XCL110C503KR-G Evaluation Board User Manual

Inductor Built-in Step-up “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 production and in case of any doubt, please contact your Torex representative.

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Evaluation Board Picture

Evaluation Board Specifications

Ta=25℃

		CONDITON	MIN.	TYP.	MAX.	UNIT
Vin	Input Voltage Range	-	0.65	-	6.0	V
Vout	Setting Output Voltage	-	-	5.0	-	V
Iout	Output Current	-	Refer to Graph 4			mA
fosc	Switching Frequency	-	-	3.0	-	MHz

XCL109/XCL110 Series Features

- Input Voltage Range ····· 0.65V ~ 6.0V
- Operation Start Voltage ····· 0.9V
- Output Voltage Range ····· 2.2V ~ 5.5V (step 0.1V)
- Switching frequency ····· 3.0MHz

- Selectable depending on the application
  - Load Disconnection (A/D/G/J)
  - Bypass(XCL105B/E/H/K)
  - OR Connection (XCL105C/F/M/L)

- Built-in Inductor / Small Solution Size
- Low EMI

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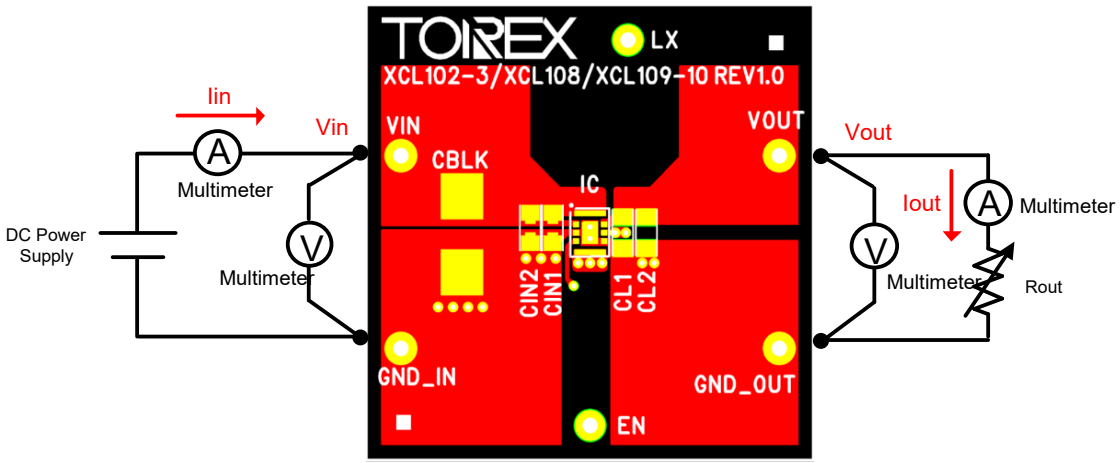
Quick Start Procedure



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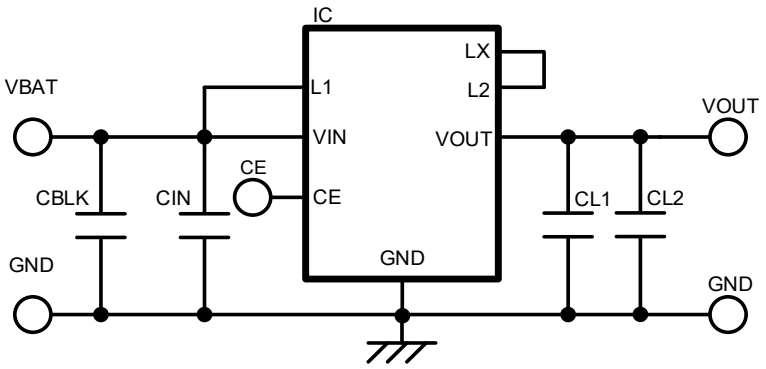
Schematic



