

## SFH615A



### DESCRIPTION

The SFH615A series of optically coupled isolators each consists of an infrared light emitting diode and an NPN silicon photo transistor in a space efficient Dual In Line Plastic Package.

### FEATURES

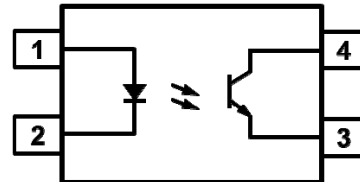
- AC Isolation Voltage 5300V<sub>RMS</sub>
- Low Input Current I<sub>F</sub> 1mA
- High Current Transfer Ratios
- Wide Operating Temperature Range  
-55°C to +110°C
- Lead Free and RoHS Compliant
- UL File E91231 Package Code "EE"
- VDE Approval Certificate No. 40028086

### APPLICATIONS

- Computer Terminals
- Industrial System Controllers
- Measuring Instruments

### ORDER INFORMATION

- Add X after PN for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel



- 1 Anode
- 2 Cathode
- 3 Emitter
- 4 Collector

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

#### Input

Forward Current	50mA
Reverse Voltage	6V
Power dissipation	70mW

#### Output

Collector to Emitter Voltage V <sub>CEO</sub>	70V
Emitter to Collector Voltage V <sub>ECO</sub>	6V
Collector Current	50mA
Power Dissipation	150mW

#### Total Package

Isolation Voltage	5300V <sub>RMS</sub>
Total Power Dissipation	200mW
Operating Temperature	-55 to 110 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

#### ISOCOM COMPONENTS 2004 LTD

Unit 25B, Park View Road West, Park View Industrial Estate  
Hartlepool, Cleveland, TS25 1PE, United Kingdom  
Tel : +44 (0)1429 863 609 Fax : +44 (0)1429 863 581  
e-mail : sales@isocom.co.uk  
<http://www.isocom.com>

#### ISOCOM COMPONENTS ASIA LTD

Hong Kong Office  
Block A, 8/F, Wah Hing Industrial Mansion  
36 Tai Yau Street, San Po Kong, Kowloon, Hong Kong  
Tel : +852 2995 9217 Fax : +852 8161 6292  
e-mail : sales@isocom.com.hk



## SFH615A

### ELECTRICAL CHARACTERISTICS (Ambient Temperature = 25°C unless otherwise specified)

#### INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	$V_F$	$I_F = 20\text{mA}$		1.2	1.4	V
Reverse Leakage	$I_R$	$V_R = 4\text{V}$			10	$\mu\text{A}$
Terminal Capacitance	$C_t$	$V = 0\text{V}, f = 1\text{KHz}$		30	250	pF

#### OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector–Emitter Breakdown Voltage	$BV_{CEO}$	$I_C = 0.1\text{mA}, I_F = 0\text{mA}$	70			V
Emitter–Collector Breakdown Voltage	$BV_{ECO}$	$I_E = 10\mu\text{A}, I_F = 0\text{mA}$	6			V
Collector–Emitter Dark Current	$I_{CEO}$	$V_{CE} = 20\text{V}, I_F = 0\text{mA}$			100	nA

## SFH615A

### ELECTRICAL CHARACTERISTICS (Ambient Temperature = 25°C unless otherwise specified)

#### COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit	
Current Transfer Ratio	CTR	$I_F = 10\text{mA}, V_{CE} = 5\text{V}$				%	
		SFH615A-1	40		80		
		SFH615A-2	63		125		
		SFH615A-3	100		200		
		SFH615A-4	160		320		
		$I_F = 1\text{mA}, V_{CE} = 5\text{V}$					
		SFH615A-1	13				
		SFH615A-2	22				
Collector–Emitter Saturation Voltage	$V_{CE(\text{sat})}$	$I_F = 20\text{mA}, I_C = 1\text{mA}$		0.1	0.2	V	
Floating Capacitance	$C_f$	$V = 0\text{V}, f = 1\text{MHz}$		0.6	1	pF	
Cut-Off Frequency	$f_c$	$V_{CE} = 5\text{V}, I_C = 2\text{mA}, R_L = 100\Omega, -3\text{dB}$		80		kHz	



