



# TEST REPORT: RPS-200-27

## 200W Single Output Green Medical Type

### ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

### ■ SAFETY & E.M.C. TEST

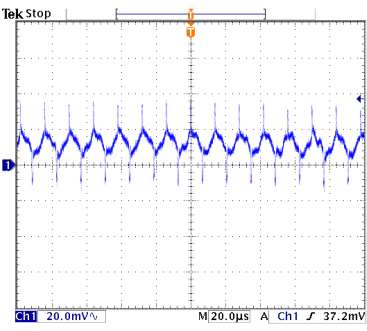
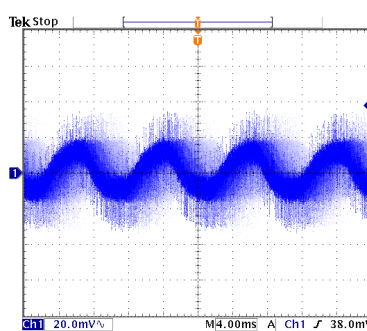
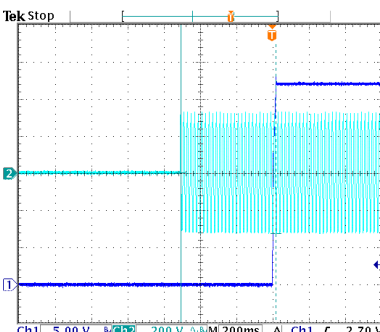
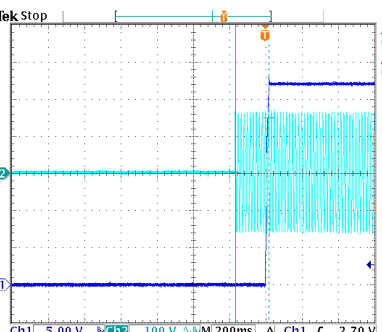
Safety Test

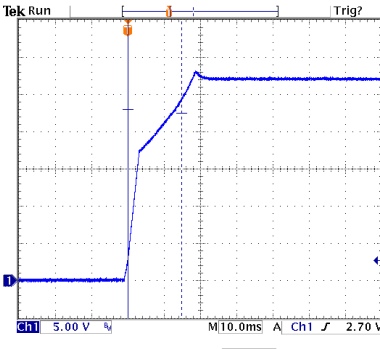
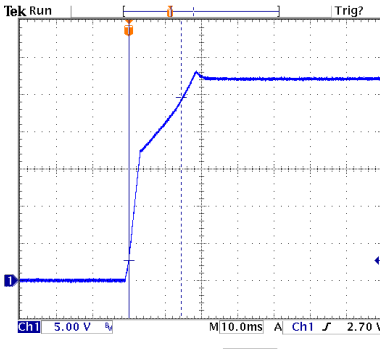
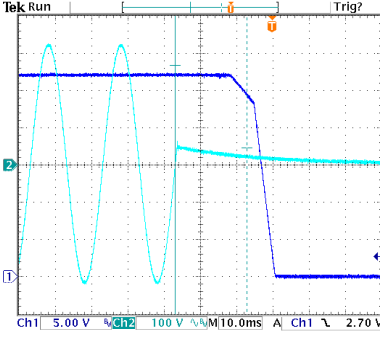
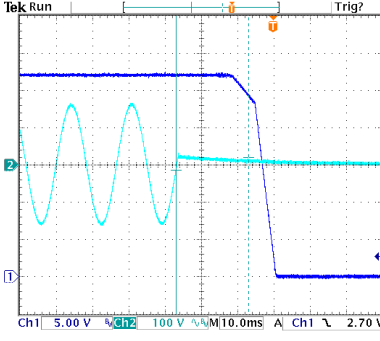
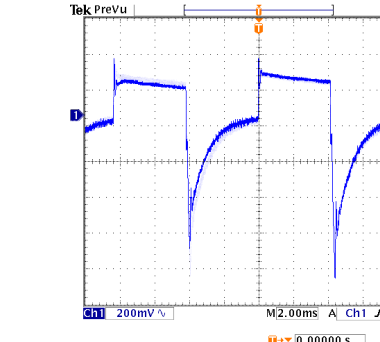
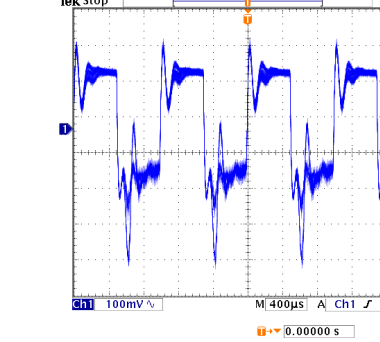
E.M.C. Test

