



## A.HE83134 Introduction

HE83134 is a member of 8-bit Micro-controller series that is developed by King Billion. Users can chose any one of combination among 【640 dots LCD Driver + 12 Bit I/O Port】 ... 【320 dots LCD Driver + 32 Bit I/O Port】 etc. (Decide by Mask Option). This IC has built-in one OP comparator. The built-in OP comparator can be used with (light 、 voice 、 temperature 、 humility) sensor. The 7-bit current-type D/A converter and PWM device provide the complete speech output mechanism. The 256K ROM Size can storage around 80 second's speech. This IC is applicable to the medium systems such as LCD Games and Educational Toy etc. Use external SRAM or Flash RAM to have recording function. This IC is applicable to the medium systems such as LCD Games, Education Toy etc. This IC is very easy to learn and use. Most of instructions take only 3 oscillator clocks (machine cycles). As a result this IC is suitable for the applications that require higher performance system.

## B.HE83134 Features

- Operation Voltage : 2.2V – 5.5V
- System Clock : DC ~ 8MHz @ 5.0V  
DC ~ 4MHz @ 2.2V
- Internal ROM : 256K Bytes(64K Program ROM +192K Data ROM)
- Internal RAM : 256 Bytes
- Dual Clock System : Normal (Fast) clock : 32.768K ~ 8MHz  
Slow clock : 32.768KHz
- Operation Mode : DUAL 、 FAST 、 SLOW 、 IDLE 、 SLEEP Mode.
- With WDT (WATCH DOG TIMER) to prevent deadlock condition.
- 12-bit ~ 32-bit Bi-directional I/O port. Mask Option can select PUSH-PULL or OPEN DRAIN output mode for each I/O pin.
- One built-in OP comparator.
- 640 ~320 dots LCD driver (A 、 B TYPE selectable).



- One 7-bit current-type DAC output.
- PWM device.
- Two external interrupts and two internal timers interrupts.
- Two 16-bit timers.
- Instruction set : 32 instructions, 4 addressing mode. 8-bit DATA POINTER for RAM and 18-bit TABLE POINTER for ROM.

## C.HE83134 Application

- This IC is applicable to the medium systems such as LCD Games and Educational Toy etc.
- Light, voice, temperature, humidity-controlled system's speech. Applicable to the LCD application.
- Use external SRAM or Flash RAM to have recording function.

