SOLID STATE OPTRONICS



TD3021

Random Phase Switching
400V
Triac Driver

Description

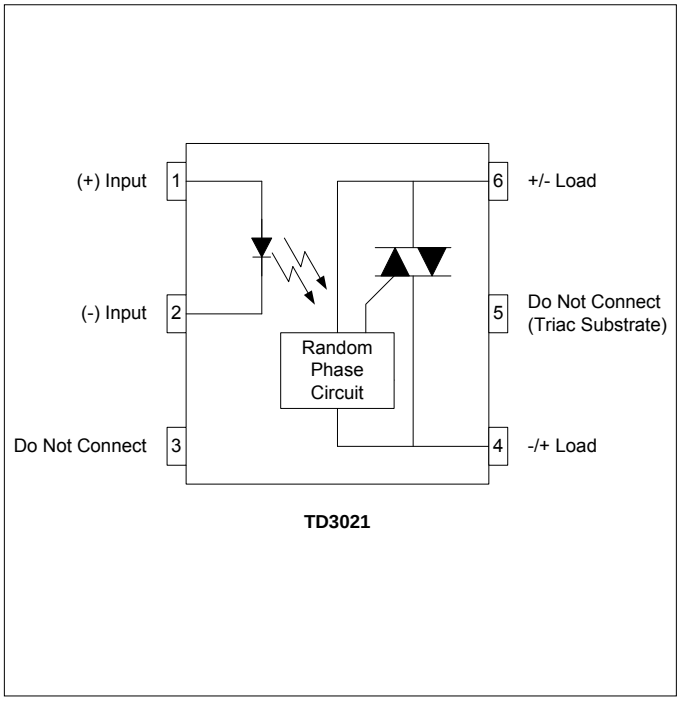
The TD3021 consists of a single input AlGaAs LED optically coupled to a Random Phase triac driver chip. The TD3021 provides high input-to-output isolation and is designed to drive high-powered triacs. Typical uses include interfacing logic level control signals to equipment powered from $110V_{AC}$ lines and higher.

The TD3021 comes standard in a miniature 6 pin DIP package making it ideal for high-density board applications.

Applications

- Home Appliances
- Motor / Drive Controls
- Solid State Relays
- Solenoid / Valve Controls
- Temperature Controls
- Dimmer Controls

Schematic Diagram



TD3021

Features

- Random Phase Switching
- 400V Blocking Voltage
- Trigger Current (15mA MAX)
- High Isolation Voltage ($5000V_{RMS}$)
- High dV/dt (1kV/μS MIN)
- Long Life / High Reliability
- RoHS / Pb-Free / REACH Compliant

Agency Approvals

UL/C-UL:	File # E201932
VDE:	File # 40035191 (EN 60747-5-2)

Absolute Maximum Ratings

The values indicated are absolute stress ratings. Functional operation of the device is not implied at these or any conditions in excess of those defined in electrical characteristics section of this document. Exposure to absolute Maximum Ratings may cause permanent damage to the device and may adversely affect reliability.

Storage Temperature	-55 to +125°C
Operating Temperature	-40 to +100°C
Continuous Input Current	50mA
Transient Input Current	400mA
Reverse Input Control Voltage	5V
Input Power Dissipation	40mW
Output Power Dissipation	330mW
Solder Temperature – Wave (10sec)	260°C
Solder Temperature – IR Reflow (10sec)	260°C

Ordering Information

Part Number	Description
TD3021	6 pin DIP, (60/Tube)
TD3021-H	0.40" (10.16mm) Lead Spacing (VDE0884)
TD3021-S	6 pin SMD, (60/Tube)
TD3021-STR	6 pin SMD, Tape and Reel (1000/Reel)

NOTE: Suffixes listed above are not included in marking on device for part number identification

