LH1500AT/AAB/AABTR

1 Form A

Solid State Relay

FEATURES

- **Current Limit Protection**
- **I/O Isolation, 5300 V_{RMS}**
- **Typical R_{ON} 20 Ω**
- **Load Voltage 350 V**
- **Load Current 150 mA**
- **High Surge Capability**
- **Linear, AC/DC Operation**
- **Clean Bounce Free Switching**
- **Low Power Consumption**
- **High Reliability Monolithic Receptor**
- **SMD Lead Available on Tape and Reel**

AGENCY APPROVALS

- **UL – File No. E52744**
- **BSI/BABT Cert. No. 7980**
- **FIMKO Approval**
- **CSA – Certification 093751**

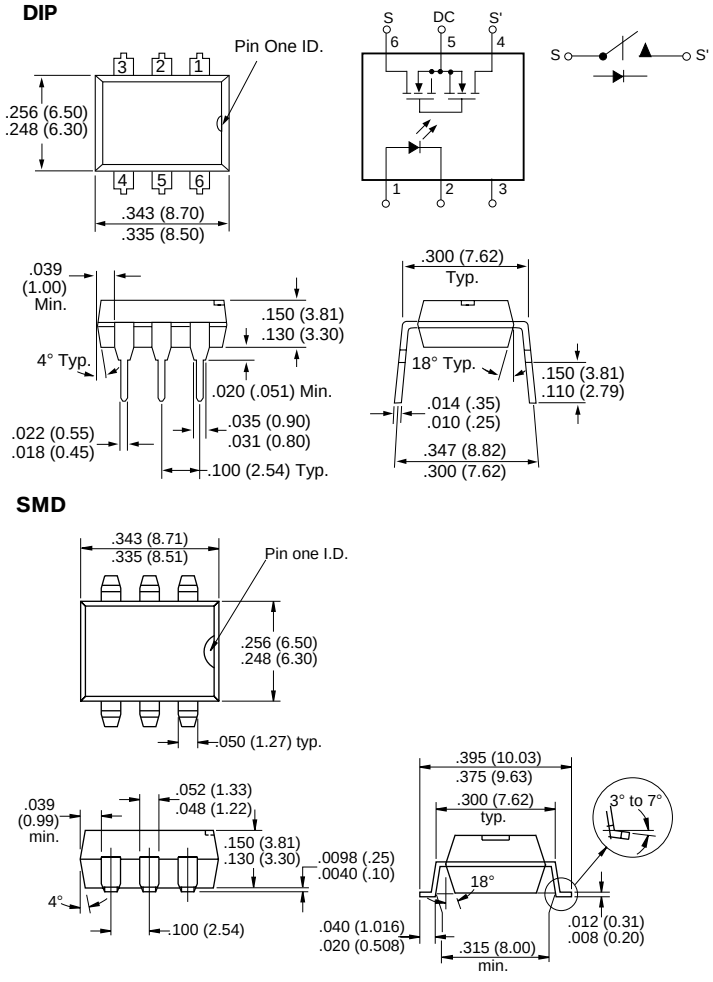
APPLICATIONS

- **General Telecom Switching**
  - **On/off Hook Control**
  - **Ring Delay**
  - **Dial Pulse**
  - **Ground Start**
  - **Ground Fault Protection**
- **Instrumentation**
- **Industrial Controls**
- **See Application Note 56**

DESCRIPTION

The LH1500 is robust, ideal for telecom and ground fault applications. It is a SPST normally open switch (1 Form A) that replaces electromechanical relays in many applications. It is constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuitry and MOSFET switches. In addition, it employs current-limiting circuitry which meets FCC 68.302 and other regulatory voltage surge requirements when overvoltage protection is provided.

