POWER SUPPLY SPECIFICATION

3400W Switching Mode Power Supply / EV Charger

EVC-116-3400

GWP SIGNATURE				CUSTOMER APPROVAL SIGNATURE
Prepared	**Checked**	**Approved**	**Marketing**	

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1. GENERAL

This specification describes the performance characteristics of a 3.4kW charger, which supports constant current, constant voltage and constant power charging. The charging current and voltage are controlled through CAN communication. The charger is intended to use in a variety of applications, including on-board charger of Electric Vehicle (EV) and battery systems contained within them.

The model features in:

- high efficiency: 94% typical @230Vac, full load
- high power factor: 0.98 typical @ 230Vac, full load
- with all-round protections (OVP, OTP , SCP, Reverse Connection Protection)

☐ SMPS Adaptor (Wall mount)
☐ Open Frame
☐ Others
☐ SMPS Adaptor (Desk-top)
■ SMPS Unit (With Case)

2. ELECTRICAL PERFORMANCE

** Unless noted, the characteristics are specified at 25 ℃.*

2.1 Input Characteristics

2.1.1 Input Voltage and Frequency

The range of input voltage is from 90Vac to 264Vac single phase.

Input	Min.	Typ.	Max.
Input Voltage	90Vac	115Vac/230Vac	264Vac
Input Frequency	45Hz	50Hz/60Hz	65Hz

2.1.2 Input Current

13A max. @ 115Vac input & half load.
16A max. @ 230Vac input & full load.

2.1.3 AC Line Inrush(25°C Cold Start)

No component shall be damaged and the input fuse shall not blow when the power supply is powered on.

2.1.4 Power Factor

Items	Min.	Typ.	Test Condition
Power Factor	0.98	0.99	115Vac, 25°C, Half Load
	0.97	0.98	230Vac, 25°C, Full Load

2.1.5 Efficiency

Items	Min.	Typ.	Test Condition
Low Line Efficiency	92%	93%	115Vac, 25°C, Half Load
High Line Efficiency	93%	94%	230Vac, 25°C, Full Load

2.1.6 UVLO/AC Line Brownout

The PSU shall shut down when AC voltage is below 90VAC and power supply shall not be damaged.
Internal limits for safety protections: The brown-in voltage (charger off-> charger on) is around 87Vac, and the brown-out voltage (charger on-> charger off) is about 81Vac

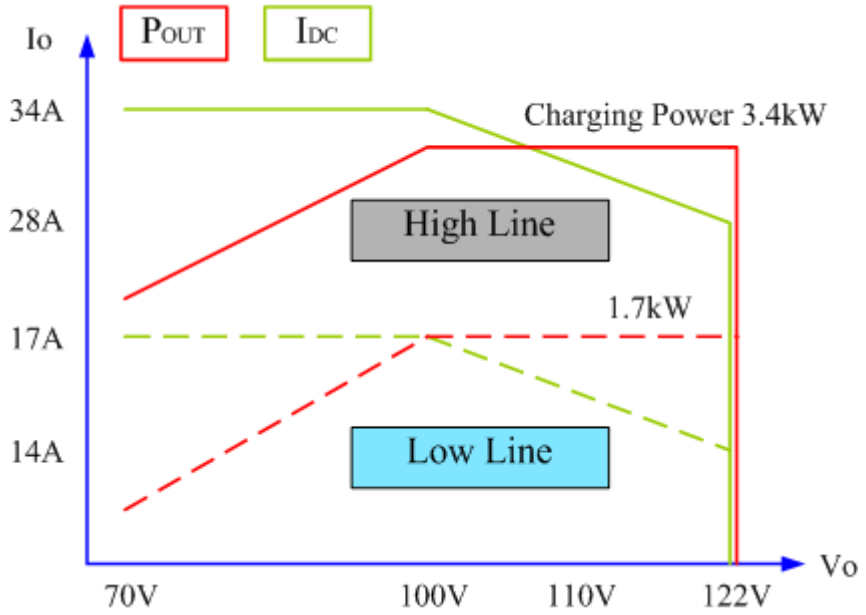
2.2 Output Characteristics

2.2.1 Static Output Characteristics

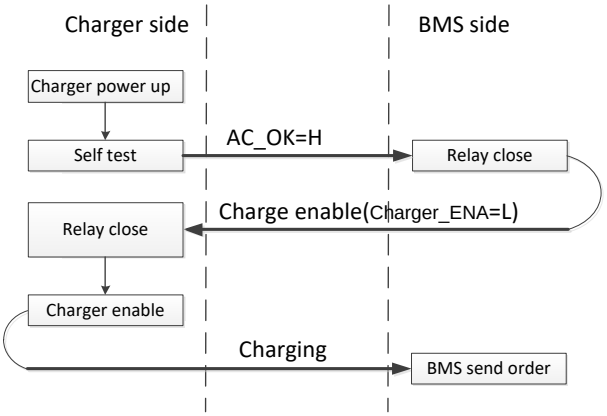
Items	Min.	Typ.	Max.
Output voltage	70VDC	116VDC	122VDC
Maximum voltage ripple (≥120Hz)	N/A	N/A	5%
Maximum voltage ripple (<120Hz)	N/A	N/A	3%
Output current*	5A	N/A	34A
Maximum ripple current @100~120Hz	N/A	N/A	±8.5A
Maximum ripple current @100~120Hz W/O battery	N/A	N/A	±8.5A
Measurement accuracy of DC output voltage as a percentage of 100V		±1%	
Measurement accuracy of DC output current as a percentage of 34A		±5%	

