IXYS
INTEGRATED CIRCUITS DIVISION

CPC1301
Optocoupler with High-Voltage Darlington Output

Parameter	Rating	Units
Breakdown Voltage - BV_{CEO}	350	V_P
Current Transfer Ratio - CTR	1000-8000	%

Features

- $5000V_{rms}$ Input/Output Isolation
- $350V_P$ Breakdown Voltage
- Small 4-Pin Package
- Machine Insertable, Wave Solderable
- Surface Mount Tape & Reel Version Available

Applications

- Telecom Switching
- Tip/Ring Circuits
- Hook Switch
- Modem Switching (Laptop, Notebook, Pocket Size)
- Loop Detect
- Ringing Detect
- Current Sensing

Description

The CPC1301 is a unidirectional input optocoupler with a high-voltage Darlington output. Light output from the highly efficient GaAlAs infrared LED activates the optically coupled silicon NPN photo-Darlington output transistor. The input LED and the output transistor are separated by a $5000V_{rms}$ isolation barrier.

With a LED current of only 1mA, a current transfer ratio of 1000% to 8000% is guaranteed at the collector of the 350V Darlington output transistor.

The CPC1301's low input current, high current transfer ratio, high output voltage capability, and large isolation barrier rating make it ideal for many applications such as telecom, industrial, and power control.

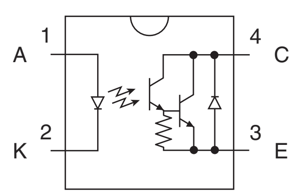
Approvals

- UL 1577 Approved Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN 60950 Certified Component: TUV Certificate B 10 05 49410 006

Ordering Information

Part Number	Description
CPC1301G	4-Pin DIP (100/Tube)
CPC1301GR	4-Pin Surface Mount (100/Tube)
CPC1301GRTR	4-Pin Surface Mount (1000/Reel)

Pin Configuration



Pb RoHS e3

Absolute Maximum Ratings @ 25ºC

Parameter	Ratings	Units
Breakdown Voltage, BV_{CEO}	350	V_P
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10ms)	1	A
Input Power Dissipation [1]	150	mW
Phototransistor Power Dissipation [2]	150	mW
Isolation Voltage, Input to Output	5000	V_{rms}
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C

[1] Derate linearly 1.33 mW / ºC
[2] Derate linearly 1.5 mW / ºC

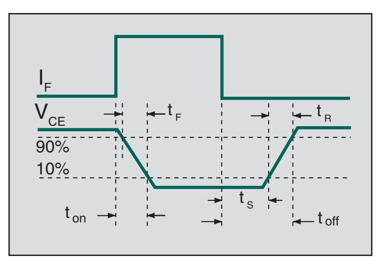
Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

Electrical Characteristics @ 25ºC

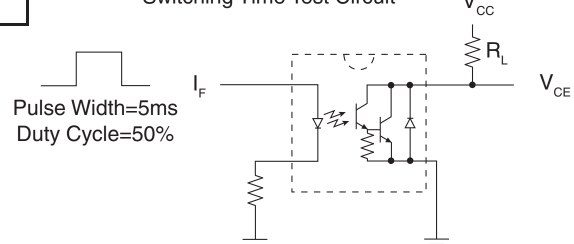
Parameters	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics						
Phototransistor Breakdown Voltage	I_{CEO}=100µA	BV_{CEO}	350	-	-	V_P
Emitter-Collector Breakdown Voltage	I_E=0.1mA	BV_{ECO}	0.3	-	-	V
Phototransistor Output (Dark) Current	V_{CEO}=200V, I_F=0mA	I_{CEO}	-	-	100	nA
Saturation Voltage	I_C=10mA, I_F=1mA	$V_{CE(Sat)}$	-	-	1	V
	I_C=100mA, I_F=10mA		-	-	1.2	V
Current Transfer Ratio	I_F=1mA, V_{CE}=1V	CTR	1000	5500	8000	%
Output Capacitance	V_{CEO}=50V, f=1MHz	C_{OUT}	-	13	-	pF
Input Characteristics						
Input Control Current	I_C=10mA, V_{CE}=1V	I_F	-	0.07	1	mA
Input Voltage Drop	I_F=5mA	V_F	0.9	1.2	1.4	V
Input Reverse Current	V_R=5V	I_R	-	-	10	µA
Common Characteristics						
Input to Output Capacitance	-	$C_{I/O}$	-	3	-	pF

