



120W Single Output Industrial DIN RAIL Power Supply

WDR-120 series



■ Features :

- Wide input range 180 ~ 550VAC
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Cooling by free air convection
- Built-in constant current limiting circuit
- Can be installed on DIN rail TS-35/7.5 or 15
- UL508(industrial control equipment)approved
- EN61000-6-2(EN50082-2) industrial immunity level
- 100% full load burn-in test
- Built-in DC OK relay contact
- 3 years warranty

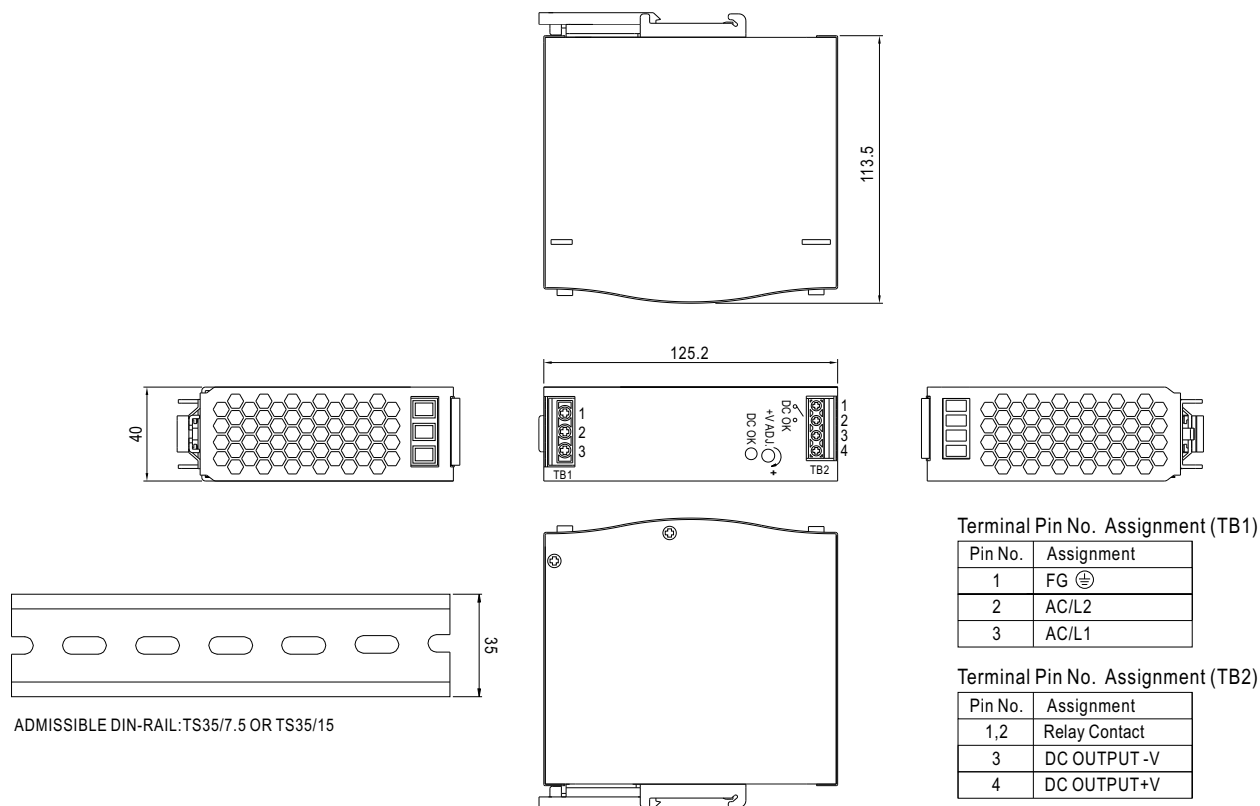


SPECIFICATION

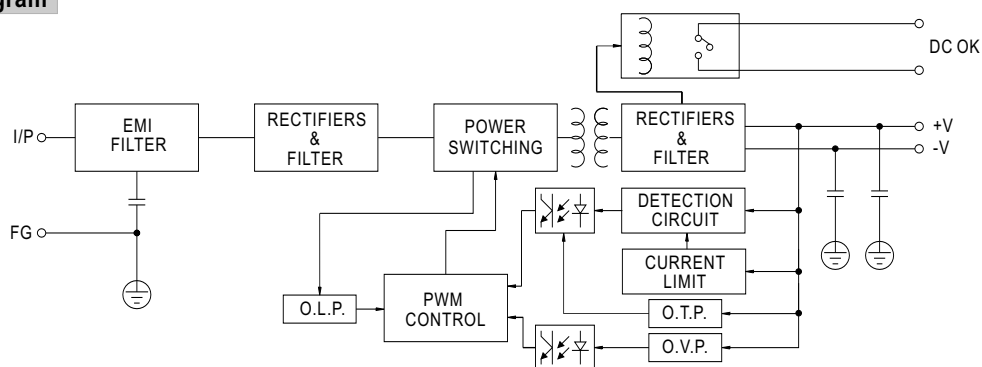
MODEL		WDR-120-12	WDR-120-24	WDR-120-48
OUTPUT	DC VOLTAGE	12V	24V	48V
	RATED CURRENT	10A	5A	2.5A
	CURRENT RANGE	0 ~ 10A	0 ~ 5A	0 ~2.5A
	RATED POWER	120W	120W	120W
	RIPPLE & NOISE (max.) Note.2	120mVp-p	120mVp-p	150mVp-p
	VOLTAGE ADJ. RANGE	12 ~ 15V	24 ~ 29V	48 ~ 58V
	VOLTAGE TOLERANCE Note.3	±1.5%	±1.0%	±1.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±0.5%	±0.5%	±0.5%
SETUP, RISE, HOLD UP TIME		2000ms, 70ms, 50ms/400VAC 2000ms, 70ms, 10ms/230VAC at full load		
INPUT	VOLTAGE RANGE	180 ~ 550VAC 254 ~ 780VDC		
	FREQUENCY RANGE	47 ~ 63Hz		
	EFFICIENCY (Typ.)	89.5% / 400V	91% / 400V	92% / 400V
	AC CURRENT	0.55A/400VAC 1.2A/230VAC		
	INRUSH CURRENT (max.)	COLD START 50A		
	LEAKAGE CURRENT	<3.5mA / 530VAC		
PROTECTION	OVERLOAD	105 ~ 130% rated output power Protection type : Constant current limiting, recovers automatically after fault condition is removed		
	OVER VOLTAGE	16 ~ 18V	31 ~ 37V	60 ~ 67V
