

TOSHIBA Bipolar Digital Integrated Circuit Silicon Monolithic

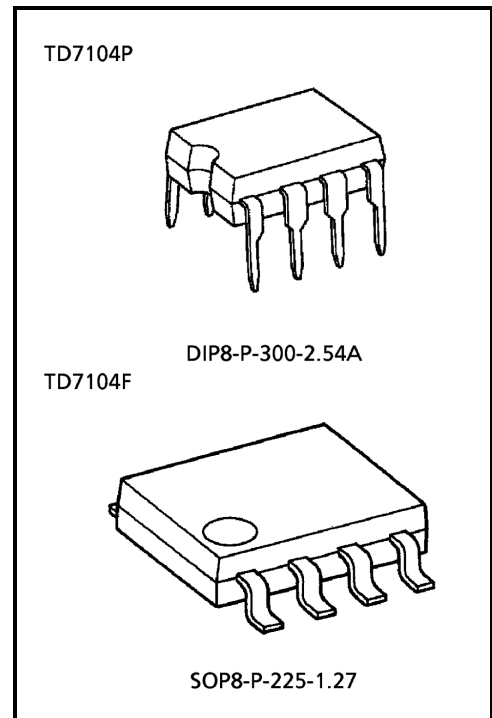
TD7104P, TD7104F

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.

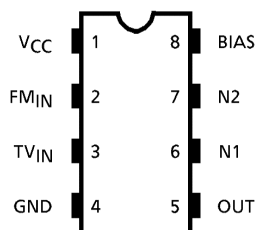
Features

- Maximum operating frequency 1GHz.
(at 1 / 8 dividign 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

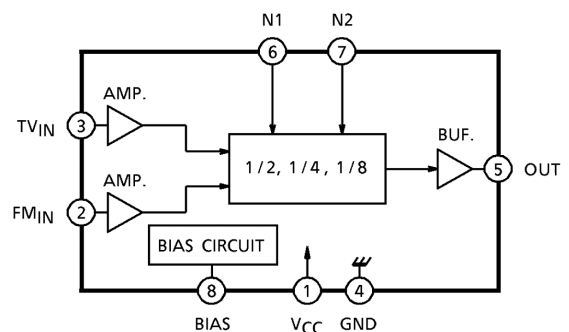


Weight
 DIP8-P-300-2.54A: 0.45g (typ.)
 SOP8-P-225-1.27: 0.76g (typ.)

Pin Connection



Block Diagram



Pin Function

| Pin No. | Symbol | Pin Name | Function And Description | Remarks |
|---------|------------------|---|---|------------------------------|
| 1 | V _{CC} | Power supply terminal | Applies voltage of V _{CC} = 3.0 to 5.5V | — |
| 2 | FM _{IN} | FM local OSC. signal input terminal | Inputs local oscillation signal in FM band. f _{IN} = 50 to 200MHz, FM _{IN} input signal is output by 1 / 1 dividing (buffer amplifier). | Built-in input Amp. provided |
| 3 | TV _{IN} | TV local OSC. signal input terminal | Inputs local oscillation signal in TV band. F _{IN} = 50M to 1.0GHz, TV _{IN} 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 _{IN} 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 _{IN} | 50M~200MHz | +1 | 0 | 0 |
| TV | TV _{IN} | 50M~400MHz | +2 | 1 | 0 |
| | | 100M~500MHz | +4 | 0 | 1 |
| | | 100M~1.0GHz | +8 | 1 | 1 |

Maximum Ratings (Ta = 25°C)

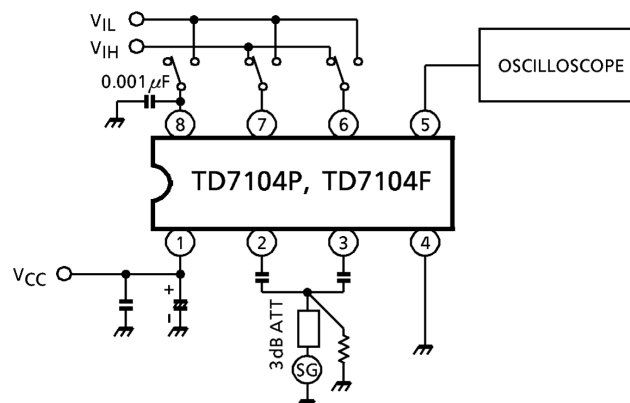
| Characteristic | Symbol | Rating | Unit |
|-----------------------|------------------|----------------------------|------|
| Power supply voltage | V _{CC} | 6.5 | V |
| Power dissipation | P _D | 450 (200) (*) | mW |
| Input voltage | V _{in} | -0.3~V _{CC} + 0.3 | V |
| Operating temperature | T _{opr} | -30~75 | °C |
| Storage temperature | T _{stg} | -55~150 | °C |

