

Tiny Package, High Efficiency, Constant Current LED Driver

General Description

The RT9269 is a compact, high efficient LED driver with high flexibility of application configurations in charge pump mode or in boost rectifier mode, delivering Tens of mA constant output current for driving 1~4 white LED's.

The 0.25V low reference voltage minimized the power loss across the current-setting resistor.

The wide applicable VDD range makes RT9269 suitable for 1 to 4 battery cell applications as well as being supplied with 2.5/3.3/5/6V system powers. The 500kHz high switching rate minimized the size of external components. Besides, the 17 μ A low quiescent current together with high efficiency maintains long battery lifetime.

The output current is set with 1 external resistor. And the chip enable (CE) pin can be used for tuning the LED brightness by controlling the ON/OFF duty with external clock. RT9269 is provided in SOT-26 package.

Ordering Information

RT9269□ □

Package Type
E : SOT-26

Operating Temperature Range
C: Commercial Standard

Marking Information

For marking information, contact our sales representative directly or through a RichTek distributor located in your area, otherwise visit our website for detail.

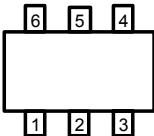
Features

- 0.25V Low Reference Voltage
- 17 μ A Quiescent (Switch-off) Supply Current
- Zero Shutdown Mode Supply Current
- 85% Efficiency
- 500kHz Fixed Switching Rate
- Tuning LED brightness with CE pin ON/OFF Duty
- Small SOT-26 Package

Applications

- LED Module
- Hand Held Panel
- Compact Back Light Module
- Small Battery Charger
- Constant Current Source

Pin Configurations

Part Number	Pin Configurations
RT9269CE (Plastic SOT-26)	TOP VIEW  1. CE 2. EXT 3. GND 4. LX 5. VDD 6. FB

