CPC1978J

i4-PAC™ Power Relay

	CPC1978J	Units
Blocking Voltage	800	V_P
Load Current	2.5	A_{rms}
On-resistance	2.3	Ω
$R_{\theta JC}$	0.35	°C/W

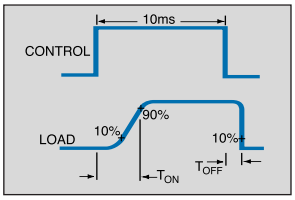
Features

- Compact i4-PAC™ Power Package
- Low Thermal Resistance
- Heat Sink Option
- Handle Load Currents Up to 2.5A_{rms} (free air)
- High Reliability
- No Moving Parts
- Low Drive Power Requirements (TTL/CMOS Compatible)
- Arc-Free With No Snubbing Circuits
- 2500V_{rms} Input/Output Isolation
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable

Applications

- Industrial Controls
- Motor Control
- Robotics
- Medical Equipment—Patient/Equipment Isolation
- Instrumentation
  - Multiplexers
  - Data Acquisition
  - Electronic Switching
  - I/O Subsystems
  - Meters (Watt-Hour, Water, Gas)
- Transportation Equipment
- Aerospace/Defense

Switching Characteristics of Normally Open (Form A) Devices



Description

Clare and IXYS have combined to bring OptoMOS technology, reliability and compact size to a new family of high power solid state relays. The CPC1978J, a 1-Form-A solid state relay, is part of this new family. The CPC1978J employs optically coupled MOSFET technology to provide 2500V_{rms} of input to output isolation. The efficient MOSFET switches and photovoltaic die use Clare's patented OptoMOS architecture while the input is controlled by a highly efficient GaAlAs infrared LED. The combination of low on resistance and high load current handling capability makes the relay suitable for a variety of high performance switching applications.

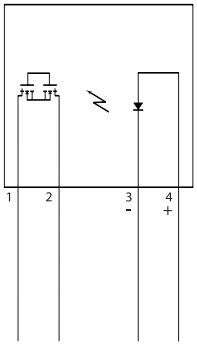
The unique i4-PAC™ package pioneered by IXYS allows solid state relays to achieve the highest current and power ratings. This package features an IXYS unique process where the silicon chips are soft soldered onto the Direct Copper bond (DCB) substrate instead of the usual copper leadframe. The DCB ceramic, the same substrate used in high power modules, not only provides 2500V_{rms} isolation, but also very low thermal resistance.

Ordering Information

Part #	Description
CPC1978J	i4-PAC™ 25 per tube

Pin Configuration

CPC1978J Pinout



Absolute Maximum Ratings (@ 25° C)

Parameter	Ratings	Units
Blocking Voltage	800	V_P
Reverse Input Voltage	5	V
Input Control Current Peak (10ms)	100 1	mA A
Input Power Dissipation	150	mW
Isolation Voltage Input to Output	2500	V_{RMS}
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C
Soldering Temperature (10 Seconds Max.)	+260	°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.

Electrical Characteristics

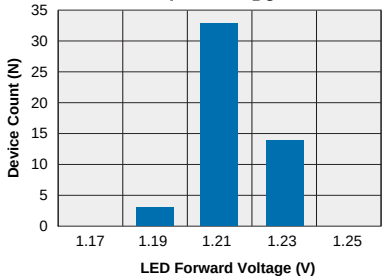
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Output Characteristics @ 25°C						
Load Current	Continuous, free air	I_L	-	-	2.5	A_{rms}
Peak Load Current	T ≤ 10ms	I_L	-	-	10	A_{rms}
On-Resistance [1]	I_F=10mA, I_L=1.0A	R_{ON}	-	1.7	2.3	Ω
Off-State Leakage Current	V_L=800V	I_{LEAK}	-	-	1	µA
Switching Speeds Turn-On	I_F=20mA, V_L=10V	T_{ON}	-	8	20	ms
Turn-Off	I_F=20mA, V_L=10V	T_{OFF}	-	0.15	5	ms
Input Characteristics @ 25°C						
Input Control Current [2]	I_L=1.0A	I_F	10	-	-	mA
Input Dropout Current	-	I_F	0.6	-	-	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 @ 25°C						
Capacitance Input to Output	-	$C_{I/O}$	-	1	-	pF
Thermal Characteristics						
Thermal Resistance, Junction to case	-	$R_{\theta JC}$	-	0.35	-	°C/W

