



Test Report: BIC-2200-24

AC<->DC Bidirectional Power Supply with Energy Recycle Function

■ DESIGN VERIFY TEST

Output Function Test (AC to DC Direction)

Input Function Test(AC to DC Direction)

Output Function Test (DC to AC Direction)

Input Function Test(DC to AC Direction)

Protection Function Test

Control Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

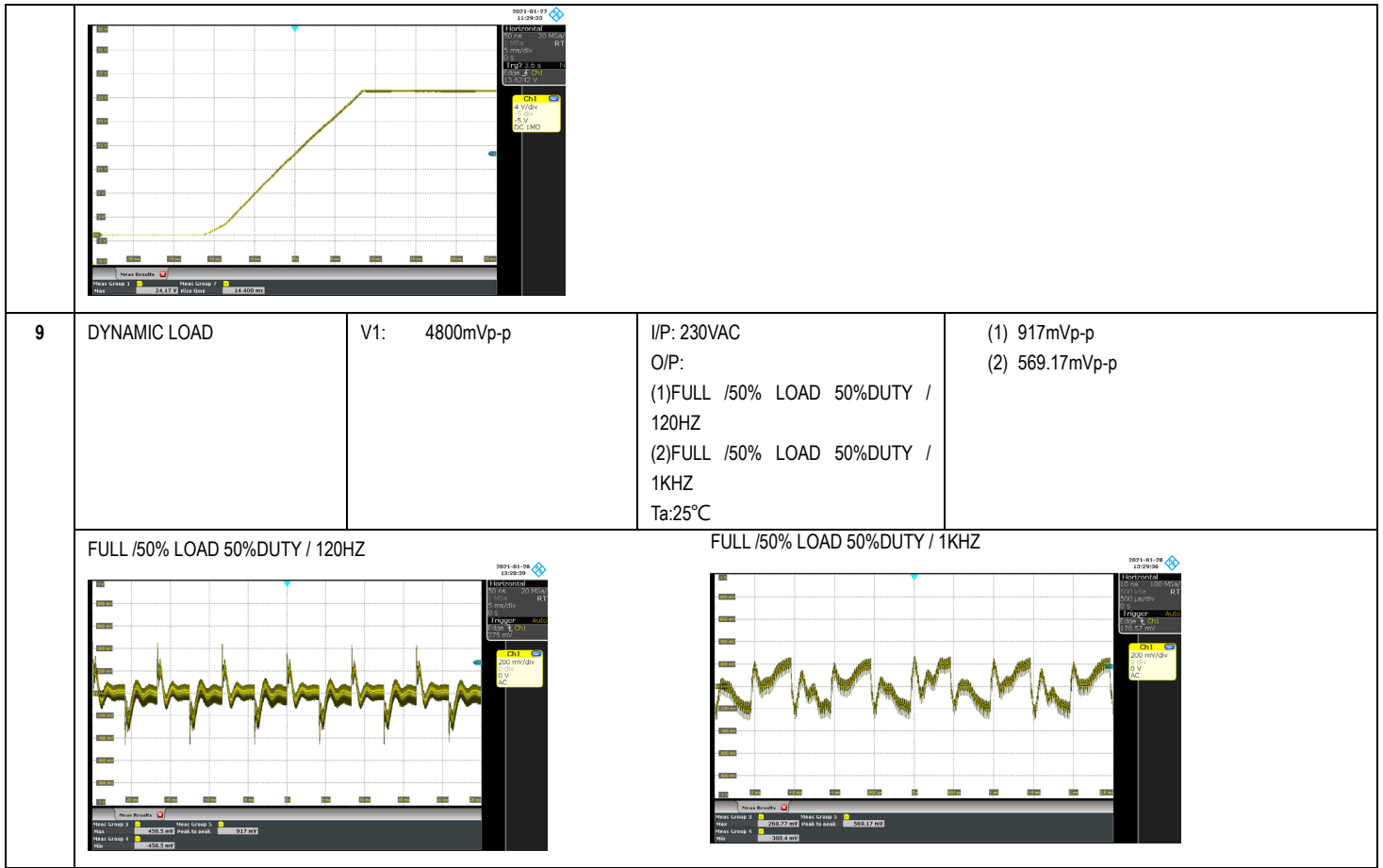
E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

■ **DESIGN VERIFY TEST**

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------------|--|---|---------------------|
| 1 | OUTPUT VOLTAGE ADJUST RANGE | CH1: 19V~ 28 V | I/P : 230 VAC O/P : MIN LOAD Ta : 25°C | 18.4V~28.9V/230VAC |
| 2 | VOLTAGE TOLERANCE (Max) | V1: 1%~ -1 % | I/P: 180VAC /264VAC O/P:FULL/ MIN. LOAD Ta:25°C | V1: 0.66%~ -0.59 % |
| 3 | LINE REGULATION (Max) | V1: 0.5%~ -0.5 % | I/P: 180VAC~ 264VAC O/P:FULL LOAD Ta:25°C | V1: 0.06 %~ -0.06 % |
| 4 | LOAD REGULATION(Max) | V1: 0.5%~ -0.5% | I/P: 230VAC O/P:FULL ~MIN LOAD Ta:25°C | V1: 0.05 %~ -0.03 % |
| 5 | OVER/UNDERSHOOT TEST | < ±10% | I/P: 230VAC O/P:FULL LOAD Ta:25°C | <10% |
| 6 | RIPPLE & NOISE(Max) | V1: 260mVp-p | I/P:230VAC O/P:FULL LOAD Ta:25°C | V1: 199.6mVp-p |
| | | high frequency : | low frequency : | |
| | | | | |
| 7 | SET UP TIME(Max) | 230VAC/1800ms | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/ 994ms |
| | | INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage CH2 : AC Input Voltage | | |
| | | | | |
| 8 | RISE TIME (Max) | 230VAC/60ms | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | 230VAC/14.4ms |
| | | INPUT=230VAC/50HZ @ FULL LOAD CH1 : Output Voltage | | |



INPUT FUNCTION TEST(AC to DC Direction)

