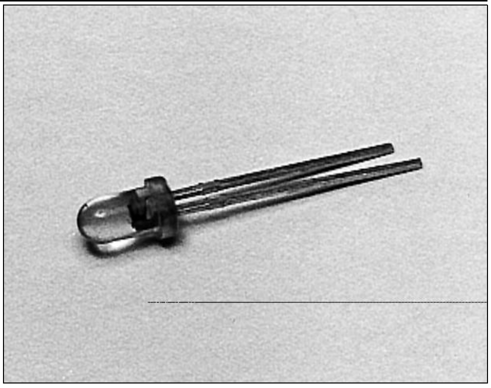
SDP8405

Silicon Phototransistor

FEATURES
- T-1 plastic package
- 20° (nominal) acceptance angle
- Consistent optical properties
- Wide sensitivity ranges
- Mechanically and spectrally matched to SEP8505 and SEP8705 infrared emitting diodes



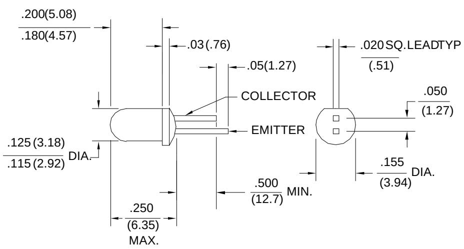
INFRA-22.TIF

DESCRIPTION

The SDP8405 is an NPN silicon phototransistor transfer molded in a T-1 clear plastic package. Transfer molding of this device assures superior optical centerline performance compared to other molding processes. Lead lengths are staggered to provide a simple method of polarity identification.

OUTLINE DIMENSIONS in inches (mm)

Tolerance	3 plc decimals	±0.005(0.12)
	2 plc decimals	±0.020(0.51)



DIM_100.ds4

SDP8405

Silicon Phototransistor

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Light Current	I_L				mA	V_{CE}=5 V
SDP8405-001		1.00				H=5 mW/cm² [1]
SDP8405-002		7.00		14.0		
SDP8405-003		12.0		24.0		
Light Current	I_L				mA	V_{CE}=5 V
SDP8405-011		0.16				H=0.25 mW/cm² [2]
SDP8405-012		0.16		0.46		
SDP8405-013		0.32		0.92		
SDP8405-014		0.64		1.85		
SDP8405-015		1.25				
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=15 V, H=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=100 µA
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5.0			V	I_E=100 µA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=I_L/8
SDP8405-001 to -003						H=5 mW/cm²
SDP8405-011 to -015						H=0.25 mW/cm²
Angular Response [3]	Ø		20		degr.	I_F=Constant
Rise And Fall Time	t_r, t_f		15		µs	V_{CC}=5 V, I_L=1 mA R_L=1000 Ω

Notes
1. The radiation source is a tungsten lamp operating at a color temperature of 2870°K.
2. The radiation source is an IRED with a peak wavelength of 935 nm.
3. Angular response is defined as the total included angle between the half sensitivity points.

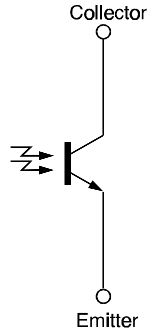
ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Collector-Emitter Voltage	30 V
Emitter-Collector Voltage	5 V
Power Dissipation	70 mW [1]
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

Notes
1. Derate linearly from 25°C free-air temperature at the rate of 0.18 mW/°C.

SCHEMATIC

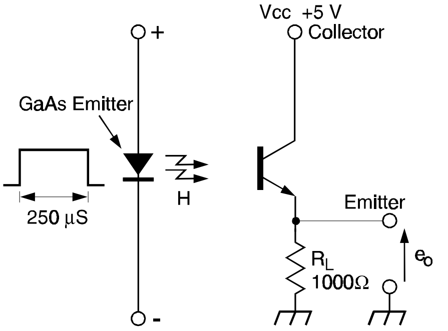


SDP8405

Silicon Phototransistor

SWITCHING TIME TEST CIRCUIT

cir_015.cdr



SWITCHING WAVEFORM

cir_004.cdr

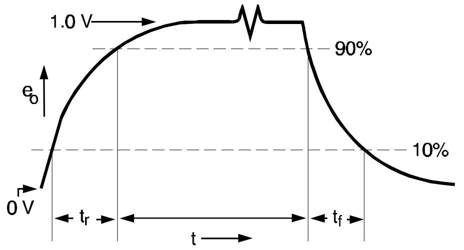


Fig. 1 Responsivity vs Angular Displacement

gra_047.ds4

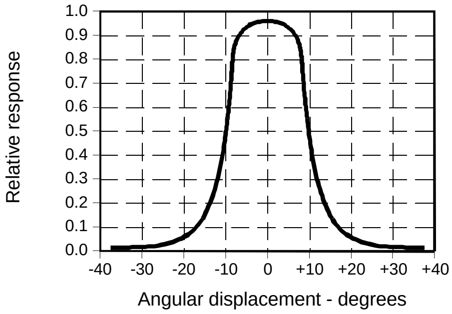


Fig. 2 Collector Current vs Ambient Temperature

gra_039.ds4

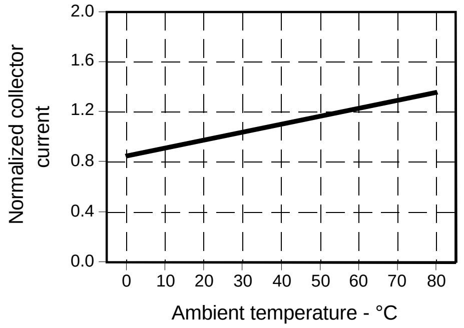


Fig. 3 Dark Current vs Temperature

gra_301.cdr

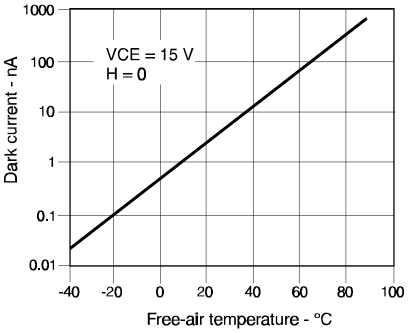
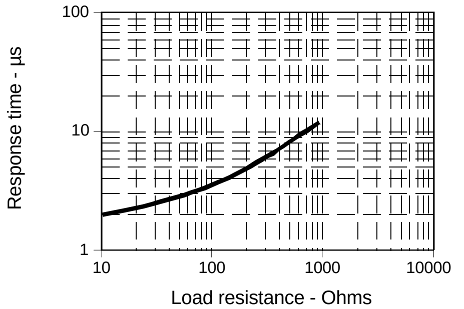


