

# Monsanto

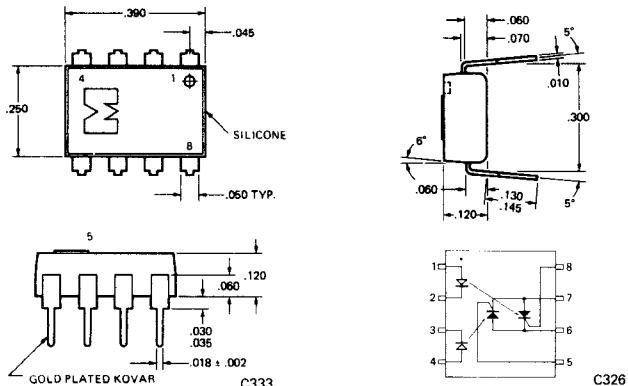
## OPTICALLY ISOLATED SOLID STATE AC DIP RELAY

## MCS6200 MCS6201

### PRODUCT DESCRIPTION

The MCS6200 series are optically-isolated solid state relays with two photo-SCR's connected Anode-to-Cathode (see circuit diagram). Two Light Emitting Diodes, coupled to the photo-SCR's, provide independent SCR control. The MCS6200 features an input to output minimum breakdown voltage of 1500 VDC, while the MCS6201 features 2500 VDC.

### PACKAGE DIMENSIONS, PIN DESIGNATION, CIRCUIT CONFIGURATION



### FEATURES

- Fast switching
- Independent direction control
- Low input control power
- High pulse current capability
- High voltage isolation between input and output
- Compact plastic DIP package

### APPLICATIONS

- AC power control
- Triac triggering
- Bi-directional motor control
- DC power supply polarity control

### ABSOLUTE MAXIMUM RATINGS

Storage temperature -55° to 150°C

Operating temperature -55°C to 100°C

Lead soldering time @ 260°C 7.0 seconds

#### LED (GaAs Diode)

Power dissipation @ 25°C ambient	.....	60 mW
Derate linearly from 25°C	.....	0.8 mW/°C
Continuous forward current	.....	40 mA
Reverse voltage	.....	3.0 volts
Peak forward current (50 µs pulse, 120 pps)	.....	0.5 A

#### COUPLED

Total package power dissipation at 25°	.....	400 mW
Derate linearly from 25°C	.....	5.3 mW/°C
Input to output breakdown voltage	.....	

MCS6200 ..... 1500 VDC

MCS6201 ..... 2500 VDC

#### DETECTOR (Photo SCR) each direction

Power dissipation @ 25°C ambient	.....	200 mW
Derate linearly from 25°C	.....	2.67 mW/°C
Continuous forward current	.....	150 mA
Peak pulse current (100 µsec @ 120 pps)	....	1.0 A
Average gate current	.....	25 mA
Reverse gate current	.....	1.0 mA

### ELECTRO-OPTICAL CHARACTERISTICS (25°C Free Air Temperature Unless Otherwise Specified)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
LED (each)						
Forward voltage	V <sub>F</sub>	1.1	1.25	1.5	V	I <sub>F</sub> = 40 mA
Reverse voltage	V <sub>R</sub>	3.0	—	—	V	I <sub>R</sub> = 10 µA
Reverse current	I <sub>R</sub>	—	.001	10	µA	V <sub>R</sub> = 3.0 V
Junction capacitance	C <sub>J</sub>	—	100	—	pF	V <sub>F</sub> = 0 V
Rise and Fall Time	t <sub>r</sub> , t <sub>f</sub>	—	20	—	nsec	I <sub>F</sub> = 40 mA, R <sub>L</sub> = 50 Ω

