

# XCL226B0K1H2 Evaluation Board User Manual

**0.5A Inductor Built-in Step-down “micro DC/DC” Converter**

## **CAUTION**

### **ENGINEERING EVALUATION PURPOSES ONLY**

This evaluation board is made for the purpose of the product evaluation. It is strictly prohibited to use this evaluation board for any other purpose.

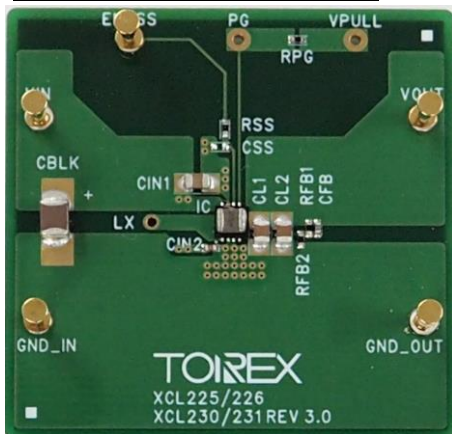
Torex Semiconductor does not guarantee that all samples will perform in exactly the same way and we recommend that you always consult our product data sheets for the minimum and maximum specifications.

It is also important that you evaluate all our products carefully before mass

## **XCL226B0K1H2 Evaluation Board**

*18V operation synchronous step-down DC/DC converter*

### **Evaluation Board Picture**



### **Evaluation Board SPEC**

						Ta=25°C
		CONDITON.	MIN.	TYP.	MAX.	UNIT
Vin	Input Voltage Range	-	3.0	-	18.0	V
Vout	Setting Output Voltage	-	-	5.0	-	V
Iout	Output Current	-	0.0	-	500.0	mA
fosc	Switching frequency	-	-	1.2	-	MHz

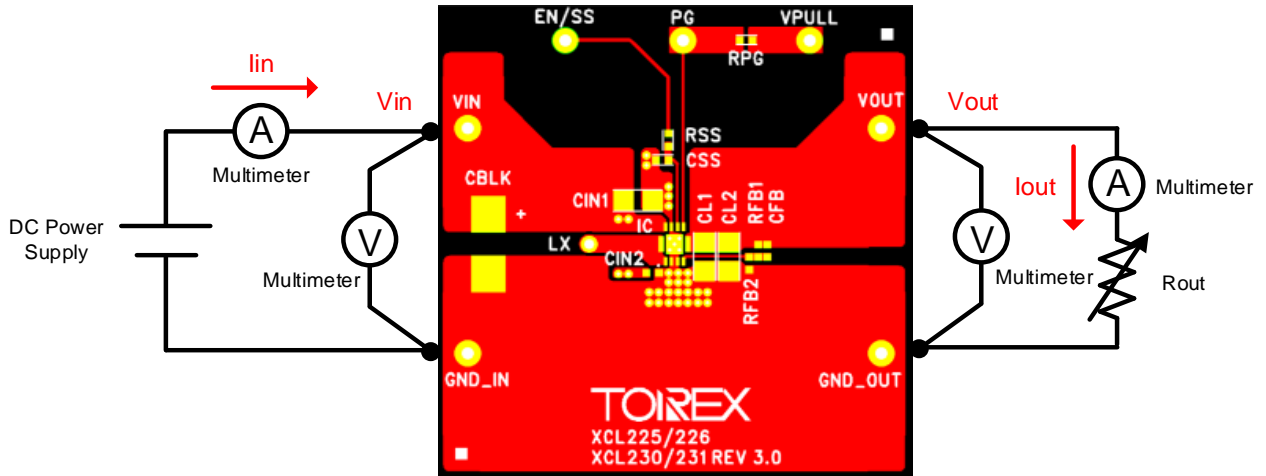
### **XCL225/XCL226 Series Features**

- Input Voltage Range ..... 3.6V ~ 18.0V
- Output Voltage Range ..... 1.0V ~ 15.0V
- Max Output Current ..... 500mA max.
- Switching frequency ..... 1.2MHz
- Max Duty Cycle ..... 100%
- Small Solution Size
  
