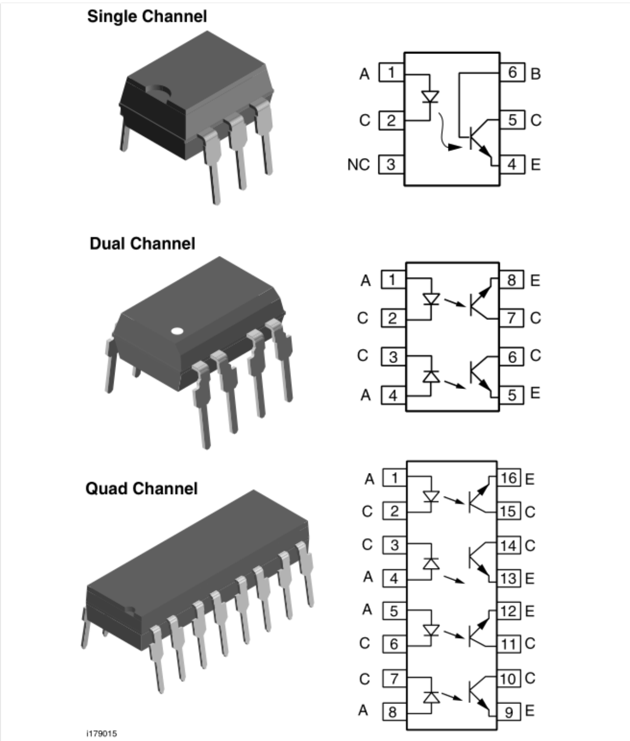
Optocoupler, Phototransistor Output (Single, Dual, Quad Channel)



FEATURES

- IL74/ILD74/ILQ74 TTL compatible
- Transfer ratio, 35 % typical
- Coupling capacitance, 0.5 pF
- Single, dual, and quad channel
- Industry standard DIP packages
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- CSA 93751
- BSI IEC 60950; IEC 60065
- DIN EN 60747-5-2 (VDE 0884)/DIN EN 60747-5-5 pending available with option 1, X001 suffix
- FIMKO

DESCRIPTION

The IL74/ILD74/ILQ74 is an optically coupled pair with a GaAIAs infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output.The IL74/ILD74/ILQ74 is especially for driving medium-speed logic, where it may be used to eliminate troublesome ground loop and noise problems. Also it can be used to replace relays and transformers in many digital interface applications, as well as analog applications such as CTR modulation.
The ILD74 has two isolated channels in a single DIP package; the ILQ74 has four isolated channels per package.

ORDER INFORMATION	
PART	**REMARKS**
IL74	CTR_{DC} > 12.5 %, single channel DIP-6
ILD74	CTR_{DC} > 12.5 %, dual channel DIP-8
ILQ74	CTR_{DC} > 12.5 %, quad channel DIP-16
IL74-X006	CTR_{DC} > 12.5 %, single channel DIP-6 400 mil (option 6)
ILD74-X006	CTR_{DC} > 12.5 %, dual channel DIP-8 400 mil (option 6)
ILD74-X007	CTR_{DC} > 12.5 %, dual channel SMD-8 (option 7)
ILD74-X009	CTR_{DC} > 12.5 %, dual channel SMD-8 (option 9)
ILQ74-X009	CTR_{DC} > 12.5 %, dual channel SMD-16 (option 9)

Note
For additional information on the available options refer to option information.

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
INPUT					
Peak reverse voltage			V_R	3.0	V
Forward continuous current			I_F	60	mA
Power dissipation			P_{diss}	100	mW
Derate linearly from 55 %				1.33	mW/°C
OUTPUT					
Collector emitter breakdown voltage			BV_{CEO}	20	V
Emitter collector breakdown voltage			BV_{ECO}	5.0	V
Collector base breakdown voltage			BV_{CBO}	70	V
Power dissipation			P_{diss}	150	mW
Derate linearly from 25 °C				2.0	mW/°C
COUPLER					
Isolation test voltage	t = 1.0 s		V_{ISO}	5300	V_{RMS}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C		R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C		R_{IO}	$\geq 10^{11}$	Ω
Total package dissipation		IL74	P_{tot}	200	mW
		ILD74	P_{tot}	400	mW
		ILQ74	P_{tot}	500	mW
Derate linearly from 25 °C		IL74		2.7	mW/°C
		ILD74		5.33	mW/°C
		ILQ74		6.67	mW/°C
Creepage distance				≥ 7.0	mm
Clearance distance				≥ 7.0	mm
Storage temperature			T_{stg}	- 55 to + 150	°C
Operating temperature			T_{amb}	- 55 to + 100	°C
Lead soldering time at 260 °C				10	s

Note

T_{amb} = 25 °C, unless otherwise specified.
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.

