

Technical Specifications and Description Of GSM Mobile Handset

Model--A12

Version 1.0

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ZTE CORPORATION

1 Abstract

This document gives brief technical specification & description of our product—A12

2 Abbreviations

AMR Adaptive Multi Rate

BB Base Band

BAI Baseband Audio Interface

DAI Digital-Audio-Interface

DTMF Dual Tone Multi Frequency function

EFR Enhanced Full Rate

FDN Fixed dialing number

FEM Front End Module

FR Full Rate

GSM Global system for mobile communications

IC Integrated circuit

JTAG IEEE standardized test interface for IC's

LCD Liquid Crystal Display

LNA Low noise amplifiers

PA Power amplifier

PCB Printed Circuit Board

PCS Public cellular system

PMU Power Management Unit

RF Radio Frequency

RX Receiver

SIM Subscriber Identity Module

TC Transceiver

TX Transmitter

USB Universal Serial Bus

VCO Voltage controlled oscillator

VTCXO Voltage controlled temperature compensated x-tal oscillator

3 Product Features

3.1 General specification

Item	Feature	Remarks
Protocol	GSM 850/1900 MHz	Dual-band
Standard	GSM Phase 2+	With SIM
Size	106mm x 44.4mm x 16.8mm	With battery
Weight	77g	With battery
Talk / Standby Time	2 – 4h / 60 – 130h	
Operating Temp.	Standard : -15 ~ +35 Limit : -10 ~ +55	
Antenna	Internal	50Ω 1/4λ
Form Factor	Bar type	
Memory	Flash : 32Mbit SRAM : 4Mbit	
LCD	Main : 96 x 64 dots	Amber, white or blue back light
Keyboard lights	Amber or blue	

Battery	Standard Battery : Li-ion,710mAh	
Phone book	300 names	
WAP	No	
MMS	No	
GPRS	No	
Melody	Yes	16 Midi
Vibrator	Yes	
Side Volume Key	No	

3.2 Hardware specification

Item	Feature	Remarks
Chipset	Maker : ANALOG DEVICES BB Chipset : AD6525XCA, AD6537B RF Chipset : AD6539, RF3146	
PCB	Main Board : 8-layers, 1.1mm	
Talk time	Up to 240 minutes	Estimated
Standby time	Up to 130 hrs	Estimated
Charging time	2.0hrs	@ Std battery
Frequency Range	TX : 824-849MHz ;1850-1910MHz; RX :	

	869 -894MHz ;1930-1990MHz;	
Band Width	0.2MHz	
Vocoder	FR, EFR,HR	AMR optional
Modulation/ Demodulation	GMSK	
Chip Rate	MCU 39MHz, DSP 65MIPS	
RX sensitivity	-102 dBm (GSM850/PCS)	Conducted emission Conducted Static conditions
TX output power	Maximum : 33dBm(+/-2dB) (GSM850) 30dBm(+/-2dB) (PCS) Minima : 5dBm(+/-5dB) (GSM850) 0dBm(+/-5dB) (PCS)	Normal test conditions
SIM card	Plug-In Type, 3V	
Pre-paid SIM	Yes	
Status Indicator	2 Color LED	
System connector	18 Pin	
Ear Phone Jack	ZTE Special I/F	
Speaker	8Ω	
Ear-microphone	Yes	Optional
Battery Charger	No	
Travel Adapter	Yes	

3.3 Software specification

Item	Feature		Remarks
GSM 02.07 Functions	Mandatory	Display of Called Number	Support
	Mandatory	Indication of Call Progress Signals	Support
	Mandatory	Country/PLMN Indication	Support
	Mandatory	Country/PLMN Selection	Support,
	Mandatory	Keypad	Support
	Mandatory	IMEI	Support
	Mandatory	Short Message	Support
	Mandatory	Short Message Overflow Indication	Support
	Optional	International Access Function ("+" key)	Support
	Mandatory	Service Indicator	Support
	Mandatory	Emergency Calls capabilities	Support
	Mandatory	Dual Tone Multi Frequency function (DTMF)	Support
	Mandatory	Subscription Identity Management	Support
	Mandatory	On/Off switch	Support
	optional	Sub-address	Support
	Mandatory	Support of Encryption A5/1 and A5/2	Support
Other	optional	Short Message Service Cell Broadcast DRX	Support
	optional	Service Provider Indication	Support
	Mandatory	Ciphering Indicator	Support