(*) Flat package

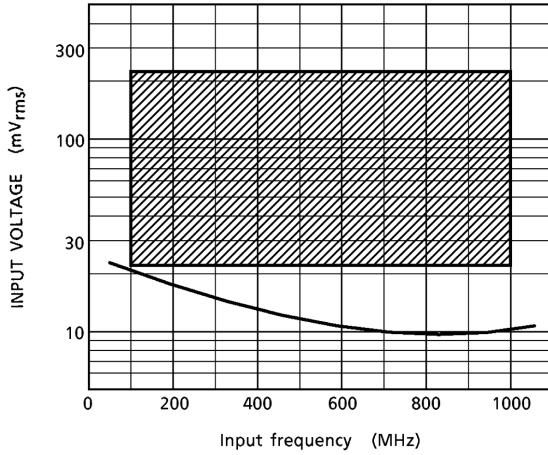
Electrical Characteristics (unless otherwise specified, V_{CC} = 3.0~6.0V, Ta = -30~75°C)

| 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, ÷8, ÷4 | — | 14 | 20 | mA | |
| | I _{CC2} | — | V _{CC} = 5.0V, ÷2 | — | 11 | 18 | | |
| | I _{CC3} | — | V _{CC} = 5.0V, FM mode | — | 7 | 13 | | |
| Stand-by current | I _{CS} | — | V _{CC} = 5.0V, BIAS = GND | — | 30 | 70 | µA | |
| Operating frequency range | f _{IN1} | 1 | ÷8, TV _{IN} | 100 | — | 1000 | MHz | |
| | f _{IN2} | | ÷4, TV _{IN} | 100 | — | 500 | | |
| | f _{IN3} | | ÷2, TV _{IN} | 50 | — | 400 | | |
| | f _{IN4} | | FM mode, FM _{IN} | 50 | — | 200 | | |
| Input voltage range | V _{IN1} | 1 | TV _{IN} (÷8, ÷4) | 22.0 | — | 220 | mV _{rms} | |
| | V _{IN2} | | TV _{IN} (÷2) | f _{IN} = 50~100MHz | 35.0 | — | | 220 |
| | | | | f _{IN} = 100~400MHz | 22.0 | — | | 220 |
| V _{IN3} | FM _{IN} | 22.0 | — | 220 | | | | |
| Output amplitude | V _{OUT} | 1 | Out, C _L = 3pF | 0.4 | 0.5 | — | V _{p-p} | |
| Input voltage | "H" level | V _{IH} | — | N1, N2, BIAS | 2.5 | — | V _{CC} | V |
| | "L" level | V _{IL} | — | N1, N2, BIAS | 0 | — | 0.8 | |
| Input current | "H" level | I _{IH} | — | N1, N2, BIAS, V _{CC} = 5.0V V _{IH} = 4.0V | — | — | 100 | µA |
| | "L" level | I _{IL} | — | N1, N2, BIAS, V _{CC} = 5.0V V _{IL} = 1.0V | — | — | 10 | |

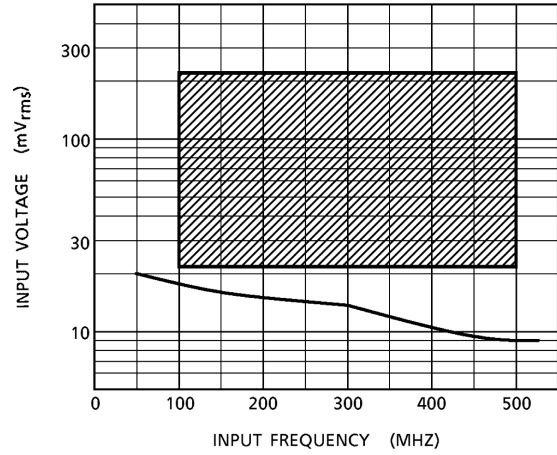
Test Circuit 1 (input voltage sensitivity)



