Test Report: BIC-5K-96

AC⇔DC 5KW Bidirectional Power Supply with Energy Recycle

■ DESIGN VERIFY TEST

Output Function Test (AC to DC)
Input Function Test (AC to DC)
Input Function Test (DC to AC)
Output Function Test (DC to AC)
Protection Function Test
Control Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

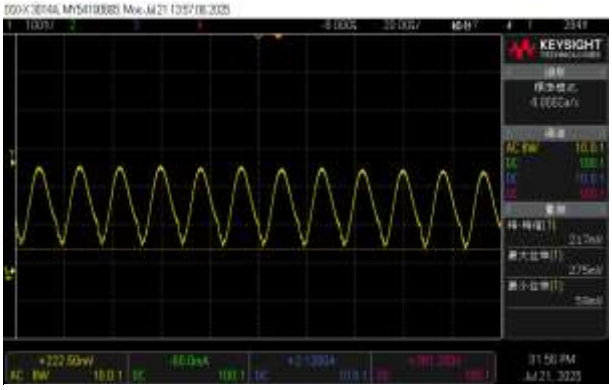
Safety Test
E.M.C. Test

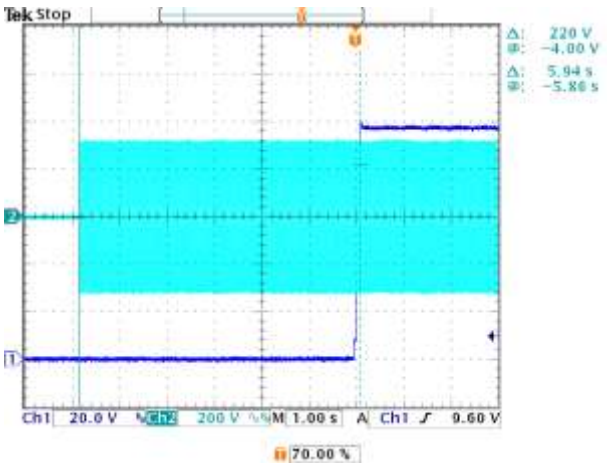
■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

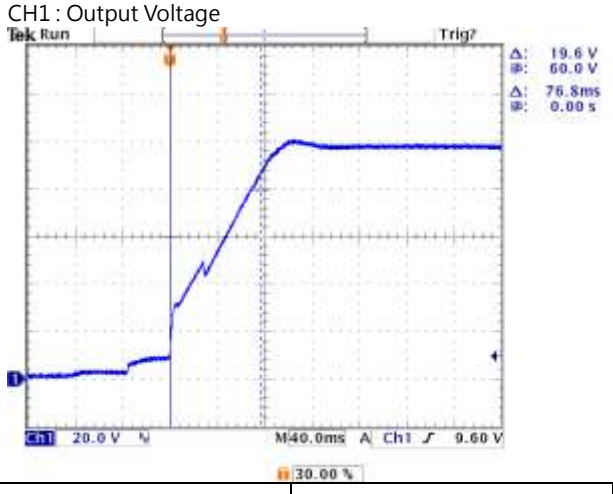
OUTPUT FUNCTION TEST (AC to DC)

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 76 V~ 112V	I/P： 230 VAC I/P： 180 VAC O/P：MIN LOAD Ta：25℃	76.09V~112.02V / 230VAC 76.08V~112.01V / 180VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: 2% ~ 2%	I/P: 180VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.114% ~0.145 % 180VAC:96.11V 305VAC:96.14V
3	LINE REGULATION	V1: 1%~ -1%	I/P: 200VAC~ 305VAC O/P:FULL LOAD Ta:25℃	V1: -0.093% ~ 0.166% 200V：96.12V-96.16V 305V：96.09V-96.14V
4	LOAD REGULATION	V1: 1%~ -1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.156%~ 0.197% 96.19V / 96.15V / 96.18V
5	OVER/UNDERSHOOT TEST	<± 10%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	6.77% / -7.5%
6	RIPPLE & NOISE (Max)	V1: 900mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 559mVp-p
	high frequency：  low frequency： 			
7	SET UP TIME(Max)	230VAC/8sec	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 5.94sec
	INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2 : AC Input Voltage			



