Test Report: NDR-480-48

480W Single Output Industrial DIN RAIL

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Component Stress Test

■ SAFETY & E.M.C. TEST

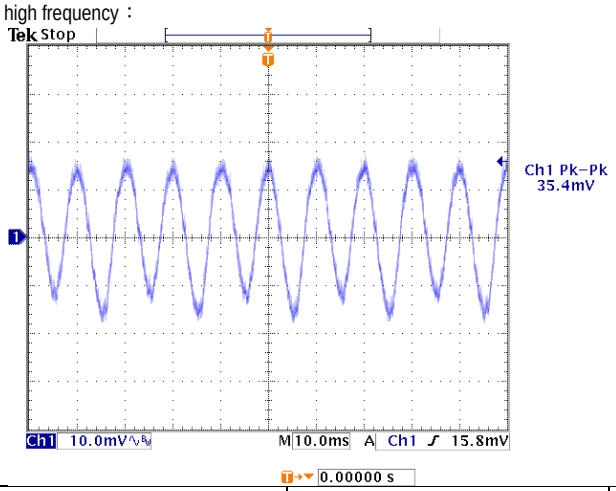
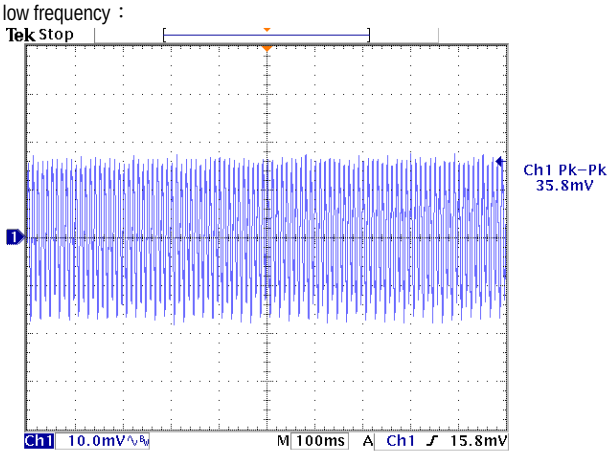
Safety Test
E.M.C. Test

