EM78P346N

8-Bit Microprocessor with OTP ROM

Product Specification

DOC. VERSION 1.3

ELAN MICROELECTRONICS CORP.

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APPENDIX

Specification Revision History

Doc. Version	Revision Description	Date
0.9	Preliminary version	2007/05
1.0	Initial pre-released version	2007/12/25
1.1	Modified Type 1 and Type 0 description for code option	2008/10/31
1.2	Added Section 8.3 *Device Characteristics*	2011/04/21
1.3	1. Added Ordering and Manufacturing Information. 2. Added LVR specifications	2013/03/26

Item	EM78P346N
Level Voltage Reset	4.1V, 3.7V, 2.8V
Crystal mode Operating frequency range	DC ~ 16 MHz, 4.5V DC ~ 8 MHz, 3.0V DC ~ 4 MHz, 2.1V
IRC mode Wake-up time (Sleep mode → Normal mode)	10 μs Condition: 5V, 4 MHz
Code Option	With Code Option NRM

1 General Description

The EM78P346N is an 8-bit microprocessor designed and developed with low-power and high-speed CMOS technology. It has as an on-chip 4K×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 its enhanced OTP-ROM feature, the device provides 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
  - 4K×13 bits on-chip ROM
  - 144×8 bits on-chip registers (SRAM)
  - 8-level stacks for subroutine nesting
  - Four programmable Level Voltage Detector (LVD) : 4.5V, 4.0V, 3.3V, 2.3V
  - Three programmable Level Voltage Reset (LVR) : 4.1V, 3.7V, 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
  - Wake-up port : P6
  - 21 programmable pull-down I/O pins
  - 21 programmable pull-high I/O pins
  - 22 programmable open-drain I/O pins
  - Four programmable high-sink I/O pins
  - External interrupt : P50
- Operating voltage range:
  - 2.1V~5.5V at 0°C~70°C (commercial)
  - 2.3V~5.5V at -40°C~85°C (industrial)
- Operating frequency range (base on two clocks):
  - Crystal mode: DC ~ 16 MHz, 4.5V
    DC ~ 8 MHz, 3V; DC ~ 4 MHz, 2.1V
  - RC mode: DC ~ 16 MHz, 4.5V;
    DC ~ 12 MHz, 4V; DC ~ 4 MHz, 2.1V
  - Internal RC Drift Rate (Ta=25°C, VDD=5V ± 5%, VSS=0V)

Internal RC Frequency	Drift Rate			
	Temperature (-40℃ +85℃)	Voltage (2.3V~5.5V)	Process	Total
455kHz	±5%	±5%	±4%	±14%
1 MHz	±5%	±5%	±4%	±14%
4 MHz	±5%	±5%	±4%	±14%
16 MHz	±5%	±5%	±4%	±14%

- All the four main frequencies can be trimmed by programming with four calibrated bits in the ICE346N Simulator. OTP is auto trimmed by ELAN Writer.
- Fast set-up time requires only 0.8 ms (HXT2, 4 MHz) in high Crystal and 32 CLKS in IRC mode from wake up to operating mode
- Peripheral configuration
  - 8-bit real time clock/counter (TCC) with selective signal sources, trigger edges, and overflow interrupt
  - 8-bit multi-channel Analog-to-Digital Converter with 12-bit resolution in Vref mode
  - Three Pulse Width Modulation (PWM) with 10-bit resolution
  - One pair of comparator (offset voltage: 5mV)
  - One pair of OP (offset voltage: 5 mV)
  - Power-down (Sleep) mode
  - High EFT immunity (4 MHz, 4 clocks)
- Seven available interrupts
  - TCC overflow interrupt
  - Input-port status changed interrupt (wake up from sleep mode)
  - External interrupt
  - ADC completion interrupt
  - PWM period match completion
  - Comparator high/low interrupt
  - Low voltage detector interrupt
- Programmable free running Watchdog Timer
  - Watchdog Timer: 16.5ms ± 5% with Vdd =5V at 25°C, Temperature range ± 5% (-40°C ~+85°C)
  - Watchdog Timer: 18ms ± 5% with Vdd =3V at 25°C, Temperature range ± 5% (-40°C~+85°C)
  - Two clocks per instruction cycle
- Package Type:
  - 18-pin DIP 300mil : EM78P346ND18J/S
  - 18-pin SOP 300mil : EM78P346NSO18J/S
  - 20-pin DIP 300mil : EM78P346ND20J/S
  - 20-pin SOP 300mil : EM78P346NSO20J/S
  - 20-pin SSOP 209mil : EM78P346NSS20J/S
  - 24-pin skinny DIP 300mil : EM78P346NK24J/S
  - 24 pin SOP 300mil : EM78P346NSO24J/S
  - 24 pin SSOP 150mil : EM78P346NSS24J/S

Note: *These are Green products which do not contain hazardous substances.*