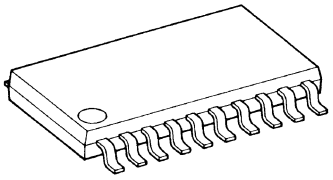
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA4303F

Down Converter for BS/CS Tuner IC

Description

The TA4303F is a monolithic IC to down-convert the L-band (900~2150 MHz) signal for the satellite tuners. It's integrated circuits that perform the mixer/oscillator function. They have double-balanced mixer, local oscillator, IF amplifier, OSC buffer amplifier and prescaler buffer amplifier circuits.



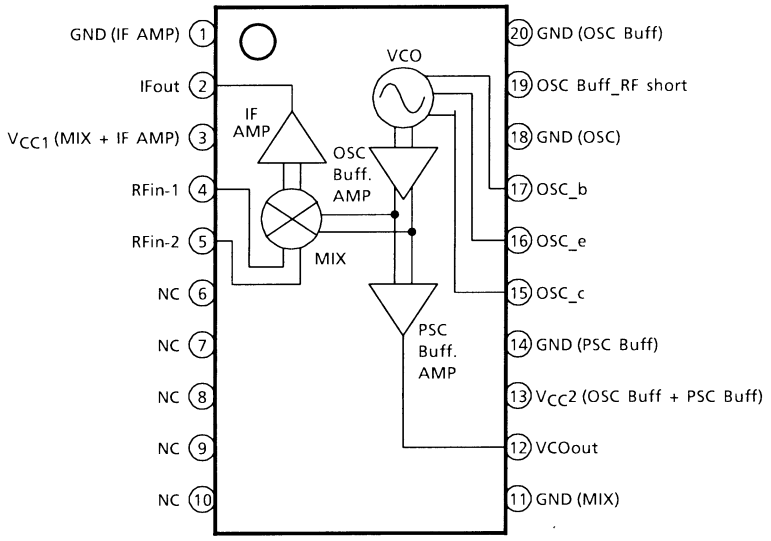
SSOP20-P-225-1.00

Weight: 0.17 g (typ.)

Features

- Single chip full band solution, compatible with digital and analog transmissions.
- Single 5 V power supply operation
- Full band constant convertion Gain and Noise Figure
- Local oscillator output circuit for PLL
- Low Phase Noise local oscillator

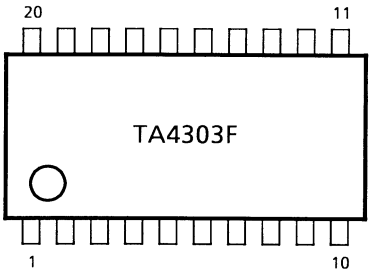
Pin Connection Function Block Diagram



Top view

Package : SSOP20-P-225, 1.0mm pitch

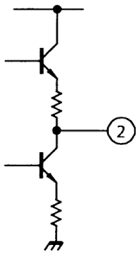
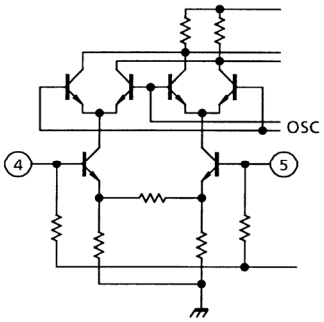
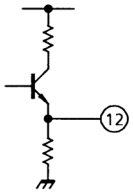
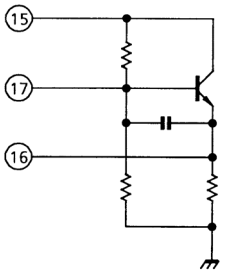
Marking

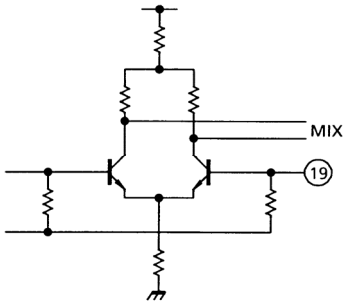


Caution

This devices is electrostatic sensitivity.

