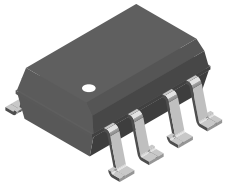
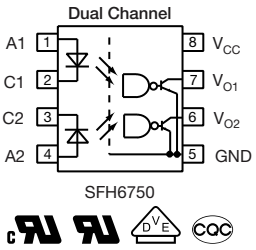
High Speed Optocoupler, Dual, 10 MBd





FEATURES

- CMR performance of 100 V/µs
- High speed: 10 MBd typical
- +5 V CMOS compatibility
- Pure tin leads
- Guaranteed AC and DC performance over temperature: -40 °C to +100 °C
- Meets IEC 60068-2-42 (SO_2) and IEC 60068-2-43 (H_2S) requirements
- Low input current capability: 5 mA
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

APPLICATIONS

- Microprocessor system interface
- PLC, ATE input / output isolation
- Computer peripheral interface
- Digital fieldbus isolation: CC-link, DeviceNet, profibus, SDS
- High speed A/D and D/A conversion
- AC plasma display panel level shifting
- Multiplexed data transmission
- Digital control power supply
- Ground loop elimination

AGENCY APPROVALS

- UL
- cUL
- DIN EN 60747-5-5 (VDE 0804), available with option 1
- BSI
- CQC GB4943.1
- CQC GB8898

LINKS TO ADDITIONAL RESOURCES

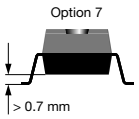
Product Page

DESCRIPTION

The SFH675x are single and dual channel 10 MBd optocouplers utilizing a high efficient input LED coupled with an integrated optical photodiode IC detector. The detector has an open drain NMOS-transistor output, providing less leakage compared to an open collector Schottky clamped transistor output. For the single channel type, an enable function on pin 7 allows the detector to be strobed. The internal shield provides a guaranteed common mode transient immunity of 100 V/µs for the SFH6750.

ORDERING INFORMATION

S	F	H	6	7	#	#	-	X	0	0	#	T
PART NUMBER								PACKAGE OPTION				TAPE AND REEL



AGENCY CERTIFIED / PACKAGE	DUAL CHANNEL
	CMR (kV/µs)
BSI, UL, cUL	0.1
SMD-8, option 7	SFH6750-X007T

Note

- For additional information on the available options refer to option information

TRUTH TABLE (positive logic)		
LED	**ENABLE**	**OUTPUT**
On	H	L
Off	H	H
On	L	H
Off	L	H
On	NC	L
Off	NC	H

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
INPUT				
Average forward current (single channel)		I_F	20	mA
Average forward current (per channel for dual channel)		I_F	15	mA
Reverse input voltage		V_R	5	V
Enable input voltage (single channel)		V_E	V_{CC} + 0.5 V	V
Enable input current (single channel)		I_E	5	mA
Surge current	t = 100 µs	I_{FSM}	200	mA
OUTPUT				
Supply voltage		V_{CC}	7	V
Output current		I_O	50	mA
Output voltage		V_O	7	V
Output power dissipation (single channel)		P_{diss}	85	mW
Output power dissipation per channel (dual channel)		P_{diss}	60	mW
COUPLER				
Storage temperature		T_{stg}	-55 to +150	°C
Operating temperature		T_{amb}	-40 to +100	°C
Lead solder temperature (single channel)	For 10 s		260	°C
Solder reflow temperature (1)	For 1 min		260	°C
Isolation test voltage	t = 1 min	V_{ISO}	5300	V_{RMS}

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

RECOMMENDED OPERATING CONDITIONS					
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**MAX.**	**UNIT**
Operating temperature		T_{amb}	-40	100	°C
Supply voltage		V_{CC}	4.5	5.5	V
Input current low level		I_{FL}	0	250	µA
Input current high level		I_{FH}	5	15	mA
Logic high enable voltage		V_{EH}	2	V_{CC}	V
Logic low enable voltage		V_{EL}	0	0.8	V
Output pull up resistor		R_L	330	4K	Ω
Fanout	R_L = 1 kΩ	N		5	-

