



### 35W Single Output Switching Power Supply

## NES-35 series



#### ■ Features :

- Universal AC input/Full range
- Protections: Short circuit / Overload / Over voltage
- Cooling by free air convection
- 100% full load burn-in test
- 2 years warranty

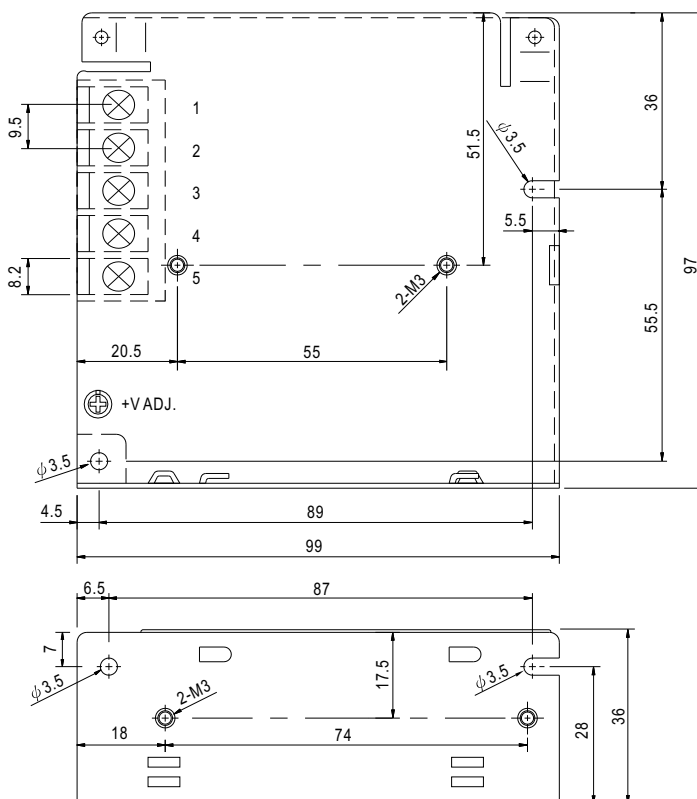


#### SPECIFICATION

| MODEL                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | NES-35-5                                                                                                                | NES-35-12    | NES-35-15      | NES-35-24    | NES-35-48    |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------|----------------|--------------|--------------|
| OUTPUT                                  | DC VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5V                                                                                                                      | 12V          | 15V            | 24V          | 48V          |
|                                         | RATED CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7A                                                                                                                      | 3A           | 2.4A           | 1.5A         | 0.8A         |
|                                         | CURRENT RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0 ~ 7A                                                                                                                  | 0 ~ 3A       | 0 ~ 2.4A       | 0 ~ 1.5A     | 0 ~ 0.8A     |
|                                         | RATED POWER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 35W                                                                                                                     | 36W          | 36W            | 36W          | 38.4W        |
|                                         | RIPPLE & NOISE (max.) <small>Note.2</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 80mVp-p                                                                                                                 | 120mVp-p     | 150mVp-p       | 200mVp-p     | 240mVp-p     |
|                                         | VOLTAGE ADJ. RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4.75 ~ 5.5V                                                                                                             | 10.8 ~ 13.2V | 13.5 ~ 16.5V   | 21.6 ~ 26.4V | 43.2 ~ 52.8V |
|                                         | VOLTAGE TOLERANCE <small>Note.3</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ±2.0%                                                                                                                   | ±1.0%        | ±1.0%          | ±1.0%        | ±1.0%        |
|                                         | LINE REGULATION <small>Note.4</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ±0.5%                                                                                                                   | ±0.5%        | ±0.5%          | ±0.5%        | ±0.5%        |
|                                         | LOAD REGULATION <small>Note.5</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ±0.5%                                                                                                                   | ±0.5%        | ±0.5%          | ±0.5%        | ±0.5%        |
|                                         | SETUP, RISE TIME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 500ms, 30ms/230VAC      1200ms, 30ms/115VAC at full load                                                                |              |                |              |              |
| HOLD UP TIME (Typ.)                     | 50ms/230VAC      10ms/115VAC at full load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                         |              |                |              |              |
| INPUT                                   | VOLTAGE RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 85 ~ 264VAC      120 ~ 370VDC                                                                                           |              |                |              |              |
|                                         | FREQUENCY RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 47 ~ 63Hz                                                                                                               |              |                |              |              |
|                                         | EFFICIENCY (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 78%                                                                                                                     | 81%          | 83%            | 85%          | 86%          |
|                                         | AC CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0.75A/115VAC      0.5 A/230VAC                                                                                          |              |                |              |              |
|                                         | INRUSH CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | COLD START 45A                                                                                                          |              |                |              |              |
|                                         | LEAKAGE CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <2mA / 240VAC                                                                                                           |              |                |              |              |
