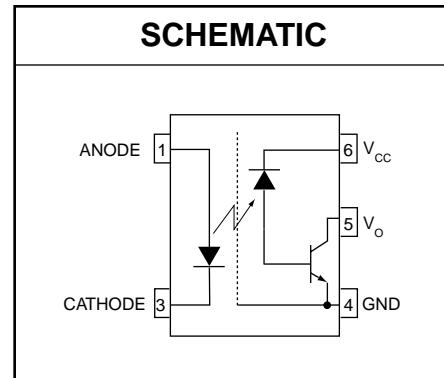
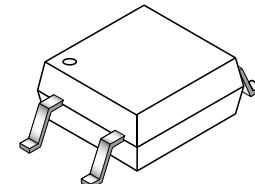
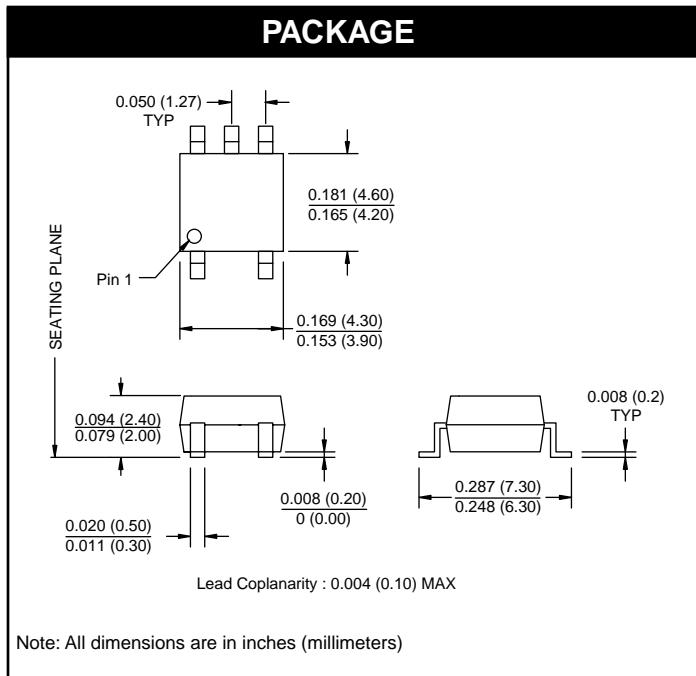


## FODM452

## FODM453



## DESCRIPTION

The FODM452 and FODM453 optocouplers consist of an AlGaAs LED optically coupled to a high speed photodetector transistor. The devices are housed in a compact 5-pin mini flat package for optimum mounting density. The FODM453 features a high CMR rating for optimum common mode transient immunity.

## FEATURES

- Compact 5-pin mini flat package
- High speed-1 MBit/s
- Superior CMR-15kV/μs at V<sub>CM</sub> = 1500V (FODM453)
- Performance guaranteed over temperature (0–70°C)
- U.L. recognized (File # E90700)
- VDE0884 recognized (File # 136480)
  - Ordering option V, e.g., FODM452V

## APPLICATIONS

- Line receivers
- Pulse transformer replacement
- Output interface to CMOS-LSTTL-TTL
- Wide bandwidth analog coupling

**FODM452**

**FODM453**

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

Parameter	Symbol	Value	Units
Storage Temperature	$T_{STG}$	-40 to +125	°C
Operating Temperature	$T_{OPR}$	-40 to +85	°C
<b>EMITTER</b>			
DC/Average Forward Input Current	$I_F$ (avg)	25	mA
Peak Forward Input Current (50% duty cycle, 1 ms P.W.)	$I_F$ (pk)	50	mA
Peak Transient Input Current - ( $\leq 1 \mu\text{s}$ P.W., 300 pps)	$I_F$ (trans)	1.0	A
Reverse Input Voltage	$V_R$	5	V
Input Power Dissipation (No derating required over specified operating temp range)	$P_D$	45	mW
<b>DETECTOR</b>			
Average Output Current	$I_O$ (avg)	8	mA
Peak Output Current	$I_O$ (pk)	16	mA
Supply Voltage	$V_{CC}$	-0.5 to 30	V
Output Voltage	$V_O$	-0.5 to 20	V
Output power dissipation (No derating required over specified operating temp range)	$P_D$	100	mW

