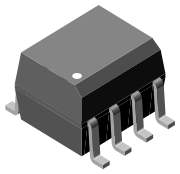
Optocoupler, Phototransistor Output, With Base Connection in SOIC-8 package, 110 °C Rated

Features

- Operating Temperature from -55 °C to +110 °C
- High BV_{CEO}, 70 V
- Isolation Test Voltage, 3000 V_{RMS}
- Industry Standard SOIC-8 Surface Mountable Package
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



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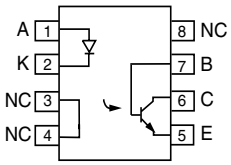


Agency Approvals

- UL 1577 - File No. E52744 System Code Y
- DIN EN 60747-5-2 (VDE0884)
  Available with Option 1
- CUL - File No. E52744, equivalent to CSA bulletin 5A

Applications

AC Adapters
PLCs
Switch Mode Power Supplies
DC/DC Converters
Microprocessor I/O Interfaces
General impedance matching circuits

Description

The 110 °C IL1205AT/1206AT/1207AT/1208AT are optically coupled pairs with a Gallium Arsenide 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. This family comes in a standard SOIC-8 small outline package for surface mounting which makes them ideally suited for high density application with limited space. In addition to eliminating through-hole requirements, this package conforms to standards for surface mounted devices.

A specified minimum and maximum CTR allows a narrow tolerance in the electrical design of the adjacent circuits. The high BV_{CEO} of 70 volts gives a higher safety margin compared to the industry standard 30 volts.

Order Information

Part	Remarks
IL1205AT	CTR 40 - 80 %, SMD
IL1206AT	CTR 63 - 125 %, SMD
IL1207AT	CTR 100 - 200 %, SMD
IL1208AT	CTR 160 - 320 %, SMD

Available on Tape and Reel only.

For additional information on the available options refer to Option Information.

Absolute Maximum Ratings

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 Rating for extended periods of the time can adversely affect reliability.

Input

Parameter	Test condition	Symbol	Value	Unit
Continuous forward current		I_F	60	mA
Peak reverse voltage		V_R	6.0	V
Power dissipation		P_{diss}	90	mW
Derate linearly from 25 °C			0.9	mW/°C

Output

Parameter	Test condition	Symbol	Value	Unit
Collector-emitter voltage		V_{CE}	70	V
Collector current		I_C	50	mA
	t < 1.0 ms	I_C	100	mA
Power dissipation		P_{diss}	150	mW
Derate linearly from 25 °C			1.5	mW/°C

Coupler

Parameter	Test condition	Symbol	Value	Unit
Isolation test voltage	t = 1.0 s	V_{ISO}	3000	V_{RMS}
Operating temperature		T_{amb}	- 55 to + 110	°C
Total package dissipation (LED + detector)		P_{tot}	240	mW
Storage temperature		T_{stg}	- 55 to + 150	°C
Soldering temperature	max. 10 sec, dip soldering distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C
Derate linearly from 25 °C			2.4	mW/°C

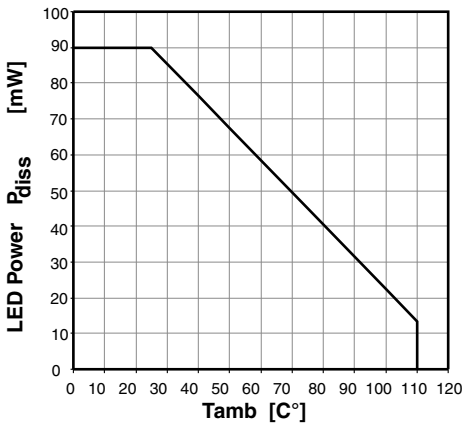


Figure 1. Intput Power Dissipation (LED) vs Ambient Temperature

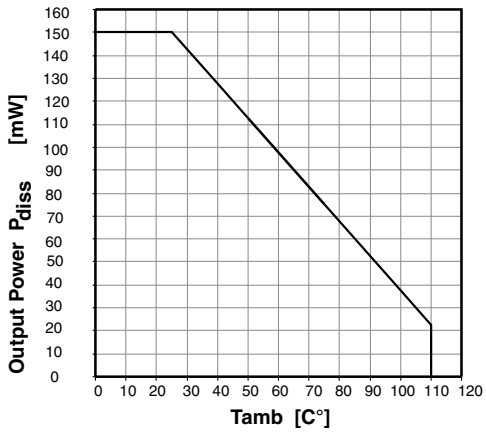


Figure 2. Output Power Dissipation vs Ambient Temperature

Electrical Characteristics

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.

Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward voltage	I_F = 10 mA	V_F		1.3	1.5	V
Reverse current	V_R = 6.0 V	I_R		0.1	100	µA
Capacitance	V_R = 0 V	C_I		13		pF

Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Collector-emitter leakage current	V_{CE} = 10 V	I_{CEO}		5.0	50	nA
Collector-emitter breakdown voltage	I_C = 100 µA	BV_{CEO}	70			V
Emitter-collector breakdown voltage	I_E = 100 µA	BV_{ECO}	7.0	10		V
Collector-base breakdown voltage		BV_{CBO}	70			V
Saturation voltage, collector-emitter	I_C = 2.0 mA, I_F = 10 mA	V_{CEsat}			0.4	

Coupler

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
DC Current Transfer Ratio	I_F = 10 mA, V_{CE} = 5.0 V	IL1205AT	CTR	40		80	%
		IL1206AT	CTR	63		125	%
		IL1207AT	CTR	100		200	%
		IL1208AT	CTR	100		320	%
	I_F = 1.0 mA, V_{CE} = 5.0 V	IL1205AT	CTR	13	25		%
		IL1206AT	CTR	22	40		%
		IL1207AT	CTR	34	60		%
		IL1208AT	CTR	56	95		%
Capacitance (input to output)			C_{IO}		0.5		pF

Switching Characteristics

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Turn-on time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V	t_{on}		3.0		µs
Turn-off time	I_C = 2 mA, R_L = 100 Ω, V_{CC} = 10 V	t_{off}		3.0		µs

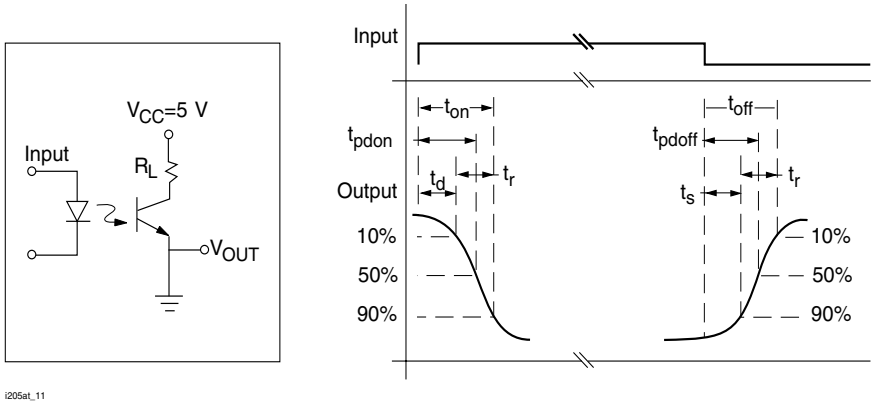


Figure 3. Switching Test Circuit

Safety and Insulation Ratings

As per IEC60747-5-2, §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.

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Climatic Classification (according to IEC 68 part 1)				55/110/21		
Polution Degree (DIN VDE 0109)				2.0		mm
Comparative tracking index per DIN IEC112/VDE 0303 part 1, group IIIa per DIN VDE 6110 175 399			175		399	
V_{IOTM}		V_{IOTM}	5000			V
V_{IORM}		V_{IORM}	560			V
Resistance (input-output)		R_{IO}		100		Ω
P_{SI}					350	mW
I_{SI}					150	mA
T_{SI}					165	°C
Creeapage			4.0			mm
Clearance			4.0			mm

Typical Characteristics (Tamb = 25 °C unless otherwise specified)

