

Up/Down Converter for 900 MHz-Band Mobile Communications

Description

The CXA1851N is an up/down converter IC for 900 MHz-band mobile communications.

This is suitable for 900 MHz-band digital cordless telephone (CT2) and digital cellular.

Features

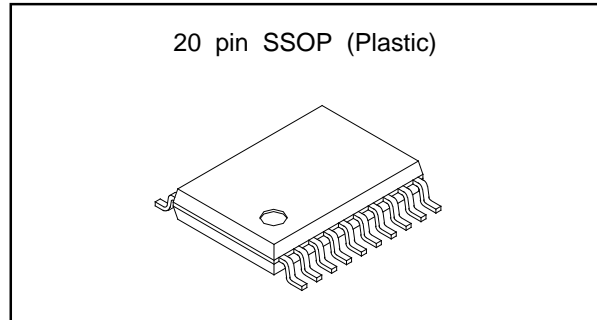
- Transmission/reception converter on a single chip
- Operating frequency: 800 to 900 MHz
- Supply voltage: 2.7 to 4.5 V
- Power saving function
- 20-pin SSOP package used for set size reduction

Applications

- CT2 digital cordless telephone
- Digital cellular

Structure

Bipolar silicon monolithic IC



Absolute Maximum Ratings (Ta=25°C)

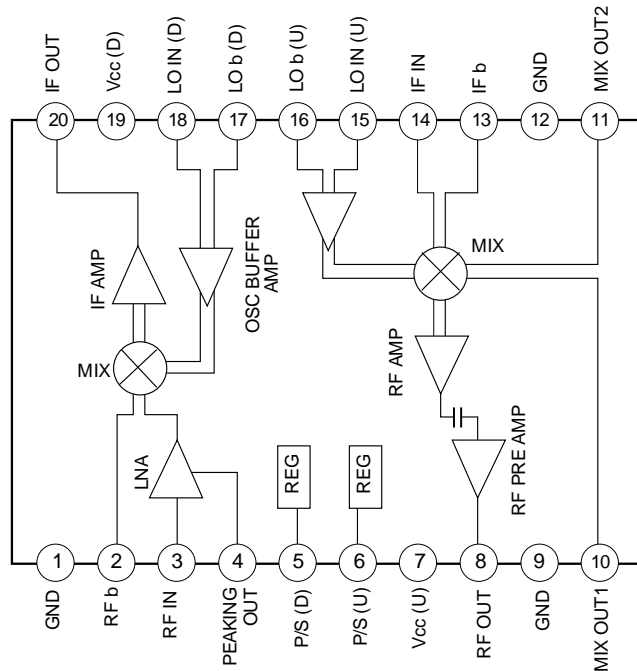
| | | | |
|-------------------------------|------------------|-------------|----|
| • Supply voltage | V _{cc} | 5 | V |
| • Operating temperature | T _{opr} | -20 to +75 | °C |
| • Storage temperature | T _{stg} | -65 to +150 | °C |
| • Allowable power dissipation | P _D | 530* | mW |

* When mounted on a 505×0×1.6 mm copper-foiled glass epoxy board

Recommended Operating Conditions

| | | | |
|----------------|-----------------|------------|---|
| Supply voltage | V _{cc} | 2.7 to 4.5 | V |
|----------------|-----------------|------------|---|

Block Diagram and Pin Configuration



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Pin Description

| Pin No. | Symbol | Typical pin voltage (V) | Equivalent circuit | Description |
|---------|----------------------|-------------------------|--------------------|--|
| 1 | GND | 0.0 | | GND pin for the down converter. |
| 2 | RF BYPASS | 1.1 | | MIX input by-pass pin for the down converter. |
| 3 | RF INPUT | 0.9 | | RF input pin for the down converter. Because of high impedance, a 4.7 nH external chip inductor should be used for impedance matching. |
| 4 | PEAKING OUT | 0.12 | | Emitter pin for the low-noise amplifier. Connect an approximately 3 pF chip capacitor and an approximately 22Ω chip resistor in series to the GND. |
| 5 | P/S (for DOWN CONV.) | 0 to 4.5 | | Power saving control pin for the down converter. OFF when $V_{p/s} \leq 1.0$ V; ON when $V_{p/s} \geq 1.8$ V |
| 6 | P/S (for UP CONV.) | 0 to 4.5 | | Power saving control pin for the up converter. OFF when $V_{p/s} \leq 1.0$ V; ON when $V_{p/s} \geq 1.8$ V |
| 7 | Vcc (for Up CONV.) | 2.7 to 4.5 | | Power supply for the up converter. |
| 8 | RF OUTPUT | 2.7 (Vcc=2.7V) | | RF output pin for the up converter. Connect this pin to the Pin 7 power supply via the 15 nH chip inductor. |
| 9 | GND | 0.0 | | GND pin for the up converter RF amplifier. |

