

## Wide Band FSK Receiver

### Description

The CXA3067AM is an integrated circuit designed for CATV wide band FSK receiver. This monolithic IC is composed of local oscillator, double balanced mixer, limiter, FM detector, data shaper and PLL circuit in a single chip.

### Features

- Built in PLL
- 3 bits 3 states frequency selection
- Applied for 4 reference frequency (7.15625/7.15909/14.3125/14.31818 MHz)
- Compatible with external reference clock and X'tal oscillator
- Balanced oscillator and double balanced mixer for low L.O. leakage
- Low power consumption
- SOP 30 pin package

### Function

- Oscillator
- Mixer
- PLL
- Limiter
- FSK detector
- Data shaper

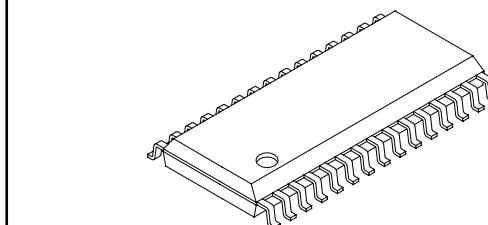
### Applications

FSK receiver for CATV

### Structure

Bipolar silicon monolithic IC

30 pin SOP (Plastic)



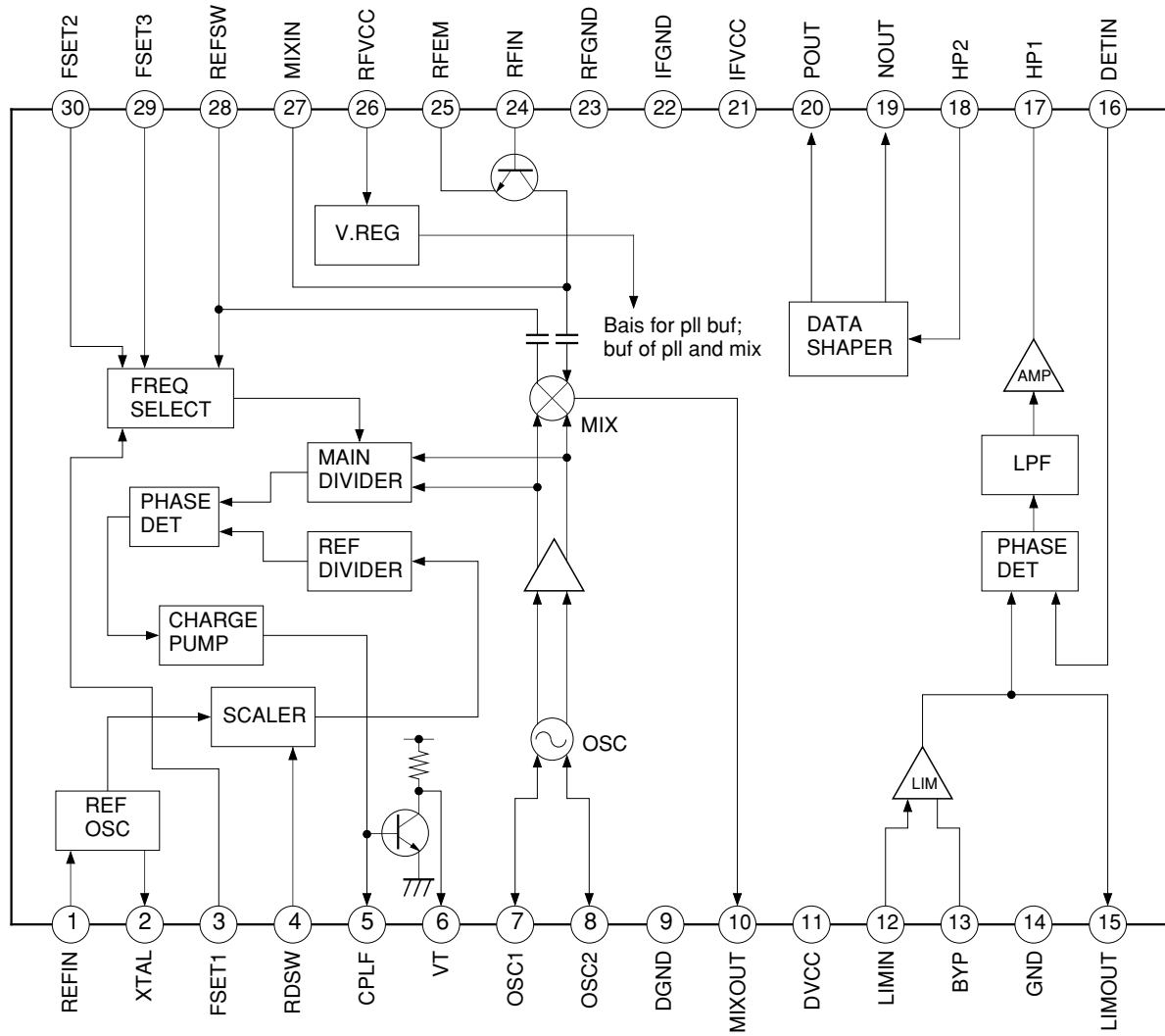
### Absolute Maximum Ratings (Ta=25 °C)

- |                       |                  |              |    |
|-----------------------|------------------|--------------|----|
| • Supply voltage      | V <sub>cc</sub>  | -0.3 to +5.5 | V  |
| • Storage temperature | T <sub>stg</sub> | -55 to +150  | °C |

### Operating Conditions

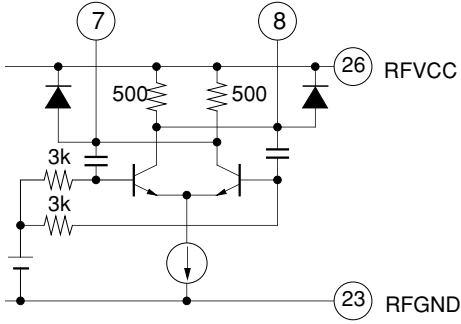
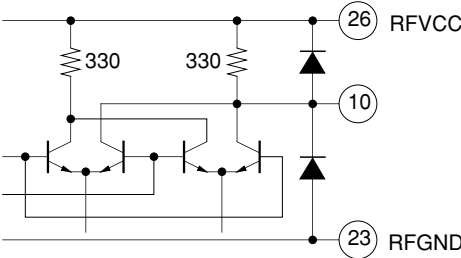
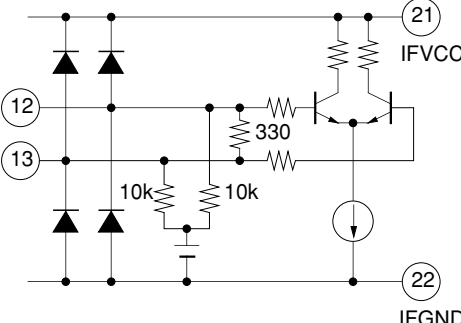
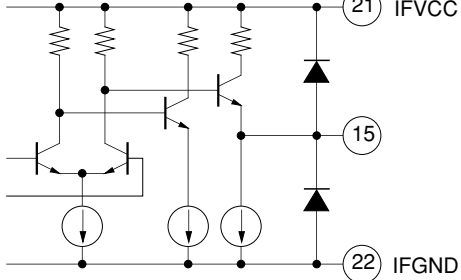
- |                         |                  |             |    |
|-------------------------|------------------|-------------|----|
| • Supply voltage        | V <sub>cc</sub>  | 4.75 to 5.3 | V  |
| • Operating temperature | T <sub>opr</sub> | -25 to +75  | °C |

