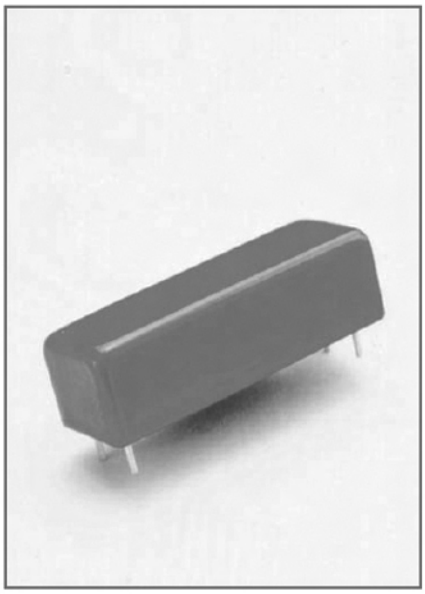
7000 Series/High Reliability Reed Relays

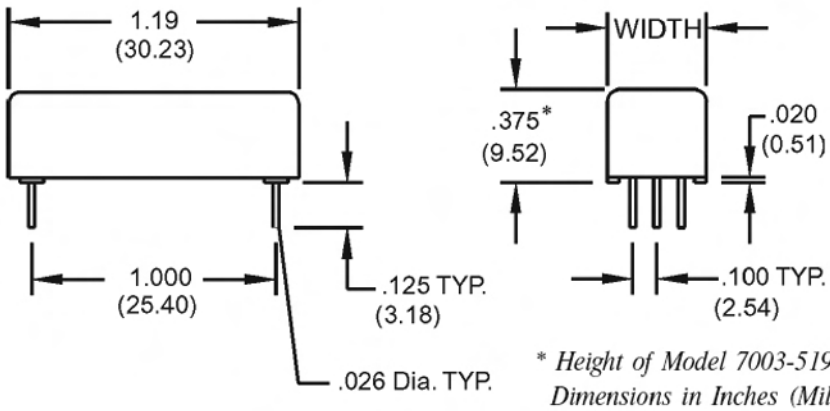


High Reliability Reed Relays

The 7000 Series is ideally suited to the needs of Instrumentation, Data Acquisition, Process Control, Telecommunications and General Purpose requirements. The specification tables allow you to select the appropriate relay for your particular application. These models are specifically designed for high quality and reliability with versatile switching capabilities and contact forms. If your requirements differ, please consult your local representative or Coto's Factory to discuss a custom reed relay.

7000 Series Features

- Multi-pole contact forms (Form A, B, and C)
- Wide range of switching capabilities; Low level, High Voltage, Hg wet
- Hermetically sealed contacts for long life and high reliability
- High speed switching compared to electromechanical relays
- Potted in metal shell - Magnetic Shield
- Optional Electrostatic Shield for reducing capacitive coupling
- PCB mounting versatility - 1.0" x 0.100" grid
- Optional coil suppression diode offered to protect coil drivers



* *Height of Model 7003-5193 is .480 (12.2)*
Dimensions in Inches (Millimeters)

WIDTH	A	B	C	D
DIMENSION	.410 (10.41)	.500 (12.70)	.660 (16.76)	.760 (19.30)

Table #1

Ordering Information

Part Number XXXX-XX-1XXX

Model Number
See Tables (7000 Series)

Coil Voltage
05 = 5 volts
12 = 12 volts
24 = 24 volts

Coil Termination
0 = End to End
1 = Same End

Diode Options [2]
0 = No Diode
1 = Diode Included

Electrostatic Shield Options
0 = No Electrostatic Shield
1 = Electrostatic Shield

Note:
Model #7003-5193 represents a complete part number.

7000 Series/High Reliability Reed Relays

Parameters	Test Conditions	Units	Form A, B, Latch	Form C	Form A[4] Hg Wet	Form C[4] Hg Wet	Form A High Voltage	Form A Sensor (7003-5193)
CONTACT RATINGS								
Switching Voltage	Max DC/Peak AC Resist.	Volts	200	150	500	500	500	50
Switching Current	Max DC/Peak AC Resist.	Amps	0.5	0.25	1.0	1.0	0.5	0.05
Carry Current	Max DC/Peak AC Resist.	Amps	2.0	0.5	2.0	2.0	2.0	0.5
Contact Rating	Max DC/Peak AC Resist.	Watts	10	3	50	50	10	3
Life Expectancy-Typical [1]	Signal Level 1.0V,10mA	x 10^6 Ops.	1000	100	1000	1000	100	100
Static Contact Resistance (max. init.)	50mV, 10mA	Ω	0.100	0.150	0.075	0.100	0.100	0.200
Dynamic Contact Resistance (max. init.)	0.5V, 50mA at 100 Hz, 1.5 msec	Ω	0.150	0.200	0.100	0.150	0.150	N/A
RELAY SPECIFICATIONS								
Insulation Resistance (minimum)	Between all Isolated Pins at 100V, 25°C, 40% RH	Ω	10^{12}	10^{10}	10^{12}	10^9	10^{12}	10^{10}
Capacitance - Typical	No Shield	pF	1.0	2.0	1.0	2.0	1.0	1.0
Across Open Contacts	Shield Guarding	pF	0.2	1.0	0.2	1.0	0.2	0.2
Dielectric Strength (minimum)	Between Contacts	VDC/peak AC	250	200	1000	1000	1200	200
	Contacts to Shield	VDC/peak AC	1000	1000	1000	1000	1000	N/A
	Contacts/Shield to Coil	VDC/peak AC	1500	1500	1500	1500	1500	2850
Operate Time - including bounce - Typical	At Nominal Coil Voltage, 30 Hz Square Wave	msec.	1.0	2.0.	2.0	2.0	1.0	0.35
Release Time - Typical	Zener-Diode Suppression[3]	msec.	0.1	2.5	1.0	1.5	0.1	0.25

Dot stamped on top of relay refers to pin #1 location

(See following pages for schematic diagrams and coil data.)

Notes:

[1] Consult factory for life expectancy at other switching loads.

[2] Optional coil suppression diode Pin #1 is +.

[3] Consists of 56V Zener diode and 1N4148 diode in series, connected in parallel with coil.

[4] Hg Content: Form A, 0.04 grams per capsule; Form C, 0.072 grams per capsule.

Environmental Ratings:

Storage Temp: -35°C to +100°C;
Operating Temp: -20°C to +85°C
Solder Temp: 270°C max; 10 sec. max
The operate and release voltage and the coil resistance are specified at 25°C. These values vary by approximately 0.4% / °C as the ambient temperature varies.
Vibration: 20 G's to 2000 Hz; Shock: 50 G's

