



# Test Report: NDR-240-24

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240W 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

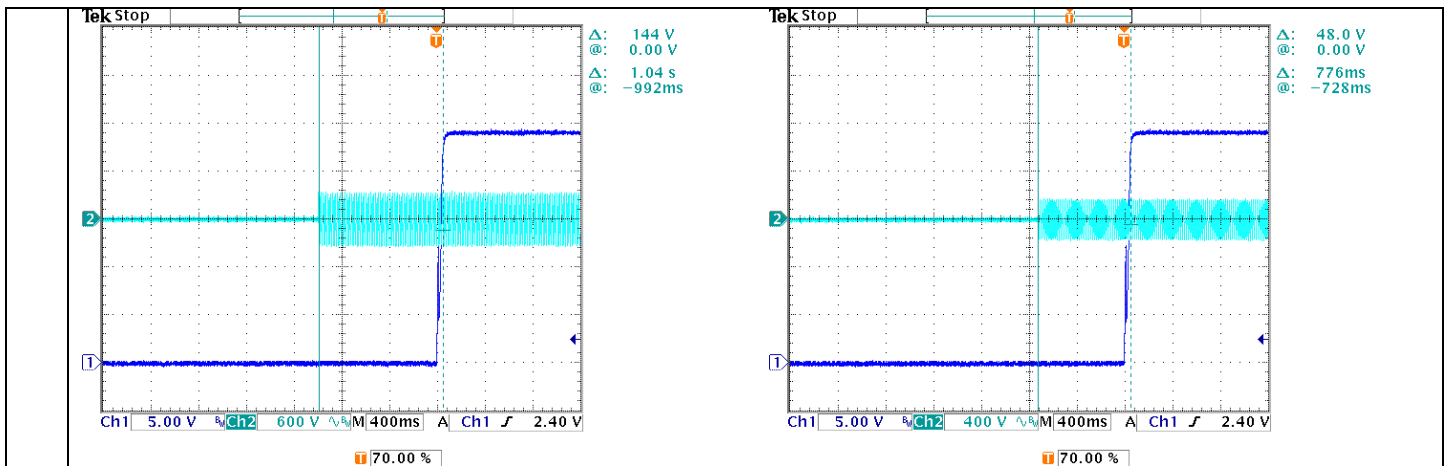
## ■ RELIABILITY TEST

ENVIRONMENT TEST

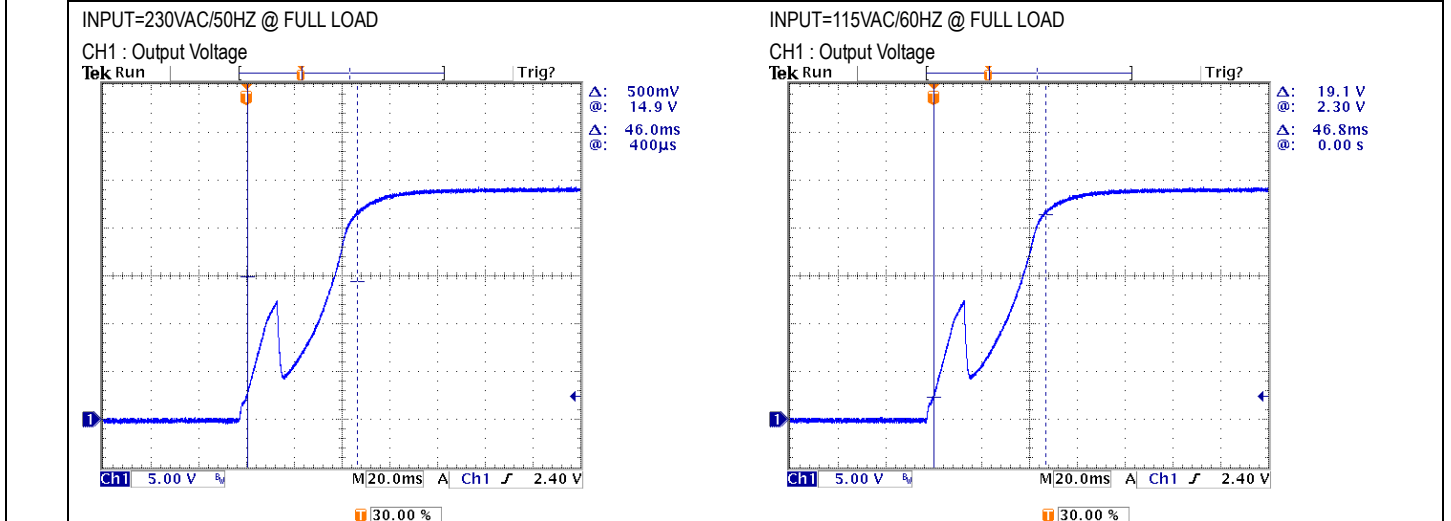
■ DESIGN VERIFY TEST

**OUTPUT FUNCTION TEST**

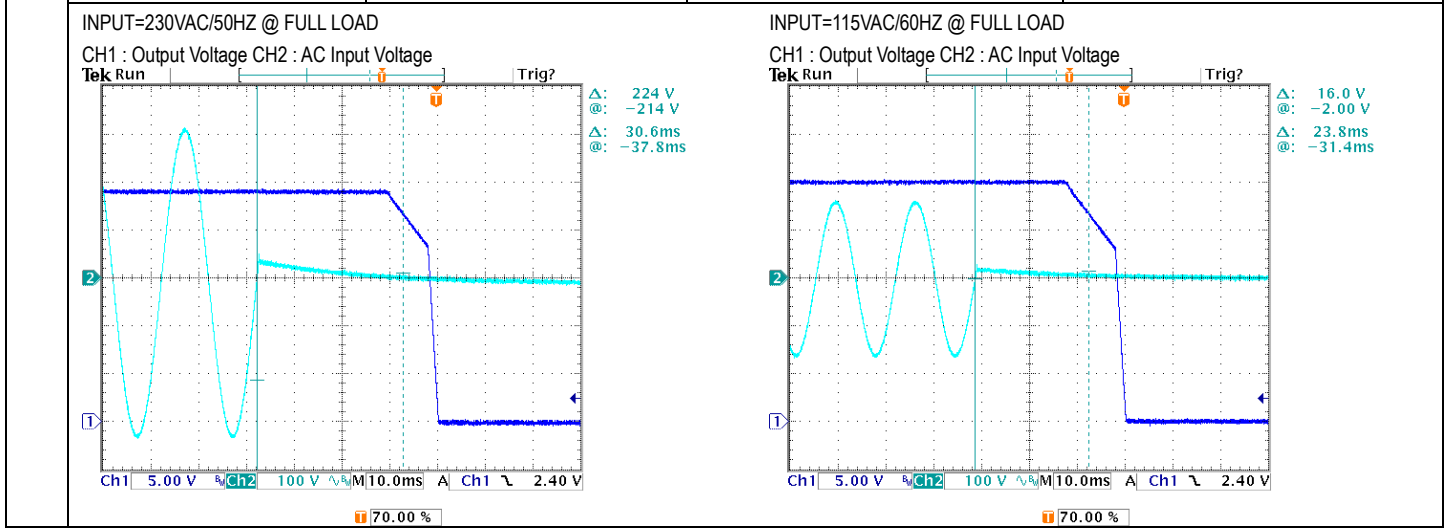
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 24V~ 28V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	23.35V~28.56V/230VAC 23.34V~28.55V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -1%~ -1%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -0.124%~ 0.166%
3	LINE REGULATION (Max)	V1: -0.5%~ -0.5%	I/P: 100VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: 0%~ 0.04%
4	LOAD REGULATION(Max)	V1: -1%~ -1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -0.124%~ 0.166%
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: 24.6mVp-p
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>high frequency :</p> </div> <div style="text-align: center;"> <p>low frequency :</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/ 1040.0ms 115VAC/ 776.0ms
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	I/P : 230 VAC	230VAC/ 46.0ms
		115VAC/100ms	I/P : 115 VAC	115VAC/ 46.8ms
			O/P : FULL LOAD	
			Ta : 25°C	