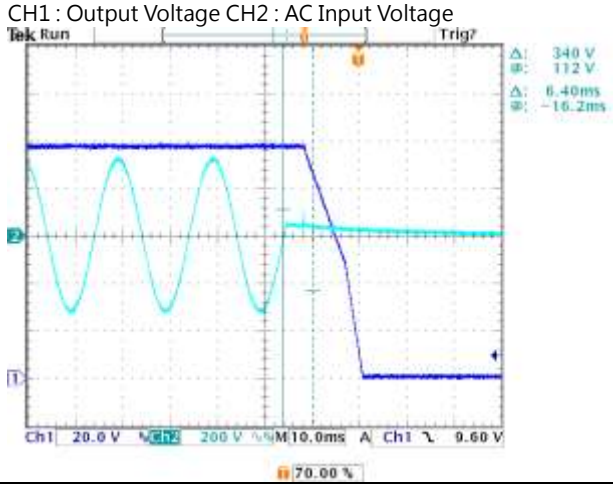
8	RISE TIME (Max)	230VAC/150ms	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC / 76.8ms

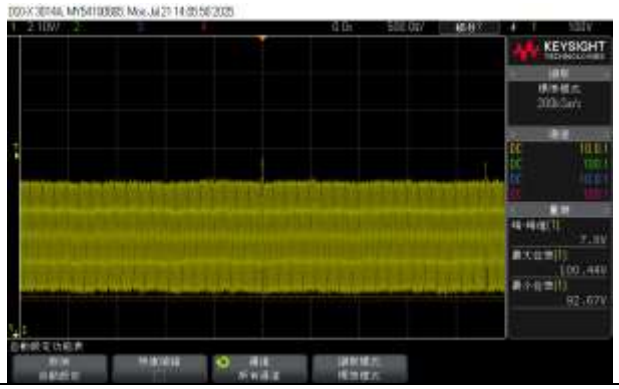
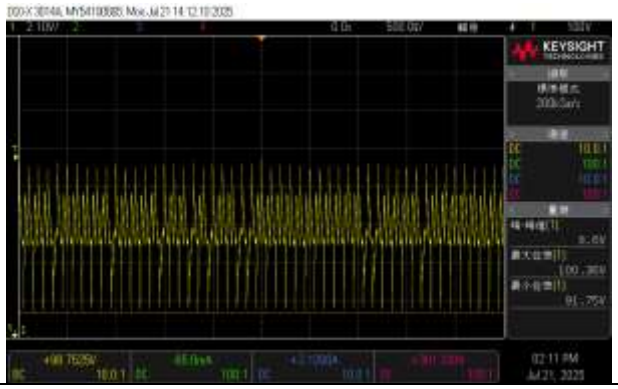
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



9	HOLD UP TIME (Typ.)	230VAC/--	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 6.4 ms

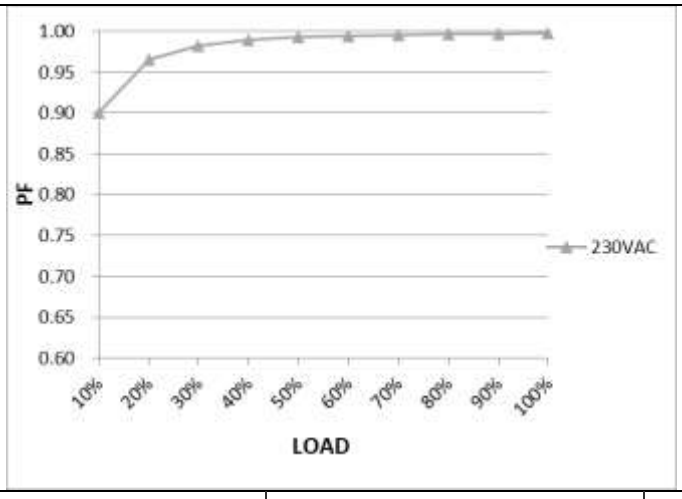
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



10	DYNAMIC LOAD	V1: 9600mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 7800mVp-p 8600mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	

