



## H11L1, H11L1V



### DESCRIPTION

The H11L1 (UL Approval) and H11L1V (UL and VDE Approvals) devices each consist of a GaAs infrared emitting diode optically coupled to a high speed output integrated Microprocessor Compatible Schmitt trigger detector, which provides hysteresis for noise immunity and pulse shaping.

### FEATURES

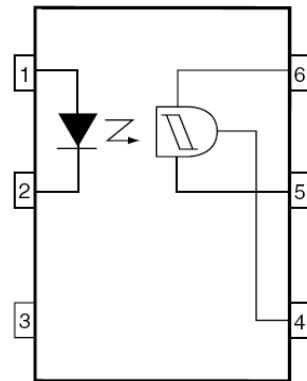
- High Data Rate, 1MHz typical (NRZ)
- Free from Latch Up and Oscillation
- Microprocessor Compatible Drive
- Logical Compatible Output sinks 16mA at 0.4V maximum
- Guaranteed On/Off Threshold Hysteresis
- Wide Supply Voltage Capability, compatible with all popular Logic Systems
- Operating Voltage Range  
V<sub>CC</sub> 3V to 16V
- Operating Temperature Range  
- 55°C to +100°C
- High AC Isolation voltage 5000V<sub>RMS</sub>
- Lead Free and RoHS Compliant
- UL Approval Certificate E91231
- VDE Approval Certificate 40044376

### APPLICATIONS

- Logic to Logic isolator
- Line Receiver - eliminate noise and transient problems
- Programmable Current Level Sensor
- AC to TTL Conversion - Square Wave Shaping
- Power Supply Digital Programming
- Computer Peripherals Interface

### ORDER INFORMATION

- 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 NC
- 4 V<sub>O</sub>
- 5 GND
- 6 V<sub>CC</sub>

### 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	60mA
Reverse Voltage	6V
Power Dissipation	120mW

#### Output

Output Current	50mA
Output Voltage	16V
Supply Voltage	16V
Power Dissipation	150mW

#### Total Package

Isolation Voltage	5000V <sub>RMS</sub>
Total Power Dissipation	250mW
Operating Temperature	-55 to 100 °C
Storage Temperature	-55 to 150 °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



## H11L1, H11L1V

### Truth Table

LED	V <sub>o</sub>
ON	LOW
OFF	HIGH

### ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C, unless otherwise specified. Typical Values at T<sub>A</sub> = 25°C)

#### INPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 10mA		1.15	1.5	V
Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 5V			10	μA
Terminal Capacitance	C <sub>IN</sub>	V = 0V, f = 1MHz		33		pF

#### OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Operating Voltage	V <sub>CC</sub>		3		15	V
Supply Current	I <sub>CC(off)</sub>	V <sub>CC</sub> = 5V, I <sub>F</sub> = 0mA		1.6	5	mA
High Level Output Current	I <sub>OH</sub>	I <sub>F</sub> = 0mA, V <sub>CC</sub> = V <sub>O</sub> = 15V			100	μA



## H11L1, H11L1V

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , unless otherwise specified, Typical Values at $T_A = 25^\circ\text{C}$ )

#### COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Supply Current	$I_{CC(on)}$	$V_{CC} = 5V, I_F = 10mA$		1.6	5	mA
Low Level Output Voltage	$V_{OL}$	$V_{CC} = 5V, I_F = I_{F(on)} (max), R_L = 270\Omega$			0.4	V
Turn-On Threshold Current	$I_{F(on)}$	$V_{CC} = 5V, R_L = 270\Omega$			1.6	mA
Turn-Off Threshold Current	$I_{F(off)}$	$V_{CC} = 5V, R_L = 270\Omega$		1		mA
Hysteresis Ratio	$I_{F(off)}/I_{F(on)}$	$V_{CC} = 5V, R_L = 270\Omega$	0.5		0.9	
Turn-On Time	$t_{(on)}$	$V_{CC} = 5V, I_F = I_{F(on)} (max), R_L = 270\Omega$			4	$\mu s$
Fall Time	$t_f$			0.1		
Turn-Off Time	$t_{(off)}$				4	
Rise Time	$t_r$			0.1		

