



Test Report: HEP-2300-55

2300W Switching Power Supply for Harsh Environment

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

■ RELIABILITY TEST

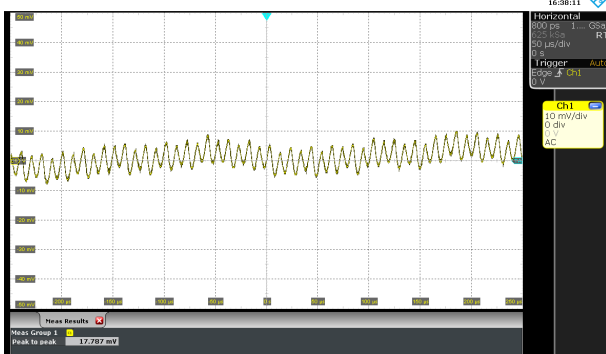
ENVIRONMENT TEST

DESIGN VERIFY TEST

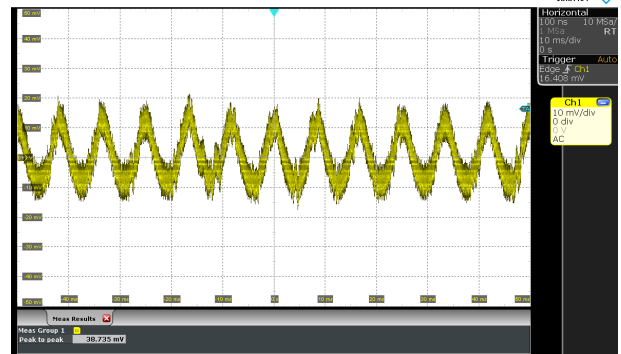
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 39V ~ 57.6V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	37.94V~59.16V/230VAC 37.93V~59.15V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1 : -1%~ +1%	I/P : 90VAC /305VAC O/P:FULL/ MIN. LOAD Ta : 25°C	V1 : -0.01%~ 0%
3	LINE REGULATION (Max)	V1 : -0.5%~ +0.5%	I/P : 220VAC~ 305VAC O/P : FULL LOAD Ta : 25°C	V1 : 0%~ 0%
4	LOAD REGULATION(Max)	V1 : -0.5%~ +0.5%	I/P : 230VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.01%~ 0.09%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	0 %
6	RIPPLE & NOISE(Max)	V1 : 480mVp-p	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 38.73mVp-p

high frequency :



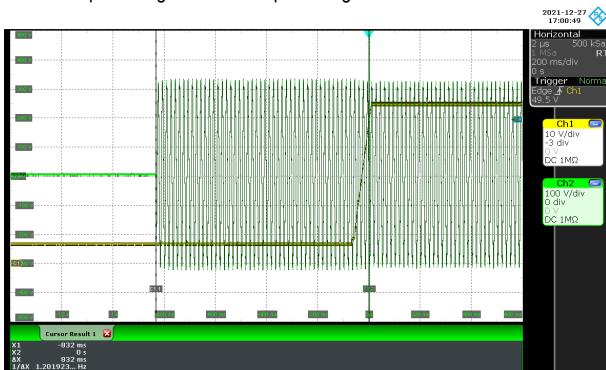
low frequency :



7	SET UP TIME(Max)	230VAC/1800ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 832ms
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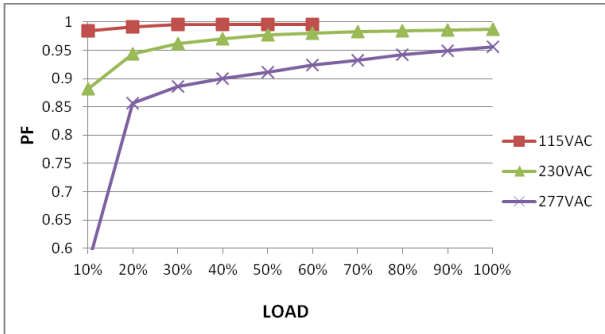
INPUT=230VAC/50HZ @ FULL LOAD

