

FODM121 Series, FODM124, FODM2701, FODM2705 4-Pin Full Pitch Mini-Flat Package Transistor Output Optocouplers

Features

- More than 5mm creepage/clearance
- Compact 4-pin surface mount package (2.4mm maximum standoff height)
- Current Transfer Ratio in selected groups
DC Input:
FODM121: 50–600% FODM2701: 50–300%
FODM121A: 100–300% FODM124: 100% MIN
FODM121B: 50–150%
FODM121C: 100–200%
AC Input:
FODM2705: 50–300%
- Available in tape and reel quantities of 2500
- Applicable to Infrared Ray reflow (260°C max, 10 sec.)
- C-UL, UL and VDE* certifications

*option 'V' required

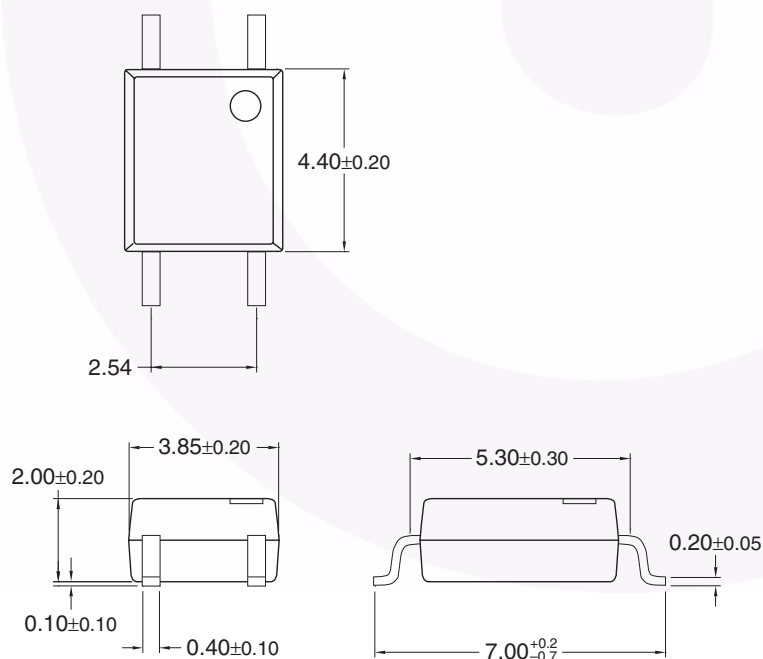
Applications

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

Description

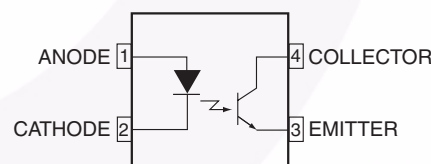
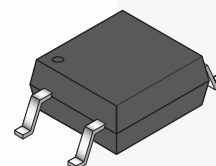
The FODM124, FODM121 series, and FODM2701 consists of a gallium arsenide infrared emitting diode driving a phototransistor in a compact 4-pin mini-flat package. The lead pitch is 2.54mm. The FODM2705 consists of two gallium arsenide infrared emitting diodes connected in inverse parallel for AC operation.

Package Dimensions

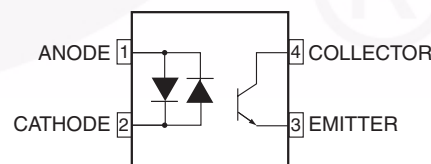


Note:

All dimensions are in millimeters.



Equivalent Circuit
FODM121, FODM124, FODM2701



Equivalent Circuit
FODM2705

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	-40 to +125	°C	
T _{OPR}	Operating Temperature	-40 to +110	°C	
EMITTER				
I _{F (avg)}	Continuous Forward Current	50	mA	
I _{F (pk)}	Peak Forward Current (1μs pulse, 300 pps.)	1	A	
V _R	Reverse Input Voltage	6	V	
P _D	Power Dissipation	70	mW	
	Derate linearly (above 25°C)	0.65	mW/°C	
DETECTOR				
	Continuous Collector Current	80	mA	
P _D	Power Dissipation	150	mW	
	Derate linearly (above 25°C)	2.0	mW/°C	
V _{CEO}	Collector-Emitter Voltage	FODM2701, FODM2705	40	V
		FODM121 Series, FODM124	80	
V _{ECO}	Emitter-Collector Voltage	7	V	

