XCL301 Series

Inductor Built-in Inverting "micro DC/DC" Converters

☆Green Operation Compatible

■GENERAL DESCRIPTION

The XCL301 series is a inverting micro DC/DC converter which integrates a P-channel FET, an inductor and a control IC in one tiny package (2.5mm × 2.0mm, h=1.00mm max). A wide operating voltage range of 2.7V to 5.5V enables support for applications that require an internally -3.3V fixed output voltage.

The XCL301 series uses automatic PFM/fixed off time PWM. In automatic PFM/fixed off time PWM control, the IC operates by PFM control when the load is light to achieve high efficiency over the full load range from light to heavy. The device provides a stable inverting power supply to be configured using only a SBD and two capacitors connected externally.

During stand-by, all circuits are shutdown to reduce current consumption to as low as 0.1µA or less. With the built-in UVLO function, the internal P-channel MOS driver transistor is forced OFF when input voltage becomes 2.2V or lower. The XCL301 integrate C_L High Speed discharge function which enables the electric charge at the output capacitor C_L to be discharged via the internal discharge.

■APPLICATIONS

● Negative power supply for AMP

● Negative power supply for LCD

● Negative power supply for CCD

● General purpose Negative power supply

■FEATURES

Input Voltage Range	:	2.7V ~ 5.5V
Output Voltage	:	-3.3V
Output Voltage accuracy		±2.0%
Output Current	:	-50mA@V_{OUT}=-3.3V, V_{IN}=3.3V (TYP)
Internal Driver	:	1.3Ω (Pch Driver Tr)
Quiescent Current	:	40µA (TYP.)
Control Methods	:	PFM / Fixed off time PWM Auto
Transient Response	:	-50mV
		(V_{IN}=3.3V,V_{OUT}=-3.3V,I_{OUT}=1mA→50mA)
PFM switch Current	:	550mA
Function	:	Current Limit
		Soft-Start
		CL High Speed Discharge
		UVLO
		CL High Speed Discharge
Operating Ambient Temperature	:	-40 ~ +85℃
Packages	:	CL-2025-02
Environmentally Friendly	:	EU RoHS Compliant, Pb Free

■TYPICAL APPLICATION CIRCUIT
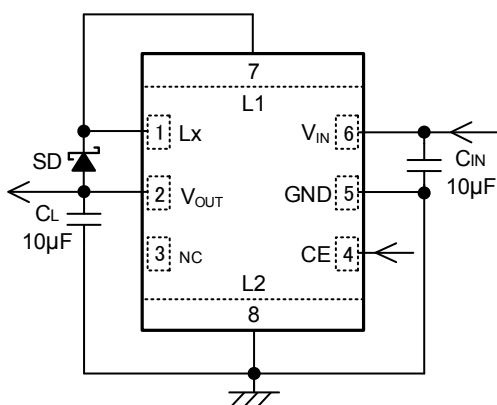
■TYPICAL PERFORMANCE CHARACTERISTICS

●Efficiency-Output Voltage

XCL301A331

C_{IN}=10µF(LMK105CBJ106MVLF),C_L=10µF×2(LMK105CBJ106MVLF)
SBD:SBA240CH
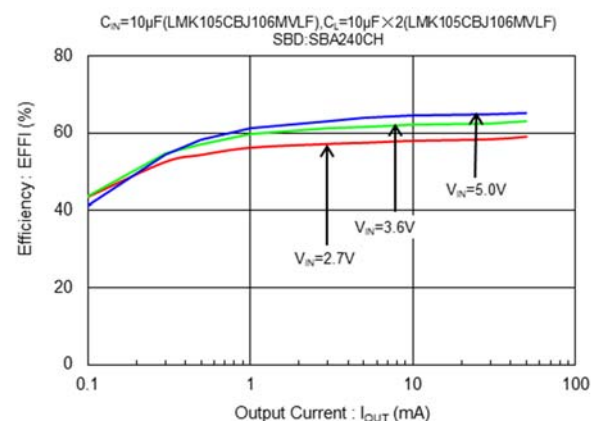
■BLOCK DIAGRAM
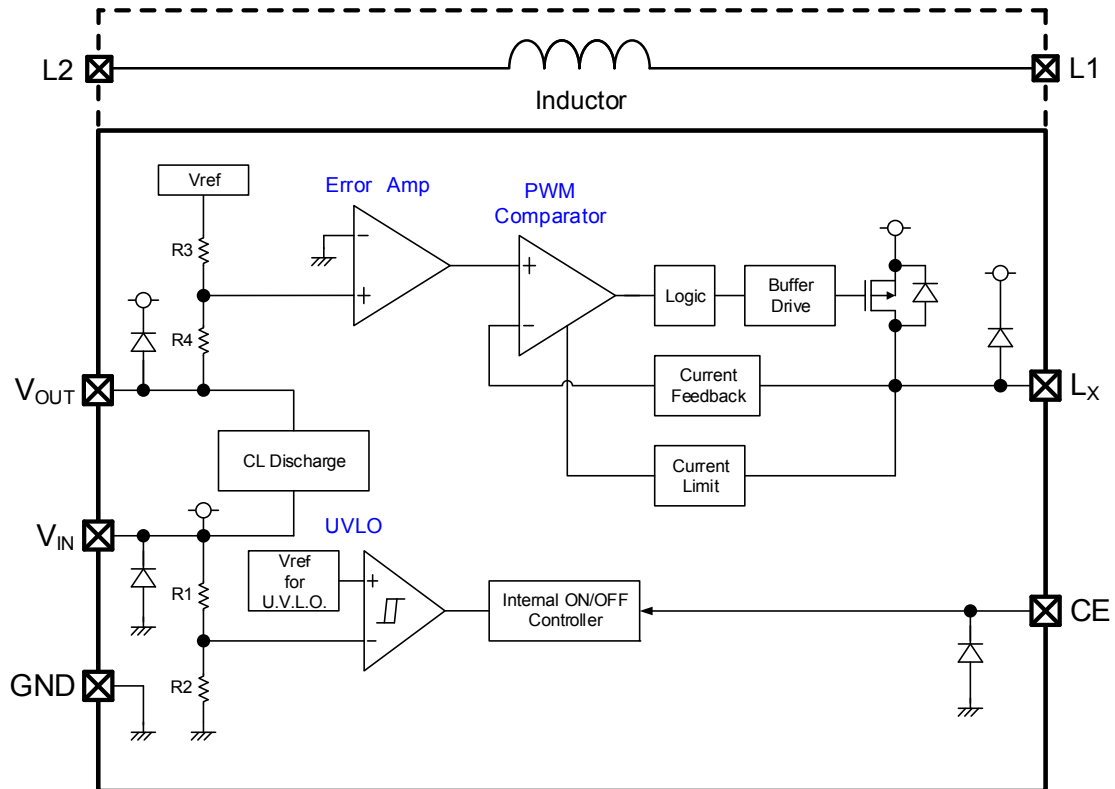
* Diodes inside the circuit are an ESD protection diode and a parasitic diode.

■PRODUCT CLASSIFICATION

●Ordering Information

XCL301①②③④⑤⑥-⑦

DESIGNATOR	ITEM	SYMBOL	DESCRIPTION
①	Product Type	A	Refer to Selection Guide
②③	Output Voltage	33	Output Voltage = -3.3V only
④	PFM Switch Current	1	550mA (TYP.)
⑤⑥-⑦ (*1)	Packages (Order Unit)	ER-G	CL-2025-02 (3,000pcs/Reel)

(*1) The "-G" suffix denotes Halogen and Antimony free as well as being fully EU RoHS compliant.

