EM78P340N/341N /3411N/342N/343N

8-Bit Microprocessor with OTP ROM

Product Specification

DOC. VERSION 1.1

ELAN MICROELECTRONICS CORP.

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Specification Revision History

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Doc. Version	Revision Description	Date
1.0	Initial released version	2006/12/01
1.1	1. Add EM78P340N 10 pin and EM78P3411N 16 pin package. 2. Modify programmable Level Voltage Reset (LVR). 3. Modify operating voltage range and frequency range. 4. Modify IRC mode Wake-Up time. 5. Modify some code option bits are available. 6. Add APPENDIX D : How to use ICE341N	2007/09/11

1   General Description

The EM78P340N, EM78P341N, EM78P3411N, EM78P342N and EM78P343N are 8-bit microprocessors designed and developed with low-power and high-speed CMOS technology. The series have an on-chip 2K×13-bit Electrical One Time Programmable Read Only Memory (OTP-ROM). It provides a protection bit to prevent intrusion of user's OTP memory code. Three Code option bits are also available to meet user's requirements.

With enhanced OTP-ROM features, the EM78P340N, EM78P341N, EM78P3411N, EM78P342N and EM78P343N provide a convenient way of developing and verifying user's programs. Moreover, this OTP device offers the advantages of easy and effective program updates, using development and programming tools. User can avail of the ELAN Writer to easily program his development code.

2   Features

- CPU configuration
  - 2K×13 bits on chip ROM
  - 80×8 bits on chip registers (SRAM)
  - 8 level stacks for subroutine nesting
  - 4 programmable Level Voltage Detector (LVD): 4.5V, 4.0V, 3.3V, 2.2V
  - 3 programmable Level Voltage Reset (LVR): 4.0V, 3.5V, 2.4V,
  - Less than 1.5 mA at 5V/4MHz
  - Typically 15 μA, at 3V/32kHz
  - Typically 2 μA, during sleep mode
- I/O port configuration
  - Three bidirectional I/O ports : P5, P6, P7
  - 18 I/O pins
  - Wake-up port: P5
  - 8 Programmable pull-down I/O pins
  - 16 programmable pull-high I/O pins
  - 8 Programmable open-drain I/O pins
  - 4 Programmable high sink current I/O pins
  - External interrupt: P60
- Operating voltage range:
  - Commercial version:
    Operating voltage range: 2.1V~5.5V
  - Industrial version:
    Operating voltage range:2.3V~5.5V
- Operating temperature range**:**
  - Commercial version:
    Operating voltage range: 0°C ~ 70°C
  - Industrial version:
    Operating voltage range: -40°C ~ 85°C
- Operating frequency range:
  Main clock
  - Crystal mode:
    DC ~ 16MHz/2clks @ 4.5V;
    DC ~ 8 MHz/2clks @ 3.0V
    DC ~ 4MHz/2clks @ 2.1V
  - ERC mode:
    DC ~ 16MHz/2clks @ 4.5V;
    DC ~ 125ns inst. cycle @ 4.5V;
    DC ~ 8MHz/2clks @ 3V
    DC ~ 250ns inst. cycle @ 3V
  - IRC mode:
    Oscillation mode : 16MHz, 4MHz, 1MHz, 455kHz

Internal RC Frequency	Drift Rate			
	Temperature (-40°C+85°C)	Voltage (2.1V~5.5V)	Process	Total
4MHz	±5%	±5%	±4%	±14%
16MHz	±5%	±5%	±4%	±14%
1MHz	±5%	±5%	±4%	±14%
455MHz	±5%	±5%	±4%	±14%

All these four main frequencies can be trimmed by programming with four calibrated bits in the ICE341N Simulator. OTP is auto trimmed by ELAN Writer (DWTR).

