Appendix　4.

Block Diagram

Circuit Description

BLOCK DIAGRAM

K5L2731CAA MCP	

2.85V

LED Charger Status

GE0406 Vibration Motor

24Mhz Resonator

24Mhz Crystal

Adress Data

LDO 3.3V/2.85V (BT / DSP/MCP)

3.3V

a3060w Image sensor

SPI

ADSP-BF533 DSP

1.2V

LDO 1.2V (DSP)

Li-polymer Battery 3.7V 420mAh

LDO 3.3V (PIC)

CHARGER

Tx/Rx

3.3V

ISL6292-2CR4Z Charger IC

LED Charger Status

F1E21 Bluetooth Module

3.3V

PIC12F676 PIC

3.3V

USB POWER

USB Connector

ADC

ANT

Pressure sensor Pentip

1. Operation Features

■ Smartpen with Bluetooth interface

■ Battery for 2 hours continuous writing

■ Interactive operation connecting with Smartphone and PC's

2. DSP ICs

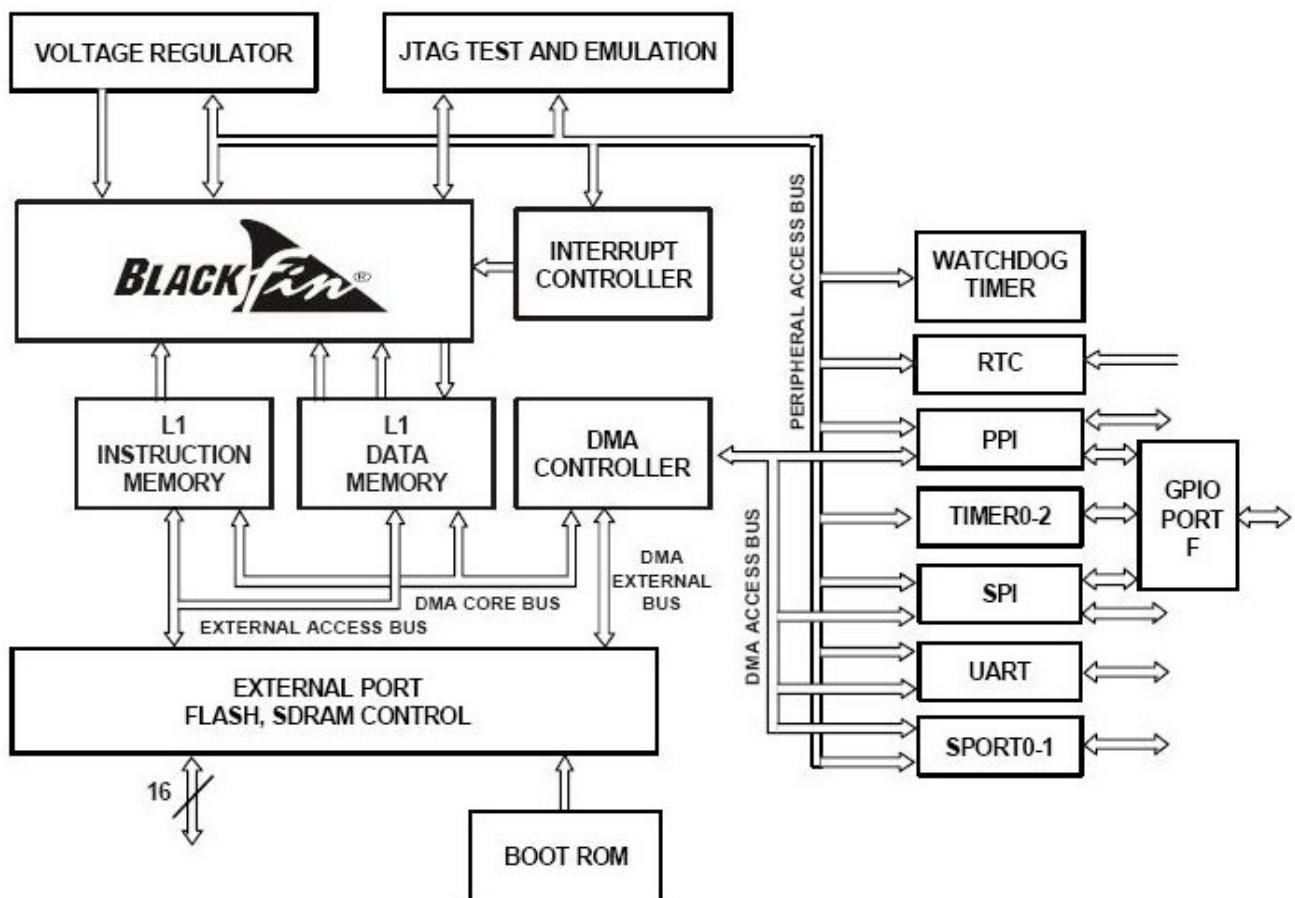### 2.1 Blackfin Embedded Processor

Features

- Up to 600 MHz high performance Blackfin processor
  Two 16-bit MACs, two 40-bit ALUs, four 8-bit video ALUs, 40-bit shifter