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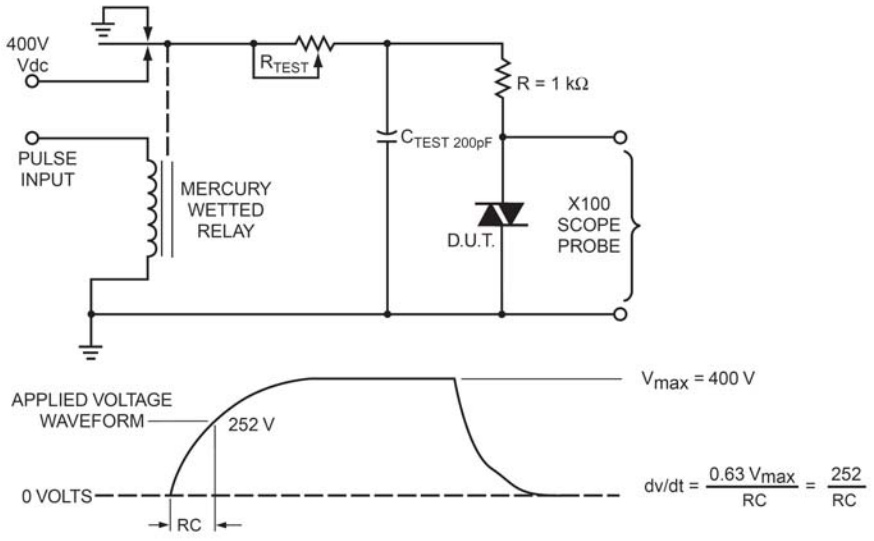
Electrical Characteristics, T_A = 25°C (unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Input Specifications						
LED Forward Voltage	V_F	-	1.4	1.8	V	I_F = 10mA
LED Reverse Voltage	BV_R	5	-	-	V	I_R = 10µA
Reverse Leakage Current	$I_{InRleak}$	-	-	10	µA	V_R = 5µA
Trigger Current[1]	I_{InOn}	-	-	15	mA	Main Terminal Voltage = 3V
Output Specifications						
Blocking Voltage	V_{DRM}	400	-	-	V	I_O = 1µA
Peak Blocking Current	I_{DRM1}	-	10	100	nA	V_{DRM} = 400
Continuous Load Current	I_O	-	-	100	mA	I_F = 15mA
On-State Voltage	V_{ON}	-	2	3	V	I_F = 15mA, I_{TM} = 100mA
Leakage Current	I_{DRM2}	-	0.2	1	µA	I_F=0mA, V_{DRM} = 400V
Holding Current	I_{HOLD}	-	250	-	µA	-
Critical Rate of Rise[2]	dV/dt	1,000	1,500	-	V/µS	-
Isolation Specifications						
Isolation Voltage	V_{ISO}	5,000	-	-	V_{RMS}	RH ≤ 50%, t=1min
Input-Output Resistance	R_{I-O}	-	10^{12}	-	Ω	V_{I-O} = 500V_{DC}

Note 1: Resistive load. For inductive loads, higher drive current is recommended

Note 2: This is for static dV/dt. Test Circuit Below

TD3021 Static dV/dt Test Circuit:



TD3021 Performance & Characteristics Plots, T_A = 25°C (unless otherwise specified)

Figure 1: *Maximum Load Current vs. Temperature*

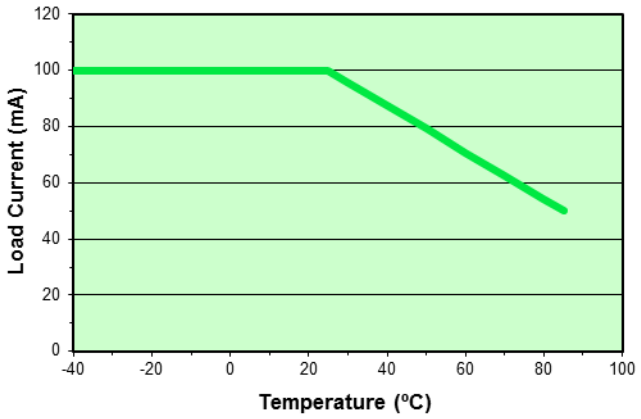


Figure 2: *Typical Blocking Voltage Distribution* (N = 100, Ta = 25ºC)

