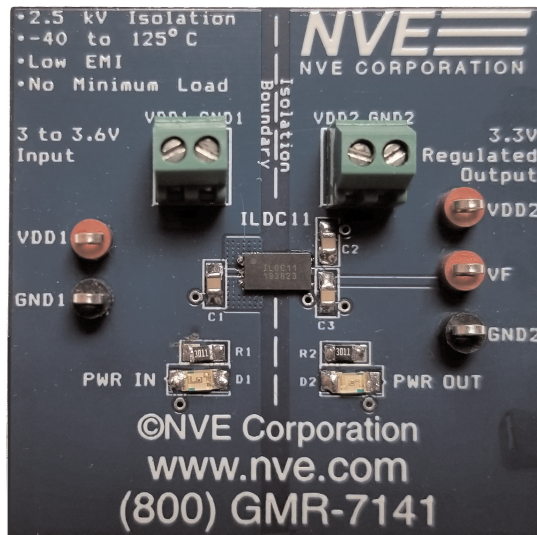


# ILDC11-01

## Ultraminiature Isolated DC-DC Converter Evaluation Board



Board No.: ILDC11-01

# About This Evaluation Board

This Evaluation Board uses the world's smallest DC-DC convertor, the ILDC11-15E.

The 1.75 by 1.75 inch (45 by 45 mm) board has an ILDC11-15E plus the three recommended external bypass capacitors as well as LEDs to show the DC-DC convertor is operating. Screw terminals provide easy connections.

The ILDC11 is an ultraminiature one-quarter watt DC-DC convertor that generates an full-isolated, independent 3.3-volt supply.

No additional regulation is required and there is no minimum load. Frequency hopping and shielding reduce EMI, and ferrite beads are not necessary for EMI mitigation.

A high-temperature process allows up to 175 °C junction temperature for full power up to 125 °C operating temperature with no derating. Integrated short-circuit protection avoids excessive power dissipation.

## ILDC11-15E Specification Highlights

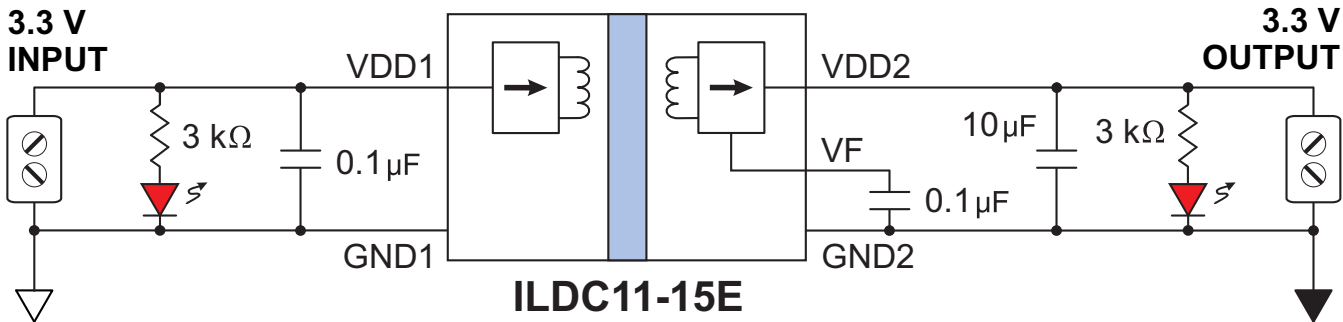
- Ultraminiature 3 mm x 5.5 mm DFN package
- 3.3 V input to 3.3 V output
- Quarter watt output power
- Fully-regulated output
- Short-circuit protection
- No minimum load
- Low EMI without ferrite beads
- Full 2500 V isolation
- Full -40 °C to 125 °C temperature range

## Quick Start

- Connect  $V_{DD1}$  to a 3.3 V power supply.
- The two LEDs should indicate input and output power.
- The output can be checked for voltage, ripple, stability, shot-circuit protection, etc.

