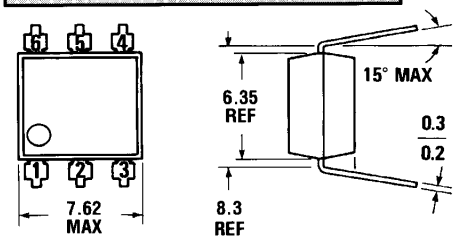
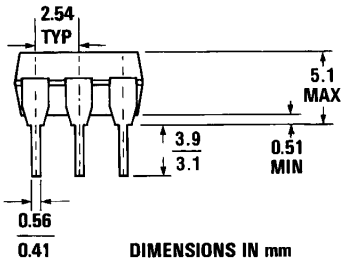
FAIRCHILD
SEMICONDUCTOR™

NON-ZERO-CROSSING TRIACS

MOC3020 MOC3021 MOC3022 MOC3023

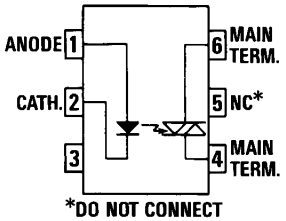
PACKAGE DIMENSIONS





DIMENSIONS IN mm
PACKAGE CODE E

ST1603



*DO NOT CONNECT
(TRIAC SUBSTRATE)

C2081

Equivalent Circuit

DESCRIPTION

The MOC3020, MOC3021, MOC3022 and MOC3023 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 is designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 240 VAC operations.

FEATURES

- Excellent I_{FT} stability—IR emitting diode has low degradation
- High isolation voltage—minimum 7500 VAC peak
- Underwriters Laboratory (UL) recognized—File #E90700

APPLICATIONS

- European applications for 240 VAC
- 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

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 ambient)	1.33 mW/°C

OUTPUT DRIVER

Off-state output terminal voltage		400 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 (PW=10 ms, DC=10%)		1.2 A
Total power dissipation (25°C ambient)		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}	—	10	100	nA	V_{DRM}=400 V, Note 1
Peak on-state voltage, either direction	V_{TM}	—	2.5	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)	MOC3020	I_{FT}	—	—	30	mA	Main terminal voltage=3.0 V, R_L=150Ω
	MOC3021	I_{FT}	—	—	15	mA	
	MOC3022	I_{FT}	—	—	10	mA	
	MOC3023	I_{FT}	—	—	5	mA	
Holding current		I_H	—	100	—	μA	Either direction

TRANSFER CHARACTERISTICS

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
dv/dt RATING						
Critical rate of rise of off-state voltage	dv/dt	—	12	—	V/μs	Static dv/dt, T_A=85°C (see Fig. 3)
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} ≤1 μA, 1 Minute
	V_{iso}	7500			V_{AC}PEAK	I_{I-O} ≤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

Note 1: Ratings apply to either polarity of pin 6 — referenced to pin 4. Voltages must be applied within dv/dt rating.

TYPICAL ELECTRICAL CHARACTERISTIC CURVES

(25°C Free Air Temperature Unless Otherwise Specified)

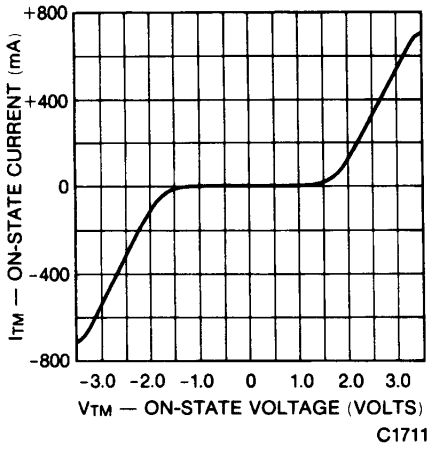


Fig. 1. On-State Characteristics

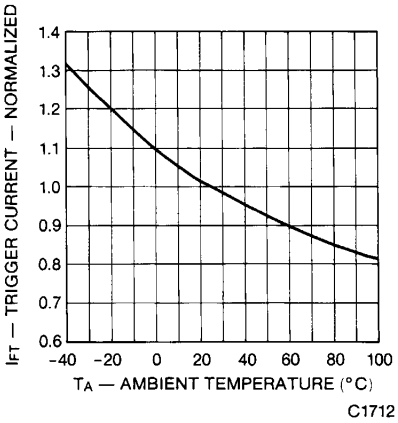
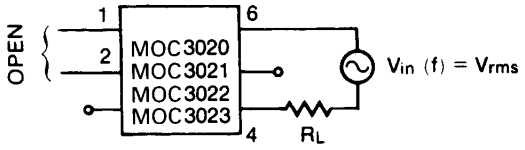


Fig. 2. Trigger Current vs. Temperature

TEST CIRCUITS FOR dV/dt MEASUREMENTS



$$\frac{dV}{dt} = wV_{pack} = 2\pi f \times 1.414\ V_{rms}$$
$$= 8.88\ f\ V_{rms}$$

Fig. 3. Static dV/dt

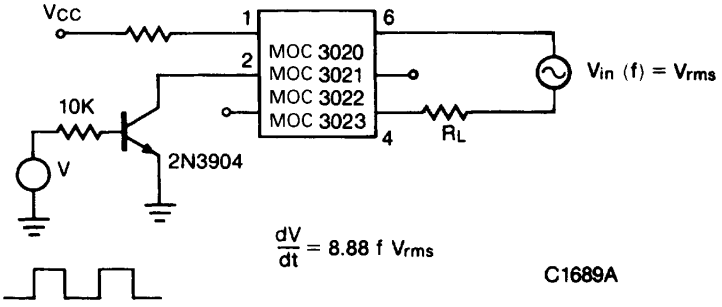


Fig. 4. Commutating dV/dt

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