

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA32305FN/TA32305FNG*

RF 1chip Receiver and Transmitter for low power wireless

The TA32305FN is an RF 1 chip receiver and transmitter IC.

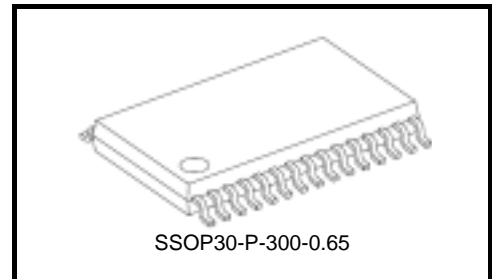
Receiver is for AM/FM radio.

The IC incorporates an RF amp, 2-level comparator, and local $\times 8$ circuit.

This IC's main use is remote control.

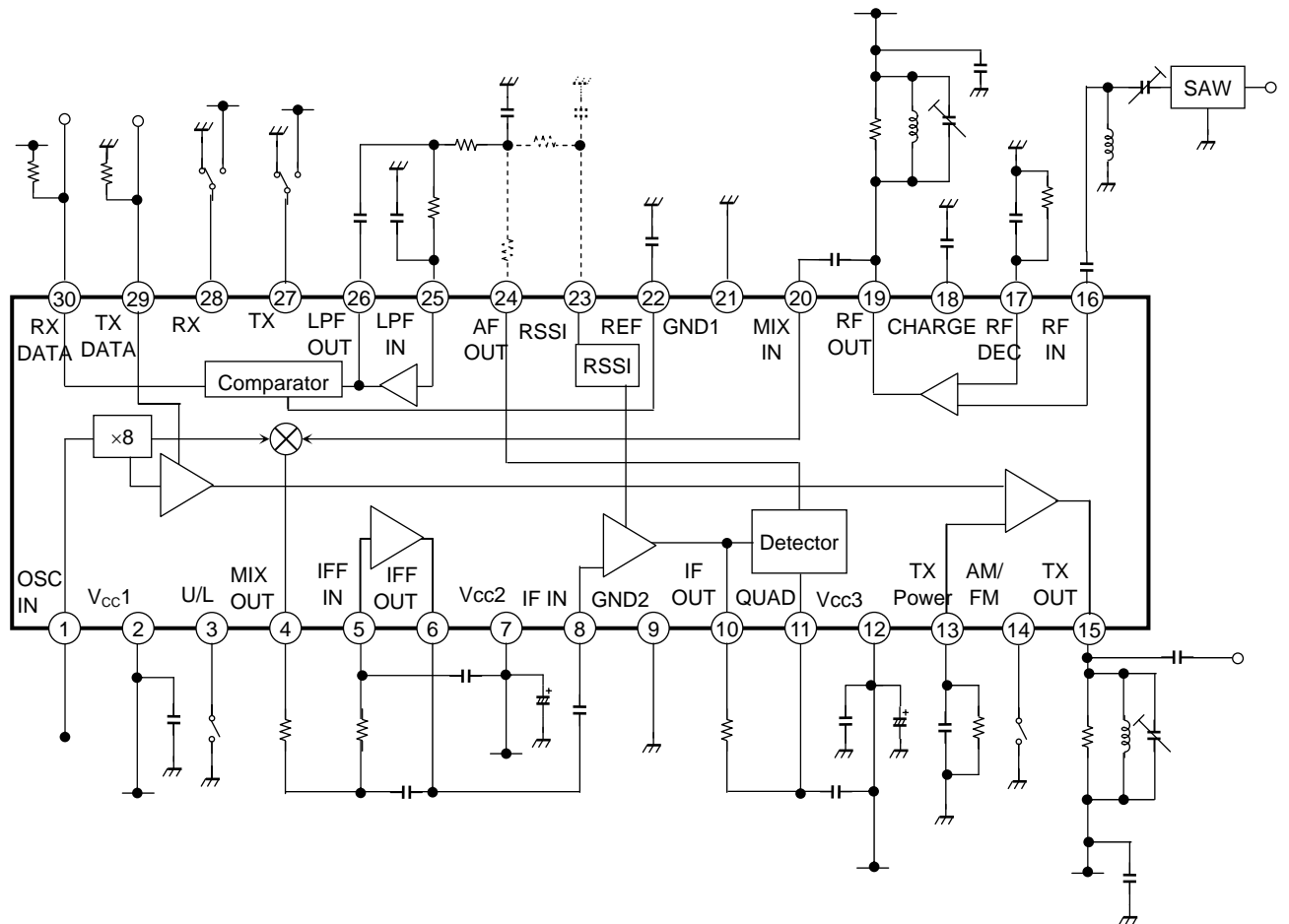
Features

- RF frequency: 240 to 450 MHz (multiplication is used)
- IF frequency: 80 kHz
- Operating voltage range: 2.2 to 5.5 V
- Current dissipation: TX 4.3 mA/ RX 5.6 mA (FM), 5.3 mA (AM)
(except current at oscillator circuit)
- Current dissipation at BS: 0 μ A (typ.)
- Small package: 30-pin SSOP (0.65 mm pitch)



Weight: 0.17 g (typ)

Block Diagram



*: TA32305FNG Package is Pb-Free.

Pin Description

(the values of resistor and capacitor in the internal equivalent circuit are typical.)

| Pin No. | Pin Name | Function | Internal Equivalent Circuit |
|---------|------------------|--|-----------------------------|
| 1 | OSC IN | Local oscillator input pin. | |
| 2 | V _{CC1} | Local power supply pin. | — |
| 3 | U/L | U/L switch pin. OPEN : Upper Local L : Lower Local Do not connect V _{cc} . | |
| 4 | MIX OUT | Mixer output pin. The output impedance of the pin is typically 225 Ω. | |
| 5 | IFF IN | IF filter input pin. | |
| 6 | IFF OUT | IFfilter output pin. | |
| 7 | V _{CC2} | Power supply pin 2. | — |
| 8 | IF IN | IF amp input pin. | |
| 10 | IF OUT | IF amp output pin. | |
| 9 | GND2 | GND pin 2. | — |

| Pin No. | Pin Name | Function | Internal Equivalent Circuit |
|---------|----------|--|-----------------------------|
| 11 | QUAD | Phase-shift input terminal for the FSK Demodulator. | |
| 12 | Vcc3 | Power supply pin 3. | |
| 13 | TX Power | Regulating TX output power pin. | |
| 15 | TX OUT | TXsignal output pin. | |
| 14 | AM/FM | Changeover switch for AM/ FM. OPEN : AM L : FM Do not connect Vcc. | |
| 16 | RF IN | RF signal input pin. | |
| 17 | RF DEC | Emitter pin for internal transistor. | |
| 19 | RF OUT | RF amp output pin. | |
| 18 | CHARGE | Control terminal for quick charge circuit. To use the quick charge circuit, attach a capacitor. | |

| Pin No. | Pin Name | Function | Internal Equivalent Circuit |
|---------|----------|--|-----------------------------|
| 20 | MIX IN | Mixer input pin. | |
| 21 | GND1 | GND pin 1. | |
| 22 | REF | Threshold input terminal for 2-level FM/AM comparator. | |
| 23 | RSSI | RSSI output pin. This pin is connected internal circuit. MONI pin during transmitting. | |
| 24 | AF OUT | Output terminal for FM demodulator. | |
| 25 | LPF IN | FM/AM LPF input pin. | |
| 26 | LPF OUT | FM/AM LPF output pin. | |
| 27 | TX | Battery saving pin for transmitter. | |

| Pin No. | Pin Name | Function | Internal Equivalent Circuit |
|---------|----------|--|-----------------------------|
| 28 | RX | Battery saving pin for receiver. | |
| 29 | TX DATA | AM modulation switch for transmitter. L : Output ON H : Output FF | |
| 30 | RX DATA | FM/AM waveform shaping output pin for receiver. Open collector output. Connect a pull-up resistor. | |

Equivalent circuits are given to help understand design of the external circuits to be connected. They do not accurately represent the internal circuits.

Functions

1. Waveform Shaper Circuit (comparator)

The output data (pin 30) are inverted.

2. RSSI Function

DC potential corresponding to the input level of IF IN (pin 8) is output to RSSI (pin 23). Output to RSSI (pin 23) is converted to a voltage by the internal resistance. Thus, connecting external resistance R to pin 21 varies the gradient of the RSSI output as shown below. Note that due to the displacement of temperature coefficients between external resistor R and the internal IC resistor IC resistor, the temperature characteristic of the RSSI output may change. Also, the maximum RSSI value should be $V_{CC} - 0.8 V$ or less.

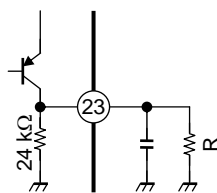


Figure 1

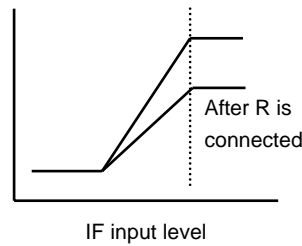


Figure 2

3. S Curve Characteristics

Changing external capacitance C27 varies the gradient of the S curve characteristics as shown below. In case of widening the detection range, heightening IF frequency or lowering demodulation output, make the gradient of the S curve characteristics gentle less than typical (120pF).

When using this IC by about 2.2V (low supply), set the constant of C27 100pF or add attenuator to AF OUT (24 pin).

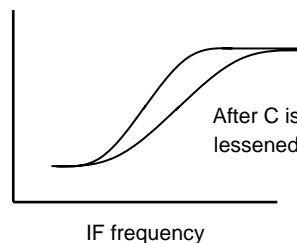


Figure 3

4. VCC Pin and GND Pin

Use the same voltage supply for VCC1 (2 pin) and VCC2 (7 pin) and VCC3 (12 pin) (or connect them). Also, use the same voltage supply source for GND1 (21 pin) and GND2 (9 pin) (or connect them).

5. Local Oscillator Circuit

The local oscillator circuit is external-input-only. The device incorporates no transistor for oscillation.

Input to pin 1 at a level from 92 to 105dBμV.

Adjust the values of constants C shown in the application circuit diagram so that the input level will become approximately 100dBμV.

6. U/L switch pin

It is possible to switch Mixer output frequency to upper local or lower local comparing RF input frequency.

7. RF Amp Current Adjustment

The RF amp current dissipation can be regulated by varying resistor R as shown in the figure below. When R = 560 Ω, the current dissipation is approximately 600 μA.

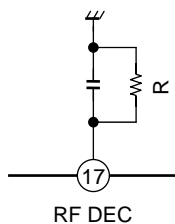


Figure 4

8. Battery-Saving (BS) Function

The IC incorporates a battery-saving function. These functions offer the following selection.

