2G/3G Opertation Description

Model：Orion
Band：GSM850,GSM900,DCS1800,PCS1900,WCDMA 850,WCDMA2100

1. Scope

   This document shows and provides the basic information about the platform we used.The more detail information about RF section are also included.

   Orion product is new phone designed by ZIVI.The baseband circuit is based on Broadcom MAXIM 8986+ and RF circuit is included Transceiver named Broadcom BCM2091 ,Blacksand PA and RDA PA.It works at six bands,GSM850,GSM900,DCS1800,PCS1900,WCDMA 850,WCDMA2100

2. Platform

   BCM21552 is based on RF band support WCDMA+GSM and support LPDDR1 and NAND flash device.
   - Baseband functions,including multiple hardware cores.
   - Single platform that provides dedicated support for all market leading codecs and other multimedia formats to support carrier deployments around the word.
   - High-quality digital still image camera performance with up to 8-megapixel resolution.
   - HS-USB core with built-in PHY eliminates additional USB components.
   - DC power reduction using innovative technique.

3. Transceiver BCM2091

   - radioOne RF transceiver functions(Rx and Tx,both eliminating their intermediate frequency components).
   - WCDMA(Release 6/7,HSDPA 7.2M,HSUPA 5.8M) and GSM(Rel'99,GPRS).
   - Wireless connectivity and analog functions-Bluetooth 3.0+EDR,FM radio.
   - RF transmitters: The transmitter is based on a direct upconversion architecture that enables the use of low cost multiband,multimode power amplifier(PAS) for WCDMA and EDGE transmission.GSM modulation is applied through the TX PLL using the direct modulation approach.Because of its low noise design,the transmitter is able to operate without filtering in 2G and 3G modes.It is also able to operate in power class 4 for GSM850/900,power class 1 for DCS1800/PCS1900,and class 3 for WCDMA.
   - RF receivers: supports GSM850,GSM900,DCS1800,PCS1900,WCDMA850,WCDMA2100 operation with primary receiver path,using a differential configuration to maximize common-mode rejection,Tx isolation,out-of-band suppression,and second-order intermodulation performance.There are Five quadrature downconverters and digital baseband interfaces to the device.   .

4. PA

   GSM

   RF3234 is a Multi-State non-Linear GPRS PAM designed for use with the Braodcom BCM2091 GPRS：solutions and compact form factor for quad-band cellular handsets comprising GSM850/900,DCS1800,and PCS1900 operation.

Table 2. Recommended Operating Conditions

Parameter	Minimum	Nominal	Maximum	Unit
Supply Voltage	3	3.6	4.5	V
Logic control "High"	1.5			V
Logic control "Low"			0.5	V
Input RF Power	1		6	dBm
Operating Temperature	-20	+25	+80	°C

Table 3. Truth Table

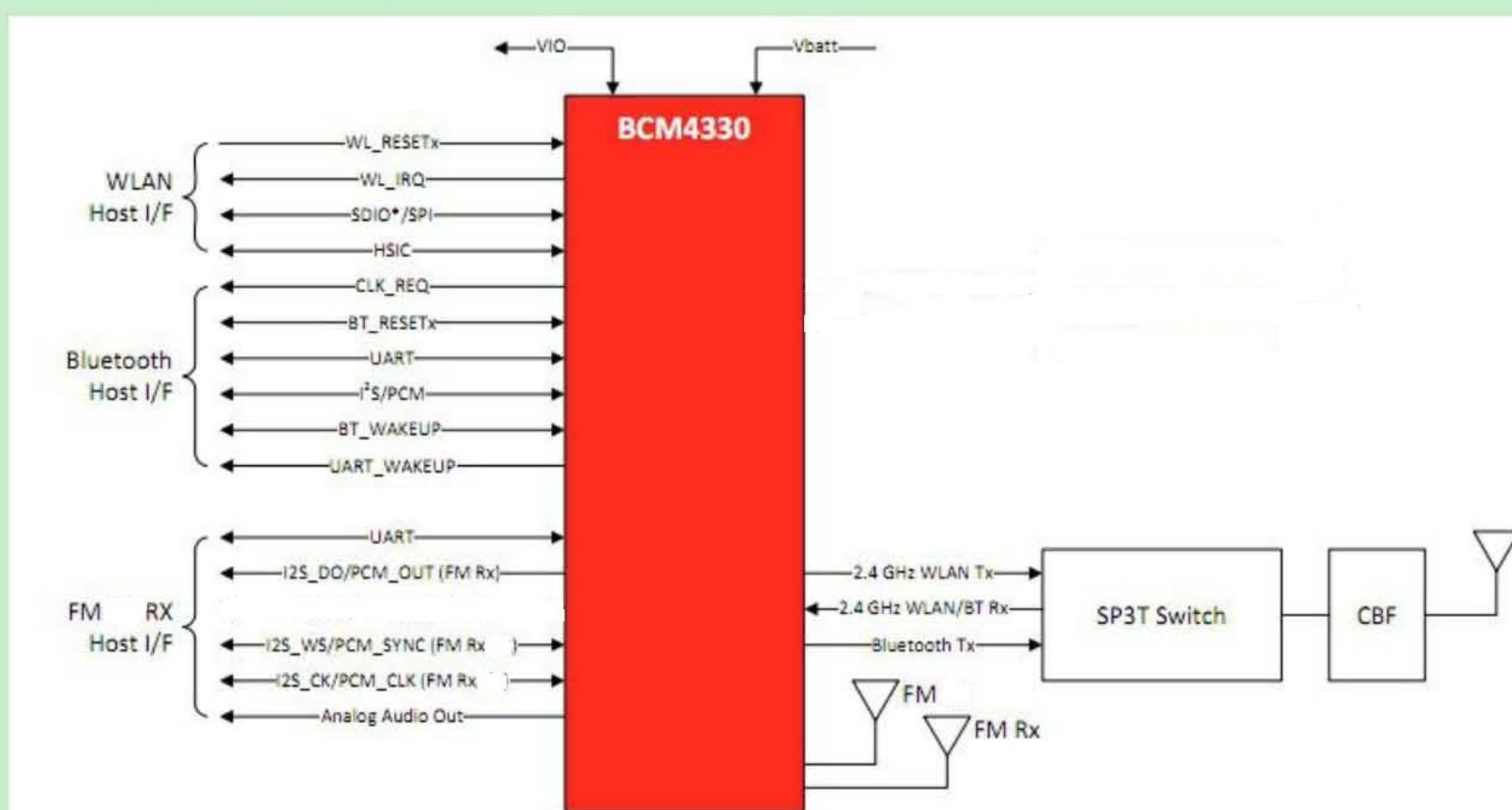|	CTR2	CTR1	CTR0	TXEN	RAMP
Default	0	0	0	0	-
Power Down	0	0	0	0	
GSM TX On	0	1	0	1	-
DCS TX On	0	1	1	1	-
RX1 On	1	0	0	0	-
RX2 On	0	1	0	0	-
TRX1 On	0	1	1	0	-
TRX2 On	0	0	1	0	-