**ELECTRICAL CHARACTERISTICS** ( $T_A = 0$  to  $70^\circ\text{C}$  Unless otherwise specified)

**INDIVIDUAL COMPONENT CHARACTERISTICS**

Parameter	Test Conditions	Symbol	Min	Typ**	Max	Unit
<b>EMITTER</b>	( $I_F = 16 \text{ mA}$ , $T_A = 25^\circ\text{C}$ )	$V_F$		1.60	1.7	V
Input Forward Voltage	( $I_F = 16 \text{ mA}$ )			1.8		
Input Reverse Breakdown Voltage	( $I_R = 10 \mu\text{A}$ )	$B_{VR}$	5.0			V
Temperature coefficient of forward voltage	( $I_F = 16 \text{ mA}$ )	$(\Delta V_F / \Delta T_A)$		-1.8		mV/°C
<b>DETECTOR</b>						
Logic high output current	( $I_F = 0 \text{ mA}$ , $V_O = V_{CC} = 5.5 \text{ V}$ ) ( $T_A = 25^\circ\text{C}$ )	$I_{OH}$		.001	0.5	μA
	( $I_F = 0 \text{ mA}$ , $V_O = V_{CC} = 15 \text{ V}$ ) ( $T_A = 25^\circ\text{C}$ )			.001	1	
	( $I_F = 0 \text{ mA}$ , $V_O = V_{CC} = 15 \text{ V}$ )				50	
Logic low supply current	( $I_F = 16 \text{ mA}$ , $V_O = \text{Open}$ ) ( $V_{CC} = 15 \text{ V}$ )	$I_{CCL}$		100	200	μA
Logic high supply current	( $I_F = 0 \text{ mA}$ , $V_O = \text{Open}$ , $V_{CC} = 15 \text{ V}$ ) ( $T_A = 25^\circ\text{C}$ )	$I_{CCH}$		0.05	1	μA
	( $I_F = 0 \text{ mA}$ , $V_O = \text{Open}$ ) ( $V_{CC} = 15 \text{ V}$ )				2	

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

## FODM452

## FODM453

### TRANSFER CHARACTERISTICS ( $T_A = 0$ to $70^\circ\text{C}$ Unless otherwise specified)

Parameter	Test Conditions	Symbol	Min	Typ**	Max	Unit
<b>COUPLED</b> Current transfer ratio ( $I_F = 16 \text{ mA}$ , $V_{CC} = 4.5 \text{ V}$ )	(Note 1) $T_A = 25^\circ\text{C}$ $V_{OL} = 0.4\text{V}$ $V_{OL} = 0.5\text{V}$	CTR	20		50	%
			15			
Logic low output voltage output voltage	$(I_F = 16 \text{ mA}, I_O = 3 \text{ mA})$ $(V_{CC} = 4.5 \text{ V}, T_A = 25^\circ\text{C})$	$V_{OL}$			0.4	V
					0.5	