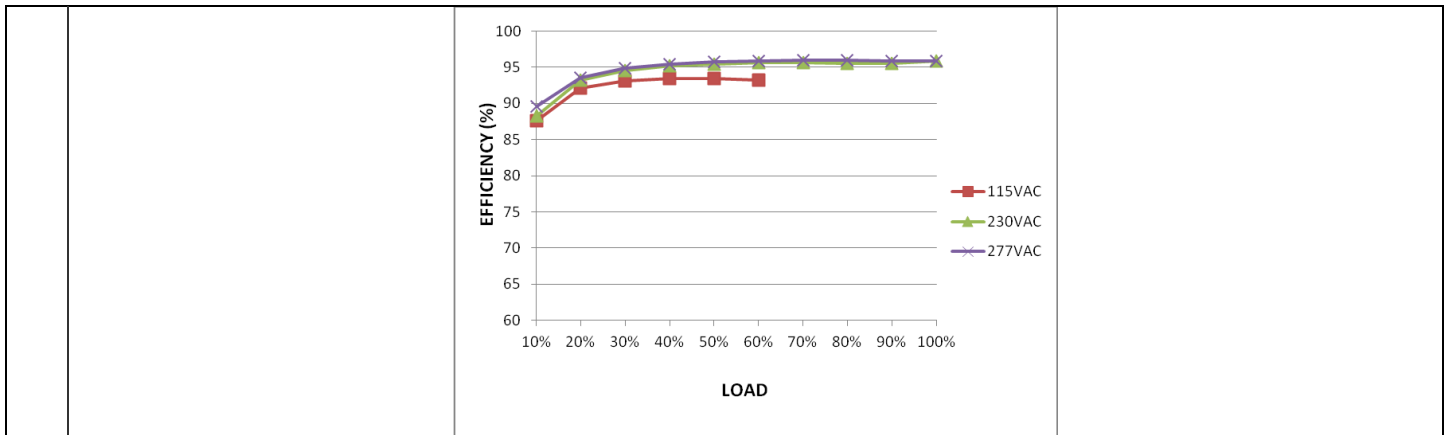
CH1 : Output Voltage CH2 : AC Input Voltage



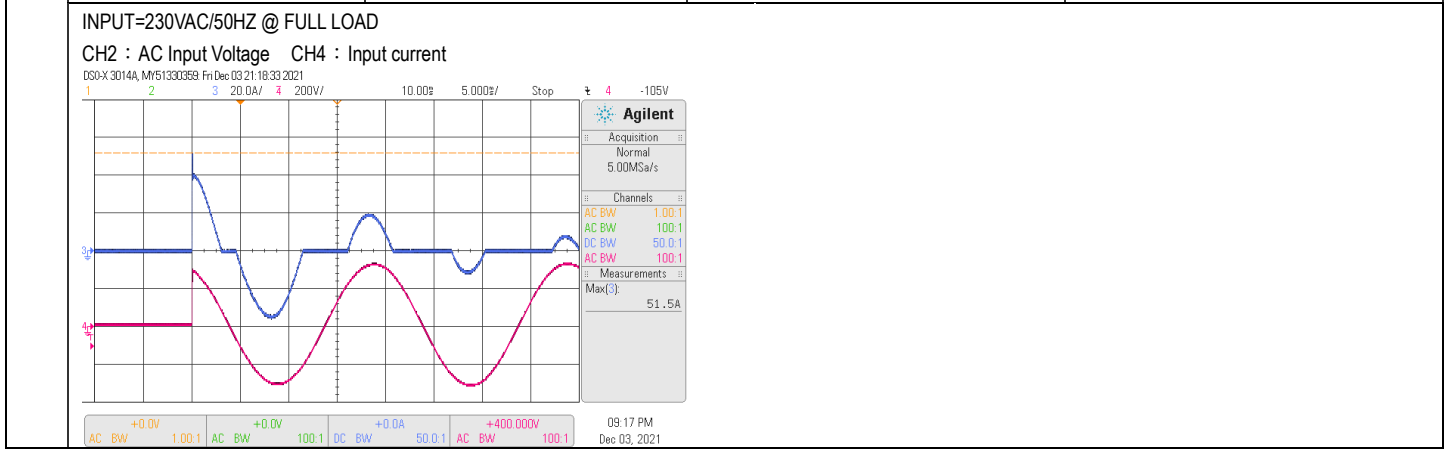
8	RISE TIME (Max)	230VAC/100ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 62ms
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage</p> <p>Δ: 3.80 V @: 29.8 V Δ: 62.0ms @: 0.00 s</p> <p>Ch1 10.0 V M20.0ms A Ch1 5.60 V</p> <p>30.00 %</p>				
9	HOLD UP TIME (Typ.)	230VAC/12ms @FULL LOAD	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 22 ms@ FULL LOAD
<p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1 : Output Voltage CH2 : AC Input Voltage</p> <p>Δ: 28.0 V @: -20.0 V Δ: 22.0ms @: -42.0ms</p> <p>Ch1 10.0 V Ch2 100 V M20.0ms A Ch1 5.60 V</p> <p>70.00 %</p>				
10	DYNAMIC LOAD	V1: 5.5Vp-p	I/P : 230VAC O/P : (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta : 25°C	474.31mVp-p 375.49mVp-p
<p>FULL /50% LOAD 50%DUTY / 120HZ</p> <p>Horizontal 20 ms 20 MSa RT Vertical 100 mV/div Scale 5 mV/div Trigger Edge of CH1 Level 1.0 mV</p> <p>Ch1 100 mV/div 0 div AC</p> <p>Peak Group 1 Peak to peak 474.31 mV</p>		<p>FULL /50% LOAD 50%DUTY / 1KHZ</p> <p>Horizontal 20 ms 20 MSa RT Vertical 100 mV/div Scale 5 mV/div Trigger Edge of CH1 Level 1.0 mV</p> <p>Ch1 100 mV/div 0 div AC</p> <p>Peak Group 1 Peak to peak 375.49 mV</p>		

