IXYS
INTEGRATED CIRCUITS DIVISION

CPC1393
Single-Pole, Normally Open 4-Pin OptoMOS® Relay

Parameter	Rating	Units
Blocking Voltage	600	V_P
Load Current	90	mA_{rms} / mA_{DC}
On-Resistance (max)	50	Ω

Features
- 5000V_{rms} Input/Output Isolation
- 600V_P Blocking Voltage
- 100% Solid State
- Low Drive Power Requirements
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Small 4-Pin Package

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 CPC1393G is a single-pole, normally open (1-Form-A) Solid State Relay with an enhanced input to output isolation barrier of 5000V_{rms}.

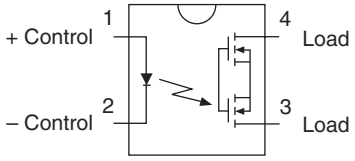
The relay output is constructed with efficient MOSFET switches that use IXYS Integrated Circuits Division's patented OptoMOS architecture. The input, a highly efficient infrared LED, controls the optically coupled output.

Approvals
- UL Certified Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN/IEC 60950-1 Certified Component: TUV Certificate B 13 12 82667 003

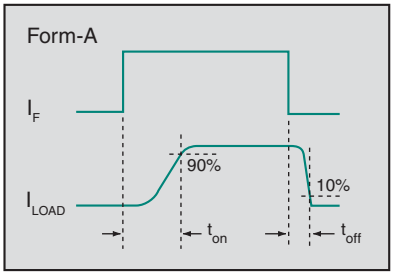
Ordering Information

Part Number	Description
CPC1393G	4-Pin DIP (100/Tube)
CPC1393GV	4-Pin DIP V-Bend (100/Tube)
CPC1393GR	4-Pin Surface Mount (100/Tube)
CPC1393GRTR	4-Pin Surface Mount (1000/Reel)

Pin Configuration



Switching Characteristics of Normally Open Devices



Absolute Maximum Ratings @ 25ºC

Parameter	Ratings	Units
Peak Blocking Voltage	600	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 1.33mW / ºC

[2] Derate linearly 3mW / 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.

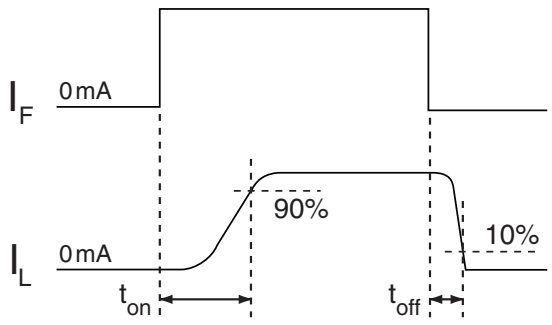
Typical values are characteristic of the device at +25°C, and are the result of engineering evaluations. They are provided for information purposes only, and are not part of the manufacturing testing requirements.

Electrical Characteristics @ 25ºC

Parameters	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics						
Load Current						
Continuous	-	I_L	-	-	90	mA_{rms} / mA_{DC}
Peak	t=10ms	I_{LPK}	-	-	±350	mA_P
On-Resistance [1]	I_L=90mA	R_{ON}	-	35	50	Ω
Off-State Leakage Current	V_L=600V_P	I_{LEAK}	-	-	1	µA
Switching Speeds						
Turn-On	I_F=5mA, V_L=10V (See Timing Diagram)	t_{on}	-	-	5	ms
Turn-Off		t_{off}	-	-	5	
Output Capacitance	I_F=0mA, V_L=50V, f=1MHz	C_{OUT}	-	50	-	pF
Input Characteristics						
Input Control Current to Activate	I_L=90mA	I_F	-	0.55	2	mA
Input Control Current to Deactivate	-	I_F	0.2	-	-	
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	V_{IO}=0V, f=1MHz	C_{IO}	-	3	-	pF

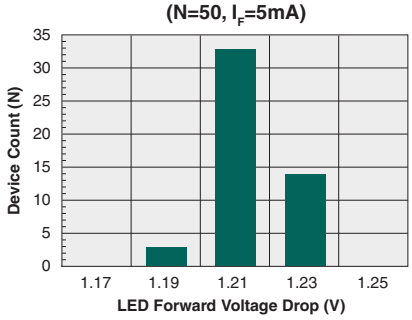
[1] Measurement taken within 1 second of on-time.

