



# TEST REPORT: GSM220A24

## 220W AC-DC Reliable Green Medical Adaptor

### ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

### ■ SAFETY & E.M.C. TEST

Safety Test

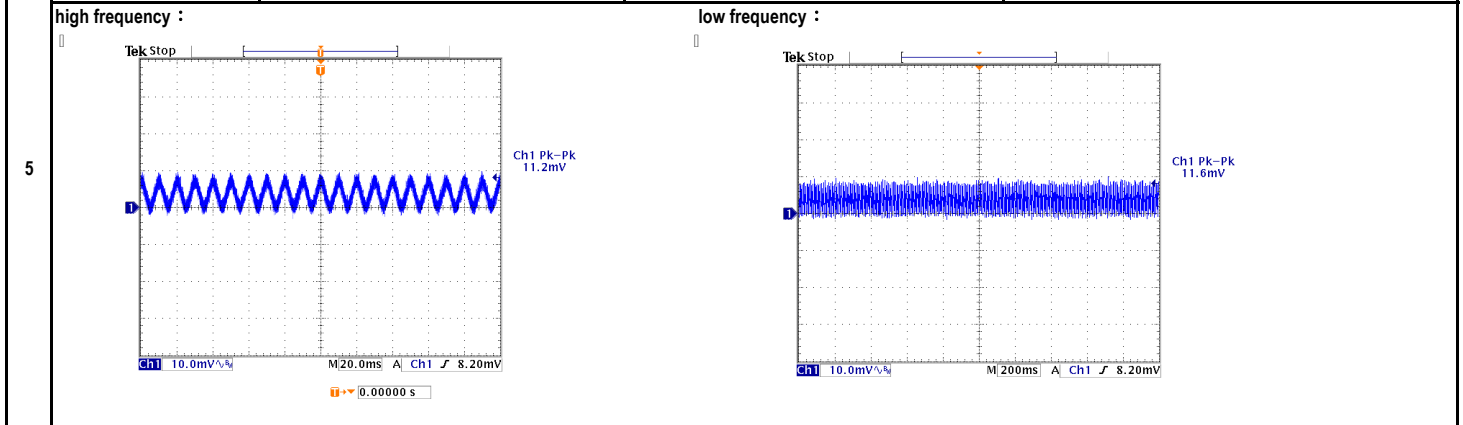
E.M.C. Test

### ■ RELIABILITY TEST

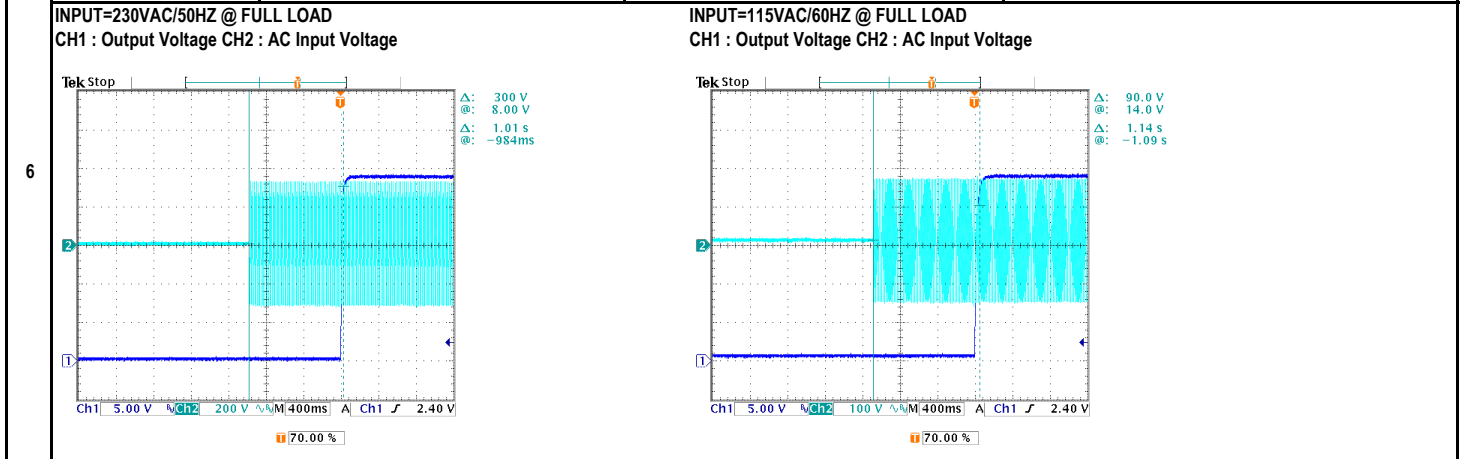
ENVIRONMENT TEST

DESIGN VERIFY TEST  
OUTPUT FUNCTION

| NO | TEST ITEM                      | SPECIFICATION     | TEST CONDITION                                          | RESULT             |
|----|--------------------------------|-------------------|---------------------------------------------------------|--------------------|
| 1  | OUTPUT VOLTAGE TOLERANCE (Max) | V1 : 3.0% ~ -3.0% | I/P : 95VAC / 264VAC<br>O/P: FULL / MINLOAD<br>TA= 25°C | V1: 0.79% ~ -0.33% |
| 2  | LINE REGULATION (MAX.)         | V1 : 1.0% ~ -1.0% | I/P : 95VAC / 264VAC<br>O/P: FULL LOAD<br>TA : 25°C     | V1: 0.00% ~ 0.00%  |