Receiver

FM Mode (FM/AM pin: GND)

| RX Pin | Circuit Status in the IC | IC Current Dissipation (at no signal) |
|--------|---|---------------------------------------|
| H | Circuits in operation: <ul style="list-style-type: none"> • ×8 circuit • Mixer • RF amp • Comparator • IF amp • Detector circuit • RSSI • Comparator capacitor charger circuit | 5.6 mA (typ.) |
| L | All circuits | 0 mA (typ.) |

AM Mode (FM/AM pin: OPEN)

| RX Pin | Circuit Status in the IC | IC Current Dissipation (at no signal) |
|--------|---|---------------------------------------|
| H | Circuits in operation: <ul style="list-style-type: none"> • ×8 circuit • Mixer • RF amp • Comparator • IF amp • RSSI • Comparator capacitor charger circuit | 5.3 mA (typ) |
| L | All circuits | 0 mA (typ) |

Transmitter

| TX Pin | Circuit Status in the IC | IC Current Dissipation (at no signal) |
|--------|--|---------------------------------------|
| H | Circuits in operation: <ul style="list-style-type: none"> • ×8 circuit • TX amp | 4.3 mA (typ) |
| L | All circuits | 0 mA (typ) |

9. RF Amp Gain 2

RF amp gain 2 ($G_v(RF) 2$) is a reference value calculated as follows. Measure G_{RF} in the following figure. $G_v(RF) 2$ is calculated as follows:

$$G_v(RF) 2 = G_{RF} - G_v(MIX)$$

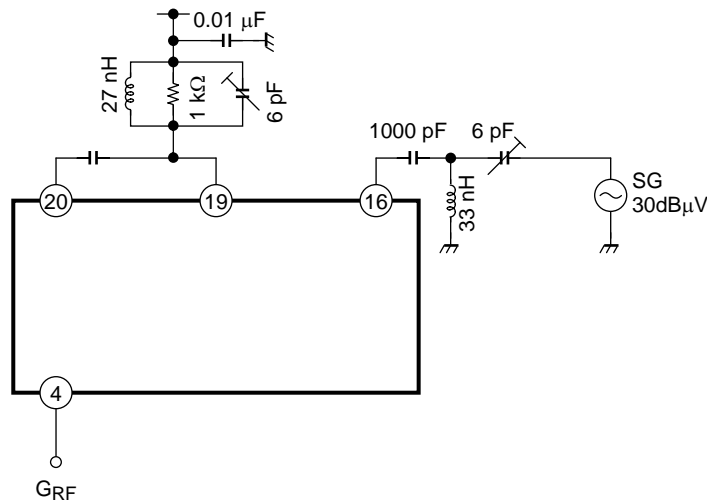


Figure 5

10. Waveform-Shaping Output Duty Cycle

The specified range of electrical characteristics is only available for single-tone.

11. Treatment of FM Terminal when Using AM

When using AM, it is not necessary to treat the QUAD pin (pin 11). Leave it open or connected to an FM external circuit. To use the bit rate filter, connect the RSSI pin (pin 23) to the bit rate filter through a resistor. The AF-OUT pin (pin 24) should be left open.

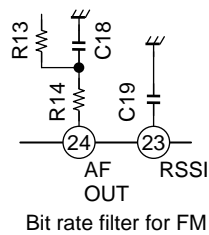


Figure 6

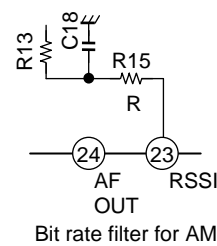


Figure 7

12. Control Terminal for Quick Charge Circuit (CHARGE)

CHARGE (18 pin) is control terminal for quick charge circuit. REF (22 pin) control terminal for quick charge a given period by time constant of internal resistance and outside capacitance. Enabling the CHARGE pin requires an external capacitor. In normal operation, connect a capacitor having the same capacitance as that of the capacitor connected to the REF pin (pin 22).

If the connected external capacitor (C30) is 0.1 μF, the quick charge time is 7 ms (typically).

13. Bit Rate Filter for FM

The current FM bit rate filter is used as a tertiary filter.

If the filter is to be used at a rate other than 1200 bps, please change the filter constant.

Quadratic Filter (NRZ)

| | R12 | R13 | R14 | C14 | C15 | C18 |
|----------|-------|-------|-------|---------|--------|---------|
| 1200 bps | 68 kΩ | 68 kΩ | 68 kΩ | 0.01 μF | 560 pF | 3300 pF |
| 2400 bps | 68 kΩ | 68 kΩ | 68 kΩ | 4700 pF | 270 pF | 1500 pF |
| 4800 bps | 68 kΩ | 68 kΩ | 68 kΩ | 2200 pF | 150 pF | 680 pF |
| 9600 bps | 68 kΩ | 68 kΩ | 68 kΩ | 1200 pF | 68 pF | 390 pF |

14. Bit Rate Filter for AM

The current AM bit rate filter is used as a quadratic filter.

If the filter is to be used at a rate other than 1200 bps, please change the filter constant.

Quadratic Filter (NRZ)

(the bit rate filter time constant takes into account the internal resistance RSSI (24 kΩ))

| | R15 | R12 | C14 | C15 |
|----------|-------|-------|---------|---------|
| 1200 bps | 43 kΩ | 68 kΩ | 4700 pF | 1500 pF |
| 2400 bps | 43 kΩ | 68 kΩ | 2200 pF | 680 pF |
| 4800 bps | 43 kΩ | 68 kΩ | 1000 pF | 390 pF |
| 9600 bps | 43 kΩ | 68 kΩ | 470 pF | 180 pF |

In addition, the current AM bit rate filter can be used as a tertiary filter.

If the filter is to be used at a rate other than 1200 bps, please change the filter constant.

Quadratic Filter (NRZ)

(the bit rate filter time constant takes into account the internal resistance RSSI (24 kΩ))

| | R15 | R13 | R12 | C14 | C15 | C18 |
|----------|-------|-------|-------|---------|--------|---------|
| 1200 bps | 43 kΩ | 68 kΩ | 68 kΩ | 0.01 μF | 560 pF | 3300 pF |
| 2400 bps | 43 kΩ | 68 kΩ | 68 kΩ | 4700 pF | 270 pF | 1500 pF |
| 4800 bps | 43 kΩ | 68 kΩ | 68 kΩ | 2200 pF | 150 pF | 680 pF |
| 9600 bps | 68 kΩ | 68 kΩ | 68 kΩ | 1200 pF | 68 pF | 390 pF |

For the cutoff frequency of the bit rate filter, specify a sufficiently high value for the bit rate to be used. Specifying a relatively high cutoff frequency for the bit rate filter enables a low capacitor to be used at the REF pin, therefore making the pulse rise quickly.

When AM is used, the internal resistance of RSSI is used. So, take the output resistance into account when specifying a cutoff frequency.

15. Simple Image Cancel Mixer for Receiver

The IC incorporates simple image cancel mixer for receiver.

16. TX Amp Current Adjustment

The RF amp current dissipation can be regulated by varying resistor R as shown in the figure below. When $R = 560 \Omega$, the current dissipation is approximately $680 \mu\text{A}$.

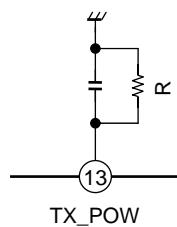


Figure 8

Cautions for Designing Circuit Board Patterns

Observe the following cautions when designing circuit patterns for this product.

Local Oscillator Circuit (pin 1)

Isolate the local oscillator circuit block sufficiently from the RF amp block.

Isolate the local oscillator circuit block securely so that its output will not get in the IF input, IF filter, or mixer input.

Do not place the local oscillator circuit block too close to the ceramic filter.

Subdivide the ground pattern for the local oscillator circuit block, and connect the subdivisions with thin lines.

IF Input and Output Block (pin 8, 10)

Isolate the input from output patterns of the IF filter and detector block securely from each other.

Demodulator Circuit Block (pin 11)

Isolate the demodulator circuit block sufficiently from the IF input block (pin 8).

Do not place the LC too close to the IC device.

Data Output Block (pin 30)

Isolate the data output block sufficiently from the IF input block (pin 8).

Isolate the output pattern of the data output block from other circuits as much as possible, so any noise from a stage subsequent to the output will not affect them.

RF Amp Circuit Block

1) Preventing RF amp oscillation

Do not place the patterns connected to pins 16 and 17 too close to each other.

Isolate the patterns connected to the input block (pin 16) and output block (pin 19) from each other.

Make the RF input signal line relatively thin.

Place a relatively wide ground pattern between the RF-IN pin (pin 16) and RF-DEC pin (pin 17).

Connect the RF-OUT pin (pin 19) and MIX-IN pin (pin 20) with the shortest possible pattern.

2) Attaining a sufficient gain

To attain a sufficient RF amp gain, select an optimum value for the input matching circuit block (pin 16) according to the board circuit pattern.

3) Sharing antenna with receiver and transmitter

Using hi power application, place the patterns connected to SAW filter and pin 15 close.

IC Mounting Area

Provide a ground pattern under the IC device, and prepare relatively many through holes.

Cautions for mounting

Mount better accurate constants of capacitance in IF filter block and detector block.

Maximum Ratings

(unless otherwise specified, Ta = 25°C. the voltage is with reference to the ground level.)

| Characteristics | Symbol | Rating | Unit |
|-----------------------------|------------------|---------|------|
| Supply voltage | V _{CC} | 6 | V |
| Power dissipation | P _D | 860 | mW |
| Operating temperature range | T _{opr} | -40~85 | °C |
| Storage temperature range | T _{stg} | -55~150 | °C |

The maximum ratings must not be exceeded at any time. Do not operate the device under conditions outside the above ratings.

Operable Range

(unless otherwise specified, Ta = 25°C. the voltage is with reference to the ground level.)

| Characteristics | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|-------------------------|-----------------|--------------|----------------|-----|------|-----|------|
| Operating voltage range | V _{CC} | — | — | 2.2 | 3.0 | 5.5 | V |
| RF operating frequency | f _{RF} | — | — | 250 | — | 450 | MHz |

Operating ranges indicate the conditions for which the device is intended to be functional even with the electrical changes.