BOM

Required Circuit Components

Item	Value	Description	Size [mm]	Part Number	Manufacturer
IC	-	Step-up micro DC/DC converter	CL-2025-02	XCL110C503KR-G	TOREX
CIN1	10uF	Ceramic cap., 10V/10uF	1608	GRM188D71A106MA	Murata
CIN2	-	-	-	-	-
CL1	10uF	Ceramic cap., 10V/10uF	1608	GRM188D71A106MA	Murata
CL2	10uF	Ceramic cap., 10V/10uF	1608	GRM188D71A106MA	Murata

Additional Demo Board Circuit Components

Item	Value	Description	Size [mm]	Part Number	Manufacturer
CBLK	-	-	-	-	-

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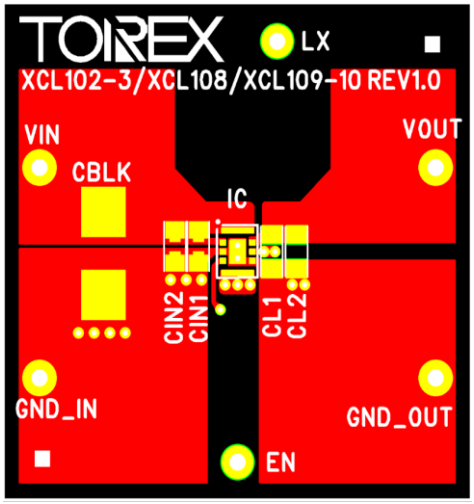
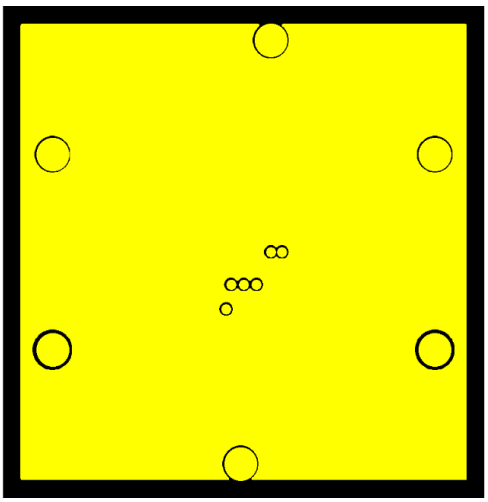
PCB Layout

