



Test Report: RQ-85D

85W Quad 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

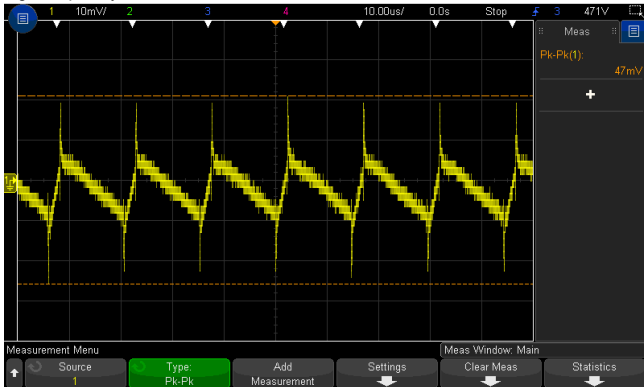
ENVIRONMENT TEST

DESIGN VERIFY TEST

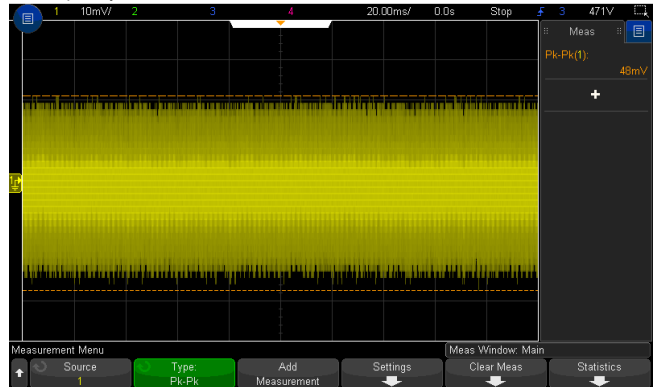
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE ADJUST RANGE	CH1: 4.75V~ 5.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	4.70V~5.66V/230VAC 4.70V~5.66V/115VAC
2	OUTPUT VOLTAGE(Max) TOLERANCE	V1 : -2%~2 % V2 : -3%~7 % V3 : -8%~8 % V4 : -5%~5 %	I/P: 88VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1 : -0.09%~0.09% V2 : -0.68%~0.12% V3 : -1.48%~0.07% V4 : -0.03%~0.04%
3	LINE REGULATION (Max)	V1: -0.5%~0.5% V2: -1%~ 1% V3: -1%~ 1% V4: -1%~ 1%	I/P: 88VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1 : -0.01%~0.01% V2 : -0.08%~0.08% V3 : -0.13%~0.04% V4 : -0.03%~0.03%
4	LOAD REGULATION(Max)	V1: -1%~1% V2: -3%~3% V3: -5%~5% V4: -2%~2%	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1 : -0.09%~0.09% V2 : -0.68%~0.12% V3 : -1.48%~0.07% V4 : -0.03%~0.04%
5	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	2.8%
6	RIPPLE & NOISE(Max)	V1: 80mVp-p V2: 120mVp-p V3: 150mVp-p V4: 80mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 48mVp-p V2: 76mVp-p V3: 88mVp-p V4: 42mVp-p

