



# Test Report: WDR-480-48

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480W Single Output Industrial DIN RAIL 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 : 65 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 48 V ~ 55 V	I/P : 400 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	46.83 V~ 56.49 V/ 400 VAC 46.82 V~ 56.49 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 : 0.2 %~ -0.2 %	P
4	LINE REGULATION	V1 : 0.5%~ -0.5% (Max)	I/P : 200 VAC ~ 550 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0.002 %~ -0.002 %	P
5	LOAD REGULATION	V1 : 1%~ -1% (Max)	I/P : 400 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.2 %~ -0.2 %	P
6	SET UP TIME	400VAC : 800 ms (Max) 230VAC : 2000 ms(Max)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	400VAC/ 494 ms 230VAC/ 969 ms	P
7	RISE TIME	400VAC : 150 ms (Max) 230VAC : 150 ms (Max)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	400VAC/ 53 ms 230VAC/ 105 ms	P
8	HOLD UP TIME	400VAC : 18 ms (TYP) 230VAC : 16 ms (TYP)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	400VAC/ 19 ms 230VAC/ 19 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 (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 562 mVp-p (2) 1241 mVp-p	P

### INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~550 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C  I/P : LOW-LINE-3V= 177 V HIGH-LINE+15%=550V O/P : FULL/MIN LOAD ON : 30 Sec. OFF : 30 Sec 10MIN ( AC POWER ON/OFF NO DAMAGE )	167 V~550V  TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P : 180 VAC ~ 550 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	EFFICIENCY	93 % (TYP)	I/P : 400 VAC O/P : FULL LOAD Ta : 25°C	93.03 %	P
4	INPUT CURRENT	400V/ 1.6 A (TYP) 230V/ 4 A (TYP)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 1.48 A/ 400 VAC I = 2.53 A/ 230 VAC	P
5	INRUSH CURRENT	400V/ 50 A (TYP) COLD START	I/P : 400 VAC O/P : FULL LOAD Ta : 25°C	I = 40 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 : 1.4 mA N-FG : 1.4 mA	P
7	POWER FACTOR	0.84 / 400VAC(TYP) 0.84 / 230 VAC(TYP)	I/P : 400 VAC I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.853 / 400VAC PF= 0.87 / 230 VAC	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	116 %/ 400 VAC 116 %/ 230 VAC Constant current limiting, unit will shut down after 3 sec. , auto-recovery after 1 minute if the fault condition is removed	P
2	OVER VOLTAGE PROTECTION	CH1 : 56V ~ 65 V	I/P : 400 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	60.9 V/ 400 VAC 60.98 V/ 230 VAC Shut down o/p voltage, auto-recovery after 1 minute if the fault condition is removed	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 95 ± 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, unit will shut down after 3 sec. , auto-recovery after 1 minute if the fault condition is removed	P

### CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	DO OK RELAY CONTACT RAYINGS	60VDC/0.3A 、 30VDC/1A 、 30VAC/0.5A resistive load	I/P : 550 VAC O/P : FULL LOAD Ta : 25°C	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	Q 40 Rated : IRFB4229PbF 46A/250V	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) 249 V (2) 249 V (3) 243 V	P
2	Diode Peak Voltage	Q100 Rated : YA868C15RSC 30A/150V	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) 144 V (2) 108 V (3) 139 V	P
3	Input Capacitor Voltage	C 5 Rated : 390u/250V 105°C 22*30 KMR	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) 205.9 V (2) 215.5 V (3) 215.5 V	P
4	Control IC Voltage Test	U2 Rated : L6599AD 8.85V~16V	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) 14.491 V (2) 14.192 V (3) 14.216 V	P
5	Power Transistor ( D to S) or (C to E) Peak Voltage	Q901 Rated : IPW90R500C3 11A/900V	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) 900 V (2) 760 V (3) 860 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 : 2 KVAC/min O/P-FG : 0.5 KVAC/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 : 9.51 mA I/P-FG : 6.97 mA O/P-FG : 10.96 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 : 25.8 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	10 mΩ	P
4	APPROVAL	TUV : Certificate NO : UL : File NO : E215312			P

