
BK3211

Specifications

Beken Internal Data — Signed NDA Required for Distribution

Single Chip for Bluetooth

Beken Corporation
Suite 3A, No.1278 Keyuan Road, Zhangjiang High Tech Park, Pudong New District,
Shanghai 201203, China
PHONE: (86)21 5108 6811
FAX: (86)21 6087 1277

This document contains information that may be proprietary to, and/or secrets of, Beken Corporation. The contents of this document should not be disclosed outside the companies without specific written permission.

Disclaimer: Descriptions of specific implementations are for illustrative purpose only, actual hardware implementation may differ.

Contents

1.	General Description	3
1.1.	Features	3
1.1.1.	Radio Features	3
1.1.2.	Baseband Features	3
1.1.3.	Device Features	3
1.2.	Applications	3
2.	Pin Definition	4
3.	Functional Description	6
3.1.	Block Diagram	6
4.	Electrical Characteristics	7
4.1.	Absolute Maximum Ratings	7
4.2.	Recommended Operating Conditions	7
4.3.	Typical Power Consumption	7
4.4.	RX AC Characteristics	7
4.4.1.	Basic Data Rate mode RX AC Characteristics	7
4.4.2.	Enhanced Data Rate mode RX AC Characteristics	8
4.5.	TX AC Characteristics	9
4.5.1.	Basic Data Rate mode TX AC Characteristics	9
4.5.2.	Enhanced Data Rate mode TX AC Characteristics	9
5.	Application Schematic	11
6.	Package Information	12
7.	Solder Reflow Profile	13
7.1.	RoHS Compliant	13
7.2.	ESD Sensitivity	13

1. General Description

The BK3211 chip is a highly integrated single-chip Bluetooth device. It integrates the high-performance transceiver and rich features baseband processor, which is compliant with Bluetooth 2.1 + EDR specification.

The BK3211 is available in 32-pin 4x4 mm QFN packages.

1.1. Features

1.1.1. Radio Features

- On-chip TX/RX switch
- Polar modulation transmitter architecture with very low power consumption and high TX performance
- Near-Zero IF receiver architecture with -91dBm sensitivity
- Support for class 1, class 2 and class 3 transmitting power requirement
- Fully integrated synthesizer without external loop filter component

1.1.2. Baseband Features

- Fully compliant with Bluetooth 2.1 + EDR specification
- Support Bluetooth Piconet and Scatternet
- Support up to 3Mbps high speed UART interface
- Support Sniff mode, hold mode and park mode
- Support A-law, μ -law and CVSD digitize audio CODEC in PCM interface
- Provide I2C interface

1.1.3. Device Features

- Enhanced support for WLAN/BT Co-existence
- Standby and sleep modes to minimize power consumption
- Support share handset system reference clock

