



# Test Report: NMP1200

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1200W Modular Power  
FULL CASE LOAD

## ■ 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

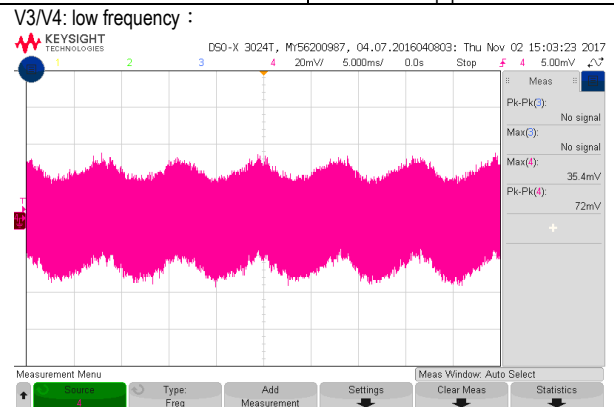
## DESIGN VERIFY TEST

MODEL : NMP-1200-CEHHKK

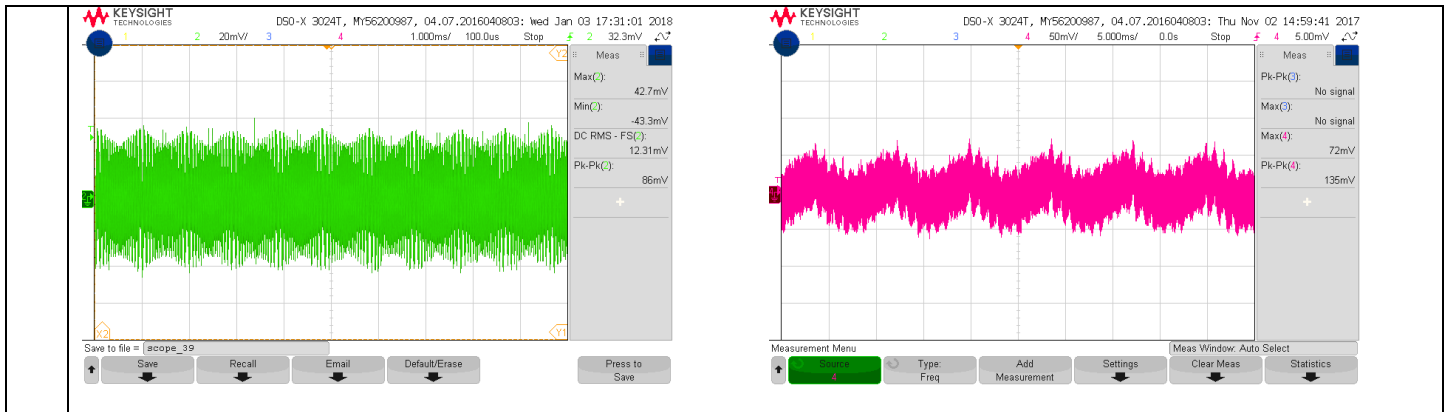
V1:NMS-240-5 ; V2:NMS-240-12 ; V3/V4:NMS-240-24 ; V5/V6:NMS-240-48

### OUTPUT FUNCTION TEST

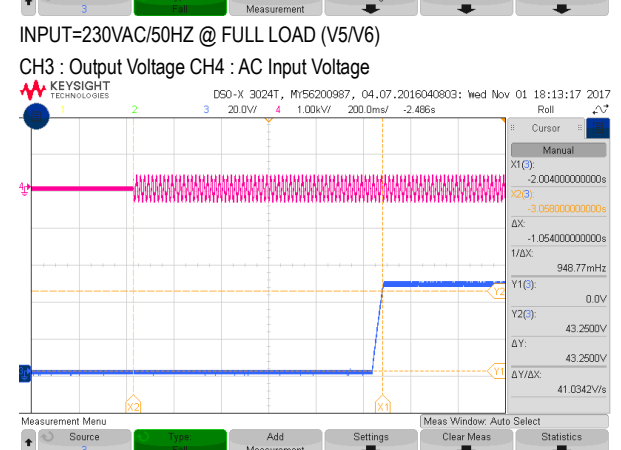
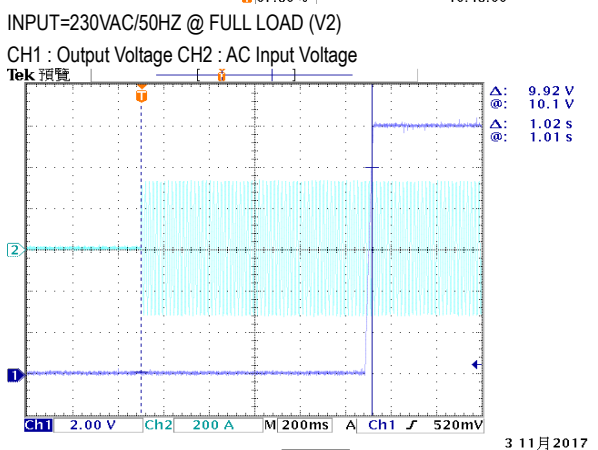
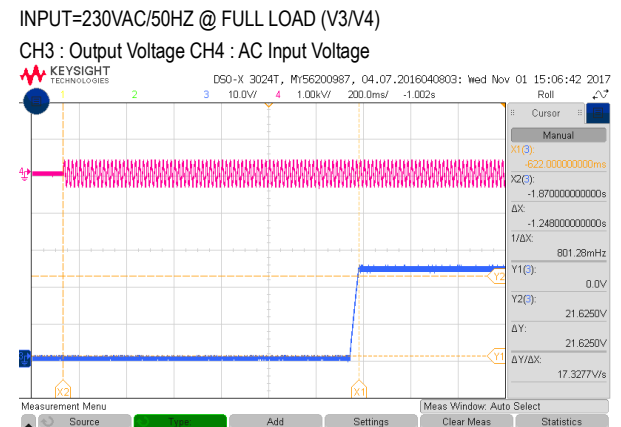
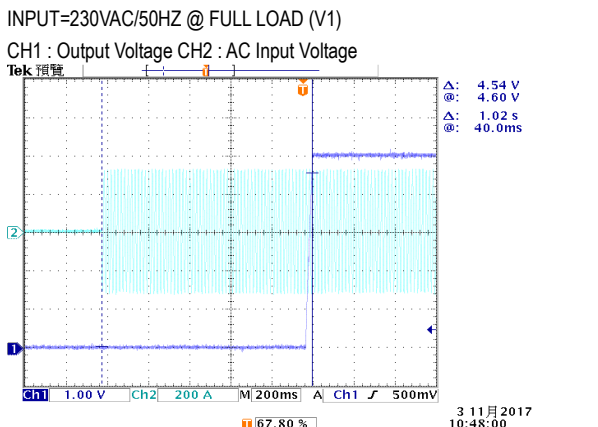
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	V1: 3 V~ 6V V2: 6 V~ 15V V3/V4: 15 V~ 30V V5/V6: 30 V~ 55V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	V1: 2.846V~6.512V/230VAC V2: 5.6V~ 16.3V/230VAC V3/V4: 13.44V~31.16V/230VAC V5/V6: 25.92V~57.36V/230VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: 2 %~ -2% V2: 1 %~ -1% V3/V4: 1 %~ -1% V5/V6: 1 %~ -1%	I/P: 110VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.8%~1% V2: -0.75%~0.75% V3/V4: -0.17%~0.17% V5/V6: -0.17%~0.17%
3	LINE REGULATION (Max)	V1:0.5 %~ -0.5 % V2:0.3 %~ -0.3 % V3/V4:0.2 %~ -0.2 % V5/V6:0.2 %~ -0.2 %	I/P: 110VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~0% V2: 0%~0% V3/V4: 0 %~ 0 % V5/V6:0 %~ 0%
4	LOAD REGULATION(Max)	V1: 1 %~ -1 % V2: 0.5 %~ -0.5 % V3/V4: 0.5 %~ -0.5 % V5/V6: 0.5 %~ -0.5 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1:-0.19 %~0% V2: 0%~ 0% V3/V4: -0.17%~0.17% V5/V6: -0.17%~0.17%
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	<5%
6	RIPPLE & NOISE(Max)	V1: 100 mVp-p V2: 150 mVp-p V3/V4: 150 mVp-p V5/V6: 250 mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1:79 mVp-p V2: 86 mVp-p V3/V4: 72mVp-p V5/V6: 135mVp-p