**E.M.C TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	I/P : 400 /240/220VAC 50HZ O/P : 100/75/50/25%LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 400 /230VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 400 /230VAC (50HZ) 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 : 400 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 400 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 : 400 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.	THERMO TRACER TEST (ROOM AMBIENT)	MODEL: WDR-480-24	TEST CONDITION: 100 VAC FULL LOAD	ROOM AMBIENT = 25.4 °C	<table border="1"> <thead> <tr> <th></th> <th>Position</th> <th>Temp</th> <th>VERDICT</th> </tr> </thead> <tbody> <tr><td>p 1:</td><td>L6</td><td>80.8</td><td>PASS</td></tr> <tr><td>p 2:</td><td>L8</td><td>59.8</td><td>PASS</td></tr> <tr><td>p 3:</td><td>C24</td><td>60.6</td><td>PASS</td></tr> <tr><td>p 4:</td><td>C902</td><td>64.9</td><td>PASS</td></tr> <tr><td>p 5:</td><td>C107</td><td>63.6</td><td>PASS</td></tr> <tr><td>p 6:</td><td>Q902</td><td>80.4</td><td>PASS</td></tr> <tr><td>p 7:</td><td>Q40</td><td>64.5</td><td>PASS</td></tr> <tr><td>p 8:</td><td>C51</td><td>70.8</td><td>PASS</td></tr> <tr><td>p 9:</td><td>C6</td><td>68.1</td><td>PASS</td></tr> <tr><td>p 10:</td><td>T1</td><td>73.0</td><td>PASS</td></tr> <tr><td>p 11:</td><td></td><td></td><td></td></tr> <tr><td>p 12:</td><td></td><td></td><td></td></tr> <tr><td>p 13:</td><td></td><td></td><td></td></tr> <tr><td>p 14:</td><td></td><td></td><td></td></tr> <tr><td>p 15:</td><td></td><td></td><td></td></tr> </tbody> </table>		Position	Temp	VERDICT	p 1:	L6	80.8	PASS	p 2:	L8	59.8	PASS	p 3:	C24	60.6	PASS	p 4:	C902	64.9	PASS	p 5:	C107	63.6	PASS	p 6:	Q902	80.4	PASS	p 7:	Q40	64.5	PASS	p 8:	C51	70.8	PASS	p 9:	C6	68.1	PASS	p 10:	T1	73.0	PASS	p 11:				p 12:				p 13:				p 14:				p 15:																																																																
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2	TEMPERATURE RISE TEST	MODEL : WDR-480-24	1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 400VAC O/P : FULL LOAD Ta= 35.1 °C 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 400VAC O/P : FULL LOAD Ta= 55.1 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 35.1 °C</th> <th>HIGH AMBIENT Ta= 55.1 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C122</td><td>220u/35V UL8Kh ZLH</td><td>75.0°C</td><td>95.0°C</td></tr> <tr><td>2</td><td>C42</td><td>100u/50V L7Kh KY</td><td>79.4°C</td><td>100.1°C</td></tr> <tr><td>3</td><td>C902</td><td>220u/250V 105°C 18*31.5 KXG</td><td>83.0°C</td><td>103.7°C</td></tr> <tr><td>4</td><td>L3</td><td>TR964</td><td>48.0°C</td><td>66.4°C</td></tr> <tr><td>5</td><td>C106</td><td>1500u/35V UL10Kh 12.5*30 ZLH</td><td>74.3°C</td><td>94.9°C</td></tr> <tr><td>6</td><td>C8</td><td>824/275VAC 20%</td><td>60.7°C</td><td>80.2°C</td></tr> <tr><td>7</td><td>C5</td><td>390u/250V KMR</td><td>64.3°C</td><td>84.4°C</td></tr> <tr><td>8</td><td>C26</td><td>390u/35V L8Kh ZLH</td><td>71.4°C</td><td>90.9°C</td></tr> <tr><td>9</td><td>C24</td><td>225/450V 10% P=15 MMX</td><td>74.4°C</td><td>95.7°C</td></tr> <tr><td>10</td><td>C108</td><td>680u/35V UL10Kh 10*23 ZLH</td><td>70.8°C</td><td>91.0°C</td></tr> <tr><td>11</td><td>BD1</td><td>KBJ1010G 