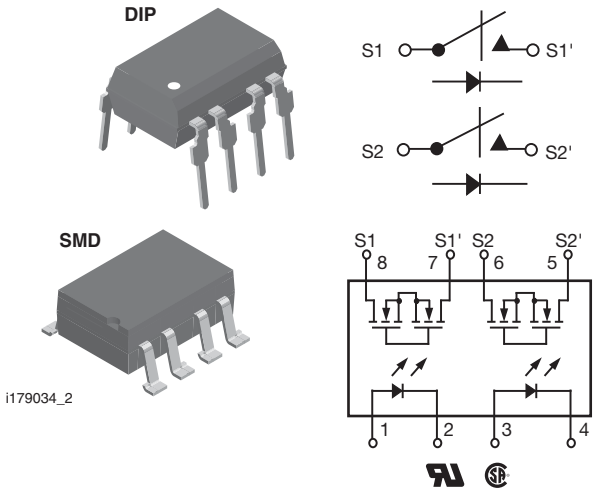
Dual 1 Form A Solid-State Relay



FEATURES

- Dual channel (LH1546)
- Current limit protection
- Isolation test voltage 5300 V_{RMS}
- Typical R_{ON} 28 Ω
- Load voltage 350 V
- Load current 120 mA
- High surge capability
- Clean bounce free switching
- Low power consumption
- SMD lead available on tape and reel
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

DESCRIPTION

The LH1556 dual 1 form A relays are SPST normally open switches that can replace electromechanical relays in many applications. They 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 circuitry, and MOSFET switches. In addition, the LH1556 SSRs employ current-limiting circuitry, enabling them to pass lightning surge testing as per ANSI/TIA-968-B and other regulatory surge requirements when overvoltage protection is provided.

APPLICATIONS

- General telecom switching
  - On/off hook control
  - Ring relay
  - Dial pulse
  - Ground start
  - Ground fault protection
- Instrumentation
- Industrial controls

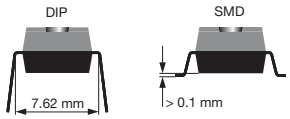
AGENCY APPROVALS

UL1577: file no. E52744 system code H, double protection

CSA: certification no. 093751

ORDERING INFORMATION

L	H	1	5	5	6	A	#	#	T	R
PART NUMBER						ELECTR. VARIATION	PACKAGE CONFIG.		TAPE AND REEL	



PACKAGE	UL, CSA
SMD-8, tubes	LH1556AAC
SMD-8, tape and reel	LH1556AACTR
DIP-8, tubes	LH1556AB

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
LED continuous forward current		I_F	50	mA
LED reverse voltage	$I_R \leq 10$ µA	V_R	8.0	V
OUTPUT				
DC or peak AC load voltage	$I_L \leq 50$ µA	V_L	350	V
Continuous DC load current, one pole operating		I_L	120	mA
Continuous DC load current, two poles operating		I_L	110	mA
SSR				
Peak load current (single shot)	t = 100 ms	I_P	(1)	mA
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 150	°C
Pin soldering temperature (2)	t = 10 s max.	T_{sld}	260	°C
Input to output isolation voltage		V_{ISO}	5300	V_{RMS}
Output power dissipation (continuous)		P_{diss}	550	mW

Notes

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. 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 the time can adversely affect reliability.

(1) Refer to current limit performance application note for a discussion on relay operation during transient currents.

