

# FULL PITCH MINI-FLAT PACKAGE 4-PIN OPTOCOUPLERS

**HMA121 Series**

**HMA124**

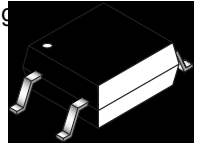
**HMA2701 Series**

**HMAA2705**

## DESCRIPTION

The HMA124, HMA121 series and HMA2701 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 2.54 mm.

The HMAA2705 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 2.54mm.



## FEATURES

- Compact 4-pin package (2.4 mm maximum standoff height)
- Current Transfer Ratio in selected groups
  - HMA121: 50–600%      HMA2701: 50–300%
  - HMA121A: 100–300%    HMA2701A: 150–300%
  - HMA121B: 50–150%    HMA2701B: 80–160%
  - HMA121C: 100–200%    HMA124: 100% MIN
  - HMA121D: 50–100%    HMAA2705: 50–300%
  - HMA121E: 150–300%
  - HMA121F: 100–600%
- 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 #1162301), UL (File #E90700) and VDE (File #136480) certified
- Creepage  $\geq$  5 mm, typical 5.2 mm
- Clearance  $\geq$  5 mm, typical 5.2 mm

## APPLICATIONS

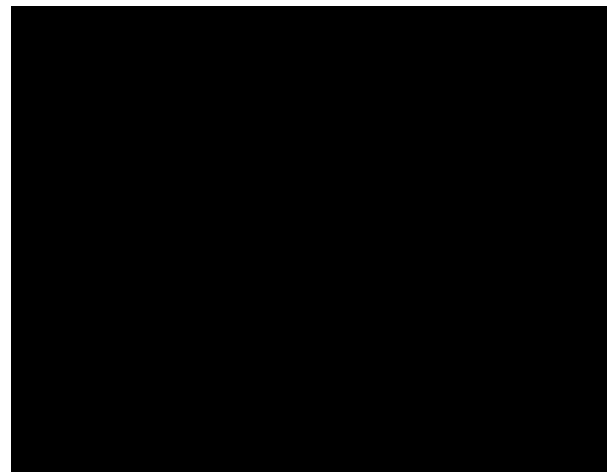
HMAA2705

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

HMA121 series, HMA2701 series, HMA124

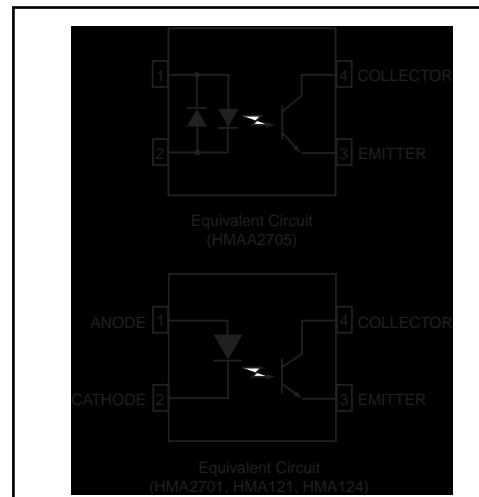
- Digital logic inputs
- Microprocessor inputs
- Power supply monitor
- Twisted pair line receiver
- Telephone line receiver

## 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
<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 (HMA)	$V_R$	6	V
Power Dissipation	$P_D$	70	mW
Derate linearly (above $25^\circ\text{C}$ )		0.65	mW/ $^\circ\text{C}$
<b>DETECTOR</b>			
Continuous Collector Current		80	mA
Power Dissipation	$P_D$	150	mW
Derate linearly (above $25^\circ\text{C}$ )		2.0	mW/ $^\circ\text{C}$
Collector-Emitter Voltage	$V_{CEO}$	HMA2701 Series, HMAA2705 40	V
		HMA121 Series, HMA124 80	
Emitter-Collector Voltage	$V_{ECO}$	7	V

