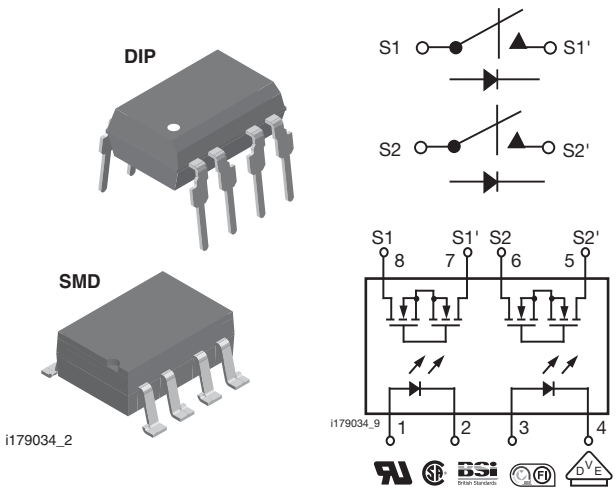
Dual 1 Form A Solid-State Relay



FEATURES

- Dual channel (LH1500)
- Current limit protection
- Isolation test voltage 5300 V_{RMS}
- Typical R_{ON} 20 Ω
- Load voltage 350 V
- Load current 150 mA
- High surge capability
- Clean bounce free switching
- Low power consumption
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free

e3

RoHS COMPLIANT

APPLICATIONS

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

DESCRIPTION

The LH1520 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 LH1520 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.

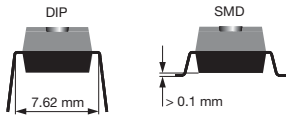
AGENCY APPROVALS

UL1577:	file no. E52744 system code H, double protection
CSA:	certification no. 093751
BSI/BABT:	certification no. 7980
DIN EN:	60747-5-2 (VDE 0884)/60747-5-5 (pending), available with option 1
FIMKO:	approval

ORDERING INFORMATION

L	H	1	5	2	0	A	#	#	T	R

PART NUMBER — ELECTR. VARIATION — PACKAGE CONFIG. — TAPE AND REEL



PACKAGE	UL, CSA, BSI, FIMKO
SMD-8, tubes	LH1520AAC
SMD-8, tape and reel	LH1520AACTR
DIP-8, tubes	LH1520AB

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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	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	150	mA
Continuous DC load current, two poles operating		I_L	110	mA
Peak load current (single shot), form B	t = 100 ms	I_P	(2)	
SSR				
Ambient temperature range		T_{amb}	- 40 to + 85	°C
Storage temperature range		T_{stg}	- 40 to + 150	°C
Pin soldering temperature (3)	t = 10 s max.	T_{sld}	260	°C
Input to output isolation test voltage	t = 1 s, I_{ISO} = 10 µA max.	V_{ISO}	5300	V_{RMS}
Pole-to-pole isolation voltage (S1 to S2) (1) (dry air, dust free, at sea level)			1600	V
Output power dissipation (continuous)		P_{diss}	600	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) Breakdown occurs between the output pins external to the package.
(2) Refer to current limit performance application note for a discussion on relay operation during transient currents.
(3) 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	2	mA
LED forward current, switch turn-off	V_L = ± 300 V	I_{Foff}	0.2	1.1		mA
LED forward voltage	I_F = 10 mA	V_F	1.15	1.26	1.45	V
OUTPUT						
On-resistance	I_F = 5 mA, I_L = 50 mA	R_{ON}	12	20	25	Ω
Off-resistance	I_F = 0 mA, V_L = ± 100 V	R_{OFF}	0.5	300		GΩ
Current limit	I_F = 5 mA, t = 5 ms, V_L = ± 6 V	I_{LMT}	230	270	370	mA
Off-state leakage current	I_F = 0 mA, V_L = ± 100 V	I_O		0.32	200	nA
	I_F = 0 mA, V_L = ± 350 V	I_O			1	µA
Output capacitance	I_F = 0 mA, V_L = 1 V	C_O		55		pF
	I_F = 0 mA, V_L = 50 V	C_O		10		pF
Pole-to-pole capacitance (S1 to S2)	I_F = 5 mA			0.5		pF
Switch offset	I_F = 5 mA	V_{OS}		0.15		µV
TRANSFER						
Capacitance (input to output)	V_{ISO} = 1 V	C_{IO}		1.1		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 mA, I_L = 50 mA	t_{on}		1.4	2	ms
Turn-off time	I_F = 5 mA, I_L = 50 mA	t_{off}		0.7	2	ms

