

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

## HMHAA280

### Description

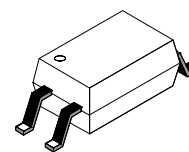
The HMHAA280 series consists of two gallium arsenide infrared emitting diodes, connected in inverse parallel, driving a single silicon phototransistor in a compact 4-pin mini-flat package. The lead pitch is 1.27 mm.

### 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

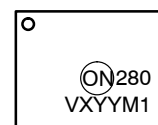
### Applications

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



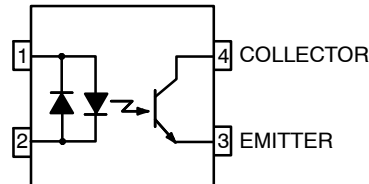
MPF4  
CASE 100AL

### MARKING DIAGRAM



- ON = onsemi Logo  
 280 = Device Number  
 V = 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.

# HMHAA280

## ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C, unless otherwise noted)

| Symbol | Parameter | Value | Unit |
|--------|-----------|-------|------|
|--------|-----------|-------|------|

### TOTAL PACKAGE

|                  |                       |              |    |
|------------------|-----------------------|--------------|----|
| T <sub>STG</sub> | Storage Temperature   | -55 to + 125 | °C |
| T <sub>OPR</sub> | Operating Temperature | -55 to + 100 | °C |

### EMITTER

|                      |                                                   |           |             |
|----------------------|---------------------------------------------------|-----------|-------------|
| I <sub>F</sub> (avg) | Continuous Forward Current                        | 50        | mA          |
| I <sub>F</sub> (pk)  | Peak Forward Current (1μs pulse, 300 pps.)        | 1         | A           |
| V <sub>R</sub>       | Reverse Input Voltage                             | 6         | V           |
| P <sub>D</sub>       | Power Dissipation<br>Derate Linearly (above 25°C) | 60<br>0.6 | mW<br>mW/°C |

### DETECTOR

|                  |                                                   |            |             |
|------------------|---------------------------------------------------|------------|-------------|
|                  | Continuous Collector Current                      | 50         | mA          |
| P <sub>D</sub>   | Power Dissipation<br>Derate Linearly (above 25°C) | 150<br>1.5 | mW<br>mW/°C |
| V <sub>CEO</sub> | Collector–Emitter Voltage                         | 80         | V           |
| V <sub>ECO</sub> | Emitter–Collector Voltage                         | 7          | V           |

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|--------|-----------|----------------|-----|-----|-----|------|
|--------|-----------|----------------|-----|-----|-----|------|

### INDIVIDUAL COMPONENT CHARACTERISTICS

#### Emitter

|                |                 |                        |   |   |     |    |
|----------------|-----------------|------------------------|---|---|-----|----|
| 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   | μA |

#### 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 <sub>F</sub> = ±5 mA, V <sub>CE</sub> = 5 V                        | 50   | – | 600 | %  |
|                      | CTR Symmetry              | I <sub>F</sub> = ±5 mA, V <sub>CE</sub> = 5 V                        | 0.33 | – | 3.0 |    |
| V <sub>CE(SAT)</sub> | Saturation Voltage        | I <sub>F</sub> = ±8 mA, I <sub>C</sub> = 2.4 mA                      | –    | – | 0.4 | V  |
| t <sub>r</sub>       | Rise Time (Non–Saturated) | I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5 V, R <sub>L</sub> = 100 Ω | –    | 3 | –   | μs |
| t <sub>f</sub>       | Fall Time (Non–Saturated) | I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5 V, R <sub>L</sub> = 100 Ω | –    | 3 | –   | μs |

