

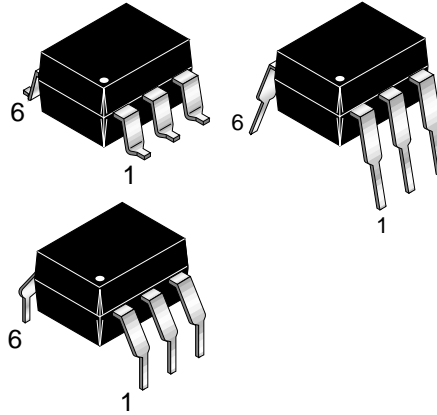
**DESCRIPTION**

The 4N39 and 4N40 have a gallium-arsenide infrared emitting diode optically coupled with a light activated silicon controlled rectifier in a dual in-line package.

**4N39 4N40**

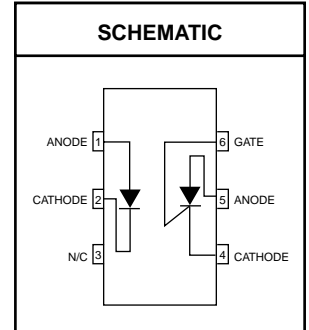
**FEATURES**

- 10 A, T<sup>2</sup>L compatible, solid state relay
- 25 W logic indicator lamp driver
- 400 V symmetrical transistor coupler
- Underwriters Laboratory (UL) recognized — File #E90700



**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
<b>TOTAL DEVICE</b>				
*Storage Temperature	T <sub>STG</sub>	All	-55 to +150	°C
*Operating Temperature	T <sub>OPR</sub>	All	-55 to +100	°C
*Lead Solder Temperature	T <sub>SOL</sub>	All	260 for 10 sec	°C
*Total Device Power Dissipation (-55°C to 50 °C) Derate above 50°C	P <sub>D</sub>	All	450	mW
			9.0	mW/°C
<b>EMITTER</b>				
*Continuous Forward Current	I <sub>F</sub>	All	60	mA
*Reverse Voltage	V <sub>R</sub>	All	6	V
*Forward Current - Peak (300 μs, 2% Duty Cycle)	I <sub>F(pk)</sub>	All	1.0	A
*LED Power Dissipation (-55°C to 50 °C) Derate above 50°C	P <sub>D</sub>	All	100	mW
			2.0	mW/°C
<b>DETECTOR</b>				
*Off-State And Reverse Voltage		4N39	200	V
		4N40	400	V
*Peak Reverse Gate Voltage			6	V
*Direct On-State Current			300	mA
*Surge On-State Current (100 μs)			10	A
*Peak Gate Current			10	mA
*Detector Power Dissipation (-55°C to 50°C) Derate above 50°C	P <sub>D</sub>	All	400	mW
			8.0	mW/°C

Note

\* Indicates JEDEC Registered Data

\*\* Typical values at T<sub>A</sub> = 25°C

4N39	4N40
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### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C Unless otherwise specified.)

#### INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
<b>EMITTER</b>							
Input Forward Voltage	I <sub>F</sub> = 10 mA	V <sub>F</sub>	All		1.1	1.5	V
Reverse Leakage Current	V <sub>R</sub> = 3 V	I <sub>R</sub>	All			10	μA
Capacitance	V <sub>F</sub> = 0 V, f = 1.0 MHz	C <sub>J</sub>	All		50		pF
<b>DETECTOR</b>							
Peak Off-State Voltage	R <sub>GK</sub> = 10 kΩ, T <sub>A</sub> = 100 °C	V <sub>DM</sub>	4N39 4N40	200 400			V
Peak Reverse Voltage	T <sub>A</sub> = 100 °C	V <sub>RM</sub>	4N39 4N40	200 400			V
On-State Voltage	I <sub>T</sub> = 300 mA	V <sub>T</sub>	All			1.3	V
Off-State Current	V <sub>DM</sub> = 200 V, T <sub>A</sub> = 100 °C, I <sub>F</sub> = 0 mA, R <sub>GK</sub> = 10 kΩ	I <sub>DM</sub>	4N39 4N40			50 150	μA
Reverse Current	V <sub>R</sub> = 200 V, T <sub>A</sub> = 100 °C, I <sub>F</sub> = 0 mA	I <sub>R</sub>	4N39 4N40			50 150	μA
Holding Current	V <sub>Fx</sub> = 50V, R <sub>GK</sub> = 27 kΩ	I <sub>H</sub>	All			1.0	mA