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------------------|--------------------------|---|--------------------------------|
| 1 | INPUT VOLTAGE RANGE | 180VAC~264VAC | I/P: TESTING O/P: FULL LOAD Ta:25°C | (1) 165V~264V |
| | | | I/P: LOW-LINE-3V=177 V HIGH-LINE+15%=300 V O/P: FULL/MIN LOAD (PLEASE CHECK DERATING CURVE) ON: 30 Sec OFF: 30 Sec 10MIN (POWER ON/OFF NO DAMAGE) | TEST: OK |
| 2 | INPUT FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE | I/P: 180VAC ~264 VAC O/P: FULL ~MIN LOAD Ta:25°C | TEST: OK |
| 3 | INPUT CURRENT (Typ.) | 230V/ 11A | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | I =10.34A/ 230VAC |
| 4 | LEAKAGE CURRENT | < 2mA / 230 VAC | I/P : 230 VAC O/P : Min LOAD Ta : 25°C | L-FG : 1.2 mA N-FG : 1.2 mA |
| 5 | POWER FACTOR (Typ.) | 0.98/ 230VAC | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | PF=0.9965/230VAC |

| | <p>P.F vs LOAD</p> <table border="1"> <caption>PF vs LOAD Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>180VAC PF</th> <th>230VAC PF</th> </tr> </thead> <tbody> <tr><td>10%</td><td>0.88</td><td>0.83</td></tr> <tr><td>20%</td><td>0.96</td><td>0.94</td></tr> <tr><td>30%</td><td>0.98</td><td>0.97</td></tr> <tr><td>40%</td><td>0.99</td><td>0.98</td></tr> <tr><td>50%</td><td>0.995</td><td>0.99</td></tr> <tr><td>60%</td><td>1.00</td><td>0.995</td></tr> <tr><td>70%</td><td>1.00</td><td>0.995</td></tr> <tr><td>80%</td><td>1.00</td><td>0.995</td></tr> <tr><td>90%</td><td>1.00</td><td>0.995</td></tr> <tr><td>100%</td><td>1.00</td><td>0.995</td></tr> </tbody> </table> | | | LOAD (%) | 180VAC PF | 230VAC PF | 10% | 0.88 | 0.83 | 20% | 0.96 | 0.94 | 30% | 0.98 | 0.97 | 40% | 0.99 | 0.98 | 50% | 0.995 | 0.99 | 60% | 1.00 | 0.995 | 70% | 1.00 | 0.995 | 80% | 1.00 | 0.995 | 90% | 1.00 | 0.995 | 100% | 1.00 | 0.995 | |
|----------|--|------------------------|---|------------------------------------|-----------------------|-----------------------|-----|------|------|-----|------|------|-----|------|------|-----|------|------|-----|-------|------|-----|------|-------|-----|------|-------|-----|------|-------|-----|------|-------|------|------|-------|--|
| LOAD (%) | 180VAC PF | 230VAC PF | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10% | 0.88 | 0.83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20% | 0.96 | 0.94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30% | 0.98 | 0.97 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40% | 0.99 | 0.98 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50% | 0.995 | 0.99 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60% | 1.00 | 0.995 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70% | 1.00 | 0.995 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80% | 1.00 | 0.995 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90% | 1.00 | 0.995 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100% | 1.00 | 0.995 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | EFFICIENCY(Typ.) | 93% | I/P:230 VAC O/P: 75% LOAD Ta:25°C | 93.02% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>EFFICIENCY vs LOAD</p> <table border="1"> <caption>Efficiency vs LOAD Data</caption> <thead> <tr> <th>LOAD (%)</th> <th>180VAC Efficiency (%)</th> <th>230VAC Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>84</td><td>84</td></tr> <tr><td>20%</td><td>91</td><td>92</td></tr> <tr><td>30%</td><td>94</td><td>94</td></tr> <tr><td>40%</td><td>94.5</td><td>95</td></tr> <tr><td>50%</td><td>94.5</td><td>95</td></tr> <tr><td>60%</td><td>94</td><td>94.5</td></tr> <tr><td>70%</td><td>93.5</td><td>94</td></tr> <tr><td>80%</td><td>93</td><td>93.5</td></tr> <tr><td>90%</td><td>92.5</td><td>93</td></tr> <tr><td>100%</td><td>92</td><td>92.5</td></tr> </tbody> </table> | | | LOAD (%) | 180VAC Efficiency (%) | 230VAC Efficiency (%) | 10% | 84 | 84 | 20% | 91 | 92 | 30% | 94 | 94 | 40% | 94.5 | 95 | 50% | 94.5 | 95 | 60% | 94 | 94.5 | 70% | 93.5 | 94 | 80% | 93 | 93.5 | 90% | 92.5 | 93 | 100% | 92 | 92.5 | |
| LOAD (%) | 180VAC Efficiency (%) | 230VAC Efficiency (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10% | 84 | 84 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20% | 91 | 92 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30% | 94 | 94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40% | 94.5 | 95 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50% | 94.5 | 95 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60% | 94 | 94.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70% | 93.5 | 94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80% | 93 | 93.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90% | 92.5 | 93 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100% | 92 | 92.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | INRUSH CURRENT(Typ.) | 230V/35A COLD START | I/P : 230 VAC O/P : FULL LOAD Ta : 25°C | I=32.8A/ 230VAC T50=1900us/230V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>INPUT=230VAC/50HZ @ FULL LOAD CH2 : AC Input Voltage CH4 : Input current</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | TOTAL HARMONIC DISTORTION | <3% | I/P : 230VAC O/P : FULL LOAD Ta : 25°C | THD = 1.9% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

OUTPUT FUNCTION TEST(DC to AC Direction)

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-------------------------------------|--------------------------|---|--------------------|
| 1 | OUTPUT POWER (Typ.) (@240V/60HZ) | 1720W | I/P:24VDC O/P: FULL LOAD Ta:25°C | 1707W |
| 2 | VOLTAGE RANGE | 180VAC~264VAC | I/P:24VDC O/P: TESTING Ta:25°C | (1) 170 VAC~270VAC |
| 3 | FREQUENCY RANGE | 47HZ ~63 HZ NO DAMAGE | I/P:24VDC O/P:FULL~MIN LOAD Ta:25°C | TEST: OK |
| 4 | AC CURRENT (Typ.) | 230VAC/ 7.5 A | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | I =7.3A/ 230VAC |
| 5 | POWER FACTOR (Typ.) | 0.99/ 230VAC | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | PF=0.994/230VAC |
| 6 | EFFICIENCY(Typ.) | 93% | I/P: 24VDC O/P:75%LOAD Ta:25°C | 93.3% |
| 7 | TOTAL HARMONIC DISTORTION | <3% | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | THD = 2.7 % |

INPUT FUNCTION TEST(DC to AC Direction)

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-------------------|---------------|---|---|
| 1 | RATED INPUT POWER | 1800W | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | 1828W |
| 2 | DC VOLTAGE RANGE | 19VDC ~28VDC | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | 19VDC/76.14A 24VDC/75.06A 28VDC/64.68A/ AUTO DERATING |
| 3 | MAX INPUT CURRENT | 75A | I/P : 24VDC O/P : FULL LOAD Ta : 25°C | 75.06A |

