UltraBK™ MYTNCxxx-EVM

Document Category: User guide

Ultra-thin High Efficiency DCDC converter module

ABSTRACT

This user's guide provides information on the correct usage of the test board and an explanation of the test points on the board. The test board operates over the entire input voltage range of the MYTNCxxx series. The minimum output capacitors are included on the board.

Table of Contents

Description

MYTNCxxx-EVM is a hardware platform that allows customers to evaluate the performance of the step-down DC-DC converter MYTNCxxx series.

MYTNCxxx is an Ultra-thin High Efficiency integrated power solution which combines 4A or 6A DC-DC converter with components. This converter can be programmed via the I2C serial bus interface to configure certain system parameters. Those programmable parameters are output voltage and soft start time. See the section of "Register Map" and "Detailed Register Description" in the datasheet for program to register. This total power solution can be used in a system without loop compensation and with just two external components in the minimum case.

This totally integrated module provides up to 90.0% efficiency despite small and thin 10.5mm x 9.5mm x 2.1mm LGA package. Murata's easy-to-use module pinout design allows simple power layout and maximizing efficiency by minimize routing parasitic resistance.

The EVM uses a recommended PCB layout that minimizes output ripple and noise.

Detailed application information for MYTNCxxx is available in the datasheet.

Figure 1. Evaluation Board Overview

Performance Summary

Table 1. Performance Summary

Parameter	Symbol	Conditions	Min	Typ	Max	Units
INPUT SUPPLY						
Input Voltage Range	VIN		6	12	14.4	V
OUTPUT						
Output Voltage	VOUT	Full load condition, DC	0.7	-	1.8	V
Output Current	IOUT	MYTNC1R86RELA2RA	0	-	6	A
		MYTNC1R84RELA2RA	0	-	4	A
Efficiency	EFF	VIN=12V, VOUT=1.8V, IOUT=6A	-	87.5	-	%
		VIN=12V, VOUT=1.8V, IOUT=4A	-	90.0	-	%
Switching Frequency	FSW		-	1000	-	kHz

Quick Start Guide

Figure 2 highlights the user interface items associated with the EVM.

The VIN power terminals are used for connection to the host input supply and the VOUT power terminals are used for connection to the load. Sense (+/-) test points for both VIN and VOUT, located near the power terminals are intended to be used as voltage monitoring points where voltmeters can be connected to measure VIN and VOUT. **Do not use sense (+/-) and S+ terminals as the input supply or output load connection points.**

The other terminals are made available to test the features of the device. The external voltage must be applied to the POK terminal for the PGOOD signal using (POK).

The switch can be controlled ON/OFF.

