



25 Years of Solid Commercial and Industrial Experience

Commercial/Industrial

SOLID STATE RELAY

DATA BOOK

APPLICATIONS:

INDUSTRIAL & PROCESS CONTROL

HEATER & LIGHT CONTROL

AUTOMATION EQUIPMENT

ENERGY MANAGEMENT

INSTRUMENTATION

POWER CONTROL

MOTOR CONTROL

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TELEDYNE RELAYS is an industry leader in the manufacture of high quality, high reliability, solid state relays for a wide variety of general purpose and custom applications in consumer, industrial, military and space environments.

THIS DATA BOOK contains detailed technical information on a broad line of 8 different families comprising 28 models of solid state relays and a family of computer input/output switching modules. Relays are presented as series (family) groupings, where a single package configuration is capable of handling a variety of power switching problems, ranging from high current and low voltage to high voltage and lower current. This allows a single mechanical configuration to cover many applications in a system for maximum design flexibility in the solution of specific problems. These products are designed specifically for commercial and industrial applications where low cost, high performance and functional reliability are required.

CUSTOM APPLICATIONS often require custom solutions. Teledyne Relays will consider custom testing, parameter screening, modifying (customizing) our standard solid state relays or computer input/output modules or even developing a brand new product to solve your specific application problem. If you have a unique problem ask and we may be able to suggest a solution.

APPLICATION SUPPORT is available on request. We maintain a staff of technical personnel to answer questions you may have on applying the products in this data book to solve your specific switching problems.

APPLICATION ASSISTANCE or for information on Teledyne Relays high reliability, military products or electromechanical relays please call (310) 577-3825.

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Bi-Directional Solid State Relay

C60 Series



OPTICALLY ISOLATED 0.5 to 2.5 A



Part Number	Relay Description
C60	Solid State Relay, Terminals for Through Hole Mount
SC60	Solid State Relay, Terminals For Surface Mount

ELECTRICAL SPECIFICATIONS

(25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS (See Note 1)

Parameter	Min	Max	Units
Control Voltage Range (See Figure 1)	1.1	1.5	Vdc
Input Current (See Figure 1 and Notes 1, 7)		50	mA
Input Current (Guaranteed On), (See Figure 4 and Note 7)	5.0		mA
Turn-Off Voltage (Guaranteed Off)		0.8	Vdc
Reverse Voltage Protection		-6	Vdc

OUTPUT (LOAD) SPECIFICATIONS (See Figure 2 And Note 2)

Parameter	Part Number	DC		Bi-Directional		Units
		Min	Max	Min	Max	
Load Voltage Rating	C60-10		60		±60	Vdc
	C60-20		100		±100	
	C60-30		200		±200	
	C60-40		400		±400	
Output Current Rating	C60-10		2.5		±1.25	Adc
	C60-20		1.5		±0.75	
	C60-30		1.0		±0.50	
	C60-40		0.5		±0.25	
On Resistance (See Note 6)	C60-10		0.07		0.28	Ohms
	C60-20		0.2		0.7	
	C60-30		0.45		1.8	
	C60-40		1.0		4.0	
Leakage Current at Maximum Voltage			2.0		1.0	µAdc
Turn-On Time @ 10 mA (See Figure 4 and Note 7)	C60-10		4.0		4.0	ms
	C60-20,-30,-40		3.0		3.0	
Turn-Off Time	C60-10		4.0		4.0	ms
	C60-20,-30,-40		3.0		3.0	
Output Capacitance	C60-10		1000		500	pF
	C60-20		500		250	
	C60-30		400		200	
	C60-40		400		200	
Isolation (Input to Output)		10 ⁹		10 ⁹		Ohms
Dielectric Strength		1500		1500		Vac
Capacitance (Input to Output)			3.0		3.0	pF
Junction Temperature (T _J)			125		125	°C

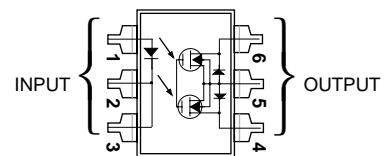
FEATURES/BENEFITS

- Power FET output with Very Low On Resistance - Virtually no offset with very low leakage and voltage drop.
- Optical Isolation - Isolates control elements from load transients. Eliminates ground loops and signal ground noise.
- Three Terminal Output - Output FETs can be paralleled externally to change current load rating.
- Floating Output - Allows for high and low side switching.
- Switches High Voltages and Currents - Voltages to 400 Vdc. Current to 2.5 Adc. Bi-directional, DC, or AC.
- High Noise Immunity - Control circuit cannot be triggered by output switching noise.
- 6 Pin Mini-DIP Package - Standard or surface mount available.

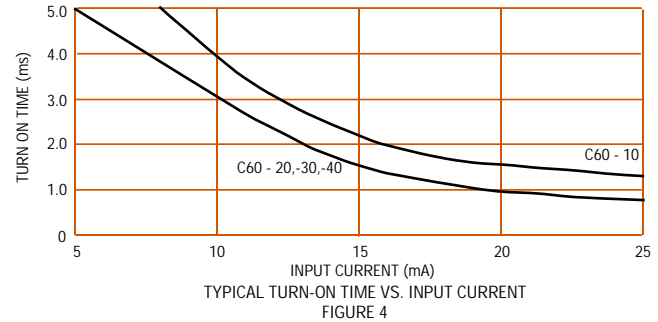
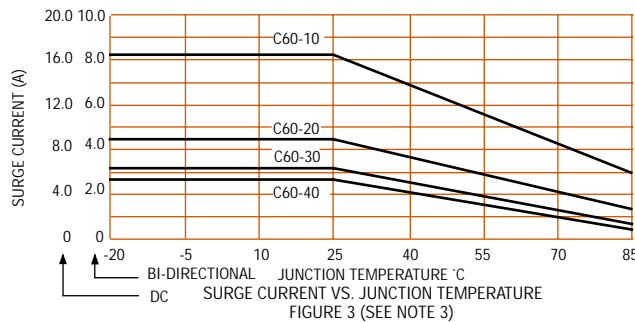
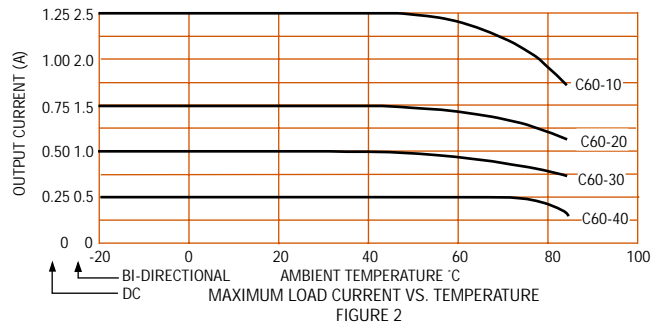
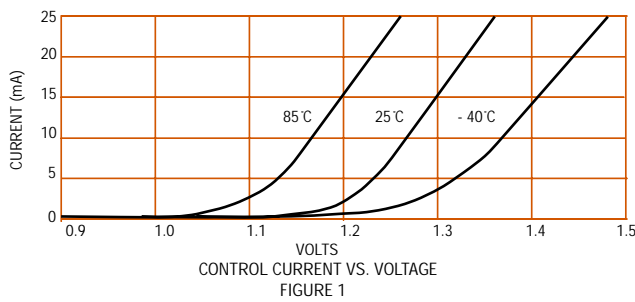
DESCRIPTION

The C60 series solid state relay is an advanced design capable of switching very heavy loads in a physically small 6 pin mini DIP package. These relays have a power FET output that ensures low On resistance, no offset voltage and low leakage current. They are versatile and can be used to switch AC, Bi-directional or DC loads. Optical isolation ensures complete protection of signal lines, power and ground bus and control circuits from switching

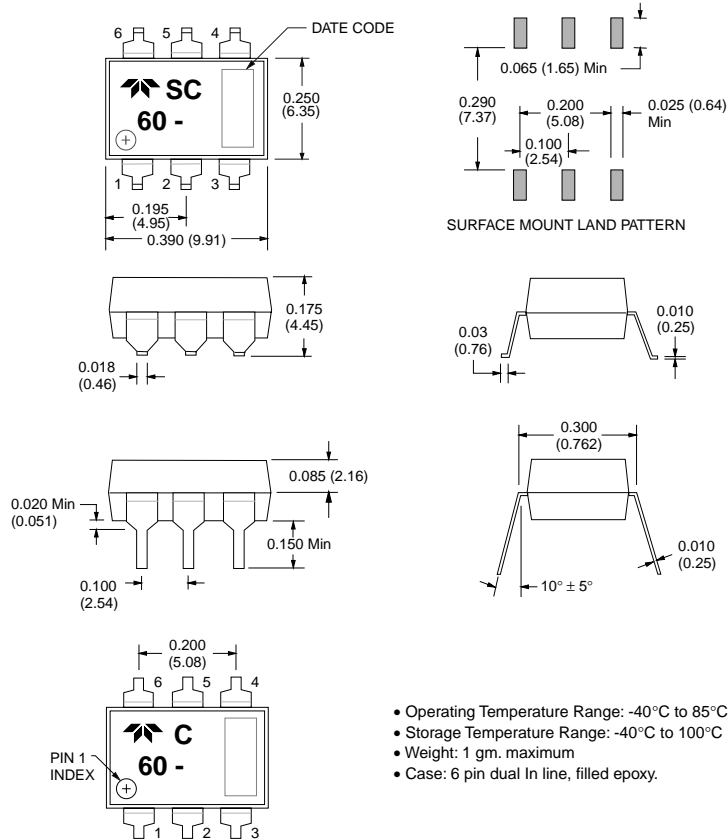
BLOCK DIAGRAM



CHARACTERISTIC CURVES

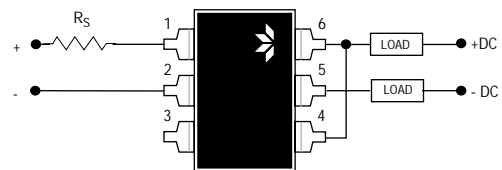
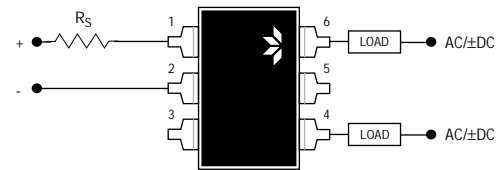


MECHANICAL SPECIFICATION



DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS) Tolerances (unless otherwise specified)
 0.XX = ± 0.010 (± 0.25)
 0.XXX = ± 0.005 (± 0.13)

WIRING CONFIGURATIONS



NOTES:

- Series resistor is required to limit input current to 50 mA maximum.
- The input current is 10 mA for all tests unless otherwise specified.
- The surge current is non repetitive for a maximum duration of 20 ms (See Figure 3).
- Loads may be connected to positive or negative referenced power supplies. Inductive loads must be diode suppressed.
- Continuous load current is rated under the conditions of still air and mounted on a printed circuit board.
- To calculate ON Resistance for a given junction temperature calculate the new R_{On} using the equation shown below:

$$R_{On} = R_{(25^{\circ}C)} \times e^{0.006(T_J - 25^{\circ}C)}$$
- Turn On Time can be controlled with input control current. Calculate a new turn-on time:

$$t_{On} = (t_{\text{Specification Limit}})(10 \text{ mA}/I_{In})$$
- Load voltage rating should be derated 10% at -40°C

PART NUMBER	RELAY DESCRIPTION
C61	Solid State Relay with Terminals for Through Hole Mount
SC61	Solid State Relay with Terminals for Surface Mount

ELECTRICAL SPECIFICATIONS

(25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Min	Max	Units
Input Voltage Drop @ 10mA	1.1	1.5	Vdc
Input Current		50	mA
Reverse Voltage Protection		-6	Vdc
Turn-Off Voltage (Guaranteed off)		0.8	Vdc
Input Current (Guaranteed on)	5		mA

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Min	Max	Units
Load Voltage Rating	C61-20	100	Vdc
	C61-40	400	
Output Current (See Figure 2)	C61-20	1.0	Adc
	C61-40	0.4	
On Resistance (See Note 7)	C61-20	0.3	Ohm
	C61-40	2.0	
Turn-On Time (See Figure 4 and Note 2)	C61-20	3.0	ms
	C61-40	3.0	
Turn-Off Time	C61-20	3.0	ms
	C61-40	3.0	
Output Capacitance	C61-20	250	pF
	C61-40	200	
Leakage Current at Maximum Voltage		1.0	mAdc
Dielectric Strength		1500	Vrm
Input to Output Isolation	10 ⁹		Ohms
Junction Temperature (Tj)		125	°C
Junction to Ambient Thermal Resistance		150	°C/W

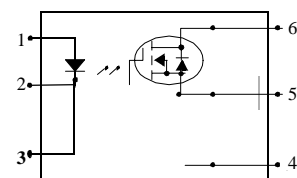
**FEATURES/BENEFITS**

- Optical Isolation - Isolates control elements from load transients. Eliminates ground loops and signal ground noise.
- Low On Resistance power FET Output- low leakage and voltage drop.
- Switches High Voltages and Currents - Voltages to 400 Vdc Currents to 1.0 Adc
- Floating Output - Allows for high and low side switching .
- High Noise Immunity - Control circuit can not be triggered by output switching noise.
- 6 Pin Mini DIP Package- Through-hole or surface mount available

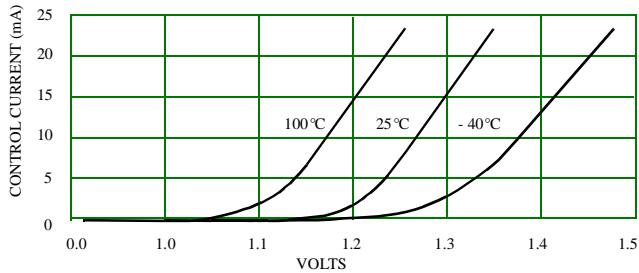
DESCRIPTION

The C61 series solid state relay is an advanced design capable of switching heavy loads in a physically small 6 pin mini-DIP package. These relays have a power FET output that ensures low On Resistance, and low leakage current.

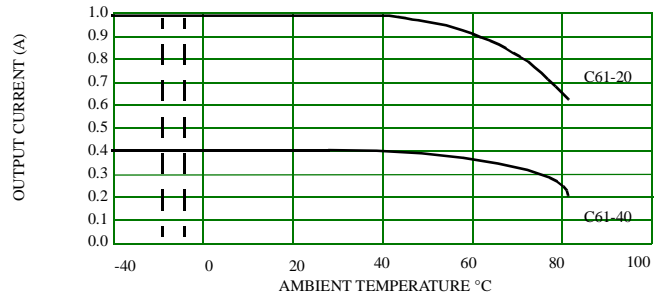
Optical isolation ensures complete protection of signal lines, power and ground bus and control circuits from switching noise and EMI.

BLOCK DIAGRAM

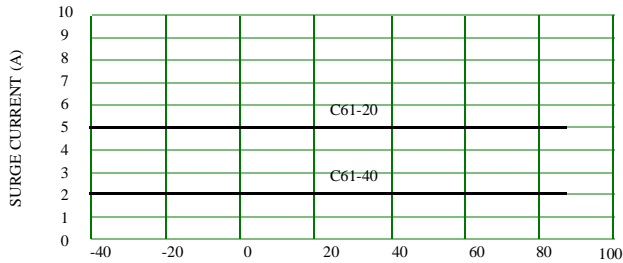
CHARACTERISTIC CURVES



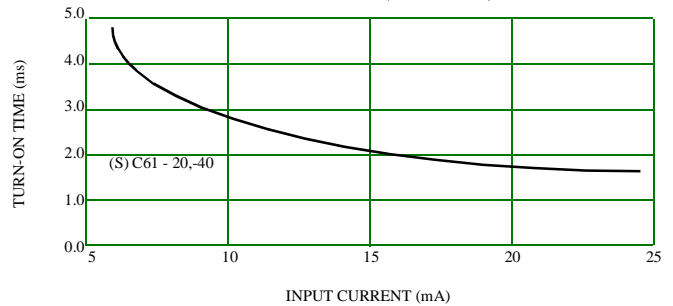
CONTROL CURRENT VS. INPUT VOLTAGE
FIGURE 1



THERMAL DERATING CURVE
FIGURE 2 (SEE NOTE 4)

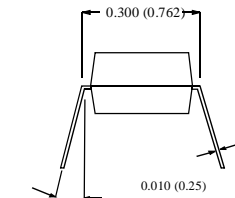
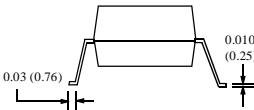
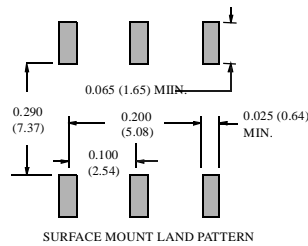
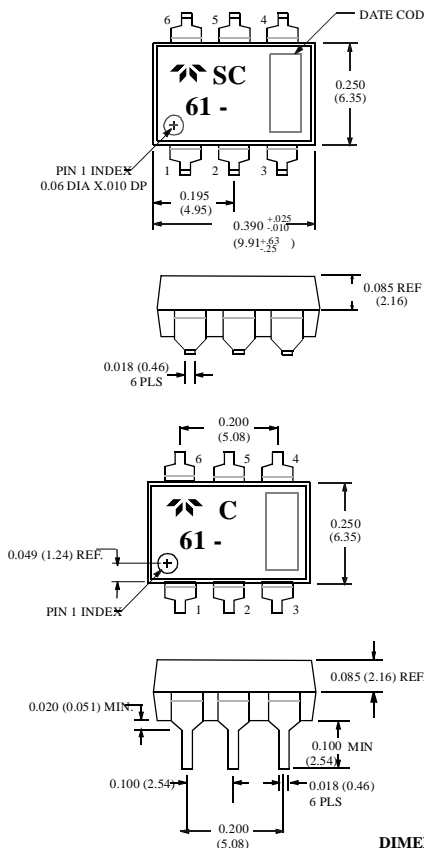


SURGE CURRENT, NON REPETITIVE, 20 ms
FIGURE 3 (SEE NOTE 6)



TYPICAL TURN ON TIME VS. INPUT CURRENT
FIGURE 4 (SEE NOTE 2)

MECHANICAL SPECIFICATION

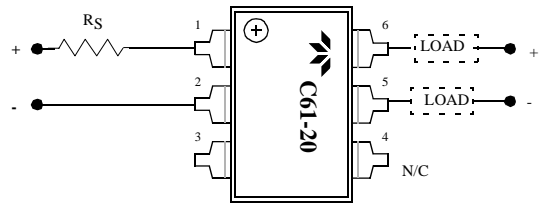


DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)

Tolerances (unless otherwise specified)
0.XX = ± 0.010 (± 0.25)
0.XXX = ± 0.0005 (± 0.13)

- ² Operating Temperature Range: -40°C to 85°C
- ² Storage Temperature Range: -40°C to 100°C
- ² Weight: 1 gm. maximum
- ² Case: 6 pin dual In line, filled epoxy.

WIRING CONFIGURATIONS



NOTES:

1. Series resistor is required to limit input current to 50 mA maximum.
2. Turn On Time can be controlled with input control current. Calculate a new turn-on-time: $t_{On} = (t_{Specification\ Limit})(10\ mA / I_{In})$
3. The input current is 10 mA for all tests unless otherwise specified.
4. Continuous load current is rated under the conditions of still air and mounted on a printed circuit board.
5. Loads may be connected to positive or negative referenced power supplies. Inductive loads must be diode suppressed.
6. The surge current is non-repetitive for a maximum duration of 20 ms (See Figure 3).
7. To calculate maximum ON Resistance for a given junction temperature calculate the new R_{On} using the equation shown below:

$$R_{On} = R_{(25^{\circ}C)} \times e^{0.006(T_J - 25^{\circ}C)}$$



PART NUMBER	RELAY DESCRIPTION
C75-2	SSR with Short Circuit Protection & Terminals for Through Hole Mount
C75-2S	SSR with Short Circuit Protection, Control Status, & Terminals for Through Hole Mount
C75-2SH	SSR with Short Circuit Protection, Control Status, High Voltage & Terminals for Through Hole Mount
SC75-2	SSR with Short Circuit Protection & Terminals for Surface Mount
SC75-2S	SSR with Short Circuit Protection, Control Status, & Terminals for Surface Mount
SC75-2SH	SSR with Short Circuit Protection, Control Status, High Voltage & Terminals for Surface Mount

ELECTRICAL SPECIFICATIONS
(-40°C to 85°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter (see Note 1)	Min	Max	Units
Control Voltage Range	4.5	5.5	Vdc
Input Current (See Figure 1)	12	18	mAdc
Must Turn-On Voltage	4.5		Vdc
Must Turn-Off Voltage		1.5	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter (see Note 1)	Min	Max	Units
Load Voltage Rating		60	Vdc
Transient Blocking Voltage		80	Vdc
Output Current Rating (See Figure 2)		1.0	Adc
On Resistance (See Figure 3)		0.9	Ohm
Leakage Current at Rated Voltage		100	µAdc
Turn-On Time		2.0	ms
Turn-Off Time		2.0	ms
Input to Output Capacitance @ 1MHz		5	pF
Dielectric Strength	1000		Vrms
Input to Output Isolation	10 ⁸		Ohm
Junction Temperature		130	°C

STATUS SPECIFICATIONS

Parameter	Min	Max	Units
Status Leakage Current @ 15Vdc		1	µAdc
Status Blocking Voltage		32	Vdc
Status "On" Voltage @ 10 mAdc		0.4	Vdc
Status "On" Current		10	mAdc

FEATURES/BENEFITS

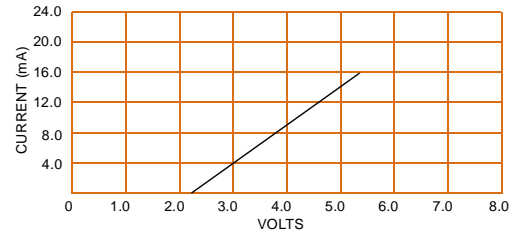
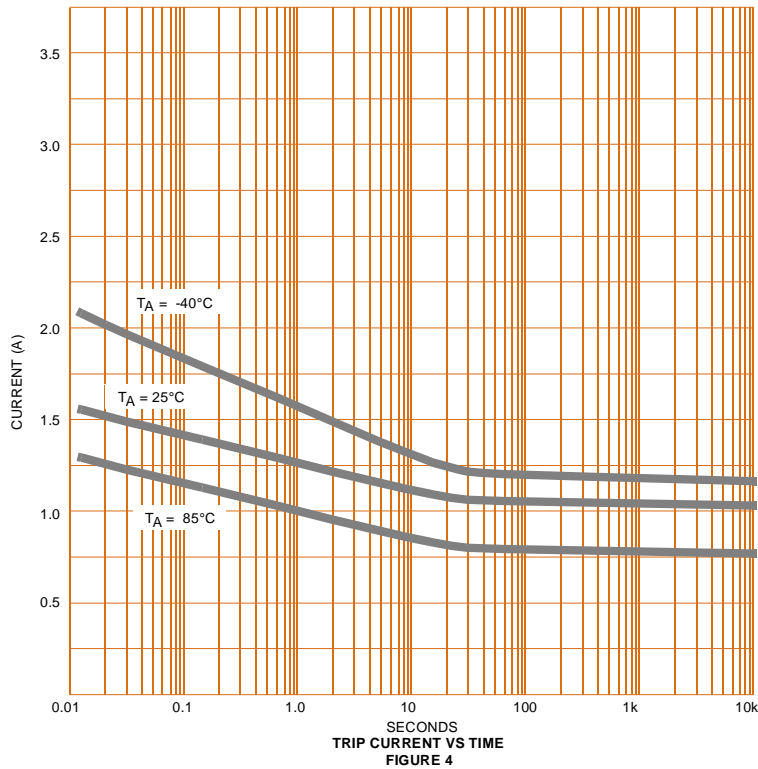
- Short Circuit Protected - Prevents damage to system components, assemblies and system wiring
- Trip Status- Provides status monitoring and feedback of the protection state
- Optical Isolation - Isolates control circuits from load transients
Eliminates ground loops and signal ground noise
- Low Off-State Leakage - For high off-state impedance
- Switches High Currents - To 1.0 Adc
- High Noise Immunity - Control signals isolated from switching noise
- High Dielectric Strength - For safety and for protection of control and signal level circuits

DESCRIPTION

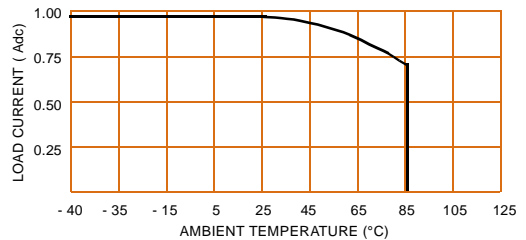
The C75-2S solid state relay utilizes a power FET switch that is protected against overload and short circuit currents. Protection is provided against turn-on into a short circuit, shorts that occur while conducting loads up to rated or for long term overload currents above rated that slowly overheat the relay. Once the protection trips the relay off it will remain off until reset by cycling the input control. Using the C75-2S to switch power loads can prevent fires, damage to system assemblies and system wiring. The power FET output offers low "On" resistance and can switch loads in either the high or the low side of the power line. The C75-2 is packaged in a 16 pin DIP, with surface mount or through hole mounting available.

The C75-2SH also provides an open collector trip status feedback to the relay's control side for short circuit and thermal trip monitoring.

