

Reveal Gsmart MS800



Deassembly: Expensive HW Architecture

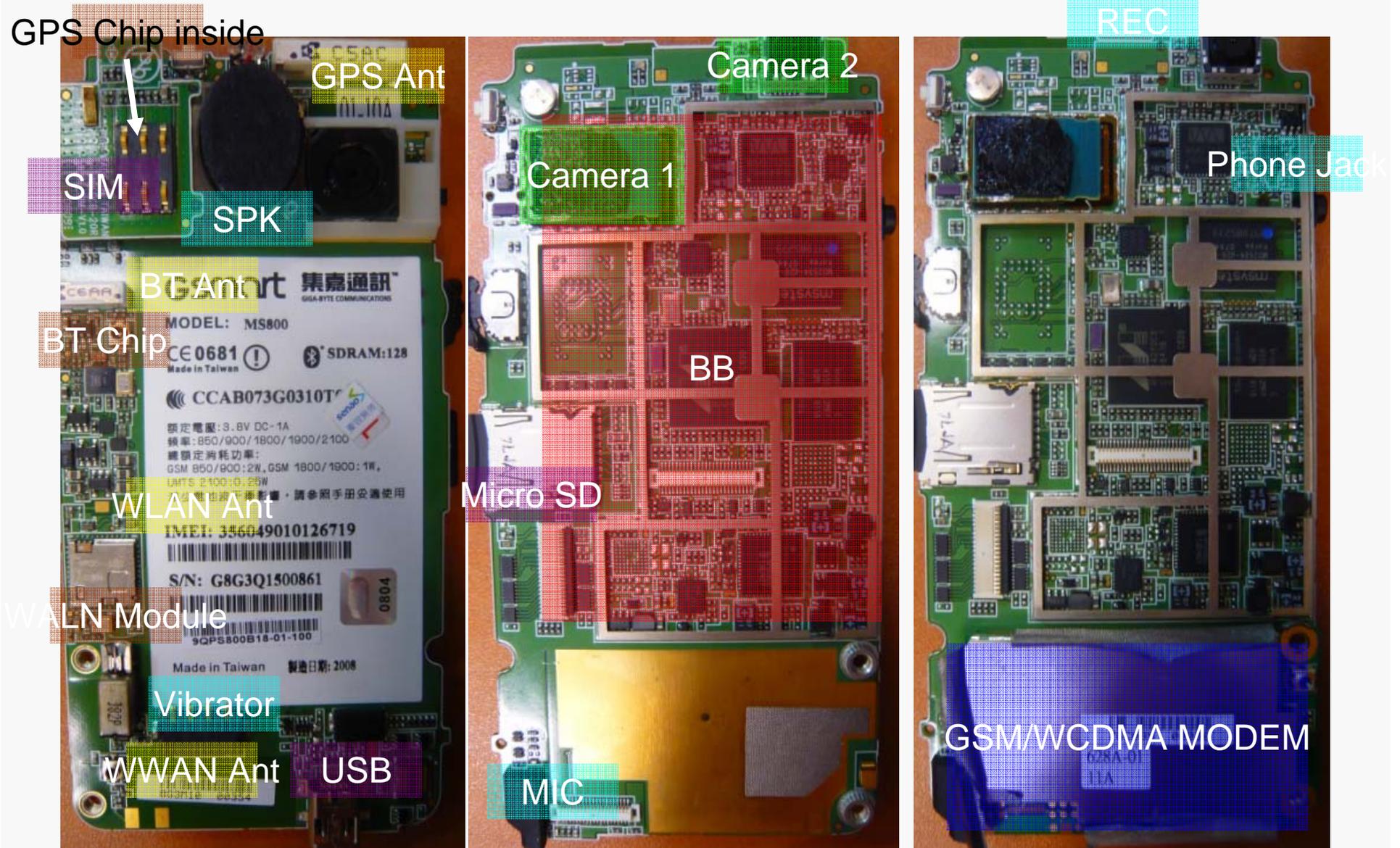
Openmoko
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Gsmart MS800 at a glance

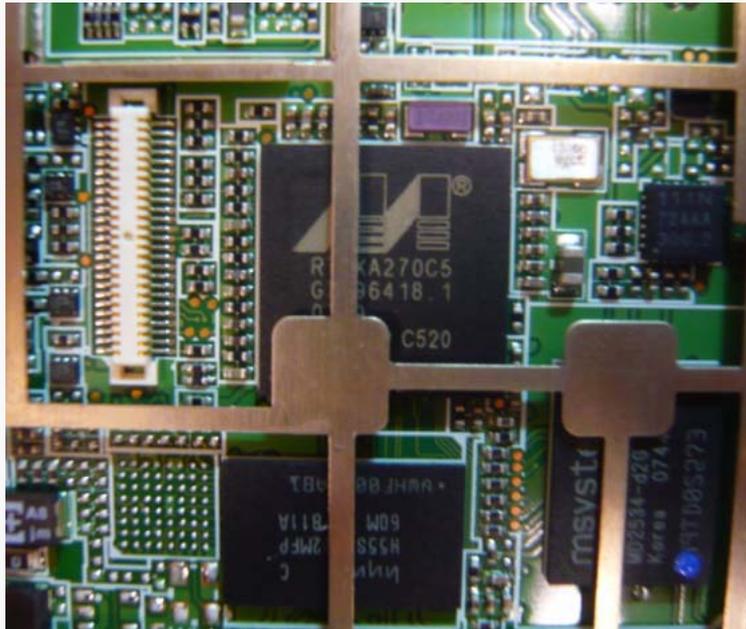


Available:	Q1 2008
CPU	Marvell PXA270 520MHz Processor
Network:	GSM 850/900/1800/1900 WCDMA 2100
Data:	GPRS + EDGE + WIFI+GPS (Sirf StarIIIIGSC3f/LP)
Memory	256MB Flash+128MB SDRAM
Screen:	2.8" 240x320 pixels, 65k colours,VGA
Camera:	2 megapixeks AF
Size:	Compact PDA-style device 116 x 59 x 14.95 mm / 140 grams
Bluetooth:	Yes
Memory Card:	microSD
Infra-red:	No
Polyphonic:	Yes
Java:	Limited
Battery life:	210 minss talktime /6.25 days standby (1300mAh)
FM	FM tuner+ transmitter(RDS)

MS800 PCBA



MS800 Bandband



MCU

Marvell PXA270 520MHz +Qualcomm
MSM6280 (270MHz ARM926)

ABB
(GSM Modem PMU)