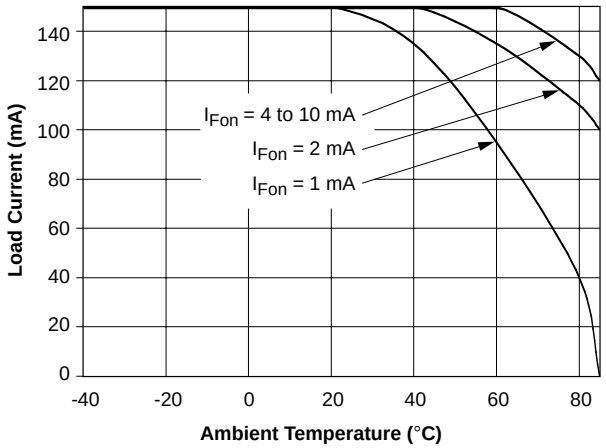
Package Dimensions in Inches (mm)



Part Identification

Part Number	Description
LH1500AT	6-pin DIP, Thru Hole
LH1500AAB	6-pin SMD
LH1500AABTR	6-pin SMD, Tape and Reel

Recommended Operating Conditions



Absolute Maximum Ratings, T_A=25°C

Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to maximum rating conditions for extended periods can adversely affect device reliability.

Ambient Temperature Range ..... –40 to +85°C
Storage Temperature Range ..... –40 to +150°C
Soldering Temperature (t=10 s max.) ..... 260°C
Isolation Test Voltage (for 1.0 s) ..... 5300 V_{RMS}
Isolation Resistance
  V_{IO}=500 V, T_A=25°C ..... $\geq 10^{12}\ \Omega$
  V_{IO}=500 V, T_A=100°C ..... $\geq 10^{11}\ \Omega$
SSR Output Power Dissipation (continuous) ..... 550 mW
LED Continuous Forward Current ..... 50 mA
LED Reverse Voltage ($I_R \leq 10$ mA) ..... 8.0 V
DC or Peak AC Load Voltage ($I_L \leq 50$ mA) ..... 350 V
Continuous DC Load Current at 25°C
  Bidirectional ..... 150 mA
  Unidirectional ..... 250 mA

Electrical Characteristics, T_A=25°C

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Input						
LED Forward Current, Switch Turn-on	I_{Fon}	—	0.9	2.0	mA	I_L=100 mA, t=10 ms
LED Forward Current, Switch Turn-off	I_{Foff}	0.2	0.8	—	mA	V_L±300 V
LED Forward Voltage	V_F	1.15	1.25	1.45	V	I_F=10 mA
Output						
ON-resistance, ac/dc: Pin 4 (±) to 6 (±)	R_{ON}	—	18	25	Ω	I_F=5.0 mA, I_L=50 mA
ON-resistance, dc: Pin 4, 6 (+) to 5 (-)		3.0	4.6	6.25	Ω	I_F=5.0 mA, I_L=100 mA
OFF-resistance	R_{OFF}	0.5	300	—	GΩ	I_F=0 mA, V_L=±100 V
Current Limit ac/dc pin 4 (±) to 6 (±)	I_{LMT}	230	255	370	mA	I_F=5.0 mA, t=5.0 ms V_L±6.0 V
Off-state Leakage Current	I_O	—	0.32	200	nA	I_F=0 mA, V_L=±100 V
		—	73.4	1.0	mA	I_F=0 mA, V_L=±350 V
Output Capacitance, Pin 4 to 6	C_O	—	33	—	pF	I_F=0 mA, V_L=1.0 V
		—	10	—	pF	I_F=0 mA, V_L=50 V
Switch Offset	V_{OS}	—	0.2	—	µV	I_F=5.0 mA
Transfer						
Input/Output Capacitance	C_{ISO}	—	0.71	—	pF	V_{ISO}=1.0 V
Turn-on Time	t_{on}	—	0.338	2.0	ms	I_F=5.0 mA, I_L=50 mA
Turn-off Time	t_{off}	—	0.63	2.0	ms	I_F=5.0 mA, I_L=50 mA