| PROTECTION                              | OVERLOAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 110 ~ 150% rated output power<br>Protection type : Hiccup mode, recovers automatically after fault condition is removed |              |                |              |              |
|                                         | OVER VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5.75 ~ 6.75V                                                                                                            | 13.8 ~ 16.2V | 17.25 ~ 20.25V | 27.6 ~ 32.4V | 55.2 ~ 64.8V |
|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Protection type : Shut down o/p voltage, re-power on to recover                                                         |              |                |              |              |
| ENVIRONMENT                             | WORKING TEMP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | -20 ~ +60℃ (Refer to output load derating curve)                                                                        |              |                |              |              |
|                                         | WORKING HUMIDITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 20 ~ 90% RH non-condensing                                                                                              |              |                |              |              |
|                                         | STORAGE TEMP., HUMIDITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | -40 ~ +85℃, 10 ~ 95% RH                                                                                                 |              |                |              |              |
|                                         | TEMP. COEFFICIENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ±0.03%/℃ (0 ~ 45℃)                                                                                                      |              |                |              |              |
|                                         | VIBRATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes                                                 |              |                |              |              |
| SAFETY & EMC<br><small>(Note 6)</small> | SAFETY STANDARDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | UL60950-1, CB(IEC60950-1) Approved                                                                                      |              |                |              |              |
|                                         | WITHSTAND VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | I/P-O/P:3KVAC    I/P-FG:1.5KVAC    O/P-FG:0.5KVAC                                                                       |              |                |              |              |
|                                         | ISOLATION RESISTANCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | I/P-O/P, I/P-FG, O/P-FG:100M Ohms/500VDC                                                                                |              |                |              |              |
|                                         | EMI CONDUCTION & RADIATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Compliance to EN55022 (CISPR22) Class B                                                                                 |              |                |              |              |
|                                         | HARMONIC CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Compliance to EN61000-3-2,-3                                                                                            |              |                |              |              |
|                                         | EMS IMMUNITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Compliance to EN61000-4-2, 3, 4, 5, 6, 8, 11, ENV50204, EN55024, EN61000-6-1 Light industry level, criteria A           |              |                |              |              |
| OTHERS                                  | MTBF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 394Khrs min.    MIL-HDBK-217F (25℃)                                                                                     |              |                |              |              |
|                                         | DIMENSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 99*97*36mm (L*W*H)                                                                                                      |              |                |              |              |
|                                         | PACKING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.36Kg; 45pcs/17.2Kg/0.93CUFT                                                                                           |              |                |              |              |
| NOTE                                    | 1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature.<br>2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.<br>3. Tolerance : includes set up tolerance, line regulation and load regulation.<br>4. Line regulation is measured from low line to high line at rated load.<br>5. Load regulation is measured from 0% to 100% rated load.<br>6. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. |                                                                                                                         |              |                |              |              |

