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MOC3010M MOC3011M MOC3012M MOC3020M MOC3021M MOC3022M **MOC3023M**

DESCRIPTION

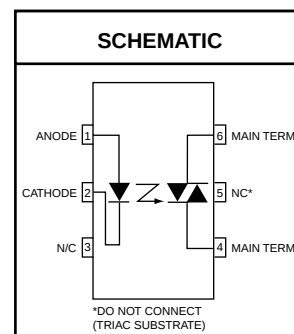
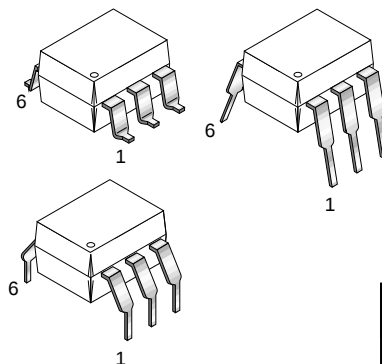
The MOC301XM and MOC302XM series are optically isolated triac driver devices. These devices contain a AlGaAs infrared emitting diode and a light activated silicon bilateral switch, which functions like a triac. They are designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 115/240 VAC operations.

FEATURES

- Excellent I_{FT} stability—IR emitting diode has low degradation
- High isolation voltage—minimum 5300 VAC RMS
- Underwriters Laboratory (UL) recognized—File #E90700
- Peak blocking voltage
 - 250V-MOC301XM
 - 400V-MOC302XM
- VDE recognized (File #94766)
 - Ordering option V (e.g. MOC3023VM)

APPLICATIONS

- European applications for
- Triac driver
 - 240 VAC (MOC302X only)
- Industrial controls
- Traffic lights
- Vending machines
- Solid state relay
- Lamp ballasts
- Solenoid/valve controls
- Static AC power switch
- Incandescent lamp dimmers
- Motor control



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameters	Symbol	Device	Value	Units
TOTAL DEVICE				
Storage Temperature	T _{STG}	All	-40 to +150	°C
Operating Temperature	T _{OPR}	All	-40 to +85	°C
Lead Solder Temperature	T _{SOL}	All	260 for 10 sec	°C
Junction Temperature Range	T _J	All	-40 to +100	°C
Isolation Surge Voltage ⁽¹⁾ (peak AC voltage, 60Hz, 1 sec duration)	V _{ISO}	All	7500	Vac(pk)
Total Device Power Dissipation @ 25°C Derate above 25°C	P _D	All	330	mW
			4.4	mW/°C
EMITTER				
Continuous Forward Current	I _F	All	60	mA
Reverse Voltage	V _R	All	3	V
Total Power Dissipation 25°C Ambient Derate above 25°C	P _D	All	100	mW
			1.33	mW/°C
DETECTOR				
Off-State Output Terminal Voltage	V _{DRM}	MOC3010M/1M/2M	250	V
		MOC3020M/1M/2M/3M	400	
Peak Repetitive Surge Current (PW = 1 ms, 120 pps)	I _{TSM}	All	1	V
Total Power Dissipation @ 25°C Ambient Derate above 25°C	P _D	All	300	mW
			4	mW/°C

Note

1. Isolation surge voltage, V_{ISO} , is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

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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 Leakage Current	$V_R = 3\text{ V}, T_A = 25^\circ\text{C}$	I_R	All		0.01	100	μA
DETECTOR							
Peak Blocking Current, Either Direction	Rated V_{DRM} , $I_F = 0$ (note 1)	I_{DRM}	All		10	100	nA
Peak On-State Voltage, Either Direction	$I_{TM} = 100\text{ mA peak}, I_F = 0$	V_{TM}	All		1.8	3	V
Critical Rate of Rise of Off-State Voltage	$I_F = 0$ (figure 5, note2)	dv/dt	All		10		V/ μs

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

DC Characteristics	Test Conditions	Symbol	Device	Min	Typ	Max	Units
LED Trigger Current	Voltage = 3V (note 3)	I_{FT}	MOC3020M			30	mA
			MOC3010M			15	
			MOC3021M			15	
			MOC3011M			10	
			MOC3022M			10	
			MOC3012M			5	
			MOC3023M			5	
Holding Current, Either Direction		I_H	All		100		μA

Note

1. Test voltage must be applied within dv/dt rating.
2. This is static dv/dt . See Figure 5 for test circuit. Commutating dv/dt is a function of the load-driving thyristor(s) only.
3. All devices are guaranteed to trigger at an I_F value less than or equal to max I_{FT} . Therefore, recommended operating I_F lies between max I_{FT} (30 mA for MOC3020M, 15 mA for MOC3010M and MOC3021M, 10 mA for MOC3011M and MOC3022M, 5 mA for MOC3012M and MOC3023M) and absolute max I_F (60 mA).

