IXYS
INTEGRATED CIRCUITS DIVISION

CPC1335
Single Pole OptoMOS® Relay with Bi-directional Transient Protection

Parameters	Ratings	Units
Load Voltage, AC/DC	350	V_P
Load Current	100	mA_{rms} / mA_{DC}
On-Resistance (max)	35	Ω
LED Current to Operate	1	mA

Transient Protection Characteristics

Peak Pulse Power	V_{WM}
600W	40.2V

Features
- Meets Requirements of EN50130-4 (Installation Class 3)
- 3750V_{rms} Input/Output Isolation
- 100% Solid State
- Low Drive Power Requirements
- High Reliability
- No EMI/RFI Generation
- Flammability Rating UL 94 V-0

Applications
- Security
- Sensor Circuitry
- Instrumentation
- Multiplexers
- Data Acquisition
- Electronic Switching
- I/O Subsystems
- Industrial Controls

Description
The CPC1335 is a single-pole, normally open (1-Form-A) solid state relay with bi-directional transient voltage suppressor (TVS) relay protection, which is designed to meet the requirements of EN50130-4 (installation class 3).

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

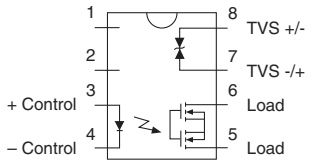
The CPC1335 is available in a space-saving 8-pin SOIC package.

Approvals
- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1172007
- EN/IEC 62368-1 Certified Component: TUV Certificate B 082667 0008

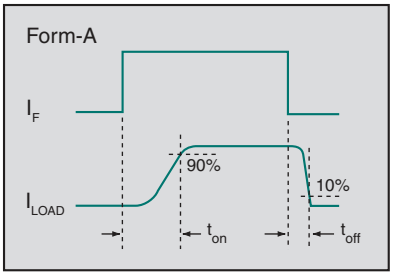
Ordering Information

Part #	Description
CPC1335P	8-Pin SOIC (Flatpack) (50/Tube)
CPC1335PTR	8-Pin SOIC (Flatpack) (1000/Reel)

Pin Configuration



Switching Characteristics of Normally Open Devices



Absolute Maximum Ratings @ 25ºC

Parameter	Ratings	Units
SSR Output Blocking Voltage	350	V_P
TVS Working Voltage, Maximum (V_{WM})	40.2	V
Reverse Input Voltage	5	V
Input Control Current	50	mA
Peak (10ms)	1	A
Input Power Dissipation [1]	150	mW
SSR Output Power Dissipation [2]	400	mW
TVS Peak Pulse Power (P_{PP}) (I_{PP}=9.3A, 10/1000µs pulse)	600	W
Isolation Voltage, Input to Output	3750	V_{rms}
Operating Temperature, Ambient	-40 to +85	°C
Storage Temperature	-40 to +125	°C

[1] Derate linearly 1.33 mW / ºC
[2] Derate output linearly 6.67 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.

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: TVS

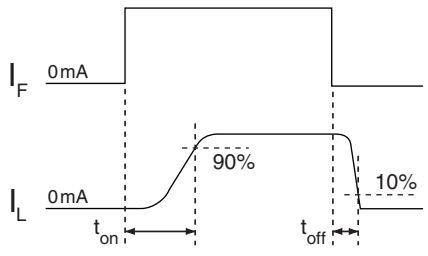
Parameters	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics @ 25°C						
Clamping Voltage	I_{PP}=9.3A	V_C	-	-	66.5	V
Reverse Breakdown Voltage	I=1mA	V_{BR}	44.4	-	-	V
Reverse Leakage Current	V_{WM}=40.2V	I_L	-	-	5	µA

Electrical Characteristics @ 25ºC

Parameters	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics						
Blocking Voltage	I_L=1µA	V_{DRM}	350	-	-	V_P
Load Current, AC/DC						
Continuous [1]	I_F=2mA	I_L	-	-	100	mA_{rms} / mA_{DC}
Peak	t=10ms	I_{LPK}	-	-	±350	mA_P
On-Resistance [2]	I_L=100mA	R_{ON}	-	25	35	Ω
Off-State Leakage Current	V_L=350V_P	I_{LEAK}	-	-	1	µA
Switching Speeds						
Turn-On	I_F=2mA, V_L=10V	t_{on}	-	-	10	ms
Turn-Off	(See Timing Diagram)	t_{off}	-	-	10	ms
Output Capacitance	I_F=0V, V_L=50V, f=1MHz	C_{OUT}	-	40	-	pF
Input Characteristics						
Input Control Current to Activate [3]	I_L=100mA	I_F	-	-	1	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	V_{IO}=0V, f=1MHz	C_{IO}	-	3	-	pF