Typical Application Circuit

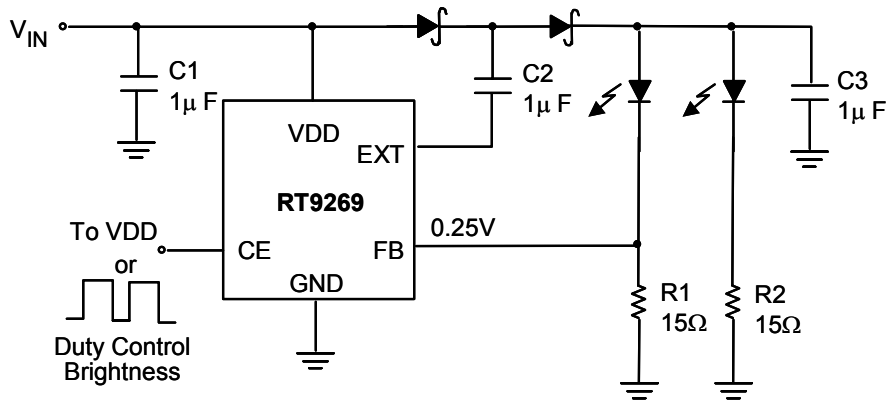


Fig. 1 RT9269 drives single or parallel LED's in charge pump configuration

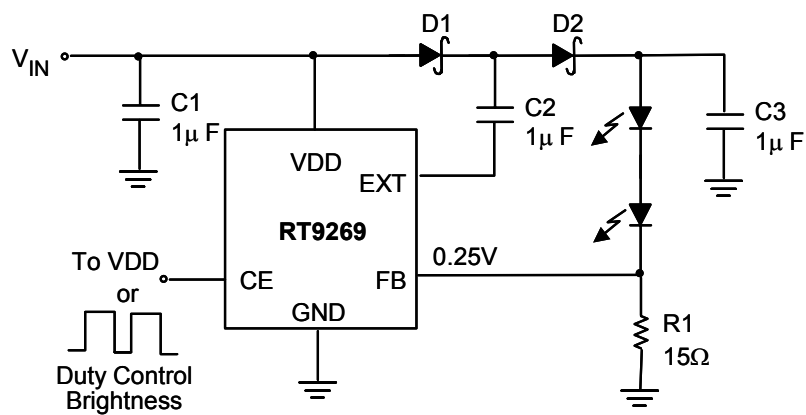


Fig. 2 RT9269 drives 2 series connected LED's in charge pump configuration

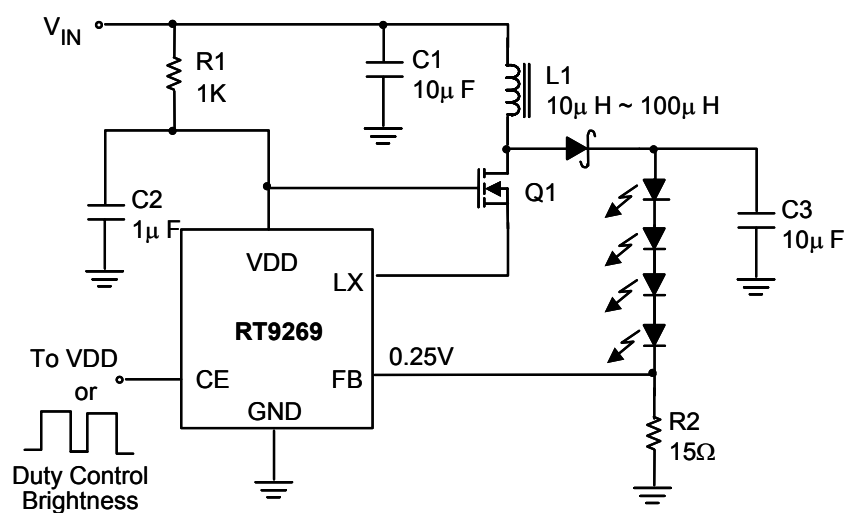


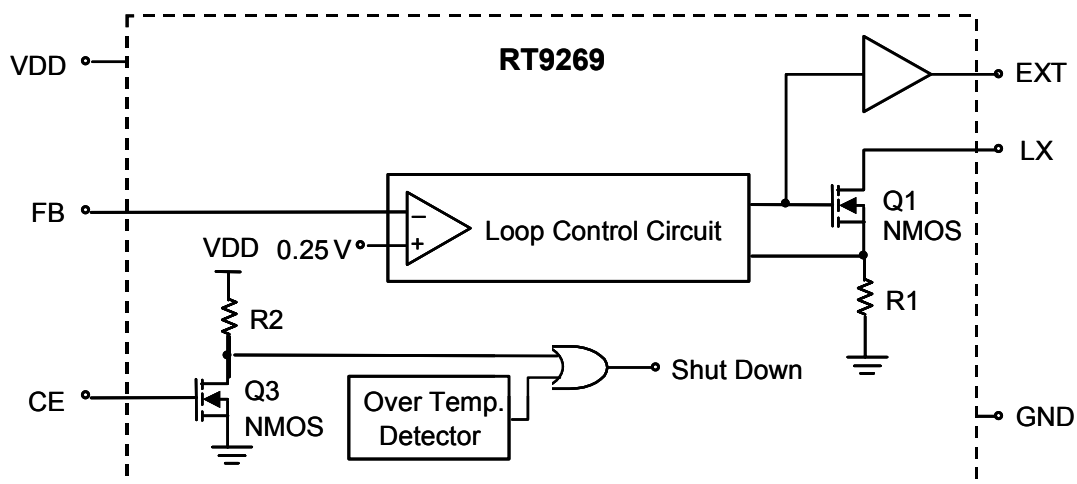
Fig. 3 RT9269 drives 2~4 series connected LED's in boost rectifier configuration

Note: NICHIA NSCW100 is used for RT9269 LED parts.

Pin Description

Pin No.	Pin Name	Pin Function
1	CE	Chip enable RT9269 gets into shutdown mode when CE pin set to low.
2	EXT	Output pin for configuring charge pump or driving external NMOS
3	GND	Ground
4	LX	Pin for switching
5	VDD	Input positive power pin of RT9269
6	FB	Feedback input pin Internal reference voltage for the error amplifier is 0.25V.