### Mechanical Specification

Case No. 905 Unit:mm

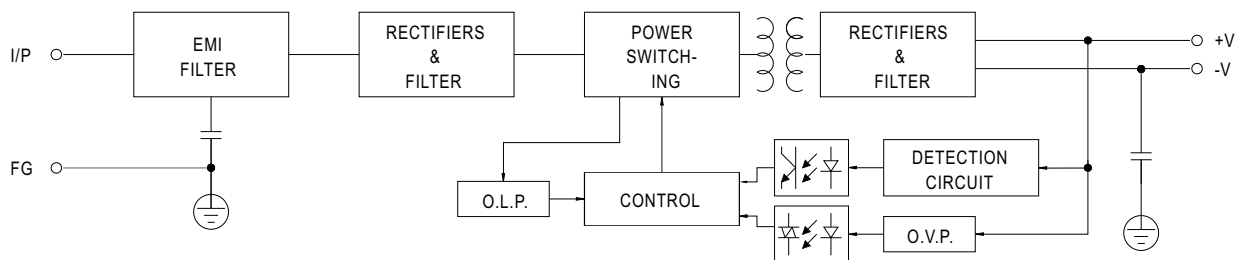


Terminal Pin. No Assignment

| Pin No. | Assignment | Pin No. | Assignment   |
|---------|------------|---------|--------------|
| 1       | AC/L       | 4       | DC OUTPUT -V |
| 2       | AC/N       | 5       | DC OUTPUT +V |
| 3       | FG $\perp$ |         |              |

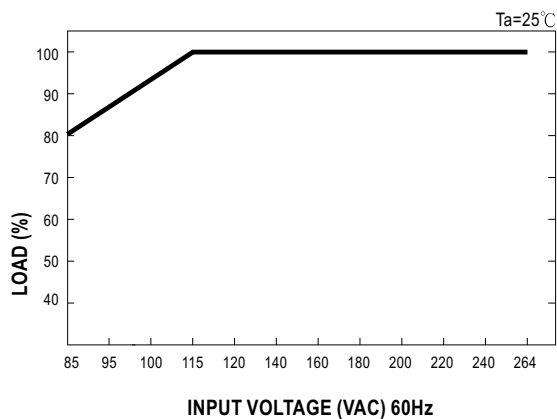
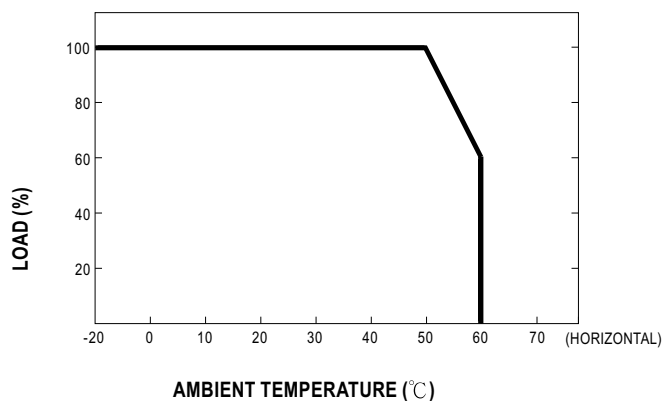
### Block Diagram

