

Tiny Package, High Efficiency, Constant Current LED Driver

General Description

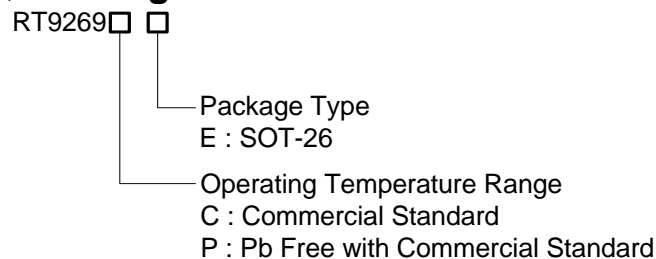
The RT9269 is a compact, high efficient LED driver with high flexibility of application configurations in charge pump mode or in boost rectifier mode, delivering Tens of mA constant output current for driving 1~4 white LED's.

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 17µA low quiescent current together with high efficiency maintains long battery lifetime.

The output current is set with 1 external resistor. And the chip enable (EN) 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



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.

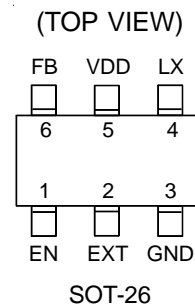
Features

- 0.25V Low Reference Voltage
- 17µA Quiescent (Switch-off) Supply Current
- Zero Shutdown Mode Supply Current
- 85% Efficiency
- 500kHz Fixed Switching Rate
- Tuning LED brightness with EN 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



Note : There is no pin1 indicator on top mark for SOT-26 type, and pin 1 will be lower left Pin when reading top mark from left to right.

