

# HMHA281, HMHA2801, HMHA2801A DC Input Half Pitch Mini-Flat Package 4-Pin Optocouplers

## Features

- Compact 4-pin package (2.4mm maximum standoff height)
- Half pitch leads for optimum board space savings
- Current Transfer Ratio:  
HMHA2801: 80–600%  
HMHA2801A: 80–160%  
HMHA281: 50–600%
- Available in tape and reel quantities of 2500
- CSA (File #1201524), UL (File #E90700) and VDE (File #136480) certified

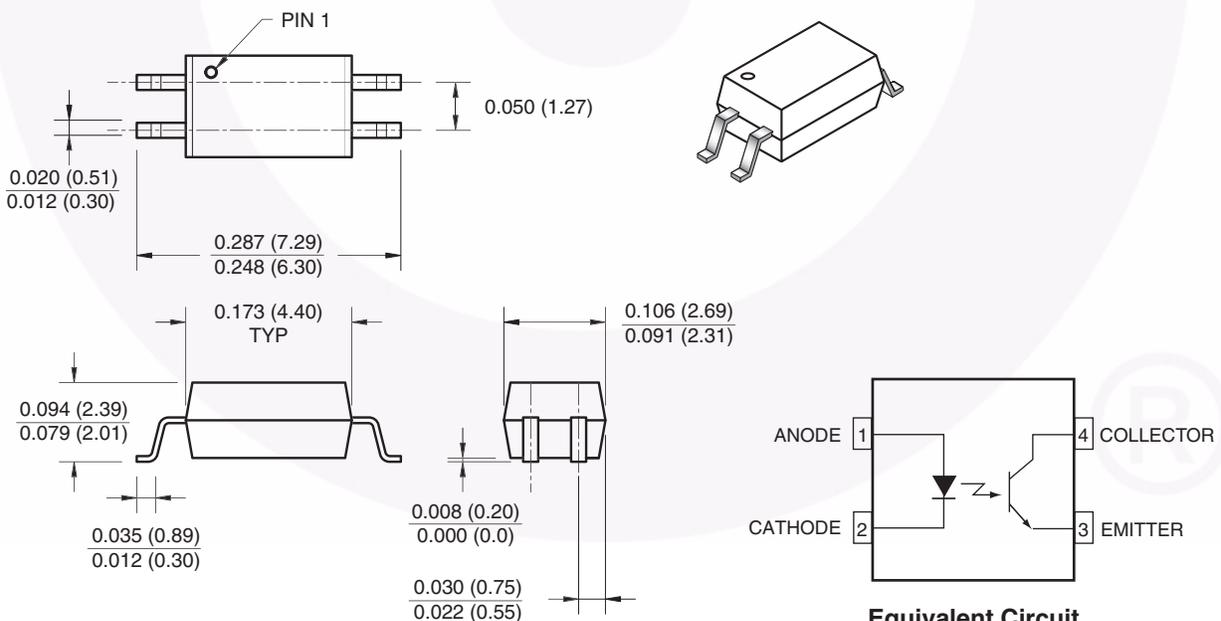
## Description

The HMHA281, HMHA2801 and HMHA2801A devices consist of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a compact 4-pin mini-flat package. The lead pitch is 1.27mm.

## Applications

- Digital logic inputs
- Microprocessor inputs
- Power supply monitor
- Twisted pair line receiver
- Telephone line receiver

## Package Dimensions



Equivalent Circuit

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  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
<b>TOTAL PACKAGE</b>			
$T_{\text{STG}}$	Storage Temperature	-55 to +125	$^\circ\text{C}$
$T_{\text{OPR}}$	Operating Temperature	-55 to +100	$^\circ\text{C}$
<b>EMITTER</b>			
$I_{\text{F (avg)}}$	Continuous Forward Current	50	mA
$I_{\text{F (pk)}}$	Peak Forward Current (1 $\mu\text{s}$ pulse, 300pps.)	1	A
$V_{\text{R}}$	Reverse Input Voltage	6	V
$P_{\text{D}}$	Power Dissipation	60	mW
	Derate linearly (above $25^\circ\text{C}$ )	0.6	mW/ $^\circ\text{C}$
<b>DETECTOR</b>			
	Continuous Collector Current	50	mA
$P_{\text{D}}$	Power Dissipation	150	mW
	Derate linearly (above $25^\circ\text{C}$ )	1.5	mW/ $^\circ\text{C}$
$V_{\text{CEO}}$	Collector-Emitter Voltage	80	V
$V_{\text{ECO}}$	Emitter-Collector Voltage	7	V

