



BK3266 Bluetooth Audio SoC Datasheet

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***Revision History***

Rev.	Date	Remark
0.1	22/Sep/2017	Initial version
0.2	26/Sep/2017	Update pin list that line in will be no GPIO function
0.3	19/Oct/2017	Update TSSOP28 pin definition
0.4	20/Oct/2017	Typo correction
0.41	20/Oct/2017	Typo correction
0.5	11/Apr/2018	Add SOP16 package
0.6	20/June/2018	Update 3266 to Bluetooth dual mode version 5.0 (Declaration ID: D039902)
0.7	12/July/2018	Add QFN56 Pin package
0.8	18/March/2019	Typo correction
0.9	25/Jun/2019	Add QFN24 package
1.0	23/Jul/2019	Update QFN24 pin definition



Contents

1. General Description.....	5
1.1. Features	5
1.2. Applications.....	5
2. Pin Definition	7
3. Functional Description	20
3.1. Overview.....	20
3.2. Modes of Operation.....	20
3.3. RF Transceiver	21
3.4. Bluetooth Baseband.....	22
3.5. Audio Peripherals.....	22
3.5.1. 5 – Band Digital Equalizer.....	23
3.5.2. Stereo ADC and DAC	23
3.5.3. Microphone Input Amplifier and Bias.....	23
3.5.4. Line-in Input.....	24
3.5.5. Stereo Audio L/R Outputs.....	24
3.6. MCU.....	24
3.7. FLASH Access Interface	25
3.8. Beken Bluetooth Software Stack.....	25
3.9. Crystal Oscillator	25
3.10. Power Management.....	26
3.11. GPIO and LED Driver	27
3.12. Timer and Watch Dog Timer.....	28
3.13. PWM output.....	28
3.14. I2C and UART Interface	29
3.15. SPI Interface.....	29
3.16. General Purpose SAR ADC	29
3.17. SDIO Card Interface and USB interface.....	30
3.18. IrDA interface	30
3.19. I2S interface	30



4.	Electrical Characteristics.....	31
4.1.	Absolute Maximum Ratings.....	31
4.2.	Recommended Operating Conditions	31
4.3.	System LDO	31
4.4.	USB LDO	31
4.5.	BATTERY CHARGE	32
4.6.	Analog LDO/BUCK.....	32
4.7.	Digital LDO/BUCK	32
4.8.	Crystal and Reference Clock	33
4.9.	Typical Power Consumption	33
4.10.	RF Characteristics	33
4.11.	Audio Characteristics	34
5.	About Qualification	35
6.	Package Information.....	36
6.1.	QFN 4x4 32-pin package	36
6.2.	TSSOP28 package	37
6.3.	QFN 5x5 40-pin package	38
6.4.	SOP16 package.....	39
6.5.	QFN56 Package	40
6.6.	QFN24 Package	41
7.	Ordering Information	42



1. General Description

The BK3266 is a low power, highly integrated Bluetooth system on chip (SoC) audio device. It integrates a high performance Bluetooth RF transceiver, feature rich baseband processor, FLASH memory controller, multiple analog and digital peripherals, and a Bluetooth software stack including the audio, voice, and SPP profiles.

The cache based architecture enables full programmability with FLASH memory device and can be used for both control and multimedia hybrid applications. The internal dual stereo ADC converts stereo analog input to digital signals that can be processed with a digital equalizer. Hardware realizations of the equalizer offload the MCU making the chip ideal for low power headset applications.

The device incorporates on-chip power management with linear and switch-mode buck regulators and also includes a 220 mA internal battery charge controller to further reduce external bill of material (BOM) costs.

1.1. Features

- Operation voltage from 2.8 V to 4.2 V
- 9 mA average current for A2DP
- 300 uA for 500 ms sniff current
- 0.8 uA deep sleep current
- Bluetooth 5.0 classic and low energy
- A2DP v1.3, AVRCP v1.6, HFP v1.7, HID v1.1, AVCTP v1.4, AVDTP v1.3, and SPP v1.2
- True wireless stereo and two active link
- Two wires UART download interface
- 16 bits stereo ADC and DAC
- Stereo line in and dual microphone
- Five bands digital hardware equalizer
- SPI, UART, I2C, SDIO and USB
- I2S master and slave interface with MCLK output
- Interface for external PA and LNA
- Up to 220 mA battery charge controller

1.2. Applications

- Bluetooth stereo speaker
- Bluetooth stereo headset
- Bluetooth control and multimedia hybrid

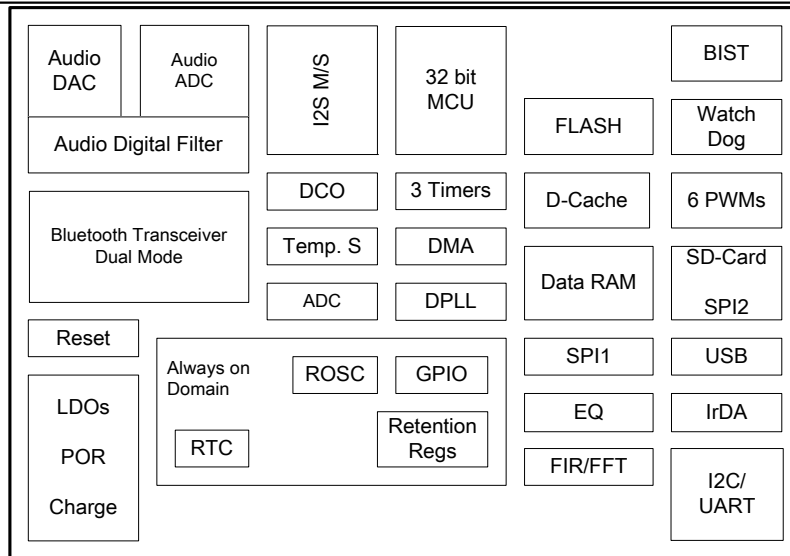


Figure 1. Block diagram of BK3266 Bluetooth Audio SoC

2. Pin Definition

The BK3266 is available in 16-pin SOP, 28-pin TSSOP package, 32-pin 4x4 mm² QFN, 40-pin 5x5 mm² QFN and 56-pin 7x7 mm² QFN and 32-pin 4X4mm² QFN24 package.

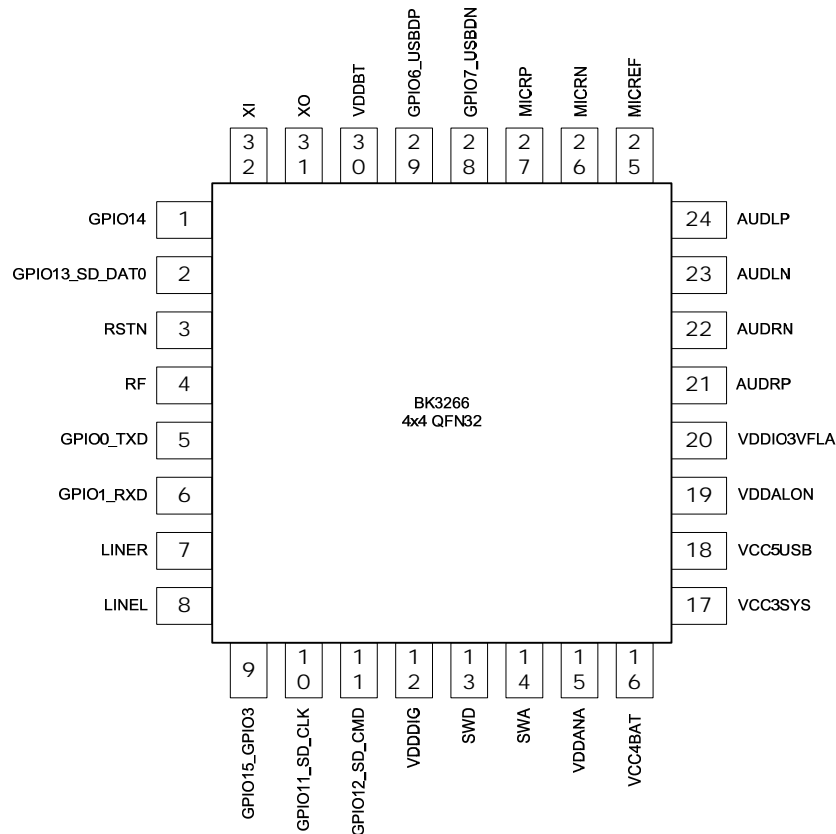


Figure 2 32-Pin QFN 4mmx4mm diagram

Table 1 Pin Description of 32-Pin Package

PI N	Name	Description
1	GPIO14	GPIO14, JTAG_TDO/PWM5/ADC7/PCM_DOUT
2	GPIO13_SD_DAT 0	GPIO13, JTAG_TDI/PWM4/ADC6/PCM_DIN/SD_DATA0/SPI2_