Typical Application Circuit

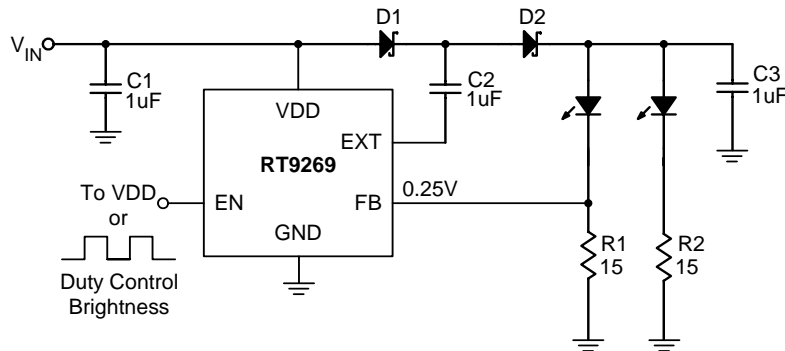


Figure 1. RT9269 drives single or parallel LED's in charge pump configuration

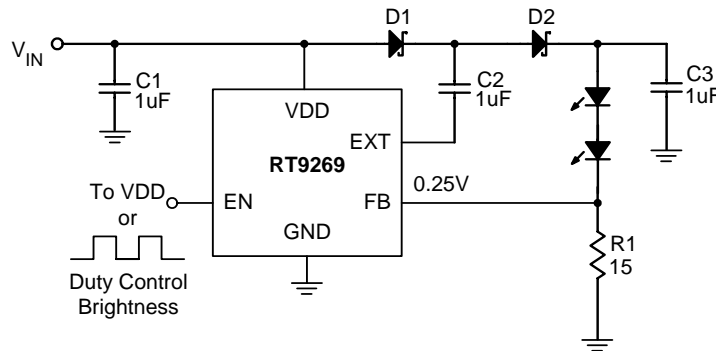


Figure 2. RT9269 drives 2 series connected LED's in charge pump configuration

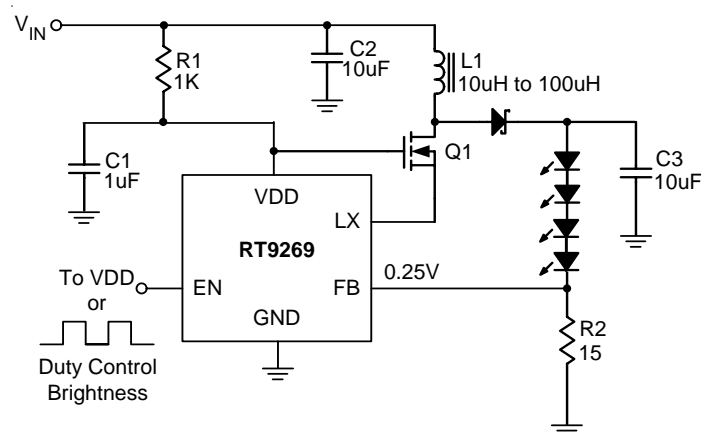


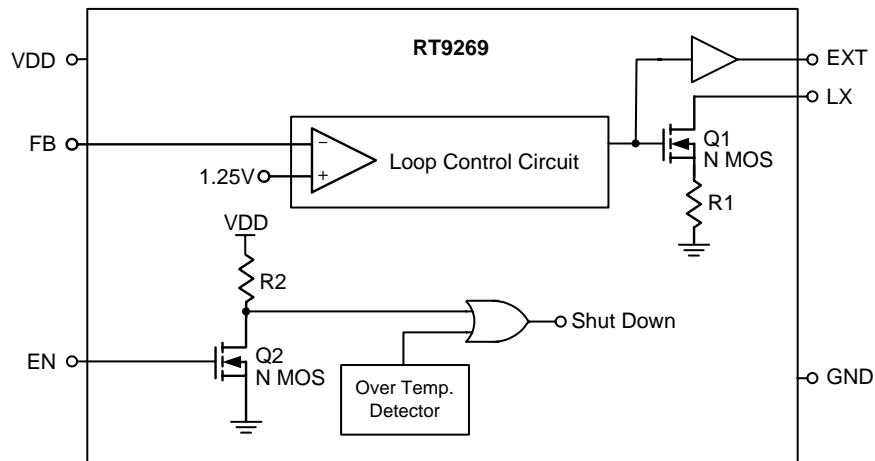
Figure 3. RT9269 drives 2~4 series connected LED's in boost rectifier configuration

Note: NICHIA NSCW100 is used for RT9269 LED parts.

Functional Pin Description

| Pin No. | Pin Name | Pin Function |
|---------|----------|---|
| 1 | EN | Chip Enable (Active High) |
| 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