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

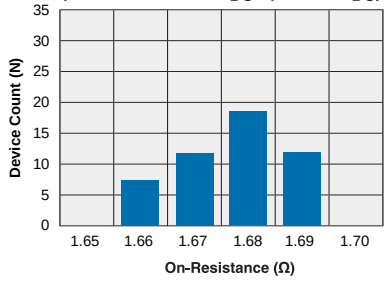
[2] For applications requiring high temperature operation (greater than 60ºC) an LED drive current of 20mA is recommended.

PERFORMANCE DATA*

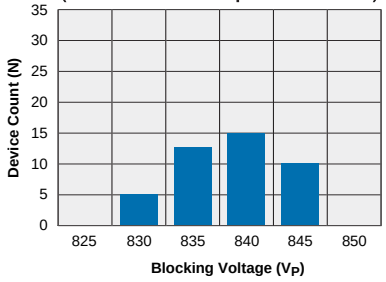
CPC1978J
Typical LED Forward Voltage Drop
(N=50 Ambient Temperature = 25°C)
I_F = 10mA$_{DC}$



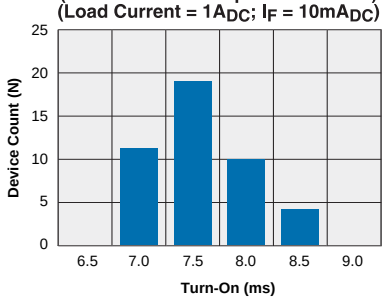
CPC1978J
Typical On-Resistance Distribution
(N=50 Ambient Temperature = 25°C)
(Load Current = 1A$_{DC}$; I_F = 10mA$_{DC}$)



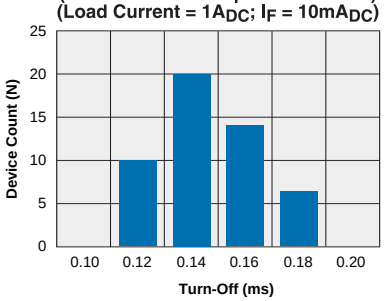
CPC1978J
Typical Blocking Voltage Distribution
(N=50 Ambient Temperature = 25°C)



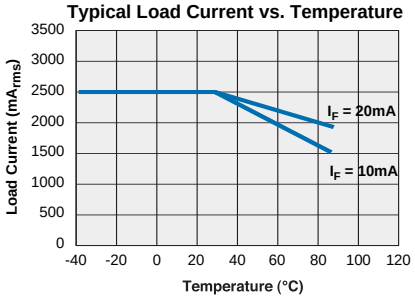
CPC1978J
Typical Turn-On Time
(N=50 Ambient Temperature = 25°C)
(Load Current = 1A$_{DC}$; I_F = 10mA$_{DC}$)



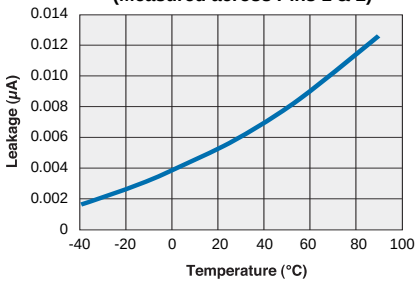
CPC1978J
Typical Turn-Off Time
(N=50 Ambient Temperature = 25°C)
(Load Current = 1A$_{DC}$; I_F = 10mA$_{DC}$)



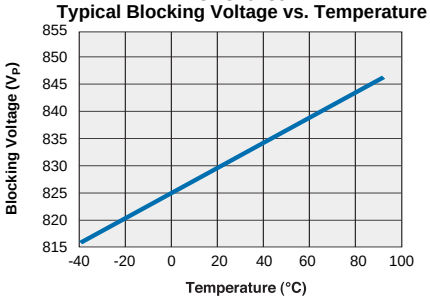
CPC1978J
Typical Load Current vs. Temperature