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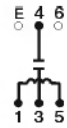
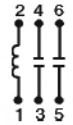
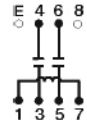
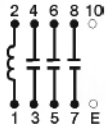
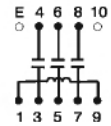
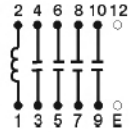
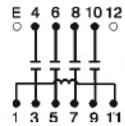
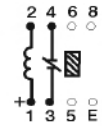
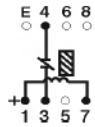
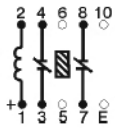
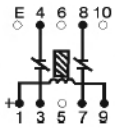
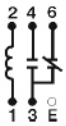
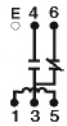
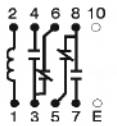
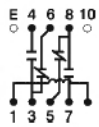
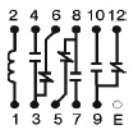
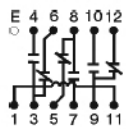
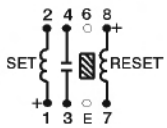
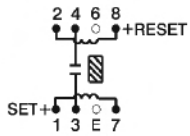
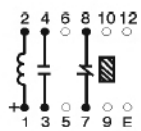
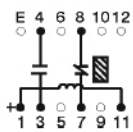
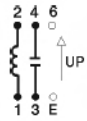
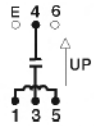
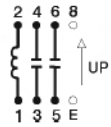
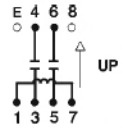
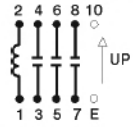
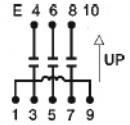
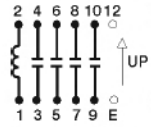
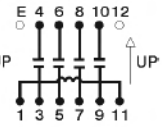
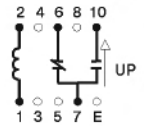
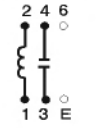
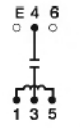
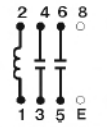
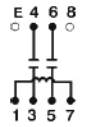
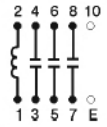
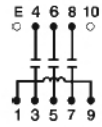
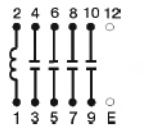
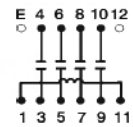
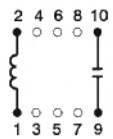
Contact Form	Model Number	Nominal Coil Voltage VDC	Must Operate Voltage VDC max.	Must Release Voltage VDC min.	Coil Resistance ±10%_ @25°C	Width (See Table #1)	Schematic Top View [2,8] End to End Coil	Same End Coil
1A	7101	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	300 1600 4200	A		
2A	7102	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	150 1000 3500	B		
3A	7103	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	100 800 2400	C		
4A	7104	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	80 550 2000	D		
1B[5]	7121	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	150 1000 3500	B		
2B[5]	7122	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	100 800 2400	C		
1C	7141	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	175 1100 4200	A		
2C	7142	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	65 490 1550	C		
3C	7143	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	55 300 1350	D		
1A Latch[5,6]	7150	5 12	3.75 9.0	0.4 1.0	550/550 1750/1750	B		
1A1B[5,7]	7160	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	80 550 2000	D		

Contact Form	Model Number	Nominal Coil Voltage VDC	Must Operate Voltage VDC max.	Must Release Voltage VDC min.	Coil Resistance ±10%_ @25°C	Width (See Table #1)	Schematic Top View [2,8] End to End Coil	Same End Coil
1A Hg wet[9]	7201	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	70 450 1785	A		
2A Hg wet[9]	7202	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	60 340 1330	B		
3A Hg wet[9]	7203	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	50 300 1200	C		
4A Hg wet[9]	7204	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	40 250 960	D		
1C Hg wet[9]	7241	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	50 300 1200	C		
1A High Voltage	7301	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	175 1100 4200	A		
2A High Voltage	7302	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	100 640 2450	B		
3A High Voltage	7303	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	65 490 1550	C		
4A High Voltage	7304	5 12 24	3.75 9.0 18.0	0.4 1.0 2.0	55 300 1350	D		
1A Current Sensor	7003-5193	N/A	13.0 (mA Max)	5.0 (mA Min)	8	C		

Notes:

[5] These relays contain bias magnets. Correct coil polarity must be observed.

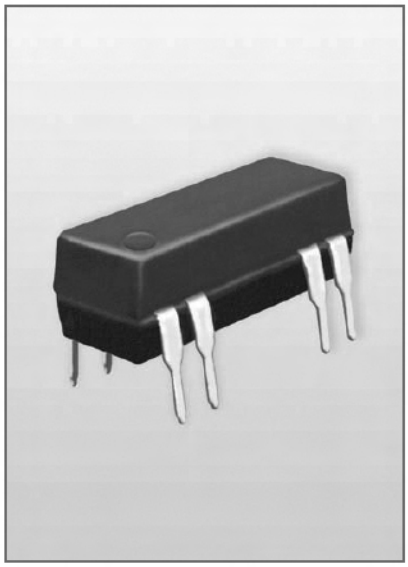
[6] Coil suppression diode is recommended for proper operation. Correct coil polarity must be observed.

[7] Break before make not guaranteed.

[8] Dot stamped on top of relay refers to pin #1 location. E-pin indicates Electrostatic shield pin. Unused pins omitted. Pin numbers for reference only.

[9] All models with Hg wet contacts are position sensitive, must be mounted within 30° of vertical plane. See schematic.

8L Series/Spartan DIP Reed Relays

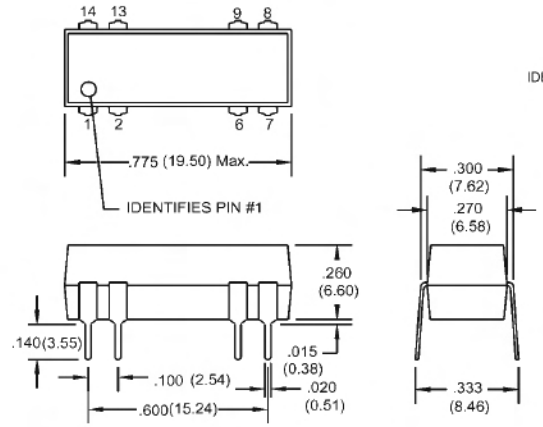


Economy DIP Reed Relays

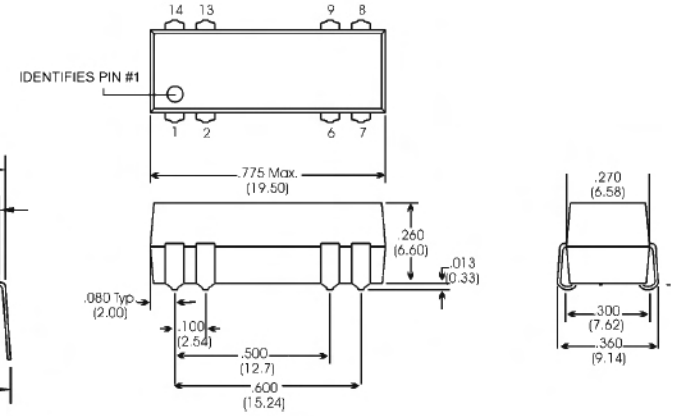
The Coto 8L Spartan Series relays combine Coto quality and economy in the industry standard 14 pin molded DIP package. This series will cross to all competitive DIP packages and is ideal for telecom, security, and other general purpose applications.

8L Series Features

- Drop-in low cost replacement for industry standard DIP packages
- Contact forms; 1A, 2A, 1B and 1C available
- Available coils in 5V, 12V and 24V
- Molded thermoset body on integral lead frame design
- Hermetically Sealed Contacts
- Optional Electrostatic Shield and Coil Suppression Diode
- UL File # E67117



(For Model #'s 8L01, 8L02, 8L21 & 8L41)



(For Model # 8L61)

Dimensions in Inches (Millimeters)

Ordering Information

Part Number 8LXX-XX-XX1

Model Number: 8L01 8L41 8L61

Coil Voltage:
05 = 5 volts
12 = 12 volts
24 = 24 volts

Diode Option [3]: 0 = No Diode 1 = Diode

Shield Option [4]:
0 = No Shield
1 = Electrostatic Shield

Ordering Information

Part Number 8LXX-XX-XX

Model Number: 8L02 8L21

Coil Voltage:
05 = 5 volts
12 = 12 volts
24 = 24 volts

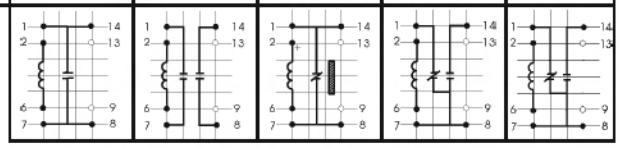
Diode Option [3]: 0 = No Diode 1 = Diode