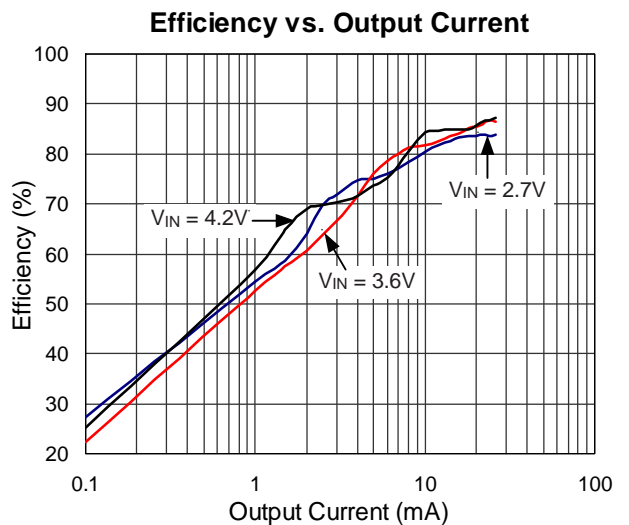
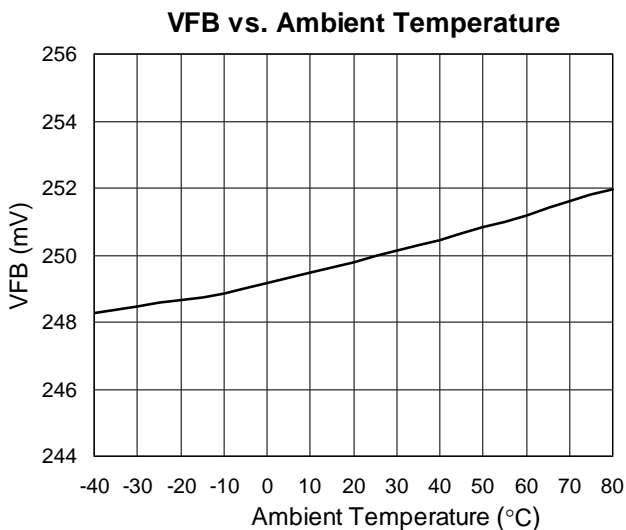
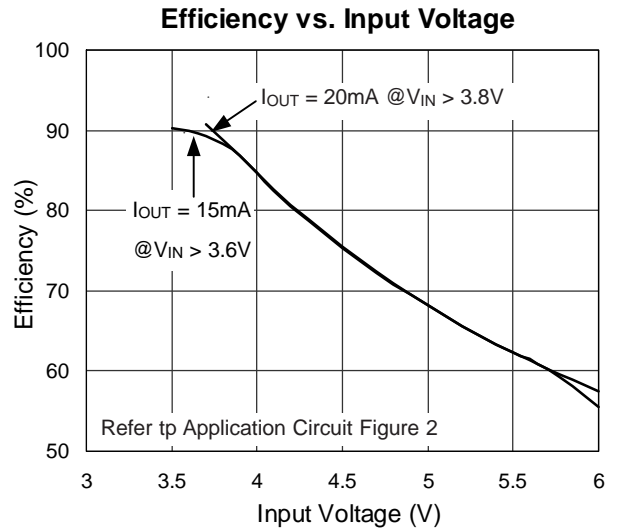
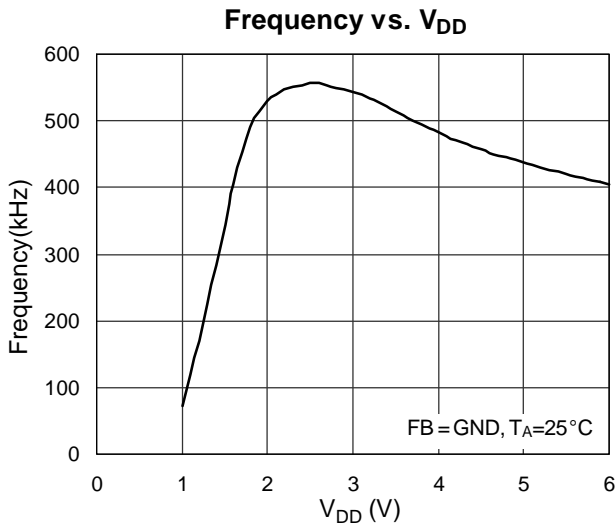
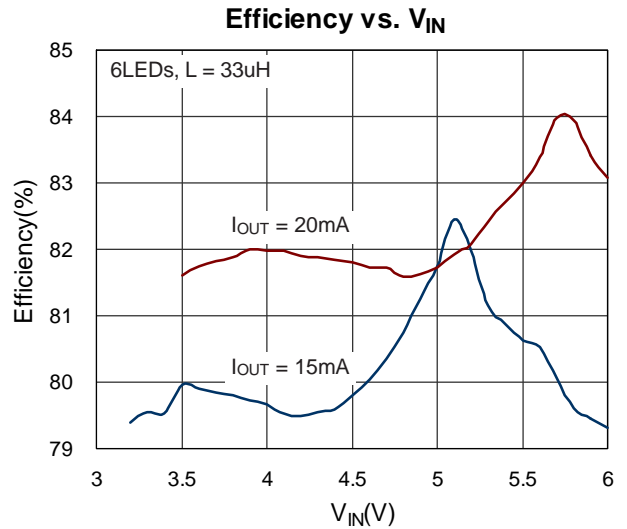
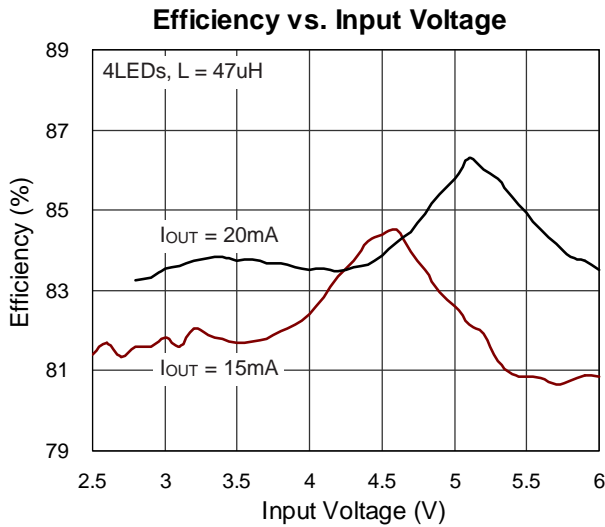
- Supply Voltage ----- -0.3V to 7V
- LX Pin Switch Voltage ----- -0.3V to (V_{DD} +0.8V)
- Other I/O Pin Voltages ----- -0.3V to (V_{DD} +0.3V)
- LX Pin Switch Current ----- 2.5A
- EXT Pin Driver Current ----- 200mA
- Power Dissipation, P_D @ T_A = 25°C
 - SOT-26 ----- 0.25W
- Package Thermal Resistance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