| Pin No. | Symbol | Typical pin voltage (V) | Equivalent circuit | Description |
|---------|--------------------------------|-------------------------|--------------------|--|
| 10 | MIX OUT1 | 2.3 | | MIX output pin for the up converter. |
| 11 | MIX OUT2 | 2.3 | | MIX output pin for the up converter. Connect an approximately 4.7 nH chip inductor and an approximately 3.5 pF chip capacitor between this pin and Pin 10 to form a tank circuit. |
| 12 | GND | 0.0 | | GND pin for the oscillator buffer amplifier and mixer blocks of the up converter. |
| 13 | IF BYPASS | 1.03 | | IF input by-pass pin for the up converter. |
| 14 | IF INPUT | 1.03 | | IF input pin for the up converter. Because of high impedance, an external matching circuit is necessary which consists of a 220 nH chip inductor and an approximately 1.5 pF chip capacitor. |
| 15 | OSC INPUT (for UP CONV.) | 1.8 | | Oscillator input pin for the up converter. A matching circuit consisting of a 51Ω resistor is necessary. |
| 16 | OSC BYPASS (for UP CONV.) | 1.8 | | Oscillator input by-pass pin for the up converter. |
| 17 | OSC BYPASS (for DOWN CONV.) | 1.85 | | Oscillator input by-pass pin for the down converter. |
| 18 | OSC BYPASS (for DOWN CONV.) | 1.85 | | Oscillator input pin for the down converter. A matching circuit consisting of a 51Ω resistor is necessary. |
| 19 | Vcc (for DOWN CONV.) | 2.7 to 4.5 | | Power supply for the down converter. |
| 20 | IF OUTPUT | 1.45 | | IF output pin for the down converter. |

Electrical Characteristics

(Ta=25°C, Vcc=2.7V, ZL=ZS=50Ω)

| Item | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|--|------------|------------------------------|-------|--------|--------|------|
| Up Converter Block *1 | | | | | | |
| Current consumption | Icc | For no signal input | 18.0 | 25.0 | 35.0 | mA |
| Conversion gain | CG | Pin= - 40dBm | 17.5 | 20.5 | 25.5 | dB |
| RF output power | Pout | Pin= -10dBm, 50Ω load | 0 | 3 | | dBm |
| Noise figure | NF | DSB mode | | 13 | 18 | dB |
| Lo leak | ISO (Lo) | Pin= - 10dBm | | - 25.0 | - 10 | dBm |
| IF leak | ISO (IF) | Pin= - 10dBm | | - 12.0 | - 5 | dBm |
| Standby current consumption | Icc (PD) | 6pin (P/S)<1.0V | | 220 *2 | 350 *2 | μA |
| Power saving control voltage | Vp/s (ON) | | 1.8 | | 4.5 | V |
| | Vp/s (OFF) | | | | 1.0 | V |
| Rise time | Tup | | | 2.5 | 5.0 | μs |
| Down Converter Block *3 | | | | | | |
| Current consumption | Icc | For no signal input | 8.0 | 15.0 | 22.0 | mA |
| Conversion gain | CG | Pin= - 40dBm, 50Ω load | 15.0 | 18.0 | 23.0 | dB |
| IF output power | Pout (IF) | Pin= - 10dBm, 50Ω load | - 4.5 | - 2.0 | | dBm |
| Third-order intermodulation distortion | IM3 | fRF1=866.4MHz, Pin1= - 40dBm | 45 | 49.0 | | dBc |
| | | fRF2=866.8MHz, Pin2= - 40dBm | | | | |
| Noise figure | NF | DSB mode | | 7.5 | 10 | dB |
| Standby current consumption | Icc (PD) | 5pin (P/S)≤1.0V | | 220 *2 | 350 *2 | μA |
| Power saving control voltage | Vp/s (ON) | | 1.8 | | 4.5 | V |
| | Vp/s (OFF) | | | | 1.0 | V |
| Rise time | Tup | | | 2.5 | 5.0 | μs |

