

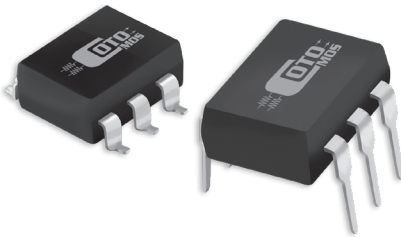
1 Description

Coto's new S117X Silicon Carbide (SiC) MOSFET relay supports and sustains load voltages of 1700 V while carrying a current of up to 170 mA. Advantages of the S117X SiC Relay include low switching loss, high breakdown voltage, low RdsON resistance. The extreme durability of the SiC material ensures stable performance in volatile environments under variable humidity, across a wide temperature range. Ideal applications include those requiring high voltage, high temperature and high frequency features. Target markets include Battery Management Systems, Factory Automation Control, EV Charging stations and Solar Inverters & Smart Grids.

Device Information

Part Series	Package	Body Size (mm)
S117T	DIP Thru-Hole	8.8 x 6.4 x 3.4
S117S	DIP Surface Mount	8.8 x 6.4 x 3.4

Device Package



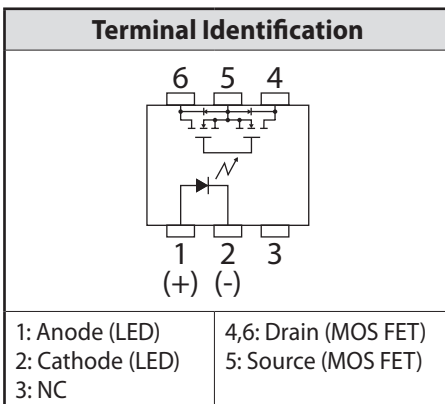
2 Features

- ▶ Contact Form: 1A
- ▶ Load Voltage: 1700V (AC Peak or DC)
- ▶ Load Current: 120 mA
- ▶ Low ON-Resistance: 20Ω Maximum
- ▶ Low Off-State Leakage Current: 1μA Maximum
- ▶ Package Type: 6-DIP or SMD
- ▶ Silicon Carbide FET Output

3 Applications

- ▶ Battery Management Systems
- ▶ Factory Automation Control
- ▶ EV Charging Stations
- ▶ Solar Inverters & Smart Grids

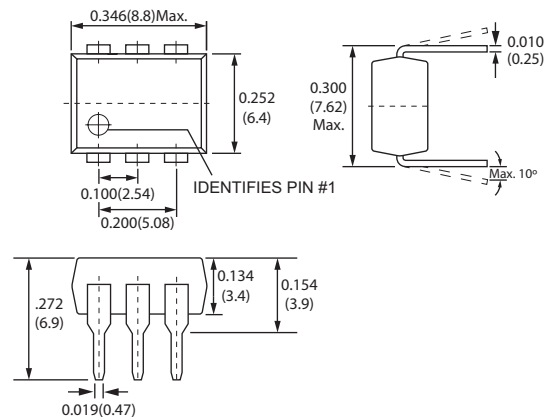
4 Device Schematic



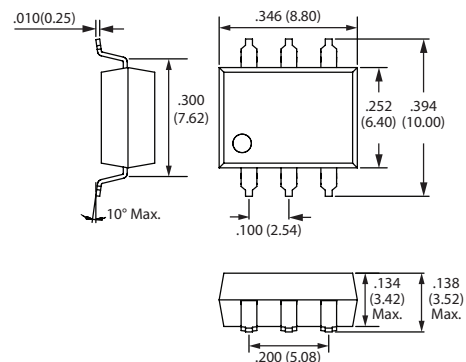
5 DIMENSIONS

in Inches (Millimeters)

S117T (Thru-Hole)



S117S (Surface Mount)