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

### SWITCHING CHARACTERISTICS ( $T_A = 0$ to $70^\circ\text{C}$ unless otherwise specified., $V_{CC} = 5 \text{ V}$ )

Parameter	Test Conditions	Symbol	Device	Min	Typ**	Max	Unit
Propagation delay time to logic low	$(R_L = 1.9 \text{ k}\Omega, I_F = 16 \text{ mA})$ (Note 2) (Fig. 9) $T_A = 25^\circ\text{C}$	$T_{PHL}$			0.40	0.8	$\mu\text{s}$
	$(R_L = 1.9 \text{ k}\Omega, I_F = 16 \text{ mA})$ (Note 2) (Fig. 9)					1.0	$\mu\text{s}$
Propagation delay time to logic high	$(R_L = 1.9 \text{ k}\Omega, I_F = 16 \text{ mA})$ (Note 2) (Fig. 9) $T_A = 25^\circ\text{C}$	$T_{PLH}$			0.35	0.8	$\mu\text{s}$
	$(R_L = 1.9 \text{ k}\Omega, I_F = 16 \text{ mA})$ (Note 2) (Fig. 9)					1.0	$\mu\text{s}$
Common mode transient immunity at logic high	$(I_F = 0 \text{ mA}, V_{CM} = 10 \text{ V}_{P-P}, R_L = 1.9 \text{ k}\Omega)$ (Note 3) (Fig. 10) $T_A = 25^\circ\text{C}$	$ CM_H $	FODM452	5	15		$\text{KV}/\mu\text{s}$
	$(I_F = 0 \text{ mA}, V_{CM} = 1500 \text{ V}_{P-P})$ $T_A = 25^\circ\text{C}$ , ( $R_L = 1.9 \text{ k}\Omega$ ) (Note 3) (Fig. 10)		FODM453	15	40		$\text{KV}/\mu\text{s}$
Common mode transient immunity at logic low	$(I_F = 16 \text{ mA}, V_{CM} = 10 \text{ V}_{P-P}, R_L = 1.9 \text{ k}\Omega)$ (Note 3) (Fig. 10) $T_A = 25^\circ\text{C}$	$ CM_L $	FODM452	5	15		$\text{KV}/\mu\text{s}$
	$(I_F = 16 \text{ mA}, V_{CM} = 1500 \text{ V}_{P-P})$ $(R_L = 1.9 \text{ k}\Omega)$ $(T_A = 25^\circ\text{C})$ (Note 3) (Fig. 10)		FODM453	15	40		$\text{KV}/\mu\text{s}$
Bandwidth	$R_L = 100\Omega$	BW			3		MHz

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

**FODM452**

**FODM453**

**ISOLATION CHARACTERISTICS ( $T_A = 0$  to  $70^\circ\text{C}$  Unless otherwise specified)**

Characteristics	Test Conditions	Symbol	Min	Typ**	Max	Unit
Withstand insulation test voltage	(RH $\leq 50\%$ , $T_A = 25^\circ\text{C}$ ) (Note 4) (t = 1 min.)	$V_{ISO}$	3750			$V_{RMS}$
Capacitance (input to output)	(Note 4) (f = 1 MHz)	$C_{I-O}$		0.2		pF

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

**Notes**

1. Current Transfer Ratio is defined as a ratio of output collector current,  $I_O$ , to the forward LED input current,  $I_F$  times 100%.
2. The 1.9 k $\Omega$  load represents 1 TTL unit load of 1.6 mA and 5.6 k $\Omega$  pull-up resistor.
3. Common mode transient immunity in logic high level is the maximum tolerable (positive)  $dV_{cm}/dt$  on the leading edge of the common mode pulse signal  $V_{CM}$ , to assure that the output will remain in a logic high state (i.e.,  $V_O > 2.0$  V). Common mode transient immunity in logic low level is the maximum tolerable (negative)  $dV_{cm}/dt$  on the trailing edge of the common mode pulse signal,  $V_{CM}$ , to assure that the output will remain in a logic low state (i.e.,  $V_O < 0.8$  V).
4. Device is considered a two terminal device: Pins 1, and 3 are shorted together and Pins 4, 5, and 6 are shorted together.

