

## Infrared Components

### Ceramic Discrete Surface Mount Emitters and Detectors

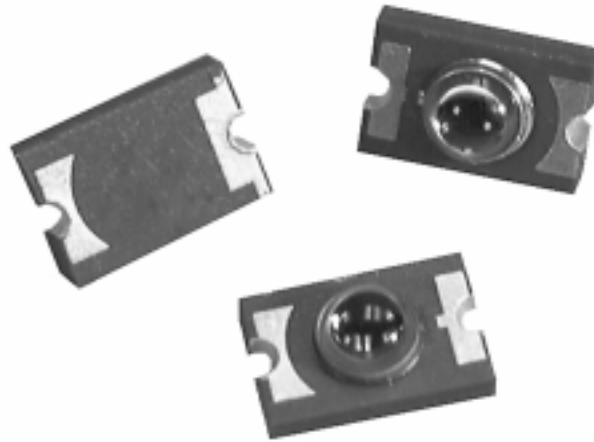
### *SME/SMD Series*

#### FEATURES

- Small package size
- Glass lensed optics for efficient optical coupling
- Upright or inverted mounting capability
- Low profile, small size for flexible layout of multiple channels and custom arrays
- Compatible with automated solder processes:
  - IR reflow
  - vapor phase
  - solder wave
  - convection oven
- Choice of photodiode or phototransistor detectors
- IRED features high power dissipation capability
- Tape and reel packaging option – pick and place machine compatible

#### APPLICATIONS

- Optical encoders for motion control
- Computer peripherals
- Vending and point-of-sale applications
- Smoke detectors
- Medical equipment



The SME2470, SMD2440 and SMD2420 Series surface mount infrared components are small ceramic packages (0.15 x 0.10 x 0.083 in. / 3,81 x 2,54 x 2,1 mm) with glass lenses. The lens minimizes cross talk and often eliminates the need for apertures in non-critical applications. The low profile components may be mounted on the printed circuit board, lens up or inverted, allowing flexibility in layouts for multiple channel and custom arrays. When mounted lens down over a hole in the PC board, the lens is hidden, lowering overall package height.

The SME2470 is a high intensity aluminum gallium arsenide infrared emitting diode (IRED) which can be used with either the SMD2440 phototransistor or the SMD2420 photodiode. It supplies optimum optical characteristics and efficient optical coupling. The small size and high power dissipation properties of the IRED promote PC board miniaturization and high density placement.

The SMD2440 Series phototransistor's gain characteristics make it useful for applications requiring high responsivity. The SMD2420 Series photodiode is especially useful in applications requiring linear response or high switching speed.

These components are available in bulk, or on tape and reel for use with automatic placement equipment.

# Infrared Components

## Ceramic Discrete Surface Mount

## SME/SMD Series

### SME2470 SERIES IRED ABSOLUTE MAXIMUM RATINGS

Power dissipation @ 25 °C*	150 mW
Continuous forward current	75 mA (mounted on a PC board)
Reverse voltage ( $I_F = 10 \mu\text{A}$ )	3 V
Operating free air temperature range	-55° to +125°C (-67° to +257°F)
Storage temperature	-65° to +150°C (-85° to +302°F)
Soldering temperature	260°C (500°F), 5 seconds max.

\*Derate 1.43 mW/°C above 25°C ambient.

### CAUTION

#### STRESS DAMAGE

Functional operation of the device at or above "Absolute Maximum Ratings" for extended periods of time may affect reliability.

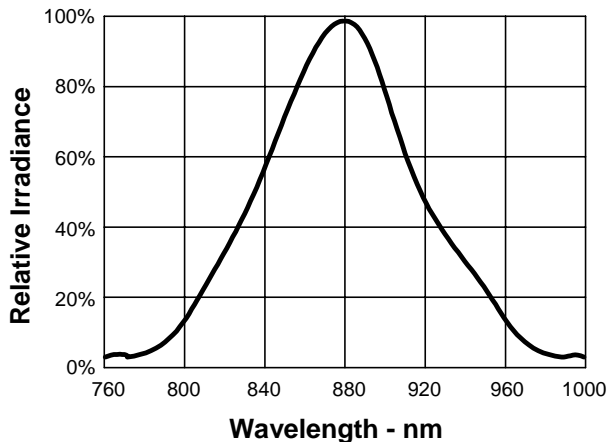
**Failure to comply with these instructions may result in product damage.**

### SME2470 SERIES IRED ELECTRICAL CHARACTERISTICS (at 25°C unless otherwise noted)

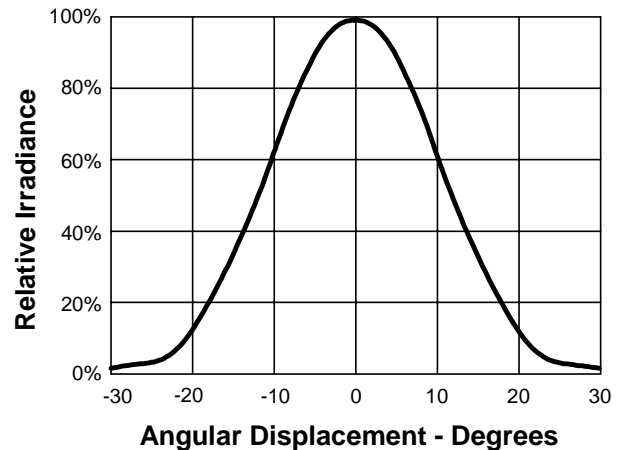
Parameter	Test Conditions	Sym.	Min.	Typ.	Max.	Units
Irradiance	Measured into 0.104 in. (2.64 mm) dia. aperture @ 0.535 in. (13.59 mm) from lens tip. $I_F = 50 \text{ mA}$	H	0.6			mW/cm <sup>2</sup>
Forward voltage	$I_F = 50 \text{ mA}$	$V_F$		1.5	1.8	Volts
Reverse breakdown voltage	$I_R = 10 \mu\text{A}$	$BV_R$	3.0			Volts
Peak output wavelength	$I_F = 50 \text{ mA}$	$\lambda$		880		nm
Spectral bandwidth	$I_F = 50 \text{ mA}$			80		nm
Rise time	10 $\mu\text{sec}$ pulse width	$t_R$		800		ns
Fall time		$t_F$		700		ns