*Note: Maximum output current is 17A for 90Vac to 185Vac input voltage, and 34A for 177Vac to 264Vac input voltage.

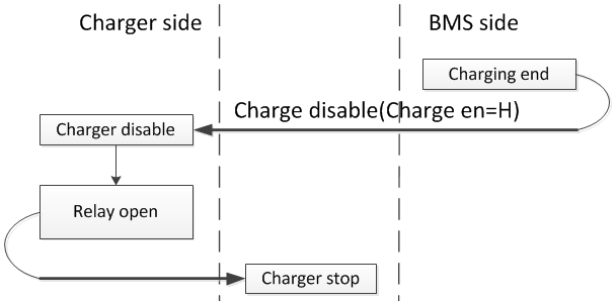
2.2.2 Charge Curve (example)



2.2.3 Power-on Timing



2.2.4 Power-off Timing



2.2.5 Ripple and Noise

Current Ripple:

8.5A peak to peak max, during constant current mode at 25℃(Vac=120V 60hz Io=12A) measured at 20Mhz bandwith.

2.2.6 Turn-on Delay Time

5.0s max. @ Full load.

2.3 Protection Circuits

2.3.1 Over Temperature Protection

The charger will not enter over temperature protection if the case temperature is below 85 degree C. When the case temperature exceeds 85 degree C, the charger may go into over-temperature protection condition (typically in the 5°C to 10°C above region), and no components should be damaged. The PSU shall enter hiccup mode, and shall self-recover when the case temperature becomes normal at 85°C or lower.

2.3.2 Short Circuit Protection

When output is being shorted, power supply will enter hiccup mode, and shall self-recover when the fault condition is removed.

2.3.3 Over Voltage Protection

The PSU enters auto recovery mode when the static output voltage is between 125V and 130V and the dynamic peak output voltage is between 136V and 146V.

2.3.4 Anti Reverse Polarity Protection

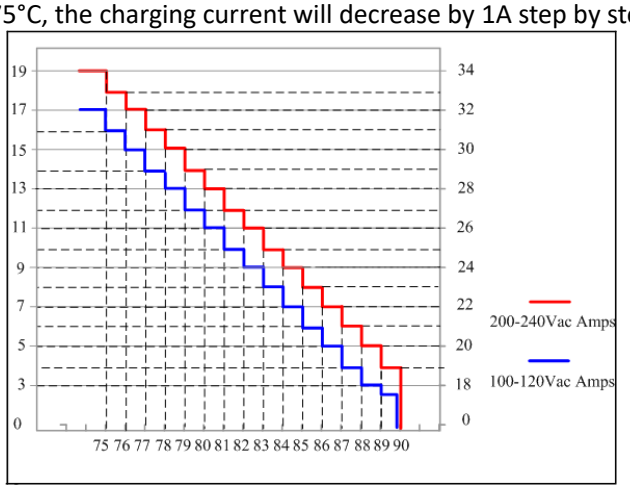
When the battery polarity is reversely connected to the charger, the charger will not output.

2.3.5 Communication Fault Protection

When there is communication fault between charger and BMS, the charger will not output.

3. DERATING CURVES

Charger will self-regulate output power to prevent overheating and resulting internal damages. When the case temperature is higher than 75°C, the charging current will decrease by 1A step by step.



4. CONTROL SIGNALS

Signal connector: will be JAE MX23A18NF1 present on a PCB connector and shall be mounted to the charger body.

Below by pin number. Undefined pins are no connection. * are comments.

1. Not Connected
2. Not Connected
3. Not Connected
4. CAN_GND
5. CAN_5V– Power internally
6. CAN_L
7. CAN_H
8. TEST for factory use
9. Not Connected
10. AC_OK
11. AC_OK
12. Charger_ENA
13. 12V_ISO_GND
14. 12V_ISO
15. DGND
16. BKGD/MS
17. RESET
18. +5VSB

PIN5/PIN4: Output power supply, an isolated 5V for CAN.

PIN7/PIN6: CAN communication signals. The voltage should be lower than 5V.

PIN8: Factory Use (Input pin). A pin is loaded in this position for the factory use. The charger will disable the CAN control function when this pin is connecting to the pin18 (+5VSB).The voltage should be lower than 5V. Please let open if not used.

