OVC3960
Datasheet

OmniVision Technologies, Inc. reserves the right to make changes without further notice to any product herein to improvereliability, function or design. OmniVision does not assume any liability arising out of the application or use of any project,circuit described herein; neither does it convey any license under its patent nor the right of others.

The datasheet is the official document of OmniVision. The applicaton notes are application guide lines for reference. Ifthere are any difference between datasheet and application notes, please follow datasheet and kindly report the difference to OVT FAE.

Datasheet of OVC3960

PRELIMINARY SPECIFICATION

Bluetooth® 3.0 + EDR stereo audio processor

Copyright © 2013 OmniVision Technologies, Inc. All rights reserved.

Trademark Information

Bluetooth® 3.0 + EDR stereo audio processor

datasheet

PRELIMINARY SPECIFICATION

version 1.0 Aug. 2013

To learn more about OmniVision Technologies, visit www.ovt.com.
OmniVision Technologies is publicly traded on NASDAQ under the symbol OVTI.

applications

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

general

- Cost effective, low power consumption, single-chip solution for Bluetooth stereo audio
- Bluetooth V3.0,EDR specification compliant fully integrated RF and baseband processor

features

- highly integrated single chip Bluetooth stereo audio solution
- ultra low power consumption
- Bluetooth V3.0 + EDR specification compliant
- Bluetooth radio with +4 dBm transmit power and -88 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 25~300 mA Lithium battery charger
- integrated switch voltage regulator
- integrated low Iq linear regulators
- supports A2DP V1.3 and AVRCP V1.5
- supports HSP V1.2 and HFP V1.6
- UART and SCCB interfaces
- low power 1.2V operation
- small footprint 60-pin QFN 7 x 7 x 0.9mm package
- RoHS compliant

Radio

- Bluetooth V3.0, EDR specification compliant system in 2.4GHz ISM band
- Typical +4 dbm transmit power
- Typical -88 dBm receive sensitivity
- Supports Class 2 and Class 3 without the need of an external power amplifier
- Supports up to 10+ meters communication range
- No External Balun needed

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 V3.0, EDR features including AFH and enhanced data rate up to 3 Mbps

Synthesizer

- Fully integrated synthesizer
- On-chip synthesizer allowing the input clock frequency ranging from 12~26MHz(step:2Mhz)

Digital interfaces

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

Stereo audio CODEC and AEC

- Integrated high fidelity audio CODEC with SNR > 95dB
- On-chip stereo audio digital-to-analog converter (DAC), SNR>95dB
- On-chip analog-to-digital converter (ADC), SNR>75dB
- Integrated headphone amplifier in 40mW @ 32Ω
- Integrated differential audio output
- On-chip dual microphone input
- Integrated single microphone echo cancellation

Power Management

- Low power 1.2V core operation and 1.8V to 3.3V I/O
- On-chip high efficiency switched mode regulator up to 96%, from 3.3V to 4.5V input
- On-chip, fully-functional, single-cell Lithium ion/polymer battery charger with programmable charging current between 25 to 300mA
- Supports standard sniff/hold power save mode and OmniVision extended modes

Bluetooth stack

- On-chip Bluetooth stack allows full-speed data transfer and Piconet support
- On-chip A2DP and AVRCP profiles with hardware SBC decoder enables audio stream over
- On-chip HFP and HSP profiles
- On-chip SPP and PBAP profiles

key specifications

- **power supply:**
VDD: 1.1~1.3V (1.2V typical)
VDD$_{IO}$: 3.0~3.6V
VDD$_{BAT}$: 3.3~4.2V

- **power requirements:**
active: 20 mA
sleep: 400 µA
shutdown: 10 µA

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 2.1 with EDR

operating range: up to 10 meters

modulation: n/4 DQPSK / 8DQPSK

transmission frequency: 2402~2480 MHz

receive sensitivity: -88 dBm @ 1% BER (typical)

maximum RF transmit power: 0 ~ +4 dBm
antenna impedance: 50 ohms

input clock: 12 MHz

package dimensions: 7 mm x 7 mm x 0.9mm

note
values shown are preliminary and are subject to change after further testing.

