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ACBEL POLYTECH INC.

Approval Sheet

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 Hardware Rev. : A00
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Contents

- 1. Specification**
- 2. Mechanical Outline Drawing**
- 3. I/O Label Drawing**
- 4. Safety**



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Specification



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R1C Series 1300W

Power Module Specification

Model Number: R1CA2132A-T Series
AcBel PN: FSL020-Series

80Plus Titanium Compliant

Note: Outward Airflow

Rev:A02

Prepared by PM	Prepared by EE	Reviewed by ME	Reviewed by FW	Approved by EE Leader
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Table of Contents

Table of Contents	2
1 Revision Log	5
2 Scope	6
2.1 Power Supply Overview	6
3 AC Input Requirements	6
3.1 Input Conditions	6
3.2 Input Fuse	7
3.3 Harmonic Current and Power Factor Correction	7
3.4 Input Connector	7
3.5 AC Line Isolation Requirements	7
3.6 AC Line Dropout / Hold up time	7
3.7 AC Line V_{SB} Hold-up time	8
3.8 Inrush Current	8
3.9 Efficiency	8
3.10 Line Disturbance	9
3.11 I_{THD}	9
3.12 Leakage Current	9
3.13 AC Line Transient, Compliant with EMC Standard	10
3.14 EMI	10
3.15 Voltage Interruptions	10
3.16 Power Recovery	11
4 DC Output Requirements	12
4.1 Output Load and Status Regulation	12
4.2 Standby Output	12
4.3 Ripple /Noise	12
4.4 Dynamic Regulation	13
4.5 Audible Noise	13
4.6 Immune Voltage	13
4.7 Capacitive Loading	14
4.8 Turn on/off Overshoot & Undershoot	14
4.9 Grounding	14
4.10 No Load Condition	14
4.11 Close Loop Stability	14
4.12 Remote Sense	15
4.13 Common Mode Noise	15
4.14 Hot Swap Requirement	15
4.15 Output Isolation	15
4.16 Soft Starting	15
4.17 Force Load Share	15
4.18 Load Share Signal Characteristics	16
4.19 DC Connector and Pin Assignment	16
4.20 Handle Retention	17
4.21 LED Identification	17



5	Protection Requirements	18
5.1	Primary Protection	18
5.2	Secondary Protection	18
5.2.1	Current Limit & Power Protection (OCP & OPP)	18
5.2.2	Over and Under Voltage Protection	19
5.2.3	Short Circuit Protection	19
5.2.4	Reset after Shutdown.....	19
5.2.5	Over Temperature Protection.....	19
6	Signal Requirement	20
6.1	PSO ^N	21
6.2	Power Good (PWOK or P_GOOD)	22
6.3	PRESEN ^T	22
6.4	Load Share Signal.....	23
6.5	Sharing Accuracy	23
6.6	SMBAlert [#]	24
6.7	Address_A0 / A1.....	24
6.8	PMBus CLOCK_SCL & DATA_SDA.....	25
6.9	REMOTE SENSE + / REMOTE SENSE –	25
6.10	Smart Redundant Bus, CR [#]	25
6.11	VIN_GOOD	25
6.12	Standby Turn-off.....	26
6.13	LED indicators.....	26
6.14	Timing.....	26
7	Additional Requirements	28
7.1	Fan Speed Control	28
7.2	OTP	28
7.3	FAN FAIL	28
8	PMBus.....	29
8.1	PMBus requirement.....	29
8.1.1	Accuracy for V _{IN} , I _{IN} , P _{IN} , 12.2V _{OUT} , I _{OUT} , P _{OUT}	29
8.1.2	Smart Redundancy	29
8.1.3	Black Box.....	29
8.1.4	System on-Line Boot loader	29
9	Environmental Requirements	30
9.1	Temperature.....	30
9.1.1	Normal Operating Ambient (At Sea Level)	30
9.1.2	Non-Operating Ambient (At Sea Level)	30
9.2	Humidity.....	30
9.2.1	Operating	30
9.2.2	Non-Operating.....	30
9.3	Altitude	30
9.3.1	Operating	30
9.3.2	Non-Operating.....	30
9.4	Thermal shock (none-operating).....	30



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9.5	Vibration(Refer IPC-9592B).....	31
9.5.1	Unpackaged Operating Random Vibration	31
9.5.2	Packaged Non-Operating Random Vibration.....	32
9.6	Mechanical shock(Refer IPC-9592B).....	32
9.6.1	Sample Size	32
9.6.2	Test Method.....	32
9.6.3	Pass Criteria	32
9.7	Free fall(Refer IPC-9592B)	33
9.7.1	Sample Size	33
9.7.2	Test Method.....	33
9.7.3	Pass Criteria	33
9.8	Drop.....	34
9.8.1	Test Condition	34
9.8.2	Pass Criteria	34
10	Reliability	35
10.1	Reliability	35
10.2	E-Cap. Life	35
10.3	Burn-in.....	35
10.4	Component De-rating	35
11	EMC and Safety Requirements	36
11.1	Product Safety and Compliance	36
11.2	EMI Requirement.....	36
11.3	Hi-pot.....	36
12	Mechanical Drawing.....	37
13	RoHS Compliance.....	37





2 Scope

This specification establishes the requirements for a custom “1U” form factor, 1300 Watts output, active power factor corrected, and wide-range power supply. Also, the approximate dimensions are 73.5mm (W) x 185mm (D) x 40mm (H). The power supply will be used in N+1 redundant (load share, and N=3) and must contain appropriate Oring devices on all outputs. The number of PSU would be limited to four.

2.1 Power Supply Overview

Application	Sever System	
AC Input & DC input	100-240V _{AC} , 240V _{DC}	
Power Factor Correction	Active	
Output Power	1300 Watts maximum continuous	
EMC Classification	EN61000-4-5 2KV common mode, 2KV Differential mode	
EFT	2KV meet criteria B, 1KV meet criteria A	
Outputs	12.2V Main Output (12.2V _{OUT})	12V Standby (V _{SB})
Nominal Output Voltage	12.20 V	12.00 V
Voltage Regulation	11.4V~12.8V	11.4V~12.6V
Minimum Operating Current	1 A	0 A
Maximum Operating Current	108.3 A(200V _{AC} -240V _{AC}) 83.33A(100V _{AC} -127V _{AC})	3 A

Table. 1

3 AC Input Requirements

3.1 Input Conditions

AC input Parameter	Minimum	Nominal	Maximum	Unit
Low Line V _{IN}	90	100-127	140	V _{AC, RMS}
High Line V _{IN}	180	200-240	264	V _{AC, RMS}
Frequency f _{AC}	47	50/60	63	Hz
I _{IN}			8.5A (High Line) 12A (Low Line)	A _{AC, RMS}
V _{BROWN_IN}	81	85	89	V _{AC, RMS}
V _{BROWN_OUT}	70	75	80	V _{AC, RMS}
V _{IN_OVP}	300			V _{AC, RMS}

DC input Parameter	Minimum	Nominal	Maximum	Unit
V _{IN}	180	240	300	V _{DC}
I _{IN} – nominal voltage (A)			6(240Vdc)	A _{, RMS}
V _{BROWN_IN}	171	175	179	V _{DC}
V _{BROWN_OUT}	160	165	170	V _{DC}
V _{IN_OVP}	310			V _{DC}

Table. 2



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- Note** 1: The standby output may continue to operate when input voltage below turn-off range.
2. Due to the C14 Inlet current limit, max Brown-in / Brown-Out loading should become 80% of rated load.
3. The I_{in} is specified when the V_{in} at nominal condition.
4. The AC voltage considering CF=1.1 & 1.6 should meet the turn on/off point as above. Due to many waveforms have same C.F result, so the all C.F setting in this specification is based on Chroma.

3.2 Input Fuse

A normal-fast-blow, Fuse must be placed in the single line fuse on the line/hot wire of the AC input. AC inrush does not cause the ac line fuse to blow under any condition. All protection circuits in the power supply do not cause the ac fuse to blow unless a component in the power supply has failed.

3.3 Harmonic Current and Power Factor Correction

The power supply shall incorporate universal power input with active power factor corrections, which shall reduce line harmonics in accordance with the EN61000-3-2 and JEIDA MITI standards.

The power factor lists as below:

Load	10%	20%	50%	100%
P.F. _{MIN}	0.90	0.96	0.98	0.99

Tested at 200 V_{AC} -240 V_{AC} / 50Hz & 60Hz, 115 V_{AC} / 60Hz, measurement environment shall comply with 80+ or energy star regulation, and take the worst result from one of both.

3.4 Input Connector

The AC input receptacle shall be an IEC-320 type C14 capable of at least 15A. This connector is located at the front side of power supply. There is a retainer to fix the line cord to avoid accident disconnection,

3.5 AC Line Isolation Requirements

The power supply shall meet all safety agency requirements for dielectric strength. Additionally, power supply vendor must provide Intel with written confirmation of dielectric withstand test which includes: voltage level, duration of test and identification detailing how each power supply is marked to indicate dielectric withstand test had been completed successfully. Transformers' isolation between primary and secondary windings must comply with the 3000 V_{AC} (4242 V_{DC}) dielectric strength criteria. If the working voltage between primary and secondary dictates a higher dielectric strength test voltage the highest test voltage should be used. In addition the insulation system must comply with reinforced insulation per safety standard IEC 950. Separation between the primary and secondary circuits, and primary to ground circuits, must comply with the IEC 950 spacing requirements.

3.6 AC Line Dropout / Hold up time

An AC line dropout is defined to be when the AC input drops to 0 V_{AC} at any phase of the AC line for any length of time. During an AC dropout the power supply must meet dynamic voltage regulation requirements. An AC line dropout of any duration shall not cause tripping of control signals or protection circuits. If the AC dropout lasts longer than the holdup time the power supply should recover and meet all turn on requirements. The power supply shall meet the AC dropout requirement over rated AC voltages and frequencies. A dropout of the AC line for any duration shall not cause damage to the power supply.



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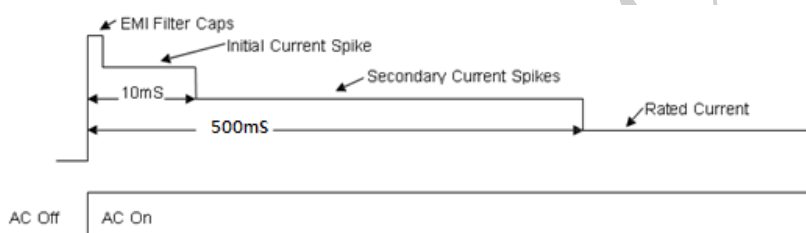
Loading during AC dropout / holdup	Holdup time / Dropout duration
0% to 100% of rated load	10 mS

3.7 AC Line V_{SB} Hold-up time

The V_{SB} output voltage should stay in regulation under its full load (static or dynamic) during an AC dropout of 70 mSec min (= V_{SB} holdup time) whether the power supply is in ON or OFF state (PSON[#] asserted or de-asserted).

3.8 Inrush Current

The power supply shall provide circuitry to limit the turn-on inrush current on any initial current surge or spike of 10ms or less will not exceed 35A peak. Any additional inrush current surges or spikes in the form of AC cycles or multiple AC cycles greater than 10ms, and less than 500ms, must not exceed 35A peak. After 1.2 Sec the AC input current must meet the requirements in section 3.1.



Notes:

1. The inrush current due to the EMI filter capacitors can be ignored.
2. All internal components (including the fuse, bulk rectifiers and surge limiting device) must be able to withstand the surge current without damage the power supply.
3. The inrush limiting circuitry shall be designed such that if the active bypass circuitry is not functional the remaining circuitry shall not cause any smoke/flame potential safety issue.
4. The inrush current must meet at cold / warm start.
5. When the output remains on during line drop out, the inrush current may exceed than 35A, the I^2T of Input current at this condition shall be less than I^2T of first inrush current.
6. For the repetitive ON/OFF inrush current performance, the minimize period is 5S ON/ 5S OFF at 35degC ambient.

3.9 Efficiency

The Power supply shall meet 80plus Titanium efficiency requirement at 230V_{AC}.

Loading Efficiency	10% of max Load	20% of max Load	50% of max Load	100% of max Load
230Vac	90%	94%	96%	91%

Note:

1. Fan loading is not included for efficiency measurements. Efficiency to be measured at 20-25°C after supply has run for 30 minutes.



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3.10 Line Disturbance

The following requirements for “Line Disturbances” should be over the complete load, temperature of the power supply unless specified otherwise.

Item	Sag	Input Voltage	Input Frequency	Performance Criteria
0 - 1/2 cycle ^{note 1}	95%	Nominal AC Voltage Ranges	50 / 60 Hz	No loss of function or performance
> 1 AC cycle	> 30%	Nominal AC voltage Ranges	50 / 60 Hz	Loss of function acceptable, self-recoverable.

Item	Surge	Input Voltage	Input Frequency	Performance Criteria
Continuous	10%	Nominal AC voltage Ranges	50 / 60Hz	No loss of function or performance
0 - 1/2 cycle ^{note 1}	30%	Mid-point of Nominal AC voltage Ranges	50 / 60Hz	No loss of function or performance

Note:

1. During 0-1/2 cycle test condition as above, the load should be set to 80% maximum (follow holdup time requirement) and minimum load.
2. The power supply may power off under these conditions, it must be capable of restarting, either automatically or under program control after the disturbance.
3. When test condition included high line to low line range, Maximum Load should be the rated current of the lower voltage range. If the output current larger than rated current of the lower voltage range, power supply may latch off due to output over current protection.

3.11 I_{THD}

This test shall be measured at 115V_{AC} @ 60 Hz, 230V_{AC} and 50 / 60 Hz

Load	>5%, <10%	>=10%, <20%	>=20%, <40%	>=40%, <50%	>=50%
Low Line	N/A	10%	8%	5%	5%
High Line	20%	15%	10%	8%	5%

3.12 Leakage Current

Maximum input leakage current at 264 V_{AC}, 50Hz, shall not exceed 0.875 mA



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3.13 AC Line Transient, Compliant with EMC Standard

Power supply shall operate within specifications under the followings conditions:

- a) Transients as defined in IEC61000-4-4, Electrical Fast Transients standard, up to 1 KV at AC line.
- b) Transients as defined in IEC61000-4-5, Electrical Surge standard. Criteria A.
Common mode 2.0 KV/ 2 Ohm
Differential mode 2.0 KV/ 2 Ohm
Note: The Power supply shall test to 2.2kV CM and 2.2kV DM for design margin.
- c) Power supply shall comply with IEC61000-4-2, Electrostatic Discharge standard, up to 8 KV with contact, 15 KV with air discharge. Criteria A.
- d) Power supply shall meet all the transient requirements for the CE mark designation.

3.14 EMI

The power supply shall comply with FCC and EN55032 (CISPR32) Class A for conducted and radiated emissions. It must comply at 100 - 120, 200 - 240VAC / 50Hz with 6dB margin as minimum.

3.15 Voltage Interruptions

The power supply shall comply with the limits defined in EN55024: 1998/A1: 2001/A2: 2003 using the IEC 61000-4-11: Second Edition: 2004-03 test standard and performance criteria C defined in Annex B of CISPR 24.

Performance criteria C, Temporary loss of function is allowed provided the function is self-recoverable or can be restored by the operation of the controls.



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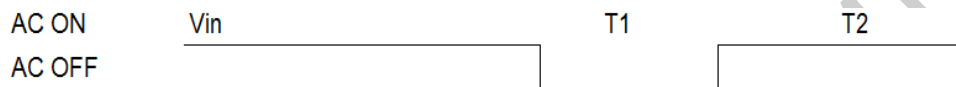
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3.16 Power Recovery

The power supply shall recover automatically after an AC power failure remove. AC power failure is defined to be any loss of AC power that exceeds the dropout criteria. (follow section 3.10)

Auto restart conditions are tested from -40% to -100% AC under voltage conditions for time intervals (T1) ranging from 25 mS to 8 Sec (Max. Load) or 36 Sec (Min. Load) as below matrix table. For each time interval, all of the under voltage conditions listed will be tested. These tests are performed at both the lowest and highest nominal operating AC voltages of the power supply, the output load setting shall consider Max. and Min. load conditions, the available AC duration (T2) on each drop cycle shall be greater than $T_{AC_ON_DELAY}$ as specified in section 6.14 .

If output load could not downgrade to Low Line operating range before AC drop to Low line, it may trigger output OCP, please refer to section 5.2.1



Note 1: T2 must be long enough

Max. or Min. Load		25ms	40ms	60ms	90ms	0.13S	0.2S	0.28S	0.4S	0.6S	0.9S	1.3S	1.65S	2S	4S	12S	24S	30S	36S
Lowest or Highest Nominal Load condition	-40%																		
	-50%																		
	-60%																		
	-70%																		
	-80%																		
	-90%																		
	-100%																		

Table. 5



4 DC Output Requirements

4.1 Output Load and Status Regulation

The following table provides a summary of specifications for each individual output. The Output voltage must meet the following table under section 3.1, section 4.1 & section 9.1 condition.

Parameter	V _{AC} Rating	Power Rating	Min Current	Max Current Rating	50 mSec Peak Current	1 mSec Peak Current	200 uSec Peak Current	Voltage Regulation
12.2V main (100-127V _{AC})	115 V _{AC}	1000 W	1 A	83.33 A	104 A	113 A	116 A	11.2V~13V
12.2V main (200-240V _{AC})	230 V _{AC}	1300 W	1 A	108.3 A	135 A	146 A	151 A	
12V _{SB} ¹	--	36 W	0 A	3 A	--	--	--	11.2V~13V

Notes:.

1. The setting of $I_{Peak} < I_{OCW} < I_{OCP}$ needs to be followed to make the CLST work reasonably.
2. Power supply must protect itself in case system doesn't take any action to reduce load based on SMBAlert[#] signal asserting.
3. The power supply shall support 200uSec peak power at 20% duty cycle step loading for an average current at the current rating. If over maximum load then may be trig OTP.
4. After Peak Current condition, load current should dwell @ full load condition about 10 Minutes before the next Peak current occurred.

4.2 Standby Output

The V_{SB} output shall be present when an AC input greater than the power supply turn on voltage is applied. There should be load sharing in the standby rail.

4.3 Ripple /Noise

The following output ripple/noise requirements will be met throughout the load ranges specified in section 4.1 and under all input voltage conditions specified in section 3.1 and temperature condition specified in section 9.1.

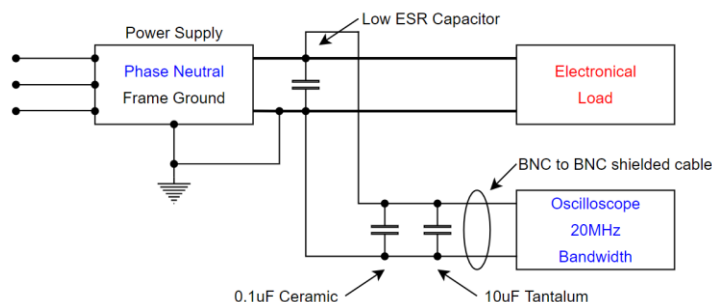
Outputs	Maximum	Capacitive Load
V _{SB}	120 mV _{PK-PK}	1000uF.
12.2V _{OUT}	120 mV _{PK-PK}	3300uF.



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Notes:

1. Output ripple & noise should be measured at the pins of the mating output connector.
2. Connect the probe with the input tip and ground as short as possible.
3. Output ripple & noise measured with only PS capacitance plus 10 uF Tantalum and 0.1uF Ceramic capacitor.
4. Ripple & noise are defined as periodic or random signals over the frequency band of 20 MHz.
5. To help reduce switching ripple further, an additional 3,300 μ F low ESR electrolytic capacitor may be placed in parallel

4.4 Dynamic Regulation

The output voltage shall remain within the limits specification in section 2.1 Voltage Regulation for the step loading and within the limit specification in below table for the capacitive loading. The load transient repetition rate shall be tested between 50 Hz and 5 kHz at duty cycles ranging from 10% - 90%.

The load transient repetition rate is only a test specification. The step load may occur anywhere within the 2A to the Max Load show in below table. During 12.2V_{OUT} output load changes from minimum to maximum or maximum to minimum, the power supply must not shutdown. The capacitor in here is defined as low ESR capacitor, the OS-CON Cap is recommended.

Outputs ¹	Step Load Size	Slew Rate	Test Capacitor load
12.2V _{OUT}	60%	2.5A/uS	2000 uF
V _{SB}	1A	2.5 A/uS	1000 uF

Note:

1. For step load 0% to 100%, slew rate 2.5A/us , should be have cap load 3300uF, 12.2Vout can meet 11.0V~13V.
2. During load transient from 0A to 100% load (or Master/Active inner short in CR Mode) with 3300uF cap, 12.2VDC output voltage no bellow 11.0V~13V.

4.5 Audible Noise

No abnormal audible noise is allowed to be generated by the power supply.

4.6 Immune Voltage

The PSU should be immune to any residual voltage placed on its outputs (typically a leakage voltage through the system from standby output) up to 500 mV. There shall be no additional heat generated, nor stressing of any internal components with this voltage applied to any individual or all outputs simultaneously. It also should not trip the protection circuits during turn on.

The residual voltage at the power supply outputs for no load condition shall not exceed 100 mV when AC voltage is applied and the PSON[#] signal is de-asserted.



4.7 Capacitive Loading

The PSU will be able to power up and operate normally with the capacitive load on system side; the power supply shall be stable and meet all requirements with the following capacitive loadings for all system applications. The capacitor in here is defined as low ESR capacitor, the OS-CON Cap is recommended, and normal AL electrical capacitor shall not be applied.

Outputs	MIN	MAX	Units
V_{SB}	10	3,100	uF
$12.2V_{OUT}$	2000	36000	uF

4.8 Turn on/off Overshoot & Undershoot

During the turn-on or turn-off stage, the output voltage including the standby output, under any of the conditions specified in section 4.1 and temperature section 9.1, capacitive loading section 4.7 will less than 10% above the nominal voltage and will settle into the regulation band within 20 mSec.

The output voltage undershoot during turn-off of any of the output, including the Standby output, under any of the condition specified in section 4.1 and temperature section 9.1, capacitive loading section 4.7 shall not exceed than 0.3V

There must be a smooth and continuous ramp of each output voltage from 10% to 95% of its final set point within the regulation band. No voltage of opposite direction will be present on any output during turn-on or turn-off stage.

4.9 Grounding

The output ground of the pins of the power supply provides the output power return path. The output connector ground pins shall be connected to the safety ground (power supply enclosure). This grounding should be well designed to ensure passing the max allowed Common Mode Noise levels.

4.10 No Load Condition

This condition shall not trip any failure circuitry shutdown or cause any permanently damaged to the power supply. Also, the power supply shall normal operate when the power supply is turn on or when the power supply is already on at no load condition.

When the power supply is subsequently loaded, it must begin to regulate and source current without fault.

4.11 Close Loop Stability

The power supply shall be unconditionally stable under all line/load/transient load condition including capacitive load. A minimum of 45 degrees phase margin and -10dB gain margin is required.

The power supply manufacturer shall provide proof of the unit's closed-loop stability with local sensing through the submission of Bode plots.

Bode Plot documentation will have Phase and Gain margin data, line and load conditions, as well as the oscillator injection level. For verification purposes the plots will have the method of test and injection points clearly documented on a current schematic. Stability plots need to be provided at both the upper and lower operating temperature limits.



4.12 Remote Sense

Differential (Single ended) remote sense is to be provided for the designated remote sense outputs. The remote sense must be able to compensate for the defined system output voltage drop over the system output resistance (after the output connector).

The remote sense lines must be protected such that if only the remote sense is connected to the load, or there is a short across the remote sense, the power supply is not damaged.

Note: Make sure the drop compensation is included in determining OV limits.

4.13 Common Mode Noise

The Common Mode Noise on any output shall not exceed 350 mV_{PK-PK} over the frequency band of 20 MHz.

1. The measurement shall be made across a 100 Ω resistor between each of DC outputs, including ground at the DC power connector and chassis ground (power subsystem enclosure).
2. The test set-up shall use a FET probe such as Tektronix model P6046 or equivalent

4.14 Hot Swap Requirement

Hot swapping a power supply is the process of inserting and extracting a power supply from an operating system. During this process, the output voltage shall remain within the regulation limits specified in section 4.1 with capacitive load specified in section 4.7. The hot swap test must be conducted when the system is operating under static, dynamic condition and zero loading condition.

The power supply should use a latching mechanism to prevent insertion and extraction of the power supply when AC power cord is inserted into the power supply.

4.15 Output Isolation

All outputs have an isolating device to isolate the power supply from the system power during a power supply failure or during a hot swap operation. This device is located in power supply. This device is an oring diode or functional equivalent.

4.16 Soft Starting

The Power Supply shall contain control circuit which provides monotonic soft start for its outputs without overstress of the AC line or any power supply components at any specified AC line or load conditions.

4.17 Force Load Share

The 12.2V_{OUT} main output will have active load sharing. The output will share within 5% at 20% - 100% load, 10% at 10 - 20% load. The failure of a power supply should not affect the load sharing or output voltages of the other supplies still operating and does not cause these outputs to go out of regulation in the system.

The power supplies must be able to load share with up to 4 power supplies in parallel and operate in a hot-swap/redundant N+1 or N+N configurations.

The V_{SB} standby output can be passive sharing. The V_{SB} of power supplies are connected together in the system, so that a failure or hot swap of a redundant power supply does not cause these outputs to go output of regulation in the system.



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4.18 Load Share Signal Characteristics

The load share signal is only for the 12.2V_{OUT} load function. The load share signal characteristics can be defined by vendor. The delay from output voltages in regulation to load share active with maximum load of one power supply and 2 power supplied in parallel is 100 mSec maximum.

Item	Description	Min	Nominal	Max
V _{SHARE} ; I _{OUT} =Max	Voltage of load share bus at specified maximum output current	7.76 V	8.0 V	8.24 V
$\Delta V_{SHARE} / \Delta I_{OUT}$; I _{OUT} > 1A	Slope of load share bus voltage with changing load		8.00 / I _{MAX} V/A	
I _{SHARE} sink; V _{SHARE} = 4.00V	Amount of current the load share bus output from each power supply sources.			0.5 mA
I _{SHARE} source V _{SHARE} = 4.00V	Amount of current the load share bus output from each power supply sinks.	4 mA		

4.19 DC Connector and Pin Assignment

Pin No.	Pin Name	Pin Type	Pin Length	Description
A1~A9 B1~B9	GND	12.2V _{OUT} main & V _{SB} Return	Long	12.2V _{OUT} main & V _{SB} Return
A10~A18 B10~B18	12.2V _{OUT}	12.2V _{OUT} main output	Standard	12.2V _{OUT} main output
A19	SDA	I / O	Short	SMBus / PMBus Data
A20	SCL	I / O	Short	SMBus / PMBus Clock
A21	PSON [#]	Input	Short	Active low; 12.2V _{OUT} main output on/off control
A22	SMBAAlert [#]	Output	Short	Active low; I ² C alert signal (interrupt)
A23	RETURN Sense	Analog Input	Standard	12.2V _{OUT} main output Remote Sense -
A24	12.2V _{OUT} Remote Sense	Analog Input	Standard	12.2V _{OUT} main output remote sense +
A25	PWOK	Output	Standard	Active high; indicate 12.2V _{OUT} main is valid
B19	A0	Input	Standard	PMBus address 0
B20	A1	Input	Standard	PMBus address 1
B21	12V Standby V _{SB}	Aux Power	Standard	Standby voltage
B22	Smart Redundant Bus	I / O	Short	Cold Redundancy Bus ¹
B23	12.2V _{OUT} Load Share Bus	Analog Output	Standard	12.2V _{OUT} main output load current sharing
B24	Present [#]	Output	Short	Power Supply Present
B25	Vin_GOOD	Output	Standard	Indicate AC Voltage is existence and with operating range

1: Refer to the Spec. of CRPS Common Requirements specification

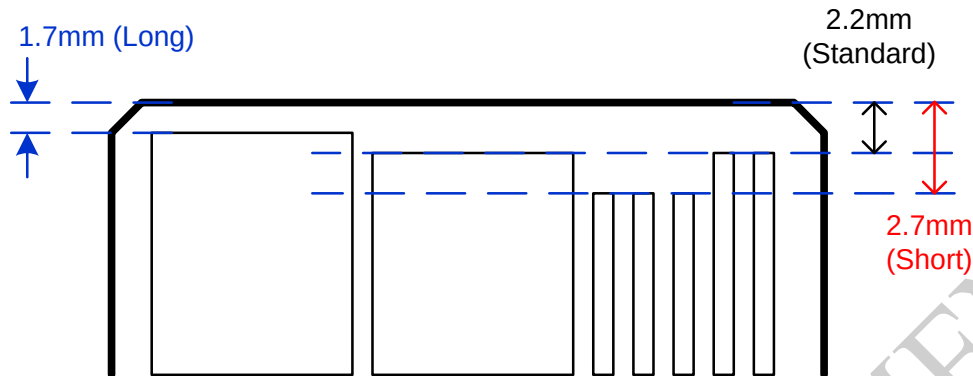


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Pin length definition is illustrated on below:



4.20 Handle Retention

The power supply shall have a handle to assist extraction. The module shall be able to be inserted and extracted without the assistance of tools. The power supply shall have a latch which retains the power supply into the system and prevents the power supply from being inserted or extracted from the system when the AC power cord is pulled into the power supply.

The handle shall protect the operator from any burn hazard and be designed plastic handle or equivalent material.

4.21 LED Identification

The power supply shall use a bi-color LED; Amber [λ : 607-613 nm] & Green [λ : 562-568 nm]. Both LEDs luminance are 300~1100 cd/m².

5 Protection Requirements

5.1 Primary Protection

The supply must have internal primary over current protection. A normal blow (fast blow), high-breaking-capacity fuse must be placed in the line side of the input circuit. This fuse is not to be considered replaceable for purposes of determining power supply reliability and life as specified in Section 10.1.

If any component on the line side of the fuse is shorted or opened, it shall not cause a fire or any other safety risk.

Note: PFC OVP is re-try mode *3 time + latch mode finally if PFC OV failure continuously. Based on robust design, PSU will auto-recover when Vin is greater than 2 seconds of Brown-in condition and OVP status clearly.

5.2 Secondary Protection

5.2.1 Current Limit & Power Protection (OCP & OPP)

The power supply shall have current limit to prevent the outputs from exceeding the values shown in table below. If the current limits are exceeded the power supply shall shutdown and latch off. The latch will be cleared by either an AC power interruption or toggle PSON[#] signal. The power supply shall not be damaged from repeated power cycling in this condition. The power supply shall support Over Power Protection (OPP) level low enough to protect the power supply running in this mode for repeated 100 μ S durations at a 1% duty cycle. +12V_{SB} will be auto-recovered after removing OCP limit.

Outputs	Status	Unit		Trip timing min		SMBAlert Mode
		Min.	Max.	SMBAlert	OC fault	
+12VSB	OCP (shutdown, hiccup)	3.5 A	5 A		100ms	1. SMBAlert[#] will be asserted within asserting time. Afterward, SMBAlert[#] is latched for 100ms and will be reset by PSU itself. 2. If power shut down, SMBAlert[#] will keep latching until AC power cycle on/off or PS_ON cycle on/off or reset by operation command.
+12.2Vout (High line)	OC Warning1 (SMBAlert [#])	114A	124 A	10S		
	OCP1 (shutdown, latch)	124 A	135 A	50mS	60mS	
	OCP2 (shutdown, latch)	135 A	146 A	1mS	2mS	
	OPP (shutdown, latch)	146 A	151A	200uS	400uS	
	SCP (shutdown, latch)	151 A		Immediately shutdown		
+12.2Vout (Low line)	OC Warning1 (SMBAlert [#])	89 A	95 A	10S		
	OCP1 (shutdown, latch)	95 A	104 A	50mS	60mS	
	OCP2 (shutdown, latch)	104 A	113 A	1mS	2mS	
	OPP (shutdown, latch)	113 A	116A	200uS	400uS	



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	SCP (shutdown, latch)	116 A		Immediately shutdown	
--	--------------------------	-------	--	-------------------------	--

Note: Power supply may shutdown in OC Warning1 status if OTP or I_{IN} OCP occurred.

