



Parameters	Ratings	Units
Load Voltage	400	V _p
Load Current	150	mA
Max R _{ON}	25	Ω

Features

- Small 8-Pin Package
- Through-hole and surface mount packages available
- Low Drive Power Requirements (TTL/CMOS Compatible)
- No Moving Parts
- High Reliability
- Arc-Free With No Snubbing Circuits
- 3750V_{rms} Input/Output Isolation
- FCC Compatible
- VDE Compatible
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable
- Tape & Reel available for surface mount packages.

Applications

- Telecommunications
 - Telecom Switching
 - Tip/Ring Circuits
 - Modem Switching (Laptop, Notebook, Pocket Size)
 - Hook Switch
 - Dial Pulsing
 - Ground Start
 - Ringing Injection
- Instrumentation
 - Multiplexers
 - Data Acquisition
 - Electronic Switching
 - I/O Subsystems
 - Meters (Watt-Hour, Water, Gas)
- Medical Equipment-Patient/Equipment Isolation
- Security
- Aerospace
- Industrial Controls

Description

TS190L is a 400V_p, 150mA, 25Ω, 1-Form-A current limiting relay with a bidirectional input, single transistor output optocoupler in a single package. The Solid State Relay (SSR) features enhanced peak load voltage capability with improved peak load current handling for specialized telecom applications.

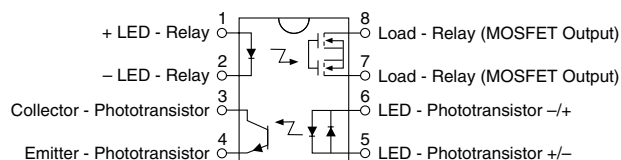
Approvals

- UL Recognized: File Number E76270
- CSA Certified: File Number LR 43639-10
- Complies with:
 - EN 60950
 - IEZC 950
 - AS/NZ 3260
 - EN 41003

Ordering Information

Part #	Description
TS190L	8-Pin DIP (50/Tube)
TS190PL	8-Pin Flatpack (50/Tube)
TS190PLTR	8-Pin Flatpack (1000/Reel)
TS190LS	8-Pin Surface Mount (50/Tube)
TS190LSTR	8-Pin Surface Mount (1000/Reel)

Pin Configuration



Absolute Maximum Ratings

Parameter	Ratings	Units
Relay Portion		
Blocking Voltage	400	V _P
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10ms)	1	A
Input Power Dissipation ¹	150	mW
Detector Portion		
Blocking Voltage	20	V _P
Input Control Current	100	mA
Peak (10ms)	1	A
Common Ratings		
Total Power Dissipation ²	800	mW
Isolation Voltage Input to Output	3750	V _{rms}
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C

¹ Derate Linearly 1.33 mW/°C

² Derate Linearly 6.67 mW/°C

Electrical absolute maximum ratings are at 25°C

Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

Electrical Characteristics

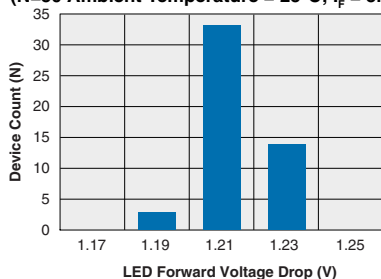
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Relay Portion (Pins 7, 8)						
Output Characteristics @ 25°C						
Load Current (Continuous)	-	I _L	-	-	150	mA
Load Current Limit	-	I _{CL}	190	235	280	mA
On-Resistance	I _L =150mA	R _{ON}	-	18	25	Ω
Off-State Leakage Current	V _L =400V	I _{LEAK}	-	-	1	μA
Switching Speeds Turn-On	I _F =5mA, V _L =10V	T _{ON}	-	-	1	ms
Turn-Off	I _F =5mA, V _L =10V	T _{OFF}	-	-	0.25	ms
Output Capacitance	50V; f=1MHz	C _{OUT}	-	25	-	pF
Relay Portion (Pins 1, 2)						
Input Characteristics @ 25°C						
Input Control Current	I _L =150mA	I _F	5	-	-	mA
Input Dropout Current	-	I _F	0.4	0.7	-	mA
Input Voltage Drop	I _F =5mA	V _F	0.9	1.2	1.4	V
Reverse Input Current	V _R =5V	I _R	-	-	10	μA
Relay Portion						
Common Characteristics, Input to Output						
Capacitance	-	C _{I/O}	-	3	-	pF

