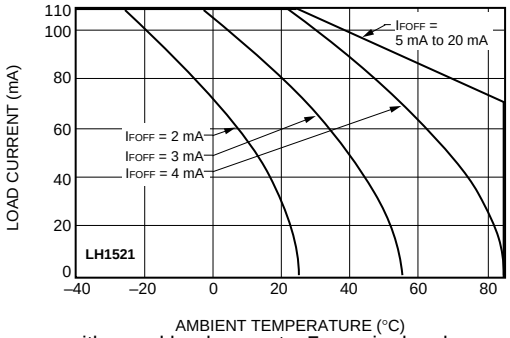
Absolute Maximum Ratings T_A=25°C

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 this document. Exposure to Absolute Maximum Ratings for extended periods of time can adversely affect reliability.

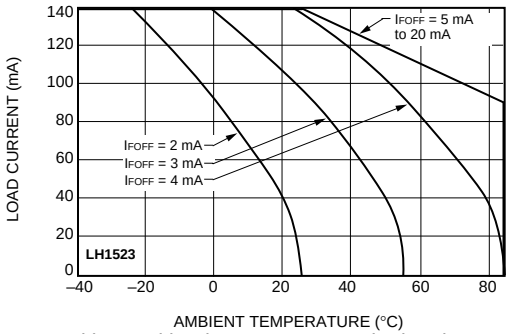
Parameter	Symbol	Test Conditions	LH1521	LH1523	Units
Ambient Operating Temperature Range	T_A	—	–40 to +85	–40 to +85	°C
Storage Temperature Range	T_{stg}	—	–40 to +150	–40 to +150	°C
Pin Soldering Temperature	T_S	t=10 s max	260	260	°C
Input/Output Isolation Test Voltage	V_{ISO}	Vrms t=1 s I_{ISO}=10 µA max	5300	5300	Vrms
Pole-to-Pole Isolation Voltage* (S1 to S2)	—	Dry air, dust free, at sea level	1600	1600	V
LED Continuous Forward Current	I_F	—	50	50	mA
LED Reverse Voltage	V_R	$I_R \leq 10$ µA	8	8	V
dc or Peak ac Load Voltage	V_L	$I_L \leq 50$ µA	350	200	V
Continuous dc Load Current One Pole Operating Two Poles Operating	I_L	—	 150 110	 200 140	 mA mA
Peak Load Current	I_P	t=100 ms (single shot)	400	600	mA
Output Power Dissipation (continuous)	P_{DISS}	—	600	600	mW

* Breakdown occurs between the output pins external to the package.

Recommended Operating Conditions



Both relays on with equal load currents. For a single relay operation, refer to LH1501 Recommended Operating Conditions graph.



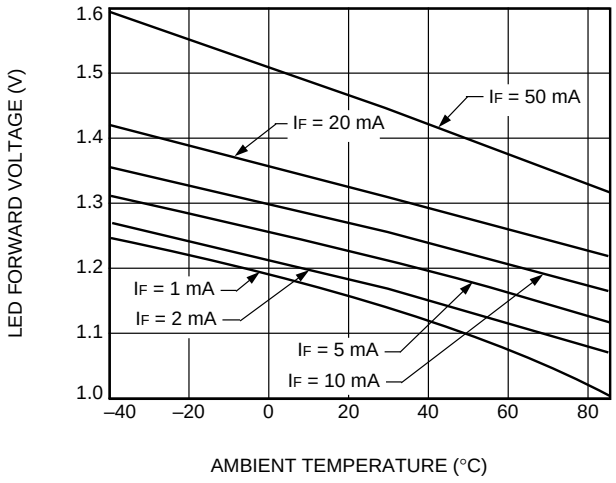
Both relays on with equal load currents. For a single relay operation, refer to LH1511 Recommended Operating Conditions graph.

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 purposes only and are not part of the testing requirements.

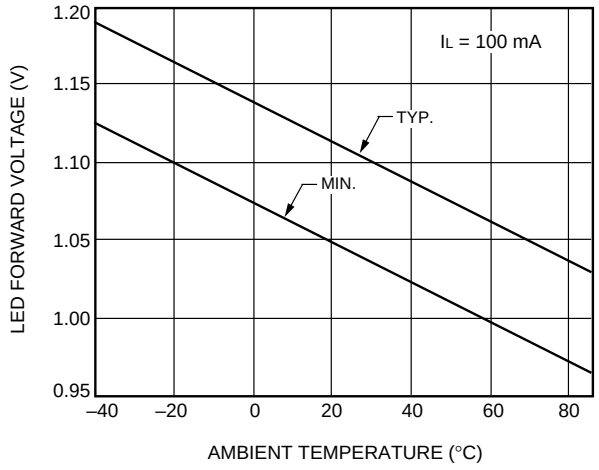
	Parameter	Symbol	Test Conditions	Values	LH1521	LH1523	Units
INPUT	LED Forward Current for Switch Turn-off	I_{Foff}	—	Min	—	—	mA
				Typ	1.0	1.0	mA
				Max	2.0	2.0	mA
			V_L	±	300	150	V
	LED Forward Current for Switch Turn-on	I_{Fon}	t=10 ms	Min	0.2	0.2	mA
				Typ	0.9	0.9	mA
				Max	—	—	mA
			I_L	±	150	200	mA
	LED Forward Voltage	V_F	I_F=10 mA	Min	1.15	1.15	V
				Typ	1.22	1.22	V
				Max	1.45	1.45	V
OUTPUT	ON-resistance	R_{ON}	I_F=0 mA I_L=50 mA	Min	12	6	Ω
				Typ	20	10	Ω
				Max	25	15	Ω
	OFF-resistance	R_{OFF}	I_F=5 mA V_L=±100 V	Min	0.1	0.1	GΩ
				Typ	1.4	1.4	GΩ
				Max	—	—	GΩ
	Off-state Leakage Current	—	I_F=5 mA V_L=±100 V	Min	—	—	µA
				Typ	0.07	0.07	µA
				Max	1.0	1.0	µA
			I_F=5 mA	Min	—	—	µA
				Typ	0.08	0.07	µA
				Max	1.0	1.0	µA
			V_L	±	350	200	V
	Output Capacitance	—	I_F=5 mA V_L=1 V	Min	—	—	pF
				Typ	35	45	pF
				Max	—	—	pF
			I_F=5 mA V_L=50 V	Min	—	—	pF
				Typ	10	15	pF
				Max	—	—	pF
	Pole-to-pole Capacitance	—	I_F=0 mA	Min	—	—	pF
				Typ	0.5	0.5	pF
				Max	—	—	pF
	Switch Offset	—	I_F=0 mA	Min	—	—	µV
				Typ	0.1	0.1	µV
				Max	—	—	µV
TRANSFER	Input/Output Capacitance	C_{ISO}	V_{ISO}=1 V	Min	—	—	pF
				Typ	1.1	1.1	pF
				Max	—	—	pF
	Turn-off Time	t_{off}	I_F=5 mA I_L=50 mA	Min	—	—	ms
				Typ	2.0	1.0*	ms
				Max	3.0	3.0*	ms
	Turn-on Time	t_{on}	I_F=5 mA I_L=50 mA	Min	—	—	ms
				Typ	1.0	1.2*	ms
				Max	3.0	3.0*	ms

* I_F=10 mA.

