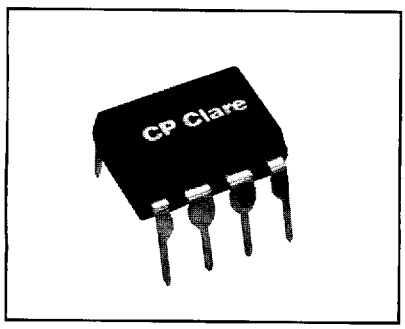
OptoMOS® "TS" Series
Multifunction Solid State Telecom Switches



DESCRIPTION

CP Clare's "TS" series telecom switches provide optimal function density for tip/ring interface circuits. The "TS" series incorporates an optically isolated solid state relay for hookswitch, dial-pulse or loop start switching with a bi-directional optocoupler for detection of ringing signal or loop current (off-hook/on-hook).

The "TS" products may be used to switch and detect AC or DC. Aside from the obvious advantage of board space savings, there are significant cost savings due to the elimination of multiple discrete components.

FEATURES

- Two functions in one package (hookswitch and ring detect/loop detect)
- Small 8 pin DIP package (.370) length
- Bi-directional current sensing
- Bi-directional current switching
- Replaces up to eight components
- 3750V_{RMS} input/output isolation
- FCC compatible
- No EMI/RFI generation
- Machine insertable, wave solderable
- Surface Mount and Tape & Reel version available
- UL recognized file #: E76270
- CSA certified file #: LR 43639-10
- VDE compatible
- BSI certified to:

  BS EN 60950: 1992
  (BS 7002: 1992)
  Certificate #: 7344

  BS EN 41003: 1993
  Certificate #: 7344

  Complies with EN41003: 1993

APPLICATIONS

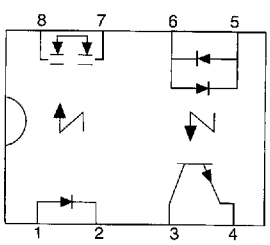
- Telecom switching
- Tip/Ring circuits
- Modem switching (laptop, notebook, pocket size)
- Hookswitch
- Dial pulsing
- Ground start
- Ringer injection
- Loop detect
- Ring detect

RATINGS (@ 25°C)

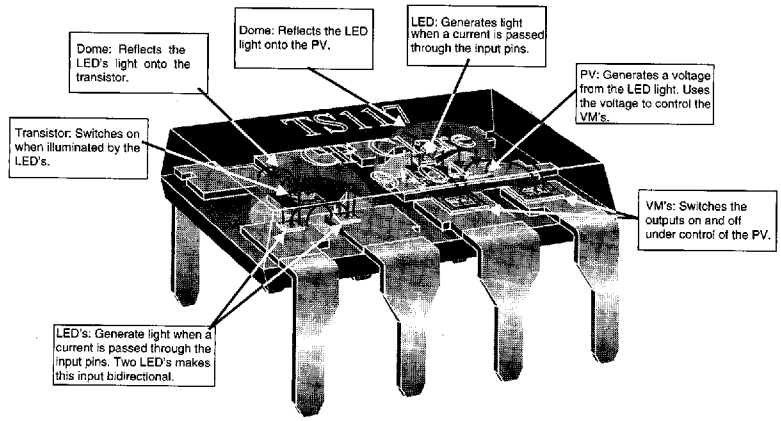
Parameter	Min	Typ	Max	Units
Input Power Dissipation	-	-	150[1]	mW
Input Control Current	-	-	100	mA
Peak (10ms)	-	-	1	A
Reverse Input Voltage	-	-	5	V
Phototransistor	-	-	150[2]	mW
Power Dissipation				
Total Package Dissipation	-	-	500[3]	mW
Capacitance				
Input to Output	-	3	-	pF
Isolation Voltage				
Input to Output	2500	-	-	V_{RMS}
"E" Suffix (optional)	3750	-	-	V_{RMS}
Operating Temperature	-40	-	+85	°C
Storage Temperature	-40	-	+125	°C
Soldering Temperature (10 Seconds Max)	-	-	+260	°C

[1] Derate Linearly 1.33 mW/°C
[2] Derate Linearly 2.70 mW/°C
[3] Derate Linearly 1.67 mW/°C

EQUIVALENT CIRCUIT



1. +LED-Relay
2. - LED-Relay
3. Collector-Phototransistor
4. Emitter-Phototransistor
5. LED-Phototransistor +/-
6. LED- Phototransistor -/+
7. Load-Relay (MOSFET output)
8. Load-Relay (MOSFET output)



Note: For Mechanical Dimensions see pages 46-49.

