



Test Report: GST360A12

360W AC-DC High Reliability Industrial Adaptor

■ 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

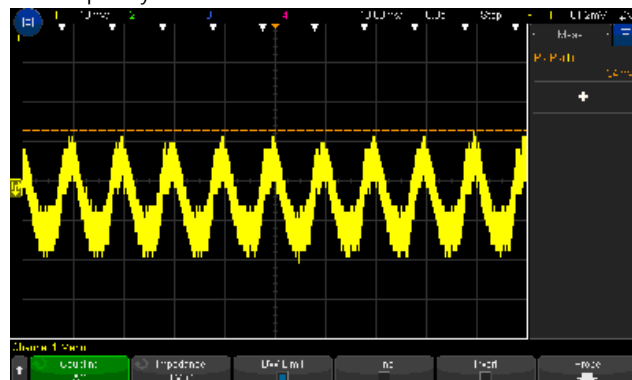
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -5.0%~ +5.0 %	I/P: 85VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C	V1: -1.97%~2.00%
2	LINE REGULATION (Max)	V1: -1.0%~ +1.0 %	I/P: 85VAC~ 264VAC O/P:FULL LOAD Ta:25°C	V1: -0.015%~0.012%
3	LOAD REGULATION(Max)	V1: -5.0%~ +5.0 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: -1.97%~2.00%
4	OVER/UNDERSHOOT TEST	< +5%	I/P: 230VAC O/P:FULL LOAD Ta:25°C	4.5%
5	RIPPLE & NOISE(Max)	V1: 120mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25°C	V1: 34mVp-p

high frequency :

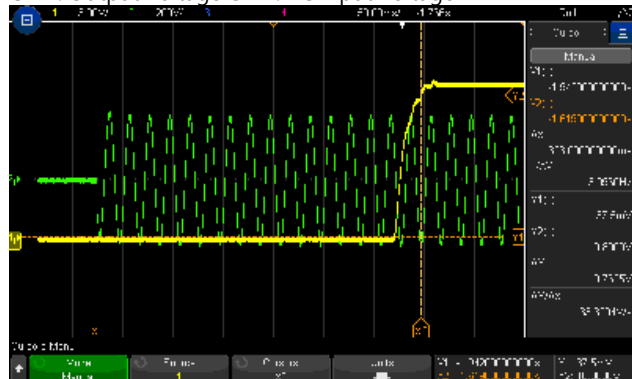


low frequency :



