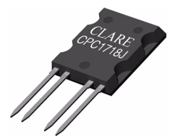
CPC1718

Single-Pole, Normally Open ISOPLUS™-264 DC Power Relay



Characteristics

Parameter	Rating	Units
Blocking Voltage	100	V_P
Load Current, T_A=25°C:		
With 5°C/W Heat Sink	17.5	A_{DC}
No Heat Sink	6.75	A_{DC}
On-Resistance	0.075	Ω
$R_{\theta JC}$	0.3	°C/W

Features

- 17.5A_{DC} Load Current with 5°C/W Heat Sink
- Low 0.075Ω On-Resistance
- 100V_P Blocking Voltage
- 2500V_{rms} Input/Output Isolation
- Low Thermal Resistance (0.3 °C/W)
- Electrically Non-conductive Thermal Pad for Heat Sink Applications
- Low Drive Power Requirements
- Arc-Free With No Snubbing Circuits
- No EMI/RFI Generation
- Machine Insertable, Wave Solderable

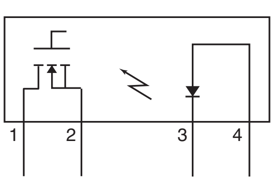
Applications

- 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

Approvals

- UL 508 Certified Component: File E69938
- CSA Certified Component: Certificate 1172007

Pin Configuration



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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 this family, the CPC1718 single-pole normally open (1-Form-A) DC Solid State Power Relay employs optically coupled MOSFET technology to provide 2500V_{rms} of input to output isolation.

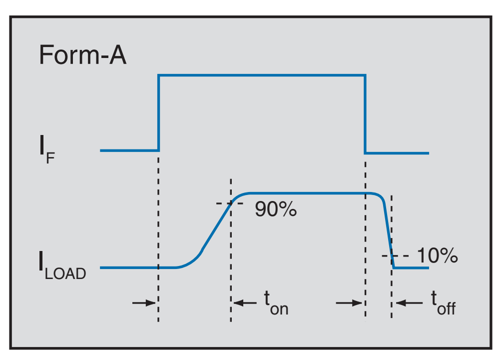
The output, constructed with an efficient MOSFET switch and photovoltaic die, uses Clare's patented OptoMOS architecture while the input, a highly efficient GaAlAs infrared LED, provides the optically coupled control. The combination of low on-resistance and high load current handling capability makes this relay suitable for a variety of high performance DC switching applications.

The unique ISOPLUS-264 package pioneered by IXYS enables Solid State Relays to achieve the highest load current and power ratings. This package features a unique IXYS process where the silicon chips are soft soldered onto the Direct Copper Bond (DCB) substrate instead of the traditional 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 (0.3 °C/W).

Ordering Information

Part	Description
CPC1718J	ISOPLUS-264 Package (25 per tube)

Switching Characteristics



1 Specifications

1.1 Absolute Maximum Ratings @ 25°C

Symbol	Ratings	Units
Blocking Voltage	100	V_P
Reverse Input Voltage	5	V
Input Control Current	100	mA
Peak (10ms)	1	A_{DC}
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

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.

1.2 Electrical Characteristics @ 25°C

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Units
Output Characteristics						
Load Current [1]						
Peak	t≤10ms	I_L	-	-	40	A_P
Continuous	No Heat Sink	I_L	-	-	6.75	A_{DC}
Continuous	T_C=25°C	I_L	-	-	32	A_{DC}
Continuous	T_C=99°C	$I_{L(99)}$	-	-	8.5	A_{DC}
On-Resistance [2]	I_F=10mA, I_L=1A	R_{ON}	-	0.03	0.075	Ω
Off-State Leakage Current	V_L=100V_P	I_{LEAK}	-	-	1	µA
Switching Speeds						
Turn-On	I_F=20mA, V_L=10V	t_{on}	-	7.5	20	ms
Turn-Off	I_F=20mA, V_L=10V	t_{off}	-	0.19	5	ms
Output Capacitance	V_L=25V, f=1MHz	C_{out}	-	1600	-	pF
Input Characteristics						
Input Control Current [3]	I_L=1A	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
Input/Output Characteristics						
Input-to-Output Capacitance	-	$C_{I/O}$	-	1	-	pF

[1] Higher load currents possible with proper heat sinking.