5.2.2 Over and Under Voltage Protection

Outputs	Under Voltage		Over Voltage		Unit
	Minimum	Maximum	Minimum	Maximum	
V_{SB}	10	11	13.5	14.5	V
$12.2V_{OUT}$	10	11	13.5	14.5	V

Notes:

1. The above OV/UV test will be satisfied throughout AC input in section 3.1 and the entire operating temperature range in section 9.1
2. Standby output shall not latch off due to an under/over voltage condition.
3. A fault on any output other than Standby will not cause the Standby to turn off. Also, that fault on Standby will cause the other outputs to turn off but not latch off.
4. The power supply will provide latch mode except for Standby output.

5.2.3 Short Circuit Protection

A short circuit is considered to be resistance of 50mohms or less, applied to any output during start-up or while running will not cause any damage to the power supply (connectors, components, PCB traces, etc.). The power supply shuts down and latches off for short on main outputs but recovers upon PS_ON assertion or AC toggle

When the Standby output V_{SB} is shorted the output may go into "hiccup mode", and all outputs shuts down upon a short circuit of the V_{SB} . When the short is removed on V_{SB} , the power supply shall recover automatically.

5.2.4 Reset after Shutdown

If the power supply latches into a shutdown state due to a fault condition on any output, the power supply will return to normal operation only after the fault has been removed and the power supply has been AC Input- cycled or toggled PS_ON#. The PSU cannot be reset until the OTP and fan fault recovery level released. Both methods of resetting the power supply shall be designed into the supply so that the user may choose which method to use.

Reset can be accomplished in one of two ways as below:

- a) Removing AC input power, waiting for Standby output to drop below 1.0V, then reapplying AC power. The time it takes for Standby output to drop below 1.0V shall not exceed 15 seconds.
- b) Cycling the state of PS_ON# from on to off to on. The minimum cycle time will be 100 mSec.

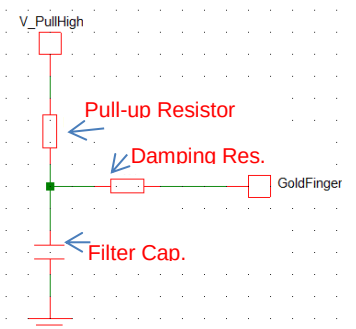
5.2.5 Over Temperature Protection

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an OTP condition the PSU will shut down. When the power supply temperature drops to within specified limits, the power supply shall restore power automatically.

The OTP circuit must have built in hysteresis such that the power supply will not oscillate on and off due to temperature recovering condition. The OTP trip level shall have a minimum of 5 °C of ambient temperature hysteresis.

6 Signal Requirement

This requirement shall be met throughout the load regulation condition specified in section 4.1, under all input voltage condition specified in section 3.1 and temperature condition specified in section 9.1.



Pin	Pin Name	Pin Type (I/O/A)	Pull-up location	Pull-up Res. on system (Ω)	Pull-up Res. On PSU (Ω)	Filter Cap. Pin to GND	Damping Resistance (Ω)	Pull-up Vol. (V)
A19	SDA	I / O	P	--	10k	10pF	20	3.3
A20	SCL	I / O	P	--	10k	10pF	20	3.3
A21	PSON [#]	I	P	--	10k	N.A	N.A	3.3
A22	SMBAlert [#]	O	P/S	10k	10k	N.A	N.A	3.3
A25	PWOK	O	P	--	34	N.A	N.A	3.3
B19	A0	I	P	--	10k	N.A	N.A	3.3
B20	A1	I	P	--	10k	N.A	N.A	3.3
B22	Smart Redundant Bus	I / O	P	--	--	--	--	3.3
B23	12.2V _{OUT} Load Share Bus	A	--	--	N.A	N.A	N.A	N.A
B24	Present [#]	O	P	--	N.A	N.A	0	GND
B25	VIN_GOOD	O	P	--	1k	N.A	0	3.3

A: Analog, O: Output, I: Input, P: PSU, S: System.



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6.1 PSON[#]

The PSON[#] signal is required to remotely turn on/off the power supply. PSON[#] is an active low signal that turn on the main power rails. When this signal is not pulled low by the system, or left open, the outputs turn off.

The power supply shall provide an internal pull-up to high. The power supply shall also provide de-bounce circuitry on PSON[#] to prevent it from oscillating On/Off at startup when activated by mechanical switch.

Provisions for de-bouncing will be included in the PSON[#] circuitry to prevent the power supply from oscillating on/off at startup.

Signal type	Accepts an open collector/drain input from the system Pull-up to internal 3.3V located in power supply	
PSON [#] =Low	PSU ON	
PSON [#] = Open or High	PSU OFF	
	MIN	MAX
Logic level low (PSU ON)	0 V	1 V
Logic level high (PSU OFF)	2.0 V	3.46 V
Source current, V _{PSON} = low		4 mA
Power up delay: T _{PSON_ON_DELAY}	5 mSec	400 mSec
Power off delay: T _{PSON_PWOK}		5 mSec
PSON [#] rise and fall time		100uSec

PSON[#] signal should be logic level low (PSU ON) when the voltage between 0V ~ 1V, and become logic level high (PSU OFF) when the voltage between 2.0V ~ 3.46V. So the signal may become logic level low when the voltage little larger than 1V, and become logic level high when the voltage little smaller than 2.0V.



6.4 Load Share Signal

This input / output will allow two or more power supplies to share output current between them.

If one of the supplies fails the remaining supplies must pick up the entire load without any of the outputs dropping out of regulation. A defective supply that is connected to the output voltage bus will not have adverse effect on the operation of the remaining function supplies.

12.2V Total Load (12VSB no load)	Number of supplies	V _{LS} (V) Minimum	V _{LS} (V) Nominal	V _{LS} (V) Maximum
100%	2	3.8	4	4.2
50%	2	1.8	2	2.2
20%	2	0.64	0.8	0.96
100%	1	7.76	8	8.24
50%	1	3.8	4	4.2
20%	1	1.4	1.6	1.8
0%	1	0	0	0.3

6.5 Sharing Accuracy

12.2V_{OUT} output should share load tolerance the average output current from full load to half load.

12.2V Total Load (12VSB no load)	Sharing Accuracy
20 - 100%	±5%
10 - 20%	±10%

Note:

- Sharing accuracy is not measured under transient conditions, but under transient conditions a false over current fault must not occur.
- Current sharing is not required power on of the outputs until the PWOK signal is asserted. (All outputs are valid)



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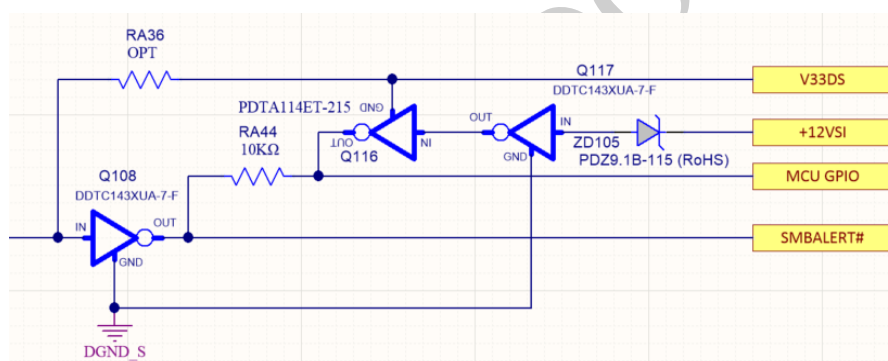
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6.6 SMBAlert[#]

This signal indicates that the power supply is experiencing a problem that the user should investigate. This shall be asserted due to Critical events or Warning events. The signal shall activate in the case of critical component temperature reached a warning threshold, over-current. This signal may also indicate the power supply is reaching its end of life or is operating in an environment exceeding the specified limits.

Signal type	Open collector / drain output from power supply. Pull-up to 3.3 V located in system	
SMBAlert = High	OK	
SMBAlert = low	Power Alert to system	
	Minimum	Maximum
Logical Level Low, $I_{SINK} = 4 \text{ mA}$	0 V	0.4 V
Logical Level High, $I_{SINK} = 50 \text{ uA}$	2.0 V	3.46 V
Sink current, Alert [#] = low		4 mA
Sink current, Alert [#] = high		50 uA
Alert [#] fall time		10 uSec



SMBAlert[#] Circuit

6.7 Address_A0 / A1

This signal is defined by end user system for PMBus communication, to allocate address of power supply unit in particular slot location.

This signal has an internal resistor to internal 3.3 V located in power supply.

Signal type	10kohm Pull-up to internal 3.3 V located in power supply	
Address_A0/A1 = high	Address 1	
Address_A0/A1 = low	Address 0	
	Minimum	Maximum
Logical Level Low	0 V	0.8 V
Logical Level High	2.00 V	3.46 V



6.8 PMBus CLOCK_SCL & DATA_SDA

SCL is the SMBus clock input to the supply,

SDA is the bi-directional SMBus data path to /from the supply.

Both have a pull-up resistors to 3.3 V internal located in power supply. The pull-up must be diode isolated to prevent an unpowered/ faulted supply from loading the signal. It must be designed to not glitch bus during hot plug and unplugging.

The main pull-up resistors are provided by the system and may be connected to 3.3V.

The PMBus operation frequency is 100 kHz.

It shall conform to SMBus V2.0 signaling protocol standards. And this specification is based on the PMBus specification parts I and II, revision 1.2.

Note:

All I²C devices will be powered from the outside of the standby Oring-device. This will allow the status to be read from a supply that is not powered on, or has some other fault.

Some types of protection must be provided so a fault within the supply does not take down the bus.

6.9 REMOTE SENSE + / REMOTE SENSE -

These signals are analog Input / Output 12.2V_{OUT} Main Voltage Sense. Both are analog input / output voltage sense lines to compensate for power path voltage drop. These low level analog signals should be isolated from digital circuit noise.

The remote sense lines must be protected such that if only the remote sense is connected to the load, or there is a short across the remote sense, the power supply is not damaged.

The Power Supply must be able to compensate for up to 200mV of IR drop measured between the Power Supply connector output and the point of load where the remote sense lines are connected.

6.10 Smart Redundant Bus, CR[#]

This signal should be connected together at system board for smart redundant function. Please refer to the PMBus specification for detail.

6.11 VIN_GOOD

This signal is an output to indicate AC power is existence and is within operation range. It should act from high to low level within 2 mS only for Vin drops out to zero and input voltage brown-out events.

Signal type	Pull-up 1k ohm to internal 3.3 V located in power supply	
VIN_GOOD = High	Input voltage is in operating range	
VIN_GOOD = low	Input voltage is out of operating range	
	Minimum	Maximum
Logical Level Low, I _{SINK} = 4 mA	0 V	0.4 V
Logical Level High, I _{SOURCE} = 50 uA	2.0 V	3.46 V
Sink current, VIN_GOOD = low		1 mA
Source current, VIN_GOOD = high		0.3mA
VIN_GOOD rise and fall time		400 uSec



6.12 Standby Turn-off

Following removal of AC power, the Standby output will remain at its steady state value until such time as it begins to decrease in voltage. The decrease will be monotonic in nature dropping to 0.5 V or less. There will be no other perturbations of this voltage at, or following, removal of AC power.

6.13 LED indicators

The power supply may have a single Bi-color (Green-Amber) Configuration.

Power Supply Condition	LED State
Output ON and OK	GREEN
No AC power to all power supplies.	OFF
AC present / Only VSB on (PS off) or PS in Smart redundant state / Off line mode	1 Hz Blink GREEN
AC cord unplugged or AC power lost; with a second power supply in parallel still with AC input power.	AMBER
Power supply warning events where the power supply continues to operate; high temp, high power, high current, slow fan, UV. (include standby mode)	1 Hz Blink Amber
Power supply critical event causing a shutdown; failure, OCP, OVP, Fan Fail (include standby mode)	AMBER
Power supply FW updating	2 Hz Blink GREEN

6.14 Timing

These are the timing requirements for the power supply operation. All outputs must rise monotonically. Table below shows the timing requirements for the power supply being turned on and off via the AC input, with PS_{ON}[#] held low and the PS_{ON}[#] signal, with the AC input applied.

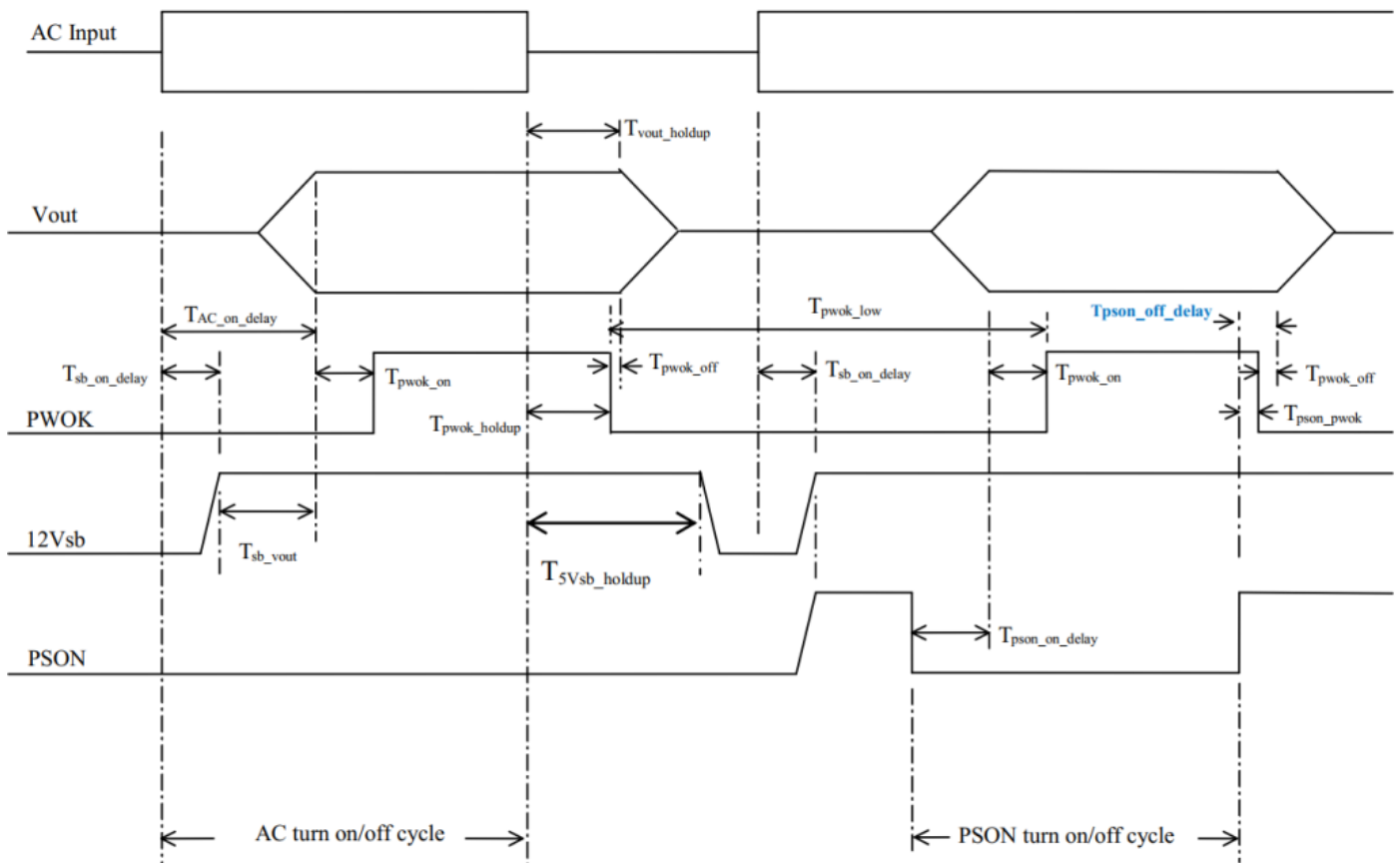
TEM	DESCRIPTION	MIN	MAX	UNITS
T _{VSB_RISE}	Standby voltage rise time for V _{SB}	1	25	mSec
T _{12VOUT_RISE}	Output voltage rise time for 12.2V _{OUT}	1	70	mSec
T _{VSB_ON_DELAY}	Delay from AC being applied to 12V _{SB} being within regulation.	--	1500	mSec
T _{AC_ON_DELAY}	Delay from AC being applied to 12.2V _{OUT} output voltage being within regulation.	--	3000	mSec
T _{12VOUT_HOLDUP}	Time 12.2V _{OUT} output voltage stay within regulation after loss of AC with specified load on section 3.6.	11	--	mSec
T _{PWOK_HOLDUP}	Delay from loss of AC to de-assertion of PWOK with specified load on section 3.6.	10	--	mSec
T _{PSON_ON_DELAY}	Delay from PS _{ON} [#] active to output voltages within regulation limits.	5	400	mSec
T _{PSON_PWOK}	Delay from PS _{ON} [#] deactivate to PWOK being de-asserted.	--	5	mSec
T _{PWOK_ON}	Delay from output voltages within regulation limits to PWOK asserted at turn on.	100	500	mSec
T _{PWOK_OFF}	Delay from PWOK de-asserted to output voltages dropping out of regulation limits.	1	--	mSec
T _{PWOK_LOW}	Duration of PWOK being in the de-asserted state during an off/on cycle using AC or the PS _{ON} [#] signal.	100	--	mSec
T _{VSB_12VOUT}	Delay from V _{SB} being in regulation to 12.2V _{OUT} output voltage being in regulation at AC turn on.	50	1000	mSec
T _{VSB_HOLDUP}	Time the V _{SB} standby voltage stays within regulation after loss of AC.	70	--	mSec
T _{12off to 12VSB off}	Time 12VSB stay within regulation after 12.2V turn off(out regulation)	5	--	mSec



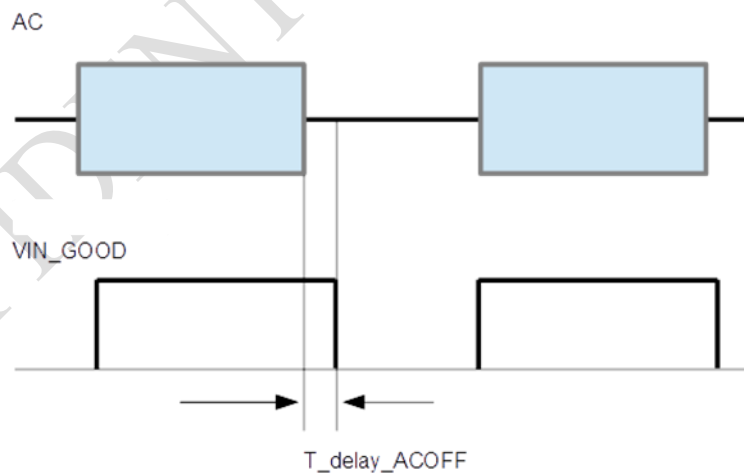
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The VIN_GOOD signals shall be active in 2 mSec after AC drop output to zero is happened.



7 Additional Requirements

7.1 Fan Speed Control

The power supply shall incorporate a 40 x28 mm fan for cooling the power supply when installed in the system. The airflow direction shall be from the card edge connector side to the AC inlet side of the power supply. The Fan speed control must have close loop algorithm based on both the critical component temperature and the ambient temperature (Inlet temperature). Thus ensure the PSU Fan will always ramp to maximum speed under any condition to protect the power supply from overheating. These conditions include high ambient temperatures; loading, AC input, and airflow impedance.

Anti-reverse fan is needed. PSU Fan can get back to normal from 6000 rpm reverse rotating condition, w/o event log occurred.



7.2 OTP

The power supply shall incorporate a thermal shutdown feature that turns off all outputs (except Standby output) When an over temperature condition occurs, the power supply will not be damaged and will automatically restart when the over temp condition no longer exists. Hysteresis shall be employed to prevent a frequent toggling on and off of the outputs.

The location of the OTP sensor should be on the component(s) most likely to overheat in the event of an abnormal ambient temperature or a blockage of airflow.

In normal operation the OTP cannot activate when the power supply is operated in any of the specified operating conditions of sections 3.1, 4.1, and 9.1.

The OTP must be driven low before or at the same time that PWOK is driven low. PWOK must be low for at least 1mSec before the main outputs go out of regulation.

7.3 FAN FAIL

The fan(s) are running or the supply is in Standby mode, If there is a fan fault per section 6.12, the PSU is off and the PWOK must be low for at least 1mS before the main outputs go out of regulation,

FAN FAIL on 12.2V rail will be latched and is reset per section 5.2.4 when fan fault event is removed and the frequency of Fan TACH signal reaches back the setting point accordingly to load.

The PSU should not damage when the airflow is block, but it's can be trigger OTP.



8 PMBus

8.1 PMBus requirement

PMBus spec, follow Acbel CRPS PMBus spec.

Note1: The TI microcontroller also occupies reserved slave address 0xFE(reserved for for Vendor use). Systems shall avoid communication via this address.

8.1.1 Accuracy for V_{IN} , I_{IN} , P_{IN} , $12.2V_{OUT}$, I_{OUT} , P_{OUT}

Required Accuracy

	0-5% load	5-10% load	>10% - 20% Load	> 20% - 100% Load
P_{IN} / E_{IN}	$\pm 10W$ or $\pm 10\%$ whichever is greater when $P_{in} \leq 10W$, report 10W	$\pm 5\%$ or $\pm 5W$ whichever is greater	$\pm 5\%$	$\pm 2\%$
V_{IN}	$\pm 5\%$	$\pm 5\%$	$\pm 5\%$	$\pm 2\%$
I_{IN}	$\pm 0.2A$ or $\pm 10\%$ whichever is greater when $I_{in} < 0.2A$, report 0.2A	$\pm 0.2A$ or $\pm 10\%$ whichever is greater	$\pm 5\%$	$\pm 2\%$
FAN	Speed <25000 rpm, accuracy $\pm 500rpm$; Speed >25000 rpm, accuracy $\pm 5\%$			
$12.2V_{OUT}$	$\pm 5\%$	$\pm 5\%$	$\pm 2\%$	$\pm 2\%$
I_{OUT}	$\pm 1A$ or $\pm 10\%$ whichever is greater when $I_{out} < 1A$, report 1A	$\pm 1A$ or $\pm 10\%$ whichever is greater	$\pm 5\%$	$\pm 2\%$
P_{OUT}	$\pm 10W$ or $\pm 10\%$ whichever is greater when $P_{out} \leq 7W$, report 7W	$\pm 5W$ or $\pm 5\%$ whichever is greater	$\pm 5\%$	$\pm 2\%$
Temperature	$\pm 3^{\circ}C$			

Note:

- 1: Accuracy should meet 115Vac/230Vac.at 60Hz
- 2: The accuracy of AMB temperature is defined as the temperature around the temperature sensor inside of PSU, thereby this accuracy performance shall measure the closest point on the inlet chassis to internal temperature sensor

8.1.2 Smart Redundancy

This signal should be connected together at system board for smart redundant function. Please refer to the PMBus specification for detail

8.1.3 Black Box

The power supply shall save the latest PMBus data and other pertinent data into nonvolatile memory when a critical event shuts down the power supply. This data shall be accessible via the SMBus interface with an external source providing power to the V_{SB} output.

8.1.4 System on-Line Boot loader

The power supply shall have the capability to update its firmware via the PMBus interface while it is in standby mode. This FW can be updated when in the system and in standby mode and outside the system with power applied to the V_{SB} pins.

PSU signals output shall keep normal during FW updating and PSU re-boot.



9 Environmental Requirements

9.1 Temperature

9.1.1 Normal Operating Ambient (At Sea Level)

Minimum: - 5 °C

Maximum: + 55 °C,.

The system side shall provide at least 10 CFM to PSU when the PSU Fan runs at full speed condition.

Ambient	55 deg C
Low Line (W)	1000
High Line (W)	1300
Typ. OTW (C)	60
Typ. OTP (C)	67

9.1.2 Non-Operating Ambient (At Sea Level)

Minimum: - 40 °C

Maximum: + 70 °C

Maximum rate of change is 20 °C /hr.

9.2 Humidity

9.2.1 Operating

Up to 85% relative humidity. (Non-Condensing)

9.2.2 Non-Operating

Up to 95% relative humidity. (Non-Condensing)

9.3 Altitude

9.3.1 Operating

- 50 to 10,000 feet (3,048 meters). 5,000 meter is preferred.

NOTE:

1. The system ambient supports 55 °C at 950 m (3,000 feet) Altitude.

2. Maximum operating temperature is de-rated 1 °C per 125 m above 950 m. If over this condition then may be trig OTP

9.3.2 Non-Operating

-50 to 50,000 feet (15,240 meters)

9.4 Thermal shock (none-operating)

Non-operating: -40 °C to +70 °C, 50 cycles, 30 °C/min. ≥ transition time ≥ 15 °C/min., duration of exposure to temperature extremes for each half cycle shall be 30 minutes.



9.5 Vibration(Refer IPC-9592B)

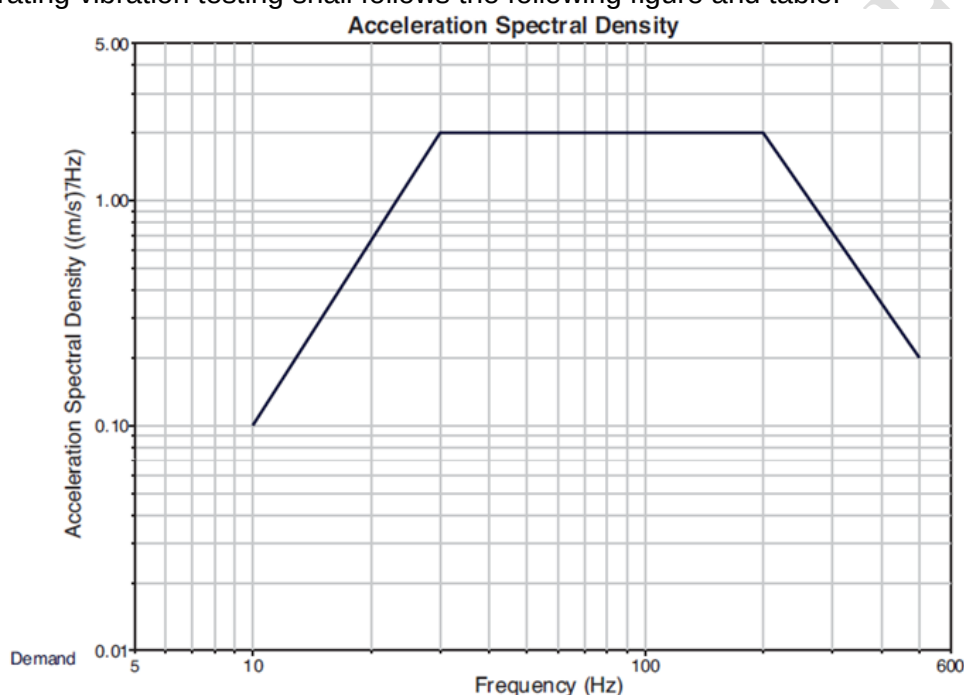
9.5.1 Unpackaged Operating Random Vibration

9.5.1.1 Sample Size

For all product classes and categories, the minimum number of samples **shall** be 3 devices.

9.5.1.2 Test Method

Each device **shall** be tested in three axes for a minimum of 30 minutes per axis. The device **shall** be powered for the duration of the test at nominal input voltage and no load. For operating vibration testing shall follows the following figure and table.



Hz	(m/s²)²/Hz	G²/Hz
10	0.1	0.00046
30	2	0.0052
200	2	0.0052
500	0.2	0.0001
Grms = 2.40		

9.5.1.3 Pass Criteria

Each power and signal output of each unit under test **shall** be monitored continuously during the test. Sampling at greater than 1 millisecond periods is not permitted.

The units under test **shall** operate within specification during the entire test.



9.5.2 Packaged Non-Operating Random Vibration

9.5.2.1 Sample Size

For all product categories and product classes, the minimum number of samples **shall** be 3 devices packaged in their fully populated, bulk shipping package or individual packages of product.

9.5.2.2 Test Method

The products are in the shipping packaging for this test. For non-operating vibration testing, see the following figure and table. Each shipping package **shall** be tested in three axes for a minimum of 30 minutes per axis.

Hz	$(m/s^2)^2/Hz$	G^2/Hz
5	5	0.052
200	5	0.052
500	0.3	0.003
Grms = 3.80		

9.5.2.3 Pass Criteria

At the conclusion of all three axes of testing, the products **shall** be unpackaged and visually inspected for any signs of damage. Only minor cosmetic damage that does not affect form, fit or function is allowed. Bent connector pins, damaged switches, damaged handles, labels with impaired readability, or bent or deformed sheet metal are not allowed.

All units **shall** also pass a functional test.

There are no requirements on the condition of the shipping package.

9.6 Mechanical shock(Refer IPC-9592B)

9.6.1 Sample Size

For all product types and product classes, the minimum number of samples **shall** be 3 devices.

9.6.2 Test Method

Each tested device **shall** be exposed to three shocks in each of three axes. The amplitude of each shock shall be no less than 30 g with a half sine wave shape and duration of 11millisecond.

9.6.3 Pass Criteria

Each power and signal output of each unit under test **shall** be monitored continuously during the test. Sampling at greater than 1 millisecond periods is not permitted.

The units under test **shall** operate within specification during the entire test.



9.7 Free fall(Refer IPC-9592B)

9.7.1 Sample Size

For all product types and product classes, the minimum number of samples **shall** be 3 devices.

9.7.2 Test Method

Devices **shall** be held with the side that normally faces down, facing down, before being allowed to fall.

The height of the fall varies with the weight of the device, as shown in the following table.

Device Weight (gms)	Fall Height (mm)
0 – 10.0	1000
10.1 – 20.0	500
20.1 – 50.0	250
50.1 – 100.0	100
100.1 – 200	50
>200	25

9.7.3 Pass Criteria

At the conclusion of free fall testing, the device **shall** be visually inspected for any signs of damage. Only minor cosmetic damage that does not affect form, fit or function is allowed. Bent connector pins, damaged switches, damaged handles, labels with impaired readability, or bent or deformed sheet metal are not allowed.

All units **shall** also pass a functional test.



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Fax : 886-2-2623-6530 • 2623-4156

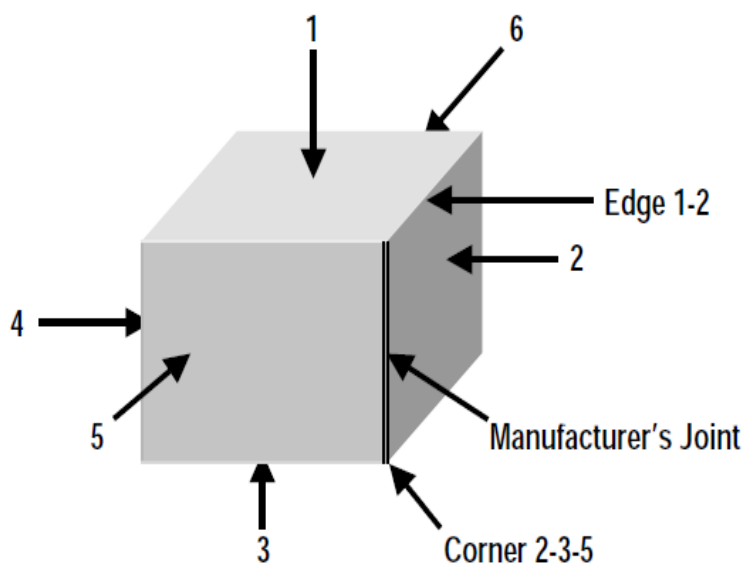
9.8 Drop

9.8.1 Test Condition

Drop test should follow ISTA-2A requirement: Drop the package at 6 surfaces; 1 corner (Weakest corner); 3 related edges to the weakest corner.