Electrical Characteristics (Continued)

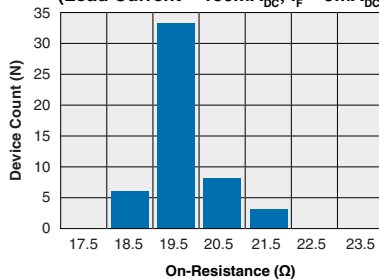
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Detector Portion (Pins 3,4) Output Characteristics @ 25°C						
Phototransistor Blocking Voltage	$I_C=10\mu A$	BV_{CEO}	20	50	-	V
Phototransistor Output Dark Current	$V_{CE}=5V, I_F=0mA$	I_{CEO}	-	50	500	nA
Saturation Voltage	$I_C=2mA, I_F=16mA$	V_{CEsat}	-	0.3	0.5	V
Current Transfer Ratio	$I_F=6mA, V_{CE}=0.5V$	CTR	33	100	-	%
Detector Portion (Pins 5,6) Input Characteristics @ 25°C						
Input Control Current	$I_C=2mA, V_{CE}=0.5V$	I_F	-	2	6	mA
Input Voltage Drop	$I_F=5mA$	V_F	0.9	1.2	1.4	V
Input Current (Detector must be off)	$I_C=1\mu A, V_{CE}=5V$	I_F	5	25	-	μA
Detector Portion Common Characteristics, Input to Output						
Capacitance	-	$C_{I/O}$	-	3	-	pF

PERFORMANCE DATA*

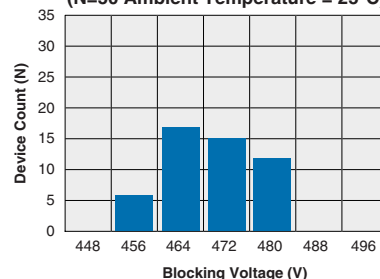
TS190L
 Typical LED Forward Voltage Drop
 (N=50 Ambient Temperature = 25°C; $I_F = 5\text{mA}_{DC}$)



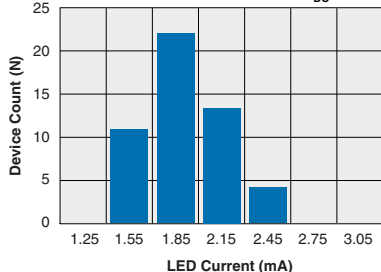
TS190L
 Typical On-Resistance Distribution
 (N=50 Ambient Temperature = 25°C)
 (Load Current = 150mA_{DC}; $I_F = 5\text{mA}_{DC}$)



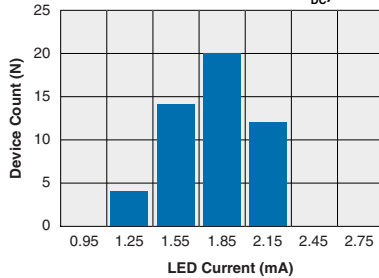
TS190L
 Typical Blocking Voltage Distribution
 (N=50 Ambient Temperature = 25°C)



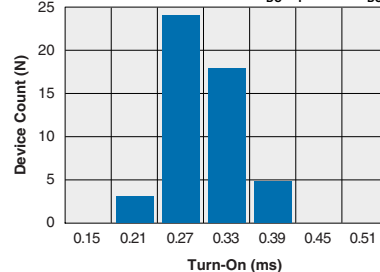
TS190L
 Typical I_F for Switch Operation
 (N=50 Ambient Temperature = 25°C)
 (Load Current = 150mA_{DC})



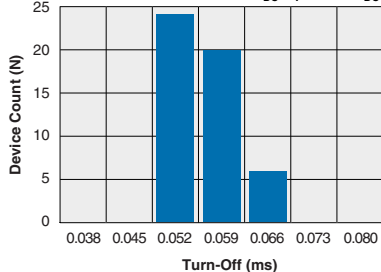
TS190L
 Typical I_F for Switch Dropout
 (N=50 Ambient Temperature = 25°C;
 Load Current = 150mA_{DC})