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

[3] For applications requiring high temperature operation (> 60ºC) a LED drive current of 20mA is recommended.

2 Thermal Characteristics

Parameter	Conditions	Symbol	Minimum	Typical	Maximum	Units
Thermal Resistance (Junction to Case)	-	$R_{\theta JC}$	-	-	0.3	°C/W
Thermal Resistance (Junction to Ambient)	Free Air	$R_{\theta JA}$	-	33	-	°C/W
Junction Temperature (Operating)	-	T_J	-40	-	100	°C

2.1 Thermal Management

Device high current characterization was performed using Kunze heat sink KU 1-159, phase change thermal interface material KU-ALC 5, and transistor clip KU 4-499/1. This combination provided an approximate junction-to-ambient thermal resistance of 12.5°C/W.

2.2 Heat Sink Calculation

Higher load currents are possible by using lower thermal resistance heat sink combinations.

Heat Sink Rating

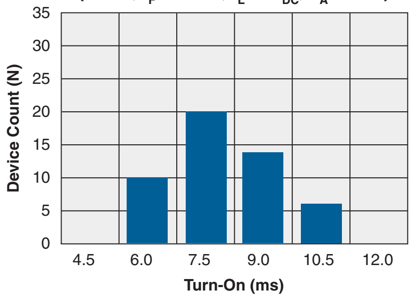
$$R_{\theta CA} = \frac{(T_J - T_A)\, I_{L(99)}^{2}}{I_L^{2} \bullet P_{D(99)}} - R_{\theta JC}$$

T_J = Junction Temperature (°C), $T_J \leq 100°C$ *
T_A = Ambient Temperature (°C)
$I_{L(99)}$ = Load Current with Case Temperature @ 99°C (A_{DC})
I_L = Desired Operating Load Current (A_{DC}), $I_L \leq I_{L(MAX)}$
$R_{\theta JC}$ = Thermal Resistance, Junction to Case (°C/W) = 0.3°C/W
$R_{\theta CA}$ = Thermal Resistance of Heat Sink & Thermal Interface Material , Case to Ambient (°C/W)
$P_{D(99)}$ = Maximum power dissipation with case temperature held at 99°C = 3.33W

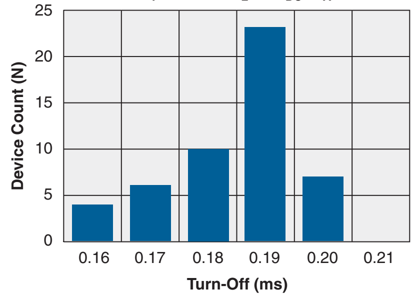
* Elevated junction temperature reduces semiconductor lifetime.

3 Performance Data

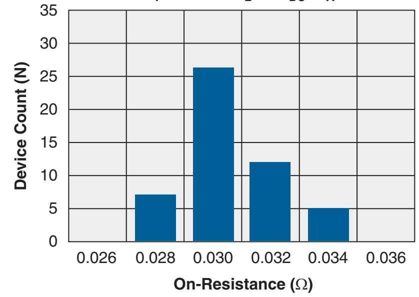
Typical Turn-On Time
(N=50, I_F=20mA, I_L=1A_{DC}, T_A=25°C)



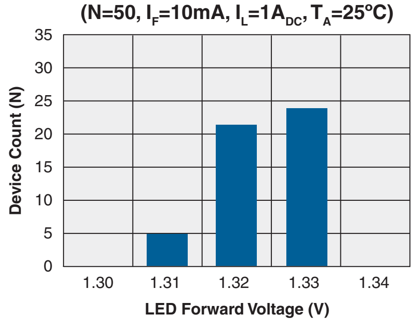
Typical Turn-Off Time
(N=50, I_F=20mA, I_L=1A_{DC}, T_A=25°C)