Explanation

Pin No.	Pin Name	Pin Voltage	Explanation	Equivalent Circuit
1	GND (IF Amp)	0	GND pin for IF Amp.	—
2	IF out	2.2	IF output pin.	
3	V_{CC1} (MIX + IF Amp)	5.0	Supply voltage for MIX + IF Amp.	—
4	RFin-1	1.7	RF input pin.	
5	RFin-2	1.7	RF input pin.	
6	NC	—	—	—
7	NC	—	—	—
8	NC	—	—	—
9	NC	—	—	—
10	NC	—	—	—
11	GND (MIX)	0	GND pin for MIX.	—
12	VCOout	2.0	OSC output pin.	
13	V_{CC2} (OSC Buff + PSC Buff)	5.0	Supply voltage pin for OSC Buff + PSC Buff.	—
14	GND (PSC Buff)	0	GND pin for PSC Buff.	—
15	OSC-c	5.0	OSC collector pin, supply voltage pin.	
16	OSC-e	1.8	Emitter pin for OSC.	
17	OSC-b	2.6	Base pin for OSC.	

Pin No.	Pin Name	Pin Voltage	Explanation	Equivalent Circuit
18	GND (OSC)	0	GND pin for OSC.	—
19	RF GND (OSC Buff)	1.4	RF GND pin.	
20	GND (OSC Buff)	0	GND pin for OSC Buff.	—

Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V_{CC}	6	V
Total power dissipation	P_D (Note 1)	1100	mW
Operating temperature	T_{opr}	−20~85	°C
Storage temperature	T_{stg}	−45~150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: 100 cm2 × 1.6 t (Cu layer area: 36%) on glass epoxy resins.

Operating Ranges

Characteristic	Symbol	Rating	Unit
Supply voltage	V_{CC} (Amp)	4.75~5.25	V
Supply voltage	V_{CC} (OSC)	4.75~5.25	V
Input frequency range	fin	900~2150	MHz
IF Input frequency range	fIF	350~550	MHz

Electrical Characteristics (Ta = 25°C) (Note 2)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Supply current	I_{CC} (Total)	1	V_{CC} = 5 V, No RF input	61	74	87	mA
Conversion gain	Gc	1	fin = 1.6 GHz, fIF = 400 MHz	14	18	25	dB
Noise figure	NF	1	fin = 1.6 GHz, fIF = 400 MHz	—	15	22	dB
Saturation output	$P_{O\ (sat)}$	1	fin = 1.6 GHz, fIF = 400 MHz	5	10	—	dBmW
Third-order intercept	IP3	1	fin = 1.596 GHz, 1.6 GHz fIF = 400 MHz, 404 MHz	12	17	24	dBmW
Posc	P_{OSC}	1	fLO = 2.0 GHz	−14	−8	—	dBmW