fosc : 60KHz



### Derating Curve

### Output Derating VS Input Voltage



MODEL : NES-35-48

## OUTPUT FUNCTION TEST

| NO | TEST ITEM                      | SPECIFICATION                                  | TEST CONDITION                                               | RESULT                                               | VERDICT |
|----|--------------------------------|------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------|---------|
| 1  | RIPPLE & NOISE                 | V1:240 mVp-p (Max )                            | I/P: 230VAC<br>O/P:FULL LOAD<br>Ta:25℃                       | V1: 17 mVp-p (Max )                                  | P       |
| 2  | OUTPUT VOLTAGE<br>ADJUST RANGE | CH1: 43.2V~ 52.8 V                             | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:MIN LOAD<br>Ta:25℃       | 42.54 V~ 56.8 V/ 230 VAC<br>42.54 V~ 56.8 V/ 115 VAC | P       |
| 3  | OUTPUT VOLTAGE<br>TOLERANCE    | V1: 1 %~ -1 % (Max)                            | I/P: 115 VAC / 264 VAC<br>O/P:FULL/ MIN LOAD<br>Ta:25℃       | V1: 0.1 %~ -0.1 %                                    | P       |
| 4  | LINE REGULATION                | V1: 0.5 %~ -0.5 % (Max)                        | I/P: 115 VAC ~ 264 VAC<br>O/P:FULL LOAD<br>Ta:25℃            | V1: 0.03 %~ -0.03 %                                  | P       |
| 5  | LOAD REGULATION                | V1: 0.5 %~ -0.5 % (Max)                        | I/P: 230 VAC<br>O/P:FULL ~MIN LOAD<br>Ta:25℃                 | V1: 0.1 %~ -0.1 %                                    | P       |
| 6  | SET UP TIME                    | 230VAC: 500 ms (Max)<br>115 VAC: 1200 ms (Max) | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25℃      | 230VAC/ 206 ms<br>115VAC/ 600 ms                     | P       |
| 7  | RISE TIME                      | 230VAC: 30 ms (Max)<br>115VAC: 30 ms (Max)     | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25℃      | 230VAC/ 18 ms<br>115VAC/ 20 ms                       | P       |
| 8  | HOLD UP TIME                   | 230VAC: 50 ms (TYP)<br>115VAC: 10 ms (TYP)     | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25℃      | 230VAC/ 103 ms<br>115VAC/ 23 ms                      | P       |
| 9  | OVER/UNDERSHOOT TEST           | < ±5%                                          | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25℃                      | TEST: <5 %                                           | P       |
| 10 | DYNAMIC LOAD                   | V1: 4800 mVp-p                                 | I/P: 230 VAC<br>O/P:FULL /Min LOAD<br>90%DUTY/1KHZ<br>Ta:25℃ | 120 mVp-p                                            | P       |

## INPUT FUNCTION TEST

| N<br>O | TEST ITEM             | SPECICATION                             | TEST CONDITION                                                                                                                          | RESULT                                     | VERDICT |
|--------|-----------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------|
| 1      | INPUT VOLTAGE RANGE   | 85VAC~264 VAC                           | I/P:TESTING<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                 | 58 V~264V                                  | P       |
|        |                       |                                         | I/P:<br>LOW-LINE-3V= 82V<br>HIGH-LINE+15%=300 V<br>O/P:FULL/MIN LOAD<br>ON: 30 Sec . OFF: 30 Sec 10MIN<br>( AC POWER ON/OFF NO DAMAGE ) | TEST: OK                                   |         |
| 2      | INPUT FREQUENCY RANGE | 47HZ ~63 HZ<br>NO DAMAGE OSC            | I/P: 85VAC ~ 264 VAC<br>O/P:FULL~MIN LOAD<br>Ta:25°C                                                                                    | TEST: OK                                   | P       |
| 3      | EFFICIENCY            | 86 % (TYP)                              | I/P: 230 VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                                | 88 %                                       | P       |
| 4      | INPUT CURRENT         | 230V/ 0.5 A (TYP)<br>115V/ 0.75 A (TYP) | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                | I = 0.37 A/ 230 VAC<br>I = 0.63 A/ 115 VAC | P       |
| 5      | INRUSH CURRENT        | 230V/ 45 A (TYP)<br>COLD START          | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:FULL LOAD<br>Ta:25°C                                                                                | I = 41 A/ 230 VAC                          | P       |
| 6      | LEAKAGE CURRENT       | < 2 mA / 240 VAC                        | I/P: 254 VAC<br>O/P:Min LOAD<br>Ta:25°C                                                                                                 | L-FG: 0.75 mA<br>N-FG: 0.75 mA             | P       |