## D. Pin Assignment

| Pin # | Pin Name | I/O | Function                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|----------|-----|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 77    | FXI,     | B,  | External fast clock pin. Connecting to crystal or RC to generate 32.768 kHz ~ 8MHz system clock.                                    | <b>Mask Option settings :</b><br><br><b>MO_FCK/SCKN=00 : Slow Clock only</b><br><b>01 : Illegal</b><br><b>10 : Dual Clock</b><br><b>11 : Fast Clock only</b><br><br><b>MO_FOSCE=0 : Internal fast oscillation</b><br><b>1 : External fast oscillation</b><br><b>MO_FXTAL=0 : R,C oscillation for Fast Clock</b><br><b>1 : Crystal oscillation for Fast Clock</b><br><b>MO_SXTAL=0 : R,C oscillation for 32.768K Clock</b><br><b>1 : Crystal oscillation for 32.768K</b> |
| 76    | FXO      | O   |                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 80    | SXI,     | I,  | External slow clock pin. Connecting with 32.768 Hz OSC to generate the stable frequency for Slow Clock Mode and Timer clock source. | <b>Clock °</b><br><br><b>Program the value of OP1and OP2 to change the operating modes (Normal, Slow, Idle and Sleep).</b><br><br><b>In Dual Clock mode , the system runs in Fast Clock, only the LCD and timer I use the 32.768K clock source °</b>                                                                                                                                                                                                                    |
| 79    | SXO      | O   |                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|                 |                           |         |                                                                                                                        |                                                                                                                                                                                                                                                                                                         |
|-----------------|---------------------------|---------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 75              | RSTP_N                    | I       | System Reset Signal.                                                                                                   | <p>Pull this pin to low level to reset the system. Besides, select the Mask Option (MQ_PORE=1) to enable the HE83134 internal Power-on Reset function.</p> <p>In addition, the MO_WDTE is used for Watch Timer setting :</p> <p>MO_WDTE=0 : Disable Watch Dog Timer<br/>=1 : Enable Watch Dog Timer</p> |
| 78              | TSTP_P                    | I       | Test Pin                                                                                                               | Pull the pin to high level to enter into testing mode.                                                                                                                                                                                                                                                  |
| 90..<br>92<br>1 | PRTC[3:0]                 | I       | Port C bi-directional I/O Pin (4Pins)                                                                                  | <p>Mask Option MO_CPP[3:0] to preset the output type :</p> <p>MO_CPP=1 : Push-pull output;<br/>=0 : Open-drain output</p> <p>When assigned the port to input pin, send a '1' and read the result to get the input value</p>                                                                             |
| 82..<br>89      | PRTD[7:0]                 | B       | Port D bi-directional I/O pin (8 pins). PRTD[7:2] is also a Wake-up pin and PRTD[7:6] is used for interrupt input pin. | <p>Mask Option MO_DPP[7:0] to preset the output type :</p> <p>MO_DPP=1 : Push-pull output;<br/>=0 : Open-drain output</p> <p>When assigned the port to input pin, send a '1' and read the result to get the input value</p>                                                                             |
| 12..<br>15      | PRT17[7:4]/<br>SEG[39:36] | B/<br>O | Port 17 bi-directional pin(4pins) or LCD Segment[39:36]                                                                | <p>Mask Option MO_LIO17[7:4]</p> <p>Set 4 pins to be I/O or LCD Segment:</p> <p>MO_LIO17[7:0]=0 ; I/O Pin =1 ; LCD Pin</p> <p>I/O Pin Assigned</p> <p>Mask Option MO_17PP[7:4]</p> <p>MO_17PP[7:4]=0 ; Open-drain output<br/>=1 ; Push-pull output</p>                                                  |



|                     |                           |         |                                                               |                                                                                                                                                                                                                                                  |
|---------------------|---------------------------|---------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16..<br>23          | PRT15[7:0]/<br>SEG[35:28] | B/<br>O | Port 15 bi-directional<br>pin(8pins) or LCD<br>Segment[35:28] | Mask Option MO_LIO15[7:0]<br><br>Set 8 pins to be I/O or LCD Segment:<br><br>MO_LIO15[7:0]=0 ; I/O Pin=1 ; LCD Pin<br>I/O Pin Assigned<br><br>Mask Option MO_15PP[7:0]<br><br>MO_15PP[7:0]=0 ; Open-drain output<br><br>=1 ; Push-pull output    |
| 24<br>31            | PRT14[7:0]/<br>SEG[27:20] | B/<br>O | Port 14 bi-directional<br>pin(8pins) or LCD<br>Segment[27:20] | Mask Option MO_LIO14[7:0]<br><br>Set 8 pins to be I/O or LCD Segment :<br><br>MO_LIO14[7:0]=0 ; I/O Pin=1 ; LCD Pin<br>I/O Pin Assigned<br><br>Mask Option MO_14PP[7:0]<br><br>MO_14PP[7:0]= 0 ; Open-drain output<br><br>= 1 ; Push-pull output |
| 11..4<br>52..<br>59 | COM[15:0]                 | O       | LCD COMmon Output                                             | Data filled from D8H, please refer the LCD RAM<br>Map                                                                                                                                                                                            |
| 32..<br>51          | SEG[19:0]                 | O       | LCD SEGment Output                                            |                                                                                                                                                                                                                                                  |
| 61                  | LC2                       | B       | Charge Pump Switch 2                                          | LV3=VDD , Charge Pump for LCD is turn off. Take<br>one 0.1 $\mu$ F capacitor between LC1 and LC2 off.<br>Please refer the application circuit in order to avoid<br>power consumption.                                                            |
| 60                  | LC1                       | B       | Charge Pump Switch 1                                          |                                                                                                                                                                                                                                                  |
| 63                  | LV3                       | B       | Charge Pump V3                                                | Please refer the application circuit.                                                                                                                                                                                                            |
| 62                  | LV1                       | B       | Charge Pump V1                                                |                                                                                                                                                                                                                                                  |
| 64..<br>67          | LR[4..1]                  | B       | LCD Resister level 4 ~ 1                                      | Please refer the application circuit.                                                                                                                                                                                                            |
| 68                  | LVG                       | I       | LCD Virtual Ground                                            |                                                                                                                                                                                                                                                  |
|                     |                           |         | PWM +ve output pin can<br>directly drive Speaker              | Set the Bit2 for VOC register (PWM =1) to turn on<br>the PWM                                                                                                                                                                                     |



