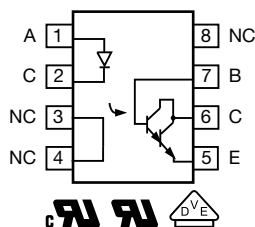
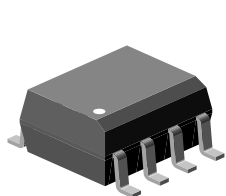




Optocoupler, Photodarlington Output, Low Input Current, High Gain, With Base Connection



FEATURES

- Isolation test voltage, 4000 V_{RMS}
- Industry standard SOIC-8 surface mountable package
- Standard lead spacing, 0.05"
- Available only on tape and reel (conforms to EIA standard RS481A)
- Compatible with dual wave, vapor phase and IR reflow soldering
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS
COMPLIANT

LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The IL221AT, IL222AT, IL223AT are high current transfer ratio (CTR) optocouplers with a gallium arsenide infrared LED emitter and a silicon NPN photodarlington transistor detector.

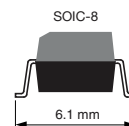
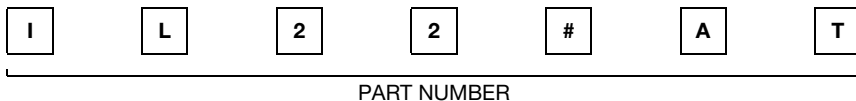
The device has a CTR tested at 1.0 mA LED current. This low drive current permits easy interfacing from CMOS to LSTTL or TTL.

This optocoupler is constructed in a standard SOIC-8 foot print which makes it ideally suited for high density applications. In addition to eliminating through-hole requirements, this package conforms to standards for surface mount devices.

AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#), available with option 1

ORDERING INFORMATION



AGENCY CERTIFIED / PACKAGE	CTR (%)		
	1 mA		
UL, cUL	≥ 100	≥ 200	≥ 500
SOIC-8	IL221AT	IL222AT	IL223AT



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT				
Peak reverse voltage		V_R	6.0	V
Forward continuous current		I_F	60	mA
Power dissipation		P_{diss}	90	mW
Derate linearly from 25 °C			1.2	mW/°C
OUTPUT				
Collector emitter breakdown voltage		BV_{CEO}	30	V
Emitter collector breakdown voltage		BV_{ECO}	5.0	V
Collector base breakdown voltage		BV_{CBO}	70	V
$I_{C\text{MAX DC}}$		$I_{C\text{MAX DC}}$	50	mA
$I_{C\text{MAX}}$	$t < 1.0\text{ ms}$	$I_{C\text{MAX}}$	100	mW
Power dissipation		P_{diss}	150	mW
Derate linearly from 25 °C			2.0	mW/°C
COUPLER				
Isolation test voltage	$t = 1.0\text{ s}$	V_{ISO}	4000	V_{RMS}
Total package dissipation (at 25 °C ambient)(LED and detector)		P_{tot}	240	mW
Derate linearly from 25 °C			3.2	mW/°C
Storage temperature		T_{stg}	-55 to +150	°C
Operating temperature		T_{amb}	-55 to +100	°C
Soldering time at 260 °C			10	s

Note

- 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT						
Forward voltage	$I_F = 1.0\text{ mA}$	V_F	-	1.0	1.5	V
Reverse current	$V_R = 6\text{ V}$	I_R	-	0.1	100	μA
Capacitance	$V_R = 0\text{ V}$, $f = 1.0\text{ MHz}$	C_O	-	25	-	pF
OUTPUT						
Collector emitter breakdown voltage	$I_C = 100\text{ }\mu\text{A}$	BV_{CEO}	30	-	-	V
Emitter collector breakdown voltage	$I_E = 100\text{ }\mu\text{A}$	BV_{ECO}	5.0	-	-	V
Emitter emitter breakdown voltage	$I_C = 10\text{ }\mu\text{A}$	BV_{CBO}	70	-	-	V
Collector emitter capacitance	$V_{CE} = 10\text{ V}$	C_{CE}	-	3.4	-	pF
COUPLER						
Saturation voltage, collector emitter	$I_{CE} = 0.5\text{ mA}$	V_{CEsat}	-	-	1.0	V
Capacitance (input to output)		C_{IO}	-	0.5	-	pF
Resistance (input to output)		R_{IO}	-	100	-	$\text{G}\Omega$

Note

- Minimum and maximum values are tested 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.

CURRENT TRANSFER RATIO ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
I_C/I_F	$I_F = 1.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$	IL221AT	CTR_{DC}	100	-	-	%
		IL222AT	CTR_{DC}	200	-	-	%
		IL223AT	CTR_{DC}	500	-	-	%

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification	According to IEC 68 part 1		-	55 / 100 / 21	-	
Comparative tracking index		CTI	175	-	399	
V_{IOTM}			6000	-	-	V
V_{IORM}			560	-	-	V
P_{SO}			-	-	350	mW
I_{SI}			-	-	150	mA
T_{SI}			-	-	165	$^{\circ}\text{C}$
Creepage distance			4	-	-	mm
Clearance distance			4	-	-	mm
Insulation thickness			0.2	-	-	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.

