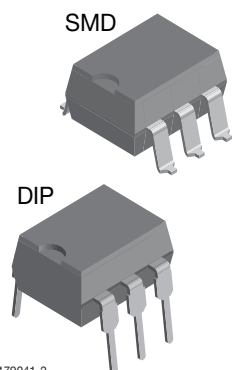
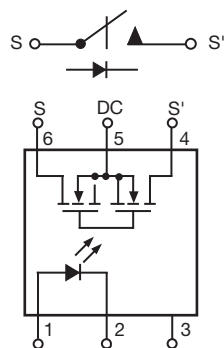




1 Form A Solid-State Relay



i179041-2



FEATURES

- Isolation test voltage 5300 V_{RMS}
- Current limit protection built in
- High reliability monolithic output die
- Low power consumption
- Clean bounce free switching
- High surge capability
- Surface mountable
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

RoHS
COMPLIANT

APPLICATIONS

- General telecom switching
- Instrumentation
- Industrial controls

AGENCY APPROVALS

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

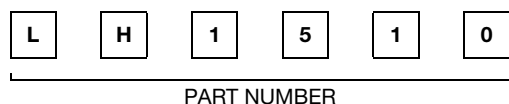
CSA: certification no. 093751

BSI: certification no. 7979/7980

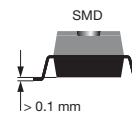
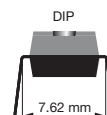
DIN EN: 60747-5-2 (VDE 0884)/60747-5-5 (pending), available with option 1

FIMKO: 25419

ORDERING INFORMATION



PART NUMBER

ELECTR.
VARIATIONPACKAGE
CONFIG.TAPE AND
REEL

PACKAGE

UL, CSA, BSI, FIMKO

SMD-6, tubes

LH1510AAB

SMD-6, tape and reel

LH1510AABTR

DIP-6, tubes

LH1510AT

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 ≤ 10 μA	V _R	8	V
OUTPUT				
DC or peak AC load voltage	I _L ≤ 50 μA	V _L	200	V
Continuous DC load current - bidirectional operation		I _L	200	mA
Continuous DC load current - unidirectional operation		I _L	350	mA
Peak load current (single shot)	t = 100 ms	I _P	(1)	

**ABSOLUTE MAXIMUM RATINGS** ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
SSR				
Ambient temperature range		T_{amb}	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	- 40 to + 150	$^{\circ}\text{C}$
Pin soldering temperature ⁽²⁾	$t = 10\text{ s max.}$	T_{sld}	260	$^{\circ}\text{C}$
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 58 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
LED forward current, switch turn-on	$I_L = 100\text{ mA}$, $t = 10\text{ ms}$	I_{Fon}		0.95	2	mA
LED forward current, switch turn-off	$V_L = \pm 150\text{ V}$	I_{Foff}	0.2	0.85		mA
LED forward voltage	$I_F = 10\text{ mA}$	V_F	1.15	1.27	1.45	V
OUTPUT						
ON-resistance AC/DC: pin 4 ($\pm$) to 6 ($\pm$)	$I_F = 5\text{ mA}$, $I_L = 50\text{ mA}$	R_{ON}	6	11.27	15	Ω
ON-resistance DC: pin 4, 6 (+) to 5 ($\pm$)	$I_F = 5\text{ mA}$, $I_L = 100\text{ mA}$	R_{ON}	1.5	3.15	3.75	Ω
Off-resistance	$I_F = 0\text{ mA}$, $V_L = \pm 100\text{ V}$	R_{OFF}	0.5	80		$G\Omega$
Current limit AC/DC: pin 4 ($\pm$) to 6 ($\pm$)	$I_F = 5\text{ mA}$, $V_L = \pm 5\text{ V}$, $t = 5\text{ ms}$	I_{LMT}	300	368	450	mA
Current limit DC: pin 4, 6 (+) to 5 ($\pm$)	$I_F = 5\text{ mA}$, $V_L = \pm 4\text{ V}$, $t = 5\text{ ms}$	I_{LMT}	600	736	920	mA
Off-state leakage current	$I_F = 0\text{ mA}$, $V_L = \pm 100\text{ V}$	I_O		2.36	200	nA
	$I_F = 0\text{ mA}$, $V_L = \pm 200\text{ V}$	I_O		79.2	1	μA
Output capacitance pin 4 to 6	$I_F = 0\text{ mA}$, $V_L = 1\text{ V}$	C_O		27.75		pF
	$I_F = 0\text{ mA}$, $V_L = 50\text{ V}$	C_O		10.82		pF
Switch offset	$I_F = 5\text{ mA}$	V_{OS}		0.17		μV
TRANSFER						
Capacitance (input to output)	$V_{ISO} = 1\text{ V}$	C_{IO}		0.72		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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Turn-on time	$I_F = 5\text{ mA}$, $I_L = 50\text{ mA}$	t_{on}		0.5	2	ms
Turn-off time	$I_F = 5\text{ mA}$, $I_L = 50\text{ mA}$	t_{off}		0.7	2	ms