Shield Option [4]:
0 = No Shield
1 = Electrostatic Shield

8L Series/Spartan DIP Reed Relays

Model Number			8L01[2,3,4]	8L02[2,3,4]	8L21[2,3,4]	8L41[2,3,4]	8L61[2,3,4,5]
Parameters	**Test Conditions**	**Units**	**1 Form A**	**2 Form A**	**1 Form B**	**1 Form C**	**1 Form C SMD**
COIL SPECS.							
Nom. Coil Voltage		VDC	5 12 24	5 12 24	5 12 24	5 12 24	5 12
Max. Coil Voltage		VDC	6.5 15 32	6.5 15 32	6.5 15 32	6.5 15 32	6.5 15
Coil Resistance	+/- 10%, 25° C	Ω	500 500 2150	200 500 2000	200 500 2000	200 500 2000	200 500
Operate Voltage	Must Operate by	VDC - Max.	3.8 9.6 19.2	3.8 9.6 19.2	3.8 9.6 19.2	3.8 9.6 19.2	3.8 9.6
Release Voltage	Must Release by	VDC - Min.	0.5 1.0 2.0	0.5 1.0 2.0	0.5 1.0 2.0	0.5 1.0 2.0	0.5 1.0
CONTACT RATINGS							
Switching Voltage	Max DC/Peak AC Resist.	Volts	200	200	200	100	100
Switching Current	Max DC/Peak AC Resist.	Amps	0.5	0.5	0.5	0.25	0.25
Carry Current	Max DC/Peak AC Resist.	Amps	1.0	1.0	1.0	0.5	0.5
Contact Rating	Max DC/Peak AC Resist.	Watts	10	10	10	3	3
Life Expectancy-Typical [1]	Signal Level 1.0V,10mA	x 10^6 Ops.	500	500	500	100	100
Static Contact Resistance (max. init.)	50mV, 10mA	Ω	0.150	0.150	0.150	0.200	0.200
Dynamic Contact Resistance (max. init.)	0.5V, 50mA at 100 Hz, 1.5 msec	Ω	N/A	N/A	N/A	N/A	0.250
RELAY SPECIFICATIONS							
Insulation Resistance (minimum)	Between all Isolated Pins at 100V, 25°C, 40% RH	Ω	10^{10}	10^{10}	10^9	10^9	10^9
Capacitance - Typical Across Open Contacts	No Shield	pF	0.5	0.5	0.5	1.5	1.5
	Shield Floating	pF	1.0	0.5	0.5	1.5	1.5
	Shield Guarding	pF	0.5	0.2	0.2	1.0	1.0
Open Contact to Coil	No Shield	pF	1.5	1.5	2.5	1.5	1.5
	Shield Floating	pF	2.0	2.0	2.0	2.0	2.0
	Shield Guarding	pF	0.5	0.5	1.5	0.5	0.5
Contact to Shield	Contacts Open, Shield Floating	pF	2.0	1.5	2.0	2.0	2.0
Dielectric Strength (minimum)	Between Contacts	VDC/peak AC	250	250	250	200	200
	Contacts to Shield	VDC/peak AC	1500	1500	1500	1500	1500
	Contacts/Shield to Coil	VDC/peak AC	1500	1500	1500	1500	1500
Operate Time - including bounce - Typical	At Nominal Coil Voltage, 30 Hz Square Wave	msec.	0.5	0.5	0.5	1.0	1.0
Release Time - Typical	Diode Suppression [6]	msec.	1.0	1.0	1.0	1.5	1.5
	No Suppression	msec.	0.5	0.5	0.5	1.0	1.0

Top View:
Dot stamped on top of relay refers to pin #1 location
Grid = .1"x.1" (2.54mm x 2.54mm)



Notes:

[1] Consult factory for life expectancy at other switching loads.
[2] Molded Depression on top of relay refers to pin #1 location.
[3] Optional coil suppression diode across pins 2(+) and 6(-).
[4] Optional ES Shield is tied to pin 9.
[5] Surface mount processing temperature: 260°C max for 1 minute dwell time. Temperature measured on leads where lead exits molded package.
[6] Consists of 56V Zener diode and 1N4148 diode in series, connected in parallel with coil.

Environmental Ratings:

Storage Temp: -35°C to +100°C
Operating Temp: -20°C to +85°C
Solder Temp: 270°C max; 10 sec. max
The operate and release voltage and the coil resistance are specified at 25°C. These values vary by approximately 0.4%/°C as the ambient temperature varies.
Vibration: 20 G's to 2000 Hz; Shock: 50 G's

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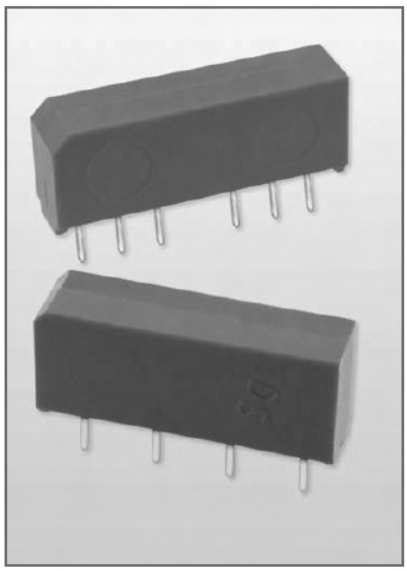
9000 Series / Molded SIP Reed Relays



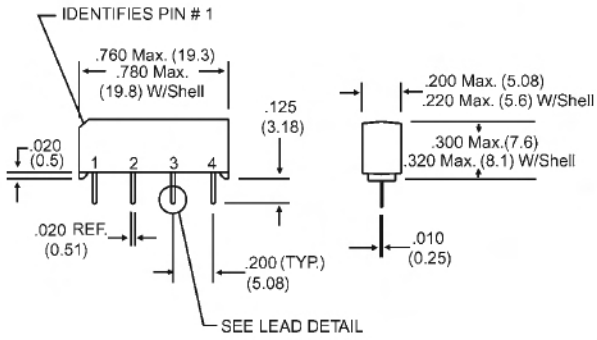
High Performance SIP Reed Relays

The SIP relay is the industry standard when high reliability and consistent performance are desired in a compact package. The 9001 and 9002 are high performance relays ideally suited for Automatic Test Equipment, Instrumentation, RF and Telecommunications applications. The specification tables allow you to select the appropriate relay for your application.

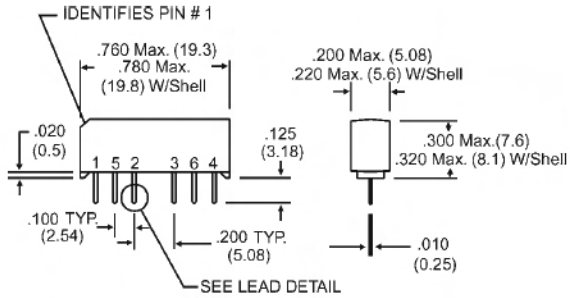
Series Features

- High Insulation Resistance - 10^{12} Ω minimum (10^{13} Ω typical)
- High reliability, hermetically sealed contacts for long life (tested to 1 Billion Operations)
- High dielectric strength available, consult factory
- High speed switching compared to electromechanical relays
- Molded thermoset body on integral lead frame design
- Coaxial Shield for 50 Ω impedance and switching of fast rise time digital pulses - 9002 only
- Optional Coil Suppression Diode - protects coil drive circuits
- UL File # E67117, CSA File # LR 28537

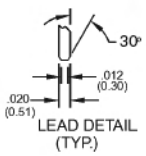
Model 9001



Model 9002



Dimensions in Inches (Millimeters)



Ordering Information

Part Number 90XX-XX-XX

Model Number
9001 9002

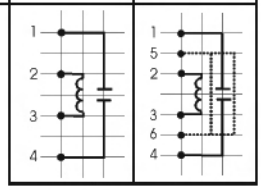
Coil Voltage
05=5 volts 12=12 volts

Magnetic Shield Option
0=No Shield
1=Shield

General Options
0=No Diode
1=Diode [2]
2=Form B Contacts (Normally Closed [3])
(9001 & 9002 Models, 5V only)

