GENERAL DESCRIPTION

This user's guide describes the evaluation module (EVM) for the MAXIN MICRO MX26631DL eFuse in DFN package. The document provides EVM configuration information and test setup details for evaluating the MX26631DL device. The EVM schematic, board layout, and bill of materials (BOM) are also included.

The MX26631DL device is a 4.5 V to 40 V, 5A eFuse with overvoltage, undervoltage, short-circuit, current limit and reverse current blocking protection.

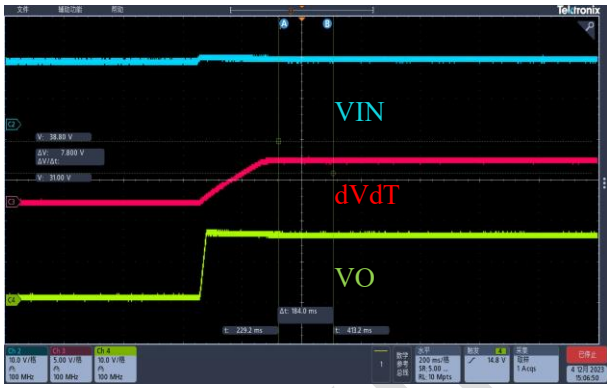
FEATURES

- ♦ 4.5V to 40V operating voltage (without TVS on Input)
- ♦ 0.6A to 5A programmable current limit
- ♦ Adjustable inrush current for large capacitive loads
- ♦ Auto-retry configuration
- ♦ UVLO configuration using onboard jumpers

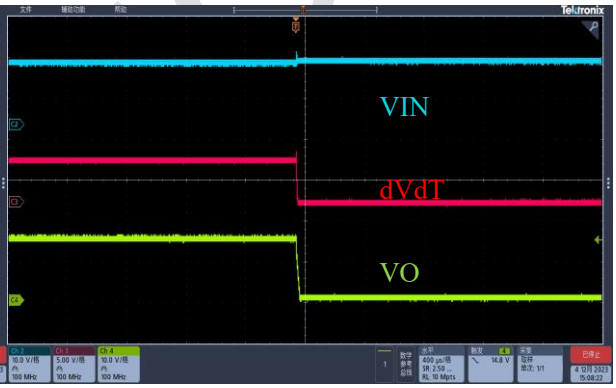
APPLYCATIONS

- ♦ Factory automation and control
- ♦ Motor drives
- ♦ Active antenna Systems and Remote Radio Units.
- ♦ Industrial printers
- ♦ Electronic circuit breakers

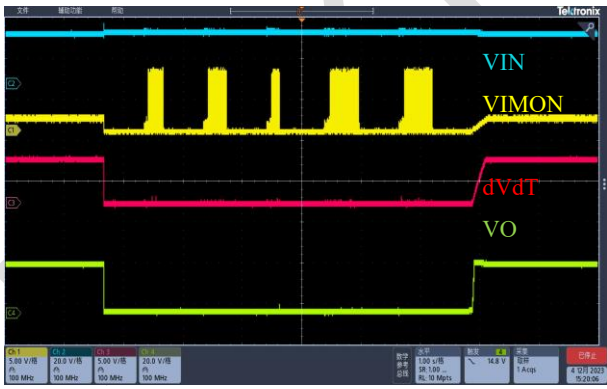
Test Procedure and Results



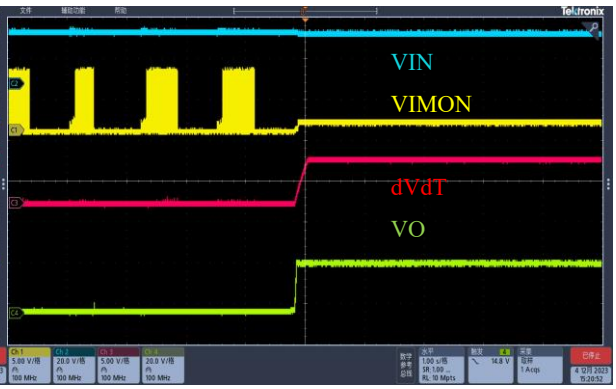
UVLO Performance during V_{IN_SYS} from 15V to 16V



UVLO Performance during V_{IN_SYS} from 16V to 15V

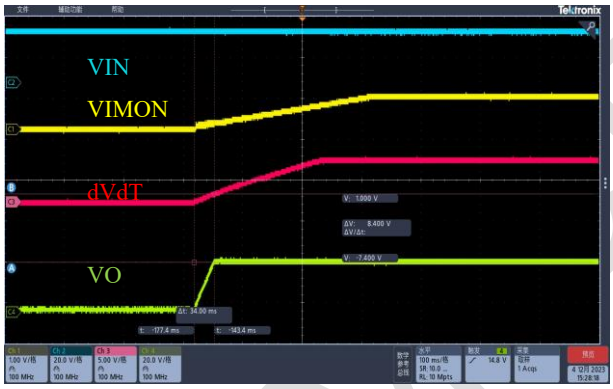


Overcurrent Performance during Load Step from 5.2A to 5.4A



Overcurrent Performance during Load Step from 5.4A to 4.4A

Output Short Protect Performance　　Output Short Protect Release



Turn on control with SHDN

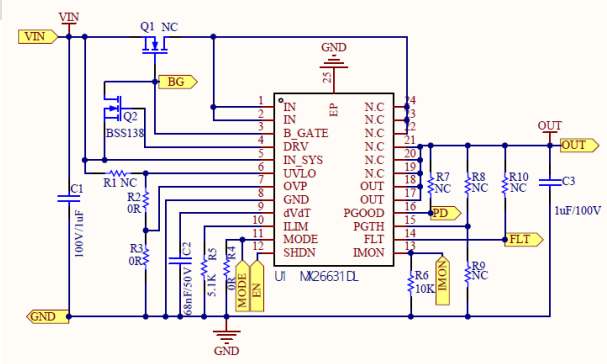
Schematic and Board Layout

The following figure shows the Schematic of the EVM board.