### ■ RELIABILITY TEST

ENVIRONMENT TEST

# DESIGN VERIFY TEST OUTPUT FUNCTION

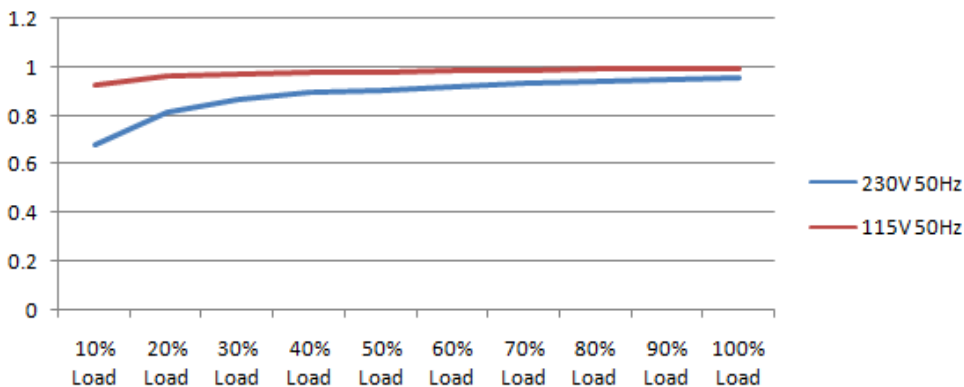
| NO | TEST ITEM                                                                                                                                                                                                                                                                                                                                                                    | SPECIFICATION                    | TEST CONDITION                                           | RESULT                       |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------|------------------------------|
| 1  | OUTPUT VOLTAGE<br>ADJUST RANGE                                                                                                                                                                                                                                                                                                                                               | CH1: 25.60V ~ 28.40V             | I/P : 230VAC<br>O/P: MIN LOAD<br>TA : 25°C               | CH1: 24.36V ~ 29.12V         |
| 2  | OUTPUT VOLTAGE<br>TOLERANCE (Max)                                                                                                                                                                                                                                                                                                                                            | V1 : 1.0% ~ -1.0%                | I/P : 115VAC / 264VAC<br>O/P: FULL / MINLOAD<br>TA= 25°C | V1: 0.70% ~ 0.63%            |
| 3  | LINE REGULATION<br>(MAX.)                                                                                                                                                                                                                                                                                                                                                    | V1 : 0.5% ~ -0.5%                | I/P : 115VAC / 264VAC<br>O/P: FULL LOAD<br>TA: 25°C      | V1: 0.04% ~ 0.00%            |
| 4  | LOAD REGULATION<br>(MAX.)                                                                                                                                                                                                                                                                                                                                                    | V1 : 1.0% ~ -1.0%                | I/P : 230VAC<br>O/P: MIN LOAD ~ FULL LOAD<br>TA : 25°C   | V1: 0.04% ~ -0.04%           |
| 5  | OVER/UNDERSHOOT<br>TEST                                                                                                                                                                                                                                                                                                                                                      | < ±5%                            | I/P : 230VAC<br>O/P: FULL LOAD<br>TA : 25°C              | TEST< 3.704 %                |
| 6  | RIPPLE & NOISE(Max)                                                                                                                                                                                                                                                                                                                                                          | V1 : 120 mVp-p                   | I/P : 230VAC<br>O/P: FULL LOAD<br>TA : 25°C              | V1 : 67.6 mVp-p              |
|    | <div><div>high frequency :<br/></div><div>low frequency :<br/></div></div>                                                                                                                              |                                  |                                                          |                              |
| 7  | SET UP TIME (MAX.)                                                                                                                                                                                                                                                                                                                                                           | 230VAC : 700ms<br>115VAC : 700ms | I/P : 230VAC<br>I/P : 115VAC                             | 230VAC 524ms<br>115VAC 184ms |
|    | <div><div>INPUT=230VAC/50HZ @ FULL LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage<br/></div><div>INPUT=115VAC/60HZ @ FULL LOAD<br/>CH1 : Output Voltage CH2 : AC Input Voltage<br/></div></div> |                                  |                                                          |                              |

