



# Test Report: DBU -3200-24

---

3200W Intelligent Single Output Battery Charger

## ■ 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	BOOST CHARGE VOLTAGE	Default, programmable 28.8V±0.24V	I/P: 230 VAC O/P: CV MODE Ta:25°C	28.764V
2	FLOAT CHARGE VOLTAGE	Default, programmable 27.6V±0.24V	I/P: 230 VAC O/P: CV MODE Ta:25°C	27.57V
3	OUTPUT CURRENT	110A±3%	I/P: 230 VAC O/P:CV MODE-2V Ta:25°C	110 A
4	VOLTAGE ADJ. RANGE	23.5V~30V	I/P: 230 VAC O/P:NO LOAD Ta:25°C	23.112V~ 31.38V/230VAC 23.113V~ 31.38V/115VAC
5	LEAKAGE CURRENT FROM BATTERY (Typ.)	<1.5mA	I/P: AC OFF O/P:BATTERY 24v Ta:25°C	1.1mA

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C  I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+15%=300 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (2)230Vac ON: 0.5 Sec OFF: 0.5 Sec 20MIN (3)230Vac ON:3Sec OFF:3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	180V~264V/ FULL LOAD 76V~264 /HALF LOAD  TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:180 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 17A	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I =13.8 A/ 230VAC
4	LEAKAGE CURRENT	<2 mA / 230 VAC	I/P : 230 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.85 mA N-FG : 0.85 mA
5	POWER FACTOR (Typ.)	0.97 / 230VAC	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.997 /230VAC
6	EFFICIENCY(Typ.)	93.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	93.55%

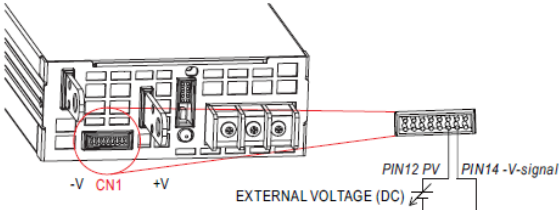
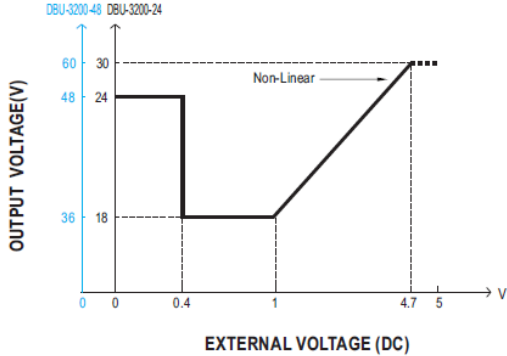
7	INRUSH CURRENT(Typ.) COLD START	230V/55 A	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 49.2A/ 230VAC T50=2230 us/230V
<p>INPUT=230VAC/50HZ @ FULL LOAD CH4 : Input current CH2: input voltage</p> <p>Ch2 Max 314 V Ch4 Max 49.2 A</p> <p>Δ: 3.12 A ⊖: 21.1 A Δ: 2.23ms ⊖: -8.00μs</p> <p>CH2 100 V 400ms A CH2 100 V CH4 12.0 A 20.00%</p>				

## PROTECTION FUNCTION TEST

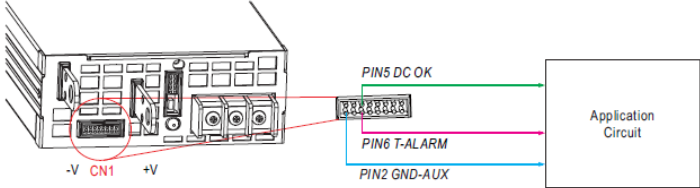
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER VOLTAGE PROTECTION	31.5 V~ 37.5 V  PROTECTION TYPE : Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta:25°C	33.25V/ 264VAC 33.3V/ 230VAC 33.37V/ 90VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
2	OVER TEMPERATURE PROTECTION	NO DAMAGE  PROTECTION TYPE : Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P. Active PROTECTION TYPE : Shut down o/p voltage, recovers automatically after temperature goes down

## CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																
1	PMBus Communication Interface	DBU-3200 supports PMBus Rev. 1.1 with maximum 100KHz bus speed, allowing information reading, status monitoring, output trimming, etc. For details, please refer to the Installation Manual. TEST RESULT : OK																																		
2	Charging Curve	<p>※ By factory default, this charger performs the default curve which can be programmed via PMBus. ※ To disable / enable the charging curve, change to a 2 stage curve, a different curve frequently used for certain types of batteries in the industry, and so on, please refer to the Installation Manual.</p> <p>◎ Default 3 stage charging curve</p> <p>3 Stage Start ———— Vboost Charge Voltage ———— Vfloat 100% 10% Constant Current Constant Voltage Float stage 1 stage 2 stage 3 Color of LED Orange Green Status Indicator ———— Charger fail if charging time exceed charging timeout</p> <p>◎ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).</p>	<p>◎ Embedded 3 stage charging curve</p> <table border="1"> <thead> <tr> <th>MODEL</th> <th>Description</th> <th>Vboost</th> <th>Vfloat</th> <th>CC(default)</th> </tr> </thead> <tbody> <tr> <td rowspan="4">24V</td> <td>Default, programmable</td> <td>28.8</td> <td>27.6</td> <td rowspan="4">110A</td> </tr> <tr> <td>Pre-defined, gel batter</td> <td>28</td> <td>27.2</td> </tr> <tr> <td>Pre-defined, flooded battery</td> <td>28.4</td> <td>26.8</td> </tr> <tr> <td>Pre-defined, AGM battery</td> <td>29</td> <td>27</td> </tr> <tr> <td rowspan="4">48V</td> <td>Default, programmable</td> <td>57.6</td> <td>55.2</td> <td rowspan="4">55A</td> </tr> <tr> <td>Pre-defined, gel batter</td> <td>56</td> <td>54.4</td> </tr> <tr> <td>Pre-defined, flooded battery</td> <td>56.8</td> <td>53.6</td> </tr> <tr> <td>Pre-defined, AGM battery</td> <td>58</td> <td>54</td> </tr> </tbody> </table> <p>Note: When using this charger unit, please configured the system with recommended battery capacity by specification defined. Should battery capacity in use be much smaller so that user needs to set a low current for charging, under such condition it might cause higher current ripple.</p>	MODEL	Description	Vboost	Vfloat	CC(default)	24V	Default, programmable	28.8	27.6	110A	Pre-defined, gel batter	28	27.2	Pre-defined, flooded battery	28.4	26.8	Pre-defined, AGM battery	29	27	48V	Default, programmable	57.6	55.2	55A	Pre-defined, gel batter	56	54.4	Pre-defined, flooded battery	56.8	53.6	Pre-defined, AGM battery	58	54
MODEL	Description	Vboost	Vfloat	CC(default)																																
24V	Default, programmable	28.8	27.6	110A																																
	Pre-defined, gel batter	28	27.2																																	
	Pre-defined, flooded battery	28.4	26.8																																	
	Pre-defined, AGM battery	29	27																																	
48V	Default, programmable	57.6	55.2	55A																																
	Pre-defined, gel batter	56	54.4																																	
	Pre-defined, flooded battery	56.8	53.6																																	
	Pre-defined, AGM battery	58	54																																	

