

Typical Feature

- ◆ Fixed Input Voltage, isolated & unregulated Output, power 1W
- ◆ Continuous short circuit protection
- ◆ Operating Temperature: -50°C to +115°C
- ◆ Small SMD package, international standard pin out
- ◆ Isolation Voltage 1500VDC
- ◆ High efficiency up to 88%
- ◆ No load input current as low as 3mA
- ◆ ESD satisfy 8KV contact discharge



Application Filed

PN1-XXSXXANT is suitable for pure digital systems, low frequency analog circuits, relay-driven circuits. It is specially designed for applications where an isolated voltage is required in a distributed power supply system.

It could be widely used in the below products:

1. The voltage of the input power supply is relatively stable(voltage change range:±10%Vin)
2. Isolation between input and output is required (Isolation Voltage1500VDC);
3. Low requirements for output voltage stability and output ripple noise;

Typical Product List

| Part No | Input Voltage | Output Voltage/Current | | Max. Capacitive Load (MAX) uF | Ripple & Noise 20MHz (TYP/MAX) mVp-p | Efficiency (MIN/TYP) % |
|----------------|--------------------|------------------------|------------------|----------------------------------|---|---------------------------|
| | (VDC) | Voltage | Current | | | |
| | Range | (VDC) | (mA) MAX/ MIN | | | |
| PN1-3V3S3V3ANT | 3.3 (2.97-3.63) | 3.3 | 303/30 | 10000 | 50/100 | 74/76 |
| PN1-3V3S05ANT | | 5 | 200/20 | 10000 | 50/100 | 80/82 |
| PN1-3V3S09ANT | | 9 | 111 /11 | 10000 | 50/100 | 83/85 |
| PN1-3V3S 12ANT | | 12 | 83/8 | 10000 | 100/150 | 85/87 |
| PN1-3V3S 15ANT | | 15 | 67/7 | 10000 | 100/150 | 85/87 |
| PN1-3V3S24ANT | | 24 | 42/4 | 10000 | 100/150 | 83/85 |
| PN1-05S3V3ANT | 5 (4.5-5.5) | 3.3 | 303/30 | 10000 | 50/100 | 78/80 |
| PN1-05S05ANT | | 5 | 200/20 | 10000 | 50/100 | 83/85 |
| PN1-05S09ANT | | 9 | 111 /11 | 10000 | 50/100 | 84/86 |
| PN1-05S12ANT | | 12 | 83/8 | 10000 | 100/150 | 85/87 |
| PN1-05S15ANT | | 15 | 67/7 | 10000 | 100/150 | 85/87 |
| PN1-05S24ANT | | 24 | 42/4 | 10000 | 100/150 | 86/88 |
| PN1-12S3V3ANT | 12 (10.8-13.2) | 3.3 | 303/30 | 1000 | 50/100 | 80/82 |
| PN1-12S05ANT | | 5 | 200/20 | 3000 | 50/100 | 84/86 |
| PN1-12S12ANT | | 12 | 83/8 | 2200 | 50/100 | 84/86 |

DC/DC Converter

PN1-XXSXXANT Series

| | | | | | | |
|---------------|-------------------|----|--------|------|--------|-------|
| PN1-12S15ANT | | 15 | 67/6 | 1000 | 50/100 | 84/86 |
| *PN1-12S24ANT | | 24 | 42/4 | 560 | 50/100 | 84/86 |
| PN1-15S05ANT | 15 (13.5-16.5) | 5 | 200/20 | 2200 | 50/100 | 83/85 |
| PN1-24S05ANT | 24 (21.6-26.4) | 5 | 200/20 | 3000 | 50/100 | 84/86 |
| PN1-24S12ANT | | 12 | 83/8 | 2200 | 50/100 | 84/86 |
| PN1-24S15ANT | | 15 | 67/6 | 1000 | 50/100 | 84/86 |
| PN1-24S24ANT | | 24 | 42/4 | 560 | 50/100 | 84/86 |

Note 1: The typical output efficiency is based on that product is full loaded and burned-in after half an hour.