Functions	SMS group sending
	Fixed dialing number (FDN) , if SIM card supporting pin2 service
	Earphone answer through earphone button
	Out-going calls restriction
	Out-going added service (out-going call waiting, out-going, call holding, multi-parties meeting, etc.). network support is required
	Store the last 10 answered calls, last 10 missed calls and 20 dialing calls (show the date, time, number, name and duration)
	PIN error alert when opening
	large capacity of directory
	On/Off timing
	Earphone, speaker, ring volume adjustable by multilevel
	battery meter and the signal intensity indicator
	Call metering
	Alarm
	Calculator
	Games
	Directory groups
	Conventional phone book that have three hundred name card
	Call time limit: when approaching n seconds, a alert will be displayed
	Show in-coming call
	Vibration

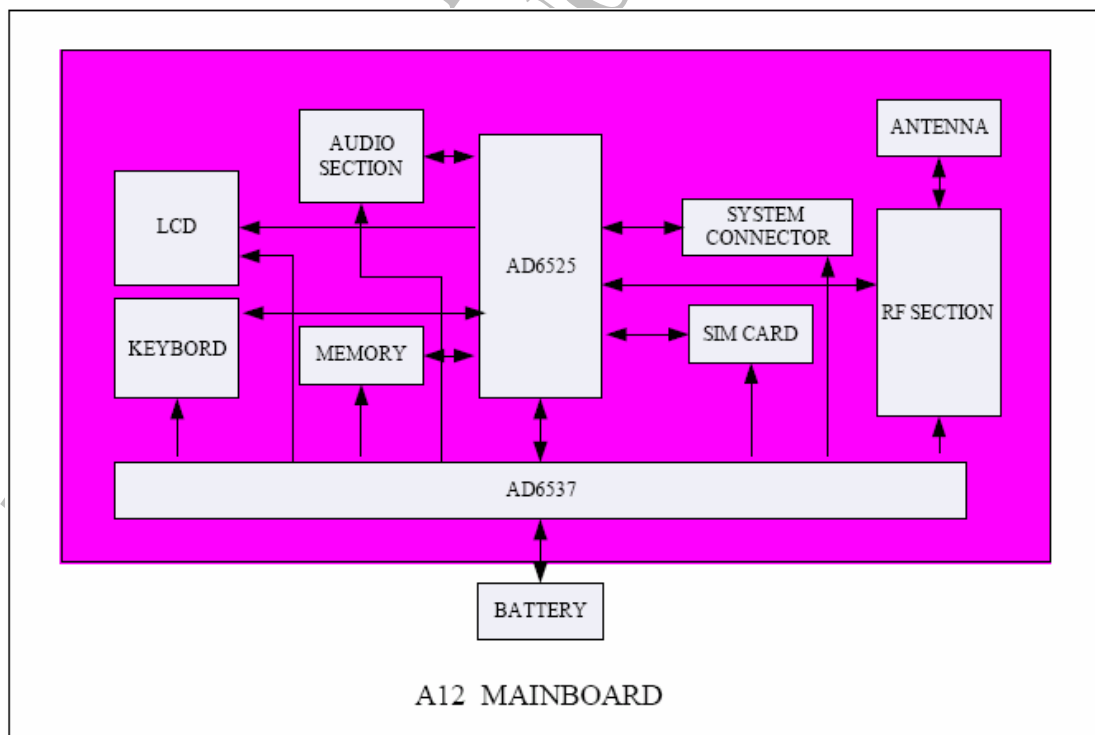
	Situation modes selection. User select different ring patterns according different situations
	Animation menu icon
	Out-going call restriction. user can define the in- call and out-call list
	In-coming call mute. User can turn off the ring

4 Solution of the Product

The A12 handset hardware uses Analog Devices (ADI) 430 family chipset, which consists of baseband (BB) unit and radio frequency (RF) unit in addition of the peripherals and accessories to build a complete mobile terminal hardware.