		MISO
3	RSTN	Reset pin, active low
4	RF	RF port
5	GPIO0_TXD	GPIO0, UART_TXD/I2C_SCL, Download port
6	GPIO1_RXD	GPIO1, UART_RXD/I2C_SDA, Download port
7	LINER	Line in L
8	LINEL	Line in R
9	GPIO15_GPIO3	GPIO15, also as GPIO3, SPI_SCK/ADC2/CLKOUT Soft shut down and wake up (active high)
10	GPIO11_SD_CLK	GPIO11, JTAG_TCK/PWM2/ADC4/PCM_SYNC/SD_CLK/SPI2_S CK
11	GPIO12_SD_CM D	GPIO12, JTAG_TMS/PWM3/PCM_CLK/SD_CMD/SPI2_MOSI
12	VDDDIG	Digital LDO output
13	SWD	Buck component
14	SWA	Buck component
15	VDDANA	Analog LDO output
16	VCC4BAT	Battery input
17	VCC3SYS	System LDO output
18	VCC5USB	USB charge power input
19	VDDALON	Always on power supply
20	VDDIO3VFLA	FLASH power supply
21	AUDRP	Audio right channel positive
22	AUDRN	Audio right channel negative
23	AUDLN	Audio left channel negative
24	AUDLP	Audio left channel positive
25	MICREF	Microphone reference voltage
26	MICRN	Microphone input negative
27	MICRP	Microphone input positive



BK3266 Datasheet

v 1.0

28	GPIO7_USBDN	GPIO7, PWM1 / USBN
29	GPIO6_USBDP	GPIO6, PWM0 / USBP
30	VDDBT	Bluetooth RF LDO output
31	XO	Crystal output
32	XI	Crystal input

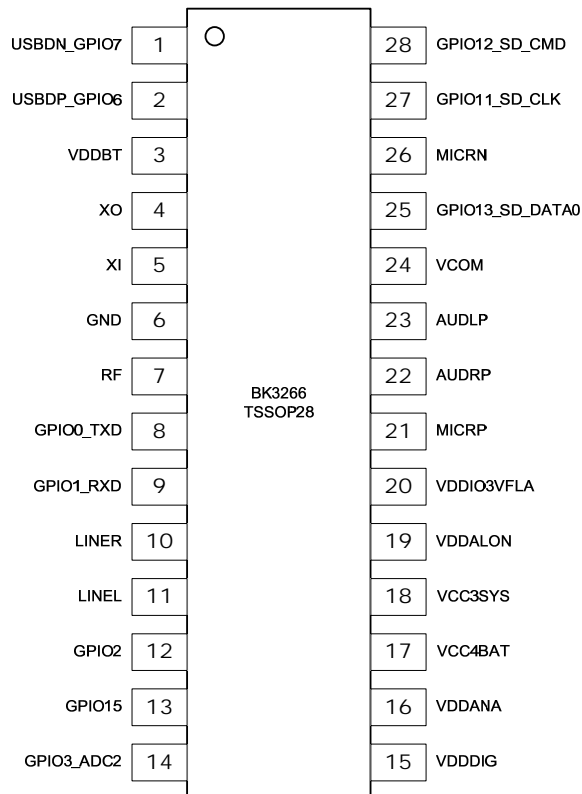


Figure 3 TSSOP28 Package

Table 2 Pin Description of 28-Pin Package

PIN	Name	Description
1	GPIO7_USBDN	GPIO7, PWM1 / USBN
2	GPIO6_USBDP	GPIO6, PWM0 / USBP
3	VDDBT	Bluetooth RF LDO output
4	XO	Crystal output



5	XI	Crystal input
6	GND	Ground
7	RF	RF port
8	GPIO0_TXD	GPIO0, UART_TXD/I2C_SCL, Download port
9	GPIO1_RXD	GPIO1, UART_RXD/I2C_SDA, Download port
10	LINER	Line in L
11	LINEL	Line in R
12	GPIO2	GPIO2, SPI_CSN/ADC1/IrDA/Capture Time
13	GPIO15	GPIO15, Soft shut down and wake up (active high)
14	GPIO3_ADC2	GPIO3, SPI_SCK/ADC2/CLKOUT
15	VDDDIG	Digital LDO output
16	VDDANA	Analog LDO output
17	VCC4BAT	Battery input
18	VCC3SYS	System LDO output
19	VDDALON	Always on power supply
20	VDDIO3VFLA	FLASH power supply
21	MICRP	Microphone input positive
22	AUDRP	Audio right channel positive
23	AUDLP	Audio left channel positive
24	VCOM	Common mode decoupling capacitor
25	GPIO13_SD_DAT0	GPIO13, JTAG_TDI/PWM4/ADC6/PCM_DIN/SD_DATA0/ SPI2_MISO
26	MICRP	Microphone input negative
27	GPIO11_SD_CLK	GPIO11, JTAG_TCK/PWM2/ADC4/PCM_SYNC/SD_CLK/ SPI2_SCK
28	GPIO12_SD_CMD	GPIO12, JTAG_TMS/PWM3/PCM_CLK/SD_CMD/SPI2_M



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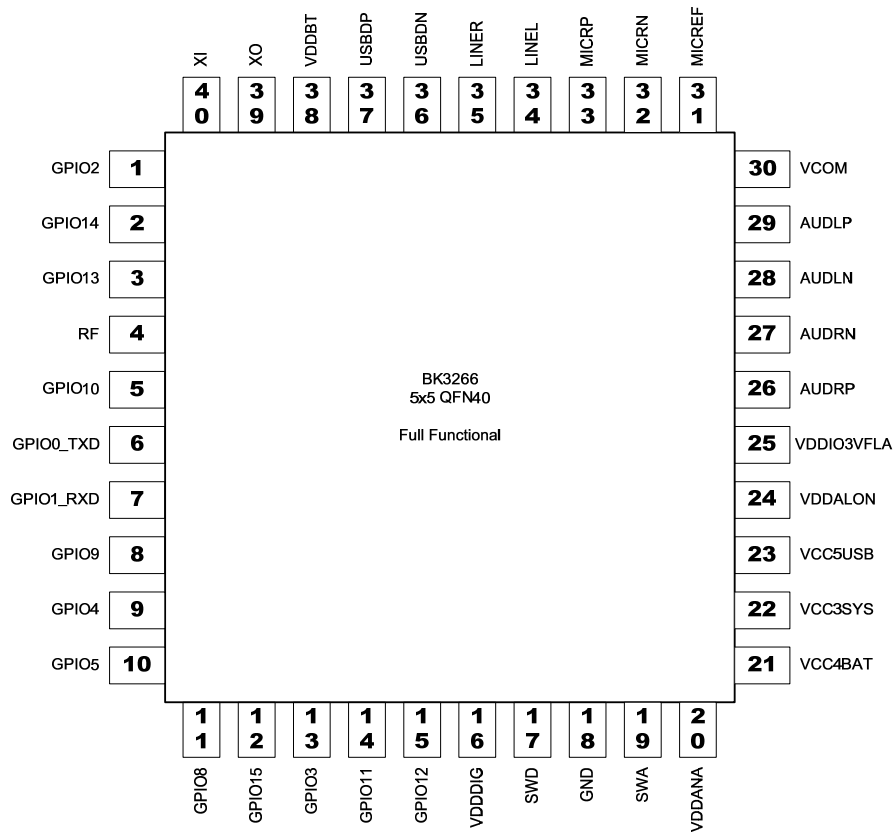


Figure 4 40-Pin QFN 5mmx5mm diagram

Table 3 Pin Description of 40-Pin Package

PIN	Name	Description
1	GPIO2	GPIO2, SPI_CSN/ADC1/IrDA/Capture Time
2	GPIO14	GPIO14, JTAG_TDO/PWM5/ADC7/PCM_DOUT
3	GPIO13	GPIO13, JTAG_TDI/PWM4/ADC6/PCM_DIN/SD_DATA0/SPI2_MISO
4	RF	RF port
5	GPIO10	GPIO10, SD_DATA0/RX_EN/SPI2_MISO



