

Wall Industries, Inc.

LANC122.5W12

DC/DC Converter
9-18 VDC Input
2.5 VDC Output at 3.5A



Features:

- **RoHS Compliant**
- **Single Output**
- **Standard 24 Pin DIP and SMT Package**
- **Five-Sided Continuous Shield**
- **No Minimum Load Required**
- **High Power Density**
- **High Efficiency up to 88%**
- **Small Size: 1.25 x 0.8 x 0.450 Inches**
- **Input to Output Isolation (1600VDC)**
- **2:1 Wide Input Voltage Range**
- **Fixed Switching Frequency**
- **Input Under-Voltage Protection**
- **Output Over-Voltage Protection**
- **Over-Current Protection**
- **Output Short Circuit Protection**
- **Remote ON/OFF**

Applications:

- **Distributed Power Architectures**
- **Communications Equipment**
- **Computer Equipment**
- **Work Stations**

Description:

The LANCW12 single output series offers 12 watts of output power from a package in an IC compatible 24pin DIP and SMT configuration. LANCW12 single output series has 2:1 wide input voltage of 9-18VDC, 18-36VDC, and 36-75VDC. The LANCW12 single output series features 1600VDC of isolation, short circuit protection and five sided shielding. All models are particularly suited for telecommunications, industrial, mobile telecom, and test equipment applications.

| Technical Specifications | | Model No. LANC122.5W12 | | | |
|---|--|------------------------|--------------------------------|-------|---------------------|
| All specifications are based on 25 °C, Nominal Input Voltage and Maximum Output Current unless otherwise noted. We reserve the right to change specifications based on technological advances. | | | | | |
| SPECIFICATION | Related condition | Min | Nom | Max | Unit |
| Switching Frequency | Test at nominal Vin and full load | | 400 | | kHz |
| INPUT (V_{in}) | | | | | |
| Operating Voltage Range | | 9 | 12 | 18 | Vdc |
| Input Voltage (Continuous) | | | | 20 | Vdc |
| Input Voltage (Transient 100ms) | | | | 36 | Vdc |
| UVLO Turn-on Threshold | | | 9 | | Vdc |
| UVLO Turn-off Threshold | | | 8 | | Vdc |
| Input Standby Current | Nominal Vin and No Load | | 50 | | mA |
| Input Voltage Variation | Complies with EST300 132 part 4.4 | | | 5 | V/ms |
| Input Current | Nominal Vin and Full Load | | | 935 | mA |
| Reflected Ripple Current | 5 to 20MHz, 12μH source impedance (See the Test Setup section - pg 8) | | 20 | | mA _{pk-pk} |
| EFFICIENCY | | | | | |
| | Test at nominal Vin and full load (See the Test Setup section – pg 8) | | 82 | | % |
| OUTPUT (V_o) | | | | | |
| Operating Output Range | Nominal Vin and Full Load | 2.47 | 2.5 | 2.53 | Vdc |
| Load Regulation | 0% to 100% Full Load | -1.0 | | +1.0 | % |
| Line Regulation | LL to HL at Full Load | -0.2 | | +0.2 | % |
| Output Ripple & Noise | 5Hz to 20MHz bandwidth (See the Test Setup section - pg 8) | | | 85 | mV _{pk-pk} |
| Output Current | | 0 | | 3.5 | A |
| Output Voltage Overshoot | LL to HL at Full Load | | 0 | 3 | % Vout |
| Over Voltage Protection | Zener diode clamp | | 3.9 | | Vdc |
| Over Current Protection | | | 150 | | % FL |
| Short Circuit Protection | | | Continuous, automatic recovery | | |
| DYNAMIC LOAD RESPONSE | | | | | |
| | Test at nominal Vin | | | | |
| Peak Deviation | Load step change from 75 to 100% or 100 to 75 % of FL | | 200 | | mV |
| Setting Time (Vout < 10% peak deviation) | | | 250 | | μs |
| REMOTE ON/OFF | | | | | |
| | The ON/OFF pin voltage is referenced to -Vin (See the Remote ON/OFF Control section - pg 5) | | | | |
| ON/OFF pin High Voltage (Remote ON) | | 3.0 | | 12 | Vdc |
| ON/OFF pin Low Voltage (Remote OFF) | | 0 | | 1.2 | Vdc |
| ON/OFF pin Low Voltage, input current | | | | 2.5 | mA |
| START UP TIME | | | | | |
| | Test at nominal Vin and constant resistive load | | | | |
| Power Up | | | 450 | | ms |
| Remote ON/OFF | | | 5 | | ms |
| ISOLATION | | | | | |
| Isolation Voltage (Input-Output) | | 1600 | | | Vdc |
| Isolation Voltage (Output to Case–DIP Type) | | 1600 | | | Vdc |
| Isolation Voltage (Output to Case–SMT Type) | | 1000 | | | Vdc |
| Isolation Voltage (Input to Case - DIP Type) | | 1600 | | | Vdc |
| Isolation Voltage (Input to Case - SMT Type) | | 1000 | | | Vdc |
| Isolation Resistance | | 1 | | | GΩ |
| Isolation Capacitance | | | | 1200 | pF |
| ENVIRONMENTAL | | | | | |
| Operating Ambient Temperature (w/ derating) | | -40 | | 85 | °C |
| Operating Case Temperature | | | | 100 | °C |
| Storage Temperature | | -55 | | 105 | °C |
| Temperature Coefficient | | -0.02 | | +0.02 | % / °C |
| MTBF | | | | | |
| | See the MTBF and Reliability section (pg 13) | | | | |
| Bellcore TR-NWT-000332, T _c =40°C | | | 2,750,000 | | hours |
| MIL-STD-217F | | | 1,080,000 | | hours |
| MECHANICAL | | | | | |
| | | | See Figure 1 | | |
| Weight | | | 18.0 | | grams |
| Dimensions | | | 1.25 x 0.8 x 0.450 | | inches |