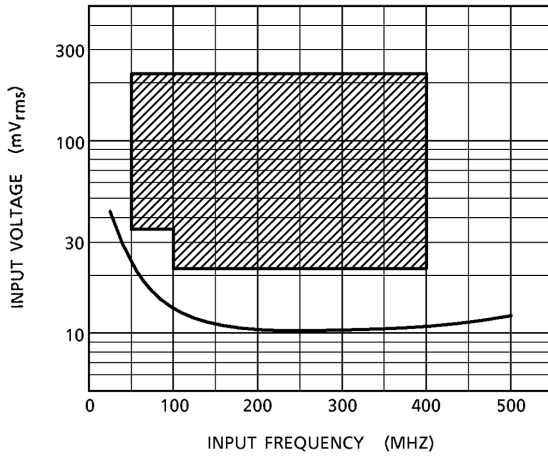
1/8 MODE INPUT VOLTAGE SENSITIVITY
($V_{CC} = 5.0V$, $T_a = 25^\circ C$)



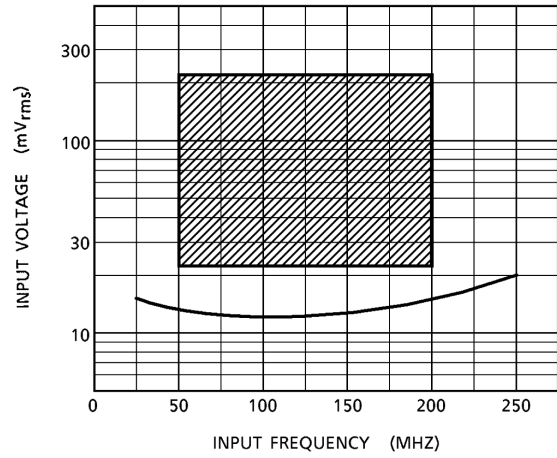
1/4 MODE INPUT VOLTAGE SENSITIVITY
($V_{CC} = 5.0V$, $T_a = 25^\circ C$)




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



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

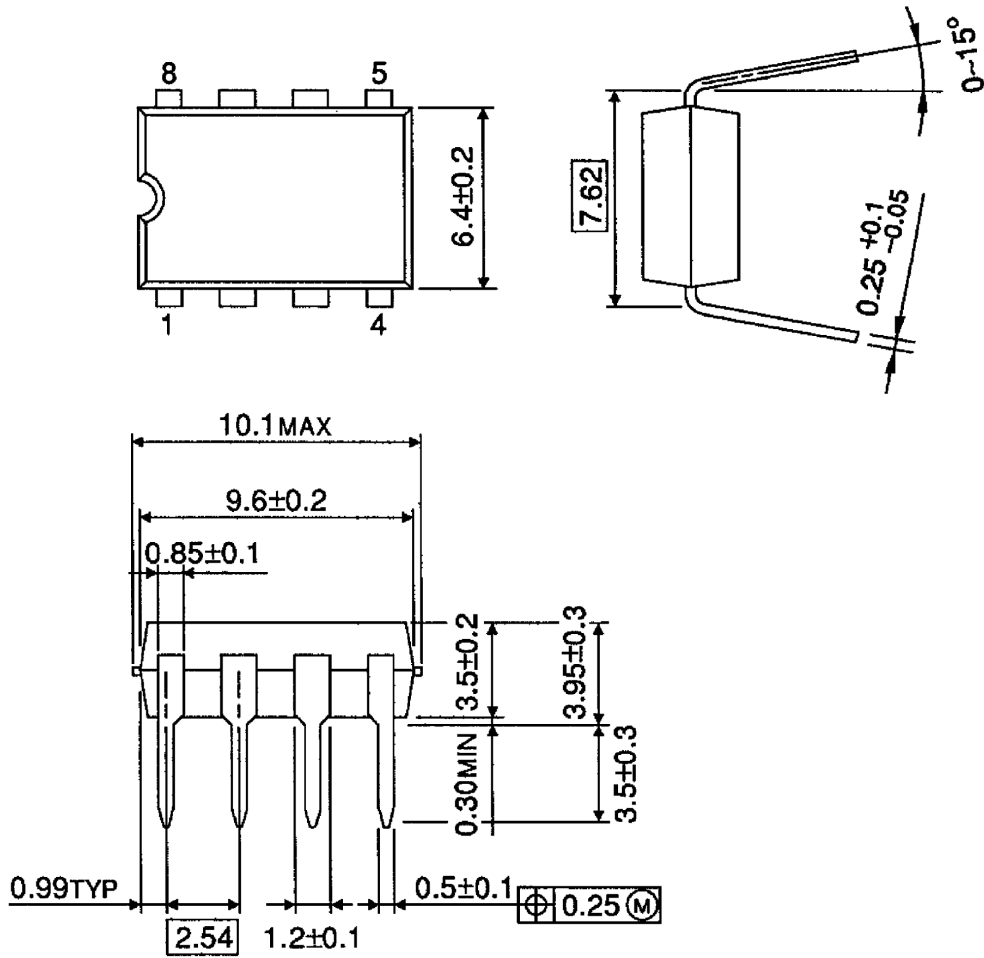


(Note)  Operating range ($V_{CC} = 3.0\sim 6.0V$, $T_a = -30\sim 75^\circ C$)

