



Test Report: BIC-5K-24

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

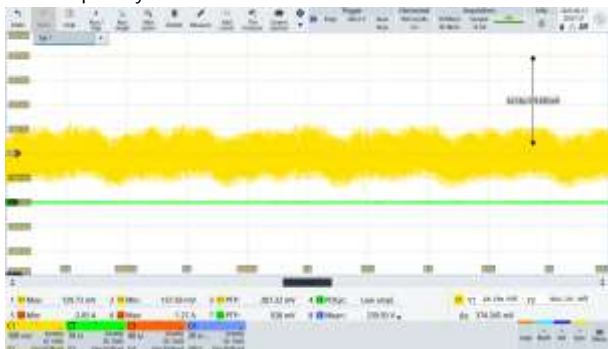
E.M.C. Test

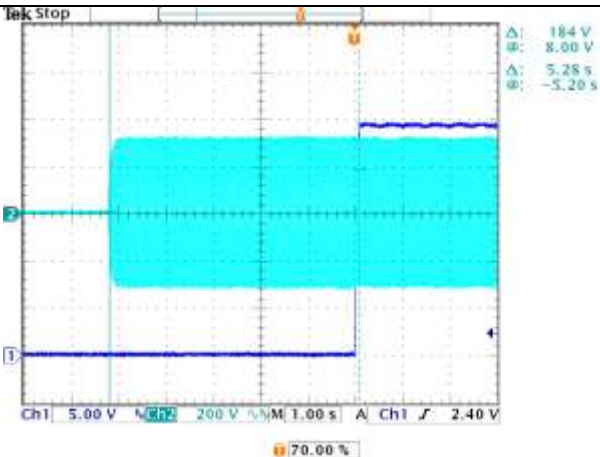
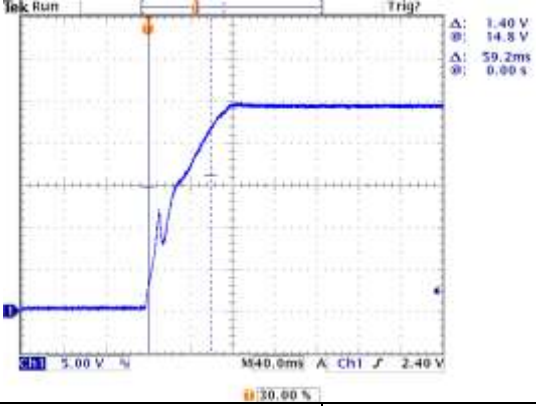
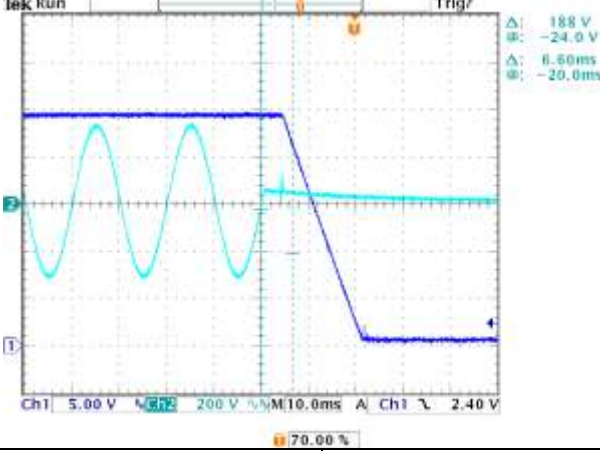
■ RELIABILITY TEST