#### TRANSFER CHARACTERISTICS (T<sub>A</sub> = 25°C Unless otherwise specified.)

Characteristics	Test Conditions	Symbol	Device	Min	Typ**	Max	Units
*Input Current to Trigger	V <sub>AK</sub> = 50 V, R <sub>GK</sub> = 10 kΩ	I <sub>FT</sub>	4N39			30	mA
	V <sub>AK</sub> = 100 V, R <sub>GK</sub> = 27 kΩ		4N40			14	
*Turn-On Time	V <sub>AK</sub> = 50 V, I <sub>F</sub> = 30 mA R <sub>GK</sub> = 10 kΩ, R <sub>L</sub> = 200 Ω	t <sub>on</sub>	ALL			50	μA
Package Capacitance (input to output)	f = 1 MHz Input to Output Voltage = 0	C <sub>I-O</sub>	ALL			2	pF
Coupled dv/dt, input to output (figure 13)		dV/dt	ALL	500			V/μS

#### ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Min	Typ**	Max	Units
*Input-Output Isolation Voltage	(I <sub>I-O</sub> ≤ 1 μA, V <sub>rms</sub> , t = 1 min.)	V <sub>ISO</sub>	5300			Vac(rms)
*Isolation Resistance	(V <sub>I-O</sub> = 500 VDC)	R <sub>ISO</sub>	10 <sup>11</sup>			Ω
Isolation Capacitance	(V <sub>I-O</sub> = ∅, f = 1 MHz)	C <sub>ISO</sub>		0.8		pf

