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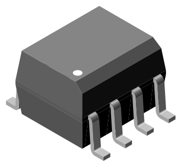
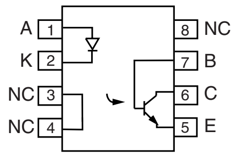
Optocoupler, Phototransistor Output, with Base Connection in SOIC-8 Package, 110 °C Rated

i179002

FEATURES

- Operating temperature from - 55 °C to + 110 °C
- High BV_{CEO}, 70 V
- Isolation test voltage, 4000 V_{RMS}
- Industry standard SOIC-8 surface mountable package
- Compatible with dual wave, vapor phase and IR reflow soldering
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb-free
e3
RoHS COMPLIANT

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 V gives a higher safety margin compared to the industry standard 30 V.

APPLICATIONS

- AC adapters
- PLCs
- Switch mode power supplies
- DC/DC converters
- Microprocessor I/O interfaces
- General impedance matching circuits

AGENCY APPROVALS

- UL1577 - file no. E52744 system code Y
- CUL - file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-5 available with option 1

ORDER INFORMATION

PART	REMARKS
IL1205AT	CTR 40 to 80 %, SOIC-8
IL1206AT	CTR 63 to 125 %, SOIC-8
IL1207AT	CTR 100 to 200 %, SOIC-8
IL1208AT	CTR 160 to 320 %, SOIC-8

ABSOLUTE MAXIMUM RATINGS (1)

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
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				
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

ABSOLUTE MAXIMUM RATINGS (1)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER				
Isolation test voltage		V_{ISO}	4000	V_{RMS}
Operating temperature		T_{amb}	- 55 to + 110	°C
Total package dissipation (LED and detector)		P_{tot}	240	mW
Storage temperature		T_{stg}	- 55 to + 150	°C
Soldering temperature (2)	max. 10 s, dip soldering distance to seating plane ≥ 1.5 mm	T_{sld}	260	°C
Derate linearly from 25 °C			2.4	mW/°C

Notes

(1) 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.

(2) Refer to reflow profile for soldering conditions for surface mounted devices (SOP/SOIC).

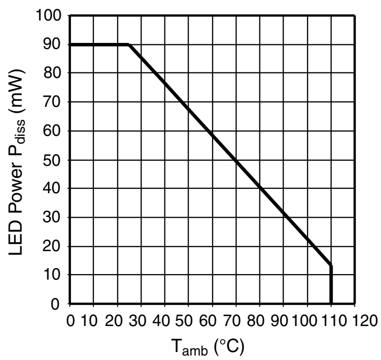


Fig. 1 - Input Power Dissipation (LED) vs. Ambient Temperature

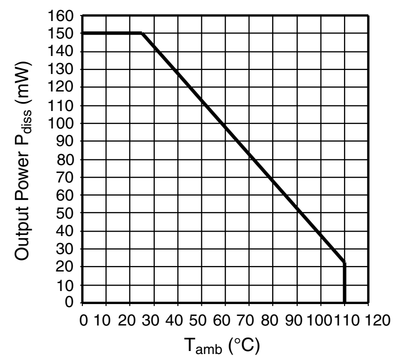


Fig. 2 - Output Power Dissipation vs. Ambient Temperature

ELECTRICAL CHARACTERISTCS							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 10 mA		V_F		1.3	1.5	V
Reverse current	V_R = 6 V		I_R		0.1	100	µA
Capacitance	V_R = 0 V		C_I		13		pF
OUTPUT							
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 current			BV_{CBO}	70			V
Saturation voltage, collector emitter	I_C = 2 mA, I_F = 10 mA		V_{CEsat}			0.4	V
COUPLER							
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

Note

T_{amb} = 25 °C, unless otherwise specified.
Minimum and maximum values were tested requierements. 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						
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

