FAIRCHILD
SEMICONDUCTOR®

FULL PITCH MINI-FLAT PACKAGE 4-PIN OPTOCOUPLERS

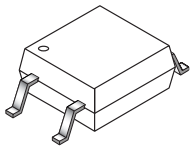
HMA121 HMA124 HMA2701 HMAA2705

DESCRIPTION

The HMA 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 HMAA 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.

FEATURES

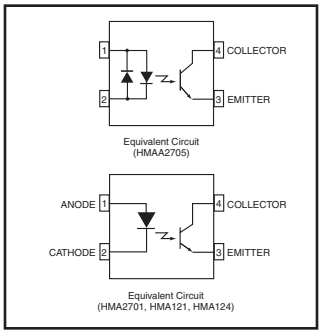


- Compact 4-pin package (2.4 mm maximum standoff height)
- Current Transfer Ratio in selected groups
  HMAA2705: 50-300% HMA121: 50-600%
  HMA2701: 50-300% HMA124: 100% MIN
- Available in tape and reel quantities of 500 and 2500.
- Applicable to Infrared Ray reflow (230°C max, 30 seconds.)
- BSI (File #8611/8612), CSA (File #1162301), UL (File #E90700) and VDE (File #136480) certified

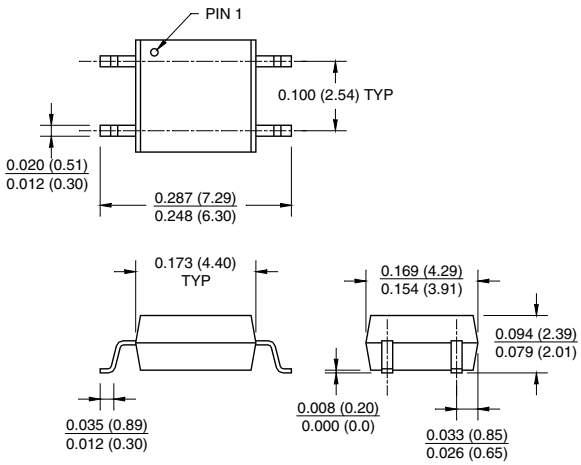
APPLICATIONS

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

HMA 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)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Units
TOTAL PACKAGE				
Storage Temperature		T_{STG}	-55 to +150	°C
Operating Temperature		T_{OPR}	-55 to +100	°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 (HMA)		V_R	6	V
Power Dissipation		P_D	70	mW
Derate linearly (above 25°C)			0.65	mW/°C
DETECTOR				
Continuous Collector Current			80	mA
Power Dissipation		P_D	150	mW
Derate linearly (above 25°C)			2.0	mW/°C
Collector-Emitter Voltage	HMA2701, HMAA2705	V_{CEO}	40	V
	HMA121, HMA124		80	
Emitter-Collector Voltage		V_{ECO}	7	V

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

INDIVIDUAL COMPONENT CHARACTERISTICS

Parameter	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
EMITTER Forward Voltage	(I_F = 10 mA)	V_F	HMA121	1.0		1.3	V
			HMA124				
	(I_F = 5 mA)		HMA2701			1.4	
	(I_F = ± 5 mA)		HMAA2705				
Reverse Current	(V_R = 5 V)	I_R	HMA2701			5	µA
			HMA121				
			HMA124				
DETECTOR Breakdown Voltage Collector to Emitter	(I_C = 1 mA, I_F = 0)	BV_{CEO}	HMA121	80			V
			HMA124				
			HMA2701	40			
			HMAA2705				
Emitter to Collector	(I_E = 100 µA, I_F = 0)	BV_{ECO}	All	7			
Collector Dark Current	(V_{CE} = 40 V, I_F = 0)	I_{CEO}	All			100	nA
Capacitance	(V_{CE} = 0 V, f = 1 MHz)	C_{CE}	All		10		pF

TRANSFER CHARACTERISTICS (T_A = 25°C)

Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
DC Current Transfer Ratio	(I_F = ± 5 mA, V_{CE} = 5 V)	CTR	HMAA2705	50		300	%
	(I_F = 5 mA, V_{CE} = 5 V)		HMA2701	50		300	
	(I_F = 5 mA, V_{CE} = 5 V)		HMA121	50		600	
	(I_F = 1 mA, V_{CE} = 0.5 V)		HMA124	100		1200	
	(I_F = 0.5 mA, V_{CE} = 1.5 V)		HMA124	50		—	
CTR Symmetry	(I_F = ± 5 mA, V_{CE} = 5 V)	—	HMAA2705	0.3		3.0	
Saturation Voltage	(I_F = ± 10 mA, I_C = 2 mA)	$V_{CE\ (SAT)}$	HMAA2705			0.3	V
	(I_F = 10 mA, I_C = 2 mA)		HMA2701			0.3	
	(I_F = 8 mA, I_C = 2.4 mA)		HMA121			0.4	
	(I_F = 1 mA, I_C = 0.5 mA)		HMA124			0.4	
Rise Time (Non-Saturated)	(I_C = 2 mA, V_{CE} = 5 V) (R_L = 100V)	t_r			3		µs
Fall Time (Non-Saturated)	(I_C = 2 mA, V_{CE} = 5 V) (R_L = 100V)	t_f			3		

ISOLATION CHARACTERISTICS

Characteristic	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Steady State Isolation Voltage	(1 Minute)	V_{ISO}	All	3750			VRMS

