

# AC Solid State Relay

# KA/LA

TELEDYNE RELAYS

OPTICALLY ISOLATED 2.0 TO 7.5 A, 250 VRMS

Part Number*	Relay Description
KA00HF	2 A AC Solid State Relay
KA58HF Protection	2 A AC Solid State Relay with Ther and Thermal TRIP Status
LA00HL	7.5 A AC Solid State Relay
LA58HL	7.5 A AC Solid State Relay with Thermal Protection and Thermal TRIP Status

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

## ELECTRICAL SPECIFICATIONS

(-55°C TO +110°C)

### INPUT (CONTROL) SPECIFICATION

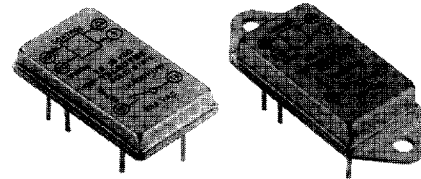
2 Terminal Configuration (See Figure 1)		Min	Max	Units
Input Voltage (See Note 2)		3.8	32	Vdc
Input Current	(V <sub>INPUT</sub> = 5 Vdc)		15	mA
	(V <sub>INPUT</sub> = 32 Vdc)		16	
Turn-On Input Voltage		3.8		Vdc
Turn-Off Input Voltage			1.5	Vdc
Reverse Polarity			-32	Vdc

### INPUT (CONTROL) SPECIFICATION

3 Terminal Configuration (See Figure 1)		Min	Max	Units
Bias Voltage (See Note 2)		3.8	32	Vdc
Bias Current (V <sub>INPUT</sub> = 32 Vdc)			16	mA
Control Voltage Range		0	18	Vdc
Control Current at 5 Vdc			250	µA <sub>dc</sub>
Turn-On Control Voltage			0.3	Vdc
Turn-Off Control Voltage		3.2		Vdc

### OUTPUT (LOAD) SPECIFICATIONS

		Min	Max	Units
Load Voltage		20	250	V <sub>ac</sub>
Frequency Range		40	440	Hz
Continuous Load Current (See Figure 3)	KA and LA Series without heat sink		2.0	A
	LA Series with heat sink		7.5	
Output Voltage Drop		1.2		V <sub>rms</sub>



## FEATURES/BENEFITS

- Available with thermal protection and thermal TRIP status-  
Provides self-protection from thermal runaway conditions and indicates protection state for system BIT.
- Optical Isolation-  
Isolates control elements from load transients with reduced EMI.
- Fully Floating Output-  
Eliminates ground potential loops and allows the output to sink or source current.
- Buffered Control-  
Relay can be controlled directly from TTL or CMOS logic circuits.
- Integral Snubber Circuit-  
Enhances dV/dt capability while minimizing EMI.

## DESCRIPTION

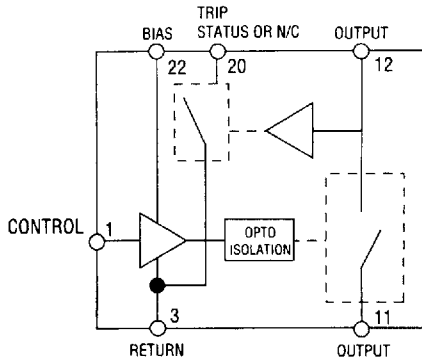
The KA/LA series of solid state relays (SSRs) is designed for use in AC power switching applications where safety and reliability are primary concerns. These SSRs are rated for load voltages up to 250 Vrms from 40 to 440 Hz and are ideal for resistive and reactive loads with power factors as low as 0.2.

Inverse parallel SCRs are configured for zero voltage turn on. Optical isolation to 1250 Vrms between the control (input) and load (output) allows the load to be safely controlled by logic circuitry.

The KA/LA series is available with thermal protection and thermal TRIP status. In case of a thermal runaway condition, the SSR will shut down the output switch and latch off until the input is reset and the junction temperature returns to a safe level. When the output does latch off, the TRIP status line will yield a logic level output indicating the protection state of the SSR. This feature provides the user with failure mode indication while enhancing the system diagnostic capability. These SSRs are available to the Y screening level of MIL-R-28750 and are packaged in low profile hermetically sealed cases.