Electrical Characteristics

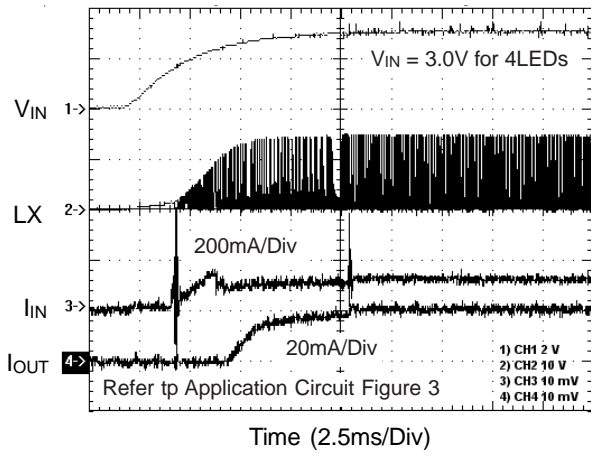
(V_{IN} = 3.3V, V_{DD} set to 5V, Load Current = 0, T_A = 25°C, unless otherwise specified)

| 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} | V _{IN} = 6V | -- | 17 | -- | μA |
| Shutdown Current I (V _{IN}) | I _{OFF} | EN 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 |
| EN Pin Trip Level | | V _{DD} = 5V | 0.4 | 0.8 | 1.2 | V |
| Temperature Stability for V _{REF} | T _S | | -- | 50 | -- | ppm/°C |
| Thermal Shutdown | T _{SD} | | -- | 165 | -- | °C |
| Thermal Shutdown Hysterises | ΔT _{SD} | | -- | 10 | -- | °C |

