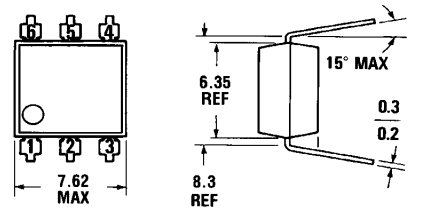
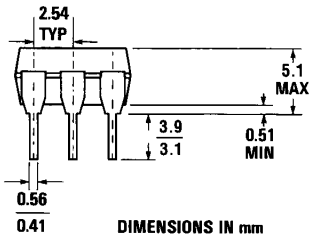
FAIRCHILD
SEMICONDUCTOR™

NON-ZERO-CROSSING TRIACS

MOC3009 MOC3010 MOC3011 MOC3012

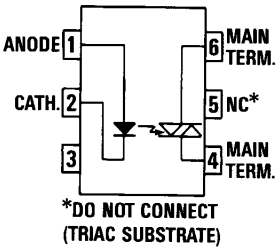
PACKAGE DIMENSIONS





DIMENSIONS IN mm
PACKAGE CODE E

ST1603-02



Equivalent Circuit

DESCRIPTION

The MOC3009, MOC3010, MOC3011 and MOC3012 are optically isolated triac driver devices. These devices contain a GaAs infrared emitting diode and a light activated silicon bilateral switch, which functions like a triac. This series is designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 120 VAC operations.

FEATURES

- Low input current required (typically 5mA—MOC3011)
- High isolation voltage—minimum 7500 VAC peak
- Underwriters Laboratory (UL) recognized—File E90700

APPLICATIONS

- Triac driver
- Industrial controls
- Traffic lights
- Vending machines
- Motor control
- Solid state relay

ABSOLUTE MAXIMUM RATINGS

TOTAL PACKAGE

Storage temperature ..... −55°C to 150°C
Operating temperature ..... −40°C to 100°C
Lead temperature
(soldering 10 sec) ..... 260°C
Withstand test voltage ... 7500 VAC Peak (50-60 Hz)

INPUT DIODE

Forward DC current ..... 50 mA
Reverse voltage ..... 3 V
Peak forward current
(1 μs pulse, 300 pps) ..... 3.0 A
Power dissipation (25°C ambient) ..... 100 mW
Derate linearly (above 25°C) ..... 1.33 mW/°C

OUTPUT DRIVER

Off-state output terminal voltage ..... 250 volts
On-state RMS current T_A=25°C ..... 100 mA
(Full cycle, 50 to 60 Hz) T_A=70°C ..... 50 mA
Peak nonrepetitive surge current ..... 1.2 A
(PW=10 ms, DC=10%)
Total power dissipation @ T_A=25°C ..... 300 mW
Derate above 25°C ..... 4.0 mW/°C

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

INDIVIDUAL COMPONENT CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
INPUT DIODE						
Forward voltage	V_F		1.2	1.50	V	I_F=10 mA
Junction capacitance	C_J		50		pF	V_F=0 V, f=1 MHz
Reverse leakage current	I_R			100	μA	V_R=3.0 V
OUTPUT DETECTOR Peak blocking current, either direction	I_{DRM}	—		100	nA	V_{DRM}=250 V, Note 1
Peak on-state voltage, either direction	V_{TM}	—	2.0	3.0	Volts	I_{TM}=100 mA Peak

Note 1. Test voltage must be applied within dv/dt rating.

TRANSFER CHARACTERISTICS

DC CHARACTERISTICS		SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
LED trigger current (current required to latch output)	MOC3009	I_{FT}	—	15.0	30	mA	Main terminal voltage=3.0 V, R_L = 150Ω
	MOC3010	I_{FT}	—	10.0	15	mA	
	MOC3011	I_{FT}	—	5	10	mA	
	MOC3012	I_{FT}	—	—	5	mA	
Holding current		I_H	—	100	—	μA	Either direction

TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
AC dv/dt RATING Critical rate of rise of off-state voltage	dv/dt	—	12.0	—	V/μs	Static dv/dt (see Fig. 4)
Critical rate of rise of commutating voltage	dv/dt	—	0.2	—	V/μS	Commutating dv/dt I_{LOAD}=15 mA (see Fig. 4)

ISOLATION CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Isolation voltage	V_{iso}	5300			V_{AC}RMS	$I_{I-O} \leq 1$ μA, 1 Minute
	V_{iso}	7500			V_{AC}PEAK	$I_{I-O} \leq 1$ μA, 1 Minute
Isolation resistance	R_{iso}	10^{11}			ohms	V_{I-O}=500 VDC
Isolation capacitance	C_{iso}		0.5		pF	f=1 MHz