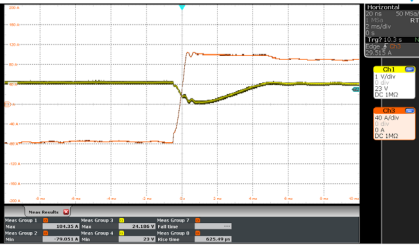
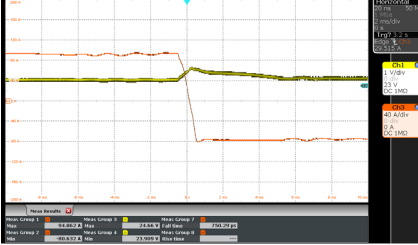
PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|----------------------|--|---|---|
| 1 | OVER LOAD PROTECTION | 105%~ 115 % AC to DC Direction: Constant current limiting, shut down DC O/P voltage 5 sec. after DC O/P voltage is down low, re-power on to recover DC to AC Direction: Not accurable with constant power design | AC to DC Direction I/P: 264VAC I/P: 230VAC I/P: 180VAC DC to AC Direction I/P: 19VDC I/P: 24VDC I/P: 28VDC O/P:FULL LOAD Ta:25°C | AC to DC Direction 112.2%/ 264VAC 112.2%/ 230VAC 112.2%/180VAC PROTECTION TYPE : Constant current limiting, shut down DC O/P voltage 5 sec. after DC O/P voltage is down low, re-power on to recover DC to AC Direction: 19VDC/76.14A 24VDC/75.06A 28VDC/64.68A/ AUTO DERATING |

| | | | | |
|---|-----------------------------|---|---|--|
| | | | | PROTECTION TYPE : Not accurable with constant power design |
| 2 | OVER VOLTAGE PROTECTION | 33.6V~39.2V Protection type :Shut down o/p voltage, re-power on to recover | I/P: 264VAC I/P: 230VAC I/P: 180VAC O/P:MIN LOAD Ta:25°C | AC to DC Direction 35.17V/ 264VAC 35.17V/ 230VAC 35.17V/ 180VAC PROTECTION TYPE : Shut down o/p voltage, re-power on to recover |
| 3 | OVER TEMPERATURE PROTECTION | Protection type : Shut down o/p voltage, recovers automatically after temperature goes down | AC to DC Direction I/P: 264VAC I/P: 180VAC DC to AC Direction I/P: 19VDC I/P: 28VDC O/P:FULL LOAD | AC to DC Direction O.T.P. Active Protection type : Shut down o/p voltage, recovers automatically after temperature goes down DC to AC Direction O.T.P. Active Protection type : Shut down o/p voltage, recovers automatically after temperature goes down |
| 4 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P: 264VAC I/P: 180VAC I/P: 19VDC I/P: 28VDC O/P: FULL LOAD Ta:25°C | AC to DC Direction NO DAMAGE PROTECTION TYPE : Shut down o/p current, re-power on to recover DC to AC Direction NO DAMAGE PROTECTION TYPE : shut down O/P voltage. re-power on to recover |
| 5 | ISLANDING PROTECTION | NO DAMAGE PROTECTION TYPE : Shut down o/p voltage, re-power on to recover | IEC62116 I/P: 27.1VDC O/P: FULL LOAD I/P: 23.5VDC O/P: 50% LOAD I/P: 19.9VDC O/P: 10% LOAD Ta:25°C | DC to AC Direction NO DAMAGE PROTECTION TYPE : Shut down o/p voltage, re-power on to recover |

CONTROL FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-----------|---------------|----------------|--------|
|----|-----------|---------------|----------------|--------|

| 1 | AUXILIARY POWER (AUX) | <p>Auxiliary voltage output, 11.4~12.6V, referenced to GND-AUX (pin 2,4). The maximum output current is 0.5A. This output is not controlled by the Remote ON/OFF control.</p> <p>I/P: 230 VAC /12VDC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="507 477 1131 647"> <thead> <tr> <th></th> <th>TOLERANCE</th> <th>RIPPLE</th> </tr> </thead> <tbody> <tr> <td>SPEC</td> <td>11.4~12.6 V</td> <td>150mVp-p</td> </tr> <tr> <td>TEST RESULT</td> <td>11.74V</td> <td>50mV</td> </tr> </tbody> </table> | | TOLERANCE | RIPPLE | SPEC | 11.4~12.6 V | 150mVp-p | TEST RESULT | 11.74V | 50mV | | | | |
|--------------------|---|---|------|---|---------------------|--------------------|---------------------|----------|---------------------|---------|--------------------|----------|----|---------|-----|
| | TOLERANCE | RIPPLE | | | | | | | | | | | | | |
| SPEC | 11.4~12.6 V | 150mVp-p | | | | | | | | | | | | | |
| TEST RESULT | 11.74V | 50mV | | | | | | | | | | | | | |
| 2 | REMOTE ON/OFF CONTROL | <p>I/P: 230 VAC /12VDC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="507 797 1329 1030"> <thead> <tr> <th>MODE</th> <th>electrical signal or dry contact between Remote ON/OFF and +12V-AUX</th> <th>Power Supply Status</th> </tr> </thead> <tbody> <tr> <td rowspan="2">AC to DC Direction</td> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> <tr> <td rowspan="2">DC to AC Direction</td> <td>SW SHORT</td> <td>ON</td> </tr> <tr> <td>SW OPEN</td> <td>OFF</td> </tr> </tbody> </table> | MODE | electrical signal or dry contact between Remote ON/OFF and +12V-AUX | Power Supply Status | AC to DC Direction | SW SHORT | ON | SW OPEN | OFF | DC to AC Direction | SW SHORT | ON | SW OPEN | OFF |
| MODE | electrical signal or dry contact between Remote ON/OFF and +12V-AUX | Power Supply Status | | | | | | | | | | | | | |
| AC to DC Direction | SW SHORT | ON | | | | | | | | | | | | | |
| | SW OPEN | OFF | | | | | | | | | | | | | |
| DC to AC Direction | SW SHORT | ON | | | | | | | | | | | | | |
| | SW OPEN | OFF | | | | | | | | | | | | | |
| 3 | BIDIRECTION SWITCH TIME(DEFAULT) | <p>I/P: 230 VAC /24VDC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="507 1176 1329 1290"> <thead> <tr> <th>MODE</th> <th>BIDIRECTION SWITCH TIME</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>AC to DC Direction</td> <td>1ms</td> <td>626 us</td> </tr> <tr> <td>DC to AC Direction</td> <td>1ms</td> <td>750 us</td> </tr> </tbody> </table> <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div> | MODE | BIDIRECTION SWITCH TIME | Result | AC to DC Direction | 1ms | 626 us | DC to AC Direction | 1ms | 750 us | | | | |
| MODE | BIDIRECTION SWITCH TIME | Result | | | | | | | | | | | | | |
| AC to DC Direction | 1ms | 626 us | | | | | | | | | | | | | |
| DC to AC Direction | 1ms | 750 us | | | | | | | | | | | | | |
| 4 | ALARM SIGNAL | <p>1. DC OK SIGNAL High (4.5 ~ 5.5V) : When the $V_{out} \leq 80\% \pm 5\%$. Low (-0.5 ~ 0.5V) : When the $V_{out} \geq 80\% \pm 5\%$. The maximum sourcing current is 4mA and only for output.</p> <p>I/P: 230 VAC/12VDC O/P:FULL LOAD Ta:25°C</p> <p>Test Result :</p> <table border="1" data-bbox="627 1816 1342 1904"> <thead> <tr> <th>MODE</th> <th>Vout</th> <th>DC OK SIGNAL</th> </tr> </thead> <tbody> <tr> <td rowspan="2">AC to DC Direction</td> <td>$V_{out} \leq 75\%$</td> <td>4.994V</td> </tr> <tr> <td>$V_{out} \geq 85\%$</td> <td>-0.038V</td> </tr> </tbody> </table> | MODE | Vout | DC OK SIGNAL | AC to DC Direction | $V_{out} \leq 75\%$ | 4.994V | $V_{out} \geq 85\%$ | -0.038V | | | | | |
| MODE | Vout | DC OK SIGNAL | | | | | | | | | | | | | |
| AC to DC Direction | $V_{out} \leq 75\%$ | 4.994V | | | | | | | | | | | | | |
| | $V_{out} \geq 85\%$ | -0.038V | | | | | | | | | | | | | |