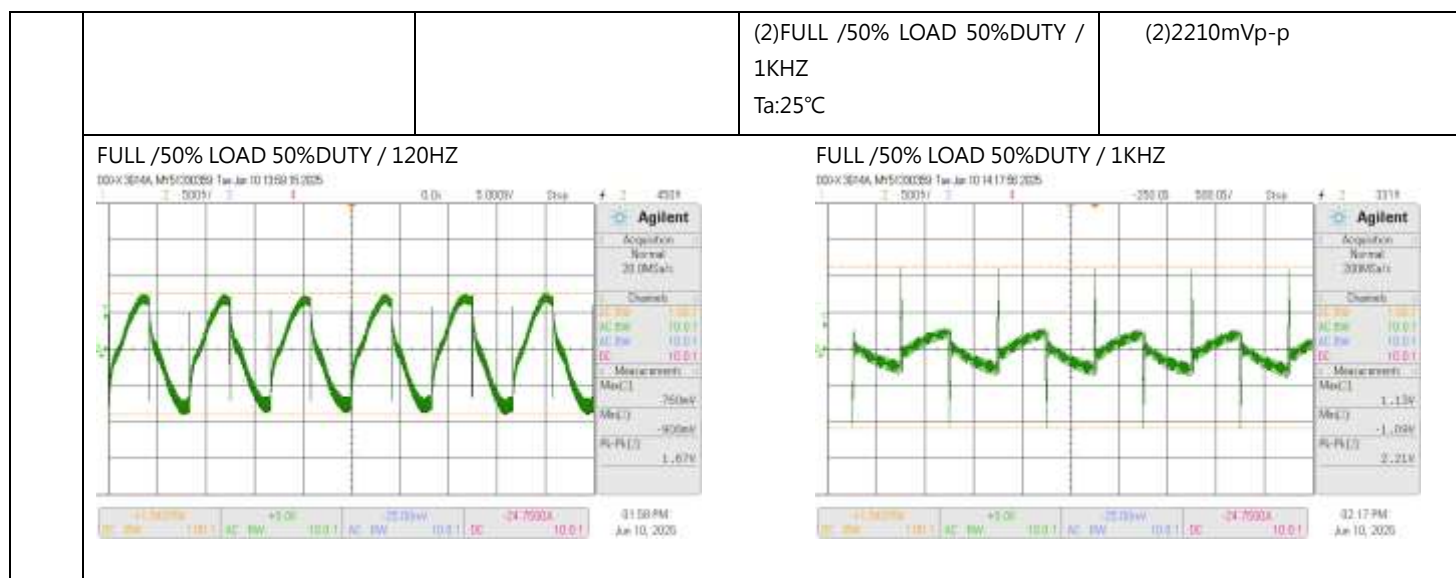
ENVIRONMENT TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST (AC to DC)