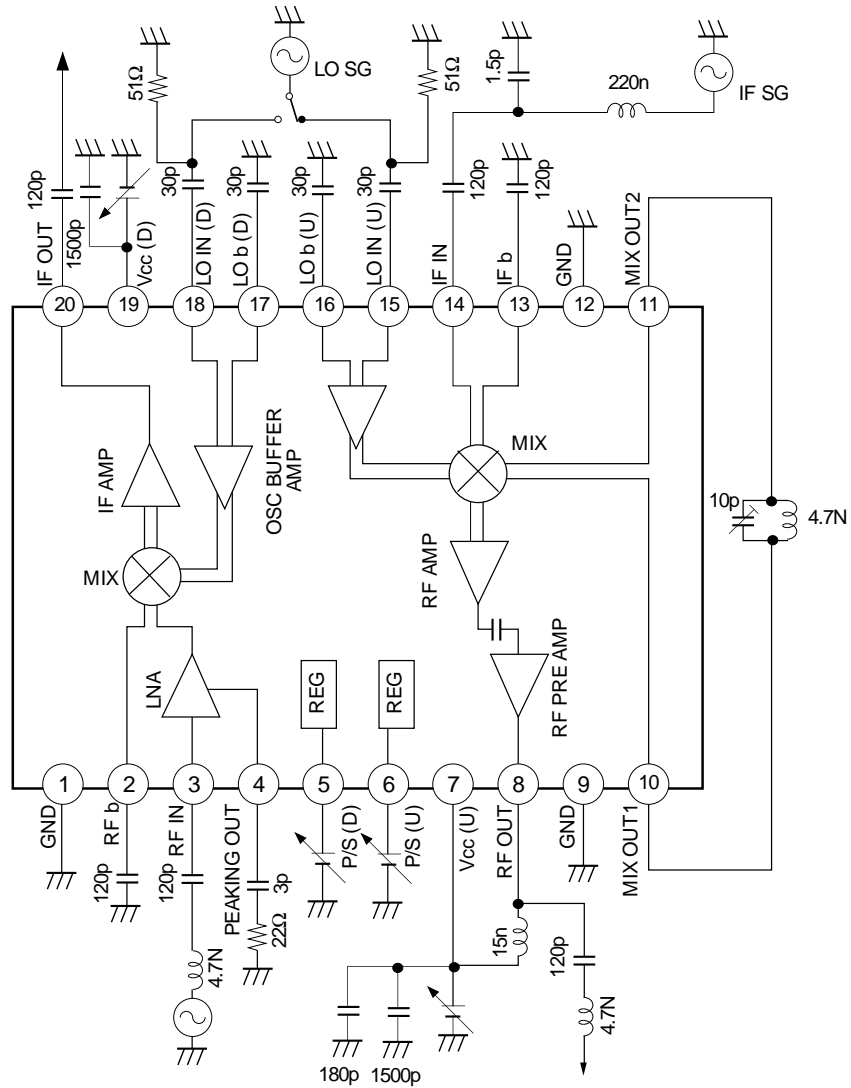
- *1: fIFin=150.05MHz, fRFout=864.05 to 868.05MHz
fLoIn=1014.10 to 1018.1MHz (- 9dBm)
- *2: These are the total values for the up and down converters.
- *3: fRFIn=864.05 to 868.05MHz
fLoIn=1014.10 to 1018.1MHz (- 9dBm)

Typical Reference characteristics

(Ta=25°C, Vcc=2.7V, ZL=ZS=50Ω)

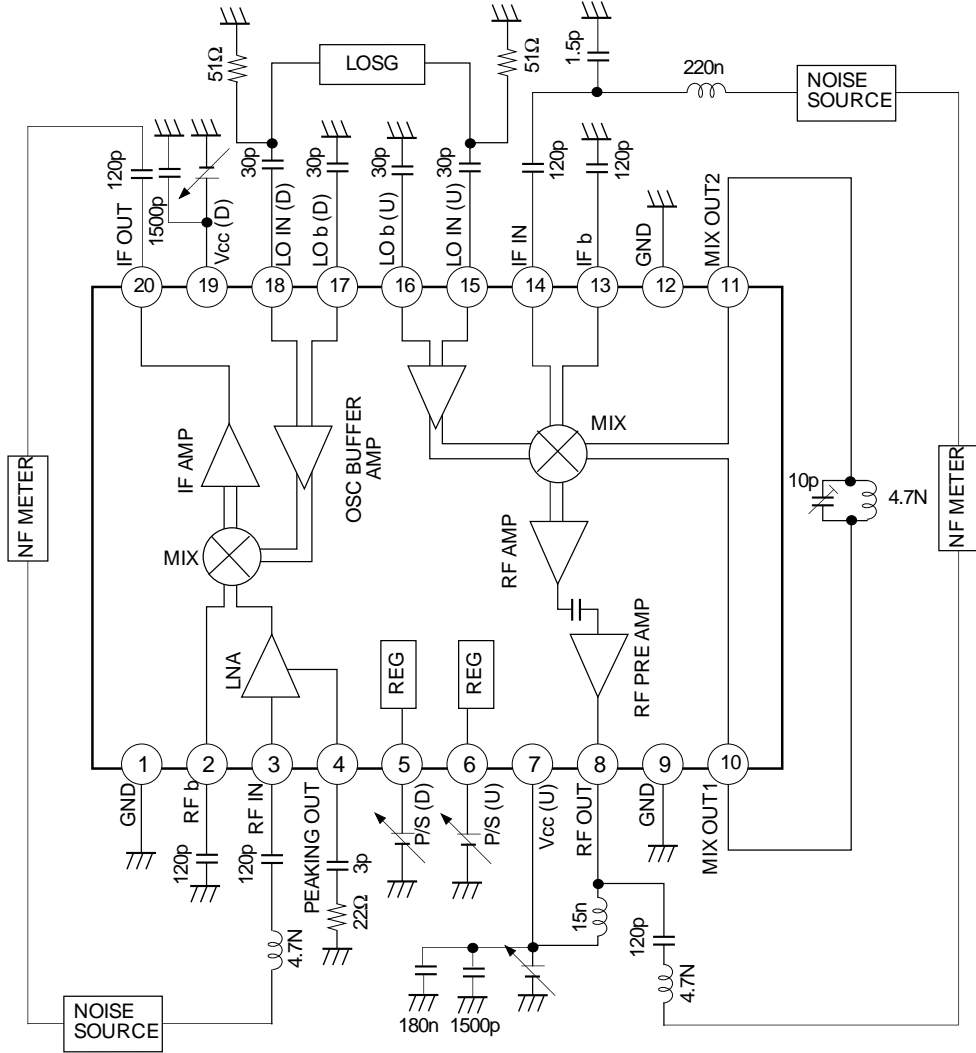
| Item | Symbol | Conditions | Typ. | Unit |
|--|----------|------------------------------|--------|------|
| Up Converter Block | | | | |
| Third-order intermodulation distortion | IM3 | fIF1=150.4MHz, PIF1= - 30dBm | 39.0 | dBc |
| | | fIF2=150.8MHz, PIF2= - 30dBm | | |
| Down Converter Block | | | | |
| 1 dB compression | P- 1dB | Output conversion, 50Ω load | - 7.0 | dBm |
| Lo leak | ISO (Lo) | Pin= - 40dBm | - 29.0 | dB |
| RF leak | ISO (RF) | Pin= - 40dBm | - 44.0 | dB |

