



# Test Report: WDR-480-24

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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 : 100 mVp-p (Max)	I/P : 400VAC O/P : FULL LOAD Ta : 25°C	V1 : 32.2 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 24 V ~ 28 V	I/P : 400 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	23.458 V ~ 28.722 V / 400 VAC 23.456 V ~ 28.722 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 : 0.01 %~ -0.01 %	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/ 510 ms 230VAC/ 976 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/ 55 ms 230VAC/ 106 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/ 18.8 ms 230VAC/ 18 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 : 2400 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). 417 mVp-p (2). 608 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+10V=560 V 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	92 % (TYP)	I/P : 400 VAC O/P : FULL LOAD Ta : 25°C	92.96 %	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 = 1.5 A/ 400 VAC I = 2.57 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 : 1.5 mA N-FG : 1.5 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= 0.862 / 400VAC PF= 0.863 / 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	114 %/ 400 VAC 114 %/ 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 : 29~ 33 V	I/P : 400 VAC I/P : 230 VAC O/P : MIN LOAD Ta : 25°C	30.45 V/ 400 VAC 30.45 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) 250 V (2) 250 V (3) 243 V	P
2	Diode Peak Voltage	Q100 Rated : IRFB3307 130A/75V	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) 65.6 V (2) 66.9 V (3) 63.1 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) 204 V (2) 205 V (3) 205 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) 14.466 V (2) 14.278 V (3) 14.299 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) 900 V (3) 900 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 : 9.09 mA I/P-FG : 6.9 mA O/P-FG : 11.2 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	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>Position</th> <th>Temp</th> <th>VERDICT</th> </tr> </thead> <tbody> <tr><td>P1</td><td>L6</td><td>80.8</td><td>PASS</td></tr> <tr><td>P2</td><td>L8</td><td>59.8</td><td>PASS</td></tr> <tr><td>P3</td><td>C24</td><td>60.6</td><td>PASS</td></tr> <tr><td>P4</td><td>C902</td><td>64.9</td><td>PASS</td></tr> <tr><td>P5</td><td>C107</td><td>63.6</td><td>PASS</td></tr> <tr><td>P6</td><td>Q902</td><td>80.4</td><td>PASS</td></tr> <tr><td>P7</td><td>Q40</td><td>64.5</td><td>PASS</td></tr> <tr><td>P8</td><td>C51</td><td>70.8</td><td>PASS</td></tr> <tr><td>P9</td><td>C6</td><td>68.1</td><td>PASS</td></tr> <tr><td>P10</td><td>T1</td><td>73.0</td><td>PASS</td></tr> </tbody> </table>	Position	Temp	VERDICT	P1	L6	80.8	PASS	P2	L8	59.8	PASS	P3	C24	60.6	PASS	P4	C902	64.9	PASS	P5	C107	63.6	PASS	P6	Q902	80.4	PASS	P7	Q40	64.5	PASS	P8	C51	70.8	PASS	P9	C6	68.1	PASS	P10	T1	73.0	PASS																																																																																		
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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 : 560 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	Conducted by Parts Stress Analysis Prediction 825.4K hrs min. Telcordia SR-332 (Bellcore) ; 112.8K hrs min. MIL-HDBK-217F (25°C)			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