Note 2: The fluctuation range of full load efficiency(% ,TYP) is $\pm 2\%$, full load output efficiency= total output power/module's input power.

Note 3: Ripple & Noise Tested by twisted-pair method, for details please check Ripple& Noise Test Method.

Input Specifications

| Item | Operating Condition | | Min. | Typ. | Max. | Unit |
|---------------------------------------|---------------------|---------------------|------|---------|---------|------|
| Input Current (Full load/ No load) | 3.3Vdc Input | 3.3Vdc/ 5Vdc output | - | 370/ 5 | 380/ 10 | mA |
| | | 9Vdc output | - | 357/ 5 | 365/ 10 | |
| | | 12Vdc/ 15Vdc output | - | 348/ 10 | 357/ 20 | |
| | | 24Vdc output | - | 357/ 20 | 365/ 30 | |
| | 5Vdc Input | 3.3Vdc output | - | 244/5 | 250/ 10 | |
| | | 5Vdc/ 9Vdc output | - | 233/6 | 238/ 15 | |
| | | 12Vdc/ 15Vdc output | - | 225/15 | 230/ 25 | |
| | | 24Vdc output | - | 244/30 | 250/ 40 | |
| | 12Vdc Input | 3.3Vdc output | - | 96/ 3 | 104/8 | |
| | | 5Vdc output | - | 196/3 | 198/8 | |
| | | 12Vdc output | - | 89/3 | 91/8 | |
| | | 15Vdc output | - | 93/7 | 95/9 | |
| | | 24Vdc output | - | - | - | |
| | 15Vdc Input | 5Vdc output | - | 78/5 | 82/10 | |
| | 24Vdc Input | 5Vdc output | - | 47/3 | 50/8 | |
| | | 12Vdc output | - | 48/5 | 50/8 | |
| 15Vdc output | | - | 48/6 | 50/8 | | |
| 24Vdc output | | - | - | - | | |
| Reflected Ripple Current | - | | - | 15 | - | |
| Overshoot Voltage | 3.3V Input | | -0.7 | - | 9 | VDC |
| | 5Vdc Input | | -0.7 | - | 11 | |

| | | | | | |
|-------------------|------------------|------|-----|----|---|
| | 12Vdc Input | -0.7 | | 18 | |
| | 15Vdc Input | -0.7 | | 21 | |
| | 24Vdc Input | -0.7 | | 30 | |
| Overshoot Current | - | - | 0.8 | - | A |
| Input Filter Type | Capacitor Filter | | | | |
| Hot Plug | Unavailable | | | | |

Output Specifications

| Item | Operating Condition | | Min. | Typ. | Max. | Unit |
|-------------------------------|--------------------------------|----------------------|--------------------------------|------|------------|-----------------------|
| Output Voltage Accuracy | - | | See Regulation Curve (Photo 1) | | | |
| Line Regulation | Input voltage change $\pm 1\%$ | 3.3Vdc/ 5Vdc output | - | - | ± 1.5 | % |
| | | Other Voltage output | - | - | ± 1.2 | |
| Load Regulation | 10%-100% load | 3.3Vdc/ 5Vdc output | - | 10 | 15 | % |
| | | Other Voltage output | - | 8 | 10 | |
| Temperature Drift Coefficient | Full load | | - | - | ± 0.03 | $\% / ^\circ\text{C}$ |
| Short Circuit Protection | - | | Continuous, Self-recovery | | | |

