

# XC9144B10CER-G Evaluation Board User Manual

**18V,  $I_{in}=1A$ , 1.2MHz PWM/PFM Synchronous Step-up 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.

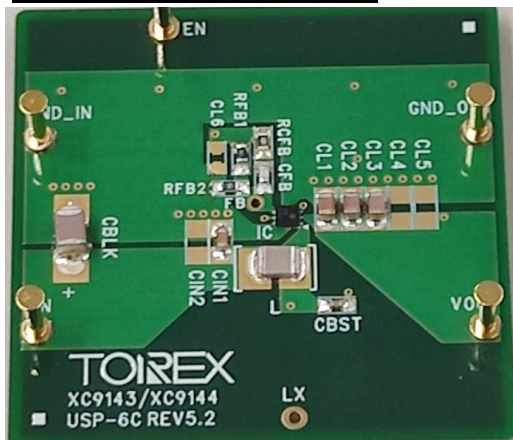
Torex Semiconductor does not guarantee that all samples will perform in exactly the same way and we recommend that you always consult our product data sheets for the minimum and maximum specifications.

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

## **XC9144B10CER-G Evaluation Board**

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### **Evaluation Board Picture**



### **Evaluation Board SPEC**

						Ta=25°C
		CONDITON.	MIN.	TYP.	MAX.	UNIT
Vin	Input Voltage Range	-	1.8	-	10.2	V
Vout	Setting Output Voltage	-	-	12.0	-	V
Iout	Output Current	-	Refer to Graph 7			mA
fosc	Switching frequency	-	-	1.2	-	MHz

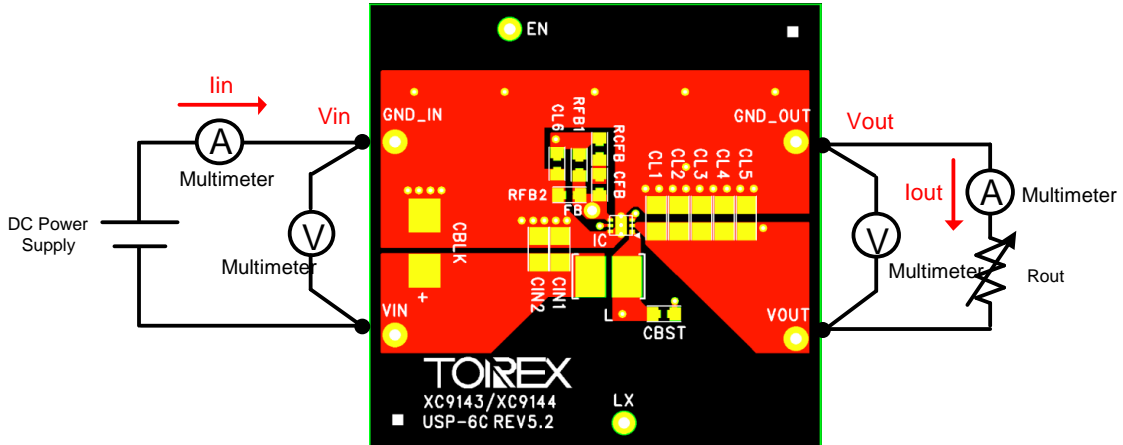
### **XC9143/XC9144 Series Features**

- Input Voltage Range ..... 1.3V ~ 16.0V
- Output Voltage Range ..... 7.0V ~ 18.0V
- Switching frequency ..... 1.2MHz or 3MHz
  
- Small Solution Size
- High Efficiency
- Low EMI Noise

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### Quick Start Procedure

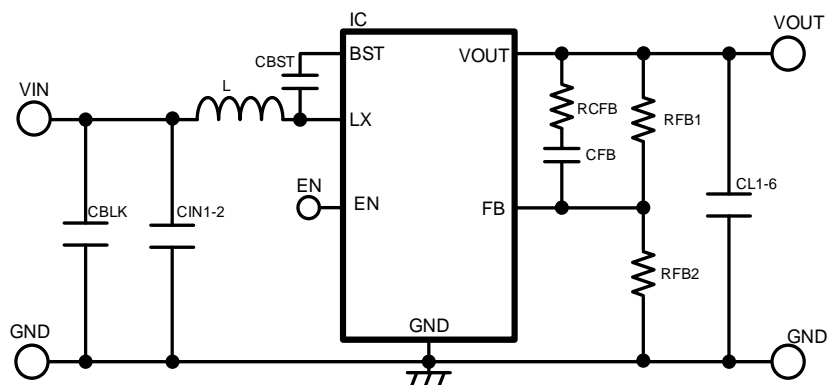


Active : EN="H" (1.6V~16.0V)  
 Stand-by : EN="L" (0V~0.3V)