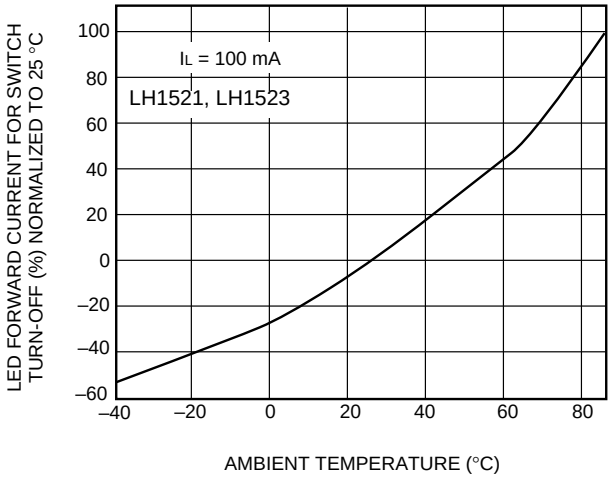
A. LED Voltage vs. Temperature



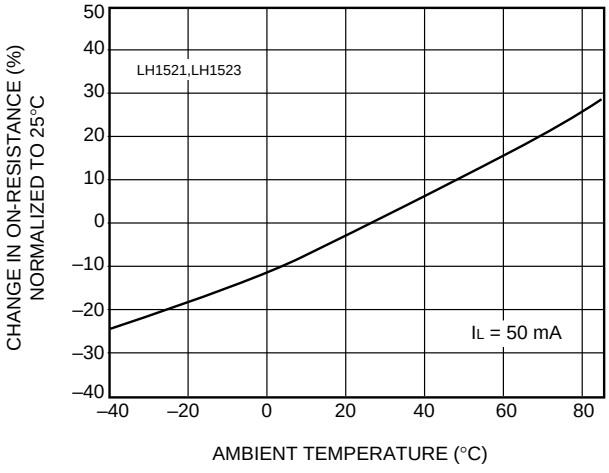
B. LED Dropout Voltage vs. Temperature



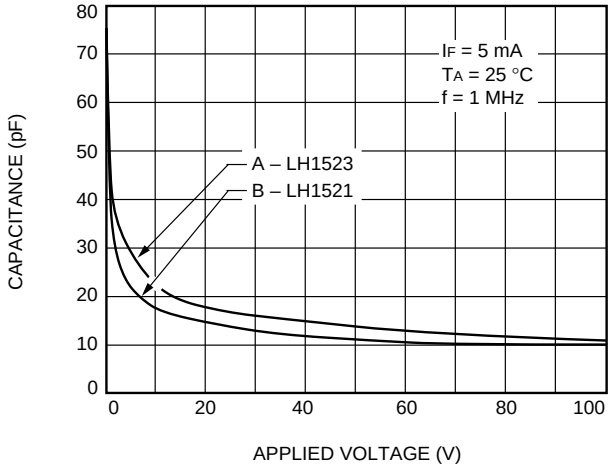
C. LED Current for Switch Turn-Off vs. Temperature



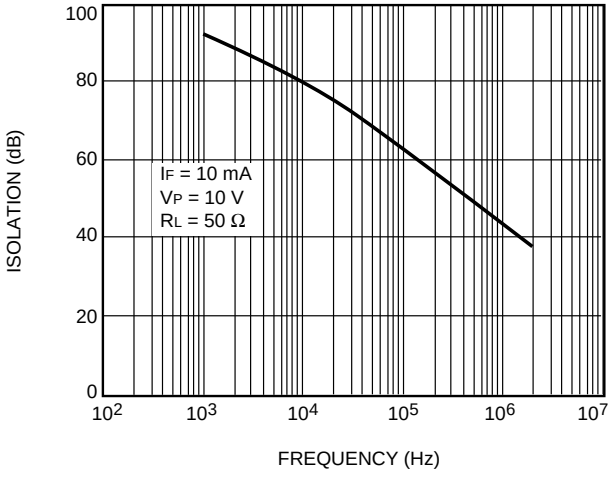
D. ON-Resistance vs. Temperature



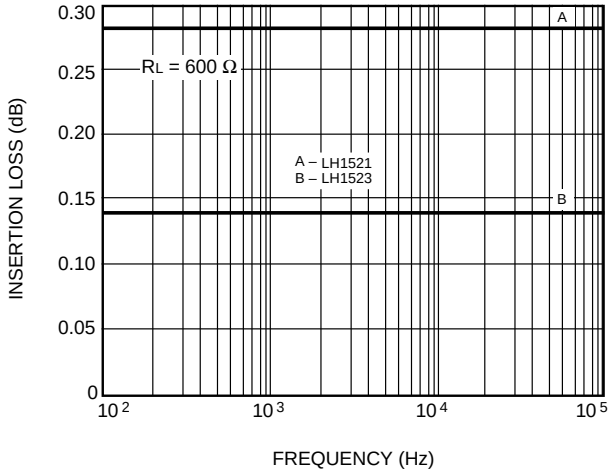
E. Switch Capacitance vs. Applied Voltage



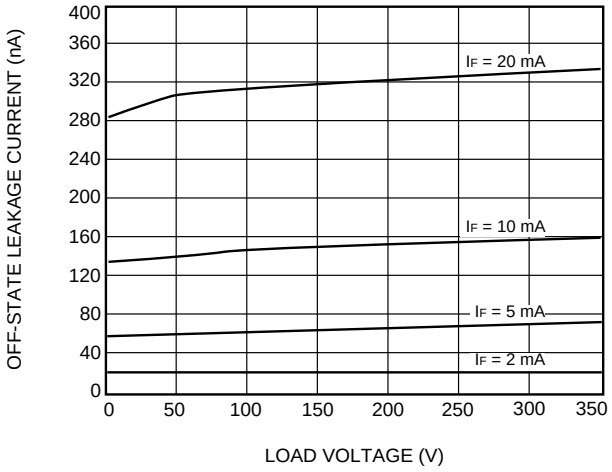
F. Output Isolation



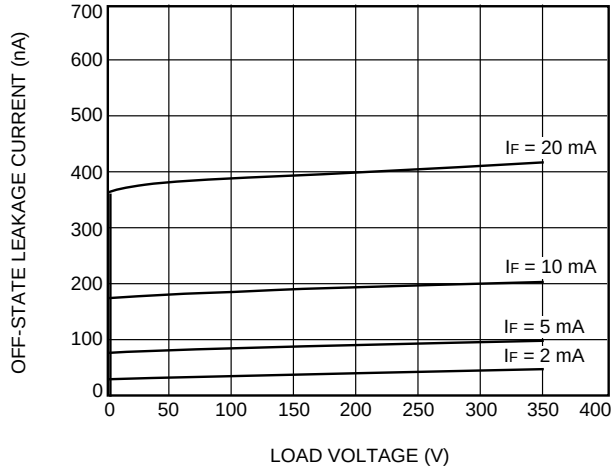
A. Insertion Loss vs. Frequency



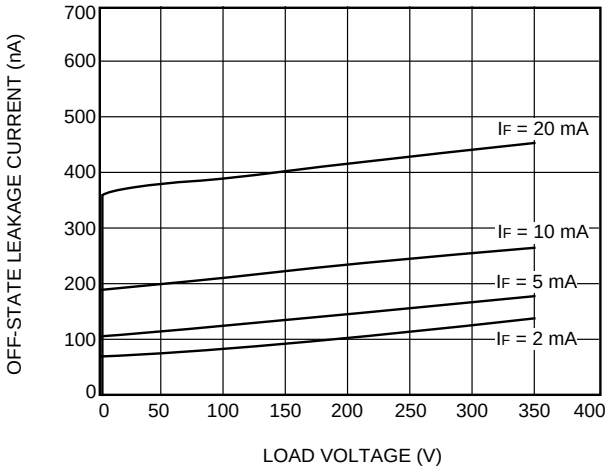
B. Leakage Current vs. Applied Voltage @ 25°C