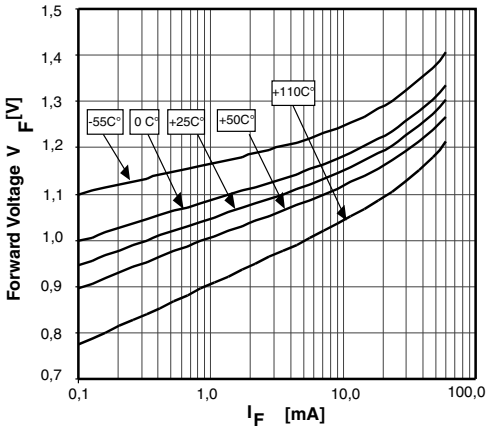


Figure 4. Diode Forward Voltage VF vs Forward Current

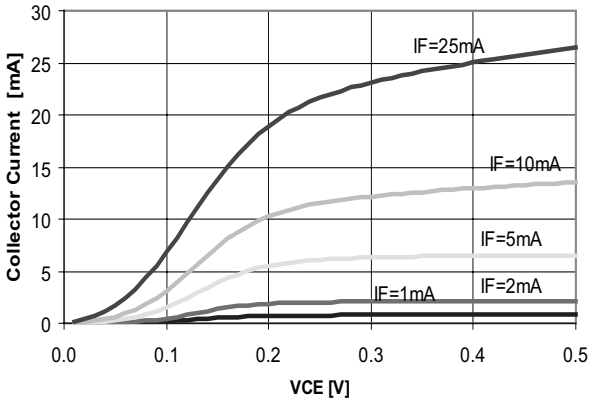


Figure 7. IC (saturated) vs. V_{CE}

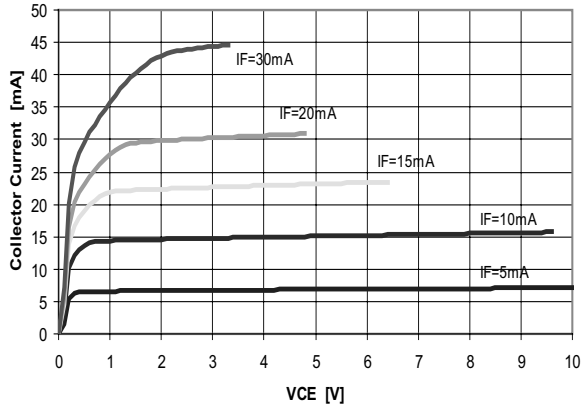


Figure 5. IC (unsaturated) vs. V_{CE}

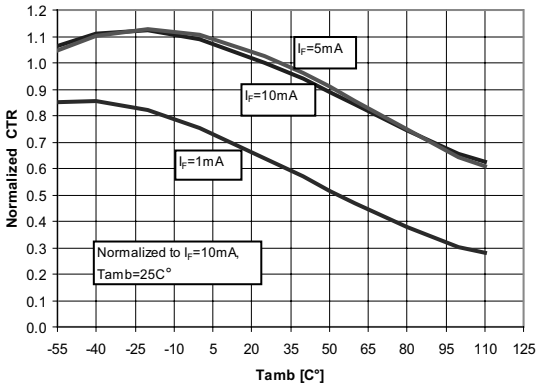


Figure 8. CTR Normalized to I_F= 10mA vs. Ambient Temperature, (Saturated, V_{CE} = 0.4V)

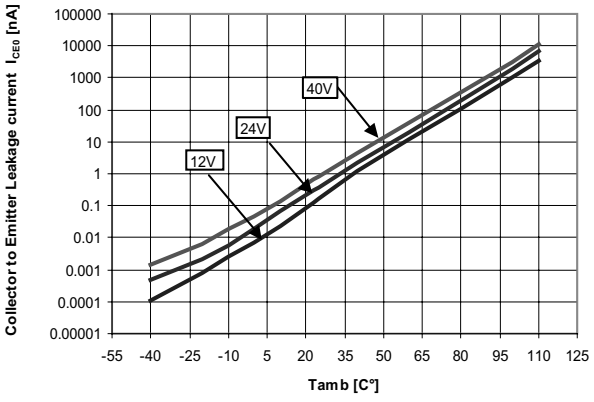


Figure 6. Collector to Emitter Current vs.Ambient Temperature

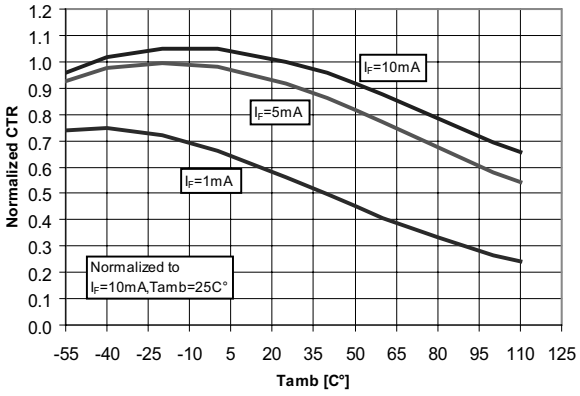


Figure 9. CTR Normalized to I_F = 10mA vs. Ambient Temperature, (Non-Saturated, V_{CE} = 5V)

