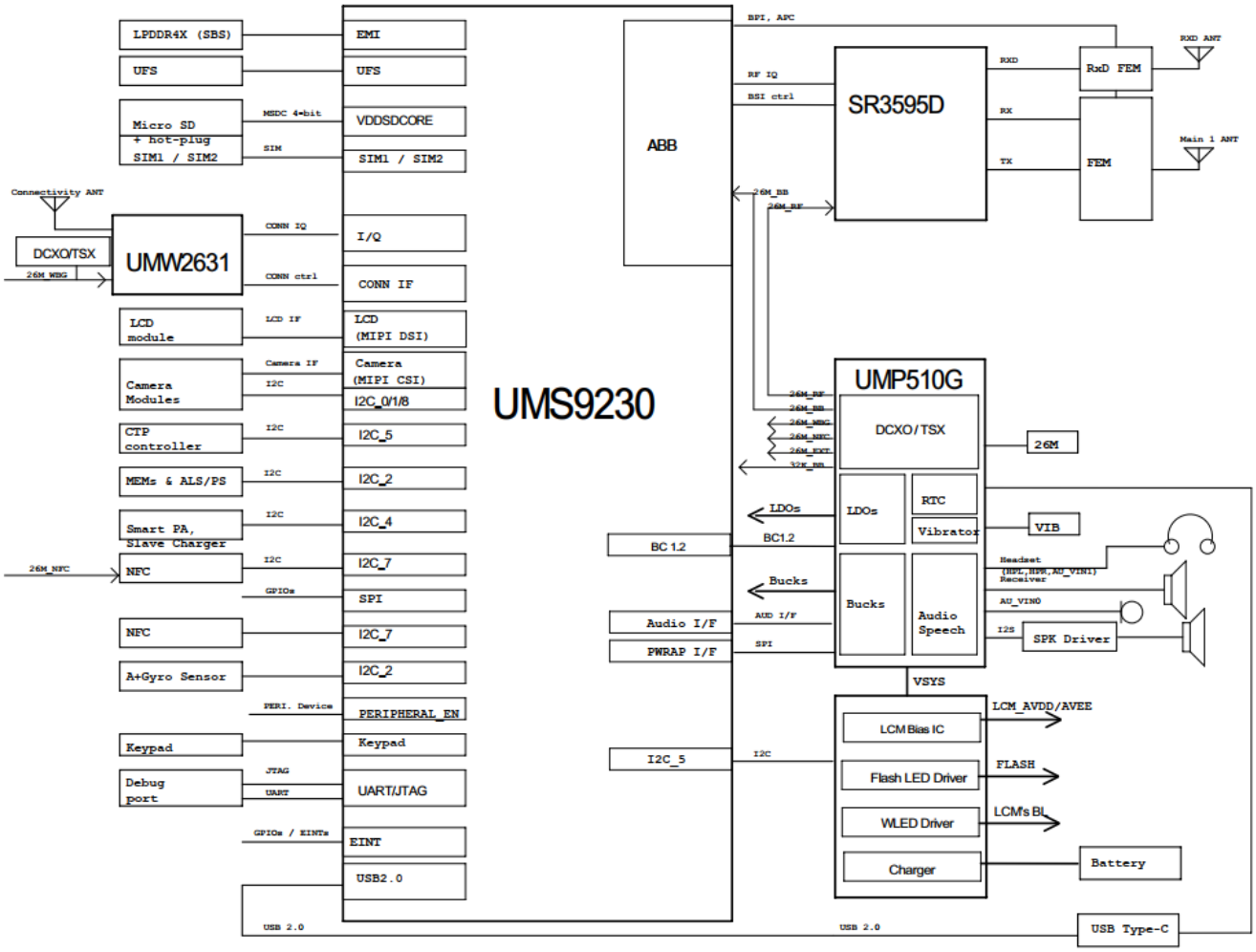
Operational Description

1. Overview:

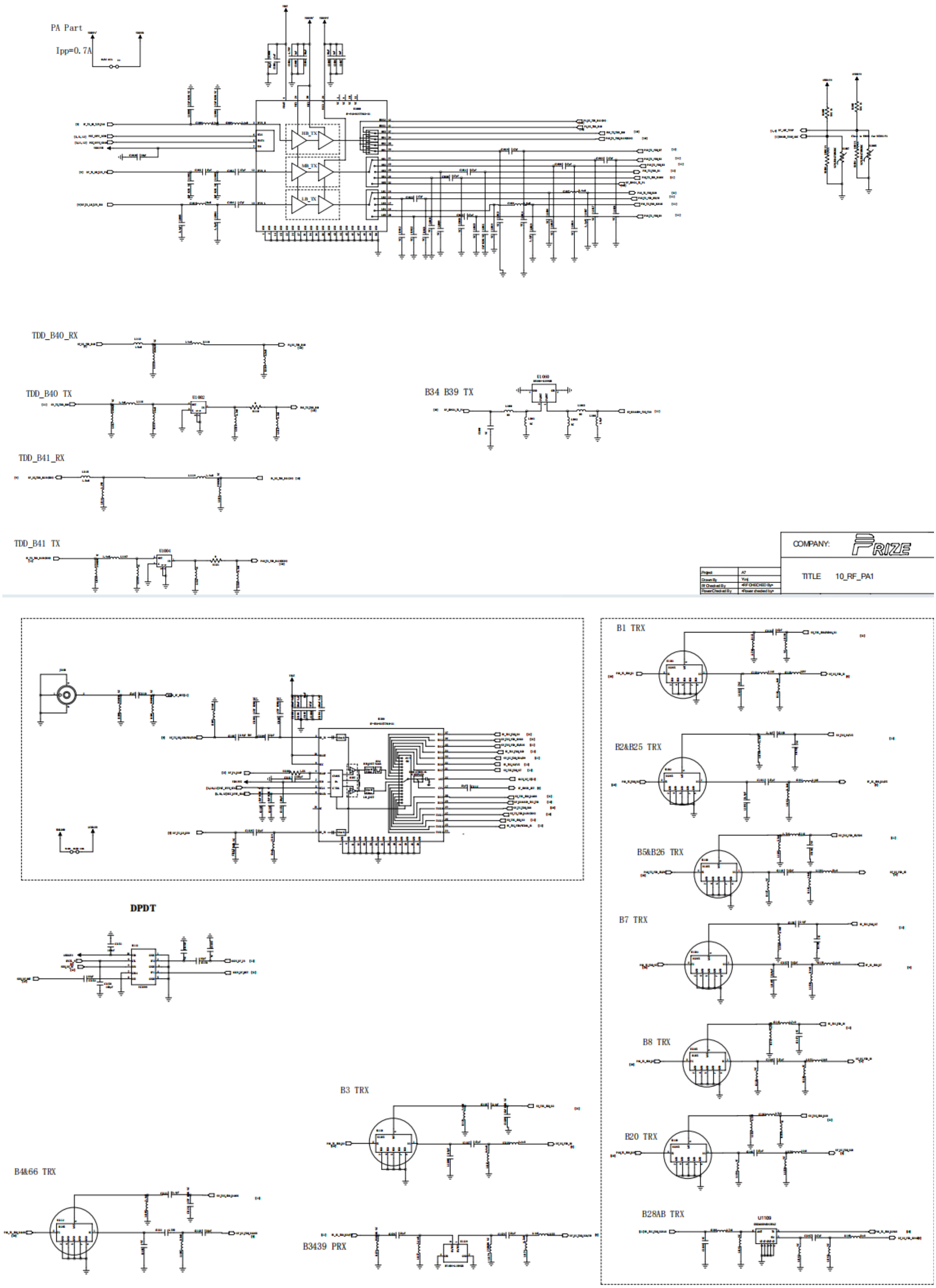
UMS9230 is a highly integrated application processor with embedded TD-LTE, LTE FDD, WCDMA/HSPA(+), WCDMA/DC-HSDPA, and GSM/GPRS/EDGE. It consists of Dual-core Arm® Cortex®-A75 and Six-core Arm® Cortex®-A55 processor as application processor, which includes a NEON multimedia processing engine, Arm® Mali™-G57 as 3D graphics accelerator, multi-standard multi-media accelerators and advanced audio subsystem. The specially optimized architecture of UMS9230 can achieve high performance and low power for a lot of applications. Proprietary architectures and algorithms were developed for low power ASIC design and power management. Unique techniques are used for noise suppression/cancellation, echo suppression/cancellation algorithm. Overall, UMS9230 chip set presents a high cost-effective platform for four mode Android mobile devices.