Electrical Characteristics Test Circuit 1



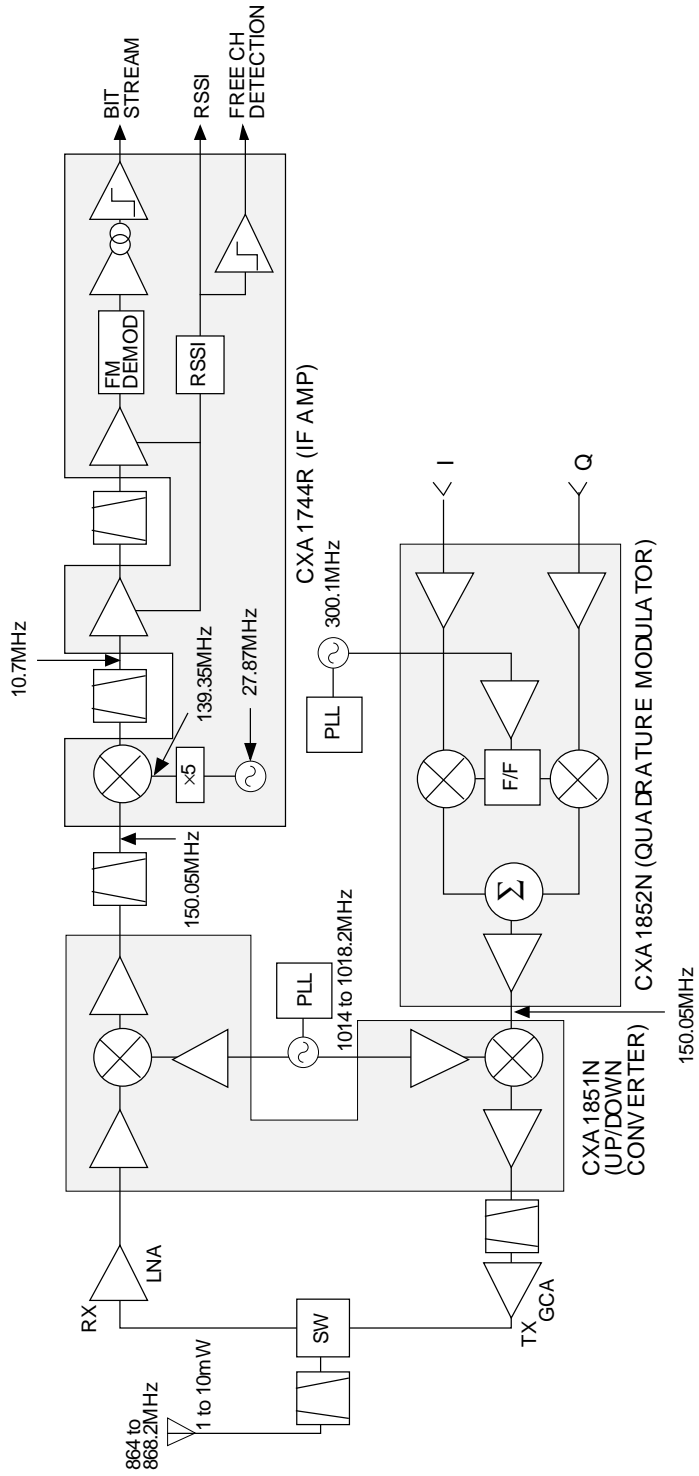
Electrical Characteristics Test Circuit 2

