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April 2011

# HMHAA280
# AC Input, Half Pitch Mini-Flat Package 4-Pin Optocoupler

## Features

- Compact 4-pin package (2.4mm maximum standoff height)
- Half pitch leads for optimum board space savings
- Current Transfer Ratio: 50–600%
- Available in tape and reel quantities of 2500
- CSA (File #1201524), UL (File #E90700) and VDE (File #136480) certified

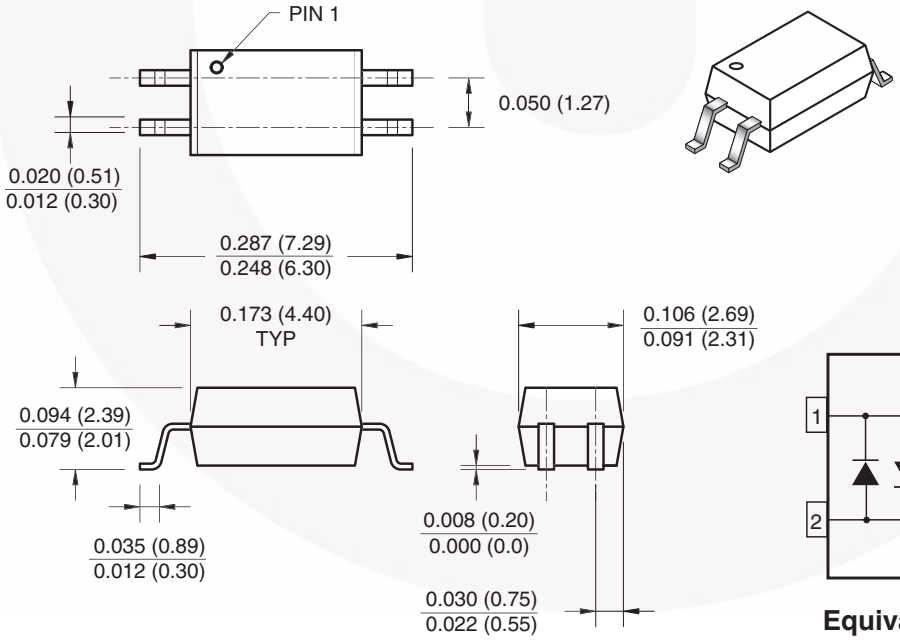
## Applications

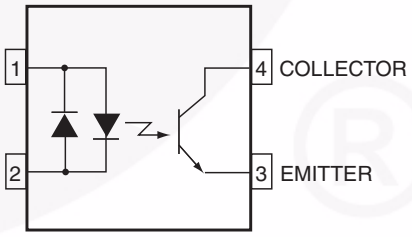
- AC line monitor
- Unknown polarity DC sensor
- Telephone line receiver

## Description

The HMHAA280 series consists of two gallium arsenide infrared emitting diodes, connected in inverse parallel, driving a single silicon phototransistor in a compact 4-pin mini-flat package. The lead pitch is 1.27mm.

## Package Dimensions




**Equivalent Circuit**

**Note:**
All dimensions are in inches (millimeters)

## Absolute Maximum Ratings ($T_A$ = 25°C unless otherwise specified)

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 | Units |
|---|---|---|---|
| **TOTAL PACKAGE** | | | |
| $T_{STG}$ | Storage Temperature | -55 to +125 | °C |
| $T_{OPR}$ | Operating Temperature | -55 to +100 | °C |
| **EMITTER** | | | |
| $I_{F\ (avg)}$ | Continuous Forward Current | 50 | mA |
| $I_{F\ (pk)}$ | Peak Forward Current (1µs pulse, 300pps.) | 1 | A |
| $V_R$ | Reverse Input Voltage | 6 | V |
| $P_D$ | Power Dissipation | 60 | mW |
| | Derate linearly (above 25°C) | 0.6 | mW/°C |
| **DETECTOR** | | | |
| | Continuous Collector Current | 50 | mA |
| $P_D$ | Power Dissipation | 150 | mW |
| | Derate linearly (above 25°C) | 1.5 | mW/°C |
| $V_{CEO}$ | Collector-Emitter Voltage | 80 | V |
| $V_{ECO}$ | Emitter-Collector Voltage | 7 | V |

