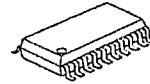


FM IF IC FOR PAGERS

■ GENERAL DESCRIPTION

THE NJM2537 is a low power FM IF IC for pagers. It is capable of designing dual conversion pager system because of including a mixer circuit. Also it includes RSSI function, so that it is easy to design automatic gain control (AGC) which improves interference when strong signal is received.

■ PACKAGE OUTLINE

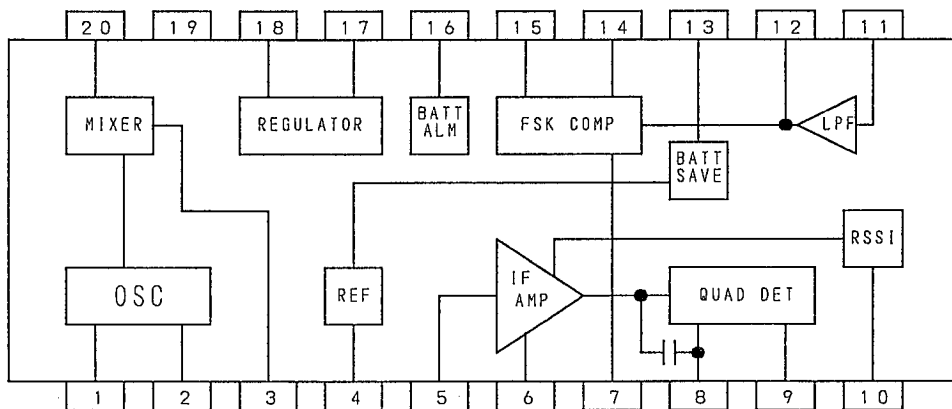


NJM2537V

■ FEATURES

- Low Operating Voltage 1.1~4.0V
- Low Operating Current 1.2mA typ. at $V^+=1.4V$
- RF Input Frequency 10~50MHz
- 2nd Mixer
- Package Outline SSOP20

■ PIN FUNCTION AND BLOCK DIAGRAM



- | | |
|---------------|--------------|
| 1. OSC IN | 11. LPF IN |
| 2. OSC OUT | 12. LPF OUT |
| 3. MIXER OUT | 13. BS |
| 4. V+ | 14. CHARGE |
| 5. IF IN | 15. FSK OUT |
| 6. DECOUPLING | 16. VALM |
| 7. FSK REF | 17. REG CONT |
| 8. QUAD IN | 18. REG OUT |
| 9. AF OUT | 19. GND |
| 10. RSSI | 20. MIXER IN |

4

■ MAXIMUM ABSOLUTE RATING

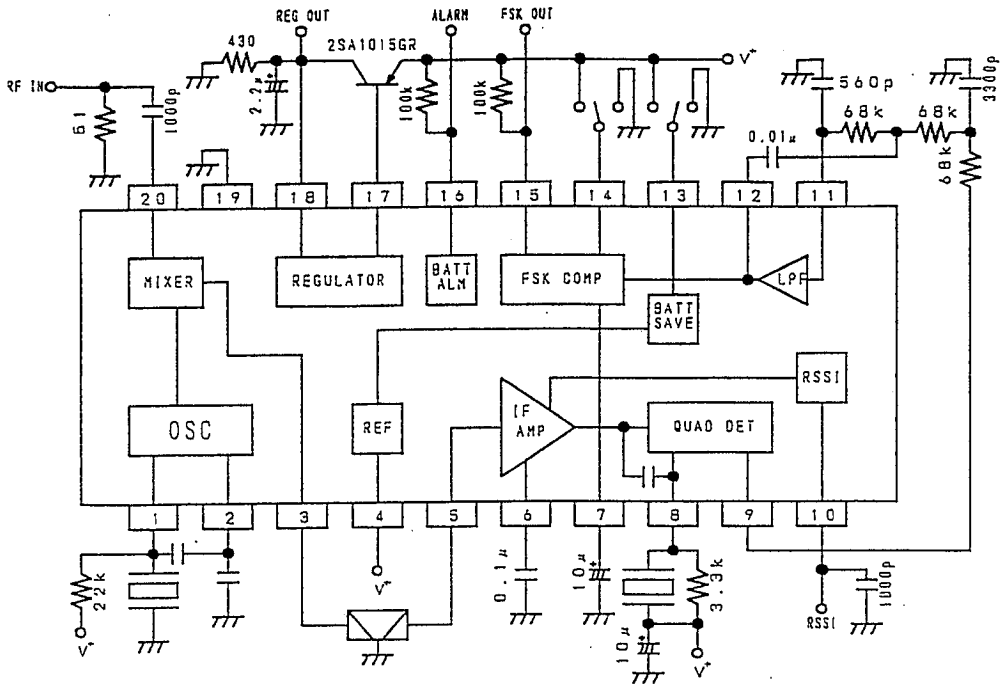
(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|----------------|----------|------|
| Supply Voltage | Vcc | 4.0 | V |
| Power Dissipation | P _D | 300 | mW |
| Operating Temperature Range | Topr | -30~+85 | °C |
| Storage Temperature Range | Tstg | -40~+125 | °C |