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Fig. 1 LED Forward Voltage vs. Forward Current

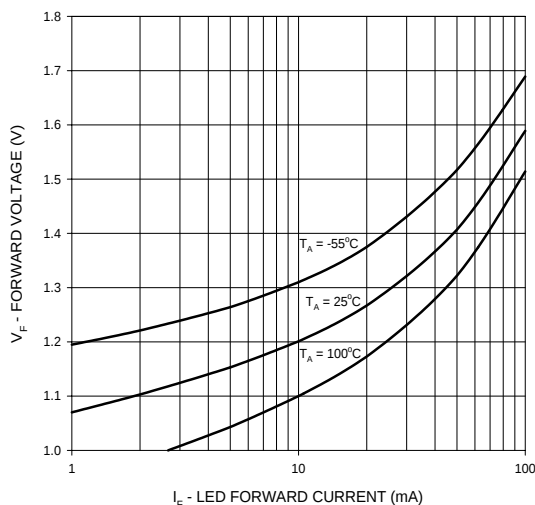


Fig. 2 On-State Characteristics

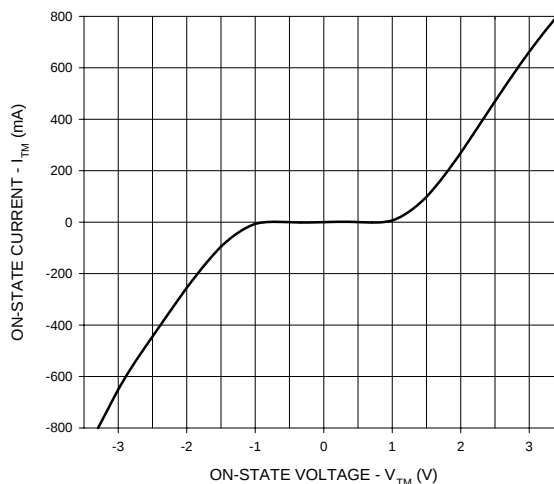


Fig. 3 Trigger Current vs. Ambient Temperature

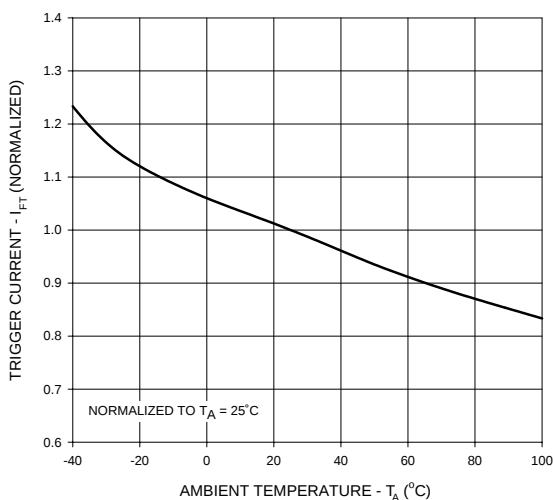


Fig. 4 LED Current Required to Trigger vs. LED Pulse Width

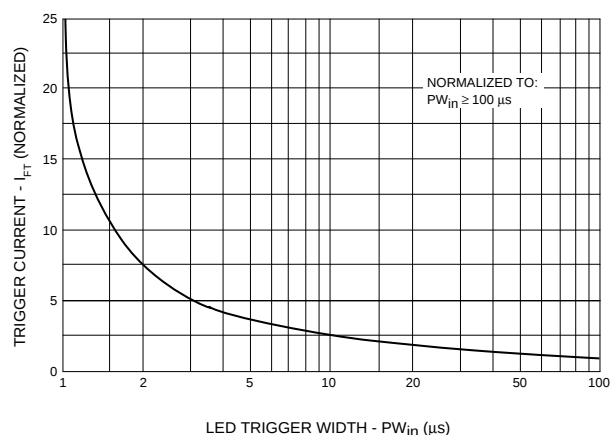


Fig. 6 Leakage Current, I_{DRM} vs. Temperature

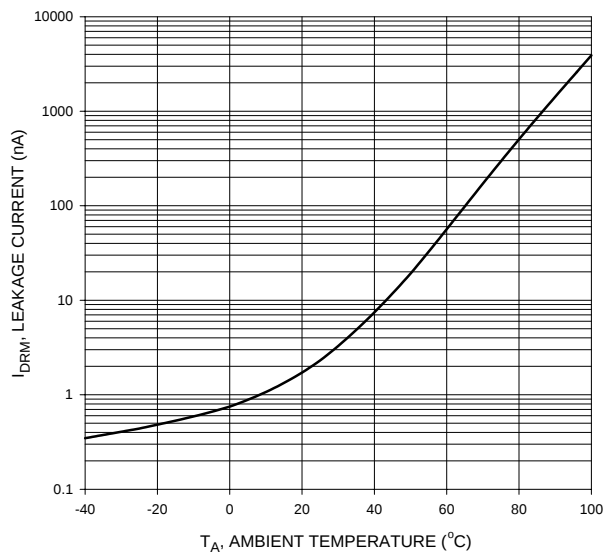
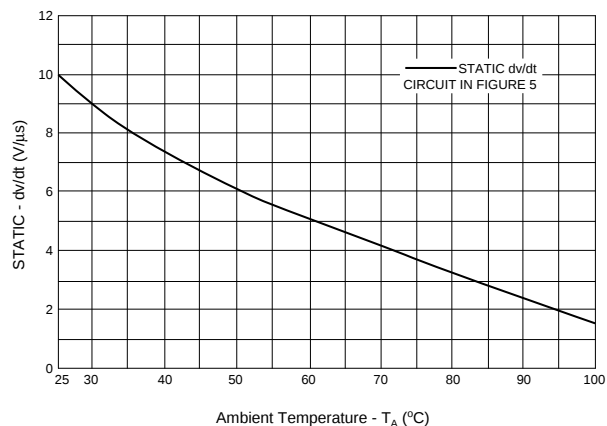
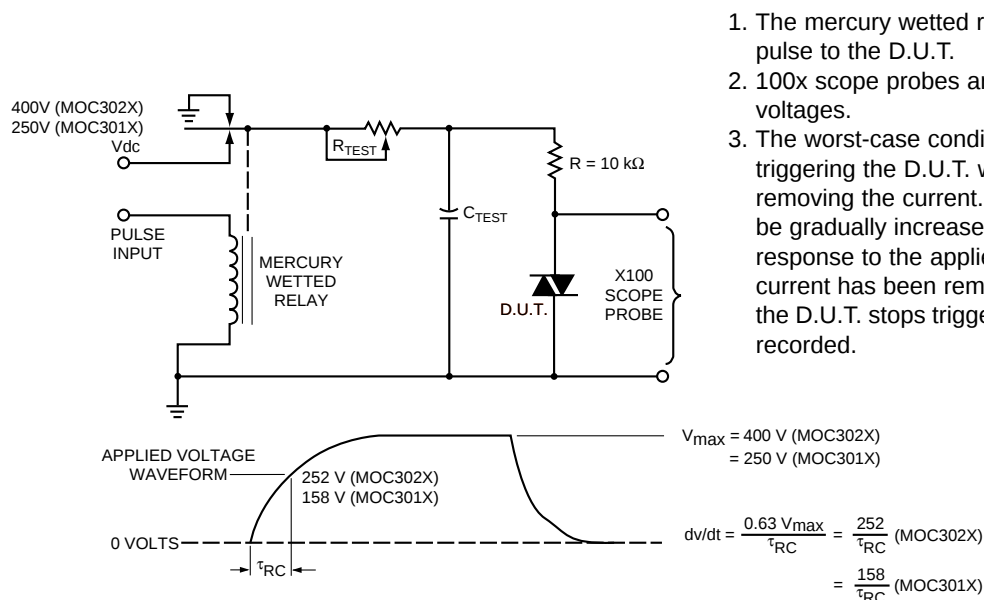


Fig. 5 dv/dt vs. Temperature



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1. The mercury wetted relay provides a high speed repeated pulse to the D.U.T.
2. 100x scope probes are used, to allow high speeds and voltages.
3. The worst-case condition for static dv/dt is established by triggering the D.U.T. with a normal LED input current, then removing the current. The variable R_{TEST} allows the dv/dt to be gradually increased until the D.U.T. continues to trigger in response to the applied voltage pulse, even after the LED current has been removed. The dv/dt is then decreased until the D.U.T. stops triggering. τ_{RC} is measured at this point and recorded.

