EVM of MYBSP series for IEEE 802.3af

Document Category: User guide

Isolated DC-DC converter for PoE-PD

ABSTRACT

The user guide provides instructions on the correct connection and operation of the test board. The guide explains the function and location of each test point on the board, which are intended for voltage measurement, waveform analysis, and signal verification. The test board supports the full input voltage range and full output current of the MYBSP00502ABFS (class0), MYBSP00502ABFT (class1) and MYBSP00502ABFU (class2).

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Description

The Evaluation Module (EVM) is a hardware platform designed for customers to evaluate the performance of the isolated DC-DC converters, MYBSP00502ABFS, MYBSP00502ABFT and MYBSP00502ABFU.

The board is equipped with appropriate parts such as input and output capacitors to cover the specification of the product.

Monitoring test points are provided to allow accurate measurement of input/output voltages and currents. Note that power dissipation and efficiency can be calculated from these measurements.

The modules are an isolated, regulated DC-DC converter for PoE- Powered Devices (PD), featuring an input range of 37-57V, a typical efficiency of 83.4%(MYBSP00502ABFS), and complete 2250 Volt DC isolation. This product is ideal for IEEE 802.3af compliant devices.

The module includes self-protection features such as input undervoltage lockout and output current limit. Additionally, the module supports detection and classification for IEEE 802.3af compliance.

The PoE system has a function called Maintain Power Signature (MPS), which allows Power Sourcing Equipment (PSE) to detect the input current of the PD module. The input current of the PD module requires 10 mA or more.

Detailed application information for the products can be found in the datasheet.

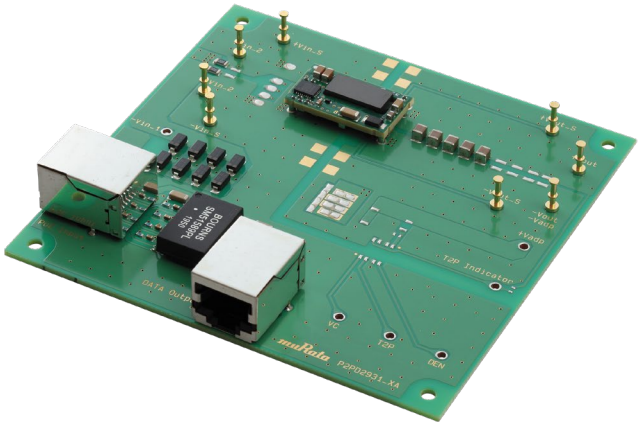


Figure 1. Evaluation Board

Performance Summary

Table 1. Performance Summary

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
INPUT SUPPLY						
Operating Input Voltage	V_{IN}		37	48	57	V
OUTPUT						
Output Voltage	V_{OUT}	I_{OUT} = 0.2A to Max.	4.7	5	5.3	V
Output Current	I_{OUT}		0	-	2.0	A
Efficiency	EFF	V_{IN} = 48V, I_{OUT} = 2A	79.4	83.4	-	%
		V_{IN} = 48V, I_{OUT} = 0.4A	77.0	81.0	-	%
		V_{IN} = 48V, I_{OUT} = 1.3A	78.5	82.5	-	%

IEEE802.3af detection / classification

MYBSP00502ABFS supports detection and classification compliant with IEEE 802.3af Class 0.
MYBSP00502ABFT supports detection and classification compliant with IEEE 802.3af Class 1.
MYBSP00502ABFU supports detection and classification compliant with IEEE 802.3af Class 2.

Quick Start Guide

Figure 2. highlights the user interface items associated with the EVM.
The V_{IN} power terminals are used for connection to the host input supply and the V_{OUT} power terminals are used for connection to the load. Sense(+/-) test points for both V_{IN} and V_{OUT}, located near the power terminals are intended to be used as voltage monitoring points where voltmeters can be connected to measure V_{IN} and V_{OUT}.
Do not connect these S+ and S- monitoring test points as the input supply or output load connection points.
Since the evaluation board includes components for the PoE circuit, such as bridge diodes and a pulse transformer, CN25 can be used to provide power and data by connecting to the PSE through a LAN cable.

