



Test Report: NID35-15

35W DC-DC Non-isolated Regulated Converter

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

■ RELIABILITY TEST

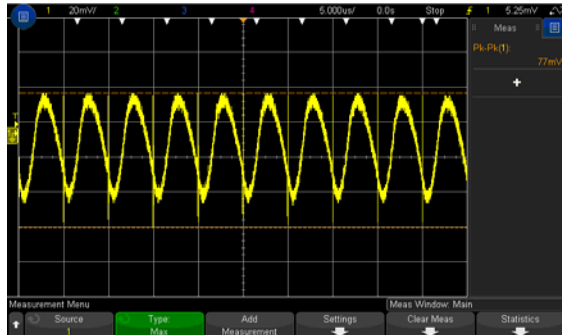
ENVIRONMENT TEST

DESIGN VERIFY TEST

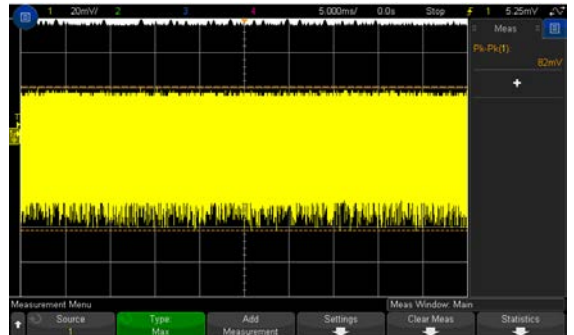
OUTPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|--------------------------------|-----------------|--|-------------------|
| 1 | OUTPUT VOLTAGE TOLERANCE (Max) | V1: -2%~ 2% | I/P: 20 VDC /53VDC O/P:FULL/ MIN. LOAD Ta:25°C | V1: -0.02%~ 0.02% |
| 2 | LINE REGULATION (Max) | V1: -0.5%~ 0.5% | I/P: 20VDC /53 VDC O/P:FULL LOAD Ta:25°C | V1:-0.01%~ 0.01% |
| 3 | LOAD REGULATION (Max) | V1: -0.5%~0.5% | I/P: 24 VDC/48 VDC O/P:FULL -MIN LOAD Ta:25°C | V1:-0.02%~ 0.02% |
| 4 | OVER/UNDERSHOOT TEST | < ±5% | I/P: 24 VDC/48 VDC O/P:FULL LOAD Ta:25°C | TEST:3.3 % |
| 5 | RIPPLE & NOISE (Max) | V1: 150mVp-p | I/P: 24 VDC/48 VDC O/P:FULL LOAD Ta:25°C | V1: 84 mVp-p |

high frequency :

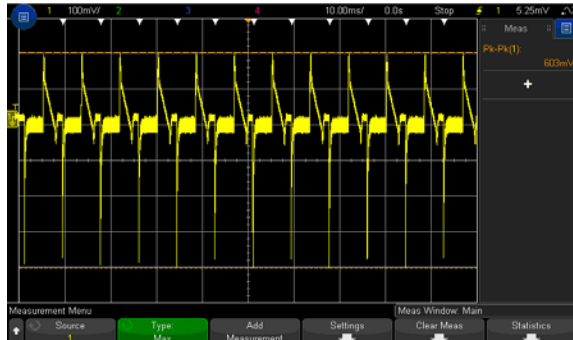


low frequency :

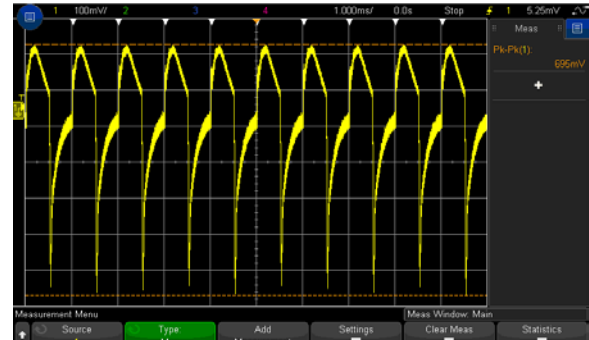


| | | | | |
|---|--------------|---------------|--|----------------------|
| 6 | DYNAMIC LOAD | V1: 1500mVp-p | I/P: 24 VDC/48 VDC O/P: (1)FULL /50% LOAD 50%DUTY / 120HZ (2)FULL /50% LOAD 50%DUTY / 1KHZ Ta:25°C | 603mVp-p 695mVp-p |
|---|--------------|---------------|--|----------------------|