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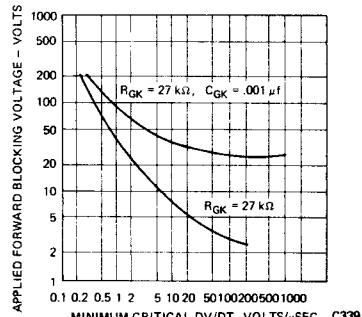
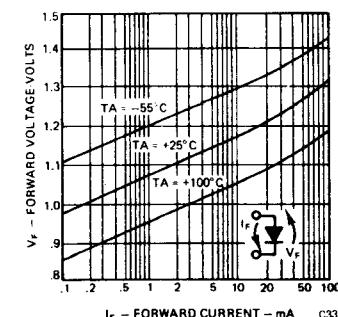
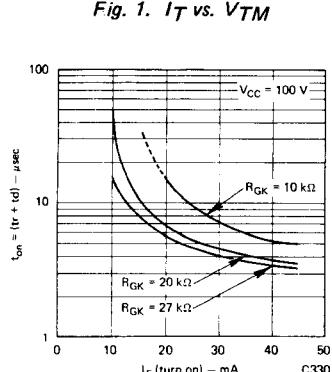
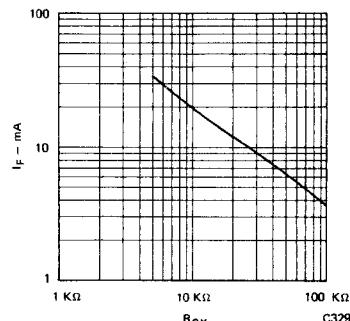
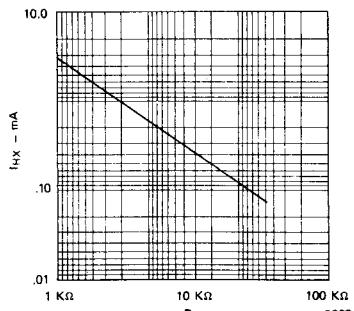
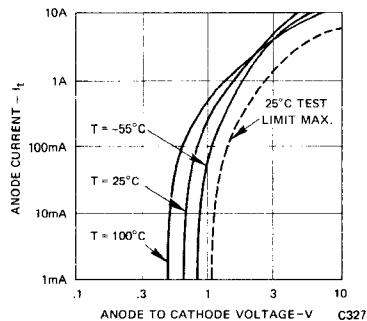
## ELECTRO-OPTICAL CHARACTERISTICS (Con't)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
DETECTOR (each)						
Forward leakage current	$I_{FX}$	—	.01	2.0	$\mu A$	$V_{FX} = \text{Rated } V_{FXM}, R_{GK} = 27 \Omega$
Reverse leakage current	$I_{RX}$	—	.01	2.0	$\mu A$	$V_{RX} = \text{Rated } V_{RDM}, R_{GK} = 27 \Omega$
Max. forward and reverse blocking voltage (Note 1)	$V_{FXM}, V_{ROM}$	200	—	—	V	$R_{GK} = 27 k\Omega$
On voltage	$V_{TM}$	—	1.0	1.3	V	$I_T = 100 \text{ mA}$
Holding current	$I_{HX}$	.01	.05	2.0	mA	$R_{GK} = 27 k\Omega$
Gate trigger voltage	$V_{GT}$	—	.5	1.0	V	$V_{FX} = 100 \text{ V}$
Gate trigger current (direct drive)	$I_{GT}$	—	15	100	$\mu A$	$V_{FX} = 100 \text{ V}, R_L = 10 k\Omega, R_{GK} = 27 k\Omega$
	$I_{GT}$	—	45	500	$\mu A$	$V_{FX} = 100 \text{ V}, R_L = 10 k\Omega, R_{GK} = 10 k\Omega$
	$I_{GT}$	—	0.5	2.0	mA	$V_{FX} = 100 \text{ V}, R_L = 10 k\Omega, R_{GK} = 1 k\Omega$
Critical rate of rise of forward anode voltage	{ $dV_A/dt$	—	0.45	—	V/ $\mu$ sec	$V_{FX} = 100 \text{ V}, R_{GK} = 27 k\Omega, C_{GK} = \text{OPEN}$
	$dV_A/dt$	—	0.9	—	V/ $\mu$ sec	$V_{FX} = 100 \text{ V}, R_{GK} = 27 k\Omega, C_{GK} = 0.001 \mu F$
COUPLED						
Turn on current	$I_F$	2	8	14	mA	$V_{FX} = 100 \text{ V}, R_{GK} = 27 k\Omega$
Trigger time	$t_{on} = t_r + t_d$	—	4.0	—	$\mu$ sec	$R_{GK} = 27 k\Omega, I_F = 30 \text{ mA}, V_{CC} = 50 \text{ V}$
AC turn on current (Note 2)	$I_F$	20	—	—	mA	$V_{CC} = 120 \text{ VAC}, I_T = 100 \text{ mA}, R_{GK} = 27 k\Omega$
ISOLATION						
Isolation breakdown voltage	$V_{ISO}$	1500	—	—	VDC	$t = 1 \text{ minute}$
MCS6200		2500	—	—	VDC	
MCS6201		—	$10^{11}$	—	$\Omega$	$V = \text{Rated } V_{ISO}$
Isolation resistance	$R_{ISO}$	—	1.0	—	pf	$f = 1 \text{ MHz}$
Capacitance	$C_{ISO}$	—	50,000	—	V-Hz	15 minutes
Dielectric dissipation limit		800	—	—	$V_{RMS}$	15 minutes
AC voltage limit @ 60 Hz						

Note 1. Due to the asymmetry of the devices, the reverse avalanche breakdown of one channel may not be protected by the forward breakdown of the other channel.