|    |                                                                                     |                                |                                                                                                      |                                              |
|----|-------------------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------|
| 8  | RISE TIME (MAX.)                                                                    | 230VAC : 30ms<br>115VAC : 30ms | I/P : 230VAC<br>I/P : 115VAC<br>O/P: FULL LOAD<br>TA : 25°C                                          | 230VAC : 14.8ms<br>115VAC : 14.4ms           |
|    | INPUT=230VAC/50HZ @ FULL LOAD<br>CH1 : Output Voltage                               |                                | INPUT=115VAC/60HZ @ FULL LOAD<br>CH1 : Output Voltage                                                |                                              |
|    |    |                                |                    |                                              |
| 9  | HOLD UP TIME (TYP.)                                                                 | 230VAC : 12ms<br>115VAC : 12ms | I/P : 230VAC<br>I/P : 115VAC<br>O/P: FULL LOAD<br>TA : 25°C                                          | 230VAC : 19.8ms<br>115VAC : 20.0ms           |
|    | INPUT=230VAC/50HZ @ FULL LOAD<br>CH1 : Output Voltage CH2 : AC Input Voltage        |                                | INPUT=115VAC/60HZ @ FULL LOAD<br>CH1 : Output Voltage CH2 : AC Input Voltage                         |                                              |
|    |   |                                |                   |                                              |
| 10 | DYNAMIC LOAD                                                                        | V1 : 2700 mVp-p                | I/P : 230VAC<br>O/P:<br>(1)Full/Min load 50%duty/120HZ<br>(2)Full/Min load 50%duty/1KHZ<br>TA : 25°C | (1). (2). unit:mVp-p<br>V1: 1230.0mv 644.0mv |
|    | FULL/Min LOAD 50%DUTY / 120HZ                                                       |                                | FULL/Min LOAD 50%DUTY / 1KHZ                                                                         |                                              |
|    |  |                                |                  |                                              |