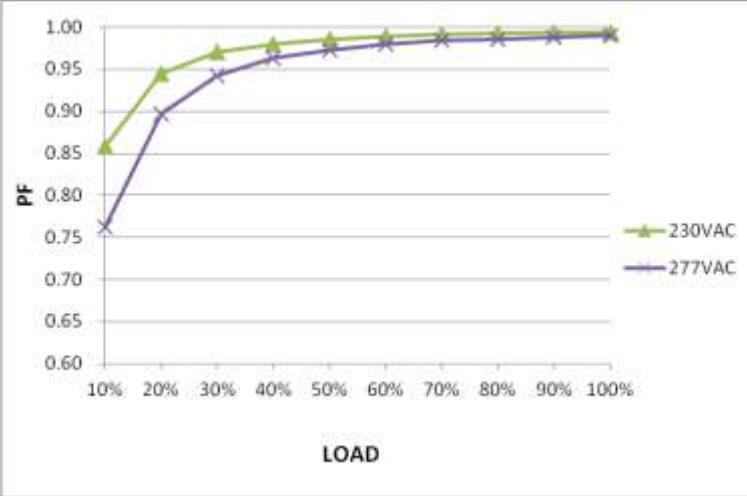
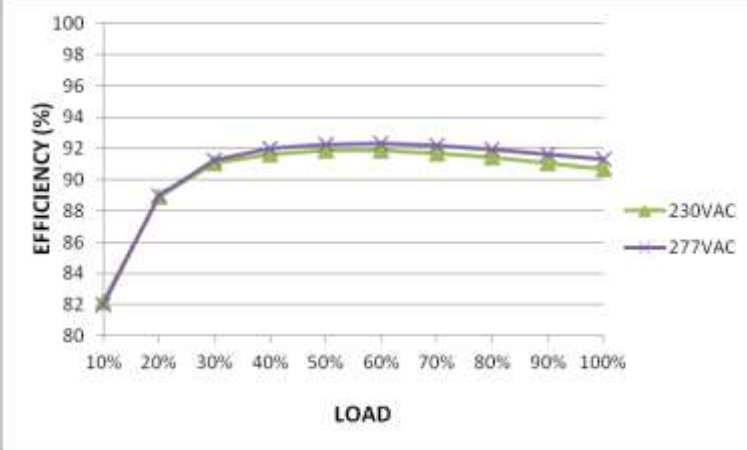
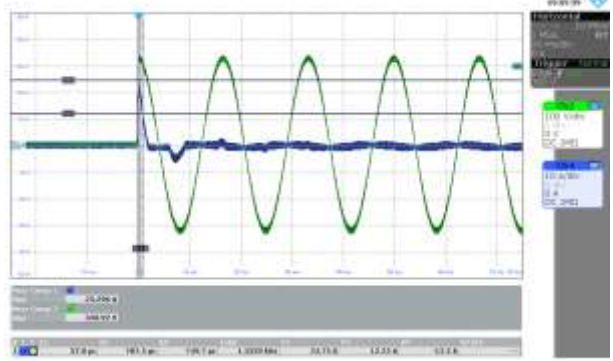
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 19 V ~ 33V	I/P : 230 VAC I/P : 180 VAC O/P : MIN LOAD Ta : 25°C	19.00V~32.95V / 230VAC 19.00V~32.95V / 180VAC
2	OUTPUT VOLTAGE TOLERANCE	V1: 2% ~ -2%	I/P: 180VAC /305VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.02% ~ -0.1%
3	LINE REGULATION	V1: 1%~ -1%	I/P: 200VAC~ 305VAC O/P:FULL LOAD Ta:25°C	V1: 0% ~ 0%
4	LOAD REGULATION	V1: 1%~ -1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.05%~ -0.03%
5	OVER/UNDERSHOOT TEST	<± 10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	9.04% / -9.04%
6	RIPPLE & NOISE (Max)	V1: 350mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 287mVp-p
high frequency :  low frequency : 				
7	SET UP TIME(Max)	230VAC/8sec	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 5.28sec
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°C	230VAC / 59.2ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage 			
9	HOLD UP TIME (Typ.)	230VAC/--	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	6.6ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 			
10	DYNAMIC LOAD	V1: 2400mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ	(1)1670mVp-p



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°C	169V~319V
			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: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 180 VAC ~305 VAC O/P : FULL~MIN LOAD Ta:25°C	TEST: PASS
3	POWER FACTOR (Typ.)	0.99/ 230VAC	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	PF=0.99
	P.F vs LOAD			

				
4	EFFICIENCY(Typ.)	91% @ 75% Load	I/P : 230 VAC O/P : 75% Load Ta:25°C	91.6%
EFFICIENCY vs LOAD 				
5	AC CURRENT (Typ.)	27A / 230V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =24.2A
6	INRUSH CURRENT(Typ.)	120A/230V COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =25.3A T50=750us
INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current 				



