FEATURES

- **Current Limit Protection**
- **I/O Isolation, 5300 V_{RMS}**
- **Typical R_{ON} 20 Ω**
- **Load Voltage 350 V**
- **Load Current 110 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**
- **CSA – Certification 093751**
- **VDE 0884 Approval**

APPLICATIONS

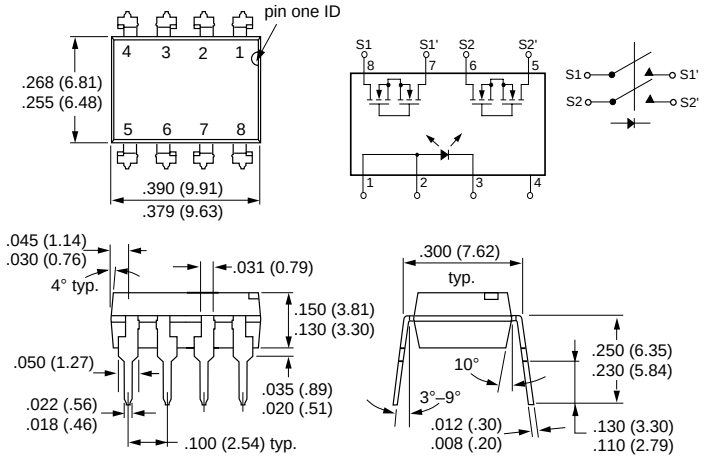
- **General Telecom Switching**
  - **On/off Hook Control**
  - **Ring Delay**
  - **Dial Pulse**
  - **Ground Start**
  - **Ground Fault Protection**
- **Instrumentation**
- **Industrial Controls**

DESCRIPTION

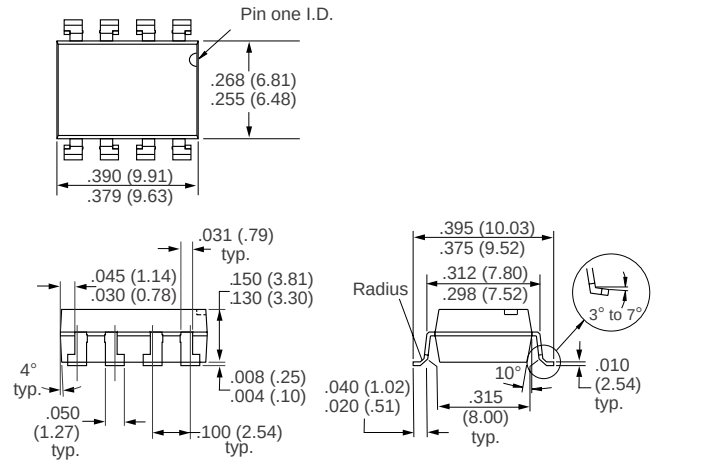
The LH1503 relays are DPST normally open switches (2 Form A) that can replace electromechanical relays in many applications. The relays are constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated in a high-voltage dielectrically isolated technology, is comprised of a photodiode array, switch control circuity, and DMOS switches. In addition, these relays employ current-limiting circuity, enabling them to pass FCC 68.302 and other regulatory voltage surge requirements when overvoltage protection is provided.

Package Dimensions in Inches (mm)

