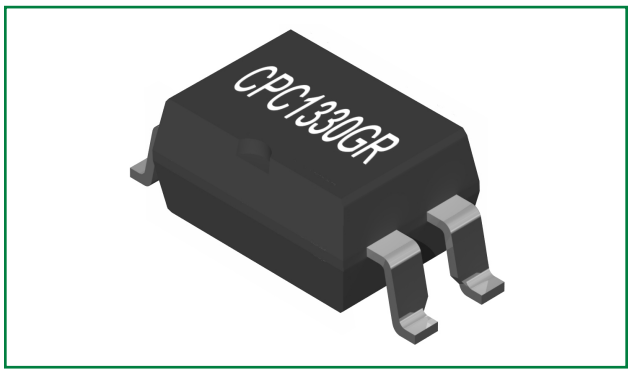
CPC1330

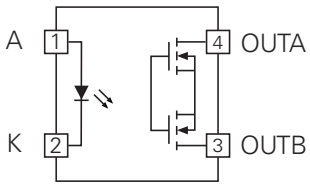
350 V, 120 mA_{RMS} / mA_{DC}, Normally Open Relay

Key Attributes

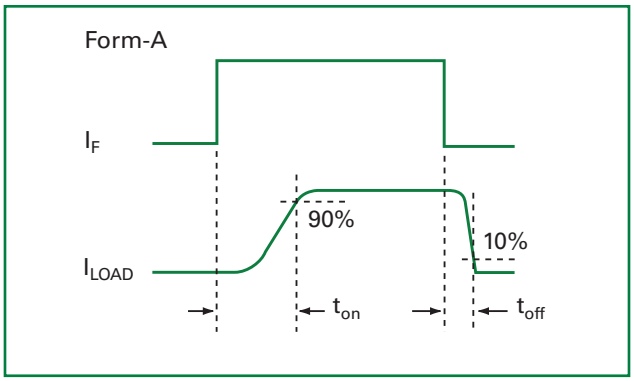
Characteristic	Rating	Unit
Blocking Voltage	350	V_P
Load Current	120	mA_{RMS}/mA_{DC}
On-Resistance (max.)	30	Ω
Isolation Voltage, Input to Output	5000	V_{RMS}



Pin Configuration (DIP-4)



Switching Characteristics



Description

The CPC1330 is a bidirectional, normally open (1-Form-A) Solid State Relay with an enhanced input to output isolation barrier of 5000 V_{RMS}.

The relay output is constructed with efficient MOSFET switches that uses Littelfuse's patented OptoMOS® architecture. The input, a highly efficient infrared LED, controls the optically coupled output.

Features

- 5000 V_{RMS} Input to Output Isolation
- 350 V_P Blocking Voltage
- Low Drive Power Requirements
- No EMI/RFI Generation
- Small 4-Pin Package

Applications

- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
- Meters (Watt-Hour, Water, Gas)
- Security
- Industrial Controls

Approvals

- UL 1577 Recognized Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN 62368-1: TUV Certificate # B 082667 0008

Ordering Information

Part	Description
CPC1330G	4-Pin DIP (100/Tube)
CPC1330GR	4-Pin Surface Mount (100/Tube)
CPC1330GRTR	4-Pin Surface Mount (1000/Reel)

Specifications

Absolute Maximum Ratings

Parameter	Ratings	Units
Blocking Voltage	350	V_P
Reverse Input Voltage	5	V
Input Control Current		
Continuous	50	mA
Peak (10 ms)	1	A
Power Dissipation		
Input [1]	100	mW
Package Total [2]	550	
Isolation Voltage, Input to Output (60 s)	5000	V_{RMS}
Operating Temperature, Ambient (T_A)	–40 to +85	°C
Storage Temperature (T_{STG})	–40 to +125	

[1] *Derate linearly 1.33 mW/°C*

[2] *Derate output power linearly 3 mW/°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.

Typical values are characteristic of the device at +25 °C, and are the result of engineering evaluations. They are provided for information purposes only, and are not part of the manufacturing testing requirements.

