



Is Now Part of



**ON Semiconductor®**

To learn more about ON Semiconductor, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (\_), the underscore (\_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (\_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at [www.onsemi.com](http://www.onsemi.com). Please email any questions regarding the system integration to [Fairchild\\_questions@onsemi.com](mailto:Fairchild_questions@onsemi.com).

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.



December 2014

H11G1M, H11G2M — 6-Pin DIP High Voltage Photodarlington Optocouplers

# H11G1M, H11G2M 6-Pin DIP High Voltage Photodarlington Optocouplers

## Features

- High  $BV_{CEO}$ :
  - 100 V Minimum for H11G1M
  - 80 V Minimum for H11G2M
- High Sensitivity to Low Input Current (Minimum 500% CTR at  $I_F = 1 \text{ mA}$ )
- Low Leakage Current at Elevated Temperature (Maximum 100  $\mu\text{A}$  at 80°C)
- Safety and Regulatory Approvals:
  - UL1577, 4,170  $VAC_{RMS}$  for 1 Minute
  - DIN-EN/IEC60747-5-5, 850 V Peak Working Insulation Voltage

## Applications

- CMOS Logic Interface
- Telephone Ring Detector
- Low Input TTL Interface
- Power Supply Isolation
- Replace Pulse Transformer

## General Description

The H11G1M and H11G2M are photodarlington-type optically coupled optocouplers. These devices have a gallium arsenide infrared emitting diode coupled with a silicon darlington connected phototransistor which has an integral base-emitter resistor to optimize elevated temperature characteristics.

## Schematic

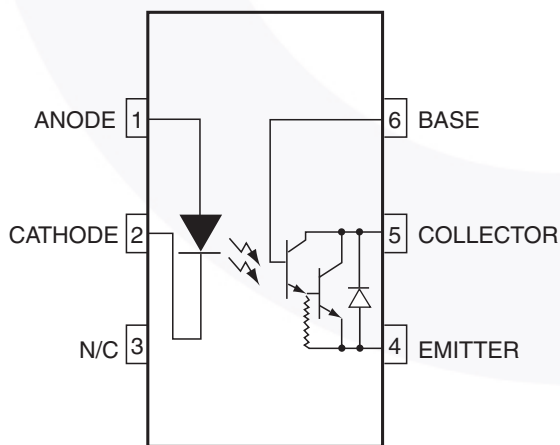


Figure 1. Schematic

## Package Outlines

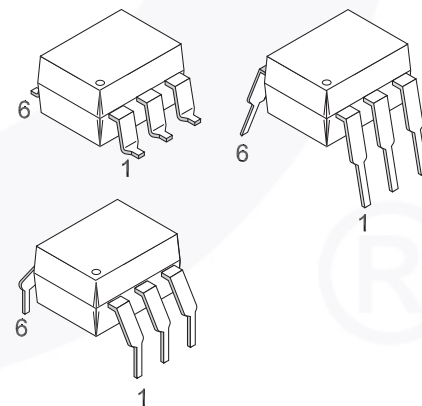


Figure 2. Package Outlines

## Safety and Insulation Ratings

As per DIN EN/IEC 60747-5-5, this optocoupler is suitable for “safe electrical insulation” only within the safety limit data. Compliance with the safety ratings shall be ensured by means of protective circuits.

Parameter		Characteristics
Installation Classifications per DIN VDE 0110/1.89 Table 1, For Rated Mains Voltage	< 150 V <sub>RMS</sub>	I–IV
	< 300 V <sub>RMS</sub>	I–IV
Climatic Classification		55/100/21
Pollution Degree (DIN VDE 0110/1.89)		2
Comparative Tracking Index		175