  RISC-like register and instruction model for ease of pro-gramming and compiler-friendly support
  Advanced debug, trace, and performance monitoring
- 0.85V to 1.30 V core VDD with on-chip voltage regulation
- 1.8V, 2.5 V, and 3.3 V compliant I/O
- 160-ball CSP_BGA, 169-ball PBGA, and 176-lead LQFP packages

MEMORY

- Up to 148K bytes of on-chip memory:
  16K bytes of instruction SRAM/Cache
  Up to 64K bytes of instruction SRAM
  Up to32K bytes of data SRAM/Cache
  Up to32K bytes of data SRAM
  4K bytes of scratchpad SRAM
- Memory management unit providing memory protection

< **Functional Block Diagram** >

3. MCP ICs

3.1 Multi-Chip Package MEMORY

Features

- ■ Operating Temperature : -25℃ ~ 85℃
- ■ Package : 64Ball FBGA _ 8.0mm x 11.6mm x 1.2mmt 0.8mm ball pitch
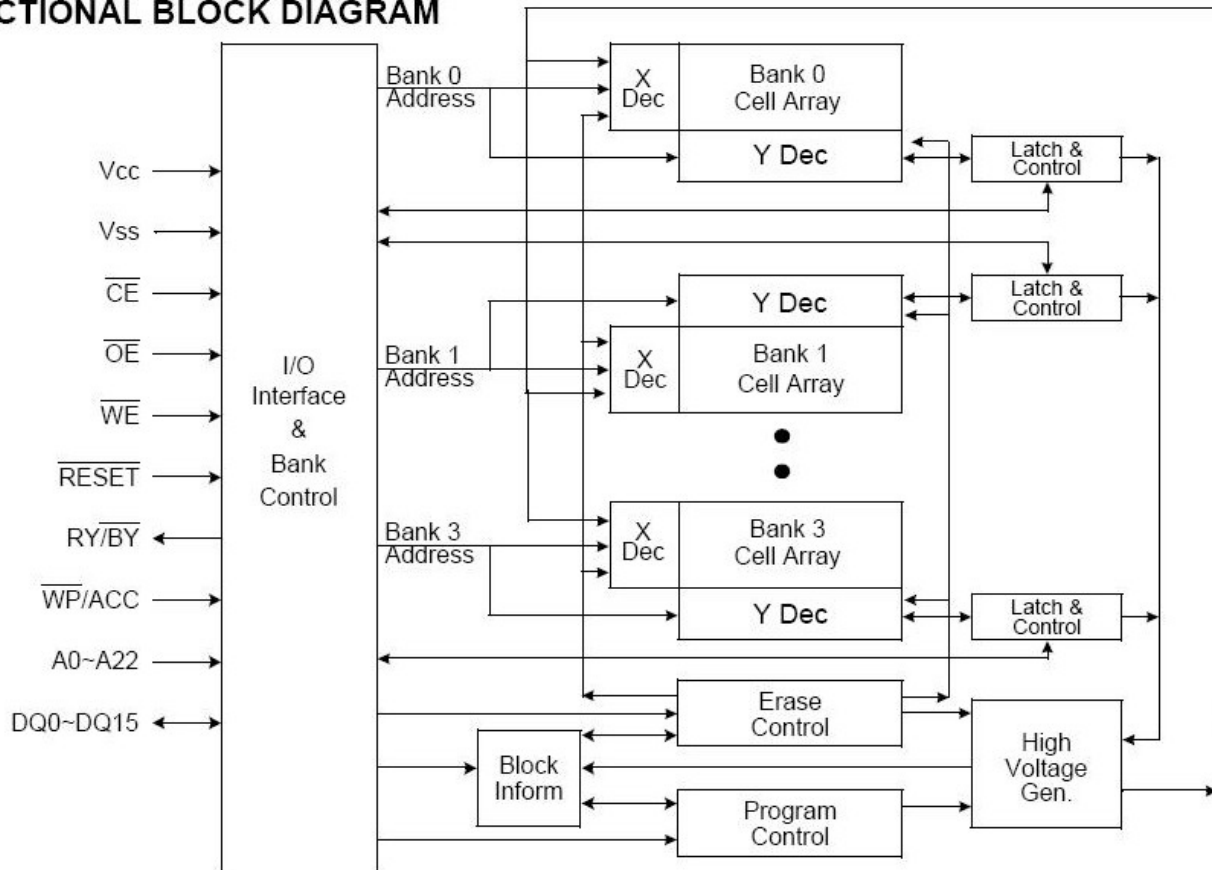
<NOR Flash>

