FAIRCHILD
SEMICONDUCTOR™

PHOTODARLINGTON OPTOCOUPLERS

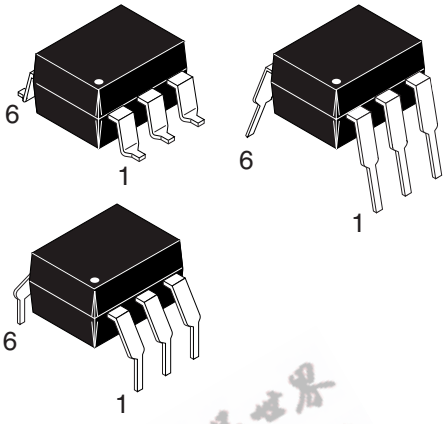
CNX48U H11B1 H11B2 H11B255 H11B3
MOC8080 TIL113

DESCRIPTION

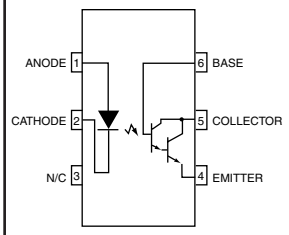
The CNX48U, H11BX, MOC8080 and TIL113 have a gallium arsenide infrared emitter optically coupled to a silicon planar photodarlington.

FEATURES

- High sensitivity to low input drive current
- Meets or exceeds all JEDEC Registered Specifications
- VDE 0884 approval available as a test option
  -add option .300. (e.g., H11B1.300)



SCHEMATIC



APPLICATIONS

- Low power logic circuits
- Telecommunications equipment
- Portable electronics
- Solid state relays
- Interfacing coupling systems of different potentials and impedances.

Parameter	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T_{STG}	All	-55 to +150	°C
Operating Temperature	T_{OPR}	All	-55 to +100	°C
Lead Solder Temperature	T_{SOL}	All	260 for 10 sec	°C
Total Device Power Dissipation @ T_A = 25°C	P_D	All	250	mW
Derate above 25°C			3.3	mW/°C
EMITTER				
Continuous Forward Current	I_F	All	100	mA
Reverse Voltage	V_R	All	6	V
Forward Current - Peak (300 µs, 2% Duty Cycle)	I_F(pk)	All	3.0	A
LED Power Dissipation @ T_A = 25°C	P_D	All	100	mW
Derate above 25°C			1.8	mW/°C
DETECTOR				
Collector-Emitter Breakdown Voltage	BV_{CEO}	CNX48U, TIL113	30	V
		H11B1, H11B2 H11B3	25	V
		H11B255 MOC8080	55	V
Collector-Base Breakdown Voltage	BV_{CBO}	CNX48U, H11B1 H11B2, H11B3 TIL113	30	V
		H11B255 MOC8080	55	V
Emitter-Collector Breakdown Voltage	BV_{ECO}	All	7	V
Detector Power Dissipation @ T_A = 25°C	P_D	All	150	mW
Derate above 25°C			2.0	mW/°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
EMITTER							
Input Forward Voltage	(I_F = 10 mA)	V_F	H11B1, H11B2 H11B255 MOC8080 TIL113	0.8	1.2	1.5	V
	(I_F = 10 mA)		CNX48U		1.2	1.3	
	(I_F = 10 mA, T_A = -55°C)		MOC8080	0.9	1.3	1.7	
	(I_F = 10 mA, T_A = 100°C)			0.7	1.05	1.4	
	(I_F = 50 mA)		H11B3		1.35	1.5	
Reverse Leakage Current	(V_R = 6 V)	I_R	All		0.001	10	µA
Capacitance	(V_F = 0 V, f = 1.0 MHz)	C	All		50		pF
DETECTOR							
Collector-Emitter Breakdown Voltage	(I_C = 1 mA, I_F = 0)	BV_{CEO}	CNX48U	30	60		V
	(I_C = 100 µA, I_F = 0)		TIL113				
	(I_C = 10 mA, I_F = 0)		H11B1, H11B2 H11B3	25	60		
	(I_C = 100 µA, I_F = 0)		H11B255	55	70		
	(I_C = 1 mA, I_F = 0)		MOC8080				
Collector-Base Breakdown Voltage	(I_C = 100 µA, I_E = 0)	BV_{CBO}	CNX48U, H11B1 H11B2, H11B3 TIL113	30	100		V
	(I_C = 100 µA, I_F = 0)		H11B255 MOC8080	55	100		
Emitter-Collector Breakdown Voltage	(I_E = 100 µA, I_B = 0)	BV_{ECO}	All	7	10		V
Collector-Emitter Dark Current	(V_{CE} = 10 V, Base Open)	I_{CEO}	All		1	100	nA

Note
** Typical values at T_A = 25°C

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TRANSFER CHARACTERISTICS (T_A = 25°C Unless otherwise specified.)

