



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
				63	SEG59/PC3
				62	SEG60/PC4
				61	SEG61/PC5
				60	SEG62/PC6
				59	SEG63/PC7
				58	SEG64/P80
				57	SEG65/P81
				56	SEG66/P82
				55	SEG67/P83
				54	SEG68/P84
				53	SEG69/P85
				52	SEG70/P86
				51	SEG71/P87
				50	SEG72/P90
				49	SEG73/P91
				48	SEG74/P92
				47	SEG75/P93
				46	SEG76/P94
				45	SEG77/P95
				44	SEG78/P96
				43	SEG79/P97
				42	P57
				41	P56
				40	P55

Fig.1 Pin assignment (128-pin QFP or chip)

* This specification are subject to be changed without notice.