



Test Report: NMP650

650W 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

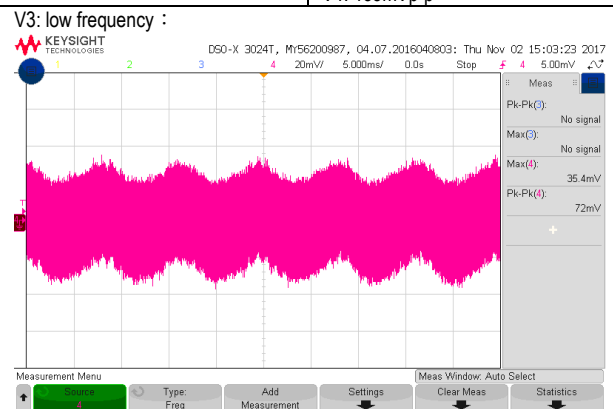
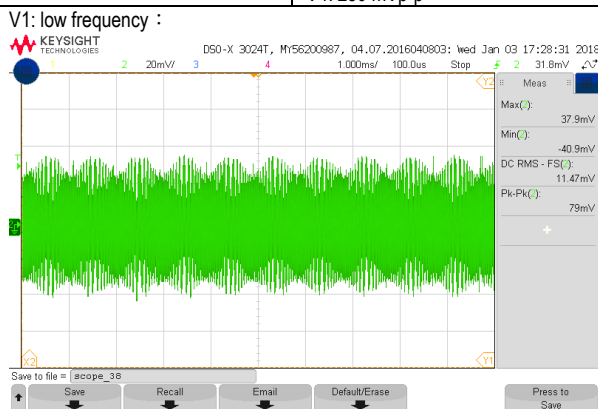
DESIGN VERIFY TEST