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

Symbol	Parameter	Test Conditions	Device	Min.	Typ.*	Max.	Unit
EMITTER							
V _F	Forward Voltage	I _F = 10mA	FODM121 Series, FODM124	1.0		1.3	V
		I _F = 5mA	FODM2701			1.4	
		I _F = ±5mA	FODM2705				
I _R	Reverse Current	V _R = 5V	FODM2701			5	μA
			FODM121 Series				
			FODM124				
DETECTOR							
BV _{CEO}	Breakdown Voltage Collector to Emitter	I _C = 1mA, I _F = 0	FODM121 Series, FODM124	80			V
			FODM2701, FODM2705	40			
BV _{ECO}	Emitter to Collector	I _E = 100μA, I _F = 0	All	7			V
I _{CEO}	Collector Dark Current	V _{CE} = 40V, I _F = 0	All			100	nA
C _{CE}	Capacitance	V _{CE} = 0V, f = 1MHz	All		10		pF

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

Symbol	Characteristic	Test Conditions	Device	Min.	Typ.*	Max.	Unit
CTR	DC Current Transfer Ratio	$I_F = \pm 5\text{mA}$, $V_{CE} = 5\text{V}$	FODM2705	50		300	%
		$I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$	FODM2701	50		300	
		$I_F = 5\text{mA}$, $V_{CE} = 5\text{V}$	FODM121	50		600	
			FODM121A	100		300	
			FODM121B	50		150	
			FODM121C	100		200	
		$I_F = 1\text{mA}$, $V_{CE} = 0.5\text{V}$	FODM124	100		1200	
		$I_F = 0.5\text{mA}$, $V_{CE} = 1.5\text{V}$		50			
	CTR Symmetry	$I_F = \pm 5\text{mA}$, $V_{CE} = 5\text{V}$	FODM2705	0.3		3.0	
$V_{CE(SAT)}$	Saturation Voltage	$I_F = \pm 10\text{mA}$, $I_C = 2\text{mA}$	FODM2705			0.3	V
		$I_F = 10\text{mA}$, $I_C = 2\text{mA}$	FODM2701			0.3	
		$I_F = 8\text{mA}$, $I_C = 2.4\text{mA}$	FODM121 Series			0.4	
		$I_F = 1\text{mA}$, $I_C = 0.5\text{mA}$	FODM124			0.4	
t_r	Rise Time (Non-Saturated)	$I_C = 2\text{mA}$, $V_{CE} = 5\text{V}$, $R_L = 100\Omega$	All		3		μs
t_f	Fall Time (Non-Saturated)	$I_C = 2\text{mA}$, $V_{CE} = 5\text{V}$, $R_L = 100\Omega$	All		3		μs

Isolation Characteristics

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

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

Note:

1. Steady state isolation voltage, V_{ISO} , is an internal device dielectric breakdown rating. For this test, pins 1 and 2 are common, and pins 3 and 4 are common.

Typical Performance Curves

Fig. 1 Forward Current vs. Forward Voltage

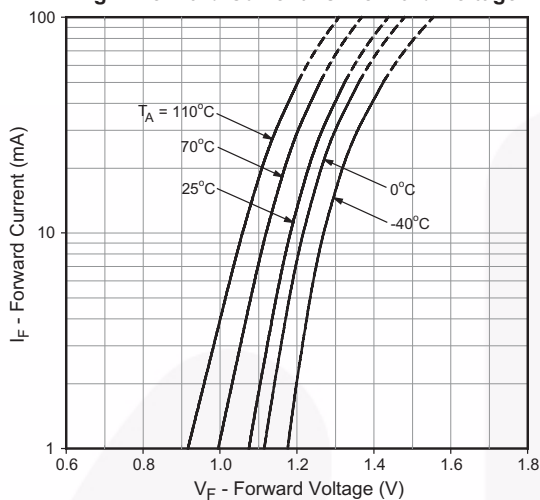


Fig. 2 Collector-Emitter Saturation Voltage vs. Ambient Temperature (FODM121/2701/2705)