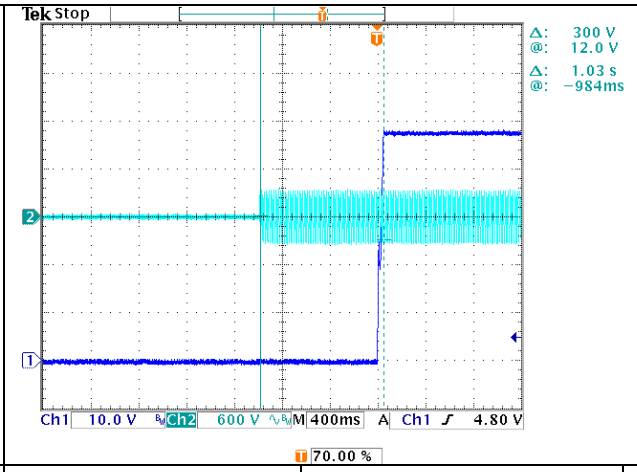
■ RELIABILITY TEST

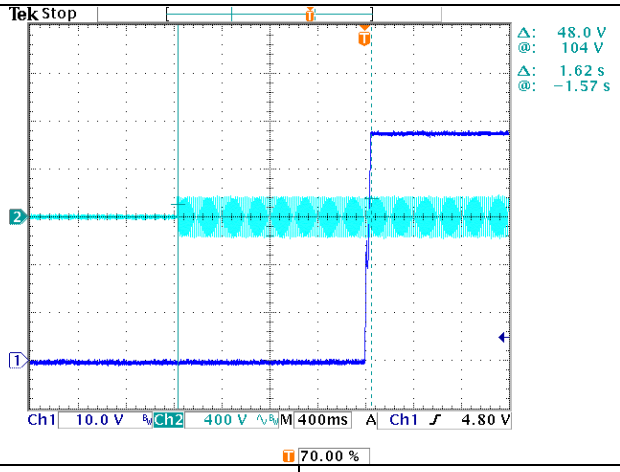
ENVIRONMENT TEST

■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 48V~ 55V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	47.21V~57.63V/230VAC 47.21V~57.63V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1%~ 1%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: −0. 17 %~ 0. 15 %
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: 0 %~0. 02 %
4	LOAD REGULATION(Max)	V1: -1%~ 1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: −0. 17 %~0. 15 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	< ±5%
6	RIPPLE & NOISE(Max)	V1: 150mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 35.8mVp-p
	high frequency： 		low frequency： 	
7	SET UP TIME(Max)	230VAC/1500ms 115VAC/3000ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 1032 ms 115VAC/ 1616 ms
	INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	

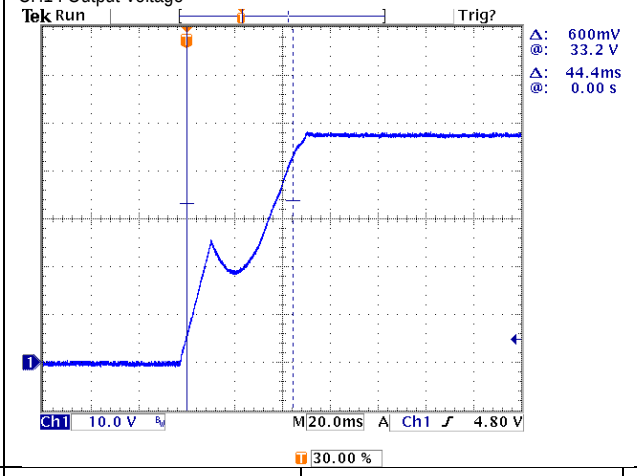




8	RISE TIME (Max)	230VAC/100ms 115VAC/100ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 44.4 ms 115VAC/ 43.6 ms

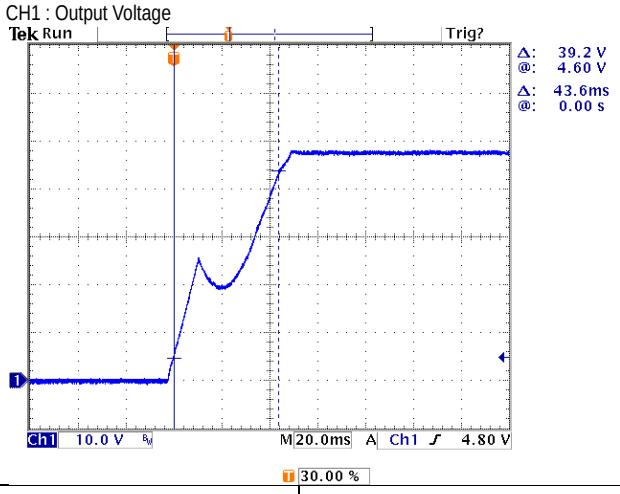
INPUT=230VAC/50HZ @ FULL LOAD

CH1 : Output Voltage



INPUT=115VAC/60HZ @ FULL LOAD

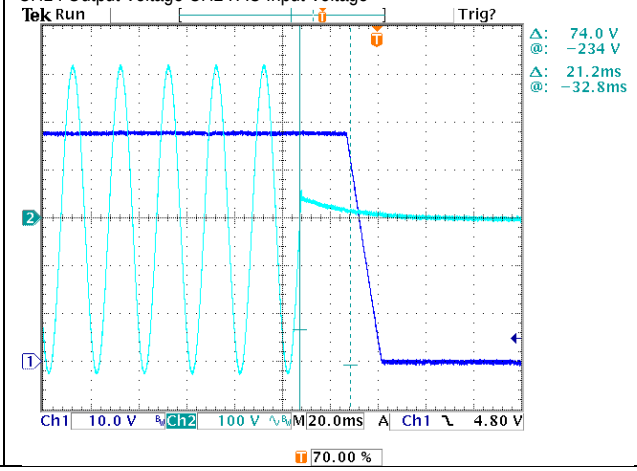
CH1 : Output Voltage



9	HOLD UP TIME (Typ.)	230VAC/16ms 115VAC/16ms	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	230VAC/ 21.2 ms 115VAC/ 20.8 ms

