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Bluetooth® 2.0 + EDR stereo audio processor

datasheet

PRELIMINARY SPECIFICATION

version 1.0

december 2010

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applications

- Bluetooth stereo headsets
- Bluetooth stereo speakers
- automotive stereo audio
- Bluetooth mini stereo soundboxes

ordering information

- **OVC3860-Q56G** (lead-free)
56-pin QFN

features

- highly integrated single chip Bluetooth stereo audio solution
- low power consumption
- Bluetooth V2.0 + EDR specification compliant
- Bluetooth radio with +2 dBm transmit power and -82 dBm receive sensitivity
- supports the mandatory Bluetooth compression coding/decoding scheme - Sub Band Coding (SBC) which is license-free
- integrated hi-fi stereo audio CODEC with -90 dB SNR DAC
- integrated 150 mA Lithium battery charger
- integrated switch voltage regulator
- integrated low Iq linear regulators
- supports A2DP V1.2 and AVRCP V1.4
- supports HSP V1.2 and HFP V1.5
- UART and SCCB interfaces
- low power 1.8V operation
- small footprint 56-pin QFN 7 x 7 x 0.9mm package
- RoHS compliant

key specifications

- **power supply:**
VDD: 1.7~1.9V (1.8V typical)
V_{IO}: 1.7~3.3V
V_{REG}: 2.2~4.2V
- **power requirements:**
active: 26 mA
SCO HV3: 23 mA
sleep: 400 μ A
shutdown: 12 μ A
- **temperature range:**
operating: -10°C to 80°C (see [table 5-2](#))
storage: -45°C to 125°C (see [table 5-2](#))
- **Bluetooth specification:** version 2.0 with EDR
- **operating range:** up to 10 meters
- **modulation:** n/4 DQPSK / 8DQPSK
- **transmission frequency:** 2402~2480 MHz
- **receive sensitivity:** -82 dBm @ 1% BER (typical)
- **maximum RF transmit power:**
0 ~ +4 dBm (+2 dBm typical)
- **antenna impedance:** 50 ohms
- **input clock:** 12 MHz
- **package dimensions:** 7 mm x 7 mm x 0.9mm

1 signal descriptions

[table 1-1](#) lists the signal descriptions and their corresponding pin numbers for the OVC3860. The package information is shown in [section 6](#).

table 1-1 signal description (sheet 1 of 3)

| pin number | signal name | I/O type | description | power domain |
|------------|-------------|----------|--|--------------|
| 01 | GPIO_A1 | digital | programmable input/output terminal, LED control | IO |
| 02 | GPIO_A0 | digital | programmable input/output terminal, LED control | IO |
| 03 | VPP | power | positive power supply of OTP ROM | OTP |
| 04 | VDD_ANA | power | positive power supply for analog circuit | core |
| 05 | VDD_RF | power | positive power supply for RF circuit | RF |
| 06 | RFA | RF | radio transmitter terminal | |
| 07 | RFB | RF | radio transmitter terminal | |
| 08 | VDD_RF | power | positive power supply for RF circuit | RF |
| 09 | VDD_LO | power | positive power supply for local oscillator circuit | |
| 10 | VDDA_RFCP | power | positive power supply for RF circuit | |
| 11 | LDO_OUT | power | linear voltage regulator output | |
| 12 | LDO_IN | power | linear voltage regulator input | |
| 13 | XTALO | analog | crystal resonator output (negative) | |
| 14 | XTALI | analog | crystal resonator output (positive) | |
| 15 | VDD_SYN | power | positive power supply for analog circuit | |
| 16 | AOM | analog | headphone common pin | |
| 17 | AOL | analog | headphone left channel output terminal | |

table 1-1 signal description (sheet 2 of 3)

| pin number | signal name | I/O type | description | power domain |
|------------|-------------|----------|---|--------------|
| 18 | VDD_AO | power | positive power supply for headphone power amplifier | |
| 19 | AOR | analog | headphone right channel output terminal | |
| 20 | VMID | analog | audio CODEC reference voltage input terminal | |
| 21 | VDDA | power | positive power supply for audio CODEC | |
| 22 | MIC | analog | microphone positive input terminal | |
| 23 | MICBIAS | analog | microphone bias output terminal | |

