

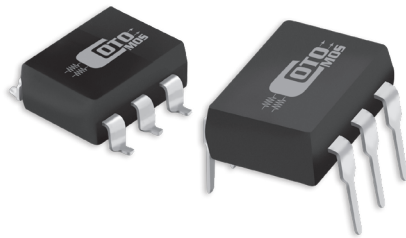
1 Description

The CT140 and CS140 1-form A, high voltage solid state relays combine Coto quality and economy in an industry standard 6 pin DIP package. Both the CT140 and the CS140 offer high voltage switching and high load current. The CT140 utilizes a thru hole lead configuration, while the CS140 offers a surface mount option when the application requires it. Both relays are ideally suited to the needs of Test and Measurement, Solar, and Battery Management.

Device Information

Part Series	Package	Body Size (mm)
CT140	DIP Thru-hole	8.8 x 6.4 x 3.4
CS140	DIP Surface Mount	8.8 x 6.4 x 3.4

Device Package



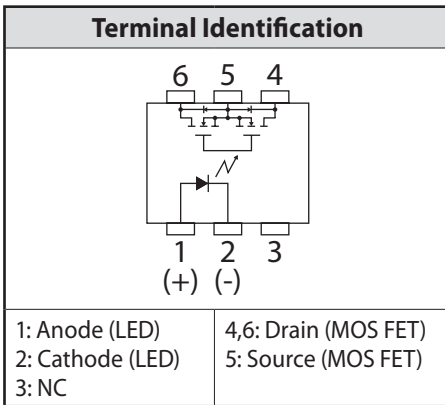
2 Features

- ▶ Contact Form: 1A
- ▶ Load Voltage: 1500V Maximum
- ▶ Operation LED Current: 5.0mA Maximum
- ▶ Load Current: 45mA A(AC), 50mA B(DC), 75mA C(DC)
- ▶ 3750 / 5000 Vrms InputOutput Isolation
- ▶ Output Capacitance: 58pF Typical
- ▶ Low Off-State Leakage Current: 10µA Maximum

3 Applications

- ▶ Test and measurement
- ▶ Solar panels
- ▶ Battery management
- ▶ Telecommunications
- ▶ Industrial control
- ▶ Metering

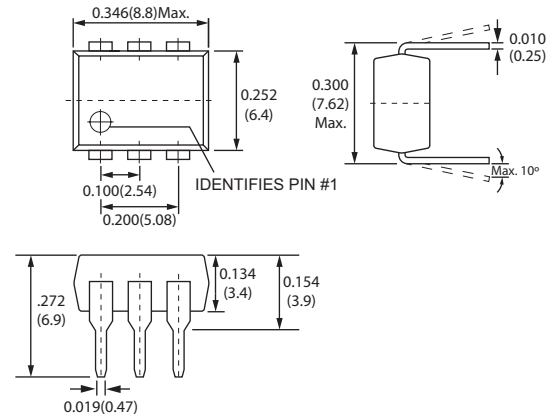
4 Device Schematic



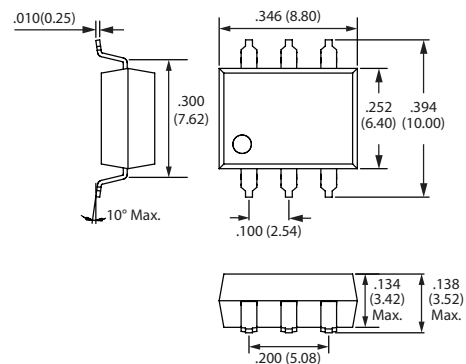
5 DIMENSIONS

in Inches (Millimeters)

CT140



CS140



6 Specifications

Absolute Maximum Ratings

Parameters		Symbol	Rating	Unit
Input	Continuous LED Current	I_F	50	mA
	Peak LED Current (f=100 Hz, 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	1500	V (AC peak or DC)
	Load Current	I_L	A	45mA (AC)
			B	50mA (DC)
			C	75mA (DC)
	Peak Load Current	I_{Peak}	180	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