Timing Diagram

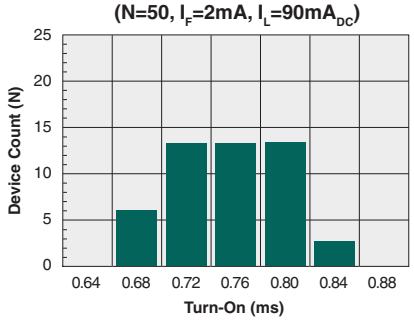


PERFORMANCE DATA @25°C (Unless Otherwise Noted)*

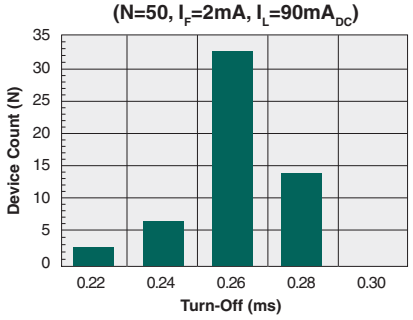
Typical LED Forward Voltage Drop (N=50, I_F=5mA)



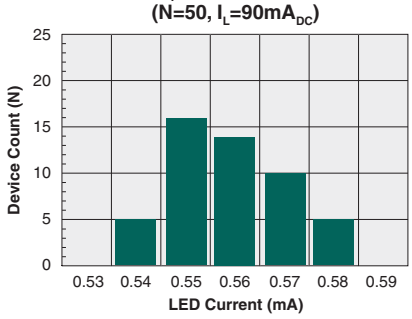
Typical Turn-On Time (N=50, I_F=2mA, I_L=90mA$_{DC}$)



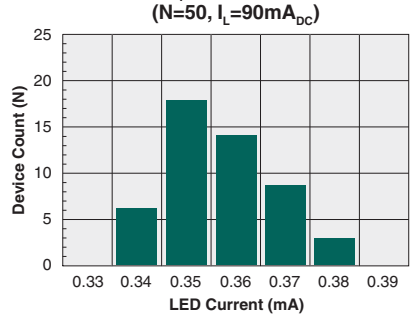
Typical Turn-Off Time (N=50, I_F=2mA, I_L=90mA$_{DC}$)



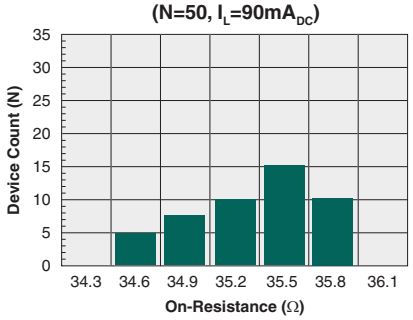
Typical I_F for Switch Operation (N=50, I_L=90mA$_{DC}$)



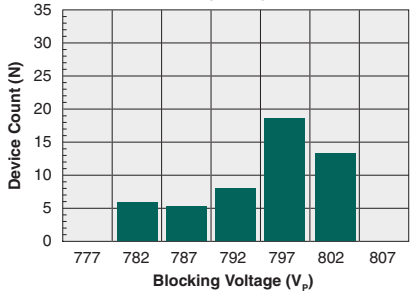
Typical I_F for Switch Dropout (N=50, I_L=90mA$_{DC}$)



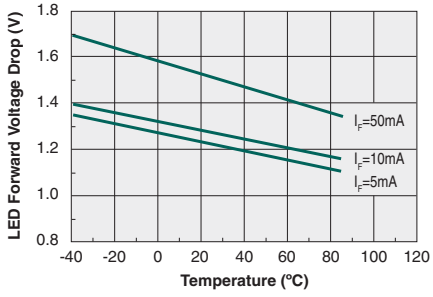
Typical On-Resistance Distribution (N=50, I_L=90mA$_{DC}$)



