



	ITC117PL	Units
Relay Blocking Voltage	350	V
Relay Load Current	120	mA
Relay Max R <sub>ON</sub>	20	Ω
Bridge Rectifier Reverse Voltage	100	V
Darlington Collector Current	120	mA
Darlington Current Gain	10,000	-

### Features

- Small 16 Pin SOIC Package (PCMCIA Compatible)
- Board Space and Cost Savings
- 2mW Hookswitch Drive Power (Logic Compatible)
- No Moving Parts
- 3750V<sub>RMS</sub> Input/Output Isolation
- Full-Wave Bridge Rectifier
- Darlington Transistor for Electronic Inductor “Dry” Circuits
- Full Wave Current Detector for Ring Signal or Loop Current Detect
- Current Limiting
- JEDEC Standard Lead Configuration

### Applications

- Data/Fax Modem
- Voice Mail Systems
- Telephone Sets
- Computer Telephony Integration
- Set Top Box Modems

### Description

The Integrated Telecom Circuit combines a 1-Form-A solid state relay, bridge rectifier, Darlington transistor and optocoupler into one 16 pin SOIC package, consolidating designs and reducing component count in telecom applications. The relay features the added benefit of current limiting. The ITC117's optocoupler provides for full wave detection of ring signals.

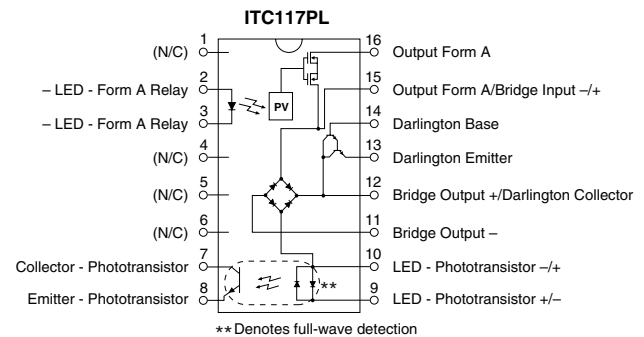
### Approvals

- UL Recognized: File Number E76270
- CSA Certified: File Number LR 43639-12
- Certified to:
  - EN 60950
  - EN 41003
  - IEC 950
  - AS/NZS 3260

### Ordering Information

Part #	Description
ITC117PL	16 Pin SOIC (50/Tube)
ITC117PLTR	16 Pin SOIC (1000/Reel)

### Pin Configuration



### Absolute Maximum Ratings (@ 25° C)

Parameter	Min	Typ	Max	Units
Total Package Dissipation	-	-	1 <sup>1</sup>	W
Isolation Voltage				
Input to Output	3750	-	-	V <sub>RMS</sub>
Relay Blocking Voltage	-	-	350	V
Operational Temperature	-40	-	+85	°C
Storage Temperature	-40	-	+125	°C
Soldering Temperature	-	-	+220	°C

(10 Seconds Max.)

<sup>1</sup> Above 25° derate linearly 8.33mW/°C

Total Power Dissipation (PD):

$$P_D = P_{\text{HOOKSWITCH}} + P_{\text{BRIDGE}} + P_{\text{DARLINGTON}} + P_{\text{LED}}$$

$$P_D = (R_{\text{DS(on)}})(I_L^2) + 2(V_F)(I_L) + (V_{\text{CE}})(I_L) + (V_{\text{LED}})(I_F)$$

WHERE:

$R_{\text{DS(on)}}$  = Maximum relay on resistance

$I_L$  = Maximum loop current

$V_F$  = Maximum diode forward voltage

$V_{\text{CE}}$  = Maximum voltage collector to emitter

$V_{\text{LED}}$  = Maximum LED forward voltage

$I_F$  = Maximum LED current

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 these or any other conditions beyond those indicated in the operational sections of this data sheet is not implied. Exposure of the device to the absolute maximum ratings for an extended period may degrade the device and effect its reliability.