●Selection Guide

TYPE	OUTPUT VOLTAGE	CL DISCHARGE	UVLO	CHIP ENABLE
A	-3.3V Fixed	Yes	Yes	Yes

■PIN CONFIGURATION

L1
7

V_{IN} |6| |1| Lx

GND |5| |2| V_{OUT}

CE |4| |3| NC

8
L2
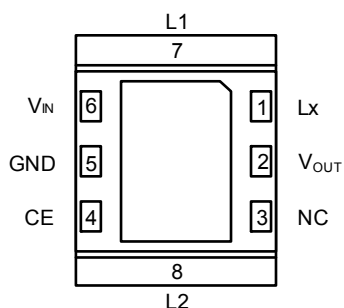
(BOTTOM VIEW)

* The dissipation pad should be solder-plated in recommended mount pattern and metal masking so as to enhance mounting strength and heat release. If the pad needs to be connected to other pins, it should be connected to the GND (No. 5) pin. NC (No.3) doesn't connect to IC chip.

■PIN ASSIGNMENT

PIN NUMBER CL-2025-02	PIN NAME	FUNCTIONS
1	L_X	Switching Output
2	V_{OUT}	Output Voltage
3	NC	No Connection
4	CE	Chip Enable
5	GND	Ground
6	V_{IN}	Power Input
7	L1	Inductor Electrodes
8	L2	Inductor Electrodes

■ FUNCTION

PIN NAME	SIGNAL	STATUS
CE	H	Operation
	L	Standby

* Please do not leave the CE pin open.

■ABSOLUTE MAXIMUM RATINGS

Ta=25˚C

PARAMETER	SYMBOL	RATINGS	UNITS
V_{IN} Pin Voltage	V_{IN}	-0.3 ~ +6.0	V
L_X Pin Voltage	V_{LX}	V_{IN}-13.0 ~ V_{IN}+0.3 or +6.0 [*1]	V
V_{OUT} Pin Voltage	V_{OUT}	V_{IN}-22.0 ~ V_{IN}+0.3 or +6.0 [*1]	V
CE Pin Voltage	V_{CE}	-0.3 ~ +6.0	V
L_X Pin Current	I_{LX}	1500	mA
Power Dissipation	Pd	1000(40mm x 40mm Standard board) [*2]	mW
Operating Ambient Temperature	Topr	-40 ~ +85	˚C
Storage Temperature	Tstg	-55 ~ +125	˚C

* All voltages are described based on the GND pin.

[*1] The maximum value should be either V_{IN} +0.3V or +6.0V in the lowest.

[*2] The power dissipation figure shown is PCB mounted and is for reference only.
  The mounting condition is please refer to PACKAGING INFORMATION.

■ELECTRICAL CHARACTERISTICS

XCL301A33AER-G

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS	CIRCUIT
Input Voltage	V_{IN}	-	2.700	-	5.500	V	–
Output Voltage [*1]	$V_{OUT(E)}$ [*2]	The voltage which Lx starts oscillation while V_{OUT} is increasing.	-3.366	-3.300	-3.234	V	①
UVLO Detection Voltage	V_{UVLOD}	$V_{IN}=V_{CE}$, $V_{OUT}=0V$, Voltage which Lx pin holding "L" level [*6]	1.75	2.20	-	V	①
UVLO Release Voltage	V_{UVLOR}	$V_{IN}=V_{CE}$, $V_{OUT}=0V$, Voltage which Lx pin holding "H" level [*6]	-	2.35	2.69	V	①
UVLO Hysteresis Width	V_{UVLOH}	$V_{UVLOH}=V_{UVLOH} - V_{UVLOD}$	0.02	0.15	0.25	V	①
Supply Current	I_{DD}	$V_{IN}=V_{CE}=5.5V$, $V_{OUT}=V_{OUT(T)}×1.1V$ [*3]	-	40	80	μA	②
Stand-by Current	I_{STB}	$V_{IN}=5.5V$, $V_{CE}=0V$	-	0	1.0	μA	③
PFM Switch Current	I_{PFM}	When connected to external components, $I_{OUT}=1mA$	280	550	800	mA	④
I_{LIMSS} Switch Current	I_{LIMSS}	When connected to external components, $I_{OUT}=1mA$	150	400	700	mA	④
Maximum ON Time	t_{ONMAX}	$V_{IN}=V_{CE}=3.7V$, $V_{OUT}=V_{OUT(T)}×0.9V$ [*3]	1.1	1.7	2.3	μs	①
Minimum OFF Time	t_{OFFMIN}	$V_{IN}=V_{CE}=3.7V$, $V_{OUT}=V_{OUT(T)}×0.9V$ [*3]	0.2	0.3	0.4	μs	①
Efficiency [*4]	EFFI	When connected to external components, $I_{OUT}=10mA$	-	63	-	%	④
Lx SW "High" ON Resistance [*5]	R_{LXH}	$I_{LX}=100mA$	0.8	1.3	1.95	Ω	⑤
Lx SW "Low" Leakage Current	I_{LEAKL}	$V_{IN}=5.5V$, $V_{CE}=0V$, $V_{LX}=0V$	-	0.01	1.00	μA	⑥
Maximum Current Limit	I_{LIM}	When connected to external components	550	900	1300	mA	④
Output Voltage Temperature Characteristics	$\triangle V_{OUT} / (V_{OUT} \cdot \triangle topr)$	$I_{OUT}=10mA$, $-40°C \leqq Topr \leqq 85°C$	-	±100	-	ppm / °C	④
C_L Auto-Discharge Resistance	R_{DCHG}	$V_{IN}=3.7V$, $V_{CE}=0V$, $V_{OUT}=-1V$	180	300	480	Ω	⑥
CE "High" Voltage	V_{CEH}	$V_{IN}=5.5V$, $V_{OUT}=V_{OUT(T)}×0.9V$ [*3], Applied voltage to V_{CE}, voltage changes Lx to "H" level [*6]	1.2	-	5.5	V	①
CE "Low" Voltage	V_{CEL}	$V_{IN}=5.5V$, $V_{OUT}=V_{OUT(T)}×0.9V$ [*3], Applied voltage to V_{CE}, voltage changes Lx to "L" level [*6]	GND	-	0.4	V	①
CE "High" Current	I_{CEPH}	$V_{IN}=V_{CE}=5.5V$	-0.1	-	0.1	μA	⑥
CE "Low" Current	I_{CEPL}	$V_{IN}=5.5V$, $V_{CE}=0V$	-0.1	-	0.1	μA	⑥
Inductance Value	L	Test Frequency=1MHz	-	4.7	-	μH	-
Inductor Rated Current	I_{DC}	$\Delta T=+40°C$	-	700	-	mA	-

Measurement conditions: Unless otherwise stated, $V_{IN}=V_{CE}=3.7V$

[*1] V_{OUT} pin voltage measured when Lx pin oscillation starts.