WCDMA

Blacksand BST3401/BST3405 supports multimode application UMTS Band1/Band5 and meets stringent linearity requirements up to 28.25dBm output power for UMTS Rel'99.The PA contains internal DC blocking capacitors for RF input and output ports.The BST3401/BST3405 supports 3 power modes-active low power,mid power and high power modes.A directional coupler is integrated into the module and both coupling and isolation ports are available externally,supporting daisy chain.The BST3401/BST3405 has intergrated on-chip Vre on-module bias switch ,so an external constant voltage source is not required.All of the digital control inputs pins such as the EN,M1 and M2 are fully CMOS compatible.The power amplifier is manufactured on an advanced CMOS technology.

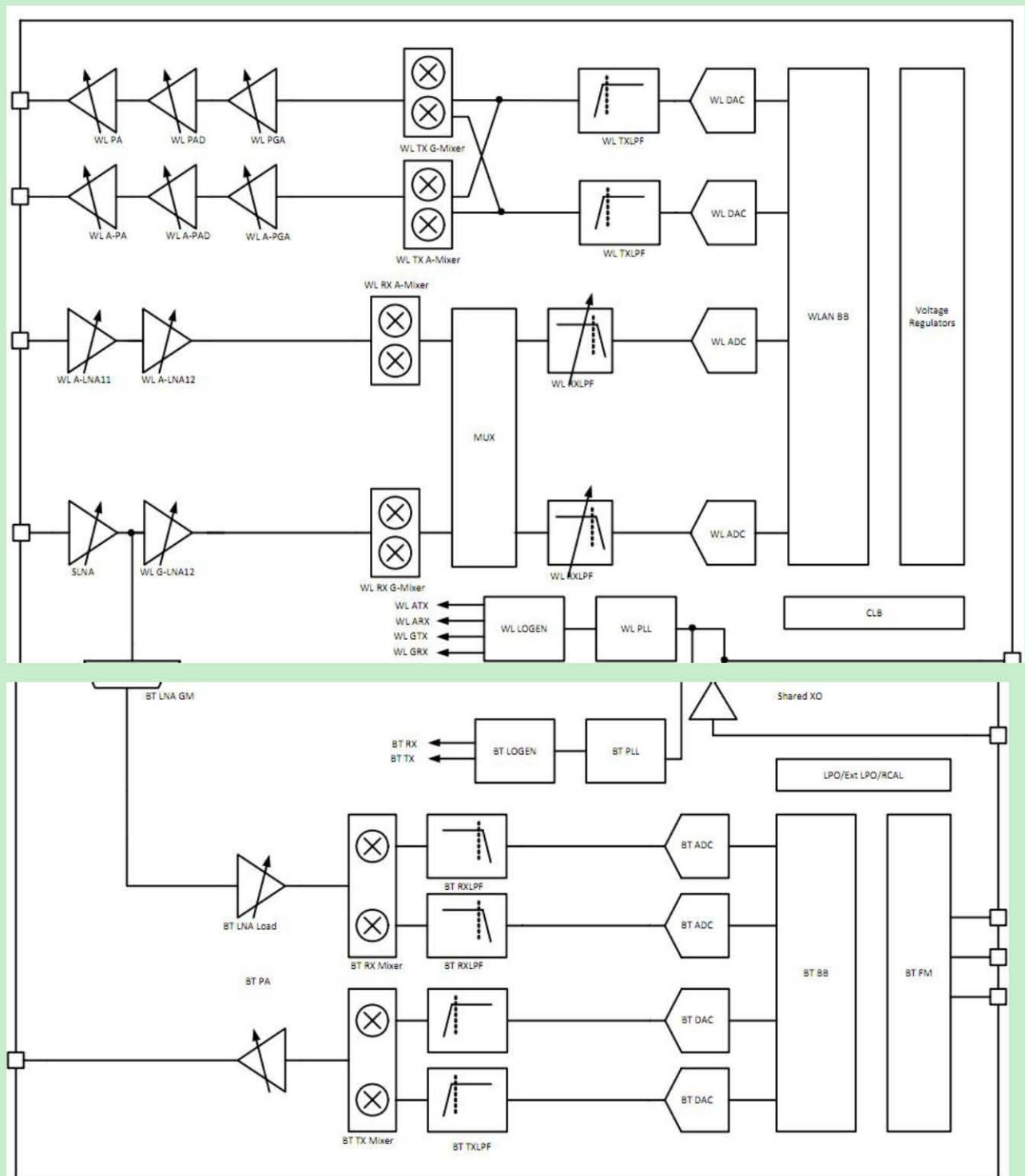## TABLE 1. Absolute Minimum and Maximum Ratings*