EVM Layout and Terminal Function

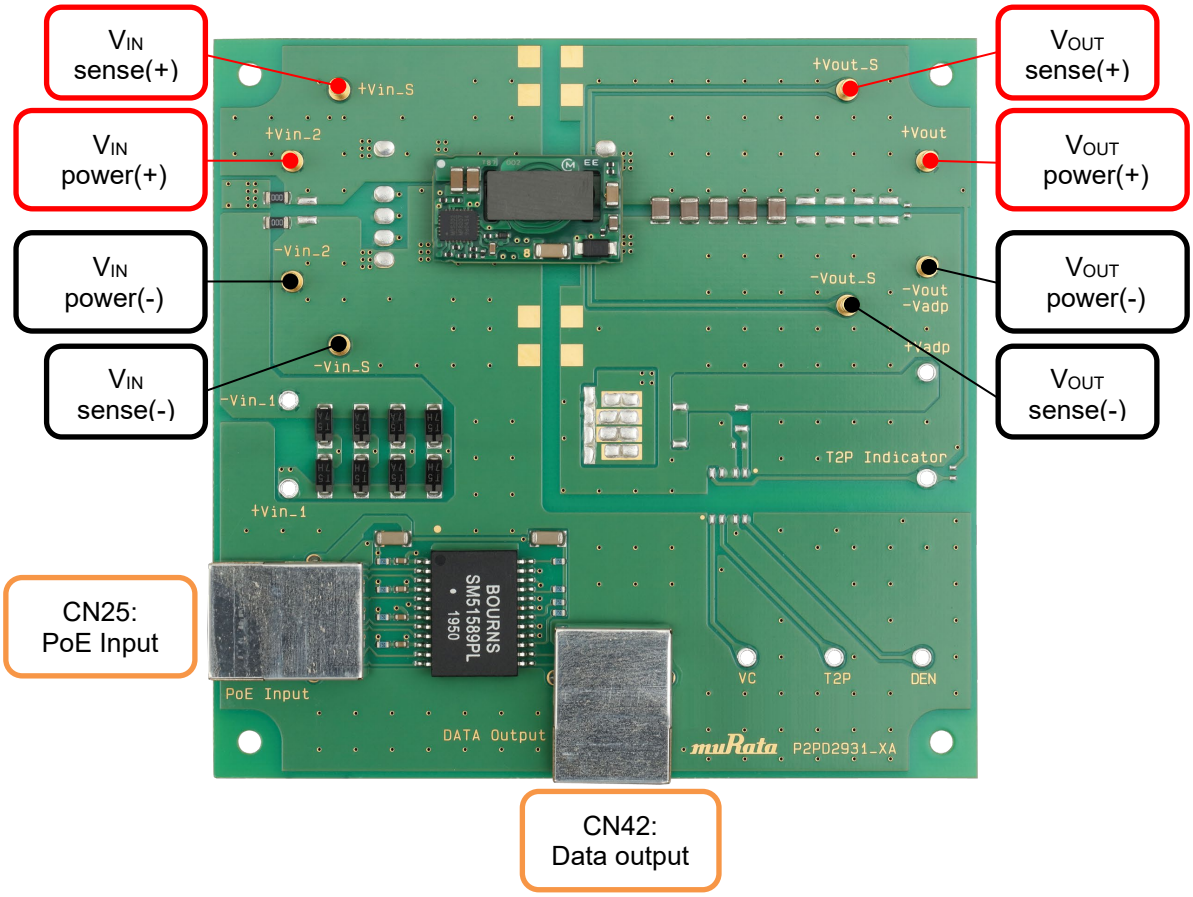


Figure 2. Evaluation Board Top View

Terminal Functions

Table 2. Terminal Functions

FUNCTION/TERMINAL	DESCRIPTION
+Vin_2	Power input pin (+)
+Vin_S	Sensing pin for measuring voltage
-Vin_2	Power input pin (-)
-Vin_S	Sensing pin for measuring voltage
+Vout	Power output pin (+)
+Vout_S	Sensing pin for measuring voltage
-Vout	Power output pin (-) & Adapter input voltage (-)
-Vout_S	Sensing pin for measuring voltage

Connector Function

Table 3. Connector Function

CONNECTOR NAME	DESCRIPTION
CN25	PoE input. Connect to PSE power and data source.
CN42	Ethernet data passthrough. Connect to downstream Ethernet device.