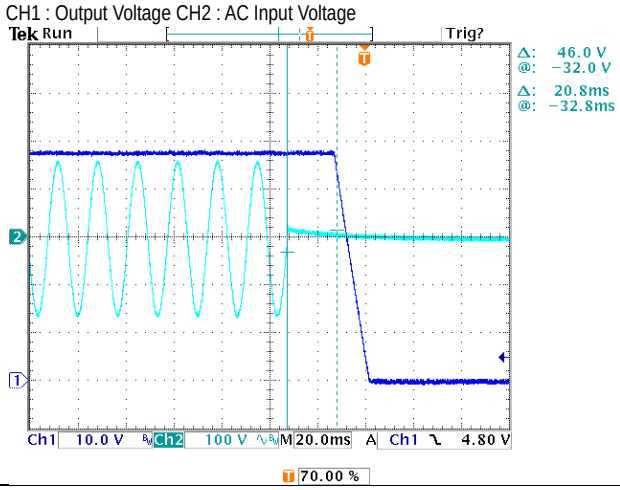
INPUT=230VAC/50HZ @ FULL LOAD

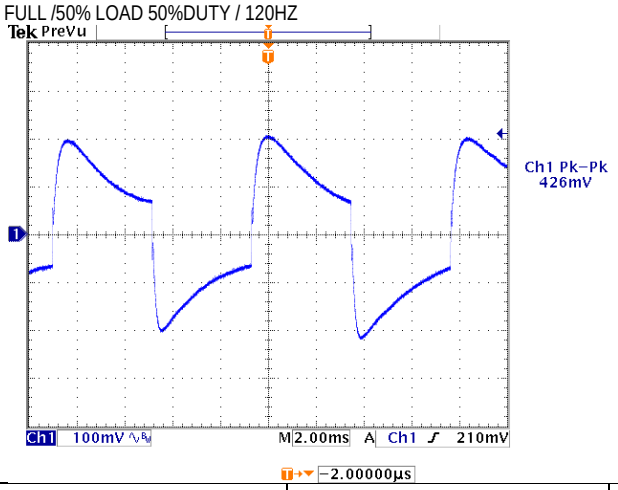
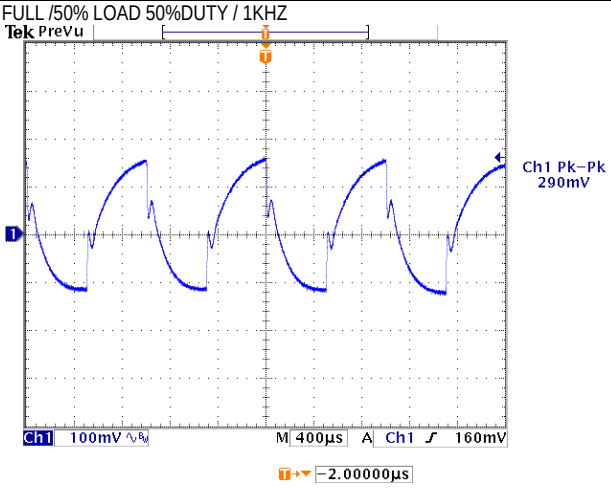
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD

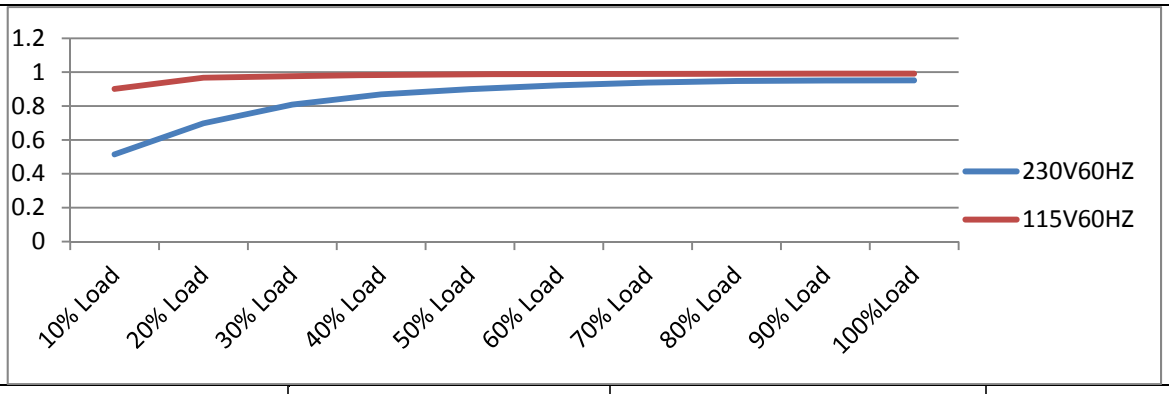
CH1 : Output Voltage CH2 : AC Input Voltage



10	DYNAMIC LOAD	V1: 4800mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25℃	 426mVp-p 290mVp-p
	FULL /50% LOAD 50%DUTY / 120HZ 		FULL /50% LOAD 50%DUTY / 1KHZ 	
11	TRANSIENT RECOVERY TIME	V1: 4800mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	308mVp-p

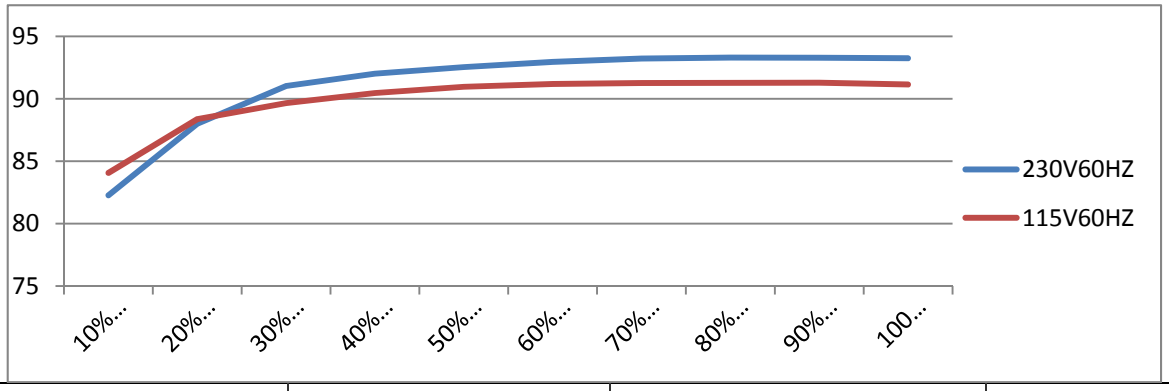
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25℃	83V~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℃	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 2.4A 115V/ 4.8A	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I= 2.348A/ 230VAC I= 4.683A/ 115VAC
4	LEAKAGE CURRENT	<2 mA / 240 VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	L-FG： 0.877 mA N-FG： 0.877 mA
5	POWER FACTOR (Typ.)	0.94/ 230VAC 0.98/115VAC	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF= 0.953/230VAC PF= 0.992/115VAC
	P.F vs LOAD			



