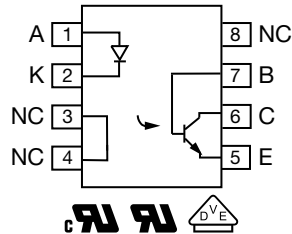
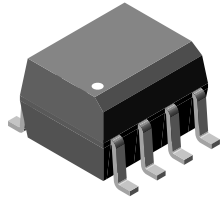




## Optocoupler, Phototransistor Output, With Base Connection in SOIC-8 Package



### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

The IL215AT, IL216AT, IL217AT 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. The IL215AT, IL216AT, IL217AT comes in a standard SOIC-8 small outline package for surface mounting which makes it ideally suited for high density applications with limited space. In addition to eliminating through hole requirements, this package conforms to standards for surface mounted devices.

The high CTR at low input current is designed for low power consumption requirements such as CMOS microprocessor interfaces.

### FEATURES

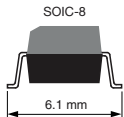
- High current transfer ratio
- Isolation test voltage, 4000 V<sub>RMS</sub>
- Industry standard SOIC-8 surface mountable package
- Compatible with dual wave, vapor phase and IR reflow soldering
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### AGENCY APPROVALS

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

ORDERING INFORMATION			
I	L	2	1
#	A	T	
PART NUMBER			
			
AGENCY CERTIFIED / PACKAGE	CTR (%)		
	1 mA		
UL, cUL	> 20	> 50	> 100
SOIC-8	IL215AT	IL216AT	IL217AT



<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	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		$BV_{ECO}$	7	V
Collector base breakdown voltage		$V_{CBO}$	70	V
$I_{C_{MAX. DC}}$		$I_{C_{MAX. DC}}$	50	mA
$I_{C_{MAX.}}$	$t < 1\text{ ms}$	$I_{C_{MAX.}}$	100	mA
Power dissipation		$P_{diss}$	150	mW
Derate linearly from 25 °C			2	mW/°C
<b>COUPLER</b>				
Isolation test voltage	1 s	$V_{ISO}$	4000	$V_{RMS}$
Total package dissipation	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	$I_F = 1\text{ mA}$	$V_F$	-	1.0	1.5	V
Reverse current	$V_R = 6\text{ V}$	$I_R$	-	0.1	100	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}$	$C_O$	-	13	-	pF
<b>OUTPUT</b>						
Collector emitter breakdown voltage	$I_C = 10\text{ }\mu\text{A}$	$BV_{CEO}$	30	-	-	V
Emitter collector breakdown voltage	$I_E = 10\text{ }\mu\text{A}$	$BV_{ECO}$	7	-	-	V
Collector dark current	$V_{CE} = 10\text{ V}, I_F = 0\text{ A}$	$I_{CEO}$	-	5	50	nA
Collector emitter capacitance	$V_{CE} = 0\text{ V}$	$C_{CE}$	-	10	-	pF
<b>COUPLER</b>						
Saturation voltage, collector emitter	$I_F = 1.0\text{ mA}, I_C = 0.1\text{ mA}$	$V_{CEsat}$	-	-	0.4	V
Isolation test voltage	1 s	$V_{ISO}$	4000	-	-	$V_{RMS}$
Capacitance (input to output)		$C_{IO}$	-	0.5	-	pF
Resistance (input to output)		$R_{IO}$	-	100	-	$\text{G}\Omega$

**Note**

- Minimum and maximum values were 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							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC current transfer ratio	$I_F = 1.0 \text{ mA}, V_{CE} = 5.0 \text{ V}$	IL215AT	$CTR_{DC}$	20	50	-	%
		IL216AT	$CTR_{DC}$	50	80	-	%
		IL217AT	$CTR_{DC}$	100	130	-	%

SWITCHING CHARACTERISTICS							
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT	
Switching time	$I_F = 2.0 \text{ mA}, R_L = 100 \Omega, V_{CC} = 10 \text{ V}$	$t_{on}, t_{off}$	-	3.0	-	$\mu\text{s}$	