## FODM452

## FODM453

### TYPICAL PERFORMANCE CURVES

Fig. 1 Input Forward Current vs Forward Voltage

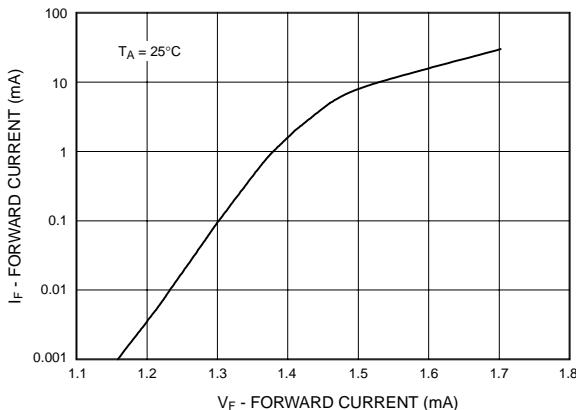


Fig. 2 Normalized Current Transfer Ratio vs. Input Current

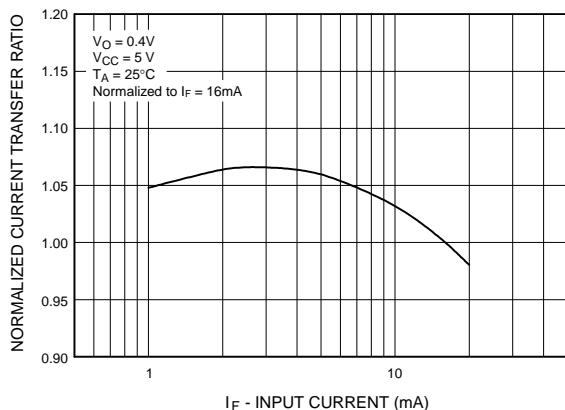


Fig. 3 Normalized Current Transfer Ratio vs. Ambient Temperature

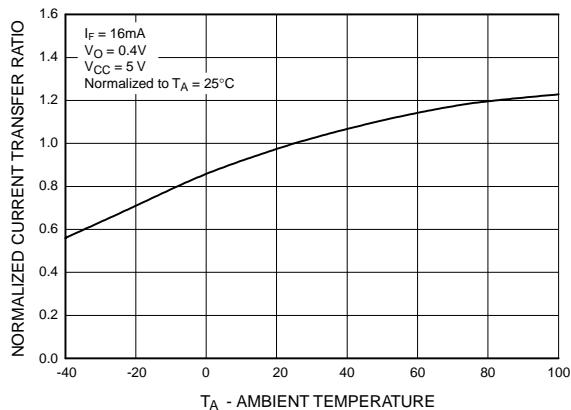


Fig. 4 Logic High Output Current vs. Ambient Temperature

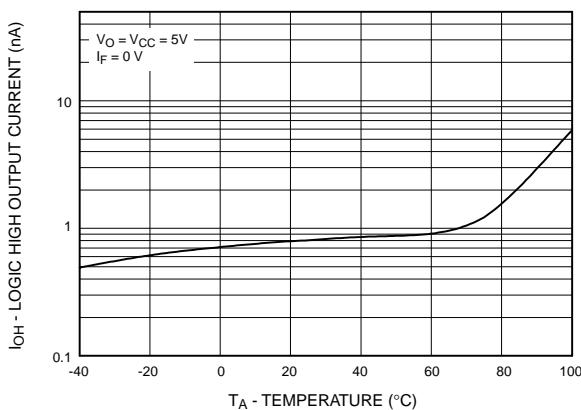