**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Device	Min.	Typ.*	Max.	Unit
<b>INDIVIDUAL COMPONENT CHARACTERISTICS</b>							
<b>Emitter</b>							
$V_F$	Forward Voltage	$I_F = 10\text{mA}$	All	1.0		1.3	V
$I_R$	Reverse Current	$V_R = 5\text{V}$	All			5	$\mu\text{A}$
<b>Detector</b>							
$BV_{CEO}$	Breakdown Voltage Collector to Emitter	$I_C = 0.5\text{mA}, I_F = 0$	All	80			V
$BV_{ECO}$	Emitter to Collector	$I_E = 100\mu\text{A}, I_F = 0$	All	7			
$I_{CEO}$	Collector Dark Current	$V_{CE} = 80\text{V}, I_F = 0$	All			100	nA
$C_{CE}$	Capacitance	$V_{CE} = 0\text{V}, f = 1\text{MHz}$	All		10		pF
<b>TRANSFER CHARACTERISTICS</b>							
CTR	DC Current Transfer Ratio	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$	HMHA281	50		600	%
			HMHA2801	80		600	
			HMHA2801A	80		160	
$V_{CE(SAT)}$	Saturation Voltage	$I_F = 8\text{mA}, I_C = 2.4\text{mA}$ $I_F = 10\text{mA}, I_C = 2\text{mA}$	HMHA281			0.4	V
			HMHA2801			0.3	
			HMHA2801A			0.3	
$t_r$	Rise Time (Non-Saturated)	$I_C = 2\text{mA}, V_{CE} = 5\text{V}, R_L = 100\Omega$	All		3		$\mu\text{s}$
$t_f$	Fall Time (Non-Saturated)	$I_C = 2\text{mA}, V_{CE} = 5\text{V}, R_L = 100\Omega$	All		3		
<b>ISOLATION CHARACTERISTICS</b>							
$V_{ISO}$	Steady State Isolation Voltage	1 Minute	All	3750			VRMS

