

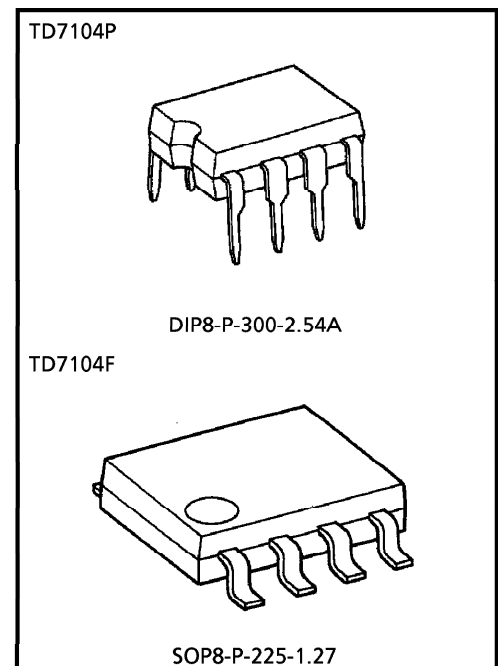
# TD7104P, TD7104F

## ECL PRESCALER FOR DIGITAL SYNTHESIZED TUNER

TD7104P, TD7104F are general-purpose fixed dividing prescaler developed for digital tuning system of PLL frequency synthesizer type, and can operate up to 1GHz.

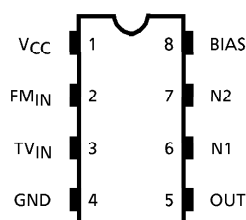
### FEATURES

- Maximum operating frequency 1GHz.  
(at 1/8 dividing mode)
- Dividing ratios of 1/8, 1/4, and 1/2 are provided.
- 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 stand-by circuit

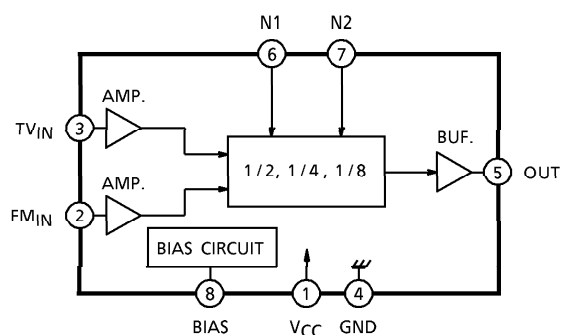


Weight  
 DIP8-P-300-2.54A : 0.45g (Typ.)  
 SOP8-P-225-1.27 : 0.76g (Typ.)

### 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 1/1 dividing (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 1/8, 1/4, or 1/2 dividing, which is controlled with 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 into Low, the IC is turned 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)

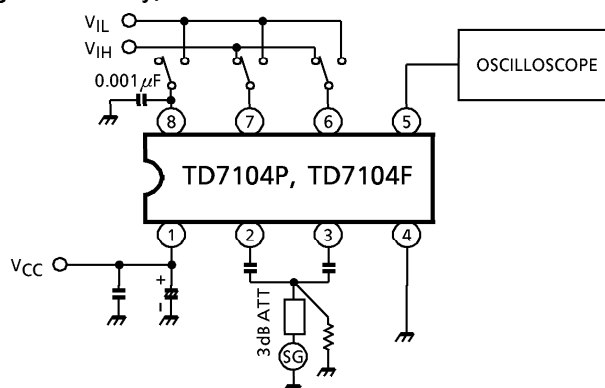
CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	$V_{CC}$	6.5	V
Power Dissipation	$P_D$	450 (200) (*)	mW
Input Voltage	$V_{in}$	$-0.3 \sim V_{CC} + 0.3$	V
Operating Temperature	$T_{opr}$	$-30 \sim 75$	°C
Storage Temperature	$T_{stg}$	$-55 \sim 150$	°C