Electrical Characteristics (unless otherwise specified: Ta = 25°C, V_{CC} = 3 V, U/L = OPEN, fin (RF) = fin (MIX) = 314.96 MHz, fin (IF) = 80 kHz)

Receiver Block

| Characteristics | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--|-----------------------|--------------|--|------|------|------|------|
| Current dissipation at battery saving | I _{CCO} | 3 | RX = "L", TX = "L" | | 0 | 5 | μA |
| RF amp gain 1 | G _V (RF) 1 | 1 (5) | The input and output impedances are 50 Ω. | -9.0 | -6.5 | -4.0 | dB |
| Mixer conversion gain | G _V (MIX) | — | — | 18 | 21 | 24 | dB |
| RSSI output voltage 1 | V _{RSSI1} | — | V _{in} (MIX) = 25dBμVEMF in AM mode | 0.25 | 0.5 | 0.75 | V |
| RSSI output voltage 2 | V _{RSSI2} | — | V _{in} (MIX) = 50dBμVEMF in AM mode | 0.7 | 1.0 | 1.3 | V |
| RSSI output voltage 3 | V _{RSSI3} | — | V _{in} (MIX) = 80dBμVEMF in AM mode | 1.35 | 1.7 | 2.05 | V |
| RSSI output resistance | R _{RSSI} | — | — | 18 | 24 | 30 | kΩ |
| Comparator input resistance | R _{COMP} | — | — | 75 | 100 | 125 | kΩ |
| RX data output voltage (L level) | V _{RXDATAL} | 1 (3) | I _{RXDATAL} = 200 μA | — | 0.04 | 0.4 | V |
| RX data output leakage current (H level) | I _{RXDATAH} | 1 (4) | — | — | 0 | 2 | μA |
| RX pin H-level input voltage | V _{RXH} | — | — | 2.0 | — | 5.5 | V |
| RX pin L-level input voltage | V _{RXL} | — | — | 0 | — | 0.2 | V |

FM Mode (Ta = 25°C, Vcc = 3.0 V, fin (RF) = fin (MIX) = 314.96 MHz, U/L = OPEN, fin (IF) = 80 kHz, dev = ±8 kHz, fmod = 600 Hz ((single wave))

| Characteristics | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--|--------|--------------|--|-----|------|-----|-------|
| Quiescent current consumption (for FM) | Iccqfm | 2 (1) | RX/FMAM = "H/ L" Fin (Lo) = 39.38 MHz | 4.2 | 5.6 | 7.0 | mA |
| Demodulated output level | Vod | — | V _{in (MIX)} = 60dBμVEMF | 95 | 130 | 165 | mVrms |
| Waveform shaping duty ratio | DRfm | 1 (2) | V _{in (MIX)} = 60dBμVEMF For single tone | 45 | 50 | 55 | % |

AM Mode (Ta = 25°C, Vcc = 3.0 V, fin (RF) = fin (MIX) = 314.96 MHz, U/L = OPEN, fin (IF) = 80 kHz, AM = 90%, fmod = 600 Hz (square wave))

| Characteristics | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--|--------|--------------|--|-----|------|-----|------|
| Quiescent current consumption (for AM) | Iccqam | 2 (2) | RX/FMAM = "H/ OPEN" Fin (Lo) = 39.38 MHz | 3.9 | 5.3 | 6.7 | mA |
| Reference characteristic data | Dram | 1 (2) | V _{in (MIX)} = 60dBμVEMF For single tone | 45 | 50 | 55 | % |

Transmitter Block

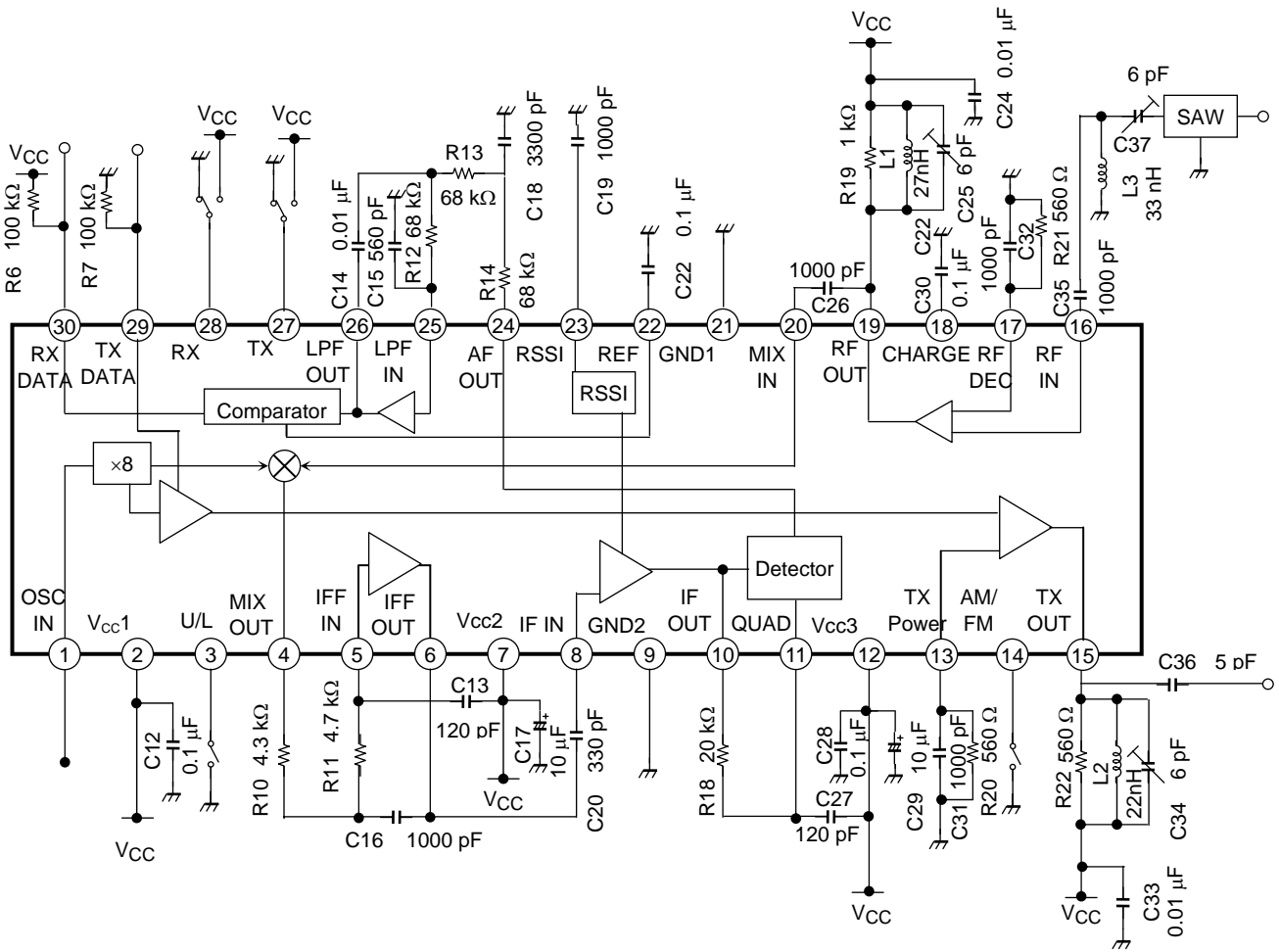
| Characteristics | Symbol | Test Circuit | Test Condition | Min | Typ. | Max | Unit |
|--|-----------------------|--------------|--------------------------------|-------|-------|-------|------|
| Quiescent current consumption (for Transmitter Mode) | Iccqtx | 2 (3) | TX= "H" | 3.0 | 4.3 | 5.6 | mA |
| TXDATA pin H-level input voltage | V _{TXDATAH} | — | — | 2.0 | — | 5.5 | V |
| TXDATA pin L-level input voltage | V _{TXDATA L} | — | — | 0 | — | 0.2 | V |
| TX pin H-level input voltage | V _{TXBSH} | — | — | 2.0 | — | 5.5 | V |
| TX pin L-level input voltage | V _{TXBSL} | — | — | 0 | — | 0.2 | V |
| TXoutput signal level 1 | V _{TX1} | — | The output impedances are 50 Ω | -25.5 | -22.5 | -19.5 | dBm |

Reference Characteristic Data *

| Characteristics | Symbol | Test Circuit | Test Condition | Typ. | Unit |
|---------------------------|-----------------------|--------------|-----------------------------------|------|------|
| RF amp gain 2 | G _{v (RF) 2} | — | — | 30 | dB |
| RF amp input resistance | R _{(RF) IN} | — | — | 1.0 | kΩ |
| RF amp input capacitance | C _{(RF) IN} | — | — | 2.0 | pF |
| RF amp output capacitance | C _{(RF) OUT} | — | — | 2.0 | pF |
| Mixer input resistance | R _{(MIX) IN} | — | — | 1.2 | kΩ |
| Mixer input capacitance | C _{(MIX) IN} | — | — | 1.6 | pF |
| Mixer intercept point | IP3 | — | — | 96 | dBμV |
| IFamp gain | G _{v (RF)} | — | — | 65 | dB |
| Signal-to-noise ratio 1 | S/N1 | 1 (8) | V _{in (MIX)} = 20dBμVEMF | 19 | dB |
| Signal-to-noise ratio 2 | S/N2 | 1 (8) | V _{in (MIX)} = 60dBμVEMF | 56 | dB |
| TX amp output capacitance | C _{(TX) OUT} | — | — | 2.0 | pF |
| TX output signal level 2 | V _{TX2} | — | — | -14 | dBm |

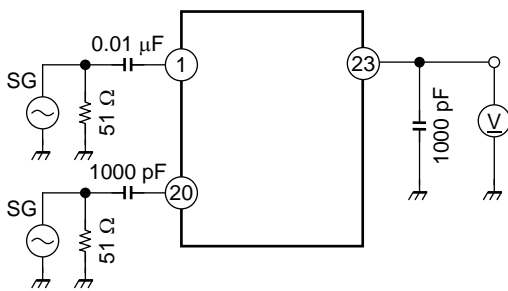
* : These characteristic data values are listed just for reference purposes. They are not guaranteed values.