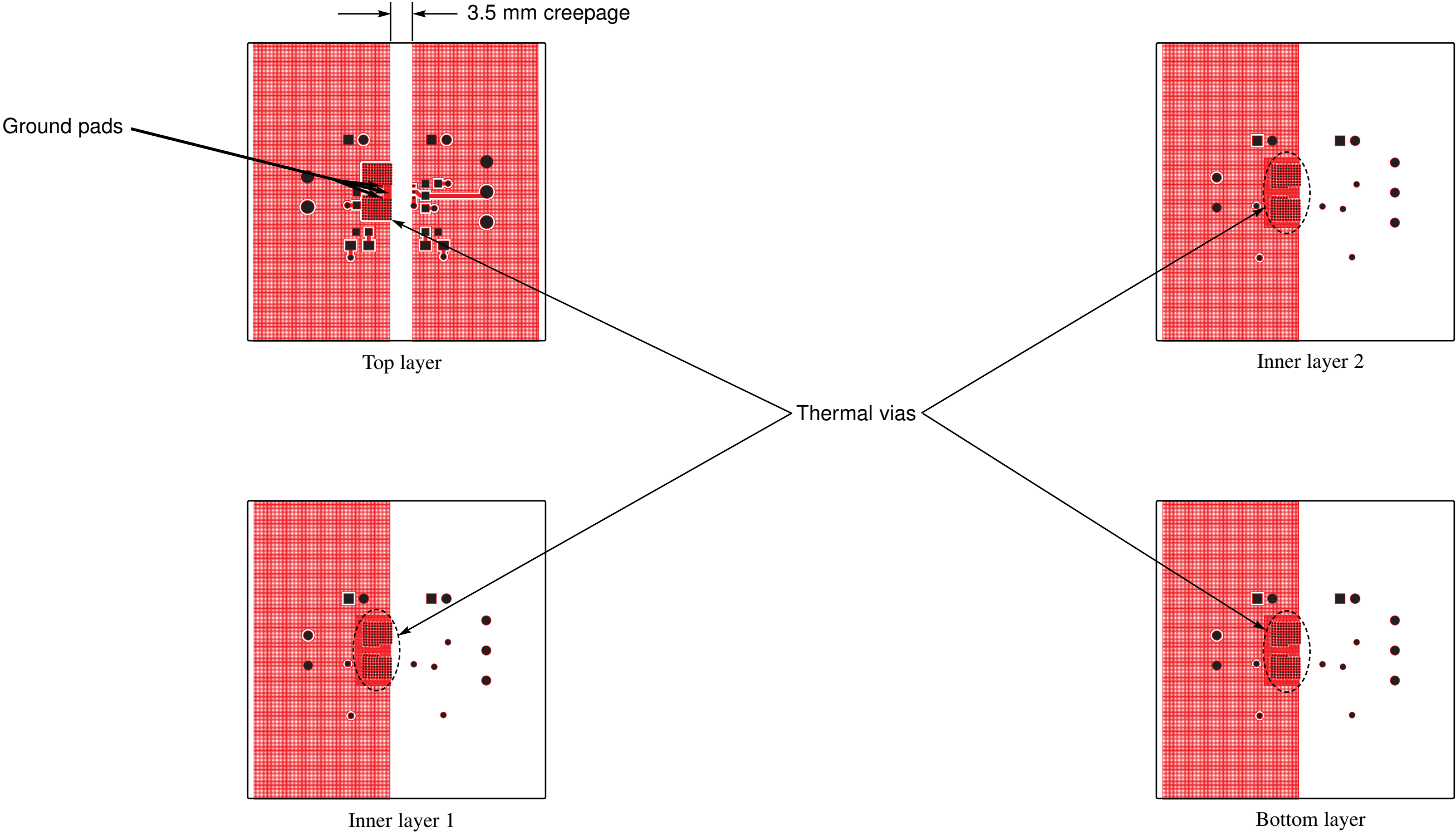
Visit **[www.nve.com](http://www.nve.com)** for datasheets and reference circuits.