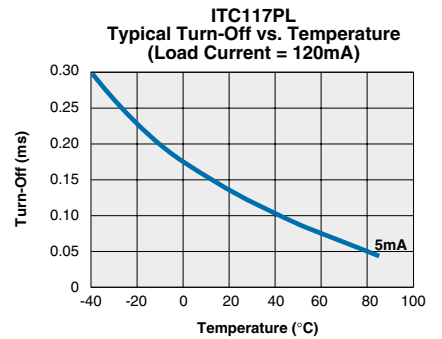
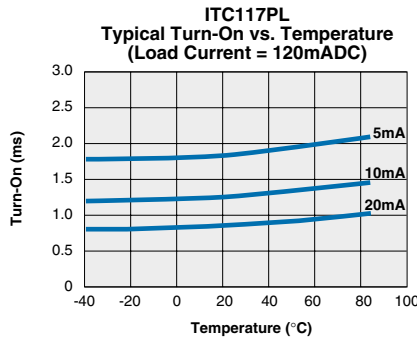
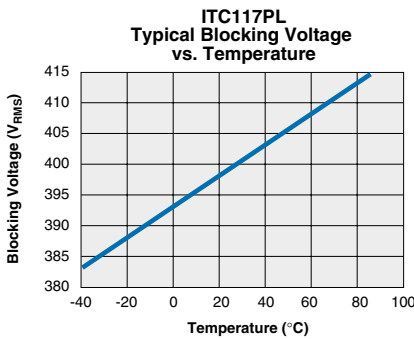
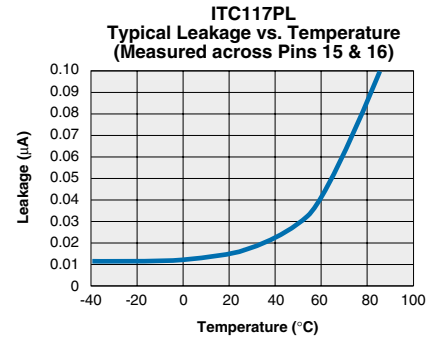
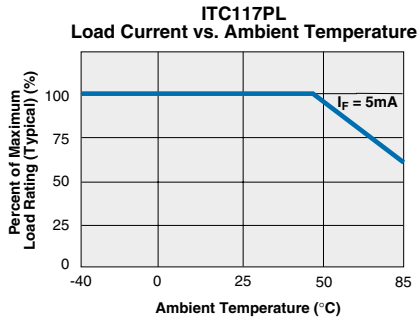
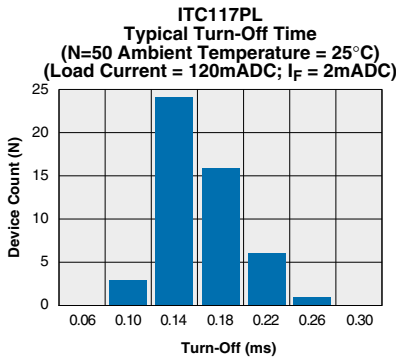
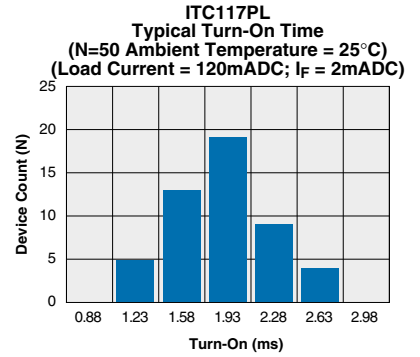
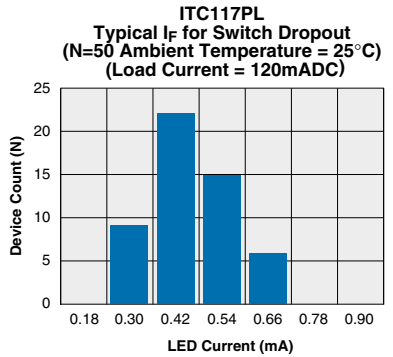
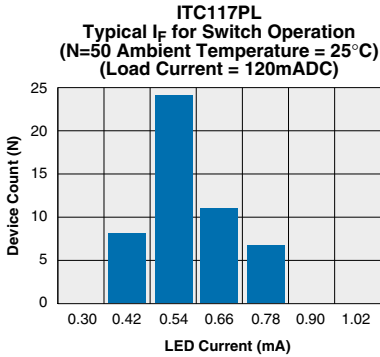
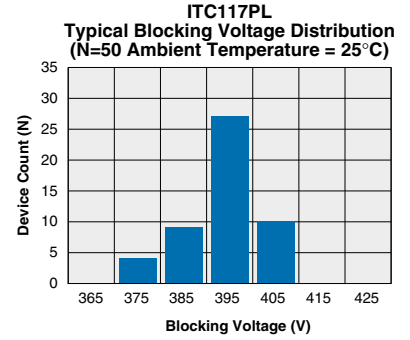
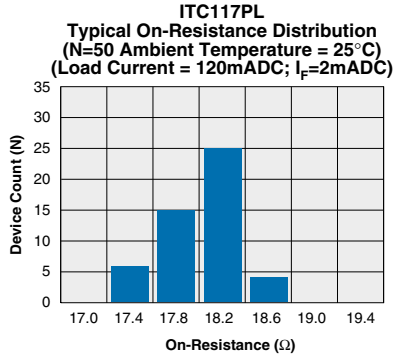
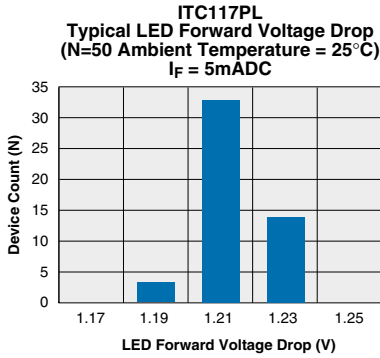
### Electrical Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
<b>Relay Portion (Pins 15,16)</b>						
<b>Output Characteristics @ 25°C</b>						
Load Current (Continuous)	-	$I_L$	-	-	120	mA
On-Resistance	$I_L=120\text{mA}$	$R_{\text{ON}}$	-	-	20	$\Omega$
Off-State Leakage Current	$V_L=350, T_J=25^\circ\text{C}$	$I_{\text{LEAK}}$	-	-	1	$\mu\text{A}$
Switching Speeds						
Turn-On	$I_F=5\text{mA}, V_L=10\text{V}$	$T_{\text{ON}}$	-	-	5	ms
Turn-Off	$I_F=5\text{mA}, V_L=10\text{V}$	$T_{\text{OFF}}$	-	-	3	ms
Output Capacitance	50V, f=1MHz	$C_{\text{OUT}}$	-	25	-	pF
Current Limit	$I_F=5\text{mA}$	$I_{\text{CL}}$	190	235	280	mA
<b>Relay Portion (Pins 2,3)</b>						
<b>Input Characteristics @ 25°C</b>						
Input Control Current	$I_L=120\text{mA}$	$I_F$	5	-	50	mA
Input Voltage Drop	$I_F=5\text{mA}$	$V_F$	0.9	1.2	1.4	V
Reverse Input Voltage	-	$V_R$	-	-	5	V
Reverse Input Current	$V_R=5\text{V}$	$I_R$	-	-	10	$\mu\text{A}$
<b>Detector Portion (Pins 7,8)</b>						
<b>Output Characteristics @ 25°C</b>						
Phototransistor Blocking Voltage	$I_C=10\mu\text{A}$	$BV_{\text{CEO}}$	20	50	-	V
Phototransistor Dark Current	$V_{\text{CE}}=5\text{V}, I_F=0\text{mA}$	$I_{\text{CEO}}$	-	50	500	A
Saturation Voltage	$I_C=2\text{mA}, I_F=16\text{mA}$	$V_{\text{SAT}}$	-	0.3	0.5	V
Current Transfer Ratio	$I_F=6\text{mA}, V_{\text{CE}}=0.5\text{V}$	CTR	33	400	-	%
<b>Detector Portion (Pins 9,10)</b>						
<b>Input Characteristics @ 25°C</b>						
Input Control Current	$I_C=2\text{mA}, V_{\text{CE}}=0.5\text{V}$	$I_F$	6	2	100	mA
Input Voltage Drop	$I_F=5\text{mA}$	$V_F$	0.9	1.2	1.4	V
Input Current (Detector must be off)	$I_C=1\mu\text{A}, V_{\text{CE}}=5\text{V}$	$I_F$	5	25	-	$\mu\text{A}$