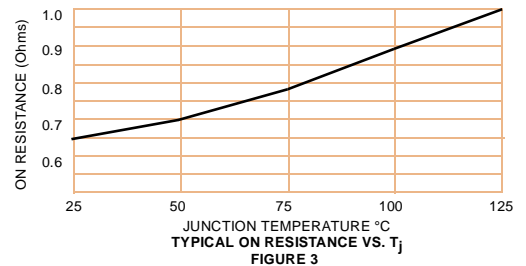
ELECTRICAL CHARACTERISTICS



CONTROL CURRENT VS. VOLTAGE
FIGURE 1 (See Note 6)

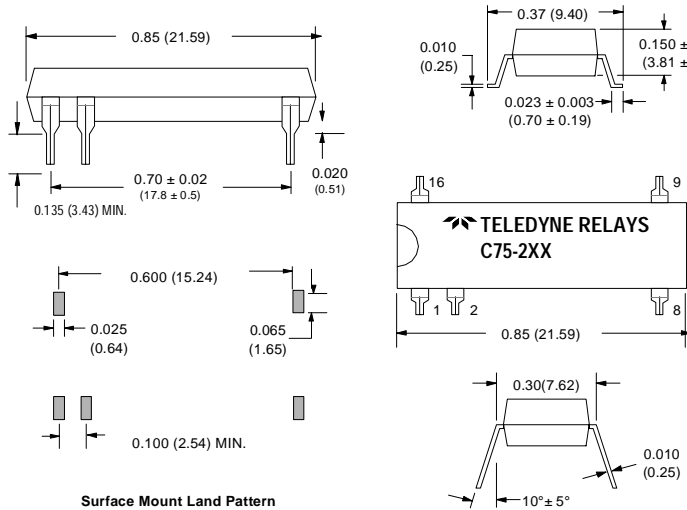


LOAD CURRENT DERATING VS AMBIENT TEMPERATURE
FIGURE 2 (See Note 5)



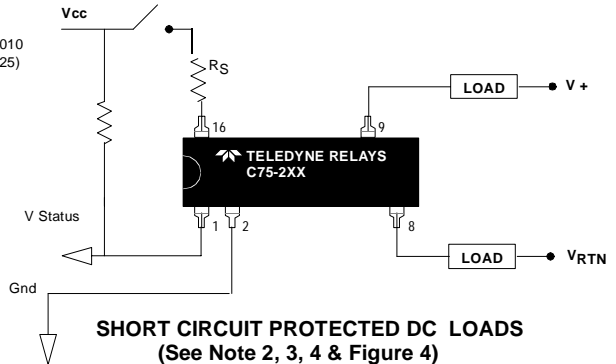
TYPICAL ON RESISTANCE VS. TJ
FIGURE 3

MECHANICAL SPECIFICATION



Surface Mount Land Pattern

WIRING CONFIGURATIONS

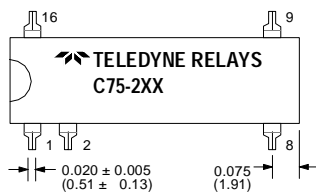


SHORT CIRCUIT PROTECTED DC LOADS
(See Note 2, 3, 4 & Figure 4)

- Operating Temperature Range -40°C to 85°C.
- Storage Temperature Range -40°C to 100°C.
- Weight: 2.0 grams maximum
- Case: 16 pin DIP package
- Case Material: Filled Epoxy, self extinguishing

NOTES:

1. The input voltage is 5.0 Vdc for all tests unless otherwise specified.
2. For input voltage greater than 5.5 Vdc, a series resistor must be used to limit the current on the input of the relay. The resistor value shall be selected using the following equation: $R = (V_{in} - 5 \text{ volts}) / 0.015 \text{ A}$
3. Reversing the output polarity when the relay is in overload or is sustaining a short circuit may cause permanent damage.
4. Inductive loads must be diode suppressed.
5. Loads may be switched in either the high side or the low side of the power source.
5. Continuous load current is rated under the conditions of still air and mounted on a printed circuit card
6. To reset a tripped state, remove the overload condition then recycle the input signal
7. Applicable for relays with trip status only. The trip status output is an open collector transistor. Normally this transistor remains off. A trip status Low condition means an output current overload has tripped the relay off.



DIMENSIONS ARE IN INCHES (MILLIMETERS)
Tolerances ± 0.015 (0.38) unless specified.



ELECTRICAL SPECIFICATIONS (25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Min	Max	Units
Control Voltage Range (See Figures 1, 2 and Note 1)	3.8	32	Vdc
Input Current @ 5 V (See Figures 1 and 2)		14	mAdc
Must Turn-On Voltage	3.8		Vdc
Must Turn-Off Voltage (Guaranteed Off)		1.5	Vdc
Reverse Voltage Protection		-32	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	DC		Bi-directional		Units
	Min	Max	Min	Max	
Load Voltage Rating	C47F-10	50	C46F-10	±50	Vdc
	C47F-20	90	C46F-20	±90	
	C47F-30	180	C46F-30	±180	
	C47F-40	360	C46F-40	±360	
Output Current Rating (See Figure 3)	C47F-10	1.75	C46F-10	1.0	Adc
	C47F-20	1.0	C46F-20	0.75	
	C47F-30	0.6	C46F-30	0.4	
	C47F-40	0.4	C46F-40	0.25	
On Resistance (See Note 3)	C47F-10	0.15	C46F-10	0.3	Ohms
	C47F-20	0.35	C46F-20	0.7	
	C47F-30	1.0	C46F-30	2.0	
	C47F-40	2.0	C46F-40	4.0	
Leakage Current at 80% of V_L		10.0		10.0	μ Adc
Surge Rating (% of Rated)		200		200	%
Turn On Time	C47F	1.5	C46F-10	2.5	ms
				C46F-20,30,40	
Turn Off Time		1.0		1.0	ms
Output Capacitance (Typical)	C47F-10	250	C46F-10	250	pF
	C47F-20	200	C46F-20	200	
	C47F-30	150	C46F-30	150	
	C47F-40	100	C46F-40	100	
Isolation (Input to Output)		10^9		10^9	Ohms
Dielectric Strength (Input to Output)	1500		1500		Vac
Capacitance (Input to Output)		10		10	pF
Junction Temperature (T_J)		125		125	°C

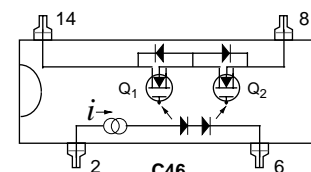
FEATURES/BENEFITS

- Power FET output with Very Low On Resistance - Virtually no offset with low leakage and voltage drop.
- Switches High Voltages and Currents - Voltages to 360 Vdc. Current to 1.75 Adc. DC, Bi-directional or AC models
- Optical Isolation - Isolates control elements from load transients. Eliminates ground loops and signal ground noise.
- Floating Output - Allows for high and low side switching.
- High Noise Immunity - Control circuit can not be triggered by output switching noise.
- 14 Pin DIP Package

DESCRIPTION

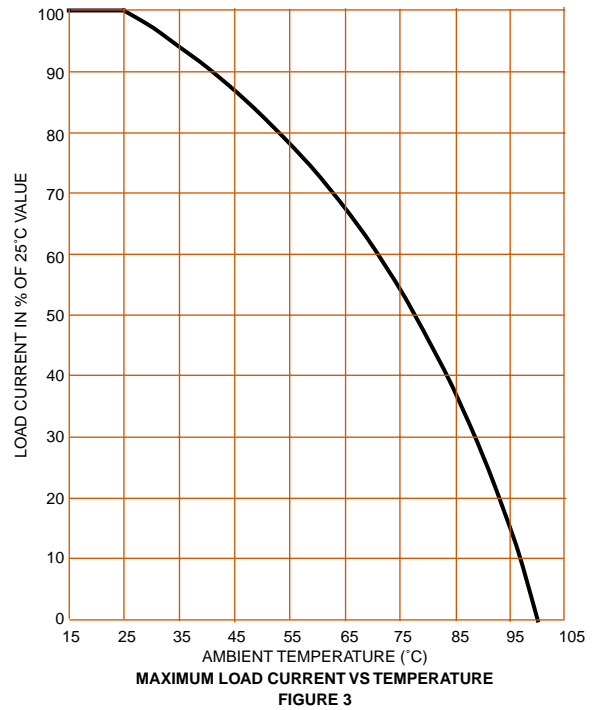
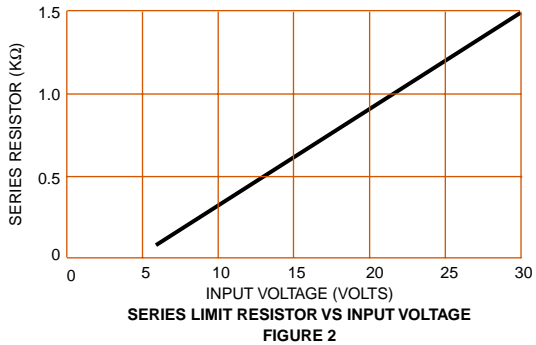
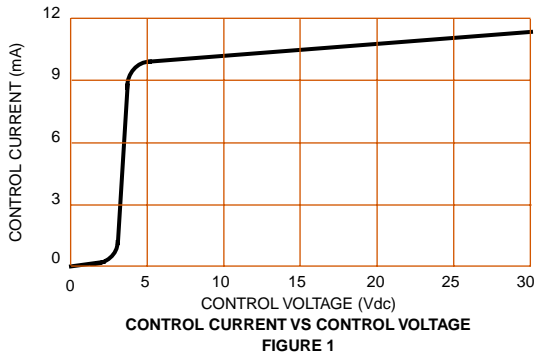
These miniature solid state relays utilize a photo-voltaic generator driving high performance power FET chips to provide low output on-resistance and high output switching capability. The series includes DC switching versions with output current ratings up to 1.75 amp, and bi-directional versions to switch AC or DC up to 1.0 amp. Output voltage ratings of both types range from 50 to 360 volts. The virtual elimination of offset voltage makes them ideal for low level switching applications as well. Input and output are optically isolated to protect input logic circuits from output voltage transients.

BLOCK DIAGRAM

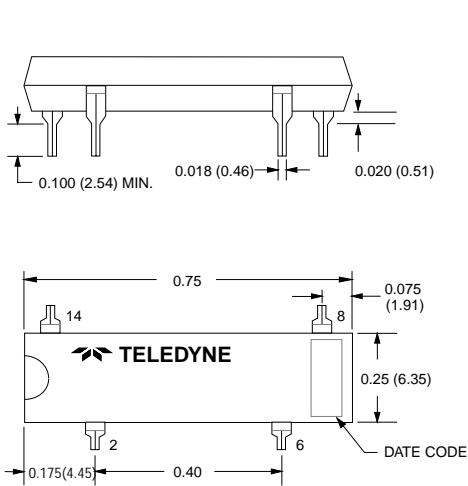


C47 is the same configuration except Q2 has been replaced with a wire short

CHARACTERISTIC CURVES



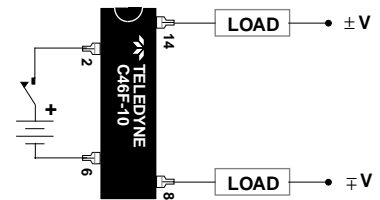
MECHANICAL SPECIFICATION



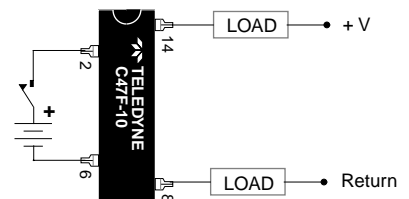
- Operating Temperature -40°C to 100°C.
- Storage Temperature -40°C to 100°C.
- Weight: 2.0 grams maximum
- Case: 14 pin Dual-In-Line (TO-116)
- Case Material: Epoxy, self extinguishing

DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)
Tolerances ± 0.015 (0.38) unless otherwise specified

TYPICAL INTERFACE



BI-DIRECTIONAL OR AC MODELS



DC MODELS

Loads may be connected in either output terminal

NOTES:

1. For control voltages above 6 volts a series resistor is required. Use standard value selected from Figure 2.
2. Surge current duty cycle 10% maximum. Surge duration not to exceed 1 second.
3. To calculate output On-Resistance for junction temperatures other than 25°C use the following equation:

$$R_T = R_{25} e^{0.006 \times \Delta T} \text{ where } R_{25} = \text{Resistance at } 25^\circ\text{C}$$

R_T = Resistance at elevated temperature
 ΔT = Elevated temperature - 25°C

Part* Numbers	Input Control Voltage Range	Output Voltage Rating	Output (Load) Current Rating
603-1	3 to 32 Vdc	50 Vdc	2A
603-2			5A

* See Note 1

**ELECTRICAL SPECIFICATIONS**

(25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Min	Max	Units
Control Voltage Range (See Note 3) (-20°C to 80°C)	3	32	Vdc
Input Current at 32V (See Figure 3) (-20°C to 80°C)		36	mA
Must Turn-On Voltage	3		Vdc
Must Turn-Off Voltage (-30°C to +80°C)		0.8	Vdc
Reverse Voltage Protection		-32	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Part Number	Min	Max	Units
Load Voltage Rating		3	50	Vdc
Output Current Rating (See Figures 1 & 2)	603-1		2	Adc
	603-2		5	
On-State Voltage Drop		1.5		Vdc
Output Leakage Current (See Figure 5)	603-1		10	mA
	603-2		15	
Turn-On Time (See Figure 5)			100	μs
Turn-Off Time			300	μs
Isolation (Input to Output, Input to Case, Output to Case)		10 ⁹		Ohms
Dielectric Strength (Input to Output, Input to Case, Output to Case)		1500		Vac
Capacitance (Input to Output)			20	pF
Junction Temperature (T _J)			150	°C
Thermal Resistance (θ _{JA})			30	°C/W
Thermal Resistance (θ _{JC})			10	°C/W

FEATURES/BENEFITS

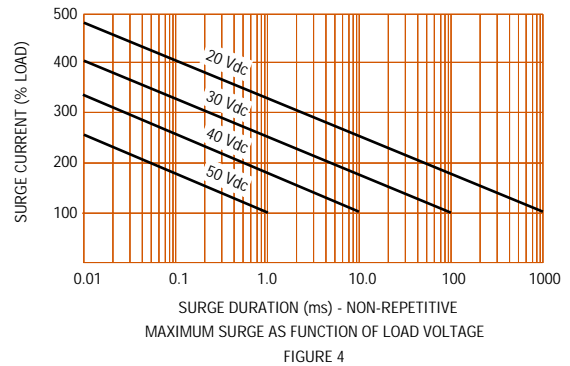
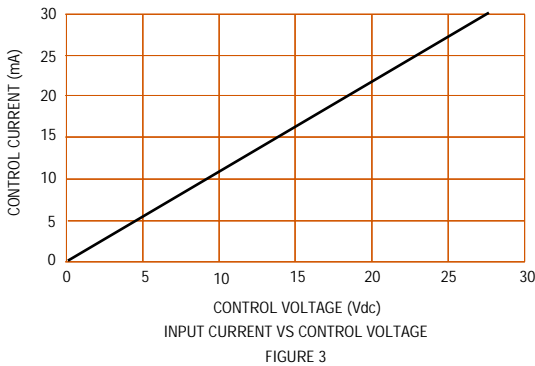
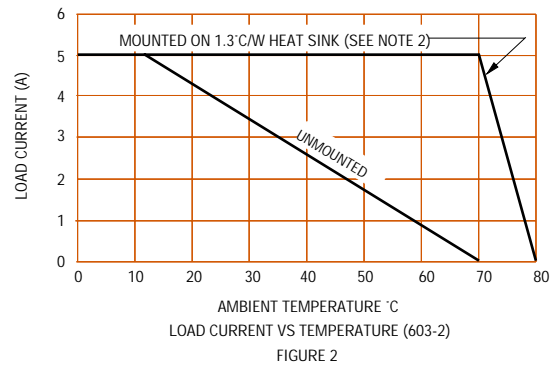
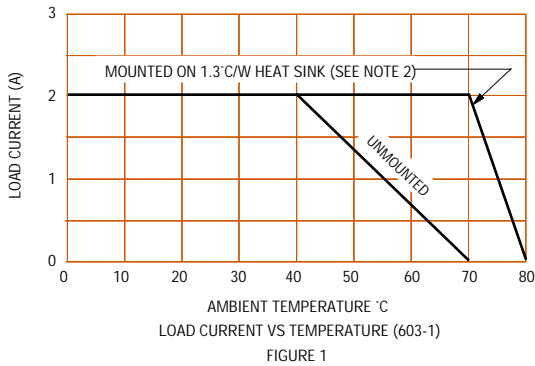
- Fast Switching Speed - Where speed is important
- Floating Output - Eliminates ground loops and signal level ground noise.
- Low Off-State Leakage Current - High off state impedance
- High Dielectric Strength - For safety and protection of signal level circuits.
- Broad Operating Temperature Range - -30°C to 80°C.

DESCRIPTION

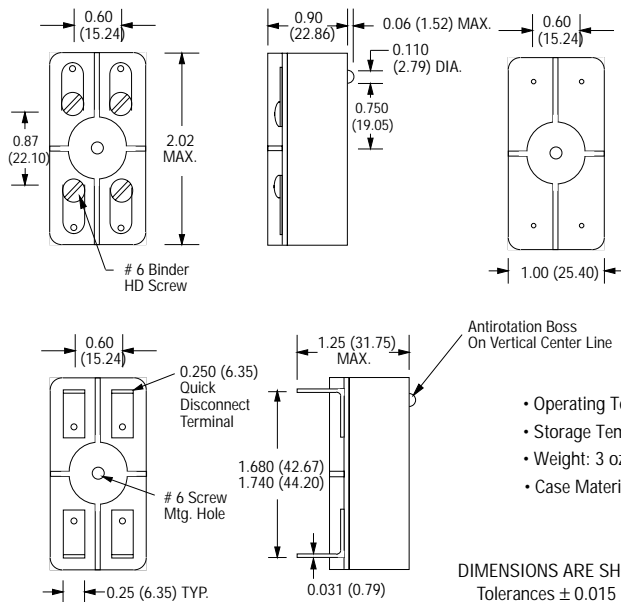
These optically coupled solid state relays are rated at 2 Adc and 5 Adc at 50 Vdc, and are available with TTL compatible inputs. Packages are available in three different configurations with a choice of screw terminals, quick disconnect terminals or through hole solder pins. This allows for maximum flexibility for mounting onto printed circuit boards, panels, or heat sink mounting with optimal mechanical and thermal considerations.

50 Vdc, 603 Series

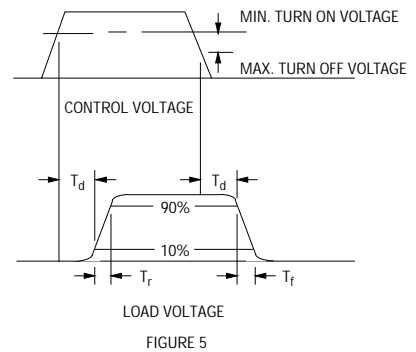
CHARACTERISTIC CURVES



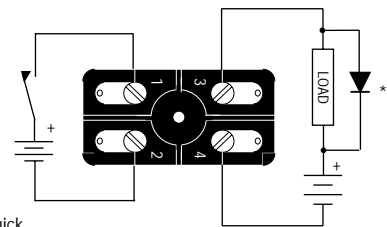
MECHANICAL SPECIFICATIONS



TIMING RESPONSE



WIRING DIAGRAM



NOTES:

- The basic part number provides for screw terminals only. To order PC mounting pins add suffix "P" to part number. For quick disconnect terminals add suffix "Q" to part number.
- Relays mounted on heat sink with silicon grease.
- Rise and fall times of input signal must be less than 1 ms or damage to output stage may result.

Part* Numbers	Input Control Voltage Range	Output Voltage Rating	Output (Load) Current Rating
603-3	4-10 Vdc	250 Vdc	5 Adc
603-4	10-32 Vdc		

*See Note 1

ELECTRICAL SPECIFICATIONS

(25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Part Number	Min	Max	Units
Control Voltage Range (-20°C to 100°C, See Note 3)	603-3	4	10	Vdc
	603-4	10	32	
Input Current (-20°C to 100°C, See Figure 1)	603-3	@5 Vdc	16	mA
	603-4	@28 Vdc	35	
Must Turn-On Voltage	603-3	4		Vdc
	603-4	10		
Must Turn-Off Voltage			0.4	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Part Number	Min	Max	Units
Load Voltage Rating			250	Vdc
Output Current Rating (See Figure 2)			5	A dc
On Resistance			0.4	Ohms
Output Leakage Current	25°C		20	μA
	100°C		100	
Turn-On Time			120	μs
Turn-Off Time (See Figure 3)			150	μs
Isolation (Input to Output, Input to Case, Output to Case)		10 ⁹		Ohms
Dielectric Strength (Input to Output, Input to Case, Output to Case)		1500		Vac
Capacitance (Input to Output)			15	pF
Junction Temperature (T _J)			150	°C
Thermal Resistance (θ _{JA}) (See Figure 2)			30	°C/W
Thermal Resistance (θ _{JC})			10	

**FEATURES/BENEFITS**

- Fast Switching Speed - Where speed is important
- Floating Output - Eliminates ground loops and signal level ground noise.
- Low Off State Leakage Current - High off state impedance
- Switches High & Low Voltages and Currents - Voltages to 250 Vdc. Currents to 5 Adc
- High Dielectric Strength - For safety and protection of signal level circuits.
- Broad Operating Temperature Range - -20°C to -100°C. Near Mil-Spec operating range in an Industrial Relay

DESCRIPTION

These DC solid state relays were designed specifically for high voltage loads up to 5A at 250 Vdc. They utilize a Teledyne transformer coupled driver/isolator to provide high input/output isolation and low off-state leakage. The adaptive package design offers a choice of screw or quick disconnect terminals for chassis, panel, or heat sink mounting, and solder pins for direct mounting on PC boards.

250 VDC, 603 Series

CHARACTERISTIC CURVES

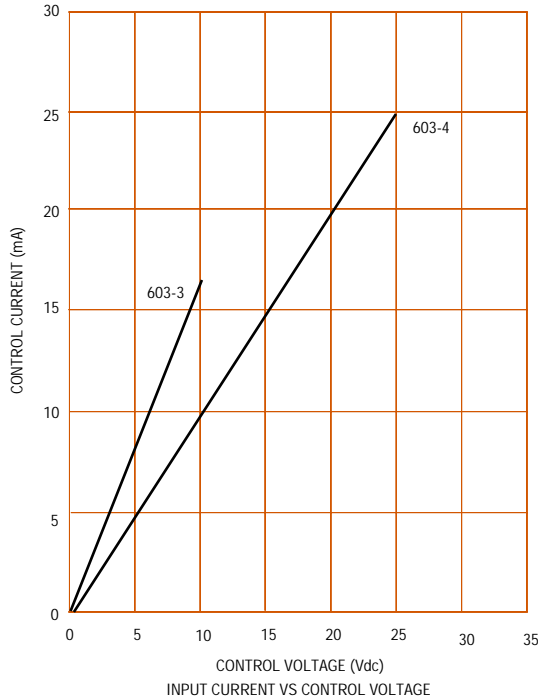


FIGURE 1

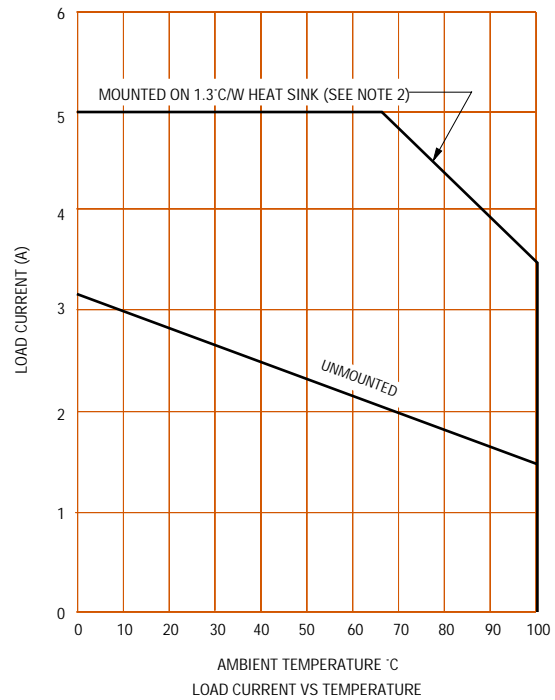
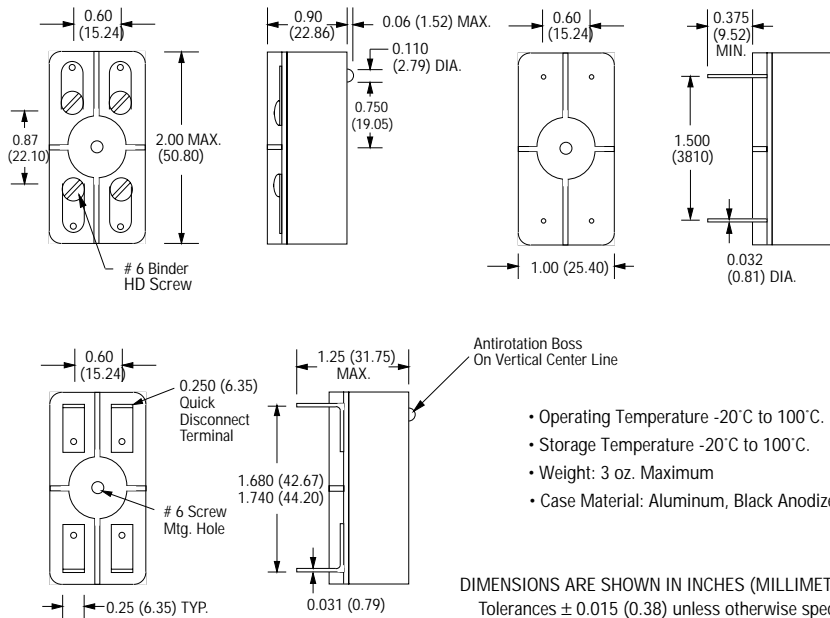


FIGURE 2

MECHANICAL SPECIFICATIONS



TIMING RESPONSE

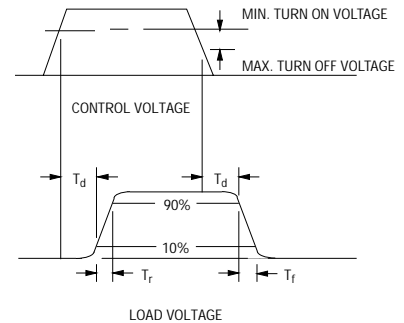
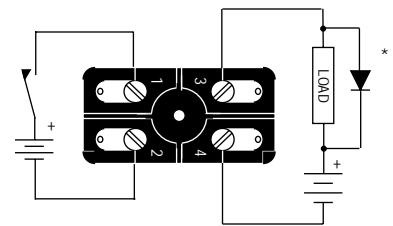


FIGURE 3

WIRING DIAGRAM



* Input and output polarity must be observed.
Inductive loads must be diode suppressed

NOTES:

- The basic part number provides for screw terminals only. To order PC mounting pins add suffix "P" to part number. For quick disconnect terminals add suffix "Q" to part number.
- Relays mounted on heat sink with silicon grease.
- Rise and fall times of input signal must be less than 1 ms or damage to output stage may result.