Power Input and Output Descriptions

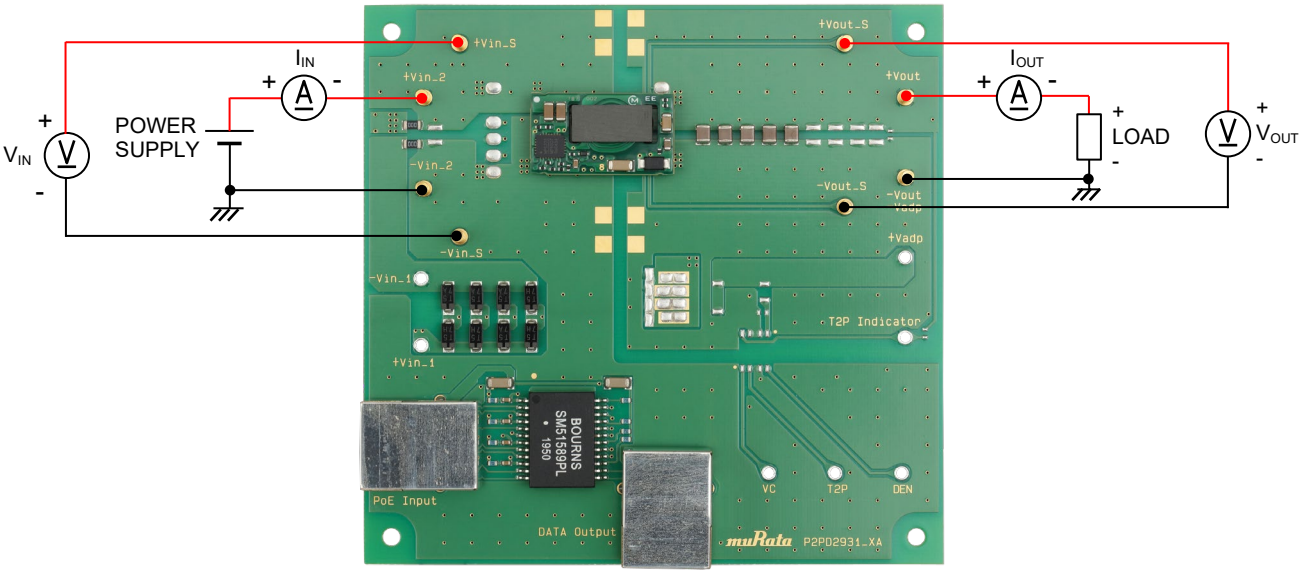
The VIN power terminals are used to connect to the input supply, and the V_{OUT} power terminals are used to connect to the load.

Caution: Do not use these sense(+) and sense(-) terminals as the input supply or output load connection points. The PCB traces connecting to these sense terminals are not designed to support high currents. High currents may cause damage to the PCB traces.

