# onsemi

# 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 = VDF mark (Note
  - 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** ( $T_A = 25^{\circ}C$ , 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 (avg)</sub>	Continuous Forward Current	50	mA
I <sub>F (pk)</sub>	Peak Forward Current (1µs pulse, 300 pps.)	1	А
V <sub>R</sub>	Reverse Input Voltage	6	V
PD	Power Dissipation Derate Linearly (above 25°C)	60 0.6	mW mW/°C

#### DETECTOR

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

## **ELECTRICAL CHARACTERISTICS** ( $T_A = 25^{\circ}C$ )

Symbol	Parameter	Test Condition	Min	Тур	Max	Unit
INDIVIDUAL COMPONENT CHARACTERISTICS Emitter						
V <sub>F</sub>	Forward Voltage	$I_F = \pm 5 \text{ mA}$	-	_	1.4	V
۱ <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	$I_{E} = 100 \ \mu A, I_{F} = 0$	7	-	-	
I <sub>CEO</sub>	Collector Dark Current	$V_{CE} = 80 \text{ V}, I_F = 0$	-	_	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	$I_F = \pm 5 \text{ mA}, V_{CE} = 5 \text{ V}$	50	_	600	%
	CTR Symmetry	$I_F = \pm 5 \text{ mA}, V_{CE} = 5 \text{ V}$	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
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  $T_A = 25^{\circ}C$ .

## **TYPICAL PERFORMANCE CHARACTERISTICS**









Figure 3. Current Transfer Ratio vs. Forward Current





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









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## **REFLOW PROFILE**



Time (s)

• 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

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

## MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

![](_page_5_Picture_2.jpeg)

MFP4 2.5X4.4, 1.27P CASE 100AL ISSUE O DATE 31 AUG 2016 0.3-0.51 2 **PIN ONE** 0.61 ഹ 6.30-7.29 4.40 (Typ) Ĺ 87 83 N 4 3 4 0.55-0.75 2.31 - 2.691.27 2.39 (Max) LAND PATTERN RECOMMENDATION 1.95-2.11 0-0.20 R0.15 (Typ) 2\: R0.15 (Typ) 1.27+/- .127 0.30-0.89 0.18-0.25 1.19 (Typ) 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 Electronic versions are uncontrolled except when accessed directly from the Document Repository. **DOCUMENT NUMBER:** 98AON13485G Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red. **DESCRIPTION:** MFP4 2.5X4.4, 1.27P PAGE 1 OF 1 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 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. ON Semiconductor does not convey any license under its patent rights nor the

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