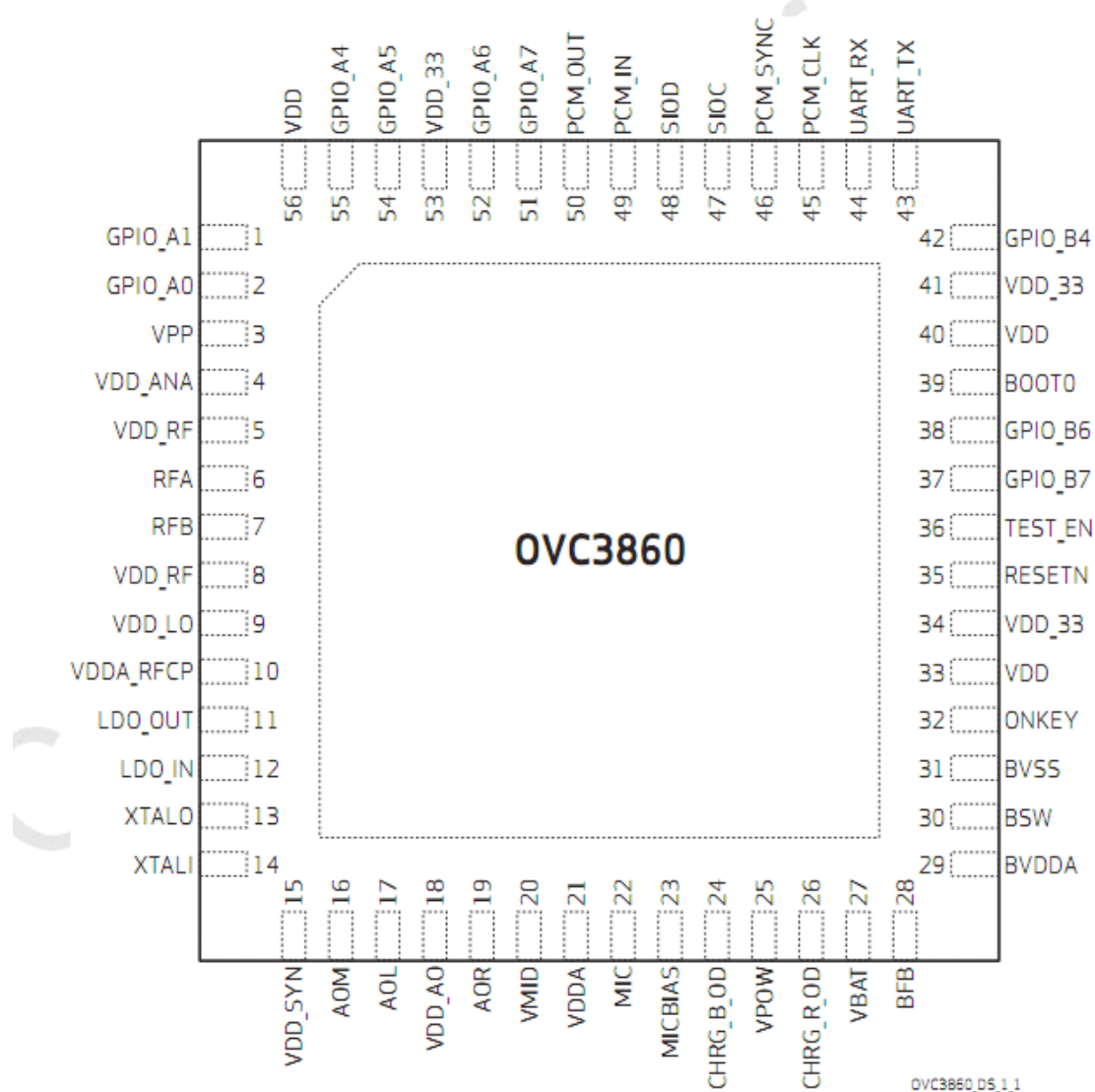
| | | | |
|----|-----------|---------|--|
| 24 | CHRG_B_OD | analog | charger status indicator output |
| 25 | VPOW | power | positive power supply for charger |
| 26 | CHRG_R_OD | power | charger status indicator output |
| 27 | VBAT | power | charger output to battery terminal |
| 28 | BFB | power | switch regulator feedback input terminal |
| 29 | BVDDA | power | positive power supply for Buck |
| 30 | BSW | power | switch regulator output terminal |
| 31 | BVSS | power | exposed pad as ground |
| 32 | ONKEY | digital | soft power ON/OFF control terminal |
| 33 | VDD | power | positive power supply for digital core |
| 34 | VDD_33 | power | positive power supply for digital I/O |
| 35 | RESETN | digital | chip reset enable (active low) |
| 36 | TEST_EN | digital | enable test mode (connect to ground) |
| 37 | GPIO_B7 | digital | programmable I/O terminal |
| 38 | GPIO_B6 | digital | programmable I/O terminal |
| 39 | BOOT0 | digital | select boot position |
| 40 | VDD | power | positive power supply for digital core |

table 1-1 signal description (sheet 3 of 3)