[*2] $V_{OUT (E)}$ is Effective Output Voltage
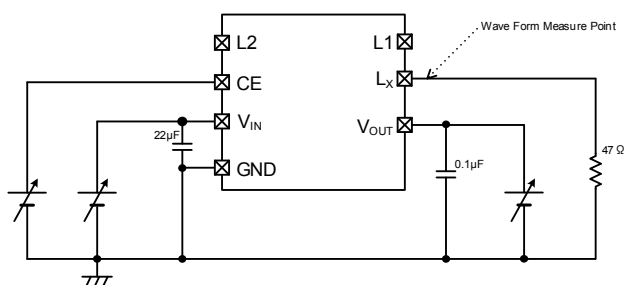
[*3] $V_{OUT (T)}$ is nominal output voltage (-3.3V)

[*4] EFFI= {(Output Voltage) × (Output Current)} / {(Input Voltage) × (Input Current)} ×100

[*5] On resistance = (Voltage measured at V_{IN} pin – Voltage measured at L_X pin) / 100mA

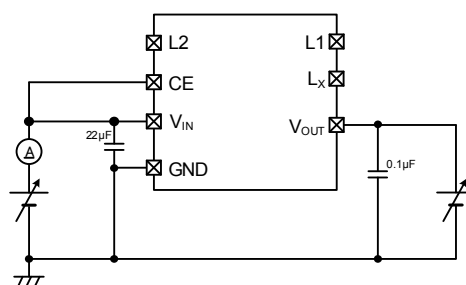[*6] "H" = $V_{IN} \sim V_{IN}$ -1.2V, "L" = +0.1V $\sim$ -0.1V

■ TEST CIRCUITS

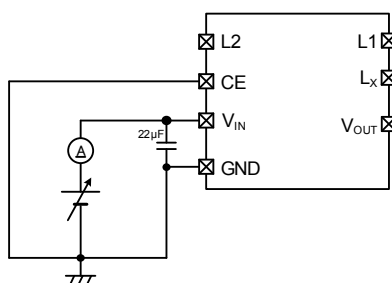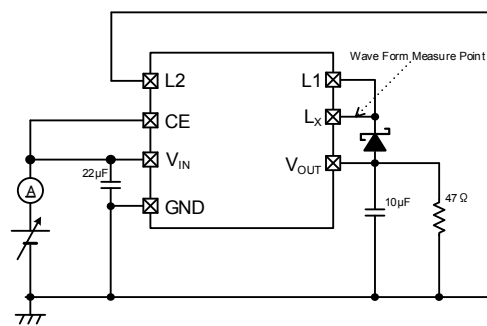< Test Circuit No.① >

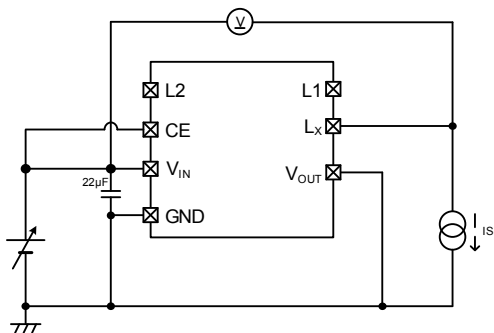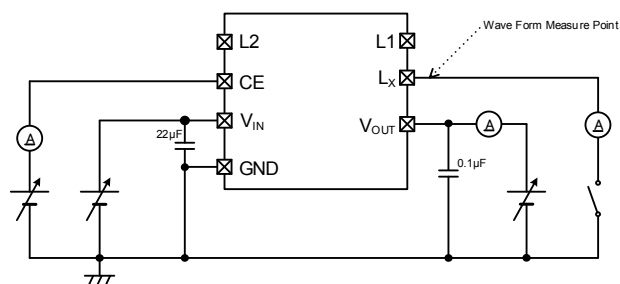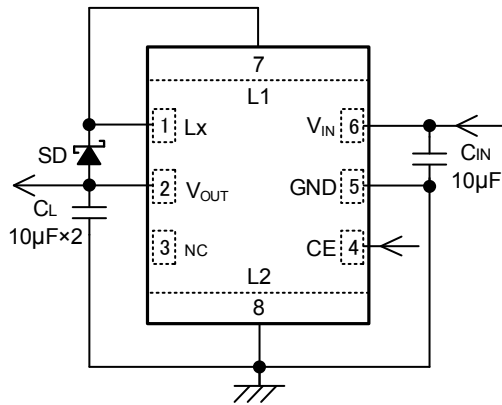< Test Circuit No.② >

< Test Circuit No.③ >

< Test Circuit No.④ >

< Test Circuit No.⑤ >

< Test Circuit No.⑥ >

■TYPICAL APPLICATION CIRCUIT

【Typical Examples】

	MANUFACTURE	PRODUCT NUMBER	VALUE
C_{IN}	TAIYO YUDEN	LMK105CBJ106MVLF	10µF/10V
C_L	TAIYO YUDEN	LMK105CBJ106MVLF×2	10µF/10V
SD	PANJIT	SBA240CH	2A/40V

* Take capacitance loss, withstand voltage, and other conditions into consideration when selecting components.

* Recommend 20uF for C_L Value.

* If a tantalum or electrolytic capacitor is used for the load capacitance C_L, ripple voltage will increase, and there is a possibility that operation will become unstable. Test fully using the actual device.

■OPERATIONAL EXPLANATION

The XCL301 series consists of a reference voltage source, error amplifier, PWM comparator, output voltage adjustment resistance, P-ch MOS driver transistor, current limiting circuit, UVLO circuit, and other components.

The internal reference voltage and the feedback voltage from the V_{OUT} pin that passes through R3 and R4 are compared by the error amplifier and a signal that determines the on time for switching during PWM operation is generated. A current feedback circuit detects the current of the P-ch MOS driver transistor at each switching and generates a current feedback signal. The PWM comparator compares the signal generated by the error amplifier and the current feedback signal, sends the output to the buffer drive circuit, and this is output from the L_X pin as the on time of switching. The off time of PWM operation is fixed inside the IC, and the P-ch MOS driver transistor is turned on after the fixed time elapses. This operation is performed continuously to stabilize the output voltage.

XCL301 Series
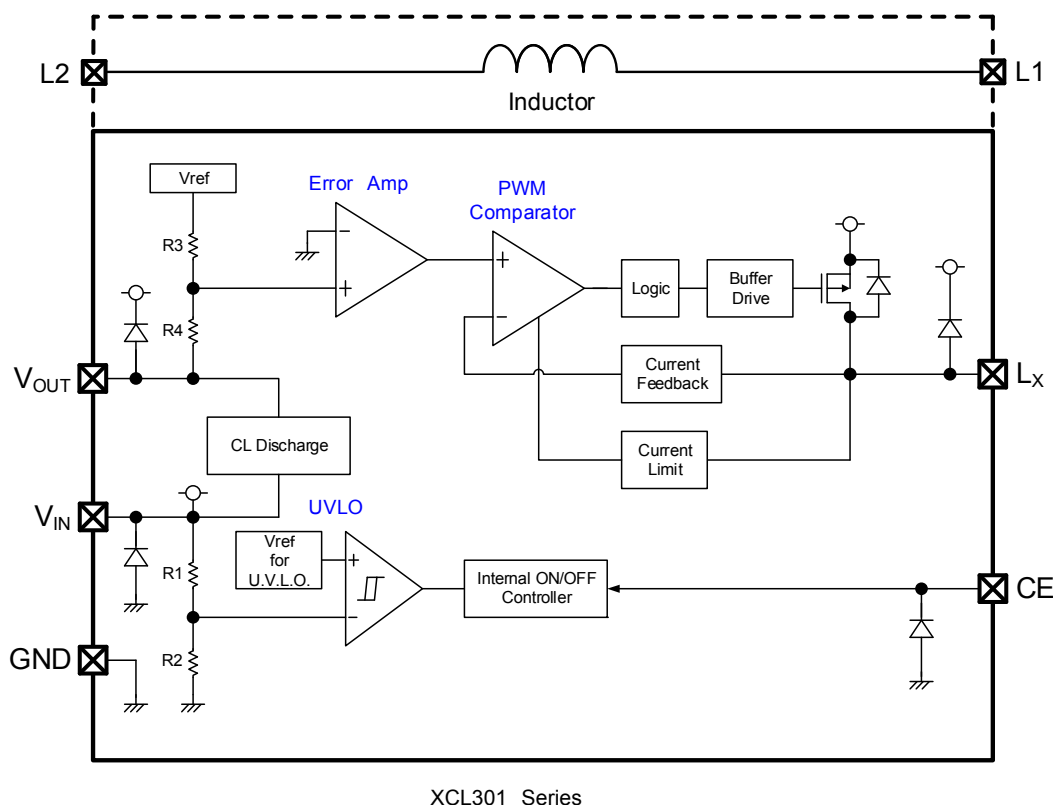
<Vref>
Reference voltage that acts as the reference used to stabilize the output voltage of this IC.