|    |      |   |                                                                           |                                                                     |
|----|------|---|---------------------------------------------------------------------------|---------------------------------------------------------------------|
| 2  | PWMP | O | or Buzzer for sound output.                                               | the PWM                                                             |
| 3  | PWMN | O | PWM -ve output pin can directly drive Speaker or Buzzer for sound output. | Set the Bit2 for VOC register (PWM =1) to turn on the PWM           |
| 70 | VO   | O | D/A voice output                                                          | Set the bit1 (DA=1) of VOC register to turn on VO                   |
| 71 | DAO  | O | D/A voice output for OP use.                                              | Set the bit0 (OP=1) of VOC register to turn on DAO                  |
| 72 | OPIN | I | OPAMP Inverting pin                                                       | Set the bit1 (OP=1) register to turn on OP Individual Op comparator |
| 73 | OPIP | I | OPAMP Non-Inverting pin                                                   |                                                                     |
| 74 | OPO  | O | OPAMP Output pin                                                          |                                                                     |
| 81 | VDD  | P | Positive Power Input                                                      |                                                                     |
| 69 | GND  | P | Power Ground Input                                                        |                                                                     |

## E.LCD RAM Map

| Page<br>0 | SEG<br>[7:0] | SEG<br>[15:8] | SEG<br>[23:16] | SEG<br>[31:24] | SEG<br>[39:32] |
|-----------|--------------|---------------|----------------|----------------|----------------|
| COM0      | 80H          | 90H           | A0H            | B0H            | C0H            |
| COM1      | 81H          | 91H           | A1H            | B1H            | C1H            |
| COM2      | 82H          | 92H           | A2H            | B2H            | C2H            |
| :         | :            | :             | :              | :              | :              |
| :         | :            | :             | :              | :              | :              |
| COM13     | 8DH          | 9DH           | ADH            | BDH            | CDH            |
| COM14     | 8EH          | 9EH           | AEH            | BEH            | CEH            |
| COM15     | 8FH          | 9FH           | AFH            | BFH            | CFH            |