MODEL : NMP-650-CEHK

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

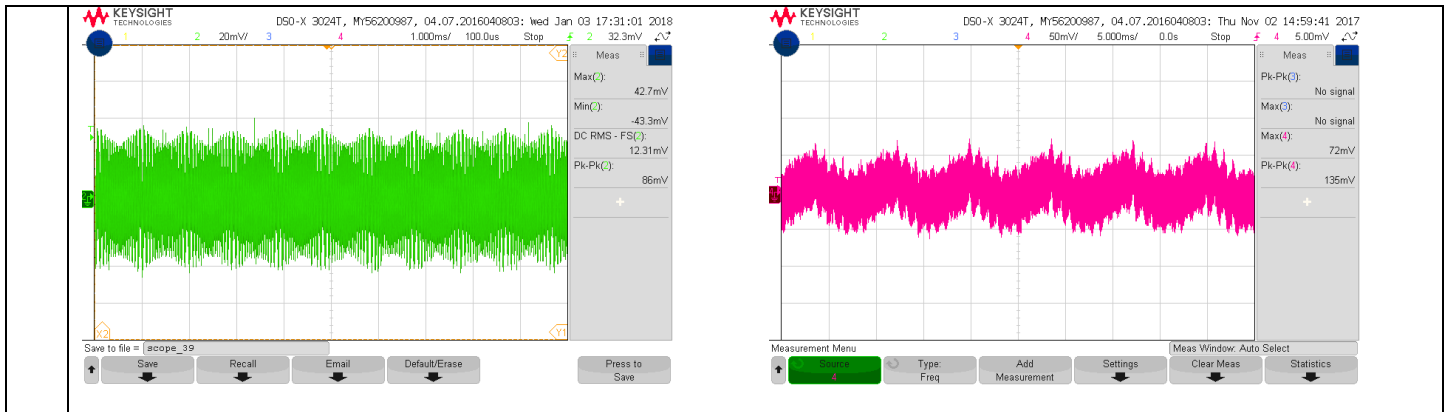
OUTPUT FUNCTION TEST

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

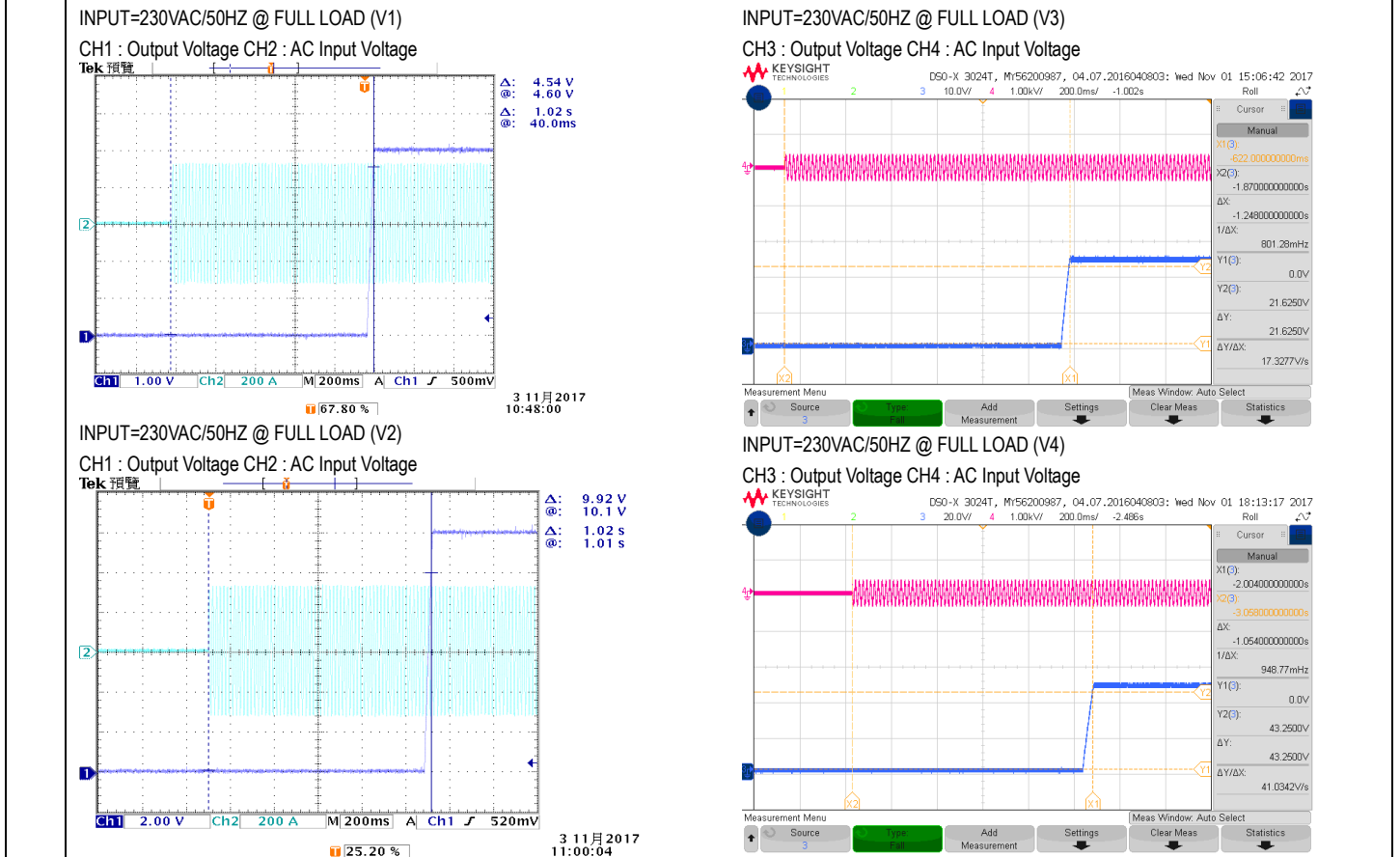


V2: low frequency :