Relay Portion (Pins 1,2,7,8)

PART NUMBER			TS117[2]	TS118[2]	TS120[2]	TS122[2]	TS190[2]	UNITS
Contact Form			Form A[3]	Form B[3]	Form A[3]	Form A[3]	Form A[3]	
Output Characteristics (Pins 7,8) @ 25°C	Load Voltage, DC or Peak AC		350	350	350	250	400	V
	Load Current, Continuous		120	120	120	170	150	mA
	Peak Load Current (10ms)		350	350	350	400	350	mA
	On-Resistance	Min	15	15	15	10	10	Ω
	@ Rated Loaded Current	Typ	23	23	23	12	15	
		Max	35	35	35	20	22	
	Off State Leakage Current @ Rated Load Voltage	Max	1	1	1	1	1	µA
	Typical Output Capacitance @50V, F=1MHz		25	25	25	50	25	pF
	T_{ON} @ I_{LED}=5mA							
	[A](Also Operates at 2mA with	Typ	1[A]	1	1	1	0.4	ms
	T_{ON}≤5ms, T_{OFF}≤3ms max)[1]	Max	3[A]	3	2.5	3	1	
	T_{OFF} @ I_F=5mA	Typ	1	1	1	1	.01	ms
		Max	3	3	2.5	3	0.25	
Input Characteristics (Pins 1,2) @ 25°C	Input Control Current	Min	2	5	5	5	5	mA
	I_{LED}	Max	100	100	100	100	100	
	Input Voltage Drop	Min	0.9	0.9	0.9	0.9	0.9	V
	V_F @ 5mA	Typ	1.2	1.2	1.2	1.2	1.2	
		Max	1.4	1.4	1.4	1.4	1.4	
	Reverse Input Current	Max	10	10	10	10	10	µA
	Reverse Input Voltage	Max	5	5	5	5	5	V

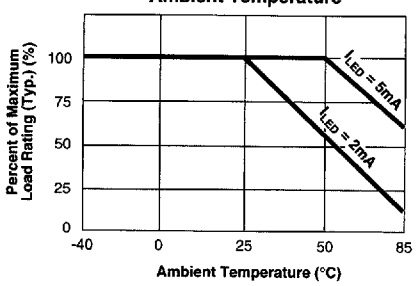
Detector Portion (Pins 3,4,5,6)

Output Characteristics (Pins 3,4) @ 25°C	Phototransistor BV_{CEO} @ I_C=10µA	Min	20	20	20	20	20	V
		Typ	50	50	50	50	50	
	Phototransistor I_{CEO}							
	V_{CE}=5V,I_{LED}=0mA	Typ	50	50	100	50	50	nA
		Max	500	500	1000	500	500	
	Saturation Voltage							
	I_C=2mA, I_{LED}=16mA	Typ	0.3	0.3	0.5[B]	0.3	0.3	V
	[B]I_C=.15mA, I_{LED}=.05mA (Darlington)	Max	0.5	0.5	0.8[B]	0.5	0.5	
Input Characteristics (Pins 5,6) @ 25°C	Current Transfer Ratio							
	I_{LED}=6mA, V_{CE}=0.5V	Typ	33	33	300[C]	33	33	%
	[C]I_C=20mA, V_{CE}=0.8 (Darlington)	Max	100	100	1000[C]	100	100	
	Input Control Current							
	I_C=2mA, V_{CE}=0.5V	Typ	2	2	1[D]	2	2	mA
	[D]I_C=20mA, V_{CE}=0.8V (Darlington)	Max	6	6	2[D]	6	6	
	Input Voltage Drop							
	V_F @ 5mA	Min	0.9	0.9	0.9	0.9	0.9	
		Typ	1.2	1.2	1.2	1.2	1.2	V
		Max	1.4	1.4	1.4	1.4	1.4	
	Input Current, Detector must be off	Min	5	5	N/A	5	5	µA
	I_C=1µA, V_{CE}=5V	Typ	25	25	N/A	25	25	
Input to Output Isolation			2500	2500	2500	2500	2500	V_{RMS}
With "E" Suffix (optional)			3750	3750	3750	3750	3750	
Current Limiting Version Available[1]			Yes	No	Yes	Yes	Yes	
(Add "L" Suffix To Part Number)								

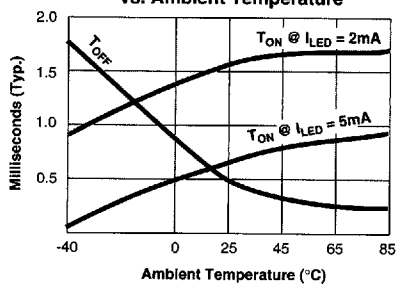
[1]Current limiting typically adds 5Ω to the total on-resistance of the device. [2]Available in low profile flatpack (add "P" suffix). [3]Form A=Norm. Open, Form B=Norm. Closed.