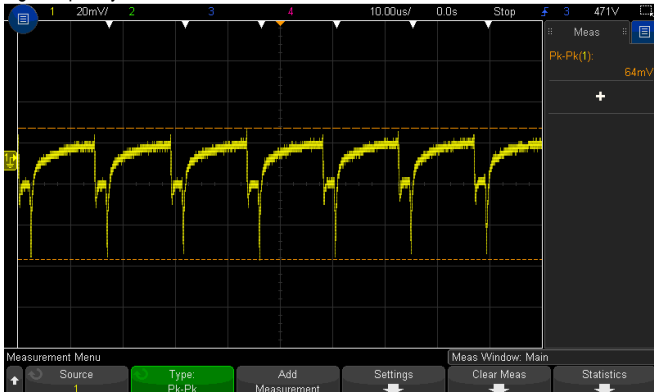
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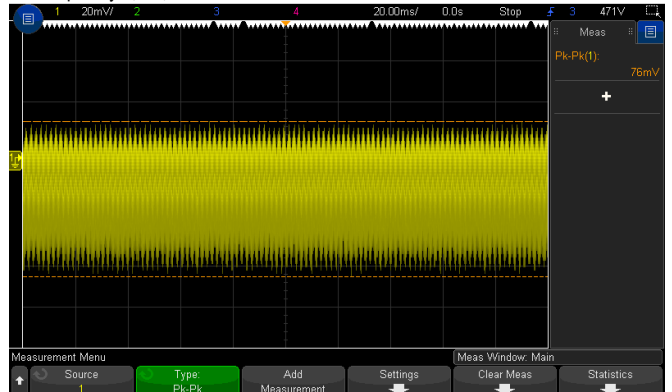
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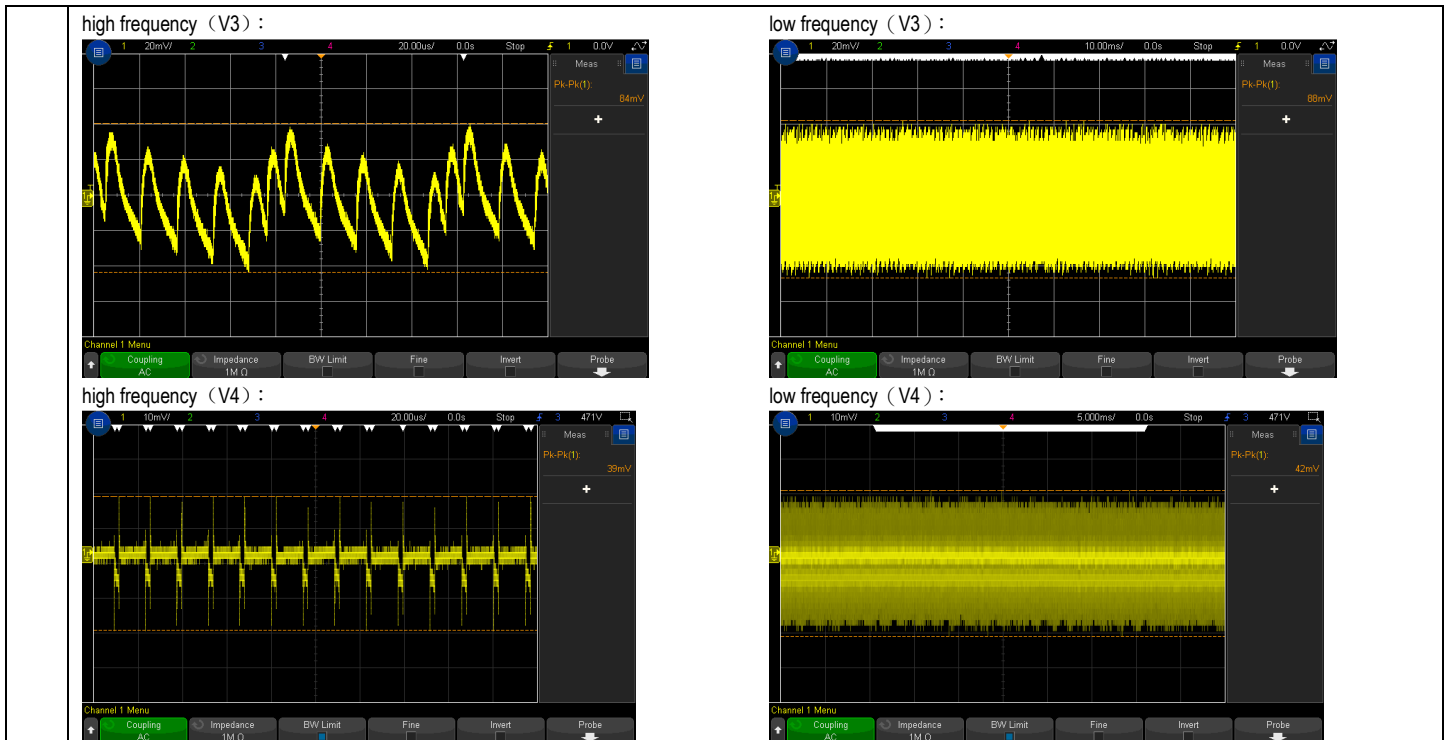