■ ELECTRICAL CHARACTERISTICS (V⁺=1.4V, f_c=21.7MHz, f_{IF}=455kHz, f_{mod}=600Hz, f_{dev}=±4kHz, Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--|--------------------|------------------------------------|------|------|------|-------------------|
| No Signal Operating Current | I _{ccq} | | - | 1.2 | 1.5 | mA |
| Battery Saving | I _{ccs} | | - | 0 | 5 | μA |
| Operating Current | | | | | | |
| Mixer Gain | GMIX | After Ceramic Filter | 11 | 14.5 | 18 | dB |
| Mixer Intercept Point | IP | | - | 103 | - | dB μVEMF |
| Mixer Input Resistance | R _{inMIX} | | - | 5 | - | kΩ |
| Mixer Output Resistance | R _{oMIX} | | - | 2 | - | kΩ |
| IF Amplifier Input Resistance | R _{inIF} | | - | 2 | - | kΩ |
| S/N 1 | S/N1 | MIXER Input, Vi=60dB μVEMF | - | 63 | - | dB |
| S/N 2 | S/N2 | IF Input, Vi=60dB μVEMF | - | 63 | - | dB |
| S/N 3 | S/N3 | IF Input, Vi=22dB μVEMF | - | 25 | - | dB |
| -3dB Limiting Sensitivity 1 | LIM1 | MIXER Input | - | 12 | 17 | dB μVEMF |
| -3dB Limiting Sensitivity 2 | LIM2 | IF Input | - | 22 | 27 | dB μVEMF |
| Demodulated Output Level | V _{od} | IF Input, Vi=60dB μVEMF | 30 | 46 | 65 | mV _{rms} |
| AM Rejection Ratio | AMR | IF Input, Vi=60dB μVEMF, AM=30% | - | 50 | - | dB |
| Duty Ratio at Wave Shaped Output | DR | IF Input, Vi=60dB μVEMF | 40 | 50 | 60 | % |
| RSSI Output Voltage | V _{rssI} | IF Input, Vi=65dB μVEMF | 0.48 | 0.62 | 0.76 | V |
| RSSI Output Resistance | R _{rssI} | | - | 62 | - | kΩ |
| Quick Charge/Discharge Current | I _{ch} | GND, 0.18V | 40 | 70 | 115 | μA |
| Alarm Detection Voltage | V _{alm} | | 1.05 | 1.10 | 1.15 | V |
| Regulator Output Voltage | V _{reg} | RL=430Ω | 0.95 | 1.00 | 1.05 | V |
| Low Level Output Voltage of VALM Terminal | V _{almL} | IL=100 μA | - | 0.1 | 0.4 | V |
| High Level Leak Current of VALM Terminal | I _{almH} | | - | 0 | 2 | μA |
| Low Level Output Voltage of FSK-OUT Terminal | V _{fskL} | IL=100 μA | - | 0.1 | 0.4 | V |
| High Level Leak Current of FSK-OUT Terminal | I _{fskH} | | - | 0 | 2 | μA |
| Low Level Output Voltage of REG-OUT Terminal | V _{regL} | IL=100 μA | - | - | 0.6 | V |