Electro-Optical Characteristics

Parameters		Symbol	Conditions	Min.	Typ.	Max.	Unit
Input	LED Forward Voltage	V_F	$I_F=10mA$		1.2	1.5	V
	Operation LED Current	I_{FON}		0.7	0.8	5.0	mA
	Recovery LED Voltage	V_{FOFF}			0.35	0.5	V
Output	On-Resistance Drain to Drain	R_{on}	$I_F=10mA, I_L=Rating$ $I_F=10mA, I_L<5mA$		130 220	200 300	Ω
	Off-State Leakage Current	I_{LEAK}	$I_F=0mA, V_L=1500V$			10	μA
	Output Capacitance	C_{out}	$V_L=0V, f=1MHz$		58		pF
Trans- mission	Turn-On Time	T_{ON}	$I_F=10mA, I_L=Rating$		0.3	1.0	ms
	Turn-Off Time	T_{OFF}			0.3	0.2	ms
Coupled	I/O Isolation Resistance	$R_{I/O}$		10^{10}			Ω
	I/O Capacitance	$C_{I/O}$	$f=1MHz$		0.8	1.5	pF

Environmental Ratings: Operating Temp: -40°C to +85°C; Storage Temp: -40 to +100 C.

7 Connections

CONNECTIONS

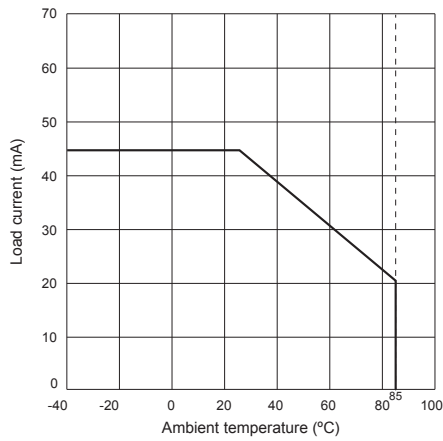