2. System diagram Overview:



2.1. RF:

RF (Radio Frequency) section is in charge of the signal transmit and receiving, signal modulation and demodulation.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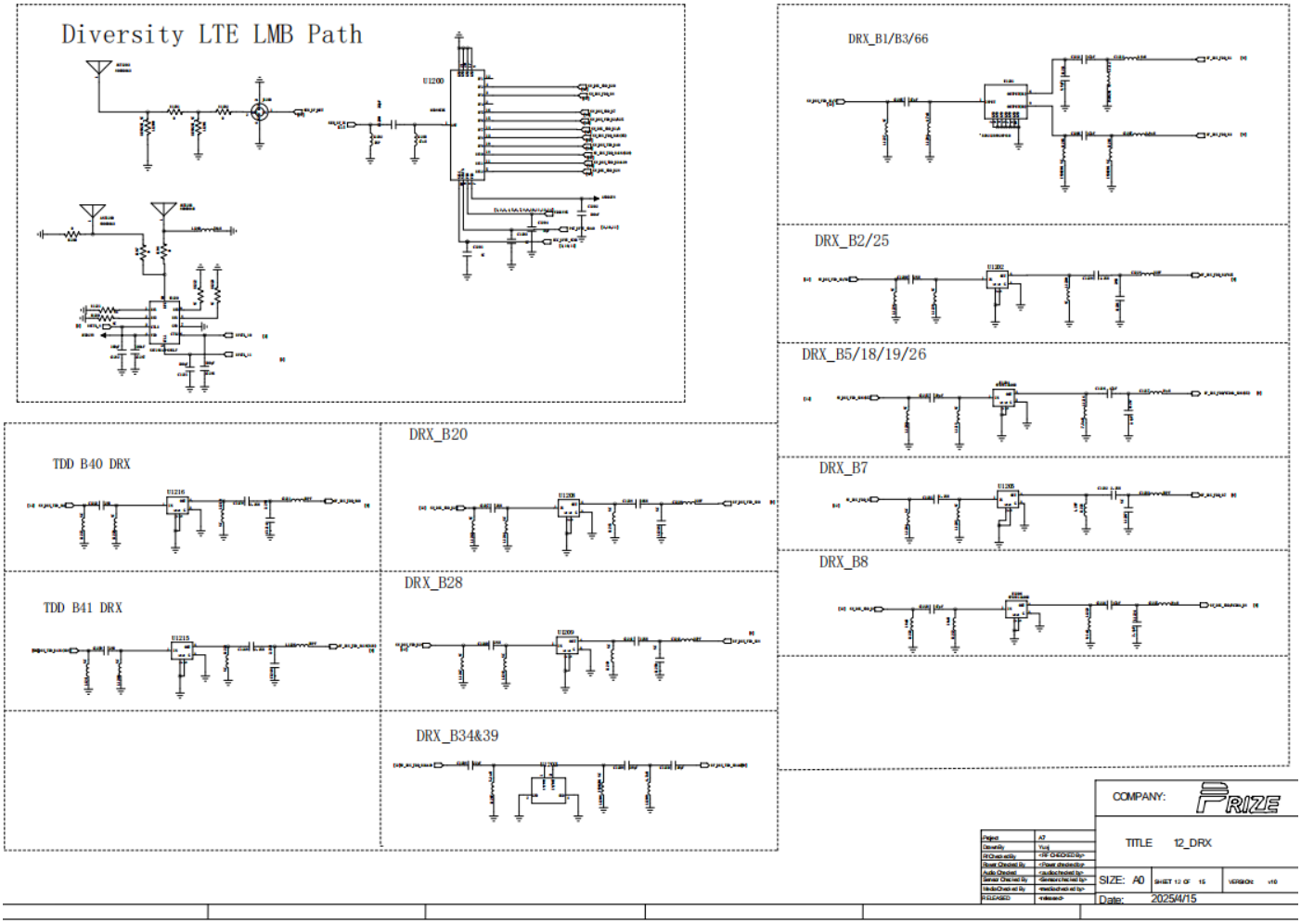
HB_TX
MB_TX
LB_TX
TDD_B40_RX
TDD_B40 TX
U1002
TDD_B41_RX
TDD_B41 TX
U1004
B34 B39 TX
U1000
COMPANY:
PRIZE
TITLE 10_RF_PA1
Project A7
Drawn By
RF Checked By <RF CHECKED By>
PowerChecked By <Power checked by>
B1 TRX
B2&B25 TRX
B5&B26 TRX
B7 TRX
B8 TRX
B20 TRX
B28AB TRX
U1109
DPDT
B3 TRX
B3439 PRX
B4&66 TRX



2.2. Product technical parameters:

GSM

Items	GSM850	GSM900	DCS	PCS
Frequency allocation	TX(Uplink): 824M - 849MHZ	TX(Uplink): 880M - 915MHZ	TX(Uplink): 1710M - 1785MHZ	TX(Uplink): 1850M - 1910MHZ
	RX(Downlink): 869M - 894MHz	RX(Downlink): 925M - 960MHZ	RX(Downlink): 1805M - 1880MHZ	RX(Downlink): 1930M - 1990MHZ
Channelwidth	200KHz	200KHz	200KHz	200KHz

Channel	128 - 251	975 - 1023, 0 - 124	512 - 885	512 - 810
Modulation	GMSK, BT=0.3 8PSK(downlink)	GMSK, BT=0.3 8PSK(downlink)	GMSK, BT=0.3 8PSK(downlink)	GMSK, BT=0.3 8PSK(downlink)
GPRS	Class12 capability class B	Class12 capability class B	Class12 capability class B	Class12 capability class B
TX/RX space	45MHz	45MHz	95MHz	80MHz
(Fn)Freq. calculating formula	Fn=824.2+(N - 128) X0.2 N: Channel No. Unit: MHz	Fn=880.2+(N - 975) X0.2 N: Channel No. Unit: MHz	Fn=1710.2+(N - 512)X0.2 N: Channel No. Unit: MHz	Fn=1850.2+(N - 512)X0.2 N: Channel No. Unit: MHz

WCDMA

Items	B1
Frequency allocation	TX(Uplink) : 1920 - 1980MHZ
	RX(Downlink):2110 - 2170MHZ
Channel band width	5MHz
Channel	9612 - 9888
Modulation	Uplink: QPSK Downlink: 16QAM
WCDMA	Power Class 3
HSDPA	Power Class 3 Category 24
HSUPA	Power Class 3 Category 7
TX/RX channel space	190MHz
(Fn)Freq. calculating formula	Fn = 1922.4+ (N - 9612) X0.2N: Channel No. //Unit: MHz

Items	B2
Frequency allocation	TX(Uplink) : 1850 -1910 MHZ
	RX(Downlink): 1930 -1990 MHZ
Channel band width	5MHz
Channel	9262 - 9538
Modulation	Uplink: QPSK Downlink: 16QAM
WCDMA	Power Class 3
HSDPA	Power Class 3 Category 24
HSUPA	Power Class 3 Category 7
TX/RX channel space	80MHz
(Fn)Freq. calculating formula	Fn = 1932.4 + (N - 9262) X0.2N: Channel No. //Unit: MHz

Items	B4
Frequency allocation	TX(Uplink) : 1712.4 - 1752.6MHZ
	RX(Downlink): 2112.4 - 2152.6MHZ
Channel band width	5MHz
Channel	1312 - 1513
Modulation	Uplink: QPSK Downlink: 16QAM
WCDMA	Power Class 3
HSDPA	Power Class 3 Category 24
HSUPA	Power Class 3 Category 7
TX/RX channel space	400MHz
(Fn)Freq. calculating formula	Fn = 1712.4+ (N - 1312) X0.2N: Channel No. //Unit: MHz

Items	B5
Frequency allocation	TX(Uplink) : 826.4 - 846.6MHZ
	RX(Downlink):871.4 - 891.6MHZ
Channel band width	5MHz

Channel	4132 - 4233
Modulation	Uplink: QPSK Downlink: 16QAM
WCDMA	Power Class 3
HSDPA	Power Class 3 Category 24
HSUPA	Power Class 3 Category 7
TX/RX channel space	45MHz
(Fn)Freq. calculating formula	Fn = 826.4+ (N - 4132) X0.2N: Channel No. //Unit: MHz