Function Block Diagram



Absolute Maximum Ratings

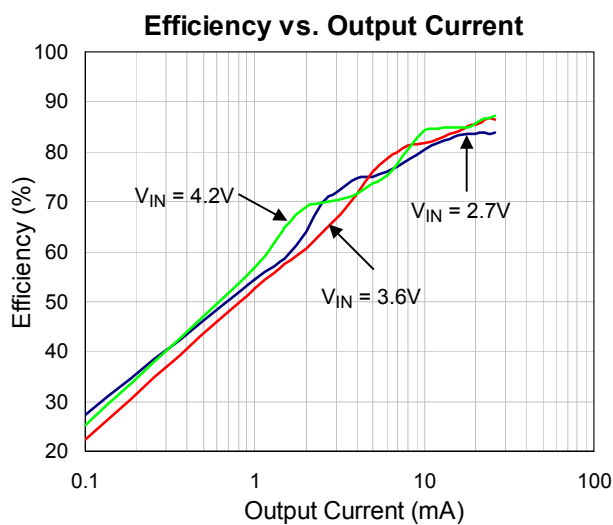
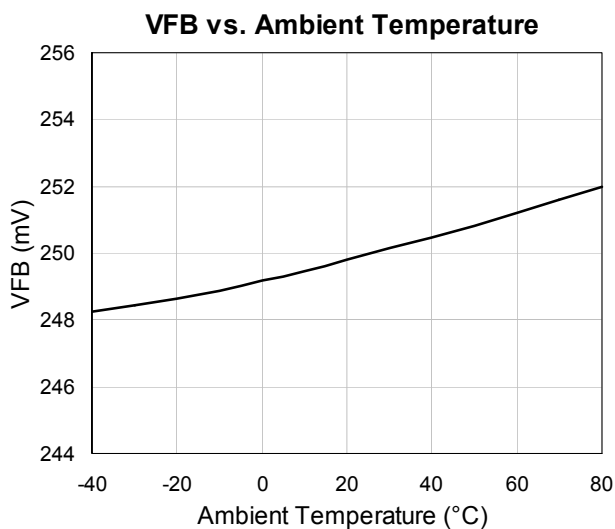
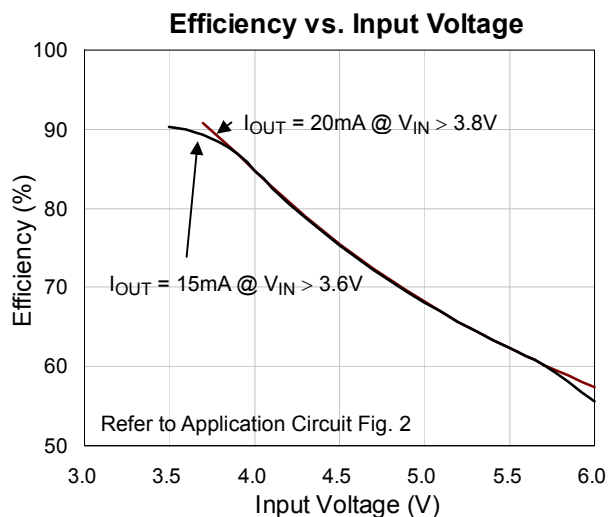
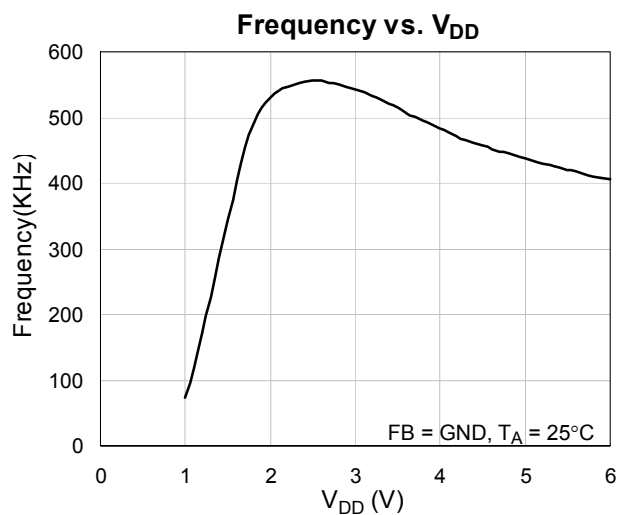
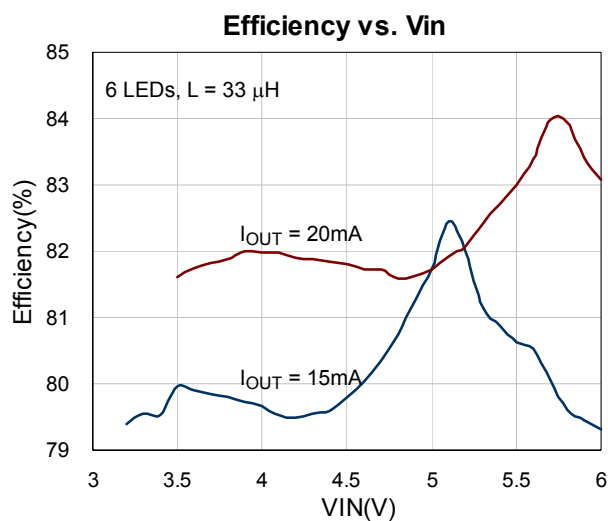
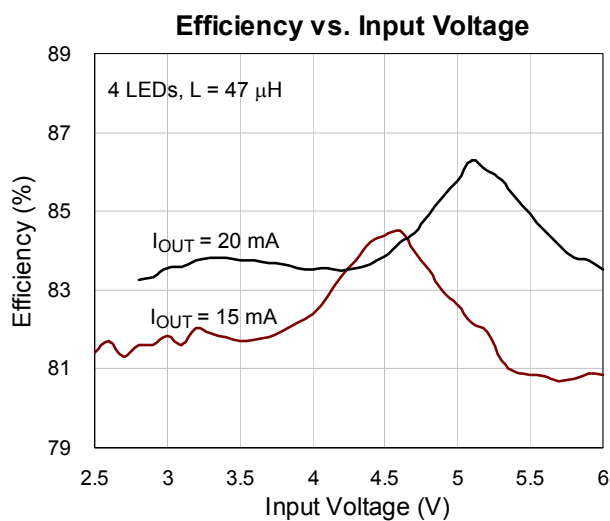
- Supply Voltage – 0.3V to 7V
- LX Pin Switch Voltage – 0.3V to ($V_{DD} + 0.8V$)
- Other I/O Pin Voltages – 0.3V to ($V_{DD} + 0.3V$)
- LX Pin Switch Current 2.5A
- EXT Pin Driver Current 200mA
- Power Dissipation, P_D @ $T_A = 25^\circ C$
 SOT-26 0.25W
- Package Thermal Resistance
 SOT-26, θ_{JA} $250^\circ C/W$
- Operating Junction Temperature $125^\circ C$
- Storage Temperature Range $-65^\circ C \sim +150^\circ C$