R1, R2, and R3 between pins IN_SYS, UVLO, and OVP are used to set the undervoltage and overvoltage points. The threshold voltages for both V_{UVLOR} and V_{OVPR} are 1.2V. The undervoltage and overvoltage points can be calculated using the following formula.

$$V_{OVPR} = R_3 \cdot V_{OV}/(R_1 + R_2 + R_3)$$

$$V_{UVLOR} = (R_2 + R_3) \cdot V_{UV}/(R_1 + R_2 + R_3)$$



R5 is used to set the overcurrent point. Set the current limit using the following formula:

$I_{OL} = \frac{42}{R_5} \times 10^3(A)$ When 25K≤R_5≤75K;

$I_{OL} = \frac{40}{R_5} \times 10^3(A)$ When 10K<R_5<25K;

$I_{OL} = \frac{37}{R_5} \times 10^3 (A)$ When 5.1K≤R_5≤10K.

Where I_{OL} is the over current protection point and R_5 is the resistor of ILMT pin, and the unit is Ω.

C2 is used to set the soft start time. Set soft start time using the following formula:

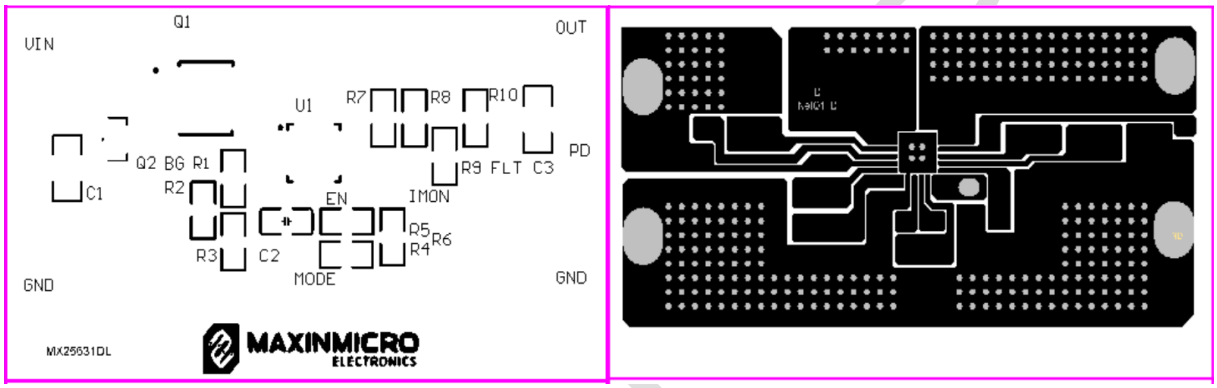
$$t_{SST} = 20.8 * 10^3 * V_{IN} * C_{dVdT}$$

R6 is used to detect the output voltage. The maximum voltage $V_{IMONmax}$ for monitoring the current is limited to 4V. This puts a limitation on maximum value of R_6 resistor and is determined by the following formula. Where, GAINIMON is the gain factor I_{IMON}: I_{OUT} = 27.9 μA/A (Typical), I_{OUT} is the load current.

$$V_{IMOM} = (I_{OUT} * GAIN_{IMON}) * R_6$$

Q1 is the reverse shutdown MOS and Q2 acts as a pull-down gate switch for Q1. If the Reverse Current Protection function is required, the MOS transistor Q1 needs to be added.

The following figures show the component placement and PCB layout for the top of the EVM board.



Bill of Materials

The following table lists the bill of materials for the MX26631DL-DEMO.

serial number	Comment	Designator	Footprint	Quantity	Manufacturer
1	1uF/100V	C1, C3	C-1206	2	YAGEO
2	68nF/50V	C2	C-0805	1	YAGEO
3	NC	Q1	MOS-DFN5*6	1	
4	BSS138	Q2	MOS-SOT23	1	扬杰
5	NC	R1, R7, R8, R9, R10	R-0805	5	
6	0R	R2, R3, R4	R-0805	3	YAGEO
7	5.1K	R5	R-0805	1	YAGEO
8	10K	R6	R-0805	1	YAGEO
9	MX22631DL	U1	QFN-24_L4.0-W4.0	1	MAXIN MICRO

Restrictions on Product Use

◆ MAXIN micro is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing MAXIN products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such MAXIN products could cause loss of human life, bodily injury or damage to property.

◆ In developing your designs, please ensure that MAXIN products are used within specified operating ranges as set forth in the most recent MAXIN products specifications.

◆ The information contained herein is subject to change without notice.

Version update record:

V10 The original version (preliminary)