Ordering number : EN*A2353

LV52117QA

Advance Information

ON Semiconductor

http://onsemi.com

Bi-CMOS IC

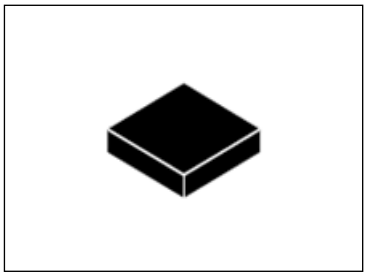
Dual-Output DC-DC Converter for LCD Panel

Overview

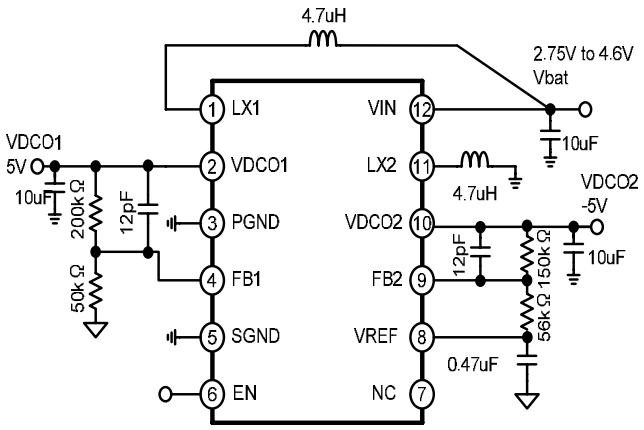
The LV52117 is a high current dual-output DC-DC converter which can generate both a positive and a negative voltage. The LV52117 is particularly suitable for powering applications such as LCD display.

Function

- Integrated 1.5MHz Synchronous Boost and Inverter Converters
- 2.75V to 4.6V Input Voltage Range
- 4.6V to 5.8V Adjustable Positive Output (VDCO1)
- -5.8V to -4.6V Adjustable Negative Output (VDCO2)
- Output Current Up to 100mA
- Pulse Skipping Mode in Low Load Condition
- Over Current/Short Circuit Protection



TDFN12 3.0x3.0x0.75mm
0.45mm pitch



Typical Applications (Tentative)

This document contains information on a new product. Specifications and information herein are subject to change without notice.

ORDERING INFORMATION

See detailed ordering and shipping information on page 10 of this data sheet.

Semiconductor Components Industries, LLC, 2014

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	VINmax	VIN to GNDs	-0.3 to +5.5	V
Maximum Pin voltage1	Vpin1max	LX1 to GNDs	-0.3 to +7.0	V
Maximum Pin voltage2	Vpin2max	LX2 to GNDs	-8.0 to +5.5	V
Maximum Pin voltage3	Vpin3max	VDCO1 to GNDs	-0.3 to +7.0	V
Maximum Pin voltage4	Vpin4max	VDCO2 to GNDs	-7.0 to +0.3	V
Maximum Pin voltage5	Vpin5max	LX2 to VDCO2	+12.5	V
Maximum Pin voltage6	Vpin6max	VDCO1 to VDCO2	+12.5	V
Maximum Pin voltage7	Vpin7max	VIN to LX2	+12.5	V
Maximum Pin voltage8	Vpin8max	EN to GNDs	-0.3 to +5.5	V
Maximum Pin voltage9	Vpin9max	Other pin to GNDs	-0.3 to +4.5	V
Allowable power	Pdmax	Ta=25°C The specified board*1	0.959	mW
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-40 to +125	°C

*1 Mounted on a specified board: 50mm×70mm×1.2mm (Double-layer glass epoxy)

