

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%
HMHA2801B: 50–150%	HMHA2801C: 50–100%
HMHA281: 50–600%	HMHAA280: 50–600%
- Available in tape and reel quantities of 2500
- Applicable to Infrared Ray reflow (230°C Max, 30 seconds)
- BSI (File #8611/8612), CSA (File #1201524), UL (File #E90700) and VDE (File #136480) certified

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.

Applications

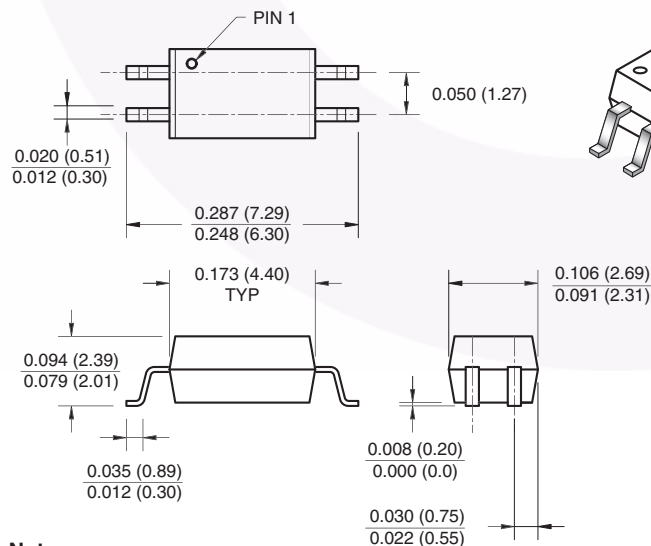
HMHAA280

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

HMHA281, HMHA2801 Series

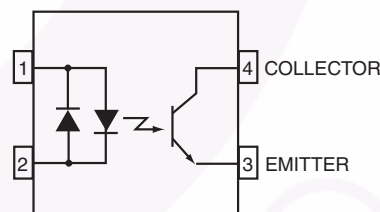
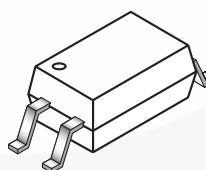
- Digital logic inputs
- Microprocessor inputs
- Power supply monitor
- Twisted pair line receiver
- Telephone line receiver

Package Dimensions

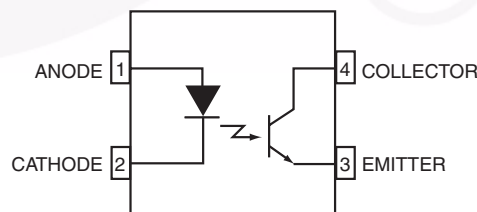


Note:

All dimensions are in inches (millimeters)



Equivalent Circuit
(HMHAA280)



Equivalent Circuit
(HMHA281, HMHA2801)

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
TOTAL PACKAGE			
T_{STG}	Storage Temperature	-55 to +125	$^\circ\text{C}$
T_{OPR}	Operating Temperature	-55 to +100	$^\circ\text{C}$
EMITTER			
I_F (avg)	Continuous Forward Current	50	mA
I_F (pk)	Peak Forward Current (1 μs 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/ $^\circ\text{C}$
DETECTOR			
	Continuous Collector Current	50	mA
P_D	Power Dissipation	150	mW
	Derate linearly (above 25°C)	1.5	mW/ $^\circ\text{C}$
V_{CEO}	Collector-Emitter Voltage	80	V
V_{ECO}	Emitter-Collector Voltage	7	V

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

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	
			HMHA2801B				
		I _F = 20mA	HMHA2801C			1.4	
		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 ($T_A = 25^\circ\text{C}$) (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	
			HMHA2801B	50		150	
		I _F = 1mA, V _{CE} = 5V	HMHA2801C	50		100	
	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	
			HMHA2801			0.3	
			HMHA2801A			0.3	
			HMHA2801B				
		I _F = 20mA, I _C = 1mA)	HMHA2801C			0.2	
t _r	Rise Time (Non-Saturated)	I _C = 2mA, V _{CE} = 5V, R _L = 100Ω	All except for HMHA2801C		3		μs
		I _C = 2mA, V _{CE} = 2V, R _L = 1 KΩ	HMHA2801C			9	
t _f	Fall Time (Non-Saturated)	I _C = 2mA, V _{CE} = 5V, R _L = 100Ω	All except for HMHA2801C		3		
		I _C = 2mA, V _{CE} = 2V, R _L = 1KΩ	HMHA2801C			9	
ISOLATION CHARACTERISTICS							
V _{ISO}	Steady State Isolation Voltage	1 Minute	All	2500			VRMS