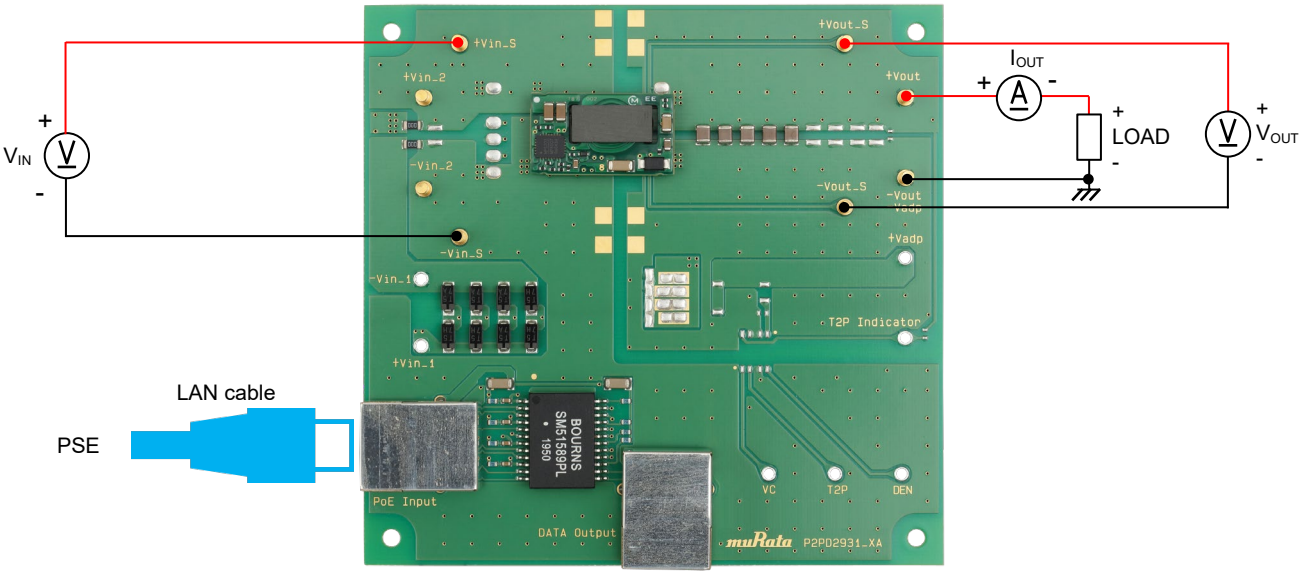
Test Point Descriptions

The sense(+) and sense(-) test points for both V_{IN} and V_{OUT}, located near the power terminal are intended to be used as voltage monitoring points where voltmeters can be connected to measure V_{IN} and V_{OUT}.

EVM Connection



(a) When directly supplying 48 volts to the input pin



(b) When supplying power with PSE through the LAN cable

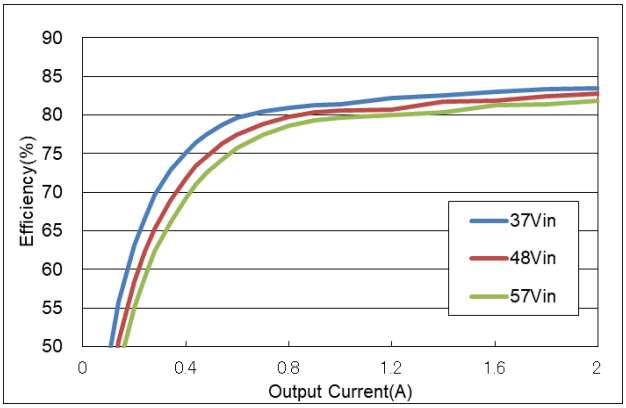
Figure 3. EVM Connection

Start-Up Procedure

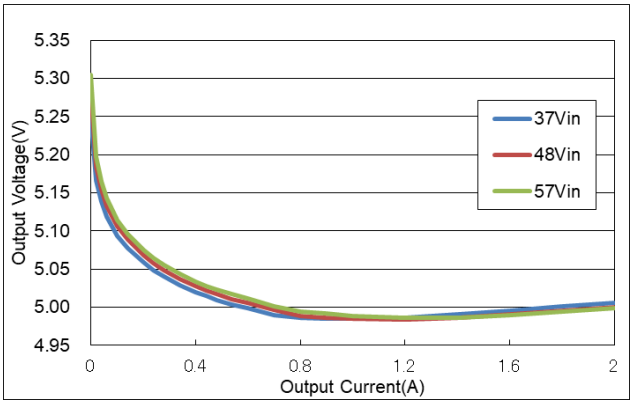
1. Set the power supply current limit to at least 0.5A. Connect the power supply to V_{IN} power(+) and V_{IN} power(-), or connect PSE to CN25 with LAN cable.
2. Connect one electronic load with more than 2A capacity between V_{OUT} power(+) and V_{OUT} power(-).
3. Set input voltage to 48V and turn the power supply on or turn the PSE on. It doesn't matter whether the load is on or off.
4. Measure the output voltages. V_{OUT} should be around 5 volts.