General Specifications

| Item | Operating Condition | | Min. | Typ. | Max. | Unit |
|------------------------------|--|-------------------------|------|------|------|------------------|
| Insulation Withstand Voltage | Input-output, Test 1min, leakage current:50.5mA | | 1500 | - | - | VDC |
| Insulation Resistance | Input-output, Insulation Voltage 500VDC | | 1000 | - | - | M Ω |
| Isolation Capacitor | Input-output, 100KHz/0.1 V | | - | 20 | - | PF |
| Operating Temperature | Temperature: $\pm 105^\circ\text{C}$, see Temperature Derating Curve | | -50 | - | 115 | $^\circ\text{C}$ |
| Case Temperature Rise | Ambient Temperature 25°C | | - | 15 | - | |
| Storage Temperature | - | | -55 | - | 135 | |
| Reflow Temperature | Peak temperature 270°C Tc 280°C , only one through the oven, peak temperature Tc 270°C , up to 3 times through the oven; | | | | | |
| Storage Humidity | No condensing | | - | - | 95 | %RH |
| Switching Frequency | Full load | 3.3Vdc/5Vdc Input | - | 260 | - | KHz |
| | | 12Vdc/15Vdc/24Vdc Input | - | 450 | - | |
| MTBF | MIL-HDBK-217F@ 25°C | | 3000 | | | K hours |

Material Characteristics

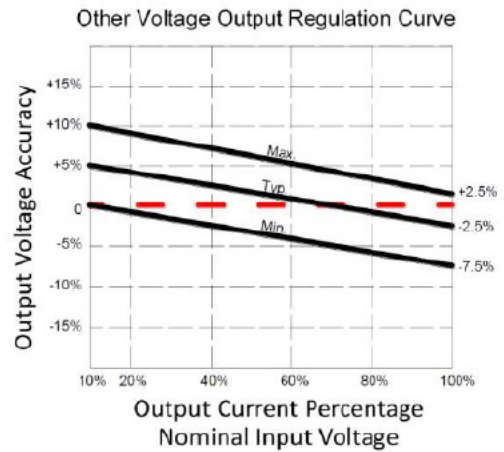
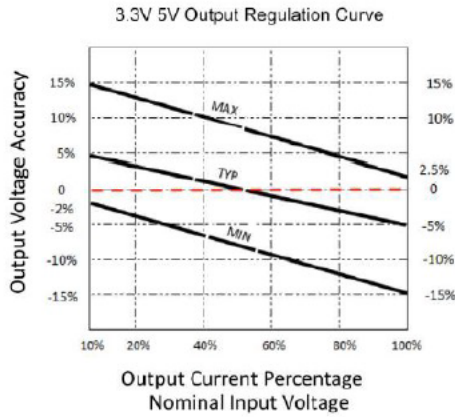
| | | | | | |
|-------------------|---|--------------------|--|--|--|
| Case Material | Black flame-retardant heat-resistant plastic (UL94 V-0) | | | | |
| Packing Dimension | SMD package | 12.7X11.20X7.25 mm | | | |
| Product Weight | | 1.4g(TYP.) | | | |

| | |
|----------------|---------------------|
| Cooling Method | Natural air cooling |
|----------------|---------------------|