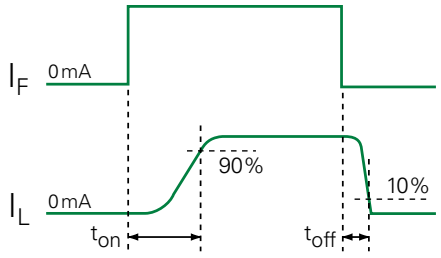
Electrical Characteristics @ 25°C

Parameter	Conditions	Symbol	Value			Units
			Minimum	Typical	Maximum	
Output Characteristics						
Blocking Voltage	I_L = 1 µA	V_{DRM}	350	—	—	V
Load current:						
Continuous	—	I_L	—	—	120	mA_{RMS}/mA_{DC}
Peak	t = 10 ms	I_{LPK}	—	—	±350	mA_P
On-resistance [1]	I_L = 120 mA	R_{on}	—	25	30	Ω
Off-state leakage current	V_L = 350 V_P	I_{LK}	—	—	1	µA
Switching speeds:						
Turn-on	I_F = 5 mA, V_L = 10 V (See Timing Diagram)	t_{on}	—	—	2	ms
Turn-off		t_{off}	—	—	1	
Output capacitance	I_F = 0 mA, V_L = 50 V, f = 1 MHz	C_{OUT}	—	25	—	pF
Input Characteristics						
Input control current to activate [2]	I_L = 120 mA	I_F	—	0.33	2	mA
Input control current to deactivate	—	I_F	0.2	0.3	—	
Input voltage drop	I_F = 5 mA	V_F	0.9	1.2	1.4	V
Reverse input current	V_R = 5 V	I_R	—	—	10	µA
Common Characteristics						
Capacitance, input to output	V_{IO} = 0 V, f = 1 MHz	C_{IO}	—	3	—	pF

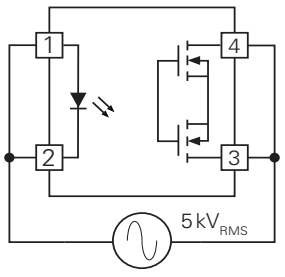
[1] *Measurement taken within 1 second of on-time.*

[2] *For operation above 60 °C a minimum input current of 4 mA is recommended.*

Timing Diagram

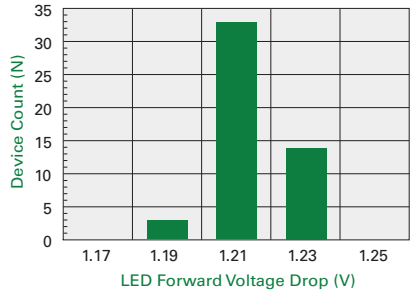


Isolation Test Circuit

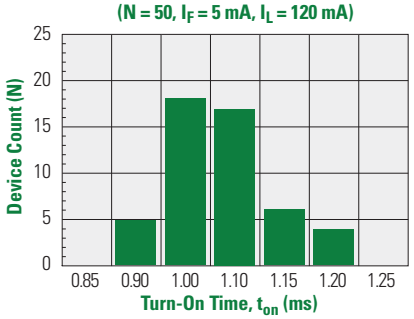


Characteristic Curves

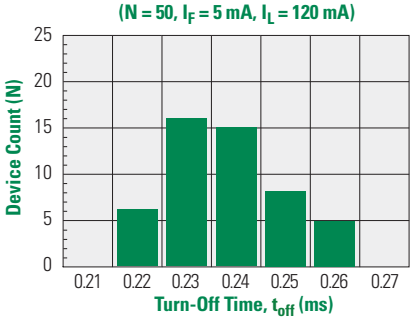
Typical LED Forward Voltage Drop
(N = 50, I_F = 5 mA)



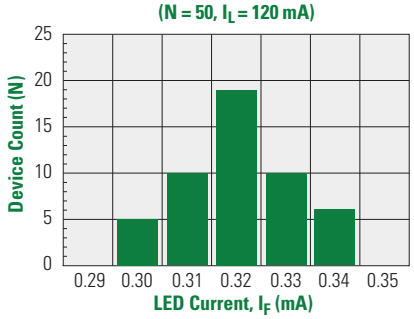
Typical Turn-On Time
(N = 50, I_F = 5 mA, I_L = 120 mA)



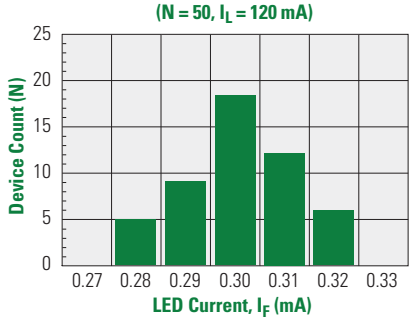
Typical Turn-Off Time
(N = 50, I_F = 5 mA, I_L = 120 mA)