■ APPLICATION CIRCUIT



4

■ TERMINAL FUNCTION

| PIN NO. | SYMBOL | PIN VOLTAGE (V) | FUNCTION | EQUIVALENT CIRCUIT |
|---------|---------|-----------------|---|--------------------|
| 1 | OSC IN | 1.38 | Local Oscillator Input. In case of using a crystal oscillator, it is connected. | |
| 2 | OSC OUT | 0.68 | Local Oscillator Output. In case of using an external oscillator, the external clock is input. | |
| 20 | MIX IN | 0.8 | Mixer input. Input resistance is 5kΩ typical. | |
| 3 | MIX OUT | 0.7 | Mixer output. Output resistance is 2kΩ typical. | |
| 5 | IF IN | 1.38 | Limiter amplifier input. Input resistance is 2kΩ typical. | |
| 6 | DEC | 1.38 | Decoupling for bias. | |
| 8 | QUAD IN | 1.4 | Input of quadrature detection circuit. A ceramic discriminator is connected. | |
| 9 | AF OUT | 0.16 | Demodulated signal output. | |

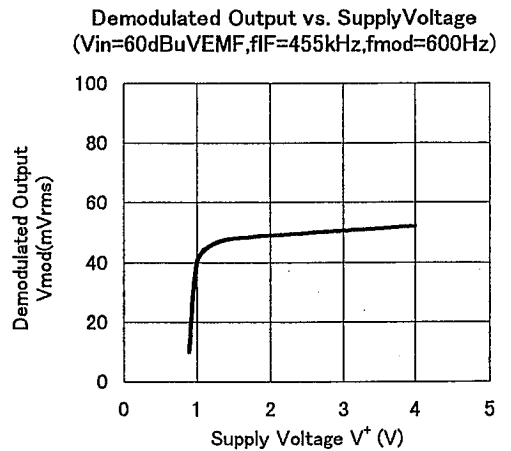
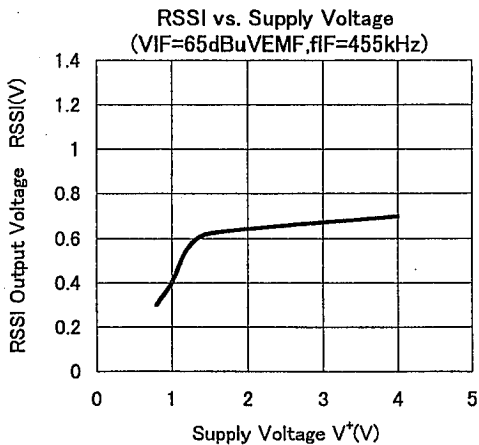
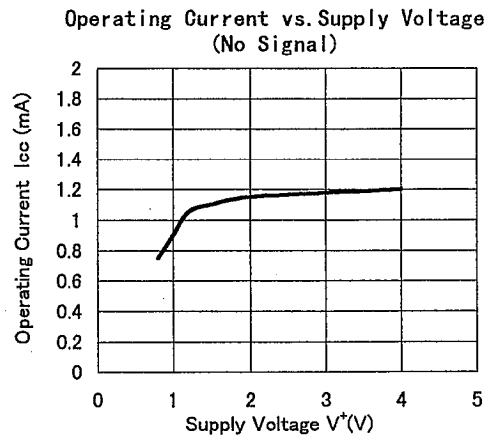
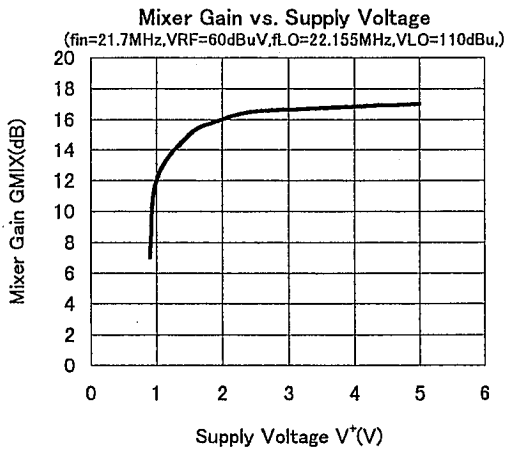
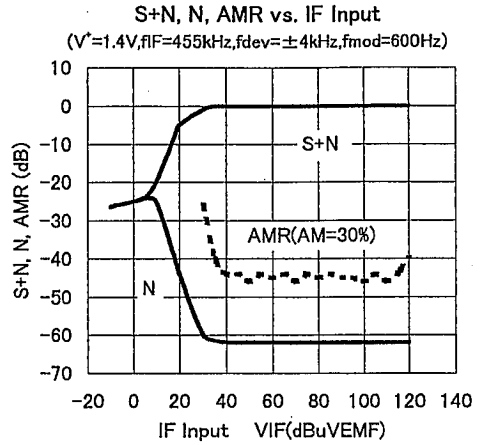
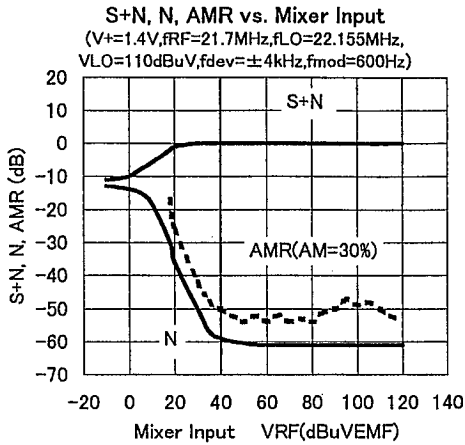
■ TERMINAL FUNCTION