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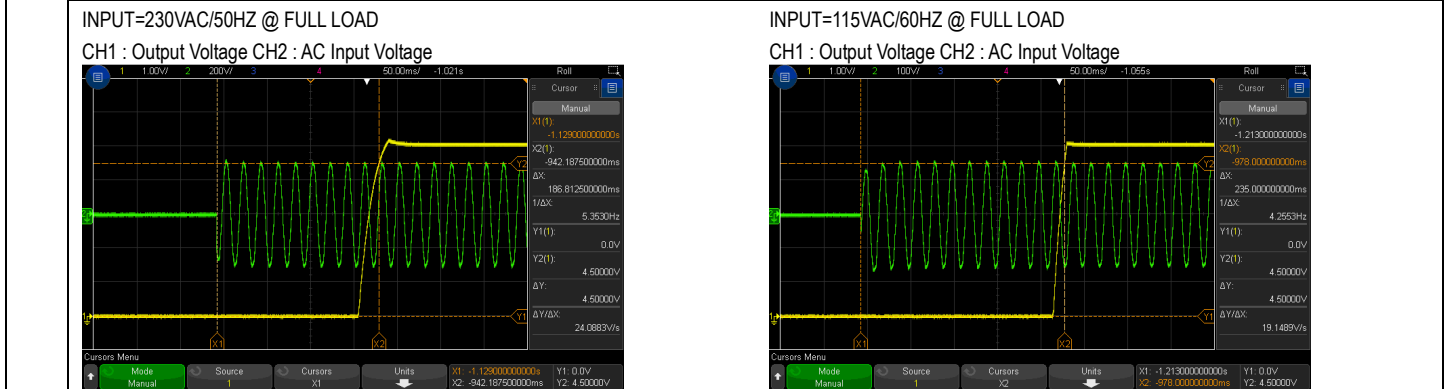


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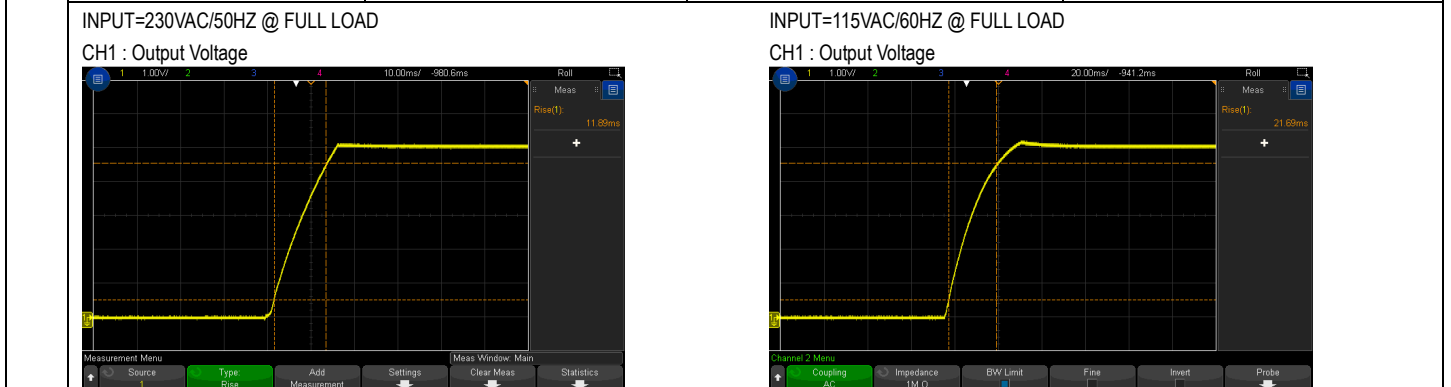


