CPC1390
Single Pole, Normally Open 4-Pin OptoMOS® Relay

Parameter	Rating	Units
Peak Blocking Voltage	400	V_P
Load Current	140	mA
Max On-resistance	22	Ω

Features
- 5000V_{rms} Input/Output Isolation
- 400V_P Blocking Voltage
- 100% Solid State
- Small 4-Pin Package
- Low Drive Power Requirements (TTL/CMOS Compatible)
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable

Applications
- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
  - Meters (Watt-Hour, Water, Gas)
- Medical Equipment—Patient/Equipment Isolation
- Security
- Aerospace
- Industrial Controls

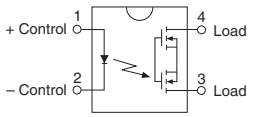
Description
The CPC1390G is a single-pole normally-open (1-Form-A) Solid State Relay with an enhanced input to output isolation barrier of 5000V_{rms}. Clare's patented OptoMOS architecture makes available the optically coupled technology necessary to activate the output's efficient MOSFET switches. Control of the isolated output is accomplished by means of the highly effective GaAlAs infrared LED at the input.

Approvals
- UL Certified Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN/IEC 60950-1 Certified Component: TUV Certificate B 10 05 49410 006

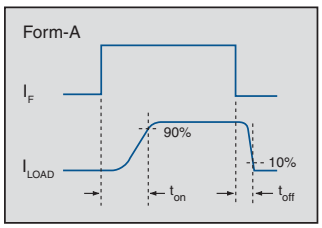
Ordering Information

Part Number	Description
CPC1390G	4-Pin DIP (100/Tube)
CPC1390GV	4-Pin DIP V-Bend (100/Tube)
CPC1390GR	4-Pin Surface Mount (100/Tube)
CPC1390GRTR	4-Pin Surface Mount (1000/Reel)

Pin Configuration



Switching Characteristics of Normally Open Devices



Absolute Maximum Ratings @ 25ºC

Parameter	Ratings	Units
Peak Blocking Voltage	400	V_P
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10ms)	1	A
Input Power Dissipation [1]	100	mW
Total Package Dissipation [2]	550	mW
Isolation Voltage, Input to Output	5000	V_{rms}
Operational Temperature	-40 to +85	ºC
Storage Temperature	-40 to +125	ºC

[1] Derate linearly 1.33 mW / ºC
[2] Derate linearly 3.00 mW / ºC

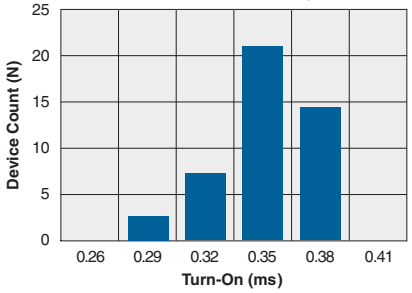
Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

Electrical Characteristics @ 25ºC

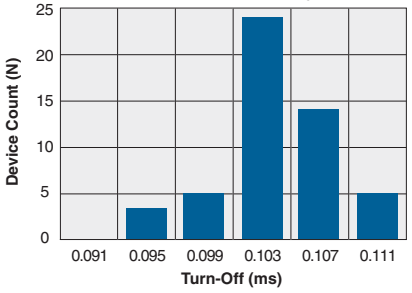
Parameters	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics						
Load Current						
Continuous	-	I_L	-	-	140	mA
Peak	t=10ms	I_{LPK}	-	-	400	
On-Resistance	I_L=140mA	R_{ON}	-	14	22	Ω
Off-State Leakage Current	V_L=400V_P	I_{LEAK}	-	-	1	µA
Switching Speeds						
Turn-On	I_F=5mA, V_L=10V	t_{on}	-	-	1	ms
Turn-Off		t_{off}	-	-	0.5	
Output Capacitance	I_F=0mA, V_L=50V, f=1MHz	C_{OUT}	-	25	-	pF
Input Characteristics						
Input Control Current	I_L=140mA	I_F	-	0.7	2	mA
Input Dropout Current	-	I_F	0.2	0.65	-	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
Common Characteristics						
Input to Output Capacitance	-	$C_{I/O}$	-	3	-	pF

