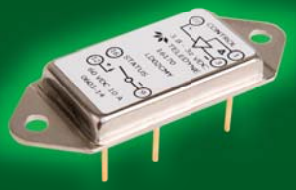
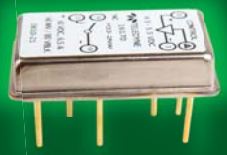
Solid-State Relays Selection Guide

Optical Isolation





Bidirectional

AC or DC

Short-Circuit Protection

Current Limiting

High Voltage

Low Leakage

MIL/AERO/COTS SWITCHING
BY TELEDYNE RELAYS

A Teledyne Technologies Company

Switching Solutions

Teledyne Relays has been the world's innovative leader in manufacturing ultraminiature, hermetically sealed, electromechanical and solid-state switching products for more than 40 years. The company's comprehensive product line meets a wide range of requirements for defense and aerospace, industrial, commercial, medical and RF & wireless uses.

Business Focus

- MIL QPL & COTS Solid-State Relays
- MIL QPL & COTS Electromechanical Relays
- HiRel (Space) Electromechanical Relays
- RF & Microwave Relays & Coaxial Switches
- Industrial Solid-State Relays
- Switching Matrices

Markets

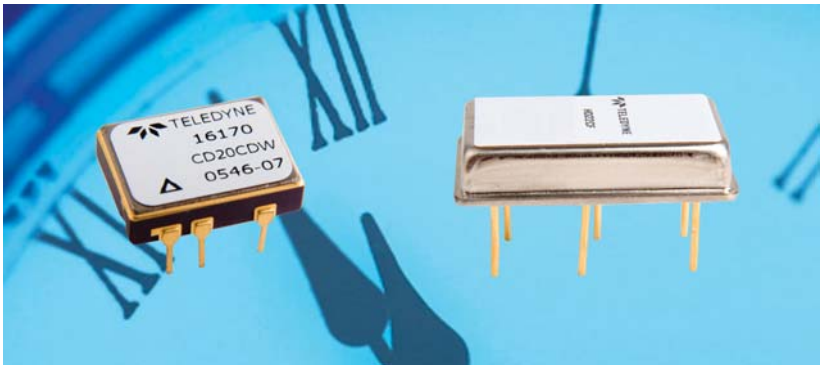
- Commercial & Military Aviation
- Defense & Aerospace
- Telecom/Communications (Wireless)
- Instrumentation & Test
- Industrial Power & Motion Control
- Medical Applications

Product Assurance

Under an aggressive Total Quality Management (TQM) program, Teledyne Relays has embraced a "continuous improvement" culture. With recognized certifications such as ISO 9002, DSCC MIL-STD-790 and Boeing D1-9000, Teledyne Relays has become a primary supplier of switching solutions with the highest quality and reliability to industry leaders around the world.

Technical Service & Customer Support

Teledyne Relays provides easy access to technical service and customer support. Our websites make it easy to find technical information, buy products and even get e-mail responses within 24 hours. Switching solutions are only a mouse click away at www.teledynerelays.com or at teledyne-europe.com. Information about coax switches is available at www.teledynecoax.com.



20 Years of Life-Cycle Testing — Series CD and HD solid-state relays have undergone 105,000 hours of permanent testing without a single failure. That's the equivalent of 376 million cycles. Test conditions featured a full load at 50% duty cycle, 85°C ambient temperature and V-load = 60 Vdc. The test parts met all given specifications.

Selection Matrix

Output			Input	Package	Surface Mount	Isolation	Short Protection	Control Status	Switch Status	Trip Status	Thermal Protection	Product	Page
AC/DC/BI*	Current	Voltage											
DC	0.25/0.5	400	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-40	3
DC	0.5/1	200	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-30	3
DC	0.75/1.5	100	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-20	3
DC	1.25/2.5	60	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-10	3
DC	1	60	8-20 mAdc	6-Pin DIP	Avail	Opto						C63-10	3
DC	0.1	60	90–250 Vrms	16-Pin DIP	N/A	Opto						C76AI-1	5
DC	0.1	60	9–60 Vdc	16-Pin DIP	N/A	Opto						C76DI-1	5
DC	0.25	28	4–7 Vdc	8-Pin SIP	N/A	Opto					X	LPD70	5
DC	0.25	100	4–7 Vdc	8-Pin SIP	N/A	Opto						LPBD100	5
DC	0.4	360	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C47F-40	5
DC	0.4	400	5–50 mAdc	6-Pin DIP	Avail	Opto						C61-40	3
DC	0.5	80	8–20 mAdc	6-Pin DIP	Avail	Opto	X			X		ZD24CC	4
DC	0.5	400	3.8–32 Vdc	16-Pin DIP	Avail	Opto	X					SR75-3	6
DC	0.6	60	3.8–16 Vdc	16-Pin DIP	N/A	Opto						C76DO-1	5
DC	0.6	180	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C47F-30	5
DC	0.75	300	3.8–32 Vdc	16-Pin DIP	Avail	Opto	X					SR75-2	6
DC	1	60	4.5–5.5 Vdc	16-Pin DIP	Avail	Opto	X					C75-2	4
DC	1	60	4.5–5.5 Vdc	16-Pin DIP	Avail	Opto	X			X		C75-2S	4
DC	1	60	4.5–5.5 Vdc	16-Pin DIP	Avail	Opto	X			X		C75-2SH	4
DC	1	60	3.8–5.5 Vdc	4-Pin TO	N/A	Opto	X					FR75-1	6
DC	1	60	3.8–6 Vdc†	8-Pin CerDIP‡	Avail	Opto	X					CD20CD**	6
DC	1	60	3.8–6 Vdc†	8-Pin CerDIP‡	Avail	Opto	X	X				CD21CD**	6
DC	1	80	8–20 mAdc	6-Pin DIP	Avail	Opto	X					ZD20CD	4
DC	1	90	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C47F-20	5
DC	1	100	5–50 mAdc	6-Pin DIP	Avail	Opto						C61-20	3
DC	1.5	60	3.8–32 Vdc	16-Pin DIP	Avail	Opto	X					SR75-1	6
DC	1.75	50	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C47F-10	5
DC	2	50	3–32 Vdc	HalfHockey	N/A	Opto						603-1	4
DC	2	60	8–20 mAdc	6-Pin DIP	Avail	Opto	X					ZD20CF	4
DC	2	60	3.8–6 Vdc†	8-Pin CerDIP‡	Avail	Opto						CD00CF**	6
DC	2	60	3.8–6 Vdc†	8-Pin CerDIP‡	Avail	Opto		X				CD01CF**	6
DC	2	60	3.8–32 Vdc†	14-PinMetal	N/A	Opto						HD00CF**	7
DC	2	60	3.8–32 Vdc†	14-PinMetal	N/A	Opto			X			HD02CF**	7
DC	2	60	3.8–32 Vdc†	14-PinMetal	N/A	Opto	X					HD20CF**	7
DC	2	60	3.8–32 Vdc†	14-PinMetal	N/A	Opto	X		X			HD22CF**	7
DC	2	60	3.8–32 Vdc†	14-PinMetal	N/A	Opto	X			X		HD24CF	7
DC	2	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto	X			X		KD44CF	8
DC	5	50	3–32 Vdc	HalfHockey	N/A	Opto						603-2	4
DC	5	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto						KD00CK	7
DC	5	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto			X			KD02CK	7
DC	5	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto	X					KD20CK	7