| | | <p>2. T-ALARM High (4.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when fan fails. Low (-0.5 ~ 0.5V) : When the internal temperature is normal, and when fan works normally. The maximum sourcing current is 4mA and only for output.</p> <p>I/P: 230 VAC/12VDC O/P:FULL LOAD Ta:25°C Test Result :</p> <table border="1" data-bbox="561 510 1513 622"> <thead> <tr> <th>MODE</th> <th>P.SU STATUS</th> <th>Vo</th> <th>T-ALARM SPEC</th> <th>T-ALARM TEST</th> </tr> </thead> <tbody> <tr> <td rowspan="3">AC to DC Direction</td> <td>NORMAL</td> <td>100%±2%</td> <td>-0.5 ~0.5V</td> <td>-0.038V</td> </tr> <tr> <td>OTP</td> <td>0V</td> <td>4.5~5.5V</td> <td>4.94V</td> </tr> <tr> <td>FAN LOCK</td> <td>0V</td> <td>4.5~5.5V</td> <td>4.94V</td> </tr> </tbody> </table> | MODE | P.SU STATUS | Vo | T-ALARM SPEC | T-ALARM TEST | AC to DC Direction | NORMAL | 100%±2% | -0.5 ~0.5V | -0.038V | OTP | 0V | 4.5~5.5V | 4.94V | FAN LOCK | 0V | 4.5~5.5V | 4.94V | | <p>3. FAULT High (4.5 ~ 5.5V) : When the input voltage is $\geq 175Vrms$ · OLP, SCP,OTP,OVP,AC Fail,fan lock,islanding protection Low (-0.5 ~ 0.5V) : When the input voltage is $\leq 165Vrms$. The maximum sourcing current is 4mA and only for output.</p> <table border="1" data-bbox="625 741 1251 831"> <thead> <tr> <th>MODE</th> <th>Vout</th> <th>FAULT SIGNAL</th> </tr> </thead> <tbody> <tr> <td rowspan="2">AC to DC Direction</td> <td>$VAC \geq 175Vrms$</td> <td>5.027v</td> </tr> <tr> <td>$VAC \leq 165Vrms$.</td> <td>-0.004V</td> </tr> </tbody> </table> | MODE | Vout | FAULT SIGNAL | AC to DC Direction | $VAC \geq 175Vrms$ | 5.027v | $VAC \leq 165Vrms$. | -0.004V |
|--------------------|--|--|---|--|--------------------|--------------------|--------------|--------------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|--------------|------------|--------------|-----------|-----------|----------------|--|--------------|---------------|---------------|--------------------|--------------------|----------------|----------------------|---------------|
| MODE | P.SU STATUS | Vo | T-ALARM SPEC | T-ALARM TEST | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC to DC Direction | NORMAL | 100%±2% | -0.5 ~0.5V | -0.038V | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | OTP | 0V | 4.5~5.5V | 4.94V | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | FAN LOCK | 0V | 4.5~5.5V | 4.94V | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MODE | Vout | FAULT SIGNAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AC to DC Direction | $VAC \geq 175Vrms$ | 5.027v | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | $VAC \leq 165Vrms$. | -0.004V | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | CURRENT SHARING | CURRENT SHARING TOLERANCE $\pm 10\%$ | I/P : 230 VAC O/P : 95/50% LOAD Ta : 25°C | <table border="1"> <thead> <tr> <th>AC to DC Direction</th> <th>DC to AC Direction</th> </tr> </thead> <tbody> <tr> <td>O/P : 95%</td> <td>O/P : 100%</td> </tr> <tr> <td>PSU1 : 86.35A</td> <td>PSU1 : 74.57A</td> </tr> <tr> <td>PSU2 : 86.55A</td> <td>PSU2 : 74.63A</td> </tr> <tr> <td>PSU3 : 83.82A</td> <td>PSU3 : 74.2A</td> </tr> <tr> <td>PSU4 : 83.29A</td> <td>PSU4 : 74.2A</td> </tr> <tr> <td>PSU5 : 86A</td> <td>PSU5 : 74.2A</td> </tr> <tr> <td>O/P : 50%</td> <td>O/P : 50%</td> </tr> <tr> <td>PSU1 : 45.62 A</td> <td>PSU1 : 36.75 A</td> </tr> <tr> <td>PSU2 : 45.8A</td> <td>PSU2 : 36.82A</td> </tr> <tr> <td>PSU3 : 44.07A</td> <td>PSU3 : 36.74A</td> </tr> <tr> <td>PSU4 : 43.76A</td> <td>PSU4 : 36.04 A</td> </tr> <tr> <td>PSU5 : 45.6A</td> <td>PSU5 : 37.01A</td> </tr> </tbody> </table> | AC to DC Direction | DC to AC Direction | O/P : 95% | O/P : 100% | PSU1 : 86.35A | PSU1 : 74.57A | PSU2 : 86.55A | PSU2 : 74.63A | PSU3 : 83.82A | PSU3 : 74.2A | PSU4 : 83.29A | PSU4 : 74.2A | PSU5 : 86A | PSU5 : 74.2A | O/P : 50% | O/P : 50% | PSU1 : 45.62 A | PSU1 : 36.75 A | PSU2 : 45.8A | PSU2 : 36.82A | PSU3 : 44.07A | PSU3 : 36.74A | PSU4 : 43.76A | PSU4 : 36.04 A | PSU5 : 45.6A | PSU5 : 37.01A |
| AC to DC Direction | DC to AC Direction | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O/P : 95% | O/P : 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU1 : 86.35A | PSU1 : 74.57A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU2 : 86.55A | PSU2 : 74.63A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU3 : 83.82A | PSU3 : 74.2A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU4 : 83.29A | PSU4 : 74.2A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU5 : 86A | PSU5 : 74.2A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O/P : 50% | O/P : 50% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU1 : 45.62 A | PSU1 : 36.75 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU2 : 45.8A | PSU2 : 36.82A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU3 : 44.07A | PSU3 : 36.74A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU4 : 43.76A | PSU4 : 36.04 A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSU5 : 45.6A | PSU5 : 37.01A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | BATTERY MODE RATED CURRENT(CAN BUS model only) | AC to DC Direction:80A DC to AC Direction:64A Can be adjusted by communication | AC to DC Direction I/P: 230VAC DC to AC Direction I/P: 24VDC O/P:FULL LOAD Ta:25°C | AC to DC Direction: 80.22A/230VAC DC to AC Direction 63.8A/24VDC | | | | | | | | | | | | | | | | | | | | | | | | | | |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|---|--|--|
| 1 | PWM Transistor (D to S) or (C to E) Peak Voltage | AC to DC Direction & DC to AC Direction Q903 Rated: 36A/ 600V VGS :± 20V | AC ON/OFF AC to DC Direction I/P:High-Line +3V =267V VDS: O/P: (1)Full Load (2)Output Short (3)0%→400% Load. I/P:Low-Line -3V = 177V O/P: (1)Full Load (2)Output Short (3)0%→400% Load. | AC to DC Direction I/P:High-Line +3V =267V VDS: (1) 419V/20.38A (2) 408V/ 15.21A (3) 403V/16.05 A I/P:Low-Line -3V = 177V VDS: (1) 406V/ 19.98A (2) 398V/ 14.85A (3) 402V/ 16.03A |