PERFORMANCE DATA*

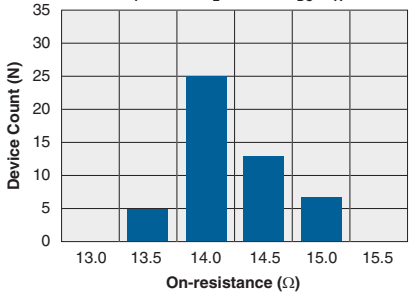
Typical Turn-On Time
(N=50, I_F=5mA, I_L=100mA$_{DC}$, T_A=25°C)



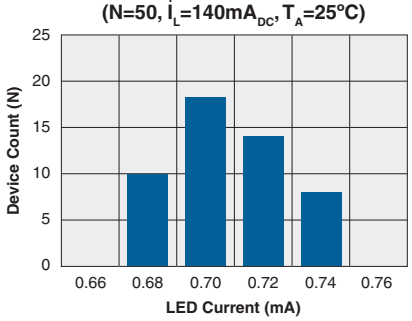
Typical Turn-Off Time
(N=50, I_F=5mA, I_L=100mA$_{DC}$, T_A=25°C)



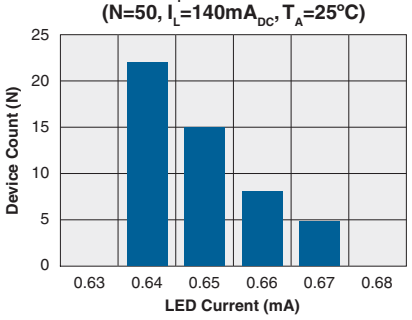
Typical On-Resistance Distribution
(N=50, I_F=5mA, I_L=140mA$_{DC}$, T_A=25°C)



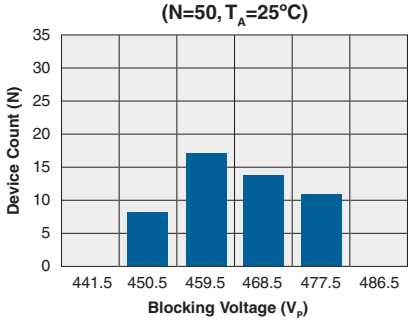
Typical I_F for Switch Operation
(N=50, I_L=140mA$_{DC}$, T_A=25°C)



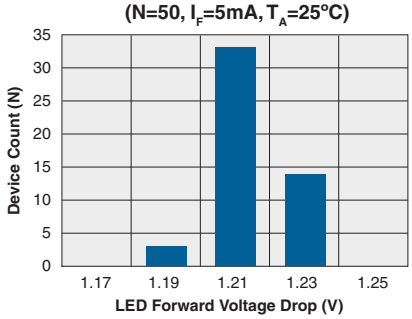
Typical I_F for Switch Dropout
(N=50, I_L=140mA$_{DC}$, T_A=25°C)



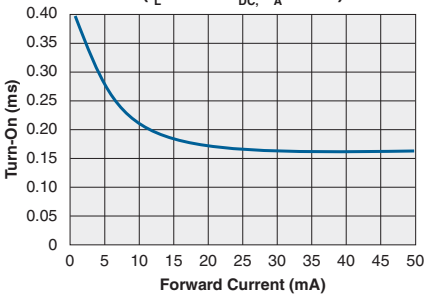
Typical Blocking Voltage Distribution
(N=50, T_A=25°C)



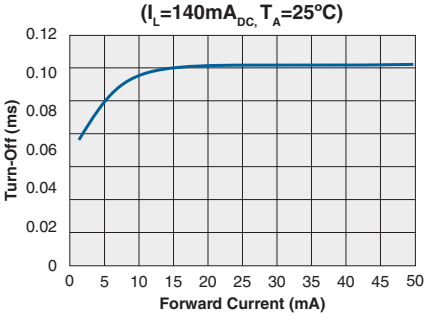
Typical LED Forward Voltage Drop
(N=50, I_F=5mA, T_A=25°C)