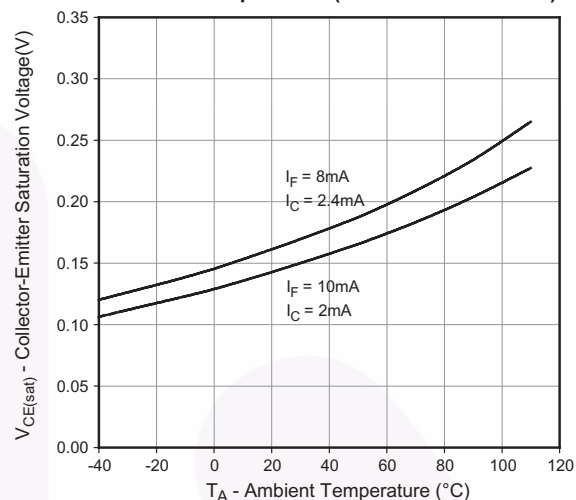


Fig. 3 Current Transfer Ratio vs. Forward Current (FODM121/2701/2705)

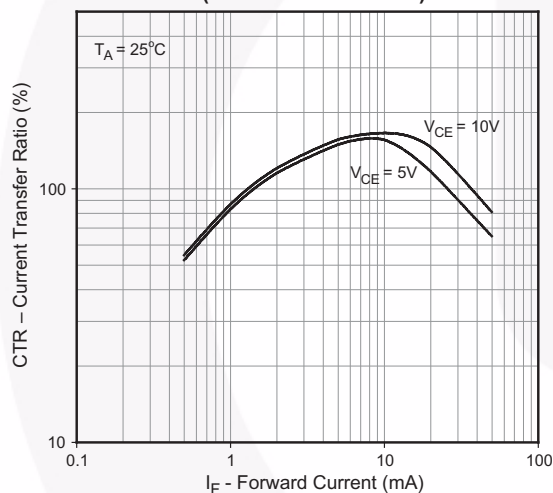


Fig. 4 Collector Current vs. Forward Current (FODM121/2701/2705)

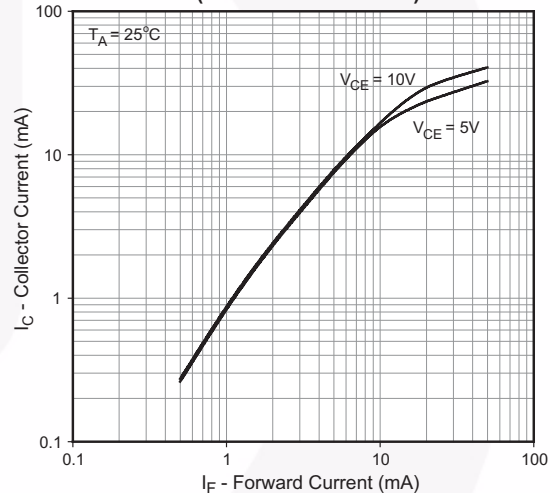


Fig. 5 Collector Current vs. Ambient Temperature (FODM121/2701/2705)

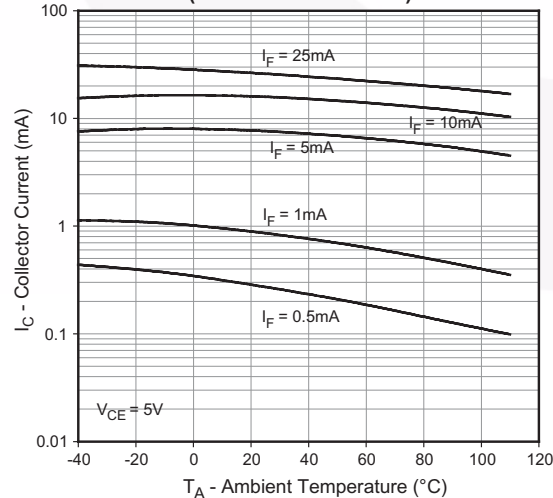


Fig. 6 Collector Current vs. Collector-Emitter Voltage (FODM121/2701/2705)