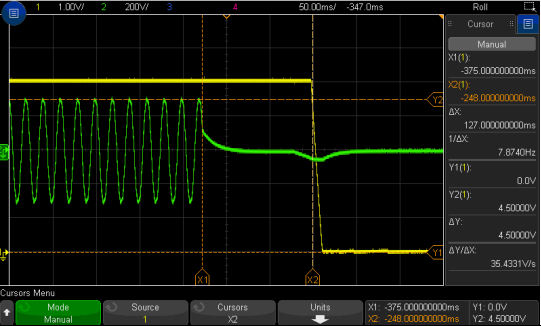
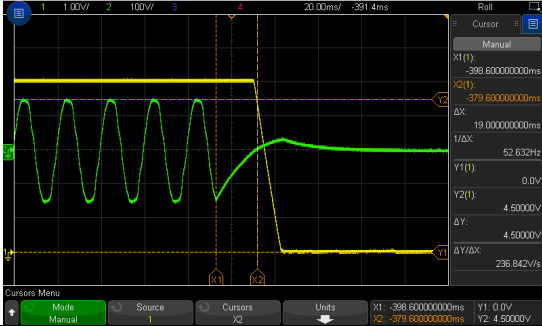
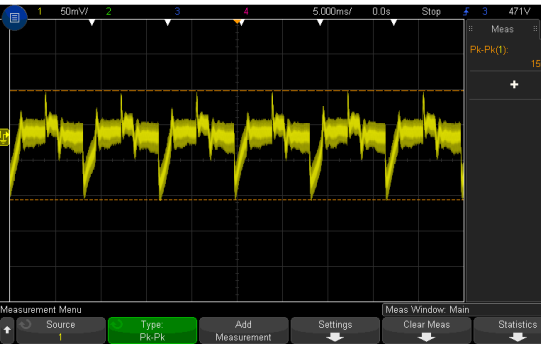
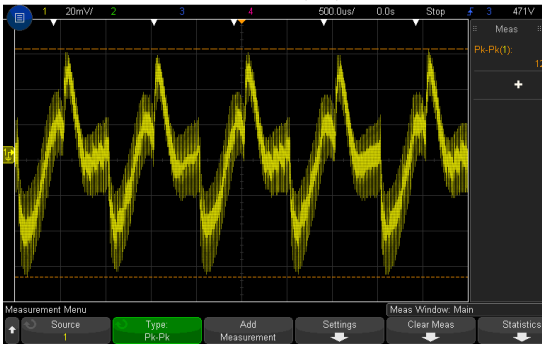
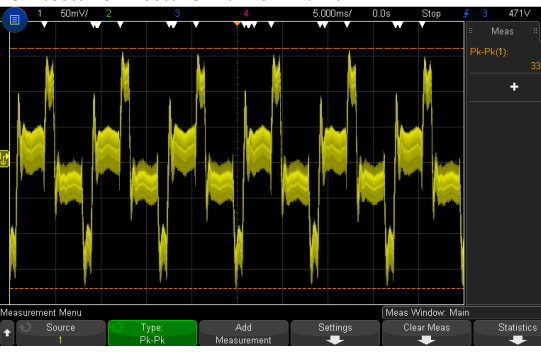
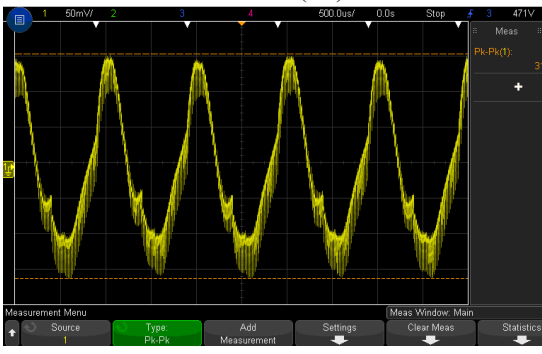
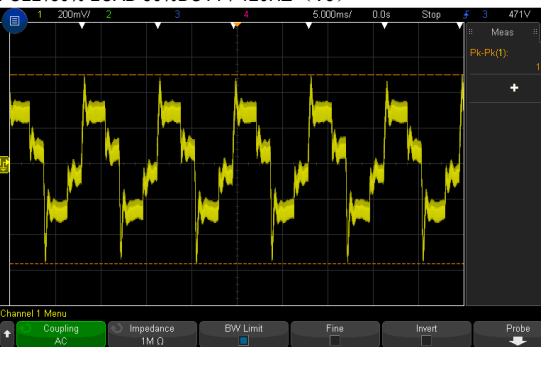
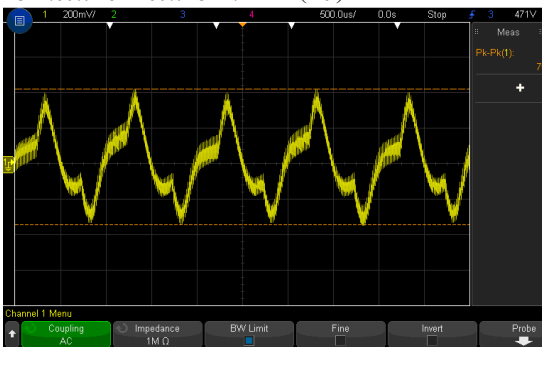


