

## HMHAA280

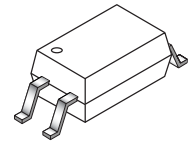
## HMHA2801 SERIES

## 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

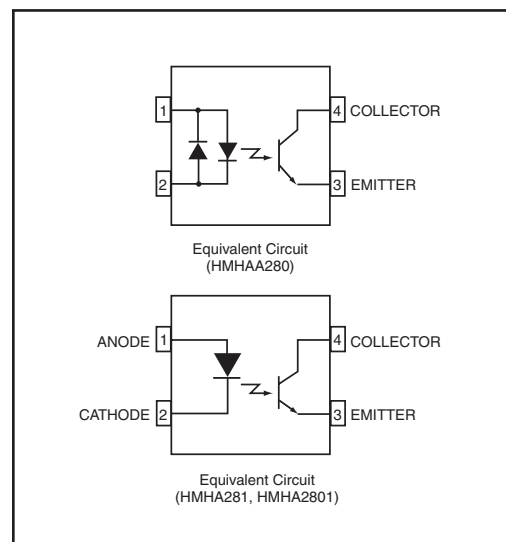
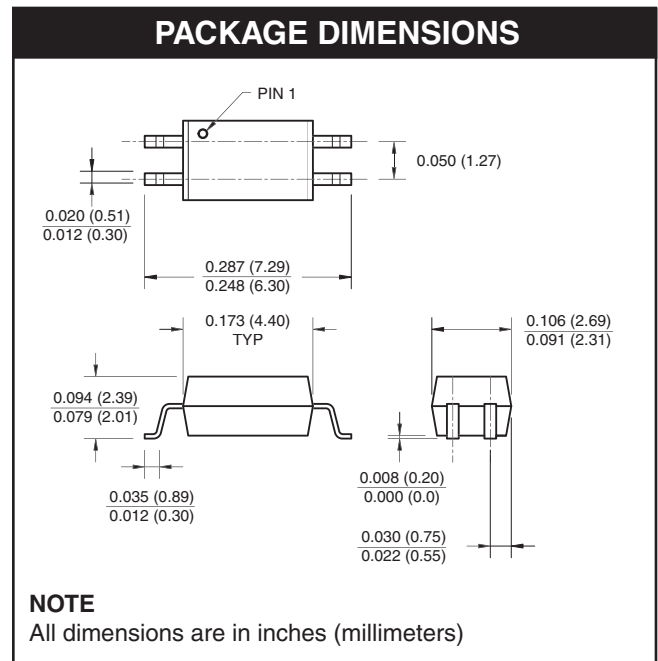
### APPLICATIONS

