



# Test Report: NDR-480-48

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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

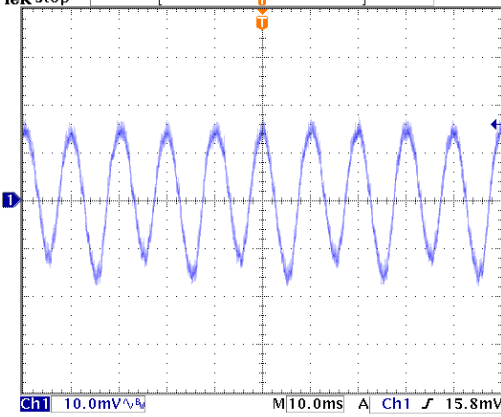
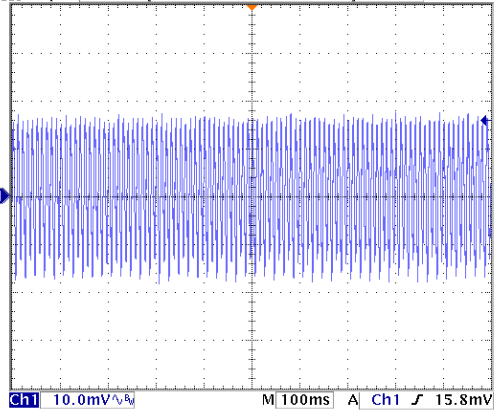
E.M.C. Test