Note

\* Indicates JEDEC Registered Data

\*\* Typical values at T<sub>A</sub> = 25°C

**4N39 4N40**

Figure 1. Input Current To Trigger vs. Anode-Cathode Voltage

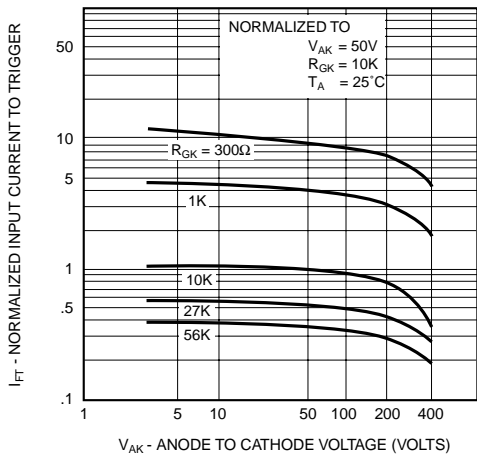


Figure 2. Input Current To Trigger vs. Temperature

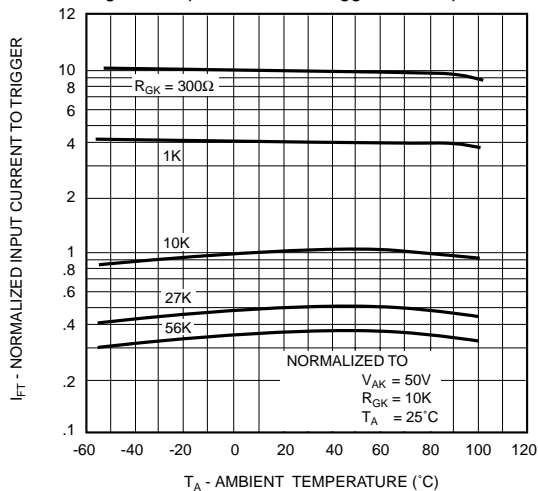


Figure 3. Input Current To Trigger Distribution vs. Temperature

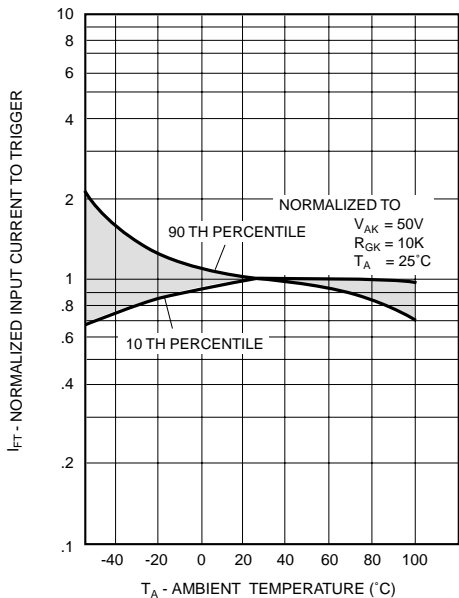


Figure 4. Input Current To Trigger vs. Pluse Width

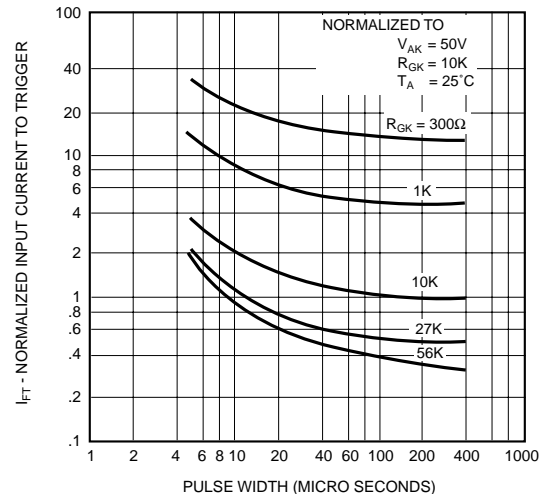


Figure 5. Turn-On Time vs. Input Current

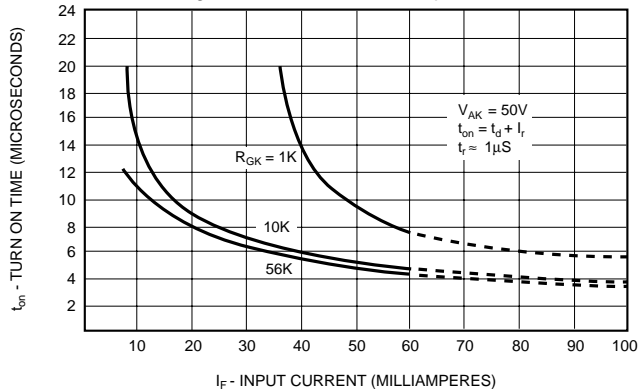
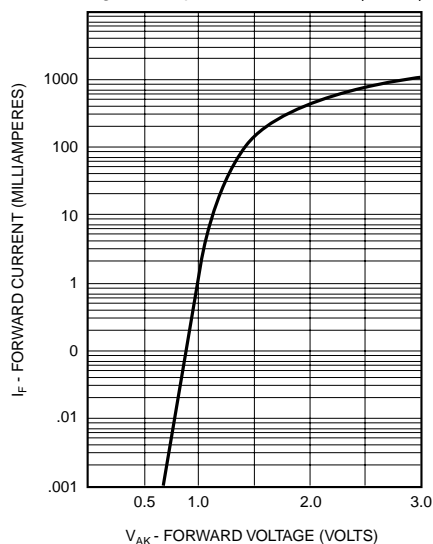