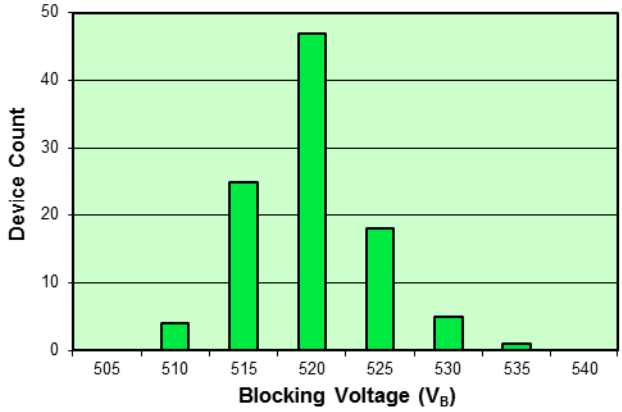


Figure 3: *On-State Characteristics*

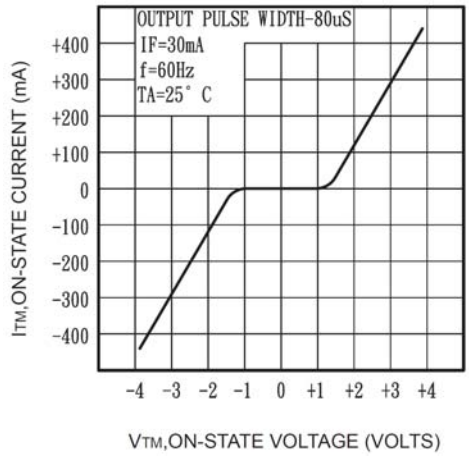


Figure 4: *Leakage Current (I_{oLEAK}) vs. Temperature (°C)*

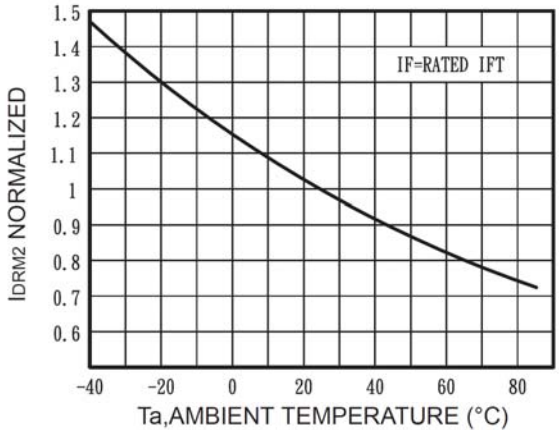
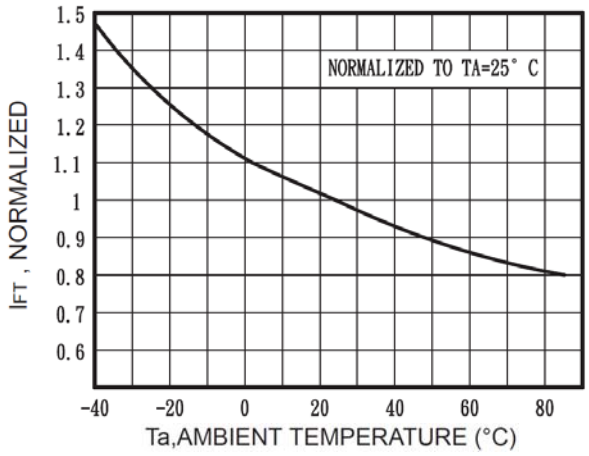


Figure 5: *Turn On Current (I_F) vs. Temperature (°C)*



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TD3021 Solder Temperature Profile Recommendations

(1) *Infrared Reflow:*

Refer to the following figure as an example of an optimal temperature profile for single occurrence infrared reflow. Soldering process should not exceed temperature or time limits expressed herein. Surface temperature of device package should not exceed 250ºC:

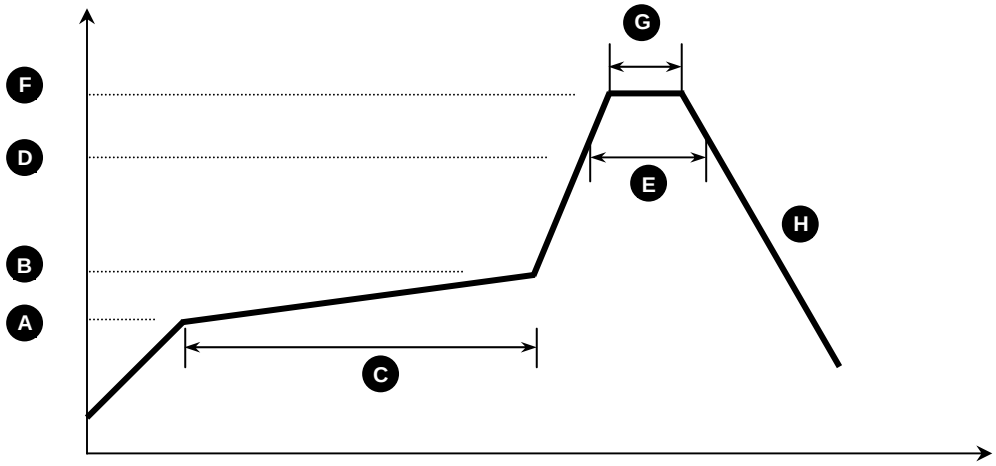


Figure 1

Process Step	Description	Parameter
A	Preheat Start Temperature (ºC)	150ºC
B	Preheat Finish Temperature (ºC)	180ºC
C	Preheat Time (s)	90 - 120s
D	Melting Temperature (ºC)	230ºC
E	Time above Melting Temperature (s)	30s
F	Peak Temperature, at Terminal (ºC)	260ºC
G	Dwell Time at Peak Temperature (s)	10s
