

FAIRCHILD
SEMICONDUCTOR®

HALF PITCH MINI-FLAT PACKAGE 4-PIN OPTOCOUPLERS

HMHAA280

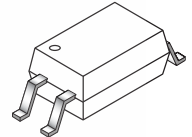
HMHA2801 SERIES

HMHA281

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 1.27 mm.

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.



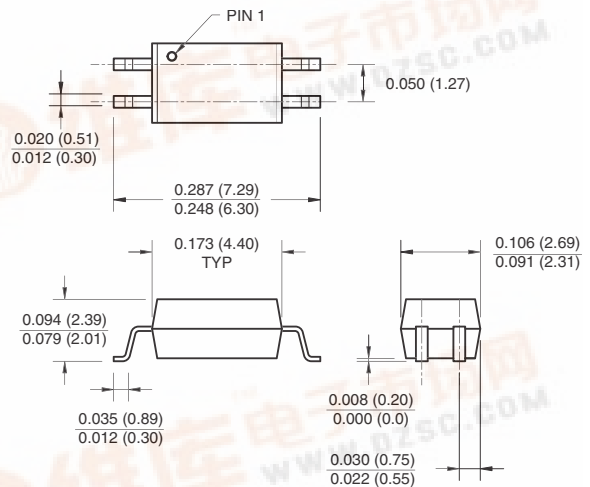
FEATURES

- Compact 4-pin package (2.4 mm 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 500 and 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

APPLICATIONS

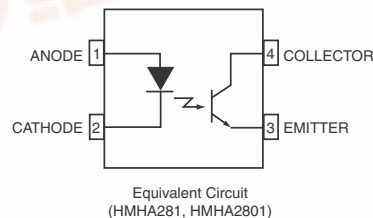
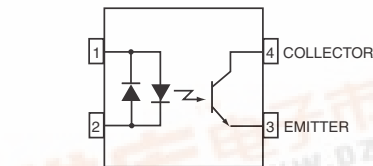
- HMHAA280
- AC line monitor
 - Unknown polarity DC sensor
 - Telephone line receiver
- HMHA281, HMHA2801 Series
- Digital logic inputs
 - Microprocessor inputs
 - Power supply monitor
 - Twisted pair line receiver
 - Telephone line receiver

PACKAGE DIMENSIONS



NOTE

All dimensions are in inches (millimeters)



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ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Units
TOTAL PACKAGE			
Storage Temperature	T_{STG}	-40 to +125	$^\circ\text{C}$
Operating Temperature	T_{OPR}	-40 to +100	$^\circ\text{C}$
EMITTER			
Continuous Forward Current	I_F (avg)	50	mA
Peak Forward Current (1 μs pulse, 300 pps.)	I_F (pk)	1	A
Reverse Input Voltage (HMHA)	V_R	6	V
Power Dissipation	P_D	60	mW
Derate linearly (above 25°C)		0.6	mW/ $^\circ\text{C}$
DETECTOR			
Continuous Collector Current		50	mA
Power Dissipation	P_D	150	mW
Derate linearly (above 25°C)		1.5	mW/ $^\circ\text{C}$
Collector-Emitter Voltage	V_{CEO}	80	V
Emitter-Collector Voltage	V_{ECO}	7	V

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

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
EMITTER Forward Voltage	$(I_F = 10 \text{ mA})$	V_F	HMHA281	1.0		1.3	V
			HMHA2801				
	$(I_F = 20 \text{ mA})$		HMHA2801A	1.0		1.3	
			HMHA2801B				
			HMHA2801C				
	$(I_F = \pm 5 \text{ mA})$	HMHAA280			1.4		
Reverse Current	$(V_R = 5 \text{ V})$	I_R	All			5	μA
DETECTOR							
Breakdown Voltage	$(I_C = 0.5 \text{ mA}, I_F = 0)$	BV_{CEO}	All	80			V
Collector to Emitter							
Emitter to Collector	$(I_E = 100 \mu\text{A}, I_F = 0)$	BV_{ECO}	All	7			
Collector Dark Current	$(V_{CE} = 80 \text{ V}, I_F = 0)$	I_{CEO}	All			100	nA
Capacitance	$(V_{CE} = 0 \text{ V}, f = 1 \text{ MHz})$	C_{CE}	All		10		pF

