2N5777 thru 2N5780 (SILICON)
MRD14B

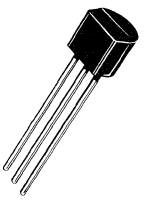
PLASTIC NPN SILICON PHOTO DARLINGTON AMPLIFIERS

. . . designed for applications in industrial inspection, processing and control, counters, sorters, switching and logic circuits or any design requiring extremely high radiation sensitivity, and stable characteristics.

- Economical Plastic Package
- Sensitive Throughout Visible and Near Infra-Red Spectral Range for Wide Application
- Range of Radiation Sensitivities and Voltages for Design Flexibility
- TO-92 Clear Plastic Package for Standard Mounting
- Annular Passivated Structure for Stability and Reliability
- Precision Die Placement

12, 25, 40 VOLT PHOTO DARLINGTON AMPLIFIERS NPN SILICON

200 MILLIWATTS

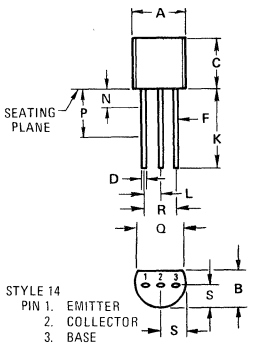


MAXIMUM RATINGS

Rating	Symbol	MRD14B	2N5777* 2N5779	2N5778* 2N5780	Unit
Collector-Emitter Voltage	V_{CEO}	12	25	40	Volts
Collector-Base Voltage	V_{CBO}	18	25	40	Volts
Emitter-Base Voltage	V_{EBO}	8.0	8.0	12	Volts
Light Current	I_L	← 250 →			mA
Total Device Dissipation @ $T_A = 25^oC$	P_D	← 200 →			mW
Derate above 25^oC		← 2.67 →			$mW/^oC$
Operating and Storage Junction Temperature Range	T_J, T_{stg} (1)	-65 to +100			^oC

*Indicates JEDEC Registered Data.

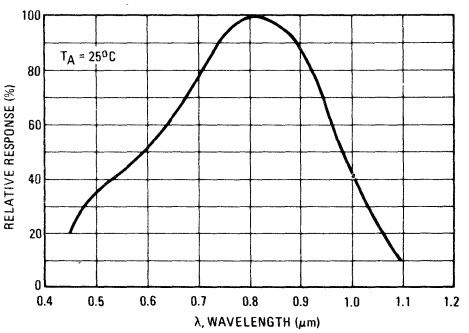
(1) Heat Sink should be applied to leads during soldering to prevent case temperature from exceeding 100^oC.



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	4.450	5.200	0.175	0.205
B	3.180	4.190	0.125	0.165
C	4.320	5.330	0.170	0.210
D	0.407	0.533	0.016	0.021
F	0.407	0.482	0.016	0.019
K	12.700	–	0.500	–
L	1.150	1.390	0.045	0.055
N	–	1.270	–	0.050
P	6.350	–	0.250	–
Q	3.430	–	0.135	–
R	2.410	2.670	0.095	0.105
S	2.030	2.670	0.080	0.105

CASE 29-02
TO-92

FIGURE 1 – CONSTANT ENERGY SPECTRAL RESPONSE



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

Characteristic		Symbol	Min	Typ	Max	Unit
Collector Dark Current (Note 2) (V_{CE} = 12 V)		I_{CEO}	–	–	0.1	μA
Collector-Emitter Breakdown Voltage (Note 2) (I_C = 10 mA)	MRD14B	BV_{CEO}	12	–	–	Volts
	2N5777, 2N5779		25	–	–	
	2N5778, 2N5780		40	–	–	
Collector-Base Breakdown Voltage (Note 2) (I_C = 100 μA)	MRD14B	BV_{CBO}	18	–	–	Volts
	2N5777, 2N5779		25	–	–	
	2N5778, 2N5780		40	–	–	
Emitter-Base Breakdown Voltage (Note 2) (I_E = 100 μA)	MRD14B	BV_{EBO}	8.0	–	–	Volts
	2N5777, 2N5779		8.0	–	–	
	2N5778, 2N5780		12	–	–	

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

Characteristic		Fig. No.	Symbol	Min	Typ	Max	Unit
Collector Light Current (Notes 1,4,5) (V_{CE} = 5.0 V)	MRD14B	–	I_L	0.5	2.0	–	mA
	2N5777, 2N5778			0.5	4.0	–	
	2N5779, 2N5780			2.0	8.0	–	
DC Current Gain (Note 2) (V_{CE} = 5.0 V, I_C = 0.5 mA)	2N5777, 2N5778	–	h_{FE}	2.5 k	–	–	–
	2N5779, 2N5780			5.0 k	–	–	
Wave Length of Maximum Sensitivity		1	λ_s	0.7	0.8	1.0	μm
Turn-On Delay Time (Notes 3, 4)		2,3	t_{d1}	–	–	100	μs
Rise Time (Notes 3, 4)		2,3	t_r	–	–	250	μs
Turn-Off Delay Time (Notes 3, 4)		2,3	t_{d2}	–	–	5.0	μs
Fall Time (Notes 3, 4)		2,3	t_f	–	–	150	μs
Collector-Base Capacitance (V_{CB} = 10 V, f = 1.0 MHz, I_E = 0)	2N5777 thru 2N5780	–	C_{cb}	–	–	10	pF

*Indicates JEDEC Registered Data.

NOTES:

1. Radiation Flux Density (H) equal to 2.0 mW/cm^2 emitted from a tungsten source at a color temperature of 2870 K.
2. Measured under dark conditions. (H≈0).
3. For unsaturated rise time measurements, radiation is provided by a pulsed GaAs (gallium-arsenide) light-emitting diode (λ ≈ 0.9 μm) with a pulse width equal to or greater than 500 microseconds (see Figures 2 and 3).
4. Measurement mode with no electrical connection to the base lead.
5. Die faces curved side of package.

FIGURE 2 – PULSE RESPONSE TEST CIRCUIT

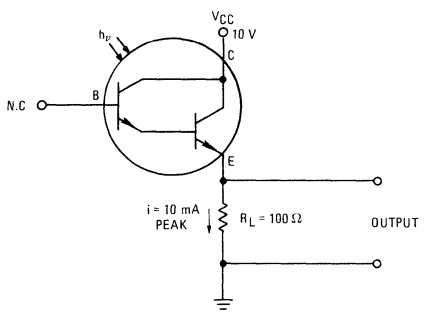


FIGURE 3 – PULSE RESPONSE TEST WAVEFORM