## Electrical Characteristics ($T_A$ = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ.* | Max. | Unit |
|---|---|---|---|---|---|---|
| **INDIVIDUAL COMPONENT CHARACTERISTICS** | | | | | | |
| **Emitter** | | | | | | |
| $V_F$ | Forward Voltage | $I_F$ = ±5mA | | | 1.4 | V |
| $I_R$ | Reverse Current | $V_R$ = 5V | | | 5 | µA |
| **Detector** | | | | | | |
| $BV_{CEO}$ | Breakdown Voltage Collector to Emitter | $I_C$ = 0.5mA, $I_F$ = 0 | 80 | | | V |
| $BV_{ECO}$ | Emitter to Collector | $I_E$ = 100µA, $I_F$ = 0 | 7 | | | |
| $I_{CEO}$ | Collector Dark Current | $V_{CE}$ = 80V, $I_F$ = 0 | | | 100 | nA |
| $C_{CE}$ | Capacitance | $V_{CE}$ = 0V, f = 1MHz | | 10 | | pF |
| **TRANSFER CHARACTERISTICS** | | | | | | |
| CTR | DC Current Transfer Ratio | $I_F$ = ±5mA, $V_{CE}$ = 5V | 50 | | 600 | % |
| | CTR Symmetry | $I_F$ = ± 5mA, $V_{CE}$ = 5V | 0.33 | | 3.0 | |
| $V_{CE\ (SAT)}$ | Saturation Voltage | $I_F$ = ± 8mA, $I_C$ = 2.4mA | | | 0.4 | V |
| $t_r$ | Rise Time (Non-Saturated) | $I_C$ = 2mA, $V_{CE}$ = 5V, $R_L$ = 100Ω | | 3 | | µs |
| $t_f$ | Fall Time (Non-Saturated) | $I_C$ = 2mA, $V_{CE}$ = 5V, $R_L$ = 100Ω | | 3 | | |
| **ISOLATION CHARACTERISTICS** | | | | | | |
| $V_{ISO}$ | Steady State Isolation Voltage | 1 Minute | 3750 | | | VRMS |