Figure 1: Mechanical Dimensions

DIP Type

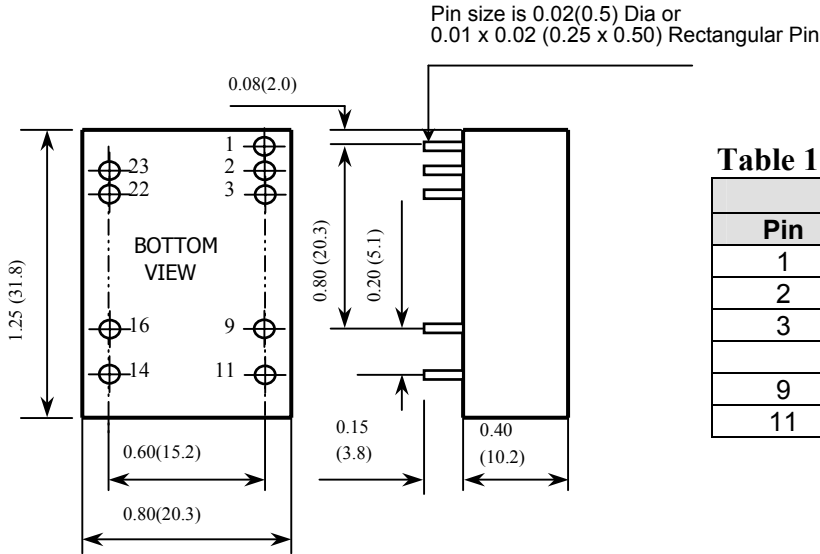


Table 1

| Pin Connection | | | |
|----------------|--------|-----|---------|
| Pin | Define | Pin | Define |
| 1 | CTRL | | |
| 2 | -Input | 23 | +Input |
| 3 | -Input | 22 | +Input |
| 9 | NC | 16 | -Output |
| 11 | NC | 14 | +Output |

1. All dimensions are in Inches (mm)
Tolerance: x.xx±0.02 (x.x±0.5)
2. Pin pitch tolerance ±0.014(0.35)

SMT Type

Suffix-S

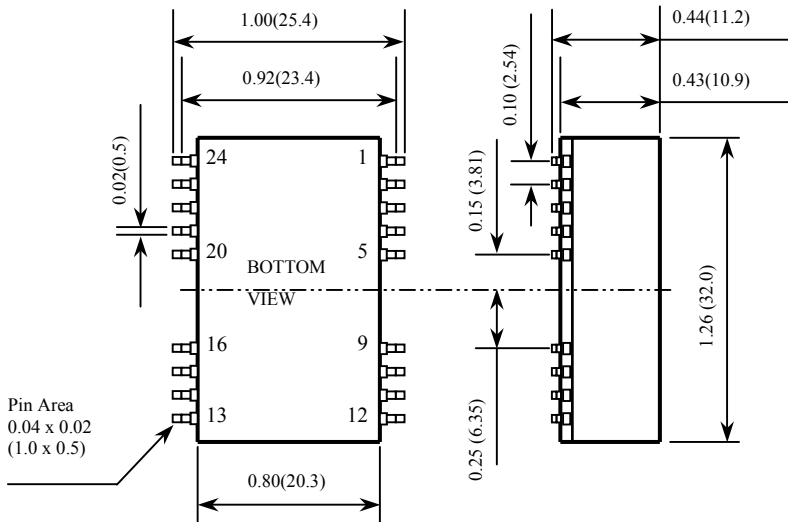


Table 2

| Pin Connection | | | |
|----------------|--------|--------|---------|
| Pin | Define | Pin | Define |
| 1 | CTRL | | |
| 2 | -Input | 23 | +Input |
| 3 | -Input | 22 | +Input |
| 9 | NC | 16 | -Output |
| 11 | NC | 14 | +Output |
| Others | NC | Others | NC |

1. All dimensions in Inches (mm)
Tolerance: x.xx±0.02 (x.x±0.5)
2. Pin pitch tolerance ±0.014(0.35)

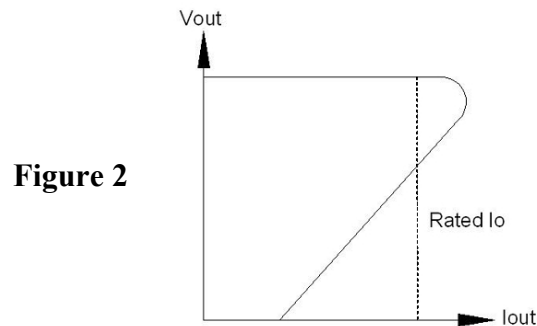
DESIGN CONSIDERATIONS:**Output Over Current Protection**

When excessive output currents occur in the system, circuit protection is required on all power supplies. Normally, overload current is maintained at approximately 150% of rated current for the LANCW12 single output series.

Fold back-mode is a method of operation in a power supply whose purpose is to protect the power supply from being damaged during an over-current fault condition. It also enables the power supply to operate normally when the fault is removed.

One of the problems resulting from over current is that excessive heat may be generated in power devices; especially MOSFET and Schottky diodes and the temperature of those devices may exceed their specified limits. A protection mechanism has to be used to prevent those power devices from being damaged.

The operation of fold back is as follows. When the current sense circuit sees an over-current event, the output voltage of the module will be decreased for low power dissipation and decrease the heat of the module.

**Output Over Voltage Protection**

The output over-voltage protection consists of an output Zener diode that monitors the voltage on the output terminals. If the voltage on the output terminals exceeds the over-voltage protection threshold, then the Zener diode clamps the output voltage.