| 3  | LOAD REGULATION (MAX.)         | V1 : 3.0% ~ -3.0% | I/P : 230VAC<br>O/P: MIN LOAD ~ FULL LOAD<br>TA : 25°C  | V1: 0.71% ~ -0.42% |
| 4  | OVER/UNDERSHOOT TEST           | < ±5%             | I/P : 230VAC<br>O/P: FULL LOAD<br>TA : 25°C             | TEST< 1.3 %        |
|    | RIPPLE & NOISE(Max)            | V1 : 120 mVp-p    | I/P : 230VAC<br>O/P: FULL LOAD<br>TA : 25°C             | V1 : 11.6 mVp-p    |

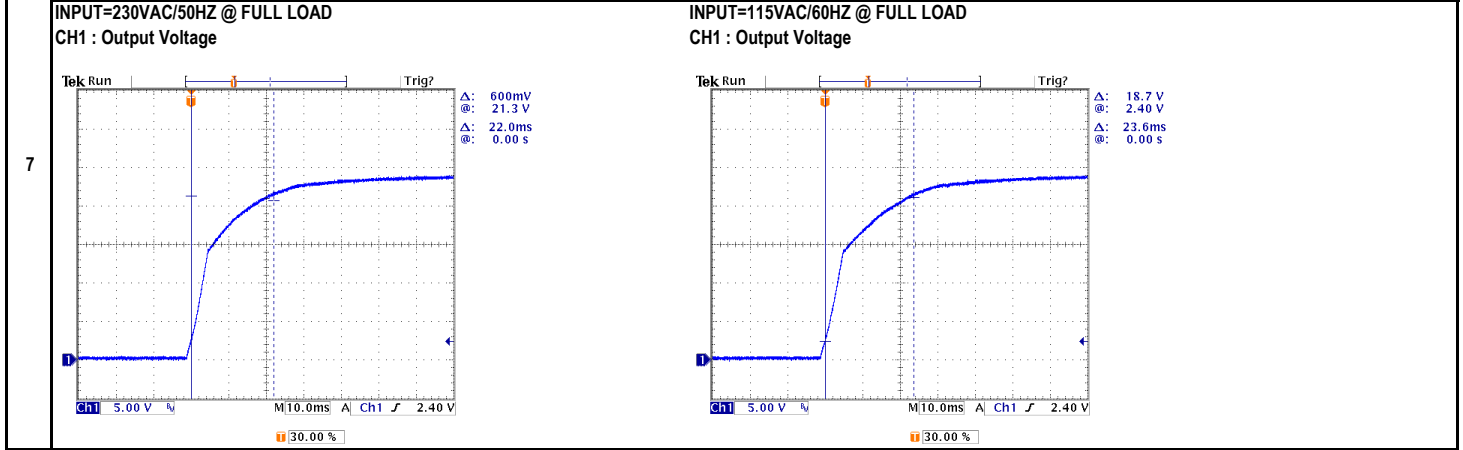


|                    |                 |                |                 |
|--------------------|-----------------|----------------|-----------------|
| SET UP TIME (MAX.) | 230VAC : 2000ms | I/P : 230VAC   | 230VAC : 1008ms |
|                    | 115VAC : 2000ms | I/P : 115VAC   | 115VAC : 1136ms |
|                    |                 | O/P: FULL LOAD |                 |
|                    |                 | TA : 25°C      |                 |