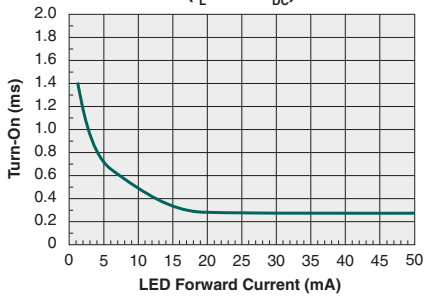
Typical Blocking Voltage Distribution (N=50)



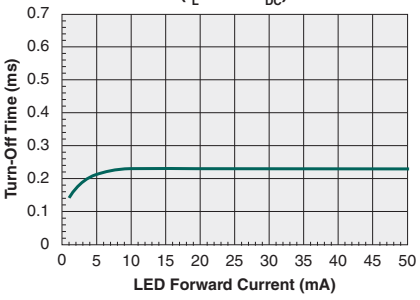
Typical LED Forward Voltage Drop vs. Temperature



Typical Turn-On vs. LED Forward Current (I_L=90mA$_{DC}$)



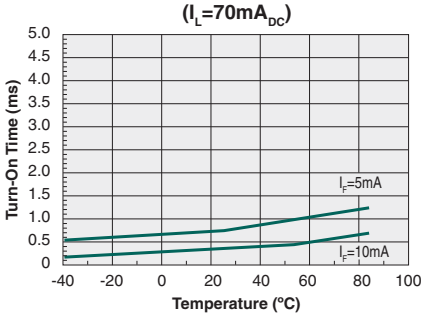
Typical Turn-Off Time vs. LED Forward Current (I_L=90mA$_{DC}$)



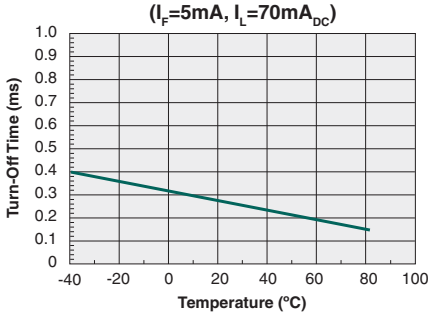
*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA @25°C (Unless Otherwise Noted)*

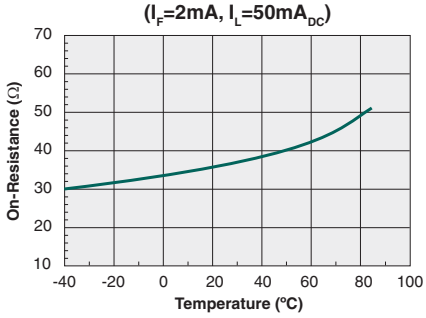
Typical Turn-On Time vs. Temperature (I_L=70mA$_{DC}$)



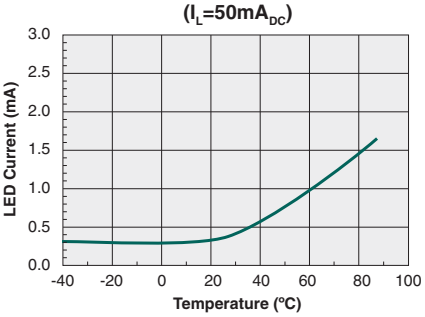
Typical Turn-Off Time vs. Temperature (I_F=5mA, I_L=70mA$_{DC}$)



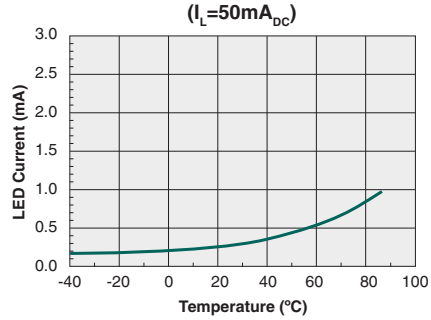
Typical On-Resistance vs. Temperature (I_F=2mA, I_L=50mA$_{DC}$)