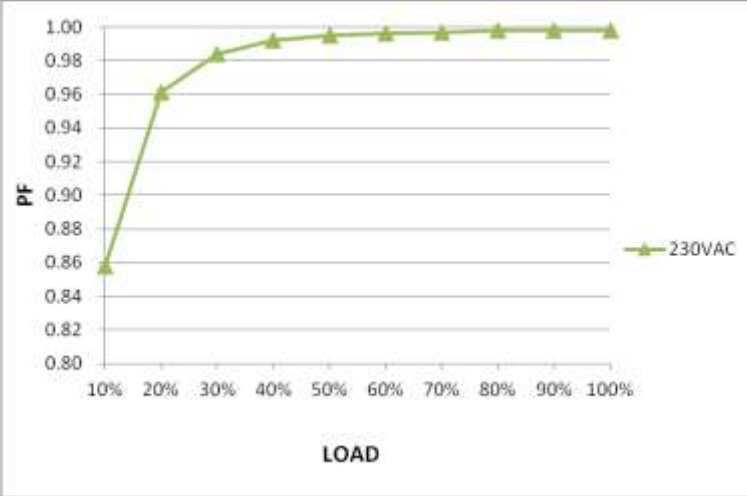
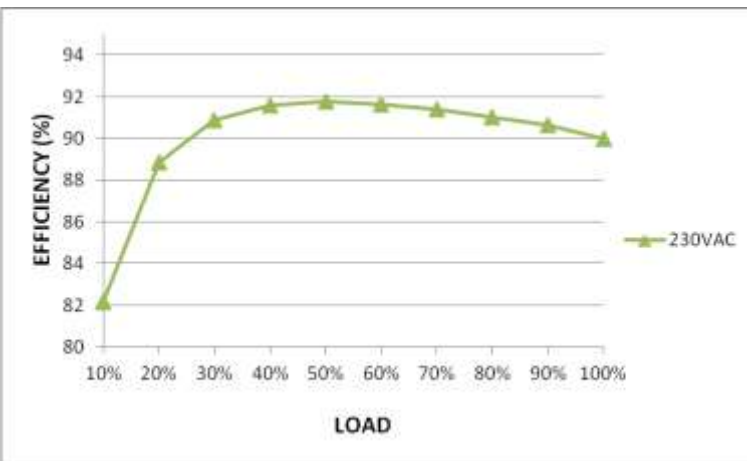
7	LEAKAGE CURRENT	< 7.07mA (Peak)/ 305VAC	I/P : 305 VAC / 60Hz O/P : Min LOAD Ta : 25°C	L-FG : 6.48mA (Peak) N-FG : 6.48mA (Peak)
8	TOTAL HARMONIC DISTORTION	<3%(@load=100%/230VAC)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	THDi = 2.12%

INPUT FUNCTION TEST(DC to AC)

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED INPUT POWER	5665W	I/P : 24VDC O/P : FULL LOAD Ta : 25°C	5602W
2	FULL POWER VOLTAGE RANGE	24VDC ~33VDC	I/P : Test O/P : FULL LOAD Ta : 25°C	TEST : 23.63~33.3V
3	DC VOLTAGE RANGE	19VDC ~33VDC	I/P : Test O/P : FULL LOAD Ta : 25°C	TEST : 18.99~33.3V
4	INPUT CURRENT (MAX.)	236A	I/P : 24VDC O/P : FULL LOAD Ta : 25°C	235.58A

OUTPUT FUNCTION TEST(DC to AC)

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RATED OUTPUT POWER	5000W	I/P : 24VDC O/P : TESTING Ta:25°C	5032W
2	VOLTAGE RANGE	180VAC~305VAC	I/P : 24VDC O/P : TESTING Ta:25°C	TEST : 167V~318V
3	FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 24VDC O/P : FULL~MIN LOAD Ta:25°C	TEST : PASS
4	AC CURRENT (Typ.)	22.5A/ 230VAC	I/P : 24VDC O/P : FULL LOAD Ta : 25°C	21.74A
5	POWER FACTOR (Typ.)	0.99/ 230VAC	I/P : 24VDC O/P : FULL LOAD Ta : 25°C	PF=0.99
	P.F vs LOAD			

				
6	EFFICIENCY(Typ.)	91%	I/P: 24VDC O/P: 75% LOAD Ta:25°C	91.2%
	EFFICIENCY vs LOAD 			
7	TOTAL HARMONIC DISTORTION	<3% (@load=100%/230VAC/50Hz)	I/P: 24VDC O/P:FULL LOAD Ta : 25°C	THDi = 2.34%