Qualcomm PM6650

MCP NAND

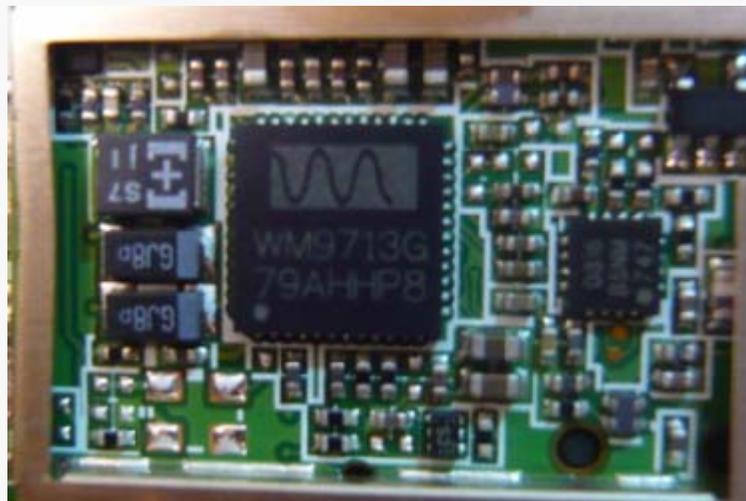
M-system 256MB NAND Flash

MCP M-SDRAM

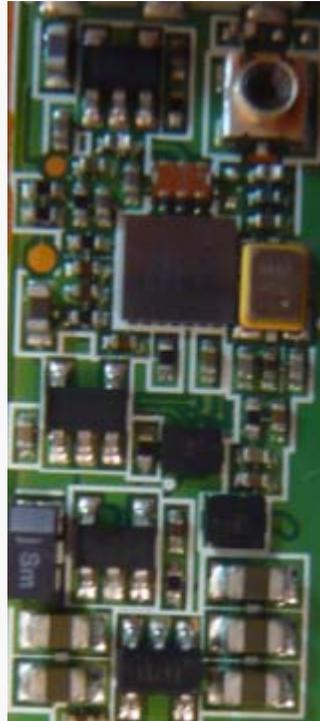
Hynix 128MB Mobile SDRAM

Audio Codec

Wolfson WM9713G



MS800 BT&Wifi



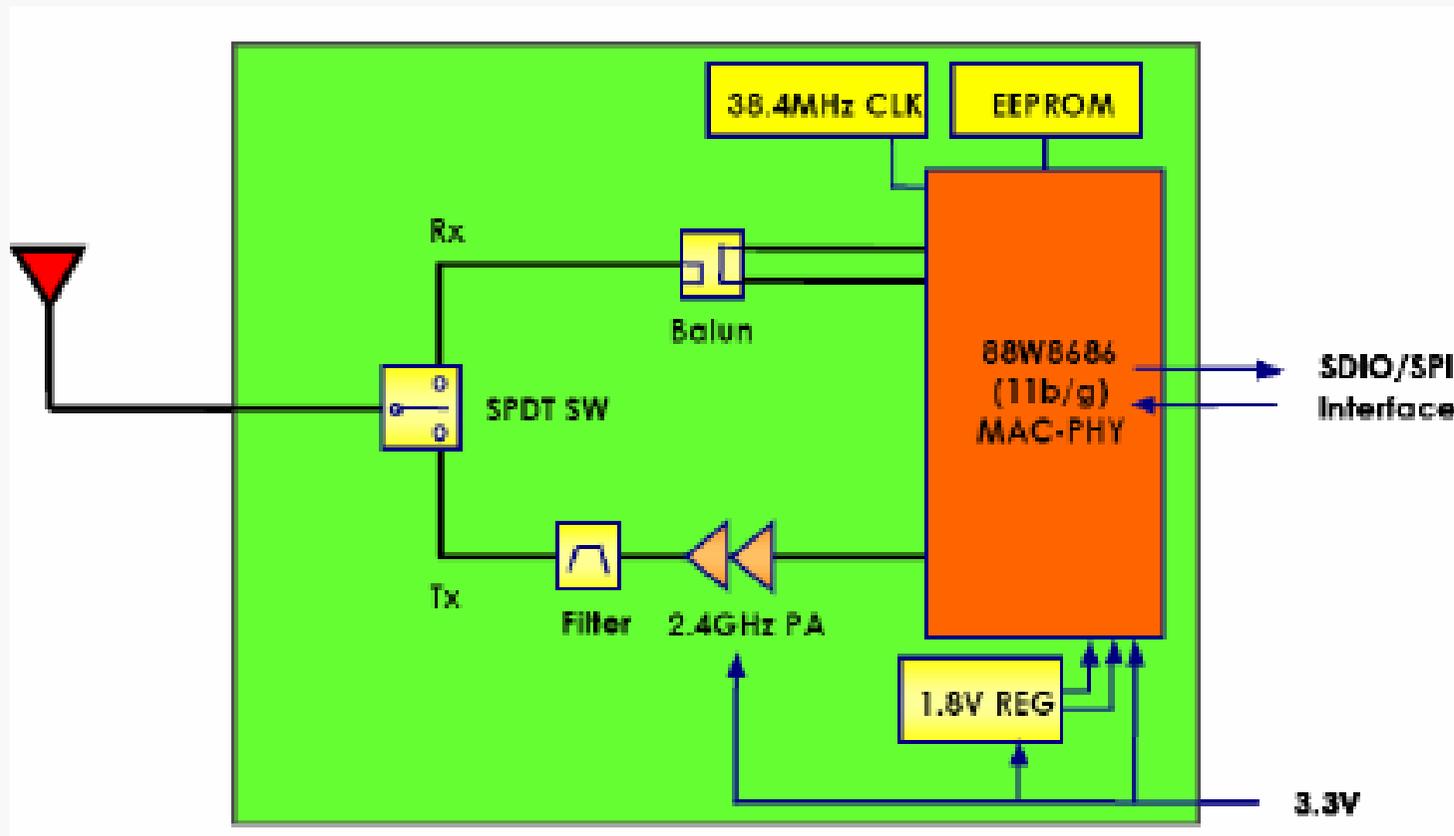
WiFi

Module (Marvell 88W8686) Murata?