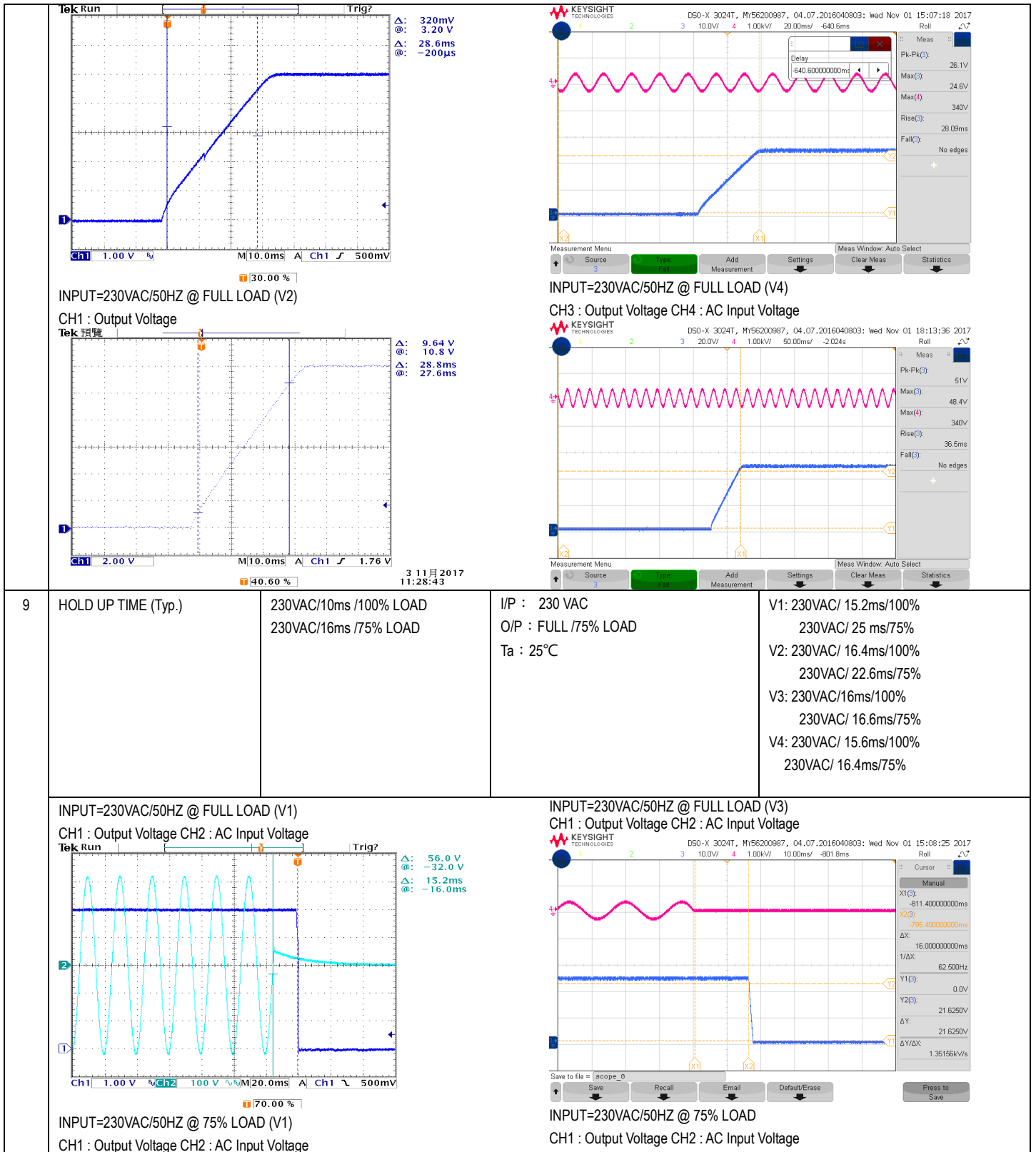
V4: low frequency :

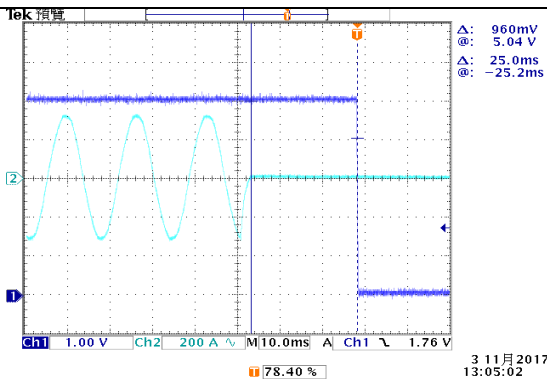


7	SET UP TIME(Max)	230VAC/1500ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	V1:230VAC/1020ms V2:230VAC/1020 ms V3:230VAC/1248ms V4:230VAC/1054ms
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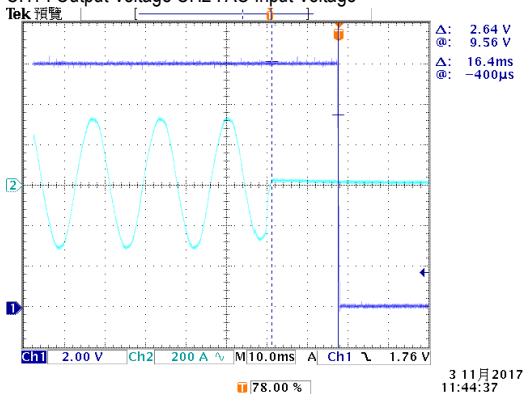