- ■ Single Voltage, 2.7V to 3.6V for Read and Write operations Voltage range of 2.7V to 3.1V valid for MCP product
- ■ Organization 8M x16 bit (Word mode Only)
- ■ Fast Read Access Time : 60ns
- ■ Page Mode Operation   8 Words Page access allows fast asychronous read
  Page Read Access Time : 20ns
- ■ Read While Program/Erase Operation
- ■ Multiple Bank architectures (4 banks)
- ■ OTP Block : Extra 256 word
  - 128word for factory and 128word for customer OTP
- ■ Power Consumption (typical value)
  - Active Read Current : 45mA (@10MHz)
  - Program/Erase Current : 17mA
  - Read While Program or Read While Erase Current : 35mA
  - Standby Mode/Auto Sleep Mode : 15uA
- ■ Support Single & Quad word accelerate program
- ■ WP/ACC input pin
  - Allows special protection of two outermost boot blocks at VIL,regardless of block protect status
  - Removes special protection of two outermost boot block at VIH,the two blocks return to normal
    block protect status
  - Reduce program time at VHH : 6us/word
  - Accelerated Quadword Program time : 1.5us
- ■ Erase Suspend/Resume
- ■ Program Suspend/Resume
- ■ Unlock Bypass Program
- ■ Hardware RESET Pin
- ■ Command Register Operation
- ■ Block Protection / Unprotection
- ■ Supports Common Flash Memory Interface
- ■ Endurance : 100,000 Program/Erase Cycles Minimum
- ■ Data Retention : 10 years
- ■ Vio options at 1.8V and 3V I/O

<UtRAM>

- ■ Process technology: CMOS
- ■ Organization: 2M x 16 bit
- ■ Power supply voltage: 2.7V~3.1V

■ 4-Page Read

■ Three state outputs

■ Supports power saving modes

   - Internal TCSR (Temperature Compensated Self Refresh)

