FAIRCHILD SEMICONDUCTOR®

October 2010

HMHAA280, HMHA2801 Series, HMHA281
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 in selected groups
  HMHA2801: 80–600% HMHA2801A: 80–160%
  HMHA281: 50–600% HMHAA280: 50–600%
- Available in tape and reel quantities of 2500
- CSA (File #1201524), UL (File #E90700) and VDE (File #136480) certified

Applications

HMHAA280

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

HMHA281, HMHA2801 Series

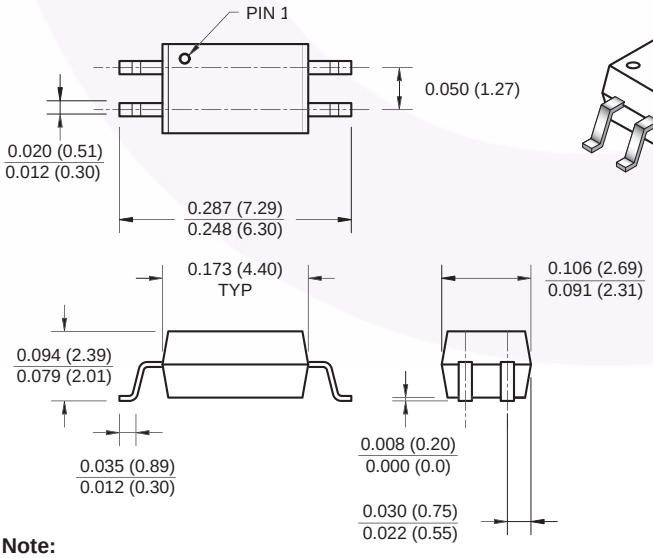
- Digital logic inputs
- Microprocessor inputs
- Power supply monitor
- Twisted pair line receiver
- Telephone line receiver

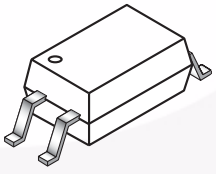
Description

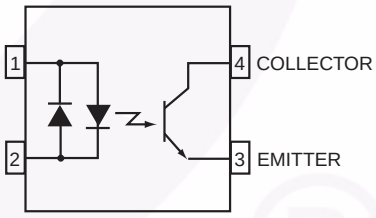
The HMHA281, HMHA2801 Series consists of a gallium arsenide infrared emitting diode driving a silicon phototransistor in a compact 4-pin mini-flat package. The lead pitch is 1.27mm.

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.

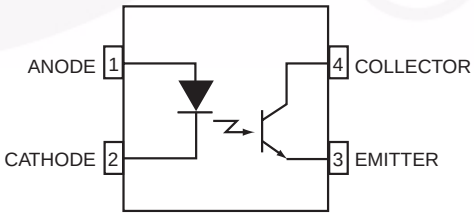
Package Dimensions







Equivalent Circuit
(HMHAA280)



Equivalent Circuit
(HMHA281, HMHA2801)

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 (HMHA)	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	Device	Min.	Typ.*	Max.	Unit
INDIVIDUAL COMPONENT CHARACTERISTICS							
Emitter							
V_F	Forward Voltage	I_F = 10mA	HMHA281	1.0		1.3	V
			HMHA2801				
			HMHA2801A	1.0		1.3	
		I_F = ±5mA	HMHAA280			1.4	
I_R	Reverse Current	V_R = 5V	All			5	µA
Detector							
BV_{CEO}	Breakdown Voltage Collector to Emitter	I_C = 0.5mA, I_F = 0	All	80			V
BV_{ECO}	Emitter to Collector	I_E = 100µA, I_F = 0	All	7			
I_{CEO}	Collector Dark Current	V_{CE} = 80V, I_F = 0	All			100	nA
C_{CE}	Capacitance	V_{CE} = 0V, f = 1MHz	All		10		pF

Electrical Characteristics (T_A = 25°C) (Continued)

