

FM IF RECEIVER FOR FLEX PAGER

KA8515

INTRODUCTION

The KA8515 is a designed for FM IF detection on the FLEX pager set. It consists of an Oscillator, Mixer, Limiting IF Amp. Quadrature Detector, Regulator, RSSI (Received Signal Strength Indicator), Bit Rate Filter, and a 2-level / 4-level FSK comparator. It has a 24-SSOP (0.65mm)Surface Mount Package.

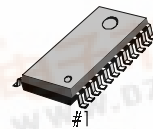
FEATURES

- Internal A/D converter for 4 level FSK (2-bit ADC)
- High transmission rate: 6400bps (Max.)
- Operating voltage range: $V_{CC1} = 1.1 \sim 4.0V$
- Typical supply current: 1.5mA at 1.4V
- Low battery detection circuit (alarm function): 1.05V
- Mixer operating frequency: 10 ~ 50MHz
- Package type: 24-SSOP (0.65mm)

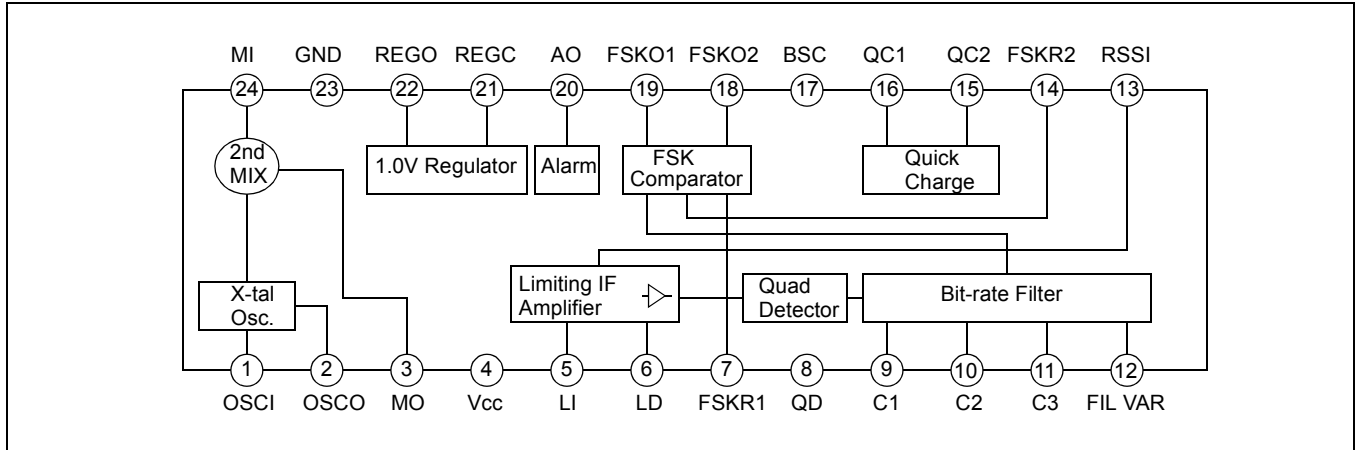
ORDERING INFORMATION

| Device | Package | Operating Temperature |
|--------|---------------|-----------------------|
| KA8515 | 24-SSOP-BD209 | -20°C ~ +70°C |

