



# Test Report: DDR-480B-48

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480W DIN Rail Type DC-DC Converter

## ■ 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

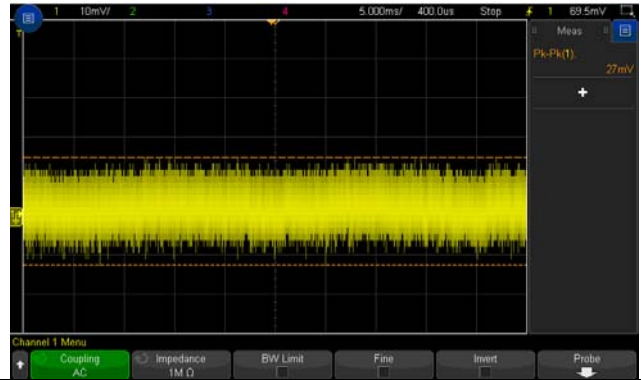
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 48V~56V	I/P: NORMAL VOLTAGE O/P: MIN LOAD Ta: 25°C	CH1: 45.23 V~57.86 V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1%~1 %	I/P: 16.8 VDC / 33.6 VDC O/P: FULL / MIN. LOAD Ta: 25°C	V1: -0.102 %~ 0.0999 %
3	LINE REGULATION (Max)	V1: -0.5 %~ 0.5%	I/P: 16.8 VDC / 33.6 VDC O/P: FULL LOAD Ta: 25°C	V1: -0.043 %~ 0.0063%
4	LOAD REGULATION (Max)	V1: -1 %~ 1 %	I/P: 24VDC O/P: FULL ~MIN LOAD Ta: 25°C	V1: -0.102 %~ 0.0999%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 24VDC O/P: FULL LOAD Ta: 25°C	TEST: 2.1%
6	Peak Loading	720W/5sec.	I/P: 24VDC O/P: 720W Ta: 25°C	TEST: OK
7	RIPPLE & NOISE (Max)	V1: 150mVp-p	I/P: 24VDC O/P: FULL LOAD Ta: 25°C	V1: 27 mVp-p

high frequency :



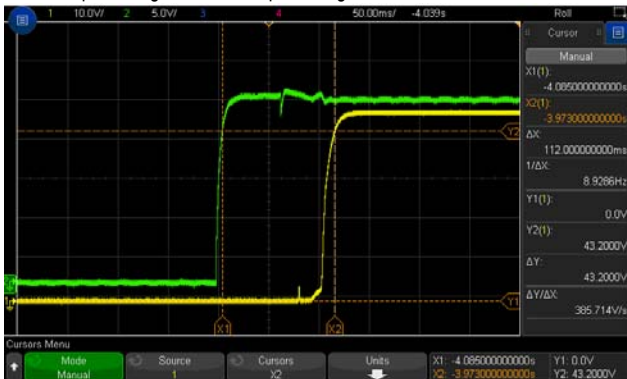
low frequency :

