Test Report: GST360A48-C6P

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

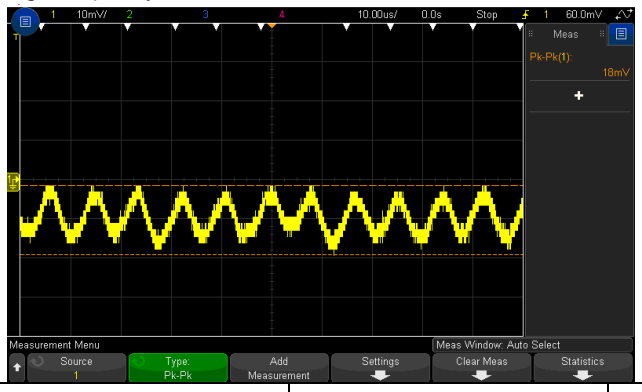
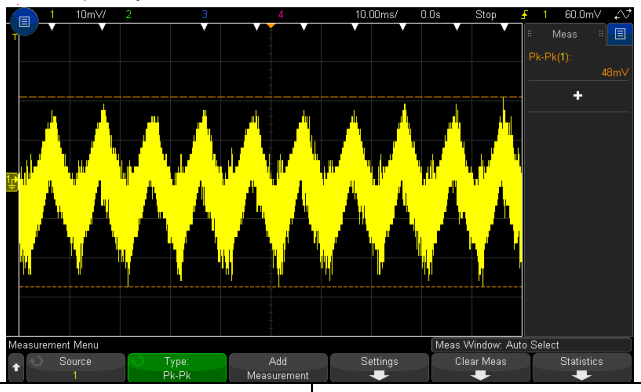
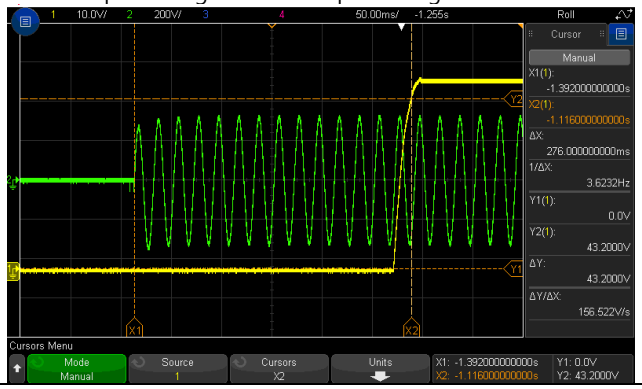
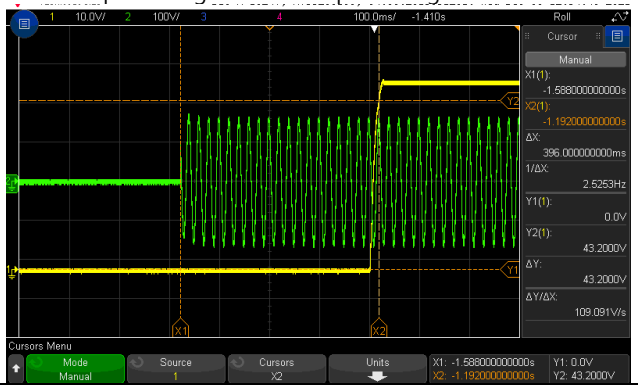
Safety Test
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

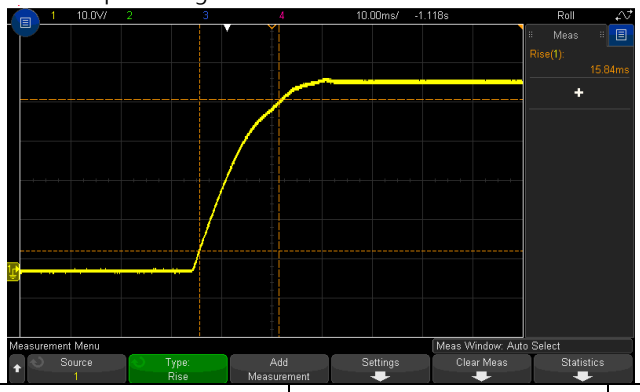
■ DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