Figure 5. Static dv/dt Test Circuit

NOTE: This optoisolator should not be used to drive a load directly.
It is intended to be a trigger device only.

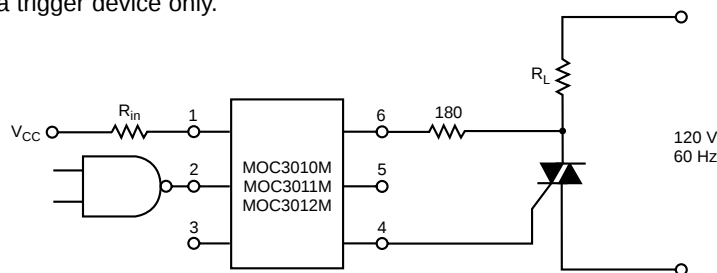


Figure 6. Resistive Load

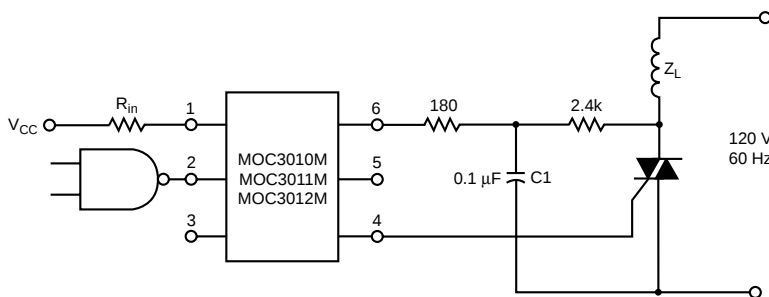


Figure 7. Inductive Load with Sensitive Gate Triac (I_{GT} ≤ 15 mA)

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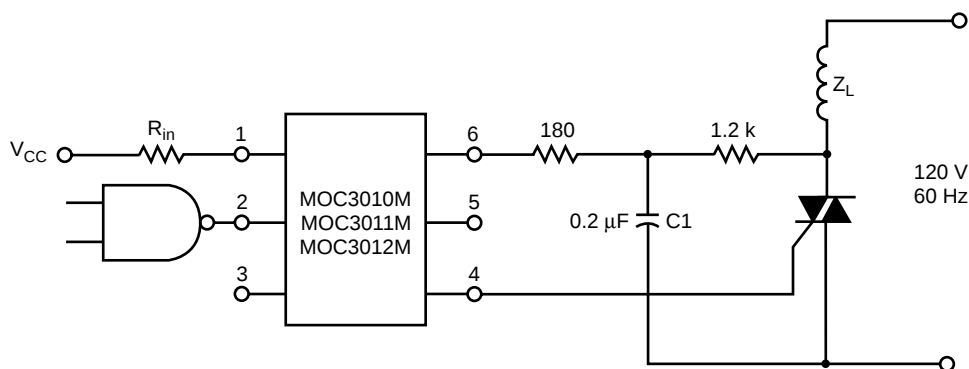
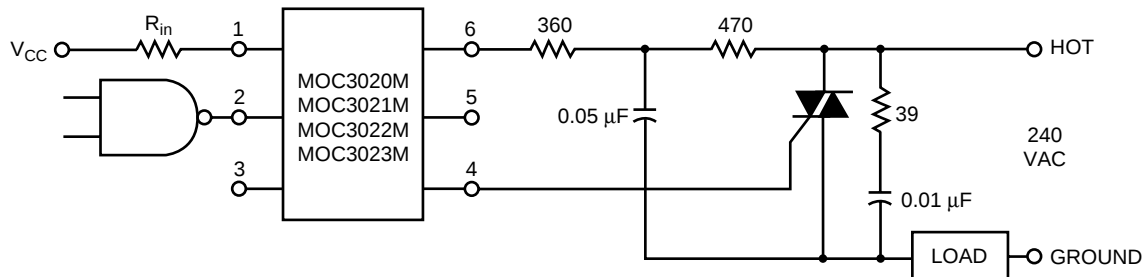