## SFH615A

### ELECTRICAL CHARACTERISTICS (Ambient Temperature = 25°C unless otherwise specified)

#### SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
NON-SATURATED						
Turn-ON Time	$t_{ON}$	$V_{CC} = 5V,$ $I_F = 10mA,$ $R_L = 75\Omega$		3.0		$\mu s$
Rise Time	$t_r$			2.0		
Turn-OFF Time	$t_{OFF}$			2.3		
Fall Time	$t_f$			2.0		
Cut-off Frequency	$f_{CO}$				250	
SATURATED $V_{CC} = 5V, R_L = 1k\Omega, V_{CE(sat)} \leq 0.4V$						
Turn-ON Time	$t_{ON}$	$I_F = 20mA$ SFH615A-1 $I_F = 10mA$ SFH615A-2 $I_F = 10mA$ SFH615A-3 $I_F = 5mA$ SFH615A-4		3.0 4.2 4.2 6.0		$\mu s$
Rise Time	$t_r$	$I_F = 20mA$ SFH615A-1 $I_F = 10mA$ SFH615A-2 $I_F = 10mA$ SFH615A-3 $I_F = 5mA$ SFH615A-4		2.0 3.0 3.0 4.6		
Turn-OFF Time	$t_{OFF}$	$I_F = 20mA$ SFH615A-1 $I_F = 10mA$ SFH615A-2 $I_F = 10mA$ SFH615A-3 $I_F = 5mA$ SFH615A-4		18 23 23 25		
Fall Time	$t_f$	$I_F = 20mA$ SFH615A-1 $I_F = 10mA$ SFH615A-2 $I_F = 10mA$ SFH615A-3 $I_F = 5mA$ SFH615A-4		11 14 14 15		

#### ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Input to Output Isolation Voltage	$V_{ISO}$	AC 1 minute, RH = 40% to 60% Note 1	5300			$V_{RMS}$
Input to Output Isolation Resistance	$R_{ISO}$	$V_{IO} = 500V,$ RH = 40% to 60% Note 1	$5 \times 10^{10}$	$1 \times 10^{11}$		$\Omega$

Note 1 : Measure with input leads shorted together and output leads shorted together.