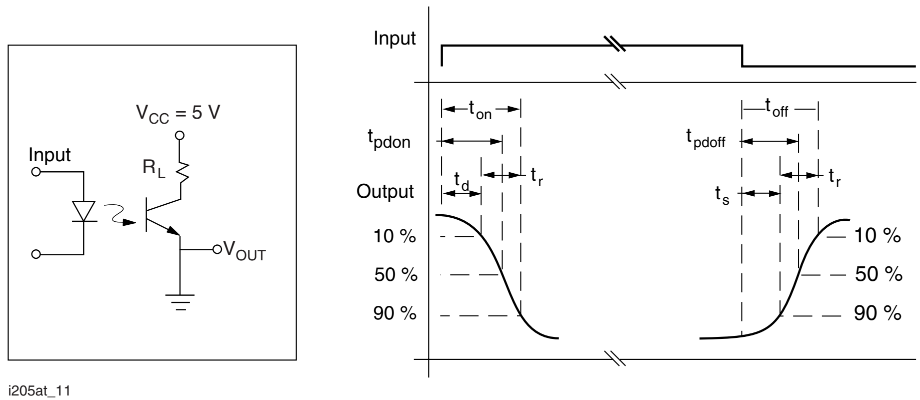


Fig. 3 Switching Test Circuit

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				55/110/21		
Pollution degree (DIN VDE 0109)				2.0		
Comparative tracking index per DIN IEC 112/VDE 0303 part 1, group IIIa per DIN VDE 6110 175 399		CTI	175		399	
V_{IOTM}		V_{IOTM}	6000			V
V_{IORM}		V_{IORM}	560			V
Resistance (input to output)		R_{IO}		10^{12}		Ω
P_{SI}					350	mW
I_{SI}					150	mA
T_{SI}					165	°C
Creepage distance			4.0			mm
Clearance distance			4.0			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

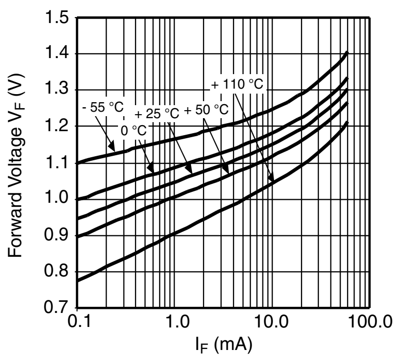


Fig. 4 - Diode Forward Voltage V_F vs. Forward Current

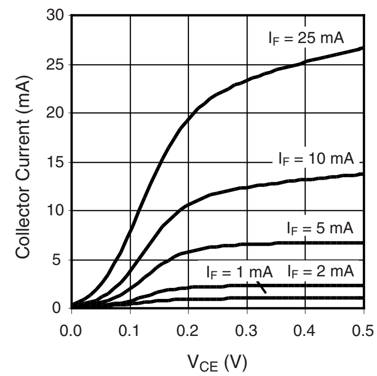


Fig. 7 - I_C (Saturated) vs. V_{CE}

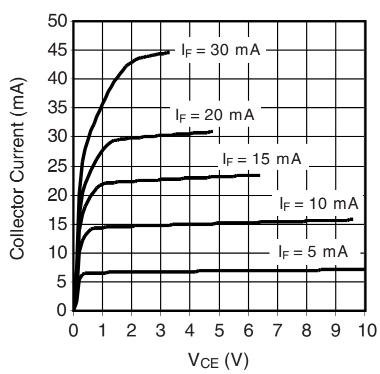


Fig. 5 - I_C (Unsaturated) vs. V_{CE}

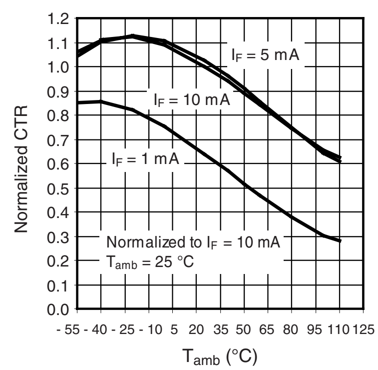


Fig. 8 - CTR Normalized to I_F = 10 mA vs. Ambient Temperature, (Saturated, V_{CE} = 0.4 V)