Figure 8. Inductive Load with Sensitive Gate Triac ($I_{GT} \leq 15$ mA)



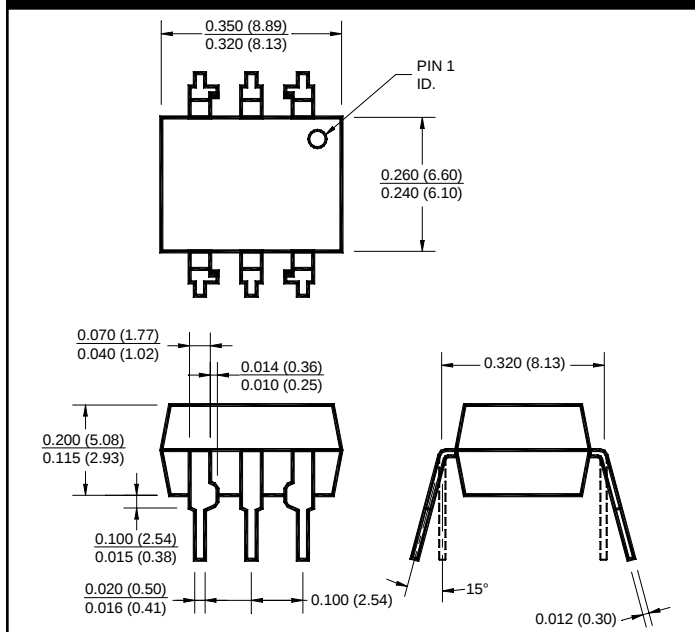
In this circuit the "hot" side of the line is switched and the load connected to the cold or ground side.

The 39 ohm resistor and 0.01 μ F capacitor are for snubbing of the triac, and the 470 ohm resistor and 0.05 μ F capacitor are for snubbing the coupler. These components may or may not be necessary depending upon the particular and load used.