(\*) Flat Package

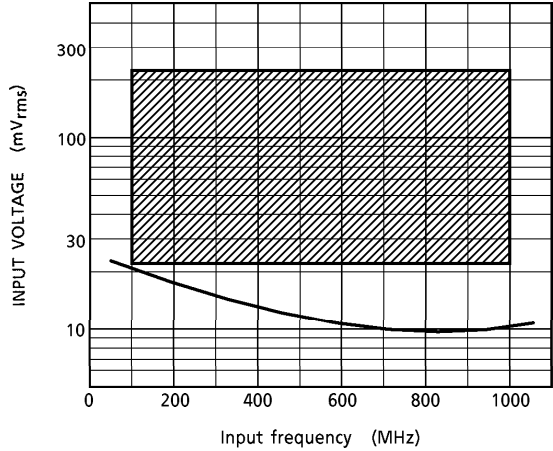
ELECTRICAL CHARACTERISTICS (Unless otherwise specified,  $V_{CC} = 3.0 \sim 6.0V$ ,  $T_a = -30 \sim 75^\circ C$ )

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply Voltage	$V_{CC}$	—	—	3.0	~	6.0	V
Operating Supply Current	$I_{CC1}$	—	$V_{CC} = 5.0V, \div 8, \div 4$	—	14	20	mA
	$I_{CC2}$	—	$V_{CC} = 5.0V, \div 2$	—	11	18	
	$I_{CC3}$	—	$V_{CC} = 5.0V, FM \text{ mode}$	—	7	13	
Stand-by Current	$I_{CS}$	—	$V_{CC} = 5.0V, BIAS = GND$	—	30	70	$\mu A$
Operating Frequency Range	$f_{IN1}$	1	$\div 8, TV_{IN}$	100	—	1000	MHz
	$f_{IN2}$		$\div 4, TV_{IN}$	100	—	500	
	$f_{IN3}$		$\div 2, TV_{IN}$	50	—	400	
	$f_{IN4}$		FM mode, $FM_{IN}$	50	—	200	
Input Voltage Range	$V_{IN1}$	1	$TV_{IN} (\div 8, \div 4)$	22.0	—	220	mV <sub>rms</sub>
	$V_{IN2}$		$TV_{IN} (\div 2)$	$f_{IN} = 50 \sim 100MHz$ 35.0	—	220	
	$V_{IN3}$		$FM_{IN}$	$f_{IN} = 100 \sim 400MHz$ 22.0	—	220	
Output Amplitude	$V_{OUT}$	1	OUT, $C_L = 3pF$	0.4	0.5	—	V <sub>p-p</sub>
Input Voltage	"H" Level	$V_{IH}$	—	N1, N2, BIAS	2.5	—	V
	"L" Level	$V_{IL}$	—	N1, N2, BIAS	0	—	
Input Current	"H" Level	$I_{IH}$	—	N1, N2, BIAS, $V_{CC} = 5.0V$ $V_{IH} = 4.0V$	—	100	$\mu A$
	"L" Level	$I_{IL}$	—	N1, N2, BIAS, $V_{CC} = 5.0V$ $V_{IL} = 1.0V$	—	10	

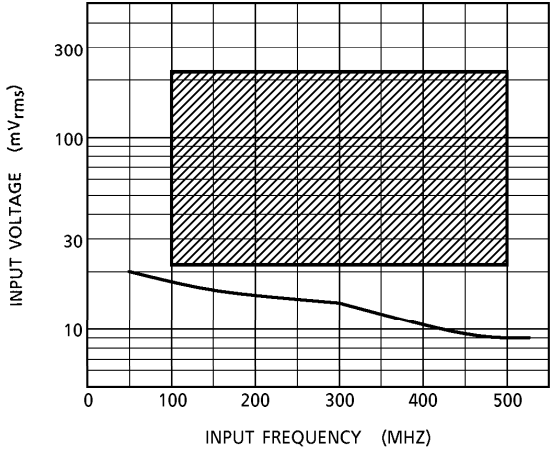
## TEST CIRCUIT 1 (Input voltage sensitivity)



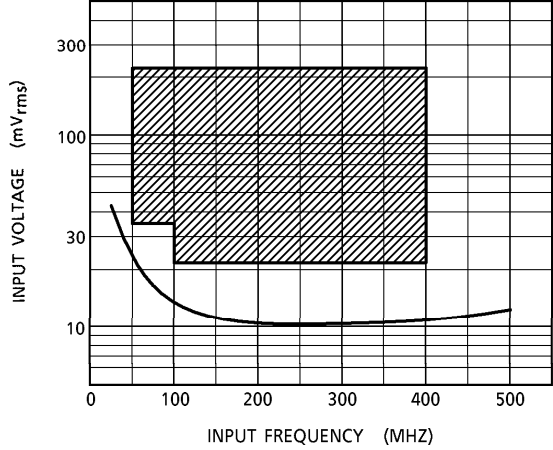
1/8 MODE INPUT VOLTAGE SENSITIVITY  
( $V_{CC} = 5.0V$ ,  $T_a = 25^\circ C$ )