ELECTRICAL CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT						
Forward voltage	I_F = 20 mA	V_F		1.3	1.5	V
Reverse current	V_R = 3.0 V	I_R		0.1	100	µA
Capacitance	V_R = 0 V	C_O		25		pF
OUTPUT						
Collector emitter breakdown voltage	I_C = 1.0 mA	BV_{CEO}	20	50		V
Collector emitter leakage current	V_{CE} = 5.0 V, I_F = 0 A	I_{CEO}		5.0	500	nA
Capacitance collector emitter	V_{CE} = 0 V, f = 1.0 Hz	C_{CE}		10		pF
COUPLER						
Saturation voltage, collector emitter	I_C = 2.0 mA, I_F = 16 mA	V_{CEsat}		0.3	0.5	V
Resistance (input to output)		R_{IO}		100		GΩ
Capacitance (input to output)		C_{IO}		0.5		pF

Note

T_{amb} = 25 °C, unless otherwise specified.
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.

CURRENT TRANSFER RATIO						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
DC current transfer ratio	I_F = 16 mA, V_{CE} = 5.0 V	CTR_{DC}	12.5	35		%

SWITCHING CHARACTERISTICS						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Switching times	R_L = 100 Ω, V_{CE} = 10 V, I_C = 2.0 mA	t_{on}, t_{off}		3.0		µs