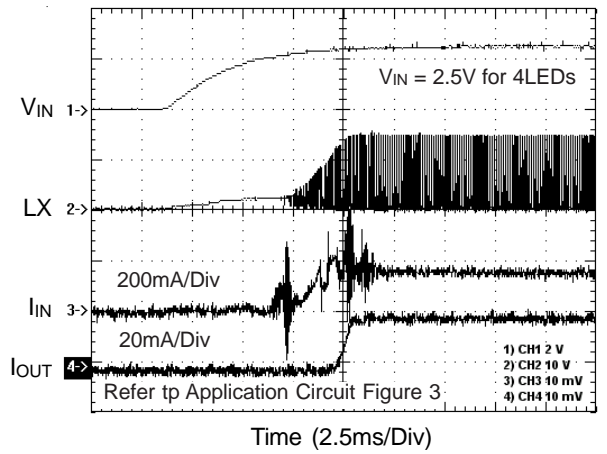
Typical Operating Characteristics



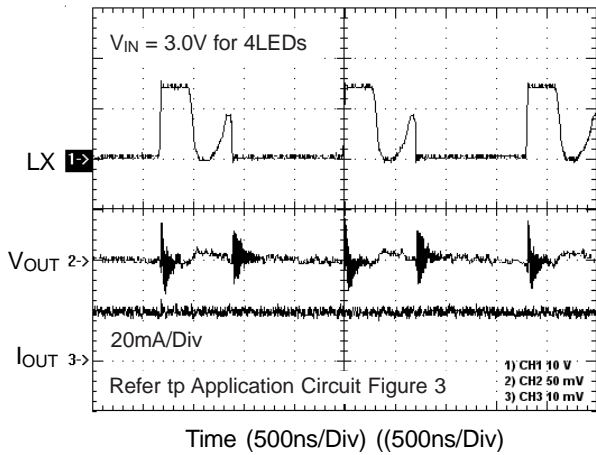
Power ON Waveform



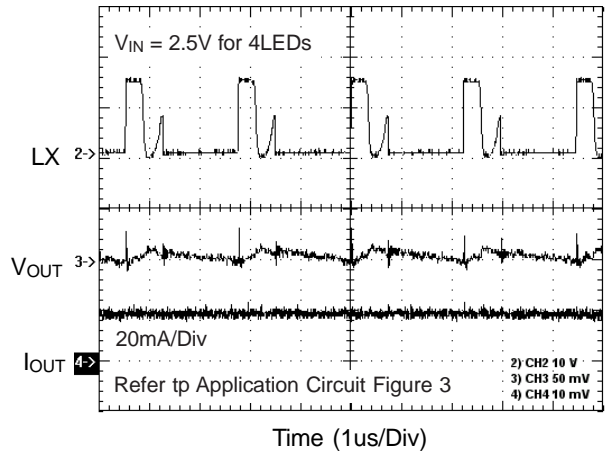
Power ON Waveform



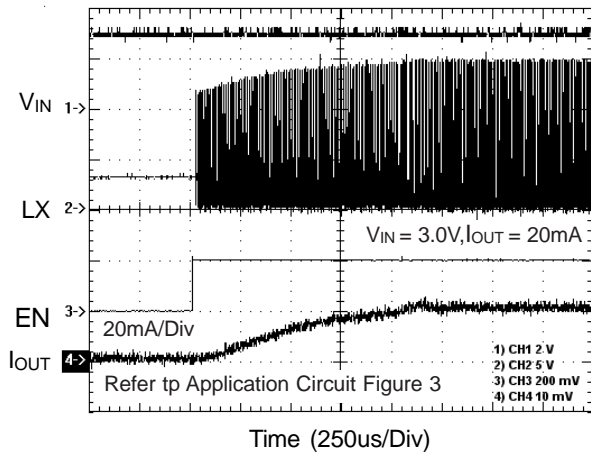
LX vs. Output Ripple



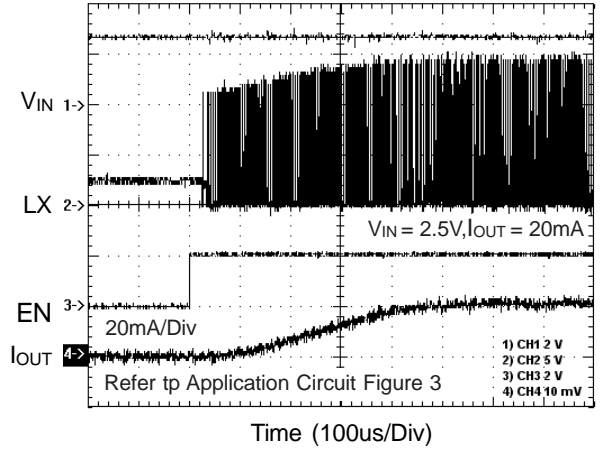
LX vs. Output Ripple



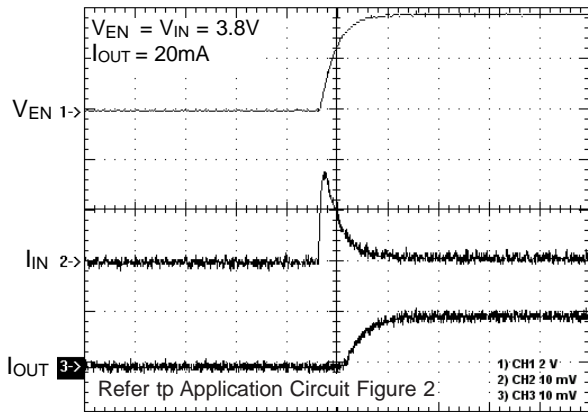
Power UP Waveform



Power UP Waveform

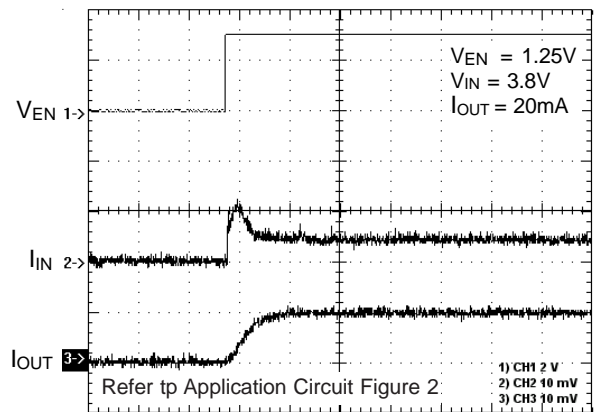


Power On Waveform



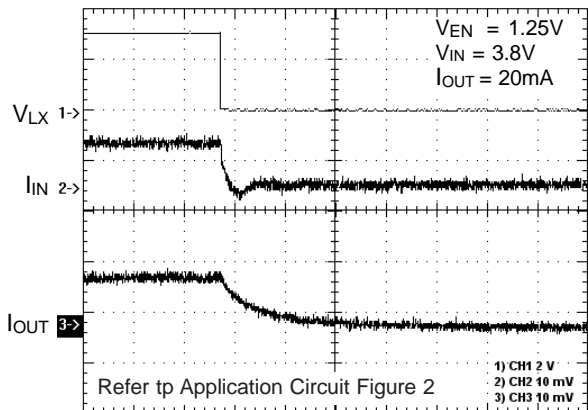
Time (10ms/Div)