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**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	$(I_F = 10 \text{ mA})$	$V_F$	HMA121 Series	1.0		1.3	V
			HMA124				
	$(I_F = 5 \text{ mA})$		HMA2701 Series			1.4	
			HMAA2705				
Reverse Current	$(V_R = 5 \text{ V})$	$I_R$	HMA2701 Series			5	$\mu\text{A}$
			HMA121 Series				
			HMA124				
<b>DETECTOR</b> Breakdown Voltage Collector to Emitter	$(I_C = 1 \text{ mA}, I_F = 0)$	$BV_{CEO}$	HMA121 Series	80			V
			HMA124				
			HMA2701 Series	40			
			HMAA2705				
Emitter to Collector	$(I_E = 100 \mu\text{A}, I_F = 0)$	$BV_{ECO}$	All	7			
Collector Dark Current	$(V_{CE} = 40 \text{ V}, I_F = 0)$	$I_{CEO}$	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 <sub>A</sub> = 25°C)							
Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
DC Current Transfer Ratio	(I <sub>F</sub> = ± 5 mA, V <sub>CE</sub> = 5 V)	CTR	HMAA2705	50		300	%
	(I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V)		HMA2701	50		300	
			HMA2701A	150		300	
	(I <sub>F</sub> = 5 mA, V <sub>CE</sub> = 5 V)		HMA2701B	80		160	
			HMA121	50		600	
			HMA121A	100		300	
			HMA121B	50		150	
			HMA121C	100		200	
			HMA121D	50		100	
			HMA121E	150		300	
			HMA121F	100		600	
(I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 0.4 V)	HMA121F	30					
(I <sub>F</sub> = 1 mA, V <sub>CE</sub> = 0.5 V)	HMA124	100		1200			
(I <sub>F</sub> = 0.5 mA, V <sub>CE</sub> = 1.5 V)	HMA124	50		—			
CTR Symmetry	(I <sub>F</sub> = ± 5 mA, V <sub>CE</sub> = 5 V)	—	HMAA2705	0.3		3.0	
Saturation Voltage	(I <sub>F</sub> = ± 10 mA, I <sub>C</sub> = 2 mA)	V <sub>CE (SAT)</sub>	HMAA2705			0.3	V
	(I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2 mA)		HMA2701			0.3	
			HMA2701A			0.3	
	(I <sub>F</sub> = 8 mA, I <sub>C</sub> = 2.4 mA)		HMA2701B			0.3	
			HMA121			0.4	
			HMA121A			0.4	
			HMA121B			0.4	
			HMA121C			0.4	
			HMA121D			0.4	
			HMA121E			0.4	
			HMA121F			0.4	
(I <sub>F</sub> = 1 mA, I <sub>C</sub> = 0.2 mA)	HMA121F			0.4			
(I <sub>F</sub> = 1 mA, I <sub>C</sub> = 0.5 mA)	HMA124			0.4			
Rise Time (Non-Saturated)	(I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5 V) (R <sub>L</sub> = 100Ω)	t <sub>r</sub>			3		μs
Fall Time (Non-Saturated)	(I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5 V) (R <sub>L</sub> = 100Ω)	t <sub>f</sub>			3		

ISOLATION CHARACTERISTICS							
Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Steady State Isolation Voltage	(1 Minute)	V <sub>ISO</sub>	All	3750			VRMS