Symbol	Characteristic	Test Conditions	Device	Min.	Typ.*	Max.	Unit
TRANSFER CHARACTERISTICS							
CTR	DC Current Transfer Ratio	I_F = ±5mA, V_{CE} = 5V	HMHAA280	50		600	%
		I_F = 5mA, V_{CE} = 5V	HMHA281	50		600	
			HMHA2801	80		600	
			HMHA2801A	80		160	
	CTR Symmetry	I_F = ± 5mA, V_{CE} = 5V	HMHAA280	0.33		3.0	
$V_{CE\ (SAT)}$	Saturation Voltage	I_F = ± 8mA, I_C = 2.4mA	HMHAA280			0.4	V
		I_F = 8mA, I_C = 2.4mA	HMHA281			0.4	
		I_F = 10mA, I_C = 2mA	HMHA2801			0.3	
			HMHA2801A			0.3	
t_r	Rise Time (Non-Saturated)	I_C = 2mA, V_{CE} = 5V, R_L = 100Ω	All		3		µs
t_f	Fall Time (Non-Saturated)	I_C = 2mA, V_{CE} = 5V, R_L = 100Ω	All		3		
ISOLATION CHARACTERISTICS							
V_{ISO}	Steady State Isolation Voltage	1 Minute	All	2500			VRMS

