

CNX35U CNX36U CNX38U CNX39U

## DESCRIPTION

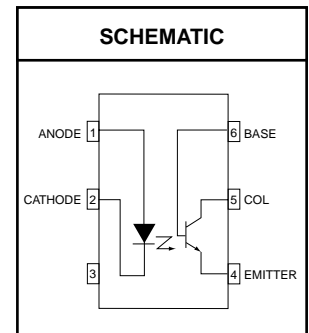
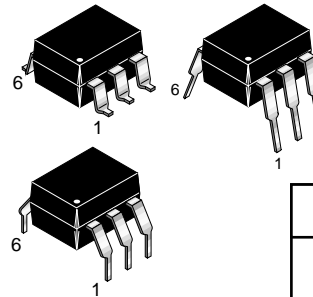
The CNX35U, CNX36U, CNX38U and CNX39U are optically coupled isolators consisting of an infrared emitting GaAs diode and a silicon NPN phototransistor with accessible base. These devices are housed in 6-pin dual-in-line packages (DIP).

## 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
<b>TOTAL DEVICE</b>				
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
<b>EMITTER</b>				
Continuous Reverse Voltage	$V_R$	All	5	V
Continuous Forward Current	$I_F$	All	100	mA
Forward Current - Peak (10 $\mu$ 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
<b>DETECTOR</b>				
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	
<b>EMITTER</b>								
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	$\mu\text{A}$	
<b>DETECTOR</b>								
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	$\mu\text{A}$
	$V_{CE} = 50\text{ V}, T_A = 70^\circ\text{C}$		CNX38U				10	$\mu\text{A}$
		$V_{CE} = 10\text{ V}$	$I_{CBO}$	All			20	nA
<b>Breakdown Voltage</b>								
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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<b>TRANSFER CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ Unless otherwise specified.)							
<b>DC Characteristics</b>	<b>Test Conditions</b>	<b>Symbol</b>	<b>Device</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>
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	
<b>AC Characteristics</b>	<b>Test Conditions</b>	<b>Symbol</b>	<b>Device</b>	<b>Min</b>	<b>Typ</b>	<b>Max</b>	<b>Units</b>
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	$\mu\text{s}$
	$R_L = 100\ \Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$		CNX39U			20	
CNX36U				20			
CNX38U		20					
Turn-Off Time See Fig. 1 and Fig. 2	$R_L = 100\ \Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$	$t_{off}$	CNX35U			20	$\mu\text{s}$
	$R_L = 100\ \Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$		CNX39U			20	
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	$\mu\text{s}$
	$R_L = 1\text{ k}\Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$		CNX39U			50	
CNX36U				50			
CNX38U		50					
Turn-Off Time See Fig. 1 and Fig. 2	$R_L = 1\text{ k}\Omega, I_C = 2\text{ mA}, V_{CC} = 5\text{ V}$	$t_{off}$	CNX35U			50	$\mu\text{s}$
	$R_L = 1\text{ k}\Omega, I_C = 4\text{ mA}, V_{CC} = 5\text{ V}$		CNX39U			50	
CNX36U				50			
CNX38U		50					

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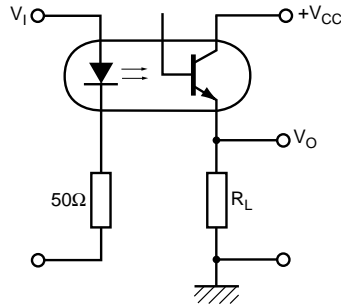