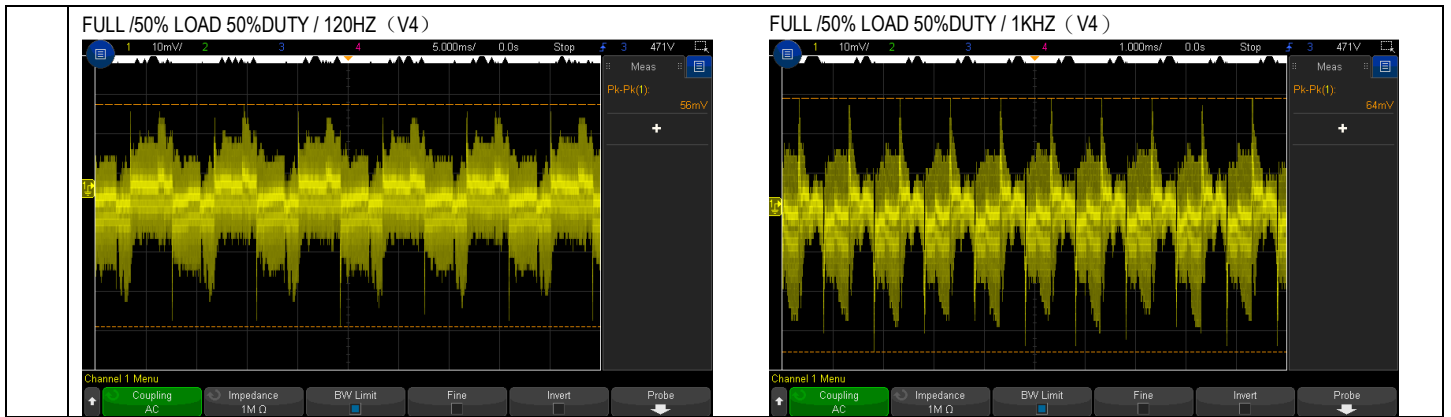
7	SET UP TIME(Max)	230VAC/500ms 115VAC/1200ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/187 ms 115VAC/ 235ms
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8	RISE TIME (Max)	230VAC/20ms 115VAC/30ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 11.89ms 115VAC/ 21.69ms
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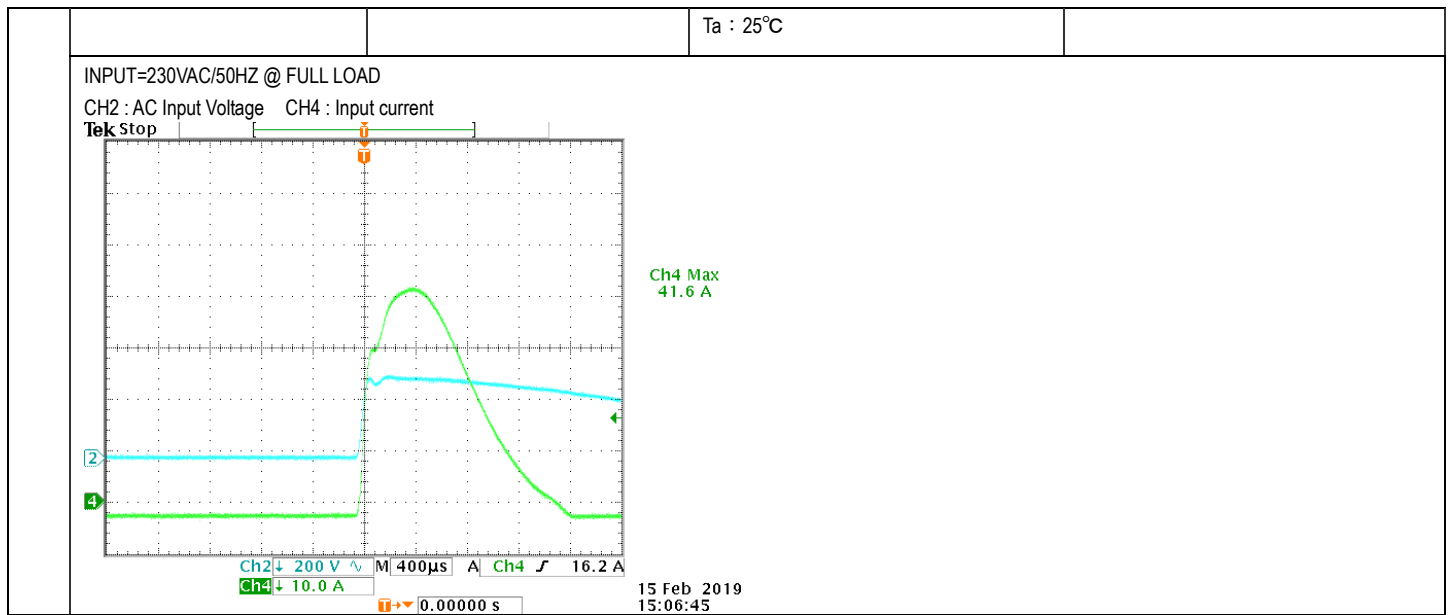