TYPICAL CHARACTERISTICS

T_{amb} = 25 °C, unless otherwise specified

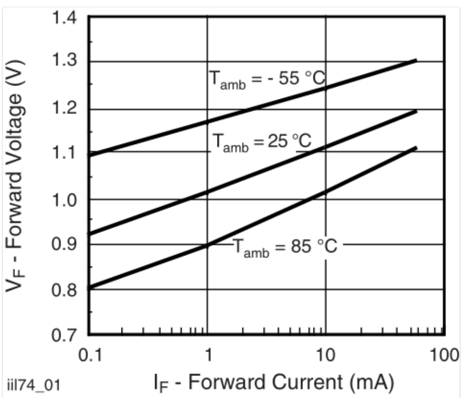


Fig. 1 - Forward Voltage vs. Forward Current

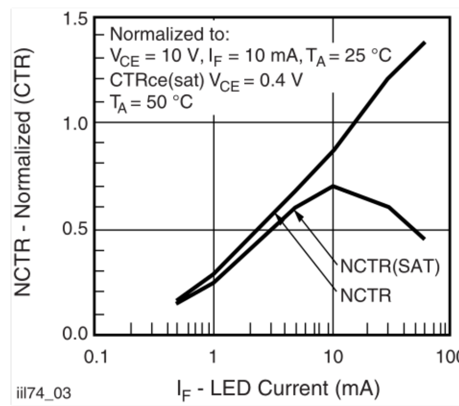


Fig. 3 - Normalized Non-Saturated and Saturated CTR vs. LED Current

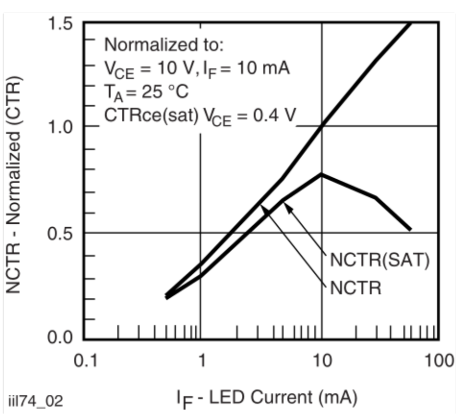


Fig. 2 - Normalized Non-Saturated and Saturated CTR vs. LED Current

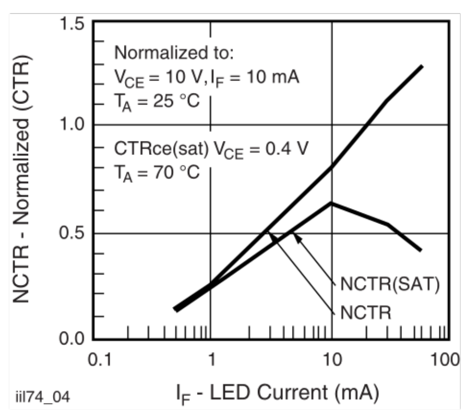


Fig. 4 - Normalized Non-Saturated and Saturated CTR vs. LED Current

