

## Melody sound source LSI for cellular phone

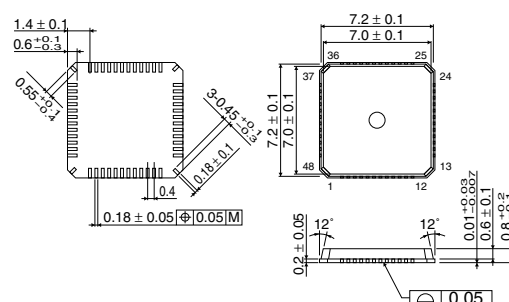
# BU8709KN

### ● Description

BU8709KN is a melody sound source LSI for cellular phones. This LSI generates 64 high quality polyphonic tones through high sampling rate ( $f_s=44.1\text{kHz}$ ).

1 ADPCM encoder and 2 ADPCM decoders functions are embedded, providing mixing capabilities. It can customize output sounds by an equalizer function and display the signals by Graphic Equalizer. It also has Reverb function, as well as LED & Vib synchronization.

### ● Dimension (Unit : mm)



QFN48U

### ● Features

- 1) Simultaneous generation of up to 64 polyphonic tones out of a tone palette of 222 sounds
- 2) High-quality tone reproduction using  $F_s=44.1\text{kHz}$ , two-voice method
- 3) 12bit pitch bending and modulation support
- 4) Stereo and monaural modes
- 5) Built-in equalizer (3 channels) and vibration function
- 6) Built-in LED (3 channels)
- 7) Built-in reverb function
- 8) Plays up to four songs simultaneously
- 9) Built-in ADPCM encoder (1 channel) and decoder (2 channel), enables mixing with melody
- 10) Select among  $\mu$ -law, A-law, and linear input for encoder
- 11) Control from CPU using serial or parallel interface
- 12) Built-in FIFO for sound source and ADPCM to reduce CPU's processing load
- 13) Built-in graphic equalizer (7-band)
- 14) Supports digital output (standard format or IIS format)
- 15) Provides 1-Poly mode for low power consumption

### ● Applications

Sound source for cellular phones and portable appliances

### ● Absolute Maximum Ratings ( $T_a=25^\circ\text{C}$ )

| Parameter                   | Symbol | Limits               | Unit             | Conditions                    |
|-----------------------------|--------|----------------------|------------------|-------------------------------|
| Max. I/O supply voltage     | VDDIO  | -0.3 ~ 4.5           | V                | DVDD_IO, AVDD                 |
| Max. CORE supply voltage    | VDDCO  | -0.3 ~ 3.5           | V                | DVDD_CORE                     |
| Voltage applied to pin      | VIN    | DVSS-0.3 ~ VDDIO+3.5 | V                |                               |
| Input current               | IIN    | -1 ~ +1              | $\mu\text{A}$    |                               |
| Power dissipation           | Pd     | 500                  | mW               | Warranty setting of single IC |
| Storage temperature range   | Tstg   | -50 ~ 125            | $^\circ\text{C}$ |                               |
| Operating temperature range | Topr   | -30 ~ 85             | $^\circ\text{C}$ |                               |

\*Derating : 5.0mW/ $^\circ\text{C}$  for operation above  $T_a=25^\circ\text{C}$

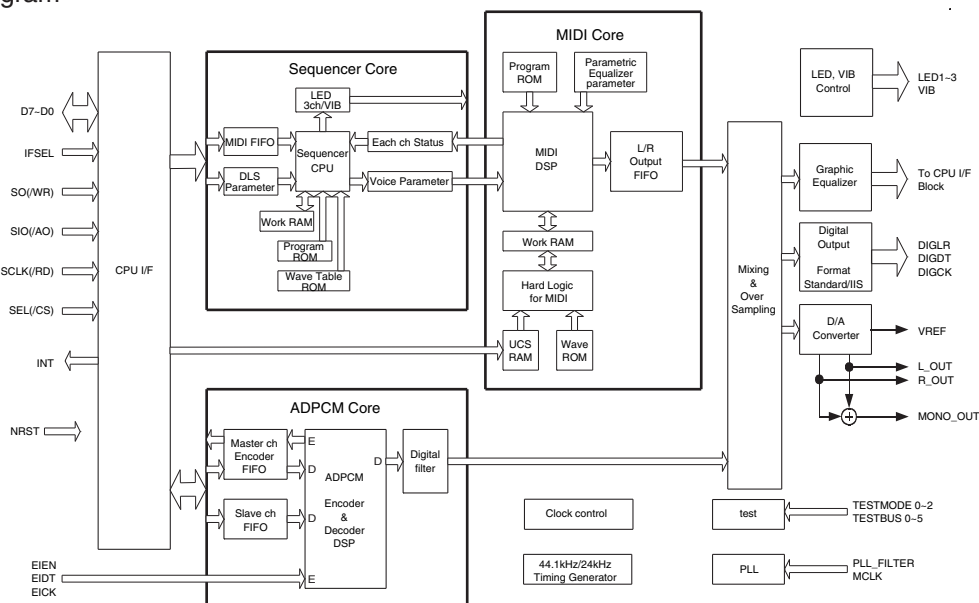
## ● Recommended Operating Conditions (Ta=25°C)