Typical Test Circuit (FSK)

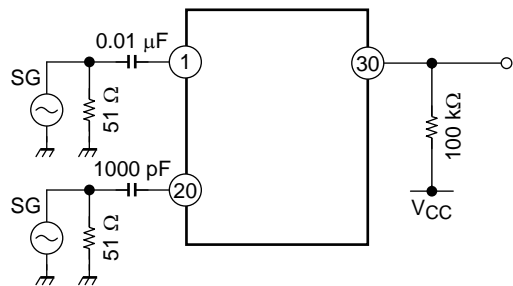


Test Circuit 1

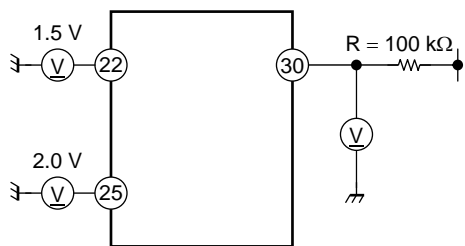
(1) V_{RSSI}



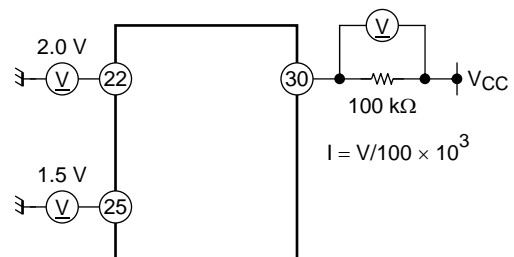
(2) DR



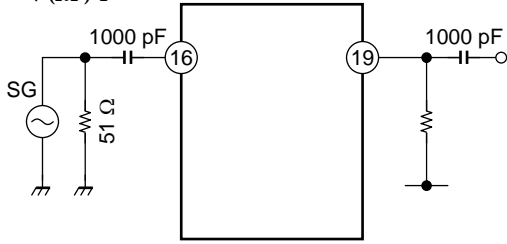
(3) V_{DATA L}



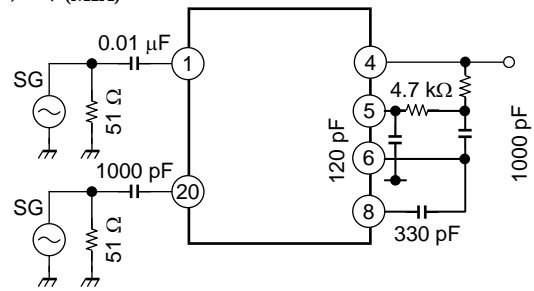
(4) I_{DATA H}



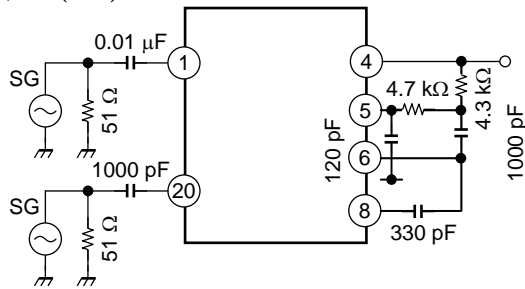
(5) G_v (RF) 1



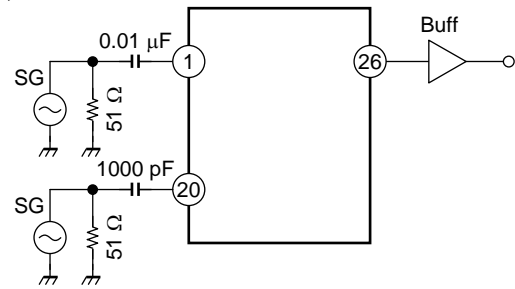
(6) G_v (MIX)



(7) G_v (MIX) vs VLO

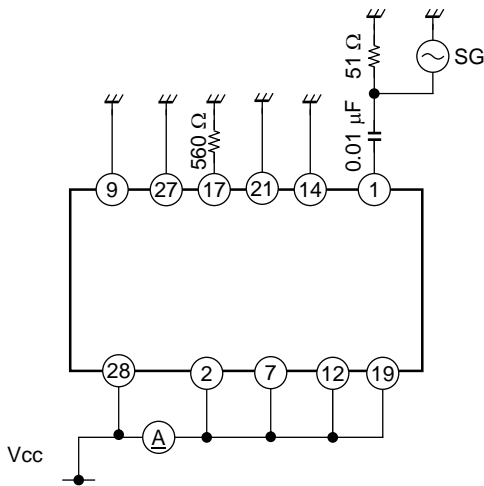


(8) S/N1, 2

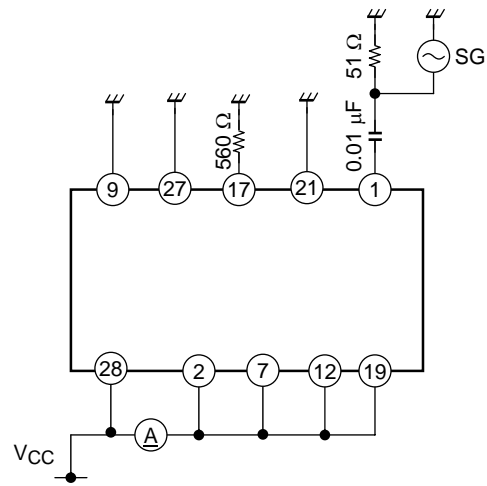


Test Circuit 2

(1) I_{ccqfm}

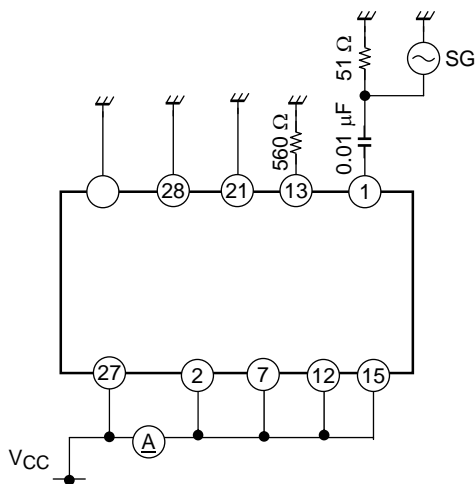


(2) I_{ccqam}

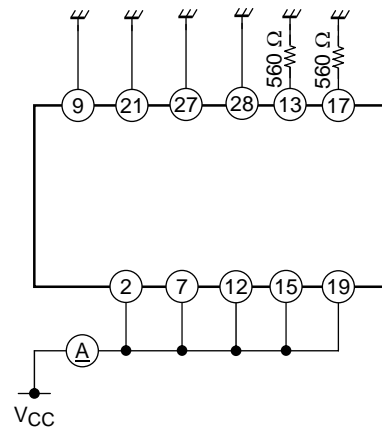


Test Circuit 3

(3) I_{cctx}

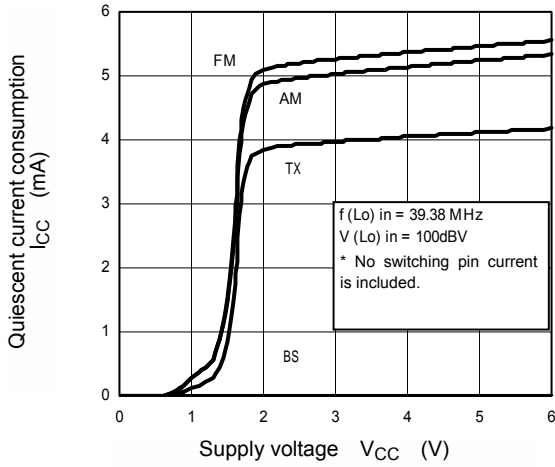


I_{cco}

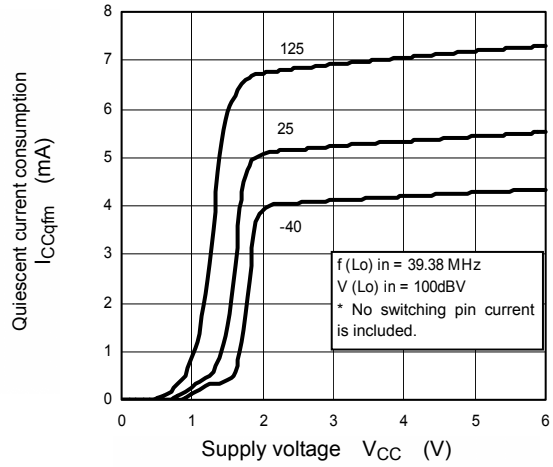


Reference Data (This is characteristics data when it used evaluation boards. This is not guarantee on condition that it is stating except electrical characteristics.)

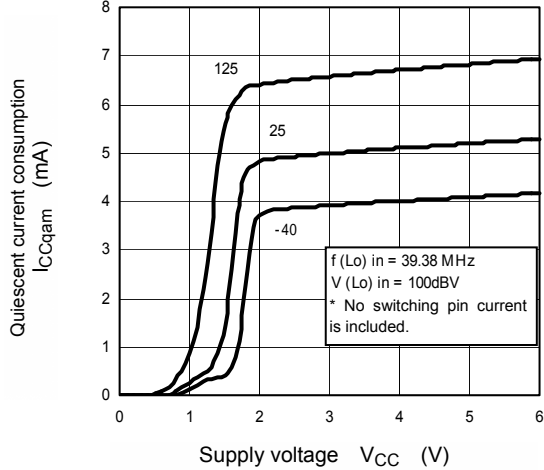
Quiescent Current Consumption –
Supply Voltage Characteristics



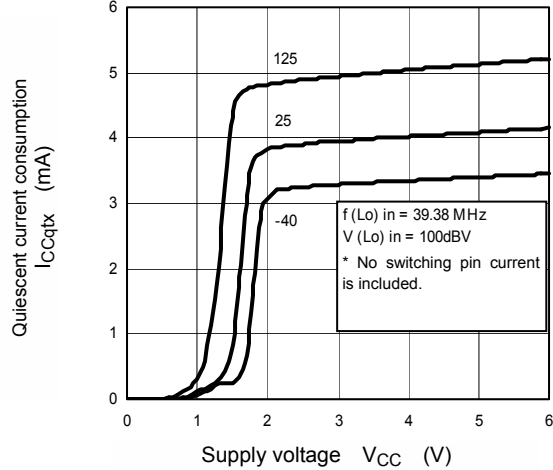
Quiescent Current Consumption –
Supply Voltage Characteristics FM Mode



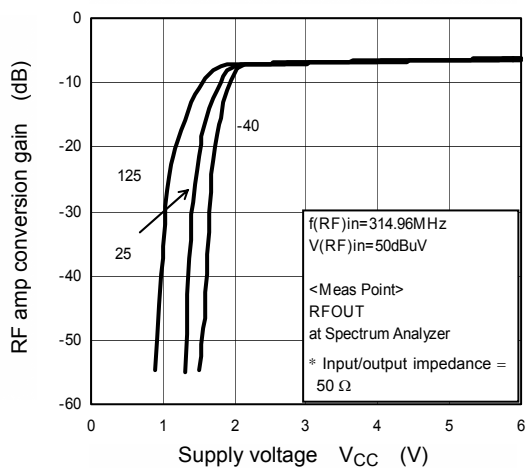
Quiescent Current Consumption –
Supply Voltage Characteristics AM Mode