PIN10/PIN11: These two pins are connected together inside the charger. It will output 12V and up to max 24mA through a 500ohm resistor to the pin14(12V_ISO) when any AC volatge within the input range is detected. Otherwise, it will be pulled to ground(12V_GND).

PIN12: Charger should have a CANbus activated charge termination, as well as a standard power supply Enable feature /12V. Enable should be isolated. This is to avoid overcharge in the event of a single point failure in the charging system. This is defined as the Charger_ENA pin in the connecter pin-out above. The charger can be turned on only if this pin pulls low to 12V_ISO_GND pin and CAN command is active.

PIN13/PIN14: PIN13 is the reference ground for PIN10/PIN11/PIN12. Charger will output at least 12V/20mA (max) using the 12V_ISO and 12V_ISO_GND pins when AC is present.

PIN15~PIN18: Programming pins for secondary MCU. The voltage should be lower than 5V.

5. CHARGER COMMUNICATION

CANbus type CANopen communication capable, standard CANbus type CANopen and needs to be isolated. Charger will use a CC/CV. Charger should have a CANbus activated charge termination.

The communication is accomplished via CAN 2.0A Interface at 500kbps.

The charger can support bootloader function, so the application code can be flash-able through CAN to bootloader.

The voltage reference of charger can be set in the range of 70 to 122V and through the hardware switch it has two different power levels, including 1700W and 3400W. If input AC voltage is between 90Vac to 185Vac, the max output power is 1700W, and if input voltage is between 177Vac to 264Vac, the max output power is 3400W.

In 3400W power mode, the value of the Charger Power Limit also can be set via CAN communication but must be not greater than 3400W otherwise it is forcibly considered to be 3400W and its current reference of charger can be set in the range of 2 to 34A.

a) If the output voltage is less than 85V and the current reference set by the CAN Frame of Charger_control (0x300) is less than 5A, the current reference is forcibly considered to be 5A.
b) If the output voltage is larger than 85V, and the current reference set by the CAN Frame of Charger_control (0x300) is less than 2A, the current reference is forcibly considered to be 2A.
c) If the current reference set by the CAN Frame of Charger_control (0x300) is greater than 34A, the current reference is forcibly considered to be 34A.

In 1700W power mode, the value of the Charger Power Limit also can be set via CAN communication but must be not greater than 1700W otherwise it is forcibly considered to be 1700W and its current reference of charger can be set in the range of 2 to 17A.

a) If the output voltage is less than 85V and the current reference set by the CAN Frame of Charger_control (0x300) is less than 5A, the current reference is forcibly considered to be 5A.
b) If the output voltage is larger than 85V, and the current reference set by the CAN Frame of Charger_control (0x300) is less than 2A, the current reference is forcibly considered to be 2A.
c) If the current reference set by the CAN Frame of Charger_control (0x300) is greater than 17A, the current reference is forcibly considered to be 17A.

It has a linear power limit function which satisfies the formula : Imax=Pmax/Ubattery. So, if the current reference set by the CAN Frame of Charger_control (0x300) is greater than the Imax limited by the formula, it is based on the Imax.

The input AC current is limited to 13A if input voltage is between 90Vac to 185Vac, and it is limited to 16A if input voltage is between 177Vac to 264Vac.

5.1 Received Charger Messages

Frame	Charger control					
Emitter	BMS or VCU Control system					
Identifier	0x300					
DLC	7 Bytes					
Type	Periodic					
Period	<=1000ms					
Parameter	Description	Start(bit)	Len(bit)	Byte Order	Resolution	Value
CHARGER_ENABLE	Turns the charger on or off (PFC and DC/DC on/off)	0	8			0:Disable 1:Enable
CHARGER_POWER_REFERENCE	Power reference demand in percent of maximum power	8	16	Little	0.1%/bit	100%:1000=E8 03
CHARGER_MAXDCVOLTLIMIT	Maximum charger DC voltage	24	16	Little	0.1V/bit	122V:1220=C4 04
CHARGER_MAXDCCURRLIMIT	Maximum charger DC current	40	16	Little	0.1A/bit	34A:340=54 01

5.2 Transmitted Charger Messages

Frame	Charger status1					
Emitter	Charger					
Identifier	0x305					
DLC	8 Bytes					
Type	Periodic					
Period	200ms					
Parameter	Description	Start(bit)	Len(bit)	Byte Order	Resolution	Value
CHARGER_STATUS	Charger status	0	8			1=IDLE, 2=CHARGE, 3=RECOVERABLE_ERROR
CHARGER_MAINS_CURRENT	Input current measurement	8	16	Little	0.1A/bit	16A:160=A0 00
CHARGER_DC_CURRENT	Output current measurement	24	16	Little	0.1A/bit	34A:340=54 01
CHARGER_DC_VOLTAGE	Output voltage measurement	40	16	Little	0.1V/bit	122V:1220=C4 04
CHARGER_MAINS_FREQUENCY	Input voltage frequency measurement	56	8		0x00	Not measurement