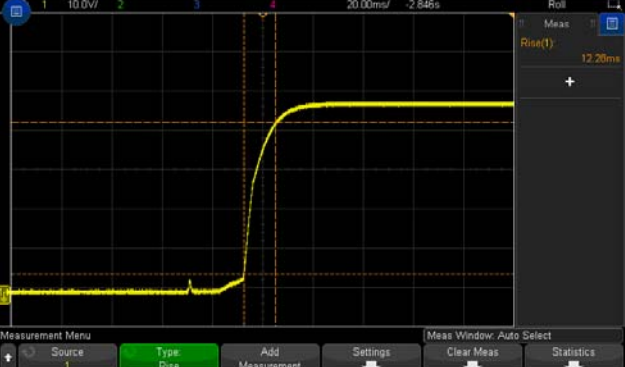

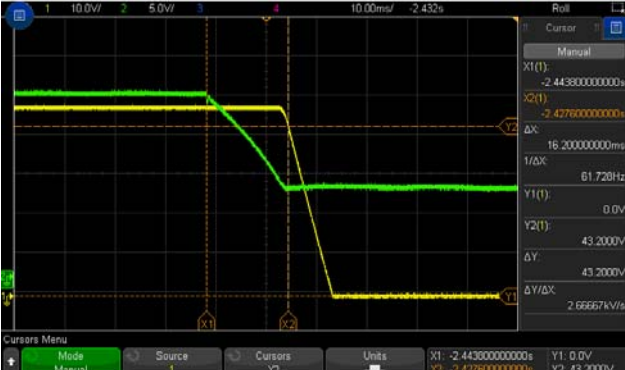
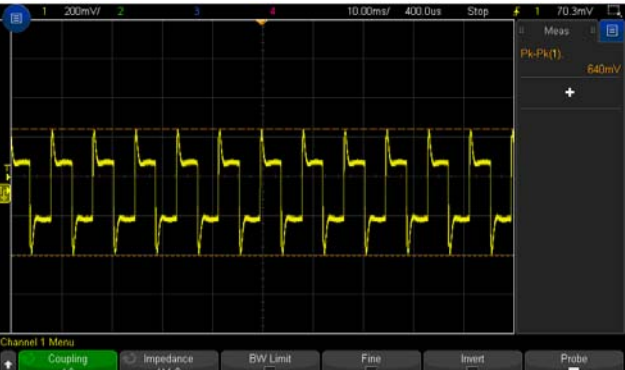
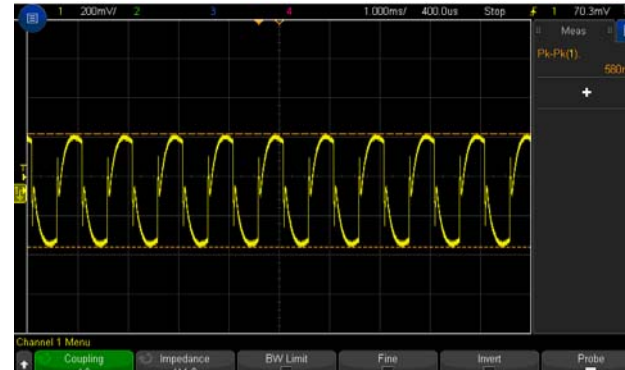


8	SET UP TIME (Max)	24VDC/ 500 ms	I/P: 24VDC O/P: FULL LOAD Ta: 25°C	112ms
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INPUT=24VDC @ FULL LOAD