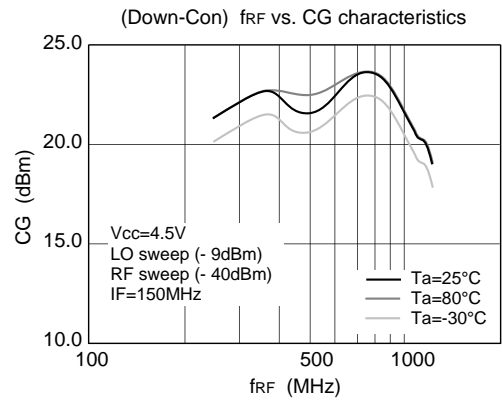
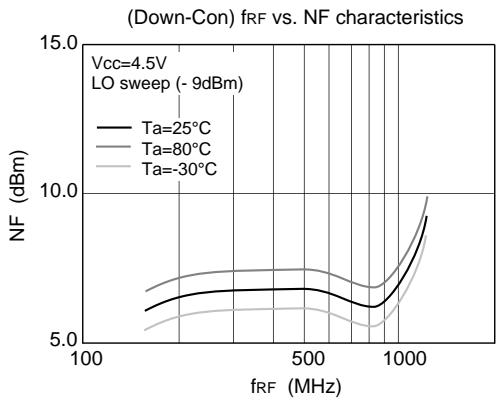
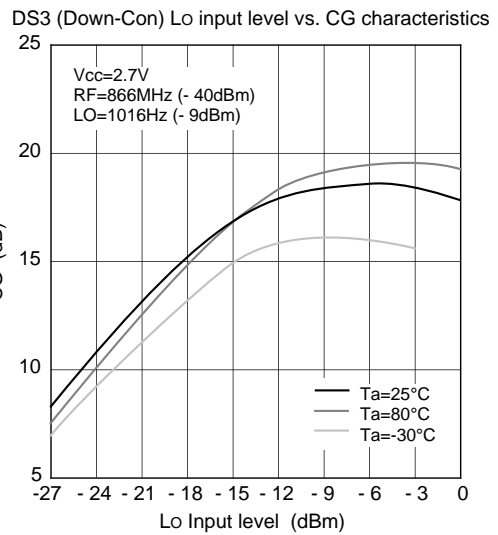
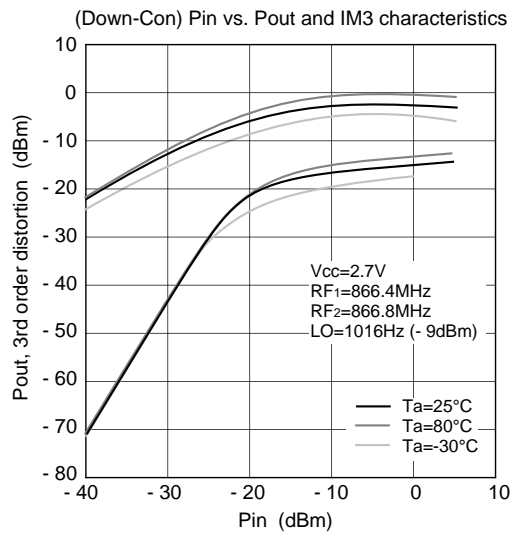
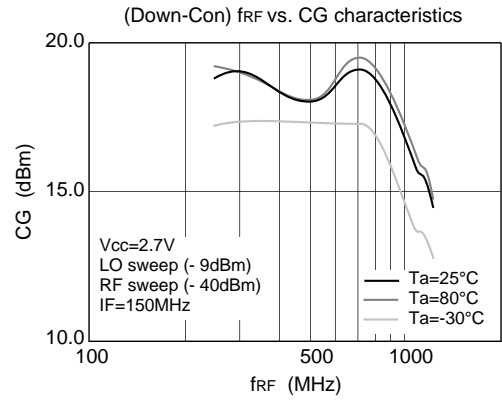
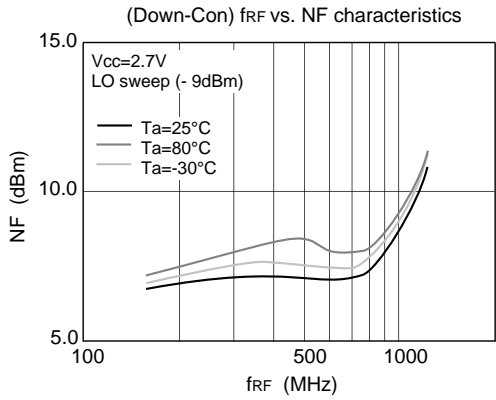
Items: NF (D), NF (U)

