



# Test Report: DDR-120D-24

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120W DC-DC DIN Rail Power Supply

## ■ 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

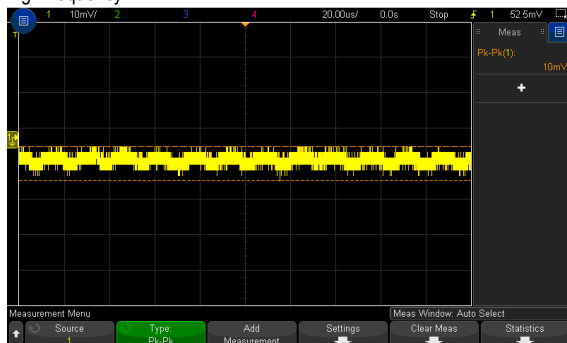
ENVIRONMENT TEST

## DESIGN VERIFY TEST

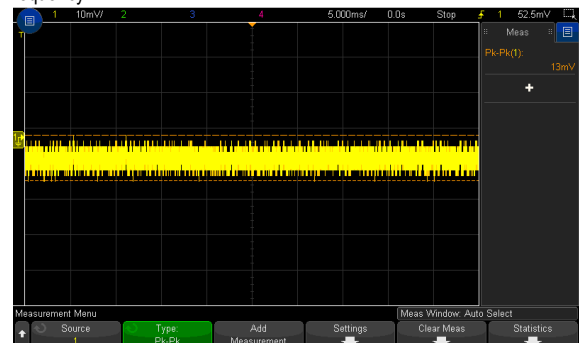
### OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE TOLERANCE (Max)	V1: -1%~1%	I/P:86.4VDC /154VDC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.13%~ 0.19%
2	LINE REGULATION (Max)	V1: -0.5%~0.5%	I/P: 86.4VDC / 154 VDC O/P:FULL LOAD Ta:25°C	V1: -0.06%~0.03%
3	LOAD REGULATION (Max)	V1: -1%~ 1%	I/P: 110VDC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.13%~ 0.19%
4	OVER/UNDERSHOOT TEST	< +5%	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	TEST: 2.1%
5	RIPPLE & NOISE (Max)	V1: 50 mVp-p	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	V1: 13 mVp-p

high frequency :



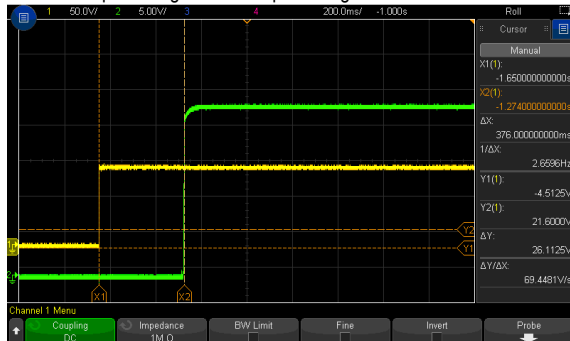
low frequency :



6	SET UP TIME (Max)	110VDC/ 500 ms	I/P: 110VDC O/P:FULL LOAD Ta:25°C	110VDC/376 ms
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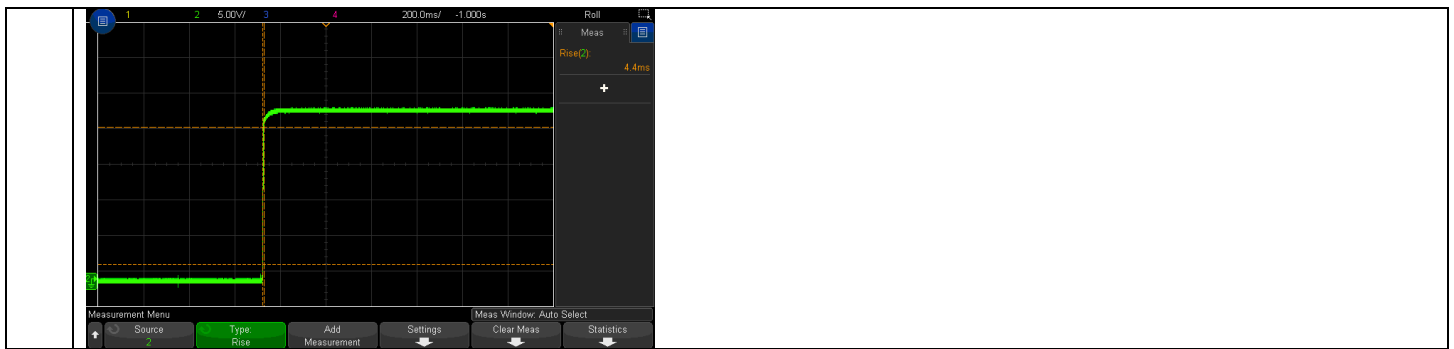
INPUT=110VDC @ FULL LOAD

