Infrared Emitting Diodes **IREDs**

Honeywell infrared emitting diodes are solid state components. They emit near infrared radiation when forward biased. IREDs are generally continuously operated (DC) to provide a high efficiency, monochromatic radiation source.

These devices may also be used in pulsed applications such as in data transmitter applications (IR remote control) or where AC coupling of the receiver is necessary to obtain increased distance or to reduce effects of ambient visible or infrared radiation.

IRED Types

Honeywell produces two types of IREDs - Gallium Arsenide (GaAs), with a principle wavelength of 935 nanometers, and Aluminum Gallium Arsenide (AlGaAs), with a wavelength of 880 nanometers. AlGaAs IREDs, with a slightly shorter wavelength, have greater internal quantum efficiency. This means greater current-transfer-ratio (CTR) in typical sensing applications, generally about 80%, when a GaAs emitter is replaced by an AlGaAs emitter (other parameters constant).

In the early days of IREDs, all devices were classified on total power output. Although it provides an easily correlatable figure-of-merit, it does not provide the information needed to complete a mathematically rigorous design. Consequently, two additional measurement schemes were introduced:

- Radiant intensity, measured in power per unit area (mW/cm^2)
- Irradiance, measured in power per unit solid angle (mW/steradian).

The two systems are mathematically related. If the required measurement criterion is known, one system can be changed to the other. Neither can be changed to total power output with any degree of accuracy, nor can total power output be changed to radiant intensity or irradiance without the risk of significant error.

CTR (current-transfer-ratio) calculations require input excitation to be expressed as power per unit area. The trend in optoelectronics is to quantify output power in mW/cm^2. This catalog however, continues the systems currently in print for each part number. Footnotes contain the necessary information to convert between irradiance and radiant intensity by using the following relationships:

$$\mathbf{mW/cm^2 = mW/sr\{2\text{-}2\cos[\tan^{-1}(D/4R)]\}/(2.54D/2)^2}$$

$$\mathbf{mW/sr = mW/cm^2\{[2.54D/2]^2/2\text{-}2\cos[\tan^{-1}(D/4R)]\}}$$

Where:

D = diameter of measurement aperture, in inches; and,

R = distance from IRED mounting place to measurement aperture, in inches.

The typical characteristics shown in the following order guides provide the information most often required in optoelectronic design.

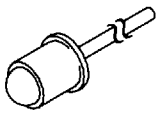
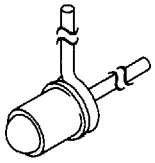
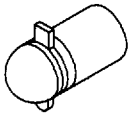
Honeywell IREDs are available in hermetic (metal can) and plastic packages.

T-41-11

IREDs Hermetic

Typical radiation rise time for all IREDs is 600 ns; minimum reverse voltage at I_R = 10 µA is 3 V.

ORDER AND SPECIFICATION GUIDE

Package Style	Part Number	Output Power min.	max.	units	@ I_F(mA)	See note	Forward Voltage max.	@ I_F(mA)	Beam Angle (degrees) Note 1	Wavelength (nm) Note 5
 Drawing 1 Page 39	SE1450-1	0.20		mW	50	2	1.6	50	24	935
	SE1450-2	0.35		mW	50	2	1.6	50	24	935
	SE1450-3	0.70		mW	50	2	1.6	50	24	935
	SE1450-4	1.00		mW	50	2	1.6	50	24	935
	SE1470-1	0.35		mW/cm²	20	3	1.8	50	24	880
	SE1470-2	0.65	2.6	mW/cm²	20	3	1.8	50	24	880
	SE1470-3	1.10	2.6	mW/cm²	20	3	1.8	50	24	880
	SE1470-4	1.65		mW/cm²	20	3	1.8	50	24	880
 Drawing 2 Page 39	SE1450-1L	0.20		mW	50	2	1.6	50	24	935
	SE1450-2L	0.35		mW	50	2	1.6	50	24	935
	SE1450-3L	0.70		mW	50	2	1.6	50	24	935
	SE1450-4L	1.00		mW	50	2	1.6	50	24	935
	SE1470-1L	0.35		mW/cm²	20	3	1.8	50	24	880
	SE1470-2L	0.65	2.6	mW/cm²	20	3	1.8	50	24	880
	SE1470-3L	1.10	2.6	mW/cm²	20	3	1.8	50	24	880
	SE1470-4L	1.65		mW/cm²	20	3	1.8	50	24	880
 Drawing 3 Page 39	SE2460-1	0.27		mW	50	2	1.6	50	18	935
	SE2460-2	0.40		mW	50	2	1.6	50	18	935
	SE2460-3	1.00		mW	50	2	1.6	50	18	935
	SE2470-1	1.7		mW/sr	50	4	1.8	50	18	880
	SE2470-2	6.0		mW/sr	50	4	1.8	50	18	880

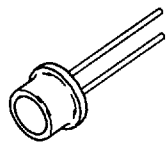
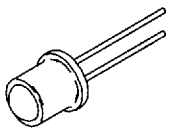
NOTES:

1. Beam angle is defined as total angle included between half-power points.
2. Total power output.
3. Power is measured into a 0.104 inch diameter aperture placed 0.535 inch from lens tip.
4. Power is measured into a 0.104 inch diameter aperture placed 0.922 inch from lens tip (0.01 steradian).
5. Wavelength of 935 nm denotes GaAs IRED; 880 nm denotes AlGaAs.