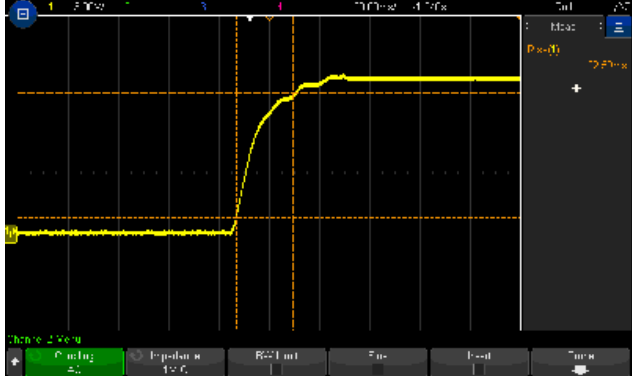
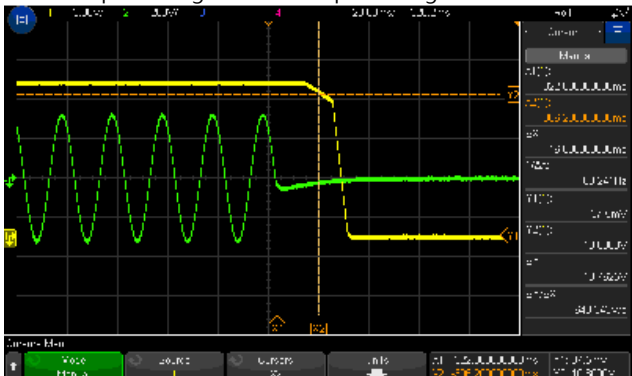
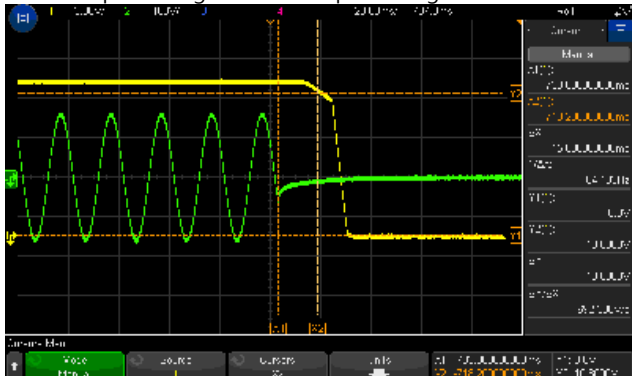
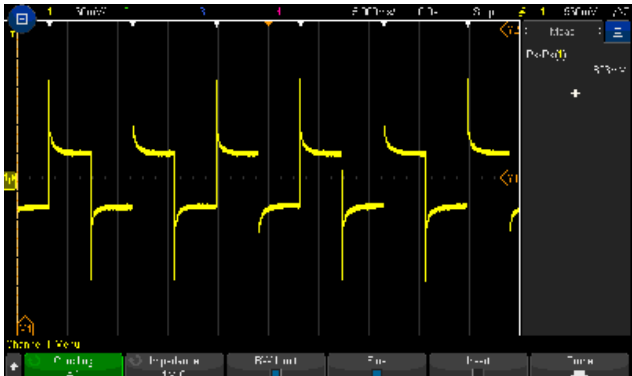
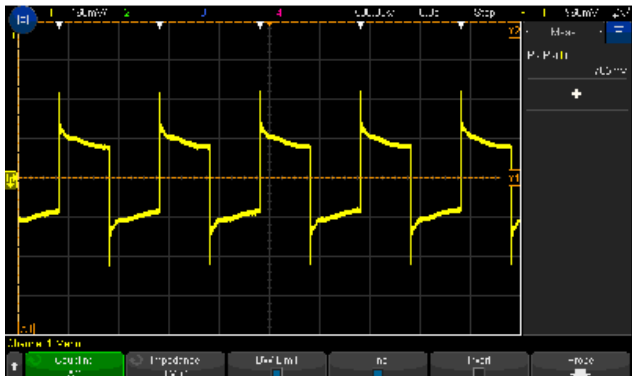
6	SET UP TIME(Max)	230VAC/2000ms 115VAC/2000ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/323ms 115VAC/332ms
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INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage



7	RISE TIME (Max)	230VAC/50ms 115VAC/50ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/19.03 ms 115VAC/22.59ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage				
INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage				
8	HOLD UP TIME (Typ.)	230VAC/8ms 115VAC/8ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/16.6ms 115VAC/15.6ms
INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage				
INPUT=115VAC/60HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage				
9	DYNAMIC LOAD	V1: 1200mVp-p	I/P: 230VAC O/P: (1)FULL/50%LOAD50%DUTY/120HZ (2)FULL/50%LOAD50%DUTY / 1KHZ Ta:25°C	(1) 823mVp-p (2) 785mVp-p
FULL /50% LOAD 50%DUTY / 120HZ				
FULL /50% LOAD 50%DUTY / 1KHZ				



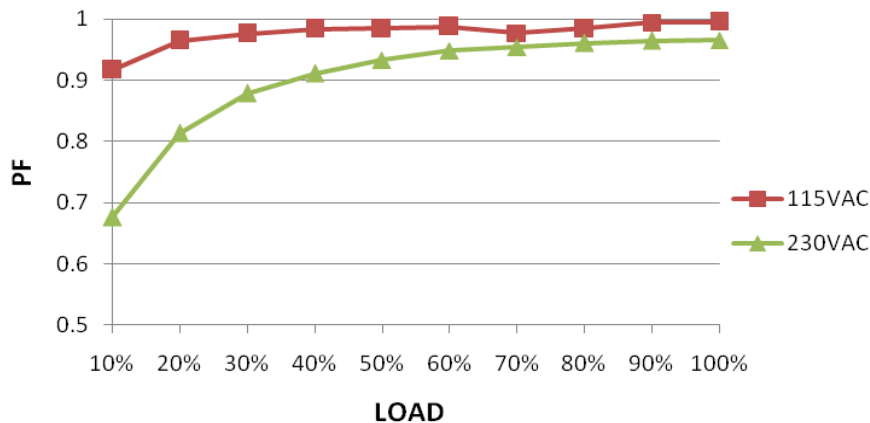
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GST360A series