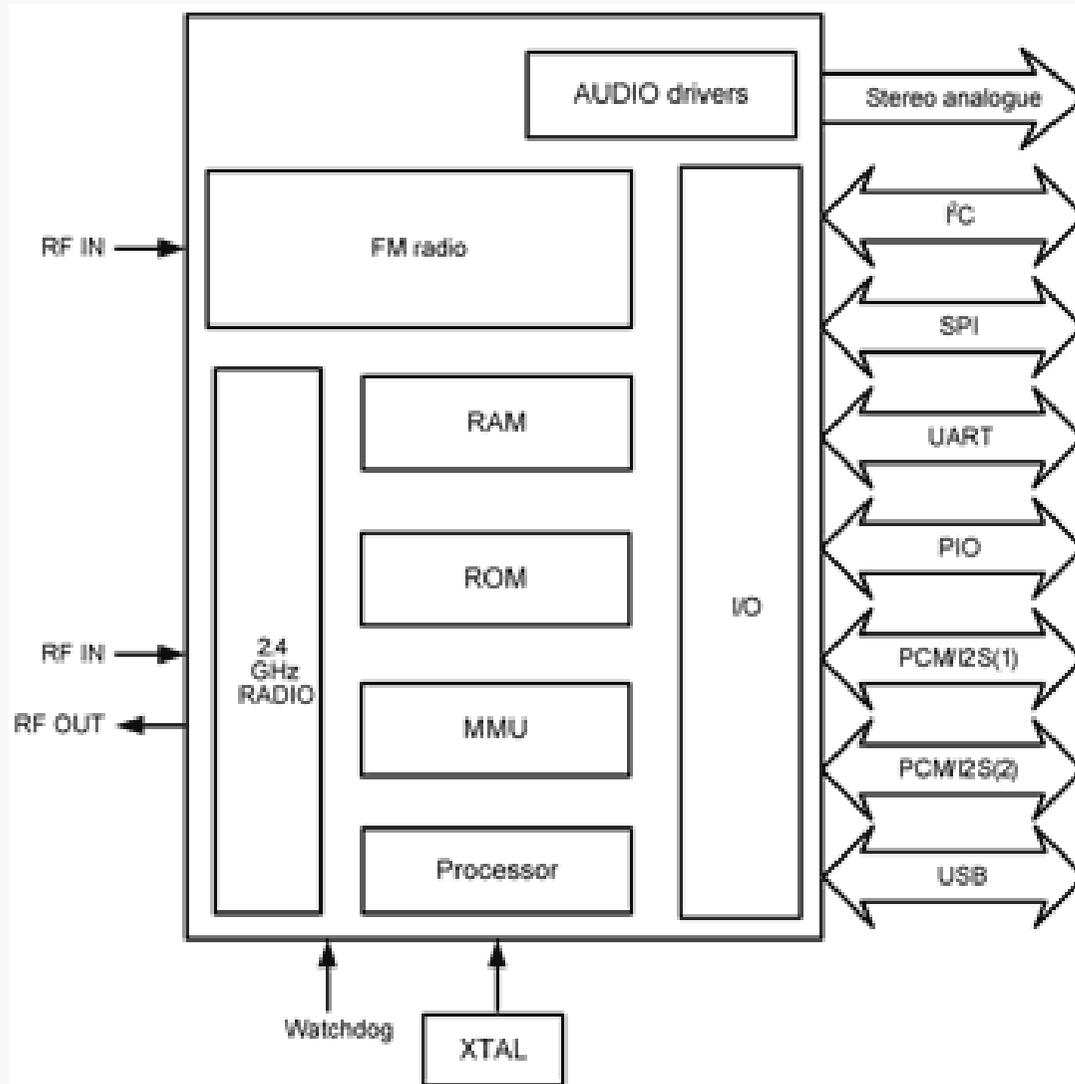
Bluetooth

CSR Bluetooth BC5 (BT+FM) V2.0 EDR
Single chip

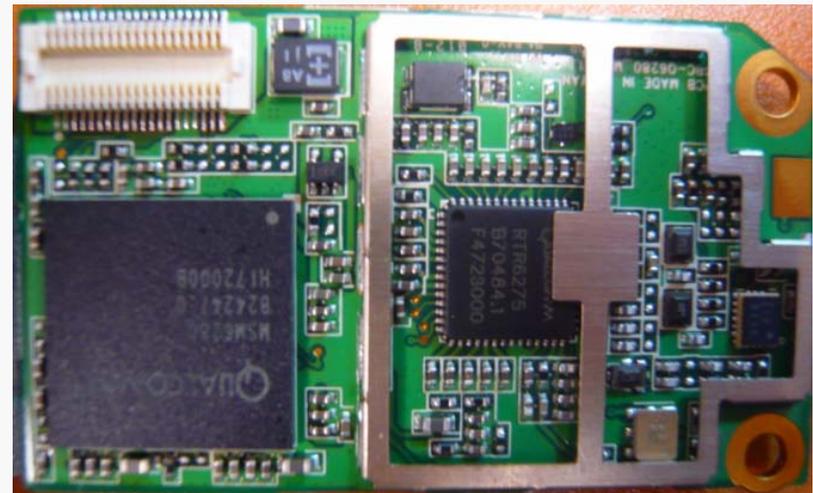
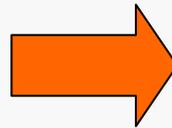
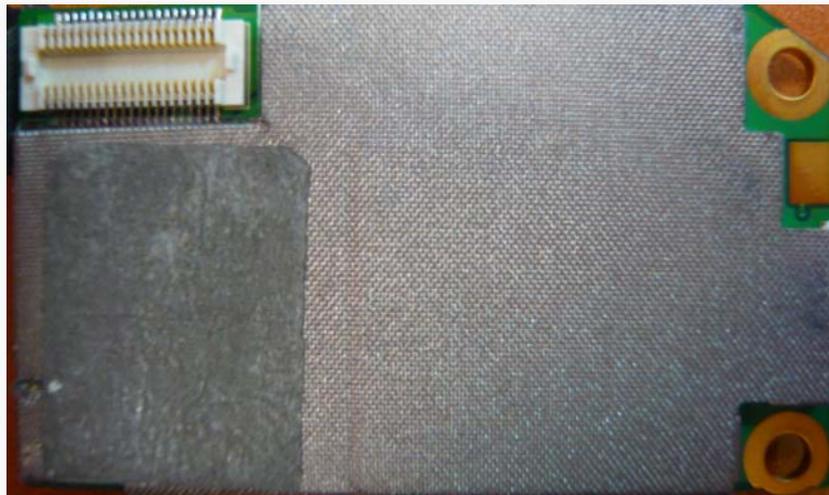
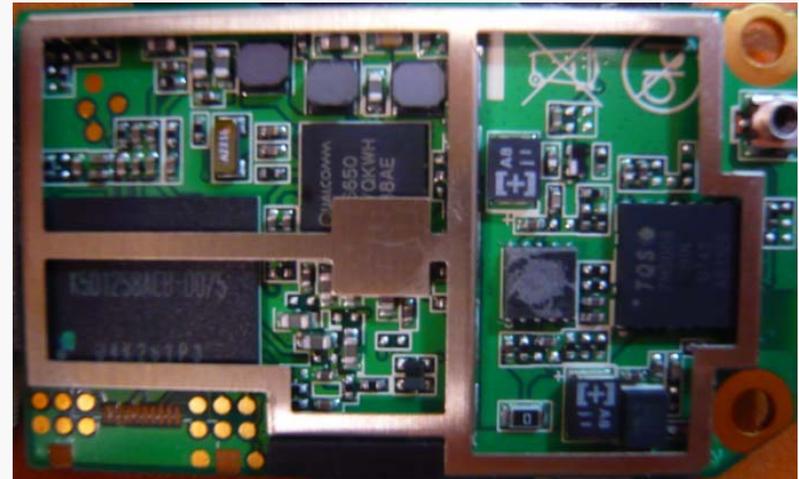
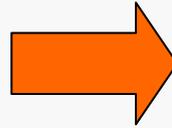
Wifi Block Diagram



Bluetooth Block Diagram



MS800 GSM MODEM



GSM MODEM Platform



PERFORMANCE

Integrated architecture ensures designs that minimize development time and expense and accelerate return on investment