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

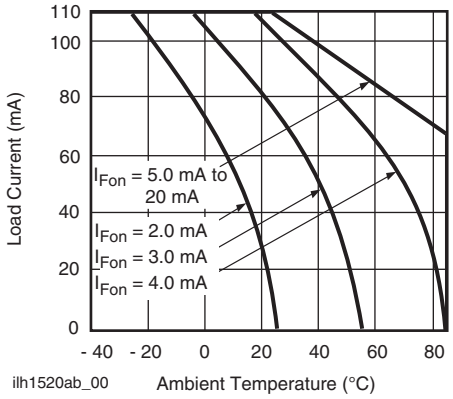

Fig. 1 - Recommended Operating Conditions

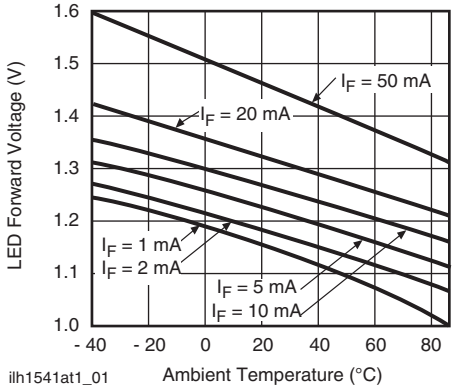

Fig. 2 - LED Voltage vs. Temperature

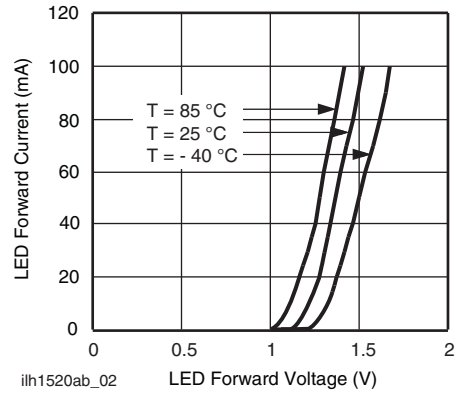

Fig. 3 - LED Forward Current vs. LED Forward Voltage

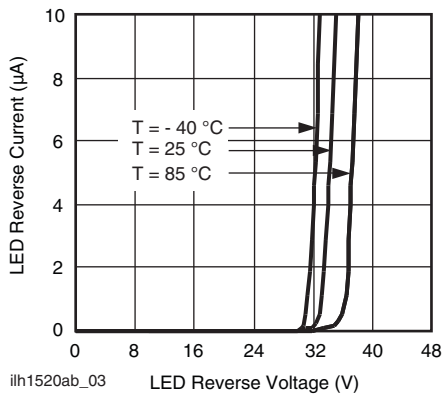

Fig. 4 - LED Reverse Current vs. LED Reverse Voltage

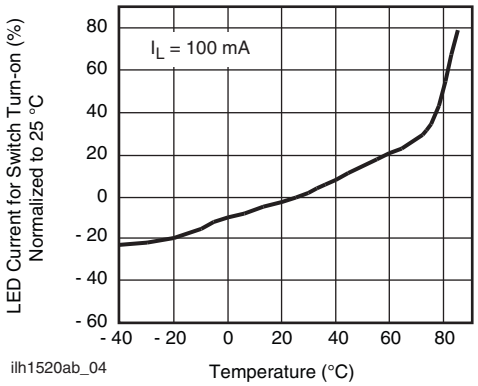

Fig. 5 - LED Current for Switch Turn-on vs. Temperature

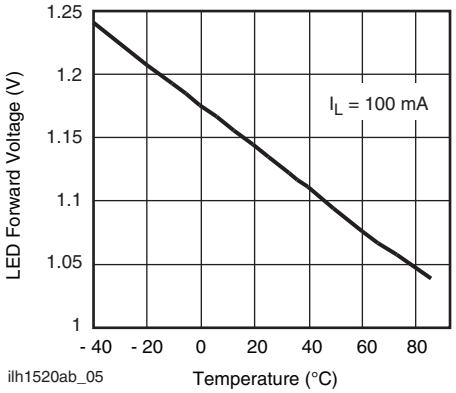

Fig. 6 - LED Dropout Voltage vs. Temperature

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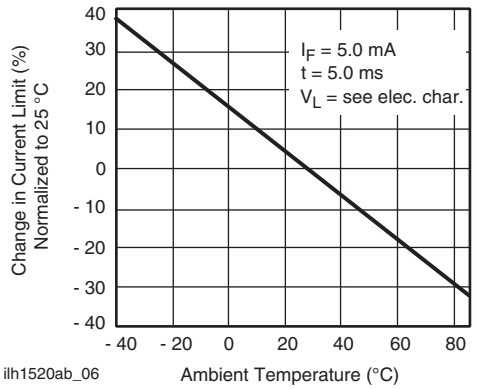

