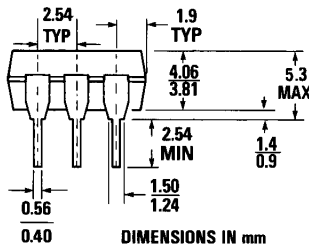
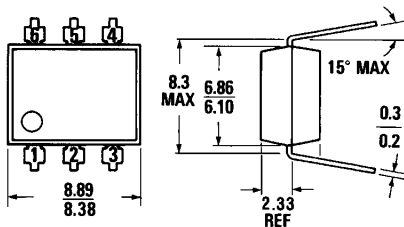
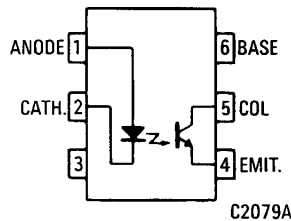


**PACKAGE DIMENSIONS**



DIMENSIONS IN mm  
PACKAGE CODE K

ST1603A



C2079A

Equivalent Circuit

**DESCRIPTION**

The MOC series consists of a Gallium Arsenide IRED coupled with an NPN phototransistor.

**FEATURES**

- High isolation voltage  
5300 VAC RMS—1 minute  
7500 VAC PEAK—1 minute
- High  $BV_{CEO}$  minimum 70 volts
- Current transfer ratio in selected groups:  
MOC8111: 20% min.  
MOC8112: 50% min.  
MOC8113: 100% min.
- Maximum switching time in saturation specified
- Underwriters Laboratory (UL) recognized File #E90700

**APPLICATIONS**

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs
- Appliance sensor systems
- Industrial controls

**ABSOLUTE MAXIMUM RATINGS**

**TOTAL PACKAGE**

Storage temperature	−55°C to 150°C
Operating temperature	−55°C to 100°C
Lead temperature (soldering, 10 sec)	260°C
Total package power dissipation @ 25°C (LED plus detector)	260 mW
Derate linearly from 25°C	3.5 mW/°C

**INPUT DIODE**

Forward DC current	90 mA
Reverse voltage	6 V
Peak forward current (1 $\mu$ s pulse, 300 pps)	3.0 A
Power dissipation 25°C ambient	135 mW
Derate linearly from 25°C	1.8 mW/°C

**OUTPUT TRANSISTOR**

Power dissipation @ 25°C	200 mW
Derate linearly from 25°C	2.67 mW/°C

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

**INDIVIDUAL COMPONENT CHARACTERISTICS**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
<b>INPUT DIODE</b>						
Forward voltage	$V_F$		1.3	1.50	V	$I_F=60\text{ mA}$
Forward voltage temp. coefficient	$\frac{\Delta V_F}{\Delta T_A}$		-1.8		mV/°C	
Reverse voltage	$V_R$	6.0	15		V	$I_R=10\ \mu\text{A}$
Junction capacitance	$C_J$		50		pF	$V_F=0\text{ V}, f=1\text{ MHz}$
			65		pF	$V_F=1\text{ V}, f=1\text{ MHz}$
Reverse leakage current	$I_R$		.35	10	$\mu\text{A}$	$V_R=3.0\text{ V}$
<b>OUTPUT TRANSISTOR</b>						
Breakdown voltage						
Collector to emitter	$BV_{CEO}$	70			V	$I_C=1.0\text{ mA}, I_F=0$
Emitter to collector	$BV_{ECO}$	7			V	$I_E=100\ \mu\text{A}, I_F=0$
Leakage current						
Collector to emitter	$I_{CEO}$		5	50	nA	$V_{CE}=10\text{ V}, I_F=0$
Capacitance						
Collector to emitter			8		pF	$V_{CE}=0, f=1\text{ MHz}$

**TRANSFER CHARACTERISTICS**

DC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Current Transfer Ratio, collector to emitter	CTR				%	$I_F=10\text{ mA}; V_{CE}=5\text{ V}$
MOC8111		20				
MOC8112		50				
MOC8113		100				
Saturation voltage	$V_{CE(SAT)}$		0.27	.40	V	$I_F=10\text{ mA}; I_C=2.5\text{ mA}$

**TRANSFER CHARACTERISTICS**

AC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
<b>SWITCHING TIMES</b>						
Non-saturated						$R_L=100\ \Omega; I_C=2\text{ mA}; V_{CC}=10\text{ V}$
Turn-on time	$t_{on}$		6.0	10	$\mu\text{s}$	
Turn-off time	$t_{off}$		5.5	10	$\mu\text{s}$	See Fig. 10.