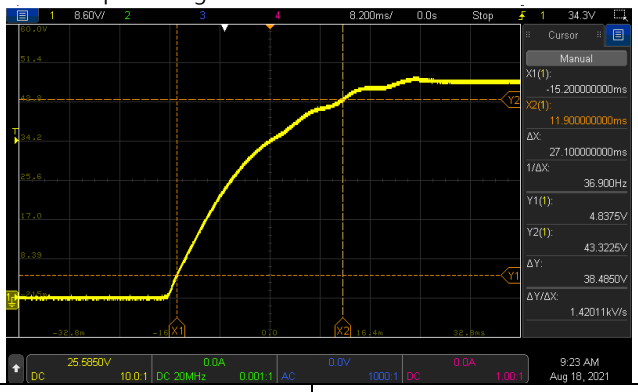
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OUTPUT VOLTAGE(Max) TOLERANCE	V1: -2.0%~ +2.0 %	I/P: 85VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25℃	V1: -0.17%~0.18%
2	LINE REGULATION (Max)	V1: -1.0%~ +1.0 %	I/P: 85VAC~ 264VAC O/P:FULL LOAD Ta:25℃	V1: -0.001%~-0.001%
3	LOAD REGULATION(Max)	V1: -2.0%~ +2.0 %	I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25℃	V1: -0.17%~0.18%
4	OVER/UNDERSHOOT TEST	< ±5%	I/P: 230VAC O/P:FULL LOAD Ta:25℃	1.3%
5	RIPPLE & NOISE(Max)	V1: 200mVp-p	I/P:230VAC O/P:FULL LOAD Ta:25℃	V1: 48mVp-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℃	230VAC/276ms 115VAC/396ms
	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℃	230VAC/ 15.84ms 115VAC/27.1ms

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage

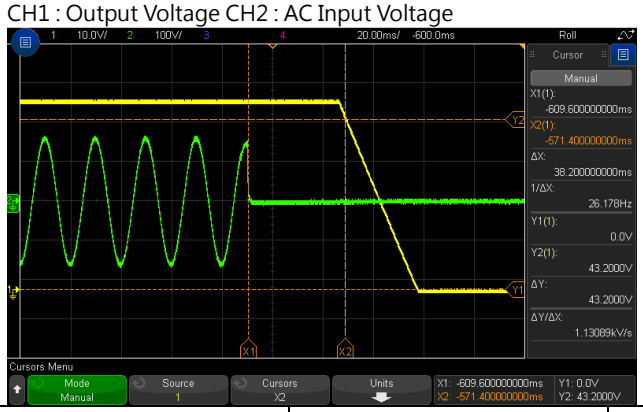


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage

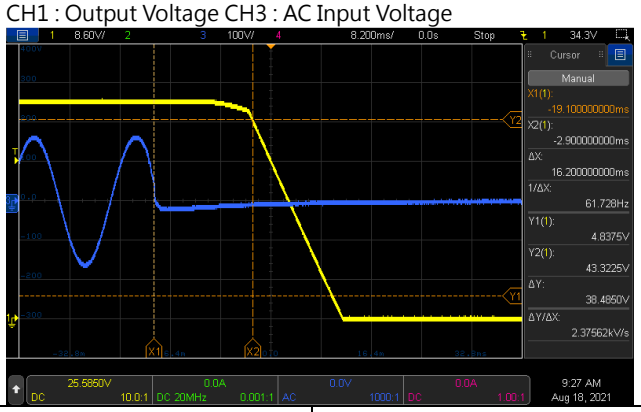


8	HOLD UP TIME (Typ.)	230VAC/8ms 115VAC/8ms	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25℃	230VAC/38.2ms 115VAC/16.2ms