Part Number	Relay Description
C45	Solid State Relay, Terminals for Through Hole Mount
SC45	Solid State Relay, Terminals for Surface Mount



ELECTRICAL SPECIFICATIONS (25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Part Number	Min	Max	Units
Control Voltage Range (See Figure 1 and Note 1)	C45-13,-23	3.5	7.0	Vdc
	C45-11,-21	5.0	50.0	
Input Current (See Figure 2 and Note 1)	C45-12,-22	10.0	50.0	mA
	C45-13,-23	12.5	50.0	
Must Turn-On Current	C45-11,-21	5.0		mA
	C45-12,-22	10.0		
Must Turn-On Voltage	C45-13,-23	3.5		Volts
Must Turn-Off Voltage			0.5	Vdc
Must Turn-Off Current	C45-11,-21		0.5	mA
	C45-12,-22		0.5	
Reverse Voltage Protection			-7.0	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Part Number	Min	Max	Units
Load Voltage Range			280	Vrms
Output Current Rating (See Figure 4)		0.01	1.0	Arms
Frequency Range		47	440	Hz
Over Voltage Rating	C45-11,-12,-13		400	Vpeak
	C45-21,-22,-23		500	
On-State Voltage Drop at Rated Current			1.5	Vrms
Zero Voltage Turn-On			15	Vpeak
Surge Current Rating (See Figure 3, Notes 3 and 4)			8.0	Apeak
Turn-On Time			1/2	Cycle
Turn-Off Time			1.0	Cycle
Leakage Current (Off-State)			1.0	mArms
Off-State dV/dt (Typical)			200	V/μs
Isolation (Input to Output)		10 ⁹		Ohms
Dielectric Strength (Input to Output)		4000		Vac
Capacitance (Input to Output)			10	pF
Junction Temperature (T _J)			150	°C

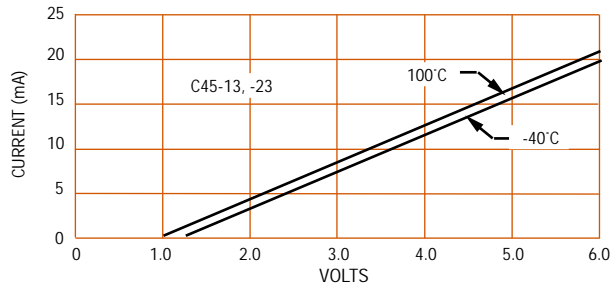
FEATURES/BENEFITS

- Switches 400 Hz - Required in Aircraft and Military Applications
- Zero Voltage Turn-On - Minimum switching transient noise and extremely low EMI
- Optical Isolation - Isolates control circuits from transients.
- Floating Output - Eliminates ground loops and signal ground noise.
- Low Off State Leakage - For high off state impedance
- Switches High Voltages - To 280 Vrms.
- Switches High Currents - To 1.0 Arms
- High Noise Immunity - Controls signals isolated from switching noise.
- High Dielectric Strength - For safety and protection of signal level circuits.
- UL & CUL registered File Number E55197

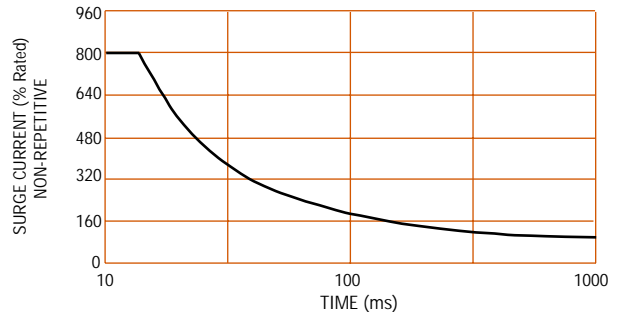
DESCRIPTION

The C45 Series employs back-to-back photo SCRs and a patented zero crossing switching circuit. The tight zero switch window ensures reliable transient free switching of AC loads and very low noise and EMI generation. Optical isolation of control circuits from load switching prevents noise coupling into signal lines and signal power and ground distribution systems. This series of solid state relays will switch from 0.01 to 1.0 Arms at 280 Vrms. The C45 is packaged in a low profile 16 pin Dual-In-Line package with either surface SC45-XX or through-hole C45-XX pin configurations for optimum printed circuit card mounting and minimum space utilization.

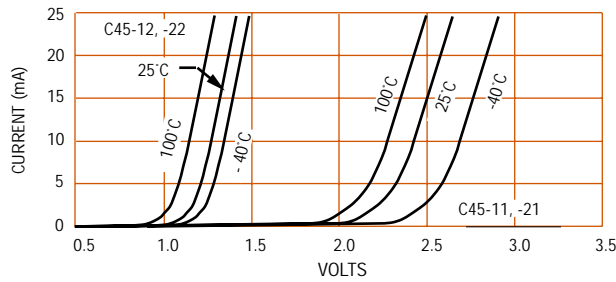
CHARACTERISTIC CURVES



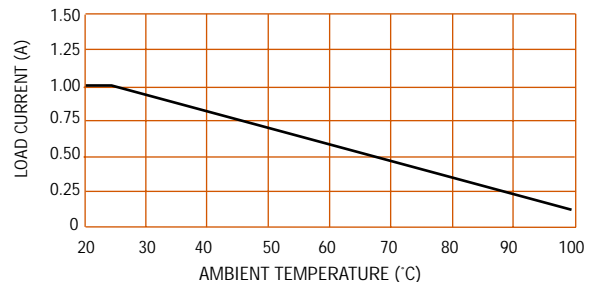
INPUT CURRENT VS CONTROL VOLTAGE
FIGURE 1



SURGE CURRENT VS DURATION
FIGURE 3

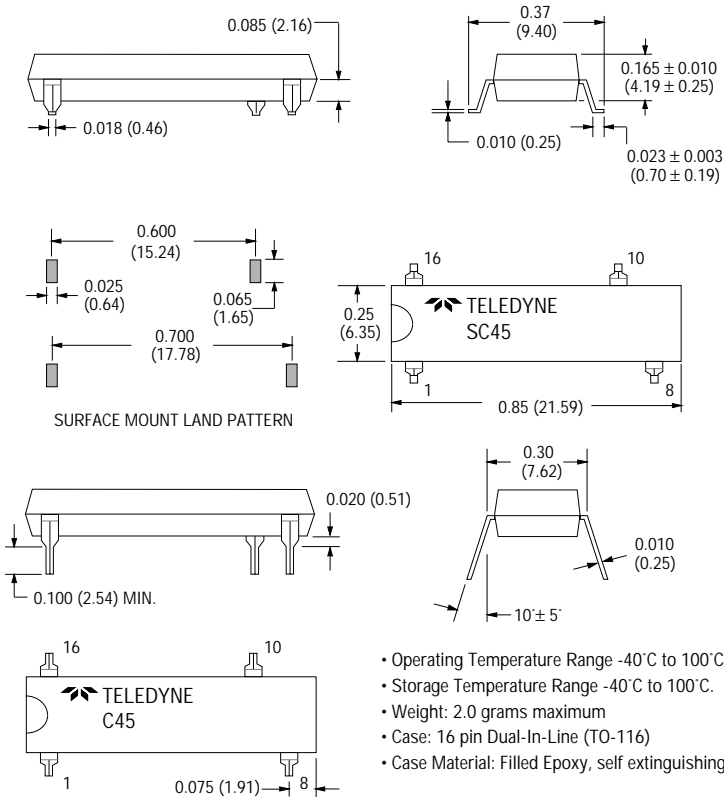


INPUT CURRENT VS CONTROL VOLTAGE
FIGURE 2



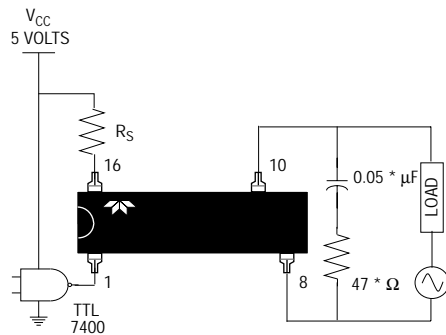
LOAD CURRENT VS TEMPERATURE
FIGURE 4

MECHANICAL SPECIFICATION



DIMENSIONS ARE IN INCHES (MILLIMETERS) Tolerances ± 0.015 (0.38) unless specified.

TYPICAL C45 INTERFACE



RS may be required to prevent exceeding maximum input current.

* OPTIONAL SNUBBER NETWORK FOR TRANSIENT VOLTAGE AND dv/dt SUPPRESSION - SEE NOTE 3

NOTES:

1. Operation at load frequencies above 70 Hz requires increased input signal. The minimum input voltage is 4.5 Vdc for C45-13, -23, the minimum input current is 7.5 mA for C45-11, -21 and the minimum input current is 15 mA for the C45-12, -22.
2. Minimum Load Power Factor = 0.4.
3. RC snubber is recommended but not required.
4. Non repetitive 16 ms maximum.

ELECTRICAL SPECIFICATIONS

(25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Min	Max	Units
Control Voltage Range (See Figure 1)	4.0	10	Vdc
Input Current at 5V Control Voltage		16	mAdc
Must Turn-On Voltage ($0 \leq T_A \leq 100^\circ\text{C}$)	4.0		Vdc
Must Turn-Off Voltage ($0 \leq T_A \leq 100^\circ\text{C}$)		0.5	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Min	Max	Units	
Load Voltage Range	641-1	6.0	140	Vrms
	641-2	6.0	250	
Output Current Rating (See Figure 3, Note 1)	0.005	0.5	Arms	
Frequency Range		70	Hz	
Over Voltage Rating	641-1		200	Vpeak
	641-2		400	
On-State Voltage Drop at Rated Current		1.5	Vrms	
Surge Current Rating (Non repetitive 16 ms max. See Figure 2, Note 2)		5.0	A	
Turn-On Time (60 Hz)		20	μs	
Turn-Off Time (60 Hz)		8.3	μs	
Leakage Current (Off State at 100°C)		1.0	mArms	
Off-State dV/dt (Without RC Snubber, Typical)		50	V/ μs	
Isolation (Input to Output at 500 Vdc)	10^9		Ohms	
Dielectric Strength (Input to Output)	2500		Vac	
Capacitance (Input to Output)		5	pF	
Junction Temperature. (T_J)		125	°C	



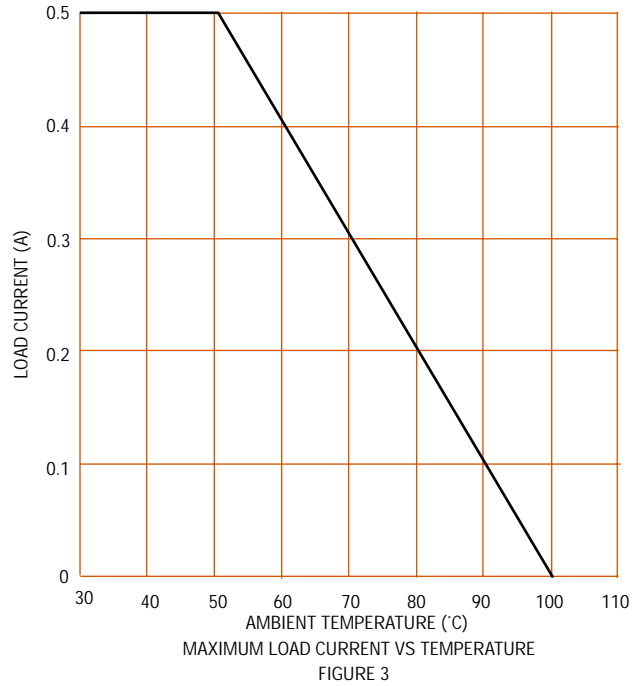
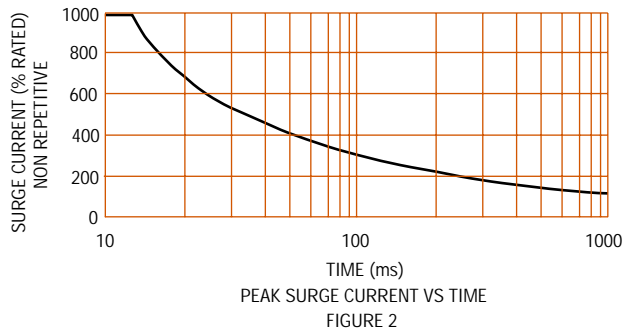
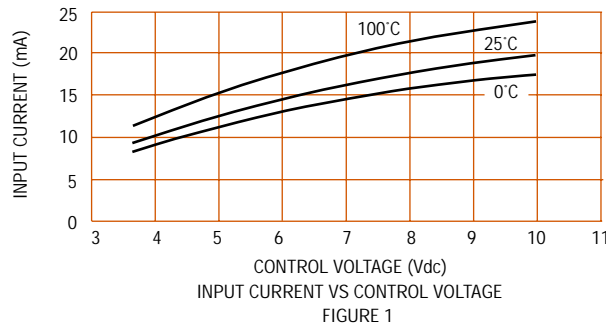
FEATURES/BENEFITS

- Fast Switching Speed - Where speed is important
- Floating Output - Eliminates ground loops and signal ground noise
- Random Turn On - For pulse width modulation
- Low Off State Leakage - For high off state impedance
- Switches High Voltages - To 250 Vrms
- Switches High Currents - To 0.5 Arms
- High Noise Immunity - Control signals isolated from switching noise
- High Dielectric Strength - For safety and for protection of control and signal level circuits
- UL & CUL registered File Number E55197

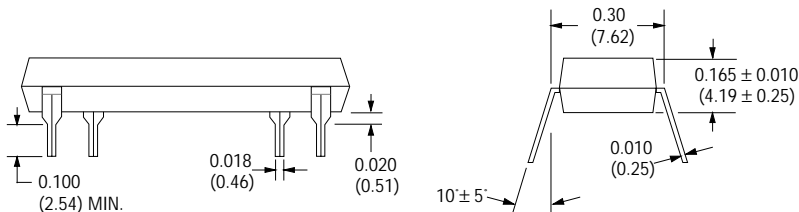
DESCRIPTION

The 641 Series features random turn-on for controlling AC loads with a triac output rated at 0.5 amp up to 50 °C ambient without a heat sink. A high frequency input oscillator with isolation transformer coupled directly to the triac gate provides the added capability of driving very low current AC loads down to 5 mA. Internal design employs a unique patented lead frame construction molded in a 14 pin DIP package.

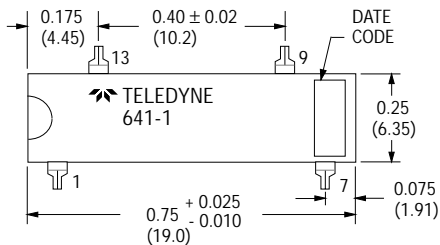
CHARACTERISTIC CURVES



MECHANICAL SPECIFICATION

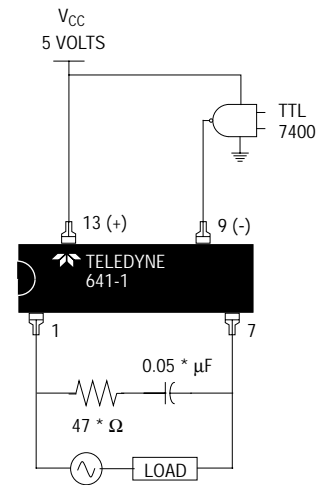


DIMENSIONS IN INCHES (MILLIMETERS)
Tolerances ± 0.015 (0.38) unless specified



- Operating Temperature -20°C to 100°C
- Storage Temperature -20°C to 100°C
- Weight: 2.0 grams maximum
- Case: 14 pin Dual-In-Line (TO-116)
- Case Material: Epoxy, self extinguishing

TYPICAL 641 INTERFACE



* OPTIONAL SNUBBER NETWORK

NOTES:

1. UL rated at 0.5 Arms for motor starting and incandescent lamp control.
2. Triac may lose blocking capability during and after surge until T_j falls below 125°C maximum.

Input Control Voltage Rating	Output Voltage Rating		Output Load Current	
			Part Numbers*	
	Continuous (RMS)	Transient (PEAK)	5A	10A
3-32 Vdc	280 Vac	500	601-1	601-2
		600	601-1H	601-2H

*See Note 1

ELECTRICAL SPECIFICATIONS

(25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Min	Max	Units
Control Voltage Range	3.0	32.0	Vdc
Input Current (-40°C to 85°C, See Figure 3)		12.0	mA
Must Turn-On Voltage (-40°C to 85°C)	3.0		Vdc
Must Turn-Off Voltage (-40°C to 85°C)		1.0	Vdc
Reverse Voltage Protection		-32	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Part Number	Min	Max	Units
Load Voltage Rating		25	280	Vrms
Output Current Rating (See Figure 1 or 2)	601-1	0.25	5.0	Arms
	601-2	0.25	10.0	
Frequency Range		47	70.0	Hz
Over Voltage Range	601-1,-2	500		Vpeak
	601-1H,-2H	600		
On-State Voltage Drop At Rated Current (See Note 4)			1.5	Vrms
Surge Current Rating (16 ms) (See Figure 4 and Note 2)			1000	%
Turn-On Time (60 Hz)			0.5	Cycle
Turn-Off Time (60 Hz)			1.0	Cycle
Off-State Leakage @ Rated Load Voltage			9.0	mArms
Off-State dV/dt (See Note 1)			200	V/μs
Isolation (Input to Output, Input to Case & Output to Case)			10 ⁹	Ohms
Dielectric Strength (Input to Output, Input to Case & Output to Case)			1500	Vac
Capacitance (Input to Output)			15.0	pF
Junction Temperature (T _J)			125	°C
Thermal Resistance	(θ _{JA})	601-1	19.0	°C/W
	(θ _{JC})	601-2	4.8	

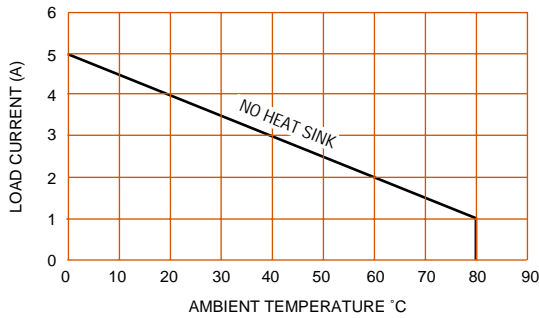
**FEATURES/BENEFITS**

- Optical Isolation - Isolates Control Elements From Load Transients
- Switches High & Low Voltages and Currents - Voltages from 25 to 280 Vrms. Currents from 0.25 to 5 and 10 Arms.
- Floating Output - Eliminates ground loops and signal level ground noise.
- Zero Voltage Turn-On - Reduces switching transient noise
- Low Off-State Leakage Current - High off state impedance.
- High Dielectric Strength - For safety and protection of signal level circuits.
- Broad Operating Temperature Range - -40°C to 85°C
- UL and CUL registered. File Number E55197

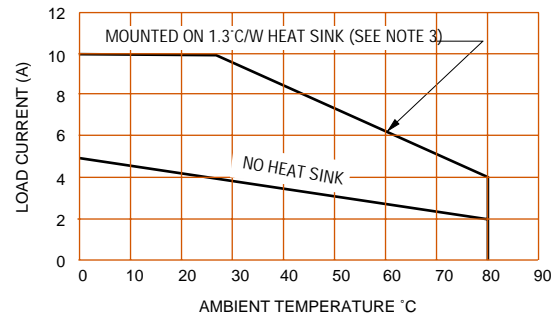
DESCRIPTION

This series of AC SSRs has been designed to incorporate custom integrated circuits to replace conventional discrete circuitry. The result is a relay with low component count, high performance, reliability, and low cost. Optical coupling between control and load provides a minimum of 1500 Vrms input/output isolation. The output circuitry includes built-in snubber protection to guarantee high immunity from false triggering and reliable switching of low power factor loads. These relays are available in three terminal styles for optimum mounting flexibility. Pin terminals mount directly on a printed circuit board, screw terminals or quick disconnect terminals are for chassis or heat sink mounting.

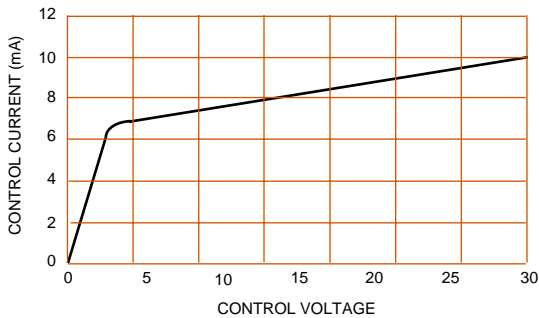
CHARACTERISTIC CURVES



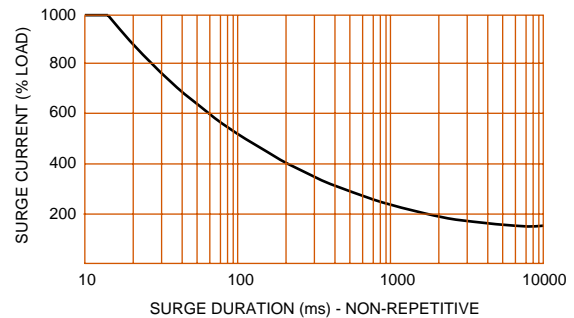
MAXIMUM LOAD CURRENT DERATING VS AMBIENT TEMPERATURE 601-1
FIGURE 1



MAXIMUM LOAD CURRENT VS AMBIENT TEMPERATURE 601-2
FIGURE 2

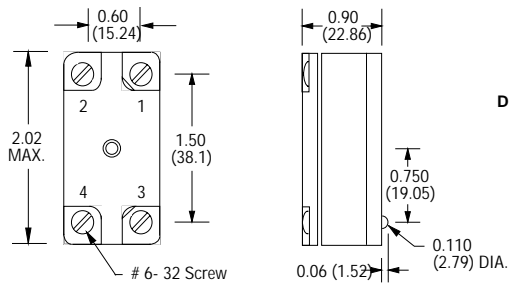


INPUT CURRENT VS CONTROL VOLTAGE
FIGURE 3

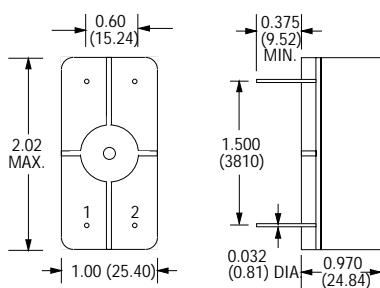


MAXIMUM SURGE AS FUNCTION OF LOAD VOLTAGE
FIGURE 4

MECHANICAL SPECIFICATIONS



601-2

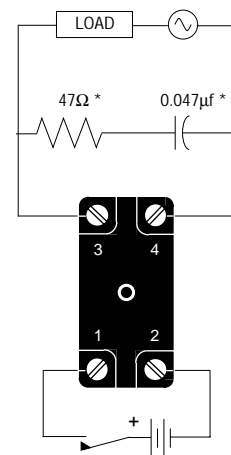


601-1

DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)
Tolerances ± 0.015 (0.38) unless otherwise specified

- Operating Temperature -40°C to $+85^{\circ}\text{C}$.
- Storage Temperature -40°C to $+100^{\circ}\text{C}$.
- Weight: 3.0 oz. maximum
- Terminals & Pins: Brass, Tin Plated
- Case Material: Epoxy, self extinguishing Aluminum Base plate

WIRING DIAGRAM

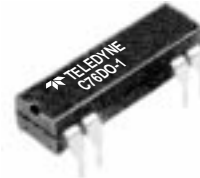
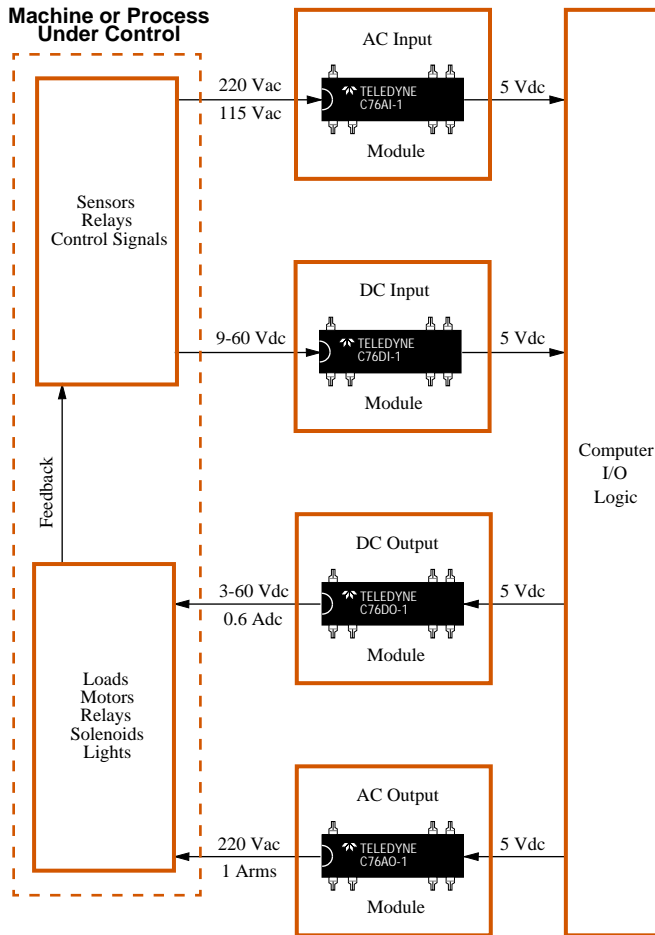


* Optional Snubber Network

NOTES:

1. The basic part number provides for screw terminals for 601-2 and pins for 601-1. For quick disconnect terminals add suffix "Q" or "QQ" for double quick disconnects on 601-2.
2. Triac may lose blocking capability during or after a large surge until T_j falls below maximum.
3. Relays mounted on heat sink with silicon grease.
4. On-State Voltage excludes commutating spikes.