	OVER TEMPERATURE	105℃±5℃(12V),110℃±5℃(24V) (TSW1) detect on heatsink of power transistor ; 100℃±5℃(48V) (TSW1) detect on heatsink of power diode Protection type : Shut down o/p voltage, recovers automatically after temperature goes down		
	FUNCTION	DC OK SIGNAL	Relay contact rating(max.) : 30V / 1A resistive	
ENVIRONMENT	WORKING TEMP.	-25 ~ +70℃ (Refer to output load derating curve)		
	WORKING HUMIDITY	20 ~ 90% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH		
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)		
	VIBRATION	Component: 10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes; Mounting clip: Compliance to IEC60068-2-6		
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL508 approved		
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC O/P-DC OK:0.5KVAC		
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃ / 70% RH		
	EMI CONDUCTION & RADIATION	Compliance to EN55011 (CISPR11), EN55022 (CISPR22), EN61204-3 Class B		
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11, ENV50204, EN61204-3, EN61000-6-2 (EN50082-2), heavy industry level, criteria A		
OTHERS	MTBF	268Khrs min. MIL-HDBK-217F (25℃)		
	DIMENSION	40*125.2*113.5mm (W*H*D)		
	PACKING	0.65Kg; 20pcs/14Kg/1.16CUFT		
NOTE	1. All parameters NOT specially mentioned are measured at 400VAC input, rated load and 25℃ of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. 5. Length of set up time is measured at cold first start. Turning ON/OFF the power supply very quick may lead to increase of the set up time.			