6 Specifications

6.1 Absolute Maximum Ratings

Parameters		Symbol	Rating	Unit
Input	Continuous LED Current	I_F	50	mA
	Peak LED Current (f=100Hz Duty=1%)	I_{FP}	1000	mA
	LED Reverse Voltage	V_R	5	V
	Input Power Dissipation	P_{IN}	75	mW
Output	Load Voltage	V_L	1700	V (AC Peak or DC)
	Load Current	A (AC)	120	mA
		B (DC)	150	mA
		C (DC)	170	mA
	Peak Load Current 100 ms (1 pulse)	I_{PEAK}	600	mA
Output Power Dissipation	P_{OUT}	450	mW	
Total Power Dissipation		P_T	500	mW
I/O Breakdown Voltage (RH = 60%, 1 min)		$V_{I/O}$	3750	Vrms
I/O Breakdown Voltage (Suffix-V) (RH = 60%, 1 min)		$V_{I/O}$	5000	Vrms
Operating Temperature		T_{OPR}	-40 to +85	°C
Storage Temperature		T_{STG}	-40 to +100	°C
Pin Soldering Temperature (10 sec max)		T_{SOL}	260	°C

6.2 Electrical Characteristics

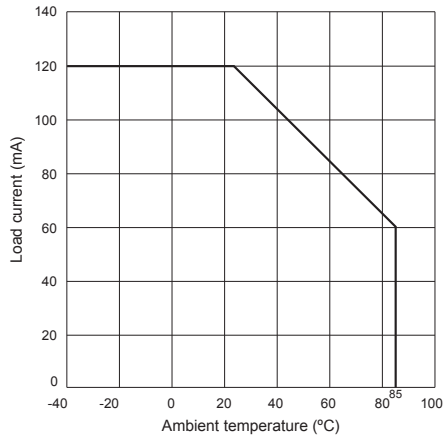
Parameters		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input	LED Forward Voltage	V_F	$I_F=10mA$		1.3	1.5	V
	Operation LED Current	I_{FON}			1.0	5.0	mA
	Recovery LED Voltage	V_{FOFF}		0.7			V
	Recovery LED Current	I_{FOFF}			0.35	0.8	mA
Output	On-Resistance	R_{ON}	$I_F=10mA, I_L=Rating,$ Time to flow is within 1 sec		15	20	Ω
			$I_F=10mA, I_L<5mA$		7.5	10	Ω
	Off-State Leakage Current	I_{LEAK}	$V_L=Rating$			1	μA
	Output Capacitance	C_{OUT}	$V_L=0, f=1MHz$		-		pF
Trans- mission	Turn-On Time	T_{ON}	$I_F=10mA, I_L=Rating$		0.15	0.5	ms
	Turn-Off Time	T_{OFF}			0.04	0.1	ms
Coupled	I/O Insulation Resistance	$R_{I/O}$	DC500V	10^{10}			Ω
	I/O Capacitance	$C_{I/O}$	f=1MHz		0.8	1.5	pF

Environmental Ratings:

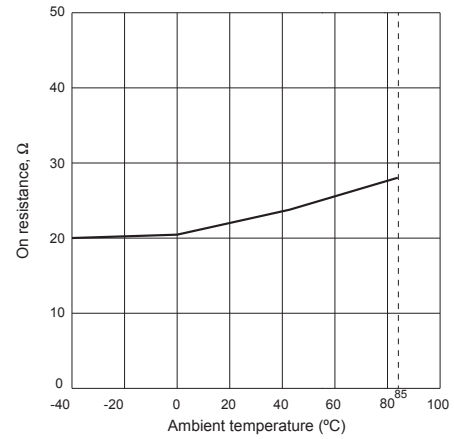
All electrical parameters measured at 25°C unless otherwise specified.