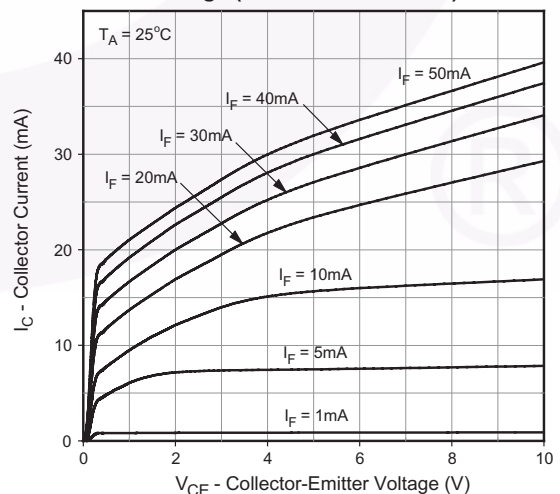


Fig 7. Collector Dark Current vs. Ambient Temperature (FODM121/2701/2705)

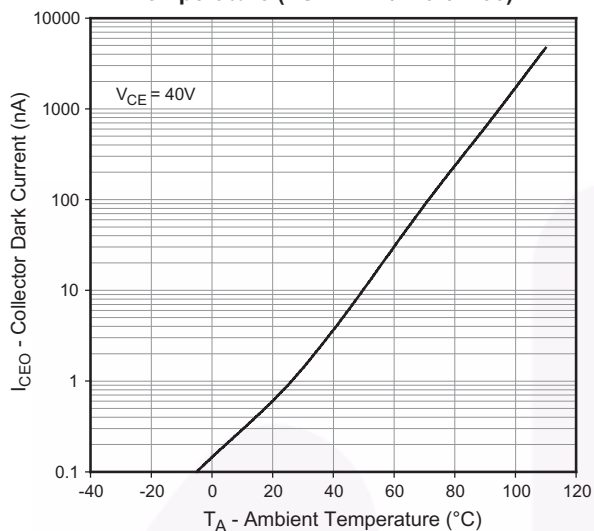


Fig. 8 Normalized Current Transfer Ratio vs. Ambient Temperature (FODM121/2701/2705)

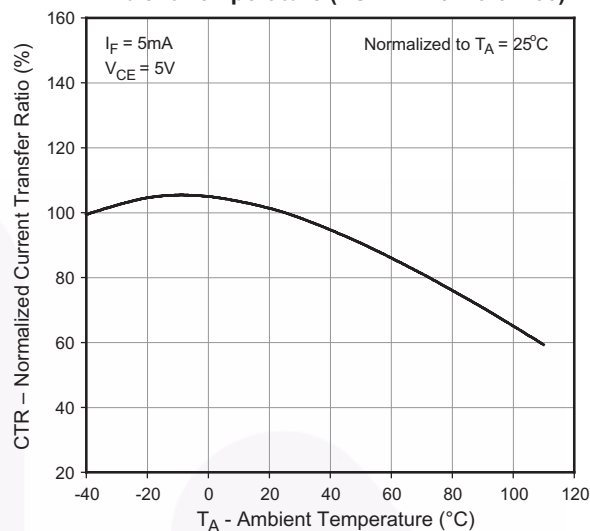


Fig. 9 Switching Time vs. Load Resistance (FODM121/2701/2705)

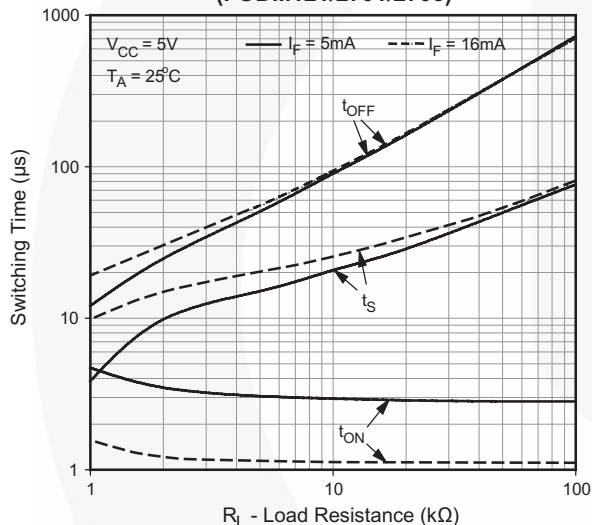


Fig. 10 Collector-Emitter Saturation Voltage vs. Ambient Temperature (FODM124)