Pin configuration and Block diagram



Pin Description and Equivalent Circuit

| Pin No. | Symbol | Typical voltage (V) | Equivalent circuit | Description  |
|---------|--------|---------------------|--------------------|--|
| 1       | REFIN  | 3.4                 |                    | External clock input and X'tal connection for reference oscillator.  |
| 2       | XTAL   | 4.0                 |                    | X'tal connection for reference oscillator.   |
| 3       | FSET1  | 2.5 (OPEN)          |                    | The pin for channel selection. The condition of pin 3 has 3 states. Connect to 5 V source for "Hi" selection and connect to GND for "Low" selection and leave open.          |
| 4       | RDSW   | 3.0 (OPEN)          |                    | Reference frequency selection. Connect to GND when reference frequency is 14.3125 MHz or 14.31818 MHz and leave open when reference frequency is 7.15625 MHz or 7.15909 MHz. |
| 5       | CPLF   | 2.0                 |                    | Charge pump output. Connect to loop filter.  |
| 6       | VT     | 0.3 to Vcc          |                    | Connect to loop filter. OSC tuning voltage output.   |

| Pin No. | Symbol | Typical voltage (V) | Equivalent circuit   | Description                                 |
|---------|--------|---------------------|--|---|
| 7       | OSC1   | 4.0                 |    | Oscillator.                                 |
| 8       | OSC2   | 4.0                 |  |   |
| 9       | DGND   | 0                   |  | PLL circuit GND.                            |
| 10      | MIXOUT | 4.0                 |   | Mixer output.<br>Output impedance is 330 Ω. |
| 11      | DVCC   | 5                   |  | PLL circuit power supply.                   |
| 12      | LIMIN  | 2.4                 |  | Limiter input.<br>Input impedance is 330 Ω. |
| 13      | BYP    | 2.4                 |  |   |
| 14      | GND    | 0                   |  | GND.  |
| 15      | LIMOUT | 3.1                 |  | Limiter output.                             |

| Pin No. | Symbol | Typical voltage (V)    | Equivalent circuit | Description   |
|---------|--------|------------------------|--------------------|---|
| 16      | DETIN  | 5.0                    |                    | Detector input.<br>Connect to a discriminator.                              |
| 17      | HP1    | 2.1                    |                    | A capacitor for DC decoupling and LPF are connected between pins 17 and 18. |
| 18      | HP2    | 2.3                    |                    |   |
| 19      | NOUT   | 4.1 (Hi)<br>0.22 (Low) |                    | FSK data output.  |
| 20      | POUT   | 4.1 (Hi)<br>0.22 (Low) |                    | Pins 19 and 20 are each other reversal condition.                           |
| 21      | IFVCC  | 5.0                    |                    | Power supply for limiter, detector, data shaper circuit.                    |

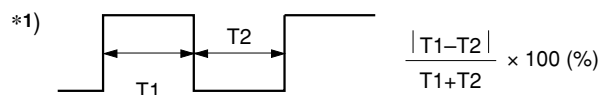
| Pin No. | Symbol | Typical voltage (V) | Equivalent circuit | Description  |
|---------|--------|---------------------|--------------------|--|
| 22      | IFGND  | 0                   |                    | GND for limiter, detector, data shaper circuit.  |
| 23      | RFGND  | 0                   |                    | GND for RFamp, Mixer, oscillator circuit.  |
| 24      | RFIN   | 1.5                 |                    | RFamp input.   |
| 25      | RFEM   | 0.7                 |                    | Gain adjustment.<br>Normally, by-pass capacitor is connected at pin 25 to GND.   |
| 27      | MIXIN  | 5.0                 |                    | RFamp output and mixer input.  |
| 26      | RFVCC  | 5.0                 |                    | Power supply for RFamp, mixer, oscillator circuit.   |
| 28      | REFSW  | 0.7 (OPEN)          |                    | Reference frequency selection.<br>Decoupling capacitor is connected at pin 28 to GND when reference frequency is 7.15909 MHz or 14.31818 MHz and pin 28 is connected to GND directly when reference frequency is 7.15625 MHz or 14.3125 MHz. |
| 29      | FSET3  | 2.5 (OPEN)          |                    | The pin of channel selection.<br>The condition of pin 29 has 3 states.<br>Connect to 5 V source for "Hi" selection and connect to GND for "Low" selection and leave open.  |
| 30      | FSET2  | 2.5 (OPEN)          |                    | The pin of channel selection.<br>The condition of pin 30 has 3 states.<br>Connect to 5 V source for "Hi" selection and connect to GND for "Low" selection and leave open.  |

Electrical Characteristics

See Electrical Characteristics Test Circuit (V<sub>CC</sub>=5.0 V, T<sub>a</sub>=+25 °C)

| Item                                 | Symbol               | Pin No. | Circuit No. | Conditions   | Min. | Typ. | Max. | Unit |
|--------------------------------------|----------------------|---------|-------------|--|------|------|------|------|
| RFVCC<br>Current consumption         | RFI <sub>CC</sub>    | 26, 27  | 1           | RFV <sub>CC</sub><br>V1=5 V  | 17   | 28   | 39   | mA   |
| IFVCC<br>Current consumption         | IFI <sub>CC</sub>    | 21      | 1           | IFV <sub>CC</sub><br>V2=5 V  | 4    | 9    | 14   | mA   |
| DVCC<br>Current consumption          | DI <sub>CC</sub>     | 11      | 1           | DV <sub>CC</sub> V4=1 V<br>V3=5 V  | 3.5  | 7    | 10   | mA   |
| Input sensitivity                    | V <sub>i1</sub>      |         | 2           | f <sub>MOD</sub> =10 kHz,<br>f <sub>DEV</sub> =±75 k, ±50 kHz<br>Jitter is 1 % for f <sub>MOD</sub><br>50 Ω Termination<br>RF=53.35 M to 302 MHz<br>frequency offset=±50 kHz | -32  |      |      | dBmV |
| Input level                          | V <sub>il</sub>      |         | 2           | f <sub>MOD</sub> =10 kHz,<br>f <sub>DEV</sub> =±75 k, ±50 kHz<br>Jitter is 1 % for f <sub>MOD</sub><br>50 Ω Termination<br>RF=53.35 M to 302 MHz<br>frequency offset=±50 kHz |      |      | +20  | dBmV |
| Duty cycle *1                        | TD                   |         |             | f <sub>MOD</sub> =10 kHz<br>f <sub>DEV</sub> =±75 k, ±50 kHz<br>Frequency offset=±50 kHz   |      | 0    | 6    | %    |
| DATA SHAPER<br>input level           | V <sub>18</sub>      | 18      | 2           | f <sub>MOD</sub> =10 kHz<br>f <sub>DEV</sub> =±75 k, ±50 kHz<br>Frequency offset=±50 kHz   | 130  | 260  | 1000 | mVpp |
| Local OSC leakage<br>from RF input 1 | LOleak1              | 24      | 2           | Measurement on RFIN pin<br>SW1 : ON<br>RF=53.35 M to 169.5 MHz   |      |      | -10  | dBmV |
| Local OSC leakage<br>from RF input 2 | LOleak2              | 24      | 2           | Measurement on RFIN pin<br>SW1 : ON<br>RF=221.95 M to 302 MHz  |      |      | -5   | dBmv |
| RFamp bias current                   | I <sub>rf</sub>      | 27      | 1           | RFV <sub>CC</sub> V1=5 V   | 4.5  | 7    | 10   | mA   |
| RFamp voltage gain                   | G <sub>rf1</sub>     | 24→27   | 3           | RF=108.5 M   | 28   | 34   | 37   | dB   |
| RFamp input resistance               | r <sub>π</sub> (rf)  | 24      |             | I=7.5 mA, RF=100 MHz<br>Load Resistance=0 Ω  |      | 1.46 |      | kΩ   |
| RFamp input capacitance              | C <sub>π</sub> (rf)  | 24      |             | I=7.5 mA, RF=100 MHz<br>Load Resistance=0 Ω  |      | 3.4  |      | pF   |
| Mixer input resistance               | r <sub>π</sub> (mix) | 27      |             | RF=100 MHz   |      | 2.3  |      | kΩ   |
| Mixer input capacitance              | C <sub>π</sub> (mix) | 27      |             | RF=100 MHz   |      | 3.4  |      | pF   |
| Mixer voltage gain                   | G <sub>mix</sub>     | 27→10   | 4           | RF=108.5 MHz→<br>IF=10.7 MHz   | 9    | 13   | 17   | dB   |
| RFamp+Mixer noise figure *2          | NF<br>rfmix          | 24→10   | 5           | RF=108.5 MHz→<br>IF=10.7 MHz   |      | 6    |      | dB   |