DIP



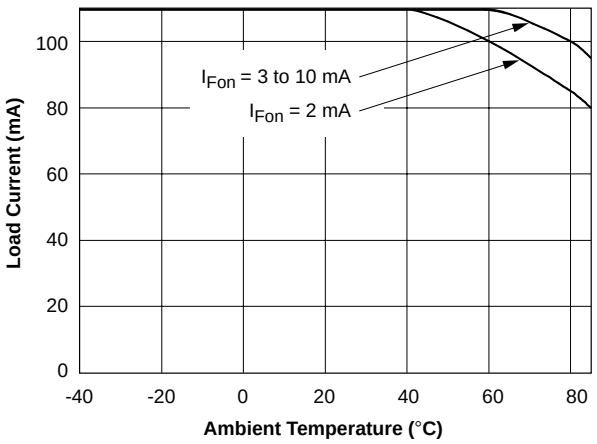
SMD



Part Identification

Part Number	Description
LH1503AB	8-pin DIP, Tubes
LH1503AAC	8-pin SMD, Gullwing, Tubes
LH1503AACTR	8-pin SMD, Gullwing, 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 (T_A) .....–40 to +85°C
Storage Temperature Range (T_{stg}).....–40 to +150°C
Pin Soldering Temperature (t=10 s max) (T_S) ..... 260°C
Input/Output Isolation Voltage (V_{ISO}) ..... 5300 V_{RMS}
Pole-to-Pole Isolation Voltage (S1 to S2).....500 V
LED Continuous Forward Current (I_F) .....50 mA
LED Reverse Voltage (I_R≤10 μA) (V_R).....8.0 V
DC or Peak AC Load Voltage (I_L≤50 μA) (V_L).....200 V
Continuous DC Load Current (I_L)
One Pole Operating.....150 mA
Two Poles Operating .....110 mA
Peak Load Current (t=100 ms) (single shot) (I_P) ..... †
Output Power Dissipation (continuous) (P_{DISS}).....600 mW

† Refer to Current Limit Performance Application Note for a discussion on relay operation during transient currents.

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	Sym.	Min.	Typ.	Max.	Units	Test Conditions
Input						
LED Forward Current, Switch Turn-on	I_{Fon}	—	2.0	3.0	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	1.26	1.45	V	I_F=10 mA
Output						
ON-resistance	R_{ON}	12	20	25	Ω	I_F=5.0 mA, I_L=50 mA
Pole-to-Pole ON-resistance Matching (S1 to S2)	—	—	0.2	2.0	ΔΩ	I_F=5.0 mA, I_L=50 mA
OFF-resistance	R_{OFF}	0.5	5000	—	GΩ	I_F=0 mA, V_L=±100 V
Current Limit	I_{LMT}	230	270	370	mA	I_F=5.0 mA, t=5.0 ms V_L±6.0 V
Off-state Leakage Current	—	—	0.02	200	nA	I_F=0 mA, V_L=±100 V
		—	—	1.0	μA	I_F=0 mA, V_L=±350 V
Output Capacitance	—	—	55	—	pF	I_F=0 mA, V_L=1.0 V
		—	10	—		I_F=0 mA, V_L=50 V
Pole-to-Pole Capacitance (S1 to S2)	—	—	3.0	—	pF	I_F=0 mA
		—	4.0	—		I_F=5.0 mA
Switch Offset	—	—	0.15	—	V	I_F=5.0 mA
Transfer						
Input/Output Capacitance	C_{ISO}	—	1.1	—	pF	V_{ISO}=1.0 V
Turn-on Time	t_{on}	—	1.6	2.5	ms	I_F=10.0 mA, I_L=50 mA
Turn-off Time	t_{off}	—	0.65	2.5	ms	I_F=10.0 mA, I_L=50 mA