DC Characteristics	Test Conditions	Symbol	Device	Min	Typ**	Max	Units
Collector Output Current[1]	(I_F = 10 mA, V_{CE} = 5 V)	I_C (CTR)	MOC8080	50 (500)			mA (%)
			H11B255	10 (100)			
	(I_F = 10 mA, V_{CE} = 1 V)		CNX48U	60 (600)			
			TIL113	30 (300)			
	(I_F = 1 mA, V_{CE} = 5 V)		H11B1	5 (500)			
			H11B2	2 (200)			
			H11B3	1 (100)			
	(I_F = 1 mA, V_{CE} = 1 V)		CNX48U	5 (500)			
	(I_F = 0.5 mA, V_{CE} = 1 V)			1.75 (350)			
Saturation Voltage	(I_F =1 mA, I_C = 1 mA)	$V_{CE(sat)}$	H11B1, H11B2 H11B3, MOC8080			1.0	V
	(I_F = 5 mA, I_C = 10 mA)		CNX48U			1.0	
	(I_F = 50 mA, I_C = 50 mA)		H11B255			1.0	
	(I_F = 8 mA, I_C = 2 mA)		TIL113			1.25	
AC Characteristics	(I_C = 10 mA, V_{CE} = 10 V) (R_L = 100 Ω) (Fig.7)	t_{on}	H11B1 H11B2 H11B255 H11B3		25		µs
		t_{off}			18		
Switching Times	(I_F = 10 mA, V_{CC} = 5 V) (R_E = 100 Ω), (R_{BE} = 1MΩ) (Fig. 8)	t_{on}	CNX48U		3.5		
		t_{off}			36		
	(I_F = 1 mA, V_{CC} = 5 V) (R_E = 1kΩ), (R_{BE} = 10MΩ) (Fig. 8)	t_{on}			70		
		t_{off}			190		
	(I_F = 5 mA, V_{CC} = 10 V) (R_L = 100 Ω) (Fig.7)	t_{on}	MOC8080		3.5		
		t_{off}			25		
	(I_F = 200 mA, I_C = 50 mA) (V_{CC} = 10 V) (R_L = 100 Ω) (Fig.7)	t_{on}	TIL113		0.35	5	
		t_{off}			55	100	

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
Input-Output Isolation Voltage[2]	(I_{I-O} ≤ 1 µA, Vrms, t = 1 min.)		5300			Vac(rms)
Isolation Resistance[2]	(V_{I-O} = 500 VDC)	R_{ISO}		10^{11}		Ω
Isolation Capacitance[2]	(V_{I-O} = ∅, f = 1 MHz)	C_{ISO}		0.8		pf