- Low EMI Noise
- Built-in Inductor
- Sequence Control is possible. (Power Good and Soft Start functions)

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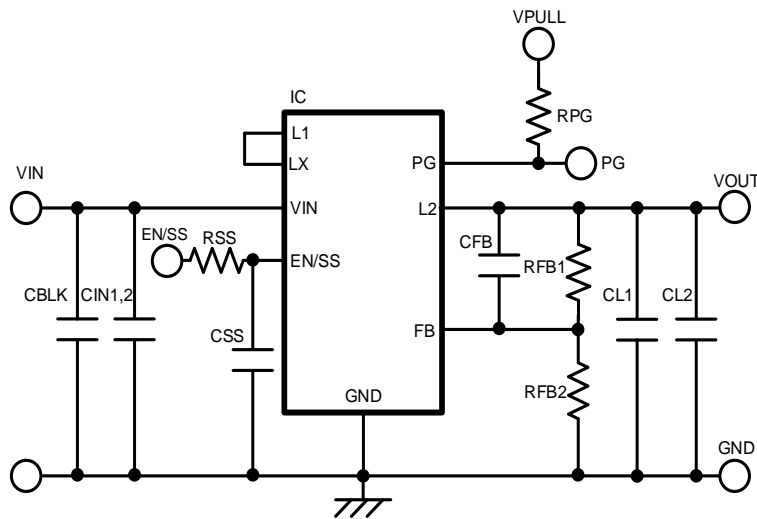
### Quick Start Procedure



## XCL226B0K1H2 Evaluation Board

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### Schematic



### BOM

#### Required Circuit Component

Item	Value	Description	Size [mm]	Part Number	Manufacture
IC	-	Step-Down micro DC/DC Converters	DFN3030-10B	XCL226B0K1H2	TOREX
CIN1	4.7uF	Ceramic cap., 50V	2012	UMK212BBJ475KG	Taiyo Yuden
CIN2	0.1uF	Ceramic cap., 50V	1608	CGA2B3X7R1H104K	TDK
CL1	10uF	Ceramic cap., 10V	2012	C2012X7R1A106K125AC	TDK
CL2	10uF	Ceramic cap., 10V	2012	C2012X7R1A106K125AC	TDK
RFB1	680kΩ	Resistor	1005	-	-
RFB2	120kΩ	Resistor	1005	-	-
CFB	18pF	Ceramic cap., 50V, CH	1005	-	-
RSS	Jumper	Resistor	-	-	-
CSS	-	-	-	-	-
RPG	100kΩ	Resistor	-	-	-

#### Additional Demo Board Circuit Components

Item	Value	Description	Size [mm]	Part Number	Manufacture
CBLK	10uF	Ceramic cap., 50V/10uF	3225	CGA6P3X7S1H106K	TDK

Vout Setting Table

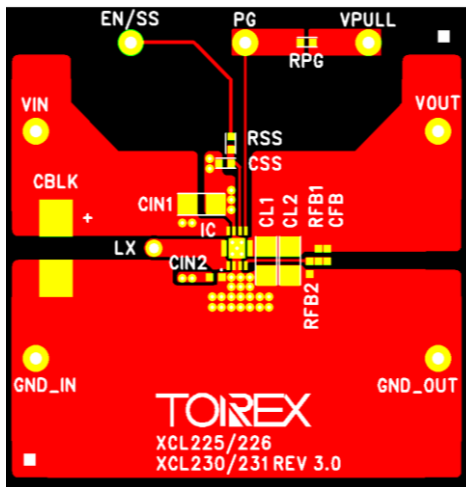
Vout Setting	RFB1	RFB2	CFB
3.0V	390kΩ	130kΩ	27pF
3.3V	510kΩ	150kΩ	22pF
5.0V	680kΩ	120kΩ	18pF
7.5V	270kΩ	30kΩ	39pF
10.0V	160kΩ	13kΩ	68pF
12.0V	360kΩ	24kΩ	33pF

