



義隆電子股份有限公司

ELAN MICROELECTRONICS CORP.

EM78870

8-BIT MICRO-CONTROLLER

Version 1.4

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User Application Note

1. ROM, OTP, ICE

ROM	OTP	ICE
EM78870	EM78P870	EM78808 ICE

2. Main Function Difference

	EM78870	EM78P870
RAM	2.5K x 8	8K x 8



I. General Description

The EM78870 is an 8-bit RISC type microprocessor with low power, high speed CMOS technology. Integrated onto a single chip are on_chip watchdog (WDT), RAM, ROM, programmable real time clock /counter, internal interrupt, power down mode, LCD driver, build-in KEY TONE clock generation, Programming Tone generators, Serial Peripheral Interface(SPI), comparator and tri-state I/O. The EM78870 provides a single chip solution to design a message_display.

II. Feature

CPU

- Operating voltage range : 2.2V~5.5V(Normal mode), 2.0V~5.5V(Green mode)
- 32Kx 13 on chip Program ROM
- 2.5Kx 8 on chip data RAM
- 144 byte working register
- Up to 51 bi-directional tri-state I/O ports (32 shared with LCD Segment pins)
- IO with internal Pull high, wake-up and interrupt functions
- STACK: 32 level stack for subroutine nesting
- TCC: 8-bit real time clock/counter (TCC) with 8-bit prescaler
- COUNTER1: 8-bit counter with 8-bit prescaler can be an interrupt source
- COUNTER2: 8-bit counter with 8-bit prescaler can be an interrupt source
- Watch Dog : Programmable free running on chip watchdog timer
- CPU modes:

Mode	CPU status	Main clock	32.768kHz clock status
Sleep mode	Turn off	Turn off	Turn off
Idle mode	Turn off	Turn off	Turn on
Green mode	Turn on	Turn off	Turn on
Normal mode	Turn on	Turn on	Turn on

- 12 interrupt source : 8 external , 4 internal
- Key Scan : Port key scan function up to 16x4 keys
- Sub-Clock: 32.768kHz crystal
- Main-clock: 3.5826MHz multiplied by 0.25, 0.5, 1 or 3 generated by internal PLL
- Key tone output (shared with IO) : 4kHz, 2kHz, 1kHz
- Comparator: 3-channel comparators, internal (16 level) or external reference voltage (shared with IO)
- Serial Peripheral Interface (SPI) : Interrupt flag available for the read buffer full, Programmable baud rates of communication, Three-wire synchronous communication. (shared with IO)

Programmable Tone Generators

- Operation Voltage 2.2V~5.5V
- Programmable Tone1 and Tone2 generators
- Independent single tone generation for Tone1 and Tone2
- Mixed dual tone generation by Tone1 and Tone2 with 2dB difference

LCD (8x80, 9x80, 16x80, 24x72)

- Maximum common driver pins : 16/24
- Maximum segment driver pins : 80(SEG0..SEG79)/72(SEG8..SEG79)
- Shared COM16 ~ COM23 pins with SEG0 ~ SEG7 pins
- 1/4 bias for 8, 9 and 16 common mode and 1/5 bias for 24 common mode
- 1/8, 1/9, 1/16, 1/24 duty
- 16 Level LCD contrast control (software)
- Internal resistor circuit for LCD bias
- Internal voltage follower for better display

Package type

- 128-pin QFP or chip : EM78870AQ (POVD disable), EM78870BQ (POVD enable), EM78870H

III. Application

Cordless phones or any telephone product with large LCD needed

IV. Pin Configuration

COM9	1	104	SEG18
COM8	2	103	SEG19
COM7	3	102	SEG20
COM6	4	101	SEG21
COM5	5	100	SEG22
COM4	6	99	SEG23
COM3	7	98	SEG24
COM2	8	97	SEG25
COM1	9	96	SEG26
COM0	10	95	SEG27
VC5	11	94	SEG28
VC4	12	93	SEG29
VC3	13	92	SEG30
VC2	14	91	SEG31
VC1	15	90	SEG32
XIN	16	89	SEG33
XOUT	17	88	SEG34
VDD	18	87	SEG35
AVDD	18	86	SEG36
PLL	19	85	SEG37
TONE	20	88	SEG38
AVSS	21	83	SEG39
GND	21	82	SEG40
TEST	22	81	SEG41
/RESET	23	80	SEG42
P70/INT0	24	79	SEG43
P71/INT0	25	78	SEG44
P72/INT0	26	77	SEG45
P73/INT0	27	76	SEG46
P74/INT1	28	75	SEG47
P75/INT1	29	74	SEG48/PB0
P76/INT1	30	73	SEG49/PB1
P77/INT2	31	72	SEG50/PB2
P60/SCK	32	71	SEG51/PB3
P61/SDO	33	70	SEG52/PB4
P62/SDI	34	69	SEG53/PB5
P63/CMP1	35	68	SEG54/PB6
P64/CMP2	36	67	SEG55/PB7
P65/CMP3	37	66	SEG56/PC0
P66	38	65	SEG57/PC1
P67/KTONE	39	64	SEG58/PC2
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Fig.1 Pin assignment (128-pin QFP or chip)

* This specification are subject to be changed without notice.