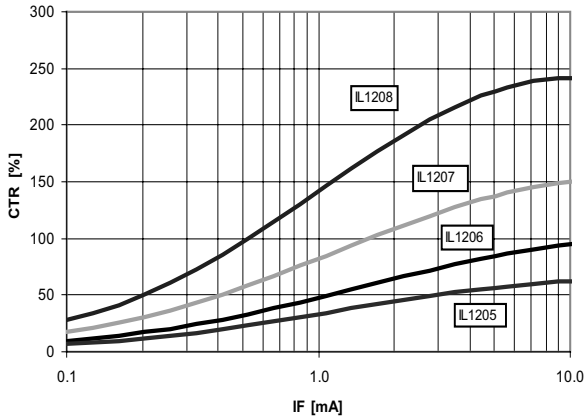


Figure 10. CTR vs. I_F, (V_{CE} = 5V, T_{amb} = 25°C) (Not normalised)

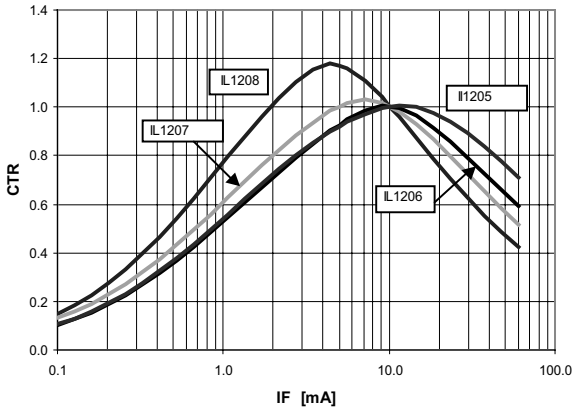


Figure 13. CTR vs. I_F Saturated, Normalised to I_F = 10mA, T_{amb} = 25°C)

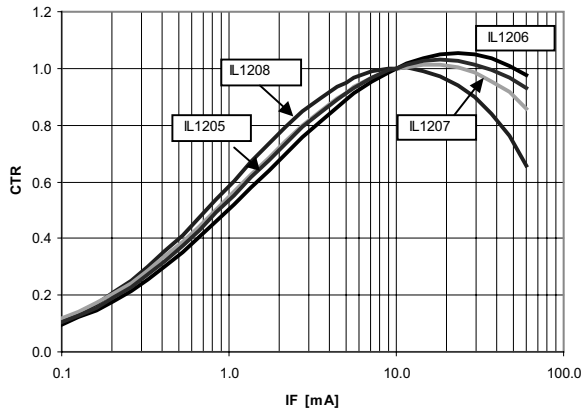


Figure 11. CTR vs. I_F, (V_{CE} = 5V, T_{amb} = 25°C) Normalised to I_F = 10mA, T_{amb} = 25°C

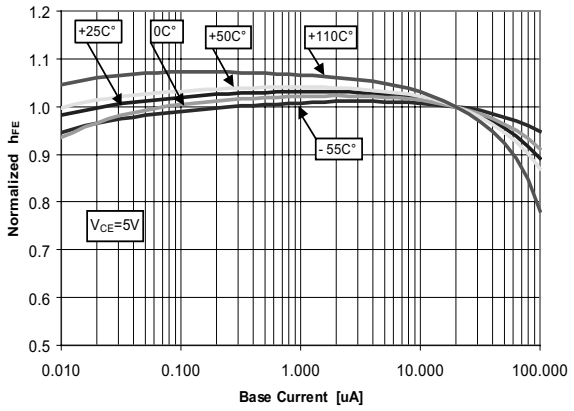


Figure 14. Normalized h_{FE} vs. Base Current and T_{amb}. (Non-saturated Condition)

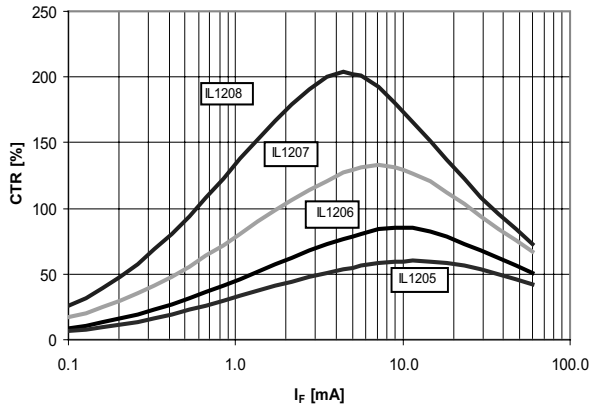


Figure 12. CTR vs. I_F Saturated, (V_{CE} = 0.4V, T_{amb} = 25°C)