6	GPIO0_TXD	GPIO0, UART_TXD/I2C_SCL, Download port
7	GPIO1_RXD	GPIO1, UART_RXD/I2C_SDA, Download port
8	GPIO9	GPIO9, SD_CMD/TX_EN/SPI2_MOSI
9	GPIO4	GPIO4, SPI_MOSI/I2C_SCL
10	GPIO5	GPIO5, SPI_MISO/I2C_SDA
11	GPIO8	GPIO8, SD_CLK/SPI2_SCK
12	GPIO15	GPIO15, Soft shut down and wake up (active high)
13	GPIO3	GPIO3, SPI_SCK/ADC2/CLKOUT
14	GPIO11	GPIO11, JTAG_TCK/PWM2/ADC4/PCM_SYNC/SD_CLK/SPI2_SCK
15	GPIO12	GPIO12, JTAG_TMS/PWM3/PCM_CLK/SD_CMD/SPI2_MOSI
16	VDDDIG	Digital LDO output
17	SWD	Buck component
18	GND	Ground
19	SWA	Buck component
20	VDDANA	Analog LDO output
21	VCC4BAT	Battery input
22	VCC3SYS	System LDO output
23	VCC5USB	USB charge power input
24	VDDALON	Always on power supply
25	VDDIO3VFLA	FLASH power supply
26	AUDRP	Audio right channel positive
27	AUDRN	Audio right channel negative
28	AUDLN	Audio left channel negative
29	AUDLP	Audio left channel positive
30	VCOM	Common mode voltage for audio output
31	MICREF	Microphone reference voltage
32	MICRN	Microphone input negative



BK3266 Datasheet

v 1.0

33	MICRP	Microphone input positive
34	LINEL	Line left channel input
35	LINER	Line right channel input
36	USBDN	GPIO7, PWM1 / USBN
37	USBDP	GPIO6, PWM0 / USBP
38	VDDBT	Bluetooth RF LDO output
39	XO	Crystal output
40	XI	Crystal input

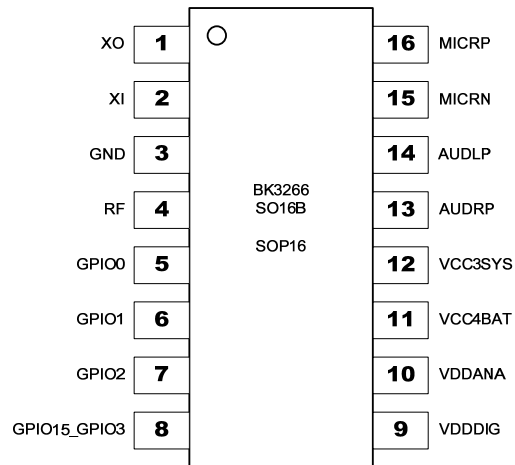


Figure 5 16-Pin SOP SO16B diagram

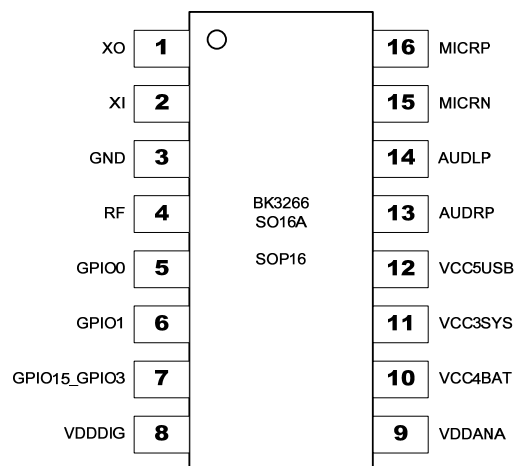


Figure 6 16-Pin SOP SO16A diagram

There are two kinds of BK3266 SOP16 package, one for speaker and one for earpiece. Please refer to the pin description of other package types for SOP16 pin description.

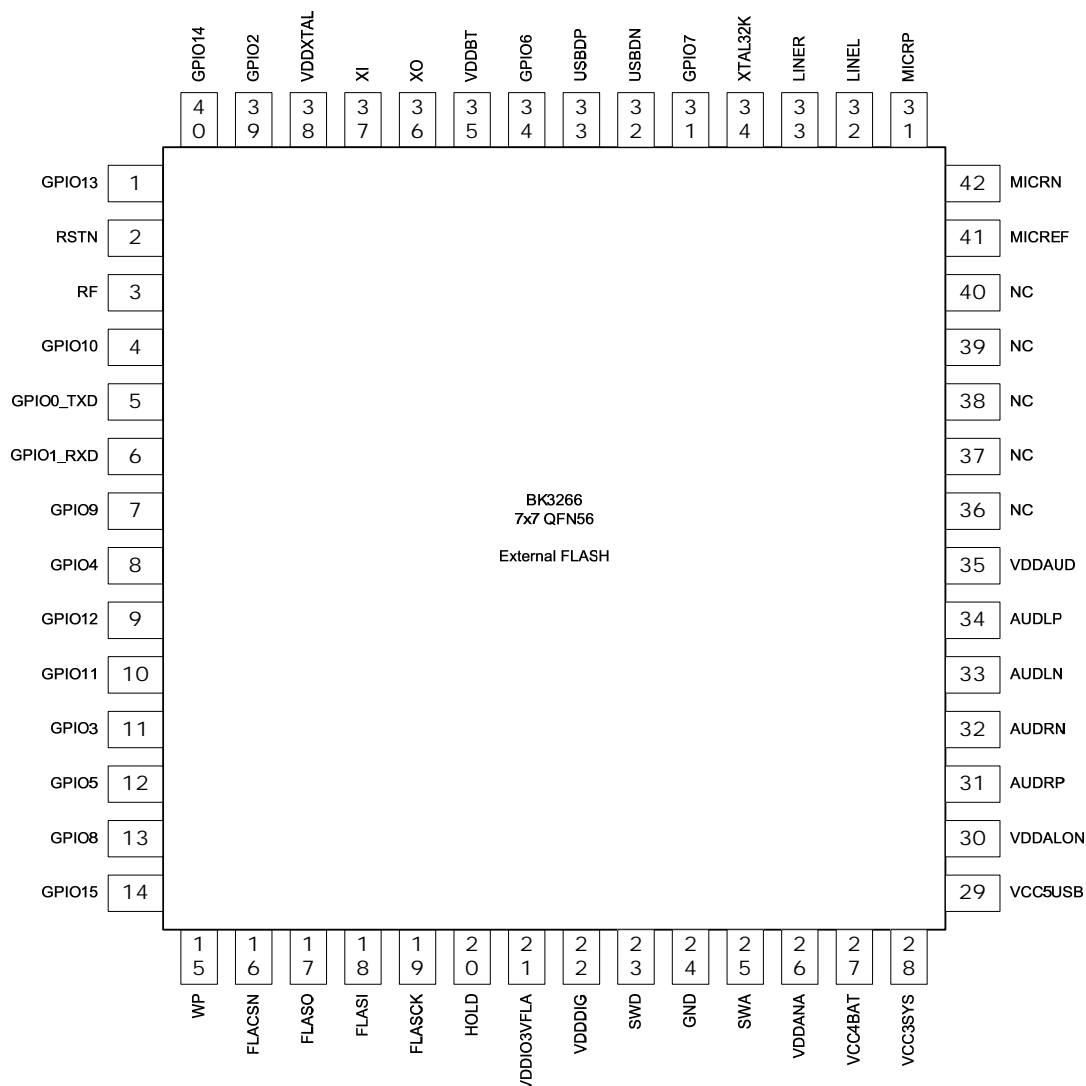


Figure 7 56-Pin QFN 7mmx7mm diagram

Table 4 Pin Description of 56-Pin Package

PIN	Name	Description
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1	GPIO13	GPIO13, JTAG_TDI/PWM4/ADC6/PCM_DIN/SD_DATA0/SPI2_MISO
2	RSTN	Chip reset
3	RF	RF port
4	GPIO10	GPIO10, SD_DATA0/RX_EN/SPI2_MISO
5	GPIO0_TXD	GPIO0, UART_TXD/I2C_SCL, Download port
6	GPIO1_RXD	GPIO1, UART_RXD/I2C_SDA, Download port
7	GPIO9	GPIO9, SD_CMD/TX_EN/SPI2_MOSI
8	GPIO4	GPIO4, SPI_MOSI/I2C_SCL
9	GPIO12	GPIO12, JTAG_TMS/PWM3/PCM_CLK/SD_CMD/SPI2_MOSI
10	GPIO11	GPIO11, JTAG_TCK/PWM2/ADC4/PCM_SYNC/SD_CLK/SPI2_SCK
11	GPIO3	GPIO3, SPI_SCK/ADC2/CLKOUT
12	GPIO5	GPIO5, SPI_MISO/I2C_SDA
13	GPIO8	GPIO8, SD_CLK/SPI2_SCK
14	GPIO15	GPIO15, Soft shut down and wake up (active high)
15	WP	External FLASH WP pin
16	FLACSN	External FLASH CSN pin
17	FLASO	External FLASH SO pin
18	FLASI	External FLASH SI pin
19	FLASCK	External FLASH SCK pin
20	HOLD	External FLASH HOLD pin
21	VDDIO3VFLA	FLASH power supply
22	VDDDIG	Digital LDO output
23	SWD	Buck component
24	GND	Ground
25	SWA	Buck component



