



Test Report: SDR-960-24

960W Single Output Industrial DIN RAIL with PFC Function

■ 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 : 180 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 43.4 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 24V ~ 28 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	23.402 V~ 28.751 V / 230 VAC V~ V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : 1%~-1% (Max)	I/P : 200 VAC / 264 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : 0.05 %~-0.05 %	P
4	LINE REGULATION	V1 : 0.5%~-0.5% (Max)	I/P : 200 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~-0 %	P
5	LOAD REGULATION	V1 : 1%~-1% (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : 0.03 %~-0.03 %	P
6	SET UP TIME	230VAC : 1000 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 682 ms	P
7	RISE TIME	230VAC : 100 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 21 ms	P
8	HOLD UP TIME	230VAC : 14 ms (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 17 ms	P
9	OVER/UNDERSHOOT TEST	< +5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
10	DYNAMIC LOAD	V1 : 2400 mVp-p	I/P : 230 VAC (1).O/P : FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P : FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P : FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P : FULL /Min LOAD 50%DUTY/ 120HZ Ta : 25°C	(1) 820 mVp-p (2) 800 mVp-p (3) 670 mVp-p (4) 1.55 Vp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V=177 V HIGH-LINE =280V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	163 V~264V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 200VAC ~ 264 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.9639 / 230 VAC	P
4	EFFICIENCY	94% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	94.31 %	P
5	INPUT CURRENT	230V/ 6 A (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 4.6331 A/ 230 VAC	P
6	INRUSH CURRENT	230V/ 50 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 40 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 3.5 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-FG : 1.3 mA N-FG : 1.25 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	1、105% ~ 130% 2、130%~ 150%	I/P : 230 VAC O/P : TESTING Ta : 25°C	117%/ 230 VAC 140%/ 230 VAC Normally works within 105 ~ 130% rated output power for more than 3 seconds and then shut down o/p voltage with auto-recovery after 30 seconds if the peak load condition is removed Constant current limiting within 130 ~ 150% rated output power for more than 3 seconds and then shut down o/p voltage, re-power on to recover	P
2	OVER VOLTAGE PROTECTION	CH1 : 29V ~ 33 V	I/P : 230 VAC I/P : 200 VAC O/P : MIN LOAD Ta : 25°C	30.437V/ 230 VAC 30.513V/ 200 VAC Shut down o/p voltage, with auto-recovery or re-power on to recover	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 90 ± 5°C O.T.P. NO DAMAGE	I/P : 230 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 : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Constant current limiting within 130 ~ 150% rated output power for more than 3 seconds and then shut down o/p voltage, re-power on to recover	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	DC OK REALY CONTACT RATINGS (max.)	60Vdc/0.3A, 24Vdc/1A, 30Vac/0.5A resistive load	I/P : 230 VAC O/P : FULL LOAD	TEST : OK	P
2	CURRENT SHARING	PSU1-PSU2- PSU3- PSU4 < 10%	I/P : 230 VAC O/P : 90%/50% LOAD Ta : 25°C	O/P : 90% PSU1 : 37.2A PSU2 : 35.2A PSU3 : 35.1A PSU4 : 35.1A O/P : 50% PSU1 : 21A PSU2 : 19.3A PSU3 : 19.2A PSU4 : 19.2A	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q301 Rated : STP26NM60N 20A/600V Q305 Rated : STP26NM60N 20A/600V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 474 V (2) 446 V (3) 448 V (1) 474 V (2) 450 V (3) 444 V	P
2	Diode Peak Voltage	Q105 Rated : IPP034NE7N3G 100A/75V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 72.8 V (2) 12.4 V (3) 72 V	P
3	Input Capacitor Voltage	C 5 Rated : 150u/450V 105°C 18*40 CXW	I/P : High-Line +3V = 267 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) 440 V (2) 436 V (3) 442 V	P
4	Control IC Voltage Test	U301 Rated : PWM L6599AD 8.85V~16V	I/P : High-Line +3V = 267 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) 14.9 V (2) 14.9 V (3) 15.1 V	P
5	Power Transistor (D to S) or (C to E) Peak Voltage	Q53 Rated : STP26NM60N 20A/600V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 500 V (2) 436 V (3) 458 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 : 13.67 mA I/P-FG : 13.29 mA O/P-FG : 9.74 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 : 24.6 GΩ I/P-FG : 14.6 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	15 mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55032 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55032 CLASS A	I/P : 230 VAC (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 : 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 Any contradictions of the test results, please refer to the latest EMC test report				

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= 50 °C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0 %/°C (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 : -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 : 230VAC/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 : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C		TEST : OK	P
9	CAPACITOR LIFE CYCLE	SDR-960-24:SUPPOSE C109 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) 54810HRS (2) 17539HRS (3) 48720HRS (4) 103043HRS	P
10	MTBF	Conducted by Parts Stress Analysis Prediction 660.2K hrs min. Telcordia SR-332 (Bellcore) ; 70.7K hrs min. MIL-HDBK-217F (25°C)			P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 30,000 hours @ TA 50°C			P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2012/7/3	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2012/8/15	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2012/10/17	PRODUCT SAMPLE W1210A24	PASS	SANFORD SU	VINCENT TSENG

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