| pin number | signal name | I/O type | description | power domain |
|------------|-------------|----------|--|--------------|
| 54 | GPIO_A5 | digital | programmable I/O terminal | |
| 55 | GPIO_A4 | digital | programmable I/O terminal | |
| 56 | VDD | power | positive power supply for digital core | |

figure 1-1 pin diagram

| | | | |
|----|----------|---------|---------------------------------------|
| 41 | VDD_33 | power | positive power supply for digital I/O |
| 42 | GPIO_B4 | digital | programmable I/O terminal |
| 43 | UART_TX | digital | UART interface data output terminal |
| 44 | UART_RX | digital | UART interface data input terminal |
| 45 | PCM_CLK | digital | PCM interface clock |
| 46 | PCM_SYNC | digital | PCM interface sync |
| 47 | SIOC | digital | SCCB interface clock output terminal |
| 48 | SIOD | digital | SCCB interface data terminal |
| 49 | PCM_IN | digital | PCM interface data in |
| 50 | PCM_OUT | digital | PCM interface data out |
| 51 | GPIO_A7 | digital | programmable I/O terminal |
| 52 | GPIO_A6 | digital | programmable I/O terminal |
| 53 | VDD_33 | power | positive power supply for digital I/O |



2 system level description

2.1 overview

The OVC3860 is a highly integrated, low power single-chip Bluetooth® RF transceiver and baseband processor for ultra low cost Bluetooth stereo audio solutions.

The OVC3860 features a 2.4GHz ISM RF transceiver, Bluetooth V2.0+EDR baseband, high-quality 20-bit stereo audio CODEC and a complete on-chip power management unit including switch regulator, Lithium ion/polymer battery charger, and low Iq linear regulators.

A configurable Bluetooth stack is integrated with profiles and applications including A2DP V1.2, AVRCP V1.4, HSP V1.2 and HPF V1.5. Incorporated with an on-chip SBC decoder, the OVC3860 is fully compliant with the Bluetooth 2.0+EDR specification. It fulfills all Bluetooth stereo audio and voice communication functions.

2.2 key features

2.2.1 general

- cost effective, low power consumption, single-chip solution for Bluetooth stereo audio applications
- Bluetooth V2.0 + EDR specification compliant fully integrated RF and baseband processor

2.2.2 radio

- Bluetooth V2.0 + EDR specification compliant system in 2.4GHz ISM band
- typical +2 dbm transmit power
- typical -83 dBm receive sensitivity
- supports Class 2 and Class 3 without the need of an external power amplifier
- up to 10 meters communication range

2.2.3 baseband processor

- on-chip low power, high performance, 32-bit RISC processor
- 2Mb internal ROM and 48kB internal RAM
- fully integrated Bluetooth baseband logic for FEC, HEC, access code correlation, CRC, demodulation, encryption bit stream generation, whitening
- fully supports Bluetooth V2.0 + EDR features including AFH and enhanced data rate up to 3 Mbps
- supports CVSD transcoder for voice over air

2.2.4 synthesizer

- fully integrated synthesizer
- 12MHz crystal compatible

2.2.5 digital interfaces

- integrated high speed UART interface for system debugging
- SCCB interface for external EEPROM to store device configuration data

OVC3860

Bluetooth® 2.0 + EDR stereo audio processor

2.2.6 stereo audio CODEC

- integrated high fidelity audio CODEC with SNR > 90dB playback
- on-chip 20-bit stereo audio digital-to-analog converter (DAC)
- on-chip 16-bit mono voice analog-to-digital converter (ADC)
- integrated headphone amplifier in 40mW @ 32Ω supporting capacitor-less output
- one-channel microphone input with microphone driver

2.2.7 power

- low power 1.8V core operation and 1.8V to 3.3V I/O
- on-chip high efficiency switched mode regulator up to 96%, from 2.7V to 4.5V input and adjustable 1.8/2.1/2.3V output
- on-chip, fully-functional, single-cell Lithium Ion/polymer battery charger with programmable charging current between 10 to 150mA with ±7% accuracy
- power-on reset programmable battery low voltage detection
- supports standard sniff/hold power save mode and OmniVision extended modes

2.2.8 Bluetooth stack

- on-chip Bluetooth stack allows full-speed data transfer and Piconet support
- on-chip A2DP V1.2 and AVRCP V1.4 profiles with hardware SBC decoder enables audio stream over Bluetooth and remote control
- on-chip HFP V1.5 and HSP V1.2 profiles

2.2.9 package

- small footprint 56-pin QFN 7 x 7 x 0.9mm, 0.4mm pitch

2.3 architecture

figure 2-1 functional block diagram