H	Cool-down (ºC/s)	<6ºC/s

(2) *Wave Solder:*

Maximum Temperature:	260ºC (at terminal)
Maximum Time:	10s
Pre-heating:	100 - 150ºC (30 - 90s)
Single Occurrence	

(3) *Hand Solder:*

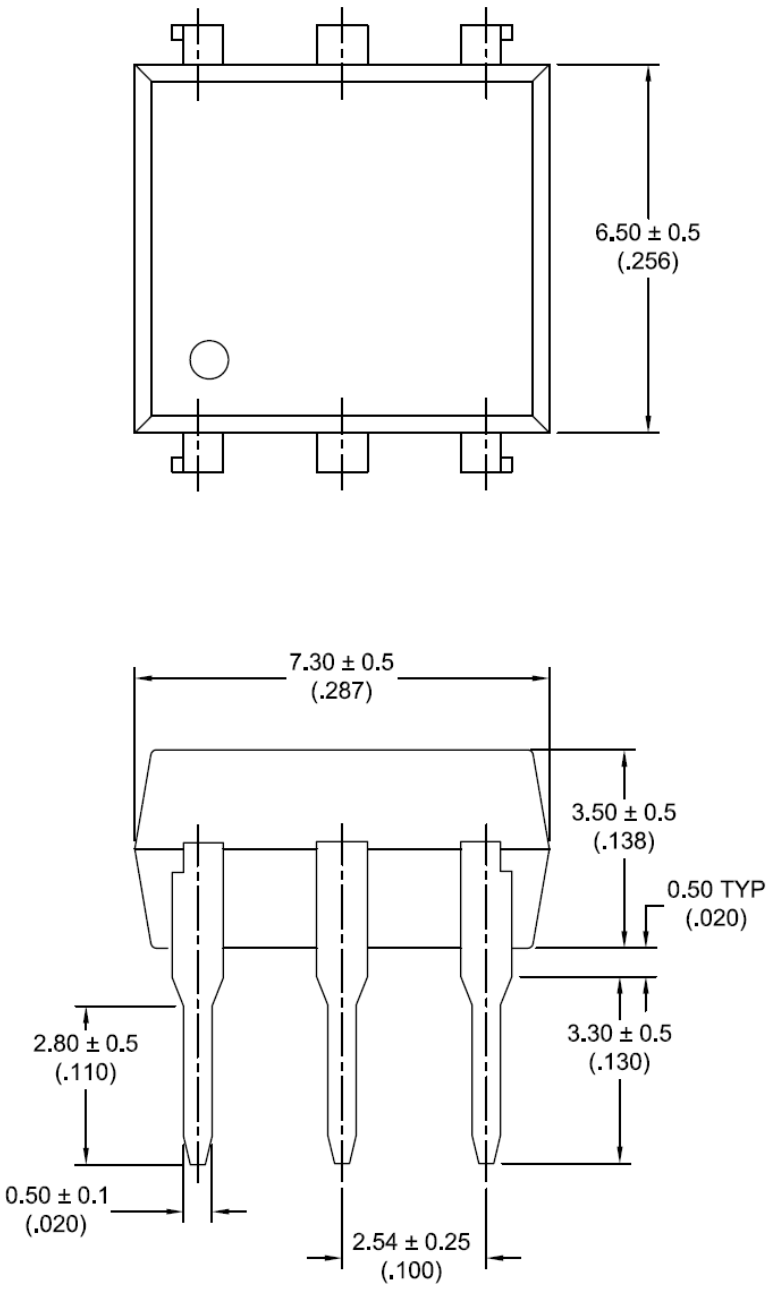
Maximum Temperature:	350ºC (at tip of soldering iron)
Maximum Time:	3s
Single Occurrence	