Figure 6. Input Characteristics  $I_F$  vs.  $V_F$



**4N39 4N40**

Figure 7. Holding Current vs. Temperature

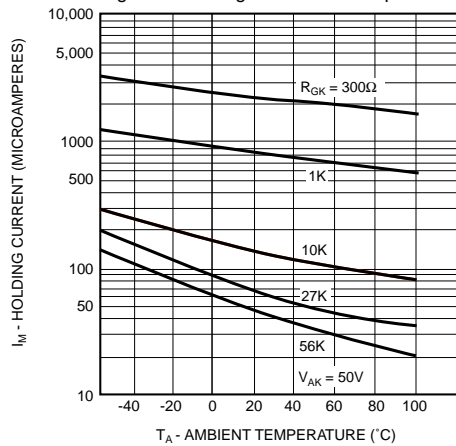


Figure 8. Maximum Transient Thermal Impedance

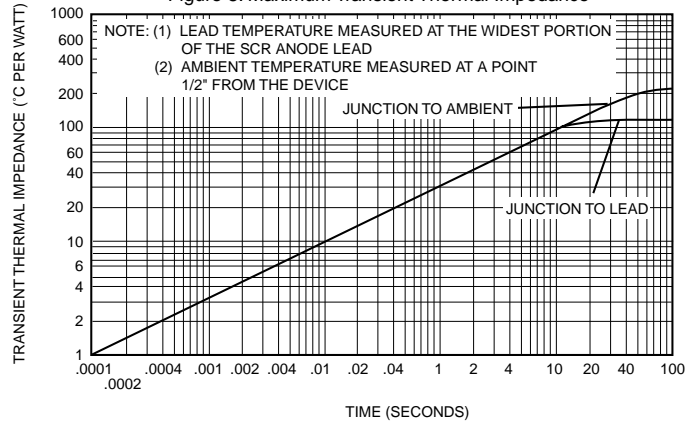


Figure 9. Off-State Forward Current vs. Temperature

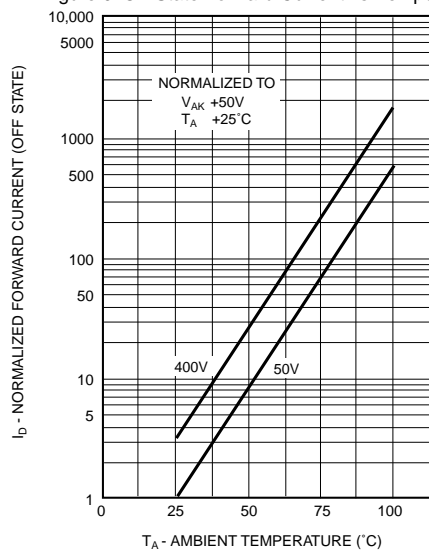


Figure 10. On-State Current vs. Maximum Allowable Temperature

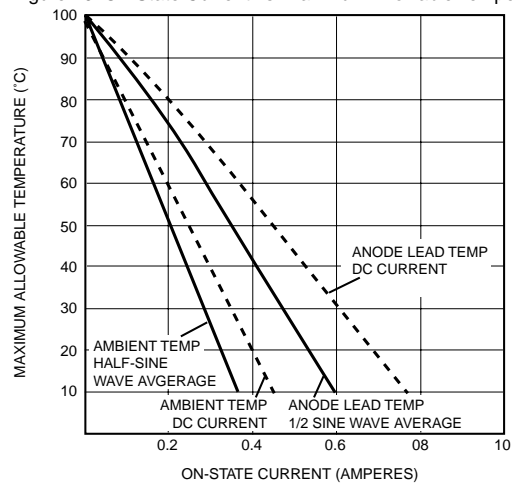


Figure 11. dv/dt vs. Temperature

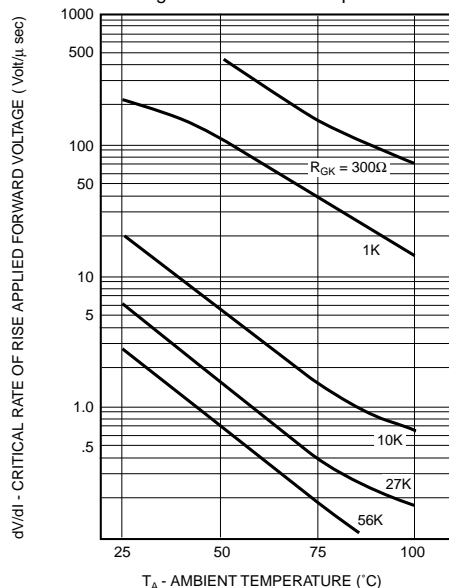
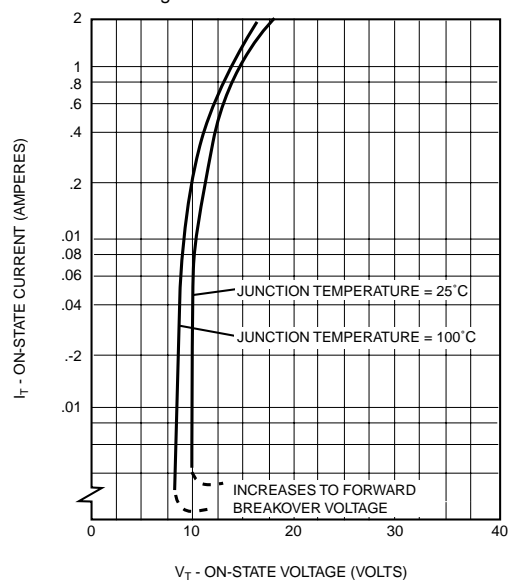