Fig. 5 DC and Pulsed Transfer Characteristics

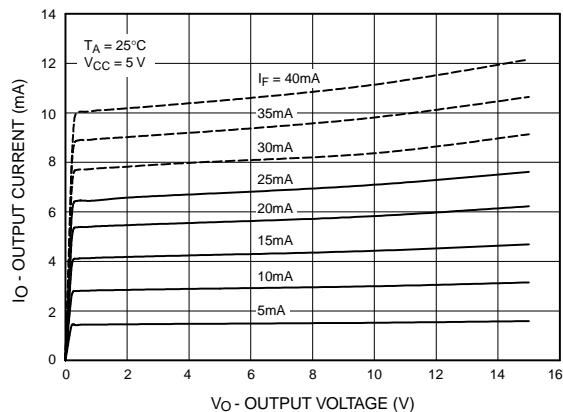
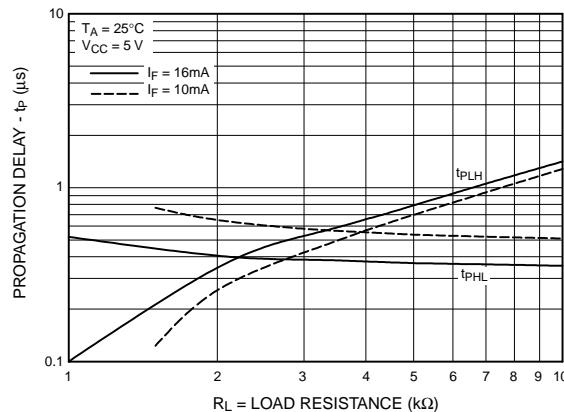


Fig. 6 Propagation Delay vs. Load Resistance

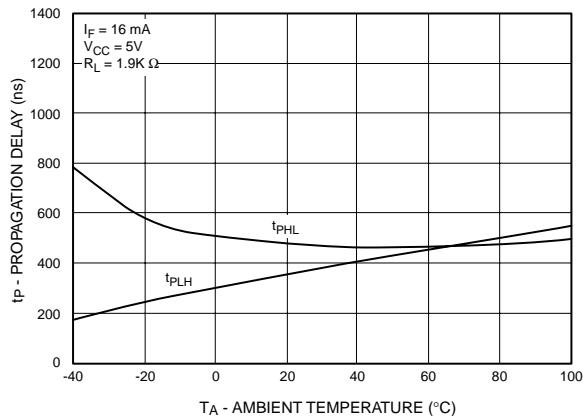


## FODM452

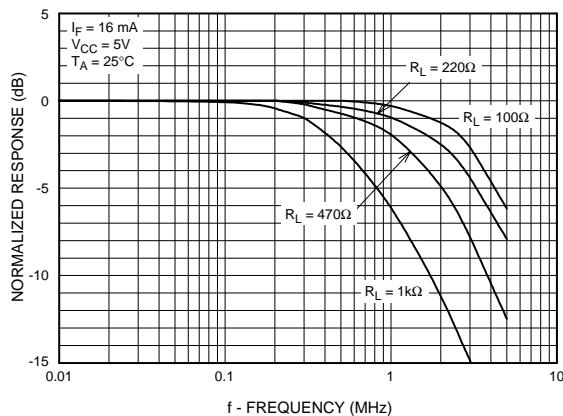
## FODM453

### TYPICAL PERFORMANCE CURVES

**Fig. 7 Propagation Delay vs. Ambient Temperature**

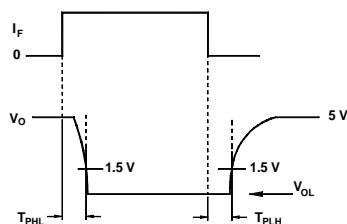
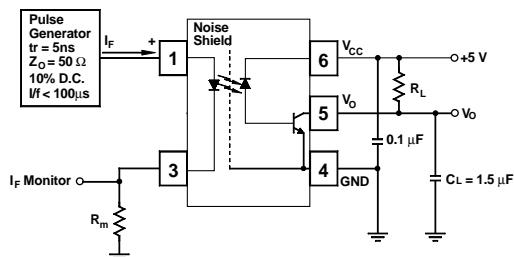