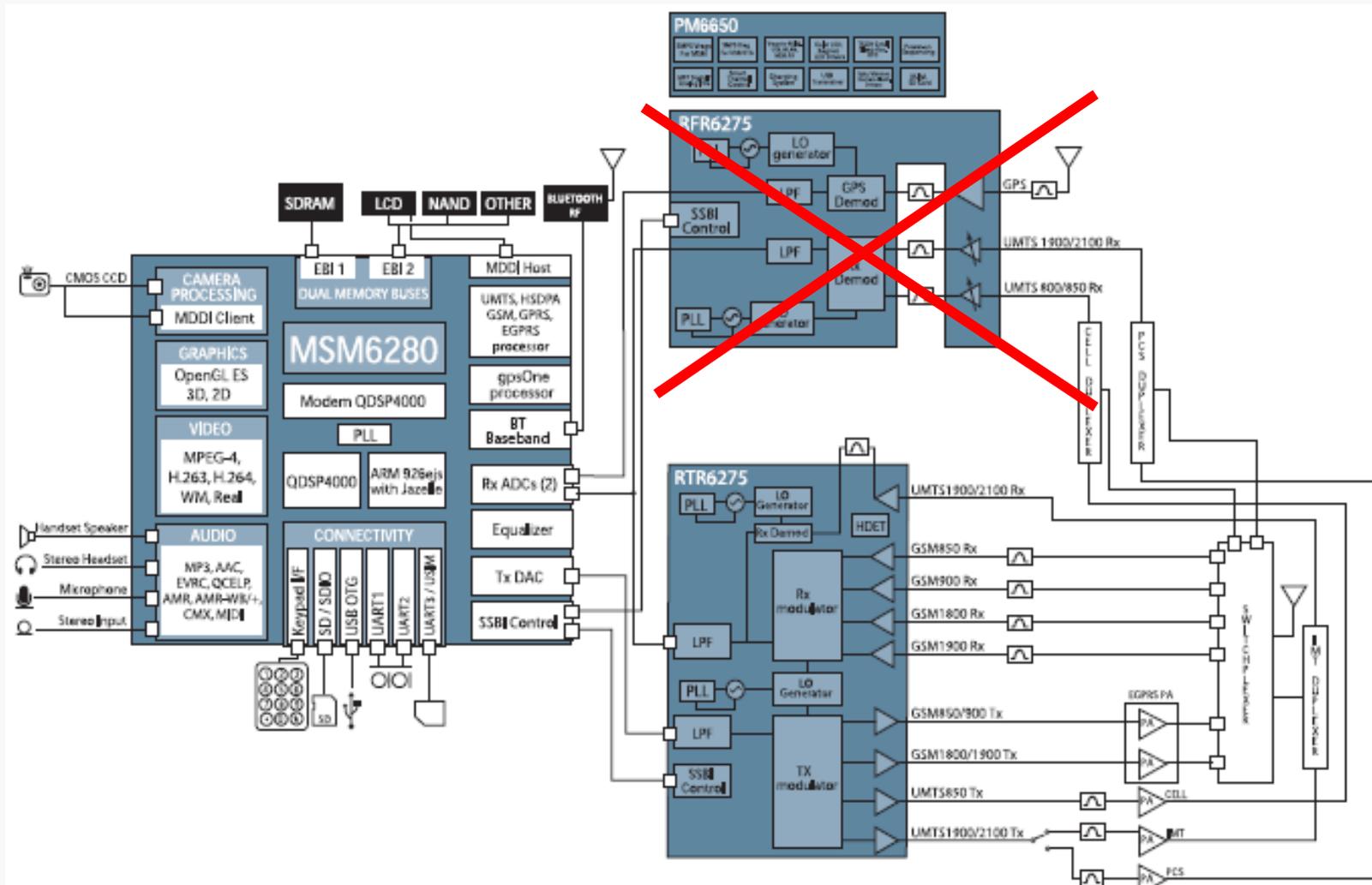
- Air interfaces supported:
 - WCDMA (UMTS) R99
 - High-Speed Downlink Packet Access (HSDPA), up to 7.2 Mbps (Category 8)
 - GSM Release 4
 - GPRS/EGPRS Multislot Class 12, Release 4
 - DTM Multislot Class 11/SAIC
 - GPS
- High-performance 270 MHz ARM926EJ-S™ microprocessor core with memory management unit (MMU)
- Two QDSP4000™ high-performance digital signal processors (DSP)
- QVM™ Java® environment platform with multitasking virtual machine (MVM) and ARM's Jazelle™ Java acceleration speeds execution of multiple, concurrent games and applets
- Memory support for NAND and SDRAM
- Advanced 409-pin 0.5 mm pitch CSP packaging technology (14 mm x 14 mm)
- Integrated secure boot, secure software and secure storage
- Open BREWapi™ software for developing handset UI and BREW® applications



MSM6280 AVAILABLE RF & PM CHIPSET COMBINATIONS						
RF Chipset Configurations		RFR6275™ RTR6275™	RTR6275™	RFR6250™ RFR6220™ RTR6250™	RTR6275™ RFR6500™	RTR6275™ RFR6525™
Power Management IC		PM6650™	PM6650™	PM6650™	PM6650™	PM6650™
GSM	850 / 900 / 1800 / 1900 MHz	■	■	■	■	■
UMTS	2100 MHz	■	■	■		■
	1900 + 850 MHz	■		■	■	
	2100 + 800 MHz	■		■		■
	2100 + 1700 + 800 MHz	■				■
	2100 + 1900 + 850 MHz	■*		■	■	
GPS		■		■	■	■
Receive Diversity					■	■

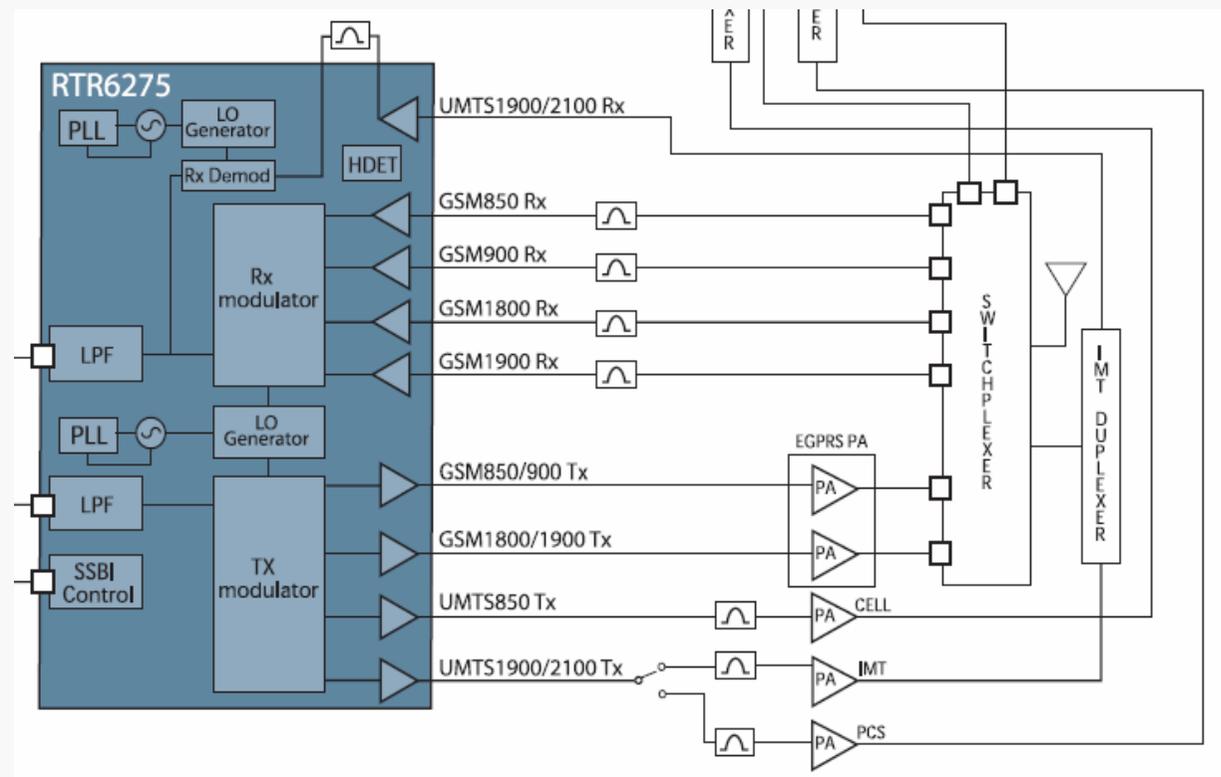
* Dual-band receive diversity (2100+1900). Single-band roaming (2100).