Mechanical Specification

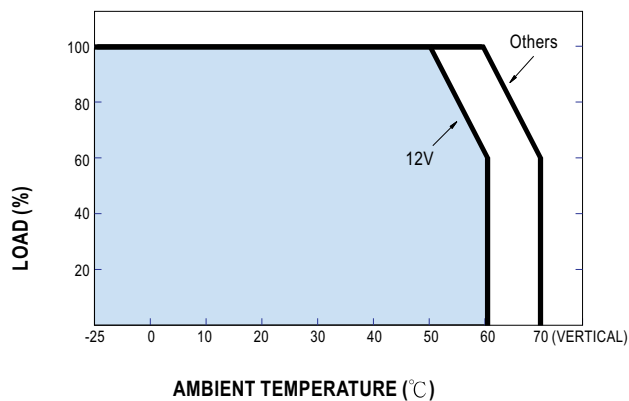
Case No.992B Unit:mm



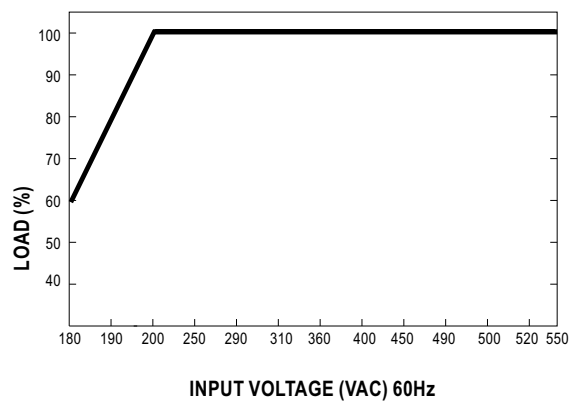
Block Diagram



Derating Curve



Static Characteristics





Test Report: WDR-120-48

240W Single Output Switching Power Supply

■ 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

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 150 mVp-p (Max)	I/P : 400VAC O/P : FULL LOAD Ta : 25°C	V1 : 23.4 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 48 V ~ 58 V	I/P : 400 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	45.7 V ~ 60.6 V/ 400 VAC 45.7 V ~ 60.6 V/ 230 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 1 %~ 1 % (Max)	I/P : 200 VAC / 550 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : 0.02 %~ -0.02 %	P
4	LINE REGULATION	V1 : 0.5 %~ 0.5 % (Max)	I/P : 200 VAC ~ 550 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.02 %~ -0.02 %	P
5	LOAD REGULATION	V1 : 0.5 %~ 0.5 % (Max)	I/P : 400 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.02 %~ -0.02 %	P
6	SET UP TIME	400VAC : 2000 ms (Max) 230VAC : 2000 ms(Max)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	400VAC/ 378 ms 230VAC/ 357 ms	P
7	RISE TIME	400VAC : 70 ms (Max) 230VAC : 70 ms (Max)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	400VAC/ 39 ms 230VAC/ 28 ms	P
8	HOLD UP TIME	400VAC : 50 ms (TYP) 230VAC : 10 ms (TYP)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	400VAC/ 63 ms 230VAC/ 12.9 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 400 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	P
10	DYNAMIC LOAD	V1 : 4800 mVp-p	I/P : 400 VAC O/P : FULL /Min LOAD 90%DUTY/ 1KHZ Ta : 25°C	201 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	200VAC ~ 550 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V= 197 V HIGH-LINE+15%= 632 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	165 V~550V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 200 VAC ~ 550 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	EFFICIENCY	92 % (TYP)	I/P : 400 VAC O/P : FULL LOAD Ta : 25°C	91.67 %	P
4	INPUT CURRENT	400V/ 0.55 A (TYP) 230V/ 1.2 A (TYP)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 0.46 A/ 400 VAC I = 0.73 A/ 230 VAC	P
5	INRUSH CURRENT	400V/ 50 A (TYP) COLD START	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 47 A/ 400 VAC	P
6	LEAKAGE CURRENT	< 3.5 mA / 530 VAC	I/P : 530 VAC O/P : Min LOAD Ta : 25°C	L-FG : 1.3 mA N-FG : 1.3 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~ 130 %	I/P : 400 VAC I/P : 230 VAC O/P : TESTING Ta : 25°C	119 %/ 400 VAC 119 %/ 230 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 60 V ~ 67 V	I/P : 400 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	63.8 V/ 400 VAC 63.8 V/ 230 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 105 ± 5°C O.T.P. NO DAMAGE	I/P : 400 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 550 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Constant Current Limiting	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	DC OK SIGNAL	Relay contact rating(max.) : 30V / 1A resistive	I/P: 400 VAC O/P:FULL LOAD	OK	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : STP7N95K3 7A/950V	I/P : High-Line +3V = 553 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 724V (2) 430V (3) 478V	P
2	Diode Peak Voltage	Q102 Rated : SF10LC40 10A/400V	I/P : High-Line +3V = 553 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 354V (2) 320V (3) 278V	P
3	Input Capacitor Voltage	C5 Rated : 120u/400V 105°C VZ	I/P : High-Line +3V = 553 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 387.2 V (2) 388.6 V (3) 386.1 V	P
4	Control IC Voltage Test	U 1 Rated : NCP1377DR2G 8.2V~18V	I/P : High-Line +3V = 553 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 14.71 V (2) 14.67 V (3) 14.7 V	P