*All typicals at T_A = 25°C

Typical Performance Characteristics

Fig. 1 Forward Current vs. Forward Voltage

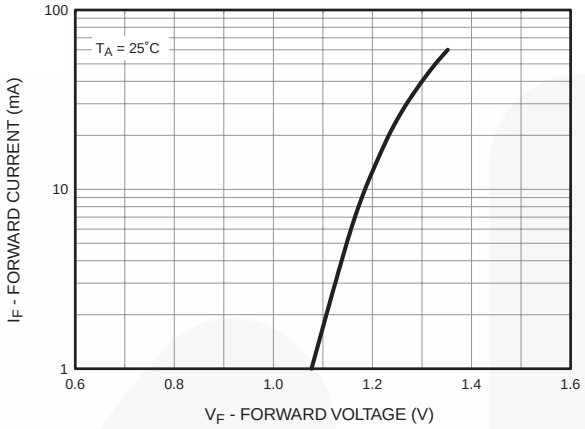


Fig. 2 Collector Current vs. Forward Current

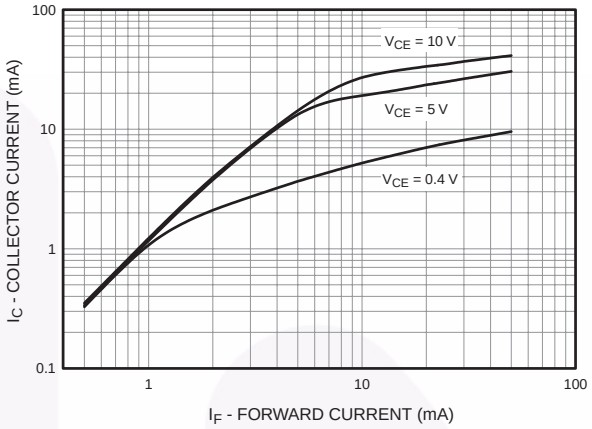


Fig. 3 Current Transfer Ratio vs. Forward Current

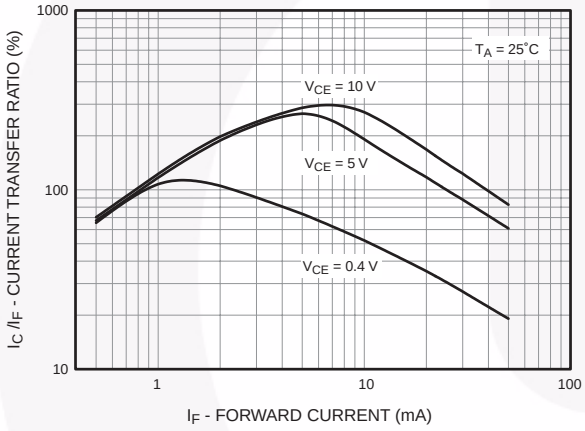


Fig. 4 Normalized CTR vs. Temperature

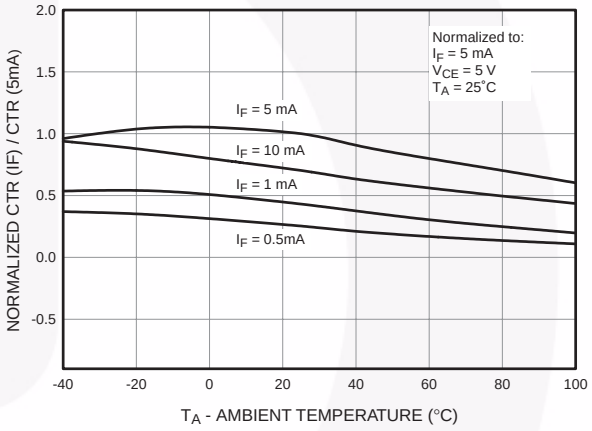
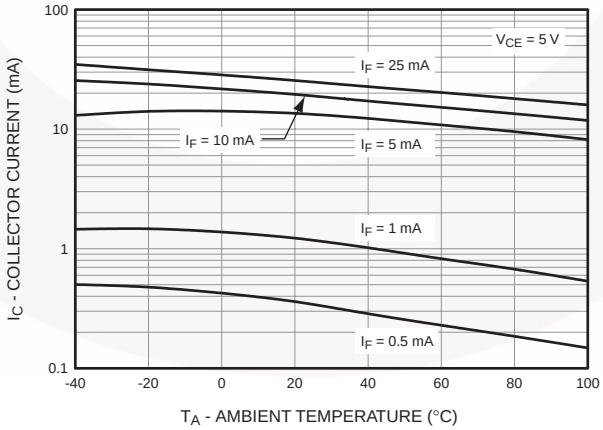


Fig. 5 Collector Current vs. Temperature



Typical Performance Characteristics (Continued)