Fig. 7 - Current Limit vs. Temperature

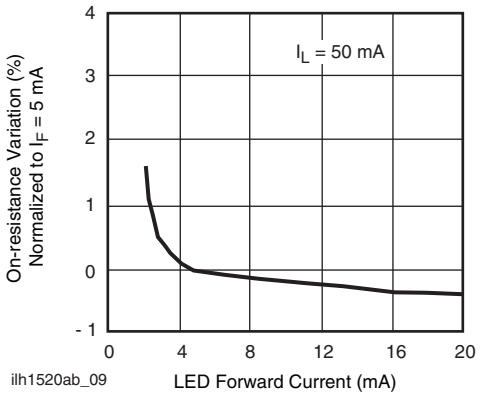

Fig. 10 - Variation in On-resistance vs. LED Current

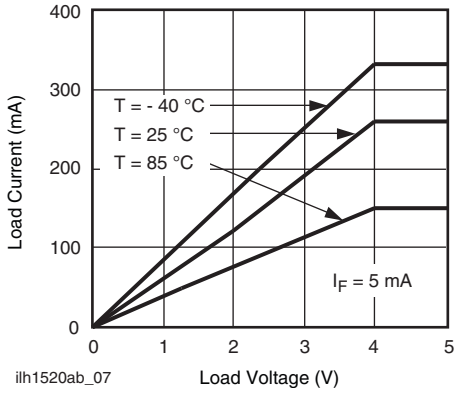

Fig. 8 - Load Current vs. Load Voltage

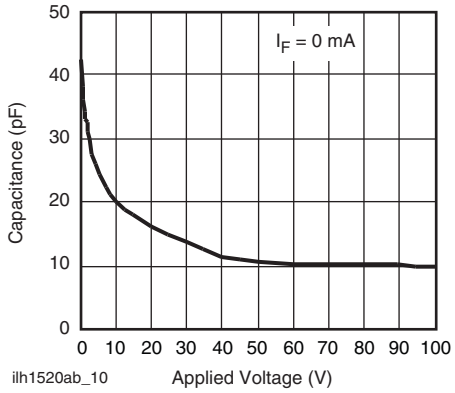

Fig. 11 - Switch Capacitance vs. Applied Voltage

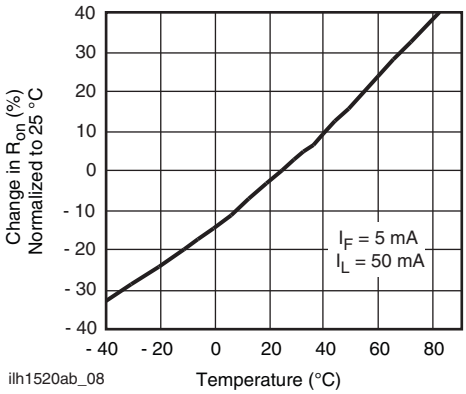

Fig. 9 - On-Resistance vs. Temperature

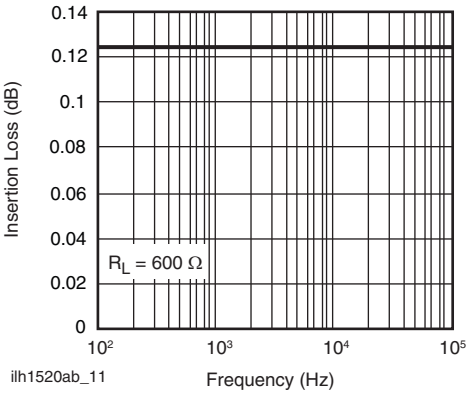

Fig. 12 - Insertion Loss vs. Frequency

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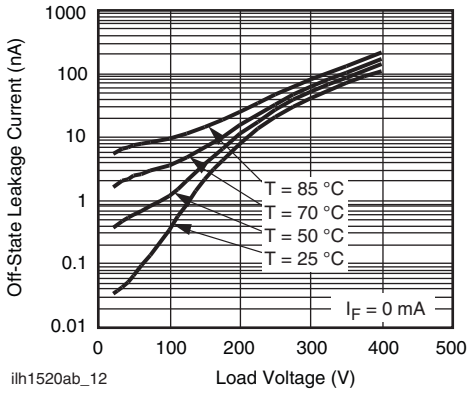