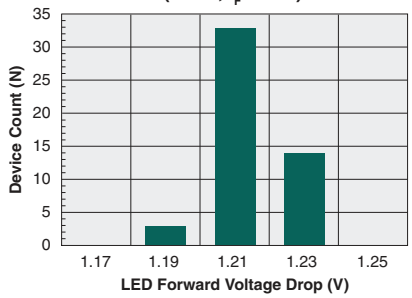
[1] Load current derates linearly from 100mA @ 25ºC to 70ma @ 85ºC
[2] Measurement taken within 1 second of on-time
[3] For applications requiring high temperature operation (greater than 60ºC) a minimum LED drive current of 3mA is recommended.

Timing Diagram

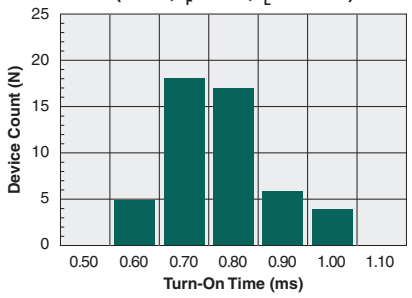


PERFORMANCE DATA*

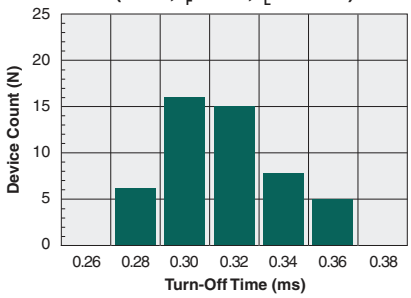
Typical LED Forward Voltage Drop
(N=50, I_F=5mA)



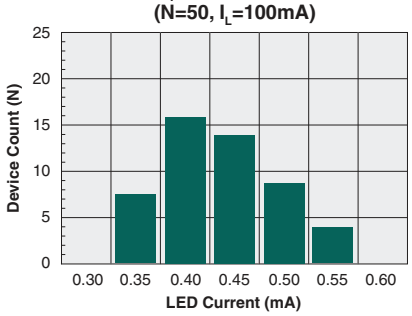
Typical Turn-On Time
(N=50, I_F=5mA, I_L=100mA)



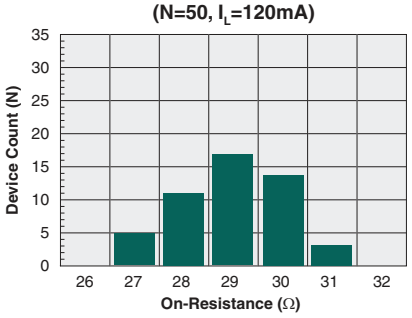
Typical Turn-Off Time
(N=50, I_F=5mA, I_L=100mA)



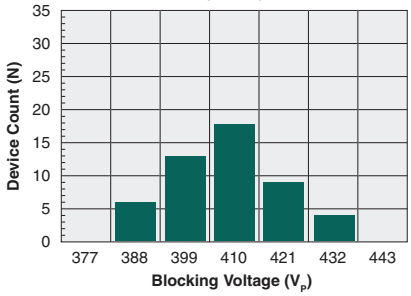
Typical I_F for Switch Operation
(N=50, I_L=100mA)



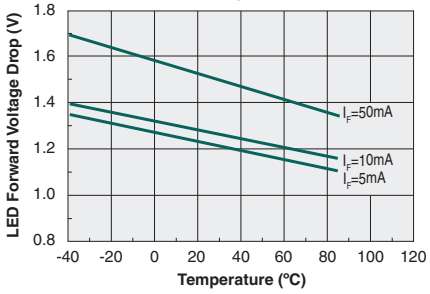
Typical On-Resistance Distribution
(N=50, I_L=120mA)