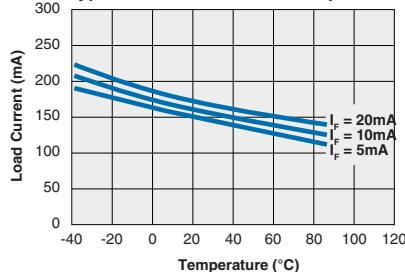
TS190L
 Typical Turn-On Time
 (N=50 Ambient Temperature = 25°C)
 (Load Current = 150mA_{DC}; $I_F = 5\text{mA}_{DC}$)



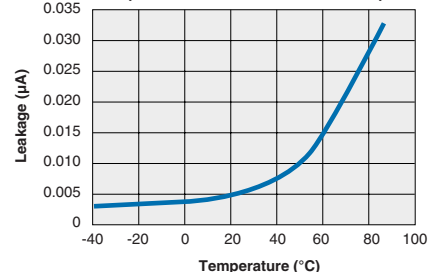
TS190L
 Typical Turn-Off Time
 (N=50 Ambient Temperature = 25°C)
 (Load Current = 150mA_{DC}; $I_F = 5\text{mA}_{DC}$)



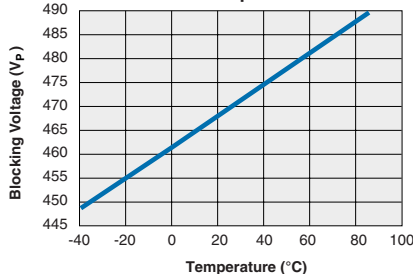
TS190L
 Typical Load Current vs. Temperature



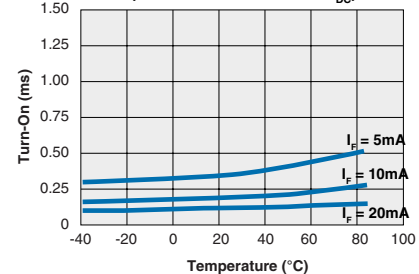
TS190L
 Typical Leakage vs. Temperature
 (Measured across Pins 7 & 8)



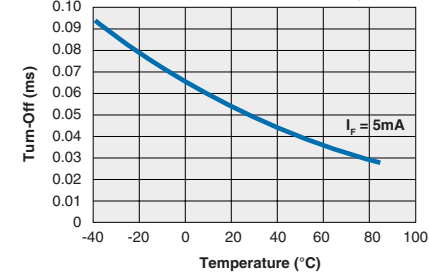
TS190L
 Typical Blocking Voltage vs. Temperature



TS190L
 Typical Turn-On vs. Temperature
 (Load Current = 150mA_{DC})