## INPUT FUNCTION TEST

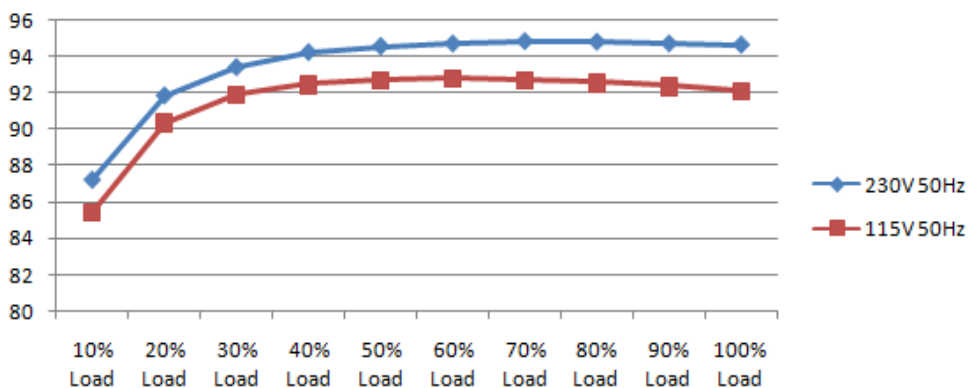
| NO | TEST ITEM                 | SPECIFICATION                    | TEST CONDITION                                                                                                                       | RESULT                                   |
|----|---------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| 1  | INPUT VOLTAGE RANGE       | 80VAC ~ 264VAC                   | I/P : TESTING<br>O/P : FULL LOAD<br>Ta : 25°C                                                                                        | 68.0VAC ~ 264VAC                         |
|    |                           |                                  | I/P :<br>LOW-LINE = 77VAC<br>HIGH-LINE = 300VAC<br>O/P : FULL/MIN LOAD<br>ON:30 Sec ; OFF:30 Sec 10MIN<br>( POWER ON/OFF NO DAMAGE ) | TEST : OK                                |
| 2  | INPUT FREQUENCY RANGE     | 47HZ ~ 63HZ<br>NO DAMAGE         | I/P : 115VAC ~ 264VAC<br>O/P : FULL-MIN LOAD<br>Ta : 25°C                                                                            | TEST : OK                                |
| 3  | INPUT CURRENT (TYP.)      | 1.00A / 230VAC<br>2.00A / 115VAC | I/P : 230VAC<br>I/P : 115VAC<br>O/P : FULL LOAD<br>TA : 25°C                                                                         | I= 0.98A / 230VAC<br>I= 1.95A / 115VAC   |
| 4  | LEAKAGE CURRENT           | < 130uA Earth leakage current    | I/P : 264VAC<br>O/P : MIN LOAD<br>TA : 25°C                                                                                          | L-FG 103 uA<br>N-FG 102 uA               |
|    |                           | < 40uA Touch leakage current     | I/P : 264VAC<br>O/P : MIN LOAD<br>TA : 25°C                                                                                          | L-V-: 33 uA<br>N-V-: 33 uA               |
| 5  | NO LOAD POWER CONSUMPTION | < 0.50W                          | I/P : 230VAC<br>O/P : MIN LOAD<br>TA : 25°C                                                                                          | < 0.3495 W                               |
|    | POWER FACTOR (TYP.)       | 0.94 / 230VAC<br>0.98 / 115VAC   | I/P : 230VAC<br>I/P : 115VAC<br>O/P : FULL LOAD<br>TA : 25°C                                                                         | PF= 0.956 / 230VAC<br>PF= 0.993 / 115VAC |

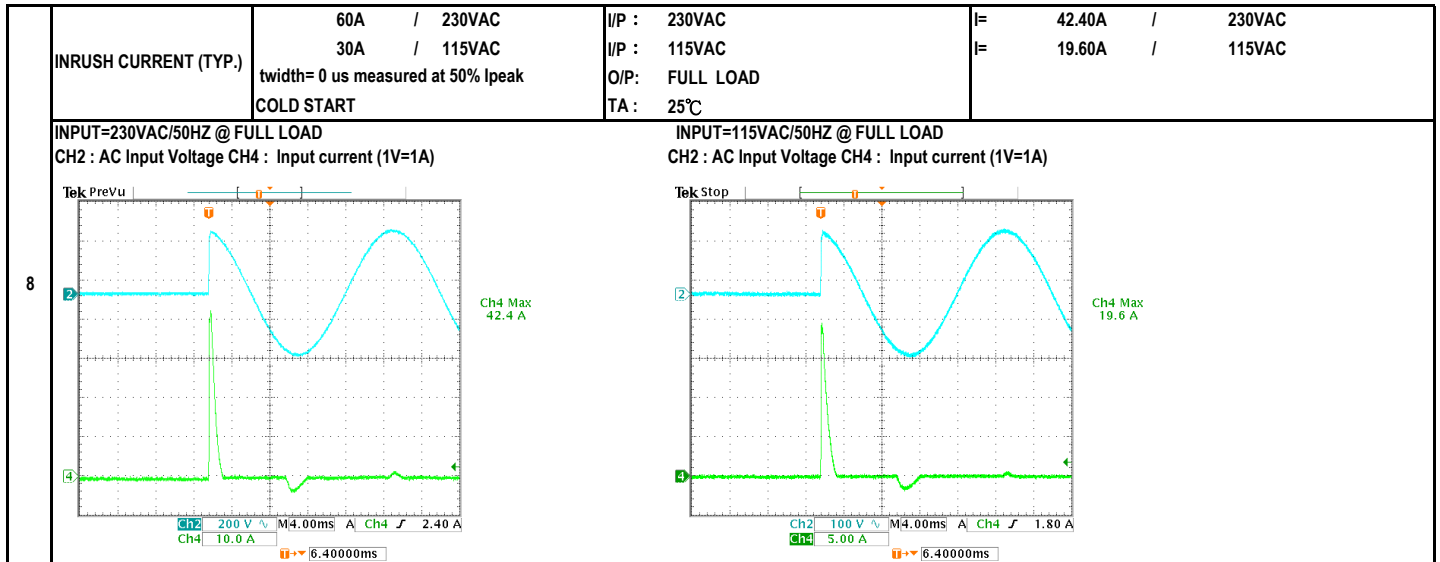
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|                   |       |                                              |          |
|-------------------|-------|----------------------------------------------|----------|
| EFFICIENCY (TYP.) | 94.0% | I/P : 230VAC<br>O/P : FULL LOAD<br>TA : 25°C | 94.492 % |
|-------------------|-------|----------------------------------------------|----------|





