FAIRCHILD
SEMICONDUCTOR®

April 2009

FODM3062, FODM3063, FODM3082, FODM3083 4-Pin Full Pitch Mini-Flat Package Zero-Cross Triac Driver Output Optocouplers

Features

- dv/dt of 600V/μs guaranteed
- Compact 4-pin surface mount package (2.4mm maximum standoff height)
- Zero voltage crossing
- Peak blocking voltage: 600V (FODM306X)
  800V (FODM308X)
- Available in tape and reel quantities of 2500
- C-UL, UL and VDE certifications pending

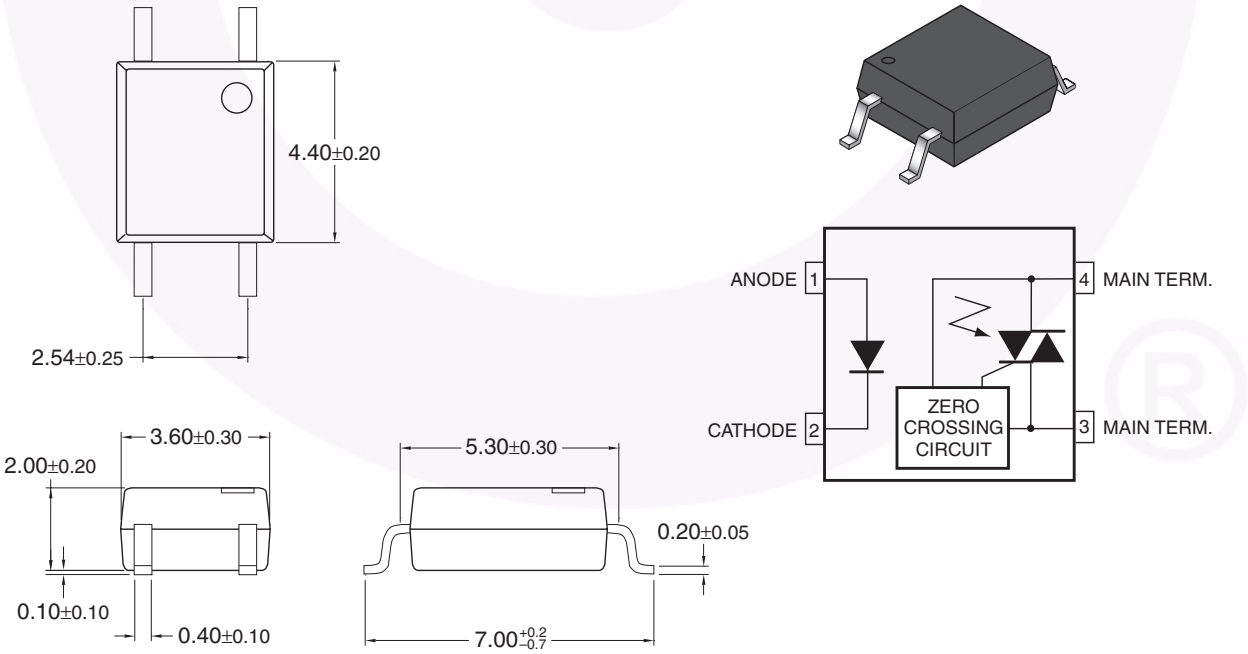
Applications

- Solenoid/valve controls
- Lighting controls
- Static power switches
- AC motor drives
- Temperature controls
- E.M. contactors
- AC motor starters
- Solid state relays

Description

The FODM306X and FODM308X series consist of an infrared emitting diode optically coupled to a monolithic silicon detector performing the function of a zero voltage crossing bilateral triac driver, and is housed in a compact 4-pin mini-flat package. The lead pitch is 2.54mm. They are designed for use with a triac in the interface of logic systems to equipment powered from 115/240 VAC lines, such as solid state relays, industrial controls, motors, solenoids and consumer appliances.

Package Dimensions



Note:
All dimensions are in millimeters.