### TYPICAL IRED PERFORMANCE CHARACTERISTICS

#### SME2470 Spectral Bandwidth



#### SME2470 Irradiance vs Angular Displacement



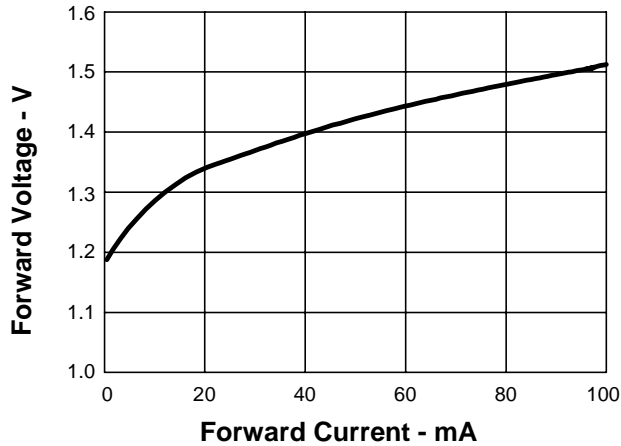
# Infrared Components

Ceramic Discrete Surface Mount

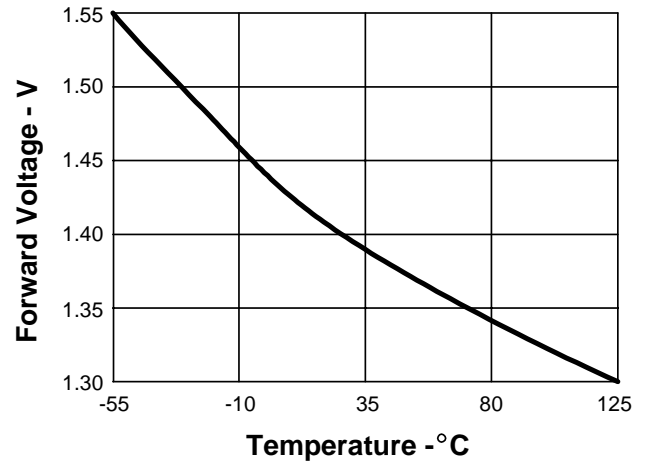
*SME/SMD Series*

## TYPICAL IRED PERFORMANCE CHARACTERISTICS (when solder mounted to PC board)

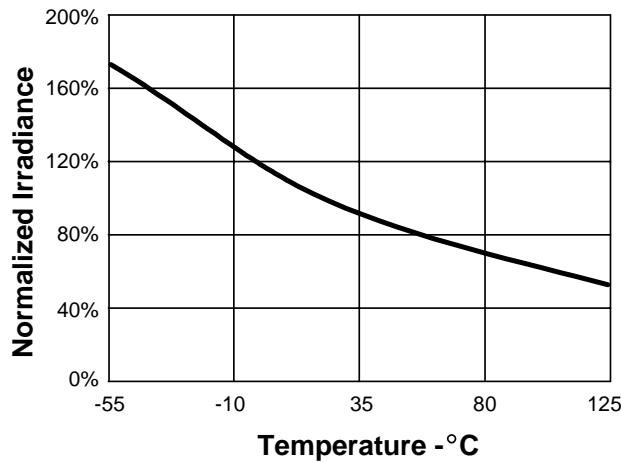
**SME2470 Forward Current vs Forward Voltage**



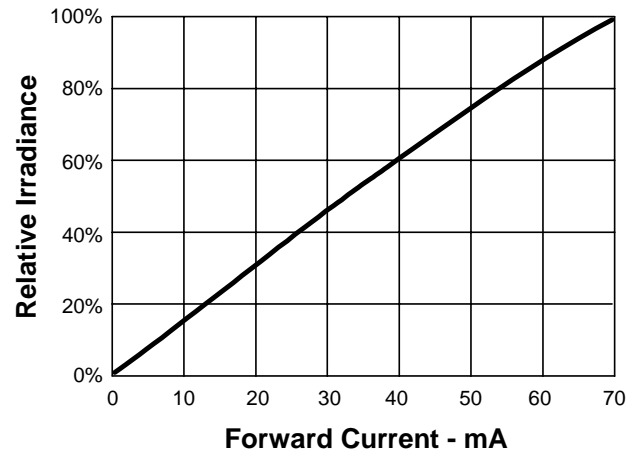
**SME2470 Forward Voltage vs Temperature**



**SME2470 Irradiance vs Temperature**



**SME2470 Irradiance vs Forward Current**



# Infrared Components

## Ceramic Discrete Surface Mount

## SME/SMD Series

### SMD2440 SERIES PHOTOTRANSISTOR ABSOLUTE MAXIMUM RATINGS

Collector-Emitter voltage	30 V
Emitter-Collector voltage	5 V
Continuous device dissipation*	125 mW
Operating free air range	-55° to +125°C (-67° to +257°F)
Storage temperature	-65° to +150°C (-85° to +302°F)
Soldering temperature	260°C (500°F), 5 seconds max.

\*Derate 1.43 mW/°C above 25°C ambient.