Fig. 13 - Leakage Current vs. Applied Voltage

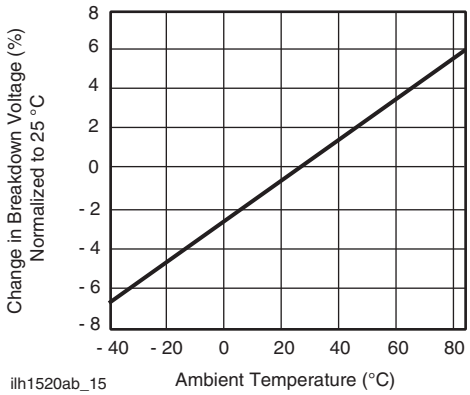

Fig. 16 - Switch Breakdown Voltage vs. Temperature

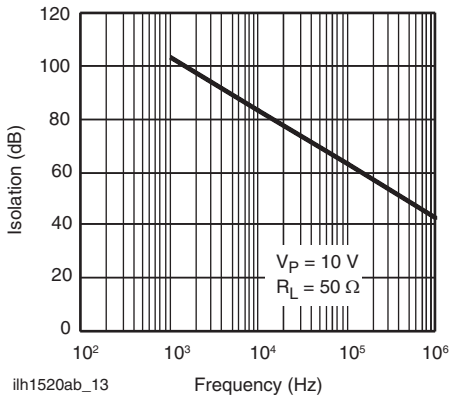

Fig. 14 - Output Isolation

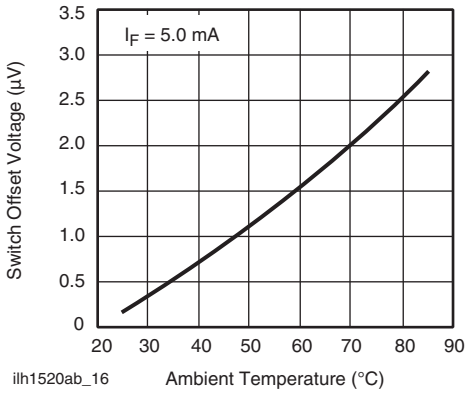

Fig. 17 - Switch Offset Voltage vs. Temperature

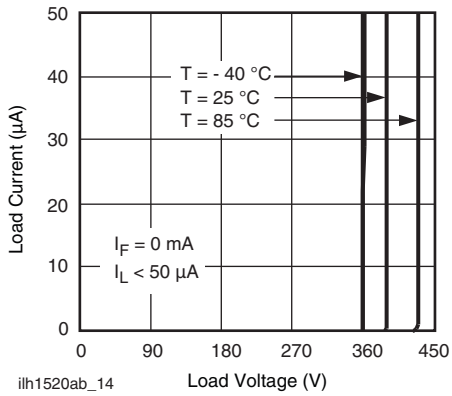

Fig. 15 - Switch Breakdown Voltage vs. Load Current

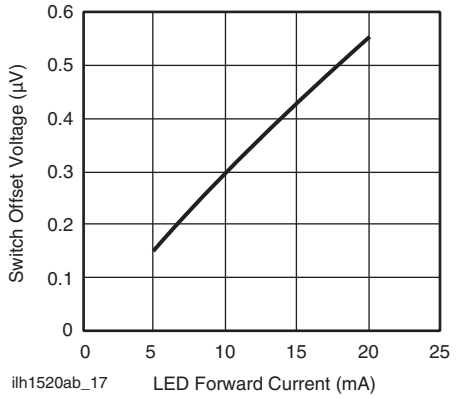

Fig. 18 - Switch Offset Voltage vs. LED Current

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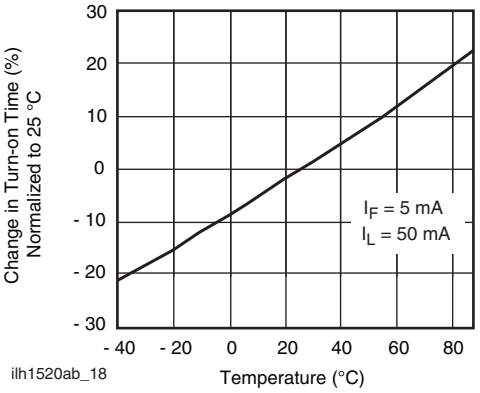