## XC9144B10CER-G Evaluation Board

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### Schematic



### BOM

#### Required Circuit Component

Item	Value	Description	Size [mm]	Part Number	Manufacture
IC	-	18V, $I_{in}=1A$ , Synchronous Step-up	USP-6C	XC9144B10CER-G	TOREX
L	4.7uH	Inductor, $I_{sat}=2.3A$	3225	DFE322512F-4R7M=P2	Murata
CIN1	4.7uF	Ceramic cap., 25V	1608	GRM188R61E475	Murata
CIN2	-	-	-	-	-
CL1	22uF	Ceramic cap., 25V	2012	GRM21BR61E226ME	Murata
CL2	22uF	Ceramic cap., 25V	2012	GRM21BR61E226ME	Murata
CL3	-	-	-	-	-
CL4	-	-	-	-	-
CL5	-	-	-	-	-
CL6	-	-	-	-	-
CBST	0.1uF	Ceramic cap., 50V	1005	CGA2B3X7R1H104K	TDK
RCFB	100Ω	Resistor	1608	-	-
RFB1	825kΩ	Resistor	1608	1.0MΩ//4.7MΩ	-
RFB2	75kΩ	Resistor	1608	-	-
CFB	100pF	Ceramic cap., 25V or more	1608	-	-

#### 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

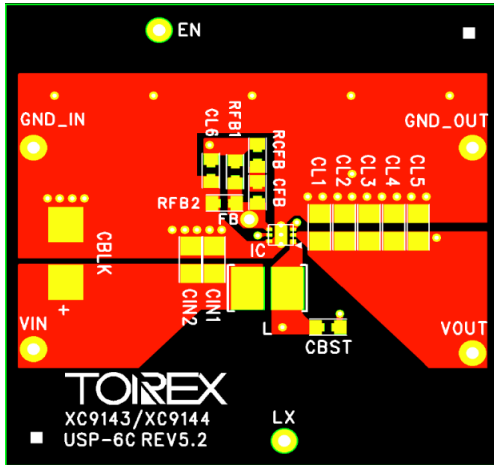
V <sub>OUTSET</sub>	R <sub>FB1</sub>	R <sub>FB2</sub>	R <sub>CFB</sub>	f <sub>OSC</sub> = 1.2MHz	
				C <sub>FB</sub>	f <sub>zfb</sub>
7.0V	900kΩ (1.2MΩ//3.6MΩ)	150kΩ	100Ω	91pF	1.9kHz
12.0V	825kΩ (1.0MΩ//4.7MΩ)	75kΩ	100Ω	100pF	1.9kHz
15.0V	955kΩ (1.3MΩ//3.6MΩ)	68kΩ	100Ω	82pF	2.0kHz
18.0V	955kΩ (1.3MΩ//3.6MΩ)	56kΩ	100Ω	82pF	2.0kHz

# **XC9144B10CER-G Evaluation Board**

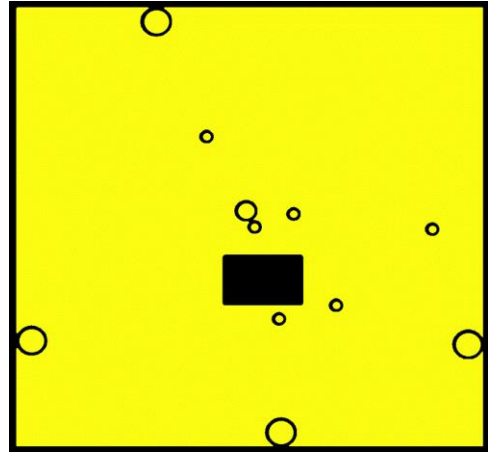
18V,  $I_{in}=1A$ , 1.2MHz PWM/PFM Synchronous Step-up Converter