CH1 : DC Input Voltage CH2 : Output Voltage



7	RISE TIME (Max)	110VDC/ 60 ms	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	110VDC/4.4 ms
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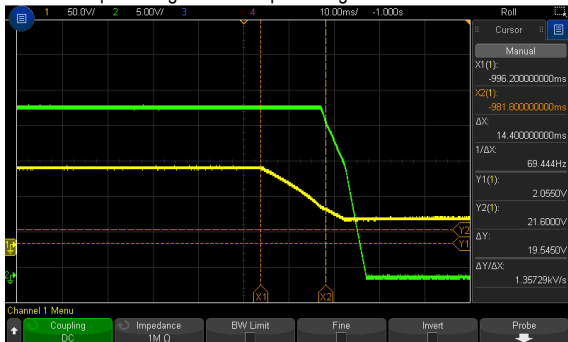
INPUT=110VDC @ FULL LOAD



8	HOLD UP TIME (TYP)	110VDC/ 10 ms	I/P: 110 VDC O/P:F ULL LOAD Ta:25°C	110VDC/14.4ms
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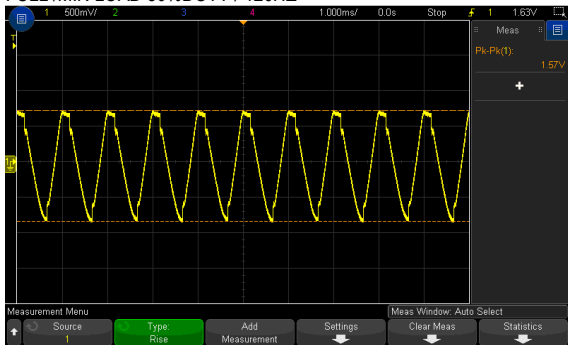
INPUT=110VDC @ FULL LOAD

CH1 : DC Input Voltage CH2 : Output Voltage

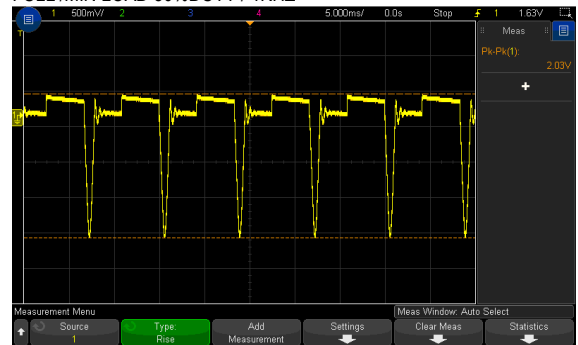


9	DYNAMIC LOAD	V1: 2400 mVp-p	I/P: 110VDC O/P: (1)FULL /MIN LOAD 50%DUTY / 120HZ (2)FULL /MIN LOAD 50%DUTY / 1KHZ Ta:25°C	1570mVp-p 2030mVp-p
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FULL /MIN LOAD 50%DUTY / 120HZ



