

	CPC1977J	Units
Blocking Voltage	600	V <sub>p</sub>
Load Current	4	A <sub>rms</sub>
On-Resistance	1	Ω
R <sub>θJC</sub>	0.35	°C/W

### Features

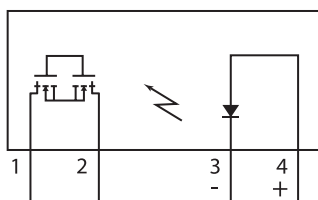
- Compact i4-PAC Power Package
- Low Thermal Resistance
- Heat Sink Option
- Handle Load Currents Up to 4A<sub>rms</sub> (free air)
- High Reliability
- No Moving Parts
- Low Drive Power Requirements (TTL/CMOS Compatible)
- Arc-Free With No Snubbing Circuits
- 2500V<sub>rms</sub> Input/Output Isolation
- 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

### Pin Configuration

CPC1977J Pinout



### Description

Clare and IXYS have combined to bring OptoMOS® technology, reliability and compact size to a new family of high power solid state relays. As part of that family, the CPC1977J is a 1-Form-A solid state relay. The CPC1977J employs optically coupled MOSFET technology to provide 2500V<sub>rms</sub> 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 GaAIAs infrared LED. The combination of low on resistance and high load current handling capabilities 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<sub>rms</sub> isolation, but also very low thermal resistance.

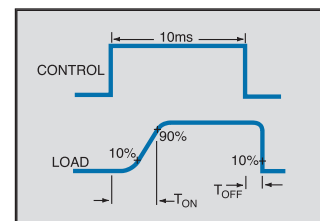
### Approvals

- UL recognized component: File # E69938
- Certified to: UL 508

### Ordering Information

Part #	Description
CPC1977J	i4-PAC (25 per tube)

### Switching Characteristics of Normally Open (Form A) Devices



### Absolute Maximum Ratings (@ 25° C)

Parameter	Ratings	Units
Blocking Voltage	600	V <sub>P</sub>
Reverse Input Voltage	5	V
Input control Current	100	mA
Peak (10ms)	1	A
Input Power Dissipation	150	mW
Isolation voltage Input to Output	2500	V <sub>rms</sub>
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°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
<b>Output Characteristics @ 25°C</b>						
Load Current, Continuous	Free air	I <sub>L</sub>	-	-	4	A <sub>rms</sub>
Peak Load Current	T≤10ms	I <sub>LPK</sub>	-	-	12	A <sub>rms</sub>
On-Resistance <sup>1</sup>	I <sub>L</sub> =1A, I <sub>F</sub> =10mA	R <sub>ON</sub>	-	0.57	1	Ω
Off-State Leakage Current	V <sub>L</sub> =600V	I <sub>LEAK</sub>	-	-	1	μA
Switching Speeds						
Turn-On	I <sub>F</sub> =20mA, V <sub>L</sub> =10V	T <sub>ON</sub>	-	7.5	20	ms
Turn-Off	I <sub>F</sub> =20mA, V <sub>L</sub> =10V	T <sub>OFF</sub>	-	0.085	5	ms
<b>Input Characteristics @ 25°C</b>						
Input Control Current <sup>2</sup>	I <sub>L</sub> =1A	I <sub>F</sub>	10	-	-	mA
Input Dropout Current	-	I <sub>F</sub>	0.6	-	-	mA
Input Voltage Drop	I <sub>F</sub> =5mA	V <sub>F</sub>	0.9	1.2	1.4	V
Reverse Input Current	V <sub>R</sub> =5V	I <sub>R</sub>	-	-	10	μA
<b>Input/Output Characteristics @ 25°C</b>						
Capacitance Input/Output	-	C <sub>I/O</sub>	-	1	-	pF

<sup>1</sup> Measurement taken within 1 second of on time.

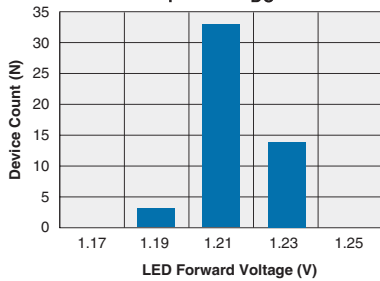
<sup>2</sup> For applications requiring high temperature operation (greater than 60°C) an LED drive current of 20mA is recommended.