## **PCB Layout**

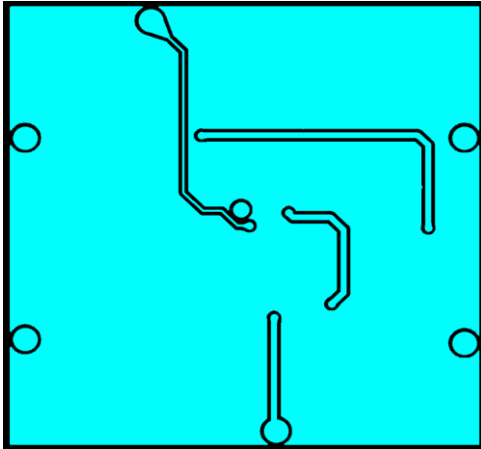
**Layer 1**



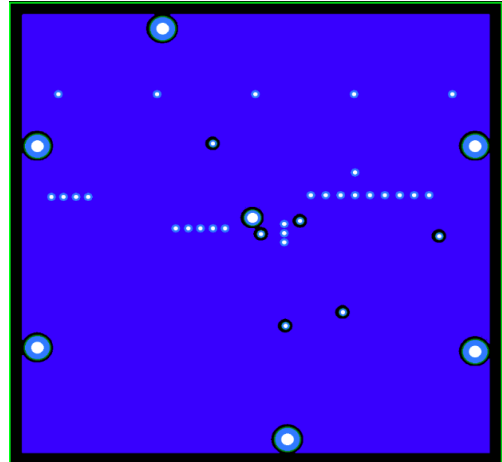
**Layer 2**



**Layer 3**



**Layer 4**

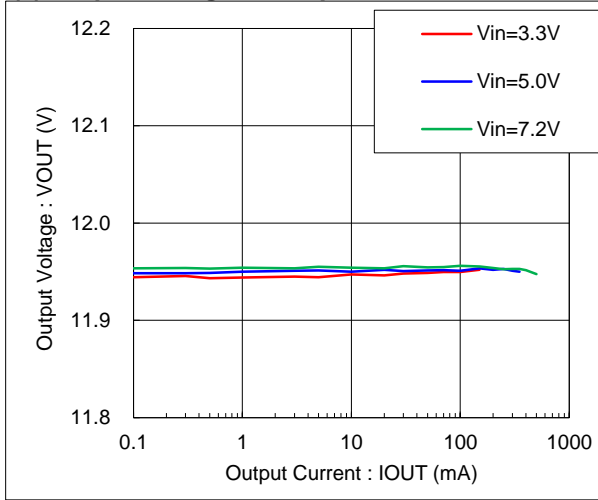


## **XC9144B10CER-G Evaluation Board**

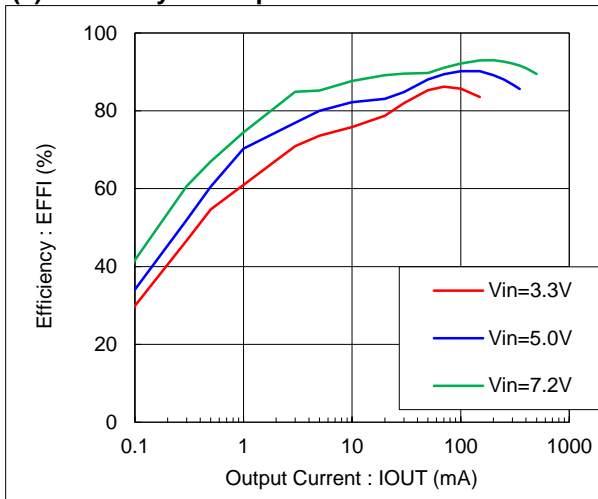
18V,  $I_{in}=1A$ , 1.2MHz PWM/PFM Synchronous Step-up Converter

### **Test Result**

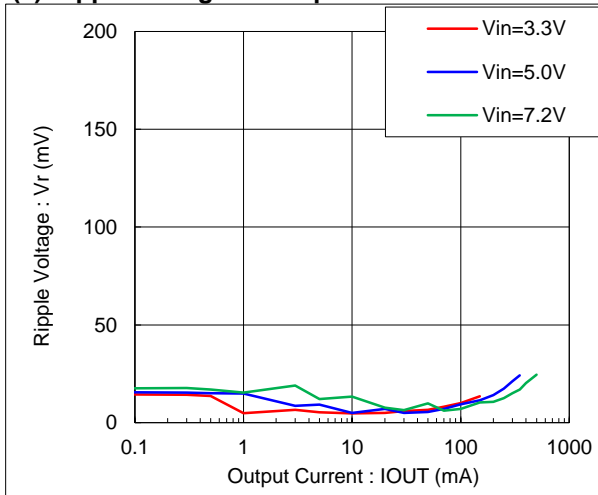
**(1) Output Voltage vs Output Current @Ta=25°C**