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3 KVAC/min I/P-FG : 1.5 KVAC/min O/P-FG : 0.5 KVAC/min O/P-DCOK : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 1.8 KVAC/min O/P-FG : 0.6 KVAC/min O/P-DCOK : 0.6KVAC/min Ta : 25°C	I/P-O/P : 6.58 mA I/P-FG : 6.07 mA O/P-FG : 3.74 mA O/P-DCOK : 0.021 mA NO DAMAGE	P
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 /70%RH	I/P-O/P : 30 GΩ I/P-FG : 30 GΩ O/P-FG : 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	28 mΩ	P
4	APPROVAL	TUV : Certificate NO : UL : File NO :			N/A

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 400/240/220 VAC/50HZ O/P : 100/75/50/25% LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 400 VAC (50HZ)/115V60HZ O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 EN55011 CLASS B	I/P : 400 VAC (50HZ)/115V60HZ O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab	P
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	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
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	P
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																																
1	TEMPERATURE RISE TEST	MODEL : WDR-120-24 1. ROOM AMBIENT BURN-IN : 0.5 HRS I/P : 400VAC O/P : FULL LOAD Ta= 25.6 °C 2. HIGH AMBIENT BURN-IN : 4 HRS I/P : 400VAC O/P : FULL LOAD Ta= 61.1 °C <table><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 25.6 °C</th><th>HIGH AMBIENT Ta= 61.1 °C</th></tr><tr><td>1</td><td>LF1</td><td>TR560</td><td>48.3°C</td><td>80.1°C</td></tr><tr><td>2</td><td>BD1</td><td>BD 8A/1000V GLASS GBU810</td><td>58.5°C</td><td>88.7°C</td></tr><tr><td>3</td><td>Q2</td><td>STP7N95K3 7A/950V</td><td>52.1°C</td><td>87.2°C</td></tr><tr><td>4</td><td>C5</td><td>100u/400V 105°C 18*31.5 KMG</td><td>52.6°C</td><td>85.8°C</td></tr><tr><td>5</td><td>C51</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>59.4°C</td><td>93.7°C</td></tr><tr><td>6</td><td>T1 COIL</td><td>TF1952</td><td>78.4°C</td><td>112.0°C</td></tr><tr><td>7</td><td>C200</td><td>47u/50V UL10Kh 6.3*11 YXM</td><td>63.5°C</td><td>97.0°C</td></tr><tr><td>8</td><td>Q102</td><td>STP75NF20 75A/200V</td><td>72.7°C</td><td>111.2°C</td></tr><tr><td>9</td><td>C106</td><td>680u/35V UL10Kh 10*23 ZLH</td><td>59.6°C</td><td>94.2°C</td></tr><tr><td>10</td><td>U1</td><td>NCP1377</td><td>54.8°C</td><td>87.7°C</td></tr><tr><td>11</td><td>TSW1</td><td>ST-22W-R3 105°C 60mm</td><td>65.9°C</td><td>102.8°C</td></tr><tr><td>12</td><td>C111</td><td>103/2KV EPOXY 80,-20%</td><td>49.7°C</td><td>83.1°C</td></tr><tr><td>13</td><td>LF100</td><td>TR847-R2</td><td>52.5°C</td><td>86.1°C</td></tr><tr><td>14</td><td>LF2</td><td>TR368</td><td>48.7°C</td><td>81.4°C</td></tr><tr><td>15</td><td>D20</td><td>BYV26EGP 1A/1KV</td><td>52.8°C</td><td>88.4°C</td></tr></table>			NO	Position	P/N	ROOM AMBIENT Ta= 25.6 °C	HIGH AMBIENT Ta= 61.1 °C	1	LF1	TR560	48.3°C	80.1°C	2	BD1	BD 8A/1000V GLASS GBU810	58.5°C	88.7°C	3	Q2	STP7N95K3 7A/950V	52.1°C	87.2°C	4	C5	100u/400V 105°C 18*31.5 KMG	52.6°C	85.8°C	5	C51	47u/50V UL10Kh 6.3*11 YXM	59.4°C	93.7°C	6	T1 COIL	TF1952	78.4°C	112.0°C	7	C200	47u/50V UL10Kh 6.3*11 YXM	63.5°C	97.0°C	8	Q102	STP75NF20 75A/200V	72.7°C	111.2°C	9	C106	680u/35V UL10Kh 10*23 ZLH	59.6°C	94.2°C	10	U1	NCP1377	54.8°C	87.7°C	11	TSW1	ST-22W-R3 105°C 60mm	65.9°C	102.8°C	12	C111	103/2KV EPOXY 80,-20%	49.7°C	83.1°C	13	LF100	TR847-R2	52.5°C	86.1°C	14	LF2	TR368	48.7°C	81.4°C	15	D20	BYV26EGP 1A/1KV	52.8°C	88.4°C	P