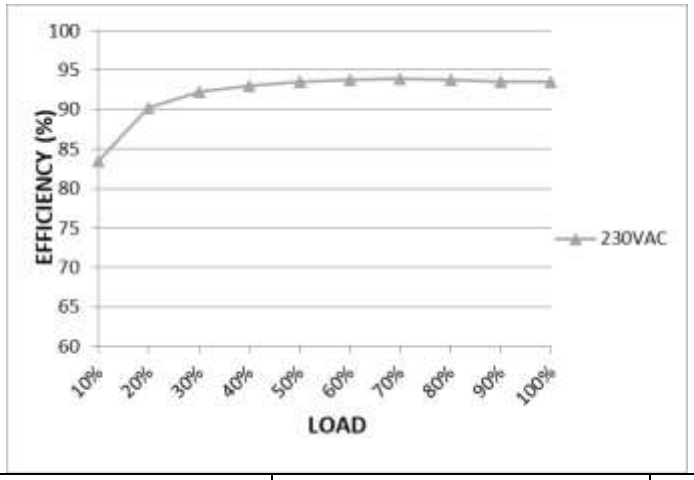
INPUT FUNCTION TEST(AC to DC)

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~305VAC	I/P : TESTING O/P : FULL LOAD Ta:25℃	166~305V
			I/P : LOW-LINE-3V=177 V HIGH-LINE+10V=315V O/P : FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE)	TEST:PASS
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 180 VAC ~305 VAC O/P : FULL~MIN LOAD Ta:25℃	TEST: PASS
3	POWER FACTOR (Typ.)	0.99/ 230VAC	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	PF=0.9988
	P.F vs LOAD			



4	EFFICIENCY(Typ.)	93% @ 75% Load	I/P : 230 VAC O/P : 75% Load Ta:25℃	93.11%

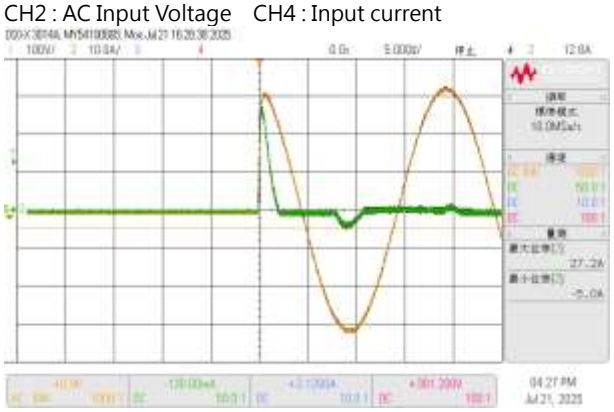
EFFICIENCY vs LOAD

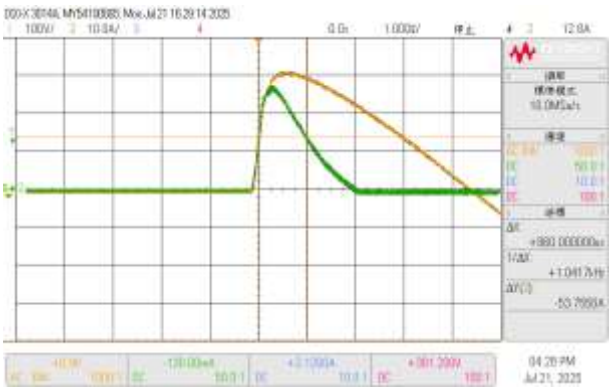


5	AC CURRENT (Typ.)	27A / 230V	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I =23.515A
6	INRUSH CURRENT(Typ.)	120A/230V COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I =27.2A T50= 960us

INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current





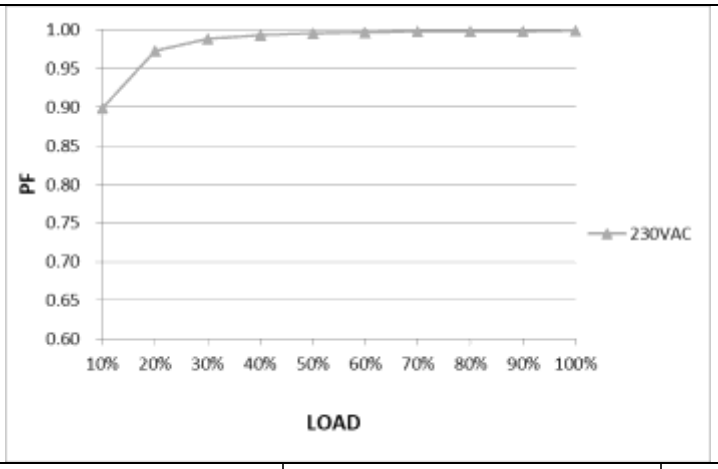
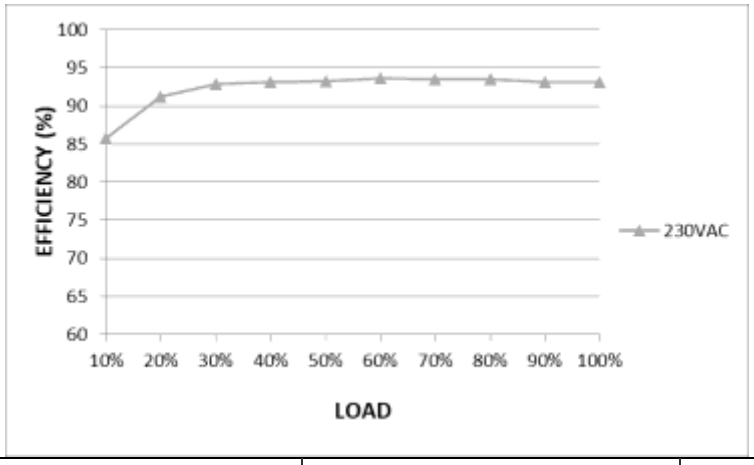
7	LEAKAGE CURRENT	< 7.07mA (Peak)/ 305VAC	I/P： 305 VAC / 60Hz O/P：Min LOAD Ta：25℃	L-FG： 6.62mA(Peak) N-FG： 6.62mA(Peak)
8	TOTAL HARMONIC DISTORTION	<3%(@load=100%/230VAC)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	THDi =2.1 %(full load)

INPUT FUNCTION TEST(DC to AC)

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED INPUT POWER	5550W	I/P： 96VDC O/P：FULL LOAD Ta：25℃	5505W
2	FULL POWER VOLTAGE RANGE	96VDC ~112VDC	I/P： Test O/P：FULL LOAD Ta：25℃	TEST： 96V~112V
3	DC VOLTAGE RANGE	76VDC ~112VDC	I/P： Test O/P：FULL LOAD Ta：25℃	TEST： 76.12V~112.06V
4	INPUT CURRENT (MAX.)	57.8A	I/P： 96VDC O/P：FULL LOAD Ta：25℃	57A

OUTPUT FUNCTION TEST(DC to AC)

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED OUTPUT POWER	5000W	I/P : 96VDC O/P : TESTING Ta:25℃	5095W
2	VOLTAGE RANGE	180VAC~305VAC	I/P : 96VDC O/P : TESTING Ta:25℃	TEST：163.5~305V
3	FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 96VDC O/P : FULL~MIN LOAD Ta:25℃	TEST：PASS
4	AC CURRENT (Typ.)	22.5A/ 230VAC	I/P：96VDC O/P：FULL LOAD Ta：25℃	22.13A
5	POWER FACTOR (Typ.)	0.99/ 230VAC	I/P：96VDC O/P：FULL LOAD Ta：25℃	PF=0.9987
	P.F vs LOAD			

				
6	EFFICIENCY(Typ.)	93%	I/P: 96VDC O/P: 75% LOAD Ta:25℃	93.1%
	EFFICIENCY vs LOAD 			
7	TOTAL HARMONIC DISTORTION	<3% (@load=100%/230VAC)	I/P: 96VDC O/P:FULL LOAD 70% Load Ta：25℃	THDi =2.1%

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 115% Constant current limiting, shut down DC O/P voltage 5 sec. after DC O/P voltage is down low, re-power on to recover	I/P: 305VAC I/P: 230VAC I/P: 200VAC I/P: 180VAC O/P:TESTING Ta:25℃	**AC to DC (BIC mode)** 110.0%/ 305VAC 109.6% / 230VAC 107.8% / 200VAC 87.5%/ 180VAC PROTECTION TYPE： Shut down O/P current, re-power on to recover

