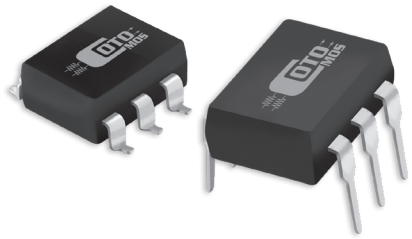
1 Description

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



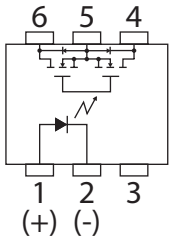
2 Features

- 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

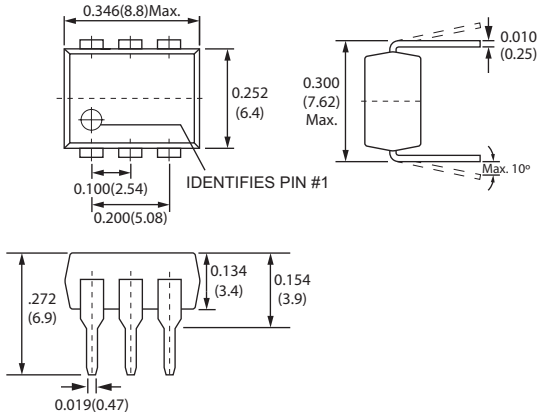
4 Device Schematic

Terminal Identification	
	
1: Anode (LED) 2: Cathode (LED) 3: NC	4,6: Drain (MOS FET) 5: Source (MOS FET)

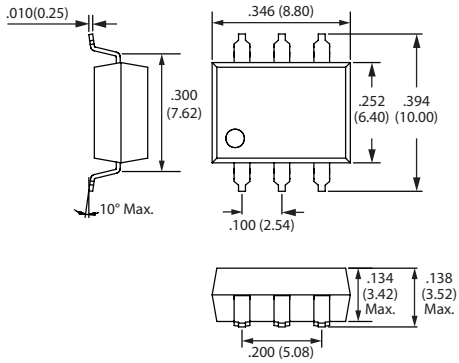
5 DIMENSIONS

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)	I_L	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

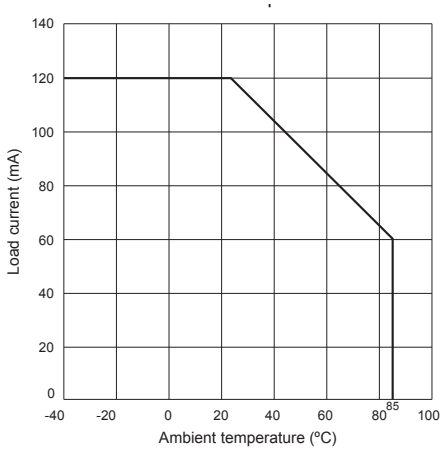
Parameters		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input	LED Forward Voltage	V_F	I_F=10mA		1.3	1.5	V
	Operation LED Current	$I_{F\,ON}$			1.0	5.0	mA
	Recovery LED Voltage	$V_{F\,Off}$		0.7			V
	Recovery LED Current	$I_{F\,OFF}$			0.35	0.8	mA
Output	On-Resistance	R_{ON}	I_F=10mA, I_L=Rating, Time to flow 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		20		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:

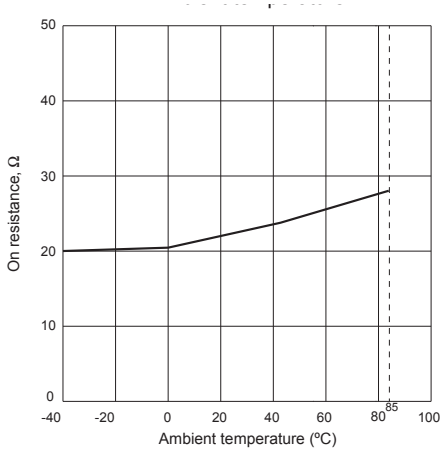
All electrical parameters measured at 25°C unless otherwise specified.