### SMD2440 SERIES PHOTOTRANSISTOR ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions	Sym.	Min.	Typ.	Max.	Units
Light current	-0X1 $V_{CE} = 5 \text{ V}, H = 1 \text{ mW/cm}^2$ ,	$I_L$	1.5		4.0	mA
	-0X2 880 nm light source		3.0		8.0	
Dark current	$V_{CE} = 10 \text{ V}, H = 0$	$I_D$			100	nA
Collector breakdown voltage	$I_C = 100 \mu\text{A}, H = 0$	$BV_{CEO}$	30			Volts
Emitter breakdown voltage	$I_E = 100 \mu\text{A}, H = 0$	$BV_{ECO}$	5			Volts
Saturation voltage (C to E)	$I_C = 0.04 \text{ mA}, H = 1 \text{ mW/cm}^2$	$V_{CE(SAT)}$		0.2	0.4	Volts
Peak response wavelength		$\lambda$		880		nm
Rise time	$V_{CC} = 5 \text{ V}, R_L = 1000 \Omega, I_L = 1 \text{ mA}$	$t_R$		15		$\mu\text{s}$
Fall time		$t_F$		15		$\mu\text{s}$

### SMD2420 SERIES PHOTODIODE ABSOLUTE MAXIMUM RATINGS

Cathode-Anode voltage	50 V
Continuous device dissipation*	125 mW
Operating free air range	-55° to +125°C (-67° to +257°F)
Storage temperature	-65° to +150°C (-85° to +302°F)
Soldering temperature	260°C (500°F), 5 seconds max.

\*Derate 1.43 mW/°C above 25°C ambient.

### SMD2420 SERIES PHOTODIODE ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions	Sym.	Min.	Typ.	Max.	Units
Light current	$V_R = 20 \text{ V}, H = 1 \text{ mW/cm}^2$ *	$I_L$	6			$\mu\text{A}$
Dark current	$V_R = 20 \text{ V}, h = 0$	$I_D$			5	nA
Reverse breakdown voltage	$I_R = 10 \mu\text{A}, H = 0$	$BV_R$	50			Volts
Peak response wavelength		$\lambda$		880		nm
Rise time	$V_R = 20 \text{ V}, R_L = 100 \Omega, I_L = 10 \mu\text{A}$	$t_R$		20		ns
Fall time		$t_F$		20		ns

\*From 880 nm source

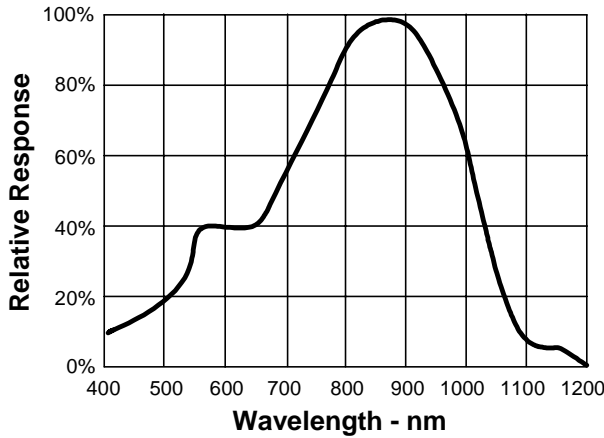
# Infrared Components

Ceramic Discrete Surface Mount

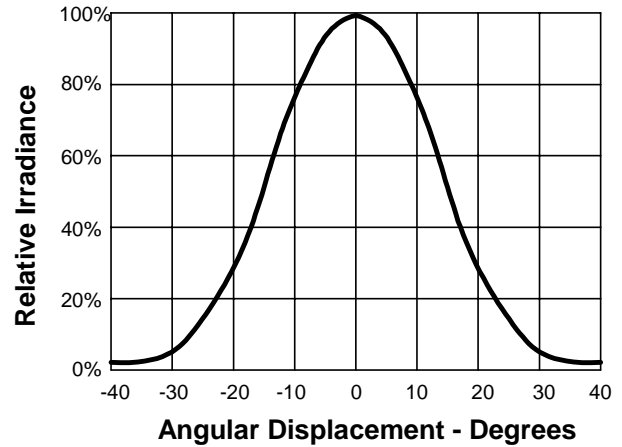
*SME/SMD Series*

**TYPICAL SMD2440 AND SMD2420 SERIES PERFORMANCE CHARACTERISTICS (when solder mounted to PC board)**

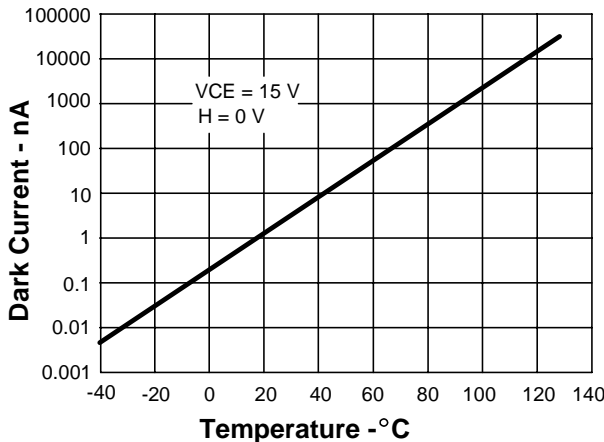
**SMD2440 and SMD2420 Spectral Responsivity**



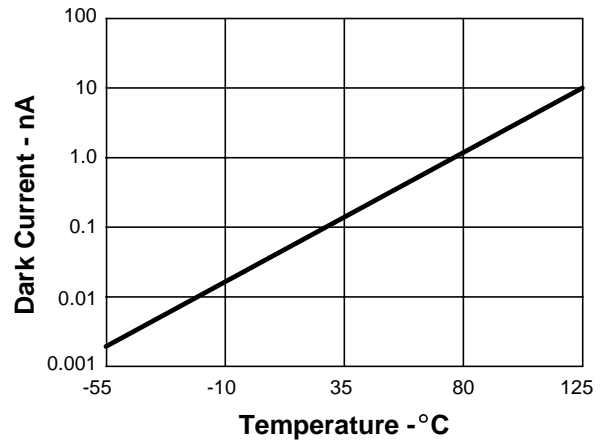
**SMD2440 and SMD2420 Responsivity vs Angular Displacement**



