

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

# **HMHAA280**

#### **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 1.27 mm.

#### **Features**

- Compact 4-pin Package (2.4 mm 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
- This is a Pb-Free Device

#### **Applications**

- AC Line Monitor
- Unknown Polarity DC Sensor
- Telephone Line Receiver



MPF4 CASE 100AL

#### **MARKING DIAGRAM**



ON = onsemi Logo

280 = Device Number

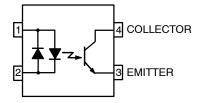
 VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)

X = One-Digit Year Code

YY = Digit Work Week, Ranging from "01" to "53"

M1 = Assembly Package Code

#### **PIN CONNECTIONS**



#### **ORDERING INFORMATION**

See detailed ordering and shipping information on page 5 of this data sheet.

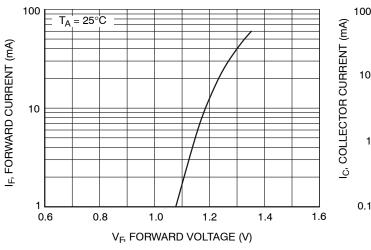
## **ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25$ °C, unless otherwise noted)

| Symbol               | Parameter                                      | Value        | Unit        |
|----------------------|--|--------------|-------------|
| TOTAL PAG            | CKAGE  |              | •           |
| T <sub>STG</sub>     | Storage Temperature                            | -55 to + 125 | °C          |
| T <sub>OPR</sub>     | Operating Temperature                          | -55 to + 100 | °C          |
| EMITTER              |  |              |             |
| I <sub>F (avg)</sub> | Continuous Forward Current                     | 50           | mA          |
| I <sub>F (pk)</sub>  | Peak Forward Current (1µs pulse, 300 pps.)     | 1            | Α           |
| V <sub>R</sub>       | Reverse Input Voltage                          | 6            | V           |
| P <sub>D</sub>       | Power Dissipation Derate Linearly (above 25°C) | 60<br>0.6    | mW<br>mW/°0 |
| DETECTOR             | R  |              |             |
|                      | Continuous Collector Current                   | 50           | mA          |
| $P_{D}$              | Power Dissipation Derate Linearly (above 25°C) | 150<br>1.5   | mW<br>mW/°( |
| $V_{CEO}$            | Collector-Emitter Voltage                      | 80           | V           |
| V <sub>ECO</sub>     | Emitter-Collector Voltage                      | 7            | V           |

| Symbol               | Parameter                              | Test Condition                                     | Min  | Тур | Max | Unit |
|----------------------|--|--|------|-----|-----|------|
| INDIVIDUA<br>Emitter | L COMPONENT CHARACTERISTICS            |  |      | •   |     | •    |
| V <sub>F</sub>       | Forward Voltage                        | I <sub>F</sub> = ±5 mA                             | -    | -   | 1.4 | V    |
| I <sub>R</sub>       | Reverse Current                        | V <sub>R</sub> = 5 V                               | -    | -   | 5   | μΑ   |
| Detector             |  | •  |      |     |     |      |
| BV <sub>CEO</sub>    | Breakdown Voltage Collector to Emitter | I <sub>C</sub> = 0.5 mA, I <sub>F</sub> = 0        | 80   | -   | -   | V    |
| BV <sub>ECO</sub>    | Emitter to Collector                   | I <sub>E</sub> = 100 μA, I <sub>F</sub> = 0        | 7    | -   | _   |      |
| I <sub>CEO</sub>     | Collector Dark Current                 | V <sub>CE</sub> = 80 V, I <sub>F</sub> = 0         | -    | -   | 100 | nA   |
| C <sub>CE</sub>      | Capacitance                            | V <sub>CE</sub> = 0 V, f = 1 MHz                   | _    | 10  | _   | pF   |
| TRANSFER             | CHARACTERISTICS                        | •  |      |     | -   |      |
| CTR                  | DC Current Transfer Ratio              | $I_F = \pm 5$ mA, $V_{CE} = 5$ V                   | 50   | -   | 600 | %    |
|                      | CTR Symmetry                           | $I_F = \pm 5$ mA, $V_{CE} = 5$ V                   | 0.33 | -   | 3.0 |      |
| V <sub>CE(SAT)</sub> | Saturation Voltage                     | $I_F = \pm 8 \text{ mA}, I_C = 2.4 \text{ mA}$     | -    | -   | 0.4 | V    |
| t <sub>r</sub>       | Rise Time (Non-Saturated)              | $I_C$ = 2 mA, $V_{CE}$ = 5 V, $R_L$ = 100 $\Omega$ | -    | 3   | _   | μS   |
| t <sub>f</sub>       | Fall Time (Non-Saturated)              | $I_C$ = 2 mA, $V_{CE}$ = 5 V, $R_L$ = 100 $\Omega$ | -    | 3   | -   | μs   |
| SOLATION             | CHARACTERISTICS                        | •  |      |     | •   | •    |
| V <sub>ISO</sub>     | Steady State Isolation Voltage         | 1 Minute   | 3750 | -   | _   | VRMS |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions. \*All typicals at  $T_A = 25$ °C.