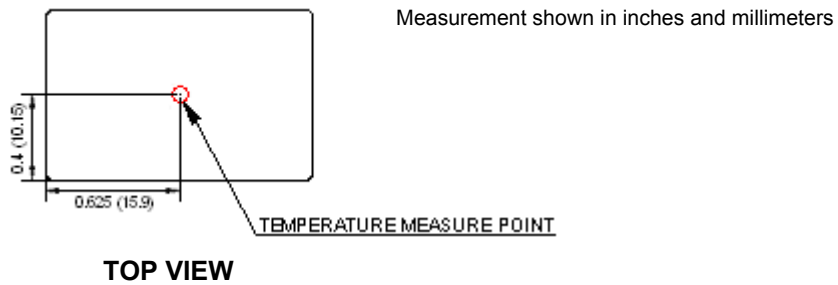
Input Source Impedance

The power module should be connected to a low impedance input source. Highly inductive source impedance can affect the stability of the power module. Input external L-C filter is recommended to minimize input reflected ripple current. The inductor is simulated source impedance of 12 μ H and capacitor is Nippon chemi-con KZE series 47 μ F/100V. The capacitor must as close as possible to the input terminals of the power module for lower impedance.

Thermal Consideration

The power module operates in a variety of thermal environments. However, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. Proper cooling can be verified by measuring the point as the figure below. The temperature at this location should not exceed 105°C. When operating, adequate cooling must be provided to maintain the test point temperature at or below 105°C. Although the maximum point temperature of the power modules is 105°C, you can limit this temperature to a lower value for extremely high reliability.

Figure 3



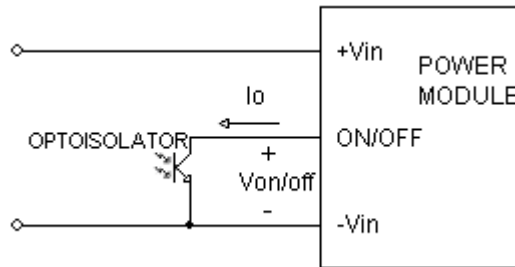
Remote ON/OFF Control

The positive logic remote ON/OFF control circuit is included.

Turns the module ON during a logic High on the On/Off pin and turns OFF during a logic Low. The On/Off pin is an open collector/drain logic input signal ($V_{on/off}$) that's referenced to GND. If not using the Remote On/Off feature, please open circuit between on/off pin and -input pin to turn the module on.