Packaged-Product Weight				Drop Height	
Equal to or greater than		But Less than		Free Fall	
lb	kg	lb	kg	In.	mm
0	0	21	10	38	970
21	10	41	19	32	810
41	19	61	28	26	660
61	28	100	45	20	510
100	45	150	68	12	310

Identify faces according to the diagram below.



9.8.2 Pass Criteria

The tested product must operate within spec after the test.
The tested product shall be no mechanical damage after the test.
The tested product must pass hi-pot test after the test

10 Reliability

10.1 Reliability

Unless otherwise specified, all section 9.0 analyses will be conducted in accordance with the parametric listed below:

The reliability requirements are based on the following product usage/application conditions.

AC Input Voltage Range	Refer to Section 3.1
DC Output Load	100% Maximum of rated output load
Temperature Range	Refer to Section 9.1
Relative Humidity	44% $\pm$ 10% Non-condensing
Altitude	Sea Level
CMTBF	250K Hours @ 100% Load and 55°C
Minimum Operating Life	5 Years @ 80% Load and 40 °C

10.2 E-Cap. Life

All used electrolytic caps must have a usefully life time which exceeds 43,800Hours at 80% load and normal input and 40°C power supply ambient temperature.

10.3 Burn-in

100% of all engineer stage units (development units) will be burned-in for 24 hours before shipment.

The Burn-In profile will be:

Ambient temperature will be (maximum temp. – 5°C) with $\pm$ 5°C ambient tolerance.

All units subjected to burn-in will be at 90~100% of rated load(s). If loading the individual outputs at 90% exceeds the power supply's output rating the loads can be decreased until the power rating of the supply is not exceeded.

Condition 1, All units subjected to burn-in will be exposed to full load condition for 12 hours under low nominal line condition.

Condition 2, All units subjected to burn-in will be exposed to full load to 5 sec power on and 5 sec power off for 1000 sec under low nominal line condition.

Condition 3, All units subjected to burn-in will be exposed to full load condition for 12 hour with ½ hour power on and off.

50% of the units subjected to burn-in will have an AC input of low nominal line condition; 50% of the units will have an AC input of high nominal line condition.

10.4 Component De-rating

The component de-rating is designed to satisfy the latest revision of Acbel component design guideline Rev A11, the document number is ELQZ-505-51 , and conditionally/partial meet IPC9592B Class I.

Note: IPC9592B is conditional/partial fulfilled. Some industry design limitation will be discussed.



11 EMC and Safety Requirements

The power supply must comply with all regulatory requirements for its intended geographical market. Depending on the chosen market, regulatory requirements may vary. Although a power supply can be designed for worldwide compliance, there may be cost factors that drive different versions of supplies for different geographically targeted markets. The power supply meets below standard, and the mark.

11.1 Product Safety and Compliance

The power supply will have the following safety approvals with most current editions:

- A) UL 62368/ CSA 62368 Edition 2/3/ FCC (USA/Canada)
- B) TUV EN62368 Edition 2/3 (Europe)
- C) CB IEC60950-1/ IEC62368 Edition 2/3 (International)
- D) CE – Low Voltage Directive 2006/95/EC (Europe)
- E) BSMI (Taiwan)
- F) CCC (China)
- G) UKCA(England)
- H) KC(Korea)
- I) BIS(India)

11.2 EMI Requirement

The power supply meet EMI standard as below, need margin 6dB

EN55032 Class A.

EN55035 Class A.

CISPR32 Class A.

FCC Class A.

11.3 Hi-pot

The power supply unit must pass a 2550 V_{DC} Residual Voltage test between primary to chassis ground. All production units must pass a 2550 Vdc Hi-Pot test between primary to chassis ground or follow safety agency requirement. The voltage must be ramped up to 2550 within 2.0S and it must be maintained at that level for a minimum of 1 sec. without failure, arc and breakdown or it must comply with safety requirement.

Test voltage	DC
Specify test voltage of Vdc	2550VDC
Current Sensitivity or Current Trip Setting	100uAdc
Ramp-Up Time	2S
Dwell time	1S
RAMP-HI	OFF
Arc fail	ON
Arc sense	5



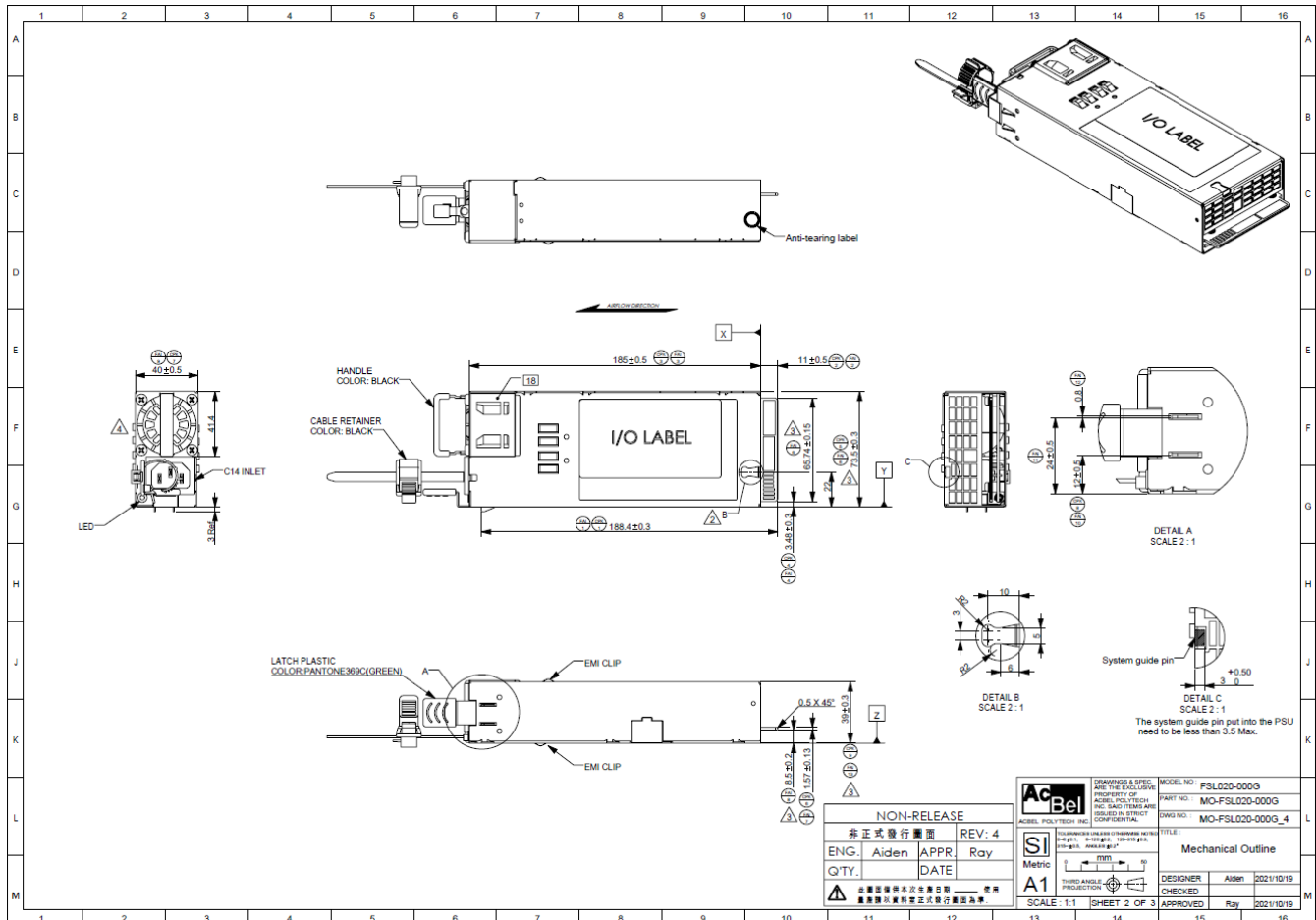
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12 Mechanical Drawing

Dimension (L x W x H): 185 x 73.5 x 40mm / 7.28 x 2.89 x 1.57inch



NOTE:

Above drawing is for reference only, detail dimension should refer to independent mechanical drawing.

13 RoHS Compliance

Products listed below that are manufactured by AcBel are in compliance with Directive 2011/65/EU, 2015/863/EU.

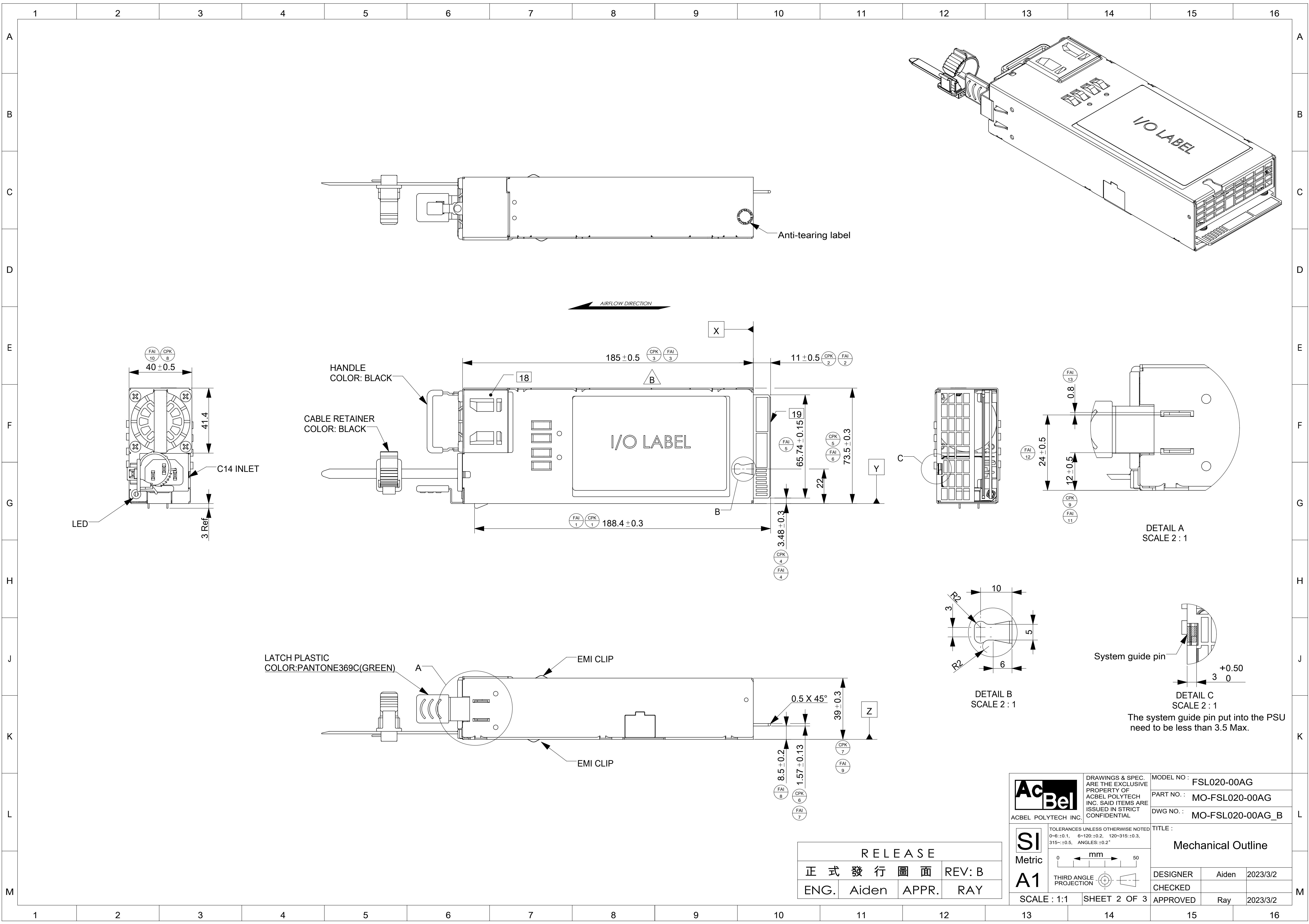


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Mechanical Outline Drawing

[illegible]



RELEASE			
正式發行圖面		REV: B	
ENG.	Aiden	APPR.	RAY

AcBel ACBEL POLYTECH INC.		DRAWINGS & SPEC. ARE THE EXCLUSIVE PROPERTY OF ACBEL POLYTECH INC. SAID ITEMS ARE ISSUED IN STRICT CONFIDENTIAL		MODEL NO : FSL020-00AG	
				PART NO. : MO-FSL020-00AG	
				DWG NO. : MO-FSL020-00AG_B	
SI Metric A1		TOLERANCES UNLESS OTHERWISE NOTED 0~6:±0.1, 6~120:±0.2, 120~315:±0.3, 315~:±0.5, ANGLES:±0.2°		TITLE : Mechanical Outline	
		0 mm 50		DESIGNER Aiden 2023/3/2	
		THIRD ANGLE PROJECTION		CHECKED	
SCALE : 1:1		SHEET 2 OF 3		APPROVED Ray 2023/3/2	

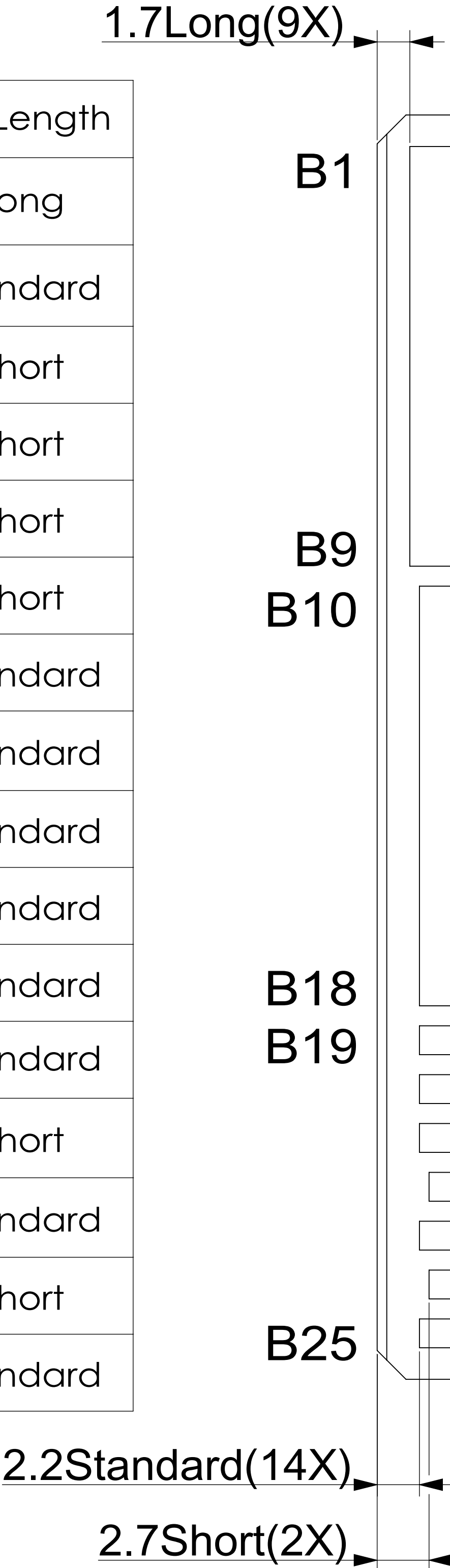
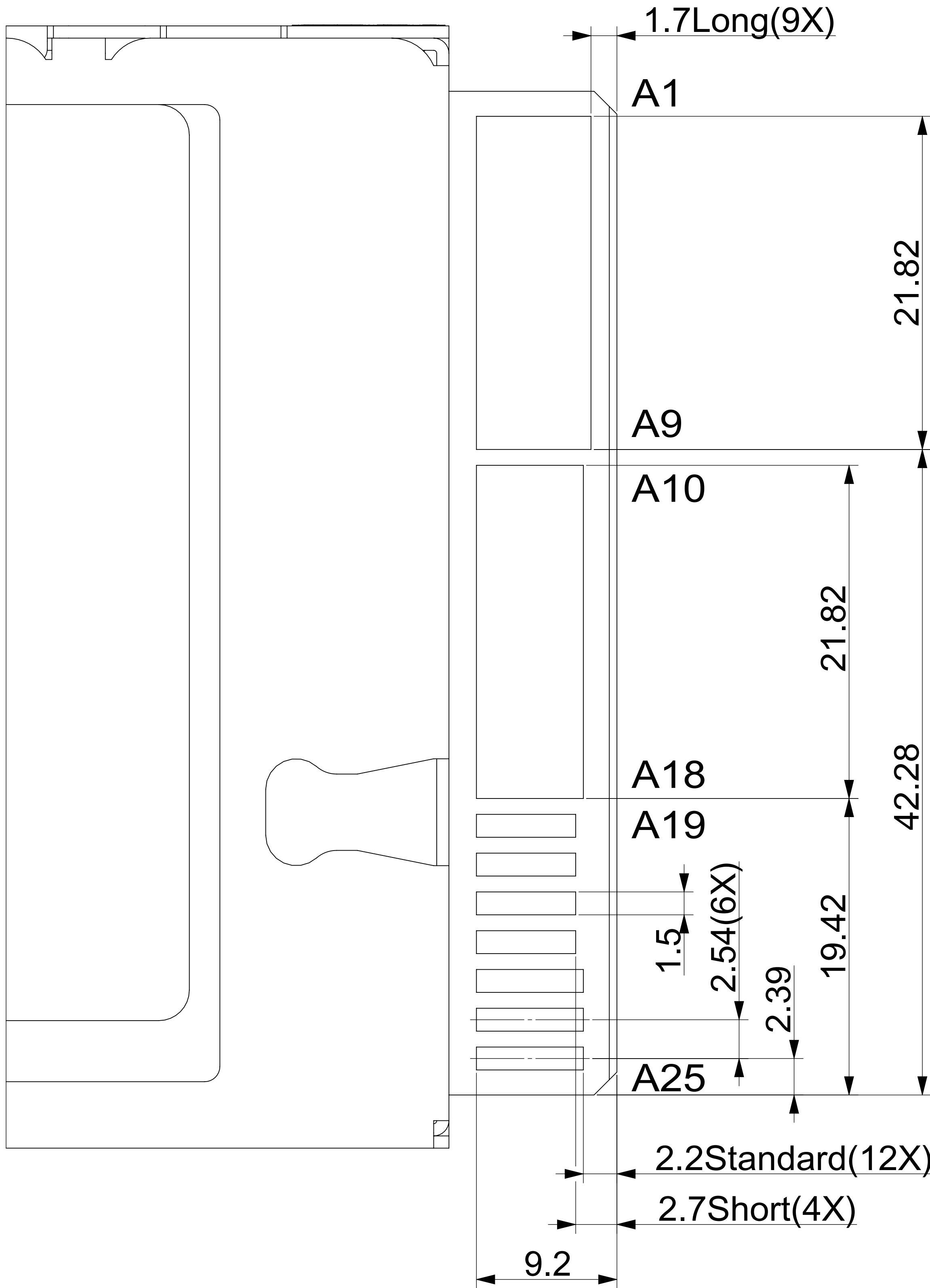
The system guide pin put into the PSU need to be less than 3.5 Max.

PIN ASSIGNMENT & PIN LENGTH DEFINITION

TOP SIDE

BOTTOM SIDE

Pin No.	Pin Name	Pin Length
A1~A9 B1~B9	GND	Long
A10~A18 B10~B18	12Vout	Standard
A19	SDA	Short
A20	SCL	Short
A21	PSON	Short
A22	SMBAlert#	Short
A23	RETURN Sense	Standard
A24	12Vout Remote Sense	Standard
A25	PWOK	Standard
B19	A0	Standard
B20	A1	Standard
B21	12V Standby Vsb	Standard
B22	Smart Redundant Bus	Short
B23	12Vout Load Share Bus	Standard
B24	Present	Short
B25	Vin_GOOD#	Standard



RELEASE			
正 式 發 行 圖 面	REV: B		
ENG.	Aiden	APPR.	RAY



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MODEL NO : FSL020-00AG

PART NO. : MO-FSL020-00AG

DWG NO. : MO-FSL020-00AG_B

SI

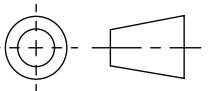
Metric

A1

TOLERANCES UNLESS OTHERWISE NOTED

0~6:±0.1, 6~120:±0.2, 120~315:±0.3,
315~:±0.5, ANGLES:±0.2°

THIRD ANGLE PROJECTION



0 mm 50

TITLE : Mechanical Outline

DESIGNER	Aiden	2023/3/2
CHECKED		
APPROVED	Ray	2023/3/2

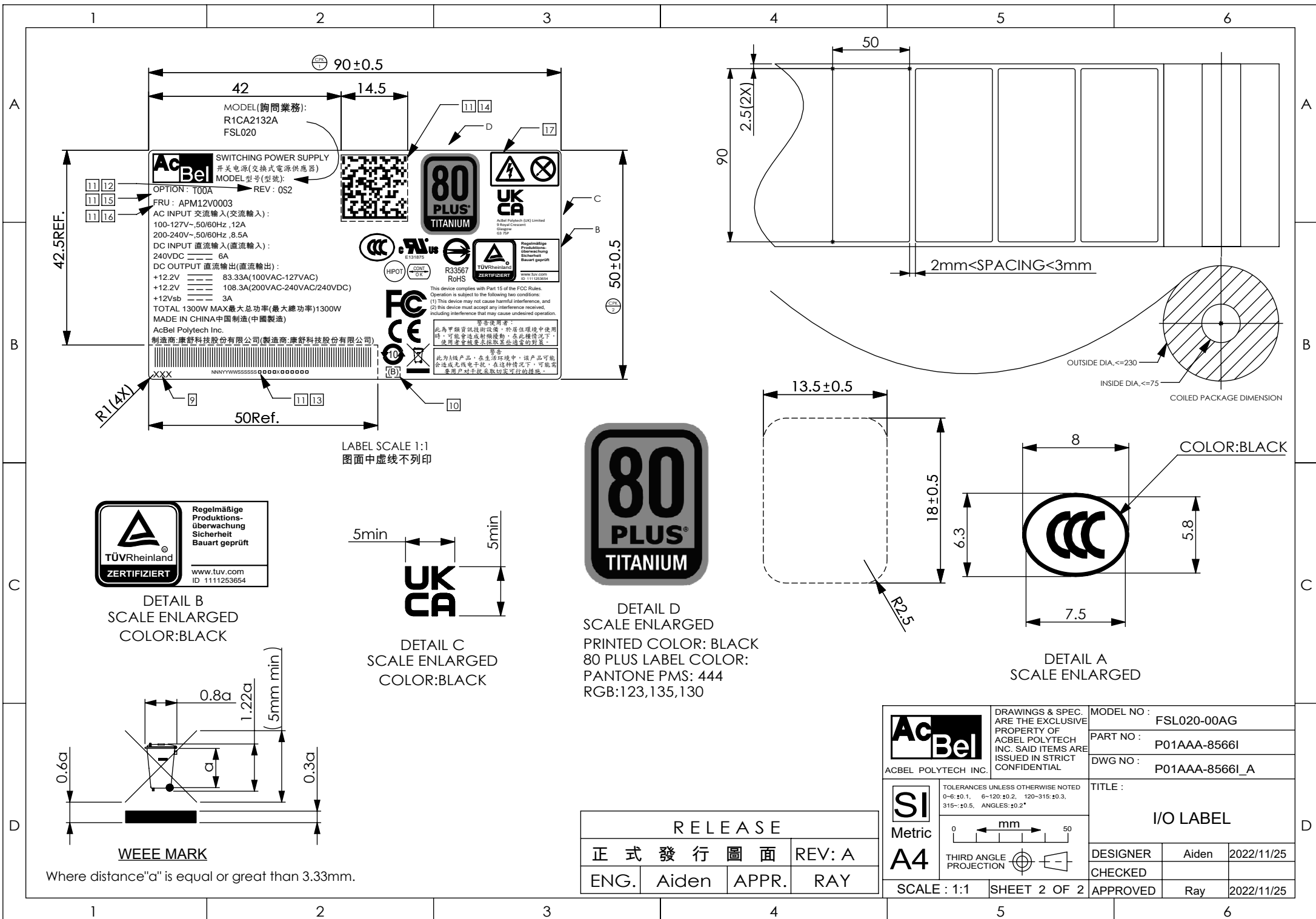
SCALE : 1:1 SHEET 3 OF 3

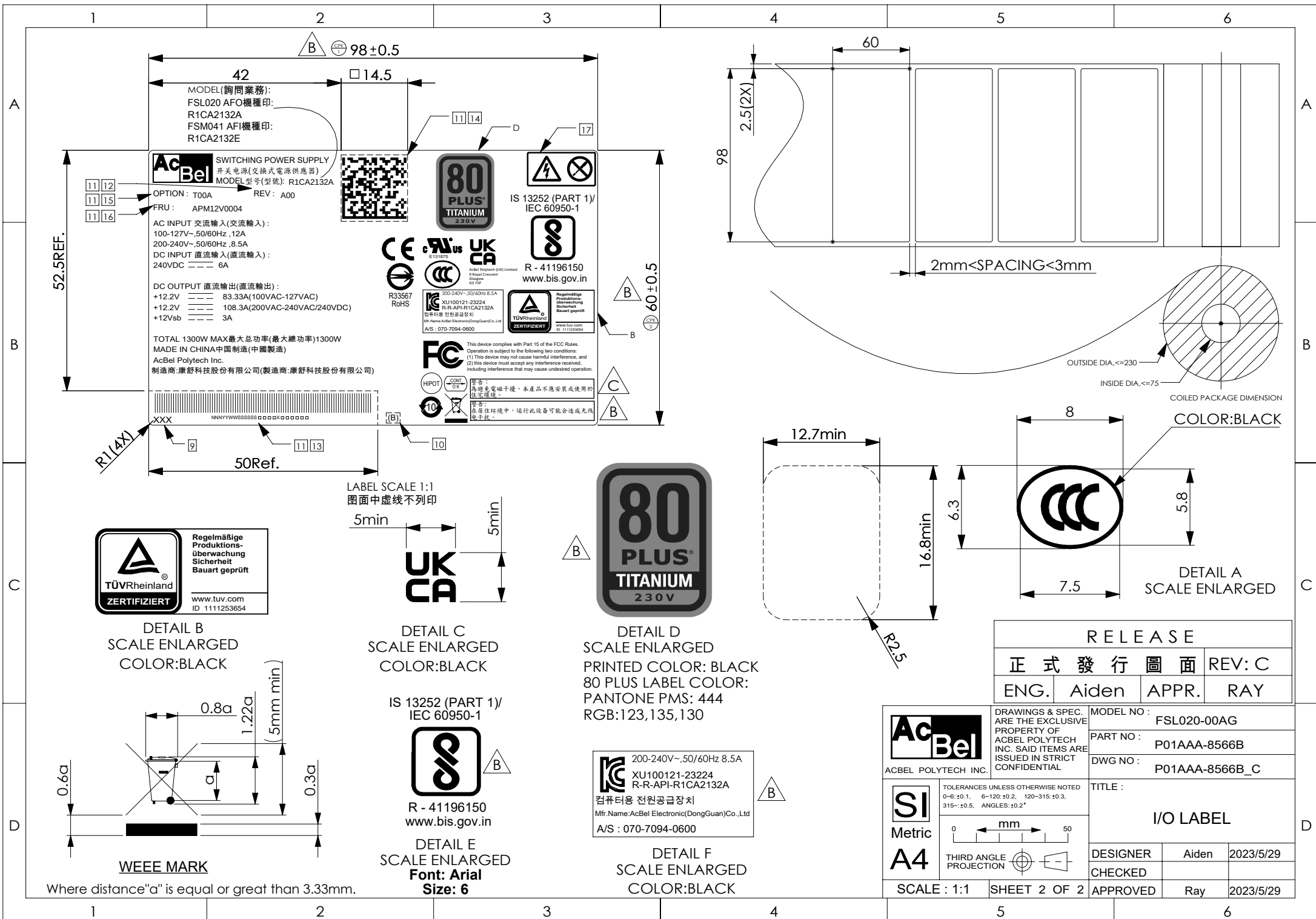


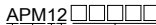
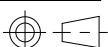
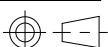
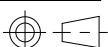
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I/O Label Drawing