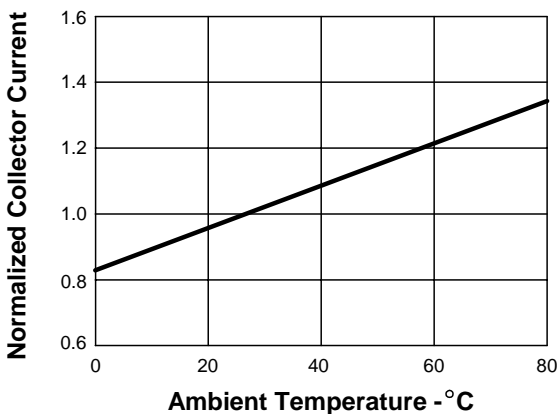
**SMD2440 Dark Current vs Temperature**



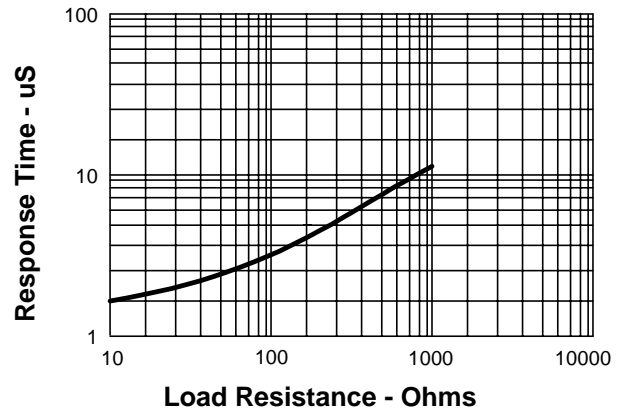
**SMD2420 Dark Current vs Temperature**



**SMD2440 Collector Current vs Ambient Temperature**



**SMD2440 Non-saturated Switching Time vs Load Resistance**



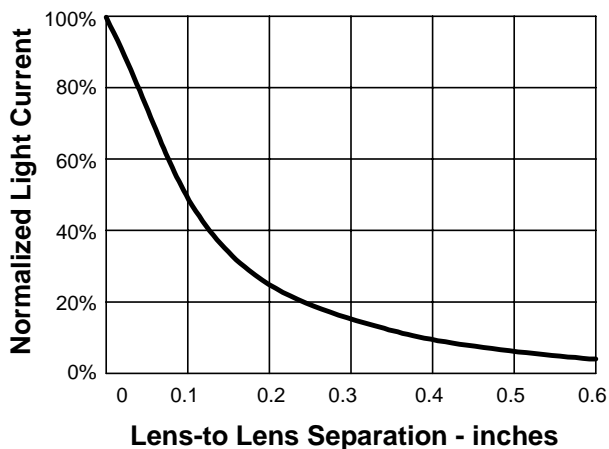
# Infrared Components

Ceramic Discrete Surface Mount

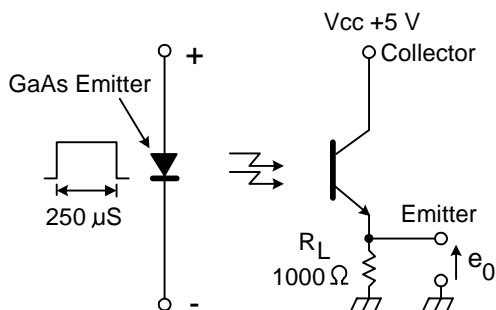
*SME/SMD Series*

**TYPICAL SMD2440 AND SMD2420 SERIES PERFORMANCE CHARACTERISTICS (when solder mounted to PC board)**

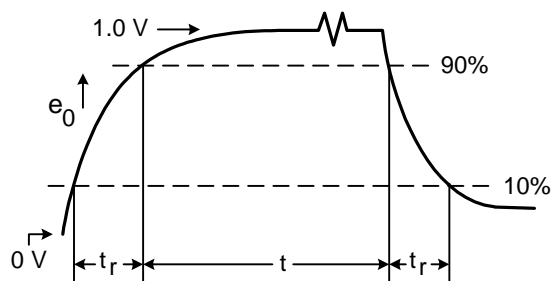
## SME to SMD Coupling Characteristics



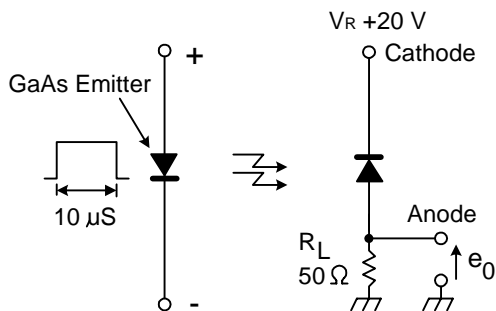
## SMD2440 Switching Time Test Circuit



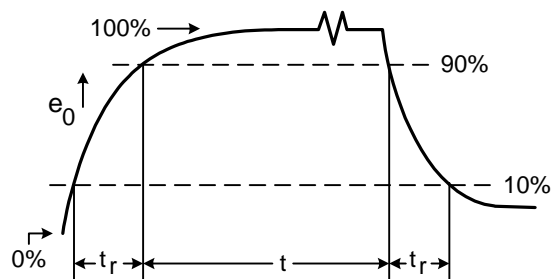
## SMD2440 Switching Waveform



## SMD2420 Switching Time Test Circuit



## SMD2420 Switching Waveform

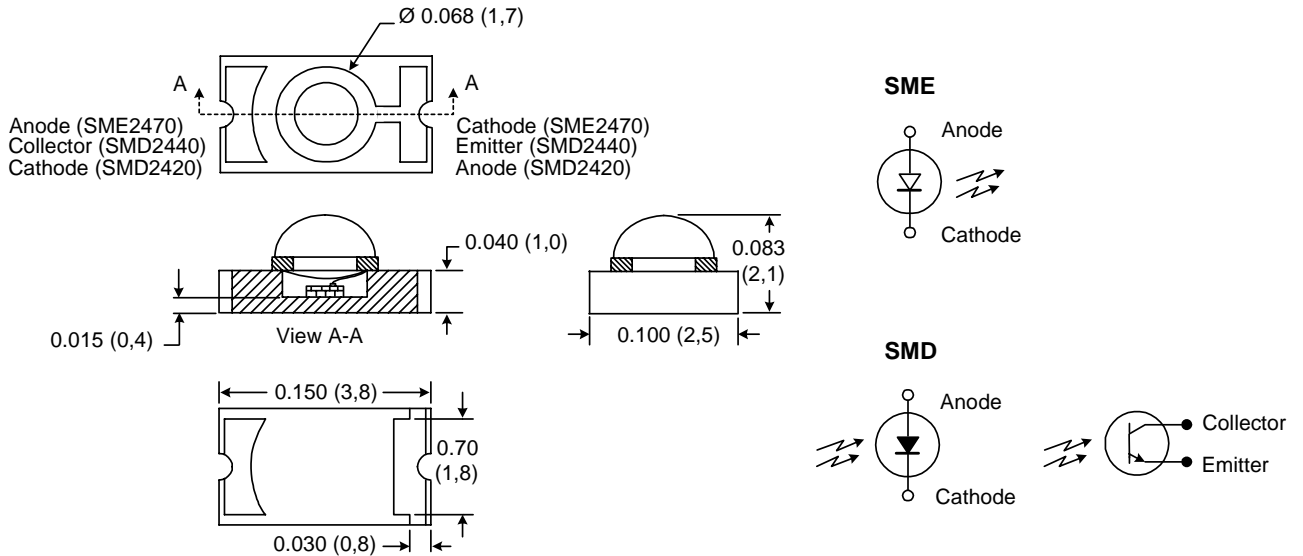


# Infrared Components

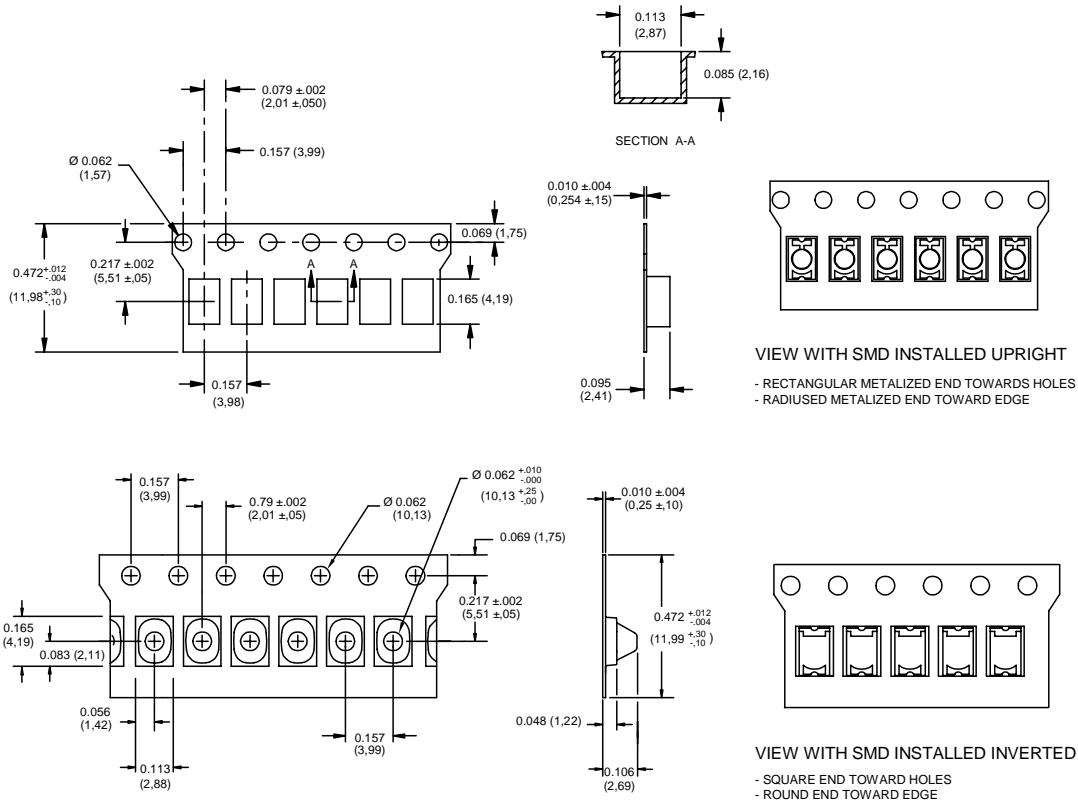
## Ceramic Discrete Surface Mount

## SME/SMD Series

### SME2470, SMD2440, SMD2420 OUTLINE DIMENSIONS in./(mm) (for reference only)



### TAPE AND REEL MOUNTING CONFIGURATIONS: EIA STD 12 mm tape and reel with a 4 mm pitch in.(mm)



# Infrared Components

## Ceramic Discrete Surface Mount

## SME/SMD Series

### ORDER GUIDE

Catalog Listing	Description