CH1 : Output Voltage CH2 : DC Input Voltage

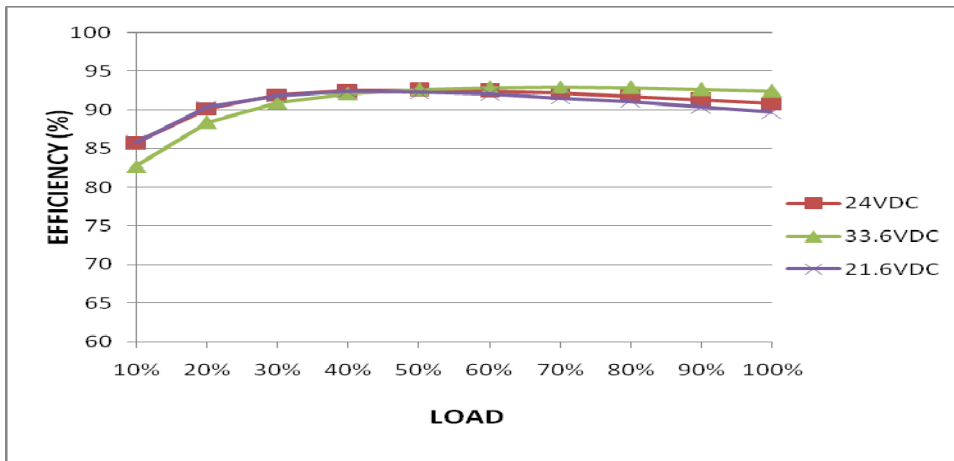


9	RISE TIME (Max)	24VDC/ 60 ms	I/P: 24VDC O/P:FULL LOAD Ta:25°C	12.28 ms
<p>INPUT=24VDC @ FULL LOAD CH1 : Output Voltage</p> 				
10	HOLD UP TIME (TYP)	24VDC/ 10 ms 24VDC/ 16 ms@70%LOAD	I/P: 24VDC O/P:FULL LOAD/70%LOAD Ta:25°C	10.8 ms @FULL LOAD 16.2 ms@70% LOAD
<p>INPUT=24VDC @ FULL LOAD CH1 : Output Voltage CH2 : DC Input Voltage</p>  <p>INPUT=24VDC @ 70% LOAD CH1 : Output Voltage CH2 : DC Input Voltage</p> 				
11	TRANSIENT RECOVERY TIME	V1:480mVp-p	I/P: 24VDC O/P:40% LOAD CHANGE 50%DUTY/120HZ	520mVp-p
12	DYNAMIC LOAD	V1: 480mVp-p	I/P: 24VDC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	640mVp-p/120HZ 580mVp-p/1KHZ
<p>FULL /50% LOAD 50%DUTY / 120HZ</p>  <p>FULL /50% LOAD 50%DUTY / 1KHZ</p> 				

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	16.8VDC~33.6 VDC 14.4VDC~16.8VDC $\geq$ 100ms	I/P:TESTING O/P:FULL LOAD Ta:25°C	(1) 14.07V~ 33.6V (2) TEST: OK
			I/P: LOW-LINE-0.2=16.6V HIGH-LINE+1V=34.6V 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 CURRENT(TYP)	24VDC/ 23 A	I/P: 24VDC O/P:FULL LOAD Ta:25°C	I=21.84 A / 24VDC
3	EFFICIENCY(TYP)	90.5 %	I/P:24VDC O/P:FULL LOAD Ta:25°C	90.84%

EFFICIENCY vs LOAD



4	INRUSH CURRENT(TYP)	24VDC/ 30 A COLD START	I/P: 24VDC O/P:FULL LOAD Ta:25°C	28.9A
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INPUT=24VDC @ FULL LOAD

CH4 : Input current



5	INTERRUPTION OF VOLTAGE SUPPLY	COMPLY WITH S2 LEVEL (10ms)	I/P: 24VDC O/P:FULL LOAD Ta:25°C	11.6ms
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**PROTECTION FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105 %~ 135 % RATED OUTPUT POWER	I/P: 21.6 VDC I/P: 24 VDC I/P: 33.6 VDC O/P: TESTING PEAK LOAD ( 5S ) Ta:25°C	117.1%/ 21.6 VDC 116.9%/ 24 VDC 116.9%/ 33.6 VDC PROTECTION TYPE : Normally works within 150% rated output power for more than 5 seconds and then constant current protection 105%~135% rated output power with auto-recovery .
2	OVER VOLTAGE PROTECTION 过压时产品异响	CH: 57.6 V~65 V	I/P: 16.8VDC I/P: 24VDC I/P: 33.6VDC O/P: MIN LOAD Ta:25°C	62.4V/16.8VDC 62.4V/24VDC 62.4V/33.6VDC PROTECTION TYPE : Shut down O/P voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	SPEC:  NO DAMAGE	I/P: 33.6/16.8VDC O/P: FULL LOAD Ta:25°C	O.T.P. Active PROTECTION TYPE : Shut down O/P voltage, re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 33.6/16.8VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Constant current limiting with auto-recovery recovers automatically after fault condition is removed
5	INPUT REVERSE	POWER OK	I/P: 33.6/16.8VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE
6	INPUT UNDER VOLTAGE PROTECTION	24VIN (C-TYPE) : POWER ON >=16.8V POWER OFF <=16.5V	I/P: TESTING O/P: FULL LOAD Ta:25°C	POWER ON >=14.046 V POWER OFF <=13.929 V