Continued on next page

* AC, DC, Bidirectional
† TTL/CMOS control configuration.
‡ Ceramic Dual Inline Package

Selection Matrix

Output			Input	Package	Surface Mount	Isolation	Short Protection	Control Status	Switch Status	Trip Status	Thermal Protection	Product	Page
AC/DC/BI*	Current	Voltage											
DC	5	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto	X		X			KD22CK	7
DC	5	250	4–10 Vdc	HalfHockey	N/A	Trans						603-3	4
DC	5	250	10–32 Vdc	HalfHockey	N/A	Trans						603-4	4
DC	7	60	4.5–5.5 Vdc	22-Pin Metal	N/A	Trans						M33-2N	8
DC	10	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto						LD00CM	7
DC	10	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto			X			LD02CM	7
DC	10	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto	X					LD20CM	7
DC	10	60	3.8–32 Vdc†	22-Pin Metal	N/A	Opto	X		X			LD22CM	7
AC	0.5	140	4–10 Vdc	14-Pin DIP	N/A	Trans						641-1	9
AC	0.5	250	4–10 Vdc	14-Pin DIP	N/A	Trans						641-2	9
AC	1	250	3.8–16 Vdc†	16-Pin DIP	N/A	Opto						C76AO-1	9
AC	1	250	3.8–32 Vdc†	8-Pin CerDIP‡	Avail	Opto						CA00HD	10
AC	1.1 (x3)	250	24–32 Vdc	PlasticMold	N/A	Opto		X				3PAK220	10
AC	2	250	3.8–32 Vdc	14-PinMetal	N/A	Opto						682-1**	10
AC	2	250	3.8–32 Vdc†	22-Pin Metal	N/A	Opto						KA00HF	11
AC	2	250	3.8–32 Vdc†	22-Pin Metal	N/A	Opto				X	X	KA58HF	11
AC	5	250	3–32 Vdc	HalfHockey	N/A	Opto						601-1	9
AC	7.5	250	3.8–32 Vdc†	22-Pin Metal	N/A	Opto						LA00HL	11
AC	7.5	250	3.8–32 Vdc†	22-Pin Metal	N/A	Opto				X	X	LA58HL	11
AC	10	250	3–32 Vdc	HalfHockey	N/A	Opto						601-2	9
AC	25	250	3.8–32 Vdc†	Metal Case	N/A	Opto						RA00HQ	11
AC	25	250	3.8–32 Vdc†	Metal Case	N/A	Opto				X	X	RA58HQ	11
AC	25	250	4–32 Vdc	Metal Case	N/A	Opto						652-1**	11
AC	25	250	4–32 Vdc	Metal Case	N/A	Opto						652-2**	11
AC/DC/BI	0.25	360	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C46F-40	12
AC/DC/BI	0.4	180	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C46F-30	12
AC/DC/BI	0.75	90	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C46F-20	12
AC/DC/BI	1	50	3.8–32 Vdc	14-Pin DIP	N/A	Opto						C46F-10	12
AC/DC/BI	0.5	350	10–25 mAdc	6-PinMetal DIP	N/A	Opto						FB00KB**	13
AC/DC/BI	0.25/0.5	400	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-40	12
AC/DC/BI	0.5/1	200	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-30	12
AC/DC/BI	0.75/1.5	100	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-20	12
AC/DC/BI	1	180	10–25 mAdc	6-PinMetal DIP	N/A	Opto						FB00FC**	13
AC/DC/BI	1.25/2.5	60	10–50 mAdc	6-Pin DIP	Avail	Opto						C60-10	12
AC/DC/BI	2	80	10–25 mAdc	6-PinMetal DIP	N/A	Opto						FB00CD**	13
AC/DC/BI	7.5	150	4.5–16 Vdc	6-PinMetal SIP	N/A	Opto						QB00FM	13

* AC, DC, Bidirectional

† TTL/CMOS control configuration.
‡ Ceramic Dual Inline Package

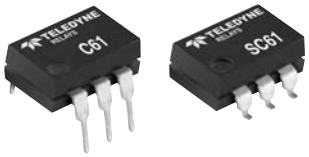
Series C60 Optically Isolated DC and Bidirectional Solid-State Relays

Series C60 solid-state relays use 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. In addition to switching DC loads, the versatile C60 can switch AC and bidirectional loads as well.

- Low on-state resistance
- Up to 2.5A output
- Optically isolated
- Three-terminal output
- Through-hole or surface-mount configuration

Isolation Type
Optically Isolated
Operating Temperature
–40°C to +85°C
Mounting
C = Through-hole SC = Surface
Dimensions LxWxH
Through-hole 0.39 x 0.25 x 0.15 in. 9.91 x 6.35 x 3.81 mm Surface 0.39 x 0.25 x 0.175 in. 9.91 x 6.35 x 4.45 mm

Part No.	OUTPUT (Load)						INPUT (Control)
	Load Voltage		Load Current		ON Resistance		Input Current
	DC	AC	DC	AC	DC	AC	
C60-10	60 Vdc	±60 Vdc	2.5 Adc	±1.25 Adc	0.07 Ω	0.28 Ω	10–50 mA
SC60-10	60 Vdc	±60 Vdc	2.5 Adc	±1.25 Adc	0.07 Ω	0.28 Ω	10–50 mA
C60-20	100 Vdc	±100 Vdc	1.5 Adc	±0.75 Adc	0.2 Ω	0.7 Ω	10–50 mA
SC60-20	100 Vdc	±100 Vdc	1.5 Adc	±0.75 Adc	0.2 Ω	0.7 Ω	10–50 mA
C60-30	200 Vdc	±200 Vdc	1 Adc	±0.50 Adc	0.45 Ω	1.8 Ω	10–50 mA
SC60-30	200 Vdc	±200 Vdc	1 Adc	±0.50 Adc	0.45 Ω	1.8 Ω	10–50 mA
C60-40	400 Vdc	±400 Vdc	0.5 Adc	±0.25 Adc	1 Ω	4 Ω	10–50 mA
SC60-40	400 Vdc	±400 Vdc	0.5 Adc	±0.25 Adc	1 Ω	4 Ω	10–50 mA



Series C61 Optically Isolated DC Solid-State Relays

Series C61 solid-state relays use 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.