Fig. 4 Non-Saturated Switching Time vs Load Resistance

gra_041.ds4



Honeywell

SDP8405

Silicon Phototransistor

Fig. 5 Spectral Responsivity

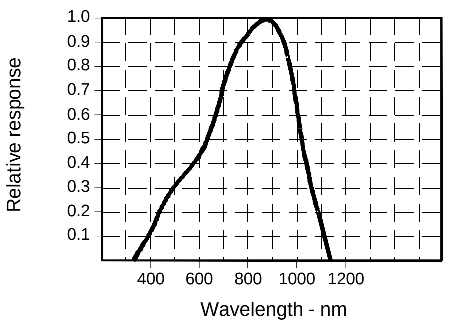
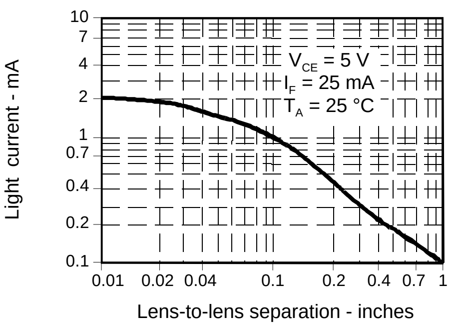


Fig. 6 Coupling Characteristics with SEP8505



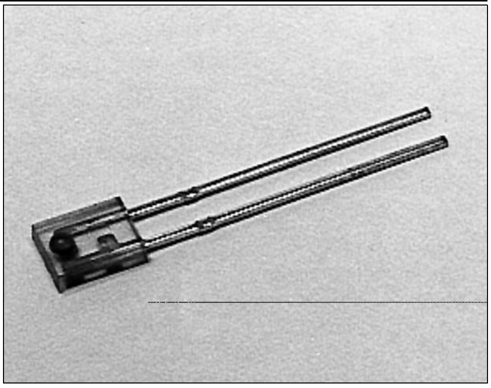
All Performance Curves Show Typical Values

SDP8406

Silicon Phototransistor

FEATURES

- Side-looking plastic package
- 50° (nominal) acceptance angle
- Wide sensitivity ranges
- Mechanically and spectrally matched to SEP8506 and SEP8706 infrared emitting diodes



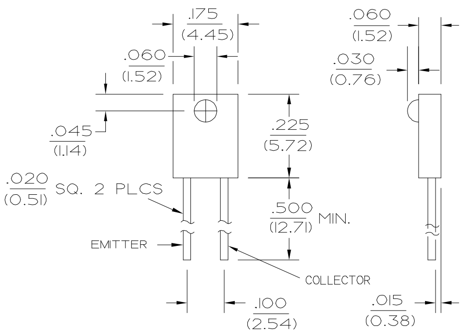
INFRA-21.TIF

DESCRIPTION

The SDP8406 is an NPN silicon phototransistor molded in a side-looking clear plastic package. The chip is positioned to accept radiation through a plastic lens from the side of the package.

OUTLINE DIMENSIONS in inches (mm)

Tolerance	3 plc decimals	±0.005(0.12)
	2 plc decimals	±0.020(0.51)



DIM_017.ds4

Honeywell

Honeywell reserves the right to make changes in order to improve design and supply the best products possible.

SDP8406

Silicon Phototransistor

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Light Current	I_L				mA	V_{CE}=5 V
SDP8406-001		0.15		1.90		H=1 mW/cm² (1)
SDP8406-002		1.80		3.60		
SDP8406-003		3.40		6.50		
SDP8406-004		6.40		12.0		
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=15 V, H=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=100 µA
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5.0			V	I_E=100 µA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=I_L/8 H=1 mW/cm²
Angular Response (2)	Ø		50		degr.	I_F=Constant
Rise And Fall Time	t_r, t_f		15		µs	V_{CC}=5 V, I_L=1 mA R_L=1000 Ω

Notes
1. The radiation source is an IRED with a peak wavelength of 935 nm.
2. Angular response is defined as the total included angle between the half sensitivity points.

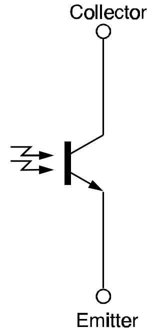
ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Collector-Emitter Voltage	30 V
Emitter-Collector Voltage	5 V
Power Dissipation	100 mW (1)
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

Notes
1. Derate linearly from 25°C free-air temperature at the rate of 0.78 mW/°C.