**Note)** 0 dBmV=1 mV, 0 dBμV=1 μV  
0 dBmV=60 dBμV  
0 dBm=47 dBmV

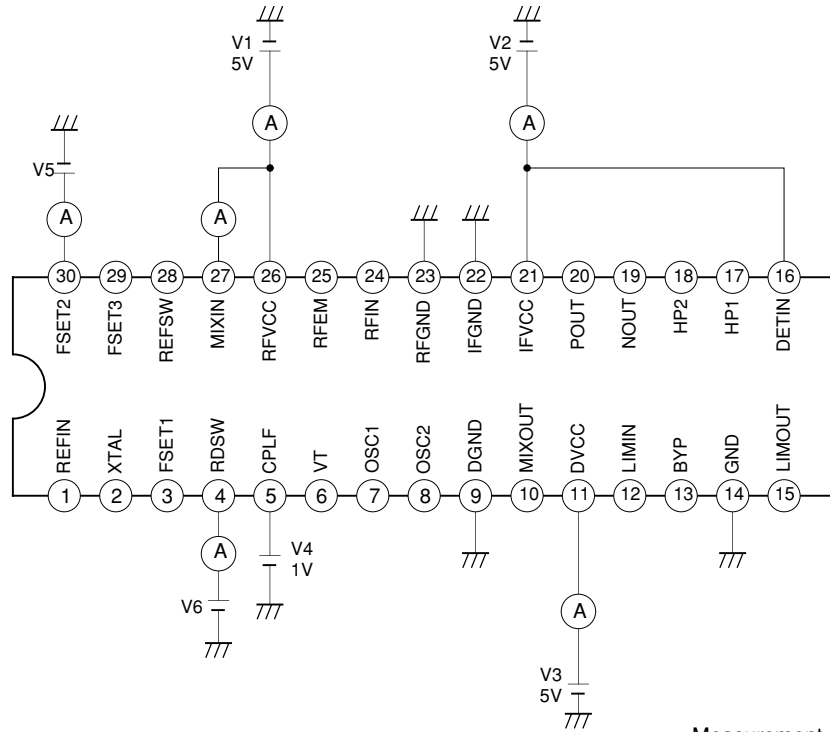


\*2) Noise figure is uncorrected for image.

| Item                                | Symbol        | Pin No.   | Circuit No. | Conditions  | Min. | Typ. | Max. | Unit     |
|-------------------------------------|---------------|-----------|-------------|---|------|------|------|----------|
| Mixer output resistance             | $r_L$ (mix)   | 10        |             | IF=10.7 MHz   | 222  | 332  | 442  | $\Omega$ |
| Limiter input resistance            | $r_\pi$ (lim) | 12        |             | IF=10.7 MHz   | 222  | 332  | 442  | $\Omega$ |
| Limiter voltage gain                | Glim          | 15        | 6           | IF=10.7 MHz   |      | 70   |      | dB       |
| FSK Data output voltage "H"         | OUTH          | 19, 20    | 2           | Load Capacitance=2 pF<br>Load Resistance=10 k $\Omega$ ,<br>fMOD=10 kHz, fDEV=±75 kHz,<br>±50 kHz | 3.8  | 4.1  |      | V        |
| FSK Data output voltage "L"         | OUTL          | 19, 20    | 2           | Load Capacitance=2 pF<br>Load Resistance=10 k $\Omega$ ,<br>fMOD=10 kHz, fDEV=±75 kHz,<br>±50 kHz |      | 0.22 | 0.6  | V        |
| FSK Data output rise time           | Tr            | 19, 20    | 2           | Load Capacitance=2 pF<br>Load Resistance=10 k $\Omega$ ,<br>fMOD=10 kHz, fDEV=±75 kHz,<br>±50 kHz |      | 12   | 30   | nsec     |
| FSK Data output fall time           | Tf            | 19, 20    | 2           | Load Capacitance=2 pF<br>Load Resistance=10 k $\Omega$ ,<br>fMOD=10 kHz, fDEV=±75 kHz,<br>±50 kHz |      | 12   | 30   | nsec     |
| Oscillation frequency               | OSC           | 7, 8      |             |   | 40   |      | 315  | MHz      |
| VT output voltage range             | VT            | 6         |             |   | 0.3  | 2.5  | Vcc  | V        |
| Charge pump current                 | Icp           | 5         | 7           | Source current → SW2 : OFF<br>SW3 : OFF<br>Sink current → SW2 : ON<br>SW3 : ON                    | ±25  | ±50  | ±75  | $\mu$ A  |
| REFCLOCK input level 1              | CLK 1         | 1         |             | Sin wave input  | 0.3  | 0.4  | 3.0  | Vp-p     |
| REFCLOCK input level 2              | CLK 2         | 1         |             | Square wave input   | 0.3  | 0.4  | 3.0  | Vp-p     |
| REFOSC loop gain                    | Gref          | 1, 2      | 3           | Vin2=14 MHz   |      | 30   |      | dB       |
| FSET1/2/3 "Hi" level input voltage  | FSETVH        | 3, 29, 30 | 1           |   | 3.8  |      | Vcc  | V        |
| FSET1/2/3 "Low" level input voltage | FSETVL        | 3, 29, 30 | 1           |   | 0    |      | 0.4  | V        |
| FSET1/2/3 "Hi" level input current  | FSETIH        | 3, 29, 30 | 1           | FSET "Hi"=V5=5 V  | 100  | 250  | 380  | $\mu$ A  |
| FSET1/2/3 "Low" level input current | FSETIL        | 3, 29, 30 | 1           | FSET "Low"=V5=0 V   | -380 | -250 | -100 | $\mu$ A  |
| RDSW "Low" level input voltage      | RDVL          | 4         | 1           |   | 0    |      | 0.4  | V        |
| RDSW "Low" level input current      | RDIL          | 4         | 1           | RDSW "L"=V6=0 V   | -122 | -83  | -43  | $\mu$ A  |
| REFSW "Low" level input voltage     | REFVL         | 28        | 1           |   | 0    |      | 0.4  | V        |