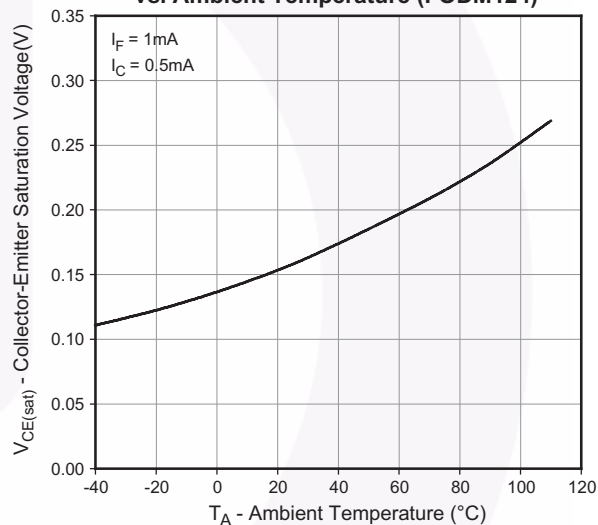


Fig. 11 Current Transfer Ratio vs. Forward Current (FODM124)

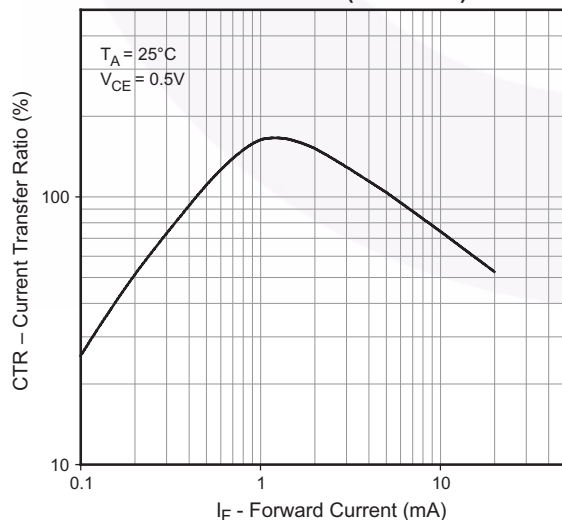


Fig 12. Collector Current vs. Forward Current (FODM124)

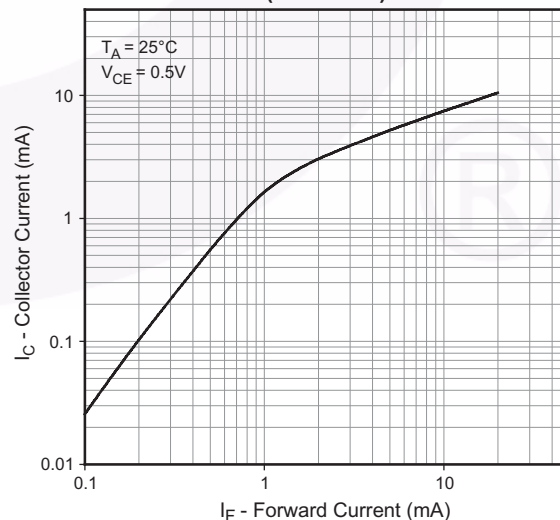


Fig 13. Collector Current vs. Ambient Temperature (FODM124)

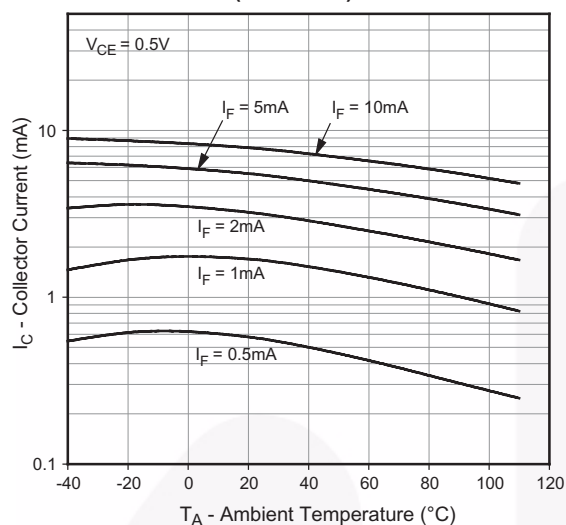


Fig 14 Collector Current vs. Collector-Emitter Voltage (FODM124)

