Technical Description

The Equipment Under Test (EUT) is an AM/FM Portable Bluetooth Radio. The Bluetooth portion is operating between 2402MHz and 2480MHz (79 channels with 1MHz channel spacing). The EUT is powered by internal 3.7VDC rechargeable battery or USB port (5V DC). When the EUT is switched ON in Bluetooth mode, the display with show "BT" and flashing. The corresponding device would be searched and connected the EUT before playing audio. After pairing, the "BT" will stay lit.

2.4GHz Bluetooth Module:
Modulation Type: GFSK
Antenna Type: Integral, Internal (PCB Trace)
Frequency Range: 2402MHz - 2480MHz, 1MHz channel spacing, 79 channels

Nominal field strength is 104.1dBµV/m @ 3m
Production Tolerance of field strength is +0dB /- 3dB
Antenna gain is 0dBi

The functions of main ICs are mentioned below.

1. BlueTooth module F-3089 (U4):
 1) OVC3860 (U8) acts as the 2.4GHz radio core of Bluetooth module F-3089 (U4) which is integrating with audio CODEC.
 2) The 12MHz crystal (Y1) provides system clock for OVC3860 (U8).

2. AM/FM Radio Portion:
 1) U2 (BK1086/88E) acts as digital AM/FM radio demodulator.
 2) X2 (32.768kHz) provides clock for the U2.
 3) Z1 provides 3V voltage regulation for U2.

3. MCU module:
 1) IC501 (EA407P000B) acts as MCU core.
 2) X301 (32.768kHz) acts as clock for the MCU core (IC501).
 3) LCD1 is the LCD display while LED1 and LED2 are the backlights.

4. Audio portion:
1) U6 (4558) provides small signal buffering for audio output from Bluetooth Module F-3089 (U4).
2) IC2 (LM4871) is 3W power amplifier driving loudspeaker SPK1.

5. Power Management portion:
 1) IC1 (TP4055) acts as power management IC for charging internal battery.
 2) U301 is 3.3V voltage regulator.

Channel Frequency Table of Bluetooth Module

CH. NO.	FRE.	Hex Value		CH. NO.	FRE.	Hex Value		CH. NO	FRE.	Hex Value		CH. NO	FRE.	Hex Value
CH0	2402MHz	0		CH26	2428MHz	1A		CH52	2454MHz	34		CH78	2480MHz	4E
CH1	2403MHz	1		CH27	2429MHz	1B		CH53	2455MHz	35				
CH2	2404MHz	2		CH28	2430MHz	1C		CH54	2456MHz	36				
CH3	2405MHz	3		CH29	2431MHz	1D		CH55	2457MHz	37				
CH4	2406MHz	4		CH30	2432MHz	1E		CH56	2458MHz	38				
CH5	2407MHz	5		CH31	2433MHz	1F		CH57	2459MHz	39				
CH6	2408MHz	6		CH32	2434MHz	20		CH58	2460MHz	3A				
CH7	2409MHz	7		CH33	2435MHz	21		CH59	2461MHz	3B				
CH8	2410MHz	8		CH34	2436MHz	22		CH60	2462MHz	3C				
CH9	2411MHz	9		CH35	2437MHz	23		CH61	2463MHz	3D				
CH10	2412MHz	A		CH36	2438MHz	24		CH62	2464MHz	3E				
CH11	2413MHz	B		CH37	2439MHz	25		CH63	2465MHz	3F				
CH12	2414MHz	C		CH38	2440MHz	26		CH64	2466MHz	40				
CH13	2415MHz	D		CH39	2441MHz	27		CH65	2467MHz	41				
CH14	2416MHz	E		CH40	2442MHz	28		CH66	2468MHz	42				
CH15	2417MHz	F		CH41	2443MHz	29		CH67	2469MHz	43				
CH16	2418MHz	10		CH42	2444MHz	2A		CH68	2470MHz	44				
CH17	2419MHz	11		CH43	2445MHz	2B		CH69	2471MHz	45				
CH18	2420MHz	12		CH44	2446MHz	2C		CH70	2472MHz	46				
CH19	2421MHz	13		CH45	2447MHz	2D		CH71	2473MHz	47				
CH20	2422MHz	14		CH46	2448MHz	2E		CH72	2474MHz	48				
CH21	2423MHz	15		CH47	2449MHz	2F		CH73	2475MHz	49				
CH22	2424MHz	16		CH48	2450MHz	30		CH74	2476MHz	4A				
CH23	2425MHz	17		CH49	2451MHz	31		CH75	2477MHz	4B				
CH24	2426MHz	18		CH50	2452MHz	32		CH76	2478MHz	4C				
CH25	2427MHz	19		CH51	2453MHz	33		CH77	2479MHz	4D				

n **Function**

ul **F-3089** is a Bluetooth Stereo Audio Module with high level of integration, low cost and low power.Accoding with Bluetooth standard V2.0 EDR.