Fig. 6 Collector Current vs. Collector-Emitter Voltage

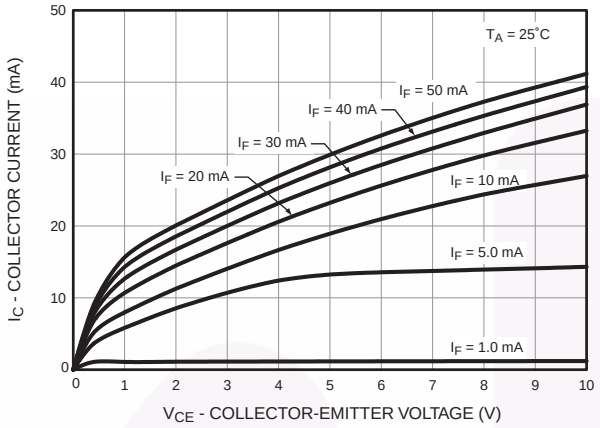


Fig. 7 Collector Current vs. Collector-Emitter Voltage

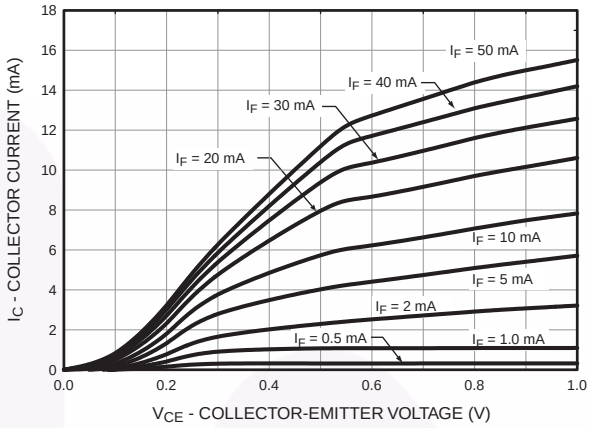


Fig. 8 Collector Dark Current vs. Temperature

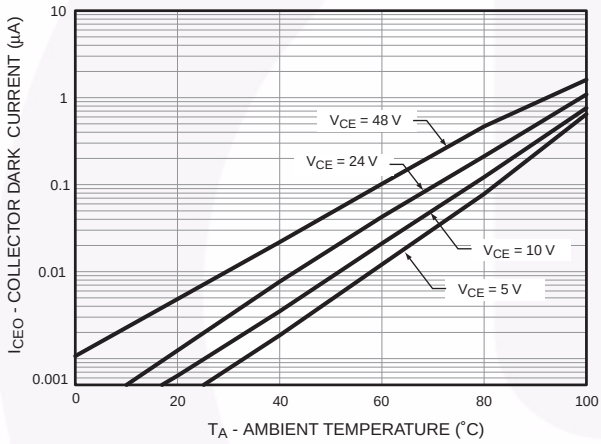


Fig. 9 Switching Time vs. Load Resistance

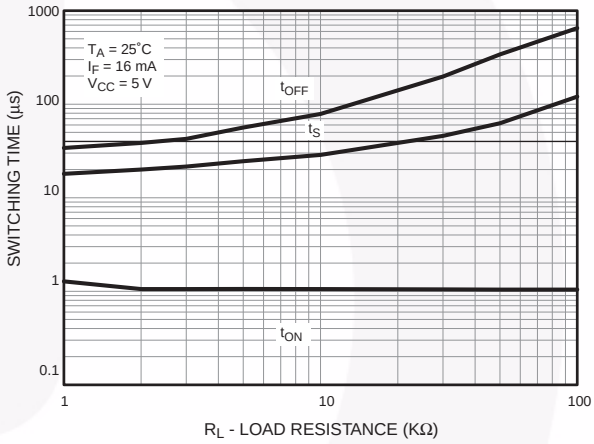
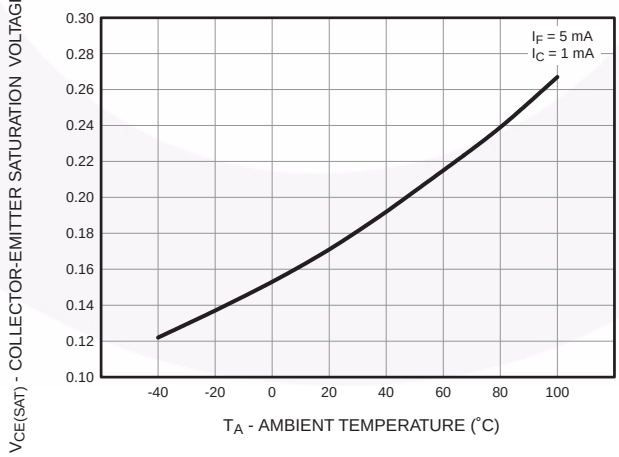


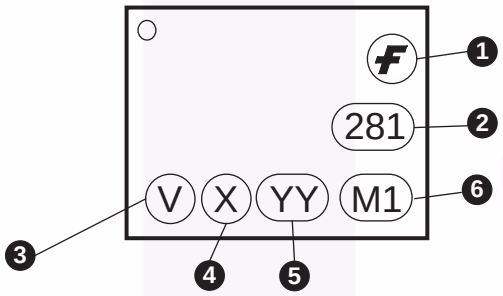
Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature



Ordering Information

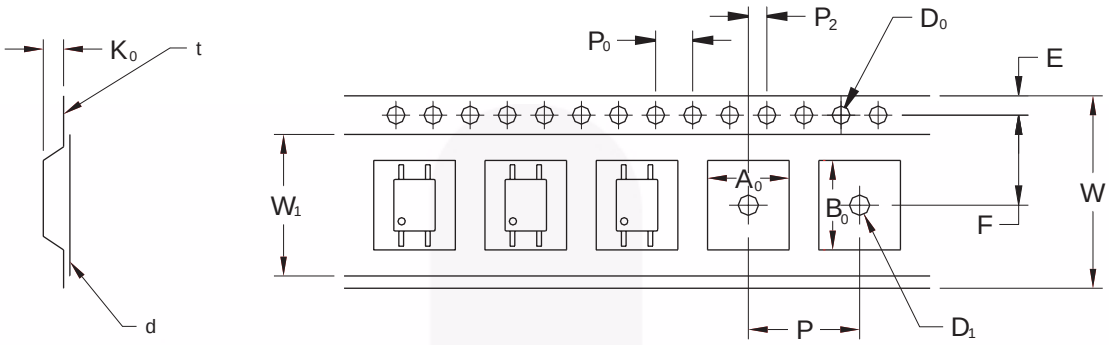
Option	Description
V	VDE Approved
R2	Tape and Reel (2500 units)
R2V	Tape and Reel (2500 units) and VDE Approved