INPUT=230VAC/50HZ @ FULL LOAD
CH1 : Output Voltage CH2 : AC Input Voltage

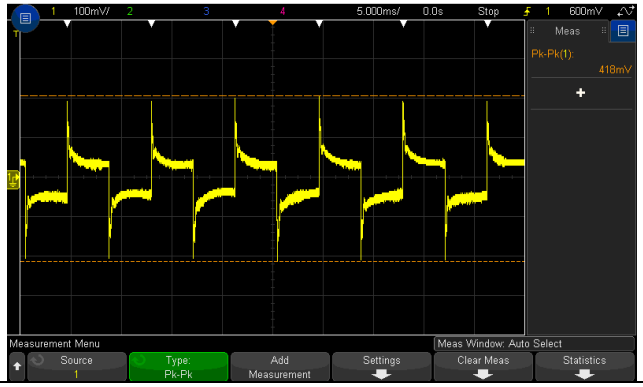


INPUT=115VAC/60HZ @ FULL LOAD
CH1 : Output Voltage CH3 : AC Input Voltage

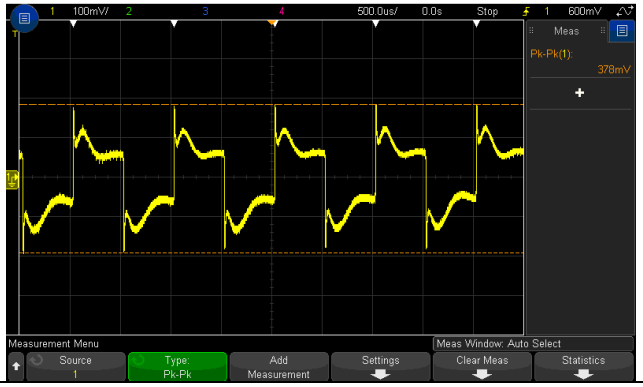


9	DYNAMIC LOAD	V1: 4800mVp-p	I/P: 230VAC O/P: (1)FULL/50%LOAD50%DUTY/120HZ (2)FULL/50%LOAD50%DUTY / 1KHZ Ta:25℃	(1) 418mVp-p (2) 378mVp-p