- Optically isolated 0.3 to 1A
- Low ON resistance power FET output
- Switches high voltages and currents
- Floating output
- High noise immunity

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Input Current	Operating Temperature	Mounting	Dimensions LxWxH
C61-20	100 Vdc	1 Adc	0.3 Ω	Optically Isolated	5–50 mA	–40°C to +85°C	Through-hole	0.39 x 0.25 x 0.15 in. 9.91 x 6.35 x 3.81 mm
SC61-20	100 Vdc	1 Adc	0.3 Ω	Optically Isolated	5–50 mA	–40°C to +85°C	Surface	0.39 x 0.25 x 0.175 in. 9.91 x 6.35 x 4.45 mm
C61-40	400 Vdc	0.4 Adc	2 Ω	Optically Isolated	5–50 mA	–40°C to +85°C	Through-hole	0.39 x 0.25 x 0.15 in. 9.91 x 6.35 x 3.81 mm
SC61-40	400 Vdc	0.4 Adc	2 Ω	Optically Isolated	5–50 mA	–40°C to +85°C	Surface	0.39 x 0.25 x 0.175 in. 9.91 x 6.35 x 4.45 mm

Series C63 Optically Isolated DC Solid-State Relays

Series C63 solid-state relays use 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.

- Low ON-state resistance
- Up to 1A output
- Optically isolated
- Floating output
- Through-hole or surface-mount configuration

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Input Current	Operating Temperature	Mounting	Dimensions LxWxH
C63-10	60 Vdc	1 Adc	0.55 Ω	Optically Isolated	8–20 mA	–40°C to +85°C	Through-hole	0.39 x 0.25 x 0.15 in. 9.91 x 6.35 x 3.81 mm
SC63-10	60 Vdc	1 Adc	0.55 Ω	Optically Isolated	8–20 mA	–40°C to +85°C	Surface	0.39 x 0.25 x 0.175 in. 9.91 x 6.35 x 4.45 mm

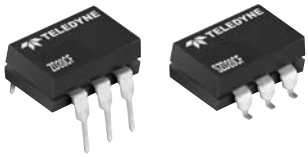
Series C75 DC Solid-State Relays with Short-Circuit Protection and Trip Status

Series C75-2 solid-state relays are packaged in a 16-pin DIP, with surface-mount or through-hole mounting available. They utilize a power FET switch that is protected against overload and short-circuit currents. 2S versions provide an open-collector trip status feedback to the relay's control side. 2SH versions add an internal transient voltage suppressor for inductive loads.

- Optically isolated
- Low OFF-state leakage
- Switches currents to 1 Adc
- High dielectric strength
- Through-hole or surface-mount configuration

Isolation Type
Optically Isolated
Operating Temperature
–40°C to +85°C
Mounting
C = Through-hole SC = Surface
Dimensions LxWxH
0.85 x 0.250 x 0.165 in. 21.59 x 6.35 x 4.19 mm

Part No.	OUTPUT (Load)			INPUT (Control)	OPTIONS		
	Load Voltage	Load Current	ON Resistance	Input Voltage	Short-Circuit Protection	Trip Status	Transient Voltage Protection
C75-2	60 Vdc	1 Adc	0.9 Ω	4.5–5.5 Vdc	X		
SC75-2	60 Vdc	1 Adc	0.9 Ω	4.5–5.5 Vdc	X		
C75-2S	60 Vdc	1 Adc	0.9 Ω	4.5–5.5 Vdc	X	X	
SC75-2S	60 Vdc	1 Adc	0.9 Ω	4.5–5.5 Vdc	X	X	
C75-2SH	60 Vdc	1 Adc	0.9 Ω	4.5–5.5 Vdc	X	X	X
SC75-2SH	60 Vdc	1 Adc	0.9 Ω	4.5–5.5 Vdc	X	X	X



ZD Optically Isolated, Short-Circuit Protected DC Solid-State Relays

Series ZD solid-state relays use an advanced design capable of switching heavy loads in a physically small 6-pin 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.

- Short-circuit protected
- Overload protected
- Low OFF-state leakage
- Trip status on ZD24 series
- Compact 6-pin DIP package

Isolation Type
Optically Isolated
Operating Temperature
–55°C to +105°C
Mounting
ZD = Through-hole SZD = Surface
Dimensions LxWxH
0.39 x 0.25 x 0.15 in. 9.91 x 6.35 x 3.81 mm

Part No.	OUTPUT (Load)			INPUT (Control)
	Load Voltage	Load Current	ON Resistance	Input Current
ZD20CD*	80 Vdc	1 Adc	0.15 Ω	8–20 mA
SZD20CD*	80 Vdc	1 Adc	0.15 Ω	8–20 mA
ZD20CF*	60 Vdc	2 Adc	0.15 Ω	8–20 mA
SZD20CF*	60 Vdc	2 Adc	0.15 Ω	8–20 mA
ZD24CC*	80 Vdc	500 mA	1 Ω	8–20 mA
SZD24CC*	80 Vdc	500 mA	1 Ω	8–20 mA

*A "W" or "T" suffix denoting Teledyne's S^2R reliablity screening level must be added to the part number. See Appendix, page 14.

Series 603 Optically Isolated DC Solid-State Relays

Series 603 solid-state relays are available with screw terminals, quick-disconnect terminals or through-hole solder pins for flexibility for mounting onto printed circuit boards, panels or heat-sink mounting. The 603-1 and 603-2 are available with TTL compatible inputs. The 603-3 and 603-4 relays are designed specifically for high-voltage loads.

- Fast switching speed
- Floating output eliminates ground loops and signal-level ground noise
- Low OFF-state leakage current
- High dielectric strength

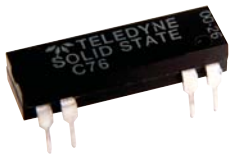
Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Input Voltage	Operating Temperature	Mounting Options	Dimensions LxWxH
603-1	50 Vdc	2 Adc	1.5 Vdc	Optically Isolated	3-32 Vdc	–40°C to +80°C	Screw, QuickDisconnect, Through-hole	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm
603-2	50 Vdc	5 Adc	1.5 Vdc	Optically Isolated	3–32 Vdc	–40°C to +80°C	Screw, QuickDisconnect, Through-hole	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm
603-3	250 Vdc	5 Adc	2 Vdc	Transformer	4–10 Vdc	–40°C to +100°C	Screw, QuickDisconnect, Through-hole	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm
603-4	250 Vdc	5 Adc	2 Vdc	Transformer	10–32 Vdc	–40°C to +100°C	Screw, QuickDisconnect, Through-hole	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm

Series C47F Optically Isolated DC Solid-State Relays

The Series C47F miniature solid-state relays utilize a photovoltaic generator driving high-performance power FET chips to provide low-output on resistance and high-output switching capability. The virtual elimination of offset voltage makes these relays ideal for low-level switching applications as well. Bidirectional switching versions (Series C46F) are available.

- 14-pin DIP package
- Switches high voltages and currents
- Optical isolation
- Floating output
- High noise immunity

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
C47F-10	50 Vdc	1.75 Adc	0.15 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm
C47F-20	90 Vdc	1 Adc	0.35 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm
C47F-30	180 Vdc	0.6 Adc	1 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm
C47F-40	360 Vdc	0.4 Adc	2 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm



Series C76 DC Solid-State Computer Input/Output Modules

Series C76 modules are designed for 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 remains noise-free by means of optical isolation between logic and power lines.

