



THE DATASHEET OF CNX38U3S



CNX35U CNX36U CNX38U CNX39U

DESCRIPTION

The CNX35U, CNX36U, CNX38U and CNX39U are optically coupled isolators consisting of an infrared emitting GaAs diode and a silicon NPN phototransistor with accessible base. These devices are housed in 6-pin dual-in-line packages (DIP).

FEATURES

- High output/input DC current transfer ratio
- Low saturation voltage
- UL recognized (File # E90700)
- VDE recognized (File # 94766)
- Ordering option '300' (e.g. CNX35U.300)

APPLICATIONS

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



Parameters	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T_{STG}	All	-55 to +150	°C
Operating Temperature	T_{OPR}	All	-40 to +100	°C
Lead Solder Temperature	T_{SOL}	All	260 for 10 sec	°C
EMITTER				
Continuous Reverse Voltage	V_R	All	5	V
Continuous Forward Current	I_F	All	100	mA
Forward Current - Peak (10 μ s pulse, $\delta = 0.01$)	$I_F(pk)$	All	3.0	A
Total Power Dissipation up to 25°C Ambient Derate Linearly from 25°C	P_D	All	200	mW
		All	2.0	mW/°C
DETECTOR				
Collector to Emitter Voltage (open base)	V_{CEO}	CNX38U	80	V
		CNX35U, CNX36U, CNX39U	30	
Collector to Base Voltage (open emitter)	V_{CBO}	CNX38U	120	V
		CNX35U, CNX36U, CNX39U	70	
Emitter to Collector Voltage (open base)	V_{ECO}	All	7	V
DC Collector Current	I_C	All	100	mA
Detector Power Dissipation up to 25°C Ambient Derate Linearly from 25°C	P_D	All	200	mW
		All	2.0	mW/°C

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

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameters	Test Conditions	Symbol	Device	Min	Typ	Max	Units	
EMITTER								
Input Forward Voltage	$I_F = 10\text{ mA}$	V_F	All		1.15	1.5	V	
Reverse Current	$V_R = 5\text{ V}$	I_R	All			10	μA	
DETECTOR								
Leakage Current Collector to Emitter	$V_{CE} = 10\text{ V}$	I_{CEO}	CNX35U, CNX36U, CNX39U		2	50	nA	
	$V_{CE} = 50\text{ V}$		CNX38U		2	50	nA	
	$V_{CE} = 10\text{ V}, T_A = 70^\circ\text{C}$		CNX35U, CNX36U, CNX39U				10	μA
	$V_{CE} = 50\text{ V}, T_A = 70^\circ\text{C}$		CNX38U				10	μA
		$V_{CE} = 10\text{ V}$	I_{CBO}	All			20	nA
Breakdown Voltage								
Collector to Emitter	$I_C = 1\text{ mA}, I_F = 0$	BV_{CEO}	CNX35U, CNX36U, CNX39U	30			V	
			CNX38U	80				
Collector to Base	$I_C = 0.1\text{ mA}, I_F = 0$	BV_{CBO}	CNX35U, CNX36U, CNX39U	70			V	
			CNX38U	120				
Emitter to Collector	$I_E = 0.1\text{ mA}, I_F = 0$	BV_{ECO}	All	7			V	

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ	Max	Units
Input-Output Isolation Voltage	$t = 1\text{ min.}$	V_{ISO}	5,300			V_{RMS}
Isolation Resistance	$V_{I-O} = 500\text{ VDC}$	R_{ISO}	1	10		$T\Omega$
Isolation Capacitance	$I_F = 0, V = 0V, f = 1\text{ MHz}$	C_{ISO}		0.6	1.3	pF