## G. Bonding Pad Location

| PIN<br>Number | PIN<br>Name | X<br>Coordinate | Y<br>Coordinate | PIN<br>Number | PIN<br>Name | X<br>Coordinate | Y<br>Coordinate |
|---------------|-------------|-----------------|-----------------|---------------|-------------|-----------------|-----------------|
| 1             | PRTC[0]     | X= -1011.00     | Y= 1635.10      | 47            | SEG[4]      | X= 1025.00      | Y= -1636.50     |
| 2             | PWMP        | X= -1820.20     | Y= 1287.70      | 48            | SEG[3]      | X= 1140.50      | Y= -1636.50     |
| 3             | PWMN        | X= -1820.20     | Y= 1124.30      | 49            | SEG[2]      | X= 1256.00      | Y= -1636.50     |
| 4             | COM[8]      | X= -1820.20     | Y= 985.20       | 50            | SEG[1]      | X= 1371.50      | Y= -1636.50     |
| 5             | COM[9]      | X= -1820.20     | Y= 869.80       | 51            | SEG[0]      | X= 1487.00      | Y= -1636.50     |
| 6             | COM[10]     | X= -1820.20     | Y= 754.20       | 52            | COM[7]      | X= 1818.30      | Y= -1535.20     |
| 7             | COM[11]     | X= -1820.20     | Y= 638.80       | 53            | COM[6]      | X= 1818.30      | Y= -1419.80     |
| 8             | COM[12]     | X= -1820.20     | Y= 523.20       | 54            | COM[5]      | X= 1818.30      | Y= -1304.20     |
| 9             | COM[13]     | X= -1820.20     | Y= 407.80       | 55            | COM[4]      | X= 1818.30      | Y= -1188.80     |
| 10            | COM[14]     | X= -1820.20     | Y= 292.20       | 56            | COM[3]      | X= 1818.30      | Y= -1073.20     |
| 11            | COM[15]     | X= -1820.20     | Y= 176.80       | 57            | COM[2]      | X= 1818.30      | Y= -957.80      |
| 12            | PRT17[7]    | X= -1820.20     | Y= 61.20        | 58            | COM[1]      | X= 1818.30      | Y= -842.20      |
| 13            | PRT17[6]    | X= -1820.20     | Y= -54.20       | 59            | COM[0]      | X= 1818.30      | Y= -726.80      |
| 14            | PRT17[5]    | X= -1820.20     | Y= -169.80      | 60            | LC1         | X= 1818.30      | Y= -611.20      |
| 15            | PRT17[4]    | X= -1820.20     | Y= -285.20      | 61            | LC2         | X= 1818.30      | Y= -495.80      |
| 16            | PRT15[7]    | X= -1820.20     | Y= -400.80      | 62            | LV1         | X= 1818.30      | Y= -380.20      |
| 17            | PRT15[6]    | X= -1820.20     | Y= -516.20      | 63            | LV3         | X= 1818.30      | Y= -264.80      |
| 18            | PRT15[5]    | X= -1820.20     | Y= -631.80      | 64            | LR4         | X= 1818.30      | Y= -149.20      |
| 19            | PRT15[4]    | X= -1820.20     | Y= -747.20      | 65            | LR3         | X= 1818.30      | Y= -33.80       |
| 20            | PRT15[3]    | X= -1820.20     | Y= -862.80      | 66            | LR2         | X= 1818.30      | Y= 81.80        |
| 21            | PRT15[2]    | X= -1820.20     | Y= -978.20      | 67            | LR1         | X= 1818.30      | Y= 197.20       |
| 22            | PRT15[1]    | X= -1820.20     | Y= -1093.80     | 68            | LVG         | X= 1818.30      | Y= 312.80       |
| 23            | PRT15[0]    | X= -1747.00     | Y= -1636.50     | 69            | GND         | X= 1818.30      | Y= 428.20       |
| 24            | PRT14[7]    | X= -1631.50     | Y= -1636.50     | 70            | VO          | X= 1699.90      | Y= 1634.40      |



|    |          |             |             |    |         |            |            |
|----|----------|-------------|-------------|----|---------|------------|------------|
| 25 | PRT14[6] | X= -1516.00 | Y= -1636.50 | 71 | DAO     | X= 1548.10 | Y= 1634.40 |
| 26 | PRT14[5] | X= -1400.50 | Y= -1636.50 | 72 | OPIN    | X= 1414.50 | Y= 1635.10 |
| 27 | PRT14[4] | X= -1285.00 | Y= -1636.50 | 73 | OPIP    | X= 1299.00 | Y= 1635.10 |
| 28 | PRT14[3] | X= -1169.50 | Y= -1636.50 | 74 | OPO     | X= 1183.50 | Y= 1635.10 |
| 29 | PRT14[2] | X= -1054.00 | Y= -1636.50 | 75 | RSTP_N  | X= 1068.00 | Y= 1635.10 |
| 30 | PRT14[1] | X= -938.50  | Y= -1636.50 | 76 | FXO     | X= 952.50  | Y= 1635.10 |
| 31 | PRT14[0] | X= -823.00  | Y= -1636.50 | 77 | FXI     | X= 837.00  | Y= 1635.10 |
| 32 | SEG[19]  | X= -707.50  | Y= -1636.50 | 78 | TSTP_P  | X= 721.50  | Y= 1635.10 |
| 33 | SEG[18]  | X= -592.00  | Y= -1636.50 | 79 | SXO     | X= 606.00  | Y= 1635.10 |
| 34 | SEG[17]  | X= -476.60  | Y= -1636.50 | 80 | SXI     | X= 490.40  | Y= 1635.10 |
| 35 | SEG[16]  | X= -361.10  | Y= -1636.50 | 81 | VDD     | X= 374.90  | Y= 1635.10 |
| 36 | SEG[15]  | X= -245.60  | Y= -1636.50 | 82 | PRTD[7] | X= 259.40  | Y= 1635.10 |
| 37 | SEG[14]  | X= -130.10  | Y= -1636.50 | 83 | PRTD[6] | X= 143.90  | Y= 1635.10 |
| 38 | SEG[13]  | X= -14.60   | Y= -1636.50 | 84 | PRTD[5] | X= 28.40   | Y= 1635.10 |
| 39 | SEG[12]  | X= 101.00   | Y= -1636.50 | 85 | PRTD[4] | X= -87.10  | Y= 1635.10 |
| 40 | SEG[11]  | X= 216.40   | Y= -1636.50 | 86 | PRTD[3] | X= -202.60 | Y= 1635.10 |
| 41 | SEG[10]  | X= 331.90   | Y= -1636.50 | 87 | PRTD[2] | X= -318.10 | Y= 1635.10 |
| 42 | SEG[9]   | X= 447.40   | Y= -1636.50 | 88 | PRTD[1] | X= -433.60 | Y= 1635.10 |
| 43 | SEG[8]   | X= 563.00   | Y= -1636.50 | 89 | PRTD[0] | X= -549.10 | Y= 1635.10 |
| 44 | SEG[7]   | X= 678.50   | Y= -1636.50 | 90 | PRTC[3] | X= -664.60 | Y= 1635.10 |
| 45 | SEG[6]   | X= 794.00   | Y= -1636.50 | 91 | PRTC[2] | X= -780.10 | Y= 1635.10 |
| 46 | SEG[5]   | X= 909.50   | Y= -1636.50 | 92 | PRTC[1] | X= -895.60 | Y= 1635.10 |