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Input forward voltage	I_F = 10 mA	V_F	1	1.4	1.7	V
Reverse current	V_R = 5 V	I_R	-	0.01	10	µA
Input capacitance	f = 1 MHz, V_F = 0 V	C_I	-	55	-	pF
OUTPUT						
High level supply current (single channel)	V_E = 0.5 V, I_F = 0 mA	I_{CCH}	-	4.1	7	mA
	V_E = V_{CC}, I_F = 0 mA	I_{CCH}	-	3.3	6	mA
High level supply current (dual channel)	I_F = 0 mA	I_{CCH}	-	6.9	12	mA
Low level supply current (single channel)	V_E = 0.5 V, I_F = 10 mA	I_{CCL}	-	4	7	mA
	V_E = V_{CC}, I_F = 10 mA	I_{CCL}	-	3.3	6	mA
Low level supply current (dual channel)	I_F = 10 mA	I_{CCL}	-	6.5	12	mA
High level output current	V_E = 2 V, V_O = 5.5 V, I_F = 250 µA	I_{OH}	-	0.002	1	µA
Low level output voltage	V_E = 2 V, I_F = 5 mA, I_{OL} (sinking) = 13 mA	V_{OL}	-	0.2	0.6	V
Input threshold current	V_E = 2 V, V_O = 5.5 V, I_{OL} (sinking) = 13 mA	I_{TH}	-	2.4	5	mA
High level enable current	V_E = 2 V	I_{EH}	-	-0.6	-1.6	mA
Low level enable current	V_E = 0.5 V	I_{EL}	-	-0.8	-1.6	mA
High level enable voltage		V_{EH}	2	-	-	V
Low level enable voltage		V_{EL}	-	-	0.8	V

Note

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements; all typicals at T_{amb} = 25 °C, V_{CC} = 5.5 V, unless otherwise specified.

SWITCHING CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Propagation delay time to high output level	R_L = 350 Ω, C_L = 15 pF	t_{PLH}	20	48	100	ns
Propagation delay time to low output level	R_L = 350 Ω, C_L = 15 pF	t_{PHL}	25	50	100	ns
Pulse width disortion	R_L = 350 Ω, C_L = 15 pF	$\lvert t_{PHL} - t_{PLH} \rvert$	-	2.9	35	ns
Propagation delay skew	R_L = 350 Ω, C_L = 15 pF	t_{PSK}	-	8	40	ns
Output rise time (10 % to 90 %)	R_L = 350 Ω, C_L = 15 pF	t_r	-	23	-	ns
Output fall time (90 % to 10 %)	R_L = 350 Ω, C_L = 15 pF	t_f	-	7	-	ns
Propagation delay time of enable from V_{EH} to V_{EL}	R_L = 350 Ω, C_L = 15 pF, V_{EL} = 0 V, V_{EH} = 3 V	t_{ELH}	-	12	-	ns
Propagation delay time of enable from V_{EL} to V_{EH}	R_L = 350 Ω, C_L = 15 pF, V_{EL} = 0 V, V_{EH} = 3 V	t_{EHL}	-	11	-	ns

Note

- Over recommended temperature (T_{amb} = -40 °C to +100 °C), V_{CC} = 5 V, I_F = 7.5 mA unless otherwise specified; all typicals at T_{amb} = 25 °C, V_{CC} = 5 V