Note 2. To ensure conduction in both directions, see "TRIAC CONNECTION" schematic.

## TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES (25°C Free Air Temperature Unless Otherwise Specified)



## TYPICAL ELECTRO-OPTICAL CHARACTERISTIC CURVES (Con't)

(25°C Free Air Temperature Unless Otherwise Specified)

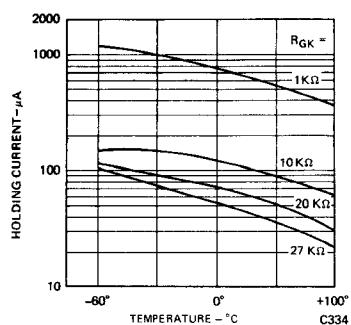


Fig. 7.  $I_{HX}$  vs. Temp. °C

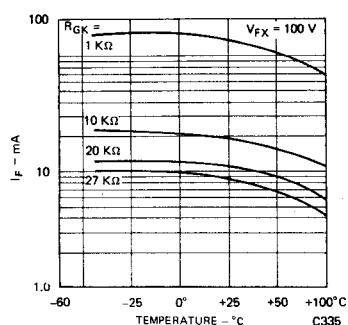


Fig. 8.  $I_F$  vs. Temp.

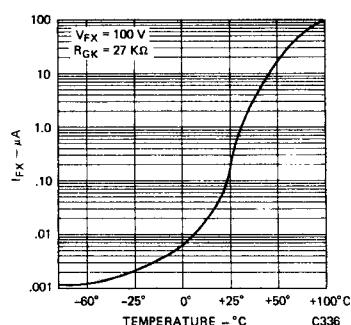


Fig. 9.  $I_{EX}$  vs. Temp.

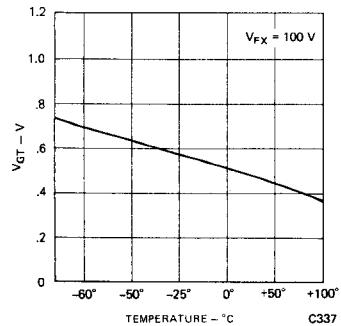


Fig. 10. Gate Trigger Voltage  $V_{GT}$  vs. T

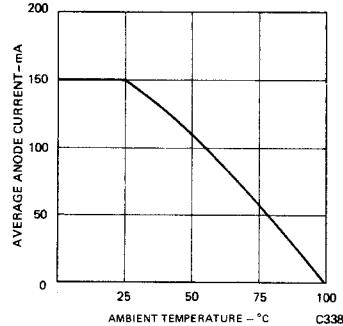
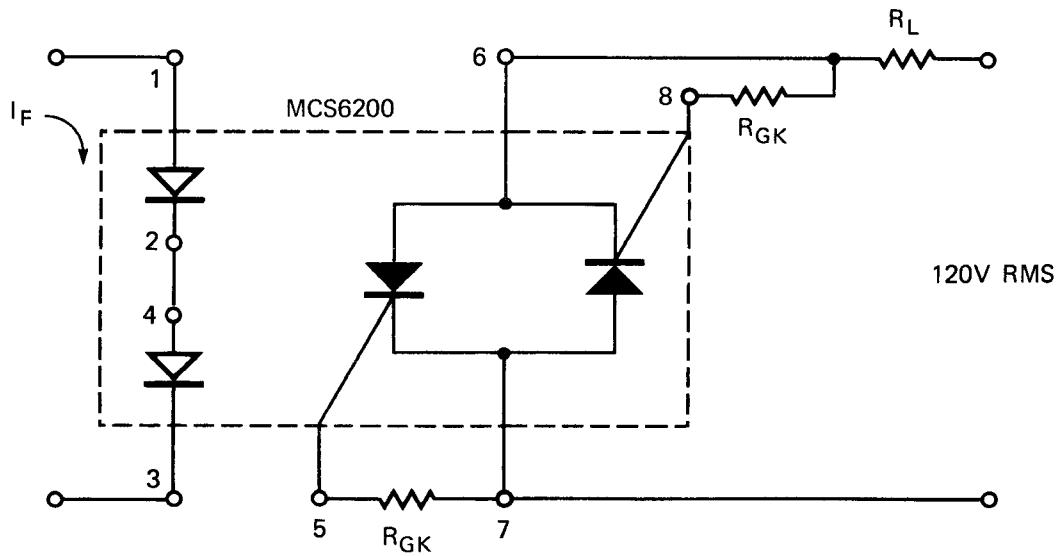