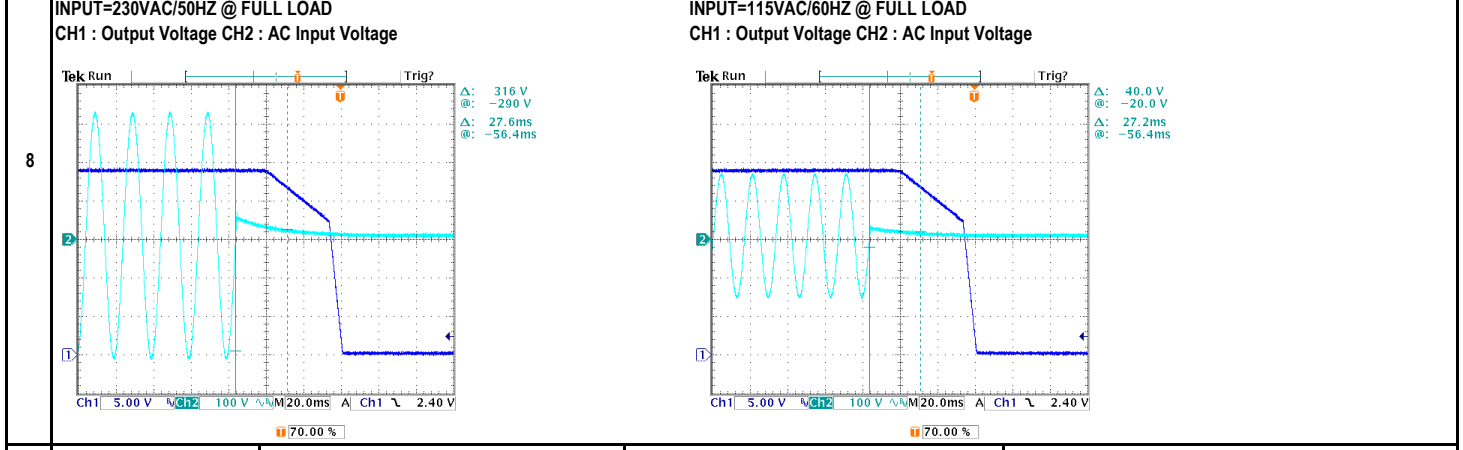




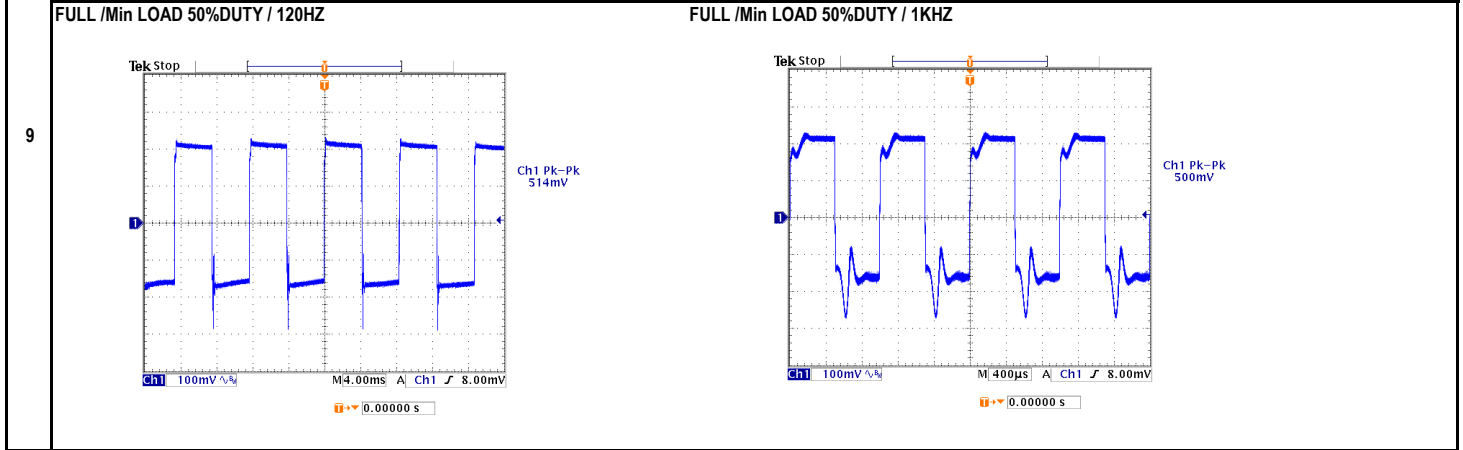
|                  |        |        |       |           |        |          |
|------------------|--------|--------|-------|-----------|--------|----------|
| RISE TIME (MAX.) | 230VAC | : 50ms | I/P : | 230VAC    | 230VAC | : 22.0ms |
|                  | 115VAC | : 50ms | I/P : | 115VAC    | 115VAC | : 23.6ms |
|                  |        |        | O/P:  | FULL LOAD |        |          |
|                  |        |        | TA :  | 25°C      |        |          |



|                     |        |        |       |           |        |          |
|---------------------|--------|--------|-------|-----------|--------|----------|
| HOLD UP TIME (TYP.) | 230VAC | : 20ms | I/P : | 230VAC    | 230VAC | : 27.6ms |
|                     | 115VAC | : 20ms | I/P : | 115VAC    | 115VAC | : 27.2ms |
|                     |        |        | O/P:  | FULL LOAD |        |          |
|                     |        |        | TA :  | 25°C      |        |          |