Typical Performance Characteristics

Figure 1. LED Voltage vs. Temperature

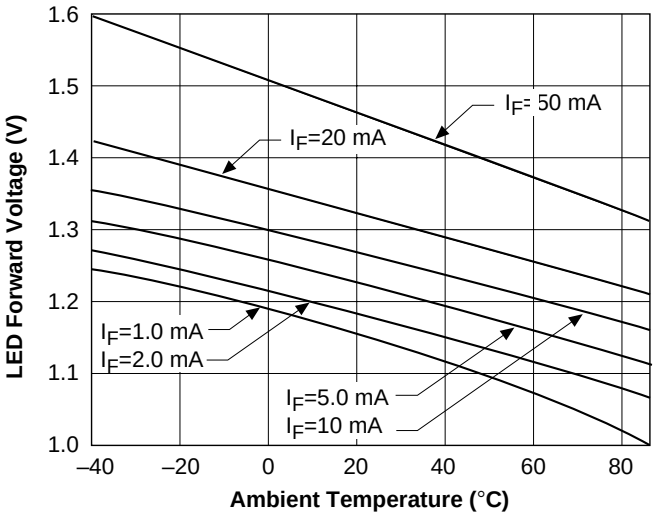


Figure 2. LED Forward Current vs. LED Forward Voltage

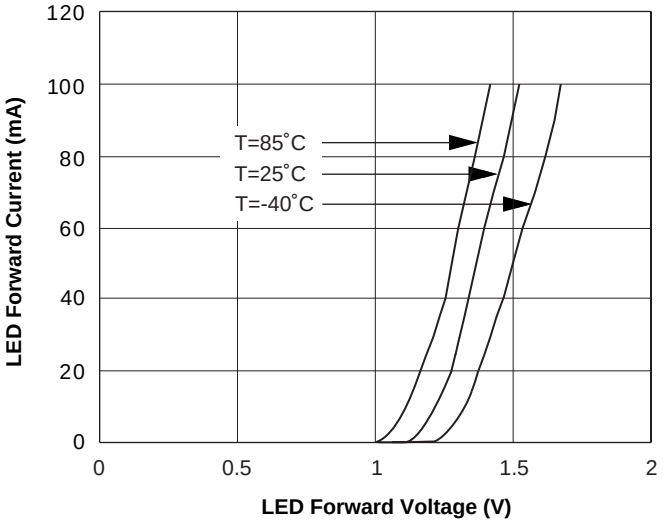


Figure 3. LED Reverse Current vs. LED Reverse Voltage

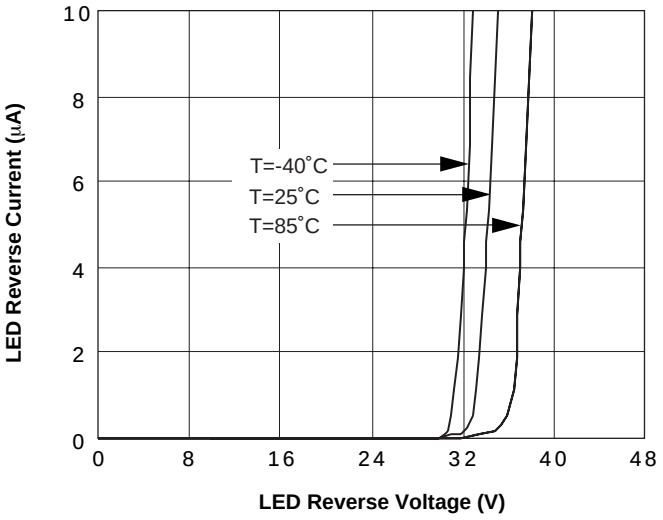