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TRANSFER CHARACTERISTICS ($T_A = 25^\circ\text{C}$)							
Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
DC Current Transfer Ratio	$(I_F = \pm 5 \text{ mA}, V_{CE} = 5 \text{ V})$	CTR	HMHAA280	50		600	%
			HMHA281	50		600	
	$(I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V})$		HMHA2801	80		600	
			HMHA2801A	80		160	
			HMHA2801B	50		150	
			HMHA2801C	50		100	
$(I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V})$							
CTR Symmetry	$(I_F = \pm 5 \text{ mA}, V_{CE} = 5 \text{ V})$	—	HMHAA280	0.33		3.0	
Saturation Voltage	$(I_F = \pm 8 \text{ mA}, I_C = 2.4 \text{ mA})$	$V_{CE(SAT)}$	HMHAA280			0.4	V
	$(I_F = 8 \text{ mA}, I_C = 2.4 \text{ mA})$		HMHA281			0.4	
	$(I_F = 10 \text{ mA}, I_C = 2 \text{ mA})$		HMHA2801			0.3	
			HMHA2801A			0.3	
			HMHA2801B				
$(I_F = 20 \text{ mA}, I_C = 1 \text{ mA})$	HMHA2801C			0.2			
Rise Time (Non-Saturated)	$(I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V})$ $(R_L = 100\Omega)$	t_r	All except for HMHA2801C		3		μs
	$(I_C = 2 \text{ mA}, V_{CE} = 2 \text{ V})$ $(R_L = 1 \text{ K}\Omega)$		HMHA2801C			9	
Fall Time (Non-Saturated)	$(I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V})$ $(R_L = 100\Omega)$	t_f	All except for HMHA2801C		3		
	$(I_C = 2 \text{ mA}, V_{CE} = 2 \text{ V})$ $(R_L = 1 \text{ K}\Omega)$		HMHA2801C			9	

ISOLATION CHARACTERISTICS							
Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Steady State Isolation Voltage	(1 Minute)	V_{ISO}	All	2500			VRMS