** All typicals at TA = 25°C

TYPICAL PERFORMANCE CURVES

Fig. 1 Forward Current vs. Forward Voltage

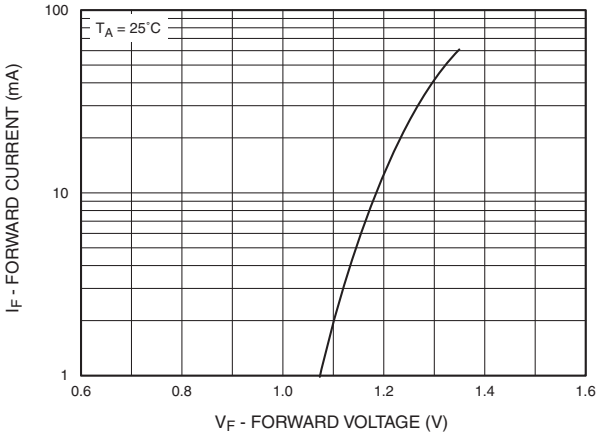


Fig. 2 Collector Current vs. Forward Current

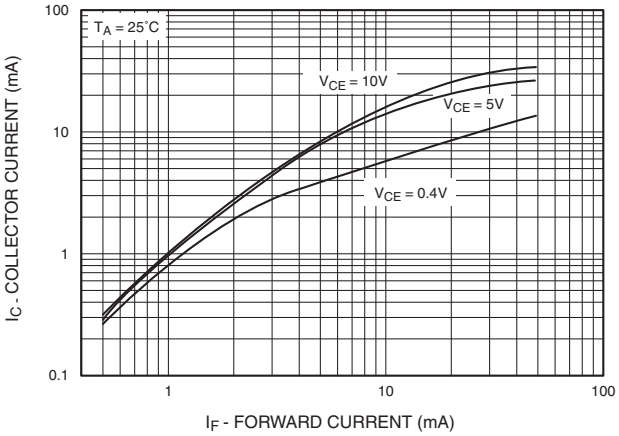


Fig. 3 Current Transfer Ratio vs. Forward Current

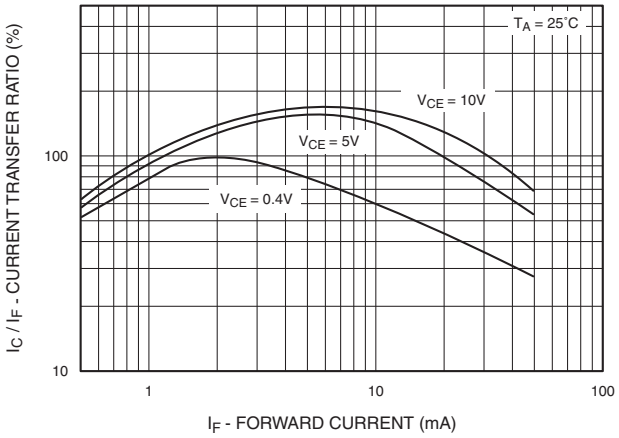


Fig. 4 Collector Current vs. Temperature

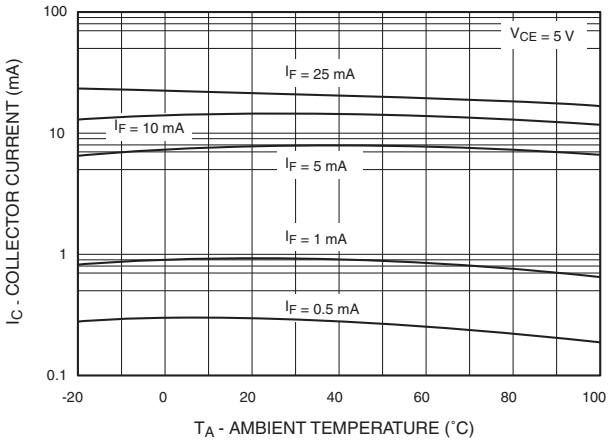


Fig. 5 Collector Current vs. Collector-Emitter Voltage

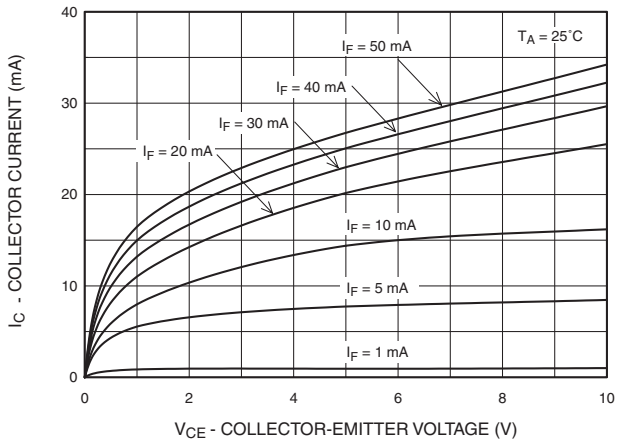


Fig. 6 Collector Current vs. Collector-Emitter Voltage

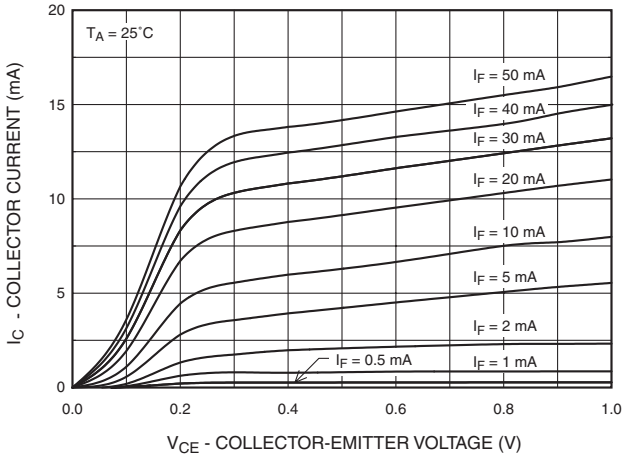