Caution 1) Absolute maximum ratings represent the values which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range	VINop	VIN	+2.75 to +4.6	V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Electrical Characteristics at Ta = 25°C, VIN=3.7V, VDCO1=5.0V VDCO2=-5.0V(Unless otherwise noted)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Control Input						
High level input voltage	VINH	Input High level EN	1.2		5.5	V
EN pull down resistor	Rpulldown			1.6		MΩ
Low level input voltage	VINL	Input Low level EN	0		0.3	V
UVLO						
UVLO up	Vuvlo_h	VIN up		2.2		V
UVLO down	Vuvlo_l	VIN down	1.9	2.1		V
VIN current						
Standby current dissipation	Icc1	IC disable		0	1	uA
DC/DC current dissipation	Icc2	IC enable,switching=on		2		mA
VREF Output						
VREF Output	VREF	IVREF=50uA	2.673	2.7	2.727	V

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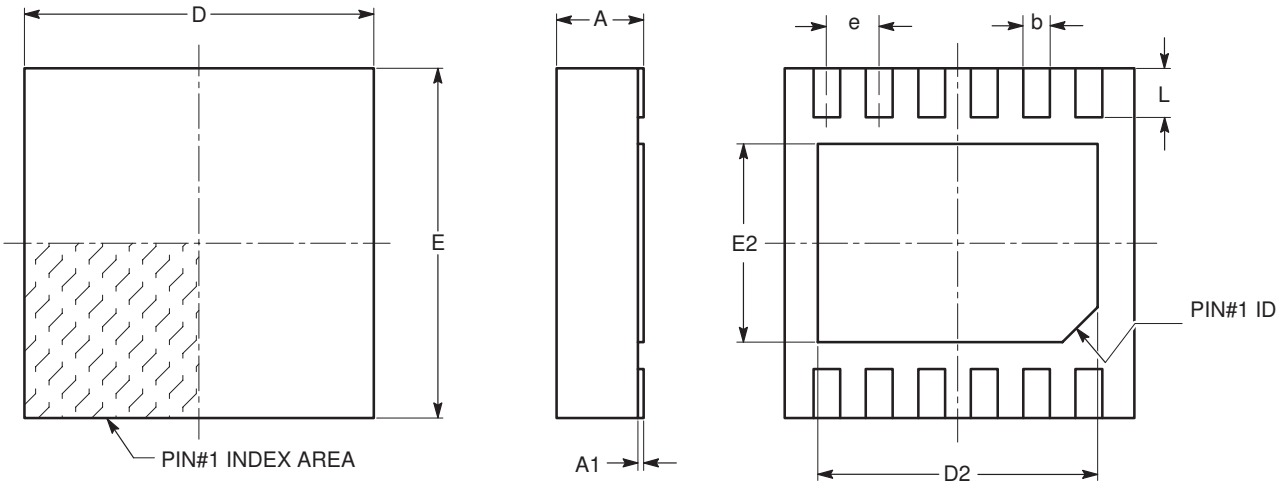
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
VDCO1 DC/DC Converter						
Feedback voltage of Positive voltage	FB1		0.99	1.0	1.01	V
VNEG voltage range	VNEG		4.6		5.8	V
Maximum Load Current	I_{LOAD_MAX}	VIN=2.9V to 4.5V	100			mA
ON Resistance LX1 Pch	RLX1P	Design guarantee		0.8		Ω
ON Resistance LX1 Nch	RLX1N	Design guarantee		0.55		Ω
VDCO2 DC/DC Converter						
Feedback voltage of Negative voltage	FB2		0.594	0.6	0.606	V
VNEG voltage range	VNEG		-5.8		-4.6	V
Maximum Load Current	I_{LOAD_MAX}	VIN=2.9V to 4.5V	100			mA
ON Resistance LX2 Pch	RLX2P	Design guarantee		0.48		Ω
ON Resistance LX2 Nch	RLX2N	Design guarantee		0.48		Ω
OSC						
OSC frequency	Fosc		1.26	1.5	1.74	MHz