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



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



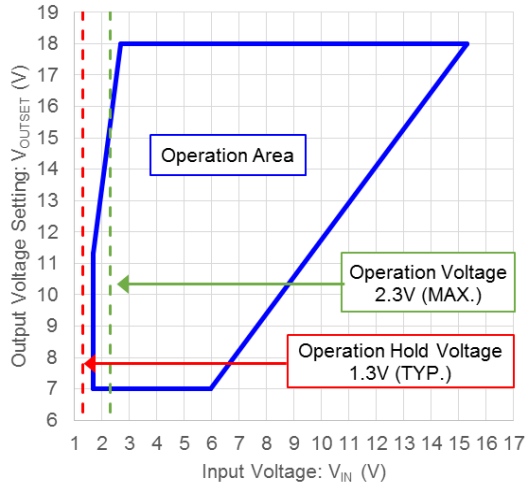
# XC9144B10CER-G Evaluation Board

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## (4) $V_{OUTSET} - V_{IN}$ Operation Area, Max output current - $V_{IN}$

### $V_{OUTSET} - V_{IN}$ Operation Area

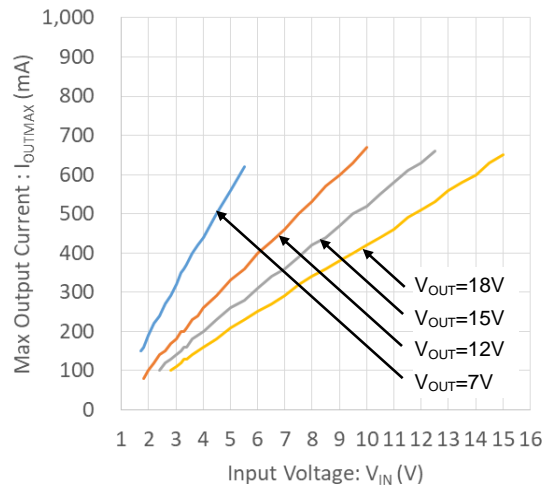
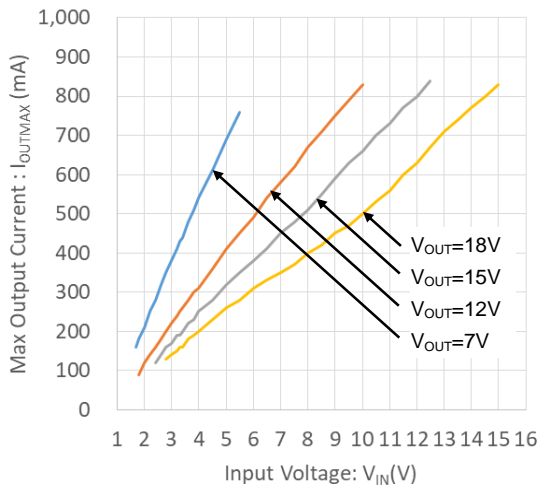
$T_a = -40 \sim 105^\circ\text{C}$



### Max output current - $V_{IN}$

$T_a = 25^\circ\text{C}$ ,  $\theta_{ja} = 100^\circ\text{C/W}$

$T_a = 60^\circ\text{C}$ ,  $\theta_{ja} = 100^\circ\text{C/W}$



## **XC9144B10CER-G Evaluation Board**

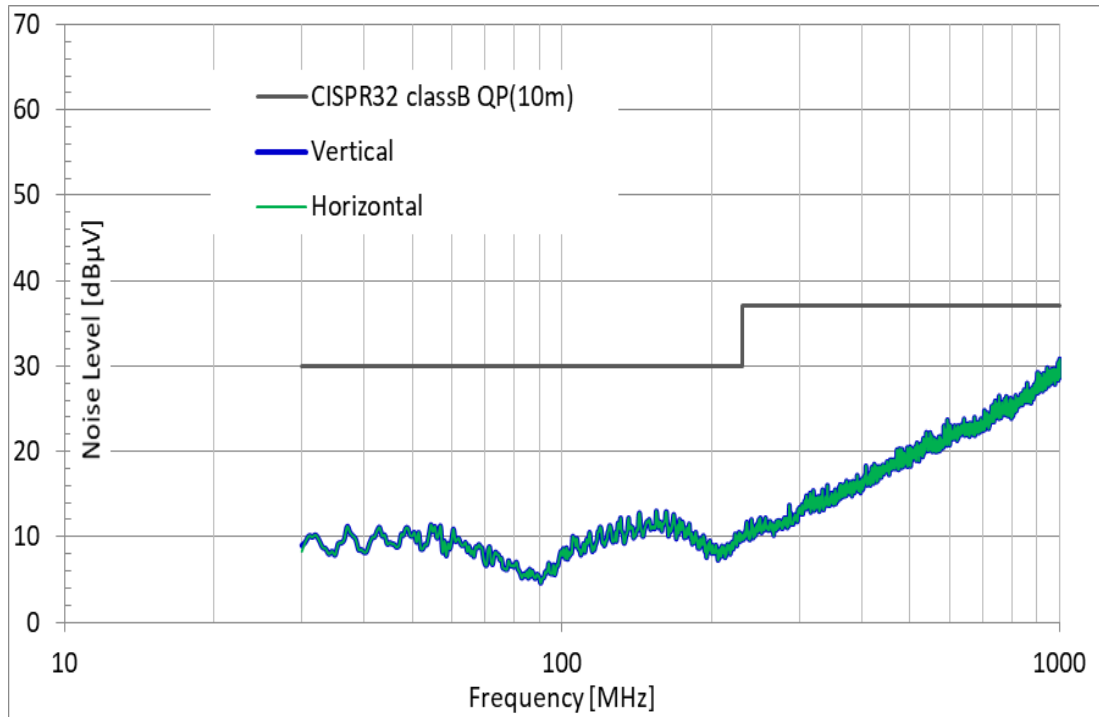
18V,  $I_{in}=1A$ , 1.2MHz PWM/PFM Synchronous Step-up Converter