- Input enable function
- Floating outputs
- Low OFF-state leakage
- Switches/controls high voltages and currents
- High dielectric strength

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
C76AI-1	4–16 Vdc	100 mA	0.5 Vdc	Optically Isolated	90–250 Vrms	–40°C to +85°C	Through-hole	0.85 x 0.25 x 0.165 in 21.59 x 6.35 x 4.19 mm
C76DO-1	3–60 Vdc	600 mAdc	1.5 Vdc	Optically Isolated	3.8–16 Vdc	–40°C to +85°C	Through-hole	0.85 x 0.25 x 0.165 in 21.59 x 6.35 x 4.19 mm
C76DI-1	4–16 Vdc	100 mA	0.5 Vdc	Optically Isolated	9–60 Vdc	–40°C to +85°C	Through-hole	0.85 x 0.25 x 0.165 in 21.59 x 6.35 x 4.19 mm

Series LPBD100 Normally Closed Dual-Output DC Solid-State Relays

The LPBD100 is a dual-output 100 Vdc plastic relay. The relay output-switch contacts are normally closed and will conduct the load current until a voltage is applied to the relay input. With 4 volts or more at the relay input, the output-switch contacts open and the relay no longer conducts. The LPBD100 assembly contains two independent, completely isolated relays.

- Compact SIP plastic package
- Dual output: two relays in one package
- Optical isolation
- Two MOSFETs for reliable operation
- Low voltage drop

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
LPBD100	100 Vdc	0.25 A	5 Ω	Optically Isolated	4–7 Vdc	–40°C to +85°C	Through-hole	0.79 x 0.37 x 0.14 in. 20.07 x 9.39 x 3.55 mm

Series LPD70 Normally Open Dual-Output DC Solid-State Relays

Series LPD70 dual-output 28 Vdc plastic relays offer internal thermal protection. They utilize optical isolation for excellent input-to-output isolation. The LPD70 offers a current-limiting output to protect itself and associated load circuits from transient current overloads. During an overcurrent condition, the LPD70 clamps the current to a safe operating value.

- Current limiting output
- Thermal protection
- Automatic recovery
- Overload protection
- Low voltage drop

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
LPD70	33 Vdc	0.25 A	2 Ω	Optically Isolated	4–7 Vdc	–40°C to +85°C	Through-hole	0.79 x 0.37 x 0.14 in. 20.07 x 9.39 x 3.55 mm

Series SR75 Optically Isolated, Short-Circuit Protected DC Solid-State Relays

The SR75 solid-state relay utilizes a power FET switch that is protected against overload and short-circuit currents. The short-circuit protection feature not only provides protection should a short or overload occur while the relay is on, but will provide protection should the relay be switched into a short. It comes in through-hole or surface-mount 16-pin DIP packages.

- For AC application using a bridge rectifier
- Low OFF-state leakage
- Switches high voltages and currents
- High noise immunity
- High dielectric strength

Isolation Type
Optically Isolated
Operating Temperature
–55°C to +105°C
Mounting
Basic Relay = Through-hole S Suffix = Surface
Dimensions LxWxH
0.855 x 0.25 x 0.16 in. 27.71 x 6.35 x 4.06 mm

Part No.	OUTPUT (Load)			INPUT (Control)
	Load Voltage	Load Current	ON Resistance	Input Voltage
SR75-3*	400 Vdc	0.5 Adc	2.4 Ω	3.8–32 Vdc
SR75-3S*	400 Vdc	0.5 Adc	2.4 Ω	3.8–32 Vdc
SR75-2*	300 Vdc	0.75 Adc	2 Ω	3.8–32 Vdc
SR75-2S*	300 Vdc	0.75 Adc	2 Ω	3.8–32 Vdc
SR75-1*	60 Vdc	1.5 Adc	0.5 Ω	3.8–32 Vdc
SR75-1S*	60 Vdc	1.5 Adc	0.5 Ω	3.8–32 Vdc

*A "W" or "T" suffix denoting Teledyne's S^2R reliablity screening level must be added to the part number. See Appendix, page 14.

Series FR75-1 Optically Isolated, Short-Circuit Protected DC Solid-State Relays

The FR75-1 solid-state relay utilizes a power FET switch that is protected against short circuits and overload currents. The short-circuit protection feature provides protection when a short or overload occurs while the relay is on as well as when the relay is switched into a short. The FR75-1 is packaged in a low-profile mini-DIP metal package.

- Optical isolation
- Low OFF-state leakage
- Switches high currents
- High noise immunity
- High dielectric strength

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
FR75-1	60 Vdc	1 Adc	0.32 Ω	Optically Isolated	3.8–5.5 Vdc	–40°C to +85°C	Through-hole	0.423 x 0.463 x 0.19 in. 10.74 x 11.76 x 4.83 mm

Series CD Optically Isolated, Short-Circuit Protected DC Solid-State Relays

The CD solid-state relay utilizes the latest FET technology to provide a low ON resistance. The control circuit is buffered to enable the relay to be driven directly from standard CMOS or open-collector TTL logic circuits. Available options include short-circuit, current overload protection, and control status. Both options are available either together or separately as standard features.

- Fast switching speed
- Optical isolation
- Meets 28 Vdc requirements of MIL-STD-704
- Low-profile hermetic ceramic package
- Meets MIL-PRF-28750 requirements

Isolation Type
Optically Isolated
Operating Temperature
–55°C to +105°C
Mounting
CD = Through-hole SCD = Surface
Dimensions LxWxH
0.560 x 0.395 x 0.155 in. 41.22 x 10.03 x 3.94 mm

Part No.	OUTPUT (Load)			INPUT (Control)		OPTIONS	
	Load Voltage	Load Current	ON Resistance	Bias Supply Voltage	CMOS Control	Short-Circuit Protection	Control Status
CD00CF*	60 Vdc	2 Adc	0.22 Ω	3.8–6 Vdc	250 µA		
SCD00CF*	60 Vdc	2 Adc	0.22 Ω	3.8–6 Vdc	250 µA		
CD01CF*	60 Vdc	2 Adc	0.22 Ω	3.8–6 Vdc	250 µA		X
SCD01CF*	60 Vdc	2 Adc	0.22 Ω	3.8–6 Vdc	250 µA		X
CD20CD*	60 Vdc	1 Adc	0.45 Ω	3.8–6 Vdc	250 µA	X	
SCD20CD*	60 Vdc	1 Adc	0.45 Ω	3.8–6 Vdc	250 µA	X	
CD21CD*	60 Vdc	1 Adc	0.45 Ω	3.8–6 Vdc	250 µA	X	X
SCD21CD*	60 Vdc	1 Adc	0.45 Ω	3.8–6 Vdc	250 µA	X	X

*A "W" suffix denoting Teledyne's S^2R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

Series HD True-Output Status-Feedback DC Solid-State Relays

The HD solid-state relay utilizes the latest technology to provide a low ON resistance and an optically isolated output. The control circuit is buffered to enable the relay to be driven directly from standard CMOS or open-collector TTL logic circuits. Available options include short-circuit and current overload protection. The second option is a status output line.