Typical Performance Characteristics

Figure 1. LED Voltage vs. Temperature

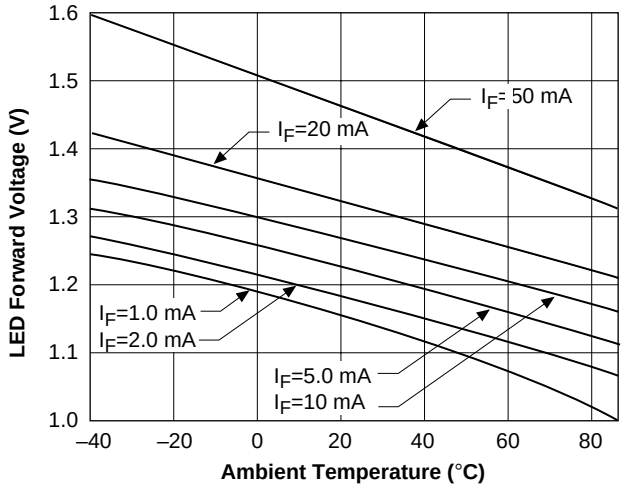


Figure 2. LED Current for Switch Turn-on vs. Temperature

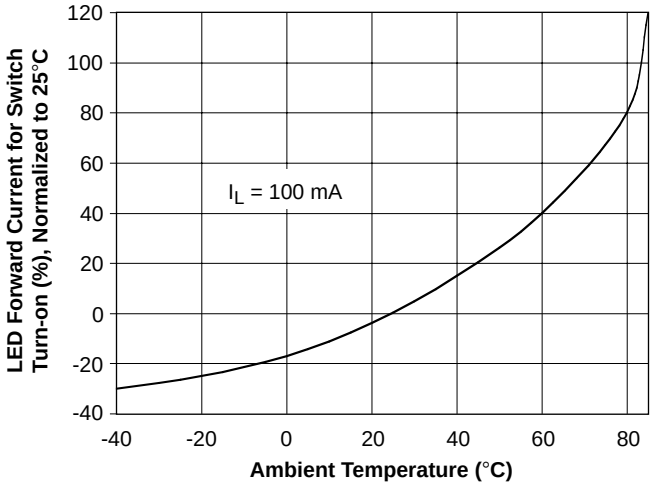


Figure 3. On-resistance vs. Temperature

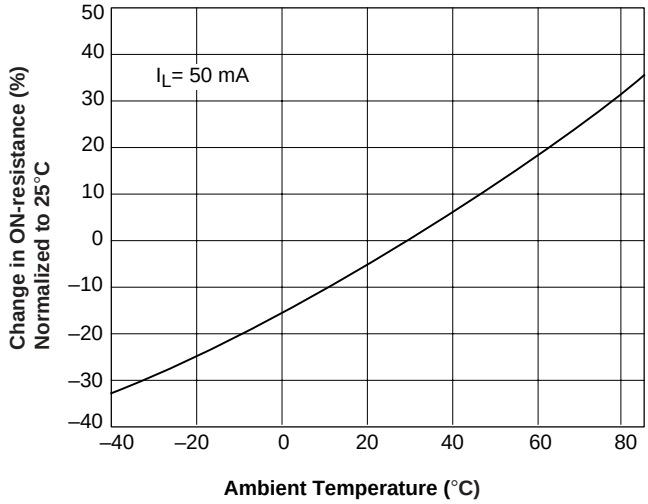