Relay Portion

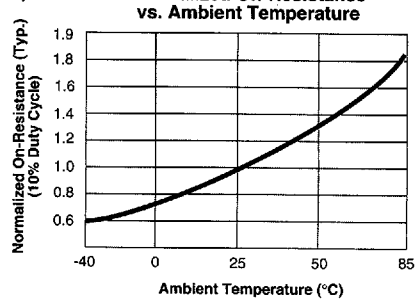
1) Load Current vs. Ambient Temperature



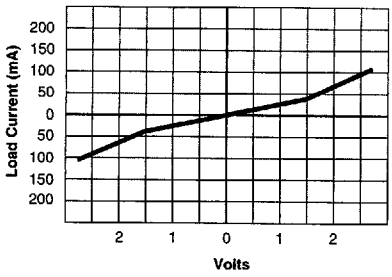
2) Switching Time (@ 2mA and 5mA) vs. Ambient Temperature



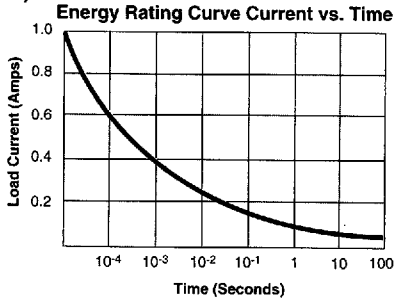
3) Normalized On-Resistance vs. Ambient Temperature



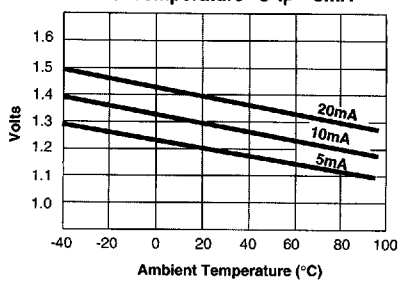
4) Load Voltage vs. Load Current (Typical)



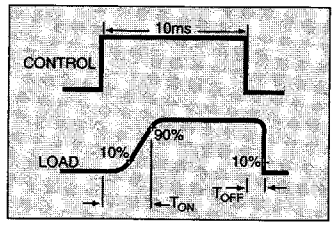
5) Energy Rating Curve Current vs. Time



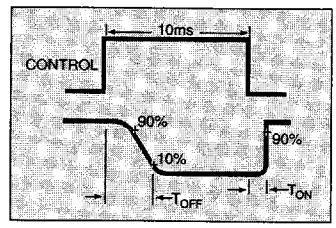
6) Typical Forward Voltage vs. Temperature @ I_F = 5mA



7) Switching Characteristics of Normally Open (Form A) Devices

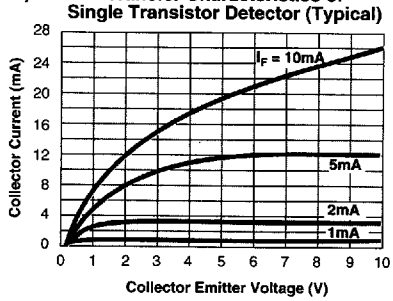


8) Switching Characteristics of Normally Closed (Form B) Devices

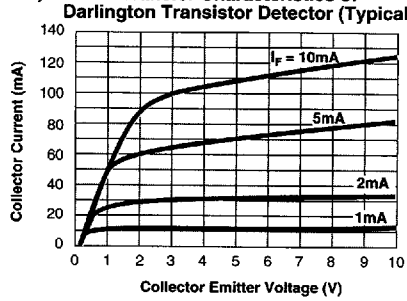


Detector Portion

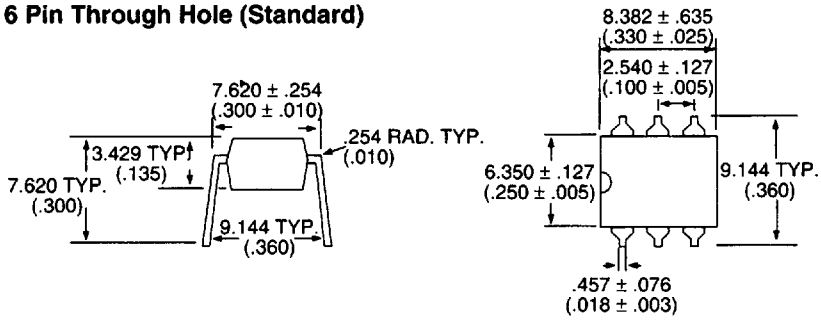
9) Transfer Characteristics of Single Transistor Detector (Typical)



