



TEST REPORT: ENP-240-12

240W Desktop Single Output Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

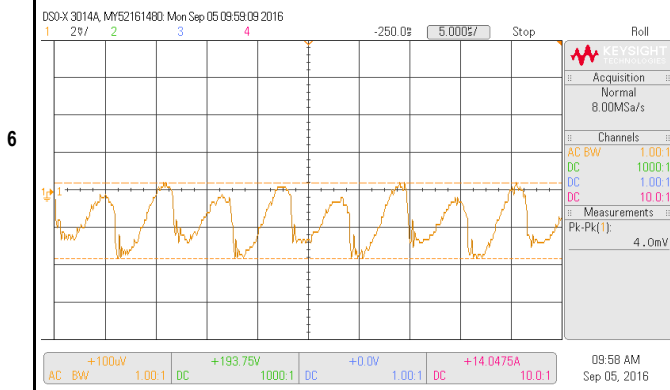
■ RELIABILITY TEST

ENVIRONMENT TEST

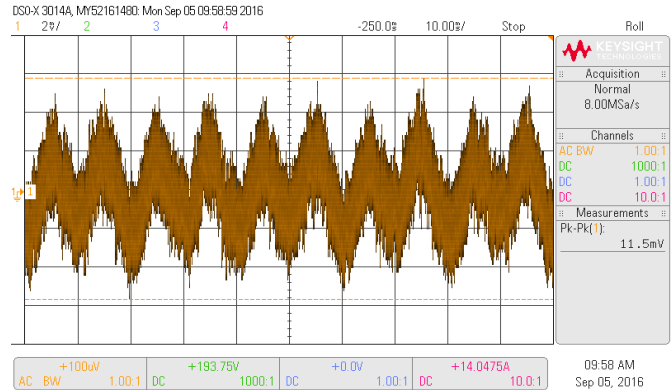
DESIGN VERIFY TEST OUTPUT FUNCTION

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 11.50V ~ 15.00V	I/P : 230VAC O/P: MIN LOAD TA : 25°C	CH1: 11.11V ~ 15.46V
2	OUTPUT VOLTAGE TOLERANCE (Max)	V1 : 1.0% ~ -1.0%	I/P : 100VAC / 264VAC O/P: FULL / MINLOAD TA= 25°C	V1: 0.22% ~ 0.43%
3	LINE REGULATION (MAX.)	V1 : 0.5% ~ -0.5%	I/P : 100VAC / 264VAC O/P: FULL LOAD TA : 25°C	V1: 0.00% ~ 0.00%
4	LOAD REGULATION (MAX.)	V1 : 2.0% ~ -2.0%	I/P : 230VAC O/P: MIN LOAD ~ FULL LOAD TA : 25°C	V1: 0.29% ~ -0.36%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	TEST< 5.0 %
	RIPPLE & NOISE(Max)	V1 : 150 mVp-p	I/P : 230VAC O/P: FULL LOAD TA : 25°C	V1 : 11.5 mVp-p

high frequency :

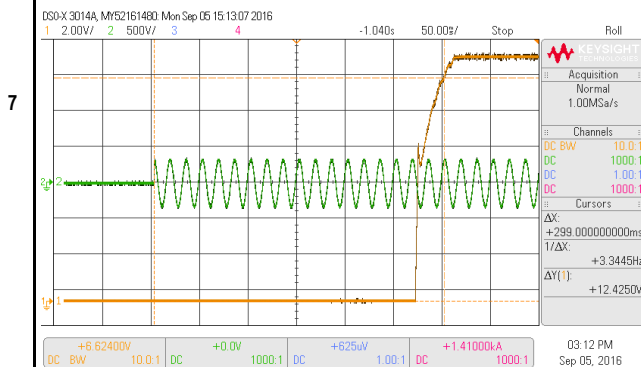


low frequency :