Fig. 19 - Turn-on Time vs. Temperature

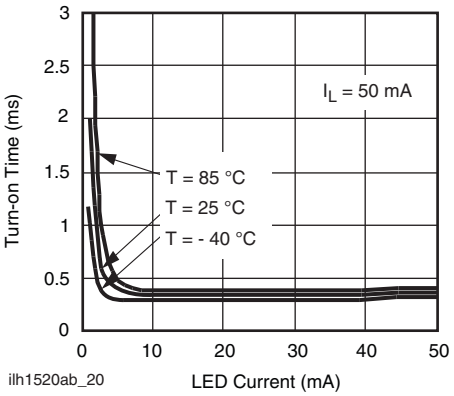


Fig. 21 - Turn-on Time vs. LED Current

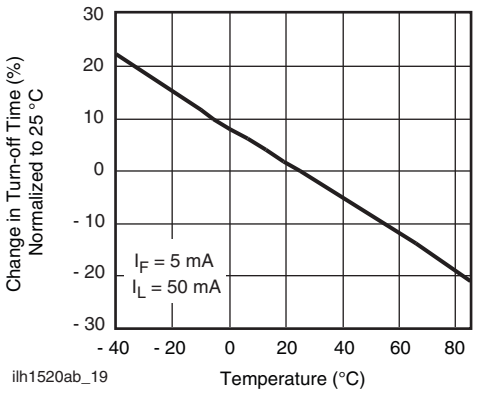


Fig. 20 - Turn-off Time vs. Temperature

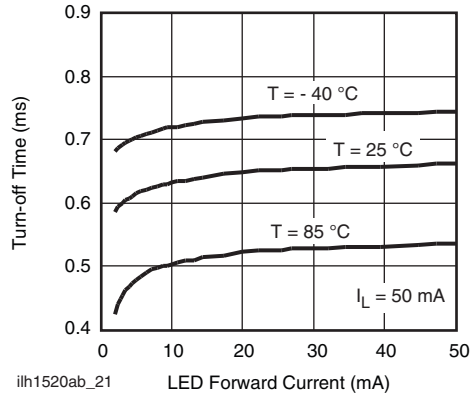
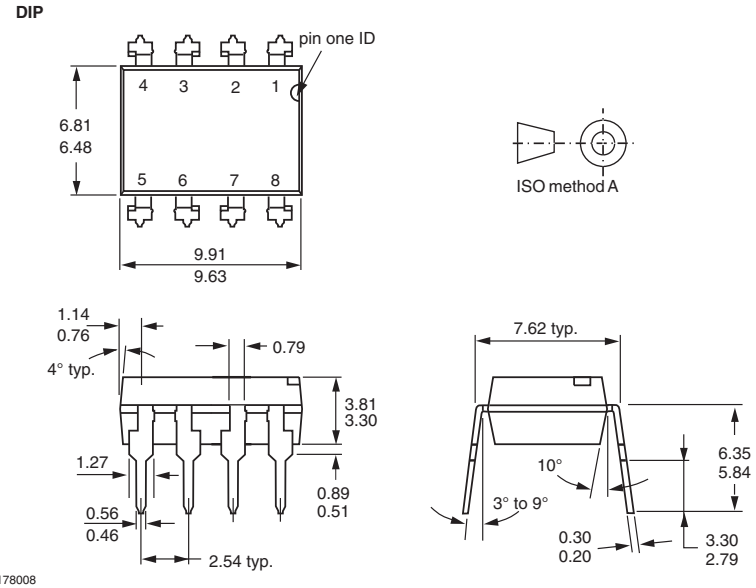


Fig. 22 - Turn-off Time vs. LED Current

