



25A, 250 Vrms Optically Isolated AC Solid-State Relay

Part Number*	Relay Description
RA00HQ	25 A AC Solid-State Relay
RA58HQ	25 A AC Solid-State Relay with Thermal Protection
	and Thermal TRIP Status

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

ELECTRICAL SPECIFICATIONS

(-55°C TO +110°C UNLESS OTHERWISE SPECIFIED)

INPUT (CONTROL) CHARACTERISTICS

INPUT (CONTROL) CHARACTERISTICS					
2 Terminal Configuration (See Figure 1)	Min	Max	Units		
Input Voltage (See Note 2)		32	Vdc		
Input Current					
$V_{INPUT} = 5 \text{ Vdc}$		15	mA		
V _{INPUT} = 32 Vdc		16	mA		
Turn-On Input Voltage	4.0		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)	4.0	32	Vdc		
Bias Current (V _{INPUT} = 32 Vdc)		16	mA		
Control Voltage Range		18	Vdc		
Control Current at 5 Vdc		250	μAdc		
Turn-On Control Voltage		0.3	Vdc		
Turn-Off Control Voltage	3.2		Vdc		
OUTPUT (LOAD) SPECIF	ICATIO	NS			
	Min	Max	Units		
Load Voltage	20	250	Vrms		
Frequency Range	40	440	Hz		
Continuous Load Current (See Figure 3)					
Without heat sink	0.2	5	Arms		
With heat sink		25	Arms		
Output Voltage Drop		1.5	Vrms		



FEATURES/BENEFITS

- Available with thermal protection and thermal TRIP status: Provides selfprotection 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 Series RA solid-state relays (SSRs) are 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 and can handle current surges up to 100 A. Optical isolation to 1500 Vrms between the control (input) and load (output) allows the load to be safely controlled by logic circuitry. RA relays are 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 packaged in low-profile hermetically sealed cases.



OUTPUT (LOAD) SPECIFICATIONS				
	Min	Max	Units	
Surge Current, at 25°C		100	Arms	
Leakage Current at 250 Vac, 400 Hz		10	mArms	
Turn-On Time		1/2	cycle	
Turn-Off Time		1	cycle	
Zero Voltage Turn-On		±15	V pk	
Load Power Factor	0.2			
dV/dt	100		V/μs	
Transient Voltage, (t < 5s) (See Note 4)		±500	V pk	
Thermal Trip Temperature (Case) (RA58HQ Only)	120	150	°C	
Dielectric Strength (60 Hz)	1250		Vac	
Insulation Resistance (@ 500 Vdc)	10 ⁹		Ohm	
Input to Output Capacitance		20	pF	
Junction Temperature at Rated Current		125	°C	
Thermal Resistance Junction to Case		0.7	°C/W	
Thermal Resistance Junction to Ambient		16	°C/W	

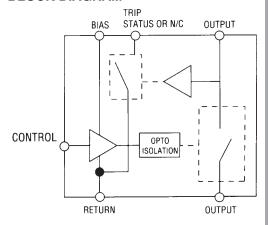
STATUS OUTPUT TRUTH TABLE

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

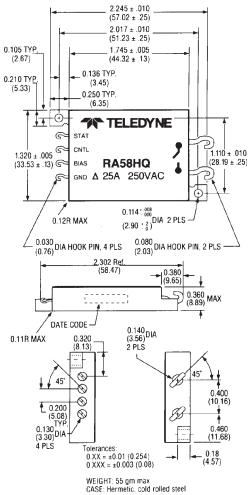
STATUS OUTPUT SPECIFICATIONS

	Min	Max	Units
Status Supply Voltage	3.8	32	Vdc
Status Leakage Current @ 32 Vdc		10	μAdc
Status Sink Current (V _{SO} ≤ 0.4 Vdc)		10	mAdc

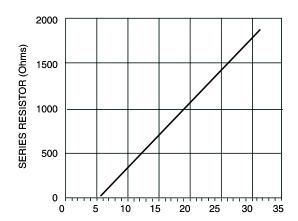
BLOCK DIAGRAM



MECHANICAL SPECIFICATIONS



ENVIRONMENTAL SPECIFICATIONS Min Max **Units** Temperature Range Operating -55 +110 °С Storage °С -55 +125 V_{STATUS} Vibration 30 g, 10 2000 Hz **Constant Acceleration** 5000 g Vso o IBIAS LOAD Shock (6 ms) 100 g VBIAS O OUTPUT RA58HQ 18 CONTRO LOAD (A) 3 TERMINAL INPUT WITH STATUS (See Note 5) OUTPUT LOAD ; V_{BIAS} = 5.0 V O-CONTROL RA00HQ RA58HQ SUPPLY 10 15 20 25 30 BIAS (INPUT) VOLTAGE (Vdc) LOAD O.C.TTL (B) 2 TERMINAL INPUT (OPEN COLLECTOR TTL DRIVE) **INPUT CURRENT VS INPUT VOLTAGE FIGURE 2** VSTATUS (See Note 2) I_{S0} I_{IN} OUTPUT LOAD CURRENT (Arms) إ-ك CONTROL SUPPLY RA58HQ RETURN LOAD (C) 2 TERMINAL INPUT (DIRECT DRIVE) WITH STATUS S_1 -55 115 CASE TEMPERATURE (°C) CONTROL RA SERIES WITH HEAT SINK (A) OUTPUT RETURN 9.0 🖂 🤾 8.0 (D) 2 TERMINAL INPUT (DIRECT DRIVE) IRIAS LOAD V_{BIAS} o OUTPUT ICONTROL V_{CONTROL} ❖ 1.0 RETURN LOAD 35 45 55 65 75 85 95 105 115 125 AMBIENT TEMPERATURE (°C) (E) 3 TERMINAL INPUT WITHOUT STATUS RA SERIES WITHOUT HEAT SINK WIRING CONFIGURATION THERMAL DERATING CURVES FIGURE 1 (See note 1 & 2) FIGURE 3



SERIES LIMIT BIAS RESISTOR VS BIAS VOLTAGE FIGURE 4 (SEE NOTE 2)

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 5.
- 3. Unless otherwise noted, the input voltage for functional tests shall be 5 Vdc.
- 4. Transient suppression must be used to limit the voltage to < 500 Vpeak when switching inductive loads.
- 5. Control input implies presence of bias voltage.