## SFH615A

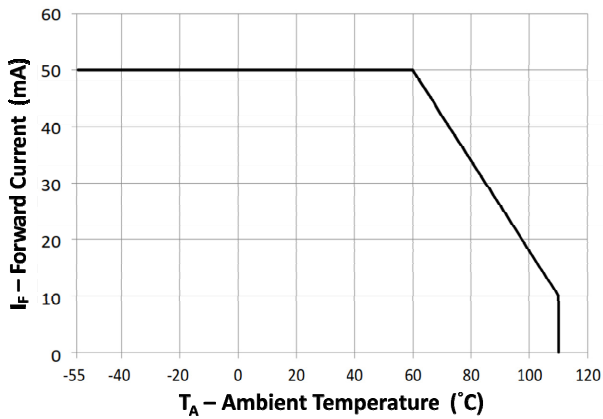


Fig 1 Forward Current vs Ambient Temperature

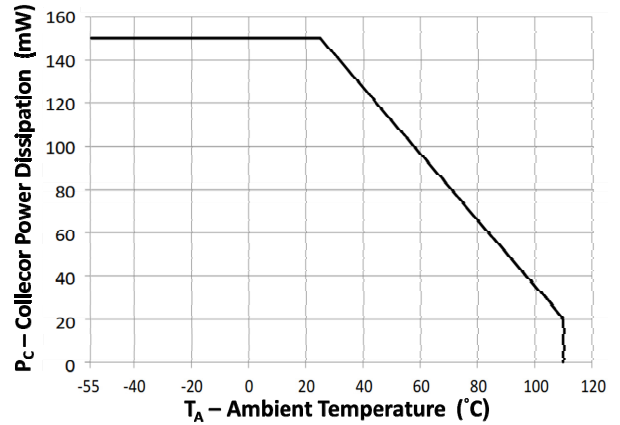


Fig 2 Collector Power Dissipation vs Ambient Temperature

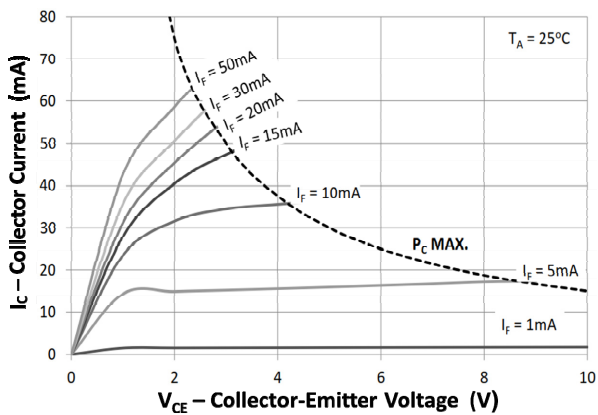


Fig 3 Collector Current vs Collector-Emitter Voltage

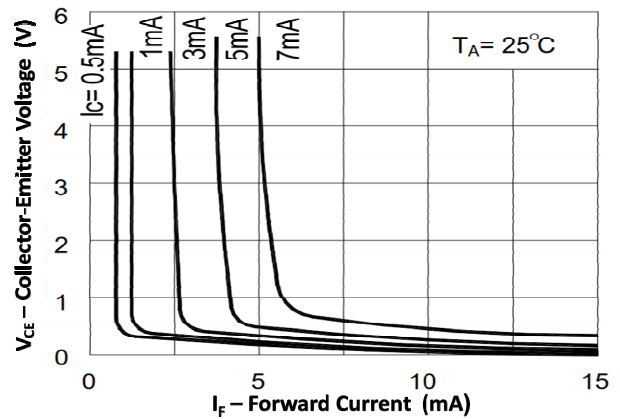


Fig 4 Collector-Emitter Voltage vs Forward Current

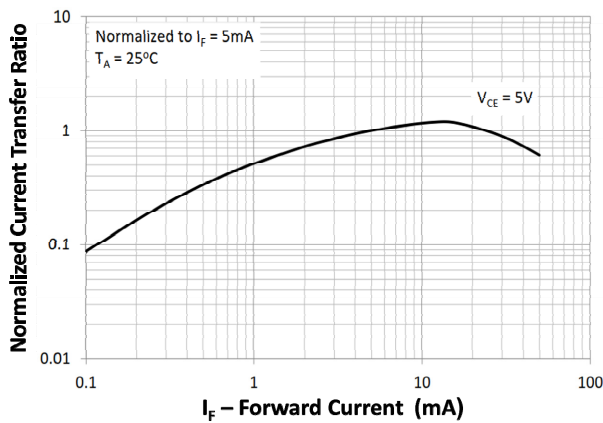


Fig 5 Normalized Current Transfer Ratio vs Forward Current

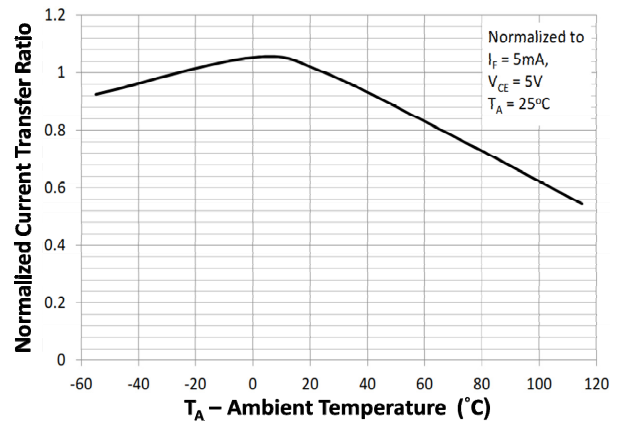
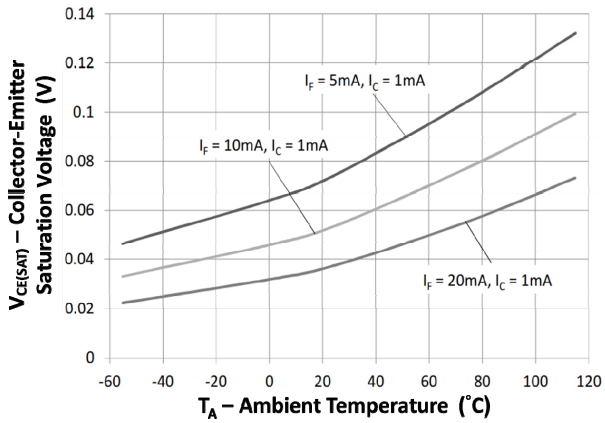
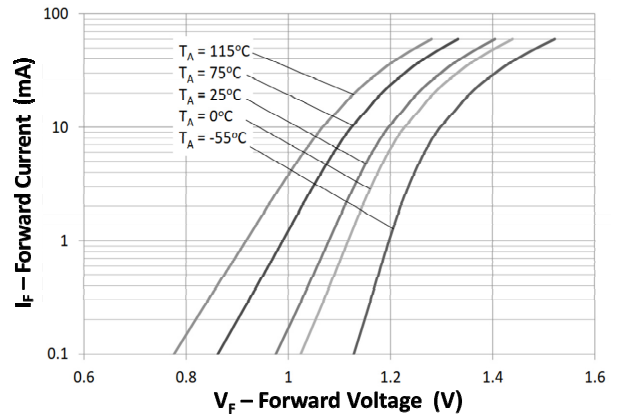