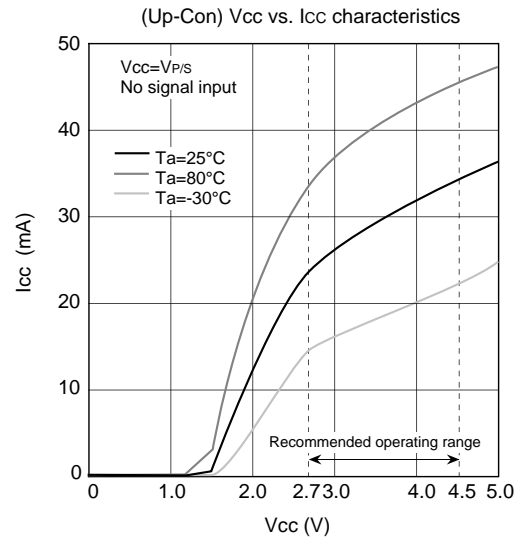
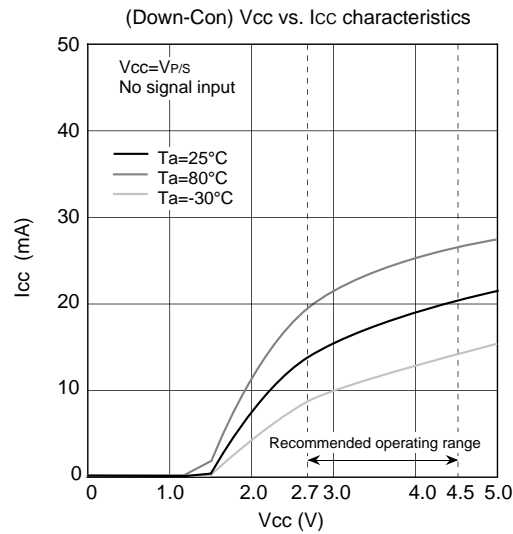
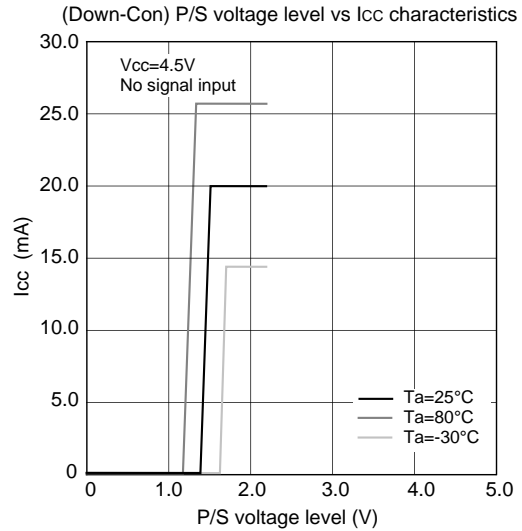
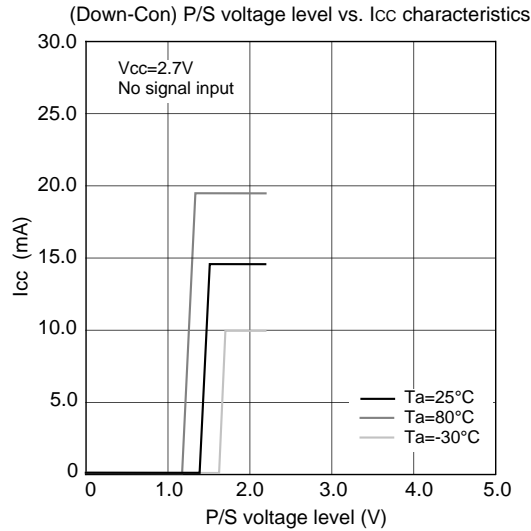
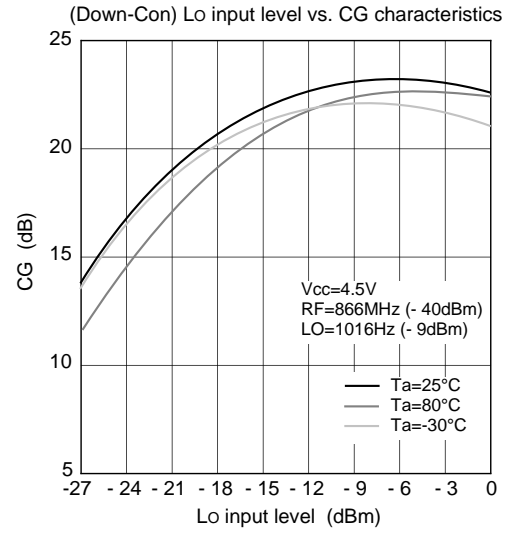
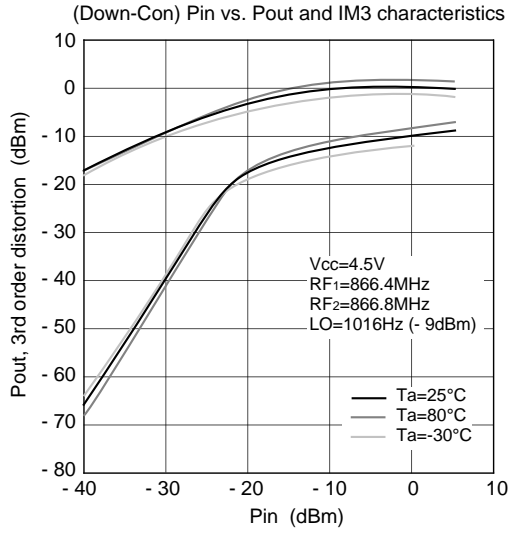