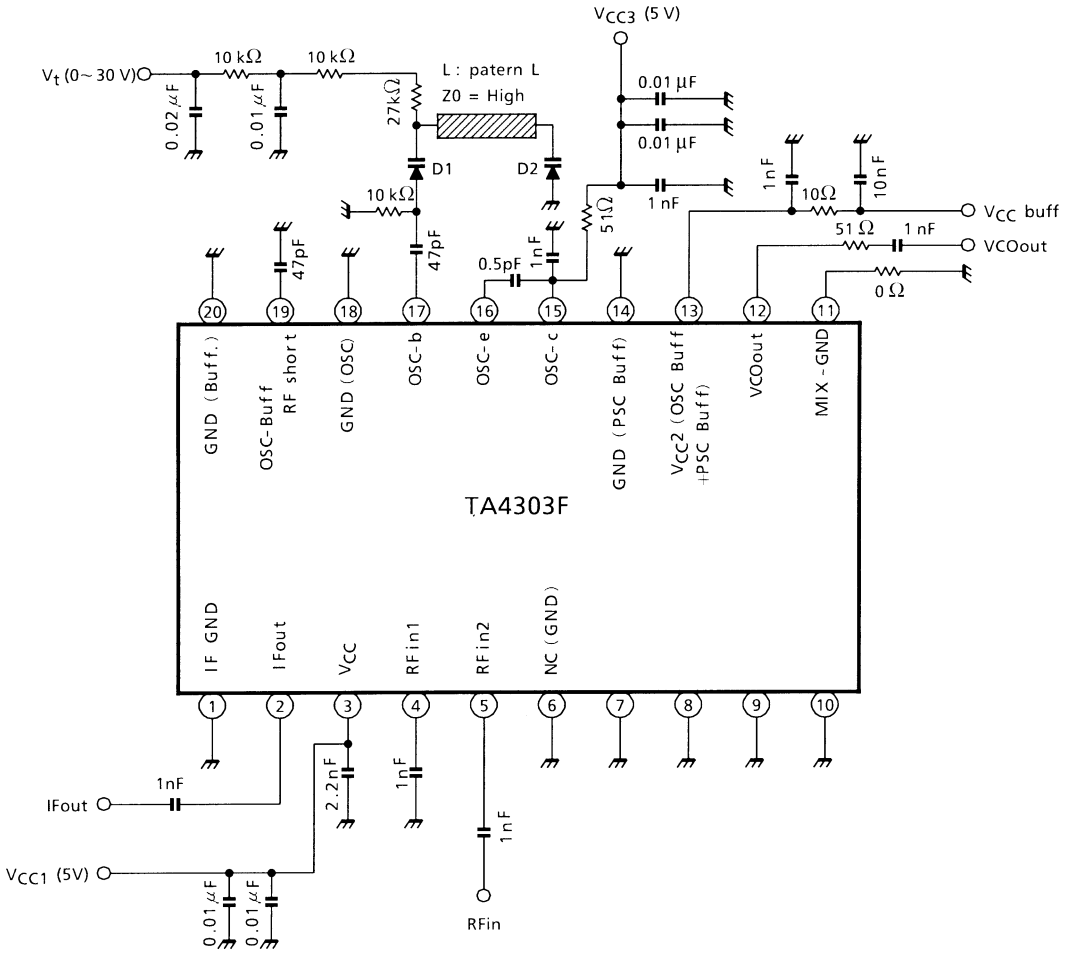
Note 2: All electrical characteristics measured in Supply Voltage 5.0 V (Amp, OSC, OSC Buffer)

Reference Characteristic (Note 3)

Characteristics	Symbol	Test Circuit	Test Condition	Typ.	Unit
Supply current	I_{CC} (Amp)	1	V_{CC} = 5 V, No RF input	36	mA
Supply current	I_{CC} (OSC)	1	V_{CC} = 5 V, No RF input	38	mA

Note 3: All electrical characteristics measured in Supply Voltage 5.0 V (Amp, OSC, OSC Buffer)

Test Circuit



Notice

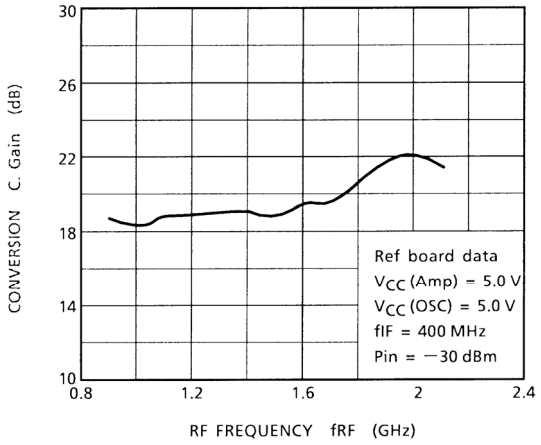
The circuits and measurements contained in this document are given only in the context of as examples of applications for these products.

Moreover, these example application circuits are not intended for mass production, since the high-frequency characteristics (the AC characteristics) of these devices will be affected by the external components which the customer uses, by the design of the circuit and by various other conditions.

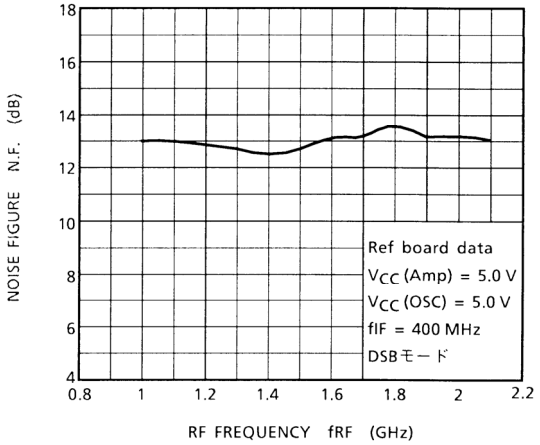
It is the responsibility of the customer to design external circuits which correctly implement the intended application, and to check the characteristics of the design.