SME2470-001	Bulk Packaged, Surface Mount IR Emitter
SMD2420-001	Bulk Packaged, Surface Mount Photodiode
SMD2440-001	Bulk Packaged, Surface Mount Phototransistor
SMD2440-002	Bulk Packaged, Surface Mount Phototransistor
SME2470-011	Tape and Reel, Inverted, Surface Mount IR Emitter
SMD2420-011	Tape and Reel, Inverted, Surface Mount Photodiode
SMD2440-011	Tape and Reel, Inverted, Surface Mount Phototransistor
SMD2440-012	Tape and Reel, Inverted, Surface Mount Phototransistor
SME2470-021	Tape and Reel Upright, Surface Mount IR Emitter
SMD2420-021	Tape and Reel, Upright, Surface Mount Photodiode
SMD2440-021	Tape and Reel, Upright, Surface Mount Phototransistor
SMD2440-022	Tape and Reel, Upright, Surface Mount Phototransistor

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### TELEPHONE

1-800-537-6945 (USA)  
1-800-737-3360 (Canada)  
1-815-235-6847 (International)

### FAX

1-815-235-6545 (USA)

### INTERNET

[www.honeywell.com/sensing](http://www.honeywell.com/sensing)  
[info@micro.honeywell.com](mailto:info@micro.honeywell.com)