**XCL226B0K1H2 Evaluation Board**

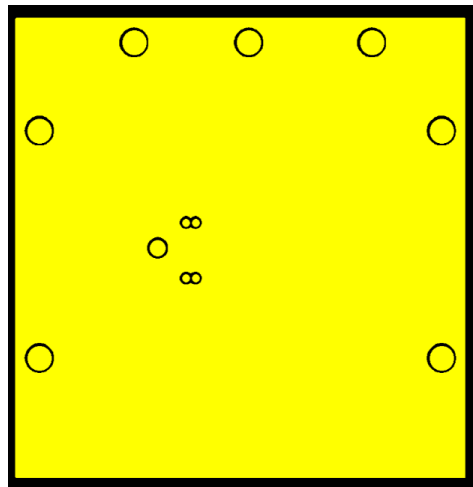
18V operation synchronous step-down DC/DC converter

**PCB Layout**

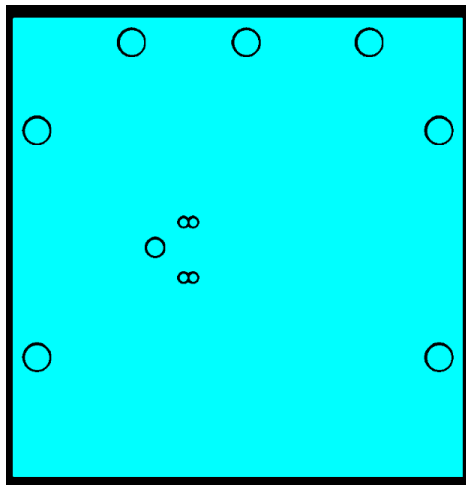
Layer 1



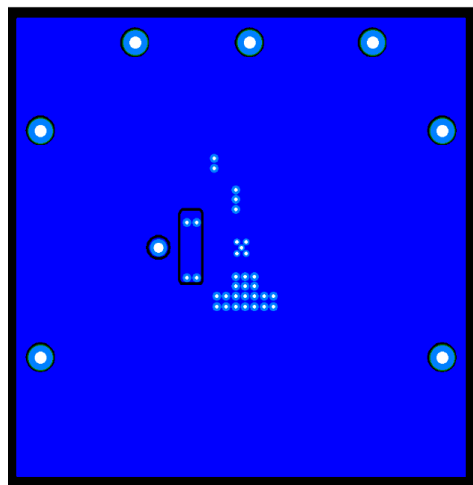
Layer 2



Layer 3



Layer 4

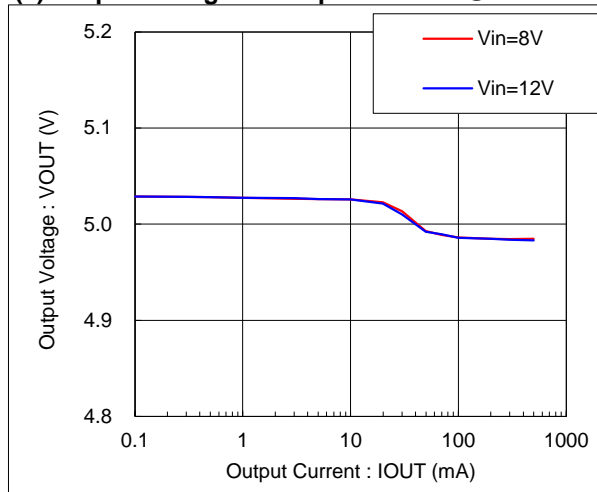


## **XCL226B0K1H2 Evaluation Board**

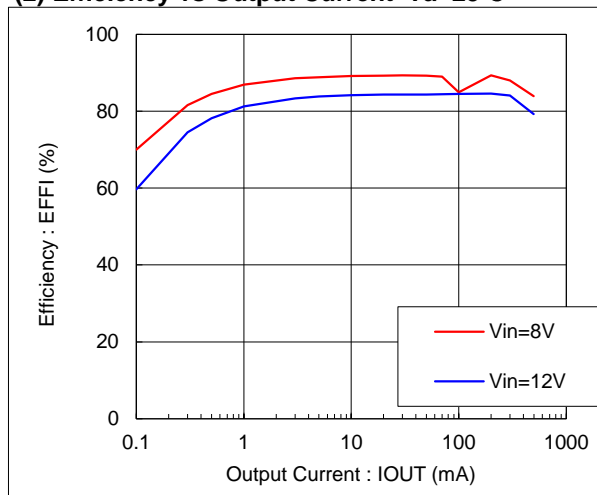
18V operation synchronous step-down DC/DC converter