Fig 6 Normalized Current Transfer Ratio vs Ambient Temperature

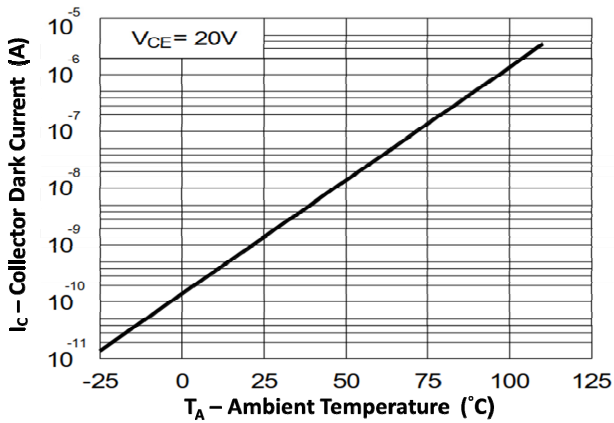
# SFH615A



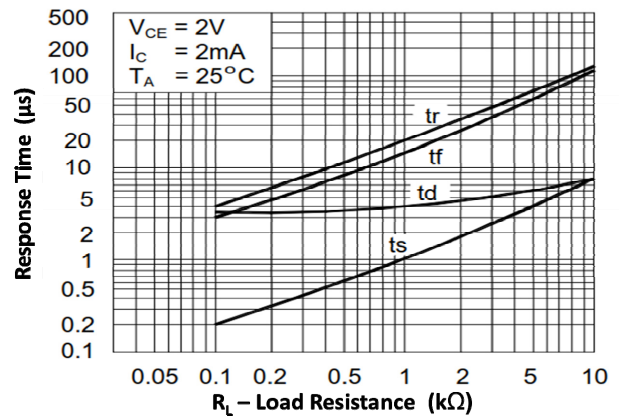
**Fig 7 Collector-Emitter Saturation Voltage vs Ambient Temperature**



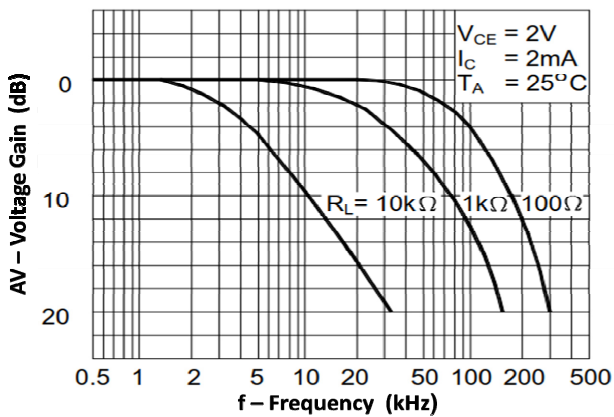
**Fig 8 Forward Current vs Forward Voltage**