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 60747-5-5, §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)

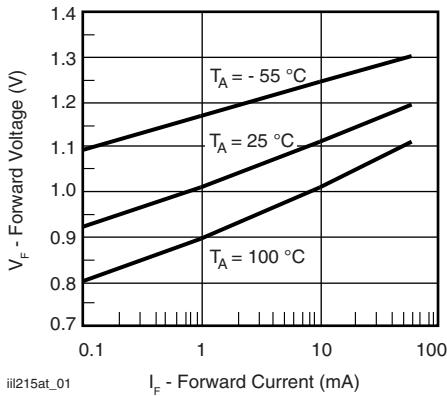


Fig. 1 Forward Voltage vs. Forward Current

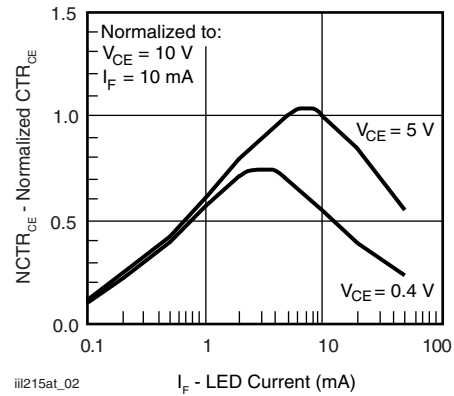


Fig. 2 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

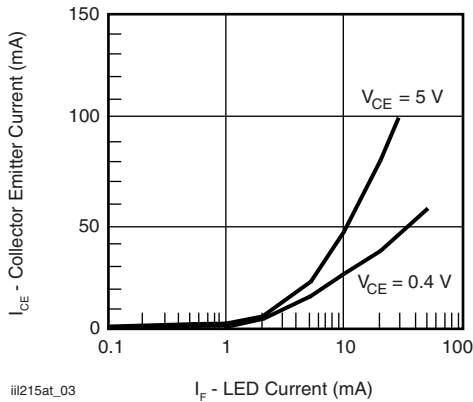


Fig. 3 - Collector Emitter Current vs. LED Current

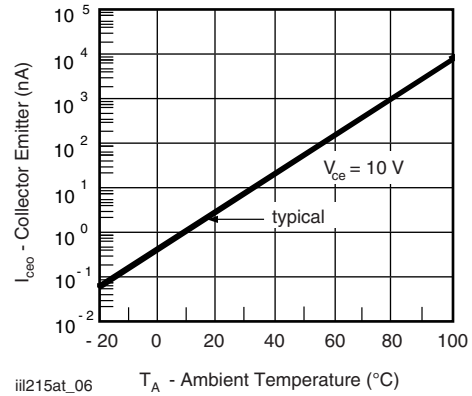