MS800 GSM/WCDMA BB

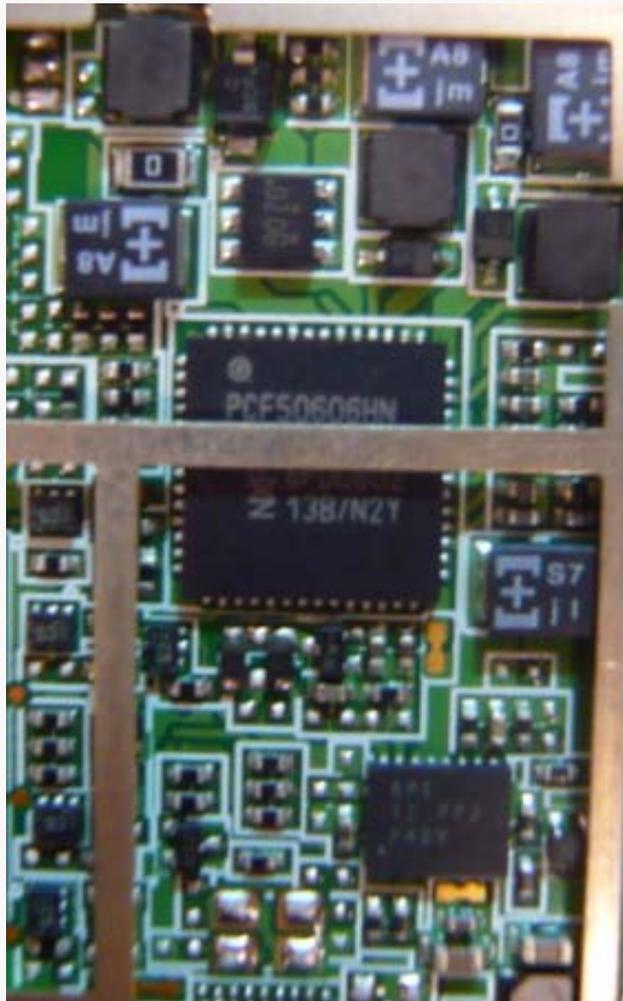


MS800 GSM/WCDMA RF

GSM Transceiver Module	Qualcomm RTR6275
GSM Power amplifier Module	TriQuint TQM7M5008 Quad-Band GSM/EDGE
UMTS2100 Power amplifier Module	??
Switchplexer & Duplexer	??