Electrical Characteristics

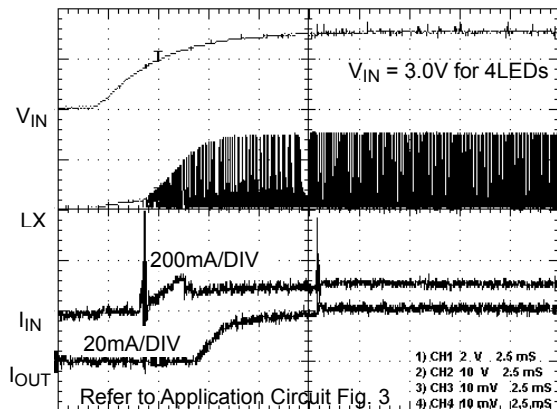
($V_{IN} = 3.3V$, V_{DD} set to 5V, Load Current = 0, $T_A = 25^\circ C$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Start-UP Voltage	V_{ST}	$I_L = 1mA$	--	0.98	1.05	V
Operating V_{DD} Range	V_{DD}	V_{DD} pin voltage	2	--	6.5	V
No Load Current I (V_{IN})	$I_{NO\ LOAD}$	$V_{IN} = 3.3V$, $V_{OUT} = 5V$	--	30	--	μA
Switch-off Current I (V_{DD})	$I_{SWITCH\ OFF}$	$V_{IN} = 6V$	--	17	--	μA
Shutdown Current I (V_{IN})	I_{OFF}	CE Pin = 0V, $V_{IN} = 6V$	--	0.1	1	μA
Feedback Reference Voltage	V_{REF}	Close Loop, $V_{DD} = 5V$		0.25		V
Switching Rate	F_S	$V_{DD} = 5V$	--	500	--	kHz
Maximum Duty	D_{MAX}	$V_{DD} = 5V$	--	75	--	%
LX ON Resistance		$V_{DD} = 5V$	--	0.4	--	Ω
Current Limit Setting	I_{LIMIT}	$V_{DD} = 5V$	--	500	--	mA
EXT ON Resistance to V_{DD}		$V_{DD} = 5V$	--	5	--	Ω
EXT ON Resistance to GND		$V_{DD} = 5V$	--	5	--	Ω
CE Pin Trip Level		$V_{DD} = 5V$	0.4	0.8	1.2	V
Temperature Stability for V_{REF}	T_S		--	50	--	ppm/ $^\circ C$
Thermal Shutdown	T_{SD}		--	165	--	$^\circ C$
Thermal Shutdown Hysterises	ΔT_{SD}		--	10	--	$^\circ C$

Typical Operating Characteristics

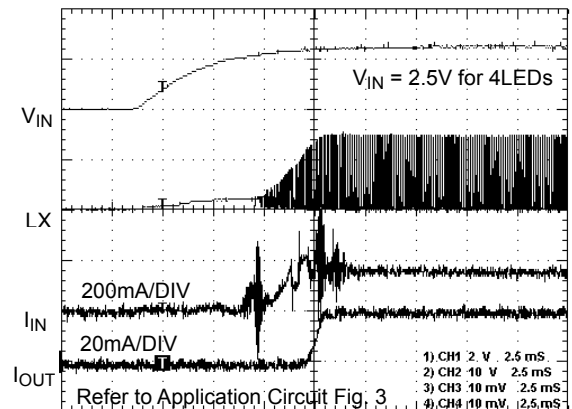


Power ON Waveform



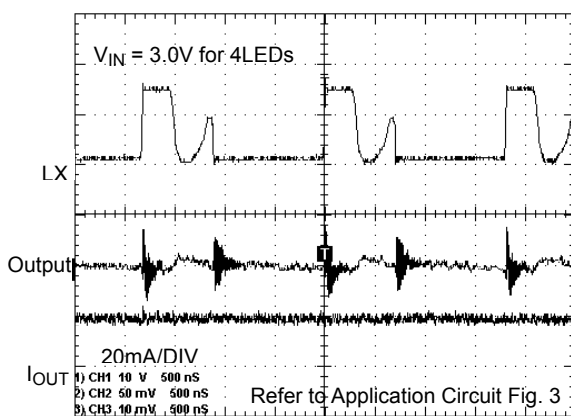
Time (2.5mS/DIV)

Power ON Waveform



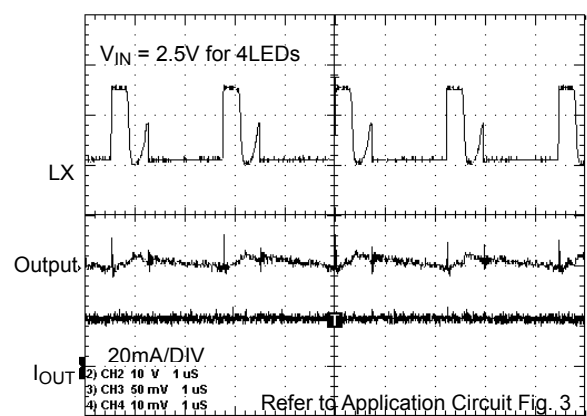
Time (2.5mS/DIV)