## ■ RELIABILITY TEST

ENVIRONMENT TEST

■ DESIGN VERIFY TEST

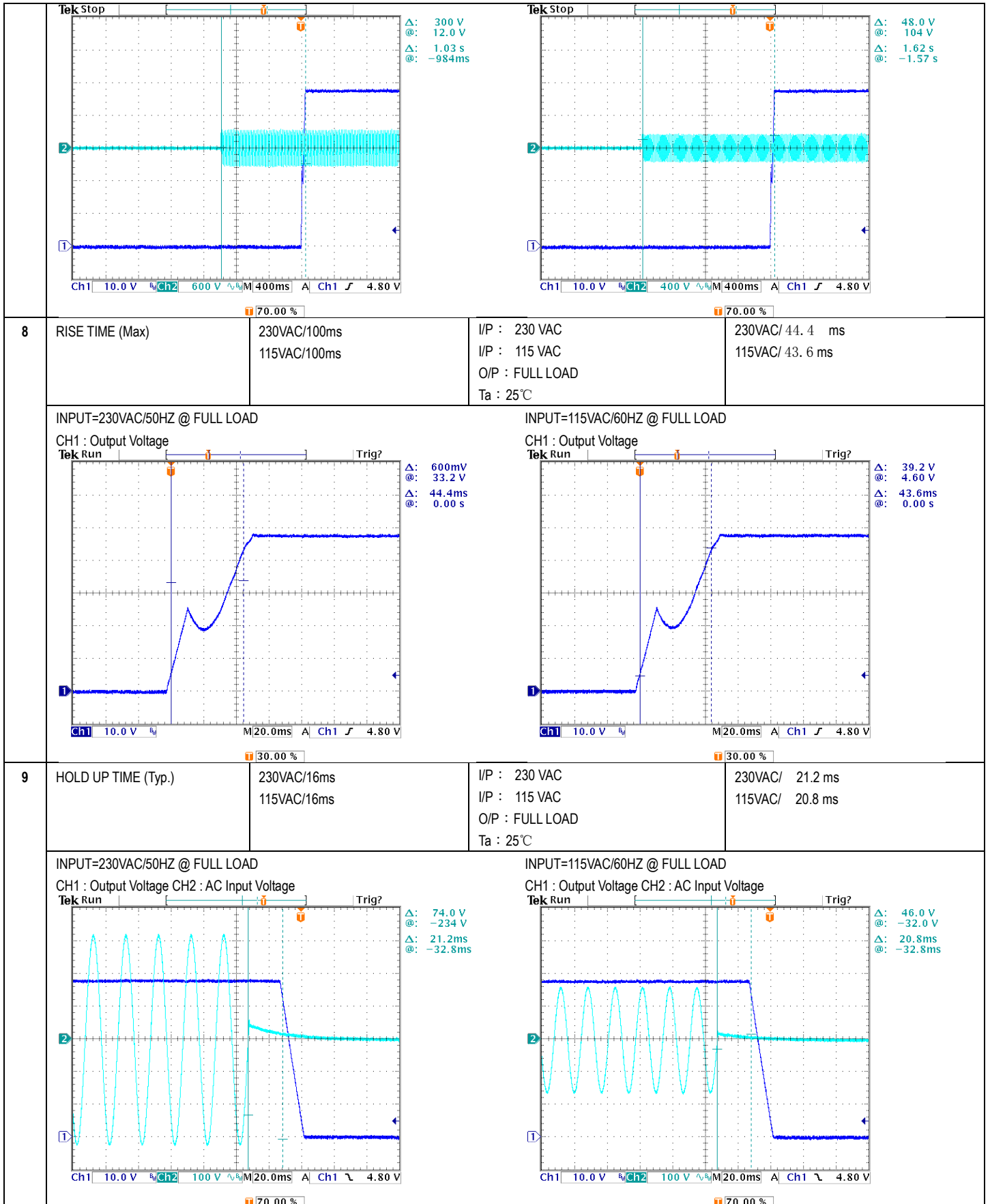
**OUTPUT FUNCTION TEST**

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°C	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°C	V1: -0.17 %~ 0.15 %
3	LINE REGULATION (Max)	V1: -0.5%~ 0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0 %~0.02 %
4	LOAD REGULATION(Max)	V1: -1%~ 1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.17 %~0.15 %
5	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	< ±5%
6	RIPPLE & NOISE(Max)	V1: 150mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 35.8mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>high frequency :</p>  <p>Ch1 Pk-Pk 35.4mV</p> </div> <div style="text-align: center;"> <p>low frequency :</p>  <p>Ch1 Pk-Pk 35.8mV</p> </div> </div>				
7	SET UP TIME(Max)	230VAC/1500ms 115VAC/3000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	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	



480W Single Output Industrial DIN RAIL

NDR-480 series





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**NDR-480 series**

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°C	426mVp-p 290mVp-p
11	TRANSIENT RECOVERY TIME	V1: 4800mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	308mVp-p

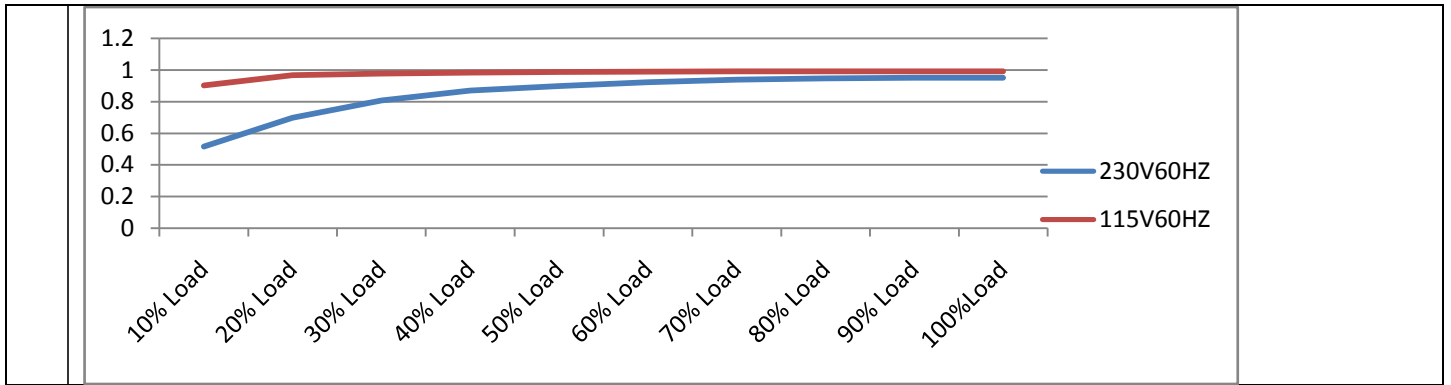
**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	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°C	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°C	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°C	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°C	PF= 0.953/230VAC PF= 0.992/115VAC
			P.F vs LOAD	