ul Supports A2DP V1.2，AVRCP V1.4 profiles. Can be equipped with the work mode and parameters with intergrating E E P R OM.

ul Do not need to get straight capacitance, stereo audio output can drive 40mW@32Ω directly to integrate power and program reset low voltage monitoring fuction.

ul six key input, including power switch/play/pause, volume up, down, previous, next song.

ul Two flash lights to indicate different working condition.

n Technology

CATEGORIES	FEATURE	IMPLEMENTATION
Wireless specification	Bluetooth	version 2.0+EDR
	F requency	2.402-2.480GHz
	Max Transmit Power	Class2
		4dBm（at antenna pad）
	Receive sensitivity	Better than -82dBm
	Range	10meters
	Data Rates	Up to 3Mbps（over the air）
	UART DATA Transfer Rate	115200bps
Host Interface	UART	No flow control support
Audio Interfaces	Microphone	Mono microphone input with bias
Profiles		A2DP-Sink Only
		AVRCP -ControllerOnly
Supply voltage	Supply	3.0V - 3.6V DC
	IO	1.7V - 3.6V DC
Power Consumption	Current Consumption	Operational - L ess than 26 mA (active)
		Idle (sleep) < 1.0mA
Connections	External Antenna	Connection via S M T pad
Physical	Dimensions	21mm x 25.1mm x 3.4mm

1

n PIN　脚位定义图

序号	名称	类型	描述
1	VOL+	Digital	Volume up singal
2	VOL-	Digital	Volume down singal
3	UP	Digital	Previous
4	DOWN	Digital	Next
5	ONKKEY	Digital	Play/Pause singal
6	1V8	Power	output1.8V
7	GND	Power	Ground
8	VBAT	Power	power
9	LED1	Sink	Indicator 1 control port
10	LED2	Sink	Indicator 2 control port
11	MIC	Audio	MIC singal input
12	AOR	Audio	Right audio output
13	AOM1	Audio	Audio output public port
14	AOL	Audio	Left audio output
15	AOM	Audio	Audio output public port
16	GND2	Power	Ground
17	UART_TX	Digital	UARTsend singal
18	UART_RX	Digital	UART receive singal
19	VBUCK	Digital	Bm singal
20	MUTE	Digital	Mute(Hihg effective)