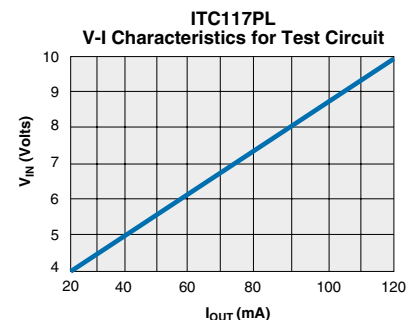
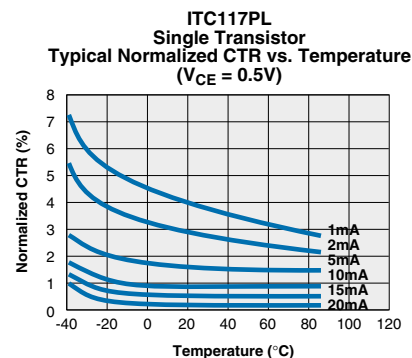
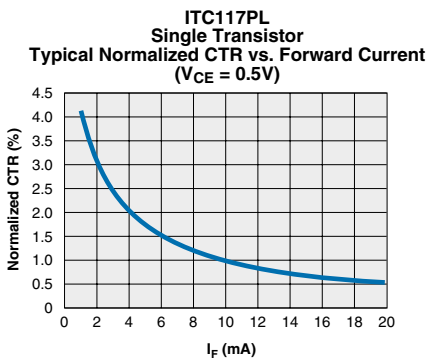
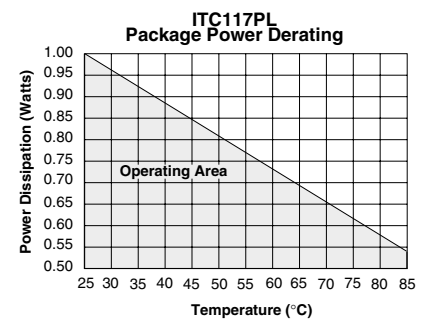
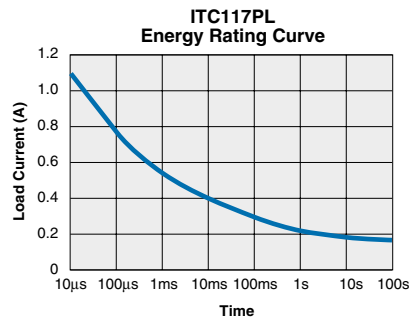
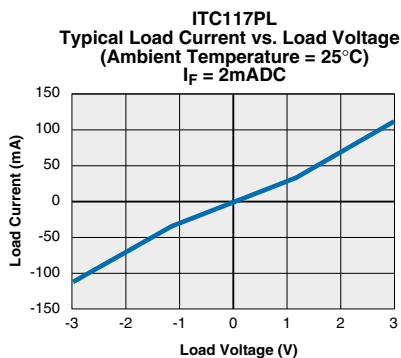
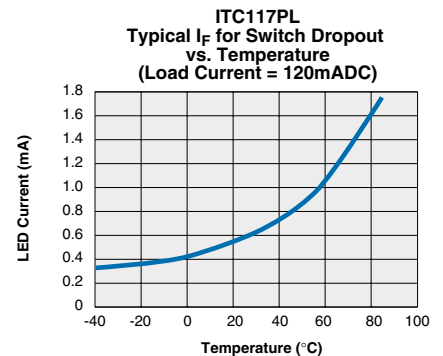
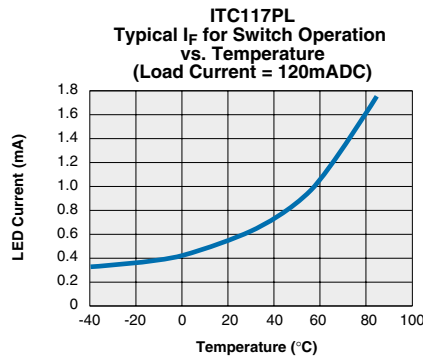
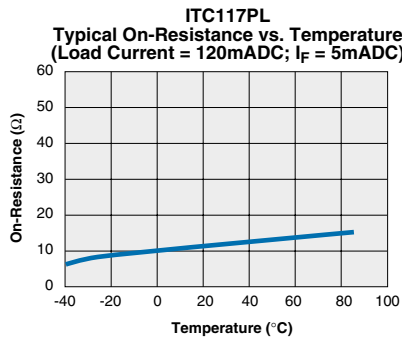
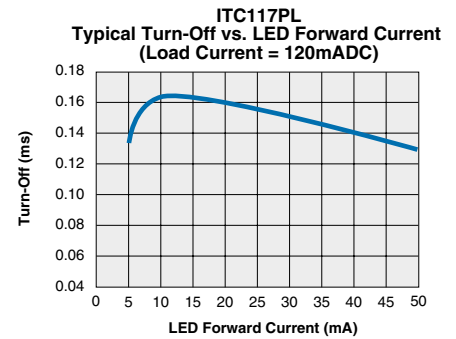
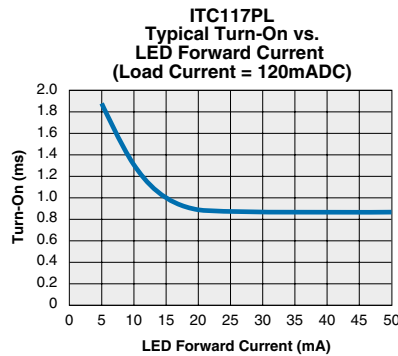
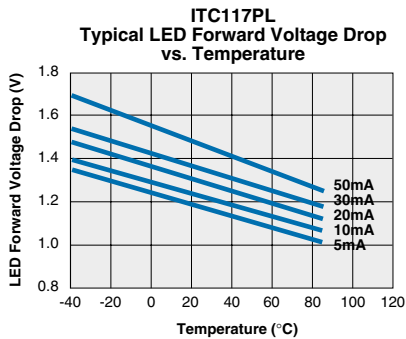
**Electrical Characteristics**