OmniVision.

table of contents

list of figures

list of tables

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

pin number	signal name	I/O type	description	power domain

1 signal descriptions

table 1-1 lists the signal descriptions and their corresponding pin numbers for the OVC3960. The package information is shown in **section 6**.

table 1-1 signal description

1	PCM CLK	Digital	PCM interface clock	
2	PCM SYNC	Digital	PCM interface sync	
3	PORT A4	Digital	Programmable I/O terminal	
4	PORT A5	Digital	Programmable I/O terminal	
5	PORT A6	Digital	Programmable I/O terminal	
6	PORT A7	Digital	Programmable I/O terminal	
7	VDDA	Power	Positive power supply for audio CODEC circuit	
8	RFA	RF	Radio transmitter terminal	
9	RFB	RF	Radio transmitter terminal	
10	VDD PA	Power	Positive power supply for PA circuit	
11	VDD RF	Power	Positive power supply for RF circuit	
12	VDDA RFCP	Power	Positive power supply for RF circuit	
13	VDD LO	Power	Positive power supply for local oscillator circuit	
14	LDO IN	Power	Linear voltage regulator input	
15	LDO OUT	Power	Linear voltage regulator output	
16	CRYI	Analog	Crystal resonator output(positive)	
17	CRYO	Analog	Crystal resonator output(negative)	
18	VDD OSC	Power	Positive power supply for oscillator circuit	
19	L PAOUTN	Analog	Audio CODEC left channle PA output(negative)	
20	L PAOUT	Analog	Audio CODEC left channle PA output(positive)	
21	R PAOUT	Analog	Audio right channle PA output(positive)	
22	R PAOUTN	Analog	Audio right channle PA output(negative)	
23	VDDAO	Power	Positive power supply for audio CODEC PA circuit	
24	VSSAO	Power	Ground supply for audio CODEC PA circuit	

25	VDDA_CODEC	Power	Positive power supply for audio CODEC circuit
26	VDDA_REF	Power	Positive power supply for audio CODEC Ref circuit
27	L_LN	Analog	Audio CODEC left channel MIC input terminal
28	VMID	Analog	Audio CODEC reference voltage input terminal
29	MICBIAS	Analog	Audio CODEC MIC bias voltage input terminal
30	R_LN	Analog	Audio CODEC left channel MIC input terminal
31	PORT_B4	Digital	Programmable I/O terminal
32	VDD33	Power	Positive power supply for digital I/O
33	VDD18	Power	Positive power supply for digital core
34	RESETN	Digital	Chip reset enable (active low)
35	BFB	Analog	Switch regulator feedback input terminal
36	BVDD	Power	Positive power supply for BUCK
37	BSW	Power	Switch regulator output terminal
38	BVSSP	Power	Exposed pas as ground
39	RFPAOUT	Analog	Positive power supply for RF PA output terminal
40	VDDA_RFLDO	Power	Positive power supply for RFLDO input terminal
41	VDDA_ALDO	Power	Positive power supply for ALDO input terminal
42	AOUT	Power	Positive power supply for ANALOG circuit
43	ONKEY	Analog	Soft power ON/OFF control terminal
44	CHRG_B_OD	Analog	Charger status indicator output
45	CHRG_R_OD	Analog	Charger status indicator output
46	VPOW	Power	Positive power supply for charger
47	VBAT	Power	Charger output to battery terminal
48	PORT_B7	Digital	Programmable I/O terminal
49	PORT_B6	Digital	Programmable I/O terminal
50	VDD33	Power	Positive power supply for digital I/O
51	VSS	Power	Ground supply for digital
52	I2C_SCL	Digital	SCCB interface SCL terminal
53	I2C_SDA	Digital	SCCB interface SDA terminal
54	UART_RX	Digital	UART interface RX terminal
55	UART_TX	Digital	UART interface TX terminal
56	VDD33	Power	Positive power supply for digital I/O
57	VDD18	Power	Positive power supply for digital core
58	PCM_OUT	Digital	PCM interface data out terminal
59	PCM_IN	Digital	PCM interface data in terminal
60	VDD33	Power	Positive power supply for digital I/O