V5/V6: low frequency :



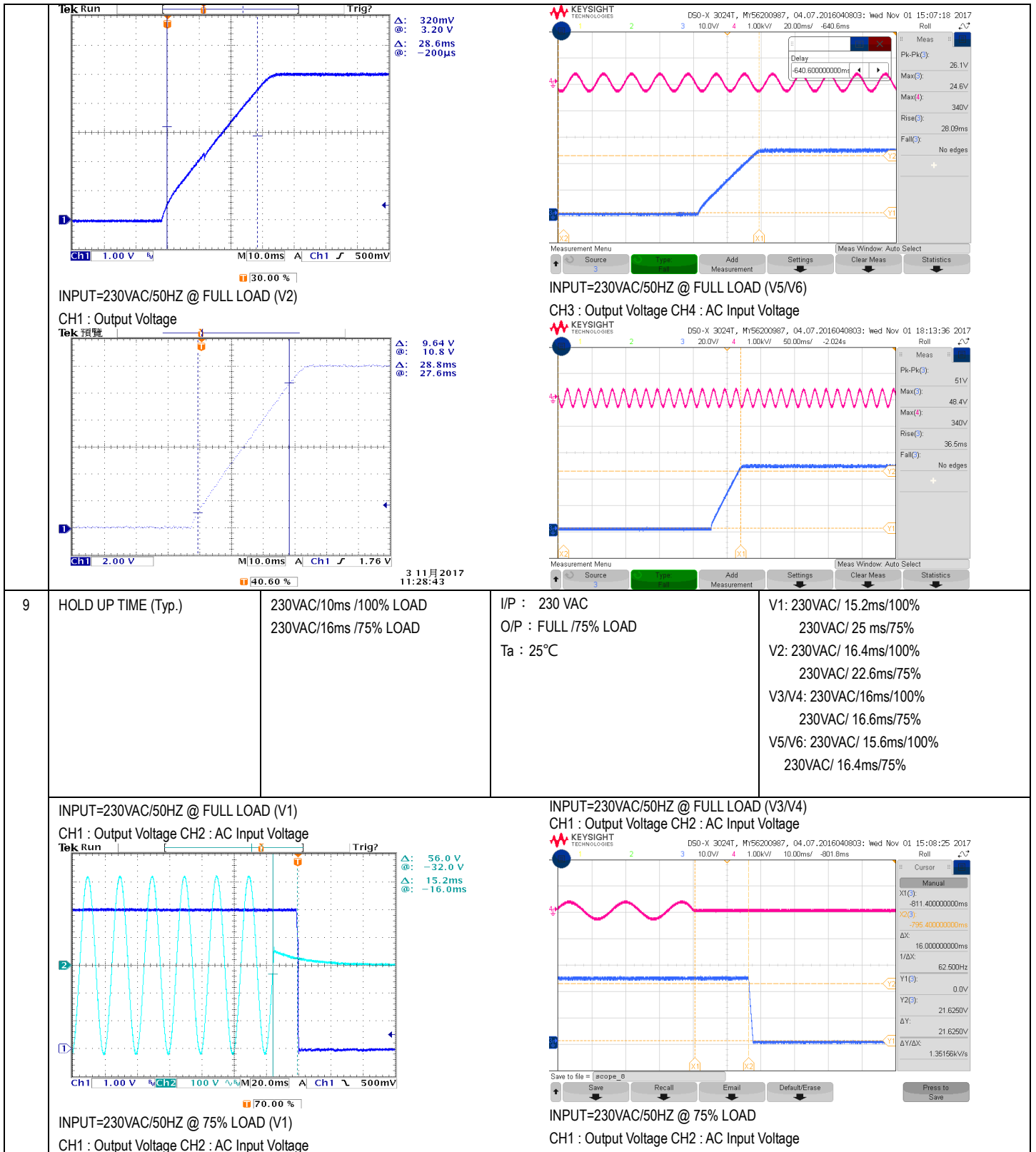
7	SET UP TIME(Max)	230VAC/1500ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	V1:230VAC/1020ms V2:230VAC/1020 ms V3/V4:230VAC/1250ms V5/V6:230VAC/1054ms
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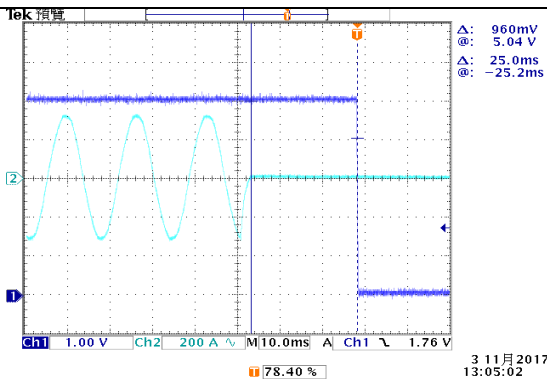