9000 Series / Molded SIP Reed Relays

Model Number			9001 [2]	9002 [2]
Parameters	**Test Conditions**	**Units**	**4 Pin SIP**	**6 Pin SIP**
COIL SPECS.				
Nom. Coil Voltage		VDC	5 12	5 12
Max. Coil Voltage		VDC	6.5 15.0	6.5 15.0
Coil Resistance	+/- 10%, 25° C	Ω	500 1000	350 750
Operate Voltage	Must Operate by	VDC - Max.	3.75 9.0	3.75 9.0
Release Voltage	Must Release by	VDC - Min.	0.4 1.0	0.4 1.0
CONTACT RATINGS				
Switching Voltage	Max DC/Peak AC Resist.	Volts	200	200
Switching Current	Max DC/Peak AC Resist.	Amps	0.5	0.5
Carry Current	Max DC/Peak AC Resist.	Amps	1.5	1.5
Contact Rating	Max DC/Peak AC Resist.	Watts	10	10
Life Expectancy-Typical [1]	Signal Level 1.0V, 10.0mA	x 10^6 Ops.	1000	1000
Static Contact Resistance (max. init.)	50mV, 10mA	Ω	0.150	0.150
Dynamic Contact Resistance (max. init.)	0.5V, 50mA at 100 Hz, 1.5 msec	Ω	0.200	0.200
RELAY SPECIFICATIONS				
Insulation Resistance (minimum)	Between all Isolated Pins at 100V, 25°C, 40% RH	Ω	10^{12}	10^{12}
Capacitance - Typical Across Open Contacts	No Shield	pF	0.7	-
	Shield Floating	pF	-	0.8
	Shield Guarding	pF	-	0.1
Open Contact to Coil	No Shield	pF	1.4	-
	Shield Floating	pF	-	1.4
	Shield Guarding	pF	-	0.5
Contact to Shield	Contacts Open, Shield Floating	pF	-	1.4
Dielectric Strength (minimum)	Between Contacts	VDC/peak AC	300	300
	Contacts to Shield	VDC/peak AC	-	1500
	Contacts/Shield to Coil	VDC/peak AC	1500	1500
Operate Time - including bounce - Typical	At Nominal Coil Voltage, 30 Hz Square Wave	msec.	0.35	0.35
Release Time - Typical	Zener-Diode Suppression [4]	msec.	0.1	0.1



Top View:
Dot stamped on relay refers to pin #1
Grid = .1"x.1"
(2.54mm x 2.54mm)

Notes:

[1]Consult factory for life expectancy at other switching loads.

[2]Optional diode is connected to pin #2 (+) and pin #3(-). Correct coil polarity must be observed.

[3]9000 series part numbers designated with Form B contacts, these relays contain bias magnets. Correct coil polarity must be observed.

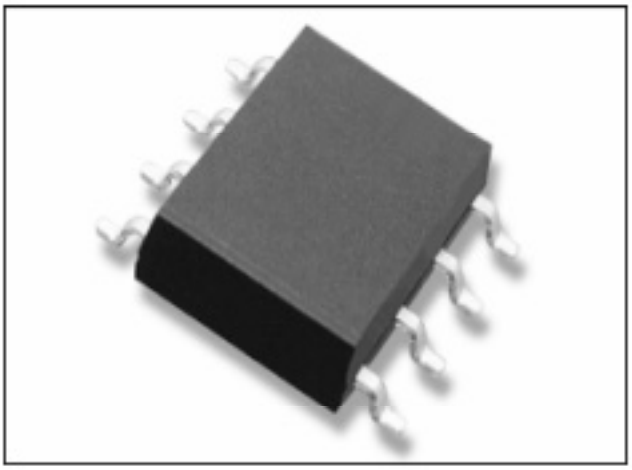
[4]Consists of 56V Zener diode and 1N4148 diode in series, connected in parallel with coil.

Environmental Ratings:

Storage Temp: -35°C to +100°C; Operating Temp: -20°C to +85°C
Solder Temp: 270°C max; 10 sec. max
The operate and release voltage and the coil resistance are specified at 25°C. These values vary by approximately 0.4% / °C as the ambient temperature varies.
Vibration: 20 G's to 2000 Hz; Shock: 50 G's

G2 Series / Solid State Relays

NEW!



Description

The G2 Series relays (SSRs) are solid state devices. No moving parts or mechanical activation is required for operation. Each relay is comprised of a light emitting diode (LED) input and metal oxide semiconductor field effect transistor (MOSFET) output. The input is optically isolated from the output. Operation of the relay is accomplished through the control circuitry on a photo diode array (PDA) semiconductor chip. This PDA chip converts the light energy from the LED into voltage required to operate the MOSFETs. Additional circuitry built into the PDA controls fast operation and current limiting in the output.

Features

- MOSFET Output Design
- Switching Voltage up to 400 VDC/Peak-AC
- Switching Current up to 1Amp DC / 500mA AC
- On Resistance as low as 3Ω
- Form A or B Contact Configuration
- Dual Pole Versions (2 single pole relays in one 8-pin package)
- Fast Turn-off Circuit
- Internal Current Limit Circuit Available

Benefits

- AC or DC Switching Capability
- 3750 Vrms I/O Isolation
- Solid State Switching:
  - Long Life
  - High Reliability
- Small size
- Arc-less, bounce-less switching
- Low Input Power Consumption
- Meets agency standards: UL, CSA, VDE, BABT

G2 Series General Information

The G2 Series of Solid State Relays are designed with the highest level of quality and reliability in mind. Each model is comprehensively tested and meets the strictest of standards as dictated by international safety organizations such as UL, VDE and BABT (See details in the "Agency Approvals" section on page 64 regarding specific information about the G2 Series approvals.). The G2 Series utilizes back-to-back MOSFETs for the output circuit. This enables the relay to switch AC or DC signals. Some models are available with internal current limiting. This feature helps to protect both the relay and any associated circuitry during overcurrent conditions. Long life and reliability are inherent because of the solid state construction. The use of solid state components eliminates mechanical wear or arcing during switching. These conditions typically lead to the reduced life of mechanical relays.

The G2 Series Solid State Relays are optically isolated switching devices. The relays operate by applying a small DC signal to the input of the device which changes the state of the output. The input is a light emitting diode (LED) and the output is a MOSFET switch. The switches are available in Form-A or Form-B, configurations. (Form-A = Normally Open, Form-B = Normally Closed.) These devices act the same way that a Reed or Electromechanical Relay would. The main advantages of the solid state relay are the extended life expectancy, increased reliability, reduced size, and arc-less switching.

Solid State Relay Selector Chart

7 RELAYS

G2 Series - Solid State Relays

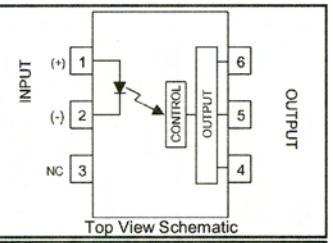
			Contact Form									
			Normally Open						Normally Closed		1 Normally Open & 1 Normally Closed	
Operating Parameters	Switching Voltage	(dc/pk-ac)	400			250	150	15	400	250	400	250
	Switching Current	(mA)	150		120	150	500	250	150	200	150	200
	On Resistance	(Ω)	24	18	35	18	3	8	20	13	24	13
	Current Limit	(Typ.; mA)	380	n/a	380	380	n/a	n/a	n/a	n/a	380*	380*
Relay Configuration	Single Channel	Model #	G2-1A02	G2-1A03	G2-1A05	G2-1A06	G2-1A07		G2-1B01	G2-1B02		
	(1 Input/1 Output)		(Fig. #1)	(Fig. #1)	(Fig. #1)	(Fig. #1)	(Fig. #1)		(Fig. #1)	(Fig. #1)		
	2 Channel	Model #						G2-2A03				
	(1 Input/2 Outputs)							(Fig. #2)				
	Dual Channel	Model #	G2-DA01	G2-DA03	G2-DA02	G2-DA06			G2-DB01	G2-DB02	G2-AB01	G2-AB02
	(2 Inputs/2 Outputs)		(Fig. #3)	(Fig. #3)	(Fig. #3)	(Fig. #3)			(Fig. #3)	(Fig. #3)	(Fig. #3)	(Fig. #3)
	Telecom	Model #		G2-1T01								
	(1 Relay/1 Current Sensor)			(Fig. #4)								

Input to Output Isolation: 3750 Vrms for all models

(*) = Current Limit on Normally Open Contact Only

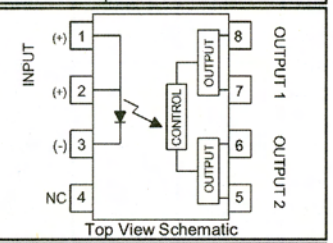
SCHEMATIC DRAWINGS

Figure #1 — Single Channel — **Model #** G2-1A02, G2-1A03, G2-1A05, G2-1A06, G2-1A07, G2-1B01, G2-1B02