The block diagram shows the main building blocks inside the subsystems: RF unit, BB unit and some accessories.

Following the main building and functional blocks of the block diagram are described.



4.1 Radio Frequency unit

The Radio-unit consists of all receiver, transmitter and high frequency generation and receives sections of the A12 hardware.

It represents the transition to the air-interface, the Radio-link between the GSM-network base station and the mobile terminal.

4.1.1 Front End Module (FEM)

This building block separate and switch the radio frequency signal from the receive/transmit antenna connector via an Antenna Switch Filter into the receiver and transmit part as well as a separation into the four receive bands and the transmit high and low band. For each of the four receives chains the corresponding SAW-filter prevents high level out-of band signals to the following receive low noise amplifiers (LNA). To realize a full quad-band application for the receive chain, with respect to the direct conversion receive inputs of the AD6539 transceiver, a circuitry combines the quad band receive chains for GSM850, EGSM900, DCS and PCS into transceiver. For the transmit part, the complete power amplifier (RF3146) with 50 input and output terminals. The RF3146 is a high-power, high-efficiency power amplifier module with integrated power control.

The power amplifier is switched via the radio control signal from LB into HB frequency range. The PA is used as voltage controlled gain amplifier (typical 0...35dB) controlled by the RAMP voltage.

The RF input power coming from the transceiver is set on a constant level. The PA output power is controlled via the level of the analog control voltage RAMP. This control input voltage RAMP for controlling the output power as well as the GSM confirms up- and down-ramping is generated by the BB-unit. The integrated power detection and control loop compensate output power variations via supply voltage, RF input voltage and temperature, thus the transmitted output power is fully compliant to the ETSI specification regarding power time-template and power spectrum requirements.

4.1.2 Transceiver

This building block consists mainly of the transceiver chip AD6539. On the receiver input chain the GSM-band separated signal from the FEM is amplified by four differential LNAs with programmable-gain. These LNAs drive a direct conversion demodulator to baseband. The down converted signals then pass in quadrate to the baseband programmable-gain amplifiers and low pass filters for channel selection.

The AD6539 uses a single integrated LO VCO for both the receiver and the transmit circuit. An integrated fractional-N synthesizer provides fast and accurate frequency control for all bands.

Also included in the AD6539 is a complete PA power control loop. This uses a log strip to detect the PA output power and provides a voltage output suitable for controlling PA.

4.2 Baseband unit

Baseband unit is composed of digital baseband, analog baseband and memory. Digital baseband chip uses AD6525, which consists of DSP, MCU and digital interface. It presents versatile GPIO and GPO to control LCD, SIM card, to provide JTAG signal, LCD and keyboard backlight controller, and USC interface.

Analog baseband chip uses AD6537B, which consists of all voltage supply unit, power management unit, communication interface, and the modulated (TX: BB DAC) and demodulated (RX: BB ADC) of baseband IQ signal generation. In order to get high quality call, the analog baseband provides abundance baseband audio (BAI) interface for terminal, including microphone, speaker, receiver and earphone.

Memory uses COMBO FLASH/SRAM, which consists mainly of the combined memory chip, FLASH and SRAM into one single IC package. AD6537B provides 1.8V supply for the memory chip. The FLASH memory is a 32Mbit dual bank memory. The SRAM memory is 4Mbit.