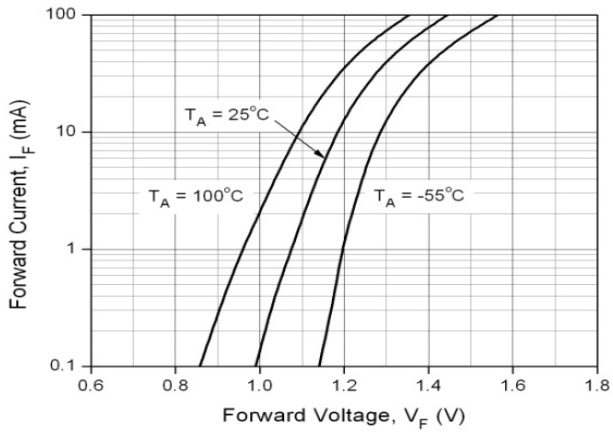
#### ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Isolation Voltage	$V_{ISO}$	R.H. = 40% to 60%, $t = 1 \text{ min}$ , Note 1	5000			$V_{RMS}$
Input - Output Resistance	$R_{I-O}$	$V_{I-O} = 500VDC$ R.H. = 40% to 60%	$10^{11}$			$\Omega$

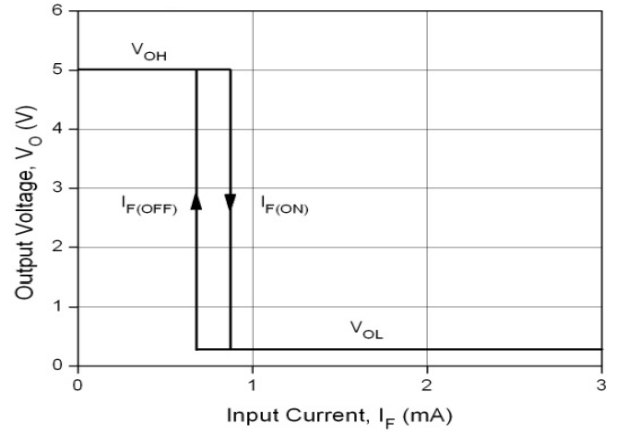
Note 1 : Measured with input leads shorted together and output leads shorted together.



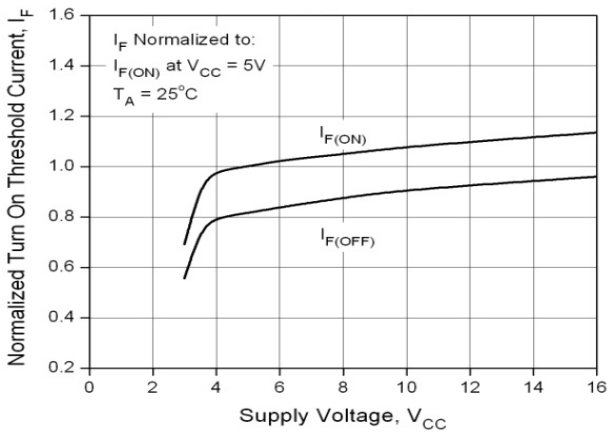
## H11L1, H11L1V



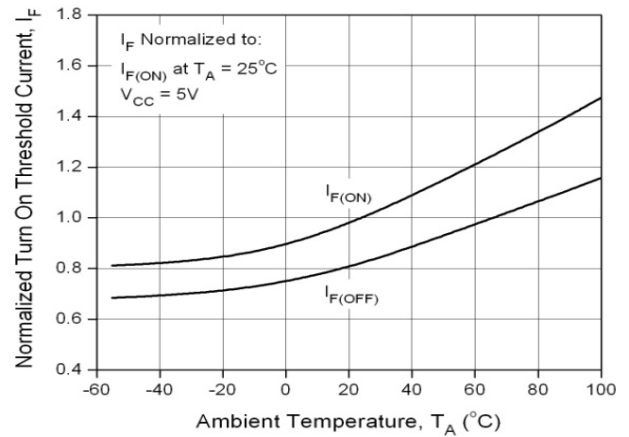
**Fig 1 Forward Current vs Forward Voltage**