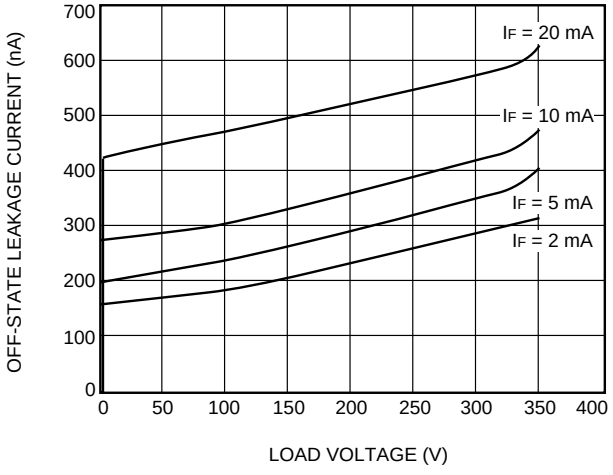
C. Leakage Current vs. Applied Voltage @ 50°C



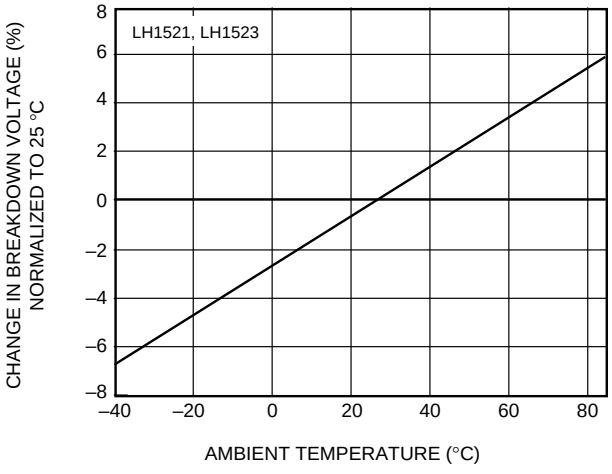
D. Leakage Current vs. Applied Voltage @ 70°C



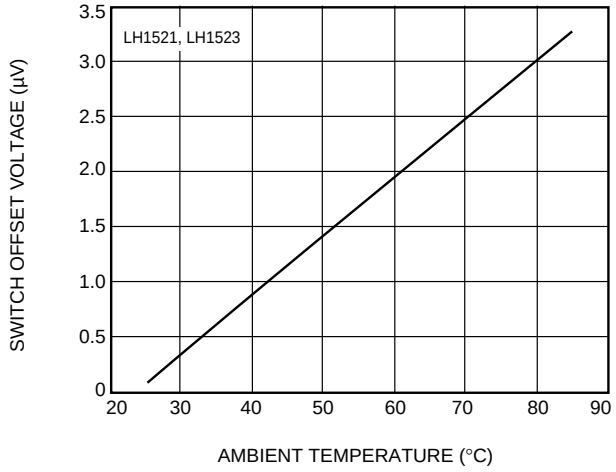
E. Leakage Current vs. Applied Voltage @ 85°C



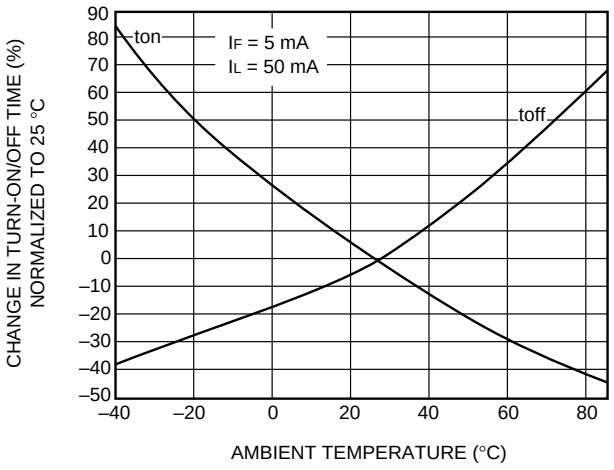
F. Switch Breakdown Voltage vs. Temperature



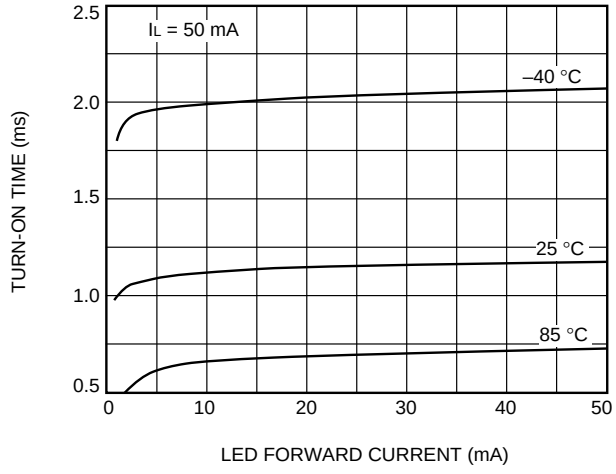
A. Switch Offset Voltage vs. Temperature



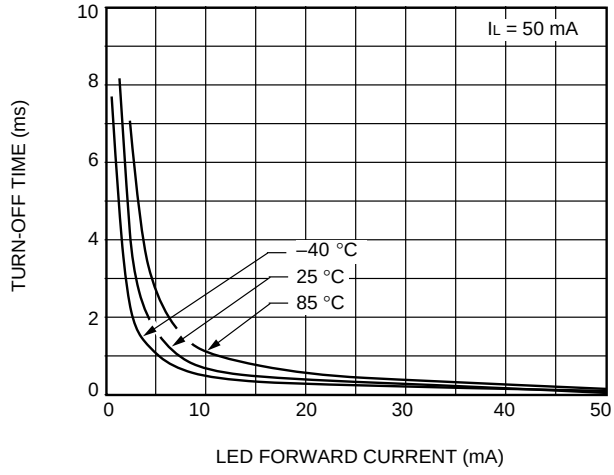
B. Turn-On/Off Time vs. Temperature



C. Turn-On Time vs. LED Current



D. Turn-Off Time vs. LED Current



Absolute Maximum Ratings T_A=25°C

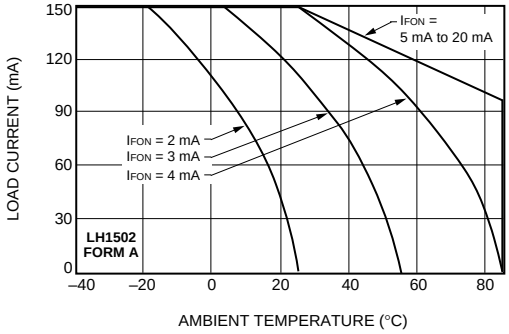
Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to Absolute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