## PROTECTION FUNCTION TEST

| NO | TEST ITEM               | SPECICATION                            | TEST CONDITION                                          | RESULT                                                       | VERDICT |
|----|-------------------------|----------------------------------------|---------------------------------------------------------|--------------------------------------------------------------|---------|
| 1  | OVER LOAD PROTECTION    | 110 %~ 150 %                           | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:TESTING<br>Ta:25°C  | 132 %/ 230 VAC<br>127 %/ 115 VAC<br>Hiccup Mode              | P       |
| 2  | OVER VOLTAGE PROTECTION | CH1: 55.2 V~ 64.8 V                    | I/P: 230 VAC<br>I/P: 115 VAC<br>O/P:MIN LOAD<br>Ta:25°C | 62.2V/ 230 VAC<br>62.2 V/ 115 VAC<br>Shunt down Re- power ON | P       |
| 3  | SHORT PROTECTION        | SHORT EVERY OUTPUT<br>1 HOUR NO DAMAGE | I/P: 264 VAC<br>O/P:FULL LOAD<br>Ta:25°C                | NO DAMAGE<br>Hiccup Mode                                     | P       |

## ENVIRONMENT TEST

| NO | TEST ITEM                                                         | SPECIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | TEST CONDITION                                                 | RESULT                    | VERDICT |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
|----|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------|---------|----------|-----|-----------------------------|---------------------------|---|-----|--------------------|--------|--------|---|-----|--------|--------|--------|---|----|--------------------|--------|--------|---|----|------------------------|--------|--------|---|----|----------|--------|--------|---|----|-------------------|--------|--------|---|---------|---------|--------|--------|---|-----|------------------------|--------|--------|---|------|------------------|--------|--------|----|------|------------------------|--------|--------|----|------|-------------|--------|--------|----|----|-------|--------|--------|----|--|--|----|----|----|--|--|----|----|----|--|--|----|----|---|
| 1  | TEMPERATURE RISE TEST                                             | <div>MODEL : NES-35-24</div> <div>1. ROOM AMBIENT    BURN-IN : 2 HRS</div> <div>I/P: 230VAC    O/P: FULL LOAD    Ta= 28.9 °C</div> <div>2. HIGH AMBIENT    BURN-IN : 2 HRS</div> <div>I/P: 230VAC    O/P: FULL LOAD    Ta= 50 °C</div> <table><thead><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT<br/>Ta= 28.9 °C</th><th>HIGH AMBIENT<br/>Ta= 50 °C</th></tr></thead><tbody><tr><td>1</td><td>BD1</td><td>KBJ208G 2A/800V LT</td><td>52.5°C</td><td>69.4°C</td></tr><tr><td>2</td><td>LF1</td><td>LF-158</td><td>42.8°C</td><td>60.5°C</td></tr><tr><td>3</td><td>D1</td><td>HER306 3A/600V REC</td><td>56.2°C</td><td>74.1°C</td></tr><tr><td>4</td><td>C5</td><td>82U/400V CAPX 85°C NEG</td><td>43.7°C</td><td>61.5°C</td></tr><tr><td>5</td><td>R5</td><td>P6KE150A</td><td>54.5°C</td><td>72.4°C</td></tr><tr><td>6</td><td>Q1</td><td>K2628 6A/600V SAN</td><td>62.0°C</td><td>79.9°C</td></tr><tr><td>7</td><td>T1 COIL</td><td>TF-1241</td><td>58.5°C</td><td>76.1°C</td></tr><tr><td>8</td><td>C36</td><td>100U/35V RUB 105°C YXF</td><td>38.8°C</td><td>57.2°C</td></tr><tr><td>9</td><td>D100</td><td>FMX-12S 10A/200V</td><td>55.9°C</td><td>74.3°C</td></tr><tr><td>10</td><td>C105</td><td>470U/35V CAPX 105°C GL</td><td>45.6°C</td><td>64.7°C</td></tr><tr><td>11</td><td>R105</td><td>51Ω/2W R/MO</td><td>59.9°C</td><td>79.0°C</td></tr><tr><td>12</td><td>U1</td><td>1203P</td><td>46.2°C</td><td>64.3°C</td></tr><tr><td>13</td><td></td><td></td><td>°C</td><td>°C</td></tr><tr><td>14</td><td></td><td></td><td>°C</td><td>°C</td></tr><tr><td>15</td><td></td><td></td><td>°C</td><td>°C</td></tr></tbody></table> |                                                                |                           | NO      | Position | P/N | ROOM AMBIENT<br>Ta= 28.9 °C | HIGH AMBIENT<br>Ta= 50 °C | 1 | BD1 | KBJ208G 2A/800V LT | 52.5°C | 69.4°C | 2 | LF1 | LF-158 | 42.8°C | 60.5°C | 3 | D1 | HER306 3A/600V REC | 56.2°C | 74.1°C | 4 | C5 | 82U/400V CAPX 85°C NEG | 43.7°C | 61.5°C | 5 | R5 | P6KE150A | 54.5°C | 72.4°C | 6 | Q1 | K2628 6A/600V SAN | 62.0°C | 79.9°C | 7 | T1 COIL | TF-1241 | 58.5°C | 76.1°C | 8 | C36 | 100U/35V RUB 105°C YXF | 38.8°C | 57.2°C | 9 | D100 | FMX-12S 10A/200V | 55.9°C | 74.3°C | 10 | C105 | 470U/35V CAPX 105°C GL | 45.6°C | 64.7°C | 11 | R105 | 51Ω/2W R/MO | 59.9°C | 79.0°C | 12 | U1 | 1203P | 46.2°C | 64.3°C | 13 |  |  | °C | °C | 14 |  |  | °C | °C | 15 |  |  | °C | °C | P |
| NO | Position                                                          | P/N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ROOM AMBIENT<br>Ta= 28.9 °C                                    | HIGH AMBIENT<br>Ta= 50 °C |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 1  | BD1                                                               | KBJ208G 2A/800V LT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 52.5°C                                                         | 69.4°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 2  | LF1                                                               | LF-158                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 42.8°C                                                         | 60.5°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 3  | D1                                                                | HER306 3A/600V REC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 