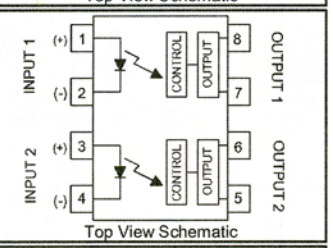
Top View Schematic

Figure #2 — Two Channel — **Model #** G2-2A03



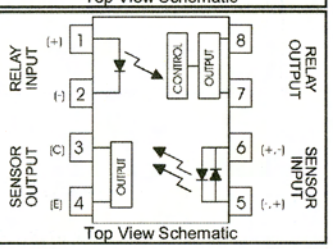
Top View Schematic

Figure #3 — Dual Channel — **Model #** G2-AB01, G2-AB02, G2-DA01, G2-DA02, G2-DA03, G2-DA06, G2-DB01, G2-DB02



Top View Schematic

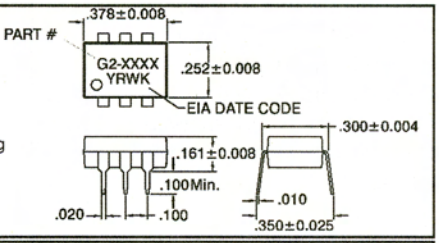
Figure #4 — Telecom Relay — **Model #** G2-1T01



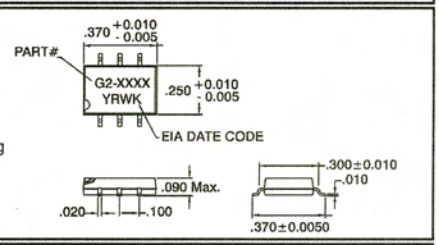
Top View Schematic

PACKAGE DRAWINGS

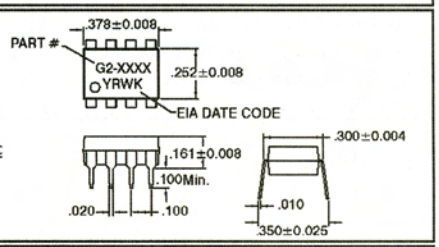
6-Pin DIP Package Drawing



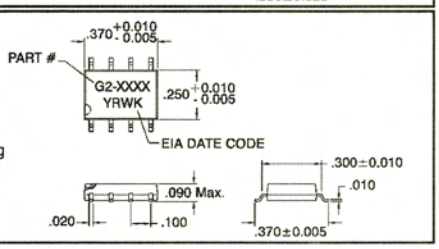
6-Pin SOP Package Drawing



8-Pin DIP Package Drawing



8-Pin SOP Package Drawing



Ordering Information

For Relays in DIP package shipped in Tubes : G2-xxxx-TT
For Relays in SOP package shipped in Tubes : G2-xxxx-ST
For Relays in SOP package shipped in Tape & Reel : G2-xxxx-SR
Specific Model Number as noted above.

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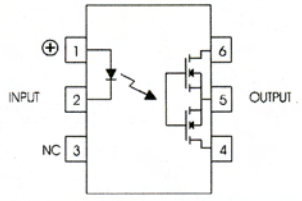
G2 Series/ 1 FORM A Solid State Relays

Model Number					G2-1A02	G2-1A03	G2-1A05	G2-1A06	G2-1A07
Parameters	Sym.	Test Conditions	Units		1 Form A	1 Form A	1 Form A	1 Form A	1 Form A
Input Characteristics									
LED Forward Current - Turn on	I_{Fon}	I_L = 100mA, t = 10mS	mADC	Max	5.0	5.0	5.0	5.0	5.0
				Typ	2.0	2.0	2.0	2.0	2.0
LED Forward Current - Turn off	I_{Foff}	I_L = 0.2mA, V_L = (Note 1)	mADC	Min	0.1	0.1	0.1	0.1	0.1
				Typ	1.8	1.8	1.8	1.8	1.8
Recommended Forward Current	I_F		mADC	Min	10	10	10	10	10
				Max	30	30	30	30	30
LED Forward Voltage	V_F	I_F = 20mA	VDC	Min	1.1	1.1	1.1	1.1	1.1
				Max	1.4	1.4	1.4	1.4	1.4
Maximum Input Ratings									
LED Forward Current	I_F		mADC	Max	50	50	50	50	50
LED Reverse Voltage Withstand	V_R	I_R =10μA	VDC	Max	10	10	10	10	10
Output Characteristics									
Switching Voltage	V_L	I_L = 50mA	V PEAK	Max	400	400	400	250	150
Switching Current: AC Mode (Note 2)	I_L	Pin 4 to pin 6	mA	Max	150	150	120	150	450
Switching Current: DC Mode (Note 2)	I_L	Pins 5(-) to pins 4&6 (+)	mA	Max	250	250	200	250	900
Current Limit: AC Mode (Note 2)	I_{Lmt}	I_F = 5mA, t = 5mS	mA	Typ.	380	n/a	380	380	n/a
Current Limit: DC Mode (Note 2)	I_{Lmt}	IF = 5mA, t = 5mS	mA	Typ.	540	n/a	540	760	n/a
On Resistance: AC Mode (Note 2)	R_{On}	I_F = 5mA, I_L = 50mA	Ω	Max	24	18	35	18	5
On Resistance: DC Mode (Note 2)	R_{On}	IF = 5mA, IL = 50mA	Ω	Max	6	4.5	8.75	4.5	1.25
Off State Resistance	R_{Off}	I_F = 0mA, V_L = 100V	GΩ	Min	0.5	0.5	0.5	0.5	0.5
				Typ	5000	5000	5000	5000	5000
Off State Leakage	I_{Off}	I_F = 0mA, V_L = 100V	nA	Max	200	200	200	200	200
				Typ	0.5	0.5	0.5	0.5	0.5
	I_{Off}	I_F = 0mA, V_L = Max	μA	Max	1	1	1	1	1
Turn On Time	T_{On}	I_F = 5mA, I_L = 50mA	mS	Max	5.0	5.0	5.0	5.0	5.0*
Turn Off Time	T_{Off}	I_F = 5mA, I_L = 50mA	mS	Max	1.0	1.0	1.0	1.0	1.0
Capacitance - Across Output		I_F = 0mA, V_L = 1V	pF	Typ	95	95	60	110	170
		I_F = 0mA, V_L = 50V	pF	Typ	10	10	7	15	30
Thermal Offset Voltage		I_F = 5mA	μV	Typ	0.2	0.2	0.2	0.2	0.2
General Characteristics									
Dielectric Strength - Input to Output		t = 60sec.	V RMS	Min	3750	3750	3750	3750	3750
Capacitance - Input to Output			pF	Typ	0.8	0.8	0.8	0.8	0.8
Power Dissipation	P_{Diss}		mW	Max	500	500	500	500	600

* I_F = 10mA

Schematic Top View:
Mold mark on top of relay indicates Pin #1
Package Drawings on Page 61



Notes:

1: V_L for LED Forward Current - Turn off is 50 Volts less than "Switching Voltage : Max"
2: See "AC Mode and DC Mode of Operation" on Page 67 for further description of AC and DC Mode.
3: Specifications subject to change without notice

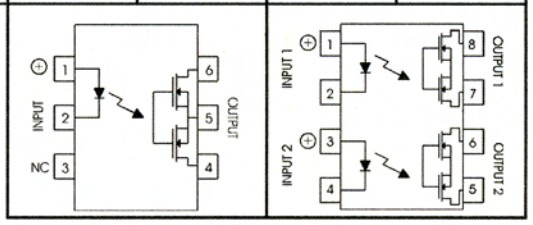
Environmental Ratings

Storage Temp: -40°C to +150°C
Operating Temp: -40°C to +85°C
Solder Temp: 240°C max. for 10 seconds
All electrical parameters specified at 25°C
Vibration: 20G's to 2000Hz
Shock: 50G's