TYPICAL ELECTRICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified)

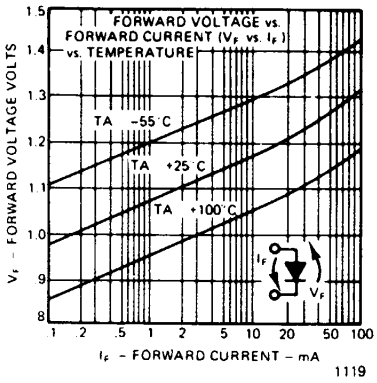


Fig. 1. Forward Voltage Drop vs. Forward Current

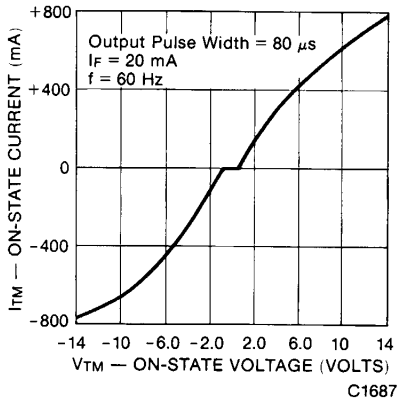


Fig. 2. On-State Characteristics

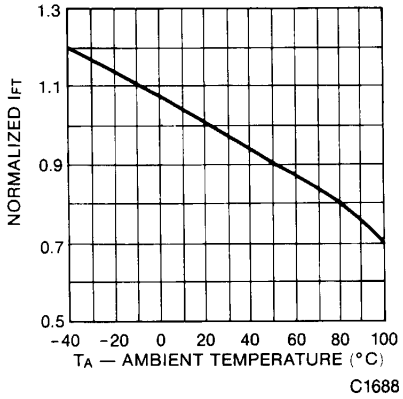


Fig. 3. Trigger Current vs. Temperature

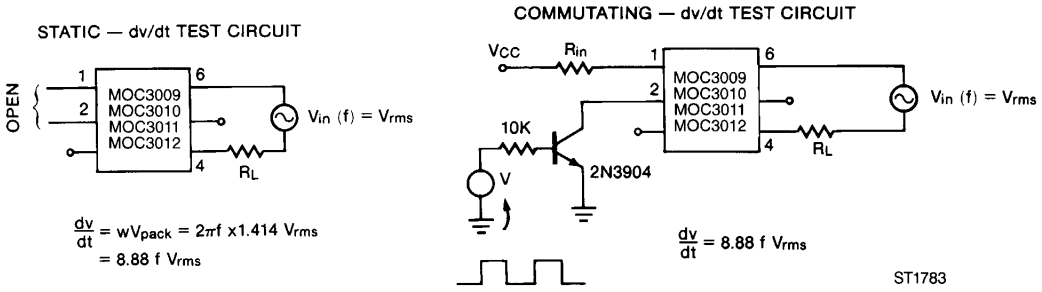


Fig. 4. dV/dt Test Circuits

TYPICAL ELECTRICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

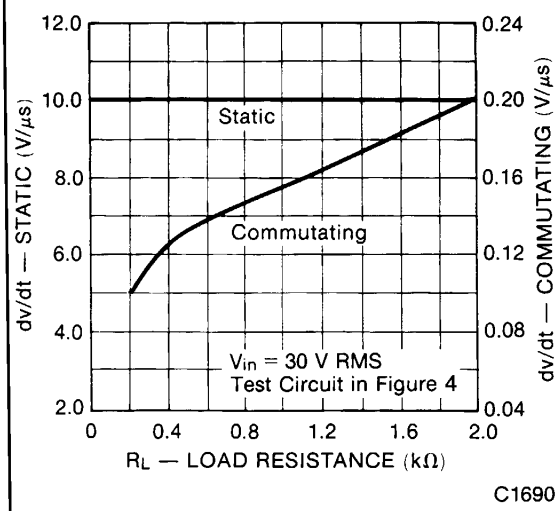


Fig. 5. dV/dt vs. Load Resistance