8	RISE TIME (Max)	230VAC/50ms	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	V1:230VAC/28.6ms V2:230VAC/ 28.8ms V3:230VAC/ 28.09 ms V4:230VAC/36.5ms
INPUT=230VAC/50HZ @ FULL LOAD (V1) CH1 : Output Voltage		INPUT=230VAC/50HZ @ FULL LOAD (V3) CH3 : Output Voltage CH4 : AC Input Voltage		

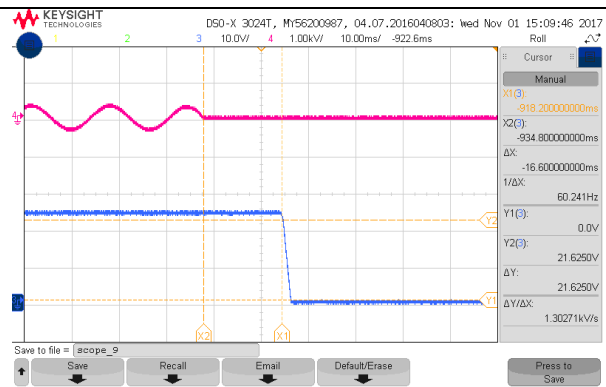
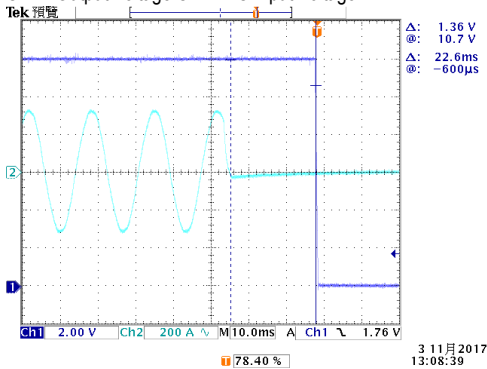




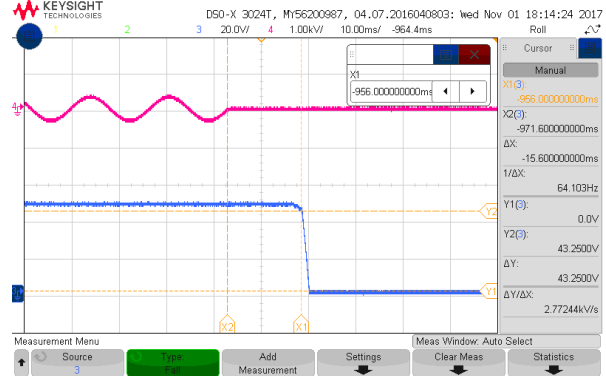
INPUT=230VAC/50HZ @ FULL LOAD (V2)
 CH1 : Output Voltage CH2 : AC Input Voltage



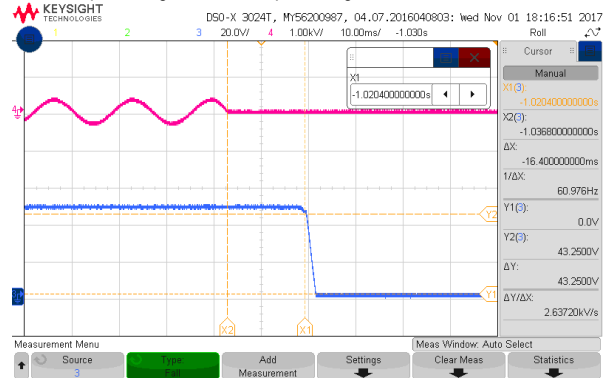
INPUT=230VAC/60HZ @ 75% LOAD (V2)
 CH1 : Output Voltage CH2 : AC Input Voltage