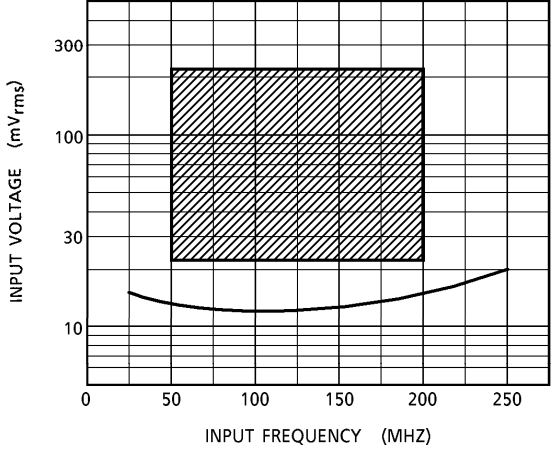
1/4 MODE INPUT VOLTAGE SENSITIVITY  
( $V_{CC} = 5.0V$ ,  $T_a = 25^\circ C$ )




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



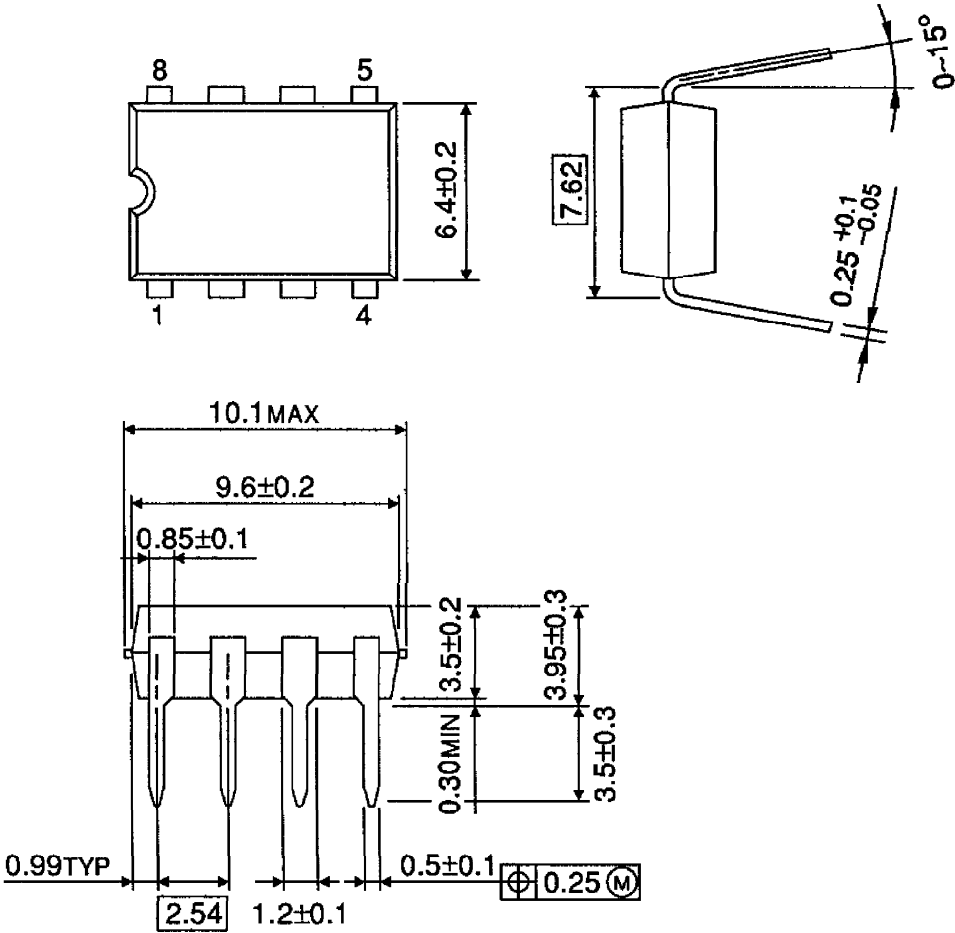
1/1 MODE INPUT VOLTAGE SENSITIVITY  
( $V_{CC} = 5.0V$ ,  $T_a = 25^\circ C$ )



