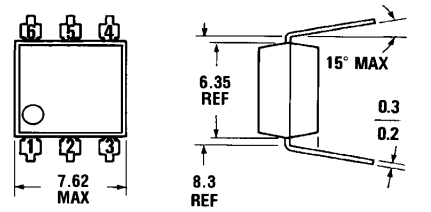
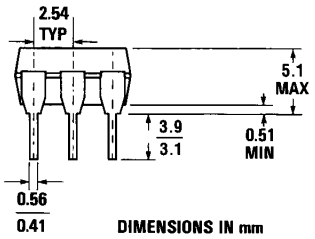
FAIRCHILD
SEMICONDUCTOR™

NON-ZERO-CROSSING TRIACS

MOC3009 MOC3010 MOC3011 MOC3012

PACKAGE DIMENSIONS





DIMENSIONS IN mm
PACKAGE CODE E

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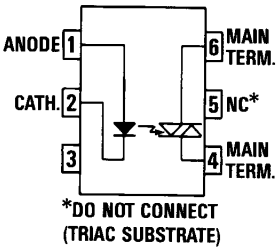

Equivalent Circuit

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)

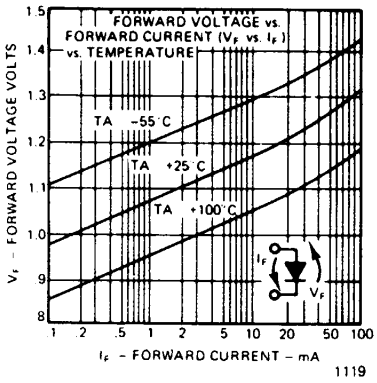

Fig. 1. Forward Voltage Drop vs. Forward Current

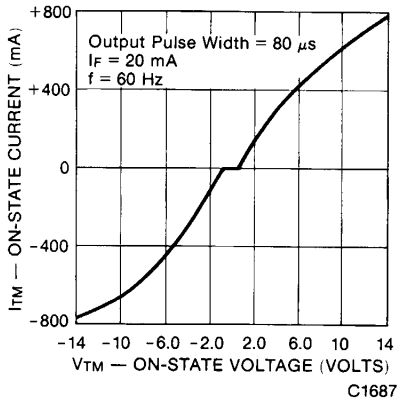

Fig. 2. On-State Characteristics

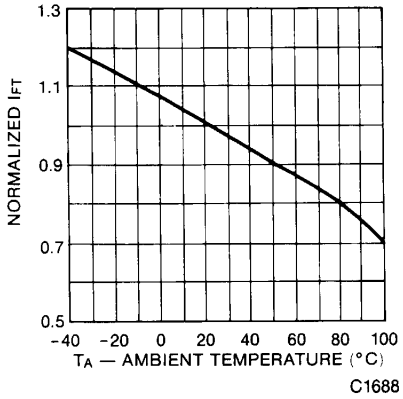

Fig. 3. Trigger Current vs. Temperature

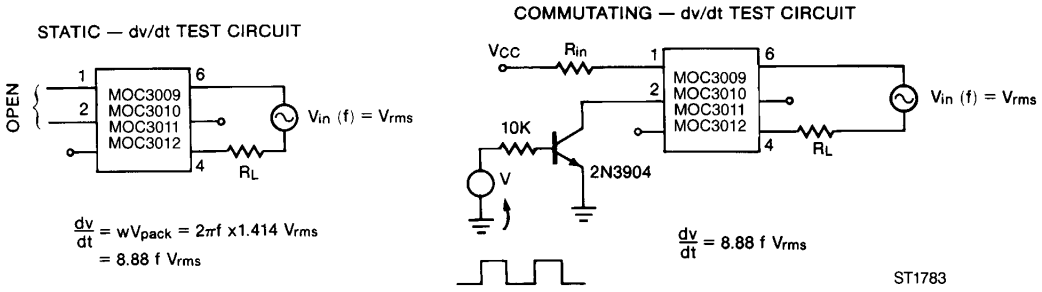

Fig. 4. dV/dt Test Circuits