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																												
1	INPUT VOLTAGE RANGE	90VAC~305VAC	I/P : TESTING O/P : Derating Load Ta : 25°C	87V~305V																																												
			I/P : LOW-LINE-3V=87 V HIGH-LINE+15%=315 V O/P : FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON : 30 Sec OFF : 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST : OK																																												
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 90 VAC ~305 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK																																												
3	INPUT CURRENT (Typ.)	277/ 9.3A 230V/ 11A 115V/ 13.3A	I/P : 277 VAC O/P : Full Load I/P : 230 VAC O/P : Full Load I/P : 115 VAC O/P : 60% Load Ta : 25°C	I=9.14A / 277VAC I=10.62A / 230VAC I=12.77 / 115VAC																																												
4	LEAKAGE CURRENT	<1.8mA(peak)/240V <2 mA(peak)/277V	I/P : 264 VAC I/P : 305 VAC O/P : Min LOAD Ta : 25°C	L-FG : 1.28 mA / 264V N-FG : 1.28 mA / 264V L-FG : 1.52 mA / 305V N-FG : 1.52 mA / 305V																																												
5	POWER FACTOR (Typ.)	0.93/277VAC 0.95/230VAC 0.99/115VAC	I/P : 277AC O/P : FULL LOAD I/P : 230 VAC O/P : FULL LOAD I/P : 115 VAC O/P : 60% LOAD Ta : 25°C	PF=0.9540/277VAC PF=0.9848/230VAC PF=0.9957/115VAC																																												
P.F vs LOAD <div style="text-align: center;">  <table border="1"> <caption>Approximate data from P.F vs LOAD graph</caption> <thead> <tr> <th>Load (%)</th> <th>115VAC P.F.</th> <th>230VAC P.F.</th> <th>277VAC P.F.</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.98</td><td>0.88</td><td>0.60</td></tr> <tr><td>20%</td><td>0.98</td><td>0.94</td><td>0.85</td></tr> <tr><td>30%</td><td>0.98</td><td>0.96</td><td>0.89</td></tr> <tr><td>40%</td><td>0.98</td><td>0.97</td><td>0.91</td></tr> <tr><td>50%</td><td>0.98</td><td>0.97</td><td>0.92</td></tr> <tr><td>60%</td><td>0.98</td><td>0.97</td><td>0.93</td></tr> <tr><td>70%</td><td>0.98</td><td>0.97</td><td>0.94</td></tr> <tr><td>80%</td><td>0.98</td><td>0.97</td><td>0.94</td></tr> <tr><td>90%</td><td>0.98</td><td>0.97</td><td>0.95</td></tr> <tr><td>100%</td><td>0.98</td><td>0.97</td><td>0.95</td></tr> </tbody> </table> </div>					Load (%)	115VAC P.F.	230VAC P.F.	277VAC P.F.	10%	0.98	0.88	0.60	20%	0.98	0.94	0.85	30%	0.98	0.96	0.89	40%	0.98	0.97	0.91	50%	0.98	0.97	0.92	60%	0.98	0.97	0.93	70%	0.98	0.97	0.94	80%	0.98	0.97	0.94	90%	0.98	0.97	0.95	100%	0.98	0.97	0.95
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6	EFFICIENCY(Typ.)	95.5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	95.7%																																												
EFFICIENCY vs LOAD																																																