Figure 4. LED Current for Switch Turn-on vs. Temperature

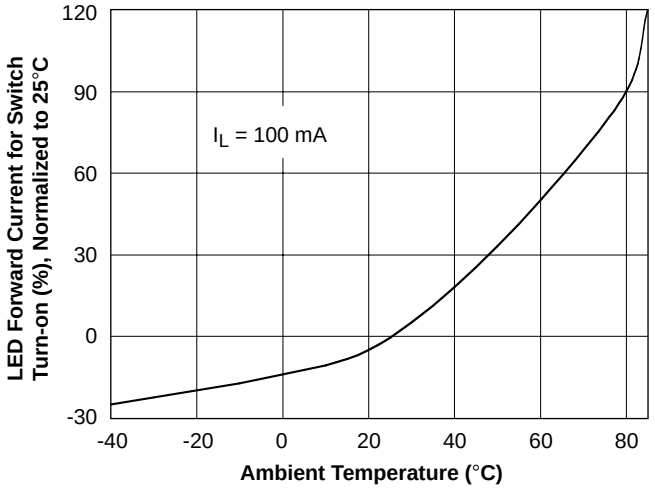


Figure 5. LED Dropout Voltage vs. Temperature

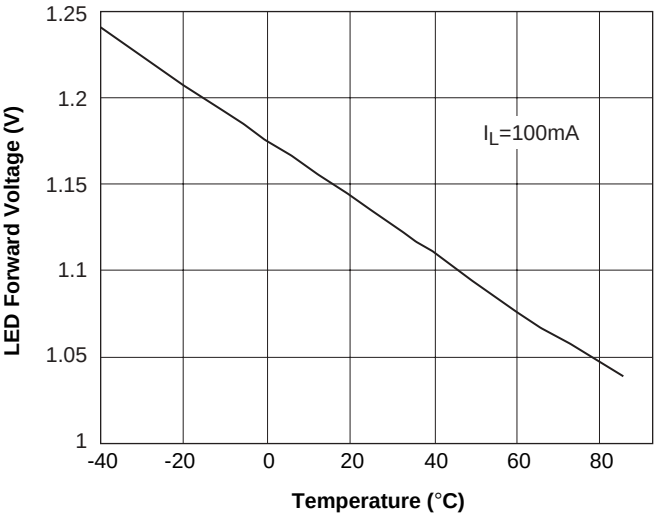


Figure 6. Current Limit vs. Temperature

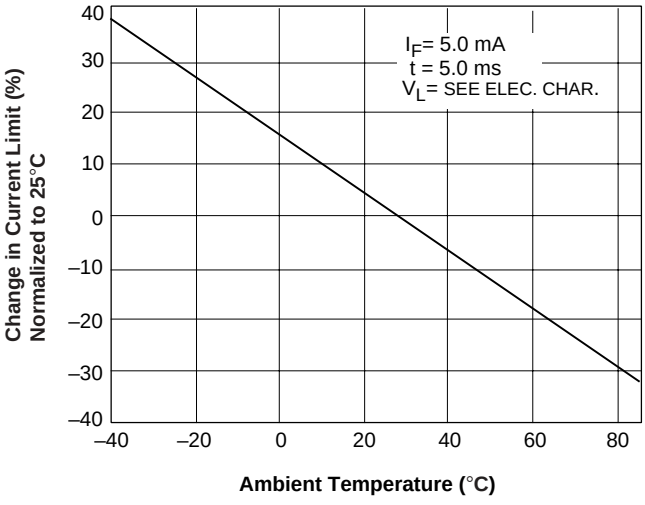


Figure 7. Load Current vs. Load Voltage