<Error Amp.>
The error amplifier is designed to monitor the output voltage. The voltage divided by the internal R3 and R4 resistances is fed back and compared to the reference voltage. In response to feedback of a voltage higher than the reference voltage, the output voltage of the error amplifier increases. The frequency characteristics of the error amplifier are optimized internally.

<Current Feedback>
Detects the current of the P-ch MOS driver transistor at each switching and generates a current feedback signal.

<PWM Comparator>
The signal generated by the error amplifier and the current feedback signal are compared, and when the signal generated by the error amplifier is lower, a signal that turns the driver transistor off is output.

<Buffer Drive>
Outputs the signal that drives the P-ch MOS driver transistor.

■OPERATIONAL EXPLANATION (Continued)

<Current Limit>

The current limiting circuit of the XCL301 series monitors the current that flows through the P-ch MOS driver transistor that is connected to the L_X pin and limits the current.

(1) If the driver current is higher than a specific current, the current limiting function activates and turns off the pulse that is output from the L_X pin at any selected timing.
(2) The driver transistor remains off until the inductor current becomes 0A.
(3) The P-ch MOS driver transistor turns on at the timing of the next pulse, however, if there is over-current at this time, the P-ch MOS driver transistor turns off immediately.
(4) When the over-current state no longer exists, normal operation takes place.
While repeating (1) to (3), the IC waits for the over-current state to stop.

<UVLO>
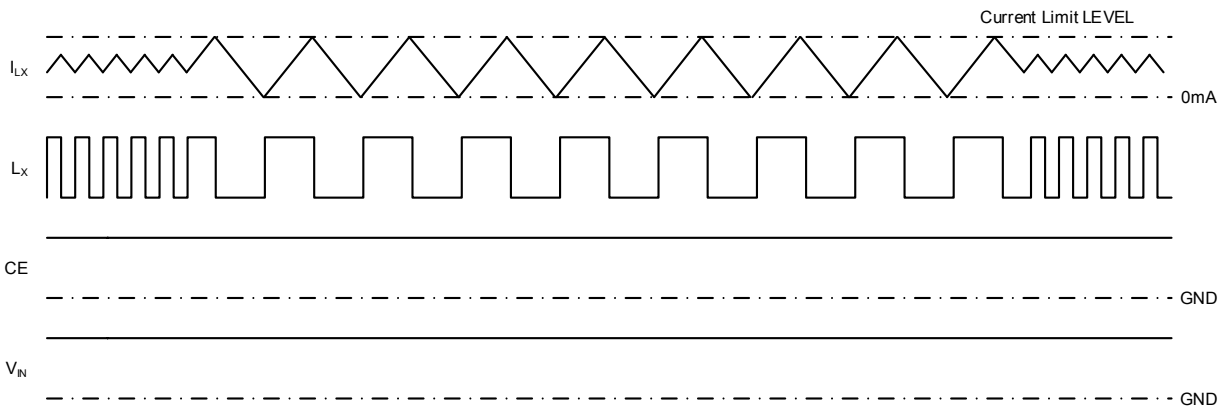
To prevent incorrect pulse output due to instable operation of the internal circuitry when the V_{IN} pin voltage drops below 2.2V (TYP.), the driver transistor is forcibly turned off. When the V_{IN} pin voltage rises higher than 2.35V (TYP.), switching operation is performed. When the UVLO function is canceled, the soft-start function activates and output start operation begins. Soft-start also operates if the V_{IN} pin momentarily drops below the UVLO operation voltage. The UVLO function only stops pulse output; it does not shut down the IC and thus the internal circuitry continues to operate.

<PFM Switch Current>

During PFM operation, the P-ch MOS driver transistor is on until the current flowing through the inductor reaches a specific value
(I_{PFM}). This P-ch MOS driver transistor on time (t_{ON}) is determined by the following equation:

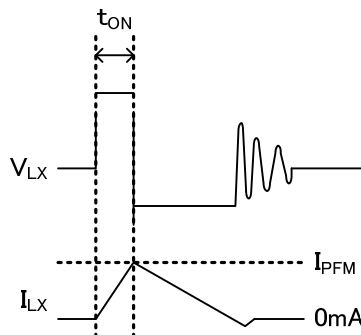$$t_{ON} = L \times I_{PFM} / V_{IN}$$

Fig. PFM Current

■OPERATIONAL EXPLANATION (Continued)

< C_L Auto Discharge >

The XCL301 series allows high-speed discharge of the output capacitor (C_L) through the IC internal C_L discharge resistance when an L level signal is input into the CE pin (when the IC is in the standby state). This makes it possible to prevent application malfunctioning due to a charge remaining on C_L when the IC is stopped. The discharge time is determined by the C_L discharge resistance and C_L.

$$t = -\tau \ln ((V_{IN}-V) / (V_{IN}-V_{OUT(T)}))$$

V: Output voltage after discharge
$V_{OUT (T)}$: Nominal output voltage
t: Unit: mm
  Discharge time
τ $C_L \times R_{DCHG}$

C_L: Capacitance of output capacitor
R_{DCHG}: C_L auto-discharge resistance

<CE Pin Function>

The XCL301 series can be put in the shutdown state by L level input to the CE pin. In the shutdown state, the supply current of the IC is 0μA (TYP.). Operation is started by inputting H level to the CE pin. The CE pin input is CMOS input and the sink current is 0μA (TYP.).

<The rise operation>

The rise time is determined by the input voltage, output voltage, output capacitance, and soft-start current limit (I_{LIMSS}).

(1) When the CE pin is turned on, the driver transistor turns on.
(2) When the driver current exceeds the soft-start current limit value, the driver transistor is turned off.
(3) The driver transistor remains off until the inductor current becomes 0A.
(4) When the inductor current becomes 0A, the driver transistor is turned on again.
(5) If the output voltage is larger than setting voltage, the operations of (2) to (5) are repeated.
(6) When the output voltage becomes smaller than setting voltage, operation starts in PFM/fixed off-time PWM control.
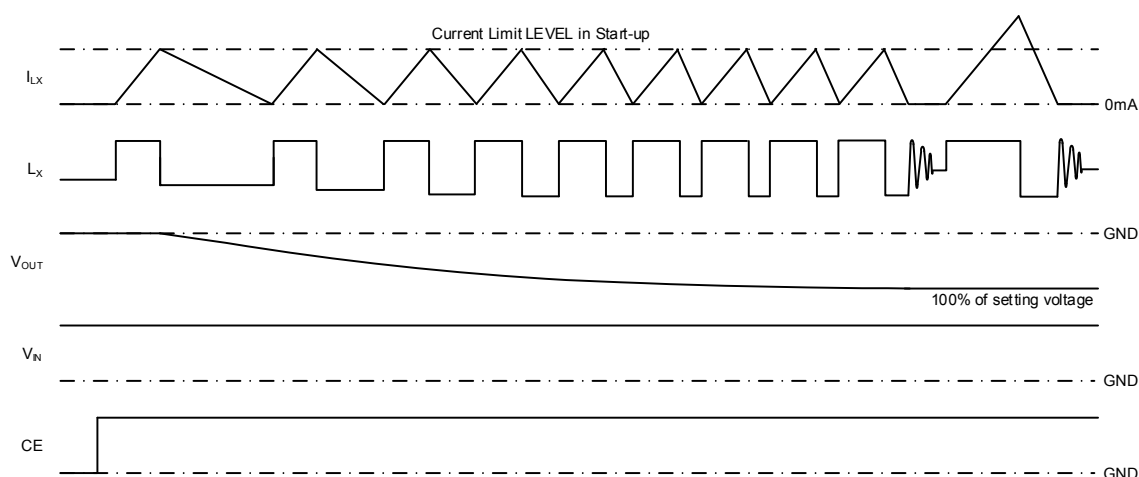
■NOTE ON USE

1. Be careful not to exceed the absolute maximum ratings for externally connected components and this IC.

2. The DC/DC converter characteristics greatly depend not only on the characteristics of this IC but also on those of externally connected components, so refer to the specifications of each component and be careful when selecting the components. Be especially careful of the characteristics of the capacitor used for the load capacity C_L and use a capacitor with B characteristics (JIS Standard) or an X7R/X5R (EIA Standard) ceramic capacitor.