SCHEMATIC

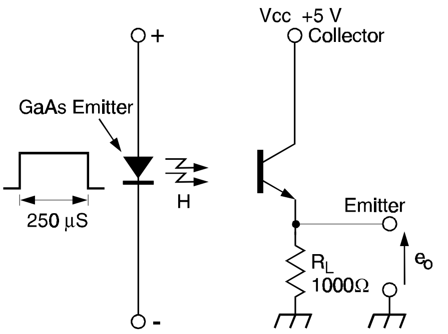


SDP8406

Silicon Phototransistor

SWITCHING TIME TEST CIRCUIT

cir_015.cdr



SWITCHING WAVEFORM

cir_004.cdr

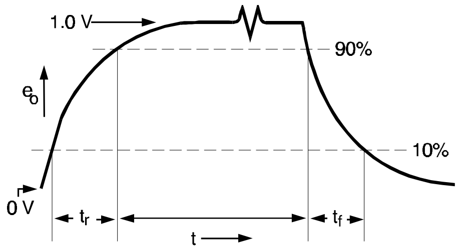


Fig. 1 Responsivity vs Angular Displacement

gra_054.ds4

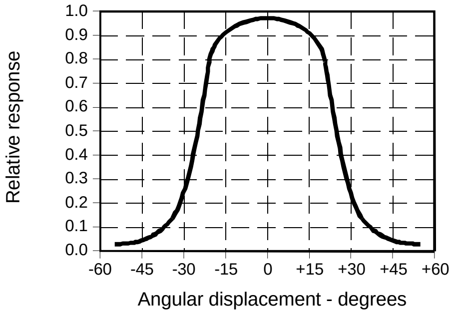


Fig. 2 Collector Current vs Ambient Temperature

gra_039.ds4

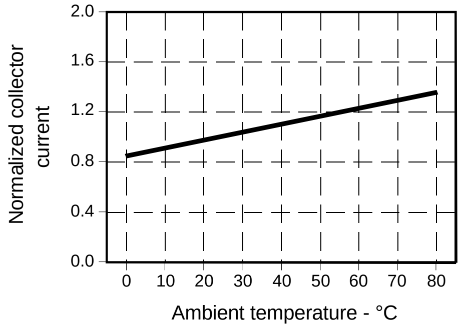


Fig. 3 Dark Current vs Temperature

gra_301.cdr

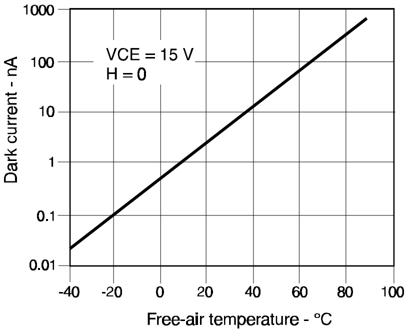


Fig. 4 Non-Saturated Switching Time vs Load Resistance

gra_041.ds4

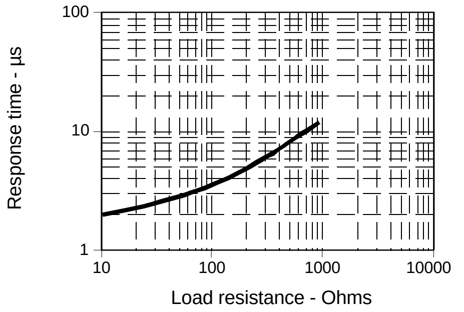


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Fig. 5 Spectral Responsivity

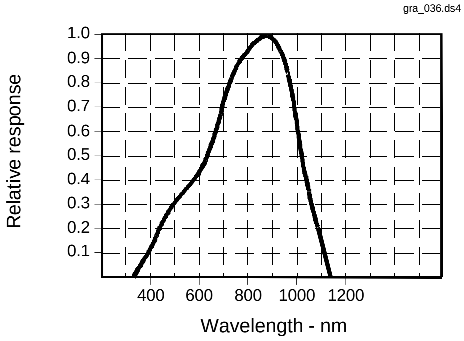
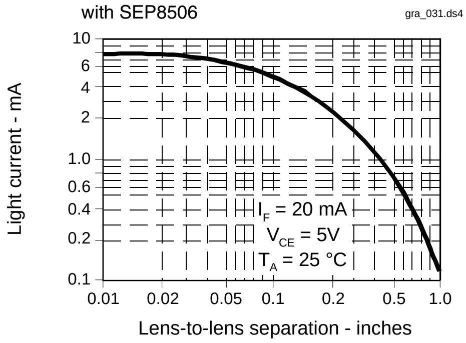


Fig. 6 Coupling Characteristics with SEP8506



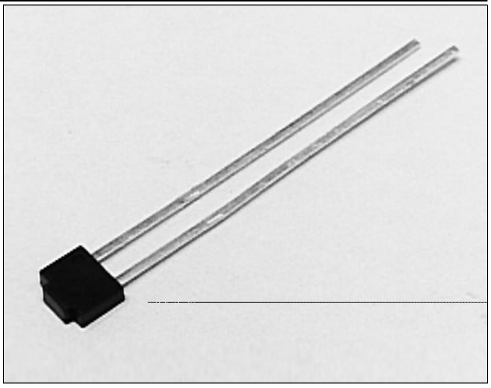
All Performance Curves Show Typical Values

SDP8407

Silicon Phototransistor

FEATURES

- End-looking plastic package
- 135° (nominal) acceptance angle
- Low profile for design flexibility
- Mechanically and spectrally matched to SEP8507 infrared emitting diode



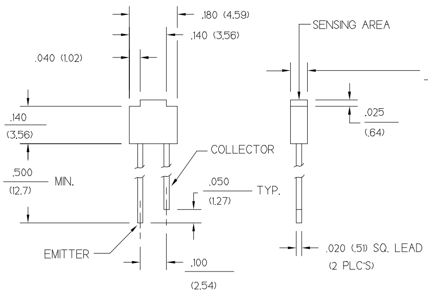
INFRA-16.TIF

DESCRIPTION

The SDP8407 is an NPN silicon phototransistor molded in an end-looking black plastic package. The chip is positioned to accept radiation from the top of the package. Lead lengths are staggered to provide a simple method of polarity identification.

OUTLINE DIMENSIONS in inches (mm)

Tolerance	3 plc decimals	±0.008(0.20)
	2 plc decimals	±0.020(0.51)



DIM_018.ds4

Honeywell

SDP8407

Silicon Phototransistor

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Light Current SDP8407-001	I_L	0.10			mA	V_{CE}=5 V H=1 mW/cm² [1]
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=10 V, H=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=100 µA
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5.0			V	I_E=100 µA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=10 µA H=1 mW/cm²
Angular Response [2]	Ø		135		degr.	I_F=Constant
Rise And Fall Time	t_r, t_f		15		µs	V_{CC}=5 V, I_L=1 mA R_L=1000 Ω

Notes
1. The radiation source is an IRED with a peak wavelength of 935 nm.
2. Angular response is defined as the total included angle between the half sensitivity points.

ABSOLUTE MAXIMUM RATINGS

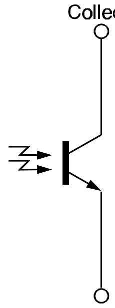
(25°C Free-Air Temperature unless otherwise noted)

Collector-Emitter Voltage	30 V
Emitter-Collector Voltage	5 V
Power Dissipation	100 mW [1]
Operating Temperature Range	-40°C to 85C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

Notes
1. Derate linearly from 25°C free-air temperature at the rate of 0.66 mW/°C.