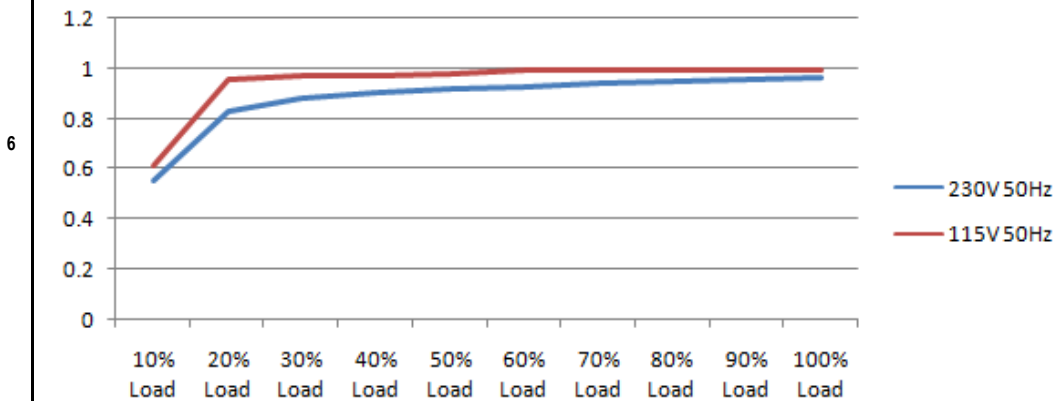
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|--------------|------|------|--------------------------------|-------|--------|-------|-------|------------|
| DYNAMIC LOAD | V1 : | 2400 | mVp-p                          | I/P : | 230VAC | (1).  | (2).  | unit:mVp-p |
|              |      |      |                                | O/P:  |        | 514mv | 500mv |            |
|              |      |      | (1)Full/Min load 50%duty/120HZ |       |        |       |       |            |
|              |      |      | (2)Full/Min load 50%duty/1KHZ  |       |        |       |       |            |
|              |      |      | TA :                           | 25°C  |        |       |       |            |