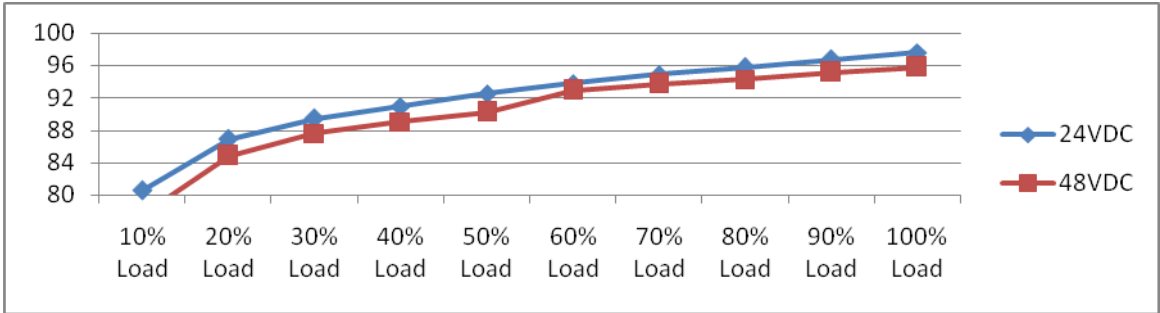
FULL /50% LOAD 50%DUTY / 120HZ



FULL /50% LOAD 50%DUTY / 1KHZ



INPUT FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------------------|------------------------------------|--|--|----------|----------------------|----------------------|-----|----|----|-----|----|----|-----|----|----|-----|----|----|-----|----|----|-----|----|----|-----|----|----|-----|----|----|-----|----|----|------|----|----|
| 1 | INPUT VOLTAGE RANGE | 20VDC-53VDC | I/P:TESTING O/P:FULL LOAD Ta:25°C | 15.6V-56V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | I/P: LOW-LINE-0.2= 19.8V HIGH-LINE+3V= 56V 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 CURRENT(TYP) | FULL LOAD: 1620mA NO LOAD: 30mA | I/P: 24 VDC \48 VDC O/P:FULL LOAD O/P:NO LOAD Ta:25°C | FULL LOAD NO LOAD I =1542mA/24VDC I =11.5mA/24VDC I =785mA/48VDC I =13mA/48VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | EFFICIENCY(TYP) | 96% /24VDC 94%/48VDC | I/P: 24 VDC \48 VDC O/P:FULL LOAD Ta:25°C | 97.6% /24VDC 95.8%/48VDC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>EFFICIENCY vs LOAD</p>  <table border="1"> <caption>Efficiency vs Load Data</caption> <thead> <tr> <th>Load (%)</th> <th>24VDC Efficiency (%)</th> <th>48VDC Efficiency (%)</th> </tr> </thead> <tbody> <tr><td>10%</td><td>80</td><td>80</td></tr> <tr><td>20%</td><td>86</td><td>84</td></tr> <tr><td>30%</td><td>89</td><td>87</td></tr> <tr><td>40%</td><td>91</td><td>89</td></tr> <tr><td>50%</td><td>92</td><td>90</td></tr> <tr><td>60%</td><td>93</td><td>92</td></tr> <tr><td>70%</td><td>94</td><td>93</td></tr> <tr><td>80%</td><td>95</td><td>94</td></tr> <tr><td>90%</td><td>96</td><td>95</td></tr> <tr><td>100%</td><td>97</td><td>96</td></tr> </tbody> </table> | | | | | Load (%) | 24VDC Efficiency (%) | 48VDC Efficiency (%) | 10% | 80 | 80 | 20% | 86 | 84 | 30% | 89 | 87 | 40% | 91 | 89 | 50% | 92 | 90 | 60% | 93 | 92 | 70% | 94 | 93 | 80% | 95 | 94 | 90% | 96 | 95 | 100% | 97 | 96 |
| Load (%) | 24VDC Efficiency (%) | 48VDC Efficiency (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10% | 80 | 80 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20% | 86 | 84 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30% | 89 | 87 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40% | 91 | 89 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50% | 92 | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60% | 93 | 92 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70% | 94 | 93 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80% | 95 | 94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90% | 96 | 95 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100% | 97 | 96 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