Symbol	Parameter	Value	Unit
V <sub>PR</sub>	Input-to-Output Test Voltage, Method A, V <sub>IORM</sub> × 1.6 = V <sub>PR</sub> , Type and Sample Test with t <sub>m</sub> = 10 s, Partial Discharge < 5 pC	1360	V <sub>peak</sub>
	Input-to-Output Test Voltage, Method B, V <sub>IORM</sub> × 1.875 = V <sub>PR</sub> , 100% Production Test with t <sub>m</sub> = 1 s, Partial Discharge < 5 pC	1594	V <sub>peak</sub>
V <sub>IORM</sub>	Maximum Working Insulation Voltage	850	V <sub>peak</sub>
V <sub>IOTM</sub>	Highest Allowable Over-Voltage	6000	V <sub>peak</sub>
	External Creepage	≥ 7	mm
	External Clearance	≥ 7	mm
	External Clearance (for Option TV, 0.4" Lead Spacing)	≥ 10	mm
DTI	Distance Through Insulation (Insulation Thickness)	≥ 0.5	mm
T <sub>S</sub>	Case Temperature <sup>(1)</sup>	175	°C
I <sub>S,INPUT</sub>	Input Current <sup>(1)</sup>	350	mA
P <sub>S,OUTPUT</sub>	Output Power <sup>(1)</sup>	800	mW
R <sub>IO</sub>	Insulation Resistance at T <sub>S</sub> , V <sub>IO</sub> = 500 V <sup>(1)</sup>	> 10 <sup>9</sup>	Ω

### Note:

1. Safety limit values – maximum values allowed in the event of a failure.

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Value	Unit
<b>TOTAL DEVICE</b>			
T <sub>STG</sub>	Storage Temperature	-40 to +125	°C
T <sub>OPR</sub>	Operating Temperature	-40 to +100	°C
T <sub>J</sub>	Junction Temperature	-40 to +125	°C
T <sub>SOL</sub>	Lead Solder Temperature	260 for 10 seconds	°C
P <sub>D</sub>	Total Device Power Dissipation @ T <sub>A</sub> = 25°C	290	mW
	Derate Above 25°C	3.5	mW/°C
<b>EMITTER</b>			
I <sub>F</sub>	Forward Input Current	60	mA
V <sub>R</sub>	Reverse Input Voltage	6.0	V
I <sub>F(pk)</sub>	Forward Current – Peak (1 μs pulse, 300 pps)	3.0	A
P <sub>D</sub>	LED Power Dissipation @ T <sub>A</sub> = 25°C	90	mW
	Derate Above 25°C	1.8	mW/°C
<b>DETECTOR</b>			
V <sub>CEO</sub>	Collector-Emitter Voltage H11G1M	100	V
	H11G2M	80	V
P <sub>D</sub>	Photodetector Power Dissipation @ T <sub>A</sub> = 25°C	200	mW
	Derate Above 25°C	2.67	mW/°C

## Electrical Characteristics

$T_A = 25^\circ\text{C}$  unless otherwise specified.

### Individual Component Characteristics

Symbol	Characteristic	Test Conditions	Device	Min.	Typ.	Max.	Unit
<b>EMITTER</b>							
$V_F$	Forward Voltage	$I_F = 10\text{ mA}$	All		1.3	1.5	V
$\frac{\Delta V_F}{\Delta T_A}$	Forward Voltage Temperature Coefficient		All		-1.8		mV/°C
$BV_R$	Reverse Breakdown Voltage	$I_R = 10\ \mu\text{A}$	All	3.0	25		V
$C_J$	Junction Capacitance	$V_F = 0\text{ V}, f = 1\text{ MHz}$	All		50		pF
		$V_F = 1\text{ V}, f = 1\text{ MHz}$			65		pF
$I_R$	Reverse Leakage Current	$V_R = 3.0\text{ V}$	All		0.001	10	$\mu\text{A}$
<b>DETECTOR</b>							
$BV_{CEO}$	Breakdown Voltage Collector to Emitter	$I_C = 1.0\text{ mA}, I_F = 0$	H11G1M	100			V
			H11G2M	80			V
$BV_{CBO}$	Collector to Base	$I_C = 100\ \mu\text{A}$	H11G1M	100			V
			H11G2M	80			V
$BV_{EBO}$	Emitter to Base		All	7	10		V
$I_{CEO}$	Leakage Current Collector to Emitter	$V_{CE} = 80\text{ V}, I_F = 0$	H11G1M			100	nA
		$V_{CE} = 60\text{ V}, I_F = 0$	H11G2M			100	nA
		$V_{CE} = 80\text{ V}, I_F = 0, T_A = 80^\circ\text{C}$	H11G1M			100	$\mu\text{A}$
		$V_{CE} = 60\text{ V}, I_F = 0, T_A = 80^\circ\text{C}$	H11G2M			100	$\mu\text{A}$