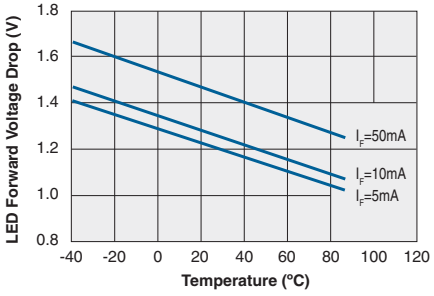
Typical Turn-On
vs. LED Forward Current
(I_L=140mA$_{DC,}$ T_A=25°C)



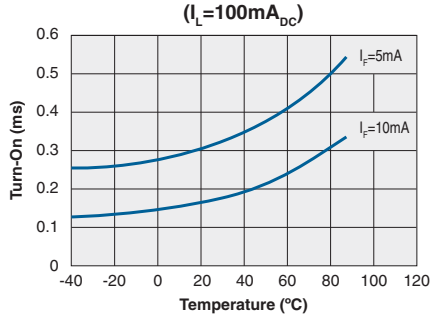
Typical Turn-Off
vs. LED Forward Current
(I_L=140mA$_{DC,}$ T_A=25°C)



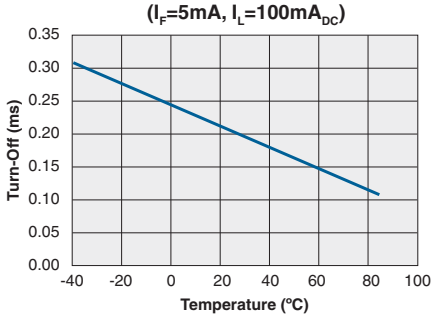
Typical LED Forward Voltage Drop
vs. Temperature



Typical Turn-On vs. Temperature
(I_L=100mA$_{DC}$)



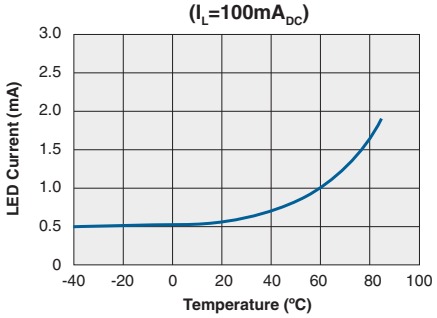
Typical Turn-Off vs. Temperature
(I_F=5mA, I_L=100mA$_{DC}$)



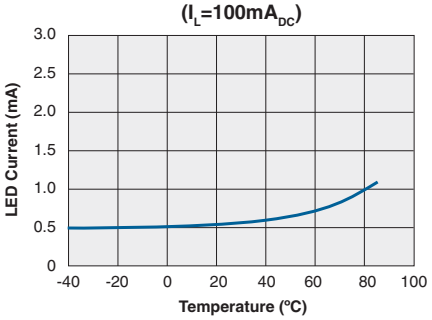
*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*

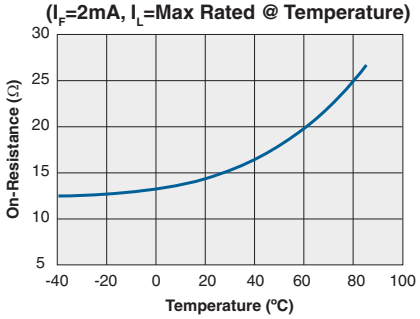
Typical I_F for Switch Operation vs. Temperature (I_L=100mA$_{DC}$)



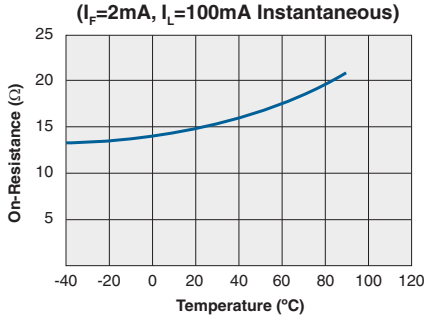
Typical I_F for Switch Dropout vs. Temperature (I_L=100mA$_{DC}$)