*All typicals at $T_A = 25^\circ\text{C}$

Typical Performance Characteristics

Fig. 1 Forward Current vs. Forward Voltage

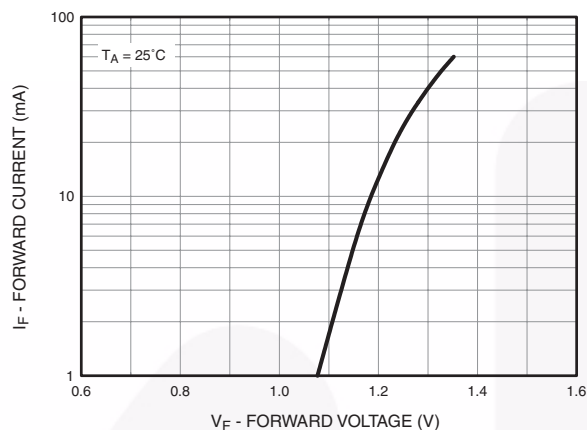


Fig. 2 Collector Current vs. Forward Current

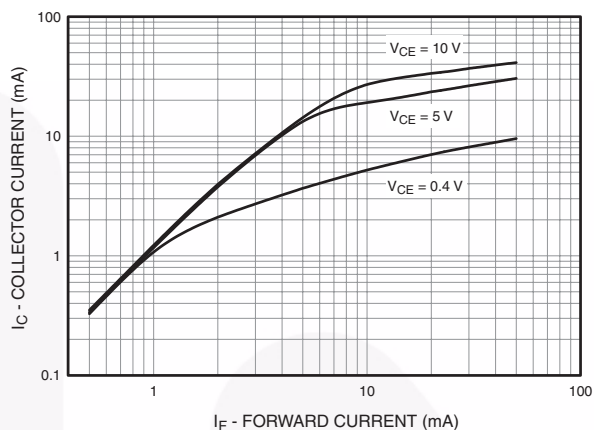


Fig. 3 Current Transfer Ratio vs. Forward Current

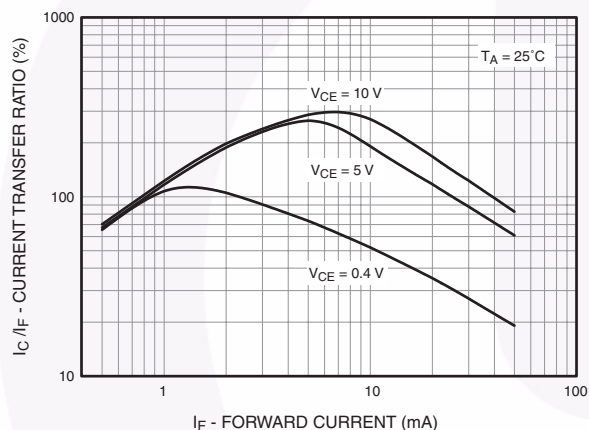


Fig. 4 Normalized CTR vs. Temperature

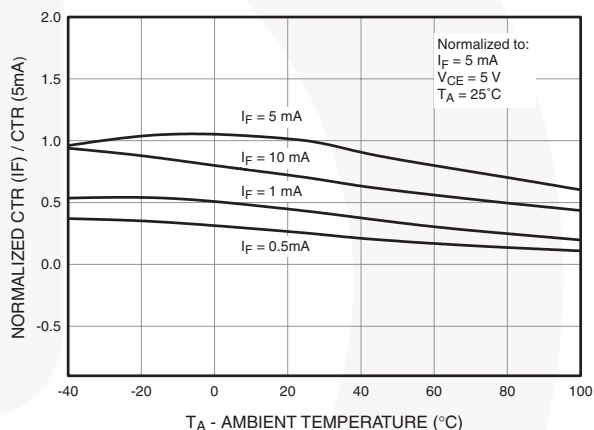
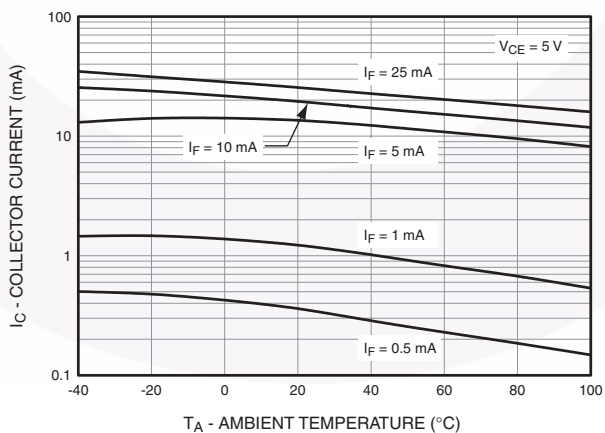


Fig. 5 Collector Current vs. Temperature



Typical Performance Characteristics (Continued)