- Fast switching speed
- Optical isolation
- Meets 28 Vdc requirements of MIL-STD-704
- Low-profile hermetic ceramic package
- Meets MIL-PRF-28750 requirements

Part No.	OUTPUT (Load)				INPUT (Control)		MECHANICAL			OPTIONS	
	Load Voltage	Load Current	ON Resistance	Isolation Type	Bias Supply Voltage	CMOS Control	Operating Temperature	Mounting	Dimensions LxWxH	Short-Circuit Protection	Switch Status
HD00CF*	60 Vdc	2.1 Adc	0.15 Ω	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +105°C	Through-hole	0.890 x .530 x 0.190 in. 22.6 x 13.5 x 4.83 mm		
HD02CF*	60 Vdc	2.1 Adc	0.15 Ω	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +105°C	Through-hole	0.890 x .530 x 0.190 in. 22.6 x 13.5 x 4.83 mm		X
HD20CF*	60 Vdc	2.1 Adc	0.15 Ω	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +105°C	Through-hole	0.890 x .530 x 0.190 in. 22.6 x 13.5 x 4.83 mm	X	
HD22CF*	60 Vdc	2.1 Adc	0.15 Ω	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +105°C	Through-hole	0.890 x .530 x 0.190 in. 22.6 x 13.5 x 4.83 mm	X	X
HD24CF*	60 Vdc	2.1 Adc	0.15 Ω	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +105°C	Through-hole	0.890 x .530 x 0.190 in. 22.6 x 13.5 x 4.83 mm	X	Trip Status

*A "W" suffix denoting Teledyne's S²R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

Series KD/LD Optically Isolated, Short-Circuit Protected DC Solid-State Relays

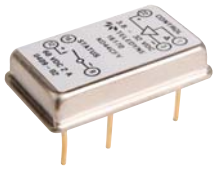
Series KD and LD solid-state relays utilize MIL-PRF-28750 test methods and are packaged in low-profile hermetically sealed cases. They feature fully floating power FET output technology. Options include short-circuit and current overload protection plus a status output line. Switch status returns the true status of the output switch and is optically isolated from the load.

- Fast switching speed
- Optical isolation
- Meets 28 Vdc requirements of MIL-STD-704
- Low-profile hermetic package
- Meets MIL-PRF-28750 requirements

Isolation Type
Optically Isolated
Operating Temperature
–55°C to +105°C
Mounting
Through-hole
Dimensions LxWxH
KD: 1.375 x 0.801 x 0.22 in. 34.92 x 20.34 x 5.59 mm LD: 2.105 x 0.801 x 0.22 in. 53.47 x 20.34 x 5.59 mm

Part No.	OUTPUT (Load)			INPUT (Control)		OPTIONS	
	Load Voltage	Load Current	ON Resistance	Input Current	Input Voltage	Short-Circuit Protection	Switch Status
KD00CK*	60 Vdc	5 Adc	0.075 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)		
KD02CK*	60 Vdc	5 Adc	0.075 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)		X
KD20CK*	60 Vdc	5 Adc	0.100 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)	X	
KD22CK*	60 Vdc	5 Adc	0.100 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)	X	X
LD00CM*	60 Vdc	5 Adc (10Adc with heatsink)	0.075 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)		
LD02CM*	60 Vdc	5 Adc (10Adc with heatsink)	0.075 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)		X
LD20CM*	60 Vdc	5 Adc (10Adc with heatsink)	0.100 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)	X	
LD22CM*	60 Vdc	5 Adc (10Adc with heatsink)	0.100 Ω	15 mAdc (TTL) 1 mAdc (CMOS)	3.8 Vdc (TTL) 0.3 Vdc (CMOS)	X	X

*A "W" suffix denoting Teledyne's S²R reliablity screening levelor "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.



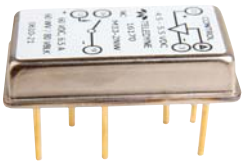
Series KD44CF DC Solid-State Relays with Flat Trip Short-Circuit Protection

The KD44CF solid-state relay utilizes MIL-PRF-28750 test methods. These relays feature fully floating power FET outputs that allow the load to be connected to either output terminal and provides a low ON resistance. A trip status indicator turns on when an overcurrent condition has occurred and the short-circuit protection has been activated.

- Short-circuit and overload protected
- Trip status
- Meets 28 Vdc requirements of MIL-STD-704
- Low-profile hermetic ceramic package
- Meets MIL-PRF-28750 requirements

Part No.	OUTPUT (Load)				INPUT (Control)		MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Bias Supply Voltage	CMOS Control	Operating Temperature	Mounting	Dimensions LxWxH
KD44CF*	60 Vdc	2 Adc	0.30 Ω	Optically Isolated	3.8–32 Vdc	250 µAdc	–55°C to +105°C	Through-hole	1.375 x 0.801 x 0.295 in. 34.92 x 20.34 x 7.49 mm

*A "W" or "Y" suffix denoting Teledyne's S²R reliability screening level or MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.



Series M33-2N Transformer Isolated, High-Surge-Current DC Solid-State Relays

The M33-2N is a military-style DC solid-state relay designed for high-current pulse load applications. It features the latest power FET output technology to minimize ON resistance. This feature provides minimum output voltage drop and allows the M33-2N to switch high pulse currents up to 100 amps at higher temperatures than those allowable with bipolar devices.

- Fast switching speed
- Optical isolation
- Transformer isolated
- Low-profile, hermetic, 22-pin metal DIP
- Meets MIL-PRF-28750 requirements

Part No.	OUTPUT (Load)				INPUT (Control)		MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Bias Supply Voltage	CMOS Control	Operating Temperature	Mounting	Dimensions LxWxH
M33-2N*	60 Vdc	7 A @25°C	0.09 Ω	Transformer	4.5–5.5 Vdc	80 µA	–55°C to +125°C	Through-hole	1.376 x .801 x .290 in. 34.95 x 20.35 x 7.36 mm

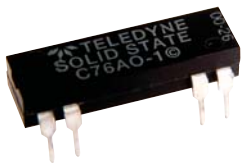
*A "W" suffix denoting Teledyne's S²R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

Series 641 Random Turn-On, Transformer-Isolated AC Solid-State Relays

Series 641 relays feature random turn-on for controlling AC loads with a triac output rated at 0.5 amp up to 50°C ambient without a heatsink. A high frequency inputoscillator with isolation transformer coupled directly to the triac gate provides the added capability of driving very low current AC loads down to 5mA. Internal design employs a patented lead-frame construction.

