



# CAT4104

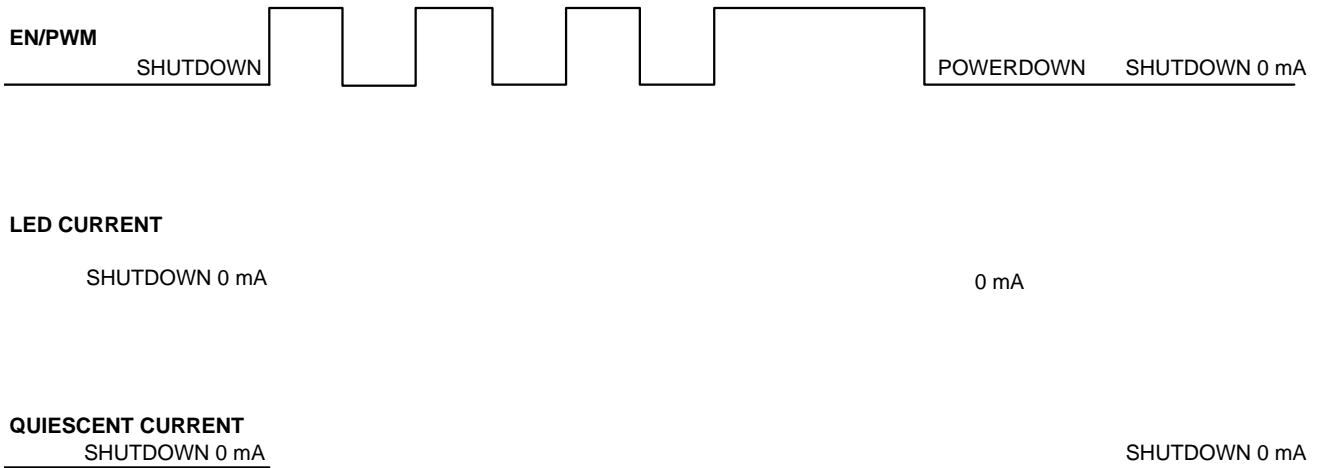
**Table 1. ABSOLUTE MAXIMUM RATINGS**

Parameter	Rating	Unit
VIN, RSET, EN/PWM Voltages	-0.3 to 6	V

# CAT4104

**Table 4. RECOMMENDED EN/PWM TIMING** (Min and Max values are over the recommended operating conditions unless specified otherwise. Typical values are at VIN = 5.0 V, TAMB = 25°C.)

Symbol	Name	Conditions	Min	Typ	Max	Units
T <sub>PS</sub>	Turn-On time, EN/PWM rising to I <sub>LED</sub> from shutdown	I <sub>LED</sub> = 175 mA I <sub>LED</sub> = 80 mA		1.5 1.3		μs
T <sub>P1</sub>	Turn-On time, EN/PWM rising to I <sub>LED</sub>	I <sub>LED</sub> = 175 mA		600		ns
T <sub>P2</sub>	Turn-Off time, EN/PWM falling to I <sub>LED</sub>	I <sub>LED</sub> = 175 mA I <sub>LED</sub> = 80 mA		400 300		ns
T <sub>R</sub>	LED rise time	I <sub>LED</sub> = 175 mA I <sub>LED</sub> = 80 mA		700 440		ns
T <sub>F</sub>	LED fall time	I <sub>LED</sub> = 175 mA I <sub>LED</sub> = 80 mA		360 320		ns
T <sub>LO</sub>	EN/PWM low time		1			μs
T <sub>HI</sub>	EN/PWM high time		5			μs
T <sub>PWRDWN</sub>	EN/PWM low time to shutdown delay			4	8	ms