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°C	AC to DC (BIC mode) 112.4%/ 305VAC 112.5% / 230VAC 113.8% / 200VAC 89.18%/ 180VAC PROTECTION TYPE : Constant current limiting, shut down DC O/P voltage 5 sec. after DC O/P voltage is down low, 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°C	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	OVERVOLTAGE PROTECTION	34V~35V 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°C	AC to DC(BIC mode) 34.4V/ 305VAC 34.4V/ 230VAC 34.4V/ 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: 33VDC O/P: FULL LOAD/ 230VAC I/P: 24VDC O/P: 50% LOAD/ 230VAC I/P: 19.5VDC O/P: 10% LOAD/ 230VAC Ta:25°C	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

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																							
1	BIDIRECTION SWITCH TIME(Typ.)	I/P: 230 VAC /24VDC O/P:FULL LOAD Ta:25°C Test Result : <table><tr><td>MODE</td><td>BIDIRECTION SWITCH TIME</td><td>Result</td></tr><tr><td>AC to DC (BIC)</td><td>1ms</td><td>93us</td></tr><tr><td>DC to AC (BIC)</td><td>1ms</td><td>450us</td></tr></table>			MODE	BIDIRECTION SWITCH TIME	Result	AC to DC (BIC)	1ms	93us	DC to AC (BIC)	1ms	450us														
MODE	BIDIRECTION SWITCH TIME	Result																									
AC to DC (BIC)	1ms	93us																									
DC to AC (BIC)	1ms	450us																									
2	REMOTE ON/OFF CONTROL	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°C Test Result : <table><tr><td>MODE</td><td>Between ON/OFF and +5V-AUX</td><td>Power Supply Status</td></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 (GRID)</td><td>SW SHORT</td><td>ON</td></tr><tr><td>SW OPEN</td><td>OFF</td></tr></table>			MODE	Between ON/OFF and +5V-AUX	Power Supply Status	AC to DC (BIC)	SW SHORT	ON	SW OPEN	OFF	DC to AC (BIC)	SW SHORT	ON	SW OPEN	OFF	AC to DC (CHG)	SW SHORT	ON	SW OPEN	OFF	DC to AC (GRID)	SW SHORT	ON	SW OPEN	OFF
MODE	Between ON/OFF and +5V-AUX	Power Supply Status																									
AC to DC (BIC)	SW SHORT	ON																									
	SW OPEN	OFF																									
DC to AC (BIC)	SW SHORT	ON																									
	SW OPEN	OFF																									
AC to DC (CHG)	SW SHORT	ON																									
	SW OPEN	OFF																									
DC to AC (GRID)	SW SHORT	ON																									
	SW OPEN	OFF																									
3	ALARM SIGNAL	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°C Test Result <table><tr><td>Spec.</td><td>Transition point</td><td>Spec.</td><td>DC OK SIGNAL</td></tr><tr><td>Vout ≤ 80%</td><td>76.91%</td><td>High (4.5 ~ 5.5V)</td><td>5.13V</td></tr><tr><td>Vout ≥ 80%</td><td>79.58%</td><td>Low (-0.5 ~ 0.5V)</td><td>0.00V</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°C Test Result :			Spec.	Transition point	Spec.	DC OK SIGNAL	Vout ≤ 80%	76.91%	High (4.5 ~ 5.5V)	5.13V	Vout ≥ 80%	79.58%	Low (-0.5 ~ 0.5V)	0.00V											
Spec.	Transition point	Spec.	DC OK SIGNAL																								
Vout ≤ 80%	76.91%	High (4.5 ~ 5.5V)	5.13V																								
Vout ≥ 80%	79.58%	Low (-0.5 ~ 0.5V)	0.00V																								

P.SU STATUS	Vo	T-ALARM SPEC	T-ALARM TEST
NORMAL	100%±2%	-0.5 ~0.5V	0.00V
OTP	0V	4.5~5.5V	5.13V
FAN LOCK	0V	4.5~5.5V	5.13V

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)

I/P: 230 VAC

O/P: FULL LOAD

Ta: 25°C

Test Result :