Switching Characteristics @ 25ºC

Characteristic	Symbol	Test Condition	Typ	Units
Rise Time	t_R	V_{CC}=10V, I_F=10mA, R_L=100Ω	40	µs
Fall Time	t_F		2.6	
Turn-On Time	t_{on}		2.75	
Storage Time	t_S		20	
Turn-Off Time	t_{off}		60	
Turn-On Time	t_{on}	V_{CC}=10V, I_F=16mA, R_L=180Ω	1	
Storage Time	t_S		40	
Turn-Off Time	t_{off}		80	

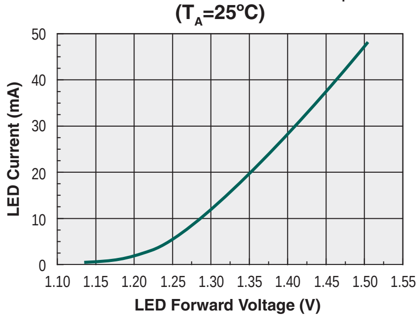


Switching Time Test Circuit

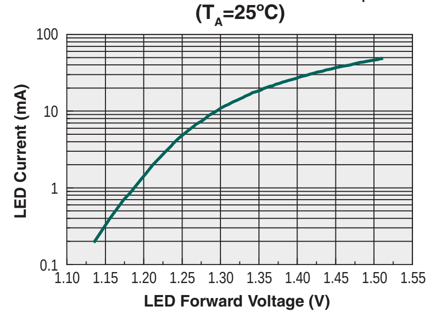


PERFORMANCE DATA*

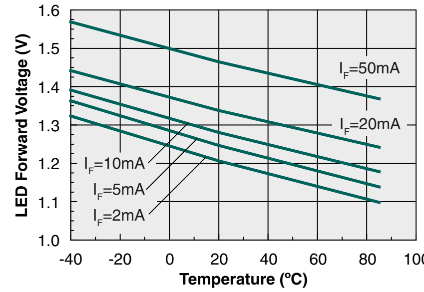
LED Current (I_F) vs. LED Forward Voltage (V_F) (T_A=25ºC)



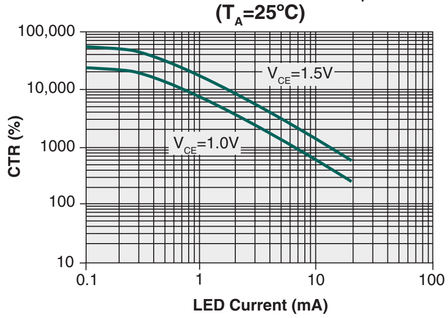
LED Current (I_F) vs. LED Forward Voltage (V_F) (T_A=25ºC)



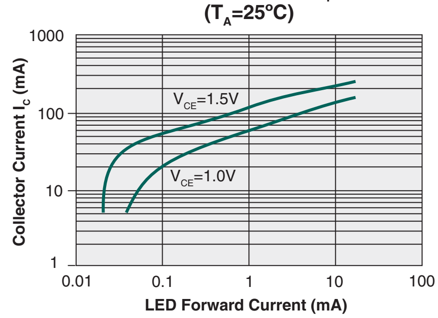
LED Forward Voltage vs. Temperature



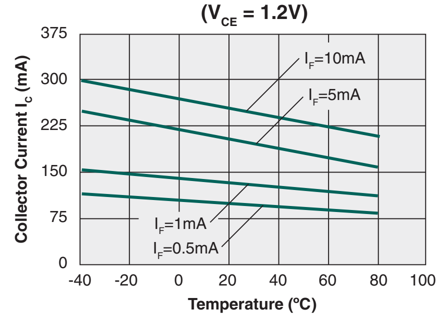
CTR vs. LED Current (I_F) (T_A=25ºC)