### Thermal Characteristics

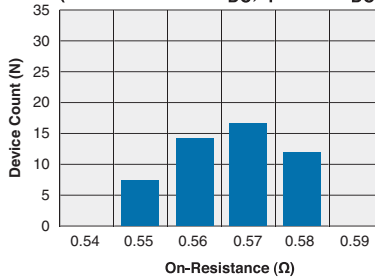
Parameter	Conditions	Symbol	Min	Typ	Max	Units
Thermal Resistance (junction to case)	-	R <sub>θJC</sub>	-	0.35	-	°C/W

**PERFORMANCE DATA\***

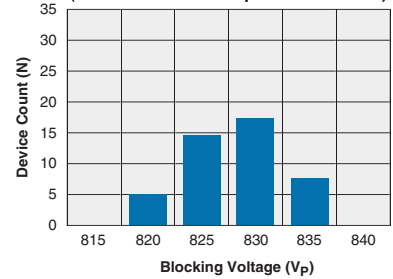
**CPC1977J**  
Typical LED Forward Voltage Drop  
(N=50 Ambient Temperature = 25°C)  
 $I_F = 10\text{mA}_{DC}$



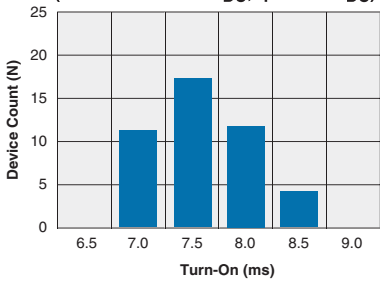
**CPC1977J**  
Typical On-Resistance Distribution  
(N=50 Ambient Temperature = 25°C)  
(Load Current =  $1\text{A}_{DC}$ ;  $I_F = 10\text{mA}_{DC}$ )



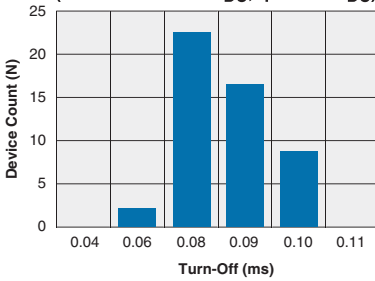
**CPC1977J**  
Typical Blocking Voltage Distribution  
(N=50 Ambient Temperature = 25°C)



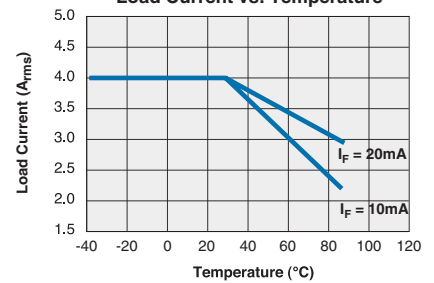
**CPC1977J**  
Typical Turn-On Time  
(N=50 Ambient Temperature = 25°C)  
(Load Current =  $1\text{A}_{DC}$ ;  $I_F = 10\text{mA}_{DC}$ )



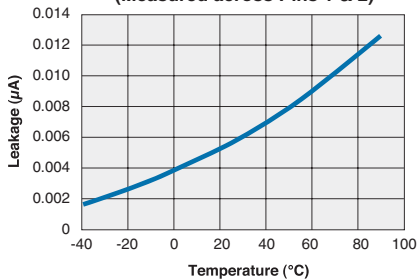
**CPC1977J**  
Typical Turn-Off Time  
(N=50 Ambient Temperature = 25°C)  
(Load Current =  $1\text{A}_{DC}$ ;  $I_F = 10\text{mA}_{DC}$ )



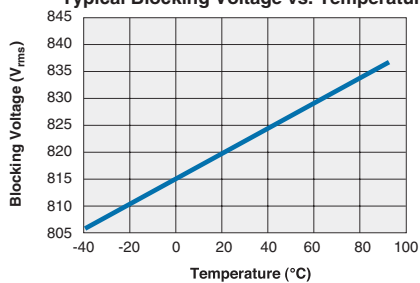
**CPC1977J**  
Typical Maximum  
Load Current vs. Temperature