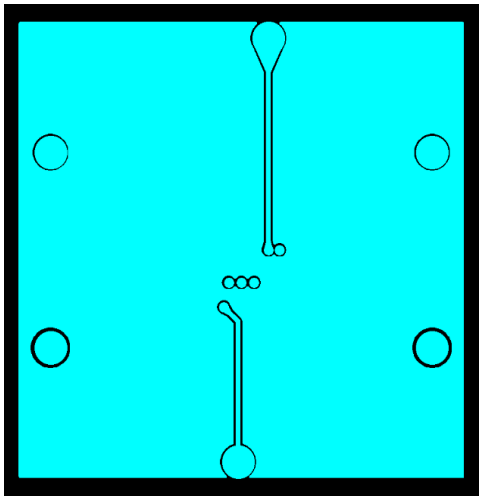
Layer 1



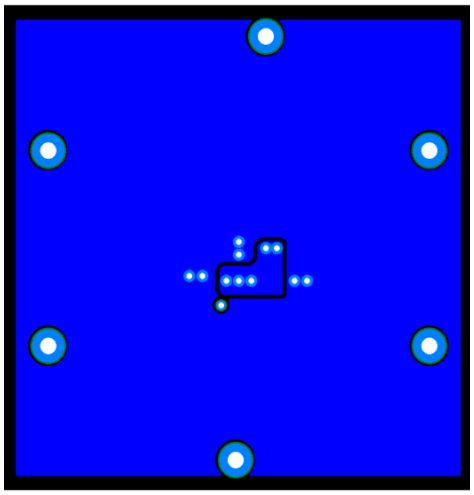
Layer 2



Layer 3



Layer 4



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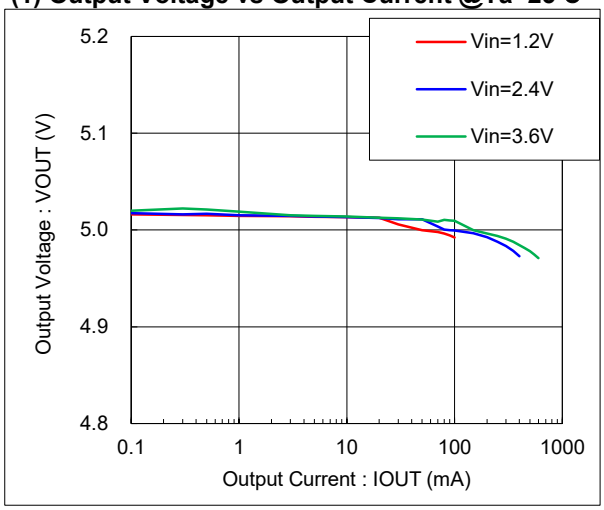
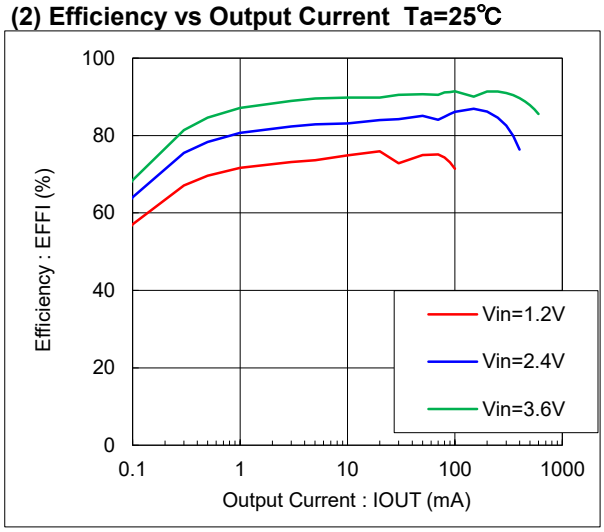
Test Result

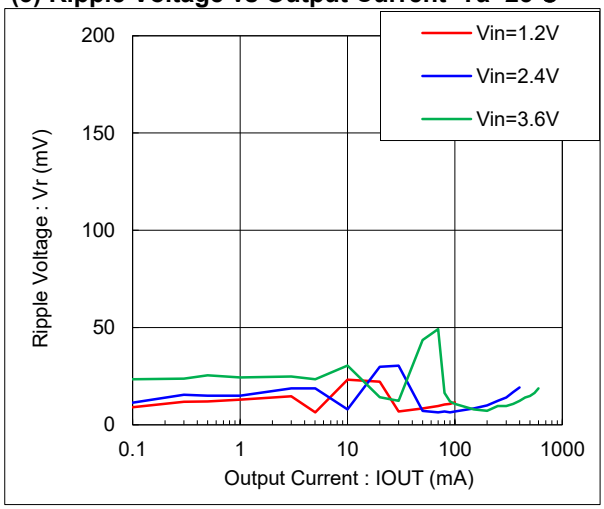
(1) Output Voltage vs Output Current @Ta=25℃



(2) Efficiency vs Output Current Ta=25℃



(3) Ripple Voltage vs Output Current Ta=25℃



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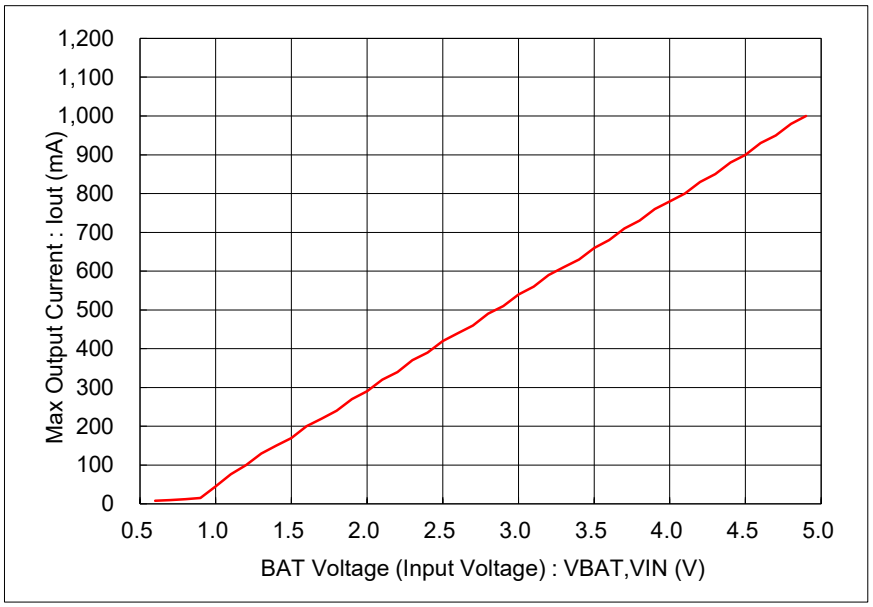
(4) Max Output Current vs BAT Voltage(Input Voltage) @ Ta=25°C