- 14-pin DIP package
- Fast switching speed
- Floating output
- Random turn-on
- Low OFF-state leakage

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
641-1	0–140 Vrms	0.005–0.5 Arms	1.5 Vrms	Transformer	4–10 Vdc	–40°C to +100°C	Through-hole	0.75 x 0.30 x 0.165 in. 19 x 7.62 x 4.19 mm
642-2	0–250 Vrms	0.005–0.5 Arms	1.5 Vrms	Transformer	4–10 Vdc	–40°C to +100°C	Through-hole	0.75 x 0.30 x 0.165 in. 19 x 7.62 x 4.19 mm



Series C76A AC Solid-State Computer Input/Output Modules

Series C76A modules are designed for 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 remains noise-free by means of optical isolation between logic and power lines.

- Input enable function
- Floating outputs
- Low OFF-state leakage
- Switches/controls high voltages and currents
- High dielectric strength

Part No.	OUTPUT (Load)				INPUT (Control)		MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Bias Supply Voltage	CMOS Control	Operating Temperature	Mounting	Dimensions LxWxH
C76AO-1	250 Vrms	1 Arms	1.5 Vrms	Optically Isolated	3.8–16 Vdc	250 µAdc	–40°C to +85°C	Through-hole	0.85 x 0.25 x 0.165 in 21.59 x 6.35 x 4.19 mm

Series 601 Optically Isolated AC Solid-State Relays

Series 601 relays 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. These relays are available with pin, screw or quick disconnect terminals.

- Optical isolation
- Floating output
- Zero-Voltage turn on
- Low OFF-state leakage
- High dielectric strength

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
601-1	250 Vrms	5 Arms	4 Vrms	Optically Isolated	3–32 Vdc	–40°C to +80°C	Chassis	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm
601-1H	250 Vrms	5 Arms	4 Vrms	Optically Isolated	3–32 Vdc	–40°C to +80°C	Chassis	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm
601-2	250 Vrms	10 Arms	4 Vrms	Optically Isolated	3–32 Vdc	–40°C to +80°C	Chassis	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm
601-2H	250 Vrms	10 Arms	4 Vrms	Optically Isolated	3–32 Vdc	–40°C to +80°C	Chassis	2.02 x 1.00 x 0.90 in. 51.3 x 25.4 x 22.86 mm

Series 3PAK220 3-Phase AC Solid-State Relays

The 3PAK220 relay is a 3-phase solid-state relay with status indication. Relay inputs and outputs are optically isolated. The 3PAK220 is a commercial-off-the-shelf (COTS) relay designed for 3-phase, 47–440 Hz applications where low EMI and reliable operation under conditions of severe environmental stress are a requirement.

- No heat sink required
- ESD class 2 compliance per MIL-STD-833, method 3015
- Compliant with MIL-STD-704D
- Status verification of the input command

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
3PAK220	20–250 Vac	1.1 Arms	1.5 Vrms	Optically Isolated	24–32 Vdc	–40°C to +85°C	Epoxy	1.585 x 1.585 x 0.750 in. 40.26x40.26x19.05mm

Model with flange mount available (above). Flange is for mounting purposes only and does not serve as a heat sink.

Series CA Optically Isolated AC Solid-State Relays

Series CA relays are designed for printed circuit board mounting in AC power switching applications. The relays are rated for 1A at 250 Vrms from 40 to 440 Hz for resistive and reactive loads with power factors as low as 0.2. Inverse parallel SCRs are configured for zero-voltage turn-on. The patented circuit design assures the lowest possible EMI.

- Low zero-cross window
- Fully floating output
- Meets MIL-STD-704 requirements
- Buffered control
- Low-profile ceramic DIP package

Part No.	OUTPUT (Load)				INPUT (Control)		MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Bias Supply Voltage	CMOS Control	Operating Temperature	Mounting	Dimensions LxWxH
CA00HD*	250 Vrms	0.1–1 A	1.5 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +105°C	Through-hole	0.560 x 0.395 x 0.155 in. 14.2 x 10.0 x 3.94 mm
SCA00HD*	250 Vrms	0.1–1 A	1.5 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +105°C	Surface	0.560 x 0.395 x 0.155 in. 14.2 x 10.0 x 3.94 mm

*A "W" suffix denoting Teledyne's S²R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

Series 682 Optically Isolated AC Solid-State Relays

The 682 is a state-of-the-art solid-state relay designed for use in AC power switching applications. Back-to-back SCRs are configured for zero-voltage turn-on and can handle current surges up to 8A. The patented circuit design assures the lowest possible EMI by virtually eliminating commutation spikes while maintaining excellent noise immunity.

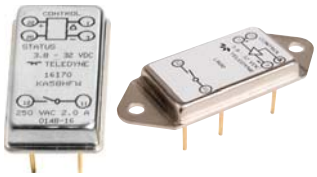
- Qualified to MIL-PRF-28750
- Zero-voltage turn-on SCR output
- Logic compatible input
- Extremely low EMI
- Low-profile metal DIP package

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
682-1*	250 Vrms	2 Arms	1.5 Vrms	Optically Isolated	3.8–32 Vdc	–55°C to +110°C	Through-hole	.890 x 5.30 x .190 in. 22.6 x 13.5 x 4.83 mm

*A "W" suffix denoting Teledyne's S²R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

Teledyne's preflight checklist:

- Short-circuit protection
- Optical isolation
- COTS screening
- Wide temperature range
- New, smaller plastic packages



Series KA/LA Optically Isolated AC Solid-State Relays

Series KA/LA solid-state relays are designed for use in AC power switching applications where safety and reliability are primary concerns. They 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. The relays are available with thermal protection and thermal trip status.

- Optical isolation
- Fully floating output
- Buffered control
- Integrated snubber circuit
- Low-profile hermetic package

Part No.	OUTPUT (Load)				INPUT (Control)		MECHANICAL			OPTION
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Bias Supply Voltage	CMOS Control	Operating Temperature	Mounting	Dimensions LxWxH	Thermal Protection and Thermal Trip Status
KA00HF*	250 Vrms	2 Arms	1.2 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +110°C	Through-hole	1.375 x 0.801 x 0.22 in. 34.92 x 20.34 x 5.59 mm	
KA58HF*	250 Vrms	2 Arms	1.2 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +110°C	Through-hole	1.375 x 0.801 x 0.22 in. 34.92 x 20.34 x 5.59 mm	X
LA00HL*	250 Vrms	2 Arms (7.5 Arms with heat sink)	1.2 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +110°C	Through-hole	2.105 x 0.801 x 0.22 in. 53.47 x 20.34 x 5.59 mm	
LA58HL*	250 Vrms	2 Arms (7.5 Arms with heat sink)	1.2 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +110°C	Through-hole	2.105 x 0.801 x 0.22 in. 53.47 x 20.34 x 5.59 mm	X

*A "W" suffix denoting Teledyne's S²R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

Series RA Optically Isolated AC Solid-State Relays

Series RA solid-state relays are designed for use in AC power switching applications where safety and reliability are primary concerns. The relays 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.