- Fast set-up time requires only 800μs (VDD:5V Crystal: 4MHz, C1/C2: 30pF) in HXT2 mode and 10μs in IRC mode (VDD:5V IRC:4MHz)
- Peripheral configuration
  - Easily implemented IR (or infrared remote control)
  - 8-bit real time clock/counter (TCC) with selective signal sources, trigger edges, and overflow interrupt
  - 8-bit real time clock/counter (TCCA, TCCC) and 16-bit real time clock/counter (TCCB) with selective signal sources, trigger edges, and overflow interrupt
  - 8-bit channels Analog-to-Digital Converter with 12-bit resolution in Vref mode
  - One pair of comparators or OP (offset voltage is smaller than 10mV)
- Seven available interrupts:
  - TCC, TCCA, TCCB, TCCC overflow interrupt
  - Input-port status changed interrupt (wake-up from sleep mode)
  - External interrupt
  - ADC completion interrupt
  - IR/PWM interrupt
  - Comparator status change interrupt
  - Low voltage detect (LVD) interrupt
- Special features
  - Programmable free running watchdog timer (4.5ms:18ms)
  - Power saving Sleep mode
  - Selectable Oscillation mode
  - Power-on voltage detector available (1.7 V± 0.1V)
  - High EFT immunity.(better performance at 4MHz or below)
- Package type:
  - 10-pin SSOP 150mil   : EM78P340NKMS/NKMJ
  - 14-pin DIP 300mil   ; EM78P341NPS/NPJ
  - 14-pin SOP 150mil   :EM78P341NMS/NMJ
  - 16-pin SOP 150mil   :EM78P3411NAMS/NAMJ
  - 18-pin DIP 300mil   :EM78P342NPS/NPJ
  - 18-pin SOP 300mil   :EM78P342NMS/NMJ
  - 20-pin DIP 300mil   :EM78P343NPS/NPJ
  - 20-pin SOP 300mil   :EM78P343NMS/NMJ
  - 20-pin SSOP 209mil   :EM78P343NKMS/NKMJ

3 Pin Assignment

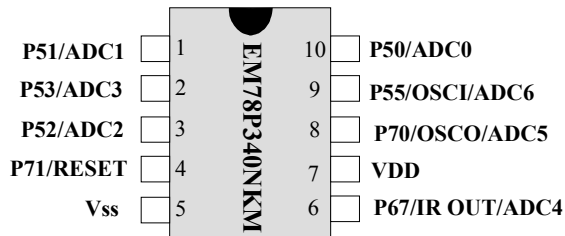(1) 10-Pin SSOP

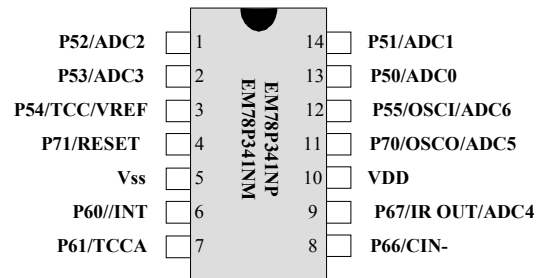Fig. 3-1 10-pin EM78P340NKM

(2) 14-Pin DIP/SOP

Fig. 3-2 14-pin EM78P341NP/NM
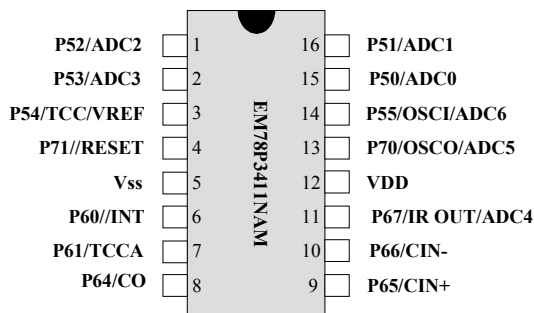
(3) 16-Pin SOP

Fig. 3-3 16-pin EM78P3411NAM
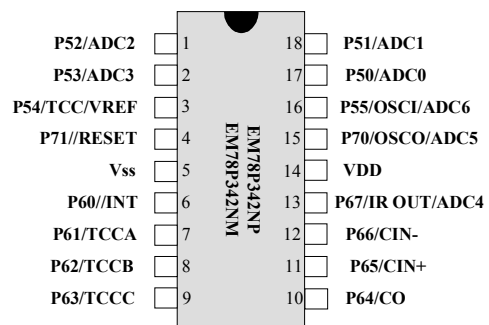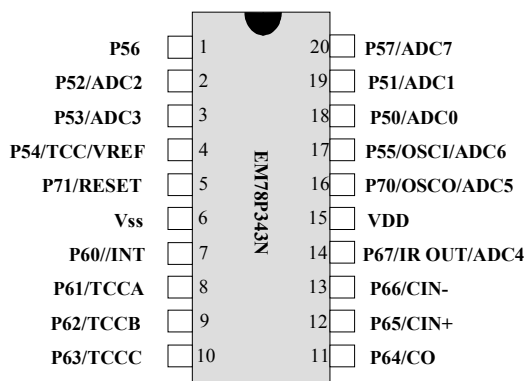
(4) 18-Pin DIP/SOP

Fig. 3-4 18-pin EM78P342NP/NM

(5) 20-Pin DIP/SOP/SSOP

Fig. 3-5 20-pin EM78P343NP/NM/NKM