7	INRUSH CURRENT(Typ.)	230V/60A COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =51.5A / 230VAC T50= 1.44 ms /230V
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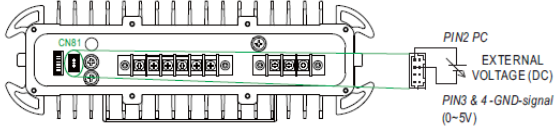
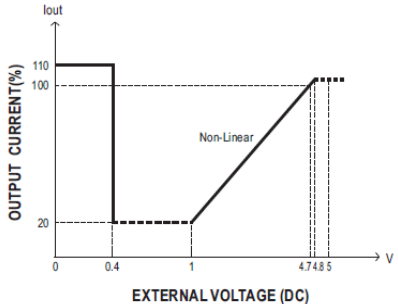


PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~115% PROTECTION TYPE : Constant current limiting,unit will shutdown after 5 sec,re-power on to recover.	I/P : 305VAC I/P : 90V O/P : TESTING Ta : 25°C	110%/ 305VAC 51.4% /90VAC
2	OVER VOLTAGE PROTECTION	60.5V~69.1V Protection type : Shut down O/P voltage,re-power on to recover.	I/P : 305VAC I/P : 90VAC O/P : MIN LOAD Ta : 25°C	62.2V/ 305VAC 62.2V/ 90VAC
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down O/P voltage,, recovers automatically after temperature goes down	I/P : 305VAC O/P : FULL LOAD I/P : 90VAC O/P : 50% LOAD	O.T.P. Active PASS Shutdown O/P voltage,, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE PROTECTION TYPE : Constant current limiting,unit will shutdown after 5 sec,re-power on to recover.	I/P : 305VAC I/P : 90VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT															
1	AUXILIARY POWER (AUX)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C Test Result : <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>AUX</th> <th>TOLERANCE</th> <th>RIPPLE</th> <th>TEST RESULT</th> </tr> </thead> <tbody> <tr> <td>12V / 0.5A</td> <td>10.8~13.2 V</td> <td>150mVp-p</td> <td>11.94V/55mv</td> </tr> </tbody> </table>	AUX	TOLERANCE	RIPPLE	TEST RESULT	12V / 0.5A	10.8~13.2 V	150mVp-p	11.94V/55mv									
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12V / 0.5A	10.8~13.2 V	150mVp-p	11.94V/55mv																
2	REMOTE ON/OFF CONTROL	3.Remote ON-OFF Control The power supply can be turned ON/OFF individually or along with other units in parallel by using the "Remote ON-OFF" function. <div style="text-align: center; margin: 10px 0;"> </div> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Remote ON-OFF</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>Short circuit</td> <td>ON</td> </tr> <tr> <td>Open circuit</td> <td>OFF</td> </tr> </tbody> </table> I/P : 230 VAC O/P : FULL LOAD Ta : 25°C Test Result : <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Between ON/OFF and +5V-AUX</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> </tbody> </table>	Remote ON-OFF	Power Supply Status	Short circuit	ON	Open circuit	OFF	Between ON/OFF and +5V-AUX	Power Supply Status	SW SHORT	ON	SW OPEN	OFF					
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3	OUTPUT VOLTAGE PROGRAMMABLE(PV)	1.Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim) ※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed by applying EXTERNAL VOLTAGE. <div style="text-align: center; margin: 10px 0;"> </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>© The 100% output voltage is 115/216/334V.</p> </div> <div style="text-align: center;"> <p>© The rated current should change with the Output Voltage Programming accordingly.</p> </div> </div> I/P : 230 VAC O/P : FULL LOAD Ta : 25°C TEST RESULT : <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>MODEL</th> <th>PV</th> <th><0.4V</th> <th>1V</th> <th>5V</th> </tr> </thead> <tbody> <tr> <td>SPEC</td> <td></td> <td>55±5%</td> <td>24±5%</td> <td>57.6±5%</td> </tr> <tr> <td>Vout</td> <td></td> <td>55.18V</td> <td>23.35V</td> <td>58.82V</td> </tr> </tbody> </table>	MODEL	PV	<0.4V	1V	5V	SPEC		55±5%	24±5%	57.6±5%	Vout		55.18V	23.35V	58.82V		
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Vout		55.18V	23.35V	58.82V															