Fig. 1 Switching Test Circuit

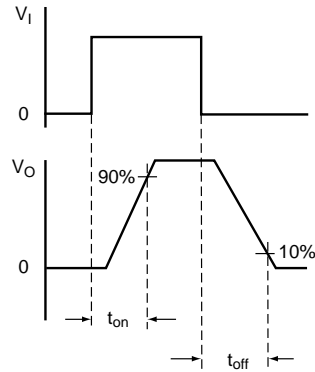


Fig. 2 Switching Test Waveforms

Fig. 3 LED Forward Voltage vs. Forward Current

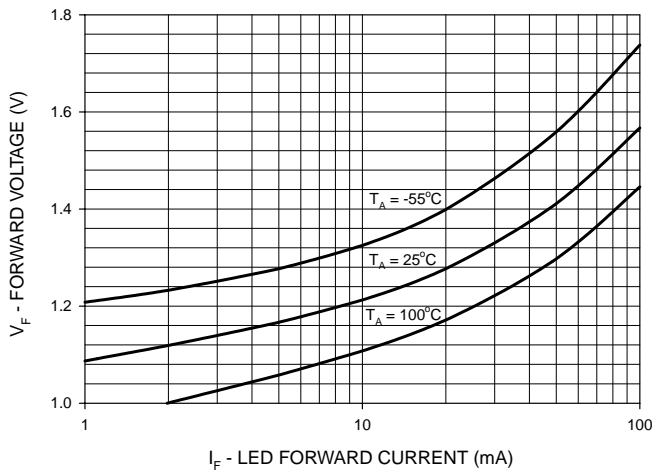


Fig. 4 Normalized CTR vs. Forward Current

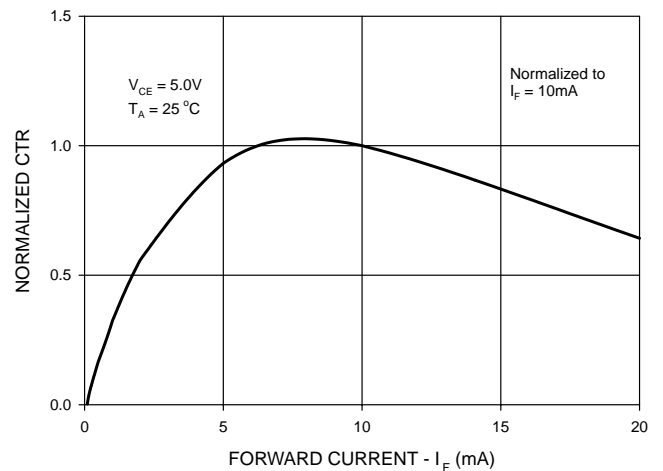


Fig. 5 Normalized CTR vs. Temperature

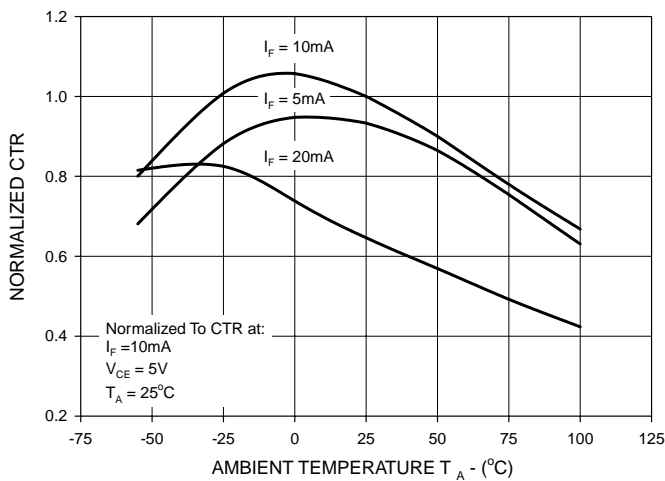
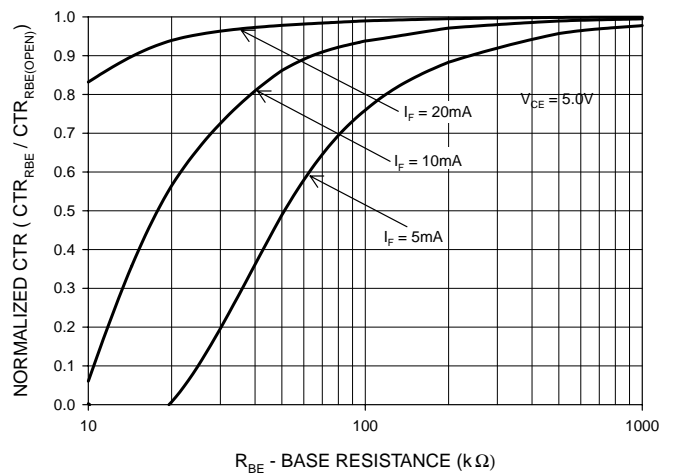
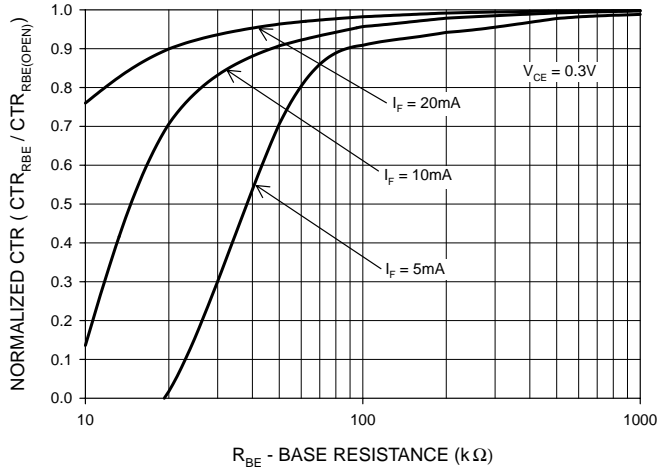