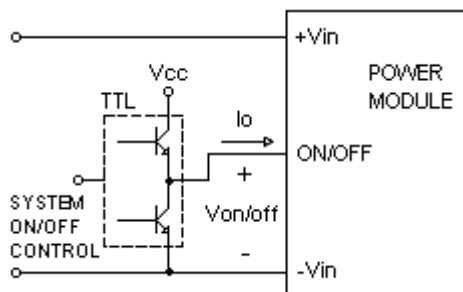
Remote ON/OFF Implementation

Figure 4



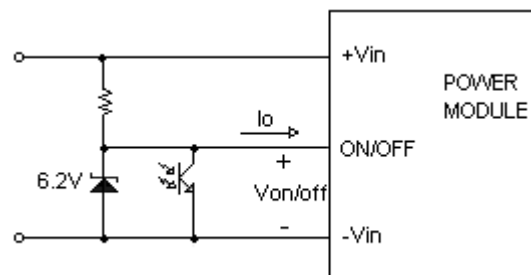
Isolated-Closure Remote ON/OFF

Figure 5



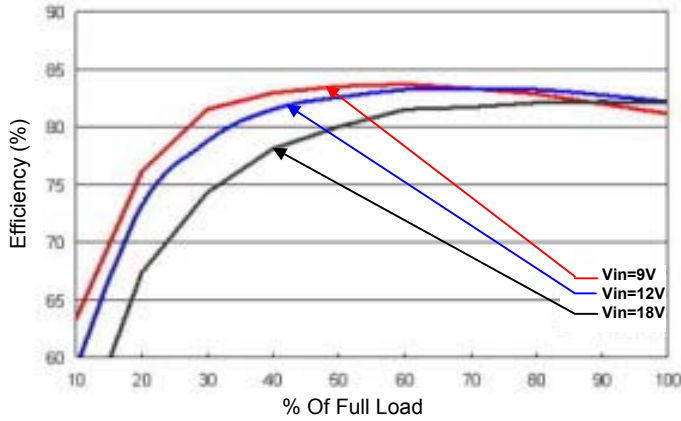
Level Control using TTL Output

Figure 6

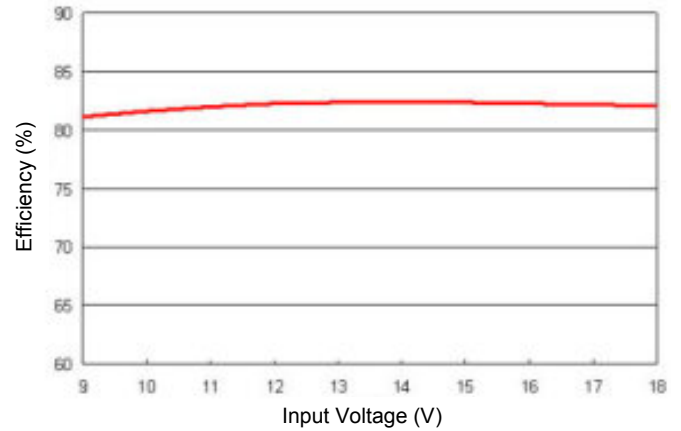


Level Control using Line Voltage

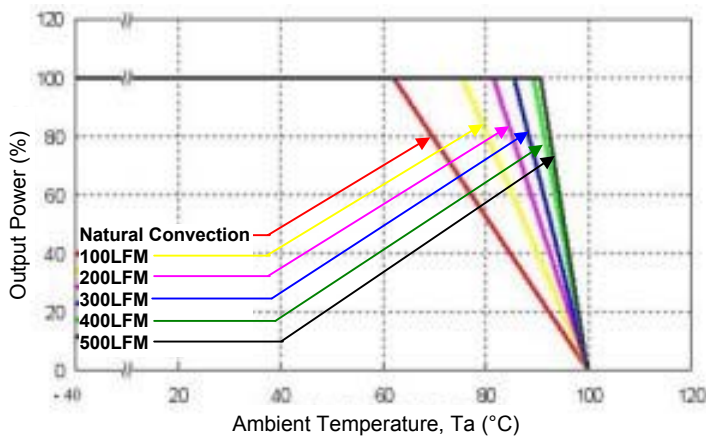
Graph 1: Efficiency vs. Output Current



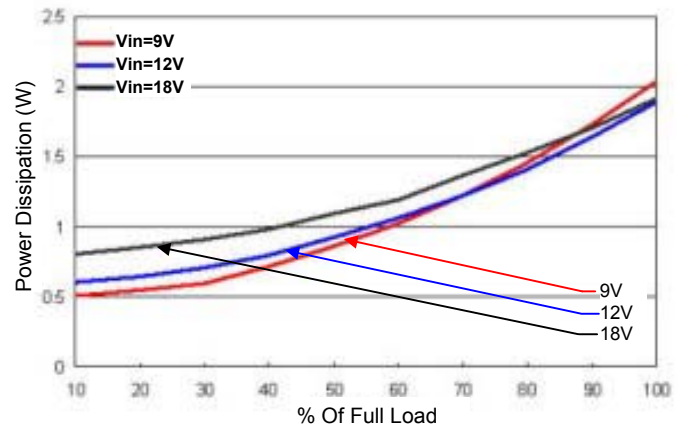
Graph 2: Efficiency vs. Input Voltage (Full Load)



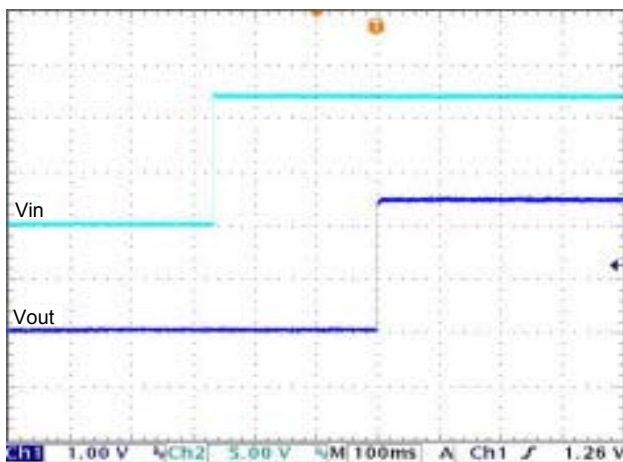
Graph 3: Output Power vs. Ambient Temperature & Airflow (Nominal Vin)



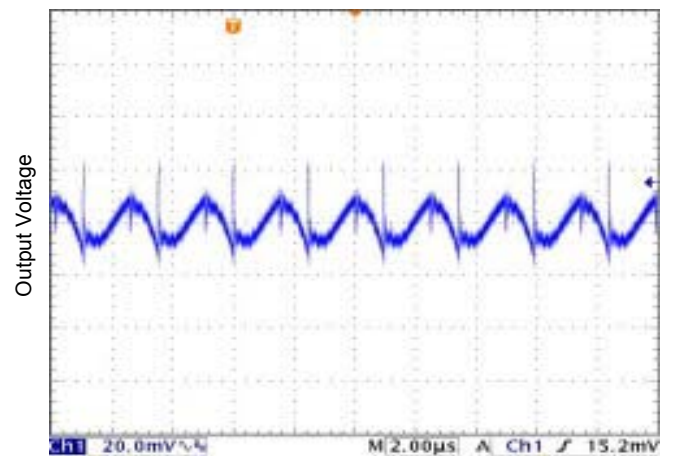
Graph 4: Power Dissipation Vs. Output Current



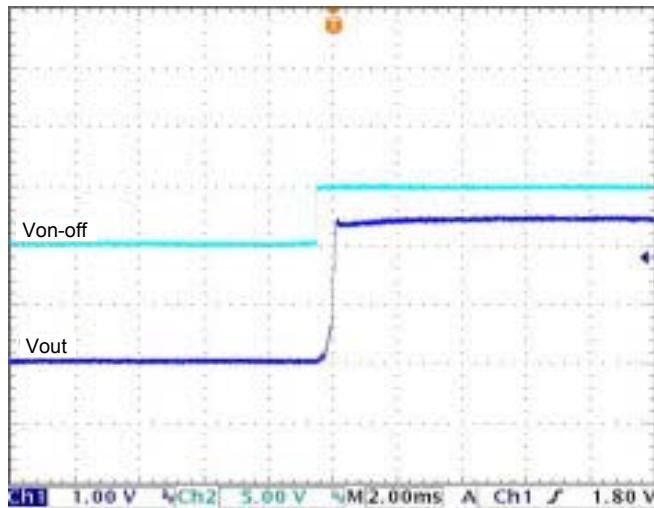
Graph 5: Typical Input Start-Up and Output Rise Characteristic (Nominal Vin and Full Load)



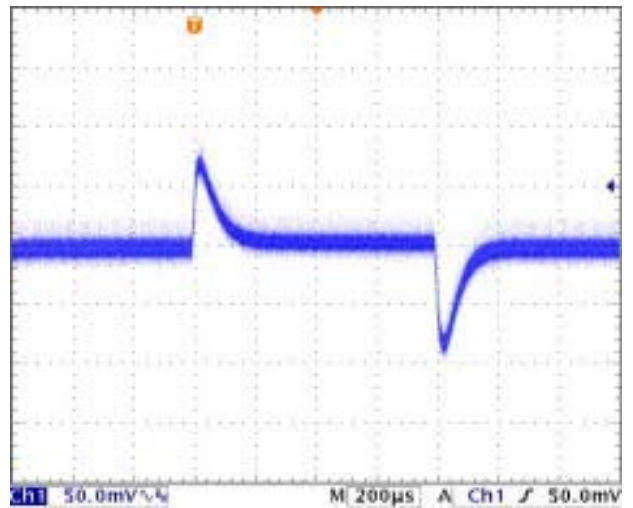
Graph 6: Typical Output Ripple and Noise (Nominal Vin and Full Load)



Graph 7: Using ON/OFF Voltage Start-Up and Vo Rise Characteristic (Nominal Vin and Full Load)