### **Test Result**

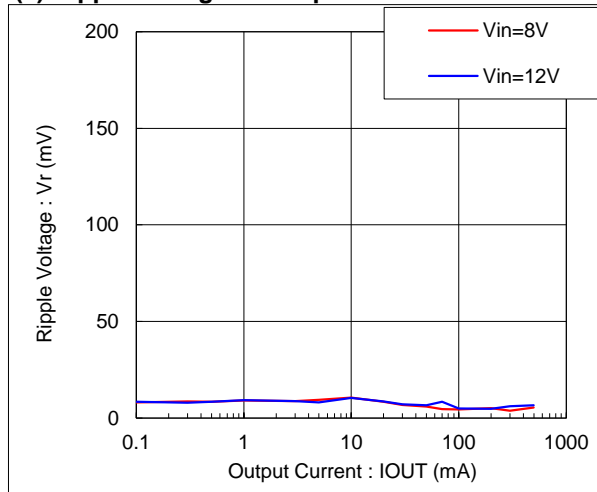
**(1) Output Voltage vs Output Current @Ta=25°C**



**(2) Efficiency vs Output Current Ta=25°C**



**(3) Ripple Voltage vs Output Current Ta=25°C**



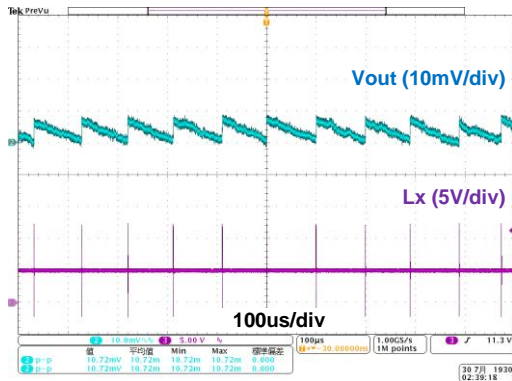
# XCL226B0K1H2 Evaluation Board

18V operation synchronous step-down DC/DC converter

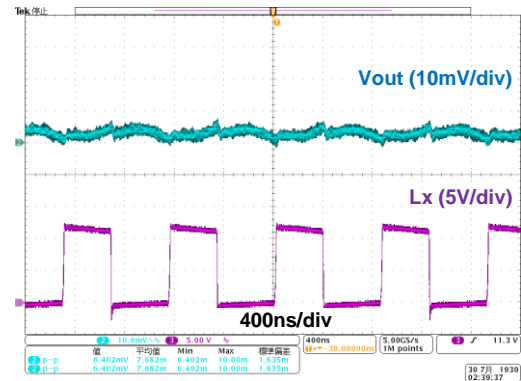
## Test Result

### (4) Output Voltage Waveform @ Ta=25°C

(4-1) Vin = 12V, Iout = 1mA



(4-2) Vin = 12V, Iout = 300mA



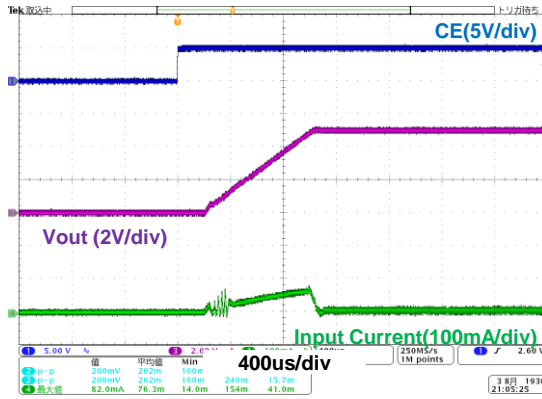