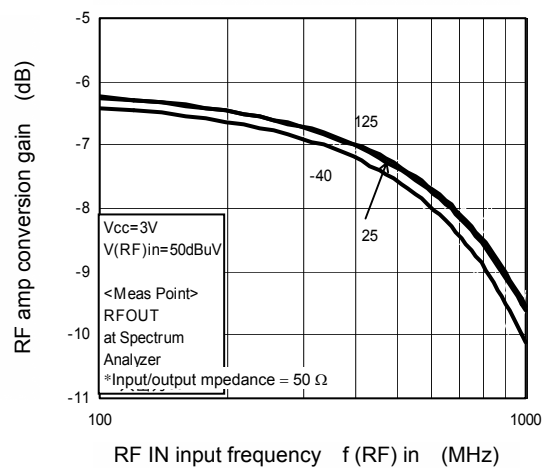
Quiescent Current Consumption –
Supply Voltage Characteristics TX Mode



RF Amp Gain –
Supply Voltage Characteristics

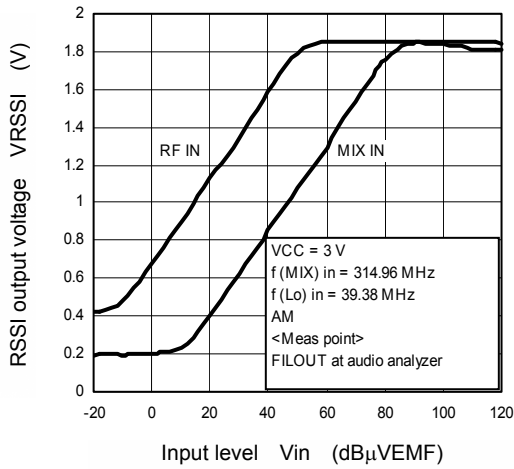


RF Amp Frequency Characteristics

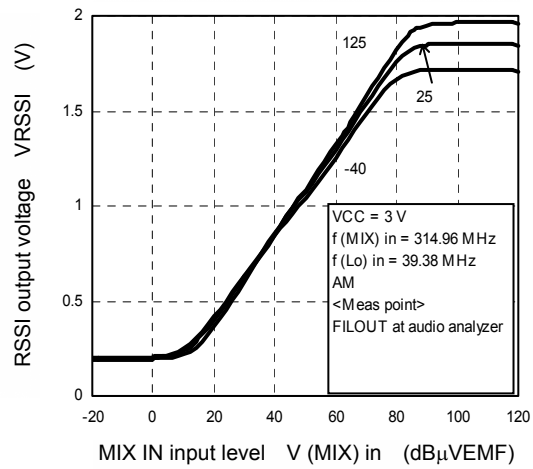


Reference Data (This is characteristics data when it used evaluation boards. This is not guarantee on condition that it is stating except electrical characteristics.)

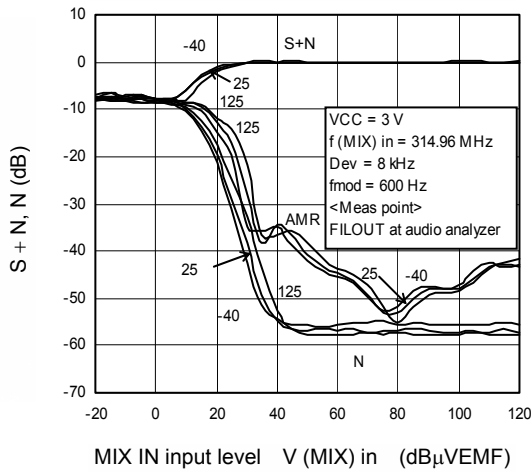
RSSI Output Voltage Characteristics (MIX, and RF inputs)



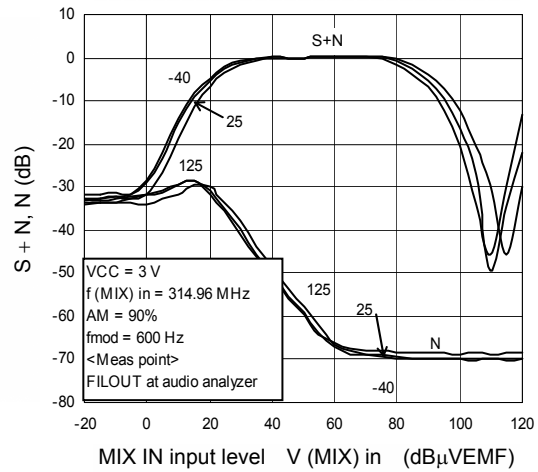
RSSI Output Voltage Characteristics (MIX inputs)



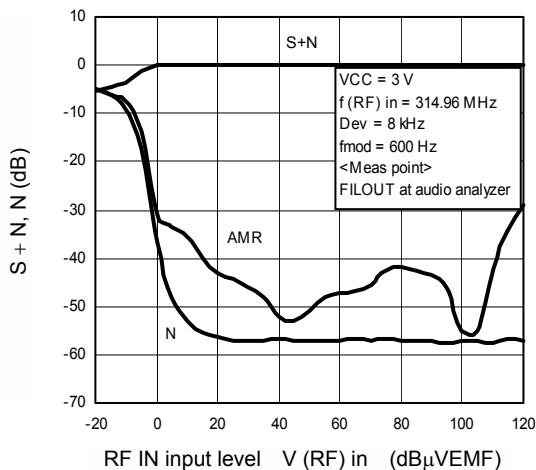
S/N Characteristics (MIX input) in the FM Mode



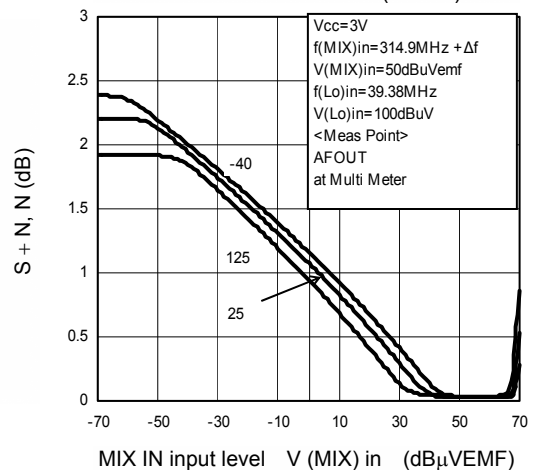
S/N Characteristics (MIX input) in the AM Mode



S/N Characteristics (RF input) in the FM Mode

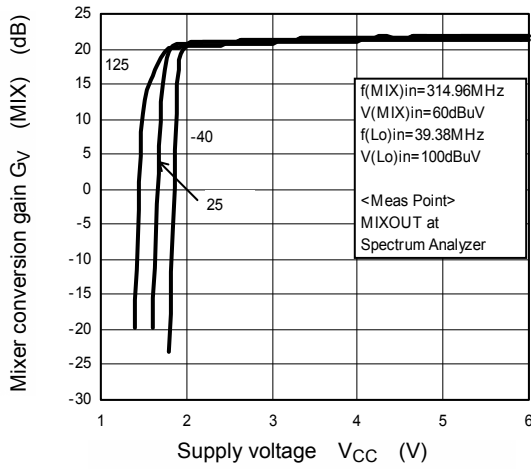


S Curve Characteristics (MIX IN)

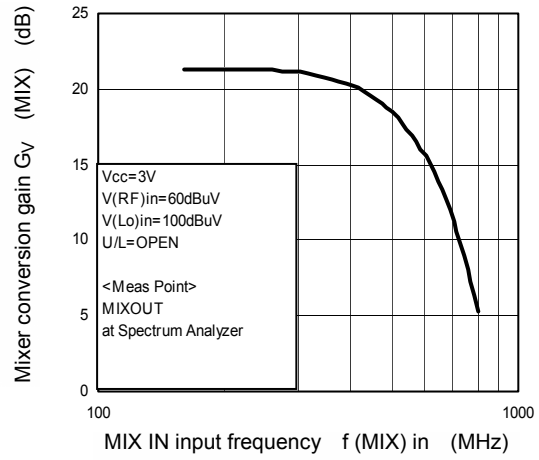


Reference Data (This is characteristics data when it used evaluation boards. This is not guarantee on condition that it is stating except electrical characteristics.)

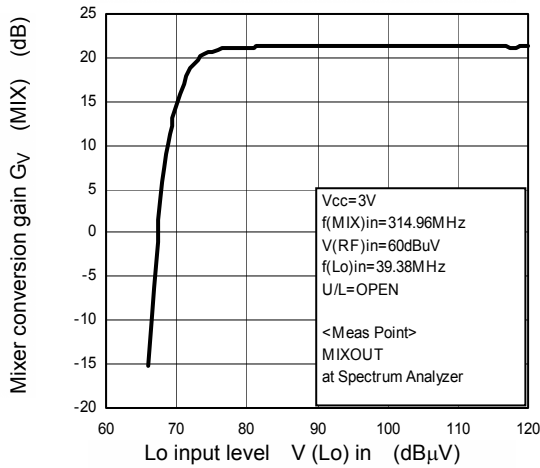
Mixer Conversion Gain –
Supply Voltage Characteristics



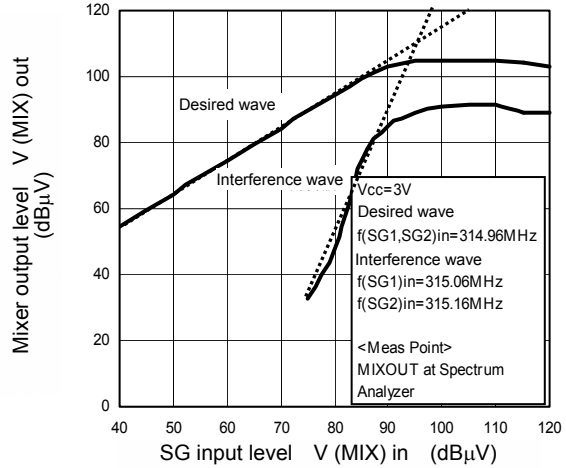
Mixer Conversion Gain Frequency
Characteristics



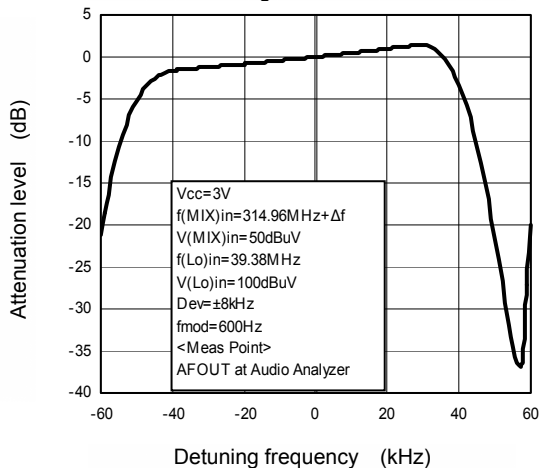
Mixer Conversion Gain –
Local Input Level Characteristics