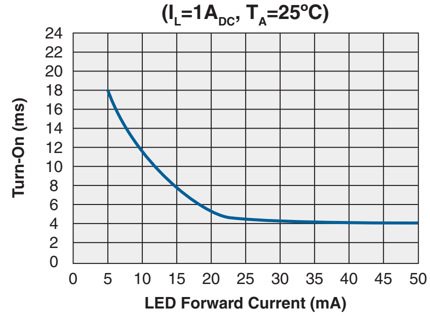
Typical On-Resistance Distribution
(N=50, I_F=10mA, I_L=1A_{DC}, T_A=25°C)



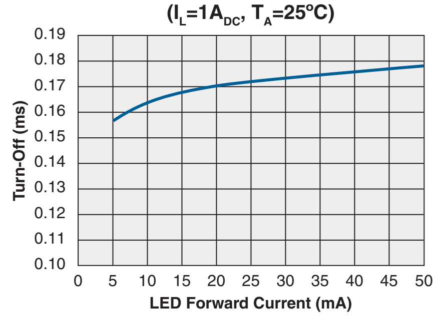
Typical LED Forward Voltage Drop
(N=50, I_F=10mA, I_L=1A_{DC}, T_A=25°C)



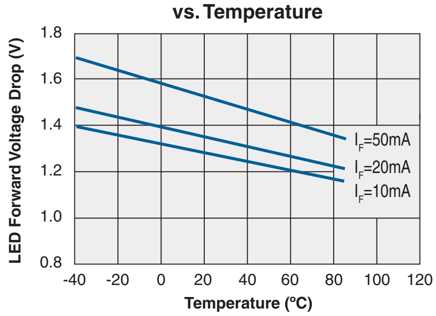
Typical Turn-On
vs. LED Forward Current
(I_L=1A_{DC}, T_A=25°C)



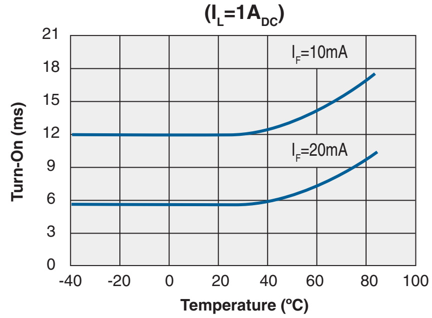
Typical Turn-Off
vs. LED Forward Current
(I_L=1A_{DC}, T_A=25°C)



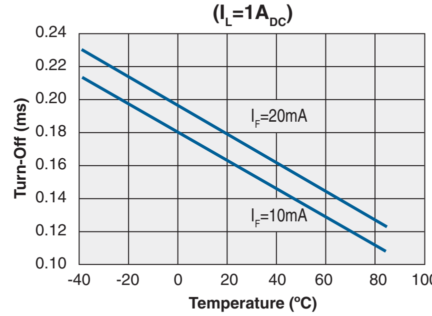
Typical LED Forward Voltage Drop
vs. Temperature



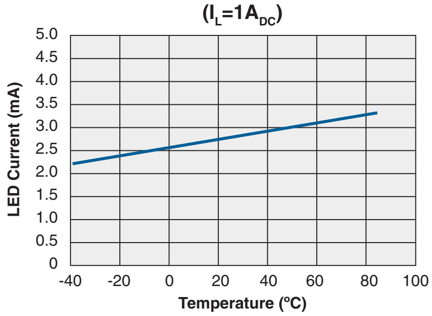
Typical Turn-On vs. Temperature
(I_L=1A_{DC})



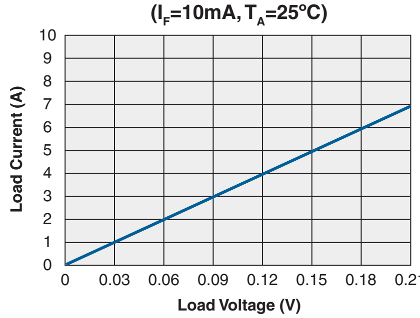
Typical Turn-Off vs. Temperature
(I_L=1A_{DC})