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

TYPICAL PERFORMANCE CURVES

Fig. 1 Forward Current vs. Forward Voltage

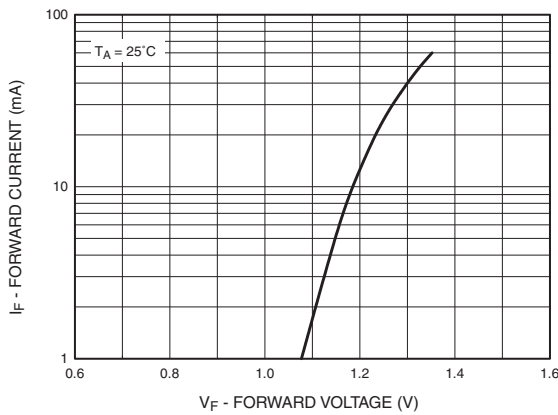


Fig. 2 Collector Current vs. Forward Current

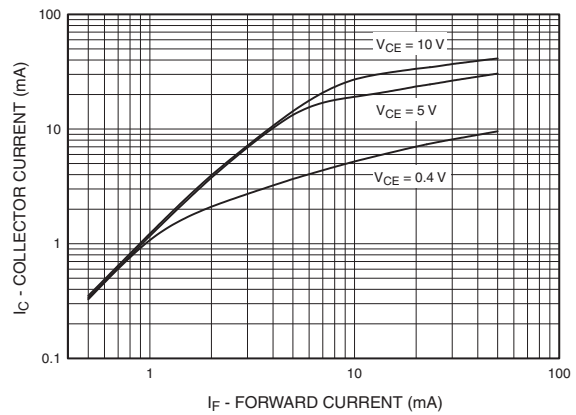


Fig. 3 Current Transfer Ratio vs. Forward Current

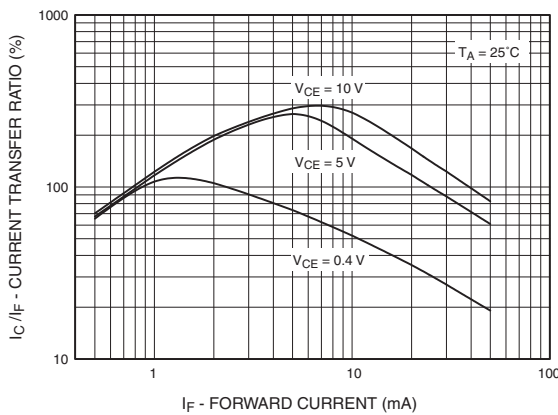


Fig. 4 Normalized CTR vs. Temperature

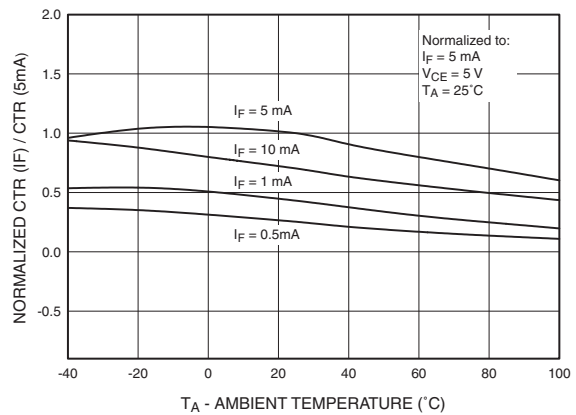


Fig. 5 Collector Current vs. Temperature

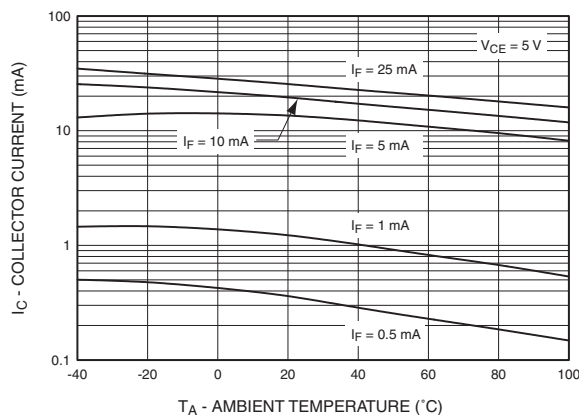


Fig. 6 Collector Current vs. Collector-Emitter Voltage

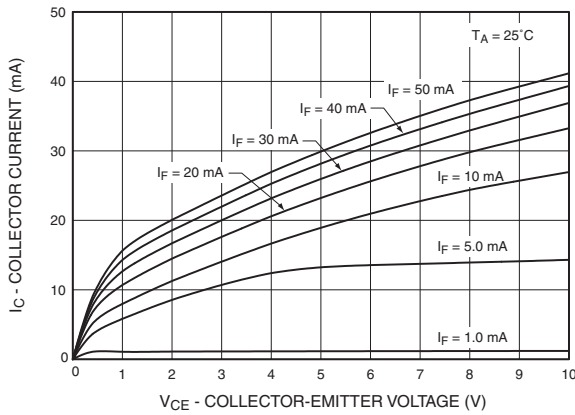


Fig. 7 Collector Current vs. Collector-Emitter Voltage

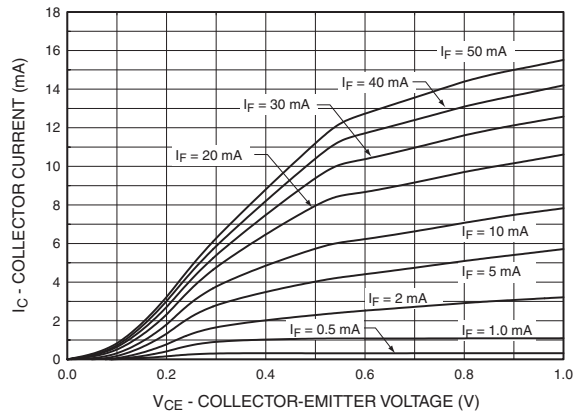