LX vs. Output Ripple Waveform



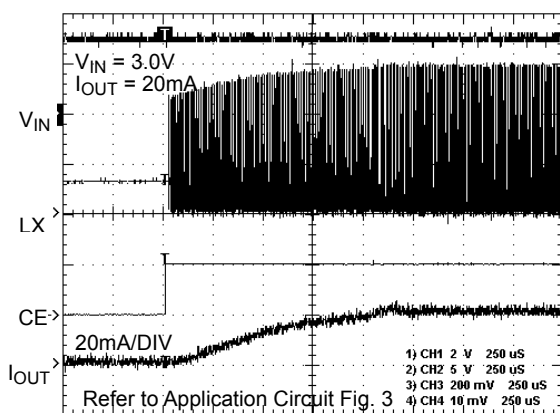
Time (500nS/DIV)

LX vs. Output Ripple Waveform



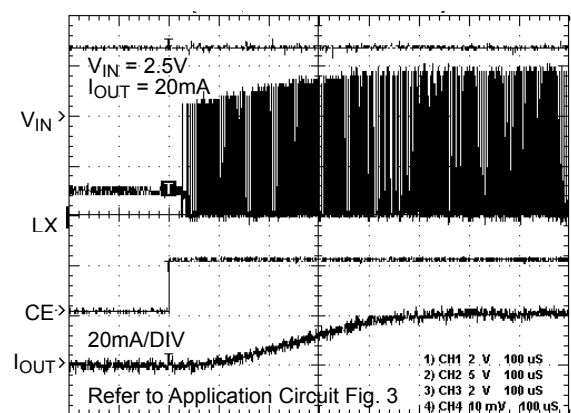
Time (1μS/DIV)

Power Up Waveform



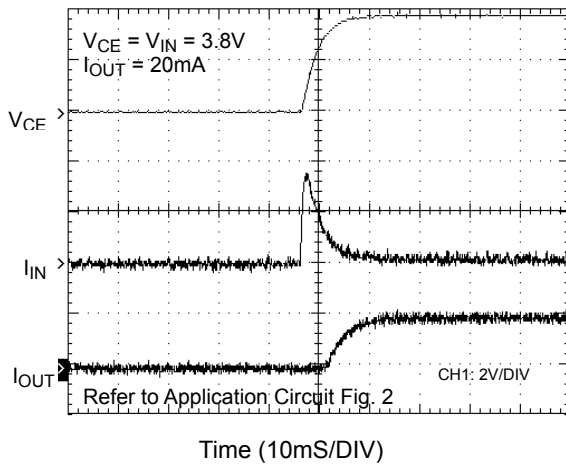
Time (250μS/DIV)

Power Up Waveform

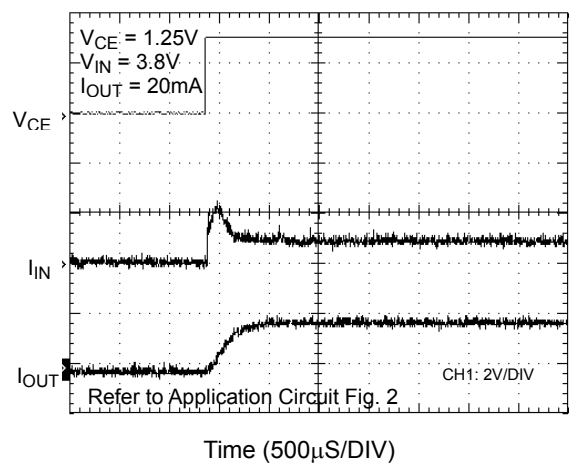


Time (100μS/DIV)