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## Infrared Components

### Plastic Discrete Surface Mount Emitters and Detectors

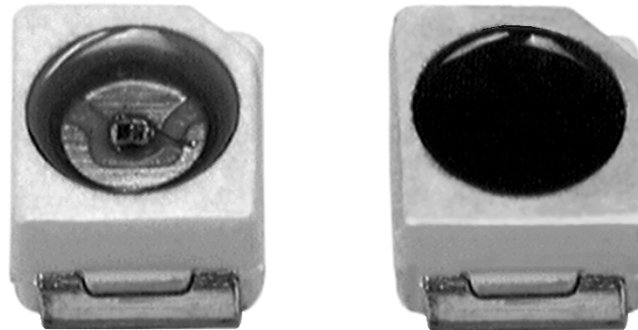
### *SME/SMD Series*

#### FEATURES

- Small package size
- Compatible with automated solder processes:
  - IR reflow
  - conductive epoxy
  - vapor phase reflow
  - convection oven
- Helps eliminate mixed technology PC boards
- Will operate in a DC or pulse mode for increased output
- Light pipe compatible
- Top-emitting and sensing area
- Low profile, small size for flexible layout of multiple channels and custom arrays
- Tape and reel packaging option - pick and place machine compatible

#### APPLICATIONS

- Optical encoders for motion control
- Computer peripherals
- Vending and point-of-sale applications
- Smoke detectors
- Medical equipment



The SME6700 and SMD6400 Series surface mount infrared components are small plastic packages (2,8 mm x 3,2 mm x 1,5 mm/ 0.110 in x 0.126 in x 0.073 in) in an un-lensed, top emitting and sensing package.

These surface mount infrared components are designed for high density placement by automatic assembly machinery.

The SME6700 is an aluminum gallium arsenide infrared emitting diode (IRED). This component supplies optimum optical characteristics and can be used with the SMD6400 phototransistor. The small size and high power dissipation properties of the IRED promote PC (Printed Circuit) board miniaturization and high density placement.

These surface mount infrared components are available in bulk, or on tape and reel for use with automatic placement equipment.

# Infrared Components

## Plastic Discrete Surface Mount Emitters and Detectors

*SME/SMD Series*

### SME6700 SERIES IRED ABSOLUTE MAXIMUM RATINGS

Power dissipation @ 25 °C <sup>(1)</sup>	100 mW
Continuous forward current	100 mA (mounted on a PC board)
Reverse voltage (I <sub>F</sub> = 10 μA)	5 V
Operating free air temperature range	-40 °C to +85 °C (-104 °F to +185 °F)
Storage temperature	-40 °C to +85 °C (-104 °F to +185 °F)
Soldering temperature	260 °C (500 °F), 10 seconds max.

### CAUTION

#### STRESS DAMAGE

Functional operation of the device at or above "Absolute Maximum Ratings" for extended periods of time may affect reliability.

**Failure to comply with these instructions may result in product damage.**

#### Note:

1. Derate 0.78 mW/°C above 25 °C ambient.

### SME6700 SERIES IRED ELECTRICAL CHARACTERISTICS (at 25 °C unless otherwise noted)

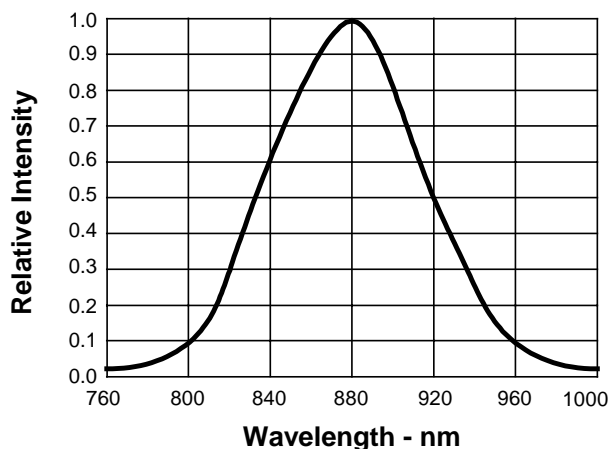
Parameter	Test Conditions	Sym.	Min.	Typ.	Max.	Units
Irradiance -001	I <sub>F</sub> = 50 mA measured into 2,06 mm (0.081 in) dia. aperture located 18,16 mm (0.715 in) from the emitting surface	I <sub>e</sub>	.40	.52		mW/cm <sup>2</sup>
Forward voltage	I <sub>F</sub> = 50 mA	V <sub>F</sub>			1.8	V
Reverse breakdown voltage	I <sub>R</sub> = 1 μA	V <sub>R</sub>	5.0			V
Peak output wavelength	I <sub>F</sub> = 50 mA	λ		880		nm
Spectral bandwidth	I <sub>F</sub> = 50 mA	-λ		80		nm
Temperature coefficient of λ <sub>P</sub>		-λ <sub>P</sub> /λ		0.2		nm/°C
Beam angle <sup>(1)</sup>	I <sub>F</sub> = constant	θ		120		deg.
Radiation rise/fall time	10 μsec pulse width	t <sub>R</sub> t <sub>F</sub>		0.7		Ts