2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 305VAC I/P: 180VAC O/P: FULL LOAD Ta:25℃	**AC to DC (BIC mode)** NO DAMAGE PROTECTION TYPE : Shut down O/P current, re-power on to recover **DC to AC(BIC mode) (AC short)** NO DAMAGE PROTECTION TYPE : Shut down O/P current, re-power on to recover **DC to AC(GRID mode) (AC short)** NO DAMAGE PROTECTION TYPE : Shut down O/P current, re-power on to recover
3	OVER VOLTAGE PROTECTION	115V~121V Protection type : Shut down O/P voltage, re-power on to recover	I/P: 305VAC I/P: 230VAC I/P: 180VAC O/P:MIN LOAD Ta:25℃	**AC to DC(BIC mode)** 115.92V/ 305VAC 115.93V/ 230VAC 115.56V/ 180VAC PROTECTION TYPE : Shut down O/P current, re-power on to recover
4	OVER TEMPERATURE PROTECTION	Protection type : Shut down O/P voltage, recovers automatically after temperature goes down	I/P: 305VAC I/P: 180VAC O/P:FULL LOAD	**AC to DC(BIC mode)** O.T.P. Active Protection type : Shut down O/P voltage, recovers automatically after temperature goes down **DC to AC(BIC mode)** O.T.P. Active Protection type : Shut down O/P voltage, recovers automatically after temperature goes down
5	ISLANDING PROTECTION	Shut down AC O/P voltage, re-power on to recover	I/P: 112VDC O/P: FULL LOAD/ 230VAC I/P: 96VDC O/P: 50% LOAD/ 230VAC I/P: 76VDC O/P: 10% LOAD/ 230VAC Ta:25℃	**DC to AC(BIC mode) (AC open)** NO DAMAGE *Check VAC Out PROTECTION TYPE : Shut down O/P current, re-power on to recover **DC to AC (GRID mode)(AC open)** NO DAMAGE *Check VAC Out PROTECTION TYPE : Shut down O/P current, re-power on to recover

CONTROL FUNCTION TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>BIDIRECTION SWITCH TIME(Typ.)</td><td colspan="3">I/P: 230 VAC /96VDC
O/P:FULL LOAD
Ta:25℃ Test Result：
DC-Source(SHP-30K-115)+bat

<table>
<tr><th>MODE</th><th>BIDIRECTION SWITCH TIME</th><th>Result</th></tr>
<tr><td>AC to DC (BIC)</td><td>1ms</td><td>59us</td></tr>
<tr><td>DC to AC (BIC)</td><td>1ms</td><td>900us</td></tr>
</table></td></tr>
<tr><td>2</td><td>REMOTE ON/OFF CONTROL</td><td colspan="3">By electrical signal or dry contact Short: Power ON Open: Power OFF Please refer to the Function Manual infollowing

I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
Test Result：
<table>
<tr><th>MODE</th><th>Between ON/OFF and +5V-AUX</th><th>Power Supply Status</th></tr>
<tr><td rowspan="2">AC to DC (BIC)</td><td>SW SHORT</td><td>ON</td></tr>
<tr><td>SW OPEN</td><td>OFF</td></tr>
<tr><td rowspan="2">DC to AC (BIC)</td><td>SW SHORT</td><td>ON</td></tr>
<tr><td>SW OPEN</td><td>OFF</td></tr>
<tr><td rowspan="2">AC to DC (CHG)</td><td>SW SHORT</td><td>ON</td></tr>
<tr><td>SW OPEN</td><td>OFF</td></tr>
<tr><td rowspan="2">DC to AC (GRIN)</td><td>SW SHORT</td><td>ON</td></tr>
<tr><td>SW OPEN</td><td>OFF</td></tr>
</table></td></tr>
<tr><td>3</td><td>ALARM SIGNAL</td><td colspan="3">1. DC OK SIGNAL
High (4.5 ~ 5.5V) : When the Vout ≦ 80%±5%.
Low (-0.5 ~ 0.5V) : When Vout ≧ 80%±5%.
The maximum sourcing current is 4mA and only for output.
I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
Test Result
<table>
<tr><th>Spec.</th><th>Transition point</th><th>Spec.</th><th>DC OK SIGNAL</th></tr>
<tr><td>Vout ≦ 75%~85%</td><td>75.9%</td><td>High (4.5 ~ 5.5V)</td><td>5.08V</td></tr>
<tr><td>Vout ≧ 75%~85%</td><td>80.2%</td><td>Low (-0.5 ~ 0.5V)</td><td>0V</td></tr>
</table>
2. T-ALARM
High (4.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when Fan fails.
Low (-0.1 ~ 0.5V) : When the internal temperature is normal, and when Fan works normally.
The maximum sourcing current is 4mA and only for output