6	EFFICIENCY(Typ.)	92.5%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	92.77%

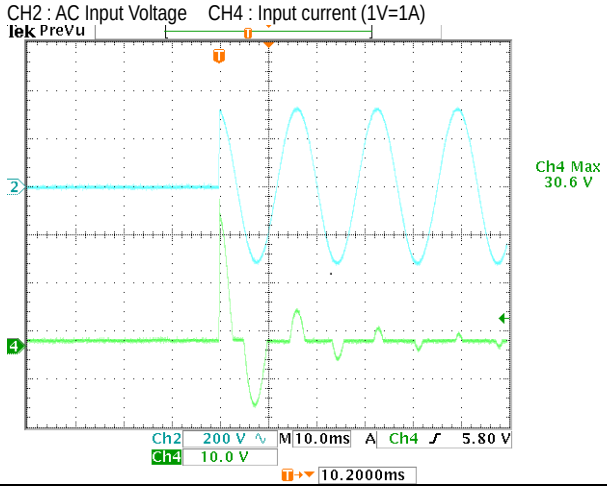
EFFICIENCY vs LOAD



7	INRUSH CURRENT(Typ.)	230V/35A 115V/20A COLD START	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I= 30.6A/ 230VAC I= 19.6A/ 115VAC

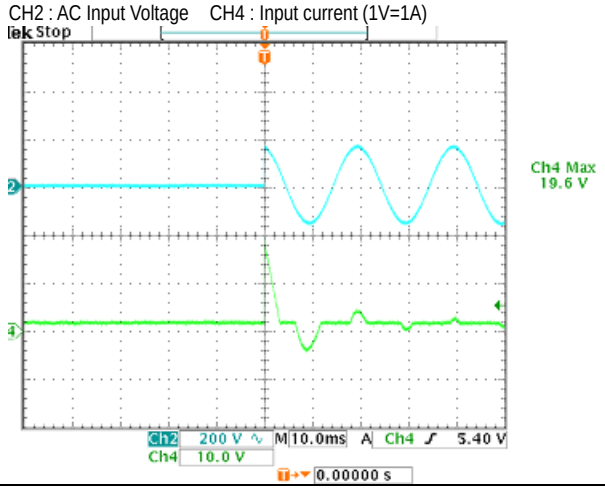
INPUT=230VAC/50HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current (1V=1A)



INPUT=115VAC/ 60HZ @ FULL LOAD

CH2 : AC Input Voltage CH4 : Input current (1V=1A)



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	105%~ 130 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25℃	119.7%/ 264VAC 119.7%/ 230VAC 119.7%/100VAC PROTECTION TYPE : constant current limiting, unit will shut down after 3sec.,re-power on to recover
2	OVER VOLTAGE PROTECTION	56V~65V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P:MIN LOAD Ta:25℃	61.68V/ 264VAC 61.40V/ 230VAC 61.45V/ 90VAC PROTECTION TYPE : shut down o/p voltage,re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type : :shut down o/p voltage,recovers automaticallyafter 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 automaticallyafter 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℃	NO DAMAGE PROTECTION TYPE : constant current limiting, recovers automatically after fault condition is removed