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TD3021 Package Dimensions

6 PIN DIP Package

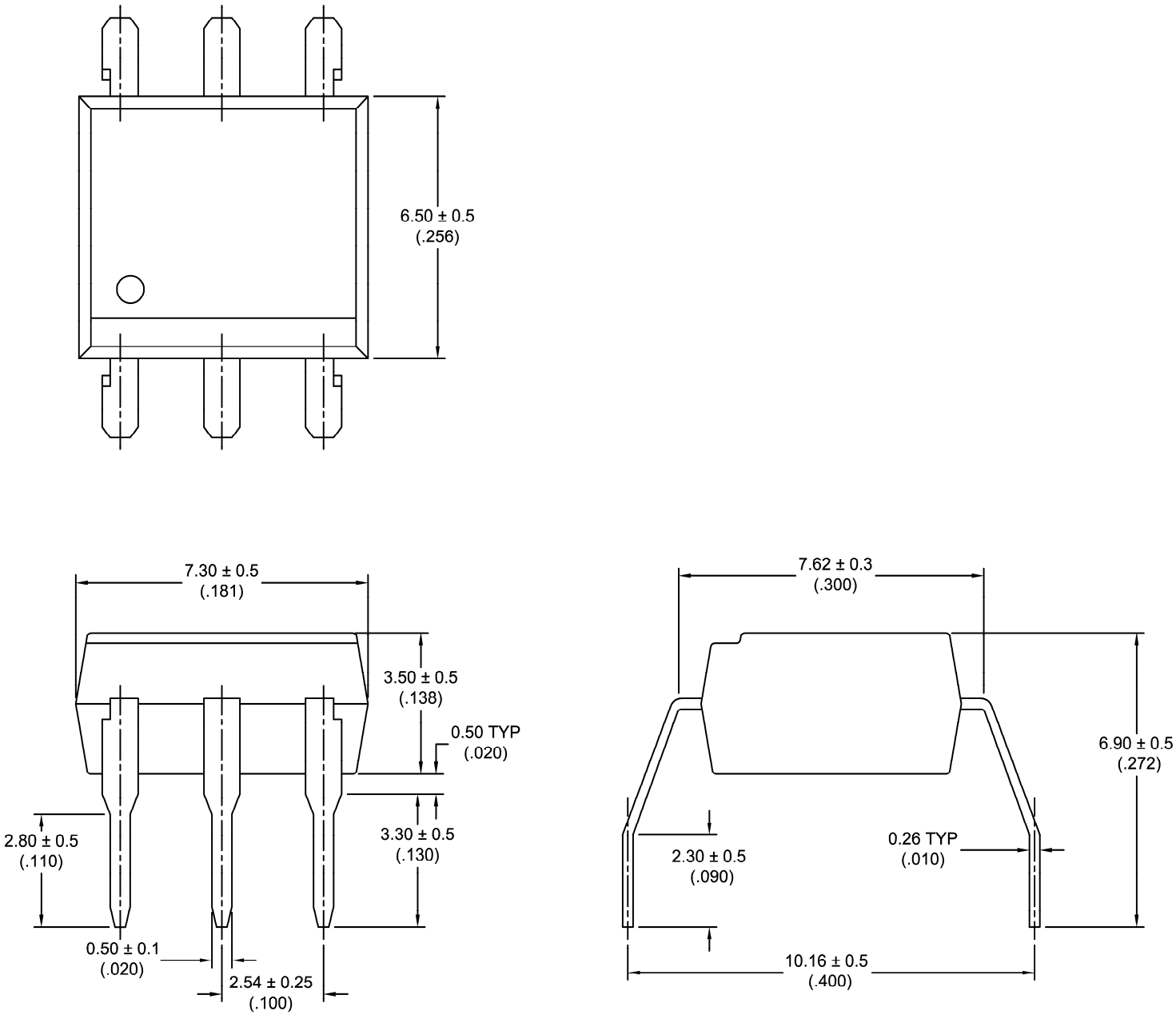
Note: *All dimensions in millimeters with inches [“] in parenthesis ()*