#### PROTECTION FUNCTION TEST

| NO | TEST ITEM                   | SPECIFICATION                          | TEST CONDITION                                                        | RESULT                                                                   |
|----|-----------------------------|----------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1  | OVER LOAD PROTECTION        | 110% ~ 140%                            | I/P: 264VAC<br>I/P: 230VAC<br>I/P: 115VAC<br>O/P: TESTING<br>TA: 25°C | 122.40% 264VAC<br>121.73% 230VAC<br>121.73% 115VAC<br>Hiccup Mode        |
| 2  | OVER VOLTAGE PROTECTION     | 29.70V ~ 35.00V                        | I/P: 264VAC<br>I/P: 230VAC<br>I/P: 80VAC<br>O/P: MIN LOAD<br>TA: 25°C | 31.70V 264VAC<br>31.70V 230VAC<br>31.70V 80VAC<br>Shut down Re- power ON |
| 3  | 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                                                 |
| 4  | OVER TEMPERATURE PROTECTION | Shut down Re- power ON                 | I/P: 264VAC<br>I/P: 80VAC<br>O/P: FULL LOAD                           | O.T.P. Active<br>Shut down Re- power ON                                  |

#### CONTROL FUNCTION TEST

| NO | TEST ITEM       | SPECIFICATION                                             | TEST CONDITION                            | RESULT                                                            |
|----|-----------------|-----------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------|
| 1  | AUXILIARY POWER | 12V / 0.5A<br>ripple & noise: * mv<br>Tolerance: -15~15 % | I/P: 230VAC<br>O/P: FULL LOAD<br>TA: 25°C | 11.493 V/ 0.4993 A<br>ripple & noise: * mv<br>Tolerance: -4.225 % |

#### COMPONENT STRESS TEST

| NO | TEST ITEM            | SPECIFICATION                                                               | TEST CONDITION                                                                                                            | RESULT                                                                                                              |
|----|----------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| 1  | PWM Power Transistor | Q5 Rated : 500V 13.0A<br>Q6 Rated : 500V 13.0A                              | I/P : 267VAC<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                      | Q5 Q6<br>(1). 496.00V 496.00V<br>(2). 496.00V 494.00V<br>(3). 446.00V 460.00V                                       |
| 2  | Input Capacitor      | C5 Rated : 100uf 420V                                                       | 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 | (1). 418.00V<br>(2). 417.00V<br>(3). 418.00V                                                                        |
| 3  | Control IC           | U1 Rated : 38.0V (max)<br>13.0V (min)<br>U101 Rated : 24V (max)<br>6V (min) | 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<br>(1). 28.10V 12.20V<br>(2). 20.10V 1.58V<br>(3). 20.10V 1.58V<br>(4). 28.90V 12.80V<br>(5). 22.50V 10.50V |