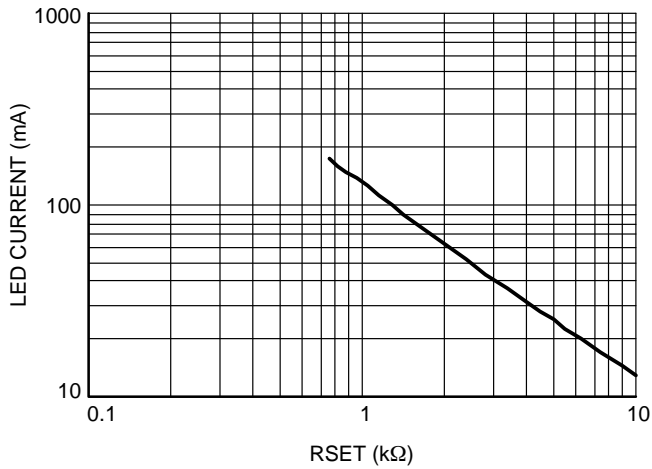


**Figure 2. CAT4104 EN/PWM Timing**

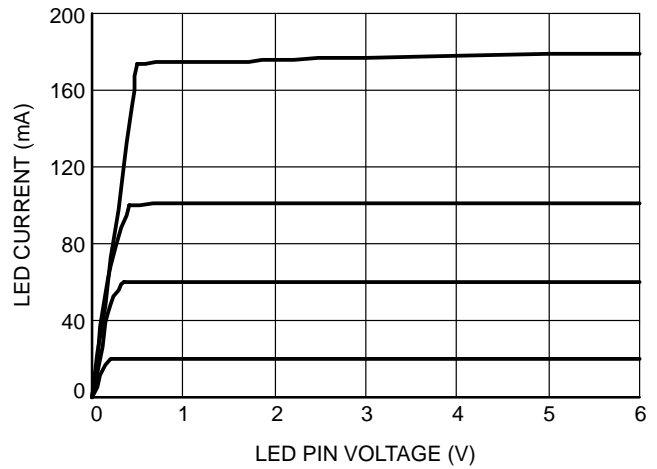


**TYPICAL PERFORMANCE CHARACTERISTICS**

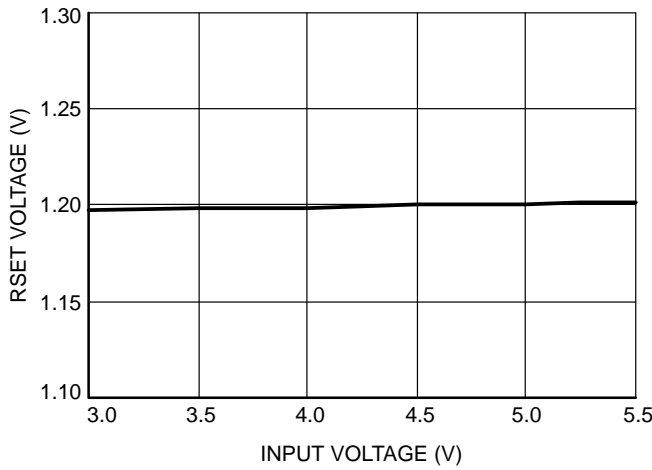
(VIN = 5 V, VCC = 5 V, LED FORWARD VOLTAGE = 3.5 V, CIN = 1 MF, TAMB = 25°C UNLESS OTHERWISE SPECIFIED.)



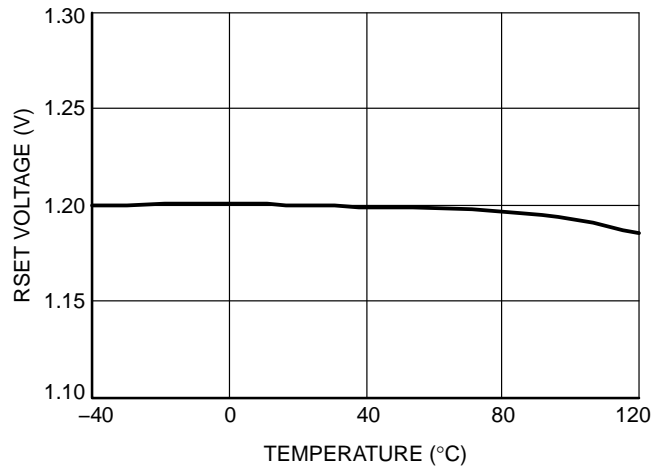
**Figure 9. LED Current vs. RSET Resistor**



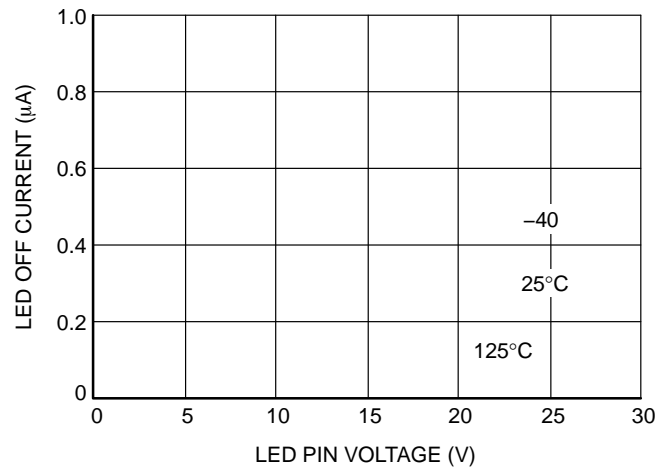
**Figure 10. LED Current vs. LED Pin Voltage**



**Figure 11. RSET Pin Voltage vs. Input Voltage**



**Figure 12. RSET Pin Voltage vs. Temperature**



**Figure 13. LED Off Current vs. LED Pin Voltage**

# CAT4104

## TYPICAL PERFORMANCE CHARACTERISTICS

(VIN = 5 V, VCC = 5 V, LED FORWARD VOLTAGE = 3.5 V, CIN = 1 MF, TAMB = 25°C UNLESS OTHERWISE SPECIFIED.)

