

Appendix

Data sheet for the Motorola MRD500 photodiode.

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

Photo Detectors Diode Output

... designed for application in laser detection, light demodulation, detection of visible and near infrared light-emitting diodes, shaft or position encoders, switching and logic circuits, or any design requiring radiation sensitivity, ultra high-speed, and stable characteristics.

- Ultra Fast Response — (< 1 ns Typ)
- High Sensitivity — MRD500 ($1.2 \mu\text{A}/\text{mW}/\text{cm}^2$ Min)
MRD510 ($0.3 \mu\text{A}/\text{mW}/\text{cm}^2$ Min)
- Available With Convex Lens (MRD500) or Flat Glass (MRD510) for Design Flexibility
- Popular TO-18 Type Package for Easy Handling and Mounting
- Sensitive Throughout Visible and Near Infrared Spectral Range for Wide Application
- Annular Passivated Structure for Stability and Reliability

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Reverse Voltage	V_R	100	Volts
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ 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 ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Fig. No.	Symbol	Min	Typ	Max	Unit
Dark Current ($V_R = 20$ V, $R_L = 1$ megohm) Note 2 $T_A = 25^\circ\text{C}$ $T_A = 100^\circ\text{C}$	2 and 3	I_D	— —	— 14	2 —	nA
Reverse Breakdown Voltage ($I_R = 10 \mu\text{A}$)	—	$V_{(BR)R}$	100	200	—	Volts
Forward Voltage ($I_F = 50$ mA)	—	V_F	—	—	1.1	Volts
Series Resistance ($I_F = 50$ mA)	—	R_s	—	—	10	Ohms
Total Capacitance ($V_R = 20$ V, $f = 1$ MHz)	5	C_T	—	—	4	pF

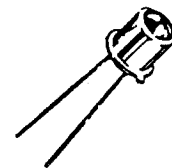
OPTICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	MRD500 MRD510	Fig. No.	Symbol	Min	Typ	Max	Unit
Light Current ($V_R = 20$ V) Note 1	MRD500 MRD510	1	I_L	6 1.5	9 2.1	— —	μA
Sensitivity at $0.8 \mu\text{m}$ ($V_R = 20$ V) Note 3	MRD500 MRD510	—	$S_{(\lambda = 0.8 \mu\text{m})}$	— —	6.6 1.5	— —	$\mu\text{A}/\text{mW}/\text{cm}^2$
Response Time ($V_R = 20$ V, $R_L = 50$ Ohms)	—	—	$t_{(resp)}$	—	1	—	ns
Wavelength of Peak Spectral Response	—	5	λ_s	—	0.8	—	μm

NOTES: 1. Radiation Flux Density (H) equal to $5 \text{ mW}/\text{cm}^2$ emitted from a tungsten source at a color temperature of 2870 K.
2. Measured under dark conditions. ($H = 0$).
3. Radiation Flux Density (H) equal to $0.5 \text{ mW}/\text{cm}^2$ at $0.8 \mu\text{m}$.

**MRD500
MRD510**

PHOTO DETECTORS
DIODE OUTPUT
PIN SILICON
250 MILLIWATTS
100 VOLTS



CASE 209-01
MRD500
(CONVEX LENS)



CASE 210-01
MRD510
(FLAT GLASS)

TYPICAL CHARACTERISTICS

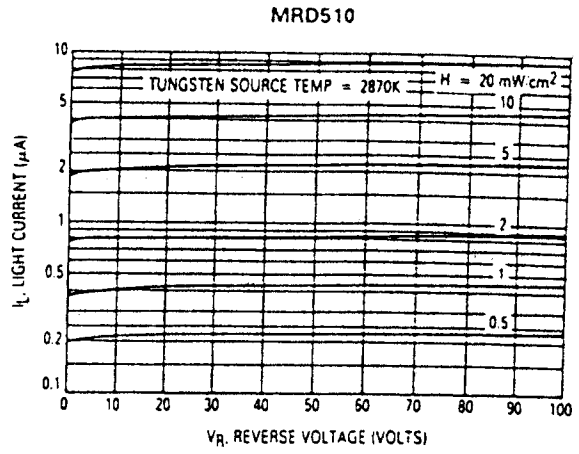
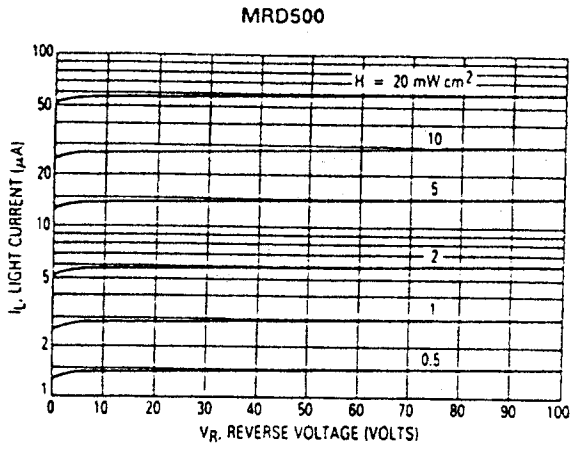


