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-R-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 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 Vdc			250	µAdc
	V_{INPUT} = 18 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 Vdc			40	µA
Output Voltage Drop			0.60	Vdc
Continuous Operating Load Voltage			60	Vdc
Transient Blocking Voltage			80	Vdc
ON Resistance			0.30	Ohms
Turn-On Time (See Fig. 7)			3	ms
Turn-Off Time (See Fig. 7)			1	ms
Output Capacitance , 25 Vdc, 100 KHz			1000	pF

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 occured, 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-R-28750 test methods-
- Meets requirements of MIL-STD-704-

DESCRIPTION

The KD44CF solid state relay is screened utilizing the test methods of MIL-R-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 occured, and the short circuit protection has been activated. Cycling the control voltage resets the output switch and trip status indicator.

OUTPUT (LOAD) SPECIFICATIONS (Cont'd)

(See Note 2,3 & 6)	Min	Typ	Max	Units
Isolation (Input to Output)			15	pF
Dielectric Strength	1000			Vac
Insulation Resistance @ 500 Vdc	10^9			Ohms
Output Junction Temperature @ I_{LOAD} = maximum rated current			130	°C
Maximum Junction Temperature (T_J Max)			150	°C
Thermal Resistance Junction to Ambient(θ_{JA})			35	°C/W
Thermal Resistance Junction to Case(θ_{JC})			10	°C/W

STATUS OUTPUT SPECIFICATIONS

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

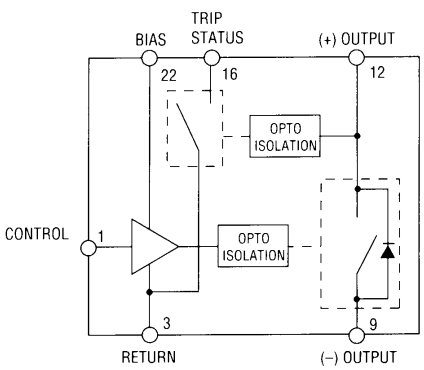
ENVIRONMENTAL SPECIFICATIONS

Temperature Range	Operating	-55°C to +105°C
	Storage	-55°C to +125°C
Vibration	100 g, 10 to 3000 Hz	
Constant Acceleration	5000 g	
Shock	1500 g, 0.5 ms pulse	

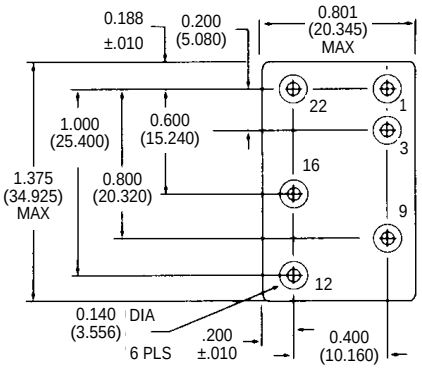
STATUS OUTPUT

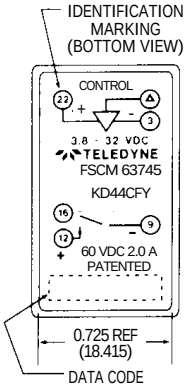
Output Tripped	Status Low
Output Not Tripped	Status High

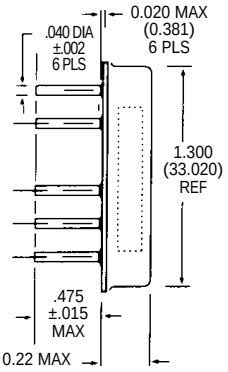
BLOCK DIAGRAM



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

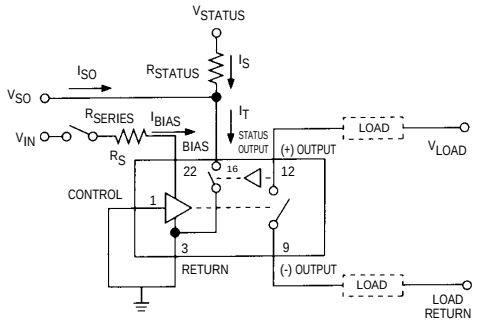
TOLERANCE: XXX = ± .005

PIN-OUTS

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

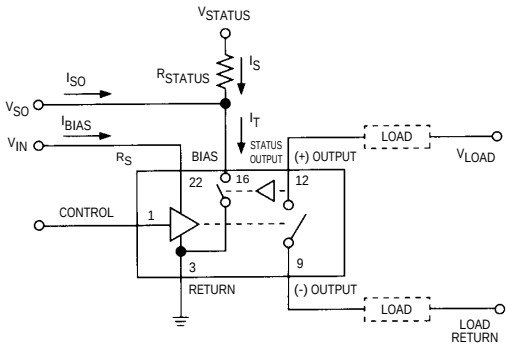
DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE



(A) 2 TERMINAL INPUT (DIRECT DRIVE) WITH STATUS (SEE NOTE 6)