56.2°C                                                         | 74.1°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 4  | C5                                                                | 82U/400V CAPX 85°C NEG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 43.7°C                                                         | 61.5°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 5  | R5                                                                | P6KE150A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 54.5°C                                                         | 72.4°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 6  | Q1                                                                | K2628 6A/600V SAN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 62.0°C                                                         | 79.9°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 7  | T1 COIL                                                           | TF-1241                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 58.5°C                                                         | 76.1°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 8  | C36                                                               | 100U/35V RUB 105°C YXF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 38.8°C                                                         | 57.2°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 9  | D100                                                              | FMX-12S 10A/200V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 55.9°C                                                         | 74.3°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 10 | C105                                                              | 470U/35V CAPX 105°C GL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 45.6°C                                                         | 64.7°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 11 | R105                                                              | 51Ω/2W R/MO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 59.9°C                                                         | 79.0°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 12 | U1                                                                | 1203P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 46.2°C                                                         | 64.3°C                    |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 13 |                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | °C                                                             | °C                        |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 14 |                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | °C                                                             | °C                        |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 15 |                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | °C                                                             | °C                        |         |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 2  | OVER LOAD BURN-IN TEST                                            | NO DAMAGE<br>1 HOUR ( MIN )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | I/P: 230 VAC<br>O/P: 139 % LOAD<br>Ta:25°C                     | TEST : OK                 | P       |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 3  | LOW TEMPERATURE<br>TURN ON TEST                                   | TURN ON AFTER 2 HOUR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | I/P: 230 VAC<br>O/P: 100% LOAD<br>Ta= -20°C                    | TEST : OK                 | P       |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 4  | HIGH HUMIDITY<br>HIGH TEMPERATURE<br>HIGH VOLTAGE<br>TURN ON TEST | AFTER 12 HOURS<br>IN CHAMBER ON<br>CONTROL 50°C<br>NO DAMAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | I/P: 272 VAC<br>O/P:FULL LOAD<br>Ta= 50°C<br>HUMIDITY= 95 %R.H | TEST : OK                 | P       |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 5  | TEMPERATURE<br>COEFFICIENT                                        | ± 0.03 %(0-45°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | I/P: 230 VAC<br>O/P:FULL LOAD                                  | ± 0.01 %(0-45°C)          | P       |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |
| 6  | VIBRATION TEST                                                    | 1 Carton & 1 Set<br>(1) Waveform: Sine Wave<br>(2) Frequency:10-500Hz<br>(3) Sweep Time:10min/sweep cycle<br>(4) Acceleration:2G<br>(5) Test Time:1 hour in each axis (X.Y.Z)<br>(6) Ta:25°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                | TEST : OK                 | P       |          |     |                             |                           |   |     |                    |        |        |   |     |        |        |        |   |    |                    |        |        |   |    |                        |        |        |   |    |          |        |        |   |    |                   |        |        |   |         |         |        |        |   |     |                        |        |        |   |      |                  |        |        |    |      |                        |        |        |    |      |             |        |        |    |    |       |        |        |    |  |  |    |    |    |  |  |    |    |    |  |  |    |    |   |