		<p>I/P: 230 VAC  O/P: TESTING  Ta: 25°C  TEST RESULT : OK</p>																				
3	<p>Front Panel LED Indicators &amp; Corresponding Signal at Function Pins</p>	<table border="1" data-bbox="534 398 1407 564"> <thead> <tr> <th>LED</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td><span style="color: green;">●</span> Green</td> <td>Float (stage 3)</td> </tr> <tr> <td><span style="color: orange;">●</span> Orange</td> <td>Charging (stage 1 or stage 2)</td> </tr> <tr> <td><span style="color: red;">●</span> Red</td> <td>Abnormal status (OTP, OLP, Fan Fail, Charging timeout.)</td> </tr> </tbody> </table> <p>I/P: 230 VAC  O/P: TESTING  Ta: 25°C  TEST RESULT : OK</p>	LED	Description	<span style="color: green;">●</span> Green	Float (stage 3)	<span style="color: orange;">●</span> Orange	Charging (stage 1 or stage 2)	<span style="color: red;">●</span> Red	Abnormal status (OTP, OLP, Fan Fail, Charging timeout.)												
LED	Description																					
<span style="color: green;">●</span> Green	Float (stage 3)																					
<span style="color: orange;">●</span> Orange	Charging (stage 1 or stage 2)																					
<span style="color: red;">●</span> Red	Abnormal status (OTP, OLP, Fan Fail, Charging timeout.)																					
4	<p>OUTPUT VOLTAGE PROGRAMMABLE(PV)</p>	<p>※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed by applying EXTERNAL VOLTAGE.</p>   <p>I/P: 230 VAC  O/P: FULL LOAD  Ta: 25°C  TEST RESULT :</p> <table border="1" data-bbox="470 1523 1252 1736"> <thead> <tr> <th>PV</th> <th>&lt;0.4V</th> <th>1V</th> <th>4.7V</th> <th>5V</th> </tr> </thead> <tbody> <tr> <td>MODEL</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SPEC</td> <td>24V±5%</td> <td>18V±5%</td> <td>30V±5%</td> <td>30V±5%</td> </tr> <tr> <td>Vout</td> <td>24.08V</td> <td>17.8V</td> <td>30.84V</td> <td>31.37V</td> </tr> </tbody> </table>	PV	<0.4V	1V	4.7V	5V	MODEL					SPEC	24V±5%	18V±5%	30V±5%	30V±5%	Vout	24.08V	17.8V	30.84V	31.37V
PV	<0.4V	1V	4.7V	5V																		
MODEL																						
SPEC	24V±5%	18V±5%	30V±5%	30V±5%																		
Vout	24.08V	17.8V	30.84V	31.37V																		

<p>5</p>	<p><b>OUTPUT CURRENT PROGRAMMABLE (PC)</b></p>	<p>※ 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> <p>TEST RESULT :</p> <table border="1"> <thead> <tr> <th>ADJ V</th> <th>&lt;0.4V</th> <th>1V</th> <th>4.7V</th> <th>5V</th> </tr> </thead> <tbody> <tr> <td>SPEC</td> <td>100%±10%</td> <td>20%±10%</td> <td>100%±10%</td> <td>100%±10%</td> </tr> <tr> <td>Io</td> <td>112A</td> <td>20.7A</td> <td>112A</td> <td>112A</td> </tr> </tbody> </table>	ADJ V	<0.4V	1V	4.7V	5V	SPEC	100%±10%	20%±10%	100%±10%	100%±10%	Io	112A	20.7A	112A	112A
ADJ V	<0.4V	1V	4.7V	5V													
SPEC	100%±10%	20%±10%	100%±10%	100%±10%													
Io	112A	20.7A	112A	112A													
<p>6</p>	<p><b>REMOTE ON/OFF CONTROL</b></p>	<p>The power supply can be turned ON/OFF individually or along with other units in parallel by using the "Remote ON-OFF" function.</p> <table border="1"> <thead> <tr> <th>Between Remote ON-OFF and +5V-AUX</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td>Switch Short</td> <td>ON</td> </tr> <tr> <td>Switch Open</td> <td>OFF</td> </tr> </tbody> </table> <p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C</p> <p>Test Result :</p> <table border="1"> <thead> <tr> <th>Between ON/OFF and +5V-AUX</th> <th>OUTPUT</th> </tr> </thead> <tbody> <tr> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> </tbody> </table>	Between Remote ON-OFF and +5V-AUX	Power Supply Status	Switch Short	ON	Switch Open	OFF	Between ON/OFF and +5V-AUX	OUTPUT	SW SHORT	ON	SW OPEN	OFF			
Between Remote ON-OFF and +5V-AUX	Power Supply Status																
Switch Short	ON																
Switch Open	OFF																
Between ON/OFF and +5V-AUX	OUTPUT																
SW SHORT	ON																
SW OPEN	OFF																
<p>7</p>	<p><b>Temperature Compensation</b></p>	<p>① To exploit the temperature compensation function, please attach the temperature sensor, NTC, which is enclosed with the charger, to the battery or the battery's vicinity. ② The charger is able to work normally without the NTC.</p> <p>When multiple chargers are connected in parallel, please configure with the NTC as exhibited in the diagram . If the temperature compensation is not required, RTH+ (PIN15) and RTH- (PIN16) from each unit still need to be connected.</p> <p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C</p> <p>Test Result :</p> <table border="1"> <thead> <tr> <th>TEMP</th> <th>Voltage compensation</th> <th>Temperature compensation</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	TEMP	Voltage compensation	Temperature compensation												
TEMP	Voltage compensation	Temperature compensation															