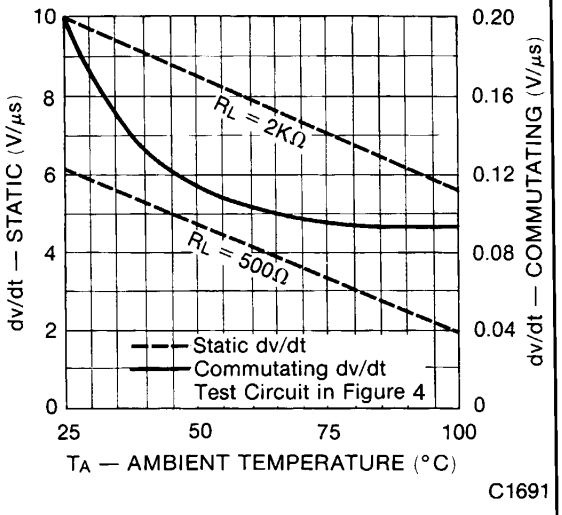


Fig. 6. dV/dt vs. Temperature

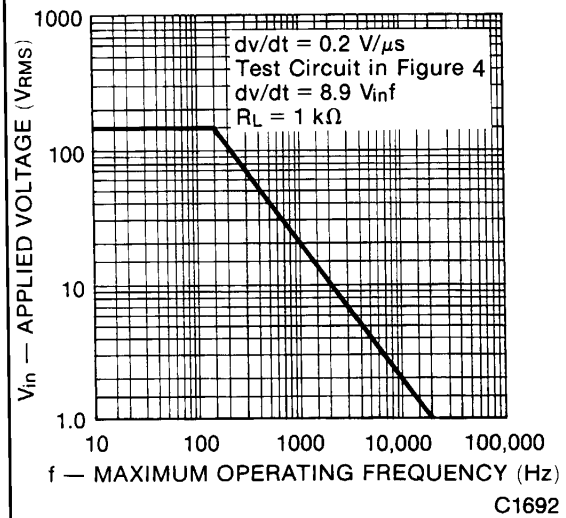


Fig. 7. Commutating dV/dt vs. Frequency

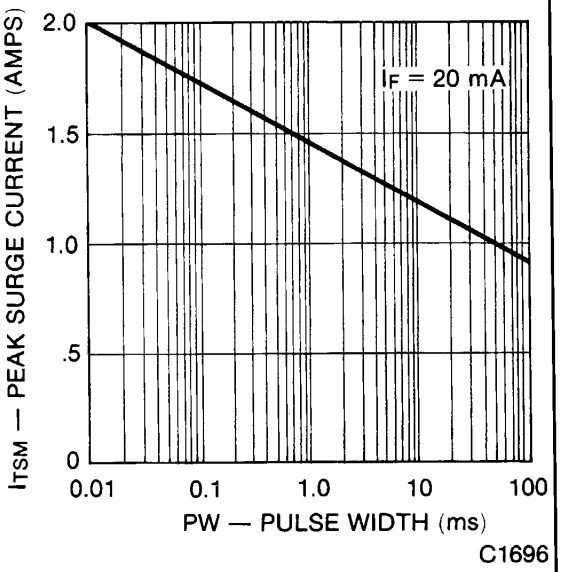


Fig. 8. Maximum Nonrepetitive Surge Current

TYPICAL APPLICATION CIRCUITS

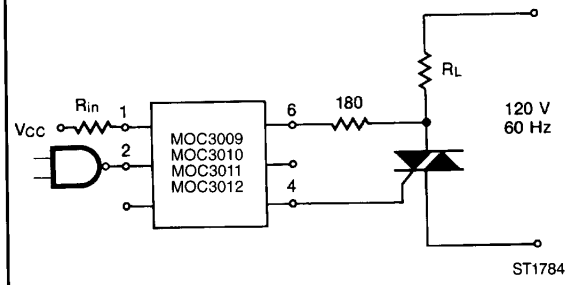


Fig. 9. Resistive Load

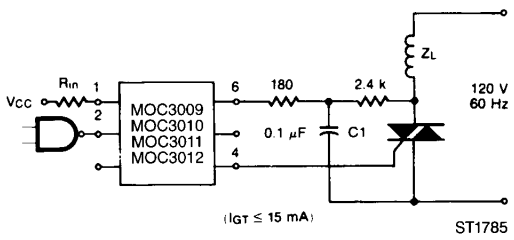


Fig. 10. Inductive Load With Sensitive Gate Triac

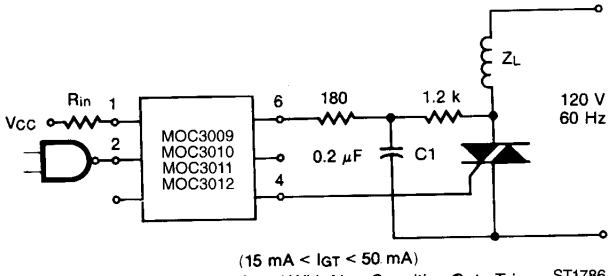


Fig. 11. Inductive Load With Non-Sensitive Gate Triac

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.