1.2. Applications

- Mobile handset
- MP3, MP4 player and PMP
- Other portable devices

2. Pin Definition

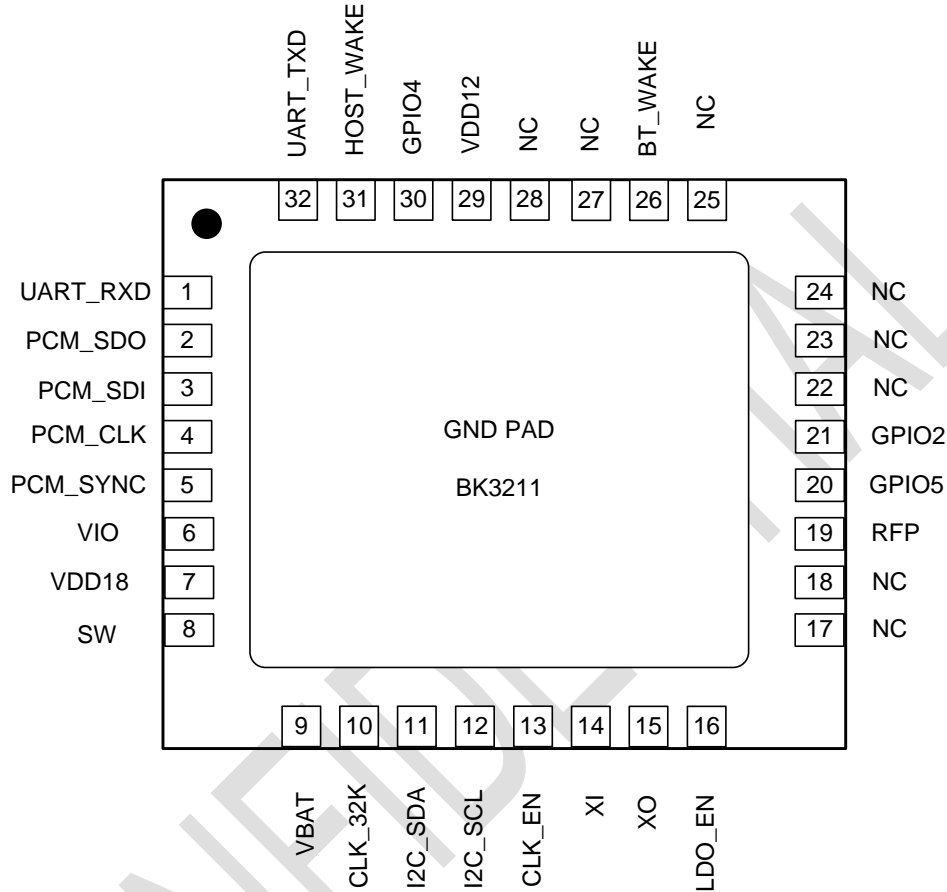


Figure 1 BK3211 PIN Definition Diagram

Table 1 Pin Definition

Package Pin #	Name	Description
1	UART_RXD	UART RX data input
2	PCM_SDO	PCM data output
3	PCM_SDI	PCM data input
4	PCM_CLK	PCM data clock
5	PCM_SYNC	PCM data sync
6	VIO	IO power supply
7	VDD18	1.8V voltage output, connected with 1uF decoupling cap.
8	SW	Internal buck regulator output
9	VBAT	VBAT LDO input, connected with 1uF decoupling cap.
10	CLK_32K	32.768 kHz clock input



11	I2C_SCL	I2C Clock signal
12	I2C_SDA	I2C Data signal
13	CLK_EN	Request source clock active
14	XI	Crystal input or oscillator input.
15	XO	Crystal output.
16	LDO_EN	System power on/off control
17	NC	Not connect
18	NC	Not connect
19	RFP	RF input and output
20	GPIO5	General purpose input/output
21	GPIO2	General purpose input/output or Bluetooth Priority signal
22	NC	Not connect
23	NC	Not connect
24	NC	Not connect
25	NC	Not connect
26	BT_WAKE	To wakeup BT. Input from host.
27	NC	Not connect
28	NC	Not connect
29	VDDD12	Power supply for digital
30	GPIO4	General purpose input/output or WLAN Active signal
31	HOST_WAKE	To wakeup host. Output to host.
32	UART_TXD	UART TX data output

3. Functional Description

3.1. Block Diagram

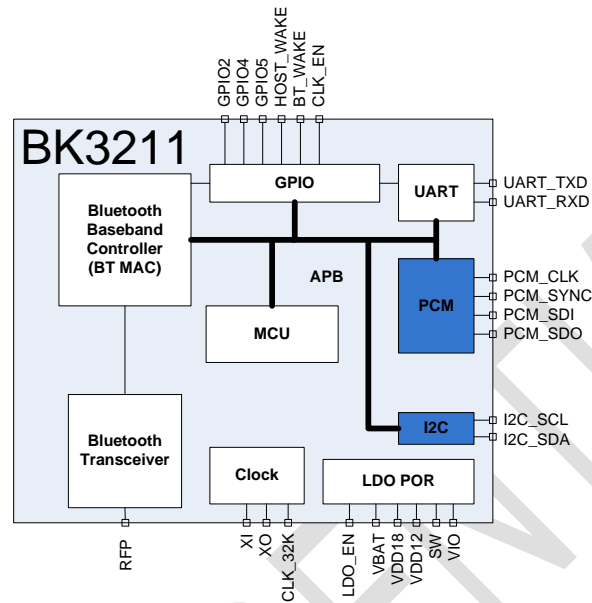


Figure 2 BK3211 Block Diagram

As shown in the **Figure 2**, the BK3211 integrates the Bluetooth transceiver, Bluetooth baseband controller and MCU etc. The Bluetooth transceiver integrates the low-IF single conversion RX and Polar loop modulation TX. The Bluetooth baseband controller carries out the baseband protocols and other low-level link routines such as modulation/demodulation, packets processing, bit stream processing, frequency hopping and so on.