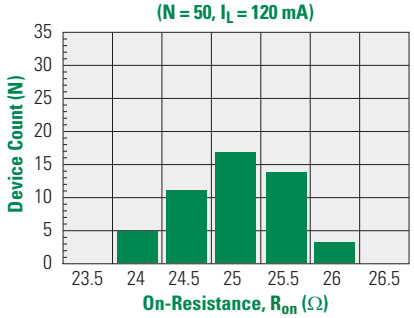
Typical I_F for Switch Operation
(N = 50, I_L = 120 mA)



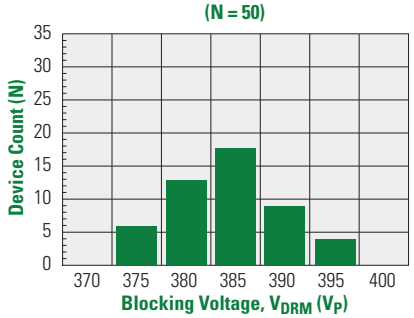
Typical I_F for Switch Dropout
(N = 50, I_L = 120 mA)



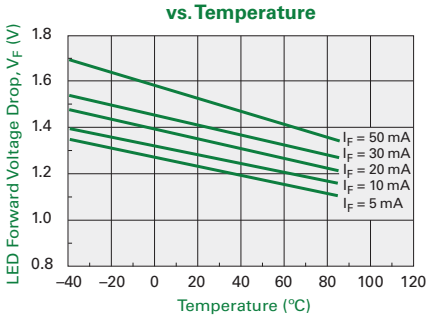
Typical On-Resistance Distribution
(N = 50, I_L = 120 mA)



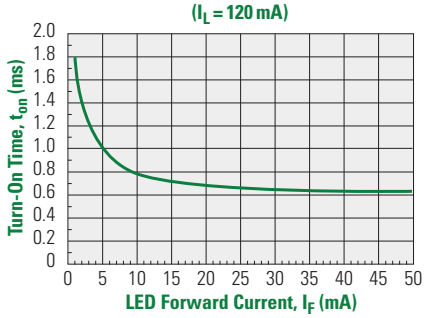
Typical Blocking Voltage Distribution
(N = 50)



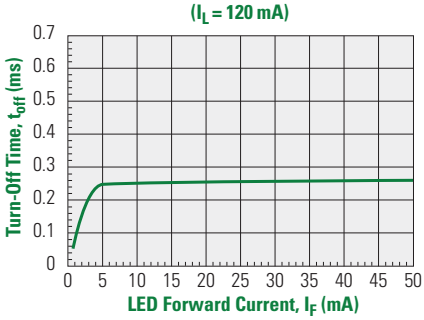
Typical LED Forward Voltage Drop
vs. Temperature



Typical Turn-On Time
vs. LED Forward Current
(I_L = 120 mA)



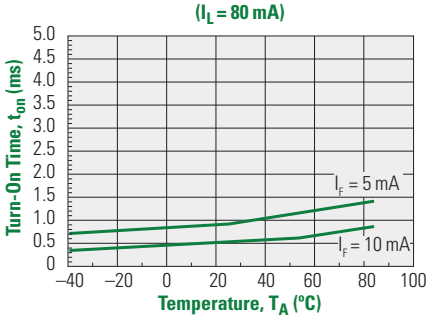
Typical Turn-Off Time
vs. LED Forward Current
(I_L = 120 mA)



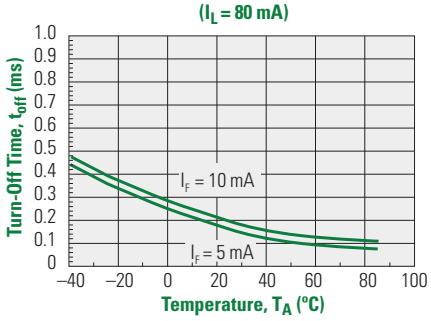
Unless otherwise noted, data presented in these graphs is typical of device operation at T_A = 25°C.