AC

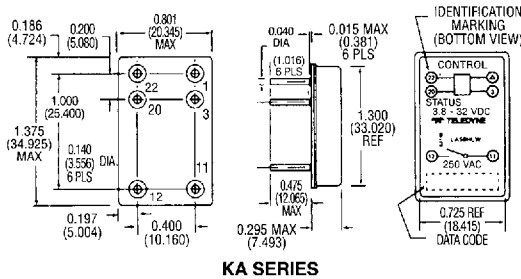
**BLOCK DIAGRAM**



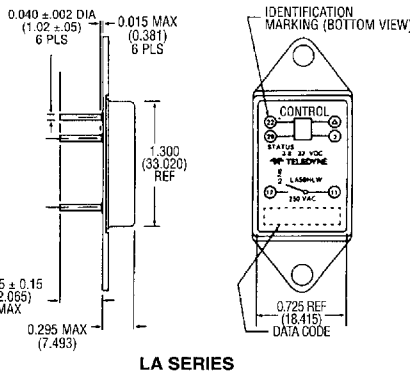
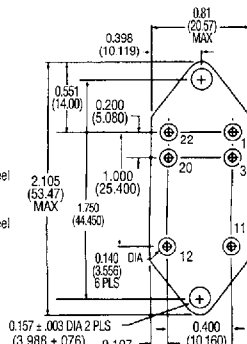
**OUTPUT SPECIFICATIONS**

	Min	Max	Units
Surge Current, 16 ms at 25°C (See Note 4)	KA Series	60	Arms
	LA Series	75	
Leakage Current at 250 Vac, 400 Hz		10	mA
Turn-On Time		1/2	cycle
Turn-Off Time		1	cycle
Zero Voltage Turn-On		±15	Vpk
Load Power Factor		0.2	
dV/dt		100	V/μs
Transient Voltage, (t < 5s) (See Note 5)		±500	Vpk
Dielectric Strength (60 Hz)		1250	Vrms
Insulation Resistance (@ 500 Vdc)		10 <sup>9</sup>	Ohms
Input to Output Capacitance		15	pF
Junction Temperature at Rated Current		125	°C
Thermal Resistance Junction to Case		5	°C/W
Thermal Resistance Junction to Ambient		30	°C/W

**MECHANICAL SPECIFICATIONS**



ENCLOSURE: Hermetically Sealed DIP  
 LEAK RATE: 1 x 10<sup>-8</sup> CC/Sec Maximum  
 MATERIAL: Header - Cold Rolled Steel  
               - Nickel Plated  
               Pins - Copper Core  
               Can - Cold Rolled Steel  
               - Nickel Plated  
 WEIGHT: 20 grams max  
 TOLERANCE: .XX = ± 0.10 (±.25)  
               .XXX = ± 0.05 (±.13)



DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS)

**STATUS OUTPUT TRUTH TABLE**

Status Output State	Control Input	Output (Load) State
Off (High)	Low	On
On (Low)	Low	Tripped
Off (High)	High	Off
On (Low)	High	Non-applicable condition

**STATUS OUTPUT SPECIFICATIONS**

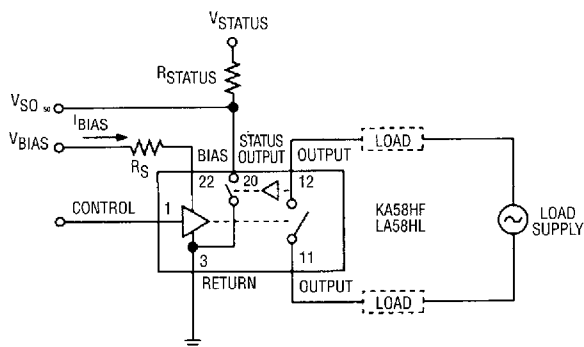
	Min	Max	Units
Status Supply Voltage		32	Vdc
Status Leakage Current @ 32 Vdc		10	μAdc
Status Sink Current (V <sub>so</sub> ≤ 0.4 Vdc)		10	mAdc