Parameter	Conditions	Symbol	Min	Typ	Max	Units
<b>Bridge Rectifier Electrical Ratings @ 25°C</b>						
Reverse Voltage	-	$V_{RD}$	-	-	100	V
Forward Drop Voltage	$I_{FD}=120\text{mA}$	$V_{FD}$	-	-	1.5	V
Reverse Leakage Current $T_J=85^\circ\text{C}$	$T_J=25^\circ\text{C}, V_R=100\text{V}$	$I_{RD}$ -	- -	- 50	10 -	$\mu\text{A}$
Forward Current (Continuous)		$I_{FD}$	-	-	140	mA
Forward Current (Peak)	$t=10\text{mS}$	$I_{FD}$	-	-	0.5	A
<b>Darlington Electrical Ratings @ 25°C</b>						
Collector-Emitter Voltage	$I_C=10\text{mA DC}, I_B=0$	$V_{CEO}$	40	-	-	V
Collector-Current Continuous	$V_C=3.5\text{V}$	$I_C$	-	-	120	mA
Power Dissipation @ 25°C	-	$P_d$	-	-	500	mW
Off-State Collector Emitter Leakage Current	$V_{CE}=10\text{V}; I_B=0\text{mA}$	$I_{CEX}$	-	-	1	$\mu\text{A}$
DC Current Gain $V_{CE}=10\text{VDC}$	$I_C=120\text{mA}$	$h_{FE}$	10,000	-	-	
Saturation Voltage	$I_C=120\text{mA}$	$V_{CE(SAT)}$	-	-	1.5	V
Total Harmonic Distortion $I_C=40\text{mA}$	$f_o=300\text{Hz @ -10dBm}$	-	-	-	-80	dB

