

**Technical Specifications and
Description
Of
GSM Dual-band Digital Mobile Phone**

Model—ZTE A139

Version 1.0

30, Oct . 2007

ZTE CORPORATION

1 Abstract

This document gives brief technical specification & description of our product—ZTE A139.

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 OR EGSM 900/1800 MHz	Dual-band
Standard	GSM Phase 2+	With SIM
Size	94mm×47mm×16.1mm	With battery
Talk / Standby Time	2 – 4h / 60 – 120h	
Operating Temp.	Standard: -10°C ~ +35°C Limit: -15°C ~ +55°C	
Antenna	Internal	50Ω 1/4λ
Form Factor	Bar type	
Memory	Flash: 128Mbit SRAM: 32Mbit	
LCD	Main: 176x 220 dots	
Keyboard lights	Amber	
Battery	Standard Battery: Li-ion,770mAh	
Phone book	300 names	
WAP	Yes	
MMS	Yes	

GPRS	Yes	
Melody	Yes	32 Midi
Vibrator	Yes	
Side Volume Key	No	

3.2 Hardware specification

Item	Feature	Remarks
Chipset	Maker: MTK BB Chipset: MT6225 RF Chipset: MT6139	
PCB	Main Board: 8-layers	
Talk time	Up to 240 minutes	Estimated
Standby time	Up to 120 hrs	Estimated
Charging time	2.0hrs	@ Std battery
Frequency Range	GSM 850/1900 TX: 824- 849MHz ;1850-1910MHz; RX: 869- 894MHz ;1930-1990MHz; EGSM 900/1800 TX: 880- 915MHz ;1710-1785MHz; RX: 925- 960MHz ;1805-1880MHz;	

Band Width	0.2MHz	
Vocoder	FR, EFR,HR	AMR optional
Modulation/ Demodulation	GMSK	
Chip Rate	MCU 39MHz, DSP 78MIPS	
RX sensitivity	-102 dBm	Conducted emission Conducted Static conditions
TX output power	Maximum: 33dBm(+/-2dB) (GSM850/GSM900) 30dBm(+/-2dB) (DCS/PCS) Minimum: 5dBm(+/-5dB) (GSM850/GSM900) 0dBm(+/-5dB) (DCS/PCS)	Normal test conditions
SIM card	Plug-In Type, 3V	
Pre-paid SIM	Yes	
Status Indicator	No	
System connector	8 Pin	
Ear Phone Jack	Yes	
Speaker	8Ω	
Ear-microphone	Yes	
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
	optional	Short Message Service Cell Broadcast DRX	Support
	optional	Service Provider Indication	Support
Mandatory	Ciphering Indicator	Support	

<p>Other Functions</p>	<p>Sending or receiving SMS</p>
	<p>SMS group sending</p>
	<p>Fixed dialing number (FDN), if SIM card supporting pin2 service</p>
	<p>Out-going calls restriction</p>
	<p>Out-going added service (out-going call waiting, out-going, call holding, multi-parties meeting, etc.). network support is required</p>
	<p>Store the last 10 answered calls, last 10 missed calls and 20 dialing calls (show the date, time, number, name and duration)</p>
	<p>PIN error alert when opening</p>
	<p>large capacity of directory</p>
	<p>On/Off timing</p>
	<p>speaker, ring volume adjustable by multilevel</p>
	<p>battery meter and the signal intensity indicator</p>
	<p>Call metering</p>
	<p>Alarm</p>

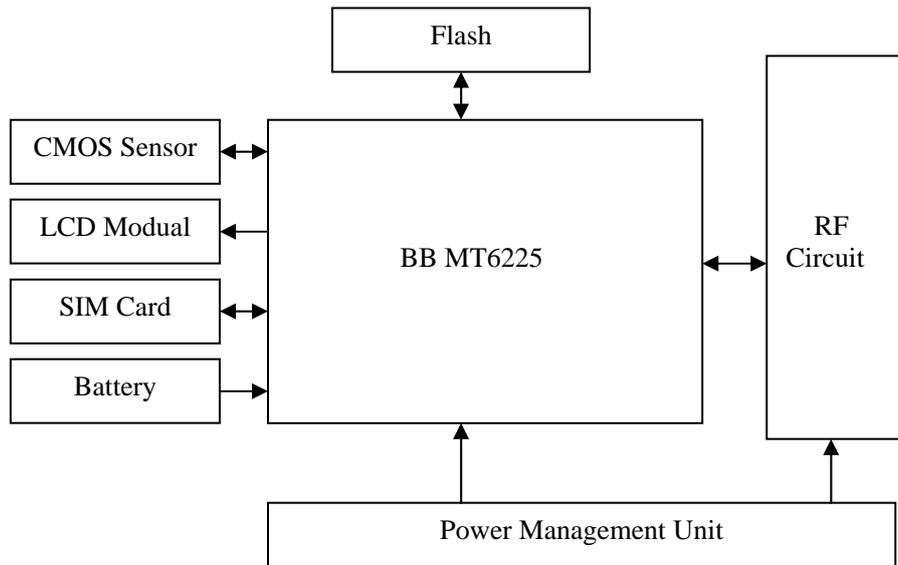
	Calculator
	Stopwatch
	World clock
	Camera
	Games
	Directory groups
	Conventional phone book that have three hundred name card
	Call time limit: when approaching n seconds, a alert will be displayed
	Show in-coming call
	Situation modes selection. User select different ring patterns according different 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 ZTE A139 handset hardware uses MTK 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.