G2 Series/ FORM B Solid State Relays

Model Number					G2-1B01	G2-1B02	G2-DB01	G2-DB02
Parameters	Sym.	Test Conditions	Units		1 Form B	1 Form B	Dual Form B	Dual Form B
Input Characteristics								
LED Forward Current - Turn on	I_{Fon}	I_L = 100mA, t = 10mS	mADC	Max	5.0	5.0	5.0	5.0
				Typ	3.0	3.0	3.0	3.0
LED Forward Current - Turn off	I_{Foff}	I_L = 0.2mA, V_L = (Note 1)	mADC	Min	0.1	0.1	0.1	0.1
				Typ	1.8	1.8	1.8	1.8
Recommended Forward Current	I_F		mADC	Min	10	10	10	10
				Max	30	30	30	30
LED Forward Voltage	V_F	I_F = 20mA	VDC	Min	1.1	1.1	1.1	1.1
				Max	1.4	1.4	1.4	1.4
Maximum Input Ratings								
LED Forward Current	I_F		mADC	Max	50	50	50	50
LED Reverse Voltage Withstand	V_R	I_R = 10mA	VDC	Max	10	10	10	10
Output Characteristics								
Switching Voltage	V_L	I_L = 50mA	V PEAK	Max	350	250	350	250
Switching Current	I_L	(Note 2)	mA	Max	165	200	170	200
		(Note 3)	mA	Max	330	400	120	140
On Resistance (Note 2)	R_{On}	IF = 5mA, IL = 50mA	Ω	Max	20	13	20	13
On Resistance (Note4)	R_{On}	IF = 5mA, IL = 50mA	Ω	Max	5.0	3.25	n/a	n/a
Off State Resistance	R_{Off}	I_F = 0mA, V_L = 100V	GΩ	Min	0.1	0.1	0.1	0.1
				Typ	1.4	1.4	1.4	1.4
Off State Leakage	I_{Off}	I_F = 0mA, V_L = 100V	µA	Max	0.07	0.07	0.07	0.07
				Typ	1.0	1.0	1.0	1.0
	I_{Off}	I_F = 0mA, V_L = Max	µA	Max	1.0	1.0	1.0	1.0
Turn On Time	T_{On}	I_F = 5mA, I_L = 50mA	mS	Max	5.0	5.0	5.0	5.0
Turn Off Time	T_{Off}	I_F = 5mA, I_L = 50mA	mS	Max	1.0	1.0	1.0	1.0
Capacitance - Across Output		I_F = 0mA, V_L = 1V	pF	Typ	200	170	200	170
		I_F = 0mA, V_L = 50V	pF	Typ	20	25	20	25
Thermal Offset Voltage		I_F = 5mA	µV	Typ	0.2	0.2	0.2	0.2
General Characteristics								
Dielectric Strength - Input to Output		t = 60sec.	V RMS	Min	3750	3750	3750	3750
Capacitance - Input to Output			pF	Typ	0.8	0.8	1.2	1.2
Power Dissipation	P_{Diss}		mW	Max	500	500	600	600

Schematic Top View:
Mold mark on top of relay indicates Pin #1
Package Drawings on Page 61



Notes:

1: V_L for LED Forward Current - Turn off is 50 Volts less than "Switching Voltage : Max"
2: For G2-1B01 and G2-1B02: Output connected to pins 4 and 6.
For G2-DB01 and G2-DB02: Each channel.
3: For G2-1B01 and G2-1B02: Output connected to pin 5(-) and pins 4 & 6(+).
For G2-DB01 and G2-DB02: Both channels switching simultaneously
4: For G2-1B01 and G2-1B02: Output connected to pin 5(-) and pins 4 & 6(+).
5: Specifications subject to change without notice

Environmental Ratings

Storage Temp: -40°C to +150°C
Operating Temp: -40°C to +85°C
Solder Temp: 240°C max. for 10 seconds
All electrical parameters specified at 25°C
Vibration: 20G's to 2000Hz
Shock: 50G's

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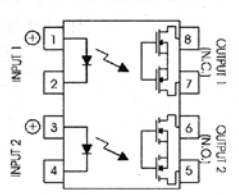
G2 Series/ 1A/1B Solid State Relays

Model Number					G2-AB01	G2-AB02
Parameters	Sym.	Test Conditions	Units		1A/1B	1A/1B
Input Characteristics						
LED Forward Current - Turn on	I_{Fon}	I_L = 100mA, t = 10mS	mADC	Max	5.0	5.0
				Typ	2.0	2.0
LED Forward Current - Turn off	I_{Foff}	I_L = 0.2mA, V_L = (Note 1)	mADC	Min	0.1	0.1
				Typ	1.8	1.8
Recommended Forward Current	I_F		mADC	Min	10	10
				Max	30	30
LED Forward Voltage	V_F	I_F = 20mA	VDC	Min	1.1	1.1
				Max	1.4	1.4
Maximum Input Ratings						
LED Forward Current	I_F		mADC	Max	50	50
LED Reverse Voltage Withstand	V_R	I_R = 10μA	VDC	Max	10	10
Output Characteristics						
Switching Voltage	V_L	I_L = 50mA	V PEAK	Max	400	250
Switching Current	I_L	Each Channel	mA	Max	150	200
		Both Ch.'s Simultaneously	mA	Max	110	150
Current Limit: N.O. Channel only	I_{Lmt}	I_F = 5mA, t = 5mS	mA	Typ.	380	380
On Resistance	R_{On}	I_F = 5mA/0mA, I_L = 50mA	Ω	Max	24	13
Off State Resistance: N.O. Channel	R_{Off}	I_F = 0mA, V_L = 100V	GΩ	Min	0.5	0.5
				Typ	5000	5000
Off State Resistance: N.C. Channel	R_{Off}	I_F = 5mA, V_L = 100V	GΩ	Min	0.5	0.5
				Typ	5000	5000
Off State Leakage: N.O. Channel	I_{Off}	I_F = 0mA, V_L = 100V	nA	Max	200	200
				Typ	0.17	0.17
	I_{Off}	I_F = 0mA, V_L = Max	μA	Max	1	1
Off State Leakage: N.C. Channel	I_{Off}	I_F = 5mA, V_L = 100V	μA	Max	0.02	0.02
				Typ	1	1
	I_{Off}	I_F = 5mA, V_L = Max	μA	Max	1	1
Turn On Time	T_{On}	I_F = 5mA, I_L = 50mA	mS	Max	5.0	5.0
Turn Off Time	T_{Off}	I_F = 5mA, I_L = 50mA	mS	Max	1.0	1.0
Thermal Offset Voltage		I_F = 5mA	μV	Typ	0.2	0.2
General Characteristics						
Dielectric Strength - Input to Output		t = 60sec.	V RMS	Min	3750	3750
Capacitance - Input to Output			pF	Typ	1.2	1.2
Power Dissipation	P_{Diss}		mW	Max	600	600

* I_F = 10mA

Schematic Top View:
Mold mark on top of relay indicates Pin #1
Package Drawings on Page 61



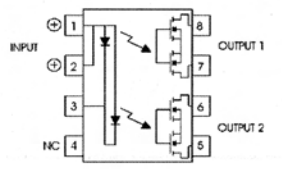
Notes:
1: V_L for LED Forward Current - Turn off is 50 Volts less than "Switching Voltage Max"
2: Specifications subject to change without notice

Environmental Ratings
Storage Temp: -40°C to +150°C
Operating Temp: -40°C to +85°C
Solder Temp: 240°C max. for 10 seconds
All electrical parameters specified at 25°C
Vibration: 20G's to 2000Hz
Shock: 50G's