26	VDDANA	Analog LDO output
27	VCC4BAT	Battery input
28	VCC3SYS	System LDO output
29	VCC5USB	USB charge power input
30	VDDALON	Always on power supply
31	AUDRP	Audio right channel positive
32	AUDRN	Audio right channel negative
33	AUDLN	Audio left channel negative
34	AUDLP	Audio left channel positive
35	VDDAUD	Audio power supply
36	NC	Not connected
37	NC	Not connected
38	NC	Not connected
39	NC	Not connected
40	NC	Not connected
41	MICREF	Microphone reference voltage
42	MICRN	Microphone input negative
43	MICRP	Microphone input positive
44	LINEL	Line left channel input
45	LINER	Line right channel input
46	XTAL32K	32 kHz XTAL input
47	GPIO7	GPIO7, PWM1
48	USBDN	USBN
49	USBDP	USBP
50	GPIO6	GPIO6, PWM0
51	VDDBT	Bluetooth RF LDO output
52	XO	Crystal output
53	XI	Crystal input
54	VDDXTAL	XTAL power supply
55	GPIO2	GPIO2, SPI_CSN/ADC1/IrDA/Capture Time

56	GPIO14	GPIO14, JTAG_TDO/PWM5/ADC7/PCM_DOUT
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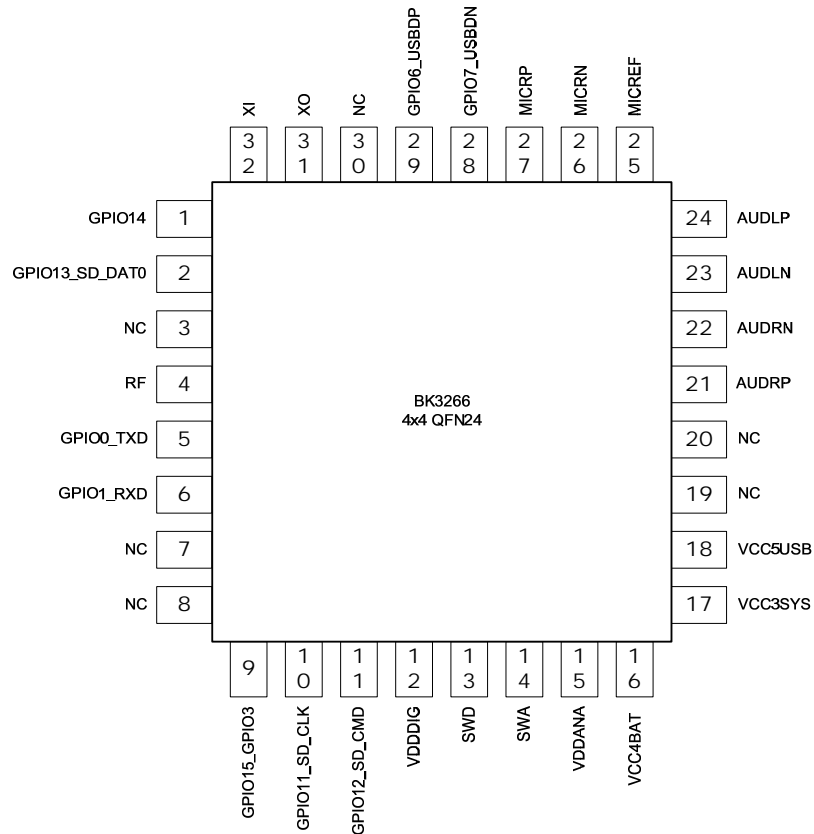


Figure 8 32-Pin QFN24 4mmx4mm diagram

Table 5 Pin Description of 32-Pin QFN24 Package

PIN	Name	Description
1	GPIO14	GPIO14, JTAG_TDO/PWM5/ADC7/PCM_DOUT
2	GPIO13_SD_DAT0	GPIO13,JTAG_TDI/PWM4/ADC6/PCM_DIN/SD_D ATA0/SPI2_MISO
3	NC	Not connected
4	RF	RF port
5	GPIO0_TXD	GPIO0, UART_TXD/I2C_SCL, Download port
6	GPIO1_RXD	GPIO1, UART_RXD/I2C_SDA, Download port



7	NC	Not connected
8	NC	Not connected
9	GPIO15_GPIO3	GPIO15, also as GPIO3, SPI_SCK/ADC2/CLKOUT Soft shut down and wake up (active high)
10	GPIO11_SD_CLK	GPIO11, JTAG_TCK/PWM2/ADC4/PCM_SYNC/SD_CLK/SPI 2_SCK
11	GPIO12_SD_CMD	GPIO12, JTAG_TMS/PWM3/PCM_CLK/SD_CMD/SPI2_MOS I
12	VDDDIG	Digital LDO output
13	SWD	Buck component
14	SWA	Buck component
15	VDDANA	Analog LDO output
16	VCC4BAT	Battery input
17	VCC3SYS	System LDO output
18	VCC5USB	USB charge power input
19	NC	Not connected
20	NC	Not connected
21	AUDRP	Audio right channel positive
22	AUDRN	Audio right channel negative
23	AUDLN	Audio left channel negative
24	AUDLP	Audio left channel positive
25	MICREF	Microphone reference voltage
26	MICRN	Microphone input negative
27	MICRP	Microphone input positive
28	GPIO7_USBDN	GPIO7, PWM1 / USBN
29	GPIO6_USBDP	GPIO6, PWM0 / USBP
30	NC	Not connected
31	XO	Crystal output



32	XI	Crystal input
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3. Functional Description

3.1. Overview

The BK3266 is a single-chip Bluetooth SoC offering advanced audio processing and low power consumption by utilizing dedicated hardware blocks such as a five band equalizer and a hardware accelerator to increase performance and offload the MCU. It has Bluetooth version 5.0 dual mode stack and application profiles and can be used for both control and multimedia hybrid applications.

The BK3266 includes a rich set of analog and digital peripherals that allow users to add features such as a microphone input, stereo line-in inputs, SDIO memory card, and an FM radio to a Bluetooth application enhancing overall user experience.

3.2. Modes of Operation

The general operation of the BK3266 is as follows. After system reset, the BK3266 enters the low power standby mode waiting for external circuitry via the GPIO interface to wake the device up. Once the device is awake, it will establish a connection with other Bluetooth devices using the Inquire and Paging states. After a connection is made the device can be placed into Active or Sniff mode depending on the master Bluetooth device

Shutdown – In this mode all circuits are powered down except for the GPIO15 interface to allow external circuitry to wake-up the device. Software can enter this mode by write special register and system can only be waked up by active level applied on GPIO15.

Standby – In this mode all circuits are powered down except the GPIO interface and a timer active to allow external circuitry and internal timer to wake-up the device. This is the default low power state of the chip while it



is waiting to be used. There is no interaction with any Bluetooth devices in this state.

Active – During this mode, the BK3266 and the other connected Bluetooth device are actively receiving and transmitting data on the channel. This data can be high fidelity audio, voice, or control commands depending on the application.

Sniff – In this mode, the device remains active but listens and communicates at a reduced rate. The device maintains connection with the master with its Active Member Address (AM_ADDR) and goes to sleep and wakes up at assigned Sniff Intervals to exchange packets with the master.

Test – The BK3266 provides a test mode to test the internal RAM memory BIST and other blocks. The test mode is normally not used.

3.3. RF Transceiver

The BK3266 integrates a high-performance Bluetooth transceiver and frequency synthesizer. The transceiver is fully differential and incorporates an integrated on-chip balun which transforms the single-ended RF signal from the antenna through pin, RFP_BT, into an internal differential balanced signal for the low noise amplifier (LNA). On the transmit side, the differential outputs of the power amplifier (PA) are combined and transformed to a single-ended output using the same on-chip balun thus enabling only one RF pin connection to the antenna for both transmit and receive operations. The device is able to output +8 dBm of transmit output power allowing users to develop a class 2 (+4 dBm) device with small printed circuit board (PCB) antenna. The frequency synthesizer is fully integrated and does not require any external components.

3.4. Bluetooth Baseband

The BK3266 Bluetooth baseband implements the Bluetooth version 5.0 Enhanced Data Rate (EDR) modem providing Basic Data Rate (BDR) 1 Mbps and BLE 1 Mbps as well as the enhanced 2 Mbps, and 3 Mbps data rates.

Data Rate	Modulation	Bits/Symbol
BDR/BLE: 1 Mbps	GFSK	1
EDR: 2 Mbps	$\pi/4$ DQPSK	2
EDR: 3 Mbps	8 DPSK	3

Table 6. BK3266 Bluetooth Modulation Formats

The Bluetooth baseband utilizes a combination of both hardware blocks and firmware for the frequency hopping sequence generator, access code generation, detection, and correlation, encryption and decryption for security, forward error correction, 16-bit CRC, packet construction, and Bluetooth clocks and timers to optimize for power consumption and user programmability.