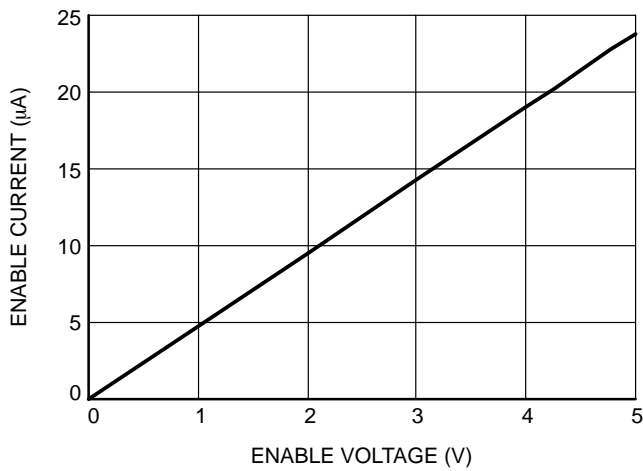


Figure 14. EN/PWM Pull-down Current vs.  $V_{EN/PWM}$

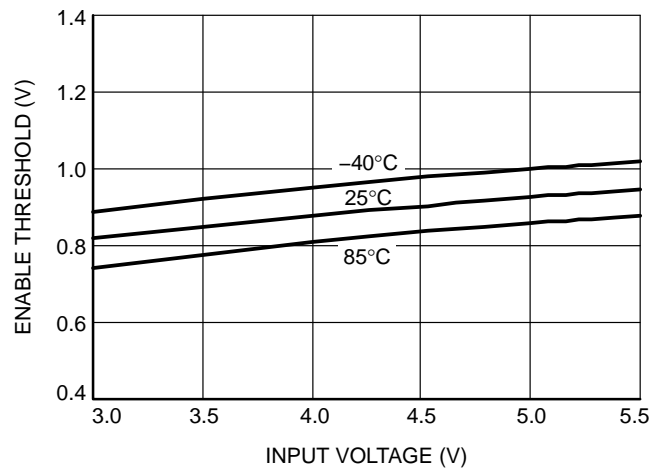


Figure 15. EN/PWM Threshold vs. VIN

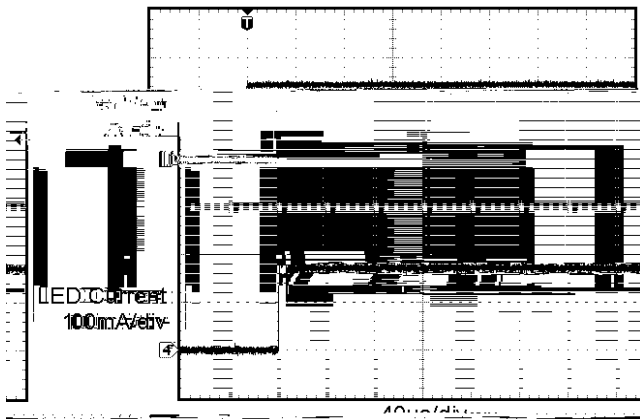


Figure 16. Power Up from Shutdown

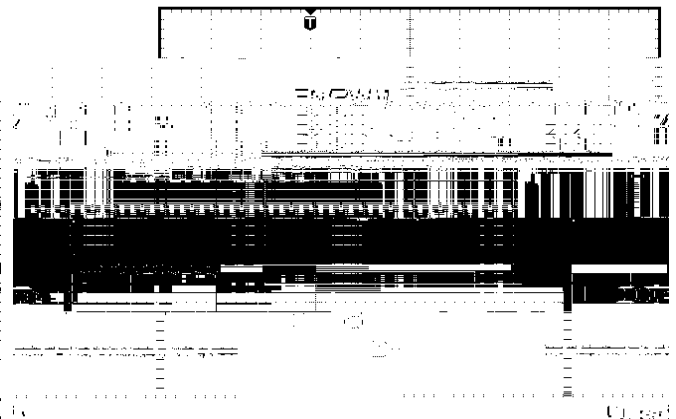


Figure 17. Power Down

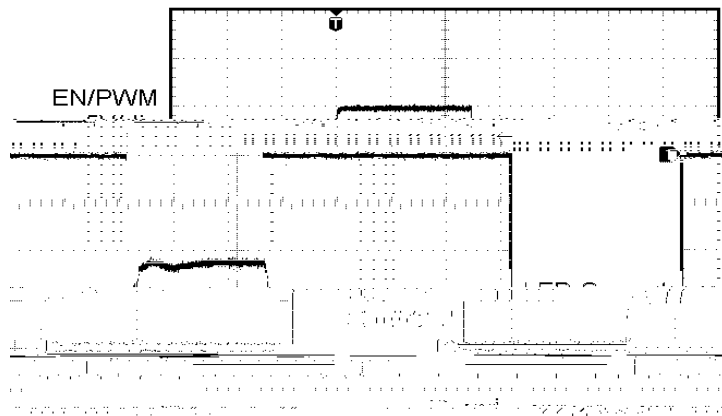


Figure 18. PWM 200 Hz, 1% Duty Cycle

Table 5. PIN DESCRIPTIONS

Name	Pin SOIC 8-Lead	Pin TDFN 8-Lead	Function
LED1	1	1	LED1 cathode terminal
LED2	2	2	LED2 cathode terminal
LED3	3	3	LED3 cathode terminal
LED4	4	4	LED4 cathode terminal
GND	5	5 and TAB	Ground reference
EN/PWM	6	6	Device enable input and PWM control
VIN	7	7	Device supply pin
RSET	8	8	LED current set pin for the LED channels

**PIN FUNCTION**

**VIN** is the supply pin for the device. A small 0.1 μF ceramic bypass capacitor is optional for noisy environments. Whenever the input supply falls below the under-voltage threshold, all LED channels are automatically disabled.

**EN/PWM** is the enable and one wire dimming input for all LED channels. Guaranteed levels of logic high and logic low are set at 1.3 V and 0.4 V respectively. When EN/PWM is initially taken high, the device becomes enabled and all LED currents are set at a gain of 100 times the current in RSET. To place the device into zero current shutdown mode, the EN/PWM pin must be held low for 4 ms typical.

**LED1 to LED4** provide individual regulated currents for each of the LED cathodes. These pins enter a high

impedance zero current state whenever the device is placed in shutdown mode.

**RSET** pin is connected to an external resistor to set the LED channel current. The ground side of the external resistor should be star connected to the GND of the PCB. The pin source current mirrors the current to the LED sinks. The voltage at this pin is regulated to 1.2 V.

**GND** is the ground reference for the device. The pin must be connected to the ground plane on the PCB.

**TAB** (TDFN 8-Lead Only) is the exposed pad underneath the package. For best thermal performance, the tab should be soldered to the PCB and connected to the ground plane.