Fig. 11. Anode Current Derating

## TYPICAL CIRCUIT APPLICATIONS

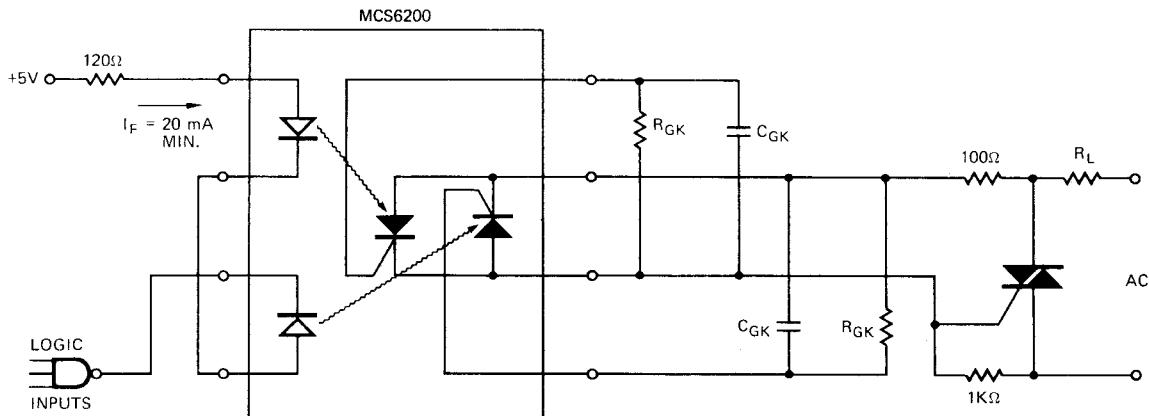


A. TRIAC CONNECTION

C340

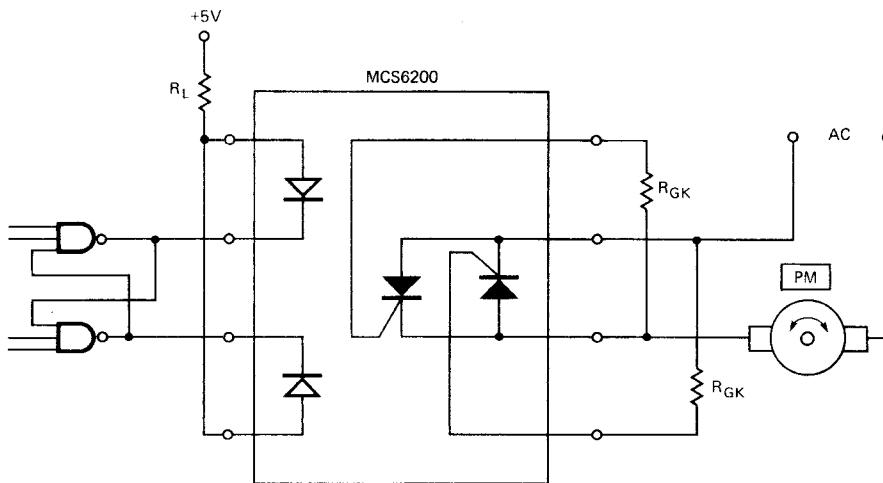
# MCS6200 MCS6201

## TYPICAL CIRCUIT APPLICATIONS (Cont'd)



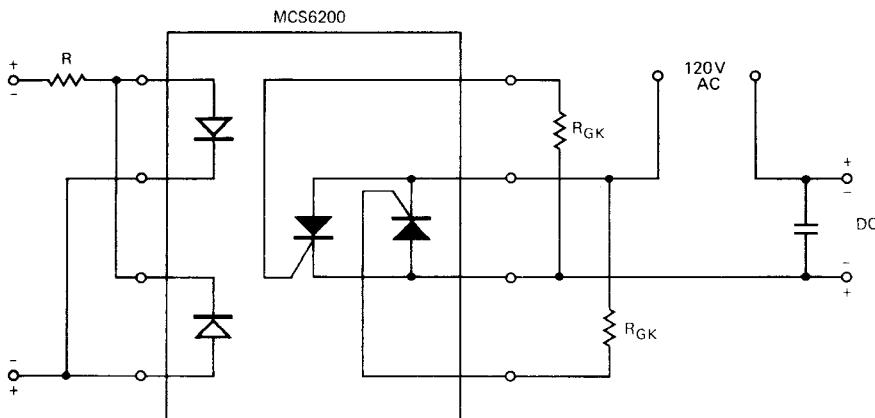
C341

### B. TRIAC TRIGGER



C342

### C. BI-DIRECTIONAL MOTOR CONTROL



C343

### D. DC POWER SUPPLY POLARITY CONTROL

**Monsanto**

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