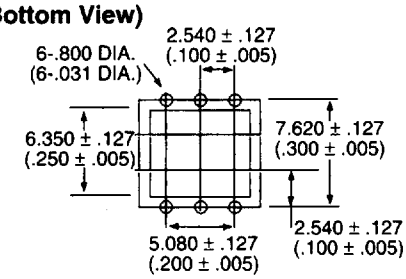
10) Transfer Characteristics of Darlington Transistor Detector (Typical)



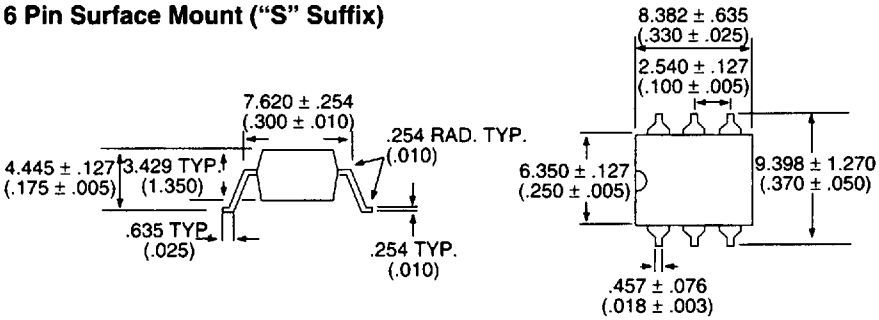
6 Pin Through Hole (Standard)



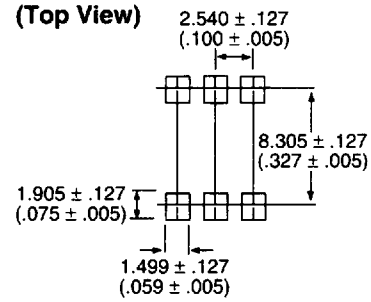
6 Pin PC Board Pattern (Bottom View)



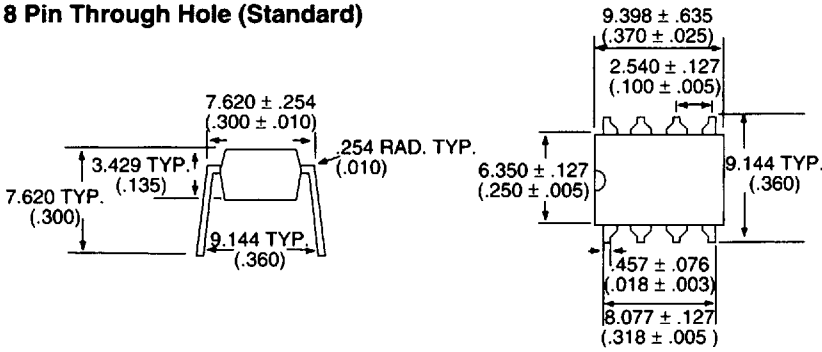
6 Pin Surface Mount ("S" Suffix)



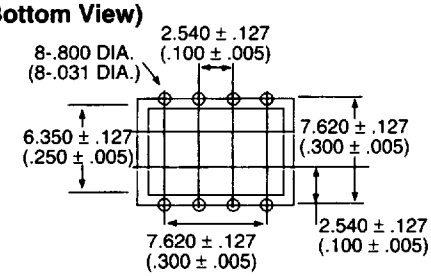
6 Pin Mounting Pad (Top View)



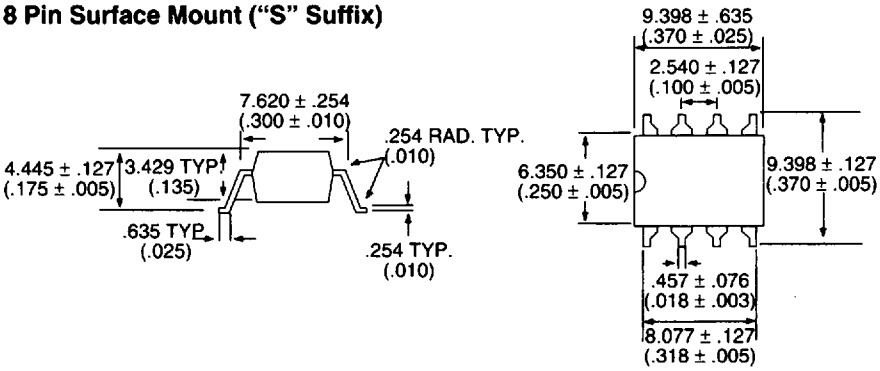
8 Pin Through Hole (Standard)