## H. DA/DC Characteristics

### Absolute Maximum Rating

| Item                  | Sym.     | Rating                           | Condition |
|-----------------------|----------|----------------------------------|-----------|
| Supply Voltage        | $V_{dd}$ | $-0.5V \sim 8V$                  |           |
| Input Voltage         | $V_{in}$ | $-0.5V \sim V_{dd}+0.5V$         |           |
| Output Voltage        | $V_o$    | $-0.5V \sim V_{dd}+0.5V$         |           |
| Operating Temperature | $T_{op}$ | $0^{\circ}C \sim 70^{\circ}C$    |           |
| Storage Temperature   | $T_{st}$ | $-50^{\circ}C \sim 100^{\circ}C$ |           |

### Recommended Operating Conditions

| Item                  | Sym.      | Rating                           | Condition     |
|-----------------------|-----------|----------------------------------|---------------|
| Supply Voltage        | $V_{dd}$  | $2.2V \sim 5.5V$                 |               |
| Input Voltage         | $V_{ih}$  | $0.9 V_{dd} \sim V_{dd}$         |               |
|                       | $V_{il}$  | $0.0V \sim 0.1V_{dd}$            |               |
| Operating Frequency   | $F_{max}$ | 8MHz                             | $V_{dd}=5.0V$ |
|                       |           | 4MHz                             | $V_{dd}=2.2V$ |
| Operating Temperature | $T_{op}$  | $0^{\circ}C \sim 70^{\circ}C$    |               |
| Storage Temperature   | $T_{st}$  | $-50^{\circ}C \sim 100^{\circ}C$ |               |