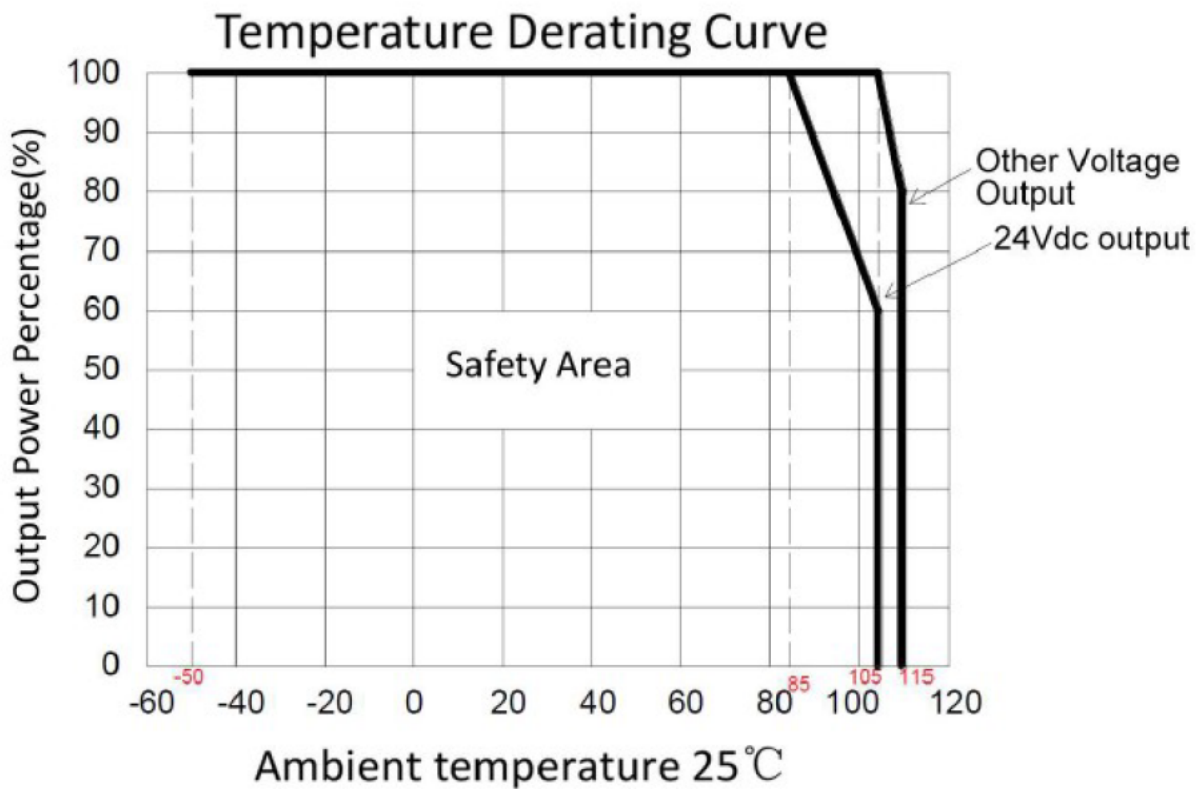
EMC Character

| | | |
|-----|-----|--|
| EMI | CE | CISPR32/EN55032 CLASS B (See EMC recommended circuit) |
| | RE | CISPR32/EN55032 CLASS B (See EMC recommended circuit) |
| EMS | ESD | IEC/EN61000-4-2 Air $\pm 8kV$, Contact $\pm 8kV$ perf. Criteria B |