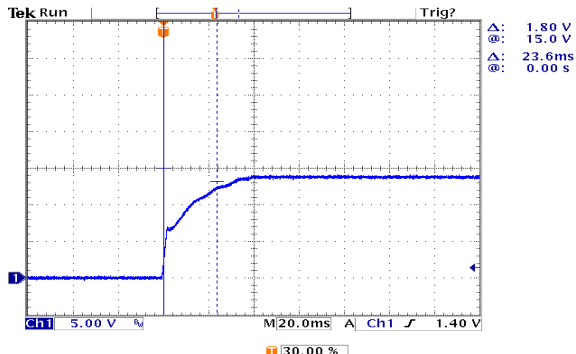
SET UP TIME (MAX.)	230VAC : 1000ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 299ms
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INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



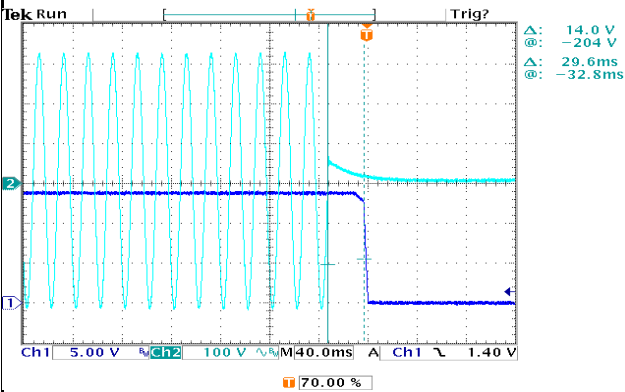
RISE TIME (MAX.)	230VAC : 100ms	I/P : 230VAC O/P: FULL LOAD TA : 25°C	230VAC : 23.6ms
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INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage



HOLD UP TIME (TYP.)	230VAC : 20ms	I/P : 230VAC O/P : FULL LOAD TA : 25°C	230VAC : 29.6ms
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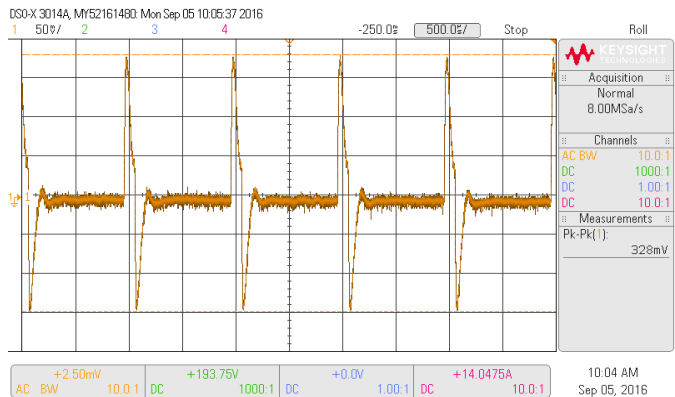
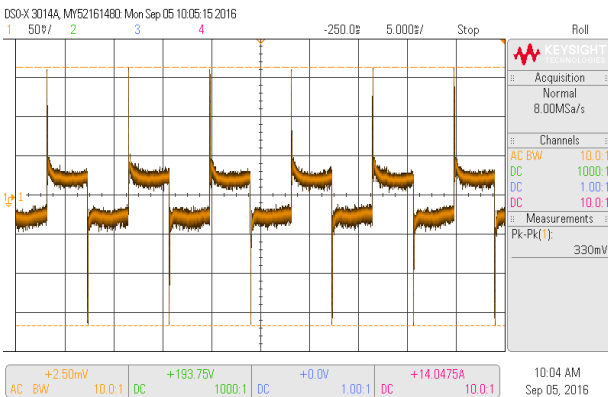
INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



DYNAMIC LOAD	V1 : 1380 mVp-p	I/P : 230VAC O/P : (1)Full/Min load 50%duty/120HZ (2)Full/Min load 50%duty/1KHZ TA : 25°C	V1: (1). 330mv (2). 328mv	unit:mVp-p
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FULL /MIN LOAD 50%DUTY / 120HZ