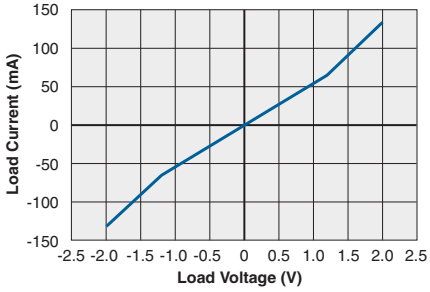
Typical On-Resistance vs. Temperature (I_F=2mA, I_L=Max Rated @ Temperature)



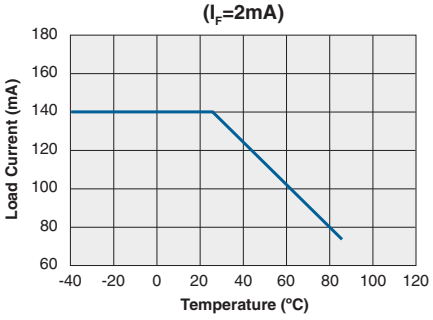
Typical On-Resistance vs. Temperature (I_F=2mA, I_L=100mA Instantaneous)



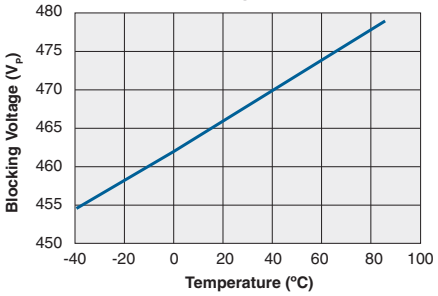
Typical Load Current vs. Load Voltage (I_F=5mA, T_A=25°C)



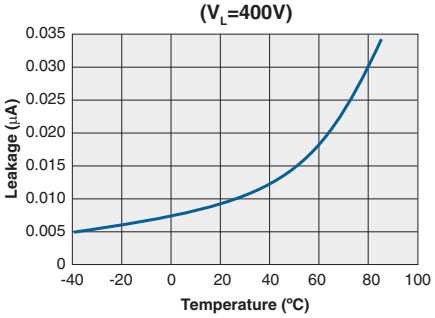
Typical Load Current vs. Temperature (I_F=2mA)



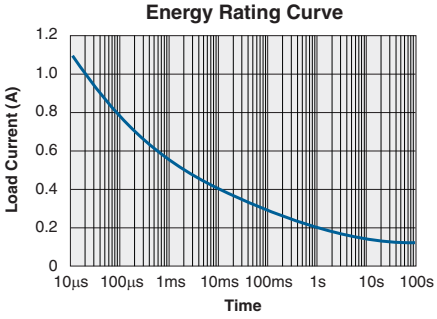
Typical Blocking Voltage vs. Temperature



Typical Leakage vs. Temperature Measured Across Pins 3 & 4 (V_L=400V)



Energy Rating Curve



*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

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. Clare classified all of 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) rating** 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) Rating
CPC1390G / CPC1390GV / CPC1390GR	MSL 1

ESD Sensitivity

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

Reflow Profile

This product has a maximum body temperature and time rating as shown below. All other guidelines of **J-STD-020** must be observed.