Fig. 8 Collector Dark Current vs. Temperature

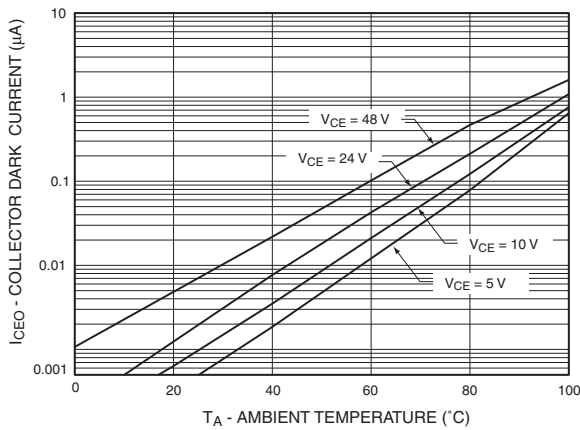


Fig. 9 Switching Time vs. Load Resistance

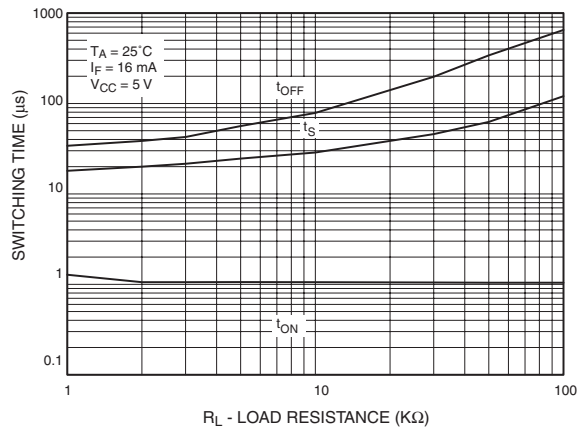
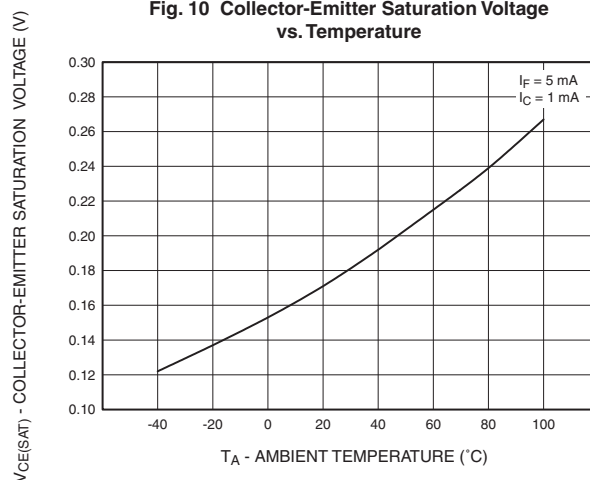


Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature





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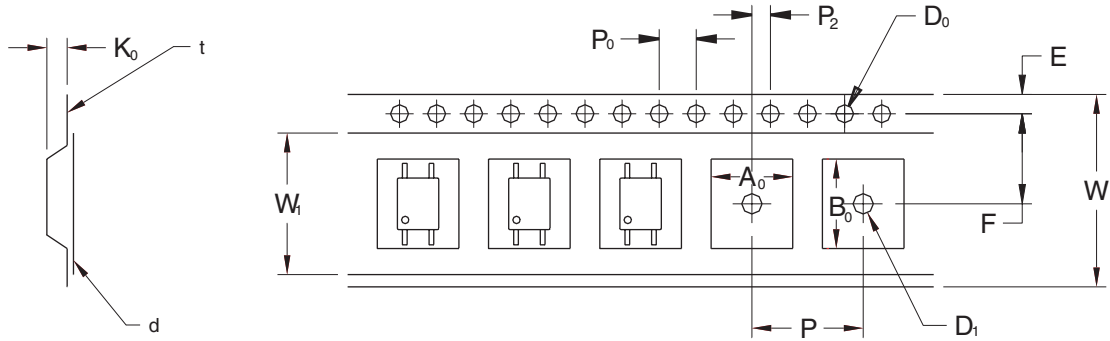
ORDERING INFORMATION

Option	Description
V	VDE Approved
R1	Tape and Reel (500 units)
R2	Tape and Reel (2500 units)
R3	Tape and Reel (500 units; unit 180° rotated)
R4	Tape and Reel (2500 units; unit 180° rotated)
R1V	Tape and Reel (500 units) and VDE Approved
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

