



Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
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. Please email any questions regarding the system integration to 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. 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

4N38M, H11D1M, H11D3M, MOC8204M 6-Pin DIP High Voltage Phototransistor Optocouplers

Features

- High Voltage:
 - MOC8204M, $BV_{CEO} = 400\text{ V}$
 - H11D1M, $BV_{CEO} = 300\text{ V}$
 - H11D3M, $BV_{CEO} = 200\text{ V}$
- Safety and Regulatory Approvals:
 - UL1577, 4,170 VAC_{RMS} for 1 Minute
- DIN-EN/IEC60747-5-5, 850 V Peak Working Insulation Voltage

Applications

- Power Supply Regulators
- Digital Logic Inputs
- Microprocessor Inputs
- Appliance Sensor Systems
- Industrial Controls

Description

The 4N38M, H11D1M, H11D3M, and MOC8204M are phototransistor-type optically coupled optoisolators. A gallium arsenide infrared emitting diode is coupled with a high voltage NPN silicon phototransistor. The device is supplied in a standard plastic six-pin dual-in-line package.

Schematic

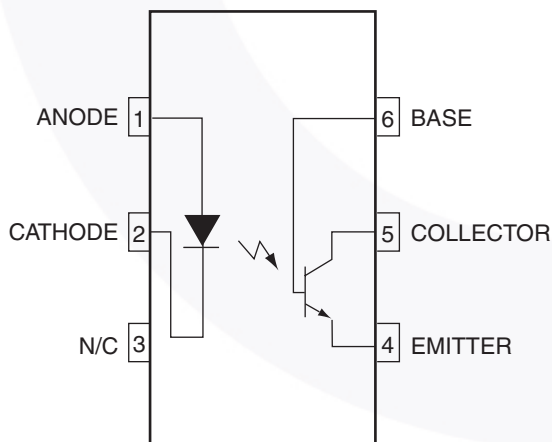


Figure 1. Schematic

Package Outlines

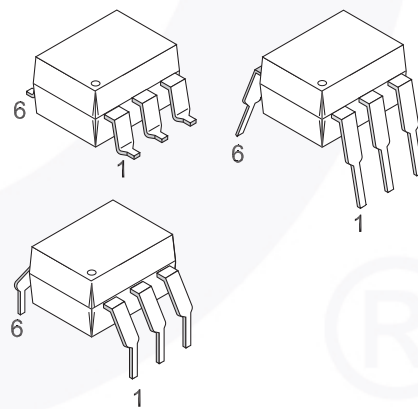


Figure 2. Package Outlines

4N38M, H11D1M, H11D3M, MOC8204M — 6-Pin DIP High Voltage Phototransistor Optocouplers

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 _{RMS} | I–IV |
| | < 300 V _{RMS} | I–IV |
| Climatic Classification | | 55/100/21 |
| Pollution Degree (DIN VDE 0110/1.89) | | 2 |
| Comparative Tracking Index | | 175 |