10A/1KV</td><td>67.7°C</td><td>87.2°C</td></tr> <tr><td>12</td><td>LF2</td><td>TR957</td><td>67.1°C</td><td>86.9°C</td></tr> <tr><td>13</td><td>L8</td><td>TR958</td><td>75.5°C</td><td>96.6°C</td></tr> <tr><td>14</td><td>D4</td><td>STPSC606D 6A/600V</td><td>69.3°C</td><td>90.4°C</td></tr> <tr><td>15</td><td>Q902</td><td>IPW90R500C3 11A/900V</td><td>83.4°C</td><td>105.4°C</td></tr> <tr><td>16</td><td>D17</td><td>TVS P6KE200A</td><td>74.3°C</td><td>93.8°C</td></tr> <tr><td>17</td><td>Q12</td><td>STD2NK90Z-1 2.1A/900V</td><td>58.5°C</td><td>76.4°C</td></tr> <tr><td>18</td><td>U2</td><td>L6599AD SO-16N</td><td>81.7°C</td><td>102.4°C</td></tr> <tr><td>19</td><td>TSW</td><td>ST-22W-R0 95°C</td><td>74.9°C</td><td>95.5°C</td></tr> <tr><td>20</td><td>Q40</td><td>IRFB4229PbF 46A/250V TO220</td><td>78.2°C</td><td>99.5°C</td></tr> <tr><td>21</td><td>T1 COIL</td><td>TF2115</td><td>72.0°C</td><td>92.1°C</td></tr> <tr><td>22</td><td>Q102</td><td>IRFB3307 130A/75V TO220</td><td>64.5°C</td><td>84.5°C</td></tr> <tr><td>23</td><td>L180</td><td>TR830</td><td>72.2°C</td><td>92.3°C</td></tr> <tr><td>24</td><td>L6</td><td>TR944</td><td>90.6°C</td><td>112.1°C</td></tr> </tbody> </table>	NO	Position	P/N	ROOM AMBIENT Ta= 35.1 °C	HIGH AMBIENT Ta= 55.1 °C	1	C122	220u/35V UL8Kh ZLH	75.0°C	95.0°C	2	C42	100u/50V L7Kh KY	79.4°C	100.1°C	3	C902	220u/250V 105°C 18*31.5 KXG	83.0°C	103.7°C	4	L3	TR964	48.0°C	66.4°C	5	C106	1500u/35V UL10Kh 12.5*30 ZLH	74.3°C	94.9°C	6	C8	824/275VAC 20%	60.7°C	80.2°C	7	C5	390u/250V KMR	64.3°C	84.4°C	8	C26	390u/35V L8Kh ZLH	71.4°C	90.9°C	9	C24	225/450V 10% P=15 MMX	74.4°C	95.7°C	10	C108	680u/35V UL10Kh 10*23 ZLH	70.8°C	91.0°C	11	BD1	KBJ1010G 10A/1KV	67.7°C	87.2°C	12	LF2	TR957	67.1°C	86.9°C	13	L8	TR958	75.5°C	96.6°C	14	D4	STPSC606D 6A/600V	69.3°C	90.4°C	15	Q902	IPW90R500C3 11A/900V	83.4°C	105.4°C	16	D17	TVS P6KE200A	74.3°C	93.8°C	17	Q12	STD2NK90Z-1 2.1A/900V	58.5°C	76.4°C	18	U2	L6599AD SO-16N	81.7°C	102.4°C	19	TSW	ST-22W-R0 95°C	74.9°C	95.5°C	20	Q40	IRFB4229PbF 46A/250V TO220	78.2°C	99.5°C	21	T1 COIL	TF2115	72.0°C	92.1°C	22	Q102	IRFB3307 130A/75V TO220	64.5°C	84.5°C	23	L180	TR830	72.2°C	92.3°C	24	L6	TR944	90.6°C	112.1°C	P
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3	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR ( MIN )	I/P : 400 VAC O/P : 112 % LOAD Ta : 25°C	TEST : OK	P
4	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 550VAC/100VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	P
5	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= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P
6	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P : 400 VAC O/P : FULL LOAD	± 0.003 %(0-50°C)	P
7	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
8.	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°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
9	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	P
10	CAPACITOR LIFE CYCLE	SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P : 400VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 400VAC O/P : FULL LOAD Ta= 50 °C LIFE TIME (3) I/P : 400VAC O/P : 75% LOAD Ta= 50 °C LIFE TIME		(1) 207823.9 HRS (2) 35272.3 HRS (3) 76075.1 HRS	P
11	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 112.8 KHRS			P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/4/15	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/7/23	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023