n Dimension(单位: MM)
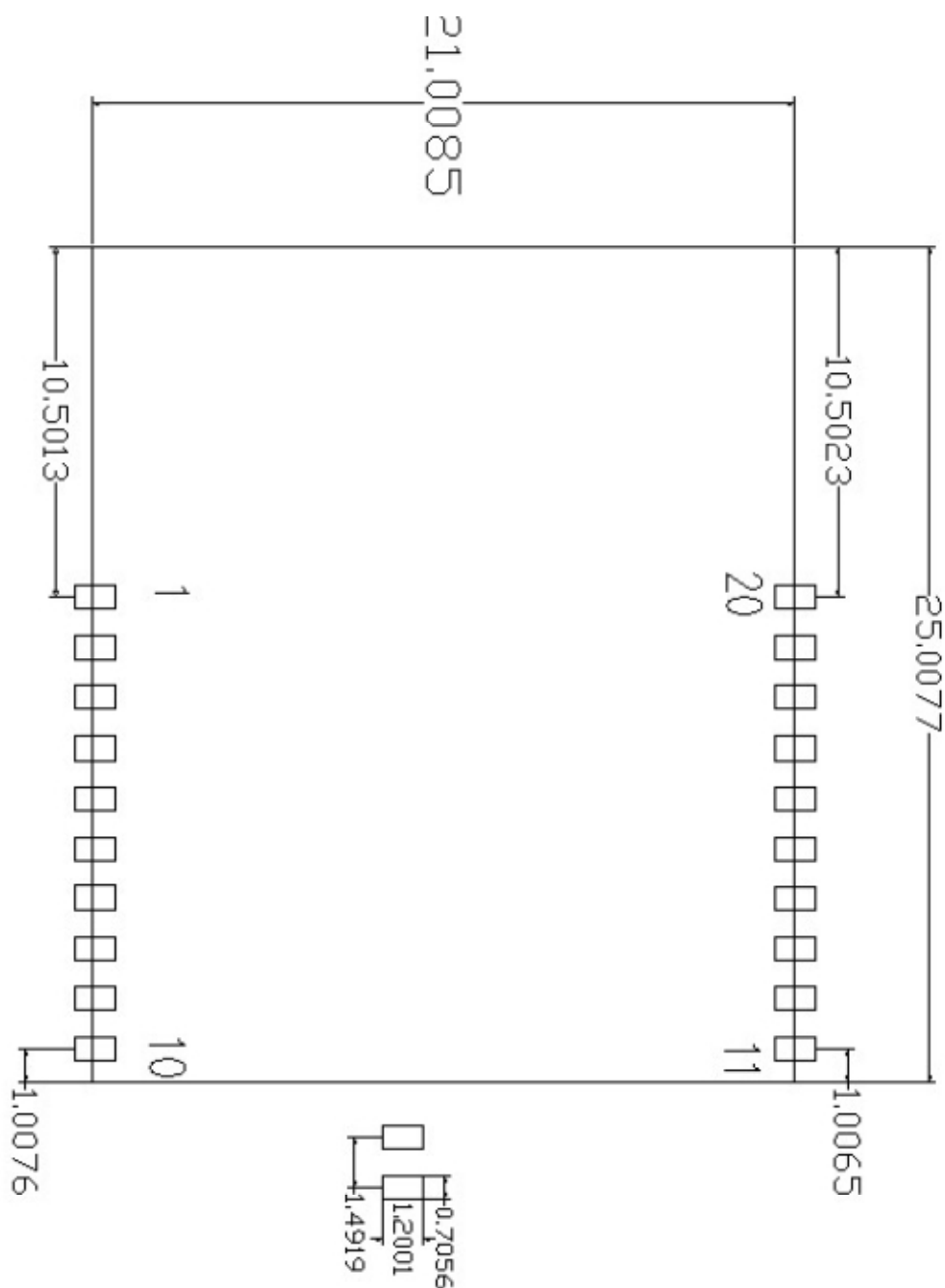
n Application circuit diagram
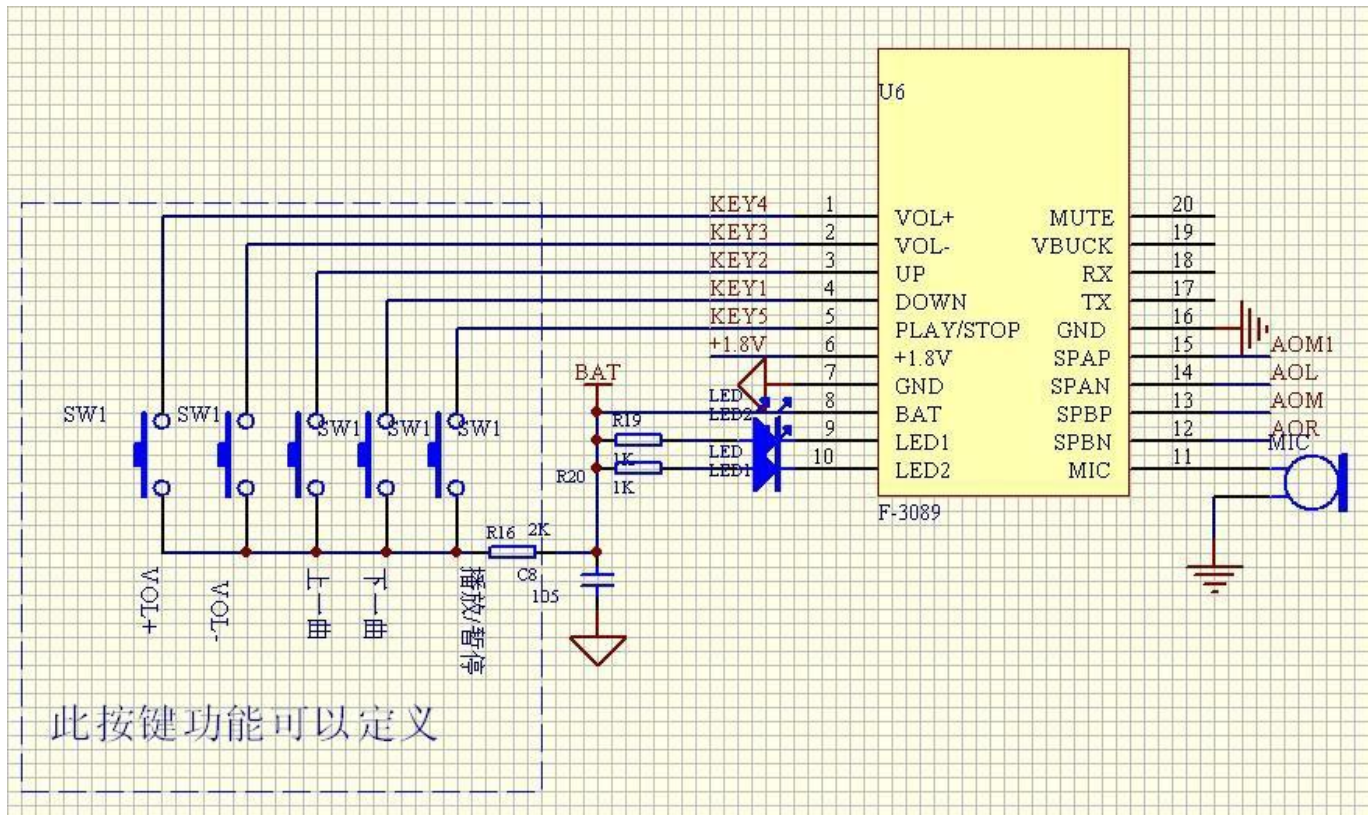
n Know problem list