4. Electrical Characteristics

4.1. Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings

Parameter	Description	MIN	TYP	MAX	Unit
V _{BAT}	Battery Regulator Supply Voltage	-0.3		4.8	V
P _{RX}	RX Input Power	-	10	-	dBm
T _{STR}	Storage Temperature Range	-40	-	150	°C
V _{CC}	Input Voltage	-0.3	-	3.6	V

4.2. Recommended Operating Conditions

Table 3 Recommended Operating Conditions

Parameter	Description	MIN	TYP	MAX	Unit
V _{BAT}	Battery Regulator Supply Voltage	3.3	4	4.2	V
T _{OPR}	Operation Temperature Range	-20	-	60	°C
V _{IL}	CMOS Low Level Input Voltage	0	-	0.3*V _{IO}	V
V _{IH}	CMOS High Level Input Voltage	0.7*V _{IO}	-	V _{IO}	V
V _{TH}	CMOS Threshold Voltage		0.5*V _{IO}		V

Notes:

 1. V_{IO}=1.8~3.3V

4.3. Typical Power Consumption

Table 4 Typical Power Consumption

State	Description	MIN	TYP	MAX	Unit
Shut Down			8		uA
Sleep			600		uA
Only HCI Active			5		mA
DH1/DM1			42		mA
DH3/DM3			46		mA
DH5/DM5			47		mA

4.4. RX AC Characteristics

4.4.1. Basic Data Rate mode RX AC Characteristics

Table 5 Basic Data Rate mode RX AC Characteristics

 (V_{BAT} = 3.6 V, T_{OPR} = 27 °C, unless otherwise specified)

Parameter	Condition	MIN	TYP	MAX	Unit
Input Frequency	2402~2480	2402	-	2480	MHz
RXSNS	BER=0.001	-	-89	-	dBm



Maximum Received Signal	BER=0.001	0	-	-	dBm
C/ICO		-	10	-	dB
C/I1ST	F = F0 + 1MHz	-	0	-	dB
	F = F0 - 1MHz	-	0	-	dB
C/I2ND	F = F0 + 2MHz	-	-15	-	dB
	F = F0 - 2MHz	-	-24	-	dB
C/I3RD	F = F0 + 3MHz	-	-30	-	dB
	F = F0 - 3MHz	-	-40	-	dB
C/I Image Channel	F = F _{image}	-	-15	-	dB
Out-of-Band Blocking Performance	30MHz-2000MHz	-10	-	-	dBm
	2000MHz-2400MHz	-27	-	-	dBm
	2500MHz-3000MHz	-27	-	-	dBm
	3000MHz-12.5GHz	-10	-	-	dBm
Intermodulation		-	-37	-	dBm

4.4.2. Enhanced Data Rate mode RX AC Characteristics

Table 6 Enhanced Data Rate mode RX AC Characteristics

(VBAT = 3.6 V, T_{OPR} = 27 °C, unless otherwise specified)

Parameter	Condition	MIN	TYP	MAX	Unit
π/4 DQPSK					
RXSNS	BER=0.0001	-	-91	-	dBm
BER Floor	BER=0.00001	-	-85	-	dBm
Maximum Received Signal	BER=0.001	0	-	-	dBm
C/ICO		-	11	-	dB
C/I1ST	F = F0 + 1MHz	-	-11	-	dB
	F = F0 - 1MHz	-	-11	-	dB
C/I2ND	F = F0 + 2MHz	-	-15	-	dB
	F = F0 - 2MHz	-	-27	-	dB
C/I3RD	F = F0 + 3MHz	-	-32	-	dB
	F = F0 - 3MHz	-	-40	-	dB
C/I Image Channel	F = F _{image}	-	0	-	dB
8DPSK					
RXSNS	BER=0.0001	-	-83	-	dBm
BER Floor	BER=0.00001	-	-78	-	dBm
Maximum Received Signal	BER=0.001	0	-	-	dBm
C/ICO		-	20	-	dB
C/I1ST	F = F0 + 1MHz	-	-5	-	dB
	F = F0 - 1MHz	-	-5	-	dB
C/I2ND	F = F0 + 2MHz	-	-10	-	dB
	F = F0 - 2MHz	-	-22	-	dB
C/I3RD	F = F0 + 3MHz	-	-30	-	dB
	F = F0 - 3MHz	-	-30	-	dB
C/I Image Channel	F = F _{image}	-	4	-	dB