I/P: 230 VAC
O/P:FULL LOAD
Ta:25℃
Test Result：</td></tr>
</table>

P.SU STATUS	Vo	T-ALARM SPEC	T-ALARM TEST
NORMAL	100%±2%	-0.5 ~0.5V	0V
OTP	0V	4.5~5.5V	5.08V
FAN LOCK	0V	4.5~5.5V	5.08V

3. Fault

High (4.5 ~ 5.5V) : When the Vac≦165Vrms,OLP, SCP,OTP,OVP,AC Fail,fan lock,islanding protection.
Low (-0.5 ~ 0.5V) : When Vac≧175Vrms and when power supply work normally.
The maximum sourcing current is 4mA and only for output. (Note.1)

Ta:25℃

Test Result：

Spec.	Spec.	Fault Signal
VAC ≦165Vrms	High (4.5 ~ 5.5V)	5.2V
OLP		5.2V
SCP		5.2V
OTP		5.2V
OVP		5.2V
AC Fail		5.2V
Fan lock		5.2V
Islanding protection		5.2V
Work normal	-0.5 ~0.5V	0V

4	CURRENT SHARING	CURRENT SHARING TOLERANCE < ±10%	I/P： 230 VAC O/P：95%/50% LOAD Ta：25℃	O/P：95% PSU1： 50.32A PSU2： 50.10A PSU3： 51.29A PSU4： 49.33A PSU5： 49.50A PSU6： 48.77A O/P：50% PSU1： 27.00A PSU2： 27.61A PSU3： 28.26A PSU4： 26.40A PSU5： 28.40A PSU6： 27.20A
5	FAN SPEED CONTROL	10% load 43dB 70% load 44dB with Ta=25℃	I/P: 230VAC O/P:TESTING Load Ta:25℃	42.61dB @10%Load 43.17dB@70%Load
6	C/D Control	High (4.5 ~5.5V)：Battery Charging mode Low (0 ~0.5V)：Battery Discharging mode I/P: 230 VAC O/P:FULL LOAD/ 50V Ta:25℃ Test Result：PASS		

MODE	Between ON/OFF and	Status

				+5V-AUX		
			AC to DC	SW SHORT	Charging	
			(Battery mode)	SW OPEN	Discharging	

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	DC TO DC Power Transistor (D to S) or (C to E) **Peak Voltage**	Q914 Rated : 650V 103 A@TC=25℃ 75 A@TC=100℃ VGS :+ 23V/-7V	**AC to DC** I/P:High-Line +3V =308V / 63Hz AC ON/OFF 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 Full Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load **DC to AC** I/P : High line (112Vdc) O/P : 308VAC / 63HZ VDS: (1) Full Load (2) +100%Io/1S~-100%Io/1S (3)-100%Io AC Off I/P : Low line (96Vdc) O/P : 197VAC / 47HZ VDS: (1) Full Load (2) +100%Io/1S~-100%Io/1S (3)-100%Io AC Off Ta:25℃	 (1)354V/35.5A (2)466V/58A (3)362V/35.2A (4)350V/36.0A (5)354V/32.8A (6)349V/36.0A (7)449V/60.2A (1)395V/35.2A (2)403V/44.9A (3)403V/39.2A (1)343V/36.8A (2)343V/40.1A (3)351V/38.4A
2	P.F.C Transistor (D to S) or (C to E) **Peak Voltage**	Q3 : Rated: 650 V 80A@TC=25℃ 80A@TC=100℃ VGE :±20V	**AC to DC** I/P:High-Line +3V =308V / 63Hz AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz	 (1)503V/48.4A (2)527V/31.8A (3)503V/43.5A