**ENVIRONMENTAL SPECIFICATIONS**

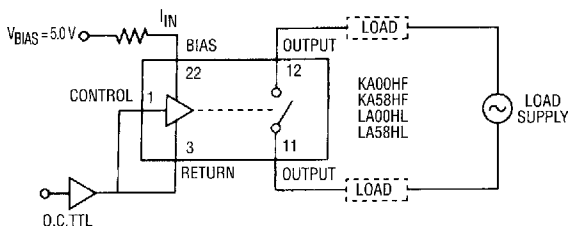
Temperature Range	Operating	-55°C to +110°C
	Storage	-55°C to +125°C
Vibration		100 g, 10 to 3000 Hz
Constant Acceleration		5000 g
Shock		1500 g, 0.5 ms pulse

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

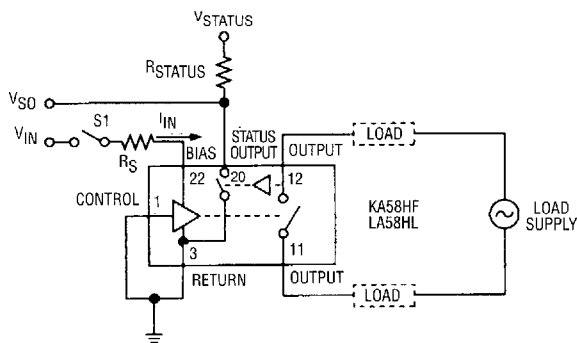
8917669 0000908 3T0



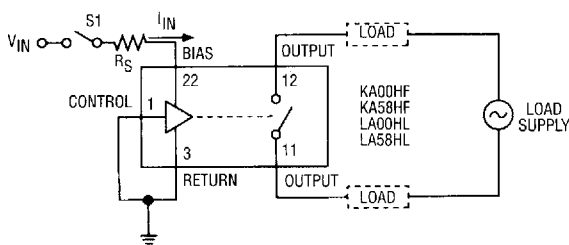
(A) 3 TERMINAL INPUT WITH STATUS (See Note 7)



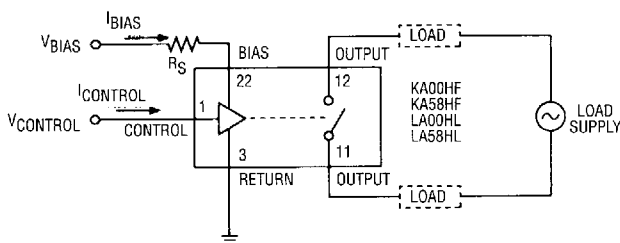
(B) 2 TERMINAL INPUT (OPEN COLLECTOR TTL DRIVE)



(C) 2 TERMINAL INPUT (DIRECT DRIVE) WITH STATUS

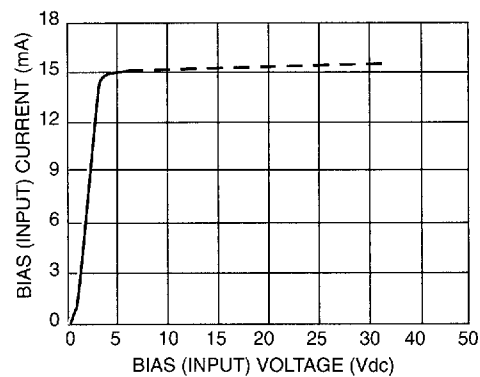


(D) 2 TERMINAL INPUT (DIRECT DRIVE)

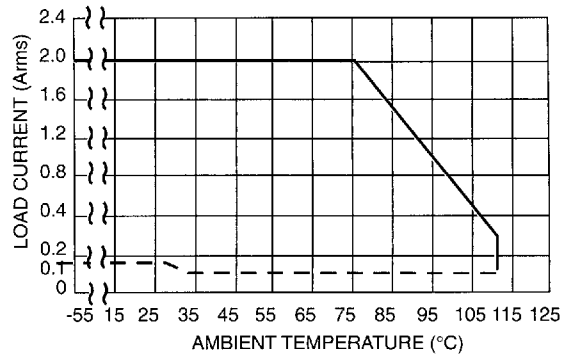


(E) 3 TERMINAL INPUT WITHOUT STATUS

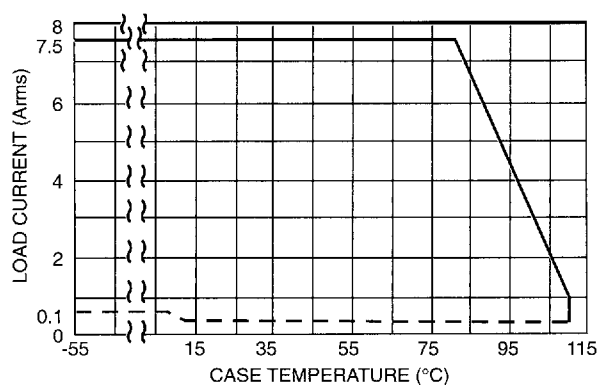
WIRING CONFIGURATIONS  
FIGURE 1 (See Notes 1 and 2)