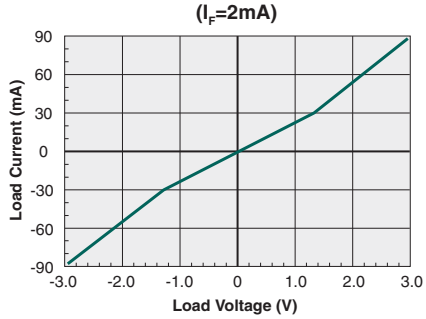
Typical I_F for Switch Operation vs. Temperature (I_L=50mA$_{DC}$)



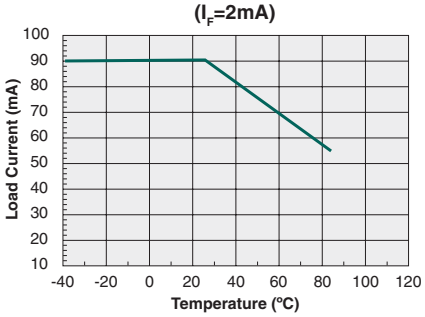
Typical I_F for Switch Dropout vs. Temperature (I_L=50mA$_{DC}$)



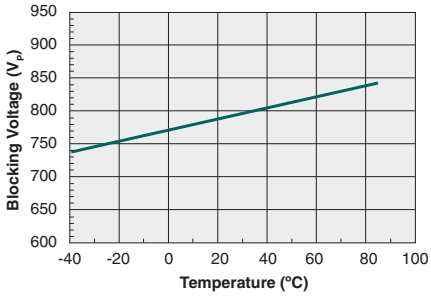
Typical Load Current vs. Load Voltage (I_F=2mA)



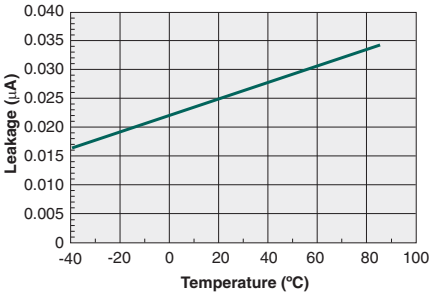
Maximum Load Current vs. Temperature (I_F=2mA)



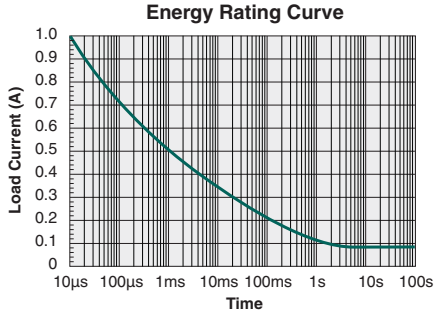
Typical Blocking Voltage vs. Temperature



Typical Leakage vs. Temperature Measured Across Pins 3 & 4



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. IXYS Integrated Circuits Division 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
CPC1393G / CPC1393GV	MSL 1
CPC1393GR	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 the body temperature of this device may be above (T_C - 5)°C. The classification temperature sets the Maximum Body Temperature allowed for this device during lead-free reflow processes. Additionally, for the CPC1393GR, 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 devices, CPC1393G and CPC1393GV, and any other processes, the guidelines of **J-STD-020** must be observed.

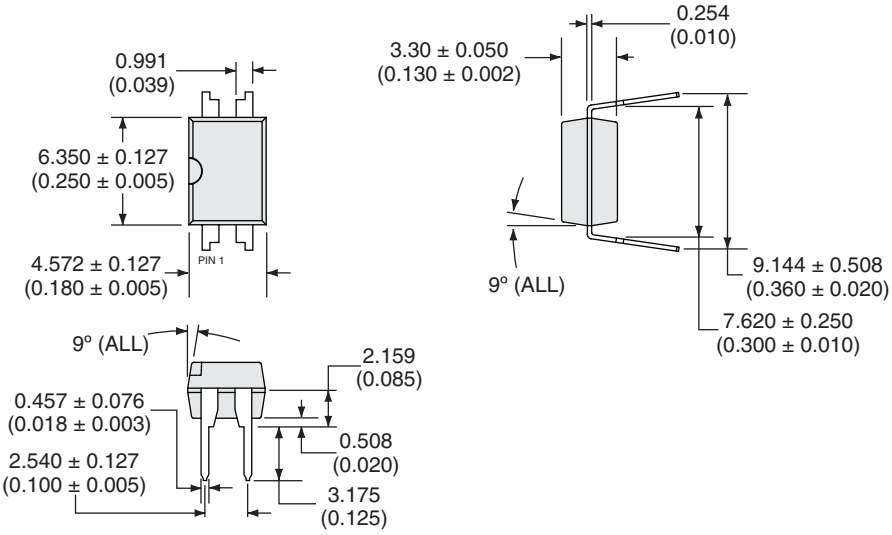
Device	Maximum Body Temperature (T_c)	Time
CPC1393GR	250°C	15 seconds