#### 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



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

Parameter	Symbol	Value	Units
<b>TOTAL PACKAGE</b>			
Storage Temperature	$T_{STG}$	-40 to +125	$^\circ\text{C}$
Operating Temperature	$T_{OPR}$	-40 to +100	$^\circ\text{C}$
<b>EMITTER</b>			
Continuous Forward Current	$I_F$ (avg)	50	mA
Peak Forward Current (1 $\mu\text{s}$ 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 $25^\circ\text{C}$ )		0.6	mW/ $^\circ\text{C}$
<b>DETECTOR</b>			
Continuous Collector Current		50	mA
Power Dissipation	$P_D$	150	mW
Derate linearly (above $25^\circ\text{C}$ )		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
<b>EMITTER</b> Forward Voltage	$(I_F = 10 \text{ mA})$	$V_F$	HMHA281	1.0		1.3	V
			HMHA2801				
			HMHA2801A	1.0		1.3	
			HMHA2801B				
	$(I_F = 20 \text{ mA})$	HMHA2801C			1.4		
$(I_F = \pm 5 \text{ mA})$	HMHAA280			1.4			
Reverse Current	$(V_R = 5 \text{ V})$	$I_R$	All			5	$\mu\text{A}$
<b>DETECTOR</b>							
Breakdown Voltage Collector to Emitter	$(I_C = 0.5 \text{ mA}, I_F = 0)$	$BV_{CEO}$	All	80			V
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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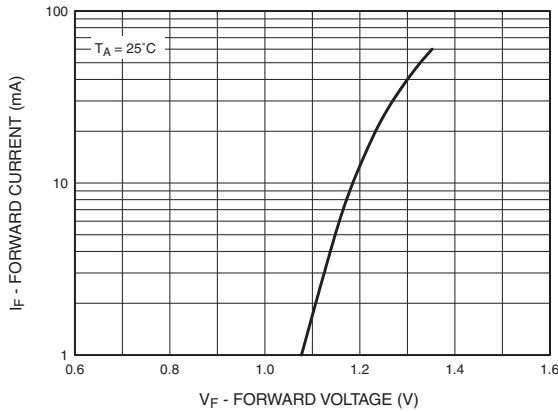
<b>TRANSFER CHARACTERISTICS</b> ( $T_A = 25^\circ\text{C}$ )							
Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
DC Current Transfer Ratio	$(I_F = \pm 5 \text{ mA}, V_{CE} = 5 \text{ V})$	CTR	HMHAA280	50		600	%
			HMHA281	50		600	
	$(I_F = 5 \text{ mA}, V_{CE} = 5 \text{ V})$		HMHA2801	80		600	
			HMHA2801A	80		160	
	$(I_F = 1 \text{ mA}, V_{CE} = 5 \text{ V})$		HMHA2801B	50		150	
			HMHA2801C	50		100	
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
			HMHA281			0.4	
	$(I_F = 8 \text{ mA}, I_C = 2.4 \text{ mA})$		HMHA2801			0.3	
			HMHA2801A			0.3	
	$(I_F = 10 \text{ mA}, I_C = 2 \text{ mA})$		HMHA2801B			0.3	
			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		$\mu\text{s}$
			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		
			HMHA2801C			9	

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

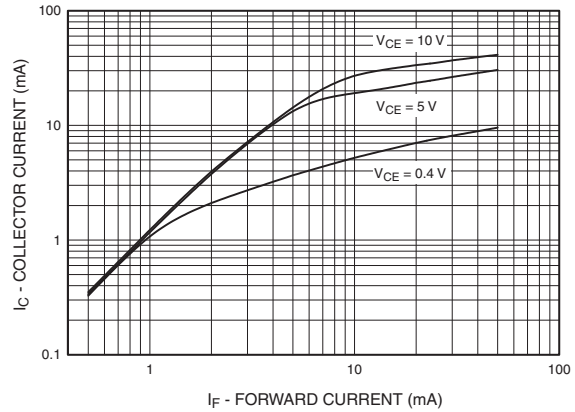
\*\* All typicals at  $T_A = 25^\circ\text{C}$

**TYPICAL PERFORMANCE CURVES**

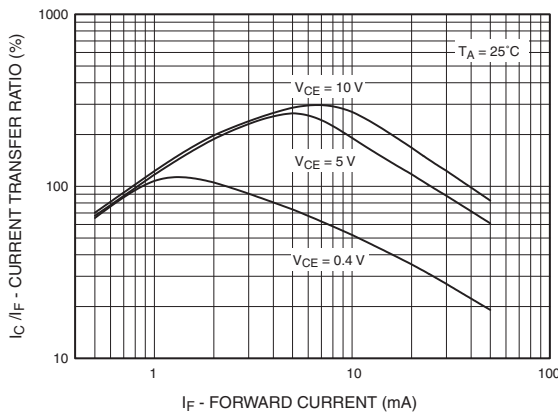
**Fig. 1 Forward Current vs. Forward Voltage**