3. Wire external components as close to the IC as possible and use thick, short connecting traces to reduce the circuit impedance.

4. Mount the externally connected components in the vicinity of the IC. Also use short, thick wires to reduce the wire impedance.

5. When the input voltage is high or the ambient temperature is low temperature, there is a case that the coil current at the time of rise is superimposed and the inrush current becomes larger than 700 mA
Please test fully using the actual device before use. (See the figure below)

V_{IN}=5.5V, V_{OUT}=-3.3V, I_{OUT}=10mA, Ta=-40℃   ZOOM

CE[10V/div]
L_X[10V/div]
V_{OUT}[2V/div]
I_{LX}[500mA/div]

100[us/div]   10[us/div]
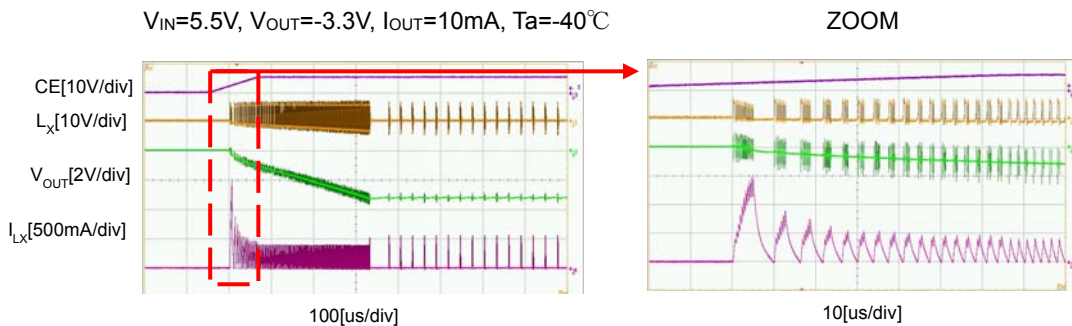
6. Ripple voltage will be if both the input voltage is high and the ambient temperature is low. Once the design has been completed, verification with actual components should be done. (Please refer to below)

V_{IN}=5.5V, V_{OUT}=-3.3V, I_{OUT}=50mA, Ta=-40℃

L_x [10V/div]

V_{OUT} [100mV/div]
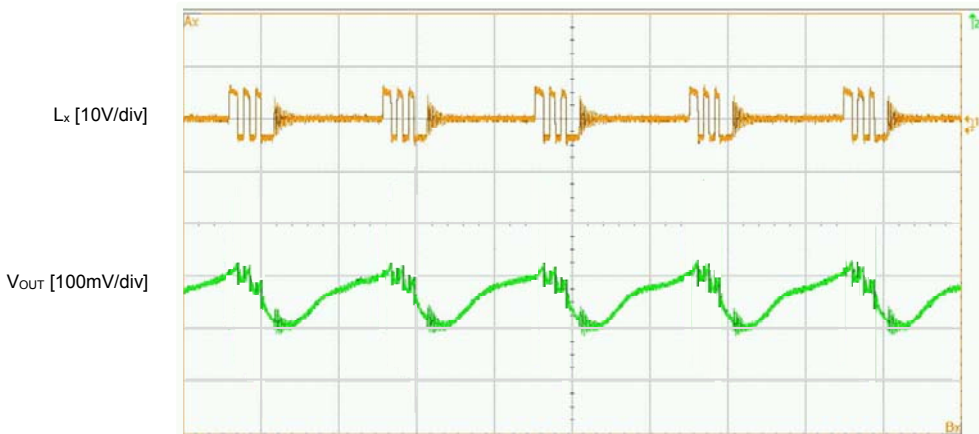
7. Use of the IC at voltages below the recommended voltage range may lead to instability.

8. In case load current (resistance load) is large when rising, output voltage may not reach the setting voltage. Once the design has been completed, verification with actual components should be done.

9. C_L discharge function may end even if more than 10% output voltage remains at the following conditions: CE pin=L with lower than 3V input voltage, or input voltage is lower than UVLO detection voltage. [*1]

10. C_L discharge function may not work under any of the following conditions:
When the voltage at the CE pin is turned Low level, following a situation when the output voltage never reached less than -3V despite the voltage at the CE pin was turned high level.
With the CE pin connected to V_{IN}, when the V_{IN} voltage drops below the UVLO detect voltage, following a situation when the output voltage never reached less than -3V despite the input voltage rise above the UVLO release voltage. [*1]
[*1] "H"=1.2V~5.5V, "L"=GND~0.4V

■NOTE ON USE (Continued)

11. If the output is short-circuited, the IC internal power dissipation may exceed the power dissipation specified in the data sheet even if the inductor current does not reach the maximum current limit.

12. When the input voltage is high or the ambient temperature is low, the coil current may be superimposed and the maximum current limit value may exceed 1300 mA. This may cause the possibility of exceeding the rated current of the IC, coil and schottky diode in some cases. Please test fully using the actual device before use.

13. For temporary, transitional voltage drop or voltage rising phenomenon, the IC is liable to malfunction should the ratings be exceeded.

14. Torex places an importance on improving our products and their reliability.
We request that users incorporate fail-safe designs and post-aging protection treatment when using Torex products in their systems.

15. Please use within the power dissipation range below. Please also note that the power dissipation may be changed by test conditions, the power dissipation figure shown is PCB mounted.

16. The proper position of mounting is based on the coil terminal

(

Power dissipation vs. Operating Temp

Package Body Temp vs. Operating Temp
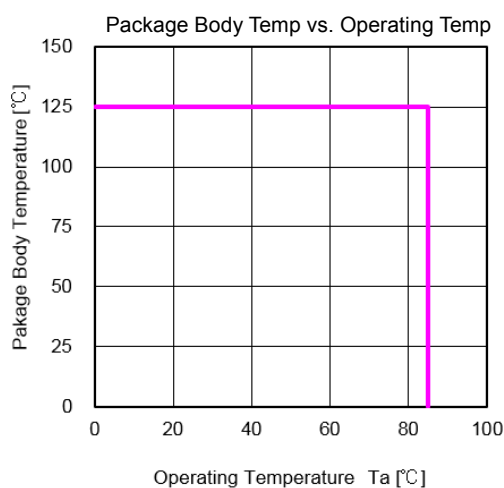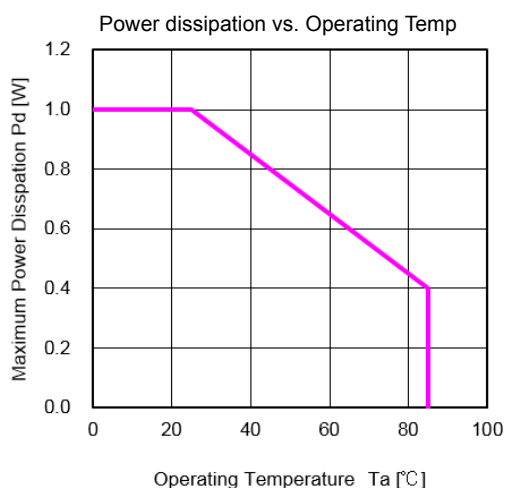
The power loss of micro DC/DC according to the following formula:

Power loss = $V_{OUT} \times I_{OUT} \times ((100/EFFI) - 1)$ (W)

V_{OUT}: Output Voltage (V)
I_{OUT}: Output Current (A)
EFFI: Conversion Efficiency (%)

■NOTES ON LAYOUT

1. In order to stabilize V_{IN} voltage level, we recommend that a by-pass capacitor (C_{IN}) be connected as close as possible to the V_{IN} & GND pins.