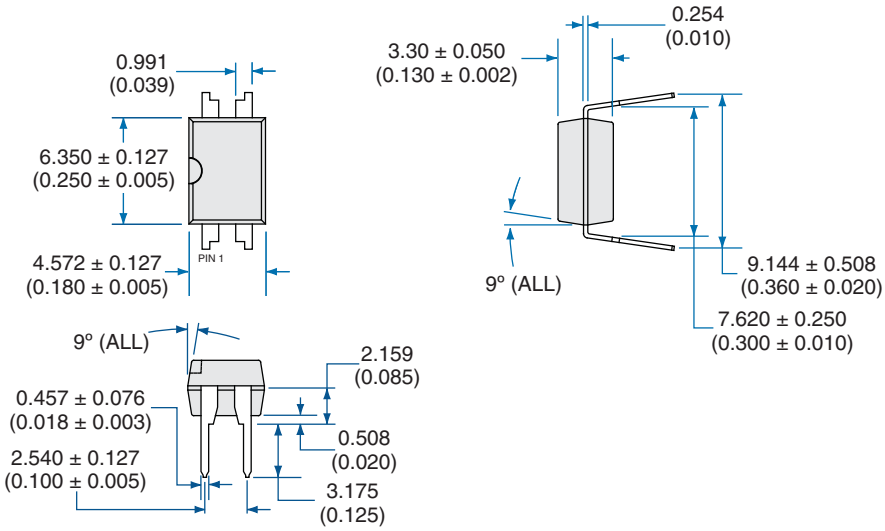
Device	Maximum Temperature x Time
CPC1390G / CPC1390GV / CPC1390GR	250°C for 30 seconds

Board Wash

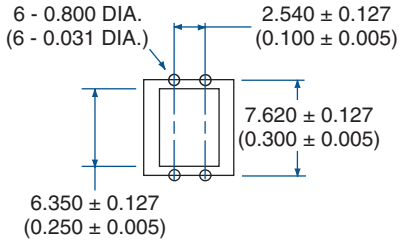
Clare recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since Clare employs the use of silicone coating as an optical waveguide in many of its optically isolated products, the use of a short drying bake could be necessary if a wash is used after solder reflow processes. Chlorine- or Fluorine-based solvents or fluxes should not be used. Cleaning methods that employ ultrasonic energy should not be used.

MECHANICAL DIMENSIONS

CPC1390G

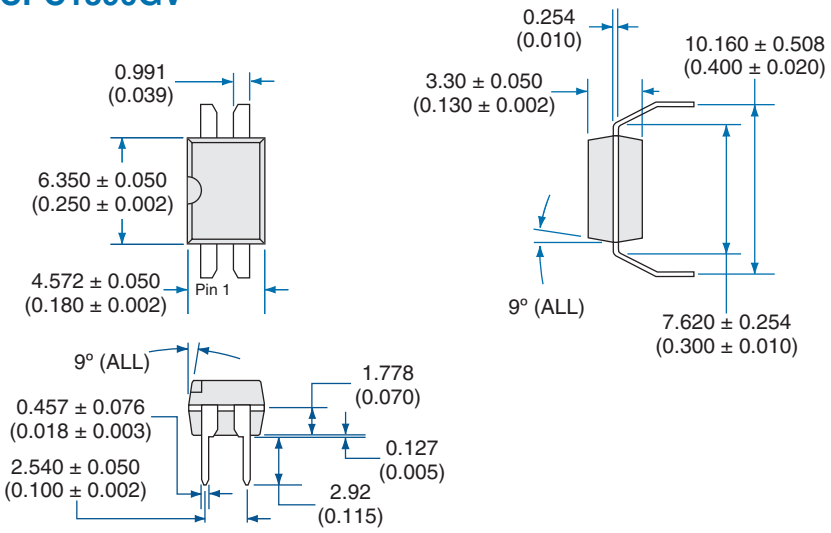


PC Board Pattern (Top View)

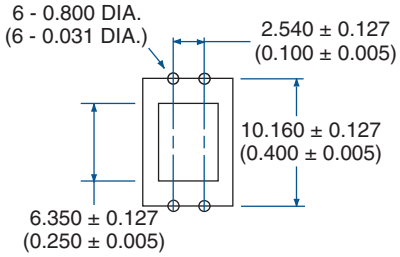


Dimensions
mm
(inches)