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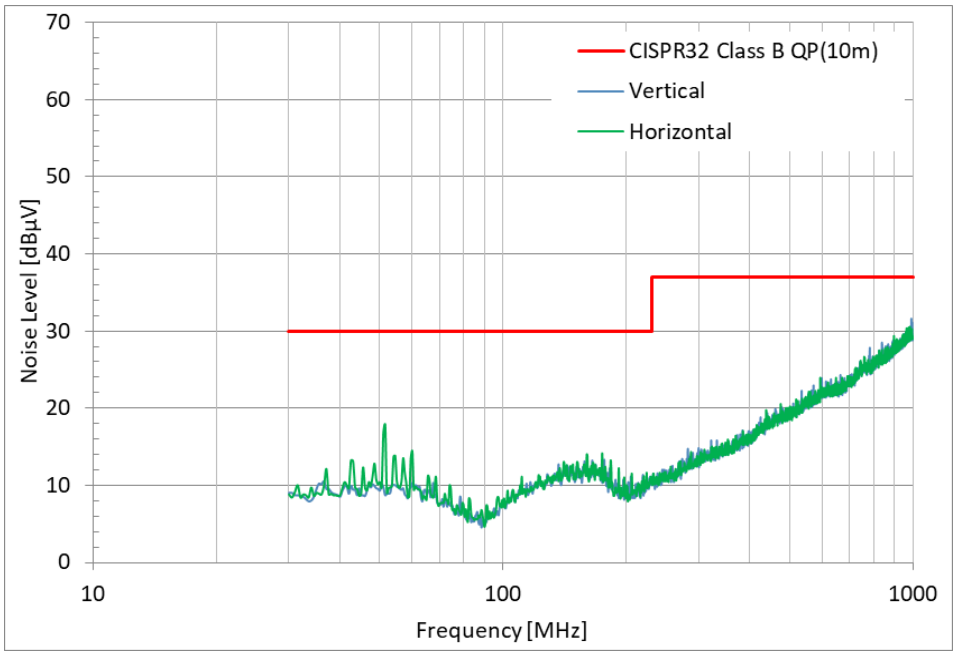
(5) Radiation EMI : CISPR-32/VCCI 10m Peak

Condition

IC : XCL110
Vin : 2.4V
Vout : 3.3V
Iout : 300mA



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

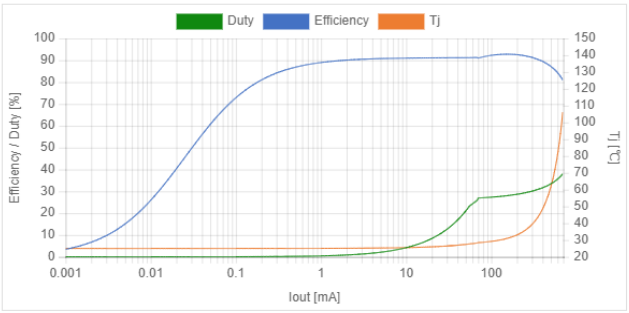
It can be calculated by the following "WEB DC/DC Simulation".