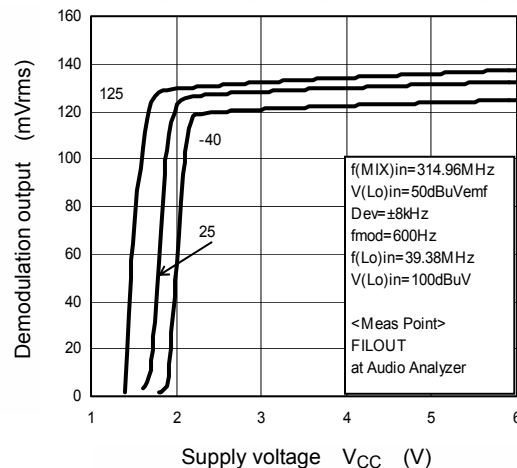
Mixer Intercept Point



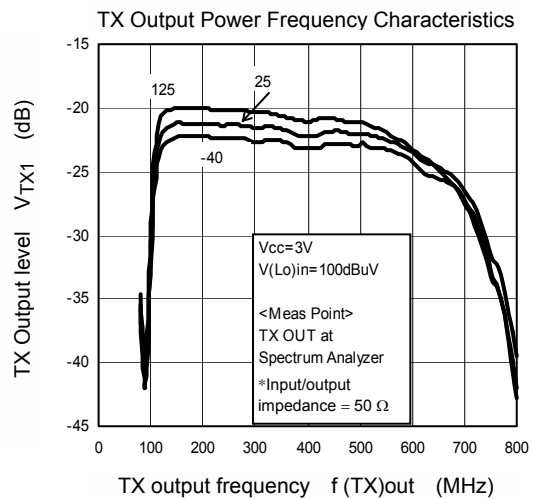
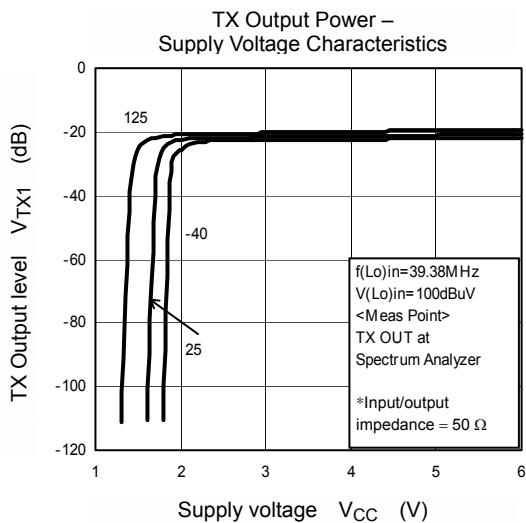
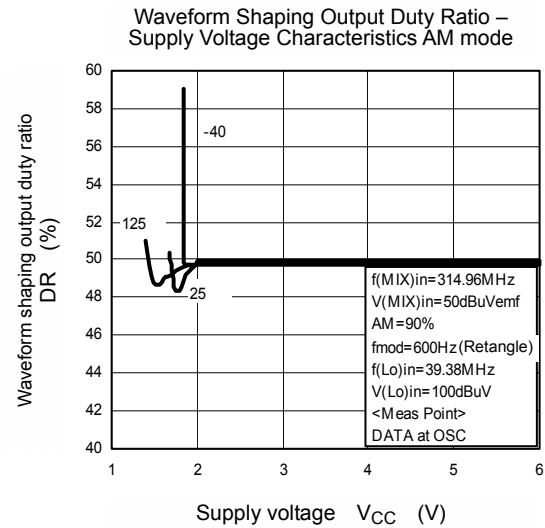
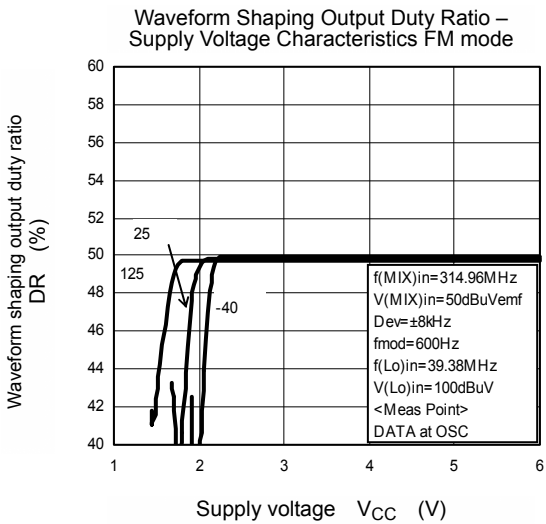
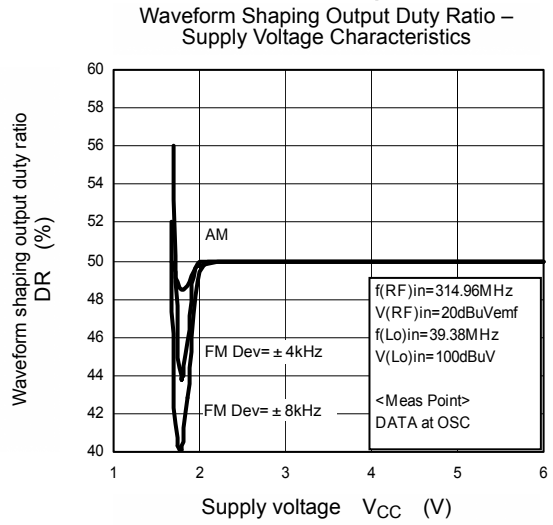
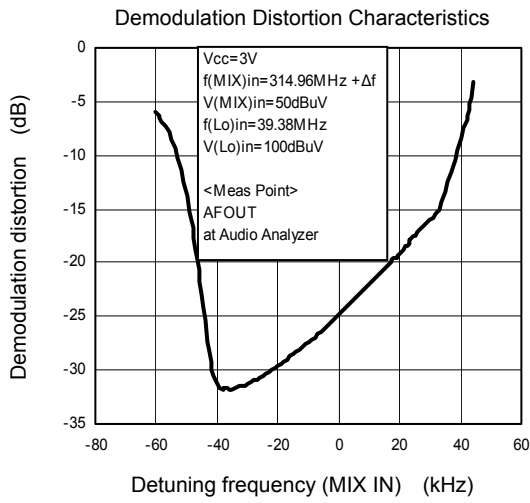
Detuning Characteristics



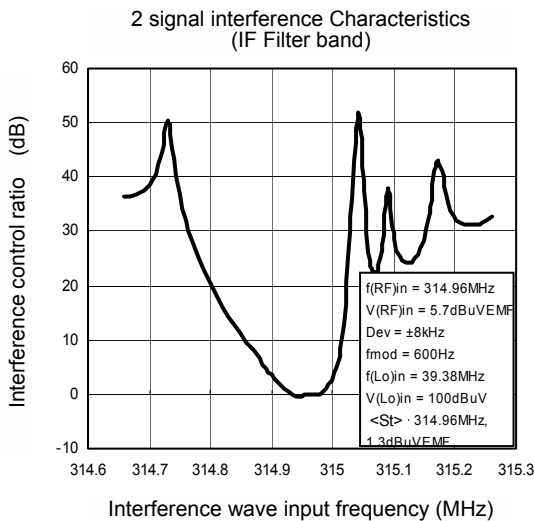
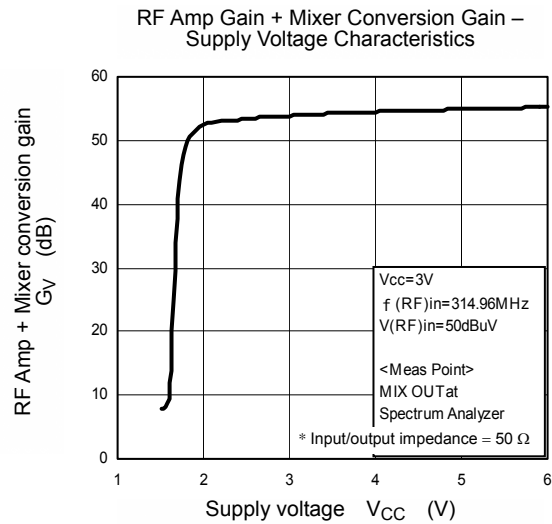
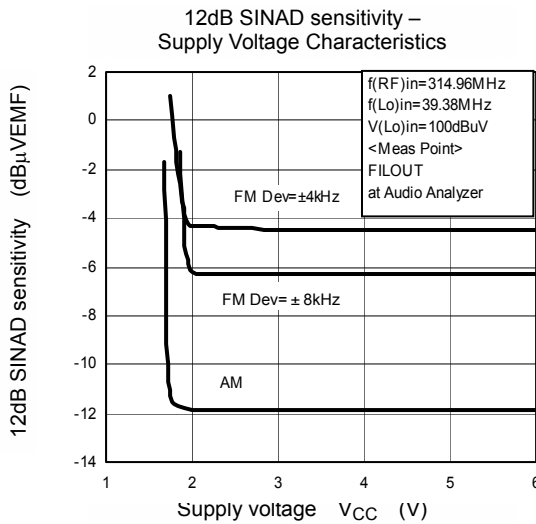
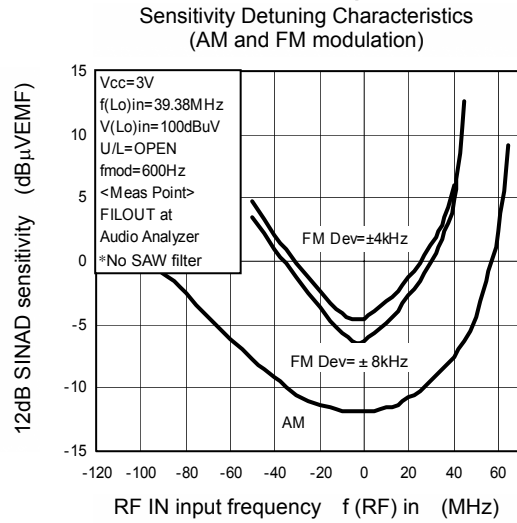
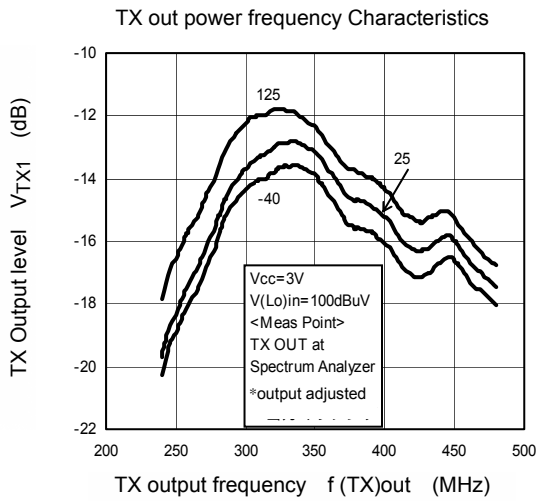
Demodulation Output –
Supply Voltage Characteristics (FM)



Reference Data (This is characteristics data when it used evaluation boards. This is not guarantee on condition that it is stating except electrical characteristics.)