1、 Part of mobile phones players , because of not having the function of coming and going. A POP song played between suspened sound.

2、 Because the break for bluetooth testing is a real-time operation, the cell phone has delayed when switching off the speaker.

3、 Automatic back to united function and automatic start-up function mutually exclusive, open to be automatic back to united function can not achieve automatic power off. 4、When the macth list in your cell phone has existed and open to be automatic back to united function，it maybe cause failure to match as the automatic back to united function collision with the cell phone. .

5、 The audio output port has a short impending state in the moment of power , speaker Will send out current sound.

OmniVision.

OVC3860

datasheet
PRELIMINARY SPECIFICATION

Bluetooth® 2.0 + EDR stereo audio processor

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Trademark Information

Bluetooth® 2.0 + EDR stereo audio processor

datasheet
PRELIMINARY SPECIFICATION

version 1.2
april 2011

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

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
  sleep: 400 µA
  shutdown: 12 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 2.0 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

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

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	
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	DNC	analog	do not connect	
23	AUDIOENABLE	analog	audio CODEC active indicate	

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

pin number	signal name	I/O type	description	power domain
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	
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	

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

OVC3860_DS_1_1
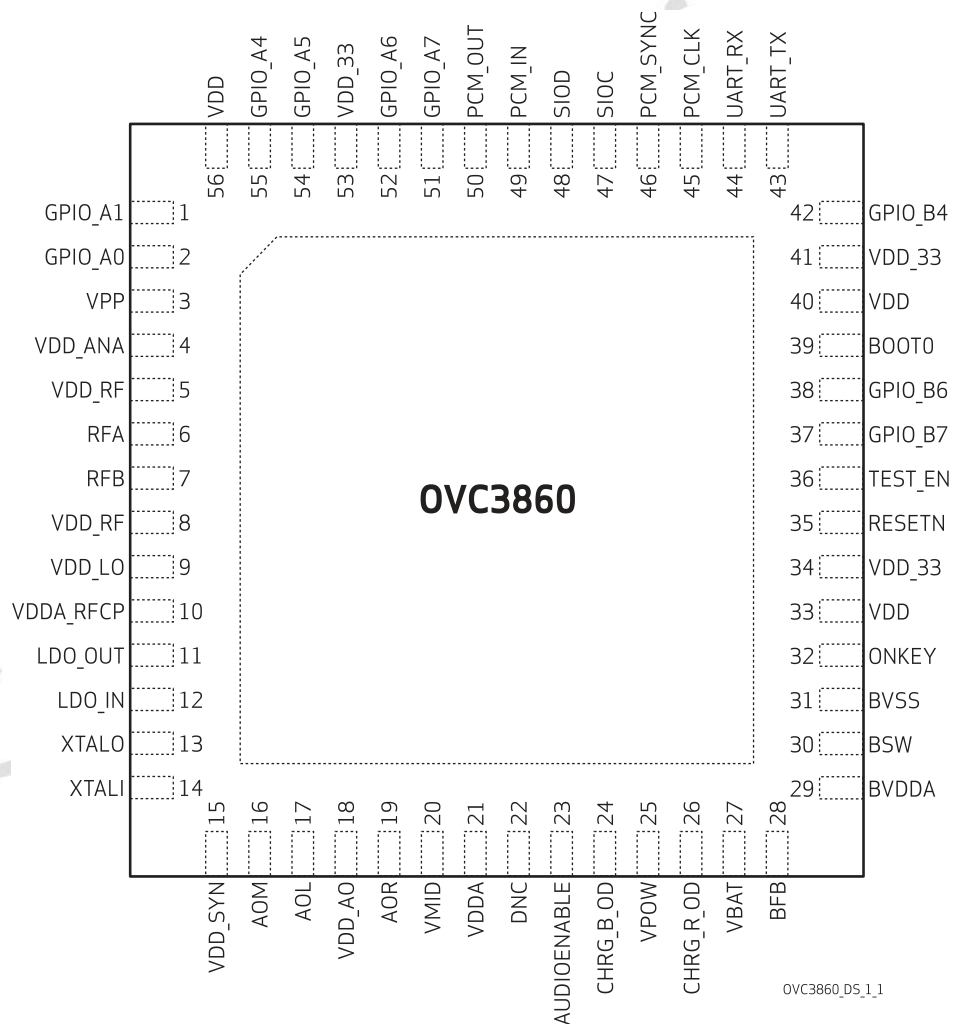
2   system level description