C76 I/O INTERFACE SYSTEM



APPLICATIONS

- Robotics
- Programmable Controllers
- Process Control
- Machine Tool Control
- Energy Management
- Automatic Test Equipment

FEATURES/BENEFITS

- Input Enable Function - For computer timing function control.
- Floating Outputs - Eliminates ground loops and signal noise. Protects computer I/O and logic circuits
- Low Off-State Leakage - High off-state impedance
- Switches/Controls High Voltages - To 250 Vrms
- Switches/Controls High Currents - To 1.0 Arms
- High Noise Immunity - Control signals isolated from switching noise
- High Dielectric Strength - Safety and protection of control and signal level circuits

DESCRIPTION

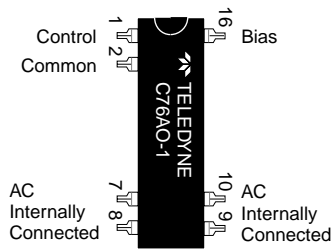
The C76 Series Solid State Computer Input/Output Modules are designed expressly for application in computerized control systems where reliable noise-free interface of switching is required to isolate computer logic elements from high conducted noise encountered in industrial environments. Sensitive logic circuitry is kept noise-free by means of optical isolation between logic and power lines.

Output modules allow either TTL or CMOS level signals to control the switching of power to high voltage and high current loads. Hysteresis at the input significantly increases the noise margin when used in the CMOS input mode, preventing false triggering in noisy environments.

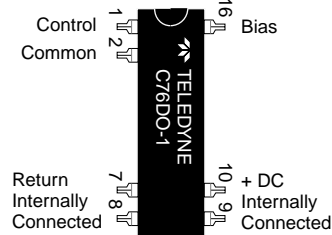
Input modules convert the presence or absence of load level voltages from pressure, flow, temperature and other transducers, limit switches, solenoids or relays to "clean" low level logic signals for computer input. An ENABLE function maintains the module's output in an "open" state until the ENABLE terminal is brought up to the bias supply level.

Part Number	Type	Characteristics
C76AO-1	AC Output	3.8 to 16 Vdc Input 5 to 250 Vrms, 1 A Output
C76AI-1	AC Input	90 to 250 Vrms Input 0 to 60 Vdc, 100 mA Output
C76DO-1	DC Output	3.8 to 16 Vdc Input 3 to 60 Vdc, 0.6 A Output
C76DI-1	DC Input	9 to 60 Vdc Input 0 to 60 Vdc, 100 mA Output

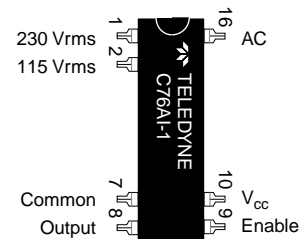
PIN CONFIGURATIONS



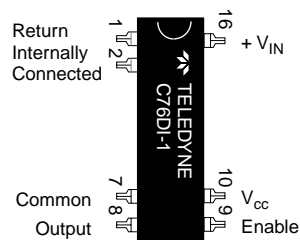
C76AO-1



C76DO-1



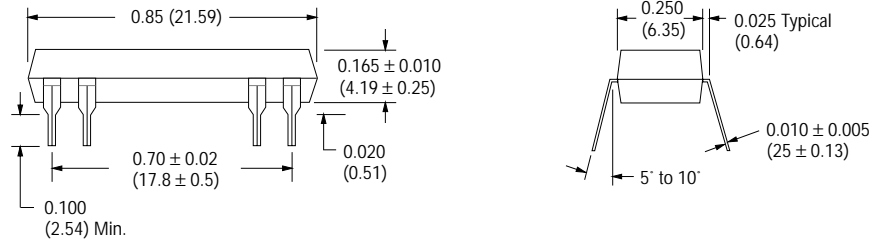
C76AI-1



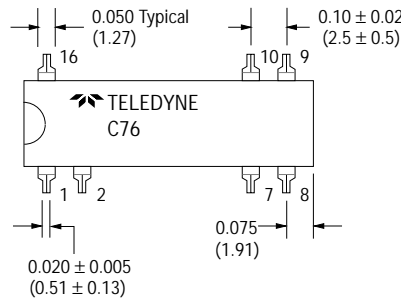
C76DI-1

(TOP VIEW)

MECHANICAL SPECIFICATION



DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)
Tolerances (unless otherwise specified) ± 0.015 (0.38)



Operating Temperature Range: -40°C to 85°C
Storage Temperature Range: -40°C to 100°C
Weight: 2.0 gm. maximum
Case: Special 16 pin dual In line, filled epoxy.

TRUTH TABLE FOR ENABLE FUNCTION

V_{IN}^1	ENABLE ²	OUTPUT ³
0	0	0
1	0	0
0	1	0
1	1	1

- For C76AI-1:
When using 115 Vrms input, V_{IN} is a "1" when the voltage is ≥ 90 Vrms
When using 220 Vrms input, V_{IN} is a "1" when the voltage is ≥ 180 Vrms
- For C76AI-1 and C76DI-1:
The Enable input is a "1" when the Enable voltage $V_E \geq 2.0$ Vdc.
The Enable input is a "0" when the Enable voltage $V_E \leq 0.4$ Vdc.
- A "0" represents an open output switch.
A "1" represents a closed output switch.

NOTE:

When used in the CMOS input configuration, the C76AO-1 and the C76DO-1 provide inversion. When the input voltage is 0.5 Vdc or less the output will be guaranteed "On". When the input voltage is 2.8 Vdc or more the output will be guaranteed "Off".



ELECTRICAL SPECIFICATIONS (25°C UNLESS OTHERWISE SPECIFIED)

INPUT (BIAS) SPECIFICATIONS

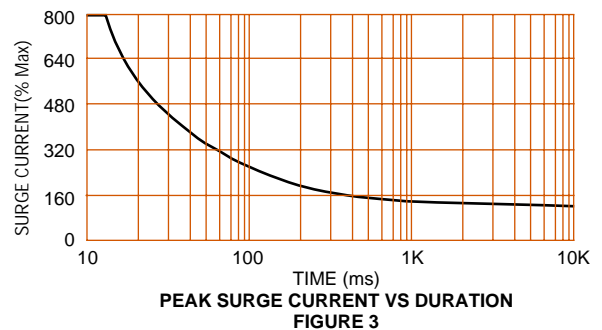
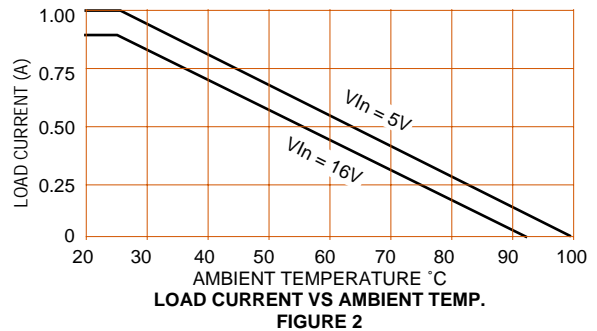
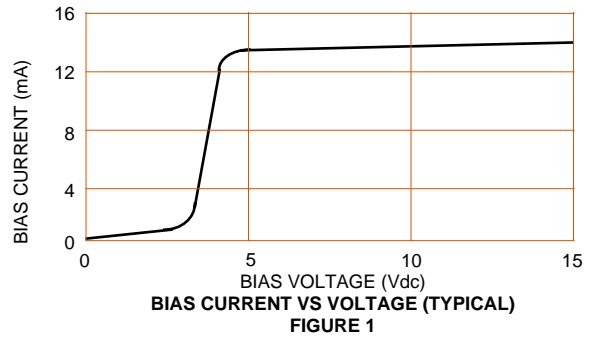
Parameter	Min	Max	Units
Bias Voltage Range (See Fig. 1)	3.8	16.0	Vdc
Bias Current @ 5 Vdc		16.0	mA
Must Turn-On Voltage	3.8		Vdc
Must Turn-Off Voltage		1.5	Vdc
Reverse Voltage Protection		-32.0	Vdc

INPUT (CONTROL) SPECIFICATIONS

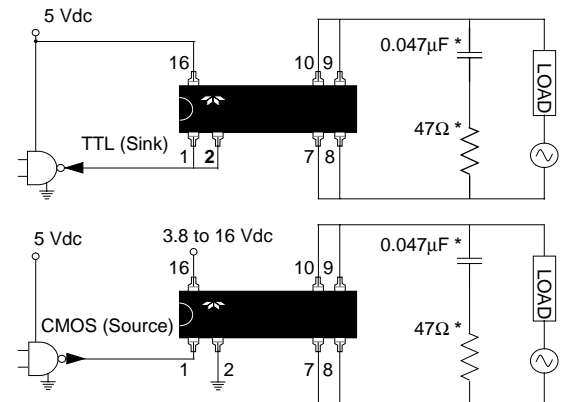
Parameter	Min	Max	Units
Control Voltage Range		16.0	Vdc
Control Current at 5 Vdc		250	mA
Must Turn-On Voltage	0.5		Vdc
Must Turn-Off Voltage		2.8	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Min	Max	Units
Load Voltage Range	5.0	250	Vrms
Output Current Rating (See Fig. 2)	0.01	1.0	Arms
Frequency Range	47	70	Hz
Over Voltage Rating		±500	Vpeak
On-State Voltage Drop @ 1 Arms		1.5	Vrms
Zero Voltage Turn-On		±15.0	Vpeak
Surge Current Rating (See Fig. 3)		8.0	Apeak
Turn-On Time		1/2	Cycle
Turn-Off Time		1/2	Cycle
Leakage Current (Off-State) @ 220 Vrms		1.0	mA
Off-State dV/dt w/o Snubber	200		V/μs
Isolation (Input to Output)	10 ⁹		Ohms
Dielectric Strength (Input to Output)	3750		Vac
Capacitance (Input to Output)		5.0	pF
Junction Temperature (T _j)		150	°C



TYPICAL INTERFACE TO TTL AND CMOS LOGIC



* RC snubber network is optional for protecting switching system from high voltage transients

ELECTRICAL SPECIFICATIONS
 (25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

Parameter	Min	Max	Units
Control Voltage Range	115 Vrms; V_{IN}	90	135 Vrms
	220 Vrms; V_{IN}	180	250 Vrms
Input Current	115 Vrms; V_{IN}	3.5	mA
	220 Vrms; V_{IN}	3.0	mA
Input Line Frequency	45	70	Hz
Must Turn-Off Voltage	115 Vrms; V_{IN}	25	Vrms
	230 Vrms; V_{IN}	50	Vrms
Input Transient (≤ 1 ms)		± 600	Vpeak

INPUT (ENABLE) SPECIFICATIONS

Parameter	Min	Max	Units
Enable Voltage	2.0	16.0	Vdc
Enable Current		10.0	μ A

OUTPUT SPECIFICATIONS

Parameter	Min	Max	Units
Logic Supply Voltage (V_{CC})	4.0	16.0	Vdc
Output Voltage Rating (V_o)		60	Vdc
Output Current Rating		100	mA
On Resistance		6.0	Ohms
Output Leakage Current @ 15 Vdc		1.0	μ A
Turn-On Time @ 60 Hz		40	ms
Turn-Off Time @ 60 Hz		40	ms
Isolation (Input to Output)	10^9		Ohms
Dielectric Strength (Input to Output)	3750		Vac
Capacitance (Input to Output)		5.0	pF
Junction Temperature (T_J)		125	$^{\circ}$ C

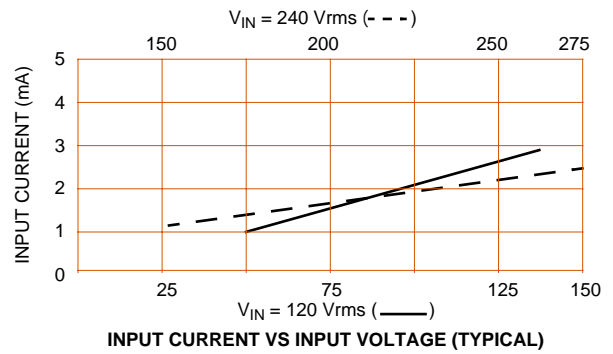


FIGURE 1

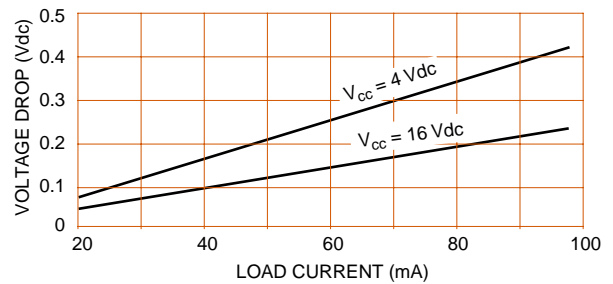


FIGURE 2

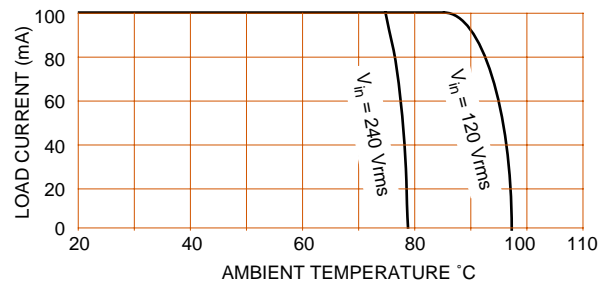
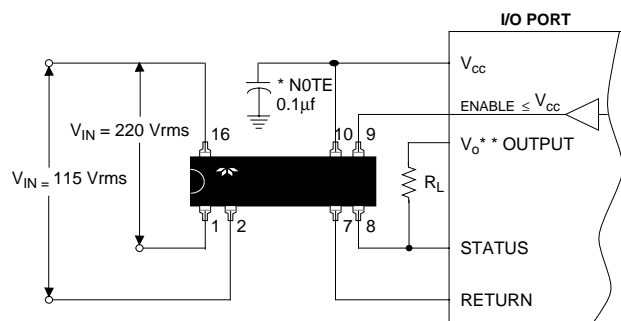


FIGURE 3

TYPICAL INTERFACE TO I/O PORT



* NOTE: 0.1 μ F decoupling capacitor is required
 ** V_o maybe supplied by V_{CC}

ELECTRICAL SPECIFICATIONS
 (25°C UNLESS OTHERWISE SPECIFIED)

INPUT (BIAS) SPECIFICATIONS

Parameter	Min	Max	Units
Bias Voltage Range	3.8	16.0	Vdc
Bias Current @ 5.0 Vdc		15.0	mA
Must Turn-On Voltage	3.8		Vdc
Must Turn-Off Voltage		1.5	Vdc
Reverse Voltage Protection		-32.0	Vdc

INPUT (CONTROL) SPECIFICATIONS

Parameter	Min	Max	Units
Control Voltage		16.0	Vdc
Control Current @ 5 Vdc		15.0	μA
Must Turn-On Voltage	0.5		Vdc
Must Turn-Off Voltage		2.8	Vdc

OUTPUT (LOAD) SPECIFICATIONS

Parameter	Min	Max	Units
Load Voltage Range	3.0	60	Vdc
Output Current Rating		600	mAdc
Output Voltage Drop @ 600 mA		1.5	Vdc
Turn-On Time		60	μs
Turn-Off Time		180	μs
Leakage Current (Off-State) @ 50 Vdc		2.0	μA
Isolation (Input to Output)		10 ⁹	Ohms
Dielectric Strength (Input to Output)		3750	Vac
Capacitance (Input to Output)		5.0	pF
Junction Temperature (T _j)		150	°C

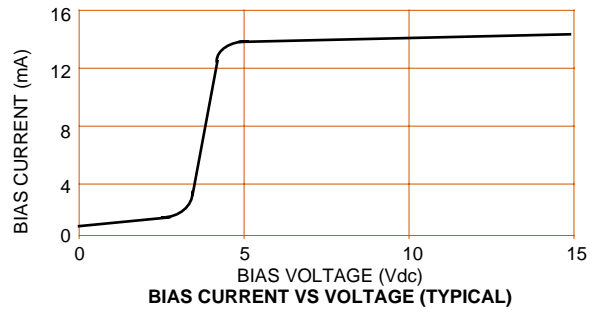


FIGURE 1

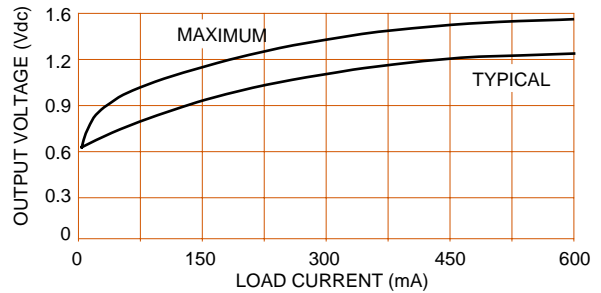


FIGURE 2

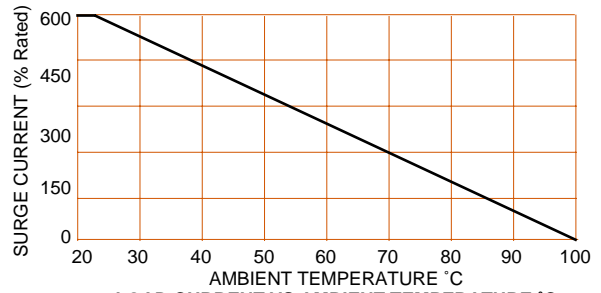
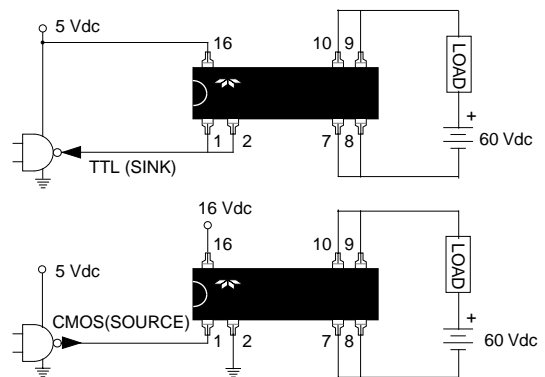


FIGURE 3

TYPICAL INTERFACE TO TTL AND CMOS LOGIC





ELECTRICAL SPECIFICATIONS (25°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) SPECIFICATIONS

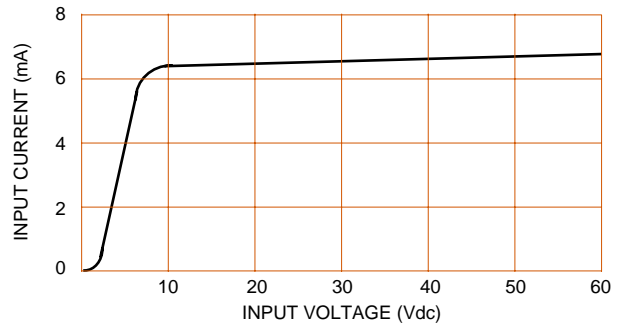
Parameter	Min	Max	Units
Control Voltage Range	9.0	60.0	Vdc
Input Current @ 55 Vdc		10.0	mA
Must Turn-On Voltage		9.0	Vdc
Must Turn-Off Voltage		1.5	Vdc
Input Transient (≤ 1 ms)		100	Vpeak

INPUT (ENABLE) SPECIFICATIONS

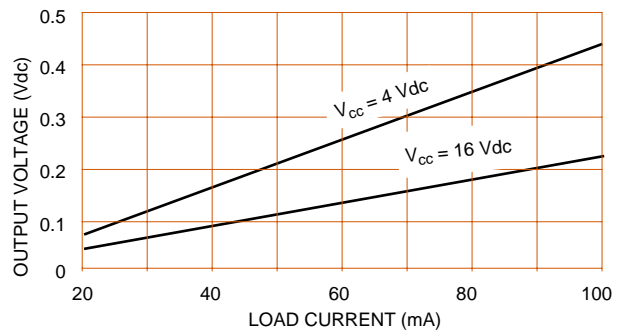
Parameter	Min	Max	Units
Enable Voltage	2.0	16.0	Vdc
Enable Current		10.0	μ A

OUTPUT (LOAD) SPECIFICATIONS

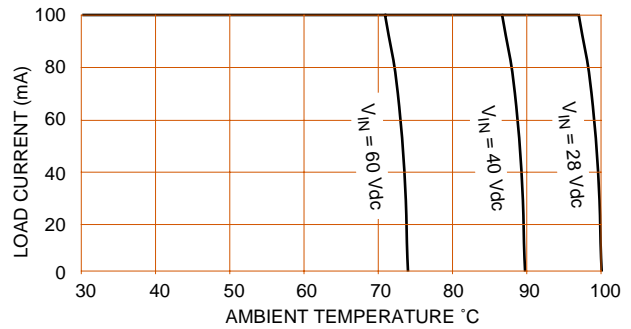
Parameter	Min	Max	Units
Logic Supply Voltage (V_{cc})	4.0	16.0	Vdc
Output Voltage Rating (V_o)		60	Vdc
Output Current Rating		100	mA
On Resistance		6.0	Ohms
Leakage Current (Off-State) @ 15 Vdc		1.0	μ A
Turn-On Time		3.0	ms
Turn-Off Time		3.0	ms
Isolation (Input to Output)	10^9		Ohms
Dielectric Strength (Input to Output)	3750		Vac
Capacitance (Input to Output)		5.0	pF
Junction Temperature (T_j)		125	$^{\circ}$ C



INPUT CURRENT VS INPUT VOLTAGE (TYPICAL)
FIGURE 1

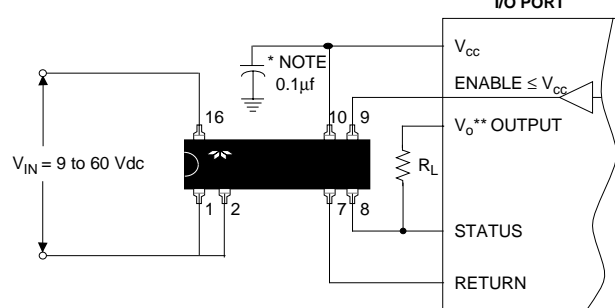


LOAD CURRENT VS VOLTAGE DROP (TYPICAL)
FIGURE 2



LOAD CURRENT VS AMBIENT TEMPERATURE
FIGURE 3

TYPICAL INTERFACE TO I/O PORT



* NOTE: 0.1 μ F decoupling capacitor is required
** V_o maybe supplied by V_{cc}

Introduction

This Teledyne Relays catalog presents our Industrial Solid State Products. These relays are typically used as power interface modules between micro processors and power loads from 10 to 200 amps and voltages up to 1600 volts. The applications are extensive and limited only by the imagination of the designers applying these devices to control power functions.

Facilities

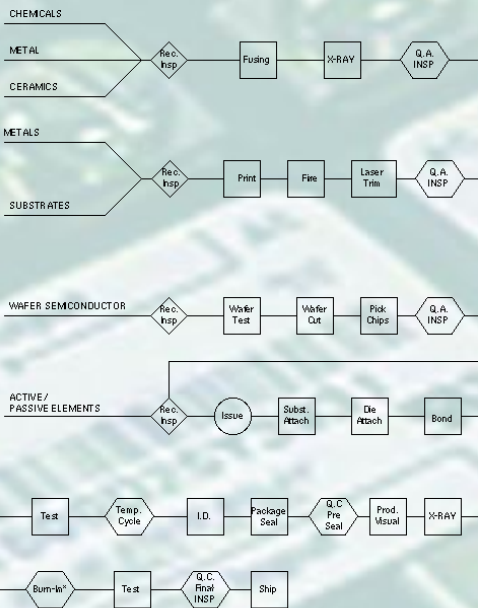
The manufacturing facility located at 7345 East Acoma Drive, Scottsdale, Arizona, consists of ten thousand square foot of dedicated air-conditioned manufacturing space. Five thousand square foot, of the to-



tal, is a dedicated clean room with special air handling and static control for a high quality manufacturing environment.

Assembly and Test

The essential focus of the manufacturing operation is to take wafers and other raw materials such as ceramics and metals, and assemble and test the product. The following is an example of a processing schematic.