4.5. TX AC Characteristics

4.5.1. Basic Data Rate mode TX AC Characteristics

Table 7 Basic Data Rate mode TX AC Characteristics

 (VBAT = 3.6 V, T_{OPR} = 27 °C, unless otherwise specified)

Parameter	Condition	MIN	TYP	MAX	Unit
Maximum RF Transmit Power		-	8	9	dBm
RF Power Control Range		-	15	-	dB
20dB Band Width		-	0.9	-	MHz
ACP1ST	F = F0 + 1MHz	-	-	-	dBm
	F = F0 - 1MHz	-	-	-	dBm
ACP2ND	F = F0 + 2MHz	-	-30	-	dBm
	F = F0 - 2MHz	-	-30	-	dBm
ACP _≥ 3RD	F = F0 + ≥ 3MHz	-	-40	-	dBm
	F = F0 - ≥ 3MHz	-	-40	-	dBm
Out-of-Band Spurious Emission	30MHz to 1GHz, Operating Mode	-	-36	-	dBm
	1GHz to 12.75GHz, Operating Mode	-	-30	-	dBm
	1.8GHz to 1.9GHz, 5.15GHz to 5.3GHz	-	-47	-	dBm
Δf _{1avg} Maximum Modulation		-	160	-	KHz
Δf _{2max} Minimum Modulation		-	120	-	KHz
Δf _{2avg} /Δf _{1avg}		-	0.9	-	-
Initial Carrier Frequency Tolerance		-	5	-	KHz
Drift Rate		-	7	-	KHz/50us
Drift (1 slot packet)		-	8	-	KHz
Drift (3 slot packet)		-	8	-	KHz
Drift (5 slot packet)		-	10	-	KHz

4.5.2. Enhanced Data Rate mode TX AC Characteristics

Table 8 Enhanced Data Rate mode TX AC Characteristics

 (VBAT = 3.6 V, T_{OPR} = 27 °C, unless otherwise specified)

Parameter	Condition	MIN	TYP	MAX	Unit
Maximum RF Transmit Power		-	4	6	dBm
Relative Transmit Power		-	-4	-	dB
π/4 DQPSK Max Carrier Frequency Stability w ₀		-	2	-	kHz
π/4 DQPSK Max Carrier Frequency Stability w _i		-	3	-	kHz
π/4 DQPSK Max Carrier Frequency Stability w _i + w ₀		-	1.5	-	kHz



BK3211 Datasheet

Bluetooth

8DPSK Max Carrier Frequency Stability w_0		-	2	-	kHz
8DPSK Max Carrier Frequency Stability w_i		-	3	-	kHz
8DPSK Max Carrier Frequency Stability $ w_i + w_0 $		-	1.5	-	kHz
$\pi/4$ DQPSK Modulation Accuracy	RMS DEVM	-	7	-	%
	99% DEVM	-	-	20	%
	Peak DEVM	-	15	-	%
8DPSK Modulation Accuracy	RMS DEVM	-	9	-	%
	99% DEVM	-	-	20	%
	Peak DEVM	-	17	-	%
ACP1ST	F = F0 + 1MHz	-	-14	-	dBm
	F = F0 - 1MHz	-	-13	-	dBm
ACP2ND	F = F0 + 2MHz	-	-20	-	dBm
	F = F0 - 2MHz	-	-20	-	dBm
ACP \geq 3RD	F = F0 + \geq 3MHz	-	-40	-	dBm
	F = F0 - \geq 3MHz	-	-40	-	dBm
EDR Differential Phase Coding		-	100	-	%

CONFIDENTIAL

5. Application Schematic

The compatible design for BK3211 and BK3511, which inside the square brackets are BK3511 Pin names or component values