7 CotoMOS® S117X Series Graphs

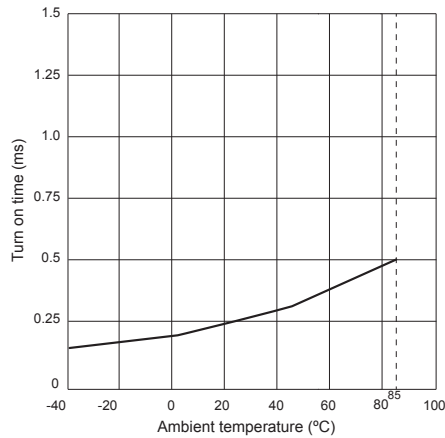
Load Current Vs. Ambient Temperature



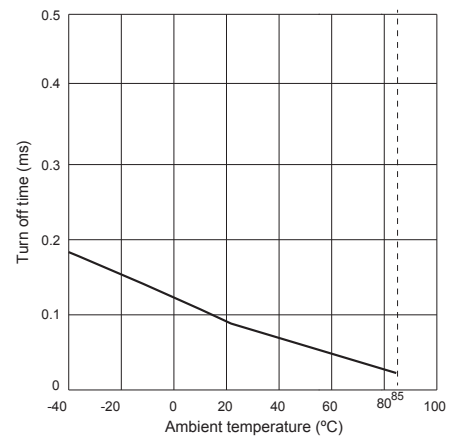
On-Resistance Vs. Ambient Temperature



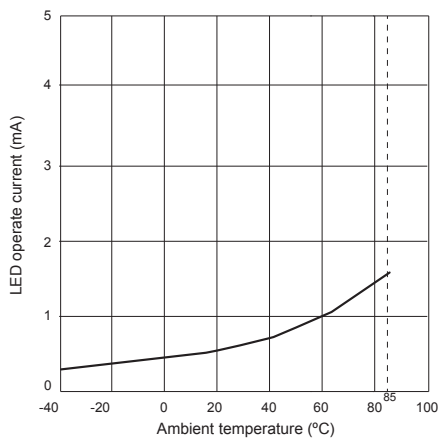
Turn-On Time Vs. Ambient Temperature



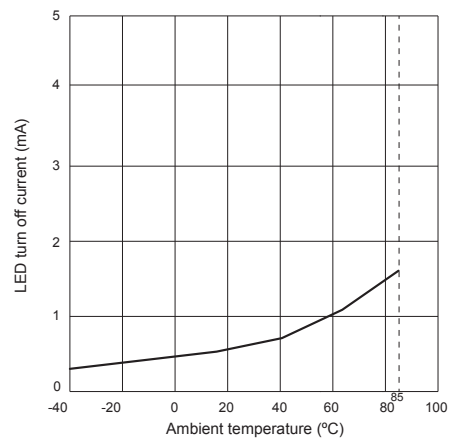
Turn-Off Time Vs. Ambient Temperature



LED Operate Current Vs. Ambient Temperature

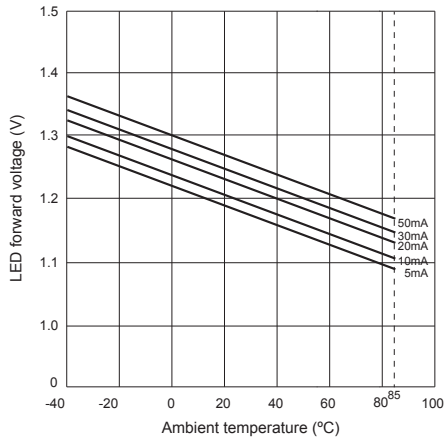


LED Turn-Off Current Vs. Ambient Temperature

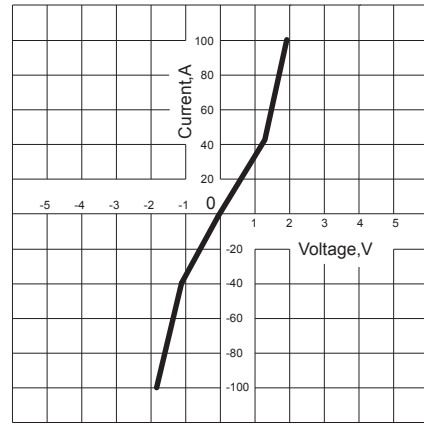


7 CotoMOS® S117X Series Graphs

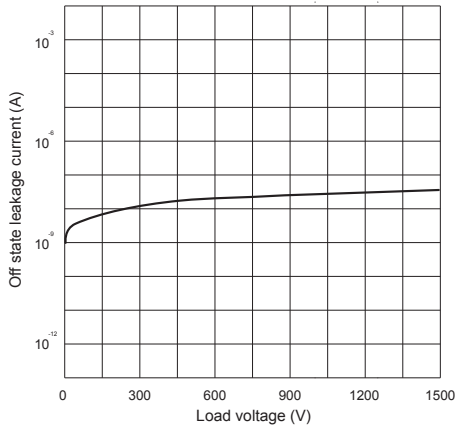
LED Forward Voltage Vs. Ambient Temperature