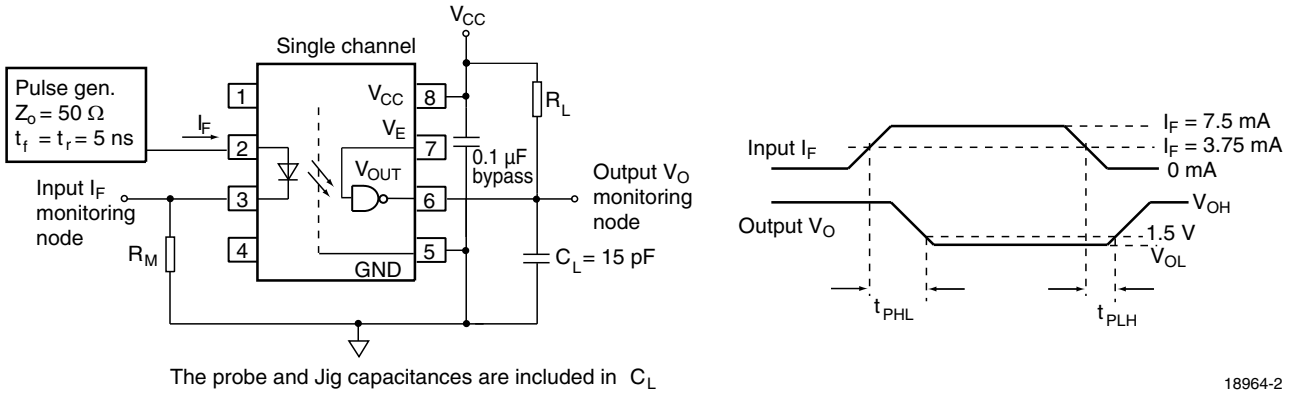


Fig. 1 - Single Channel Test Circuit for t_{PLH}, t_{PHL}, t_r and t_f

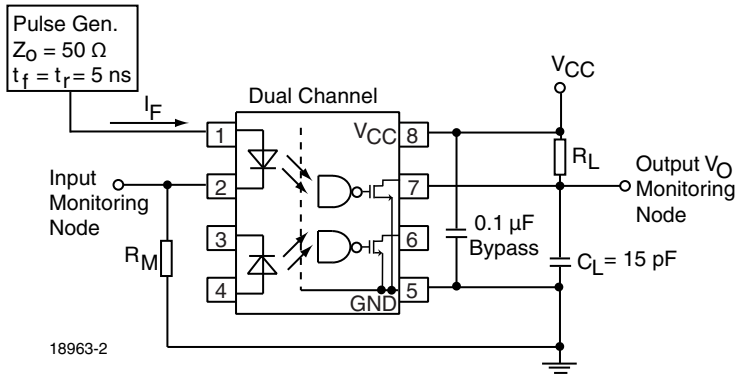


Fig. 2 - Dual Channel Test Circuit for t_{PLH}, t_{PHL}, t_r and t_f

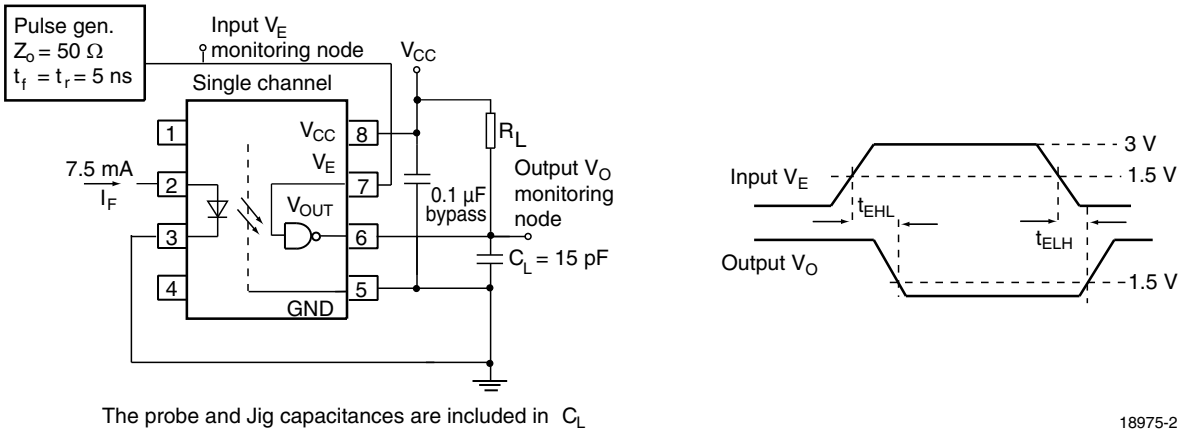


Fig. 3 - Single Channel Test Circuit for t_{EHL}, and t_{ELH}

COMMON MODE TRANSIENT IMMUNITY						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Common mode transient immunity (high)	$\|V_{CM}\|$ = 10 V, V_{CC} = 5 V, I_F = 0 mA, $V_{O(min.)}$ = 2 V, R_L = 350 Ω, T_{amb} = 25 °C (1)	$\|CM_H\|$	100	-	-	V/µs
	$\|V_{CM}\|$ = 50 V, V_{CC} = 5 V, I_F = 0 mA, $V_{O(min.)}$ = 2 V, R_L = 350 Ω, T_{amb} = 25 °C (2)	$\|CM_H\|$	5000	10 000	-	V/µs
	$\|V_{CM}\|$ = 10 V, V_{CC} = 5 V, I_F = 7.5 mA, $V_{O(max.)}$ = 0.8 V, R_L = 350 Ω, T_{amb} = 25 °C (1)	$\|CM_L\|$	100	-	-	V/µs
	$\|V_{CM}\|$ = 50 V, V_{CC} = 5 V, I_F = 7.5 mA, $V_{O(max.)}$ = 0.8 V, R_L = 350 Ω, T_{amb} = 25 °C (2)	$\|CM_L\|$	5000	10 000	-	V/µs