Items	B8
Frequency allocation	TX(Uplink) : 880 -915 MHZ
	RX(Downlink): 925 -960 MHZ
Channel band width	5MHz
Channel	2712 - 2863
Modulation	Uplink: QPSK Downlink: 16QAM
WCDMA	Power Class 3
HSDPA	Power Class 3 Category 24
HSUPA	Power Class 3 Category 7
TX/RX channel space	45MHz
(Fn)Freq. calculating formula	Fn = 882.4 + (N - 2712) X0.2N: Channel No. //Unit: MHz

FDD LTE

Items	B1
Frequency allocation	TX(Uplink) : 1920 - 1980MHZ
	RX(Downlink):2110 - 2170MHZ
Channel band width	5/10/15/20MHz
Channel	18025 - 18575
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	190MHz

Items	B2
Frequency allocation	TX(Uplink) : 1850 - 1909.9MHZ
	RX(Downlink): 1930 - 1989.9MHZ
Channel band width	5/10/15/20MHz
Channel	18600 - 19199
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4

TX/RX channel space	80MHz

Items	B3
Frequency allocation	TX(Uplink) : 1710 - 1785MHZ
	RX(Downlink):1805 - 1880MHZ
Channel band width	1.4/3/5/10/15/20MHz
Channel	19207 - 19943
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	95MHz

Items	B4
Frequency allocation	TX(Uplink) : 1710 - 1754.9MHZ
	RX(Downlink): 2110 - 2154.9MHZ
Channel band width	5/10/15/20MHz
Channel	19950 - 20399
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	400MHz

Items	B5
Frequency allocation	TX(Uplink) : 824 - 848.9MHZ
	RX(Downlink): 869 - 893.9MHZ
Channel band width	1.4/3/5/10MHz
Channel	20400 - 20649
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	45MHz

Items	B7
Frequency allocation	TX(Uplink) : 2500 - 2570MHZ
	RX(Downlink):2110 - 2170MHZ
Channel band width	5/10/15/20MHz
Channel	20775 - 21425
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	120MHz

Items	B8
Frequency allocation	TX(Uplink) : 880 - 915MHZ
	RX(Downlink):925 - 960MHZ
Channel band width	1.4/3/5/10MHz
Channel	21457 - 21793
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM

LTE Category	Category 4
TX/RX channel space	45MHz

Items	B18
Frequency allocation	TX(Uplink) : 815 - 829.9MHZ
	RX(Downlink): 860 - 874.9MHZ
Channel band width	5/10/15MHz
Channel	24025 - 24125
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	45MHz

Items	B19
Frequency allocation	TX(Uplink) : 832.5 - 842.5MHZ
	RX(Downlink): 877.5 - 887.5MHZ
Channel band width	5/10/15MHz
Channel	24025 - 24125
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	45MHz

Items	B20
Frequency allocation	TX(Uplink) : 832 - 862MHZ
	RX(Downlink):791 - 821MHZ
Channel band width	5/10/15/20MHz
Channel	24175 - 24425
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	41MHz

Items	B25
Frequency allocation	TX(Uplink) : 1850 - 1914.9MHZ
	RX(Downlink): 1930 - 1994.9MHZ
Channel band width	1.4/3/5/10/15/20MHz
Channel	26040 - 26689
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	80MHz

Items	B26
Frequency allocation	TX(Uplink) : 814 - 848.9MHZ
	RX(Downlink): 859 - 893.9MHZ
Channel band width	1.4/3/5/10/15MHz
Channel	26690 - 27039

Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	45MHz

Items	B28
Frequency allocation	TX(Uplink) : 703 - 747.9MHZ
	RX(Downlink): 758 - 802.9MHZ
Channel band width	1.4/3/5/10MHz
Channel	27210 - 27659
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	55MHz

Items	B66
Frequency allocation	TX(Uplink) : 1712.5 - 1777.5MHZ
	RX(Downlink): 2112.5 - 2177.5MHZ
Channel band width	5/10/15/20MHz
Channel	131979 - 132671
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	400MHz

TDD_LTE

Items	B34
Frequency allocation	TX(Uplink) : 2010 - 2024.9MHZ
	RX(Downlink): 2010 - 2024.9MHZ
Channel band width	5/10/15MHz
Channel	36225 - 36324
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	

Items	B38
Frequency allocation	TX(Uplink) : 2570 - 2619.9MHZ
	RX(Downlink): 2570 - 2619.9MHZ
Channel band width	5/10/15/20MHz
Channel	37775 - 38224
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	

Items	B39
Frequency allocation	TX(Uplink) : 1880 - 1919.9MHZ
	RX(Downlink): 1880 - 1919.9MHZ
Channel band width	5/10/15/20MHz

Channel	38275 - 38624
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	

Items	B40
Frequency allocation	TX(Uplink) : 2300 - 2399.9MHZ
	RX(Downlink): 2300 - 2399.9MHZ
Channel band width	5/10/15/20MHz
Channel	38675 - 39624
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	

Items	B41 100M
Frequency allocation	TX(Uplink) : 2555 - 2654.9MHZ
	RX(Downlink): 2555 - 2654.9MHZ
Channel band width	5/10/15/20MHz
Channel	40265 - 41214
Modulation	Uplink: QPSK 16QAM Downlink: 16QAM 64QAM
LTE Category	Category 4
TX/RX channel space	

BR/EDR Specs:

BR/EDRSpecs:	
Items	Values
FrequencyRange	2402MHz - 2480MHz
Power	8dBm±2dB
Modulation	GFSK/8 - DPSK/π/4 - DQPSK
Numberorchannels	79
Channelspacing	1MHz

BLE Specs:

Items	Values
FrequencyRange	2402MHz - 2480MHz
RFPowerOutput	0.0dBm±1dB
Modulation	GFSK
Numberorchannels	40

WIFI Specs:

Frequencyrange	2412MHz - 2472MHzforb/g/n(HT20) 2422MHz - 2462MHzforn(HT40) 5180MHz - 5825MHzfora/n(HT20) 5180MHz - 5825MHzforn(HT40)
IEEE	802.11a/b/g,802.11nHT20/HT40

RFpower802.11baveragepower	15.5Bm±1dB
RFpower802.11gaveragepower	13.5dBm±1dB
RFpower802.11aHT20averagepower	12.5dBm±1dB
RFpower802.11nHT20averagepower	11.5dBm±1dB
RFpower802.11nHT40averagepower	10.0dBm±1dB
RFpower802.11bpeakpower	20.0dBm±1dB
RFpower802.11gpeakpower	22.0dBm±1dB
RFpower802.11aHT20peakpower	22.0dBm±1dB
RFpower802.11nHT20peakpower	22.0dBm±1dB
RFpower802.11nHT40peakpower	20.0dBm±1dB
Modulation	DSSS/OFDM
Numberofchannels	13fora/b/g/n(HT20)11forn(HT40)
Channelspacing	5MHz

RECOMMENDABLE OPERATION CONDITION:

NormalSupplyVoltage(Vd.c.)	3.7V
MaximumExtremeSupplyVoltage(Vd.c.)	4.2V
MinimumExtremeSupplyVoltage(Vd.c.)	3.4V
MinimumExtremeTemperature	-20℃
SIM/USIMVoltage	1.8/3v