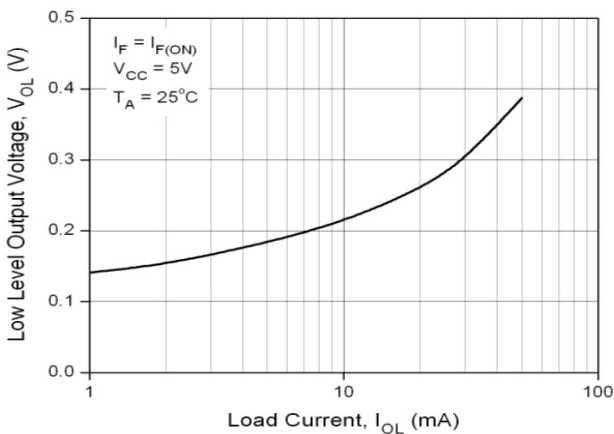
**Fig 2 Transfer Characteristics**



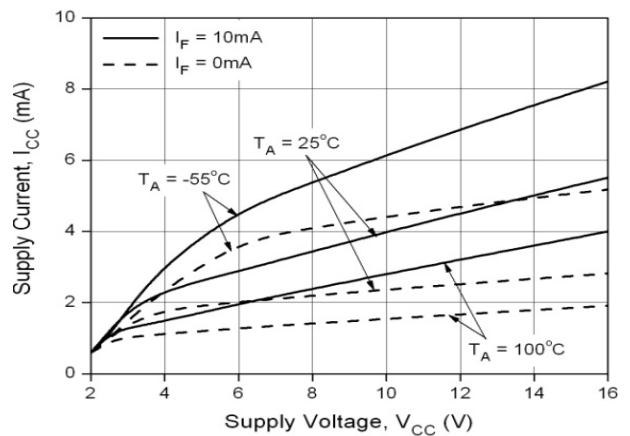
**Fig 3 Normalized Turn-On Current vs Supply Voltage**



**Fig 4 Normalized Turn-On Current vs Ambient temperature**



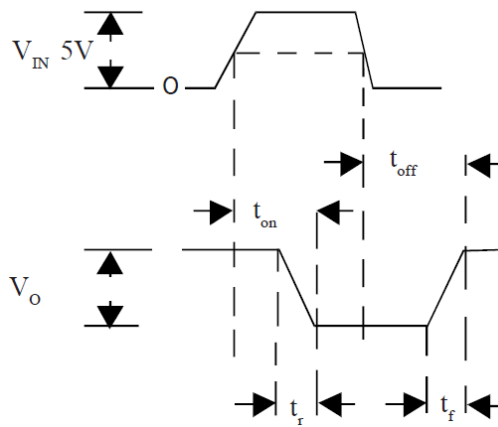
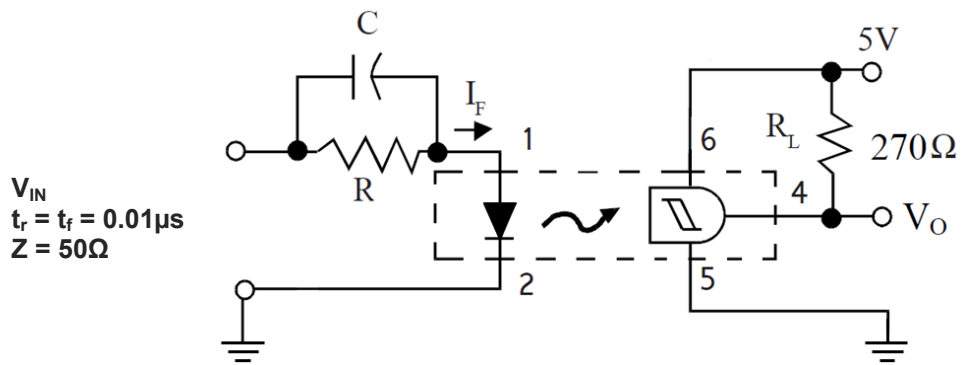
**Fig 5 Low Level Output Voltage vs Load Current**