Test Condition : TEMP=25°C, VDD=3V+/-10%, GND=0V

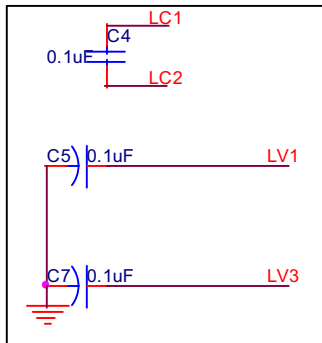
|                          | PARAMETER                |                             | CONDITION                                                                                                      | MIN                    | TYP                    | MAX                    | UNIT |
|--------------------------|--------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------|------------------------|------------------------|------------------------|------|
| <b>I<sub>Fast</sub></b>  | NORMAL Mode Current      | System                      | 2M ext. R/C                                                                                                    |                        | 0.75                   | 1                      | mA   |
| <b>I<sub>Slow</sub></b>  | SLOW Mode Current        | System                      | 32.768K X'tal<br>LCD Disable                                                                                   |                        | 10                     | 20                     | μA   |
| <b>I<sub>Idle</sub></b>  | IDLE Mode Current        | System                      | 32.769K X'tal<br>LCD Disable                                                                                   |                        | 6                      | 10                     | μA   |
| <b>I<sub>LCD</sub></b>   | Extra Current if LCD ON  | System                      | LCD Enable,<br>LCD option=300Kohm<br>Voltage-doubler OFF                                                       |                        | 12                     | 20                     | μA   |
|                          |                          |                             | LCD Enable,<br>LCD option=30Kohm,<br>Voltage-doubler ON                                                        |                        | 100                    | 120                    |      |
| <b>I<sub>Sleep</sub></b> | Sleep Mode Current       | System                      |                                                                                                                |                        |                        | 1                      | μA   |
| <b>I<sub>oHPWM</sub></b> | PWM Output Drive Current | PWMP, PWMN <sup>*2</sup>    | V <sub>DD</sub> =3V; V <sub>oh</sub> =2V                                                                       | 12                     | 15                     |                        | mA   |
| <b>I<sub>oLPWM</sub></b> | PWM Output Sink Current  | PWMP, PWMN <sup>*2</sup>    | V <sub>DD</sub> =3V; V <sub>oL</sub> =1V                                                                       | 33                     | 40                     |                        | mA   |
| <b>I<sub>oVO</sub></b>   | DAC Output Current       | VO, DAO                     | V <sub>DD</sub> =3V; VO=0~2V, Data=7F                                                                          | 2.5                    | 3                      |                        | mA   |
| <b>V<sub>iH</sub></b>    | Input High Voltage       | I/O pins                    |                                                                                                                | 0.8<br>V <sub>DD</sub> |                        |                        | V    |
| <b>V<sub>iL</sub></b>    | Input Low Voltage        | I/O pins                    |                                                                                                                |                        |                        | 0.2<br>V <sub>DD</sub> | V    |
| <b>V<sub>hys</sub></b>   | Input Hysteresis Width   | I/O, RSTP_N                 | Threshold=2/3V <sub>DD</sub> (input from low to high)<br>Threshold=1/3V <sub>DD</sub> (input from high to low) |                        | 1/3<br>V <sub>DD</sub> |                        | V    |
| <b>I<sub>oH</sub></b>    | Output Drive Current     | I/O pull-high <sup>*1</sup> | V <sub>oL</sub> =2.0V                                                                                          | 50                     |                        |                        | μA   |
| <b>I<sub>oL_1</sub></b>  | Output Sink Current      | I/O pull-low <sup>*1</sup>  | V <sub>oL</sub> =0.4V                                                                                          | 1.0                    |                        |                        | mA   |
| <b>I<sub>iL_1</sub></b>  | Input Low Current        | RSTP_N                      | V <sub>iL</sub> =GND, pull high Internally                                                                     |                        | 20                     |                        | μA   |
| <b>I<sub>iL_2</sub></b>  | Input Low Current        | I/O                         | V <sub>iL</sub> =GND, if pull high Internally by user                                                          |                        | 100                    |                        | μA   |

Note: \*1: Drive Current Spec. for Push-Pull I/O port only  
Sink Current Spec. for both Push-Pull and Open-Drain I/O port.

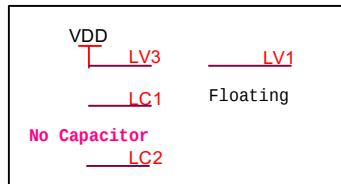
\*2: This Spec. base on one driver only. There are five build-in driver, so user just multiply the number of driver he used to one driver current to get the total amount of current. ( $I_{OHPWM} \cdot I_{OLPWM} \cdot N$ ;  $N=0,1,2,3,4,5$ )