**XCL226B0K1H2 Evaluation Board**

18V operation synchronous step-down DC/DC converter

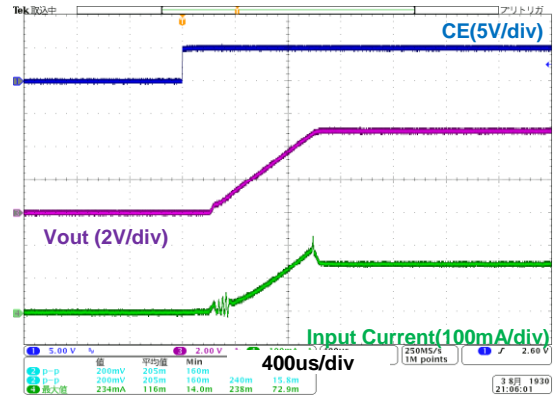
**Test Result**

**(5) Start-up Waveform @ Ta=25°C**

(5-1) Vin = 12V, Iout = 10mA



(5-2) Vin = 12V, Iout = 300mA





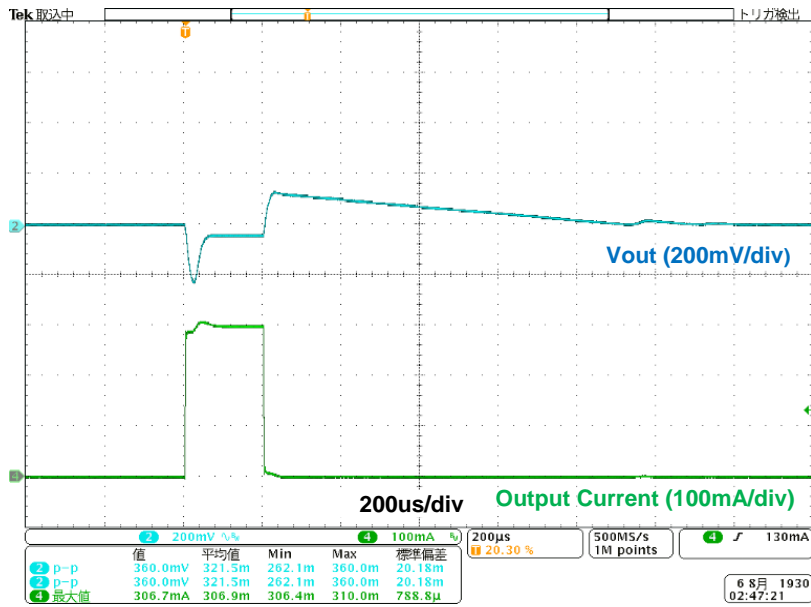
# XCL226B0K1H2 Evaluation Board

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## Test Result

(6) Load Transient Waveform @ Ta=25°C

(6-1) Vin = 12V, Iout = 1mA ⇄ 300mA



## **XCL226B0K1H2 Evaluation Board**

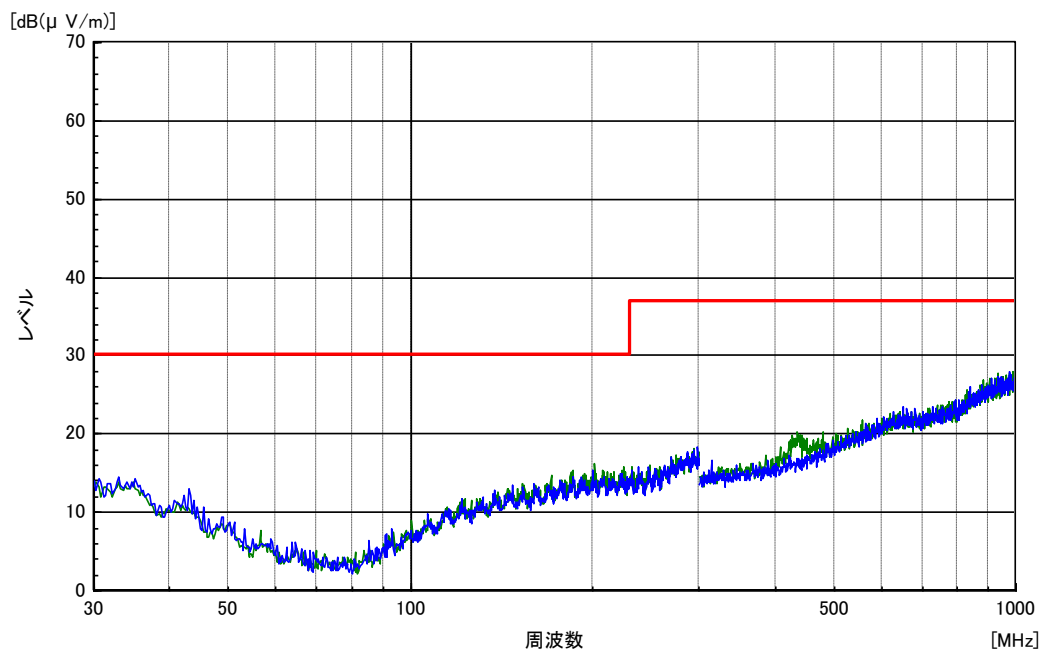
*18V operation synchronous step-down DC/DC converter*