Specification	Symbol	Min	Typ	Max	Units
Supply voltage (no RF input)	V_{BAT}			5.0	V
Input/Output pins	V_{IO}	-0.5		3.5	V
RF input power	P_{IN}			+10	dBm
Operating temperature (case temperature at ground pad)	T_{CMAX}	-40		+110	°C
Storage temperature (ambient)	T_A	-55		+150	°C

TABLE 2.   Mode Control

Specification		Logic	Min	Typ	Max	Units
Power Down (PD)	EN	0	0.0		0.5	V
	M1	X	-		-	-
	M2	X	-		-	-
High Power Mode (HPM) ($P_{OUT} \leq 27.5$dBm)	EN	1	1.4		3.3	V
	M1	0	0.0		0.5	V
	M2	0	0.0		0.5	V
Medium Power Mode (MPM) ($P_{OUT} \leq 19$dBm))	EN	1	1.4		3.3	V
	M1	1	1.4		3.3	V
	M2	0	0.0		0.5	V
Low Power Mode (LPM) ($P_{OUT} \leq 8$dBm))	EN	1	1.4		3.3	V
	M1	1	1.4		3.3	V
	M2	1	1.4		3.3	V

WIFI/BT operation block

The WIFI device and Bluetooth solution receives digital clock from Transceiver BCM2091. One Buck regulator, four LDO regulators, and a Power Management Unit (PMU) are integrated into the BCM4330. All regulators are programmable via the PMU. These blocks simplify power supply design for Bluetooth, WLAN, and FM functions in embedded designs. A single host power supply can be used (including VBATT ranging from 2.3V to 4.8V) with all additional voltages being provided by the regulators in the BCM4330.The WIFI device has a SDIO lines which is intended to connect to host processer and the Transceiver Bluetooth solution is intended to host processer via UART bus on the Transceiver itself.The coexistence between WIFI and Transceiver Bluetooth is linked through the controlled GPIO named the BT active,the BT status and WLAN active.

WL PA WL PAD WL PGA WL TX G-Mixer WL TXLPF WL DAC

WL A-PA WL A-PAD WL A-PGA WL TX A-Mixer WL TXLPF WL DAC

WL RX A-Mixer

WL A-LNA11 WL A-LNA12 WL RXLPF WL ADC

MUX

WLAN BB Voltage Regulators

SLNA WL G-LNA12 WL RX G-Mixer WL RXLPF WL ADC

WL ATX
WL ARX
WL GTX
WL GRX

WL LOGEN WL PLL CLB

BT LNA GM Shared XO

BT RX
BT TX

BT LOGEN BT PLL LPO/Ext LPO/RCAL

BT LNA Load BT RXLPF BT ADC

BT RXLPF BT ADC

BT RX Mixer

BT PA BT BB BT FM

BT DAC

BT TX Mixer BT TXLPF BT DAC

The WIFI device and the BT module on the transceiver itself have the similar Tx/Rx functional hardware.For example ,the receive is comprised of an LNA,a direct conversion mixer,and a baseband programmable gain filter.This receiver is implemented using the direct conversion topology.The mixer down convert the signal to baseband in-phase and quadrature-phase signals.The I/Q signals are low-pass filtered and amplified by the baseband programmable gain filter controlled by digital logic.The baseband I/Q signals are sent to the ADC.

The transmitter is comprised of a programmable reconstruction filter,a direct convertion

mixer,a preamplifier and a PA .This transmitter is implemented using the direct conversion topology.The transmit output power is adjusted by a digitally programmable control loop at the start of each packet and the Tx signal is amplified by the PA to the sky.