Figure 4. LED Dropout Voltage vs. Temperature

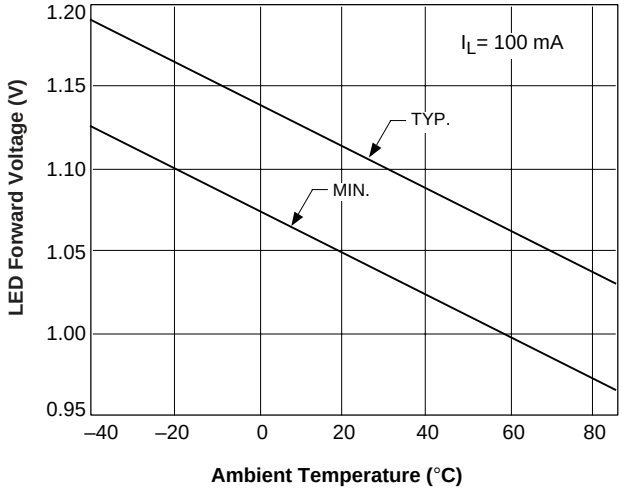


Figure 5. Current Limit vs. Temperature

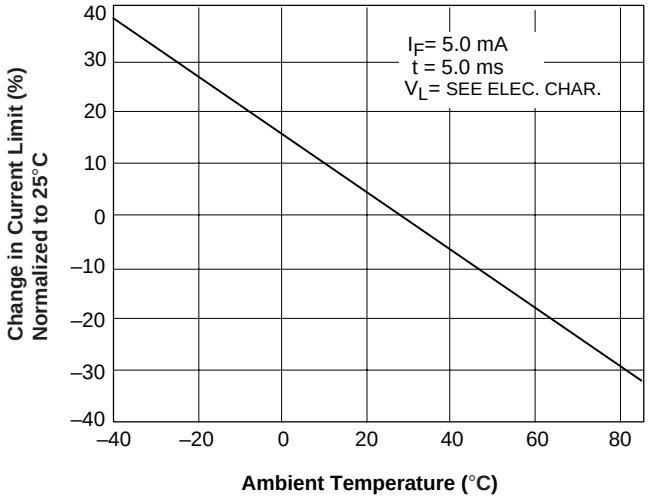


Figure 6. Variation in On-resistance vs. LED Current

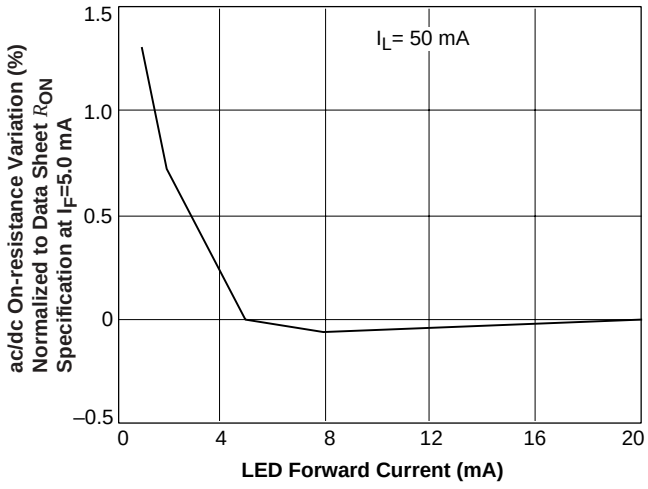


Figure 7. Switch Capacitance vs. Applied Voltage