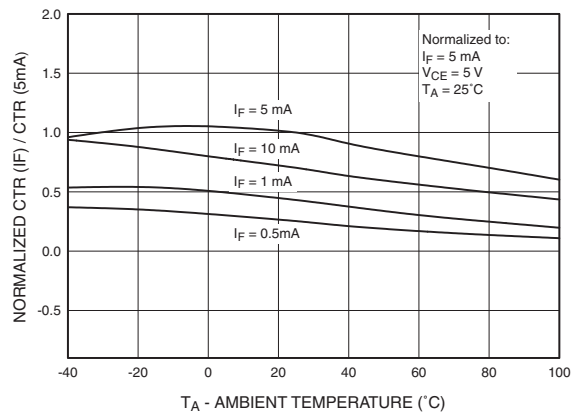
**Fig. 2 Collector Current vs. Forward Current**



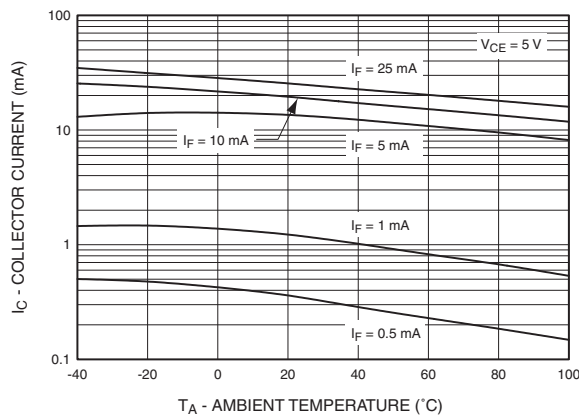
**Fig. 3 Current Transfer Ratio vs. Forward Current**



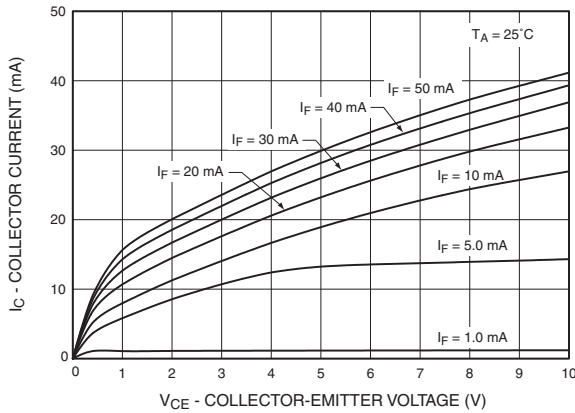
**Fig. 4 Normalized CTR vs. Temperature**



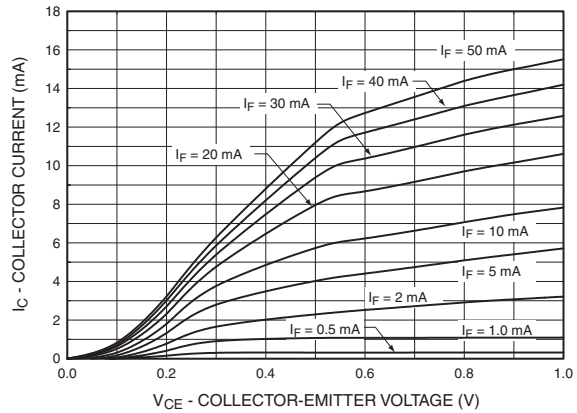
**Fig. 5 Collector Current vs. Temperature**



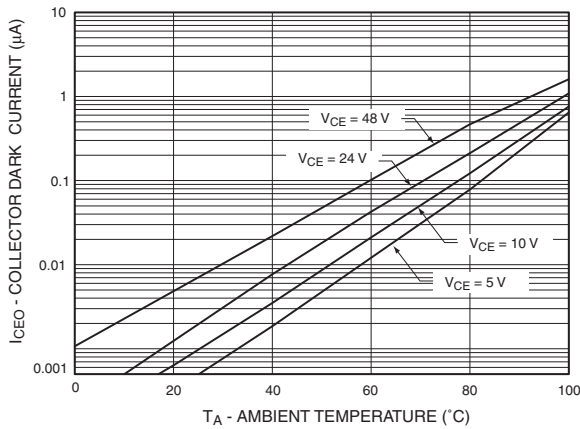
**Fig. 6 Collector Current vs. Collector-Emitter Voltage**



