

DESCRIPTION

The H11DX and 4N38 are phototransistor-type optically coupled optoisolators. An infrared emitting diode manufactured from specially grown gallium arsenide is selectively coupled with a high voltage NPN silicon phototransistor. The device is supplied in a standard plastic six-pin dual-in-line package.

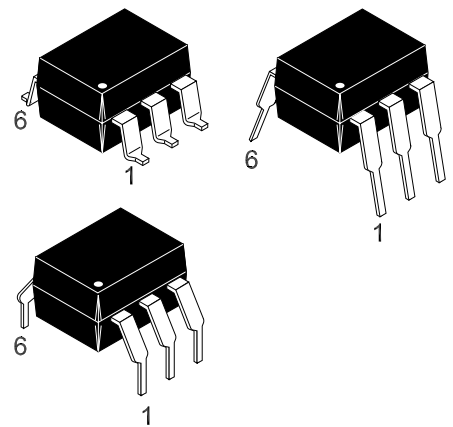
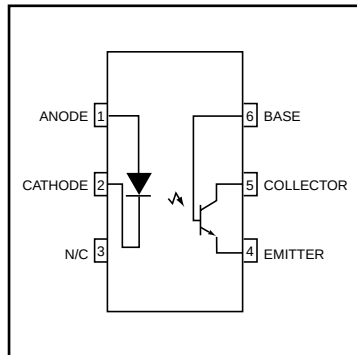
**H11D1
H11D2
H11D3
H11D4
4N38**

FEATURES

- High Voltage
 - H11D1, H11D2, $BV_{CER} = 300\text{ V}$
 - H11D3, H11D4, $BV_{CER} = 200\text{ V}$
- High isolation voltage
 - 5300 VAC RMS - 1 minute
 - 7500 VAC PEAK - 1 minute
- Underwriters Laboratory (UL) recognized File# E90700

APPLICATIONS

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Units
TOTAL DEVICE			
Storage Temperature	T_{STG}	-55 to +150	$^{\circ}\text{C}$
Operating Temperature	T_{OPR}	-55 to +100	$^{\circ}\text{C}$
Lead Solder Temperature	T_{SOL}	260 for 10 sec	$^{\circ}\text{C}$
Total Device Power Dissipation @ $T_A = 25^{\circ}\text{C}$	P_D	260	mW
Derate above 25°C		3.5	mW/ $^{\circ}\text{C}$
EMITTER			
*Forward DC Current	I_F	80	mA
*Reverse Input Voltage	V_R	6.0	V
*Forward Current - Peak (1 μs pulse, 300pps)	$I_F(\text{pk})$	3.0	A
*LED Power Dissipation @ $T_A = 25^{\circ}\text{C}$	P_D	150	mW
Derate above 25°C		1.41	mW/ $^{\circ}\text{C}$

H11D1, H11D2, H11D3, H11D4, 4N38

ABSOLUTE MAXIMUM RATINGS (Cont.)

Parameter	Symbol	Value	Units
DETECTOR			
*Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	300	mW
Derate linearly above 25°C		4.0	mW/ $^\circ\text{C}$
*Collector to Emitter Voltage	V_{CER}	H11D1 - H11D2 H11D3 - H11D4 4N38	300 200 80
*Collector Base Voltage		H11D1 - H11D2 H11D3 - H11D4 4N38	300 200 80
*Emitter to Collector Voltage		H11D1 - H11D2 H11D3 - H11D4	7
Collector Current (Continuous)		100	mA

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)