Absolute Maximum Ratings (T_A = 25°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		Rating	Units
TOTAL PACKAGE				
T_{STG}	Storage Temperature		-55 to +150	°C
T_{OPR}	Operating Temperature		-40 to +100	°C
EMITTER				
$I_{F\ (avg)}$	Continuous Forward Current		60	mA
$I_{F\ (pk)}$	Peak Forward Current (1µs pulse, 300pps.)		1	A
V_R	Reverse Input Voltage		6	V
P_D	Power Dissipation (No derating required over operating temp. range)		100	mW
DETECTOR				
$I_{T(RMS)}$	On-State RMS Current		70	mA (RMS)
V_{DRM}	Off-State Output Terminal Voltage	FODM3062/FODM3063	600	V
		FODM3082/FODM3083	800	
P_D	Power Dissipation (No derating required over operating temp. range)		300	mW

Electrical Characteristics (T_A = 25°C)

Individual Component Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Units
EMITTER						
V_F	Input Forward Voltage	I_F = 30mA			1.5	V
I_R	Reverse Leakage Current	V_R = 6V			100	µA
DETECTOR						
I_{DRM1}	Peak Blocking Current, Either Direction	Rated V_{DRM}, I_F = 0(1)			500	nA
dV/dt	Critical Rate of Rise of Off-State Voltage	I_F = 0 (Figure 1)(2)	600			V/µs

Transfer Characteristics

Symbol	DC Characteristics	Test Conditions	Device	Min.	Typ.*	Max.	Units
I_{FT}	LED Trigger Current	Main Terminal Voltage = 3V(3)	FODM3062			10	mA
			FODM3082				
			FODM3063			5	
			FODM3083				
I_H	Holding Current, Either Direction		All		300		µA
V_{TM}	Peak On-State Voltage, Either Direction	I_F = Rated I_{FT}, I_{TM} = 100mA peak	All			3	V

Zero Crossing Characteristics

Symbol	Characteristics	Test Conditions	Device	Min.	Typ.*	Max.	Units
V_{IH}	Inhibit Voltage, MT1-MT2 Voltage above which device will not trigger	I_F = Rated I_{FT}	All			20	V
IDRM2	Leakage in Inhibit State	I_F = Rated I_{FT}, Rated VDRM, Off-State	FODM3062 FODM3082			500	µA
			FODM3083			1000	

Isolation Characteristics

Characteristics	Test Conditions	Symbol	Device	Min.	Typ.*	Max.	Units
Steady State Isolation Voltage(4)	(1 Minute) R.H. = 40% to 60%	V_{ISO}	All	3750			VRMS

*All typicals at 25°C.

Notes:

1. Test voltage must be applied within dv/dt rating.
2. This is static dv/dt. See Figure 1 for test circuit. Commutating dv/dt is function of the load-driving thyristor(s) only.
3. All devices are guaranteed to trigger at an I_F value less than or equal to max I_{FT}. Therefore, recommended operating I_F lies between max I_{FT} (10mA for FODM3062/82, 5mA for FODM3063/83) and absolute max I_F (60 mA).
4. Steady state isolation voltage, V_{ISO}, is an internal device dielectric breakdown rating. For this test, pins 1 & 2 are common, and pins 3 & 4 are common.

