A. HE83138 Introduction

HE83138 is a member of 8-bit Micro-controller series developed by King Billion Electronics Ltd. This IC provides 512 pixels LCD display and built-in OP comparator can be used with light, voice, temperature and humility sensor or used to detect the battery low. The 7-bit current-type D/A converter and PWM drive output provide the complete speech output mechanism.

The 48K bytes ROM size can be used to store 15 seconds speech data. It can be applicable to the LCD game, medium level educational toy, lower second voice recording system or used with external command mode SRAM or Flash RAM for higher second voice recording etc.
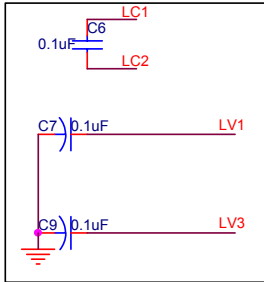
The instruction sets of HE80000 series are quite easy to learn and simple to use. Only about thirty instructions with four-type addressing mode are provided. Most of instructions take only 3 oscillator clocks (machine cycles). The performance of HE83750S is enough for most of battery operation system.

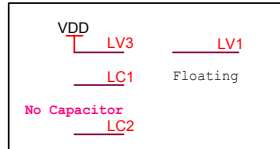# B. HE83138 Features

- Operation Voltage: 2.4V ~ 5.5V
- System Clock   4MHz ~ 8MHz
- Clock Source: Internal/External Fast clock, Internal/External slow clock
- Dual Clock System：   Normal (Fast) clock   32.768KHz ~ 8MHz
                             Slow clock   32.768 KHz
- Operation Mode：   DUAL、FAST、SLOW、IDLE、SLEEP Mode.
- Internal ROM: 48K Bytes.
- Internal RAM: 1K Bytes.
- Watch dog timer.
- 16 Bi-directional I/O ports.
- 512 pixels LCD driver with A, B type choice
- LCD Bias : 1/5
- LCD Charge Pump: 1 or 1.5 times of VDD
- One 7-bits current-type DAC output.
- One built-in OP comparator.
- PWM device.
- Built-in DTMF Generator.
- Speech recognition function
- Two external interrupts and three internal timer interrupts.
- Two 16-bit timers.
- Instruction set： 32 instructions, 4 addressing mode. 10-bit DATA POINTER for RAM and 16-bit TABLE POINTER for ROM.

C. Application Circuit
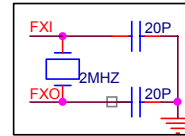
Twice Charge Pump is selected
LCD Max. Voltage=LV3=3/2*VDD

C6
0.1uF
LC1
LC2

C7 0.1uF   LV1

C9 0.1uF   LV3

Twice Charge Pump is selected
LCD Max. Voltage=LV3=VDD

VDD
LV3   LV1
LC1   Floating
No Capacitor
LC2

**No External Parts is
necessary if user adopt
Internal Fast RC Clock**

**External Fast Clock:
Crystal osc.**

FXI   20P
2MHZ
FXO   20P

**External Fast Clock:
RC osc.**

VDD
R > 8.2 KOhm
FXI
C: Please Ref. AN016
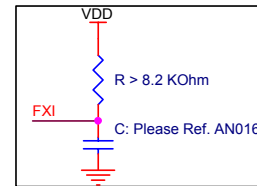
**External Slow Clock:
Crystal osc.**

SXI   20P
32.768K
SXO   20P

**External Slow Clock:
RC osc.**

SXI
R: Please ref. AN016
SXO

VDD

BATTERY1
3V
C1 0.1uF
C2 100uF
R1 50K
C3 0.1uF
SW1
RESET

VDD   FXI
FXO
SXI
SXO
RSTP_N

PRTD[7:0]
PRT17[7:0]

GND
LC1   LC1
LC2   LC2
LV1   LV1

COM[15:0]
SEG[31:0]

LCD PANEL

LV3
C1 0.1uF   LV3 < 9 Volt
C2 0.1uF   LR4
C3 0.1uF   LR3
C4 0.1uF   LR2
C5 0.1uF   LR1
LR0

**1/5 BAIS
CONFIGURATION**

OPIN
OPIP
OPO
DAO

**Buzzer
or
Speaker
Circuit**

PWMP
PWMN

VDD
SP1
Q1 NPN
SPEAKER

**Passive
Bias &
Filter
Circuit**

VO

Please Refer
AN022 for Speech
Output Circuit

LVG
?K Ohm   VR1
TSTP_P