			BEFORE	AFTER																			
		( Ta=0°C )	28.8V = +0.90V ±0.24V	27.593	28.516																		
		( Ta=25°C )	28.8V = 0V ±0.24V	27.593	27.593																		
		( Ta=50°C )	28.8V = -0.90V ±0.24V	27.593	26.695																		
8	ALARM SIGNAL	<p>※ There are 2 alarm signals, DC OK and T-ALARM, in TTL signal form, on CN1. These signals are isolated from output. The maximum sink current is 10mA.</p>  <p>1. DC OK SIGNAL            High (4.5 ~ 5.5V) : When the <math>V_{out} \leq 16V \pm 1V</math>.            Low (-0.1 ~ 0.5V) : When <math>V_{out} \geq 16V \pm 1V</math>.            The maximum sourcing current is 10mA and only for output.            I/P: 230 VAC            O/P:FULL LOAD            Ta:25°C            Test Result :</p> <table border="1"> <thead> <tr> <th>Vout</th> <th>DC OK SIGNAL</th> </tr> </thead> <tbody> <tr> <td><math>V_{out} \leq 15V</math></td> <td>4.72v</td> </tr> <tr> <td><math>V_{out} \geq 17V</math></td> <td>-0.065V</td> </tr> </tbody> </table> <p>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 10mA and only for output(Note.2)            I/P: 230 VAC            O/P:FULL LOAD            Ta:25°C            Test Result :</p> <table border="1"> <thead> <tr> <th>P.SU STATUS</th> <th>T-ALARM</th> </tr> </thead> <tbody> <tr> <td>NORMAL</td> <td>-0.065V</td> </tr> <tr> <td>OTP OR FAN LOCK</td> <td>4.71V</td> </tr> </tbody> </table>			Vout	DC OK SIGNAL	$V_{out} \leq 15V$	4.72v	$V_{out} \geq 17V$	-0.065V	P.SU STATUS	T-ALARM	NORMAL	-0.065V	OTP OR FAN LOCK	4.71V							
Vout	DC OK SIGNAL																						
$V_{out} \leq 15V$	4.72v																						
$V_{out} \geq 17V$	-0.065V																						
P.SU STATUS	T-ALARM																						
NORMAL	-0.065V																						
OTP OR FAN LOCK	4.71V																						
9	Current Sharing with Remote Sensing	<p>DBU-3200 has the built-in active current sharing function and can be connected in parallel, up to 2 units, to provide higher output power as exhibited below :</p> <p>※ The power supplies should be paralleled using short and large diameter wiring and then connected to the load.</p> <p>※ Difference of output voltages among parallel units should be less than 0.2V.</p> <p>※ The total output current must not exceed the value determined by the following equation:            Maximum output current at parallel operation=(Rated current per unit) × (Number of unit) × 0.9</p> <p>※ When the total output current is less than 5% of the total rated current, or say (5% of Rated current per unit) × (Number of unit) the current shared among units may not be balanced.</p> <p>※ CN500/SW1 Function pin connection</p> <table border="1"> <thead> <tr> <th rowspan="2">Parallel</th> <th colspan="2">PSU1</th> <th colspan="2">PSU2</th> </tr> <tr> <th>CN500</th> <th>SW1</th> <th>CN500</th> <th>SW1</th> </tr> </thead> <tbody> <tr> <td>1 unit</td> <td>X</td> <td>ON</td> <td>—</td> <td>—</td> </tr> <tr> <td>2 unit</td> <td>V</td> <td>ON</td> <td>V</td> <td>ON</td> </tr> </tbody> </table>		Parallel	PSU1		PSU2		CN500	SW1	CN500	SW1	1 unit	X	ON	—	—	2 unit	V	ON	V	ON	<p>I/P : 230 VAC            O/P : 396A/160A            Ta : 25°C</p> <p>O/P : 396A            PSU1 : 98.3A            PSU2 : 98.5A            PSU3 : 98.4A            PSU4 : 98.6A</p> <p>O/P : 160A            PSU1 : 38.9A            PSU2 : 40.4A            PSU3 : 39.5A            PSU4 : 39.2A</p>
Parallel	PSU1		PSU2																				
	CN500	SW1	CN500	SW1																			
1 unit	X	ON	—	—																			
2 unit	V	ON	V	ON																			