| | | | | | |
|---|--|--|--|---|---|
| | | | <p>DC to AC Direction I/P: 28VDC VDS: O/P: (1)Full Load (2)+100%Io/1S~-100%Io/1S (3)-100%Io AC Off I/P: 19VDC O/P: (1)Full Load (2)+100%Io~-100%Io (3)-100%Io AC Off Ta:25°C</p> | <p>DC to AC Direction I/P: 28VDC VDS: (1) 423 V/5.32A (2) 431 V/6.91A (3) 510 V/6.29A I/P: 19VDC VDS: (1) 424V/ 5.34A (2) 435V/6.57A (3) 510V/6.37A</p> | |
| 2 | P.F.C Transistor (D to S) or (C to E) Peak Voltage | <p>AC to DC Direction Q2 Rated : 53A/ 650V VGS :-8~19V Q4 Rated : 52A/ 600V VGS :± 25V</p> | <p>I/P:High-Line +3V =267 V AC ON/OFF (1)Full Load (2)Output Short (3)0%→400% Load. I/P:Low-Line -3V = 177V AC ON/OFF O/P:(1)Full Load (2)Output Short (3)0%→400% Load. Ta:25°C</p> | <p>I/P:High-Line +3V =267V Q2 VDS: (1) 469V/21.8A (2) 423V/10.9A (3) 418V/9.56A Q4 VDS: (1) 411V/18.5A (2) 412V/10.29A (3) 412V/11.28A I/P:Low-Line -3V = 177V Q2 VDS: (1) 429V/13.61A (2) 413V/9.5A (3) 417V/15.58A Q4 VDS: (1) 441V/15.65A (2) 441V/13.98A (3) 417V/13.81A</p> | |
| 3 | Diode Peak Voltage | <p>AC to DC Direction & DC to AC Direction Q950 Rated: 24A/250V VGS :±20V Q951 Rated: 24A/250V VGS :±20V Q958 Rated: 225A/ 60V VGS :±20V Q959 Rated: 24A/250V VGS :±20V AC to DC Direction only Q74 Rated:24A/250V VGS :±20V</p> | <p>AC to DC Direction AC ON/OFF I/P:High-Line +3V =267 V <u>VO=SPEC VR MAX</u> O/P: (1)Full Load (2)Output Short (3)0%→400% Load. <u>VO=RATED VOLTAGE</u> O/P: (1)Full Load DC to AC Direction I/P:28VDC <u>VO=SPEC VR MAX</u> O/P: (1)Full Load (2)+100%Io/1S~-100%Io/1S (3)-100%Io AC Off <u>VO=RATED VOLTAGE</u> O/P: (1)Full Load Ta:25°C</p> | <p>AC to DC Direction Q950: <u>VO=SPEC VR MAX</u> VDS: (1) 46.1V (2) 43.3V (3) 54.1V <u>VO=RATED VOLTAGE</u> (1) 45.7V Q951: <u>VO=SPEC VR MAX</u> VDS: (1) 44.1V (2) 42.1V (3) 44.1V <u>VO=RATED VOLTAGE</u> (1) 45.7V Q958: <u>VO=SPEC VR MAX</u> VDS: (1) 46.5V (2) 41.7V</p> | <p>DC to AC Direction Q950: <u>VO=SPEC VR MAX</u> VDS: (1) 50.1V 542 (2) 52.1V 543 (3) 58.9V 544 <u>VO=RATED VOLTAGE</u> (1) 49.3V 538 Q951: <u>VO=SPEC VR MAX</u> VDS: (1) 49.7V (2) 50.1V (3) 57.3V <u>VO=RATED VOLTAGE</u> (1) 48.9V Q958: <u>VO=SPEC VR MAX</u> VDS: (1) 48.5V (2) 48.9V</p> |