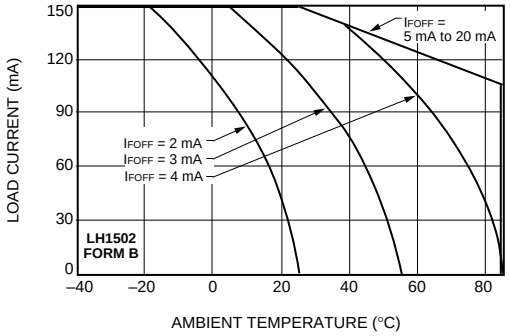
Parameter	Symbol	Test Conditions		LH1502	LH1512	Units
Ambient Operating Temperature Range	T_A	—		–40 to +85	–40 to +85	°C
Storage Temperature Range	T_{stg}	—		–40 to +150	–40 to +150	°C
Pin Soldering Temperature	T_S	t=10 s max		260	260	°C
Input/Output Isolation Test Voltage	V_{ISO}	t=1 s I_{ISO}=10 µA max		5300	5300	Vrms
Pole-to-Pole Isolation Voltage* (S1 to S2)	—	Dry air, dust free, at sea level		1600	1600	V
LED Continuous Forward Current	I_F	—		50	50	mA
LED Reverse Voltage	V_R	$I_R \leq 10$ µA		8	8	V
dc or Peak ac Load Voltage	V_L	$I_L \leq 50$ µA		350	200	V
Continuous dc Load Current (Form C operation)	I_L	—		150	200	mA
Peak Load Current	I_P	t=100 ms	Form A	†	†	mA
		(single shot)	Form B	400	600	mA
Output Power Dissipation (continuous)	P_{DISS}	—		600	600	mW

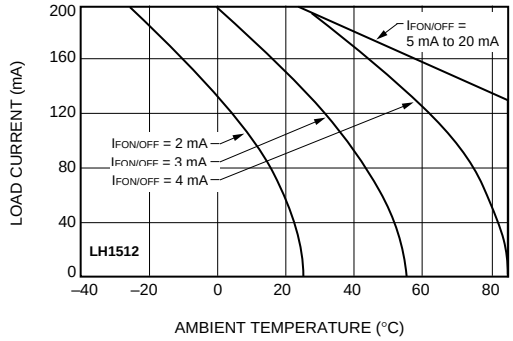
* Breakdown occurs between the output pins external to the package.

† Refer to Current-Limit Performance application note for a discussion on relay operation during transient currents.

Recommended Operating Conditions







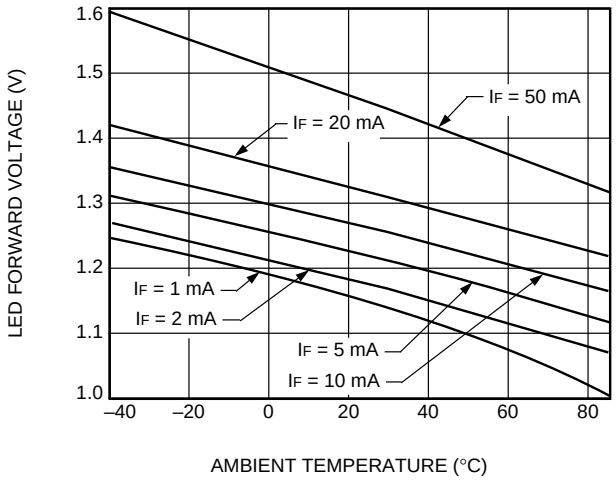
Electrical Characteristics T_A=25°C

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 purposes only and are not part of the testing requirement.

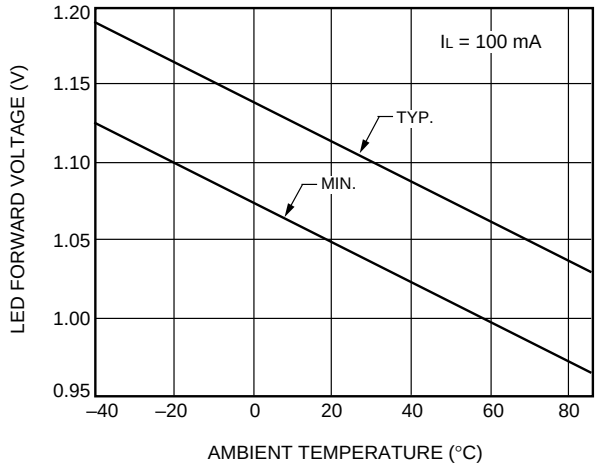
	Parameter	Symbol	Test Condition	Values	LH1502	LH1512	Units
INPUT	LED Forward Current for Switch Turn-on (NO)	I_{Fon}	I_L=100 mA t=10 ms	Min	—	—	mA
				Typ	0.6	0.6	mA
				Max	2.0	2.0	mA
	LED Forward Current for Switch Turn-off (NO)	I_{Foff}	—	Min	0.2	0.2	mA
				Typ	0.5	0.5	mA
				Max	—	—	mA
			V_L	±	300	150	V
	LED Forward Current for Switch Turn-on (NC)	I_{Fon}	I_L=100 mA t=10 ms	Min	0.2	0.2	mA
				Typ	0.9	0.9	mA
				Max	—	—	mA
	LED Forward Current for Switch Turn-off (NC)	I_{Foff}	—	Min	—	—	mA
				Typ	1.0	1.0	mA
				Max	2.0	2.0	mA
			V_L	±	300	150	V
	LED Forward Voltage	V_F	I_F=10 mA	Min	1.15	1.15	V
				Typ	1.26	1.26	V
				Max	1.45	1.45	V
OUTPUT	ON-resistance: (NO, NC)	R_{ON}	I_F=5 mA (NO), 0 mA (NC) I_L=50 mA (NC)	Min	12	6	Ω
				Typ	20	10	Ω
				Max	25	15	Ω
	OFF-resistance (NO) (NC)	R_{OFF}	I_F=0 mA V_L=±100 V	Min	0.5	0.5	GΩ
				Typ	5000	5000	GΩ
				Max	—	—	GΩ
			I_F=5 mA V_L=±100 V	Min	0.1	0.1	GΩ
				Typ	1.4	1.4	GΩ
				Max	—	—	GΩ
	Current Limit (NO)	I_{LMT}	I_F=5 mA t=5 ms	Min	230	300	mA
				Typ	270	360	mA
				Max	370	460	mA
			V_L	±	6	5	V
	Off-state Leakage Current (NO) (NC)	—	I_F=0 mA V_L=±100 V	Min	—	—	nA
				Typ	0.02	0.02	nA
				Max	200	200	nA
			I_F=5 mA V_L=±100 V	Min	—	—	µA
				Typ	0.07	0.07	µA
				Max	1.0	1.0	µA
	(NO, NC)		I_F=0 mA (NO) I_F=5 mA (NC)	Min	—	—	µA
				Typ	—	—	µA
				Max	1.0	1.0	µA
			V_L	±	350	200	V
	Output Capacitance (NO)		I_F=0 mA V_L=1 V	Min	—	—	pF
				Typ	55	60	pF
				Max	—	—	pF
			I_F=0 mA V_L=50 V	Min	—	—	pF
				Typ	10	15	pF
				Max	—	—	pF
	(NC)		I_F=5 mA V_L=1 V	Min	—	—	pF
				Typ	35	45	pF
				Max	—	—	pF
			I_F=5 mA V_L=50 V	Min	—	—	pF
				Typ	10	15	pF
				Max	—	—	pF
	Pole-to-pole Capacitance (S1 to S2)		I_F=0 mA	Min	—	—	pF
				Typ	0.5	0.5	pF
				Max	—	—	pF
	Switch Offset (NO)		I_F=5 mA (NO) I_F=5 mA (NC)	Min	—	—	µV
				Typ	0.15	0.15	µV
				Max	—	—	µV
	Switch Offset (NC)		I_F=0 mA (NC) I_F=5 mA (NO)	Min	—	—	µV
				Typ	0.1	0.1	µV
				Max	—	—	µV