Power Up Waveform



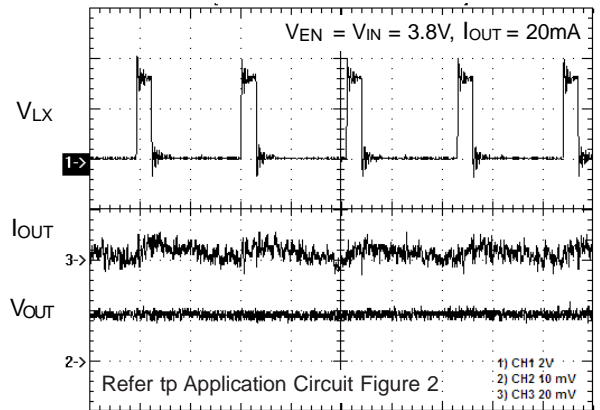
Time (500us/Div)

EN Pin Shutdown Response



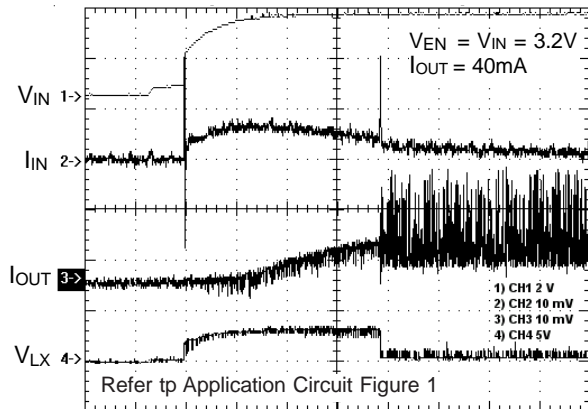
Time (500us/Div)

LX vs. Output Ripple



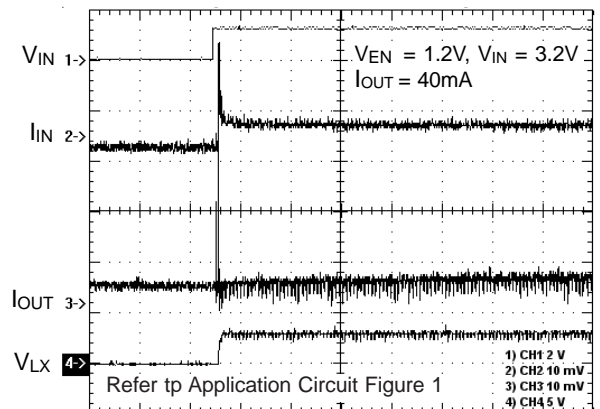
Time (1us/Div)

Power On Waveform



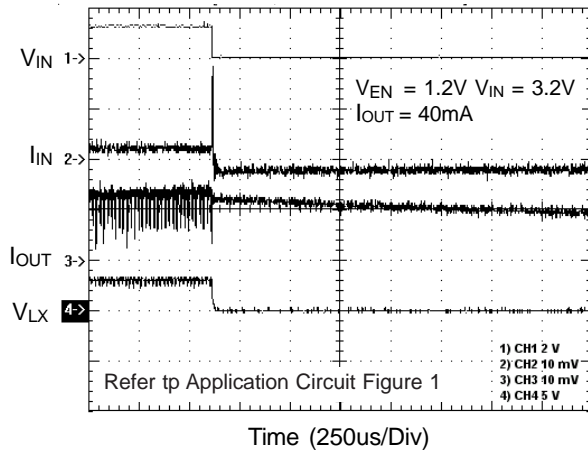
Time (5ms/Div)