COMPONENT STRESS TEST

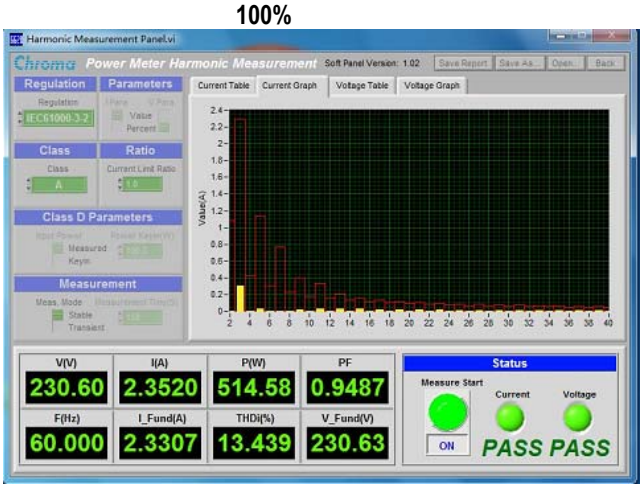
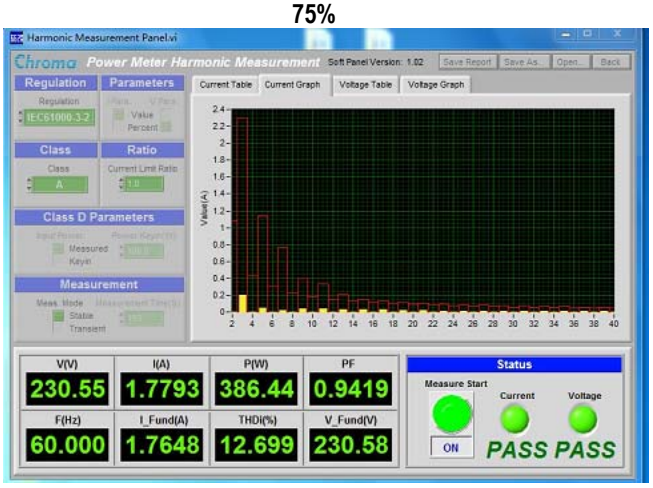
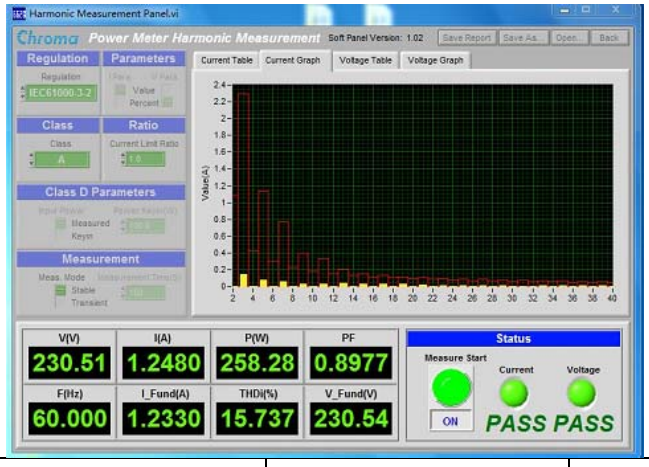
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) **Peak Voltage**	Q1 Rated : 20A/ 600V	I/P:High-Line +3V =267V AC ON/OFF VDS: O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25℃	VDS: (1) 462V (2) 448V (3) 430V
2	P.F.C Transistor (D to S) or (C to E) **Peak Voltage**	Q902 Rated : 20 A/ 600 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load ContinueVGS: Ta:25℃	VDS: (1) 476V (2) 480V (3) 558V
3	P.F.C DIODE	D902 Rated : 6A/ 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℃	(1) 440V (2) 436V (3) 426V (4) 418V
4	Diode Peak **Voltage**	Q100 Rated : 30A/ 150V Q102 Rated : 30A/ 150 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue	Q100: VDS: (1) 106V (2) 9.60V (3) 105V

			Ta:25℃	Q102: VDS: (1) 108V (2) 16.7V (3) 106V
5	**Input Capacitor Voltage**	C5 Rated: : 150μ/ 400 V 105 ℃	I/P:High-Line +3V =267 V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change Ta:25℃	(1) 426V (2) 398V (3) 434V
6	**Control IC Voltage Test**	PWM IC U2 Rated : 16V 8.85V(MIN.)	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 VR 下限.LOW LINE Ta:25℃	(1) 14.6V (2) 14.1V (3) 14.1V (4) 13.6V (5) 13.8V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6 KVAC/min Ta:25℃	I/P-O/P: 9.86mA I/P-FG: 9.38mA O/P-FG: 8.13m 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℃	I/P-O/P:> 9999MΩ I/P-FG: >9999MΩ O/P-FG: >9999MΩ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25℃	15 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℃	PASS
	100%  75%  50%  			
2	CONDUCTION	EN55022	I/P： 230 VAC (50HZ) O/P：FULL/50% LOAD Ta：25℃	PASS Test by certified Lab
3	RADIATION	EN55022	I/P： 230 VAC (50HZ) O/P：FULL LOAD Ta：25℃	PASS Test by certified Lab
4	E.S.D	EN61000-4-2 INDUSTRY AIR：8KV / Contact：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT： 2KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
6	SURGE	IEC61000-4-5 INDUSTRY L-N ：2KV L,N-PE：4KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	CRITERIA A
7	Test by certified Lab & Test Report Prepare			