	1	2	3	4	5	6																																
A	NOTE: 1 UNIT : MM 單位 : 毫米 2 MATERIAL (材料): 2.1 FACE STOCK(底材): WHITE POLYESTER FILM, (白麥拉) THICKNESS = 0.05 MM(厚度=0.05毫米) 2.2 ADHESIVE(背膠): THICKNESS = 0.025 MM(厚度=0.025毫米) PRESSURE SENSITIVE ACRYLIC(壓花膠) 2.3 BACKED WITH RELEASE LINER(背面附離型紙) 2.4 LABEL TO BE AFFIXED TO AND MAXIMUM TEMPERATURE RATING: GALVANIZED STEEL 100 °C 貼紙所貼附之材質與最大耐溫等級: 鍍鋅鋼, 100 °C 2.5 MATERIAL MUST BE UL RECOGNIZED AND COMPLY TO UL 969 STANDARD 材質必須符合UL認證, 並且遵從969標準		12 REV printed rules ("S1"printed : 0S1 ; "S2"printed : 0S2 ; "A"printed : A00) 版本列印規則 (S1印: 0S1 ; S2印: 0S2 ; A印: A00) 13 SN BARCODE FORMAT: CODE128/CPI:13.64 THE NARROW ELEMENT DIMENSION(X DIIMENSION) SHOULD WITHIN RANGE OF 0.170MM(0.0067INCH) 條碼格式 : CODE 128/ CPI 13.64 寬/窄比 : 0.17毫米(0.0067英吋) NNN YYWW SSSSSS 00AG X FSL020 API MODEL NAME(EXAMPLE : 若機種為FSL020-00AG則印製"FSL020"於此六個欄位) MFG FACTORY CODE(東莞康舒印: B ; 東莞康展印: T ; 武漢康舒印: W ; 淡水康舒印: D) ID CODE (Ex:若機種為FSL020-00AG印"00AG") SERIAL NO 000001~999999 DATE CODE(YY:YEAR WW:WEEK FOR EXAMPLE:2021 27TH WEEK 則此四欄位為"2127") API REVISION CONTROL CODE(S1印:0S1 ; S2印:0S2 ; A印:A00)				A																															
B	3 LABEL MUST BE MADE BY A UL RECOGNIZED AND CSA APPROVED VENDOR. 貼紙之製造商必須是UL與CSA所認證 4 FAI , CPK , "  " CRITICAL DIMENSION SYMBOL, SUPPLIER MUST INSPECT THIS DIMENSION FOR EVERY SHIPMENT FAI , CPK , "  " 表示該(尺寸/位置)為設計的重點尺寸, 廠商每次出貨前必須檢驗合格方可出貨		14 DATAMATRIX CODE PRINTED RULES: 二維條碼列印規則: XXXXXXXXXPPPP;NNNNYYWWSSSSSSOOOOXOOOOOO;YYMMDD;XXXXXXXXXX FRU (參照FRU自印原則) 生產日期 (例 : 2021年3月26日生產則印"210326") SN (參照SN自印原則) OPTION(EX:T00A) MODEL(EX:R1CA2132A)				B																															
C	5 THIS MATERIALS/PARTS/ASSEMBLIES MUST COMPLY TO ACBEL SPEC "CRITERIA FOR ENVIRONMENT- RELATED SUBSTANCES" 零件/材料/製程皆須符合康舒"環境物質的規範" 6 CHARACTER HEIGHT : 2 MM ,UNLESS OTHERWISE SPECIFIED.圖面未標示之字體高度皆為 2毫米 7 ALL PRODUCTS MUST BE THE SAME AS ENGINEERING APPROVAL SAMPLE ANY HARD TOOLING MODIFICATION MUST BE APPROVED BY ACBEL MECHANICAL ENGINEERING SECTION 所有產品必須與認可的樣品一致,任何的修改都必須經由 康舒機構工程師同意及認可		15 OPTION printed rules: OPTION 列印規則:  機種尾碼(FSL020-00AG印00A) 效率等級(Titanium印T;Platinum印P; Gold印G) 16 FRU PRINTED RULES FRU列印規則 : APM12 FW REVISION (印 : A0000 ; A0001 ; A0002 ...Z9999) TYP MINOR REVISION (印 : 1 ; 2 ; 3 ...) TYP MAJOR REVISION (印 : 1 ; 2 ; 3 ...) TYP (PMBUS印 : PM ; SMBUS印 : SM ; EEPROM印 : EP) API(API印:A)				C																															
D	8 PRINTED COLOR(列印顏色) : BLACK(黑色)-TEXT(文字), GRAPHICS(圖形),LOGO(標誌) IMAGE(圖像), SURROUND SHAPE(外圍圖形) WHITE(白色)- BACKGROUND (背景) 9 LABEL MUST CONTAIN THE VENDOR'S ID MARK LOCATED IN THE AREA INDICATED. ID MARK LETTER HEIGHT TO BE 1.5MM 貼紙必須印製廠商代碼, 代碼字高為1.5毫米 10 ACBEL FACTORY CODE : A) ACBEL-TAIWAN: MADE IN TAIWAN ROC, NONE MARK B) ACBEL-DONGGUAN: MADE IN CHINA , USE "B" MARK C) ACBEL MANILA: MADE IN PHILIPPINES , USE "C" MARK 康舒製造廠的標記: A)康舒台灣廠: 在台灣製造的不用標記 B)康舒塘廈廠: 在中國大陸製造的使用"B"標記 C)康舒馬尼拉廠: 在菲律賓製造的使用"C"標記 11 REV & POTION & FRU & SN BARCODE & DATAMATRIX CODE, ACBEL PRINTED REV、OPTION、FRU、系列條碼、二維條碼由康舒自印		17 WARNING LABEL PRINTED COLOR: 警告符號顏色定義: PMC BlackC 黑色 - 文字、圖形、圖像、標誌 PMC 108C 黃色 - 背 		<table><tr><td colspan="4">RELEASE</td></tr><tr><td colspan="2">正式發行圖面</td><td colspan="2">REV: C</td></tr><tr><td>ENG.</td><td>Aiden</td><td>APPR.</td><td>RAY</td></tr></table>		RELEASE				正式發行圖面		REV: C		ENG.	Aiden	APPR.	RAY	<table><tr><td> ACBEL POLYTECH INC.</td><td>DRAWINGS & SPEC. ARE THE EXCLUSIVE PROPERTY OF ACBEL POLYTECH INC. SAID ITEMS ARE ISSUED IN STRICT CONFIDENTIAL</td><td>MODEL NO : FSL020-00AG PART NO : P01AAA-8566B DWG NO : P01AAA-8566B_C</td></tr><tr><td></td><td>TOLERANCES UNLESS OTHERWISE NOTED 0-6:±0.1, 6-120:±0.2, 120-315:±0.3, 315~:±0.5, ANGLES:±0.2° </td><td>TITLE : I/O LABEL</td></tr><tr><td colspan="2">SCALE : 1:1</td><td>SHEET 1 OF 2</td></tr><tr><td>DESIGNER</td><td>Aiden</td><td>2023/5/29</td></tr><tr><td>CHECKED</td><td></td><td></td></tr><tr><td>APPROVED</td><td>Ray</td><td>2023/5/29</td></tr></table>	 ACBEL POLYTECH INC.	DRAWINGS & SPEC. ARE THE EXCLUSIVE PROPERTY OF ACBEL POLYTECH INC. SAID ITEMS ARE ISSUED IN STRICT CONFIDENTIAL	MODEL NO : FSL020-00AG PART NO : P01AAA-8566B DWG NO : P01AAA-8566B_C		TOLERANCES UNLESS OTHERWISE NOTED 0-6:±0.1, 6-120:±0.2, 120-315:±0.3, 315~:±0.5, ANGLES:±0.2° 	TITLE : I/O LABEL	SCALE : 1:1		SHEET 1 OF 2	DESIGNER	Aiden	2023/5/29	CHECKED			APPROVED	Ray	2023/5/29	D
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APPROVED	Ray	2023/5/29																																				
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	更新BSMI警語	05/29/23"	Aiden
	增加 KC&BIS Logo 更新CCC警語 更新80+ LOGO 標籤尺寸改為98X60	01/03/23"	Aiden
A	RELEASE	11/25/21"	Aiden
1	PRIMARILY	09/28/20"	Aiden
REV	DESCRIPTION	DATE	BY
 ACBEL POLYTECH INC.		MODEL NO : FSL020-00AG	
		PART NO : P01AAA-8566B	
		DWG NO : P01AAA-8566B_C	
 TOLERANCES UNLESS OTHERWISE NOTED 0-6: ±0.1, 6-120: ±0.2, 120-315: ±0.3, 315--: ±0.5, ANGLES: ±0.2°		TITLE : I/O LABEL	
		DESIGNER	Aiden 2023/5/29
		CHECKED	
SCALE : 1:1		SHEET 1 OF 2	APPROVED Ray 2023/5/29



康舒科技

ACBEL POLYTECH INC.

Safety



TM

Ref. Certif. No.

JPTUV-134306-A2/M1

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT
(IECEE) CB SCHEME

CB TEST CERTIFICATE

Product

Switching Power Supply

Name and address of the applicant

Acbel Polytech Inc.
No. 159,
Sec. 3, Danjin Rd., Tamsui Dist., New Taipei City 251
Taiwan

Name and address of the manufacturer

Acbel Polytech Inc.
No. 159,
Sec. 3, Danjin Rd., Tamsui Dist., New Taipei City 251
Taiwan

Name and address of the factory

See additional page(s)

Ratings and principal characteristics

Input : 1) AC 100-127V/200-240V; 12A/8.5A; 50/60Hz,
DC 240V; 6A; Class I
2) AC 100-240V; 50/60Hz; 10A, DC 240V; 5A max.;
Class I

Output: refer to the test report

Trademark (if any)

AcBel

Customer's Testing Facility (CTF) Stage used

CTF Stage 1

Model / Type Ref.

1) FSL020, R1CA2132A, FSM041, R1CA2132E
2) FSM009, R1CA2801H, FSM042, R1CA2801LAdditional information (if necessary may
also be reported on page 2)For model differences, refer to the test report.
Re-issue of JPTUV-134306-A1/M1 dated 2022-12-29,
due to non-technical change.A sample of the product was tested and
found to be in conformity withIEC 62368-1:2018
See Test Report for National DifferencesAs shown in the Test Report Ref. No. which
forms part of this Certificate

CN22A8T0 004

This CB Test Certificate is issued by the National Certification Body



TÜVRheinland®

TÜV Rheinland Japan Ltd.
Global Technology Assessment Center
4-25-2 Kita-Yamata, Tsuzuki-ku
Yokohama 224-0021, Japan
Phone + 81 45 914-3888
Fax + 81 45 914-3354
Mail: info@jpn.tuv.com
Web : www.tuv.com

Date: 2023-01-09

Signature:

Dipl.-Ing. F. Stoelzel

1. AcBel Polytech(Philippines) INC.
No. 2 Tagaytay Ridge Drive,
Carmelray Industrial Park II,
Km. 54 National Highway
Calamba City, Laguna 4027, Philippines
2. ACBEL ELECTRONIC (WUHAN) CO., LTD
No. 1, DuTai North Road
Economic Development Zone
XianTao City, HuBei Province
P.R. China
3. Acbel Electronic (Dong Guan)
Co., Ltd.
No. 17-28, Horng Yeh Road, Horng
Yeh Ind. District, Tang Xia Town
Dongguan, Guangdong 523710, P.R. China
4. Acbel Polytech Inc.
No. 159,
Sec. 3, Danjin Rd., Tamsui Dist.,
New Taipei City 251
Taiwan

Additional information (if necessary)

Report Ref. No. : CN22A8T0 004

Date: 2023-01-09

Signature:



Dipl.-Ing. F. Stoelzel

Acbel Polytech Inc.
Mr. Paul Huang

Date : 29.04.2022
Our ref. : WYP ZTW1
Your ref.: T211186 Leon Chen

No. 159, Sec. 3, Danjin Rd.
Tamsui Dist., New Taipei City 251
Taiwan

Ref : R TÜV-Bauart-Zeichen o. Akkred. Nr.

Type of Equipment : Switching Power Supply
Model Designation : See Certificate
Certificate No. : R 50542521 0001
Report No. : CN22XI5H 001

Dear Mr. Paul Huang,

The above specified equipment has been tested and found to be in accordance with the relevant requirements.

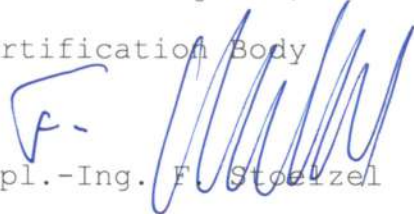
Please find enclosed your certificate as specified above.

If cancellation of the certificate is submitted by 15 November in a given year, no fee will be charged for the following year.

The certificate is issued with the reservation that the license holder applies all information required in § 6 of the ProdSG related to name and address of the manufacturer or his authorized representative / importer, including their respective contact addresses on the product prior to marketing of the product in the European Economic Area. In case you have a change regarding your involved local representative for the certificate, please inform us in due time.

With kind regards,

Certification Body


Dipl.-Ing. F. Stöckel

Enclosure

TÜV RHEINLAND TAIWAN LTD.

11F., No. 758, Sec. 4, Bade Rd.,
Songshan Dist., Taipei City 105,
Taiwan, R. O. C.
Tel. (02) 2172-7000
Fax (02) 2172-1322
[http: //www.tuv.com](http://www.tuv.com)

NEW TAIPEI BRANCH:
No. 458-18 & 458-19,
Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244,
Taiwan, R. O. C.
Tel. (02) 2172-1000
Fax (02) 2172-1322

TAICHUNG BRANCH:
3F., No. 497, Zhongming South Rd.,
West Dist., Taichung City 403,
Taiwan, R. O. C.
Tel. (02) 2172-7000
Fax (02) 2172-1322

KAOSIUNG BRANCH:
27F.-3, No.80, Minzu 1st Rd.,
Sanmin Dist., Kaohsiung City 807,
Taiwan, R. O. C.
Tel. (07) 262-6000
Fax (07) 380-0577

Zertifikat

Certificate



Zertifikat Nr. *Certificate No.*
R 50542521

Blatt *Sheet*
0001

Ihr Zeichen *Client Reference*
T211186 Leon Chen

Unser Zeichen *Our Reference*
ZTW1-WYP-CN22XI5H 001

Ausstellungsdatum *Date of Issue*
29.04.2022 (day/mo/yr)

Genehmigungsinhaber *License Holder*
Acbel Polytech Inc.
No. 159, Sec. 3, Danjin Rd.
Tamsui Dist., New Taipei City 251
Taiwan

Fertigungsstätte *Manufacturing Plant*
Refer to latest revision
of the annex list of factories

Prüfzeichen *Test Mark*



Geprüft nach *Tested acc. to*
EN IEC 62368-1:2020+A11

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

Einbauschaltnetzteil (Switching Power Supply)

Bezeichnung : 1) FSL020, R1CA2132A (AcBel)
(Type Designation) 2) FSM009, R1CA2801H (AcBel)
Nennspannung : 1) AC 100-127V/200-240V, 50/60Hz;
(Rated Voltage) DC 240V
2) AC 100-240V, 50/60Hz;
DC 240V
Nennstrom : 1) 12A/8.5A; 6A
(Rated Current) 2) 10A; 5A
Ausgang : siehe Aufbau-Übersicht
(Output) (see constructional dataform)
max. Umgebungstemperatur (max. Ambient Temperature) : +55°C
max. Betriebshöhe (max. Operating Altitude) : 5000m
Schutzklasse (Protection Class) : I
Verschmutzungsgrad (Pollution Degree) : 2

ANLAGE (Appendix): 1

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg

http://www.tuv.com/safety E-mail: markcheck@tuv.com
Fax: +49 221 806-3935

Zertifizierungsstelle



Anlage Fertigungsstättenliste
/ Attachment List of Factories



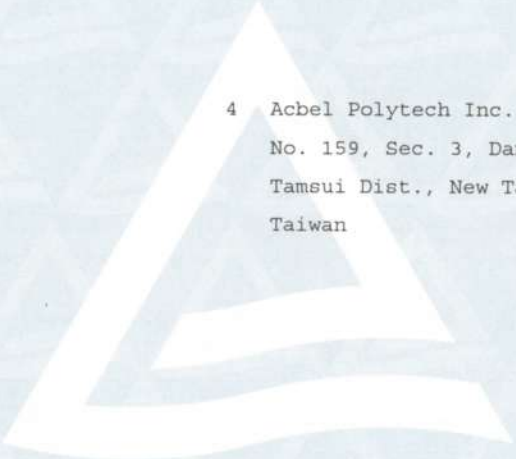
R 50542521 0001

1 Acbel Electronic (Dong Guan)
Co., Ltd.
No. 17-28, Horng Yeh Road, Horng
Yeh Ind. District, Tang Xia Town
Dongguan, Guangdong 523710
P.R. China

2 ACBEL ELECTRONIC (WUHAN) CO., LTD
No. 1, DuTai North Road
Economic Development Zone
XianTao City, HuBei Province
P.R. China

3 AcBel Polytech(Philippines) INC.
No. 2 Tagaytay Ridge Drive,
Carmelray Industrial Park II,
Km. 54 National Highway,
Calamba City, Laguna 4027
Philippines

4 Acbel Polytech Inc.
No. 159, Sec. 3, Danjin Rd.
Tamsui Dist., New Taipei City 251
Taiwan

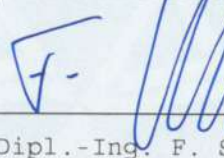


TÜVRheinland®

Dieser Anhang ersetzt den Vorgänger vom/
This annex replaces the previous annex dated

Datum / Date 29.04.2022

Zertifizierungsstelle
/ Certification Body


Dipl.-Ing. F. Stoelzel



NOTICE OF COMPLETION
AND
AUTHORIZATION TO APPLY THE UL MARK



2022-05-06

MR. LEON CHEN
ACBEL POLYTECH INC
No159 Sec 3 Danjin Rd
TamSui District
New Taipei, 251, TW

Your Reference: T211186
Our Reference: File E131875-A6129-UL-1, Order: 14290520
Volume X7 Project: 4790374878
Project Scope: UL/cUL 62368-1 Ed.3: Switching power supply, Models FSL020, R1CA2132A, FSM009, R1CA2801H; New with 2 power ratings, single Input rating (E131875, TransformerX1).

Dear Mr. Leon Chen:

UL has completed the investigation under the above project and confirmed compliance of your product(s) with UL requirements. We appreciate that you have a choice of certification providers and thank you for choosing UL.

This letter temporarily supplements the UL Follow-Up Services Procedure and serves as authorization to apply the UL Mark at the factory location(s) identified on the Authorization Page of UL File E131875, Volume X7. You are required to send a copy of this letter to all manufacturing locations authorized under UL File E131875, Volume X7.

The Follow-Up Services Procedure covering your product(s) will typically be provided by UL within 10 business days. Any information and documentation provided to you involving the UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Products that bear the UL Mark must be identical to those submitted to UL for evaluation and certification and must comply with the Follow-Up Services Procedure covering your product(s). Additional requirements related to the responsibilities of the Applicant and Manufacturer can be found under **Additional Resources** at <https://www.ul.com/fus>.

A UL certification is a valuable marketing tool meaning your product or company has successfully met stringent requirements. We encourage you to use your UL Mark and certification in your marketing activities. You can find information on how to accurately promote your UL certification at <https://www.ul.com/marketing>.

If you have any questions, please contact me or any of our customer service representatives. And, congratulations again on your achievement!

NOTICE OF COMPLETION
AND
AUTHORIZATION TO APPLY THE UL MARK



Sincerely,

Sam Fu
Senior Project Engineer
Underwriters Laboratories Taiwan Co., Ltd.
Sam.Fu@ul.com

Bruce A. Mahrenholz
Director, Conformity Assessment Programs (CPO)
UL LLC
Bruce.A.Mahrenholz@ul.com

55f1e48c96c94a00ae6be140f0baac6d

Declaration of Conformity

For the following equipment :

Product :	Switching Power Supply
Type Designation :	FSL020, R1CA2132A, FSM009, R1CA2801H
Trademark :	ACBEL
Manufacturer's Name :	ACBEL POLYTECH INC
Manufacturer's Address :	No.159, Sec. 3, Danjin Rd., Tamsui Dist., New Taipei City, Taiwan

Is herewith confirmed to comply with the following legal requirements set out in the Official Journal of the European Union. Products sold in the European Economic Area (EEA) have been assessed to meet high safety, health, and environmental protection requirements.

- ☒ Low-Voltage Directive EN 62368 -1: 2020 + A11: 2020
2014/35/EU :
- ☒ EMC Directive EN 55032:2015+A11:2020 ; EN 55035:2017+A11 :2020 ;
2014/30/EU : EN 61000-3-2:2014 ; EN 61000-3-3:2013+A2 :2021
- ☒ ErP Directive : EN 50563:2011/A1:2013
Regulation (EC) No.
278/2009
- ☒ RoHS Directive EN 50581:2012
2011/65/EU

((EU) 2015/863) :
- ☒ Additional information : DECISION No 768/2008/EC

Responsible for making this declaration is the :

- ☒ Manufacturer
- ☐ Authorized representative established within the EU
- ☐ Authorized representative established within the EU (if applicable) :

Company Name : _____

Company Address : _____

Person responsible for making this declaration

Name , Surname : Paul Huang

Position / Title : Safety Supervisor / Acbel Polytech Inc.

Taipei , Taiwan
Place

2022-05-11
Date


Legal Signature

UK Declaration of Conformity

For the following equipment :

Product :	Switching Power Supply
Type Designation :	FSL020,R1CA2132A, FSM009,R1CA2801H, FSM042,R1CA2801L, FSM041,R1CA2132E
Trademark :	AcBel
Manufacturer's Name :	ACBEL POLYTECH INC.
Manufacturer's Address :	No.159, Sec. 3, Danjin Rd., Tamsui Dist., New Taipei City, Taiwan

Herewith confirmed to comply with the following legal requirements. Products sold in the Great Britain (GB) have been assessed to meet high safety, health and environmental protection requirements.

- | | | |
|-------------------------------------|---|--|
| ☒ | Electrical Equipment
(Safety) Regulations 2016 : | BS EN IEC 62368-1:2020+A11:2020 |
| ☒ | Electromagnetic Compatibility
Regulations 2016 : | BS EN 55032:2015+A11:2020 ;
BS EN 55035:2017+A11:2020 ;
BS EN IEC 61000-3-2:2019+A1:2021 ;
BS EN 61000-3-3:2013+A2:2021 |
| ☐ | The Ecodesign for Energy-Related
Products and Energy Information
(Amendment) (EU Exit)
Regulations 2019 : | BS EN 50563:2011/A1:2013 |
| ☒ | The Restriction of the Use of
Certain Hazardous Substances in
Electrical and Electronic
Equipment Regulations 2012 : | BS EN IEC 63000:2018 |

Responsible for making this declaration is the :

- ☒ Manufacturer
- ☐ Authorized representative established within the UK
- ☐ Authorized representative established within the UK (if applicable) :

Company Name : _____

Company Address : _____

Person responsible for making this declaration

Name, Surname : Nat Liu

Position / Title : Safety Supervisor / Acbel Polytech Inc.

Taipei, Taiwan
Place

2023-01-13
Date


Legal Signature



中国国家强制性产品认证证书

证书编号: 2022010907470832

发证日期: 2023 年 02 月 27 日
有效期至: 2027 年 05 月 18 日

认证委托人名称 康舒科技股份有限公司
及注册地址 中国台湾台北市松山区南京东路 5 段 99 号 11 楼

产品生产者名称 康舒科技股份有限公司
及注册地址 中国台湾台北市松山区南京东路 5 段 99 号 11 楼

生产企业名称 康舒电子(东莞)有限公司
及生产地址 中国广东省东莞市塘厦镇宏业工业区宏业大道 17-28 号

产品名称和系列、规格、型号 开关电源
FSL020, R1CA2132A, FSM009, R1CA2801H, FSM041, R1CA2132E, FSM042, R1CA2801L ;规格:FSL020, R1CA2132A, FSM041, R1CA2132E :交流输入: 100-127V~, 50/60Hz, 12A, 200-240V~, 50/60Hz, 8.5A ; 直流输入: 240Vdc, 6A ; 直流输出: +12.2V/83.33A, (FOR INPUT 100Vac-127Vac), +12.2V/108.3A (FOR INPUT 200Vac-240Vac/240Vdc), +12Vsb/3A; 最大总功率:1300W MAX. (FOR INPUT 200-240V~, 240Vdc) ; FSM009, R1CA2801H, FSM042, R1CA2801L :交流输入: 100-240V~, 50/60Hz, 10A ; 直流输入: 240Vdc, 5A MAX. ; 直流输出: +12.2V/66A, +12Vsb/3A; 最大总功率:800W MAX. (不带电线组件销售, 仅适用于海拔 5000 米及以下)

产品标准和技术要求 GB 17625.1-2012;GB 4943.1-2022;GB/T 9254.1-2021(Class A)

上述产品符合 CNCA-C09-01:2014 认证规则的要求, 特发此证。
证书有效期内本证书的有效性依据发证机构的定期监督获得保持。
本证书为变更证书, 证书首次颁发日期: 2022 年 05 月 19 日
经中国合格评定国家认可委员会认可 CNAS C001-P

可通过扫描下方二维码或登录国家认监委网站 (www.cnca.gov.cn) 查验证书信息



签发:

谢肇煦



中国质量认证中心





CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

CERTIFICATE NO.:2022010907470832

Valid from:Feb.27,2023

Valid until:May.18,2027

**NAME AND REGISTERED
ADDRESS OF THE APPLICANT**

Acbel Polytech Inc.
11F., No.99, Sec. 5, Nan-King E. Road, Sungshan Chiu, Taipei, Taiwan, Province Of China.

**NAME AND REGISTERED
ADDRESS OF THE
MANUFACTURER**

Acbel Polytech Inc.
11F., No.99, Sec. 5, Nan-King E. Road, Sungshan Chiu, Taipei, Taiwan, Province Of China.

**NAME AND LOCATION
OF THE FACTORY**

Acbel Electronic (Dong Guan) Co., Ltd.
No. 17-28, Horng Yeh Road, Horng Yeh Industrial District, Tang Xia Town, Dong Guan City, Guang
Dong Province, China

PRODUCT MODEL(S)

SWITCHING POWER SUPPLY
FSL020, R1CA2132A, FSM009, R1CA2801H, FSM041, R1CA2132E,
FSM042, R1CA2801L; Specifications: FSL020, R1CA2132A, FSM041, R1CA2132E: AC INPUT: 100-127V~,
50/60Hz, 12A, 200-240V~, 50/60Hz, 8.5A; AC INPUT: 240Vdc, 6A; DC OUTPUT: +12.2V/83.33A, (FOR
INPUT 100Vac-127Vac), +12.2V/108.3A (FOR INPUT 200Vac-240Vac/240Vdc), +12Vsb/3A; Total
Power: 1300W MAX. (FOR INPUT 200-240V~, 240Vdc); FSM009, R1CA2801H, FSM042, R1CA2801L: AC
INPUT: 100-240V~, 50/60Hz, 10A; AC INPUT: 240Vdc, 5A MAX.; DC OUTPUT: +12.2V/66A, +12Vsb/3A;
Total Power: 800W MAX. (Sale without cord set, Altitude up to 5000m)

**STANDARDS AND
TECHNICAL REQUIREMENTS**

GB 17625.1-2012; GB 4943.1-2022; GB/T 9254.1-2021 (Class A)

This is to certify that the above mentioned product(s) complies with the requirements of implementation rules for compulsory certification (REFNO.CNCA-C09-01:2014)

The validity of the certificate is subject to positive result of the regular follow up inspection by issuing certification body until the expiry date.

Date of original issued: May.19,2022

Accredited by China National Accreditation Service for Conformity Assessment CNAS C001-P

The certificate information is available through the QR code below or CNCA's website: www.cnca.gov.cn



SIGNATURE:

谢肇煦



CHINA QUALITY CERTIFICATION CENTRE





中国国家强制性产品认证证书

变更结论 Modification Approval

证书编号 Certificate No.: 2022010907470832

申请编号 Application No.: A2023CCC0907-4098486

申请人(委托人) Applicant: 康舒科技股份有限公司/Acbel Polytech Inc.

证书编号 Certificate No. (变更前 Original): 2022010907470832

变更产品名称: 开关电源

Name of Product Modified: SWITCHING POWER SUPPLY

变更情况 Situation of Modification (见下表 See table below):

序号	项目 Item	变更前 Original	变更后 Present
1	安全标准换代	GB 4943.1-2011	GB 4943.1-2022
2	补充泄放 IC	见原报告	见安全关键件清单
3	增列内外部 布线和 绝缘片	见原报告	见安全关键件清单

现批准以上变更。

Above Modification is approved. The present will replace the original.

批准日期 (Date): 2023 年 02 月 27 日

第 1 页 / 共 1 页

签发:

谢肇煦



中国质量认证中心





經濟部標準檢驗局
BUREAU OF STANDARDS, METROLOGY AND INSPECTION,
MINISTRY OF ECONOMIC AFFAIRS



商品驗證登錄證書
CERTIFICATE OF THE REGISTRATION OF PRODUCT CERTIFICATION

證書號碼： CI331065678967 號 01
Certificate No.

茲據 康舒科技股份有限公司
定，准予登錄並使用商品安全標章  及識別號碼：
The application made by

申請驗證登錄，經審查結果符合規
R33567 。其登錄事項如下：
for Registration of Product

Certification has been reviewed and found to be in compliance with related regulations. Therefore, registration is granted with the
Product Safety Mark  and the Identification No. R33567 . Details of the registration are follows :

申請人：康舒科技股份有限公司
Applicant

統一編號：12341051
Uniform No.

地址：臺北市松山區南京東路五段99號11樓
Address

生產廠場：詳如附表
Factory

廠址：詳如附表
Factory Address

商品種類名稱：
Type/name of product

商品分類號列：8504.40.91.00.7-A
C.C.C Code

中文名稱：交換式電源供應器
Chinese name

英文名稱：Switching Power Supply
English name

型式：FSL020
Type

系列型式：FSM009, FSM041, FSM042, R1CA2132A, R1CA2132E, R1CA2801H, R1CA2801L(以下空白)
Series of the type

依據標準：CNS15598-1 (109年06月)、CNS15936 (105年09月)、符合CNS 15663第5節「
Standards 含有標示」規定 (102年版)

標準檢驗局發證 (發證地址：100臺北市中正區濟南路1段4號)

This certificate is issued by the BSMI. (No.4, Sec. 1, Jinan Rd., Zhongzheng Dist., Taipei City 100, Taiwan)

本證書以電子文件行之，所載內容若有不符之處，以標準檢驗局系統登錄資料為主，查詢證書
資料網址：<https://civil.bsmi.gov.tw>

登錄日期：中華民國	111	年	05	月	17	日
Registration Date	2022	(year)	05	(month)	17	(day)
本證書有效期限至	114	年	05	月	16	日
Expiration Date	2025	(year)	05	(month)	16	(day)
發證日期：中華民國	112	年	05	月	22	日
Date of issue	2023	(year)	05	(month)	22	(day)



註1：持本證書進口驗證登錄商品時，進口人須與本證書名義人相同。

註2：次年度商品驗證登錄年費繳納期限為當年11月30日，逾期未繳納者，經限期繳納屆期未繳納，即依商品檢
驗法第42條第7款規定廢止驗證登錄，並自次年度1月1日起生效。

註3：本證書僅代表完成檢驗程序，不作為其他(如產地)證明。

經濟部標準檢驗局
BUREAU OF STANDARDS, METROLOGY AND INSPECTION,
MINISTRY OF ECONOMIC AFFAIRS

商品驗證登錄證書
CERTIFICATE OF THE REGISTRATION OF PRODUCT CERTIFICATION

證書號碼： CI331065678967 號 01
Certificate No.

- 生產廠場： 1. ACBEL ELECTRONIC (WUHAN) CO., LTD
Factory : No.1, DuTai North Road, Economic Development Zone,
XianTao City, HuBei Province, People's Republic Of
China
2. 康舒電子(東莞)有限公司
中國廣東省東莞市塘廈鎮宏業工業區(宏業大道)17-28號
3. Acbel Polytech (Philippines) Inc.
No. 2, Tagaytay Ridge Drive, Carmelray Industrial Park
II, Km 54 National Highway, Calamba City, Laguna
Philippines 4027
4. 康舒科技股份有限公司
新北市淡水區淡金路三段159號

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안전확인신고증명서 Confirmation Letter of Declaration

신고번호 : XU100121-23224A
(Application No.)

신고회사명 : Acbel Electronic (Dongguan) Co.,Ltd.
(Applicant)

주 소 : No.17-28 (Hong Yeh Rd) Hong Yeh Industrial District, Tang Xia Town, Dongguan,
(Address) Guangdong, China

제 품 명 : 컴퓨터용 전원공급장치
(Product)

기본모델명 : FSL020
(Basic Model)

파생모델명 (Series Model) :
R1CA2132A,FSM041,R1CA2132E

정격/안전기준상의 모델 구분 : 200-240 V~, 50/60 Hz, 8.5 A DC O/P: +12.2V/108.3A, +12Vsb/3A TOTAL 1300W MAX.
(Rating)

안전기준 : KC 62368-1(2021-08)
(Standard)

본 확인신고는 제 조 국 명 : 중국

제조업자명 : Acbel Electronic (Dongguan) Co.,Ltd.

제조공장의 주소 : No.17-28 (Hong Yeh Rd) Hong Yeh Industrial District, Tang Xia Town,
Dongguan, Guangdong, China
의 제품에만 해당함

「전기용품 및 생활용품 안전관리법」시행규칙 제28조제1항, 같은조제3항, 제29조제2항 또는 제34조제2항에 따라 안전확인신고증명서를 발급합니다.

We issue this Confirmation Letter of Declaration of the safety Confirmation for the above appliances in accordance with Article 28(1), 28(3), 29(2) or 34(2) of the Electrical Appliances and Consumer Products Safety Control Act.

2023 년 01 월 12 일
(Year) (Month) (Day)

한국기계전기전자시험연구원
Korea Testing Certification Institute



※ 이 증명서는 「전기용품 및 생활용품 안전관리법」에 따른 제품의 안전성 확인에 한정된 것이며, 그 밖의 다른 법률이 적용되는 제품의 경우에는 해당 법률에 따라 추가로 인증·허가 등을 받아야 합니다.