SCHEMATIC

Collector



Emitter

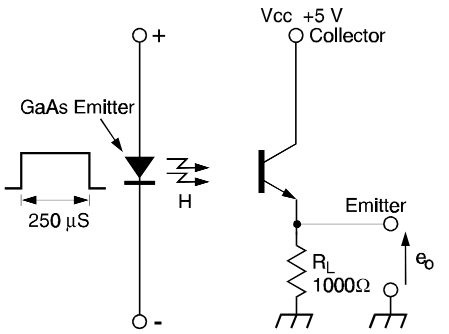
Honeywell

SDP8407

Silicon Phototransistor

SWITCHING TIME TEST CIRCUIT

cir_015.cdr



SWITCHING WAVEFORM

cir_004.cdr

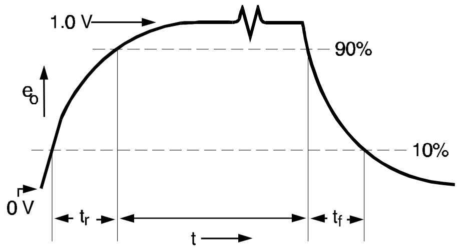


Fig. 1 Responsivity vs Angular Displacement

gra_055.ds4

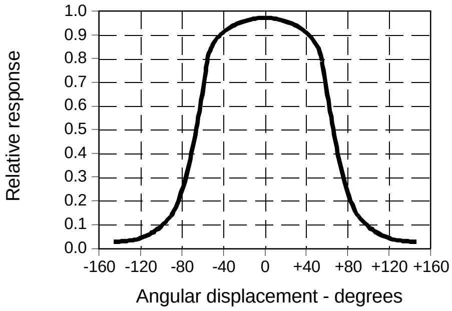


Fig. 2 Collector Current vs Ambient Temperature

gra_039.ds4

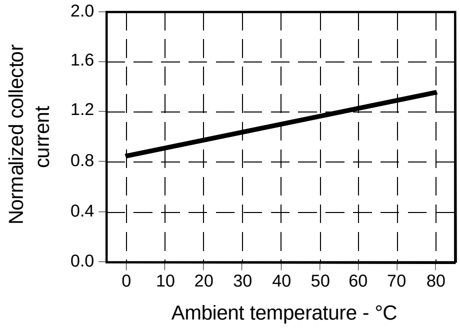


Fig. 3 Dark Current vs Temperature

gra_301.cdr

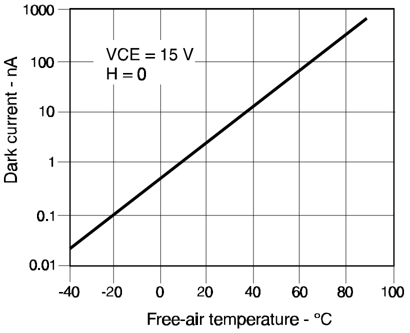
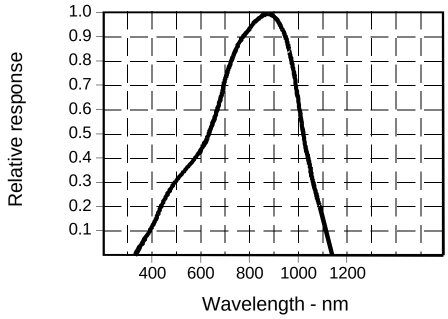


Fig. 4 Spectral Responsivity

gra_036.ds4



All Performance Curves Show Typical Values

Honeywell

SDP8407

Silicon Phototransistor

SDP8436

Silicon Phototransistor

FEATURES

- Side-looking plastic package
- 18° (nominal) acceptance angle
- Enhanced coupling distance
- Internal visible light rejection filter
- Low profile for design flexibility
- Wide sensitivity ranges
- Mechanically matched to SEP8736 infrared emitting diode

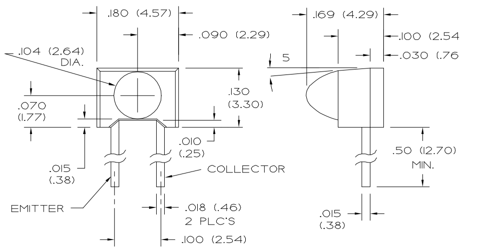
INFRA-82.TIF

DESCRIPTION

The SDP8436 is an NPN silicon phototransistor molded in a black plastic package which combines the mounting advantages of a side-looking package with the narrow acceptance angle and high optical gain of a T- 1 package. The SDP8436 is designed for those applications which require longer coupling distances than standard side- looking devices can provide, such as touch screens. The device is also well suited to applications in which adjacent channel crosstalk could be a problem. The package is highly transmissive to the IR source energy while it provides effective shielding against visible ambient light.

OUTLINE DIMENSIONS in inches (mm)

Tolerance	3 plc decimals	±0.005(0.12)
	2 plc decimals	±0.020(0.51)



DIM_019.ds4

Honeywell

SDP8436

Silicon Phototransistor

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Light Current	I_L				mA	V_{CE}=5 V
SDP8436-001		0.50				H=1 mW/cm² (1)
SDP8436-002		4.00		10.0		
SDP8436-003		7.00		17.5		
SDP8436-004		12.5				
Collector Dark Current	I_{CEO}			100	nA	V_{CE}=15 V, H=0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=100 µA
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5.0			V	I_E=100 µA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=0.1 mA H=1 mW/cm²
Angular Response (2)	Ø		18		degr.	I_F=Constant
Rise And Fall Time	t_r, t_f		15		µs	V_{CC}=5 V, I_L=1 mA R_L=1000 Ω

Notes
1. The radiation source is an IRED with a peak wavelength of 880 nm.
2. Angular response is defined as the total included angle between the half sensitivity points.

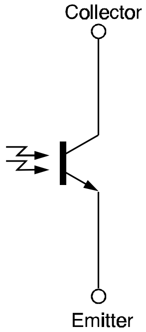
ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Collector-Emitter Voltage	30 V
Emitter-Collector Voltage	5 V
Power Dissipation	100 mW (1)
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

Notes
1. Derate linearly from 25°C free-air temperature at the rate of 0.78 mW/°C.

SCHEMATIC



Honeywell reserves the right to make changes in order to improve design and supply the best products possible.