8	RISE TIME (Max)	230VAC/50ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	V1:230VAC/28.6ms V2:230VAC/ 28.8ms V3/V4:230VAC/ 28.09 ms V5/V6:230VAC/36.5ms
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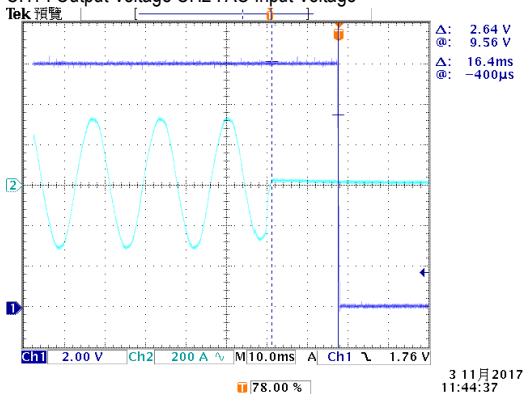
INPUT=230VAC/50HZ @ FULL LOAD (V1)  
CH1 : Output Voltage

INPUT=230VAC/50HZ @ FULL LOAD (V3/V4)  
CH3 : Output Voltage CH4 : AC Input Voltage

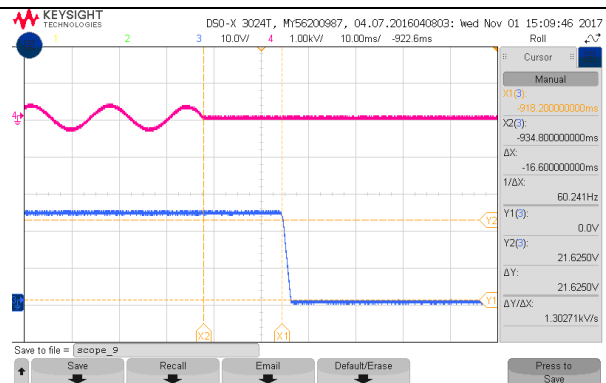
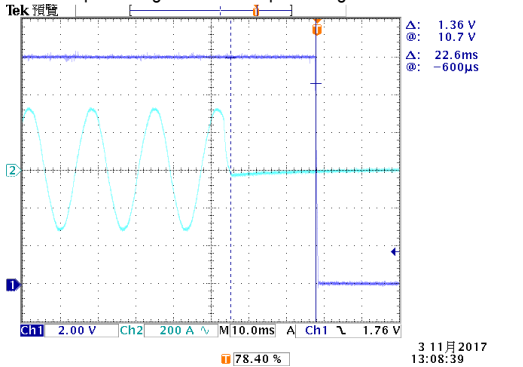




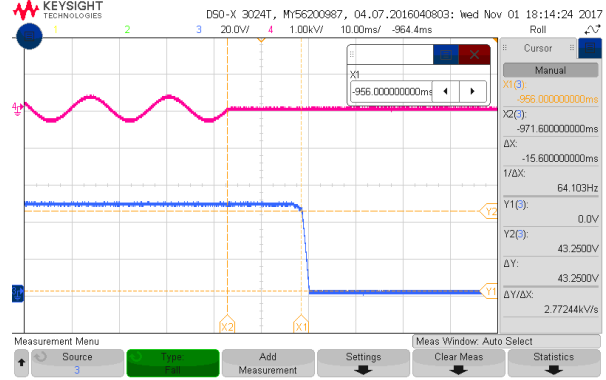
INPUT=230VAC/50HZ @ FULL LOAD (V2)  
CH1 : Output Voltage CH2 : AC Input Voltage



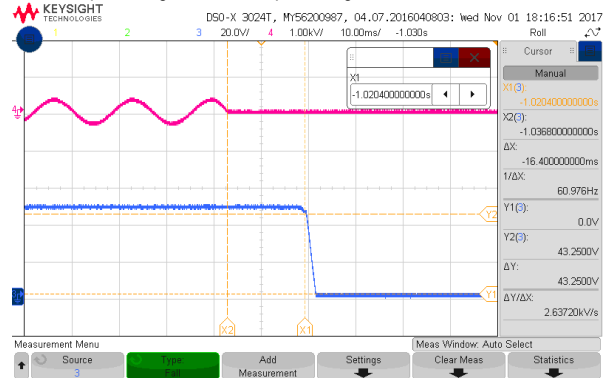
INPUT=230VAC/60HZ @ 75% LOAD (V2)  
CH1 : Output Voltage CH2 : AC Input Voltage



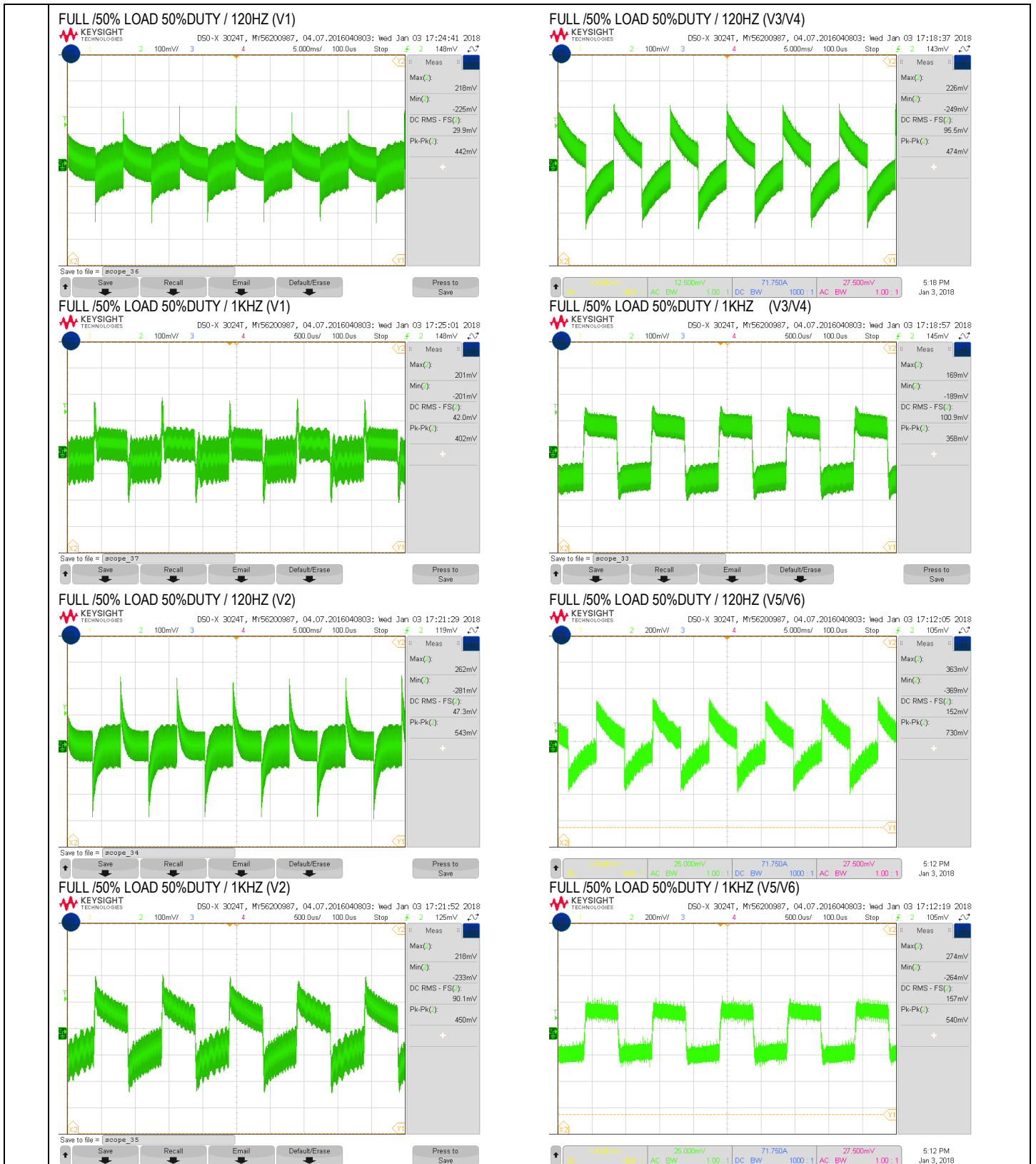
INPUT=230VAC/50HZ @ FULL LOAD (V5/V6)  
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=230VAC/50HZ @ 75% LOAD (V5/V6)  
CH1 : Output Voltage CH2 : AC Input Voltage