INDIVIDUAL COMPONENT CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
EMITTER							
*Forward Voltage	($I_F = 10\text{ mA}$)	V_F	ALL		1.15	1.5	V
Forward Voltage Temp. Coefficient		$\frac{\Delta V_F}{\Delta T_A}$	ALL		-1.8		mV/ $^\circ\text{C}$
Reverse Breakdown Voltage	($I_R = 10\text{ }\mu\text{A}$)	BV_R	ALL	6	25		V
Junction Capacitance	($V_F = 0\text{ V}$, $f = 1\text{ MHz}$)	C_J	ALL		50		pF
	($V_F = 1\text{ V}$, $f = 1\text{ MHz}$)		ALL		65		pF
*Reverse Leakage Current	($V_R = 6\text{ V}$)	I_R	ALL		0.05	10	μA
DETECTOR							
*Breakdown Voltage Collector to Emitter	($R_{BE} = 1\text{ M}\Omega$)	BV_{CER}	H11D1/2	300			V
	($I_C = 1.0\text{ mA}$, $I_F = 0$)		H11D3/4	200			
	(No R_{BE}) ($I_C = 1.0\text{ mA}$)	BV_{CEO}	4N38	80			
*Collector to Base	($I_C = 100\text{ }\mu\text{A}$, $I_F = 0$)	BV_{CBO}	H11D1/2	300			
			H11D3/4	200			
			4N38	80			
Emitter to Base	($I_E = 100\text{ }\mu\text{A}$, $I_F = 0$)	BV_{EBO}	4N38	7			
Emitter to Collector		BV_{ECO}	ALL	7	10		
*Leakage Current Collector to Emitter ($R_{BE} = 1\text{ M}\Omega$)	($V_{CE} = 200\text{ V}$, $I_F = 0$, $T_A = 25^\circ\text{C}$)	I_{CER}	H11D1/2			100	nA
	($V_{CE} = 200\text{ V}$, $I_F = 0$, $T_A = 100^\circ\text{C}$)					250	μA
	($V_{CE} = 100\text{ V}$, $I_F = 0$, $T_A = 25^\circ\text{C}$)		H11D3/4			100	nA
	($V_{CE} = 100\text{ V}$, $I_F = 0$, $T_A = 100^\circ\text{C}$)					250	μA
	(No R_{BE}) ($V_{CE} = 60\text{ V}$, $I_F = 0$, $T_A = 25^\circ\text{C}$)	I_{CEO}	4N38			50	nA

Notes

* Parameters meet or exceed JEDEC registered data (for 4N38 only)

** All typical values at $T_A = 25^\circ\text{C}$

H11D1, H11D2, H11D3, H11D4, 4N38

TRANSFER CHARACTERISTICS

DC Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit	
EMITTER Current Transfer Ratio Collector to Emitter	(I _F = 10 mA, V _{CE} = 10 V) (R _{BE} = 1 MΩ)	CTR	H11D1 H11D2 H11D3	2 (20)			mA (%)	
			H11D4	1 (10)				
	(I _F = 10 mA, V _{CE} = 10 V)		4N38	2 (20)				
	*Saturation Voltage	(I _F = 10 mA, I _C = 0.5 mA) (R _{BE} = 1 MΩ)	V _{CE (SAT)}	H11D1/2/3/4		0.1	0.40	V
(I _F = 20 mA, I _C = 4 mA)		4N38				1.0		

TRANSFER CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
SWITCHING TIMES Non-Saturated Turn-on Time Turn-off Time	$(V_{CE} = 10 \text{ V}, I_{CE} = 2 \text{ mA})$	t_{on}	ALL		5		μs
	$(R_L = 100 \Omega)$	t_{off}	ALL		5		

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Isolation Voltage	$(I_{I-O} \leq 1 \mu\text{A}, 1 \text{ min.})$	V_{ISO}	ALL	5300			$(V_{AC(RMS)})$
				7500			$(V_{AC(PEAK)})$
Isolation Resistance	$(V_{I-O} = 500 \text{ VDC})$	R_{ISO}	ALL	10^{11}			Ω
Isolation Capacitance	$(f = 1 \text{ MHz})$	C_{ISO}	ALL		0.5		pF

Notes

* Parameters meet or exceed JEDEC registered data (for 4N38 only)

** All typical values at $T_A = 25^\circ\text{C}$

Fig.1 LED Forward Voltage vs. Forward Current

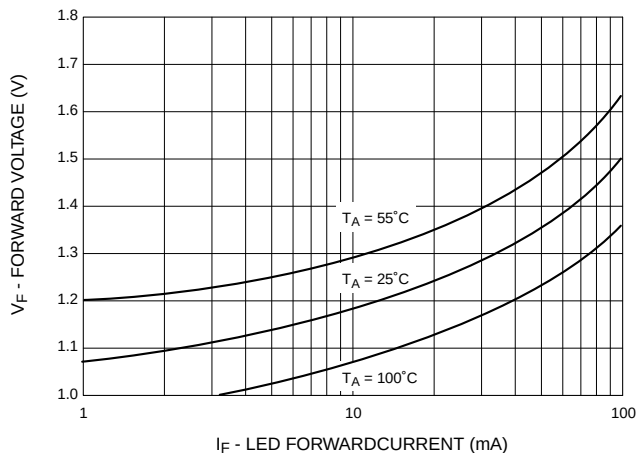
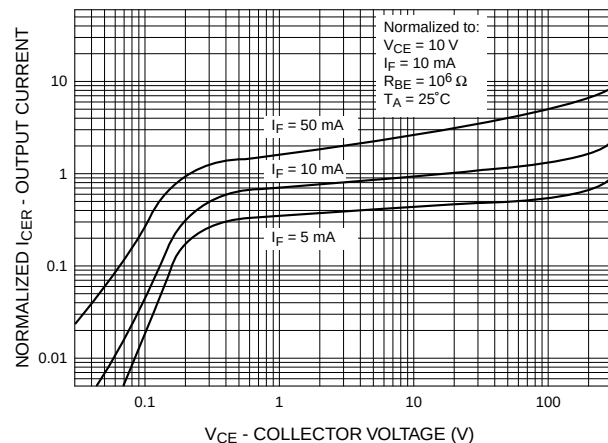