Note
** Typical values at T_A = 25°C

Fig. 1 Output Current vs. Input Current

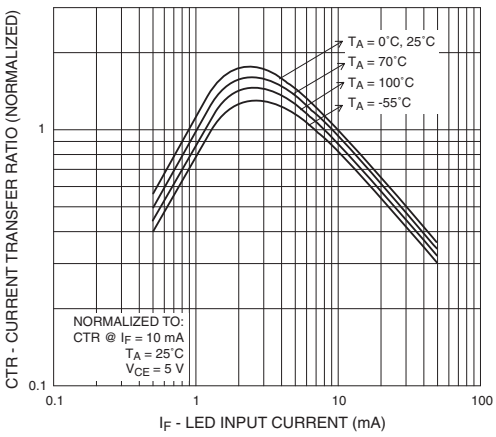


Fig. 2 Current Transfer Ratio vs. Ambient Temperature

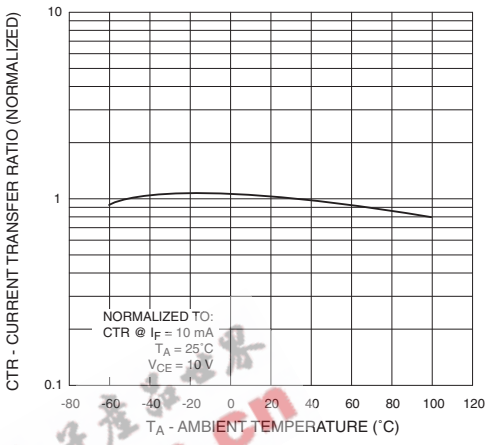


Fig. 3 Collector Current vs. Collector-Emitter Voltage

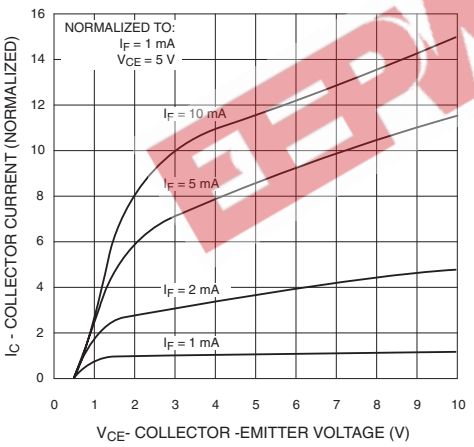


Fig. 4 Dark Current vs. Ambient Temperature

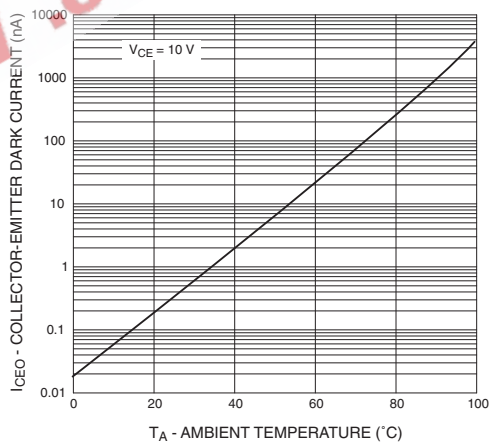


Fig. 5 Turn-On Time vs. Input Current

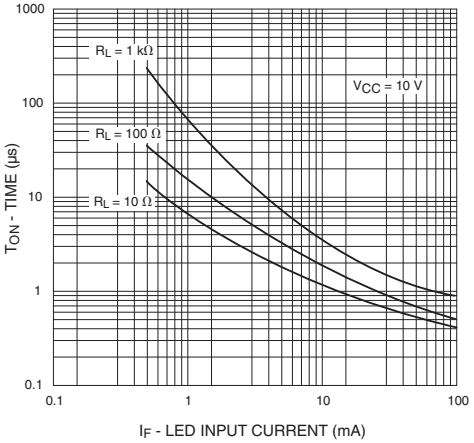
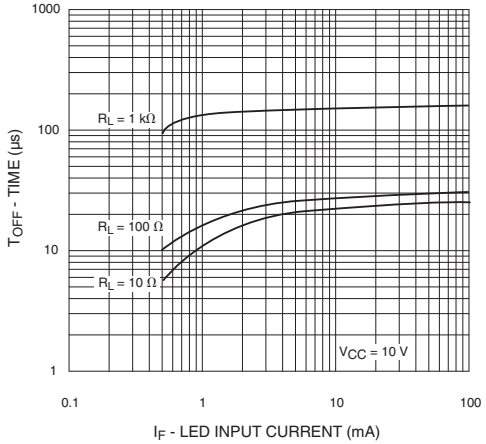
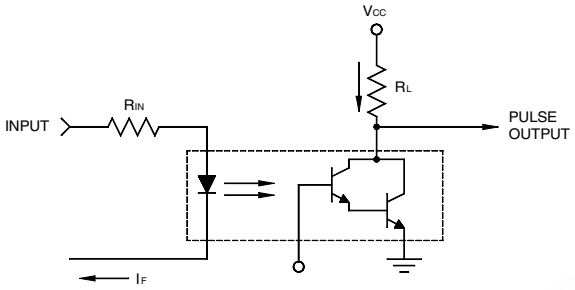


Fig. 6 Turn-Off Time vs. Input Current

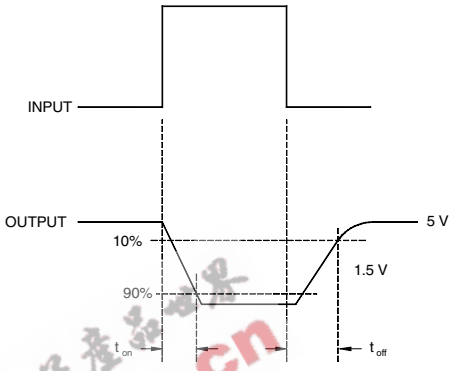


TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES

(25°C Free air temperature unless otherwise specified) (Cont.)