Typical Performance Curves

Fig. 1 LED Forward Voltage vs. Forward Current

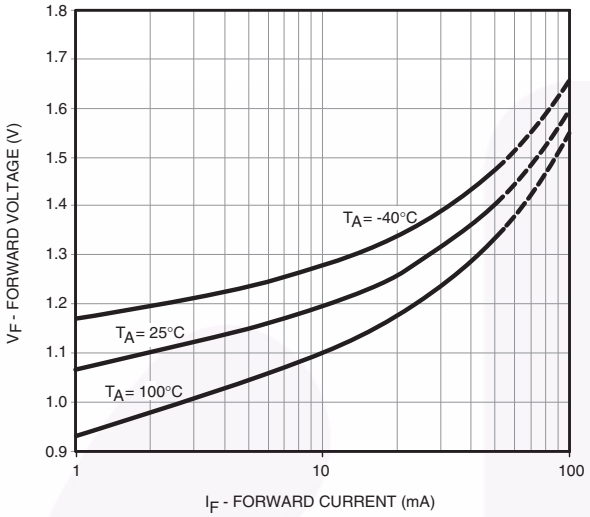


Fig. 2 Leakage Current vs. Ambient Temperature

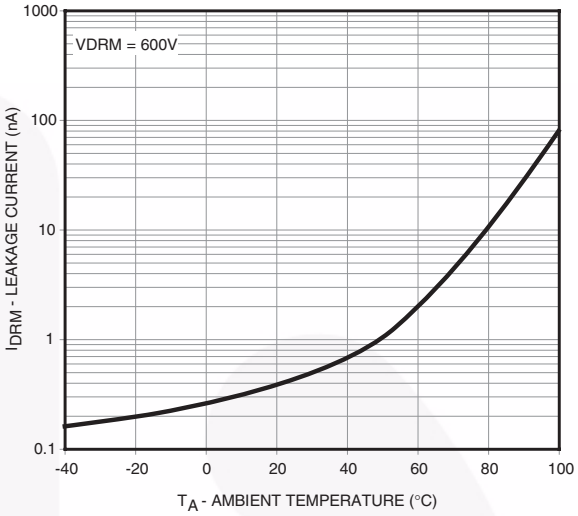


Fig. 3 Holding Current vs. Ambient Temperature

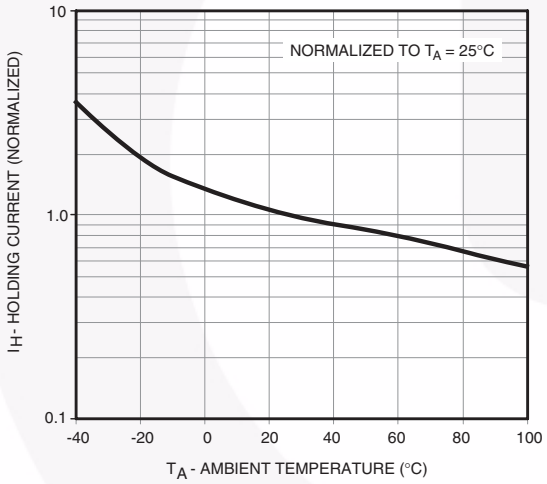
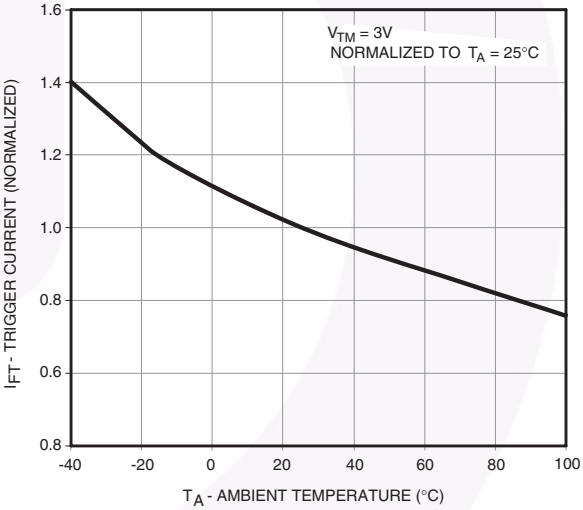


Fig. 4 Trigger Current vs. Ambient Temperature



Typical Performance Curves (Continued)