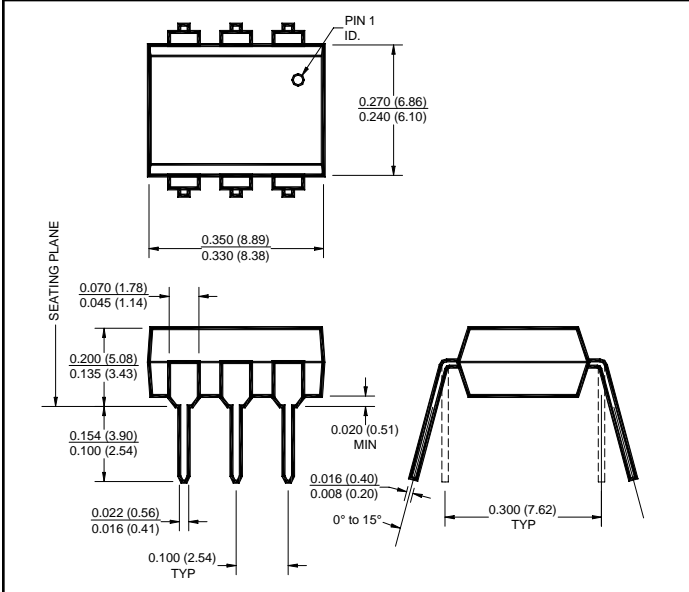
Figure 12. On-State Characteristics



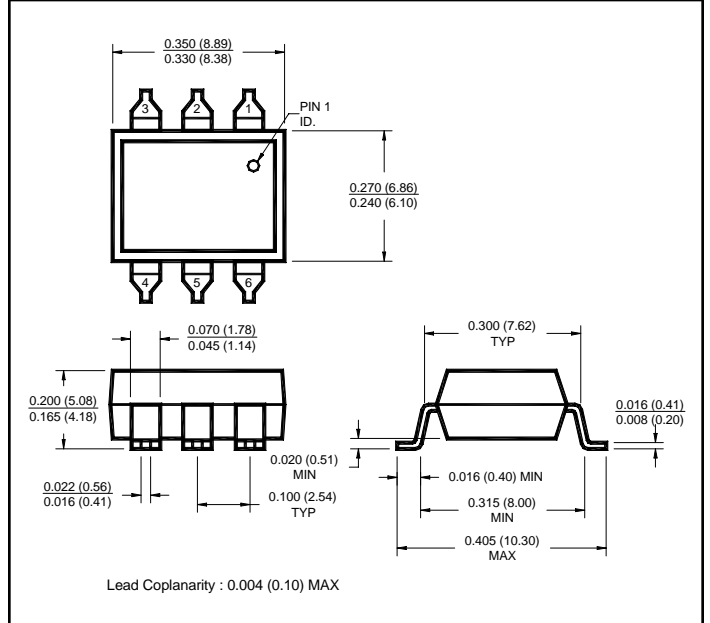


**4N39 4N40**

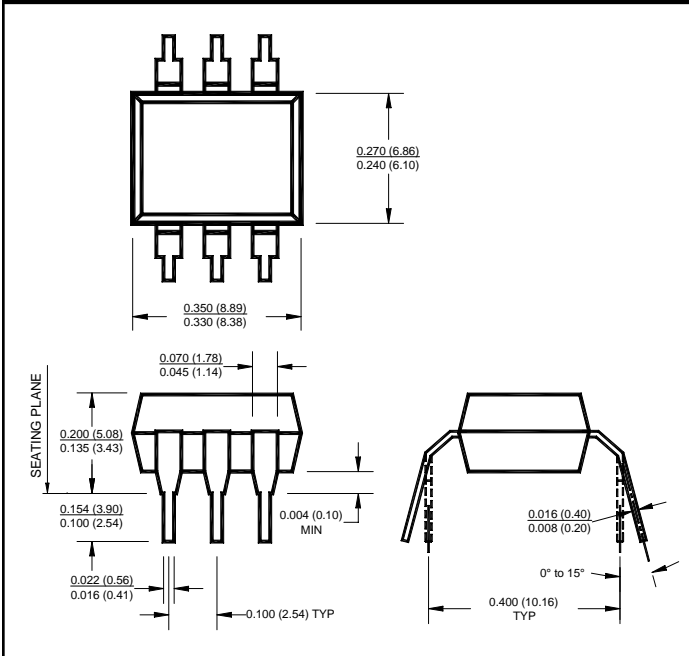
**Package Dimensions (Through Hole)**



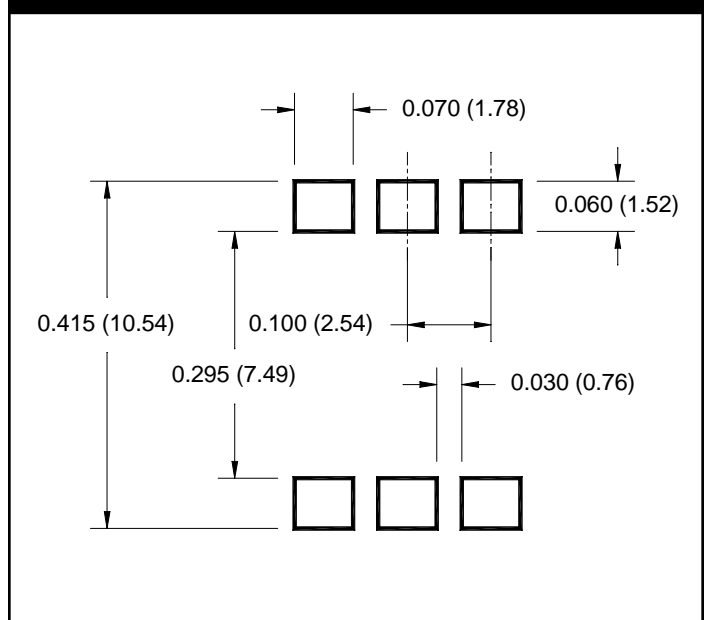
**Package Dimensions (Surface Mount)**



**Package