

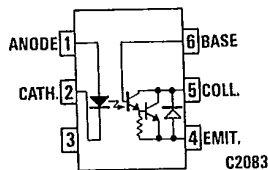
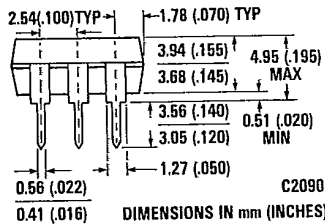
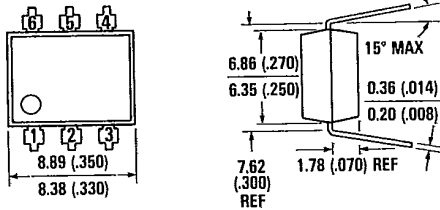
GENERAL INSTRUMENT

HIGH VOLTAGE PHOTODARLINGTON OPTOCOUPLED

Optocouplers

MCA11G1 (H11G1)
MCA11G2 (H11G2)
MCA11G3 (H11G3)

PACKAGE DIMENSIONS



Equivalent Circuit

DESCRIPTION

The MCA11G1 and MCA11G2 are photodarlington-type optically coupled optoisolators. Both devices have a gallium arsenide infrared emitting diode coupled with a silicon darlington connected phototransistor which has an integral base-emitter resistor to optimize elevated temperature characteristics.

FEATURES

- High BV_{CE0}
 Minimum 100V for MCA11G1
 Minimum 80V for MCA11G2
- Pin for pin replacement for H11G1, H11G2, H11G3
- High sensitivity to low input current—Minimum 500 percent CTR at $I_F = 1 \text{ mA}$
- High isolation voltage
 2500 VAC RMS—Steady State Rating
- Low leakage current at elevated temperature (maximum 100 μA at 80°C)
- Underwriters Laboratory (UL) recognized File #50151

APPLICATIONS

- CMOS logic interface
- Telephone ring detector
- Low input TTL interface
- Power supply isolation
- Replace pulse transformer

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
Isolation voltage	..... 2.5 kV RMS

INPUT DIODE

Forward DC current	..... 60 mA
Reverse voltage	..... 6 V
Peak forward current (1 μs pulse, 300 pps)	.. 3.0 A
Power dissipation 25°C ambient	..... 100 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
Collector to emitter voltage	
MCA11G1 100 V
MCA11G2 80 V
MCA11G3 55 V

MCA11G1 MCA11G2 MCA11G3 (H11G1 H11G2 H11G3)

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

TRANSFER CHARACTERISTICS							
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS
DC	Current Transfer Ratio collector to emitter MCA11G1/2 MCA11G1/3 MCA11G3	CTR	1000			%	$I_F = 10 \text{ mA}; V_{CE} = 1 \text{ V}$
	500				%	$I_F = 1 \text{ mA}; V_{CE} = 5 \text{ V}$	
	Saturation voltage	$V_{CE(SAT)}$		0.85 0.75	1.0 1.0	V V	$I_F = 16 \text{ mA}; I_C = 50 \text{ mA}$ $I_F = 1 \text{ mA}; I_C = 1 \text{ mA}$
SWITCHING TIMES	Turn-on time	t_{on}		5		μs	$R_L = 100\Omega; I_F = 10 \text{ mA}$ $V_{CE} = 5 \text{ V}$ Pulse width $\leq 300 \mu\text{sec}$, $f \leq 30 \text{ Hz}$
	Turn-off time	t_{off}		100		μs	
ISOLATION	Surge isolation	V_{iso}	4000			VDC	Relative humidity $\leq 50\%$, $I_{I-O} \leq 10 \mu\text{A}$ 1 second
			3000			VAC-rms	
	Steady state isolation	V_{iso}	3500			VDC	Relative humidity $\leq 50\%$, $I_{I-O} \leq 10 \mu\text{A}$ 1 minute
			2500			VAC-rms	
	Isolation resistance	R_{iso}	10^{11}			ohms	$V_{I-O} = 500 \text{ VDC}$
	Isolation capacitance	C_{iso}		0.5		pF	$f = 1 \text{ MHz}$

INDIVIDUAL COMPONENT CHARACTERISTICS								
	CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNITS	TEST CONDITIONS	
INPUT DIODE	Forward voltage	V_F		1.3	1.50	V	$I_F = 10 \text{ mA}$	
	Forward voltage temp. coefficient			-1.8		$\text{mV}/^\circ\text{C}$		
	Reverse breakdown voltage	BV_R	3.0	25		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		0.35	10	μA	$V_R = 3.0 \text{ V}$	
OUTPUT DARLINGTON	Breakdown voltage							
	Collector to emitter	BV_{CEO}				V	$I_C = 1.0 \text{ mA}, I_F = 0$	
	MCA11G1		100					
	MCA11G2		80					
	MCA11G3		55					
	Collector to base	BV_{CBO}					V	$I_C = 100 \mu\text{A}$
	MCA11G1		100					
	MCA11G2		80					
	MCA11G3		55					
	Emitter to base	BV_{EBO}		7	10		V	$I_E = 100 \mu\text{A}, I_F = 0$
Leakage current								
Collector to emitter	I_{CEO}					nA	$V_{CE} = 80 \text{ V}, I_F = 0$	
MCA11G1					100	nA	$V_{CE} = 60 \text{ V}, I_F = 0$	
MCA11G2					100	nA	$V_{CE} = 80 \text{ V}, I_F = 0,$ $T_A = 80^\circ\text{C}$	
MCA11G1					100	μA	$V_{CE} = 60 \text{ V}, I_F = 0,$ $T_A = 80^\circ\text{C}$	
MCA11G2					100	μA	$V_{CE} = 30 \text{ V}, I_F = 0,$	
MCA11G3					100	μA		