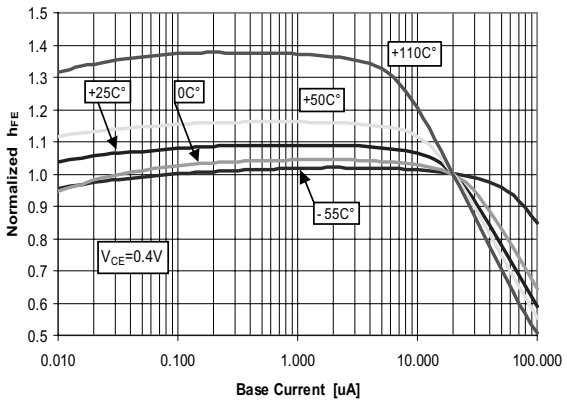


Figure 15. Normalized h_{FE} vs. Base Current and T_{amb}. (Saturated Condition)

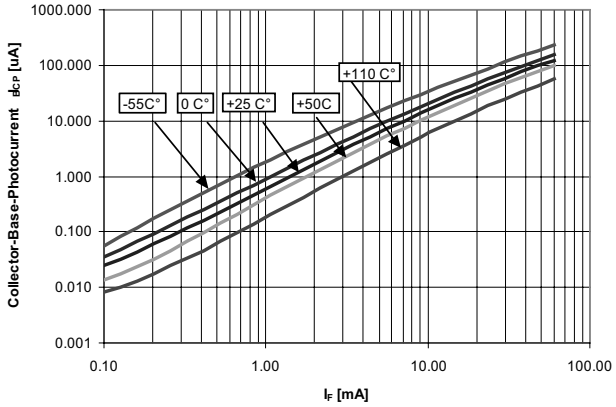


Figure 16. Collector-Base-Photocurrent vs. I_F

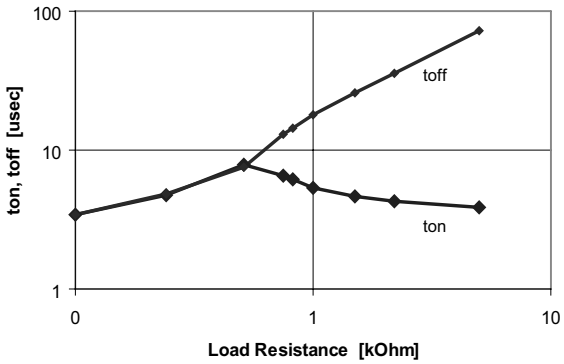


Figure 19. Switching time ton, toff vs. Load Resistance (100 Ohm...5000 Ohm)