<p>4 OUTPUT CURRENT PROGRAMMABLE (PC)</p>	<p>2. Output Current Programming (or, PC / remote current programming / dynamic current trim) ※ The output current can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.</p>   <p>I/P : 230 VAC O/P : TESTING Ta : 25°C</p> <table border="1" data-bbox="422 806 1093 907"> <tr> <td>ADJ V</td> <td><0.4V</td> <td>1V</td> <td>5V</td> </tr> <tr> <td>SPEC</td> <td>46A±5%</td> <td>8.35A±10%</td> <td>48A±10%</td> </tr> <tr> <td>TEST</td> <td>46.05A</td> <td>8A</td> <td>46A</td> </tr> </table> <p>⊙ The 100% output current is rated current. ⊙ Maximum operation current <100% is recommended.</p>		ADJ V	<0.4V	1V	5V	SPEC	46A±5%	8.35A±10%	48A±10%	TEST	46.05A	8A	46A							
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TEST	46.05A	8A	46A																		
<p>5 DC-OK SIGNAL</p>	<p>The TTL signal out, PSU turn on = 4.5 ~ 5.5V PSU turn off = -0.5V ~ 0.5V Please refer to the Function Manual</p>	<p>I/P : 230VAC O/P : FULL LOAD Ta : 25°C</p>	<p>PSU turn on = 5.12 V PSU turn off = -0.005 V</p>																		
<p>6 LED Indicators</p>	<p>※ LED Status Indicators</p> <table border="1" data-bbox="359 1108 1220 1198"> <thead> <tr> <th>LED</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>● Green</td> <td>The power supply functions normally.</td> </tr> <tr> <td>● Red</td> <td>Abnormal status (Over temperature protection, Overload protection)</td> </tr> <tr> <td>● Red (Flashing)</td> <td>The LED will flash with the red light when the internal temperature reaches 95°C; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus/CANBus/MODBus interface.)</td> </tr> </tbody> </table> <p>※ LED Status Indicators (for Charger)</p> <table border="1" data-bbox="359 1232 1220 1344"> <thead> <tr> <th>LED</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>● Green</td> <td>Float (stage 3)</td> </tr> <tr> <td>● Orange</td> <td>Charging (stage 1 or stage 2)</td> </tr> <tr> <td>● Red</td> <td>Abnormal status (OTP, OLP, Charging timeout.)</td> </tr> <tr> <td>● Red (Flashing)</td> <td>The LED will flash with the red light when the internal temperature reaches 95°C; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus/CANBus/MODBus interface.)</td> </tr> </tbody> </table>		LED	Description	● Green	The power supply functions normally.	● Red	Abnormal status (Over temperature protection, Overload protection)	● Red (Flashing)	The LED will flash with the red light when the internal temperature reaches 95°C; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus/CANBus/MODBus interface.)	LED	Description	● Green	Float (stage 3)	● Orange	Charging (stage 1 or stage 2)	● Red	Abnormal status (OTP, OLP, Charging timeout.)	● Red (Flashing)	The LED will flash with the red light when the internal temperature reaches 95°C; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus/CANBus/MODBus interface.)	<p>PASS</p>
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CHARGER MODE

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	BOOST CHARGE VOLTAGE	57.6V±0.55V	I/P : 230 VAC O/P : BAT. LOAD Ta : 25°C	57.78V
2	FLOAT CHARGE VOLTAGE	55.2V±0.55V	I/P : 230 VAC O/P : BAT. LOAD Ta : 25°C	55.41V
3	OUTPUT CURRENT	40A	I/P : 230 VAC O/P : BAT. LOAD Ta : 25°C	40.05A