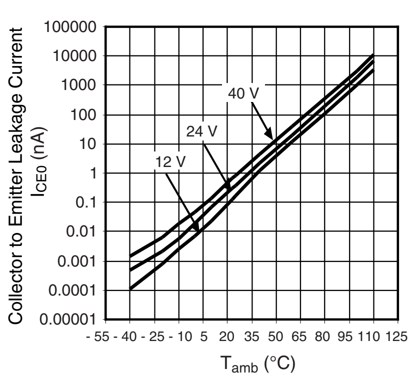


Fig. 6 - Collector to Emitter Current vs. Ambient Temperature

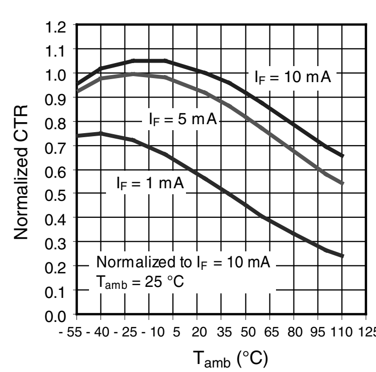


Fig. 9 - CTR Normalized to I_F = 10 mA vs. Ambient Temperature, (Non-Saturated, V_{CE} = 5 V)

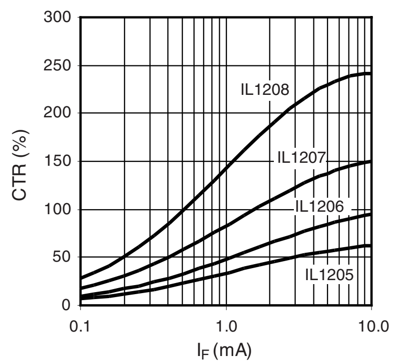


Fig. 10 - CTR vs. I_F, (V_{CE} = 5 V, T_{amb} = 25 °C) (Not Normalised)

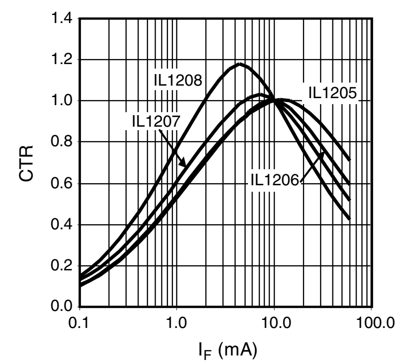


Fig. 13 - CTR vs. I_F Saturated, Normalised to I_F = 10 mA, T_{amb} = 25 °C

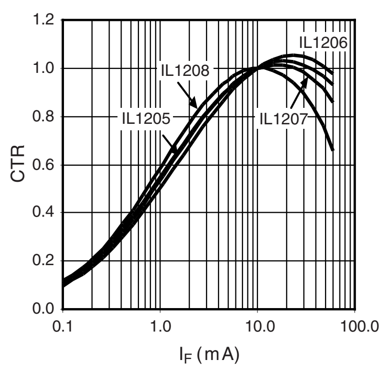


Fig. 11 - CTR vs. I_F, (V_{CE} = 5 V, T_{amb} = 25 °C) Normalised to I_F = 10 mA, T_{amb} = 25 °C

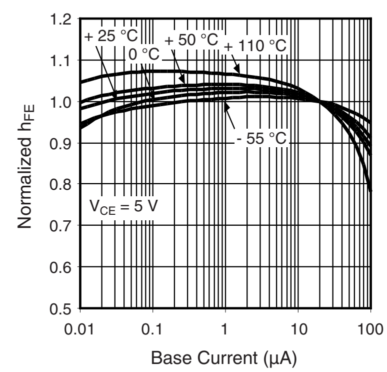


Fig. 14 - Normalized h_{FE} vs. Base Current and T_{amb} (Non-Saturated Condition)