## Typical Performance Characteristics

Fig. 1 Forward Current vs. Forward Voltage

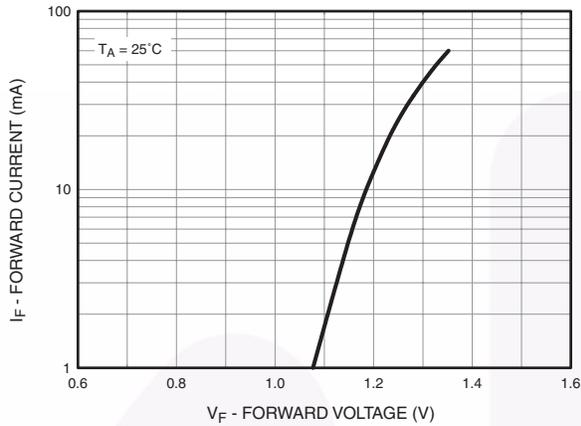


Fig. 2 Collector Current vs. Forward Current

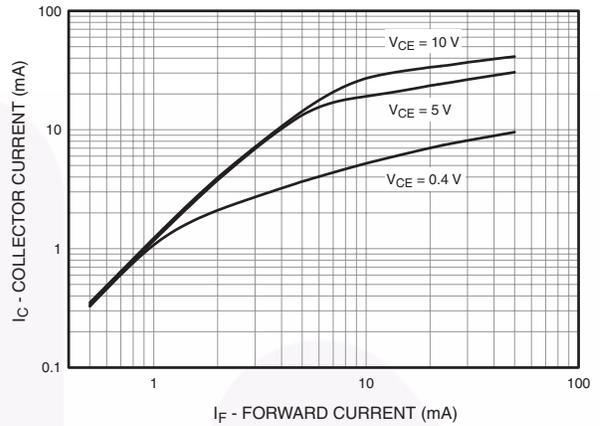


Fig. 3 Current Transfer Ratio vs. Forward Current

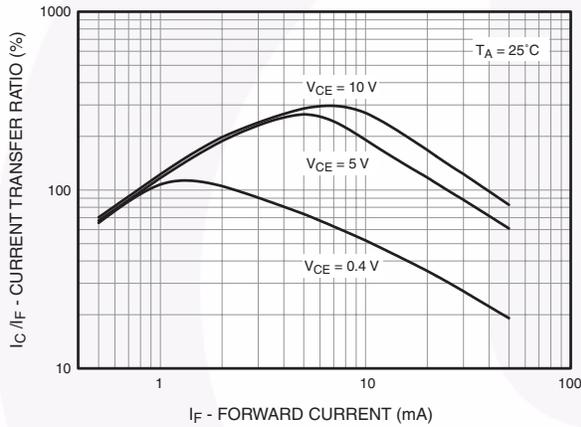


Fig. 4 Normalized CTR vs. Temperature

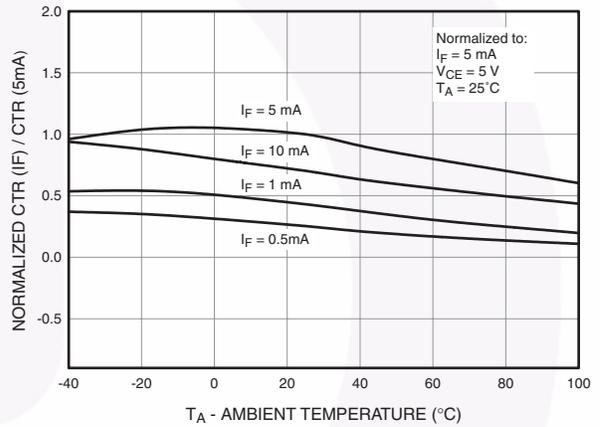
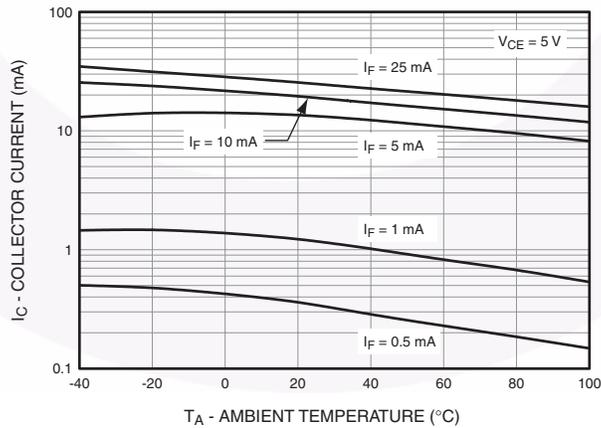


Fig. 5 Collector Current vs. Temperature



Typical Performance Characteristics (Continued)