2G PA

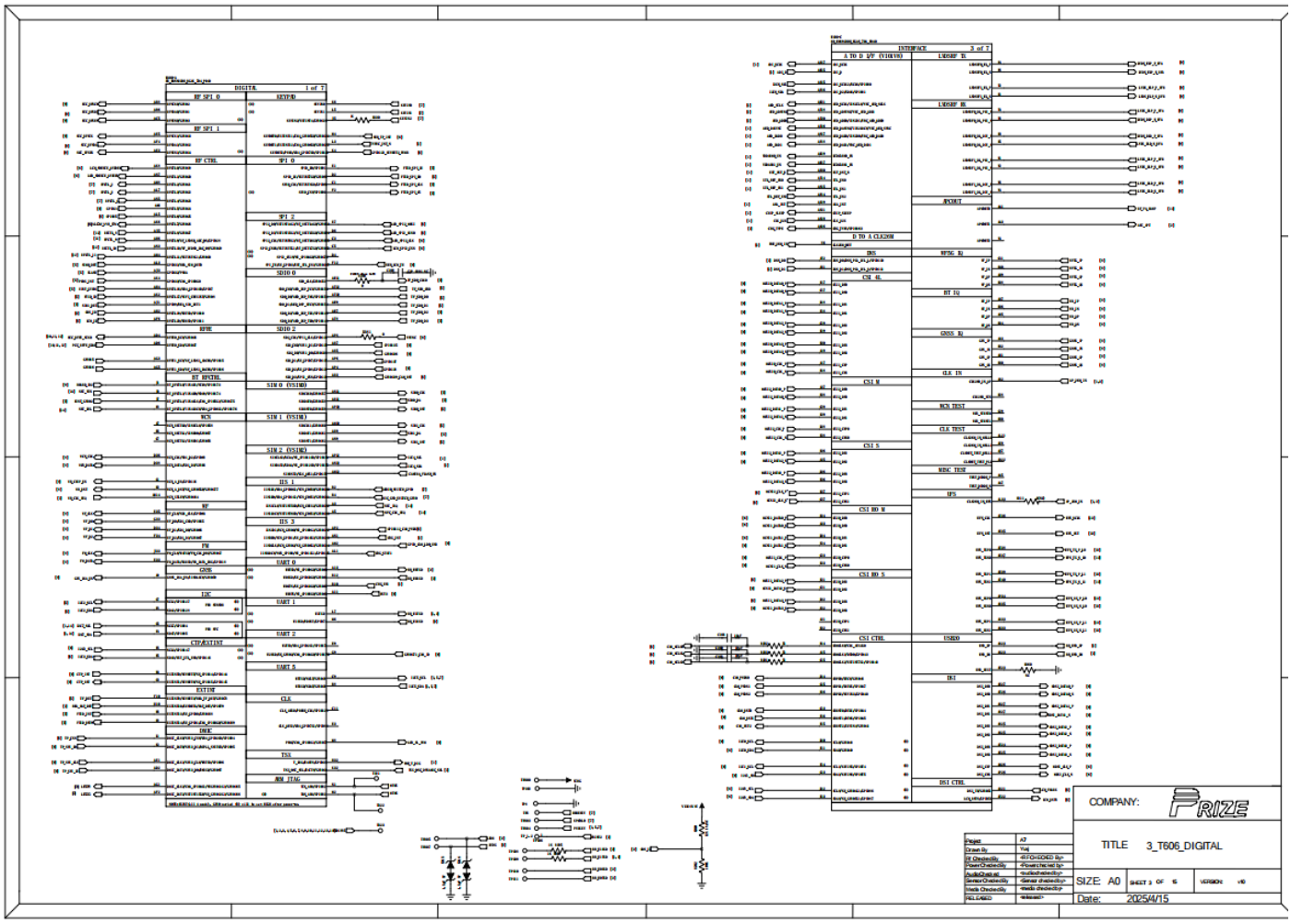
PA parameter GSM	Specification		
	Min.	Typ.	Max.
Powersupplyvoltage	3V	3.4V	4.8V
Powersupplycurrent	0	0.23	2A

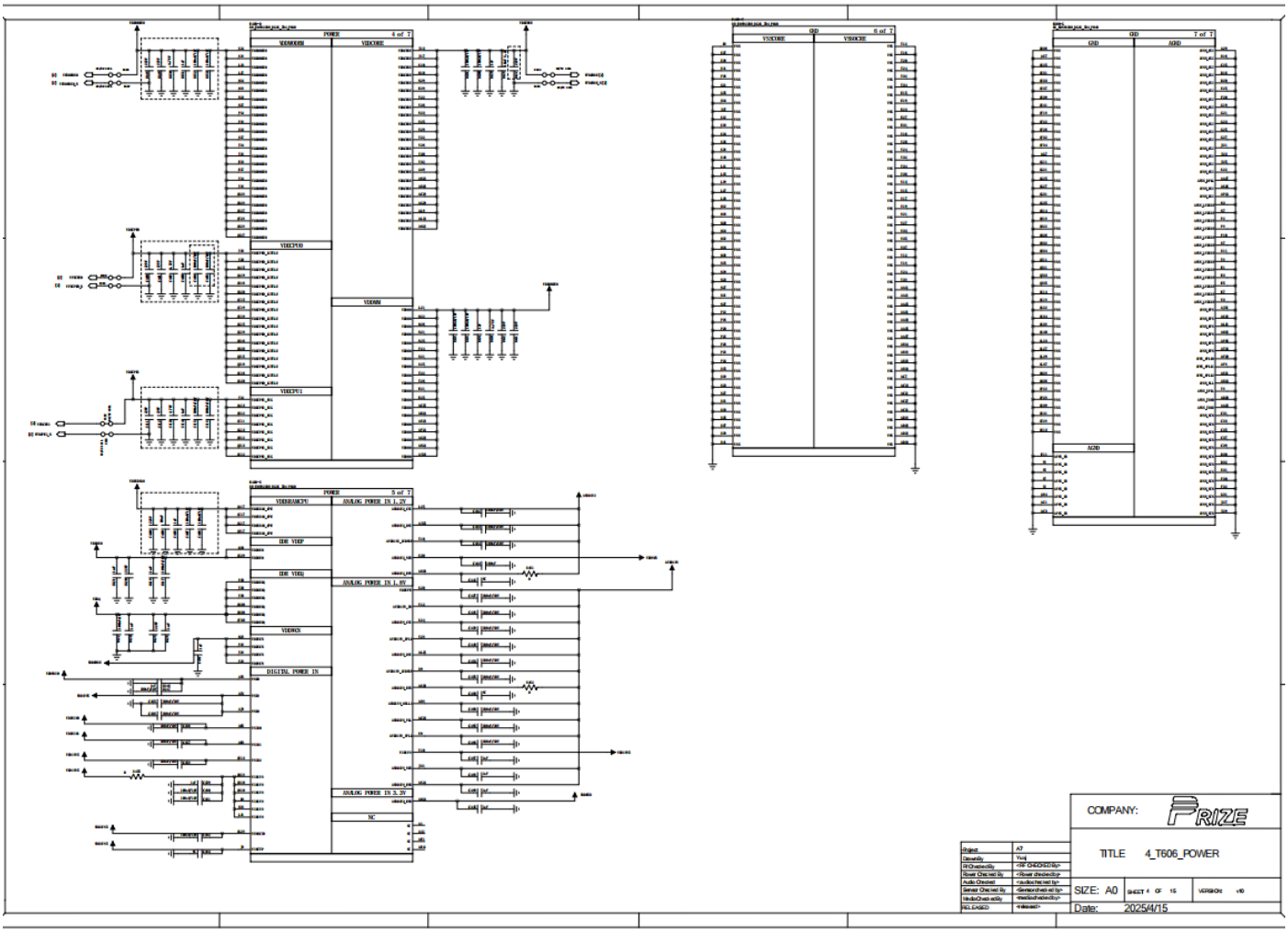
3G /LTE PA

PA parameter UMTS/LTE	Specification		
	Min.	Typ.	Max.
Powersupplyvoltage	3.2V	3.4V	4.2V
Powersupplycurrent	0	0.51	1A

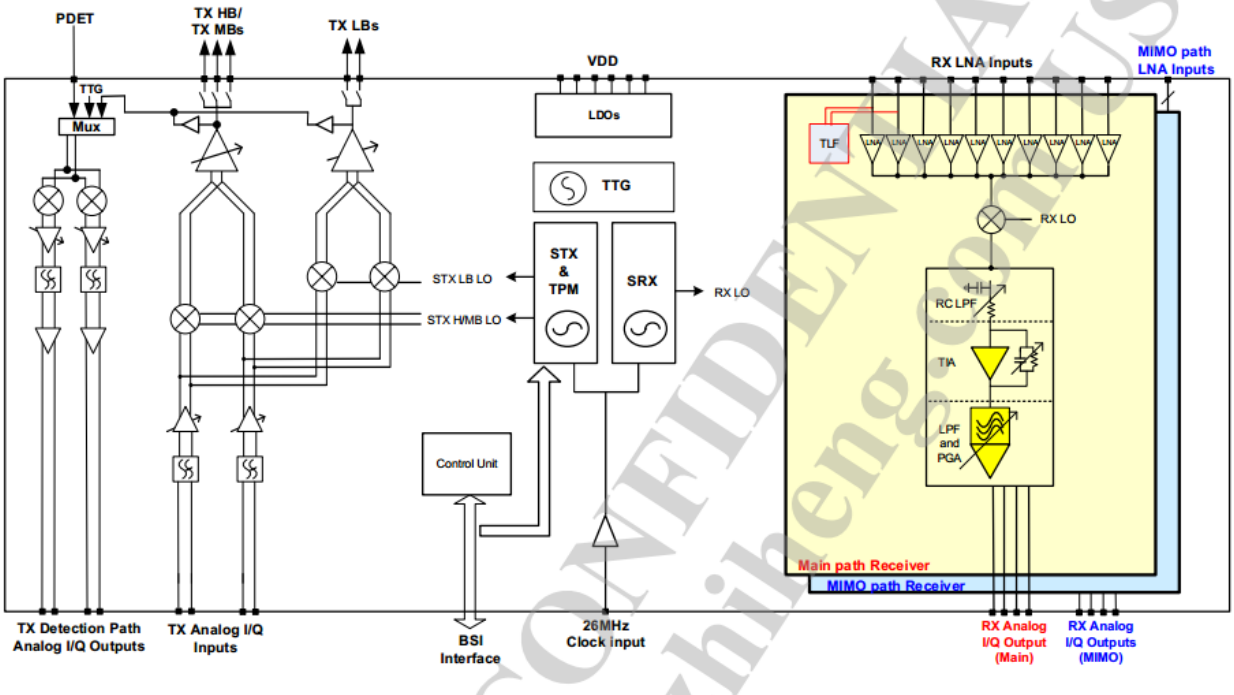
2.3. BB:

BB (Base-Band) section is the control & management center of the mobile where OS (Operate System) running and provides the MMI for the Tablet PC.



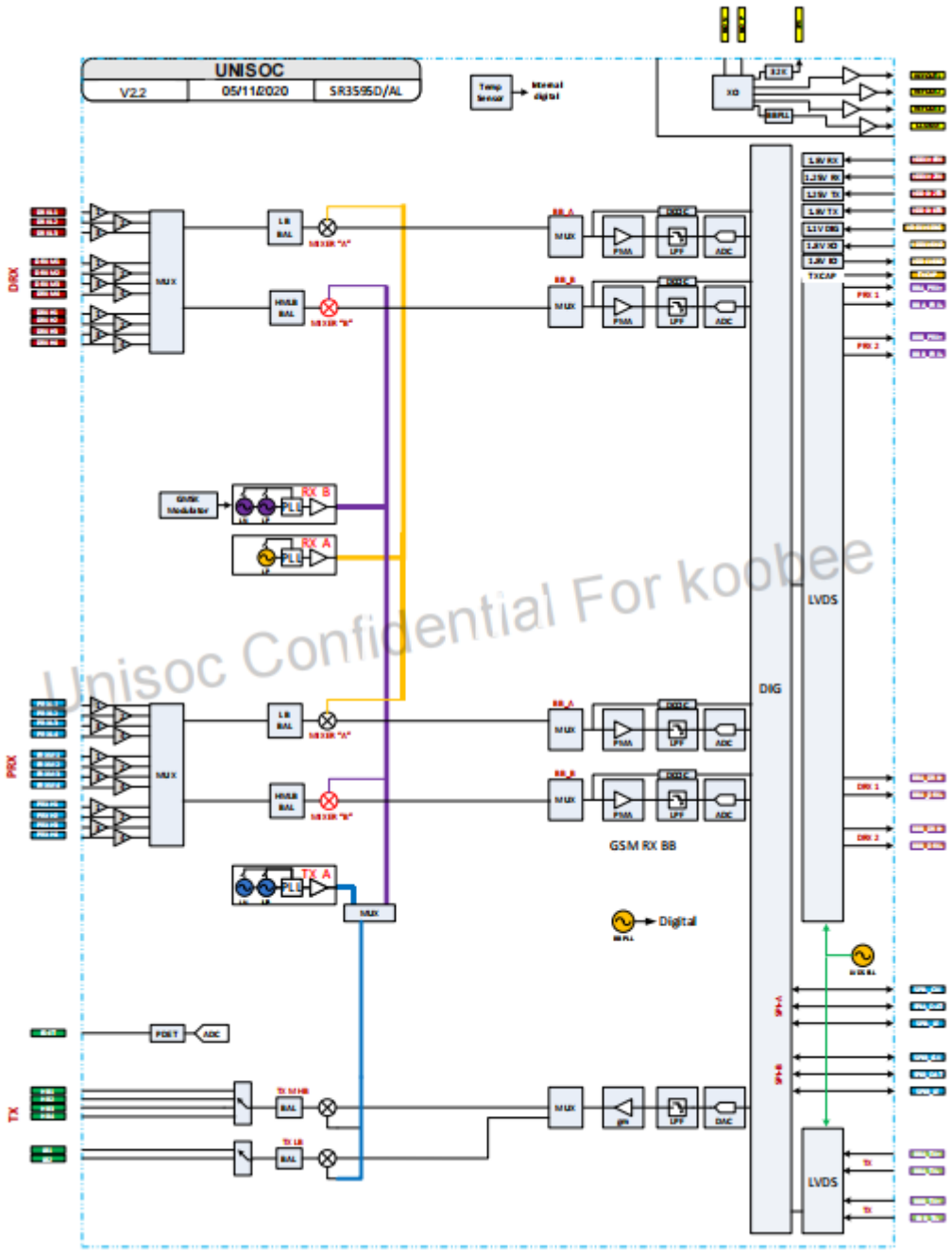


2.4. Receiver principle



The aerial signal mobile received go to RF Connector, and then transmit to transceiver via the selected band in RF switcher & SAW filter. Four IQ signals input to CPU, Go through A/D, DSP, andD/A section in CPU, then output to receiver.

2.5. Transmitter principle



1) Audio signal input from Microphone, Microphone convert the voice signal to analog signal and input to CPU (UM9230).

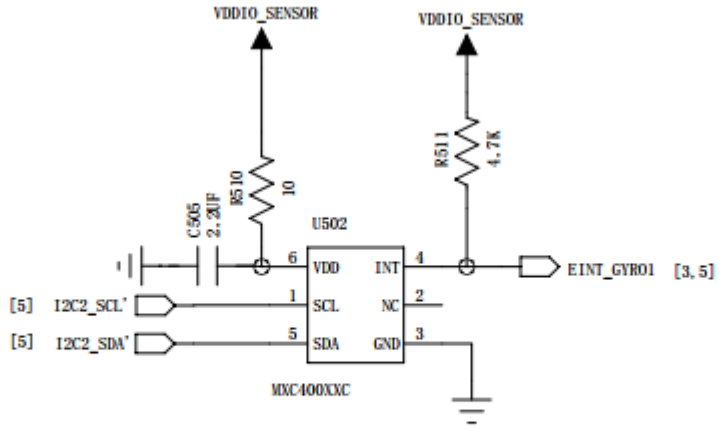
2) After A/D in CPU, then send the digital signal to DSP pass ASI. Then processed logic signal pass D/A converter divided into four signals (IQ), output from CPU (UM9230) to RF Transceiver I/Q input.

3) After modulated, Then to PA

4). Tx signals output from PA, flow through RF-Connector to antenna.