7 CotoMOS® S117X Series Graphs

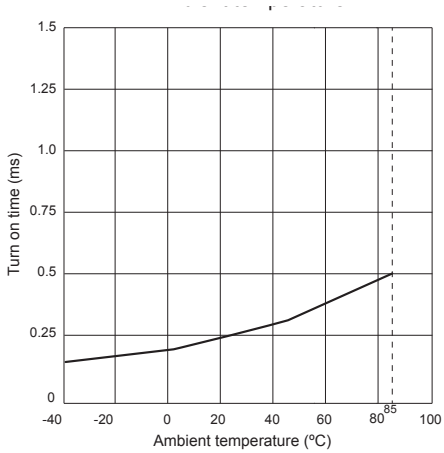
Load Current Vs. Ambient Temperature



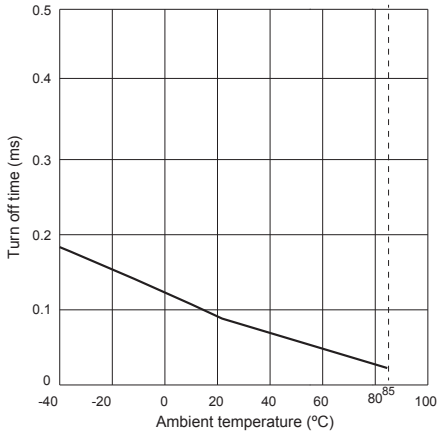
On-Resistance Vs. Ambient Temperature



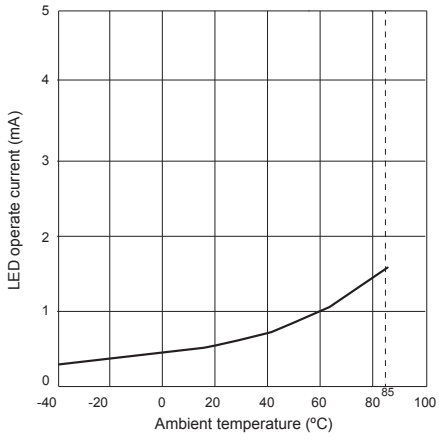
Turn-On Time Vs. Ambient Temperature



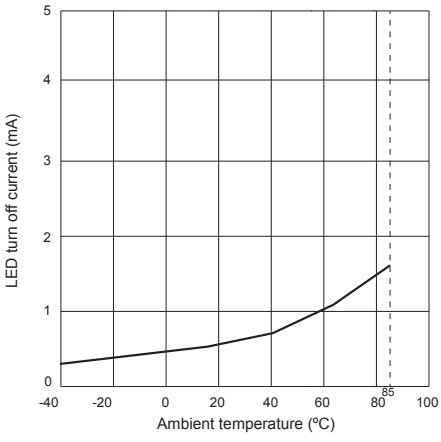
Turn-Off Time Vs. Ambient Temperature



LED Operate Current Vs. Ambient Temperature

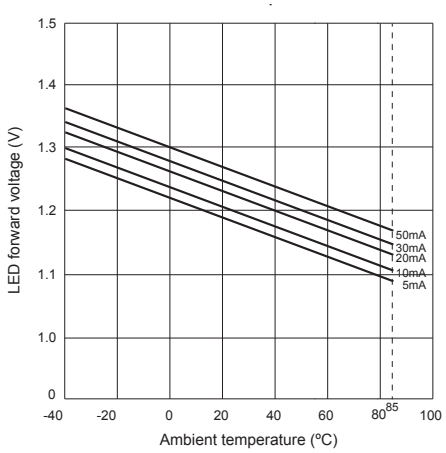


LED Turn-Off Current Vs. Ambient Temperature

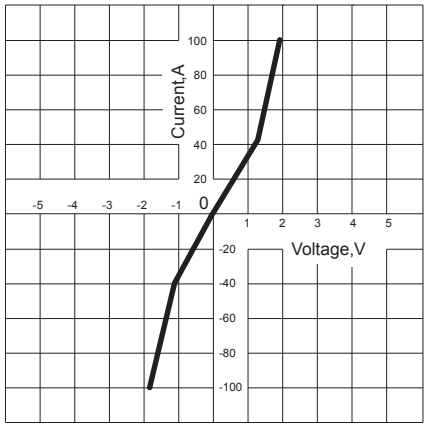


7 CotoMOS® S117X Series Graphs

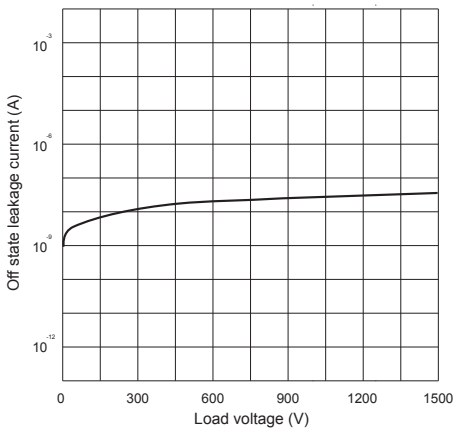
LED Forward Voltage Vs. Ambient Temperature



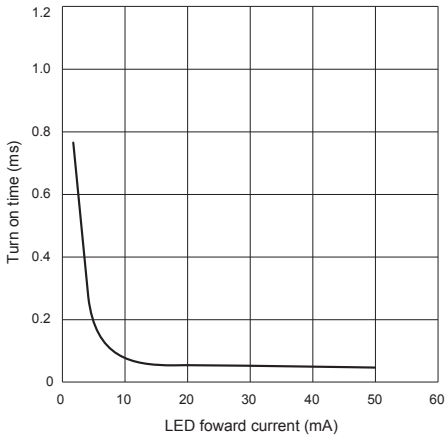