첨부서류

1. 전기용품의 안전관리부품 및 재질목록(List of Critical Components)(전기용품에 한정한다)
2. 기본모델·파생모델의 내용(Description of the basic and series model)
3. 안전확인신고 내용의 변경 현황(Revisions Status)

증명서를 받은 자의 유의 사항 Notification for Recipients

1. 본 증명서는 기재된 제조공장에서 생산된 제품으로서 적용된 안전기준에 적합한 경우에 한하여 유효합니다.

(This certificate is valid only when the product meets the safety standards and is produced from the manufacturing factory that states on this certificate.)

2. 본 증명 마크는 본래의 의미와 다르게 사용자가 오해를 일으킬 수 있는 방법으로 광고, 카탈로그 등에 사용하면 인증정지 또는 취소의 사유가 됩니다.

(Ceasation or cancellation of the certification may occur if the actual meaning of the Certification Mark is misled to the public by false advertisement on a overstated catalog of the product.)

3. 다음과 같은 사유가 발생할 경우에는 안전인증기관에 확인증명 변경 신청을 하여 재교부 받아야 합니다.

(In case of the following events, the Confirmation Letter of Declaration shall be reapplied and reissued for revision)

- 1) 제조자, 대표자, 주소 등 증명서 기재내용의 변경

(Revisions in contents of the certificate such as manufacturer representative, address and etc.)

- 2) 파생모델의 추가, 변경 또는 삭제 (Additions, changes, or removals of series model)

- 3) 안전관리 부품의 변경 또는 추가

(Additions or changes in components which are listed on certificate)

4. 증명서를 받은 자는 다음 사항을 이행하여야 합니다.

(Recipients of the Certificate shall comply with the followings.)

- 1) 증명 표시 등 증명 요건의 유지관리

(Maintaining and preserving the Mark and other certification requirements)

- * 증명을 받기 이전 또는 정지, 취소된 이후 생산된 제품에 증명 표시를 하면 법에 의거 처벌을 받게 됩니다.

(It will be punished by the law of the certification mark is used before the issue (or after suspension or cancellation) of the certification.)

- 2) 자체 검사의 실시 및 그 기록관리 (Self-testing and record keeping)

- * 증명을 받은 자는 제품검사를 철저히 실시하여 제품의 품질이 안전기준에 미달되지 않도록 유의.

(Recipients of the Certificate shall conduct product inspection strictly for products to comply with the safety standards)

5. 인증서(증명서)에는 진위여부 확인을 위해 다음과 같은 사항이 적용되어 있습니다.

- 1) 문서관리번호 (문서관리번호 노출시 CS홈페이지를 통해 기술문서 내용이 조회 가능함으로 사본 등 제출시 노출되지 않도록 주의하시기 바랍니다.)

- 2) 시점확인필

- 3) 2D바코드

인증시의 조건: 동 제품의 생산 시 자체검사를 실시하고 안전인증 시 등록된 부품누락 및 임의 변경하지 말 것.
Conditions of Certification : In the production of this product, conduct a self-test and do not miss and change the registered components.



기술문서

Technical Document

page : 1 / 15

안전인증번호 : XU100121-23224A
(Certificate No)

접수번호 : KCA2022-13820
(Receipt No)

1. 기본모델 · 파생모델의 내용 (General Descriptions of Certified Products)

1.1 제품의 설명 (Product description)

인증제품의 개요는 다음과 같다.

(Information on certified basic model product is as follow)

구 분 (Section)	내 용 (Description)
용도 (Normal use)	Switching Power Supply for Computer(Built-in Type).
내부구조 (Internal construction)	Consisting of basic, reinforced insulation or double insulation between the primary circuit and SELV circuit.
외부구조 (External construction)	Provided with metal enclosure and appliance inlet, Certified without KC cordset.
기타(others)	Class I, Tested by TÜV Rheinland Japan Ltd. (JPTUV-134306-A2/M1).

1.2 전기용품의 표시 : 전기용품 및 생활용품 안전관리법 시행규칙 제37조(안전확인대상제품의표시)에 따라 표시한다.

(Marking of KC Mark : Marking shall comply with the Article 37 of the Enforcement Rule of the Electrical Appliances and Consumer products Safety Control Act.)

1.3 등록모델 (Registered Models)

구분 (Class)	모 델 명 및 정 격 (Model / Rating)	기본모델과의 차이점 (Difference between basic model and series model)
기본모델 (Basic model)	FSL020 200-240 V~, 50/60 Hz, 8.5 A DC O/P: +12.2V/108.3A, +12Vsb/3A TOTAL 1300W MAX.	
파생모델 (Variant model)	R1CA2132A	identical to basic model except for model designation
	FSM041	identical to basic model except for DC fan air-flow direction and model designation
	R1CA2132E	identical to basic model except for DC fan air-flow direction and model designation

2. 안전관리 부품 및 재질목록(List of Critical Components)

부품명(회로기호) Components(Part no.)	제조사(상표명) Manufacturer(Brand)	모델명(형식) Model(Type)	정격 또는 특성 (Technical Data)	인증규격 (Certification)
Inlet	SHENG MING ENTERPRISE CO LTD (WINTRON ENTERPRISE CO LTD)	S14-102, S14-202	10A, 250Vac	IEC

[서식 CP401-18-00]



기 술 문 서

Technical Document

page : 2 / 15

안전인증번호 : XU100121-23224A
(Certificate No)

접수번호 : KCA2022-13820
(Receipt No)

부품명(회로기호) Components(Part no.)	제조사(상표명) Manufacturer(Brand)	모델명(형식) Model(Type)	정격 또는 특성 (Technical Data)	인증규격 (Certification)
(Alt.)	HCR Electronics Co., Ltd.	SK01	10A, 250Vac	IEC
Fuse (F1)	Hollyland Co Ltd	5HF/5HF(P)	F16AL, 420Vac/Vdc	IEC
(Alt.)	Littelfuse Inc (Littelfuse Ltd, Suzhou Littelfuse OVS Ltd, Littelfuse B V)	487 Series	F16AL, 420Vac/Vdc	IEC
(Alt.)	Conquer Electronics Co Ltd	UBF-A	F16AL, 420Vac/Vdc	IEC
(Alt.)	Walter Electronic Co., Ltd.	FHP	F16AL, 420Vac/Vdc	IEC
X-Cap. (C4, C7) C4 max. 1 μ F; C7 max. 0.68 μ F (Optional) (X1 or X2 type)	Arcotronics Italia SPA	R.46	250Vac min., 110°C	IEC
(Alt.)	Hua Jung Components Co Ltd	MKP	250Vac min., 110°C	IEC
(Alt.)	Strong Capacitor Co. Ltd.	MPX	250Vac min., 110°C	IEC
(Alt.)	ZHUHAI SUNG HO ELECTRONICS CO LTD	CMPP	250Vac min., 105°C	IEC
(Alt.)	Carli Electronics Co Ltd	MPX	250Vac min., 100°C	IEC
(Alt.)	SHENZHEN SURONG CAPACITORS CO LTD	MPX/MKP	250Vac min., 100°C	IEC
Y-Cap. (C198, C199, C5, C6) C198, C199, C5, C6 max. 1000 pF (Optional) (Y1 or Y2 type)	Murata Mfg Co Ltd	RA	250Vac min., 125°C (Y1)	IEC
(Alt.)	TDK Corporation	CD	250Vac min., 125°C (Y1)	IEC

[서식 CP401-18-00]



기 술 문 서

Technical Document

page : 3 / 15

안전인증번호 : XU100121-23224A

(Certificate No)

접수번호 : KCA2022-13820

(Receipt No)

부품명(회로기호) Components(Part no.)	제조사(상표명) Manufacturer(Brand)	모델명(형식) Model(Type)	정격 또는 특성 (Technical Data)	인증규격 (Certification)
(Alt.)	TDK Corporation	CS	250Vac min., 125°C (Y2)	IEC
(Alt.)	Walsin Technology Corp (Pan Overseas Electronic Co Ltd)	AH	250Vac min., 125°C (Y1)	IEC
(Alt.)	Walsin Technology Corp (Pan Overseas Electronic Co Ltd)	AC	250Vac min., 125°C (Y2)	IEC
(Alt.)	Success Electronics Co Ltd	SE	250Vac min., 125°C (Y1)	IEC
Y-Cap. (C41, C42) C41, C42 max. 4700 pF (Optional) (Y1 or Y2 type)	Murata Mfg Co Ltd	RA	250Vac min., 125°C (Y1)	IEC
(Alt.)	TDK Corporation	CD	250Vac min., 125°C (Y1)	IEC
(Alt.)	TDK Corporation	CS	250Vac min., 125°C (Y2)	IEC
(Alt.)	Walsin Technology Corp (Pan Overseas Electronic Co Ltd)	AH	250Vac min., 125°C (Y1)	IEC
(Alt.)	Walsin Technology Corp (Pan Overseas Electronic Co Ltd)	AC	250Vac min., 125°C (Y2)	IEC
(Alt.)	Success Electronics Co Ltd	SE	250Vac min., 125°C (Y1)	IEC
Bridge-Cap. (C17) C17 max. 2200pF (Optional) (Y1 type)	Murata Mfg Co Ltd	RA	250Vac min., 125°C	IEC
(Alt.)	TDK Corporation	CD	250Vac min., 125°C	IEC
(Alt.)	Walsin Technology Corp (Pan Overseas Electronic Co Ltd)	AH	250Vac min., 125°C	IEC
(Alt.)	Success Electronics Co Ltd	SE	250Vac min., 125°C	IEC

[서식 CP401-18-00]



기 술 문 서

Technical Document

page : 4 / 15

안전인증번호 : XU100121-23224A
(Certificate No)

접수번호 : KCA2022-13820
(Receipt No)

부품명(회로기호) Components(Part no.)	제조사(상표명) Manufacturer(Brand)	모델명(형식) Model(Type)	정격 또는 특성 (Technical Data)	인증규격 (Certification)
Varistor (MOV1) (Optional)	Thinking Electronic Industrial Co Ltd (Wujin Thinking Electronic Co Ltd)	TVR10yyy-D series (yyy: 471, 511, 561, 621, 681, 751, 821, 911, 102, 112)	300, 320, 350, 395, 420, 465, 510, 550, 625, 680Vac, 40/85/56 6KV/3KA pulse test passed (coating V-0)	IEC/UL
(Alt.)	Thinking Electronic Industrial Co Ltd (Wujin Thinking Electronic Co Ltd)	TVR10yyy-V series (yyy: 471, 511, 561, 621, 681, 751, 821, 911, 102, 112)	300, 320, 350, 395, 420, 465, 510, 550, 625, 680Vac, 40/85/56 6KV/3KA pulse test passed (coating V-0)	IEC/UL
(Alt.)	Thinking Electronic Industrial Co Ltd (Wujin Thinking Electronic Co Ltd)	TVRxyyyy series (xx: 14, 20; yyy: 471, 511, 561, 621, 681, 751, 821, 911, 102, 112)	300, 320, 350, 395, 420, 465, 510, 550, 625, 680Vac, 40/85/56 6KV/3KA pulse test passed (coating V-0)	IEC/UL
(Alt.)	Joyin Co. Ltd	xxSyyyK (xx: 10, 14, 20; yyy: 471, 511, 561, 621, 681, 751, 781, 821, 911, 102, 112)	300, 320, 350, 385, 420, 460, 485, 510, 550, 625, 680Vac; 40/85/56 6KV/3KA pulse test passed (coating V-0)	IEC/UL
(Alt.)	Joyin Co. Ltd	xxNyyyK (xx: 10, 14, 20; yyy: 471, 511, 561, 621, 681, 751, 781, 821, 911, 102, 112, 182)	300, 320, 350, 385, 420, 460, 485, 510, 550, 625, 680, 1000Vac; 40/85/56 6KV/3KA pulse test passed (coating V-0)	IEC/UL
Isolator IC (M6, M8)	Texas Instruments Tucson Corp	UCC21540ADWK R, UCC21540DWKR, UCC21540DWR	Minimum 5700Vac, clearance 8.0mm min., creepage 8.0mm min., 125°C	IEC/UL
(Alt.)	Analog Devices Inc.	ADUM4223BRWZ	Minimum 5000Vac, clearance 8.0mm min., creepage 8.0mm min., 125°C	IEC/UL

[서식 CP401-18-00]



기 술 문 서

Technical Document

page : 5 / 15

안전인증번호 : XU100121-23224A
(Certificate No)

접수번호 : KCA2022-13820
(Receipt No)

부품명(회로기호) Components(Part no.)	제조사(상표명) Manufacturer(Brand)	모델명(형식) Model(Type)	정격 또는 특성 (Technical Data)	인증규격 (Certification)
(Alt.)	Silicon Laboratories Inc Skyworks Solutions, Inc.(for UL)	Si8233BD series, Si8233AD series, Si8235AD series, Si8238AD series, Si8238BD series.	Minimum 5000Vac, clearance 8.5mm min., creepage 8.5mm min., 125°C	IEC/UL
Isolator IC (M35)	Texas Instruments Tucson Corp	ISO7841DWR	Minimum 5700Vac, clearance 8.0mm min., creepage 8.0mm min., 125°C	IEC/UL
(Alt.)	Silicon Laboratories Inc Skyworks Solutions, Inc.(for UL)	SI8641ED-B-IS	Minimum 5000Vac, clearance 8.0mm min., creepage 8.0mm min., 125°C	IEC/UL
Isolator IC (M503)	POWER INTEGRATIONS	INN3xyzC; where x = 1, 2, 6; y = 6, 7; and z = 2 to 8	Minimum 4000Vac, clearance 10.8mm min., creepage 10.8mm min., 125°C	IEC/UL
ICX (M9)	Power Integrations, Inc.	CAP300DG	240V AC, 50-60Hz	-
Relay (REL1) (optional)	Good Sky Electric Co. Ltd.	GQ-SH-112DM2F	250Vac, 16A	IEC/UL
(Alt.)	XIAMEN HONGFA ELECTROACOUSTIC CO LTD	HF32FV-16	250Vac, 16A	IEC/UL
Choke (L1)	AcBel Polytech Inc.(API)	21V30	130°C min.	-
Choke (L4)	AcBel Polytech Inc.(API)	21W77	130°C min.	-
Choke (L5)	AcBel Polytech Inc.(API)	21W14	130°C min.	-
Transformer (T5)	AcBel Polytech Inc.(API)	25R84	Class B	-
Transformer (T401)	AcBel Polytech Inc.(API)	25R83	Class B	-
Transformer (T501)	AcBel Polytech Inc.(API)	25R63	Class B	-

[서식 CP401-18-00]



기 술 문 서

Technical Document

page : 6 / 15

안전인증번호 : XU100121-23224A

(Certificate No)

접수번호 : KCA2022-13820

(Receipt No)

부품명(회로기호) Components(Part no.)	제조사(상표명) Manufacturer(Brand)	모델명(형식) Model(Type)	정격 또는 특성 (Technical Data)	인증규격 (Certification)
Fan	Asia Vital Components Co., Ltd.	DBPT0428B2UP00 7	12V, 1.85A, 35.52 CFM	-
Fan	Asia Vital Components Co., Ltd.	DBPT0428B2SP00 3	12V, 2.8A, 38.35 CFM	-
Fan	Nidec Taiwan Corporation	W40S12BS2E5-57 T08A7	12V, 1.85A, 30.3 CFM	-
Fan	Nidec Taiwan Corporation	W40S12BS3P5-57 T08A1	12V, 3.15A, 37.8 CFM	-
Fan	Sunonwealth Electric Machine Industry Co., Ltd.	VF40281BX-Q790- S9H	12V, 1.9A, 34.3 CFM	-
Fan	Sunonwealth Electric Machine Industry Co., Ltd.	XF40281BX-Q021- S9H	12V, 1.9A, 38.6 CFM	-
Fan	Dongguan Protechnic Electric Co., Ltd.	MGT4012PB-W28	12V, 2.0A, 36.09 CFM	-
Fan	Dongguan Protechnic Electric Co., Ltd.	MGT4012FB-W28	12V, 3.0A, 42.64 CFM	-
PCB (for PCB1, PCB5) (PCB2, PCB3, PCB4, PCB6)	Shenzhen Mankun Electronics Co Ltd	MK-M	V-0, 130 °C	UL
(Alt.)	GUANG DONG ELLINGTON ELECTRONICS TECHNOLOGY CO LTD	ETM02	V-0, 130 °C	UL
(Alt.)	Treasure Shantou Electronic Technologic Company Ltd	T-M1	V-0, 130 °C	UL
(Alt.)	VICTORY GIANT TECHNOLOGY (HUIZHOU) CO LTD	SH50	V-0, 130°C	UL
(Alt.)	SHENZHEN ZHONG LUO ELECTRONICS CO LTD	ZL-04A	V-0, 130°C	UL

[서식 CP401-18-00]



기 술 문 서

Technical Document

page : 7 / 15

안전인증번호 : XU100121-23224A

(Certificate No)

접수번호 : KCA2022-13820

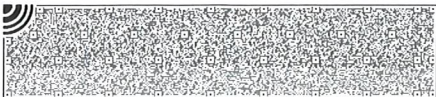
(Receipt No)

부품명(회로기호) Components(Part no.)	제조사(상표명) Manufacturer(Brand)	모델명(형식) Model(Type)	정격 또는 특성 (Technical Data)	인증규격 (Certification)
(Alt.)	SHEN ZHEN SUN & LYNN CIRCUITS CO LTD	SL-M	V-0, 130°C	UL
Thermistor (RT1) (Optional)	Interchangeable	Interchangeable	50 Ω at 25°C , PTC	-
Thermistor (RT2, RT5, RT401, RT601)	Interchangeable	Interchangeable	10K Ω at 25°C , NTC	-
Discharge Resistor (RHV1, RHV2, RHV3)	Interchangeable	Interchangeable	1/4W, 143K Ω	-
Bridge Diode (BD1, BD2)	Interchangeable	Interchangeable	600V min., 25A min.	-
Electrolytic Capacitor (C201)	Interchangeable	Interchangeable	940μF; 105°C min., 450V min.	-
Electrolytic Capacitor (C201)	Interchangeable	Interchangeable	925μF; 105°C min., 450V min.	-
Electrolytic Capacitor (C201)	Interchangeable	Interchangeable	1200μF; 105°C min., 450V min.	-
Electrolytic Capacitor (C201)	Interchangeable	Interchangeable	1020μF; 105°C min., 450V min.	-
Electrolytic Capacitor (C201)	Interchangeable	Interchangeable	1100μF; 105°C min., 450V min.	-
Transistor (Q3, Q53)	Interchangeable	Interchangeable	600V min., 24A min.	-
Transistor (Q1, Q2, Q11, Q21)	Interchangeable	Interchangeable	600V min., 25A min.	-
Metal Enclosure	Interchangeable	Interchangeable	0.8mm min.	-

3. 전기용품안전인증의 변경현황(Status of Certificate Revisions)

일자(Date)	발급현황(Status of issues)
	변경내용(Modification of Contents)

[서식 CP401-18-00]



기술 문서 Technical Document

page : 8 / 15

안전인증번호 : XU100121-23224A
(Certificate No)

접수번호 : KCA2022-13820
(Receipt No)

2023/01/12	신규발급(파생)

4. 기타(Carefully Informed Note)

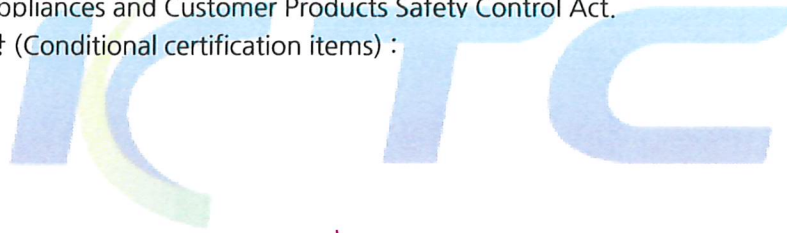
- 1) 안전관리부품 및 재질목록에 기재된 사항은 안전에 직접적인 영향을 주는 부분이므로 내용을 변경 또는 복수등재를 원하는 경우 안전인증변경신청 또는 안전확인변경신고를 하여야 합니다. 안전인증변경신청 또는 안전확인변경신고를 하지 않고 임의로 변경하는 경우에는 전기용품 및 생활용품 안전관리법에 따라 행정조치 될수 있습니다.

The certificate holder should apply for a revision of the certificate if the registered critical components are to be changed, modified or alternated. Should the contents of Certificate are altered without the application for the modification, the administrative measures can occur according to the Electrical Appliances and Consumer Products Safety Control Act.

- 2) 공장주소(전화번호포함), 대표자, 상호 및 부품변경, 신고인정보 등 안전인증 또는 안전확인신고의 내용이 변경되었을 때, 안전인증변경신청 또는 안전확인변경신고를 하지 않을 경우에는 전기용품 및 생활용품 안전관리법에 따라 행정조치 될 수 있습니다.

Should a factory address, president name, manufacturer name and critical component are altered without the application for the modification, the administrative measures can occur according to the Electrical Appliances and Customer Products Safety Control Act.

- 3) 조건부 인증사항 (Conditional certification items) :



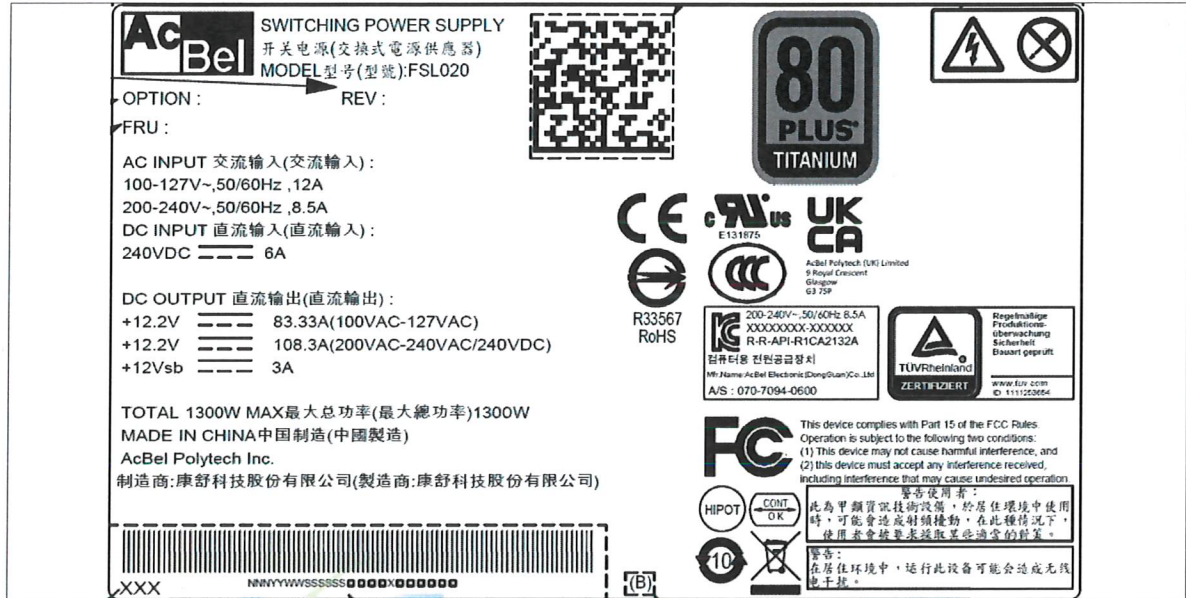
기술문서붙임자료

page : 9 / 15

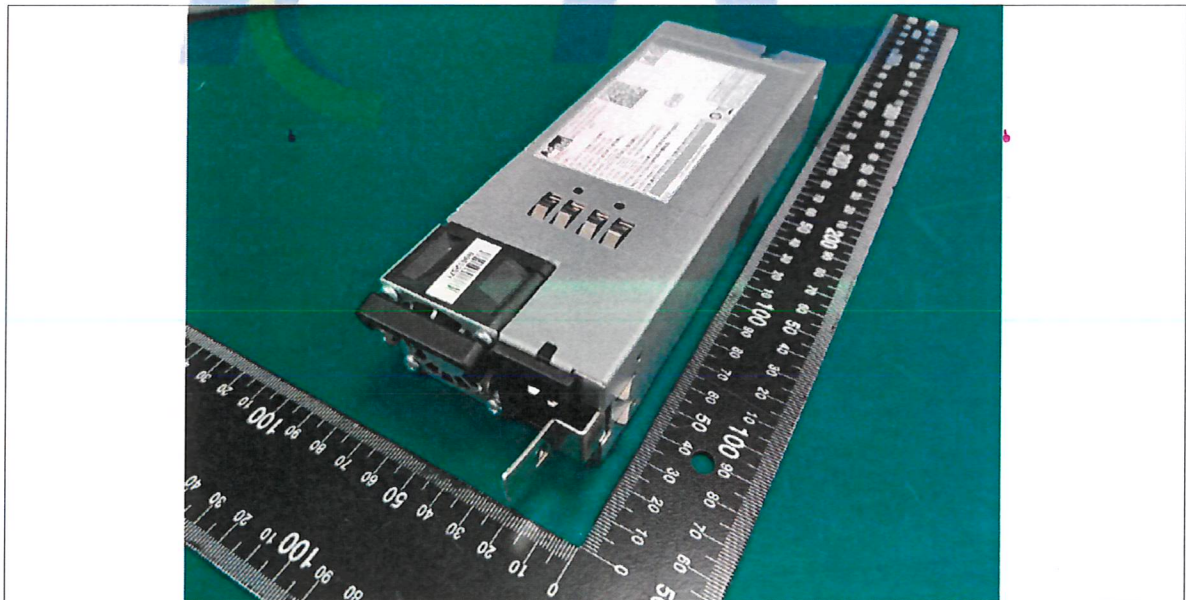
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접수번호 : KCA2022-13820

NO. 1 Label



NO. 2 Picture



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Korea Testing Certification

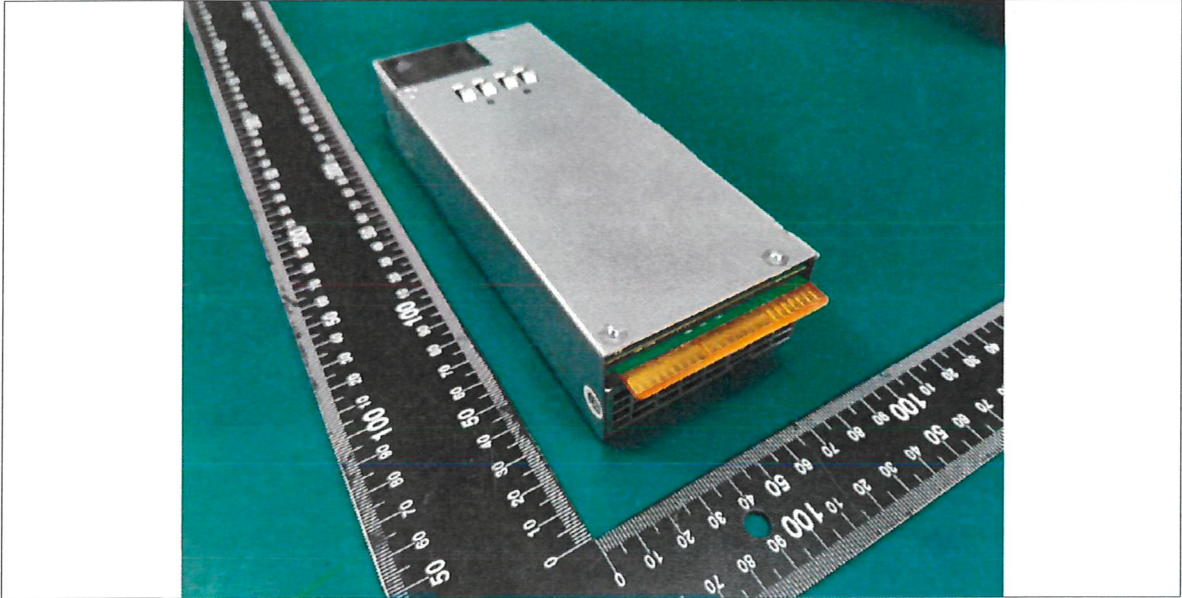
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page : 10 / 15

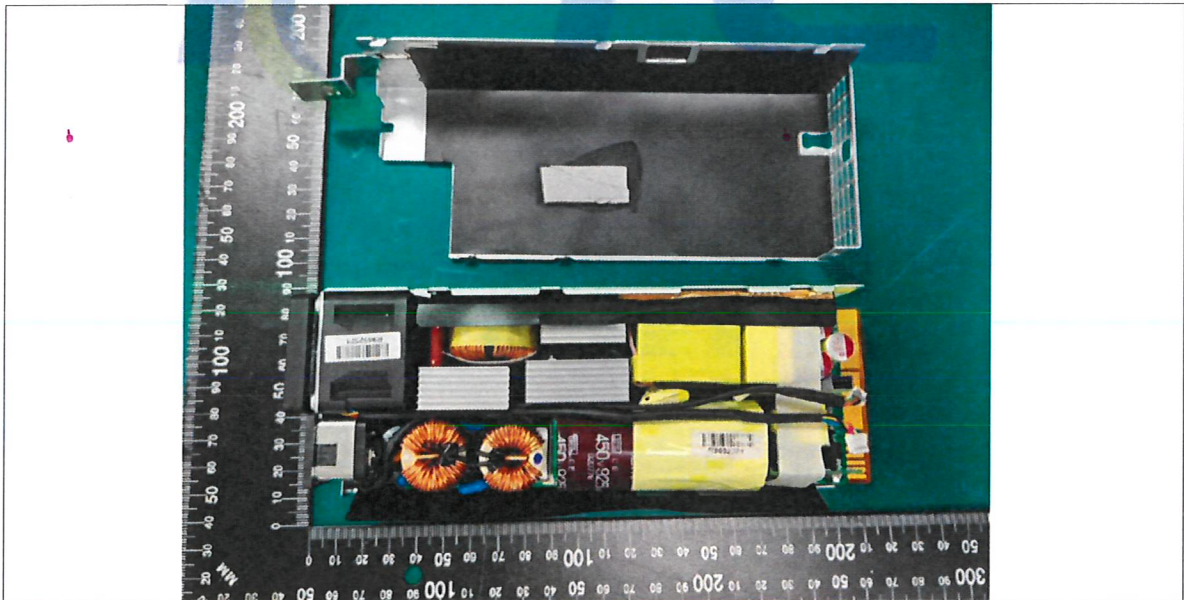
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NO. 4 Picture



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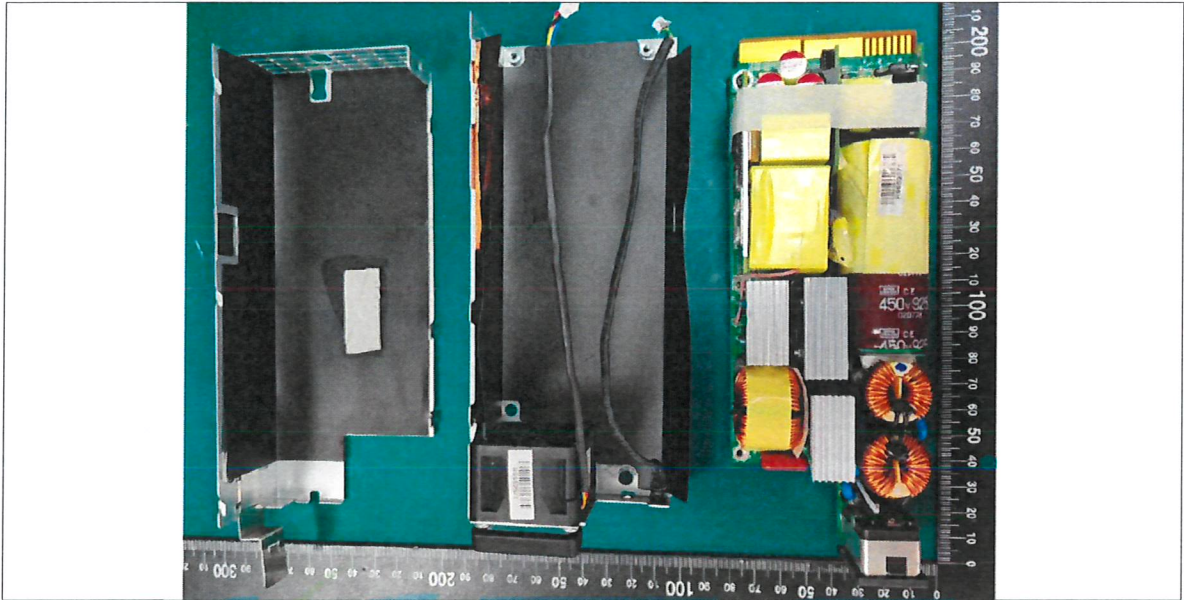
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page : 11 / 15