**SAFETY AND INSULATION RATINGS**

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	IEC 68 part 1		40/85/21	
Pollution degree	DIN VDE 0109		2	
Tracking resistance (comparative tracking index)	Insulation group IIIa	CTI	175	
Highest allowable overvoltage	Transient overvoltage	V_{IOTM}	8000	V_{peak}
Max. working insulation voltage	Recurring peak voltage	V_{IORM}	890	V_{peak}
Insulation resistance at 25 °C	$V_{IO} = 500 V$	R_{IS}	$\geq 10^{12}$	Ω
Insulation resistance at T_S		R_{IS}	$\geq 10^9$	Ω
Insulation resistance at 100 °C		R_{IS}	$\geq 10^{11}$	Ω
Partial discharge test voltage	Methode a, $V_{pd} = V_{IORM} \times 1.875$	V_{pd}	1669	V_{peak}
Safety limiting values - maximum values allowed in the event of a failure	Case temperature	T_{SI}	175	°C
	Input current	I_{SI}	300	mA
	Output power	P_{SO}	700	mW
Minimum external air gap (clearance)	Measured from input terminals to output terminals, shortest distance through air		≥ 7	mm
Minimum external tracking (creepage)	Measured from input terminals to output terminals, shortest distance path along body		≥ 7	mm

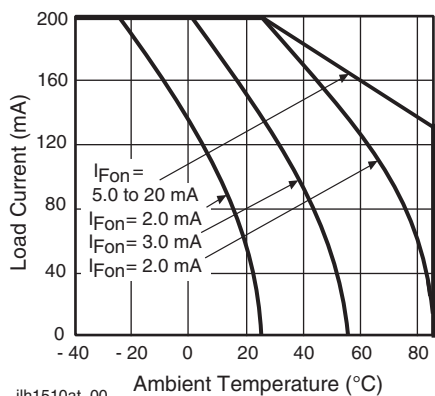
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ °C}$, unless otherwise specified)