NO	Position	P/N	ROOM AMBIENT Ta= 25.6 °C	HIGH AMBIENT Ta= 61.1 °C																																																																																	
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10	U1	NCP1377	54.8°C	87.7°C																																																																																	
11	TSW1	ST-22W-R3 105°C 60mm	65.9°C	102.8°C																																																																																	
12	C111	103/2KV EPOXY 80,-20%	49.7°C	83.1°C																																																																																	
13	LF100	TR847-R2	52.5°C	86.1°C																																																																																	
14	LF2	TR368	48.7°C	81.4°C																																																																																	
15	D20	BYV26EGP 1A/1KV	52.8°C	88.4°C																																																																																	
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 400 VAC O/P : 114 % LOAD Ta : 25°C	TEST : OK	P																																																																																
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 550VAC/100VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	P																																																																																
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 60 °C NO DAMAGE	I/P : 567 VAC O/P : FULL LOAD Ta= 60 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																
5	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P : 400 VAC O/P : FULL LOAD	± 0.003 %(0-50°C)	P																																																																																
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 : 5 CYCLE 5. Input/Output condition : STATIC		OK	P																																																																																
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +55°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 : 400VAC/Full Load AC ON/OFF TEST turn on 58sec : turn off 2sec		OK	P																																																																																

8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25℃	TEST : OK	P
9	CAPACITOR LIFE CYCLE	WDR-120-24:SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P : 400VAC O/P : FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P : 400VAC O/P : FULL LOAD Ta= 60 ℃ LIFE TIME (3) I/P : 400VAC O/P : 75% LOAD Ta= 60 ℃ LIFE TIME	(1) 289302.5HRS (2) 27200.4HRS (3) 48077.9HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 268K HRS		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/11/3	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/12/17	W0911C65	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023