안전인증번호 : XU100121-23224A

접수번호 : KCA2022-13820

NO. 5 Picture



NO. 6 Picture



한국기계전기전자시험연구원
Korea Testing Certification



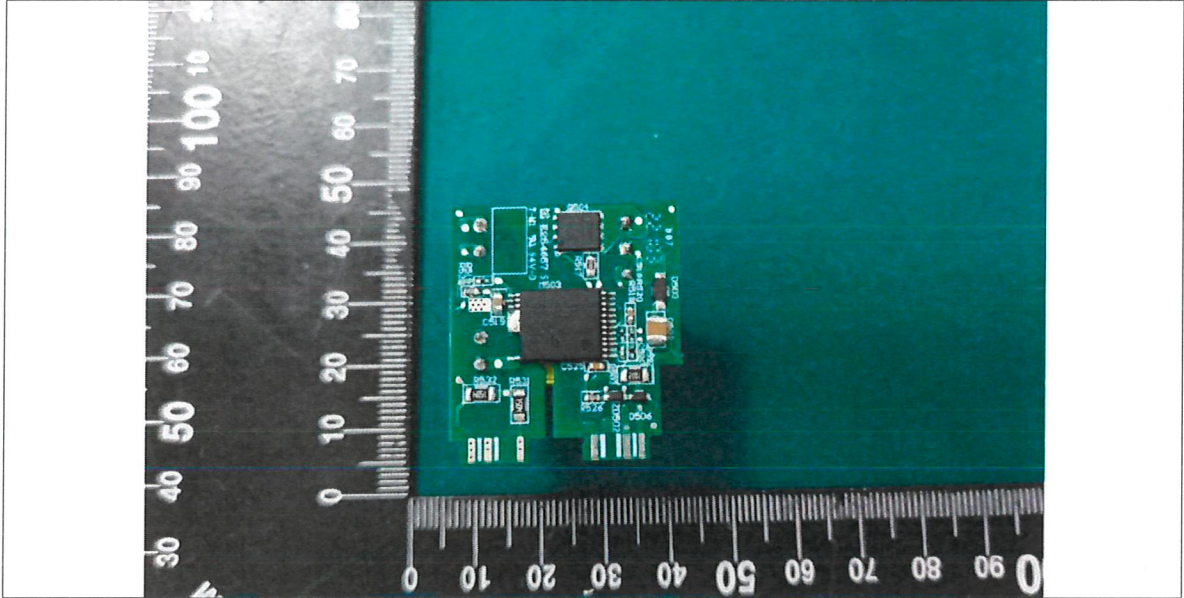
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page : 12 / 15

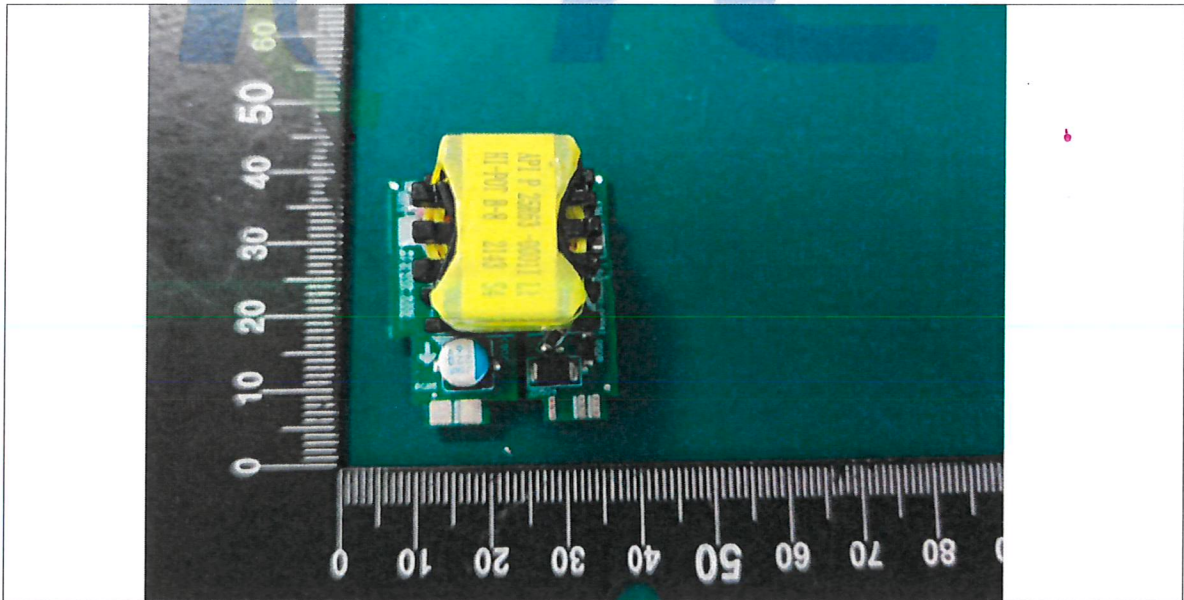
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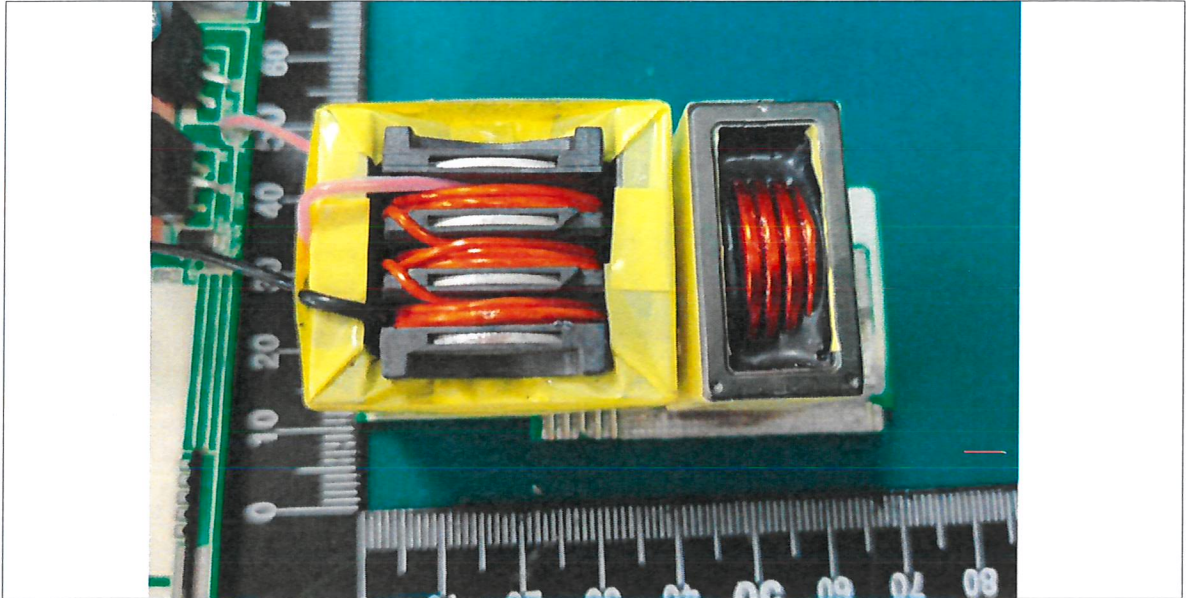
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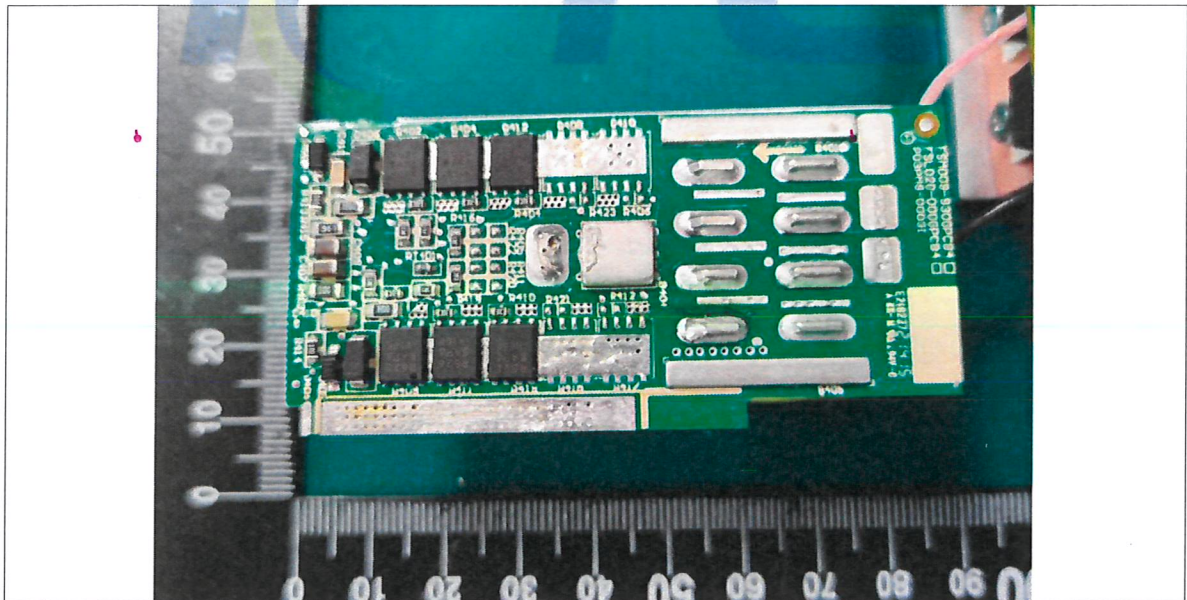
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접수번호 : KCA2022-13820

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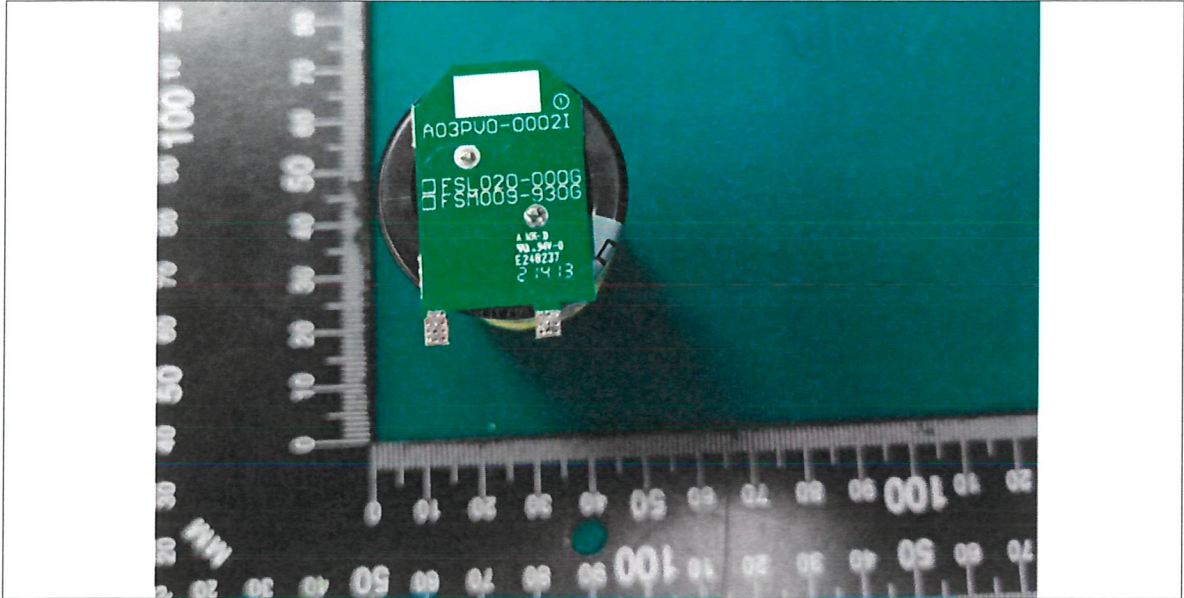
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page : 14 / 15

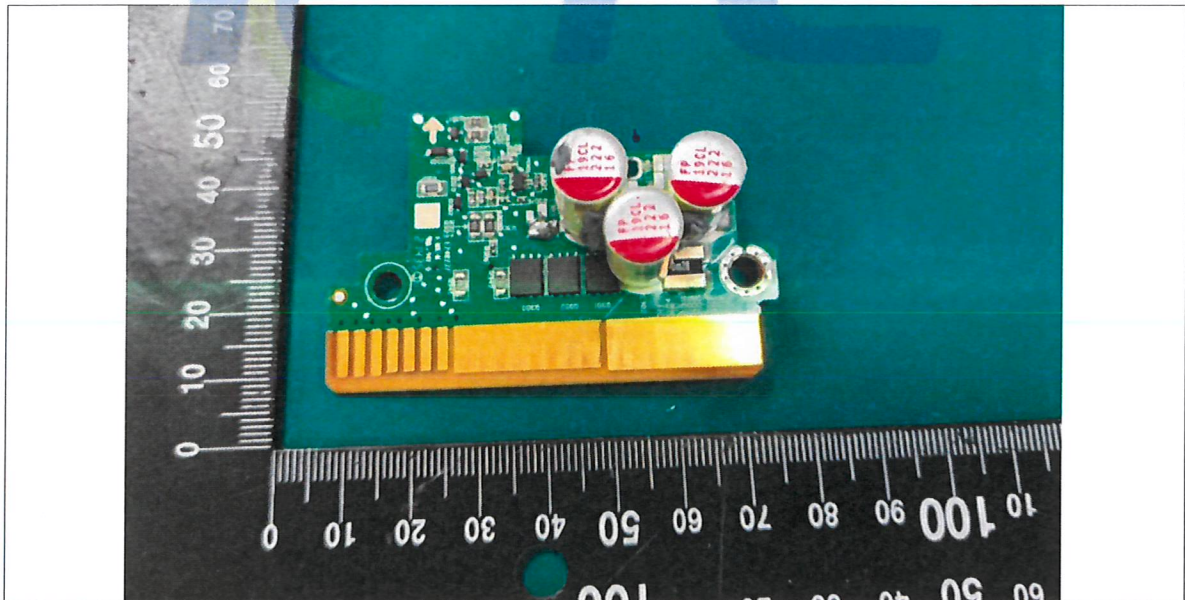
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접수번호 : KCA2022-13820

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Korea Testing Certification



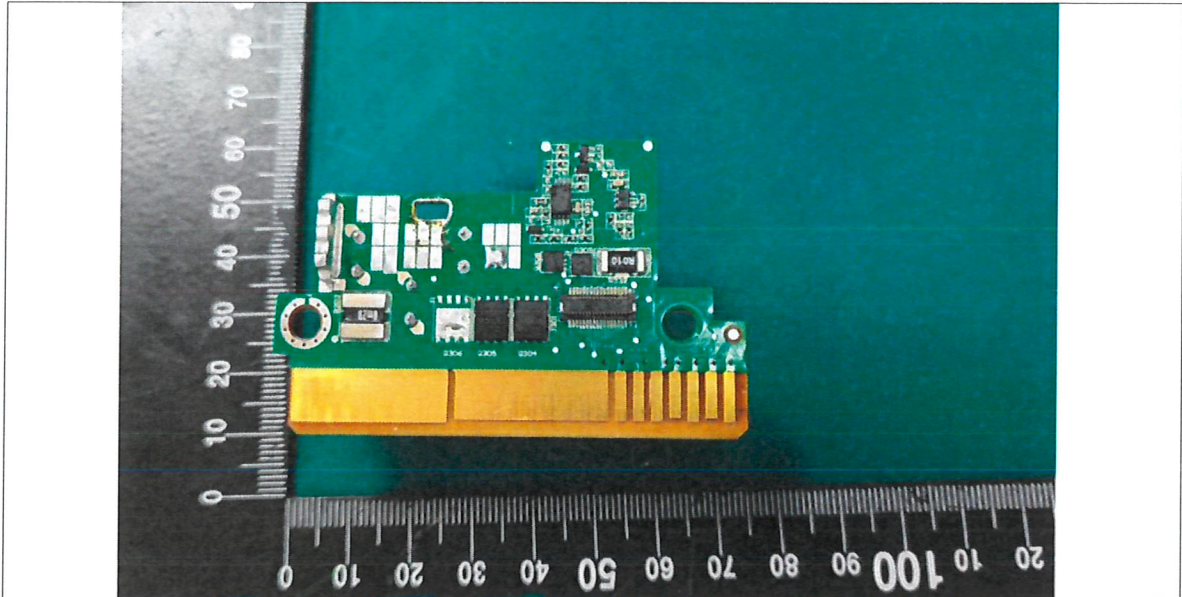
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page : 15 / 15

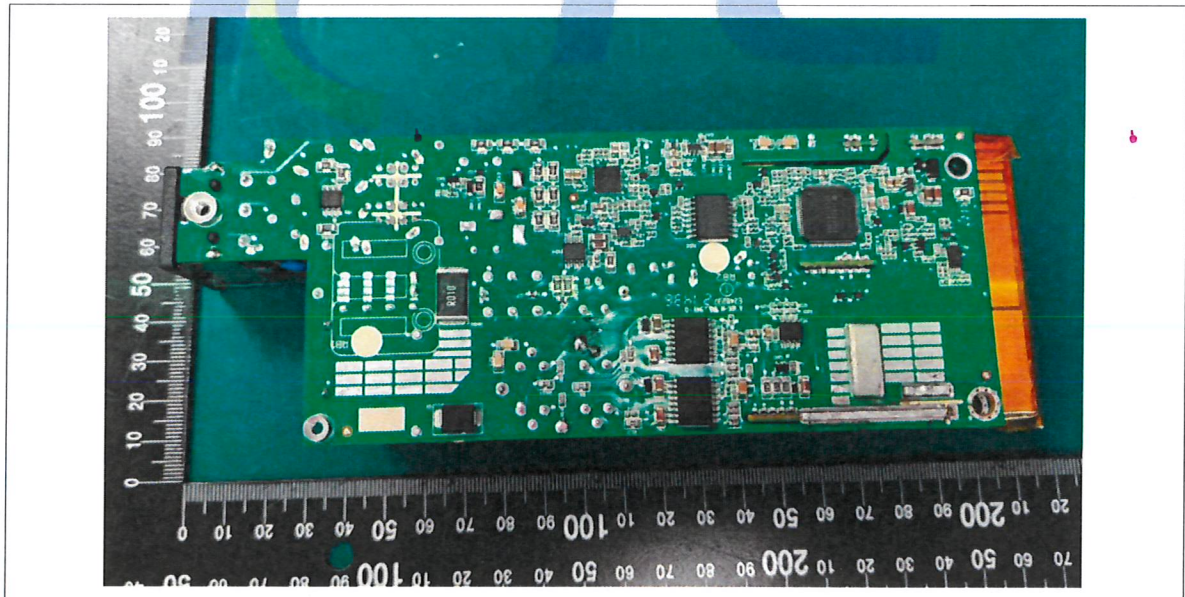
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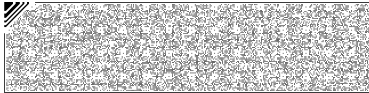
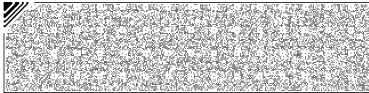
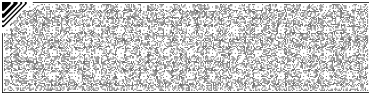
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한국기계전기전자시험연구원
Korea Testing Certification



변경신고 처리결과 통보서				
전자민원신청번호		202317210000024617	접수일자	2023-01-12
대상기기	상호 또는 성명	ACBEL POLYTECH INC.	적합성평가 분야	적합등록
	기자재 명칭	Switching Power Supply	기본모델명	FSL020
	적합성평가 번호	R-R-API-R1CA2132A	적합성평가 연 월 일	2023-01-12
변경 사항		변경 전	변경 후	
기타			대치용 커패시터 모델 1. HU2W941MCZS11WPEC 2.B43647 3.450 MXT 1200 M EHC SN 30X70 (사용모델:FSL020, R1CA2132A, FSM041, R1CA2132E) 4. HU2W811MCZS9WPEC 5. 450 MXH 810 M EFC SN 30X60 6. PO2W811MND3060EMY (사용모델:FSM009, R1CA2801H, FSM042, R1CA2801L)	
「방송통신기자재등의 적합성평가에 관한 고시」 제16조에 따른 적합성평가 사항의 변경신고 건에 대하여 위와 같이 변경처리 되었음을 알려드립니다. 2023년(Year) 01월(Month) 12일(Date) 국립전파연구원장 국립전파연구원장인				



방송통신기자재등의 적합등록 필증

Registration of Broadcasting and Communication Equipments

상호 또는 성명 Trade Name or Registrant	ACBEL POLYTECH INC.
기자재명칭(제품명칭) Equipment Name	Switching Power Supply
기기부호/추가 기기부호 Equipment code /Additional Equipment code	IMI
기본모델명 Basic Model	FSL020
파생모델명 Series Model	FSM041, R1CA2801H, R1CA2132A, FSM009, R1CA2801L, R1CA2132E, FSM042
등록번호 Registration No.	R-R-API-R1CA2132A
제조사/제조국가 Manufacturer/Country of	ACBEL POLYTECH INC., ACBEL ELECTRONIC (WUHAN) CO., LTD, Acbel Electronic (Dong Guan) Co., Ltd., Acbel Polytech (Philippines) INC./대만, 중국, 필리핀
등록연월일 Date of Registration	2023-01-05
기타 Others	대치용 커패시터 모델 1.HU2W941MCZS11WPBC 2.B43647 3.450 MXT 1200 M EHC SN 30X70 (사용모델:FSL020, R1CA2132A, FSM041, R1CA2132E) 4. HU2W811MCZS9WPBC 5. 450 MXH 810 M EFC SN 30X60 6. PO2W811MND3060EMY (사용모델:FSM009, R1CA2801H, FSM042, R1CA2801L)

위 기자재는 「전파법」 제58조의2 제3항에 따라 등록되었음을 증명합니다.

It is verified that foregoing equipment has been registered under the Clause 3, Article 58-2 of Radio Waves Act.

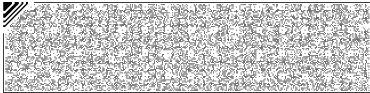
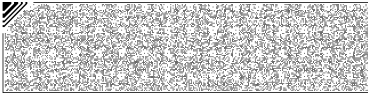
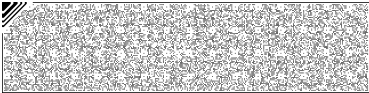
2023년(Year) 01월(Month) 12일(Day)

국립전파연구원장



Director General of National Radio Research Agency

※ 적합등록 방송통신기자재는 반드시 "적합성평가표시" 를 부착하여 유통하여야 합니다.
위반시 과태료 처분 및 등록이 취소될 수 있습니다.





भारतीय मानक ब्यूरो

(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)

BUREAU OF INDIAN STANDARDS

(Ministry of Consumer Affairs, Food & Public Distribution,
Govt. of India)

मानक भवन, 9 बहादुर शाह जफर मार्ग, नई दिल्ली - 110002
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi - 110002
दूरभाष/Phone: +91-11-23230856/2323010131/23233375/23239402
ई-मेल/E-mail: registration@bis.gov.in
वेबसाइट/Website: <https://bis.gov.in/>, <https://www.crsbis.in/BIS/>

Our Ref: REGISTRATION /CRS-2021-3957/R-41196150

Dated: 2023-06-02
18:17:20

RENEWAL ID : 20576

Subject : RENEWAL OF LICENCE R-41196150 AS PER IS 13252(Part 1):2010/ IEC 60950-1 : 2005

Acbel Electronics (Dong Guan) Co Ltd
HORNG YEH INDUSTRIAL DISTRICT TANG XIA TOWN DONGGUAN GUANGDONG CHINA
GUANGDONG, China, 0



Dear Sir/Madam,

With reference to your online application dated 02-06-2023 for renewal of the above mentioned licence; this is to inform you that the same has been renewed from **20-07-2023** to **19-07-2026**.

It may be noted that the said licence granted under clause (b) of sub section (2) of section 13 of the Act shall *expire* at the end of the period for which it is granted unless renewed or its renewal is deferred. You are, therefore, requested to apply for next renewal to BIS within three months before the expiration of the licence.

Thanking you.

Yours faithfully,

Registration Department
Bureau of Indian Standards,
9, Bahadur Shah Zafar Marg,
New Delhi-110002.
Telfax : +91-11-23230856
E-mail: registration@bis.gov.in

Note: This is a system generated letter. Hence signature is not required.
To verify authentication of letter, kindly scan the QR code on this letter.

For details information on BIS, consult the e-BIS Portal (www.manakonline.in).
Please use BIS CARE APP for verification of ISI-marked goods and hallmarked gold jewellery.

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart B, Class A
ANSI C63.4: 2014

Report No.: FDBEDU-WTW-P22040299B

Product: Switching Power Supply

Brand: AcBel

Model No.: FSM009, FSL020

Series Model: R1CA2132A, R1CA2801H, FSM042, R1CA2801L, FSM041, R1CA2132E

Received Date: 2023/4/25

Test Date: 2023/4/26

Issued Date: 2023/5/15

Applicant: AcBel Polytech Inc.

Address: No.159, Sec. 3, Danjin Rd., Tamsui Dist., New Taipei City 251, Taiwan (R.O.C.)

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

FCC Registration /

Designation Number: 418586 / TW1078

Approved by:


Jim Hsiang / Associate Technical Manager

Date:

2023/5/15

This test report consists of 26 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The test results in the report only apply to the tested sample. The test results in this report are traceable to the national or international standards.



Prepared by : Vivian Chen / Senior Specialist

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

Table of Contents

Release Control Record	3
1 Certificate.....	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Supplementary Information	5
3 General Information	6
3.1 Description of EUT	6
3.2 Primary Clock Frequencies of Internal Source.....	6
3.3 Features of EUT	6
3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode	7
3.5 Test Program Used and Operation Descriptions	7
3.6 Connection Diagram of EUT and Peripheral Devices	8
3.7 Configuration of Peripheral Devices and Cable Connections	8
4 Test Instruments	9
4.1 Conducted Emissions from Power Ports	9
4.2 Radiated Emissions up to 1 GHz	10
5 Limits of Test Items.....	11
5.1 Conducted Emissions from Power Ports	11
5.2 Radiated Emissions up to 1 GHz	11
6 Test Arrangements	12
6.1 Conducted Emissions from Power Ports	12
6.2 Radiated Emissions up to 1 GHz	13
7 Test Results of Test Item	14
7.1 Conducted Emissions from Power Ports	14
7.2 Radiated Emissions up to 1 GHz	18
8 Pictures of Test Arrangements	22
8.1 Conducted Emissions from Power Ports	22
8.2 Radiated Emissions up to 1 GHz	24
9 Information of the Testing Laboratories	26

Release Control Record

Issue No.	Description	Date Issued
FDBEDU-WTW-P22040299B	Original release.	2023/5/15

1 Certificate

Product: Switching Power Supply

Brand: AcBel

Test Model: FSM009, FSL020

Series Model: R1CA2132A, R1CA2801H, FSM042, R1CA2801L, FSM041, R1CA2132E

Sample Status: Engineering sample

Applicant: AcBel Polytech Inc.

Test Date: 2023/4/26

Standard: 47 CFR FCC Part 15, Subpart B, Class A
ANSI C63.4: 2014

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

2 Summary of Test Results

The test items that the EUT need to perform in accordance with its interfaces, evaluated functions, are as follows:

Standard / Clause	Test Item	Result	Remark
FCC Part 15.107	Conducted Emissions from Power Ports	Pass	Minimum passing Class A margin is -7.74 dB at 0.16190 MHz
FCC Part 15.109	Radiated Emissions up to 1 GHz	Pass	Minimum passing Class A margin is -9.82 dB at 155.52 MHz

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Specification	Expanded Uncertainty (k=2) (±)	Maximum allowable uncertainty (±)
Conducted Emissions from Power Ports	9 kHz ~ 30 MHz	3.00 dB	3.4 dB (U_{CISPR})
Radiated Emissions up to 1 GHz	30 MHz ~ 1 GHz	3m: 5.44 dB 10m: 4.02 dB	6.3 dB (U_{CISPR})

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 Description of EUT

Product	Switching Power Supply
Brand	AcBel
Test Model	FSM009, FSL020
Series Model	R1CA2132A, R1CA2801H, FSM042, R1CA2801L, FSM041, R1CA2132E
Model Difference	Refer to note as below
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	Rating: Refer to note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. This report is issued as a supplementary report to BV CPS report no.: FDBEDU-WTW-P22040299. The difference compared with original report is for add models (as below shaded area). Therefore the EUT is re-tested in this report.

Model	Rating	Wind Direction	Airflow	Model Difference
FSL020	AC I/P: 100-127V, 50/60Hz, 12A; 200-240V, 50/60Hz, 8.5A; DC I/P: 240V, 6A DC O/P: +12.2V, 83.33A (100-127V) +12.2V, 108.3A (200-240V & 240Vdc) +12Vsb, 3A Total 1300W	AFO	30.3CFM min	For Marketing difference
R1CA2132A		AFI	38.35CFM min	
FSM041				
R1CA2132E				
FSM009	AC I/P: 100-240V, 50/60Hz, 10A; DC I/P: 240V, 5A DC O/P: +12.2V, 66A +12Vsb, 3A Total 800W	AFO	30.3CFM min	For Marketing difference
R1CA2801H		AFI		
FSM042				
R1CA2801L				

During the test, **Model: FSL020, FSM009** were selected as the representative pre-test models.

3.2 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 30-60kHz, provided by AcBel Polytech Inc., for detailed internal source, please refer to the manufacturer's specifications.

3.3 Features of EUT

The tests reported herein were performed according to the method specified by AcBel Polytech Inc., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

Please refer to appendix of the report if the applicant has provided additional descriptions of the EUT.

3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode

The EUT has been pre-tested under following test modes.

Test Condition	
Mode	Conducted Emissions from Power Ports
1	FSL020 + full load + Input Power(120 Vac, 60 Hz)
2	FSL020 + full load + Input Power(240 Vac, 60 Hz)
3	FSL020 + full load + Input Power(240 Vdc)
4	FSM009 + full load + Input Power(120 Vac, 60 Hz)
5	FSM009 + full load + Input Power(240 Vac, 60 Hz)
6	FSM009 + full load + Input Power(240 Vdc)
Note: The worst case is that modes 3 and 6 are shown in bold.	
Mode	Radiated Emissions up to 1 GHz
1	FSL020 + full load + Input Power(240 Vdc)
2	FSM009 + full load + Input Power(240 Vdc)
3	FSL020 + full load + Input Power(120 Vac, 60 Hz)
4	FSM009 + full load + Input Power(120 Vac, 60 Hz)
Note: The worst case is that modes 1 and 2 are shown in bold.	

Test modes are presented in the report as below.