Fig. 6 CTR vs. R\_BE (Unsaturated)

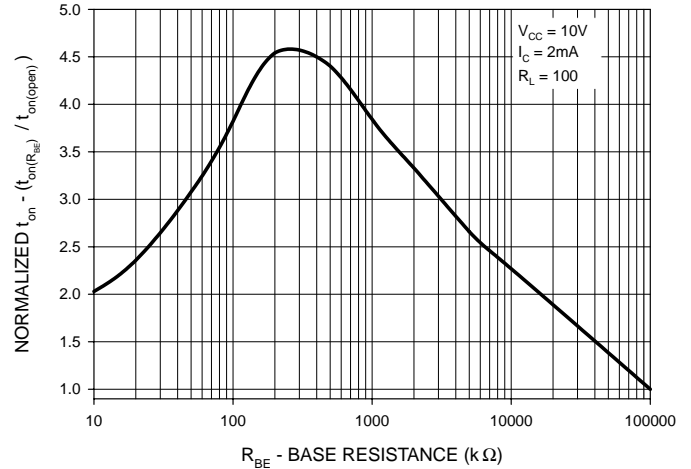


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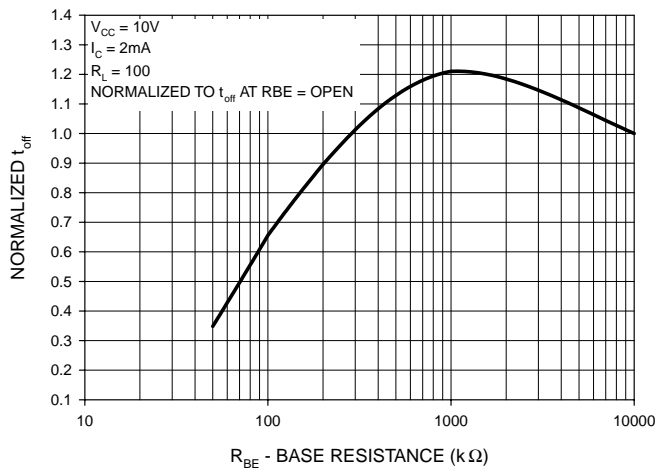
**Fig. 7 CTR vs. R<sub>BE</sub> (Saturated)**