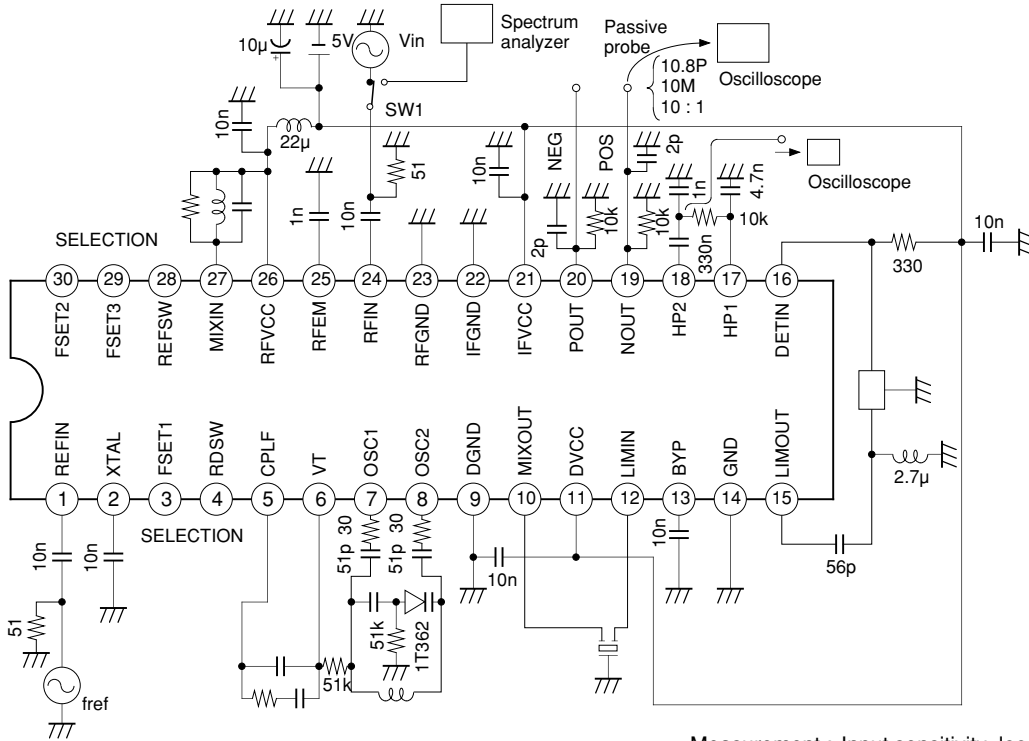


Electrical Characteristics Test Circuit



Measurement : Current consumption

Measurement circuit 1



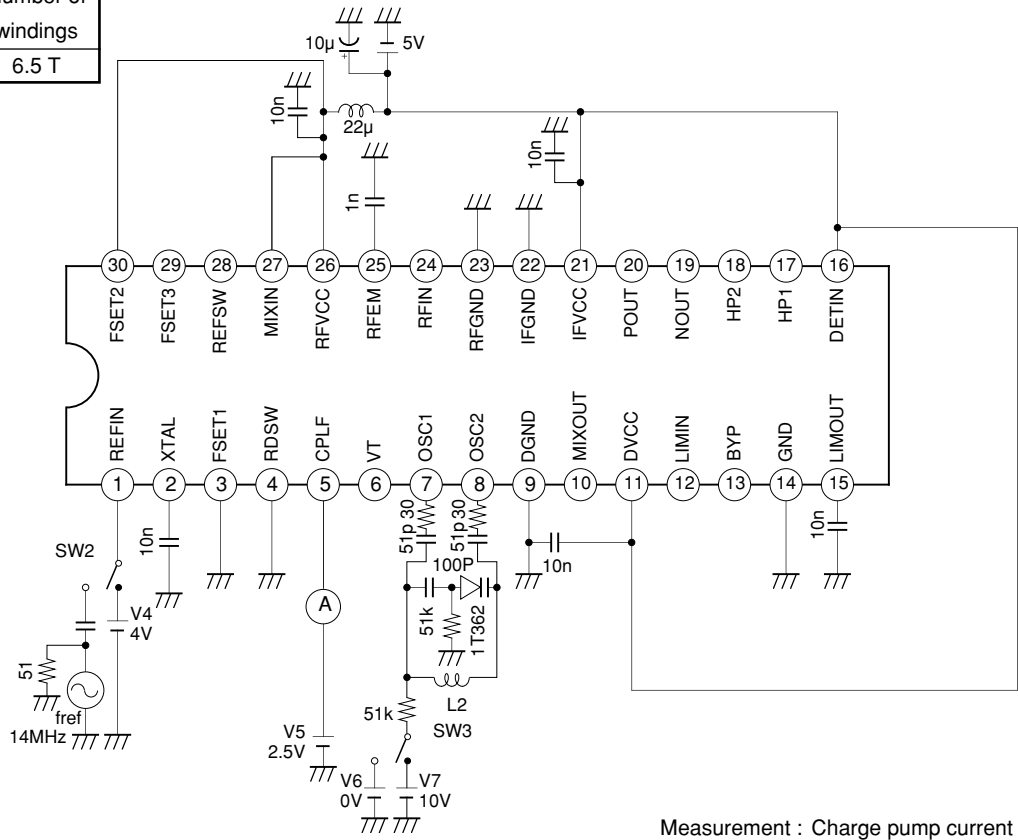
Measurement : Input sensitivity, local osc leakage,  
DATA SHAPER input level  
FSK DATA output voltage,  
rise time, fall time

Measurement circuit 2





|    | Wire diameter | Coil diameter | Number of windings |
|----|---------------|---------------|--------------------|
| L2 | 0.5           | 3.8 φ         | 6.5 T              |



Measurement : Charge pump current

Measurement circuit 7

## Function Explanation

The CXA3067AM is an integrated circuit designed for CATV wide band FSK receiver. This monolithic IC is composed of local oscillator, double balanced mixer, limiter, FM detector, data shaper and PLL circuit in a single chip.

The function of each other section is described below.

### 1. RFamp circuit

This circuit amplifies RF signal, and RF signal is input to pin 24 (RFIN).

Since pin 27 is an open collector, connect power supply through a coil which composes tune circuit or a choke coil or a resistor.

RF signal is selected a desired frequency by this tune circuit.

The desired frequency is input to mixer circuit through coupling capacitor.

### 2. Mixer circuit

This is a double-balanced mixer having small leakage of local signal.

The RF signal is converted to IF signal by the signal supplied from oscillator.

The output impedance is approximately 330  $\Omega$ .

Normally, connect a ceramic filter to 10 pin (MIXOUT).

### 3. Local oscillator circuit

The balanced oscillator circuit with pins 7 and 8 (OSC1, OSC2).

Connect an LC resonance circuit comprising a varicap diode to pins 7 and 8.

### 4. PLL circuit

The PLL circuit fixes the local oscillator frequency to desired frequency.

It consists of the main divider, reference divider, phase comparator, charge pump, reference oscillator.

As stated in the accompanying document, desired frequency (channel) can be selected through the combination of the conditions of pins 1, 29 and 30 (FSET 1; 2; 3).

As stated in the accompanying document, reference frequency can be selected through the combination the conditions of pin 3 (RDSW) and pin 28 (REFSW).

### 5. Limiter circuit

This circuit amplifies the mixer IF output through ceramic filter.

For quadrature FM detection, this circuit amplifies IF signal by necessary level.

The input impedance is approximately 330  $\Omega$ .

### 6. Detector circuit

For quadrature FM detection, the phase of limiter output (pin 15) is shifted 90° by discriminator as the output is input to pin 16.

### 7. Data shaper

This circuit output performs the waveform shaping of the demodulated FSK signal and outputs the resulting signal as a rectangular wave.

### Description of PLL Block

1. The followings “channel No.” can be selected through the combination of the conditions of pins 1, 29 and 30 (FSET 1; 2; 3).

FSET conditions have 3 states (OPEN, Hi, Low).

### Channel Selection

| Channel No. | Local<br>OSC frequency<br>[MHz] | Receiving<br>frequency<br>[MHz] | FSET 1 | FSET 2 | FSET 3 |
|-------------|---------------------------------|---------------------------------|--------|--------|--------|
| 1           | 42.65                           | 53.35                           | OPEN   | OPEN   | OPEN   |
| 2           | 83.70                           | 73.00                           | L      | OPEN   | OPEN   |
| 3           | 98.20                           | 87.50                           | H      | OPEN   | OPEN   |
| 4           | 100.00                          | 89.30                           | OPEN   | L      | OPEN   |
| 5           | 108.20                          | 97.50                           | L      | L      | OPEN   |
| 6           | 117.20                          | 106.50                          | H      | L      | OPEN   |
| 7           | 117.80                          | 128.50                          | OPEN   | H      | OPEN   |
| 8           | 119.20                          | 108.50                          | L      | H      | OPEN   |
| 9           | 133.40                          | 122.70                          | H      | H      | OPEN   |
| 10          | 139.20                          | 128.50                          | OPEN   | OPEN   | L      |
| 11          | 168.70                          | 158.00                          | L      | OPEN   | L      |
| 12          | 180.20                          | 169.50                          | H      | OPEN   | L      |
| 13          | 211.25                          | 221.95                          | OPEN   | L      | L      |
| 14          | 219.10                          | 229.80                          | L      | L      | L      |
| 15          | 312.70                          | 302.00                          | H      | L      | L      |

**Note)** OPEN : No connect

L : Connect to GND

H : Connect to Vcc

2. The followings Reference frequency can be selected through the combination the conditions of pin 3 (RDSW) and pin 28 (REFSW).

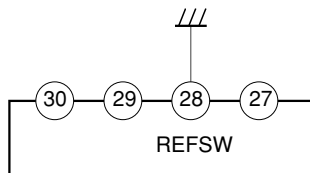
When the pin 28 is connected to GND directly, the pin 28 is state of DCGND.

When the pin 28 is connected to GND through decoupling capacitor, the pin 28 is state of ACGND.

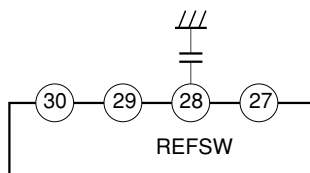
**Reference Frequency selection**

| f (ref)      | RDSW | REFSW    |
|--------------|------|----------|
| 7.15625 MHz  | OPEN | DCGND *1 |
| 7.15909 MHz  | OPEN | ACGND *2 |
| 14.3125 MHz  | GND  | DCGND *1 |
| 14.31818 MHz | GND  | ACGND *2 |

**Note \*1)** Connect to GND directly.



**Note \*2)** Connect to GND through decoupling capacitor



3. The comparison frequency is 25.021853 kHz at reference frequency 7.15625 MHz/14.3125 MHz, and 25.031783 kHz at reference frequency 7.15909 MHz/14.31818 MHz.

The frequency division ratio of the reference divider is 286.