- Optional thermal protection and thermal trip status
- Fully floating output
- Buffered control
- Integral snubber circuit

Part No.	OUTPUT (Load)				INPUT (Control)		MECHANICAL			OPTION
	Load Voltage	Load Current	ON-State Voltage Drop	Isolation Type	Bias Supply Voltage	CMOS Control	Operating Temperature	Mounting	Dimensions LxWxH	Thermal Protection and Thermal Trip Status
RA00HQ*	20–250 Vrms	5 Arms (0.2–25 Arms with heatsink)	1.5 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +110°C	Chassis	2.245 x 1.320 x 0.360 in. 57.02 x 33.53 x 9.14 mm	
RA58HQ*	20–250 Vrms	5 Arms (0.2–25 Arms with heatsink)	1.5 Vrms	Optically Isolated	3.8–32 Vdc	250 µA	–55°C to +110°C	Chassis	2.245 x 1.320 x 0.380 in. 57.02 x 33.53 x 9.65 mm	X

*A "W" suffix denoting Teledyne's S²R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

Series 652 Optically Isolated AC Solid-State Relays

The Series 652 is an AC output solid-state relay designed for power switching. It incorporates a sealed, optically coupled solid-state relay as a zero-voltage turn-on driver. The input circuit is TTL logic compatible. Output switching is accomplished by back-to-back SCRs with a built-in snubber circuit, which provides reliable switching of both resistive and reactive loads.

- Qualified to MIL-PRF-28750
- Zero-voltage turn-on, zero-current turn-off
- Logic compatible input
- Sealed aluminum case
- High transient immunity and low EMI

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON-State Voltage Drop	Zero-Cross Window	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
652-1*	250 Vrms	25 A	1.5 Vrms	±15 V	4–32 Vdc	–55°C to +110°C	Terminal	2.410 x 1.57 x 1.845 in. 61.5 x 39.88 x 46.86 mm
652-2*	250 Vrms	25 A	1.5 Vrms	±40 V	4–32 Vdc	–55°C to +110°C	Terminal	2.410 x 1.57 x 1.845 in. 61.5 x 39.88 x 46.86 mm

*A "W" suffix denoting Teledyne's S²R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.
-1 = DSCC Drawing Number M28750/10-001; -2 = DSCC Drawing Number M28750/10-002.

Series C46F Optically Isolated Bidirectional Solid-State Relays

The Series C46F miniature solid-state relays utilize a photovoltaic generator driving high-performance power FET chips to provide low-output on resistance and high-output switching capability. The virtual elimination of offset voltage makes these relays ideal for low-level switching applications as well. DC switching versions (Series C47F) are available.

- 14-pin DIP package
- Switches high voltages and currents
- Optical isolation
- Floating output
- High noise immunity

Part No.	OUTPUT (Load)				INPUT (Control)	MECHANICAL		
	Load Voltage	Load Current	ON Resistance	Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
C46F-10	±50 Vdc	±1 Adc	0.3 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm
C46F-20	±90 Vdc	±0.75 Adc	0.7 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm
C46F-30	±180 Vdc	±0.4 Adc	2 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm
C46F-40	±360 Vdc	±0.25 Adc	4 Ω	Optically Isolated	3.8–32 Vdc	–40°C to +100°C	Through-hole	0.75 x .25 x .165 in. 19.05 x 6.35 x 4.19 mm

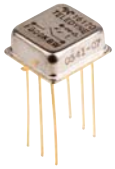
Series C60 Optically Isolated Bidirectional Solid-State Relays

Series C60 solid-state relays use 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, bidirectional or DC loads.

- Low on-state resistance
- Up to 2.5A output
- Optically isolated
- Three-terminal output
- Through-hole or surface-mount configuration

Isolation Type
Optically Isolated
Operating Temperature
–40°C to +85°C
Mounting
C = Through-hole SC = Surface
Dimensions LxWxH
Through-hole 0.39 x 0.25 x 0.15 in. 9.91 x 6.35 x 3.81 mm Surface 0.39 x 0.25 x 0.175 in. 9.91 x 6.35 x 4.45 mm

Part No.	OUTPUT (Load)						INPUT (Control)
	Load Voltage		Load Current		ON Resistance		Input Current
	DC	AC	DC	AC	DC	AC	
C60-10	60 Vdc	±60 Vdc	2.5 Adc	±1.25 Adc	0.07 Ω	0.28 Ω	10–50 mA
SC60-10	60 Vdc	±60 Vdc	2.5 Adc	±1.25 Adc	0.07 Ω	0.28 Ω	10–50 mA
C60-20	100 Vdc	±100 Vdc	1.5 Adc	±0.75 Adc	0.2 Ω	0.7 Ω	10–50 mA
SC60-20	100 Vdc	±100 Vdc	1.5 Adc	±0.75 Adc	0.2 Ω	0.7 Ω	10–50 mA
C60-30	200 Vdc	±200 Vdc	1 Adc	±0.50 Adc	0.45 Ω	1.8 Ω	10–50 mA
SC60-30	200 Vdc	±200 Vdc	1 Adc	±0.50 Adc	0.45 Ω	1.8 Ω	10–50 mA
C60-40	400 Vdc	±400 Vdc	0.5 Adc	±0.25 Adc	1 Ω	4 Ω	10–50 mA
SC60-40	400 Vdc	±400 Vdc	0.5 Adc	±0.25 Adc	1 Ω	4 Ω	10–50 mA



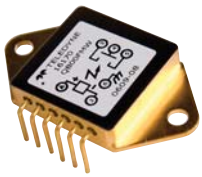
Series FB Low-Leakage, High-Voltage Bidirectional and DC Solid-State Relays

The Series FB relay is an advanced solid-state bidirectional relay designed specifically for high-speed switching in ATE systems. These devices provide high reliability, low life-cycle cost and exceptional switch performance. The FB has very fast turn-on times of under 1 msec. Optical coupling minimizes EMI generation.

- High voltage output
- Extremely low leakage current (200 nA)
- Bidirectional power FET output
- Fast switching speed
- Low-profile metal 6-pin mini-DIP

Part No.	OUTPUT (Load)							INPUT (Control)	MECHANICAL		
	Load Voltage		Load Current		ON Resistance		Isolation Type	Input Current	Operating Temperature	Mounting	Dimensions LxWxH
	DC	AC	DC	AC	DC	AC					
FB00CD*	80 Vdc	±80 Vdc	2 Adc	±1 Adc	0.15 Ω	0.6 Ω	Optically Isolated	10–25 mAdc	–55°C to +120°C	Through-hole	0.458 x 0.418 x 0.190 in. 11.6 x 10.6 x 4.83 mm
FB00FC*	180 Vdc	±180 Vdc	1 Adc	±0.5 Adc	0.25 Ω	1 Ω	Optically Isolated	10–25 mAdc	–55°C to +120°C	Through-hole	0.458 x 0.418 x 0.190 in. 11.6 x 10.6 x 4.83 mm
FB00KB*	350 Vdc	±350 Vdc	0.5 Adc	±0.25Adc	2 Ω	8 Ω	Optically Isolated	10–25 mAdc	–55°C to +120°C	Through-hole	0.458 x 0.418 x 0.190 in. 11.6 x 10.6 x 4.83 mm

*A "W" suffix denoting Teledyne's S^2R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.