Product Character Curve



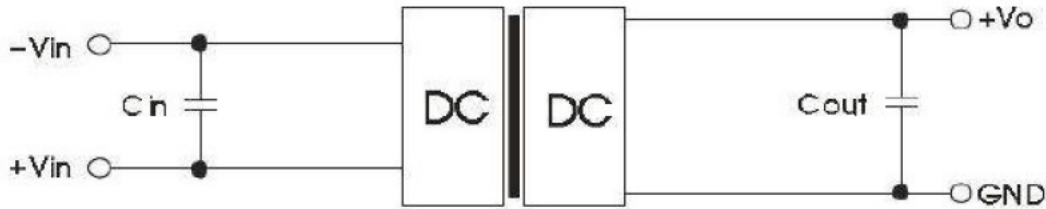
Products Characteristic Curve



Application Circuit

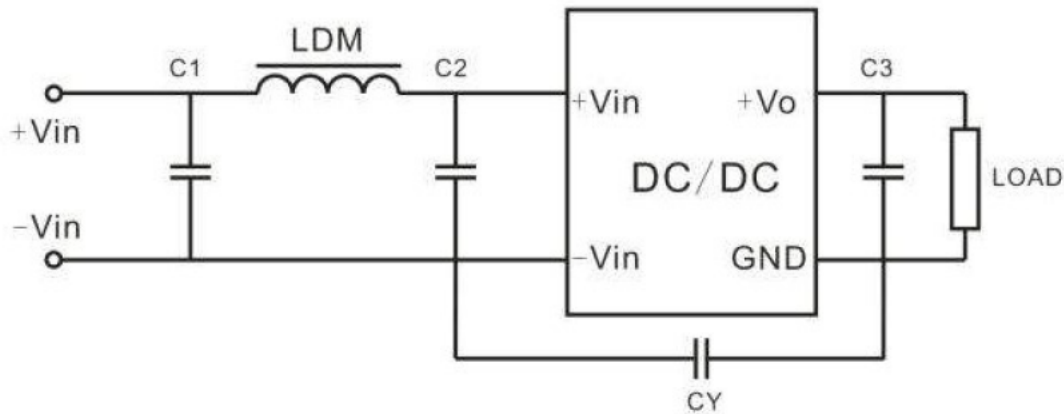
1. Typical Application

In order to ensure the input/output ripple and noise decreased, capacitor filter net could be connected to input and output side, application circuit as below photo 3; choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance.



Note 1: C_{in} is 4.7uF/50V, C_{out} is 10uF/50V

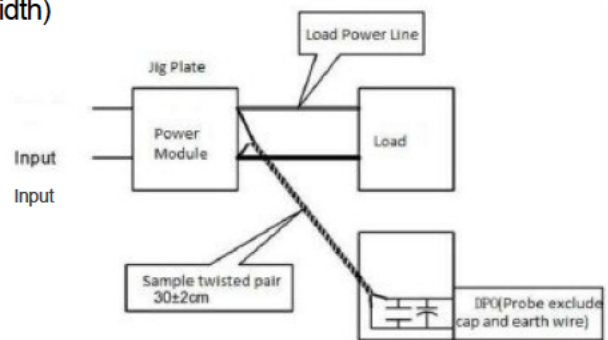
2. EMC Typical Recommended Circuit



Note 2: $C1, C2$ are 4.7uF/50V, LDM is 6.8uH, CY is 1nF/250Vac, for $C3$, please refer to the Typical Circuit.

3. Ripple & Noise Test: (Twisted Pair Method 20MHz bandwidth)

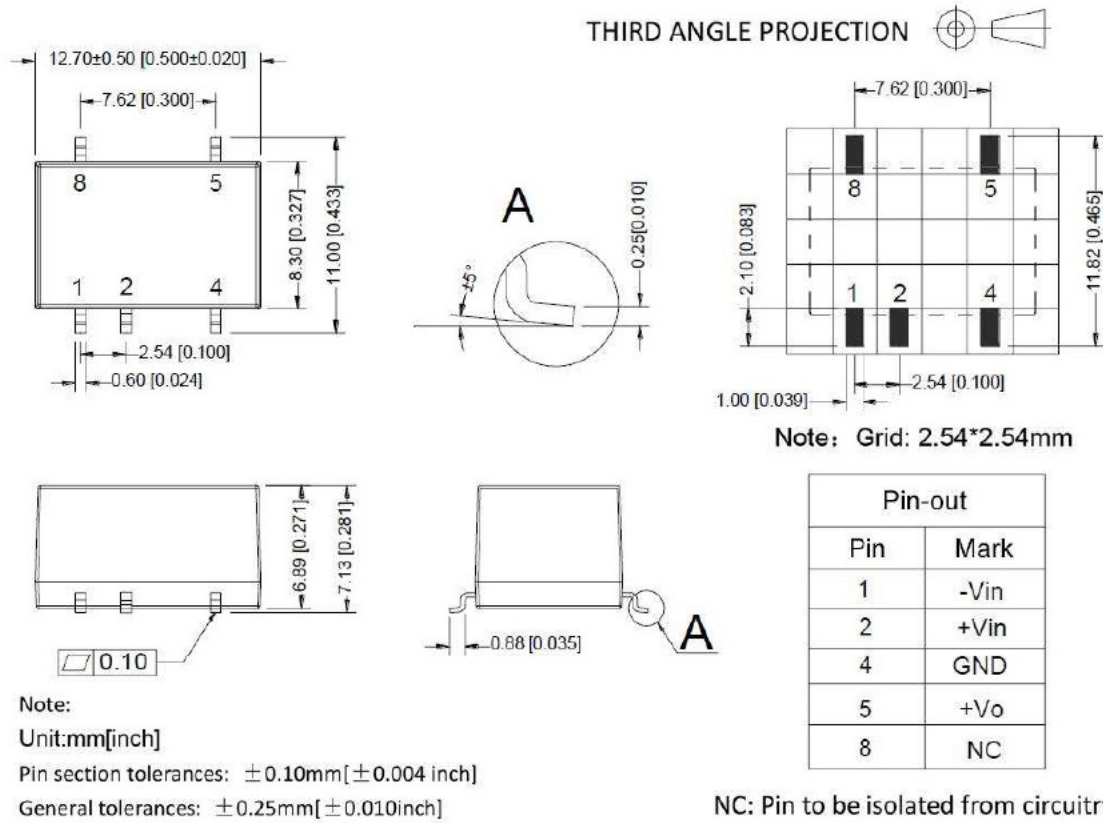
- a. 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1 uF polypropylene capacitor and 4.7uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.
- b. Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