\*\* All typicals at T<sub>A</sub> = 25°C

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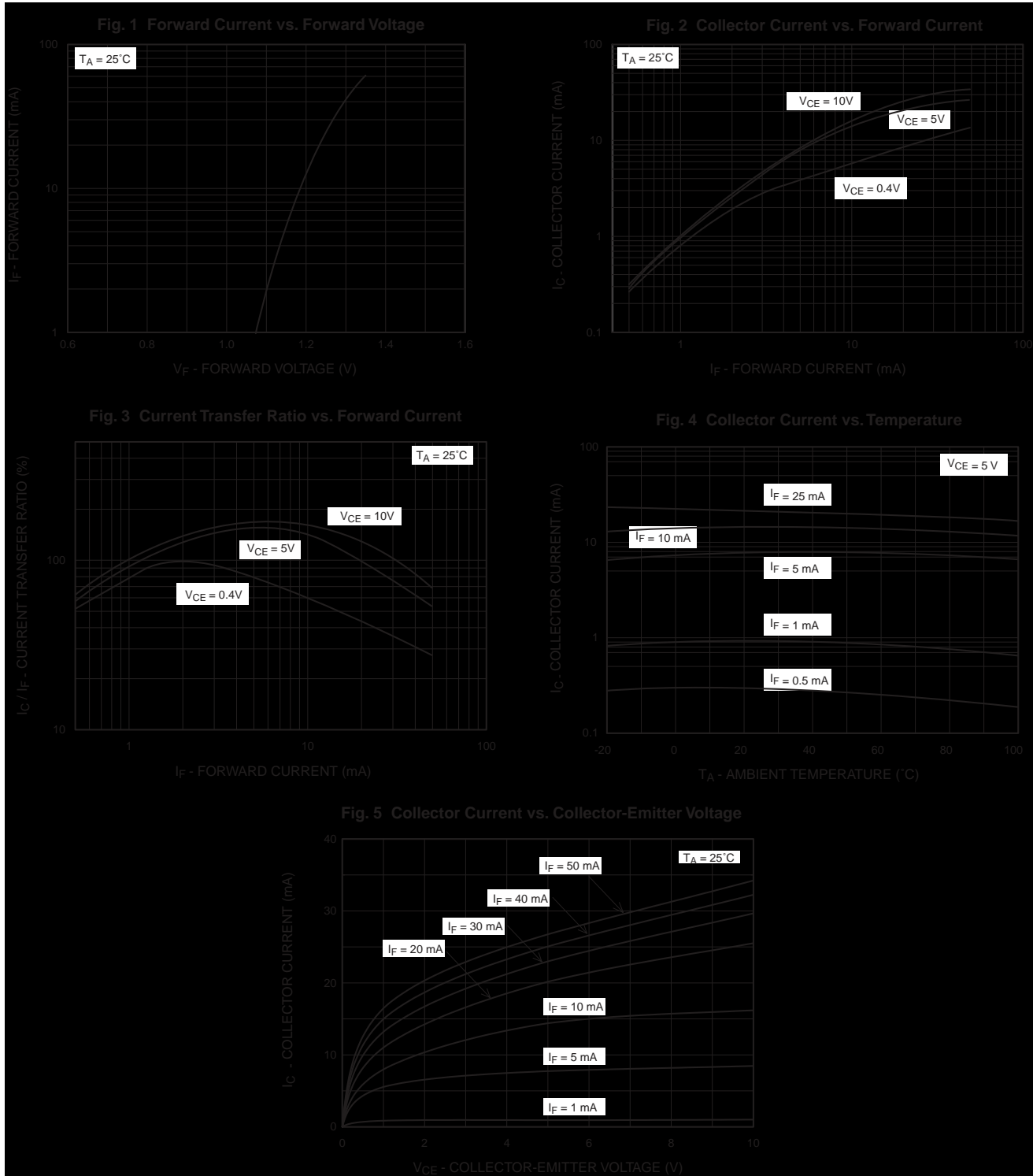
HMA121 Series