Optocouplers

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

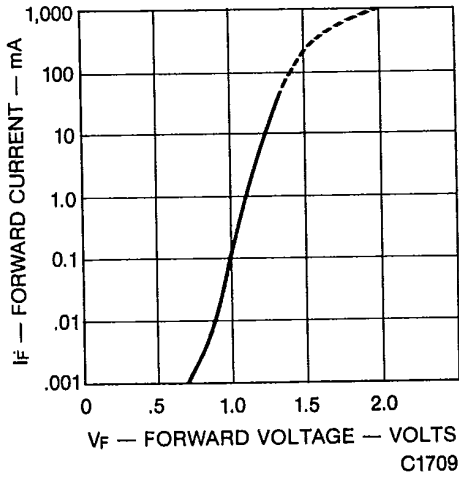


Fig. 1. Forward Voltage vs. Forward Current

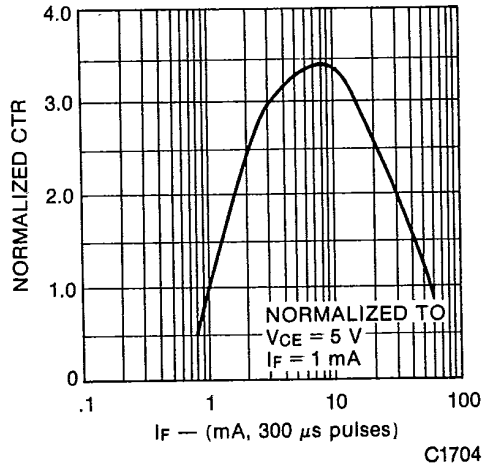


Fig. 2. Normalized CTR vs. Input Current

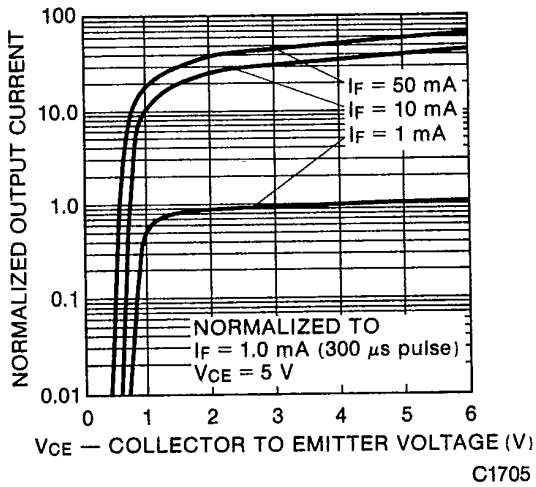


Fig. 3. Output Characteristics

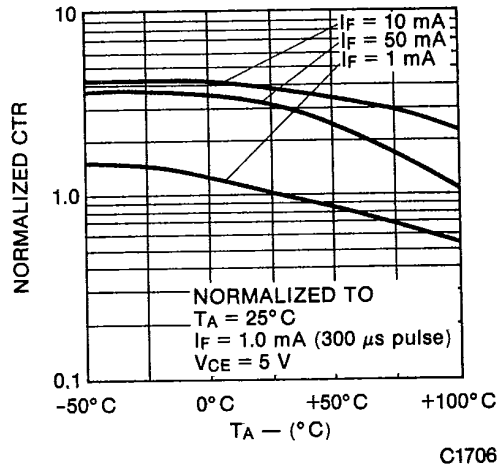
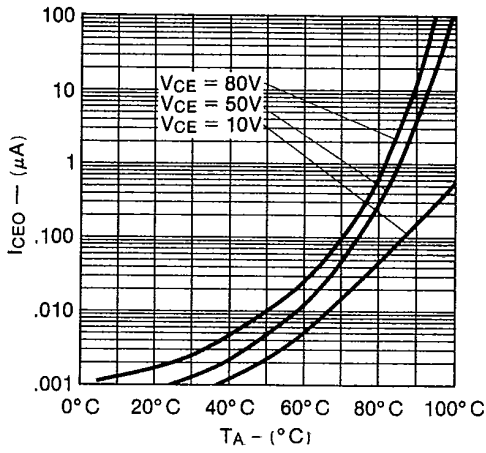


Fig. 4. Normalized CTR vs. Temperature

MCA11G1 MCA11G2 MCA11G3 (H11G1 H11G2 H11G3)

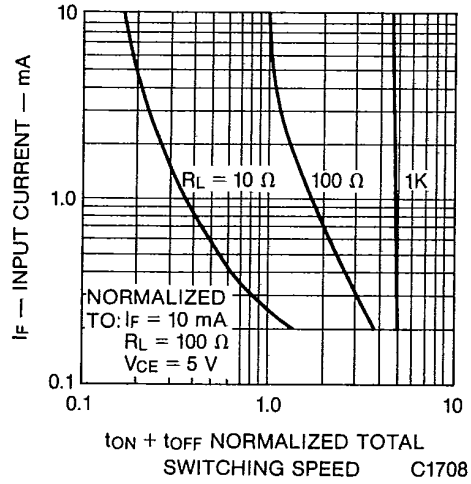
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TYPICAL ELECTRICAL CHARACTERISTIC CURVES (Cont'd)
 (25°C Free Air Temperature Unless Otherwise Specified)



C1707

Fig. 5. Dark Current vs. Temperature



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Fig. 6. Switching Speed