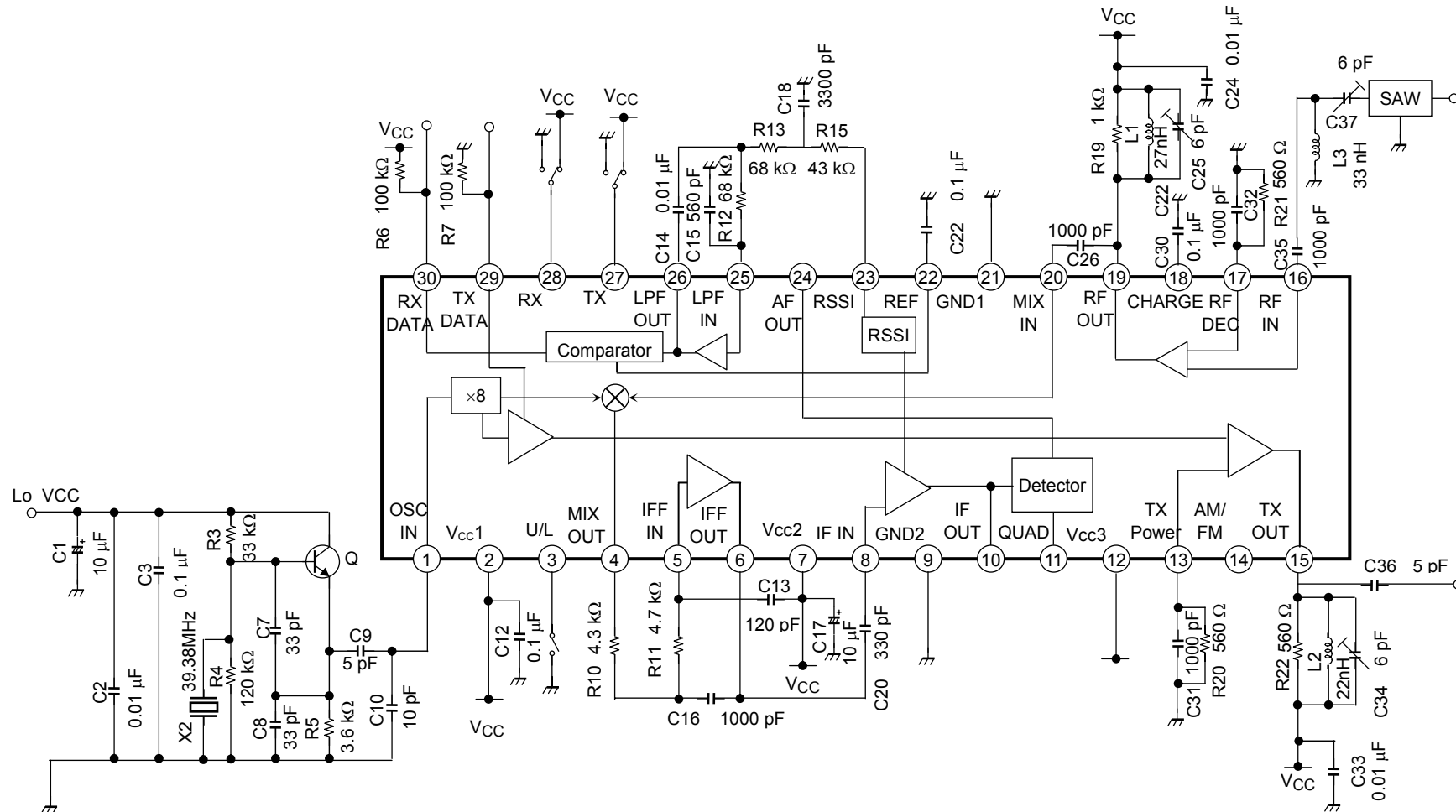


Reference Data (This is characteristics data when it used evaluation boards. This is not guarantee on condition that it is stating except electrical characteristics.)



Application Circuit (ASK) *This circuit is not guaranteed for mass product design. Please evaluate the circuit for mass product design well.

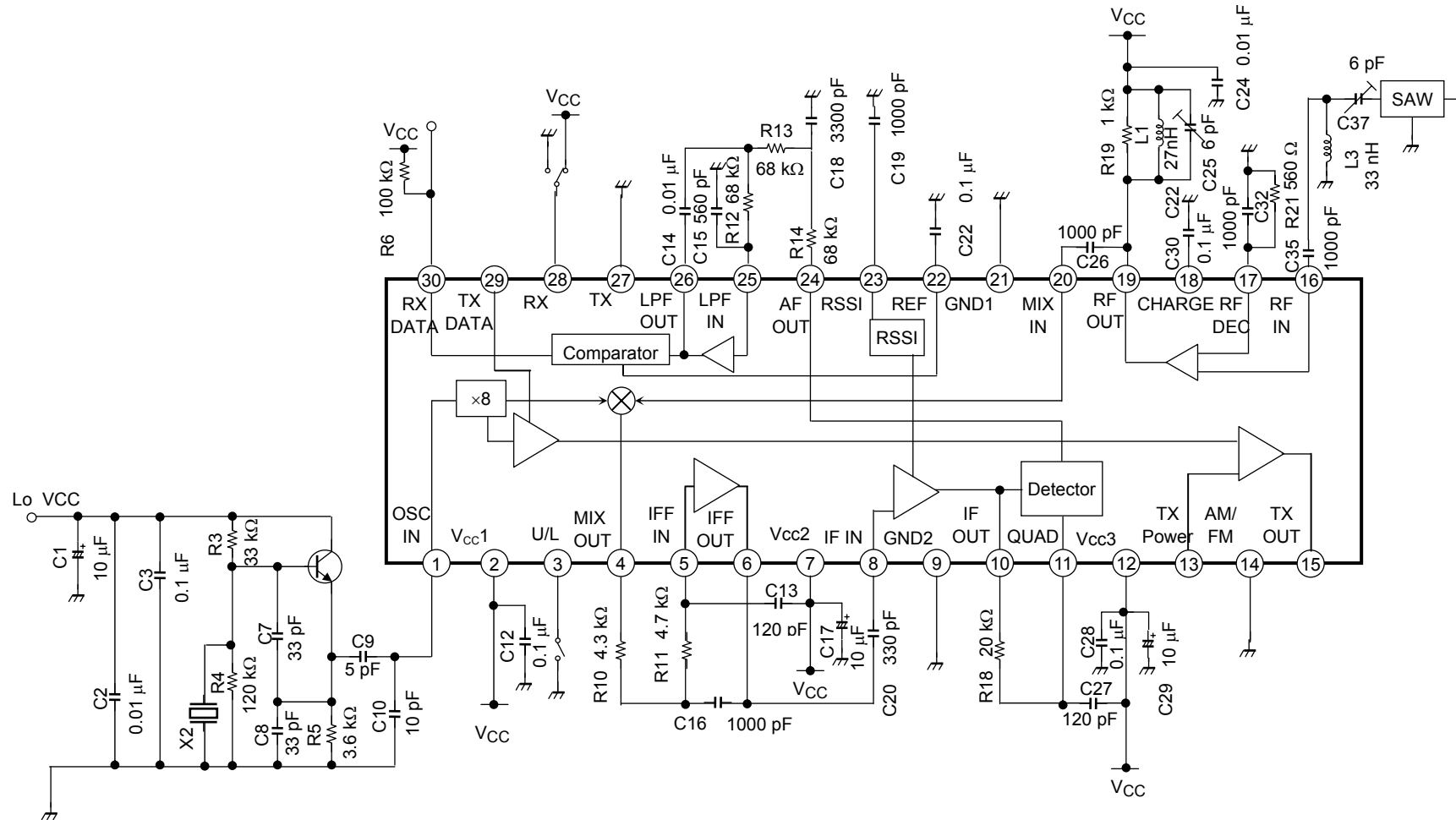
For Receiver and Transceiver



SAW: SAFCH315MAM0T00 (Murata Manufacturing)
 X2: TR-1 (TEW)
 Q: 2SC2499 (TOSHIBA)

Application Circuit (FSK) *This circuit is not guaranteed for mass product design. Please evaluate the circuit for mass product design well.

For Receiver only



SAW: SAFCH315MAM0T00 (Murata Manufacturing)

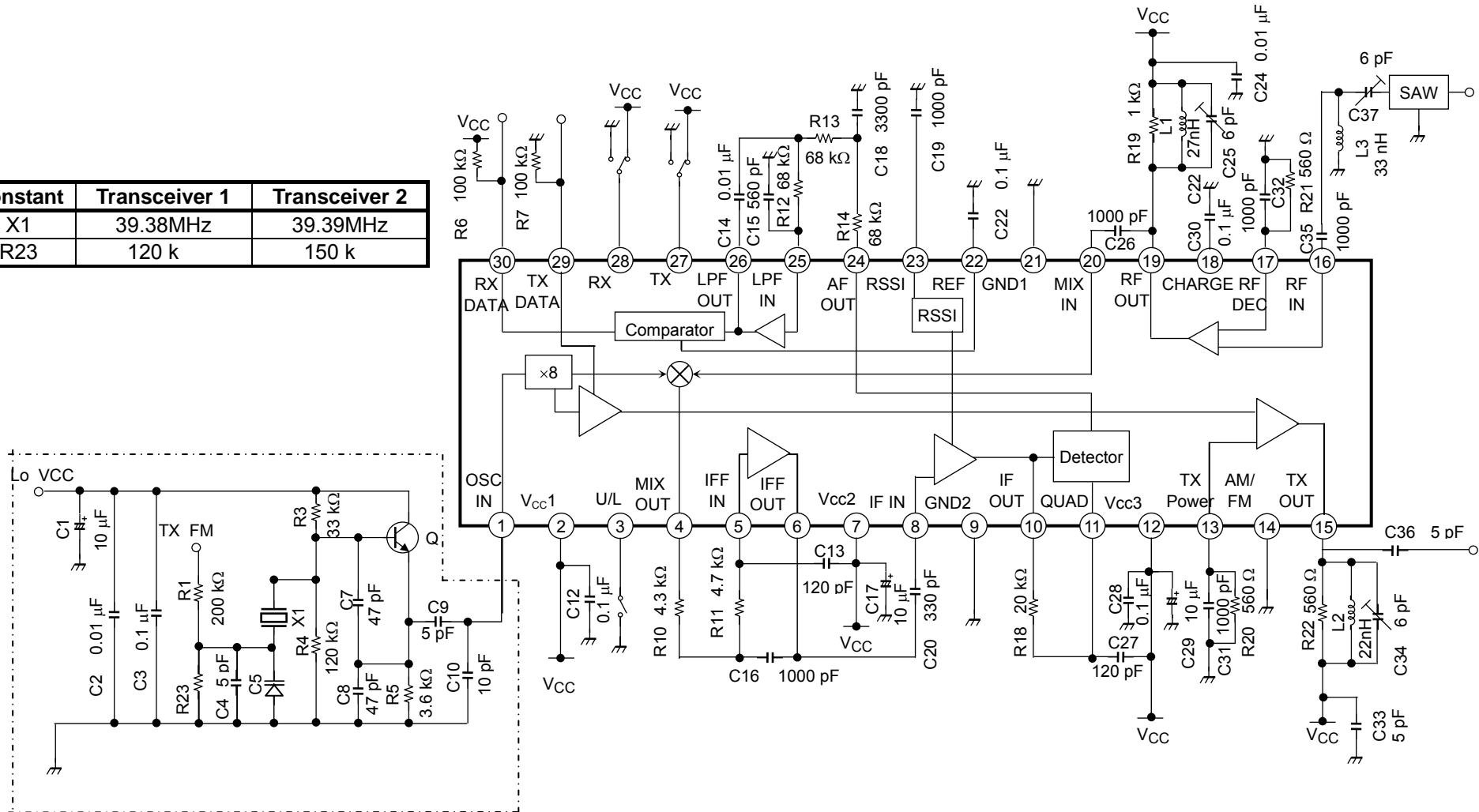
X2: TR-1 (TEW)