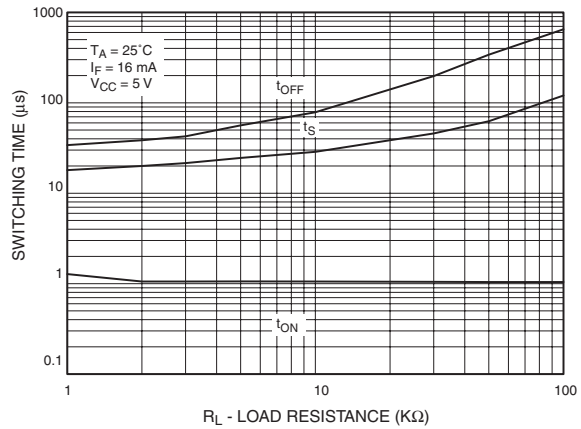
**Fig. 7 Collector Current vs. Collector-Emitter Voltage**



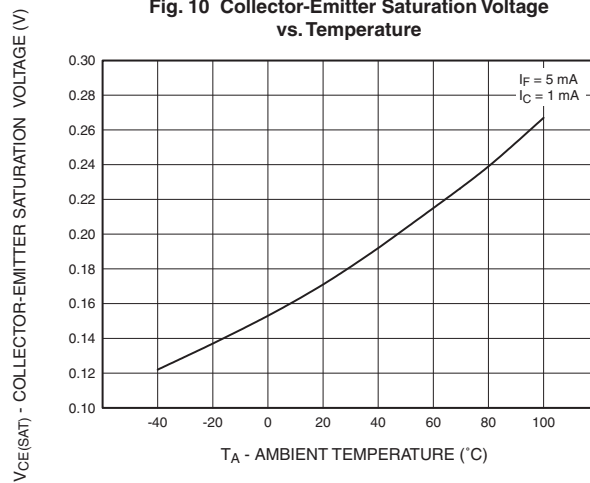
**Fig. 8 Collector Dark Current vs. Temperature**



**Fig. 9 Switching Time vs. Load Resistance**



**Fig. 10 Collector-Emitter Saturation Voltage vs. Temperature**



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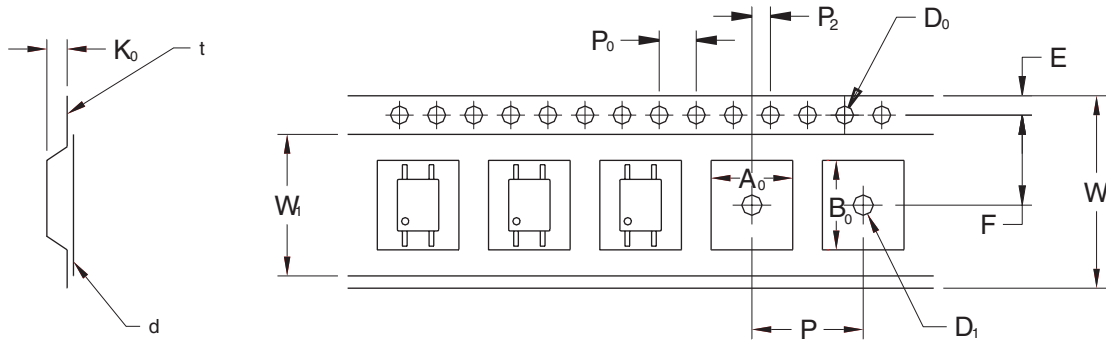
**ORDERING INFORMATION**

<b>Option</b>	<b>Description</b>
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