figure 1-1 pin diagram

figure 1-1 pin diagram
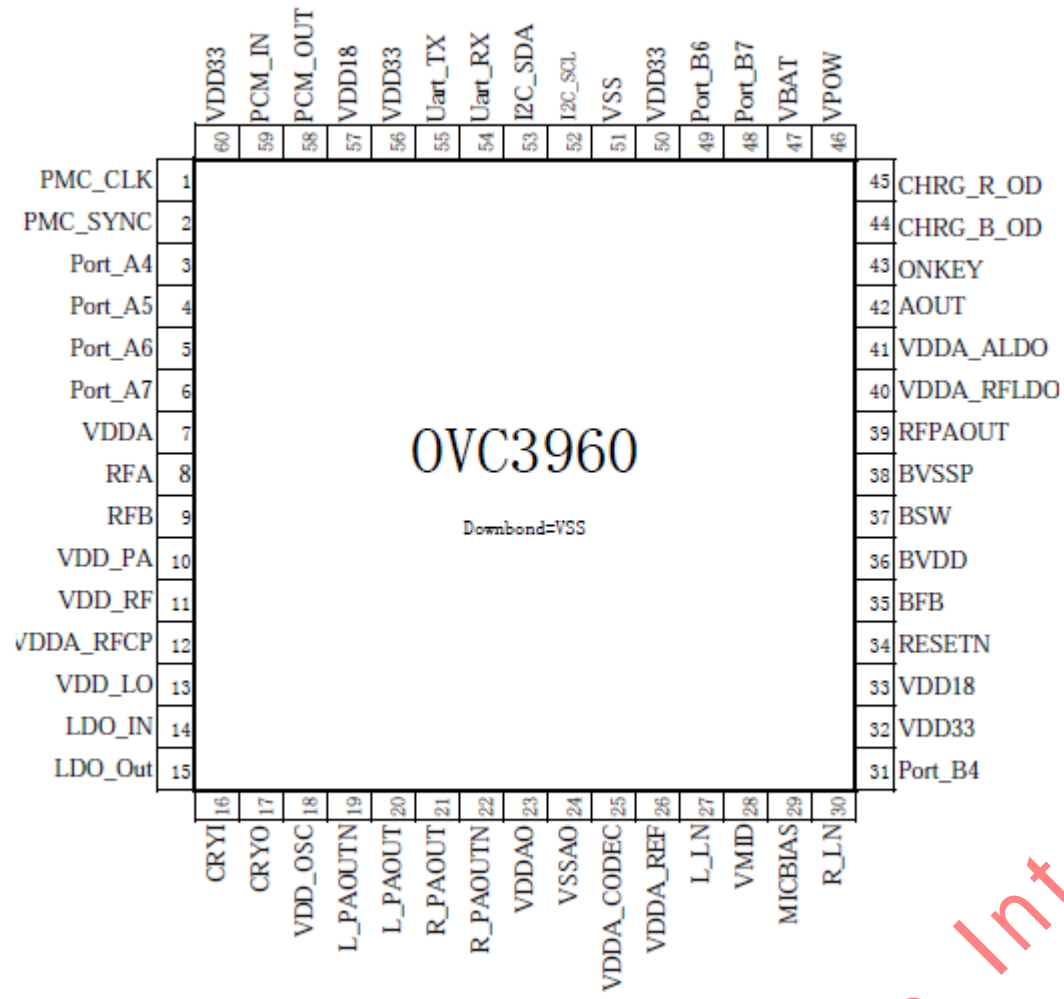
2 system level description

2.1 overview

The OVC3960 is a highly integrated, low power single-chip Bluetooth® RF transceiver and baseband processor for ultra low cost Bluetooth stereo audio solutions. It's a cost effective, low power consumption, single-chip solution for Bluetooth stereo audio applications with advanced echo cancellation.

The OVC3960 features a 2.4GHz ISM RF transceiver, Bluetooth V2.1+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 V1.3, AVRCP V1.5, HSP V1.2 and HPF V1.6. Incorporated with an on-chip SBC decoder, the OVC3960 is fully compliant with the Bluetooth 2.1+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 with advanced echo cancellation
- Bluetooth V2.1,EDR specification compliant fully integrated RF and baseband processor

2.2.2 radio
- Bluetooth V2.1 + EDR specification compliant system in 2.4GHz ISM band
- typical +4 dbm transmit power
- typical -88 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 V2.1 + EDR features including AFH and enhanced data rate up to 3 Mbps

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

2.2.6 stereo audio CODEC
- Integrated high fidelity audio CODEC with SNR > 95dB
- On-chip stereo audio digital-to-analog converter (DAC), SNR>95dB
- On-chip analog-to-digital converter (ADC), SNR>75dB
- Integrated headphone amplifier in 40mW @ 32Ω
- Integrated differential audio output
- On-chip dual microphone input
- Integrated single microphone echo cancellation