Fig. 5 LED Current Required to Trigger vs. LED Pulse Width

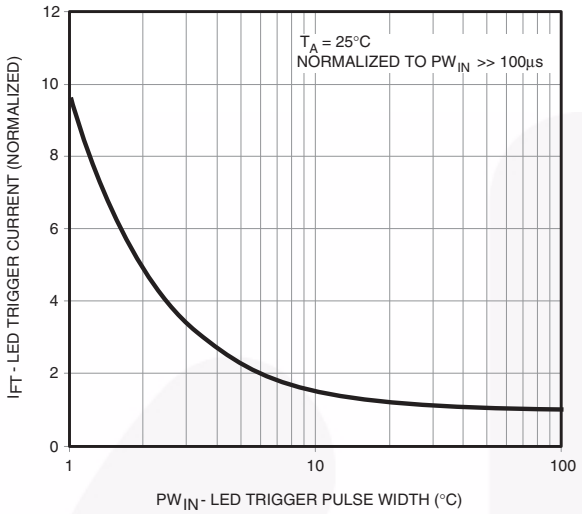


Fig. 6 Off-State Output Terminal Voltage vs. Ambient Temperature

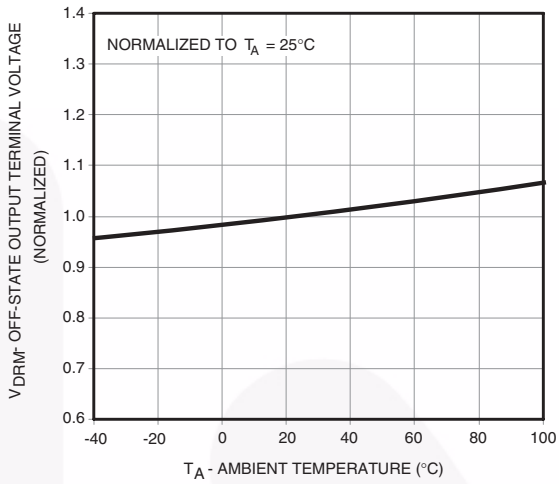
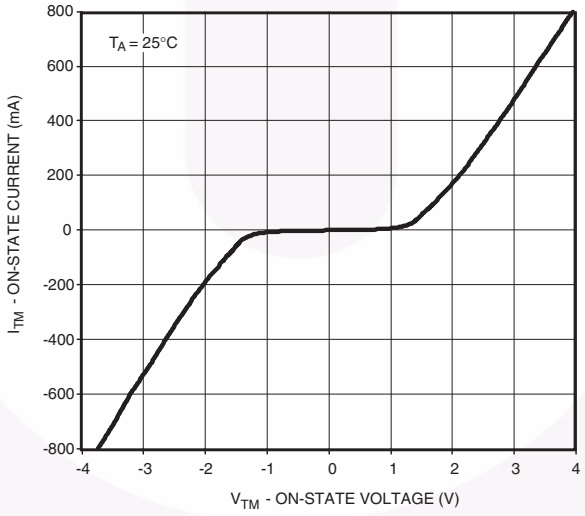
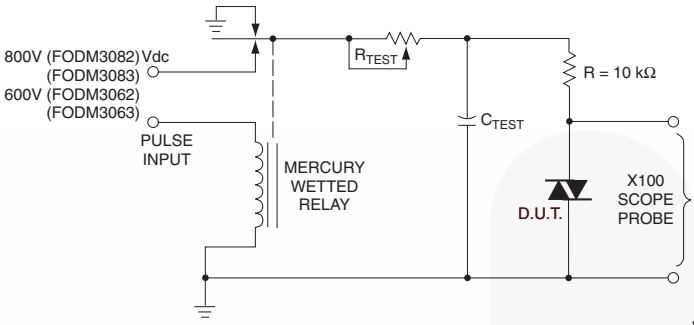


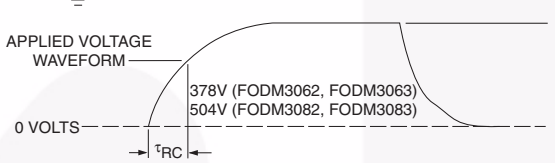
Fig. 7 On-State Characteristics



Typical Applications



1. The mercury wetted relay provides a high speed repeated pulse to the D.U.T.
2. 100x scope probes are used, to allow high speeds and voltages.
3. The worst-case condition for static dv/dt is established by triggering the D.U.T. with a normal LED input current, then removing the current. The variable RTEST allows the dv/dt to be gradually increased until the D.U.T. continues to trigger in response to the applied voltage pulse, even after the LED current has been removed. The dv/dt is then decreased until the D.U.T. stops triggering. tRC is measured at this point and recorded.