G2 Series/ 2 FORM A Solid State Relays

Model Number					G2-2A03
Parameters	Sym.	Test Conditions	Units		2 Form A
Input Characteristics					
LED Forward Current - Turn on	I_{Fon}	I_L = 100mA, t = 10mS	mADC	Max	10
				Typ	3.4
LED Forward Current - Turn off	I_{Foff}	I_L = 0.2mA, V_L = (Note 1)	mADC	Min	0.1
				Typ	3.0
Recommended Forward Current	I_F		mADC	Min	15
				Max	40
LED Forward Voltage	V_F	I_F = 20mA	VDC	Min	1.1
				Max	1.4
Maximum Input Ratings					
LED Forward Current	I_F		mADC	Max	50
LED Reverse Voltage Withstand	V_R	I_R =10μA	VDC	Max	10
Output Characteristics					
Switching Voltage	V_L	I_L = 50mA	V PEAK	Max	15
Switching Current	I_L	Each Channel	mA	Max	250
		Both Ch.'s Simultaneously	mA	Max	150
Current Limit	I_{Lmt}	I_F = 5mA, t = 5mS	mA	Min	n/a
				Max	n/a
On Resistance	R_{On}	I_F = 10mA, I_L = 50mA	Ω	Max	8
Off State Resistance	R_{Off}	I_F = 0mA, V_L = 15V	GΩ	Min	0.5
				Typ	5000
Off State Leakage	I_{Off}	I_F = 0mA, V_L = 15V	nA	Max	200
				Typ	0.5
	I_{Off}	I_F = 0mA, V_L = Max	μA	Max	1
Turn On Time	T_{On}	I_F = 10mA, I_L = 50mA	mS	Max	1.5
Turn Off Time	T_{Off}	I_F = 10mA, I_L = 50mA	mS	Max	0.5
Capacitance - Across Output		I_F = 0mA, V_L = 1V	pF	Typ	40
		I_F = 0mA, V_L = 50V	pF	Typ	-
Thermal Offset Voltage		I_F = 10mA	μV	Typ	0.2
General Characteristics					
Dielectric Strength - Input to Output		t = 60sec.	V RMS	Min	3750
Capacitance - Input to Output			pF	Typ	1.2
Power Dissipation	P_{Diss}		mW	Max	600

Schematic Top View:
Mold mark on top of relay indicates Pin #1
Package Drawings on Page 485



Notes:
1: V_L for LED Forward Current - Turn off is 50 Volts less than "Switching Voltage : Max"
2: Specifications subject to change without notice

Environmental Ratings
Storage Temp: -40°C to +150°C
Operating Temp: -40°C to +85°C
Solder Temp: 240°C max. for 10 seconds
All electrical parameters specified at 25°C
Vibration: 20G's to 2000Hz
Shock: 50G's

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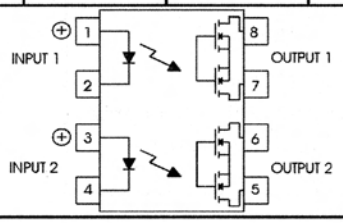
G2 Series/ DUAL FORM A Solid State Relays

Model Number					G2-DA01	G2-DA02	G2-DA03	G2-DA06
Parameters	Sym.	Test Conditions	Units		Dual Form A	Dual Form A	Dual Form A	Dual Form A
Input Characteristics								
LED Forward Current - Turn on	I_{Fon}	I_L = 100mA, t = 10mS	mADC	Max	5.0	5.0	5.0	5.0
				Typ	2.0	2.0	2.0	2.0
LED Forward Current - Turn off	I_{Foff}	I_L = 0.2mA, V_L = (Note 1)	mADC	Min	0.1	0.1	0.1	0.1
				Typ	1.8	1.8	1.8	1.8
Recommended Forward Current	I_F		mADC	Min	10	10	10	10
				Max	30	30	30	30
LED Forward Voltage	V_F	I_F = 20mA	VDC	Min	1.1	1.1	1.1	1.1
				Max	1.4	1.4	1.4	1.4
Maximum Input Ratings								
LED Forward Current	I_F		mADC	Max	50	50	50	50
LED Reverse Voltage Withstand	V_R	I_R = 10μA	VDC	Max	10	10	10	10
Output Characteristics								
Switching Voltage	V_L	I_L = 50mA	V PEAK	Max	400	400	400	250
Switching Current	I_L	Each Channel	mA	Max	150	120	180	180
		Both Ch.'s Simultaneously	mA	Max	110	70	125	125
Current Limit	I_{Lmt}	I_F = 5mA, t = 5mS	mA	Typ.	380	380	n/a	380
On Resistance	R_{On}	I_F = 5mA, I_L = 50mA	Ω	Max	24	35	18	18
Off State Resistance	R_{Off}	I_F = 0mA, V_L = 100V	GΩ	Min	0.5	0.5	0.5	0.5
				Typ	5000	5000	5000	5000
Off State Leakage	I_{Off}	I_F = 0mA, V_L = 100V	nA	Max	200	200	200	200
				Typ	0.5	0.5	0.5	0.5
	I_{Off}	I_F = 0mA, V_L = Max	μA	Max	1	1	1	1
Turn On Time	T_{On}	I_F = 5mA, I_L = 50mA	mS	Max	5.0	5.0	5.0	5.0
Turn Off Time	T_{Off}	I_F = 5mA, I_L = 50mA	mS	Max	1.0	1.0	1.0	1.0
Capacitance - Across Output		I_F = 0mA, V_L = 1V	pF	Typ	95	60	95	110
		I_F = 0mA, V_L = 50V	pF	Typ	10	7	10	15
Thermal Offset Voltage		I_F = 5mA	μV	Typ	0.2	0.2	0.2	0.2
General Characteristics								
Dielectric Strength - Input to Output		t = 60sec.	V RMS	Min	3750	3750	3750	3750
Capacitance - Input to Output			pF	Typ	1.2	1.2	1.2	1.2
Power Dissipation	P_{Diss}		mW	Max	600	600	600	600



Schematic Top View:
Mold mark on top of relay indicates Pin #1
Package Drawings on Page 485

Notes:

1: V_L for LED Forward Current - Turn off is 50 Volts less than "Switching Voltage : Max"

2: Specifications subject to change without notice

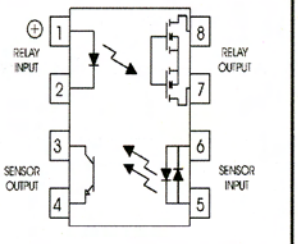
Environmental Ratings

Storage Temp: -40°C to +150°C
Operating Temp: -40°C to +85°C
Solder Temp: 240°C max. for 10 seconds
All electrical parameters specified at 25°C
Vibration: 20G's to 2000Hz
Shock: 50G's

G2 Series/ INTEGRATED TELECOM Solid State Relays

Model Number					G2-1T01
Relay Specifications	Sym.	Test Conditions	Units		Telecom
Input Characteristics					
LED Forward Current - Turn on	I_{Fon}	I_L = 100mA, t = 10mS	mADC	Max	5.0
				Typ	1.5
LED Forward Current - Turn off	I_{Foff}	I_L = 0.2mA, V_L = (Note 1)	µA	Min	0.1
				Typ	1.4
Recommended Forward Current	I_F		mADC	Min	10
				Max	30
LED Forward Voltage	V_F	I_F = 20mA	VDC	Min	1.1
				Max	1.4
Maximum Input Ratings					
LED Forward Current	I_F		mADC	Max	50
LED Reverse Voltage Withstand	V_R	I_R = 10µA	VDC	Max	10
Output Characteristics					
Switching Voltage	V_L	I_L = 50mA	V PEAK	Max	400
Switching Current	I_L		mA	Max	150
On Resistance	R_{On}	I_F = 5mA, I_L = 50mA	Ω	Max	18
Off State Resistance	R_{Off}	I_F = 0mA, V_L = 100V	GΩ	Min	0.5
				Typ	5000
Off State Leakage	I_{Off}	I_F = 0mA, V_L = 100V	nA	Max	200
				Typ	0.5
		I_F = 0mA, V_L = Max	µA	Max	1
Turn On Time	T_{On}	I_F = 5mA, I_L = 50mA	mS	Max	5.0
Turn Off Time	T_{Off}	I_F = 5mA, I_L = 50mA	mS	Max	1.0
Capacitance - Across Output		I_F = 0mA, V_L = 1V	pF	Typ	95
		I_F = 0mA, V_L = 50V	pF	Typ	10
Thermal Offset Voltage		I_F = 5mA	µV	Typ	0.2
General Characteristics					
Dielectric Strength - Input to Output		t = 60sec.	V RMS	Min	3750
Capacitance - Input to Output			pF	Typ	0.8
Power Dissipation	P_{Diss}		mW	Max	600

Schematic Top View:
Mold mark on top of relay indicates Pin #1
Package Drawings on Page 485



Notes:
1: V_L for LED Forward Current - Turn off is 50 Volts less than "Switching Voltage : Max"
2: Specifications subject to change without notice