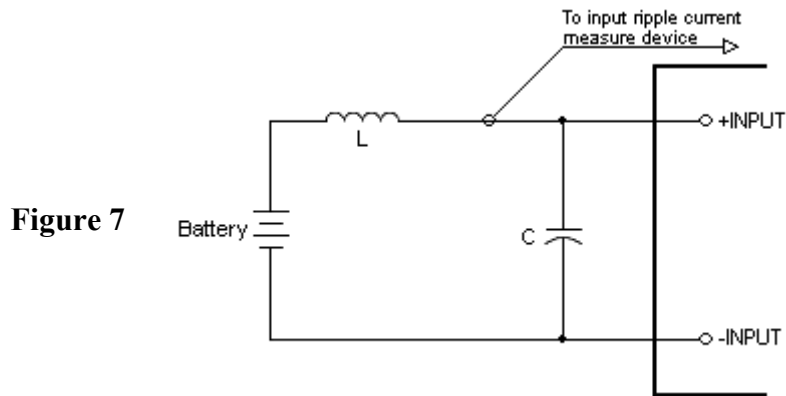
Graph 8: Transient Response to Dynamic Load Change from 100% to 75% to 100% of Full Load at Nominal Vin



TEST SETUP:

The LANC122.5W12 specifications are tested with the following configurations:

Input Reflected-Ripple Current Measurement Test Setup



| Component | Value | Voltage | Reference |
|-----------|------------|---------|---------------------------------|
| L | 12 μ H | ---- | ---- |
| C | 47 μ F | 100V | Aluminum Electrolytic Capacitor |

Peak-to-Peak Output Ripple & Noise Measurement Setup

Figure 8

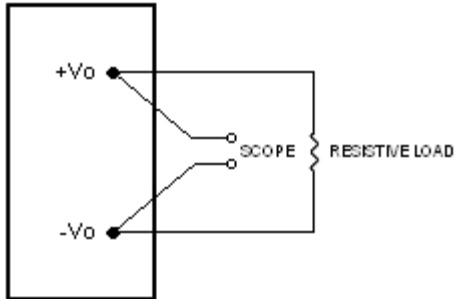
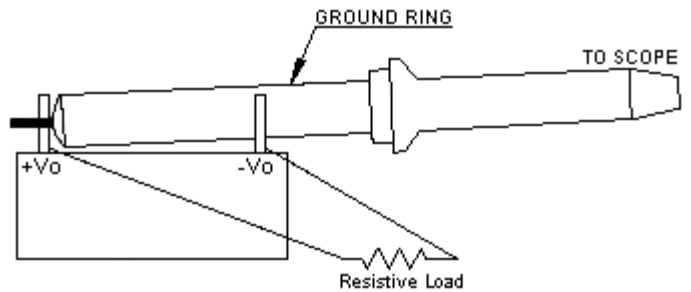
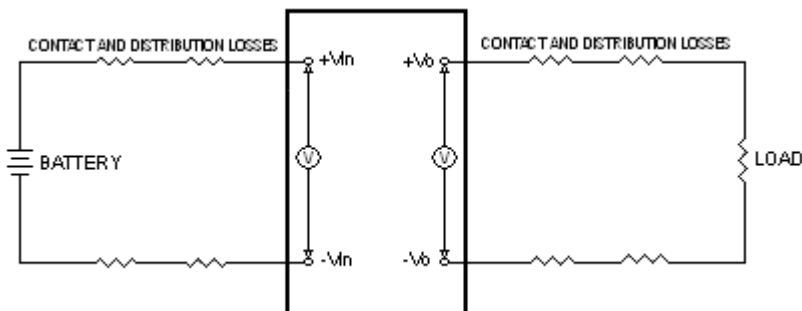


Figure 9



Output Voltage and Efficiency Measurement Setup

Figure 10



$$Efficiency = \left(\frac{V_{out} \times I_{out}}{V_{in} \times I_{in}} \right) \times 100\%$$

NOTE: All measurements are taken at the module terminals

EMC Considerations

Suggested Schematic for EN55022 Conducted Emission Class A Limits

Figure 11

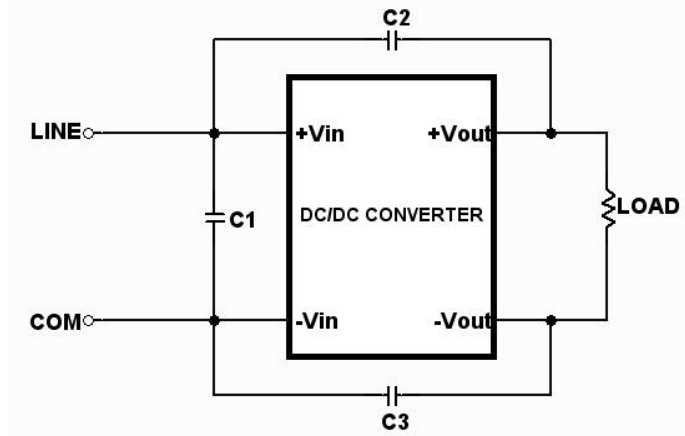
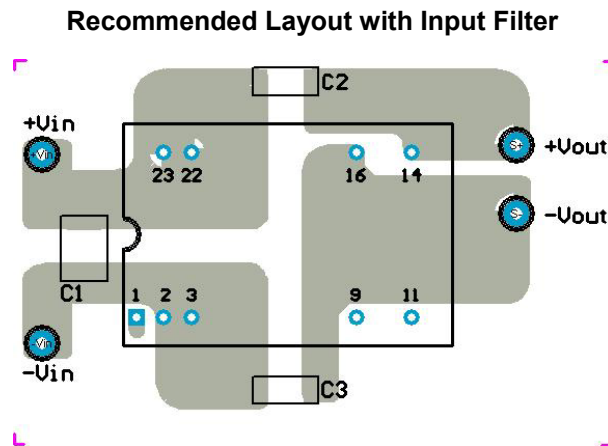


Figure 12



To meet Conducted Emissions EN55022 CLASS A needed the following components:

LANC12xxW12

| Component | Value | Voltage | Reference |
|-----------|--------|---------|-----------|
| C1 | 6.8uF | 50V | 1210 MLCC |
| C2, C3 | 1000pF | 2KV | 1206 MLCC |