Spec.	Spec.	Fault Signal
VAC ≤ 165Vrms	High (4.5 ~ 5.5V)	5.13V
OLP		5.13V
SCP		5.13V
OTP		5.13V
OVP		5.13V
AC Fail		5.13V
Fan lock		5.13V
Islanding protection		5.13V
Work normal	-0.5 ~0.5V	0.0V

4	CURRENT SHARING	CURRENT SHARING TOLERANCE < ±10%	I/P : 230 VAC O/P : 95%/50% LOAD Ta : 25°C	O/P : 95% PSU1 : 198.5A PSU2 : 198.3A PSU3 : 194.5A PSU4 : 204.0A PSU5 : 193.1A PSU6 : 194.5A O/P : 50% PSU1 : 105.0A PSU2 : 101.3A PSU3 : 104.0A PSU4 : 110.4A PSU5 : 100.3A PSU6 : 100.0A
5	FAN SPEED CONTROL	10% load 54dB 70% load 54dB with Ta=25°C	I/P: 230VAC O/P: TESTING Load Ta: 25°C	54dB @10%Load 54dB@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/ 26V		

Ta:25°C		
Test Result :		
MODE	Between ON/OFF and +5V-AUX	Status
AC to DC (Battery mode)	SW SHORT	Charging
	SW OPEN	Discharging

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	DC TO DC High Side Power Transistor (D to S) or (C to E)	Q914 Rated : 650V 103 A@TC=25°C 75 A@TC=100°C VGS :+ 23V/-7V	AC to DC I/P:High-Line +3V =308V / 63Hz O/P : 24V AC ON/OFF VDS: (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 (33Vdc) →Vset O/P : 308VAC / 63HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3)-100%Io AC Off I/P : Low line (24Vdc) O/P : 197VAC / 47HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3)-100%Io AC Off Ta:25°C	(1)418.97V/57.708A (2) 460.87V /74A (3)416.21V/55.336A (4)416.21V/54.545A (5)412.25V/51.383A (6)428.06V/53.755A (7)599.21V/50.435A (1)502.8V/8.9A (2)538.3V/13.8A (3)506.7V/8.9A (1)400V/15A (2)400V/16.6A (3)400V/15A
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q3 : Rated: 650 V 80A@TC=25°C 80A@TC=100°C VGE :±20V	AC to DC I/P:High-Line +3V =308V / 63Hz AC ON/OFF VDS: (1)Full Load (2)Output Short	(1)512.25V/40.316A (2)492.49V/26.739A

			(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 (33Vdc) O/P : 308VAC / 63HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off I/P : Low line (24Vdc) O/P : 197VAC / 47HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off Ta:25°C	(3)504.35V/41.502A (4)504.35V/39.921A (5)504.35V/40.316A (6)508.3V/40.711A (7)504.35V/19.229A (1)566V/26.1A (2)570V/38.7A (3)609.5V/26.1A (1)593.7V/37.9A (2)629.0V/40.3A (3)601.6V/37.2A
3	BUCK MOS	Q 901、Q905 Rated : 650V 80 A@TC=25°C 56 A@TC=100°C VGE :±20V	AC to DC I/P:High-Line +3V =308V / 63Hz AC ON/OFF (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 (33Vdc) O/P : 308VAC / 63HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off I/P : Low line (24Vdc) O/P : 197VAC / 47HZ (1) Full Load	Q901 (1)580.6V/28.85A (2) 539.9V/78.498A (3)600.4V/29.64A (4)592.5V/28.46A (5)584.6V/28.06A (6)632.1V/30.83A (7)620.16V/35.692A Q905 (1)509.5V/28.85A (2)492.49V/78.498A (3)505.5V/29.64A (4)505.5V/28.458A (5)505.5V/28.063A (6)509.5V/30.83A (7)529.25V/35.692A (1)546.3V/15.4A (2)629.3V/23.7A (3)601.6V/14.6A (1)589.7V/15.4A (2)589.7V/23.7A (3) 577.9V /14.6A (1)542.3V/29.2A (1)617.4V/29.2A

