



Test Report: NDR-480-24

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	CH1:24V~ 28V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	23.29V~28.73V/230VAC 23.29V~28.73V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1:-1%~-1%	I/P: 100VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1:-0.37%~0.37%
3	LINE REGULATION(Max)	V1:-0.5%~0.5%	I/P: 100VAC~264VAC O/P:FULL LOAD Ta:25°C	V1:0%~0%
4	LOAD REGULATION(Max)	V1:-1%~-1%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1:-0.37%~0.37%
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> <p>Ch1 Pk-Pk 10.4mV</p> </div> <div style="text-align: center;"> <p>low frequency :</p> <p>Ch1 Pk-Pk 24.6mV</p> <p>Waveform Intensity: 47%</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/872ms 115VAC/1688ms
		INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage	

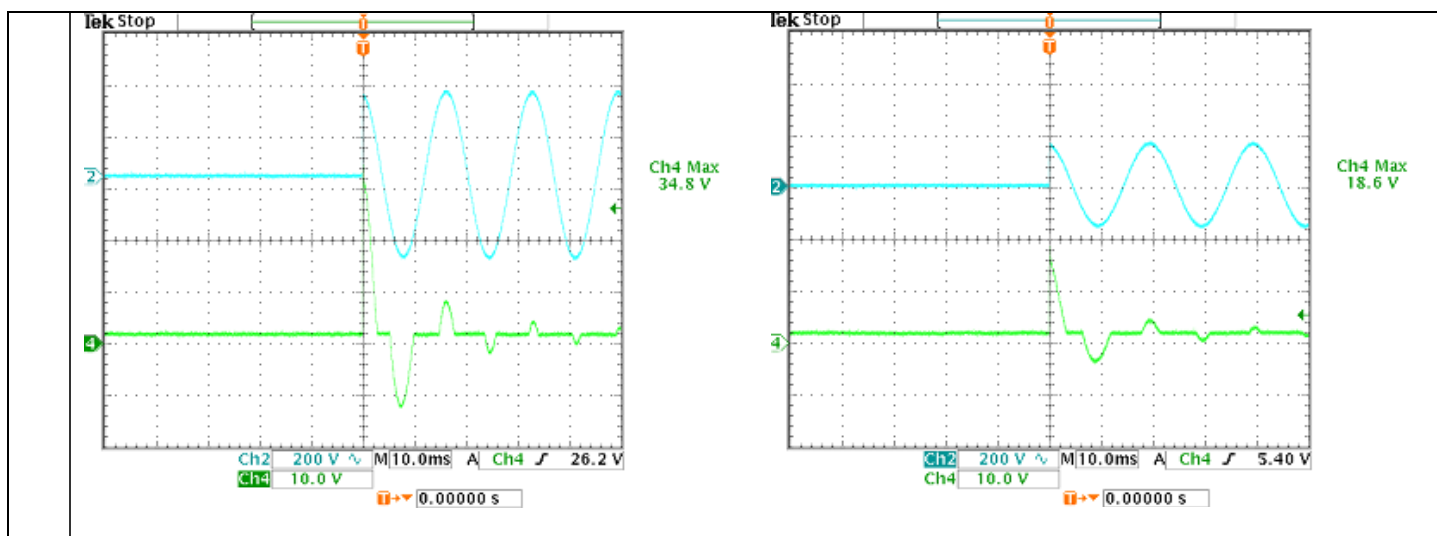
<p>8 RISE TIME (Max)</p>	<p>230VAC/100ms 115VAC/100ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/44.4ms 115VAC/42.8ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage</p>	
<p>9 HOLD UP TIME(Typ.)</p>	<p>230VAC/16ms 115VAC/16ms</p>	<p>I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C</p>	<p>230VAC/18.4ms 115VAC/18.8ms</p>
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>		<p>INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage</p>	
<p>10 DYNAMIC LOAD</p>	<p>V1:2400mVp-p</p>	<p>I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY/120HZ</p>	<p>331mVp-p</p>

			(2)FULL /50% LOAD 50%DUTY/ 1KHZ Ta:25°C	248mVp-p
11	TRANSIENT RECOVERY TIME	V1:2400mVp-p <500us	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	259mVp-p