Voltage Vs. Current Characteristics of Output at MOSFET Portion



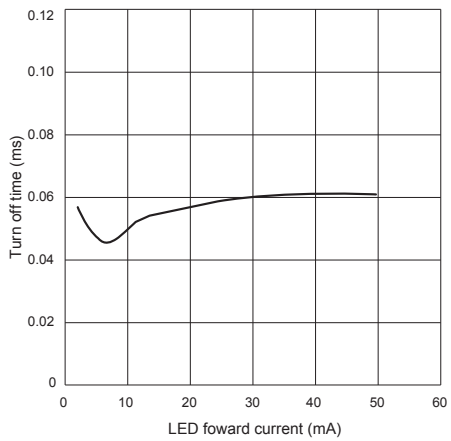
Off-State Leakage Current Vs. Load Voltage



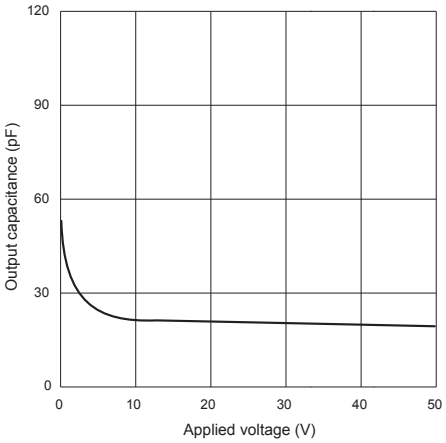
Turn-On Time Vs. LED Forward Current



Turn-Off Time Vs. LED Forward Current

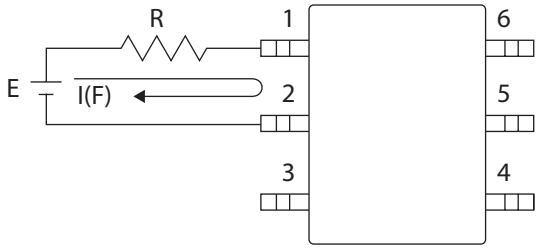


Output Capacitance Vs. Applied Voltage



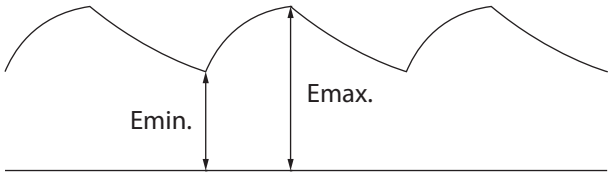
8 Using Methods

Examples of resistance value to control LED forward current (I_F=5mA)



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

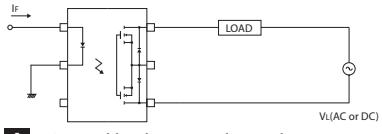
1. LED forward current must be more than 5mA, at E min.
2. LED forward current must be less than 50mA, at E max.