			(4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz	(4)511V/47.1A
			(5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz	(5)515V/46.7A
			(6)Dynamic Load Full Load/ Min. Load 50%Duty/120Hz	(6)539V/50.6A
			(7)0%→400% Load.	(7)547V/37.1A
			DC to AC	
			I/P : High line (112Vdc)	
			O/P : 308VAC / 63HZ	
			(1) Full Load	(1)511V/30.4A
			(2) +100%Io/1S~-100%Io/1S	(2)551V/31.8A
			(3) -100%Io AC Off	(3)579V/43.8A
			I/P : Low line (96Vdc)	
			O/P : 197VAC / 47HZ	(1)543V/37.1A
			(1) Full Load	(2)579V/38.7A
			(2) +100%Io/1S~-100%Io/1S	(3)595V/38.3A
			(3) -100%Io AC Off	
			Ta:25℃	
3	BUCK MOS	Q 901、Q905	**AC to DC**	
		Rated：650V	I/P:High-Line +3V =308V / 63Hz	
		80 A@TC=25℃	AC ON/OFF	Q901 Q905
		56 A@TC=100℃	O/P: (1)Full Load	(1)587V/14.7A (1)489V/35.4A
		VGE :±20V	(2)Output Short	(2)599V/16.3A (2)566V/35.4A
			(3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz	(3)571V/15.5A (3)485V/36.6A
			(4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz	(4)567V/12.3A (4)481V/37.8A
			(5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz	(5)571V/13.7A (5)485V/37.8A
			(6)Dynamic Load Full Load/ Min. Load 50%Duty/120Hz	(6)583V/13.9A (6)485V/48.2A
			(7)0%→400% Load.	(7)554V/15.9A (7)513V/44.9A
			(8)OLP	(8)592V/12.9A (8)489V/37.3A
			DC to AC	
			I/P : High line (112Vdc)	
			O/P : 308VAC / 63HZ	
			(1) Full Load	(1)481V/10.5A (1)541V/22.4A
			(2) +100%Io/1S~-100%Io/1S	(2)493V/13.1A (2)558V/26.4A
			(3) -100%Io AC Off	(3)481V/10.3A (3)541V/26.9A
			I/P : Low line (96Vdc)	
			O/P : 197VAC / 47HZ	
			(1) Full Load	(1)489V/12.9A (1)558V/29.7A
			(2) +100%Io/1S~-100%Io/1S	(2)485V/12.3A (2)549V/32.1A
			(3) -100%Io AC Off	(3)489V/12.5A (3)553V/32.5A

			Ta:25℃	
4	SR MOS	Q120 : Rated: 200 V 65A@TC=25℃ 46A@TC=100℃ VGS :±30V	**AC to DC** I/P : 308V / 63Hz VO:SPEC MAX 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 Full Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8).NO LOAD VO: standard O/P: (1)Full Load **DC to AC** I/P : High line (112Vdc) O/P : 308VAC / 63HZ (1)Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off I/P : Low line (96Vdc) O/P : 197VAC / 47HZ (1)Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off Ta:25℃	 (1)113.8V (2)113.0V (3)114.6V (4)114.6V (5)113.8V (6)116.2V (7)112.2V (8)113.8V (1)97.8V (1)112.2V (2)112.2V (3)115.4V (1)97.0V (2)98.6V (3)99.4V
5	**DC BUS Capacitor Voltage**	C5 : Rated：470u / 550V Surge voltage：600 V	**AC to DC** I/P:High-Line +3V =308V / 63Hz O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue **DC to AC** I/P : High line (112Vdc) O/P : 308VAC / 63HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off	 (1)504V (2)494V (3)522V (4)506V (1)526V (2)529V (3)524V

			I/P : Low line (96Vdc) O/P : 197VAC / 47HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off Ta:25℃	 (1)505V (2)529V (3)527V

■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 6 K VDC/min I/P-FG : 4 K VDC/min O/P-FG: 4 KVDC/min	I/P-O/P: 6.6 KVDC/min I/P-FG: 4.4 KVDC/min O/P-FG: 4.4 KVDC/min Ta:25℃	I/P-O/P: 0.002 mA I/P-FG: 0.002 mA O/P-FG: 0.002 m A
2	ISOLATION RESISTANCE	I/P-O/P: 500 VDC>100MΩ I/P-FG: 500 VDC>100MΩ O/P-FG: 500 VDC >100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25℃	I/P-O/P: 11.1 GΩ I/P-FG: 19 GΩ O/P-FG: 6.8 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	50A / 2min Ta:25℃	19 mΩ

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-12 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25℃	PASS
2	CONDUCTION	EN55032 CLASS A	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS A	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR：8KV / Contact：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A

6	SURGE	IEC61000-6-2 INDUSTRY L-N ：2KV L,N-PE：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
7	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL： BIC-5K-48 **AC to DC Direction:** 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 230VAC O/P： FULL LOAD Ta= 25 ℃ 2. HIGH AMBIENT BURN-IN： 22.5HRS I/P： 230VAC O/P： FULL LOAD Ta= 40 ℃ **DC to AC Direction:** 1. ROOM AMBIENT BURN-IN：2 HRS I/P： 24VDC O/P： FULL LOAD Ta= 25 ℃ 2. HIGH AMBIENT BURN-IN： 2 HRS I/P： 24VDC O/P： FULL LOAD Ta= 40 ℃		