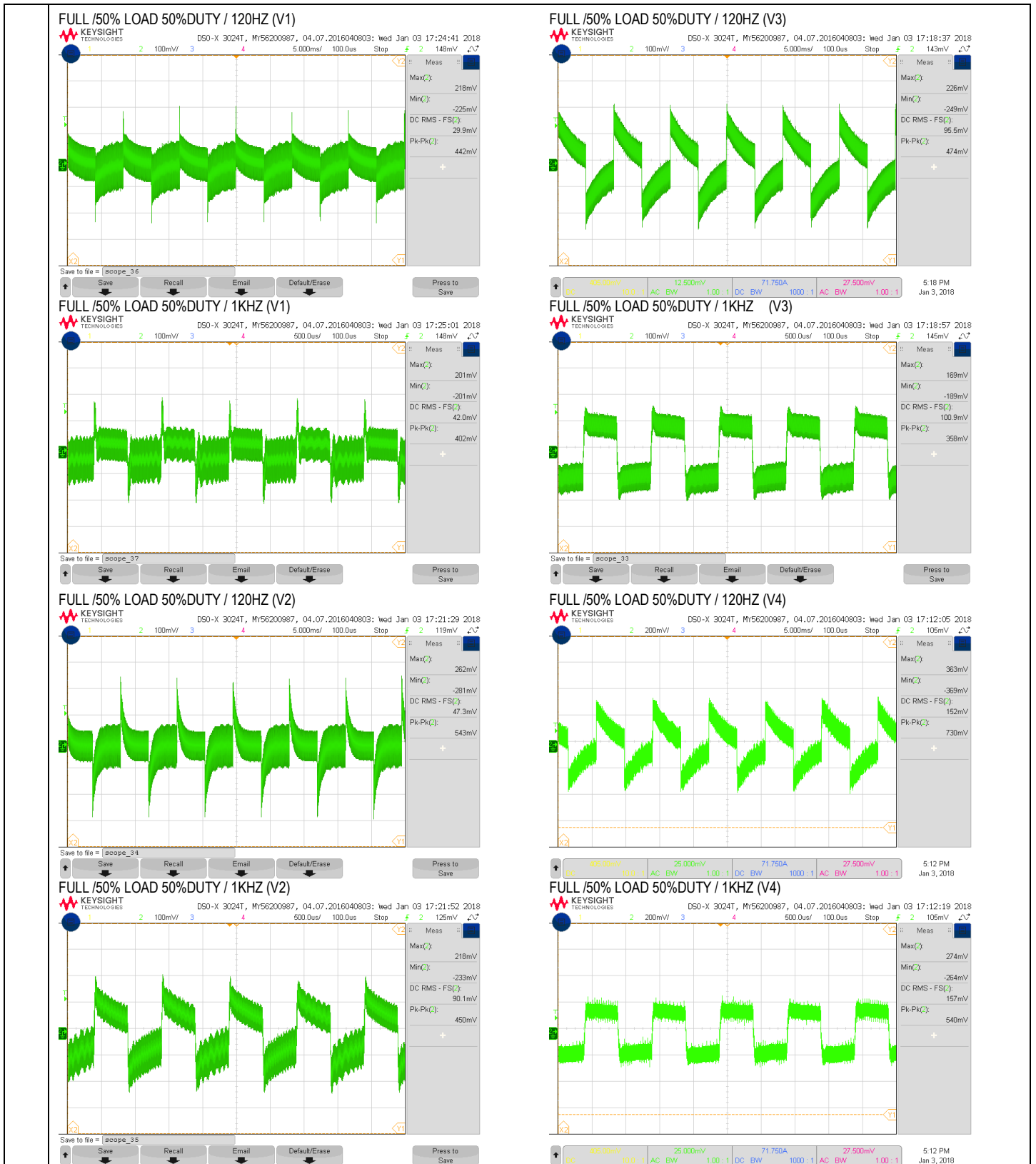
INPUT=230VAC/50HZ @ FULL LOAD (V4)
 CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=230VAC/50HZ @ 75% LOAD (V4)
 CH1 : Output Voltage CH2 : AC Input Voltage



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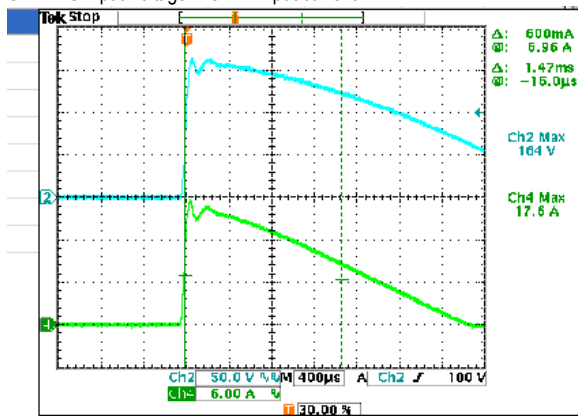