| PIN NO. | SYMBOL | PIN VOLTAGE (V) | FUNCTION | EQUIVALENT CIRCUIT |
|---------|---------|-----------------|--|--------------------|
| 10 | RSSI | 0 | RSSI output. | |
| 11 | LPF IN | 0.18 | Input of a low pass filter. It is biased from AF-OUT (9pin) through an external RC filter. | |
| 12 | LPF OUT | 0.18 | Output of a low pass filter. | |
| 7 | FSK REF | 0.18 | Reference input of a wave shaping comparator. An external capacitor is connected. | |
| 13 | BS | — | Control of a battery saving circuit. Hi:active Lo:suspended | |
| 14 | CHARGE | — | Control of a quick charge/discharge circuit Hi:Its circuit turns ON Lo:Its circuit turns OFF | |
| 15 | FSK OUT | — | Output of a wave shaping circuit. The output signal is inverted against LPF output signal. | |

■ TERMINAL FUNCTION

| PIN NO. | SYMBOL | PIN VOLTAGE (V) | FUNCTION | EQUIVALENT CIRCUIT |
|---------|----------|-----------------|--|--------------------|
| 16 | VALM | 0.1 | Output of the alarm signal. When V^+ drops down to 1.1V, this output becomes high. | |
| 17 | REG CONT | 0.6 | Control of an external PNP transistor used for the regulator. | |
| 18 | REG OUT | 1.0 | Monitoring of the regulator. | |
| 4 | V^+ | — | Power Supply. | — |
| 19 | GND | — | Ground | — |