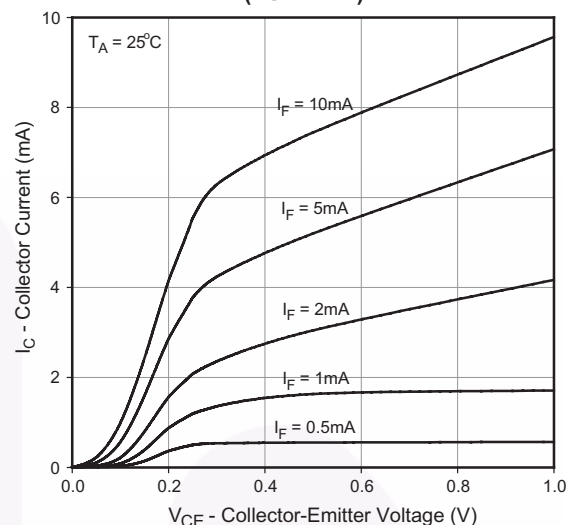


Fig. 15 Collector Dark Current vs. Ambient Temperature (FODM124)

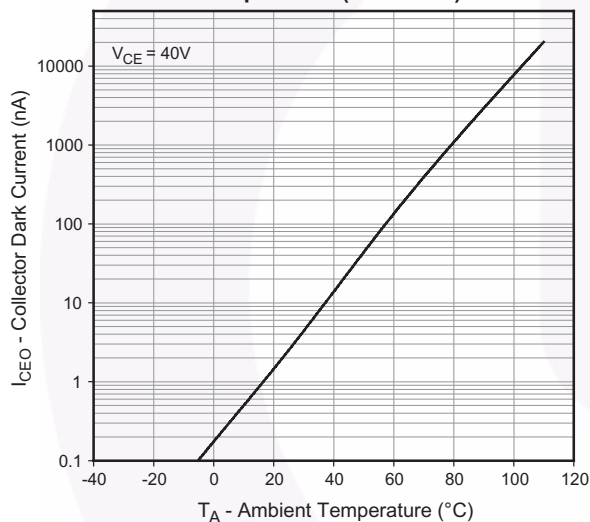


Fig. 16 Normalized Current Transfer Ratio vs. Ambient Temperature (FODM124)

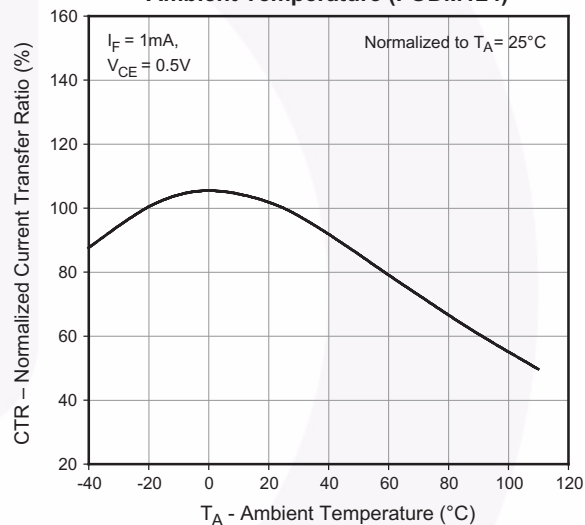
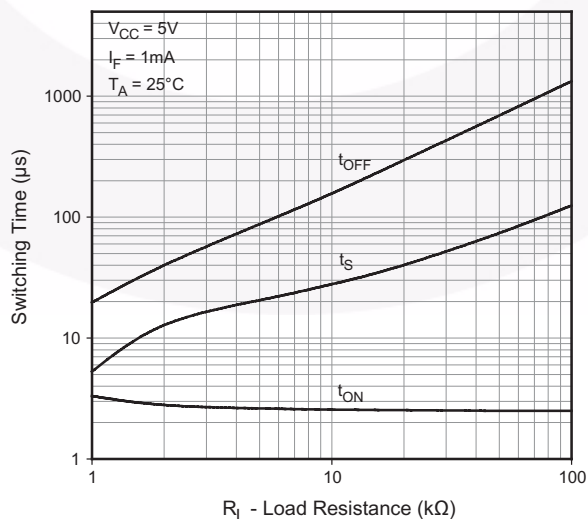