FULL /50% LOAD 50%DUTY / 120HZ



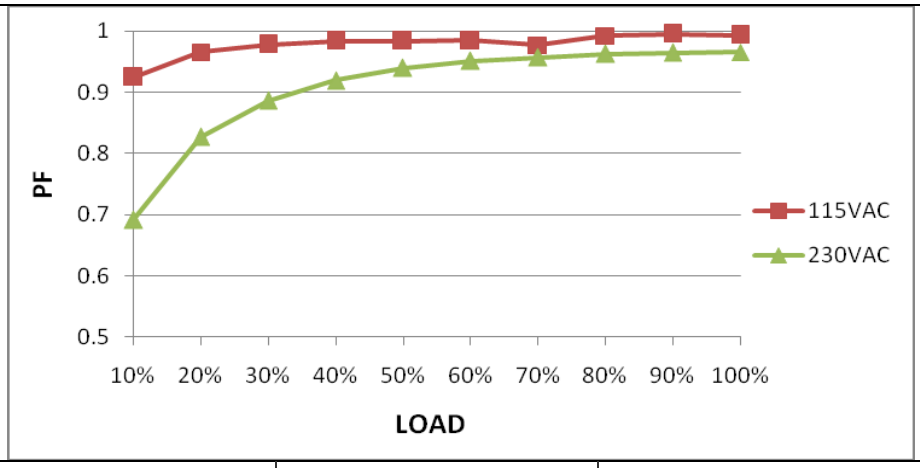
FULL /50% LOAD 50%DUTY / 1KHZ



10	TRANSIENT RECOVERY TIME	V1: 4800mVp-p	I/P: 230VAC O/P:40% LOAD CHANGE 50%DUTY/120HZ 1.25A/us	490mVp-p

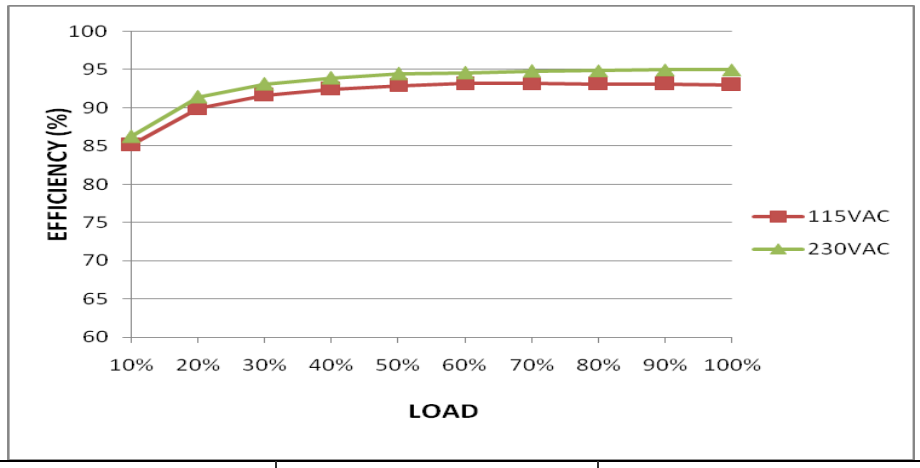
INPUT FUNCTION TEST

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℃	(1) 77.5V~264V (2)112Vdc~370Vdc/FULL LOAD 112Vdc~370Vdc/50% LOAD (3)112Vdc~370Vdc/FULL LOAD 112Vdc~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℃	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℃	I =1.677A/ 230VAC I =3.350A/ 115VAC
4	LEAKAGE CURRENT	< 1.5mA / 240 VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	0.61mA
5	NO LOAD CONSUMPTION	< 0.5W	I/P：230VAC O/P：NO LOAD Ta：25℃	0.386W
6	POWER FACTOR (Typ.)	0.95/ 230VAC 0.98/115VAC	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF=0.965/230VAC PF=0.992/115VAC
	P.F vs LOAD			



7	EFFICIENCY(Typ.)	95%	I/P:230 VAC O/P:FULL LOAD Ta:25℃	95.1%

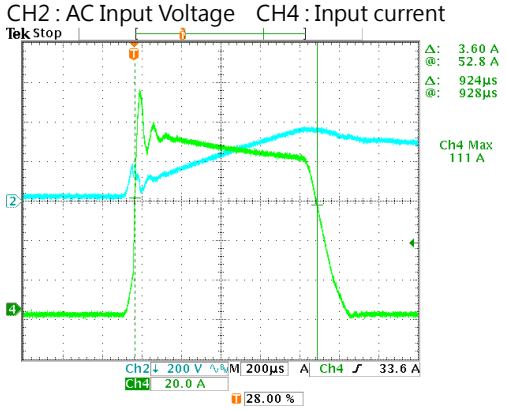
EFFICIENCY vs LOAD



8	INRUSH CURRENT(Typ.)	230V/120A 115V/95A COLD START	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I =111A/ 230VAC I =91.2A/ 115VAC

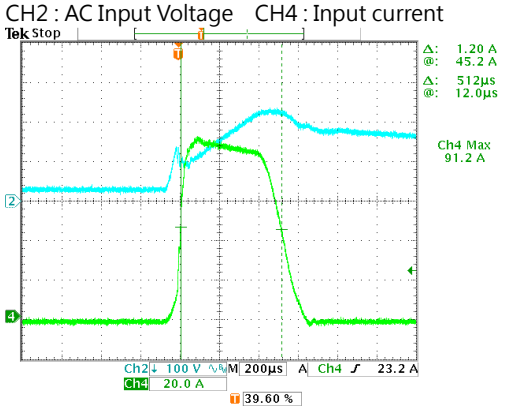
INPUT=230VAC/50HZ @ FULL LOAD

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 : Shut down o/p voltage, re-power on to recover	I/P: 264VAC I/P: 230VAC I/P: 100VAC O/P:TESTING Ta:25℃	139.3%/ 264VAC 139.2%/ 230VAC 139.6%/100VAC Protection type : Shut down o/p voltage, re-power on to recover
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℃	55.9V %/ 264VAC 55.9V %/ 230VAC 55.9V %/ 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℃	Q3 VDS: (1) 432V (2) 460V (3) 424V (4) 432V (5) 444V (6) 432V (7) 416V Q4 VDS: (1) 432V (2) 460V (3) 444V (4) 432V (5) 436V (6) 436V (7) 420V
2	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 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	Q1 VDS: (1) 480V (2) 428V (3) 452V (4) 464V (5) 448V (6) 440V (7) 420V Q2 VDS: (1) 488V (2) 420V (3) 444V (4) 440V (5) 452V (6) 440V (7) 420V