Fig. 6 - Collector Emitter Leakage Current vs. Temperature

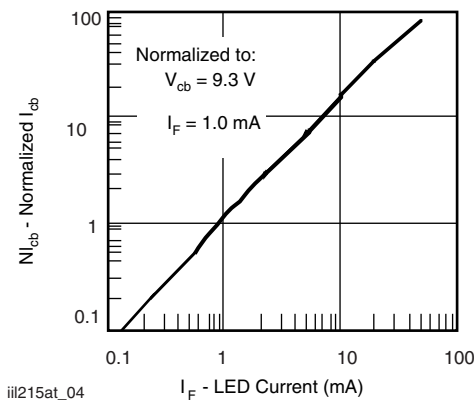


Fig. 4 - Normalized Collector Base Photocurrent vs. LED Current

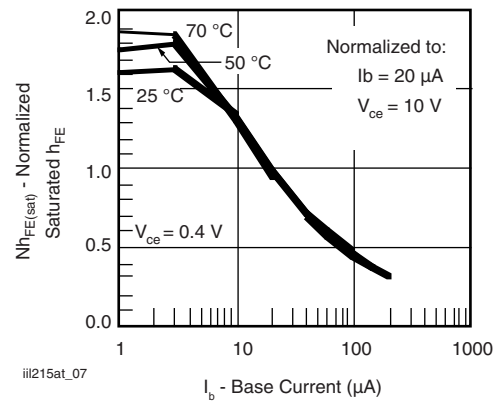


Fig. 7 - Normalized Saturated  $h_{FE}$  vs. Base Current and Temperature

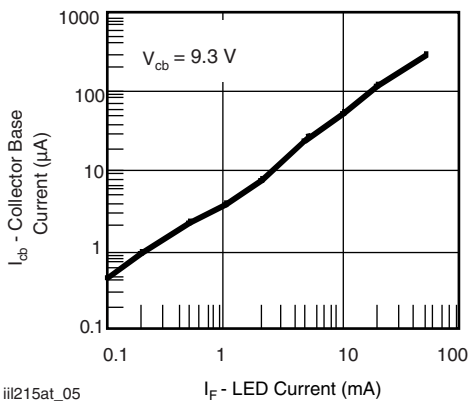


Fig. 5 - Collector Base Photocurrent vs. LED Current

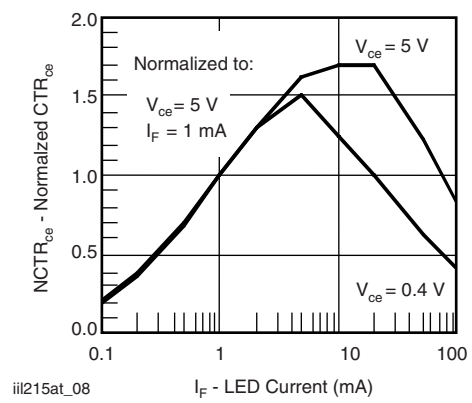
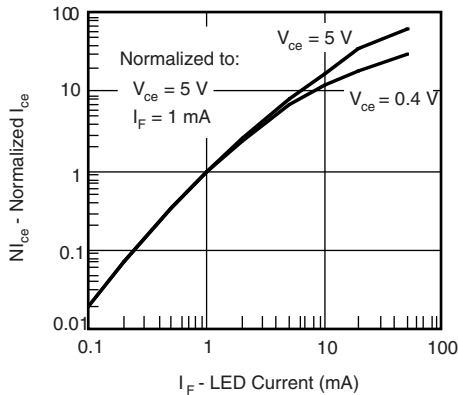
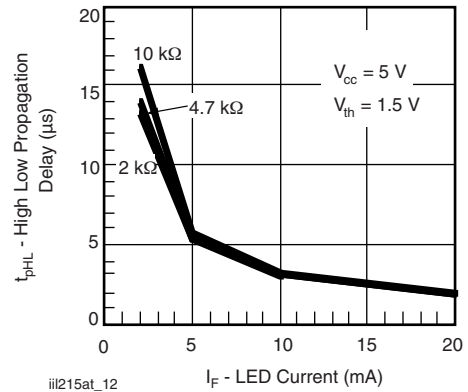