Notes

(1) For SFH6750

(2) For SFH6741

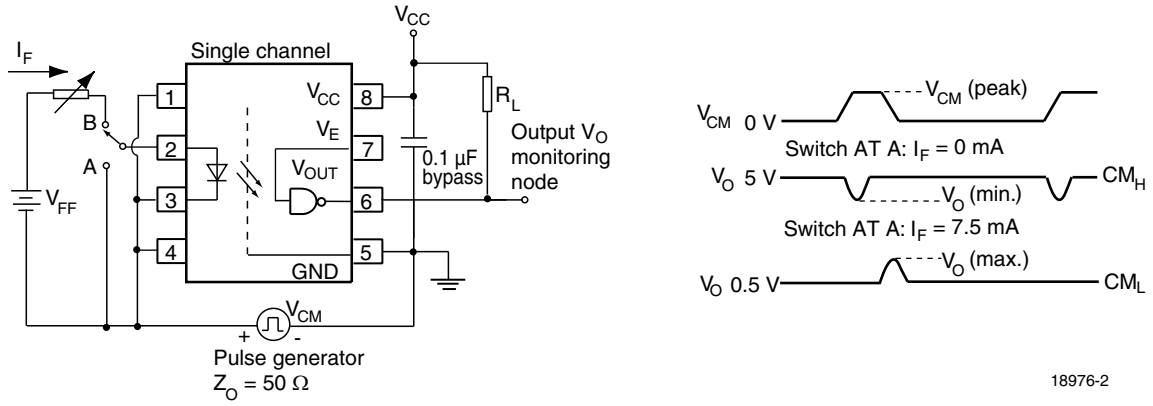


Fig. 4 - Single Channel Test Circuit for Common Mode Transient Immunity

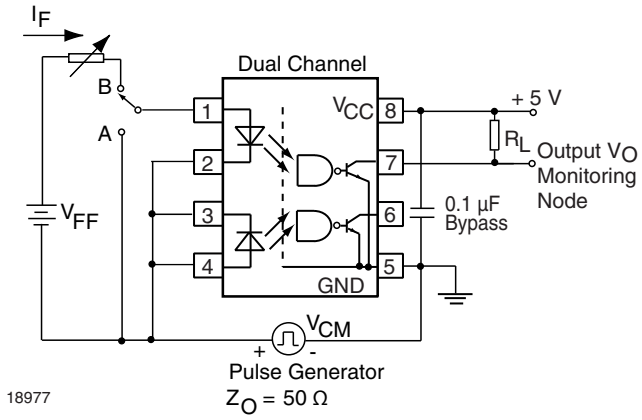


Fig. 5 - Dual Channel Test Circuit for Common Mode Transient Immunity

SAFETY AND INSULATION RATINGS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Climatic classification	According to IEC 69 part 1		-	40 / 100 / 21	-	
Comparative tracking index		CTI	175	-	399	
Peak transient overvoltage		V_{IOTM}	8000	-	-	V
Peak insulation voltage		V_{IORM}	630	-	-	V
Safety rating - power output		P_{SO}	-	-	500	mW
Safety rating - input current		I_{SI}	-	-	300	mA
Safety rating - temperature		T_{SI}	-	-	175	°C
Creepage distance	DIP-8, 400 mil, option 6		8	-	-	mm
Clearance distance			8	-	-	mm
Creepage distance	SMD-8, option 7		8	-	-	mm
Clearance distance			8	-	-	mm
Insulation thickness, reinforced rated	Per IEC 60950.2.10.5.1		0.4	-	-	mm