FULL /MIN LOAD 50%DUTY / 1KHZ



### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	67.2 VDC~ 154 VDC	I/P:TESTING O/P:FULL LOAD Ta:25°C	62.8V~ 154 V
			I/P: LOW-LINE-0.2= 67 V HIGH-LINE+3V= 157 V O/P:FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec . OFF: 30 Sec 10MIN ( POWER ON/OFF NO DAMAGE )	TEST (1) <u>OK</u> (2) <u>OK</u> (3) <u>OK</u>

2	INPUT CURRENT(TYP)	110VDC/ 1.3A	I/P: 110VDC O/P:FULL LOAD Ta:25°C	I=1.18A/110VDC																						
3	EFFICIENCY(TYP)	91 %	I/P: 110VDC O/P:FULL LOAD Ta:25°C	91.96%																						
<p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs Load Data (24VDC)</caption> <thead> <tr> <th>LOAD (%)</th> <th>EFFICIENCY (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>82</td></tr> <tr><td>20%</td><td>76</td></tr> <tr><td>30%</td><td>83</td></tr> <tr><td>40%</td><td>92</td></tr> <tr><td>50%</td><td>93</td></tr> <tr><td>60%</td><td>92</td></tr> <tr><td>70%</td><td>89</td></tr> <tr><td>80%</td><td>88</td></tr> <tr><td>90%</td><td>90</td></tr> <tr><td>100%</td><td>92</td></tr> </tbody> </table>					LOAD (%)	EFFICIENCY (%)	10%	82	20%	76	30%	83	40%	92	50%	93	60%	92	70%	89	80%	88	90%	90	100%	92
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4	INRUSH CURRENT(TYP)	110VDC/ 20 A COLD START	I/P: 110VDC O/P:FULL LOAD Ta:25°C	I=4.02 A/110 VDC																						
<p>INPUT=110VDC @ FULL LOAD</p>																										

### PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~135%RATED OUTPUT POWER	I/P: 67.2 VDC I/P: 110 VDC I/P: 154 VDC O/P:TESTING Ta:25°C	125.9%/ 154VDC 125.9%/110VDC 126.2%/ 67.2VDC PROTECTION TYPE : Normally works within 105~150% rated output power for more than 3 seconds and then constant current protection with auto-recovery >150% rated power ,constant current limiting with auto-recovery
2	OVER VOLTAGE PROTECTION	CH: 28.8 V~ 32.4 V	I/P: 154 VDC I/P: 110 VDC I/P: 67.2 VDC O/P:MIN LOAD Ta:25°C	30.7V/154VDC 30.7V/ 110 VDC 30.9V/ 67.2 VDC PROTECTION TYPE : Shut down O/P voltage,re-power on to recover
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 154 VDC O/P: FULL LOAD Ta:25°C	NO DAMAGE PROTECTION TYPE : Normally works within 105~150% rated output power for more than 3 seconds and then constant current protection with auto-recovery >150% rated power ,constant current limiting



				with auto-recovery
3	INPUT REVERSE	POWER OK	I/P:154 VDC O/P: NO LOAD Ta:25°C	NO DAMAGE

**COMPONENT STRESS TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	Q 5 Rated : 26 A/ 400 V  Q 6 Rated : 2A/ 400 V	I/P:High-Line +3V =157V DC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	Q5 VDS: (1) 246V (2) 178V (3) 224V  Q6 VDS: (1) 276V (2) 176V (3) 214V
2	Diode Peak Voltage	Q100 Rated :200V  Q101 Rated : 150V	I/P:High-Line +3V =157 V DC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	Q100: (1) 101V (2) 17.6V (3) 40.1V  Q101: (1) 139V (2) 141V (3) 131V
3	Input Capacitor Voltage	C5 Rated: : 120 $\mu$ / 160 V	I/P:High-Line +3V =157 V 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	C5: (1)162V (2) 160V (3) 158V (4)158 V
4	Control IC Voltage Test	PWM IC U1 Rated -0.3V~16V	I/P:High-Line +3V =157 V DC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25°C	U1: (1) 14.2V (2) 14.2V (3) 14.4V (4) 14.2V