Fig. 1 - Recommended Operating Conditions

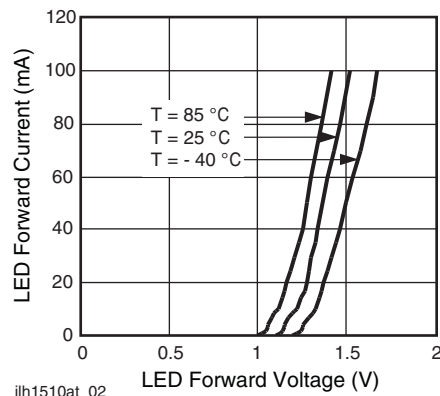


Fig. 3 - LED Forward Current vs. LED Forward Voltage

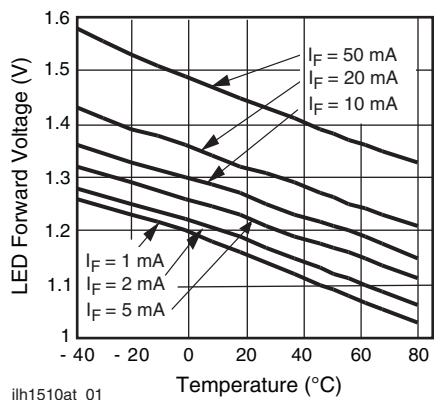


Fig. 2 - LED Voltage vs. Temperature

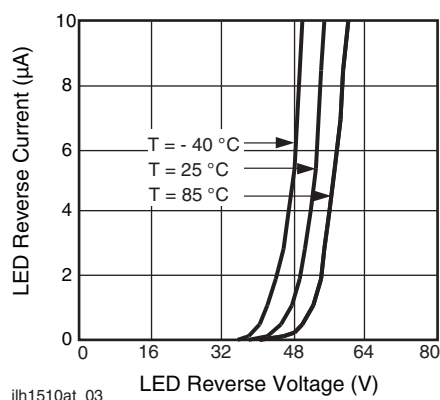


Fig. 4 - LED Reverse Current vs. LED Reverse Voltage

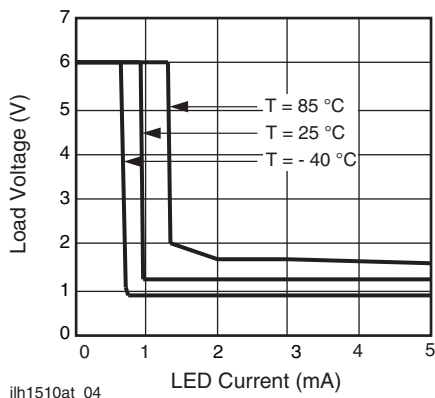


Fig. 5 - LED Current vs. Load Voltage

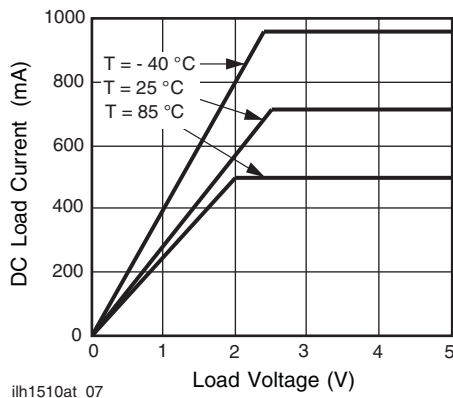


Fig. 8 - DC Load Current vs. Load Voltage