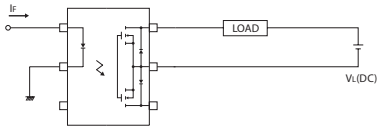
9 Connections

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

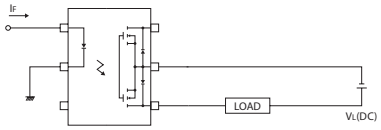
CONNECTIONS

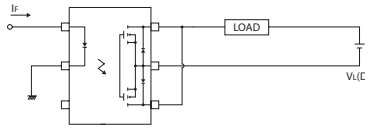


A Control bi-directional signal



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





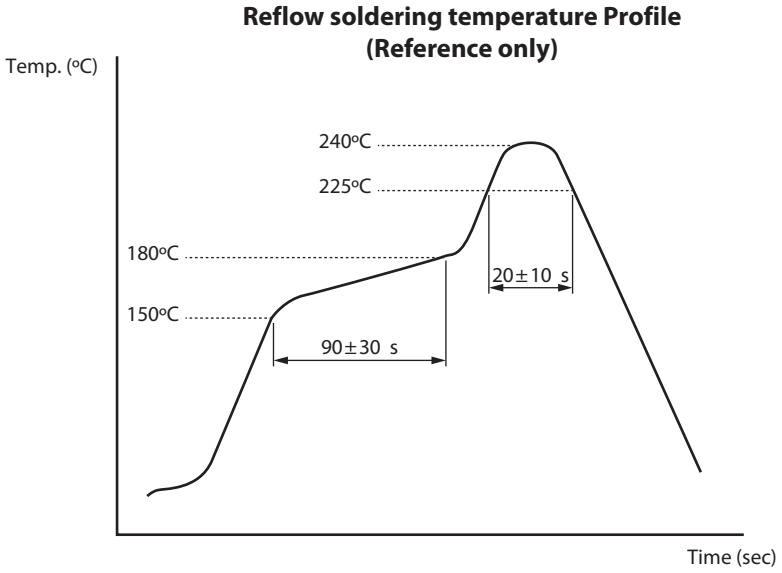
C On-Resistance is 1/2 of B-connection

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