**Fig 6 Supply Current vs Supply Voltage**



## H11L1, H11L1V



**Switching Time Test Circuit and Waveform**



## H11L1, H11L1V

### ORDER INFORMATION

H11L1 (UL Approval)			
After PN	PN	Description	Packing quantity
None	H11L1	Standard DIP6	65 pcs per tube
G	H11L1G	10mm Lead Spacing	65 pcs per tube
SM	H11L1SM	Surface Mount	65 pcs per tube
SMT&R	H11L1SMT&R	Surface Mount Tape & Reel	1000 pcs per reel

H11L1V (UL Approval and VDE Approvals)			
After PN	PN	Description	Packing quantity
None	H11L1V	Standard DIP6	65 pcs per tube
G	H11L1VG	10mm Lead Spacing	65 pcs per tube
SM	H11L1VSM	Surface Mount	65 pcs per tube
SMT&R	H11L1VSMT&R	Surface Mount Tape & Reel	1000 pcs per reel

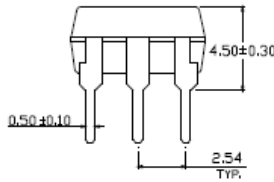
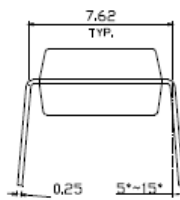
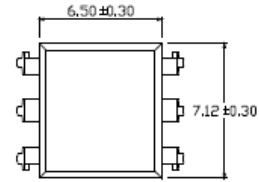




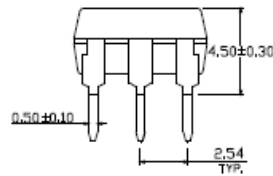
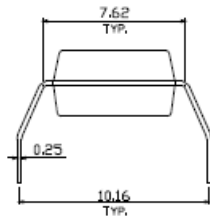
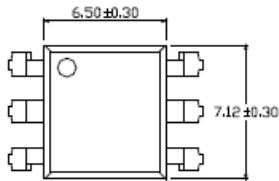
## H11L1, H11L1V

### PACKAGE DIMENSIONS in mm (inch)

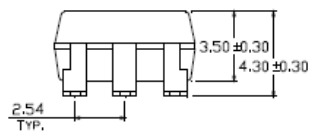
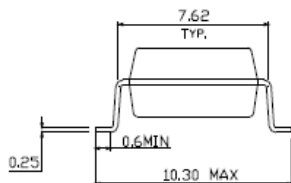
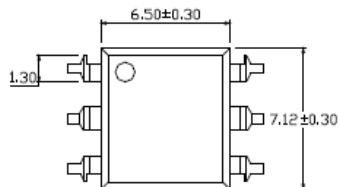
**DIP**