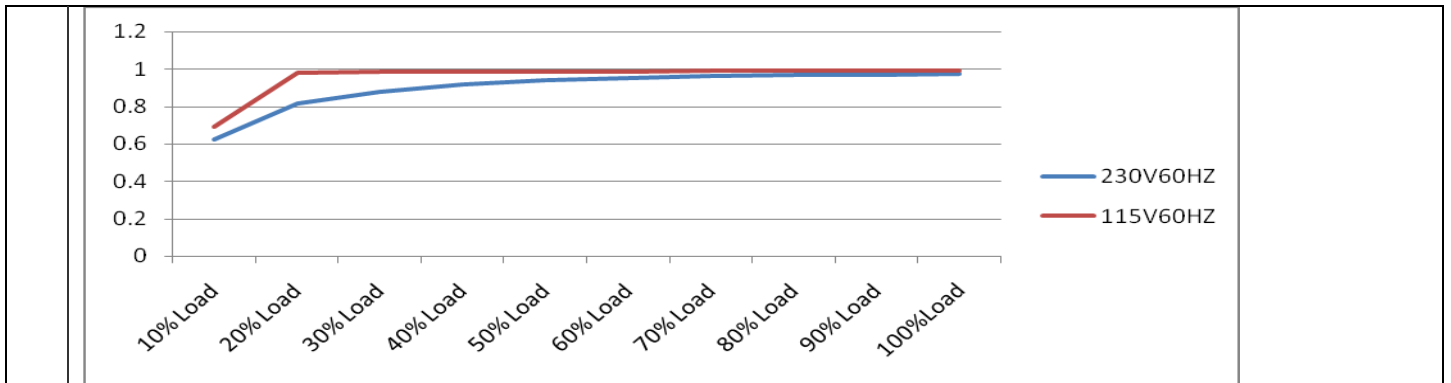
9	HOLD UP TIME (Typ.)	230VAC/28ms	I/P : 230 VAC	230VAC/ 30.6ms
		115VAC/22ms	I/P : 115 VAC	115VAC/ 23.8ms
			O/P : FULL LOAD	
			Ta : 25°C	



10	DYNAMIC LOAD	V1: 2400mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	331mVp-p 248mVp-p
	<p>Ch1 Pk-Pk 331mV</p>		<p>Ch1 Pk-Pk 248mV</p>	
11	TRANSIENT RECOVERY TIME	V1: 2400mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	462mVp-p

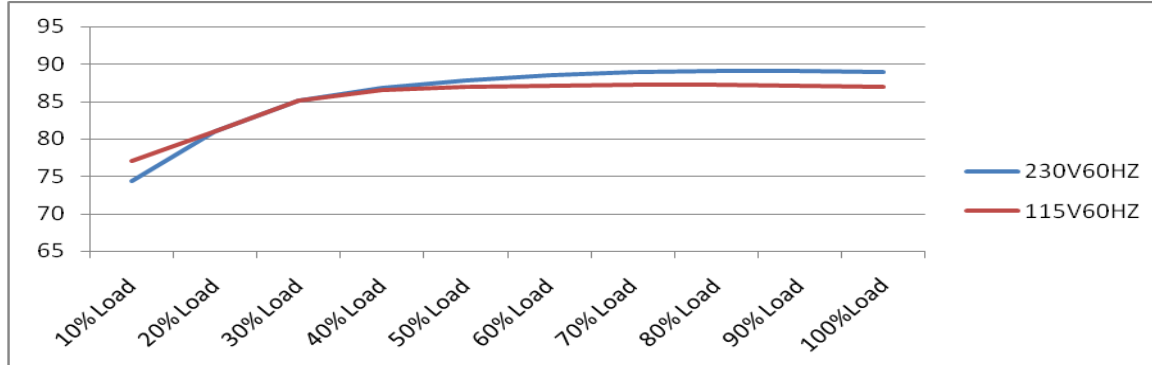
**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	68V~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/ 1.3A 115V/ 2.5A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I=1.196A/ 230VAC I=2.424A/ 115VAC
4	LEAKAGE CURRENT	<1 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.83 mA N-FG : 0.83 mA
6	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=0.975/230VAC PF=0.992/115VAC
	P.F vs LOAD			



7	EFFICIENCY(Typ.)	88%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	88.89%
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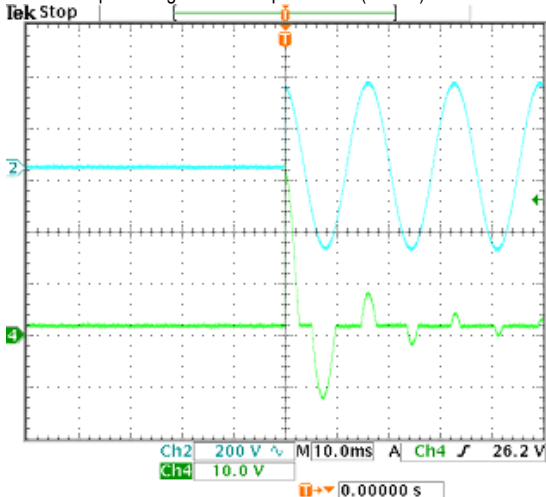
EFFICIENCY vs LOAD