Marking Information



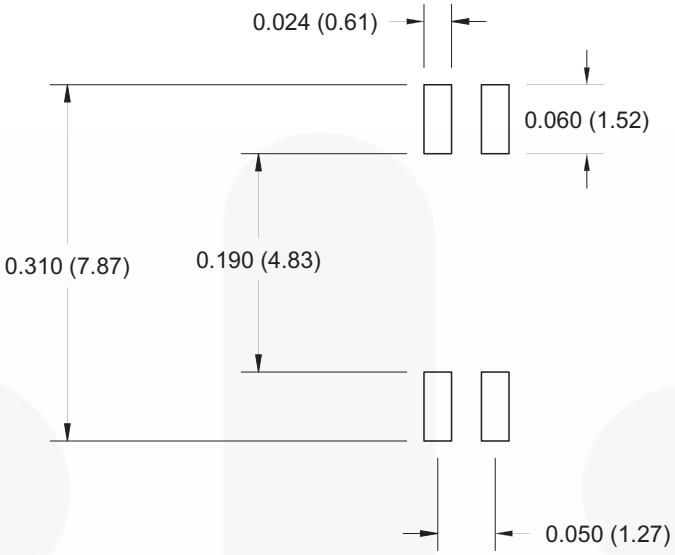
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

Tape and Reel Dimensions

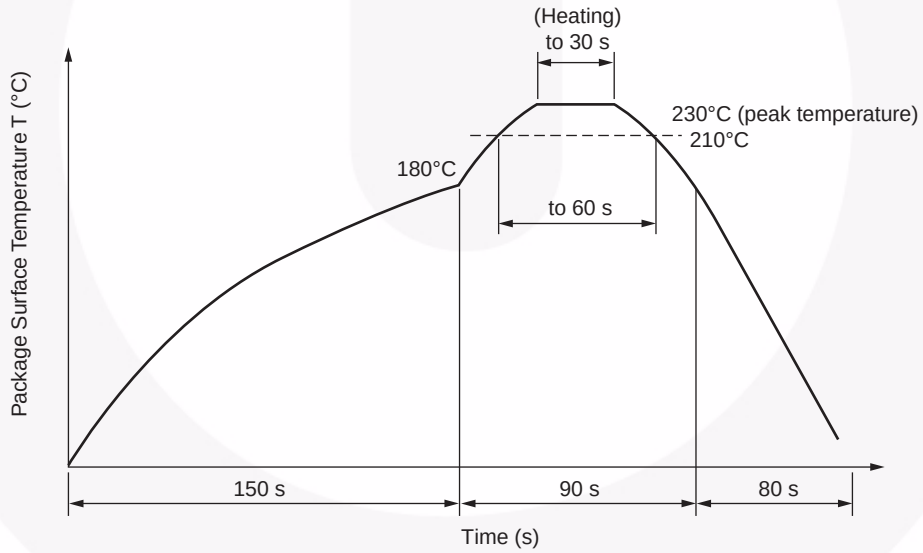


		1.27 Pitch
Description	**Symbol**	**Dimensions (mm)**
Tape Width	W	12.00 +0.30/-0.10
Tape Thickness	t	0.30 ±0.05
Sprocket Hole Pitch	P_0	4.00 ±0.10
Sprocket Hole Diameter	D_0	1.50 +0.10/-0.0
Sprocket Hole Location	E	1.75 ±0.10
Pocket Location	F	5.50 ±0.10
	P_2	2.00 ±0.10
Pocket Pitch	P	8.00 ±0.10
Pocket 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 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

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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

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