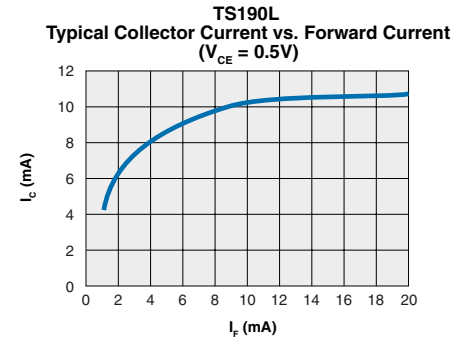
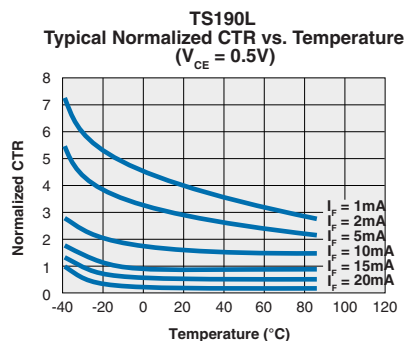
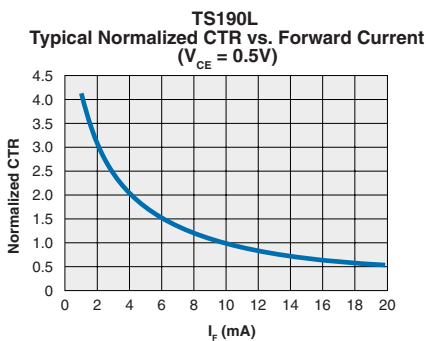
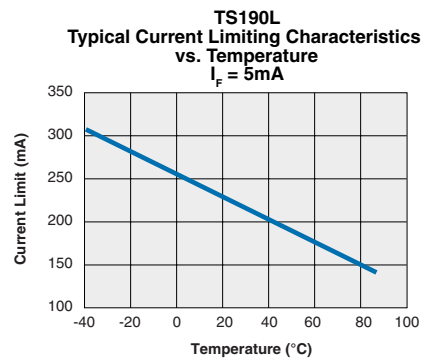
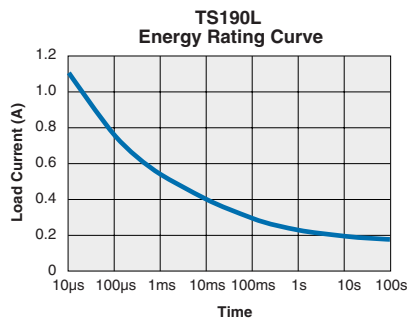
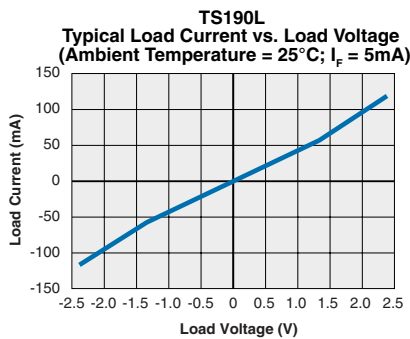
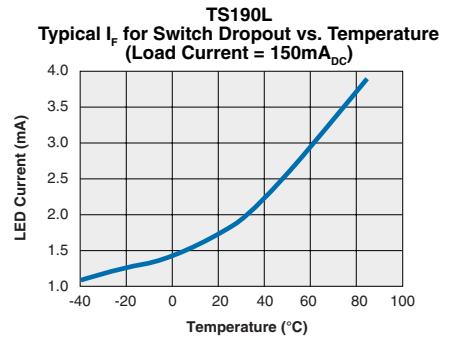
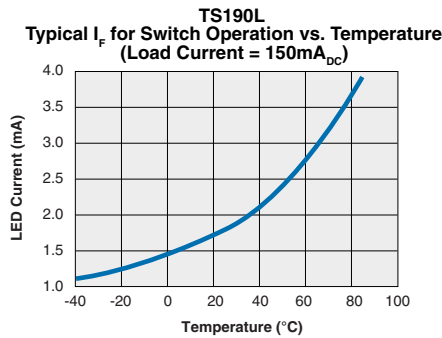
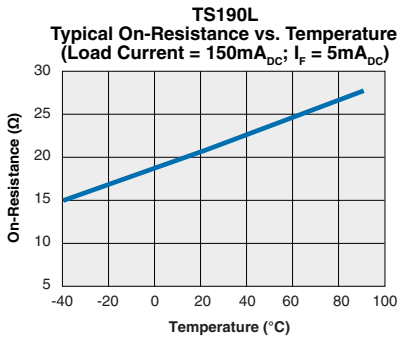
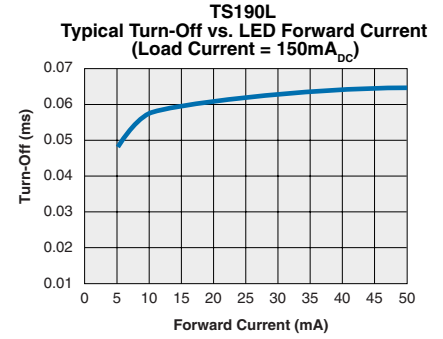
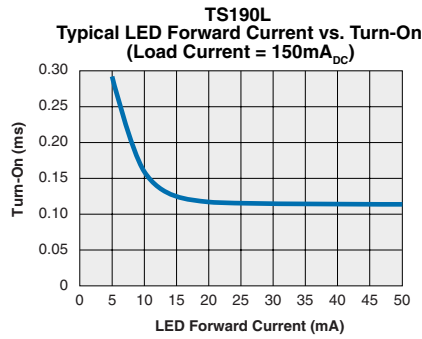
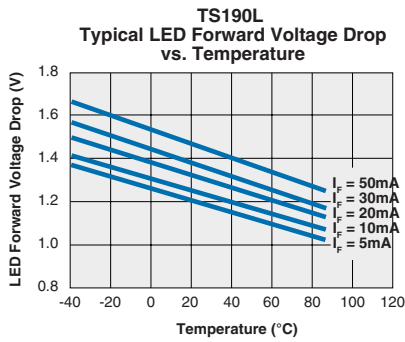