Environmental Ratings
Storage Temp: -40°C to +150°C
Operating Temp: -40°C to +85°C
Solder Temp: 240°C max. for 10 seconds
All electrical parameters specified at 25°C
Vibration: 20G's to 2000Hz
Shock: 50G's

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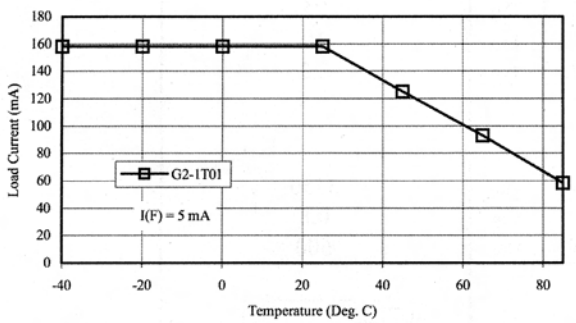
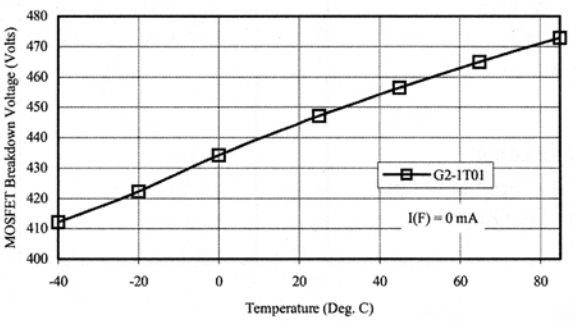
G2 Series/ INTEGRATED TELECOM Solid State Relays

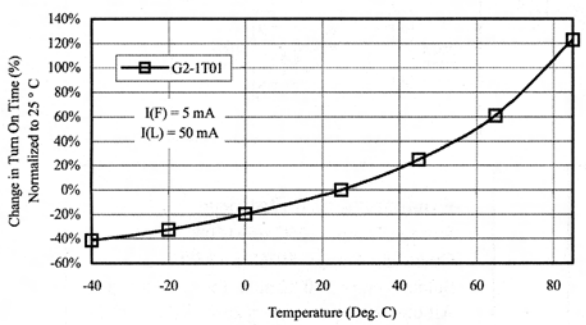
Model Number					G2-1T01
Optocoupler Specifications	Sym.	Test Conditions	Units		Telecom
Input Characteristics					
LED Forward Current to Operate	I_{Fon}	No shunt resistor	mA	Max	6.0
Input Characteristics				Typ	2.0
LED Forward Voltage Drop	V_F	I_F = 10mA	VDC	Min	0.9
				Typ	1.5
LED Current; Detector Off			µA	Min	5
				Typ	25
LED Continuous Forward Current	I_F		mA	Max	50
Output Characteristics (pins 3 & 4)					
Saturation Voltage	V_L	I_F = 16mA, I_C = 2mA	V	Typ	0.8
Collector-Emitter Breakdown Voltage	BV_{CEO}		V	Min	30
Dark Current Leakage	I_{CEO}	I_F = 0mA, V_{CE} = 5V	nA	Typ	10
				Max	100
Trickle Current Leakage	I_{CEO}	I_F = 5mA, V_{CE} = 5V	µA	Max	1.0
General Characteristics					
DC Current Transfer Ratio	CTR	I_F = 6mA, V_{CE} = 0.5V	%	Min	33
				Typ	165
Phototransistor Power Dissipation	P_{Diss}		mW	Max	150
Dielectric Strength - Input to Output		t = 60sec.	V RMS	Min	3750



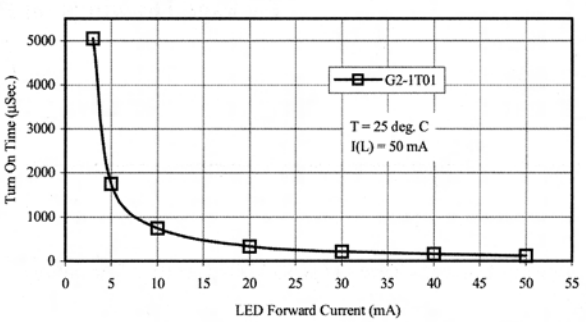
A. Load Current vs. Ambient Temperature



B. Output MOSFET BV vs. Ambient Temperature



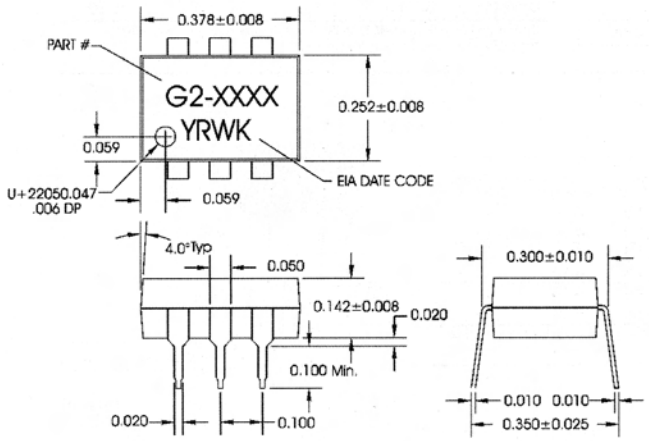
C. On Time vs. Ambient Temperature



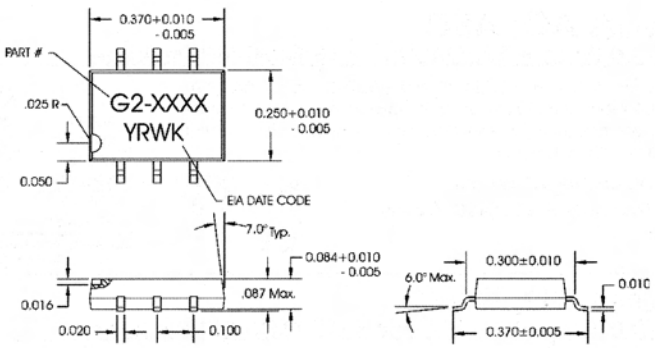
D. Turn On Time vs. LED Forward Current

SSR Technical & Applications Information

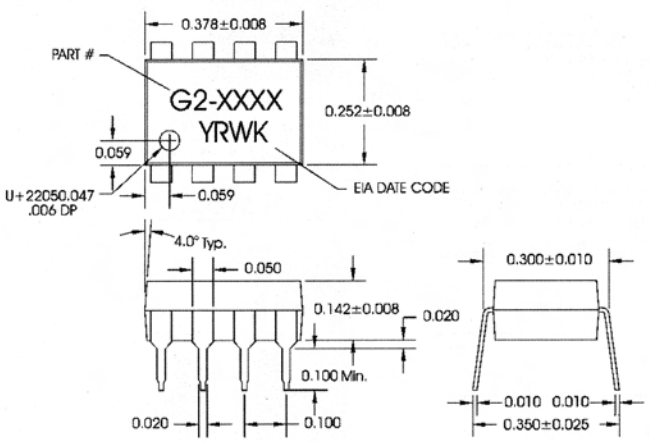
Package Drawings



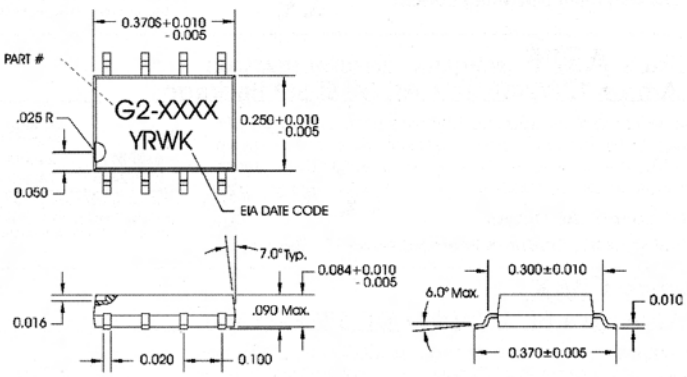
6-Pin Thru-Hole Package



6-Pin Surface Mount Package



8-Pin Thru-Hole Package



8-Pin Surface Mount Package

(All Dimensions in Inches)

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