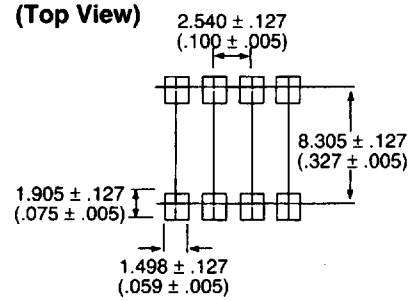
8 Pin PC Board Pattern (Bottom View)



8 Pin Surface Mount ("S" Suffix)

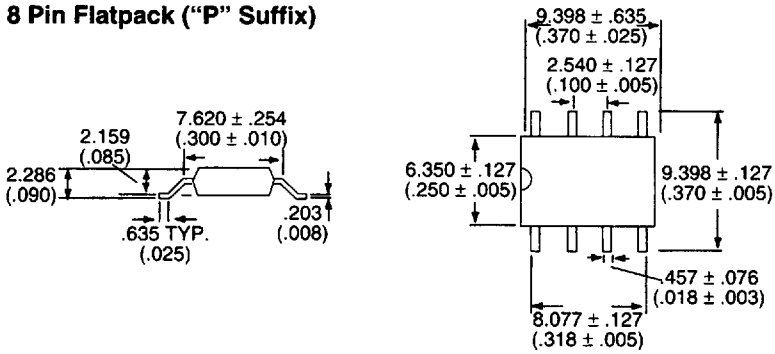


8 Pin Mounting Pad (Top View)

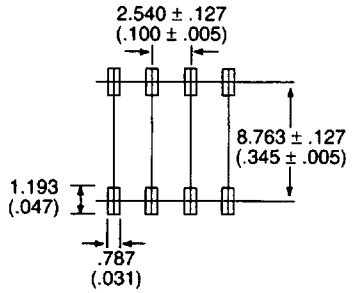


DIMENSIONS
mm
(Inches)

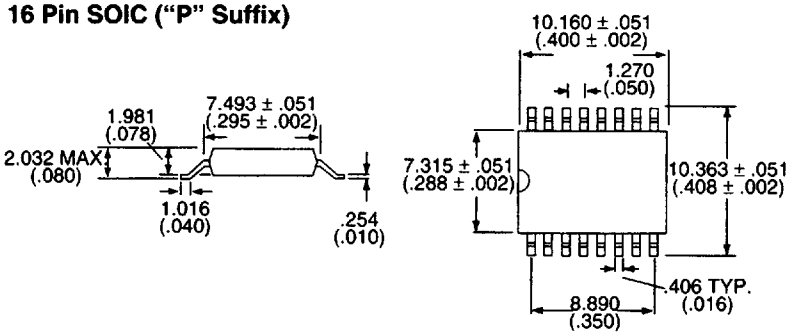
8 Pin Flatpack ("P" Suffix)



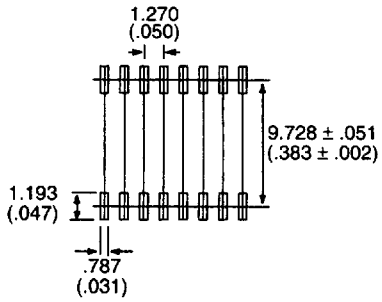
8 Pin Flatpack Mounting Pad (Top View)



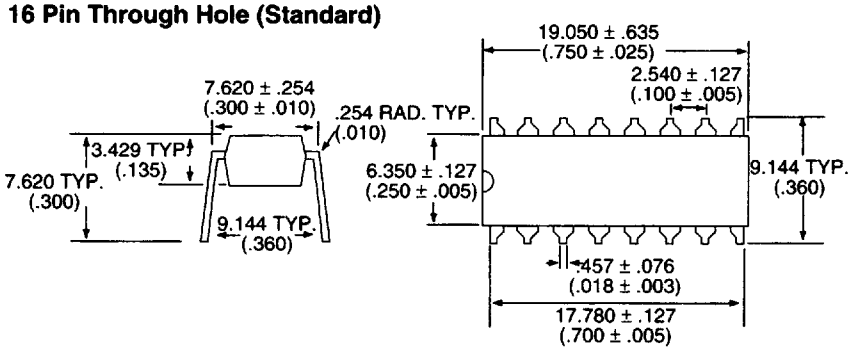
16 Pin SOIC ("P" Suffix)



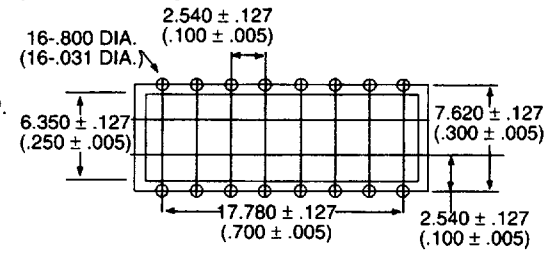
16 Pin SOIC Mounting Pad (Top View)