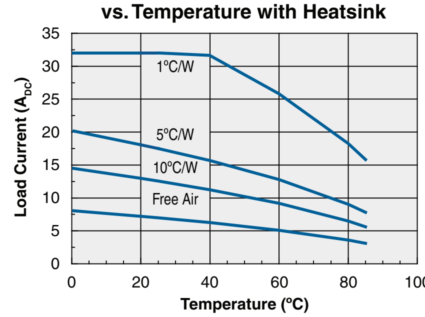
Typical I_F for Switch Operation
vs. Temperature
(I_L=1A_{DC})



Typical Load Current
vs. Load Voltage
(I_F=10mA, T_A=25°C)



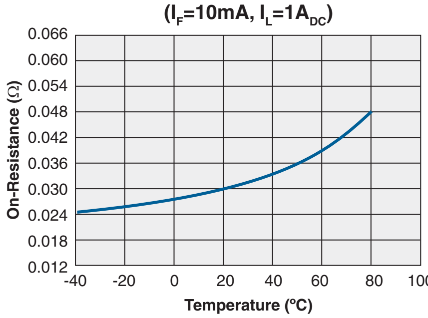
Maximum Load Current
vs. Temperature with Heatsink



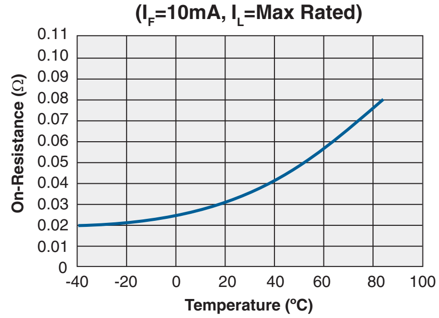
Unless otherwise specified, all performance data was acquired without the use of a heat sink.

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.

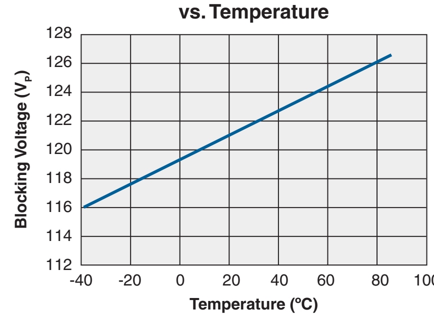
Typical On-Resistance vs. Temperature (I_F=10mA, I_L=1A_{DC})



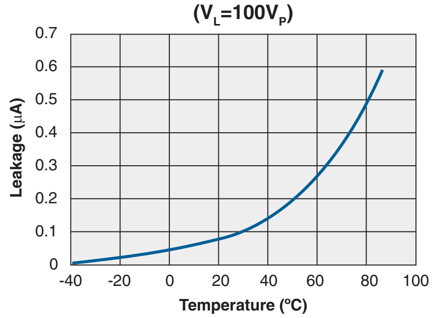
Typical On-Resistance vs. Temperature (I_F=10mA, I_L=Max Rated)



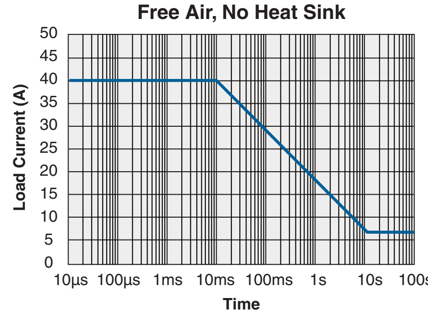
Typical Blocking Voltage vs. Temperature



Typical Leakage vs. Temperature Measured Across Pins 1&2 (V_L=100V_P)



Energy Rating Curve Free Air, No Heat Sink



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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.

4 Manufacturing Information

4.1 Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. Clare 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
CPC1718J	MSL 1

4.2 ESD Sensitivity

This product is **ESD Sensitive**, and should be handled according to the industry standard **JESD-625**.