* 100% to special requirements from customers

Operations

Careful attention is given to the structure and function of our operations. Teledyne Relays utilizes a Microsoft Windows NT, SQL based manufacturing software incorporating CAD, email, financial planning, prod-

uct data specification and control, internet access, real time visual drag and drop order scheduling, sales analysts, video based instruction.

The implementation of these tools has improved cycle time, rate of on-time deliveries and cut cost significantly allowing Teledyne Relays to better serve the needs of our customers. Teledyne Relays is also poised with it's systems to incorporate ISO 9001 Certification by the end of 1997.

Reliability and Quality Assurance

Full Computerized Statistical Process Control (SPC) and Quality Control methods are used in the manufacturing process to meet the increasingly stringent requirements of the marketplace. Teledyne Relays has extensive documentation and control to assure proper assembly occurs on a repetitive basis.

Equipment

To ensure that the customer gets the highest quality Solid State Relay at the lowest price, Teledyne Relays has instituted the latest technology available for all facets of business equipment such as:



1. State of the Art automated in-line surface mount solder stencil printing, pick and place assembly, nitrogen atmosphere reflow ovens and aqueous cleaning equipment.

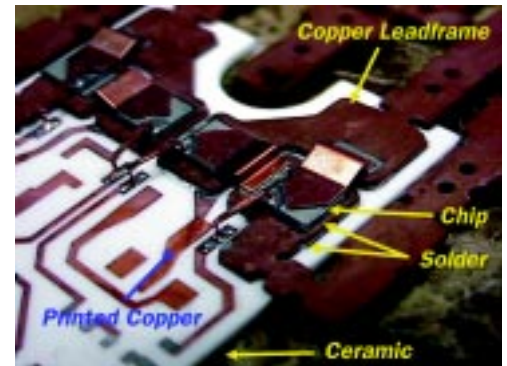
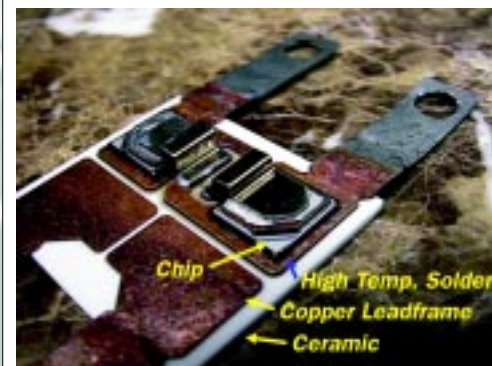
2. Computer-controlled laser systems for active and passive elements.
3. Computer automated test equipment for both active and passive semiconductor components and curve tracers.
4. Automatic and semi-automatic printers for basic circuit patterns on all varieties of ceramic substrates for logic circuits.
5. Hydrogen, nitrogen and special atmospheric furnaces for firing ceramic and metals.
6. Automatic and manual wire bonders capable of using aluminum wire with diameters from .005 to .025 inches.
7. Automatic wafer cutting equipment for chip separation.
8. Reflow and reduction soldering accomplished for all components in a single operation using the unique Powertherm® and Fused Copper™ process; special encapsulating system based on Teledyne Relays formulations using automatic dispensing apparatus, together with special vacuum and baking ovens to prepare and cure materials.
9. Computer-controlled product labeling and special graphic design equipment.
10. Burn-in apparatus and environmental equipment.
11. X-ray inspection system.



Construction Processes Fused Copper™ and Powertherm™

A typical Fused Copper circuit uses a high temperature process to achieve an intimate bond between copper lead frame members and the isolated ceramics. This process creates a closely matched thermal expansion coefficient. Power devices are placed on the lead frame. Logic devices are placed on a ceramic that contains a metallized pattern solder onto the leadframe. Using the Fused Copper currents up to 8000 amps are possible.

A typical Powertherm circuit consist of a ceramic substrate. Metalization is deposited onto the ceramic. Then a special Copper Alloy lead frame is superimposed onto the appropriate areas. Power devices are placed on the lead frame. Logic devices are placed on the metallized pattern. Using the Powertherm process currents up to 1000 amps are possible.





General Information

LR is a very small package outline containing a single relay. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate **Triac** or **SCR** die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555
CE #EN60947-1

Part Number Example: LR1200480R25

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating				
LR - SCR	1200480	1200	530	48	
LR - SCR	600240	600	280	24	
LRT - Triac*	600240	600	280	24	

Step 3 Input Type								
A - AC**	90	90	280	2.5	10	8.3		
D - Zero Cross	5	3	32	.25	1	8.3	-.32	
R - Random Cross	5	4	26	.25	1	.02	-.32	

Step 4 Output Current Amps					
SCRS					
40	1.7	400	1200	85	.35
25	1.7	250	600	50	.5
Triacs					
25	1.5	250	260	50	.6
10	1.5	100	60	50	.6

Step 5 Options
See Page 20
-021 TransAX™
Transient
Eliminator up to
2000V
Protection!
(Available for D
or R input only)

Max. Transient Overvoltage
VAC PEAK

Max. Line Voltage(VAC)

Min. Line Voltage (VAC)

* 600V 10A and 25A only
** Units are VAC where VDC is specified

Max Input Current
15ma @ - VDC

Min. Input Voltage - VDC

Max. Input Voltage - VDC

Min. Turn Off Current - mA DC

Min. Turn Off Voltage - VDC

Max. Turn On Time - mS

Reverse Voltage - VDC

Max. On-State Voltage Drop @
Max. Rated Current - V

Max Single Cycle Surge Current

Max Fusing I²T Value (8.3 mS) - A² Sec.

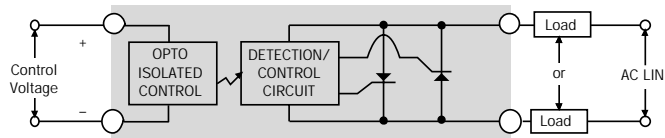
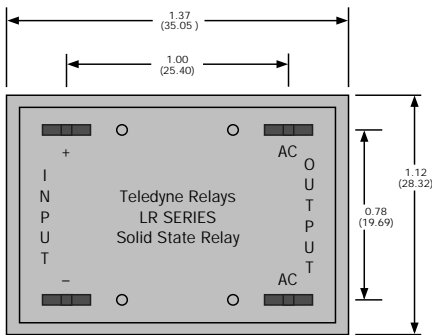
Max. Power Dissipation (T_c=85°C) - W

Max. Thermal Resistance J_c - °C/W

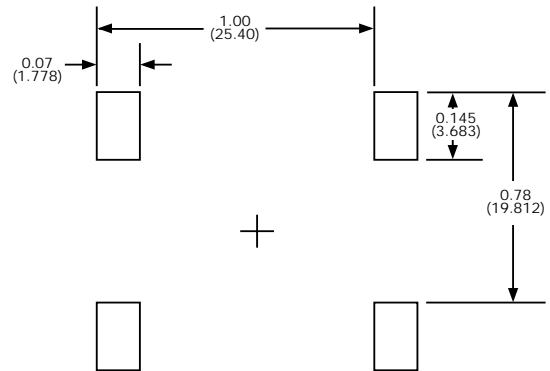
Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Dimensional Drawing

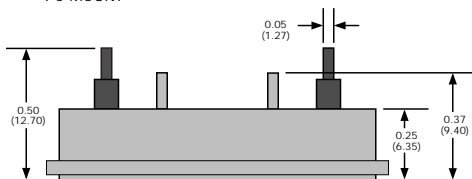
Electrical Schematic



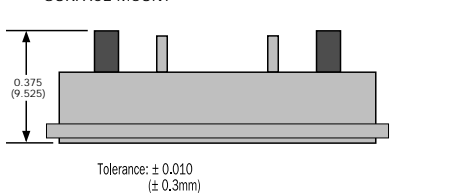
RECOMMENDED PAD SPACING FOR SURFACE MOUNT



PC MOUNT



SURFACE MOUNT



*Add -008 to Suffix of Part Number.
For surface mounting option.

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distributor stock, catalog request and order
placement. Find out about the latest in solid state
relay technology @ <http://www.teledynereleys.com>

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Providing the quality solid state relay solution.

General Information

BR is a package designed for faston connectors containing a single relay. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate **Triac** and **SCR** die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
 File E128555
 CE #EN60947-1



Part Number Example: BR600240R25

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
BR - SCR	1200480 1200 530 48	A - AC** 90 90 280 2.5 10 8.3 D- Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	SCR 55 1.7 600 3000 110 .35 40 1.7 400 1200 85 .35 25 1.7 250 600 50 .5 Triacs 25 1.5 250 260 50 .6 10 1.5 100 60 50 .6	See Page 20 -021 TransAX™ Transient Eliminator up to 6000V Protection! (Available for 600V line voltage relays only)
BR - SCR	600240 600 280 24			
BRT - Triac*	600240 600 280 24			

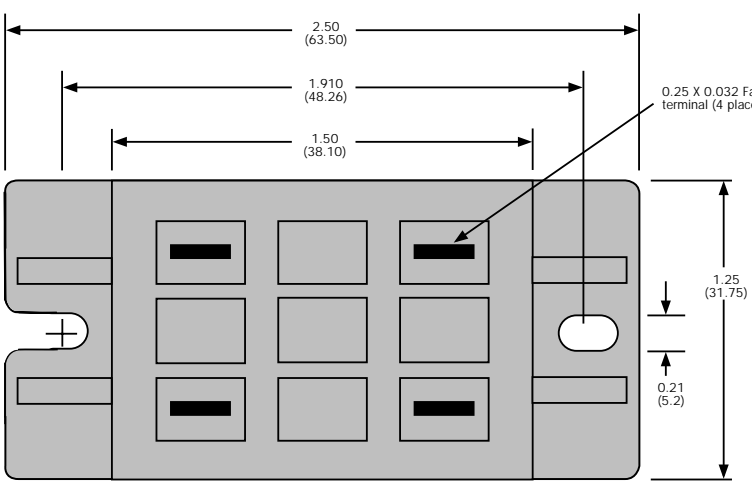
Max. Transient Overvoltage VAC PEAK
 Max. Line Voltage(VAC)
 Min. Line Voltage (VAC)

Max Input Current 15ma @ - VDC
 Min. Input Voltage - VDC
 Max. Input Voltage - VDC
 Min. Turn Off Current - mA DC
 Min. Turn Off Voltage - VDC
 Max. Turn On Time - mS
 Reverse Voltage - VDC

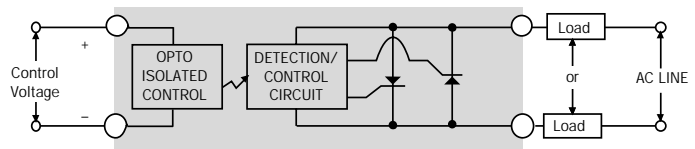
Max. On-State Voltage Drop @ Max. Rated Current - V
 Max Single Cycle Surge Current
 Max Fusing I²T Value (8.3 mS) - A² Sec.
 Max. Power Dissipation (T_c=85°C) - W
 Max. Thermal Resistance J_c - °C/W

Isolation: 4000V Input to Output
 Operating Temp. Range: -40°C to 125°C
 dv/dt: 500V/μs Typical
 Operating Frequency: 47 to 400 Hz
 (For 400 Hz inductive load, contact factory)

Dimensional Drawing

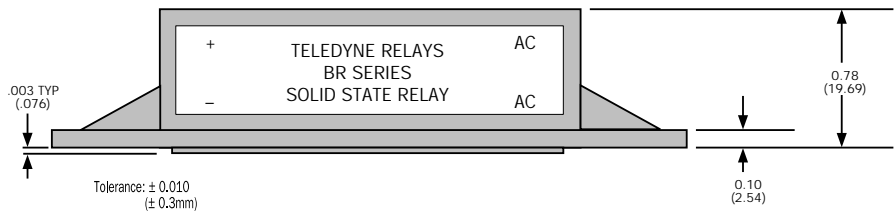


Electrical Schematic



Single Pole Unit with Faston

- Faster and Simpler Installation!
- 25% Smaller Mounting Footprint than Standard SSR Package



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Industrial Solid State Products Single SCR or Triac output to 125 amps

SUNSTAR射频通信 <http://www.rfoc.net/> TEL:0755-8339682 FAX:0755-83376182 E-MAIL:szss20@163.com

1-800-436-8766 <http://www.teledynereleys.com>

Providing the quality solid state relay solution.



General Information

SSR is an industry standard package outline containing a single relay. It is constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate **Triac** or **SCR** die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555
CE #EN60947-1
VDE #5928 (Selected Models)

Part Number Example: SSR1200480D125

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
SSR - SCR	1600660 1600 660 60 1200480 1200 530 48 600240 600 280 24	A- AC** 90 90 280 2.5 10 8.3 D-Zero Cross*** 5 3 32 .25 1 8.3 -32 R- Random Cross**** 5 4 26 .25 1 .02 -32	SCR 125 1.7 1400 12760 250 0.25 90 1.7 1000 8900 175 0.3 75 1.7 800 5000 150 0.3 55 1.7 600 3000 110 0.35 40 1.7 400 1200 85 0.35 25 1.7 250 600 50 0.4 Triacs 25 1.5 250 260 50 .6 10 1.5 100 60 50 .6	See Page 20
SSRT - Triac*	600240 600 280 24			

Max. Transient Overvoltage VAC PEAK
Max. Line Voltage (VAC)
Min. Line Voltage (VAC)

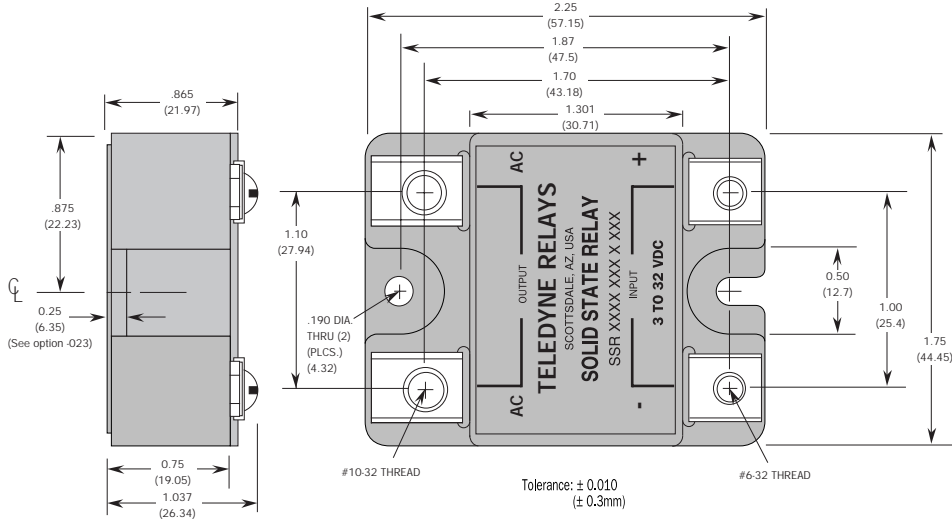
Max Input Current 15ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

Max. On-State Voltage Drop @ Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W

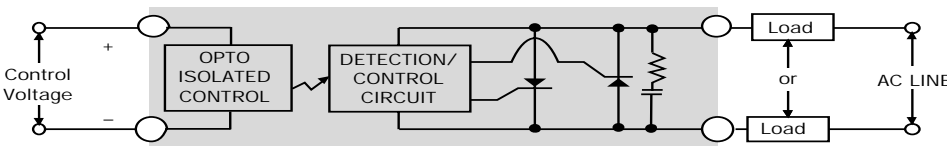
* 600V 10A and 25A only
** Units are VAC where VDC is specified
*** 4.5 to 32 VDC for 1600 volt "D" type relays
**** 5 to 26 VDC for 1600 volt "R" type relays

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Dimensional Drawing



Electrical Schematic



View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

Inquire about Teledyne Relays' exclusive EZmount™ and TransAX™ options.



General Information

EFR is a heavy duty, high current package containing a single relay. It is constructed using the FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate SCR die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments.

UL & ULC Recognized
File E128555
CE #EN60947-1

Part Number Example: EFR1200480D150

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
EFR - SCR	1600660 1600 660 60 1200480 1200 530 48 600240 600 280 24	A- AC** 90 90 280 2.5 10 8.3 D-Zero Cross*** 5 3 32 .25 1 8.3 -32 R- Random Cross****5 4 26 .25 1 .02 -32	150 1.7 1600 13500 1000 .25	See Page 20

Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

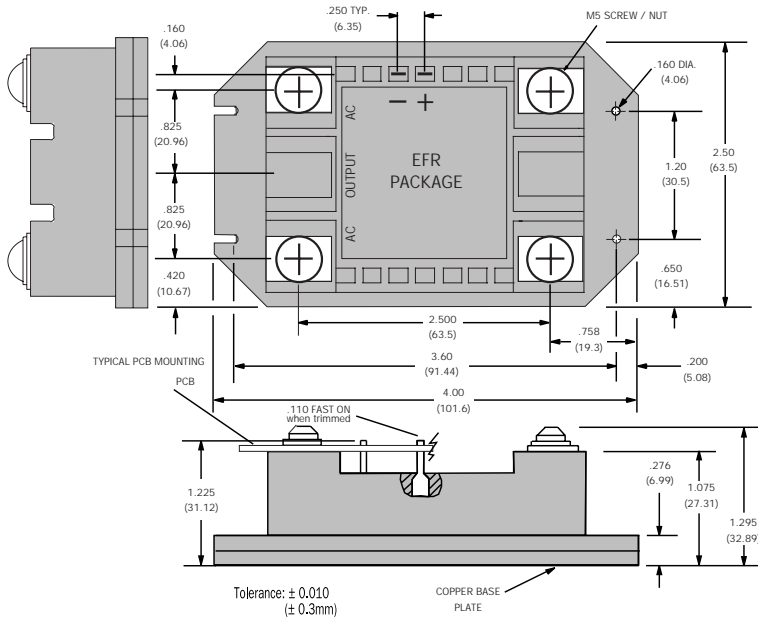
Max Input Current 15ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

Max. On-State Voltage Drop @ Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W

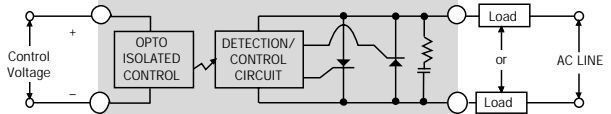
** Units are VAC where VDC is specified
*** 4.5 to 32 VDC for 1600 volt "D" type relays
**** 5 to 26 VDC for 1600 volt "R" type relays

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Dimensional Drawing



Electrical Schematic



1600 Volts.
150 Amps.

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Providing the quality solid state relay solution.

General Information

DRDT is a small package outline containing a dual relay. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate Triac die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relay to provide the best thermal performance.

UL & ULC Recognized
File E128555
CE #EN60947-1



Part Number Example: DRDT600240D10

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
DRDT - Triac	600240 600 280 24	D- Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	10 1.5 100 60 50 .6	See Page 20

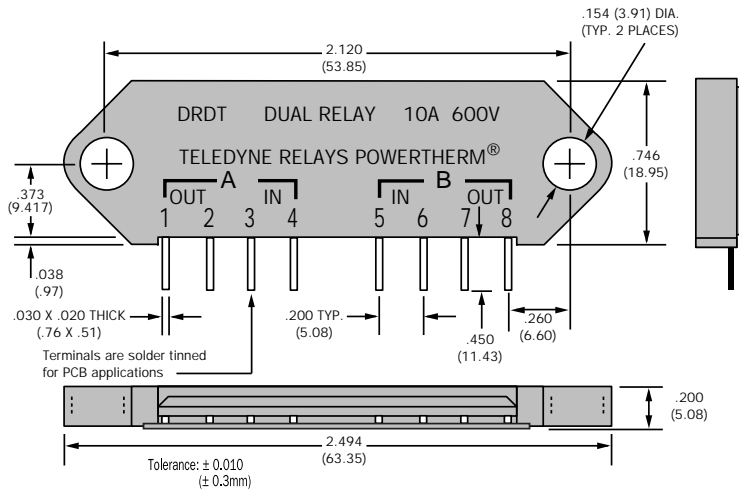
Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

Max Input Current 15ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

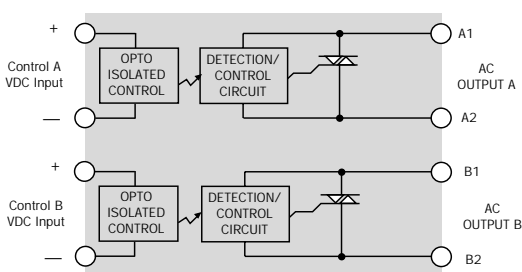
Max. On-State Voltage Drop @
Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Dimensional Drawing

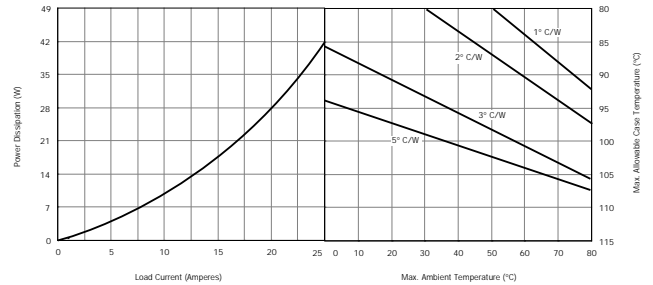


Electrical Schematic



Heatsink Graphs

For Continuous Dual Output Operation



The DRDT Series is an ideal relay where load current is ten amps or less, high reliability is required and space is limited.

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Providing the quality solid state relay solution.

General Information

CRD is a medium size package outline containing a dual relay. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate SCR die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in the most demanding of environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555
CE #EN60947-1



Part Number Example: CRD600240D25

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
CRD - SCR	1200480 1200 530 48 600240 600 280 24	A - AC** 90 90 280 2.5 10 8.3 D - Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	25 1.7 300 370 45 .4	See Page 20

Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

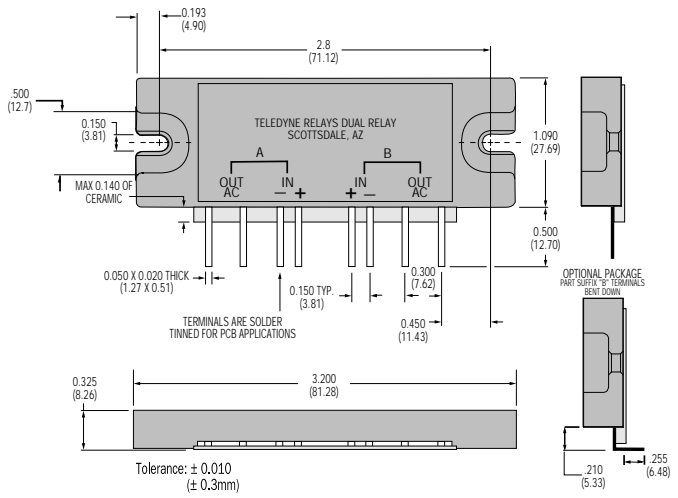
** Units are VAC were VDC is specified

Max Input Current 15ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

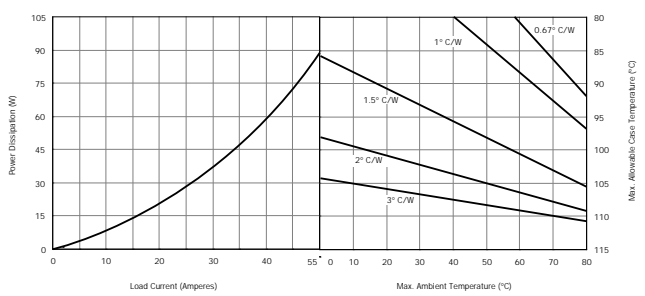
Max. On-State Voltage Drop @
Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W (one section on)

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

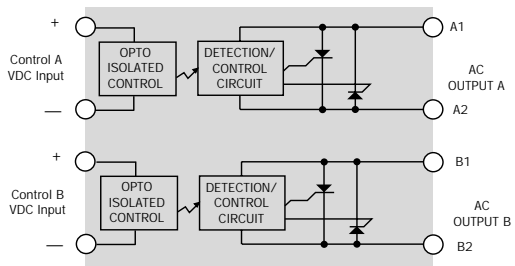
Dimensional Drawing



Heatsink Graphs For Continuous Dual Output Operation



Electrical Schematic



The CRD Series is an ideal relay where load current is twenty five amps or less, high reliability is required, space is limited and SCR's are required.