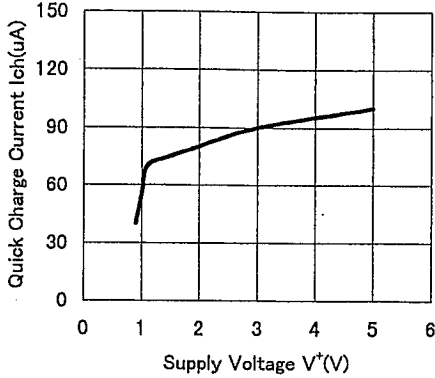
■ TYPICAL CHARACTERISTICS



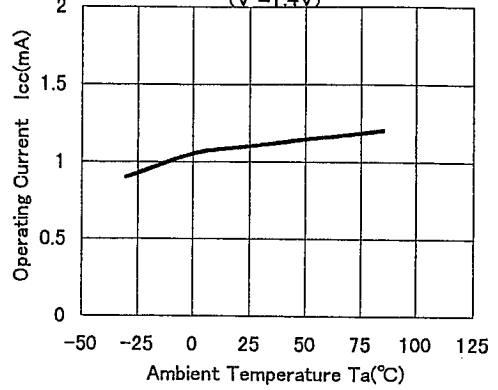
4

TYPICAL CHARACTERISTICS

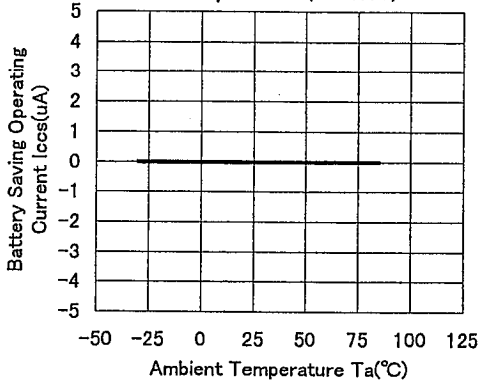
Quick Charge Current vs. Supply Current
(12pin=0.18V)



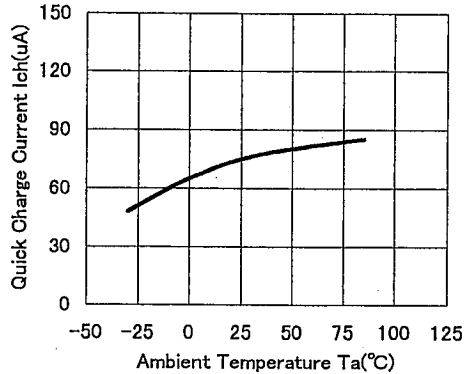
Operating Current vs. Temperature
($V^+=1.4V$)



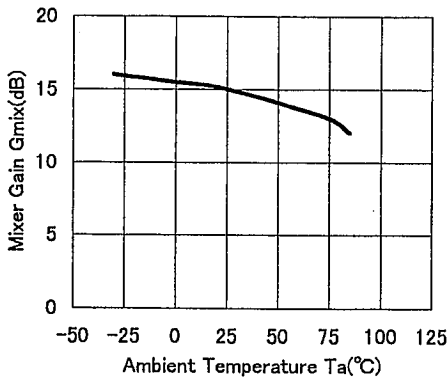
Battery Saving Operating Current vs. Temperature
($V^+=1.4V$)



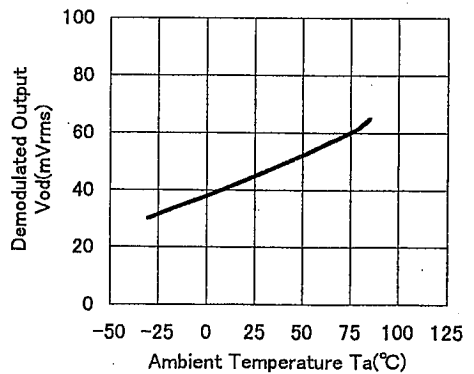
Quick Charge Current vs. Temperature
($V^+=1.4V, 12pin=0.18V$)