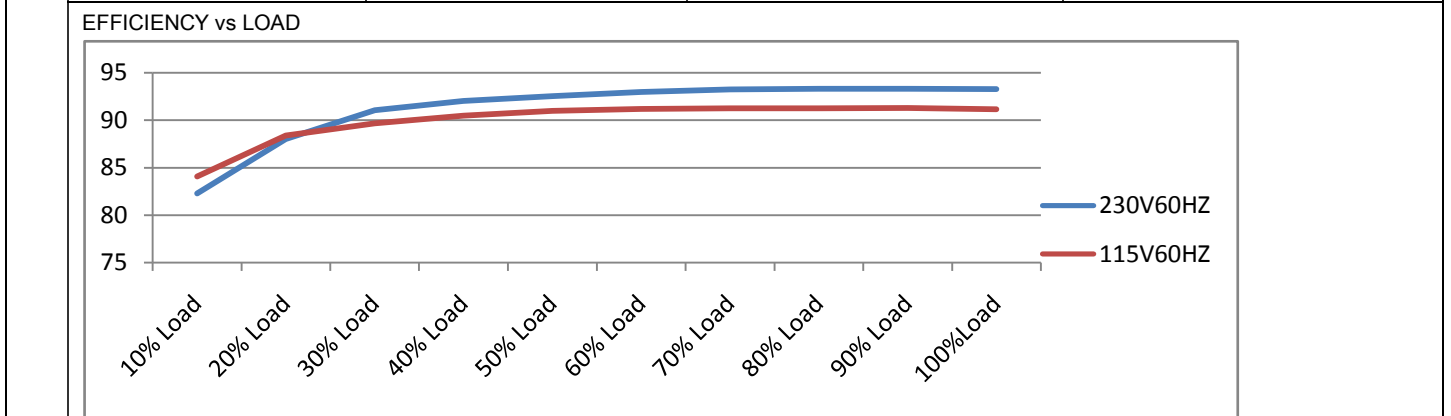


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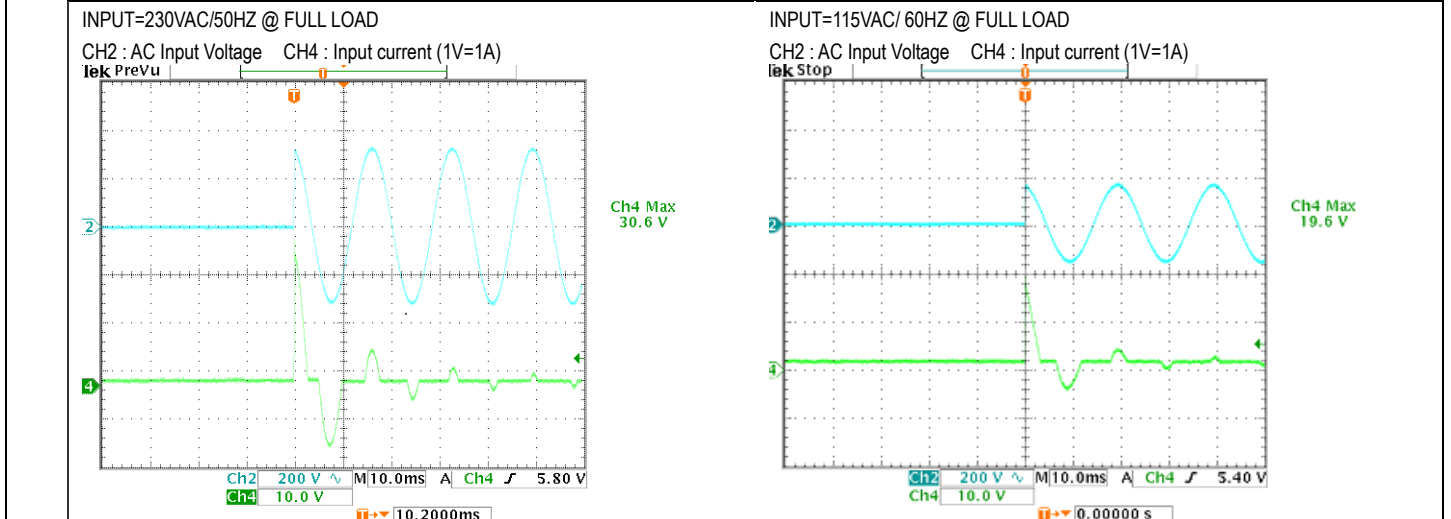
NDR-480 series



6	EFFICIENCY(Typ.)	92.5%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	92.77%
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7	INRUSH CURRENT(Typ.)	230V/35A 115V/20A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 30.6A/ 230VAC I = 19.6A/ 115VAC
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**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°C	119.7%/ 264VAC 119.7%/ 230VAC 119.7%/100VAC PROTECTION TYPE : constant current limiting, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	56V~65V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta: 25°C	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 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
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 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°C	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 Continue VGS: Ta: 25°C	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°C	(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