Q: 2SC2499 (TOSHIBA)

Application Circuit (FSK) *This circuit is not guaranteed for mass product design. Please evaluate the circuit for mass product design well.

For Transceiver only: Change the constants (X1 and R23) at oscillator circuit like the table below to be shifted oscillator frequency 10 kHz.

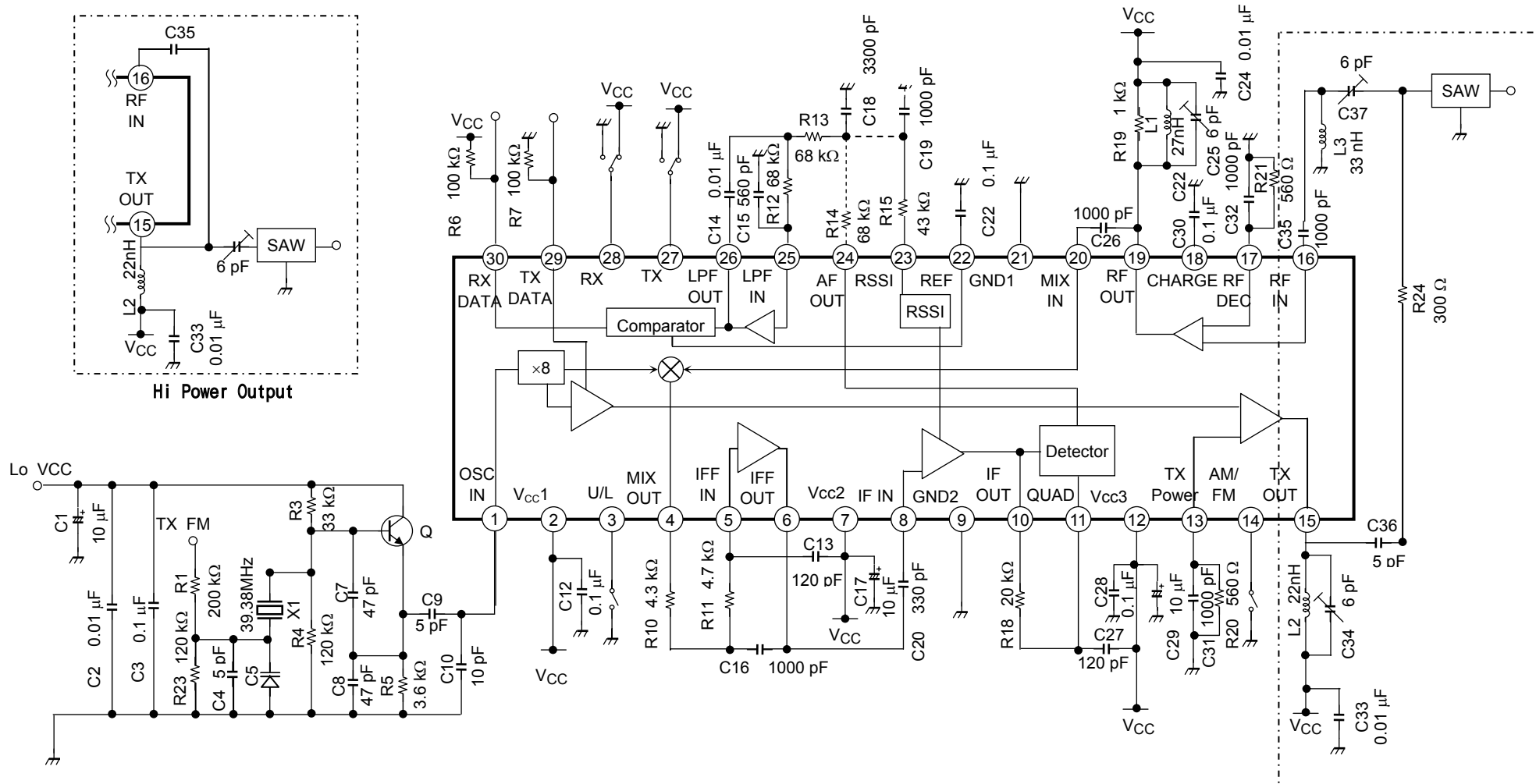
| Constant | Transceiver 1 | Transceiver 2 |
|----------|---------------|---------------|
| X1 | 39.38MHz | 39.39MHz |
| R23 | 120 k | 150 k |



- SAW: SAFCH315MAM0T00 (Murata Manufacturing)
- X2: TR-1 (TEW)
- Q: 2SC2499 (TOSHIBA)
- C5: 1SV325 (TOSHIBA)

Application Circuit *This circuit is not guaranteed for mass product design. Please evaluate the circuit for mass product design well.

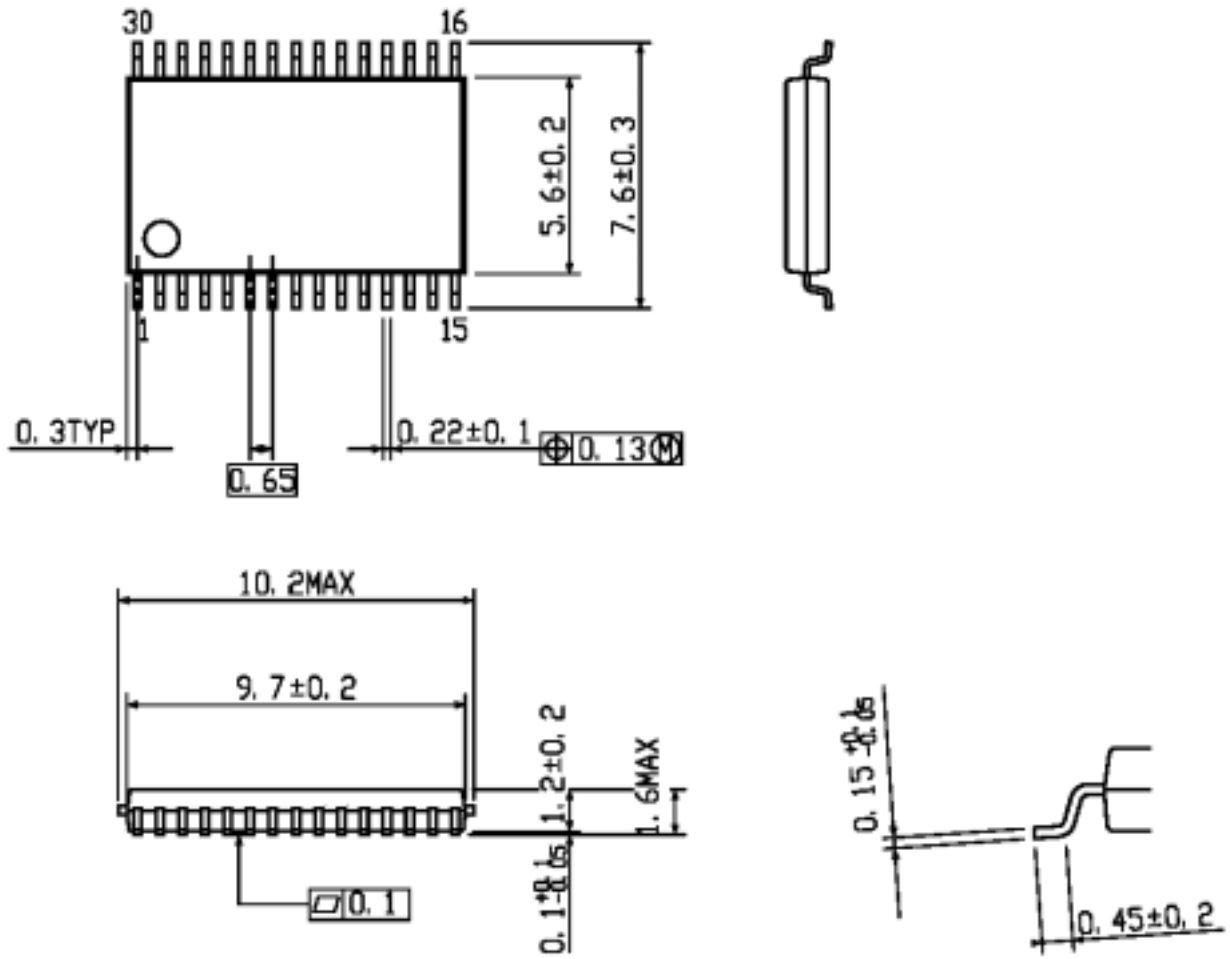
For Transceiver, one antenna version: Adjust the circuit expect antenna block. In case of Hi power output application, set the circuit like left figure.



Package Dimensions

SSOP30-P-300-0.65A

Unit::mm



Weight: 0.17 g (typ)

Notice for Pb free product

About solderability, following conditions were confirmed

➤ Solderability

- (1) Use of Sn-36Pb solder bath
 - solder bath temperature = 230
 - dipping time = 5seconds
 - the number of times = once
 - use of R-type flux
- (2) Use of Sn-3.0Ag-0.5Cu solder bath
 - solder bath temperature = 245
 - dipping time = 5seconds
 - the number of times = once
 - use of R-type flux

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000707EBA

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