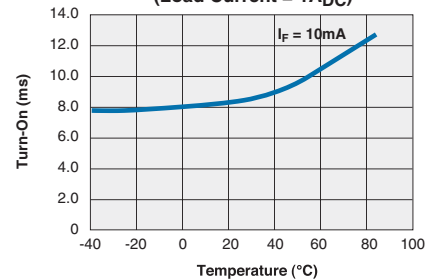
**CPC1977J**  
Typical Leakage vs. Temperature at  
Maximum Rated Voltage  
(Measured across Pins 1 & 2)



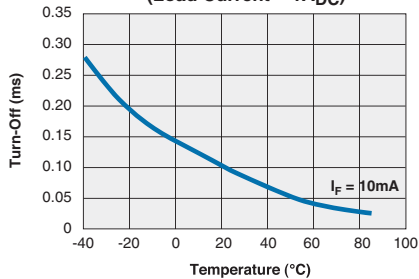
**CPC1977J**  
Typical Blocking Voltage vs. Temperature



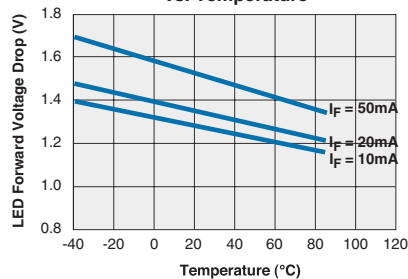
**CPC1977J**  
Typical Turn-On vs. Temperature  
(Load Current =  $1\text{A}_{DC}$ )



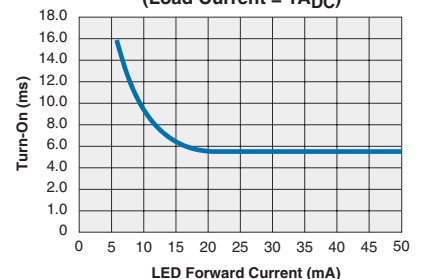
**CPC1977J**  
Typical Turn-Off vs. Temperature  
(Load Current =  $1\text{A}_{DC}$ )



**CPC1977J**  
Typical LED Forward Voltage Drop  
vs. Temperature

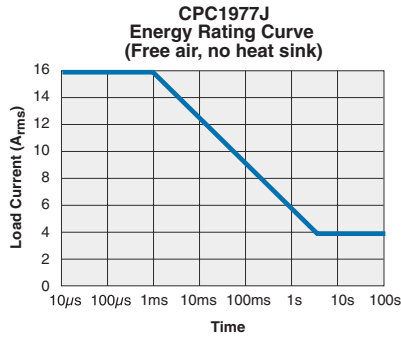
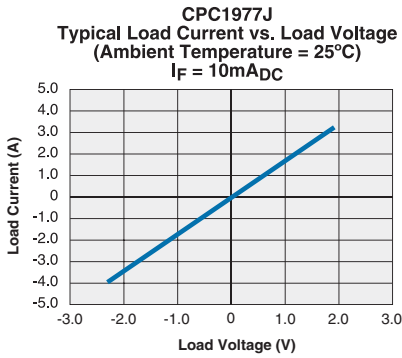
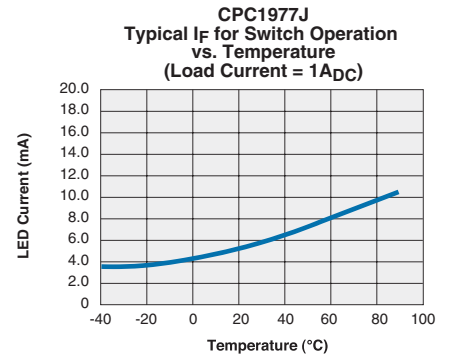
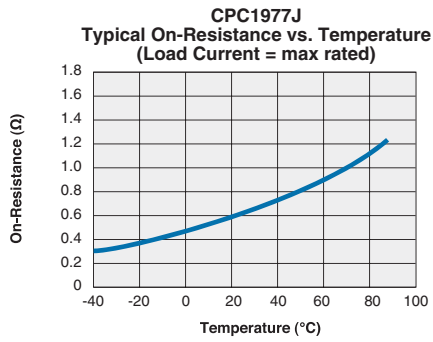
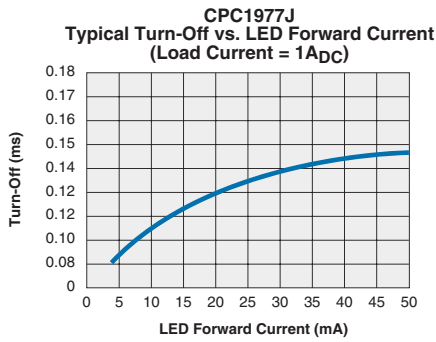