**Fig 9 Collector Dark Current vs Ambient Temperature**

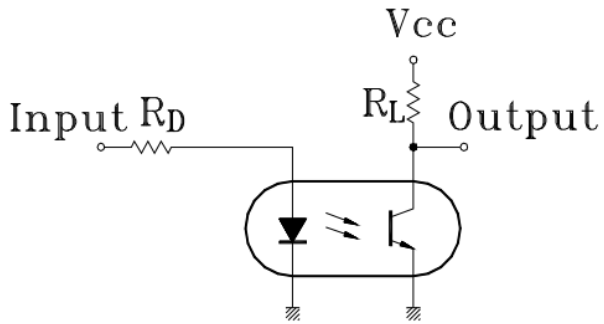


**Fig 10 Response Time vs Load Resistance**

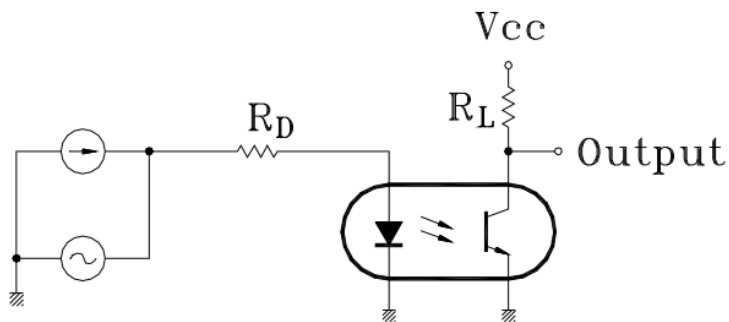
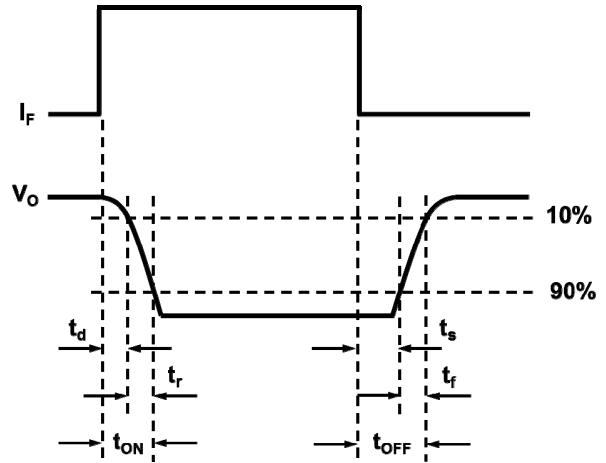


**Fig 11 Frequency Response**

## SFH615A



Response Time Test Circuit and Waveform



Frequency Response Test Circuit

## SFH615A

### ORDER INFORMATION

SFH615A (UL Approval)			
After PN	PN	Description	Packing quantity
None	SFH615A-1, SFH615A-2, SFH615A-3, SFH615A-4	Standard DIP4	100 pcs per tube
G	SFH615A-1G, SFH615A-2G, SFH615A-3G, SFH615A-4G	10mm Lead Spacing	100 pcs per tube
SM	SFH615A-1SM, SFH615A-2SM, SFH615A-3SM, SFH615A-4SM	Surface Mount	100 pcs per tube
SMT&R	SFH615A-1SMT&R, SFH615A-2SMT&R, SFH615A-3SMT&R, SFH615A-4SMT&R	Surface Mount Tape & Reel	2000 pcs per reel

SFH615A (UL and VDE Approvals)			
After PN	PN	Description	Packing quantity
None	SFH615A-1X, SFH615A-2X, SFH615A-3X, SFH615A-4X	Standard DIP8	100 pcs per tube
G	SFH615A-1XG, SFH615A-2XG, SFH615A-3XG, SFH615A-4XG	10mm Lead Spacing	100 pcs per tube
SM	SFH615A-1XSM, SFH615A-2XSM, SFH615A-3XSM, SFH615A-4XSM	Surface Mount	100 pcs per tube
SMT&R	SFH615A-1XSMT&R, SFH615A-2XSMT&R, SFH615A-3XSMT&R, SFH615A-4XSMT&R	Surface Mount Tape & Reel	2000 pcs per reel

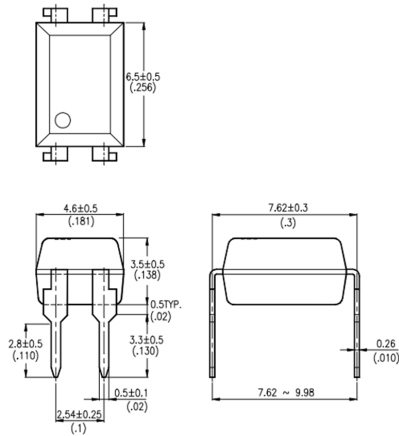


# SFH615A

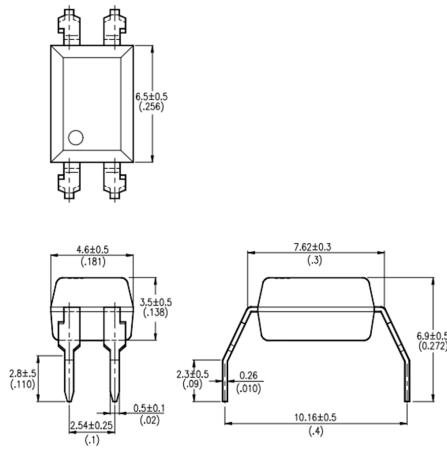
## PACKAGE DIMENSIONS in mm (inch)