3.5. Audio Peripherals

The BK3266 comes with a rich set of audio peripherals to enhance the Bluetooth listening experience. The chip includes a 5-band digital equalizer, 96 dB signal-to-noise ratio (SNR) stereo analog-to-digital converter (ADC) and digital-to-analog converter (DAC), microphone input amplifier and bias, line-in input, and stereo audio left and right (L/R) outputs.



3.5.1. 5 – Band Digital Equalizer

A dedicated 5-band digital equalizer is implemented prior to digital-to-analog conversion to give users the option of customizing the frequency response of the audio output. The equalizer is implemented in hardware to reduce overall chip power consumption. The 5-band equalizer is easily configured using the BK3266 software configuration tool kit. For more information, please refer to the BK3266 Software Configuration Tool Users Guide.

3.5.2. Stereo ADC and DAC

The BK3266 contains high fidelity 96 dB SNR stereo ADCs with sample rates of 8 kHz, 16 kHz, 44.1 kHz, or 48 kHz. The chip also integrates high fidelity 96 dB SNR stereo DACs with sample rates of 8 kHz, 16 kHz, 44.1 kHz or 48 kHz.

3.5.3. Microphone Input Amplifier and Bias

BK3266 contains a fully differential analog microphone input amplifier and a low-noise microphone bias generator. Expensive external components are not needed as the microphone amplifier and active bias circuitry are integrated into the chip allowing the microphone to be interfaced with only cheap passive resistors and capacitors.

The microphone signal can be amplified with gain from -8 ~ 38dB with 0.5 dB step.

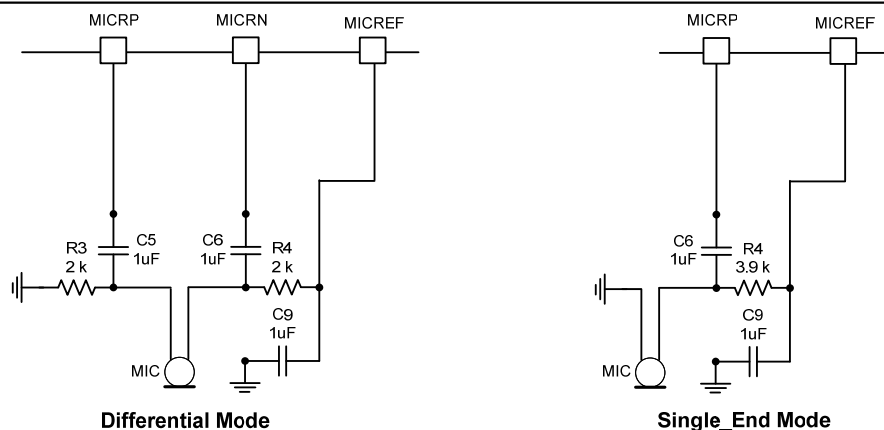


Figure 9. Microphone Interface

3.5.4. Line-in Input

BK3266 includes stereo line-in inputs which connect to the stereo left and right channel ADCs through a 0~6 dB amplifier with 2 dB step. The digitized line-in inputs can be further processed with the 5-band equalizer prior to digital-to-analog conversion.

3.5.5. Stereo Audio L/R Outputs

BK3266 provides high fidelity stereo audio L/R outputs capable of driving 16 Ω speakers with up to 30 pF of load capacitance.

3.6. MCU

The BK3266 includes a 32-bit internal RISC MCU, memory and a DMA bus controller to run the Bluetooth software stack and application while supporting efficient execution and data exchange with the internal SIP FLASH memory. The JTAG interface can be used for on-line debug and can also be configured as GPIO.

3.7. FLASH Access Interface

BK3266 internal RISC MCU operates with an external FLASH , which is used to store program code, external settings and configurations, and can also be used to store user data such as encryption key configuration and Bluetooth paring information.

3.8. Beken Bluetooth Software Stack

The BK3266 comes with Bluetooth version 5.0 dual mode compliant software stack which run on the internal 32-bit RISC MCU. The SoC also runs the application program removing the need for an external host controller. An external host can be connected through the UART interface for debugging purposes but is not needed to run the application. Beken Corporation provides a development kit that customers can use to configure their applications. The development kit includes a software configuration tool and reference software code for stereo-mode Bluetooth speakers and hands-free operation. The interested reader is encouraged to contact their local Beken Corporation representative for more information.

3.9. Crystal Oscillator

BK3266 contains an integrated crystal oscillator driver circuit to drive an external 26 MHz crystal. The 26 MHz crystal frequency provides the reference frequency to the frequency synthesizer and can also be selected as the reference clock to the internal MCU.

If an external reference clock is used, the clock input should be applied to the XI pin. Care must be taken to not overdrive the XI input with a voltage above 3.6 V.

There is tunable load capacitance from 6 to 18 pF (both side have this capacitance) with 64 steps to tune the crystal frequency, that no external capacitance is needed.

3.10. Power Management

The power management system on the BK3266 includes a battery charger, two buck regulators which can be configured as low-drop out (LDO) regulators and several internal LDO regulators to provide voltage and noise isolation to various parts of the chip.

The BK3266 can be powered directly from a 2.8V to 4.2V external battery via the VCC4BAT pin or it can be powered from a 4.75V to 5.75V USB power supply via the VCC5USB pin. For battery powered applications, the BK3266 will generate 3.2V to the VCC3SYS pin using the SYS LDO regulator for the other of the chip to run off of. When USB power is available, the BK3266 will get its power from the USB power supply and will use the USB LDO regulator to generate 3.3V for the rest of the system to run from. If a low voltage battery is connected while the USB power supply is applied, the BK3266 will automatically charge the battery using charge current control while providing power to the chip through the USB LDO regulator.

When BUCK is enabled, the internal analog and digital buck regulators (BUCKA, BUCKD) directly work under VBAT; The VCC3SYS regulated output voltage serves as the voltage source to all others of the chip. The LDO regulators (LDOA, LDOD, XTAL, Flash and digital) all use the VCC3SYS output voltage as their input voltage. Outputs from the buck and LDO regulators require proper bypass capacitors to reduce supply noise and these outputs are to be used only by the BK3266. Please refer to the



BK3266 EVB Users Guide or application note for more details about choosing the proper bypass capacitors.

Also one BUCK mode is available. In this condition, BUCKA is on, and BUCKD is off; and LDOD is work under output of BUCKA.

The two on-chip buck converters reduce the current consumption by about 50% and thus provide a significant improvement in overall chip power consumption.

The BK3266 can enter standby mode when there is no active connection. The standby mode can be awakened by any GPIO signal and by applying the USB power supply.

3.11. GPIO and LED Driver

The BK3266 has a total 16 GPIOs, which can be configured as either input or output. Most of them have a second function as shown below:

GPIO	Peripheral Mode
GPIO0	UART_TXD/I2C_SCL
GPIO1	UART_RXD/I2C_SDA
GPIO2	SPI_CSN/ADC1/IrDA/Capture Time
GPIO3	SPI_SCK/ADC2/CLKOUT
GPIO4	SPI_MOSI/I2C_SCL/Line in L
GPIO5	SPI_MISO/I2C_SDA/Line in R
GPIO6	PWM0/USBP
GPIO7	PWM1/USBN
GPIO8	SD_CLK/SPI2_SCK
GPIO9	SD_CMD/TX_EN/SPI2_MOSI
GPIO10	SD_DATA0/RX_EN/SPI2_MISO
GPIO11	JTAG_TCK/PWM2/ADC4/PCM_SYNC/SD_CLK/SPI2_SCK
GPIO12	JTAG_TMS/PWM3/PCM_CLK/SD_CMD/SPI2_MOSI



GPIO13	JTAG_TDI/PWM4/ADC6/PCM_DIN/SD_DATA0/SPI2_MISO
GPIO14	JTAG_TDO/PWM5/ADC7/PCM_DOUT
GPIO15	Shutdown IO (Shutdown mode, wake up by active high)

Table 7 GPIO Function Mapping

All GPIO pins can wake up the internal MCU from standby mode. In standby mode, any level change on the set GPIO will trigger the wake up procedure.

In shutdown mode, system can be only waked up by GPIO15 high level.

3.12. Timer and Watch Dog Timer

There are two sets of timers. One set (fast) uses 1 MHz clock as the main clock, and another set (slow) uses divided 100 kHz clock as main clock. Each set has three 16-bit counters with 4-bit pre-divider.

The watch dog timer runs from the RC 100 kHz clock and has a maximum programmable period of up to 10.48 ($2^{16}/100\text{kHz} * 16$) seconds.