Fig. 6 Collector Current vs. Collector-Emitter Voltage

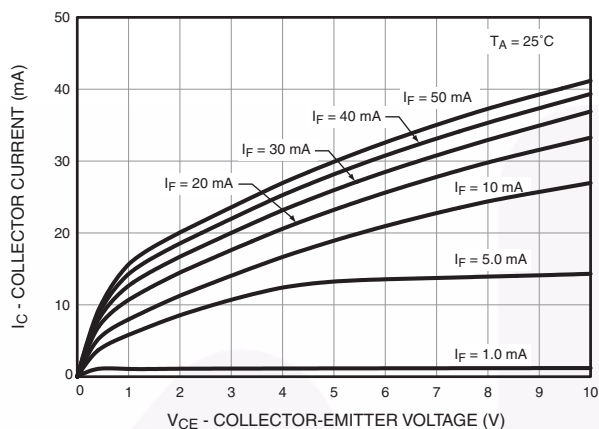


Fig. 7 Collector Current vs. Collector-Emitter Voltage

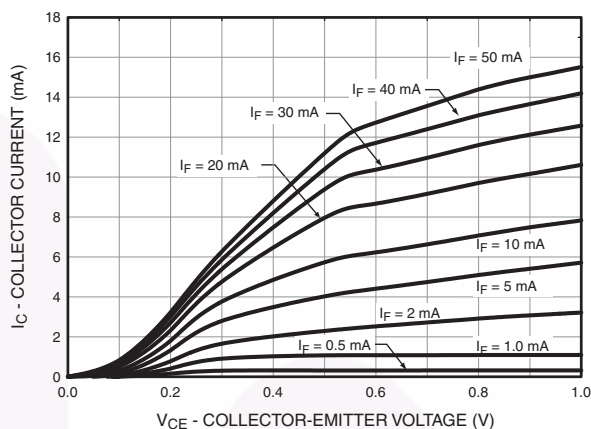


Fig. 8 Collector Dark Current vs. Temperature

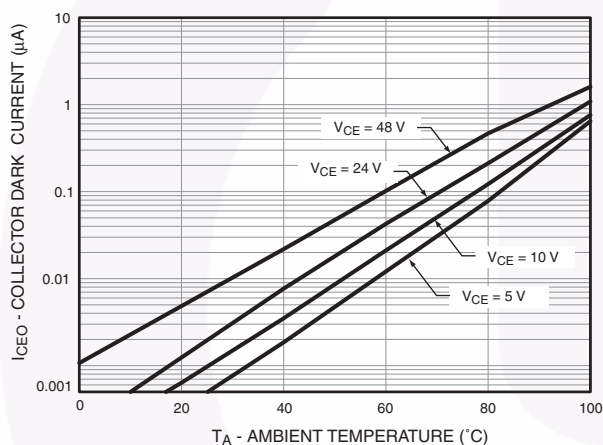


Fig. 9 Switching Time vs. Load Resistance

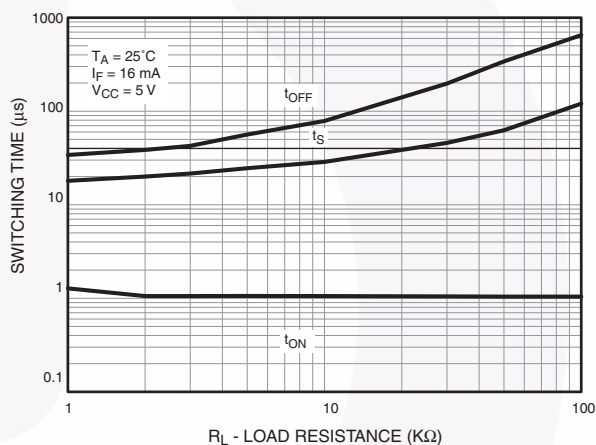
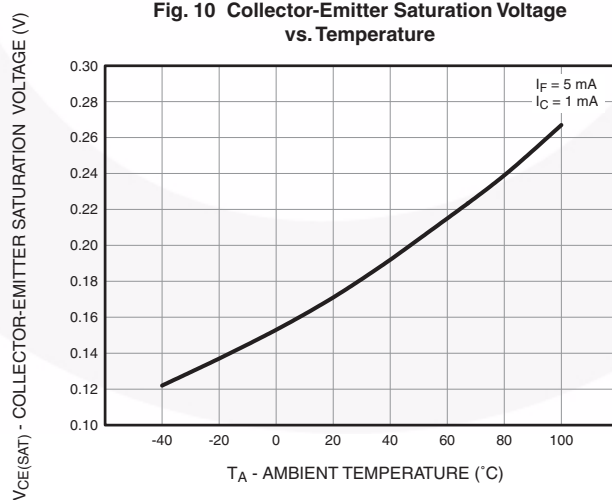


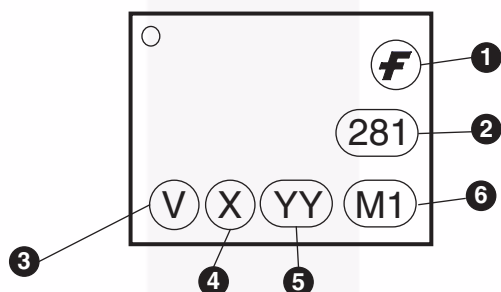
Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature



Ordering Information

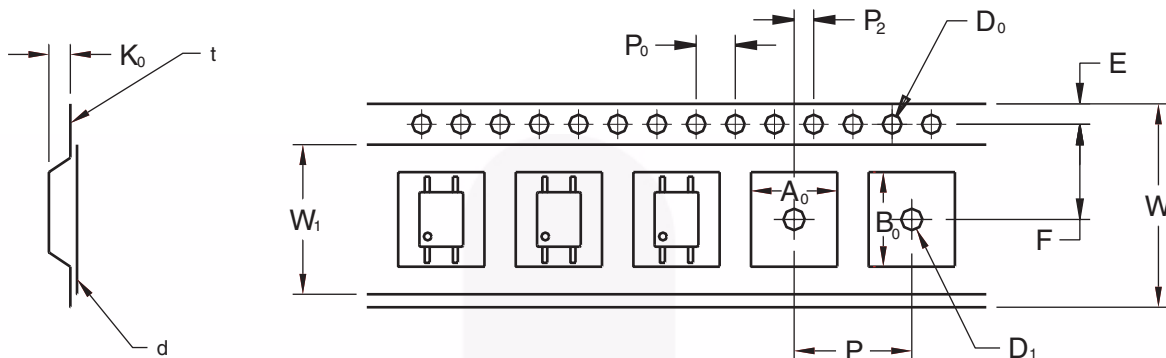
Option	Description
V	VDE Approved
R2	Tape and Reel (2500 units)
R3	Tape and Reel (500 units; unit 180° rotated)
R4	Tape and Reel (2500 units; unit 180° rotated)
R2V	Tape and Reel (2500 units) and VDE Approved
R3V	Tape and Reel (500 units; unit 180° rotated) and VDE Approved
R4V	Tape and Reel (2500 units; unit 180° rotated) and VDE Approved