|   |                      |                       |                                                                                                                                                                          |                                                              |                                    |
|---|----------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------|
| 4 | O/P Diode (MOSFET)   | Q101 Rated : 150V 50A | I/P : 267VAC<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                                                                     | Q101<br>(1). 62.80V<br>(2). 13.00V<br>(3). 61.40V            | Q102<br>64.60V<br>13.40V<br>62.40V |
|   |                      | Q102 Rated : 150V 50A |                                                                                                                                                                          |                                                              |                                    |
| 5 | PFC Power Transistor | Q1 Rated : 600V 20.2A | I/P : 267VAC<br>O/P : (1)Full Load Turn on<br>(2) Output Short<br>(3)Full load continue<br>Ta : 25°C                                                                     | (1). 554.00V<br>(2). 556.00V<br>(3). 508.00V                 |                                    |
|   |                      |                       |                                                                                                                                                                          |                                                              |                                    |
| 6 | PFC Diode            | D1 Rated : 600V 5.0A  | 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 | (1). 542.00V<br>(2). 490.00V<br>(3). 522.00V<br>(4). 518.00V |                                    |
|   |                      |                       |                                                                                                                                                                          |                                                              |                                    |

#### 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 : 1.500KVAC /min | I/P-O/P: 4.400KVAC /min<br>I/P-FG: 2.400KVAC /min<br>O/P-FG: 1.800KVAC /min<br>Ta : 25°C | I/P-O/P: 1.01mA<br>I/P-FG: 1.39mA<br>O/P-FG: 0.59mA<br>NO DAMAGE |
|    |                      |                                                                                |                                                                                          |                                                                  |
| 2  | ISOLATION RESISTANCE | I/P-O/P : 500VDC>100MΩ<br>I/P-FG : 500VDC>100MΩ                                | I/P-O/P: 500VDC<br>I/P-FG: 500VDC<br>Ta : 25°C/70%RH                                     | I/P-O/P: 9999MΩ<br>I/P-FG: 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>MEDICAL 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>MEDICAL INPUT: 2KV               | I/P : 230VAC /50HZ<br>O/P : FULL LOAD<br>Ta : 25°C            | CRITERIA A                    |
|    |            |                                                 |                                                               |                               |
| 6  | SURGE      | IEC61000-4-5<br>MEDICAL L-N:2KV;L/N-PE: 4KV     | 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 : RPS-200-24                                                                                                                                                                                                                                                             |                                                                   |                                                                           |                        |
|    |                                                        | 1. ROOM AMBIENT BURN-IN : 1.0hrs                                                                                                                                                                                                                                               |                                                                   |                                                                           |                        |
|    |                                                        | IP: 230VAC O/P: 100% LOAD TA= 18.5℃                                                                                                                                                                                                                                            |                                                                   |                                                                           |                        |
|    |                                                        | 2. HIGH AMBIENT BURN-IN : 1.0hrs                                                                                                                                                                                                                                               |                                                                   |                                                                           |                        |
|    |                                                        | IP: 230VAC O/P: 100% LOAD TA= 49.3℃                                                                                                                                                                                                                                            |                                                                   |                                                                           |                        |
|    |                                                        | NO.                                                                                                                                                                                                                                                                            | Position                                                          | ROOM AMBIENT 18.5℃                                                        | HIGH AMBIENT Ta: 49.3℃ |
|    |                                                        | 1                                                                                                                                                                                                                                                                              | RTH1                                                              | 64.1℃                                                                     | 82.3℃                  |
|    |                                                        | 2                                                                                                                                                                                                                                                                              | LF1                                                               | 28.2℃                                                                     | 57.0℃                  |
|    |                                                        | 3                                                                                                                                                                                                                                                                              | LF2                                                               | 29.2℃                                                                     | 59.7℃                  |
|    |                                                        | 4                                                                                                                                                                                                                                                                              | L2                                                                | 31.0℃                                                                     | 61.3℃                  |
|    |                                                        | 5                                                                                                                                                                                                                                                                              | BD1                                                               | 39.3℃                                                                     | 69.1℃                  |