HMA124

HMA2701 Series

HMAA2705

## TYPICAL PERFORMANCE CURVES



# FULL PITCH MINI-FLAT PACKAGE 4-PIN OPTOCOUPLERS

HMA121 Series

HMA124

HMA2701 Series

HMAA2705

Fig. 6 Collector Current vs. Collector-Emitter Voltage

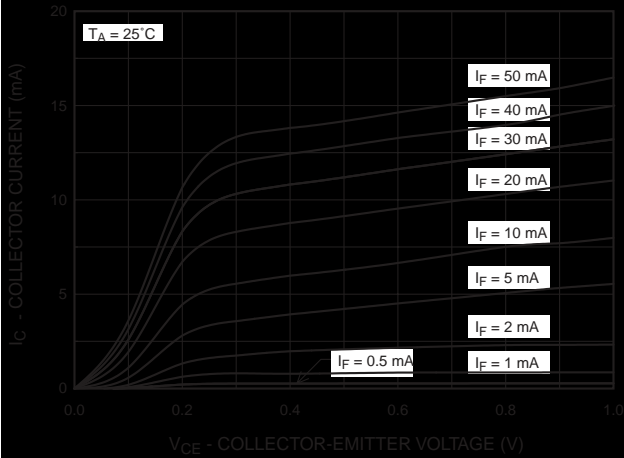


Fig. 7 Collector Dark Current vs. Temperature

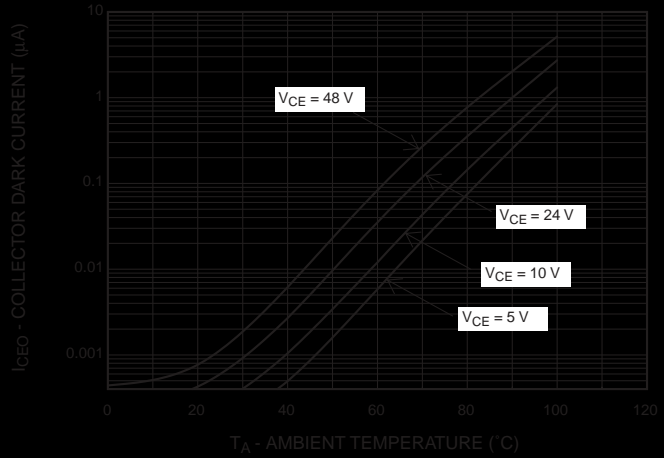


Fig. 8 Switching Time vs. Load Resistance

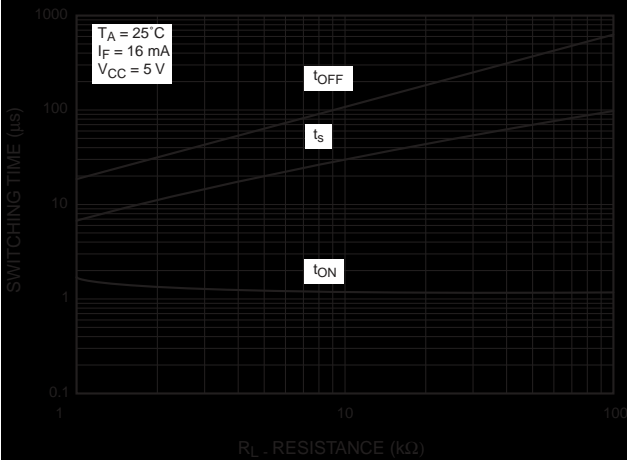
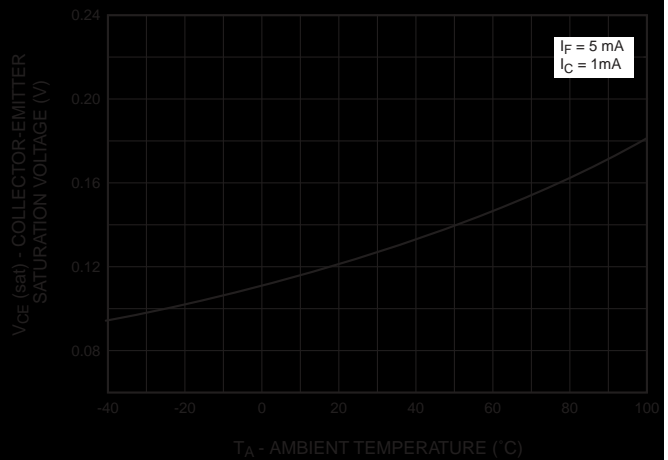