**CONTROL FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT						
1	REMOTE ON/OFF CONTROL	I/P: 24VDC O/P: FULL LOAD Ta:25°C Test Result :								
		<table border="1"> <tr> <td>Remote ON-OFF (TB1 PIN2,4)</td> <td>Power Supply Status</td> </tr> <tr> <td>Open or 4~10VDC</td> <td>ON 3.44VDC</td> </tr> <tr> <td>Short or 0~0.8VDC</td> <td>OFF 0.84vdc</td> </tr> </table>	Remote ON-OFF (TB1 PIN2,4)	Power Supply Status	Open or 4~10VDC	ON 3.44VDC	Short or 0~0.8VDC	OFF 0.84vdc		
Remote ON-OFF (TB1 PIN2,4)	Power Supply Status									
Open or 4~10VDC	ON 3.44VDC									
Short or 0~0.8VDC	OFF 0.84vdc									
2	DC OK CONTACT RATINGS	30VDC/1A RESISTIVE LOAD	I/P: 24VDC O/P: FULL LOAD Ta:25°C	TEST : OK						

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT								
1	PWM Transistor ( D to S ) or ( C to E ) Peak Voltage	Q 8/Q19/ Q12/Q17 Rated : 100 A/ 100V	DC ON/OFF I/P: High-Line +1V =34.6V VDS: O/P: (1) Full Load	<table> <tr> <td><b>Q8</b></td> <td><b>Q19</b></td> </tr> <tr> <td>VDS:</td> <td>VDS:</td> </tr> <tr> <td>(1) 55.3V</td> <td>(1) 59.9V</td> </tr> <tr> <td>(2) 74.5V</td> <td>(2) 74.5V</td> </tr> </table>	<b>Q8</b>	<b>Q19</b>	VDS:	VDS:	(1) 55.3V	(1) 59.9V	(2) 74.5V	(2) 74.5V
<b>Q8</b>	<b>Q19</b>											
VDS:	VDS:											
(1) 55.3V	(1) 59.9V											
(2) 74.5V	(2) 74.5V											



			<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.  Ta:25°C</p>	<p>(3) 60.9V  (4) 62.2V  (5) 61.7V  (6) 58.5V  (7) 61.7V</p> <p>Q12  VDS:  (1) 55.9V  (2) 73.3V  (3) 56.3V  (4) 56.3V  (5) 56.3V  (6) 56.7V  (7) 56.3V</p>	<p>(3) 59.3V  (4) 58.9V  (5) 59.3V  (6) 56.1V  (7) 57.3V</p> <p>Q17  VDS:  (1) 55.9V  (2) 74.9V  (3) 57.5V  (4) 58.3V  (5) 58.3V  (6) 57.1V  (7) 58.3V</p>
2	Clamp MOSFET (D to S) or (C to E) Peak Voltage	Q20/Q4 Rated : 73 A/ 100 V VGS ± 20 V	<p>DC ON/OFF  I/P:High-Line +1V =34.6V  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.  Ta:25°C</p>	<p>Q20  VDS:  (1) 47.7V  (2) 50.9V  (3) 56.9V  (4) 54.9V  (5) 54.9V  (6) 58.1V  (7) 59.7V</p>	<p>Q4  VDS:  (1) 48.7V  (2) 50.7V  (3) 68.5V  (4) 63.9V  (5) 62.3V  (6) 63.9V  (7) 57.9V</p>
3	Diode Peak Voltage	Q101/Q104/ Q200/Q202 Rated : 10 A/ 400V	<p>DC ON/OFF  I/P:High-Line +1V =34.6V  VOmax:  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  VO:  O/P: (1)Full Load  Ta:25°C</p>	<p>Q101:  VOmax:  VDS:  (1) 307V  (2) 217V  (3) 346V  (4) 350V  (5) 346V  (6) 314V  (7) 164V  (8) 152V  VO:  (1) 267V</p> <p>Q104:  VOmax:  VDS:  (1) 347V  (2) 360V  (3) 368V  (4) 354V  (5) 347V  (6) 380V  (7) 380V  (8) 380V  VO:  (1) 356V</p>	<p>Q200:  VOmax:  VDS:  (1) 239V  (2) 193V  (3) 291V  (4) 299V  (5) 291V  (6) 269V  (7) 148V  (8) 140V  VO:  (1) 211V</p> <p>Q202:  VOmax:  VDS:  (1) 323V  (2) 331V  (3) 360V  (4) 335V  (5) 335V  (6) 380V  (7) 380V  (8) 376V  VO:  (1) 319V</p>