Frame	Charger status2					
Emitter	Charger					
Identifier	0x306					
DLC	7 Bytes					
Type	Periodic					
Period	200ms					
Parameter	Description	Start(bit)	Len(bit)	Byte Order	Resolution	Value
CHARGER_PRIMARY_TEMP	Primary PFC temperature measurement	0	8		1℃/bit	The display value is added by 40: -40℃=00；0℃=28；40℃=50
CHARGER_AMB_TEMP	Ambient temperature measurement	8	8		1℃/bit	
CHARGER_MAINS_VOLTAGE	Input voltage measurement	16	16	Little	1V/bit	264Vac:264=08 01
CHARGER_MAX_POWER	Maximum charger power (constant value)	32	16	Little	1W/bit	3400W:3400=48 0D
CHARGER_AVAILABLE_POWER	Maximum available power (may be less than maximum power due to temperature and mains derating)	48	8		0.5%/bit	100%:200=C8

Frame	TEST For Internal Use1					
Emitter	Charger					
Identifier	0x30E					
DLC	7 Bytes					
Type	Periodic					
Period	200ms					
Parameter	Description	Start(bit)	Len(bit)	Byte Order	Resolution	Value
VBUS	PFC bus voltage	0	16	Little	0.1V/bit	390V:3900=3C 0F
NTC_D2D_Pri	D2D primary heatsink temperature	16	8			The display value is added by 40: -40℃=00；0℃=28；40℃=50
NTC_D2D_Sec	D2D secondary heatsink temperature	24	8			
Fault_SEC	Secondary fault	32	16	Little		
Fault_PRI	Parmary fault	48	8			

Frame	TEST For Internal Use2					
Emitter	Charger					
Identifier	0x30F					
DLC	8 Bytes					
Type	Periodic					
Period	200ms					
Parameter	Description	Start(bit)	Len(bit)	Byte Order	Resolution	Value
CHARGER_DC_VOLTAGE_2	Output voltage before relay	0	16	Little	0.1V/bit	122V:1220=C4 04
Vo_SET	Output voltage set value	16	8		1V/bit	122V:122=7A
Io_SET	Output current set value	24	8		1A/bit	34A:34=22
POWER_SET	Charger power limit	32	8		1%/bit	100%:100=64
FLAG	Charger internal critical flag	40	16	Little		
FLAG_test	Flag for factory test	56	8			

5.3 Transmitted Diagnostic Messages

Parameter	Signal	Description	Start(bit)	Len(bit)	Value
Fault_SEC	RES	Reserver	32	5	
	C_UVP Charger	Charger low voltage protection	37	1	0:Normal 1:Protect
	C_No load	Output no load protection	38	1	0:Normal 1:Protect
	C_MCU_S	Pri to Sec Communication fail	39	1	0:Normal 1:Protect
	C_SHORT	Output short protection	40	1	0:Normal 1:Protect
	C_UVP	Battery low voltage protection	41	1	0:Normal 1:Protect
	C_OTIMP	CAN Comm.Timeout	42	1	0:Normal 1:Protect
	C_HFP	Charger hardware failure	43	1	0:Normal 1:Protect
	C_OCP	Output overcurrent protection	44	1	0:Normal 1:Protect
	C_OVP	Output overvoltage protection	45	1	0:Normal 1:Protect
	C_OTP_CASE	CASE Over temperature protection	46	1	0:Normal 1:Protect
	C_OTP_D2D_Sec	D2D Over temperature protection	47	1	0:Normal 1:Protect
Fault_PRI	RES	Reserver	48	1	0:Normal 1:Protect
	C_MCU_P	Sec to Pri Communication fail	49	1	0:Normal 1:Protect
	C_OTP_D2D_Pri	D2D Over-temperature protection	50	1	0:Normal 1:Protect
	C_OTP_PFC	PFC Over-temperature protection	51	1	0:Normal 1:Protect
	C_BUS_UVP	BUS Under-Voltage Protection	52	1	0:Normal 1:Protect
	C_BUS_OVP	BUS Over-Voltage Protection	53	1	0:Normal 1:Protect
	C_AC_UVP	AC Under-Voltage Protection	54	1	0:Normal 1:Protect
	C_AC_OVP	AC Over-Voltage Protection	55	1	0:Normal 1:Protect