LANC24xxW12

| Component | Value | Voltage | Reference |
|-----------|--------|---------|-----------|
| C1 | 4.7uF | 50V | 1210 MLCC |
| C2, C3 | 1000pF | 2KV | 1206 MLCC |

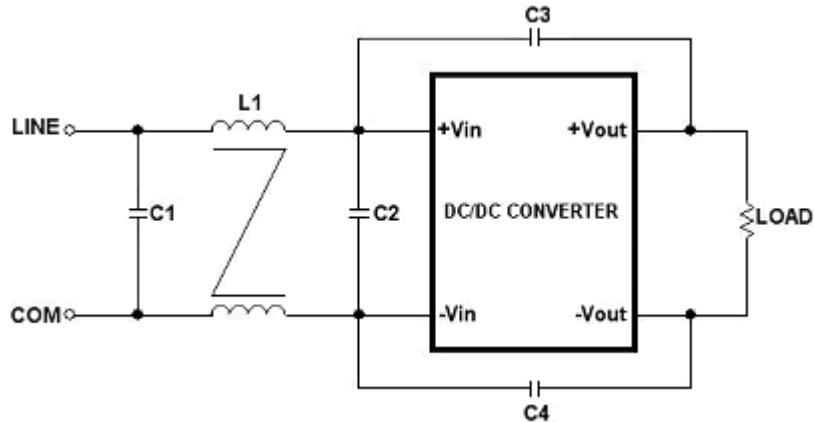
LANC48xxW12

| Component | Value | Voltage | Reference |
|-----------|--------|---------|-----------|
| C1 | 2.2uF | 100V | 1812 MLCC |
| C2, C3 | 1000pF | 2KV | 1206 MLCC |

EMC Considerations (Continued)

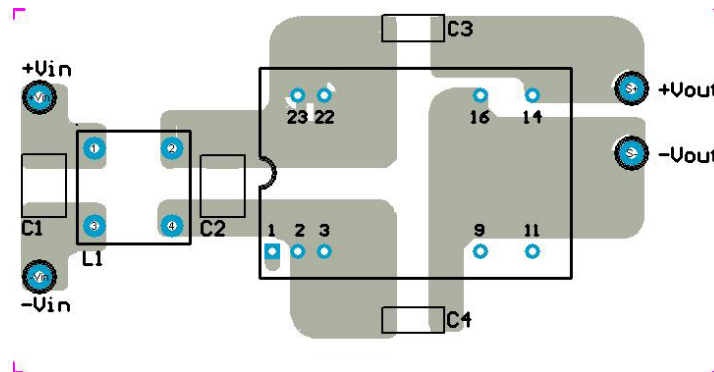
Suggested Schematic for EN55022 Conducted Emission Class B limits

Figure 13



Recommended Layout with Input Filter

Figure 14



To meet Conducted Emissions EN55022 CLASS B needed the following components:

LANC12xxW12

| Component | Value | Voltage | Reference |
|-----------|-------------|---------|----------------------------|
| C1 | 3.3 μ F | 50V | 1812 MLCC |
| C3, C4 | 1000pF | 2KV | 1206 MLCC |
| L1 | 325 μ H | ---- | Common Choke, P/N: PMT-050 |

LANC24xxW12

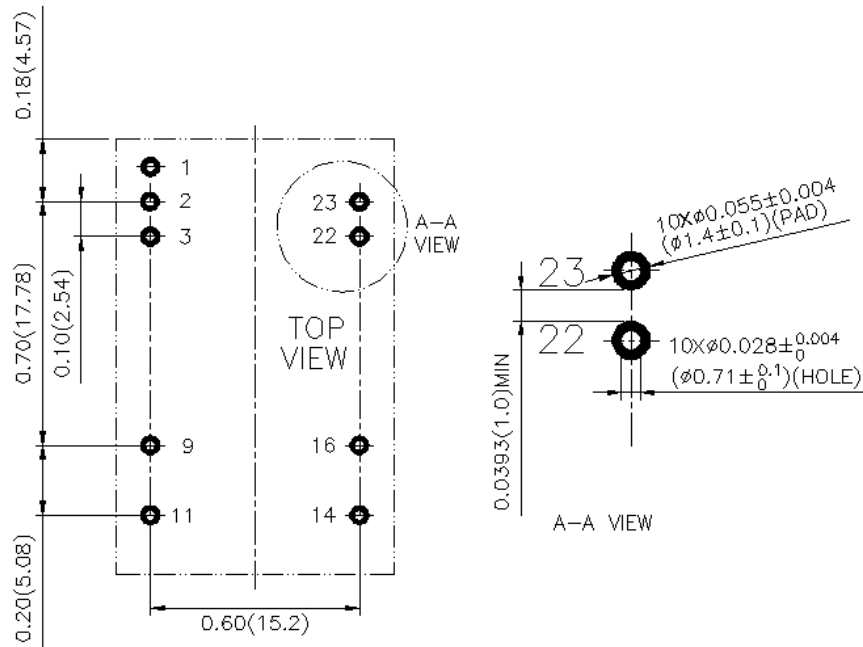
| Component | Value | Voltage | Reference |
|-----------|-------------|---------|----------------------------|
| C1 | 4.7 μ F | 50V | 1812 MLCC |
| C3, C4 | 1000pF | 2KV | 1206 MLCC |
| L1 | 325 μ H | ---- | Common Choke, P/N: PMT-050 |

LANC48xxW12

| Component | Value | Voltage | Reference |
|-----------|-------------|---------|----------------------------|
| C1 | 2.2 μ F | 100V | 1812 MLCC |
| C3, C4 | 1000pF | 2KV | 1206 MLCC |
| L1 | 325 μ H | ---- | Common Choke, P/N: PMT-050 |