Note

- As per IEC 60747-5-2, §7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

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

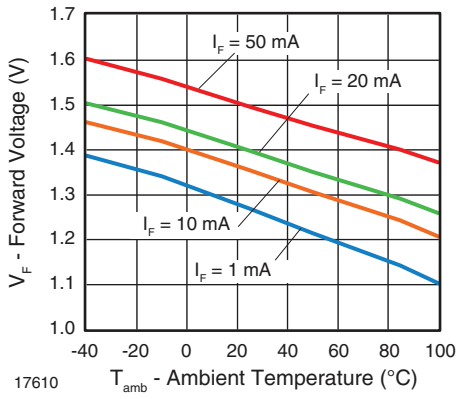


Fig. 6 - Forward Voltage vs. Ambient Temperature

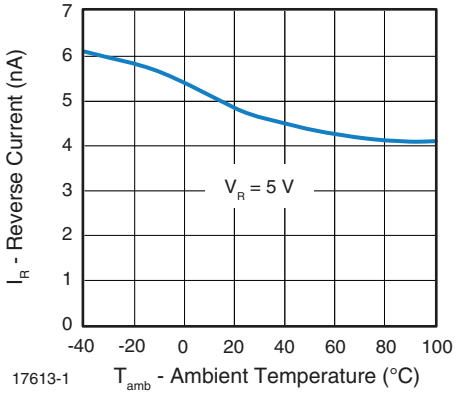


Fig. 8 - Reverse Current vs. Ambient Temperature

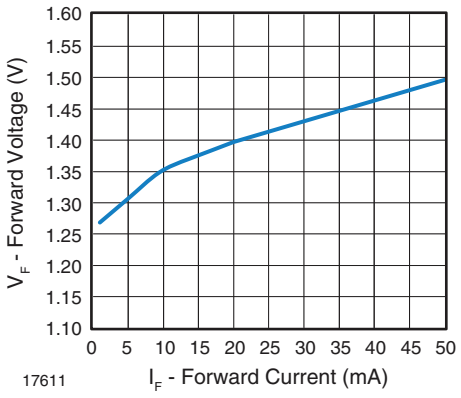


Fig. 7 - Forward Voltage vs. Forward Current

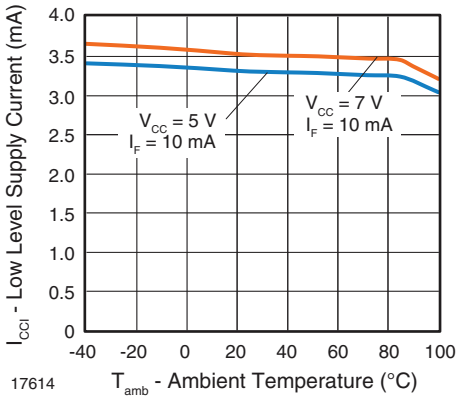


Fig. 9 - Low Level Supply Current vs. Ambient Temperature

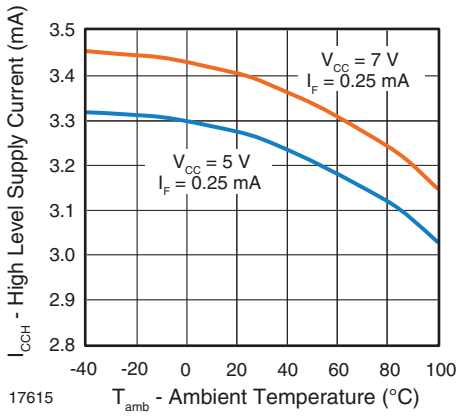


