

TOSHIBA Bipolar Digital Integrated Circuit Silicon Monolithic

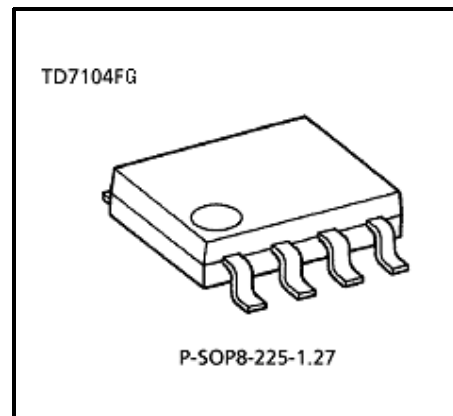
# TD7104FG

## ECL Prescaler for Digital Synthesized Tuner

The TD7104FG is a general-purpose fixed dividing prescaler developed for digital tuning system of the PLL frequency synthesizer type, and can operate at up to 1 GHz.

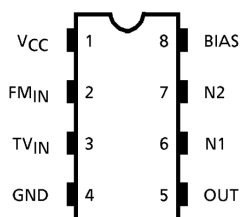
### Features

- Maximum operating frequency 1 GHz (at 1 / 8 dividing mode)
- Dividing ratios of 1 / 8, 1 / 4, and 1 / 2 are available.
- Independent TV and FM inputs are provided.  
In FM mode, this IC can function as a buffer amplifier (1 / 1 dividing).
- The built in input amplifier contributes to realizing high input voltage sensitivity.
- Built in standby circuit

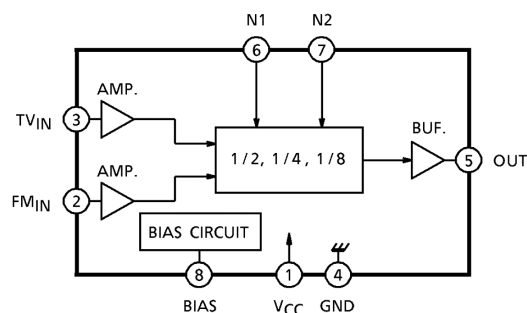


Weight  
P-SOP8- 225-1.27 : 76 mg (typ.)

### Pin Connection



### Block Diagram



**Pin Function**

Pin No.	Symbol	Pin Name	Function And Description	Remarks
1	V <sub>CC</sub>	Power supply terminal	Applies voltage of V <sub>CC</sub> = 3.0 to 5.5V	—
2	FM <sub>IN</sub>	FM local OSC. signal input terminal	Inputs local oscillation signal in FM band. f <sub>IN</sub> = 50 to 200MHz, FM <sub>IN</sub> input signal is output by a 1 / 1 dividing ratio (buffer amplifier).	Built-in input Amp. provided
3	TV <sub>IN</sub>	TV local OSC. signal input terminal	Inputs local oscillation signal in TV band. F <sub>IN</sub> = 50M to 1.0GHz, TV <sub>IN</sub> input signal is output by a 1 / 8, 1 / 4, or 1 / 2 dividing ratio, which is controlled through N1 and N2 input.	Built-in input Amp. provided
4	GND	Ground terminal	Grounds.	—
5	Out	Dividing signal output terminal	Outputs dividing signal.	—
6	N1	Dividing ratio selecting control terminal	These inputs control the selection of a dividing ratio among 1 / 1, 1 / 2, 1 / 4, and 1 / 8. FM <sub>IN</sub> terminal is selected at N1 = N2 = "L" level (1 / 1 dividing). The truth table is shown below.	—
7	N2			
8	BIAS	BIAS terminal	Connects capacitors on bias circuit. Change this pin to low to convert the IC is to stand-by mode.	—

**Truth Table**

Receiving Band	Input Terminal	Operating Frequency Range	Dividing Ratio	N1	N2
FM	FM <sub>IN</sub>	50M~200MHz	÷1	0	0
TV	TV <sub>IN</sub>	50M~400MHz	÷2	1	0
		100M~500MHz	÷4	0	1
		100M~1.0GHz	÷8	1	1