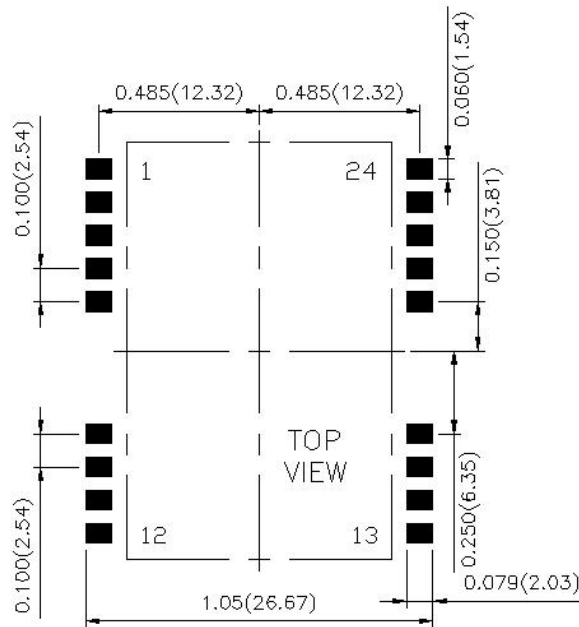
Recommended Pad Layout for DIP Type

Figure 15



Recommended Pad Layout for SMT Type

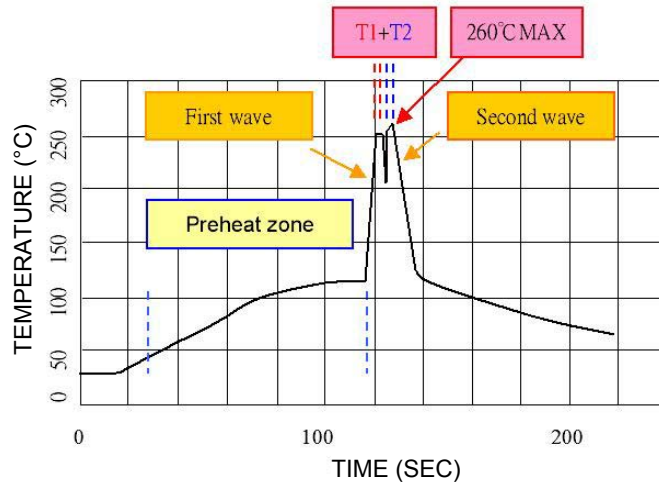
Figure 16



1. All dimensions in Inches (mm)
2. Pin pitch tolerance $\pm 0.35\text{mm}$
3. Tolerance: $x.xx \pm 0.02$ ($x.x \pm 0.5$)
 $x.xxx \pm 0.01$ ($x.xx \pm 0.25$)

Soldering and Reflow Considerations:

Lead Free Wave Solder Profile for DIP Type



Reference Solder: Sn-Ag-Cu; Sn-Cu

Hand Welding:
Soldering Iron: Power 90W
Welding Time: 2~4 sec
Temp: 380~400°C

Figure 17

| Zone | Reference Parameter |
|----------------|---|
| Preheat Zone | Rise temp. speed: 3°C/sec max. Preheat temp: 100~130°C |
| Actual Heating | Peak temp: 250~260°C Peak time (T1+T2 time): 4~6 sec |

Lead free reflow profile for SMT type

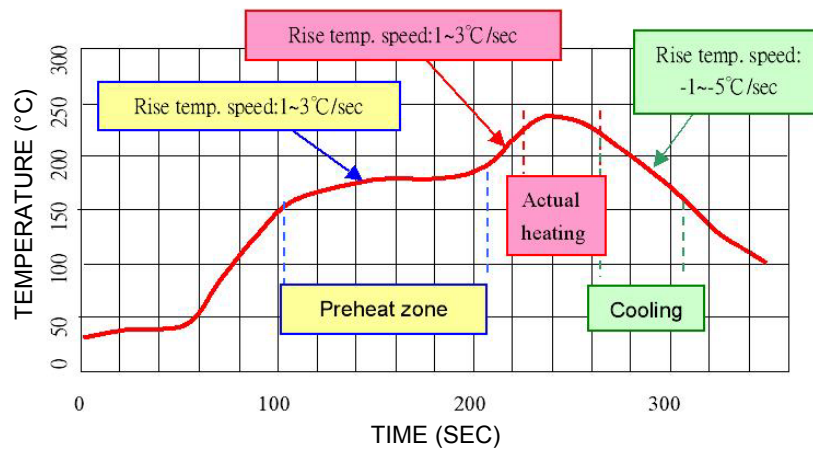
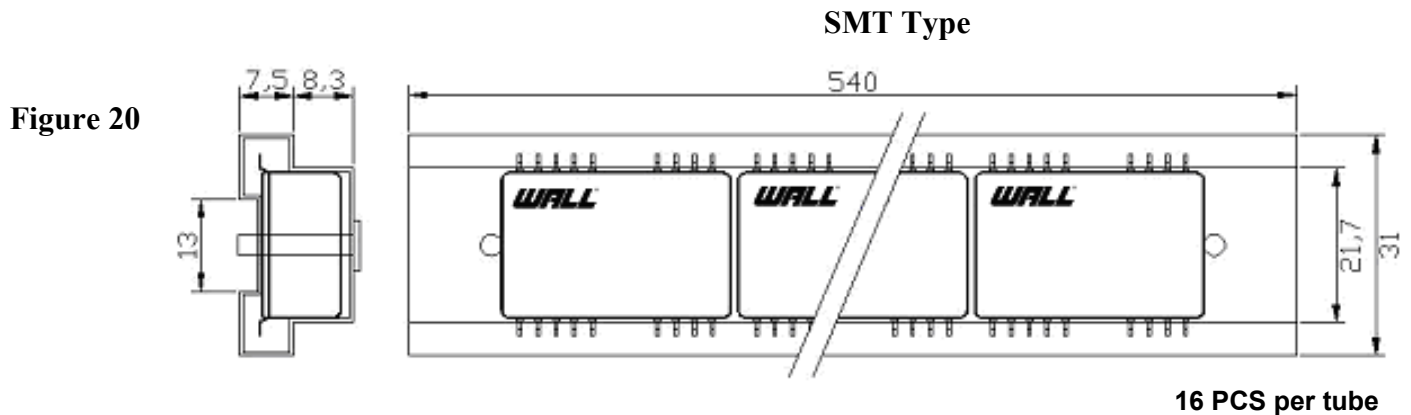
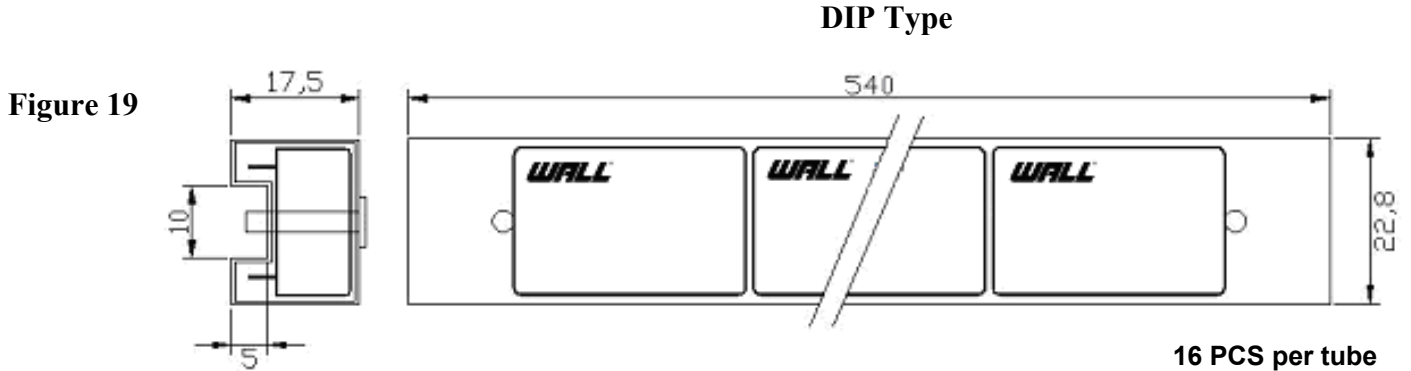