Performance Data

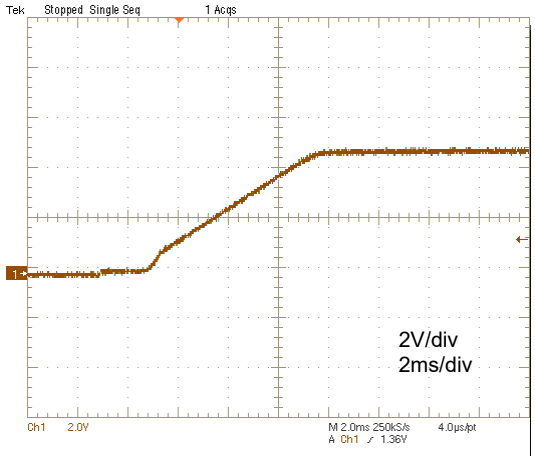
The following data demonstrates the MYBSP00502ABFS-EVM performance.
The test results show the typical performance of the evaluation board with a power supply.



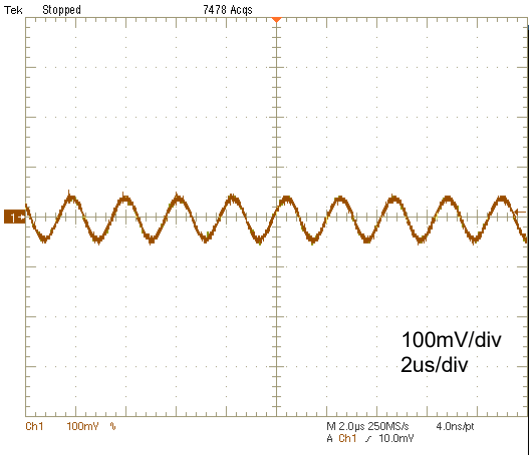
Efficiency (Ta = 25degC)



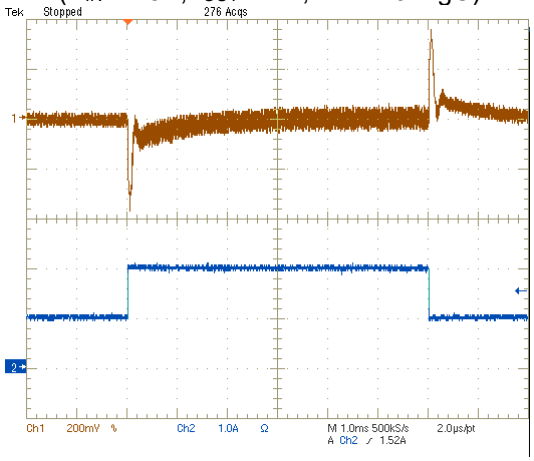
Load Regulation (Ta = 25degC)



V_{OUT} Start-up
(V_{IN} = 48V, I_{OUT} = 2A, Ta = 25degC)



Output Ripple and Noise
(V_{IN} = 48V, I_{OUT} = 2A, Ta = 25degC)



Transient Response
(V_{IN} = 48V, I_{OUT} = 1 to 2A, Ta = 25degC)
Ch1 = V_{OUT}, 200mV/div, Ch2 = I_{OUT}, 1A/div

Bill of Materials (BOM)