			NO	Position	AC to DC Direction:		DC to AC Direction:	
					ROOM AMBIENT Ta= 25℃	HIGH AMBIENT Ta= 40 ℃	ROOM AMBIENT Ta= 25℃	HIGH AMBIENT Ta= 40 ℃
			1	L901	65.4℃	76.8℃	35.1℃	48.7℃
			2	L902	49.1℃	61.0℃	56.0℃	62.8℃
			3	L11	52.0℃	61.4℃	50.0℃	57.4℃
			4	C6	50.7℃	62.0℃	52.6℃	60.8℃
			5	Q902	93.3℃	104.8℃	115.9℃	121.2℃
			6	Q905	98.4℃	111.5℃	122.4℃	126.5℃
			7	Q3	74.5℃	86.7℃	73.1℃	81.7℃
			8	Q7	77.4℃	89.5℃	73.1℃	81.5℃
			9	Q2	74.1℃	86.1℃	70.8℃	79.2℃
			10	Q6	74.5℃	86.4℃	70.3℃	78.3℃
			11	Q917	38.8℃	51.5℃	42.3℃	51.7℃
			12	Q918	39.2℃	51.5℃	43.1℃	52.2℃
			13	Q701	56.7℃	66.5℃	57.0℃	65.2℃
			14	T701	48.3℃	57.6℃	48.0℃	56.7℃
			15	T1-Wire	58.5℃	69.5℃	59.7℃	67.5℃
			16	T1-core	54.6℃	65.6℃	55.6℃	63.3℃
			17	T2-Wire	50.4℃	62.8℃	55.9℃	64.4℃
			18	T2-core	54.2℃	66.0℃	57.2℃	65.2℃
			19	Q233	45.8℃	55.3℃	47.1℃	54.4℃
			20	Q232	42.4℃	51.1℃	43.7℃	50.7℃
			21	Q124	45.7℃	58.2℃	50.8℃	58.4℃
			22	Q125	47.0℃	59.5℃	51.7℃	60.3℃
			23	C201	50.5℃	60.3℃	50.8℃	58.2℃
			24	C103	47.7℃	59.5℃	50.7℃	58.8℃
			25	LF1	48.8℃	62.4℃	49.7℃	58.0℃
			26	D311	54.6℃	63.6℃	54.7℃	62.5℃
			27	RG74	66.3℃	71.3℃	63.9℃	74.0℃
			28	C711	56.5℃	65.3℃	57.1℃	65.6℃
			29	RTH1(Q905)	83.5℃	96.6℃	93.9℃	99.4℃
			30	RTH2(IGBT)	68.2℃	80.2℃	65.4℃	73.5℃
			31	RTH3(T1)	55.8℃	67.4℃	57.7℃	65.7℃
			32	RTH4(DD)	43.8℃	56.3℃	48.8℃	57.1℃
			33	HS102(DD)	43.6℃	56.0℃	48.4℃	56.6℃
			34	HS1(Q905)	63.4℃	77.0℃	75.6℃	82.1℃
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)			I/P： 230 VAC O/P： 110% LOAD Ta：25℃		TEST：OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR			I/P： 305VAC/180VAC O/P： 100 %/80%LOAD Ta= -32℃		TEST：OK	

4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃/95 %R.H NO DAMAGE	I/P： 315 VAC O/P：FULL LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	± 0.03%/℃(0~40℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.008%/℃(0~40℃)
6	STORAGE TEMPERATURE TEST	-40℃~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / 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	-30℃~40℃	1. Thermal shock Temperature： -32℃~ +45℃ 2. Temperature change rate ：25℃ / 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	10 ~ 500Hz, 3G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform： Sine Wave (2) Frequency：10~500Hz (3) Sweep Time：10min/sweep cycle (4) Acceleration：4G (5) Test Time：180min in each axis (X.Y.Z) (6) Ta：25℃	
9	CAPACITOR LIFE CYCLE	SUPPOSE C201 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 40℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 40 ℃ LIFE TIME		(1) 362379HRS (2) 183719HRS (3) 300240HRS (4) 346355HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 209.4K hrs min. Telcordia SR-332 (Bellcore) ; 17.8K hrs min. MIL-HDBK-217F (25℃)		
11	Ongoing Reliability Test	I/P：230VAC O/P：FULL LOAD TA=40℃ Demonstration Mean Time Between Failure : 50,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	DANIEL GAO	SANFORD SU	ERIS WU

2020.10.1 TAG-QA-009