(2) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
LED forward current, switch turn-on	I_L = 100 mA, t = 10 ms	I_{Fon}		1.1	2.0	mA
LED forward current, switch turn-off	V_L = ± 350 V	I_{Foff}	0.2	1.0		mA
LED forward voltage	I_F = 10 mA	V_F	1.15	1.26	1.45	V
OUTPUT						
On-resistance AC/DC: pin 4 (±) to 6 (±)	I_F = 5.0 mA, I_L = 50 mA	R_{ON}		28	35	Ω
On-resistance DC: pin 4, 6 (+) to 5 (-)	I_F = 5.0 mA, I_L = 100 mA	R_{ON}		7.0	10	Ω
Off-resistance	I_F = 0 mA, V_L = ± 100 V	R_{OFF}	0.5	300		GΩ
Current limit AC/DC	I_F = 5.0 mA, V_L = ± 6.0 V, t = 5.0 ms	I_{LMT}	170	210	250	mA
Off-state leakage current	I_F = 0 mA, V_L = ± 100 V	I_O		0.35	200	nA
	I_F = 0 mA, V_L = ± 350 V	I_O		0.096	1.0	µA
Output capacitance pin 4 to 6	I_F = 0 mA, V_L = 1.0 V	C_O		18		pF
	I_F = 0 mA, V_L = 50 V	C_O		6.7		pF
Switch offset	I_F = 5.0 mA	V_{OS}		0.3		µV
TRANSFER						
Capacitance (input to output)	V_{ISO} = 1.0 V	C_{IO}		0.67		pF

Note

- 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.

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Turn-on time	I_F = 5.0 mA, I_L = 50 mA	t_{on}		1.14	3.0	ms
Turn-off time	I_F = 5.0 mA, I_L = 50 mA	t_{off}		0.71	3.0	ms