Fig. 10 - High Level Supply Current vs. Ambient Temperature

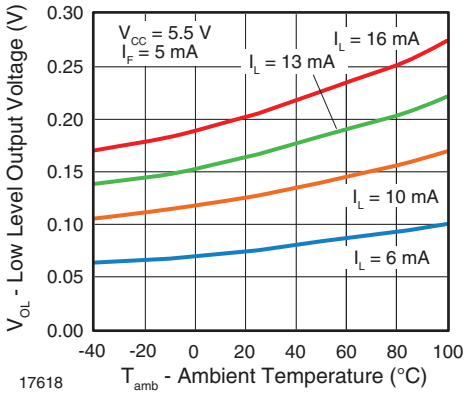


Fig. 13 - Low Level Output Voltage vs. Ambient Temperature

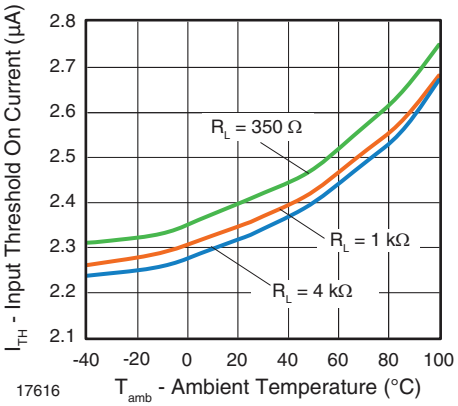


Fig. 11 - Input Threshold On Current vs. Ambient Temperature

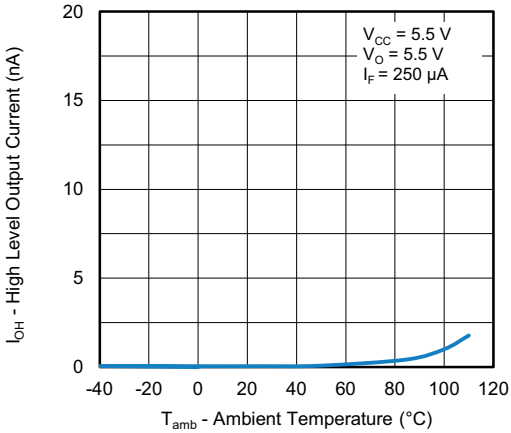


Fig. 14 - Low Level Output Current vs. Ambient Temperature

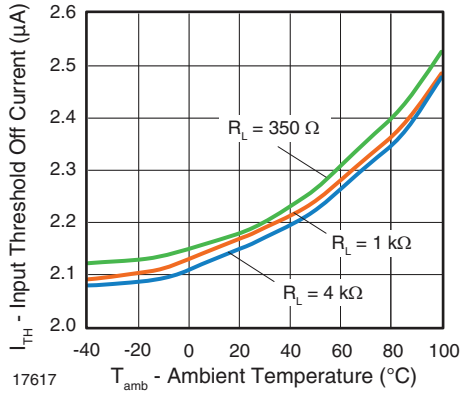


Fig. 12 - Input Threshold Off Current vs. Ambient Temperature

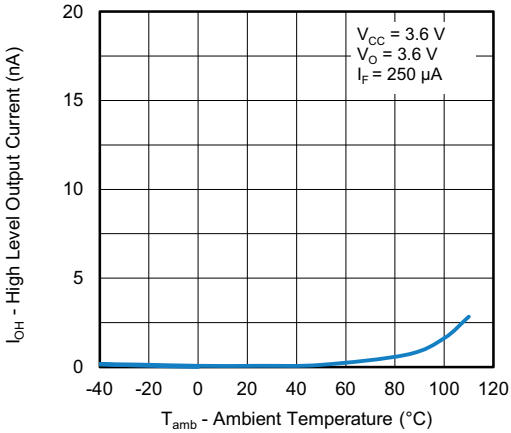


Fig. 15 - High Level Output Current vs. Ambient Temperature