10	TRANSIENT RECOVERY TIME	V1: 1200mVp-p	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	682mVp-p
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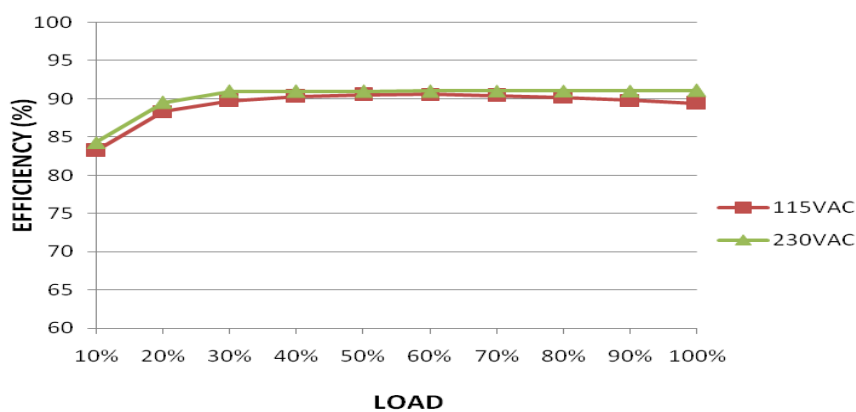
INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	85VAC~264VAC 120VDC~ 370VDC	(1) I/P:TESTING O/P:FULL LOAD (2) I/P:DC TESTING(L:- N:-) O/P: FULL / 50% LOAD (3) I/P:DC TESTING(L:- N:+) O/P: FULL / 50% LOAD Ta:25°C	(1)77.5V~264V (2)110Vdc~370Vdc/FULL LOAD 1107Vdc~370Vdc/50% LOAD (3) 110Vdc~370Vdc/FULL LOAD 110Vdc~370Vdc/50% LOAD
			I/P: LOW-LINE-3V=82 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)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P:85VAC ~264 VAC O/P:FULL~MIN LOAD Ta:25°C	TEST: OK
3	INPUT CURRENT (Typ.)	230V/ 2 A 115V/ 3.8 A	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =1.58A/ 230VAC I =3.14A/ 115VAC
4	LEAKAGE CURRENT	< 1.5mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	0.53 mA
5	NO LOAD CONSUMPTION	< 0.5W	I/P : 230VAC O/P : NO LOAD Ta : 25°C	0.275W
6	POWER FACTOR (Typ.)	0.95/ 230VAC 0.98/115VAC	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF=0.964/230VAC PF=0.993/115VAC
	PF vs LOAD			



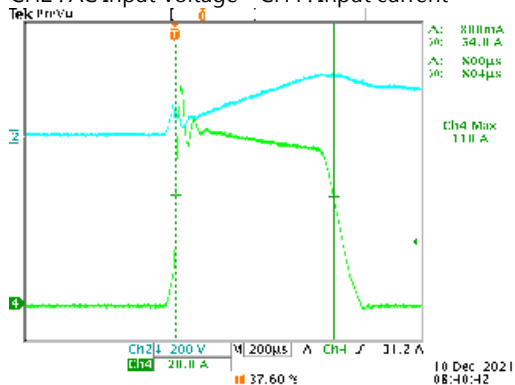
7	EFFICIENCY(Typ.)	91%	I/P:230 VAC O/P:FULL LOAD Ta:25°C	91.1%
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EFFICIENCY vs LOAD

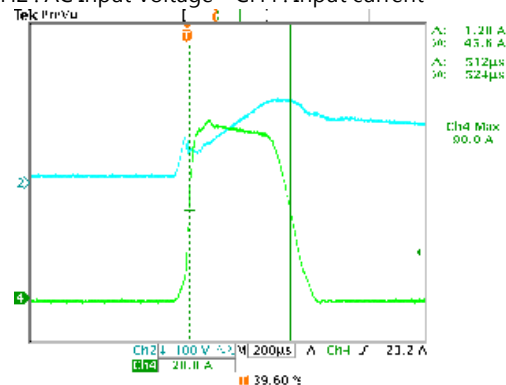


8	INRUSH CURRENT(Typ.)	230V/120A 115V/95A COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I =110A/ 230VAC I =90A/ 115VAC
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INPUT=230VAC/50HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current