Fig.2 Normalized Output Characteristics



H11D1, H11D2, H11D3, H11D4, 4N38

Fig.3 Normalized Output Current vs. LED Input Current

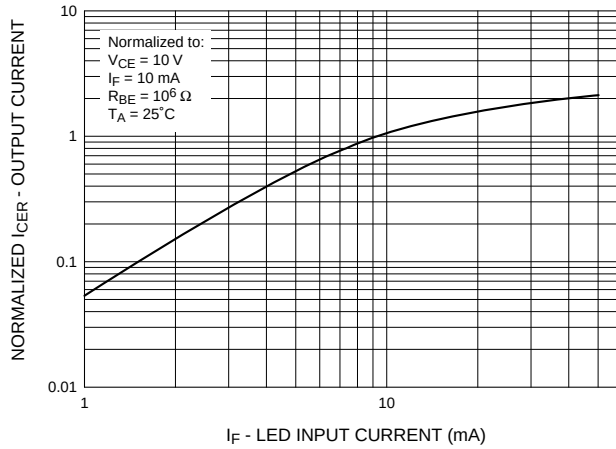


Fig.4 Normalized Output Current vs. Temperature

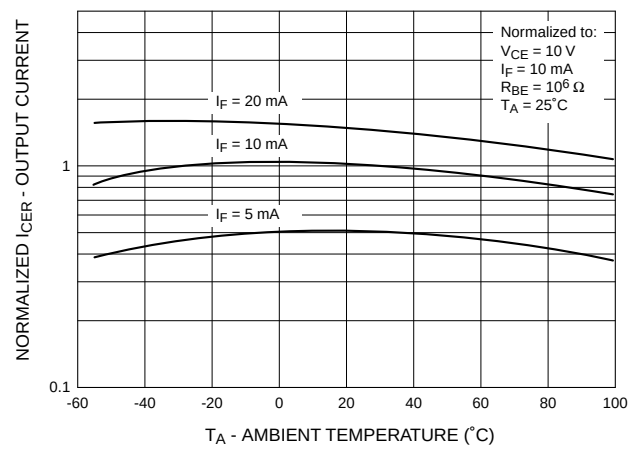
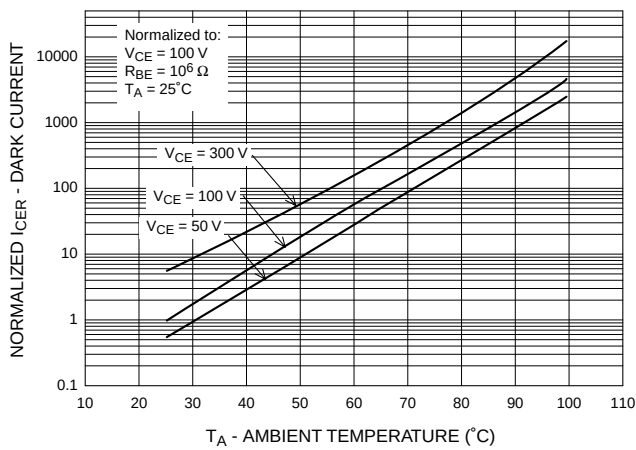
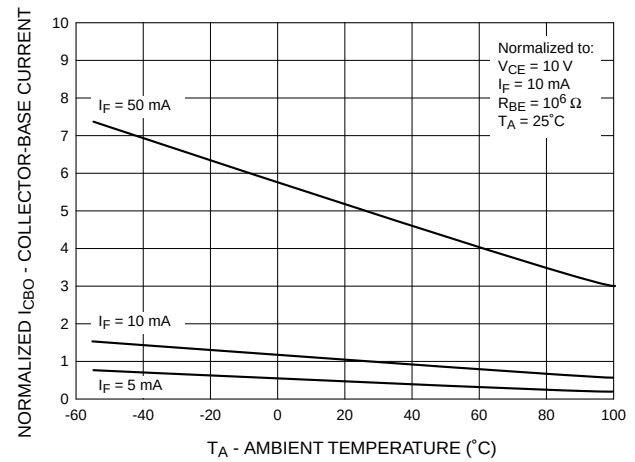