C_UVP Charger: After the charger is enabled to output, the charger will check the output voltage. If it is below 68V, this protection will work in order to protect the charger, and it is recoverable.
C_No load: If the charge current is lower than 1A, no other protection happens, and this state lasts 4 seconds, this protection will work. Otherwise this protection will be released.
C_MCU_S: If the internal primary mcu of the charger fails to transfer data to secondary mcu, this protection will work. Otherwise this protection will be released.
C_SHORT: If output is being shorted, this protection will work. Otherwise this protection will be released.
C_UVP: Before the charger is enabled to output, the charger will check the battery voltage. If it is below 68V, this protection will work in order to protect the battery or to prevent the battery was reversed, and it is recoverable.
C_OTIMP: If the charger does not receive the CAN command from BMS continuously more than 1s, this protection will work. Once received, this protection will be released..
C_HFP: The internal failure of the charger which leads to no output or incorrect charging current, this protection will work, and it is recoverable.
C_OCP: If output current of the charger is higher than 37.4A, this protection will work. And it is recoverable.
C_OVP: If output voltage of the charger is higher than 128V, this protection will work. And it is recoverable.
C_OTP_CASE: If the maximum temperature of the CASE exceeds 89℃, this protection will work and it is reduced to 75℃, this protection will be released.
C_OTP_D2D_Sec: If the temperature of secondary rectifier diodes is higher than 104℃, this protection will work and it is reduced to 75℃, this protection will be released.
C_MCU_P: If the internal secondary mcu of the charger fails to transfer data to primary mcu, this protection will work. Otherwise this protection will be released.
C_OTP_D2D_Pri: If the temperature of primary mosfet is higher than 96℃, this protection will work and it is reduced to 75℃, this protection will be released.
C_OTP_PFC: If the temperature of PFC is higher than 92℃, this protection will work and it is reduced to 75℃, this protection will be released.

C_BUS_UVP: If the internal BUS voltage of the charger is lower than 340V when PFC is enabled, this protection will work. Otherwise this protection will be released.
C_BUS_OVP: If the internal BUS voltage of the charger is higher than 439V, this protection will work. Otherwise this protection will be released.
C_AC_UVP: If input AC voltage is lower than 81Vac, this protection will work. And when it is raised to 87Vac, the protection will be released.
C_AC_OVP: If input AC voltage is higher than 273Vac, this protection will work. And when it is reduced to 265Vac, the protection will be released.

Note: No details are provided as the signals of FLAG and FLAG_test are just for designer and factory use.

6. ENVIRONMENTAL

The power supply shall operate normally; sustain no damage as a result of the environmental conditions listed in this section.

6.1 Operating Ambient Temperature and Relative Humidity

-40ºC to +60ºC（50ºC to 60ºC with power derating）
10%RH to 100%RH
Maximum case temperature is 85ºC.

6.2 Storage ambient Temperature and Relative Humidity

-40° C to +85° C
10%RH to 100%RH

6.3 Waterproof Grade

IP25 – for the charger connector
IP66 – Integrated heatsink and cooling plate option if needed.

6.4 Vibration

10 to 300Hz sweep at a constant acceleration of 1G (breadth 3.5mm) for 1 hour for each of the perpendicular axis's

6.5 Weight

Liquid version: about 4.85KG (10.7 lbs).

6.6 MTBF/Life Time

The MTBF shall be at least 200,000 hours at 25° C ambient temperature, Full load and nominal input condition.
The product life-time shall be at least 20,000hours at 50° C case temperature.

7. REGULATORY

7.1 Agency Requirements

Designed to Meet UL2202 and approval might be required

A) Dielectric Strength(Hi-pot):
Primary to Secondary: 3000Vac / 10mAMax / 60seconds (3second for production)
Primary to Earth: 1500Vac 10mA max./60 seconds (3 seconds for production)
Secondary to Earth: 500Vac 10mA max./60 seconds (3 seconds for production)