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 -82 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

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 > 90dB playback
• on-chip 20-bit stereo audio digital-to-analog converter (DAC)
• integrated headphone amplifier in 40mW @ 32Ω supporting capacitor-less output

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
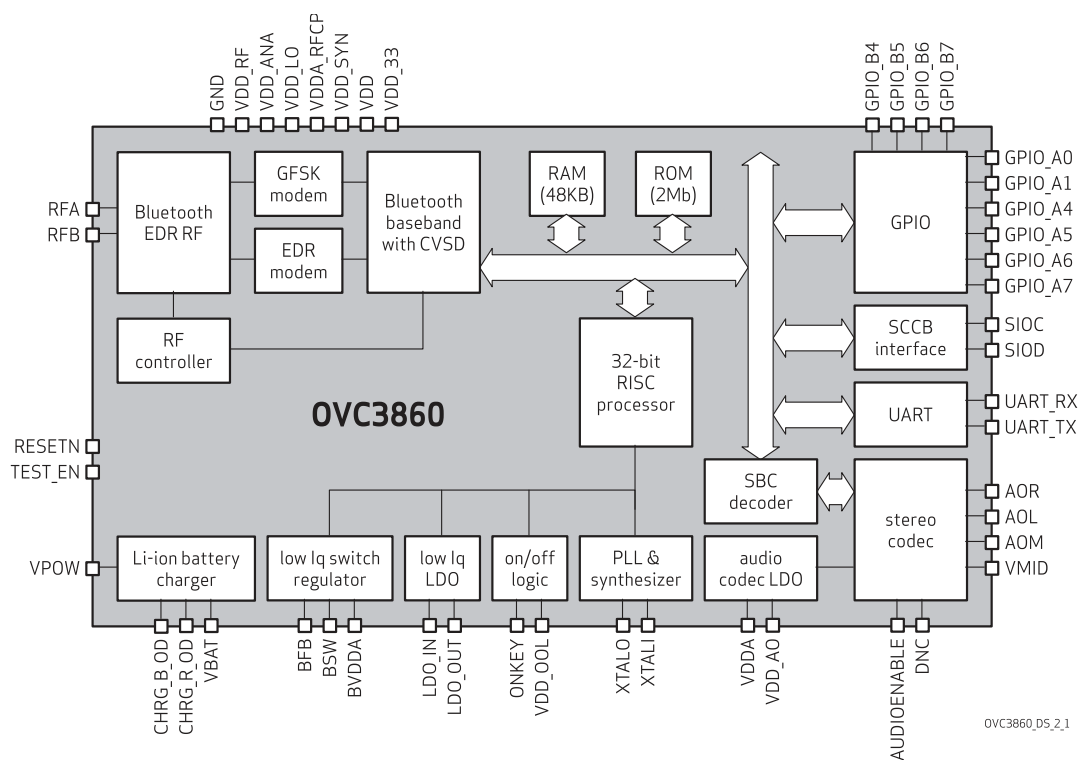
2.2.8 Bluetooth stack

• 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

OVC3860_DS_2_1