### **Test Result**

#### **(7) Radiation EMI : VCCI 10m**

##### **Condition**

**IC : XCL225B0K1H2-G**  
**Vin : 12V**  
**Vout : 5V**  
**Iout : 300mA**

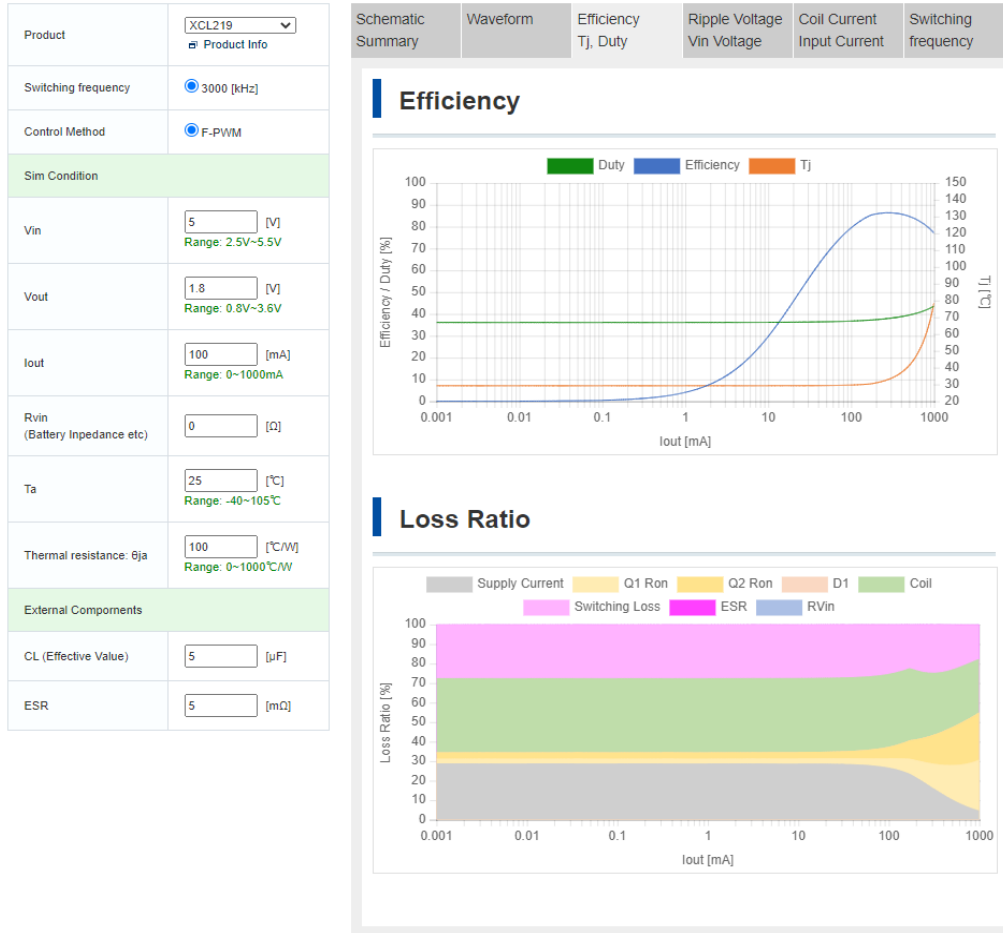


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## 【Appendix】 How to calculate DC/DC Converter or DC/DC Controller.

It can be calculated by the following "WEB DC/DC Simulation".



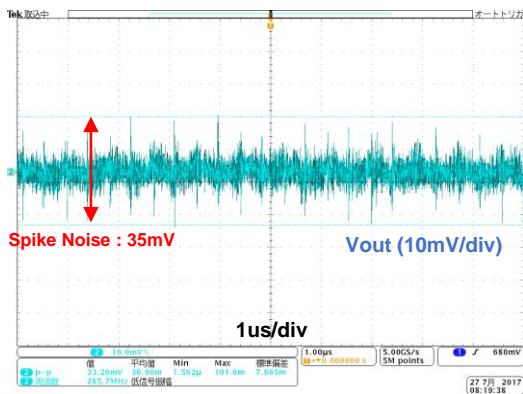
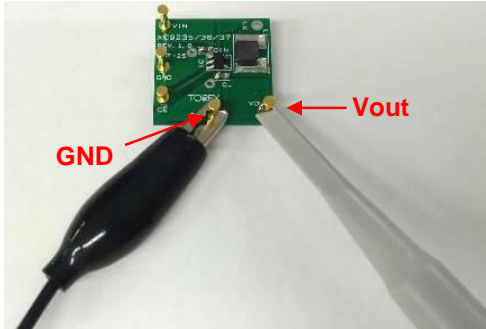
- 日本語 : <https://www.torex.co.jp/technical-support/dcdc-simulation/>
- English : <https://www.torexsemi.com/technical-support/dcdc-simulation/>