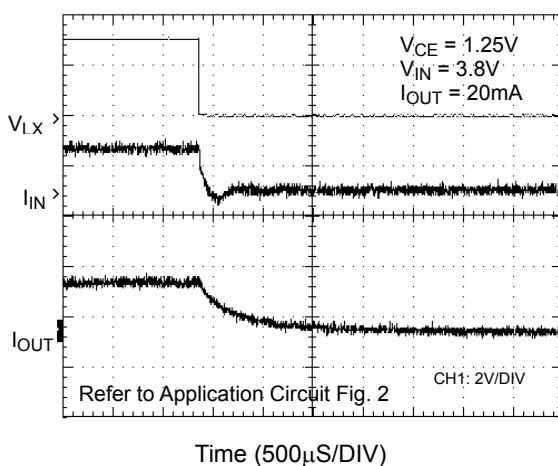
Power On Waveform



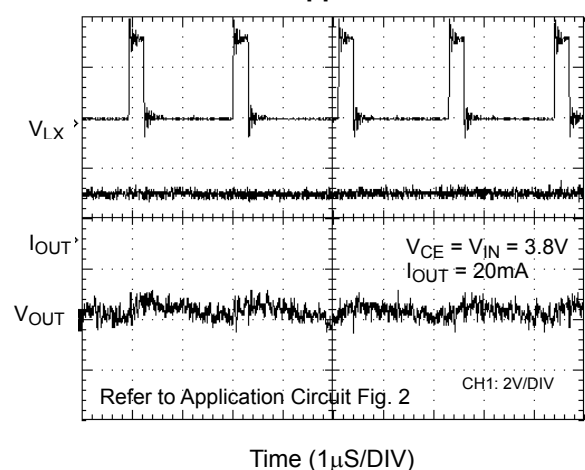
Power Up Waveform



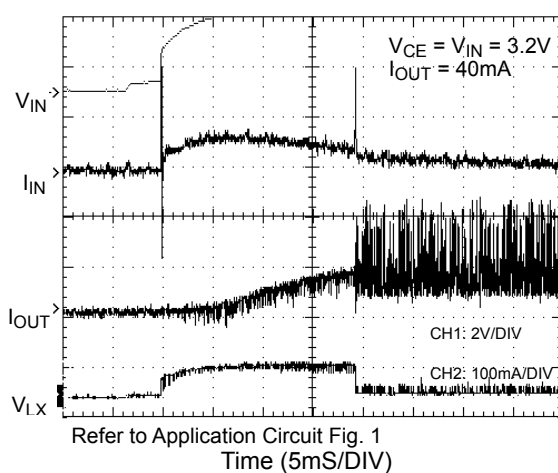
Shutdown Waveform



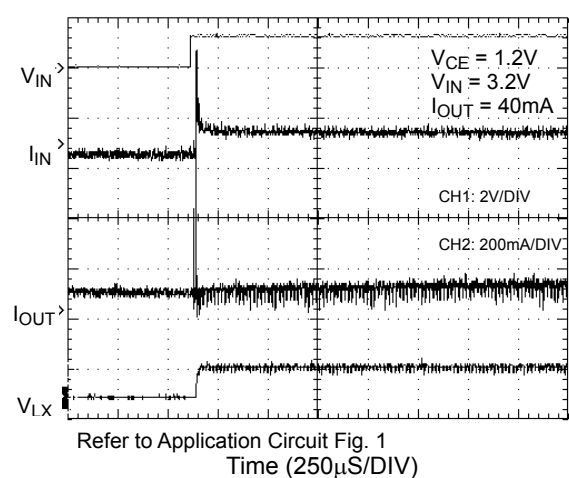
LX vs. Ripple Waveform



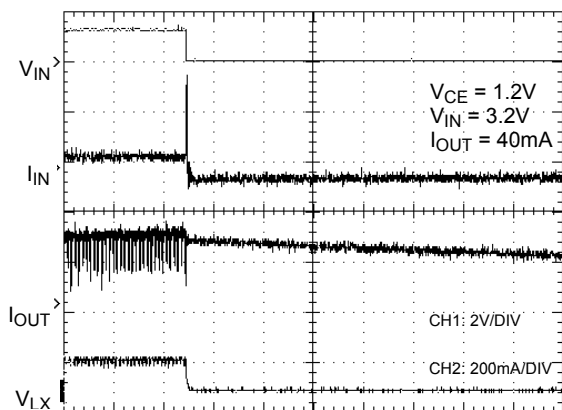
Power On Waveform



Power Up Waveform

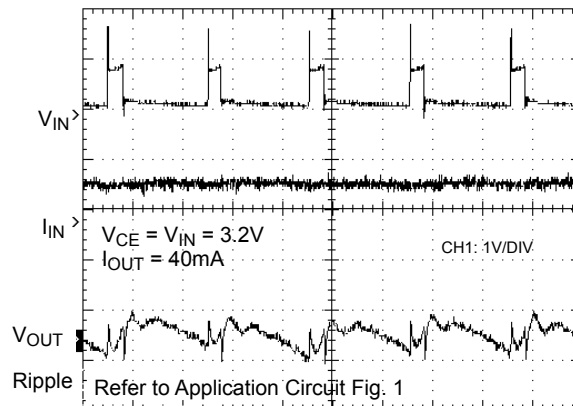


Shutdown Waveform



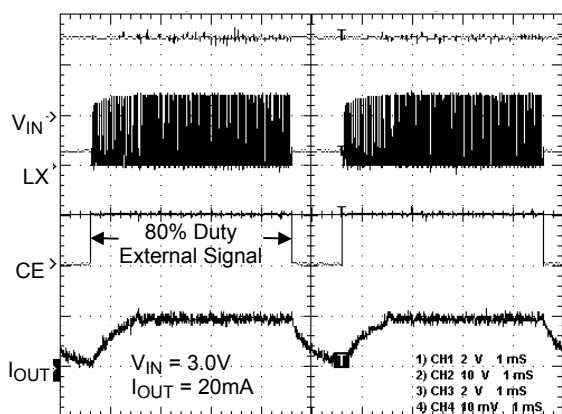
Refer to Application Circuit Fig. 1
Time (250 μ S/DIV)

LX vs. Output Ripple Waveform