10	DYNAMIC LOAD	<p>V1: 1000mVp-p V2: 1200mVp-p V3/V4: 2400mVp-p V5/V6: 4800mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C</p>	<p>V1:442mVp-p 402mVp-p V2:543mVp-p 450mVp-p V3/V4:474mVp-p 368mVp-p V5/V6:730mVp-p 540mVp-p</p>
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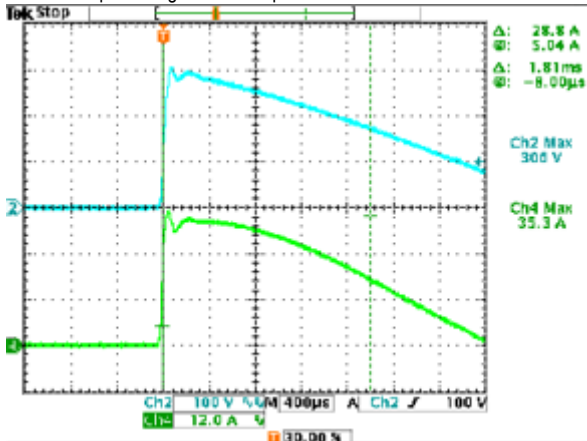


## INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	71V~264V
			I/P: LOW-LINE-3V=107V HIGH-LINE+15%=300 V 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:110 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 6.7 A 115V/ 13.5 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=6.02A/ 230VAC I=12.69A/ 115VAC
4	LEAKAGE CURRENT	< 400 L-FG : uA N-FG : uA	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 298 uA N-FG : 298uA
		< 100 L-V+ : uA L-V- : uA N-V+ : uA N-V- : uA	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-V+ : 8.1 μA L-V- : 8.1 μA N-V+ : 8.1 μA N-V- : 8.1 μA
5	POWER FACTOR (Typ.)	0.95/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF=0.9909/230VAC PF=0.9979/115VAC
6	EFFICIENCY(Typ.)	90.5%, full case load with H module at nominal 24V/48V only 88.5%(Normal work), full case load with each type of module at nominal voltage	I/P:230 VAC O/P:FULL LOAD Ta:25°C	90.65%( 24V only) 90.7%( 48V only) 88.607%( each type)
7	INRUSH CURRENT(Typ.)	230V/40A 115V/25A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=35.3A/ 230VAC I=18.5A/ 115VAC

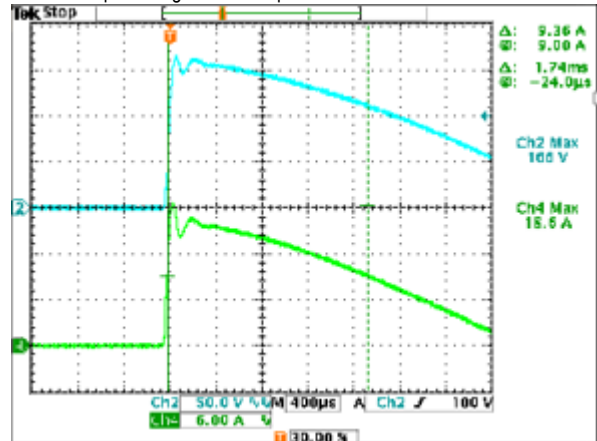
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH1 : Input current



INPUT=115VAC/ 60HZ @ FULL LOAD

CH2 : AC Input Voltage CH1 : Input current



## PROTECTION FUNCTION TEST

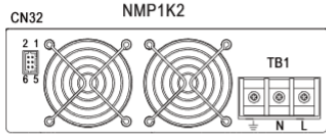
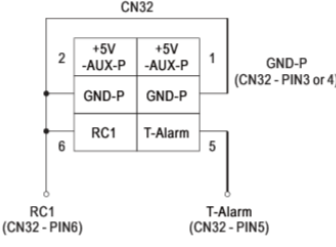
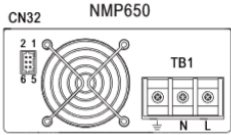
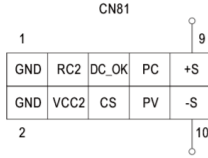
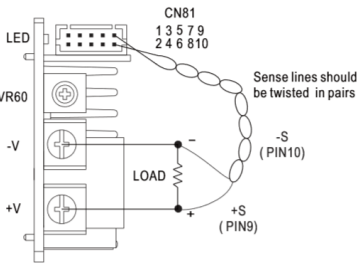
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage, recovers automatically after temperature goes down	I/P: 264VAC I/P: 90VAC O/P: FULL LOAD	O.T.P. Active Protection type : Shut down o/p voltage, recovers automatically after temperature goes down
2	OVER LOAD PROTECTION	105%~ 125 % PROTECTION TYPE : constant current limiting protection	I/P: 230VAC O/P: TESTING Ta:25°C	V1:112.78%/ 230VAC V2:114.5%/ 230VAC V3/V4:116%/ 230VAC V5/V6:113%/ 230VAC PROTECTION TYPE : constant current limiting protection
3	OVER VOLTAGE PROTECTION	V1:6.1V~7.5V V2:15.1V~20V V3/V4:30.1V~37V V5/V6:56V~66V PROTECTION TYPE : Shut down o/p voltage, re-power on to recover	I/P: 230VAC O/P: MIN LOAD Ta:25°C	V1:6.69V/ 230VAC V2:17.59V/ 230VAC V3/V4:33.74V/ 230VAC V5/V6:62.49V/ 230VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover
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:OK PROTECTION TYPE : constant current limiting protection

## CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT						
1	Global or Local ON/OFF CONTROL	Global ON/OFF  <table border="1"> <thead> <tr> <th>Between RC1(CN32-PIN6) and GND-P(CN32-PIN3)</th> <th>Output Status</th> </tr> </thead> <tbody> <tr> <td>SW ON(short)</td> <td>ON</td> </tr> <tr> <td>SW OFF(open)</td> <td>OFF</td> </tr> </tbody> </table>  I/P: 230 VAC O/P: FULL LOAD TEST RESULT : PASS Ta:25°C  Local ON/OFF	Between RC1(CN32-PIN6) and GND-P(CN32-PIN3)	Output Status	SW ON(short)	ON	SW OFF(open)	OFF		
Between RC1(CN32-PIN6) and GND-P(CN32-PIN3)	Output Status									
SW ON(short)	ON									
SW OFF(open)	OFF									



		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Between RC2(CN81-PIN3) and GND(CN81-PIN1 or 2)</th> <th style="text-align: left;">Output Modules Status(NMS-240)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">SW OFF(open)</td> <td style="text-align: center;">ON</td> </tr> <tr> <td style="text-align: center;">SW ON(short)</td> <td style="text-align: center;">OFF</td> </tr> </tbody> </table>   <p>I/P: 230 VAC  O/P: FULL LOAD  Ta: 25°C  TEST RESULT : PASS</p>	Between RC2(CN81-PIN3) and GND(CN81-PIN1 or 2)	Output Modules Status(NMS-240)	SW OFF(open)	ON	SW ON(short)	OFF	
Between RC2(CN81-PIN3) and GND(CN81-PIN1 or 2)	Output Modules Status(NMS-240)								
SW OFF(open)	ON								
SW ON(short)	OFF								
2	Auxiliary Power	<p>+5V-Aux_P :  5V±10% / 1.5A      RIPPLE : 50mVp-p</p> <p>I/P: 230 VAC  O/P: FULL LOAD  Ta: 25°C</p>	4.964V @1.5 A : ripple: 37.4mVp-p						
		<p>Vcc2 :  5V±10%@10mA      ripple:50mVp-p</p>  <p>I/P: 230 VAC  O/P: FULL LOAD  Ta: 25°C</p>	<p>V1: 4.98V / 10mA : ripple: 3.76mVp-p  V2: 4.977V / 10mA : ripple: 3.72 mVp-p  V3/V4: 5.005 V / 10mA : ripple: 25 mVp-p  V5/V6: 4.99V / 10mA : ripple: 27mVp-p</p>						

<p>3</p>	<p>T-ALARM SIGNAL</p>	<p>TTL signal output for over temperature alarm. The maximum sourcing current is 10mA.</p> <table border="1" data-bbox="454 313 1332 414"> <thead> <tr> <th>Between T-Alarm(CN32 PIN 5) and GND-P(CN32 PIN 3 or 4)</th> <th>Internal temperature (U702)</th> <th>Output Status</th> </tr> </thead> <tbody> <tr> <td>0~0.5V</td> <td>The internal temperature is normal.</td> <td>ON</td> </tr> <tr> <td>4.5~5.5V</td> <td>Exceeds the limit of temperature alarm.</td> <td>ON</td> </tr> <tr> <td>4.5~5.5V</td> <td>Exceeds the "safe limit" of temperature alarm.</td> <td>OFF</td> </tr> </tbody> </table> <div style="display: flex; justify-content: space-around; align-items: center;">    </div> <p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C TEST RESULT :</p> <table border="1" data-bbox="454 806 1460 963"> <thead> <tr> <th rowspan="2">P.S.U STATUS</th> <th colspan="2">SPEC</th> <th colspan="2">RESULT</th> </tr> <tr> <th>Vo</th> <th>T-ALARM</th> <th>Vo</th> <th>T-ALARM</th> </tr> </thead> <tbody> <tr> <td>The internal temperature is normal.</td> <td>100%±2%</td> <td>0 ~0.5V</td> <td>100%</td> <td>0V</td> </tr> <tr> <td>Exceeds the limit of temperature alarm.</td> <td>100%±2%</td> <td>4.5~5.5V</td> <td>100%</td> <td>4.89V</td> </tr> <tr> <td>Exceeds the "safe limit" of temperature alarm.</td> <td>0V</td> <td>4.5~5.5V</td> <td>0V</td> <td>4.89V</td> </tr> </tbody> </table>	Between T-Alarm(CN32 PIN 5) and GND-P(CN32 PIN 3 or 4)	Internal temperature (U702)	Output Status	0~0.5V	The internal temperature is normal.	ON	4.5~5.5V	Exceeds the limit of temperature alarm.	ON	4.5~5.5V	Exceeds the "safe limit" of temperature alarm.	OFF	P.S.U STATUS	SPEC		RESULT		Vo	T-ALARM	Vo	T-ALARM	The internal temperature is normal.	100%±2%	0 ~0.5V	100%	0V	Exceeds the limit of temperature alarm.	100%±2%	4.5~5.5V	100%	4.89V	Exceeds the "safe limit" of temperature alarm.	0V	4.5~5.5V	0V	4.89V
Between T-Alarm(CN32 PIN 5) and GND-P(CN32 PIN 3 or 4)	Internal temperature (U702)	Output Status																																				
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P.S.U STATUS	SPEC		RESULT																																			
	Vo	T-ALARM	Vo	T-ALARM																																		
The internal temperature is normal.	100%±2%	0 ~0.5V	100%	0V																																		
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Exceeds the "safe limit" of temperature alarm.	0V	4.5~5.5V	0V	4.89V																																		
<p>4</p>	<p>Remote Sense</p>	<p>Compensate voltage drop on the load wiring up to 0.5V.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C</p>	<p>&gt; 0.5 V</p>																																			

5 DC OK SIGNAL

"DC OK" signal is a TTL level signal. It indicates the output status of the output modules. "High" when module turns on. The maximum sourcing current is 10mA (4.5~5.5V).