4. Output load requirement

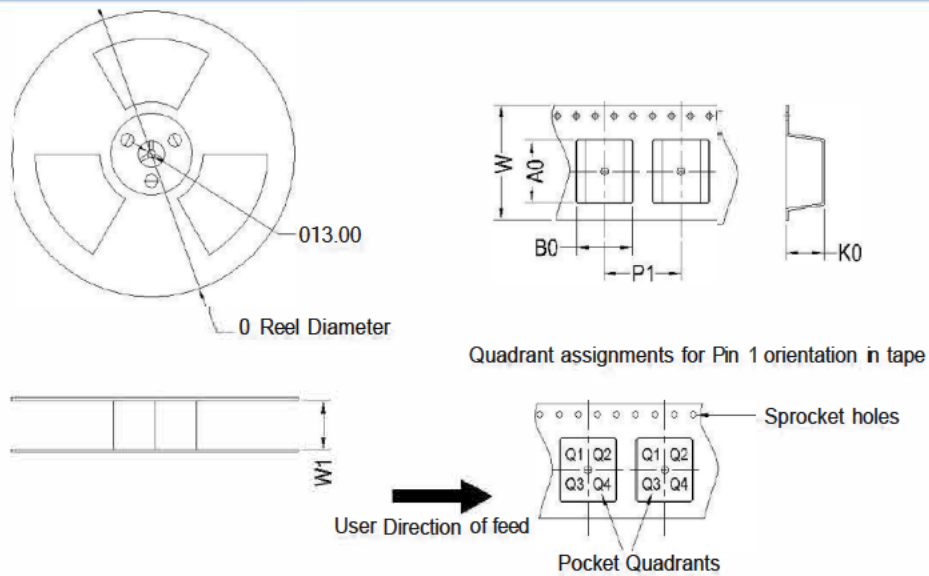
In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor at the output side. (The actual using power and the power of the resistor should be more than 10% rated power)

Packing Information



Note: if the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

Packing Information



| Device | Package Type | PIN | SPQ | Reel D(" r | Reel Width W1(mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | w (mm) | PIN1 Quadrant |
|---------------|--------------|-----|-----|------------|-------------------|---------|---------|---------|---------|--------|---------------|
| NN 1-XXSXXANT | SMD | 5 | 500 | 330 | 24.5 | 13.1 | 11.7 | 7.5 | 16.0 | 24 | Q1 |

Note:

1. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
2. The maximum capacitive load is tested under nominal input voltage range and full load condition;
3. Unless otherwise specified, data in this datasheet are tested under conditions of **Ta=25-C**, **humidity<75%** when inputting nominal voltage and outputting rated load(pure resistance load);
4. All index testing methods in this datasheet are based on our Company's corporate standards.
5. We can provide customized product service;