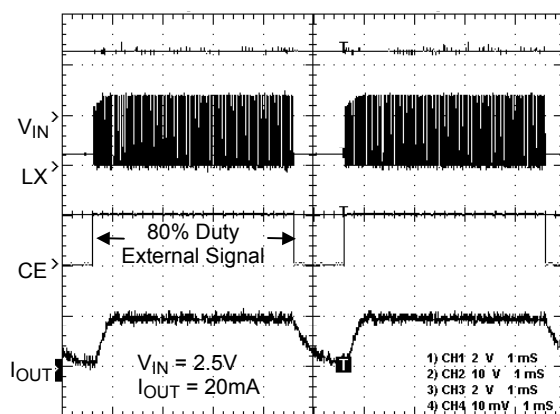
Time (1 μ S/DIV)

Brightness Control

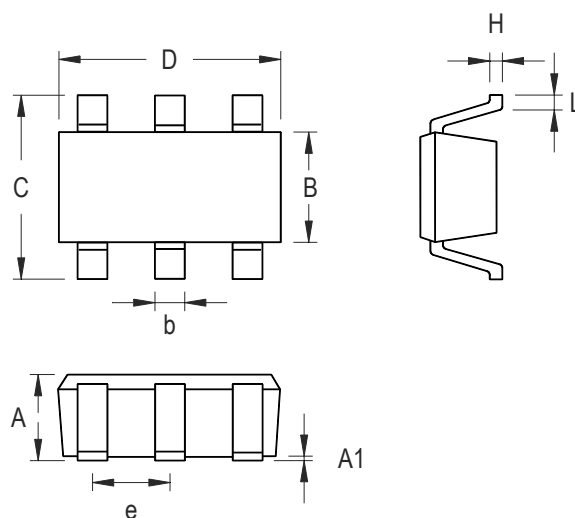


Time (1mS/DIV)

Brightness Control



Time (1mS/DIV)

Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.035	0.051
A1	--	0.152	--	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.559	0.014	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.102	0.254	0.004	0.010
L	0.356	0.610	0.014	0.024

SOT- 26 Surface Mount Package

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