Series QB00FM Bidirectional and DC Output Bidirectional Solid-State Relays

The QB00FM relay is an advanced solid-state bidirectional relay designed for high-speed power switching applications. It provides high reliability, low life-cycle cost and exceptional switch performance. The QB00FM is capable of switching AC or DC power and is suitable for heat sink or circuit card mounting. Pin 6 is connected to the case for additional safety shielding.

- High voltage output
- Low ON resistance
- Power FET output
- Fast switching speed
- High surge current capability

Part No.	OUTPUT (Load)							INPUT (Control)	MECHANICAL		
	Load Voltage		Load Current		ON Resistance		Isolation Type	Input Voltage	Operating Temperature	Mounting	Dimensions LxWxH
	DC	AC	DC	AC	DC	AC					
QB00FM*	150 Vdc	±150 Vdc	7.5 Adc	±4.3 Adc	0.035 Ω	0.10 Ω	Optically Isolated	4.5–16 Vdc	–55°C to +105°C	Through-hole	1.870 x 1.010 x 0.275 in. 47.5 x 25.65 x 6.99 mm

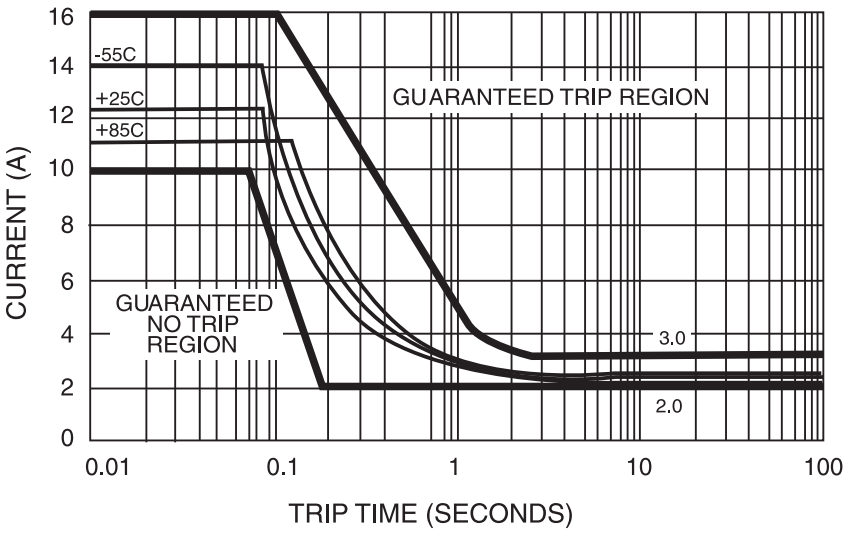
*A "W" suffix denoting Teledyne's S^2R reliablity screening level or "Y" suffix denoting MIL-PRF-28750 level must be added to the part number. See Appendix, page 14.

APPENDIX: Quality Conformance Inspection

All tests are 100% unless otherwise noted.

Inspection	S^2R Level "W"	S^2R Level "T"	MIL-PRF-28750 Level "Y"
Destructive Wirebond Pull Test (Sample test) MIL-STD-883 Method 2011	X	X	X
Internal Visual MIL-STD-883 Method 2017	X	X	X
Constant Acceleration MIL-STD-883 Method 2001, 5000 Gs, Y1 axis			X
Temperature Cycling MIL-STD-883 Method 1010, 10 cycles	X Specified temp range	X Specified temp range	X –55° to +125°C
Load Conditioning 3 hours at rated input and load 90% duty cycle, 1 to 30 operations per second (latching fault indication for drop out)	X	X	X
Pre Burn-In (optional)			X
Burn-in Test MIL-STD-883 Method 1015, 160 hours at specified temperature and rated load (latching fault indication on failure)		X (48 hours of same testing for plastic-packaged relays)	X
Dielectric Withstanding Voltage MIL-STD-202 Method 301	X	X	X
Insulation Resistance MIL-STD-883 Method 1003	X	X	X
Electrical Characteristics at –55°C		X	X
Electrical Characteristics at +25°C	X	X	X
Electrical Characteristics at +125°C (or as specified)		X	X
Seal MIL-STD-202 Method 112 (Gross) MIL-STD-883 Method 1014 (Fine)	X (N/A for plastic-packaged relays)	X (N/A for plastic-packaged relays)	X
Visual/Mechanical (Sample test)	X	X	X
Solderability (2 Samples) MIL-STD-202 Method 208		X	X

APPENDIX: Glossary

DSCC	Defense Supply Center Columbus. Organization that provides information and recommendations to contractors on commonality and selection of parts, and to manufacturers for qualification of the parts.
DSCC Drawing	This is a drawing created by DSCC for parts manufactured to a military specification but are not yet qualified to that specification. These parts may be used in military programs until a slash sheet is created and parts are qualified to the military specification.
MIL-PRF-28750	General specification for solid-state relays. This military specification covers the design, construction, manufacture, performance, test, and screening of military solid-state relays. Relays qualified to this specification are JAN branded and are suitable for all military programs.
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 the zero-voltage transition of the AC sine wave.
Short-Circuit Protection	A feature incorporated into the output circuit of a solid-state relay to protect the relay and circuitry against a shorted load. The relay output will turn-off should a short occur. The output can be reset from the control. 
Status, Switch	Indicates the state of the output. It operates independently of the control/bias and will return a status as long as load voltage and load circuit continuity exists. It is generated from the load supply and creates an offstate leakage from 600 µA to 2 mA.
Status, Flow	Indicates whether there is load current flowing. It operates only when the output is conducting and has a threshold of 10% to 20% of the maximum rated output current. It does not create an OFF-state leakage, but only operates when the output circuit is conducting.
Status, Trip	This type of status is only applicable for short-circuit protected relays. It provides an indication when the short-circuit protection has been activated and the output has tripped off. It does not indicate the normal state of the output.
Status, Control	This type of status provides an indication of control circuit continuity. It is analogous to the second set of contacts of a double-pole electromechanical relay. It does provide much higher output drive capability than the other types of status outputs.

APPENDIX: NOTES

APPENDIX: NOTES

HEADQUARTERS
12525 Daphne Ave.
Hawthorne, CA 90250
Phone: (323) 777-0077 or (800) 284-7007
Fax: (323) 241-1287
E-mail: relays@teledyne.com

www.teledynerelays.com

EUROPE
9-13 Napier Road
Wardpark North
Cumbernauld G68 OEF
Scotland UK
Phone: +44 (0) 1236 453 124
Fax: +44 (0) 1236 780 651
E-mail: sales_europe@teledyne.com

www.teledyne-europe.com

TELEDYNE
RELAYS
A Teledyne Technologies Company

PRINTED IN U.S.A.

TR0212