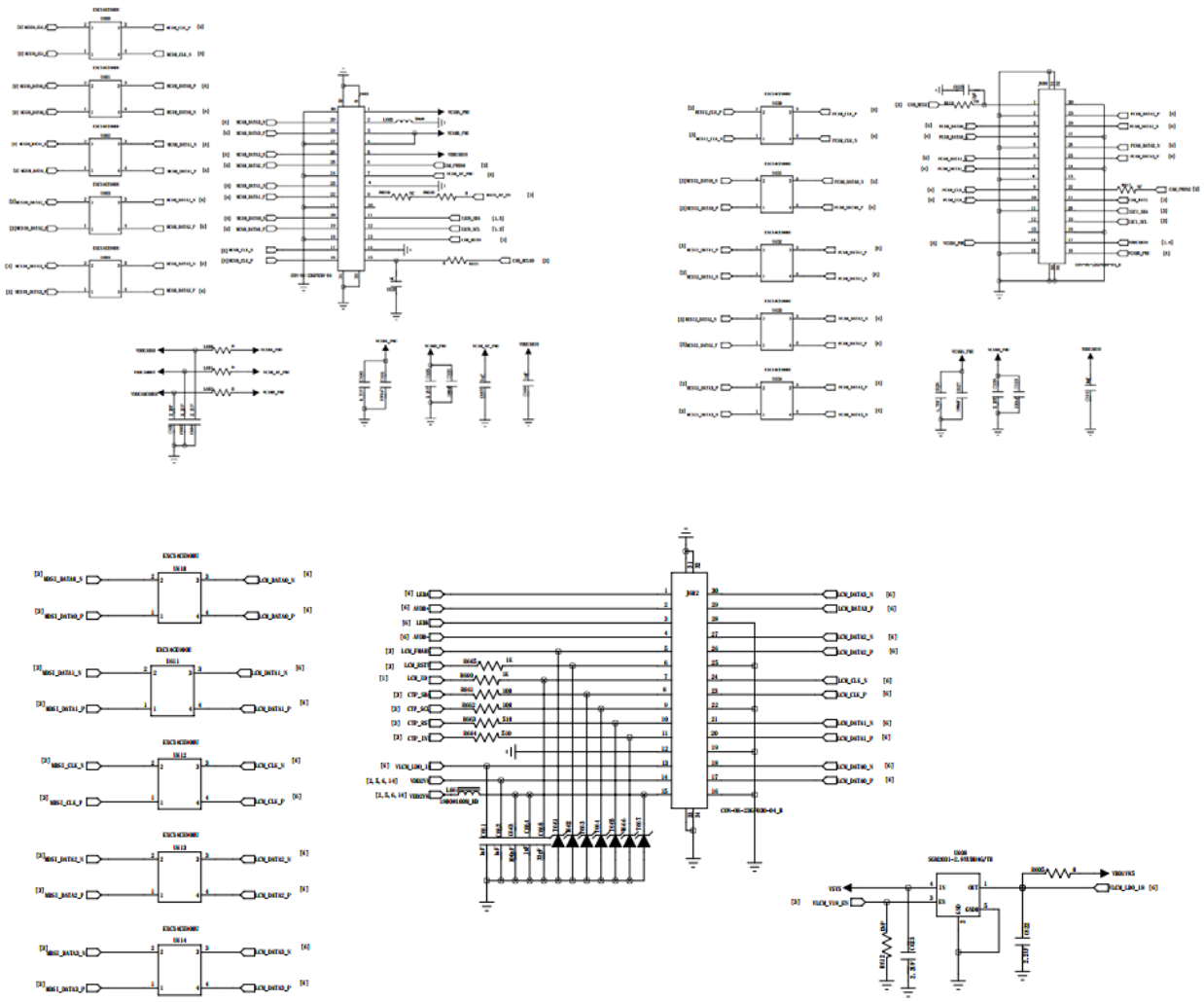
G - Sensor circuit:

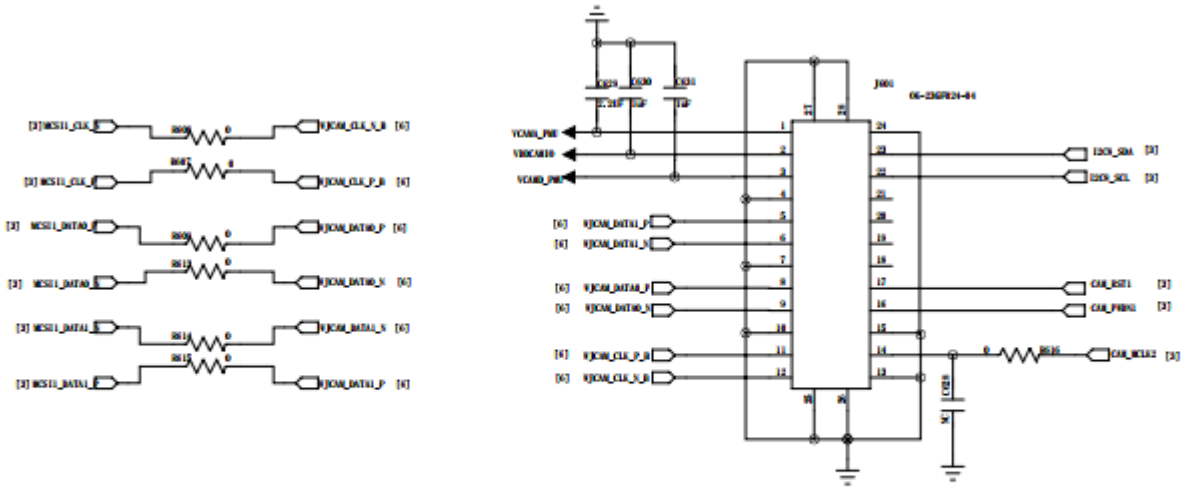
The G sensor cannot use as power reduction instead of proximity sensor, which only used as screen orientation or compass etc



CAMERA Circuit

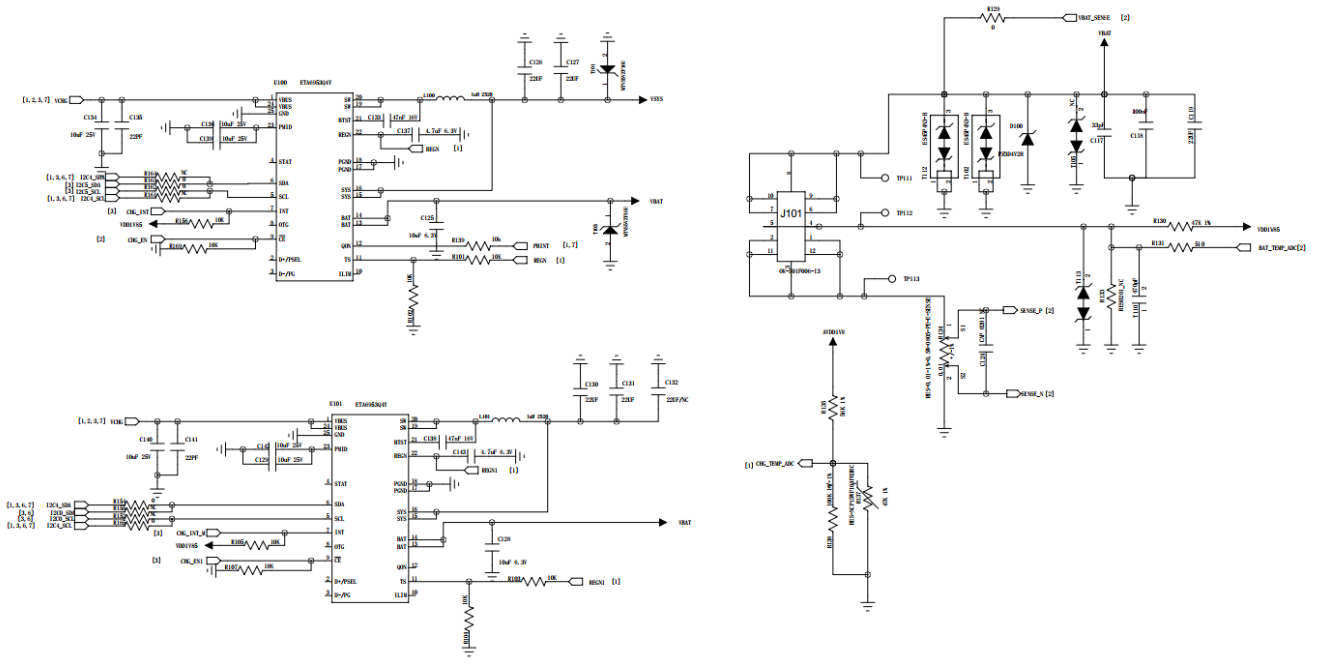
The Dual camera connects to UM9230 through Camera interface.