The frequency division ratio of the scaler is 1 or 2;

When the reference frequency is 7.15625 MHz/7.15909 MHz, the frequency division ratio of the scaler is 1.

When the reference frequency is 14.3125 MHz/14.31818 MHz, the frequency division ratio of the scaler is 2.

Reference frequency=7.15625 MHz

The comparison frequency=7.15625/286=25.021853 kHz

| Ch | fOSC [MHz] | Divider | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|----|------------|---------|------|------|------|------|-----|-----|-----|----|----|----|---|---|---|---|
| 1  | 42.65      | 1705    | 0    | 0    | 0    | 1    | 1   | 0   | 1   | 0  | 1  | 0  | 1 | 0 | 0 | 1 |
| 2  | 83.7       | 3345    | 0    | 0    | 1    | 1    | 0   | 1   | 0   | 0  | 0  | 1  | 0 | 0 | 0 | 1 |
| 3  | 98.2       | 3925    | 0    | 0    | 1    | 1    | 1   | 1   | 0   | 1  | 0  | 1  | 0 | 1 | 0 | 1 |
| 4  | 100        | 3997    | 0    | 0    | 1    | 1    | 1   | 1   | 1   | 0  | 0  | 1  | 1 | 1 | 0 | 1 |
| 5  | 108.2      | 4324    | 0    | 1    | 0    | 0    | 0   | 0   | 1   | 1  | 1  | 0  | 0 | 1 | 0 | 0 |
| 6  | 117.2      | 4684    | 0    | 1    | 0    | 0    | 1   | 0   | 0   | 1  | 0  | 0  | 1 | 1 | 0 | 0 |
| 7  | 117.8      | 4708    | 0    | 1    | 0    | 0    | 1   | 0   | 0   | 1  | 1  | 0  | 0 | 1 | 0 | 0 |
| 8  | 119.2      | 4764    | 0    | 1    | 0    | 0    | 1   | 0   | 1   | 0  | 0  | 1  | 1 | 1 | 0 | 0 |
| 9  | 133.4      | 5331    | 0    | 1    | 0    | 1    | 0   | 0   | 1   | 1  | 0  | 1  | 0 | 0 | 1 | 1 |
| 10 | 139.2      | 5563    | 0    | 1    | 0    | 1    | 0   | 1   | 1   | 0  | 1  | 1  | 1 | 0 | 1 | 1 |
| 11 | 168.7      | 6742    | 0    | 1    | 1    | 0    | 1   | 0   | 0   | 1  | 0  | 1  | 0 | 1 | 1 | 0 |
| 12 | 180.2      | 7202    | 0    | 1    | 1    | 1    | 0   | 0   | 0   | 0  | 1  | 0  | 0 | 0 | 1 | 0 |
| 13 | 211.25     | 8443    | 1    | 0    | 0    | 0    | 0   | 0   | 1   | 1  | 1  | 1  | 1 | 0 | 1 | 1 |
| 14 | 219.1      | 8756    | 1    | 0    | 0    | 0    | 1   | 0   | 0   | 0  | 1  | 1  | 0 | 1 | 0 | 0 |
| 15 | 312.7      | 12497   | 1    | 1    | 0    | 0    | 0   | 0   | 1   | 1  | 0  | 1  | 0 | 0 | 0 | 1 |

Reference frequency=7.15909 MHz

The comparison frequency=7.15909/286=25.031783 kHz

| Ch | fOSC [MHz] | Divider | 8192 | 4096 | 2048 | 1024 | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
|----|------------|---------|------|------|------|------|-----|-----|-----|----|----|----|---|---|---|---|
| 1  | 42.65      | 1704    | 0    | 0    | 0    | 1    | 1   | 0   | 1   | 0  | 1  | 0  | 1 | 0 | 0 | 0 |
| 2  | 83.7       | 3344    | 0    | 0    | 1    | 1    | 0   | 1   | 0   | 0  | 0  | 1  | 0 | 0 | 0 | 0 |
| 3  | 98.2       | 3923    | 0    | 0    | 1    | 1    | 1   | 1   | 0   | 1  | 0  | 1  | 0 | 0 | 1 | 1 |
| 4  | 100        | 3995    | 0    | 0    | 1    | 1    | 1   | 1   | 1   | 0  | 0  | 1  | 1 | 0 | 1 | 1 |
| 5  | 108.2      | 4323    | 0    | 1    | 0    | 0    | 0   | 0   | 1   | 1  | 1  | 0  | 0 | 0 | 1 | 1 |
| 6  | 117.2      | 4682    | 0    | 1    | 0    | 0    | 1   | 0   | 0   | 1  | 0  | 0  | 1 | 0 | 1 | 0 |
| 7  | 117.8      | 4706    | 0    | 1    | 0    | 0    | 1   | 0   | 0   | 1  | 1  | 0  | 0 | 0 | 1 | 0 |
| 8  | 119.2      | 4762    | 0    | 1    | 0    | 0    | 1   | 0   | 1   | 0  | 0  | 1  | 1 | 0 | 1 | 0 |
| 9  | 133.4      | 5329    | 0    | 1    | 0    | 1    | 0   | 0   | 1   | 1  | 0  | 1  | 0 | 0 | 0 | 1 |
| 10 | 139.2      | 5561    | 0    | 1    | 0    | 1    | 0   | 1   | 1   | 0  | 1  | 1  | 1 | 0 | 0 | 1 |
| 11 | 168.7      | 6739    | 0    | 1    | 1    | 0    | 1   | 0   | 0   | 1  | 0  | 1  | 0 | 0 | 1 | 1 |
| 12 | 180.2      | 7199    | 0    | 1    | 1    | 1    | 0   | 0   | 0   | 0  | 0  | 1  | 1 | 1 | 1 | 1 |
| 13 | 211.25     | 8439    | 1    | 0    | 0    | 0    | 0   | 0   | 1   | 1  | 1  | 1  | 0 | 1 | 1 | 1 |
| 14 | 219.1      | 8753    | 1    | 0    | 0    | 0    | 1   | 0   | 0   | 0  | 1  | 1  | 0 | 0 | 0 | 1 |
| 15 | 312.7      | 12492   | 1    | 1    | 0    | 0    | 0   | 0   | 1   | 1  | 0  | 0  | 1 | 1 | 0 | 0 |



## Notes on Application

Take care of the followings because the CXA3067AM has limiter voltage gain of approximately 67 dB and uses high frequency.

- 1) Separate the input pattern from the output pattern as far as possible and makes wiring short.
- 2) Ground the decoupling capacitor as close to pin 13 as possible.

Take care of the followings in order to reduce the jitter.

- 1) Insert the capacitor as close to pin 17 and 18 as possible.
- 2) Ground the by-pass capacitor as close to IFV<sub>CC</sub> to supply pin 16 as possible.

Take care of the following, for the purpose of the isolation of local oscillator resonance circuit and X'tal (RFF CLOCK).

- 1) Separate the patterns connected pin 1 and pin 2 from the local oscillator resonance circuit.

Take care of the following, in order to reduce the phase noise.

- 1) Connect the loop filter as close to pins 5 and 6 as possible.

Take care of the following, in order to prevent the parasitic oscillation.

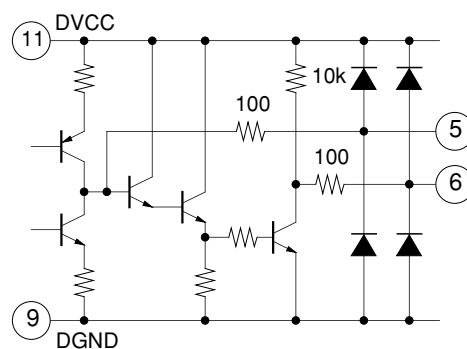
- 1) Connect the local oscillator resonance circuit as close to pins 7 and 8 as possible.  
And compact the local oscillator resonance circuit.

The tuning voltage at the local oscillator resonance circuit.

The output voltage at pin 6 is 0.3 V to V<sub>CC</sub>.