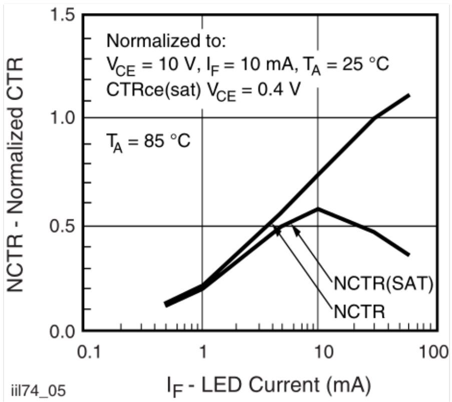


Fig. 5 - Normalized Non-Saturated and Saturated CTR vs. LED Current

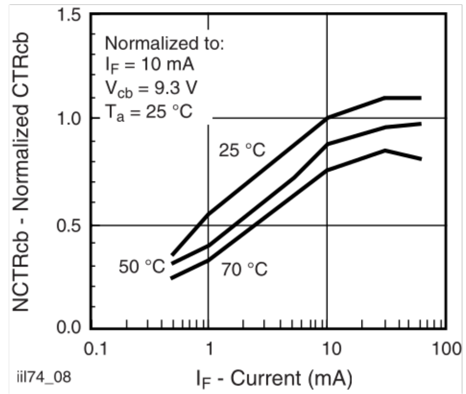


Fig. 8 - Normalized CTR_{cb} vs. LED Current and Temperature

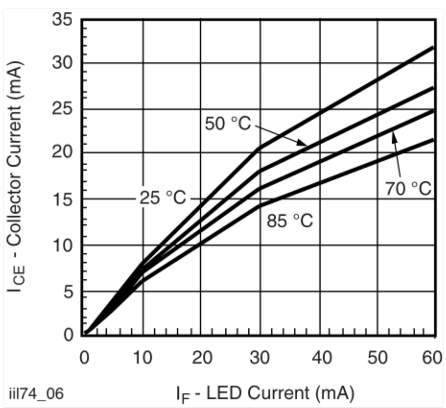


Fig. 6 - Collector Emitter Current vs. Temperature and LED Current

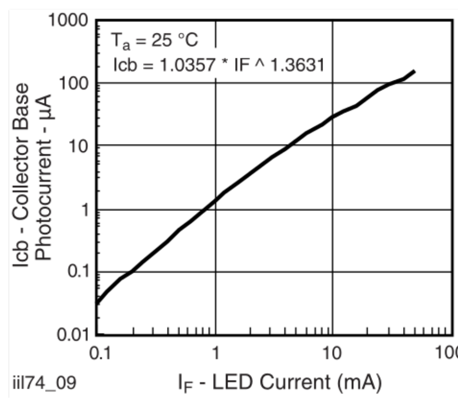


Fig. 9 - Collector Base Photocurrent vs. LED Current

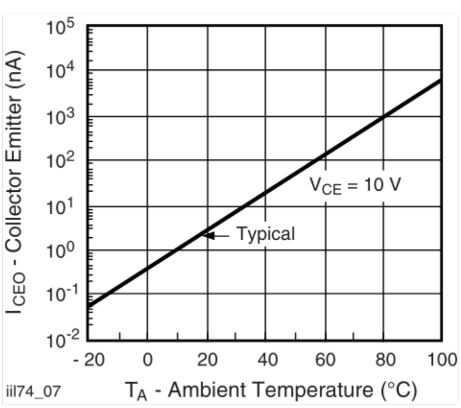


Fig. 7 - Collector Emitter Leakage Current vs.Temperature