3.13. PWM output

There are six PWM timers to provide six PWM output on GPIO. All the timers run with the same frequency, which can be either 26 MHz clock or low power clock.

The PWM timer has 16 bit resolution, with 1~16 pre scalar.

3.14. I2C and UART Interface

There is an I2C interface or UART interface for debug or external MCU control of the BK3266. They both share the same pins GPIO0 and GPIO1.

The I2C clock rate can be from 12 to 3072 divided frequency from 26 MHz clock.

The UART clock rate can be from 3.2 kHz to 6.5 MHz.

3.15. SPI Interface

The 4-wire SPI interface supports high speed data communication which can be used as an interface for an external memory or LCD controller.

The SPI clock rate is from 50.8 kHz to 6.5 MHz when acts as master, and can be 6.5 MHz maximum as slave.

3.16. General Purpose SAR ADC

The general purpose SAR ADC has 10-bit resolution with a programmable sampling rate range from 5 kHz up to 50 kHz and is used to measure DC and low frequency voltages. The input voltage range for the ADC is from 0V to 3V. The general purpose ADC has six channels as shown in Table .

Channel Number	Detected Voltage	Description
0	VCCBAT	Monitor battery voltage($0.65 \times V_{BAT}$)
1	GPIO2	GPIO2 voltage
2	GPIO3	GPIO3 voltage
3	VCC5USB	Monitor USB voltage($0.5 \times V_{USB}$)
4	GPIO11	GPIO11 voltage



5	Temp-Sensor	Temp-Sensor Output voltage
6	GPIO13	GPIO13 voltage
7	GPIO14	GPIO14 voltage

Table 8 ADC Channel Table

3.17. SDIO Card Interface and USB interface

BK3266 includes a secure digital input output (SDIO) card interface. It supports either 1-bit mode, 2-bit mode or 4-bit mode. The initial clock rate is 203.125 kHz and can be up to 13 MHz.

The USB interface support both host and device mode, with full speed.

3.18. IrDA interface

There is a hardware IrDA decoder interface to decode the signal. Also the interface has the capture timer capability to allow software decoding the input signal.

3.19. I2S interface

The I2S interface supports both master and slave mode, with sample rate from 7.35 kHz to 96 kHz. The master clock can be output from GPIO3.



4. Electrical Characteristics

4.1. Absolute Maximum Ratings

Parameter	Description	MIN	TYP	MAX	Unit
VCC4BAT	Battery regulator supply voltage	-0.3		4.2	V
VCC5USB	USB power supply voltage	4.75		5.75	V
VCCBT	BT transceiver supply voltage	1.6		2.4	V
VCCAUD	Audio supply voltage	1.6		2.4	V
VCC3XTAL	Crystal supply voltage	2.8		3.8	V
P _{RX}	RX input power	-	10	-	dBm
T _{STR}	Storage temperature range	-40	-	150	°C

4.2. Recommended Operating Conditions

Parameter	Description	MIN	TYP	MAX	Unit
VCC4BAT	Battery regulator supply voltage	2.8	3.6	4.2	V
VCC5USB	USB power supply voltage	4.75	5	5.75	V
VCCBT	BT transceiver supply voltage	1.6		2.4	V
VCCAUD	Audio supply voltage	1.6		2.4	V
VCC3XTAL	Crystal supply voltage	2.8		3.8	V
T _{OPR}	Operation temperature range	-20	-	80	°C

4.3. System LDO

Parameter	Description	MIN	TYP	MAX	Unit
VCC4BAT	Battery input voltage	2.8		4.2	V
VCC3SYS	LDO output voltage	2.8	3.2	3.8	V
Load Current	Load current			200	mA

4.4. USB LDO

When USB is plug in, VCC3SYS will be generated from USB LDO.



Parameter	Description	MIN	TYP	MAX	Unit
VCC5USB	USB Input voltage	4.75	5	5.75	V
VCC3SYS	LDO output voltage		3.3		V
Load Current	Load current			200	mA

4.5. BATTERY CHARGE

Parameter	Description	MIN	TYP	MAX	Unit
VCC5USB	Charger input voltage	4.75	5	5.75	V
I_trickle	Charge Current at trickle mode as percent of fast charge mode		10		%
I_fast	Charge current at fast charge mode	40		220	mA
V_end(Need Calibrated)	VBAT voltage when Charge End		4.2		V

4.6. Analog LDO/BUCK

System can choose the analog BUCK or LDO as the power supply of RF and Audio part.

Parameter	Description	MIN	TYP	MAX	Unit
Analog LDO					
VDDANA	Analog LDO output voltage	1.6	1.8	2.4	V
Load Current	Load current			150	mA
Analog BUCK					
VDDANA	Analog BUCK output voltage	1.6	1.8	2.4	V
Load Current	Load current			150	mA
Switching frequency	BUCK modulation frequency	0.5	1	6	MHz

4.7. Digital LDO/BUCK

System can also choose the digital BUCK or LDO as the power supply for the Digital part.

Parameter	Description	MIN	TYP	MAX	Unit
Digital LDO					



BK3266 Datasheet

v 1.0

VDDDIG	Digital LDO output voltage	1	1.2	1.35	V
Load Current	Load current			40	mA
Digital BUCK					
VDDDIG	Digital BUCK output voltage	1	1.2	1.35	V
Load Current	Load current			40	mA
Switching frequency	BUCK modulation frequency	0.5	1	6	MHz

4.8. Crystal and Reference Clock

Parameter	Description	MIN	TYP	MAX	Unit
Frequency	Crystal and Reference frequency	-	26	-	MHz
Tolerance	Crystal and Reference frequency tolerance	-10	-	+10	ppm
XI Pin	Input voltage range for reference clock input	-0.3		3.6	V

4.9. Typical Power Consumption

State	Description	MIN	TYP	MAX	Unit
Shut Down	Software sets device into shut down mode, wake up from GPIO15		0.4	0.8	uA
Standby	Software sets device into standby mode, wake up from GPIO and RTC timer		4	6	uA
Idle-Sniff	Idle state at Sniff mode		300		uA
Active (A2DP)	2DH5		9		mA
Active (HFP)	HV1		9.5		mA

4.10. RF Characteristics

Parameter	Condition	MIN	TYP	MAX	Unit
Operate Frequency	2402~2480	2402		2480	MHz
RXSENS-1 Mbps	BER=0.001		-88		dBm
RXSENS-2 Mbps	BER=0.0001		-91		dBm



RXSENS-3 Mbps	BER=0.0001		-83		dBm
Maximum received signal	BER=0.001	0			dBm
Maximum RF transmit power			8		dBm
RF Power Control Range		30			dB

4.11. Audio Characteristics

Parameter	Condition	MIN	TYP	MAX	Unit
DAC Diff. Output	With 600ohm loading			1.1	Vrms
	With 32ohm loading		-	-	Vrms
	With 16ohm loading			0.9	Vrms
DAC Diff. Output THD	With 1.1Vrms@600ohm loading		75		dB
	With 0.8Vrms@16ohm loading		75		dB
DAC output SNR	1 kHz sine wave		98		dB
DAC Sample Rate		8		48	kHz
ADC SNR	1 kHz sine wave		96		dB
ADC Sample Rate		8		48	kHz

