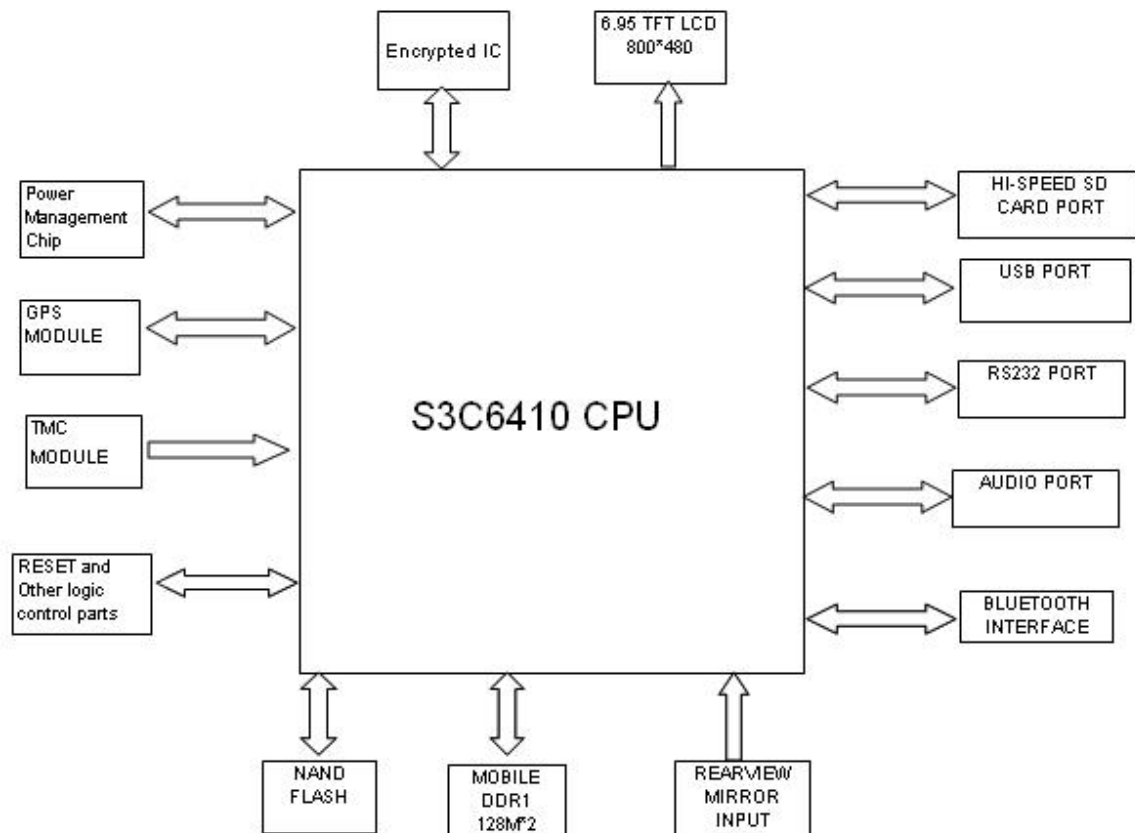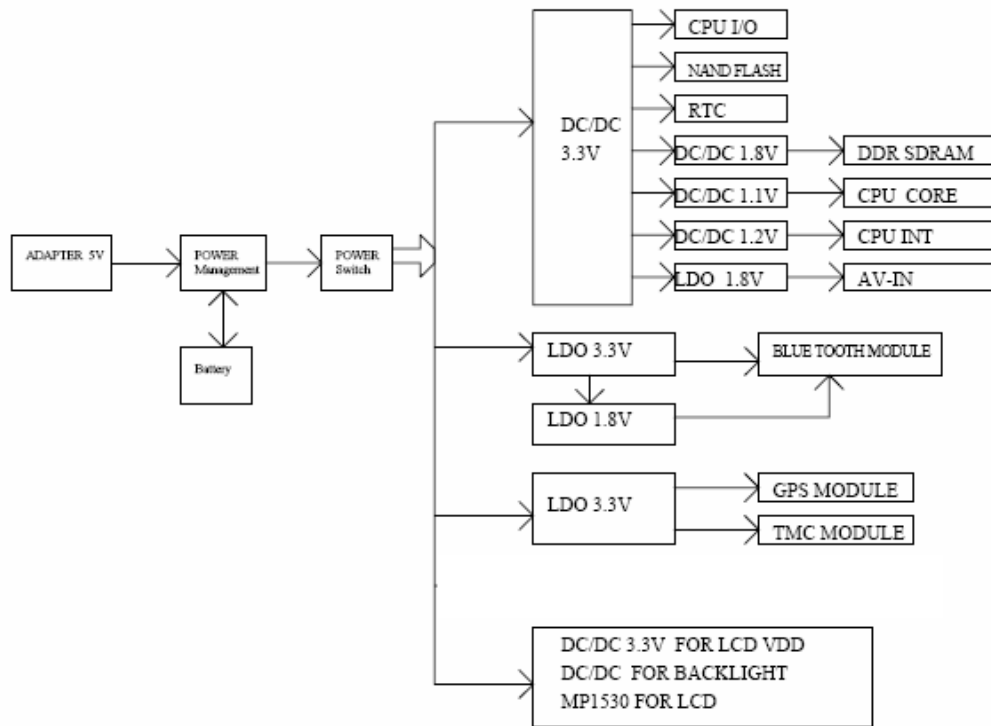# GPS Navigator
GPS-008-000
A brief introduction of build-up and principle