FULL /MIN% LOAD 50%DUTY / 1KHZ



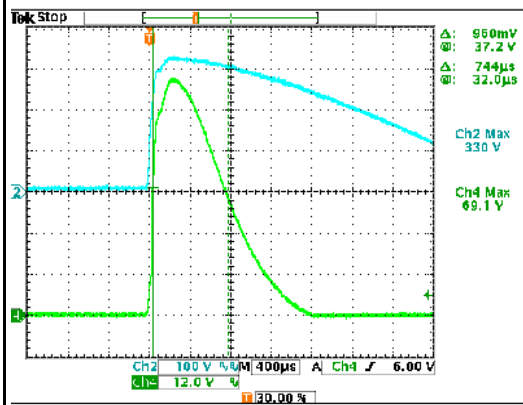
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC ~ 264VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C	77.0VAC ~ 264VAC
			I/P : LOW-LINE = 97VAC HIGH-LINE = 300VAC	TEST : OK

			O/P : FULL/MIN LOAD ON:30 Sec ; OFF:30 Sec 10MIN (POWER ON/OFF NO DAMAGE)																																		
2	INPUT FREQUENCY RANGE	47HZ ~ 63HZ NO DAMAGE	I/P : 100VAC ~ 264VAC O/P : FULL-MIN LOAD Ta : 25°C	TEST : OK																																	
3	INPUT CURRENT (TYP.)	1.25 / 230VAC 2.5 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	I= 1.14 / 230VAC I= 2.3 / 115VAC																																	
4	LEAKAGE CURRENT	< 3.50mA	I/P : 240VAC O/P: MIN LOAD TA : 25°C	L-FG: 0.5 mA N-FG: 0.5 mA																																	
5	NO LOAD POWER CONSUMPTION	< 0.15W	I/P : 230VAC O/P: MIN LOAD TA : 25°C	< 0.13 W																																	
	POWER FACTOR (TYP.)	0.95 / 230VAC 0.98 / 115VAC	I/P : 230VAC I/P : 115VAC O/P: FULL LOAD TA : 25°C	PF= 0.972 / 230VAC PF= 0.992 / 115VAC																																	
6	<table border="1"> <caption>Power Factor (PF) vs Load</caption> <thead> <tr> <th>LOAD</th> <th>115VAC</th> <th>230VAC</th> </tr> </thead> <tbody> <tr><td>50%</td><td>0.985</td><td>0.935</td></tr> <tr><td>60%</td><td>0.987</td><td>0.948</td></tr> <tr><td>70%</td><td>0.988</td><td>0.958</td></tr> <tr><td>80%</td><td>0.989</td><td>0.962</td></tr> <tr><td>90%</td><td>0.990</td><td>0.965</td></tr> <tr><td>100%</td><td>0.990</td><td>0.968</td></tr> </tbody> </table>				LOAD	115VAC	230VAC	50%	0.985	0.935	60%	0.987	0.948	70%	0.988	0.958	80%	0.989	0.962	90%	0.990	0.965	100%	0.990	0.968												
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	EFFICIENCY (TYP.)	91.0%	I/P : 230VAC O/P: FULL LOAD TA : 25°C	93.4 %																																	
7	<table border="1"> <caption>Efficiency (%) vs Load</caption> <thead> <tr> <th>LOAD</th> <th>115VAC</th> <th>230VAC</th> </tr> </thead> <tbody> <tr><td>10%</td><td>88.0</td><td>90.0</td></tr> <tr><td>20%</td><td>89.8</td><td>91.8</td></tr> <tr><td>30%</td><td>91.2</td><td>93.2</td></tr> <tr><td>40%</td><td>91.8</td><td>93.8</td></tr> <tr><td>50%</td><td>92.0</td><td>94.0</td></tr> <tr><td>60%</td><td>92.0</td><td>93.8</td></tr> <tr><td>70%</td><td>91.8</td><td>93.8</td></tr> <tr><td>80%</td><td>91.5</td><td>93.8</td></tr> <tr><td>90%</td><td>91.5</td><td>93.8</td></tr> <tr><td>100%</td><td>91.5</td><td>93.5</td></tr> </tbody> </table>				LOAD	115VAC	230VAC	10%	88.0	90.0	20%	89.8	91.8	30%	91.2	93.2	40%	91.8	93.8	50%	92.0	94.0	60%	92.0	93.8	70%	91.8	93.8	80%	91.5	93.8	90%	91.5	93.8	100%	91.5	93.5
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100%	91.5	93.5																																			
	INRUSH CURRENT (TYP.)	75A / 230VAC	I/P : 230VAC O/P: FULL LOAD TA : 25°C	I= 69.1A / 230VAC T50= 744.0us / 230VAC																																	

INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Input current (1V=2A) CH2 : AC Input Voltage



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	1 110% ~ 125%	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING	114.05% 264VAC 114.06% 230VAC 114.03% 100VAC Normally works within 110 ~ 125% rated output power for more than 3 seconds and switches to constant current limiting, with auto-recovery after the peak load condition is removed
		2 > 125%	TA : 25°C	131.03% 264VAC 131.03% 230VAC 131.03% 100VAC Constant current limiting, if >125% rated power, with auto-recovery after the overload condition is removed
2	OVER VOLTAGE PROTECTION	15.50V ~ 18.20V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD TA : 25°C	16.60V 264VAC 16.65V 230VAC 16.57V 90VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	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 Shut down O/P voltage, recovers automatically after temperature goes down
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE Constant current limiting, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Power Transistor	Q902 Rated : 600V 16.0A	I/P : 267VAC I/P : 97VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load Ta : 25°C	VIN: 267VAC 97VAC VDS: VDS: (1). 458.00V 446.00V (2). 446.00V 438.00V (3). 426.00V 434.00V (4). 438.00V 438.00V (5). 438.00V 442.00V (6). 442.00V 442.00V (7). 450.00V 442.00V
		Q100 Rated : 60V 120.0A	I/P : 267VAC VDS : O/P : (1)Full Load Turn on (2) Output Short	Q100 Q101 VDS : VDS : (1). 35.70V 40.90V (2). 19.60V 18.00V

2	O/P Diode (MOSFET)	Q101	Rated : 60V 120.0A	(3)Full load continue (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load (8) NO LOAD Ta : 25°C	(3). 34.10V 38.90V (4). 36.10V 41.70V (5). 36.10V 41.70V (6). 35.30V 40.90V (7). 32.90V 36.90V (8). 32.10V 37.30V
3	Input Capacitor	C5	Rated : 180uf 420V	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1). 413.00V (2). 405.00V (3). 421.00V
4	Control IC	U1 U901	Rated : 28V (max) 10V (min) Rated : 20V (max) 10V (min)	I/P : 267VAC O/P : (1)Full Load Turn on /Off (2)Output Short Change (4)O.V.P (5)Low Line No Load Vo(min) Ta : 25°C	U1 U901 (1). 17.60V 17.00V (2). 17.60V 18.60V (3). 17.60V 17.20V (4). 16.80V 16.40V (5). 12.00V 14.40V
5	PFC Power Transistor	Q1	Rated : 600V 20.0A	I/P : 267VAC I/P : 97VAC VDS : O/P : (1)Full Load Turn on (2) Output Short (3)Full load continu PASS (4)Dynamic Load Full/Min Load 90%Duty/1KHz (5)Dynamic Load Full/Min Load 90%Duty/5KHz (6)Dynamic Load Full/Min Load 50%Duty/120Hz (7)0%→400% Load Ta : 25°C	VIN: 267VAC 97VAC VDS: VDS: (1). 507.00V 487.00V (2). 499.00V 455.00V (3). 463.00V 487.00V (4). 519.00V 487.00V (5). 515.00V 487.00V (6). 515.00V 467.00V (7). 491.00V 483.00V
6	PFC Diode	D1	Rated : 600V 15.0A	I/P : 267VAC I/P : 97VAC O/P : (1)Full Load Turn on (2) Output Short (3)Dynamic Load Full/Min Load 90%Duty/5KHz (4)Dynamic Load Full/Min Load 50%Duty/120Hz Ta : 25°C	267VAC 97VAC (1). 507.00V 507.00V (2). 503.00V 507.00V (3). 451.00V 503.00V (4). 495.00V 471.00V