#### Note:

1. Beam angle is defined as the total included angle between the half power points.

### TYPICAL IRED PERFORMANCE CHARACTERISTICS

#### SME6700 Spectral Bandwidth



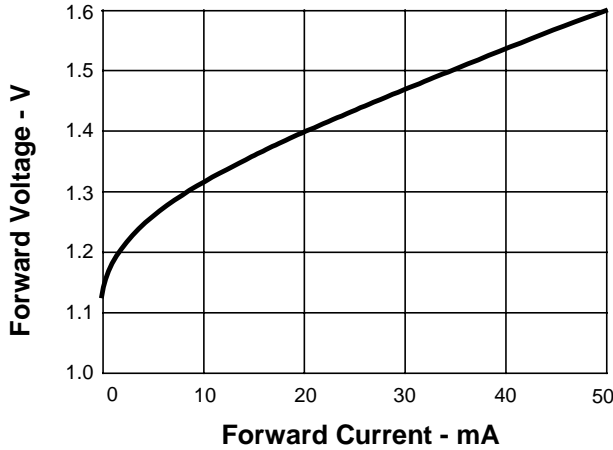
# Infrared Components

Plastic Discrete Surface Mount Emitters and Detectors

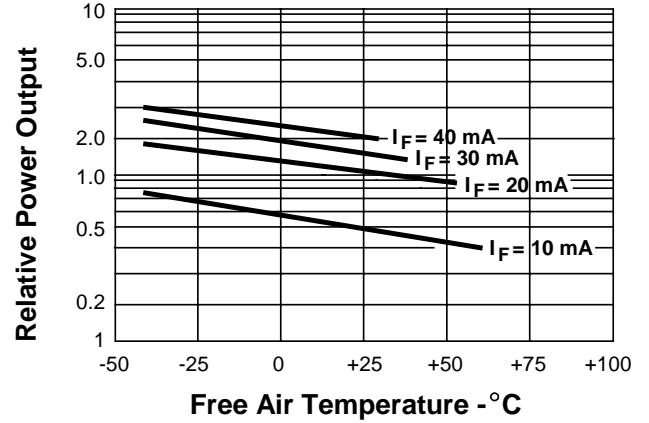
*SME/SMD Series*

## TYPICAL IRED PERFORMANCE CHARACTERISTICS (when solder mounted to PC board)

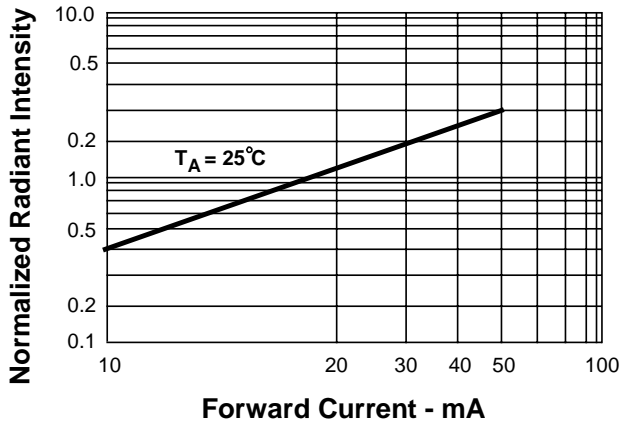
**SME6700 Forward Current vs Forward Voltage**



**SME6700 Irradiance vs Temperature**



**SME6700 Irradiance vs Forward Current**



# Infrared Components

Plastic Discrete Surface Mount Emitters and Detectors

*SME/SMD Series*

## SMD6400 SERIES PHOTOTRANSISTOR ABSOLUTE

### MAXIMUM RATINGS ( $T_A = 25\text{ }^\circ\text{C}$ )

Collector-emitter voltage	35 V
Emitter-collector voltage	5 V
Continuous device dissipation <sup>(1)</sup>	100 mW
Operating free air range	-40 °C to +85 °C (-104 °F to +185 °F)
Storage temperature	-40 °C to +85 °C (-104 °F to +185 °F)
Soldering temperature	260 °C (500 °F), 5 seconds max.

#### Note:

- Derate 2.2 mW/°C above 25 °C ambient.

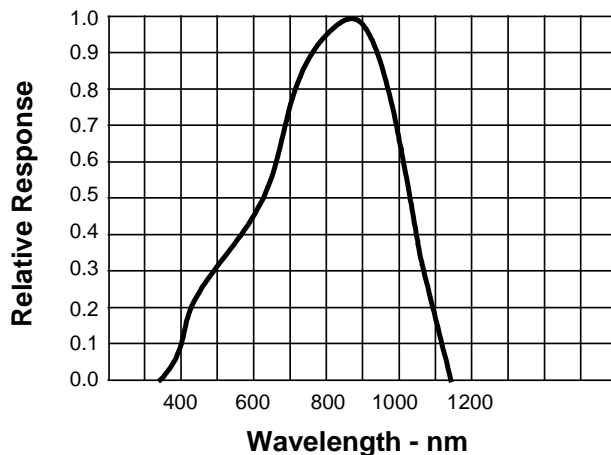
## SMD6400 SERIES PHOTOTRANSISTOR ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions	Sym.	Min.	Typ.	Max.	Units	
Light current <sup>(1)</sup>	-001	$H = 0.1\text{ mW/cm}^2, V_{ce} = 5\text{ V}$	$I_c$	16			$\mu\text{A}$
	-002			16		32	$\mu\text{A}$
	-003			25		50	$\mu\text{A}$
	-004			40			$\mu\text{A}$
Dark current	$V_{ce} = 25\text{ V}, H = 0$	$I_{ceo}$			200	nA	
Collector breakdown voltage	$I_c = 100\text{ }\mu\text{A}, H = 0$	$BV_{ceo}$	35			V	
Emitter breakdown voltage	$I_e = 100\text{ }\mu\text{A}, H = 0$	$BV_{eco}$	5			V	
Saturation voltage (C to E)	$I_c = 0.3 \times I_{c\text{ MINIMUM}}, H = 0.1\text{ mW/cm}^2$	$V_{ce(SAT)}$			0.15	V	
Peak response wavelength		$\lambda$		935		nm	
Angular response <sup>(2)</sup>	$I_f = \text{constant}$	$\theta$		120		deg.	
Rise time	$I_c = 1\text{ mA}, V_{ce} = 5\text{ V}, R_L = 1000\text{ }\Omega$	$t_R$		6 - 8		$\mu\text{s}$	
Fall time		$t_F$		6 - 8		$\mu\text{s}$	