9 HOLD UP TIME (Typ.)	230VAC/100ms 115VAC/18ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/127ms 115VAC/ 19ms										
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 		INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage 											
10 DYNAMIC LOAD	V1: 1000 mVp-p V2: 1200 mVp-p V3: 2400 mVp-p V4: 1200 mVp-p	I/P: 230VAC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C	<table border="0"> <tr> <td>(1)</td> <td>(2)</td> </tr> <tr> <td>V1: 155mVp-p</td> <td>129mVp-p</td> </tr> <tr> <td>V2: 338mVp-p</td> <td>316mVp-p</td> </tr> <tr> <td>V3: 1060mVp-p</td> <td>760mVp-p</td> </tr> <tr> <td>V4: 56mVp-p</td> <td>64mVp-p</td> </tr> </table>	(1)	(2)	V1: 155mVp-p	129mVp-p	V2: 338mVp-p	316mVp-p	V3: 1060mVp-p	760mVp-p	V4: 56mVp-p	64mVp-p
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FULL /50% LOAD 50%DUTY / 120HZ (V1) 		FULL /50% LOAD 50%DUTY / 1KHZ (V1) 											
FULL /50% LOAD 50%DUTY / 120HZ (V2) 		FULL /50% LOAD 50%DUTY / 1KHZ (V2) 											
FULL /50% LOAD 50%DUTY / 120HZ (V3) 		FULL /50% LOAD 50%DUTY / 1KHZ (V3) 											



INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																						
1	INPUT VOLTAGE RANGE	88VAC~264VAC 125VDC ~ 373VDC (Withstand 300VAC surge for 5sec. Without damage)	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:+ N:-) O/P: FULL LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL LOAD Ta:25°C I/P: LOW-LINE-3V=85 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)	(1) 69V~264V (2) 114.1Vdc~373Vdc/FULL LOAD (3) 114.0Vdc~373Vdc/FULL LOAD TEST: OK																						
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:88 VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK																						
3	INPUT CURRENT (Typ.)	230V/ 1.5A 115V/ 2.5A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =0.80A/ 230VAC I =1.30A/ 115VAC																						
4	LEAKAGE CURRENT	<2 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.5mA																						
5	EFFICIENCY(Typ.)	78%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	79.4%																						
EFFICIENCY vs LOAD																										
<table border="1"> <caption>Efficiency vs Load Data (230VAC)</caption> <thead> <tr> <th>Load (%)</th> <th>Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>74%</td></tr> <tr><td>20%</td><td>75%</td></tr> <tr><td>30%</td><td>76%</td></tr> <tr><td>40%</td><td>77%</td></tr> <tr><td>50%</td><td>77.5%</td></tr> <tr><td>60%</td><td>78%</td></tr> <tr><td>70%</td><td>78.5%</td></tr> <tr><td>80%</td><td>79%</td></tr> <tr><td>90%</td><td>79.5%</td></tr> <tr><td>100%</td><td>80%</td></tr> </tbody> </table>					Load (%)	Efficiency (%)	10%	74%	20%	75%	30%	76%	40%	77%	50%	77.5%	60%	78%	70%	78.5%	80%	79%	90%	79.5%	100%	80%
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80%	79%																									
90%	79.5%																									
100%	80%																									
6	INRUSH CURRENT(Typ.)	230V / 50A COLD START	I/P : 230 VAC O/P : FULL LOAD	41.6A																						