### ISOLATION 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<sub>A</sub> = 25°C.

TYPICAL PERFORMANCE CHARACTERISTICS

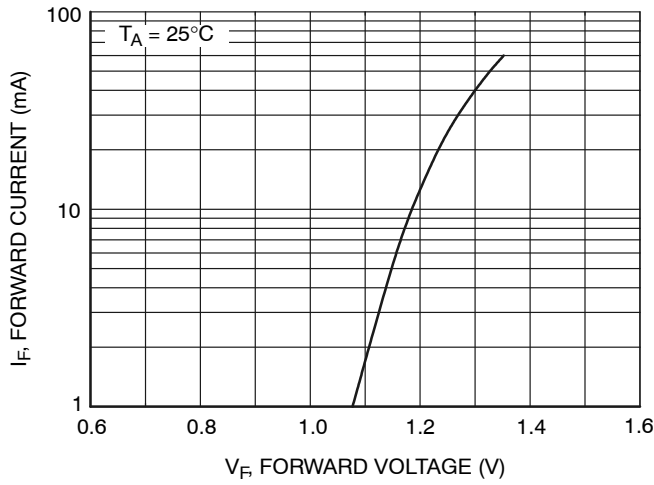


Figure 1. Forward Current vs. Forward Voltage

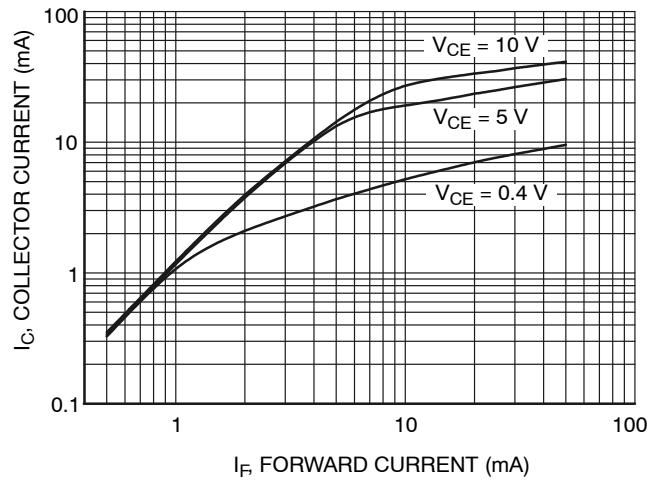


Figure 2. Collector Current vs. Forward Current

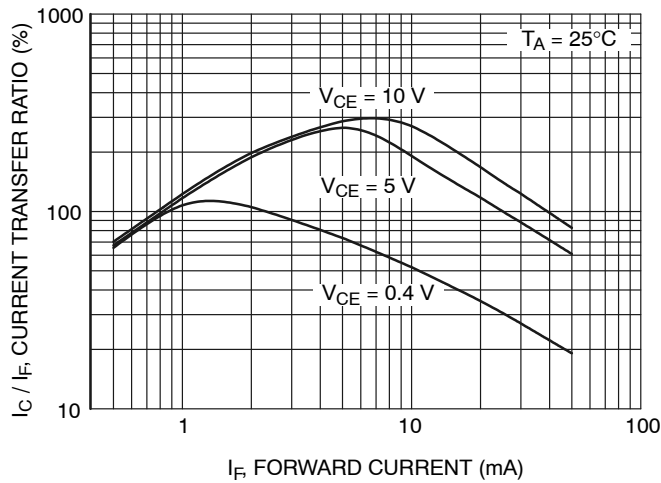