4.3 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
CPC1718J	245°C for 30 seconds

4.4 Board Wash

Clare recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since Clare 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-based or Fluorine-based solvents or fluxes should not be used. Cleaning methods that employ ultrasonic energy should not be used.

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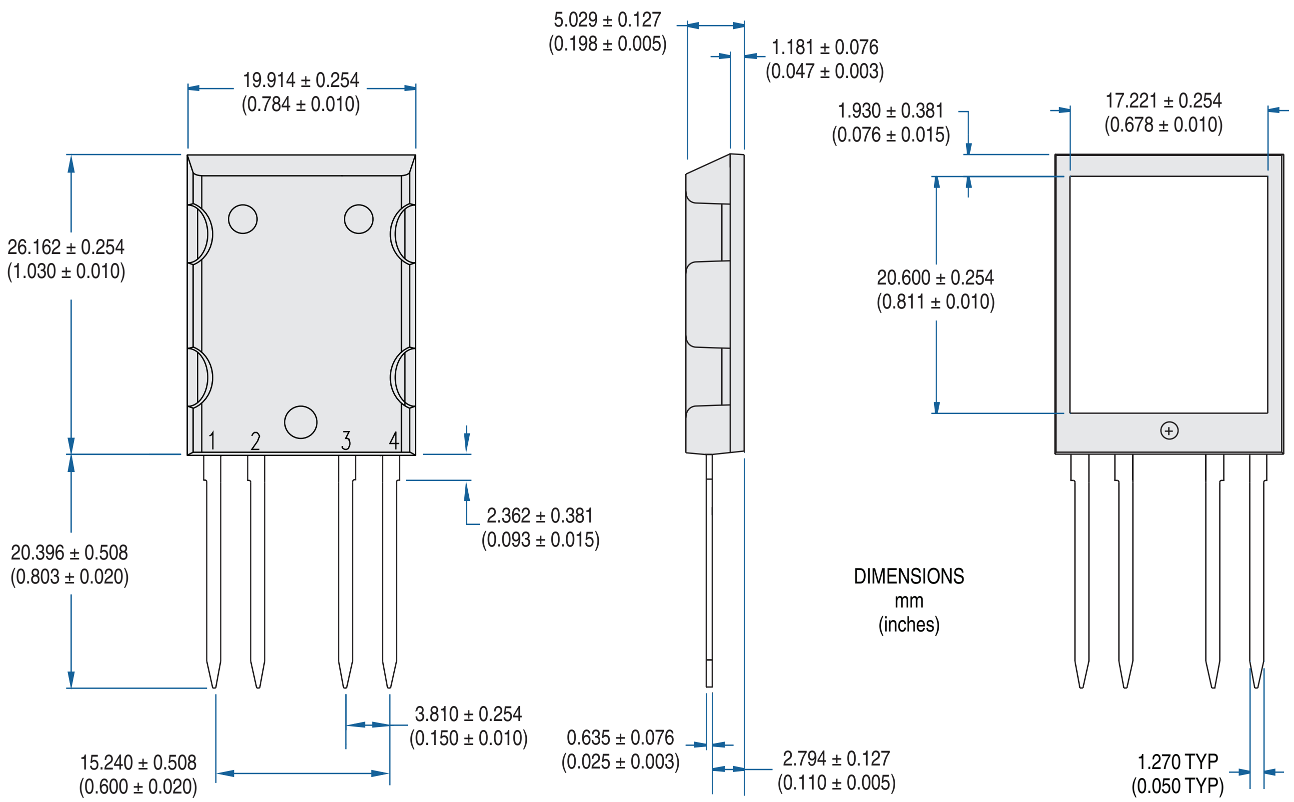
4.5 Mechanical Dimensions



NOTE: Back-side heat sink meets $2500V_{rms}$ isolation to the pins.

For additional information please visit our website at: www.clare.com

Specification: DS-CPC1718-R03

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