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			Ta:25°C	Q102: VDS: (1) 108V (2) 16.7V (3) 106V
5	<b>Input Capacitor Voltage</b>	C5 Rated: : 150 $\mu$ F / 400 V 105 °C	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°C	(1) 426V (2) 398V (3) 434V
6	<b>Control IC Voltage Test</b>	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°C	(1) 14.6V (2) 14.1V (3) 14.1V (4) 13.6V (5) 13.8V

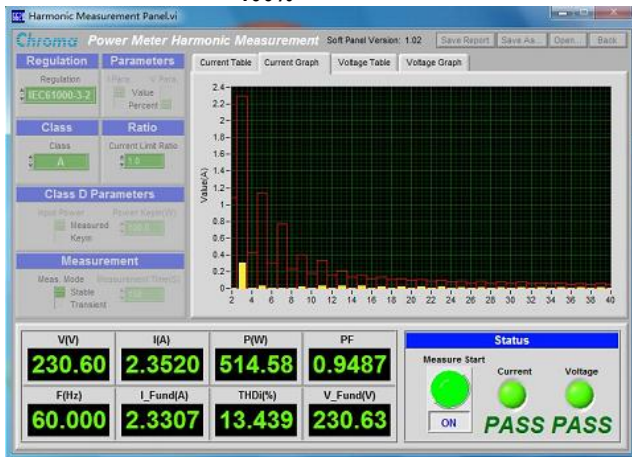
**SAFETY TEST**

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°C	I/P-O/P: 9.86mA I/P-FG: 9.38mA O/P-FG: 8.13mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M $\Omega$ I/P-FG: 500VDC>100M $\Omega$ O/P-FG:500VDC>100M $\Omega$	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:> 9999M $\Omega$ I/P-FG: >9999M $\Omega$ O/P-FG: >9999M $\Omega$ NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m $\Omega$	40A / 2min Ta:25°C	15 m $\Omega$

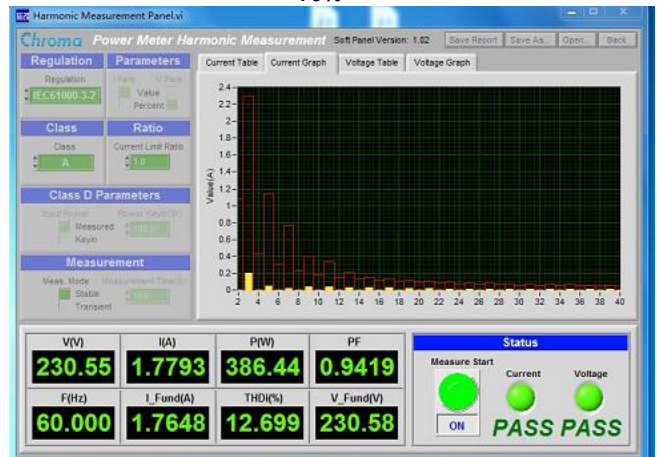
**E.M.C TEST**

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

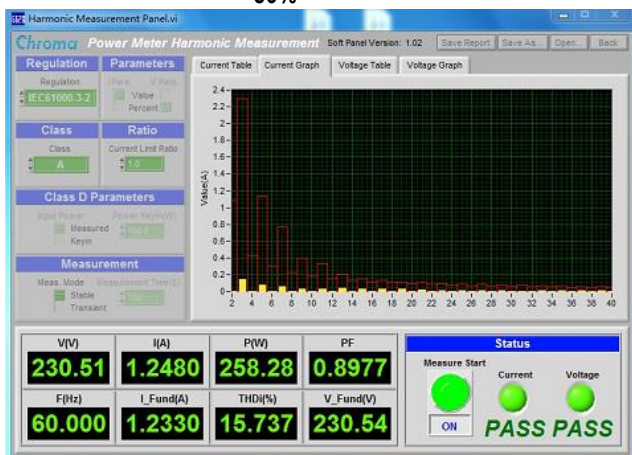
100%



75%



50%



2	CONDUCTION	EN55022	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	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°C	CRITERIA A
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	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°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare			



**ENVIRONMENT TEST**

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



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**NDR-480 series**

6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -40°C~ +85°C 2. Temperature change rate : 25°C / 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°C~ +70°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 : 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°C	TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C104 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) 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 50,000 hours @ TA 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

2007/3/20 A50-S014