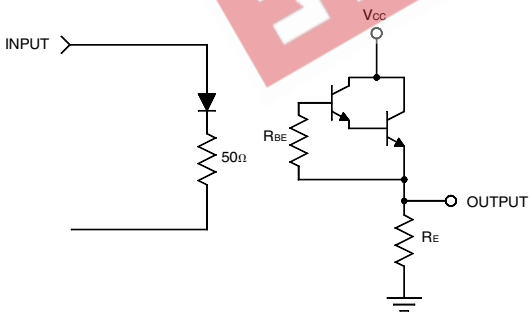


Test Circuit (All devices except CNX48U)

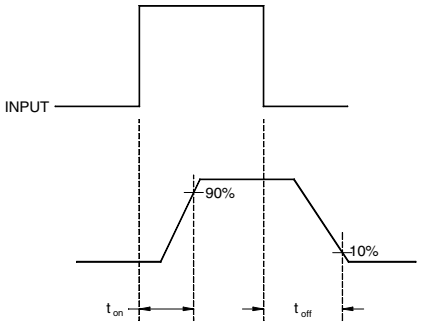


Switching Waveforms (All devices except CNX48U)

Fig. 7 Switching Time Test Circuit and Waveforms (All devices except CNX48U)



Test Circuit (CNX48U only)



Switching Waveforms (CNX48U only)

Fig. 8 Switching Time Test Circuit and Waveforms (CNX48U only)

Notes

1. The current transfer ratio(I_C/I_F) is the ratio of the detector collector current to the LED input current with V_{CE} @ 10 V.
2. For this test, LED pins 1 and 2 are common and phototransistor pins 4,5 and 6 are common.

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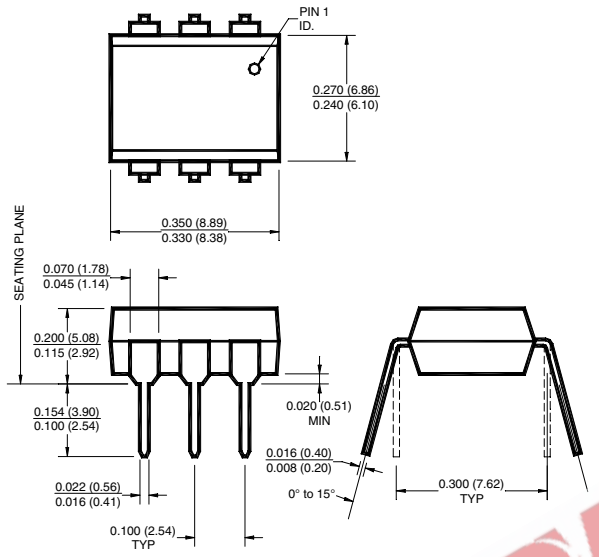
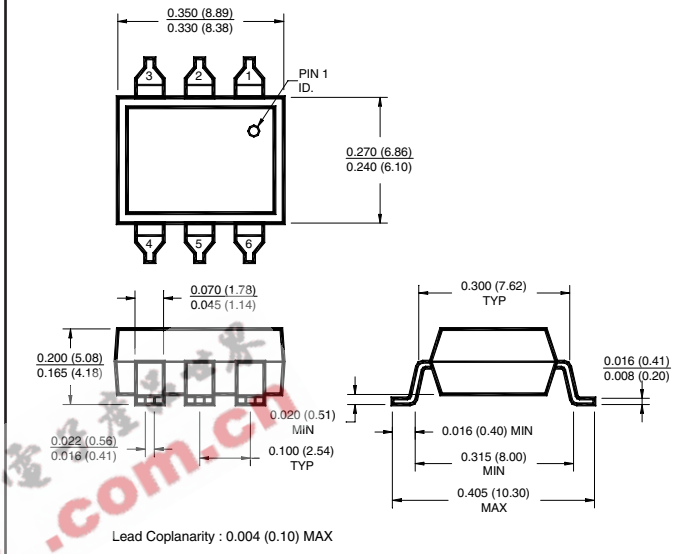
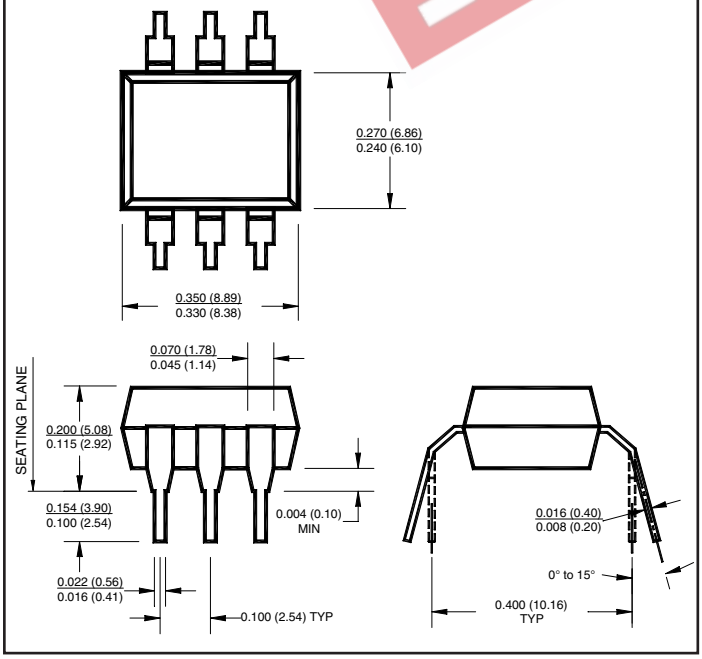
Package Dimensions (Through Hole)