*All typicals at $T_A$ = 25°C

## Typical Performance Characteristics

**Fig. 1 Forward Current vs. Forward Voltage**

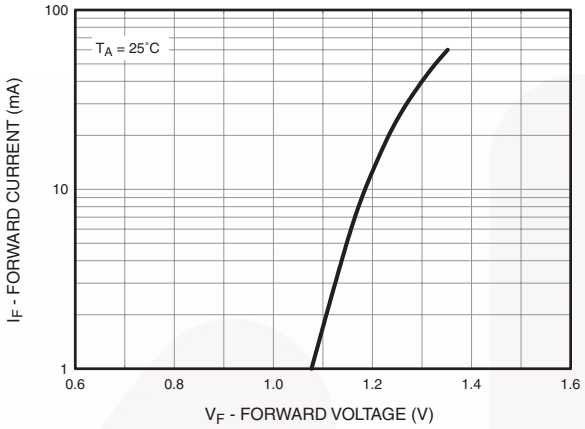



**Fig. 2 Collector Current vs. Forward Current**

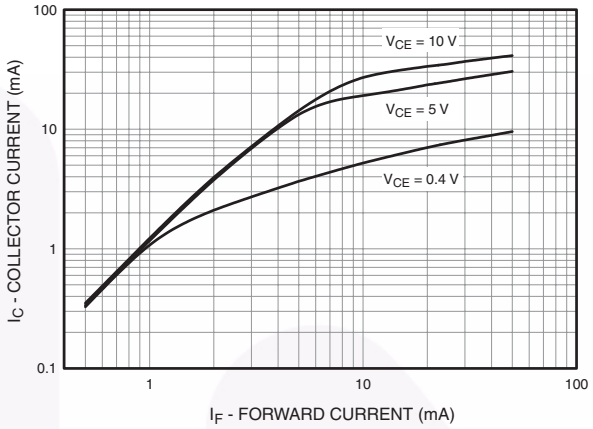



**Fig. 3 Current Transfer Ratio vs. Forward Current**

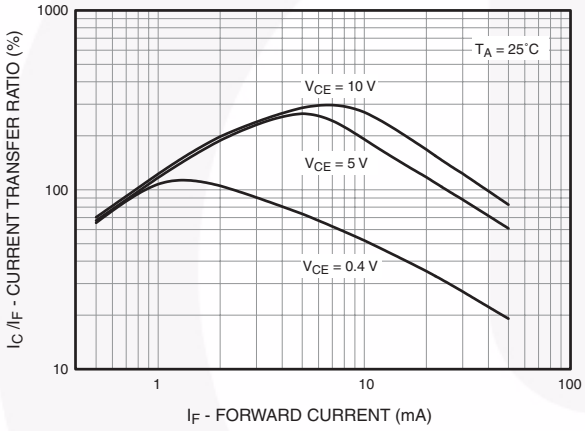



**Fig. 4 Normalized CTR vs. Temperature**

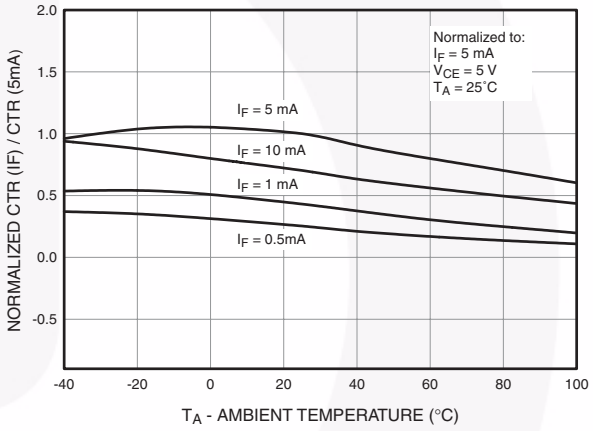
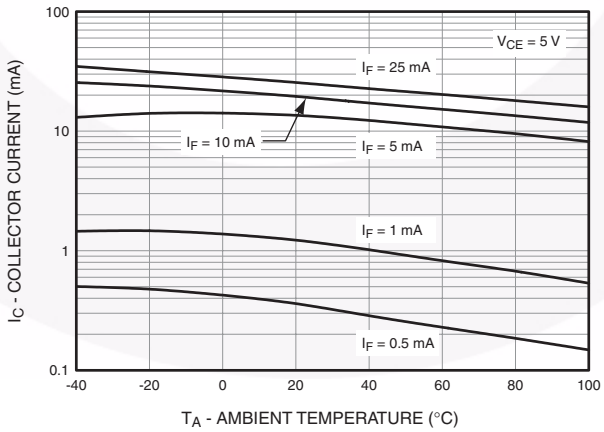



