MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRD300
MRD310*

*Motorola Preferred Device

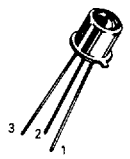
Photo Detectors
Transistor Output

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

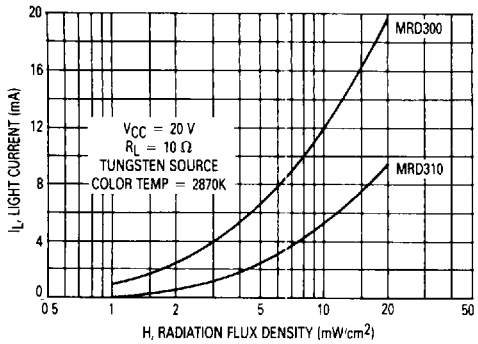

Figure 1. Light Current versus Irradiance

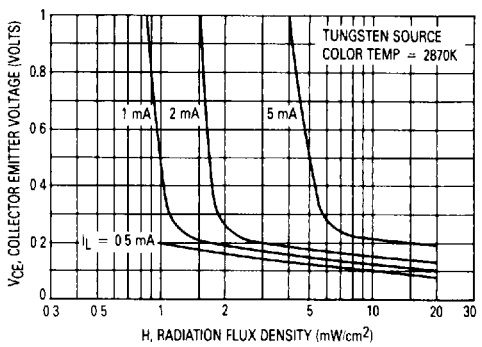

Figure 2. Collector-Emitter Saturation Characteristic

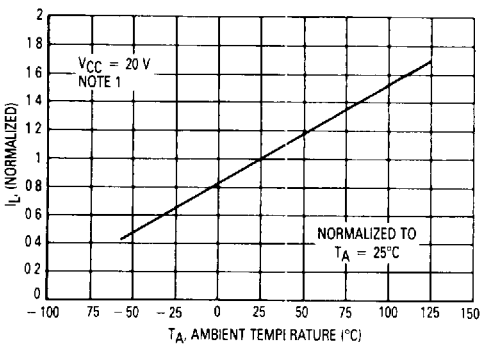

Figure 3. Normalized Light Current versus Temperature

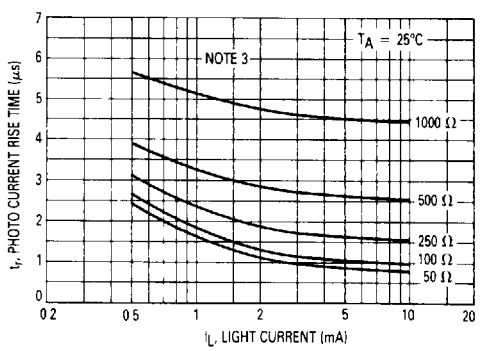

Figure 4. Rise Time versus Light Current

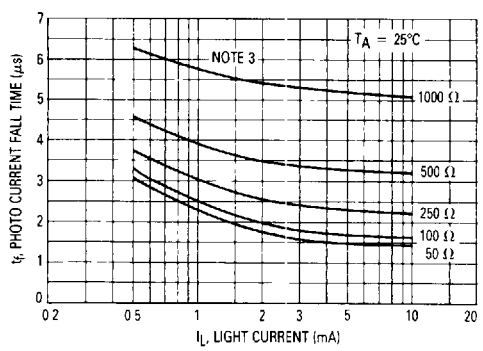

Figure 5. Fall Time versus Light Current

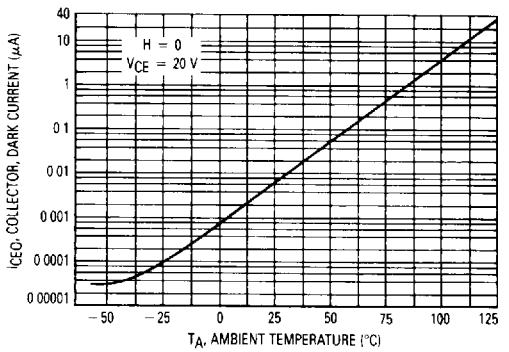

Figure 6. Dark Current versus Temperature

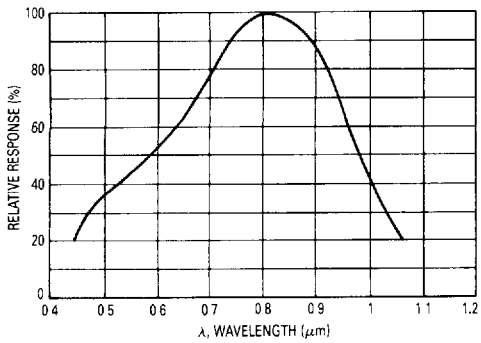

Figure 7. Constant Energy Spectral Response

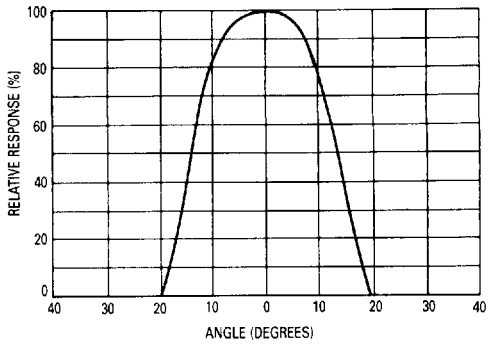

Figure 8. Angular Response

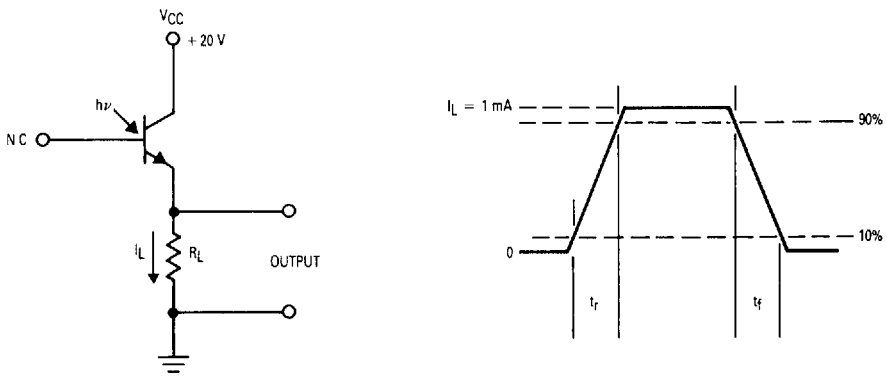

Figure 9. Pulse Response Test Circuit and Waveform

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