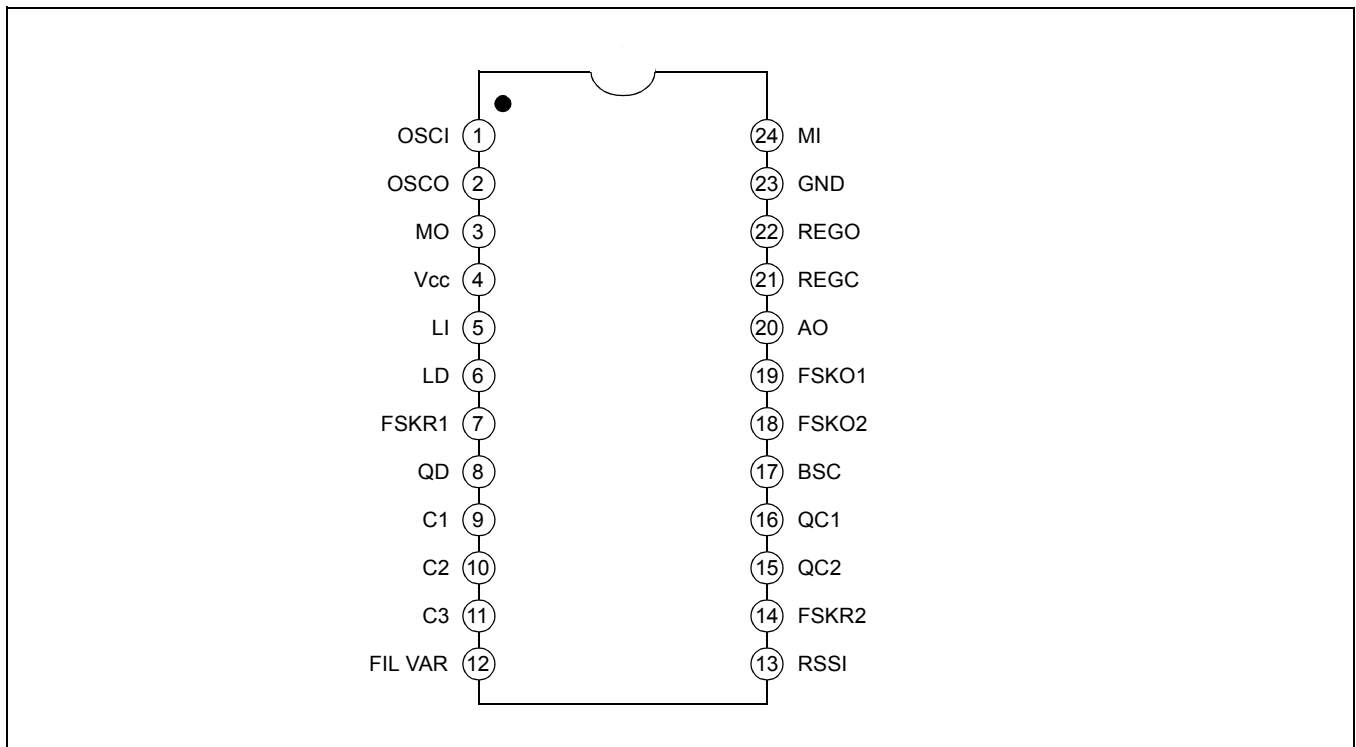
24-SSOP-BD209



BLOCK DIAGRAM



PIN CONFIGURATION



PIN DESCRIPTION

| Pin No | Symbol | Description |
|--------|-----------------|---|
| 1 | OSCI | Oscillator input (Base). The oscillator is an internally-biased colpitts type. |
| 2 | OSCO | Oscillator output (Emitter). |
| 3 | MO | Mixer output. Output impedance $\approx 1.5k\Omega$. Connect a 455kHz filter between this pin and the LI. |
| 4 | V _{CC} | Power supply voltage. |
| 5 | LI | IF limiter amplifier input. Input impedance $\approx 1.5k\Omega$ |
| 6 | LD | Bypass capacitor connect pin for the IF limiter amp. |
| 7 | FSKR1 | Differential Amp. Reference input on the FSK comparator. |
| 8 | QD | Quadrature detection, phase shifter pin. |
| 9 | C1 | Capacitors for bit-rate filter. |
| 10 | C2 | |
| 11 | C3 | |
| 12 | FIL VAR | Bit-rate filter selection. High: Internal cut-off frequency will be set to Low. Low: Internal cut- off frequency will be set to High. |
| 13 | RSSI | RSSI output. The power of received RF signal can be detected by monitoring the limiter amplifier. |
| 14 | FSKR2 | Differential Amp.Reference input on the FSK comparator for 4-Level FSK Detection. |
| 15, 16 | QC2, QC1 | Quick charge control 2 & 1. High: Quick charge-discharge on. Low : Quick charge- discharge off. |
| 17 | BSC | Battery saving control. High: Battery saving off, normal mode operation. Low : Battery saving on, battery save mode operation. |
| 18 | FSKO2 | The output signal from the Bit-rate filter is compared with FSK Reference signal, and this final output signal will be output to the LSB after 4-Level FSK detection. |
| 19 | FSKO1 | This final output signal will be output to the MSB after 4-Level FSK detection. |
| 20 | AO | Alarm output. This pin becomes high, when V _{CC} drops below 1.05V. |
| 21 | REGC | KA8515 has an internal PNP transistor. But, it also can support an external PNP transistor to control the power. |
| 22 | REGO | Regulated voltage output. |
| 23 | GND | Ground. |
| 24 | MI | Mixer input. Input impedance $\approx 1.5k\Omega$ |