**ELECTRO-OPTICAL CHARACTERISTICS**  
(25°C Temperature Unless Otherwise Specified) (Cont'd)

**TRANSFER CHARACTERISTICS (Cont'd)**

AC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
<b>SATURATED SWITCHING TIMES</b>						
Turn-on time	$t_{on}$					
MOC8111			3.0	5.5	$\mu$ S	$I_F=20$ mA, $V_{CE}=0.4$ V
MOC8112, MOC8113			4.2	8.0	$\mu$ S	$I_F=10$ mA, $V_{CE}=0.4$ V
Rise-time	$t_r$					
MOC8111			2.0	4.0	$\mu$ S	$I_F=20$ mA, $V_{CE}=0.4$ V
MOC8112, MOC8113			3.0	6.0	$\mu$ S	$I_F=10$ mA, $V_{CE}=0.4$ V
Turn-off time	$t_{off}$					
MOC8111			18	34	$\mu$ S	$I_F=20$ mA, $V_{CE}=0.4$ V
MOC8112, MOC8113			23	39	$\mu$ S	$I_F=10$ mA, $V_{CE}=0.4$ V
Fall-time	$t_f$					
MOC8111			11	20	$\mu$ S	$I_F=20$ mA, $V_{CE}=0.4$ V
MOC8112, MOC8113			14	24	$\mu$ S	$I_F=10$ mA, $V_{CE}=0.4$ V

**ISOLATION CHARACTERISTICS**

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
Isolation voltage	$V_{iso}$	5300			$V_{AC}$ RMS	$I_{i0} \leq 1$ $\mu$ A, 1 minute
	$V_{iso}$	7500			$V_{AC}$ PEAK	$I_{i0} \leq 1$ $\mu$ A, 1 minute
Isolation resistance	$R_{iso}$	$10^{11}$			ohms	$V_{i0}=500$ VDC
Isolation capacitance	$C_{iso}$		0.5		pF	$f=1$ MHz

**ELECTRICAL CHARACTERISTIC CURVES**

(25°C Free Air Temperature Unless Otherwise Specified)

