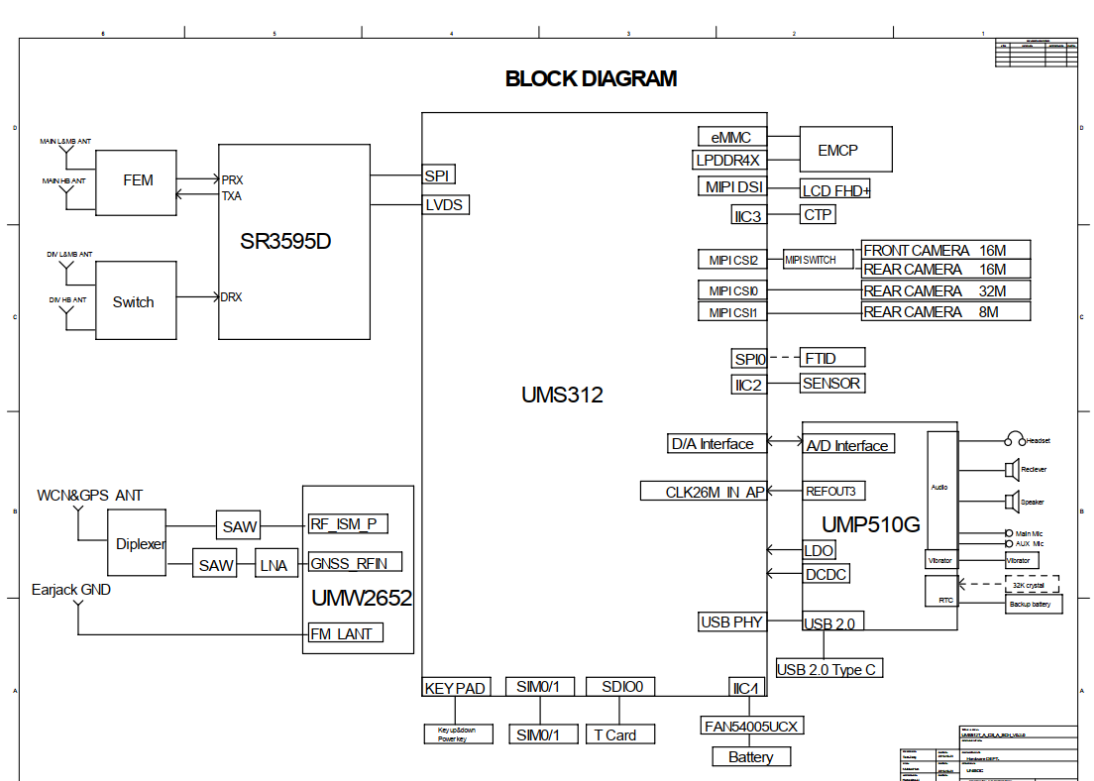# Specification

Scope

The equipment under test is a dual sim-card Three module quad band 4G LTE smart phone. This document is shown and provided the more detail information about the platform used in. The basic description for the Baseband and RF section are also included.

BLOCK DIAGRAM

PMU

UMP510G is a power management system chip optimized for 2G/3G/4G smart phones, especially based on the Spreadtrum UMS312 system solution. UMP510G cIntegrated 7 DC-DCs and 26 low dropout regulators (LDOs),,which are optimized for specific 2G/3G/smart phone subsystems. All the chipset in the platform power though this chip.Support standby mode with small deep-sleep current.

Baseband

UMS312 is a highly integrated application processor with embedded TD-LTE, LTE FDD, TDSCDMA/HSPA(+), WCDMA/DC-HSDPA, CDMA2000 and GSM/GPRS/EDGE. It consists of One-core ARM® Cortex-A75MP core and Tri-core ARM® Cortex-A55MP as application processor, whichincludes a NEON multimedia processing engine, IMG 8300 as 3D graphics accelerator, multi-standard multi-media accelerators and advanced audio subsystem. The specially optimized architecture of UMS312 can achieve high performance and low power for a lot of applications. Proprietaryarchitectures and algorithms were developed for low power ASIC design and power management.Unique techniques are used for noisesuppression/cancellation, echo suppression/cancellation algorithm. Overall, UMS312 chip set presents a high cost-effective platform for six mode Androidmobile devices .