- 简体中文 : <https://www.torex.com.cn/technical-support/dcdc-simulation/>

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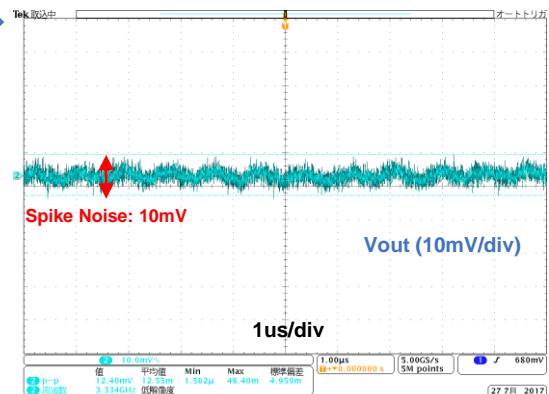
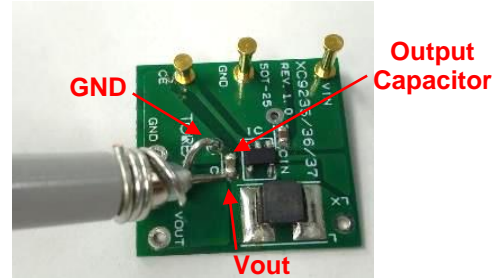
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**[Appendix] How to reduce the spike noise caused by measurement (Probing method with oscilloscope)**

**Probing method : Before improvement**



**Probing method : After**



\* Condition : XC9236, Vin=3.6V/Vout=1.8V/100mA

English : <https://www.torexsemi.com/technical-support/tips/reduction-spike-noise/>

日本語 : <https://www.torex.co.jp/technical-support/tips/reduction-spike-noise/>