

Phototransistor / Motorola

Part No. 08 MRD300

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

Photo Detectors Transistor Output

The MRD300 and MRD310 are designed for applications requiring radiation sensitivity and stable characteristics.

Features:

- Popular TO-18 Type Package for Easy Handling and Mounting
- Sensitive Throughout Visible and Near Infrared Spectral Range for Wider Application
- Minimum Light Current 4 mA at H = 5 mW/cm² (MRD300)
- External Base for Added Control
- Annular Passivated Structure for Stability and Reliability

Applications:

- Industrial Processing and Control
- Shaft or Position Readers
- Optical Switching
- Remote Control
- Light Modulators
- Punched Card Readers
- Logic Circuits
- Counters

**MRD300
MRD310***

*Motorola Preferred Device

**PHOTO DETECTORS
TRANSISTOR OUTPUT
NPN SILICON**



CASE 82-05
METAL
STYLE 1

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

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	50	Volts
Emitter-Collector Voltage	V _{ECO}	7	Volts
Collector-Base Voltage	V _{CBO}	80	Volts
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	250 2 27	mW mW/°C
Operating Temperature Range	T _A	-55 to +125	°C
Storage Temperature Range	T _{stg}	-65 to +150	°C

STATIC ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Collector Dark Current (V _{CE} = 20 V, I _B ≈ 0) T _A = 25°C T _A = 100°C	I _{CEO}	—	5 4	25 —	nA μA
Collector-Base Breakdown Voltage (I _C = 100 μA)	V _{(BR)CBO}	80	120	—	Volts
Collector-Emitter Breakdown Voltage (I _C = 100 μA)	V _{(BR)CEO}	50	85	—	Volts
Emitter-Collector Breakdown Voltage (I _E = 100 μA)	V _{(BR)ECO}	7	8.5	—	Volts

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

Characteristic	Symbol	Min	Typ	Max	Unit
Light Current (V _{CC} = 20 V, R _L = 10 Ohms) Note 1	I _L	4	7	—	mA
		1	3.5	—	—
Light Current (V _{CC} = 20 V, R _L = 100 Ohms) Note 2	I _L	—	2.5	—	mA
		—	0.8	—	—
Photo Current Rise Time (Note 3) (R _L = 100 Ohms, I _L = 1 mA peak)	t _r	—	2	2.5	μs
Photo Current Fall Time (Note 3) (R _L = 100 Ohms, I _L = 1 mA peak)	t _f	—	2.5	4	μs

NOTES 1 Radiation flux density (H) equal to 5 mW/cm² emitted from a tungsten source at a color temperature of 2870 K
 2 Radiation flux density (H) equal to 0.5 mW/cm² (pulsed) from a GaAs (gallium-arsenide) source at λ = 940 nm
 3 For unsaturated response time measurements, radiation is provided by pulsed GaAs (gallium-arsenide) light-emitting diode (λ ≈ 940 nm) with a pulse width equal to or greater than 10 microseconds (see Figure 2) I_L = 1 mA peak