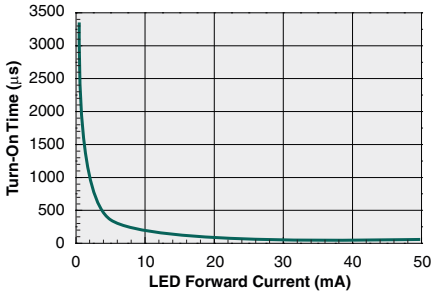
Typical Blocking Voltage Distribution
(N=50)



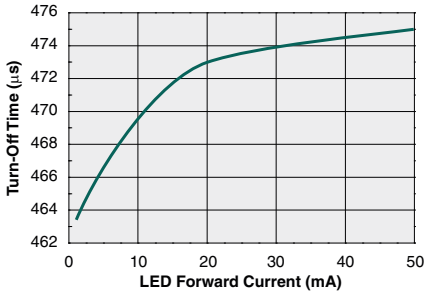
Typical LED Forward Voltage Drop
vs. Temperature



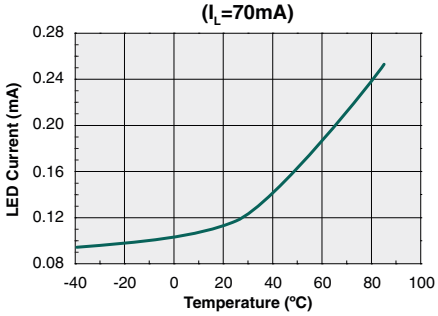
Turn-On Time
vs. LED Forward Current



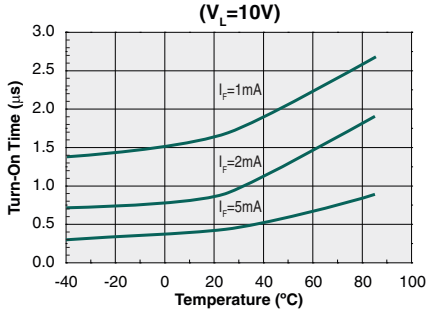
Typical Turn-Off Time
vs. LED Forward Current



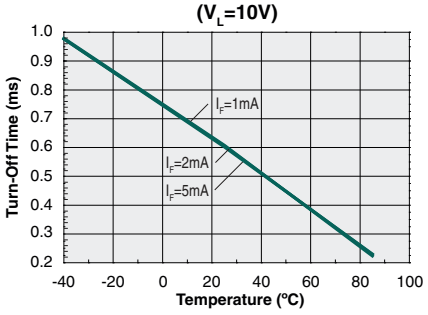
Typical LED Current to Operate
vs. Temperature
(I_L=70mA)



Typical Turn-On Time
vs. Temperature
(V_L=10V)



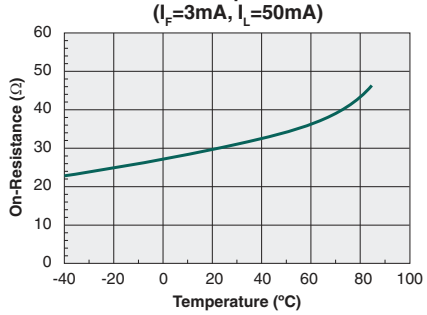
Typical Turn-Off Time
vs. Temperature
(V_L=10V)



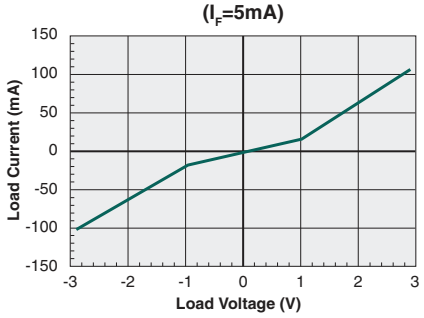
*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.