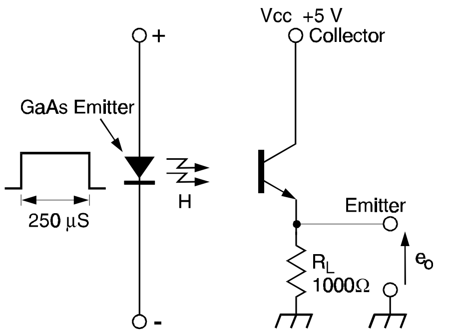
Honeywell

SDP8436

Silicon Phototransistor

SWITCHING TIME TEST CIRCUIT

cir_015.cdr



SWITCHING WAVEFORM

cir_004.cdr

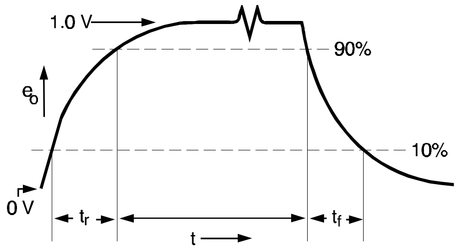


Fig. 1 Responsivity vs Angular Displacement

gra_013.ds4

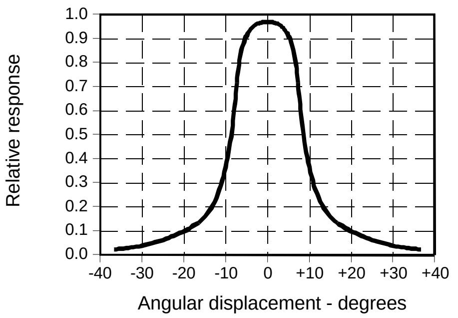


Fig. 2 Collector Current vs Ambient Temperature

gra_039.ds4

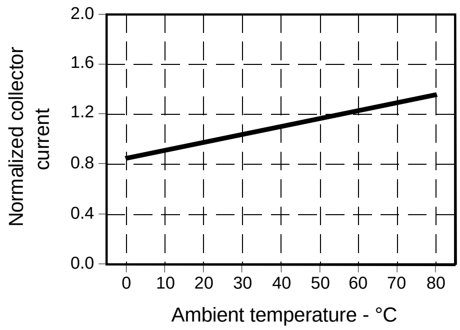


Fig. 3 Dark Current vs Temperature

gra_301.cdr

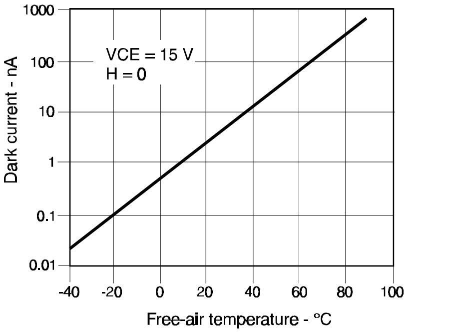
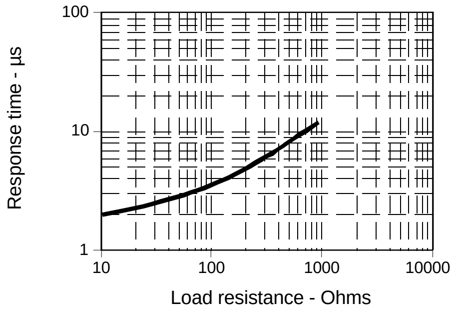


Fig. 4 Non-Saturated Switching Time vs Load Resistance

gra_041.ds4



Honeywell

SDP8436

Silicon Phototransistor

Fig. 5 Spectral Responsivity

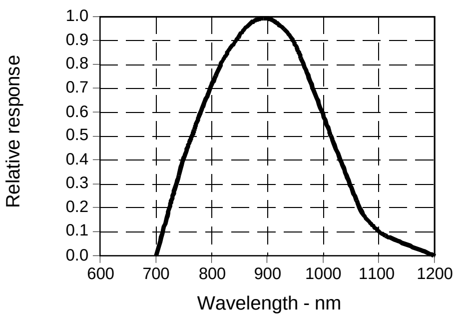
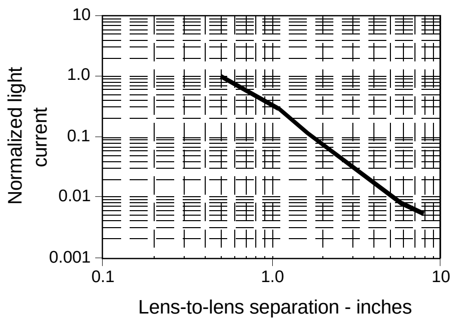


Fig. 6 Coupling Characteristics with SEP8736



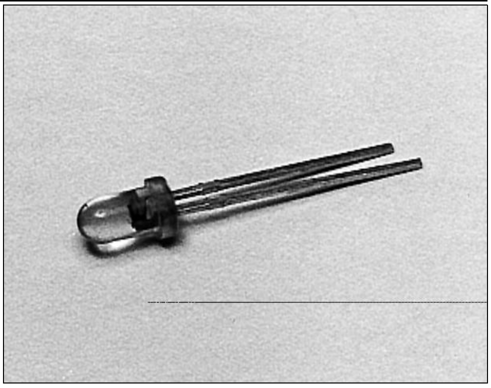
All Performance Curves Show Typical Values

SDP8475-201

Low Light Rejection Phototransistor

FEATURES

- T-1 plastic package
- Low light level immunity
- 20° (nominal) acceptance angle
- Mechanically and spectrally matched to SEP8505 and SEP8705 infrared emitting diodes



INFRA-22.TIF

DESCRIPTION

The SDP8475 is an NPN silicon phototransistor which internal base- emitter shunt resistance. Transfer molding of this device in a clear T- 1 plastic package assures superior optical centerline performance compared to other molding processes. Lead lengths are staggered to provide a simple method of polarity identification.

Distinguising Feature:

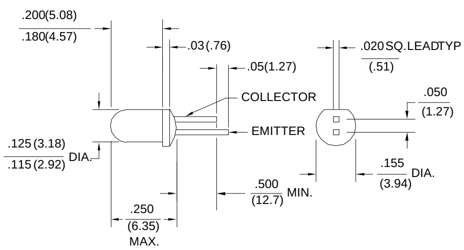
This device incorporates all of the desired features of a standard phototransistor with the advantage of low light immunity. The phototransistor switching occurs when the incident light increases above the threshold (knee point). When the light level exceeds the knee point of the device, it will function as a standard phototransistor. Chart A illustrates the light current output of the low light rejection phototransistor as compared to a standard phototransistor with similar sensitivity.

Typical Application Uses:

Ideally suited for use in applications which require ambient light rejection, or in transmissive applications where the interrupter media is semi- transparent to infrared energy. This device also provides high contrast ratio in reflective applications where unwanted background reflection is a possibility.

OUTLINE DIMENSIONS in inches (mm)

Tolerance	3 plc decimals	±0.005(0.12)
	2 plc decimals	±0.020(0.51)



DIM_100.ds4

Honeywell

SDP8475-201

Low Light Rejection Phototransistor

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Light Current Slope [1] [2] SDP8475-201	I_L Slope	4.0		14.0	mA/mW/cm²	V_{CE}=5 V H_1= 0.5 mW/cm² H_2= 0.25 mW/cm²
Knee Point [3]			0.125		mW/cm²	V_{CE}=5 V
Collector Dark Current	I_{CEO}			100	nA	H=0 mW/cm², V_{CE}=15 V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=100 µA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=I_L/8 H=0.25mW/cm²
Reverse Current	I_R			40	mA	V_{CE}=-5.0 V
Angular Response [4]	Ø		20		degr.	I_F=Constant
Rise And Fall Time	t_r, t_f		15		µs	V_{CC}=5 V, I_L=1 mA R_L=1000 Ω

Notes
1. The Slope is calculated with the following equation: (I_{L1} (@ H_1) - I_{L2} (@ H_2)) / (H_1 - H_2).
2. The radiation source is an IRED with a peak wavelength of 935 nm.
3. Knee Point is defined as being the source irradiance required to increase I_L to 50 µA.
4. Angular response is defined as the total included angle between the half sensitivity points.