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General Information

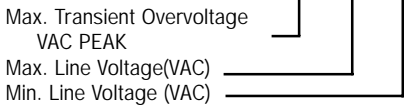
BRD is a compact package outline containing a dual relay. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate SCR die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized File E128555 CE #EN60947-1

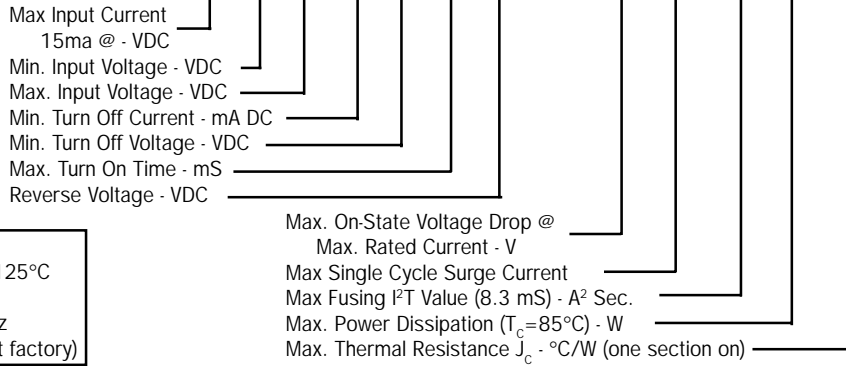
Part Number Example: BRD600240D40

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
BRD - SCR	600240 600 280 24	D- Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	40 1.7 500 1040 85 .5 25 1.7 300 370 45 .4	See Page 20

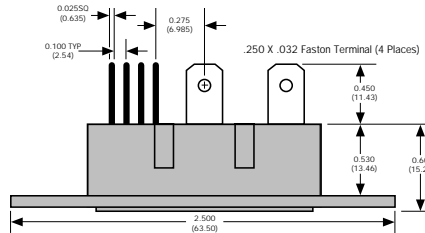
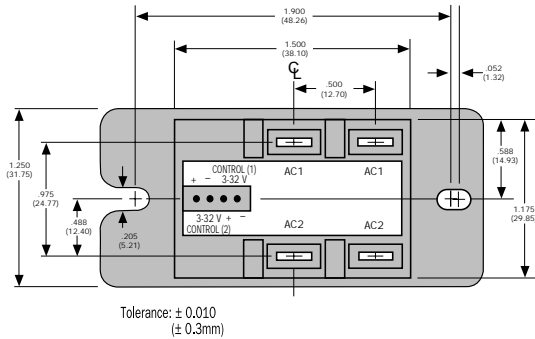


** Units are VAC where VDC is specified



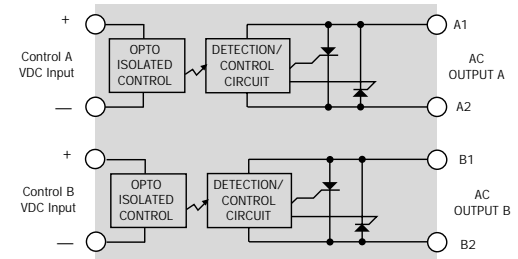
Isolation: 4000V Input to Output
 Operating Temp. Range: -40°C to 125°C
 dv/dt: 500V/μs Typical
 Operating Frequency: 47 to 400 Hz
 (For 400 Hz inductive load, contact factory)

Dimensional Drawing



Control Terminals mating Connector is AMP #640440-4 or MTA 100-4, or equivalent

Electrical Schematic



The BRD package has the same mounting holes, current rating, pins and fastons as a standard dual package. So why use a BRD package instead of a dual? Space! The BRD package footprint is 25% less than the dual package as shown in the photo at left.

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General Information

SSRD is an industry standard package outline containing a dual relay. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate **SCR** die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555
CE #EN60947-1

Part Number Example: SSRD1200480R40

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
SSRD - SCR	1200480 1200 530 48 600240 600 280 24	D - Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	40 1.7 500 1040 85 .5 25 1.7 300 370 45 .4	See Page 20

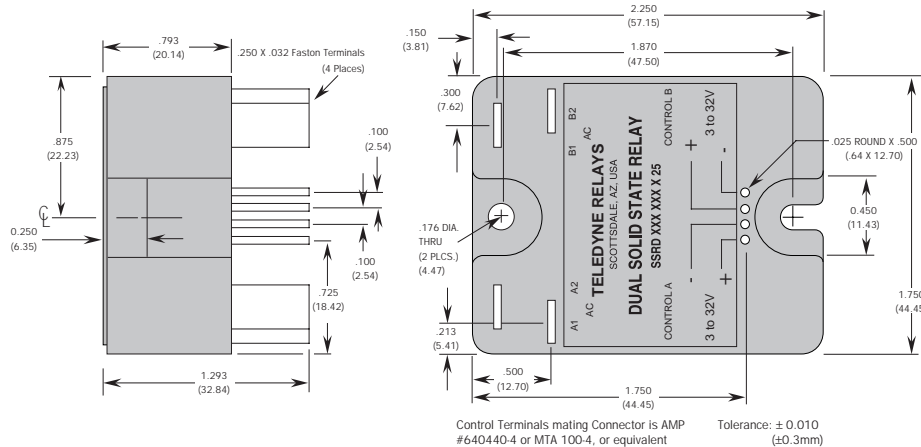
Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

Max Input Current 15ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

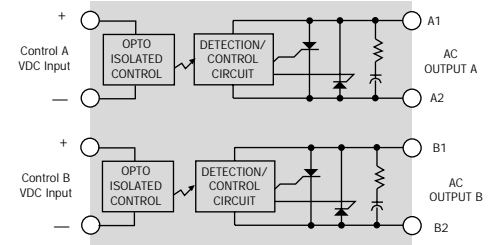
Max. On-State Voltage Drop @ Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 ms) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W (one section on)

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Dimensional Drawing



Electrical Schematic



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Providing the quality solid state relay solution.

General Information

EFRD is a heavy duty, high current package outline containing a dual relay. It is constructed using the FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate SCR die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments.

UL & ULC Recognized
File E128555
CE #EN60947-1



Part Number Example: EFRD600240A150

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
EFRD - SCR	1600660 1600 660 24 1200480 1200 530 24 600240 600 280 24	A- AC** 90 90 280 2.5 10 8.3 D-Zero Cross*** 5 3 32 .25 1 8.3 -32 R-Random Cross**** 5 4 26 .25 1 .02 -32	150 1.7 1600 13500 1000 .25	See Page 20

Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

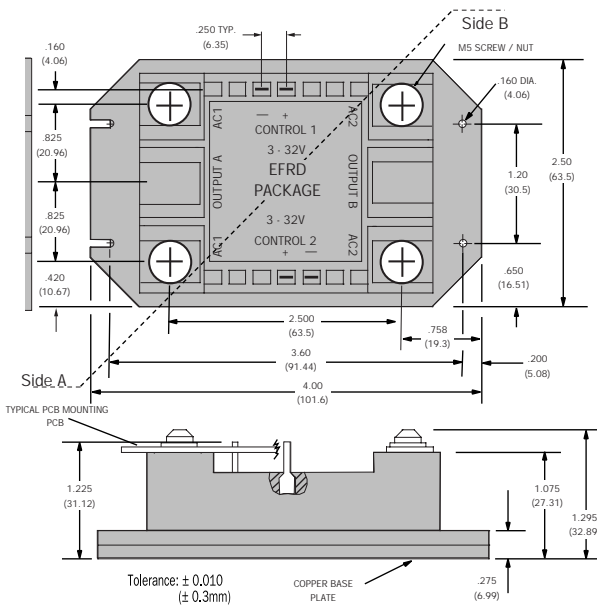
Max Input Current 15ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

Max. On-State Voltage Drop @
Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W (one section on)

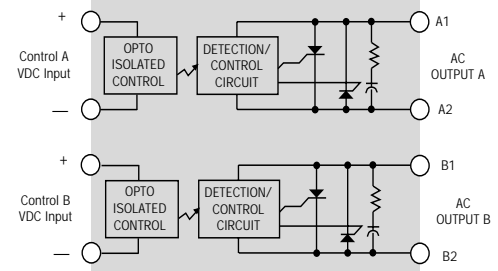
** Units are VAC where VDC is specified
*** 4.5 to 32 VDC for 1600 volt "D" type relays
**** 5 to 26 VDC for 1600 volt "R" type relays

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

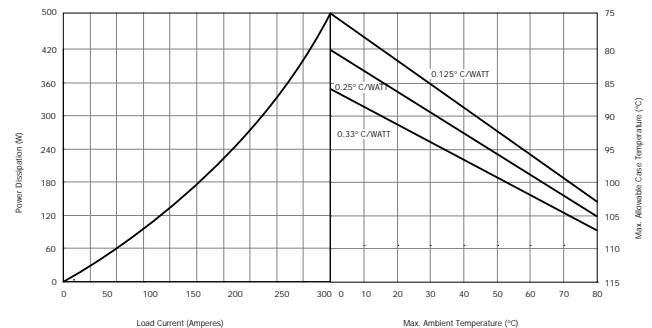
Dimensional Drawing



Electrical Schematic



Heatsink Graphs For Continuous Dual Output Operation



Output ratings of 150 Amps per Side!

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General Information

CRTP is a small in line package outline containing a three pole relay. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate SCR die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555
CE #EN60947-1

Part Number Example: CRTP600240D25

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
CRTP - SCR	1200480 1200 530 48 600240 600 280 24	D- Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	25 1.7 300 370 50 .4	See Page 20

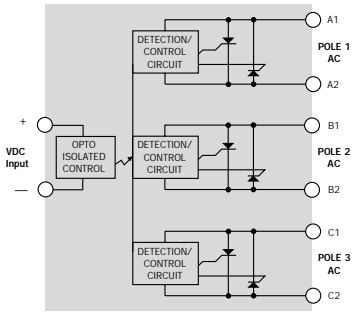
Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

Max Input Current 30ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

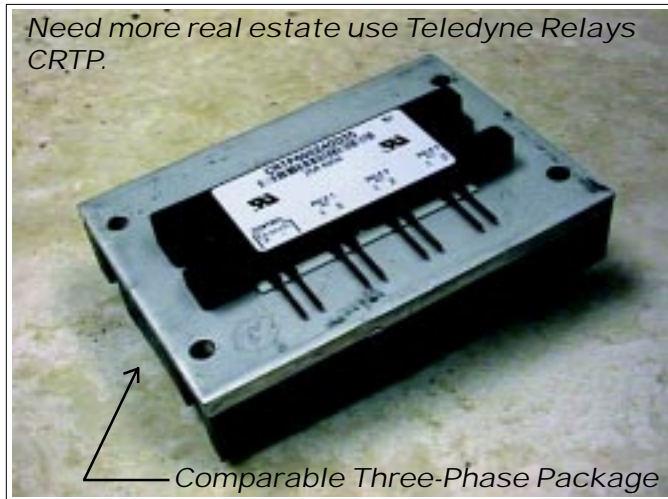
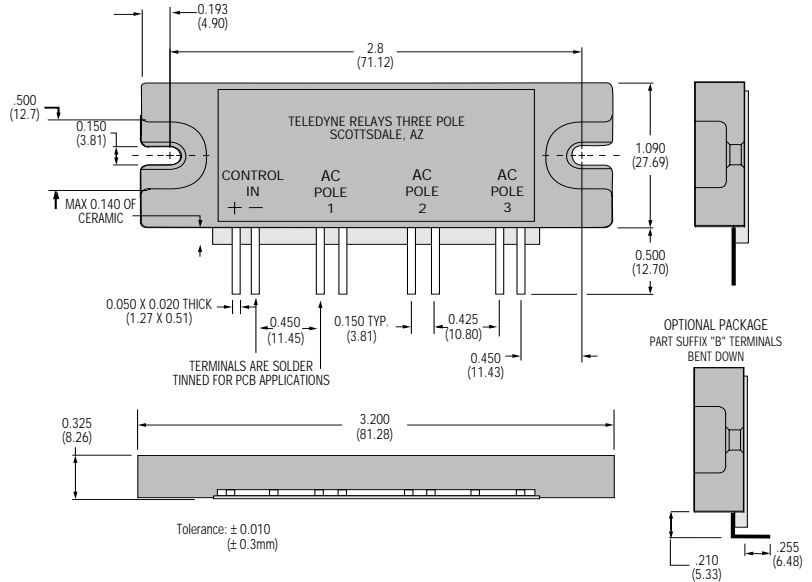
Max. On-State Voltage Drop @
Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W (one section on)

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Electrical Schematic



Dimensional Drawing



View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

Inquire about Teledyne Relays' exclusive EZmount™ and TransAX™ options.



Industrial Solid State Products Three Phase SCR output to 55 amps per phase

1-800-436-8766 <http://www.teledynereleys.com>

Providing the quality solid state relay solution.



General Information

TRTP is a compact package outline containing a three pole relay with faston connectors. It is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate SCR die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. Control status LED is standard.

UL & ULC Recognized
File E128555
CE #EN60947-1

Part Number Example: TRTP1200480A55

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
TRTP - SCR	1200480 1200 530 48 600240 600 280 24	A - AC** 90 90 280 2.5 10 8.3 D - Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	55 1.7 600 3000 110 .35	See Page 20

Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

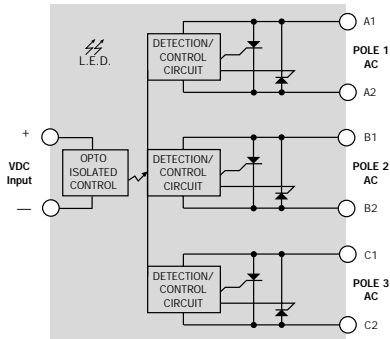
Max Input Current 30ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

Max. On-State Voltage Drop @ Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W (one section on)

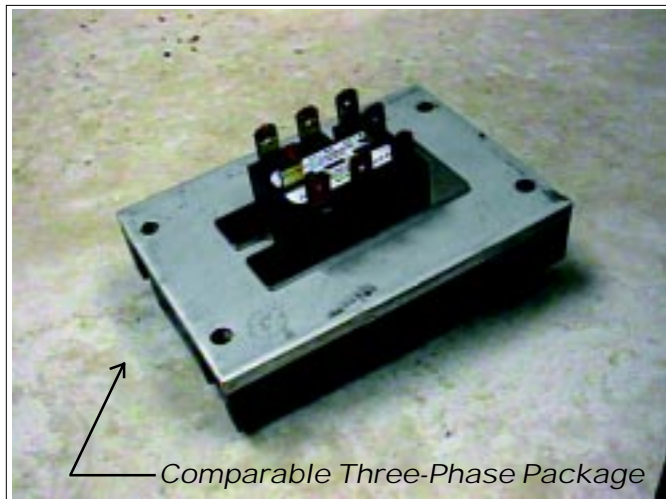
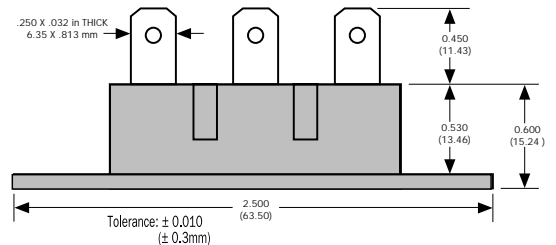
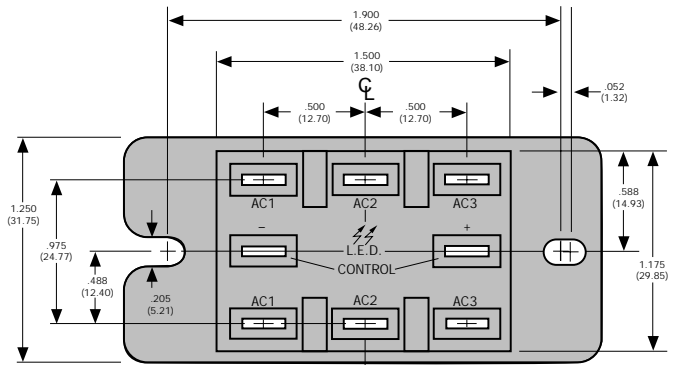
** Units are VAC where VDC is specified

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Electrical Schematic



Dimensional Drawing



View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

Inquire about Teledyne Relays' exclusive EZmount™ and TransAX™ options.



Providing the quality solid state relay solution.



General Information

EFRTIP is a high current heavy duty package outline containing a three pole relay. It is constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate SCR die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance. Control status LED is standard.

UL & ULC Recognized
File E128555
CE #EN60947-1

Part Number Example: EFRTIP1600660D150

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
EFRTIP - SCR	1600660 1600 660 60 1200480 1200 530 48 600240 600 280 24	A-AC** 90 90 280 2.5 10 8.3 D-Zero Cross*** 5 3 32 .25 1 8.3 -32 R-Random Cross**** 5 4 26 .25 1 .02 -32	150 1.7 1950 13500 1000 .25 55 1.7 600 3000 500 .35	See Page 20

Max. Transient Overvoltage VAC PEAK
Max. Line Voltage(VAC)
Min. Line Voltage (VAC)

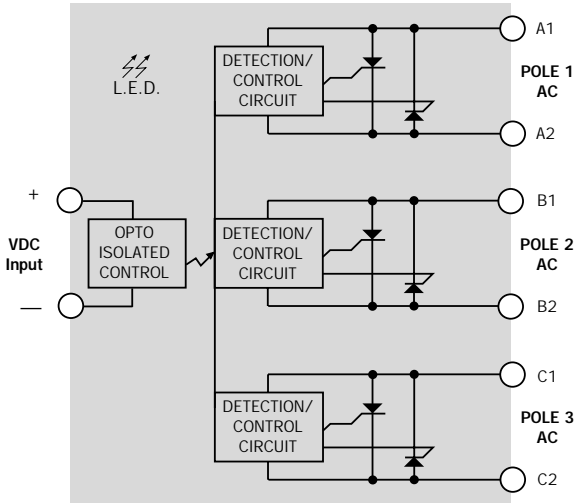
Max Input Current 30ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

Max. On-State Voltage Drop @ Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W (one section on)

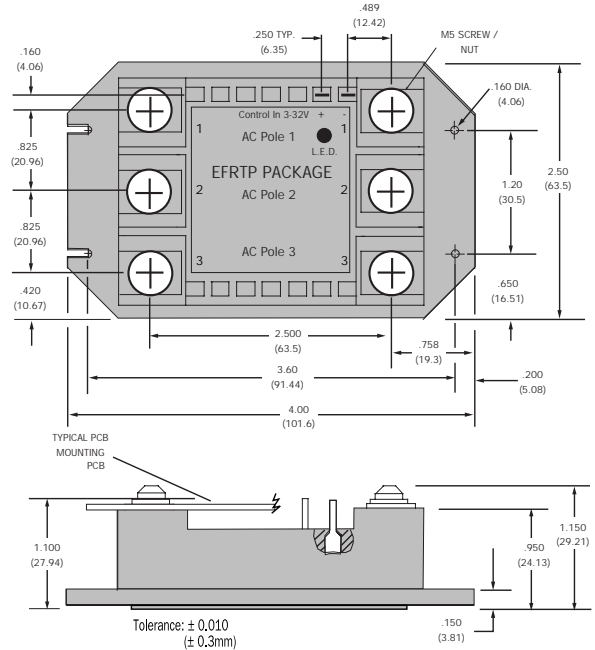
** Units are VAC where VDC is specified
*** 4.5 to 32 VDC for 1600 volt "D" type relays
**** 4.5 to 26 VDC for 1600 volt "R" type relays

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

Electrical Schematic



Dimensional Drawing



EFRTIP Series Facts:

150 Amps Per Phase.

660 Maximum Line Voltage.

View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

Inquire about Teledyne Relays' exclusive EZmount™ and TransAX™ options.



General Information

The SSRQT is an industry standard package outline containing four separate relays independently controlled. The SSRQT is constructed using the Powertherm™ process which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate triac die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. The base of the relays utilize exposed ceramic to provide the best thermal performance.

UL & ULC Recognized
File E128555
CE #EN60947-1

Part Number Example: SSRQT600240D20

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type	Step 4 Output Current Amps	Step 5 Options
SSRQT-Triac	600240 600 280 24	D- Zero Cross 5 3 32 .25 1 8.3 -32 R - Random Cross 5 4 26 .25 1 .02 -32	25 1.5 250 260 50 .6	See Page 20

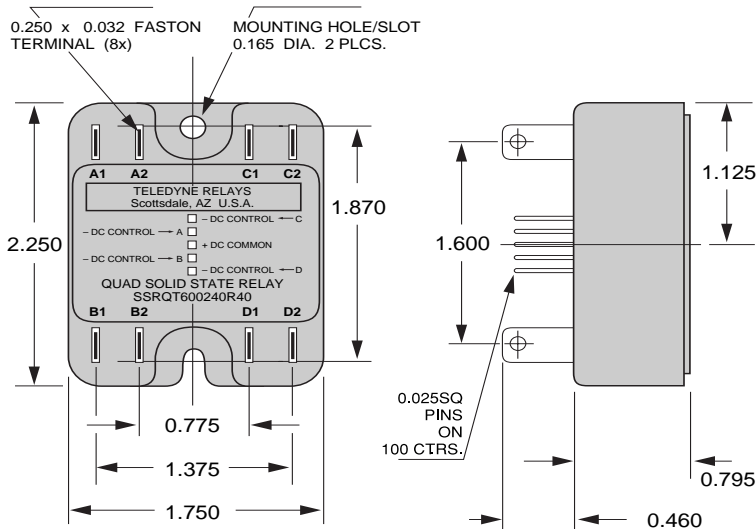
Max. Transient Overvoltage VAC PEAK
Max. Line Voltage (VAC)
Min. Line Voltage (VAC)

Max Input Current 15ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time - mS
Reverse Voltage - VDC

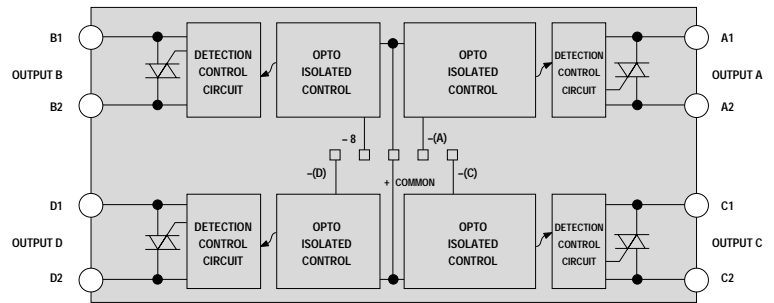
Max. On-State Voltage Drop @ Max. Rated Current - V
Max Single Cycle Surge Current
Max Fusing I²T Value (8.3 mS) - A² Sec.
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W

Isolation: 4000V Input to Output
Operating Temp. Range: -40°C to 125°C
dv/dt: 500V/μs Typical
Operating Frequency: 47 to 400 Hz
(For 400 Hz inductive load, contact factory)

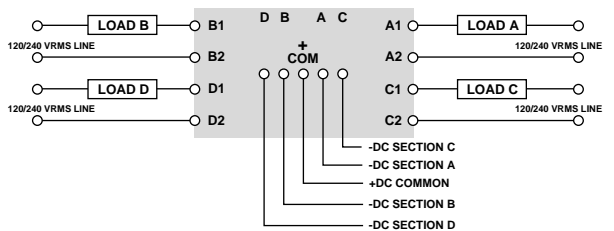
Dimensional Drawing



Electrical Schematic



TYPICAL WIRING DIAGRAM



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Inquire about Teledyne Relays' exclusive EZmount™ option.



Providing the quality solid state relay solution.



General Information

LRIGTA/D and LRMOSED is a small package outline containing a single relay. LRIGTA/D and LRMOSED are constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate **IGBT** die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555

Part Number Example: LRIGTA1200480R25-L

Part Number

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Line Rating	Step 3 Input Type Indicate High or Low by adding -L or -H before options	Step 4 Output Current Amps	Step 5 Options
LRIGTA-AC Out	1200480* 1200 480 48 600240 600 240 24	A - AC* 240** 90 280 1 10 4.8 R - Random Low 5 3.5 15 1 2 4.8 -32 R - Random High 15 15 32 1 2 4.8 -32	25 2.5 240 110 .5	See Page 20

Max. Transient Overvoltage VDC (VAC Peak for LRIGTA)
Max. Line Voltage(VDC)
Min. Line Voltage (VDC)

Max Input Current 30ma @ - VDC
Min. Input Voltage - VDC
Max. Input Voltage - VDC
Min. Turn Off Current - mA DC
Min. Turn Off Voltage - VDC
Max. Turn On Time @ 5.0 VDC (9A Load Current)- mS
Reverse Voltage - VDC

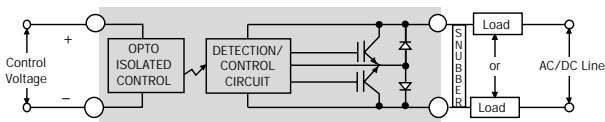
Max. On-State Voltage Drop @ Max. Rated Current - V
Pulsed Current - A
Max. Power Dissipation (T_c=85°C) - W
Max. Thermal Resistance J_c - °C/W

* Units are VAC where VDC is specified. AC Input is only available on LRIGTA 600240's or LRIGTD 600240's.
** Max Input Current 100ma @ - VDC

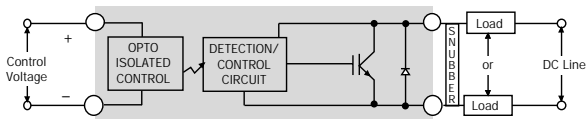
Isolation: 2500V Input to Output dv/dt: 500V/μs Typical
Operating Temp. Range: -40°C to 125°C Operating Frequency: 0 to 75 Hz

Electrical Schematics

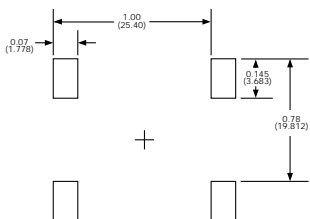
LRIGTA Series



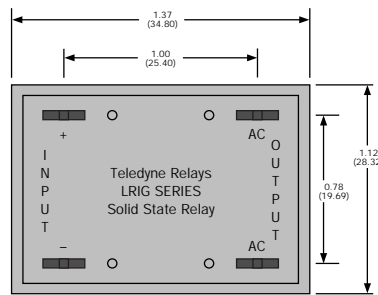
LRIGTD Series



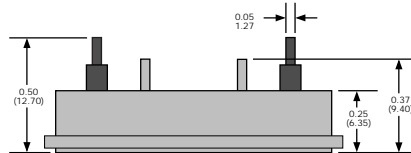
RECOMMENDED PAD SPACING FOR SURFACE MOUNT



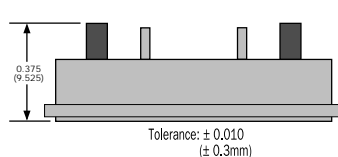
Dimensional Drawing



PC MOUNT



SURFACE MOUNT



Tolerance: ± 0.010 (± 0.3mm)

View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

*Add -008 to Suffix of Part Number. For surface mounting option.

Inquire about Teledyne Relays' exclusive EZmount™ option.