Evaluation Overview

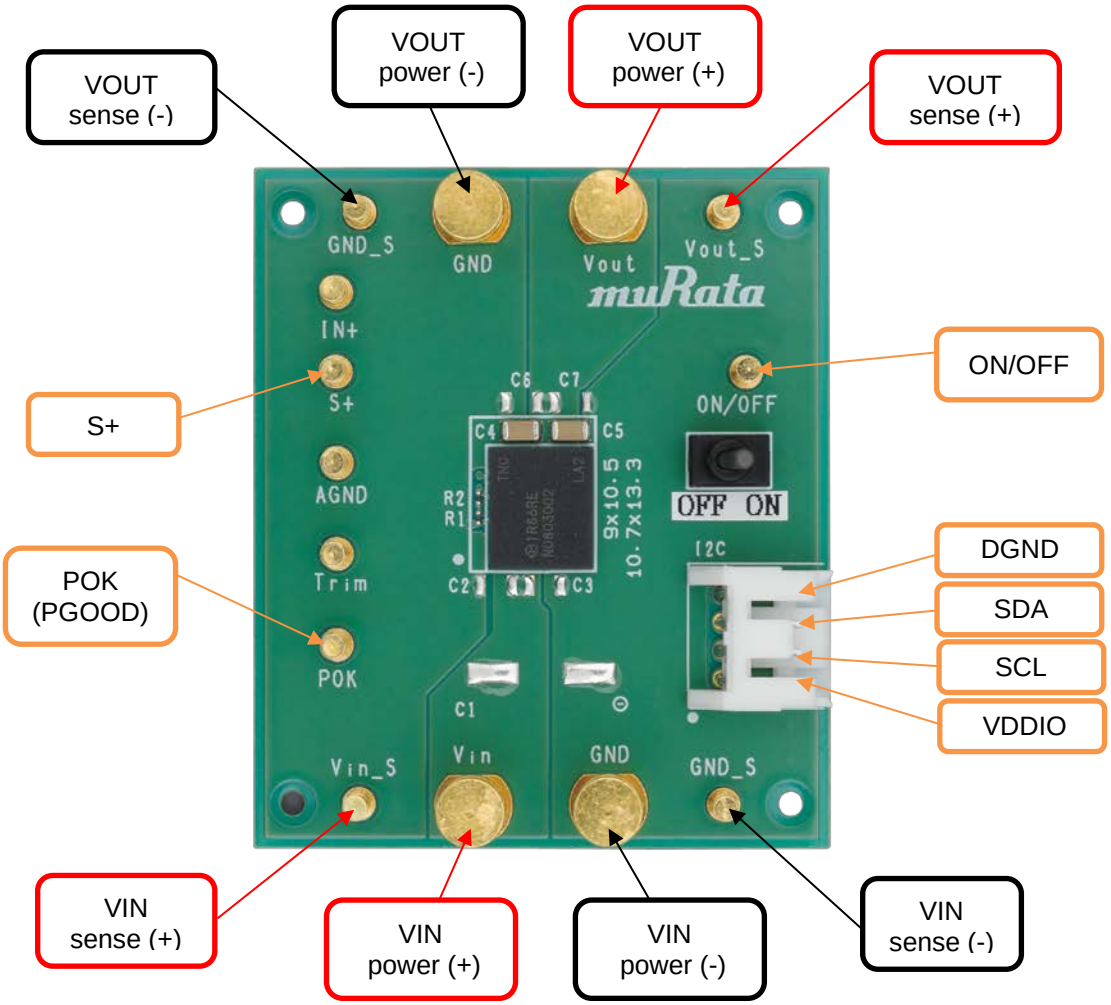

Figure 2. EVM Overview

Terminal Functions

Table 2. Terminal Functions

Function/Terminal	Description
VIN power (+/-)	Power input pin and input ground pin
VOUT power (+/-)	Power output pin and output ground pin
VIN sense (+/-)	Sensing pin for measuring the input voltage
VOUT sense (+/-)	Sensing pin for measuring the output voltage
ON/OFF	ON/OFF pin If this is high level, the module operates. (This pin is pulled up internally.)
POK	Power good pin The function is operated by internal open-drain FET. The external voltage must be applied to the terminal for the PGOOD signal using.
S+	Output voltage sensing pin (It is not a problem to be left open about this pin because it is connected to VOUT internally with 10ohm resistor.)
I2C	I2C pin (VDDIO, SDA, SCL, DGND) This converter can be programmed via the I2C serial bus interface to configure certain system parameters. VOUT can be set and VOUT, IOUT and IC temperature can be monitored.
IN+, Trim, AGND	Not used

Power Input and Output Descriptions

The VIN power terminals are used to connect to the input supply, and the VOUT power terminals are used to connect to the load.

Caution: Do not use sense (+/-) and S+ 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 VIN and VOUT, located near the power terminal are intended to be used as voltage monitoring points where voltmeters can be connected to measure VIN and VOUT.