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

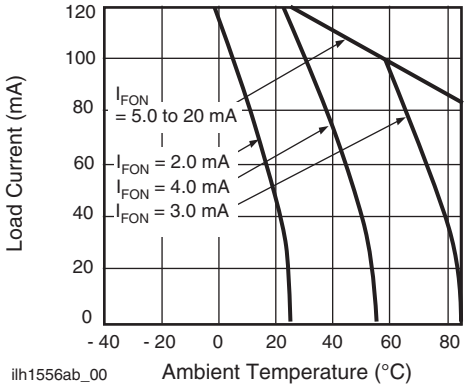


Fig. 1 - Recommended Operating Conditions

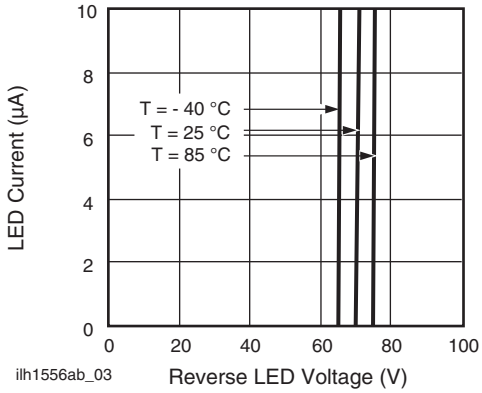


Fig. 4 - LED Reverse Current vs. LED Reverse Voltage

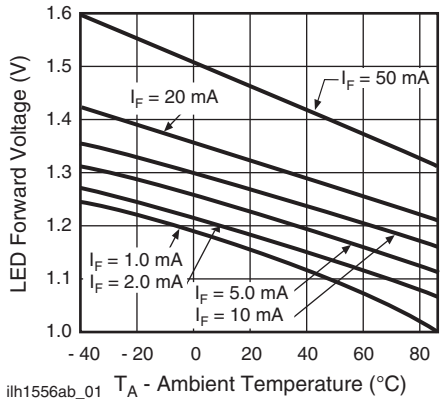


Fig. 2 - LED Voltage vs. Temperature

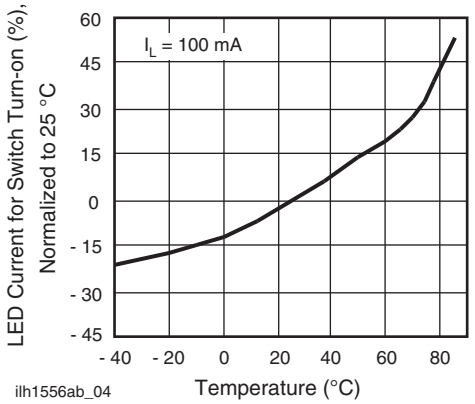


Fig. 5 - LED Current for Switch Turn-on vs. Temperature

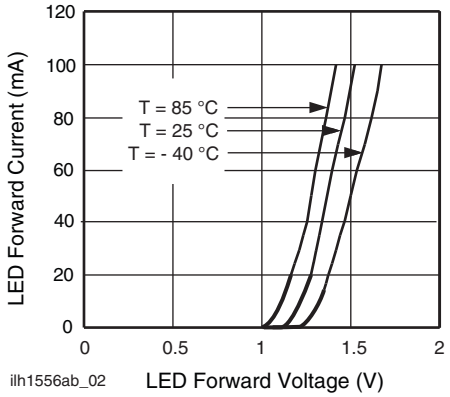


Fig. 3 - LED Forward Current vs. LED Forward Voltage

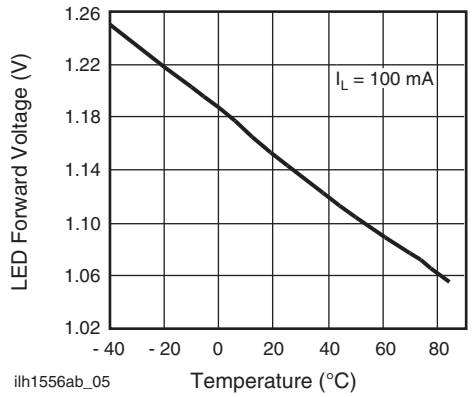


Fig. 6 - LED Dropout Voltage vs. Temperature