A Control bi-directional signal

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

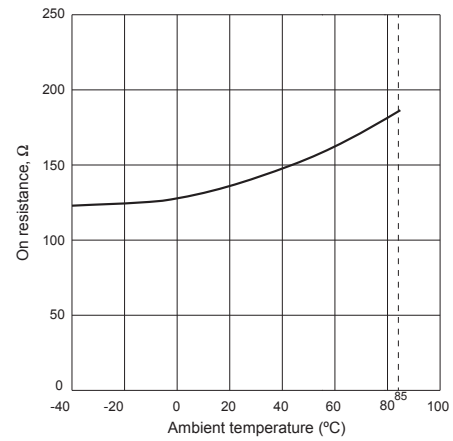
C On-Resistance is 1/2 of B-connection

8 CT140/CS140 Series Graphs

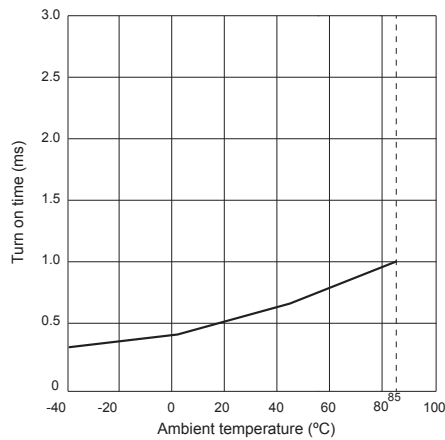
Load Current Vs. Ambient Temperature



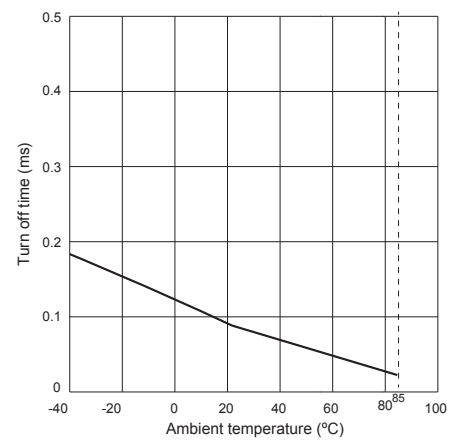
On-Resistance Vs. Ambient Temperature



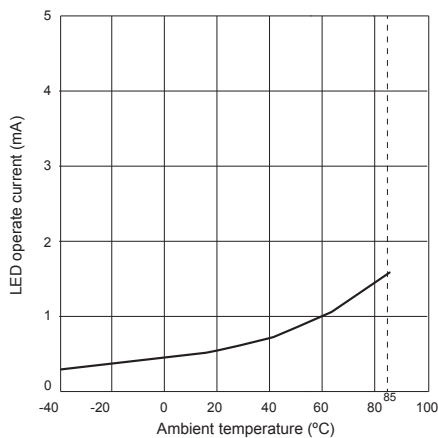
Turn-On Time Vs. Ambient Temperature



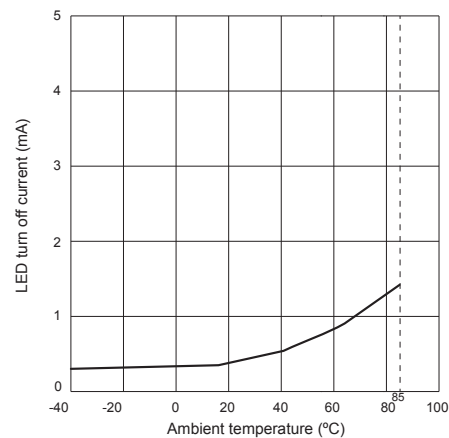
Turn-Off Time Vs. Ambient Temperature



LED Operate Current Vs. Ambient Temperature

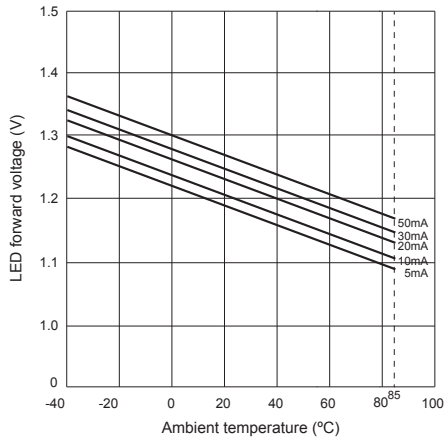


LED Turn-Off Current Vs. Ambient Temperature

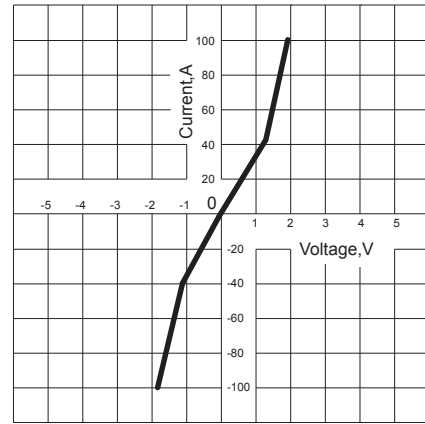


8 CT140/CS140 Series Graphs

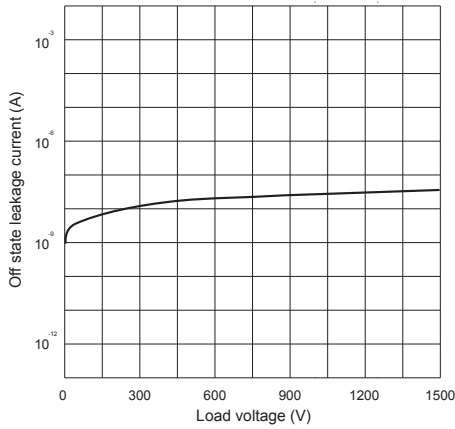
LED Forward Voltage Vs. Ambient Temperature