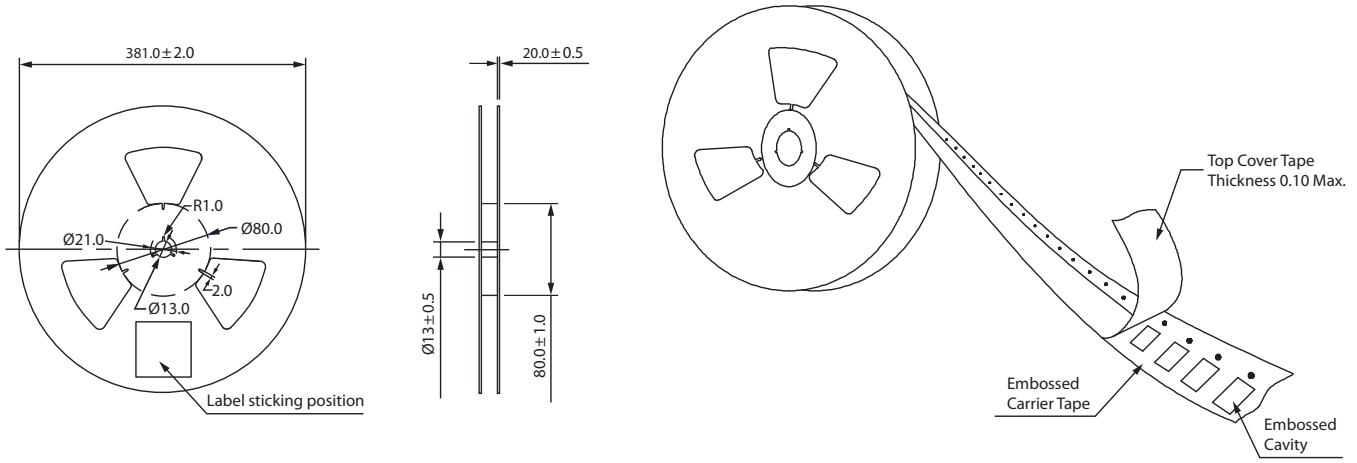


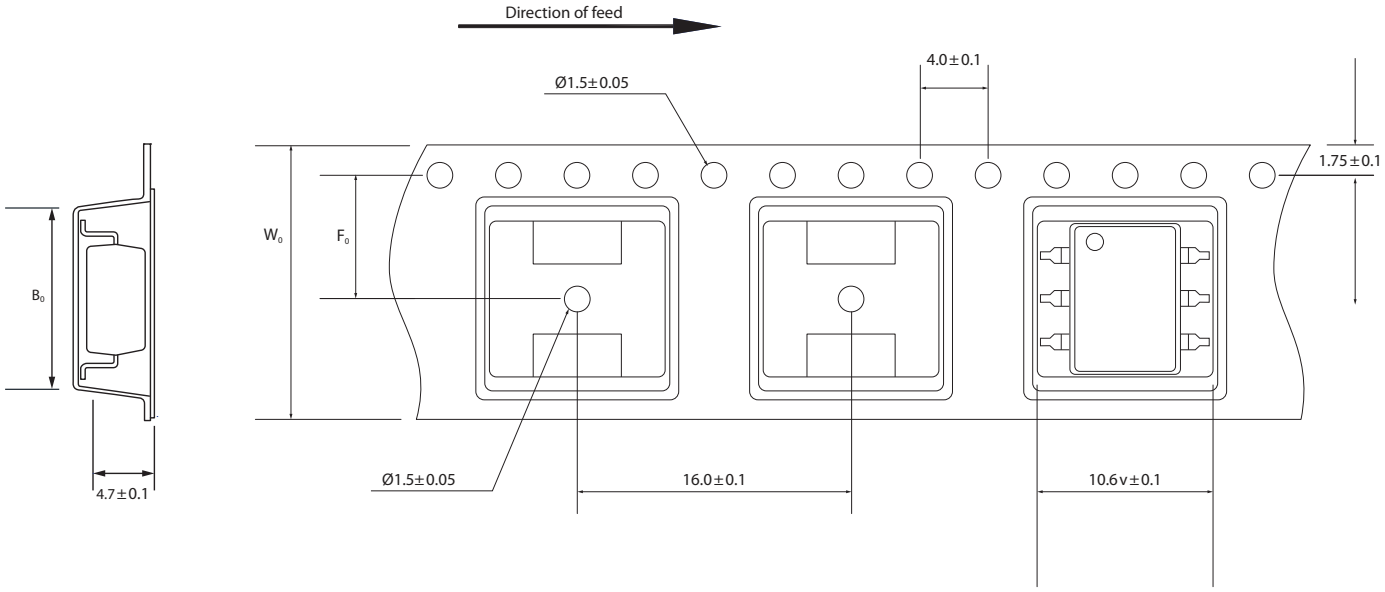
10.3 Cautions

- 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*





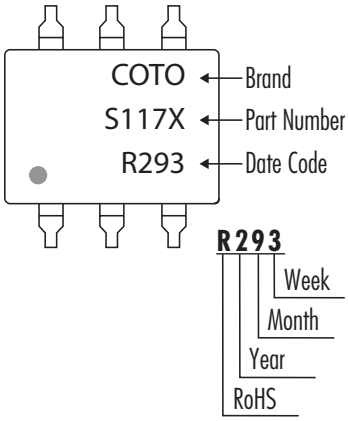
Unit: mm

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

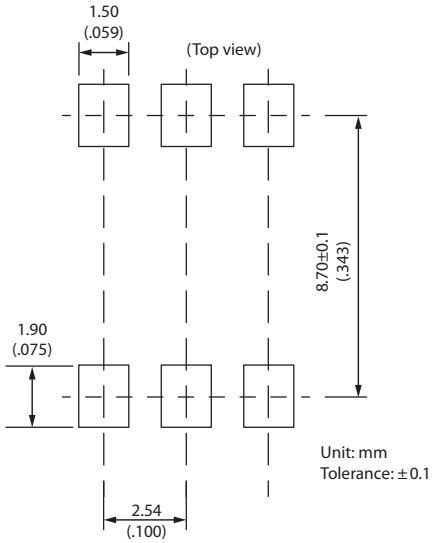
Notes

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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