Table 4. EVM Bill of Materials

REFERENCE	QTY	VALUE	DESCRIPTION	SIZE	PART NUMBER	MANUFACTURER
MYBSP00502ABFS, MYBSP00502ABFT and MYBSP00502ABFU						
CN25, CN42	2		Connector, RJ45 single port		SS-6488S-A-NF	STEWART CONNECTOR
T3	1		Pulse transformer		SM51589PEL	Bourns
D11, D12, D13, D14, D15, D16, D17, D18	8		Diode		B1100-13-F	DIODES
R1, R23, R24, R25, R29, R30, R31, R32	8		Chip resistor, 75ohm 0.1W		RK73B1JTTD 750J	KOA
C12, C20	2		Ceramic capacitor, 1500pF/ 2kV		GR442QR73D 152KW01L	Murata
C16, C17, C18, C19	4		Ceramic capacitor, 0.01uF / 100V		GRM188R72A 103KA01D	Murata
R17, R18	2		Chip resistor, 0ohm, 3216		RK73Z2BTTD	KOA
C13, C15	2		Ceramic capacitor, 47uF / 6.3V		GRM31CC80J 476KE18	Murata
C11, C21, C22, C23, C24, C25, C26, C27, C28, D19, PC6, PC8, R20, R21, R27,			No mount			

EVM Schematic

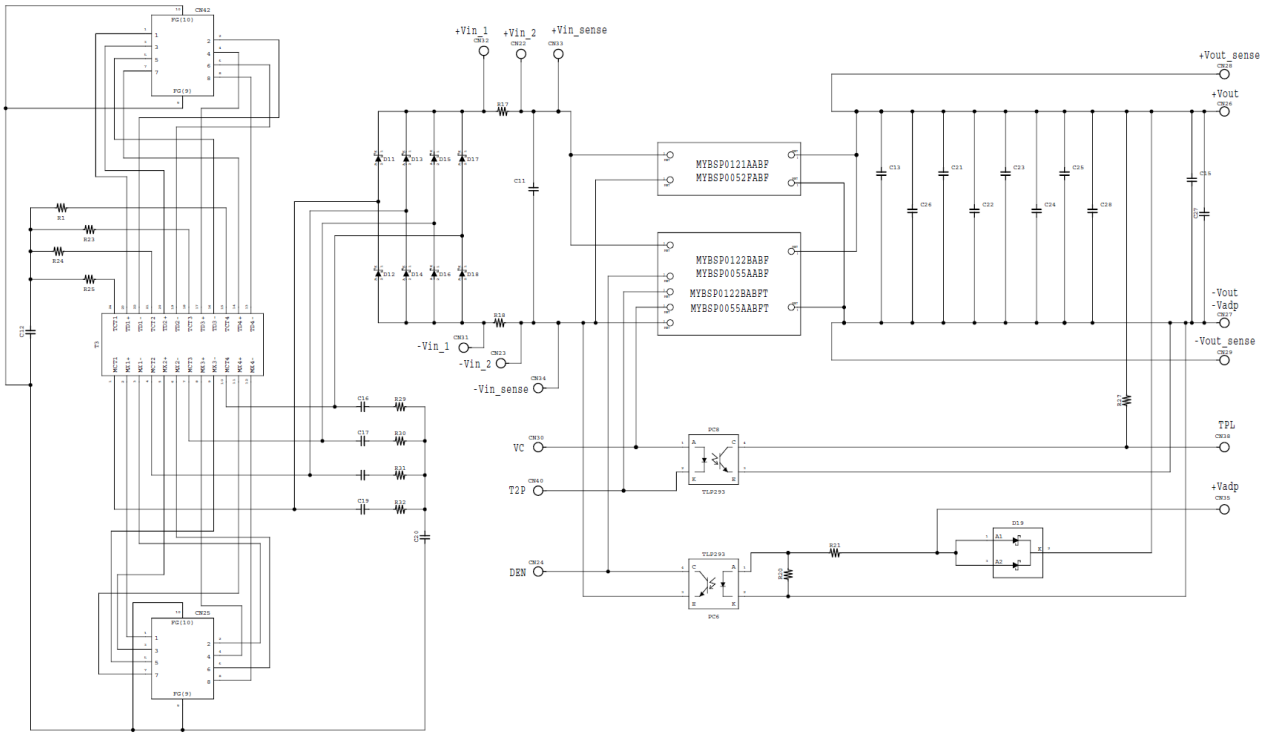
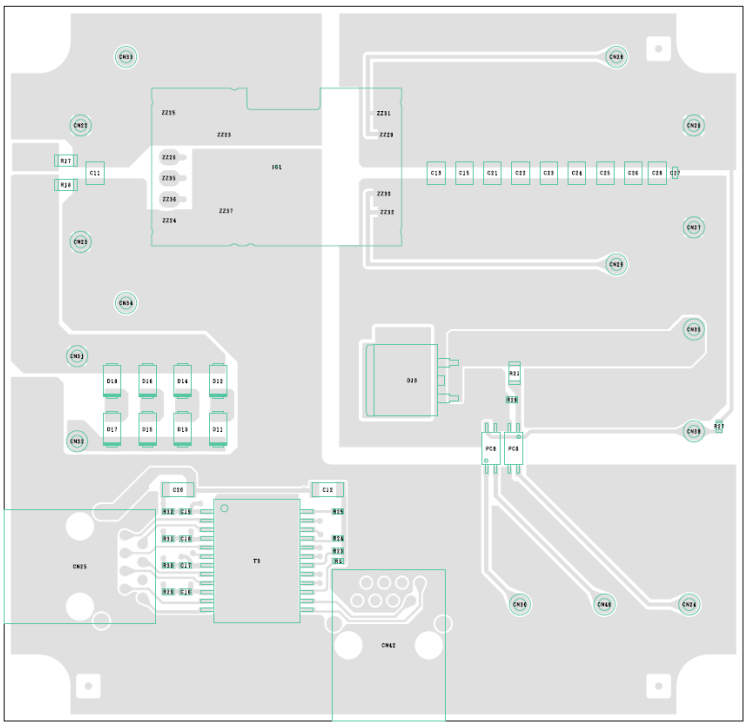
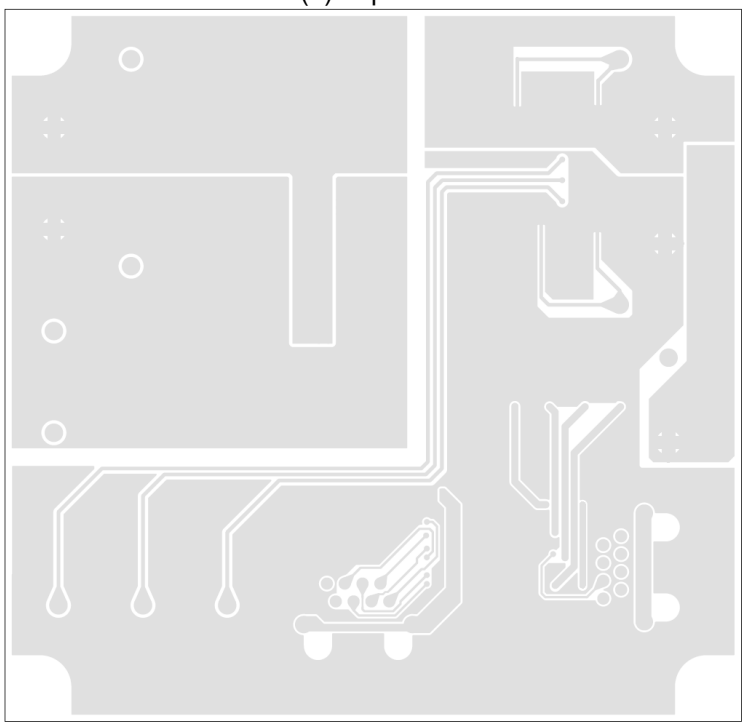


Figure 4. EVM Schematic

EVM PCB Layout



(a) Top view



(b) Bottom view

Figure 5. Evaluation Board Layout

Notices

⚠ CAUTION

1. EVMs are not finished products. Murata delivers EVM for use in a research and development evaluation purpose only.
2. Please make sure that your product has been evaluated and confirmed to your specifications when our product is used in your product.
3. All the items and parameters in this approval sheet for product specification are based on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product in a manner deviating from such agreement.
4. If you have any concerns about materials other than those listed in the RoHS directive, please contact us.
5. Be sure to provide an appropriate fail-safe functionality in your product to prevent secondary damage that could be caused by the abnormal function or failure of our product.
6. Do not allow our product to be exposed to excess moisture under any circumstances.

Contact form

https://www.murata.com/contactform?Product=Power%20Device

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