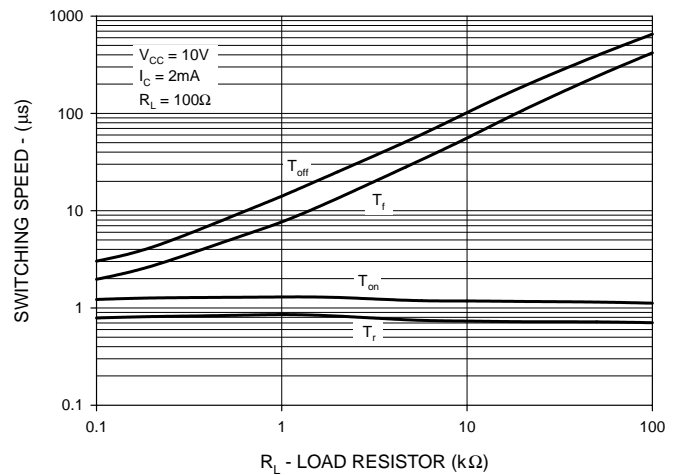
**Fig. 8 Normalized t<sub>on</sub> vs. R<sub>BE</sub>**



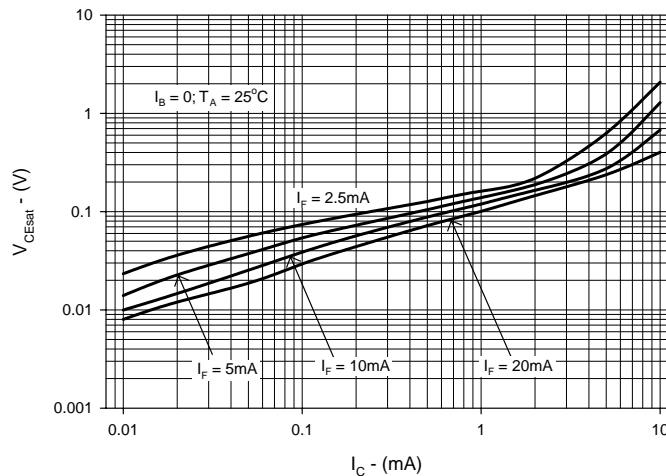
**Fig. 9 Normalized t<sub>off</sub> vs. R<sub>BE</sub>**