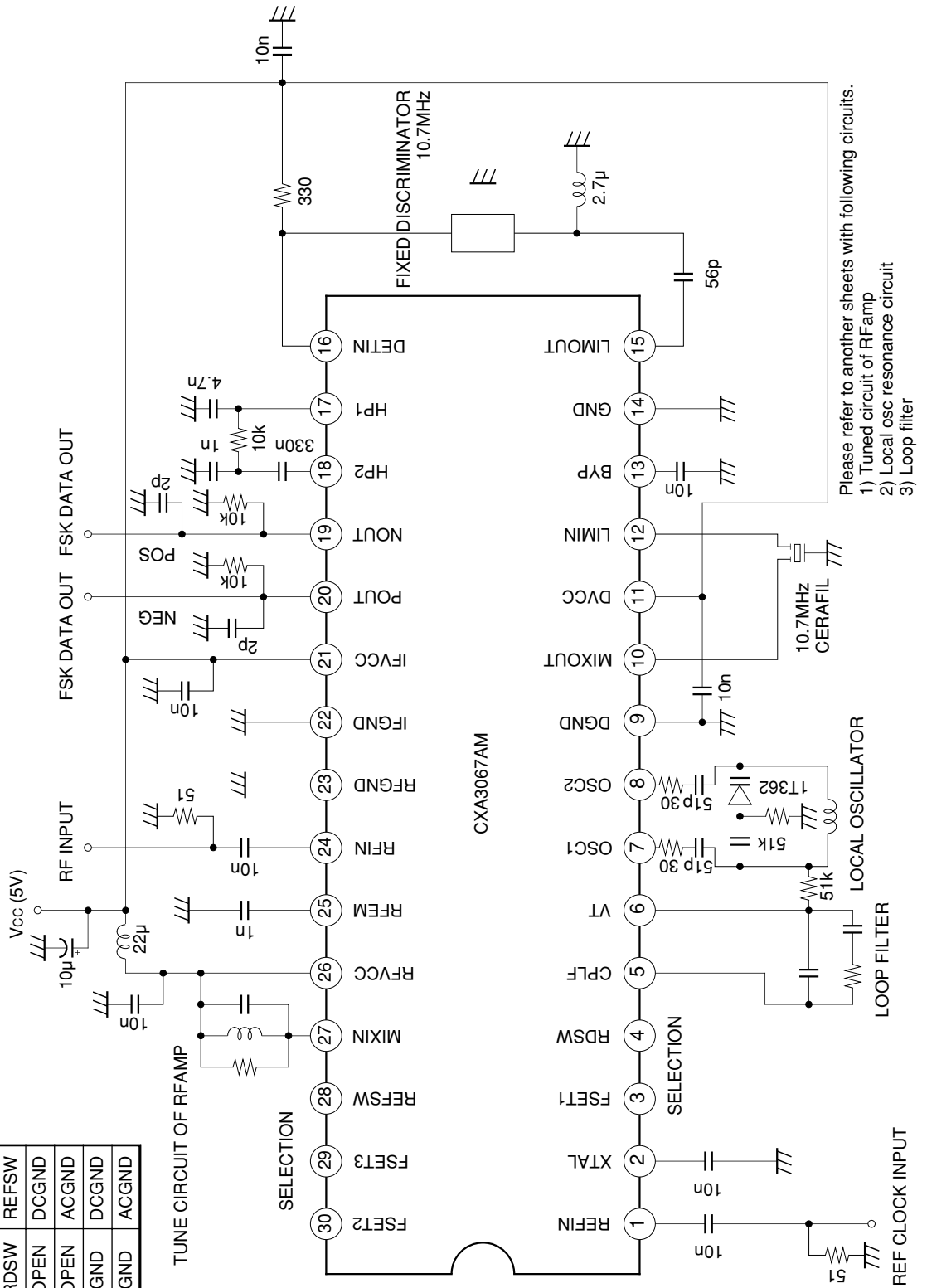
When the oscillation frequency is the desired frequency, please the output voltage at pin 6 should be been 2.5 V.

Please decide the component value of loop filter by each system.



Application

| fref         | RDSW | REFSW |
|--------------|------|-------|
| 7.15625 MHz  | OPEN | DCGND |
| 7.15909 MHz  | OPEN | ACGND |
| 14.3125 MHz  | GND  | DCGND |
| 14.31818 MHz | GND  | ACGND |



Please refer to another sheets with following circuits.  
 1) Tuned circuit of RFamp  
 2) Local osc resonance circuit  
 3) Loop filter

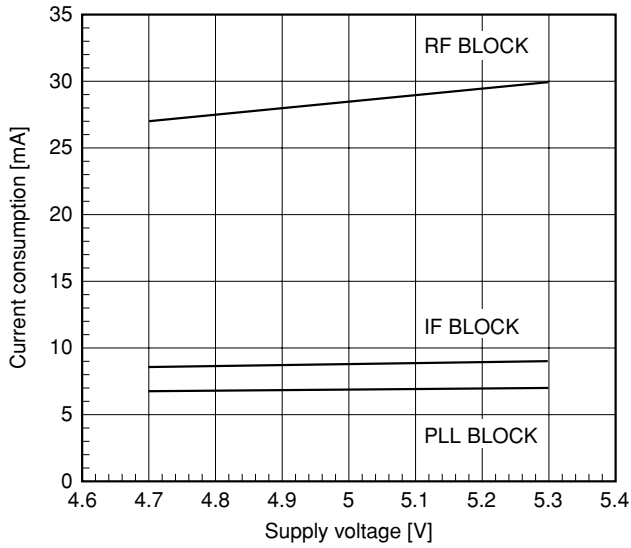
Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

The component value of the tune circuit, local oscillator resonance circuit and loop filter.

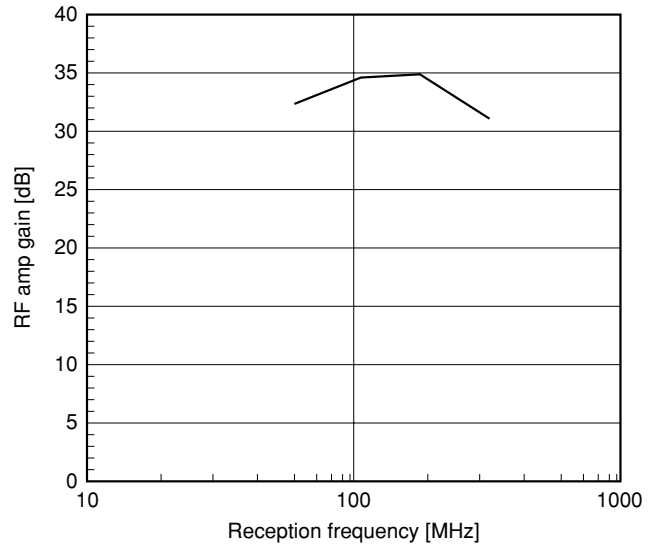
| Channel No. | Tune circuit of RFamp  | Local oscillator resonance circuit                             | Loop filter             |
|-------------|--|--|-------------------------|
| 1           | <p>Wire diameter 0.5<br/>Number of windings 2.5T<br/>Coil diameter 3φ<br/>510<br/>330p</p> | <p>7 8<br/>51p 30 30 51p<br/>1T362 0.5<br/>1n 20.5T<br/>5φ</p> | <p>3.3n<br/>39n 24k</p> |
| 2           | <p>0.5<br/>2.5T<br/>3φ<br/>510<br/>180p</p>  | <p>82p<br/>0.5 11.5T 3.8φ</p>                                  | <p>3.3n<br/>30n 27k</p> |
| 3           | <p>0.5<br/>2.5T<br/>3φ<br/>510<br/>120p</p>  | <p>100p<br/>0.5 8.5T 3.8φ</p>                                  | <p>3.3n<br/>30n 27k</p> |
| 4           | <p>0.5<br/>2.5T<br/>3φ<br/>510<br/>120p</p>  | <p>100p<br/>0.5 8.5T 3.8φ</p>                                  | <p>3.3n<br/>30n 27k</p> |
| 5           | <p>0.5<br/>2.5T<br/>3φ<br/>510<br/>82p</p>   | <p>100p<br/>0.5 8.5T 3.8φ</p>                                  | <p>3.3n<br/>30n 27k</p> |
| 6           | <p>0.5<br/>1.5T<br/>3φ<br/>510<br/>150p</p>  | <p>100p<br/>0.5 6.5T 3.8φ</p>                                  | <p>3.3n<br/>30n 27k</p> |
| 7           | <p>0.5<br/>1.5T<br/>3φ<br/>510<br/>100p</p>  | <p>100p<br/>0.5 6.5T 3.8φ</p>                                  | <p>3.3n<br/>30n 27k</p> |
| 8           | <p>0.5<br/>1.5T<br/>3φ<br/>510<br/>120p</p>  | <p>100p<br/>0.5 6.5T 3.8φ</p>                                  | <p>3.3n<br/>30n 27k</p> |

| Channel No. | Tune circuit of RFamp | Local oscillator resonance circuit | Loop filter |
|-------------|-----------------------|------------------------------------|-------------|
| 9           |                       |                                    |             |
| 10          |                       |                                    |             |
| 11          |                       |                                    |             |
| 12          |                       |                                    |             |
| 13          |                       |                                    |             |
| 14          |                       |                                    |             |
| 15          |                       |                                    |             |