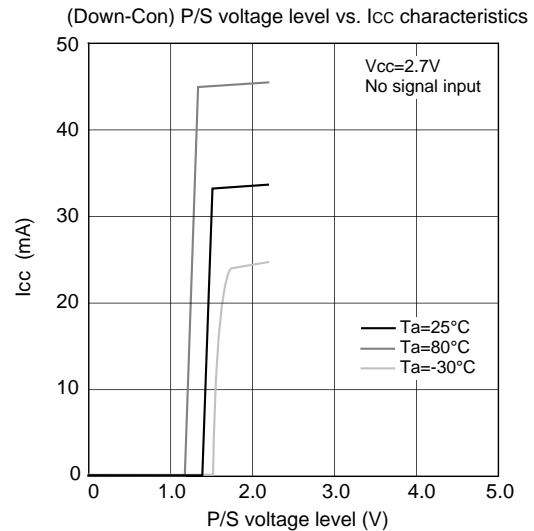
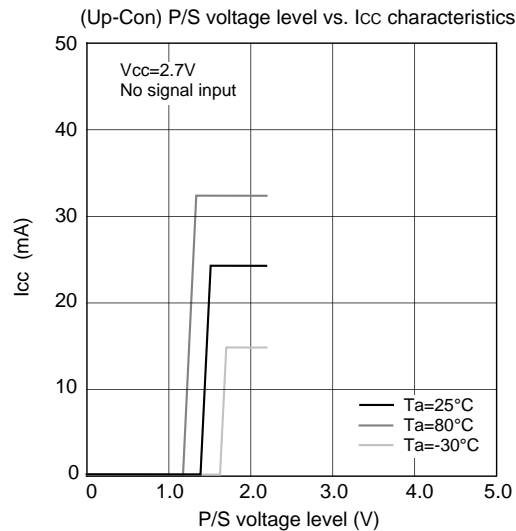
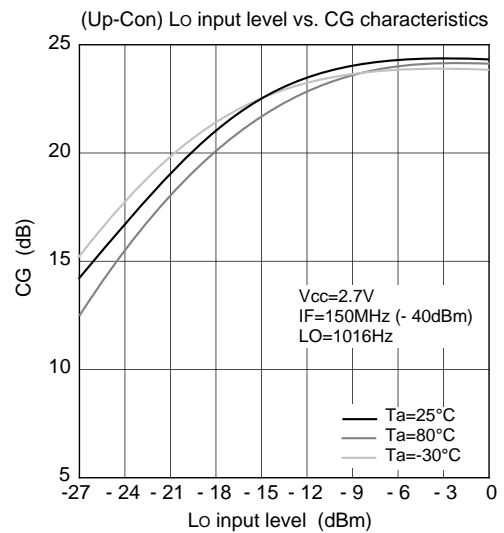
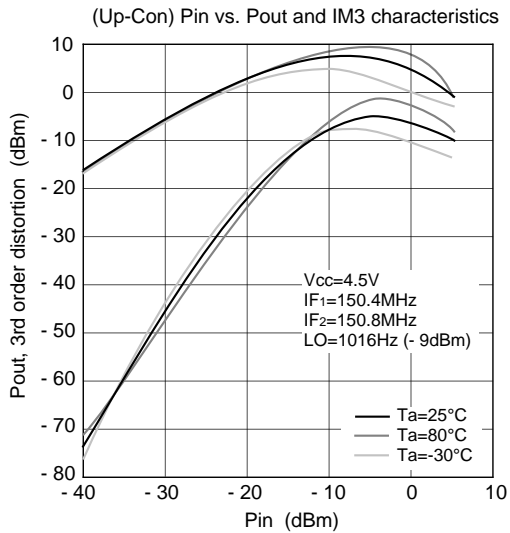
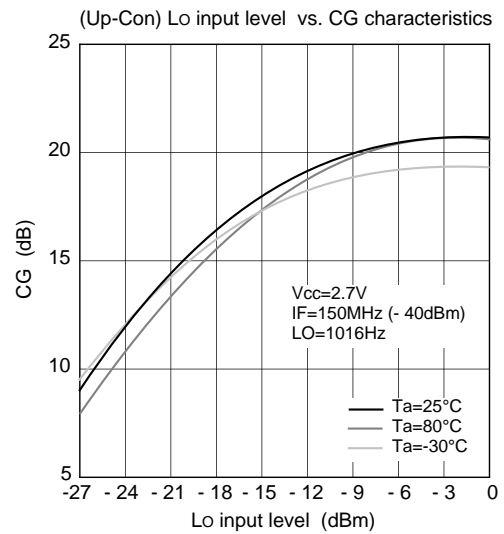
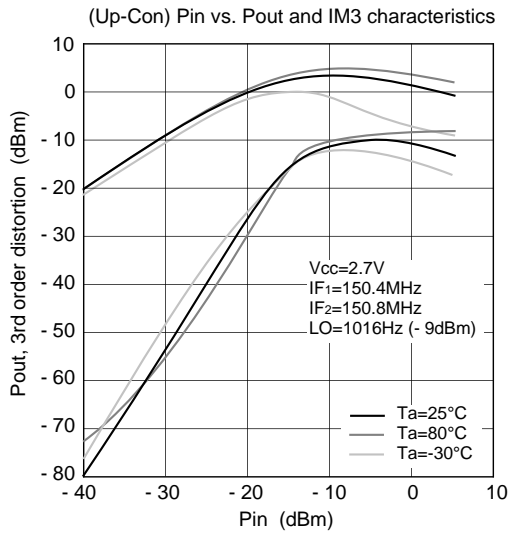
Block diagram