	Parameter	Symbol	Test Condition	Values	LH1502	LH1512	Units
TRANSFER	Input/Output Capacitance	C_{ISO}	V_{ISO}=1 V	Min	—	—	pF
				Typ	1.1	1.1	pF
				Max	—	—	pF
	Turn-on Time (NO)	t_{on}	I_F=10 mA	Min	NA	—	ms
			I_L=50 mA	Typ	NA	1.4	ms
				Max	NA	3.0	ms
	Turn-on Time (NC)	t_{on}	I_F=10 mA	Min	NA	—	ms
			I_L=50 mA	Typ	NA	1.2	ms
				Max	NA	3.0	ms
	Turn-off Time (NO)	t_{off}	I_F=10 mA	Min	NA	—	ms
			I_L=50 mA	Typ	NA	0.7	ms
				Max	NA	3.0	ms
	Turn-off Time (NC)	t_{off}	I_F=10 mA	Min	NA	—	ms
			I_L=50 mA	Typ	NA	2.0	ms
				Max	NA	3.0	ms
	Turn-on Time (NO)	t_{on}	I_F=10 mA	Min	1.0	NA	ms
			I_L=37.5 mA	Typ	3.2	NA	ms
			V_L=150 V	Max	6.0	NA	ms
	Turn-on Time (NC)	t_{on}	I_F=10 mA	Min	1.0	NA	ms
			I_L=37.5 mA	Typ	3.8	NA	ms
			V_L=150 V	Max	6.0	NA	ms
	Turn-off Time (NO)	t_{off}	I_F=10 mA	Min	—	NA	ms
			I_L=37.5 mA	Typ	1.6	NA	ms
			V_L=150 V	Max	3.0	NA	ms
	Turn-off Time (NC)	t_{off}	I_F=10 mA	Min	—	NA	ms
			I_L=37.5 mA	Typ	0.8	NA	ms
			V_L=150 V	Max	3.0	NA	ms
	Transfer OFF Time (NC off to NO on)	ttfr	I_F=10 mA	Min	0	NA	µs
			I_L=37.5 mA	Typ	800	NA	µs
			V_L=150 V	Max	—	NA	µs
	Transfer OFF Time (NO off to NC on)	ttfr	I_F=10 mA	Min	0	NA	µs
			I_L=37.5 mA	Typ	1500	NA	µs
			V_L=150 V	Max	—	NA	µs

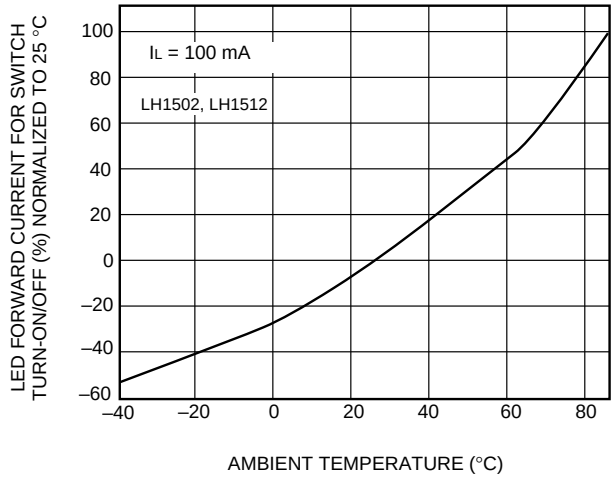
A. LED Voltage vs. Temperature



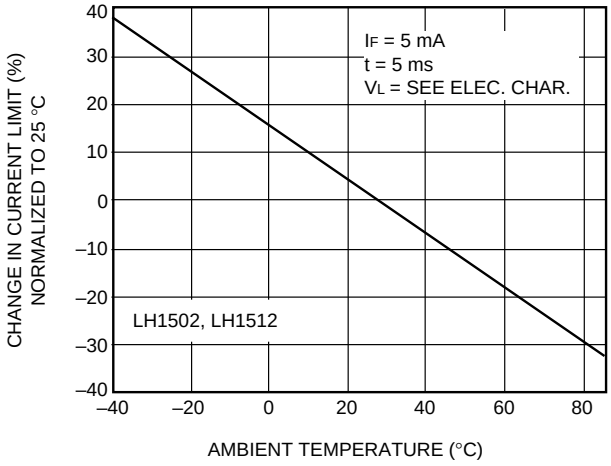
B. LED Dropout Voltage vs. Temperature



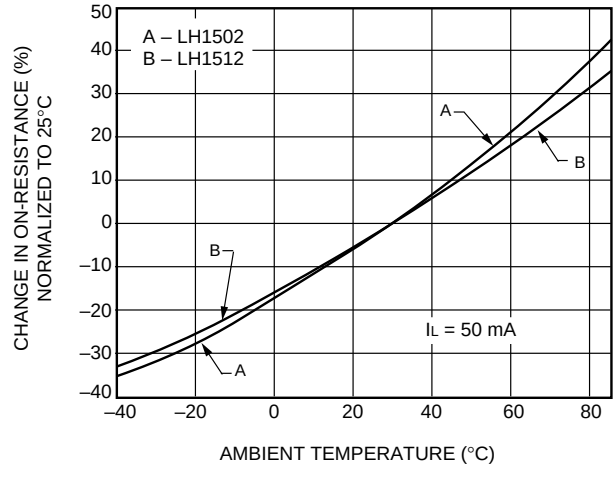
C. LED Current for Switch Turn-Off vs. Temperature