TD3021 Package Dimensions

6 PIN WIDE Lead Space Package (-H)

Note: *All dimensions in millimeters [mm] with inches in parenthesis ()*

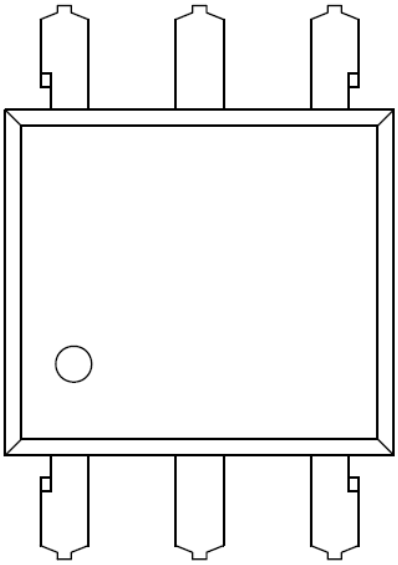


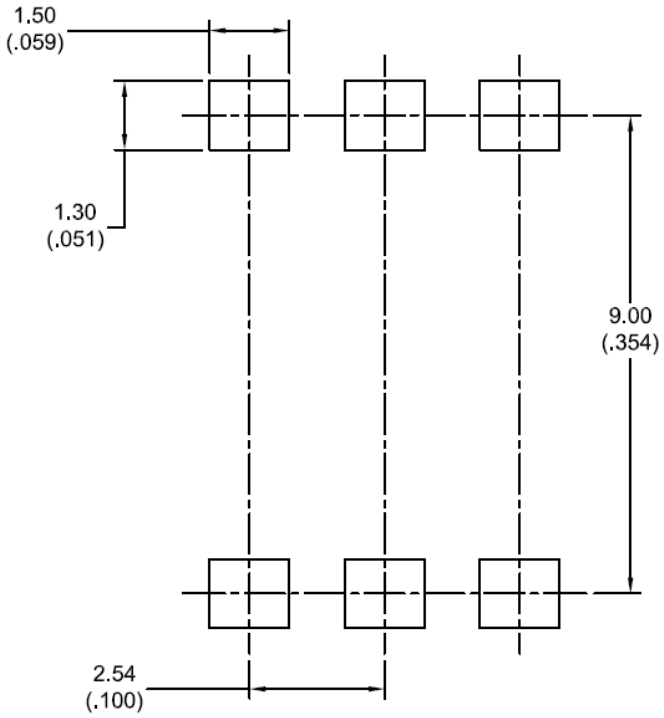
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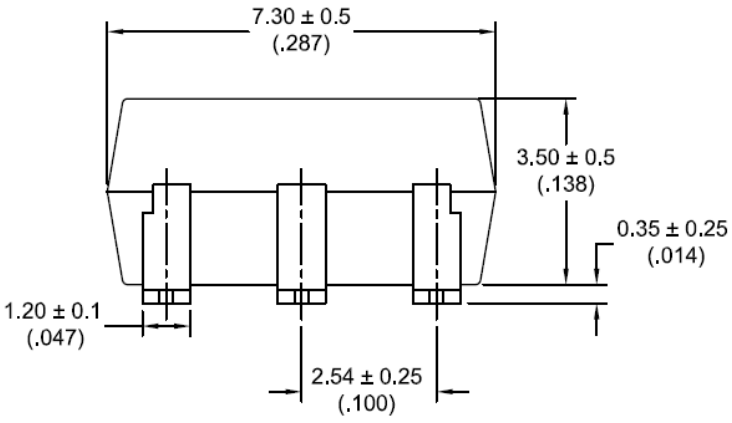
TD3021 Package Dimensions

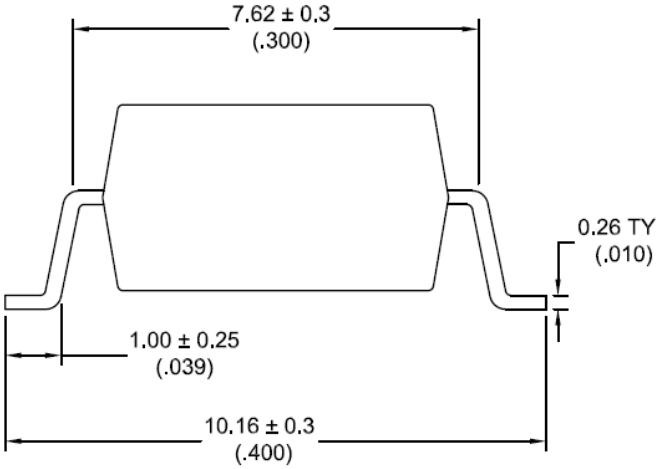
6 PIN SMD Surface Mount Package (-S)

