MOTOROLA

SEMICONDUCTORS

P.O. BOX 20912 • PHOENIX, ARIZONA 85036

H11G1
H11G2
H11G3

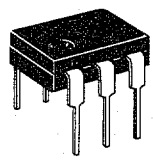
RESISTOR-DARLINGTON OPTOCOUPLER SERIES

. . . consists of a gallium arsenide IRED optically coupled to a silicon photodarlington detector which has an integral base-emitter resistor. The on-chip resistor improves higher temperature leakage characteristics. Designed with high isolation, high CTR, high voltage and low leakage, they provide excellent performance in interfacing and coupling systems, phase and feedback controls, solid state relays and general purpose switching circuits.

- High CTR, H11G1 — 1000%, H11G2 — 500%
- High Isolation, V_{ISO} = 7500 Vac pk Min.
- High $V_{(BR)CEO}$, H11G1 — 100 V, H11G2 — 80 V
- Standard, Economical, 6-Pin DIP Package
- UL Recognized — File No. E54915

OPTO COUPLER/ISOLATOR

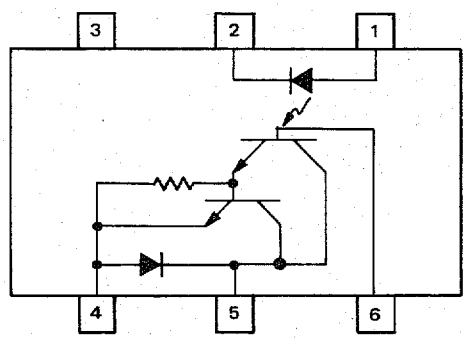
DARLINGTON OUTPUT

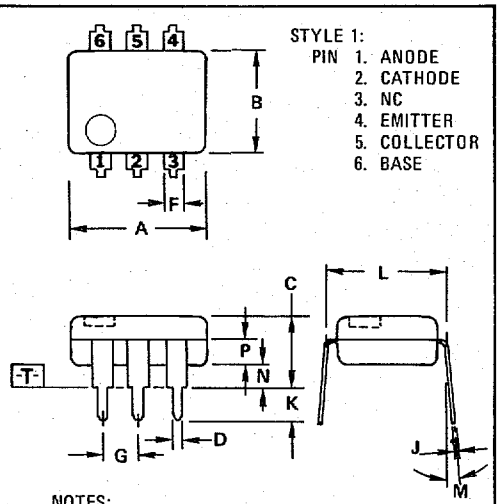


MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
INFRARED-EMITTING DIODE			
Reverse Voltage	V_R	6.0	Volts
Forward Current — Continuous	I_F	60	mA
Forward Current — Peak Pulse Width = 300 μs, 2.0% Duty Cycle	I_F	3.0	Amp
Total Power Dissipation @ T_A = 25°C Negligible Power in Transistor Derate above 25°C	P_D	100 1.33	mW mW/°C
PHOTO DARLINGTON TRANSISTOR			
Collector-Emitter Voltage H11G1 H11G2 H11G3	V_{CEO}	 100 80 55	Volts
Emitter-Base Voltage	V_{EBO}	7.0	Volts
Collector Current — Continuous	I_C	150	mA
Total Power Dissipation @ T_A = 25°C Negligible Power in Diode Derate above 25°C	P_D	150 2.0	mW mW/°C
TOTAL DEVICE			
Total Device Dissipation @ T_A = 25°C Equal Power Dissipation in Each Element Derate above 25°C	P_D	250 3.3	mW mW/°C
Operating Junction Temperature Range	T_J	-55 to +100	°C
Storage Temperature Range	T_{stg}	-55 to +150	°C
Soldering Temperature (10 s)	—	260	°C
Isolation Surge Voltage (Vac pk)	V_{ISO}	7500	Volts

FIGURE 1 — DEVICE SCHEMATIC





STYLE 1:
PIN 1. ANODE
2. CATHODE
3. NC
4. EMITTER
5. COLLECTOR
6. BASE

NOTES:
1. DIMENSIONS A AND B ARE DATUMS.
2. -T- IS SEATING PLANE.
3. POSITIONAL TOLERANCES FOR LEADS: ⌖ Ø 0.13 (0.005)Ⓜ T AⓂBⓂ
4. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5, 1973.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.13	8.89	0.320	0.350
B	6.10	6.60	0.240	0.260
C	2.92	5.08	0.115	0.200
D	0.41	0.51	0.016	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
J	0.20	0.30	0.008	0.012
K	2.54	3.81	0.100	0.150
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.38	2.54	0.015	0.100
P	1.27	2.03	0.050	0.080