| | | | | | |
|---|-------------------------|---|--|---|--|
| | | | | <p>(3) 54.9V <u>VO=RATED VOLTAGE</u> (1) 45.7V</p> <p>Q959: <u>VO=SPEC VR MAX</u> VDS: (1) 44.1V (2) 45.7V (3) 43.7V <u>VO=RATED VOLTAGE</u> (1) 43.7V</p> <p>Q74 <u>VO=SPEC VR MAX</u> VDS: (1) 48.1V (2) 48.1V (3) 47.7V <u>VO=RATED VOLTAGE</u> (1) 48.5V</p> | <p>(3) 57.3V <u>VO=RATED VOLTAGE</u> (1) 49.3V</p> <p>Q959: <u>VO=SPEC VR MAX</u> VDS: (1) 49.3V (2) 50.9V (3) 58.5V <u>VO=RATED VOLTAGE</u> (1) 49.3V</p> |
| 4 | Input Voltage | Capacitor C6 Rated: 470μ/ 450V | <p>I/P:High-Line +3V =267V AC to DC Direction O/P: (1)Full Load input on/off (2) Min load input on /Off (3)Full Load /Min load Change (4)Full load continue DC to AC Direction (1)+100%Io~100%Io (2)-100%Io AC Off Ta:25°C</p> | <p>AC to DC Direction (1) 414.3V (2) 410.1V (3) 429.9V (4) 412.1V .DC to AC Direction (1)429.84V (2)448V</p> | |
| 5 | Control IC Voltage Test | <p>PWM IC U57 Rated -0.3V~ 20V</p> <p>PFC IC U551 Rated -0.3V~ 20V</p> <p>O/P IC U308 Rated -0.3V~ 20V</p> <p>MCU IC U201 Rated 1.71V~3.6V</p> <p>AUX IC U701 Rated -0.3V~35V</p> | <p>AC ON/OFF AC to DC Direction I/P:High-Line +3V =267 V O/P(1)FULL LOAD (2) Output Short (3)O.L.P (4)O.V.P. (5)NO LOAD VRmin(LOW LINE) Ta:25°C</p> | <p>U57: (1) 11.39V (2) 11.39V (3) 11.39V (4) 11.4V (5) 11.4V U551: (1) 11.95V (2) 11.95V (3) 11.94V (4) 11.95V (5) 11.95V U308: (1) 12.46V (2) 12.45V (3) 12.46V (4) 12.44V (5)12.43V</p> <p>U201: (1) 3.304V (2) 3.302V (3) 3.301V (4) 3.302V (5) 3.303V U701: (1) 13.69V (2) 13.76V (3) 13.57V (4) 13.76V (5)13.96V</p> | |
| 6 | STAND BY POWER | Q700 Rated: 4.5A/ 800V | <p>AC ON/OFF AC to DC Direction I/P:High-Line +3V =267 V O/P: (1)Full Load (2)Remote On/Off I/P:Low-Line -3V =177V</p> | <p>I/P:High-Line +3V =267 V (1) 557V/1.976 A (2) 561V/ 2.052A I/P:Low-Line -3V =177V</p> | |

| | | | | |
|--|--|--|--|--------------------------------------|
| | | | O/P: (1)Full Load (2)Remote On/Off Ta:25°C | (1) 557V/ 1.846A (2) 565V/1.862 A |
|--|--|--|--|--------------------------------------|

■ **SAFETY& E.M.C. TEST**

SAFETY TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|----------------------|---|---|---|
| 1 | WITHSTAND VOLTAGE | I/P-O/P: 3KVAC/min I/P-FG :2KVAC/min O/P-FG:0.5KVAC/min | I/P-O/P: 3.6KVAC/min I/P-FG: 2.4 KVAC/min O/P-FG:0.6KVAC/min Ta:25°C | I/P-O/P: 16.5mA I/P-FG: 15.59mA O/P-FG:10.3 mA NO DAMAGE |
| 2 | ISOLATION RESISTANCE | I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ | I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C | I/P-O/P: 30GΩ I/P-FG: 26.2GΩ O/P-FG: 27.7GΩ NO DAMAGE |
| 3 | GROUNDING CONTINUITY | FG(PE) TO CHASSIS OR TRACE < 100 mΩ | 40A / 2min Ta:25°C | 13mΩ |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|---|--|-------------------------------|
| 1 | HARMONIC | EN61000-3-2 CLASS A | I/P:230VAC/50HZ O/P:FULL LOAD Ta:25°C | PASS |
| 2 | CONDUCTION | EN55032 CLASS B | I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C | PASS Test by certified Lab |
| 3 | RADIATION | EN55032 CLASS A | I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25°C | PASS Test by certified Lab |
| 4 | E.S.D | EN61000-4-2 AIR : 8KV / Contact : 4KV | I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 5 | E.F.T | EN61000-4-4 INPUT : 2KV | I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 6 | SURGE | IEC61000-4-5 INDUSTRY L-N : 2KV L,N-PE : 4KV | I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25°C | CRITERIA A |
| 7 | Test by certified Lab & Test Report Prepare Any contradictions of the test results, please refer to the latest EMC test report | | | |