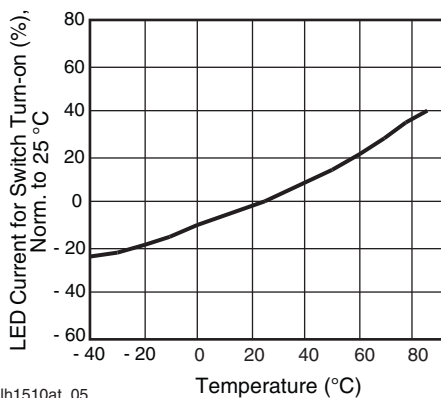


Fig. 6 - LED Current for Switch Turn-on vs. Temperature

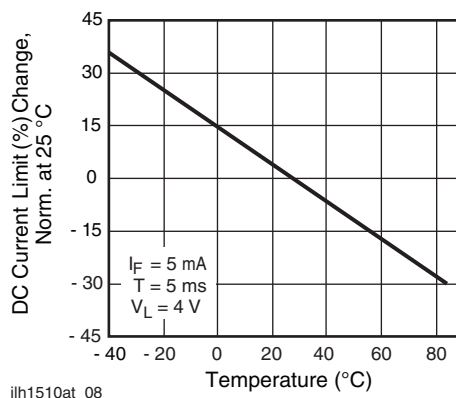


Fig. 9 - DC Current Limit vs. Temperature

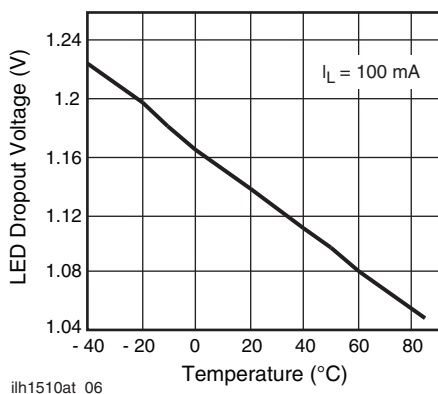


Fig. 7 - LED Dropout Voltage vs. Temperature

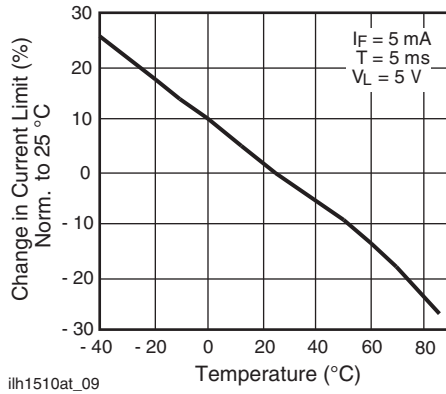


Fig. 10 - Current Limit vs. Temperature

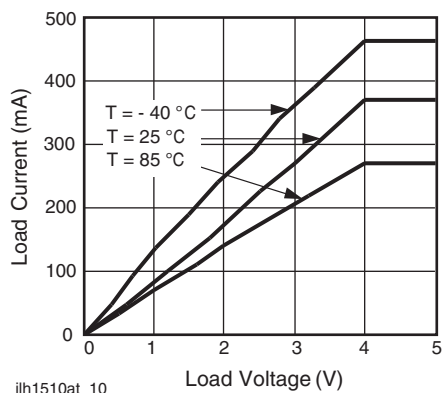


Fig. 11 - Load Current vs. Load Voltage

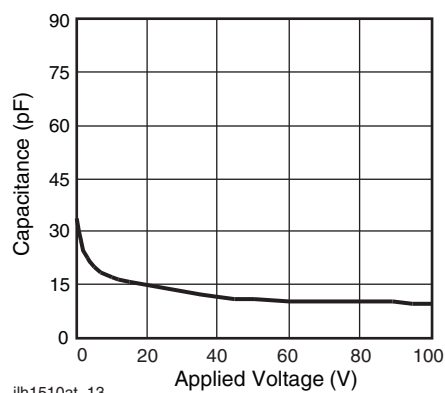