### Transfer Characteristics

Symbol	Characteristics	Test Conditions	Device	Min.	Typ.	Max.	Unit
<b>EMITTER</b>							
CTR	Current Transfer Ratio, Collector to Emitter	$I_F = 10\text{ mA}, V_{CE} = 1\text{ V}$	All	100 (1000)			mA (%)
		$I_F = 1\text{ mA}, V_{CE} = 5\text{ V}$	All	5 (500)			mA (%)
$V_{CE(SAT)}$	Saturation Voltage	$I_F = 16\text{ mA}, I_C = 50\text{ mA}$	All		0.85	1.0	V
		$I_F = 1\text{ mA}, I_C = 1\text{ mA}$	All		0.75	1.0	V
<b>SWITCHING TIMES</b>							
$t_{ON}$	Turn-on Time	$R_L = 100\ \Omega, I_F = 10\text{ mA},$ $V_{CE} = 5\text{ V}, f \leq 30\text{ Hz},$ Pulse Width $\leq 300\ \mu\text{s}$	All		5		$\mu\text{s}$
$t_{OFF}$	Turn-off Time		All		100		$\mu\text{s}$

### Isolation Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$V_{ISO}$	Input-Output Isolation Voltage	$t = 1\text{ Minute}$	4170			$V_{AC_{RMS}}$
$C_{ISO}$	Isolation Capacitance	$V_{I-O} = 0\text{ V}, f = 1\text{ MHz}$		0.2		pF
$R_{ISO}$	Isolation Resistance	$V_{I-O} = \pm 500\text{ VDC}, T_A = 25^\circ\text{C}$	$10^{11}$			$\Omega$