Board Wash

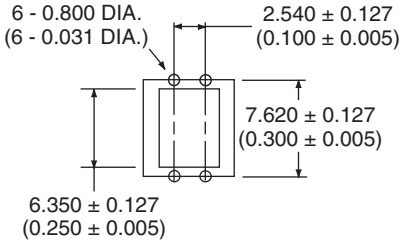
IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. Board washing to reduce or remove flux residue following the solder reflow process is acceptable provided proper precautions are taken to prevent damage to the device. These precautions include, but are not limited to: 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 flux or solvents that are Chlorine- or Fluorine-based.

MECHANICAL DIMENSIONS

CPC1393G

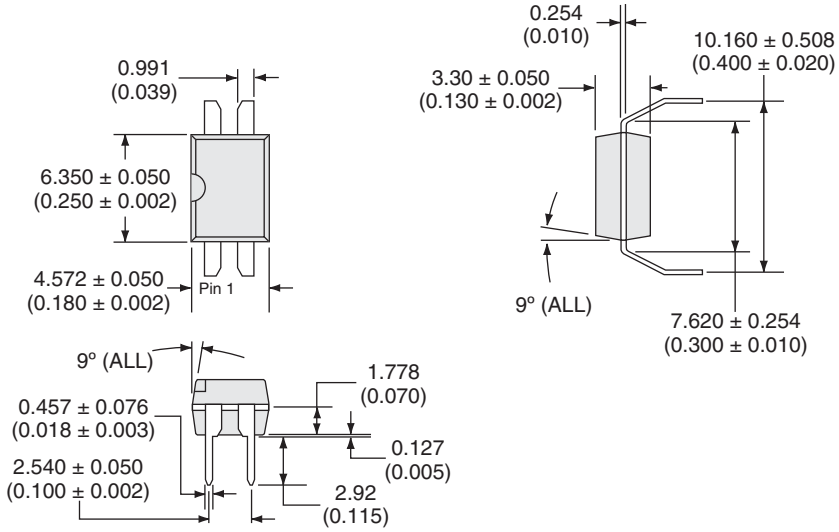


PC Board Pattern (Top View)

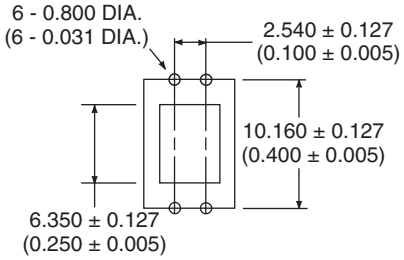


Dimensions
mm
(inches)