**Fig. 5 Collector Current vs. Temperature**



## Typical Performance Characteristics (Continued)

**Fig. 6 Collector Current vs. Collector-Emitter Voltage**

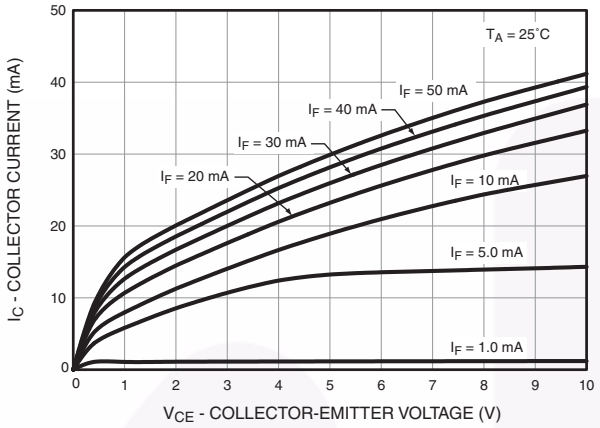



**Fig. 7 Collector Current vs. Collector-Emitter Voltage**

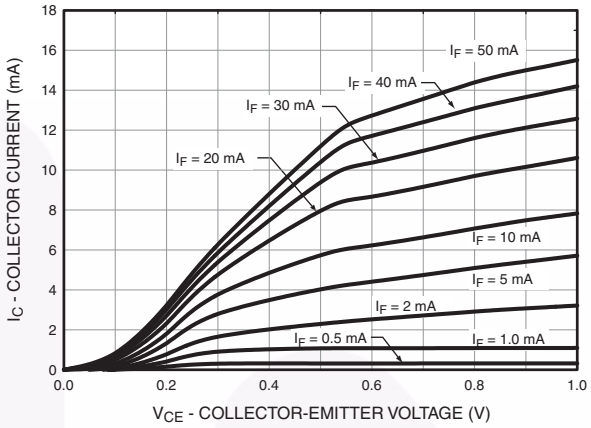



**Fig. 8 Collector Dark Current vs. Temperature**

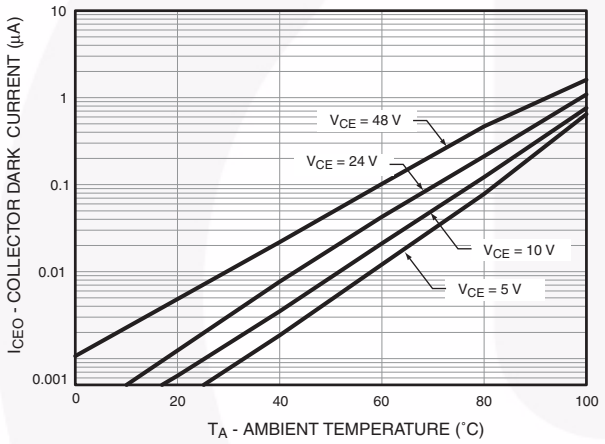



**Fig. 9 Switching Time vs. Load Resistance**

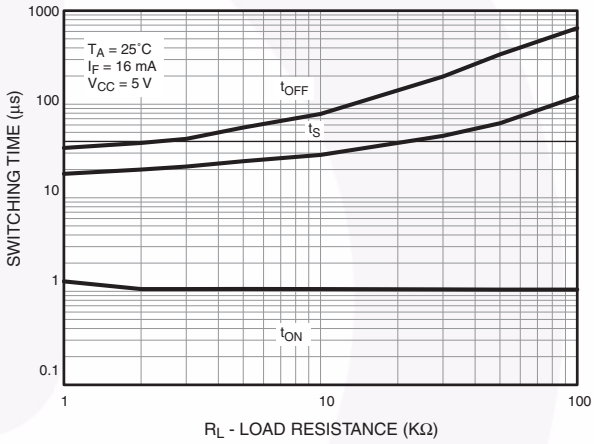
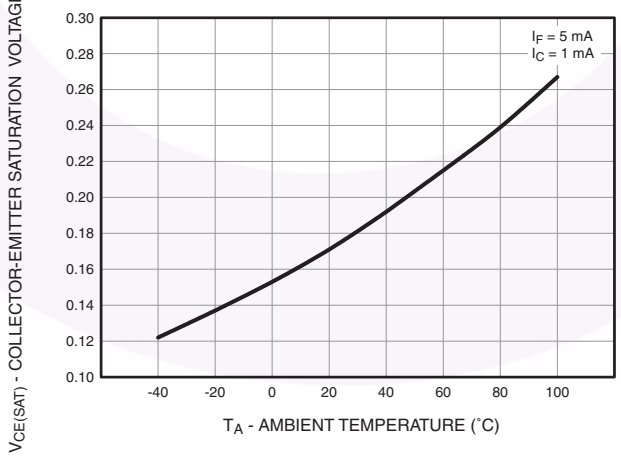


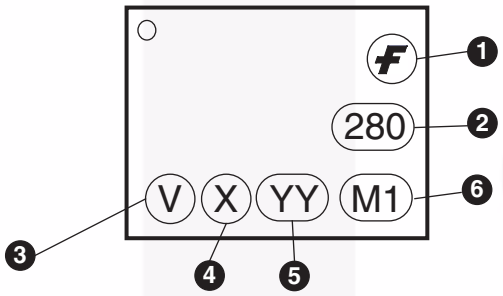

**Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature**



## Ordering Information

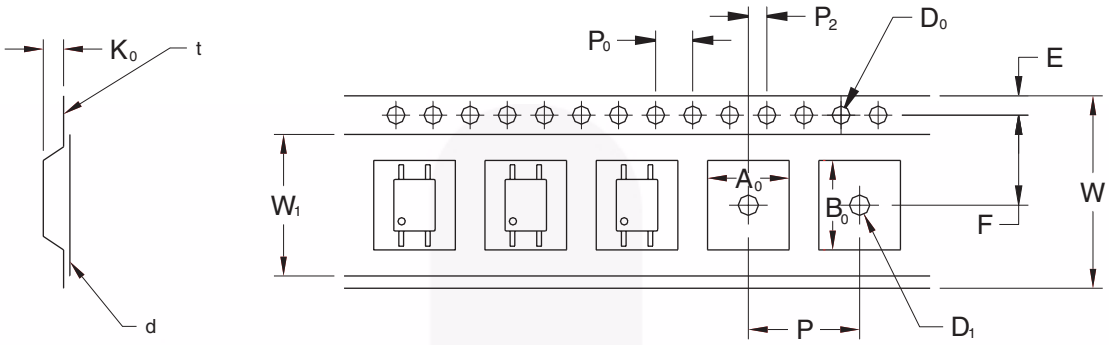
| Option | Description |
|---|---|
| V | VDE Approved |
| R2 | Tape and Reel (2500 units) |
| R2V | Tape and Reel (2500 units) and VDE Approved |