ABSOLUTE MAXIMUM RATINGS

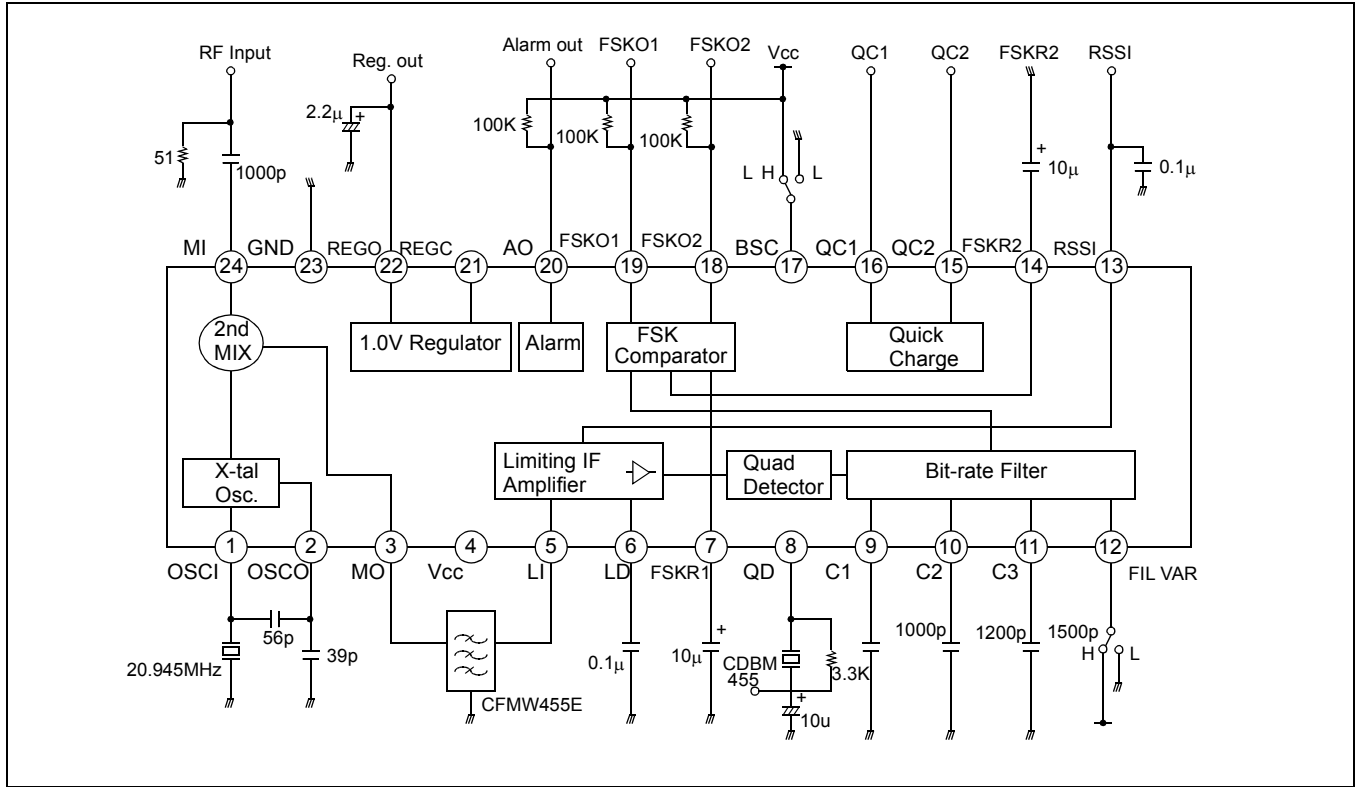
| Characteristic | Symbol | Value | Unit |
|-----------------------|---------------|------------|------|
| Supply Voltage | $V_{CC(MAX)}$ | 4 | V |
| Power Dissipation | P_D | 760 | mW |
| Operating Temperature | T_{OPR} | -20 ~ +70 | °C |
| Storage Temperature | T_{STG} | -55 ~ +125 | °C |