#### Notes:

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

## SMD6400 Spectral Responsivity

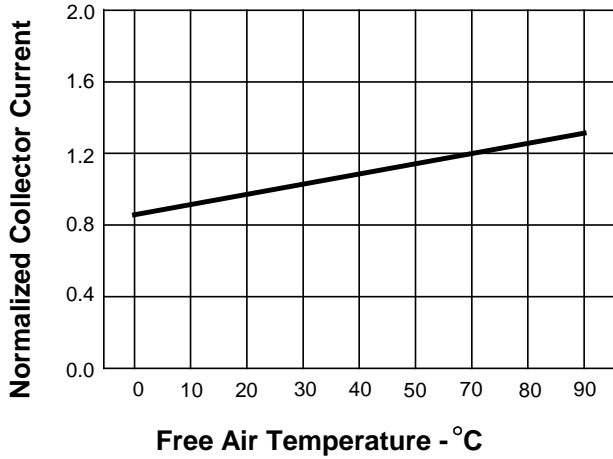


# Infrared Components

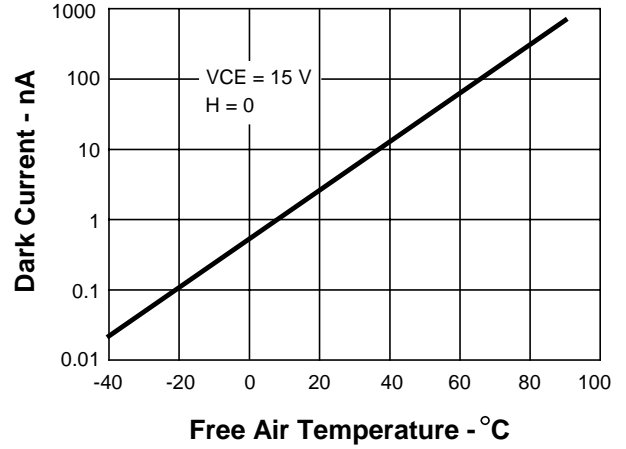
Plastic Discrete Surface Mount Emitters and Detectors

*SME/SMD Series*

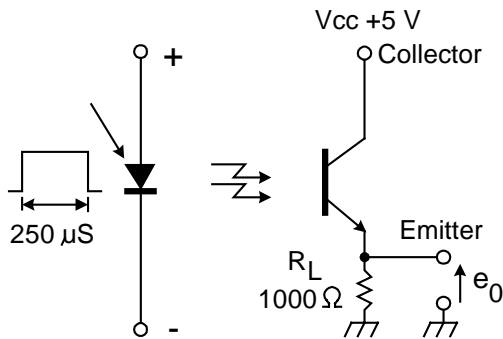
**SMD6400 Collector Current vs Ambient Temperature**



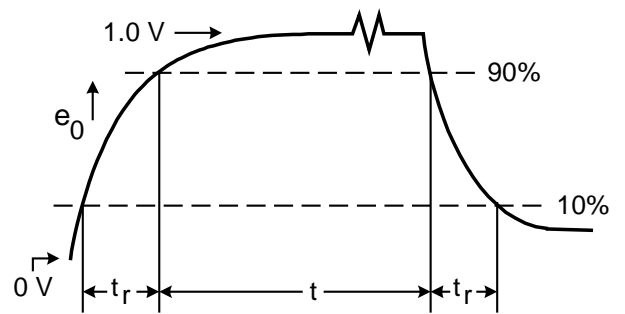
**SMD6400 Dark Current vs Temperature**



**SMD6400 Switching Time Test Circuit**



**SMD6400 Switching Waveform**



# Infrared Components

## Plastic Discrete Surface Mount Emitters and Detectors

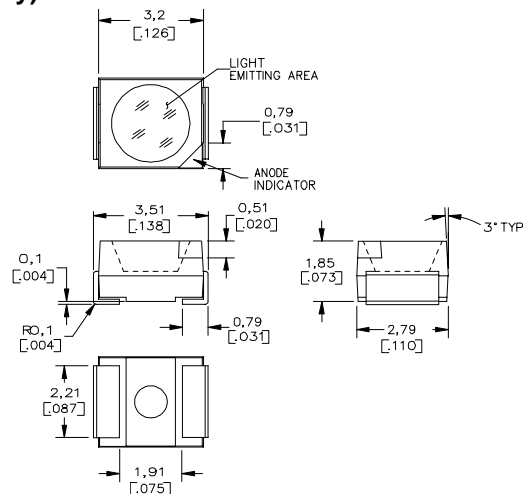
## SME/SMD Series

### ORDER GUIDE

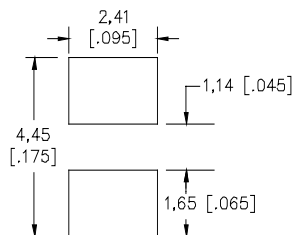
Catalog Listing	Description
SME6700-001B	Bulk Packaged, Surface Mount IR Emitter
SMD6400-001B	Bulk Packaged, Surface Mount Phototransistor
SMD6400-002B	Bulk Packaged, Surface Mount Phototransistor
SMD6400-003B	Bulk Packaged, Surface Mount Phototransistor
SMD6400-004B	Bulk Packaged, Surface Mount Phototransistor
SME6700-001T	Tape and Reel*, Surface Mount IR Emitter
SMD6400-001T	Tape and Reel*, Surface Phototransistor
SMD6400-002T	Tape and Reel*, Surface Phototransistor
SMD6400-003T	Tape and Reel*, Surface Phototransistor
SMD6400-004T	Tape and Reel*, Surface Phototransistor

\*EIA STD 12 mm Tape and Reel with a 4 mm pitch. Consult factory for details.

### SME6700 and SMD6400 OUTLINE DIMENSIONS mm/(in) (for reference only)



### RECOMMENDED SOLDER PAD LAYOUT mm/(in)



### WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective material and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during that period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is **in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.**

While we provide application assistance, personally, through our literature, and through the Honeywell website, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

For application assistance, current specifications, or name of the nearest Authorized Distributor, contact a nearby sales office. Or call:

1-800-537-6945 USA  
1-800-737-3360 Canada  
1-815-235-6847 International

### FAX

1-815-235-6545 USA

### INTERNET

[www.honeywell.com/sensing](http://www.honeywell.com/sensing)  
[info@micro.honeywell.com](mailto:info@micro.honeywell.com)

# Honeywell

Sensing and Control  
Honeywell Inc.  
11 West Spring Street  
Freeport, Illinois 61032



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