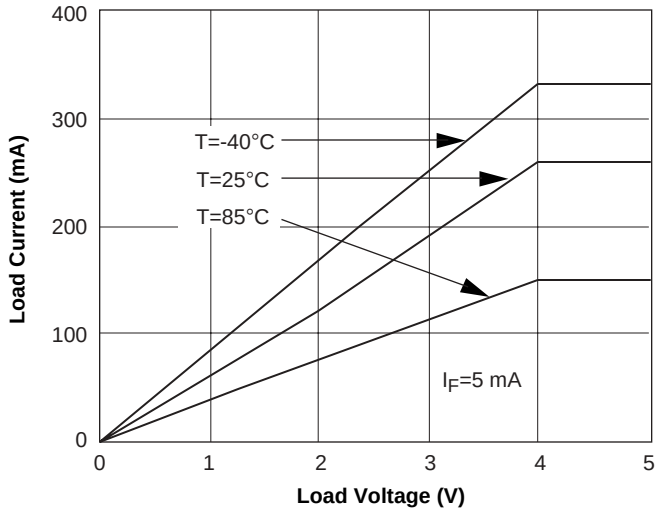


Figure 8. ON-Resistance vs. Temperature

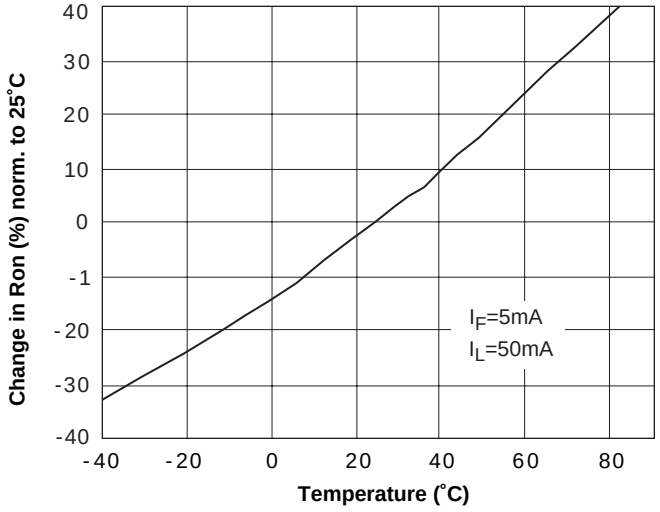


Figure 9. Variation in ON-Resistance vs. LED Current

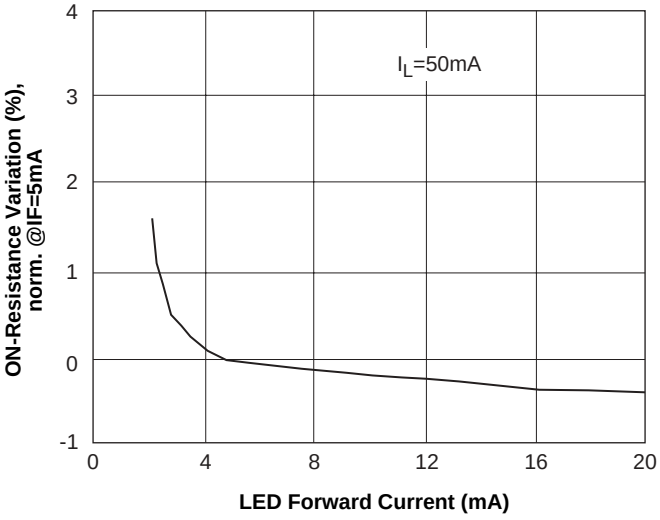


Figure 10. Switch Capacitance vs. Applied Voltage

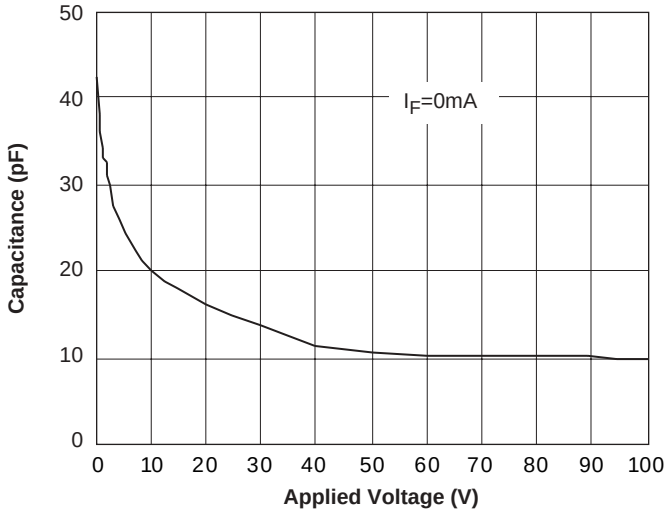