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： NDR-480-24
1. ROOM AMBIENT BURN-IN：1 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 35.1 ℃
2. HIGH AMBIENT BURN-IN： 1 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 50 ℃</td></tr>
<tr><td colspan="5">
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 35.1 ℃</th><th>HIGH AMBIENT Ta= 50 ℃</th></tr>
<tr><td>1</td><td>L3</td><td>56.3℃</td><td>72.3℃</td></tr>
<tr><td>2</td><td>L4</td><td>62.9℃</td><td>79.1℃</td></tr>
<tr><td>3</td><td>LF1</td><td>59.5℃</td><td>75.5℃</td></tr>
<tr><td>4</td><td>LF2</td><td>67.4℃</td><td>83.3℃</td></tr>
<tr><td>5</td><td>L6</td><td>67.5℃</td><td>83℃</td></tr>
<tr><td>6</td><td>BD1</td><td>81.6℃</td><td>97.1℃</td></tr>
<tr><td>7</td><td>C196</td><td>87.1℃</td><td>102.6℃</td></tr>
<tr><td>8</td><td>ZNR2</td><td>70.8℃</td><td>86.5℃</td></tr>
<tr><td>9</td><td>L901</td><td>79.7℃</td><td>94℃</td></tr>
<tr><td>10</td><td>C904</td><td>72.9℃</td><td>88.4℃</td></tr>
<tr><td>11</td><td>D902</td><td>77.5℃</td><td>93.3℃</td></tr>
<tr><td>12</td><td>Q901</td><td>80.3℃</td><td>95.7℃</td></tr>
<tr><td>13</td><td>Q1</td><td>73.6℃</td><td>89.9℃</td></tr>
<tr><td>14</td><td>C42</td><td>72.8℃</td><td>89.4℃</td></tr>
<tr><td>15</td><td>C5</td><td>72.3℃</td><td>88.3℃</td></tr>
<tr><td>16</td><td>C102</td><td>59.8℃</td><td>75.6℃</td></tr>
<tr><td>17</td><td>Q100</td><td>104.5℃</td><td>120.5℃</td></tr>
<tr><td>18</td><td>T1 一次側</td><td>91.3℃</td><td>106.4℃</td></tr>
<tr><td>19</td><td>T1 二次側</td><td>90.7℃</td><td>105.8℃</td></tr>
<tr><td>20</td><td>C51</td><td>77.8℃</td><td>94.2℃</td></tr>
<tr><td>21</td><td>TSW</td><td>71.1℃</td><td>86.8℃</td></tr>
<tr><td>22</td><td>U2</td><td>76.7℃</td><td>92.4℃</td></tr>
<tr><td>23</td><td>U150</td><td>78.8℃</td><td>94.2℃</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P： 111 % LOAD
Ta：25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 264VAC/100VAC
O/P： 100 % LOAD
Ta= -25 ℃</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 50 ℃
NO DAMAGE</td><td>I/P： 272 VAC
O/P：FULL LOAD
Ta= 51.4 ℃
HUMIDITY= 95 %R.H</td><td>TEST：OK</td></tr>
<tr><td>5</td><td>TEMPERATURE
COEFFICIENT</td><td>± 0.03 %/℃ (0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>± 0.005 %/℃ (0~50℃)</td></tr>
</table>

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -40℃~ +85℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：5 CYCLE 5. Input/Output condition： STATIC	OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -20℃~ +70℃ 2. Temperature change rate ：25℃ / MIN 3. Dwell time low and high temperature ： 30 MIN/EACH 4. Total test cycle：10 CYCLE 5. Input/Output condition： 230VAC/Full Load AC ON/OFF TEST turn on 58sec；turn off 2sec	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℃	TEST：OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C104 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 50 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 50 ℃ LIFE TIME	(1) 178628HRS (2) 31110HRS (3) 62680HRS (4) 114685HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE： 146.8 KHRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014