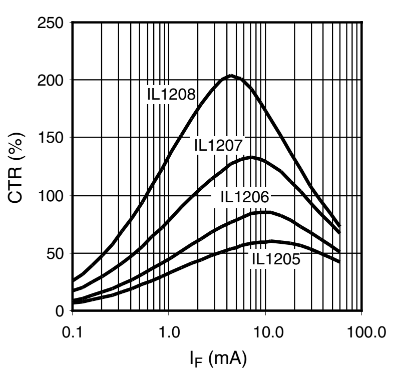


Fig. 12 - CTR vs. I_F Saturated, (V_{CE} = 0.4 V, T_{amb} = 25 °C)

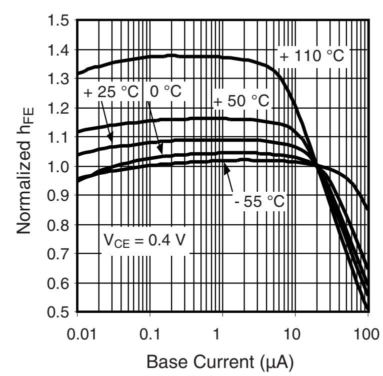


Fig. 15 - Normalized h_{FE} vs. Base Current and T_{amb} (Saturated Condition)

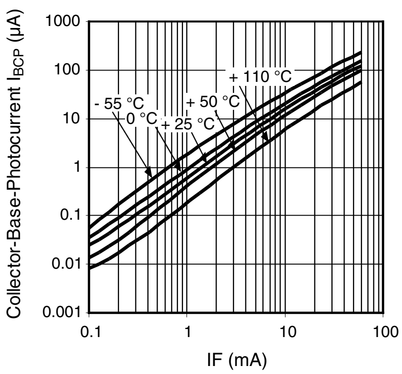


Fig. 16 - Collector Base Photocurrent vs. I_F

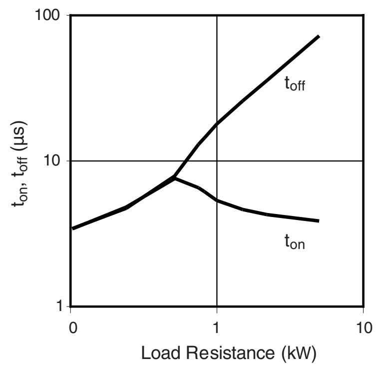


Fig. 19 - Switching Time t_{on}, t_{off} vs. Load Resistance (100 Ω to 5000 Ω)