2.2.7 power
- Low power 1.2V core operation and 1.8V to 3.3V I/O
- On-chip high efficiency switched mode regulator up to 96%, from 3.3V to 4.5V input
- On-chip, fully-functional, single-cell Lithium ion/polymer battery charger with programmable charging current between 25 to 300mA
- 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 V1.3 and AVRCP V1.5 profiles with hardware SBC decoder enables audio stream over Bluetooth and remote control
• on-chip HFP V1.6 and HSP V1.2 profiles
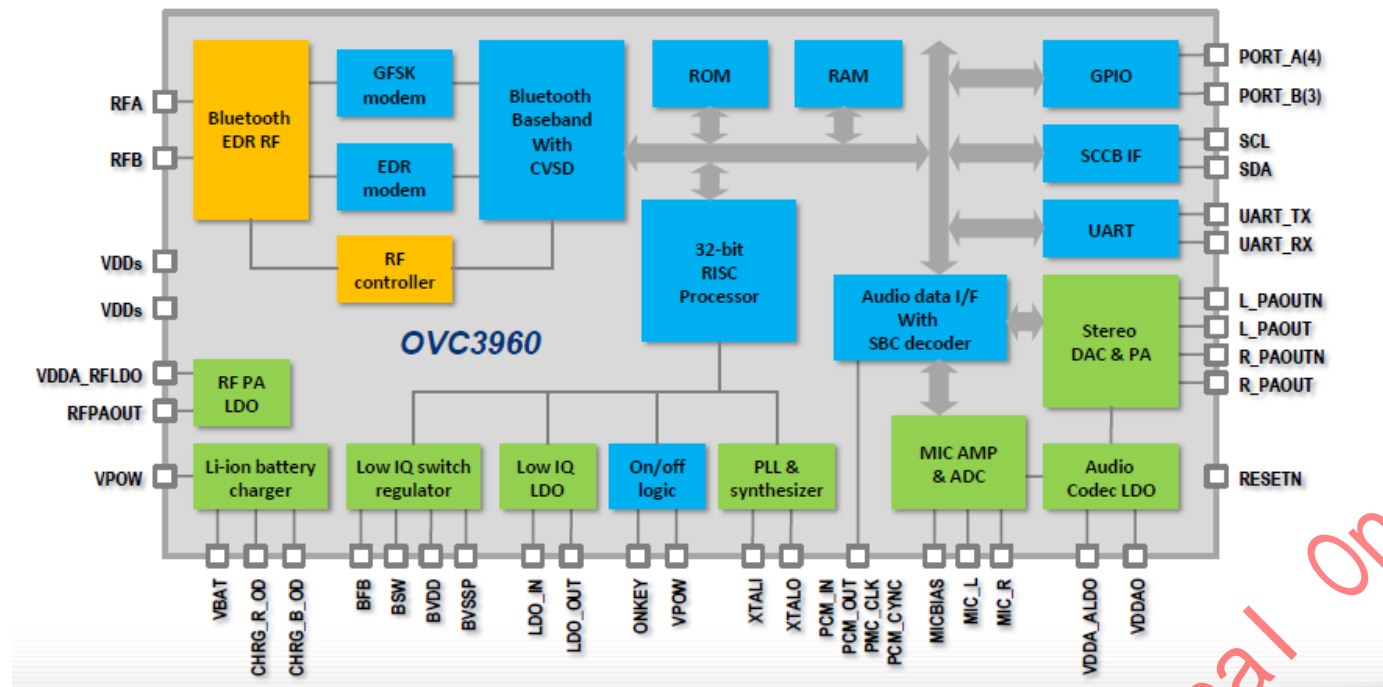
• On-chip SPP and PBAP profiles