Fig. 9 Collector-Emitter Saturation Voltage vs. Temperature



# FULL PITCH MINI-FLAT PACKAGE 4-PIN OPTOCOUPLERS

HMA121 Series

HMA124

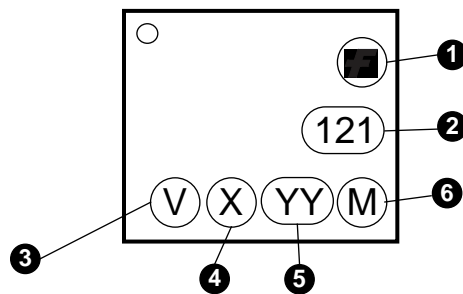
HMA2701 Series

HMAA2705

## 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

## 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

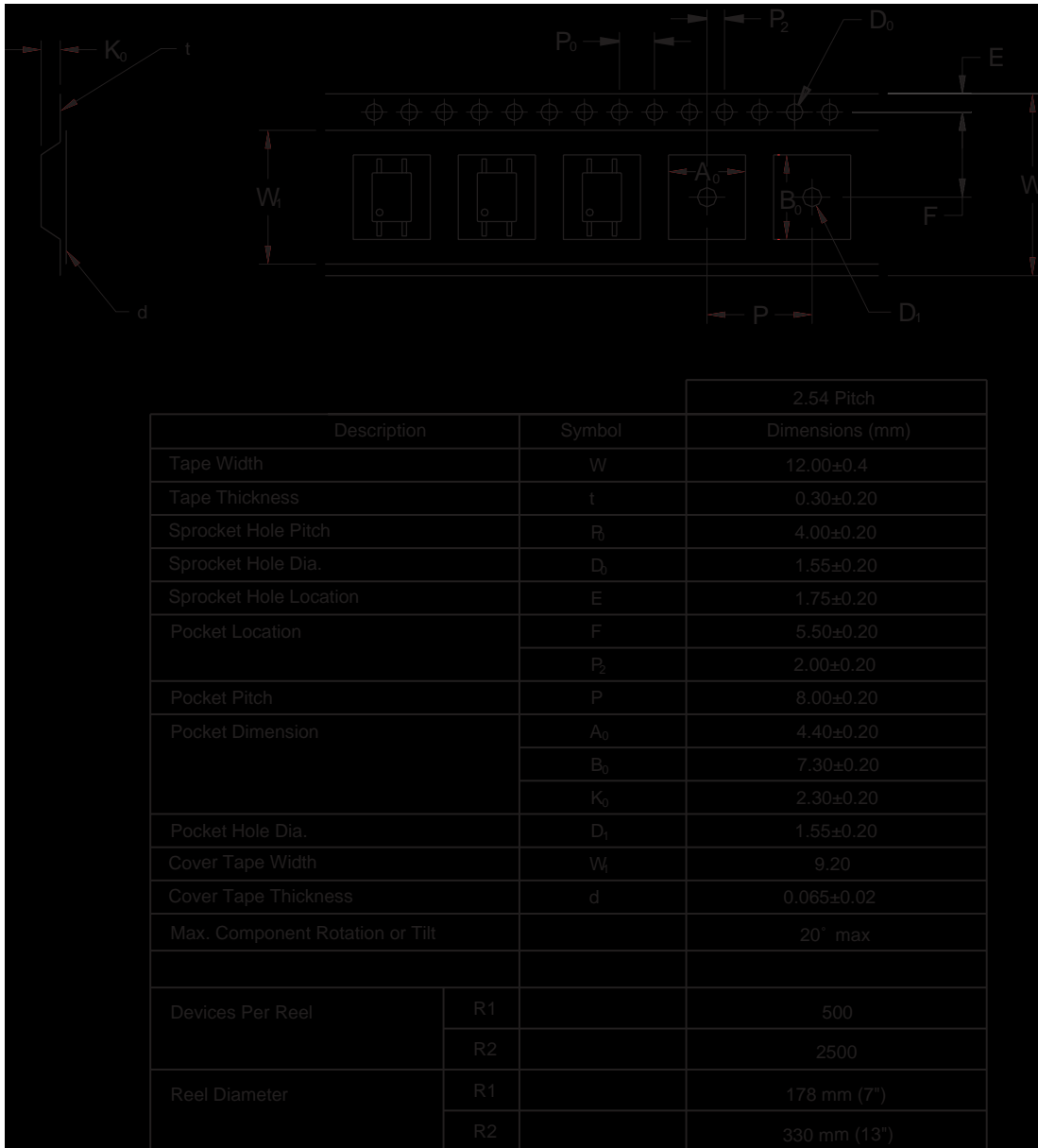
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HMA121 Series