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Package Dimensions

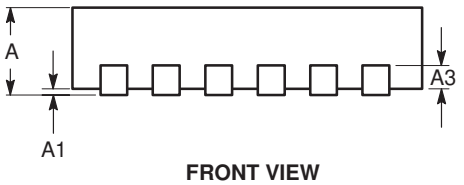
unit : mm

TDFN12, 3x3
CASE 511AN−01
ISSUE A



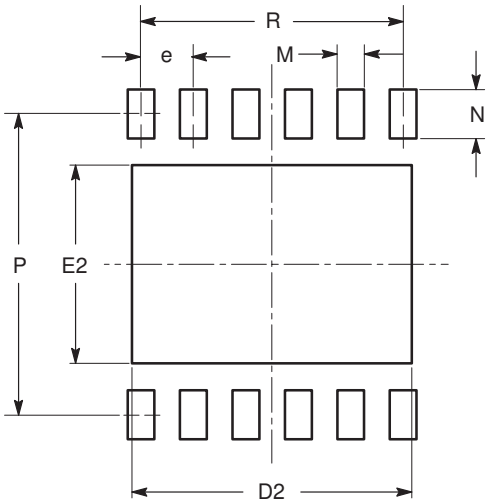
TOP VIEW **SIDE VIEW** **BOTTOM VIEW**

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3	0.178	0.203	0.228
b	0.18	0.23	0.30
D	2.90	3.00	3.10
D2	2.30	2.40	2.50
E	2.90	3.00	3.10
E2	1.55	1.70	1.75
e	0.45 BSC		
L	0.30	0.40	0.50
M	0.25	0.30	0.35
N	0.60	0.70	0.80
P	2.70	3.00	3.10
R	2.25 TYP		