# Circuit Diagram



| ILDC11 Pad     | Symbol | Description   |
|----------------|--------|---|
| 1              | GND1   | Input-Side Ground (internally connected to pad 3).                                |
| 2              | VDD1   | Input Supply (bypass with a 0.1 μF capacitor).                                    |
| 3              | GND1   | Input-Side Ground (internally connected to pad 1).                                |
| 4              | GND2   | Output-Side Ground.   |
| 5              | VF     | Filter capacitor (connect to a 0.1 μF / 16 V external capacitor).                 |
| 6              | VDD2   | Output Supply (bypass with a 10 μF / 6.3 V capacitor).                            |
| Lead-frame Pad | GND1   | Input-side leadframe connection (connect to GND1 to optimize thermal performance) |

# Evaluation Board Layers

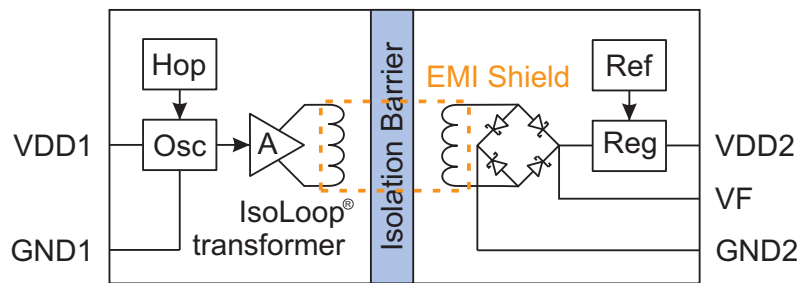


© 2011 Pearson Education, Inc. or its affiliate(s). All rights reserved.



NVE Corporation      (952) 829-9217      iso-apps@nve.com      www.nve.com      YouTube.com/NveCorporation

# Operation and Application Information



**ILDC11 detailed block diagram.**

## **ILDC11 Operation**

A 113 MHz oscillator drives a high-frequency power amplifier, which in turn drives an IsoLoop® microtransformer primary. Frequency hopping reduces EMI peak amplitudes, and embedded magnetic shielding further reduces radiated EMI.

A unique ceramic/polymer composite barrier provides full 2.5 kV isolation with virtually unlimited barrier life. On the other side of the isolation barrier, the transformer secondary output is filtered, rectified, and regulated by a low-EMI low drop-out regulator with a precision bandgap voltage reference.

## **No Temperature Derating**

A double sided, double buried power plane (“2s2p”) PCB, like the one in this evaluation board, optimizes thermal performance, allowing full power up to 125 °C operating temperature with no derating. Thermal vias are used on the input side between the buried power planes and the board surfaces. Both input-side ground pads (pads 1 and 3) and the leadframe pad are grounded to cool the leadframe.

At the full output current with the recommended PCB, the ILDC11 dissipates approximately one watt; the resultant junction temperature rise is 46 °C, so at 125 °C ambient the junction temperature is less than the 175 °C maximum junction temperature. A simple double-sided PCB can be used with some derating.

## **Maintaining Creepage**

The ILDC11 has 3.5 mm clearance between isolated pads. Creepage distances are often critical in isolated circuits. Therefore power planes should be spaced to avoid compromising creepage, and board pads should not extend past the part pads to avoid compromising creepage.

## **Low Parts Count**

The only external parts required are a 0.1 µF ceramic capacitor placed close to the VDD1 supply pad, a 10 µF ceramic capacitor for the VDD2 pad, and a 0.1 µF capacitor on the VF pad.



### **Limited Warranty and Liability**

Information in this document is believed to be accurate and reliable. However, NVE does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. In no event shall NVE be liable for any indirect, incidental, punitive, special or consequential damages (including, without limitation, lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

### **Right to Make Changes**

NVE reserves the right to make changes to information published in this document including, without limitation, specifications and product descriptions at any time and without notice.

### **Use in Life-Critical or Safety-Critical Applications**

Unless NVE and a customer explicitly agree otherwise in writing, NVE products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical devices or equipment. NVE accepts no liability for inclusion or use of NVE products in such applications and such inclusion or use is at the customer's own risk. Should the customer use NVE products for such application whether authorized by NVE or not, the customer shall indemnify and hold NVE harmless against all claims and damages.

### **Applications**

Applications described in this document are illustrative only. NVE makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification. Customers are responsible for the design and operation of their applications and products using NVE products, and NVE accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NVE product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customers. Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products. NVE does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customers. The customer is responsible for all necessary testing for the customer's applications and products using NVE products in order to avoid a default of the applications and the products or of the application or use by customer's third party customers. NVE accepts no liability in this respect.

## **An ISO 9001 Certified Company**

NVE Corporation  
11409 Valley View Road  
Eden Prairie, MN 55344-3617

©NVE Corporation

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

Manual No.: ISB-CB-020

June 2020