| Symbol | Parameter | Value | Unit |
|-----------------------|--|-------------------|-------------------|
| V _{PR} | Input-to-Output Test Voltage, Method A, V _{IORM} × 1.6 = V _{PR} , Type and Sample Test with t _m = 10 s, Partial Discharge < 5 pC | 1360 | V _{peak} |
| | Input-to-Output Test Voltage, Method B, V _{IORM} × 1.875 = V _{PR} , 100% Production Test with t _m = 1 s, Partial Discharge < 5 pC | 1594 | V _{peak} |
| V _{IORM} | Maximum Working Insulation Voltage | 850 | V _{peak} |
| V _{IOTM} | Highest Allowable Over-Voltage | 6000 | V _{peak} |
| | 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 _S | Case Temperature ⁽¹⁾ | 175 | °C |
| I _{S,INPUT} | Input Current ⁽¹⁾ | 350 | mA |
| P _{S,OUTPUT} | Output Power ⁽¹⁾ | 800 | mW |
| R _{IO} | Insulation Resistance at T _S , V _{IO} = 500 V ⁽¹⁾ | > 10 ⁹ | 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 | Device | Value | Unit |
|---------------------|--|--------------------------------|--------------------|-------|
| TOTAL DEVICE | | | | |
| T _{STG} | Storage Temperature | All | -40 to +125 | °C |
| T _{OPR} | Operating Temperature | All | -40 to +100 | °C |
| T _J | Junction Temperature | All | -40 to +125 | °C |
| T _{SOL} | Lead Solder Temperature | All | 260 for 10 seconds | °C |
| P _D | Total Device Power Dissipation @ T _A = 25°C | All | 420 | mW |
| | Derate Above 25°C | | 3.5 | mW/°C |
| EMITTER | | | | |
| I _F | Forward DC Current ⁽²⁾ | All | 80 | mA |
| V _R | Reverse Input Voltage ⁽²⁾ | All | 6.0 | V |
| I _{F(pk)} | Forward Current – Peak (1 μs pulse, 300pps) ⁽²⁾ | All | 3.0 | A |
| P _D | LED Power Dissipation @ T _A = 25°C ⁽²⁾ | All | 120 | mW |
| | Derate Above 25°C | | 1.41 | mW/°C |
| DETECTOR | | | | |
| P _D | Power Dissipation @ T _A = 25°C | All | 300 | mW |
| | Derate linearly above 25°C | | 4.0 | mW/°C |
| V _{CEO} | Collector to Emitter Voltage ⁽²⁾ | MOC8204M | 400 | V |
| | | H11D1M | 300 | V |
| | | H11D3M | 200 | V |
| | | 4N38M | 80 | V |
| V _{CBO} | Collector Base Voltage ⁽²⁾ | MOC8204M | 400 | V |
| | | H11D1M | 300 | V |
| | | H11D3M | 200 | V |
| | | 4N38M | 80 | V |
| V _{ECO} | Emitter to Collector Voltage ⁽²⁾ | H11D1M, H11D3M, MOC8204M | 7 | V |
| I _C | Collector Current (Continuous) | All | 100 | mA |

Note:

2. Parameters meet or exceed JEDEC registered data (for 4N38M only).

Electrical Characteristics

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

Individual Component Characteristics

| Symbol | Characteristic | Test Conditions | Device | Min. | Typ. | Max. | Unit |
|---------------------------------|---|--|---|-------|------|------|---------------|
| EMITTER | | | | | | | |
| V_F | Forward Voltage ⁽³⁾ | $I_F = 10\text{ mA}$ | All | | 1.15 | 1.50 | V |
| $\frac{\Delta V_F}{\Delta T_A}$ | Forward Voltage Temperature Coefficient | | All | | -1.8 | | mV/°C |
| BV_R | Reverse Breakdown Voltage | $I_R = 10\text{ }\mu\text{A}$ | All | 6 | 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 ⁽³⁾ | $V_R = 6\text{ V}$ | All | | 0.05 | 10 | μA |
| DETECTOR | | | | | | | |
| BV_{CEO} | Breakdown Voltage Collector-to-Emitter ⁽³⁾ | $R_{BE} = 1\text{ M}\Omega,$ $I_C = 1.0\text{ mA}, I_F = 0$ | MOC8204M | 400 | | | V |
| | | | H11D1M | 300 | | | V |
| | | | H11D3M | 200 | | | V |
| | | | No RBE, $I_C = 1.0\text{ mA}$ | 4N38M | 80 | | |
| BV_{CBO} | Collector to Base ⁽³⁾ | $I_C = 100\text{ }\mu\text{A}, I_F = 0$ | MOC8204M | 400 | | | V |
| | | | H11D1M | 300 | | | V |
| | | | H11D3M | 200 | | | V |
| | | | 4N38M | 80 | | | V |
| BV_{EBO} | Emitter to Base | $I_E = 100\text{ }\mu\text{A}, I_F = 0$ | 4N38M | 7 | | | V |
| BV_{ECO} | Emitter to Collector | $I_E = 100\text{ }\mu\text{A}, I_F = 0$ | All | 7 | 10 | | V |
| I_{CEO} | Leakage Current Collector to Emitter ⁽³⁾ ($R_{BE} = 1\text{ M}\Omega$) | $V_{CE} = 300\text{ V}, I_F = 0,$ $T_A = 25^\circ\text{C}$ | MOC8204M | | | 100 | nA |
| | | $V_{CE} = 300\text{ V}, I_F = 0,$ $T_A = 100^\circ\text{C}$ | | | | 250 | μA |
| | | $V_{CE} = 200\text{ V}, I_F = 0,$ $T_A = 25^\circ\text{C}$ | H11D1M | | | 100 | nA |
| | | $V_{CE} = 200\text{ V}, I_F = 0,$ $T_A = 100^\circ\text{C}$ | | | | 250 | μA |
| | | $V_{CE} = 100\text{ V}, I_F = 0,$ $T_A = 25^\circ\text{C}$ | H11D3M | | | 100 | nA |
| | | $V_{CE} = 100\text{ V}, I_F = 0,$ $T_A = 100^\circ\text{C}$ | | | | 250 | μA |
| | | | No $R_{BE}, V_{CE} = 60\text{ V},$ $I_F = 0, T_A = 25^\circ\text{C}$ | 4N38M | | | 50 |