### DIP

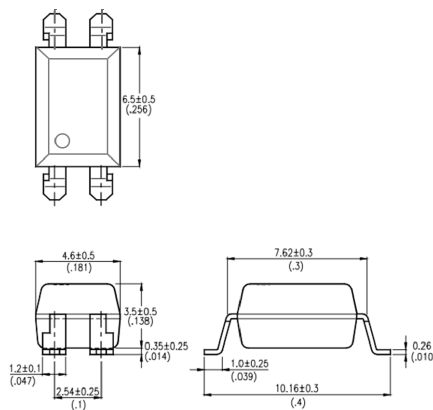
#### SFH615



#### SFH615G

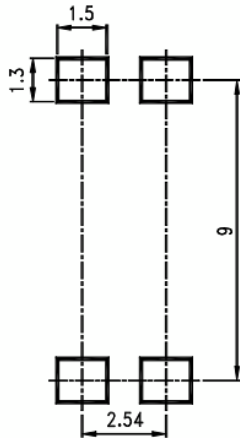


#### SFH615SM

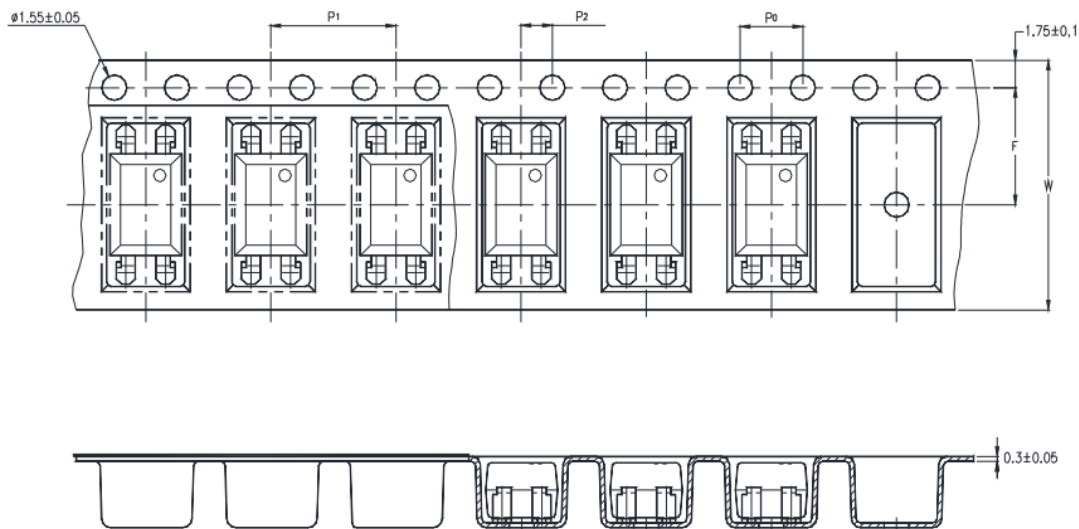


## SFH615A

### RECOMMENDED PAD LAYOUT FOR SMD (mm)



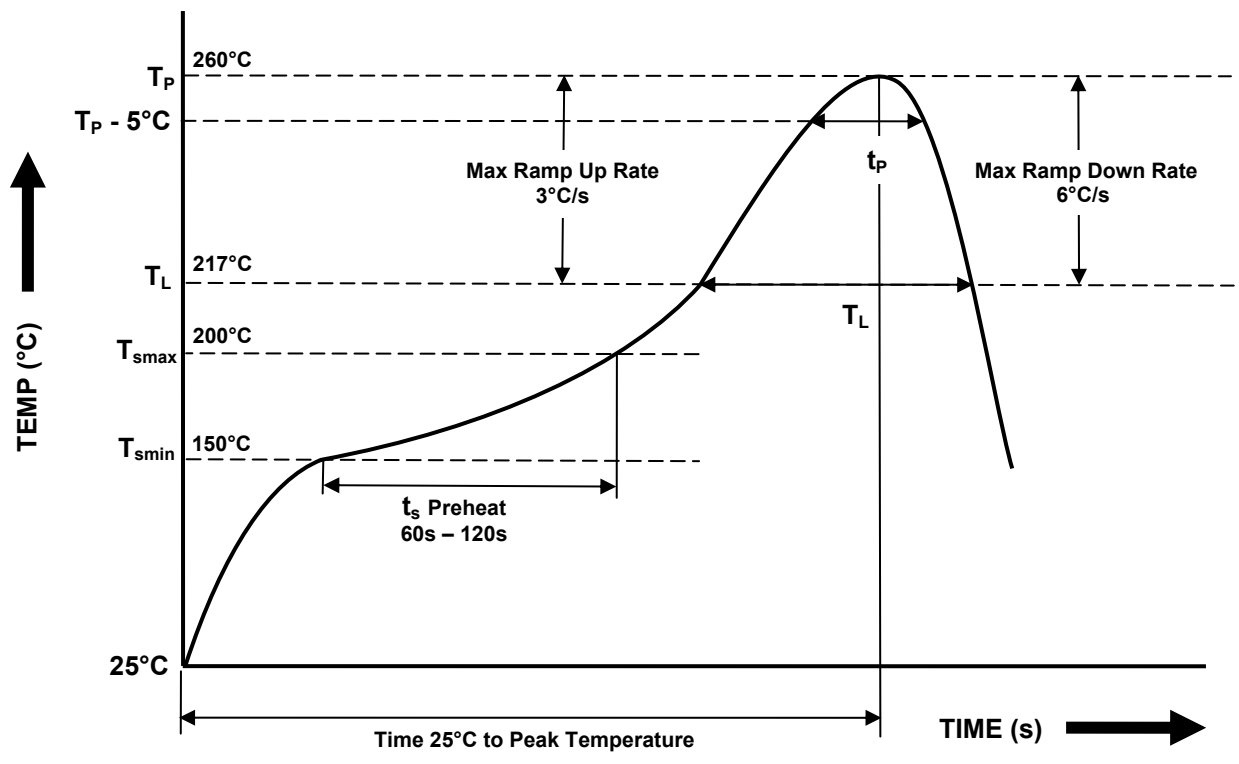
### TAPE AND REEL PACKAGING



Description	Symbol	Dimension mm (inch)
Tape Width	W	16 ± 0.3 (0.63)
Pitch of Sprocket Holes	P <sub>0</sub>	4 ± 0.1 (0.15)
Distance of Compartment to Sprocket Holes	F	7.5 ± 0.1 (0.295)
	P <sub>2</sub>	2 ± 0.1 (0.079)
Distance of Compartment to Compartment	P <sub>1</sub>	8 ± 0.1 (0.472)

## SFH615A

**IR REFLOW SOLDERING TEMPERATURE PROFILE FOR SMD**  
**One Time Reflow Soldering is Recommended.**  
**Do not immerse device body in solder paste.**



Profile Details	Conditions
<b>Preheat</b> - Min Temperature (T <sub>SMIN</sub> ) - Max Temperature (T <sub>SMAX</sub> ) - Time T <sub>SMIN</sub> to T <sub>SMAX</sub> (t <sub>s</sub> )	150°C 200°C 60s - 120s
<b>Soldering Zone</b> - Peak Temperature (T <sub>P</sub> ) - Time at Peak Temperature - Liquidous Temperature (T <sub>L</sub> ) - Time within 5°C of Actual Peak Temperature (T <sub>P</sub> - 5°C) - Time maintained above T <sub>L</sub> (t <sub>L</sub> ) - Ramp Up Rate (T <sub>L</sub> to T <sub>P</sub> ) - Ramp Down Rate (T <sub>P</sub> to T <sub>L</sub> )	260°C 10s max 217°C 30s max 60s - 100s 3°C/s max 6°C/s max
Average Ramp Up Rate (T <sub>smax</sub> to T <sub>P</sub> )	3°C/s max
Time 25°C to Peak Temperature	8 minutes max



## DISCLAIMER

Isocom Components is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing Isocom Components products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such Isocom Components products could cause loss of human life, bodily injury or damage to property.

In developing your designs, please ensure that Isocom Components products are used within specified operating ranges as set forth in the most recent Isocom Components products specifications.

The Isocom Components products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These Isocom Components products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation Instruments, traffic signal instruments, combustion control instruments, medical Instruments, all types of safety devices, etc... Unintended Usage of Isocom Components products listed in this document shall be made at the customer's own risk.

Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.

The products described in this document are subject to the foreign exchange and foreign trade laws.

The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by Isocom Components for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of Isocom Components or others.

The information contained herein is subject to change without notice.