**Fig. 10 Switching Speed vs. Load Resistor**

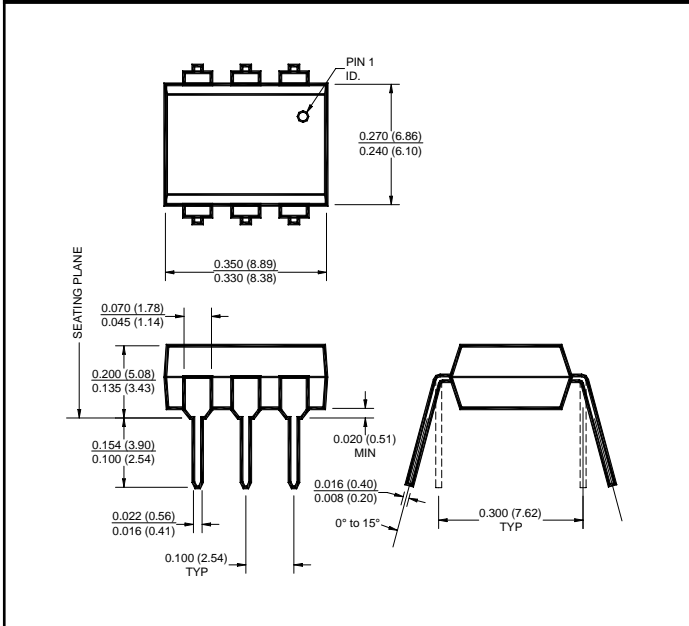


**Fig. 11 Collector-Emitter Saturation Voltage as a Function of Collector Current**

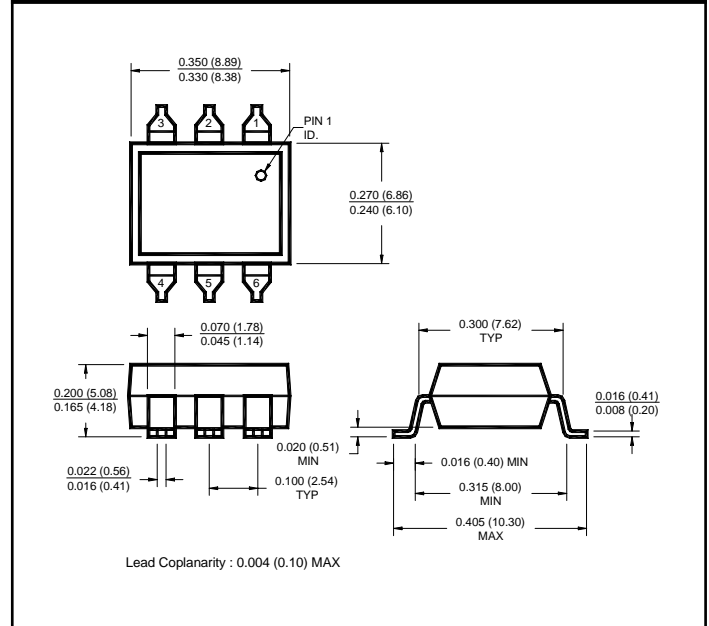


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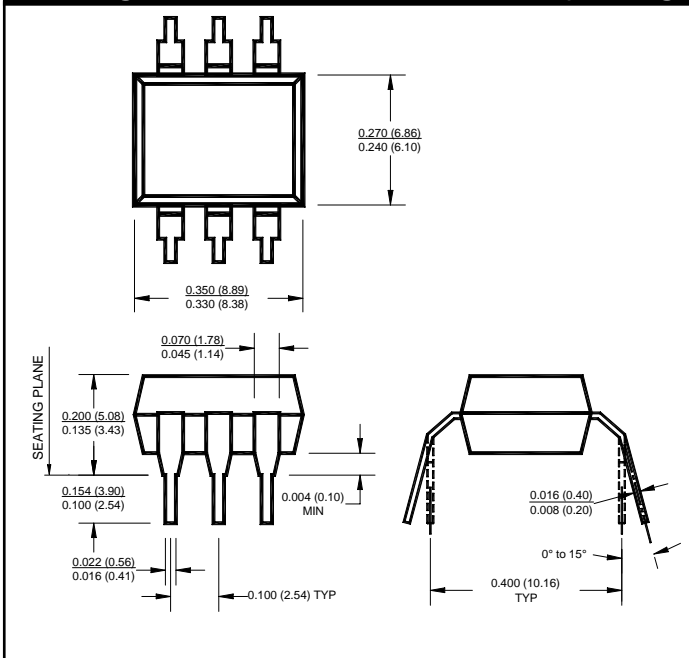
## Package Dimensions (Through Hole)



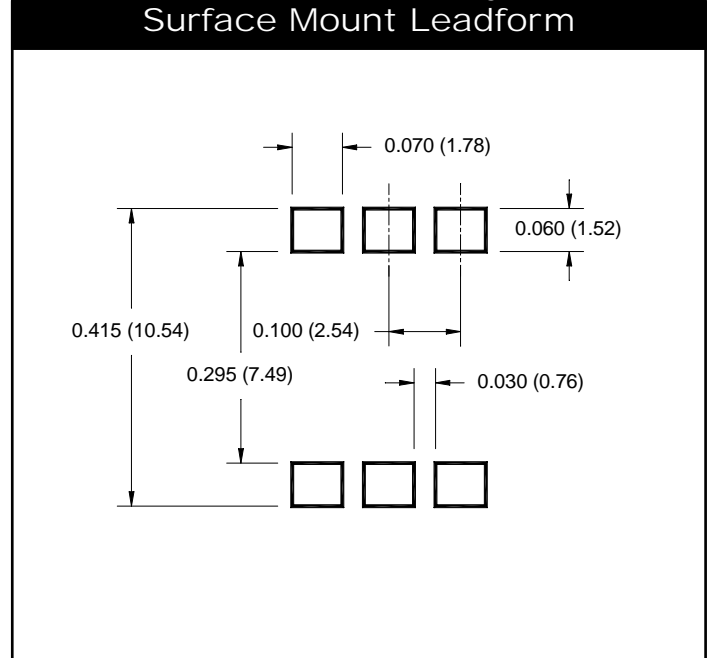
## Package Dimensions (Surface Mount)