Between DC OK(PIN 5) and GND(PIN 1 or 2)	Output Modules Status (NMS-240)
4.5~5.5V	ON
0~0.5V	OFF

I/P: 230 VAC  
O/P: FULL LOAD  
Ta: 25°C  
Test Result :

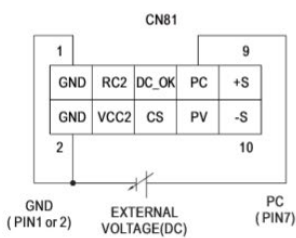
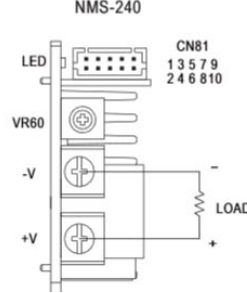
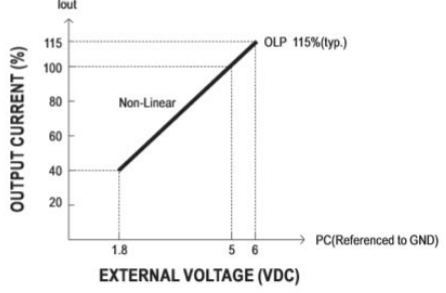
Output Modules Status	DC OK SIGNAL			
	C	E	H	K
TURN OFF	0.19V	0.19V	0.0359V	0.034V
TURN ON	5.38V	5.38V	5.21V	5.195V

6 OUTPUT VOLTAGE PROGRAMMABLE (PV)

※ In addition to the adjustment via the built-in potentiometer, the output voltage (VR60 adjustable voltage) can be trimmed by applying "EXTERNAL VOLTAGE".  
 ※ "Output Voltage Programming (PV)" range is the same to "Voltage ADJ. Range (VR60)"

I/P: 230 VAC  
O/P: FULL LOAD  
Ta: 25°C  
Test Result :

PV	Vo MIN	Vo MAX	
		C: PV=2.5V · E: PV=2V K: PV=2.73V · H: PV=2.5V	PV=5V
SPEC	40%~<80%(±5%)	80%~100%(±10%)	
TEST RESULT	C (Vo=6V)	Vout = 2.38 V	Vout = 6.15V
	E (Vo=15V)	Vout = 5.9 V	Vout = 15.46 V
	H (Vo=30V)	Vout = 13.64 V	Vout = 31 V
	K (Vo=55V)	Vout = 29.91 V	Vout = 56.88 V

<p>7</p> <p>OUTPUT CURRENT PROGRAMMABLE (PC)</p>	<p>※ The constant current level can be trimmed to 40~100% of the rated current by applying "EXTERNAL VOLTAGE".</p> <div style="display: flex; justify-content: space-around;">    </div> <p>I/P: 230 VAC O/P: TESTING Ta: 25°C Test Result :</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>ADJ V</th> <th>1.8V</th> <th>5V</th> <th>6V</th> </tr> </thead> <tbody> <tr> <td>SPEC</td> <td>40%±10%</td> <td>100%±10%</td> <td>115%±10%</td> </tr> <tr> <td rowspan="4">Iout</td> <td>C</td> <td>12.7A</td> <td>39.2A</td> </tr> <tr> <td>E</td> <td>8.07A</td> <td>23.1 A</td> </tr> <tr> <td>H</td> <td>3.9A</td> <td>11.66A</td> </tr> <tr> <td>K</td> <td>1.87 A</td> <td>5.678A</td> </tr> </tbody> </table>	ADJ V	1.8V	5V	6V	SPEC	40%±10%	100%±10%	115%±10%	Iout	C	12.7A	39.2A	E	8.07A	23.1 A	H	3.9A	11.66A	K	1.87 A	5.678A																																			
ADJ V	1.8V	5V	6V																																																						
SPEC	40%±10%	100%±10%	115%±10%																																																						
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	H	3.9A	11.66A																																																						
	K	1.87 A	5.678A																																																						
<p>8</p> <p>CURRENT SHARING</p>	<p>&lt; ±10%</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>I/P : 230 VAC O/P : 90%/50% LOAD Ta : 25°C</p> </div> <div style="width: 45%;"> <table border="0"> <tr> <td>O/P : 90% (5V)</td> <td>O/P : 90% (24V)</td> </tr> <tr> <td>PSU1 : 32.76A</td> <td>PSU1 : 8.7A</td> </tr> <tr> <td>PSU2 : 30.78A</td> <td>PSU2 : 8.6 A</td> </tr> <tr> <td>PSU3 : 31.41A</td> <td>PSU3 : 9.6 A</td> </tr> <tr> <td>PSU4 : 31.5A</td> <td>PSU4 : 8.7 A</td> </tr> <tr> <td>PSU5 : 31.6A</td> <td>PSU5 : 8.7A</td> </tr> <tr> <td>PSU6 : 31.27A</td> <td>PSU6 : 8.8A</td> </tr> <tr> <td>O/P : 50%</td> <td>O/P : 50%</td> </tr> <tr> <td>PSU1 : 18.4A</td> <td>PSU1 : 4.76A</td> </tr> <tr> <td>PSU2 : 18.48A</td> <td>PSU2 : 4.71A</td> </tr> <tr> <td>PSU3 : 19.12A</td> <td>PSU3 : 5.37 A</td> </tr> <tr> <td>PSU4 : 19.22A</td> <td>PSU4 : 4.84 A</td> </tr> <tr> <td>PSU5 : 18.64A</td> <td>PSU5 : 4.78A</td> </tr> <tr> <td>PSU6 : 18.85A</td> <td>PSU6 : 4.87A</td> </tr> <tr> <td>O/P : 90% (12V)</td> <td>O/P : 90% (48V)</td> </tr> <tr> <td>PSU1 : 18.47A</td> <td>PSU1 : 4.5A</td> </tr> <tr> <td>PSU2 : 17.721A</td> <td>PSU2 : 4.488A</td> </tr> <tr> <td>PSU3 : 16.98A</td> <td>PSU3 : 4.48A</td> </tr> <tr> <td>PSU4 : 17.54A</td> <td>PSU4 : 4.46A</td> </tr> <tr> <td>PSU5 : 17.94A</td> <td>PSU5 : 4.47A</td> </tr> <tr> <td>PSU6 : 19.5A</td> <td>PSU6 : 4.88A</td> </tr> <tr> <td>O/P : 50%</td> <td>O/P : 50%</td> </tr> <tr> <td>PSU1 : 10.15A</td> <td>PSU1 : 2.47A</td> </tr> <tr> <td>PSU2 : 9.836A</td> <td>PSU2 : 2.43A</td> </tr> <tr> <td>PSU3 : 9.181A</td> <td>PSU3 : 2.45A</td> </tr> <tr> <td>PSU4 : 9.621A</td> <td>PSU4 : 2.41A</td> </tr> <tr> <td>PSU5 : 9.824A</td> <td>PSU5 : 2.45A</td> </tr> <tr> <td>PSU6 : 10.5A</td> <td>PSU6 : 2.7A</td> </tr> </table> </div> </div>	O/P : 90% (5V)	O/P : 90% (24V)	PSU1 : 32.76A	PSU1 : 8.7A	PSU2 : 30.78A	PSU2 : 8.6 A	PSU3 : 31.41A	PSU3 : 9.6 A	PSU4 : 31.5A	PSU4 : 8.7 A	PSU5 : 31.6A	PSU5 : 8.7A	PSU6 : 31.27A	PSU6 : 8.8A	O/P : 50%	O/P : 50%	PSU1 : 18.4A	PSU1 : 4.76A	PSU2 : 18.48A	PSU2 : 4.71A	PSU3 : 19.12A	PSU3 : 5.37 A	PSU4 : 19.22A	PSU4 : 4.84 A	PSU5 : 18.64A	PSU5 : 4.78A	PSU6 : 18.85A	PSU6 : 4.87A	O/P : 90% (12V)	O/P : 90% (48V)	PSU1 : 18.47A	PSU1 : 4.5A	PSU2 : 17.721A	PSU2 : 4.488A	PSU3 : 16.98A	PSU3 : 4.48A	PSU4 : 17.54A	PSU4 : 4.46A	PSU5 : 17.94A	PSU5 : 4.47A	PSU6 : 19.5A	PSU6 : 4.88A	O/P : 50%	O/P : 50%	PSU1 : 10.15A	PSU1 : 2.47A	PSU2 : 9.836A	PSU2 : 2.43A	PSU3 : 9.181A	PSU3 : 2.45A	PSU4 : 9.621A	PSU4 : 2.41A	PSU5 : 9.824A	PSU5 : 2.45A	PSU6 : 10.5A	PSU6 : 2.7A
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## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor ( D to S) or (C to E) Peak Voltage	Q81 Rated 39.4A/ 600 V VGS:±30	I/P:High-Line +3V =267V AC ON/OFF 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	VDS: (1)392 (2)392 (3)392 (4)392 (5)392 (6)388 (7)392
2	P.F.C Transistor ( D to S) or (C to E) Peak Voltage	Q1 Rated 42A/600V	I/P:High-Line +3V =267 V AC ON/OFF 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	VDS: (1)434V (2)394V (3)438V (4)438V (5)438V (6)422V (7)442V
3	P.F.C DIODE	D6 Rated 10A/600V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	(1) 386V (2) 386V (3) 386V (4) 386V
4	Input Capacitor Voltage	C5 Rated: 220μ/ 400 V 105 °C	I/P:High-Line +3V =267V 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	(1)386V (2)378V (3)390V (4)386V
5	Control IC Voltage Test	PWM IC U701 Rated 1.8V~3.6V PFC IC U850 Rated 11.9V~ 26 V AUX IC U500 Rated, 10.5V~25 V	I/P:High-Line +3V =267 V AC ON/OFF O/P:(1)FULL LOAD (2) Output Short (3)O.L.P (4)NO LOAD.LOW LINE Ta:25°C	U701 U850 U500 (1) 43.36V (1)13.9V (1)13.9V (2) 3.48V (2)13.3V (2)13.9V (3) 3.48V (3)13.7V (3)13.5V (4) 3.53V (4)13.3V (4)13.5V
6	AUX POWER	U500 Vds:800V	I/P:High-Line +3V =267 V AC ON/OFF VDS :	(1) 521V (2) 504V (3) 513V