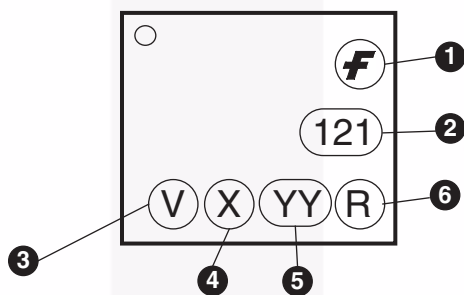
Fig. 17 Switching Time vs. Load Resistance (FODM124)



Ordering Information

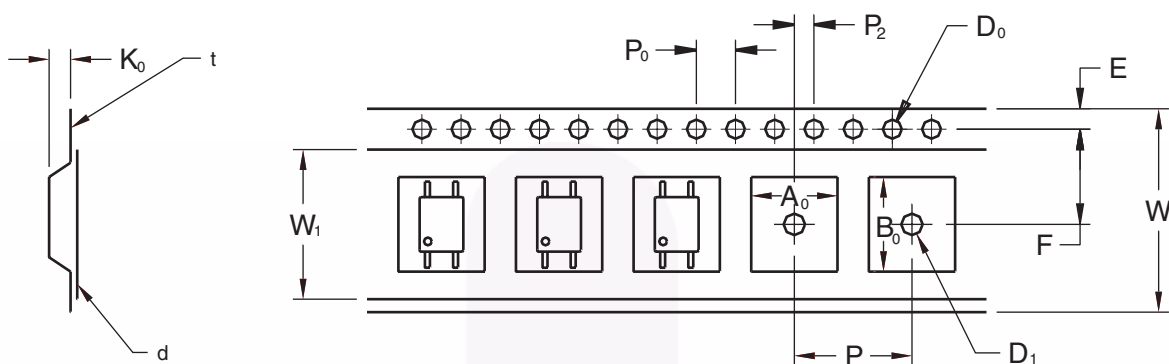
Option	Description
V	VDE Approved
R2	Tape and Reel (2500 units)
R2V	Tape and Reel (2500 units) and VDE Approved

Marking Information



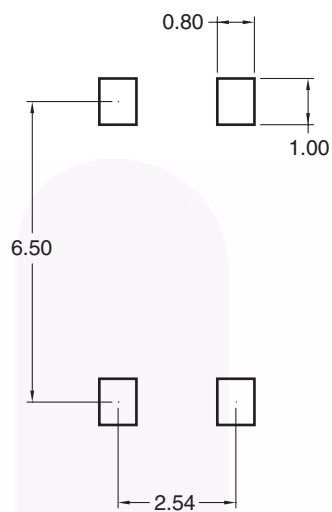
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

