



LEADER ELECTRONICS INC.



APPROVAL SHEET



CUSTOMER:	<u>Cambium</u>	P/N:	<u>N000065L001C</u>
DESIGN NO.:	<u>NU60A51550-300S</u>	REV.:	<u>1</u>
MODEL NO.:	<u>NU60A5550111-I3</u>	DATE:	<u>2017/02/23</u>
OUTPUT:	<u>55V 1.11A</u>		

Customer Signature for Approval

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Reviewed By Glenn Wu	Checked By Kent Chang	Prepared By Tina Chin
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REV.	Approval Sheet Revision Change List		Changed Date
	Description	Reason	
0	X	Original SPEC	2016/01/21
1	SPEC Rev 0 to Rev 1	According to customer requirements	2017/02/23

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2. OUTLINE DRAWING

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SPECIFICATION SHEET



CUSTOMER: Cambium

CUSTOMER P/N: N000065L001C

DESIGN NO.: NU60A51550-300S

MODEL NO.: _____

OUTPUT: 55V 1.11A

DATE: 2017/02/23

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1	2017/02/23	ECR-152763	PREPARED BY: Tina Chin	CHECKED BY: Glenn Wu
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1.0 SCOPE

This document details the electrical, mechanical and environmental specifications of a switching power supply

1.1 DESCRIPTION

- WALL MOUNT
- DESK-TOP
- INTERCHANGEABLE AC PLUG
- OPEN FRAME
- METAL CASE POWER SUPPLY UNIT
- OTHERS

2.0 INPUT REQUIREMENTS

2.1 INPUT VOLTAGE

Minimum	Normal Rating	Maximum
90 Vac	100-240 Vac	264 Vac

2.2 LINE FREQUENCY

Minimum	Normal Rating	Maximum
47 Hz	50 / 60 Hz	63 Hz

2.3 INPUT CURRENT

The maximum input current is **1.5A** at 100Vac.

2.4 INRUSH CURRENT

The inrush current will not exceed **100A** at 264Vac input for a cold start at 25°C.

2.5 POWER CONSUMPTION

The input power should be less than **0.21W** with output 0A at 115/230Vac input.

3.0 OUTPUT REQUIREMENTS

3.1 STATIC LOAD (55 Volts ODU Only)

3.1.1	Output #	V1	V2	V3	V4
3.1.2	Output Voltage:	55Vdc			
3.1.3	Minimum Load:	0A			
3.1.4	Maximum Load:	1.11A			
3.1.5	Line Regulation(*)	±1%			
3.1.6	Load Regulation(*)	±5%			
3.1.7	Voltage Accuracy:	Min	52.25V		
		Max	57.75V		
3.1.8	Ripple&Noise(**)	960mVp-p max.			

(*).Output Voltage range between 57.75V and 52.25V including all combinations of line,load and tolerance.

(**).Measuring is done by 20MHz bandwidth oscilloscope and terminated each output with a 10uF aluminum electrolytic capacitor and a 0.1uF ceramic capacitor.

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3.2 TURN ON DELAY

During turn on and turn off, no output voltage shall exceed its nominal voltage by more than 10% and no output shall change its polarity with respect to its return line. All outputs shall reach their steady state values within **10** seconds of turn on.

*Turn on delay, please refer to the Appendix for warm start/cold start times.

3.3 HOLD UP TIME

All outputs shall remain within its specified limits for a minimum of **10** milliseconds after power has been removed from the power supply. This time is measured with full load, 115V 60Hz / 230V 50Hz and power down at zero crossing on the AC input.

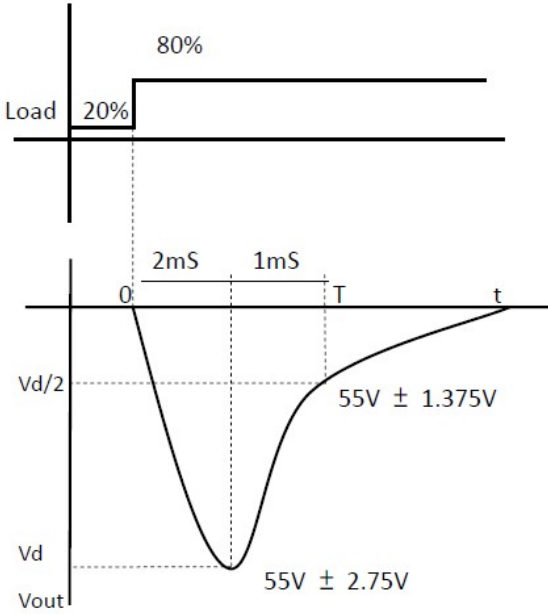
3.4 EFFICIENCY

The efficiency (watts out / watts in) shall be higher than **85%** typically while measuring at 115V 60Hz / 230V 50Hz and 100% load.