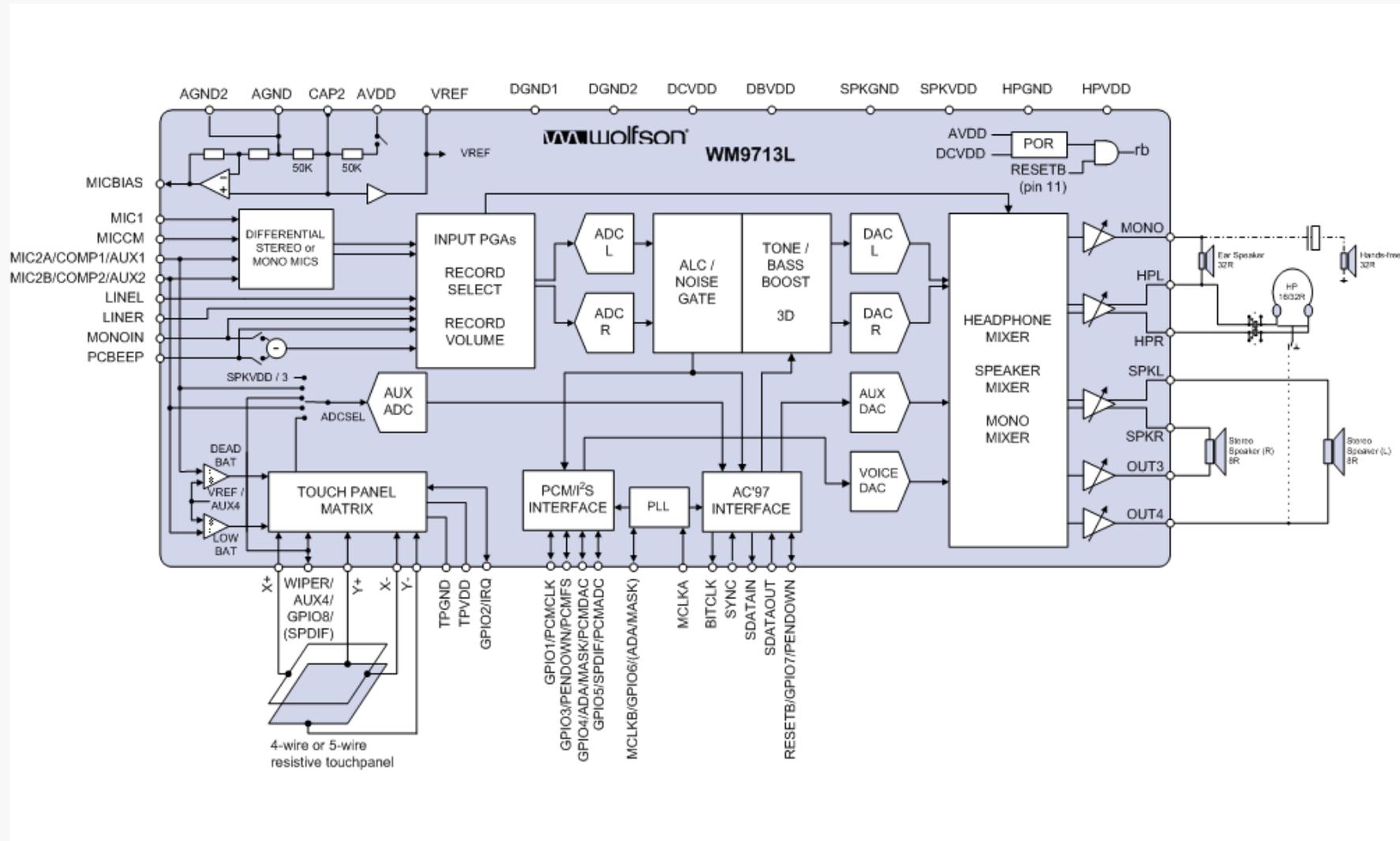


MS800 Power Management

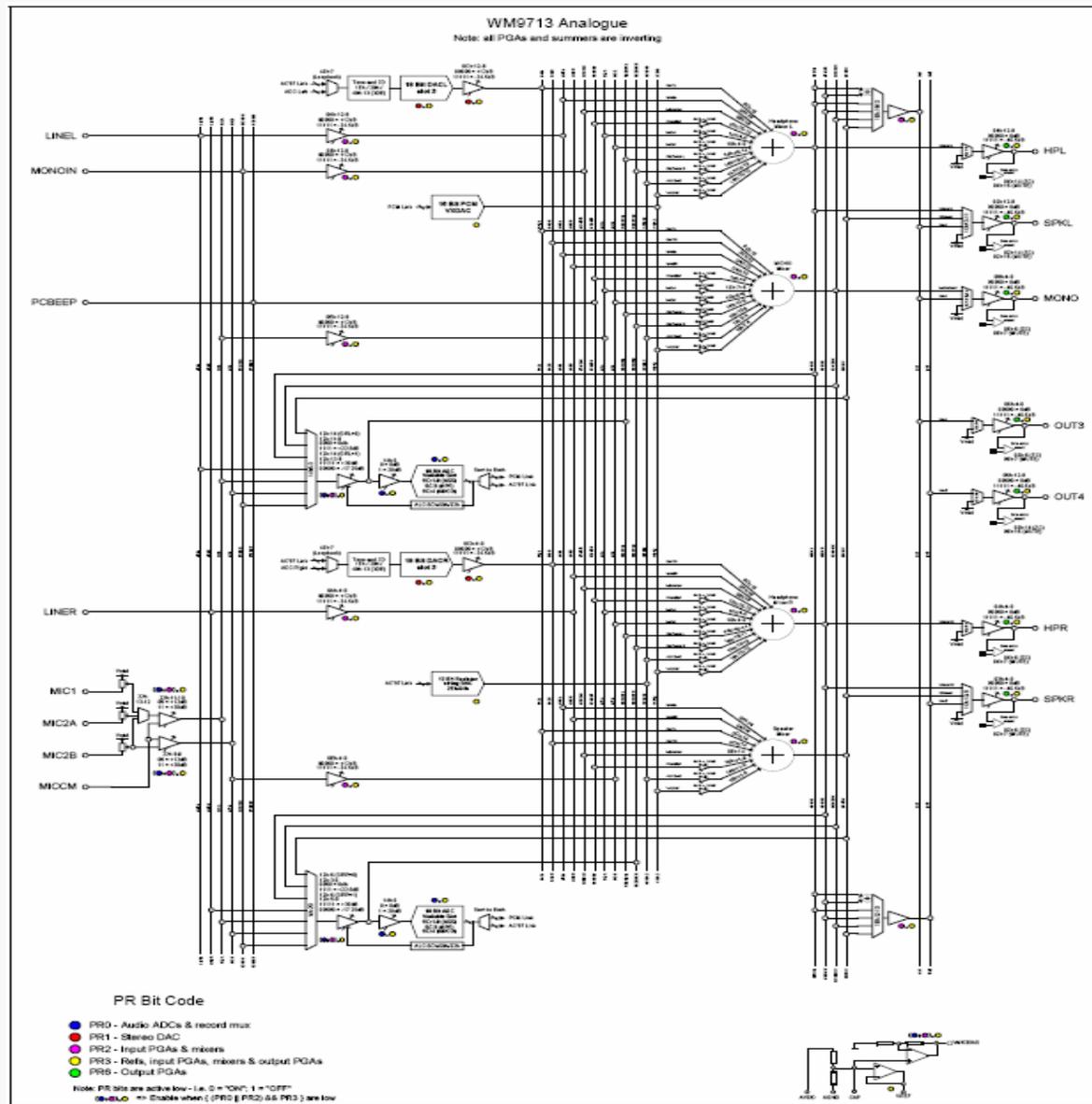


NXP PCF50606HN & Qualcomm PM6650

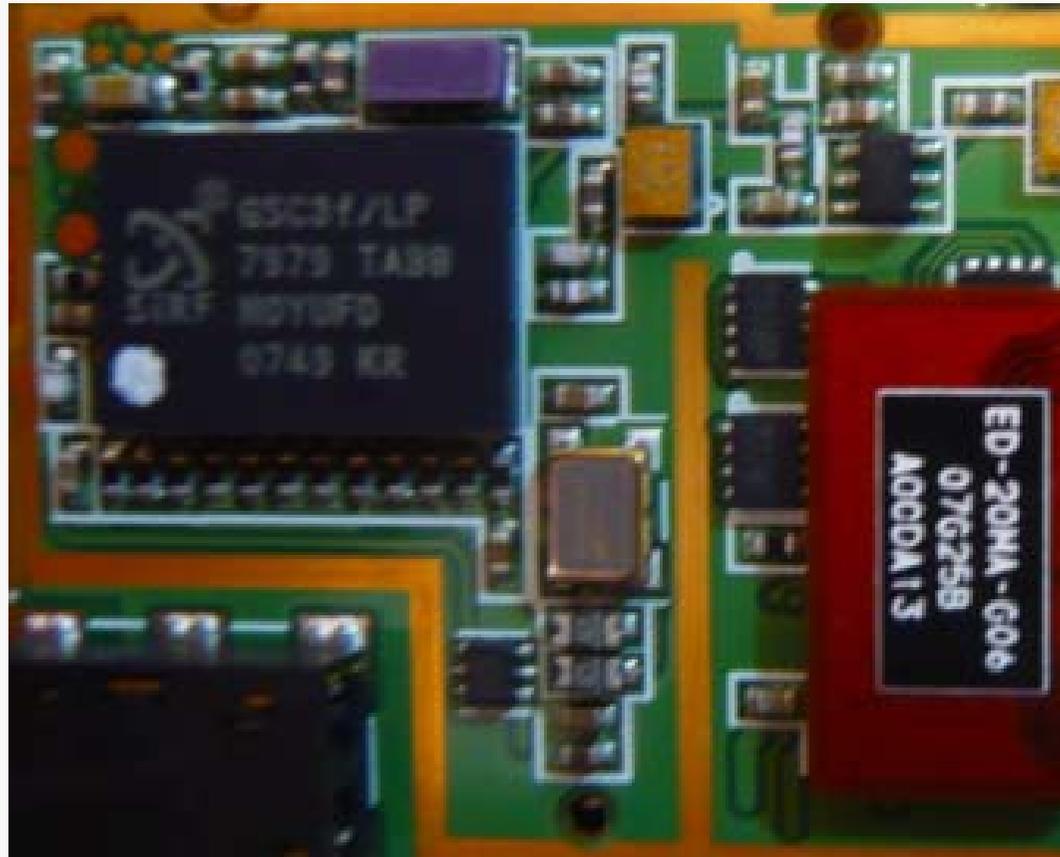
Audio Codec Block



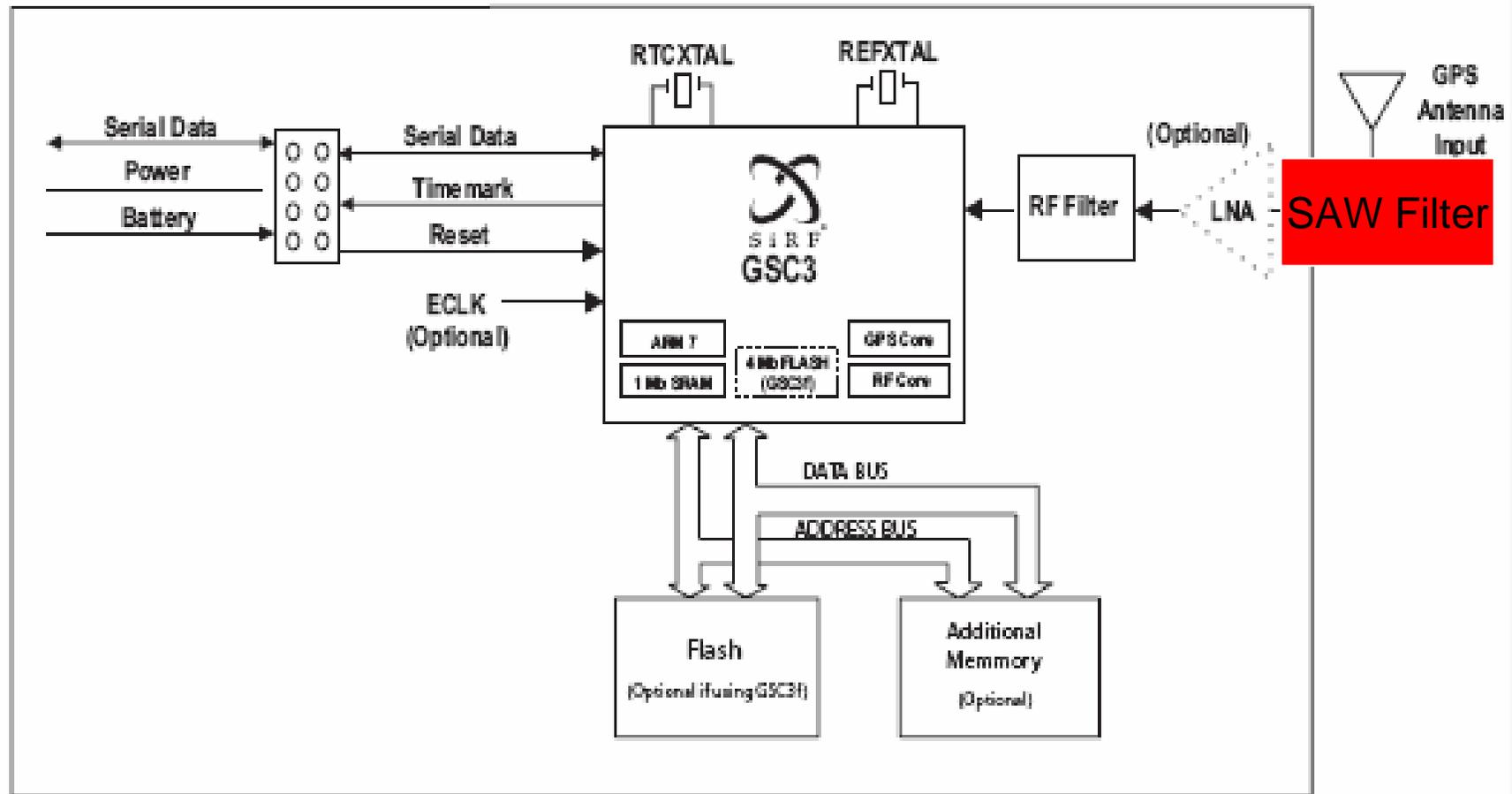
Audio Paths



GPS Chip



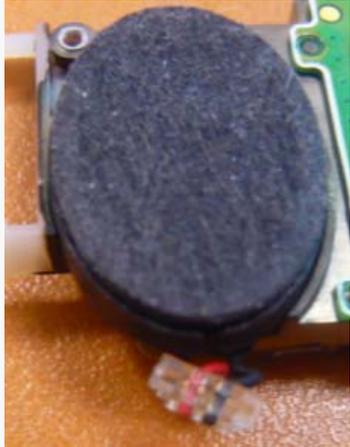
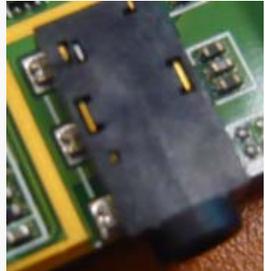
GPS Block Diagram



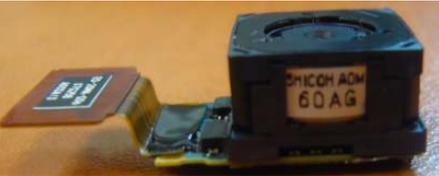
Other Electric Mechanical Components



Wintek 2.8' TFT VGA LCM with 4 wire



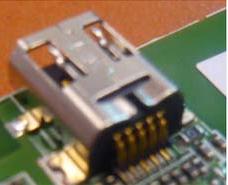
?? 2.0M AF



HRS Micro SD