PERFORMANCE DATA*

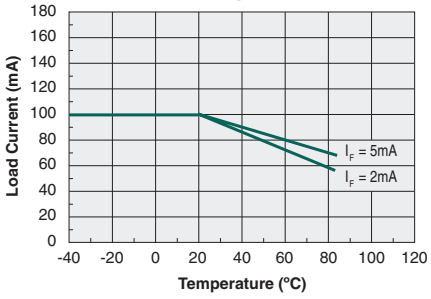
Typical On-Resistance vs. Temperature (I_F=3mA, I_L=50mA)



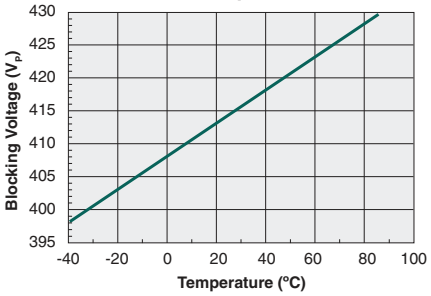
Typical Load Current vs. Load Voltage (I_F=5mA)



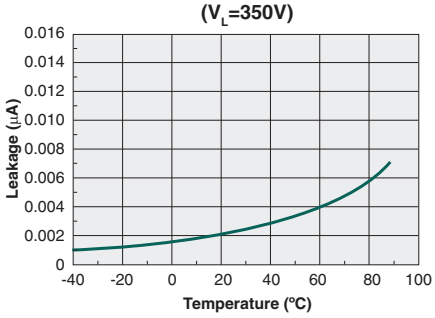
Maximum Load Current vs. Temperature



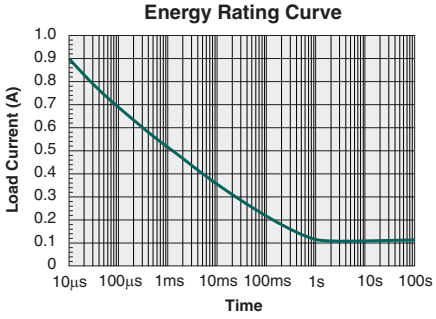
Typical Blocking Voltage vs. Temperature



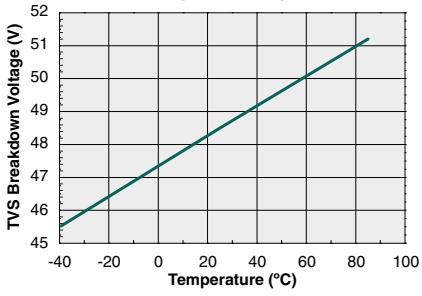
Typical Leakage vs. Temperature Measured Across Pins 5 & 6 (V_L=350V)



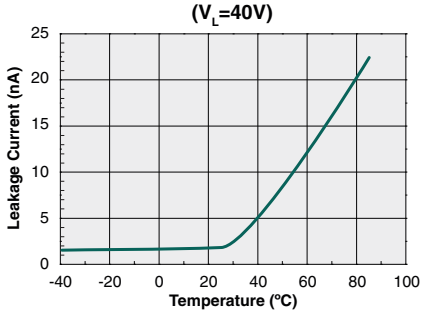
Energy Rating Curve



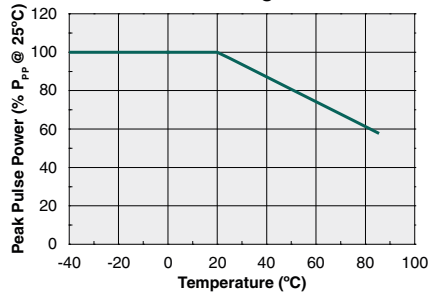
TVS Diode Breakdown Voltage vs. Temperature (Pins 7 & 8)



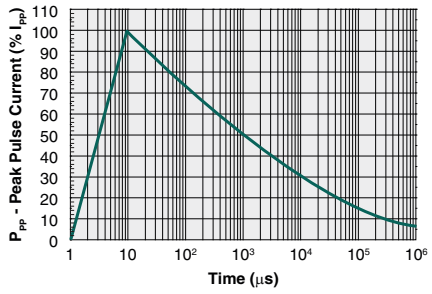
TVS Diode Leakage vs. Temperature (Pins 7 & 8) (V_L=40V)



TVS Derating Curve



TVS Pulse Waveform 10/1000 (µs)



*Unless otherwise noted, data presented in these graphs is typical of device operation at 25ºC.

Manufacturing Information

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. IXYS Integrated Circuits 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
CPC1335P	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 **IPC/JEDEC J-STD-020** Classification Temperature (T_C) and the maximum dwell time the body temperature of these surface mount devices may be (T_C - 5)°C or greater. The Classification Temperature sets the Maximum Body Temperature allowed for these devices during reflow soldering processes.