2. Please mount each external component as close to the IC as possible.

3. Wire external components as close to the IC as possible and use thick, short connecting traces to reduce the circuit impedance.

4. Make sure that the PCB GND traces are as thick as possible, as variations in ground potential caused by high ground currents at the time of switching may result in instability of the IC.

5. This series' internal driver transistors bring on heat because of the output current and ON resistance of P-ch MOS driver transistors.

6. As precautions on mounting, please set the mounting position accuracy within 0.05 mm.

●Recommended Pattern Layout
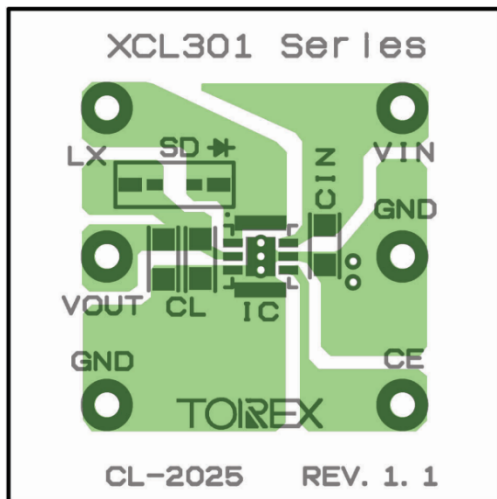
Top view
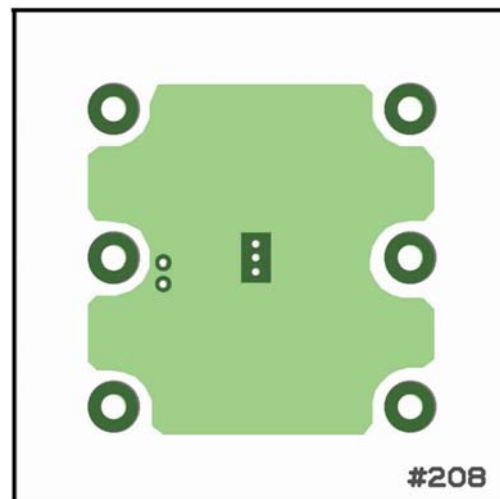
Bottom view

■ABOUT THE APPEARANCE

(1) Coils are compliant with general surface mount type chip coil (inductor) specifications and may have scratches, flux contamination and the like.

■TYPICAL PERFORMANCE CHARACTERISTICS

(1) Efficiency vs. Output Current

XCL301A331

$C_{IN}=10\mu F(LMK105CBJ106MVLF), C_L=10\mu F \times 2(LMK105CBJ 106MVLF)$
SBD:SBA240CH

Efficiency : EFFI (%) vs Output Current : I_{OUT} (mA)

$V_{IN}=5.0V$
$V_{IN}=3.6V$
$V_{IN}=2.7V$
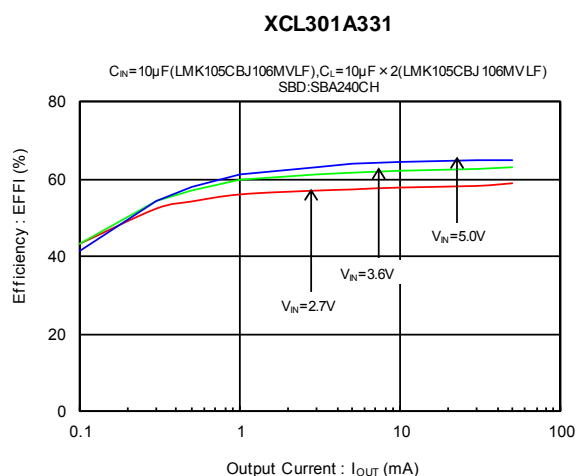
(2) Output Voltage vs. Output Current

XCL301A331

$C_{IN}=10\mu F(LMK105CBJ106MVLF), C_L=10\mu F \times 2(LMK105CBJ 106MVLF)$
SBD:SBA240CH

Output Voltage : V_{OUT} (V) vs Output Current : I_{OUT} (mA)

$V_{IN}=2.7V, 3.6V, 5.0V$
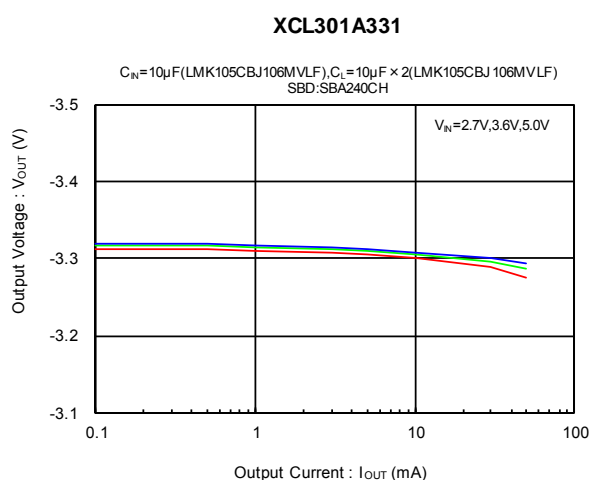
(3) Ripple Voltage vs. Output Current

XCL301A331

$C_{IN}=10\mu F(LMK105CBJ106MVLF), C_L=10\mu F \times 2(LMK105CBJ 106MVLF)$
SBD:SBA240CH

Ripple Voltage : Vr (mV) vs Output Current : I_{OUT} (mA)

$V_{IN}=5.0V$
$V_{IN}=3.6V$
$V_{IN}=2.7V$
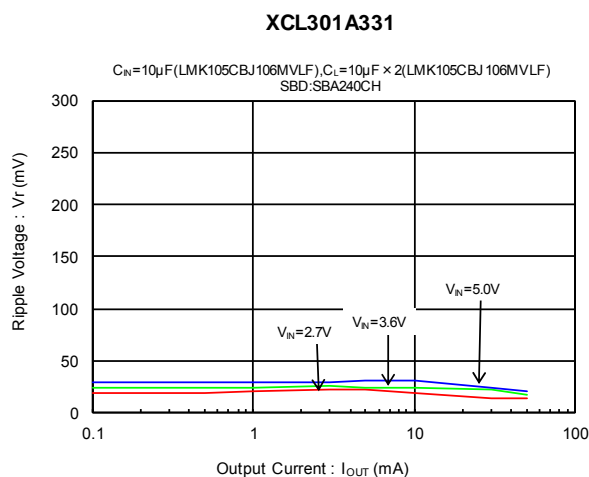
(4) Output Voltage Vs. Ambient Temperature

XCL301A331

Output Voltage : V_{OUT} (V) vs Ambient Temperature: Ta(℃)

$V_{IN}=2.7V, 5.5V$
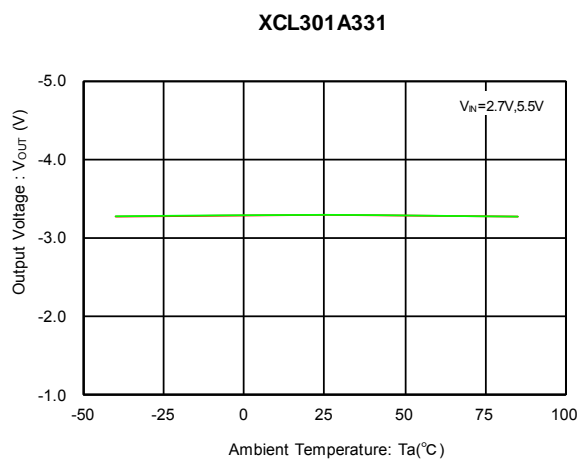
(5) Supply Current vs. Ambient Temperature