		<p>(V: CN500 connected; X: CN500 not connected.)</p> <p>Fig 5.1</p> <p>If the lines of CN500 are too long, they should be twisted in pairs to avoid the noise.</p>												
10	AUXILIARY POWER (AUX)	<p>a. +12V Auxiliary voltage output, 10.8~13.2V, referenced to GND-AUX (pin 2). The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by the Remote ON/OFF control</p> <p>b. +5V Auxiliary voltage output, 4.5~5.5V, referenced to GND-AUX (pin 2). The maximum load current is 0.3A. This output has the built-in "Oring diodes" and is not controlled by the Remote ON/OFF control</p> <p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C</p> <p>Test Result :</p> <table border="1" data-bbox="555 1120 1390 1350"> <thead> <tr> <th>AUX</th> <th>TOLERANCE</th> <th>RIPPLE</th> <th>TEST RESULT</th> </tr> </thead> <tbody> <tr> <td>12V / 0.8A</td> <td>10.6~13.2 V</td> <td>450mVp-p</td> <td>12.1V/130mv</td> </tr> <tr> <td>5V / 0.3A</td> <td>4.5 ~ 5.5V</td> <td>150mVp-p</td> <td>4.7V/110mv</td> </tr> </tbody> </table>	AUX	TOLERANCE	RIPPLE	TEST RESULT	12V / 0.8A	10.6~13.2 V	450mVp-p	12.1V/130mv	5V / 0.3A	4.5 ~ 5.5V	150mVp-p	4.7V/110mv
AUX	TOLERANCE	RIPPLE	TEST RESULT											
12V / 0.8A	10.6~13.2 V	450mVp-p	12.1V/130mv											
5V / 0.3A	4.5 ~ 5.5V	150mVp-p	4.7V/110mv											

### COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 52A/600V Q3 Rated 52A/600V	I/P: High-Line +3V = 267V AC ON/OFF VDS: O/P: (1) Full Load	Q1: Q3 VDS: VDS: (1) 477 V (1) 493 V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q 900 Rated 52 A/600V Q 902 Rated 52 A/600V	I/P: High-Line +3V = 267 V AC ON/OFF VDS: O/P: (1) Full Load	Q900: Q902: VDS: VDS: (1) 505V (1) 493V
3	P.F.C DIODE	D8 Rated 16 A/600V	I/P: High-Line +3V = 267 V AC ON/OFF O/P: (1) Full Load Ta: 25°C	(1) 441V
4	Diode Peak Voltage	Q101 Rated 100 A/100 V Q104 Rated 100 A/100 V Q107 Rated 100 A/100 V Q110 Rated	I/P: High-Line +3V = 267 V AC ON/OFF VDS: O/P: (1) Full Load	Q101: Q104: VDS: VDS: (1) 85.7V (1) 72.1V Q107: Q110: VDS: VDS:

		100 A/100 V		(1)77.7V (1)80.2V
5	Input Capacitor Voltage	C5 Rated: 330μ/ 450V 105 °C	I/P:High-Line +3V =267V O/P: (1)Full Load input on/off Ta:25°C	(1)432V
6	Control IC Voltage Test	PWM IC U201 Rated 6.5 V~30V PFC IC U900 Rated 4.5V~20 V	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD Ta:25°C	U201 U900 (1) 14.9V (1) 13.9V
7	TOP SWITCHING STAND BY POWER	U71 Rate 20 A/ 800V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Remote On/Off Ta:25°C	(1) 645V (2) 645V

### SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG :2KVAC/min O/P-FG:1.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:1.8 KVAC/min Ta:25°C	I/P-O/P: 11.76mA I/P-FG: 13.32 mA O/P-FG: 18.98 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 13 GΩ I/P-FG: 2.86GΩ O/P-FG: 5 GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	25mΩ