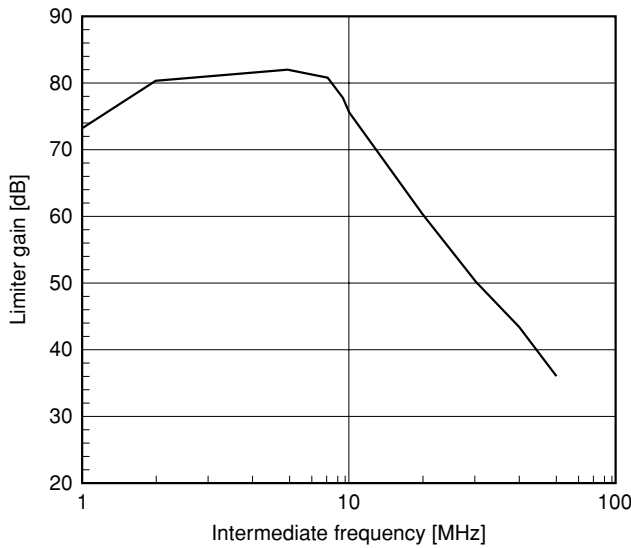
Supply voltage vs. Current consumption



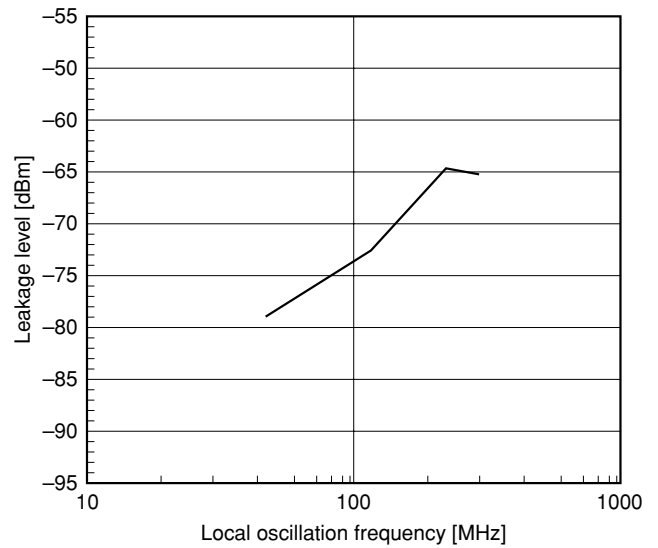
Frequency response RF amp voltage gain



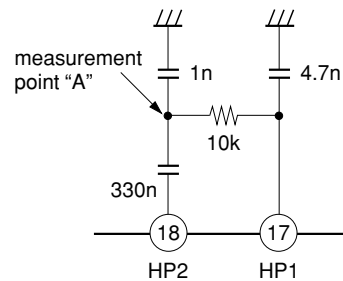
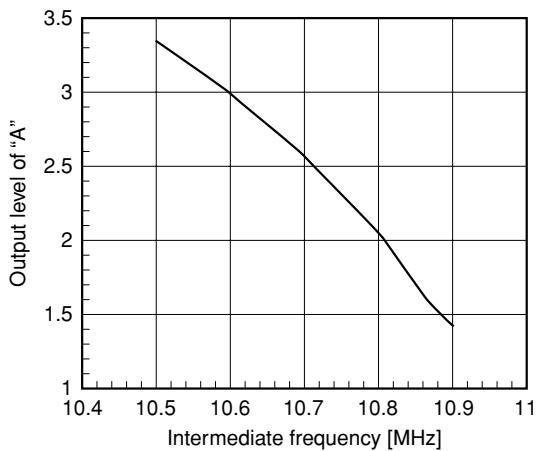
Frequency response limiter voltage gain



Local oscillation leakage at RFIN pin

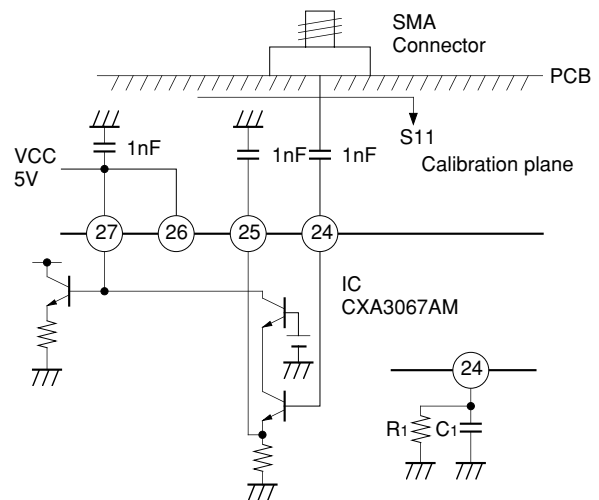
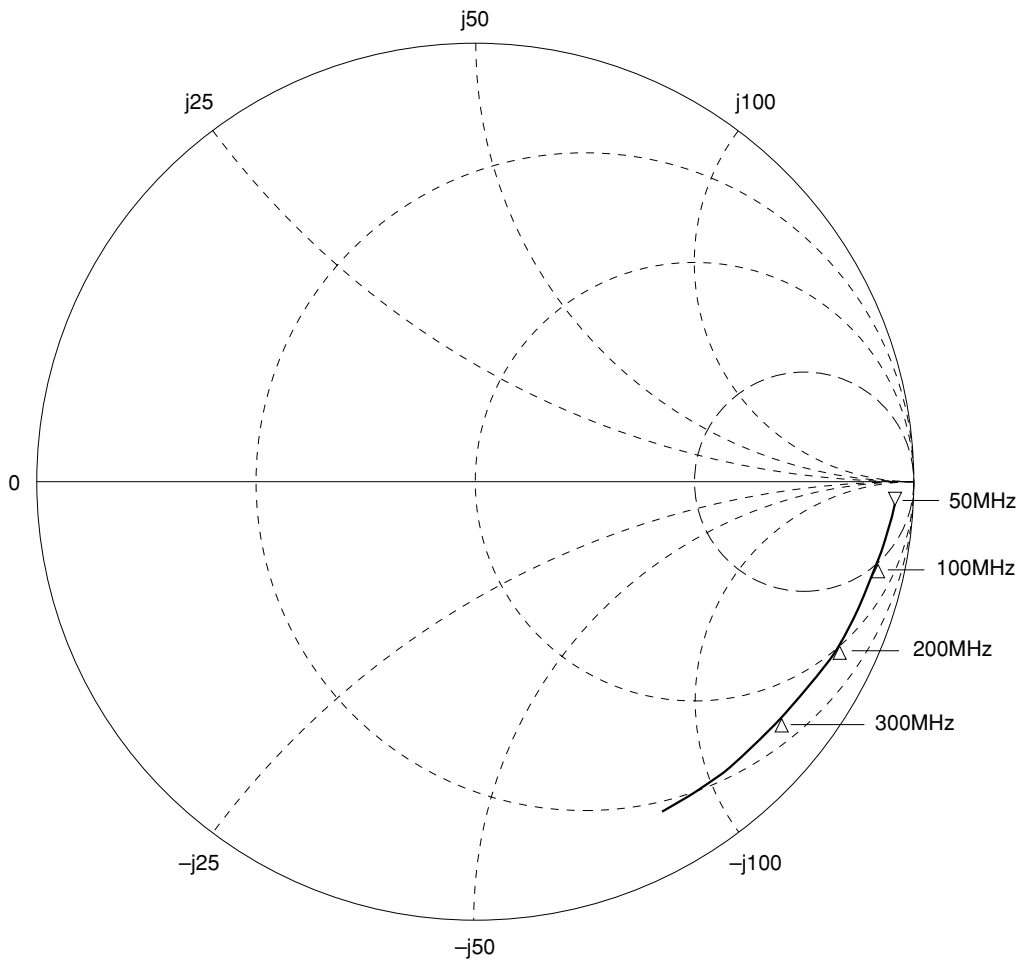