EVM Connection

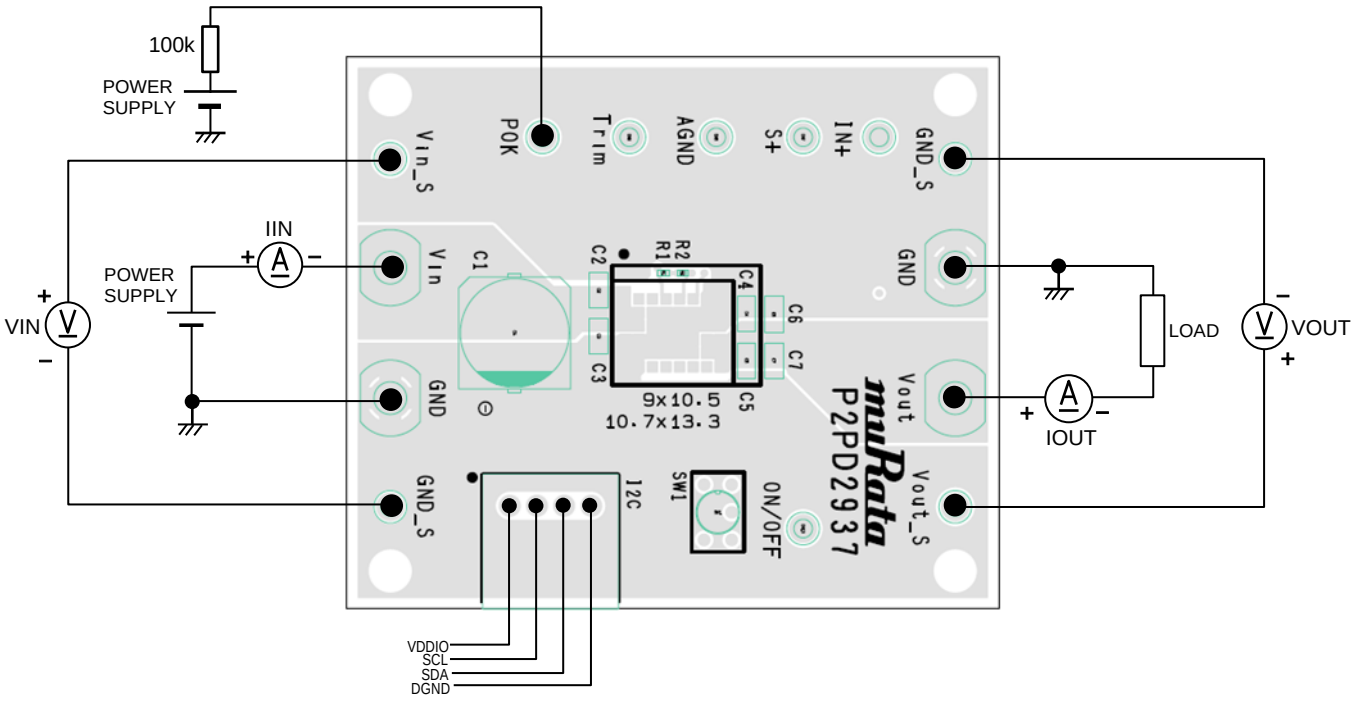

Figure 3. EVM Connection

Start-Up Procedure

1. Set the power supply current limit to at least 2A. Connect the power supply to VIN power (+) and VIN power (-).

2. (If you need PGOOD signal) Set the power supply current limit to at least 1mA.
   Connect the power supply to POK and VIN power (-).
   Insert a resistor about 100kohm between power supply and POK to prevent inrush current.

3. Connect one electronic load with more than 4A or 6A capacity between VOUT power (+) and VOUT power (-).

4. (If you need PGOOD signal) Set POK voltage to 5.5V or less and turn it on.

5. Set input voltage to 12V, then note that the input voltage start-up slew rate.
   Please refer the datasheet for detail.
   For example, from 0.1V/ms to 150V/ms is suitable slew rate for initial 1.0V output setting.

6. Apply VDDIO voltage between 1.08V and 5.5V.
   If you do not apply VDDIO voltage, the converter doesn't work properly and VOUT should be 0.6V.

7. Turn the power supply on. It doesn't matter whether the load is on or off.
   You can also use ON/OFF switch to start-up, initial setting is ON.

8. Measure the output voltages. VOUT should be 0.7V with initial setting.

EVM Startup

1. Apply VDDIO voltage between 1.08V and 5.5V.
2. Apply input voltage, then output startup. The initial setting voltage is 0.7V.
3. Startup the GUI and program if you need.
4. Apply load current after output startup.

Detailed setup information is available in the "Murata _ MYTNC- _ I2C program Manual."

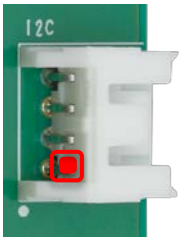

Figure 4. VDDIO Position

Performance Data

Figure 5 through Figure 10 demonstrate the MYTNC1R86RELA2RA-EVM performance. The following test results show the typical performance of the evaluation board.

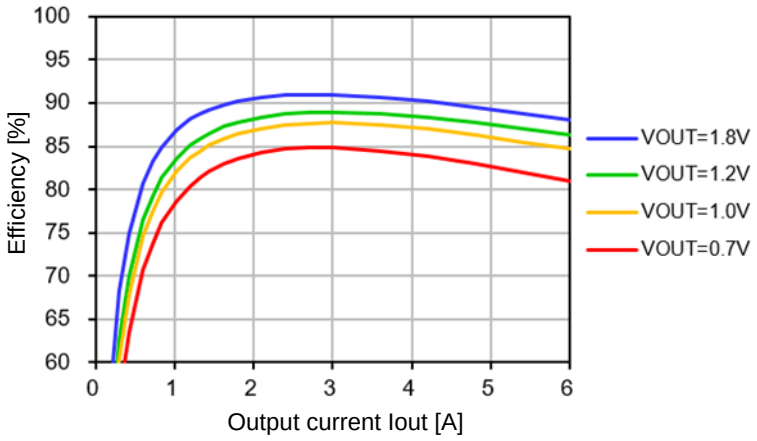

Figure 5. Efficiency (VIN=12V, Ta=25degC)