(Note: This is for production test at only nominal line and maximum load, as for International Efficiency Level (VI), which is defined as the average efficiency at for load conditions, please see 10.2 “ENERGY EFFICIENCY”)

3.5 OUTPUT TRANSIENT RESPONSE AND DEVIATION

The power supply shall maintain output transient response time within **2 mS** with a current change from 20% to 80% of maximum current and 0.5A/uS slew rate in load for the output +/- 5% (57.75 ~ 52.25V) . 1mS to recover to within the +/-1.375V when the load change from 20% to 80% of output current.



3.6 ETHERNET

Ethernet pass-through shall be 1000 Base-T compliant

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3.7 LED STATUS

Output Voltage	LED Indication
ON	Solid Green
OFF	LED OFF
OVP or OCP	Flicker

4.0 PROTECTION REQUIREMENT

4.1 OVER VOLTAGE PROTECTION

The power supply shall turn off when the output voltage reaches to its over – voltage protection trigger point **60V max @ Load 0.05A**.

- The power supply shall fail but safe – the input power shall be less than __ W.
- The power supply shall be self – recovering when the fault condition is removed.
- The power supply will go into latch-off mode, and have to OFF and ON the AC input to restart the power supply.

4.2 OVER CURRENT & SHORT CIRCUIT PROTECTION

The power supply shall turn off when operating any output in overload condition (set@ Max load **120%~250%**), or when operating any output in a short circuit condition.

*please refer to the Appendix regarding RMS fault current

- The power supply shall fail but safe – the input power shall be less than __ W.
- The power supply shall be self – recovering when the fault condition is removed.
- The power supply will go into latch-off mode, and have to OFF and ON the AC input to restart the power supply.

5.0 ENVIRONMENTAL CONDITIONS

5.1 OPERATING

The power supply shall be capable of operating continuously in any mode without performance deterioration in the following environmental conditions.

- 5.1.1 Ambient Temperature: 0°C ~ 40°C
- 5.1.2 Relative Humidity: 5% ~ 90% Non-Condensing
- 5.1.3 Altitude: Sea level to 5,000 m.
- 5.1.4 Vibration: 1.0mm, 10 –55Hz, 15 minutes per cycle for each axis (X, Y, Z)
Reference from IEC 60068-2-6.

5.2 NON - OPERATING

The power supply shall be capable of withstanding the following environmental conditions extended periods of time, without sustaining electrical or mechanical damage and subsequent operational deficiencies:

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- 5.2.1 Ambient Temperature: -20°C ~ 85°C
- 5.2.2 Relative Humidity: 5% ~ 90% Non-Condensing
- 5.2.3 Sea level to 5,000 m.
- 5.2.4 Vibration and Shock:
The power supply shall be designed to withstand normal transportation vibration per MIL-STD-810D, method 514 and procedures X, as it is mounted in the chassis assembly and packed for shipping.

6.0 INTERNATIONAL STANDARDS

6.1 EMI STANDARDS


The power supply shall meet the radiated and conducted emission requirements for [FCC part 15 CLASS B](#), [EN55022 CLASS B](#).

6.2 EMS STANDARDS

The power supply shall meet the following EMS standards:

- 6.2.1 EN61000-4-2 Electrostatic Discharge (ESD)
Static – discharge test by contact or air should be conducted with Static – discharge tester, energy storage capacitance of 150pF, and discharge resistance of 330Ω. 8KV air discharge, 4KV contact discharge, Performance Criterion B.
- 6.2.2 EN61000-4-3 RADIATED ELECTROMAGNETIC FIELDS (RS)
Radio- frequency Electromagnetic Field Susceptibility Test, RS, 80-1000MHz, 3V/m, 80%AM(1KHz), Performance Criterion A.
- 6.2.3 EN61000-4-4 Electrical Fast Transient / Burst (EFT)
Power Line to Line: 1KV
Performance Criterion B.
- 6.2.4 EN61000-4-5 Lightning Surge Attachment
Lightning Surge voltage of differential and common modes shall be applied across AC input lines and across input and frame ground.
Power Line to Line: 1KV
Power Line to Earth: 2KV
Performance Criterion B.
- 6.2.5 EN61000-4-6 CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)
Conducted Radio Frequency Disturbances Test, CS, 0.15-80 MHz, 3Vrms, 80%AM, 1 KHz, Performance Criterion A.
- 6.2.6 EN61000-4-8 POWER FREQUENCY MAGNETIC FIELD
Power Frequency Magnetic Field Test, 50Hz, 1A/m
Performance Criterion A.
- 6.2.7 EN61000-4-11 VOLTAGE DIPS/SHORT INTERRUPTION/VARIAIONS
Voltage Dips, 30% reduction- 10ms, Performance Criterion B, 60% Reduction – 100ms, Performance Criterion C, Voltage Interruptions>95% Reduction- 5000ms, Performance Criterion C.