Fig. 14 - Switch Terminal Capacitance vs. Applied Voltage

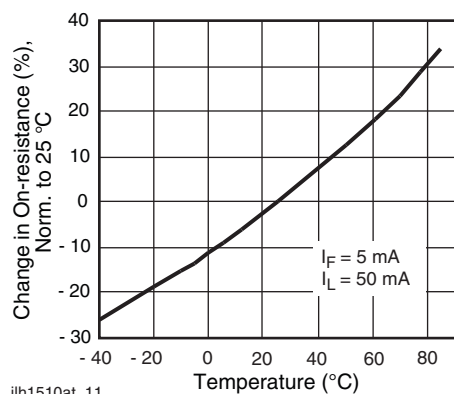


Fig. 12 - On-Resistance vs. Temperature

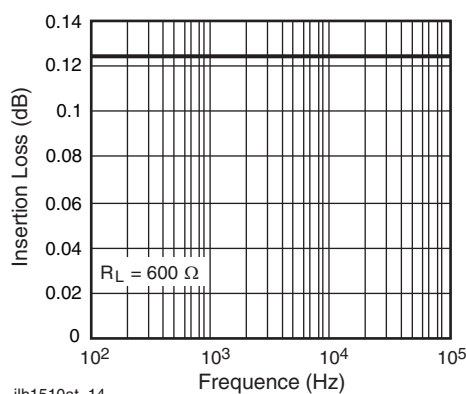


Fig. 15 - Insertion Loss vs. Frequency

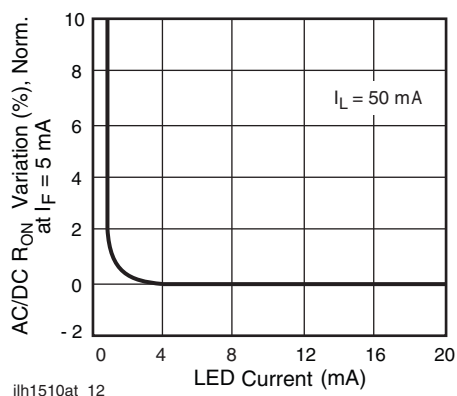


Fig. 13 - Variation in On-Resistance vs. LED Current

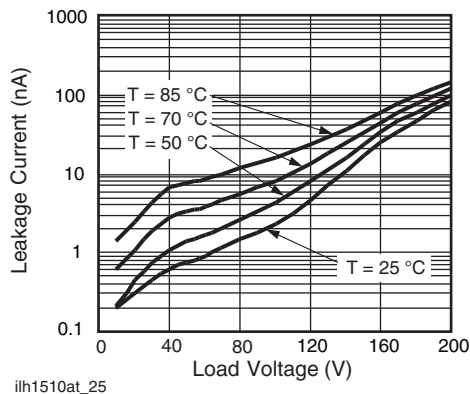


Fig. 16 - Leakage Current vs. Applied Voltage

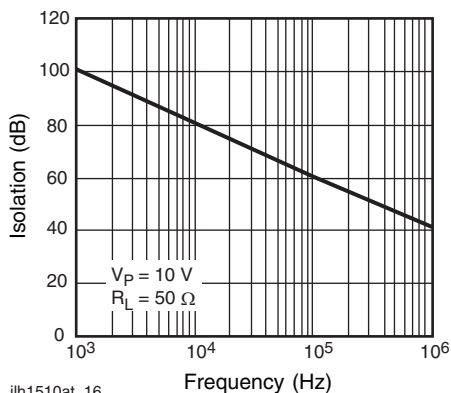


Fig. 17 - Output Isolation

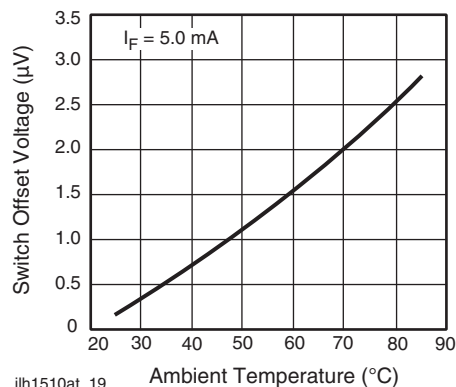