# CAT4104

## BLOCK DIAGRAM

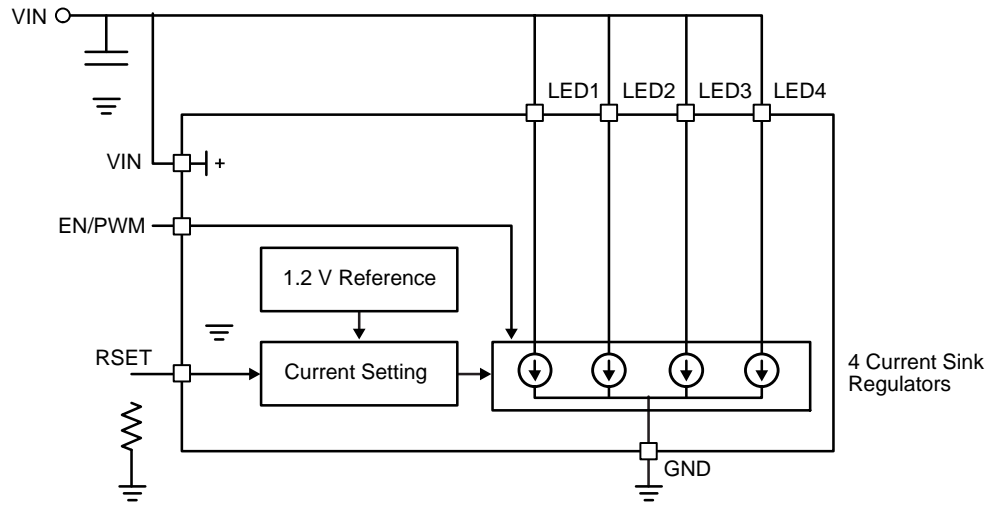


Figure 19. CAT4104 Functional Block Diagram



**APPLICATION INFORMATION**  
Single 12 V Supply

# CAT4104

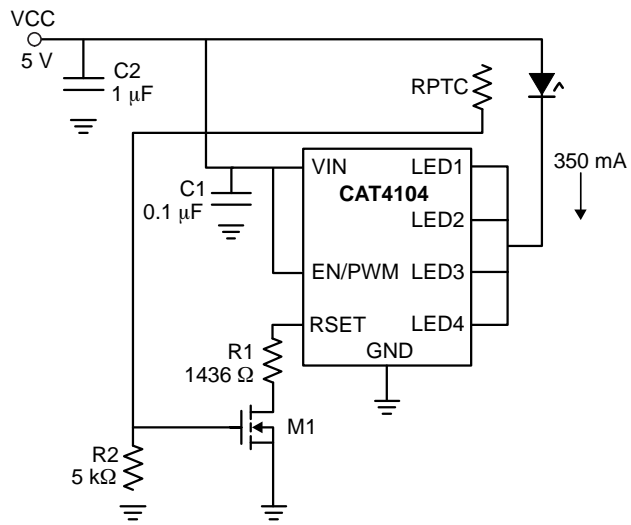
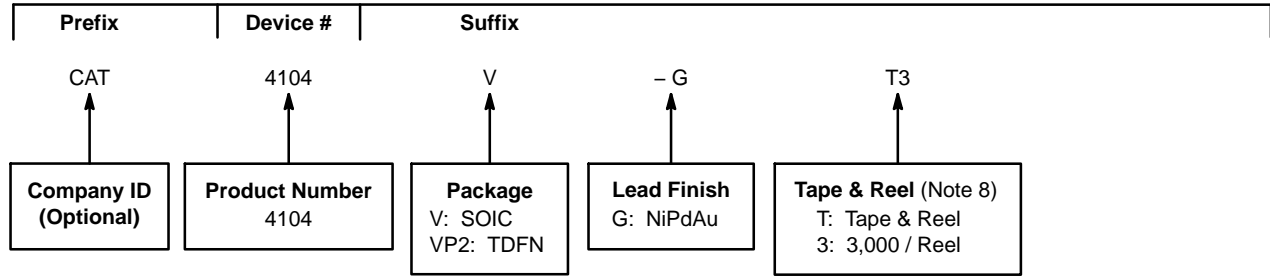


Figure 23. LED Current Derating

# CAT4104

## EXAMPLE OF ORDERING INFORMATION (NOTE 6)



4. All packages are RoHS-compliant (Lead-free, Halogen-free).
5. The standard plated finish is NiPdAu.
6. The device used in the above example is a CAT4104V-GT3 (SOIC, NiPdAu, Tape & Reel, 3,000/Reel).
7. For additional temperature options, please contact your nearest ON Semiconductor Sales office.
8. For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**TDFN8, 2x3, 0.5P**  
CASE 511AK  
ISSUE B

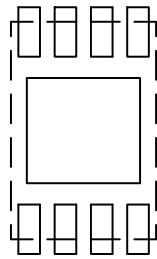
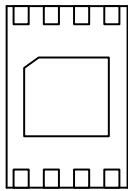
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DATE 18 MAR 2015

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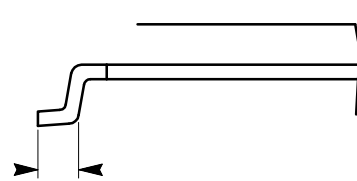
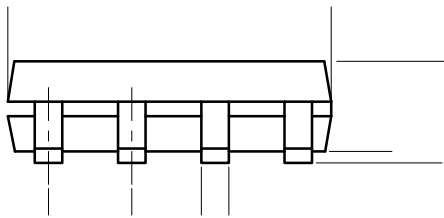
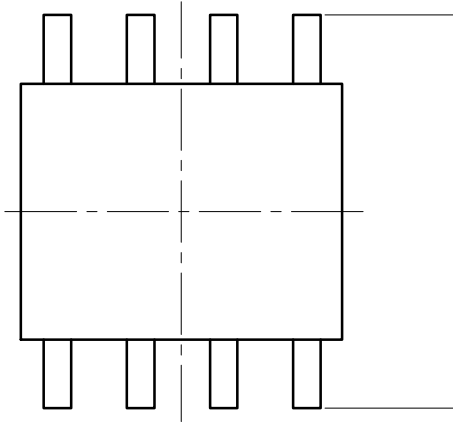
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**SOIC-8, 150 mils**  
CASE 751BD  
ISSUE O

DATE 19 DEC 2008



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