

# KA8513B

# FM IF RECEIVER

## INTRODUCTION

The KA8513B is designed for FM IF Detection on the pager set. It includes voltage regulator, low battery detection circuit, Mixer, Oscillator, FSK comparator and limiting IF Amplifier.

## FEATURES

- Operating Voltage Range : 1.0 ~ 4.0V
- Typical Supply Current : 1.1mA at 1.4V
- Low Battery Detection Circuit (alarm function) : 1.05V
- Voltage Regulator : Vreg = 1.0V (typ)
- Mixer Operating Frequency : 10 ~ 50MHz
- High Transmitting Rate : 1200bps
- FSK Data Reception
- Package Type : 20 ssop (0.65mm)

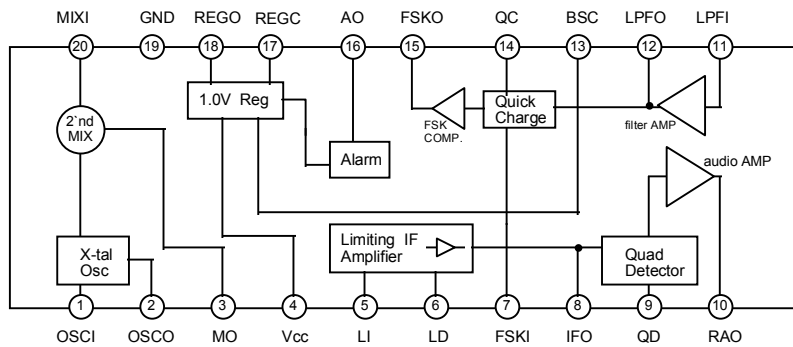
20-SSOP-225



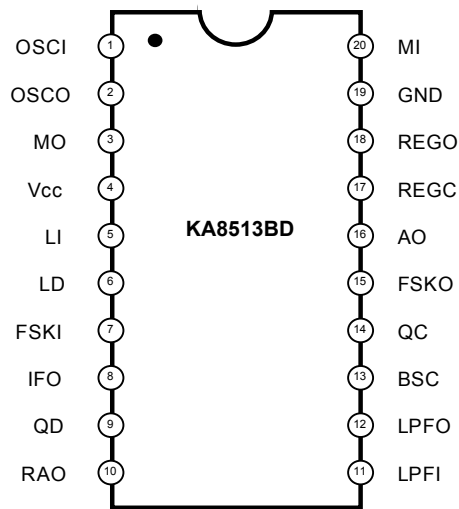
## ORDERING INFORMATION

| Device   | Package     | Operating Temperature |
|----------|-------------|-----------------------|
| KA8513BD | 20-SSOP-225 | - 20 ~ + 70°C         |

## BLOCK DIAGRAM



## PIN CONFIGURATION



## PIN DESCRIPTION

| Pin No | Symbol          | Description   |
|--------|-----------------|---|
| 1      | OSCI            | Oscillator input.<br>The oscillator is an internally-biased colpitts type.                                      |
| 2      | OSCO            | Oscillator output.  |
| 3      | MI              | Mixer output pin<br>Output impedance $\approx 2K\Omega$<br>Connect a 455KHz filter between this pin and the LI. |
| 4      | V <sub>cc</sub> | V <sub>cc</sub> pin.  |
| 5      | LI              | IF limiter amplifier input.<br>Input impedance $\approx 2K\Omega$   |
| 6      | LD              | Bypass capacitor connect pin for the IF limiter amplifier.  |

## PIN DESCRIPTION (Continued)

| Pin No | Symbol | Description   |
|--------|--------|---|
| 7      | FSKI   | Differential Amp reference input on the FSK comparator.   |
| 8      | IFO    | IF Amp output.  |
| 9      | QD     | Quadrature detection phase shifter pin.   |
| 10     | RAO    | Recovered audio signal output.  |
| 11     | LPFI   | Low pass filter amplifier input<br>Bias is supplied from pin 10.                                    |
| 12     | LPFO   | Low pass filter amplifier output.   |
| 13     | BSC    | Battery saving control pin.<br>High : Battery saving off.<br>Low : Battery saving on.               |
| 14     | QC     | Quick charge control pin.<br>High : Quick charge-discharge on.<br>Low : Quick charge-discharge off. |
| 15     | FSKO   | FSK signal output pin.  |
| 16     | AO     | Alarm output.<br>This pin becomes High when $V_{CC}$ drops below 1.05V                              |
| 17     | REGC   | Internal Transistor control pin.<br>Normal mode : open  |
| 18     | REGO   | Regulated voltage output.   |
| 19     | GND    | Ground.   |
| 20     | MI     | Mixer input impedance $\approx 5K\Omega$ .  |