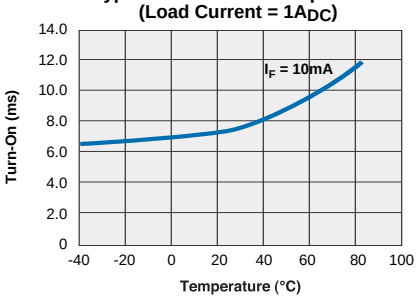
CPC1978J
Typical Leakage vs. Temperature at
Maximum Rated Blocking Voltage
(Measured across Pins 1 & 2)



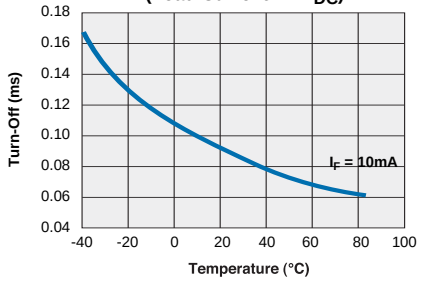
CPC1978J
Typical Blocking Voltage vs. Temperature



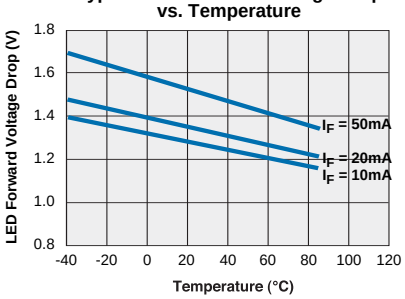
CPC1978J
Typical Turn-On vs. Temperature
(Load Current = 1A$_{DC}$)



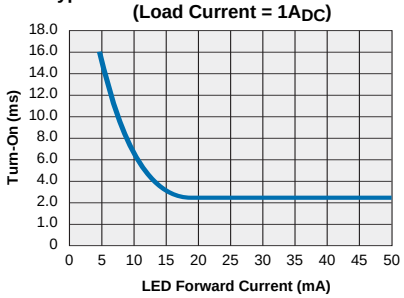
CPC1978J
Typical Turn-Off vs. Temperature
(Load Current = 1A$_{DC}$)



CPC1978J
Typical LED Forward Voltage Drop
vs. Temperature



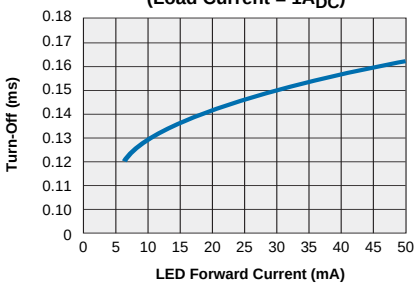
CPC1978J
Typical Turn-On vs. LED Forward Current
(Load Current = 1A$_{DC}$)



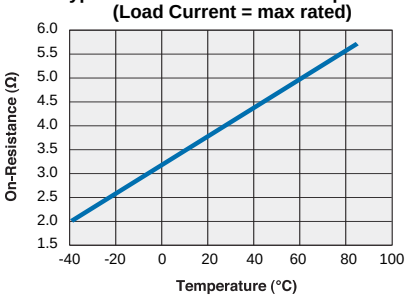
*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

PERFORMANCE DATA*

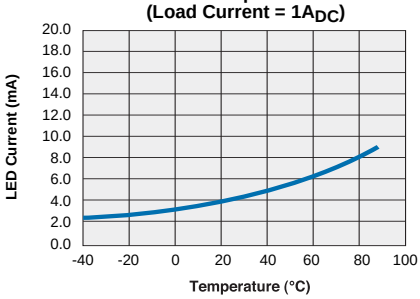
CPC1978J
Typical Turn-Off vs. LED Forward Current
(Load Current = 1A$_{DC}$)



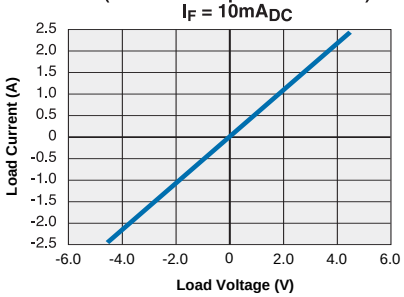
CPC1978J
Typical On-Resistance vs. Temperature
(Load Current = max rated)