■ **RELIABILITY TEST**

ENVIRONMENT TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|-----------------------|--|---------------------------|--------------------------|---------------------------|----|----------|---------------------|--|---------------------|--|--------------------------|---------------------------|--------------------------|---------------------------|---|----|--------|--------|--------|--------|---|----|--------|--------|--------|--------|---|------|--------|--------|--------|--------|---|------|--------|--------|--------|--------|---|---------|--------|---------|--------|--------|---|------|--------|---------|--------|--------|---|------|--------|--------|--------|--------|---|------|--------|--------|--------|--------|---|-----|--------|--------|--------|--------|----|----|--------|--------|--------|--------|----|------|--------|---------|--------|--------|----|------|--------|-------|--------|--------|----|------|--------|-------|--------|--------|----|---------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|----|------|--------|--------|--------|--------|
| 1 | TEMPERATURE RISE TEST | MODEL : BIC-2200-12 AC to DC Direction: 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 40 °C DC to AC Direction: 1. ROOM AMBIENT BURN-IN : 0.5 HRS I/P : 12VDC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 12VDC O/P : FULL LOAD Ta= 40 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th rowspan="2">NO</th> <th rowspan="2">Position</th> <th colspan="2">AC to DC Direction:</th> <th colspan="2">DC to AC Direction:</th> </tr> <tr> <th>ROOM AMBIENT Ta= 25°C</th> <th>HIGH AMBIENT Ta= 40 °C</th> <th>ROOM AMBIENT Ta= 25°C</th> <th>HIGH AMBIENT Ta= 40 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>Q1</td><td>67.4°C</td><td>84.0°C</td><td>49.5°C</td><td>68.9°C</td></tr> <tr><td>2</td><td>Q4</td><td>38.1°C</td><td>56.3°C</td><td>32.4°C</td><td>49.7°C</td></tr> <tr><td>3</td><td>Q906</td><td>51.5°C</td><td>74.5°C</td><td>38.9°C</td><td>55.6°C</td></tr> <tr><td>4</td><td>Q907</td><td>60.4°C</td><td>83.8°C</td><td>42.4°C</td><td>61.2°C</td></tr> <tr><td>5</td><td>T1 coil</td><td>81.9°C</td><td>103.9°C</td><td>56.6°C</td><td>75.5°C</td></tr> <tr><td>6</td><td>Q950</td><td>87.9°C</td><td>109.0°C</td><td>59.6°C</td><td>81.0°C</td></tr> <tr><td>7</td><td>Q957</td><td>79.3°C</td><td>99.6°C</td><td>55.7°C</td><td>76.8°C</td></tr> <tr><td>8</td><td>Q700</td><td>40.4°C</td><td>56.8°C</td><td>35.4°C</td><td>55.2°C</td></tr> <tr><td>9</td><td>T55</td><td>45.1°C</td><td>60.6°C</td><td>43.2°C</td><td>60.8°C</td></tr> <tr><td>10</td><td>Q3</td><td>37.5°C</td><td>57.1°C</td><td>32.2°C</td><td>49.2°C</td></tr> <tr><td>11</td><td>Q959</td><td>80.4°C</td><td>104.5°C</td><td>58.1°C</td><td>75.7°C</td></tr> <tr><td>12</td><td>Q964</td><td>97.1°C</td><td>110°C</td><td>66.0°C</td><td>84.4°C</td></tr> <tr><td>13</td><td>D972</td><td>99.3°C</td><td>111°C</td><td>66.9°C</td><td>85.7°C</td></tr> <tr><td>14</td><td>T1 core</td><td>50.2°C</td><td>70.0°C</td><td>39.0°C</td><td>58.2°C</td></tr> <tr><td>15</td><td>C722</td><td>38.1°C</td><td>53.3°C</td><td>35.8°C</td><td>53.7°C</td></tr> <tr><td>16</td><td>L700</td><td>35.7°C</td><td>48.5°C</td><td>33.2°C</td><td>52.0°C</td></tr> <tr><td>17</td><td>D707</td><td>36.1°C</td><td>51.7°C</td><td>33.6°C</td><td>52.0°C</td></tr> <tr><td>18</td><td>U701</td><td>40.5°C</td><td>57.8°C</td><td>37.3°C</td><td>54.5°C</td></tr> <tr><td>19</td><td>C711</td><td>39.2°C</td><td>57.2°C</td><td>36.8°C</td><td>53.6°C</td></tr> <tr><td>20</td><td>RG70</td><td>48.0°C</td><td>66.3°C</td><td>46.5°C</td><td>64.4°C</td></tr> <tr><td>21</td><td>D706</td><td>58.0°C</td><td>74.9°C</td><td>58.9°C</td><td>73.8°C</td></tr> <tr><td>22</td><td>D705</td><td>50.1°C</td><td>67.5°C</td><td>43.1°C</td><td>62.8°C</td></tr> <tr><td>23</td><td>U551</td><td>48.2°C</td><td>64.7°C</td><td>38.7°C</td><td>59.1°C</td></tr> <tr><td>24</td><td>U201</td><td>50.7°C</td><td>66.0°C</td><td>40.3°C</td><td>59.7°C</td></tr> </tbody> </table> | | | | NO | Position | AC to DC Direction: | | DC to AC Direction: | | ROOM AMBIENT Ta= 25°C | HIGH AMBIENT Ta= 40 °C | ROOM AMBIENT Ta= 25°C | HIGH AMBIENT Ta= 40 °C | 1 | Q1 | 67.4°C | 84.0°C | 49.5°C | 68.9°C | 2 | Q4 | 38.1°C | 56.3°C | 32.4°C | 49.7°C | 3 | Q906 | 51.5°C | 74.5°C | 38.9°C | 55.6°C | 4 | Q907 | 60.4°C | 83.8°C | 42.4°C | 61.2°C | 5 | T1 coil | 81.9°C | 103.9°C | 56.6°C | 75.5°C | 6 | Q950 | 87.9°C | 109.0°C | 59.6°C | 81.0°C | 7 | Q957 | 79.3°C | 99.6°C | 55.7°C | 76.8°C | 8 | Q700 | 40.4°C | 56.8°C | 35.4°C | 55.2°C | 9 | T55 | 45.1°C | 60.6°C | 43.2°C | 60.8°C | 10 | Q3 | 37.5°C | 57.1°C | 32.2°C | 49.2°C | 11 | Q959 | 80.4°C | 104.5°C | 58.1°C | 75.7°C | 12 | Q964 | 97.1°C | 110°C | 66.0°C | 84.4°C | 13 | D972 | 99.3°C | 111°C | 66.9°C | 85.7°C | 14 | T1 core | 50.2°C | 70.0°C | 39.0°C | 58.2°C | 15 | C722 | 38.1°C | 53.3°C | 35.8°C | 53.7°C | 16 | L700 | 35.7°C | 48.5°C | 33.2°C | 52.0°C | 17 | D707 | 36.1°C | 51.7°C | 33.6°C | 52.0°C | 18 | U701 | 40.5°C | 57.8°C | 37.3°C | 54.5°C | 19 | C711 | 39.2°C | 57.2°C | 36.8°C | 53.6°C | 20 | RG70 | 48.0°C | 66.3°C | 46.5°C | 64.4°C | 21 | D706 | 58.0°C | 74.9°C | 58.9°C | 73.8°C | 22 | D705 | 50.1°C | 67.5°C | 43.1°C | 62.8°C | 23 | U551 | 48.2°C | 64.7°C | 38.7°C | 59.1°C | 24 | U201 | 50.7°C | 66.0°C | 40.3°C | 59.7°C |
