

Part Number* Relay Description

KD44CF Solid-State DC Relay, with Flat Trip Short-Circuit Protection and Trip Status

* The Y suffix denotes parameters tested to MIL-PRF-28750 specifications.
The W suffix denotes parameters tested to Teledyne specifications.

ELECTRICAL SPECIFICATIONS

(-55°C TO +105°C AMBIENT UNLESS OTHERWISE NOTED)

INPUT (CONTROL) SPECIFICATION

When used in 2 terminal configuration

(TTL or direct control) (See Fig. 1)	Min	Typ	Max	Units
Input Current @ $V_{BIAS} = 5 \text{ Vdc}$ (See Fig. 2, 4)			15	mAdc
Turn-Off Voltage (Guaranteed Off)			1.5	Vdc
Turn-On Voltage (Guaranteed On)	3.8			Vdc
Reverse Voltage Protection			-32	Vdc
Input Supply Range (See Note 1)	3.8		32	Vdc

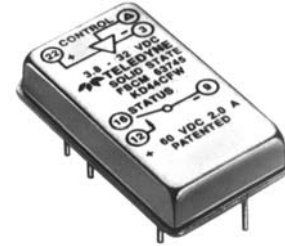
INPUT (CONTROL) SPECIFICATION

When used in 3 terminal configuration

(CMOS or open collector TTL) (See Fig. 1)	Min	Typ	Max	Units
Control Current				
$V_{input} = 5 \text{ Vdc}$			250	μAdc
$V_{input} = 18 \text{ Vdc}$			1	mAdc
Control Voltage Range	0		18	Vdc
Bias Supply Voltage Range (See Note 1)	3.8		32	Vdc
Bias Supply Current (See Fig. 2)			16	mAdc
Turn-Off Voltage (Guaranteed Off)	3.2			Vdc
Turn-On Voltage (Guaranteed On)			0.3	Vdc

OUTPUT (LOAD) SPECIFICATIONS

(See Note 2, 3 & 6)	Min	Typ	Max	Units
Continuous Load Current (See Fig. 3)			2	Adc
Leakage Current $V_{LOAD} = 60 \text{ Vdc}$			40	μA
Output Voltage Drop			0.60	Vdc
Continuous Operating Load Voltage			60	Vdc
Transient Blocking Voltage			80	Vdc
ON Resistance			0.30	Ohm



FEATURES/BENEFITS

- Short-circuit and overload protected: Prevents damage to relay and system wiring.
- Flat trip curve (temperature compensated): Stable predictable overload protection.
- Trip status: Discrete signal indicates an overload has occurred, for failure analysis and diagnostics.
- High surge capability: Prevents safe transients from causing erroneous protection trips.
- TTL and CMOS compatible: Standard system interface.
- Low ON resistance power FET output: Virtually no offset and very low output voltage drop.
- Optical Isolation: Isolates output switching transients from system control signals.
- Tested to MIL-PRF-28750 test methods.
- Meets requirements of MIL-STD-704.

DESCRIPTION

The KD44CF solid-state relay is screened utilizing the test methods of MIL-PRF-28750 and is packaged in a low-profile hermetically sealed case. These relays are constructed using state-of-the-art hybrid technology. They feature fully floating power FET outputs that allow the load to be connected to either output terminal and provides a low ON resistance. The input (control) and the output are optically isolated to protect input logic circuits from output transients. The short-circuit/overload protection is temperature compensated, and has a flat trip characteristic over the operating temperature range. These relays will not be damaged by a continuous short circuit on the load, or by being turned on into a short circuit. A trip status indicator turns on when an overcurrent condition has occurred, and the short-circuit protection has been activated. Cycling the control voltage resets the output switch and trip status indicator.

OUTPUT (LOAD) SPECIFICATIONS

(See Note 2, 3 & 6)	Min	Typ	Max	Units
Turn-Off Time (See Fig. 6)			1	ms
Turn-On Time (See Fig. 6)			5	ms
Output Capacitance, 25 Vdc, 100 KHz			1000	pF
Input to Output Capacitance			15	pF
Dielectric Strength	1000			Vac
Insulation Resistance @ 500 Vdc	10 ⁹			Ohm
Output Junction Temperature @ I _{LOAD} = maximum rated current			130	°C
Thermal Resistance Junction to Ambient(θ _{JA})			30	°C/W
Thermal Resistance Junction to Case(θ _{JC})			10	°C/W

STATUS OUTPUT SPECIFICATIONS

	Min	Typ	Max	Units
Status Supply Voltage			32	Vdc
Status Leakage Current 15 Vdc			4	μA
Status On Voltage @ 15 mA	0.4			Vdc