S curve response



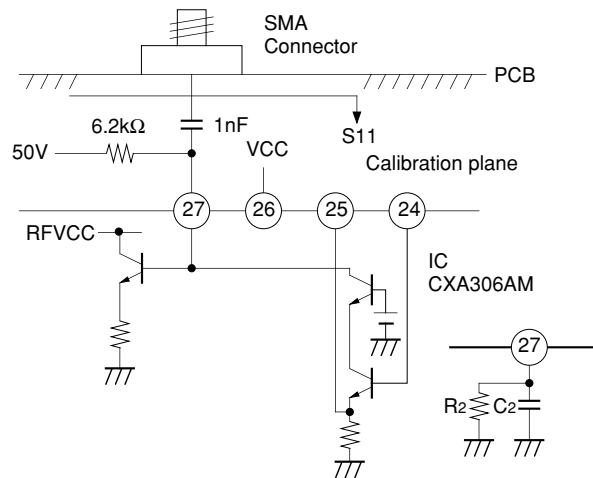
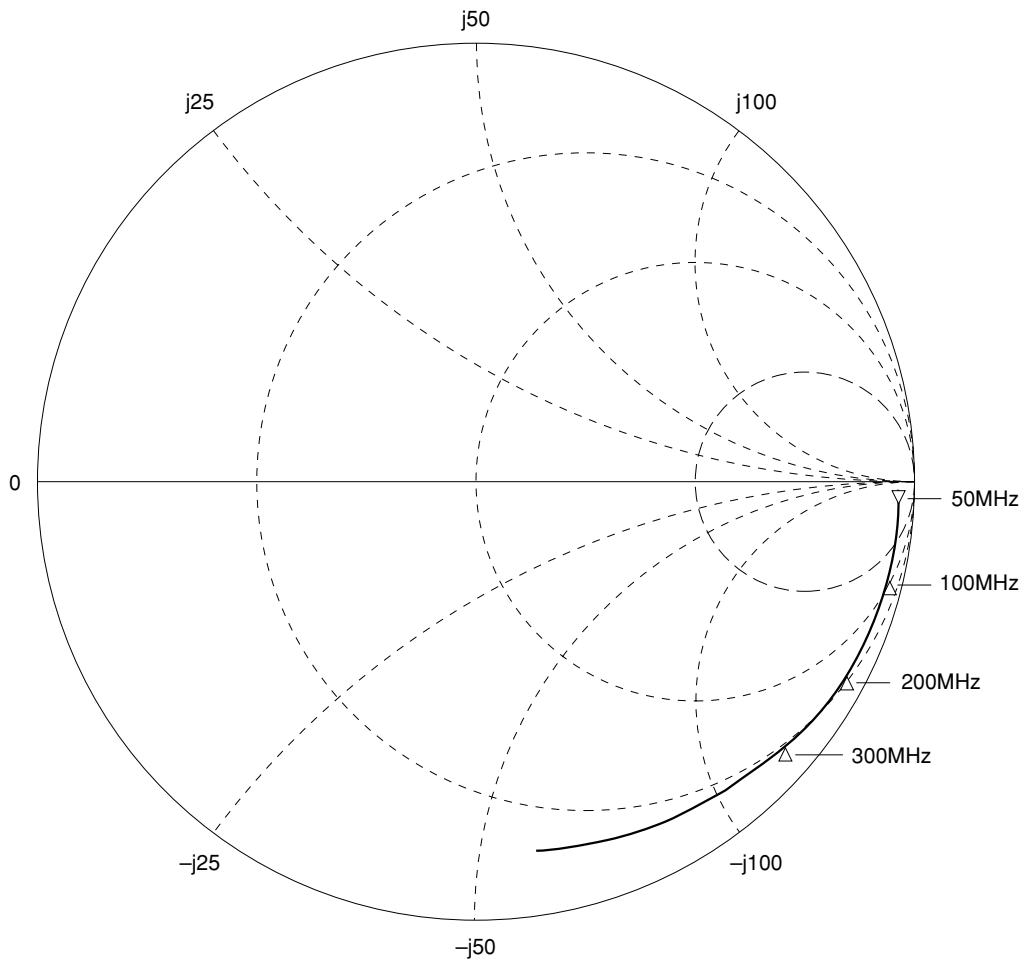
RFIN Input Impedance (Resistance, Capacitance)

| Reception frequency | Resistance R <sub>1</sub> | Capacitance C <sub>1</sub> |
|---------------------|---------------------------|----------------------------|
| 50 MHz              | 1.69 kΩ                   | 3.5 pF                     |
| 100 MHz             | 1.46 kΩ                   | 3.4 pF                     |
| 200 MHz             | 1.08 kΩ                   | 3.4 pF                     |
| 300 MHz             | 791 Ω                     | 3.5 pF                     |



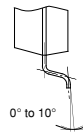
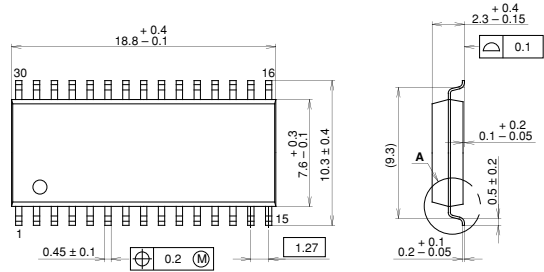
MIXIN Input Impedance (Resistance, Capacitance)

| Reception frequency | Resistance R2 | Capacitance C2 |
|---------------------|---------------|----------------|
| 50 MHz              | 2.7 kΩ        | 3.5 pF         |
| 100 MHz             | 2.3 kΩ        | 3.4 pF         |
| 200 MHz             | 1.6 kΩ        | 3.4 pF         |
| 300 MHz             | 940 Ω         | 3.7pF          |



Package Outline Unit : mm

30PIN SOP(PLASTIC)



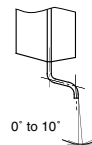
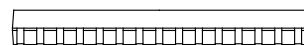
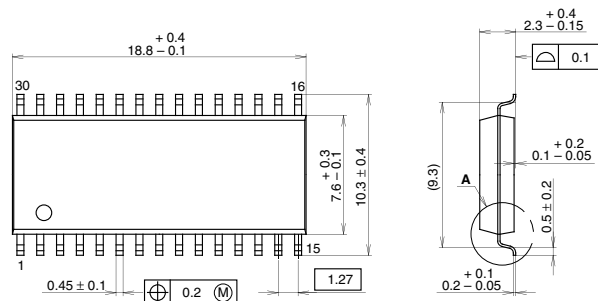
DETAIL A

|            |               |
|------------|---------------|
| SONY CODE  | SOP-30P-L03   |
| EIAJ CODE  | SOP030-P-0375 |
| JEDEC CODE |               |

PACKAGE STRUCTURE

|                  |                |
|------------------|----------------|
| PACKAGE MATERIAL | EPOXY RESIN    |
| LEAD TREATMENT   | SOLDER PLATING |
| LEAD MATERIAL    | COPPER ALLOY   |
| PACKAGE MASS     | 0.7g           |

30PIN SOP (PLASTIC)



DETAIL A

|            |               |
|------------|---------------|
| SONY CODE  | SOP-30P-L03   |
| EIAJ CODE  | SOP030-P-0375 |
| JEDEC CODE |               |

PACKAGE STRUCTURE

|                  |                |
|------------------|----------------|
| PACKAGE MATERIAL | EPOXY RESIN    |
| LEAD TREATMENT   | SOLDER PLATING |
| LEAD MATERIAL    | COPPER ALLOY   |
| PACKAGE MASS     | 0.7g           |

LEAD PLATING SPECIFICATIONS

| ITEM               | SPEC.           |
|--------------------|-----------------|
| LEAD MATERIAL      | COPPER ALLOY    |
| SOLDER COMPOSITION | Sn-Bi Bi:1-4wt% |
| PLATING THICKNESS  | 5-18 $\mu$ m    |