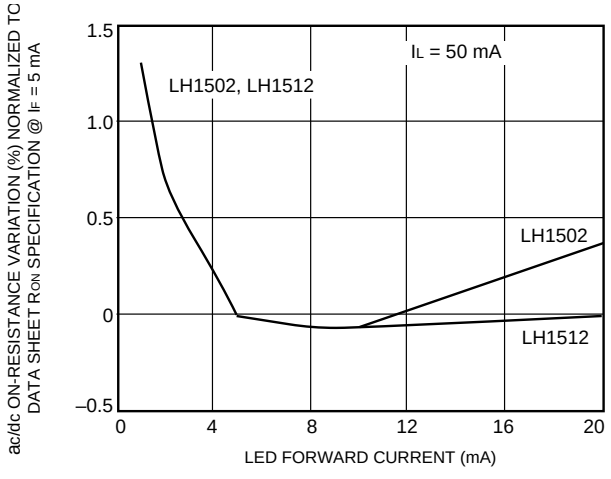
D. Current Limit vs. Temperature



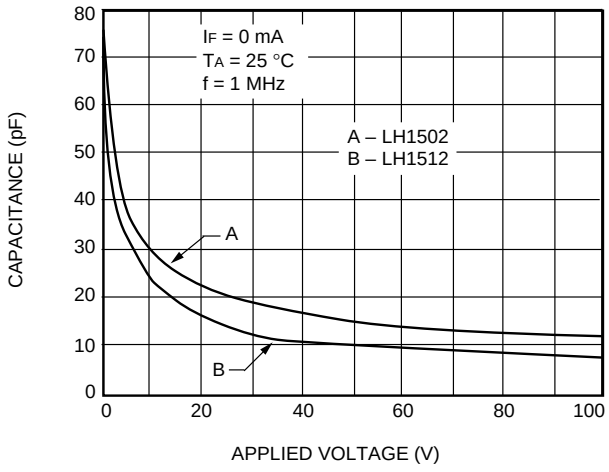
E. ON-Resistance vs. Temperature



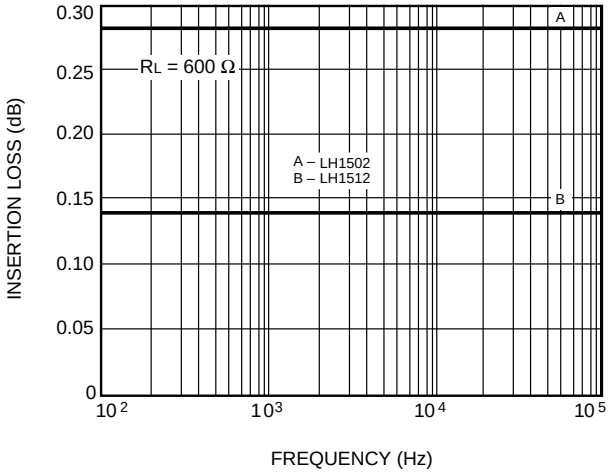
F. Variation in ON-Resistance vs. LED Current



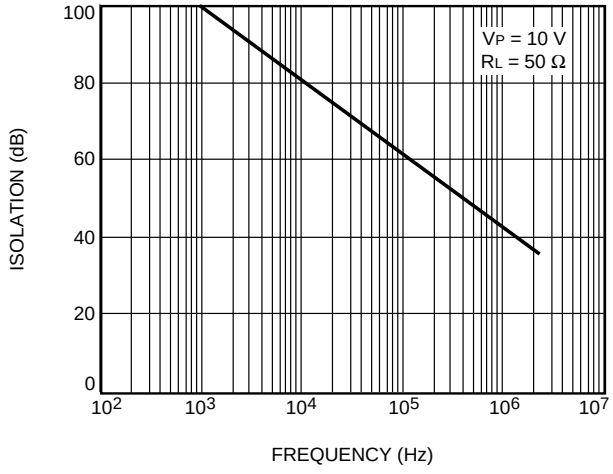
A. Switch Capacitance vs. Applied Voltage



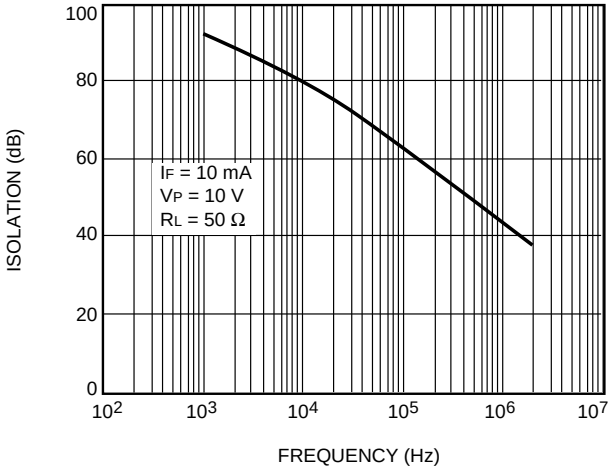
B. Insertion Loss vs. Frequency



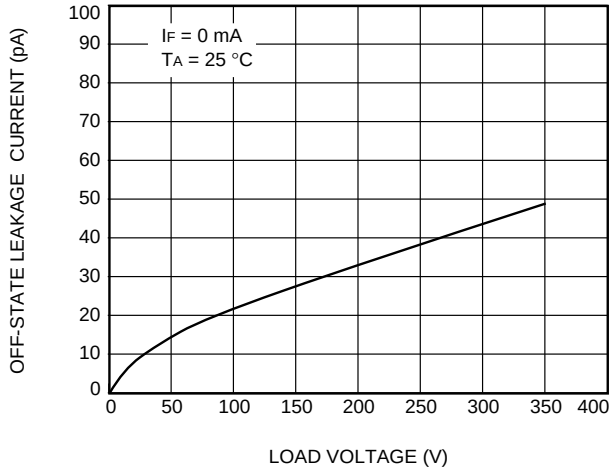
C. NO Output Isolation



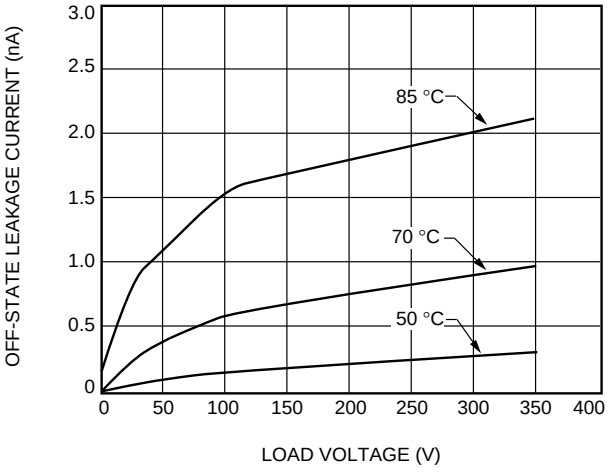
D. NC Output Isolation



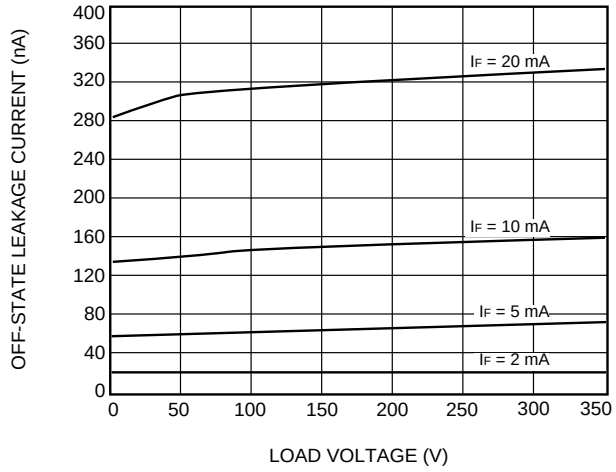
E. NO Leakage Current vs. Applied Voltage