Figure 11. Insertion Loss vs. Frequency

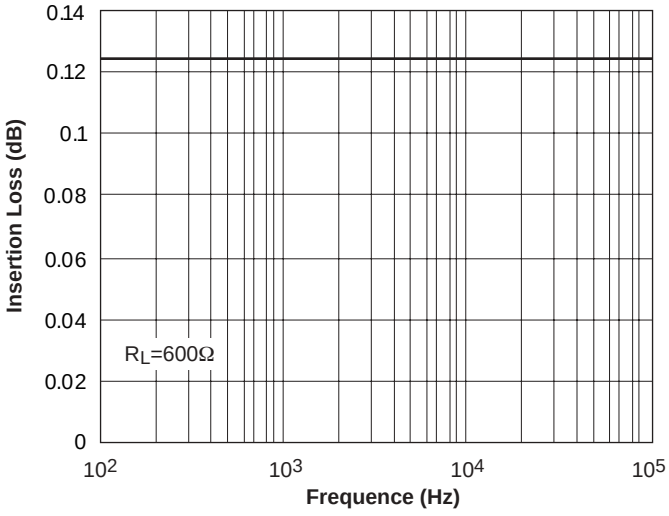


Figure 12. Leakage Current vs. Applied Voltage

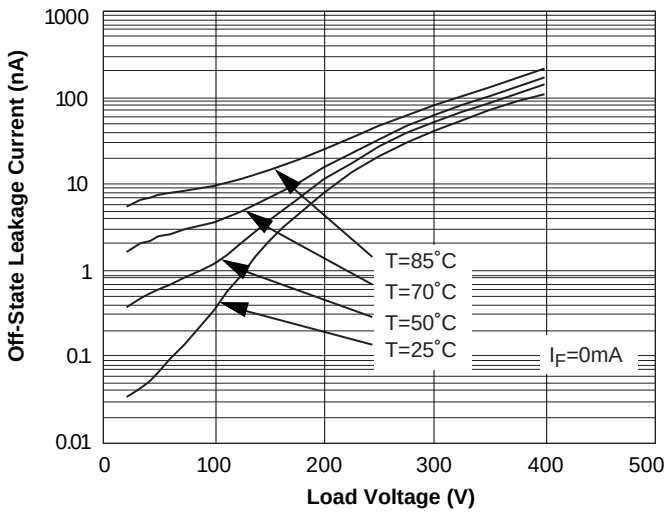


Figure 13. Output Isolation

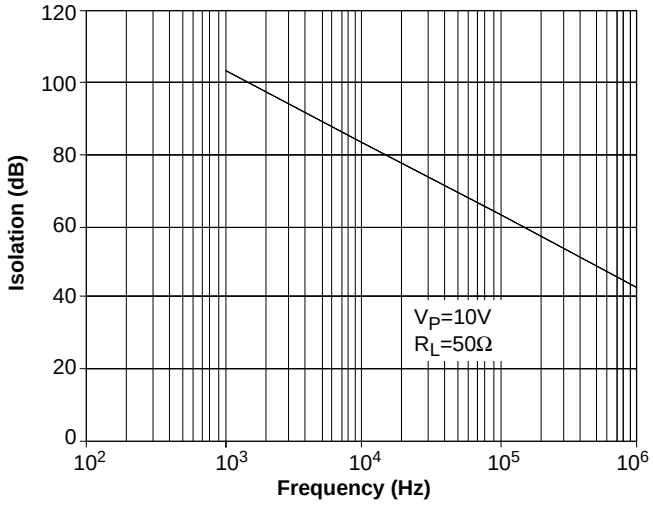


Figure 14. Switch Breakdown Voltage vs. Load Current