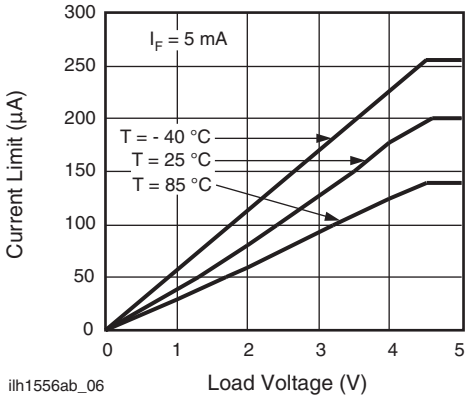


Fig. 7 - Load Current vs. Load Voltage

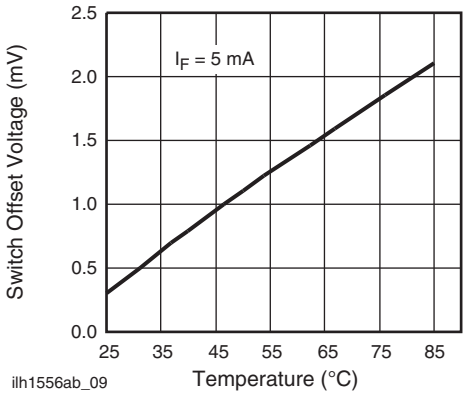


Fig. 10 - Switch Offset Voltage vs. LED Current

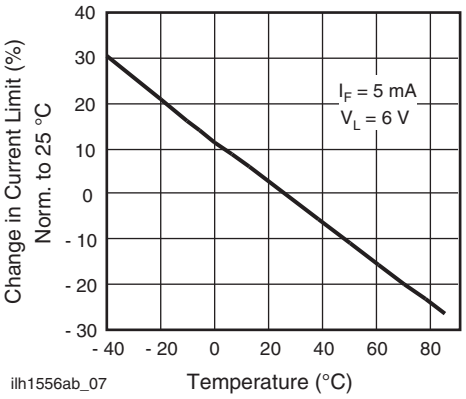


Fig. 8 - Current Limit vs. Temperature

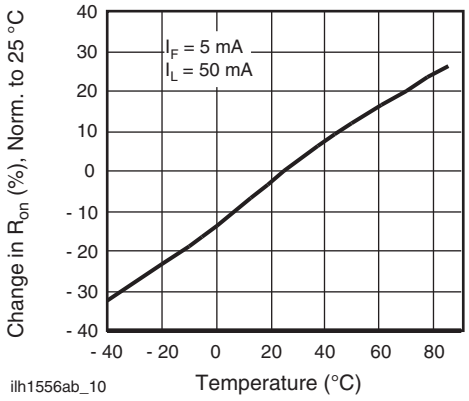


Fig. 11 - On-Resistance vs. Temperature

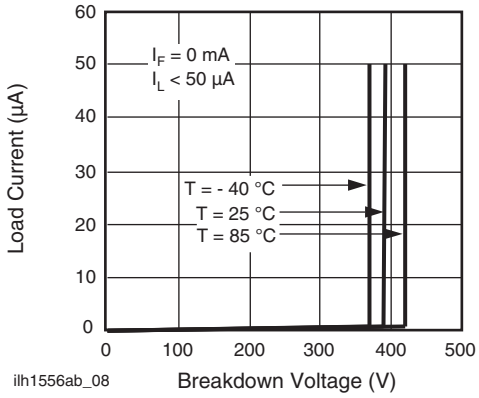


Fig. 9 - Switch Breakdown Voltage vs. Load Current

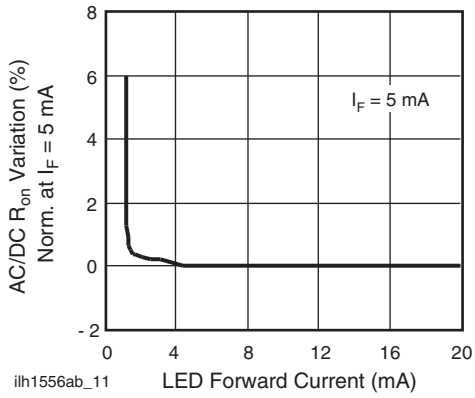


Fig. 12 - Variation in On-Resistance vs. LED Current

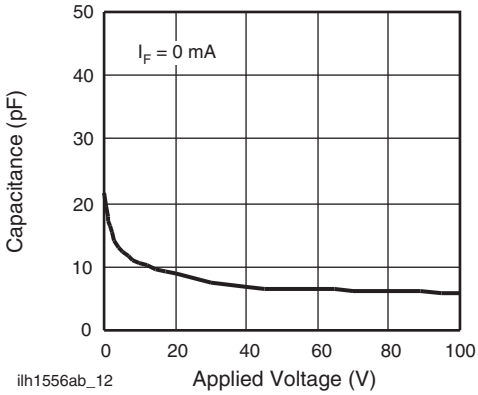