				O/P: (1)Full Load (2)Output Short (3)NO LOAD		
<b>NMS-240-5 (C)</b>						
1	SR MOS Peak Voltage	Q630 Rated 130A/60V	Q640 Rated 130A/60V	I/P:High-Line +3V =267 V AC ON/OFF 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 Ta:25°C	Q630: VDS: (1)28.8V (2)30.3V (3)29.3V (4)29.5V (5)29.5V (6)29.7V (7)36.5V (8)29.2V	Q640: VDS: (1)29.6V (2)31.2V (3)29.2V (4)29.6V (5)29.6V (6)29.2V (7)31.2V (8)29.6V
2	BUCK MOS Peak Voltage	Q660 Rated 100A/40V	Q662 Rated 300A/30 V	I/P:High-Line +3V =267 V AC ON/OFF 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	Q660: VDS: (1)21.8V (2)28.2V (3)22.6V (4)23.2V (5)22.8V (6)21.8V (7)28V (8)13.6V	Q662: VDS: (1) 24.6V (2) 27V (3) 24.8V (4) 24.6V (5) 25V (6) 24.8V (7) 27V (8) 20.2V
3	Control IC Voltage Test	O/P IC U900 Rated 4.75V~ 15 V		I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2)Output Short (3)O.L.P (4)O.V.P. Ta:25°C	(1) 9.1V (2) 9.42V (3) 9.42V (4) 9.26V	
<b>NMS-240-12 (E)</b>						
1	SR MOS Peak Voltage	Q630 Rated 60A/ 100V	Q640 Rated 60A/ 100V	I/P:High-Line +3V =267 V AC ON/OFF 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	Q630: VDS: (1)59.3V (2)58.9V (3)59.3V (4)59.7V (5)60.1V (6)62.5V (7)62.1V (8)58.5V	Q640: VDS: (1)58.9V (2)57.7V (3)58.1V (4)58.5V (5)58.5V (6)59.3V (7)60.5V (8)57.3V

			(7)0%→400% Load. (8).NO LOAD Ta:25°C		
2	BUCK MOS Peak Voltage	Q660 Rated 100A/ 40V  Q662 Rated 100A/ 40V	I/P:High-Line +3V =267 V AC ON/OFF 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 Ta:25°C	Q660: VDS: (1)34.1V (2)40V (3)34.4V (4)34V (5)34V (6)35.6V (7)36V (8)27.9V	Q662: VDS: (1)36.8V (2)36.8V (3)37.2V (4)36.8V (5)37.6V (6)37.2V (7)38.4V (8)28.8V
3	Control IC Voltage Test	O/P IC U900 Rated VCC:4.75V~ 15V Vin: 6V~ 100V	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. Ta:25°C	VCC: (1) 9.96V (2) 7.87V (3) 7.46V (4) 7.14V	Vin: (1)30.5V (2)34.7V (3)33.7V (4)30.5V