8	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 =34.8A/ 230VAC I =18.6A/ 115VAC
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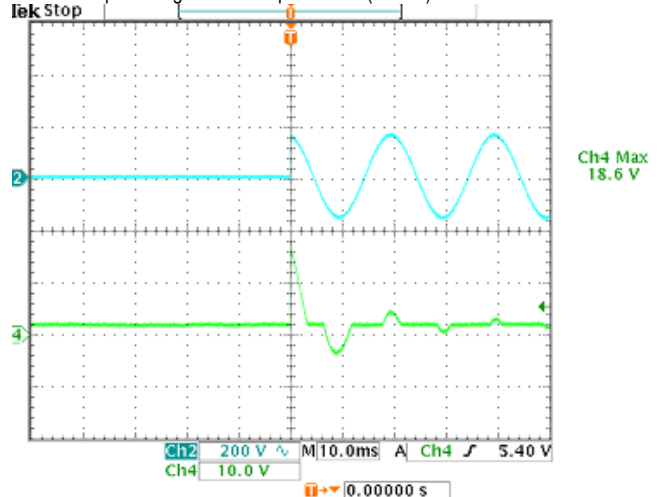
INPUT=230VAC/50HZ @ FULL LOAD

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



INPUT=115VAC/ 60HZ @ FULL LOAD

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





			<p>(2)Output Short  (3) Dynamic Load Full Load/  Min. Load 90%Duty/1KHz  (4) Dynamic Load Full Load/  Min. Load 90%Duty/5KHz  (5) Dynamic Load 100% Load/  Min. Load 50%Duty/120Hz  (6)NO LOAD  Ta:25°C</p>	(6)12.8V
2	P.F.C Transistor ( D to S) or (C to E) <b>Peak Voltage</b>	<p>Q1 Rated  : 20 A/ 600 V  VGS ± 30V</p>	<p>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  (5)0%→400% Load.  VGS:  (1)OLP  (2)Output Short  (3) Dynamic Load Full Load/  Min. Load 90%Duty/1KHz  (4) Dynamic Load Full Load/  Min. Load 90%Duty/5KHz  (5) Dynamic Load 100% Load/  Min. Load 50%Duty/120Hz  (6)NO LOAD  I/P:Low-Line -3V = 97V  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  (5)0%→400% Load.  VGS:  (1)OLP  (2)Output Short  (3) Dynamic Load Full Load/  Min. Load 90%Duty/1KHz  (4) Dynamic Load Full Load/  Min. Load 90%Duty/5KHz  (5) Dynamic Load 100% Load/  Min. Load 50%Duty/120Hz  (6)NO LOAD  Ta:25°C</p>	<p>VDS: VGS:  (1) 420V (1)13.3V  (2) 400V (2)13.2V  (3) 424V (3)13.3V  (4) 426V (4)13.3V  (5) 404V (5)13.4V  (6)13.0V  VDS: VGS:  (1) 450V (1)12.1V  (2) 402V (2)12.2V  (3) 442V (3)13.9V  (4) 412V (4)13.8V  (5) 388V (5)13.6V</p>
3	P.F.C DIODE	<p>D10 Rated  : 8A/ 600V</p>	<p>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/</p>	<p>(1) 402V  (2) 396V  (3) 402V  (4) 402V</p>

			<p>Min. Load 50%Duty/120Hz  I/P:Low-Line -3V = 97V  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</p>	<p>(1) 378V  (2) 378V  (3) 376V  (4) 376V</p>
4	Diode Peak Voltage	<p>D101 Rated : 20A/ 120V    D102 Rated : 20A/ 120 V</p>	<p>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  (5)0%→400% Load.    Ta:25°C</p>	<p>D101:  VDS:  (1)72.8V  (2)74.0V  (3)94.8V  (4)94.4V  (5)111V    D102:  VDS:  (1)101V  (2)105V  (3)101V  (4)102V  (5)105V</p>
5	Input Capacitor Voltage	<p>C5 Rated:  : 180<math>\mu</math>/ 400 V  105 °C</p>	<p>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</p>	<p>(1)392V  (2)386V  (3)398V</p>
6	Control IC Voltage Test	<p>PWM IC U1 Rated  : 27 V  12V(MIN.)</p>	<p>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</p>	<p>(1) 15.9V  (2) 15.8V  (3) 15.8V  (4) 15.6V  (5) 15.1V</p>
7	Clamp Diode Peak Voltage	<p>D22 Rated : 1KV/ 1 A</p>	<p>I/P : High-Line +3V = 267 V  AC ON/OFF  O/P : (1) Dynamic Load  90%Duty/1KHz  (2)Full load continue  Ta : 25°C</p>	<p>(1)816V  (2)792V</p>