			(6)Dynamic Load 100% Load/ Min. Load 50%Duty/120Hz (7)0%→400% Load. Ta:25℃	
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℃	(1) 432V (2) 424V (3) 432V (4) 428V
4	Diode Peak Voltage	Q100/Q112 Rated :33A/150V Q152/Q154 Rated :33 A/150V	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 Ta:25℃	Q100: VDS: (1) 111V (2) 116V (3) 116V (4) 116V (5) 112V (6) 112V (7) 121V (8) 103V Q152: VDS: (1) 106V (2) 104V (3) 106V (4) 106V (5) 106V (6) 104V (7) 102V (8) 103V Q112: VDS: (1) 114V (2) 146V (3) 127V (4) 117V (5) 114V (6) 128V (7) 122V (8) 109V Q154: VDS: (1) 111V (2) 128V (3) 115V (4) 114V (5) 111V (6) 111V (7) 124V (8) 103V
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℃	(1)396V (2)396V (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℃	U3 (1) 15.8V (2) 15.8V (3) 15.8V (4) 15.8V (5) 10.0V U1 (1) 15.2V (2) 15.0V (3) 15.2V (4) 15.0V (5) 9.4V

				U100 (1) 11.47V (2) 11.52V (3) 11.47V (4) 11.55V (5) 11.55V

■ 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	I/P-O/P: 3.6 KVAC/min I/P-FG: 2.4 KVAC/min Ta:25℃	I/P-O/P:3.63mA I/P-FG:3.58mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ	I/P-O/P: 600 VDC I/P-FG: 600 VDC Ta:25℃	I/P-O/P:9999MΩ I/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℃	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℃	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℃	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℃	CRITERIA A
5	E.F.T	BS EN/EN61000-4-4 INPUT： 1KV	I/P： 230 VAC/50HZ O/P：FULL LOAD Ta：25℃	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℃	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