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

PACKAGE DIMENSIONS  
DIP8-P-300-2.54A

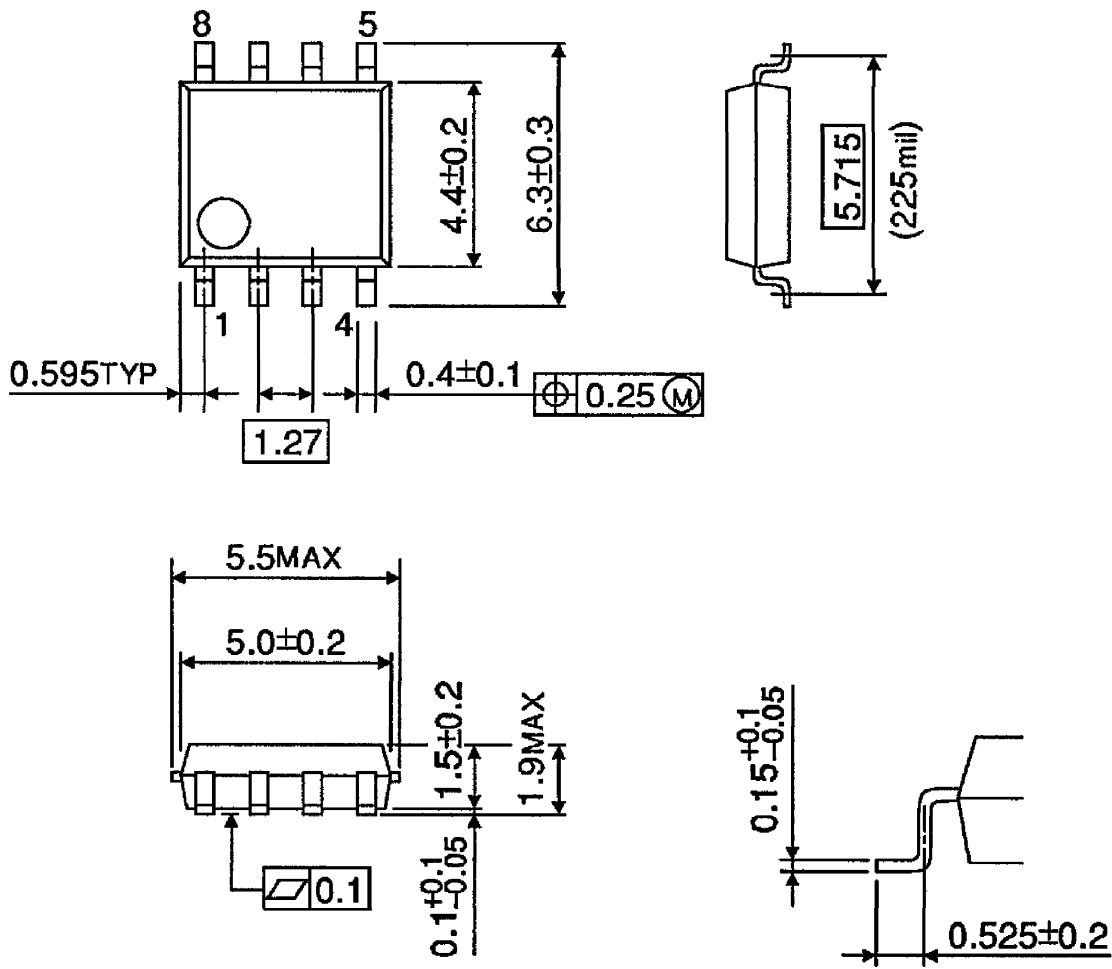
Unit : mm



Weight : 0.45g (Typ.)

PACKAGE DIMENSIONS  
SOP8-P-225-1.27

Unit : mm



Weight : 0.76g (Typ.)

**RESTRICTIONS ON PRODUCT USE**

000707EBA

- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.