B) Leakage Current

3.5mA max. @230Vac / 50HZ

C) Insulation Resistance

100Mohm min.@primary to secondary add 500Vdc test voltage

D) Grounded Resistance

0.1Ω max. @ 25A, 1 minute

7.2 Electromagnetic Compatibility

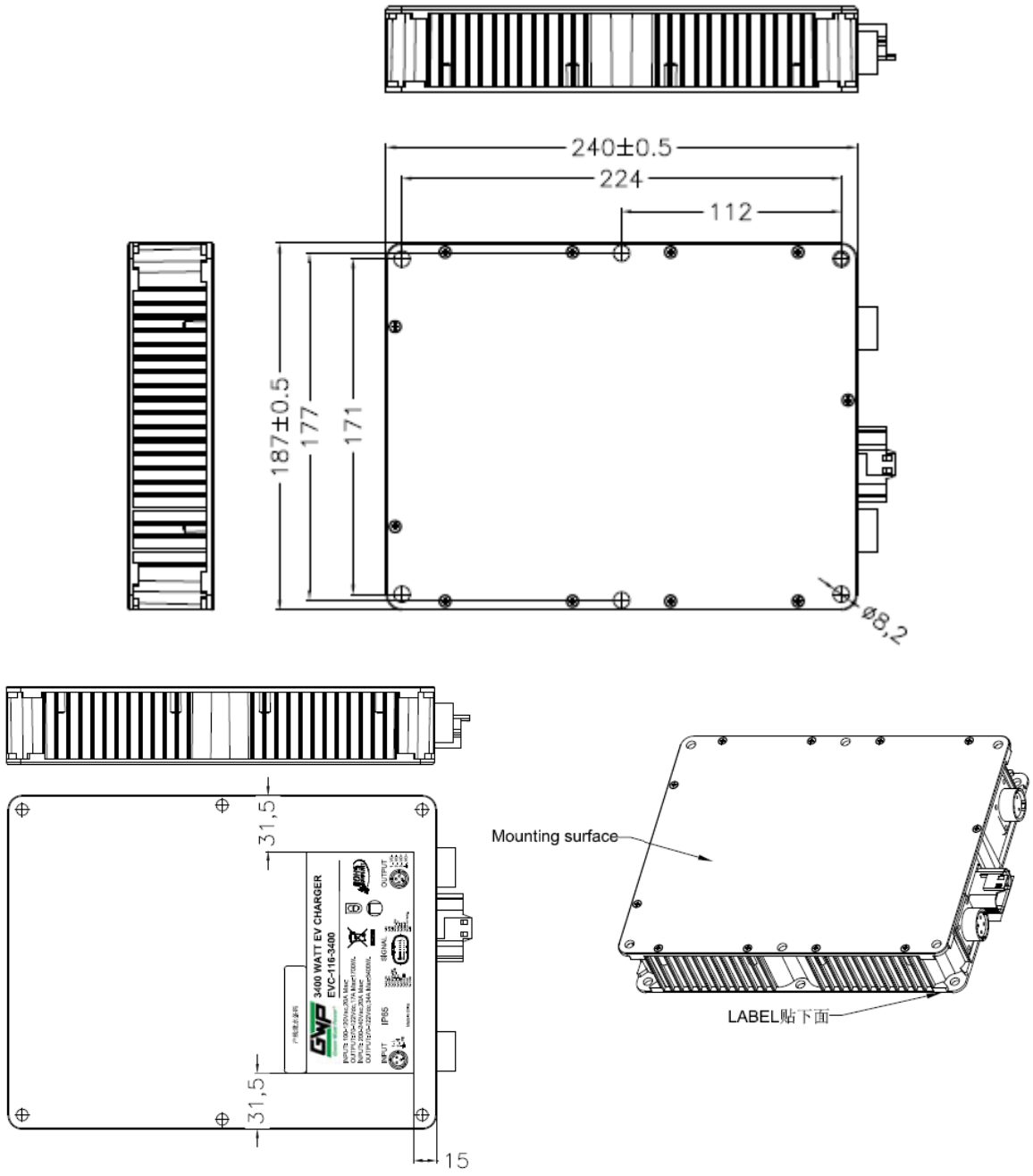
7.2.1 EMI/EMC Requirements

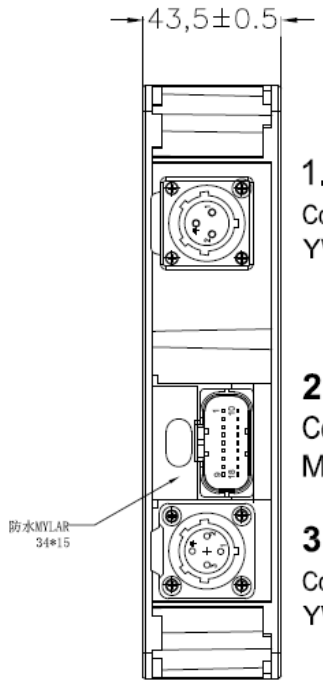
A) EMI, RFI:
Comply with EN55032 class B

B) IMMUNITY:
EN61000-3-2: Harmonic current emission
EN61000-3-3: Voltage fluctuations and flicker
EN61000-4-2: ESD 8kV air discharge, 4kV contact discharge
EN61000-4-3: Radio-frequency Electromagnetic Field Susceptibility Test-Rs
EN61000-4-4: Electrical Fast Transient/ burst-EFT
EN61000-4-5: Surge Immunity Test, AC power line: line to line 2kV; line to earth 4kV
EN61000-4-6: Conducted Radio Frequency Disturbance Test-Cs
EN61000-4-8: Power Frequency Magnetic Field Test
EN61000-4-1-1: Voltage Dips
EN61547: Electromagnetic Immunity Requirements applies to Lighting Equipment