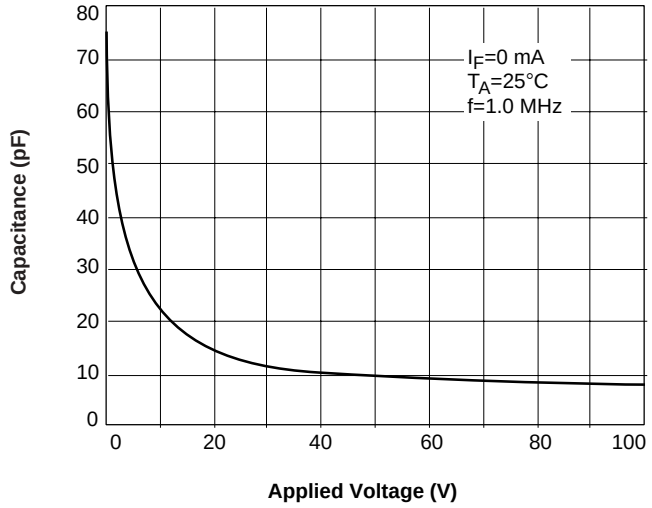


Figure 8. Output Isolation

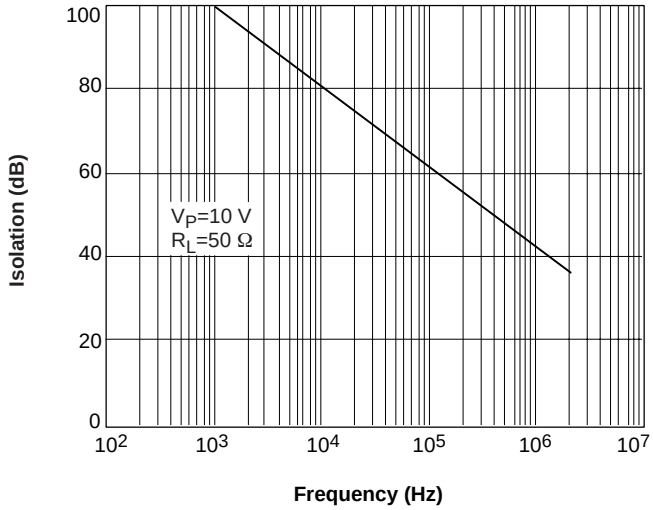


Figure 9. Leakage Current vs. Applied Voltage at Elevated Temperatures

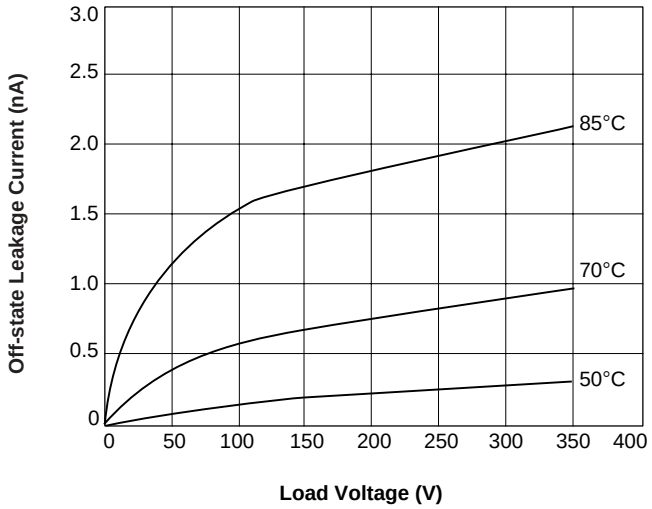


Figure 10. Insertion Loss vs. Frequency

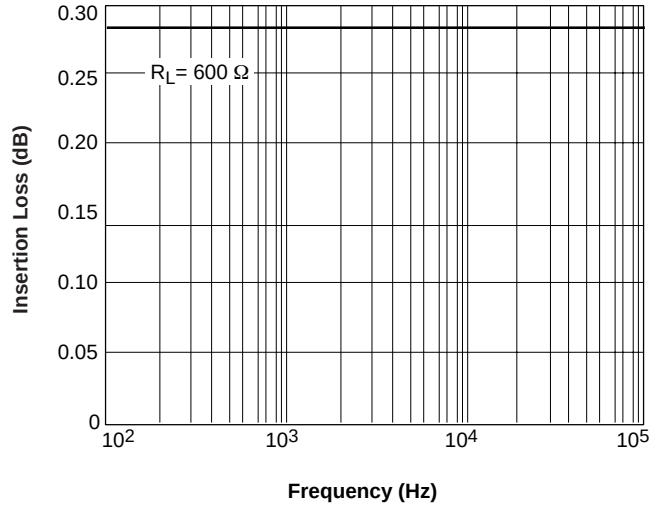


Figure 11. Leakage Current vs. Applied Voltage