Fig. 13 - Switch Capacitance vs. Applied Voltage

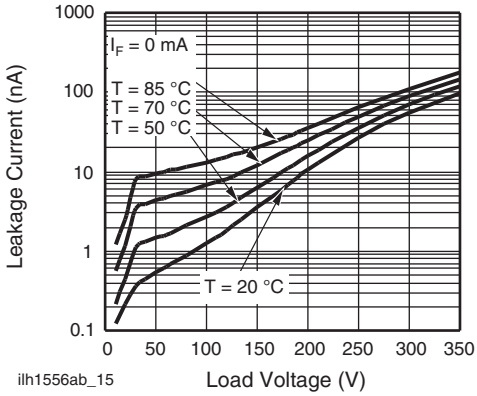


Fig. 16 - Leakage Current vs.
Applied Voltage at Elevated Temperatures

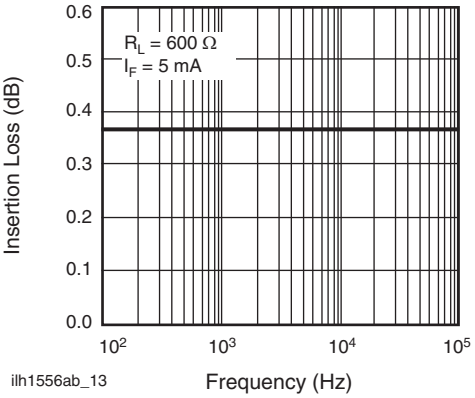


Fig. 14 - Insertion Loss vs. Frequency

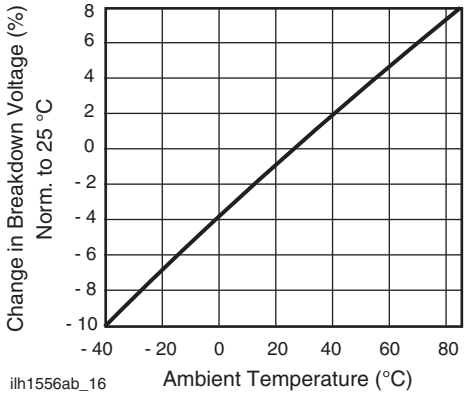


Fig. 17 - Switch Breakdown Voltage vs. Temperature

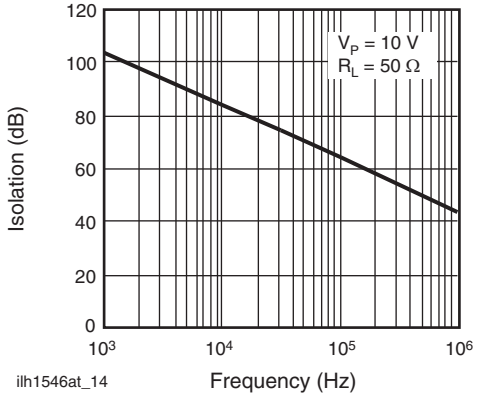


Fig. 15 - Output Isolation

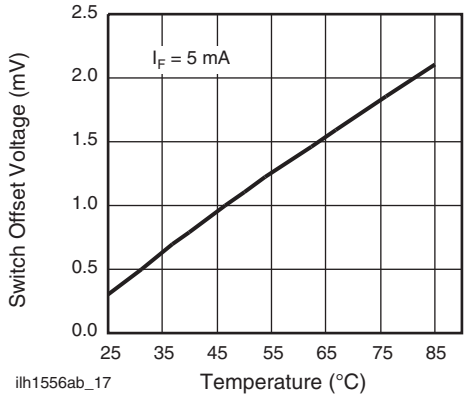


Fig. 18 - Switch Offset Voltage vs. Temperature

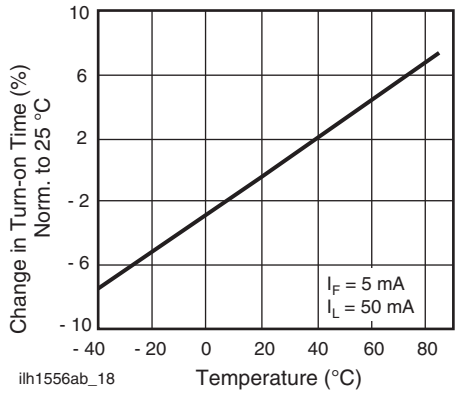


Fig. 19 - Turn-on Time vs. Temperature