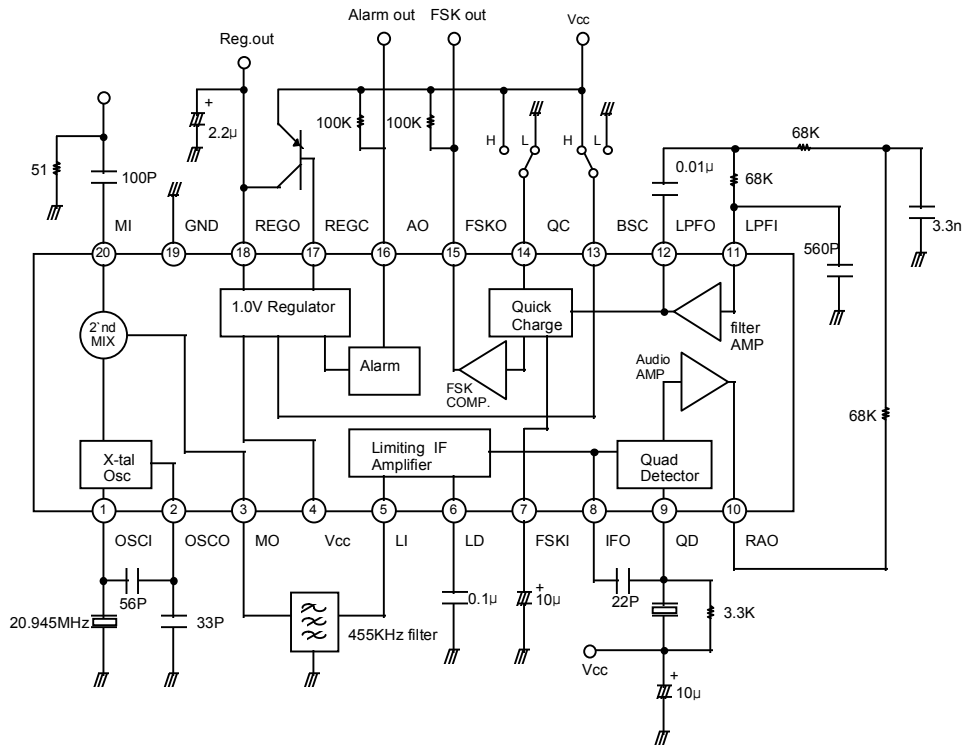
## ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

| Characteristic        | Symbol                 | Value      | Unit |
|-----------------------|------------------------|------------|------|
| Max. Supply Voltage   | $V_{CC} \text{ (Max)}$ | 4          | V    |
| Power Dissipation     | $P_D$                  | 800        | mW   |
| Operating Temperature | $T_{OPR}$              | - 20 ~ 70  | °C   |
| Storage Temperature   | $T_{STG}$              | - 55 ~ 125 | °C   |

**ELECTRICAL CHARACTERISTICS**(V<sub>CC</sub> = 1.4V ± 5%, f<sub>IN(2MIX)</sub> = 21.4MHz, f<sub>DEV</sub> = ± 4KHz, Ta = 25°C, Unless otherwise specified)