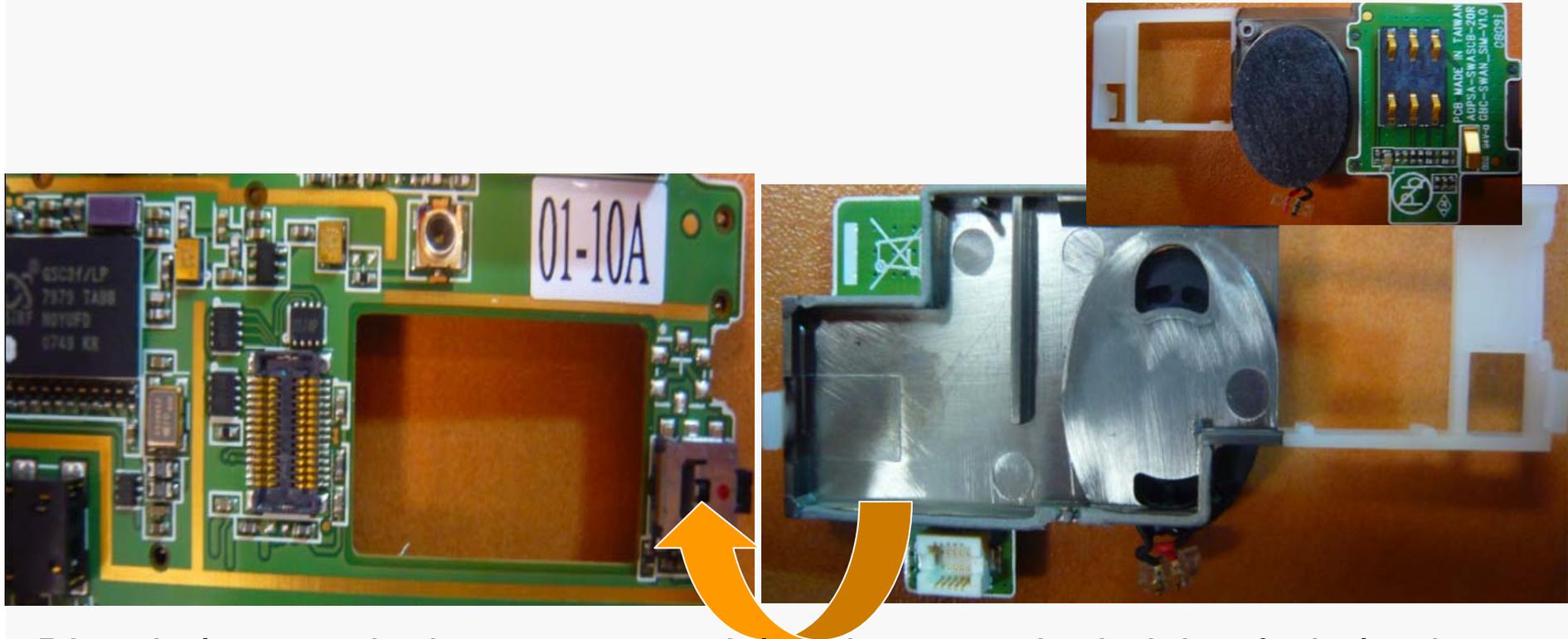
10 Pins USB



Knowles SiSonic MEMs Microphone

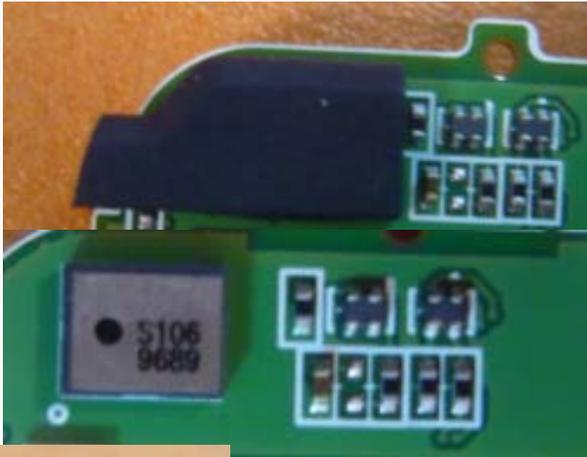


Mechanical Observation I

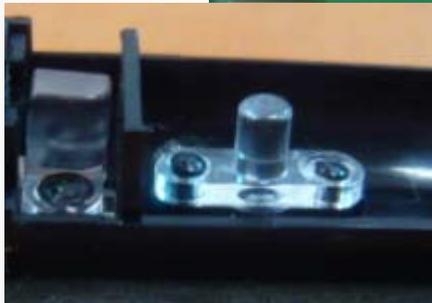


- Dig a hole to put in the camera model to decrease the height of whole phone.
- Stacking SIM holder on this chamber to release PCB area and connect to main board using BTB connector.
- This Chamber is coated the metal film to shield the sensitive GPS chip. (it is indeed the art to eliminate the requirement of shielding can which may increase the height)