The multi-standard video accelerator and an advanced audio subsystem are also included to provide advanced multimedia application and services such as streaming
Audio and video，a multitude of decoders and encoders such as H.264and MPEG-4。Audio

supported includes FR，HR，EFR，AMR FR，and AMR HR vocoders，polyphonic ringtones and advanced audio functions such as echo cancellation，hands-free speakphone operation and noise cancellation。

WCN

UMW2652 is a chip that includes the WiFi/BT/FM/GNSS baseband core and their RF. It's the highest level of integration for a mobile system with integrated 802.11/b/g and single stream 802.11n, Bluetooth5.0, Smart ready mode, GNSS and an FM radio receiver. It also includes on-chip 2.4/5GHz CMOS power amplifiers.

Implemented advanced power saving technology, the chip can satisfy the mobile devices which require minimal power consumption and compact pcb size.

RF

SR3595D is a highly integrated, single-die radio transceiver chip that supports 4G FDD-LTE, TDD-LTE, 3G WCDMA, HSDPA, HSUPA, GSM/EDGE as well as TD-SCDMA operation. Implemented in low cost bulk CMOS, it is optimized to meet the challenges of today's small form factor, power efficient, high performance cellular handsets. The SR3595D has total of 7 single-ended transmit ports, 2 GSM, 12 primary and 12 diversity single-ended receive ports. The SR3595D provides connectivity multiple bands of operation. The SR3595D offers a cost competitive and small footprint radio solution for multi-mode, multi-band applications with the highest performance at the lowest power.

The linear transceiver architecture of SR3595D is utilized for 2.5G, 3G and 4G systems, offering excellent performance and design margins over 3GPP requirements. For 2.5G, a direct modulation scheme is used in the transmitter and performance of 2.5G receive and transmit chains is such that no additional RF filters are required to meet out-of-band noise specifications. The output driver stage for each transmitter chain is single-ended and matched to 50Ω.

PA

The RTM7916-51 is a multi-mode multi-band front-end module (FEM) delivering both the power amplification and antenna switching functions. With the state-of-the-art integration design and advanced GaAs technology, this FEM supports both quad-band GSM/ GPRS/EDGE (GSM850 /PCS1900) and dual-band TD-SCDMA/ with matched 50-Ohm RF input and output ports. The FEM also supports UMTS/LTE applications through 8 high linearity TRx ports.

The RPM6743-31 is a 42-pin power amplifier module developed for high linearity applications. With advanced InGaP HBT technology, the module supports multi-band WCDMA&TD-SCDMA&FDD-LTE&TDD-LTE application, including WCDMA Band2/4/5, FDD-LTE Band2/4/5/725/26The SPM6743-11 meets the stringent linearity requirements of LTE QPSK specifications, as well as those of 16QAM modulation.

The RPM6743-31 is self contained with three GaAs power amplifiers for low, mid and high bands, a CMOS controller, a SOI 3P4T switch, a SP5T switch ,a SP7T switch and input & output matching networks. The GaAs PA provides RF amplification in linear mode, while the CMOS controller provides regulated voltage through MIPI RFFE interface. The integrated SOI switch supports band selection and Tx/Rx function. The module is fully matched to 50 ohms at all RF ports.