CASE 730A-01

LED CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Reverse Leakage Current (V_R = 3.0 V)		I_R	—	0.05	10	μA
Forward Voltage (I_F = 10 mA)		V_F	—	1.1	1.5	Volts
Capacitance (V_R = 0 V, f = 1.0 MHz)		C	—	50	—	pF

PHOTODARLINGTON CHARACTERISTICS (T_A = 25°C and I_F = 0 unless otherwise noted.)

Collector -Emitter Breakdown Voltage (I_C = 1.0 mA, I_F = 0)	H11G1	$V_{(BR)CEO}$	100	—	—	Volts
	H11G2		80	—	—	
	H11G3		55	—	—	
Collector-Base Breakdown Voltage (I_C = 100 μA, I_F = 0)	H11G1	$V_{BR)CBO}$	100	—	—	Volts
	H11G2		80	—	—	
	H11G3		55	—	—	
Emitter-Base Breakdown Voltage (I_E = 100 μA, I_F = 0)		$V_{(BR)EBO}$	7.0	—	—	Volts
Collector-Emitter Dark Current		I_{CEO}				
(V_{CE} = 80 V)	H11G1		—	—	100	nA
(V_{CE} = 80 V, T_A = 80°C)	H11G1		—	—	100	μA
(V_{CE} = 60 V)	H11G2		—	—	100	nA
(V_{CE} = 60 V, T_A = 80°C)	H11G2		—	—	100	μA
(V_{CE} = 30 V)	H11G3		—	—	100	nA
Capacitance (V_{CB} = 10 V, f = 1.0 MHz)		C_{CB}		6.0	—	pF

COUPLED CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Collector Output Current		I_C				mA
(V_{CE} = 1.0 V, I_F = 10 mA)	H11G1, 2		100	—	—	
(V_{CE} = 5.0 V, I_F = 1.0 mA)	H11G1, 2		5.0	—	—	
(V_{CE} = 5.0 V, I_F = 1.0 mA)	H11G3		2.0	—	—	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$				Volts
(I_F = 1.0 mA, I_C = 1.0 mA)	H11G1, 2		—	0.75	1.0	
(I_F = 16 mA, I_C = 50 mA)	H11G1, 2		—	0.85	1.0	
(I_F = 20 mA, I_C = 50 mA)	H11G3		—	0.85	1.2	
Isolation Surge Voltage (1, 2) (60 Hz ac Peak, 5 Seconds)		V_{ISO}	7500	—	—	Volts
Isolation Resistance (1) (V = 500 Vdc)			—	10^{11}	—	Ohms
Isolation Capacitance (1) (V = 0 V, f = 1.0 MHz)			—	—	2.0	pF

SWITCHING CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Turn-On Time	(I_F = 10 mA, V_{CE} = 5.0 V, R_L = 100 Ω, Pulse Width ≤ 300 μs, f ≤ 30 Hz)	t_{on}	—	5.0	—	μs
Turn-Off Time		t_{off}	—	100	—	

(1) For this test LED Pins 1 and 2 are common and Phototransistor Pins 4 and 5 are common.
(2) Isolation Surge Voltage, V_{ISO}, is an internal device dielectric breakdown rating.