Fig. 8 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current



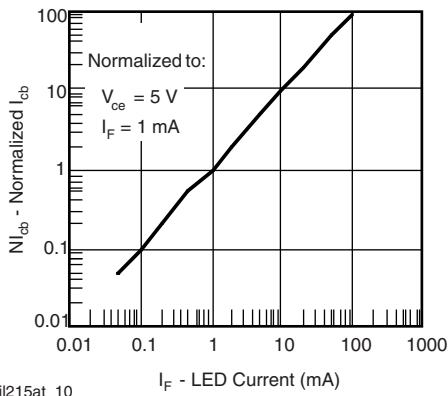
ii215at\_09

Fig. 9 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current



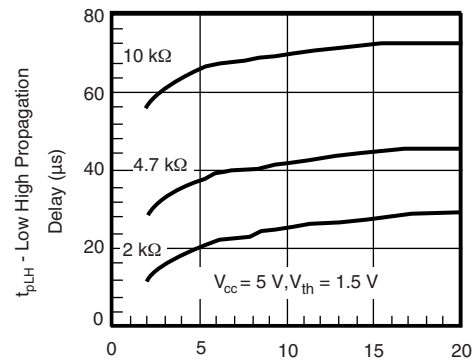
ii215at\_12

Fig. 12 - High to Low Propagation Delay vs. LED Current and Load Resistor



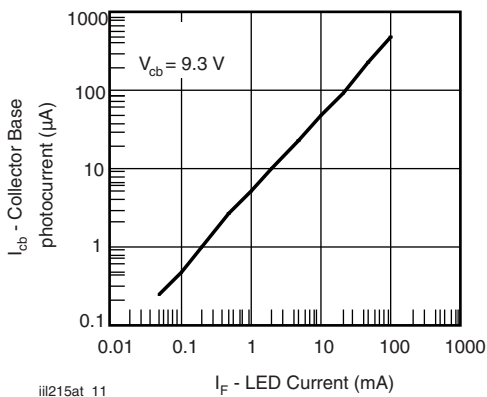
ii215at\_10

Fig. 10 - Normalized Collector Base Photocurrent vs. LED Current



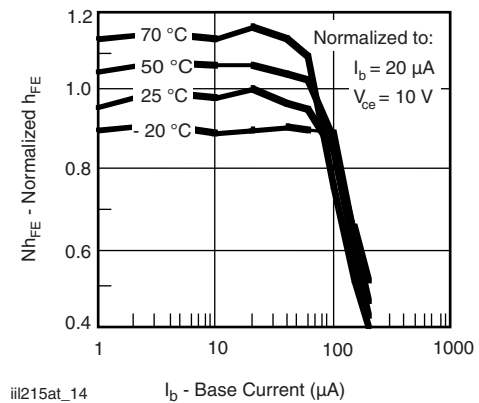
ii215at\_13

Fig. 13 - Low to High Propagation Delay vs. LED Current and Load Resistor



ii215at\_11

Fig. 11 - Collector Base Photocurrent vs. LED Current



ii215at\_14

Fig. 14 - Normalized Non-Saturated  $h_{FE}$  vs. Base Current and Temperature

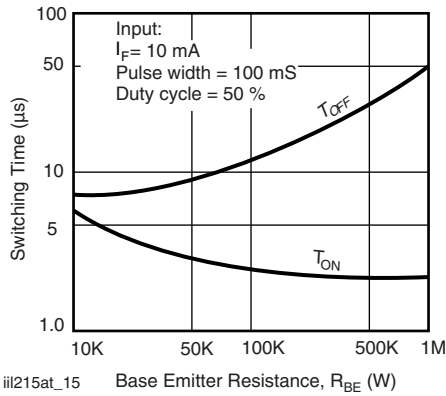


Fig. 15 - Typical Switching Characteristics vs. Base Resistance (Saturated Operation)

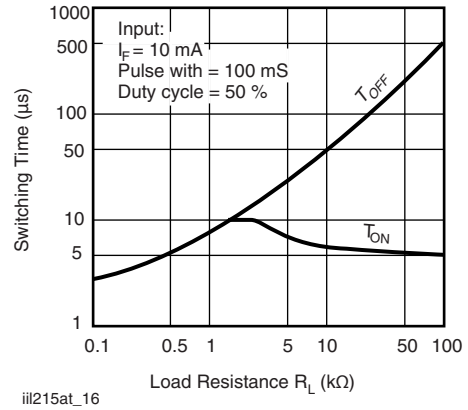
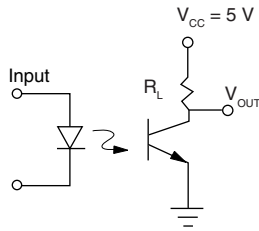