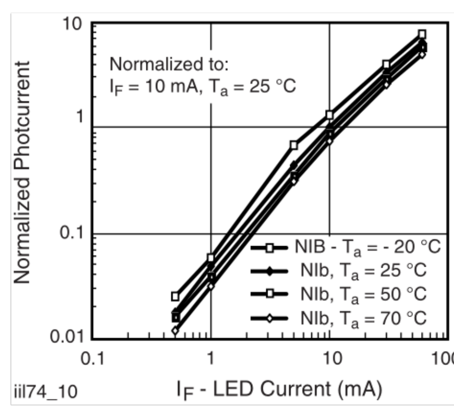


Fig. 10 - Normalized Photocurrent vs. I_F and Temperature

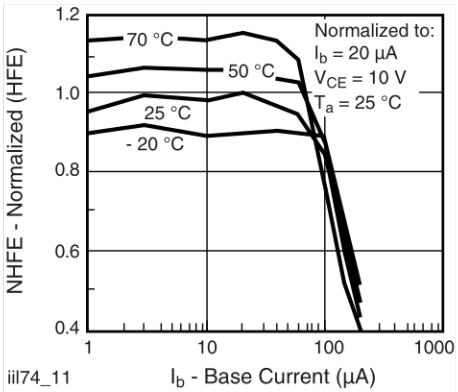


Fig. 11 - Normalized Non-Saturated h_{FE} vs. Base Current and Temperature

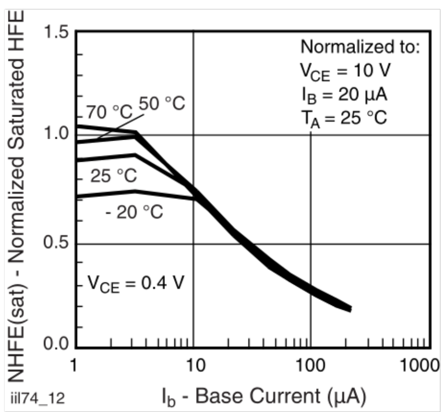


Fig. 12 - Normalized Saturated h_{FE} vs. Base Current and Temperature

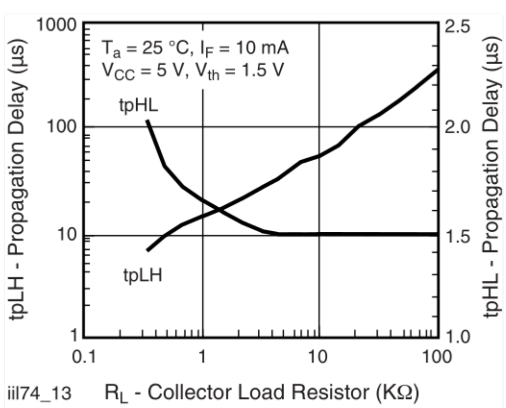
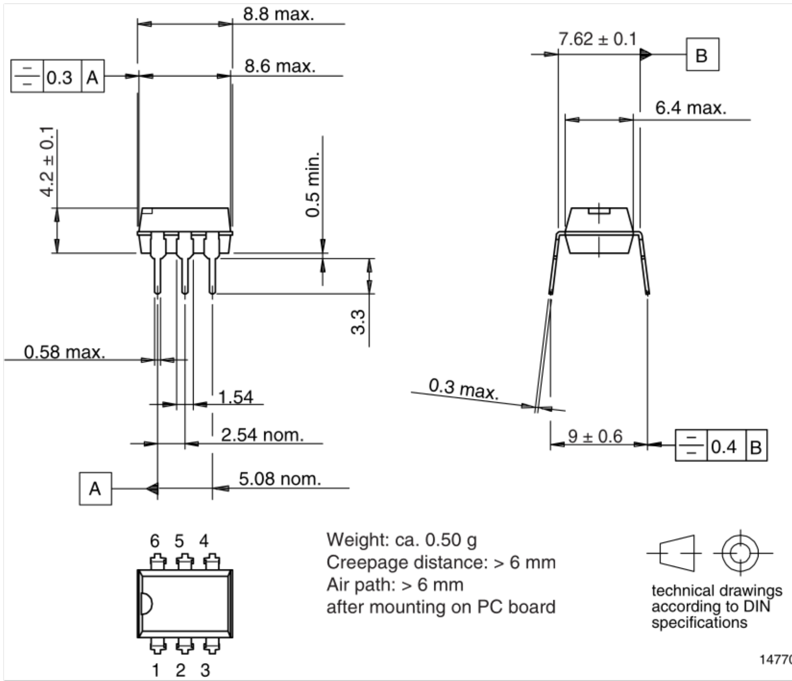
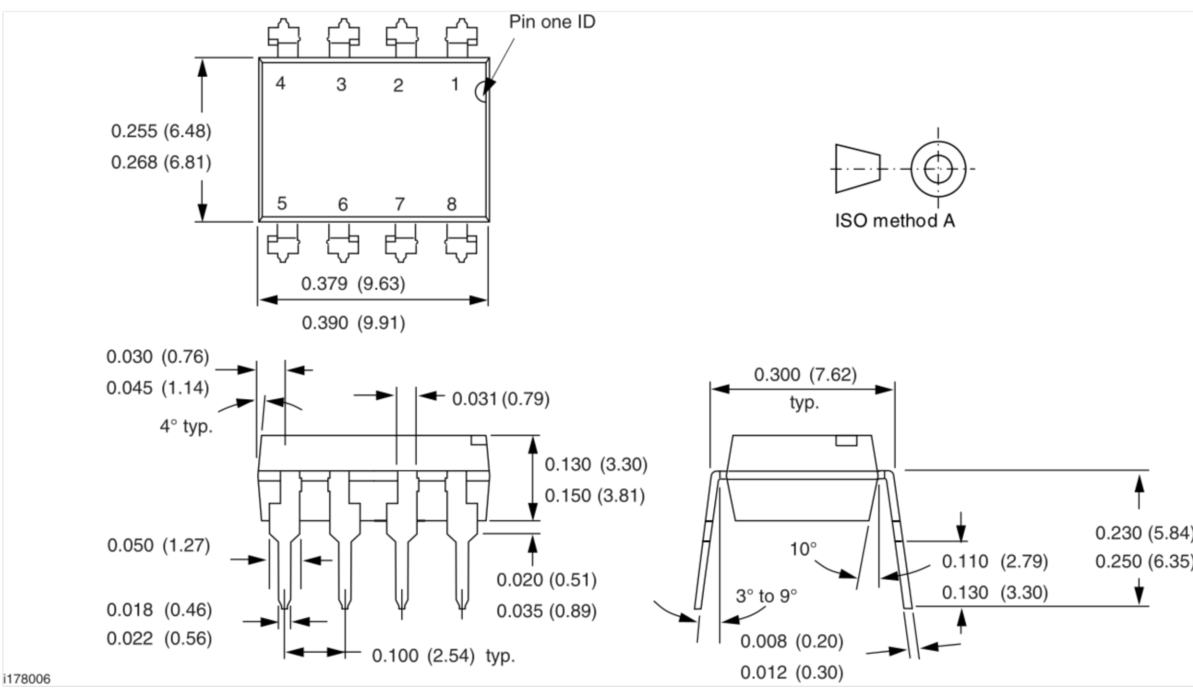
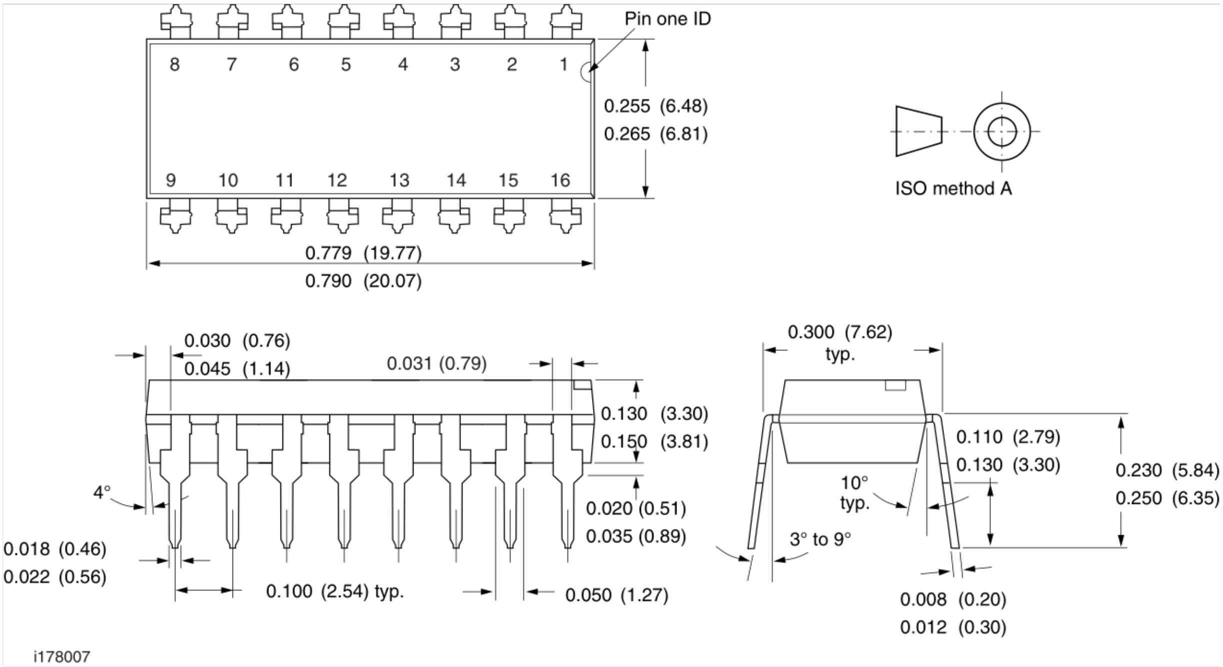