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.000KVAC /min I/P-FG : 2.000KVAC /min O/P-FG : 0.500KVAC /min	I/P-O/P: 3.600KVAC /min I/P-FG: 2.400KVAC /min O/P-FG: 0.600KVAC /min Ta : 25°C	I/P-O/P: 9.28mA I/P-FG: 5.31mA O/P-FG: 5.77mA 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: 500VDC I/P-FG: 500VDC O/P-FG: 500VDC Ta : 25°C/70%RH	I/P-O/P: 11.8GΩ I/P-FG: 4.7GΩ O/P-FG: 30.0GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C/70%RH	26.0mΩ

E.M.C. TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	PASS
2	CONDUCTION	EN55022 CLASS B	I/P : 230VAC /50HZ O/P : FULL LOAD / 50% LOAD Ta : 25°C	PASS Test by certified Lab
		EN55022	I/P : 230VAC /50HZ	PASS

3	RADIATION	CLASS B	O/P : FULL LOAD Ta : 25°C	Test by certified Lab
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT : 1KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N:1KV ; L/N-PE:2KV	I/P : 230VAC /50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A

RELIABILITY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																								
1	TEMPERATURE RISE TEST	MODEL : ENP-240-24																																																																																										
		1. ROOM AMBIENT BURN-IN : 1.0hrs IP: 230VAC O/P: 100% LOAD TA= 25.0°C																																																																																										
		2. HIGH AMBIENT BURN-IN : 1.5hrs IP: 230VAC O/P: 100% LOAD TA= 50.0°C																																																																																										
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230VAC O/P : 112.0% LOAD Ta : 25°C	TEST : OK																																																																																								
3	LOW TEMPERATURE TURN ON TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 264VAC / 100VAC O/P : FULL LOAD Ta : -35.0°C	TEST : OK																																																																																								
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50°C NO DAMAGE	I/P : 272VAC O/P : FULL LOAD Ta : 50°C HUMIDITY= 95.0% RH	TEST : OK																																																																																								
5	TEMPERATURE COEFFICIENT	±0.05% /°C (0~50°C)	I/P : 230VAC O/P : FULL LOAD	±0.01% /°C (0~50°C)																																																																																								
	STORAGE	1. Thermal shock Temperature : -45°C ~ +90°C 2. Temperature change rate : 25°C / MIN		TEST : OK																																																																																								



6	STORAGE TEMPERATURE TEST	3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC	
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C ~ 55°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 : 230VAC Full Load AC ON/OFF test turn on 3sec ; turn off 1sec @ 15cycle Full Load burn in@ 1cycle	TEST : OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK
9	CAPACITOR LIFE CYCLE	ENP-240-24 :SUPPOSE C109 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= 50°C LIFE TIME (3) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME (4) I/P : 230VAC O/P : FULL LOAD Ta= 50°C LIFE TIME	(1). 724958 HRS (2). 151371 HRS (3). 242026 HRS (4). 330309 HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1573.4K hrs min. Telcordia SR-332 (Bellcore) ; 170.6K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF /Accelerated Life test	Demonstration Mean Time Between Failure (Expected Life): 30000HRS @ TA 50°C	

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