4	Input Capacitor Voltage	C20/C28 Rated: 2200 $\mu$ / 35 V	I/P:High-Line +1V =34.6V 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 $^{\circ}$ C	C20 (1) 34.3V (2) 33.3V (3) 33.9V (4) 33.7V	C28 (1) 34.7V (2) 33.8V (3) 33.9V (4) 33.1V
5	Control IC Voltage Test	PWM IC U1 Rated 7.5V~ 15 V / VCC O/P U100 Rated -0.3V~ 32 V	DC ON/OFF I/P:High-Line +1V =34.6 V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(Low LINE) Ta:25 $^{\circ}$ C	U1 VCC1/VCC2 (1) 13.21V/13.21V (2) 13.45V/13.45V (3) 13.45V/13.37V (4) 13.05V/13.13V (5) 10.80V/10.88V	U100 (1) 11.60V (2) 11.60V (3) 11.84V (4) 11.68V (5) 11.36V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTANDVOLTAGE	I/P-O/P:4KVDC/min I/P-FG:2.5KVDC/min O/P-FG:0.71KVDC/min	I/P-O/P: 4.4KVDC/min I/P-FG: 3KVDC/min O/P-FG:0.852KVDC/min Ta:25 $^{\circ}$ C	I/P-O/P:0.1uA I/P-FG:0.1uA O/P-FG:0.3uA NO DAMAGE
2	ISOLATIONRESISTANCE	I/P-O/P:500VDC>100M $\Omega$ I/P-FG: 500VDC>100M $\Omega$ O/P-FG:500VDC>100M $\Omega$	I/P-O/P: 600 VDC I/P-FG: 600VDC O/P-FG: 600VDC Ta:25 $^{\circ}$ C	I/P-O/P:9999M $\Omega$ I/P-FG:9999M $\Omega$ O/P-FG:9999M $\Omega$ NO DAMAGE
3	GROUNDINGCONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m $\Omega$	40A / 2min Ta:25 $^{\circ}$ C	4m $\Omega$

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	EN55032 CLASS B	I/P: 24VDC O/P:FULL LOAD Ta:25 $^{\circ}$ C	PASS Test by certified Lab
2	CONDUCTION	EN55032 CLASS A	I/P:24VDC O/P:FULL LOAD Ta:25 $^{\circ}$ C	PASS Test by certified Lab
3	E.S.D	EN61000-4-2 <input type="checkbox"/> MEDICAL AIR: 15KV / Contact: 8KV <input type="checkbox"/> LIGHT INDUSTRY AIR: 8KV / Contact: 4KV <input checked="" type="checkbox"/> INDUSTRY AIR: 8KV / Contact: 6KV	I/P: 24VDC O/P:FULL LOAD Ta:25 $^{\circ}$ C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
4	E.F.T	EN61000-4-4 <input type="checkbox"/> LIGHT INDUSTRY INPUT: 0.5KV <input type="checkbox"/> MEDICAL <input checked="" type="checkbox"/> INDUSTRY INPUT: 2KV	I/P:24VDC O/P:FULL LOAD Ta:25 $^{\circ}$ C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
5	SURGE	IEC61000-4-5 <input checked="" type="checkbox"/> INDUSTRY L-N :1KV L,N-PE:2KV	I/P: 24VDC O/P:FULL LOAD Ta:25 $^{\circ}$ C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B