Digital cordless telephone chip set (CXA1744R/CXA1851N/CXA1852N)







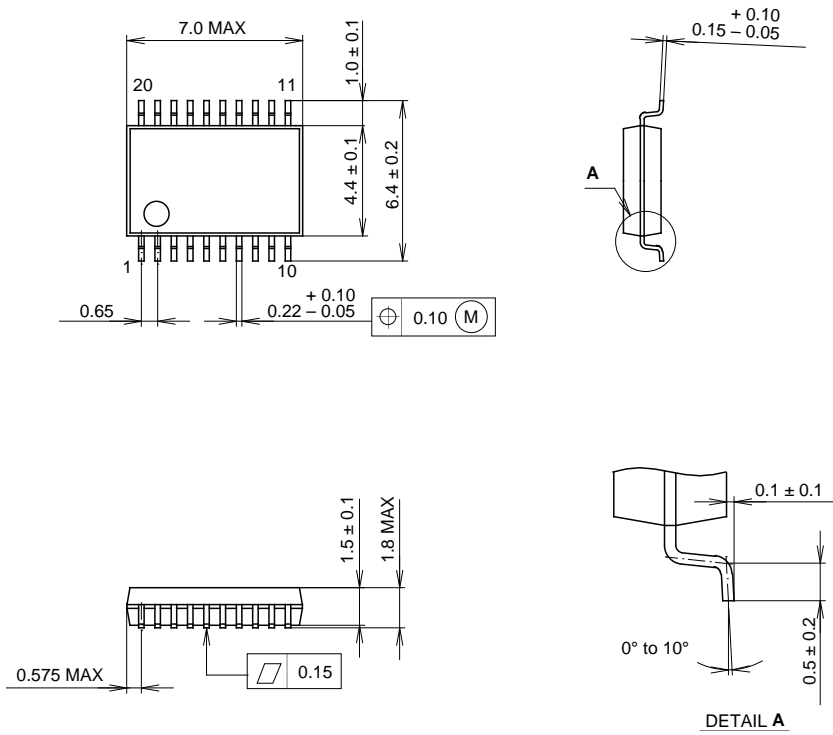


Notes on Operation

- (1) Electrostatic sensitive devices because of the high-frequency process.
- (2) Earth pattern should be as wide as possible and do not increase ground impedance to prevent from the parasitic oscillation.
- (3) Wire the GND pin as short as possible.
- (4) Connect a by-pass capacitor to the VCC pin.

Package Outline Unit : mm

20PIN SSOP (PLASTIC)



| | |
|------------|-------------------|
| SONY CODE | SSOP-20P-L072 |
| EIAJ CODE | SSOP020-P-0225-BN |
| JEDEC CODE | — |

PACKAGE STRUCTURE

| | |
|------------------|----------------------|
| MOLDING COMPOUND | EPOXY / PHENOL RESIN |
| LEAD TREATMENT | SOLDER PLATING |
| LEAD MATERIAL | COPPER ALLOY |
| PACKAGE WEIGHT | 0.1g |