CPC1390GV

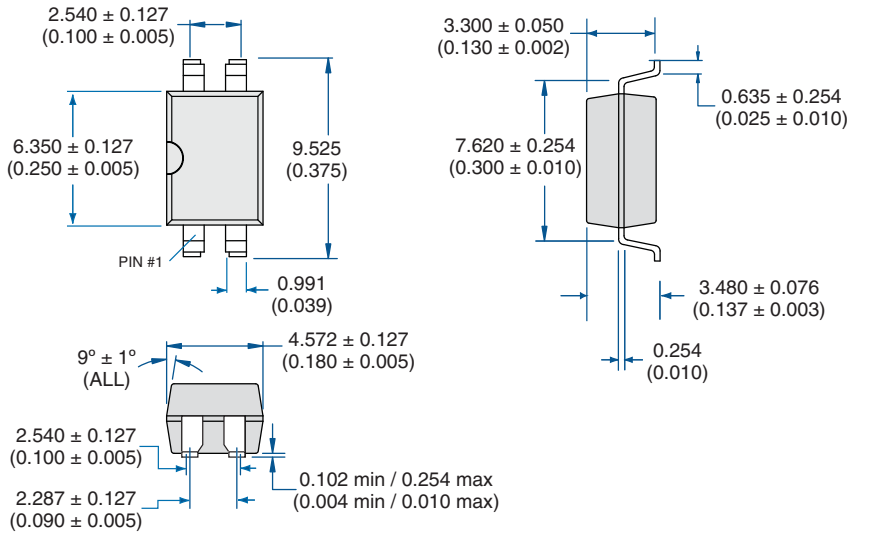


PC Board Pattern (Top View)

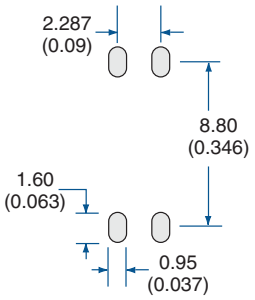


Dimensions
mm
(inches)

CPC1390GR

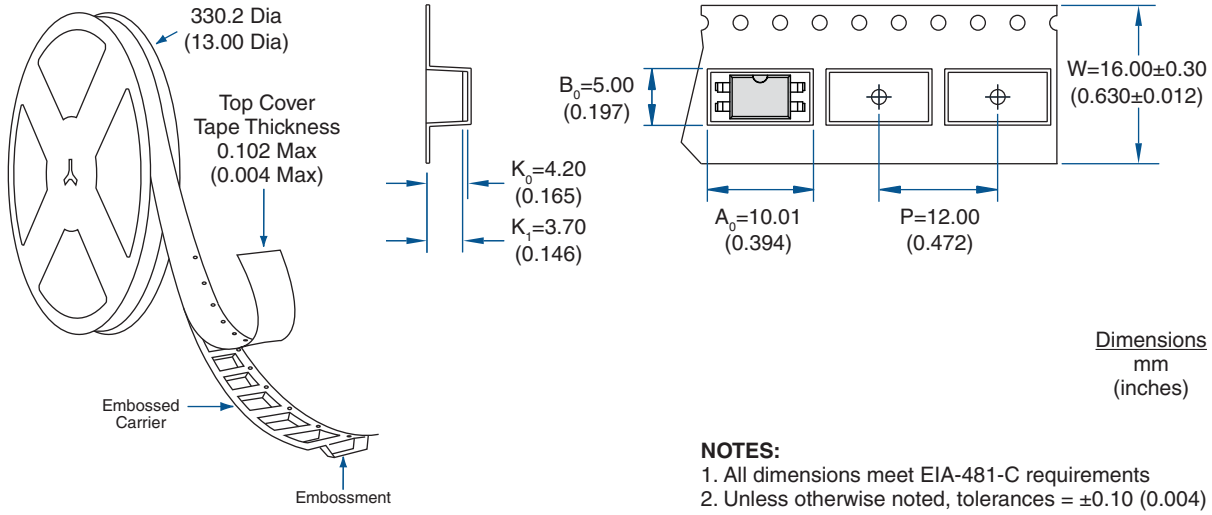


PCB Land Pattern



Dimensions
mm
(inches)

CPC1390GR Tape & Reel



Dimensions
mm
(inches)

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

For additional information please visit our website at: www.clare.com

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Specification: DS-CPC1390-R05
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