General Information

LRIGTA/D and LRMOSD is a small package outline containing a single relay. LRIGTA/D and LRMOSD are constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate MOSFET die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

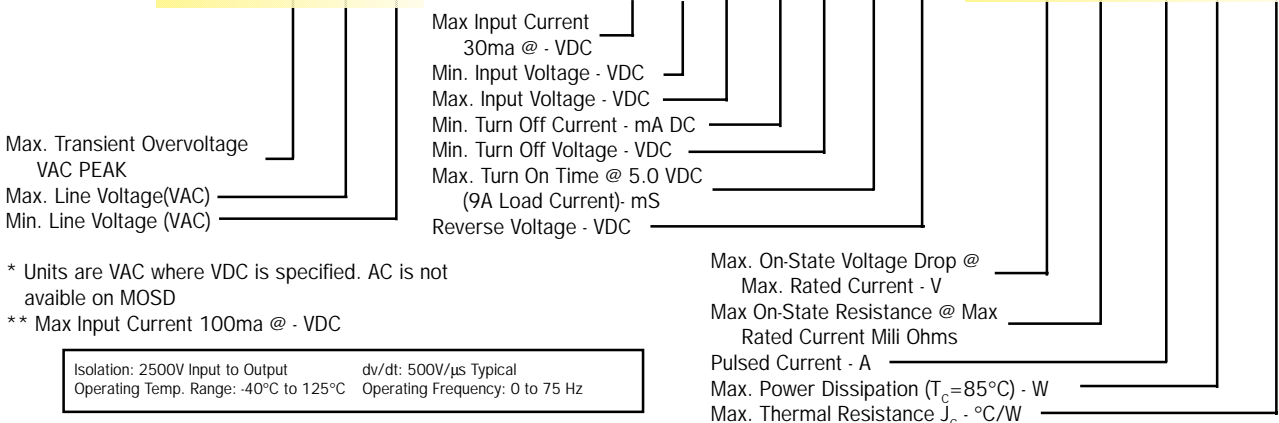
UL & ULC Recognized File E128555



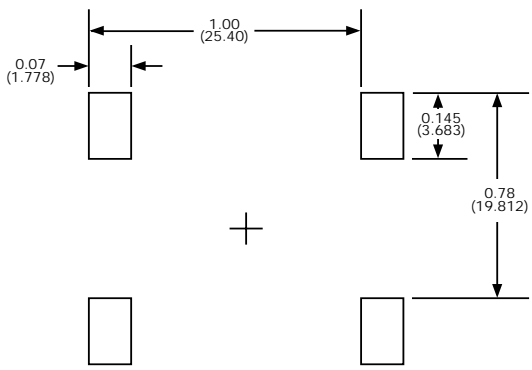
Part Number

Part Number Example: LRMOSD50-50R25-H

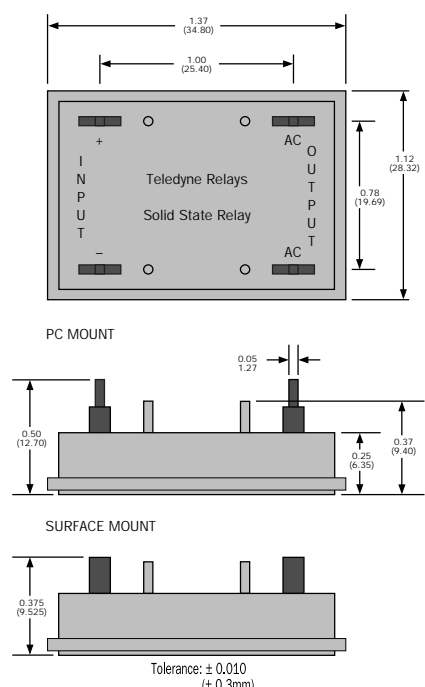
Table with 5 columns: Step 1 Package and Chip Type, Step 2 Maximum Blocking Voltage (piv) / Line Rating, Step 3 Input Type, Step 4 Output Current Amps, Step 5 Options. Includes part numbers like LRMOSD-DC Out and various voltage/current ratings.



RECOMMENDED PAD SPACING FOR SURFACE MOUNT

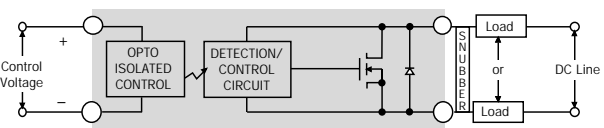


Dimensional Drawing



View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ http://www.teledynereleys.com

Electrical Schematic LRMOSD Series



Inquire about Teledyne Relays' exclusive EZmount™ option.



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General Information

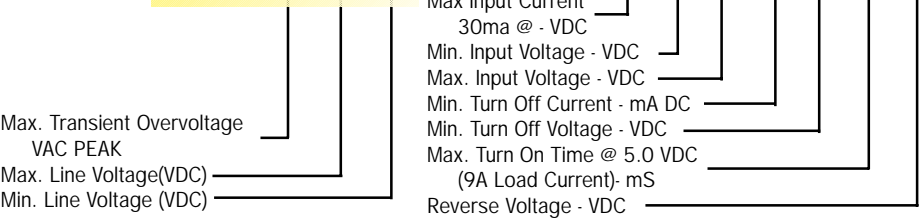
IGTA/D is an industry standard package outline containing a single relay. The IGTA/D are constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate IGBT die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555

Part Number

Part Number Example: IGTD1200480A50

Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type Indicate High or Low by adding -L or -H before options	Step 4 Output Current Amps	Step 5 Options
IGTA-AC Out*	1200480 1200 480 48 600240 600 240 24	A - AC* Low 140** 90 140 1 10 4.8 A - AC* High 280** 140 280 1 10 4.8	100 2.5 480 500 .2 75 2.5 480 500 .2 50 2.5 240 175 .33 25 2.5 190 110 .5	See Page 20
IGTD-DC Out	1200480 1200 800 48 600240 600 400 24	R - Random Low 5 3.5 15 1 2 4.8 -32 R - Random High 15 15 32 1 2 4.8 -32		



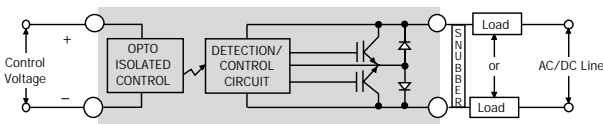
* Units are VAC where VDC is specified.
** Max Input Current 100ma @ - VAC Input

Isolation: 2500V Input to Output
Min. Load Current @ 85°C: 1.5 Amps
Operating Temp. Range: -40°C to 125°C

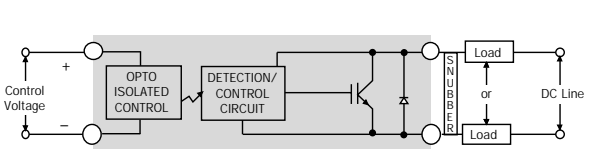
dv/dt: 500V/μs Typical
Operating Frequency: 0 to 75 Hz

Electrical Schematics

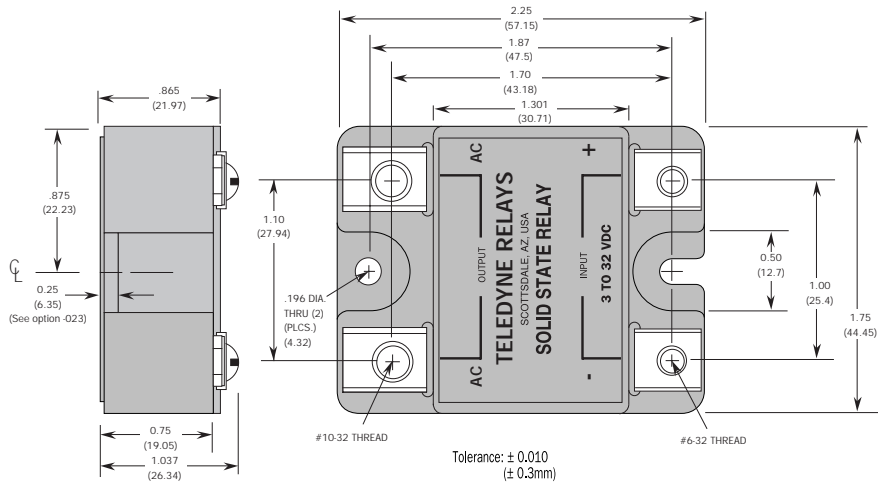
IGTA Series



IGTD Series



Dimensional Drawing



View the world wide web site: spec sheets, distributor stock, catalog request and order placement! Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

Inquire about Teledyne Relays' exclusive EZmount™ option.



General Information

MOSD is an industry standard package outline containing a single relay. The MOSD are constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate MOSFET die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555



Part Number

Part Number Example: MOSD505R100-H

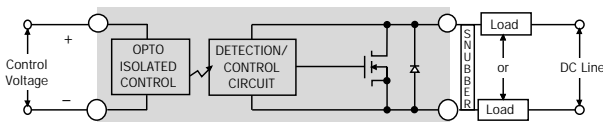
Step 1 Package and Chip Type	Step 2 Maximum Blocking Voltage (piv) / Line Rating	Step 3 Input Type Indicate High or Low by adding -L or -H before options	Step 4 Output Current Amps	Step 5 Options
MOSD-DC Out	5050 50 50 100100 100 100 200200 200 200	R - Random Low 5 3.5 15 1 2 .16 -.32 R - Random High 15 15 32 1 2 .16 -.32	Load Voltage 50V 50 28 200 500 .33 100V 100 10 300 500 .33 200V 200 5 600 500 .33 300V 300 3 400 500 .33 400V 400 2 300 500 .33	See Page 20
Max. Transient Overvoltage VDC		Max Input Current 30ma @ - VDC		
Max. Line Voltage(VDC)		Min. Input Voltage - VDC		
		Max. Input Voltage - VDC		
		Min. Turn Off Current - mA DC		
		Min. Turn Off Voltage - VDC		
		Max. Turn On Time @ 5.0 VDC (9A Load Current)- mS		
		Reverse Voltage - VDC		
		Max On-State Resistance @ Max Rated Current Milli Ohms		
		Pulsed Current - A		
		Max. Power Dissipation (T _c =85°C) - W		
		Max. Thermal Resistance J _c - °C/W		

Isolation: 2500V Input to Output
Min. Load Current @ 85°C: 1.5 Amps
Operating Temp. Range: -40°C to 125°C

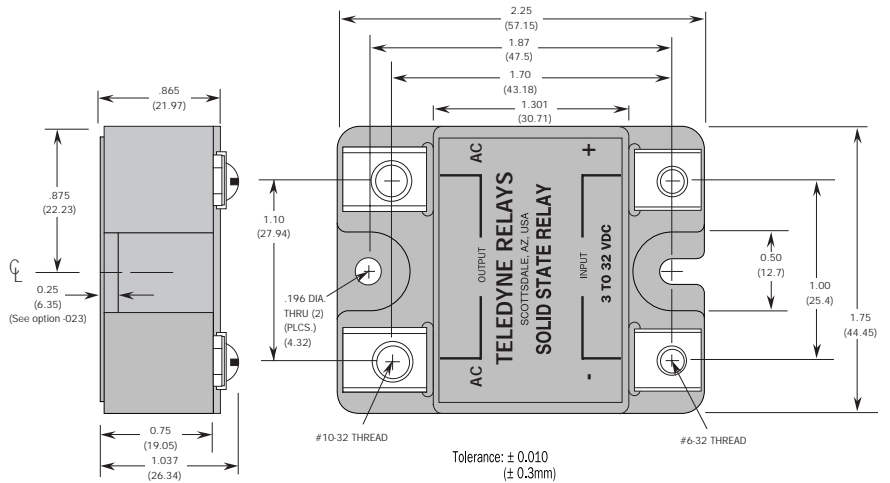
dv/dt: 500V/μs Typical
Operating Frequency: 0 to 75 Hz

Electrical Schematic

MOSD Series



Dimensional Drawing



View the world wide web site: spec sheets, distributor stock, catalog request and order placement! Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

Inquire about Teledyne Relays' exclusive EZmount™ option.



General Information

IGFA/D is an industry standard package outline containing a fast switching single relay. IGFA/D are constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate **IGBT** die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized
File E128555

Part Number

Part Number Example: IGFA1200480R50-L

Step 1 Package and Output Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type Indicate High or Low by adding -L or -H before options	Step 4 Output Current Amps	Step 5 Options See Page 20
IGFA-AC Out	1200480 1000 530 48	R - Random Low 5 3.5 15 .75 4 4 -32	100 2.5 480 500 .2	
IGFD-DC Out	600240 500 330 24	R - Random High 15 15 32 .75 4 4 -32	75 2.5 380 262 .25	
			50 2.5 240 175 .33	
			25 2.5 190 110 .5	

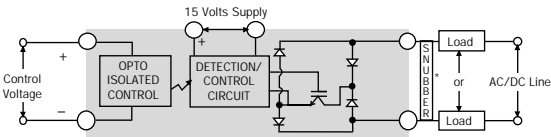
Max. Transient Overvoltage VAC PEAK	Max. Input Current 15ma @ - VDC	Max. On-State Voltage Drop @ Max. Rated Current - V
Max. Line Voltage(VDC)	Min. Input Voltage - VDC	Pulsed Current - A*
Min. Line Voltage (VDC)	Max. Input Voltage - VDC	Max. Power Dissipation (T _c =85°C) - W
	Min. Turn Off Current - mA DC	Max. Thermal Resistance J _c - °C/W
	Max. Turn On Time - μS	
	Max. Turn Off Time - μS	
	Reverse Voltage - VDC	

Isolation: 2500V Input to Output dv/dt: 500V/μs Typical
 Operating Temp. Range: -40°C to 125°C Operating Frequency: 0 to 20,000 Hz
 When used in multiple configuration -025 option must be used. Consult factory.

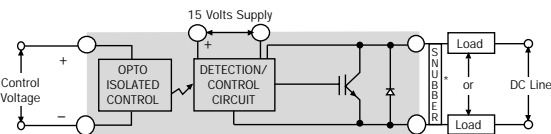
* For IGFD Decrease number by 20%

Electrical Schematics

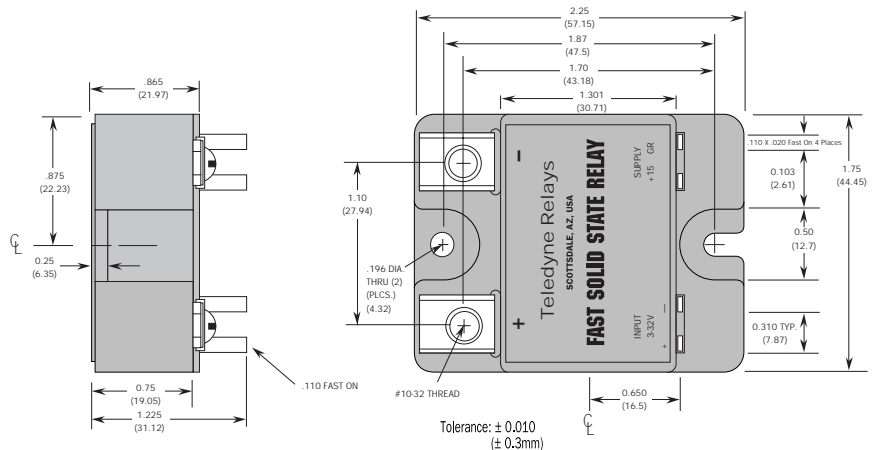
IGFA Series



IGFD Series



Dimensional Drawing



View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>

Inquire about Teledyne Relays' exclusive EZmount™ option.



Industrial Solid State Products Fast Turn-on Single Mosfet output to 200 amps

1-800-436-8766 <http://www.teledynereleys.com>

Providing the quality solid state relay solution.

General Information

MOSFD is an industry standard package outline containing a fast switching single relay. MOSFD are constructed using either the Powertherm™ or FusedCopper™ processes which minimizes thermal interconnections, allowing for cool and reliable operation. Power sections incorporate MOSFET die. The logic section uses the latest in surface mount technology. The shell is made of a high grade stable plastic material insuring protection of the device in demanding environments. An exposed ceramic makes up the base of the relays to provide the best thermal performance.

UL & ULC Recognized File E128555



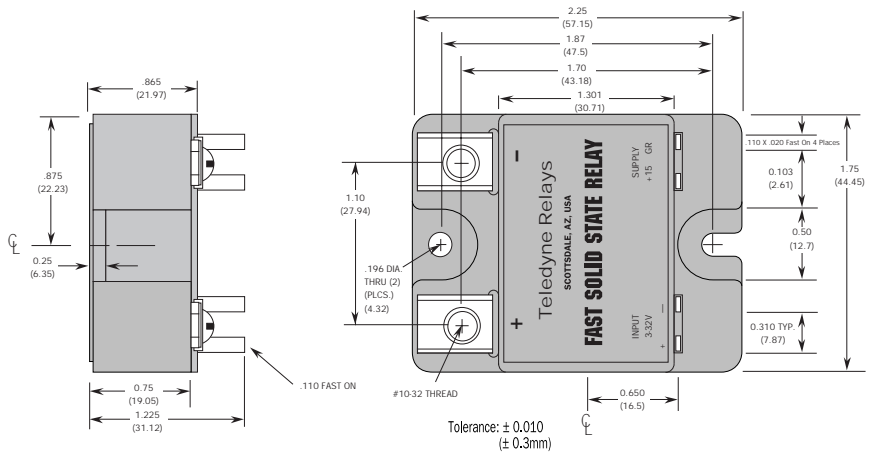
Part Number

Part Number Example: MOSFD100100R40-L

Step 1 Package and Output Type	Step 2 Maximum Blocking Voltage (piv) / Nominal Line Rating	Step 3 Input Type Indicate High or Low by adding -L or -H before options	Step 4 Output Current Amps	Step 5 Options
MOSFD-DC Out	5050 50 50 100100 100 100 200200 200 200	R - Random Low 5 3.5 15 .75 4 4 -32 R - Random High 15 15 32 .75 4 4 -32	Load Voltage 50v 50 28 200 500 .33 100 10 300 500 .33 200 5 600 500 .33 100v 40 60 160 500 .33 80 30 300 500 .33 200v 30 90 120 500 .33 60 45 200 500 .33	See Page 20

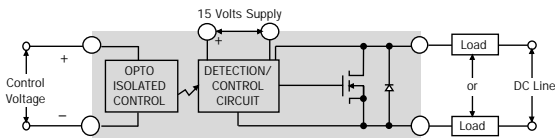
Isolation: 2000V Input to Output dv/dt: 500V/μs Typical
Operating Temp. Range: -40°C to 125°C Operating Frequency: 0 to 20,000 Hz
When used in multiple configuration -025 option must be used. Consult factory.

Dimensional Drawing



Electrical Schematic

MOSFD Series



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Inquire about Teledyne Relays' exclusive EZmount™ option.



Options

See Series Availability Chart Page 21

<u>OPTION</u>	<u>FEATURE</u>	<u>DESCRIPTION/BENEFIT</u>
-002	Control Status LED	Provides visual indication of control signal
-006	Faston Terminals	Substitutes screw type terminals with .250 quick connect terminals
-007	-65°C Operation	
-008	Surface Mount Terminals	Substitutes PCB type terminals with surface mount terminals
-009	Thermal Sensor	Facilitates thermal management evaluation for new designs
-010	#8-32 Load Terminal Hardware	Substitutes standard #10-32 load terminal Hardware with #8-32 hardware
-011	Terminal Extenders	Facilitates mounting PCB's (such as proportional control circuits) to output terminals
-012	EZ Mount™	Thermal conductive pad that eases mounting by eliminating the need for messy thermal grease
-014	Plastic Cover	Safety cover for "Hockey Puck" packaged relays
-015	Output snubber	
-016	MOV	Internal MOV for transient protection
-021	TransAx™	The ultimate transient protection (see complete description on page 24; see data pages 3 and 4 for specific applications information for those series)
-022	24VAC Control	Substitutes 90 to 280 VAC control with 24 VAC control -Maximum Input Current is 30 mA at 24 VAC
-023	Mounting Flange	height 0.1 inch
-025	Cascading PCB	Provides isolation of common 15 volt supply voltage between relays hooked up in multiple configurations (required for multiple hook-up of series IGFD, IGFA and MOSFD only.)
-026	Non-Floating Output Terminals	

Option -006 Faston Connector



Option -011 Screw Terminal Extender



Option -014 Plastic Cover



View the world wide web site: spec sheets, distributor stock, catalog request and order placement. Find out about the latest in solid state relay technology @ <http://www.teledynereleys.com>



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Providing the quality solid state relay solution.

Series Availability Chart

OPTION SERIES	-002	-006	-007	-008	-009	-010	-011	-012	-014	-015	-016	-021	-022	-023	-025	-026
LR				✓	✓						✓	*✓	✓			
LRT				✓	✓						✓		✓			
BR				✓	✓			✓			✓	*✓	✓			
BRT				✓	✓			✓			✓		✓			
SSR	✓	✓	✓	✓	✓	✓	✓	✓	✓	S	✓	✓	✓	✓		✓
SSRT	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
EFR	✓			✓						S	✓		✓			✓
DRDT				✓												
CRD				✓								✓				
BRD				✓				✓			✓					
SSRD	✓			✓				✓		S	✓	✓				
EFRD				✓						S	✓	✓	✓			✓
CRTP				✓								✓				
TRTP	✓			✓				✓					✓			
EF RTP	✓			✓						✓	✓		✓			✓
SSRQT								✓								
LRIGTA				✓												
LRIGTD				✓												
LRMOSD				✓												
IGTA		✓	✓			✓	✓	✓	✓	✓	✓					✓
IGTD		✓	✓			✓	✓	✓	✓	✓	✓					✓
MOSD		✓	✓			✓	✓	✓	✓	✓	✓					✓
IGFA		✓	✓			✓	✓	✓		✓	✓				✓	✓
IGFD		✓	✓			✓	✓	✓		✓	✓				✓	✓
MOSFD		✓	✓			✓	✓	✓		✓	✓				✓	✓

✓ = Option available for series shown

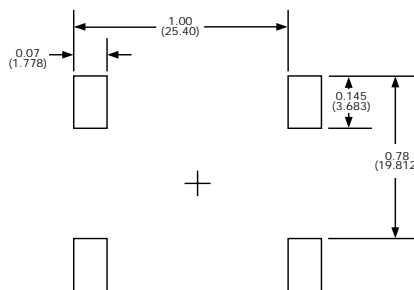
* = See data sheet pages 3 and 4 for specific applications information for LR and BR series.

S = Snubber supplied as standard for series shown

Option -008 Surface Mount Spacing for LR Package

Surface mount spacing diagrams for other packages available from factory.

RECOMMENDED PAD SPACING FOR SURFACE MOUNT



Option -012 EZMount™

The new exclusive Teledyne product called EZmount. It is a replacement of the thermal compound or typically called thermal grease. EZmount is a thermal conductive pad which is attached at the factory. When the user is ready to mount the relay just place the relay onto the heat sink and mount with recommended hardware.

Features:

- Easy Handling.
- Clean.
- Excellent thermal characteristics.

Benefits:

- No mess of thermal compound/grease.
- Less prone to operator error.
- Cost savings.



Option -021 TransAX™

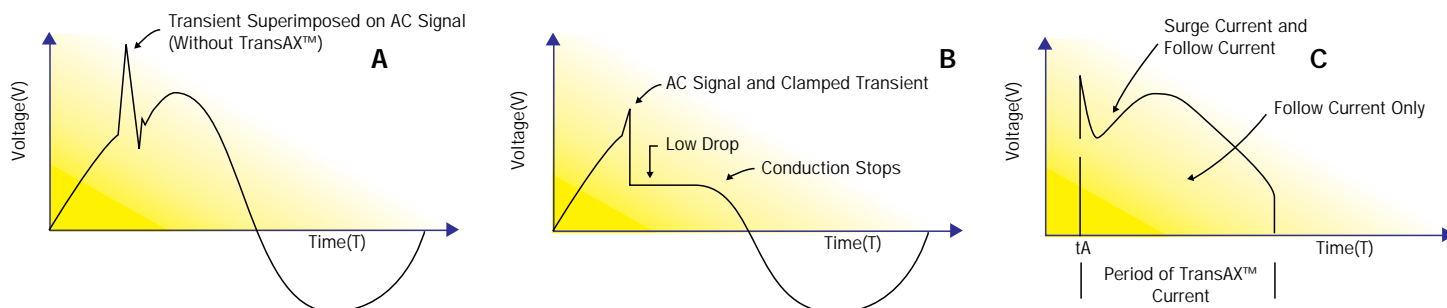
Teledyne Relays' TransAX™ provides a unique, innovative solution for managing transient energy. Historically, RC Networks and MOV Suppressors are the most common methods used to manage this problem. The RC Network is used to alter the shape of the transient wave. However, it is of little benefit in providing high voltage protection to active semiconductor components. When MOV Suppressors are used as a method of blocking transient voltages, they are effective against moderate transients. However, transients having a fast rate of rise often are not clamped by the inherently slow MOV.

Teledyne Relays' new TransAX™ option eliminates these shortcomings. TransAX™ is an active circuit that can quickly switch repetitive transient energy harmlessly through the solid state relay.

Electrical Specifications

Line Voltage (Volts)	120	240	440	660
Trip Peak Voltages +/-10%	300	600	1000	1300
Absorption Before Trip/Typical (Joules)		10		
Pass Through Energy @ Trip / 8.3 mS (Amps)	300	600	1200	2000
Recovery Time Between Max. Activations (Seconds)		1		
Maximum Applied Transient Voltage (Volts)		6,000		
Operating Temperature Range (°C)		-55 TO 125		

Teledyne has the entire product line on CD-ROM. It includes a full video demonstration of the EZmount™ & TransAX™ options. Request one today.