### **Test Result**

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

##### **Condition**

IC : XC9144B10CER-G  
 Vin : 5V  
 Vout : 12V  
 Iout : 120mA





# XC9144B10CER-G Evaluation Board

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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 <a href="#">Product Info</a>
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 Impedance etc)	0 [Ω]
Ta	25 [°C] Range: -40~85°C
Thermal resistance: θja	100 [°C/W] Range: 0~1000°C/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
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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

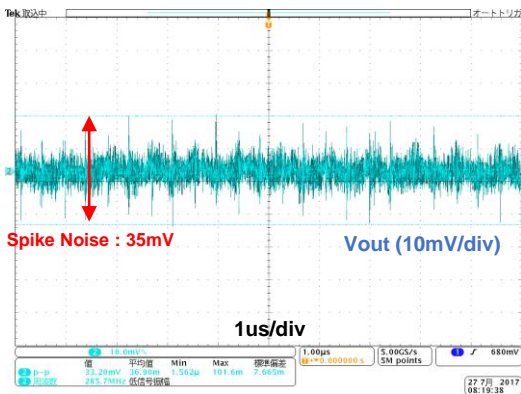
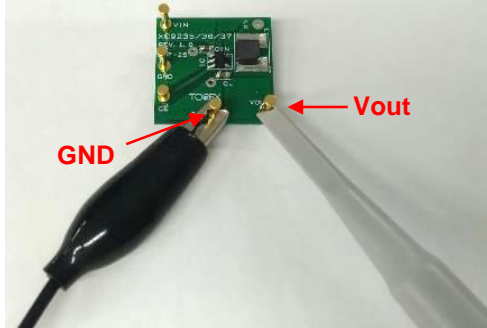
- 日本語 : <https://www.torex.co.jp/technical-support/dcdc-simulation/>
- English : <https://www.torexsemi.com/technical-support/dcdc-simulation/>
- 简体中文 : <https://www.torex.com.cn/technical-support/dcdc-simulation/>

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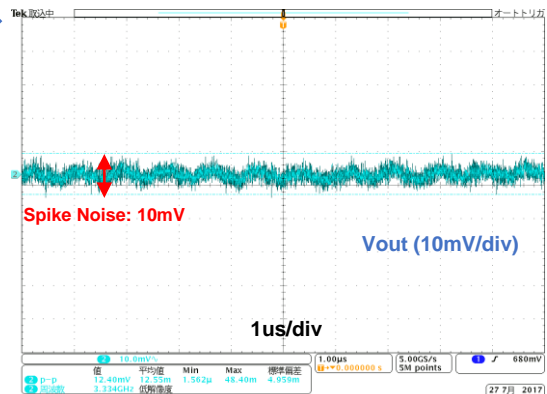
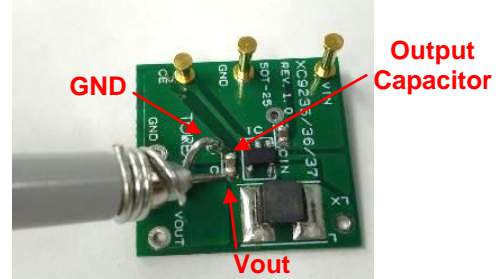
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**[Appendix]** How to reduce the spike noise caused by measurement (Probing method with oscilloscope)

**Probing method : Before improvement**



**Probing method : After**



\* Condition : XC9236,  $V_{in}=3.6V/V_{out}=1.8V/100mA$

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/>