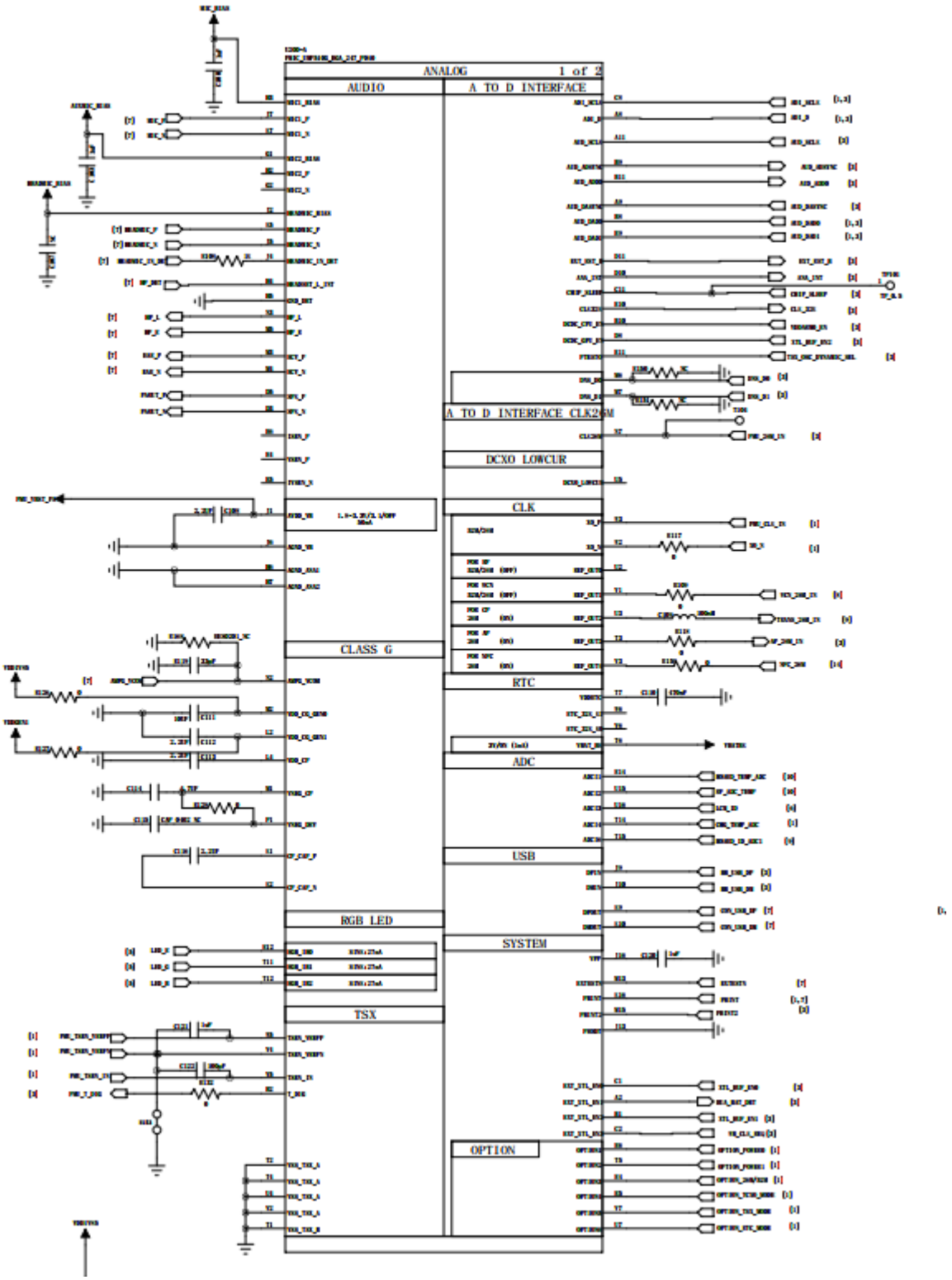
harger Circuit

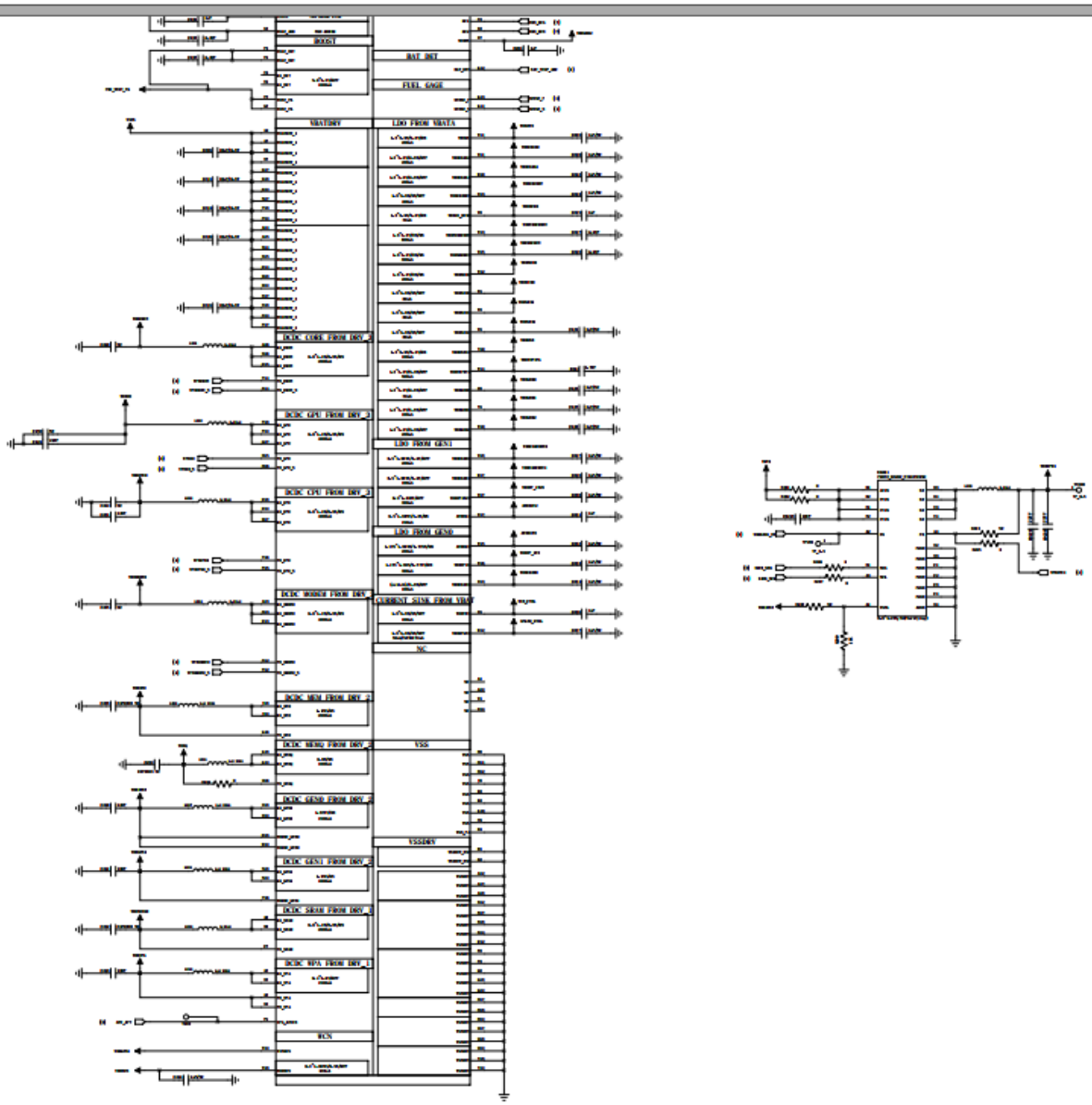
The ETA6953 is charger control circuit.



PMU Part Circuit

The circuit is part of the power management chip UMP510G. UMP510G is a power management system chip optimized for 2G/3G/4G handsets and smart phones, especially based on the UNISOC SR3595D system solution. UMP510G contains buck converters and LDO, which are optimized for specific 2G/3G/4G smart phone subsystems.


ANALOG
1 of 2
AUDIO
A TO D INTERFACE
A TO D INTERFACE CLK26M
DCXO LOWCUR
CLK
CLASS G
RTC
ADC
USB
RGB LED
SYSTEM
TSX
OPTION