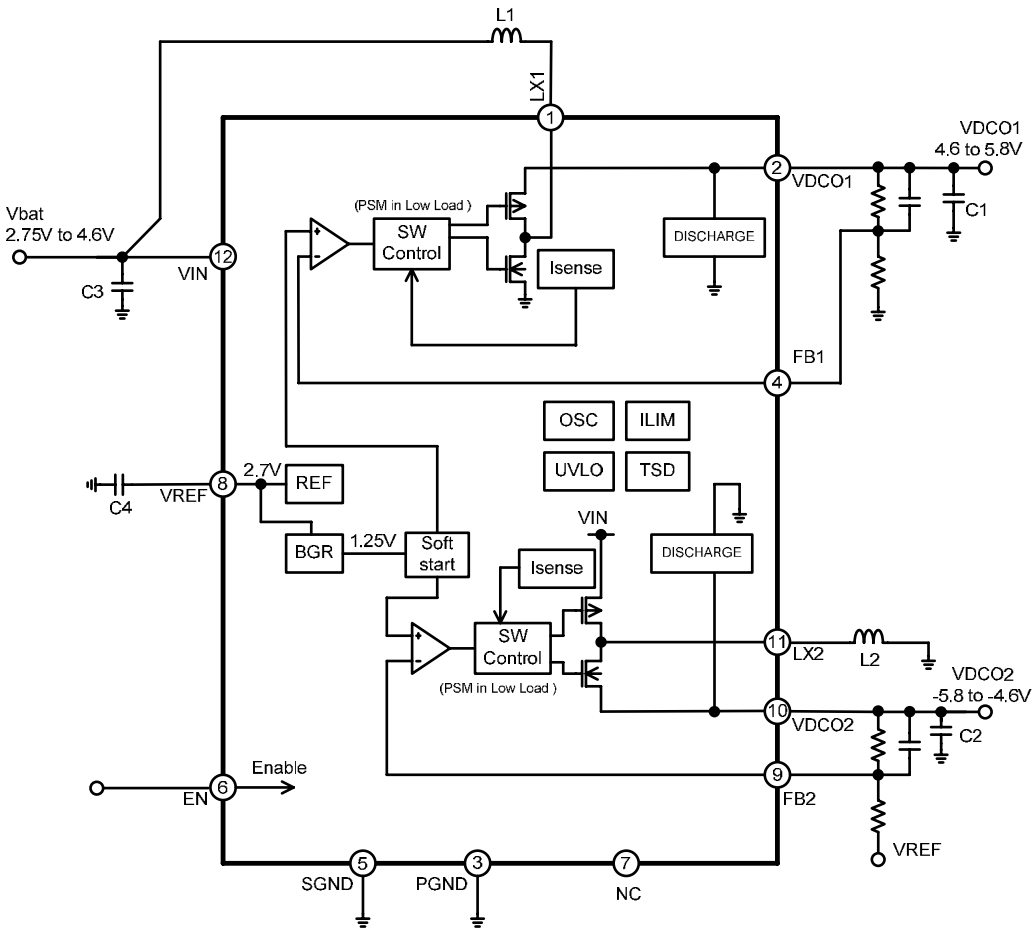
FRONT VIEW

RECOMMENDED LAND PATTERN



Notes:
(1) All dimensions are in millimeters.
(2) Complies with JEDEC MO-229.

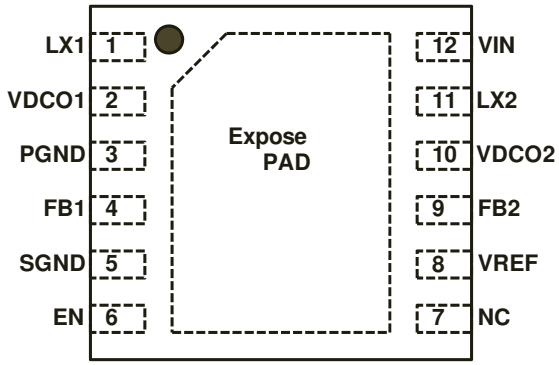
Block Diagram



L1,L2 : SPM3012T-4R7M(TDK)
C1,C2,C3 : C2012JB0J106K(TDK)

Pin Connection

TOP VIWE



Pin Function

Pin #	Pin name	
1	LX1	Boost converter switching pin
2	VDCO1	Boost converter output voltage
3	PGND	Power ground
4	FB1	Feedback pin of Boost converter.
5	SGND	Signal ground
6	EN	Chip enable (Active high) (*1)
7	NC	No Connection
8	VREF	Voltage reference output for Inverting converter
9	FB2	Feedback pin of Inverting converter.
10	VDCO2	Inverting converter output voltage
11	LX2	Inverting converter switching pin
12	VIN	Input supply voltage
	Expose-pad	Internally No Connection This pin must be connected to GND layers or VDCO2 layers

*1 DO NOT connect 6pin (EN) and 12pin (VIN) in the same line.

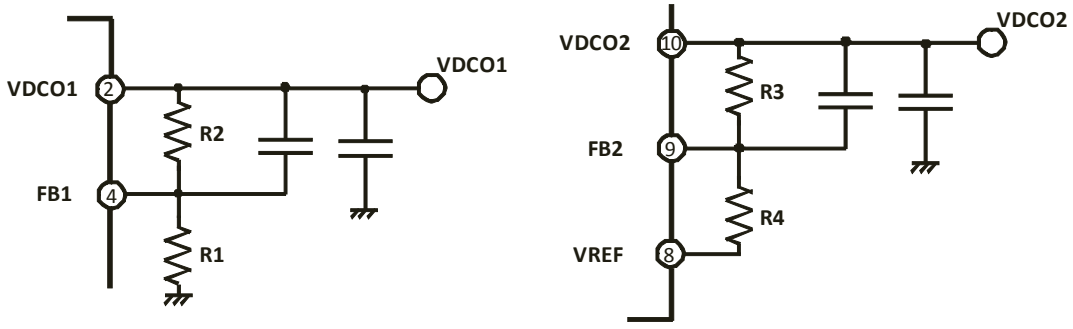
VDCO Output voltage setting

Output voltage is set by external resistor.

VDCO1 : Two external resistor that it connected between VDCO1 and GND.

VDCO2 : Two external resistor that it connected between VDCO2 and VREF.