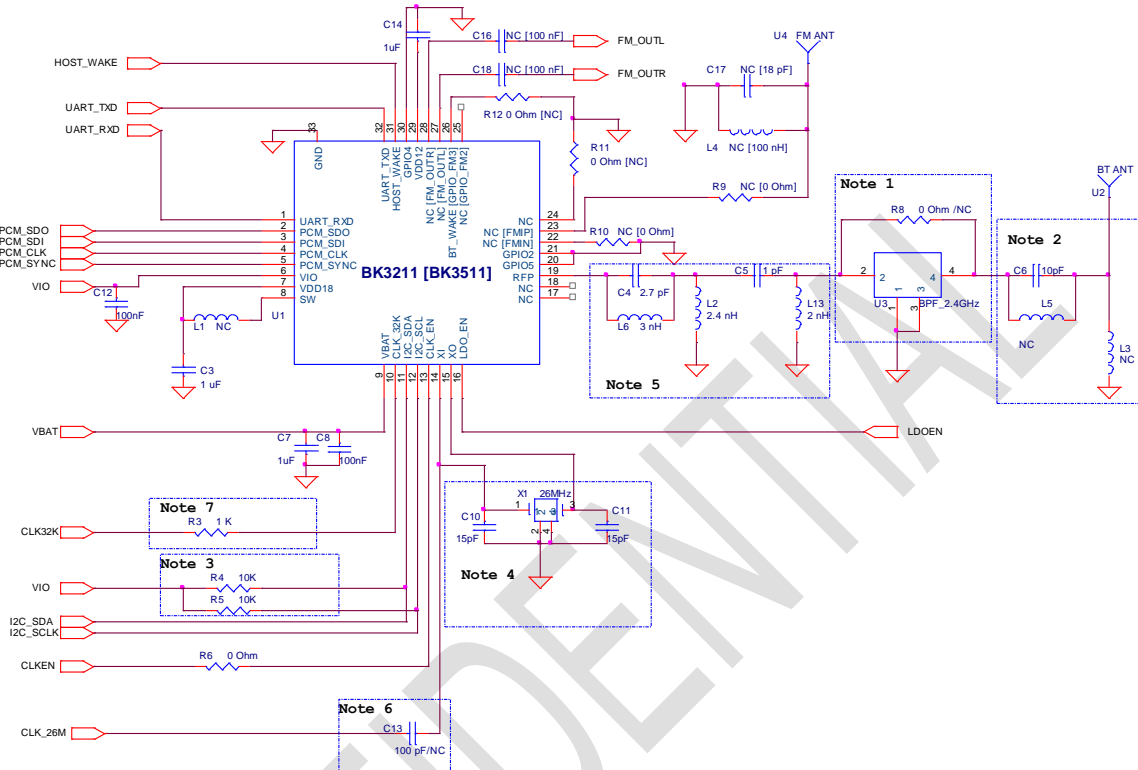


Figure 3 BK3211 Application Diagram

The detail schematic design please refers to the hardware design reference.