Power Up Waveform

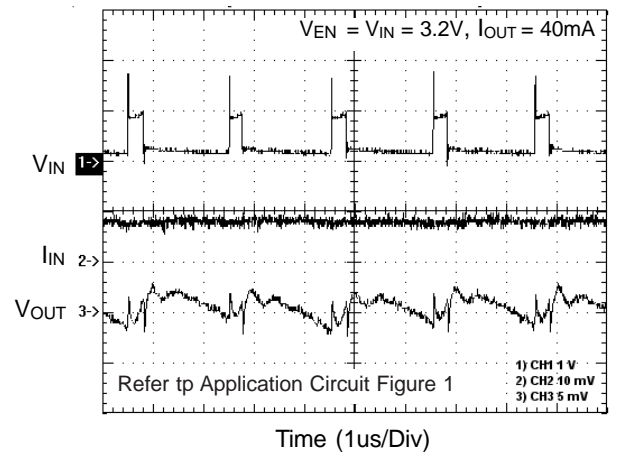


Time (250us/Div)

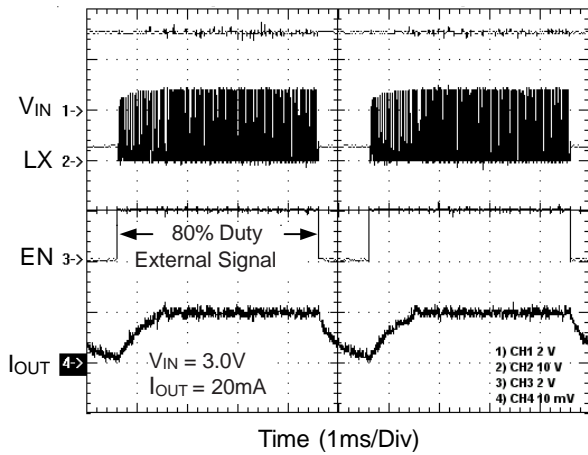
EN Pin Shutdown Response



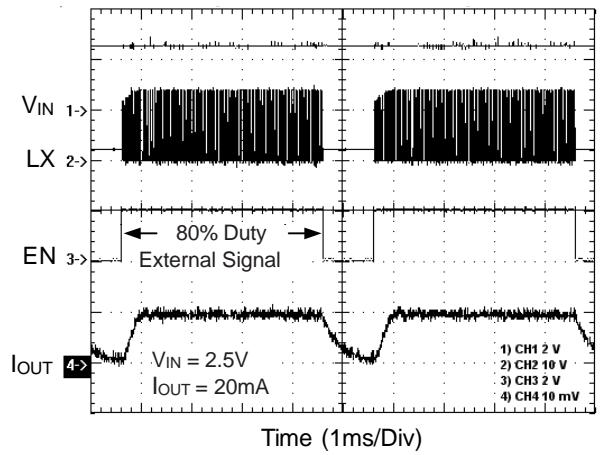
LX vs. Output Ripple



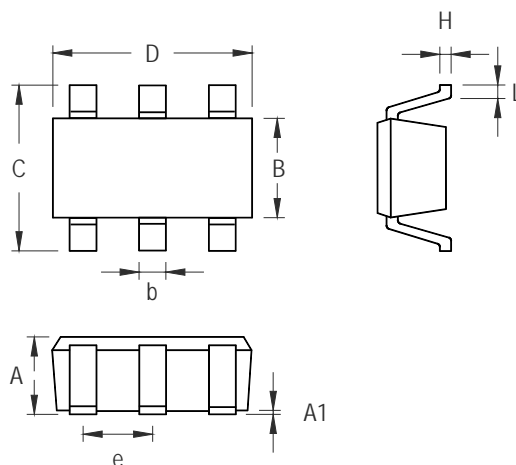
Brightness Control



Brightness Control



Outline Dimension



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.889 | 1.295 | 0.031 | 0.051 |
| A1 | 0.000 | 0.152 | 0.000 | 0.006 |
| B | 1.397 | 1.803 | 0.055 | 0.071 |
| b | 0.250 | 0.560 | 0.010 | 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 | 0.080 | 0.254 | 0.003 | 0.010 |
| L | 0.300 | 0.610 | 0.012 | 0.024 |

SOT- 26 Surface Mount Package

RICHTEK TECHNOLOGY CORP.

Headquarter
 5F, No. 20, Taiyuen Street, Chupei City
 Hsinchu, Taiwan, R.O.C.
 Tel: (8863)5526789 Fax: (8863)5526611

RICHTEK TECHNOLOGY CORP.

Taipei Office (Marketing)
 8F-1, No. 137, Lane 235, Paochiao Road, Hsintien City
 Taipei County, Taiwan, R.O.C.
 Tel: (8862)89191466 Fax: (8862)89191465
 Email: marketing@richtek.com