PROTECTION FUNCTION TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|-------------------------|--|--|---|
| 1 | OVER LOAD PROTECTION | 120%-250% RATED OUTPUT POWER | I/P: 53 VDC I/P: 48 VDC I/P: 24VDC I/P: 20VDC O/P:TESTING Ta:25°C | 175%/53VDC 172%/48VDC 156%/24VDC 150%/20VDC PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed |
| 2 | OVER VOLTAGE PROTECTION | CH: 17.5 V-21 V | I/P: NO O/P:MIN LOAD Ta:25°C | 20.1V PROTECTION TYPE : Shut off o/p voltage, clamp by TVS diode |
| 3 | SHORT PROTECTION | SHORT EVERY OUTPUT 1 HOUR NO DAMAGE | I/P: 53VDC O/P: FULL LOAD Ta:25°C | NO DAMAGE PROTECTION TYPE : Hiccup mode, recovers automatically after fault condition is removed |

Control Function Test

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|----------------|---|---|----------|
| 1 | REMOTE CONTROL | Power on: 1.2VDC < R.C-com < 12VDC Power off: R.C-com < 0.4VDC | I/P: 48 VDC I/P: 24 VDC I/P: 12 VDC O/P: FULL LOAD Ta: 25°C | TEST: OK |

COMPONENT STRESS TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|--|--|---|
| 1 | PWM Transistor (D to S) or (C to E) Peak Voltage | Q1 Rated : 49 A / 80 V Q2 Rated : 49 A / 80 V | I/P: High-Line +3V = 56V DC ON/OFF VDS: O/P: (1) Full Load (2) Output Short (3) Full Load Continue Ta: 25°C | Q1 Q2 VDS: VDS: (1) 57.9V (1) 62.3V (2) 59.5V (2) 63V (3) 57.6V (3) 61.8V |
| 2 | Input Capacitor Voltage | C22 Rated: : 105 μ / 100 V | I/P: High-Line +3V = 56 V O/P: (1) Full Load input on/off (2) Min load input on /Off (3) Full Load /Min load Change (4) Full load continue Ta: 25°C | (1) 57.4V (2) 57.0V (3) 57.4V (4) 57.4 |
| 3 | Control IC Voltage Test | PWM IC U1 Rated 7.5V-14V | I/P: High-Line +3V = 56V DC ON/OFF O/P: (1) FULL LOAD (2) Output Short (3) O.L.P (4) NO LOAD VR 下限.LOW LINE Ta: 25°C | (1) 7.78V (2) 7.78V (3) 7.78V (4) 7.78V |