TYPICAL ELECTRICAL CHARACTERISTIC CURVES

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

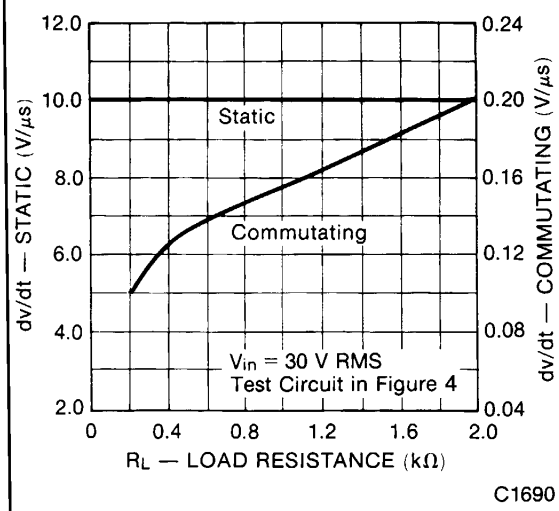

Fig. 5. dV/dt vs. Load Resistance

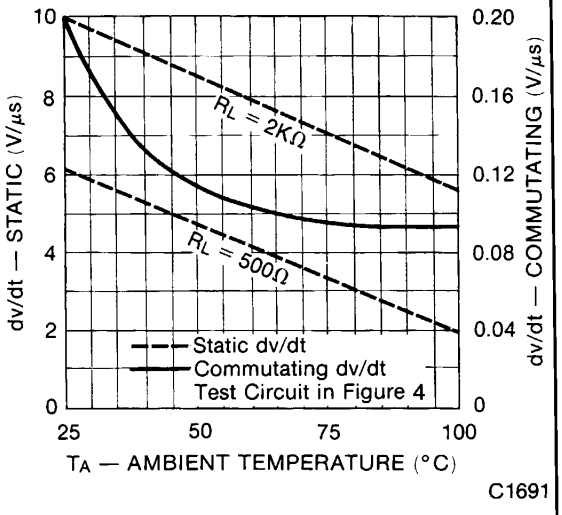

Fig. 6. dV/dt vs. Temperature

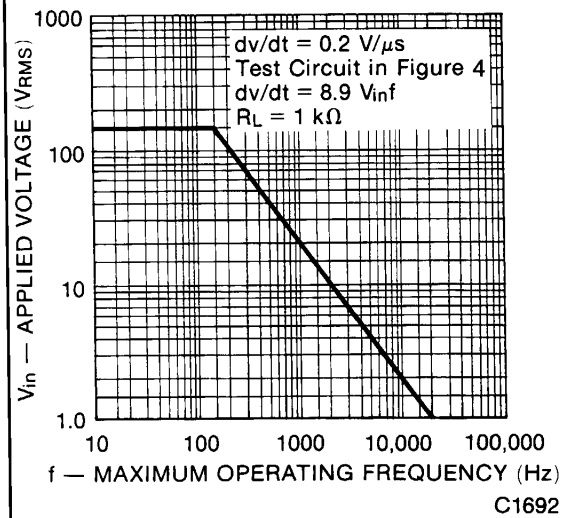

Fig. 7. Commutating dV/dt vs. Frequency

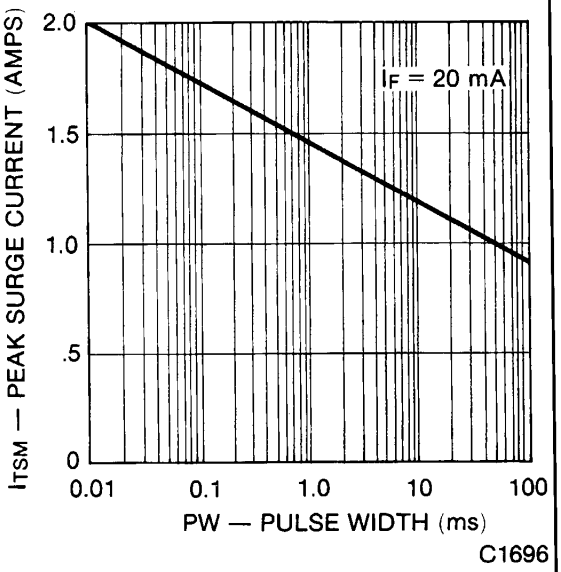

Fig. 8. Maximum Nonrepetitive Surge Current

TYPICAL APPLICATION CIRCUITS

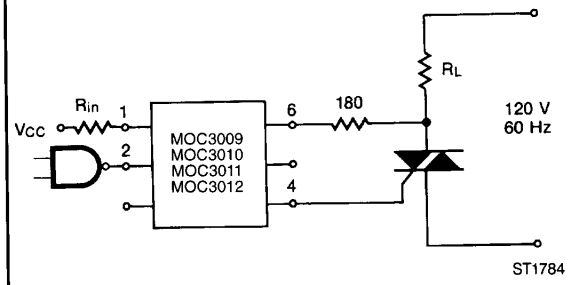

Fig. 9. Resistive Load

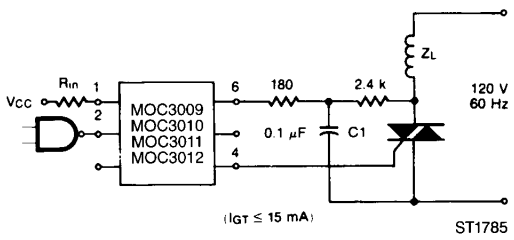

Fig. 10. Inductive Load With Sensitive Gate Triac

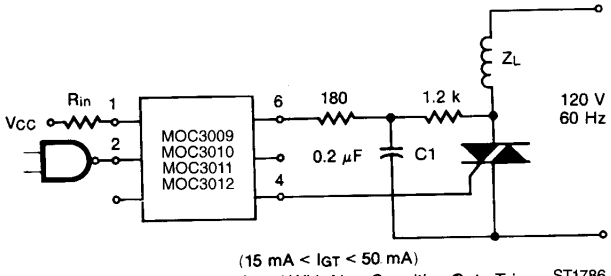

Fig. 11. Inductive Load With Non-Sensitive Gate Triac

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