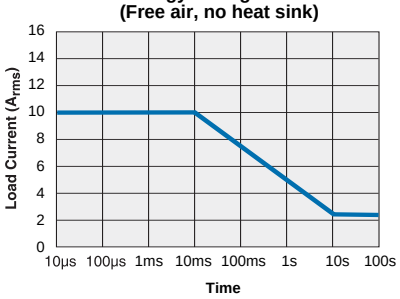
CPC1978J
Typical I$_F$ for Switch Operation
vs. Temperature
(Load Current = 1A$_{DC}$)



CPC1978J
Typical Load Current vs. Load Voltage
(Ambient Temperature = 25°C)
I$_F$ = 10mA$_{DC}$



CPC1978J
Energy Rating Curve
(Free air, no heat sink)



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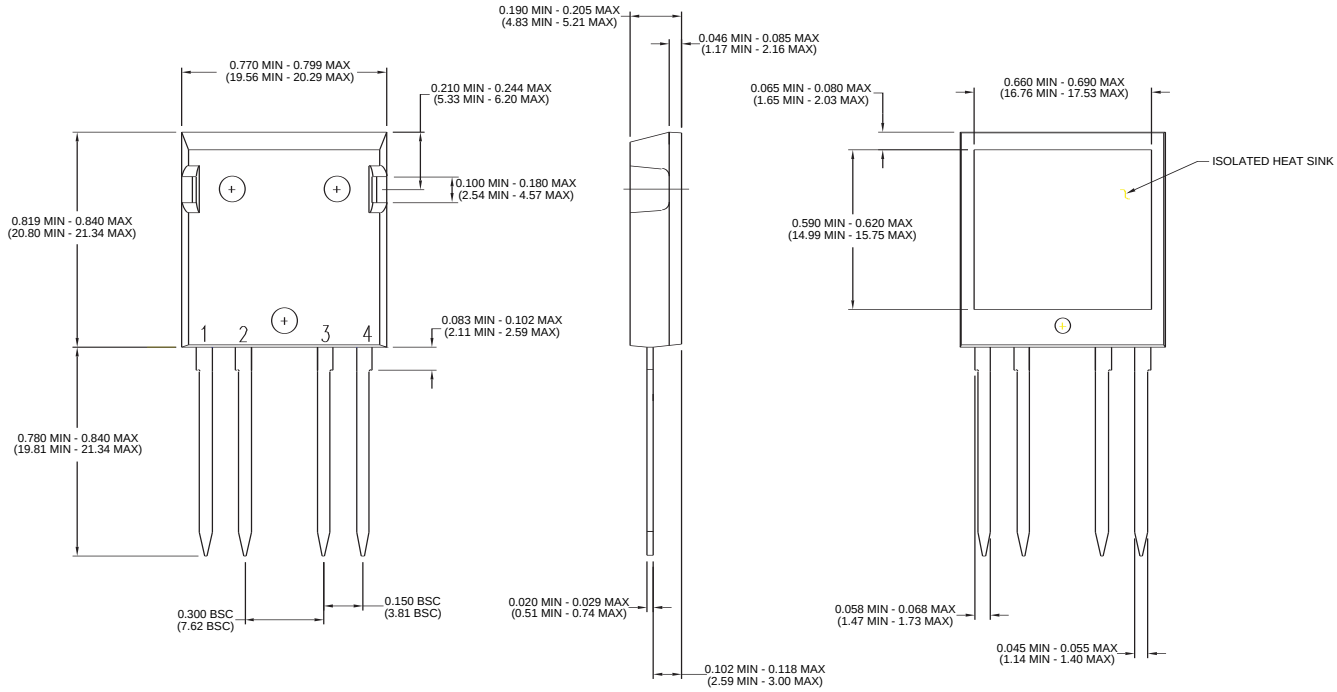
MECHANICAL DIMENSIONS



NOTE: Bottom heatsink meets 2500V_{rms} isolation to the other pins.

Dimensions
inches
(mm)

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Specification: DS-CPC1978J-R02.3

4/13/04