Fig. 7 Collector Dark Current vs. Temperature

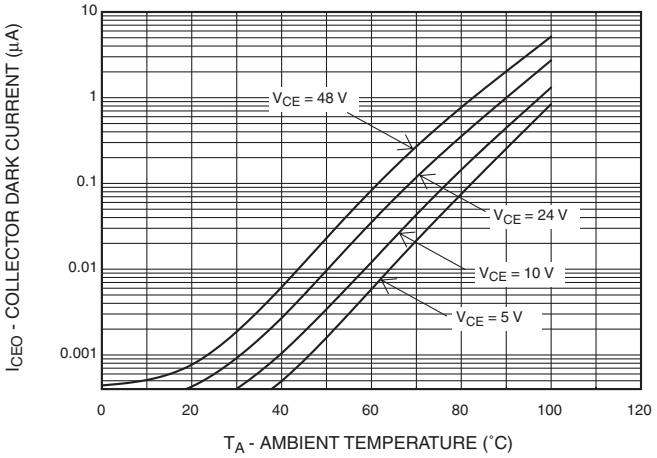


Fig. 8 Switching Time vs. Load Resistance

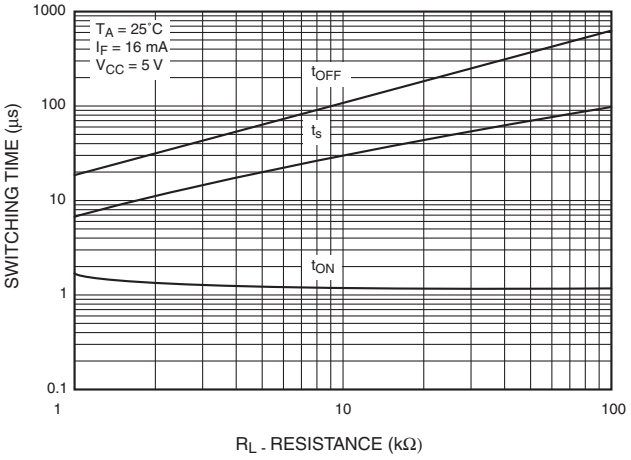
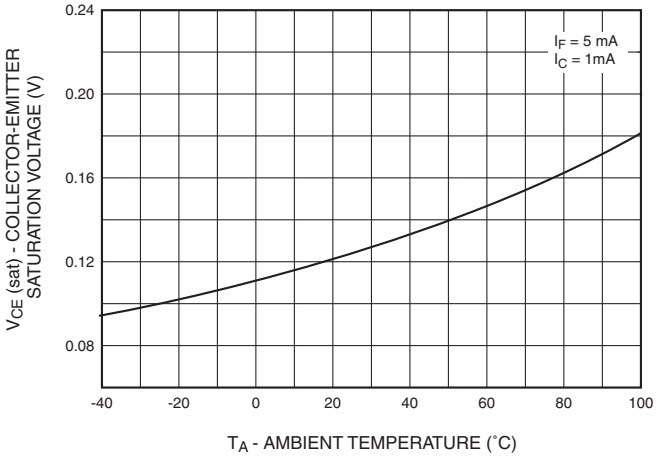


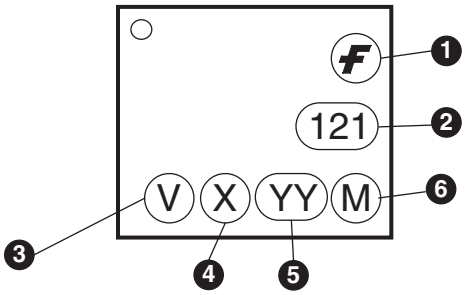
Fig. 9 Collector-Emitter Saturation Voltage vs. Temperature



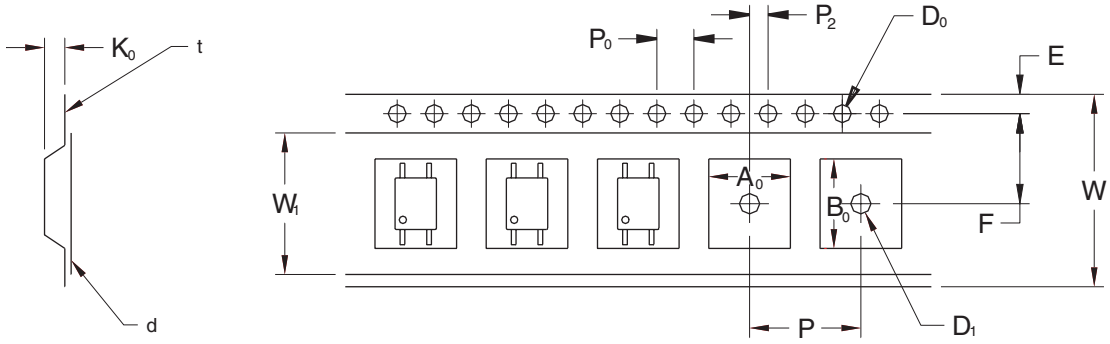
ORDERING INFORMATION

Option	Description
V	VDE Approved
R1	Tape and Reel (500 units)
R2	Tape and Reel (2500 units)
R1V	Tape and Reel (500 units) and VDE Approved
R2V	Tape and Reel (2500 units) and VDE Approved