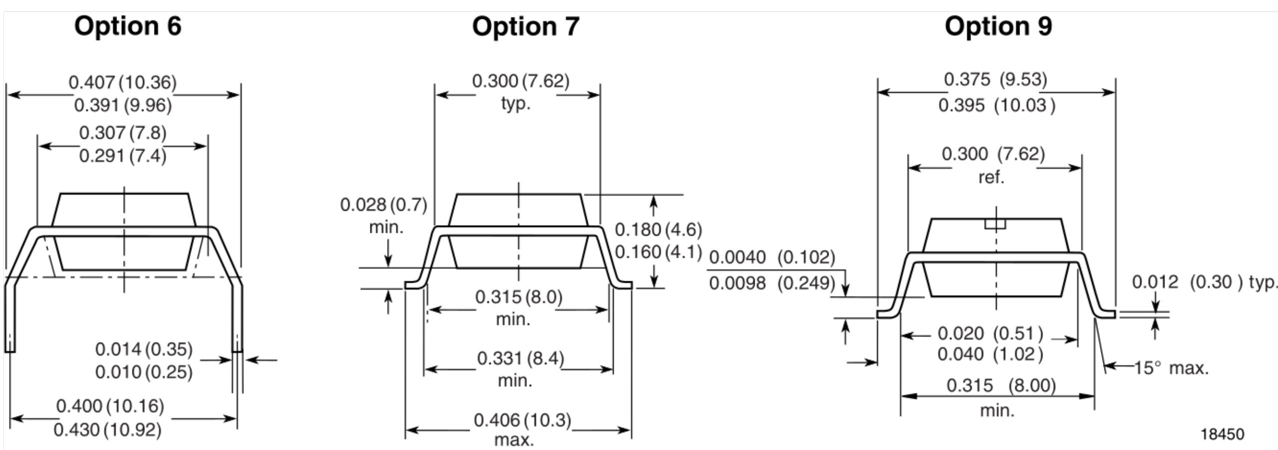
Fig. 13 - Propagation Delay vs. Collector Load Resistor

PACKAGE DIMENSIONS in inches (millimeters)






Pin one ID
8 7 6 5 4 3 2 1
9 10 11 12 13 14 15 16
0.255 (6.48)
0.265 (6.81)
ISO method A
0.779 (19.77)
0.790 (20.07)
0.030 (0.76)
0.045 (1.14)
0.031 (0.79)
0.300 (7.62)
typ.
0.130 (3.30)
0.150 (3.81)
0.110 (2.79)
0.130 (3.30)
0.230 (5.84)
0.250 (6.35)
4°
10°
typ.
0.020 (0.51)
0.035 (0.89)
3° to 9°
0.018 (0.46)
0.022 (0.56)
0.100 (2.54) typ.
0.050 (1.27)
0.008 (0.20)
0.012 (0.30)
i178007


Option 6
Option 7
Option 9
0.407 (10.36)
0.391 (9.96)
0.307 (7.8)
0.291 (7.4)
0.014 (0.35)
0.010 (0.25)
0.400 (10.16)
0.430 (10.92)
0.300 (7.62)
typ.
0.028 (0.7)
min.
0.180 (4.6)
0.160 (4.1)
0.315 (8.0)
min.
0.331 (8.4)
min.
0.406 (10.3)
max.
0.375 (9.53)
0.395 (10.03)
0.300 (7.62)
ref.
0.0040 (0.102)
0.0098 (0.249)
0.012 (0.30) typ.
0.020 (0.51)
0.040 (1.02)
15° max.
0.315 (8.00)
min.
18450

OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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