Figure 3. Current Transfer Ratio vs. Forward Current

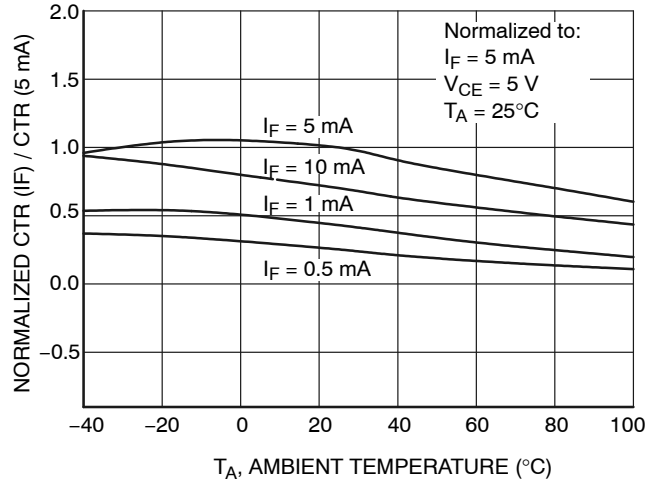


Figure 4. Normalized CTR vs. Temperature

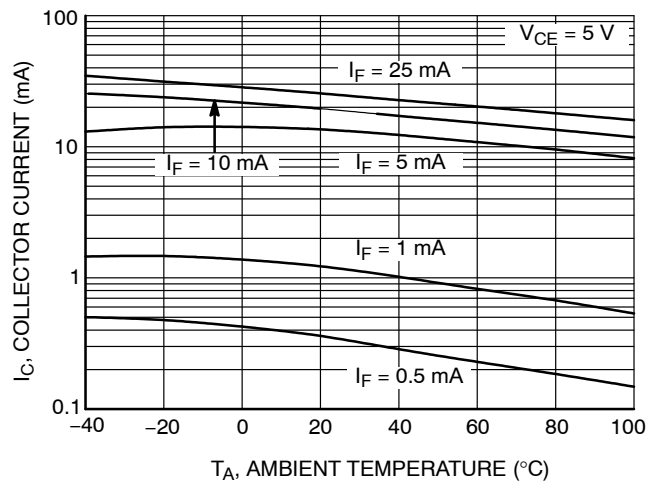


Figure 5. Collector Current vs. Temperature

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

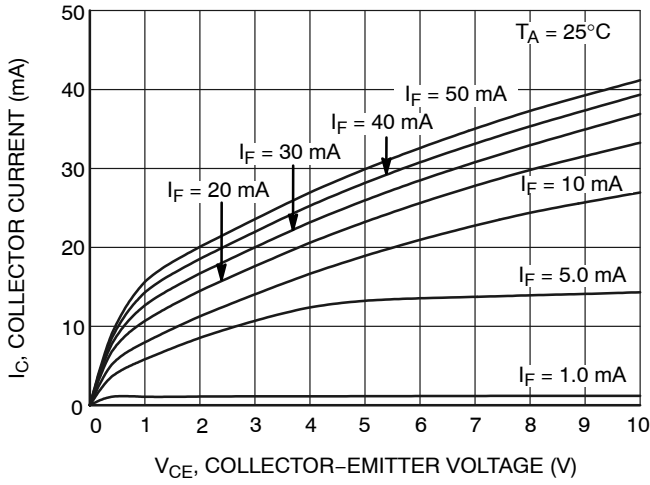


Figure 6. Collector Current vs. Collector-Emitter Voltage