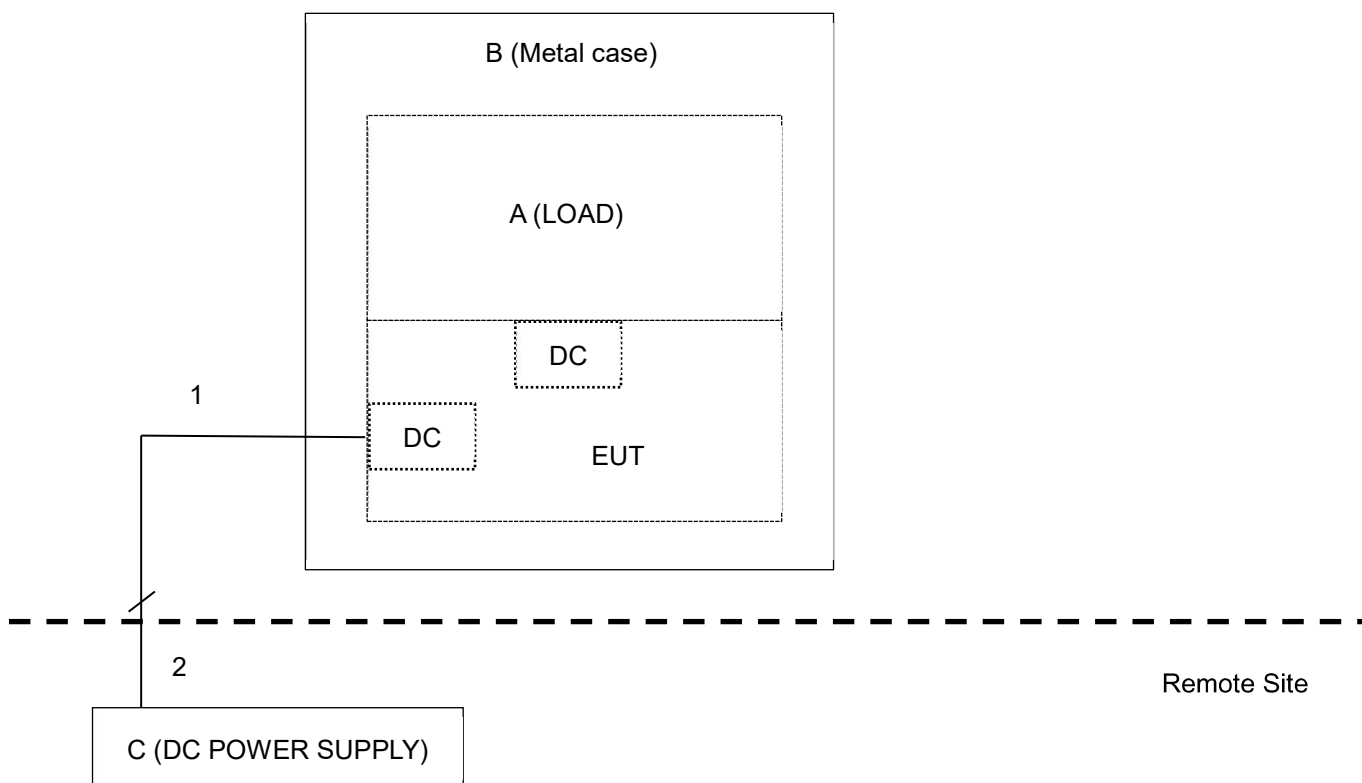
Test Condition	
Mode	Conducted Emissions from Power Ports
A	FSL020 + full load + Input Power(240 Vdc)
B	FSM009 + full load + Input Power(240 Vdc)
Mode	Radiated Emissions up to 1 GHz
A	FSL020 + full load + Input Power(240 Vdc)
B	FSM009 + full load + Input Power(240 Vdc)

3.5 Test Program Used and Operation Descriptions

Connected a resistor load with EUT and installed both of them into a metal case and then set the EUT under full resistor load for the test.

3.6 Connection Diagram of EUT and Peripheral Devices

DC Input:



3.7 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	LOAD	N/A	N/A	N/A	N/A	Supplied by applicant
B	Metal case	N/A	N/A	N/A	N/A	Supplied by applicant
C	DC Power supply	CHROMA	62150H-600S	62150EC00479	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	AC / DC power(3pin) cable	1	1.8	No	0	Provided by Lab
2	DC power cable	1	10	No	0	Provided by Lab

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Conducted Emissions from Power Ports

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal LYNICS	0900510	E1-011285	2022/9/19	2023/9/18
		E1-011286	2022/9/19	2023/9/18
50 Ohms Terminator LYNICS	0900510	E1-01-305	2023/2/13	2024/2/12
Attenuator STI	STI02-2200-10	NO.3	2022/10/21	2023/10/20
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2022/6/1	2023/5/31
	CDNE-M3	00091	2022/6/1	2023/5/31
Coupling/Dcoupling Network TESEQ	CDN A201A	44601	2022/12/14	2023/12/13
DC LISN R&S	ESH3-Z6	100219	2022/8/2	2023/8/1
		844950/018	2022/8/2	2023/8/1
DC LISN Schwarzbeck	NNLK 8121	8121-808	2022/4/29	2023/4/28
High Voltage Probe Schwarzbeck	TK9420	00982	2022/12/14	2023/12/13
Isolation Transformer Erika Fiedler	D-65396	017	2022/9/8	2023/9/7
LISN EMCO	3825/2	9204-1964	2022/6/17	2023/6/16
		9504-2359	2022/8/2	2023/8/1
LISN R&S	ENV216	101195	2022/8/1	2023/7/31
		101196	2022/5/24	2023/5/23
		101197	2022/7/5	2023/7/4
LISN Schwarzbeck	NNLK 8121	8121-731	2022/5/26	2023/5/25
		8121-00759	2022/8/18	2023/8/17
	NNLK8129	8129229	2022/6/8	2023/6/7
RF Coaxial Cable Commate	5D-FB	Cable-CO3-01	2022/9/14	2023/9/13
Software BVADT	Cond_V7.3.7.4	N/A	N/A	N/A
Test Receiver R&S	ESR3	102413	2023/2/7	2024/2/6

Notes:

1. The test was performed in Linkou Conduction 3.
2. The VCCI Site Registration No. C-10274.
3. Tested Date: 2023/4/26

4.2 Radiated Emissions up to 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Attenuator Mini-Circuits	UNAT-5+	PAD-CH8-01	2022/9/23	2023/9/22
		PAD-CH8-02	2022/9/23	2023/9/22
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2022/6/1	2023/5/31
	CDNE-M3	00091	2022/6/1	2023/5/31
Pre_Amplifier EMCI	EMC9135	980326	2023/2/16	2024/2/15
		980327	2023/2/16	2024/2/15
RF Coaxial Cable JYEBAO	LMR-600	Cable-CH8-01	2022/9/23	2023/9/22
		Cable-CH8-02	2022/9/23	2023/9/22
RF Coaxial Cable Pacific	8D-FB	Cable-CH8-03	2022/9/23	2023/9/22
Software BVADT	Radiated_V8.7.08	N/A	N/A	N/A
Test Receiver R&S	ESR3	102983	2022/5/30	2023/5/29
		102984	2022/6/10	2023/6/9
Tower Max Full.	MF7802	MF780208105	N/A	N/A
TRILOG Broad Band Antenna Schwarzbeck	VULB 9168	9168-316	2022/11/21	2023/11/20
		9168-317	2022/11/21	2023/11/20
Turn Table & Tower Max Full.	MF7802	MF7802121	N/A	N/A

Notes:

1. The test was performed in Linkou 10M Chamber (Chamber 8) , The test site validated date: 2022/8/27 (NSA)
2. The VCCI Site Registration No. R-12946.
3. Tested Date: 2023/4/26

5 Limits of Test Items

5.1 Conducted Emissions from Power Ports

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Notes: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Radiated Emissions up to 1 GHz

Emissions radiated outside of the specified bands, shall be according to the general radiated limits as following:

Radiated Emissions Limits at 10 meters (dBµV/m)				
Frequencies (MHz)	FCC 15B, Class A	FCC 15B, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39.1	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960			47	37
960-1000	49.5	43.5		

Radiated Emissions Limits at 3 meters (dBμV/m)				
Frequencies (MHz)	FCC 15B, Class A	FCC 15B, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40.0	50.5	40.5
88-216	54.0	43.5		
216-230	56.9	46.0		
230-960				
960-1000	60.0	54.0	57.5	47.5

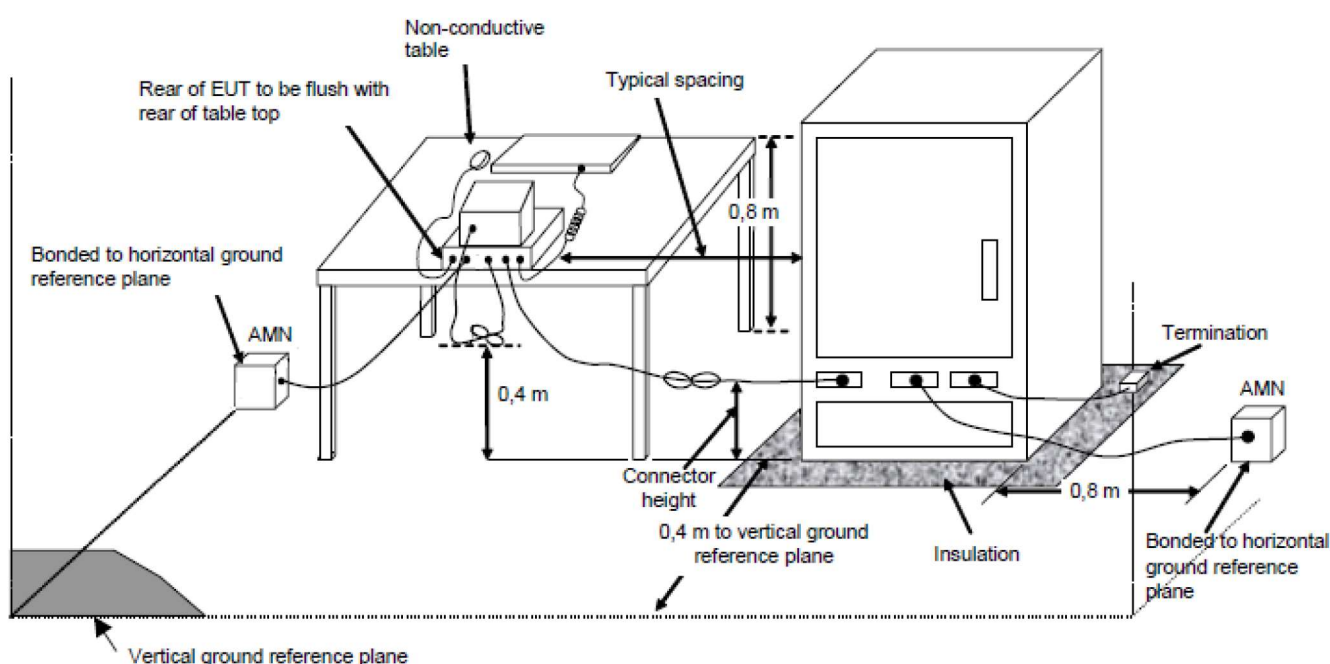
Notes: 1. The lower limit shall apply at the transition frequencies.

6 Test Arrangements

6.1 Conducted Emissions from Power Ports

- a. For the table-top EUT is placed on a 0.8 meter insulation table; for the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The EUT is placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units are connected to the power mains through another LISN. They provide coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

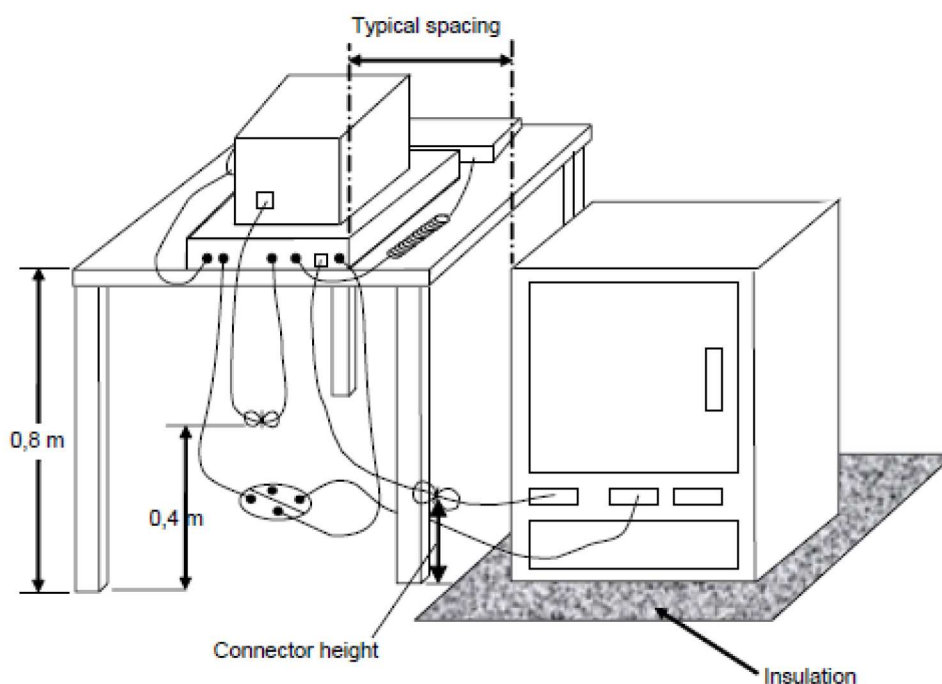


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

6.2 Radiated Emissions up to 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

7 Test Results of Test Item

7.1 Conducted Emissions from Power Ports

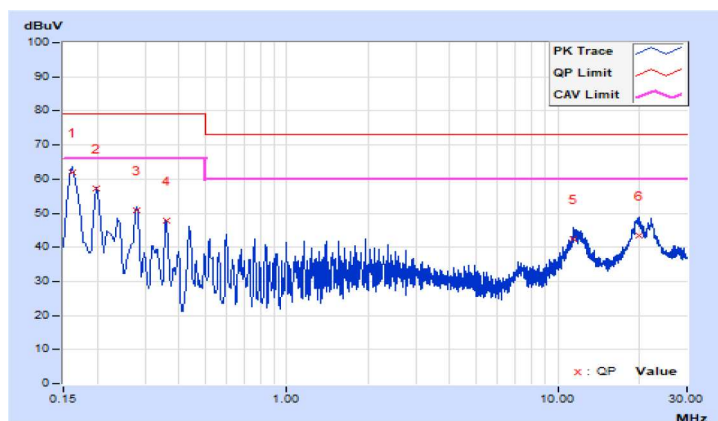
Mode A

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16190	10.06	51.87	48.20	61.93	58.26	79.00	66.00	-17.07	-7.74
2	0.19800	10.05	47.17	46.79	57.22	56.84	79.00	66.00	-21.78	-9.16
3	0.27800	10.06	40.87	40.61	50.93	50.67	79.00	66.00	-28.07	-15.33
4	0.35900	10.07	37.87	37.52	47.94	47.59	79.00	66.00	-31.06	-18.41
5	11.45600	10.39	32.08	27.89	42.47	38.28	73.00	60.00	-30.53	-21.72
6	19.97200	10.61	32.69	26.35	43.30	36.96	73.00	60.00	-29.70	-23.04

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

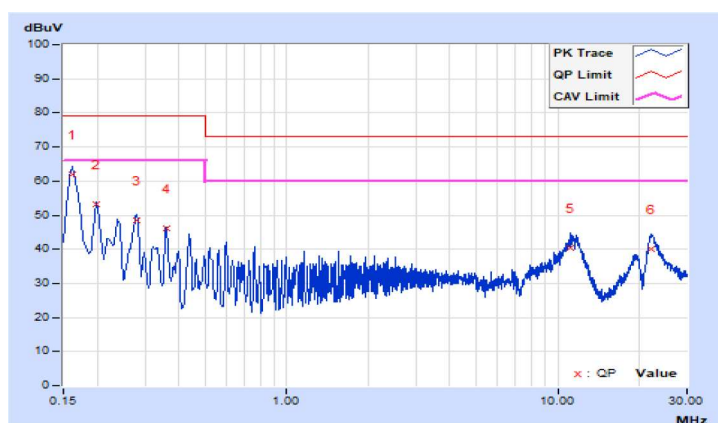


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16190	10.06	51.91	47.92	61.97	57.98	79.00	66.00	-17.03	-8.02
2	0.19800	10.06	43.30	42.55	53.36	52.61	79.00	66.00	-25.64	-13.39
3	0.27786	10.07	38.39	37.20	48.46	47.27	79.00	66.00	-30.54	-18.73
4	0.36098	10.08	36.13	35.27	46.21	45.35	79.00	66.00	-32.79	-20.65
5	11.17600	10.39	30.14	24.96	40.53	35.35	73.00	60.00	-32.47	-24.65
6	22.06000	10.67	29.44	23.47	40.11	34.14	73.00	60.00	-32.89	-25.86

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



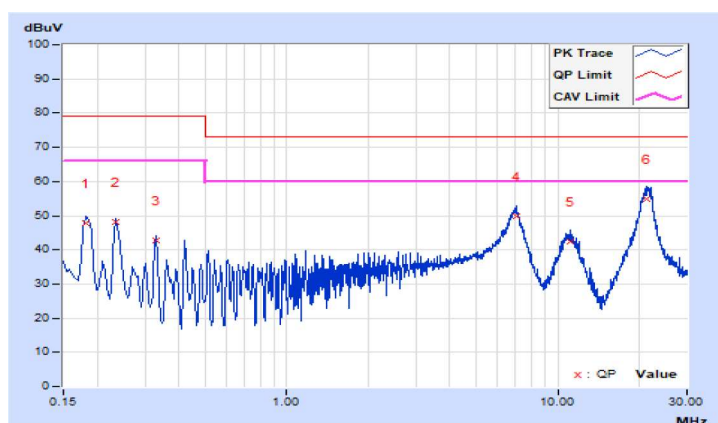
Mode B

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18180	10.05	37.67	34.11	47.72	44.16	79.00	66.00	-31.28	-21.84
2	0.23546	10.05	37.95	37.75	48.00	47.80	79.00	66.00	-31.00	-18.20
3	0.32976	10.06	32.81	31.00	42.87	41.06	79.00	66.00	-36.13	-24.94
4	7.00400	10.28	39.41	27.94	49.69	38.22	73.00	60.00	-23.31	-21.78
5	11.20400	10.38	32.11	26.67	42.49	37.05	73.00	60.00	-30.51	-22.95
6	21.32800	10.63	44.21	37.94	54.84	48.57	73.00	60.00	-18.16	-11.43

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

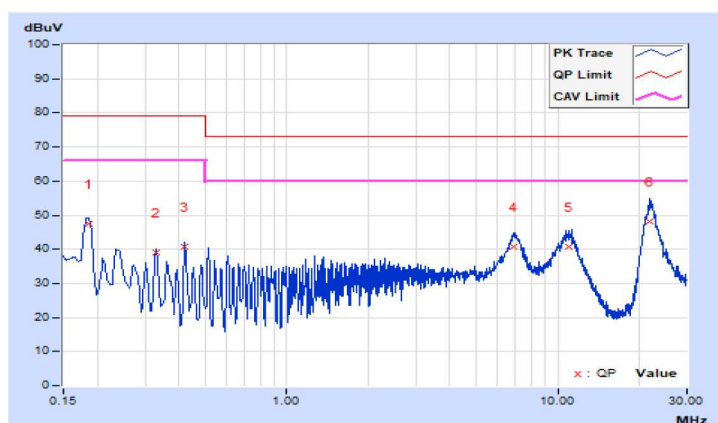


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18600	10.06	37.28	34.31	47.34	44.37	79.00	66.00	-31.66	-21.63
2	0.32976	10.07	29.03	26.05	39.10	36.12	79.00	66.00	-39.90	-29.88
3	0.42200	10.08	30.71	27.55	40.79	37.63	79.00	66.00	-38.21	-28.37
4	6.88000	10.27	30.35	19.00	40.62	29.27	73.00	60.00	-32.38	-30.73
5	10.92800	10.38	30.26	22.21	40.64	32.59	73.00	60.00	-32.36	-27.41
6	21.97200	10.67	37.39	30.23	48.06	40.90	73.00	60.00	-24.94	-19.10

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



7.2 Radiated Emissions up to 1 GHz

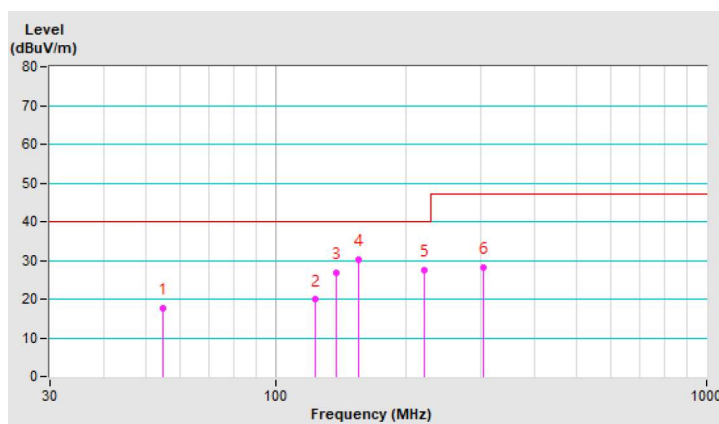
Mode A

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	54.93	17.69 QP	40.00	-22.31	4.00 H	168	35.06	-17.37
2	123.61	19.90 QP	40.00	-20.10	4.00 H	121	38.64	-18.74
3	138.50	26.77 QP	40.00	-13.23	4.00 H	106	43.98	-17.21
4	155.52	30.18 QP	40.00	-9.82	4.00 H	326	46.43	-16.25
5	221.73	27.59 QP	40.00	-12.41	3.89 H	19	46.91	-19.32
6	302.78	28.21 QP	47.00	-18.79	3.71 H	31	43.64	-15.43

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

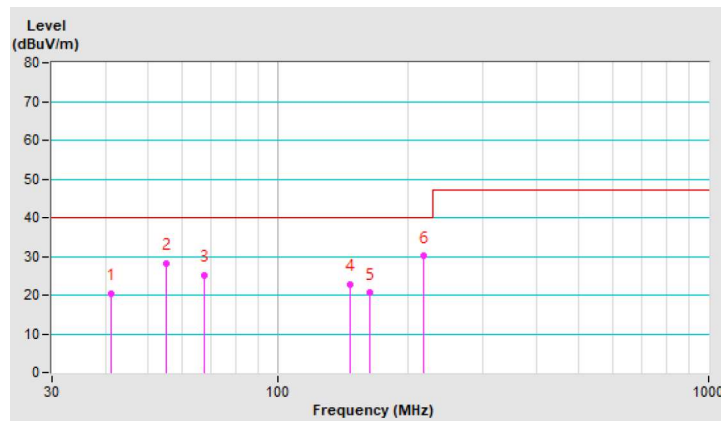


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	41.20	20.42 QP	40.00	-19.58	2.13 V	52	38.57	-18.15
2	55.37	28.13 QP	40.00	-11.87	1.52 V	187	45.68	-17.55
3	67.44	25.09 QP	40.00	-14.91	1.76 V	313	44.11	-19.02
4	146.99	22.70 QP	40.00	-17.30	1.00 V	176	39.19	-16.49
5	163.28	20.55 QP	40.00	-19.45	1.00 V	86	37.02	-16.47
6	218.04	30.02 QP	40.00	-9.98	1.00 V	120	49.60	-19.58

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



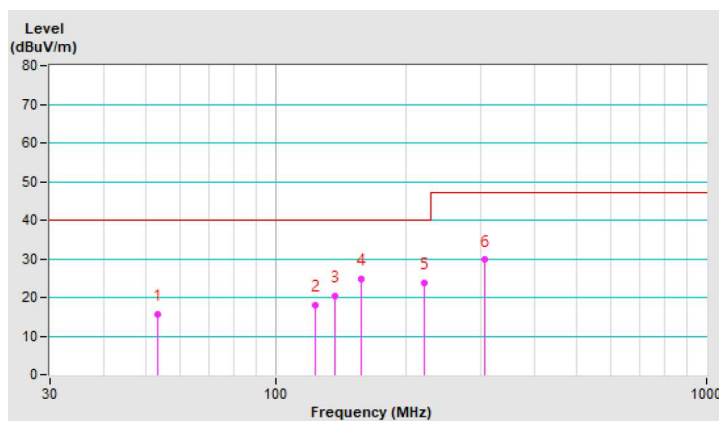
Mode B

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.28	15.74 QP	40.00	-24.26	4.00 H	130	32.91	-17.17
2	124.00	17.90 QP	40.00	-22.10	3.78 H	330	36.76	-18.86
3	137.19	20.31 QP	40.00	-19.69	4.00 H	293	37.75	-17.44
4	157.71	24.71 QP	40.00	-15.29	4.00 H	133	41.05	-16.34
5	220.86	23.87 QP	40.00	-16.13	4.00 H	354	43.14	-19.27
6	304.67	29.72 QP	47.00	-17.28	3.55 H	30	45.16	-15.44

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

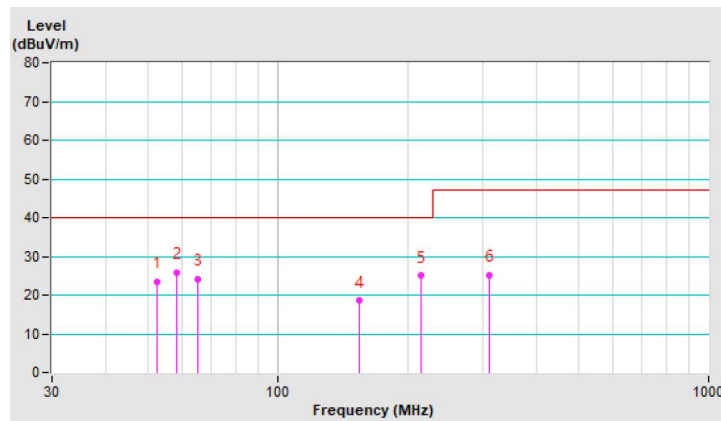


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	52.51	23.39 QP	40.00	-16.61	1.37 V	208	40.80	-17.41
2	58.42	25.87 QP	40.00	-14.13	1.62 V	48	43.63	-17.76
3	65.12	24.04 QP	40.00	-15.96	1.83 V	216	42.69	-18.65
4	154.70	18.51 QP	40.00	-21.49	1.00 V	284	34.91	-16.40
5	215.04	24.93 QP	40.00	-15.07	1.00 V	28	44.57	-19.64
6	309.08	25.20 QP	47.00	-21.80	1.00 V	312	40.82	-15.62

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



8 Pictures of Test Arrangements

8.1 Conducted Emissions from Power Ports

Mode A



Mode B



8.2 Radiated Emissions up to 1 GHz

Mode A



Mode B



9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

The address and road map of all our labs can be found in our web site also.

--- END ---

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: ICES-003: 2020 Issue 7, Class A

ICES-Gen: 2018 Issue 1 +A1:2021

ANSI C63.4-2014 amended as per ANSI C63.4a-2017

Report No.: CIBEDU-WTW-P22040299B

Product: Switching Power Supply

Brand: AcBel

Model No.: FSM009, FSL020

Series Model: R1CA2132A, R1CA2801H, FSM042, R1CA2801L, FSM041, R1CA2132E

Received Date: 2023/4/25

Test Date: 2023/4/26

Issued Date: 2023/5/15

Applicant: AcBel Polytech Inc.

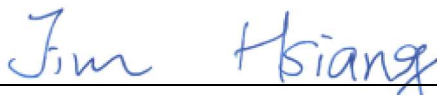
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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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Test Location: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Approved by:



Date:

2023/5/15

Jim Hsiang / Associate Technical Manager

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Prepared by : Vivian Chen / Senior Specialist

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Table of Contents

Release Control Record	3
1 Certificate.....	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Supplementary Information	5
3 General Information	6
3.1 Description of EUT	6
3.2 Primary Clock Frequencies of Internal Source.....	6
3.3 Features of EUT	6
3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode	7
3.5 Test Program Used and Operation Descriptions	7
3.6 Connection Diagram of EUT and Peripheral Devices	8
3.7 Configuration of Peripheral Devices and Cable Connections	8
4 Test Instruments	9
4.1 Conducted Emissions from Power Ports	9
4.2 Radiated Emissions up to 1 GHz	10
5 Limits of Test Items.....	11
5.1 Conducted Emissions from Power Ports	11
5.2 Radiated Emissions up to 1 GHz	11
6 Test Arrangements	12
6.1 Conducted Emissions from Power Ports	12
6.2 Radiated Emissions up to 1 GHz	13
7 Test Results of Test Item	14
7.1 Conducted Emissions from Power Ports	14
7.2 Radiated Emissions up to 1 GHz	18
8 Pictures of Test Arrangements	22
8.1 Conducted Emissions from Power Ports	22
8.2 Radiated Emissions up to 1 GHz	24
9 Information of the Testing Laboratories	26

Release Control Record

Issue No.	Description	Date Issued
CIBEDU-WTW-P22040299B	Original release.	2023/5/15

1 Certificate

Product: Switching Power Supply

Brand: AcBel

Test Model: FSM009, FSL020

Series Model: R1CA2132A, R1CA2801H, FSM042, R1CA2801L, FSM041, R1CA2132E

Sample Status: Engineering sample

Applicant: AcBel Polytech Inc.

Test Date: 2023/4/26

Standard: ICES-003: 2020 Issue 7, Class A
ICES-Gen: 2018 Issue 1 +A1:2021
ANSI C63.4-2014 amended as per ANSI C63.4a-2017

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

2 Summary of Test Results

The test items that the EUT need to perform in accordance with its interfaces, evaluated functions, are as follows:

Standard	Test Item	Result	Remark
ICES-003	Conducted Emissions from Power Ports	Pass	Minimum passing Class A margin is -7.74 dB at 0.16190 MHz
ICES-003	Radiated Emissions up to 1 GHz	Pass	Minimum passing Class A margin is -11.87 dB at 55.37 MHz

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Specification	Expanded Uncertainty (k=2) (±)	Maximum allowable uncertainty (±)
Conducted Emissions from Power Ports	9 kHz ~ 30 MHz	3.00 dB	3.4 dB (U_{CISPR})
Radiated Emissions up to 1 GHz	30 MHz ~ 1 GHz	3m: 5.44 dB 10m: 4.02 dB	6.3 dB (U_{CISPR})

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 Description of EUT

Product	Switching Power Supply
Brand	AcBel
Test Model	FSM009, FSL020
Series Model	R1CA2132A, R1CA2801H, FSM042, R1CA2801L, FSM041, R1CA2132E
Model Difference	Refer to note as below
Sample Status	Engineering sample
Operating Software	N/A
Power Supply Rating	Rating: Refer to note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. This report is issued as a supplementary report to BV CPS report no.: CIBEDU-WTW-P22040299. The difference compared with original report is for add models (as below shaded area). Therefore the EUT is re-tested in this report.

Model	Rating	Wind Direction	Airflow	Model Difference
FSL020	AC I/P: 100-127V, 50/60Hz, 12A; 200-240V, 50/60Hz, 8.5A; DC I/P: 240V, 6A DC O/P: +12.2V, 83.33A (100-127V) +12.2V, 108.3A (200-240V & 240Vdc) +12Vsb, 3A Total 1300W	AFO	30.3CFM min	For Marketing difference
R1CA2132A		AFI	38.35CFM min	
FSM041				
R1CA2132E				
FSM009	AC I/P: 100-240V, 50/60Hz, 10A; DC I/P: 240V, 5A DC O/P: +12.2V, 66A +12Vsb, 3A Total 800W	AFO	30.3CFM min	For Marketing difference
R1CA2801H		AFI		
FSM042				
R1CA2801L				

During the test, **Model: FSL020, FSM009** were selected as the representative pre-test models.