HMA124

HMA2701 Series

HMAA2705





# FULL PITCH MINI-FLAT PACKAGE 4-PIN OPTOCOUPPLERS

HMA121 Series

HMA124

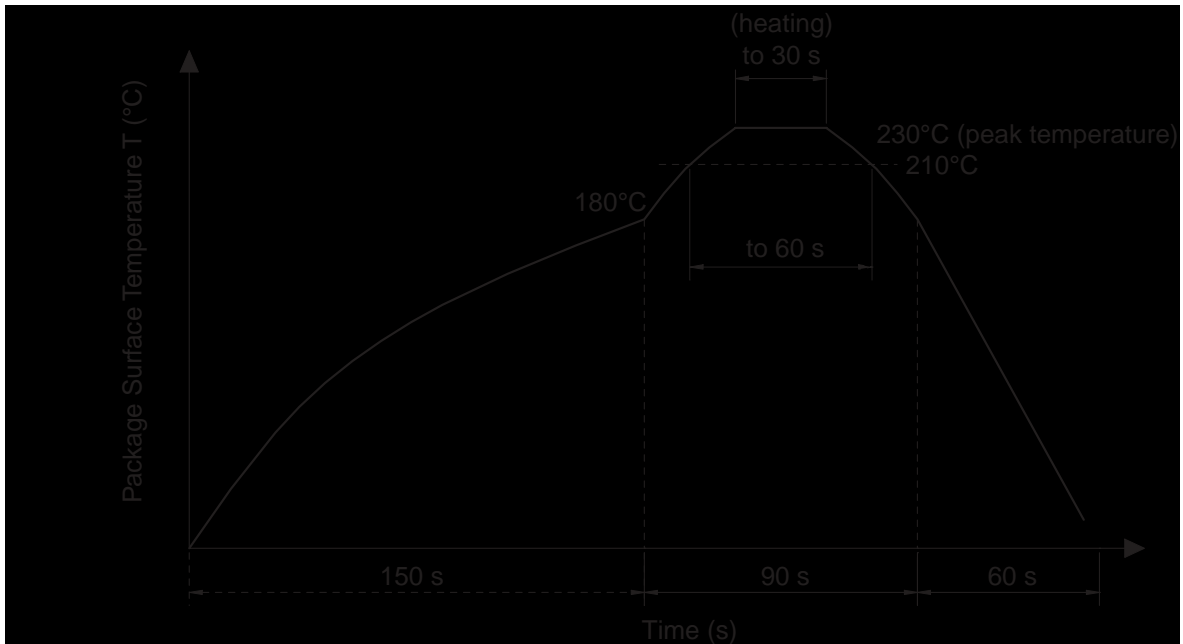
HMA2701 Series

HMAA2705

## 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



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**HMA121 Series****HMA124****HMA2701 Series****HMAA2705**

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