|    |                                                        | 6                                                                                                                                                                                                                                                                              | C5                                                                | 30.2℃                                                                     | 59.8℃                  |
|    |                                                        | 7                                                                                                                                                                                                                                                                              | Q1                                                                | 44.5℃                                                                     | 74.9℃                  |
|    |                                                        | 8                                                                                                                                                                                                                                                                              | C81                                                               | 23.0℃                                                                     | 53.0℃                  |
|    |                                                        | 9                                                                                                                                                                                                                                                                              | RTH2                                                              | 24.8℃                                                                     | 54.5℃                  |
|    |                                                        | 10                                                                                                                                                                                                                                                                             | T1 COIL                                                           | 47.7℃                                                                     | 78.2℃                  |
|    |                                                        | 11                                                                                                                                                                                                                                                                             | T1 BOB                                                            | 43.6℃                                                                     | 73.0℃                  |
| 12 | L100                                                   | 37.6℃                                                                                                                                                                                                                                                                          | 69.4℃                                                             |                                                                           |                        |
| 13 | C105                                                   | 38.2℃                                                                                                                                                                                                                                                                          | 68.5℃                                                             |                                                                           |                        |
| 14 | L1                                                     | 46.1℃                                                                                                                                                                                                                                                                          | 77.3℃                                                             |                                                                           |                        |
| 15 | U1                                                     | 39.3℃                                                                                                                                                                                                                                                                          | 69.0℃                                                             |                                                                           |                        |
| 2  | OVER LOAD BURN-IN TEST                                 | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                    | I/P : 230VAC<br>O/P : 119.00% LOAD<br>Ta : 25℃                    | TEST : OK                                                                 |                        |
| 3  | LOW TEMPERATURE TURN ON TEST                           | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                    | I/P : 264VAC / 115VAC<br>O/P : FULL LOAD<br>Ta : -30.0℃           | TEST : OK                                                                 |                        |
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 50℃<br>NO DAMAGE                                                                                                                                                                                                                    | I/P : 272VAC<br>O/P : FULL LOAD<br>Ta : 50℃<br>HUMIDITY= 95.0% RH | TEST : OK                                                                 |                        |
| 5  | TEMPERATURE COEFFICIENT                                | ±0.03% /(0℃~50℃)                                                                                                                                                                                                                                                               | I/P : 230VAC<br>O/P : FULL LOAD                                   | ±0.0000% /(0℃~50℃)                                                        |                        |
| 6  | STORAGE TEMPERATURE TEST                               | 1. Thermal shock Temperature : -40℃ ~ +85℃<br>2. Temperature change rate : 25℃ / 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℃ ~ +55℃<br>2. Temperature change rate : 25℃ / 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℃                                                                                                               |                                                                   | TEST : OK                                                                 |                        |
| 9  | CAPACITOR LIFE CYCLE                                   | :SUPPOSE C105 IS THE MOST CRITICAL COMPONENT<br>(1) I/P : 230VAC O/P : FULL LOAD Ta= 25.0℃ LIFE TIME<br>(2) I/P : 230VAC O/P : FULL LOAD Ta= 50.0℃ LIFE TIME<br>(3) I/P : 230VAC O/P : 75% LOAD Ta= 50.0℃ LIFE TIME<br>(4) I/P : 230VAC O/P : 50% LOAD Ta= 50.0℃ LIFE TIME     |                                                                   | (1). 437778 HRS<br>(2). 80132 HRS<br>(3). 179640 HRS<br>(4). 297469.9 HRS |                        |
| 10 | MTBF                                                   | Conducted by Parts Stress Analysis Prediction<br>500.2K hrs min. MIL-HDBK-217F (25℃)                                                                                                                                                                                           |                                                                   |                                                                           |                        |
| 11 | DMTBF /Accelerated Life test                           | Demonstration Mean Time Between Failure (Expected Life): Above 30000HRS @ TA 50℃                                                                                                                                                                                               |                                                                   |                                                                           |                        |

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

2007/3/20 A50-S014