| Parameter                    | Symbol | Min.  | Typ. | Max. | Unit | Conditions                             |
|------------------------------|--------|-------|------|------|------|----------------------------------------|
| I/O power supply voltage     | VDDIO  | 2.7   | 3.0  | 3.3  | V    | DVDD_IO, AVDD                          |
| CORE power supply voltage    | VDDCO  | 2.25  | 2.5  | 2.75 | V    | DVDD_CORE                              |
| Ambient temperature          | Ta     | -30   | 25   | 85   | °C   |                                        |
| MCLK input frequency         | FMCLK  | 2.688 | —    | 20   | MHz  |                                        |
| SCLK input frequency         | FSCLK  | —     | —    | 20   | MHz  | Scale precision is approximately 0.2%. |
| MCLK duty                    | DMCLK  | 40    | 50   | 60   | %    |                                        |
| Analog pin's load resistance | ZAN    | 10    | —    | —    | kΩ   | After DC Coupling                      |

## ● Electrical characteristics (Unless otherwise noted, Ta=25°C)

| Parameter                                                                                             | Symbol | Min.        | Typ.    | Max.      | Unit | Conditions                          |
|-------------------------------------------------------------------------------------------------------|--------|-------------|---------|-----------|------|-------------------------------------|
| <Digital DC characteristics>                                                                          |        |             |         |           |      |                                     |
| High-level input voltage                                                                              | VIH    | DVDD_IO-0.5 | —       | —         | V    |                                     |
| Low-level input voltage                                                                               | VIL    | —           | —       | DVSS+0.5  | V    |                                     |
| High-level input current                                                                              | IIH    | —           | —       | 1         | μA   | VIH=VDDIO                           |
| Low-level input current                                                                               | IIL    | -1          | —       | —         | μA   | VIL=DVSS                            |
| High-level output voltage                                                                             | VOH    | DVDD_IO-0.3 | —       | —         | V    | IOH=-0.8mA                          |
| Low-level output voltage                                                                              | VOL    | —           | —       | DVSS+0.3  | V    | IOH=0.8mA                           |
| <Analog DC characteristics>                                                                           |        |             |         |           |      |                                     |
| VREF pin voltage                                                                                      | VAGND  | 0.475AVDD   | 0.5AVDD | 0.525AVDD | V    | IOUT=0A (no load)                   |
| Analog pin voltage                                                                                    | VOUT   | 0.47AVDD    | 0.5AVDD | 0.53AVDD  | V    | IOUT=0A (no load) Not playing       |
| <General characteristics>                                                                             |        |             |         |           |      |                                     |
| VREF pin rise time                                                                                    | TRVR   | —           | 15      | 25        | mS   | When CVREF=1μF, NRST=L→H            |
| <Analog pin characteristics>                                                                          |        |             |         |           |      |                                     |
| Analog amplitude                                                                                      | VMAX   | —           | 1.8     | —         | Vp-p | Theoretical value for dynamic range |
| Power consumption DVDD_CORE=2.5V, DVDD_IO=3.0V, AVDD=3.0V, internal operation frequency SYS_CLK=50MHz |        |             |         |           |      |                                     |
| Analog Idd 1                                                                                          | AIDD1  | —           | 1.5     | 2.5       | mA   | Playing                             |
| Digital Idd 10                                                                                        | DIDD10 | —           | 28      | 35        | mA   | Not playing MIDI CLK control="101"  |
| Digital Idd 11 (DVDD_CORE)                                                                            | DIDD11 | —           | 56      | 65        | mA   | Playing 64POLY                      |
| Digital Idd 12 (DVDD_IO)                                                                              | DIDD12 | —           | 0.4     | 1         | mA   | Playing                             |
| Analog Idd 2                                                                                          | AIDD2  | —           | —       | 1         | μA   | Standby mode                        |
| Digital Idd 20 (DVDD_CORE)                                                                            | DIDD20 | —           | —       | 10        | μA   | Standby mode                        |
| Digital Idd 21 (DVDD_IO)                                                                              | DIDD21 | —           | —       | 5         | μA   | Standby mode                        |

## ● Block Diagram



This datasheet has been download from:

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