**A139 MAINBOARD**

4.1 Radio Frequency unit

The Radio-unit consists of all receiver, transmitter and high frequency generation and receives sections of the ZTE A139 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 Transmit Module

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 two receive bands and transmit high and low band. For each of the two 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 MT6139 transceiver, a circuitry combines the quad band receive chains for GSM850, EGSM900, DCS and PCS into transceiver. For the transmit part, the Tri-band PA (RF3196) with 50Ohm impedances at all RF input and output ports. The GSM850/900 and DCS/PCS power amplifier(PA) blocks including power control are combined with the low insertion loss quad-band pHEMT switch.

The PA is switched via the radio control signal from LB into HB frequency range. 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 MT6139, which is a highly-integrated RF Transceiver IC for the GSM850/GSM900/DCS1800/PCS1900 cellular systems

The receiver section of MT6139 includes Quad-band Low-Noise Amplifiers (LNAs), RF quadrature mixers, channel filters, Programmable-Gain Amplifiers (PGAs), and on-chip automatic DC-offset correction loops. The differential inputs are matched to external SAW filters.

MT6139 transmitter adopts the direct-conversion architecture with higher integration level and simpler frequency plan. It consists of BaseBand (BB) I/Q filters, I/Q modulators, frequency dividers, output buffers and a bias-core circuit.

4.2 Baseband unit

Baseband unit is composed of baseband and memory. Baseband chip uses MT6225, which is an advanced Single Chip Baseband Processor incorporating all digital, analog. It 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.

Memory uses COMBO FLASH/SRAM, which consists mainly of the combined memory chip, FLASH and SRAM into one single IC package. MT6225 provides 1.8V or 3.3V supply for the memory chip. The FLASH memory is a 128Mbit dual bank memory. The SRAM memory is 32Mbit.

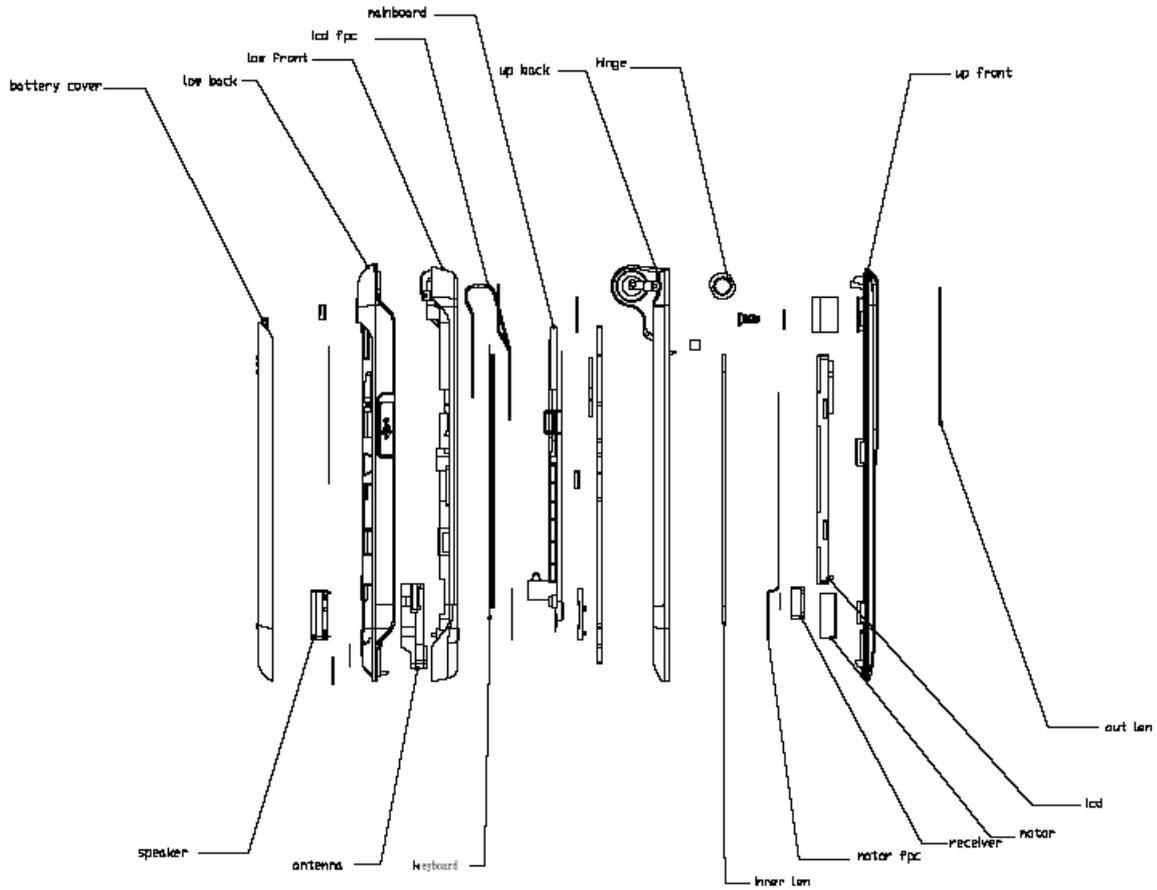
4.3 Peripherals

Display: serial interface TFT LCD with 176*220 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.



6 Software Architecture

ZTE A139 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.