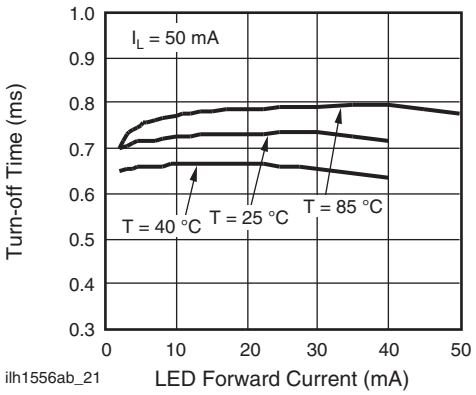


Fig. 22 - Turn-off Time vs. LED Current

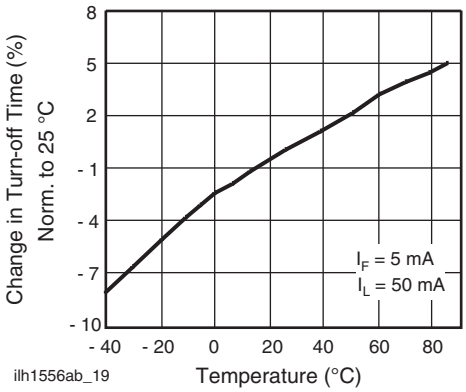


Fig. 20 - Turn-off Time vs. Temperature

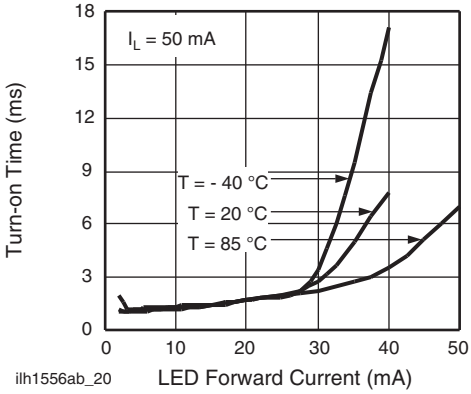
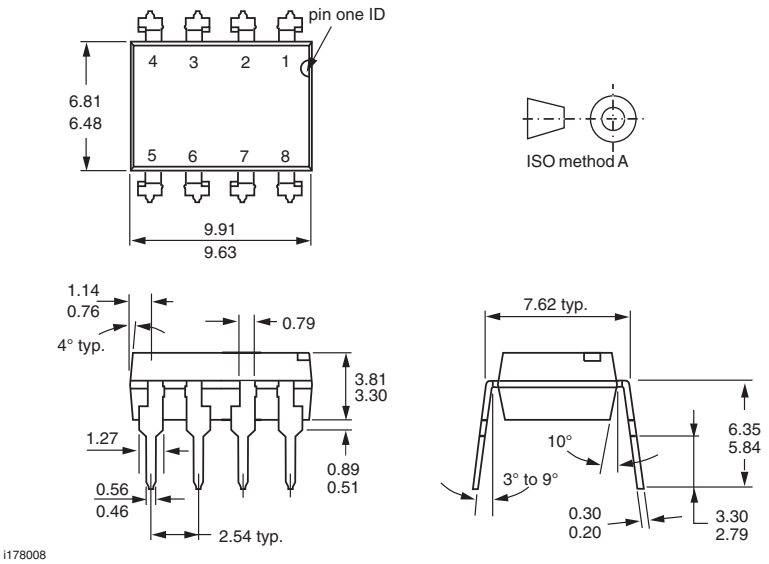


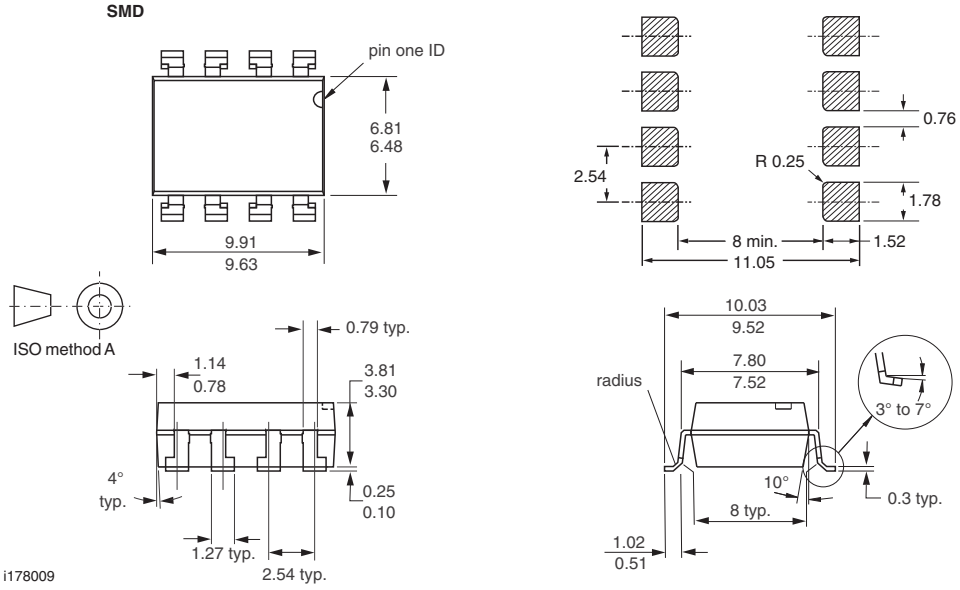
Fig. 21 - Turn-on Time vs. LED Current

PACKAGE DIMENSIONS in millimeters

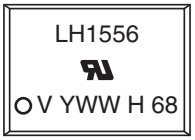
DIP



SMD



PACKAGE MARKING (example)



Note

- Tape and reel suffix (TR) is not part of the package marking.

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