Note:

3. Parameters meet or exceed JEDEC registered data (for 4N38M only).

Electrical Characteristics (Continued) $T_A = 25^\circ\text{C}$ unless otherwise specified.**Transfer Characteristics**

| Symbol | Characteristics | Test Conditions | Device | Min. | Typ. | Max. | Unit |
|------------------------|--|---|--------------------------|--------|------|------|---------------|
| EMITTER | | | | | | | |
| CTR | Current Transfer Ratio, Collector-to-Emitter | $I_F = 10\text{ mA}, V_{CE} = 10\text{ V}, R_{BE} = 1\text{ M}\Omega$ | H11D1M, H11D3M, MOC8204M | 2 (20) | | | mA (%) |
| | | $I_F = 10\text{ mA}, V_{CE} = 10\text{ V}$ | 4N38M | 2 (20) | | | mA (%) |
| $V_{CE(SAT)}$ | Saturation Voltage ⁽⁴⁾ | $I_F = 10\text{ mA}, I_C = 0.5\text{ mA}, R_{BE} = 1\text{ M}\Omega$ | H11D1M, H11D3M, MOC8204M | | 0.1 | 0.4 | V |
| | | $I_F = 20\text{ mA}, I_C = 4\text{ mA}$ | 4N38M | | | 1.0 | V |
| SWITCHING TIMES | | | | | | | |
| t_{ON} | Non-Saturated Turn-on Time | $V_{CE} = 10\text{ V}, I_C = 2\text{ mA}, R_L = 100\ \Omega$ | All | | 5 | | μs |
| t_{OFF} | Turn-off Time | | All | | 5 | | μs |

Note:

4. Parameters meet or exceed JEDEC registered data (for 4N38M only).

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} | | | Ω |

Typical Performance Curves

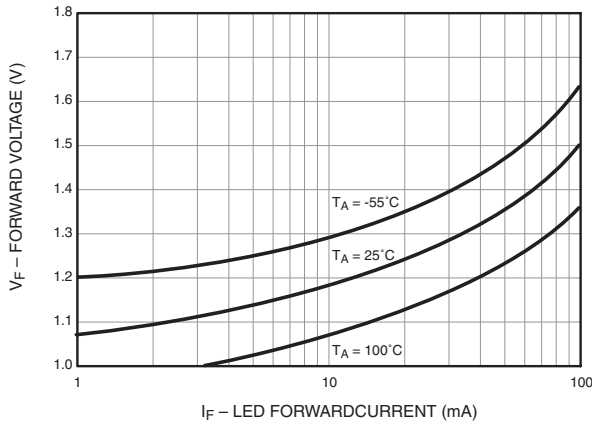


Figure 3. LED Forward Voltage vs. Forward Current

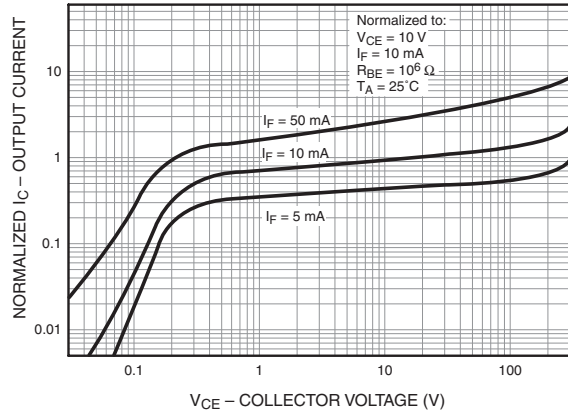


Figure 4. Normalized Output Characteristics

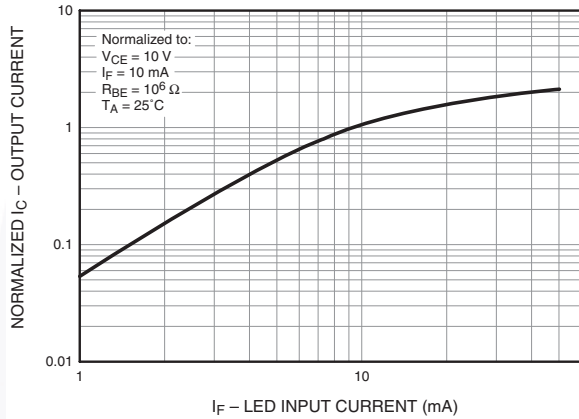


Figure 5. Normalized Output Current vs. LED Input Current

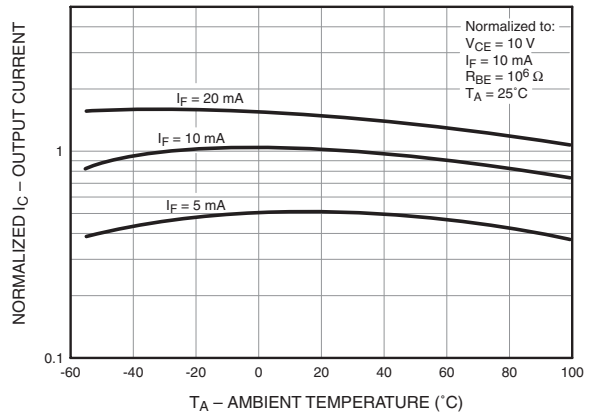


Figure 6. Normalized Output Current vs. Temperature

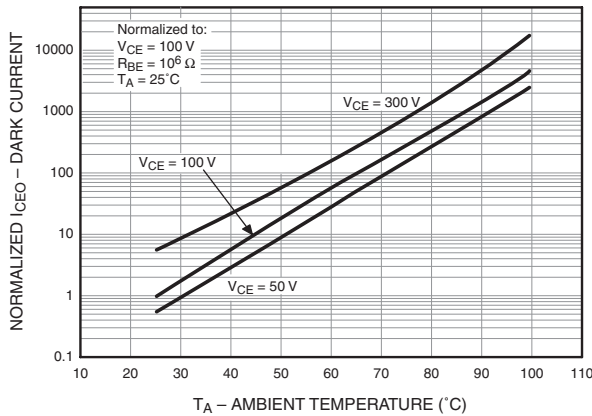


Figure 7. Normalized Dark Current vs. Ambient Temperature

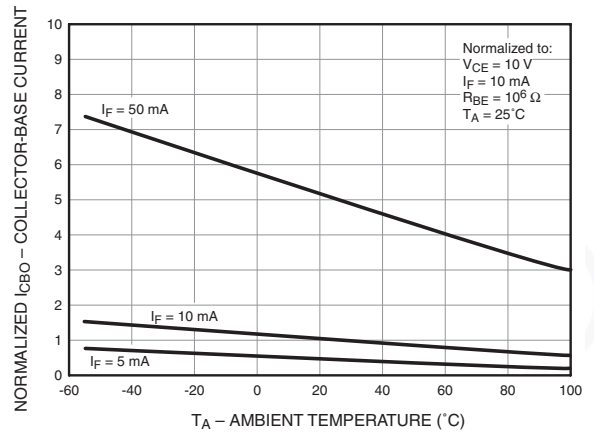


Figure 8. Normalized Collector-Base Current vs. Temperature

Reflow Profile



Figure 9. Reflow Profile

Ordering Information

| Part Number | Package | Packing Method |
|-------------|--|----------------------------|
| H11D1M | DIP 6-Pin | Tube (50 Units) |
| H11D1SM | SMT 6-Pin (Lead Bend) | Tube (50 Units) |
| H11D1SR2M | SMT 6-Pin (Lead Bend) | Tape and Reel (1000 Units) |
| H11D1VM | DIP 6-Pin, DIN EN/IEC60747-5-5 Option | Tube (50 Units) |
| H11D1SVM | SMT 6-Pin (Lead Bend), DIN EN/IEC60747-5-5 Option | Tube (50 Units) |