## Package Dimensions (0.4" Lead Spacing)



## Recommended Pad Layout for Surface Mount Leadform



**NOTE**

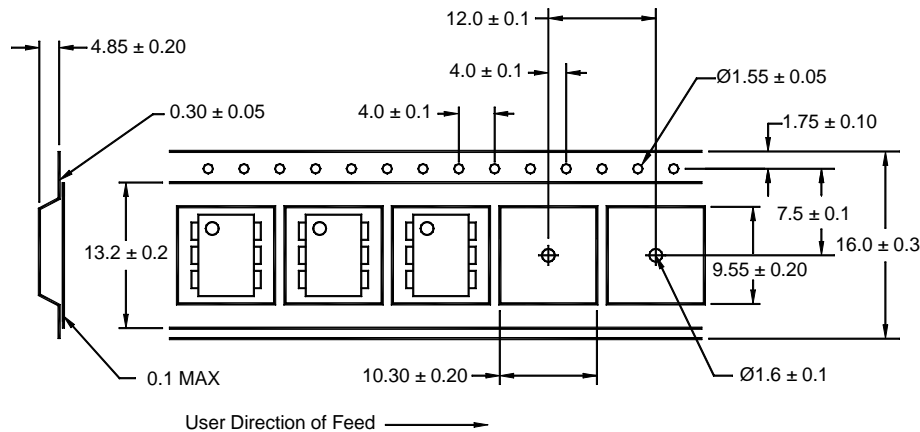
All dimensions are in inches (millimeters)

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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

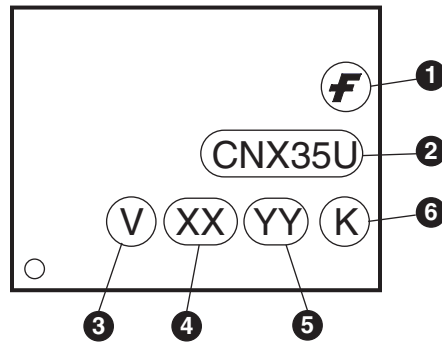
**Carrier Tape Specifications ("D" Taping Orientation)**



**NOTE**

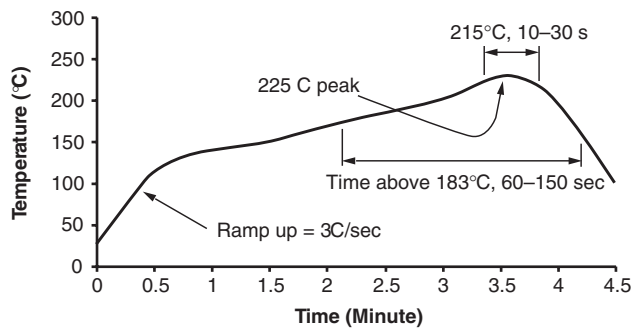
All dimensions are in inches (millimeters)

**MARKING INFORMATION**



Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	Two digit year code, e.g., '03'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

**Reflow Profile (Black Package, No Suffix)**



- Peak reflow temperature: 225°C (package surface temperature)
- Time of temperature higher than 183°C for 60–150 seconds
- One time soldering reflow is recommended



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CoolFET™	FRFET™	MicroFET™	PowerTrench®	SuperSOT™-6
CROSSVOLT™	GlobalOptoisolator™	MicroPak™	QFET®	SuperSOT™-8
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EcoSPARK™	HiSeC™	MSX™	QT Optoelectronics™	TinyLogic®
E <sup>2</sup> CMOS™	µC™	MSXPro™	Quiet Series™	TINYOPTO™
EnSigna™	i-Lo™	OCX™	RapidConfigure™	TruTranslation™
FACT™	ImpliedDisconnect™	OCXPro™	RapidConnect™	UHC™
FACT Quiet Series™		OPTOLOGIC®	µSerDes™	UltraFET®
Across the board. Around the world.™		OPTOPLANAR™	SILENT SWITCHER®	VCX™
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## PRODUCT STATUS DEFINITIONS

### Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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