Carrier Tape Specifications



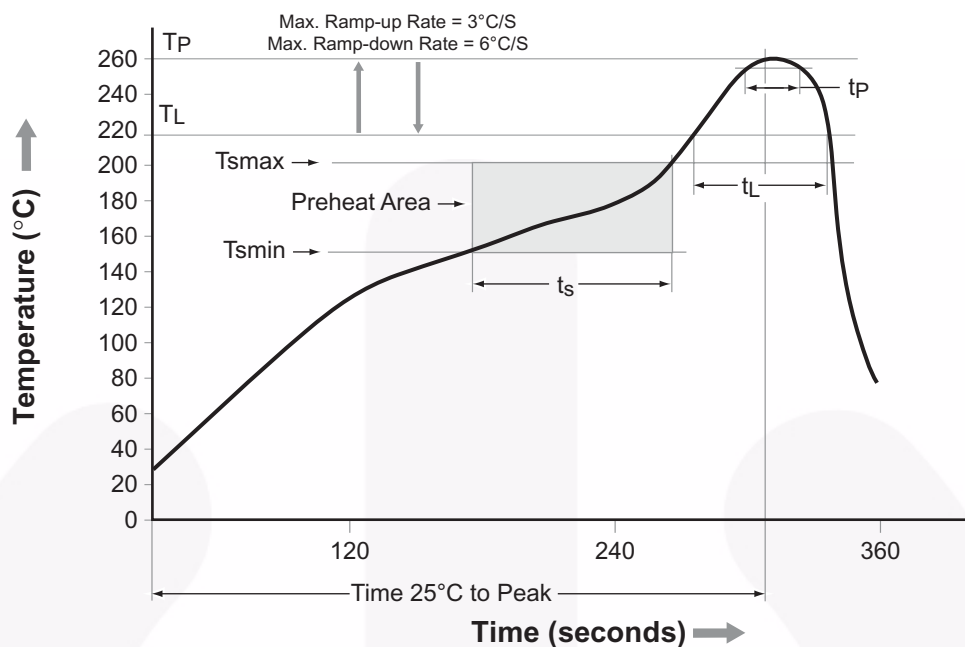
		2.54 Pitch
Description	Symbol	Dimensions
Tape Width	W	12.00±0.4
Tape Thickness	t	0.35±0.02
Sprocket Hole Pitch	P ₀	4.00±0.20
Sprocket Hole Dia.	D ₀	1.55±0.20
Sprocket Hole Location	E	1.75±0.20
Pocket Location	F	5.50±0.20
	P ₂	2.00±0.20
Pocket Pitch	P	8.00±0.20
Pocket Dimension	A ₀	4.75±0.20
	B ₀	7.30±0.20
	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



Note:
All dimensions are in mm.

Reflow Profile

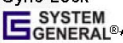


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{sm})	150°C
Temperature Max. (T _{sm})	200°C
Time (t _s) from (T _{sm} to T _{sm})	60–120 seconds
Ramp-up Rate (t _L to t _p)	3°C/second max.
Liquidous Temperature (T _L)	217°C
Time (t _L) Maintained Above (T _L)	60–150 seconds
Peak Body Package 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.



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

2Cool™	F-PFS™	PowerTrench®	The Power Franchise®
AccuPower™	FRFET®	PowerXS™	the power franchise
AX-CAP™*	Global Power Resource™	Programmable Active Droop™	TinyBoost™
BitSiC™	GreenBridge™	QFET®	TinyBuck™
Build it Now™	Green FPS™	QS™	TinyCalc™
CorePLUS™	Green FPS™ e-Series™	Quiet Series™	TinyLogic®
CorePOWER™	Gmax™	RapidConfigure™	TINYOPTO™
CROSSVOLT™	GTO™	 ™	TinyPower™
CTL™	IntelliMAX™	Saving our world, 1mW/W/kW at a time™	TinyPWM™
Current Transfer Logic™	ISOPLANAR™	SignalWise™	TinyWire™
DEUXPEED®	Making Small Speakers Sound Louder and Better™	SmartMax™	TransiC™
Dual Cool™	MegaBuck™	SMART START™	TriFault Detect™
EcoSPARK®	MICROCOUPLER™	Solutions for Your Success™	TRUECURRENT®*
EfficientMax™	MicroFET™	SPM®	μSerDes™
ESBC™	MicroPak™	STEALTH™	 SerDes™
 Fairchild®	MicroPak2™	SuperFET®	UHC®
Fairchild Semiconductor®	MillerDrive™	SuperSOT™-3	Ultra FRFET™
FACT Quiet Series™	MotionMax™	SuperSOT™-6	UniFET™
FACT®	Motion-SPM™	SuperSOT™-8	VCX™
FAST®	mWSaver™	SupreMOS®	VisualMax™
FastvCore™	OptoHiT™	SyncFET™	VoltagePlus™
FETBench™	OPTOLOGIC®	Sync-Lock™	XS™
FlashWriter®*	OPTOPLANAR®	 SYSTEM GENERAL®*	
FPS™			

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. 161