Fig. 6 Collector Current vs. Collector-Emitter Voltage

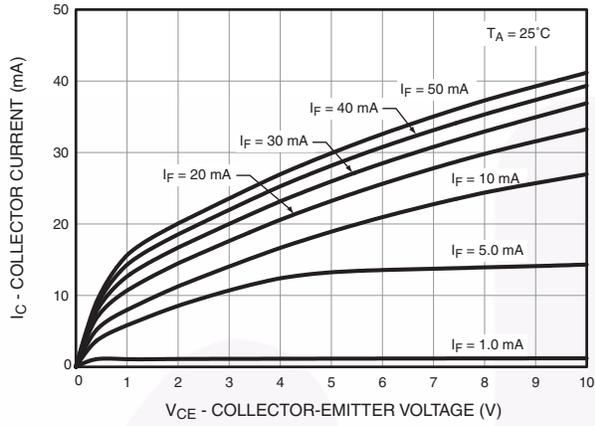


Fig. 7 Collector Current vs. Collector-Emitter Voltage

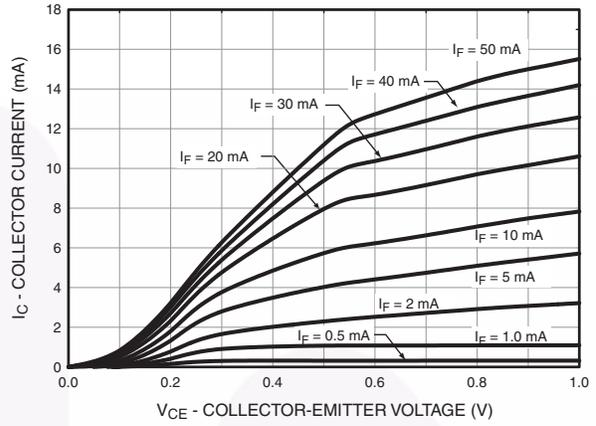


Fig. 8 Collector Dark Current vs. Temperature

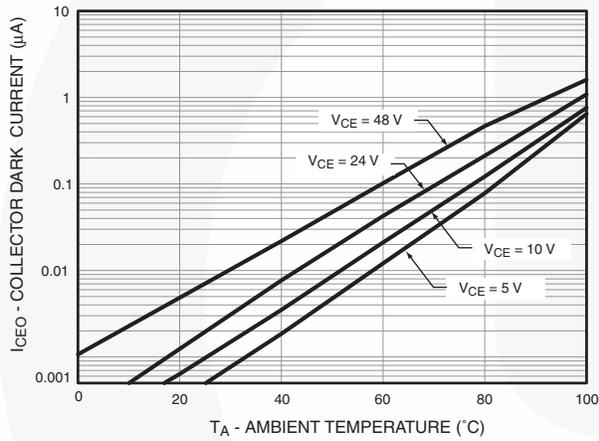


Fig. 9 Switching Time vs. Load Resistance

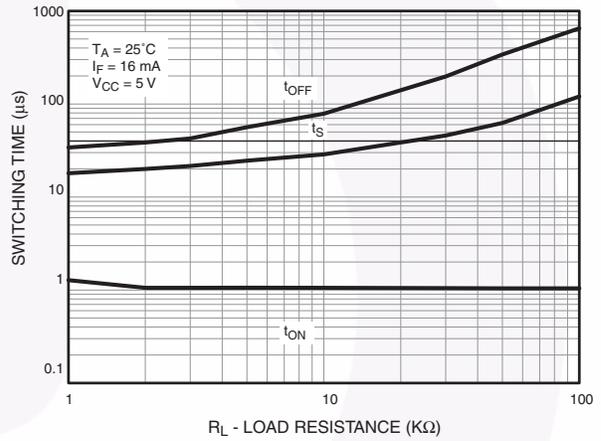
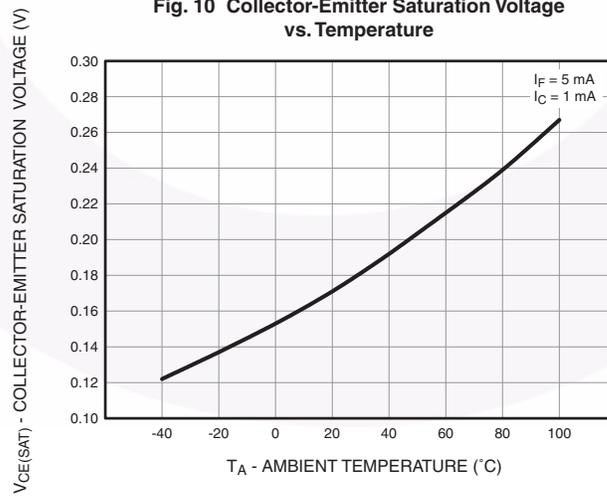


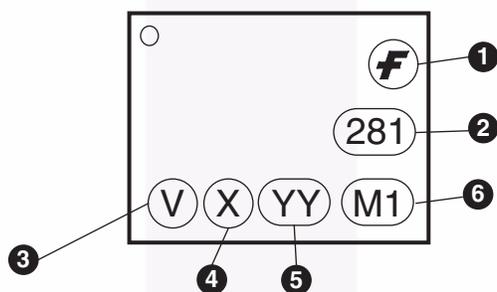
Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature



## Ordering Information

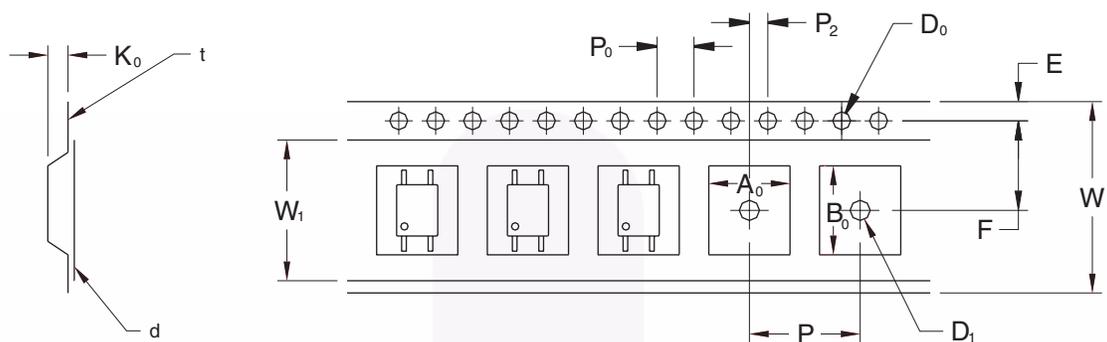
Option	Description
V	VDE Approved
R2	Tape and Reel (2500 units)
R2V	Tape and Reel (2500 units) and VDE Approved