TOSHIBA assume no responsibility for the integrity of customer circuit designs or applications.

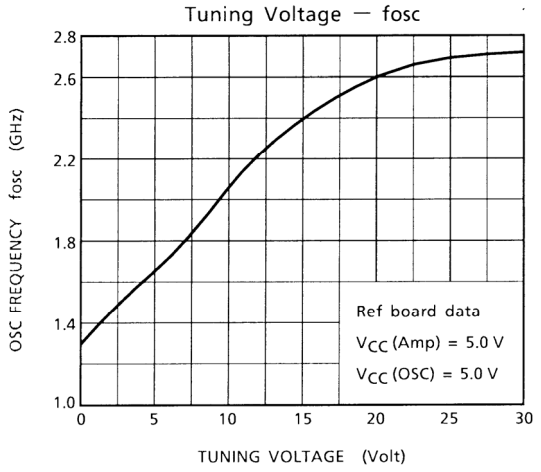
C. Gain — fRF



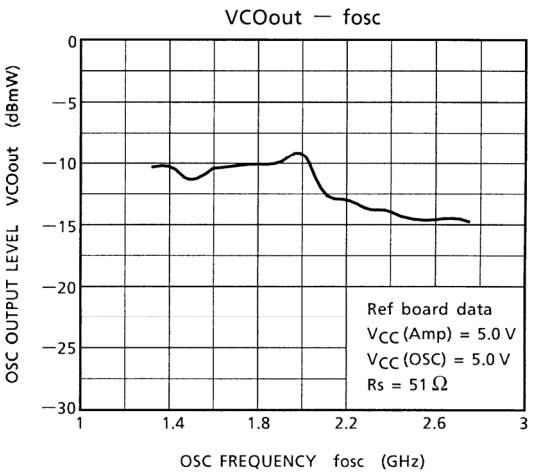
N.F. — fRF



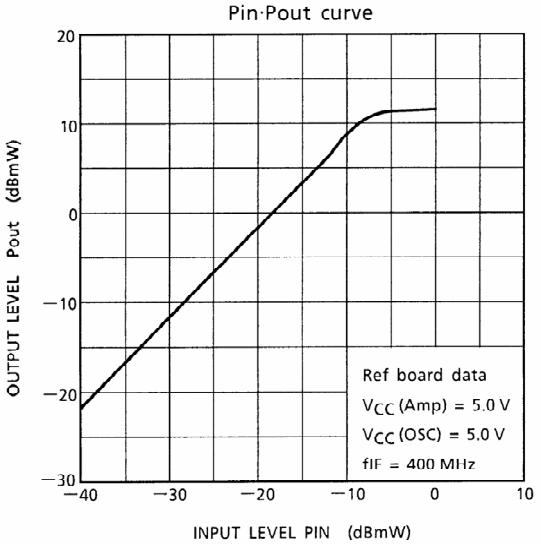
Tuning Voltage — fosc

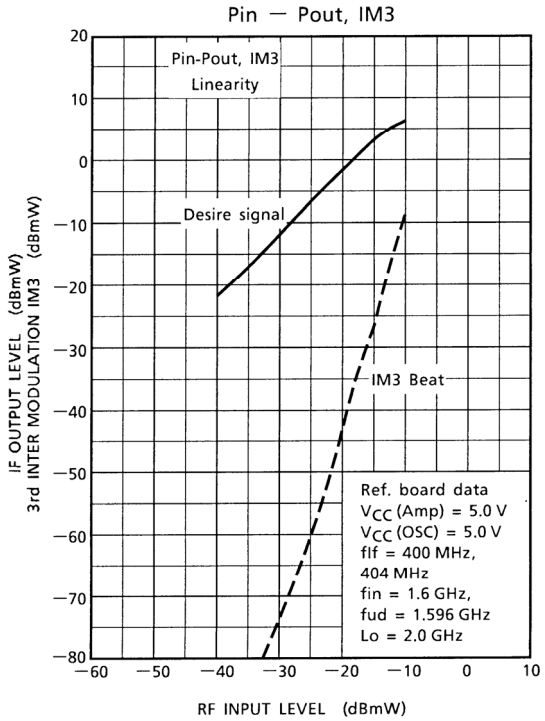


VCOout — fosc



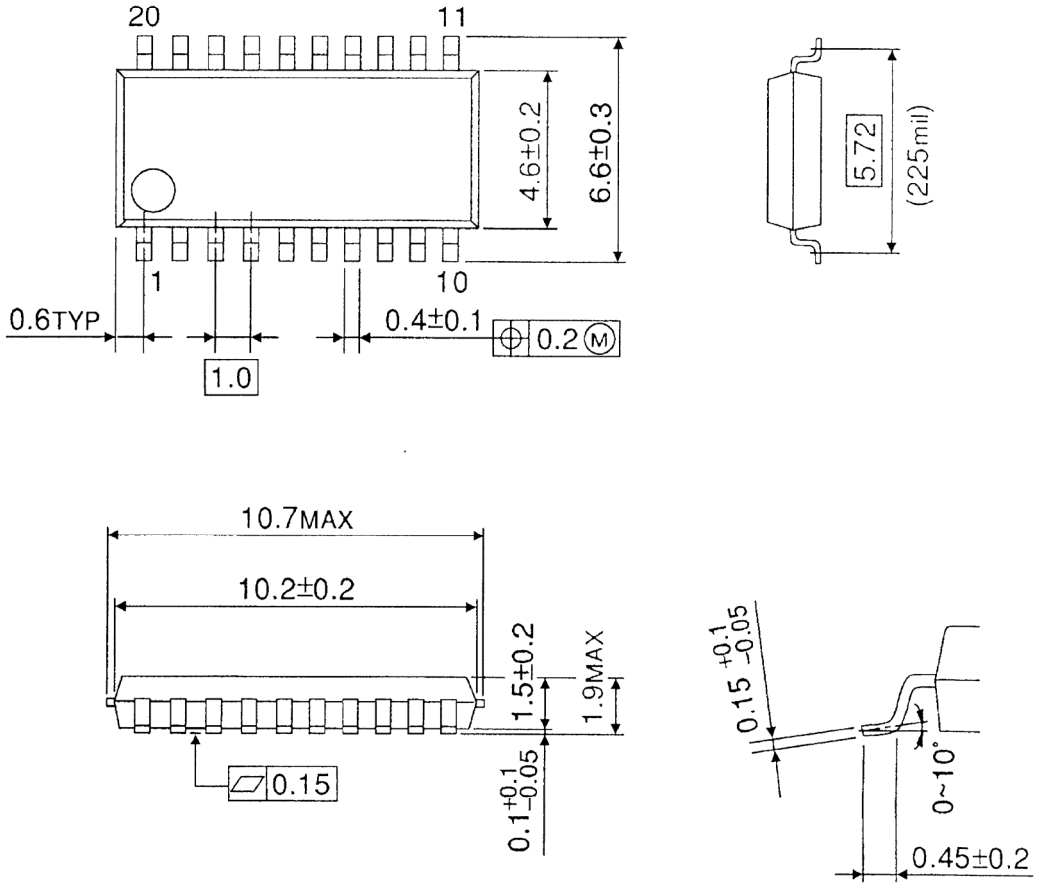
Pin·Pout curve




Pin — Pout, IM3
Pin-Pout, IM3
Linearity
Desire signal
IM3 Beat
Ref. board data
VCC (Amp) = 5.0 V
VCC (OSC) = 5.0 V
flf = 400 MHz,
404 MHz
fin = 1.6 GHz,
fud = 1.596 GHz
Lo = 2.0 GHz
IF OUTPUT LEVEL (dBmW)
3rd INTER MODULATION IM3 (dBmW)
RF INPUT LEVEL (dBmW)
20
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−60
−50
−40
−30
−20
−10
0
10

Package Dimensions

SSOP20-P-225-1.00 Unit : mm



Weight : 0.17 g (Typ.)

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20070701-EN GENERAL

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