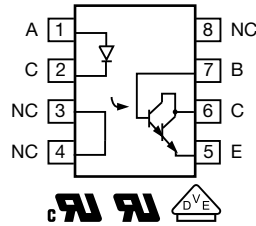
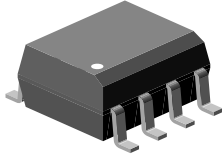




## Optocoupler, Photodarlington Output, Low Input Current, High Gain, With Base Connection



### FEATURES

- Isolation test voltage, 4000 V<sub>RMS</sub>
- 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](http://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			
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">I</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">L</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">2</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">2</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">#</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">A</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">T</div> </div> <p style="text-align: center; margin-top: 5px;">PART NUMBER</p>			
AGENCY CERTIFIED / PACKAGE	CTR (%)		
	1 mA		
UL, cUL	≥ 100	≥ 200	≥ 500
SOIC-8	IL221AT	IL222AT	IL223AT



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
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
<b>OUTPUT</b>				
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
$I_{CMAX\ DC}$		$I_{CMAX\ DC}$	50	mA
$I_{CMAX}$	$t < 1.0\text{ ms}$	$I_{CMAX}$	100	mW
Power dissipation		$P_{diss}$	150	mW
Derate linearly from 25 °C			2.0	mW/°C
<b>COUPLER</b>				
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.

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
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	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}$ , $f = 1.0\text{ MHz}$	$C_O$	-	25	-	pF
<b>OUTPUT</b>						
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
<b>COUPLER</b>						
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	-	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.



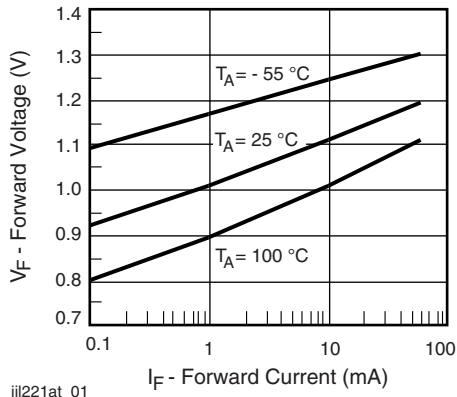
CURRENT TRANSFER RATIO ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$I_F = 1.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$	IL221AT	$CTR_{DC}$	100	-	-	%
		IL222AT	$CTR_{DC}$	200	-	-	%
		IL223AT	$CTR_{DC}$	500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

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**

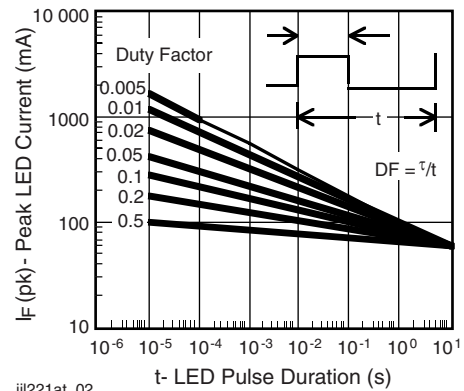
- As per IEC 60747-5-2, § 7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