Dimensions (0.4" Lead Spacing)**



**Recommended Pad Layout for Surface Mount Leadform**



**NOTE**

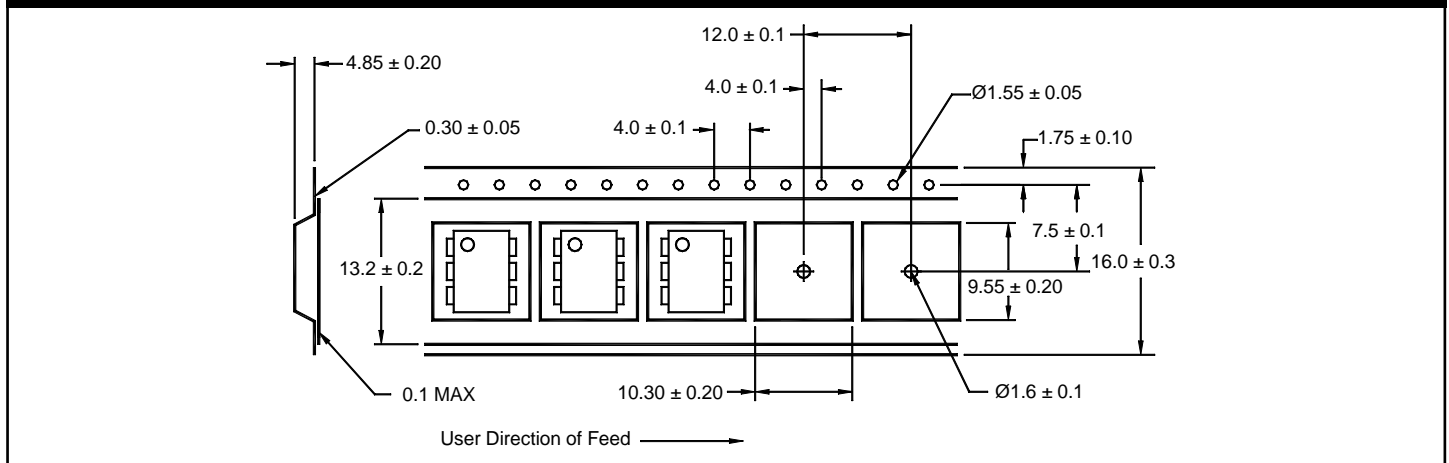
All dimensions are in inches (millimeters)

4N39 4N40

**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 millimeters

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