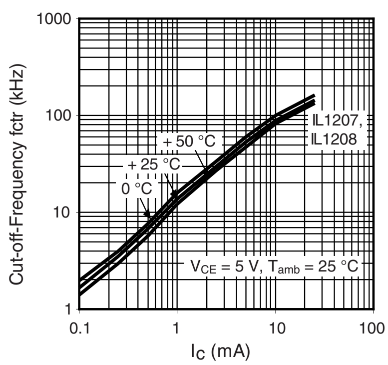


Fig. 17 - Cut-Off-Frequency (- 3 dB) vs. Collector Current

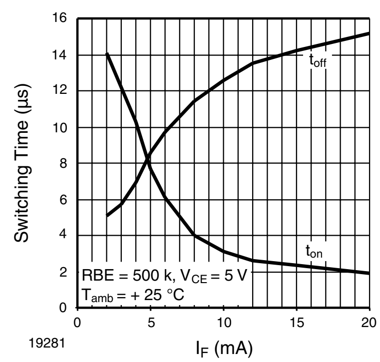


Fig. 20 - Switching Time vs. I_F

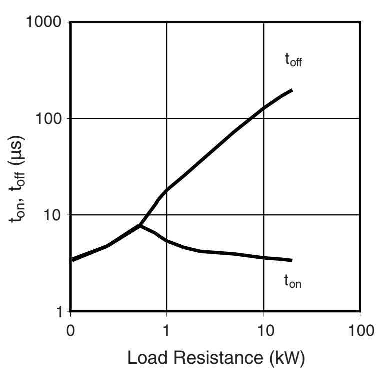


Fig. 18 - Switching Time t_{on}, t_{off} vs. Load Resistance

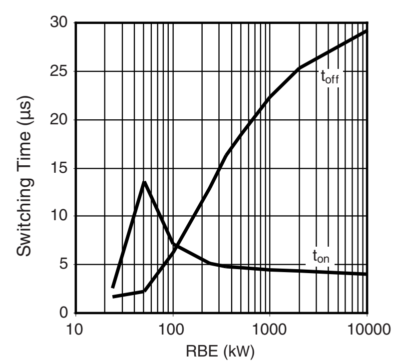
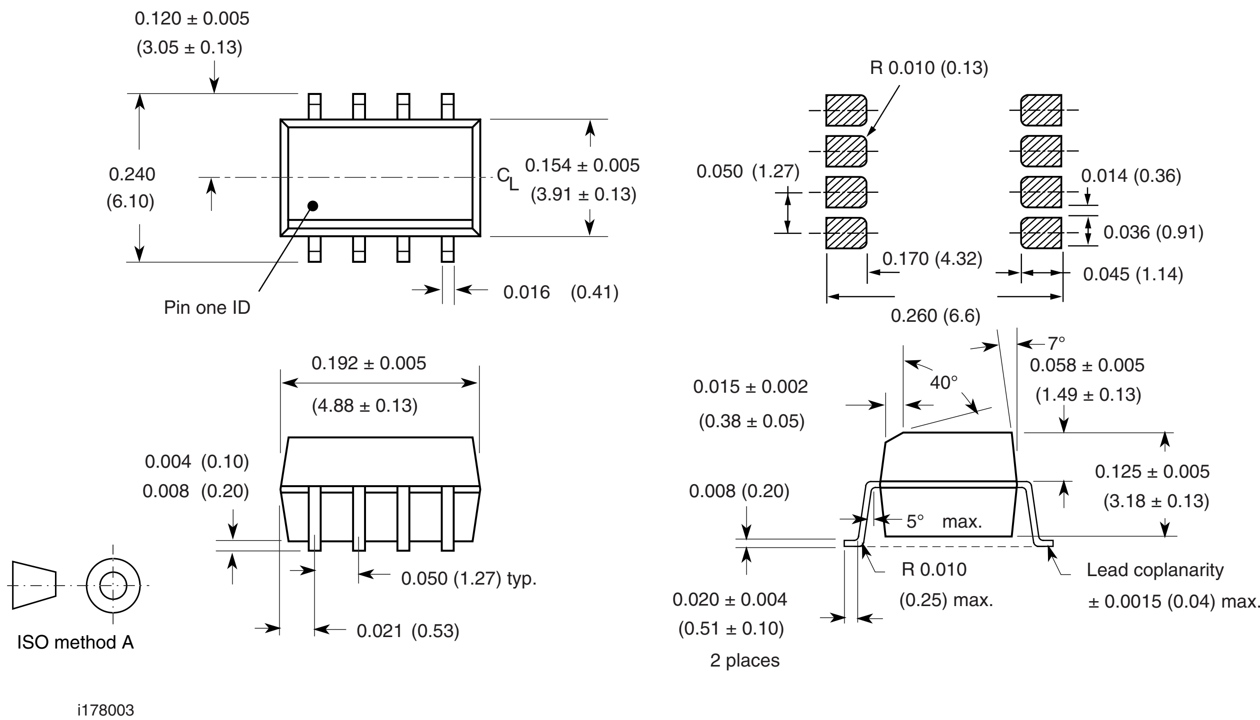


Fig. 21 - Switching Time vs. RBE, I_F = 10 mA

PACKAGE DIMENSIONS in inches (millimeters)



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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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