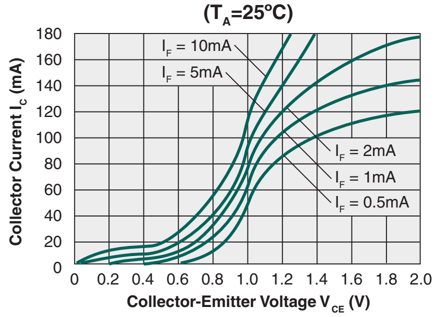
Collector Current vs. LED Current (I_F) (T_A=25ºC)



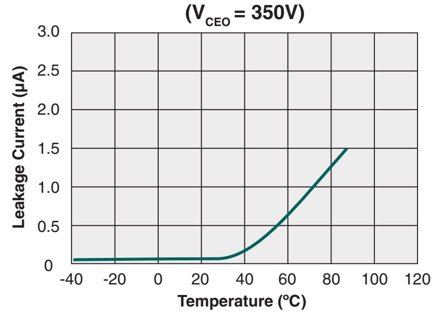
Collector Current vs. Temperature (V_{CE} = 1.2V)



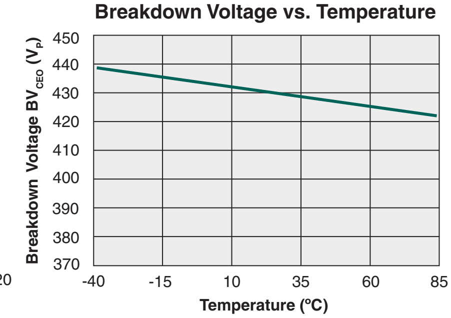
Collector Current vs. Collector-Emitter Voltage (T_A=25ºC)



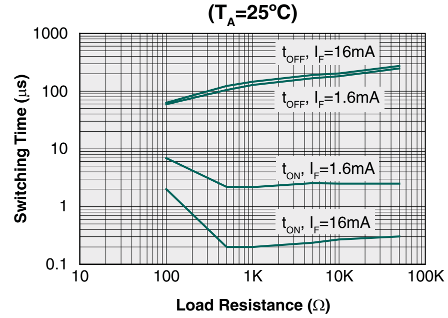
Leakage vs. Temperature (V_{CEO} = 350V)



Breakdown Voltage vs. Temperature



Switching Time vs. Load Resistance (T_A=25ºC)



*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
CPC1301G / CPC1301GR	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
CPC1301G / CPC1301GR	250°C for 30 seconds

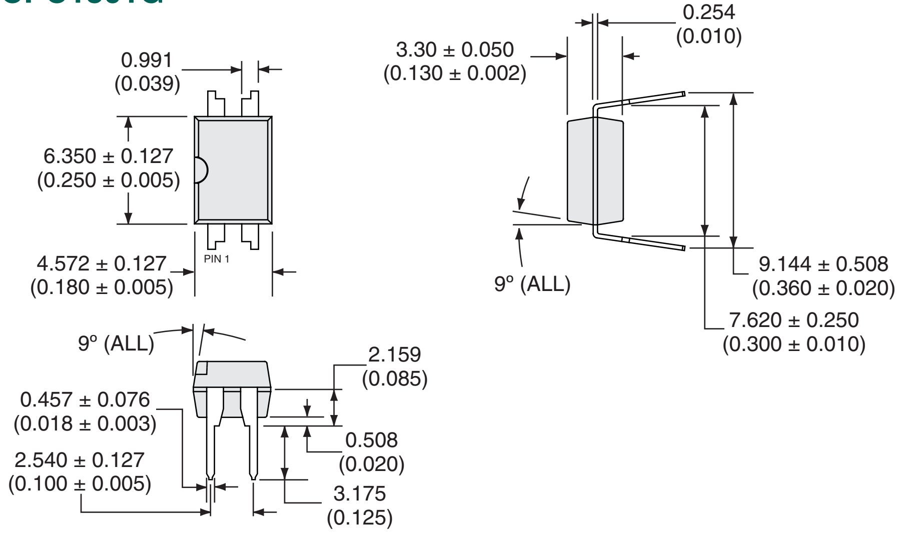
Board Wash

IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since IXYS Integrated Circuits Division 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.