## Marking Information



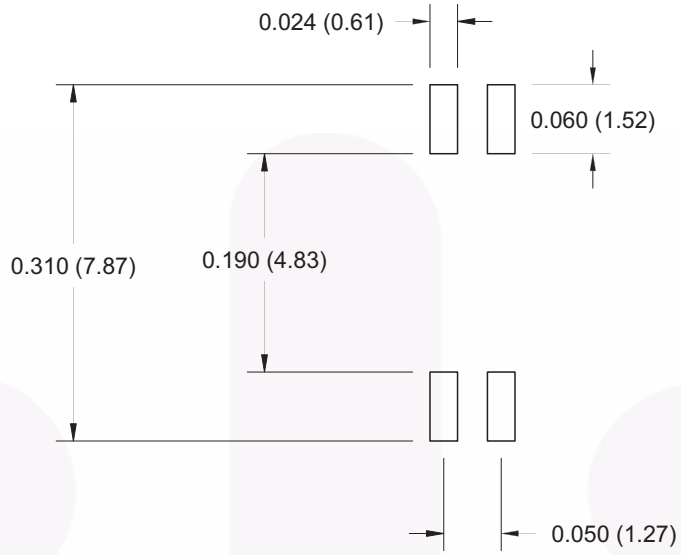

| Definitions | |
|---|---|
| 1 | Fairchild logo |
| 2 | Device number |
| 3 | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4 | One digit year code |
| 5 | Two digit work week ranging from ‘01’ to ‘53’ |
| 6 | Assembly package code |