**CPC1977J**  
Typical Turn-On vs. LED Forward Current  
(Load Current =  $1\text{A}_{DC}$ )



\*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 \***



\*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

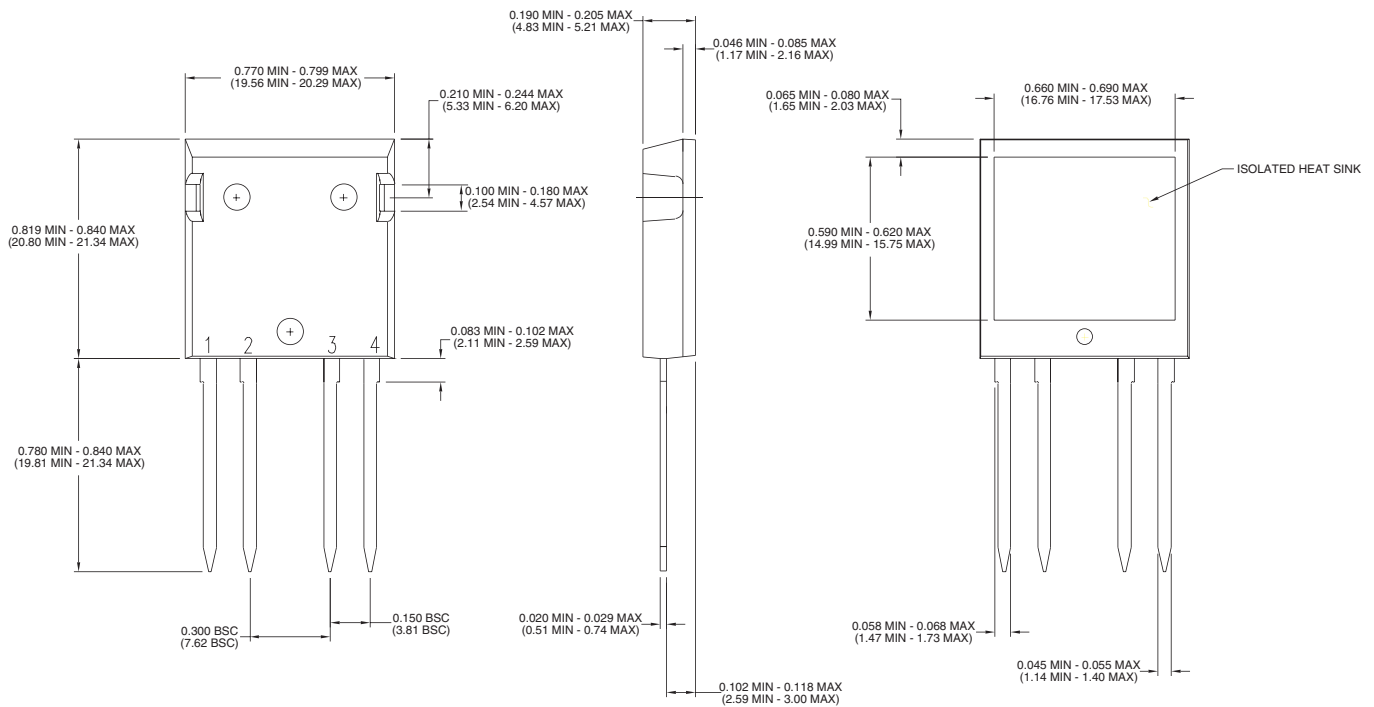
### Soldering

Recommended soldering processes are limited to 245°C component body temperature for 10 seconds.

### Washing

Clare does not recommend ultrasonic cleaning or the use of chlorinated solvents.

## MECHANICAL DIMENSIONS



NOTE: Bottom heatsink meets 2500V<sub>rms</sub> isolation to the other pins.

Dimensions:  
inches  
(mm)

For additional information please visit our website at: [www.clare.com](http://www.clare.com)

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