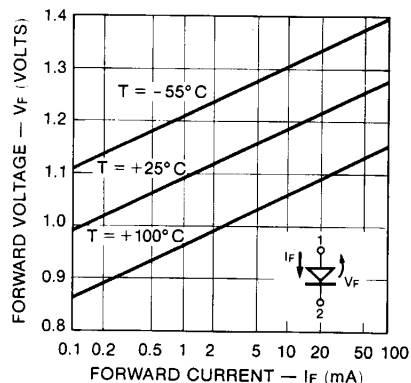


Fig. 1. Forward Voltage vs. Current

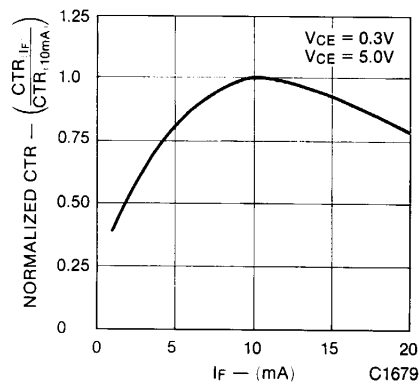


Fig. 2. Normalized CTR vs. Forward Current

**ELECTRO-OPTICAL CHARACTERISTICS**  
(25°C Temperature Unless Otherwise Specified) (Cont'd)

**TRANSFER CHARACTERISTICS** (Cont'd)

AC CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
<b>SATURATED SWITCHING TIMES</b>						
Turn-on time	$t_{on}$					
MOC8111			3.0	5.5	$\mu$ S	$I_F=20$ mA, $V_{CE}=0.4$ V
MOC8112, MOC8113			4.2	8.0	$\mu$ S	$I_F=10$ mA, $V_{CE}=0.4$ V
Rise-time	$t_r$					
MOC8111			2.0	4.0	$\mu$ S	$I_F=20$ mA, $V_{CE}=0.4$ V
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Turn-off time	$t_{off}$					
MOC8111			18	34	$\mu$ S	$I_F=20$ mA, $V_{CE}=0.4$ V
MOC8112, MOC8113			23	39	$\mu$ S	$I_F=10$ mA, $V_{CE}=0.4$ V
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Isolation resistance	$R_{iso}$	$10^{11}$			ohms	$V_{i0}=500$ VDC
Isolation capacitance	$C_{iso}$		0.5		pF	$f=1$ MHz

**ELECTRICAL CHARACTERISTIC CURVES**  
(25°C Free Air Temperature Unless Otherwise Specified)

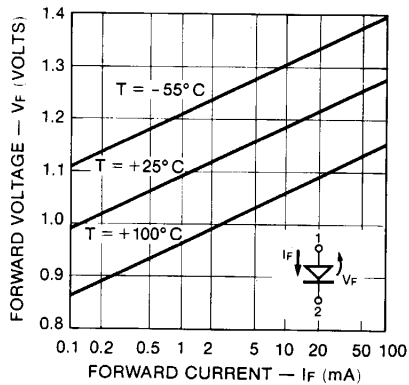


Fig. 1. Forward Voltage vs. Current

C1686

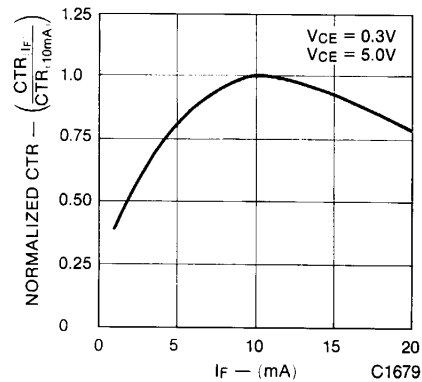


Fig. 2. Normalized CTR vs. Forward Current

C1679

**ELECTRICAL CHARACTERISTIC CURVES**  
(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

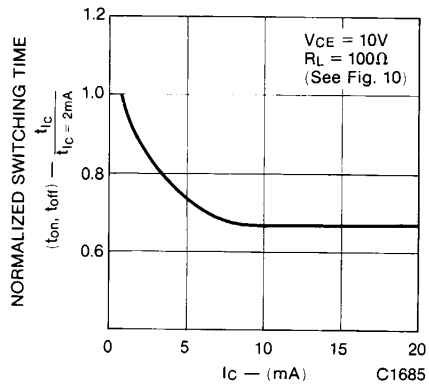


Fig. 5. Switching Time vs. IC

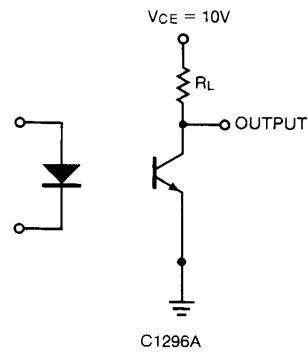


Fig. 6. Switching Time Test Circuit

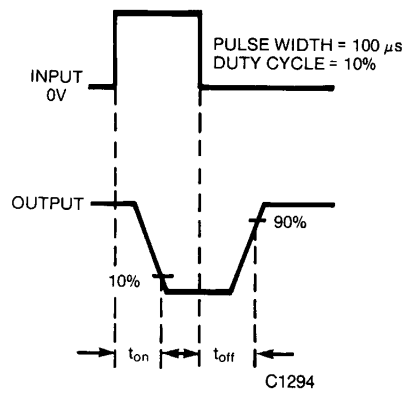


Fig. 7. Switching Time Waveforms



## PHOTOTRANSISTOR OPTOCOUPLEDERS

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