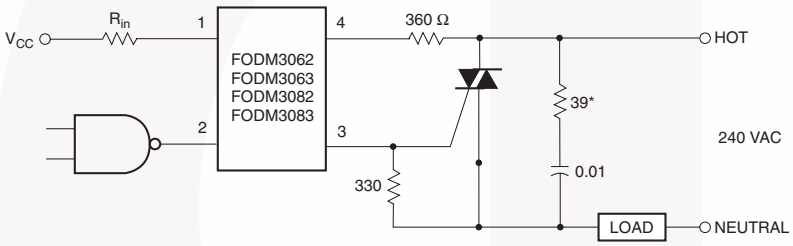
V_{max} = 800V (FODM3082, FODM3083)
= 600V (FODM3062, FODM3063)

$$dv/dt = \frac{0.63\ V_{max}}{\tau_{RC}} = \frac{378}{\tau_{RC}} \text{ (FODM3062, FODM3063)}$$

$$= \frac{504}{\tau_{RC}} \text{ (FODM3082, FODM3083)}$$

Note:
This optoisolator should not be used to drive a load directly. It is intended to be a trigger device only.

Figure 8. Static dv/dt Test Circuit

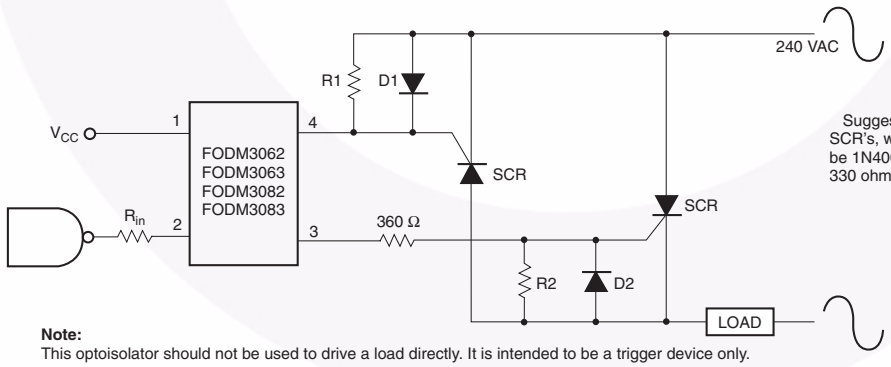


Typical circuit for use when hot line switching of 240VAC is required. In this circuit the "hot" side of the line is switched and the load connected to the cold or neutral side. The load may be connected to either the neutral or hot line.

R_{in} is calculated so that I_F is equal to the rated I_{FT} of the part, 5mA for the FODM3063/83 and 10mA for the FODM3062/82. The 39Ω resistor and 0.01μF capacitor are for snubbing of the triac and may or may not be necessary depending upon the particular triac and load used.

*For highly inductive loads (power factor < 0.5), change this value to 360 ohms.

Figure 9. Hot-Line Switching Application Circuit



Suggested method of firing two, back-to-back SCR's, with a Fairchild triac driver. Diodes can be 1N4001; resistors, R1 and R2, are optional 330 ohms.

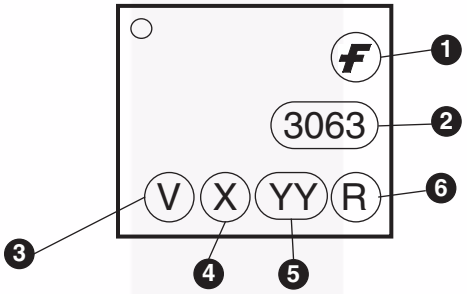
Note:
This optoisolator should not be used to drive a load directly. It is intended to be a trigger device only.

Figure 10. Inverse-Parallel SCR Driver Circuit (240VAC)