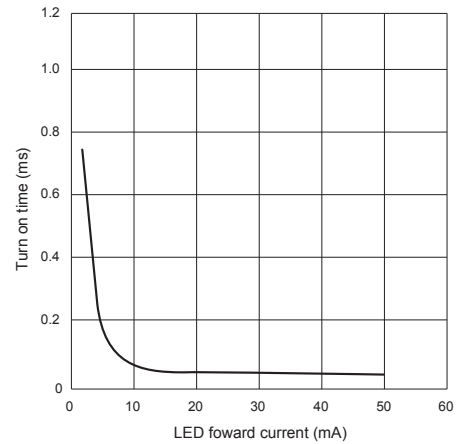
Voltage Vs. Current Characteristics of Output at MOSFET Portion



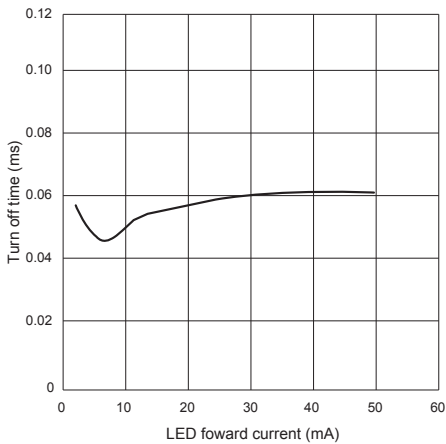
Off-State Leakage Current Vs. Load Voltage



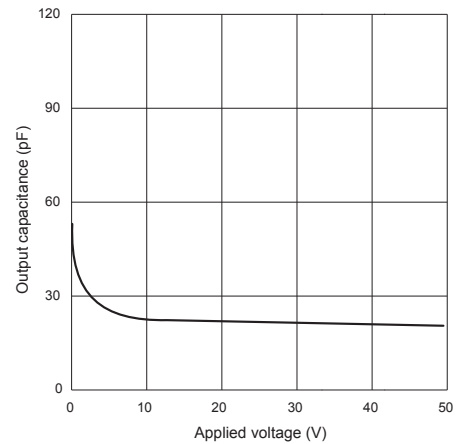
Turn-On Time Vs. LED Forward Current



Turn-Off Time Vs. LED Forward Current

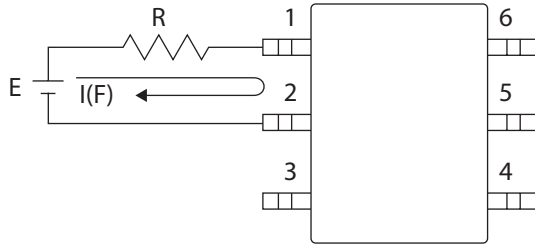


Output Capacitance Vs. Applied Voltage



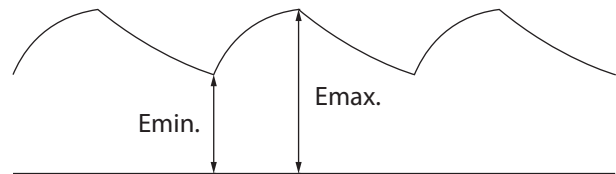
9 Using Methods

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



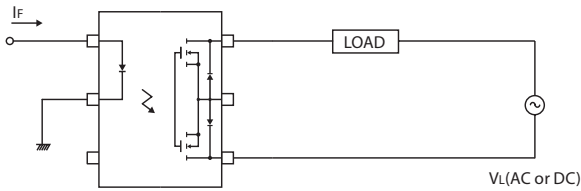
E	R
3.3V	Approx. $333\ \Omega$
5V	Approx. $640\ \Omega$
12V	Approx. $1.9\text{K}\ \Omega$
15V	Approx. $2.5\text{K}\ \Omega$
24V	Approx. $4.1\text{K}\ \Omega$