### Typical Performance Curves

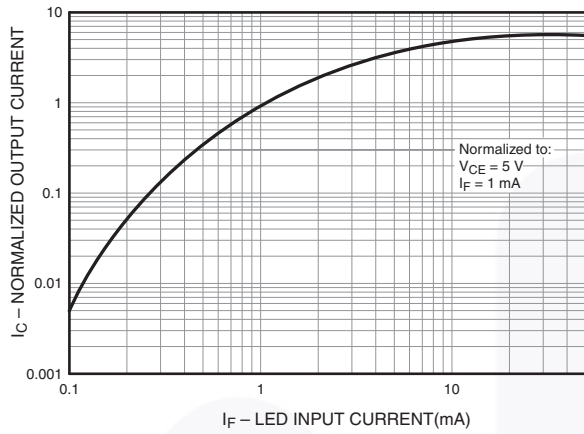


Figure 3. Output Current vs. Input Current

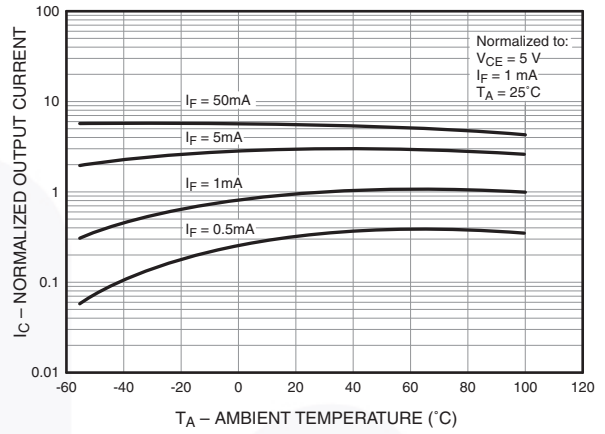


Figure 4. Normalized Output Current vs. Temperature

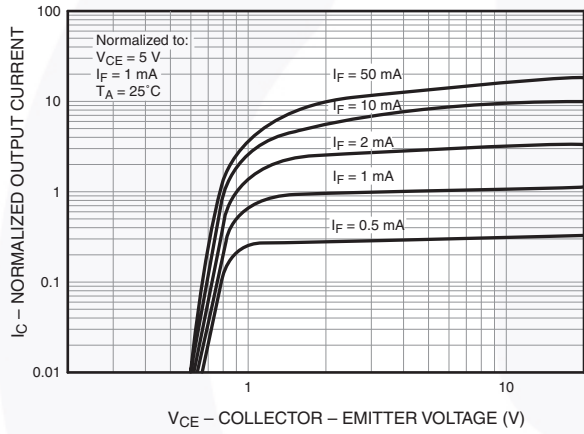


Figure 5. Output Current vs. Collector-Emitter Voltage

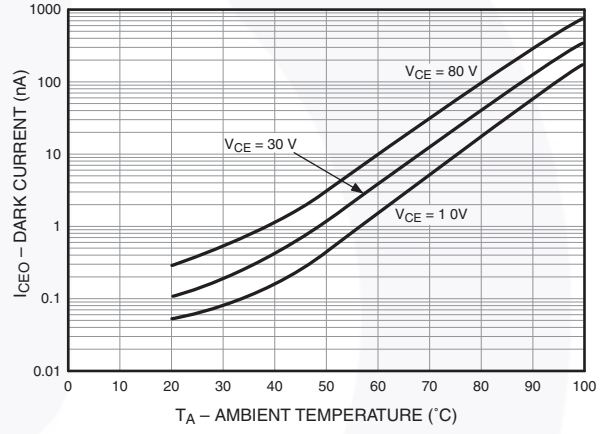


Figure 6. Collector-Emitter Dark Current vs. Ambient Temperature

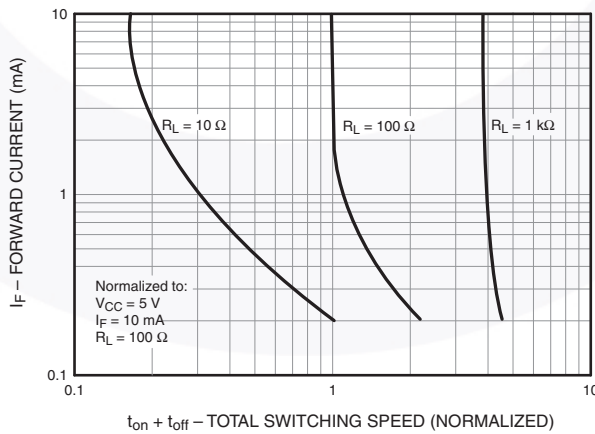


Figure 7. Input Current vs. Total Switching Speed (Typical Values)