Fig. 20 - Switch Offset Voltage vs. Temperature

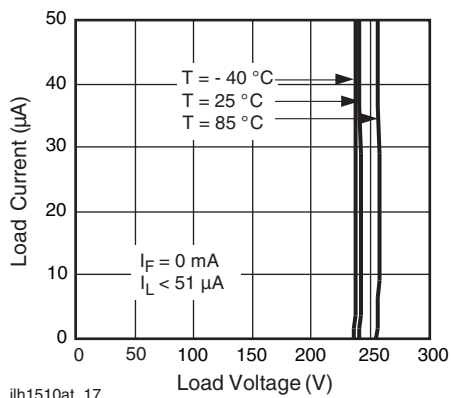


Fig. 18 - Switch Breakdown Voltage vs. Load Current

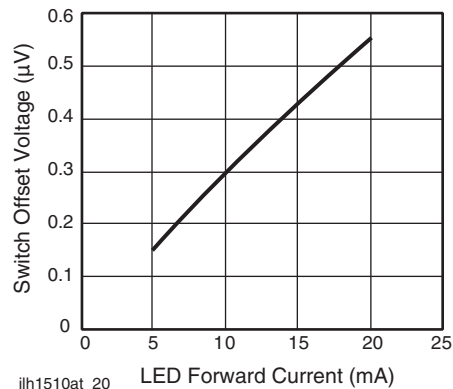


Fig. 21 - Switch Offset Voltage vs. LED Current

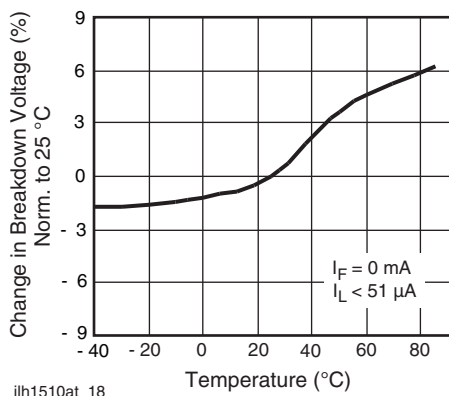


Fig. 19 - Switch Breakdown Voltage vs. Temperature

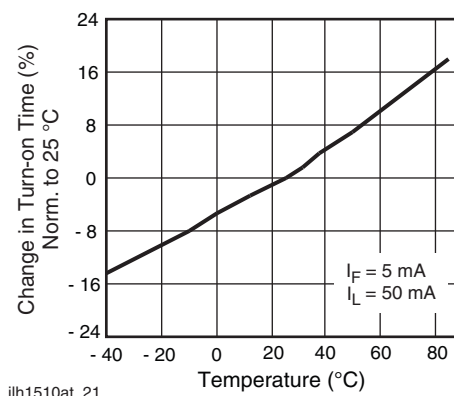


Fig. 22 - Turn-on Time vs. Temperature

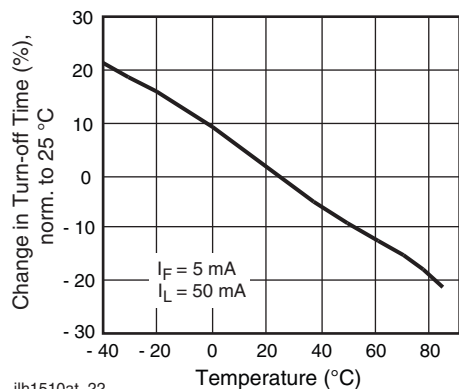