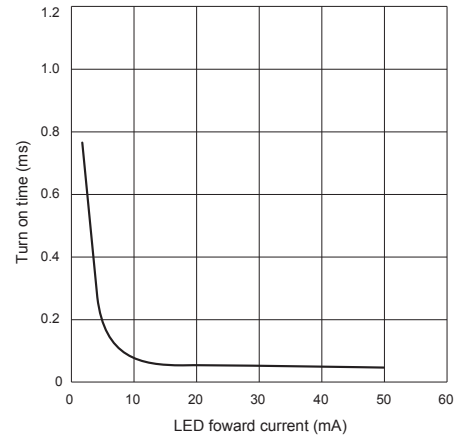
Voltage Vs. Current Characteristics of Output at MOSFET Portion



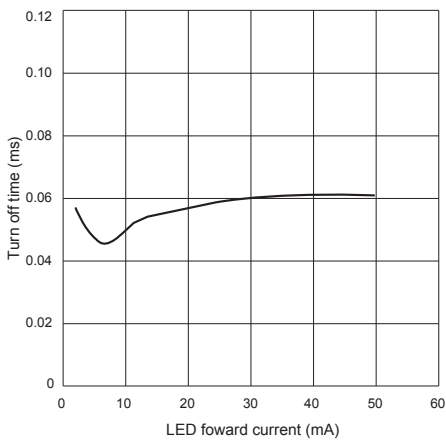
Off-State Leakage Current Vs. Load Voltage



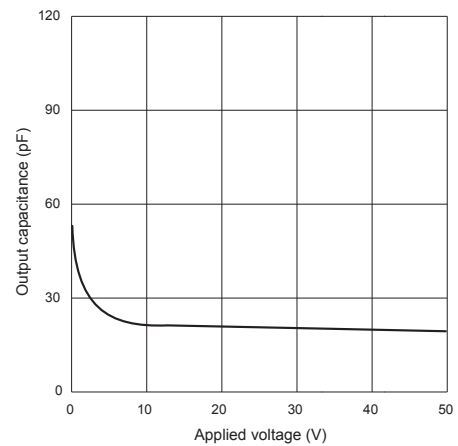
Turn-On Time Vs. LED Forward Current



Turn-Off Time Vs. LED Forward Current

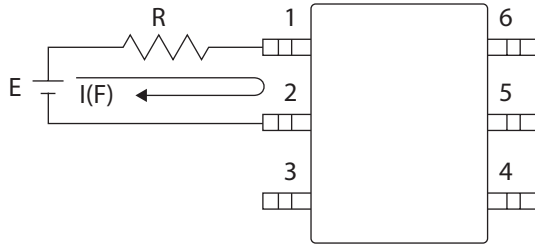


Output Capacitance Vs. Applied Voltage



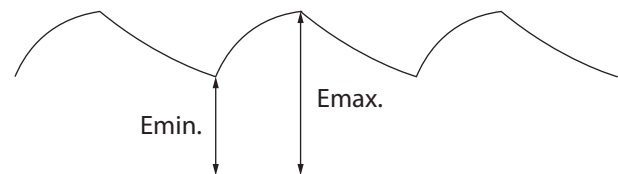
8 Using Methods

Examples of resistance value to control LED forward current ($I_f=5\text{mA}$)



E	R
3.3V	Approx. 333 Ω
5V	Approx. 640 Ω
12V	Approx. 1.9K Ω
15V	Approx. 2.5K Ω
24V	Approx. 4.1K Ω

- LED forward current must be more than 5mA, at E min.
- LED forward current must be less than 50mA, at E max.



