MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRD300
MRD310*

*Motorola Preferred Device

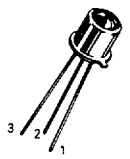
Photo Detectors
Transistor Output

PHOTO DETECTORS
TRANSISTOR OUTPUT
NPN SILICON

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/cm$_2$ (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



CASE 82-05
METAL
STYLE 1

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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, H ≈ 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)

		Symbol	Min	Typ	Max	Unit
Light Current (V_{CC} = 20 V, R_L = 10 Ohms) Note 1	MRD300 MRD310	I_L	4 1	7 3 5	— —	mA
Light Current (V_{CC} = 20 V, R_L = 100 Ohms) Note 2	MRD300 MRD310	I_L	— —	2 5 0 8	— —	mA
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/cm^2 emitted from a tungsten source at a color temperature of 2870 K
2 Radiation flux density (H) equal to 0 5 mW/cm^2 (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

MRD300, MRD310

TYPICAL CHARACTERISTICS

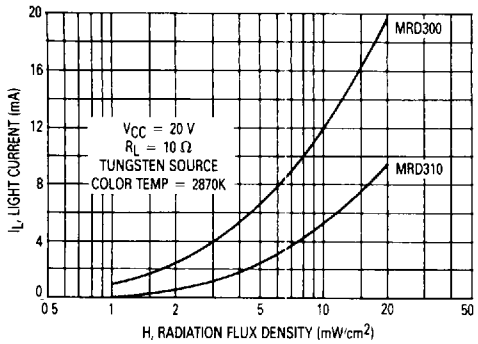

Figure 1. Light Current versus Irradiance

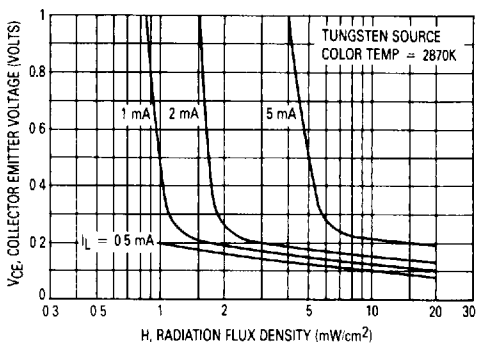

Figure 2. Collector-Emitter Saturation Characteristic

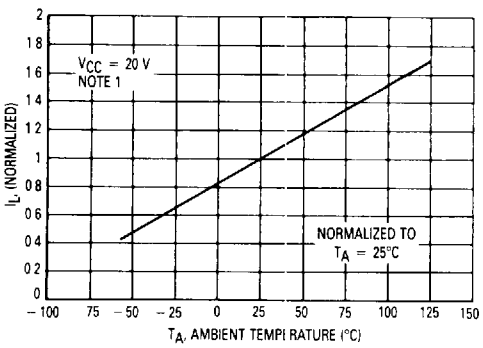

Figure 3. Normalized Light Current versus Temperature

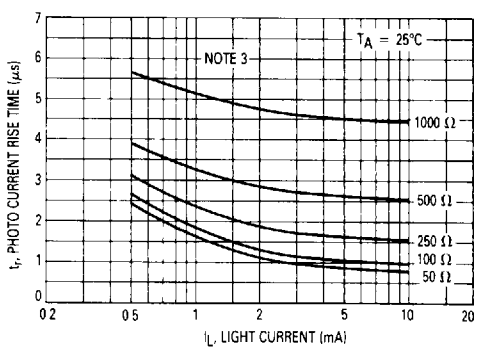

Figure 4. Rise Time versus Light Current

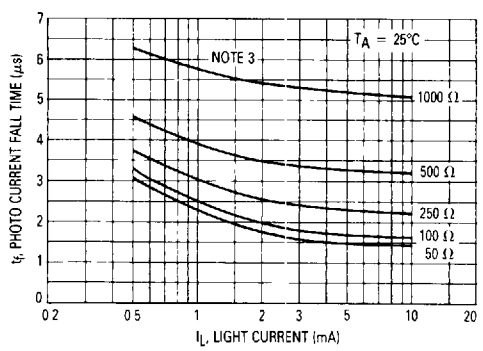

Figure 5. Fall Time versus Light Current

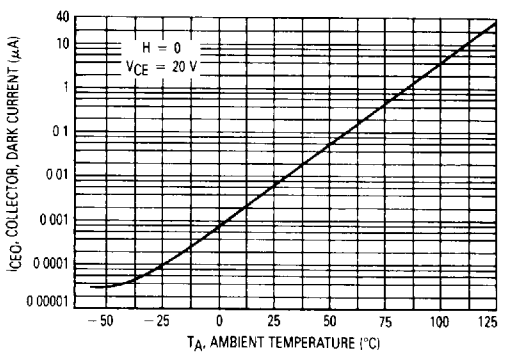

Figure 6. Dark Current versus Temperature

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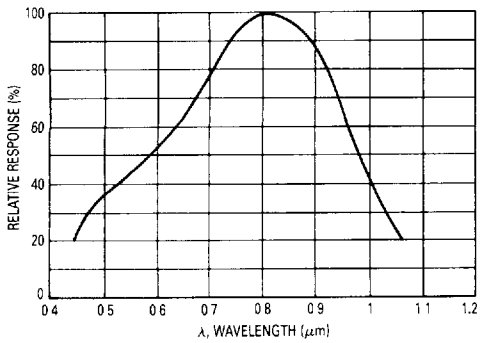

Figure 7. Constant Energy Spectral Response

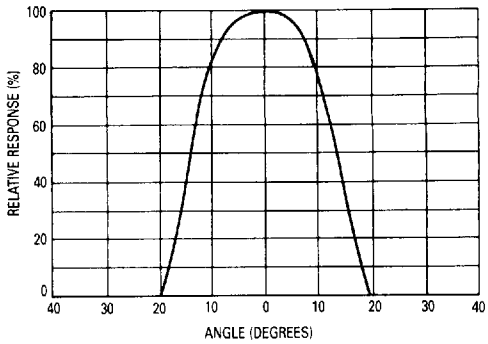

Figure 8. Angular Response

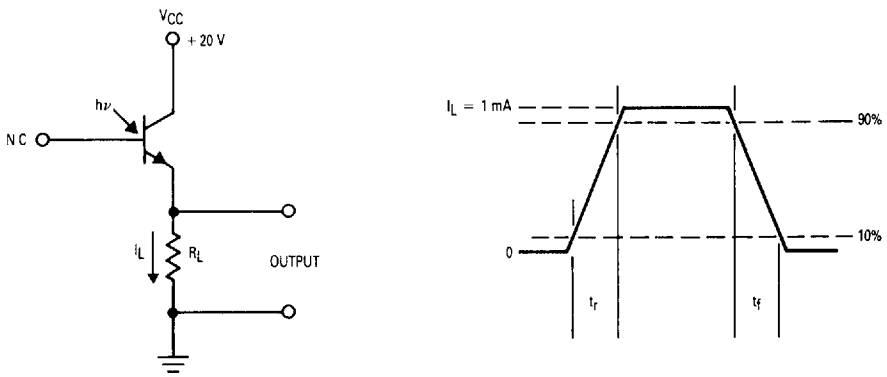

Figure 9. Pulse Response Test Circuit and Waveform

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