Figure 18

| Zone | Reference Parameter |
|----------------|---|
| Preheat Zone | Rise temp. speed: 1~3°C/sec Preheat time: 60~120sec Preheat temp. 155~185°C |
| Actual Heating | Rise temp. speed: 1~3°C/sec Melting time: 30~60 sec Melting temp: 217°C Peak temp: 230~240°C Peak time: 10~20 sec |
| Cooling | Rise temp. speed: -1~ -5°C/sec |

Reference Solder: Sn-Ag-Cu; Sn-Cu

Packaging Information:



Safety and Installation Instruction:

Fusing Consideration

Caution: This power module is not internally fused. An input line fuse must always be used.

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture. To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse. The safety agencies require a normal-blow fuse with maximum rating of 3A. Based on the information provided in this data sheet on Inrush energy and maximum DC input current; the same type of fuse with lower rating can be used. Refer to the fuse manufacturer's data for further information.

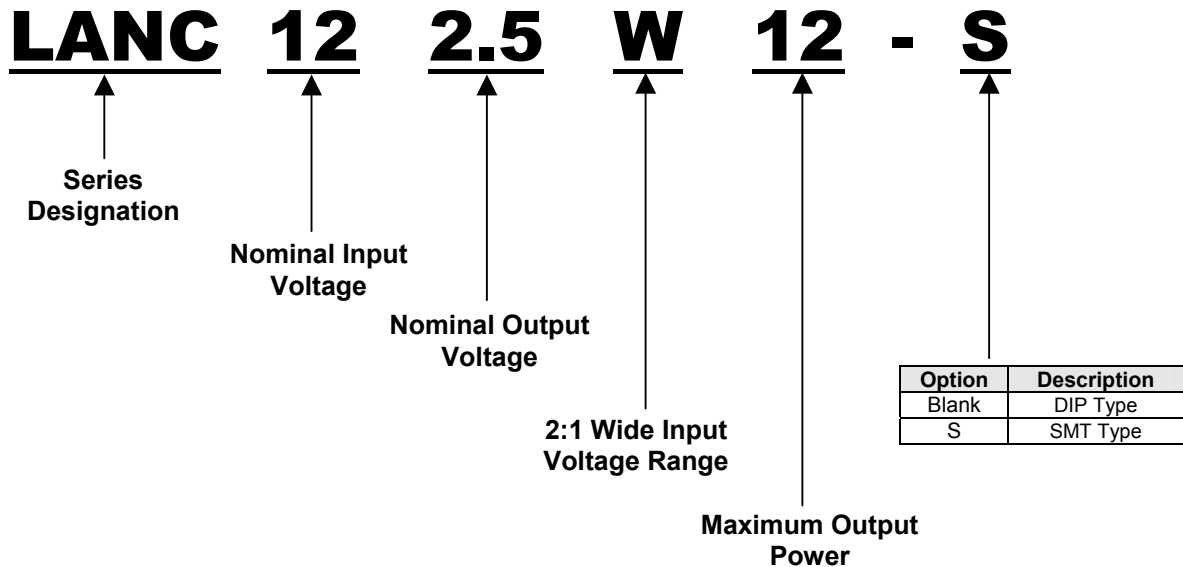
MTBF and Reliability

The MTBF of the LANCW12 single output series of DC/DC converters has been calculated using Bellcore TR-NWT-000332 Case I: 50% stress, Operating Temperature at 40°C (Ground fixed and controlled environment). The resulting figure for MTBF is 2.75×10^6 hours.

MIL-HDBK 217F NOTICE2 FULL LOAD, Operating Temperature at 25°C. The resulting figure for MTBF is 1.078×10^6 hours.

Ordering Information:

Part Number Example:



Company Information:

Wall Industries, Inc. has created custom and modified units for over 40 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001-2000 certification is just one example of our commitment to producing a high quality, well documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

Phone: ☎ (603)778-2300
Toll Free: ☎ (888)587-9255
Fax: ☎ (603)778-9797
E-mail: sales@wallindustries.com
Web: www.wallindustries.com
Address: 5 Watson Brook Rd.
Exeter, NH 03833