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

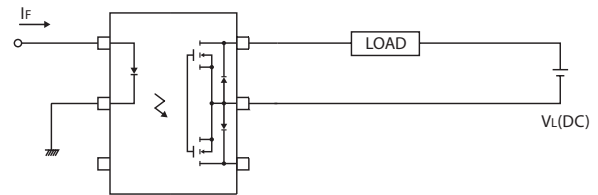


CONNECTIONS

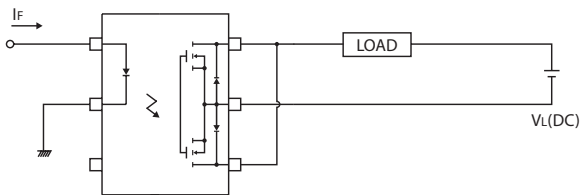
Regulate the spike voltage generated on the inductive load as follows:



A Control bi-directional signal



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



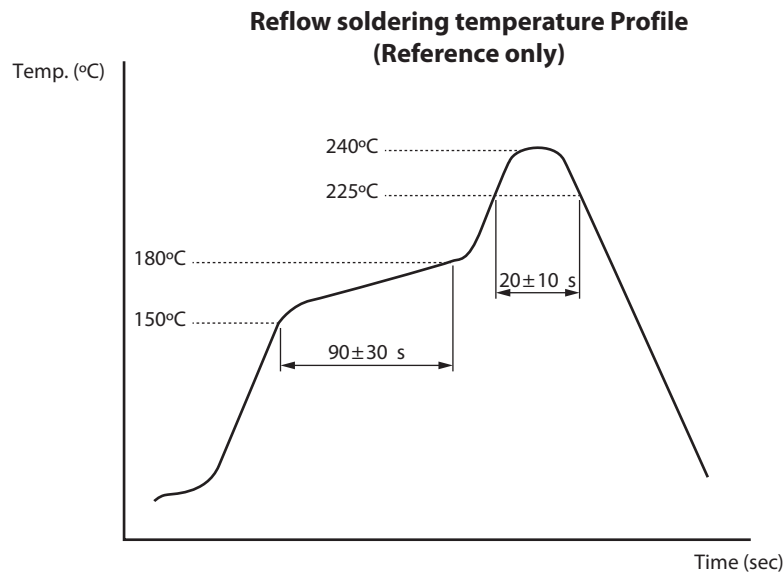
C On-Resistance is 1/2 of B-connection

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

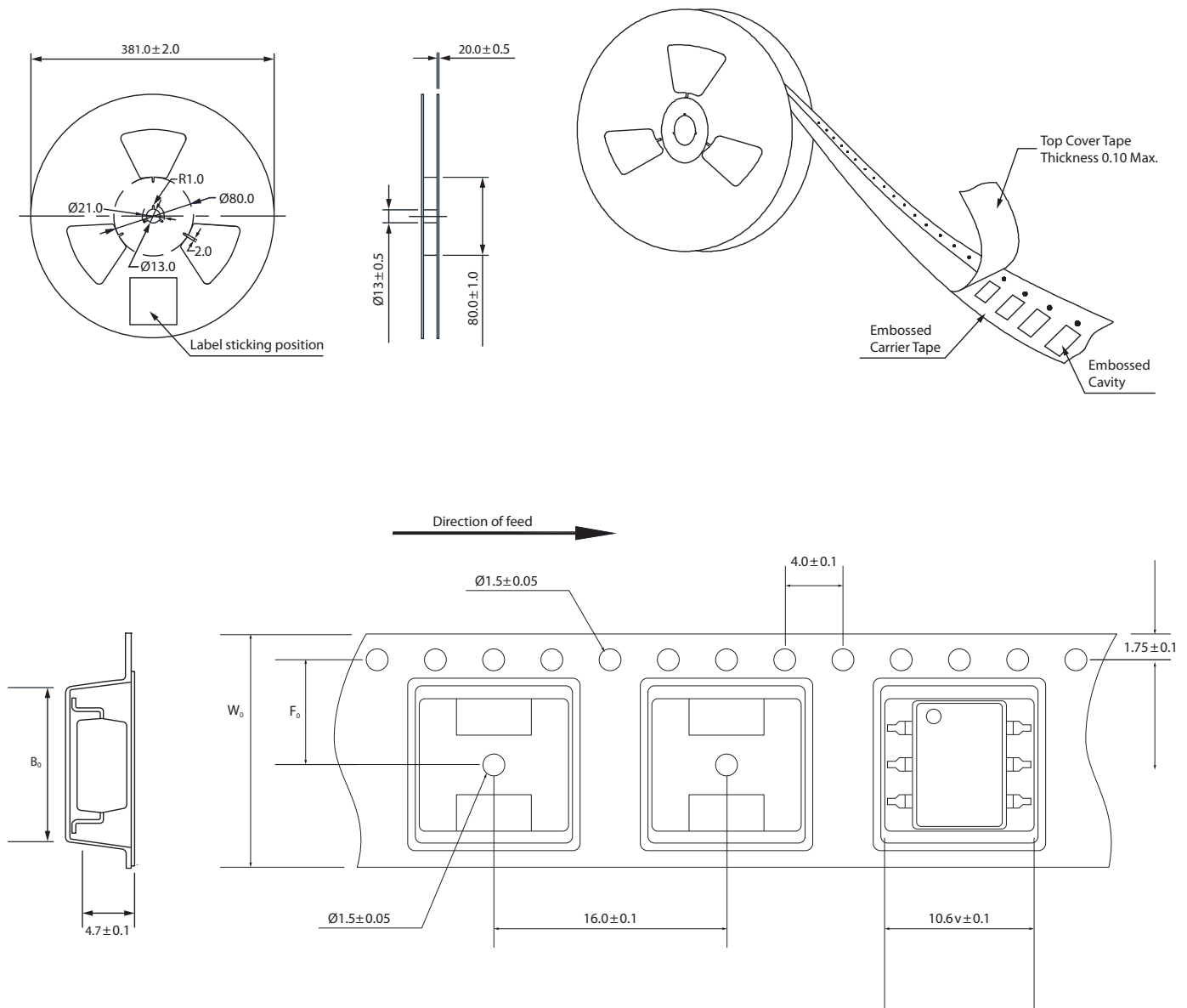