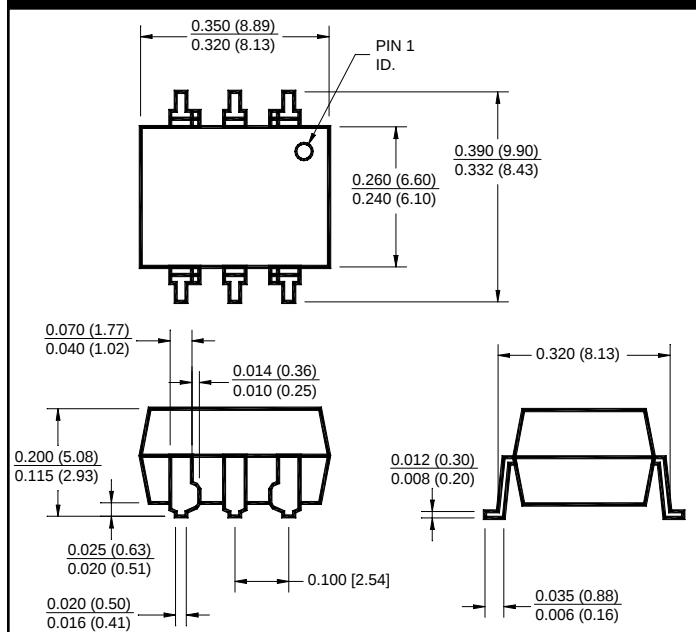
Figure 9. Typical Application Circuit

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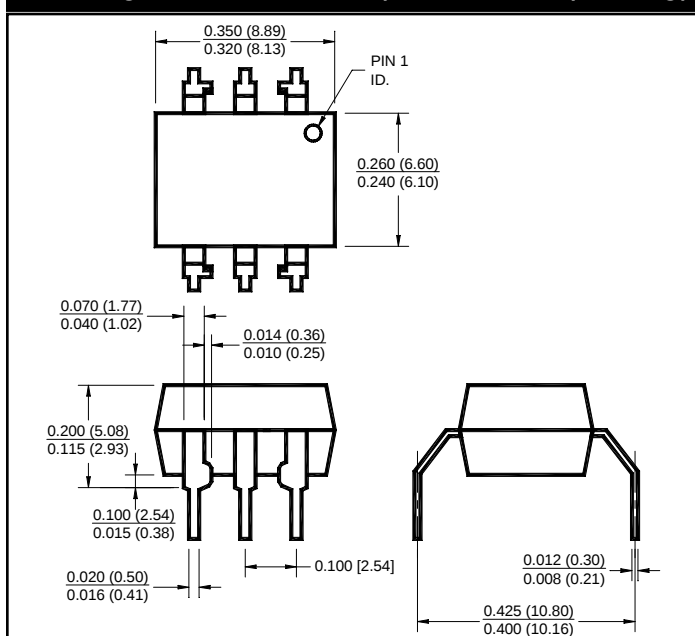
Package Dimensions (Through Hole)



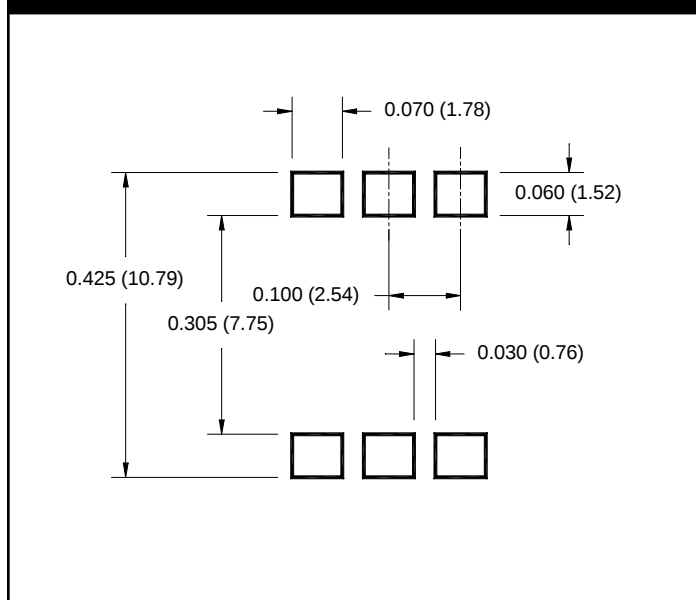
Package Dimensions (Surface Mount)



Package Dimensions (0.4" Lead Spacing)



Recommended Pad Layout for Surface Mount Leadform



NOTE

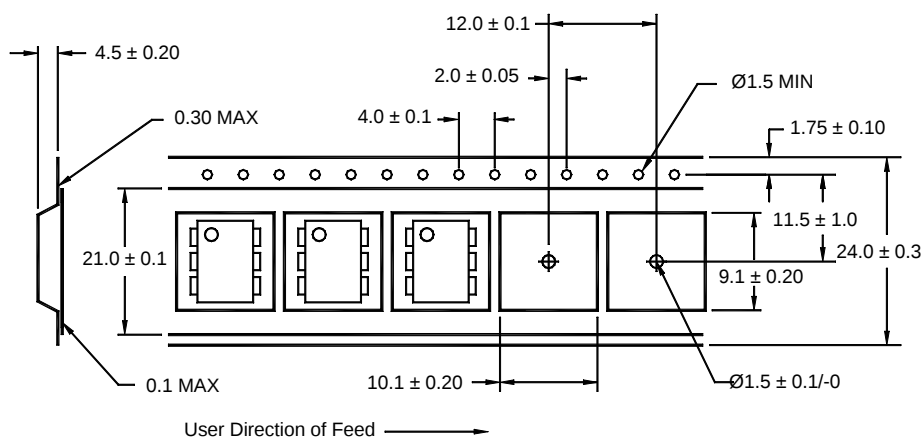
All dimensions are in inches (millimeters)

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ORDERING INFORMATION

Option	Order Entry Identifier	Description
S	S	Surface Mount Lead Bend
SR2	SR2	Surface Mount; Tape and reel
T	T	0.4" Lead Spacing
V	V	VDE 0884
TV	TV	VDE 0884, 0.4" Lead Spacing
SV	SV	VDE 0884, Surface Mount
SR2V	SR2V	VDE 0884, Surface Mount, Tape & Reel

QT Carrier Tape Specifications ("D" Taping Orientation)



NOTE

All dimensions are in inches (millimeters)

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