## SAFETY TEST

| NO | TEST ITEM            | SPECICATION                                                         | TEST CONDITION                                                                   | RESULT                                                              | VERDICT |
|----|----------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------|---------|
| 1  | WITHSTAND VOLTAGE    | I/P-O/P: 3 KVAC/min<br>I/P-FG: 1.5 KVAC/min<br>O/P-FG: 0.5 KVAC/min | I/P-O/P: 3.6 KVAC/min<br>I/P-FG: 1.8 KVAC/min<br>O/P-FG: 0.6 KVAC/min<br>Ta:25°C | I/P-O/P: 3.95 mA<br>I/P-FG: 3.15 mA<br>O/P-FG: 2.49 mA<br>NO DAMAGE | P       |
| 2  | ISOLATION RESISTANCE | I/P-O/P:500VDC>100MΩ<br>I/P-FG: 500VDC>100MΩ<br>O/P-FG:500VDC>100MΩ | I/P-O/P: 500 VDC<br>I/P-FG: 500 VDC<br>O/P-FG: 500 VDC<br>Ta:25°C                | I/P-O/P: 1 GΩ<br>I/P-FG: 2 GΩ<br>O/P-FG: 3 GΩ<br>NO DAMAGE          | P       |
| 3  | GROUNDING CONTINUITY | FG(PE) TO CHASSIS<br>OR TRACE < 100 mΩ                              | 40 A / 2min<br>Ta:25°C                                                           | 4 mΩ                                                                | P       |
| 4  | APPROVAL             | TUV: Certificate NO :<br>UL: File NO : E183223                      |                                                                                  |                                                                     | P       |