XCL301A331

$V_{IN}=V_{CE}, V_{OUT}=V_{OUT(T)} \times 1.1$

Supply Current : I_{DD} (μA) vs Ambient Temperature: Ta(℃)

$V_{IN}=3.7V$
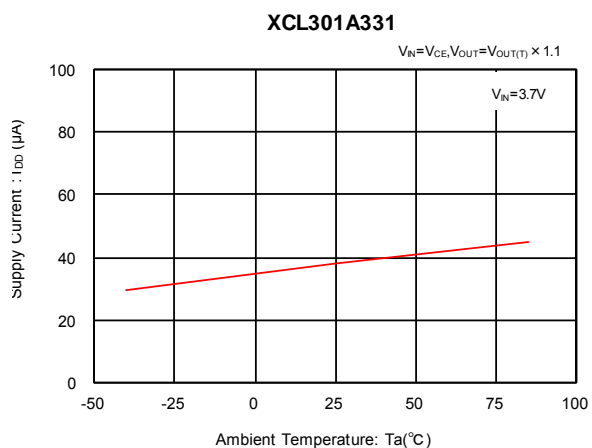
(6) Standby Current vs. Ambient Temperature

XCL301A331

$V_{CE}=0V$

Standby Current: I_{STB} (μA) vs Ambient Temperature: Ta(℃)

$V_{IN}=2.7V, 3.7V, 5.5V$
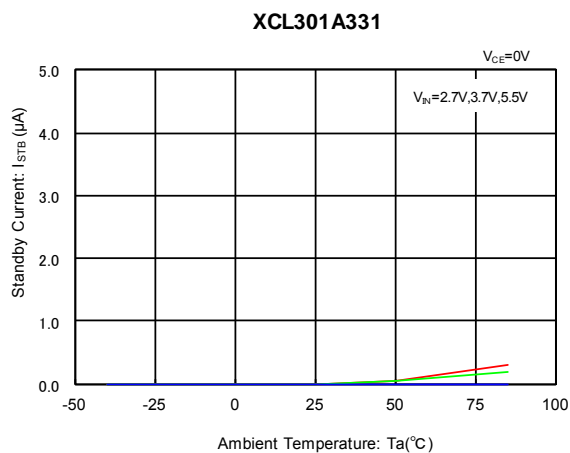
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(7) UVLO Release Voltage vs. Ambient Temperature
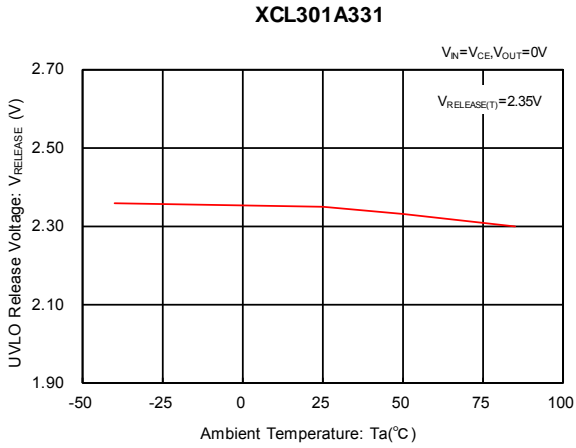
(8) PFM Switching Current vs. Ambient Temperature

XCL301A331

$V_{IN}=V_{CE}, V_{OUT}=0V$

$V_{RELEASE(T)}=2.35V$

XCL301A331

$C_{IN}=10\mu F(LMK105CBJ106MVLF), C_L=10\mu F \times 2(LMK105CBJ106MVLF)$
SBD:SBA240CH

$V_{IN}=5.5V$

$V_{IN}=3.7V$

$V_{IN}=2.5V$
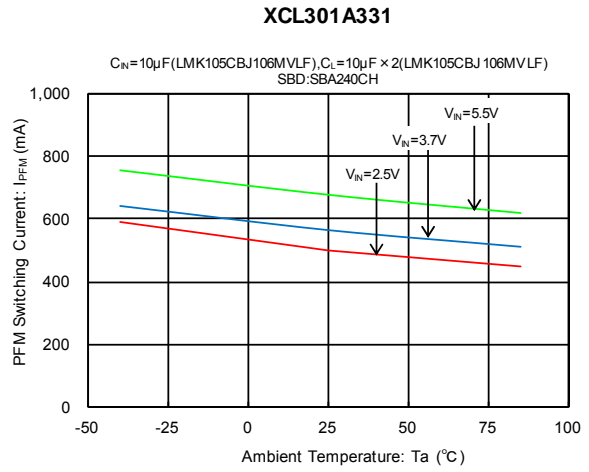
(9) Minimum OFF Time vs. Ambient Temperature
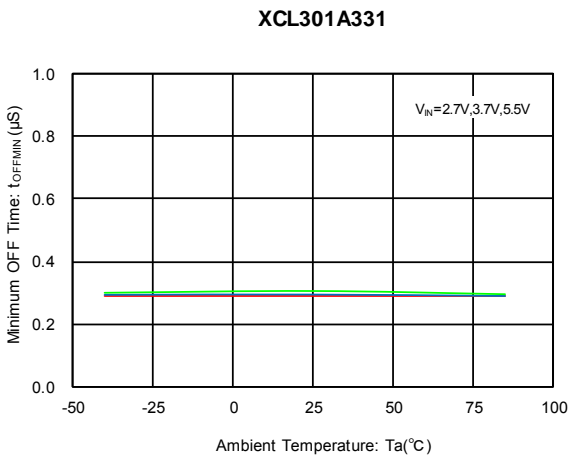
(10) Maximum ON Time vs. Ambient Temperature

XCL301A331

$V_{IN}=2.7V, 3.7V, 5.5V$

XCL301A331

$V_{IN}=2.7V, 3.6V, 4.2V$
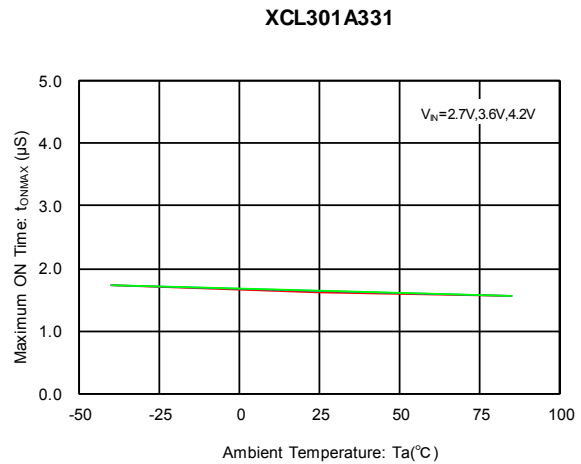
(11) Lx SW "Hign" ON Resistance vs. Ambient Temperature
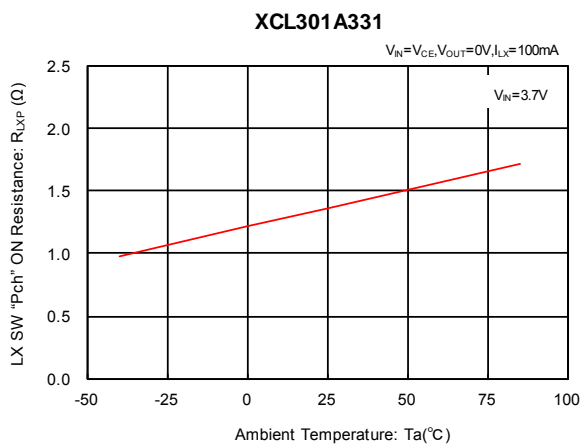
(12) Lx SW "Low" Leakage Current vs. Ambient Temperature