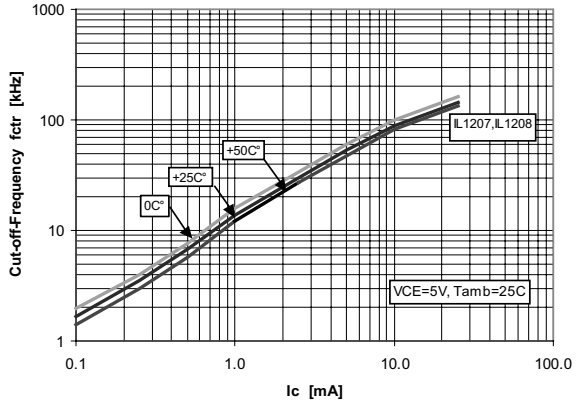


Figure 17. Cut-Off-Frequency (-3dB) vs. Collector Current

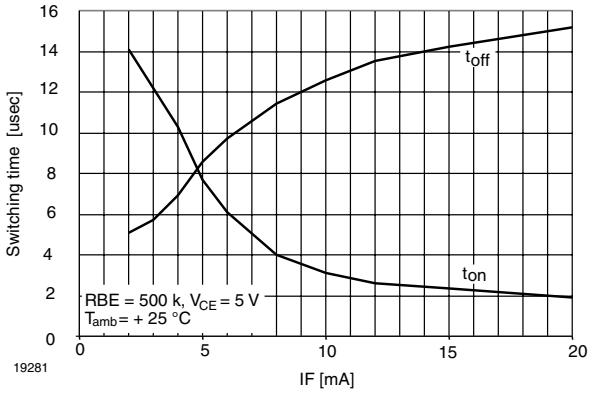


Figure 20. Switching time vs. IF

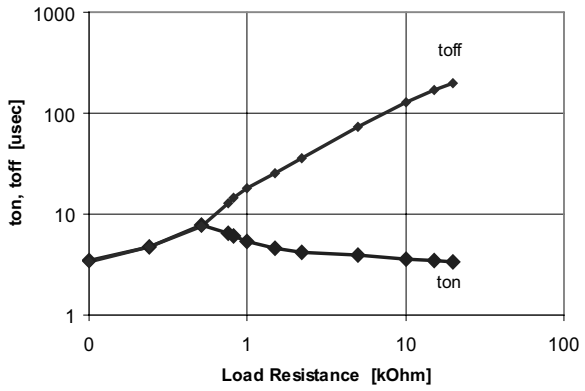


Figure 18. Switching time ton, toff vs. Load Resistance (100 Ohm...20000 Ohm)

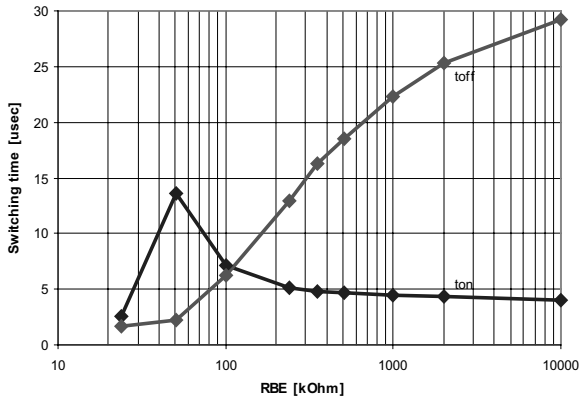
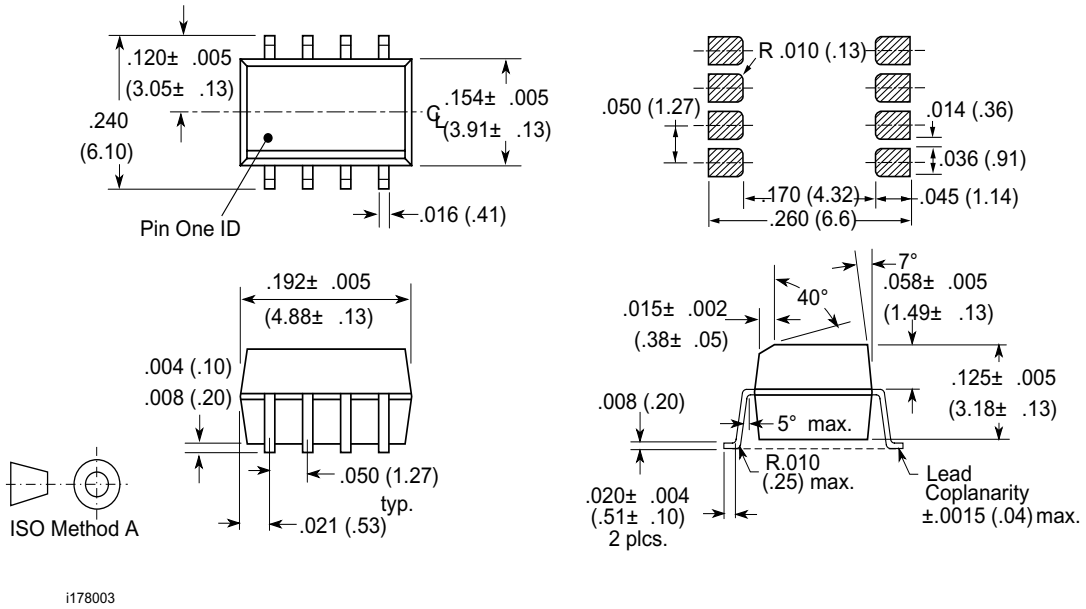


Figure 21. Switching time vs. RBE, I_F = 10mA

Package Dimensions in Inches (mm)



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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 operatingsystems 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.

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