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	65V~264V
			I/P: 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 (POWER ON/OFF NO DAMAGE)	TEST:OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:100 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 3.5 A 115V/ 7.5 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =3.21A/ 230VAC I =6.56A/ 115VAC
4	LEAKAGE CURRENT	< 400 uA/ 264 VAC for earth leakage current	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 347.5 uA N-FG : 347.5uA
		< 100 uA/264 VAC for touch leakage current	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-V+ : 9.0uA L-V-: 9.6uA N-V+ : 7.7uA N-V-: 9.6uA
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=0.988/230VAC PF=0.997/115VAC
6	EFFICIENCY(Typ.)	91%, full case load with H module at nominal 24V/48V only 88.5%, full case load with each type of module at nominal voltage	I/P:230 VAC O/P:FULL LOAD Ta:25°C	91.13% (24v only) 91.22% (48v only) 89.433% (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 =33.6A/ 230VAC I =17.6A/ 115VAC T50= 1470us/230V

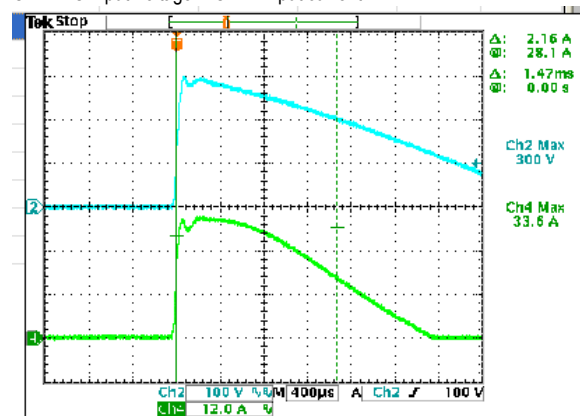
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current



INPUT=115VAC/ 60HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current

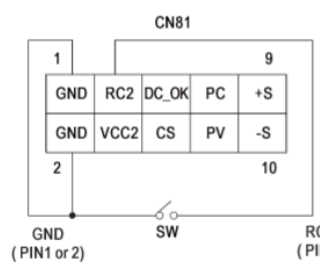
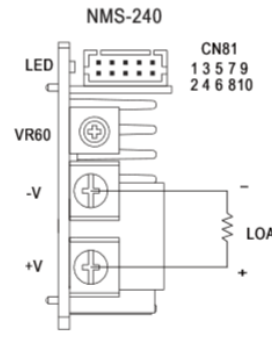
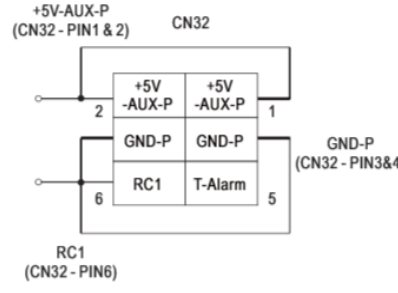
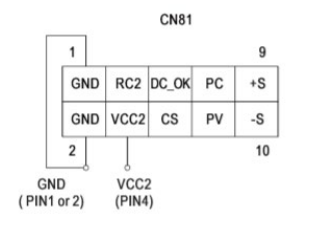
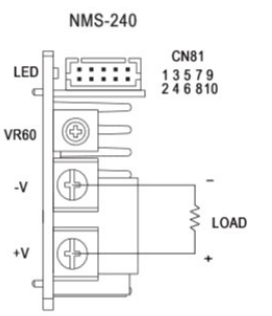


PROTECTION FUNCTION TEST

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 V3:116%/ 230VAC V4:113%/ 230VAC PROTECTION TYPE : constant current limiting protection
3	OVER VOLTAGE PROTECTION	V1:6.1V~7.5V V2:15.1V~20V V3:30.1V~37V V4:56V~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 V3:33.74V/ 230VAC V4:62.49V/ 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>	4.968V @1.5 A : ripple: 26.5mVp-p						
		<p>Vcc2 :</p> <p>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: 5.005 V / 10mA ; ripple: 25 mVp-p V4: 4.99V / 10mA ; ripple: 27mVp-p</p>						

<p>3 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 data-bbox="510 448 1468 694"> </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>0.21V</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>4.9V</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>4.9V</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%	0.21V	Exceeds the limit of temperature alarm.	100%±2%	4.5~5.5V	100%	4.9V	Exceeds the "safe limit" of temperature alarm.	0V	4.5~5.5V	0V	4.9V	
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Exceeds the "safe limit" of temperature alarm.	0V	4.5~5.5V	0V	4.9V																																		
<p>4 Remote Sense</p>	<p>Compensate voltage drop on the load wiring up to 0.5V.</p> <div data-bbox="454 1030 1117 1299"> </div> <p>I/P: 230 VAC O/P: FULL LOAD Ta: 25°C</p>	<p>> 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 :