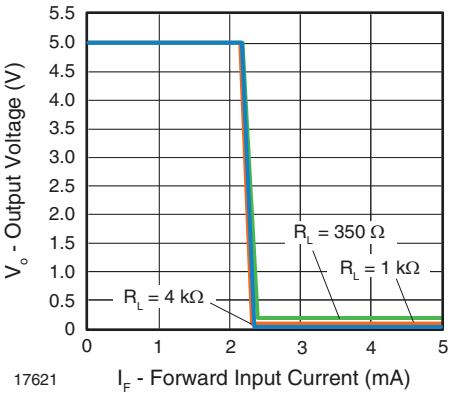


Fig. 16 - Output Voltage vs. Forward Input Current

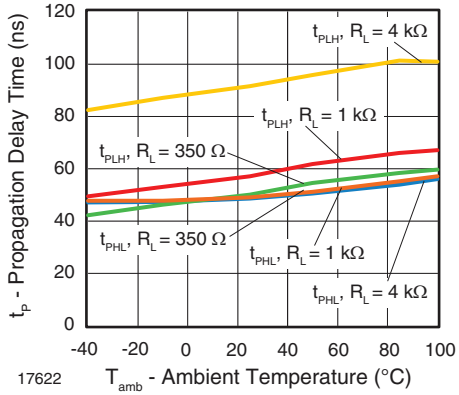


Fig. 17 - Propagation Delay vs. Ambient Temperature

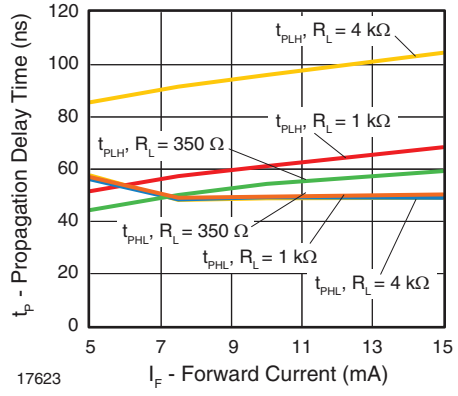


Fig. 18 - Propagation Delay vs. Forward Current

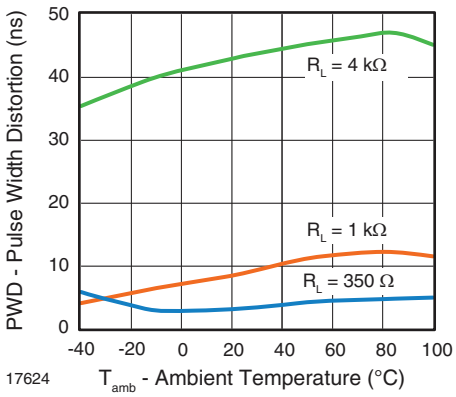


Fig. 19 - Pulse Width Distortion vs. Ambient Temperature

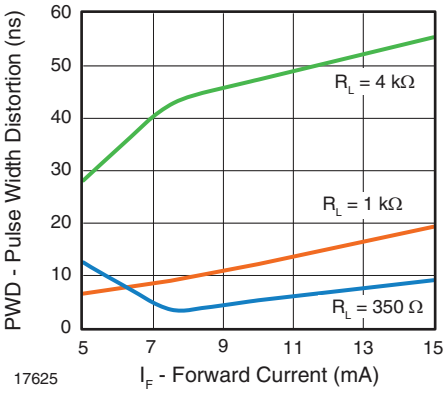


Fig. 20 - Pulse Width Distortion vs. Forward Current

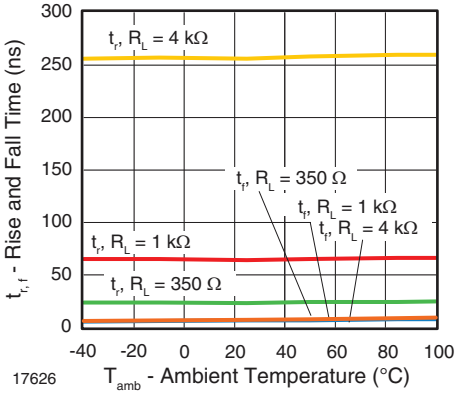