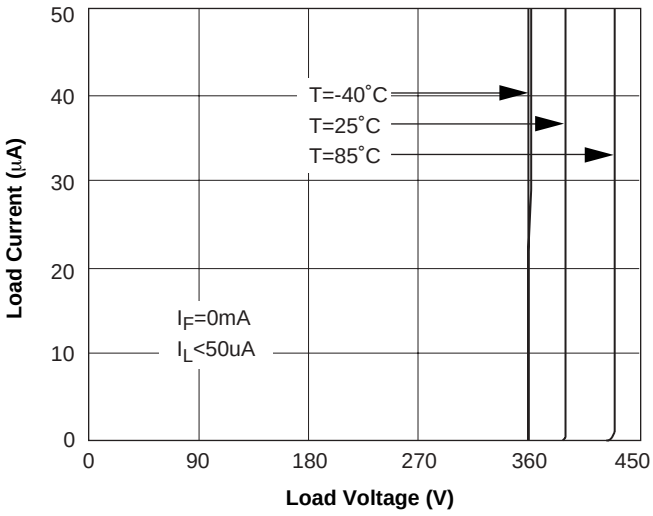


Figure 15. Switch Breakdown Voltage vs. Temperature

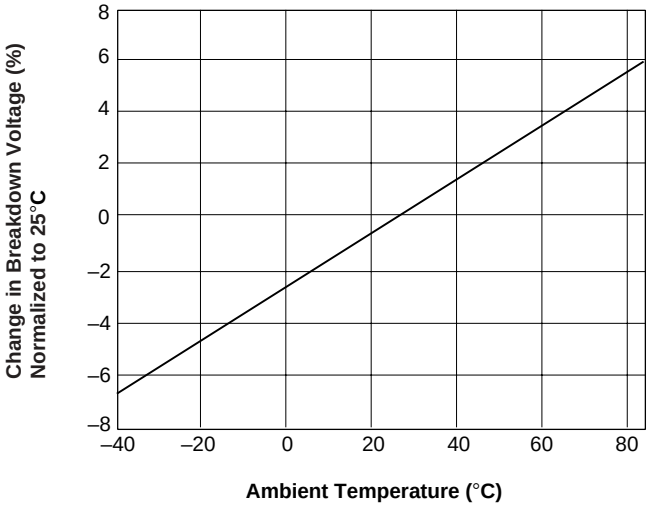


Figure 16. Switch Offset Voltage vs. Temperature

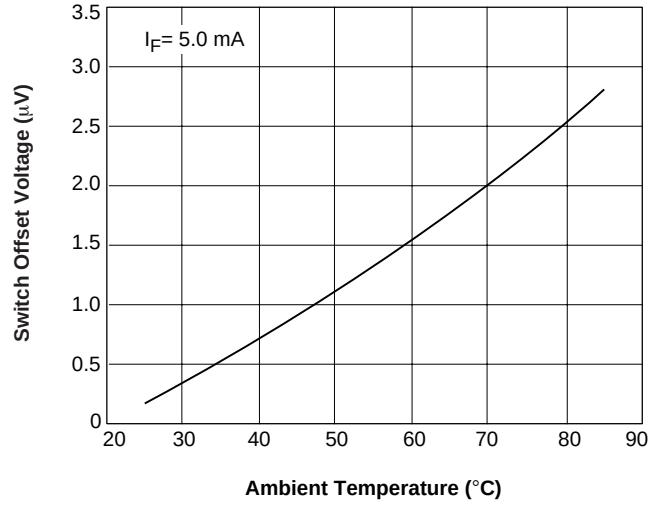


Figure 17. Switch Offset Voltage vs. LED Current

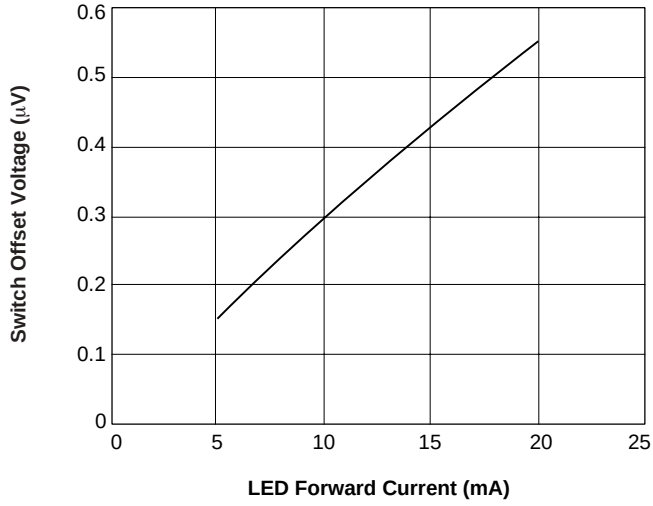