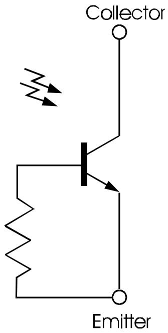
ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Collector-Emitter Voltage	30 V
Power Dissipation	70 mW [1]
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

Notes
1. Derate linearly from 25°C free-air temperature at the rate of 0.18 mW/°C.

SCHEMATIC



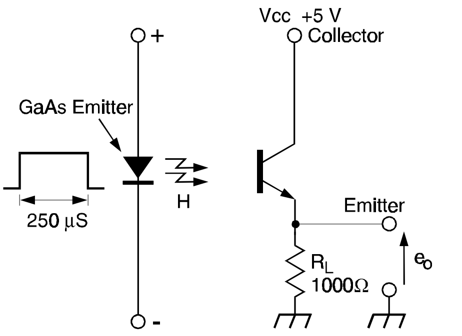
Honeywell

SDP8475-201

Low Light Rejection Phototransistor

SWITCHING TIME TEST CIRCUIT

cir_015.cdr



SWITCHING WAVEFORM

cir_004.cdr

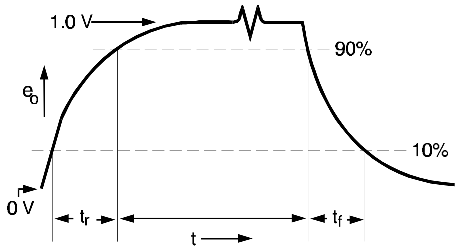


Fig. 1 Responsivity vs Angular Displacement

gra_047.ds4

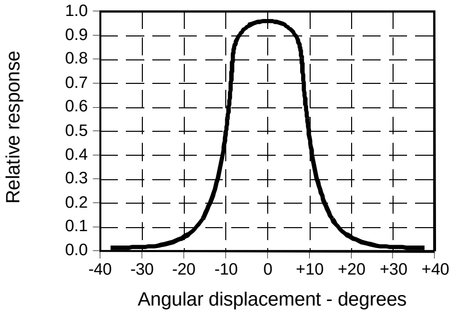


Fig. 2 Spectral Responsivity

gra_036.ds4

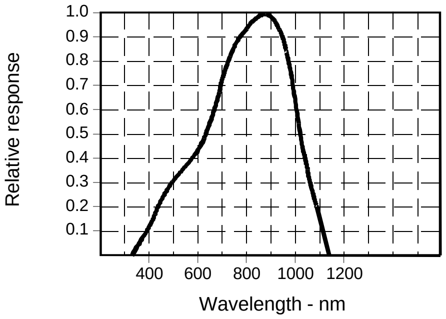


Fig. 3 Dark Current vs Temperature

gra_310.ds4

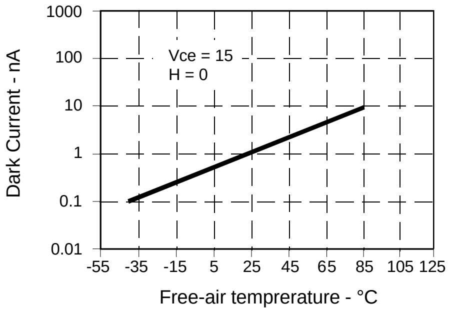
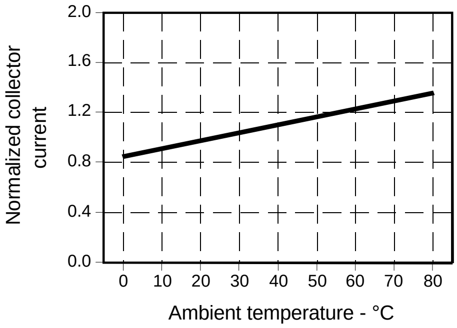


Fig. 4 Collector Current vs Ambient Temperature

gra_039.ds4



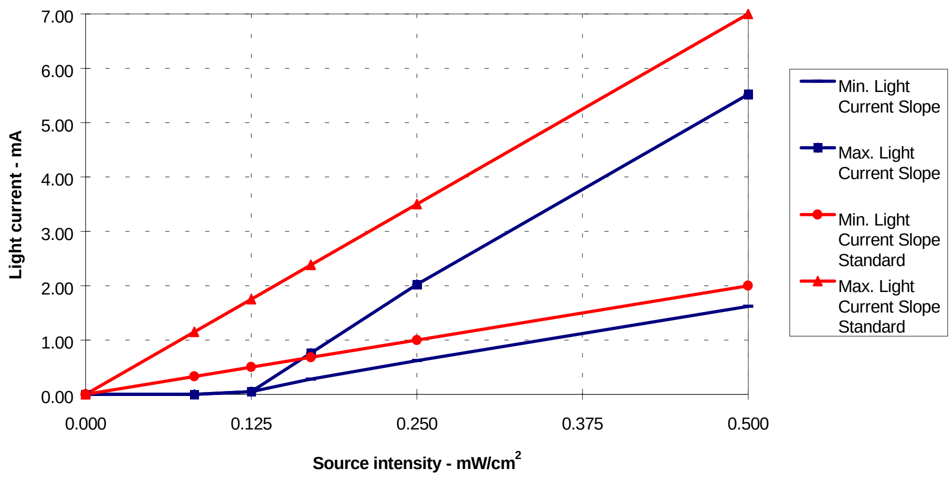
All Performance Curves Show Typical Values

Honeywell

SDP8475-201

Low Light Rejection Phototransistor

Chart A. Low Light Rejection Phototransistor vs. Standard Phototransistor



Designing with the Low Light Rejection Phototransistor:
The Low Light Rejection detector is tested at different incident light levels to determine adherence to the specified knee point and light current slope. This method assures proper functionality vs. standard phototransistors, and guarantees required light current output.

The light current slope is the change in light current output at two given source irradiances divided by the change in the two source irradiances.

(**Formula # 1)**

I_L Slope = [I_{L1} (@ H_1) - I_{L2} (@ H_2)] / [H_1 - H_2]

Where:

- I_L slope is the light current slope in mA/mW/cm^2
- I_L is the light current output in mA
- H is the source intensity in mW/cm^2

Chart A shows the specified limits of light current slope for the low light rejection phototransistor which begins its slope at the typical knee point, 0.125mW/cm^2. To make a clear distinction between this device and a standard phototransistor, light current slopes for high and low sensitivity standard phototransistors are also shown. Note that for phototransistors of the same gain, the slopes of the two products are parallel.