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7.0 RELIABILITY AND QUALITY CONTROL

7.1 MTBF (MTTF)

When the power supply is operating within the limits of this specification the MTBF shall be at least **50,000 hours** , full load at 25°C (MIL-HDBK-217F).

7.2 BURN-IN

The power supply shall undergo a minimum of 4 hours Burn-In test at 40°C ±5°C under full load.

7.3 COMPONENT DERATING

Semiconductor junction temperatures shall not exceed the manufacturer's maximum thermal rating.

7.4 ELECTROLYTIC CAPACITOR LIFE TIME


The life time of Electrolytic Capacitor should be greater than 5 years under 100V/240Vrms input voltage@25°C ambient condition with 80% load. The Electrolytic Capacitor life calculated base on actual temperature measurement and shall take into account all factors which affect life base on each capacitor vendor's Electrolytic Capacitor life formula. (For example capacitor temperature and ripple current).

7.5 DROP TEST

All types of wall mount and desktop power supply products are required to have a drop test to be verified.

The testing height must be 100cm +/-1cm from the ground, drop one time for each side of the product, and the dropping ground must be solid.

All power supply products must meet the requirement on the specification and do not have any isolation broken.

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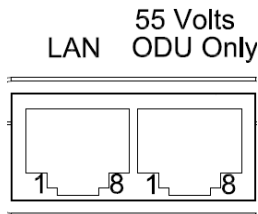
8.0 MECHANICAL

8.1 OUTPUT CONNECTOR ASSIGNMENT

The power supply shall provide output connectors as in table 8.1

PIN#	Polarity
3,4,5,6	Positive
1,2,7,8	Return

Table 8.1 Top view of DC output Pin assignment



8.2 PHYSICAL DIMENSIONS

The detail dimension of the power supply, please see attachment.

8.3 LABEL

The label of the power supply, please see attachment.

8.4 WEIGHT

The weight of the power supply shall be **240±10g**.

8.5 CONNECTOR TYPE

Port	Connector	Signal
AC Input	2 pin IEC 60320 C8	AC mains input
LAN	RJ45 8-pin	Ethernet 1000Base-T
Ethernet + Power	RJ45 8-pin(55 Volts ODU Only)	Ethernet 1000Base-T + DC power

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9.0 SAFETY

9.1 REGULATORY STANDARD

The power supply shall be certified under the following international regulatory standards:

	Country	Certified Status	Standard
UL/CUL	USA/Canada	Meet	UL60950-1; CSA-C22.2 NO. 60950-1-07
BSMI	Taiwan	Meet	CNS14336/13438(IEC60950))
EMC	Europe	Meet	EN55032
CB		Meet	IEC60950-1
MEPS	Australia	Meet	AS/NZS 4665
RCM	Australia	Meet	AS/NZS 60950; IEC/EN60950-1 EN55022/24
CCC	China	Meet	GB4943(IEC60950)
IRAM	Argentina	Meet	IEC60950-1
PSB	Singapore	Meet	IEC60950-1
NRCan	Canada	Meet	Level VI
DoE	USA	Meet	Level VI
PSE	Japan	Meet	J60950
CE	Europe	Meet	IEC60950-1/EN60950-1
NOM	Mexico	Meet	NOM-001-SCFI-1993
ST	Malaysia	Meet	IEC60950-1

9.2 INSULATION RESISTANCE

9.2.1 Input to output: Min. 50M OHM at 500 VDC.


9.3 DIELECTRIC STRENGTH (HI-POT)

9.3.1 Primary to Secondary: **DC 4242 V, 3.5mA Max.**, 1 minute for type test, 1 second minimum for production.

9.4 LEAKAGE CURRENT

The leakage current shall be less than **0.25mA** for Class II, when power supply is operated maximum input voltage and maximum load.

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10.0 GREEN REQUIREMENTS

10.1 HAZARDOUS SUBSTANCES

The components and used materials shall be in compliance with

- Lead free process
- EU Directive 2011/65/EU "RoHS"
- EU Directive 2012/19/EU "WEEE"
- REACH
- CMM(China RoHS)

10.2 ENERGY EFFICIENCY

The No-Load power consumption shall be less than 0.21 W


The average active mode efficiency (25%, 50%, 75% & 100% load) shall be higher than 88 %

International Efficiency Level VI.