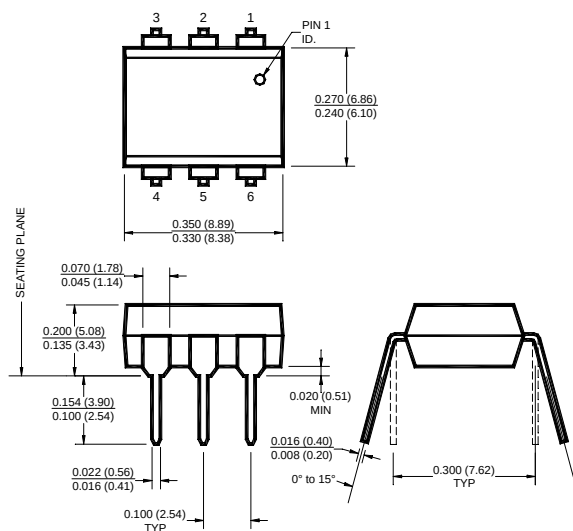
Fig.5 Normalized Dark Current vs. Ambient Temperature



Normalized Collector-Base Current vs. Temperature



Package Dimensions (Through Hole)



Lead Coplanarity : 0.004 (0.10) MAX

The drawing illustrates the mechanical specifications of a 6-pin connector. The top view shows a rectangular body with a central cutout and six pins arranged in two rows of three. The pins are numbered 1 through 6. Dimensions include a total width of 0.350 (8.89) inches and a pin pitch of 0.100 (2.54) inches. The front view shows the profile of the connector with a maximum height of 0.270 (6.86) inches and a minimum height of 0.240 (6.10) inches. The side view shows the connector's profile with a maximum height of 0.154 (3.90) inches and a minimum height of 0.100 (2.54) inches. The drawing also includes a detail view of the pin and a note indicating a typical distance of 0.100 (2.54) inches between the pins.

Top View Dimensions:

- Pin 1 ID.
- 0.270 (6.86)
- 0.240 (6.10)
- 0.350 (8.89)
- 0.330 (8.38)

Front View Dimensions:

- 0.070 (1.78)
- 0.045 (1.14)
- 0.004 (0.10) MIN
- 0.200 (5.08)
- 0.135 (3.43)
- 0.154 (3.90)
- 0.100 (2.54)
- 0.022 (0.56)
- 0.016 (0.41)
- 0.100 (2.54) TYP

Side View Dimensions:

- 0.016 (0.40)
- 0.008 (0.20)
- 0° to 15°
- 0.400 (10.16) TYP

All dimensions are in inches (millimeters)

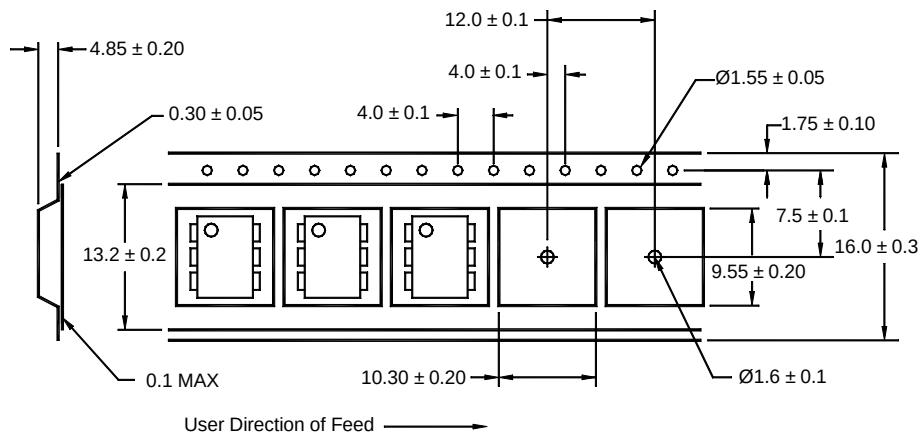
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H11D1, H11D2, H11D3, H11D4, 4N38

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 in millimeters

Call QT Optoelectronics for more information or the phone number of your nearest distributor.

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