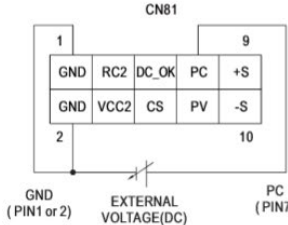
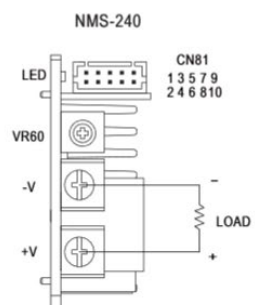
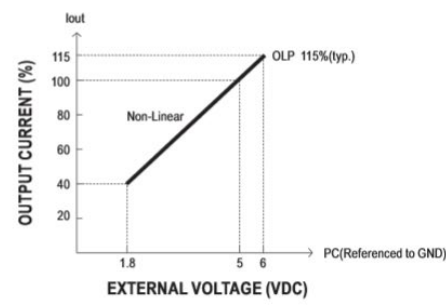
Output Modules Status	DC OK SIGNAL			
	C	E	H	K
TURN OFF	0.19V	0.19V	0.0359V	0.034V
TURN ON	5.38V	5.38V	5.21V	5.195V

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	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

7	<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 colspan="2">ADJ V</th> <th>1.8V</th> <th>5V</th> <th>6V</th> </tr> </thead> <tbody> <tr> <td colspan="2">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>33.5 A</td> <td>39.2A</td> </tr> <tr> <td>E</td> <td>8.07A</td> <td>20.08A</td> <td>23.1 A</td> </tr> <tr> <td>H</td> <td>3.9A</td> <td>10.06 A</td> <td>11.66A</td> </tr> <tr> <td>K</td> <td>1.87 A</td> <td>4.89 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	33.5 A	39.2A	E	8.07A	20.08A	23.1 A	H	3.9A	10.06 A	11.66A	K	1.87 A	4.89 A	5.678A							
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	H	3.9A	10.06 A	11.66A																																
	K	1.87 A	4.89 A	5.678A																																
8	CURRENT SHARING	<p>< ±10%</p>	<p>I/P : 230 VAC O/P : 90%/50% LOAD Ta : 25°C</p>	<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>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>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>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> </table>	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	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	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	O/P : 50%	O/P : 50%	PSU1 : 10.15A	PSU1 : 2.47A	PSU2 : 9.836A	PSU2 : 2.43A	PSU3 : 9.181A	PSU3 : 2.45A
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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	Q81Rated 26A/600 V VGS : ± 25V	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	VDS: (1) 392V (2) 392V (3) 392V (4) 396V (5) 392V (6) 384V (7) 404V

			(7)0%→400% Load. Ta:25°C	
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 22A/600 V VGS :± 25 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. Ta:25°C	VDS: (1) 465V (2) 397V (3) 457V (4) 457V (5) 465V (6) 425V (7) 510V
3	P.F.C DIODE	D6 Rated 650V/6A	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) 402V (2) 394V (3) 407V (4) 398V
4	Input Capacitor Voltage	C5 Rated: 100u/400V Surge voltage 450V	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)395V (2)399V (3)398V (4) 387V
5	Control IC Voltage Test	PWM IC U701 Rated 1.8V~3.6 V PFC IC U850 Rated 11.9V~26 V AUX IC U500 Rated, 10.5V~ 25 V AUX IC U550 Rated, 4.5V~ 23 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	U701: (1) 3.55V (2) 3.59V (3) 3.55V (4) 3.49V (5) 3.33V U500: (1) 16.7V (2) 16.7V (3) 16.7V (4) 13.1V (5) 12.9V U850: (1) 13.25V (2) 13.25V (3) 13.25V (4) 13.25V (5) 13.25V U550: (1)10.6V (2)10.6V (3)10.52V (4)10.52V (5)10.12V
6	AUX POWER	U500 800V	I/P:High-Line +3V =267 V AC ON/OFF VDS : O/P: Full Load AUX: (1)Full Load (2)Output Short (3)NO LOAD	U500: VDG (1)597V (2)589V (3)597V
NMS-240-5 (C)				
1	SR MOS Peak Voltage	Q630 Rated 130A/60V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short	Q630: VDS: (1)28.8V (2)30.3V Q640: VDS: (1)29.6V (2)31.2V