Fig. 23 - Turn-off Time vs. Temperature

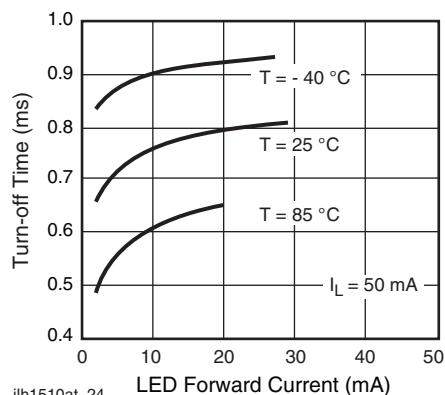


Fig. 25 - Turn-off Time vs. LED Current

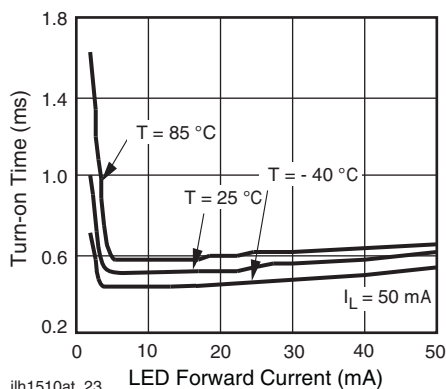
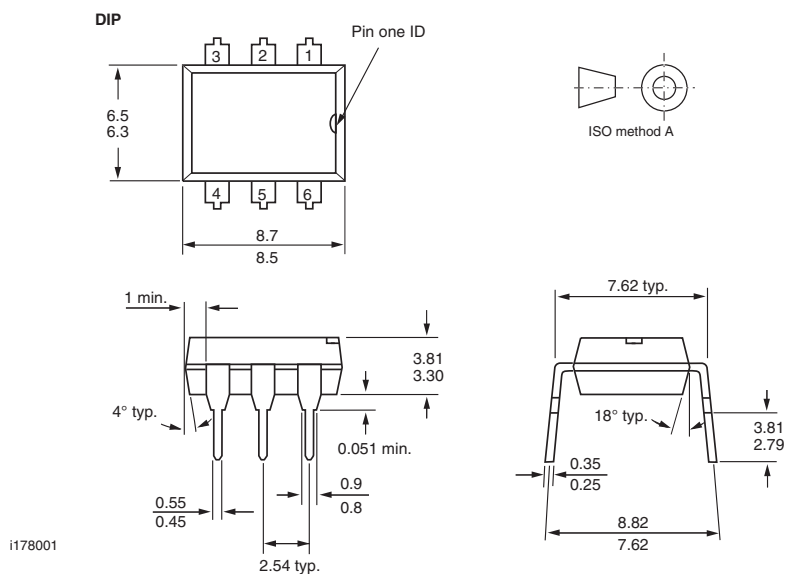
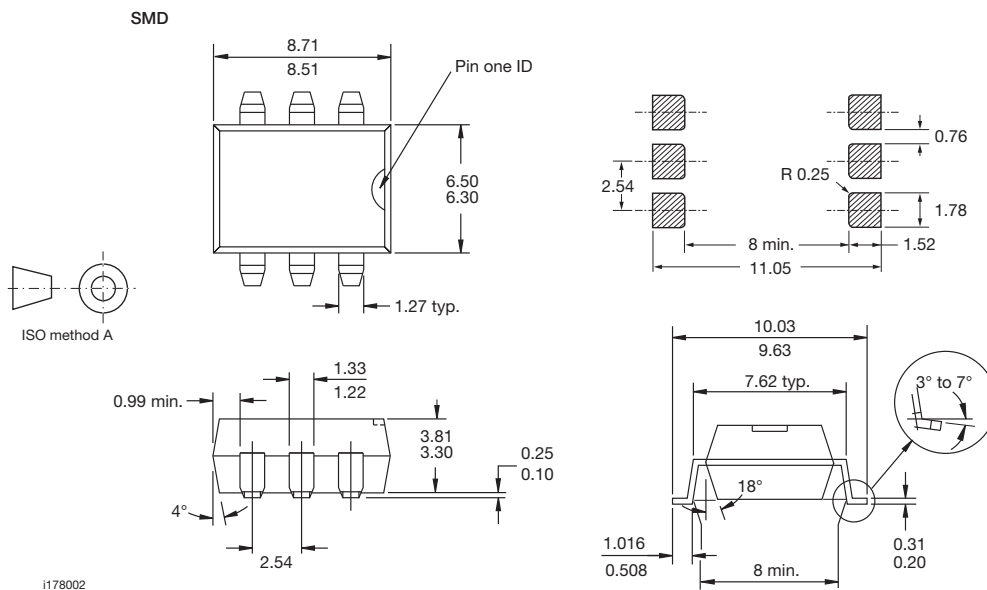


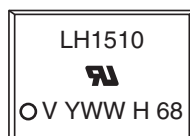
Fig. 24 - Turn-on Time vs. LED Current

PACKAGE DIMENSIONS in millimeters





PACKAGE MARKING



Note

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



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.