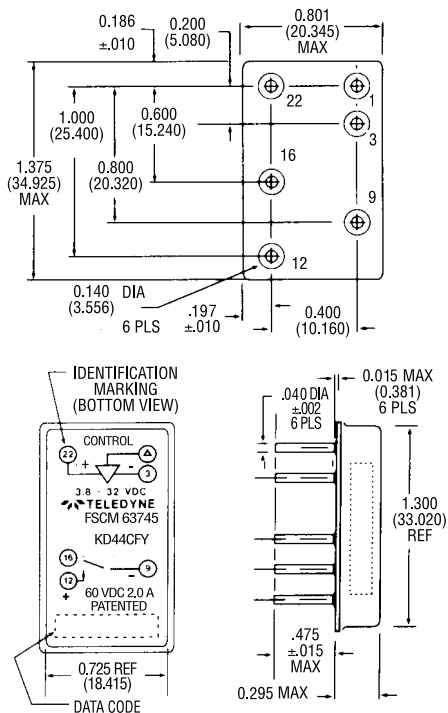
STATUS OUTPUT TRUTH TABLE

Status Output State	Control Input	Output (Load) State
Off (High)	Low	On
On (Low)	Low	Tripped
Off (High)	High	Off
On (Low)	High	Relay Malfunction

ENVIRONMENTAL SPECIFICATIONS

	Min	Typ	Max	Units
Temperature Range				
Operating	-55		+95	°C
Storage	-55		+125	°C
Vibration (10–3000 Hz)			100	g
Constant Acceleration			5000	g
Shock, 0.5 ms			1500	g

MECHANICAL SPECIFICATIONS



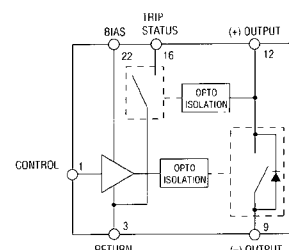
Enclosure: Hermetically Sealed DIP
Leak Rate: 1 x 10⁻⁸ CC/Sec Maximum
Material: Header: Cold Rolled Steel
 Nickel Plated
Pins: Copper Core
Weight: 20 grams
Tolerance: XXX = ± .005

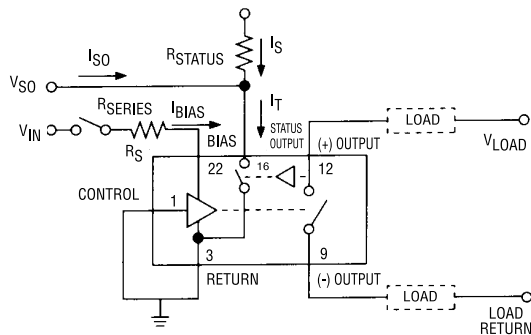
DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)

PIN-OUTS

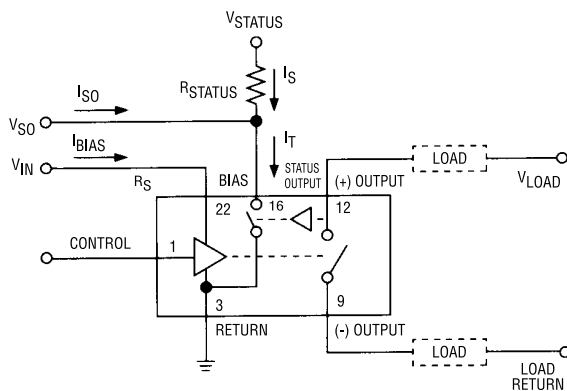
PIN NO.	FUNCTION
1	CONTROL
3	GND
9	-V (OUT)
12	+V (OUT)
16	TRIP
22	BIAS