6	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report
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## RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																																																																												
1	TEMPERATURE RISE TEST	MODEL : DDR-480B-48 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 24 VDC O/P : FULL LOAD Ta= 26.2 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 24 VDC O/P : FULL LOAD Ta= 60.6 °C																																																																																																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 26.2 °C</th> <th>HIGH AMBIENT Ta= 60.6 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF3</td><td>74.4°C</td><td>116.4°C</td></tr> <tr><td>2</td><td>C29</td><td>57.9°C</td><td>98.8°C</td></tr> <tr><td>3</td><td>T7</td><td>61.6°C</td><td>103.3°C</td></tr> <tr><td>4</td><td>U1</td><td>53.8°C</td><td>96.5°C</td></tr> <tr><td>5</td><td>T3</td><td>74.1°C</td><td>117.6°C</td></tr> <tr><td>6</td><td>Q4</td><td>62.5°C</td><td>105°C</td></tr> <tr><td>7</td><td>R23</td><td>62.3°C</td><td>104.7°C</td></tr> <tr><td>8</td><td>Q17</td><td>69.2°C</td><td>111.8°C</td></tr> <tr><td>9</td><td>T2</td><td>73.4°C</td><td>117.5°C</td></tr> <tr><td>10</td><td>L200</td><td>81.6°C</td><td>124.1°C</td></tr> <tr><td>11</td><td>Q200</td><td>75.3°C</td><td>115.6°C</td></tr> <tr><td>12</td><td>Q202</td><td>75.3°C</td><td>118.1°C</td></tr> <tr><td>13</td><td>C204</td><td>69.4°C</td><td>109.8°C</td></tr> <tr><td>14</td><td>U101</td><td>66.4°C</td><td>108.1°C</td></tr> <tr><td>15</td><td>U100</td><td>67.3°C</td><td>107.8°C</td></tr> <tr><td>16</td><td>D210</td><td>69.1°C</td><td>110.4°C</td></tr> <tr><td>17</td><td>ZD209</td><td>69°C</td><td>110.3°C</td></tr> <tr><td>18</td><td>R203</td><td>68°C</td><td>108.9°C</td></tr> <tr><td>19</td><td>Q204</td><td>68.5°C</td><td>110.3°C</td></tr> <tr><td>20</td><td>TB1</td><td>59.8°C</td><td>99.3°C</td></tr> <tr><td>21</td><td>ZNR1</td><td>62.8°C</td><td>106.2°C</td></tr> <tr><td>22</td><td>LF1</td><td>67.7°C</td><td>109.2°C</td></tr> <tr><td>23</td><td>LF2</td><td>73.2°C</td><td>115.8°C</td></tr> <tr><td>24</td><td>Q6</td><td>62.2°C</td><td>103°C</td></tr> <tr><td>25</td><td>Q13</td><td>73.1°C</td><td>115.2°C</td></tr> <tr><td>26</td><td>C64</td><td>62.4°C</td><td>101.8°C</td></tr> <tr><td>27</td><td>LF4</td><td>75.7°C</td><td>116.8°C</td></tr> <tr><td>28</td><td>T8</td><td>65.4°C</td><td>106.5°C</td></tr> <tr><td>29</td><td>Q103</td><td>75.2°C</td><td>95.9°C</td></tr> <tr><td>30</td><td>T4</td><td>76.8°C</td><td>118.1°C</td></tr> <tr><td>31</td><td>Q19</td><td>75.1°C</td><td>115.5°C</td></tr> <tr><td>32</td><td>Q8</td><td>69.9°C</td><td>109.7°C</td></tr> <tr><td>33</td><td>Q20</td><td>72.6°C</td><td>113.3°C</td></tr> <tr><td>34</td><td>R91</td><td>66°C</td><td>106°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 26.2 °C	HIGH AMBIENT Ta= 60.6 °C	1	LF3	74.4°C	116.4°C	2	C29	57.9°C	98.8°C	3	T7	61.6°C	103.3°C	4	U1	53.8°C	96.5°C	5	T3	74.1°C	117.6°C	6	Q4	62.5°C	105°C	7	R23	62.3°C	104.7°C	8	Q17	69.2°C	111.8°C	9	T2	73.4°C	117.5°C	10	L200	81.6°C	124.1°C	11	Q200	75.3°C	115.6°C	12	Q202	75.3°C	118.1°C	13	C204	69.4°C	109.8°C	14	U101	66.4°C	108.1°C	15	U100	67.3°C	107.8°C	16	D210	69.1°C	110.4°C	17	ZD209	69°C	110.3°C	18	R203	68°C	108.9°C	19	Q204	68.5°C	110.3°C	20	TB1	59.8°C	99.3°C	21	ZNR1	62.8°C	106.2°C	22	LF1	67.7°C	109.2°C	23	LF2	73.2°C	115.8°C	24	Q6	62.2°C	103°C	25	Q13	73.1°C	115.2°C	26	C64	62.4°C	101.8°C	27	LF4	75.7°C	116.8°C	28	T8	65.4°C	106.5°C	29	Q103	75.2°C	95.9°C	30	T4	76.8°C	118.1°C	31	Q19	75.1°C	115.5°C	32	Q8	69.9°C	109.7°C	33	Q20	72.6°C	113.3°C	34	R91	66°C	106°C
NO	Position	ROOM AMBIENT Ta= 26.2 °C	HIGH AMBIENT Ta= 60.6 °C																																																																																																																																													
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9	T2	73.4°C	117.5°C																																																																																																																																													
10	L200	81.6°C	124.1°C																																																																																																																																													
11	Q200	75.3°C	115.6°C																																																																																																																																													
12	Q202	75.3°C	118.1°C																																																																																																																																													
13	C204	69.4°C	109.8°C																																																																																																																																													
14	U101	66.4°C	108.1°C																																																																																																																																													
15	U100	67.3°C	107.8°C																																																																																																																																													
16	D210	69.1°C	110.4°C																																																																																																																																													
17	ZD209	69°C	110.3°C																																																																																																																																													
18	R203	68°C	108.9°C																																																																																																																																													
19	Q204	68.5°C	110.3°C																																																																																																																																													
20	TB1	59.8°C	99.3°C																																																																																																																																													
21	ZNR1	62.8°C	106.2°C																																																																																																																																													
22	LF1	67.7°C	109.2°C																																																																																																																																													
23	LF2	73.2°C	115.8°C																																																																																																																																													
24	Q6	62.2°C	103°C																																																																																																																																													
25	Q13	73.1°C	115.2°C																																																																																																																																													
26	C64	62.4°C	101.8°C																																																																																																																																													
27	LF4	75.7°C	116.8°C																																																																																																																																													
28	T8	65.4°C	106.5°C																																																																																																																																													
29	Q103	75.2°C	95.9°C																																																																																																																																													
30	T4	76.8°C	118.1°C																																																																																																																																													
31	Q19	75.1°C	115.5°C																																																																																																																																													
32	Q8	69.9°C	109.7°C																																																																																																																																													
33	Q20	72.6°C	113.3°C																																																																																																																																													
34	R91	66°C	106°C																																																																																																																																													