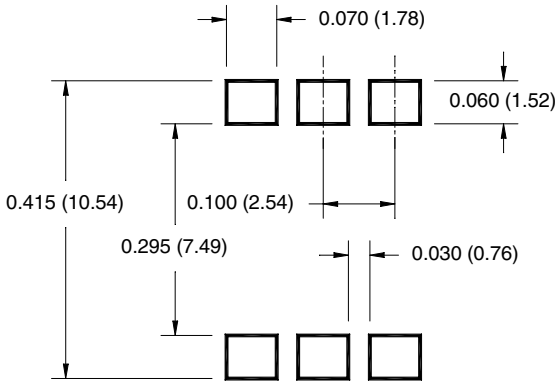
Package Dimensions (Surface Mount)



Package Dimensions (0.4”Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

All dimensions are in inches (millimeters)

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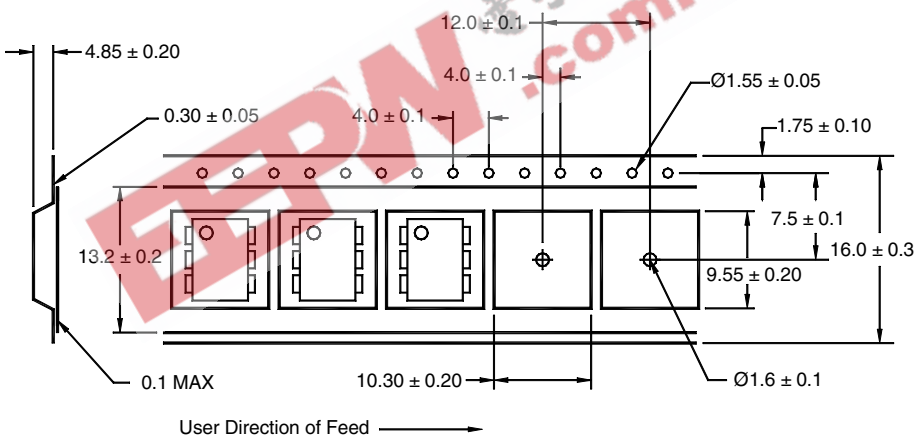
ORDERING INFORMATION

Option	Order Entry Identifier	Description
S	.S	Surface Mount Lead Bend
SD	.SD	Surface Mount; Tape and reel
W	.W	0.4” Lead Spacing
300	.300	VDE 0884
300W	.300W	VDE 0884, 0.4” Lead Spacing
3S	.3S	VDE 0884, Surface Mount
3SD	.3SD	VDE 0884, Surface Mount, Tape & Reel

QT Carrier Tape Specifications (“D” Taping Orientation)



NOTE
All dimensions are millimeters

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