The knee point, the source irradiance needed to increase I_L to 50uA, is a necessary parameter for circuit design. All variation in the knee point will be offset by the internally guardbanded light current slope limits. The appropriate formula for circuit design is the following:

(**Formula # 2)**

I_L = I_L slope$_{MIN.}$ * (H_A - H_{KP})

Where:

- I_L is the light current output in mA
- I_L slope$_{MIN.}$ is the minimum limit on the light current slope (i.e. 4.0mA/mW/cm^2)
- H_A is the source light incident on the detector for the application
- H_{KP} is the specified level of source light incident on the detector at the typical knee point (i.e. 0.125 mW/cm^2)

Example :
To design a transmissive sensor with two of Honeywell's standard components, the SEP8505-002 and the SDP8475-201, it is first necessary to determine the irradiance level in mW/cm^2 that will be incident on the detector. The application conditions are the following:

Honeywell

SDP8475-201

Low Light Rejection Phototransistor

Supply voltage = 5V
Distance between emitter and detector = 0.4 in. (10.16mm)
IRED drive current = 20mA

The SEP8505-002 gives 1.0mW/cm^2 min. to 4.0mW/cm^2 max. under the above conditions. To obtain minimum light current output, use the minimum irradiance limit.

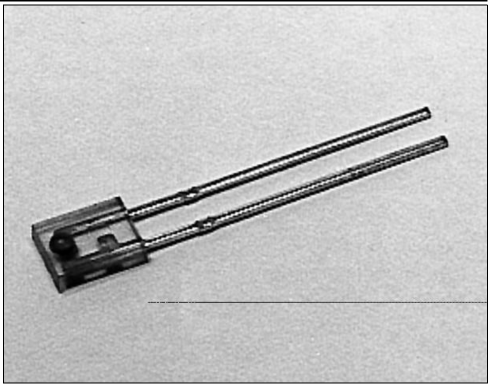
Light current output = I_L slope$_{MIN.}$ * (H_A - H_{KP})
Light current output = 4.0 mA/mW/cm^2 min. * (1.0 mW/cm^2 min. - 0.125 mW/cm^2) = 3.5mA min.

SDP8476-201

Low Light Rejection Phototransistor

FEATURES

- Side-looking plastic package
- Low light level immunity
- 50° (nominal) acceptance angle
- Mechanically and spectrally matched to SEP8506 and SEP8706 infrared emitting diodes



INFRA-21.TIF

DESCRIPTION

The SDP8476 is an NPN silicon phototransistor which internal base- emitter shunt resistance. Transfer molding of this device in a clear T- 1 plastic package assures superior optical centerline performance compared to other molding processes. Lead lengths are staggered to provide a simple method of polarity identification.

Distinguising Feature:

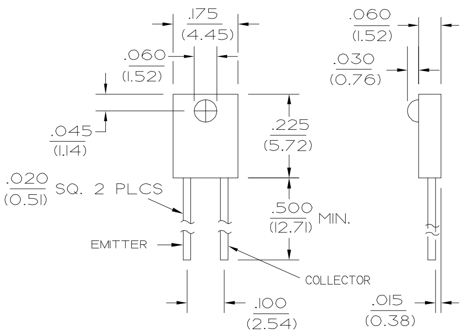
This device incorporates all of the desired features of a standard phototransistor with the advantage of low light immunity. The phototransistor switching occurs when the incident light increases above the threshold (knee point). When the light level exceeds the knee point of the device, it will function as a standard phototransistor. Chart A illustrates the light current output of the low light rejection phototransistor as compared to a standard phototransistor with similar sensitivity.

Typical Application Uses:

Ideally suited for use in applications which require ambient light rejection, or in transmissive applications where the interrupter media is semi- transparent to infrared energy. This device also provides high contrast ratio in reflective applications where unwanted background reflection is a possibility.

OUTLINE DIMENSIONS in inches (mm)

Tolerance	3 plc decimals	±0.005(0.12)
	2 plc decimals	±0.020(0.51)



DIM_017.ds4

Honeywell

SDP8476-201

Low Light Rejection Phototransistor

ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Light Current Slope [1] [2] SDP8476-201	I_L Slope	 1.0		 6.0	mA/mW/cm²	V_{CE}=5 V H_1= 1 mW/cm² H_2= 0.5 mW/cm²
Knee Point [3]			0.125		mW/cm²	V_{CE}=5 V
Collector Dark Current	I_{CEO}			100	nA	H=0 mW/cm², V_{CE}=15 V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	30			V	I_C=100 µA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$			0.4	V	I_C=I_L/8 H=1mW/cm²
Reverse Current	I_R			40	mA	V_{CE}=-5.0 V
Angular Response [4]	Ø		20		degr.	I_F=Constant
Rise And Fall Time	t_r, t_f		15		µs	V_{CC}=5 V, I_L=1 mA R_L=1000 Ω

Notes
1. The Slope is calculated with the following equation: (I_{L1} (@ H_1) - I_{L2} (@ H_2)) / (H_1 - H_2).
2. The radiation source is an IRED with a peak wavelength of 935 nm.
3. Knee Point is defined as being the source irradiance required to increase I_L to 50 µA.
4. Angular response is defined as the total included angle between the half sensitivity points.

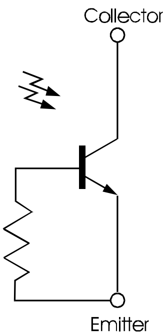
ABSOLUTE MAXIMUM RATINGS

(25°C Free-Air Temperature unless otherwise noted)

Collector-Emitter Voltage	30 V
Power Dissipation	100 mW [1]
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-40°C to 85°C
Soldering Temperature (5 sec)	240°C

Notes
1. Derate linearly from 25°C free-air temperature at the rate of 0.78 mW/°C.

SCHEMATIC



Honeywell reserves the right to make changes in order to improve design and supply the best products possible.