**SAFETY TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P:4KVDC/min I/P-FG:2.5KVDC/min O/P-FG:2.5KVDC/min	I/P-O/P: 4.4KVDC/min I/P-FG: 3 KVDC/min O/P-FG:3KVDC/min Ta:25°C	I/P-O/P: 1.2 $\mu$ A I/P-FG: 0 mA O/P-FG: 0 mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M $\Omega$ I/P-FG: 500VDC>100M $\Omega$ O/P-FG:500VDC>100M $\Omega$	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P: 9999M $\Omega$ I/P-FG: 9999 M $\Omega$ O/P-FG:9999 M $\Omega$ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m $\Omega$	40A / 2min Ta:25°C	10m $\Omega$

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RADIATION	<input checked="" type="checkbox"/> EN55032 <input type="checkbox"/> EN55011 <input type="checkbox"/> CLASS A <input type="checkbox"/> CLASS B	I/P: 110 VDC O/P:FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL Test by certified Lab



2	CONDUCTION	<input checked="" type="checkbox"/> EN55032 <input type="checkbox"/> EN55011 <input type="checkbox"/> CLASS A <input type="checkbox"/> CLASS B	I/P: 110 VDC O/P: FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL Test by certified Lab
3	E.S.D	EN61000-4-2 <input type="checkbox"/> Din rail Model : AIR: 8KV / Contact: 6KV	I/P: 110 VDC O/P: FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
4	E.F.T	EN61000-4-4 <input type="checkbox"/> INDUSTRY INPUT: 2KV	I/P: 110 VDC O/P: FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
5	SURGE	IEC61000-4-5 <input type="checkbox"/> INDUSTRY L-N :1KV L,N-FG:2KV	I/P: 110VDC O/P: FULL LOAD Ta:25°C	<input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B
6	Test by certified Lab & Test Report Prepare			

## RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																												
1	TEMPERATURE RISE TEST	MODEL : DDR-120D-48 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 110VDC O/P : FULL LOAD Ta= 23.1 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 110VDC O/P : FULL LOAD Ta= 50.8 °C																																																																																														
				<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 23.1 °C</th> <th>HIGH AMBIENT Ta= 50.8 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>LF1</td><td>47.2°C</td><td>77.6°C</td></tr> <tr><td>2</td><td>LF2</td><td>41.6°C</td><td>72.6°C</td></tr> <tr><td>3</td><td>LF100</td><td>45.9°C</td><td>75.2°C</td></tr> <tr><td>4</td><td>T1</td><td>62.3°C</td><td>91.8°C</td></tr> <tr><td>5</td><td>T2</td><td>48.6°C</td><td>78.2°C</td></tr> <tr><td>6</td><td>Q1</td><td>45.9°C</td><td>76.5°C</td></tr> <tr><td>7</td><td>Q2</td><td>46.6°C</td><td>76.9°C</td></tr> <tr><td>8</td><td>Q5</td><td>51.7°C</td><td>82.1°C</td></tr> <tr><td>9</td><td>Q6</td><td>45.7°C</td><td>76.4°C</td></tr> <tr><td>10</td><td>Q100</td><td>55.5°C</td><td>84.7°C</td></tr> <tr><td>11</td><td>Q101</td><td>58.6°C</td><td>87.7°C</td></tr> <tr><td>12</td><td>L100</td><td>71.6°C</td><td>101.6°C</td></tr> <tr><td>13</td><td>C1</td><td>48.3°C</td><td>78.6°C</td></tr> <tr><td>14</td><td>C5</td><td>44.6°C</td><td>75.4°C</td></tr> <tr><td>15</td><td>C6</td><td>42.9°C</td><td>72.6°C</td></tr> <tr><td>16</td><td>C7</td><td>45.3°C</td><td>75.4°C</td></tr> <tr><td>17</td><td>C8</td><td>53.8°C</td><td>83.5°C</td></tr> <tr><td>18</td><td>C101</td><td>50.4°C</td><td>79.7°C</td></tr> <tr><td>19</td><td>C102</td><td>43.3°C</td><td>71.9°C</td></tr> <tr><td>20</td><td>C104</td><td>50.1°C</td><td>79.5°C</td></tr> <tr><td>21</td><td>C106</td><td>55.4°C</td><td>85.5°C</td></tr> <tr><td>22</td><td>ZNR1</td><td>41.3°C</td><td>71.5°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 23.1 °C	HIGH AMBIENT Ta= 50.8 °C	1	LF1	47.2°C	77.6°C	2	LF2	41.6°C	72.6°C	3	LF100	45.9°C	75.2°C	4	T1	62.3°C	91.8°C	5	T2	48.6°C	78.2°C	6	Q1	45.9°C	76.5°C	7	Q2	46.6°C	76.9°C	8	Q5	51.7°C	82.1°C	9	Q6	45.7°C	76.4°C	10	Q100	55.5°C	84.7°C	11	Q101	58.6°C	87.7°C	12	L100	71.6°C	101.6°C	13	C1	48.3°C	78.6°C	14	C5	44.6°C	75.4°C	15	C6	42.9°C	72.6°C	16	C7	45.3°C	75.4°C	17	C8	53.8°C	83.5°C	18	C101	50.4°C	79.7°C	19	C102	43.3°C	71.9°C	20	C104	50.1°C	79.5°C	21	C106	55.4°C	85.5°C	22	ZNR1	41.3°C	71.5°C
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 110 VDC O/P : 120 % LOAD Ta : 25°C	TEST : OK																																																																																												