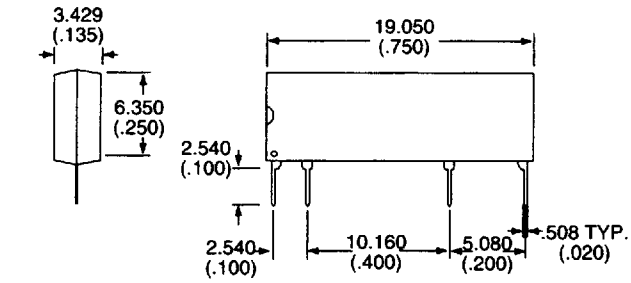
16 Pin Through Hole (Standard)



16 Pin PC Board Pattern (Bottom View)

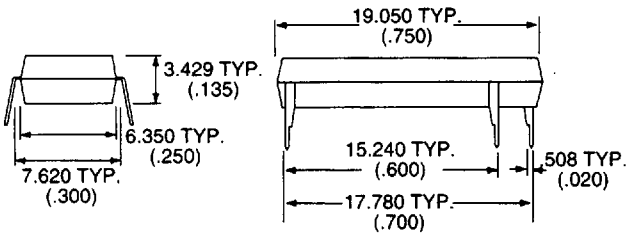


8 Pin SIP

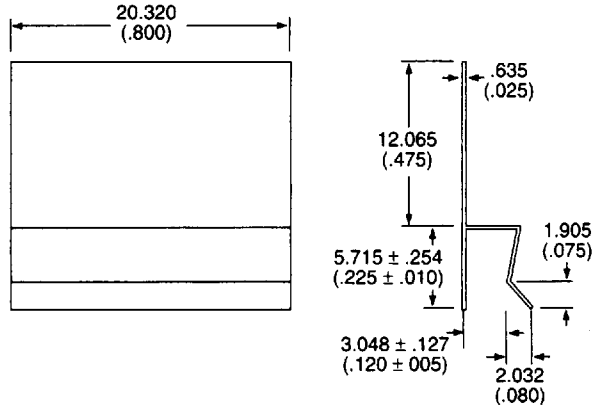


DIMENSIONS
mm
(Inches)