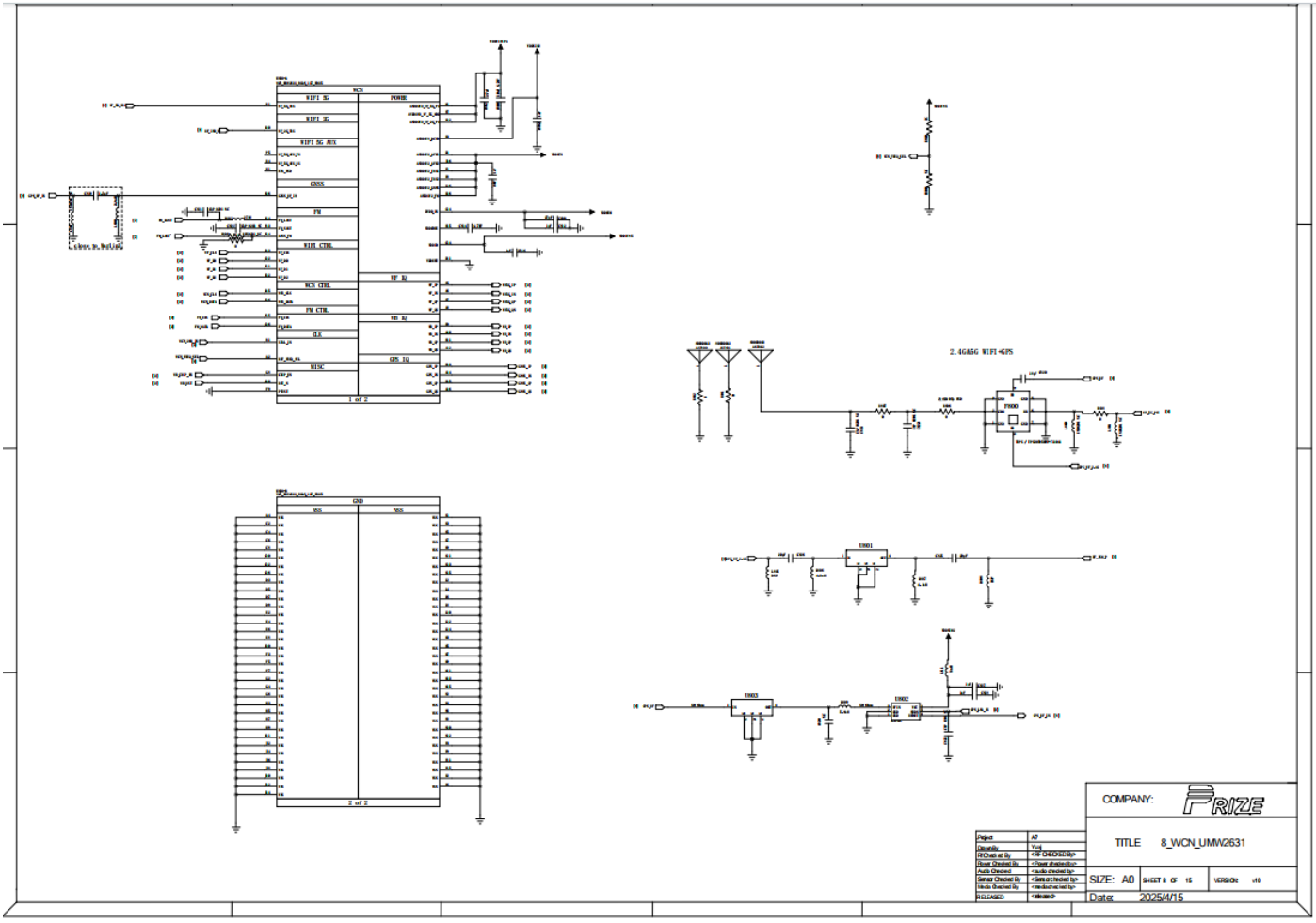


2.6. WLAN/Bluetooth,GPS and FM function

UMW2631 is a 4-in-1 wireless communication device which includes:

- WLAN
- Bluetooth
- GPS
- FM Receiver

The RF parts of those four blocks are placed on chip UMW2631. With four advanced radio technologies integrated on one chip, UM9230/UMW2631 is the best and most convenient connectivity solution in the industry,UM9230 implementing advanced and sophisticated Radio Coexistence algorithms and hardware mechanisms. It supports single antenna sharing among 2.4 GHz Bluetooth, 2.4GHz/5GHz WLAN and 1.575 GHz for GPS. The enhanced overall quality is achieved for simultaneous voice, data and audio/video transmission on mobile phones and Media Tablets. The small footprint with low-power consumption greatly reduces PCB layout resource. UM9230 also supports 802.11ac WLAN in advanced assorted with UMW2631.



2.6.1. Features

The RF parts gf those four blocks are placed onchip UMW2631!With four advanced radio technologies integrated on one chip,UM9230/UMW2631 is the best and mostconvenient connectivity solution in the industry,UM9230 implementing advanced andsophisticated Radio Coexistence algorithms and hardware mechanisms It supports single antenna sharing among 2:4GHZ Bluetooth 24GHZ/5GHZ WLAN and 1-575ghz for GPS she enhanced overall quality is achieved forimultaneous voice, data and audio/videotransmission on mobile phones and MediaTablets. The small footprint with low-power consumption greatly reduces PCB layout resource

2.6.2. WLAN

- dual-band (2.4GHZ/5GHZ)sindegtregm 8oz-11 a/b/8/n MAC/P/RE
- 8o21 d/h/k compliant
- security- WEA W A/wpapersonal WP2.0, WAPI(hardware)
- QOS: WEA WMM, WMM PS
- 8o2hn optional features: STBC, A MPDU, blk-ack, RIFS, MCS Feedback,

2o/AOMHZ coexistence (Pco).
unscheduled PSMP
- Supports 802, 11w protected managed frames
- supports wi-fi Direct(WFA p-2-p
standard) and wi-fi Miracast (wi-fi
Displa
- Supports wi-fi Hot Spot 2.0
- integrated 2.4GHZ PA with max. 19dbm
CCK output power and 5GHZ PA with
max 17dbm OFDM 54mbps output
power
- Typical Rx sensitivity with companion
chip modem: -73d6m at 1ig54mbps
node and 755dbm at iia 54mbps mode
-Per packet TX power control

2.6.3. Bluetooth

Bluetooth specifieation va1+EDR
Bluetooth specification 3.+ HS
compliance
Bluetooth v5. Low Energy (LE)
Integrated PA with 6dbm(class 1)
transmit power
Typical Rx sensitivity with companion
chip modem: GESK 925dbm, DOPSK
oi 5dbm, 8-dpsk 86dbm
best-in-class BT/wi-fi coexistence
pertormance
Up to 5 piconets simultaneously with
background inquiry/page scan
Supports Scatternet
Packet Loss Concealment (PLC)function
for better voice quality

2.6.4. GPS

- GPs/Glonass/Beidou/
- Supports SRAS(satellite-based
augmentation systems
WAAS/MSAS/EGNOS/GAGAN
- best-in-class sensitivity performance
-165 drm tracking sensitivity
-163 drm hot start sensitivity
148 dbm cold start sensitivity
-151 dbm warm start sensitivity
AGPS sensitivity is 8db design margin
over 3GPP
- Full A-GPS capability
(E911/SUPL/EPO/Hotstill)
- Active interference cancellation for up to
12 in-band tones
- 5HZ update rate

2.6.5. FM

- 65-108mhz with 5okhz step
- RDS/RBDS
- Digital stereo demodulator
- Simplified digital audio interface (12S)
- Stereo noise reducton
- Audio sensitivity 2dbuvemf
(SINAD=26db)
- Audio SINAD 60db
- anti-jamming
- Integrated short antenna

Operation Frequency:
GSM: GSM850: 824.2~848.8 MHz PCS 1900: 1850.2~1909.8 MHz
WCDMA: Band II: 1852.4~1907.6 MHz Band V: 826.4~846.6 MHz
Band IV: 1712.4~1752.6 MHz
LTE: Band 2:1850MHz~1910MHz Band 4:1710MHz~1755MHz
Band 5:824MHz~849MHz Band 7: 2500MHz~2570MHz
Band 66:1710MHz~1780MHz
Wi-Fi: 2412MHz~2462MHz 5150MHz-5250MHz
5725MHz-5850MHz
Bluetooth: 2402 MHz ~ 2480 MHz
NFC: 13.56MHz
Modulation technology:
GSM: Voice(GMSK) GPRS(GMSK) EGPRS(GMSK, 8PSK)
WCDMA: RMC(QPSK) HSUPA(QPSK) HSDPA(QPSK,16QAM)
LTE: QPSK 16QAM 64QAM
(only support downlink)
Wi-Fi: 802.11b(DSSS) 802.11a/g/n/ac (OFDM)
Bluetooth: BDR(GFSK) EDR(π/4-DQPSK, 8DPSK) LE(GFSK)
NFC: ASK
Antenna Type: Internal Antenna
Antenna Gain:
GSM 850: -3.5dBi; PCS 1900: -0.3dBi
WCDMA Band II: -0.3dBi; WCDMA Band V: -3.5dBi
WCDMA Band IV: -0.8dBi
LTE Band 2: -0.3 dBi
LTE Band 4: -0.8 dBi
LTE Band 5: -3.5 dBi
LTE Band 7: -1.7 dBi
LTE Band 66: -0.81 dBi
Bluetooth:-1.3dBi; 2.4G Wi-Fi: -1.3dBi; 5G Wi-Fi: 2.2dBi