MARKING INFORMATION

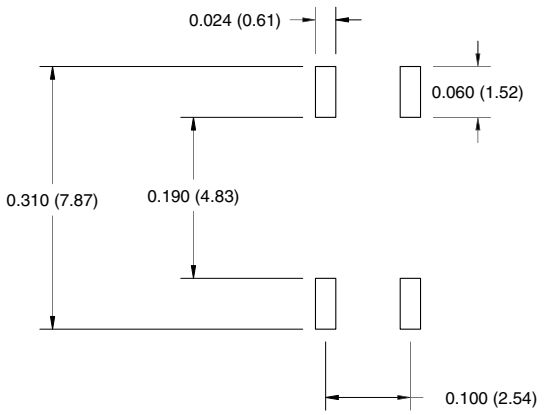


Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

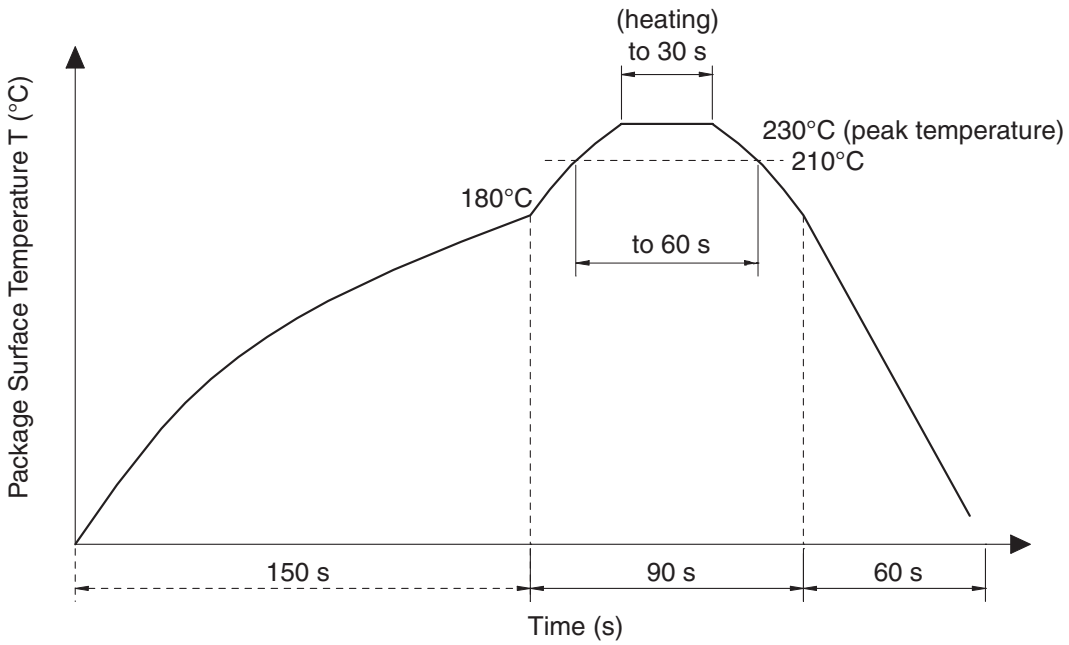


Description		Symbol	2.54 Pitch Dimensions (mm)
Tape Width		W	12.00±0.4
Tape Thickness		t	0.30±0.20
Sprocket Hole Pitch		P_0	4.00±0.20
Sprocket Hole Dia.		D_0	1.55±0.20
Sprocket Hole Location		E	1.75±0.20
Pocket Location		F	5.50±0.20
		P_2	2.00±0.20
Pocket Pitch		P	8.00±0.20
Pocket Dimension		A_0	4.40±0.20
		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_1	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

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HMA121 HMA124 HMA2701 HMAA2705

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