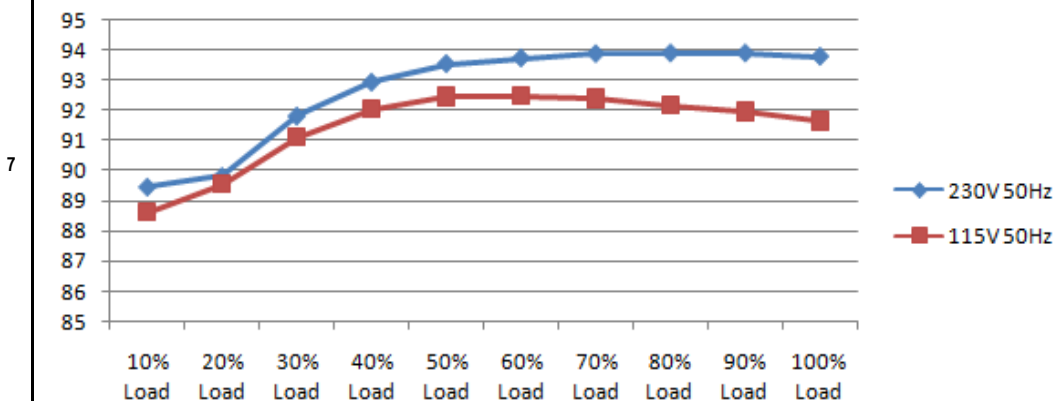


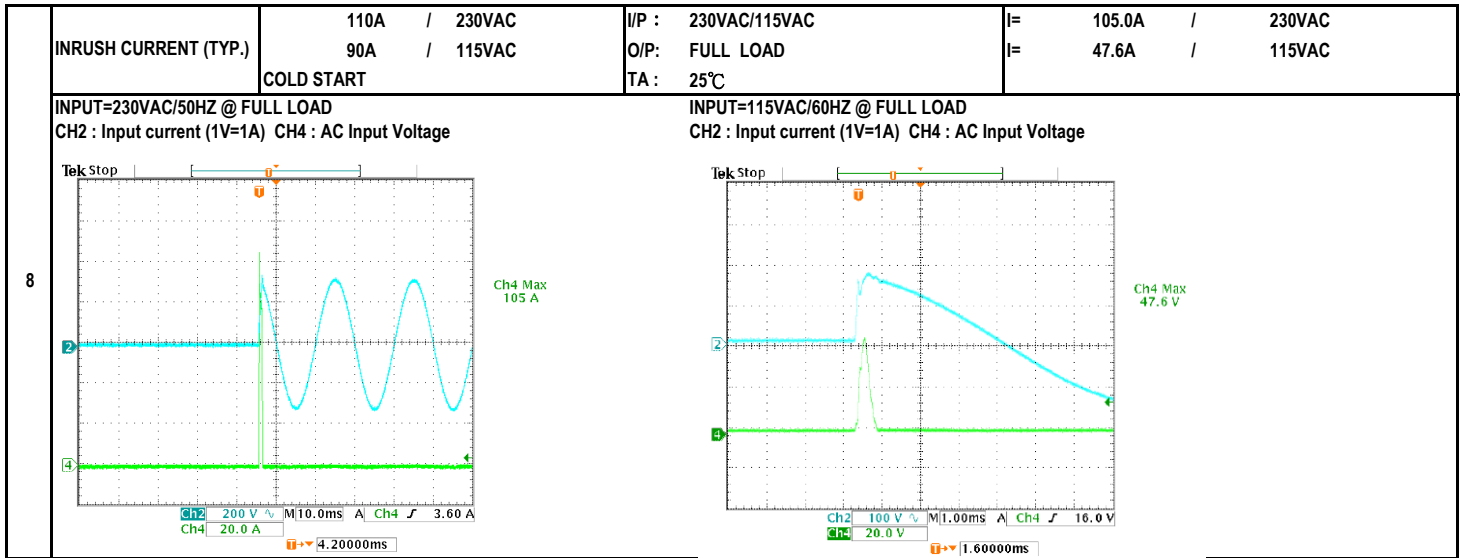
INPUT FUNCTION TEST

| NO | TEST ITEM                 | SPECIFICATION                  | TEST CONDITION                                                                                                                                                                        | RESULT                                     |
|----|---------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| 1  | INPUT VOLTAGE RANGE       | 80VAC ~ 264VAC                 | I/P : TESTING<br>O/P : FULL LOAD<br>Ta : 25°C<br>I/P :<br>LOW-LINE = 92VAC<br>HIGH-LINE = 300VAC<br>O/P : FULL/MIN LOAD<br>ON:30 Sec ; OFF:30 Sec 10MIN<br>( POWER ON/OFF NO DAMAGE ) | 66.0VAC ~ 264VAC<br><br>TEST : OK          |
| 2  | INPUT FREQUENCY RANGE     | 47HZ ~ 63HZ<br>NO DAMAGE       | I/P : 95VAC ~ 264VAC<br>O/P : FULL-MIN LOAD<br>Ta : 25°C                                                                                                                              | TEST : OK                                  |
| 3  | INPUT CURRENT (TYP.)      | 2.0A / 230VAC<br>4.0A / 115VAC | I/P : 230VAC<br>I/P : 115VAC<br>O/P : FULL LOAD<br>TA : 25°C                                                                                                                          | I= 1.0506A / 230VAC<br>I= 2.0580A / 115VAC |
| 4  | LEAKAGE CURRENT           | <115uA for earth leakage       | I/P : 264VAC<br>O/P : MIN LOAD                                                                                                                                                        | L-FG: 77 uA<br>N-FG: 75 uA                 |
|    |                           | <100uA for touch leakage       | TA : 25°C                                                                                                                                                                             | L-V-: 66 uA<br>N-V-: 65 uA                 |
| 5  | NO LOAD POWER CONSUMPTION | < 0.15W                        | I/P : 230VAC<br>O/P : MIN LOAD<br>TA : 25°C                                                                                                                                           | < 0.1066 W                                 |
|    | POWER FACTOR (TYP.)       | 0.91 / 230VAC                  | I/P : 230VAC                                                                                                                                                                          | PF= 0.9655 / 230VAC                        |
|    |                           | 0.98 / 115VAC                  | I/P : 115VAC<br>O/P : FULL LOAD<br>TA : 25°C                                                                                                                                          | PF= 0.9947 / 115VAC                        |



|                   |       |                                              |          |
|-------------------|-------|----------------------------------------------|----------|
| EFFICIENCY (TYP.) | 93.5% | I/P : 230VAC<br>O/P : FULL LOAD<br>TA : 25°C | 93.609 % |
|-------------------|-------|----------------------------------------------|----------|