9 Connections

Regulate the spike voltage generated on the inductive load as follows:

CONNECTIONS

A Control bi-directional signal

B On-Resistance is 1/2 of A-connection

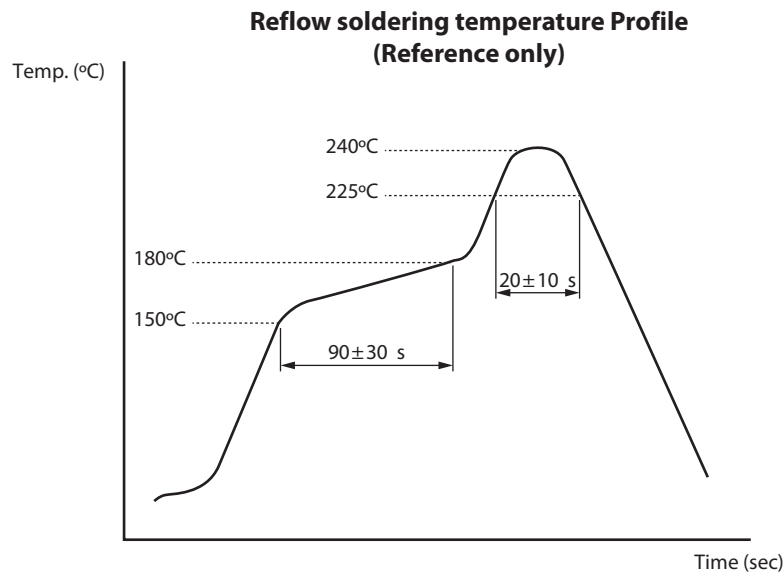
C On-Resistance is 1/2 of B-connection

10 Recommended Soldering Conditions

10.1 Infrared Reflow Soldering

- ▶ Peak reflow soldering: 240°C or below (package surface temperature)
- ▶ Time of peak reflow temperature: 20-30 seconds
- ▶ Time of temperature higher than 240°C: 30-60 seconds
- ▶ Time to preheat temperature from 180~190°C: 90-120 seconds
- ▶ Number of reflows: One
- ▶ Flux: Rosin flux containing small amount of chlorine
(The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