**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:3.25mA I/P-FG:6.42mA O/P-FG:3.27mA 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: 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°C	18mΩ

**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
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>100%</b></p> </div> <div style="text-align: center;"> <p><b>75%</b></p> </div> </div> <div style="text-align: center; margin-top: 10px;"> <p><b>50%</b></p> </div>				
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55022 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 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			

## ■ RELIABILITY TEST

### ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																																				
1	TEMPERATURE RISE TEST	MODEL : NDR-240-24 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 19.1 °C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta=47.0°C																																																																																						
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta=19.1°C</th> <th>HIGH AMBIENT Ta=47.0°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>V1</td><td>35.4°C</td><td>61.7°C</td></tr> <tr><td>2</td><td>LF1</td><td>41.0°C</td><td>67.8°C</td></tr> <tr><td>3</td><td>LF2</td><td>55.1°C</td><td>81.1°C</td></tr> <tr><td>4</td><td>BD1</td><td>49.3°C</td><td>76.0°C</td></tr> <tr><td>5</td><td>LF3</td><td>43.9°C</td><td>69.6°C</td></tr> <tr><td>6</td><td>L4</td><td>41.6°C</td><td>68.4°C</td></tr> <tr><td>7</td><td>C5</td><td>45.8°C</td><td>72.7°C</td></tr> <tr><td>8</td><td>U1</td><td>59.3°C</td><td>86.5°C</td></tr> <tr><td>9</td><td>C105</td><td>69.5°C</td><td>98.0°C</td></tr> <tr><td>10</td><td>L100</td><td>64.2°C</td><td>93.9°C</td></tr> <tr><td>11</td><td>T1</td><td>74.9°C</td><td>101.3°C</td></tr> <tr><td>12</td><td>D102</td><td>74.0°C</td><td>100.6°C</td></tr> <tr><td>13</td><td>D101</td><td>73.2°C</td><td>101.8°C</td></tr> <tr><td>14</td><td>Q2</td><td>63.2°C</td><td>89.1°C</td></tr> <tr><td>15</td><td>D10</td><td>61.3°C</td><td>89.1°C</td></tr> <tr><td>16</td><td>Q1</td><td>49.0°C</td><td>76.5°C</td></tr> <tr><td>17</td><td>TSW1</td><td>60.2°C</td><td>87.0°C</td></tr> <tr><td>18</td><td>U200</td><td>39.6°C</td><td>67.1°C</td></tr> <tr><td>19</td><td>C68</td><td>63.0°C</td><td>91.1°C</td></tr> <tr><td>20</td><td>D22</td><td>35.4°C</td><td>61.7°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta=19.1°C	HIGH AMBIENT Ta=47.0°C	1	V1	35.4°C	61.7°C	2	LF1	41.0°C	67.8°C	3	LF2	55.1°C	81.1°C	4	BD1	49.3°C	76.0°C	5	LF3	43.9°C	69.6°C	6	L4	41.6°C	68.4°C	7	C5	45.8°C	72.7°C	8	U1	59.3°C	86.5°C	9	C105	69.5°C	98.0°C	10	L100	64.2°C	93.9°C	11	T1	74.9°C	101.3°C	12	D102	74.0°C	100.6°C	13	D101	73.2°C	101.8°C	14	Q2	63.2°C	89.1°C	15	D10	61.3°C	89.1°C	16	Q1	49.0°C	76.5°C	17	TSW1	60.2°C	87.0°C	18	U200	39.6°C	67.1°C	19	C68	63.0°C	91.1°C	20	D22	35.4°C	61.7°C		
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20	D22	35.4°C	61.7°C																																																																																					
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 230 VAC O/P : 114 % 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= 49.8°C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.00149 %/°C (0~50°C)
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 C105 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) 191095HRS (2) 35482HRS (3) 54495HRS (4) 91672HRS
10	MTBF	MIL-HDBK-217F TOTAL FAILURE RATE : 230.2 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