Figure 1. Irradiated Voltage — Current Characteristic

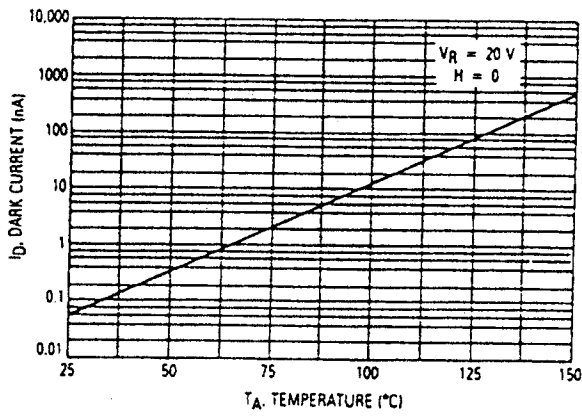


Figure 2. Dark Current versus Temperature

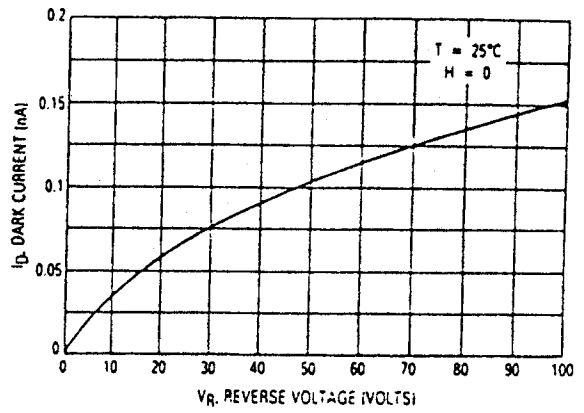


Figure 3. Dark Current versus Reverse Voltage

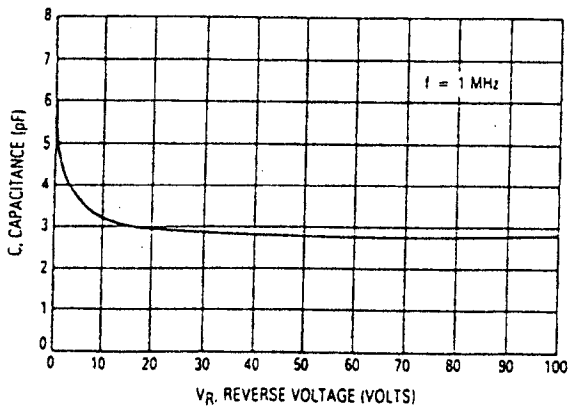


Figure 4. Capacitance versus Voltage

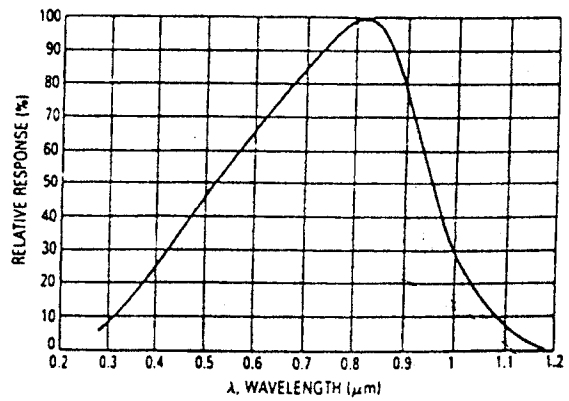


Figure 5. Relative Spectral Response