PERFORMANCE DATA\*



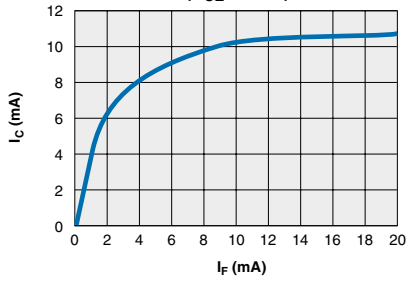
\* The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

**PERFORMANCE DATA\***


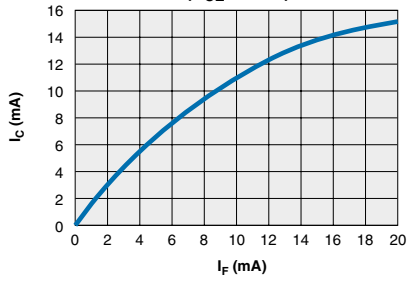
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PERFORMANCE DATA\*

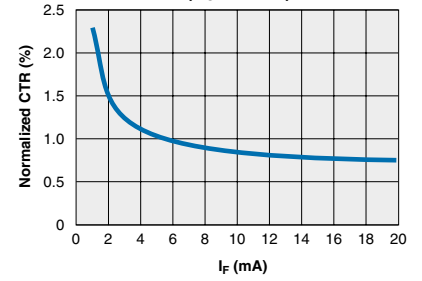
**ITC117PL Single Transistor**  
Typical Collector Current vs. Forward Current  
( $V_{CE} = 0.5V$ )