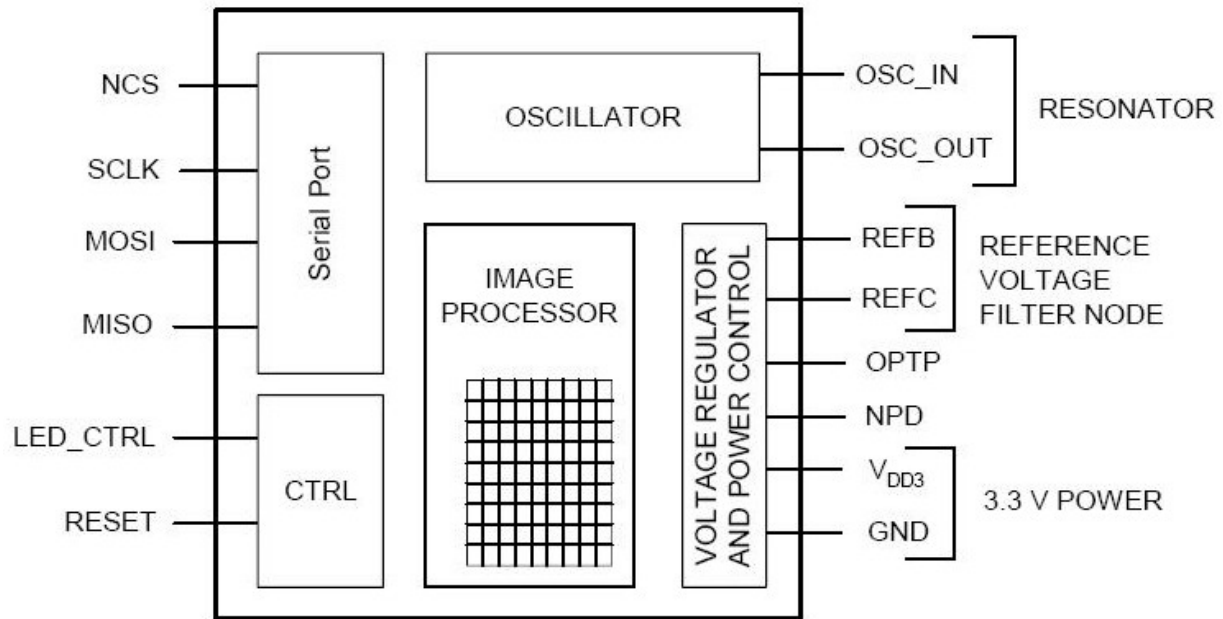## FUNCTIONAL BLOCK DIAGRAM

4. Image sensor

 4.1 High-performance Optical Sensor

    Features

■ High speed motion detection – up to 40 ips and 15g

■ New architecture for greatly improved optical navigation technology

■ Programmable frame rate over 6400 frames per second

■ SmartSpeed self-adjusting frame rate for optimum performance

■ Serial port burst mode for fast data transfer

■ 800 cpi selectable resolution

■ Single 3.3 volt power supply

■ Four-wire serial port along with Chip Select, Power Down, and Reset pins

< Image sensor Block diagram >

5. Battery Charger IC
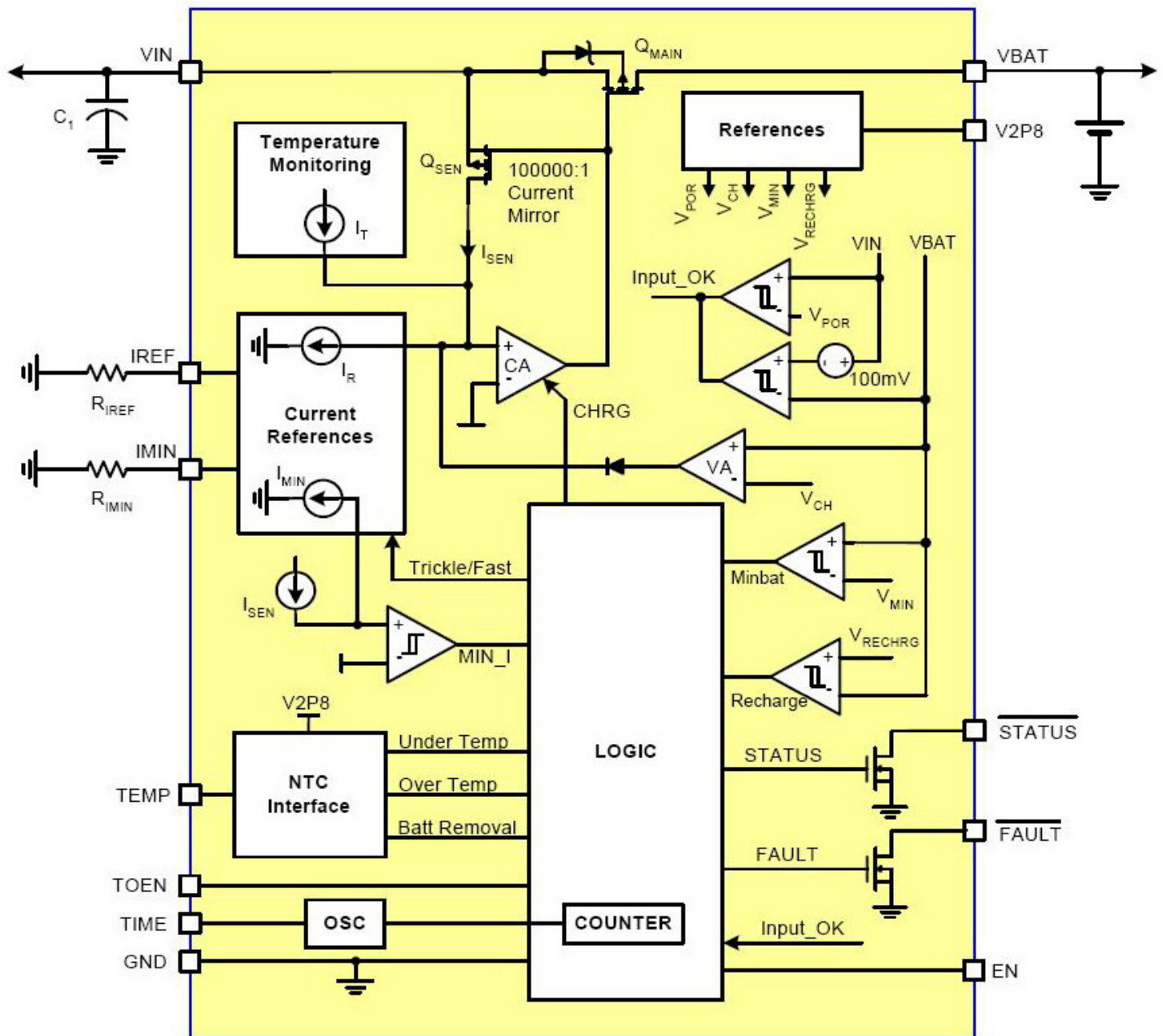 5.1 Li-ion/Li Polymer Battery Charger
   Features
       ■ Complete Charger for Single-Cell Li-ion Batteries
       ■ **Very Low Thermal Dissipation**
       ■ Integrated Pass Element and Current Sensor
       ■ No External Blocking Diode Required
       ■ 1% Voltage Accuracy
       ■ Programmable Current Limit up to 2A
       ■ Programmable End-of-Charge Current
       ■ **Charge Current Thermal Foldback**
       ■ NTC Thermistor Interface for Battery Temperature Monitor
       ■ **Accepts Multiple Types of Adapters or USB BUS Power**
       ■ **Guaranteed to Operate at 2.65V After Start Up**
       ■ Ambient Temperature Range: -20°C to 70°C
       ■ Thermally-Enhanced QFN Packages
       ■ Lead-Free Package Option Available ("Z" suffix)
   Applications
       ■ Handheld Devices including Medical Handhelds
       ■ PDAs, Cell Phones and Smart Phones
       ■ Portable Instruments, MP3 Players
       ■ Self-Charging Battery Packs
       ■ Stand-Alone Chargers
       ■ USB Bus-Powered Chargers

< BLOCK PROGRAM >