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



iii221at\_01

Fig. 1 - Forward Voltage vs. Forward Current



iii221at\_02

Fig. 2 - Peak LED Current vs. Duty Factor,  $\tau$

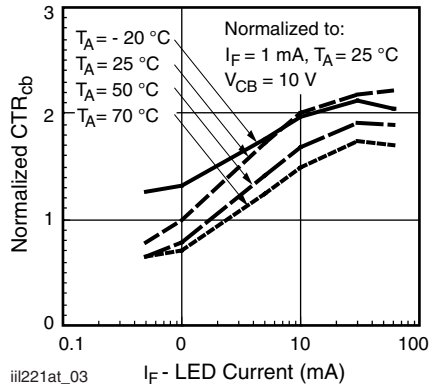


Fig. 3 - Normalized  $CTR_{cb}$  vs.  $I_F$

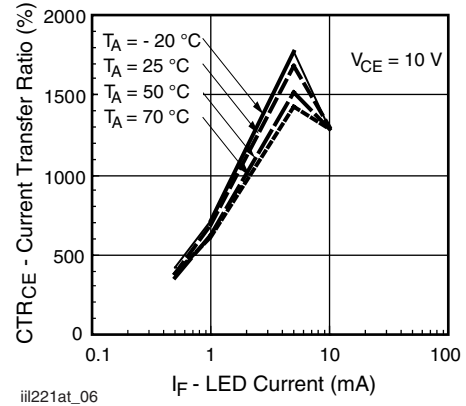


Fig. 6 - CTR vs. LED Current

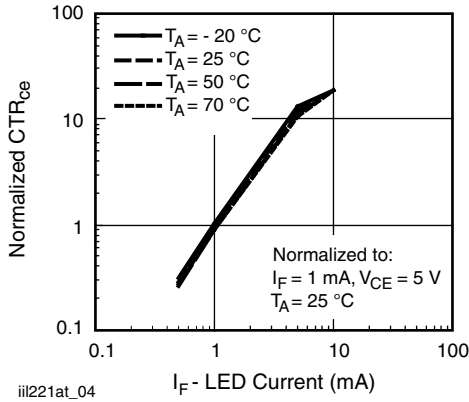


Fig. 4 - Normalized  $CTR_{CE}$  vs. LED Current

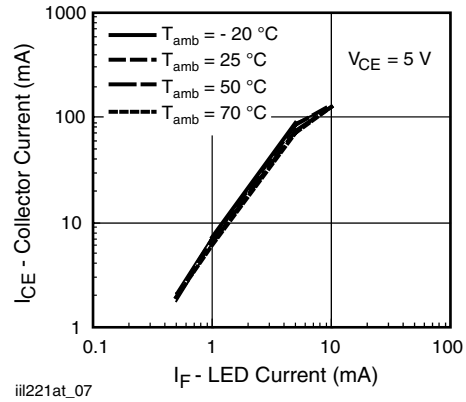


Fig. 7 - Collector Current vs. LED Current

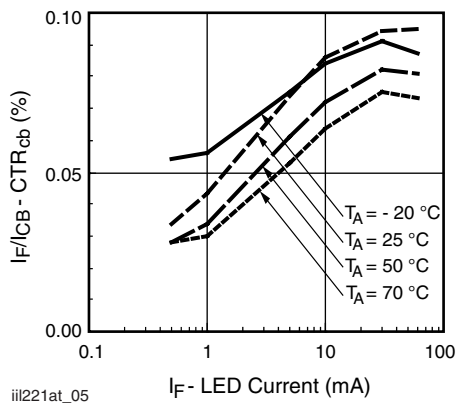


Fig. 5 -  $CTR_{CE}$  vs. LED Current