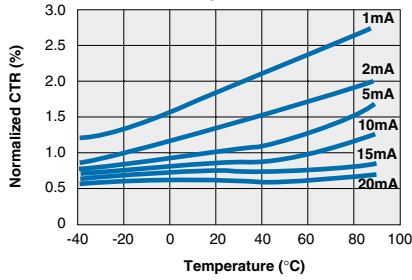
**ITC117PL Darlington Transistor**  
Typical Collector Current vs. Forward Current  
( $V_{CE} = 0.5V$ )



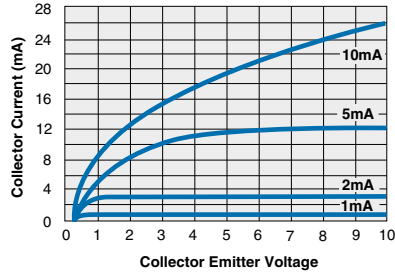
**ITC117PL Darlington Transistor**  
Typical Normalized CTR vs. Forward Current  
( $V_{CE} = 0.8V$ )



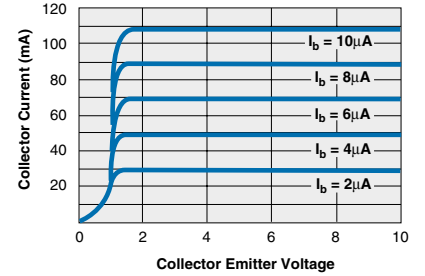
**ITC117PL Darlington Transistor**  
Typical Normalized CTR vs. Temperature  
( $V_{CE} = 0.8V$ )



**ITC117PL Single Transistor Detector**  
Typical Transfer Characteristics



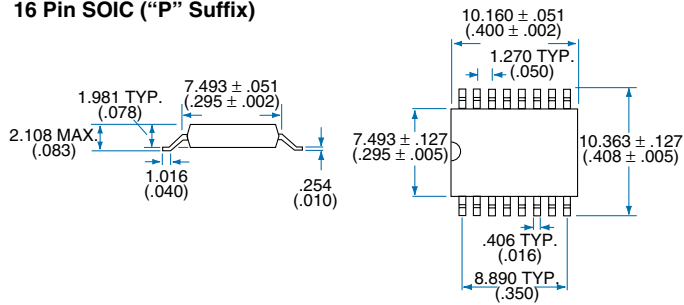
**ITC117PL Darlington Transistor**  
Typical Transfer Characteristics



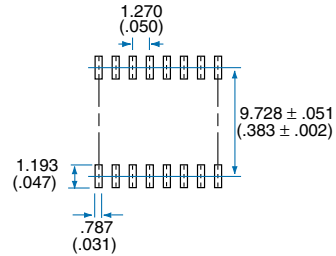
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MECHANICAL DIMENSIONS

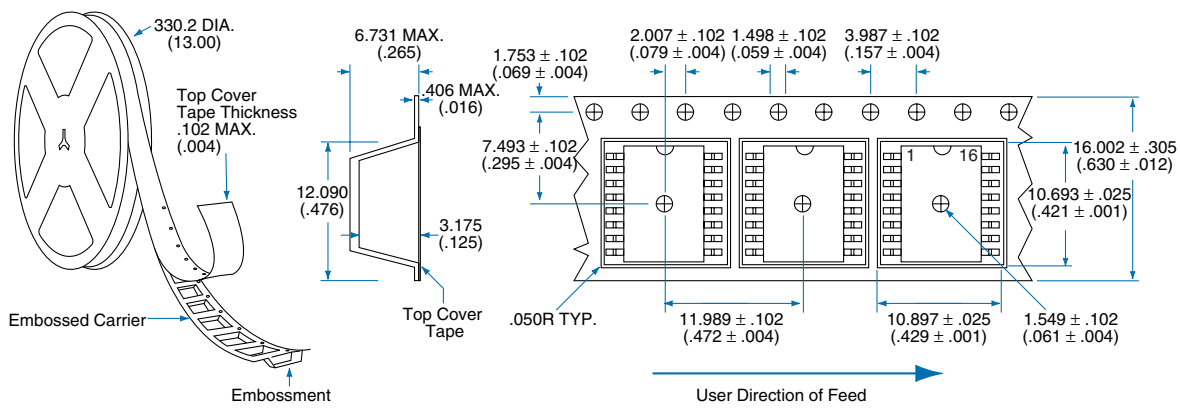
16 Pin SOIC ("P" Suffix)



PC Board Pattern (Top View)



Tape and Reel Packaging for 16 Pin SOIC Package



Dimensions  
mm  
(inches)



# CLARE

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