Product	XCL103 Product Info
Switching frequency	3000 [kHz]
Control Method	PWM/PFM
Sim Condition	
Vin	3.7 [V] Range: 0.65V~6V
Vout	5 [V] Range: 2.2V~5.5V
Iout	100 [mA] Range: 0mA~
Rvin (Battery Inpedance etc)	0 [Ω]
Ta	25 [℃] Range: -40~85℃
Thermal resistance: θja	100 [℃/W] Range: 0~1000℃/W
External Components	
CL (Effective Value)	5 [μF]
ESR	5 [mΩ]

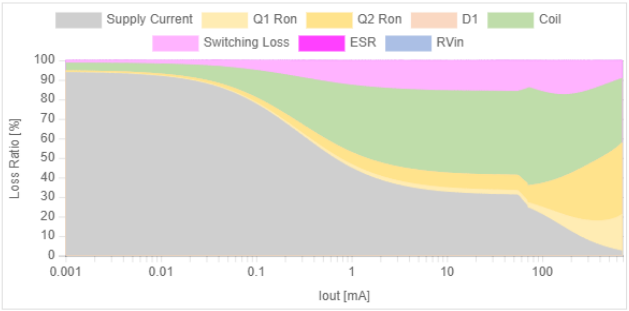
Schematic Summary | Waveform | Efficiency Tj, Duty | Ripple Voltage Vin Voltage | Coil Current Input Current | Switching frequency

本結果はICばらつきを考慮しないTYPでのデータです。
ICの製造ばらつきにより、本結果より最大出力電流が低下する場合があります。

Efficiency



Loss Ratio



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

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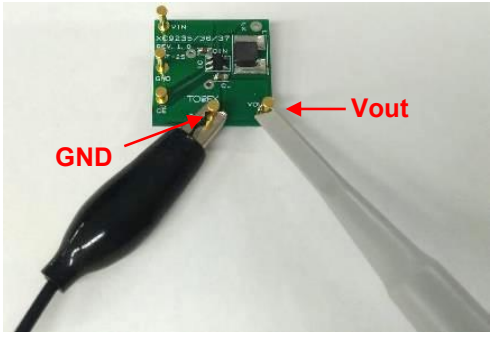
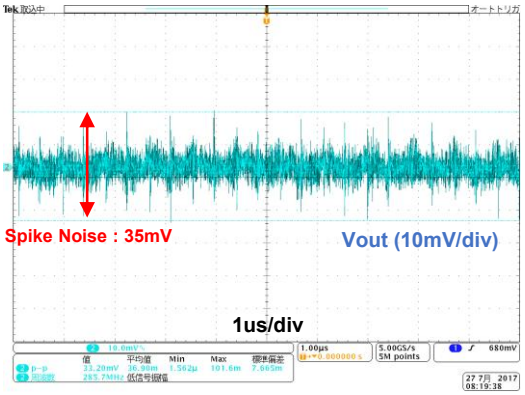
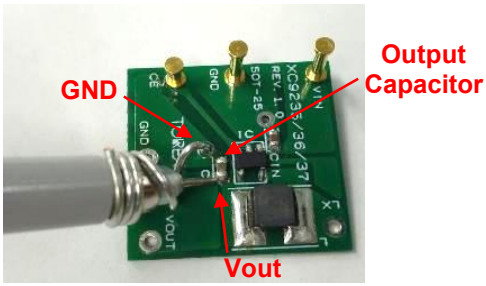
【Appendix】How to reduce the spike noise caused by measurement (Probing method with oscilloscope)

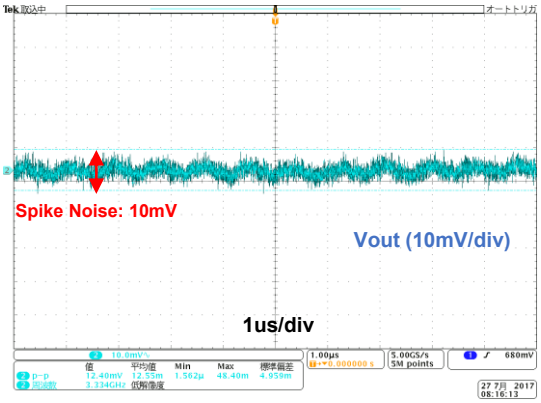
Probing method : Before improvement





Probing method : After improvement





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