E.M.C TEST

| NO | TEST ITEM | SPECIFICATION | TEST CONDITION | RESULT |
|----|---|---|---|--|
| 1 | RADIATION | <input checked="" type="checkbox"/> EN55032 <input type="checkbox"/> EN55011 <input type="checkbox"/> CLASS A <input checked="" type="checkbox"/> CLASS B | I/P: 48 VDC O/P: FULL LOAD Ta: 25°C | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL Test by certified Lab |
| 2 | CONDUCTION | <input checked="" type="checkbox"/> EN55032 <input type="checkbox"/> EN55011 <input type="checkbox"/> CLASS A <input checked="" type="checkbox"/> CLASS B | I/P: 48 VDC O/P: FULL LOAD Ta: 25°C | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL Test by certified Lab |
| 3 | E.F.T | EN61000-4-4 <input type="checkbox"/> LIGHT INDUSTRY INPUT: 0.5KV <input type="checkbox"/> MEDICAL <input checked="" type="checkbox"/> INDUSTRY INPUT: 1KV | I/P: 48 VDC O/P: FULL LOAD Ta: 25°C | <input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B |
| 4 | SURGE | IEC61000-4-5 <input type="checkbox"/> MEDICAL <input type="checkbox"/> LIGHT INDUSTRY L-N : 0.5KV L,N-PE: 0.5KV <input checked="" type="checkbox"/> INDUSTRY L-N : 1KV L,N-PE: 1KV | I/P: 48VDC O/P: FULL LOAD Ta: 25°C | <input checked="" type="checkbox"/> CRITERIA A <input type="checkbox"/> CRITERIA B |
| 5 | 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 : NID-35-24 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 48 VDC O/P : FULL LOAD Ta= 25.3 °C 2. HIGH AMBIENT BURN-IN : 1.5 HRS I/P : 48 VDC O/P : FULL LOAD Ta= 55.4 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | <table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25.3 °C</th> <th>HIGH AMBIENT Ta= 55.4 °C</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>L1</td> <td>58.5°C</td> <td>88.4°C</td> </tr> <tr> <td>2</td> <td>Q1</td> <td>56.2°C</td> <td>86.1°C</td> </tr> <tr> <td>3</td> <td>Q2</td> <td>55.1°C</td> <td>84.6°C</td> </tr> <tr> <td>4</td> <td>ZD1</td> <td>47.6°C</td> <td>77.4°C</td> </tr> <tr> <td>5</td> <td>C32</td> <td>50.7°C</td> <td>80.5°C</td> </tr> <tr> <td>6</td> <td>C23</td> <td>53.0°C</td> <td>83.2°C</td> </tr> <tr> <td>7</td> <td>U1</td> <td>57.3°C</td> <td>86.7°C</td> </tr> </tbody> </table> | NO | Position | ROOM AMBIENT Ta= 25.3 °C | HIGH AMBIENT Ta= 55.4 °C | 1 | L1 | 58.5°C | 88.4°C | 2 | Q1 | 56.2°C | 86.1°C | 3 | Q2 | 55.1°C | 84.6°C | 4 | ZD1 | 47.6°C | 77.4°C | 5 | C32 | 50.7°C | 80.5°C | 6 | C23 | 53.0°C | 83.2°C | 7 | U1 | 57.3°C | 86.7°C |
| NO | Position | ROOM AMBIENT Ta= 25.3 °C | HIGH AMBIENT Ta= 55.4 °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | L1 | 58.5°C | 88.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Q1 | 56.2°C | 86.1°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Q2 | 55.1°C | 84.6°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | ZD1 | 47.6°C | 77.4°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | C32 | 50.7°C | 80.5°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | C23 | 53.0°C | 83.2°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | U1 | 57.3°C | 86.7°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | OVER LOAD BURN-IN TEST | NO DAMAGE 1 HOUR (MIN) | I/P : 48 VDC O/P : 158% LOAD Ta : 25°C | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | LOW TEMPERATURE TURN ON TEST | TURN ON AFTER 2 HOUR | I/P : 20 VDC / 53 VDC 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 55 °C /95 %R.H NO DAMAGE | I/P : 56 VDC O/P : FULL LOAD Ta= 55 °C HUMIDITY= 95 %R.H | TEST : OK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | TEMPERATURE COEFFICIENT | ±0.03%/°C(0-55°C) | I/P : 48VDC O/P : FULL LOAD | ±0.0031%/°C(0-55°C) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | STORAGE TEMPERATURE TEST | -30-105°C | 1. Thermal shock Temperature : -45°C~ +110°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 | -30-55°C | 1. Thermal shock Temperature : -35°C~ +60°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: 48 VDC / FULL LOAD AC ON 3sec/AC OFF 1sec TEST 1cycle: 48 VDC / 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 | Ongoing Reliability Test | I/P : 48VDC O/P : FULL LOAD TA=50°C Demonstration Mean Time Between Failure : 30,000 hours |
|---|--------------------------|---|

| TEST RESULT | TESTER | REVIEW | APPROVAL |
|-------------|--------|--------|----------|
| PASS | LIUTT | | Wangdz |

2018.4.30 GP-A50-F010