			35	T1	73.6°C	115.4°C
			36	L101	82.4°C	123.5°C
			37	Q105	77.9°C	107.6°C
			38	C110	68.9°C	108.8°C
			39	C111	67.2°C	106.4°C
			40	ZD109	68.7°C	108.7°C
			41	Q14	69.2°C	109.3°C
			42	D17	75.9°C	116.7°C
			43	D106	68.8°C	108.8°C
			44	TB2	64.2°C	102°C
			45	LF100	69.2°C	108.9°C
			46	RY100	70.6°C	109.1°C
			47	C207	65.5°C	105.1°C
			48	Q22	65.9°C	106.1°C
			49	C65	75.8°C	118.4°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 24 VDC O/P : 144% LOAD Ta : 25°C		TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 21.6VDC /33.6VDC 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 60 °C /95 %R.H NO DAMAGE	I/P : 35VDC O/P : FULL LOAD Ta= 60°C HUMIDITY= 95 %R.H		TEST : OK	
5	TEMPERATURE COEFFICIENT	± 0.03%/ (0~55°C)	I/P : 24C O/P : FULL LOAD		± 0.0051%/°C (0~55°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	-40~60°C	1. Thermal shock Temperature : -45°C~+65°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: 24 VDC / FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle: 24 VDC / FULL LOAD Burn In Test			
8	VIBRATION TEST	10 ~ 500Hz, 5G 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 : 6G (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 : 24VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 24VDC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 24VDC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 24VDC O/P : 50% LOAD Ta= 60 °C LIFE TIME			(1) 364259.9HRS (2) 23084 HRS (3) 63100.7HRS (4) 113321.8HRS	



10	MTBF	Conducted by Parts Stress Analysis Prediction 280.0 K hrs min. Telcordia SR-332 (Bellcore) ; 101.7K hrs min. MIL-HDBK-217F (25°C)
11	Ongoing Reliability Test	I/P : 24VDC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30000hours

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		Wangdz

2018.4.30 GP-A50-F010