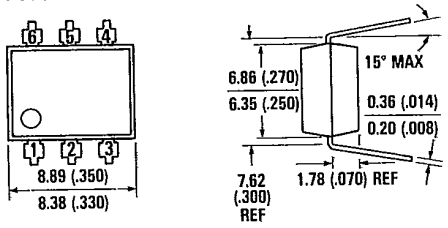
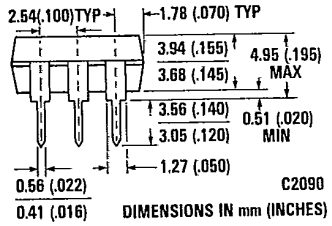
GENERAL INSTRUMENT

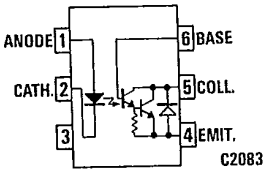
HIGH VOLTAGE PHOTODARLINGTON OPTOCOUPLERS

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 phototransitor which has an integral base-emitter resistor to optimize elevated temperature characteristics.

FEATURES

- High BV_{CEO}
  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 $I_F = 1$ 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	CTR					
	MCA11G1/2		1000			%	I_F = 10 mA; V_{CE} = 1 V
	MCA11G1/3		500			%	I_F = 1 mA; V_{CE} = 5 V
	MCA11G3		200			%	I_F = 1 mA; V_{CE} = 5 V
	Saturation voltage	$V_{CE(SAT)}$		0.85	1.0	V	I_F = 16 mA; I_C = 50 mA
				0.75	1.0	V	I_F = 1 mA; I_C = 1 mA
SWITCHING TIMES	Turn-on time	t_{on}		5		μs	R_L = 100Ω; I_F = 10 mA
	Turn-off time	t_{off}		100		μs	V_{CE} = 5V Pulse width ≤ 300 μsec, f ≤ 30 Hz
ISOLATION	Surge isolation	V_{iso}	4000			VDC	Relative humidity ≤ 50%, I_{I-O} ≤ 10 μA
			3000			VAC-rms	1 second
	Steady state isolation	V_{iso}	3500			VDC	Relative humidity ≤ 50%, I_{I-O} ≤ 10 μA
			2500			VAC-rms	1 minute
	Isolation resistance	R_{iso}	10^{11}			ohms	V_{I-O} = 500 VDC
	Isolation capacitance	C_{iso}		0.5		pF	f = 1 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 mA
	Forward voltage temp. coefficient			-1.8		mV/°C	
	Reverse breakdown voltage	BV_R	3.0	25		V	I_R = 10 μA
	Junction capacitance	C_J		50		pF	V_F = 0 V, f = 1 MHz
				65		pF	V_F = 1 V, f = 1 MHz
	Reverse leakage current	I_R		0.35	10	μA	V_R = 3.0 V
OUTPUT DARLINGTON	Breakdown voltage						
	Collector to emitter	BV_{CEO}					
	MCA11G1		100			V	I_C = 1.0 mA, I_F = 0
	MCA11G2		80				
	MCA11G3		55				
	Collector to base	BV_{CBO}					
	MCA11G1		100			V	I_C = 100 μA
	MCA11G2		80				
	MCA11G3		55				
	Emitter to base	BV_{EBO}	7	10		V	I_E = 100 μA, I_F = 0
	Leakage current						
	Collector to emitter	I_{CEO}					
	MCA11G1				100	nA	V_{CE} = 80 V, I_F = 0
	MCA11G2				100	nA	V_{CE} = 60 V, I_F = 0
	MCA11G1				100	μA	V_{CE} = 80 V, I_F = 0, T_A = 80°C
	MCA11G2				100	μA	V_{CE} = 60 V, I_F = 0, T_A = 80°C
	MCA11G3				100	μA	V_{CE} = 30 V, I_F = 0,

TYPICAL ELECTRICAL CHARACTERISTIC CURVES

(25° C Free Air Temperature Unless Otherwise Specified)