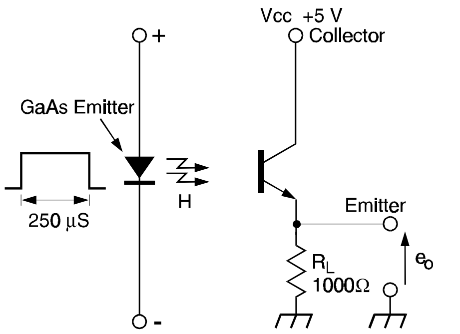
Honeywell

SDP8476-201

Low Light Rejection Phototransistor

SWITCHING TIME TEST CIRCUIT

cir_015.cdr



SWITCHING WAVEFORM

cir_004.cdr

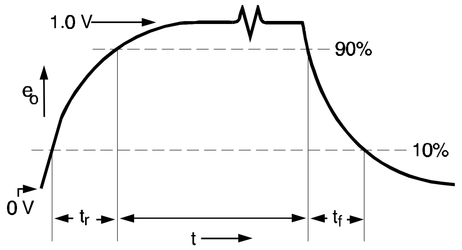


Fig. 1 Responsivity vs Angular Displacement

gra_054.ds4

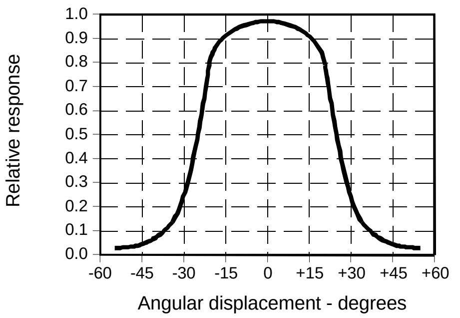


Fig. 2 Spectral Responsivity

gra_036.ds4

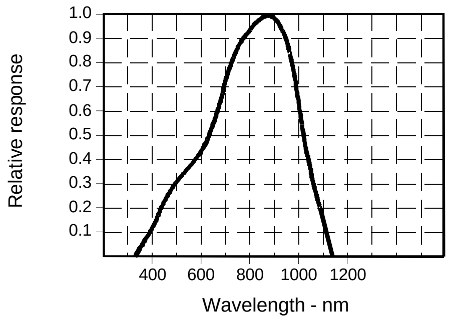


Fig. 3 Dark Current vs Temperature

gra_310.ds4

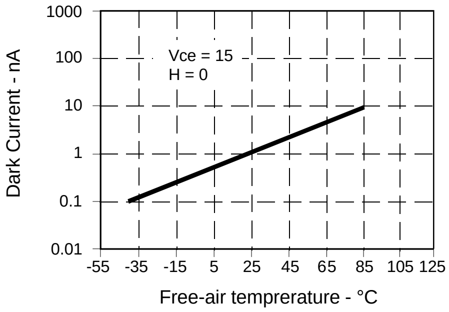
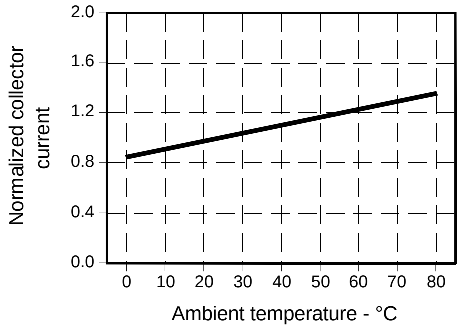


Fig. 4 Collector Current vs Ambient Temperature

gra_039.ds4

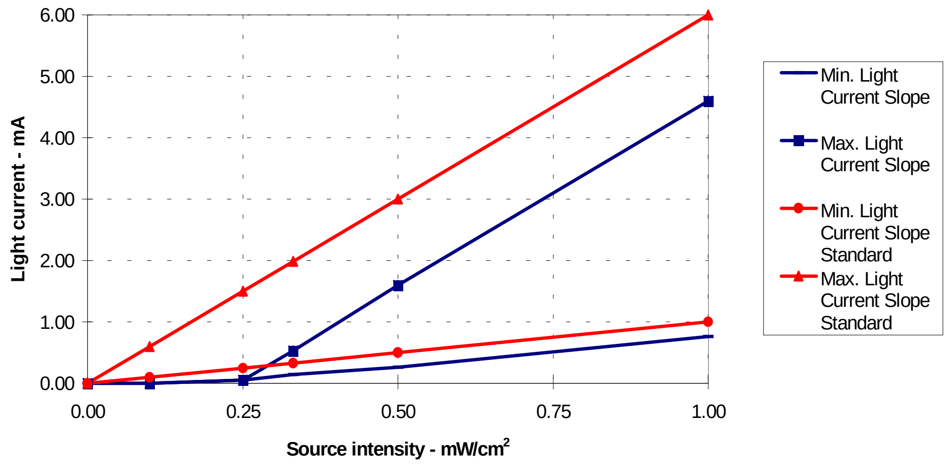


All Performance Curves Show Typical Values

SDP8476-201

Low Light Rejection Phototransistor

Chart A. Low Light Rejection Phototransistor vs. Standard Phototransistor



Designing with the Low Light Rejection Phototransistor:
The Low Light Rejection detector is tested at different incident light levels to determine adherence to the specified knee point and light current slope. This method assures proper functionality vs. standard phototransistors, and guarantees required light current output.

The light current slope is the change in light current output at two given source irradiances divided by the change in the two source irradiances.

(**Formula # 1)**

I_L Slope = $[I_{L1}$ (@ H_1) - I_{L2} (@ H_2)] / $[H_1 - H_2]$

Where:

- I_L slope is the light current slope in mA/mW/cm^2
- I_L is the light current output in mA
- H is the source intensity in mW/cm^2

Chart A shows the specified limits of light current slope for the low light rejection phototransistor which begins its slope at the typical knee point, 0.25mW/cm^2. To make a clear distinction between this device and a standard phototransistor, light current slopes for high and low sensitivity standard phototransistors are also shown. Note that for phototransistors of the same gain, the slopes of the two products are parallel.

The knee point, the source irradiance needed to increase I_L to 50uA, is a necessary parameter for circuit design. All variation in the knee point will be offset by the internally guardbanded light current slope limits. The appropriate formula for circuit design is the following:

(**Formula # 2)**

$I_L = I_L$ slope$_{MIN.}$ * $(H_A - H_{KP})$

Where:

- I_L is the light current output in mA
- I_L slope$_{MIN.}$ is the minimum limit on the light current slope (i.e. 1.0mA/mW/cm^2)
- H_A is the source light incident on the detector for the application
- H_{KP} is the specified level of source light incident on the detector at the typical knee point (i.e. 0.125 mW/cm^2)

To design a transmissive sensor with two of Honeywell's standard components, the SEP8506-003 and the SDP8476-201, it is first necessary to determine the irradiance level in mW/cm^2 that will be incident on the detector. The application conditions are the following:

SDP8476-201

Low Light Rejection Phototransistor

Supply voltage = 5V
Distance between emitter and detector = 0.535 in. (13.6mm)
IRED drive current = 20mA

The SEP8506-003 gives 0.45mW/cm^2 min. to 0.90mW/cm^2 max. under the above conditions. To obtain minimum light current output, use the minimum irradiance limit.

Light current output = I_L slope$_{MIN.}$ * (H_A - H_{KP})
Light current output = 1.0 mA/mW/cm^2 min. * (0.45mW/cm^2 min. - 0.25 mW/cm^2) = 0.2mA min.

Honeywell