Fig. 16 - Typical Switching Times vs. Load Resistance



ii1215at\_17

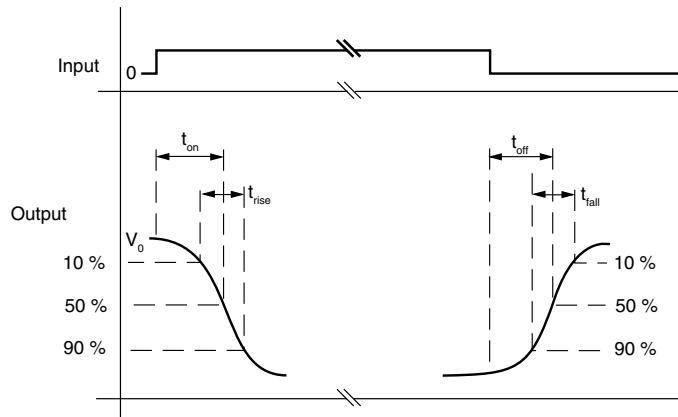
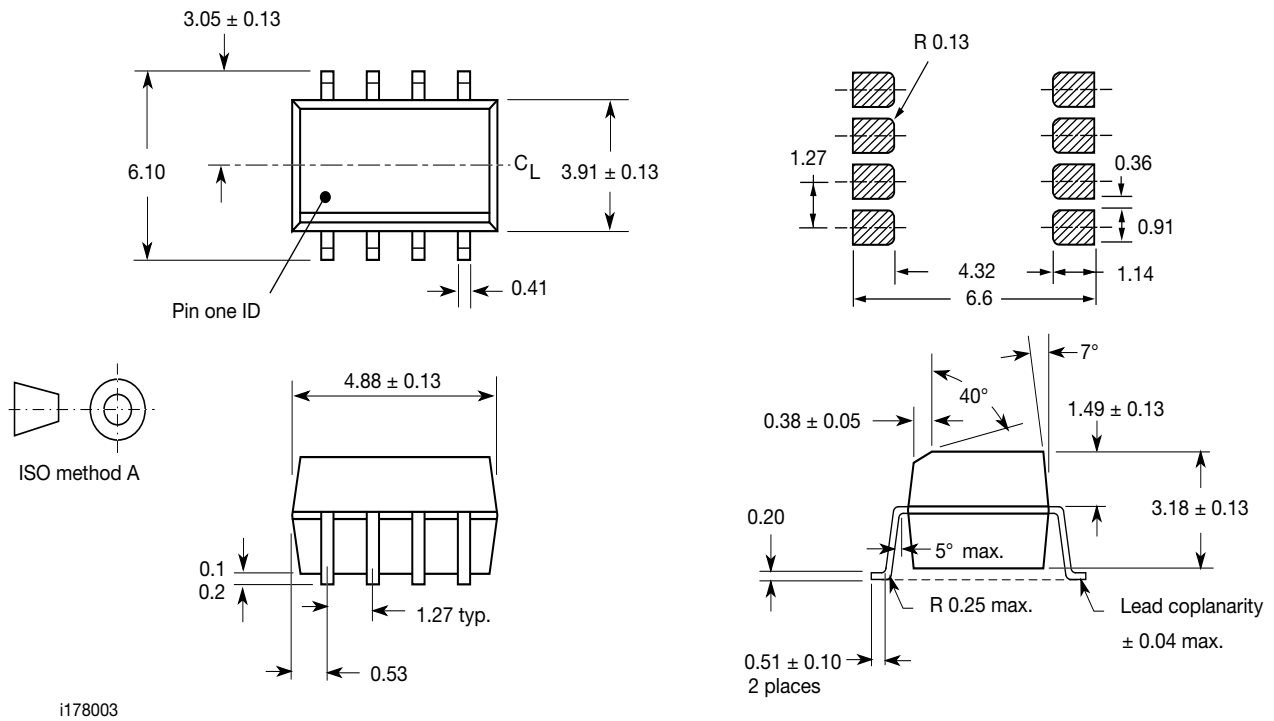


Fig. 17 - Switching Test Circuit

**PACKAGE DIMENSIONS** in millimeters



**PACKAGE MARKING** (example)

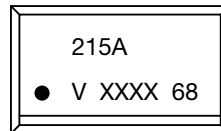


Fig. 18 - Example of IL215AT

**Notes**

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



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