4.3 Peripherals

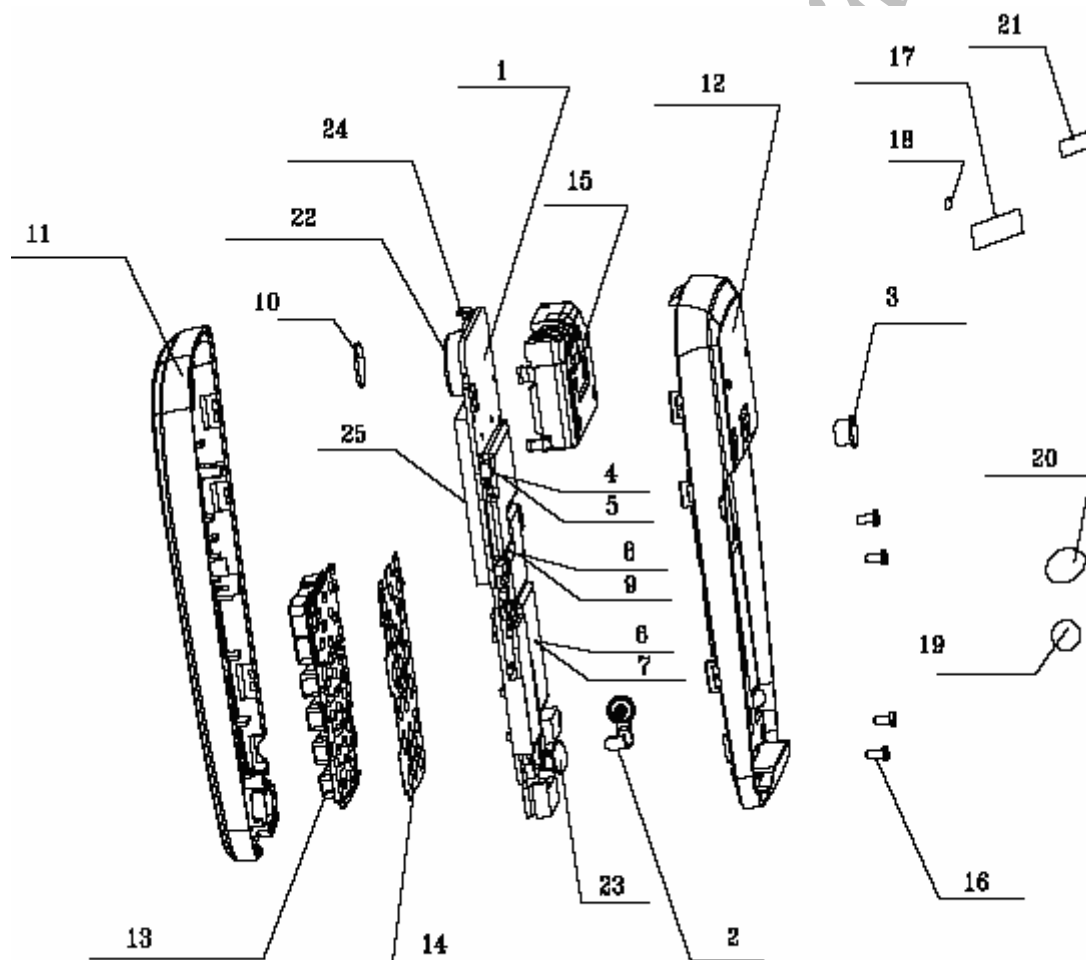
Display: serial interface B&W LCD with 96*64 dots.

ESD: providing ESD protection for microphone interface, system connector signal

interface, SIM card interface and keyboard signal.

5 Mechanical Architecture

The graph shows connection of PCB and mechanical frame. Following the main building and blocks are indicated.



- 1 PCB
- 11 Front shell
- 12 Back shell
- 13 Keyboard
- 14 Dome

15 Antenna

22 Vibrator

23 Microphone

6 Software Architecture

A12 handset software architecture consists of foreground application layer, background application layer, and protocol stack. Foreground application layer mainly handles response of keyboard, and displays needed data. Background application layer mainly performs hardware action and controls communication with protocol layer. Protocol stack layer contains functionalities that allow peer to peer exchange with GSM networks.