## E.M.C TEST

| NO | TEST ITEM                                   | SPECICATION                                              | TEST CONDITION                                      | RESULT                        | VERDICT |
|----|---------------------------------------------|----------------------------------------------------------|-----------------------------------------------------|-------------------------------|---------|
| 1  | HARMONIC                                    | EN61000-3-2<br>CLASS A                                   | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | PASS                          | P       |
| 2  | CONDUCTION                                  | EN55022<br>CLASS B                                       | I/P: 230 VAC (50HZ)<br>O/P:FULL/50% LOAD<br>Ta:25°C | PASS<br>Test by certified Lab | P       |
| 3  | RADIATION                                   | EN55022<br>CLASS B                                       | I/P: 230 VAC (50HZ)<br>O/P:FULL LOAD<br>Ta:25°C     | PASS<br>Test by certified Lab | P       |
| 4  | E.S.D                                       | EN61000-4-2<br>LIGHT INDUSTRY<br>AIR:8KV / Contact:4KV   | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | CRITERIA A                    | P       |
| 5  | E.F.T                                       | EN61000-4-4<br>LIGHT INDUSTRY<br>INPUT: 1KV              | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | CRITERIA A                    | P       |
| 6  | SURGE                                       | IEC61000-4-5<br>LIGHT INDUSTRY<br>L-N :1KV<br>L,N-PE:2KV | I/P: 230 VAC/50HZ<br>O/P:FULL LOAD<br>Ta:25°C       | CRITERIA A                    | P       |
| 7  | Test by certified Lab & Test Report Prepare |                                                          |                                                     |                               |         |

## M.T.B.F & LIFE CYCLE CALCULATION

| NO | TEST ITEM               | SPECICATION                                                                                                                                                          | TEST CONDITION | RESULT | VERDICT |
|----|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------|---------|
| 1  | CAPACITOR<br>LIFE CYCLE | SUPPOSE C105 IS THE MOST CRITICAL COMPONENT<br>I/P: 230VAC O/P:FULL LOAD Ta= 25 °C LIFE TIME= 392998 HRS<br>I/P: 230VAC O/P:FULL LOAD Ta= 50 °C LIFE TIME= 79820 HRS |                |        | P       |
| 2  | MTBF                    | MIL-HDBK-217F NOTICES2 PARTS COUNT<br>TOTAL FAILURE RATE: 394 HRS                                                                                                    |                |        | P       |

## COMPONENT STRESS TEST

| NO | TEST ITEM                                                     | SPECICATION                      | TEST CONDITION                                                                                                                                          | RESULT                                           | VERDICT |
|----|---------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------|
| 1  | Power Transistor<br>( D to S) or (C to E) <b>Peak Voltage</b> | Q 1 Rated<br>K2545 : 600V 6 A    | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load Turn on<br>(2) Full Load<br>(3)Output Short<br>Ta:25℃                                                    | (1) 452 V<br>(2) 464 V<br>(3) 528 V              | P       |
| 2  | Diode Peak <b>Voltage</b>                                     | D100 Rated<br>F10LC40 : 400V 10A | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load Turn on<br>(2) Full Load<br>(3)Output Short<br>Ta:25℃                                                    | (1) 386 V<br>(2) 388 V<br>(3) 374 V              | P       |
| 3  | Clamp Diode Peak <b>Voltage</b>                               | D1 Rated<br>HER306 : 600 V 3A    | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load<br>(2) Dynamic Load<br>90%Duty/1KHz<br>Ta:25℃                                                            | (1) 432 V<br>(2) 432 V                           | P       |
| 4  | Input Capacitor <b>Voltage</b>                                | C5 Rated<br>: 82u /400V/ 85℃     | I/P:High-Line +3V = 267 V<br>O/P: (1)Full Load Turn on /Off<br>(2) Min load Turn on /Off<br>(3)Full Load /Min load Change<br>(4)Burn in 1hour<br>Ta:25℃ | (1) 376 V<br>(2) 376 V<br>(3) 376 V<br>(4) 376 V | P       |
| 5  | Control IC <b>Voltage Test</b>                                | U1 Rated<br>1203 : 18V           | I/P:High-Line +3V = 267 V<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℃                     | (1) 12.6 V<br>(2) 12.6 V<br>(3) 11.1 V           | P       |

| DATE      | SAMPLE         | TEST RESULT | TESTER        | APPROVAL |
|-----------|----------------|-------------|---------------|----------|
| 2005/3/28 | RD SAMPLE      | PASS        | VINCENT TSENG | MAX LIN  |
| 2005/7/8  | PRODUCT SAMPLE | PASS        | VINCENT TSENG | MAX LIN  |

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