INPUT=115VAC/ 60HZ @ FULL LOAD
CH2 : AC Input Voltage CH4 : Input current



PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	135%~155 % Protection type : Hiccup mode, recovers automatically after fault condition is removed	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25°C	149.3%/ 264VAC 149.1%/ 230VAC 149.0%/100VAC Protection type : Hiccup mode, recovers automatically after fault condition is removed
2	OVER VOLTAGE PROTECTION	105% ~ 135% rated output voltage Protection type : Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 85VAC O/P:MIN LOAD Ta:25°C	14.5V / 264VAC 14.5V / 230VAC 14.5V / 85VAC Protection type : Shut down o/p voltage, re-power on to recover
3	OVER TEMPERATURE PROTECTION	Protection type : Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 85VAC O/P:FULL LOAD	O.T.P Active OK Protection type : Shut down o/p voltage, re-power on to recover

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q3/Q4 Rated : 21 A/ 600 V	AC ON/OFF I/P:High-Line +3V =267V VDS: O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25°C	Q3 Q4 VDS: VDS: (1) 438V (1) 456V (2) 452V (2) 448V (3) 444V (3) 444V (4) 432V (4) 444V (5) 444V (5) 444V (6) 428V (6) 448V (7) 444V (7) 448V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1/Q2 Rated : 18 A/ 600 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz	Q1 Q2 VDS: VDS: (1) 436V (1) 440V (2) 420V (2) 420V (3) 436V (3) 448V (4) 436V (4) 460V (5) 436V (5) 436V (6) 432V (6) 444V (7) 428V (7) 444V



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			(7)0%→400% Load. Ta:25°C	
3	P.F.C DIODE	D21 Rated : 8A/ 600 V	I/P:High-Line +3V =267 V AC ON/OFF O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (4)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz Ta:25°C	(1) 440V (2) 428V (3) 428V (4) 428V
4	Diode Peak Voltage	Q100/Q112 Rated :100A/ 60V Q152/Q154 Rated : 100 A/ 60V	AC ON/OFF I/P:High-Line +3V =267 V O/P: (1)Full Load (2)Output Short (3)Dynamic Load Full Load/ Min. Load 90%Duty/1KHz (4)Dynamic Load Full Load/ Min. Load 90%Duty/3KHz (5)Dynamic Load Full Load/ Min. Load 90%Duty/5KHz (6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. (8)NO LOAD (9)Before burst Mode Ta:25°C	Q100: VDS: (1) 40.6V (2) 40.1V (3) 41.0V (4) 43.4V (5) 40.1V (6) 44.2V (7) 42.2V (8) 37.3V (9) 51.4V Q152: VDS: (1) 29.2V (2) 29.6V (3) 32.0V (4) 28.8V (5) 29.2V (6) 31.6V (7) 31.2V (8) 28.8V (9) 27.6V Q112: VDS: (1) 34.4V (2) 40.1V (3) 37.7V (4) 33.2V (5) 33.2V (6) 38.5V (7) 39.3V (8) 37.7V (9) 40.5V Q154: VDS: (1) 30.0V (2) 30.8V (3) 32.8V (4) 29.2V (5) 29.2V (6) 32.0V (7) 30.8V (8) 34.0V (9) 33.6V
5	Input Capacitor Voltage	C5 Rated: : 220 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)398V (2)394V (3)398V (4)394V
6	Control IC Voltage Test	PWM IC U3 Rated -0.3V~ 20 V PFC IC U1 Rated -0.3V~ 20 V O/P IC U100 Rated -0.3V~ 26 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 (LOW LINE) Ta:25°C	U3 (1) 16.8V (2) 17.6V (3) 18.8V (4) 16.0V (5) 9.8V U100 (1) 11.6V (2) 12.6V (3) 12.6V (4) 12.4V (5) 11.6V U1



				(1) 16.2V (2) 16.9V (3) 18.1V (4) 15.2V (5) 9.2V
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■ SAFETY& E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3KVAC/min I/P-FG :2KVAC/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:3.66mA I/P-FG:3.59mA O/P-FG:3.26m A NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 600 VDC I/P-FG: 600 VDC O/P-FG: 600 VDC Ta:25°C	I/P-O/P: 9999MΩ I/P-FG: 9999MΩ O/P-FG: 9999MΩ NO DAMAGE