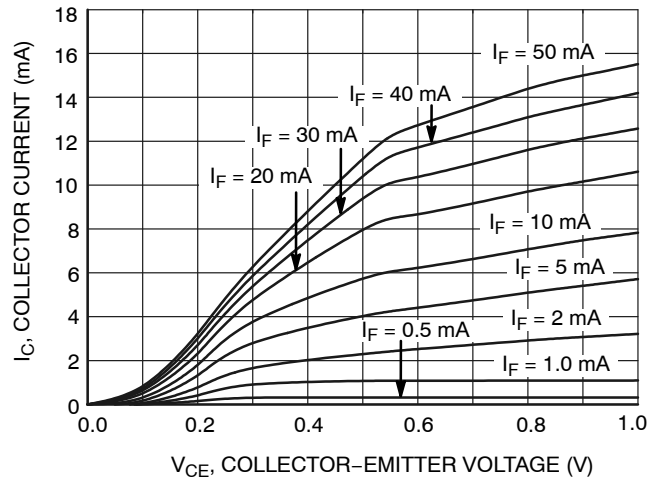


Figure 7. Collector Current vs. Collector-Emitter Voltage

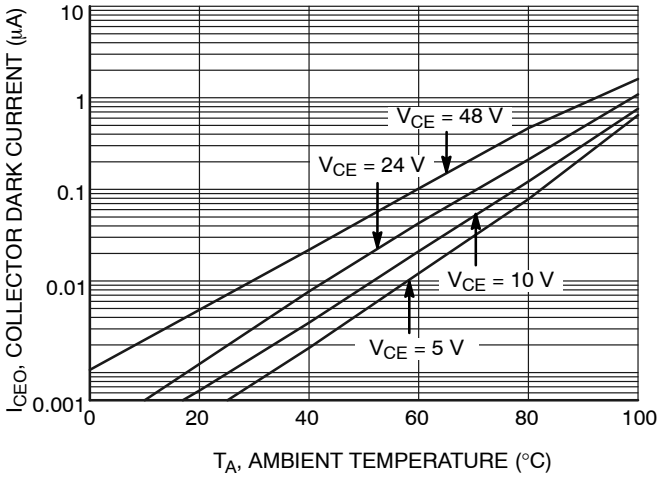


Figure 8. Collector Dark Current vs. Temperature

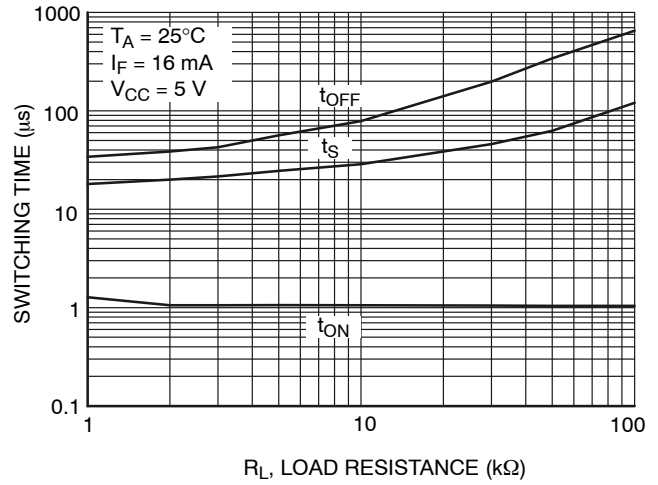


Figure 9. Switching Time vs. Load Resistance

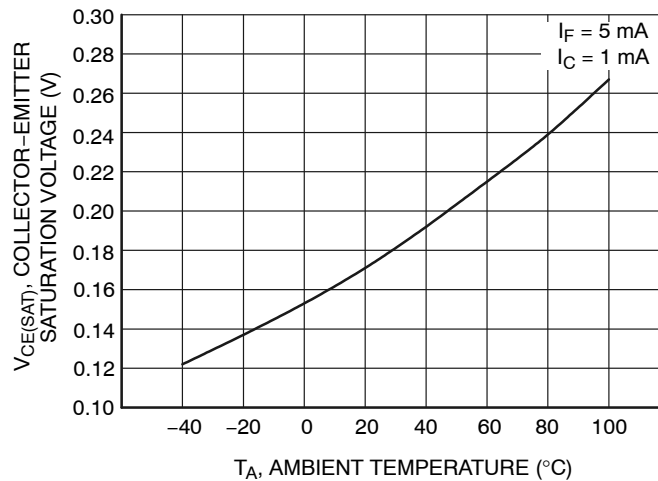
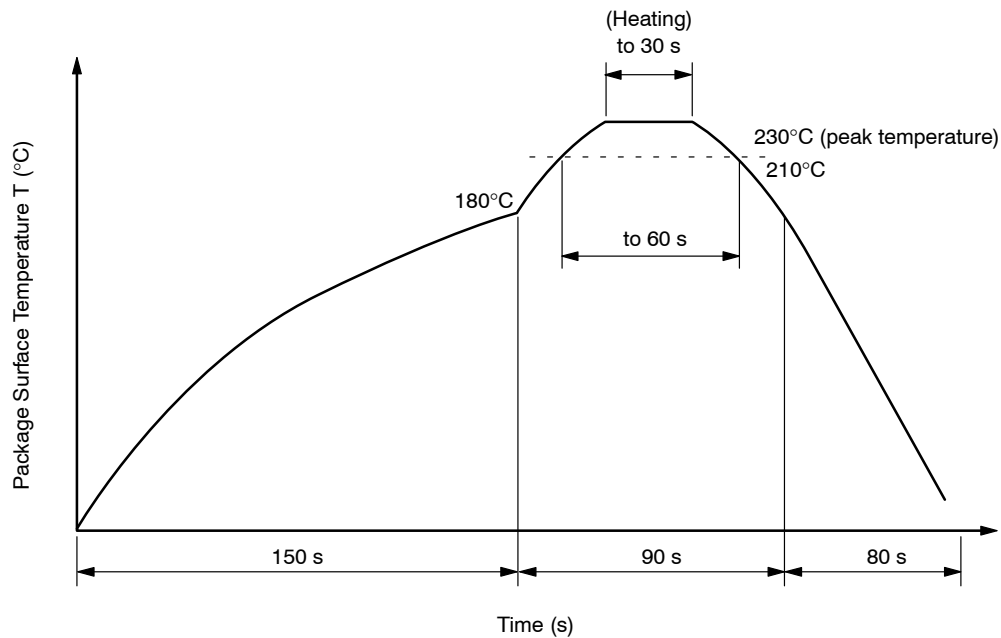