8. MECHANICAL

8.1 Outline Drawing (in mm)





1.INPUT
Connection: CNLINKO(凌科)
YW20-J03SX-02-001

2.SIGNAL OUTPUT
Connection:JAE
MX23A18NF1

3.OUTPUT
Connection: CNLINKO(凌科)
YW20-J04SX-02-001

1.INPUT
CONN: YW20-J03SX-02-001, 凌科电气

CONN.No	DESCRIPTION
1	L
2	N
⏚	PE

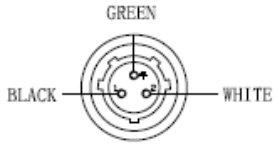
2.SIGNAL OUTPUT
CONN:JAE MX23A18NF1

CONN.No	DESCRIPTION	CONN.No	DESCRIPTION
1	NC	10	AC_OK
2	NC	11	AC_OK
3	NC	12	Charger_ENA
4	Can_Gnd	13	12V_ISO_GND
5	Can_5V	14	12V_ISO
6	Can_L	15	DGND
7	Can_H	16	BKGD/MS
8	Test For Factory	17	Reset
9	NC	18	+5VSB

3, OUTPUT:
CONN. YW20-J03SX-02-001, 凌科电气

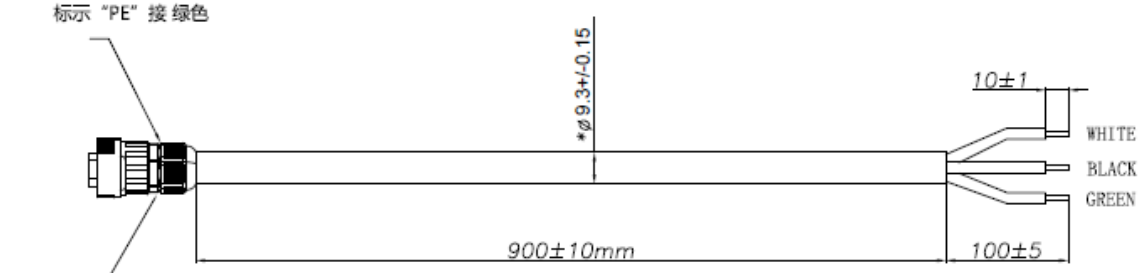
CONN.No	DESCRIPTION
1	VO-
2	VO-
3	VO+
⏚	VO+

8.2 Input and output cables



接线：标示 "L" 接 黑色
标示 "N" 接 白色
标示 "PE" 接 绿色

NOTES:
1. THE MATERIAL LIST HAVE INCLUDE PRIMARY AND SECOND SOURCE, BUT THE MANUFACTORY CAN CHANGE TO OTHER VENDER,
2. 拉力试验：整条线拉力≥15KG（1分钟无 断芯和延伸率≤总长的8%）.
3. 外观要求：表面无破损，无压伤，无油污等外观不良線材外皮，每米不能超過3個小凸點
4. 線材規格：UL SJTW 14WG*3C, 外被黑色, 無屏蔽
額定溫度：105℃，額定电压：300V
5. 必須符合"ROKS"環境管制物質技術標準



CONN:
YW-20-C03PE-02-001,
凌科

REV.	DESCRIPTION	DATE
02		
01	ORIGINAL RELEASE	03/17/18'

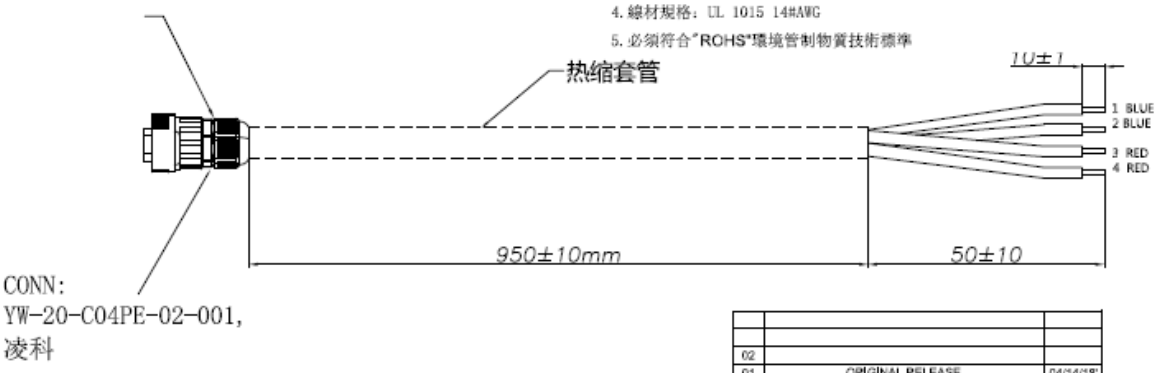
TOL. / RANGE	NCT	TOL	OTH	PAK	WIR	JIG
0 ~ <6	0.20	0.20	0.20	1.00	2.00	0.10
6 ~ <30	0.25	0.20	0.35	1.00	3.00	0.10
30 ~ <120	0.30	0.25	0.45	2.50	5.00	0.15
120 ~ <300	0.45	0.30	0.60	3.50	8.00	0.20
300 ~ <600	0.60	0.50	0.80	4.50	10.00	0.30
600 ~ <1200	1.00	0.80	1.00	5.50	15.00	0.40
ANG. TOL.	1°					0.5°

FSP GROUP POWERLAND 南京博兰得电子科技有限公司 FSP-Powerland Technology Inc.