## NMS-240-24 (H)

1	SR MOS Peak Voltage	Q630 Rated 87A/150V  Q640 Rated 87A/150 V	I/P:High-Line +3V =267 V AC ON/OFF 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 (9)BURST MODE Ta:25°C	Q630: VDS: (1)101V (2)101V (3)101V (4)100V (5)100V (6)107V (7)108V (8)105V (9)98V	Q640: VDS: (1)97.4V (2)97.5V (3)99V (4)99V (5)99.8V (6)108.7V (7)105V (8)100.6V (9)99V
2	BUCK MOS Peak Voltage	Q660 Rated 82 A/80 V  Q662 Rated 100A/80V	I/P:High-Line +3V =267 V AC ON/OFF 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.	Q660: VDS: (1)51.9V (2)51.9V (3)50.7V (4)51.9V (5)51.5V (6)51.0V (7)72.5V (8)49.5V (9)47.5V	Q662: VDS: (1)74.5V (2)78.5V (3)73.7V (4)73.7V (5)73.7V (6)73.7V (7)76.1V (8)50.2V (9)75V

			(8).NO LOAD (9)BURST MODE Ta:25°C	
3	Control IC Voltage Test	O/P IC U900 Rated 4.75V~ 15 V	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin LOW LINE Ta:25°C	(1) 10.05V (2) 10.37V (3) 10.29V (4) 8.76V (5) 8.52V
<b>NMS-240-48 (K)</b>				
1	SR MOS Peak Voltage	Q630 Rated 10 A/ 200V  Q640 Rated 10 A/ 200V	I/P:High-Line +3V =267 V AC ON/OFF 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 Ta:25°C	Q630: VDS: (1)150 (2)152 (3)150 (4)150 (5)150 (6)154 (7)148 (8)150  Q640: VDS: (1)152 (2)52 (3)150 (4)150 (5)144 (6)150 (7)148 (8)150
2	BUCK MOS Peak Voltage	Q661Rated 43 A/ 150 V  Q663Rated 71 A/100V	I/P:High-Line +3V =267 V AC ON/OFF 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	Q661: VDS: (1)76.7V (2)75.9V (3)76.7V (4)76.7V (5)76.7V (6)81.5V (7)71.1V (8)79.1V  Q663: VDS: (1)76.7V (2)73.5V (3)75.1V (4)74.3V (5)74.3V (6)77.5V (7)78.3V (8)77.5V
3	Control IC VIN Voltage Test	O/P IC U900 Rated VCC:4.75V~ 15V Vin: 6V~ 100V	I/P:High-Line +3V =267 V AC ON/OFF O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin LOW LINE Ta:25°C	VIN: VCC: (1)77.4V (1)7.82V (2)84.6V (2)7.58V (3)84.6V (3)7.58V (4)78.2V (4)7.82V (5)71.8V (5)7.5V



## SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 4KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min	I/P-O/P: 4.4 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25°C	I/P-O/P: 5.7mA I/P-FG: 3.75mA O/P-FG: 8.17m A 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: 18GΩ I/P-FG: 22GΩ O/P-FG: 3GΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	12 mΩ

## 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	EN55032/ EN55011 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 /EN55011 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 MEDICAL AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	EN61000-4-4 MEDICAL INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	IEC61000-4-5 MEDICAL 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 : NMP-1200-CEHHKK 1. ROOM AMBIENT BURN-IN : 2 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= 50 °C		

NO	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50 °C
1	BD1	49.2°C	84.1°C
2	RY1	48.7°C	75.1°C
3	RTH	47.8°C	73.8°C
4	U1	44.0°C	72.7°C
5	D6	52.6°C	81.2°C
6	Q2	44.2°C	72.3°C
7	C5	35.2°C	64.7°C
8	U870	50.4°C	82.4°C
9	Q81	48.2°C	79.1°C
10	T81	40.4°C	67.4°C
11	T500	45.0°C	71.7°C
12	TSW5	41.1°C	69.9°C
13	LF2	42.8°C	69.8°C
14	LF30	45.9°C	72.6°C
15	D540	37.8°C	66.8°C
16	D501	45.8°C	74.0°C
17	U550	41.7°C	70.7°C
18	(5V)T600	51.4°C	78.3°C
19	(5V)Q630	62.5°C	89.6°C
20	(5V)Q640	65.2°C	96.3°C
21	(5V)Q661	70.8°C	112.0°C
22	(5V)Q663	72.4°C	112.3°C
23	(5V)U900	55.8°C	78.3°C
24	(5V)RT91	59.1°C	81.6°C
25	(5V)L611	48.1°C	78.4°C
26	(5V)L600	44.1°C	67.8°C
27	(5V)U630	57.2°C	84.9°C
28	(12V)T600	50.0°C	77.1°C
29	(12V)Q630	55.4°C	83.7°C
30	(12V)Q640	57.1°C	84.6°C
31	(12V)Q661	73.8°C	100.5°C
32	(12V)Q663	63.7°C	90.0°C
33	(12V)RT91	46.1°C	72.3°C
34	(12V)L611	65.2°C	89.8°C
35	(12V)L600	41.1°C	68.1°C
36	(24V)T600	35.1°C	62.7°C
37	(24V)Q630	39.7°C	66.9°C
38	(24V)RT91	37.7°C	64.8°C
39	(24V)Q663	43.5°C	70.5°C
40	(48V)Q630	44.6°C	72.7°C
41	(48V)Q663	39.9°C	70.5°C
42	(48V)RT91	37.8°C	70.1°C
43	(5V)C678	41.5°C	69.2°C
44	(5V)C650	66.4°C	98.4°C
45	(12V)C650	55.3°C	79.6°C
46	(12V)RG60	39.0°C	68.2°C
47	(12V)U630	50.1°C	78.1°C
48	(24V)L600	37.3°C	64.7°C
49	(24V)Q640	43.9°C	70.7°C
50	(24V)Q661	46.1°C	73.9°C
51	(12V)U900	47.1°C	73.0°C



# 1200W Modular Power

# NMP1200 series

		52	U500	57.8°C	86.9°C
		53	U702	34.2°C	65.1°C
		54	(12V)C678	31.9°C	56.6°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 : 264VAC/100VAC O/P : 100 % LOAD Ta= -35°C/-30°C	TEST : OK
4	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
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C(0~50°C)		I/P : 230 VAC O/P : FULL LOAD	± 0.008 %/°C(0~50°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			OK
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 : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test			OK
8	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°C			TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE NMS-240-5 C678 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 : 75% LOAD Ta= 50°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 50°C LIFE TIME			(1) 253346HRS (2) 44786HRS (3) 339649HRS (4) 618059HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1275.4K hrs min. Telcordia SR-332 (Bellcore) ; 124.5K hrs min. MIL-HDBK-217F (25°C) (NMP1K2)			

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

12.10.30 A50-F03