Figure 10. Collector-Emitter Saturation Voltage vs. Temperature

# HMHAA280

## 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

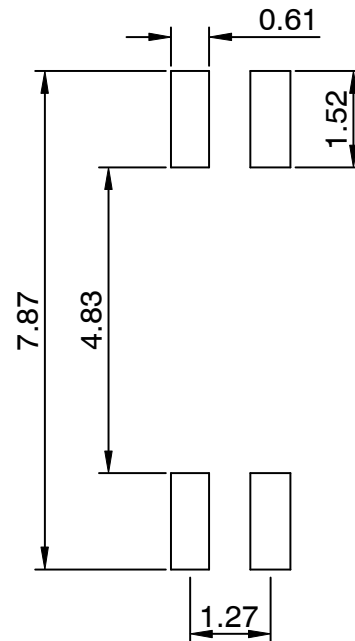
\*For applications requiring 260C peak reflow performance, please order FODM214 series.

### ORDERING INFORMATION

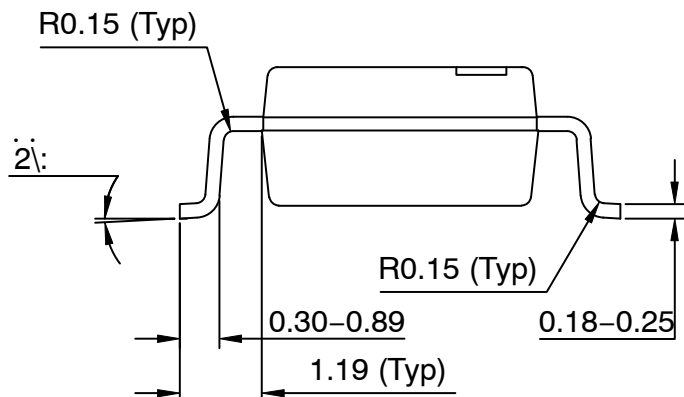
| Device      | Package           | Shipping <sup>†</sup> |
|-------------|-------------------|-----------------------|
| HMHAA280    | MFP-4             | 150 Units / Tube      |
| HMHAA280R2  | MFP-4             | 2500 / Tape & Reel    |
| HMHAA280R2V | MFP-4, VDE Option | 2500 / Tape & Reel    |
|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

DATE 31 AUG 2016



## LAND PATTERN RECOMMENDATION



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