This power supply is therefore in compliance with the requirements of

- EISA 2007 for external power supplies.
- Eco-design of EuP Lot 7 on external power supplies.
- US 10 CFR Part 430, 2014 on external power supplies
- Code-Of-Conduct of External Power Supplies Version 5, Tier 1

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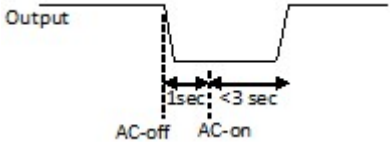
Appendix

SHORT CURRENT AND OVER CURRENT LIMIT

The power supply shall turn off when operating any output in overload condition or short circuit the fault current shall be less than 0.85 A(rms).

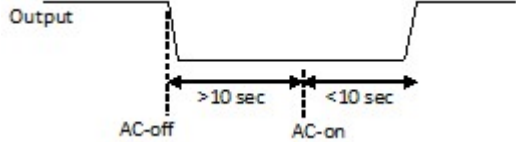
WARM START:

If the PSU has been operating, is turned off and then immediately back on (i.e. on-off-on), the time to restart must be less than 3 seconds.



COLD START:

If the PSU has been turned off for >10 seconds (i.e. on-off(long time)-on), the time to restart can then be longer, up to 10 seconds say.



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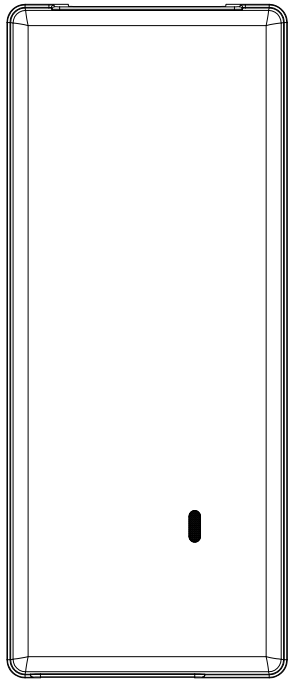
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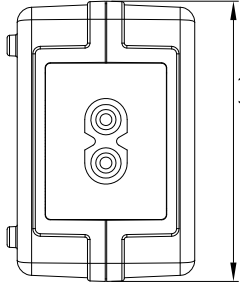
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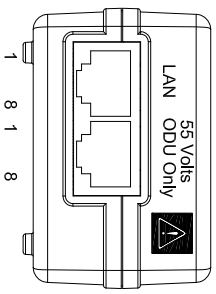
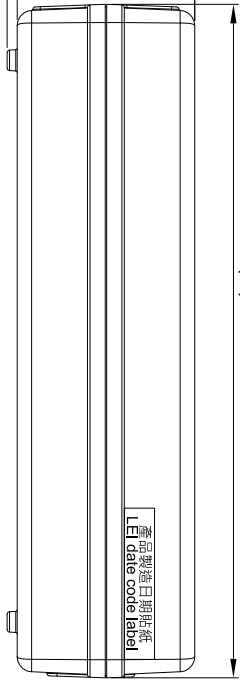


(A)55.6±1.0

(B)133.6±1.0



(D)37.2±1.0
(C)35.2±1.0



LINE IN LINE OUT

Data Pair 1	1	Data Pair 1 & DC Power (-)
Data Pair 1	2	Data Pair 1 & DC Power (-)
Data Pair 2	3	Data Pair 2 & DC Power (+)
Data Pair 3	4	Data Pair 3 & DC Power (+)
Data Pair 3	5	Data Pair 3 & DC Power (+)
Data Pair 2	6	Data Pair 2 & DC Power (+)
Data Pair 4	7	Data Pair 4 & DC Power (-)
Data Pair 4	8	Data Pair 4 & DC Power (-)



- Notes:
1. 外殼材質: Sabic PC945
(Case material : Sabic PC945)
 2. 外殼顏色: 黑色
(Case color : Black)
 3. 輸入端型式: IEC C8
(AC input type: IEC C8)
 4. 輸出端型式: RJ45
(DC output type: RJ45)
 5. 尺寸(A)~(D)由QC檢驗
(Each dimension of (A) to (D) is required to be inspected by QC.)

- 5

REV.	ZONE	DESCRIPTION	DATE	ECR NO.	DESIGNED BY	CHECKED BY	APPROVED BY
△x		新發文圖面	28/Oct/16		Shan Syu	Dinglei Bao	Ryan Chen



立德電子股份有限公司
LEADER ELECTRONICS INC.

ITEM NO.:
Outline Drawing

DRAWING NO.:
PD-NU60A51550-300S01

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A B C D E F G