PACKAGE DIMENSIONS in millimeters



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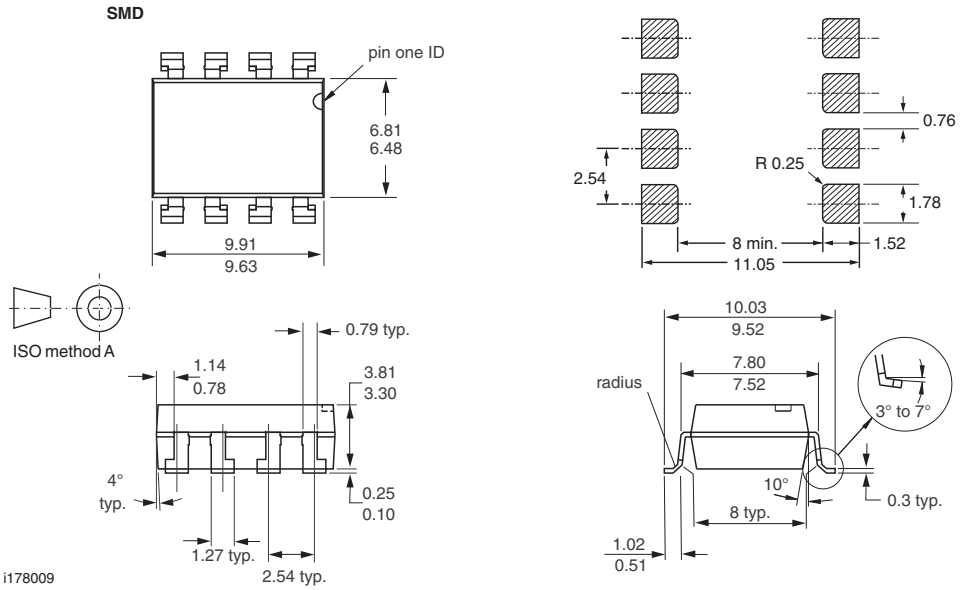
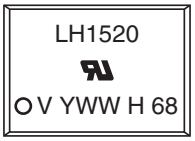


PACKAGE MARKING (example)



Note

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

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