### E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	CONDUCTION	EN55032 (CISPR32) / EN55011 (CISPR11) CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	Test by certified Lab
2	RADIATION	EN55032 (CISPR32) / EN55011 (CISPR11) CLASS A	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	Test by certified Lab
3	HARMONIC	EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:100% LOAD Ta:25°C	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°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	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°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 : DBU-3200-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD		

		NO	Position	ROOM AMBIENT Ta= 25°C	HIGH AMBIENT Ta= 50°C
		1	BD1	71.0°C	97.3°C
		2	RY1	36.7°C	62.6°C
		3	D7	71.0°C	98.2°C
		4	D8	68.9°C	96.3°C
		5	T3	47.2°C	73.3°C
		6	U900	39.8°C	66.3°C
		7	Q900	58.8°C	86.1°C
		8	Q902	69.0°C	96.9°C
		9	C5	52.9°C	81.7°C
		10	U902	43.4°C	70.5°C
		11	Q1	71.3°C	101.7°C
		12	Q3	74.1°C	104.9°C
		13	T1-2	70.0°C	99.3°C
		14	T1-1	71.7°C	100.9°C
		15	T2-2	81.8°C	112.2°C
		16	T2-1	83.8°C	114.9°C
		17	T301	58.0°C	85.3°C
		18	U71	77.7°C	107.4°C
		19	U201	60.0°C	89.6°C
		20	C111	28.4°C	52.9°C
		21	C121	41.0°C	66.8°C
		22	C115	33.4°C	58.7°C
		23	C116	39.0°C	64.8°C
		24	Q401	53.5°C	80.2°C
		25	Q411	41.7°C	67.2°C
		26	Q101	54.2°C	82.2°C
		27	Q108	75.3°C	105.0°C
		28	U425	49.9°C	77.3°C
		29	RT90	56.1°C	83.3°C
		30	U903	51.5°C	78.6°C
		31	RG76	51.5°C	77.3°C
		32	U501	35.2°C	60.2°C
		33	L1	53.0°C	79.9°C
		34	L3	77.7°C	104.7°C
		35	R900	46.4°C	72.6°C
		36	ZR2	31.4°C	57.1°C
		37	LF1	41.0°C	67.8°C
		38	C2	31.4°C	57.1°C
		39	C10	31.2°C	57.1°C
		40	ZR1	28.0°C	53.4°C
		41	RT1	31.7°C	57.3°C
		42	Q104	65.9°C	94.2°C
		43	RG75	43.6°C	68.6°C
		44	RG91	51.4°C	78.0°C
		45	D52	50.9°C	79.2°C
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR		I/P : 230VAC /180VAC O/P : 100 % LOAD Ta= -30°C/-25°C	TEST : OK
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE		I/P : 272 VAC O/P : FULL LOAD Ta= 50°C HUMIDITY= 95 %R.H	TEST : OK



4	TEMPERATURE COEFFICIENT	$\pm 0.03 \% / ^\circ\text{C}(0\sim 50^\circ\text{C})$	I/P : 230 VAC O/P : FULL LOAD	$\pm 0 \% / ^\circ\text{C}(0\sim 50^\circ\text{C})$
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : $-45^\circ\text{C}\sim +90^\circ\text{C}$ 2. Temperature change rate : $25^\circ\text{C} / \text{MIN}$ 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC		OK
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : $-35^\circ\text{C}\sim +55^\circ\text{C}$ 2. Temperature change rate : $25^\circ\text{C} / \text{MIN}$ 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		OK
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : $25^\circ\text{C}$		TEST : OK
8	CAPACITOR LIFE CYCLE	SUPPOSE C121 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= $25^\circ\text{C}$ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= $50^\circ\text{C}$ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= $50^\circ\text{C}$ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= $50^\circ\text{C}$ LIFE TIME		(1) 284793HRS (2) 49666HRS (3) 186482HRS (4) 374724HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 160.1K hrs min. Telcordia SR-332 (Bellcore) ; 38.9K hrs min. MIL-HDBK-217F ( $25^\circ\text{C}$ )		
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA $50^\circ\text{C}$		

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

2018.4.30 GP-A50-F010