## Maximum Ratings (Ta = 25°C)

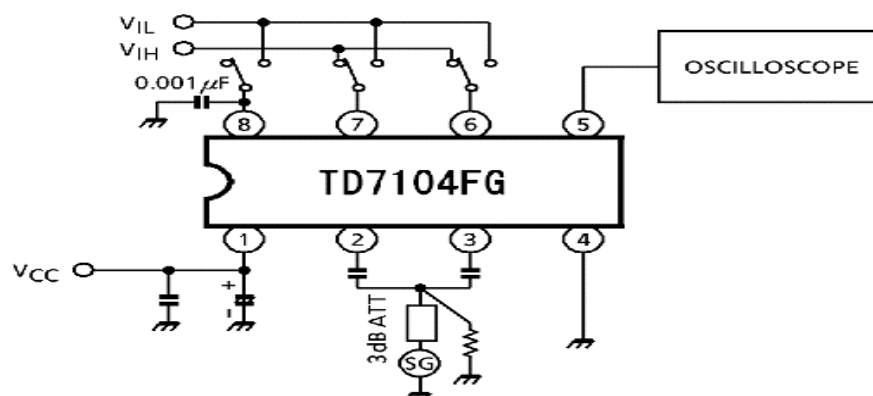
Characteristic	Symbol	Rating	Unit
Power supply voltage	V <sub>CC</sub>	6.5	V
Power dissipation	P <sub>D</sub>	450 (200) (*)	mW
Input voltage	V <sub>in</sub>	-0.3~V <sub>CC</sub> + 0.3	V
Operating temperature	T <sub>opr</sub>	-30~75	°C
Storage temperature	T <sub>stg</sub>	-55~150	°C

(\*) Flat package

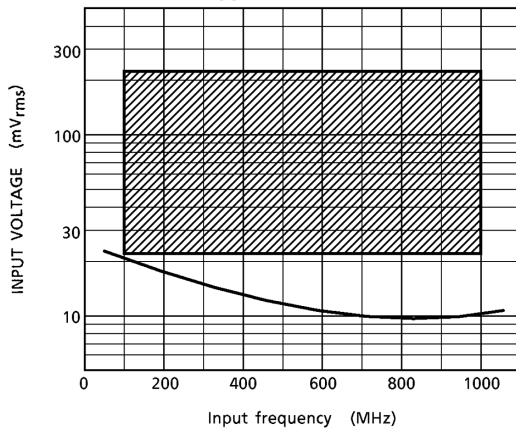
## Electrical Characteristics (unless otherwise specified, V<sub>CC</sub> = 3.0~6.0V, Ta = -30~75°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit	
Power supply voltage	V <sub>CC</sub>	—	—	3.0	~	6.0	V	
Operating supply current	I <sub>CC1</sub>	—	V <sub>CC</sub> = 5.0V, ÷8, ÷4	—	14	20	mA	
	I <sub>CC2</sub>	—	V <sub>CC</sub> = 5.0V, ÷2	—	11	18		
	I <sub>CC3</sub>	—	V <sub>CC</sub> = 5.0V, FM mode	—	7	13		
Stand-by current	I <sub>CS</sub>	—	V <sub>CC</sub> = 5.0V, BIAS = GND	—	30	70	µA	
Operating frequency range	f <sub>IN1</sub>	1	÷8, TV <sub>IN</sub>	100	—	1000	MHz	
	f <sub>IN2</sub>		÷4, TV <sub>IN</sub>	100	—	500		
	f <sub>IN3</sub>		÷2, TV <sub>IN</sub>	50	—	400		
	f <sub>IN4</sub>		FM mode, FM <sub>IN</sub>	50	—	200		
Input voltage range	V <sub>IN1</sub>	1	TV <sub>IN</sub> (÷8, ÷4)	22.0	—	220	mV <sub>rms</sub>	
	V <sub>IN2</sub>		TV <sub>IN</sub> (÷2)	f <sub>IN</sub> = 50~100MHz	35.0	—		220
				f <sub>IN</sub> = 100~400MHz	22.0	—		220
V <sub>IN3</sub>	FM <sub>IN</sub>	22.0	—	220				
Output amplitude	V <sub>OUT</sub>	1	Out, C <sub>L</sub> = 3pF	0.4	0.5	—	V <sub>p-p</sub>	
Input voltage	"H" level	V <sub>IH</sub>	—	N1, N2, BIAS	2.5	—	V <sub>CC</sub>	V
	"L" level	V <sub>IL</sub>	—	N1, N2, BIAS	0	—	0.8	
Input current	"H" level	I <sub>IH</sub>	—	N1, N2, BIAS, V <sub>CC</sub> = 5.0V V <sub>IH</sub> = 4.0V	—	—	100	µA
	"L" level	I <sub>IL</sub>	—	N1, N2, BIAS, V <sub>CC</sub> = 5.0V V <sub>IL</sub> = 1.0V	—	—	10	