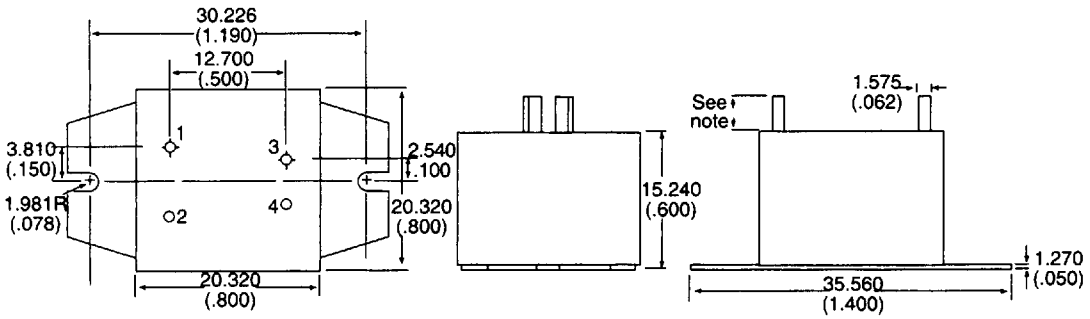
16 Pin DIP



Thermal Clip

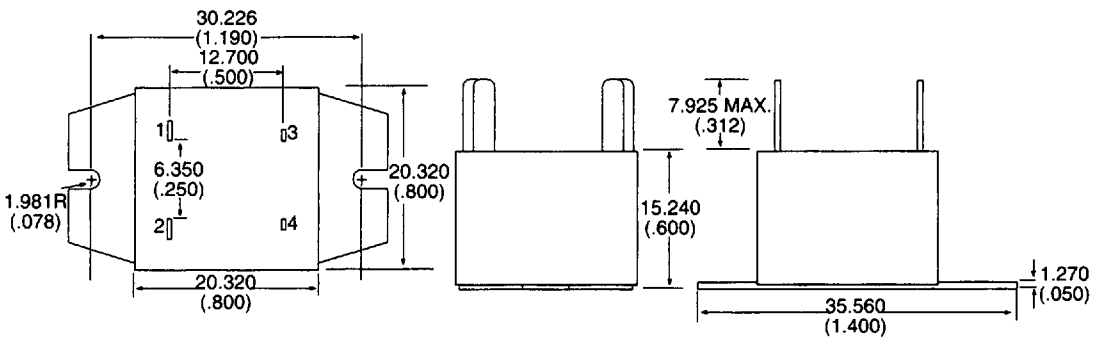


OptoFILM® 10A Series, Pins

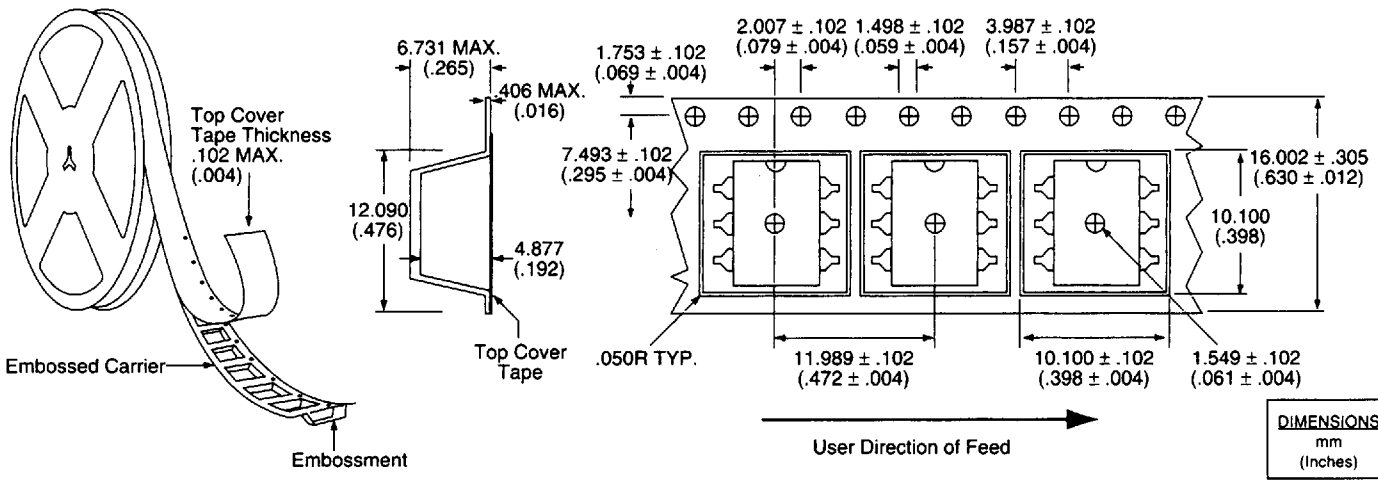


Note: Specify "-1" (0.300" pins)
Specify "-3" (0.175" pins)