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~264VAC 127VDC ~ 370VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25°C	(1) 66.8V~264V (2) 116.7Vdc~370Vdc/FULL LOAD (3) 116.6Vdc~370Vdc/FULL LOAD 116.6Vdc~370Vdc/50% LOAD
			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 =2.358A/ 230VAC I =4.683A/ 115VAC
4	LEAKAGE CURRENT	<2mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.874mA N-FG : 0.874 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=0.954/230VAC PF=0.992/115VAC

	<p>PF vs LOAD</p> <table border="1"> <caption>PF vs LOAD Data</caption> <thead> <tr> <th>Load (%)</th> <th>230V60HZ</th> <th>115V60HZ</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.55</td><td>0.90</td></tr> <tr><td>20%</td><td>0.70</td><td>0.98</td></tr> <tr><td>30%</td><td>0.80</td><td>0.99</td></tr> <tr><td>40%</td><td>0.85</td><td>0.99</td></tr> <tr><td>50%</td><td>0.88</td><td>0.99</td></tr> <tr><td>60%</td><td>0.90</td><td>0.99</td></tr> <tr><td>70%</td><td>0.92</td><td>0.99</td></tr> <tr><td>80%</td><td>0.93</td><td>0.99</td></tr> <tr><td>90%</td><td>0.94</td><td>0.99</td></tr> <tr><td>100%</td><td>0.95</td><td>0.99</td></tr> </tbody> </table>			Load (%)	230V60HZ	115V60HZ	10%	0.55	0.90	20%	0.70	0.98	30%	0.80	0.99	40%	0.85	0.99	50%	0.88	0.99	60%	0.90	0.99	70%	0.92	0.99	80%	0.93	0.99	90%	0.94	0.99	100%	0.95	0.99
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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																																	
	INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input VoltageCH4 : Input current (1V=1A)		INPUT=115VAC/60HZ @ FULL LOAD CH2 : AC Input VoltageCH4 : Input current (1V=1A)																																	



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOADPROTECTION	105%~ 130 %	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P: TESTING Ta: 25°C	116.6%/ 264VAC 116.55%/ 230VAC 116.6%/100VAC Protection type : Constant current limiting, unit will shut down after 3 sec., re-power on to recover
2	OVER VOLTAGE PROTECTION	29V~33V	I/P: 264VAC I/P: 230VAC I/P: 90VAC O/P: MIN LOAD Ta: 25°C	30.47V/264VAC 30.50V/ 230VAC 30.45V/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) 452V (2) 422V (3) 434V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q902 Rated : 20A/ 600 V	I/P: High-Line +3V =267V AC ON/OFF O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta: 25°C	VDS: (1) 498V (2) 504V (3) 460V

3	P.F.C DIODE	D902 Rated : 6A/ 600V	I/P:High-Line +3V =267V 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) 450V (2) 434V (3) 446V (4) 444V
4	Diode PeakVoltage	Q100 Rated : 130A/ 75V Q102 Rated : 130A/ 75 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3) Full Load Continue Ta:25°C	Q100: Q102: VDS: VDS: (1) 60.0V (1) 58.0V (2)2.76V (2) 15.2V (3) 60.2V (3) 58.2V
5	Input Capacitor Voltage	C5 Rated: : 150 μ / 400V 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)428V (2) 404V (3)428V
6	Control IC Voltage Test	PWM IC U2Rated :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) 14.5V (2) 14.5V (3) 14.5V (4) 13.5V (5) 13.8V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTANDVOLTAGE	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:9.73mA I/P-FG:9.31mA O/P-FG:7.89mA NO DAMAGE
2	ISOLATIONRESISTANCE	I/P-O/P:500VDC>100M Ω I/P-FG: 500VDC>100M Ω O/P-FG:500VDC>100M Ω	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:>9999M Ω I/P-FG: >9999M Ω O/P-FG: >9999M Ω NO DAMAGE
3	GROUNDINGCONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40A / 2min Ta:25°C	15m Ω

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 CLASS A	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	PASS

	100%	75%	50%	
2	CONDUCTION	BS EN/EN55032 (CISPR32) CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	BS EN/EN55032 (CISPR32) CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab
4	E.S.D	BS EN/EN61000-4-2 INDUSTRY AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	BS EN/EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	BS EN/EN61000-4-5 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-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																																																																																																		
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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)																																																																																																



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	1041.6K hrs min. Telcordia SR-332 (Bellcore) ; 146.8K hrs min. MIL-HDBK-217F (25°C)	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	FRANK	GESG	WANGDZ

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