**PROTECTION FUNCTION TEST**

| NO | TEST ITEM                   | SPECIFICATION                                                             | TEST CONDITION                                                         | RESULT                                                                                     |
|----|-----------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1  | OVER LOAD PROTECTION        | 105% ~ 135%                                                               | I/P: 264VAC<br>I/P: 230VAC<br>I/P: 95VAC<br>O/P: TESTING<br>TA : 25°C  | 110% 264VAC<br>109% 230VAC<br>110% 95VAC<br>Hiccup Mode                                    |
| 2  | OVER VOLTAGE PROTECTION     | 25.20V ~ 32.40V                                                           | I/P: 264VAC<br>I/P: 230VAC<br>I/P: 80VAC<br>O/P: MIN LOAD<br>TA : 25°C | 28.90V 264VAC<br>28.90V 230VAC<br>28.90V 80VAC<br>Shut down Re- power ON                   |
| 3  | OVER TEMPERATURE PROTECTION | Shut down o/p voltage, recovers automatically after temperature goes down | I/P: 264VAC<br>I/P: 80VAC<br>O/P: FULL LOAD                            | O.T.P. Active<br>Shut down o/p voltage, recovers automatically after temperature goes down |
| 4  | SHORT PROTECTION            | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE                                    | I/P: 264VAC<br>I/P: 80VAC<br>O/P: FULL LOAD<br>Ta: 25°C                | NO DAMAGE<br>Hiccup Mode                                                                   |

**COMPONENT STRESS TEST**

| NO | TEST ITEM            | SPECIFICATION         | TEST CONDITION                                                                                                                 | RESULT                                                                                                           |
|----|----------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 1  | PWM Power Transistor | Q5 Rated : 600V 18.0A | I/P : 267VAC<br>VDS :<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                  | Q5 Q6<br>VIN: 267VAC 267VAC<br>(1). 528.00V 528.00V<br>(2). 512.00V 532.00V<br>(3). 452.00V 456.00V              |
|    |                      | Q6 Rated : 600V 18.0A |                                                                                                                                |                                                                                                                  |
| 2  | O/P Diode (MOSFET)   | Q101 Rated : 75V 80A  | I/P : 267VAC<br>VDS :<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>(4)Burst mode<br>Ta : 25°C | Q101 Q102<br>VDS : VDS :<br>(1). 59.40V 57.20V<br>(2). 21.20V 14.00V<br>(3). 59.00V 57.20V<br>(4). 56.40V 57.60V |
|    |                      | Q102 Rated : 75V 80A  |                                                                                                                                |                                                                                                                  |
| 3  | Input Capacitor      | C5 Rated : 220uf 450V | I/P : 267VAC<br>O/P : (1)Full Load Turn on /Off<br>(2)Min load Turn on /Off<br>(3)Full Load /Min load Change<br>Ta : 25°C      | C5<br>(1). 432.00V<br>(2). 429.00V<br>(3). 422.00V                                                               |



|   |                      |    |         |             |                                                                                                                                                                          |                                                                                                           |      |
|---|----------------------|----|---------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|------|
| 4 | Control IC           | U1 | Rated : | 38V (max)   | I/P : 267VAC<br>O/P : (1)Full Load<br>(2)Output Short<br>(3)O.L.P<br>(4)O.V.P<br>(5)Low Line No Load Vo(min)<br>Ta : 25°C                                                | U1                                                                                                        | U101 |
|   |                      |    |         | -0.4V (min) |                                                                                                                                                                          | (1). 24.70V 13.80V<br>(2). 20.00V 0.83V<br>(3). 23.00V 12.90V<br>(4). 29.50V 19.50V<br>(5). 24.50V 15.30V |      |
| 5 | PFC Power Transistor | Q1 | Rated : | 600V 15.8A  | I/P : 267VAC<br>VDS :<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                                                            | Q1                                                                                                        | Q2   |
|   |                      |    |         |             |                                                                                                                                                                          | VIN: 267VAC 267VAC<br>(1). 520.00V 520.00V<br>(2). 516.00V 520.00V<br>(3). 492.00V 498.00V                |      |
| 6 | PFC Diode            | Q2 | Rated : | 600V 15.8A  | I/P : 267VAC<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Dynamic Load Full/Min Load 90%Duty/5KHz<br>(4)Dynamic Load Full/Min Load 50%Duty/120Hz<br>Ta : 25°C | D2                                                                                                        |      |
|   |                      |    |         |             |                                                                                                                                                                          | 267VAC<br>(1). 458.00V<br>(2). 456.00V<br>(3). 454.00V<br>(4). 456.00V                                    |      |