**G Form**



**SMD**

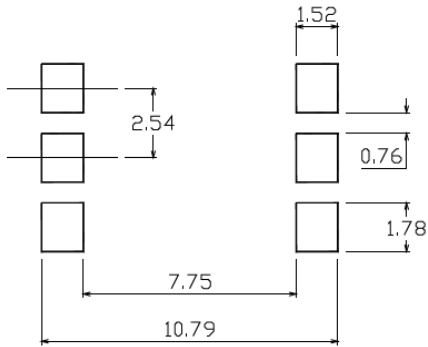




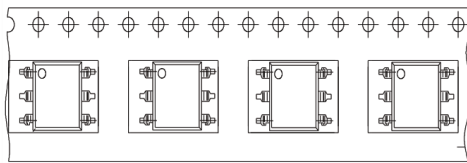


## H11L1, H11L1V

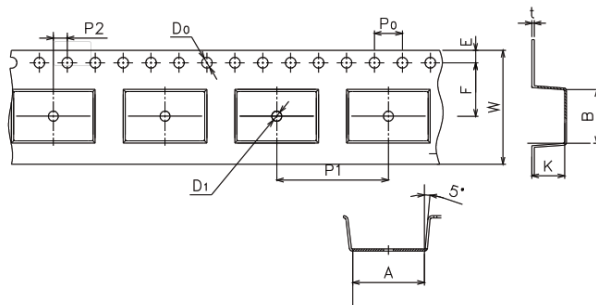
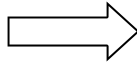
### RECOMMENDED PAD LAYOUT FOR SMD (mm)



### TAPE AND REEL PACKAGING



Direction of feed from reel

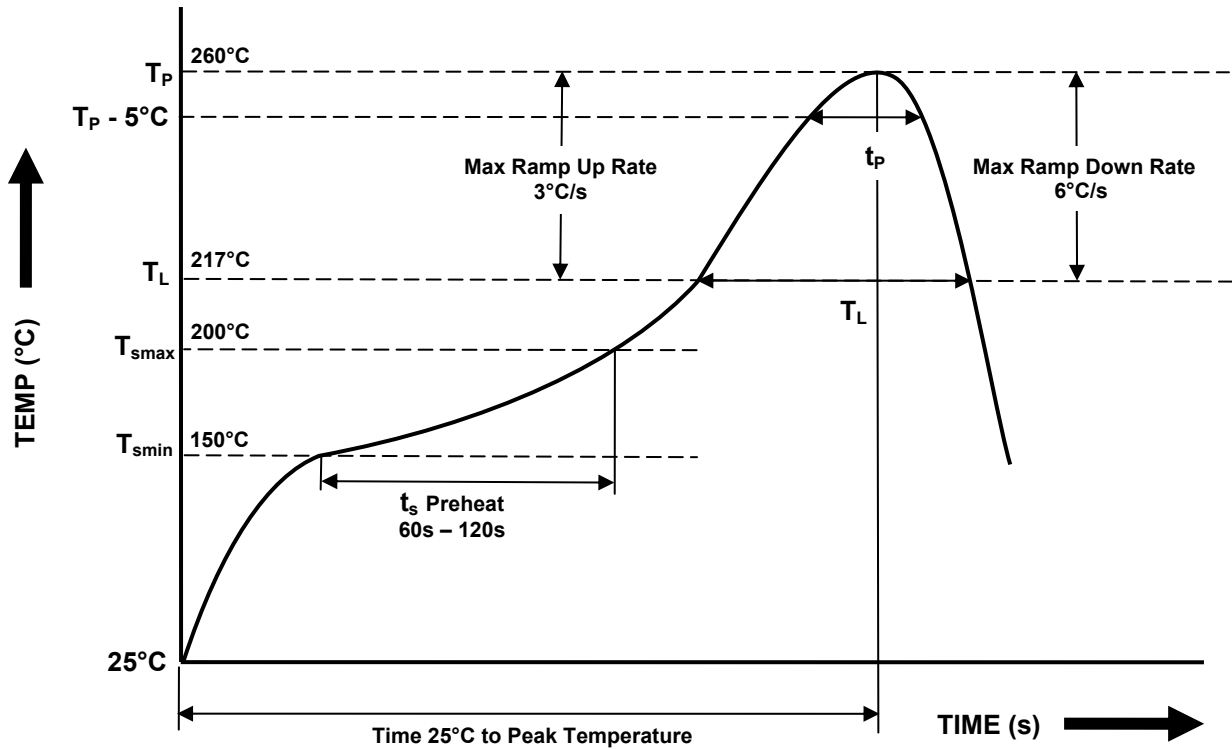


Dimension No.	A	B	Do	D1	E	F
Dimension( mm)	10.4±0.1	7.5±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12.0±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1



**H11L1, H11L1V**

**IR REFLOW SOLDERING TEMPERATURE PROFILE**  
(One Time Reflow Soldering is Recommended)



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





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