HMHAA280

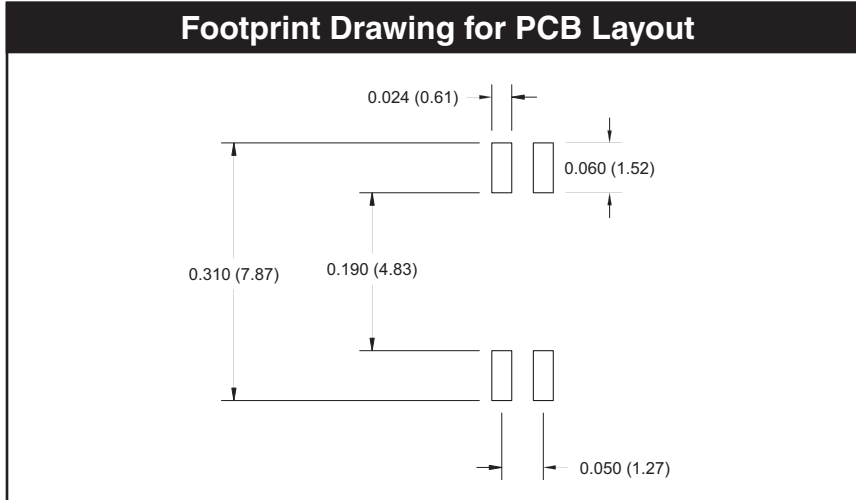
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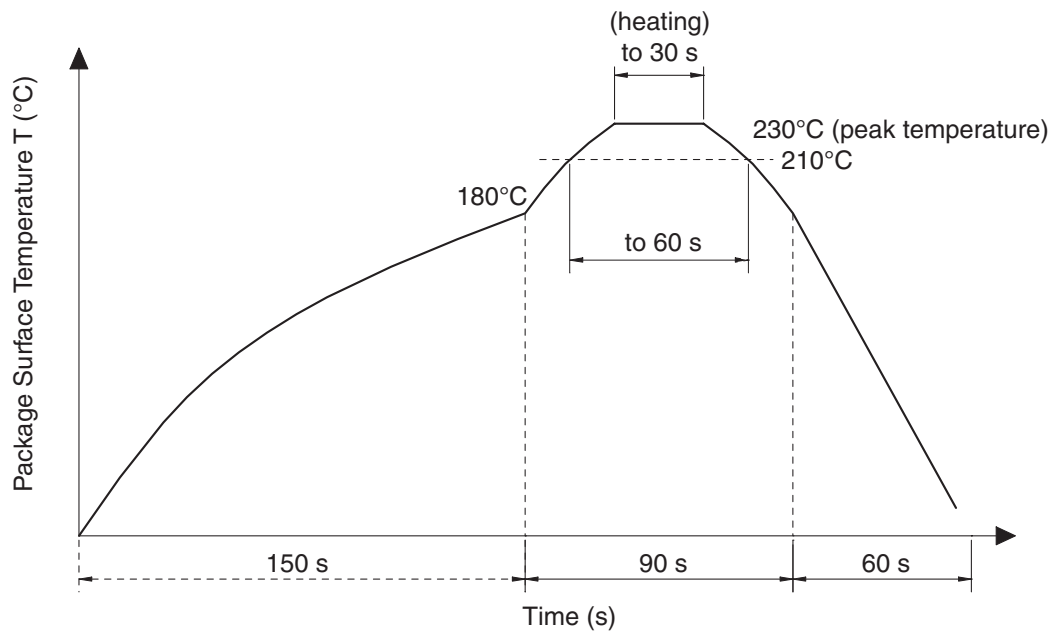


Description		Symbol	1.27 Pitch
			Dimensions (mm)
Tape Width		W	12.00±0.4
Tape Thickness		t	0.30±0.20
Sprocket Hole Pitch		P ₀	4.00±0.20
Sprocket Hole Dia.		D ₀	1.55±0.20
Sprocket Hole Location		E	1.75±0.20
Pocket Location		F	5.50±0.20
		P ₂	2.00±0.20
Pocket Pitch		P	8.00±0.20
Pocket Dimension		A ₀	4.40±0.20
		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 _i	9.20
Cover Tape Thickness		d	0.065±0.02
Max. Component Rotation or Tilt			20° max
Devices Per Reel		R1	500
		R2	2500
Reel Diameter		R1	178 mm (7")
		R2	330 mm (13")

Footprint Drawing for PCB Layout



Recommended Infrared Reflow Soldering 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



HALF PITCH MINI-FLAT PACKAGE 4-PIN OPTOCOUPLEDERS

HMHAA280**HMHA2801 SERIES****HMHA281**

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