Operating Frequency Band (RF):

Bluetooth

Operating Frequency	2402MHz~2480MHz
Modulation	GFSK, π/4-DQPSK, 8-DPSK
Number of Channels	79 Channels
Antenna Type	PIFA Antenna
Antenna Gain	1.18 dBi

BLE

Operating Frequency	2402MHz~2480MHz
Modulation	GFSK
Number of Channels	40 Channels
Antenna Type	PIFA Antenna
Antenna Gain	1.18dBi

WIFI2.4G

Operating Frequency	2412-2462MHz for 802.11b/g/11n(HT20); 2422-2452MHz for 802.11n(HT40);
Modulation	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Number of Channels	11 channels for 802.11b/g/11n(HT20); 7 channels for 802.11n(HT40);
Antenna Type	PIFA Antenna
Antenna Gain	1.18 dBi

WIFI5G

IEEE 802.11 WLAN Mode Supported	☒802.11a/n/ac (20MHz channel bandwidth) ☒802.11n/ac (40MHz channel bandwidth) ☒802.11ac (80MHz channel bandwidth)
Data Rate	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15; 802.11ac(VHT20):MCS0-MCS8; 802.11ac(VHT40/VHT80):MCS0-MCS9;
Modulation	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac;

Operating Frequency Range	☒5180-5240MHz for 802.11a/n(HT20)/ac(VHT20); 5190-5230MHz for 802.11n(HT40)/ac(VHT40); 5210MHz for 802.11ac(VHT80) ☒5745-5825 MHz for 802.11a/n(HT20)/ac(VHT20); 5755-5795 MHz for 802.11n(HT40)/ac(VHT40); 5775MHz for 802.11ac(VHT80)
Number of Channels	☒4 channels for 802.11a/n20/ac20 in the 5180-5240MHz band ; 2 channels for 802.11 n40/ac40 in the 5190-5230MHz band ; 1 channels for 802.11 ac80 in the 5210MHz band ; ☒5 channels for 802.11a/n20/ac20 in the 5745-5825MHz band ; 2 channels for 802.11 n40/ac40 in the 5755-5795MHz band ; 1 channels for 802.11 ac80 in the 5775MHz band ;
Antenna Type	PIFA Antenna
Antenna Gain	1.18dBi

GSM/WCDMA

Operating Frequency	☒GSM850: TX824.2MHz~848.8MHz /RX869.2MHz~893.8MHz; ☒UMTS FDD Band V: TX826.4MHz~846.6MHz /RX871.4MHz~891.6MHz; ☒PCS1900: TX1850.2MHz~1909.8MHz /RX1930.2MHz~1989.8MHz; ☒UMTS FDD Band II: TX1852.4MHz~1907.6MHz /RX1932.4MHz~1987.6MHz; ☒UMTS-FDD Band IV:TX1710MHz~1755MHz /RX2110MHz~2155MHz
Modulation	☒GMSK for GSM/GPRS; ☒8PSK for EGPRS; ☒QPSK for UMTS bands;
Power Class	4, tested with power level 5(GSM 850) 1, tested with power level 0(GSM 1900) 3, tested with power control "all 1"(WCDMA Band II/IV/V)
GPRS Class	☒Multi-Class12 ☒Only 4 timeslots are used for GPRS and EGPRS
Antenna Type	PIFA Antenna
Antenna Gain	GSM850: -1.05 dBi; PCS1900: 0.55 dBi Band II: 0.56 dBi; Band IV: 0.52 dBi; Band V: -1.05 dBi

LTE

Frequency Range:	LTE FDD Band 2 Uplink: 1850MHz-1910MHz, Downlink: 1930MHz-1990MHz; LTE FDD Band 4 Uplink: 1710MHz-1755MHz, Downlink: 2110MHz-2155MHz; LTE FDD Band 5 Uplink: 824MHz-849MHz,

	Downlink: 869MHz-894MHz; LTE-FDD Band 7 Uplink: 2500MHz-2570MHz, Downlink: 2620MHz-2690MHz; LTE FDD Band 25 Uplink: 1850MHz-1915MHz, Downlink: 1930MHz-1995MHz; LTE FDD Band 26 Uplink: 814MHz-849MHz, Downlink: 859MHz-894MHz;
Type of Modulation:	QPSK/16QAM
Antenna:	PIFA Antenna
Antenna gain:	Band 2: 0.56dBi; Band 4: 0.53dBi; Band 5: -1.05dBi; Band 7: 0.87dBi; Band 25: 0.53dBi; Band 26: -1.07dBi