| NO | Position | AC to DC Direction: | | DC to AC Direction: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROOM AMBIENT Ta= 25°C | HIGH AMBIENT Ta= 40 °C | ROOM AMBIENT Ta= 25°C | HIGH AMBIENT Ta= 40 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Q1 | 67.4°C | 84.0°C | 49.5°C | 68.9°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Q4 | 38.1°C | 56.3°C | 32.4°C | 49.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Q906 | 51.5°C | 74.5°C | 38.9°C | 55.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Q907 | 60.4°C | 83.8°C | 42.4°C | 61.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | T1 coil | 81.9°C | 103.9°C | 56.6°C | 75.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Q950 | 87.9°C | 109.0°C | 59.6°C | 81.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Q957 | 79.3°C | 99.6°C | 55.7°C | 76.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Q700 | 40.4°C | 56.8°C | 35.4°C | 55.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | T55 | 45.1°C | 60.6°C | 43.2°C | 60.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Q3 | 37.5°C | 57.1°C | 32.2°C | 49.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | Q959 | 80.4°C | 104.5°C | 58.1°C | 75.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Q964 | 97.1°C | 110°C | 66.0°C | 84.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | D972 | 99.3°C | 111°C | 66.9°C | 85.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | T1 core | 50.2°C | 70.0°C | 39.0°C | 58.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | C722 | 38.1°C | 53.3°C | 35.8°C | 53.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | L700 | 35.7°C | 48.5°C | 33.2°C | 52.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | D707 | 36.1°C | 51.7°C | 33.6°C | 52.0°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | U701 | 40.5°C | 57.8°C | 37.3°C | 54.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | C711 | 39.2°C | 57.2°C | 36.8°C | 53.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | RG70 | 48.0°C | 66.3°C | 46.5°C | 64.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | D706 | 58.0°C | 74.9°C | 58.9°C | 73.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | D705 | 50.1°C | 67.5°C | 43.1°C | 62.8°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | U551 | 48.2°C | 64.7°C | 38.7°C | 59.1°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | U201 | 50.7°C | 66.0°C | 40.3°C | 59.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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|---|---|---|------|--------|--|--------|--------------------|
| | | 25 | Q2 | 66.8°C | 85.1°C | 49.5°C | 68.0°C |
| | | 26 | T550 | 33.9°C | 51.4°C | 31.2°C | 47.5°C |
| | | 27 | L900 | 63.0°C | 82.7°C | 44.9°C | 61.0°C |
| | | 28 | T3 | 40.4°C | 60.4°C | 34.7°C | 51.1°C |
| | | 29 | RT51 | 47.0°C | 66.8°C | 39.4°C | 56.5°C |
| | | 30 | RT52 | 35.7°C | 55.1°C | 29.9°C | 50.1°C |
| | | 31 | L1 | 40.6°C | 56.5°C | 31.9°C | 51.1°C |
| | | 32 | BD1 | 28.3°C | 43.0°C | 23.0°C | 42.8°C |
| | | 33 | RY1 | 28.3°C | 42.0°C | 24.3°C | 43.0°C |
| | | 34 | Q902 | 57.0°C | 77.4°C | 38.4°C | 55.4°C |
| | | 35 | LF3 | 31.6°C | 50.6°C | 26.9°C | 44.8°C |
| | | 36 | C2 | 24.2°C | 42.4°C | 23.0°C | 40.9°C |
| | | 37 | C962 | 29.4°C | 46.0°C | 26.8°C | 44.3°C |
| | | 38 | C958 | 29.9°C | 46.7°C | 25.5°C | 44.7°C |
| | | 39 | L950 | 56.7°C | 71.2°C | 39.9°C | 59.2°C |
| | | 40 | RG61 | 37.4°C | 56.2°C | 30.9°C | 50.5°C |
| | | 41 | T92 | 49.4°C | 68.5°C | 38.0°C | 56.1°C |
| | | 42 | U405 | 36.0°C | 55.1°C | 34.0°C | 50.2°C |
| | | 43 | U51 | 33.6°C | 55.6°C | 31.5°C | 47.3°C |
| | | 44 | R143 | 44.6°C | 68.5°C | 41.1°C | 57.4°C |
| | | 45 | D906 | 38.3°C | 60.6°C | 37.9°C | 55.7°C |
| | | 46 | D905 | 38.6°C | 59.5°C | 38.3°C | 57.3°C |
| | | 47 | U120 | 42.6°C | 60.8°C | 35.1°C | 52.9°C |
| | | 48 | Q74 | 50.3°C | 68.1°C | 39.4°C | 58.0°C |
| | | 49 | RG50 | 30.9°C | 47.2°C | 27.9°C | 45.7°C |
| | | 50 | R938 | 38.2°C | 50.4°C | 29.8°C | 49.4°C |
| | | 51 | C6 | 48.2°C | 67.1°C | 39.3°C | 56.1°C |
| | | 52 | Q903 | 61.5°C | 84.4°C | 42.9°C | 59.5°C |
| | | 53 | Q952 | 80.1°C | 101.0°C | 58.0°C | 77.0°C |
| | | 54 | D982 | 72.8°C | 92.5°C | 53.5°C | 74.4°C |
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | | | I/P : 230 VAC O/P : 110% LOAD Ta : 25°C | | TEST : OK |
| 3 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | | | I/P : 264VAC/100VAC O/P : 100 %LOAD Ta= -35 °C | | TEST : OK |
| 4 | HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST | AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C/95 %R.H NO DAMAGE | | | I/P : 268 VAC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H | | TEST : OK |
| 5 | TEMPERATURE COEFFICIENT | ± 0.03%/°C(0~45°C) | | | I/P : 230 VAC O/P : FULL LOAD | | ± 0.01%/°C(0~45°C) |
| 6 | STORAGE TEMPERATURE TEST | -40~85°C | | | 1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : STATIC | | |

| | | | | |
|----|--------------------------|--|---|--|
| 7 | THERMAL SHOCK TEST | -30~45°C | 1. Thermal shock Temperature : -35°C~ +50°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 16 CYCLE 5. Input/Output condition : 15cycle:230V/ FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle:230V/ FULL LOAD Burn In Test | |
| 8 | VIBRATION TEST | 10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes | 1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 10min/sweep cycle (4) Acceleration : 3G (5) Test Time : 180min in each axis (X.Y.Z) (6) Ta : 25°C | |
| 9 | CAPACITOR LIFE CYCLE | SUPPOSE C962 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFE TIME | (1) 519622HRS (2) 164428HRS (3) 481868HRS (4) 784370HRS | |
| 10 | MTBF | Conducted by Parts Stress Analysis Prediction 462.9K hrs min. Telcordia SR-332 (Bellcore) ; 46K hrs min. MIL-HDBK-217F (25°C) | | |
| 11 | Ongoing Reliability Test | I/P : 230VAC O/P : FULL LOAD TA=40°C Demonstration Mean Time Between Failure : 50,000 hours | | |

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|------------|------------|---------------|
| PASS | DANIEL GAO | SANFORD SU | VINCENT TSENG |

2020.10.1 TAG-QA-009