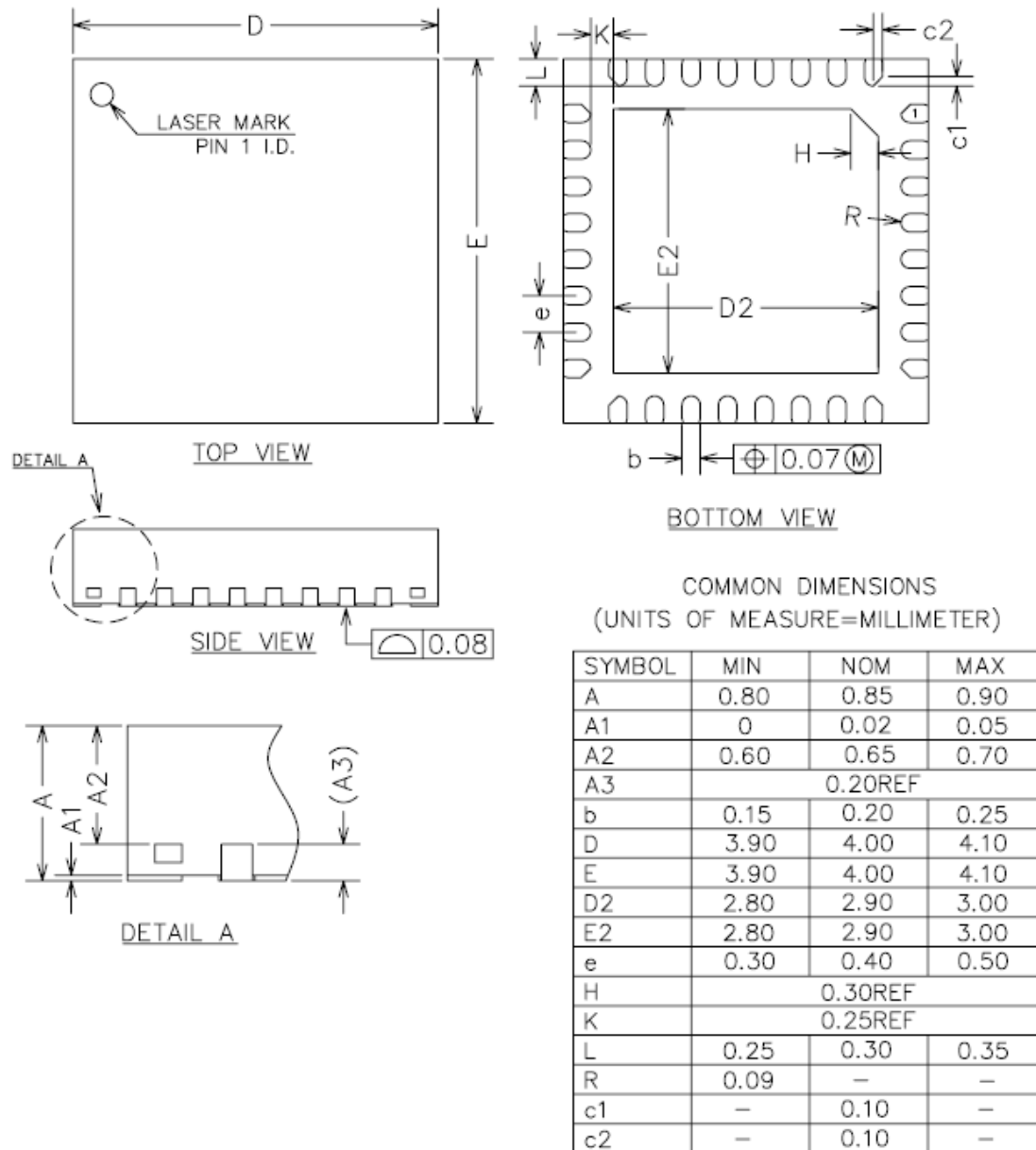


5. About Qualification

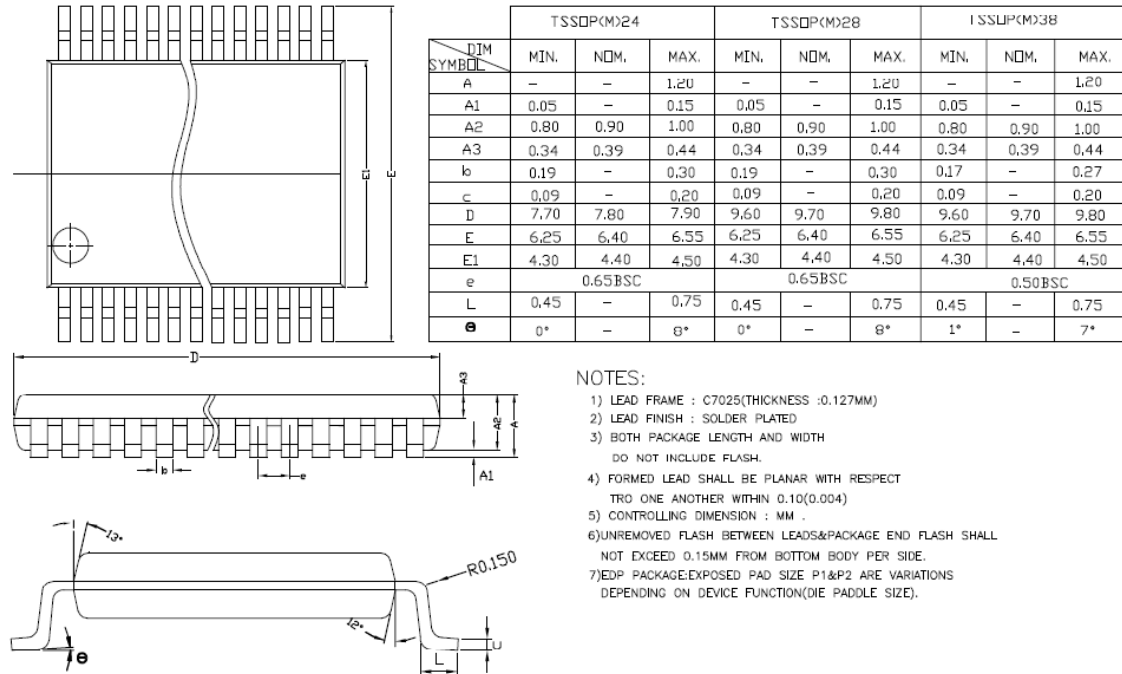
By carefully laying out the printed circuit board (PCB), the BK3266 RF performance meets FCC, CE and BQB requirement. The Bluetooth protocol and profile provided by Beken are already qualified and listed in the SIG website (Declaration ID: D039902). If there is any end product listing requirement with the BK3266, please inquire your local Beken Corporation representative for the related QDID authorization.

6. Package Information

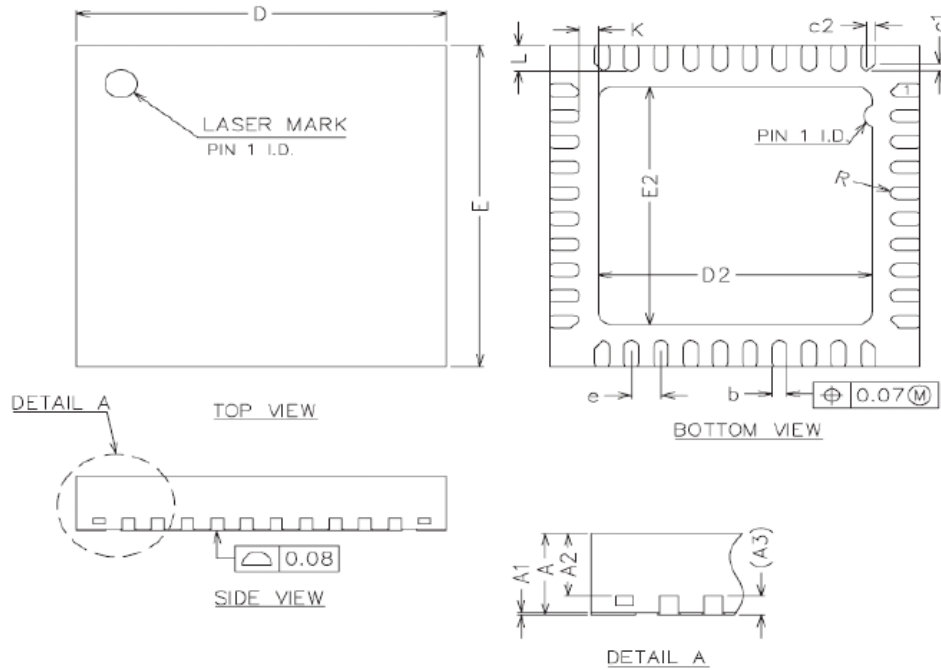
6.1. QFN 4x4 32-pin package



6.2. TSSOP28 package



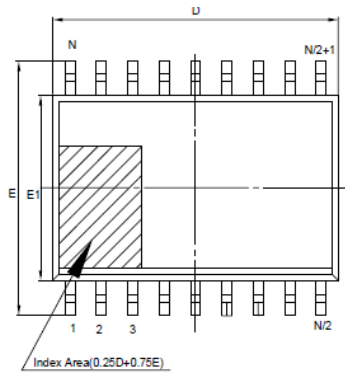
6.3. QFN 5x5 40-pin package



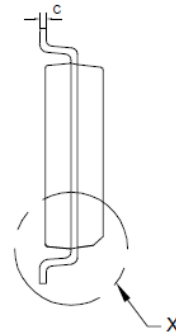
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.80	0.85	0.90
A1	0	0.02	0.05
A2	0.50	0.65	0.60
A3	0.20REF		
b	0.15	0.20	0.25
D	4.90	5.00	5.10
E	4.90	5.00	5.10
D2	3.60	3.70	3.80
E2	3.60	3.70	3.80
e	0.35	0.40	0.45
K	0.20	—	—
L	0.35	0.40	0.45
R	0.075	—	—
C1	—	0.12	—
C2	—	0.12	—