ELECTRICAL CHARACTERISTICS

($V_{CC} = 1.4V \pm 5\%$, $f_{IN(2MIX)} = 21.4MHz$, $f_{DEV} = \pm 4.8kHz$, $f_{MOD} = 800Hz$, $T_a = 25^\circ C$, $FIL_VAR = "H"$, unless otherwise specified)

| Characteristic | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|-------------------|---|------|------|------|---------------|
| Operating current | I_{CCN} | No Input Signal | - | 1.5 | 1.75 | mA |
| | I_{CCS} | Battery Saving | - | 0 | 10 | μA |
| Alarm detection voltage | V_{AD} | - | 1.0 | 1.05 | 1.1 | V |
| Alarm low level output voltage | $V_{O(AL)}$ | $I = 100\mu A$ | - | - | 0.4 | V |
| Alarm high level leakage current | $I_{LKG(AL)}$ | - | - | - | 2 | μA |
| FSK low level output voltage | $V_L(FSK)$ | $I = 100\mu A$ | - | - | 0.4 | V |
| FSK high level leakage current | $I_{LKG(FSK)}$ | - | - | - | 2 | μA |
| Regulator output voltage | V_{OREG} | - | 0.95 | 1.0 | 1.05 | V |
| Quick charge current | I_C | - | 50 | 70 | - | μA |
| Input for -3dB sensitivity | V_{LIM} | Mixer Input | - | 2.5 | 7.5 | μV_{rms} |
| Recovered audio output voltage | $V_{O(RAO)}$ | $V_{IN(2MIX)} = 500\mu V_{rms}$ | 36 | 54 | 78 | mVrms |
| Mixer conversion gain | $\Delta G_{V(M)}$ | Ceramic Filter loss = -1dB | 8 | 12 | 16 | dB |
| Signal to noise ratio | S/N | $V_{IN(MIX1N)} = 500\mu V_{rms}$ | 38 | 55 | - | dB |
| Total Harmonic Distortion | THD | $V_{IN(MIX1N)} = 500\mu V_{rms}$ | - | 2.0 | 3.5 | % |
| Mixer 3rd order intercept point | 3RD | - | - | -10 | - | dBm |
| Mixer input resistance | $R_I(MIX)$ | - | 3.5 | 5 | 6.5 | k Ω |
| Limiting amp input resistance | $R_I(LA)$ | - | 0.9 | 1.5 | 2.1 | k Ω |
| AM rejection ratio | AMR | $V_{IN(2MIX)} = 500\mu V_{rms}$ (AM = 30%) | 25 | 40 | - | dB |
| Data shaping output duty ratio | DR | $V_{IN(2MIX)} = 500\mu V_{rms}$ | 40 | 50 | 60 | % |
| RSSI output voltage | V_{RSSI} | $V_{IN(2MIX)} = 1mV_{rms}$ | 0.49 | 0.7 | 0.91 | V |
| RSSI output resistance | R_{RSSI} | - | 90 | 100 | 110 | k Ω |

TEST CIRCUIT



NOTES