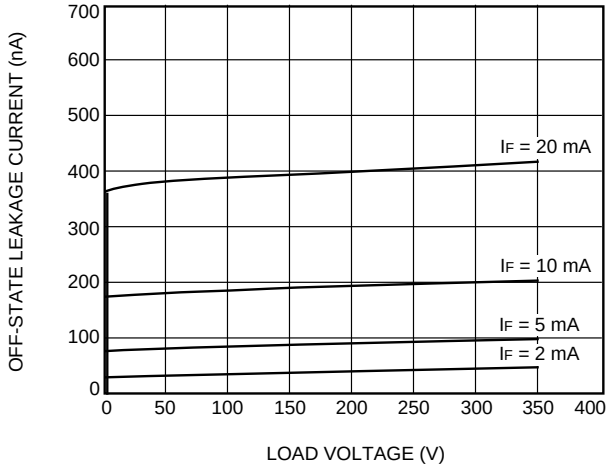
F. NO Leakage Current vs Applied Voltage @ Elevated Temperatures



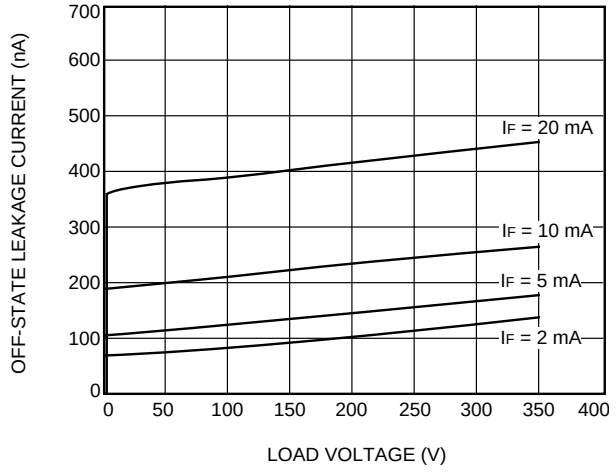
A. NC Leakage Current vs. Applied voltage @ 25°C



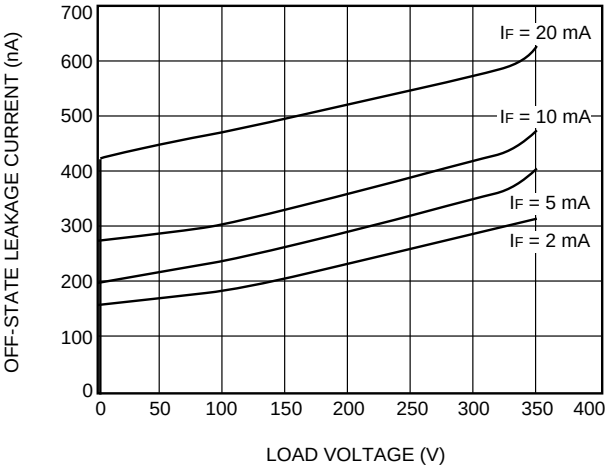
B. NC Leakage Current vs. Applied voltage @ 50°C



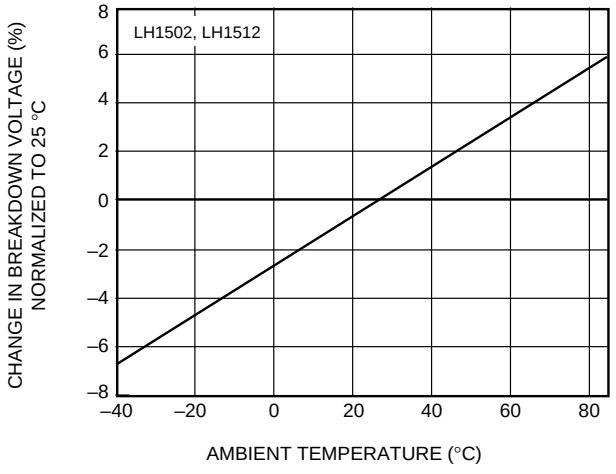
C. NC Leakage Current vs. Applied voltage @ 70°C



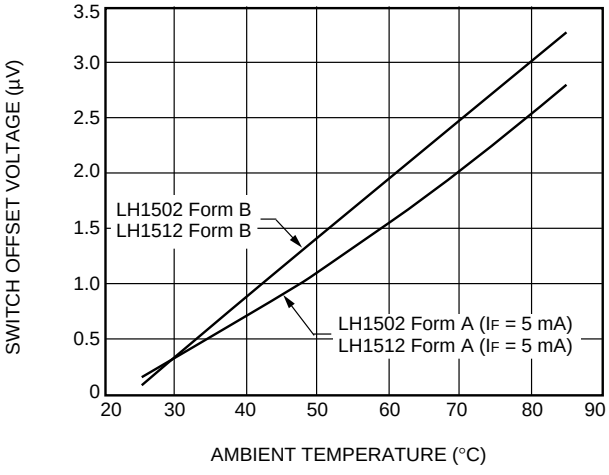
D. NC Leakage Current vs. Applied voltage @ 85°C



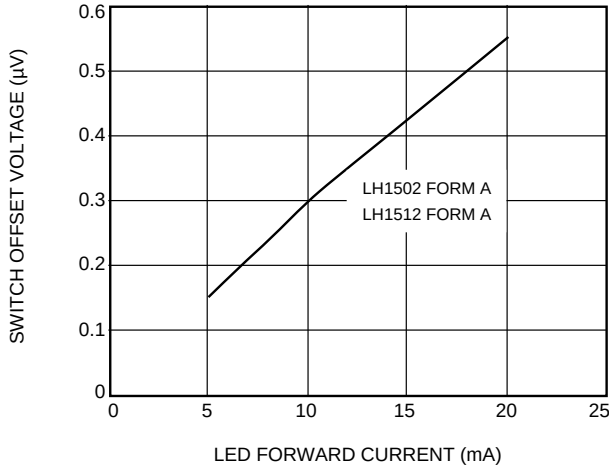
E. Switch Breakdown Voltage vs. Temperature



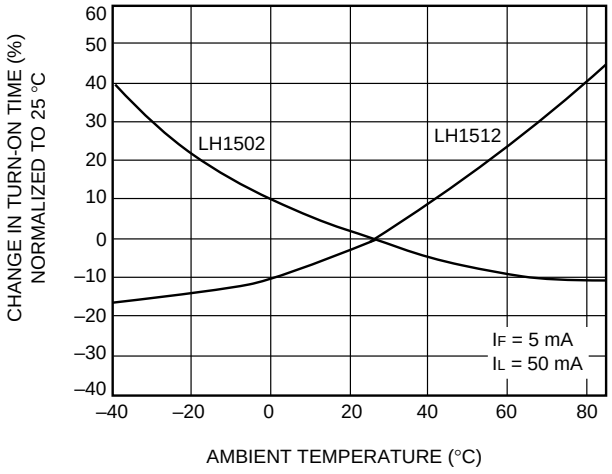
F. Switch Offset Voltage vs. Temperature