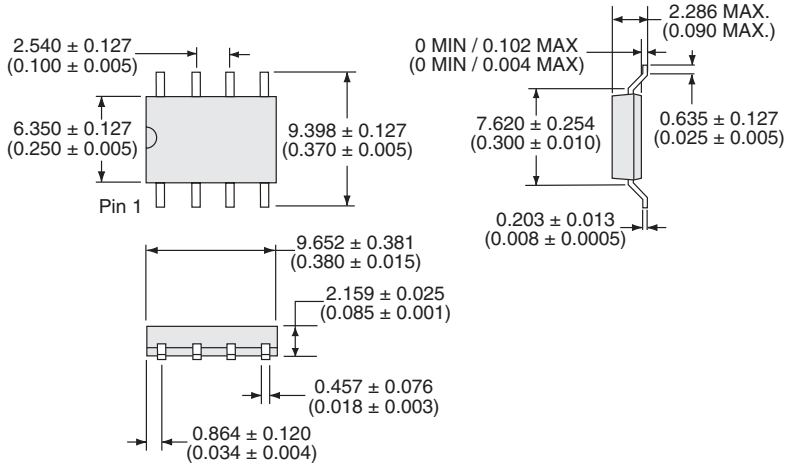
Device	Classification Temperature (T_c)	Dwell Time (t_p)	Max Reflow Cycles
CPC1335P	245°C	30 seconds	3

Board Wash

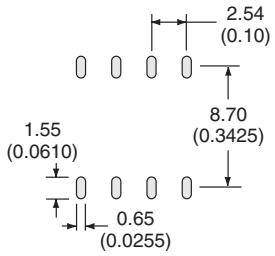
IXYS Integrated Circuits recommends the use of no-clean flux formulations. Board washing to reduce or remove flux residue following the solder reflow process is acceptable provided proper precautions are taken to prevent damage to the device. These precautions include but are not limited to: using a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

CPC1335P

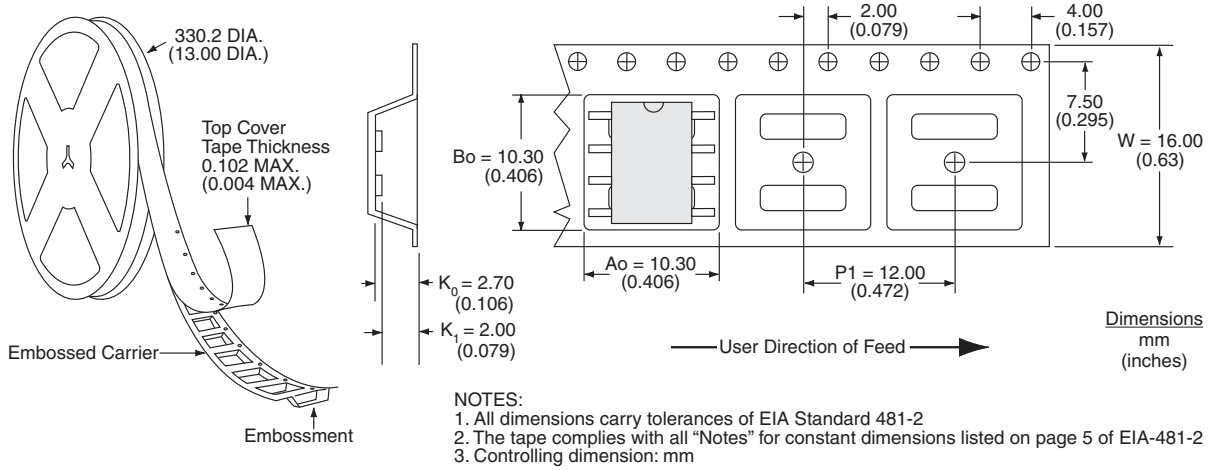


PCB Land Pattern



Dimensions
mm
(inches)

CPC1335PTR Tape & Reel



Dimensions
mm
(inches)

NOTES:
1. All dimensions carry tolerances of EIA Standard 481-2
2. The tape complies with all "Notes" for constant dimensions listed on page 5 of EIA-481-2
3. Controlling dimension: mm

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

IXYS
A Littelfuse Technology

Specification: DS-CPC1335-R09

5/4/2021