4	<p>1. Charging Curve</p> <p>※ By default, the HEP-2300 operates in power supply mode, and it can be configured to charger mode by PMBus, CANBus, or SBP-001.</p> <p>※ By factory default, this charger performs the default curve which can be programmed via PMBus and CANBus.</p> <p>※ To accommodate the parameters of the charging curve, SBP-001, the smart battery charging programmer designed by MEAN WELL, and a personal computer are needed. Please contact MEAN WELL for details.</p> <p>※ 2 stage charging curve (default)</p> <p>※ 3 stage charging curve</p> <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>State</th> <th>HEP-2300-55</th> </tr> </thead> <tbody> <tr> <td>Constant Current</td> <td>40A</td> </tr> <tr> <td>Vboost</td> <td>57.6V</td> </tr> </tbody> </table> <p>© Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).</p>	State	HEP-2300-55	Constant Current	40A	Vboost	57.6V	PASS
State	HEP-2300-55							
Constant Current	40A							
Vboost	57.6V							

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q903 Rated 76A/600V VGS : ± 30V	AC ON/OFF I/P : High-Line +3V =308V VDS : O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)CV-1V(CHARGE MODE) I/P : Low-Line -3V = 217V O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)CV-1V(CHARGE MODE) Ta : 25°C	VDS: (1) 533.20V/ (2) 537.15V/ (3) 525.30V/ (4) 529.25V/ (5) 533.20V/ (6) 521.34V/ (7) 529.25V/ (8) 521.34V VDS : (1) 537.15V/ (2) 537.15V/ (3) 529.25V/ (4) 529.25V/ (5) 533.20V/ (6) 525.30V/ (7) 521.34V/ (8) 537.15V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q66 Rated 40A/650V VGS : ± 30V	I/P : High-Line +3V =308V AC ON/OFF O/P : (1)Full Load	VDS : (1) 572.73V

			<p>(2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. I/P : Low-Line -3V = 217V AC ON/OFF O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta : 25°C</p>	<p>(2) 588.54V (3) 564.82V (4) 568.77V (5) 572.73V (6) 568.77V (7) 580.63V VDS: (1) 572.73V (2) 580.63V (3) 572.73V (4) 568.77V (5) 568.77V (6) 552.96V (7) 576.68V</p>
3	P.F.C DIODE	D14 Rated 10A/650V	<p>I/P : High-Line +3V =308V AC ON/OFF O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz I/P : Low-Line -3V = 217V AC ON/OFF O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta : 25°C</p>	<p>(1) 489.72V (2) 505.53V (3) 489.72V (4) 493.68V (1) 489.72V (2) 497.63V (3) 489.72V (4) 485.77V</p>
4	Diode Peak Voltage	<p>Q204 Rated 87A/150V VGS : ± 20V Q216 Rated 87A/150V VGS : ± 20V</p>	<p>AC ON/OFF I/P : High-Line +3V =308V O/P : (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD (9)CV-1V(CHARGE MODE) Ta : 25°C</p>	<p>Q204 : Q216 : VDS : VDS : (1) 135.34V (1) 129.80V (2) 135.34V (2) 128.22V (3) 139.29V (3) 128.22V (4) 141.66V (4) 130.59V (5) 141.66V (5) 129.8V (6) 143.24V (6) 132.17V (7) 147.19V (7) 134.55V (8) 128.22V (8) 123.48V (9) 139.29V (9) 130.59V</p>

5	Input Capacitor Voltage	C5 Rated : 220u/450V -40~105°C Surge Voltage 495V	I/P : High-Line +3V =308V O/P : (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta : 25°C	(1) 449V (2) 446.32V (3) 449V (4) 445.53V
6	Control IC Voltage Test	PWM IC U900 Rated 8.9 V ~ 15.5V PFC IC U301 Rated 10.8V ~ 27 V O/P IC U203 Rated -0.3V ~37 V MCU IC U701 Rated 2.0V ~3.6V AUX IC U601 Rated 10.5V~25V	AC ON/OFF I/P : High-Line +3V =308V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(LOW LINE) Ta : 25°C	U900 : (1) 13.083V (2) 12.806V (3) 13.241V (4) 12.806V (5) 12.885V U301 : (1) 12.569V (2) 12.372V (3) 12.925V (4) 12.332V (5) 12.411V U203 : (1) 12.253V (2) 12.174V (3) 12.451V (4) 12.134V (5) 12.095V U701 : (1) 3.33V (2) 3.52V (3) 3.33V (4) 3.36V (5) 3.43V U601 : (1) 13.747V (2) 13.826V (3) 13.826V (4) 13.431V (5) 13.51V
8	TOP SWITCHING STAND BY POWER	U601 Rated 3.5 A/ 800 V	AC ON/OFF I/P:High-Line +3V =308V O/P : (1)Full Load (2)Remote On/Off I/P : Low-Line -3V =217V O/P : (1)Full Load (2)Remote On/Off Ta : 25°C	U601 : (1) 572.73V (2) 588.54V (1) 568.77V (2) 592.49V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 6KVDC/min I/P-FG : 4KVDC/min O/P-FG : 4KVDC/min	I/P-O/P : 6.6KVDC/min I/P-FG : 4.8KVDC /min O/P-FG : 4.8KVDC /min Ta : 25°C	PASS NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩn	I/P-O/P : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C	I/P-O/P : 4.3GΩ I/P-FG : >30GΩ O/P-FG : 3.31GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta : 25°C	26 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS

2	CONDUCTION	EN55032 (CISPR32) CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS
3	RADIATION	EN55032 (CISPR32) CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS
4	E.S.D	EN61000-4-2 Level 3, 8KV air Level 2, 4KV contact	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 Level 3	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-6-2 INDUSTRY 2KV/Line-Line 4KV/Line-Earth	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : HEP-2300-55 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25°C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 50 °C		

NO	Position	ROOM AMBIENT Ta=25°C	HIGH AMBIENT Ta=50°C
1	BD1	77.4°C	105.4°C
2	Q51	69.8°C	98.0°C
3	Q65	67.2°C	95.9°C
4	Q901	69.2°C	98.3°C
5	Q903	68.3°C	95.2°C
6	Q204	67.5°C	94.9°C
7	Q212	66.8°C	94.1°C
8	T1 (coil)	69.6°C	98.7°C
9	T2 (coil)	67.5°C	95.8°C
10	RT4	65.2°C	94.1°C
11	RT5	64.1°C	92.9°C
12	U201	63.9°C	92.8°C
13	U203	62.7°C	90.5°C
14	U301	63.9°C	92.1°C
15	U302	62.0°C	89.1°C
16	U900	61.2°C	88.1°C
17	C111	67.5°C	95.9°C
18	C115	66.3°C	93.5°C
19	C125	59.8°C	82.0°C
20	C13	67.6°C	94.1°C
21	C553	65.4°C	93.1°C
22	C560	57.5°C	83.9°C
23	C6	58.3°C	85.1°C
24	C9	57.6°C	84.5°C
25	D14	81.4°C	107.5°C
26	L3 C	70.6°C	99.3°C
27	L3 W	72.7°C	102.1°C
28	LF201	63.4°C	90.8°C
29	LF3	67.8°C	96.6°C
30	LF4	67.1°C	95.9°C
31	C130	62.5°C	90.5°C
32	L1 C	70.0°C	99.8°C

			33	L1 W	69.7°C	99.6°C
			34	RT3	58.9°C	85.3°C
			35	R212	69.3°C	97.7°C
			36	RY1	68.7°C	95.6°C
			37	T51	70.1°C	96.8°C
			38	T601 (coil)	68.6°C	95.6°C
			39	U601	74.9°C	100.6°C
			40	D651	68.9°C	95.1°C
			41	D655	73.3°C	100.0°C
			42	D602	75.3°C	103.1°C
			43	U51	68.9°C	97.5°C
			44	U702	55.3°C	81.2°C
			45	RG65	62.6°C	89.4°C
			46	U651	60.7°C	87.1°C
			47	U701	58.1°C	82.9°C
			48	TC	60.3°C	85.3°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 93.7%LOAD(55V) Ta : 25°C		TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/220VAC O/P : 100 %LOAD Ta= -45 °C		TEST : OK	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C/95 %R.H NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H		TEST : OK	
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0~50°C)	I/P : 230 VAC O/P : FULL LOAD		± 0.003 %/°C(0~50°C)	
6	STORAGE TEMPERATURE TEST	-40~85°C	1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC			
7	THERMAL SHOCK TEST	-40~50°C	1. Thermal shock Temperature : -45°C~ +55°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test			
8	VIBRATION TEST	20~500Hz, 10G 12min./1cycle, 72min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 20~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 10G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C			

9	CAPACITOR LIFE CYCLE	SUPPOSE C111 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 50 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50 °C LIFE TIME	(1) 261868HRS (2) 56207HRS (3) 105243HRS (4) 121448HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 478K hrs min. Telcordia SR-332 (Bellcore) ; 44.8K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 55,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	VINCENT TSENG

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