#### TYPICAL PERFORMANCE CHARACTERISTICS



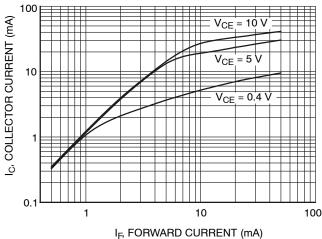
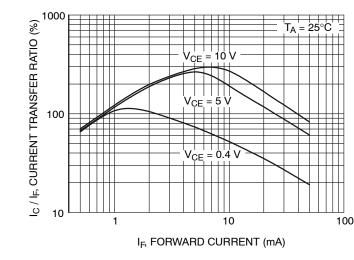


Figure 1. Forward Current vs. Forward Voltage

Figure 2. Collector Current vs. Forward Current



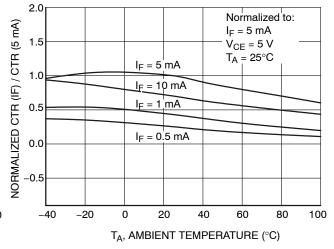


Figure 3. Current Transfer Ratio vs. Forward Current

Figure 4. Normalized CTR vs. Temperature

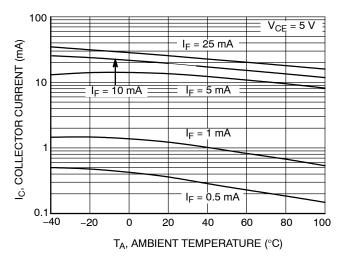


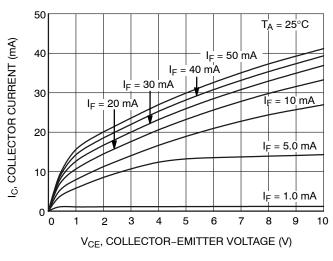
Figure 5. Collector Current vs. Temperature

#### TYPICAL PERFORMANCE CHARACTERISTICS (continued)

18

16

14



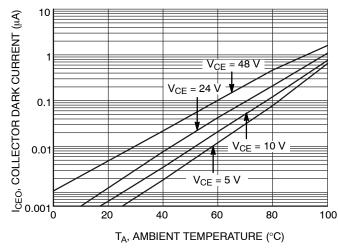
I<sub>C</sub>, COLLECTOR CURRENT (mA)  $I_F = 3'0 \text{ mA}$ 12  $I_F = 20 \text{ mA}$ 10 = 10 m/s8 Î<sub>F</sub> = 5 mA 6  $I_F = 2 \text{ m/A}$  $l_F = 0.5 \text{ m/s}$ 2  $I_{F} = 1.0 \text{ mA}$ 0.0 0.2 1.0 0.4 0.6 8.0  $V_{CE}$ , COLLECTOR-EMITTER VOLTAGE (V)

= 40 <sup>'</sup>mA

I<sub>F</sub> = 50 mA

Figure 6. Collector Current vs. Collector-Emitter Voltage

Figure 7. Collector Current vs. Collector-Emitter Voltage



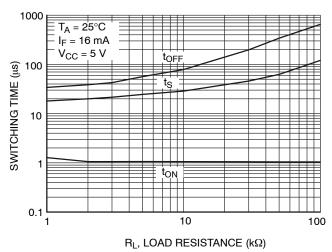


Figure 8. Collector Dark Current vs. Temperature

Figure 9. Switching Time vs. Load Resistance

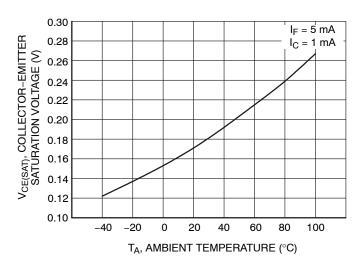
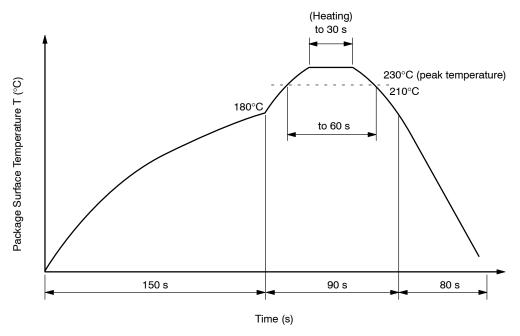


Figure 10. Collector-Emitter Saturation Voltage vs. Temperature

#### **REFLOW PROFILE**



- 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

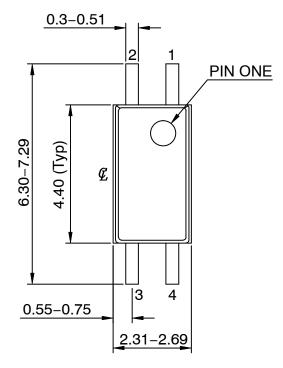
#### **ORDERING INFORMATION**

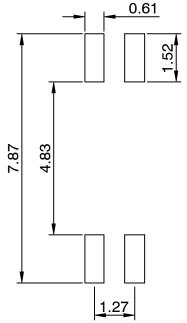
| Device      | Package           | Shipping <sup>†</sup> |  |
|-------------|-------------------|-----------------------|--|
| HMHAA280    | MFP-4             | 150 Units / Tube      |  |
| HMHAA280R2  | MFP-4             | 2500 / Tape & Reel    |  |
| HMHAA280R2V | MFP-4, VDE Option | 2500 / Tape & Reel    |  |
| HMHAA280V   | MFP-4, VDE Option | 150 Units / Tube      |  |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

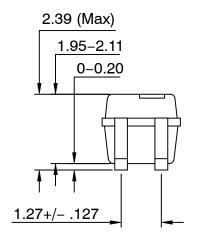
#### MFP4 2.5X4.4, 1.27P CASE 100AL ISSUE O

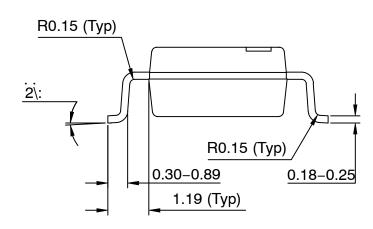
**DATE 31 AUG 2016** 





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

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