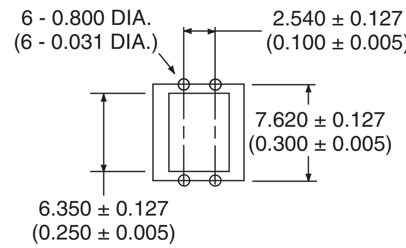
Pb RoHS e3

MECHANICAL DIMENSIONS

CPC1301G

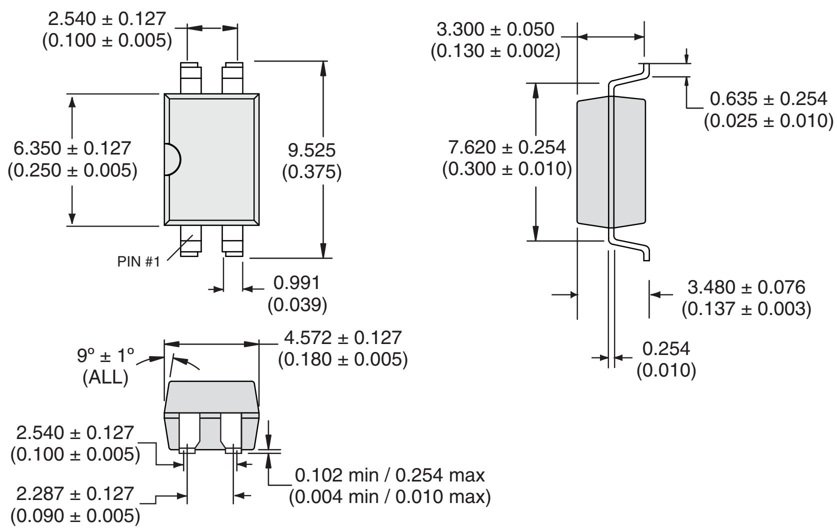


PC Board Pattern (Top View)

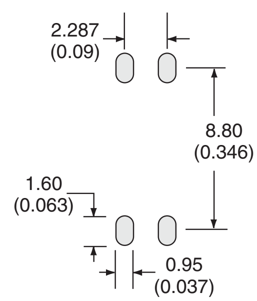


Dimensions
mm
(inches)

CPC1301GR

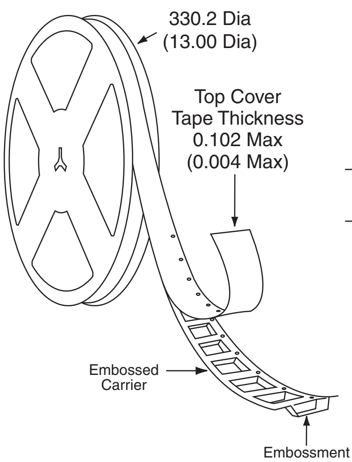


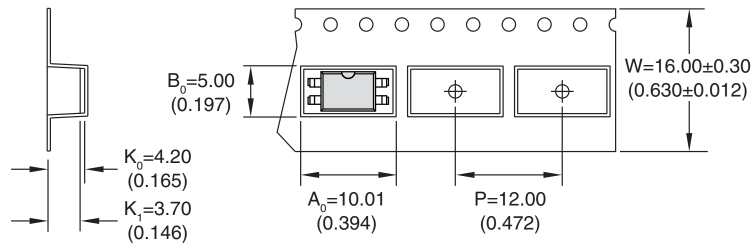
PCB Land Pattern



Dimensions
mm
(inches)

CPC1301GRTR 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-CPC1301-R05

12/16/2012