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： GST360A48
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 26.7 ℃
2. HIGH AMBIENT BURN-IN：2HRS
I/P： 230VAC O/P： FULL LOAD Ta= 44.4 ℃</td></tr>
<tr><td colspan="5">
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT
Ta= 26.7℃</th><th>HIGH AMBIENT
Ta= 44.4 ℃</th></tr>
<tr><td>1</td><td>LF1</td><td>67.4℃</td><td>83.5℃</td></tr>
<tr><td>2</td><td>ZR1</td><td>68.1℃</td><td>84.7℃</td></tr>
<tr><td>3</td><td>Q2</td><td>74.8℃</td><td>91.6℃</td></tr>
<tr><td>4</td><td>C3</td><td>71.1℃</td><td>87.2℃</td></tr>
<tr><td>5</td><td>L3</td><td>71.5℃</td><td>88.2℃</td></tr>
<tr><td>6</td><td>BD2</td><td>71.4℃</td><td>86.2℃</td></tr>
<tr><td>7</td><td>LF3</td><td>71.5℃</td><td>87.7℃</td></tr>
<tr><td>8</td><td>C6</td><td>71.3℃</td><td>89.0℃</td></tr>
<tr><td>9</td><td>L2</td><td>71.4℃</td><td>89.3℃</td></tr>
<tr><td>10</td><td>BD1</td><td>71.7℃</td><td>90.0℃</td></tr>
<tr><td>11</td><td>Q1</td><td>74.8℃</td><td>92.2℃</td></tr>
<tr><td>12</td><td>U1</td><td>73.1℃</td><td>91.5℃</td></tr>
<tr><td>13</td><td>U3</td><td>78.0℃</td><td>92.3℃</td></tr>
<tr><td>14</td><td>C41</td><td>75.2℃</td><td>90.7℃</td></tr>
<tr><td>15</td><td>C5</td><td>71.6℃</td><td>85.7℃</td></tr>
<tr><td>16</td><td>T1coil</td><td>79.0℃</td><td>94.6℃</td></tr>
<tr><td>18</td><td>T1core</td><td>76.0℃</td><td>89.8℃</td></tr>
<tr><td>19</td><td>LF100</td><td>66.8℃</td><td>84.1℃</td></tr>
<tr><td>20</td><td>C105</td><td>69.9℃</td><td>86.5℃</td></tr>
<tr><td>21</td><td>L4</td><td>72.7℃</td><td>89.0℃</td></tr>
<tr><td>22</td><td>T2 coil</td><td>78.2℃</td><td>90.4℃</td></tr>
<tr><td>24</td><td>T2 core</td><td>76.5℃</td><td>91.6℃</td></tr>
<tr><td>25</td><td>Q3</td><td>81.2℃</td><td>101.8℃</td></tr>
<tr><td>26</td><td>D7</td><td>75.0℃</td><td>91.5℃</td></tr>
<tr><td>27</td><td>Q12</td><td>82.1℃</td><td>90.7℃</td></tr>
<tr><td>28</td><td>RTH2</td><td>73.3℃</td><td>100.5℃</td></tr>
<tr><td>29</td><td>D10</td><td>74.9℃</td><td>91.8℃</td></tr>
<tr><td>30</td><td>U101</td><td>72.8℃</td><td>89.5℃</td></tr>
<tr><td>31</td><td>Q101</td><td>74.4℃</td><td>91.2℃</td></tr>
<tr><td>32</td><td>Q112</td><td>73.1℃</td><td>91.1℃</td></tr>
<tr><td>33</td><td>Q153</td><td>75.4℃</td><td>93.7℃</td></tr>
<tr><td>34</td><td>U5</td><td>71.6℃</td><td>87.5℃</td></tr>
<tr><td>35</td><td>C102</td><td>69.7℃</td><td>87.0℃</td></tr>
<tr><td>36</td><td>C114</td><td>71.3℃</td><td>88.2℃</td></tr>
</table>
</td></tr>
<tr><td>2</td><td>OVER LOAD BURN-IN TEST</td><td>NO DAMAGE
1 HOUR (MIN)</td><td>I/P： 230 VAC
O/P：122%LOAD
Ta：25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>LOW TEMPERATURE TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 264VAC/100VAC
O/P： 100%LOAD
Ta= -35℃</td><td>TEST：OK</td></tr>
</table>

4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40℃/95 %R.H NO DAMAGE	I/P： 272 VAC O/P：FULL LOAD Ta= 39.5℃ HUMIDITY= 95 %R.H	TEST：OK
5	TEMPERATURE COEFFICIENT	±0.03%/℃(0~40℃)	I/P： 230 VAC O/P：FULL LOAD	±0.0089 %/℃(0~40℃)
6	STORAGE TEMPERATURE TEST	-40~85℃	1. Thermal shock Temperature： -45℃~ +90℃ 2. Temperature change rate ：25℃ / 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℃	1. Thermal shock Temperature： -35℃~ +45℃ 2. Temperature change rate ：25℃ / 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℃	
9	CAPACITOR LIFE CYCLE	SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 40 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 40 ℃ LIFE TIME		(1) 167176.7HRS (2) 60767.6HRS (3) 116864.5HRS (4) 165759.7HRS
10	MTBF	Conducted by Parts Stress Analysis Prediction 2068.5K hrs min. Telcordia SR-332 (Bellcore) ; 269K hrs min. MIL-HDBK-217F (25℃)		
11	Ongoing Reliability Test	I/P：230VAC O/P：80% LOAD TA=50℃ Demonstration Mean Time Between Failure : 30,000 hours		

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	Liutt		Wangdz

2020.10.1 TAG-QA-009