Characteristic Curves

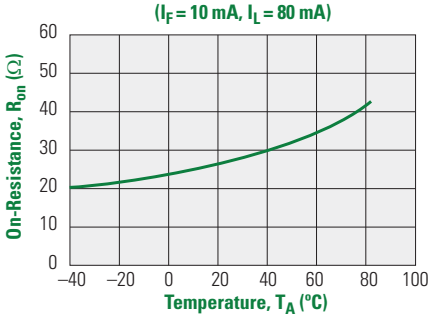
Typical Turn-On Time vs. Temperature (I_L = 80 mA)



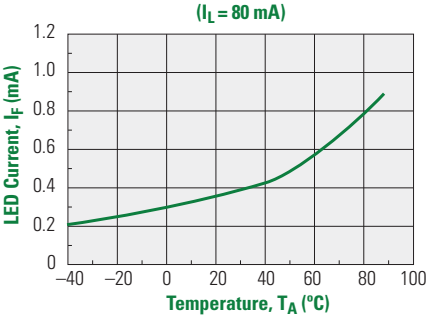
Typical Turn-Off Time vs. Temperature (I_L = 80 mA)



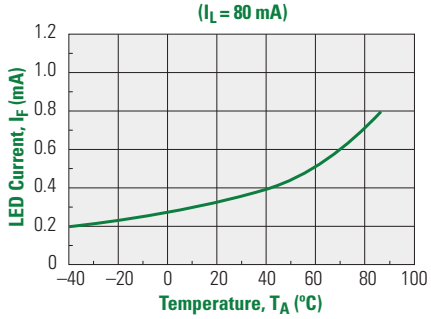
Typical On-Resistance vs. Temperature (I_F = 10 mA, I_L = 80 mA)



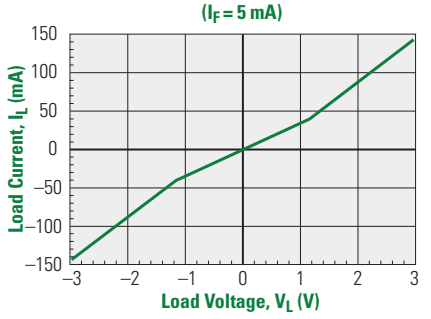
Typical I_F for Switch Operation vs. Temperature (I_L = 80 mA)



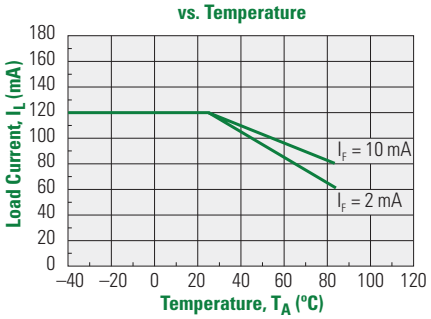
Typical I_F for Switch Dropout vs. Temperature (I_L = 80 mA)



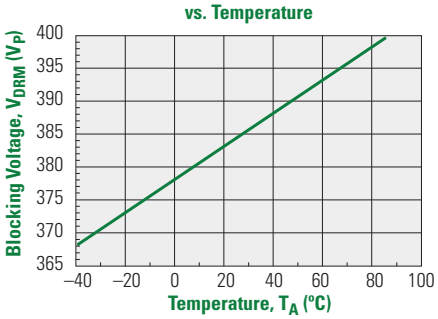
Typical Load Current vs. Load Voltage (I_F = 5 mA)



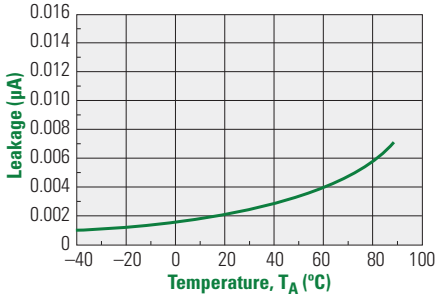
Maximum Load Current vs. Temperature



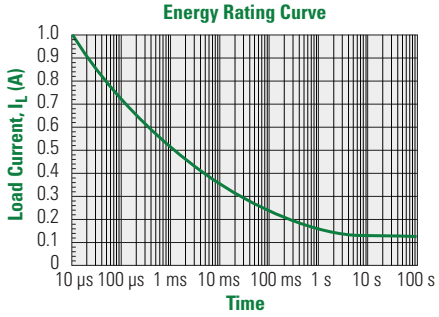
Typical Blocking Voltage vs. Temperature



Typical Leakage vs. Temperature Measured Across Pins 3 and 4



Energy Rating Curve



Unless otherwise noted, data presented in these graphs is typical of device operation at T_A = 25°C.

Manufacturing Information

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. Littelfuse classifies its plastic encapsulated devices for moisture sensitivity according to the latest version of the joint industry standard, **IPC/JEDEC J-STD-020**, in force at the time of product evaluation. We test all of our products to the maximum conditions set forth in the standard, and guarantee proper operation of our devices when handled according to the limitations and information in that standard as well as to any limitations set forth in the information or standards referenced below.