6. Package Information

QFNWB4×4-32L-A (P0.40T0.75/0.85) PACKAGE OUTLINE DIMENSIONS

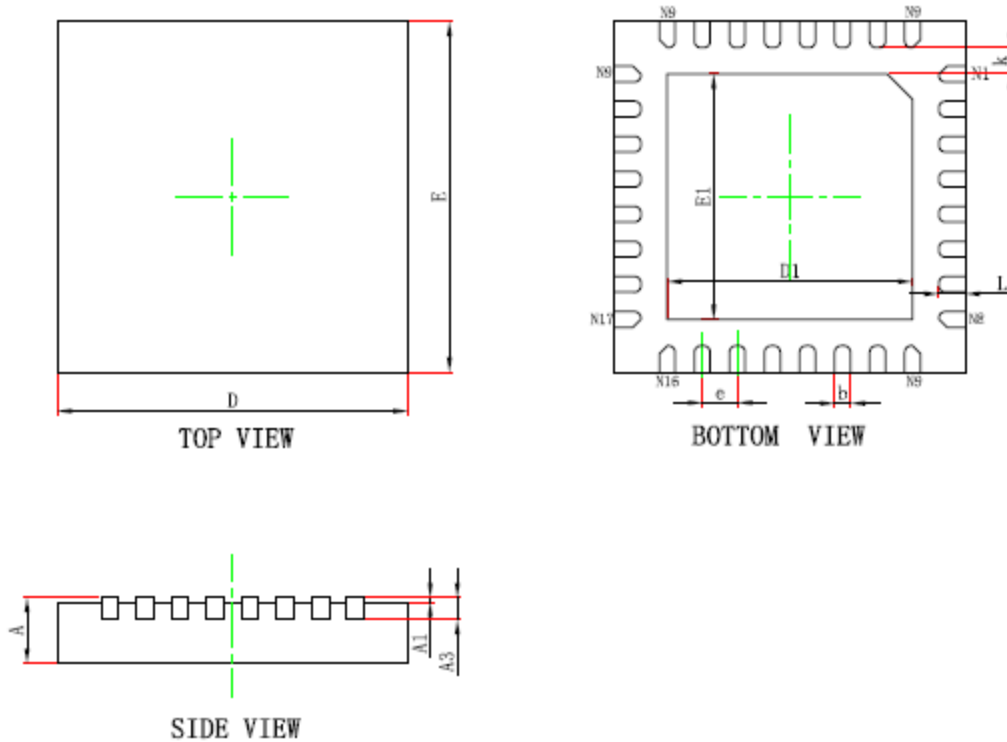


Figure 4 QFN 4x4 32 Pin Package diagram

Table 9 QFN 4x4 32 Pin Package dimensions

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	3.924	4.076	0.154	0.160
E	3.924	4.076	0.154	0.160
D1	2.700	2.900	0.106	0.114
E1	2.700	2.900	0.106	0.114
k	0.200MIN.		0.008MIN.	
b	0.150	0.250	0.006	0.010
e	0.400TYP.		0.016TYP.	
L	0.224	0.376	0.009	0.015

7. Solder Reflow Profile

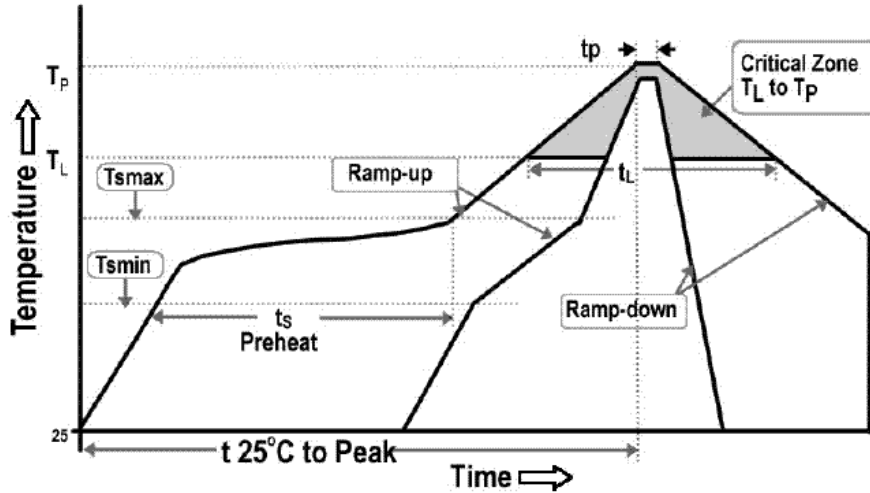


Figure 5 Classification Reflow Profile

Table 10 Solder Reflow Profile

Profile Feature	Specification	
Average Ramp-Up Rate (t _{smax} to t _p)	3 °C/second max.	
Pre_heat	Temperature Min (T _{smin})	150 °C
	Temperature Max (T _{smax})	200 °C
	Time (t _s)	60-180 seconds
Time Maintained above	Temperature (T _L)	217 °C
	Time (t _L)	60-150 seconds
Peak/Classification Temperature (T _p)	260 °C	
Time within 5 °C of Actual Peak Temperature (t _p)	20-40 seconds	
Ramp-Down Rate 6	6 °C/second max.	
Time 25 °C to Peak Temperature 8	8 minutes max.	

7.1. RoHS Compliant

The product does not contain lead, mercury, cadmium, hexavalent chromium, PBB&PBDE content in accordance with directive 2002/95/EC(RoHS).

7.2. ESD Sensitivity

Integrated circuits are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.

***Revision History***

Rev.	Date	Author(s)	Remark
1.0	5/7/2012	YMHUANG	Initial release
1.1	05/24/2012	LFBAO	Updated application schematic; updated electrical characteristics, Specially change the serial resistance from 0 to 1K at 32.768K clock path
1.2	06/19/2012	YMHUANG	Updated application schematic to improve the GSM suppression

CONFIDENTIAL