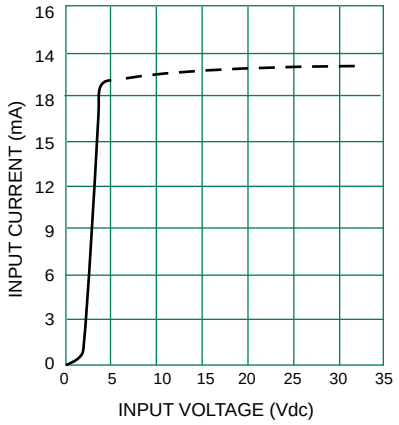
B) 2 TERMINAL CONTROL RANGE



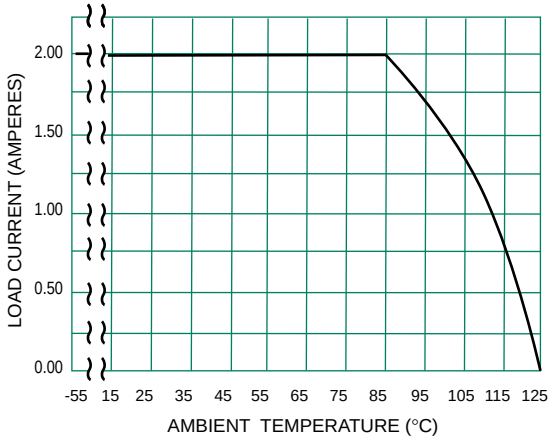
(C) 3 TERMINAL INPUT WITH STATUS (See Note 6)

D) 3 TERMINAL CONTROL RANGE

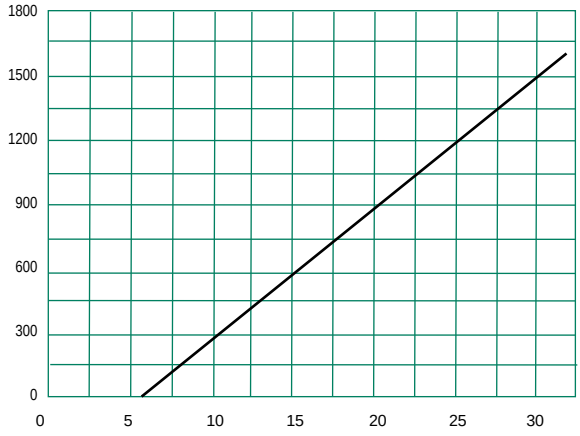
WIRING CONFIGURATIONS
FIGURE 1



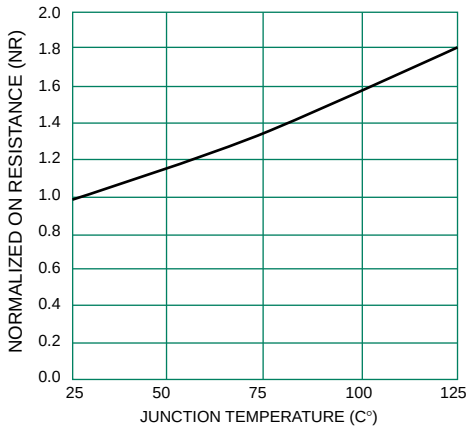
TYPICAL INPUT CURRENT VS INPUT VOLTAGE
FIGURE 2



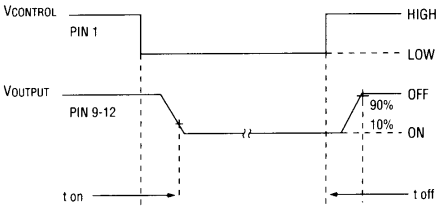
LOAD CURRENT DERATING CURVE
FIGURE 3



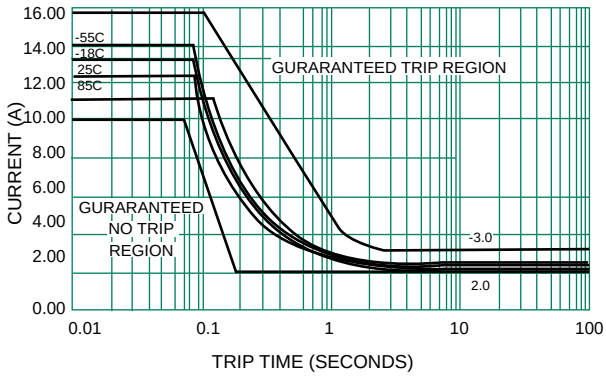
SERIES LIMIT BIAS RESISTOR VS BIAS VOLTAGE
FIGURE 4 (See Note 1)



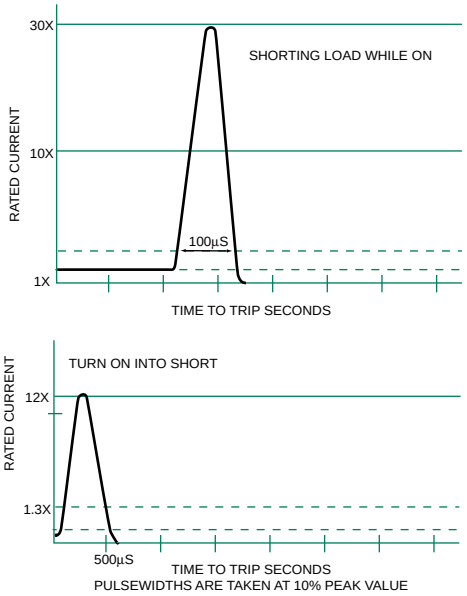
NORMALIZED ON RESISTANCE VS JUNCTION TEMPERATURE
FIGURE 5 (See Note 3)



OUTPUT TURN-ON AND OFF TIMING
FIGURE 7



TYPICAL OVERLOAD CURRENT VS TRIP TIME
FIGURE 6



TYPICAL TRIP CURRENT CHARACTERISTICS FOR SHORT CIRCUIT CONDITIONS
FIGURE 8

NOTES:

1. 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.
2. The rated input voltage is 5V for all tests unless otherwise specified.
3. 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:

   $$R_{(ON)} = NR \bullet R_{ON} @ 25°C + 0.15$$

4. Overload testing to the requirements of MIL-R-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.
5. A status pull up resistor is required for proper operation of the status output. Determine the current (Iso) required by the status interface. Calculate the current (Is) through the status resistor such that the sink current through the status output does not exceed 15 mA.

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

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