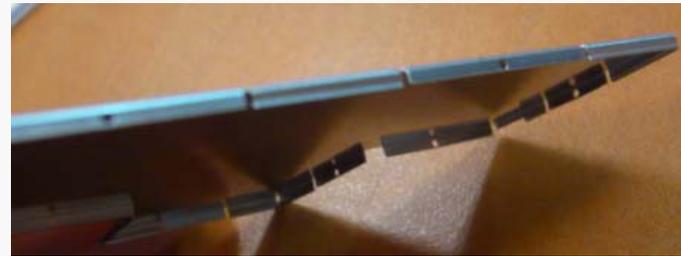
Mechanical Observation II



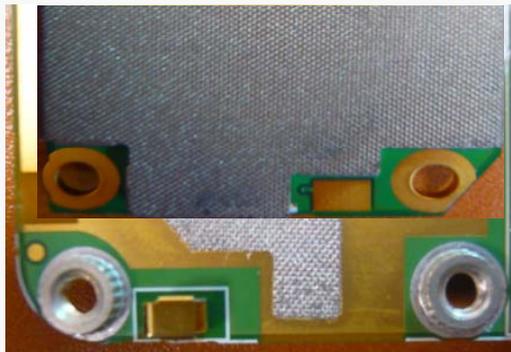
- Gasket Covered MIC will help to collect the voice from human.



- Light guide for indicator LED

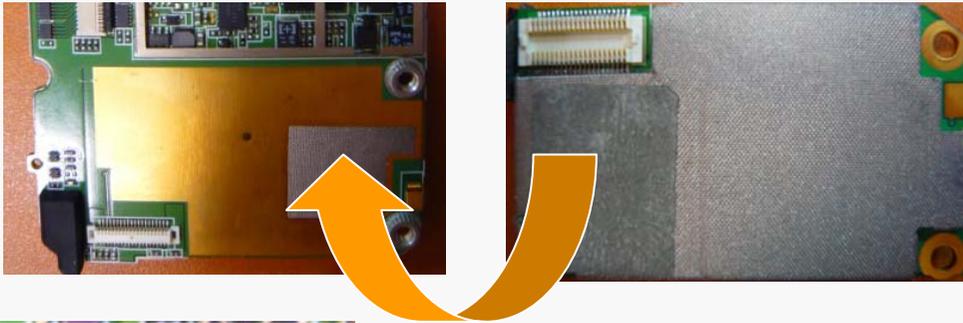


- Interlaced shielding can will be easy to open it for fixing issue.



- Use the screws to fix the GSM MODEM on the main board via bosses.

The Art for EMI Shielding



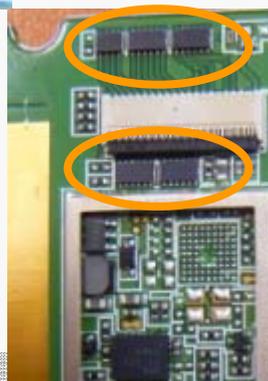
- The MODEM covered by conductive weave and contact with Main board



- The back of camera module is covered by can to prevent leakage interference.



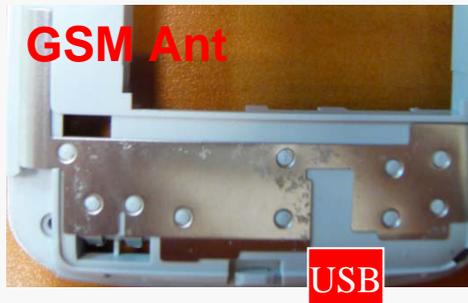
- Receiver with conductive weave to contact with GND to prevent TDD noise



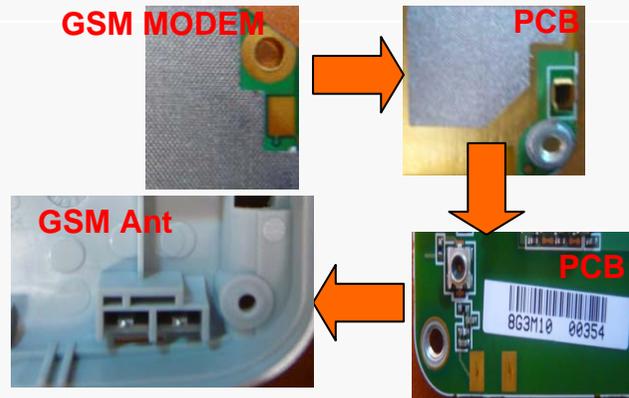
- Databus of camera and LCM are filtering using EMI array filter.

The Art for RF Antenna I

Structure



Art to feed



Comments

- This quinqu-band antenna is fixed on the back house and the PCB GND under this antenna should be eliminated for better efficiency. The structure of antenna is avoid the USB connector.



SMT

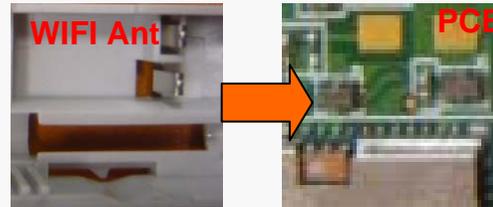
- This BT ant may have good performance.

The Art for RF Antenna II

Structure

Art to feed

Comments



- This WALN ant may have normal performance.



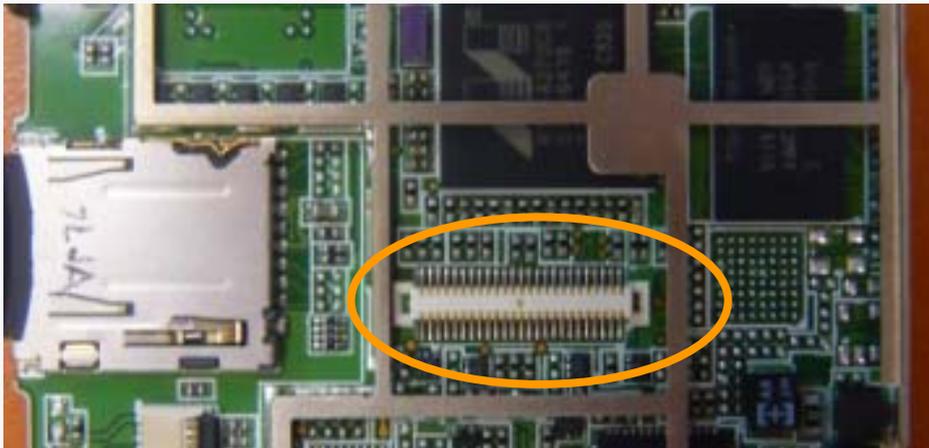
SMT

- This GPS ant is linear polarization and the position is not armed at sky. The test results show poorer performance.

Some Guesses for Design



- Twin adhesive on the back of LCM is not used. The purpose may want to decrease the loss while fixing PCBA. (Because the BB part is under the LCM. You have to fix it to tear LCM)



- This BTB connector may be used to the sake of production test. This will help to eliminate the instability of test fixture. (No test point)

Conclusions

- The Qualcomm solution is a powerful platform to implement a smart phone. However, in this phone design, just play the role in GSM/WACMA modulation/demodulation and encode/decode. The host function is realized by faster CPU. Is this design economical?
- The GSM/WCDMA Modulization may be the trend for the design of handheld device. The fast design time and reuse to decrease the R&D cost.
- The 3D stacking using BTB is also the art to make the device thinner.
- The good shielding make the phone and GPS having better performance.