TS190L
 Typical Turn-Off vs. Temperature
 (Load Current = 150mA_{DC})



*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*



*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

Manufacturing Information

Soldering

Recommended soldering processes are limited to 260°C component body temperature for 10 seconds.

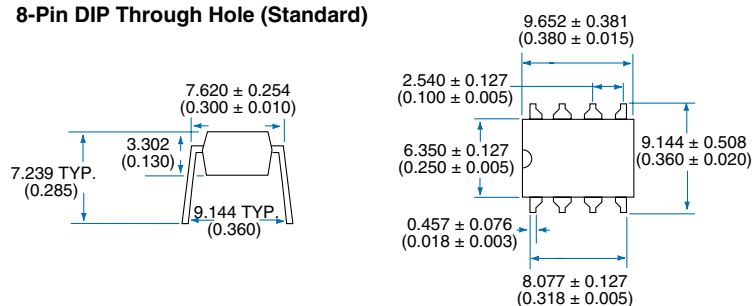


Washing

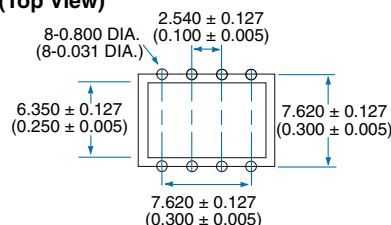
Clare does not recommend ultrasonic cleaning or the use of chlorinated solvents.

MECHANICAL DIMENSIONS

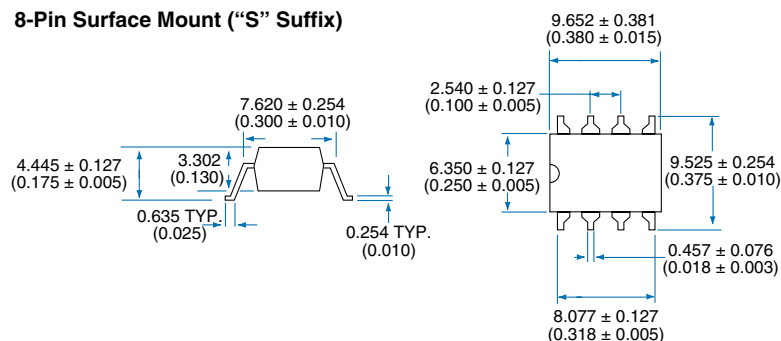
8-Pin DIP Through Hole (Standard)



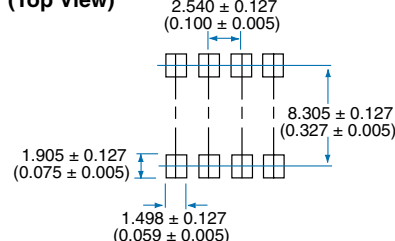
PC Board Pattern (Top View)



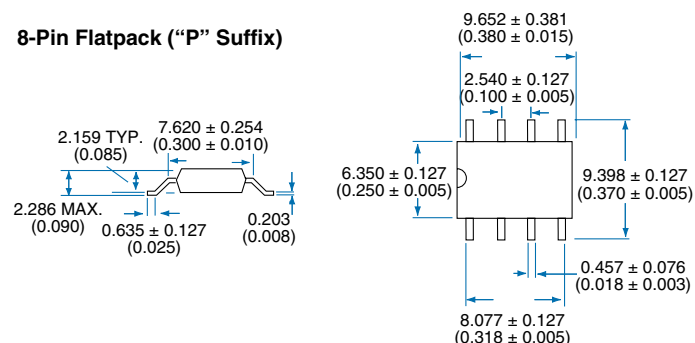
8-Pin Surface Mount ("S" Suffix)