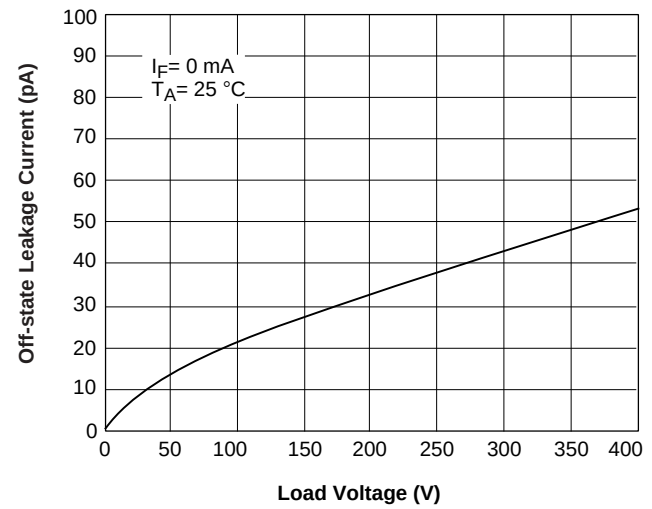


Figure 12. Switch Breakdown Voltage vs. Temperature

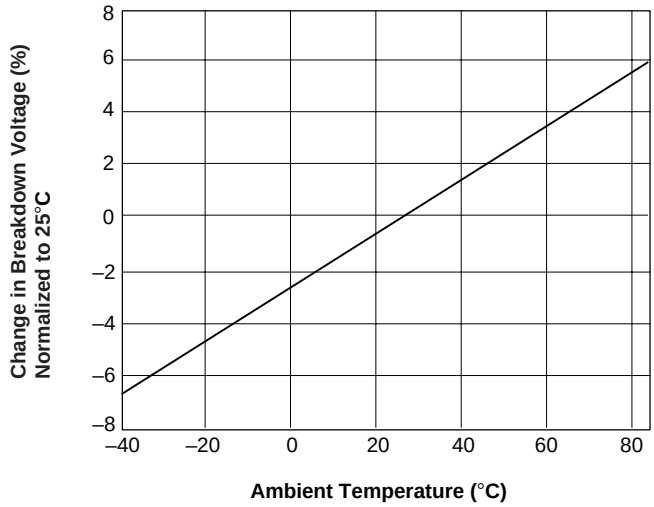


Figure 13. Switch Offset Voltage vs. Temperature

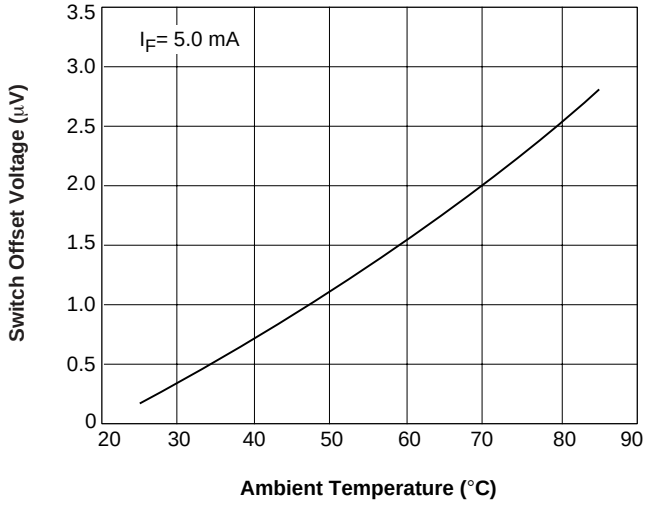


Figure 14. Turn-on Time vs. Temperature

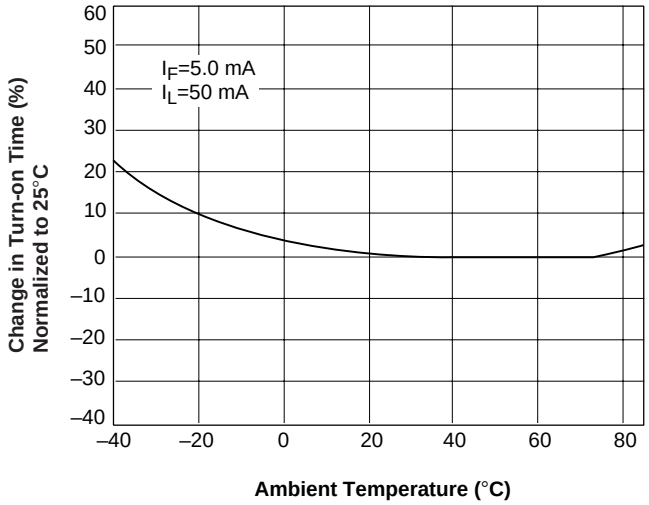