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	BS EN/EN61000-3-2 GB9254	I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C	CLASS A
2	CONDUCTION	BS EN/EN55032(CISPR32),FCC PART 15 / CISPR22 ,CNS13438,GB17625.1 EAC TP TC 020,MSIP KN32	I/P : 230 VAC (50HZ)/120 VAC (60HZ) O/P : FULL/50% LOAD Ta : 25°C	CLASS B
3	RADIATION	BS EN/EN55032(CISPR32),FCC PART 15 / CISPR22 ,CNS13438,GB17625.1 EAC TP TC 020,MSIP KN32	I/P : 230 VAC (50HZ)/120 VAC (60HZ) O/P : FULL LOAD/50% LOAD Ta : 25°C	CLASS B
4	E.S.D	BS EN/EN61000-4-2 AIR : 15KV / Contact : 8KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
5	E.F.T	BS EN/EN61000-4-4 INPUT : 1KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
6	SURGE	BS EN/EN61000-4-5 L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C	CRITERIA A
7	Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report			



■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	TEMPERATURE RISE TEST	MODEL : GST360A12 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25.8 °C 2. HIGH AMBIENT BURN-IN : 2HRS I/P : 230VAC O/P : FULL LOAD Ta= 43.1 °C		

			NO	Position	ROOM AMBIENT Ta= 25.8°C	HIGH AMBIENT Ta=43.1°C
			1	LF2	68.1°C	83.9°C
			2	LF3	70.6°C	86.4°C
			3	BD2	72.9°C	88.6°C
			4	C3	68.5°C	84.2°C
			5	C6	71.9°C	87.8°C
			6	Q1	75.7°C	91.4°C
			7	Q2	74.3°C	90.0°C
			8	T1coil	80.7°C	96.5°C
			9	T1core	80.4°C	95.6°C
			10	T2 coil	80.2°C	95.9°C
			11	T2 core	79.3°C	93.8°C
			12	L1	74.9°C	90.9°C
			13	C33	79.3°C	95.1°C
			14	L3	71.8°C	87.7°C
			15	L4	75.0°C	90.9°C
			16	C5	77.3°C	93.2°C
			17	C41	77.6°C	93.4°C
			18	U1	77.4°C	93.4°C
			19	RTH2	77.4°C	93.3°C
			20	U3	80.1°C	96.1°C
			21	C114	85.4°C	101.5°C
			22	RTH4	78.1°C	93.7°C
			23	C101	80.3°C	96.2°C
			24	C105	85.3°C	101.4°C
			25	Q112	89.4°C	106.1°C
			26	Q100	89.3°C	105.9°C
			27	Q152	86.5°C	103.0°C
			28	Q154	84.4°C	101.0°C
			29	U101	79.4°C	95.4°C
			30	U4	77.9°C	93.8°C
			31	Q3	84.9°C	102.1°C
			32	Q4	85.6°C	102.7°C
			33	LF100	91.3°C	108.1°C
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 123%LOAD Ta : 25°C		TEST : OK	
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100%LOAD Ta= -35°C		TEST : OK	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40°C/95 %R.H NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 40.5°C HUMIDITY= 95 %R.H		TEST : OK	
5	TEMPERATURE COEFFICIENT	+0.03%/°C(0~40°C)	I/P : 230 VAC O/P : FULL LOAD		+ 0.0061 %/°C(0~40°C)	



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6	STORAGE TEMPERATURE TEST	-40~85°C	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
7	THERMAL SHOCK TEST	-30~40°C	1. Thermal shock Temperature : -35°C~ +45°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
8	VIBRATION TEST	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C
9	CAPACITOR LIFE CYCLE	SUPPOSE C 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= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME	(1) 41769.5HRS (2) 34401HRS (3) 58762.9HRS (4) 144660.6HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 2068.5K hrs min. Telcordia SR-332 (Bellcore) ; 269K hrs min. MIL-HDBK-217F (25°C)	
11	Ongoing Reliability Test	I/P : 230VAC O/P : 80% LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Liutt		Wangdz

2020.10.1 TAG-QA-009