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TYPICAL CHARACTERISTICS

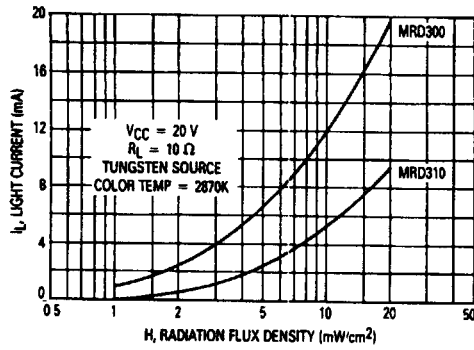


Figure 1. Light Current versus Irradiance

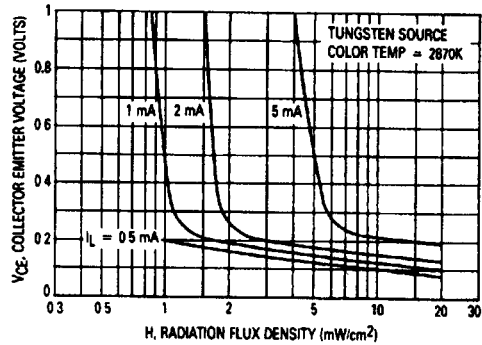


Figure 2. Collector-Emitter Saturation Characteristic

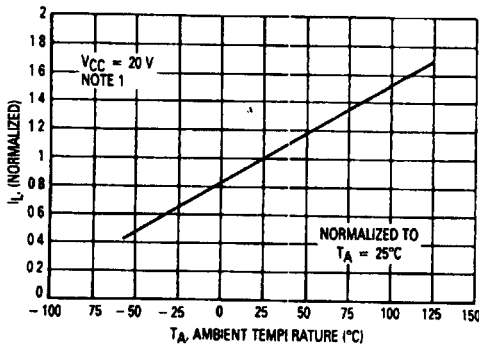


Figure 3. Normalized Light Current versus Temperature

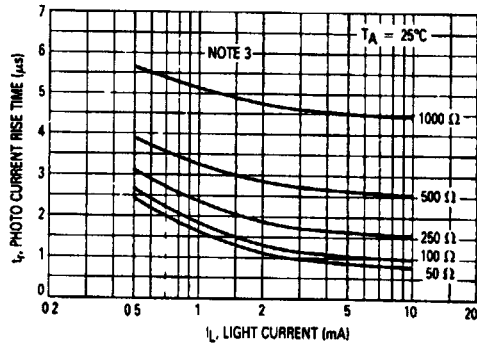


Figure 4. Rise Time versus Light Current

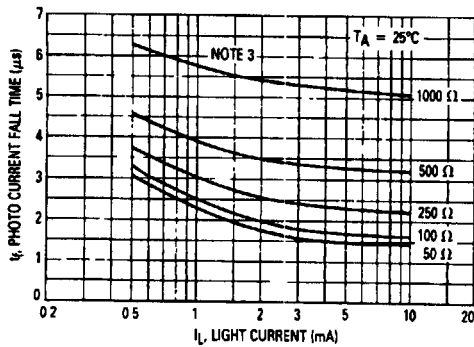


Figure 5. Fall Time versus Light Current

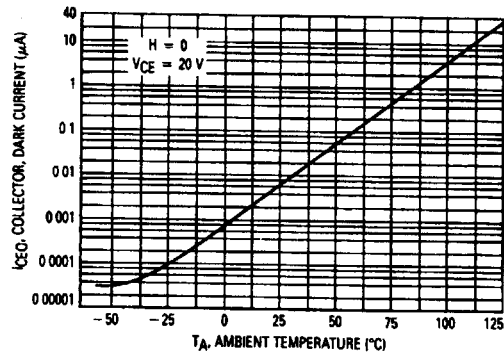


Figure 6. Dark Current versus Temperature

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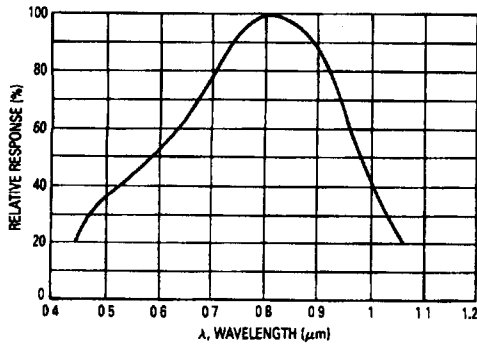


Figure 7. Constant Energy Spectral Response

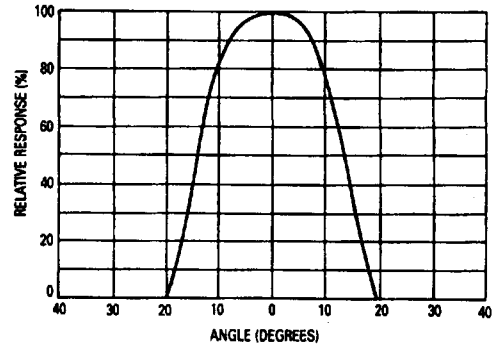


Figure 8. Angular Response

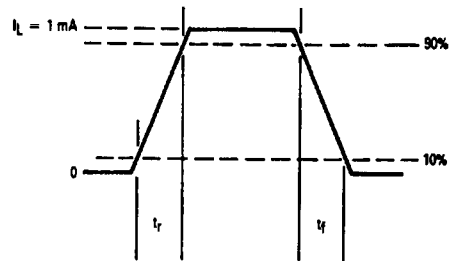
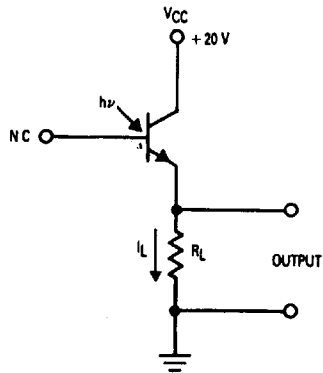


Figure 9. Pulse Response Test Circuit and Waveform