# 120W DC-DC DIN Rail Power Supply

# DDR-120D series

3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 86.4 VDC/ 154 VDC 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 55 °C NO DAMAGE	I/P : 157 VDC O/P : FULL LOAD Ta= 55 °C HUMIDITY= 95 %R.H	TEST : OK												
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~55°C)	I/P : 110 VDC O/P : FULL LOAD	± 0.009 %(0~55°C)												
6	STORAGE TEMPERATURE TEST	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		TEST : OK												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +60°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 : 110VDC/Full Load DC ON/OFF TEST turn on 3sec : turn off 1sec@15cycle\ 110VDC/Full Load DC ON@1cycle		TEST : OK												
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C 2 Din Rail <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Displacement</th> <th>Acceleration</th> </tr> </thead> <tbody> <tr> <td>2 ( +3/-0 ) Hz up to 15Hz</td> <td>± 2.5mm</td> <td>-----</td> </tr> <tr> <td>15Hz up to 50Hz</td> <td>-----</td> <td>2.3g</td> </tr> <tr> <td>Sweep rate</td> <td colspan="2">Max 1 Octave/minute</td> </tr> </tbody> </table>			Displacement	Acceleration	2 ( +3/-0 ) Hz up to 15Hz	± 2.5mm	-----	15Hz up to 50Hz	-----	2.3g	Sweep rate	Max 1 Octave/minute		TEST : OK
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15Hz up to 50Hz	-----	2.3g														
Sweep rate	Max 1 Octave/minute															
9	CAPACITOR LIFE CYCLE	SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 110VDC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 110VDC O/P : FULL LOAD Ta= 60 °C LIFE TIME (3) I/P : 110VDC O/P : 75% LOAD Ta= 60 °C LIFE TIME (4) I/P : 110VDC O/P : 50% LOAD Ta= 60 °C LIFE TIME		(1) 598693.2 HRS (2) 70283.9 HRS (3) 98741.2 HRS (4) 127646.1 HRS												
10	MTBF	Conducted by Parts Stress Analysis Prediction 1769.5K hrs min. Telcordia SR-332 (Bellcore) ; 214.5K hrs min. MIL-HDBK-217F (25°C)														
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 55°C														

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		WANGDZ

**12.10.30 A50-F031**