			(2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off Ta:25°C	(2)621.3V/34.8A (3)593.7V/29.2A	(2)629.3V/34.8A (3)577V/29.2A
4	SR MOS	Q120 : Rated : 80V 196A(TC=25°C) 151A(TC=100°C) Vgs max -20/+20 V	AC to DC I/P : 308V / 63Hz <u>VO: SPEC MAX</u> AC ON/OFF (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 <u>VO: standard</u> O/P: (1)Full Load (1)OLP (2)Output Short (3) Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4) Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (5) Dynamic Load Full Load/ Min. Load 50%Duty/120Hz (6)NO LOAD DC to AC I/P : High line (33Vdc) O/P : 308VAC / 63HZ (1)Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off I/P : Low line (24Vdc) O/P : 197VAC / 47HZ (1)Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off Ta:25°C	(1)35.534V/134.86A (2)32.016V/126.17A (3)35.929V/154.94A (4)35.534V/147.04A (5)35.929V/142.29A (6)35.929V/156.52A (7)35.236V/126.17A (8)35.253V/80.632A (1)28.102V/134.86A (1)13.63V/-3.952V (2)11.66V (3)13.68V/-4.006V (4)13.63V/-3.557V (5)13.63V/-3.952V (6)13.63V/-3.965V (1)37.4V/40.3A (2)39.6V/59.3A (3)37V/40.3A (1)29.9V/63.2A (2)29.1V/70A (3)29.9V/63.2A	

5	DC BUS Capacitor Voltage	C5 : Rated : 470u / 550V Surge voltage : 605V	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 (33Vdc) O/P : 308VAC / 63HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off I/P : Low line (24Vdc) O/P : 197VAC / 47HZ (1) Full Load (2) +100%Io/1S~-100%Io/1S (3) -100%Io AC Off Ta:25°C	(1)496.44V (2)496.44V (3)532.02V (4)516.21V (1)546.3V (2)549V (3)549V (1)548.8V (2)549V (3)549V
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■ 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°C	I/P-O/P: 0.002 mA I / P - F G : 0.002 mA O / P - F G : 0.002 m A
2	ISOLATION RESISTANCE	I/P-O/P: 500 VDC>100MΩ O/P-FG: 500 VDC>100MΩ I/P-FG: 500 VDC >100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 2780 MΩ I / P - F G : 1044 MΩ O / P - F G : 5610 MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	50A / 2min Ta:25°C	21 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°C	PASS
2	CONDUCTION	EN55032 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab



3	RADIATION	EN55032 CLASS A	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 <u>INDUSTRY</u> AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 <u>INDUSTRY</u> INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-6-2 <u>INDUSTRY</u> L-N : 2KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	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-24 AC to DC Direction: 1. ROOM AMBIENT BURN-IN : 3 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= 40 °C DC to AC Direction: 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 24VDC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 3 HRS I/P : 24VDC O/P : FULL LOAD Ta= 40 °C		