Ordering Information

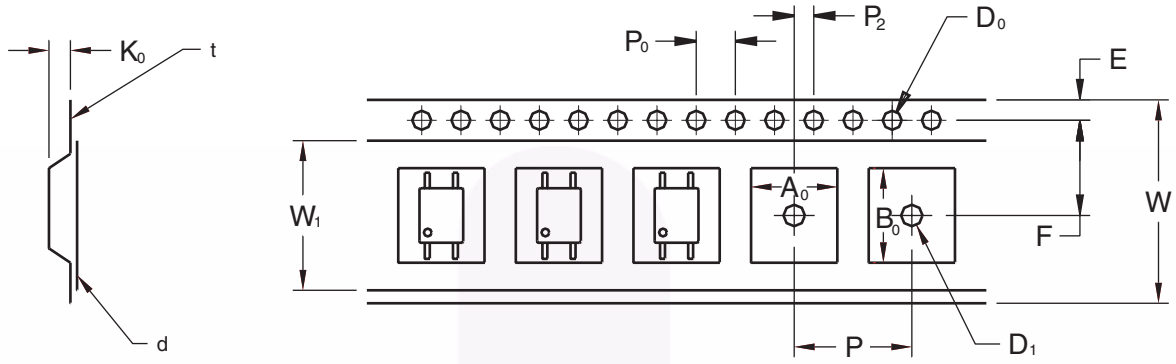
Option	Description
No option	Bulk (100 units/tube)
V	VDE Approved
R2	Tape and Reel (2500 units)
R2V	Tape and Reel (2500 units) and VDE Approved

Marking Information



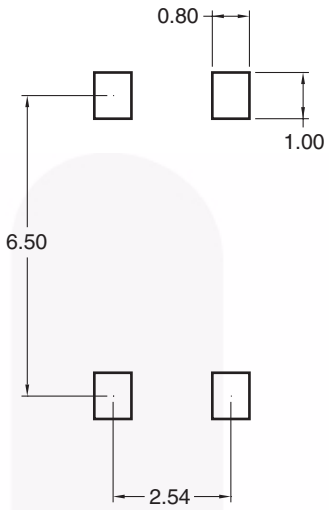
Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code
5	Two digit work week ranging from ‘01’ to ‘53’
6	Assembly package code

Tape and Reel Information



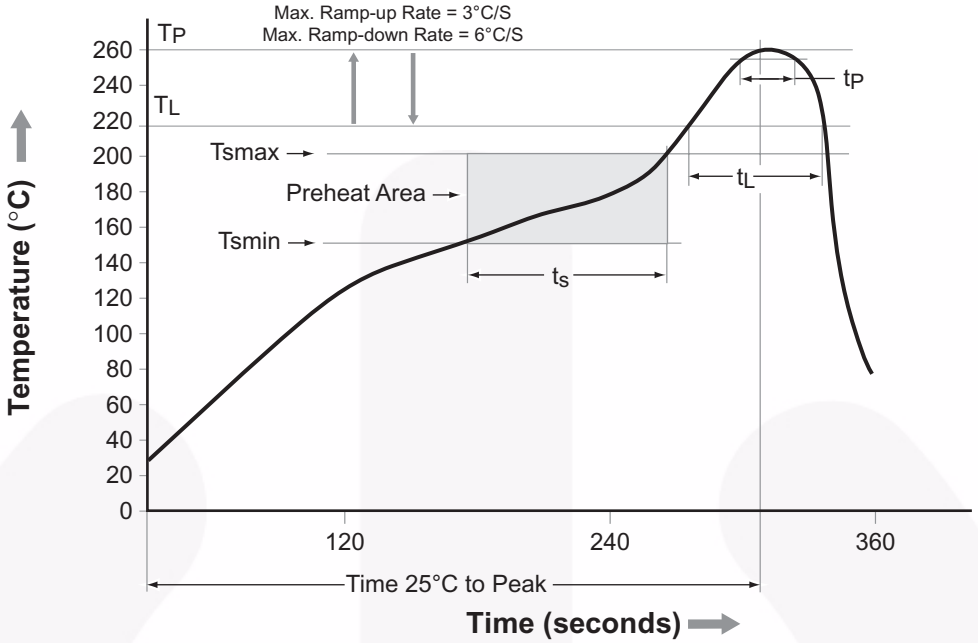
		2.54 Pitch
Description	**Symbol**	**Dimensions**
Tape Width	W	12.00±0.4
Tape Thickness	t	0.35±0.02
Sprocket Hole Pitch	P_0	4.00±0.20
Sprocket Hole Dia.	D_0	1.55±0.20
Sprocket Hole Location	E	1.75±0.20
Pocket Location	F	5.50±0.20
	P_2	2.00±0.20
Pocket Pitch	P	8.00±0.20
Pocket Dimension	A_0	4.75±0.20
	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. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (t_S) from (Tsmin to Tsmax)	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.

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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.

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