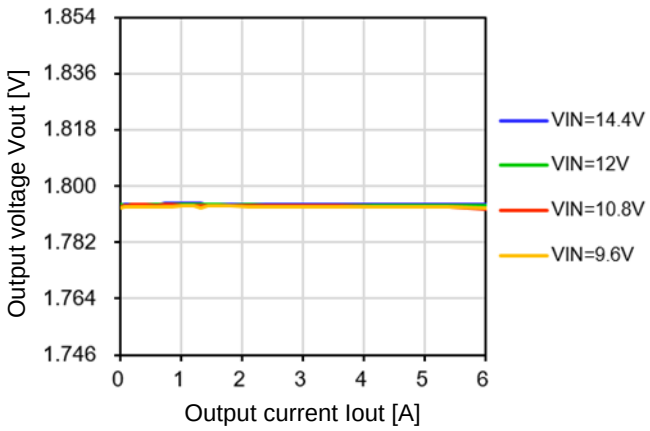

Figure 7. Load regulation (VOUT=1.8V)

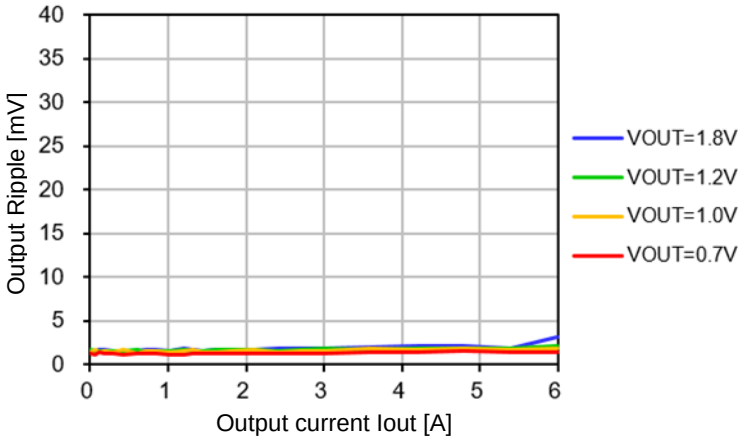

Figure 8. Output Ripple
(VIN=12V, COUT=200uF, ScopeBW=20MHz, Ta=25degC)

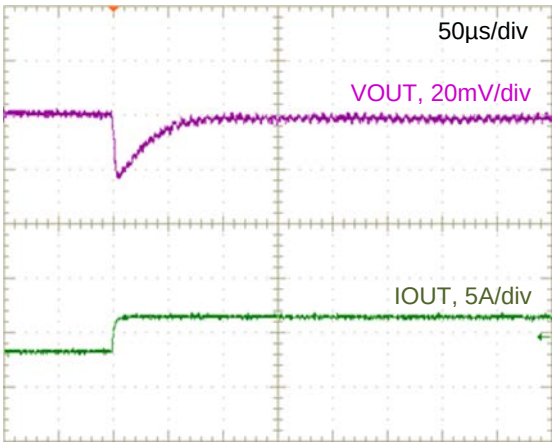

Figure 9. Load transient response Waveform

(VIN=12V, VOUT=1.8V, COUT=200uF, IOUT=3A to 6A (1.0A/us), Ta=25degC)

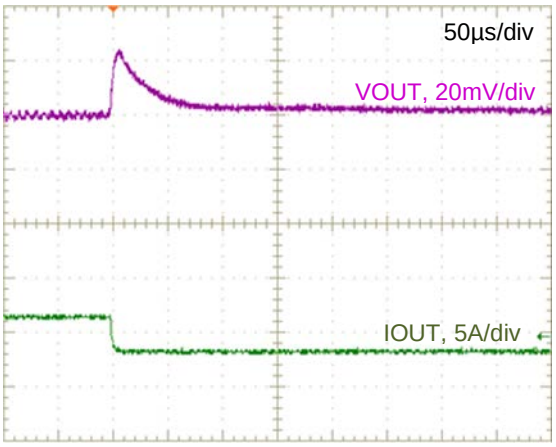

Figure 10. Load transient response Waveform (6A to 3A)

(VIN=12V, VOUT=1.8V, COUT=200uF, IOUT=6A to 3A (1.0A/us), Ta=25degC)

MYTNCxxx-EVM Bill of Materials (BOM)