1. Overall Architecture
2. Power Management
3. Power circuit
4. Basic system
5. Peripheral circuit function

1. Overall Architecture

2. Power Management

3. Power circuit

Power adaptor transfer 110V-220V AC to 5V DC needed by navigator. BQ24070（U1）is power management IC, responsible for power supply of the whole navigator. It can charge the internal battery with external power, and supply power as a battery without external power. It deserves to be mentioned that, both DC and USB port can supply power to the navigator, and when USB cable connects PC to navigator, as the power supply limitation of PC's USB port and 500mA current can be supplied at most, otherwise, it may cause PC to halt or reset, or even burn down the USB port of PC mainboard, so there are two charge mode to protect PC. When the navigator detects that PC is connected, it may limit the demand of its current within 500mA; when it detects that DC adapter is connected, there will be no limitation for the current demand. The output of BQ24070 is 4.4V BATT, and it's dispersed to the following parts.

3.3V is transferred via DC/DC chip RT8008 to supply IO and NAND Flash of CPU.
1.1V is transferred via DC/DC chip RT8008 to supply core part of CPU.
3.3V is transferred via LDO chip RT9193 to supply LCD.

3.3V and 1.8V are transferred via LDO chip RT9193 and RT9169 to supply Bluetooth module.

1.8V is transferred via LDO chip RT9169 to supply video TVP5150A.

3.3V is transferred via LDO chip RT9193 to supply GPS mode and TMC module.

Drive LCD backlight via backlight driver chip YB1520.

4. Basic System

The basic systems in GPS navigator include Power, main CPU, CPU reset circuit, Crystal Oscillator, SDRAM, NandFlash. When basic systems are normal, the machine can run.

CPU is Samsung 6410, which connect DDR SDRAM (32 digits address) and NandFlash via external date bus and external address bus. The capacity of NandFlash is 64M~2G, and the specific capacity is determined by customers' demand (the existing one is 128MB.) X3(48MHz) is USB clock crystal, and X1（12MHz）is master crystal clock oscillator which supply master clock to CPU, and X2（32.768KHz）is RTC clock crystal. X4(27MHZ) is VIDEO output clock crystal.

5. Peripheral circuit function

Audio Output: CPU connects audio chip CS42L52 via I2S connector. The output analog audio signal is magnified via LM4853MM stereo power amplifier and then drives speaker or stereo earphone.

Bluetooth: the navigator can be recognized as a Bluetooth after it starts Bluetooth function and is matched with Bluetooth mobile phone and then the user can make a call through navigator. CPU communicates with Bluetooth module through COM 0. CPU will turn off the sound from navigator itself to avoid phone calling interference when the mobile phone makes a call through navigator. The functions of HFP, SPP, DUN, A2DP, etc can be realized through Bluetooth module.

AV-in: when back a car up, it can display the images on the navigator shot by the camera at car tail. Especially in night, IR compensation function of the camera can let it provide a clearer and broader view than rear mirror. When there is PAL/NTSC video signals input, the navigator can switch to AV-in mode, and the screen is similar to a monitor.

LCD: 800*480 pixel, Chimei display, touchable operation

SD card: SD card connector includes card power (3.3V), plug test, protection test, card data (4 digits), clock and oder.

GPS: MG1613S module, communicates CPU via COM 1.

RS232 connector: CPU COM 3 and CPU COM 2 transfer chip MAX3222EEUP or ADM3222ARUZ via RS 232 level and then communicates RS 232 serial device after that (such as PC COM).

TMC: RTM_6000 module, communicates CPU via COM 3.

The TMC refer to Traffic Message Channel
Traffic Message Channel (TMC) is a technology for delivering traffic and travel information to drivers. It is typically digitally coded using the FM-RDS system on conventional FM radio broadcasts. It can also be transmitted on DAB or satellite radio. It allows silent delivery of high quality accurate, timely and relevant information, in the language chosen by the user and without interrupting normal services. Services, both public and commercial, are now operational in many European countries. The TMC module is   to received the Traffic Message transmitted by DAB or satellite radio and then integrated these data directly into a navigation system and show to the driver, this gives the driver the option to take alternative routes to avoid traffic incidents.

In the United States of America, XM Satellite Radio started transmitting TMC messages all over the US already whereas Sirius Satellite Radio announced it. NAVTEQ Traffic, formerly Traffic.com, delivers traffic information and related advertising via RDS and HD signals to navigation devices nationwide, and also provide the traffic information used by XM Radio. Also Clear Channel and Tele Atlas have a TMC service, using FM-RDS in 77 US cities and three Canadian metropolitan areas.