Appearance of follow-on current. Without surge protection, a transient appearin within the first 8.3 ms or first half-cycle of the 60 Hz sine wave can disrupt the signal (a). With TransAX™ protection this spike is clamped (b), and the conduction stops near zero crossing point. Then follow-on current (c) begins after the large spike of transient current passes through the TransAX™.

Mounting and Static Handling

STATIC HANDLING AND TESTING TECHNIQUES FOR MOS DEVICES

Caution must be used when handling and testing MOS devices. Standard procedure should include the following techniques in order to avoid possible static damage: • Store MOS modules in conductive carbon or nickel shipping bags, conductive foam, or conductive tote. • The person handling the modules should be grounded by the use of a .5 to 1M ohm wrist strap. • All work stations should have grounded conductive mats over non-conducting surfaces. • All conductive surfaces and equipment must be connected to earth ground. • Rubber gloves and clothing that do not generate static are recommended to be worn by any person handling parts. • All modules should be handled by the package, and not by the leads. • Relative room humidity should be kept between 45% and 60% as static generation increases exponentially as humidity decreases. •

WARNING: Failure to follow these instructions may result in operational malfunctions and destruction of the devices and will void warranty.

MOUNTING REQUIREMENTS AND RECOMMENDATIONS These modules must be mounted to a heatsink (copper or aluminum) which is sufficient to maintain the module base temperature at less than 85°C for full rated current, for SCR type & 25° C for MOSFET & IGBT type. The heatsink mounting surface should be smooth (30-60 micro-inch finish) and flat (30-40 micro-inch flatness in seating area). There are two methods currently available for heat extraction interface between the mounting surface and relay. The first method is a new exclusive Teledyne product called "EZmount". EZmount is a thermal conductive pad which is attached at the factory. When the user is ready to mount the relay clean the heatsink surface and peel off adhesive backing. Press unit firmly on heatsink and mount with recommended hardware.

The second method involves the use of thermal compound. The heatsink and module mounting surface should be cleaned with an alcohol or toluene wipe to remove all foreign material. Apply an even coating of thermal compound (Dow Corning DC340 recommended) to both the heatsink and module mounting surfaces. The thermal compound should be ideally 0.002" per each surface to eliminate all air pockets. (This may be verified by mounting and then removing a module. When removed, the module & heatsink should be covered with the compound. The compound on both parts will appear textured as if a vacuum has created vein like ridges when the parts are separated.)

- DR & CR Series: Mount using two #6 size screws with flat washers (0.281" OD, 0.142" ID, 0.20" Thickness) and compression washers (available from Solon Mfg. Co., part no. 06-L-21). Clamp to 4 in-lb. Torque by tightening screws in a staggered fashion one quarter turn at a time.
- TR, BR, SSR, IGT, MOS, IGF, & MOSF. Series: Mount using two #10 size screws with flat washers (0.406" OD, 0.196" ID, 0.31" Thickness) and compression washers (available from Solon Mfg. Co., part no. 010-L-31). Clamp to 10 in-lb. Torque by tightening screws in a staggered fashion one quarter turn at a time.
- EFR Series: Mount using four #6 size screws with flat washers (0.281" OD, 0.142" ID, 0.20" Thickness) and compression washers (available from Solon Mfg. Co., part no. 06-L-21). Clamp to 6 in-lb. Torque by tightening screws in a staggered fashion one quarter turn at a time.
- SSRD & SSRO Series: Mount using two #8 size screws with flat washers (0.406" OD, 0.168" ID, 0.31" Thickness) and compression washers (available from Solon Mfg. Co., part no. 08-M-31). Clamp to 7 in-lb. Torque by tightening screws in a staggered fashion one quarter turn at a time.

All dimensions noted in catalog have a tolerance of +/- .010 unless otherwise noted.

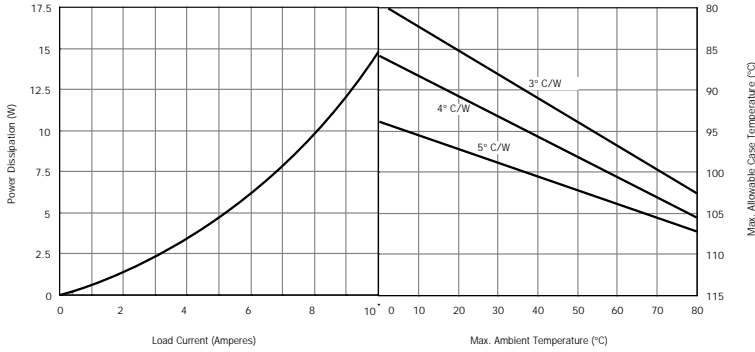
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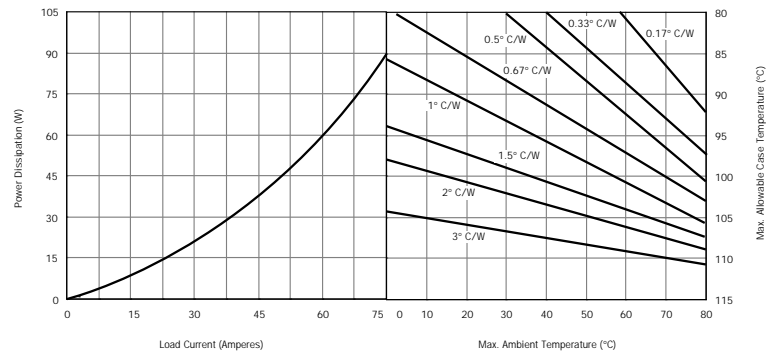
Heatsink Curves SCR and Triac

Single Output Relays

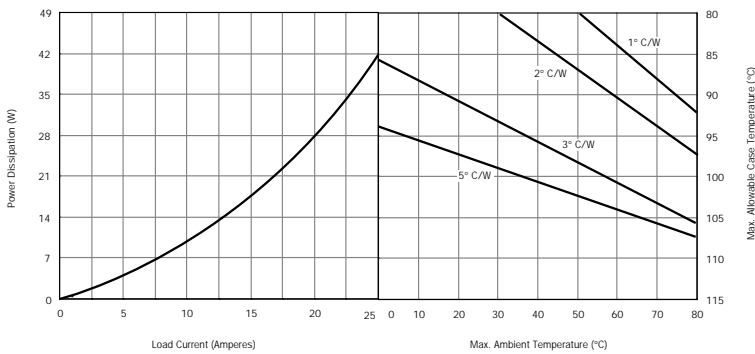
10 Amps



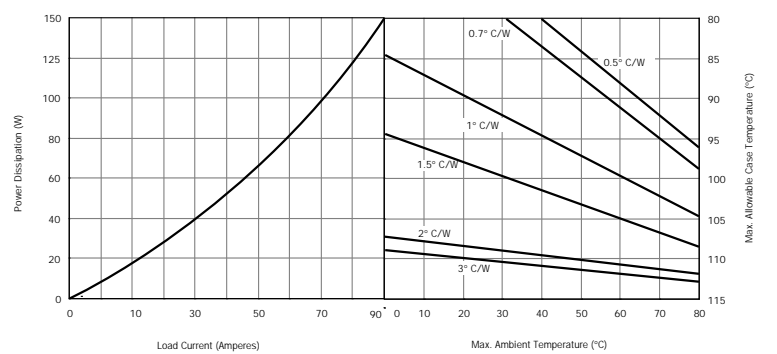
75 Amps



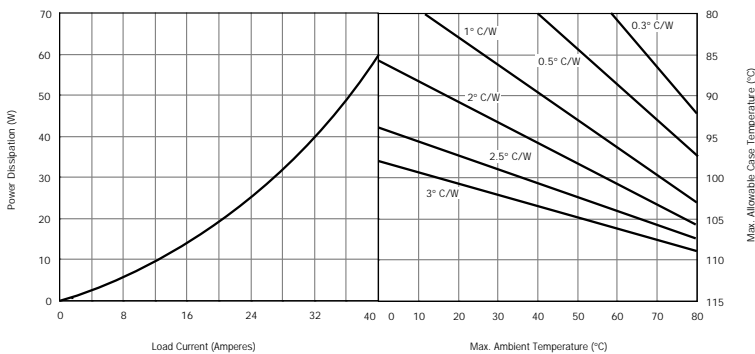
25 Amps



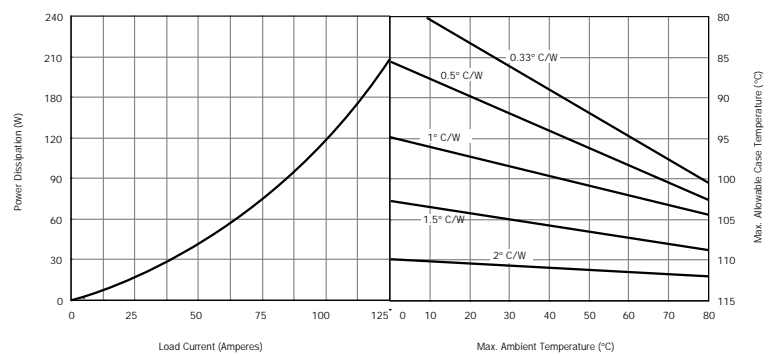
85 Amps



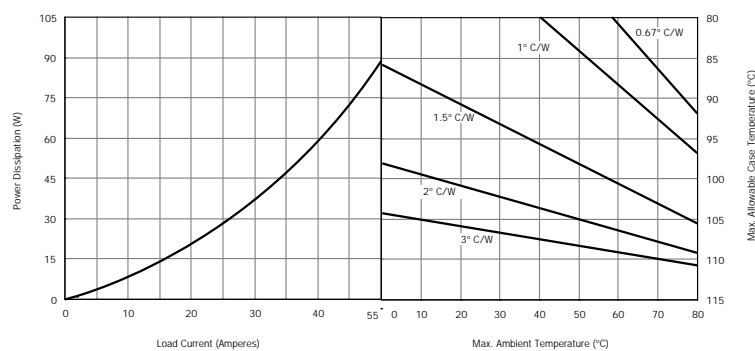
40 Amps



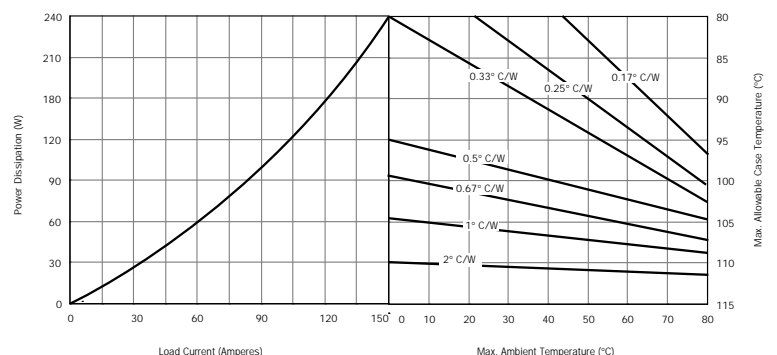
125 Amps



55 Amps



150 Amps

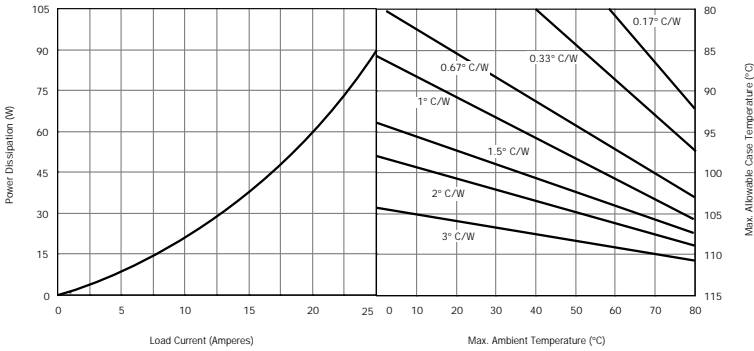




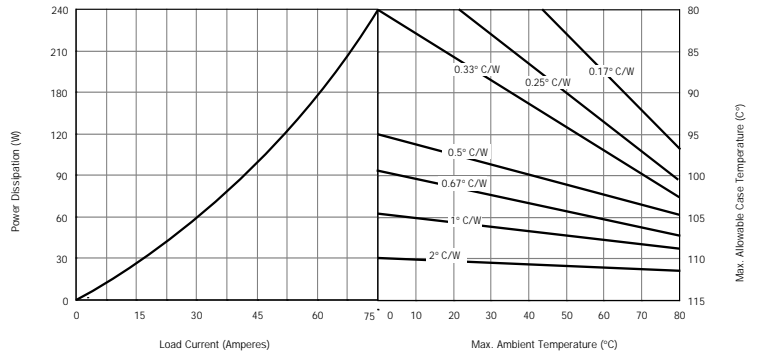
Heatsink Curves IGBT and MOSFET

Single Output Relays

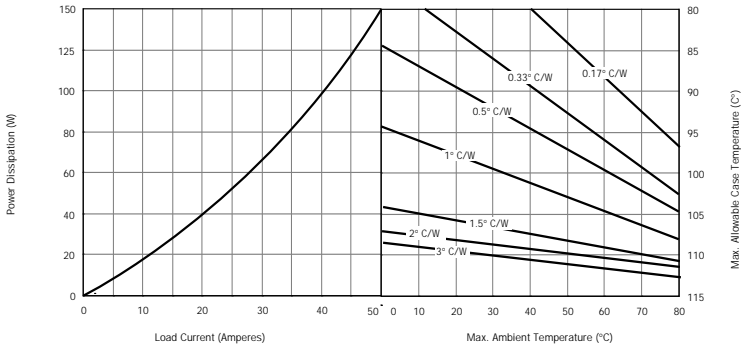
25 Amps



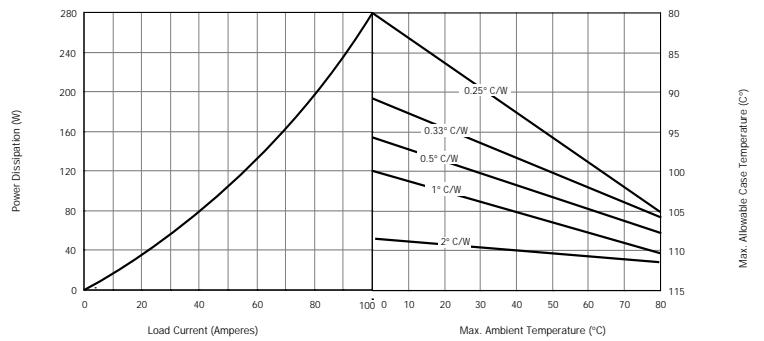
75 Amps



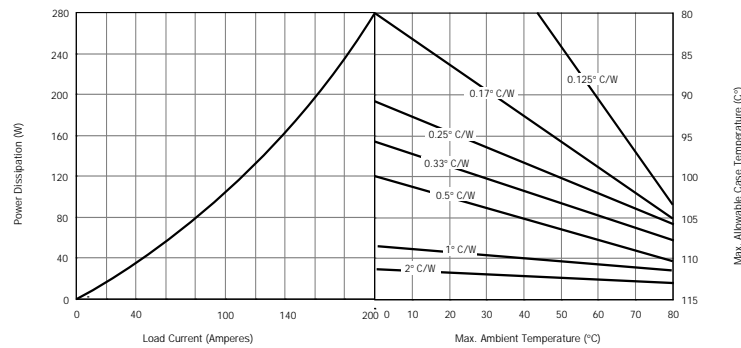
50 Amps



100 Amps



200 Amps

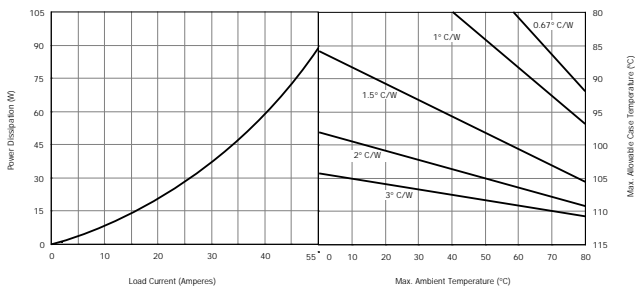




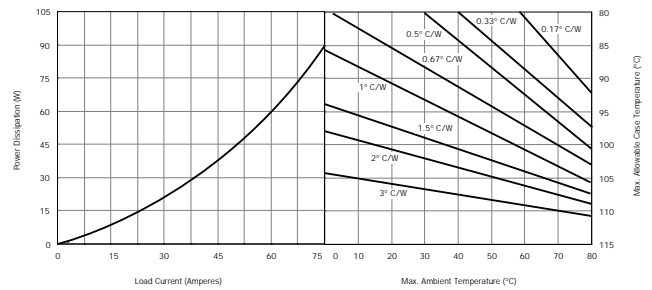
Heatsink Curves SCR and Triac

Dual Output Relays

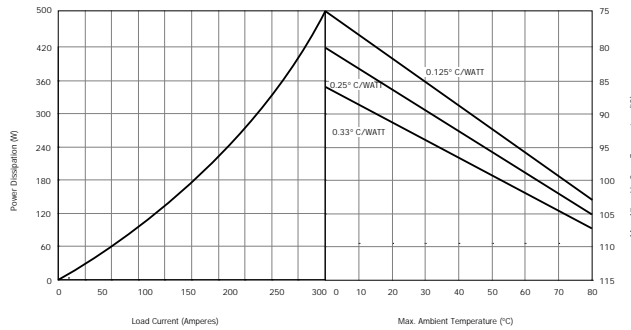
25 Amps each pole



40 Amps each pole



150 Amps each pole

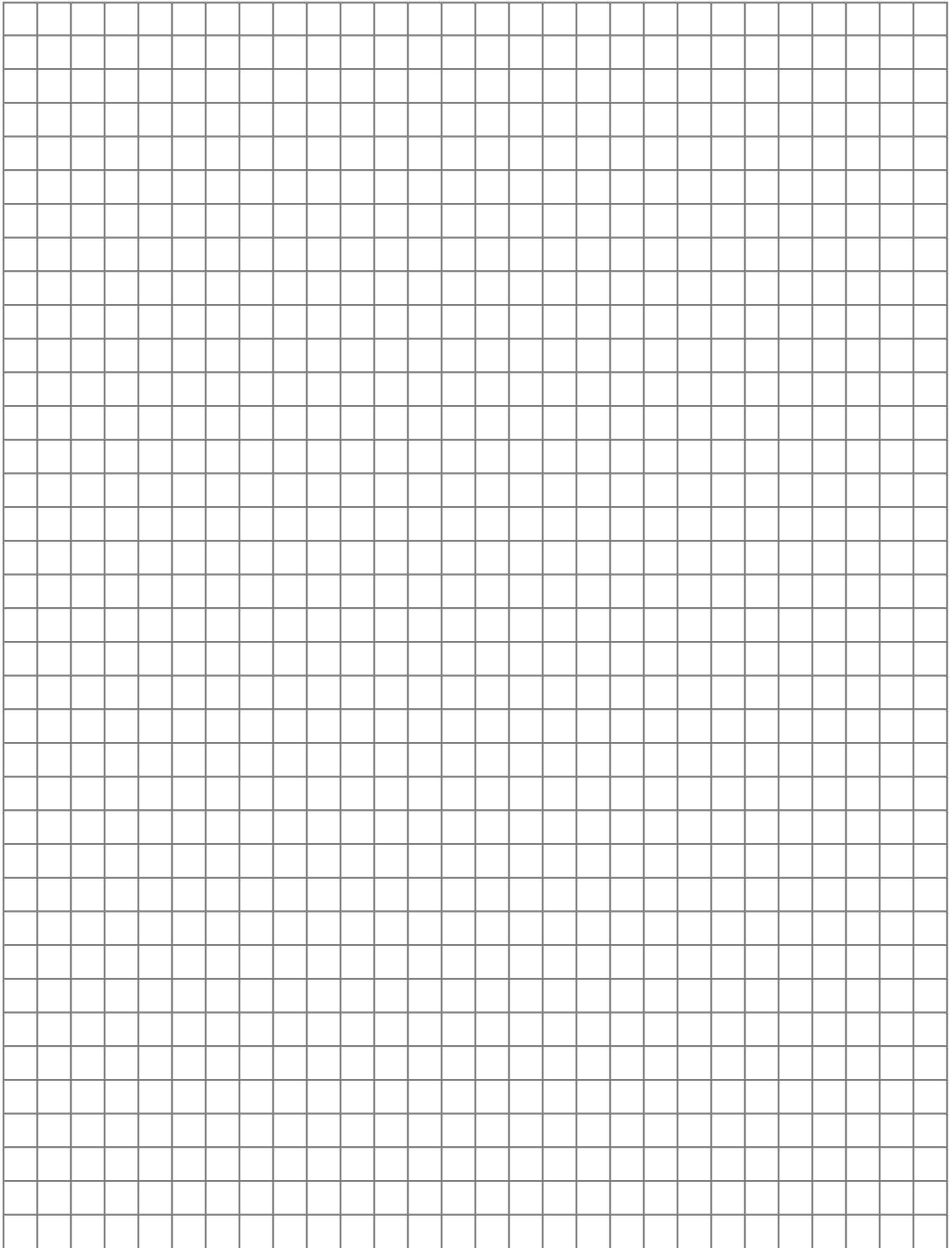


NOTE: For Three Phase and Quad output relays, consult factory

CSA	Canadian Standards Association. Canadian regulatory agency for electrical equipment.
Current, Bias	The current drawn by the input bias circuit of the SSR in both the quiescent and active state. It is specified at the rated voltage within the bias voltage range.
Current, Input (Or Control)	The current drawn by the input (control) circuit of the SSR at a specified voltage within the input voltage range.
Current, Leakage	The current that flows through the load when the relay is in the off-state.
Current, Repetitive Overload	The maximum allowable repetitive RMS overload current that may be applied to the output for a specific duration and duty cycle while still maintaining output control.
Current, Output (Or Load) Rating	The maximum steady state load current rating at 25°C. For SSR package configurations designed expressly for PC Board mounting, this rating refers to free air mounting on a PC Board without external heat sinking. For package configurations designed for mounting to a panel, chassis, or other heat sinking surface this rating is qualified by specifying a required minimum heat sink surface area or heat sink thermal resistance.
Current, Surge Rating	The maximum non-repetitive surge (or overload) current for a specified duration that the SSR can safely withstand without causing permanent damage or degradation to the output switching device.
Dielectric Strength	The breakdown voltage rating, expressed in VRMS, between input and output terminals. Sometimes referred to as "Isolation Voltage."
DIP	Dual inline package.
EMI	Electro-magnetic interference.
FCC	Federal Communication Commission
Isolation	The resistance measured at 500 V dc between input and output terminals. Sometimes referred to as "Insulation Resistance."
MOV	Metal Oxide Varistor. Used for transient suppression.
Off-State dv/dt	The rate of rise of voltage, expressed in volts per microsecond (V/μs), that the SSR output switching device can withstand without turning on.
Over-Voltage Rating	The guaranteed transient peak blocking (or breakdown) voltage rating of the SSR.
Power Dissipation, P_D	The maximum power dissipated by the SSR for a given load current.
Relay, Solid State (SSR)	A relay with isolated input and output whose functions are achieved by means of electronic components without moving parts.
Relay, Zero-Voltage Turn On	A relay with isolated input and output in which added control circuitry delays the output turn-on until a zero-voltage transition of the AC sine wave is detected.
Resistance, On-State, R_{ds} (ON)	In a Power-FET relay this is the intrinsic resistance of the output circuit in the on state.
SCR	Silicon Controlled Rectifier.

Temperature Case, T_C	The temperature at a specified point on the relay which is used to evaluate the current capabilities of the relay.
Temperature, Maximum Junction, $T_{J(max)}$	The maximum junction temperature of the output switching semiconductor(s) expressed in °C.
Temperature, Operating	That ambient temperature range over which operation is specified with relays unmounted or mounted to a heat sink as specified.
Temperature, Storage	That ambient temperature range to which a non-operating relay may be subjected without permanent electrical or mechanical damage.
Time, Delay, t_d	The time from the application of control voltage to the 10% point of the output change of state waveform.
Time, Fall, t_f	The time from the 90% and 10% points on the switching waveform.
Time, Rise, t_r	The time from the 10% and 90% points on the switching waveform.
Time, Storage, t_s	The time from the removal of control voltage to the 10% point of the output change of state waveform.
Time, Turn-Off	The sum of storage time and fall time.
Time, Turn-On	The sum of delay time and rise time.
Thermal Resistance, Junction to Ambient, θ_{JA}	The maximum thermal resistance between the output switch semiconductor) junction and still air ambient (expressed in °C/W).
Thermal Resistance, Junction to Case, θ_{JC}	The maximum thermal resistance between the output switch semiconductor(s) junction to point of measurement on the relay case (expressed in °C/W).
UL	Underwriters Laboratory. U.S. regulatory agency for electrical equipment.
VDE	Verband Deutscher Elektrotechniker. German regulatory commission similar to UL.
Voltage, Blocking (V_{BLOCK})	The maximum allowable voltage that can be applied to the relay output in the "OFF" state without breaking down the output switching device.
Voltage Drop, On State (V_{DROP})	The voltage at maximum load current developed across the output switching device when the relay is in the "ON" state. For AC relays, this value is measured $1/4$ cycle from the zero crossing of the output voltage waveform.
Voltage, Input (Or Control) Range	The full range of input (control) voltage over which the SSR will operate at 25°C unless otherwise specified.
Voltage, Output (Or Load) Range	The load voltage range over which the relay will operate as specified.
Voltage, Reverse Polarity	The maximum allowable reverse voltage which may be applied to the input of a solid state relay without permanent damage.
Zero-Crossing Turn-On Voltage	The maximum voltage across the output terminals following initial turn-on.

Notes



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ISSP

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微波光电部专业代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波 CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件：晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

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