■ SAFETY & E.M.C. TEST

SAFETY TEST

| NO | TEST ITEM            | SPECIFICATION                                                                  | TEST CONDITION                                                                           | RESULT                                                           |
|----|----------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 1  | WITHSTAND VOLTAGE    | I/P-O/P : 4.000KVAC /min<br>I/P-FG : 2.000KVAC /min<br>O/P-FG : 0.500KVAC /min | I/P-O/P: 4.400KVAC /min<br>I/P-FG: 2.400KVAC /min<br>O/P-FG: 0.600KVAC /min<br>Ta : 25°C | I/P-O/P: 1.52mA<br>I/P-FG: 1.03mA<br>O/P-FG: 2.05mA<br>NO DAMAGE |
| 2  | ISOLATION RESISTANCE | I/P-O/P : 500VDC>100MΩ                                                         | I/P-O/P: 600VDC<br>Ta : 25°C/70%RH                                                       | I/P-O/P: 9999MΩ<br>NO DAMAGE                                     |

E.M.C. TEST

| NO | TEST ITEM  | SPECIFICATION                           | TEST CONDITION                                                | RESULT                        |
|----|------------|-----------------------------------------|---------------------------------------------------------------|-------------------------------|
| 1  | HARMONIC   | EN61000-3-2<br>CLASS A                  | I/P : 230VAC /50HZ<br>O/P : FULL LOAD<br>Ta : 25°C            | PASS                          |
| 2  | CONDUCTION | EN55011<br>CLASS B                      | I/P : 230VAC /50HZ<br>O/P : FULL LOAD / 50% LOAD<br>Ta : 25°C | PASS<br>Test by certified Lab |
| 3  | RADIATION  | EN55011<br>CLASS B                      | I/P : 230VAC /50HZ<br>O/P : FULL LOAD<br>Ta : 25°C            | PASS<br>Test by certified Lab |
| 4  | E.S.D      | EN61000-4-2<br>AIR: 15KV / Contact: 8KV | I/P : 230VAC /50HZ<br>O/P : FULL LOAD<br>Ta : 25°C            | CRITERIA A                    |
| 5  | E.F.T      | EN61000-4-4<br>INPUT: 2KV               | I/P : 230VAC /50HZ<br>O/P : FULL LOAD<br>Ta : 25°C            | CRITERIA A                    |
| 6  | SURGE      | EN61000-4-5<br>L-N: 1KV;L/N-PE: 2KV     | I/P : 230VAC /50HZ<br>O/P : FULL LOAD<br>Ta : 25°C            | CRITERIA A                    |