Hermetic **IREDs**

Typical radiation rise time for all IREDs is 600 ns; minimum reverse voltage at I_R = 10 µA is 3 V.

ORDER AND SPECIFICATION GUIDE

Package Style	Part Number	Output Power min.	max.	units	@ I_F(mA)	See note	Forward Voltage max.	@ I_F(mA)	Beam Angle (degrees) Note 1	Wavelength (nm) Note 5
 Drawing 4 Page 39	SE3450-11	0.30		mW/cm²	100	3	1.7	100	90	935
	SE3450-12	0.50		mW/cm²	100	3	1.7	100	90	935
	SE3450-13	1.00		mW/cm²	100	3	1.7	100	90	935
	SE3450-14	1.50		mW/cm²	100	3	1.7	100	90	935
	SE3455-1	2.0		mW	100	2	1.7	100	90	935
	SE3455-2	3.5		mW	100	2	1.7	100	90	935
	SE3455-3	4.8		mW	100	2	1.7	100	90	935
	SE3455-4	5.4		mW	100	2	1.7	100	90	935
	SE3470-1	7.0		mW	100	2	1.9	100	90	880
	SE3470-2	9.0		mW	100	2	1.9	100	90	880
	SE3470-3	10.5		mW	100	2	1.9	100	90	880
 Drawing 5 Page 39	SE5450-11	0.30		mW/cm²	100	4	1.7	100	20	935
	SE5450-12	0.50		mW/cm²	100	4	1.7	100	20	935
	SE5450-13	1.00		mW/cm²	100	4	1.7	100	20	935
	SE5450-14	1.50		mW/cm²	100	4	1.7	100	20	935
	SE5455-1	2.0		mW	100	2	1.7	100	20	935
	SE5455-2	3.5		mW	100	2	1.7	100	20	935
	SE5455-3	4.8		mW	100	2	1.7	100	20	935
	SE5455-4	5.4		mW	100	2	1.7	100	20	935
	SE5470-1	7.0		mW	100	2	1.9	100	20	880
	SE5470-2	1.5		mW/cm²	100	4	1.9	100	20	880
	SE5470-3	2.6	5.9	mW/cm²	100	4	1.9	100	20	880
	SE5470-4	3.5		mW/cm²	100	4	1.9	100	20	880

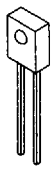
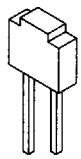
NOTES:

1. Beam angle is defined as total angle included between half-power points.
2. Total power output.
3. Power is measured into a 0.250 inch diameter aperture placed 0.466 inch from lens side of tab.
4. Power is measured into a 0.250 inch diameter aperture placed 1.429 inch from lens side of tab.
5. Wavelength of 935 nm denotes GaAs IRED; 880 nm denotes AlGaAs.

IREDs Plastic Encapsulated

Typical radiation rise time for all IREDs is 600 ns; minimum reverse voltage at I_R = 10 µA is 3 V.

ORDER AND SPECIFICATION GUIDE

Package Style	Part Number	Output Power min.	max.	units	@ I_F(mA)	See note	Forward Voltage max.	@ I_F(mA)	Beam Angle (degrees) Note 1	Wavelength (nm) Note 5
	SEP8505-1	0.5	2.0	mW/cm²	20	3	1.5	20	15	935
	SEP8505-2	1.0	4.0	mW/cm²	20	3	1.5	20	15	935
	SEP8505-3	2.0	4.0	mW/cm²	20	3	1.5	20	15	935
	SEP8505-4	2.7		mW/cm²	20	3	1.5	20	15	935
	SEP8525-1	0.50		mW/cm²	20	3	1.5	20	15	935
	SEP8525-2	1.00		mW/cm²	20	3	1.5	20	15	935
	SEP8705-1	0.54		mW/cm²	20	3	1.7	20	15	880
Drawing 6	SEP8705-2	1.4	5.6	mW/cm²	20	3	1.7	20	15	880
Page 39	SEP8705-3	2.7	7.8	mW/cm²	20	3	1.7	20	15	880
	SEP8506-1	0.05	0.36	mW/cm²	20	4	1.5	20	50	935
	SEP8506-2	0.33	0.52	mW/cm²	20	4	1.5	20	50	935
	SEP8506-3	0.45	0.90	mW/cm²	20	4	1.5	20	50	935
	SEP8506-4	0.80	2.2	mW/cm²	20	4	1.5	20	50	935
	SEP8526-1	0.05		mW/cm²	20	4	1.5	20	50	935
	SEP8526-2	0.33		mW/cm²	20	4	1.5	20	50	935
	SEP8706-1	0.20		mW/cm²	20	4	1.7	20	50	880
Drawing 7	SEP8706-2	0.45	2.6	mW/cm²	20	4	1.7	20	50	880
Page 39	SEP8706-3	0.65		mW/cm²	20	4	1.7	20	50	880
	SEP8507-1	0.40		mW	20	2	1.5	20	135	935
Drawing 8 Page 39										

NOTES:

1. Beam angle is defined as total angle included between half-power points.
2. Total power output.
3. Power is measured into 0.081 inch diameter aperture placed 0.400 inch from lens tip.
4. Power is measured into 0.104 inch diameter aperture placed 0.535 inch from lens tip.
5. Wavelength of 935 nm denotes GaAs IRED; 880 nm denotes AlGaAs.