Figure 15. Turn-on Time vs. LED Current

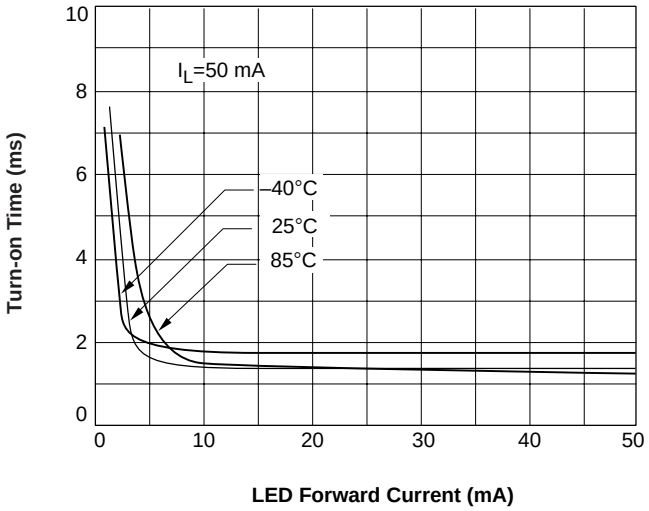


Figure 16. Switch Offset Voltage vs. LED Current

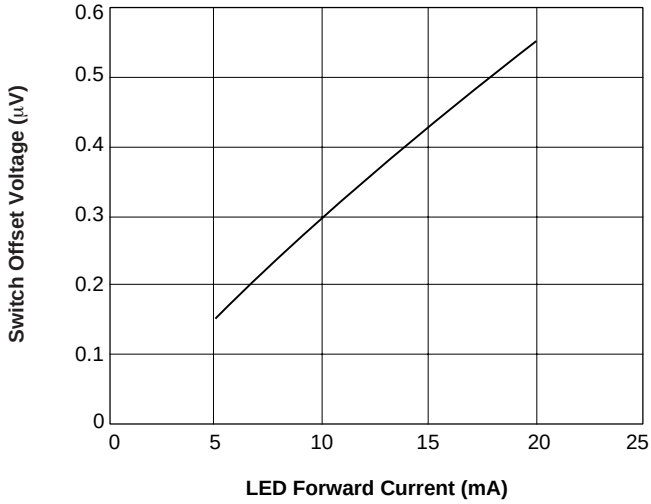


Figure 17. Turn-off Time vs. Temperature

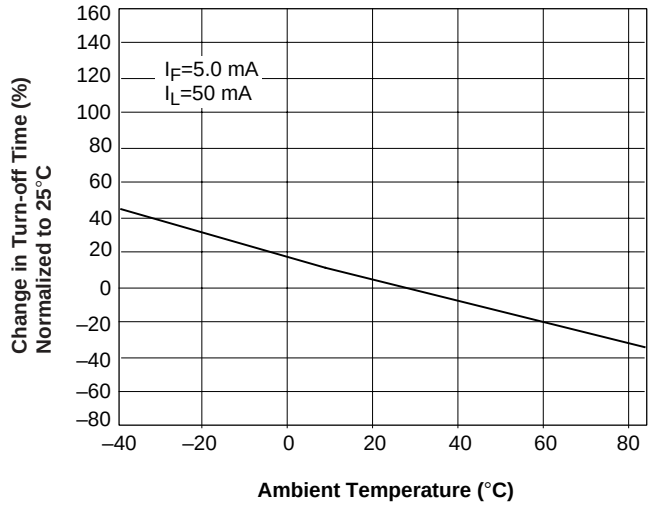


Figure 18. Turn-off Time vs. LED Current