TITLE/PART NAME: OP WIRE		APPROVED	
PART NO.:	4CF00000060DR1	CHECKED	
MODEL:	PLD3400-EVCS02-122	DESIGNED	
SCALE: 1:1	UNIT: mm	SHEET	1 OF 1

NOTES:
1. THE MATERIAL LIST HAVE INCLUDE PRIMARY AND SECOND SOURCE, BUT THE MANUFACTORY CAN CHANGE TO OTHER VENDER.
2. 拉力试验：整条线拉力≥15KG（1分钟无 断芯和延伸率≤总长的8%）.
3. 外观要求：表面无破损，无压伤，无油污等外观不良 線材外皮，每米不能超過3個小凸點
4. 線材規格：UL 1015 14#AWG
5. 必须符合"ROHS"環境管制物質技術標準

接线：1. 接 UL 1015 14#AWG BLUE
2. 接 UL 1015 14#AWG BLUE
3. 接 UL 1015 14#AWG RED
4. 接 UL 1015 14#AWG RED



CONN:
YW-20-C04PE-02-001,
凌科

REV.	DESCRIPTION	DATE
02		
01	ORIGINAL RELEASE	04/14/18'

TOL. / RANGE	NCT	TOL	✓ OTH	PAK	WIR	JIG
0 ~ <6	0.20	0.20	0.20	1.00	2.00	0.10
6 ~ <30	0.25	0.20	0.35	1.00	3.00	0.10
30 ~ <120	0.30	0.25	0.45	2.50	5.00	0.15
120 ~ <300	0.45	0.30	0.60	3.50	8.00	0.20
300 ~ <600	0.60	0.50	0.80	4.50	10.00	0.30
600 ~ <1200	1.00	0.80	1.00	5.50	15.00	0.40
ANG. TOL.	1°					0.5°

南京博兰得电子科技有限公司
FSP-Powerland Technology Inc.

TITLE/PART NAME:	OP WIRE	APPROVED	
PART NO.:	4CF00000050DR1	CHECKED	
MODEL:	PLD3400-EVCS02-122	DESIGNED	
SCALE: 1:1	UNIT: mm	SHEET	1 OF 1

9. REVISION LOG

This section contains the release history of this document:

Date	Revision	Section	Remarks
02/14/2018	V0.1		First Released.
01/15/2019	V0.2	3	Add derating condition.
		5	Limit the AC input current. Add the bootload function. Set the minimum charger current to 2A above 85V, and 5A below 85V.
		5.2	Modify the temperature value: The display value is added by 40.
		5.3	Add the detailed value for OTP/UVP/OVP.
01/17/2019		8.2	Add the input and output cables.
03/07/2019		2.2.1	Modify the accuracy description.
04/15/2019		2.2.2	Update the charge curve
04/15/2019		8	Update the shape of input and output connectors
04/28/2019		3	Change derationg point from 78°C to 75°C
04/28/2019		7.2.1	Change EMI from CLASS A to CLASS B
05/23/2022	B1	2.2.1	Output current max modify to 34A Delete"Maximum ripple current @100~120Hz" Delete" Maximum ripple current @100~120Hz W/O battery"
		2.2.5	Ripple current modify to ±8.5Amax Delete" Measurement is done by 20MHz bandwidth oscilloscope. (Test under the condition of rated input and rated output)"
		2.2.6	Delete "Rise Time 500ms max. @ Full load."
		4	Modify the PIN8 description From "The charger will begin charging when this pin is connecting to the pin18 (+5VSB). The purpose is to disable the CAN control and Charger_ENA control functions." To "The charger will disable the CAN control function when this pin is connecting to the pin18 (+5VSB)."
		5.3	Modify the fault flags' endianness, C_OTIMP description From " If the charger does not receive the CAN Frame of Charger_control (0x300) continuously more than 1s" To "If the charger does not receive the CAN command from BMS continuously more than 1s"
		6.1	Delete" As stated in above at 90ºC case temperature, charger will shut down in thermal protection."
		7.1	Add Dielectric Strength &Leakage Current &Insulation Resistance &Grounded Resistance
		7.2.1A	Modify the EMI requirement Delete "shall have a minimum of 6dB margin(TBD)."
		7.2.1B	Correct "burst-EFD" to "burst-EFT"
05/23/2022	B2	2.2.1	Current ripple Modify to"±8.5A max"
		2.2.1	Modify to "8.5A peak to peak max, during constant current mode at 25° C @ (Vac=120V 60hz Io=12A), measured at 20MHz bandwidth.'