| H11D1SR2VM | SMT 6-Pin (Lead Bend), DIN EN/IEC60747-5-5 Option | Tape and Reel (1000 Units) |
| H11D1TVM | 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 4N38M, H11D3M, and MOC8204M devices.

Marking Information

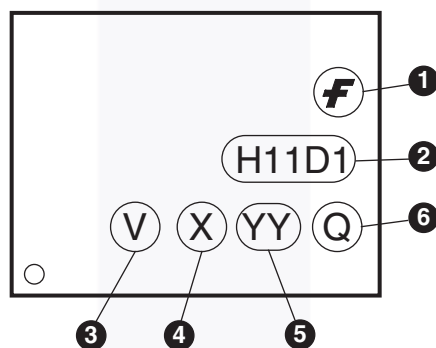


Figure 10. 12. Top Mark

Table 1. Top Mark Definitions

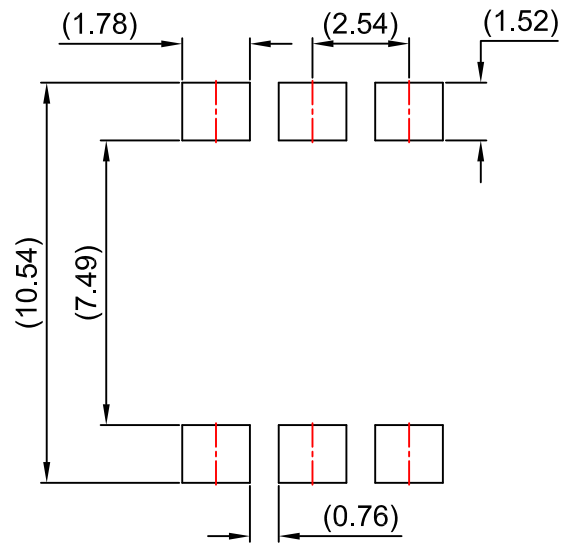
| | |
|---|---|
| 1 | Fairchild Logo |
| 2 | Device Number |
| 3 | DIN EN/IEC60747-5-5 Option (only appears on component ordered with this option) |
| 4 | One-Digit Year Code, e.g., "4" |
| 5 | Digit Work Week, Ranging from "01" to "53" |
| 6 | Assembly Package Code |



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.





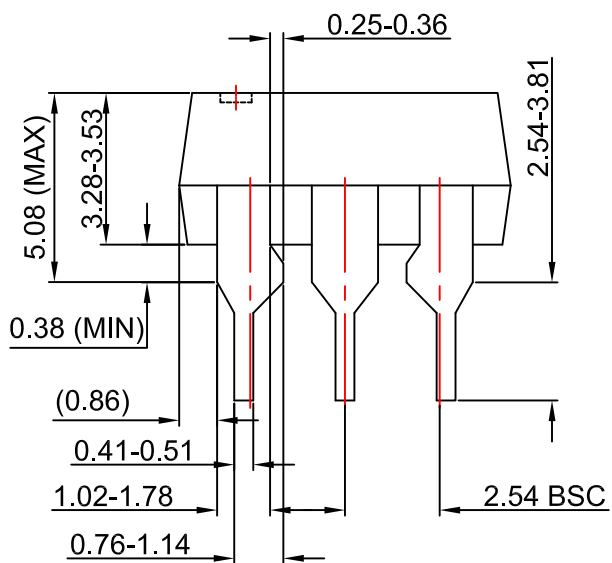
LAND PATTERN RECOMMENDATION



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. 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

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
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:](#)

[H11D1SM](#) [H11D1VM](#) [H11D1M](#) [H11D1SR2VM](#) [H11D1SR2M](#) [H11D1SVM](#)

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкуренспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: org@lifeelectronics.ru