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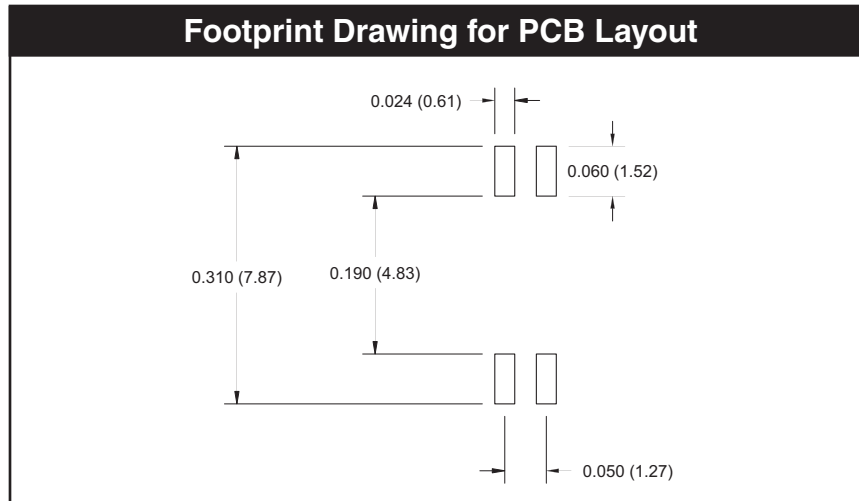


Description		Symbol	1.27 Pitch Dimensions (mm)
Tape Width		W	12.00±0.4
Tape Thickness		t	0.30±0.20
Sprocket Hole Pitch		P <sub>0</sub>	4.00±0.20
Sprocket Hole Dia.		D <sub>0</sub>	1.55±0.20
Sprocket Hole Location		E	1.75±0.20
Pocket Location		F	5.50±0.20
		P <sub>2</sub>	2.00±0.20
Pocket Pitch		P	8.00±0.20
Pocket Dimension		A <sub>0</sub>	4.40±0.20
		B <sub>0</sub>	7.30±0.20
		K <sub>0</sub>	2.30±0.20
Pocket Hole Dia.		D <sub>1</sub>	1.55±0.20
Cover Tape Width		W <sub>f</sub>	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")

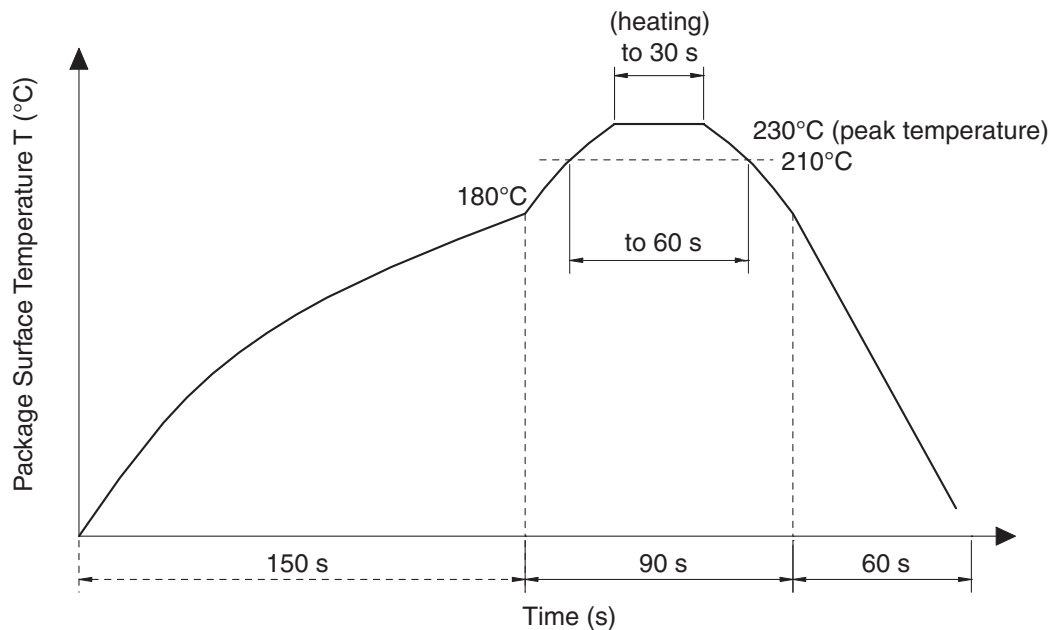
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**Recommended Infrared Reflow Soldering Profile**



- 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



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