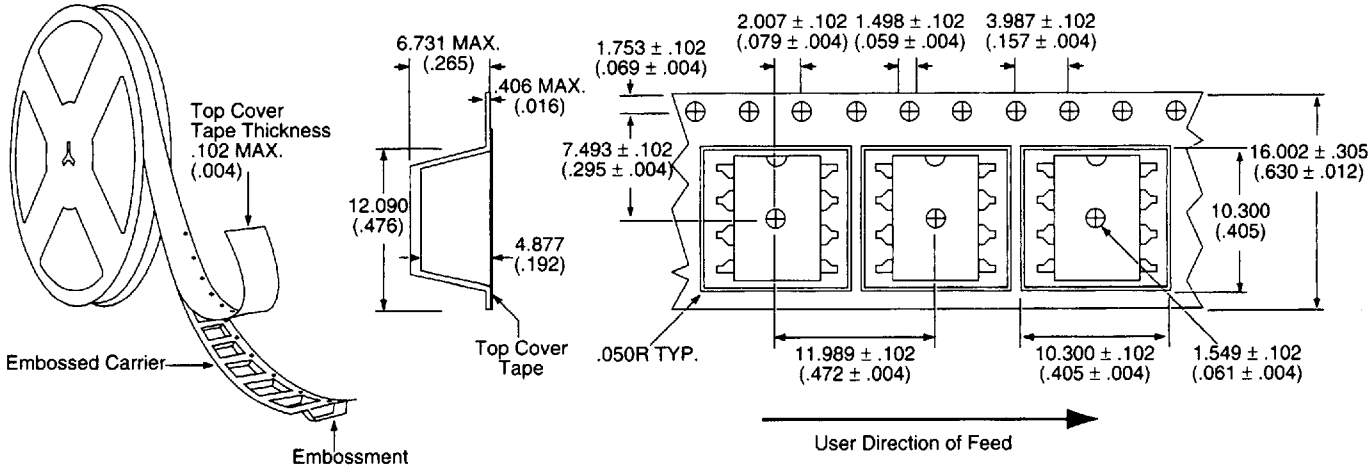
OptoFILM® 10A Series, Quick Connect



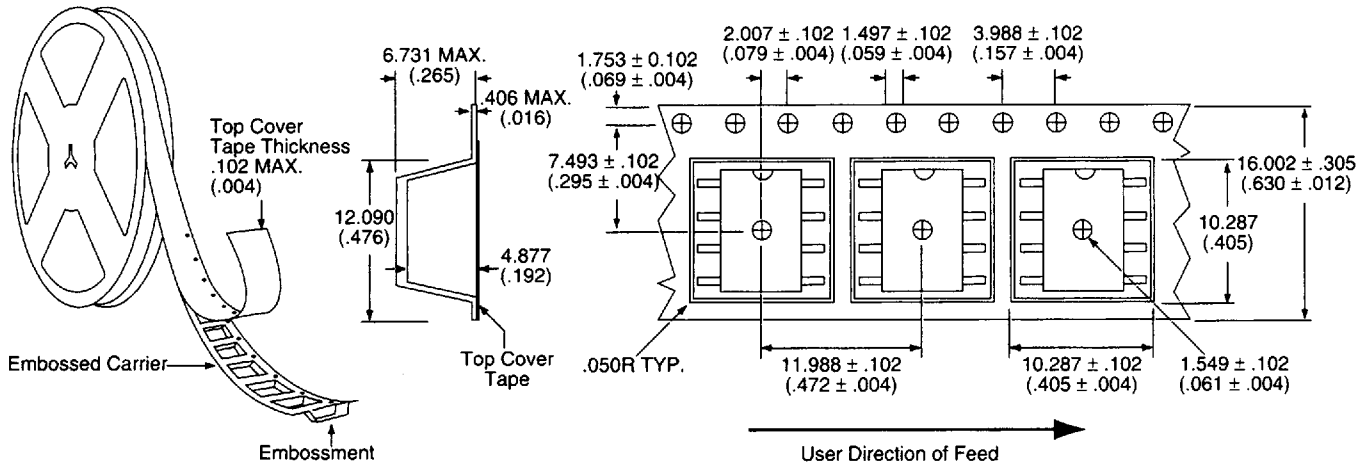
Tape and Reel Packaging for 6 Pin Surface Mount Package



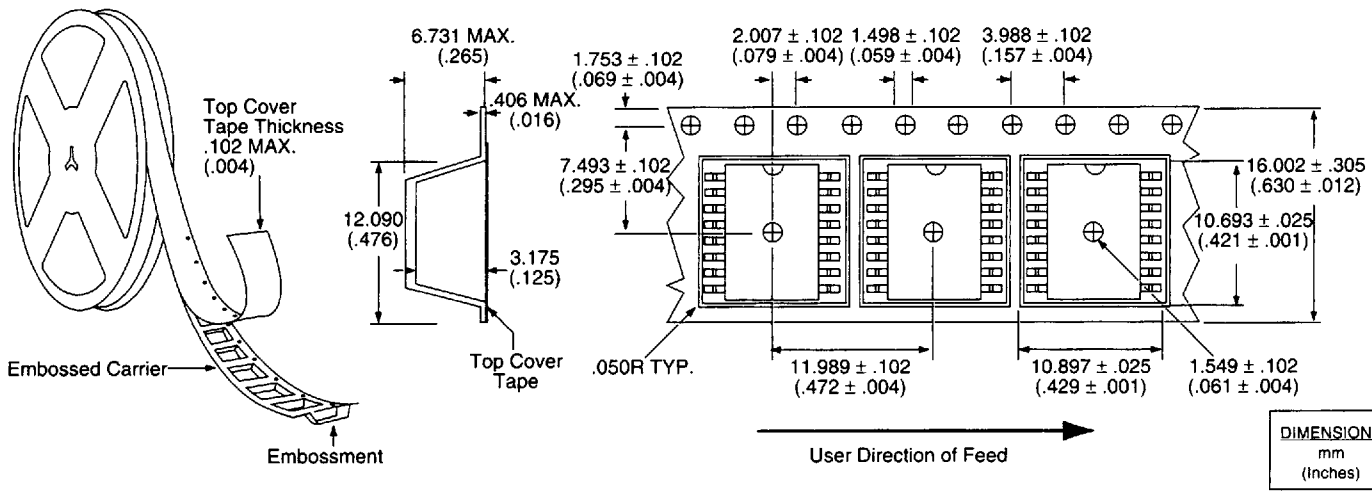
Tape and Reel Packaging for 8 Pin Surface Mount Package



Tape and Reel Packaging for 8 Pin Flatpack Package



Tape and Reel Packaging for 16 Pin SOIC Package



DIMENSIONS
mm
(Inches)