BLOCK DIAGRAM



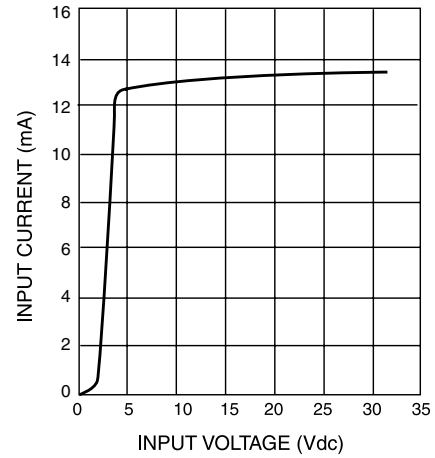


**A) 2 TERMINAL INPUT (DIRECT DRIVE) WITH STATUS (SEE NOTE 6)
AND 2 TERMINAL CONTROL RANGE**

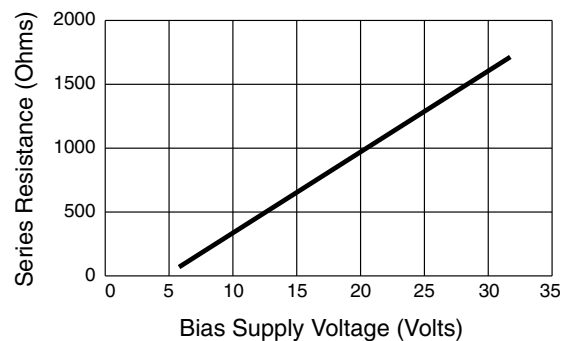


**B) 3 TERMINAL INPUT WITH STATUS (See Note 6)
AND 3 TERMINAL CONTROL RANGE**

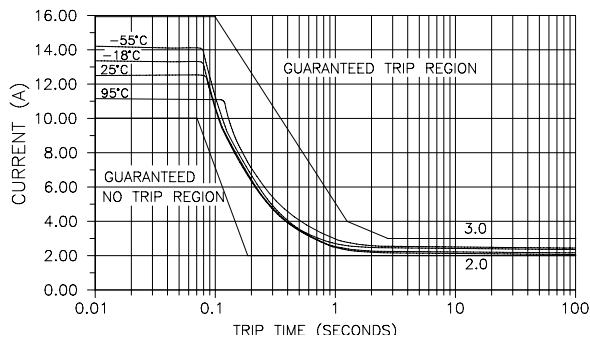
**WIRING CONFIGURATIONS
FIGURE 1**



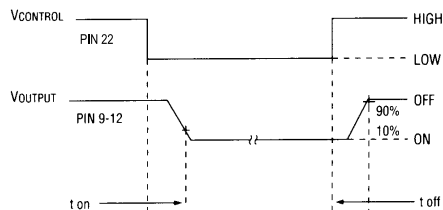
**LOAD CURRENT DERATING CURVE
FIGURE 3**



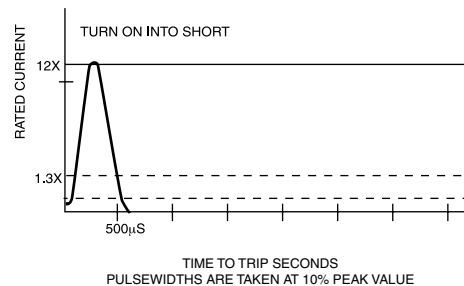
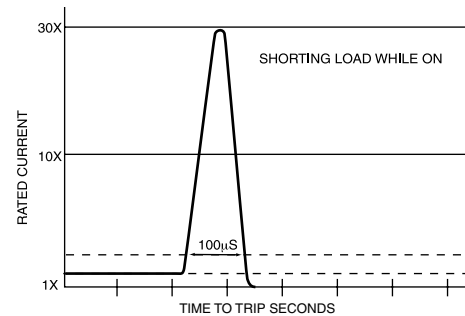
**SERIES LIMIT BIAS RESISTOR VS BIAS VOLTAGE
FIGURE 4 (See Note 1)**



**TYPICAL OVERLOAD CURRENT VS TRIP TIME
FIGURE 5**



**OUTPUT TURN-ON AND OFF TIMING
FIGURE 6**



**TYPICAL TRIP CURRENT CHARACTERISTICS
FOR SHORT CIRCUIT CONDITIONS
FIGURE 7**

NOTES:

- Control input is compatible with CMOS or open collector TTL (with pull up resistor). For bias voltages above 6V, a series resistor is required. Use the standard resistor value equal to or less than the value found in Figure 4.
- The rated input voltage is 5V for all tests unless otherwise specified.
- To calculate the maximum ON resistance for a given junction temperature, find the normalized ON resistance factor (NR) from Figure 5. Calculate the new ON resistance as follows:

$$R_{(ON)} = NR \cdot R_{ON} @ 25^{\circ}C + 0.15$$
- Overload testing to the requirements of MIL-PRF-28750 is constrained to the limits imposed by the short circuit protection characteristics as defined in this specification. System series inductance for "shorted-load" mode of operation should be 30 µH maximum. Maximum repetition rate into a shorted load should not exceed 1 Hz.
- A status pull up resistor is required for proper operation of the status output. Determine the current (I_{so}) required by the status interface. Calculate the current (I_s) through the status resistor such that the sink current through the status output does not exceed 15 mA.

$$R_{STATUS} = \frac{V_{STATUS} - 0.4V}{I_s}$$

- Inductive loads should be diode suppressed. Input transitions should be ≤ 1 ms duration and the input drive should be a bounceless contact type.
- Input transitions should be ≤ 1 msec.