CPC1393GV

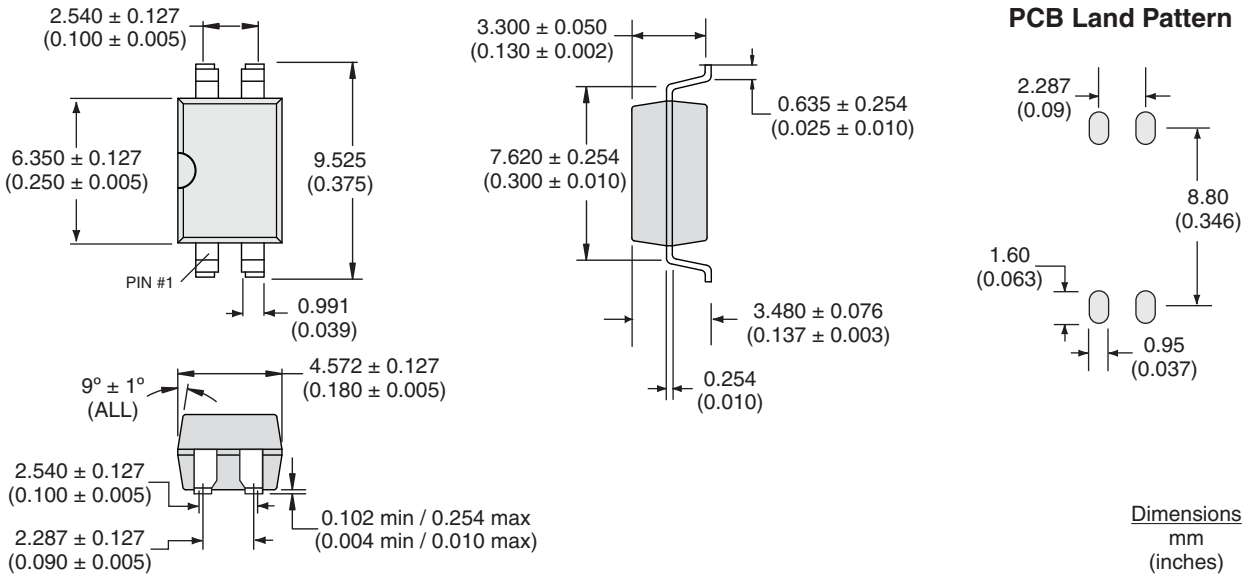


PC Board Pattern (Top View)



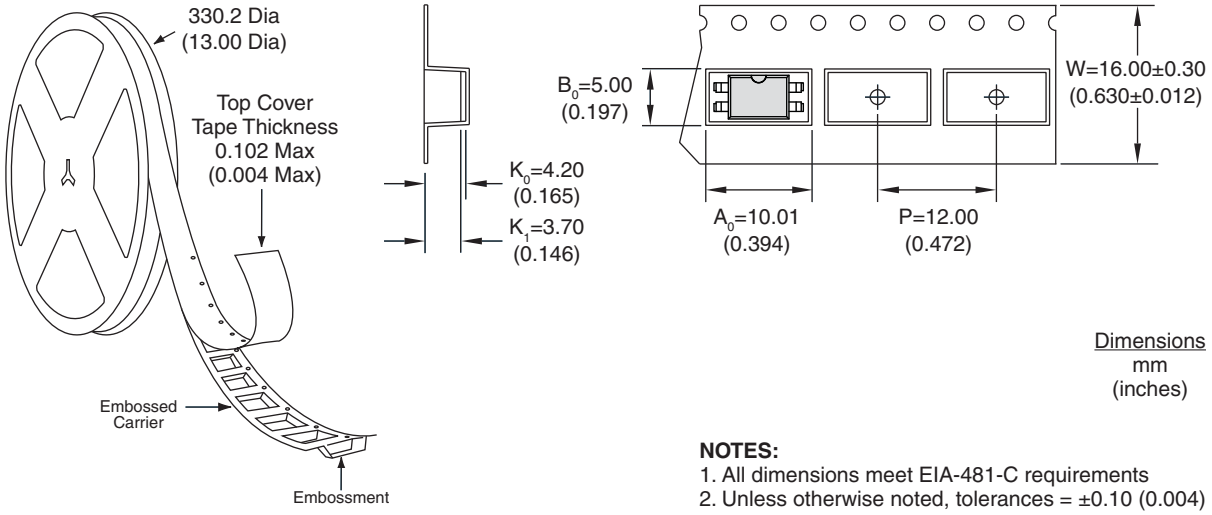
Dimensions
mm
(inches)

CPC1393GR



Dimensions
mm
(inches)

CPC1393GRTR 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.ixysic.com

Specification: DS-CPC1393-R07

1/7/2016

The information below supercedes any previously presented material.

For additional information please visit our website at: https://www.littelfuse.com

IXYS
A Littelfuse Technology