FIGURE 2 — OUTPUT CURRENT versus INPUT CURRENT

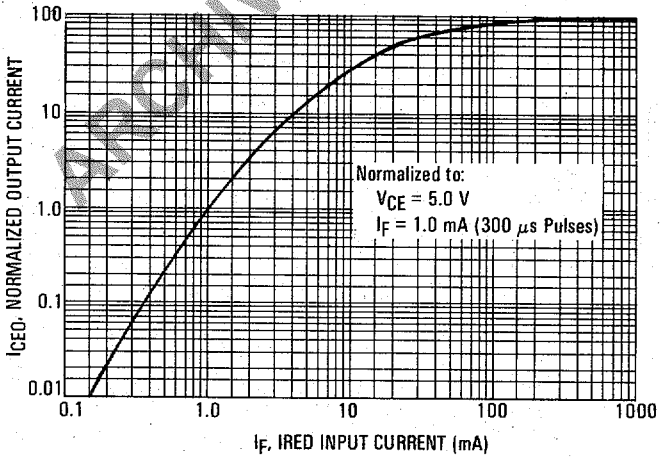


FIGURE 3 — OUTPUT CURRENT versus TEMPERATURE

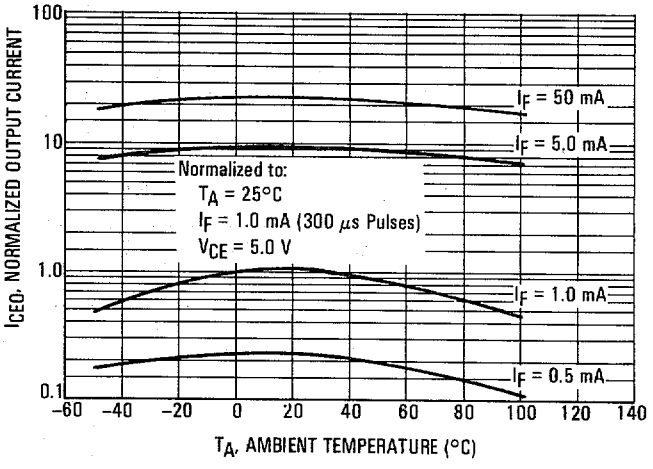


FIGURE 4 — OUTPUT CURRENT versus COLLECTOR-EMITTER VOLTAGE

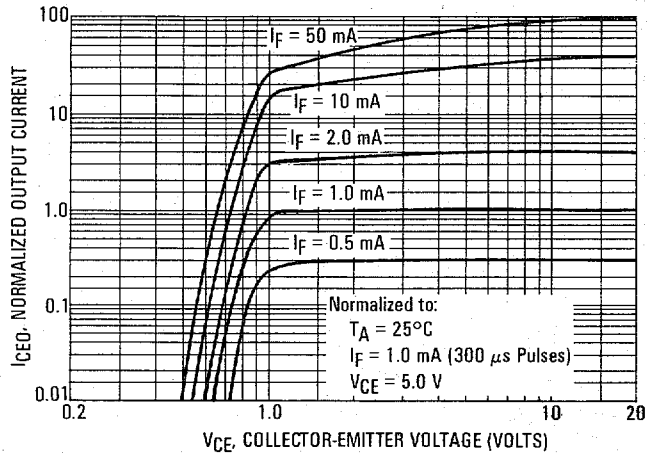


FIGURE 5 — LED FORWARD CHARACTERISTICS

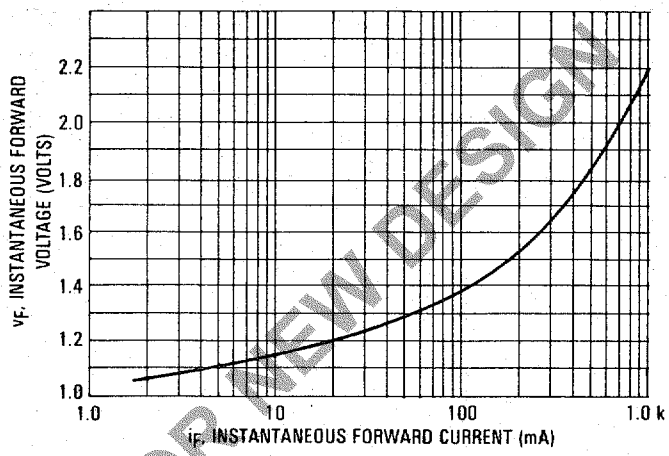


FIGURE 6 — COLLECTOR-EMITTER DARK CURRENT versus TEMPERATURE

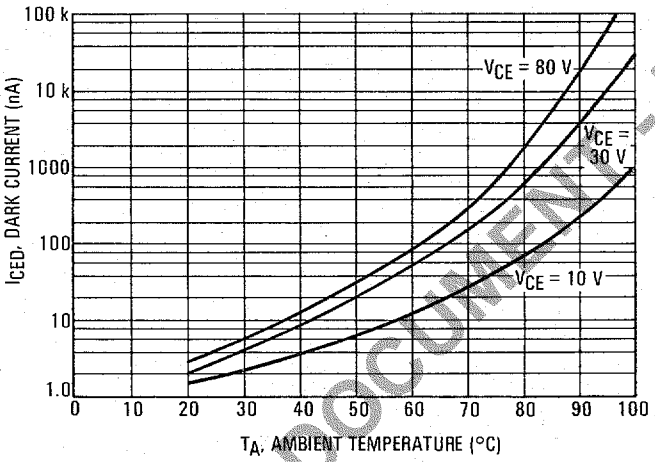
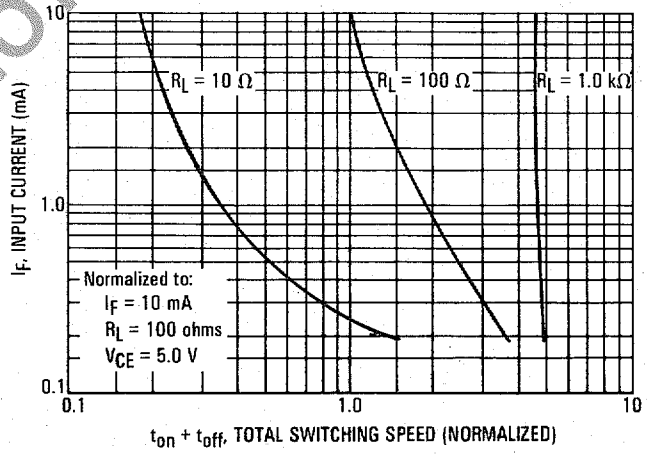
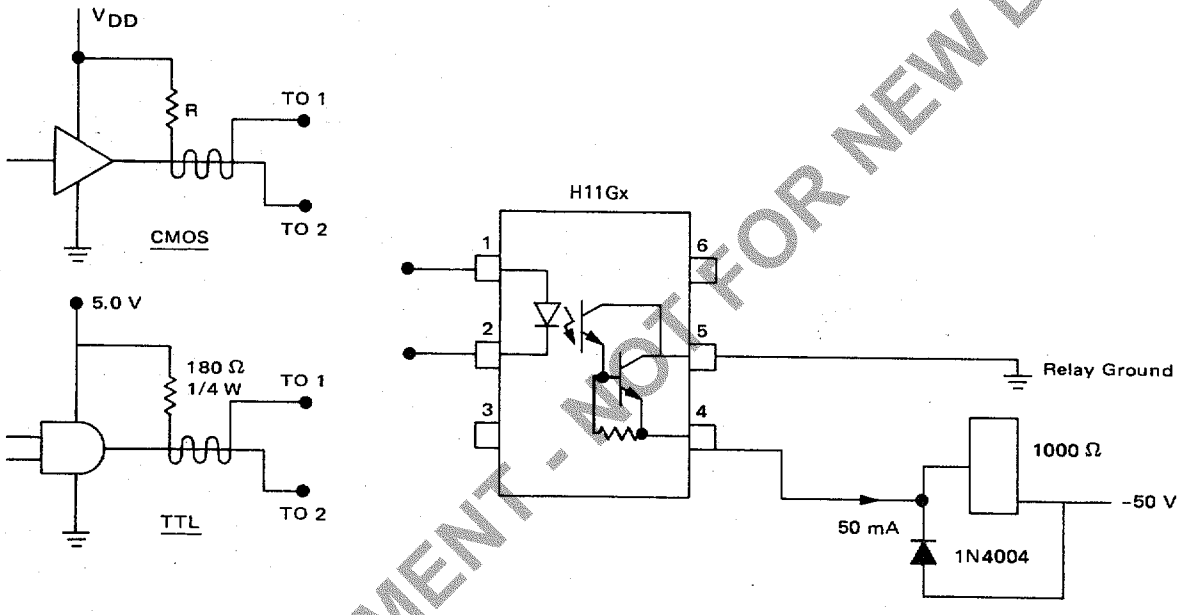


FIGURE 7 — INPUT CURRENT versus TOTAL SWITCHING SPEED



INTERFACING TTL OR CMOS LOGIC TO 50-VOLT, 1000-OHMS RELAY FOR TELEPHONY APPLICATIONS

In order to interface positive logic to negative-powered electromechanical relays, a change in voltage level and polarity plus electrical isolation are required. The H11Gx can provide this interface and eliminate the external amplifiers and voltage divider networks previously required. The circuit below shows a typical approach for the interface.



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