### Reflow Profile

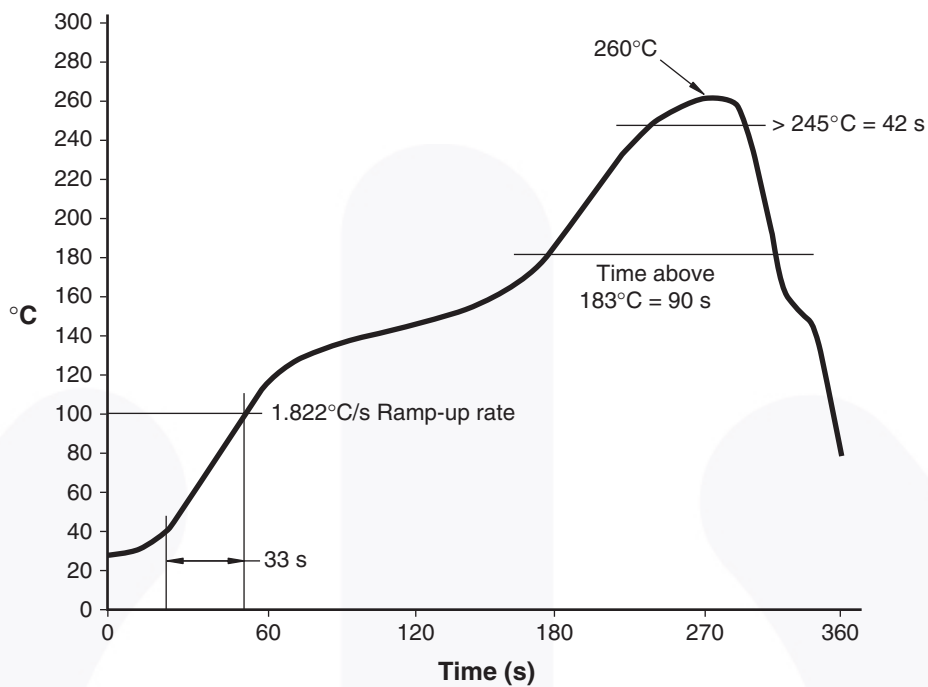


Figure 8. Reflow Profile



## Ordering Information

Part Number	Package	Packing Method
H11G1M	DIP 6-Pin	Tube (50 Units)
H11G1SM	SMT 6-Pin (Lead Bend)	Tube (50 Units)
H11G1SR2M	SMT 6-Pin (Lead Bend)	Tape and Reel (1000 Units)
H11G1VM	DIP 6-Pin, DIN EN/IEC60747-5-5 Option	Tube (50 Units)
H11G1SVM	SMT 6-Pin (Lead Bend), DIN EN/IEC60747-5-5 Option	Tube (50 Units)
H11G1SR2VM	SMT 6-Pin (Lead Bend), DIN EN/IEC60747-5-5 Option	Tape and Reel (1000 Units)
H11G1TVM	DIP 6-Pin, 0.4" Lead Spacing, DIN EN/IEC60747-5-5 Option	Tube (50 Units)

**Note:**

2. The product orderable part number system listed in this table also applies to the H11G2M device.

## Marking Information

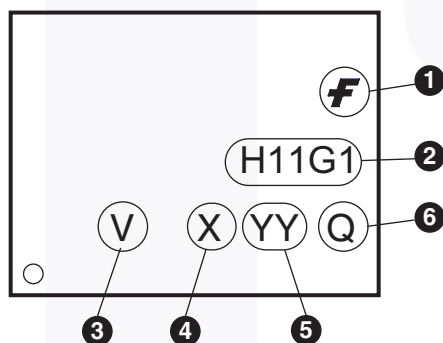


Figure 9. Top Mark

Table 1. Top Mark Definitions

1	Fairchild Logo
2	Device Number
3	DIN EN/IEC60747-5-5 Option (only appears on component ordered with this option)
4	One-Digit Year Code, e.g., "4"
5	Digit Work Week, Ranging from "01" to "53"
6	Assembly Package Code