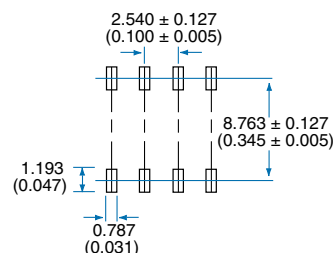
PC Board Pattern (Top View)



8-Pin Flatpack ("P" Suffix)



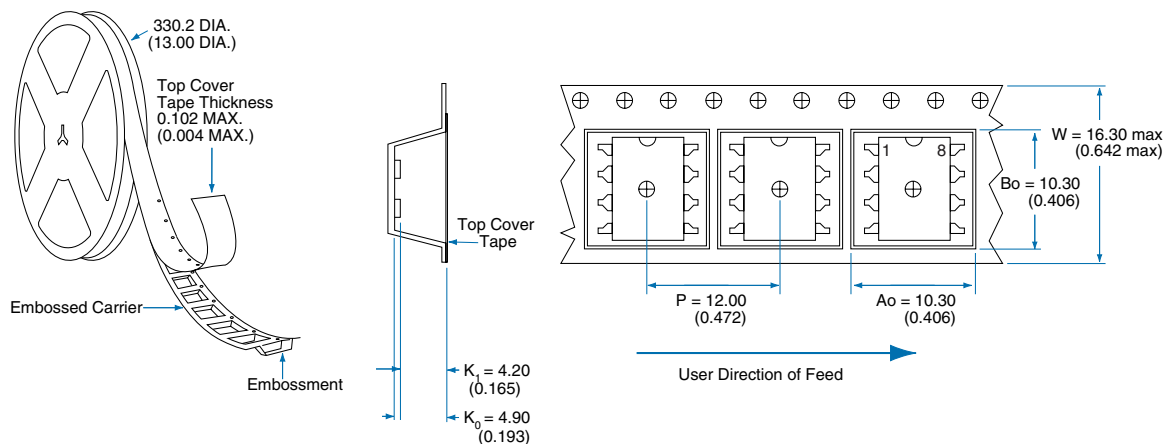
PC Board Pattern (Top View)



Dimensions:
mm
(inches)

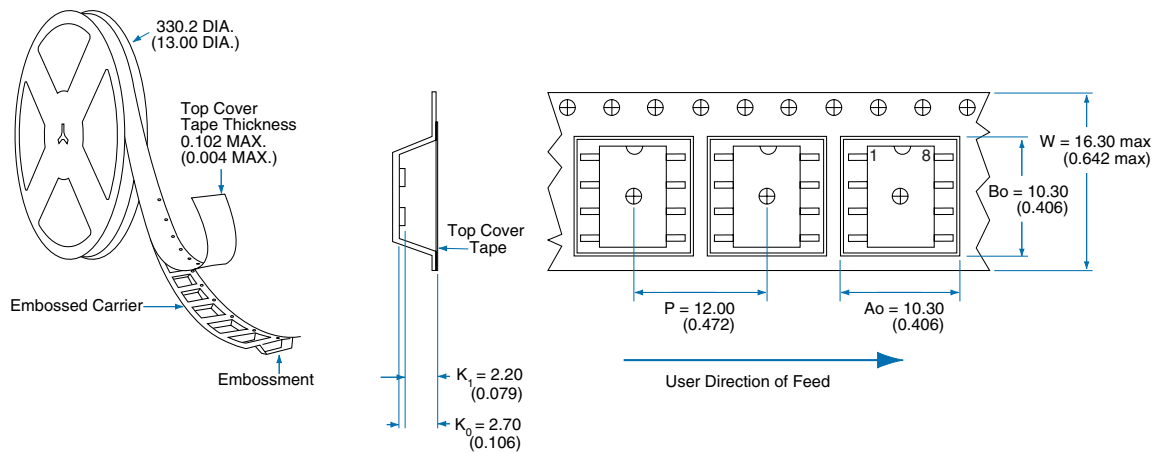
MECHANICAL DIMENSIONS

Tape and Reel Packaging for 8-Pin Surface Mount Package



NOTE: Tape dimensions not shown, comply with JEDEC Standard EIA-481-2

Tape and Reel Packaging for 8-Pin Flatpack Package



NOTE: Tape dimensions not shown, comply with JEDEC Standard EIA-481-2

Dimensions:
mm
(inches)

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