10.2 Recommended Temperature Profile of Infrared Reflow

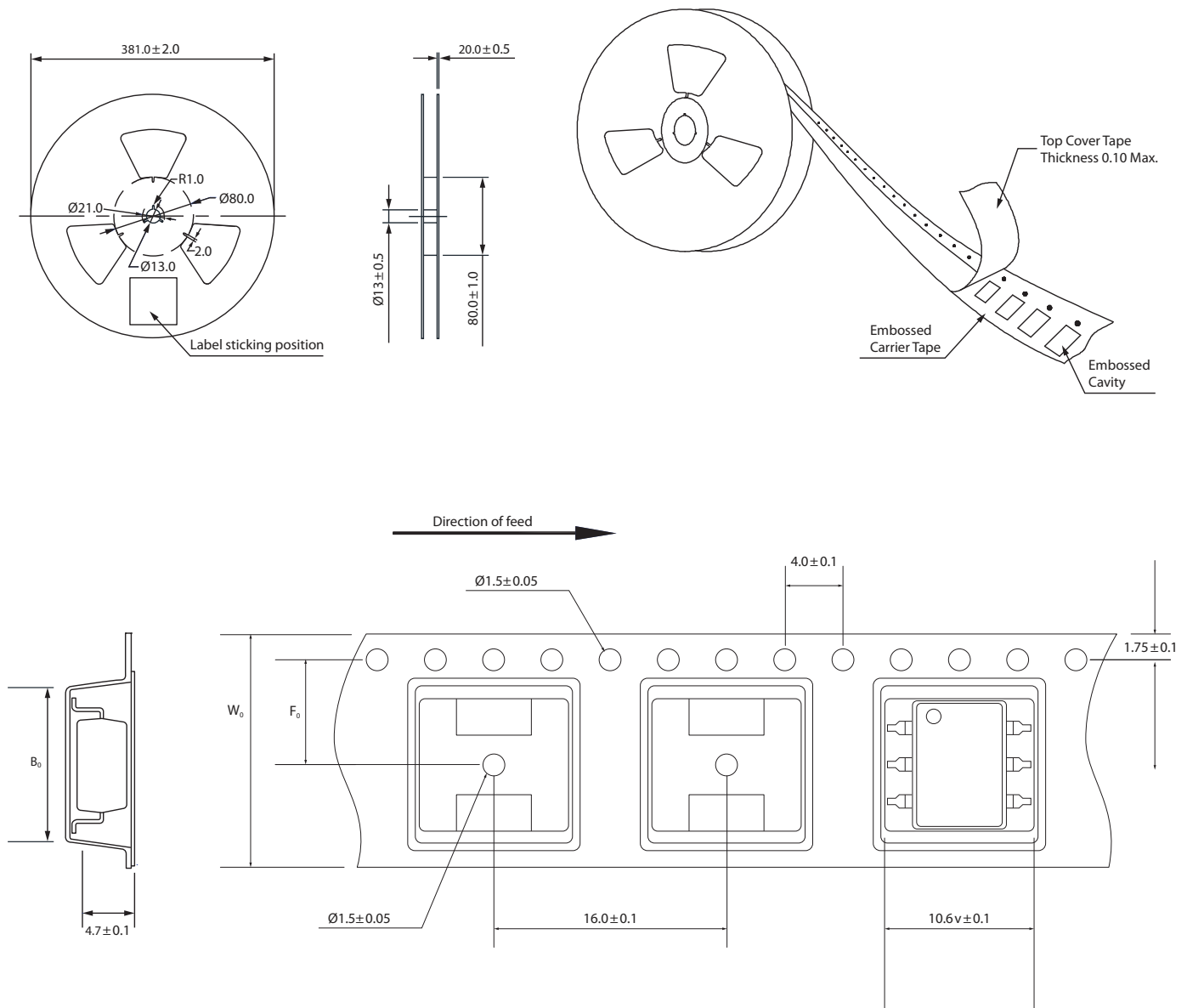


10.3 Cautions

- ▶ Fluxes: Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.
- ▶ Avoid shorting between portion of frame and leads.

11 CotoMOS Relay Packaging Information (Surface Mount Only)

11.1 6-pin SOP Carrier Tape & Reel Units: mm



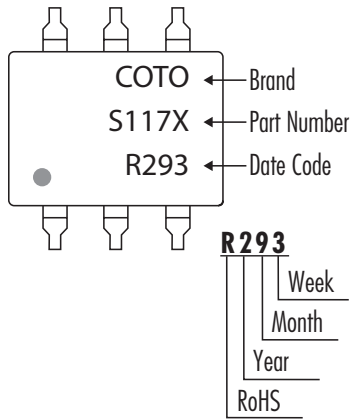
Unit: mm

TYPE	$B_0 \pm 0.1$	$F_0 \pm 0.1$	$W_0 \pm 0.1$	15" REEL/PCS
6P	9.4	7.5	16	1000

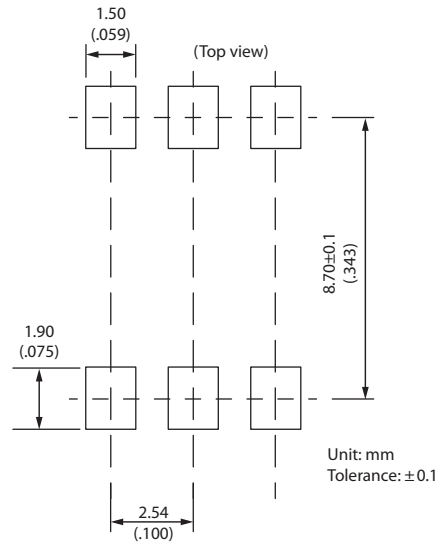
Notes

1. There is a leader of 230mm minimum which consists of carrier and/or cover tape followed by a minimum of 160mm of carrier tape sealed with cover tape.
2. There is a minimum of 160mm of empty component pockets sealed with cover tape.
3. Device pockets are in accordance with EIA standard EIA-481-A and specifications provided above.

11.2 Device Marking



11.3 Recommended Mounting Pad



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