INPUT CURRENT VS VOLTAGE  
FIGURE 2 (See Note 2)

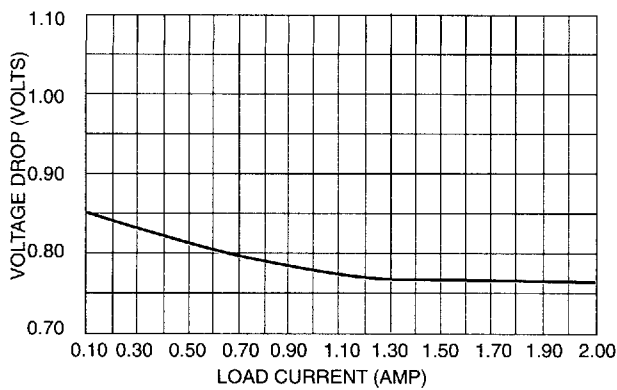


LA SERIES / KA SERIES WITHOUT HEATSINK  
(A)

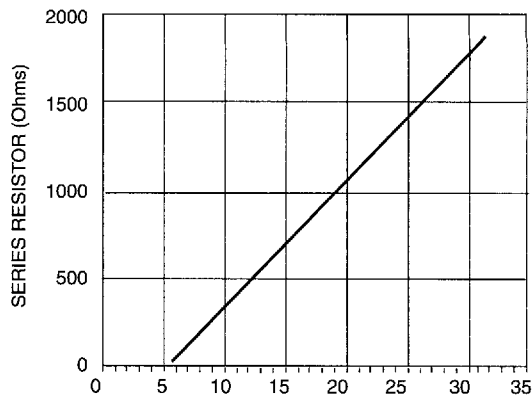


LA SERIES WITH HEATSINK  
(B)

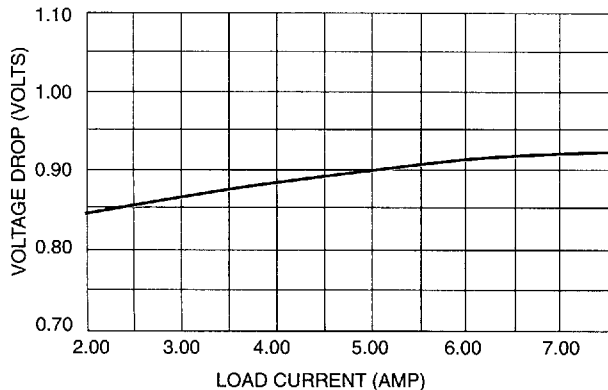
THERMAL DERATING CURVES  
FIGURE 3



TYPICAL VOLTAGE DROP VS LOAD CURRENT OF KA/LA SERIES WITHOUT HEATSINK  
FIGURE 4



SERIES LIMIT BIAS RESISTOR VS BIAS VOLTAGE  
FIGURE 6 (See Note 2)



TYPICAL VOLTAGE DROP VS LOAD CURRENT OF LA SERIES WITH 1°C/W HEATSINK  
FIGURE 5

**NOTES:**

1. Control input is compatible with CMOS or open collector TTL (with pull up resistor).
2. For bias voltages above 6 Vdc, a series resistor is recommended. Use a standard resistor value equal to or less than the value found from Figure 6.
3. Unless otherwise noted, the input voltage for functional tests shall be 5 Vdc.
4. Output may temporarily lose blocking capability during and after a surge, until  $T_j$  falls below maximum.
5. Transient suppression must be used to limit the voltage to < 500 Vpeak when switching inductive loads. Load voltage must be applied before turning ON an inductive load.

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

8917669 0000910 T59

AC