*FB1=1.0V(Typ), FB2=0.6V(Typ), VREF=2.70V(Typ)



$$VDCO1 = \frac{R1 + R2}{R1} \cdot VFB1$$

$$VDCO2 = -\frac{R3}{R4} \cdot VREF + \frac{R3 + R4}{R4} \cdot VFB2$$

Starting & Shutdown flow

< Starting flow >

1. Apply battery voltage to 12pin (VIN) and L1(LX1 coil).
2. Apply high voltage to 6pin (EN).

< Shutdown flow >

1. Apply low voltage to 6pin (EN).
2. Drop supply voltage of the battery for 12pin (VIN) and L1(LX1 coil).

*DO NOT connect 6pin (EN) and 12pin (VIN) in the same line.

Pulse skipping mode in low load condition

When DCM is detected automatically, converter is driven in skipping mode.

The skipping mode reduces power consumption by performing intermittent switching and contributes to the improving the efficiency in the low load condition.

*DCM : Dis-continuous Current Mode

Over Current Protection and Short Circuite Protection

When a heavy load to exceed a rule appears, current is limited by protection system.

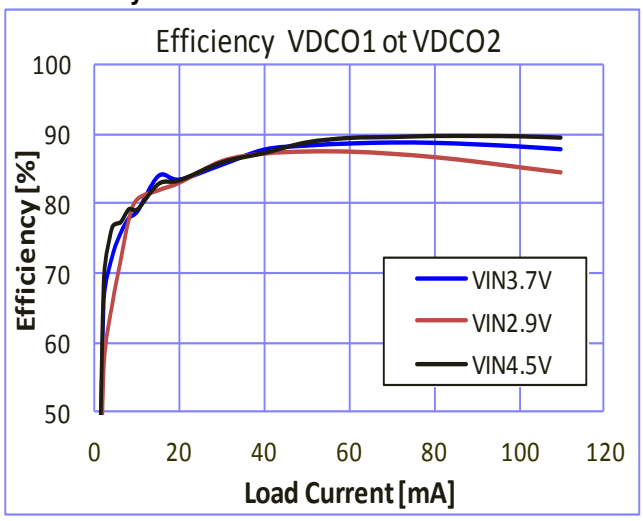
If this limiter continues more than 50ms, it is judged to have short-circuited and converter is stoped.

Thermal Shutdown

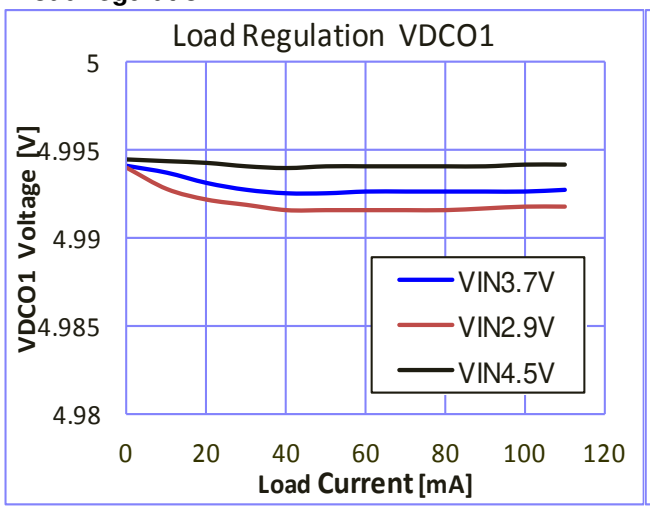
When chip temperayure is too high, boost converter and inverter converter is stopped.

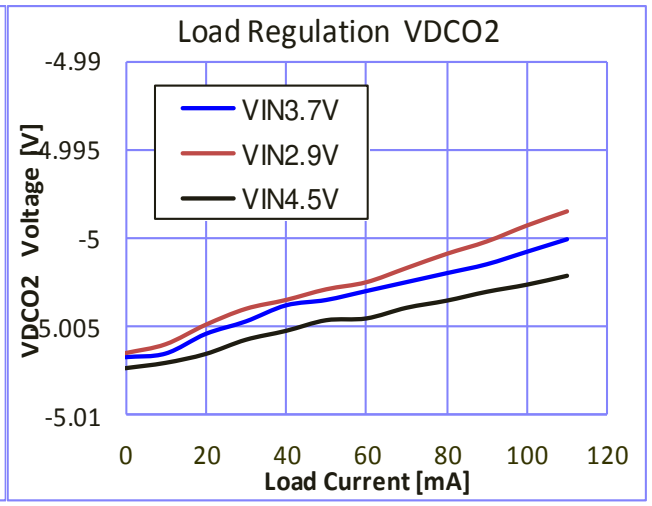
Typical Characteristics (VIN:3,7V, VDCO1:5V, VDCO2:-5V, L=4.7μF)