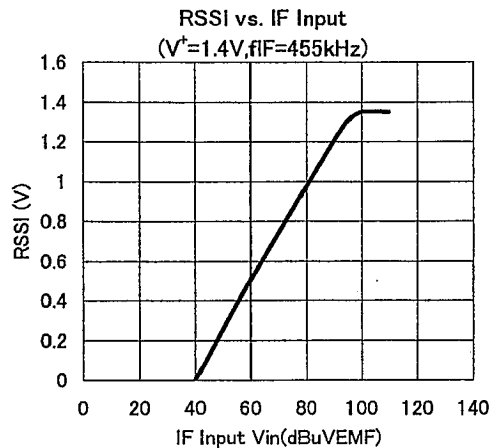
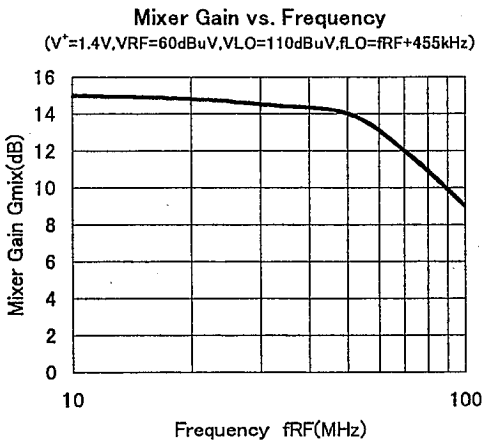
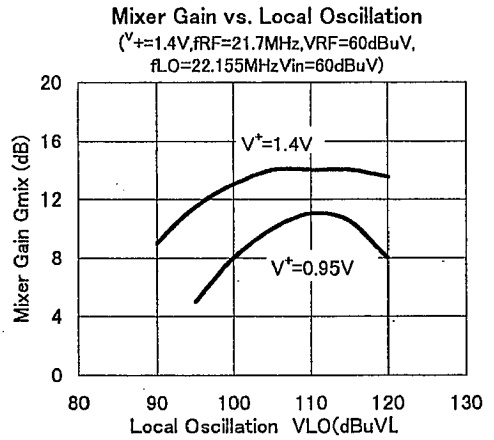
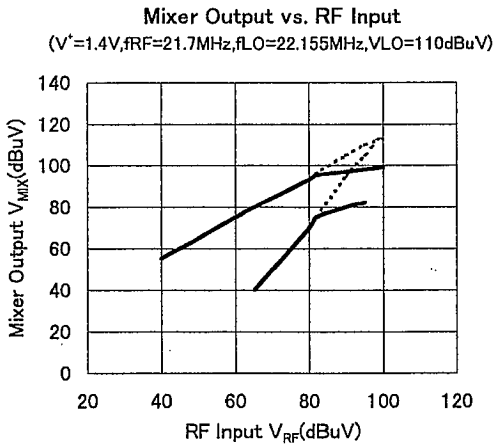
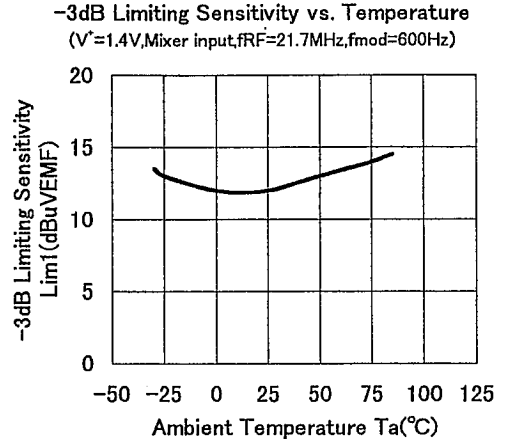
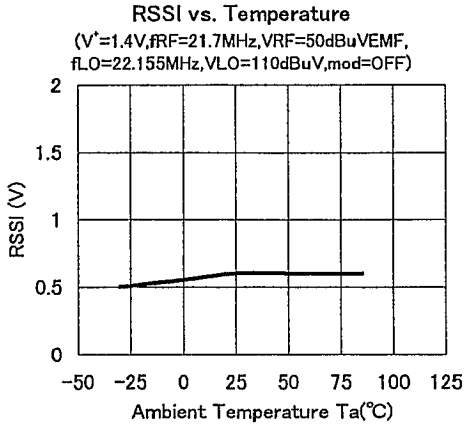
Mixer Gain vs. Temperature
($V^+=1.4V, f_{RF}=21.7MHz, V_{in}=60dBuV$)



Demodulated Output vs. Temperature
($V^+=1.4V, f_{IF}=455kHz, V_{in}=60dBuVEMF, f_{mod}=600Hz$)



■ TYPICAL CHARACTERISTICS



4

MEMO

[CAUTION]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.