## Tape and Reel Dimensions

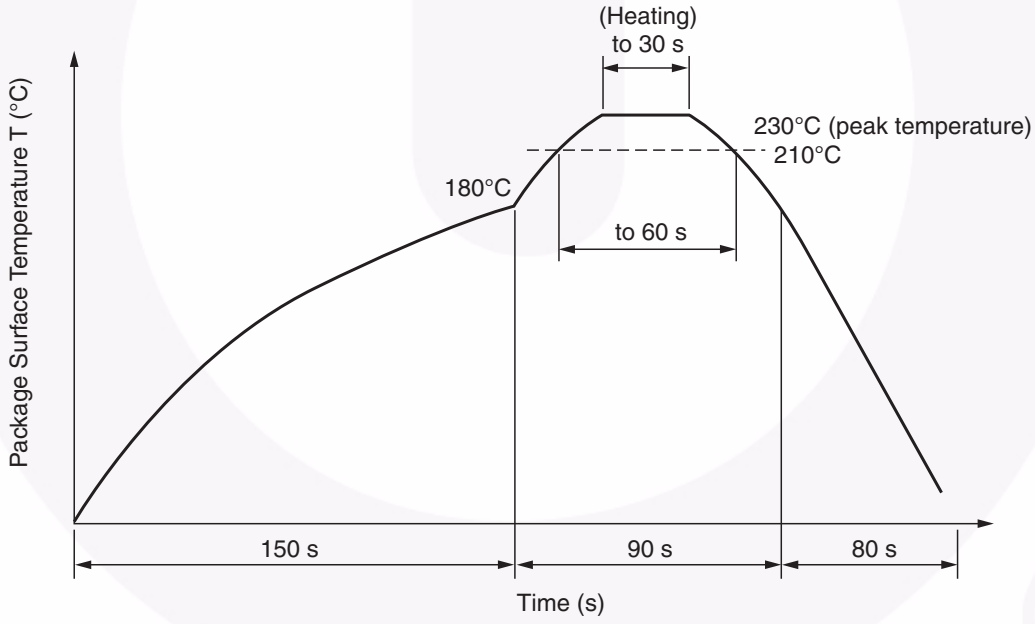



| | | 1.27 Pitch |
|---|---|---|
| **Description** | **Symbol** | **Dimensions (mm)** |
| Tape Width | W | 12.00 +0.30/-0.10 |
| Tape Thickness | t | 0.30 ±0.05 |
| Sprocket Hole Pitch | $P_0$ | 4.00 ±0.10 |
| Sprocket Hole Diameter | $D_0$ | 1.50 +0.10/-0.0 |
| Sprocket Hole Location | E | 1.75 ±0.10 |
| Pocket Location | F | 5.50 ±0.10 |
| | $P_2$ | 2.00 ±0.10 |
| Pocket Pitch | P | 8.00 ±0.10 |
| Pocket Dimension | $A_0$ | 2.80 ±0.10 |
| | $B_0$ | 7.30 ±0.10 |
| | $K_0$ | 2.30 ±0.10 |
| Pocket Hole Diameter | $D_1$ | 1.50 Min. |
| Cover Tape Width | $W_1$ | 9.20 |
| Cover Tape Thickness | d | 0.065 ±0.010 |
| Max. Component Rotation or Tilt | | 10° Max. |
| Devices Per Reel | | 2500 |
| Reel Diameter | | 330mm (13") |

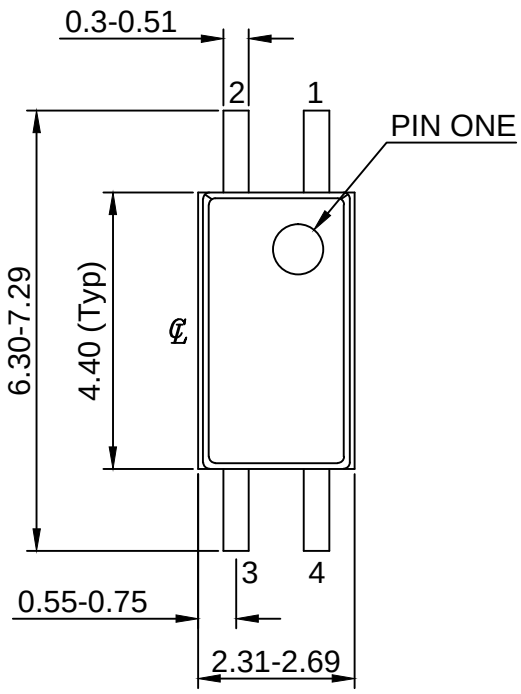
## Footprint Drawing for PCB Layout

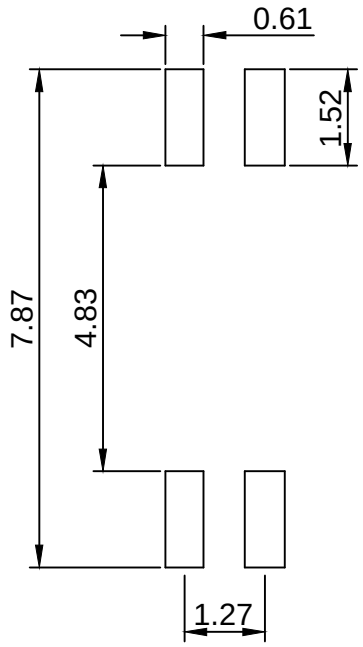



## Reflow Profile0

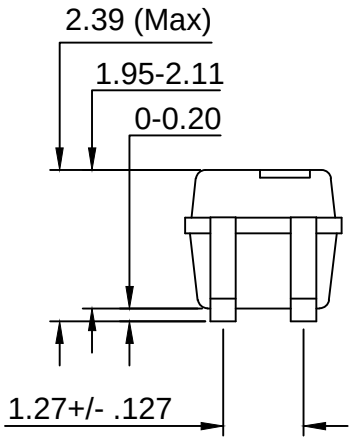


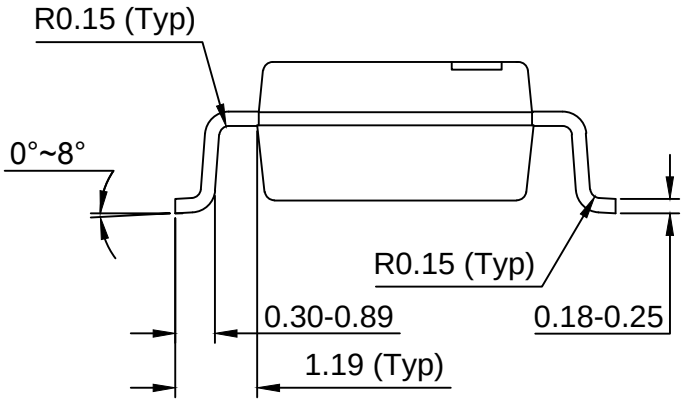

- Peak reflow temperature: 230°C (package surface temperature) for 30 seconds
- Time of temperature higher than 210°C: 60 seconds or less
- One time soldering reflow is recommended




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 REVSION : MKT-MFP04AREV4.

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