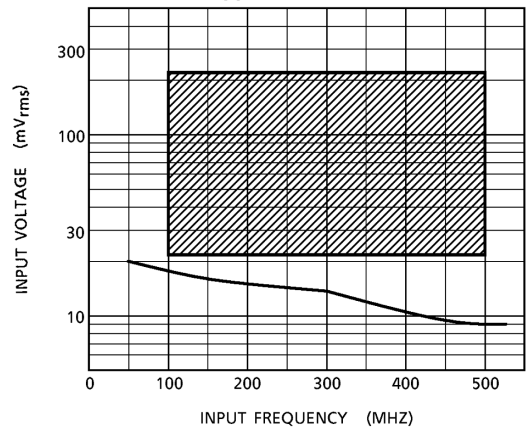
## Test Circuit 1 (input voltage sensitivity)



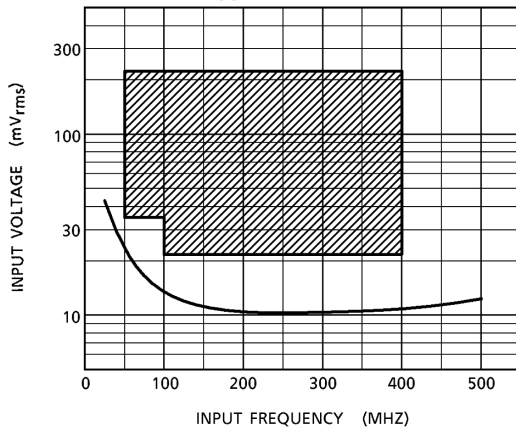
**1/8 MODE INPUT VOLTAGE SENSITIVITY**  
( $V_{CC} = 5.0V, T_a = 25^\circ C$ )



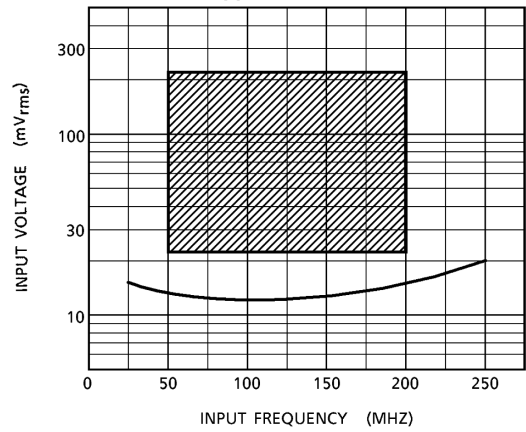
**1/4 MODE INPUT VOLTAGE SENSITIVITY**  
( $V_{CC} = 5.0V, T_a = 25^\circ C$ )