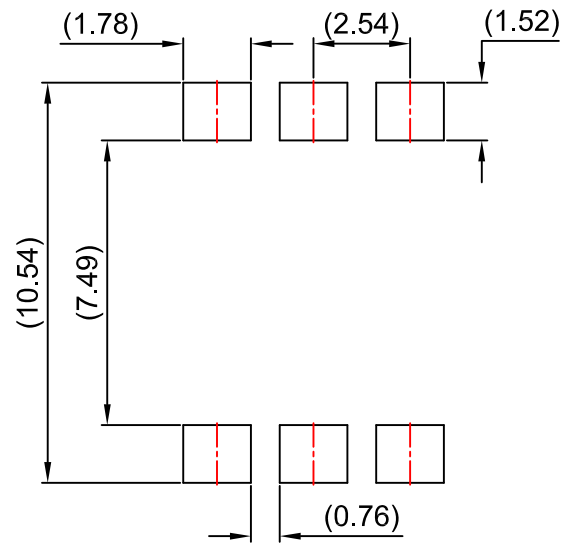
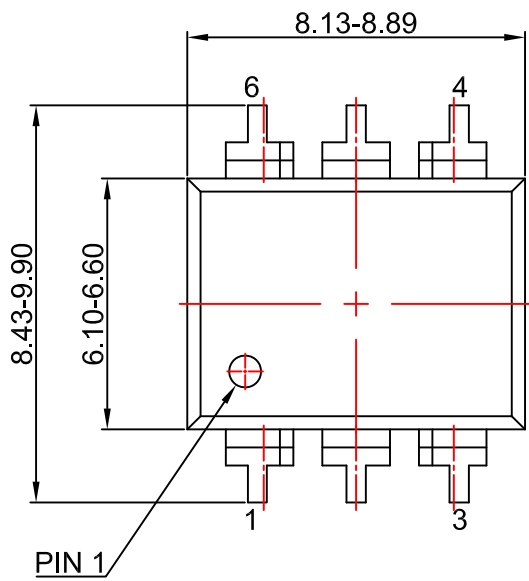




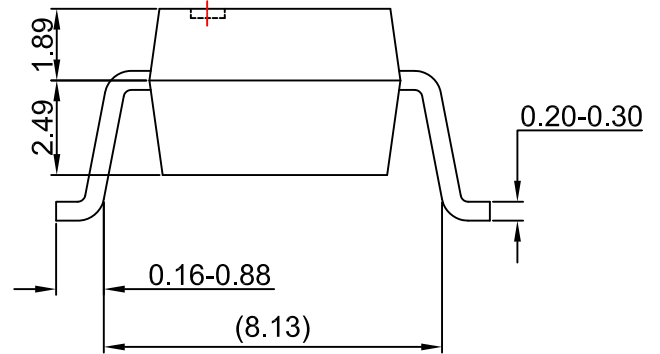
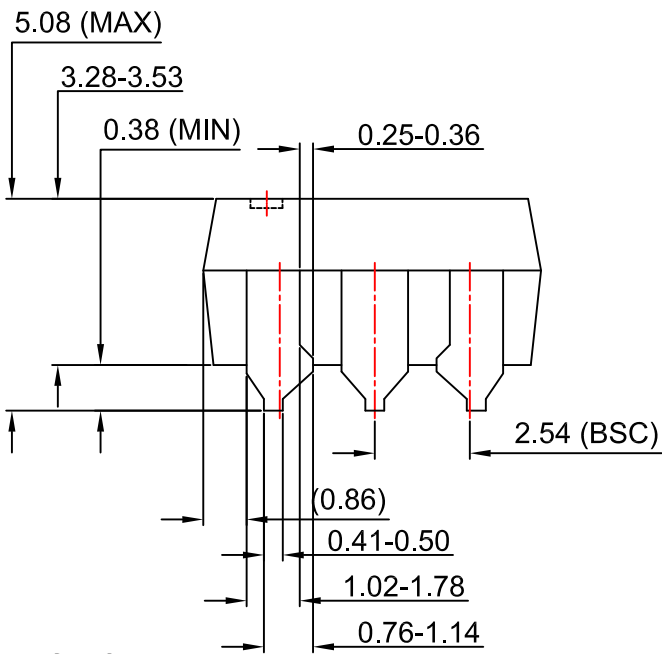
NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSION
- D) DRAWING FILENAME AND REVISION: MKT-N06BREV4.





LAND PATTERN RECOMMENDATION



NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSION
- D) DRAWING FILENAME AND REVISION : MKT-N06CREV4.





NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSION
- D) DRAWING FILENAME AND REVISION: MKT-N06Drev4



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>  
For additional information, please contact your local  
Sales Representative

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ON Semiconductor:](#)

[H11G1SR2VM](#) [H11G1TVM](#) [H11G1M](#) [H11G1SM](#) [H11G1SR2M](#)