3.2 Primary Clock Frequencies of Internal Source

The highest frequency generated or used within the EUT or on which the EUT operates or tunes is 30-60kHz, provided by AcBel Polytech Inc., for detailed internal source, please refer to the manufacturer's specifications.

3.3 Features of EUT

The tests reported herein were performed according to the method specified by AcBel Polytech Inc., for detailed feature description, please refer to the manufacturer's specifications or user's manual.

Please refer to appendix of the report if the applicant has provided additional descriptions of the EUT.

3.4 Operating Modes of EUT and Determination of Worst Case Operating Mode

The EUT has been pre-tested under following test modes.

Test Condition	
Mode	Conducted Emissions from Power Ports
1	FSL020 + full load + Input Power(120 Vac, 60 Hz)
2	FSL020 + full load + Input Power(240 Vac, 60 Hz)
3	FSL020 + full load + Input Power(240 Vdc)
4	FSM009 + full load + Input Power(120 Vac, 60 Hz)
5	FSM009 + full load + Input Power(240 Vac, 60 Hz)
6	FSM009 + full load + Input Power(240 Vdc)
Note: The worst case is that modes 3 and 6 are shown in bold.	
Mode	Radiated Emissions up to 1 GHz
1	FSL020 + full load + Input Power(240 Vdc)
2	FSM009 + full load + Input Power(240 Vdc)
3	FSL020 + full load + Input Power(120 Vac, 60 Hz)
4	FSM009 + full load + Input Power(120 Vac, 60 Hz)
Note: The worst case is that modes 1 and 2 are shown in bold.	

Test modes are presented in the report as below.

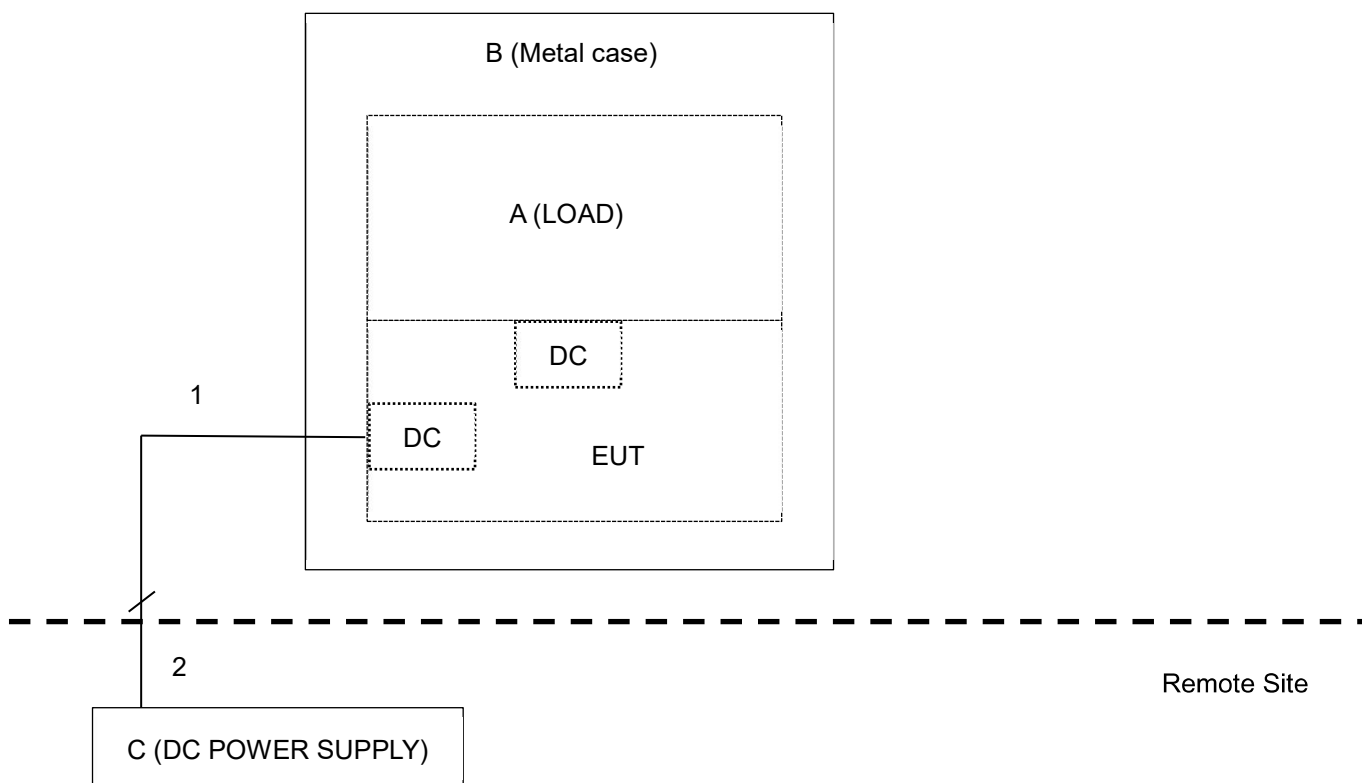
Test Condition	
Mode	Conducted Emissions from Power Ports
A	FSL020 + full load + Input Power(240 Vdc)
B	FSM009 + full load + Input Power(240 Vdc)
Mode	Radiated Emissions up to 1 GHz
A	FSL020 + full load + Input Power(240 Vdc)
B	FSM009 + full load + Input Power(240 Vdc)

3.5 Test Program Used and Operation Descriptions

Connected a resistor load with EUT and installed both of them into a metal case and then set the EUT under full resistor load for the test.

3.6 Connection Diagram of EUT and Peripheral Devices

DC Input:



3.7 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	LOAD	N/A	N/A	N/A	N/A	Supplied by applicant
B	Metal case	N/A	N/A	N/A	N/A	Supplied by applicant
C	DC Power supply	CHROMA	62150H-600S	62150EC00479	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	AC / DC power(3pin) cable	1	1.8	No	0	Provided by Lab
2	DC power cable	1	10	No	0	Provided by Lab

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Conducted Emissions from Power Ports

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal LYNICS	0900510	E1-011285	2022/9/19	2023/9/18
		E1-011286	2022/9/19	2023/9/18
50 Ohms Terminator LYNICS	0900510	E1-01-305	2023/2/13	2024/2/12
Attenuator STI	STI02-2200-10	NO.3	2022/10/21	2023/10/20
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2022/6/1	2023/5/31
	CDNE-M3	00091	2022/6/1	2023/5/31
Coupling/Dcoupling Network TESEQ	CDN A201A	44601	2022/12/14	2023/12/13
DC LISN R&S	ESH3-Z6	100219	2022/8/2	2023/8/1
		844950/018	2022/8/2	2023/8/1
DC LISN Schwarzbeck	NNLK 8121	8121-808	2022/4/29	2023/4/28
High Voltage Probe Schwarzbeck	TK9420	00982	2022/12/14	2023/12/13
Isolation Transformer Erika Fiedler	D-65396	017	2022/9/8	2023/9/7
LISN EMCO	3825/2	9204-1964	2022/6/17	2023/6/16
		9504-2359	2022/8/2	2023/8/1
LISN R&S	ENV216	101195	2022/8/1	2023/7/31
		101196	2022/5/24	2023/5/23
		101197	2022/7/5	2023/7/4
LISN Schwarzbeck	NNLK 8121	8121-731	2022/5/26	2023/5/25
		8121-00759	2022/8/18	2023/8/17
	NNLK8129	8129229	2022/6/8	2023/6/7
RF Coaxial Cable Commate	5D-FB	Cable-CO3-01	2022/9/14	2023/9/13
Software BVADT	Cond_V7.3.7.4	N/A	N/A	N/A
Test Receiver R&S	ESR3	102413	2023/2/7	2024/2/6

Notes:

1. The test was performed in Linkou Conduction 3.
2. The VCCI Site Registration No. C-10274.
3. Tested Date: 2023/4/26

4.2 Radiated Emissions up to 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Attenuator Mini-Circuits	UNAT-5+	PAD-CH8-01	2022/9/23	2023/9/22
		PAD-CH8-02	2022/9/23	2023/9/22
Coupling/Dcoupling Network Schwarzbeck	CDNE-M2	00097	2022/6/1	2023/5/31
	CDNE-M3	00091	2022/6/1	2023/5/31
Pre_Amplifier EMCI	EMC9135	980326	2023/2/16	2024/2/15
		980327	2023/2/16	2024/2/15
RF Coaxial Cable JYEBAO	LMR-600	Cable-CH8-01	2022/9/23	2023/9/22
		Cable-CH8-02	2022/9/23	2023/9/22
RF Coaxial Cable Pacific	8D-FB	Cable-CH8-03	2022/9/23	2023/9/22
Software BVADT	Radiated_V8.7.08	N/A	N/A	N/A
Test Receiver R&S	ESR3	102983	2022/5/30	2023/5/29
		102984	2022/6/10	2023/6/9
Tower Max Full.	MF7802	MF780208105	N/A	N/A
TRILOG Broad Band Antenna Schwarzbeck	VULB 9168	9168-316	2022/11/21	2023/11/20
		9168-317	2022/11/21	2023/11/20
Turn Table & Tower Max Full.	MF7802	MF7802121	N/A	N/A

Notes:

1. The test was performed in Linkou 10M Chamber (Chamber 8) , The test site validated date: 2022/8/27 (NSA)
2. The VCCI Site Registration No. R-12946.
3. Tested Date: 2023/4/26

5 Limits of Test Items

5.1 Conducted Emissions from Power Ports

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Notes: 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Radiated Emissions up to 1 GHz

Frequency range (MHz)	Class A (3 m) Quasi-peak dB μ V/m	Class A (10 m) Quasi-peak dB μ V/m	Class B (3 m) Quasi-peak dB μ V/m	Class B (10 m) Quasi-peak dB μ V/m
30-88	50.0	40.0	40.0	30.0
88-216	54.0	43.5	43.5	33.1
216-230	56.9	46.4	46.0	35.6
230-960	57.0	47.0	47.0	37.0
960-1000	60.0	49.5	54.0	43.5

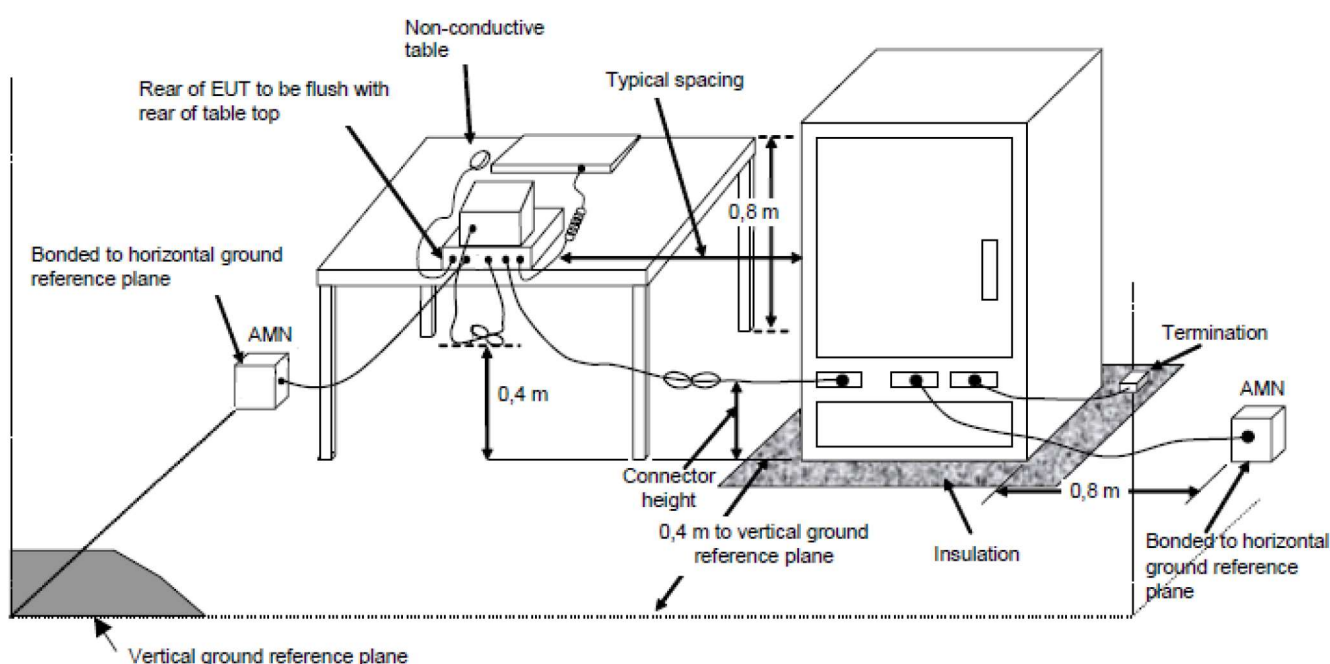
Notes: 1. The lower limit shall apply at the transition frequencies.

6 Test Arrangements

6.1 Conducted Emissions from Power Ports

- a. For the table-top EUT is placed on a 0.8 meter insulation table; for the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The EUT is placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units are connected to the power mains through another LISN. They provide coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

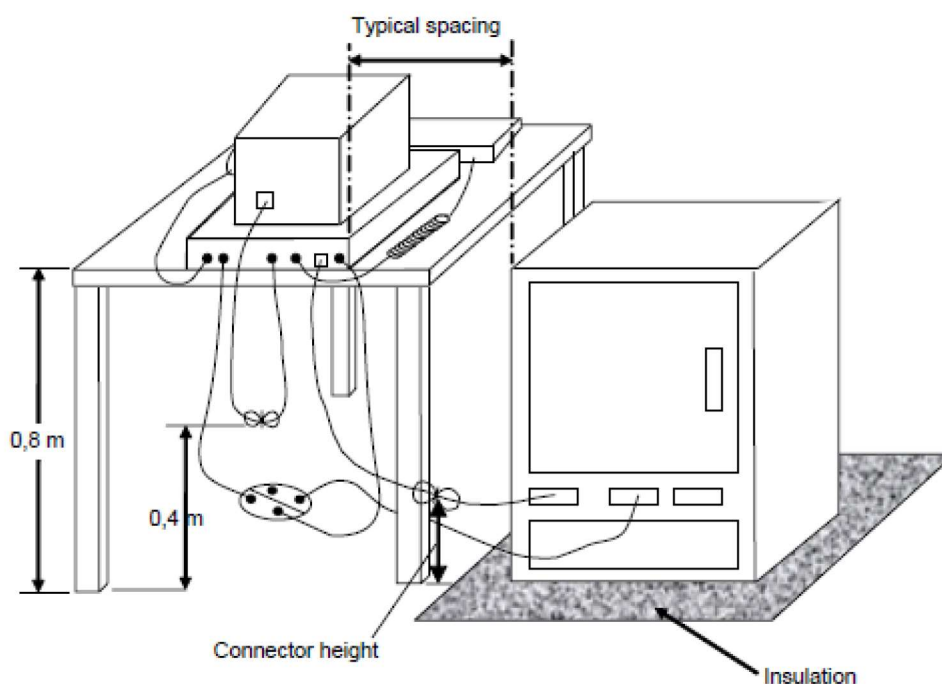


For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

6.2 Radiated Emissions up to 1 GHz

- For the table-top EUT is placed on a 0.8 meter to the top of rotating table; for the floor standing EUT shall be insulated (by insulation of 12 mm) from the horizontal reference ground plane. The rotating table is rotated 360 degrees to determine the position of the highest radiation. If the equipment requires a dedicated ground connection, this shall be provided and bonded to the RGP.
- The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is up to 1 GHz.

Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency up to 1GHz.



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

7 Test Results of Test Item

7.1 Conducted Emissions from Power Ports

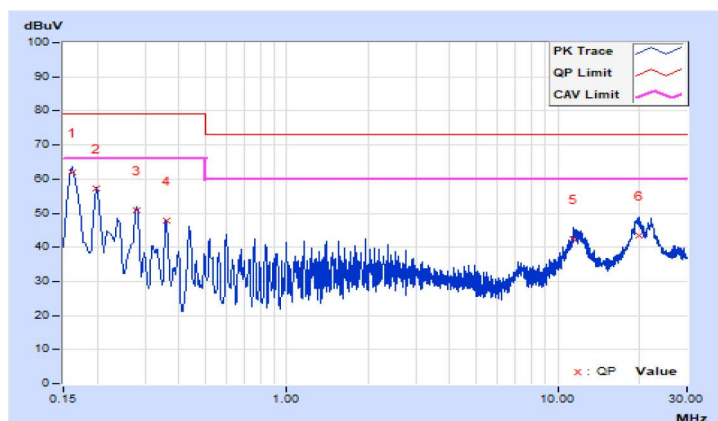
Mode A

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16190	10.06	51.87	48.20	61.93	58.26	79.00	66.00	-17.07	-7.74
2	0.19800	10.05	47.17	46.79	57.22	56.84	79.00	66.00	-21.78	-9.16
3	0.27800	10.06	40.87	40.61	50.93	50.67	79.00	66.00	-28.07	-15.33
4	0.35900	10.07	37.87	37.52	47.94	47.59	79.00	66.00	-31.06	-18.41
5	11.45600	10.39	32.08	27.89	42.47	38.28	73.00	60.00	-30.53	-21.72
6	19.97200	10.61	32.69	26.35	43.30	36.96	73.00	60.00	-29.70	-23.04

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

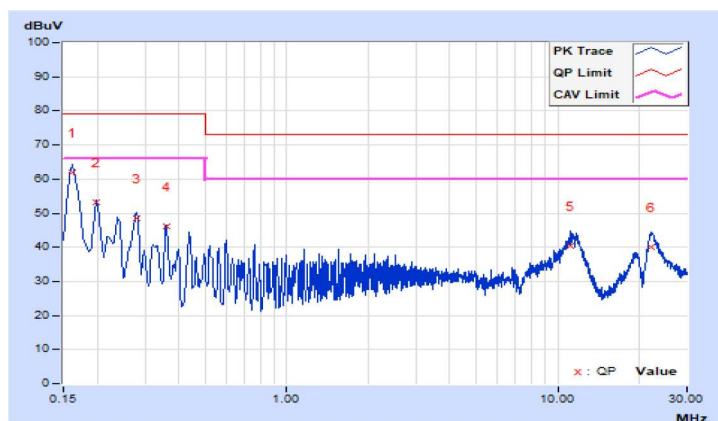


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16190	10.06	51.91	47.92	61.97	57.98	79.00	66.00	-17.03	-8.02
2	0.19800	10.06	43.30	42.55	53.36	52.61	79.00	66.00	-25.64	-13.39
3	0.27786	10.07	38.39	37.20	48.46	47.27	79.00	66.00	-30.54	-18.73
4	0.36098	10.08	36.13	35.27	46.21	45.35	79.00	66.00	-32.79	-20.65
5	11.17600	10.39	30.14	24.96	40.53	35.35	73.00	60.00	-32.47	-24.65
6	22.06000	10.67	29.44	23.47	40.11	34.14	73.00	60.00	-32.89	-25.86

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



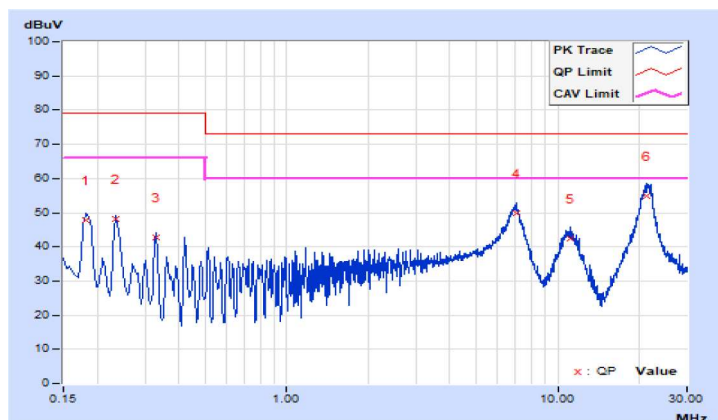
Mode B

Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Positive (+)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18180	10.05	37.67	34.11	47.72	44.16	79.00	66.00	-31.28	-21.84
2	0.23546	10.05	37.95	37.75	48.00	47.80	79.00	66.00	-31.00	-18.20
3	0.32976	10.06	32.81	31.00	42.87	41.06	79.00	66.00	-36.13	-24.94
4	7.00400	10.28	39.41	27.94	49.69	38.22	73.00	60.00	-23.31	-21.78
5	11.20400	10.38	32.11	26.67	42.49	37.05	73.00	60.00	-30.51	-22.95
6	21.32800	10.63	44.21	37.94	54.84	48.57	73.00	60.00	-18.16	-11.43

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

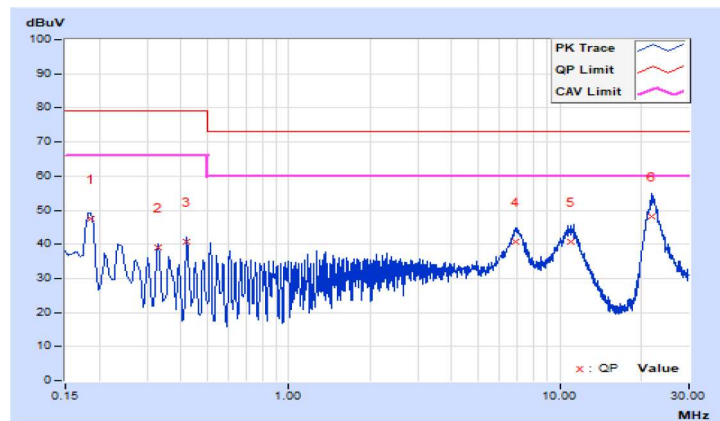


Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested by	Paul Chen		

Phase Of Power : Negative (-)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18600	10.06	37.28	34.31	47.34	44.37	79.00	66.00	-31.66	-21.63
2	0.32976	10.07	29.03	26.05	39.10	36.12	79.00	66.00	-39.90	-29.88
3	0.42200	10.08	30.71	27.55	40.79	37.63	79.00	66.00	-38.21	-28.37
4	6.88000	10.27	30.35	19.00	40.62	29.27	73.00	60.00	-32.38	-30.73
5	10.92800	10.38	30.26	22.21	40.64	32.59	73.00	60.00	-32.36	-27.41
6	21.97200	10.67	37.39	30.23	48.06	40.90	73.00	60.00	-24.94	-19.10

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



7.2 Radiated Emissions up to 1 GHz

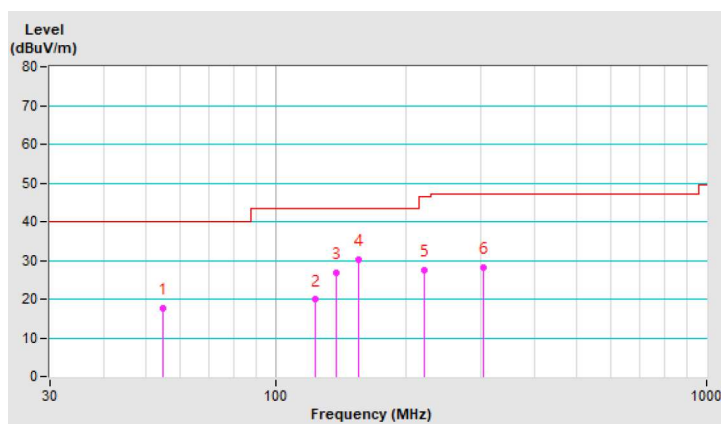
Mode A

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	54.93	17.69 QP	40.00	-22.31	4.00 H	168	35.06	-17.37
2	123.61	19.90 QP	43.50	-23.60	4.00 H	121	38.64	-18.74
3	138.50	26.77 QP	43.50	-16.73	4.00 H	106	43.98	-17.21
4	155.52	30.18 QP	43.50	-13.32	4.00 H	326	46.43	-16.25
5	221.73	27.59 QP	46.40	-18.81	3.89 H	19	46.91	-19.32
6	302.78	28.21 QP	47.00	-18.79	3.71 H	31	43.64	-15.43

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

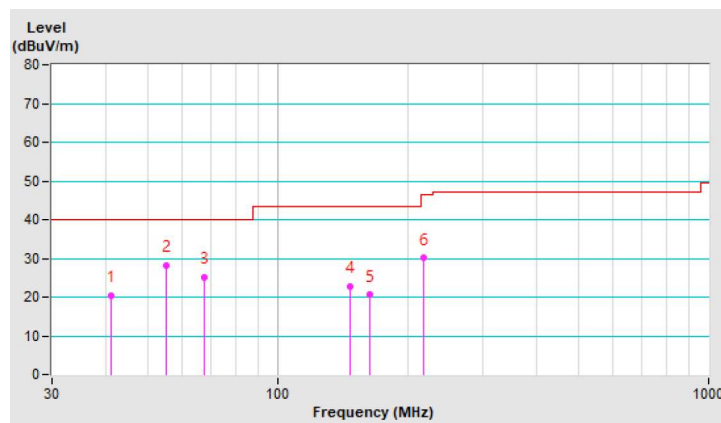


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	41.20	20.42 QP	40.00	-19.58	2.13 V	52	38.57	-18.15
2	55.37	28.13 QP	40.00	-11.87	1.52 V	187	45.68	-17.55
3	67.44	25.09 QP	40.00	-14.91	1.76 V	313	44.11	-19.02
4	146.99	22.70 QP	43.50	-20.80	1.00 V	176	39.19	-16.49
5	163.28	20.55 QP	43.50	-22.95	1.00 V	86	37.02	-16.47
6	218.04	30.02 QP	46.40	-16.38	1.00 V	120	49.60	-19.58

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



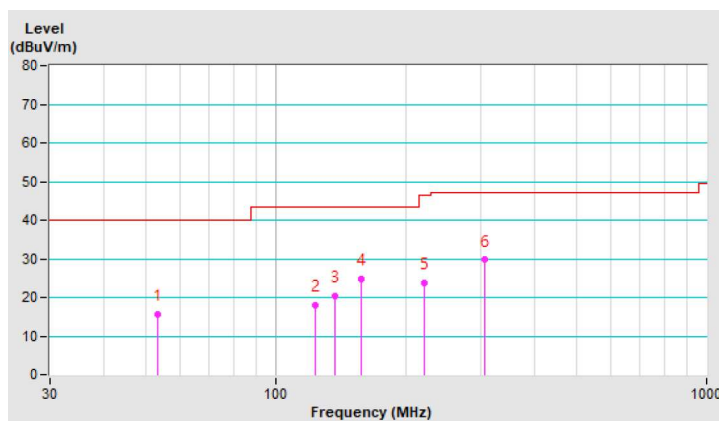
Mode B

Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Horizontal at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.28	15.74 QP	40.00	-24.26	4.00 H	130	32.91	-17.17
2	124.00	17.90 QP	43.50	-25.60	3.78 H	330	36.76	-18.86
3	137.19	20.31 QP	43.50	-23.19	4.00 H	293	37.75	-17.44
4	157.71	24.71 QP	43.50	-18.79	4.00 H	133	41.05	-16.34
5	220.86	23.87 QP	46.40	-22.53	4.00 H	354	43.14	-19.27
6	304.67	29.72 QP	47.00	-17.28	3.55 H	30	45.16	-15.44

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

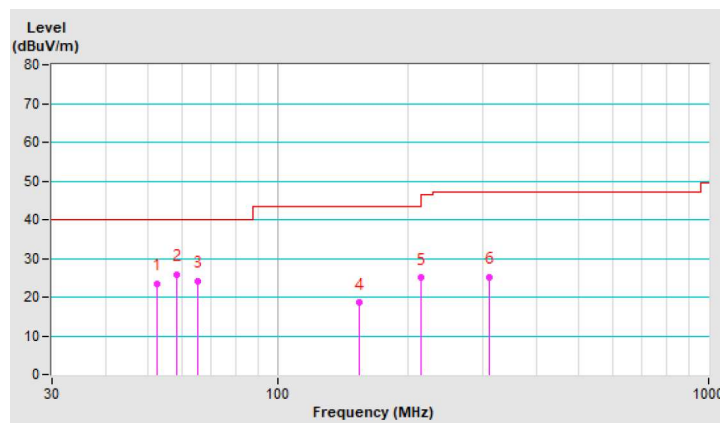


Frequency Range	30 MHz ~ 1 GHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP), 120 kHz
Input Power	240 Vdc	Environmental Conditions	22°C, 66% RH
Tested By	Paul Chen		

Antenna Polarity & Test Distance : Vertical at 10 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	52.51	23.39 QP	40.00	-16.61	1.37 V	208	40.80	-17.41
2	58.42	25.87 QP	40.00	-14.13	1.62 V	48	43.63	-17.76
3	65.12	24.04 QP	40.00	-15.96	1.83 V	216	42.69	-18.65
4	154.70	18.51 QP	43.50	-24.99	1.00 V	284	34.91	-16.40
5	215.04	24.93 QP	43.50	-18.57	1.00 V	28	44.57	-19.64
6	309.08	25.20 QP	47.00	-21.80	1.00 V	312	40.82	-15.62

Remarks:

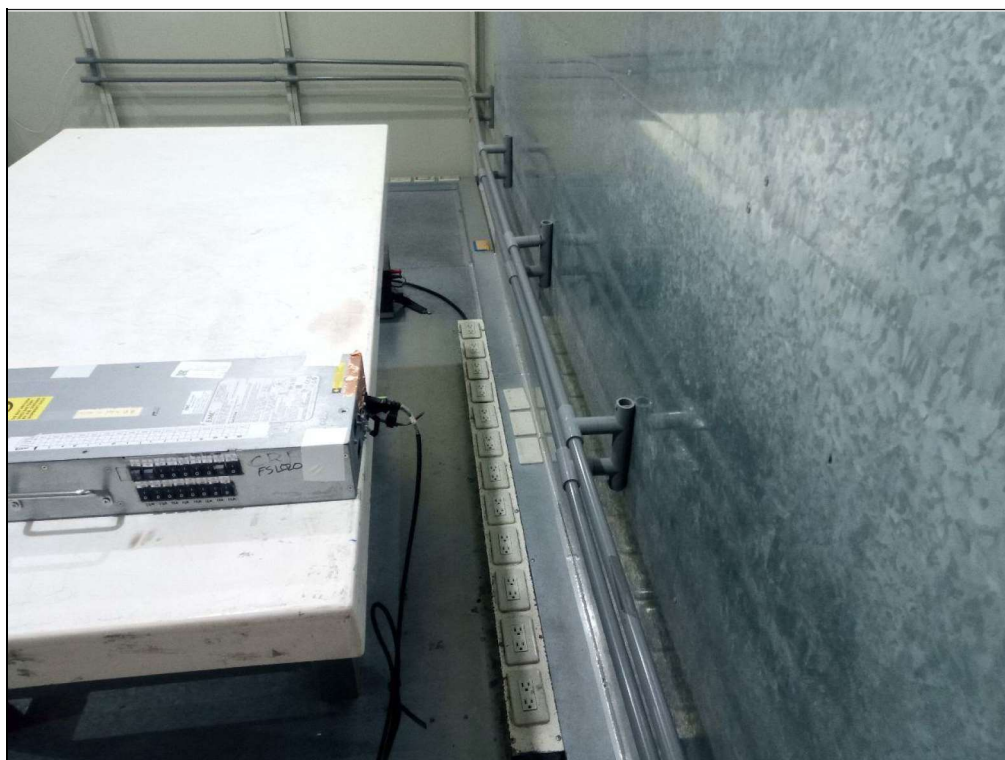
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



8 Pictures of Test Arrangements

8.1 Conducted Emissions from Power Ports

Mode A



Mode B



8.2 Radiated Emissions up to 1 GHz

Mode A



Mode B



9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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