# I. Application Circuit

Tripple Charge Pump is selected  
LCD Max. Voltage=LV3=3/2\*VDD

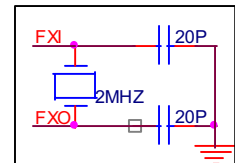


Tripple Charge Pump is selected  
LCD Max. Voltage=LV3=VDD

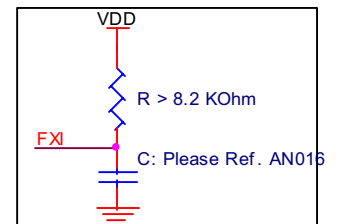


No External Parts is necessary if user adopt Internal Fast RC Clock

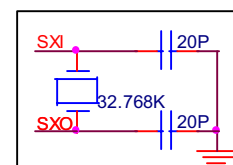
External Fast Clock:  
Crystal osc.



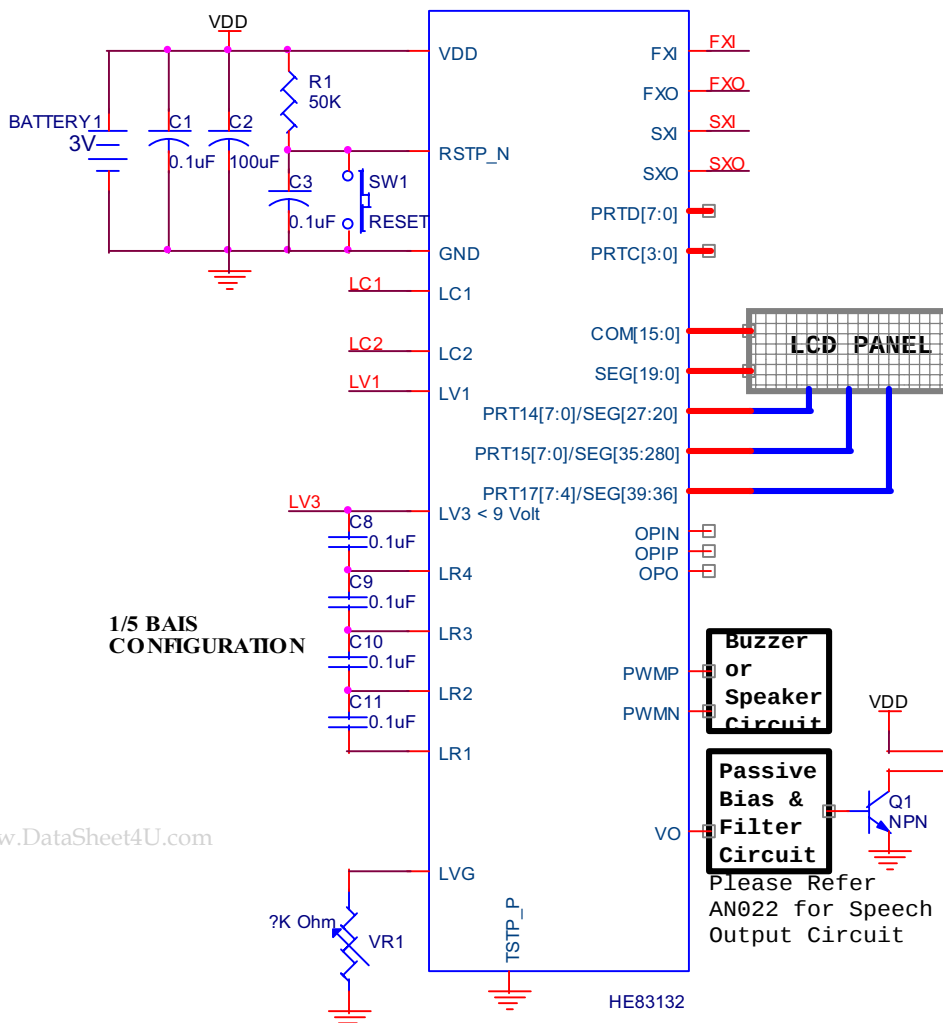
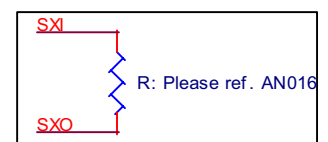
External Fast Clock:  
RC osc.



External Slow Clock:  
Crystal osc.



External Slow Clock:  
RC osc.



1/5 BAIS  
CONFIGURATION

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