Failure to adhere to the warnings or limitations as established by the listed specifications could result in reduced product performance, reduction of operable life, and/or reduction of overall reliability.

This product carries a **Moisture Sensitivity Level (MSL)** classification as shown below, and should be handled according to the requirements of the latest version of the joint industry standard **IPC/JEDEC J-STD-033**.

Device	Moisture Sensitivity Level (MSL) Classification
CPC1330G	MSL 1
CPC1330GR	MSL 3

ESD Sensitivity

This product is ESD Sensitive, and should be handled according to the industry standard **JESD-625**.

Soldering Profile

Provided in the table below is the Classification Temperature (T_C) of this product and the maximum dwell time (T_C – 5)°C. The classification temperature sets the Maximum Body Temperature allowed for this device during lead-free reflow processes. Additionally, for the CPC1330GR, the solder reflow profile given in Technical Brief TB-200 "**Pb-Free Solder Reflow Profile for Select Devices**" must be followed. For the through-hole device, CPC1330G, and any other processes, the guidelines of **J-STD-020** must be observed.

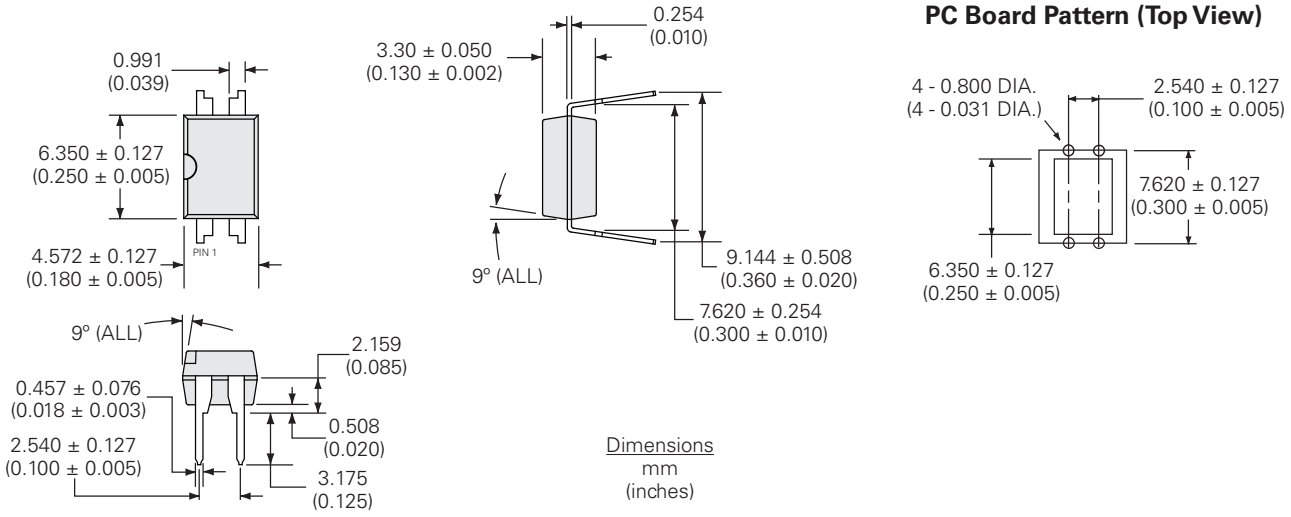
Device	Classification Temperature (T_C)	Dwell Time (T_P)	Max Reflow Cycles
CPC1330GR	250°C	15 seconds	3

Board Wash

Littelfuse recommends the use of no-clean flux formulations. Board washing to reduce, or remove flux residue following the solder reflow process is acceptable, provided proper precautions are taken to prevent damage to the device. These precautions include, but are not limited to: Using a low pressure wash and providing a follow-up bake cycle sufficient to remove any moisture trapped within the device, due to the washing process. Due to the variability of the wash parameters used to clean the board, determination of the bake temperature and duration necessary to remove the moisture trapped within the package is the responsibility of the user (assembler). Cleaning, or drying methods that employ ultrasonic energy may damage the device and should not be used. Additionally, the device must not be exposed to halide flux or solvents.