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TRANSFER CHARACTERISTICS ($T_A = 25^\circ\text{C}$ Unless otherwise specified.)							
DC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
Output/Input Current Transfer Ratio	$I_F = 10\text{ mA}, V_{CE} = 0.4\text{ V}$	CTR	CNX35U	40		160	%
			CNX39U	60		100	
	CNX36U		80		200		
	CNX38U		70		210		
			50				
$I_F = 2\text{ mA}, V_{CE} = 5\text{ V}$	All	15					
Collector-Emitter Saturation Voltage	$I_F = 10\text{ mA}, I_C = 2\text{ mA}$	$V_{CE(SAT)}$	CNX35U, CNX39U		0.15	0.4	V
	$I_F = 10\text{ mA}, I_C = 4\text{ mA}$		CNX36U		0.19	0.4	
	$I_F = 16\text{ mA}, I_C = 2\text{ mA}$		CNX38U		0.2	0.4	
AC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
Non-Saturated Switching Times Turn-On Time See Fig. 1 and Fig. 2	$R_L = 100\ \Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$	t_{on}	CNX35U			20	μs
	$R_L = 100\ \Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$		CNX39U			20	
Turn-Off Time See Fig. 1 and Fig. 2		$R_L = 100\ \Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$	CNX36U			20	
	CNX38U				20		
Saturated Switching Times Turn-On Time See Fig. 1 and Fig. 2	$R_L = 1\text{ k}\Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$	t_{on}	CNX35U			50	μs
	$R_L = 1\text{ k}\Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$		CNX39U			50	
Turn-Off Time See Fig. 1 and Fig. 2		$R_L = 1\text{ k}\Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$	CNX36U			50	
	CNX38U				50		
	$R_L = 1\text{ k}\Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$	t_{off}	CNX35U			50	μs
			CNX39U			50	
			CNX36U			50	
			CNX38U			50	

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Fig. 1 Switching Test Circuit

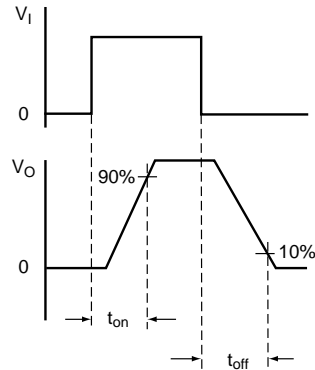


Fig. 2 Switching Test Waveforms

Fig. 3 LED Forward Voltage vs. Forward Current



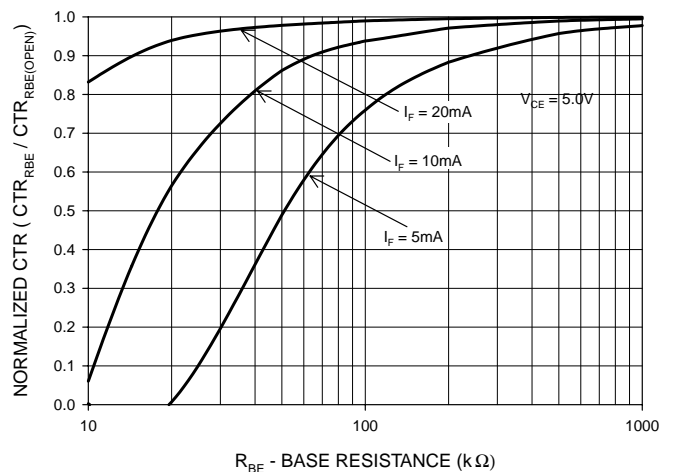
Fig. 4 Normalized CTR vs. Forward Current



Fig. 5 Normalized CTR vs. Temperature



Fig. 6 CTR vs. R_BE (Unsaturated)



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Fig. 7 CTR vs. R_{BE} (Saturated)



Fig. 8 Normalized t_{on} vs. R_{BE}



Fig. 9 Normalized t_{off} vs. R_{BE}



Fig. 10 Switching Speed vs. Load Resistor



Fig. 11 Collector-Emitter Saturation Voltage as a Function of Collector Current



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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

Carrier Tape Specifications ("D" Taping Orientation)



NOTE

All dimensions are in inches (millimeters)

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