**1/2 MODE INPUT VOLTAGE SENSITIVITY**  
( $V_{CC} = 5.0V, T_a = 25^\circ C$ )



**1/1 MODE INPUT VOLTAGE SENSITIVITY**  
( $V_{CC} = 5.0V, T_a = 25^\circ C$ )

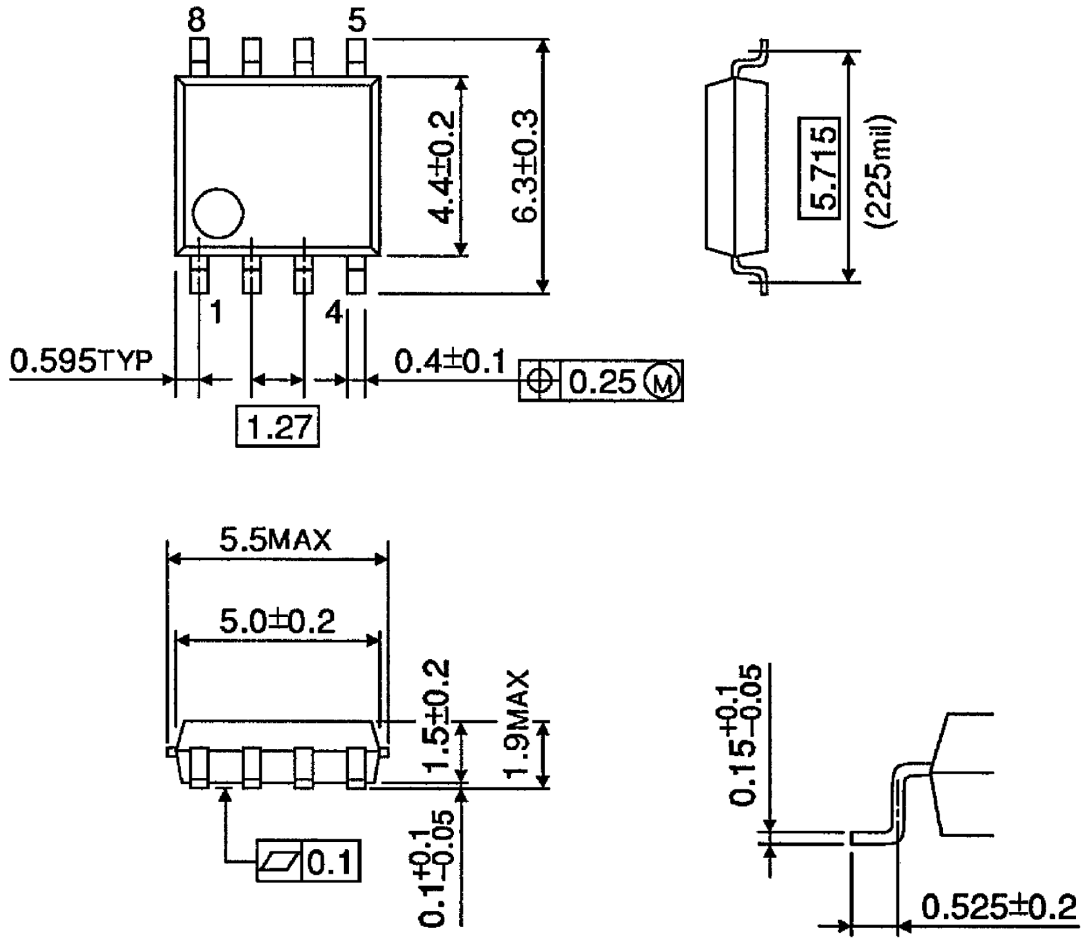


(Note) Operating range ( $V_{CC} = 3.0\sim 6.0V, T_a = -30\sim 75^\circ C$ )

**Package Dimensions**

SOP8-P-225-1.27

Unit : mm



Weight: 76 mg (typ.)

Regarding solderability, the following conditions have been confirmed:

- Solderability
  - (1) Use of Sn-63Pb solder bath
    - solder bath temperature = 230°C
    - dipping time = 5 seconds
    - the number of times = once
    - use of R-type flux
  - (2) Use of Sn-3.0Ag-0.5Cu solder bath
    - solder bath temperature = 245°C
    - dipping time = 5 seconds
    - the number of times = once
    - use of R-type flux

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