**Fig. 8 Frequency Response**

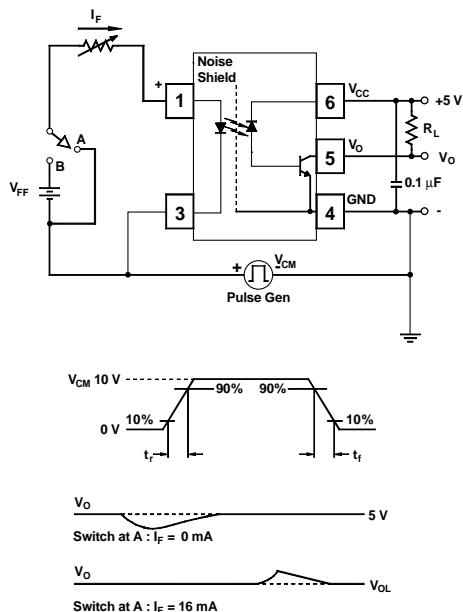


**FODM452**

**FODM453**



**Fig. 9 Switching Time Test Circuit**

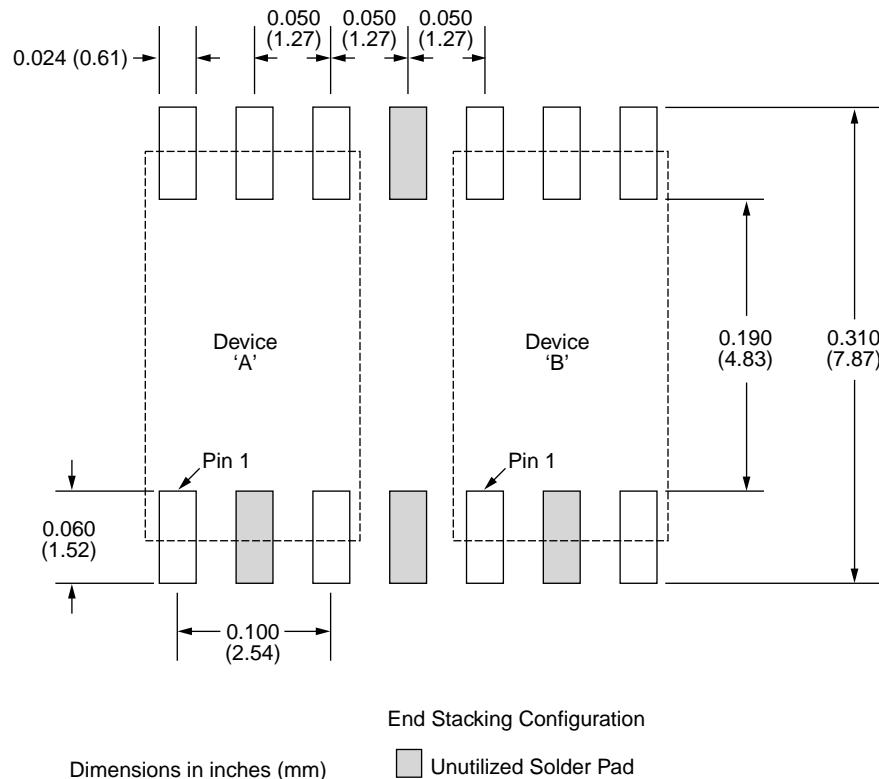


**Fig. 10 Common Mode Immunity Test Circuit**

**FODM452**

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**FOOTPRINT DRAWING FOR PCB LAYOUT**



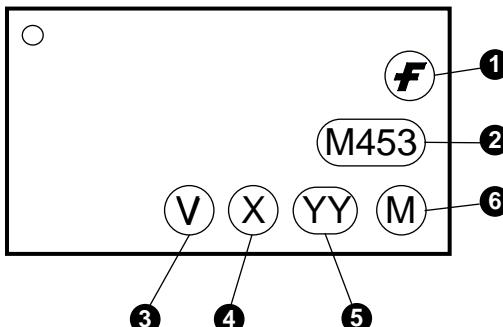
## FODM452

## FODM453

### ORDERING INFORMATION

Option	Description
R1	Tape and Reel (500 per reel)
R2	Tape and Reel (2500 per reel)
V	VDE0884
R1V	VDE0884, Tape and Reel (500 per reel)
R2V	VDE0884, Tape and Reel (2500 per reel)