NO	Position	AC to DC Direction:		DC to AC Direction:	
		ROOM AMBIENT Ta= 25°C	HIGH AMBIENT Ta= 40 °C	ROOM AMBIENT Ta= 25°C	HIGH AMBIENT Ta= 40 °C
1	RY1	33.4°C	47.4°C	33.0°C	45.1°C
2	RY2	35.0°C	49.1°C	35.3°C	45.9°C
3	L901	58.2°C	71.4°C	71.6°C	84.0°C
4	L902	43.3°C	59.4°C	46.1°C	58.7°C
5	L11	41.2°C	55.2°C	38.7°C	52.2°C
6	C6	43.1°C	57.4°C	42.8°C	55.1°C
7	Q902	92.2°C	109.0°C	90.3°C	103.8°C
8	Q905	75.7°C	91.7°C	93.3°C	107.2°C
9	Q3	62.1°C	78.3°C	57.6°C	71.8°C
10	Q7	65.6°C	81.8°C	60.2°C	74.3°C
11	Q2	61.0°C	78.1°C	57.1°C	72.2°C
12	Q6	65.2°C	81.1°C	59.1°C	73.4°C
13	Q913	34.6°C	49.0°C	35.6°C	47.2°C
14	Q917	33.8°C	48.3°C	34.6°C	46.3°C
15	Q912	34.9°C	49.4°C	36.5°C	48.7°C
16	Q918	35.4°C	49.8°C	36.9°C	49.1°C
17	Q701	64.1°C	79.6°C	61.3°C	76.2°C
18	T701	49.5°C	64.0°C	49.9°C	63.3°C
19	T1-Wire	46.5°C	61.3°C	48.3°C	61.0°C
20	T1-core	49.6°C	64.2°C	49.9°C	63.4°C
21	T2-Wire	46.1°C	61.7°C	47.2°C	60.4°C
22	T2-core	49.0°C	63.5°C	48.7°C	61.5°C
23	Q225	41.6°C	54.8°C	44.7°C	57.1°C
24	Q224	43.5°C	58.7°C	46.3°C	59.0°C
25	Q233	49.9°C	65.4°C	52.9°C	66.2°C
26	Q232	45.8°C	61.3°C	49.8°C	62.8°C
27	Q132	44.5°C	59.8°C	47.0°C	59.1°C
28	Q133	46.9°C	62.1°C	49.4°C	61.7°C
29	Q124	52.2°C	67.6°C	54.7°C	67.1°C
30	Q125	51.9°C	67.1°C	53.0°C	65.3°C
31	C201	55.0°C	70.3°C	55.5°C	68.2°C
32	C204	48.8°C	64.1°C	49.7°C	62.6°C
33	C101	51.9°C	66.7°C	54.2°C	66.3°C
34	C103	47.4°C	62.5°C	49.0°C	61.3°C
35	LF4	44.3°C	59.7°C	41.5°C	53.6°C
36	C907	40.4°C	55.4°C	41.4°C	53.3°C
37	C12	39.6°C	54.9°C	39.0°C	52.0°C
38	RG1	42.0°C	55.6°C	42.1°C	54.0°C
39	D311	59.7°C	74.6°C	60.4°C	73.5°C
40	RG74	83.7°C	98.1°C	81.4°C	95.1°C
41	C711	58.1°C	73.0°C	56.8°C	70.0°C
42	RTH1(Q905)	49.1°C	64.2°C	53.9°C	66.5°C

			43	RTH2(IGBT)	55.5°C	71.2°C	52.1°C	65.9°C	
			44	RTH3(T1)	50.7°C	66.5°C	50.7°C	63.7°C	
			45	RTH4(DD)	47.6°C	62.8°C	50.4°C	62.8°C	
			46	T1(fly)	30.4°C	44.9°C	31.3°C	44.0°C	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)			I/P : 230 VAC O/P : 110% LOAD Ta : 25°C		TEST : OK		
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR			I/P : 305VAC/180VAC O/P : 100 %/80%LOAD Ta= -32°C		TEST : OK		
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C/95 %R.H NO DAMAGE			I/P : 315 VAC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H		TEST : OK		
5	TEMPERATURE COEFFICIENT	± 0.03%/°C(0~40°C)			I/P : 230 VAC O/P : FULL LOAD		± 0.003%/°C(0~40°C)		
6	STORAGE TEMPERATURE TEST	-40°C~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	-30°C~40°C			1. Thermal shock Temperature : -32°C~ +45°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	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°C				
9	CAPACITOR LIFE CYCLE	SUPPOSE C201 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= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME					(1) 136996HRS (2) 54872HRS (3) 120556HRS (4) 145172HRS		
10	MTBF	Conducted by Parts Stress Analysis Prediction 209.4K hrs min. Telcordia SR-332 (Bellcore) ; 17.8K hrs min. MIL-HDBK-217F (25°C)							
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=40°C Demonstration Mean Time Between Failure : 50,000 hours							

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