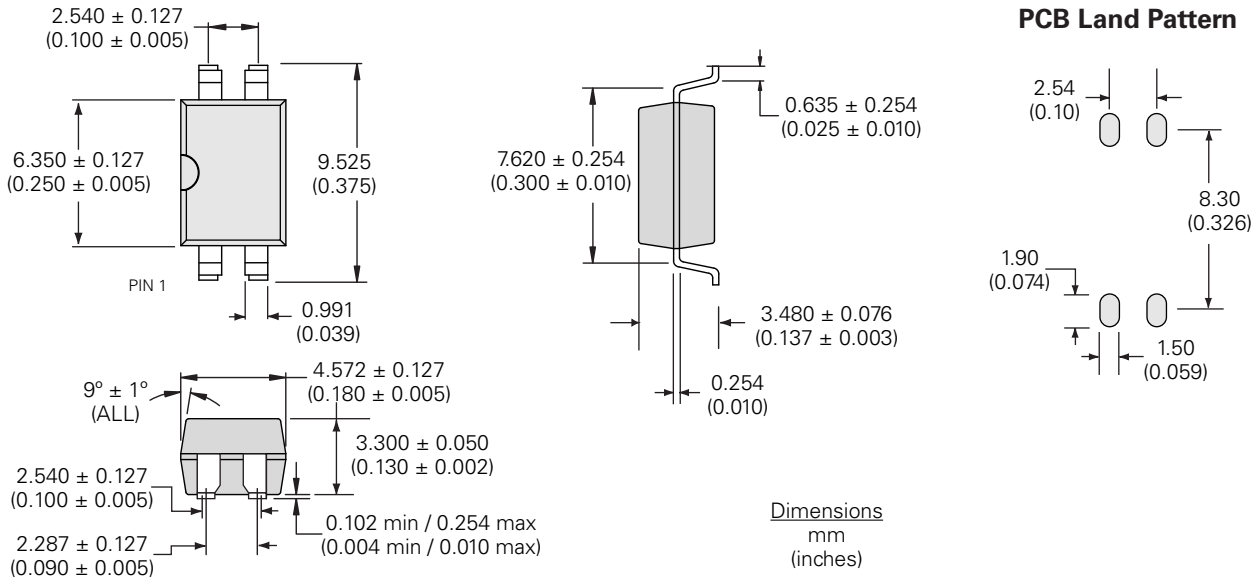
Mechanical Dimensions

CPC1330G



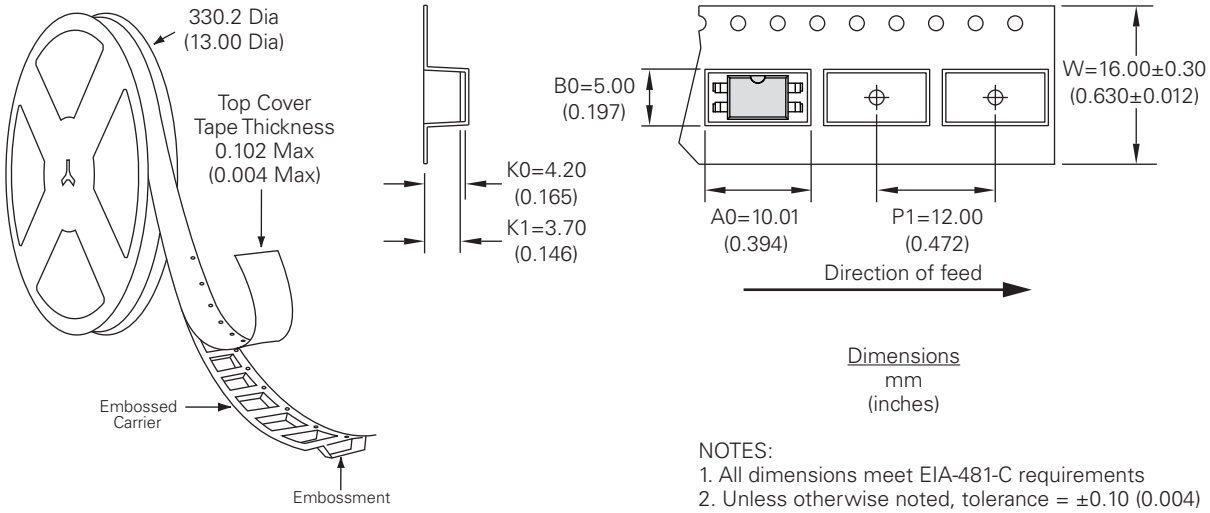
Dimensions
mm
(inches)

CPC1330GR



Dimensions
mm
(inches)

CPC1330GRTR Tape and Reel



Dimensions
mm
(inches)

NOTES:
1. All dimensions meet EIA-481-C requirements
2. Unless otherwise noted, tolerance = ±0.10 (0.004)