## Marking Information



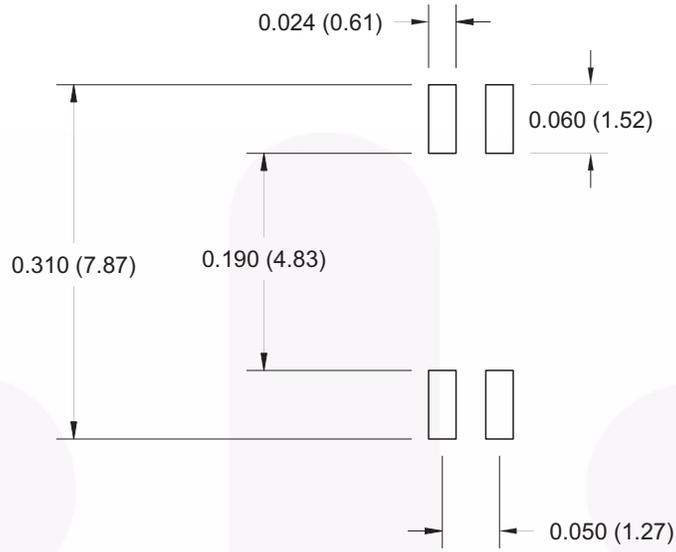
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

## Tape and Reel Dimensions

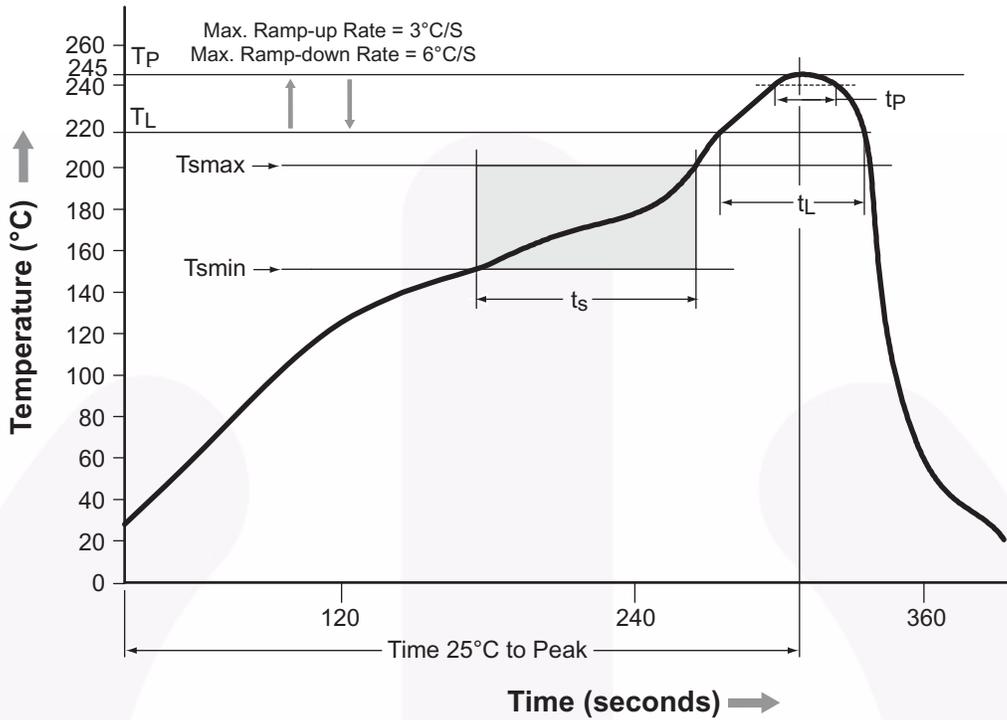


		1.27 Pitch
Description	Symbol	Dimensions (mm)
Tape Width	W	12.00 +0.30/-0.10
Tape Thickness	t	0.30 ±0.05
Sprocket Hole Pitch	P <sub>0</sub>	4.00 ±0.10
Sprocket Hole Diameter	D <sub>0</sub>	1.50 +0.10/-0.0
Sprocket Hole Location	E	1.75 ±0.10
Pocket Location	F	5.50 ±0.10
	P <sub>2</sub>	2.00 ±0.10
Pocket Pitch	P	8.00 ±0.10
Pocket Dimension	A <sub>0</sub>	2.80 ±0.10
	B <sub>0</sub>	7.30 ±0.10
	K <sub>0</sub>	2.30 ±0.10
Pocket Hole Diameter	D <sub>1</sub>	1.50 Min.
Cover Tape Width	W <sub>1</sub>	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 Profile

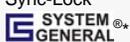


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150°C
Temperature Max. (T <sub>smax</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60–120 seconds
Ramp-up Rate (t <sub>L</sub> to t <sub>p</sub> )	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60–150 seconds
Peak Body Package Temperature	245°C +0°C / -5°C
Time (t <sub>p</sub> ) within 5°C of 260°C	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.



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