Figure 18. Turn-On Time vs. Temperature

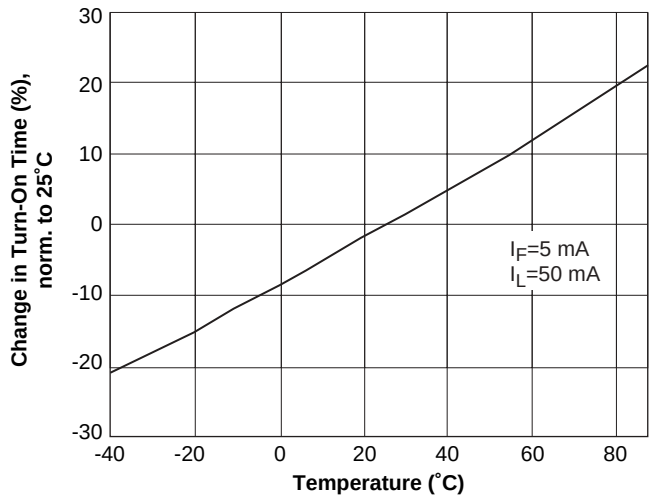


Figure 19. Turn-Off Time vs. Temperature

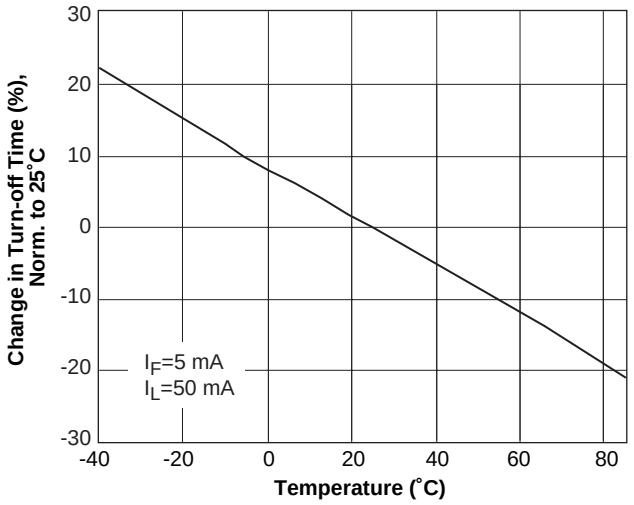


Figure 20. Turn-On Time vs. LED Current

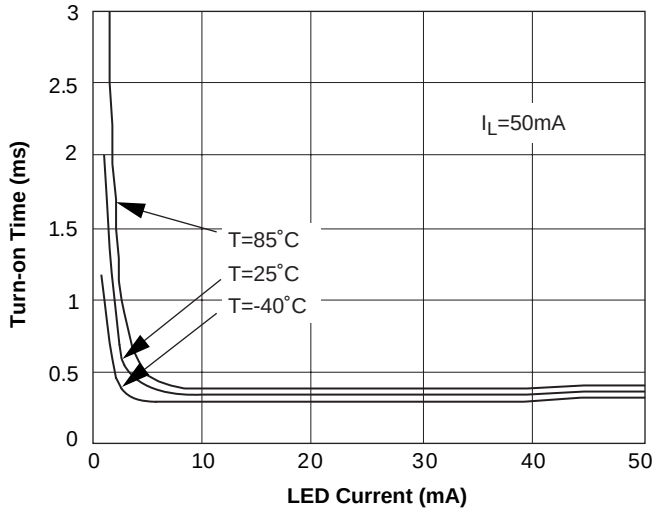


Figure 21. Turn-Off Time vs. LED Current