### MARKING INFORMATION

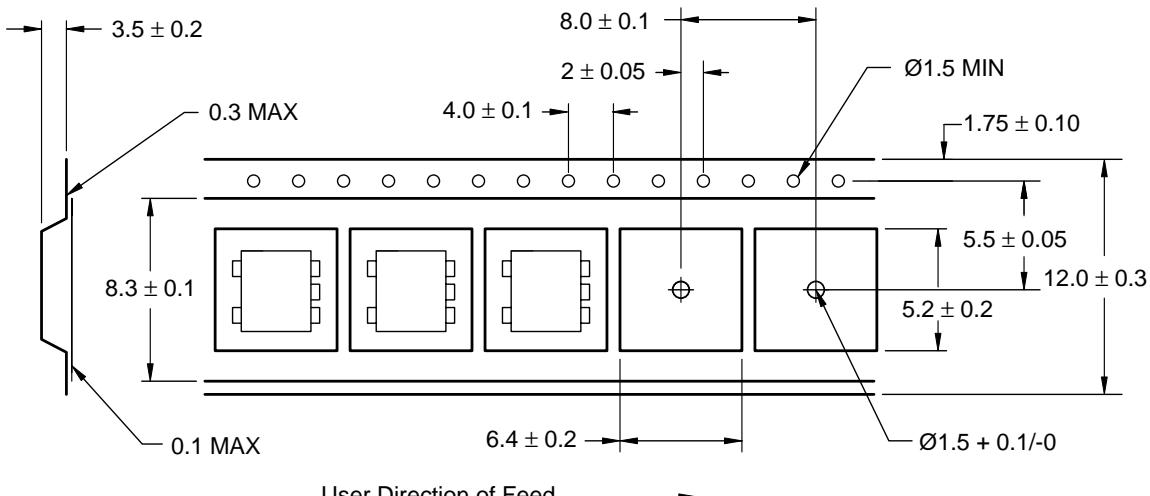


Definitions	
1	Fairchild logo
2	Device number
3	VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table)
4	One digit year code, e.g., '3'
5	Two digit work week ranging from '01' to '53'
6	Assembly package code

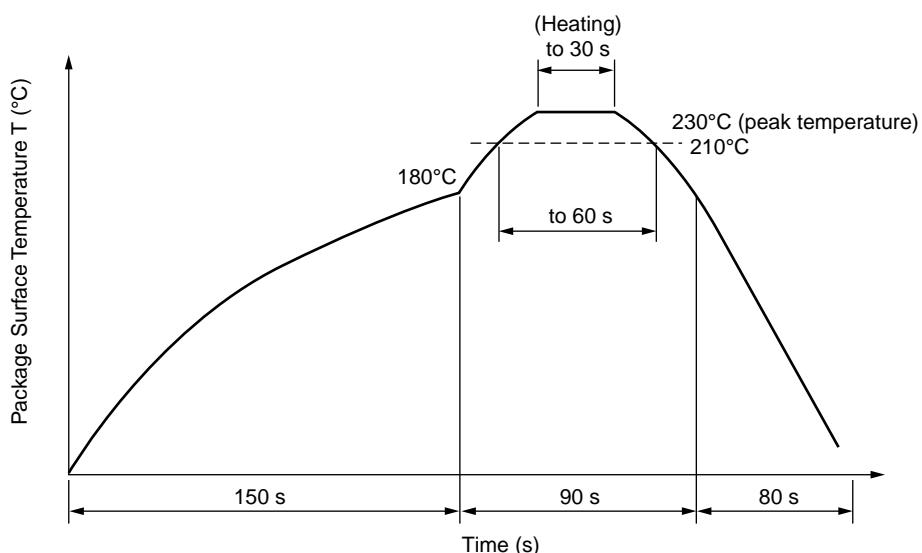
**FODM452**

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**Carrier Tape Specifications**



**Reflow 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



# 5-PIN MINI FLAT PACKAGE HIGH SPEED TRANSISTOR OPTOCOUPLES

## FODM452

## FODM453

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