RELIABILITY TEST

| NO | TEST ITEM                                              | SPECIFICATION                                                                                                                                                                                                                                                                     | TEST CONDITION                                                                                                                                                                                                                 | RESULT                                                                      |  |
|----|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--|
| 1  | TEMPERATURE RISE TEST                                  | MODEL : GSM220A24-R7B                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                |                                                                             |  |
|    |                                                        | 1. ROOM AMBIENT BURN-IN : 1.0hrs<br>IP: 230VAC O/P: 100% LOAD TA= 21.2°C                                                                                                                                                                                                          |                                                                                                                                                                                                                                |                                                                             |  |
|    |                                                        | 2. HIGH AMBIENT BURN-IN : 1.0hrs<br>IP: 230VAC O/P: 100% LOAD TA= 39.6°C                                                                                                                                                                                                          |                                                                                                                                                                                                                                |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | NO. Position ROOM AMBIENT 21.2°C HIGH AMBIENT Ta: 39.6°C                                                                                                                                                                       |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 1 LF1 55.3°C 72.2°C                                                                                                                                                                                                            |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 2 LF2 56.5°C 73.5°C                                                                                                                                                                                                            |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 3 L2 59.5°C 76.2°C                                                                                                                                                                                                             |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 4 BD1 60.0°C 76.7°C                                                                                                                                                                                                            |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 5 L1 63.4°C 79.9°C                                                                                                                                                                                                             |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 6 Q1 58.7°C 75.5°C                                                                                                                                                                                                             |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 7 Q2 59.7°C 76.4°C                                                                                                                                                                                                             |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 8 D2 61.2°C 77.9°C                                                                                                                                                                                                             |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 9 C5 63.1°C 79.3°C                                                                                                                                                                                                             |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 10 TSW1 56.6°C 73.2°C                                                                                                                                                                                                          |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 11 C83 64.1°C 80.5°C                                                                                                                                                                                                           |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 12 RTH2 60.4°C 77.2°C                                                                                                                                                                                                          |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 13 T1 COIL 75.0°C 91.3°C                                                                                                                                                                                                       |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 14 C109 65.7°C 82.6°C                                                                                                                                                                                                          |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 15 Q102 68.9°C 86.1°C                                                                                                                                                                                                          |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 16 Q101 68.3°C 85.4°C                                                                                                                                                                                                          |                                                                             |  |
|    |                                                        |                                                                                                                                                                                                                                                                                   | 17 Q5 61.7°C 78.7°C                                                                                                                                                                                                            |                                                                             |  |
|    | 18 Q6 61.6°C 78.7°C                                    |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                |                                                                             |  |
|    | 19 U1 68.1°C 84.6°C                                    |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                |                                                                             |  |
|    | 20 D3 59.1°C 75.8°C                                    |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                |                                                                             |  |
| 2  | OVER LOAD BURN-IN TEST                                 | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                       | I/P : 230VAC<br>O/P : 114.13% LOAD<br>Ta : 25°C                                                                                                                                                                                | TEST : OK                                                                   |  |
| 3  | LOW TEMPERATURE TURN ON TEST                           | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                       | I/P : 264VAC / 95VAC<br>O/P : FULL LOAD<br>Ta : -30.0°C                                                                                                                                                                        | TEST : OK                                                                   |  |
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 40°C<br>NO DAMAGE                                                                                                                                                                                                                      | I/P : 272VAC<br>O/P : FULL LOAD<br>Ta : 40°C<br>HUMIDITY= 95.0% RH                                                                                                                                                             | TEST : OK                                                                   |  |
| 5  | TEMPERATURE COEFFICIENT                                | ±0.03% /(0°C~50°C)                                                                                                                                                                                                                                                                | I/P : 230VAC<br>O/P : FULL LOAD                                                                                                                                                                                                | ±0.0069% /(0°C~50°C)                                                        |  |
| 6  | STORAGE TEMPERATURE TEST                               | 1. Thermal shock Temperature : -40°C ~ +85°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 5 CYCLE<br>5. Input/Output condition : STATIC                                                            |                                                                                                                                                                                                                                | TEST : OK                                                                   |  |
| 7  | THERMAL SHOCK TEST                                     | 1. Thermal shock Temperature : -35°C ~ +45°C<br>2. Temperature change rate : 25°C / MIN<br>3. Dwell time low and high temperature : 30 MIN/EACH<br>4. Total test cycle : 10 CYCLE<br>5. Input/Output condition :<br>230VAC Full Load AC ON/OFF test turn on 58sec ; turn off 2sec |                                                                                                                                                                                                                                | TEST : OK                                                                   |  |
| 8  | VIBRATION TEST                                         | 1 Carton & 1 Set<br>(1) Waveform : Sine Wave<br>(2) Frequency : 10~500Hz<br>(4) Acceleration : 2G<br>(5) Test Time : 60 min in each axis (X.Y.Z)<br>(6) Ta : 25°C                                                                                                                 |                                                                                                                                                                                                                                | TEST : OK                                                                   |  |
| 9  | CAPACITOR LIFE CYCLE                                   | :SUPPOSE C109 IS THE MOST CRITICAL COMPONENT                                                                                                                                                                                                                                      | (1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0°C LIFE TIME<br>(2) I/P : 230VAC O/P : FULL LOAD Ta= 40.0°C LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta= 40.0°C LIFE TIME<br>(4) I/P : 230VAC O/P : 50% LOAD Ta= 40.0°C LIFE TIME | (1). 146140.8 HRS<br>(2). 57283.2 HRS<br>(3). 145530 HRS<br>(4). 215745 HRS |  |



|    |                              |                                                                                      |          |      |       |
|----|------------------------------|--------------------------------------------------------------------------------------|----------|------|-------|
| 10 | MTBF                         | 2028.6K hrs min. Telcordia SR-332 (Bellcore) ; 210.8K hrs min. MIL-HDBK-217F (25 °C) |          |      |       |
| 11 | DMTBF /Accelerated Life test | Demonstration Mean Time Between Failure (Expected Life): Above                       | 30000HRS | @ TA | 40 °C |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|--------|--------|----------|
| PASS        | FRANK  | GESG   | WANGDZ   |