Marking Information



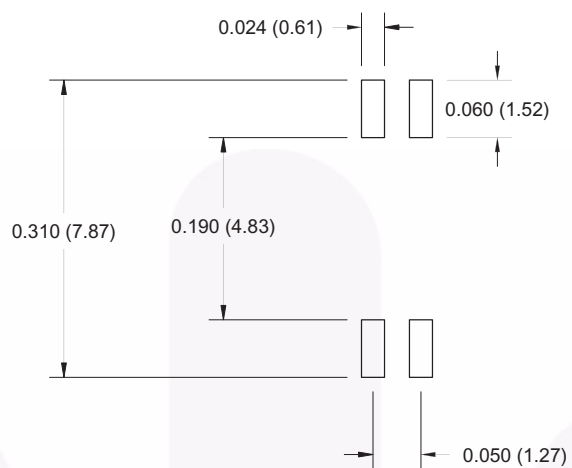
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

Tape and Reel Dimensions

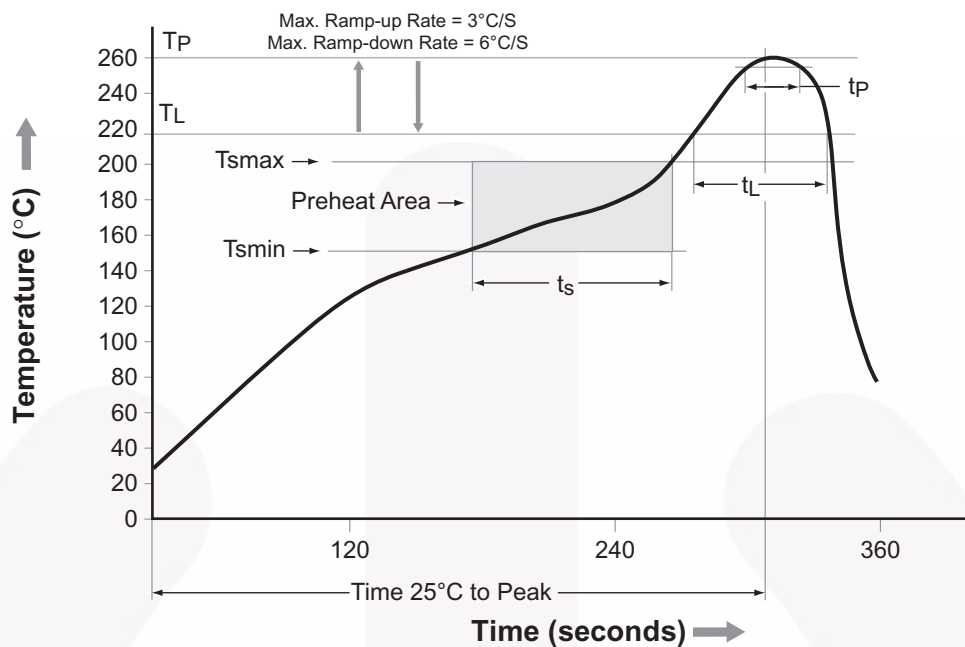


		2.54 Pitch
Description	Symbol	Dimensions
Tape Width	W	12.00±0.4
Tape Thickness	t	0.35±0.02
Sprocket Hole Pitch	P ₀	4.00±0.20
Sprocket Hole Dia.	D ₀	1.55±0.20
Sprocket Hole Location	E	1.75±0.20
Pocket Location	F	5.50±0.20
	P ₂	2.00±0.20
Pocket Pitch	P	8.00±0.20
Pocket Dimension	A ₀	4.75±0.20
	B ₀	7.30±0.20
	K ₀	2.30±0.20
Pocket Hole Dia.	D ₁	1.55±0.20
Cover Tape Width	W ₁	9.20
Cover Tape Thickness	d	0.065±0.02
Max. Component Rotation or Tilt		20° max
Devices Per Reel		2500
Reel Diameter		330 mm (13")

Footprint Drawing for PCB Layout



Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T_{smin})	150°C
Temperature Max. (T_{smax})	200°C
Time (t_s) from (T_{smin} to T_{smax})	60–120 seconds
Ramp-up Rate (t_L to t_P)	3°C/second max.
Liquidous Temperature (T_L)	217°C
Time (t_L) Maintained Above (T_L)	60–150 seconds
Peak Body Package Temperature	260°C +0°C / –5°C
Time (t_P) within 5°C of 260°C	30 seconds
Ramp-down Rate (T_P to T_L)	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.



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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.
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