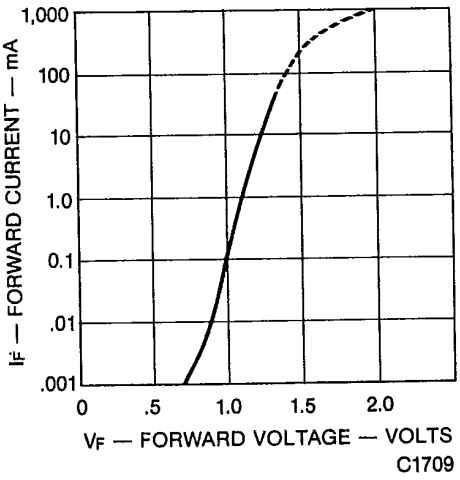

Fig. 1. Forward Voltage vs. Forward Current

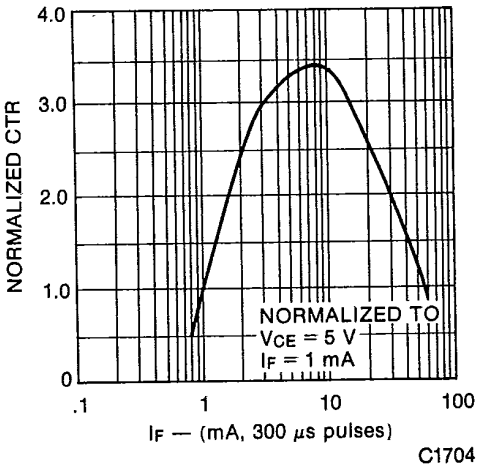

Fig. 2. Normalized CTR vs. Input Current

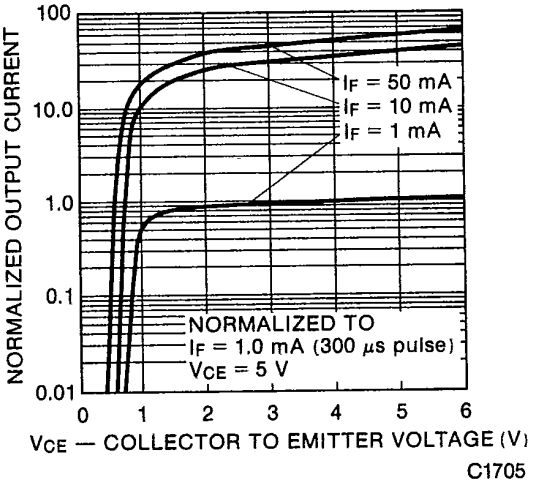

Fig. 3. Output Characteristics

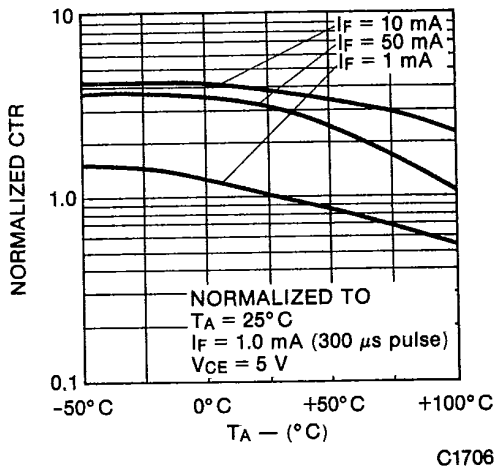

Fig. 4. Normalized CTR vs. Temperature

MCA11G1 MCA11G2 MCA11G3 (H11G1 H11G2 H11G3)

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TYPICAL ELECTRICAL CHARACTERISTIC CURVES (Cont'd)

(25° C Free Air Temperature Unless Otherwise Specified)

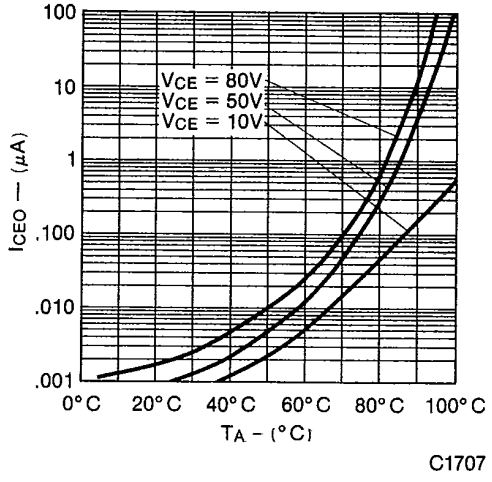

Fig. 5, Dark Current vs. Temperature

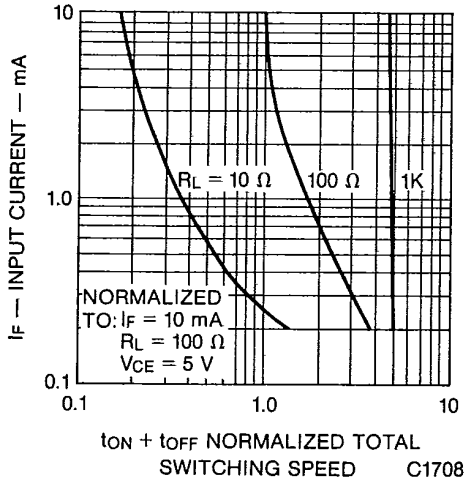

Fig. 6. Switching Speed