		Q640 Rated 130A/60V	(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	(3)29.3V (4)29.5V (5)29.5V (6)29.7V (7)36.5V (8)29.2V	(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	
NMS-240-12 (E)					
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 (7)0%→400% Load. (8).NO LOAD Ta:25°C	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
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/ (5)34V	Q660: VDS: (1)34.1V (2)40V (3)34.4V (4)34V (5)34V	Q662: VDS: (1)36.8V (2)36.8V (3)37.2V (4)36.8V (5)37.6V

			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	(6)35.6V (7)36V (8)27.9V	(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. (8).NO LOAD (9)BURST MODE Ta:25°C	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
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	(1) 10.05V (2) 10.37V (3) 10.29V (4) 8.76V (5) 8.52V	

				LINE Ta:25°C		
NMS-240-48 (K)						
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 71A/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: (1)77.4V (2)84.6V (3)84.6V (4)78.2V (5)71.8V	VCC: (1)7.82V (2)7.58V (3)7.58V (4)7.82V (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: 5.07mA I/P-FG: 3.57mA O/P-FG: 4.74mA 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: 30GΩ I/P-FG: 10.6GΩ O/P-FG: 2.58GΩ 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-650-CEHK 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	LF1	37.0°C	72.7°C
2	BD1	49.7°C	80.1°C
3	RY1	50.9°C	78.7°C
4	RTH1	47.0°C	75.1°C
5	U1	46.1°C	70.7°C
6	L2	48.2°C	75.7°C
7	Q1	46.1°C	69.8°C
8	U850	41.1°C	65.8°C
9	T80	41.4°C	66.8°C
10	Q81	42.1°C	65.5°C
11	L81	42.1°C	67.6°C
12	T300	41.6°C	67.9°C
13	D501	44.1°C	69.6°C
14	TSW5	43.2°C	68.8°C
15	(5V)T600	58.2°C	80.7°C
16	(5V)Q630	73.2°C	95.0°C
17	(5V)Q640	78.3°C	96.5°C
18	(5V)Q661	83.9°C	98.8°C
19	(5V)Q663	86.4°C	95.5°C
20	(5V)U900	69.5°C	90.5°C
21	(5V)RT91	70.7°C	91.0°C
22	(5V)L611	45.4°C	106.9°C
23	(5V)L600	49.1°C	76.4°C
24	(48V)Q630	39.5°C	68.4°C
25	(5V)U630	63.8°C	91.7°C
26	(5V)RG60	43.2°C	74.9°C
27	(12V)T600	58.0°C	64.8°C
28	(12V)Q630	68.8°C	69.0°C
29	(12V)U630	66.3°C	73.6°C
30	(12V)Q640	71.3°C	68.9°C
31	(12V)RT90	60.7°C	65.7°C
32	(12V)Q661	73.7°C	71.6°C
33	(12V)Q663	75.8°C	72.1°C
34	(12V)L611	74.3°C	73.4°C
35	(12V)U900	61.2°C	65.9°C
36	(48V)RT90	35.5°C	58.6°C
37	(12V)U800	34.5°C	56.2°C
38	(24V)T600	35.1°C	66.3°C
39	(24V)Q630	39.4°C	73.4°C
40	(24V)RT90	37.5°C	69.2°C
41	(24V)Q663	40.1°C	75.9°C
42	C5	45.7°C	69.9°C
43	C17	41.4°C	68.4°C
44	C532	40.3°C	67.4°C
45	D6	51.4°C	76.2°C
46	(5V)C678	49.6°C	71.8°C
47	(5V)C650	76.6°C	96.1°C
48	(12V)C650	58.2°C	63.7°C
49	U870	45.0°C	66.4°C
50	U500	44.5°C	69.6°C
51	U701	36.2°C	61.6°C
52	U702	36.0°C	60.8°C



650W Modular Power

NMP series

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 115 % 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	± 0.007 %/°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) 1177687HRS (2) 66226HRS (3) 141589HRS (4) 372417HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 1314.6K hrs min. Telcordia SR-332 (Bellcore) ; 128.2K hrs min. MIL-HDBK-217F (25°C) (NMP650)		

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

12.10.30 A50-F03