Fig. 21 - Rise and Fall Time vs. Ambient Temperature

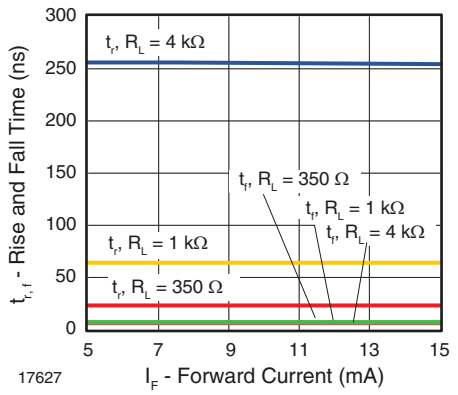


Fig. 22 - Rise and Fall Time vs. Forward Current

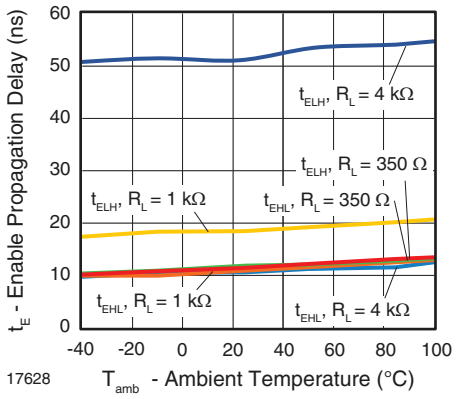
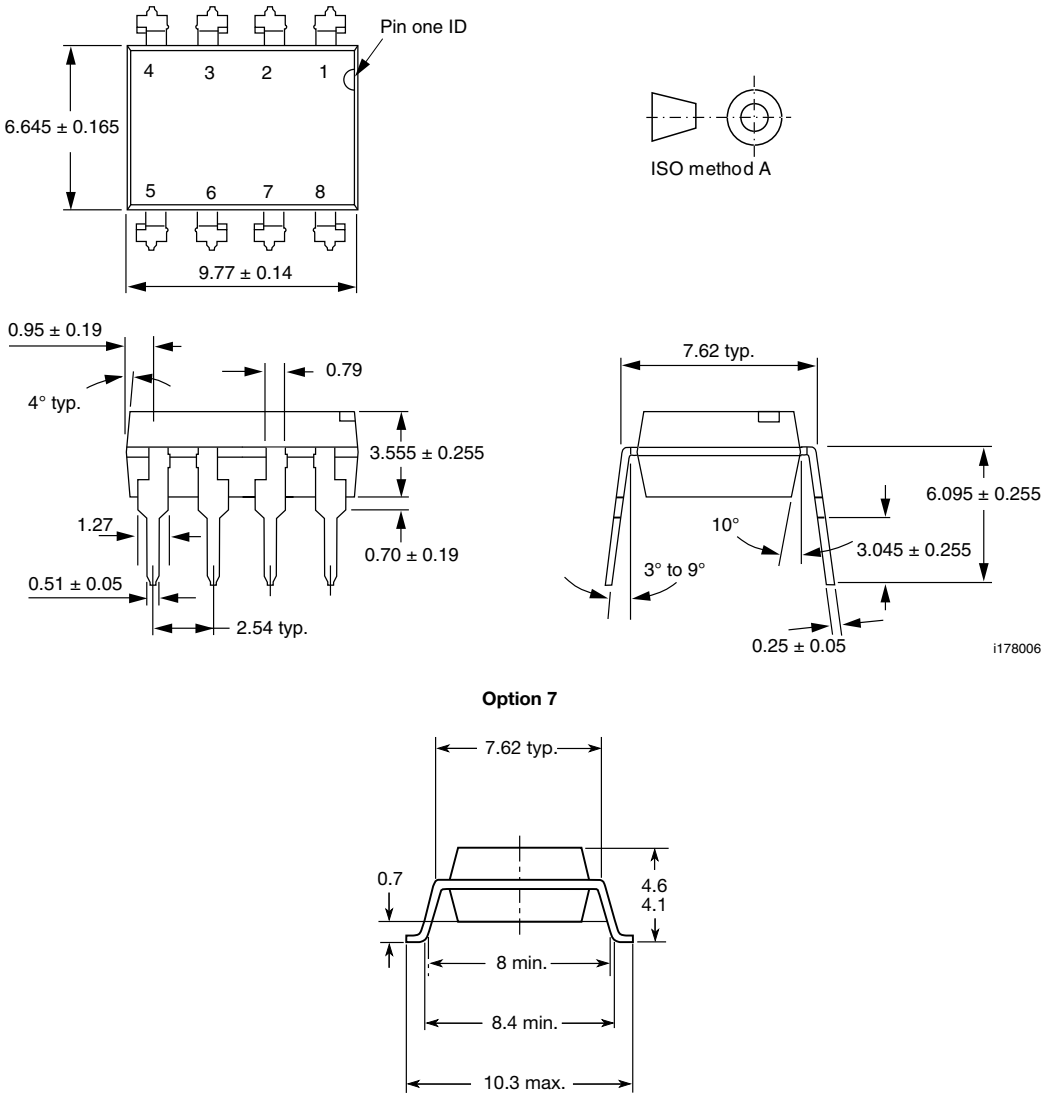


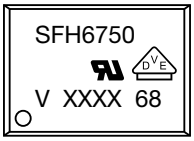
Fig. 23 - Enable Propagation Delay vs. Ambient Temperature

PACKAGE DIMENSIONS in millimeters



Option 7

PACKAGE MARKING (for example)



Notes

- XXXX = LMC (lot marking code)
- VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking

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