2.2.9 package

• small footprint 60-pin QFN 7 x 7 x 0.9mm, 0.4mm pitch

2.3 architecture

figure 2-1 functional block diagram

figure 2-1 functional block diagram

figure 2-2 Bluetooth stereo audio application reference schematic
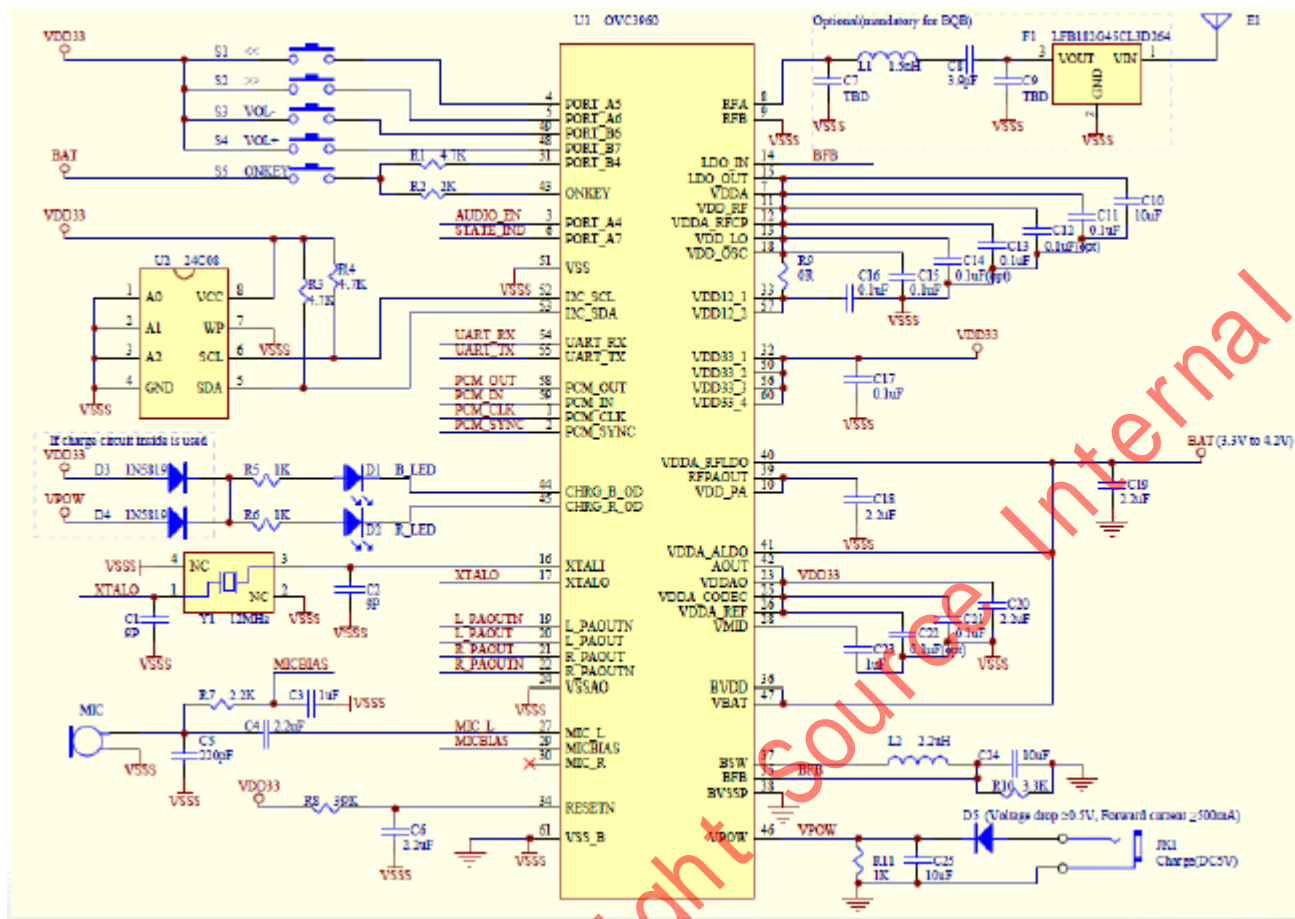
3 OmniVision Bluetooth software stack

The OVC3960 is supplied with Bluetooth 2.1+EDR specification complaint stack and application firmware, which is stored in on-chip ROM and runs on the internal RISC microprocessor.

The software stack consists of:

- Bluetooth low stack including LC and LMP
- Bluetooth highly stack including RFCOMM, L2CAP and SDP
- Bluetooth general profiles including GAP, SDAP, SPP and security management
- Headset Profile (HSP) Version 1.2 for headset
- Hands Free Profile (HFP) Version 1.6 for hands free
- Advanced Audio Distribution Profile (A2DP) Version 1.3 for audio sink
- Audio/Video Remote Control Profile (AVRCP) Version 1.5 for audio controller
- stereo audio playback and remote control application
- AT commands interpreter
- state indication tones player

defining the future of digital imaging™

website: www.ovt.com
....

OmniVision Technologies, Inc.

UNITED STATES

  4275 Burton Drive
  Santa Clara, CA 95054
  tel: + 1 408 567 3000
  fax: + 1 408 567 3001
  email: salesamerican@ovt.com

UNITED KINGDOM

  Hampshire + 44 1256 744 610

FINLAND

  Mouhijärvi + 358 3 341 1998

GERMANY

  Munich +49 89 63 81 99 88

SWEDEN

  Stockholm +46 8 505 16 431

INDIA

  Bangalore +91 988 008 0140

CHINA

  Beijing + 86 10 6580 1690
  Shanghai +86 21 6175 9888
  Shenzhen + 86 755 8384 9733
  Hong Kong + 852 2403 4011

JAPAN

  Yokohama +81 45 478 7977
  Osaka +81 6 4964 2606

KOREA

  Seoul + 82 2 3478 2812

SINGAPORE +65 6220 1335

TAIWAN

  Taipei +886 2 2657 9800
  Hsinchu +886 3 6110933