Efficiency vs Load Current

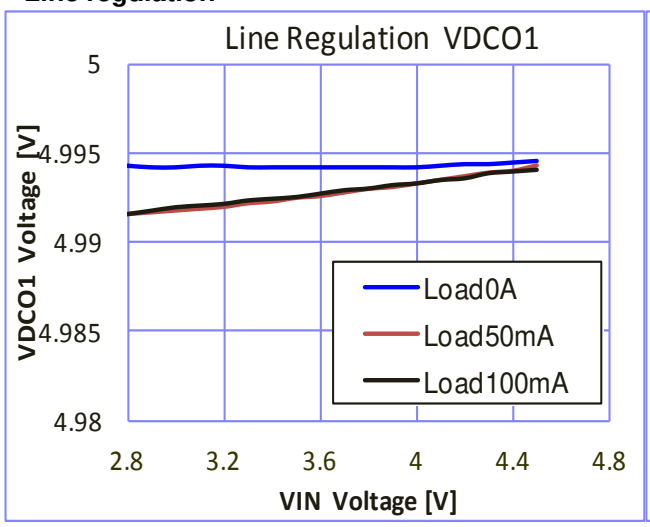


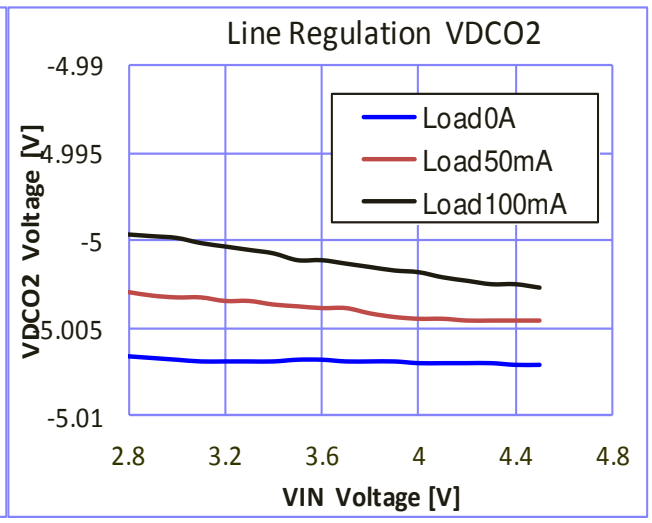
Load regulation





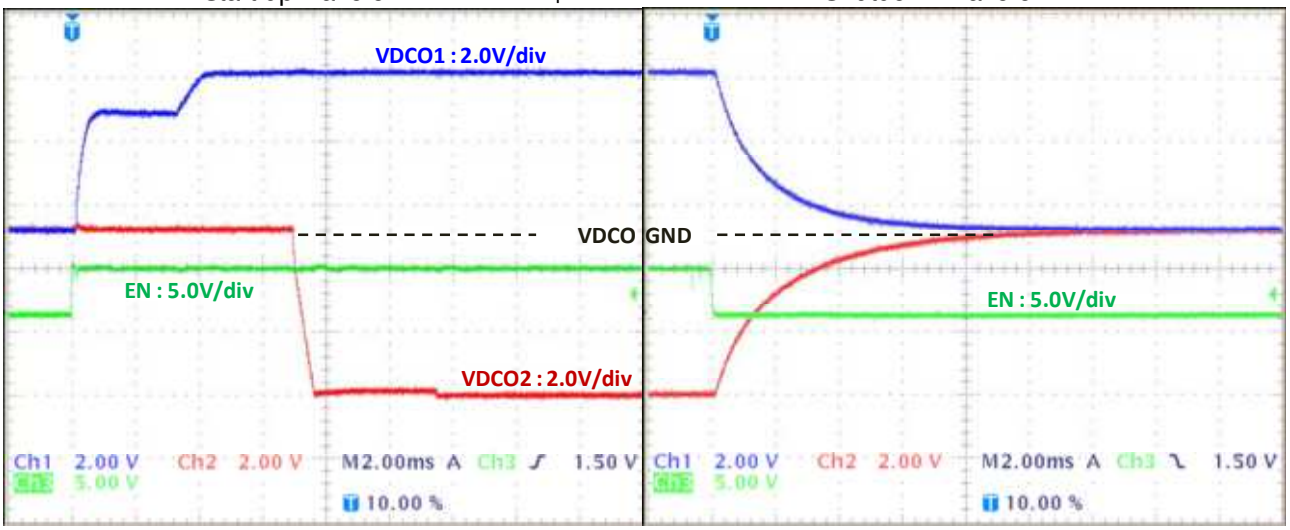
Line regulation





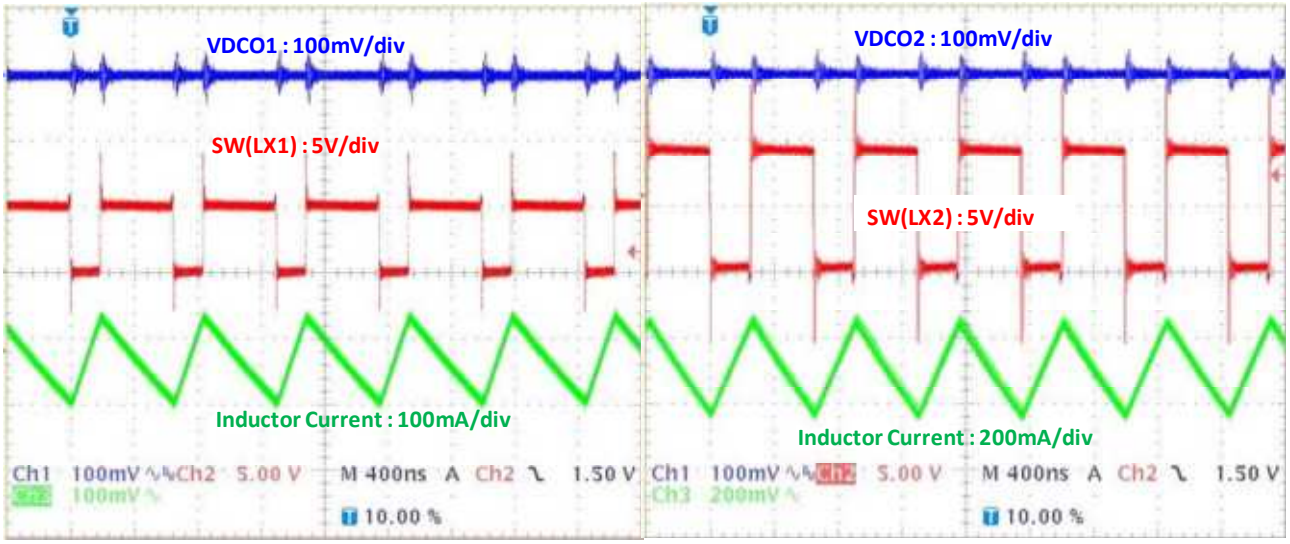
Start up & Shutdown waveform

Start up waveform | Shutdown waveform



Switching waveform (Load current 100mA)

VDCO1 VDCO2



ORDERING INFORMATION

Device	Package	Shipping (Qty / Packing)
LV52117QATXG	TDFN12 (3.0×3.0×0.75) (Halogen Free)	3000 / Tape & Reel

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