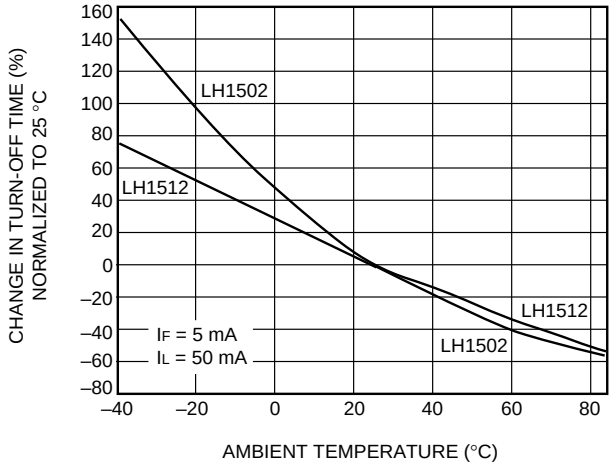
A. NO Switch Offset Voltage vs. LED Current



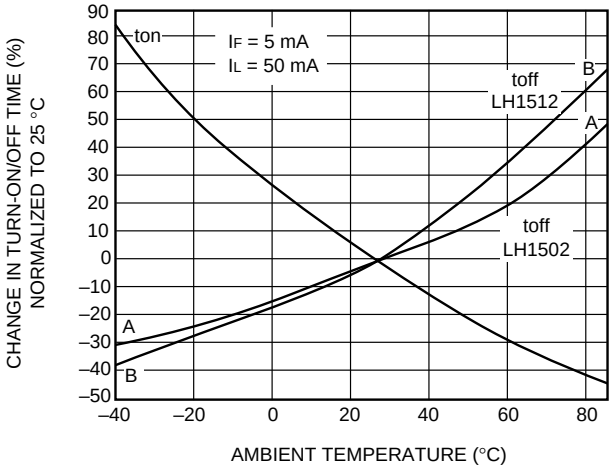
B. NO Turn-On Time vs. Temperature



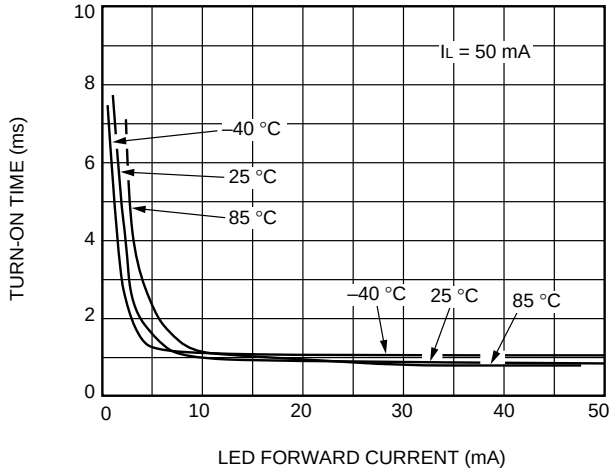
C. NO Turn-Off Time vs. Temperature



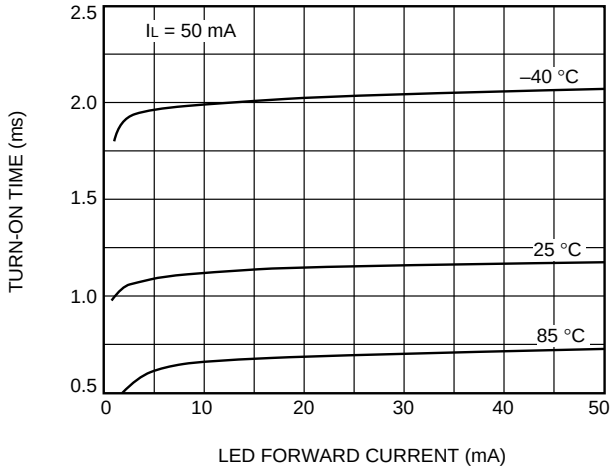
D. NC Turn-On/Off Time vs. Temperature



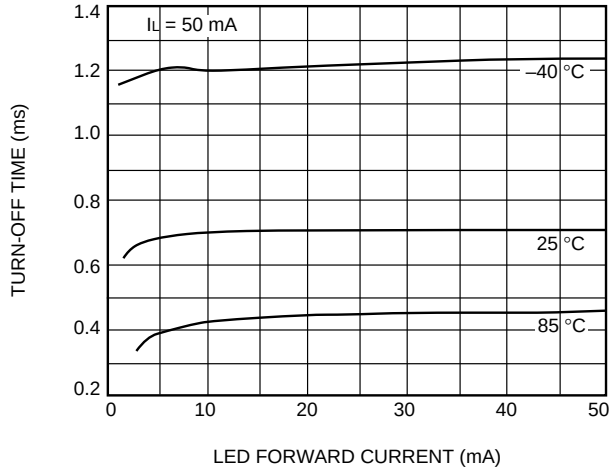
E. NO Turn-On Time vs. LED Current (LH1512)



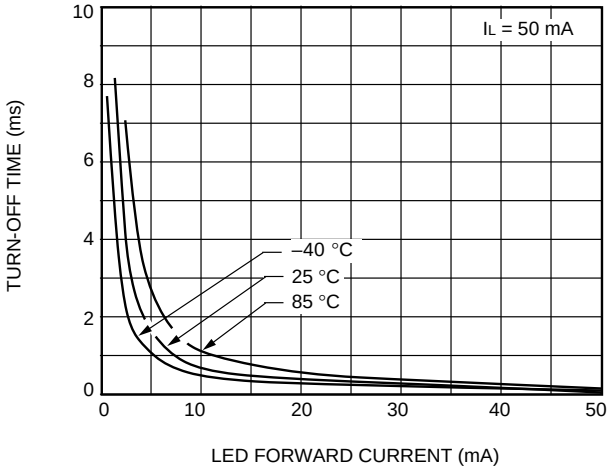
F. NC Turn-On Time vs. LED Current (LH1512)



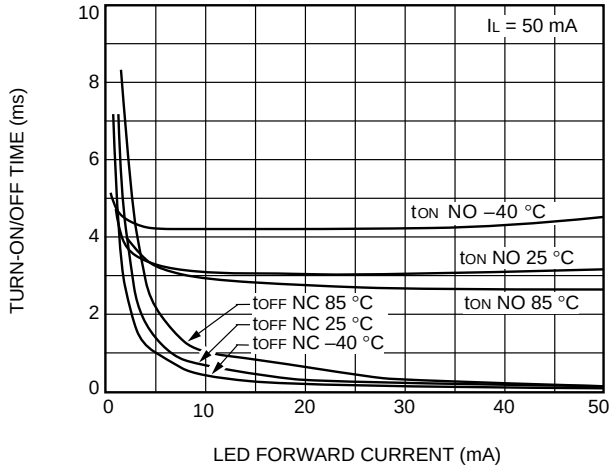
A. NO Turn-Off Time vs. LED Current (LH1512)



B. NC Turn-Off Time vs. LED Current (LH1512)



C. NC Turn-Off and NO Turn-ON Time vs. LED Current (LH1502)



D. NO Turn-Off and NC Turn-ON Time vs. LED Current (LH1502)