Package Dimensions

DIP8-P-300-2.54A

Unit : mm

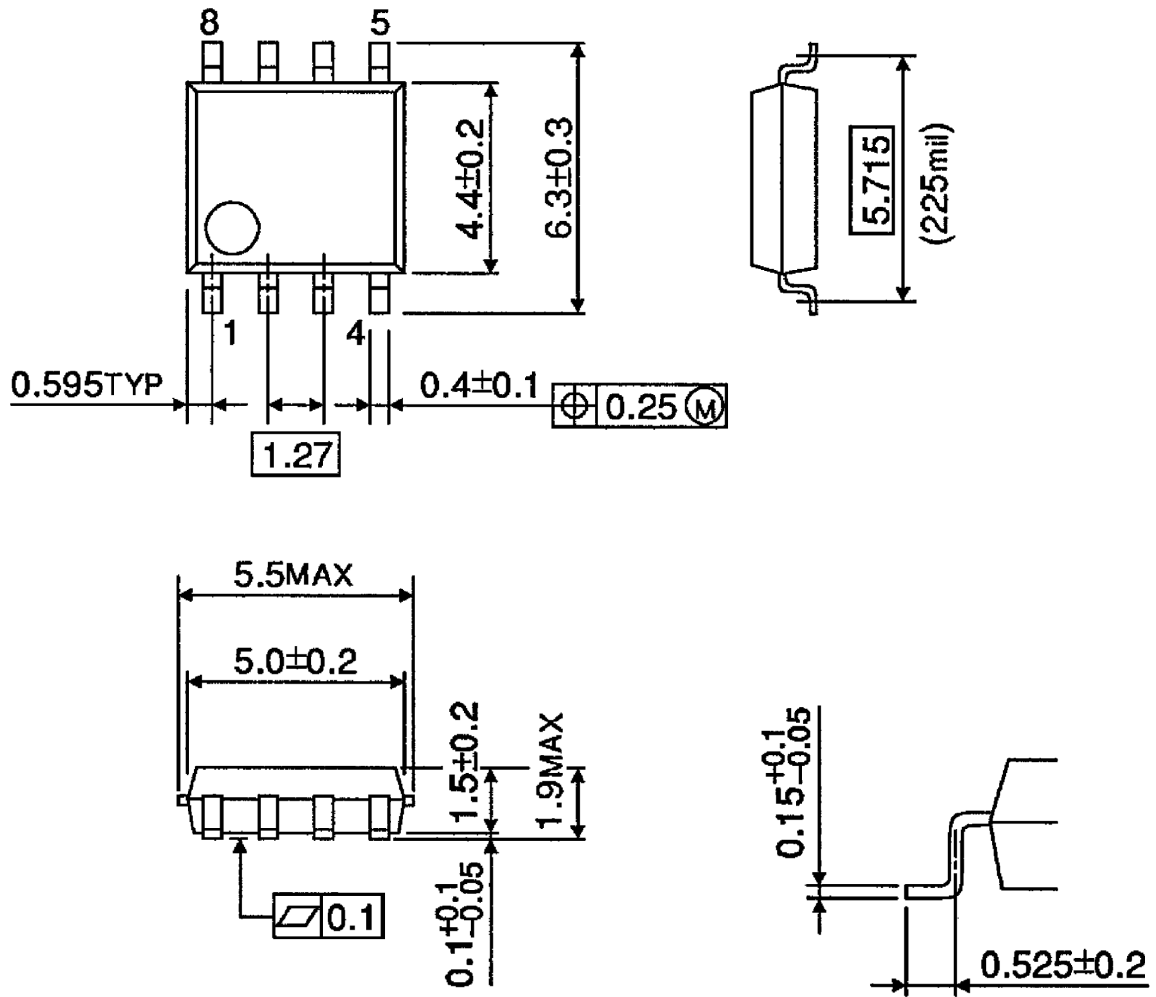


Weight: 0.45g (typ.)

Package Dimensions

SOP8-P-225-1.27

Unit : mm



Weight: 0.76g (typ.)

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