Table 3. MYTNCxxx-EVM Bill of Materials

Reference	Qty	Value	Description	Size	Part Number	Manufacturer
C4, C5	2	100uF	Output capacitor 100uF, 4V, +/-20%, X7U	3216M	GRM31CE70G1 07MEA8	Murata
SW1	1		Mechanical switch		G-12AP	
I2C	1		4pin Connector		DF1BZ-4P- 2.5DSA	
	10		Sense and other function terminals		WT-3-2	
	4		Power terminals for VIN and VOUT		GT-2-1	
M1	1		Power module		MYTNCxxx	Murata

MYTNCxxx-EVM Schematic

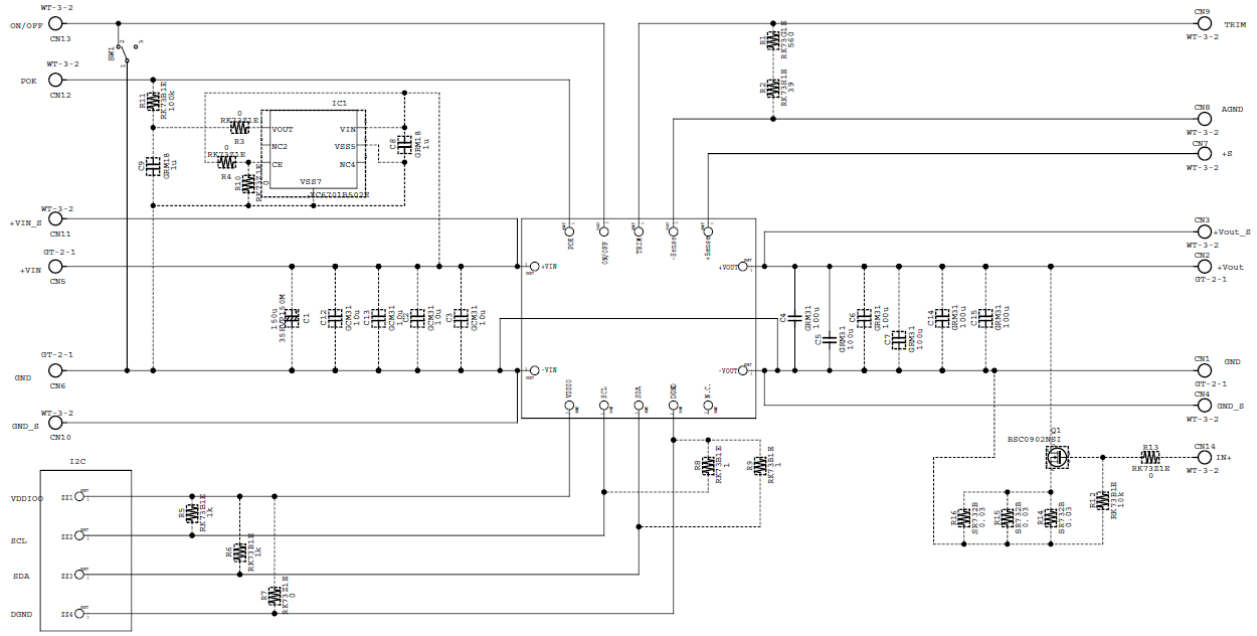

Figure 11. MYTNCxxx-EVM Schematic

EVM PCB Layout

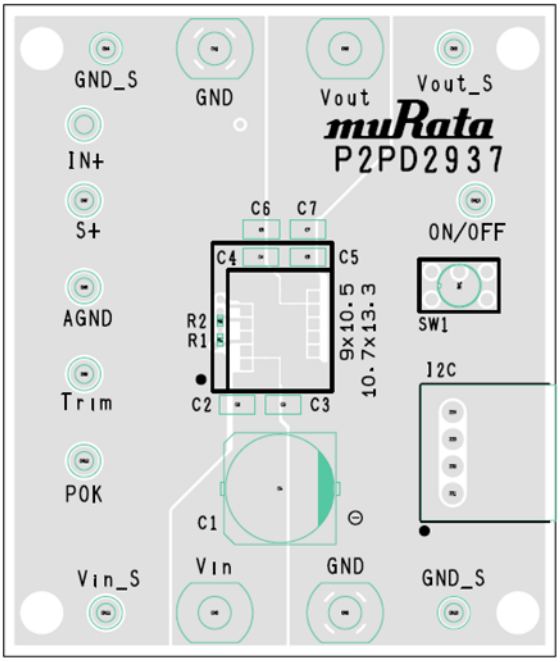

Figure 12. Evaluation Board Layout

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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