10.3 Cautions

- ▶ 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



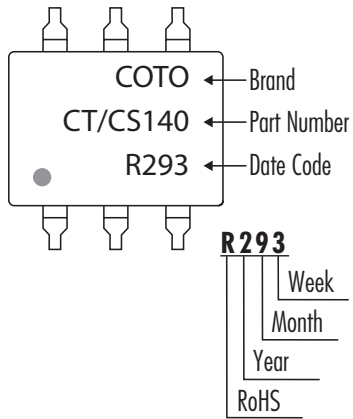
Unit: mm

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

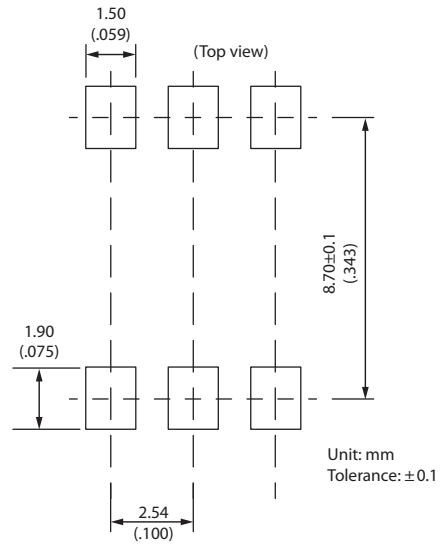
Notes

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.
4. Packaging: 1000pcs per reel (surface mount); 50pcs per tube (through-hole).

11.2 Device Marking



11.3 Recommended Mounting Pad



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