Note: *All dimensions in millimeters with inches [“] in parenthesis ()*





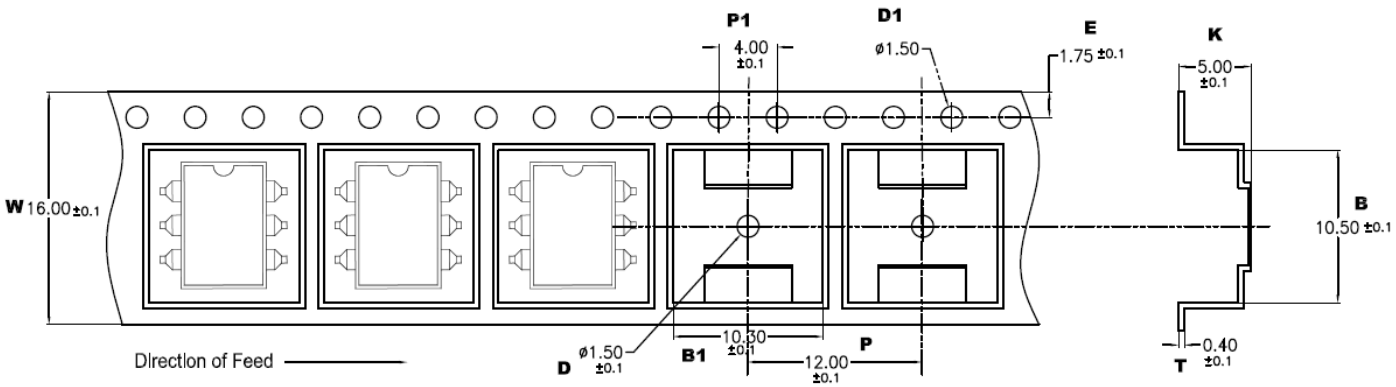




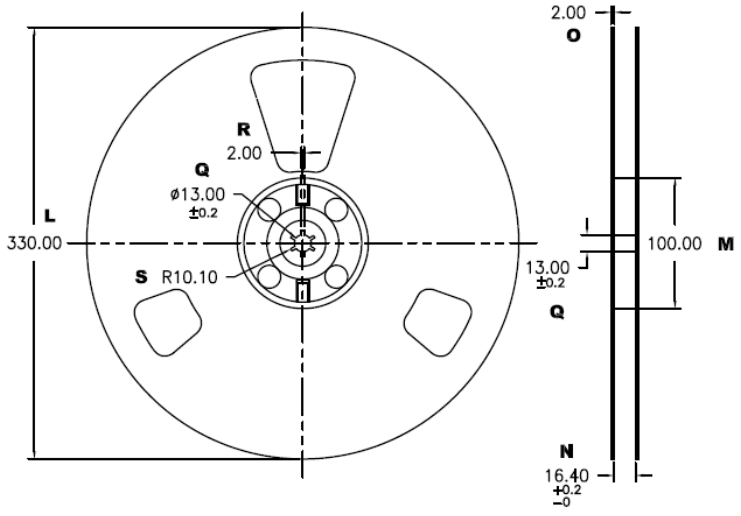
TD3021 Package Dimensions

6 PIN SMD Tape & Reel (-STR)

Note: *All dimensions in millimeters*

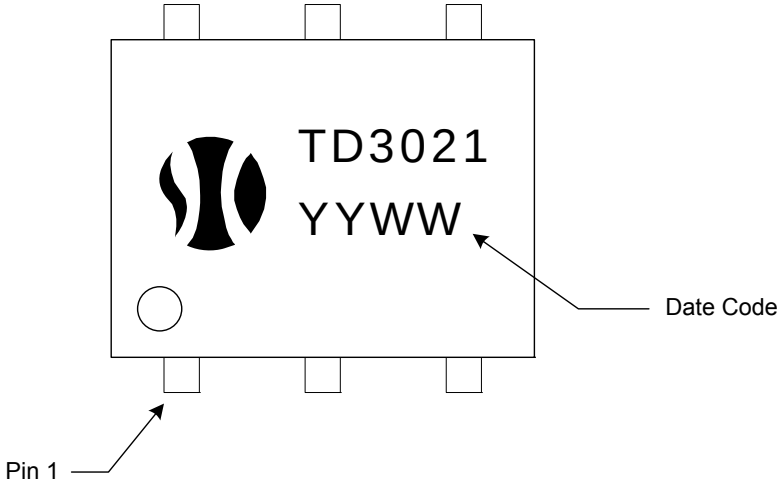


W	B	B1	P	P1	K	E	T	D	D1
16.00 ±0.1	10.50 ±0.1	10.30 ±0.1	12.00 ±0.1	4.00 ±0.1	5.00 ±0.1	1.75 ±0.1	0.40 ±0.1	1.50 ±0.1	1.50 ±0.1



L	M	N	O	Q	R	S
330.00	100.00	16.40 +0.2	2.00 ±0.1	13.00 ±0.2	2.00	10.00

TD3021 Package Marking



TD3021 Package Weights

Device	Single Unit	Full Tube (60pcs)	Full Pouch (10 tubes)	Full Reel (1000pcs)
TD3021	0.41	43	450	-
TD3021-S	0.40	42	440	-
TD3021-H	0.42	44	460	
TD3021-STR	0.40	-	-	880

Note: *All weights above are in GRAMS, and include packaging materials where applicable*

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