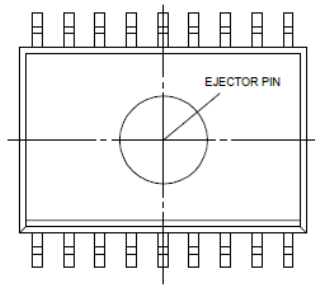
6.4. SOP16 package



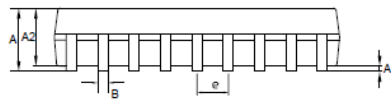
TOP View



Side View

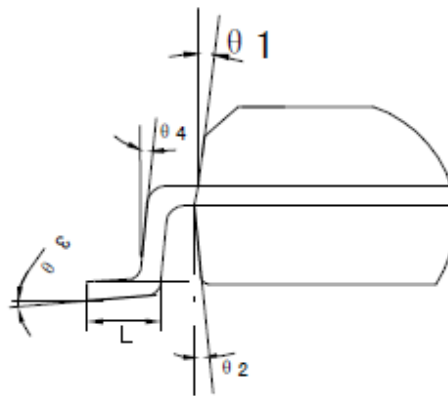


BTM View

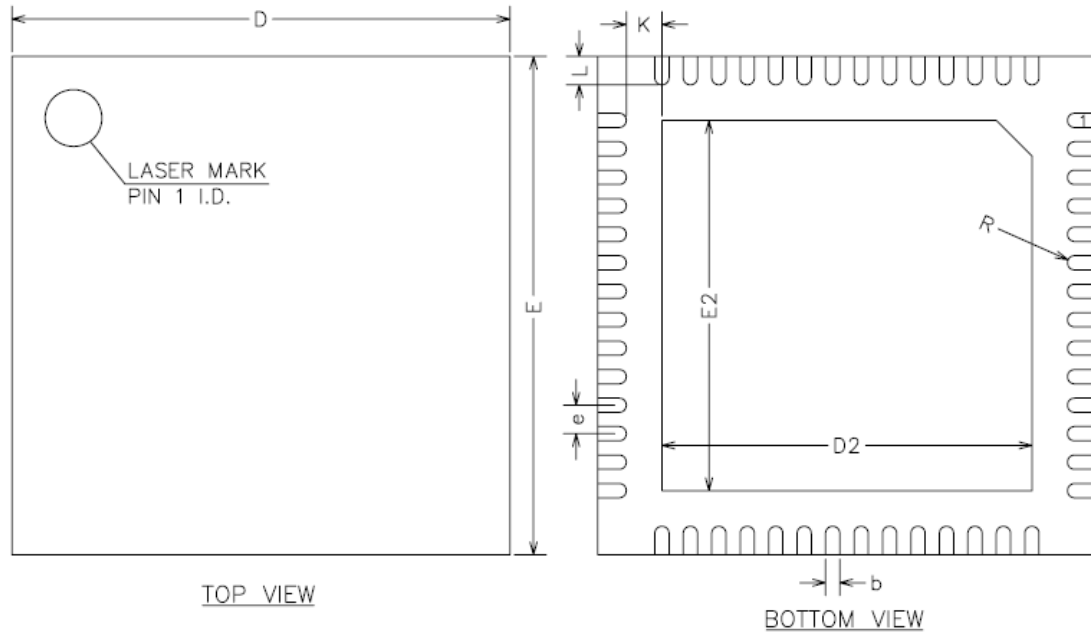


Side View

Symbol	SOP (M) 16		
	Min	Nom	Max
A	1.40		1.73
A1	0.05		0.18
A2	1.35		1.55
E	5.84		6.24
E1	3.84		4.04
D	9.90		10.10
L	0.40		0.70
e	1.27 TYP		
B	0.36		0.46
C	0.2 TYP		
θ 1	8° TYP		
θ 2	8° TYP		
θ 3	0°		8°
θ 4	15° TYP		



6.5. QFN56 Package

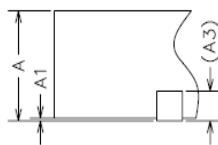


COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

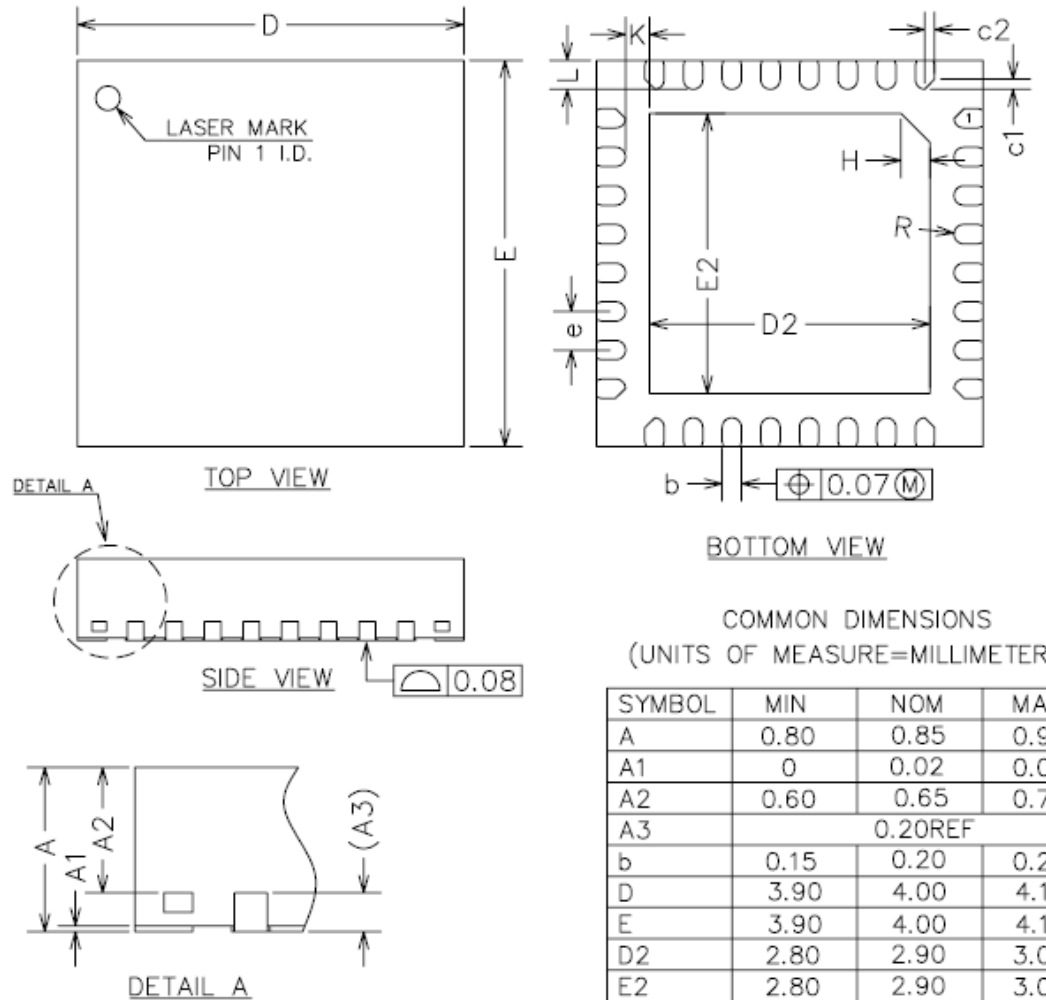
SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
A3	0.20REF		
b	0.15	0.20	0.25
D	6.90	7.00	7.10
E	6.90	7.00	7.10
D2	5.05	5.20	5.35
E2	5.05	5.20	5.35
e	0.30	0.40	0.50
K	0.20	—	—
L	0.35	0.40	0.45
R	0.09	—	—



SIDE VIEW



6.6. QFN24 Package



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.80	0.85	0.90
A1	0	0.02	0.05
A2	0.60	0.65	0.70
A3	0.20REF		
b	0.15	0.20	0.25
D	3.90	4.00	4.10
E	3.90	4.00	4.10
D2	2.80	2.90	3.00
E2	2.80	2.90	3.00
e	0.30	0.40	0.50
H	0.30REF		
K	0.25REF		
L	0.25	0.30	0.35
R	0.09	—	—
c1	—	0.10	—
c2	—	0.10	—

**7. Ordering Information**

Part number	Package	Packing	MOQ (ea)
BK3266QN32	QFN 4mmx4mm 32-Pin	Tape Reel	3 k
BK3266TS28	TSSOP 28-Pin	Tube	-
BK3266QN40	QFN 5mmx5mm 40-Pin	Tape Reel	3 k
BK3266SO16A	SOP 16-Pin	Tube	-
BK3266SO16B	SOP 16-Pin	Tube	-
BK3266QN56	QFN 7mmx7mm 56-Pin	Tape Reel	3 k
BK3266QN24	QFN 4mmx4mm 32-Pin	Tape Reel	3 k

Remark:

MOQ: Minimum Order Quantity