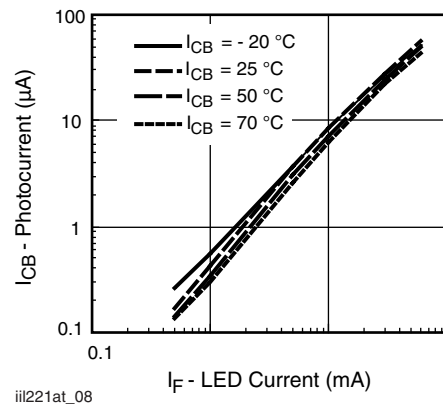


Fig. 8 - Photocurrent vs. LED Current

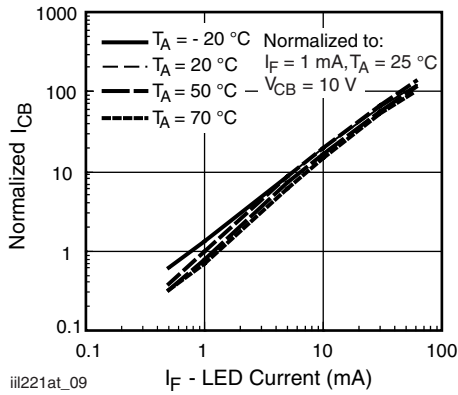


Fig. 9 - Normalized  $I_{CB}$  vs.  $I_F$

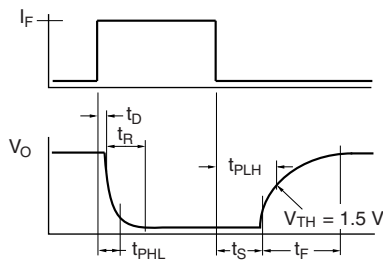
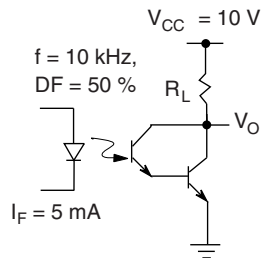


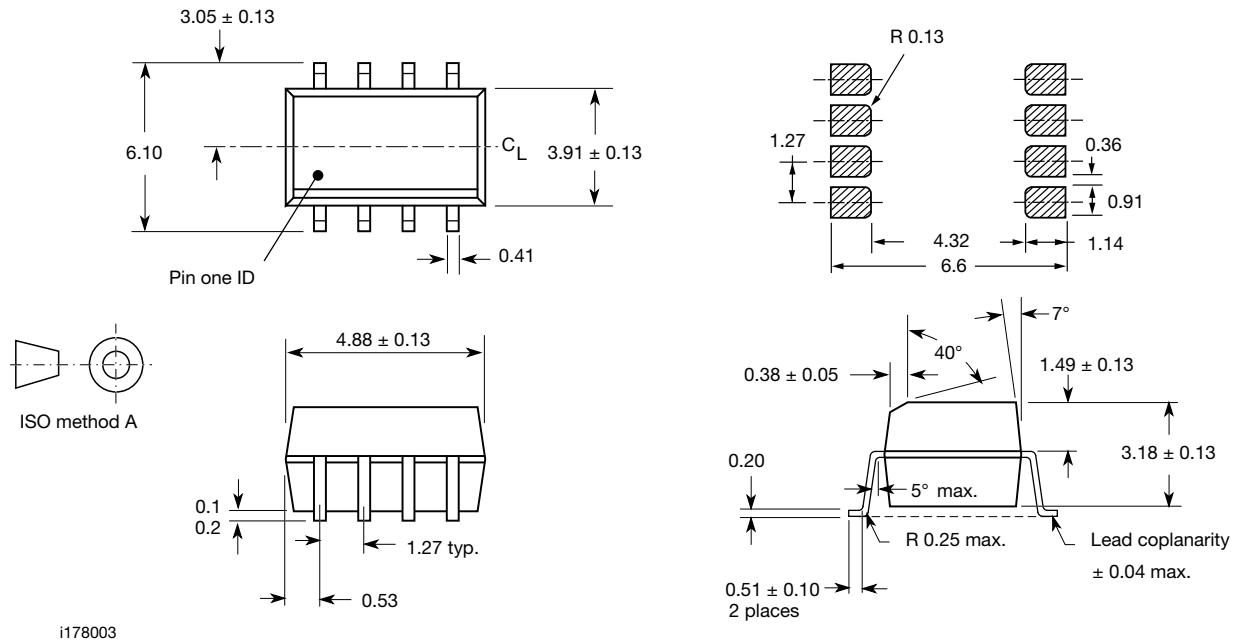
Fig. 10 - Switching Timing



iii221at\_11

Fig. 11 - Switching Schematic

## PACKAGE DIMENSIONS in inches (millimeters)



## PACKAGE MARKING (example)

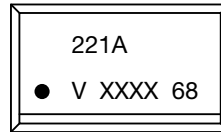


Fig. 12 - Example of IL221AT

### Notes

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



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