XCL301A331

$V_{IN}=V_{CE}, V_{OUT}=0V, I_{LX}=100mA$

$V_{IN}=3.7V$

XCL301A331

$V_{CE}=0V, V_{LX}=0V$

$V_{IN}=5.5V$
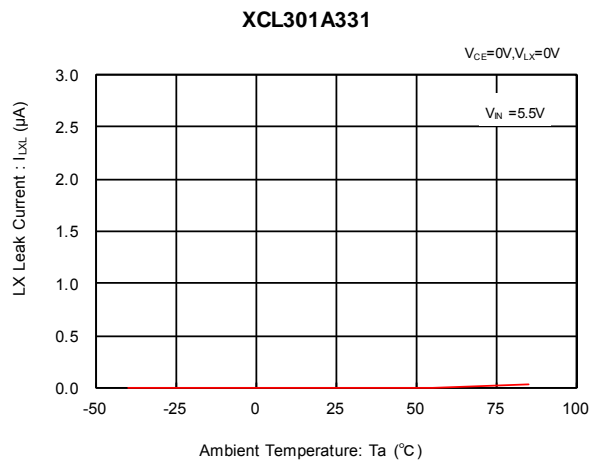
■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(13) CE "High" Voltage vs. Ambient Temperature
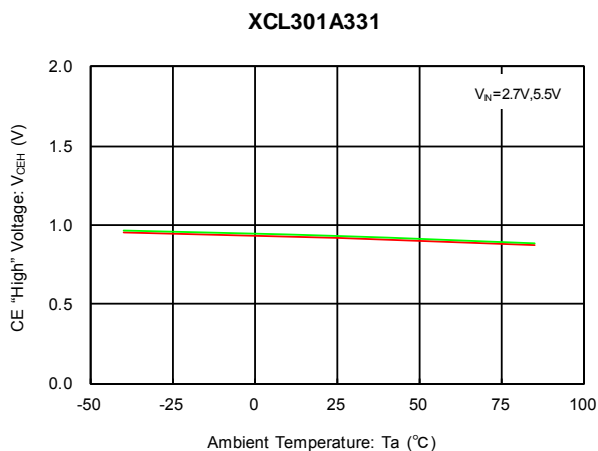
(14) CE "Low" Voltage vs. Ambient Temperature

XCL301A331

XCL301A331
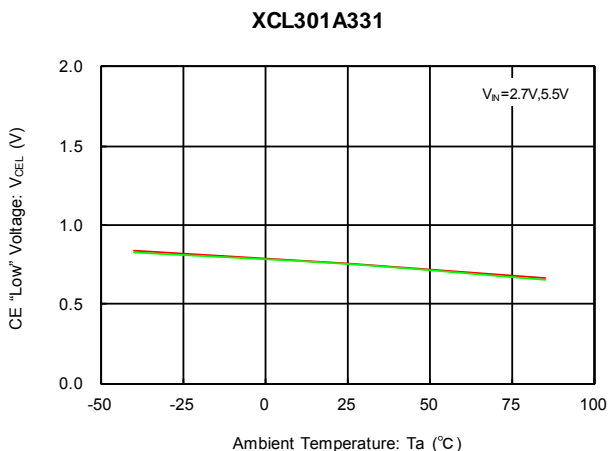
(15) C_L Discharge vs. Ambient Temperature

(16) Rising Output Voltage

XCL301A331

XCL301A331

V_{OUT}:2V/div,V_{IN}:5V/div,V_{LX}:5V/div,Time:200μs/div
C_{IN}=10μF(LMK105CBJ106MVLF),C_L=10μF×2(LMK105CBJ106MVLF)
SBD:SBA240CH
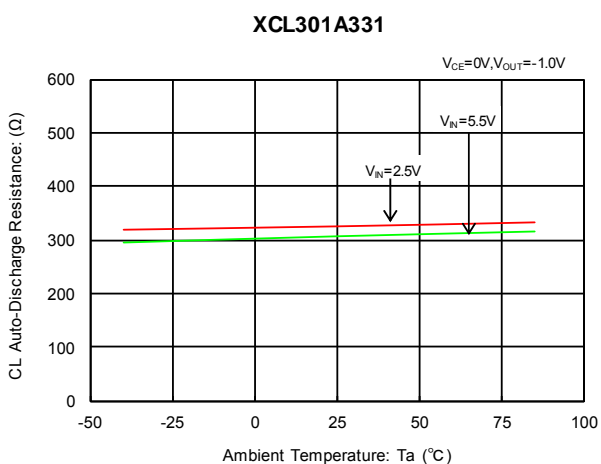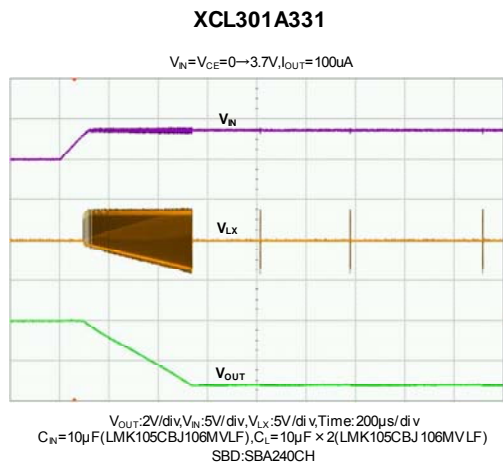
(17) Load Transient Response

XCL301A331

V_{OUT}:100mV/div,I_{OUT}:50mA/div,V_{LX}:5V/div,Time:100μs/div
C_{IN}=10μF(LMK105CBJ106MVLF),C_L=10μF×2(LMK105CBJ106MVLF)
SBD:SBA240CH
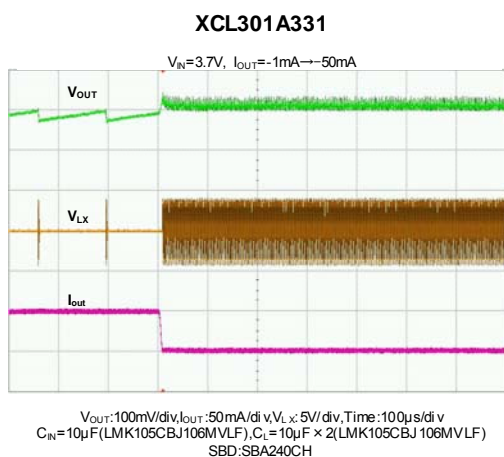
TOREX

■PACKAGING INFORMATION

For the latest package information go to, www.torexsemi.com/technical-support/packages

PACKAGE	OUTLINE / LAND PATTERN	THERMAL CHARACTERISTICS	
CL-2025-02	CL-2025-02 PKG	Standard Board	CL-2025-02 Power Dissipation

■MARKING RULE

●CL-2025-02
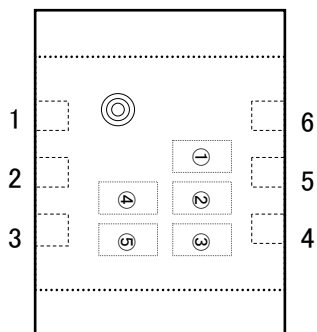
① Represents products series

MARK	PRODUCT SERIES
9	XCL301******-G

② Represents integer of the output voltage

MARK	Product Type	Output Voltage (V)	PFM Switch Current (mA)	PRODUCT SERIES
3	A	-3.x	550 (TYP)	XCL301A3*1ER-G

③ Represents the decimal part of output voltage

MARK	Output Voltage (V)	PRODUCT SERIES
3	-x.3	XCL301**3*ER-G

④, ⑤ represents production lot number

01～09、0A～0Z、11～9Z、A1～A9、AA～AZ、B1～ZZ in order.

(G, I, J, O, Q, W excluded)

Note: No character inversion used.