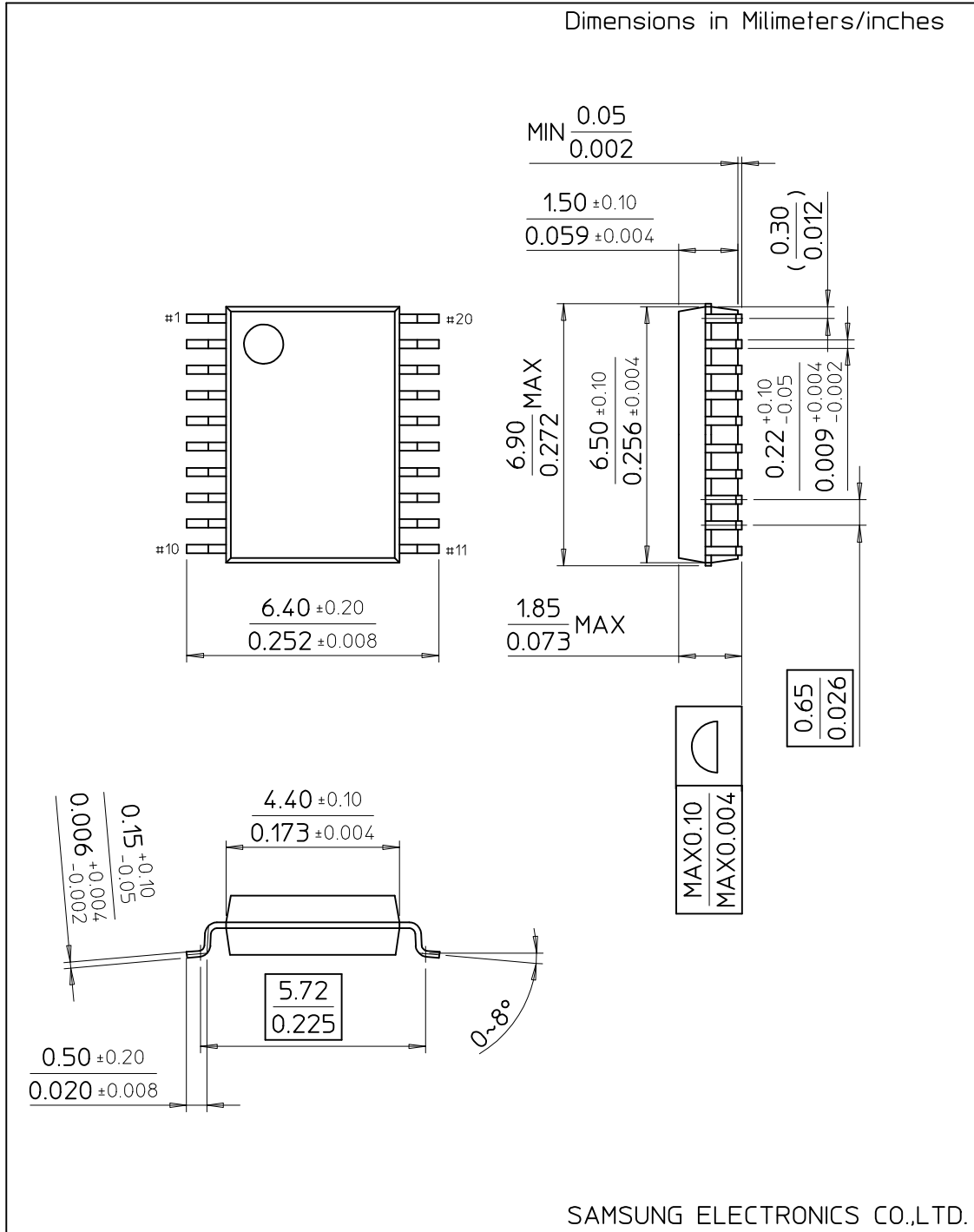
| Characteristic                      | Symbol                | Test Conditions                                  | Min  | Typ  | Max  | Unit  |
|-------------------------------------|-----------------------|--|------|------|------|-------|
| Operating Current                   | I <sub>CCN</sub>      | No Input Signal                                  | -    | 1.1  | 1.6  | mA    |
|                                     | I <sub>CCS</sub>      | Battery Saving                                   | -    | 0    | 10   | μA    |
| Alarm Detection Voltage             | V <sub>AD</sub>       | -  | 1.0  | 1.05 | 1.1  | V     |
| Alarm Low Level Output Voltage      | V <sub>O(AL)</sub>    | I = 100μA  | -    | -    | 0.4  | V     |
| Alarm High Level Leakage Current    | I <sub>LKG(AL)</sub>  | -  | -    | -    | 2    | μA    |
| FSK Low Level Output Voltage        | V <sub>L(FSK)</sub>   | I = 100μA  | -    | -    | 0.4  | V     |
| FSK High Level Leakage Current      | I <sub>LKG(FSK)</sub> | -  | -    | -    | 2    | μA    |
| Regulator Output Voltage            | V <sub>O(REG)</sub>   | -  | 0.95 | 1.0  | 1.05 | V     |
| Quick Charge Current                | I <sub>C</sub>        | -  | 50   | 70   | -    | μA    |
| Input for -3dB Sensitivity          | V <sub>LIM</sub>      | Mixer Input                                      | -    | 2.5  | 7.5  | μVrms |
| Input for -12dB SINAD Sensitivity   | V <sub>I(SEN)</sub>   | IF Input   | -    | 6.0  | 18.0 | μVrms |
| Recovered Audio Output Voltage      | V <sub>O(RAD)</sub>   | V <sub>IN(2MIX)</sub><br>= 500 μVrms             | 37   | 55   | 73   | μVrms |
| Mixer Conversion Voltage Gain       | ΔG <sub>V(M)</sub>    | Ceramic Filter loss<br>= -1dB                    | 8    | 12   | 16   | dB    |
| Signal to Noise Ratio               | S/N                   | V <sub>IN(2MIX)</sub><br>= 500 μVrms             | 38   | 55   | -    | dB    |
| Total Harmonic Distortion           | THD                   | V <sub>IN(2MIX)</sub><br>= 500 μVrms             | -    | 2.0  | 3.5  | %     |
| Mixer 3rd Order Intercept Point     | 3RD                   | -  | -    | -10  | -    | dBm   |
| Mixer Input Resistance              | R <sub>I(MIX)</sub>   | -  | 3.5  | 5    | 6.5  | KΩ    |
| Limiting Amplifier Input Resistance | R <sub>I(LA)</sub>    | -  | 1.4  | 2    | 2.6  | KΩ    |
| AM Rejection Ratio                  | AMR                   | V <sub>IN(2MIX)</sub><br>= 500 μVrms<br>AM = 30% | 25   | 40   | -    | dB    |
| Data Shapping Output Duty Ratio     | DR                    | V <sub>IN(2MIX)</sub><br>= 500 μVrms             | 40   | 50   | 60   | %     |

APPLICATION CIRCUIT



# 20-SSOP-225

Dimensions in Millimeters/inches



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