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	110%~150%	I/P: 264VAC I/P: 230VAC I/P: 115VAC O/P: TESTING Ta: 25°C	141.6%/ 264VAC 142.5%/ 230VAC 142.6%/115VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	5.75V~6.75V	I/P: 264VAC I/P: 230VAC I/P: 88VAC O/P: MIN LOAD Ta: 25°C	6.31V/ 264VAC 6.31V/ 230VAC 6.31V/ 88VAC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 264VAC I/P: 88VAC O/P: FULL LOAD Ta: 25°C	NO DAMAGE PROTECTION TYPE : Hiccup mode, 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 : 900 V	AC ON/OFF I/P: High-Line +3V =267V VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta: 25°C	VDS: (1) 509V (2) 672V (3) 501V
2	O/P Diode	D50 Rated : 200 V D52 Rated : 600V	AC ON/OFF I/P: High-Line +3V =267 V O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta: 25°C	D50 D52 (1) 118V (1) 135V (2) 96V (2) 135V (3) 110V (3) 131V

		D55 Rated : 200 V		D55 D60
		D60 Rated : 60 V		(1) 75V (2) 73.0V (3) 70V (1) 30.1V (2) 29.3V (3) 17.6V
3	Input Capacitor Voltage	C5 Rated :150 μ / 400 V	I/P:High-Line +3V =267V O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue Ta:25°C	(1) 381V (2) 377V (3) 377V (4) 369V
4	Control IC Voltage Test	U1 Rated : 8.4V~ 21 V	AC ON/OFF I/P:High-Line +3V =267 V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(LOW LINE) Ta:25°C	(1) 13.6V (2) 12.8V (3) 12.8V (4) 12.7V (5) 11.0V
5	Clamp Diode Peak Voltage	D1 Rated : 1000 V	AC ON/OFF I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 576V (2) 545V

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG:2 KVAC/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:4.14mA I/P-FG:3.47mA O/P-FG:1.86mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100M Ω I/P- FG:500VDC>100M Ω O/P- FG:500VDC>100M Ω	I/P-O/P: 600 VDC I/P- FG: 600 VDC O/P - FG: 600 VDC Ta:25°C	I/P-O/P: 9999M Ω I/P-FG: 9999M Ω O/P-FG: 9999M Ω NO DAMAGE
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 m Ω	40 A / 2min Ta: 25°C/70%RH	10m Ω

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	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab
3	RADIATION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C	PASS Test by certified Lab



2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 115% LOAD Ta : 25°C	TEST : OK
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/115VAC 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 CONTROL35°C /95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=35 °C HUMIDITY= 95 %R.H	TEST : OK
5	TEMPERATURE COEFFICIENT	± 0.03%/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.02%/°C (0~50°C)
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 : 10 CYCLE 5. Input/Output condition : STATIC		TEST : OK
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -30°C~ +40°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test		TEST : OK
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 5G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK
9	CAPACITOR LIFE CYCLE	SUPPOSE C62 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=35 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=35 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 35 °C LIFE TIME		(1) 428757.9HRS (2) 182787HRS (3) 233604.1 HRS (4) 290159.9HRS
10	MTBF	2603.4K hrs min. Telcordia SR-332 (Bellcore) ; 424.2K hrs min. MIL-HDBK-217F (25°C)		
11	Ongoing Reliability Test	I/P : 230VAC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	LIUTT		Wangdz

2018.4.30 GP-A50-F010