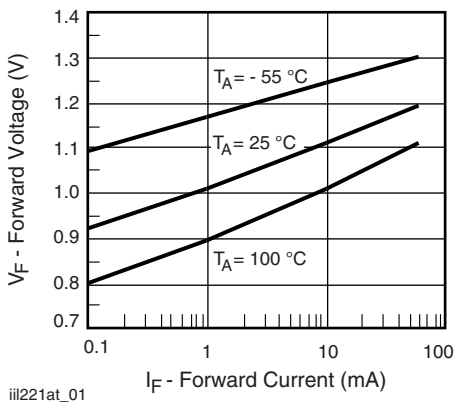
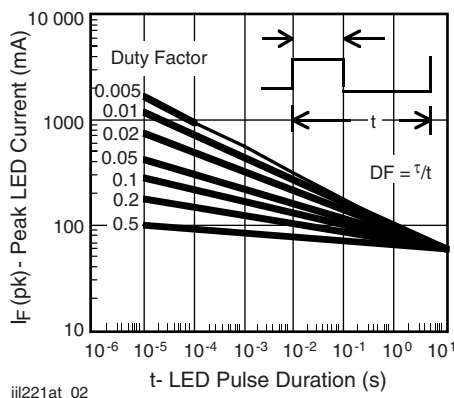
TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 1 - Forward Voltage vs. Forward Current


Fig. 2 - Peak LED Current vs. Duty Factor, τ

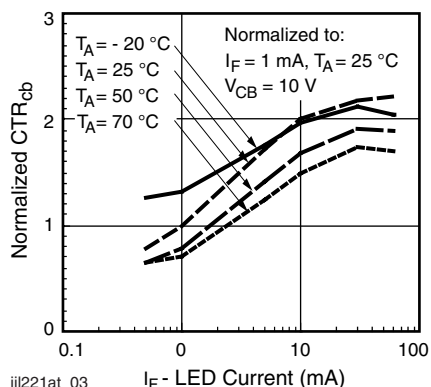
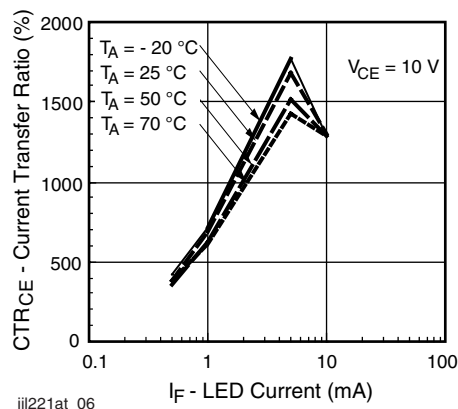

Fig. 3 - Normalized CTR_{cb} vs. I_F


Fig. 6 - CTR vs. LED Current

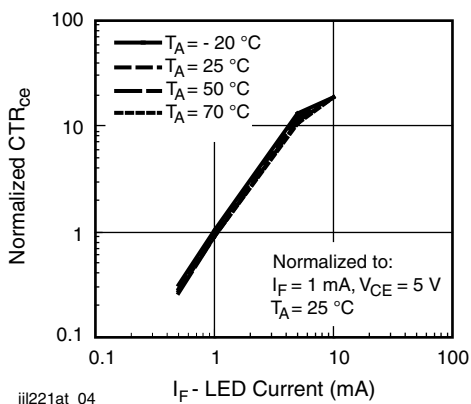
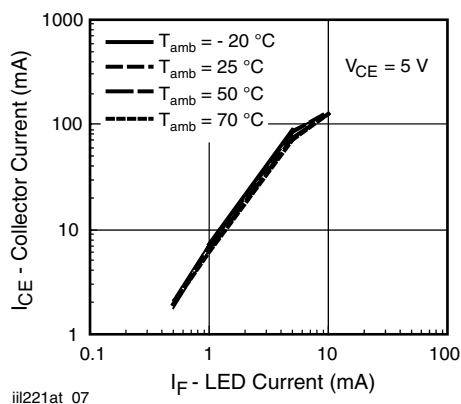

Fig. 4 - Normalized CTR_{CE} vs. LED Current


Fig. 7 - Collector Current vs. LED Current

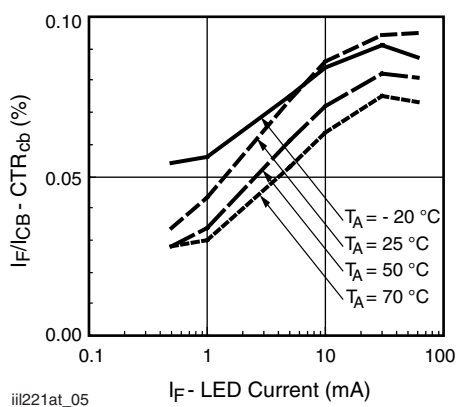
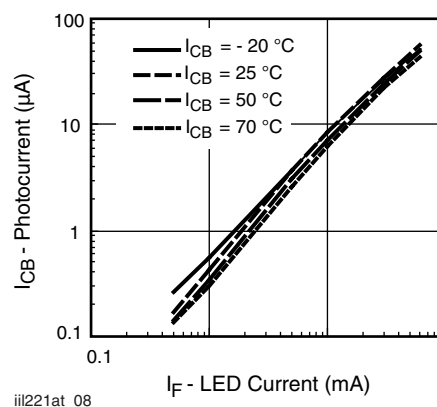

Fig. 5 - CTR_{CE} vs. LED Current


Fig. 8 - Photocurrent vs. LED Current

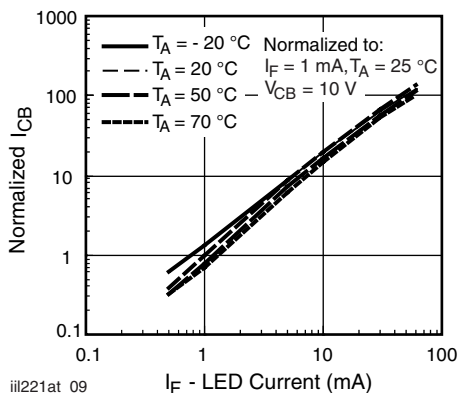
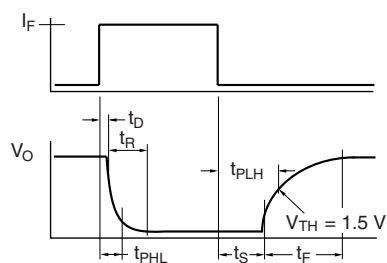

Fig. 9 - Normalized I_{CB} vs. I_F


Fig. 10 - Switching Timing

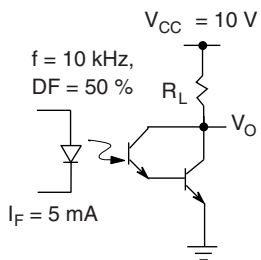
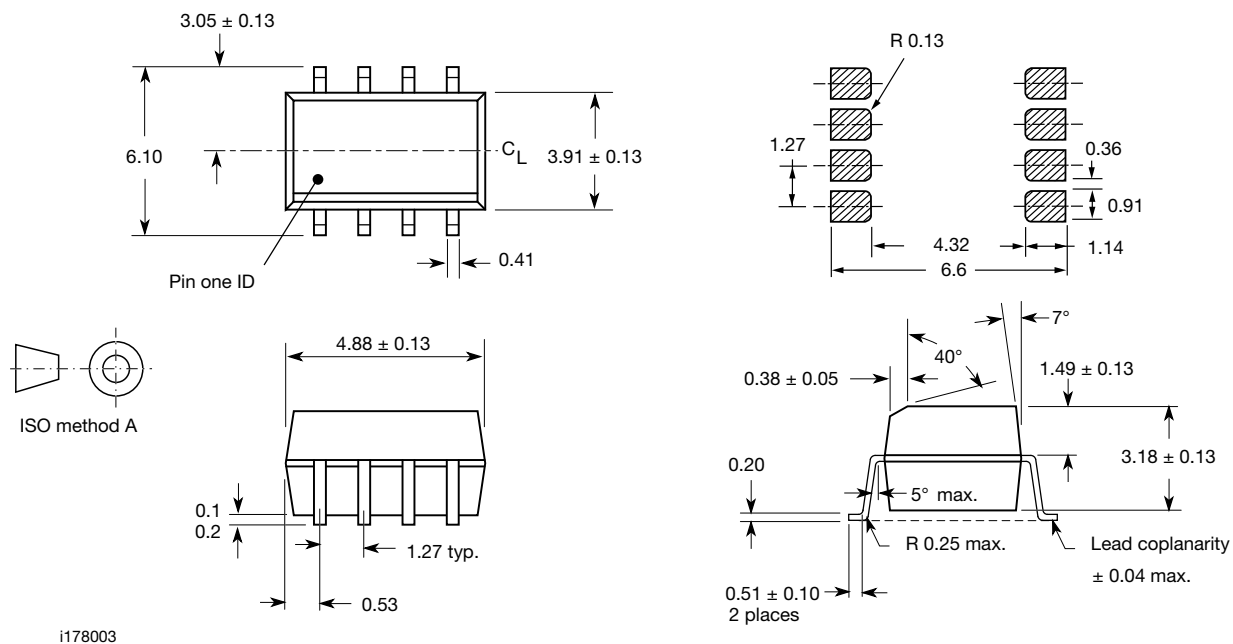


Fig. 11 - Switching Schematic

PACKAGE DIMENSIONS in inches (millimeters)

PACKAGE MARKING (example)

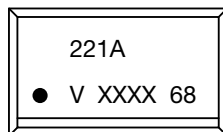


Fig. 12 - Example of IL221AT

Notes

- XXXX = LMC (lot marking code)
- Tape and reel suffix (T) is not part of the package marking



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