Winbond Electronics Corp.

# 4-BIT MICROCONTROLLER

## 1. GENERAL DESCRIPTION

The W742C(E)811 [W742C811 is mask type, W742E811 is MTP(Multiple Time Program) type] is a high-performance 4-bit microcontroller (µC) that built in 640-dot LCD driver. The device contains a 4-bit ALU, two 8-bit timers, two dividers in dual-clock operation, a 40 × 16 LCD driver, ten 4-bit I/O ports (including 1 output port for LED driving), multiple frequency output, and one channel DTMF generator. There are also eleven interrupt sources and 16-level stack buffer. The W742C(E)811 operates on very low current and has three power reduction modes, hold mode, stop mode and slow mode, which help to minimize power dissipation.

## 2. FEATURES

- Operating voltage
  - 2.4V - 6.0V for mask type
  - 2.4V - 4.8V for MTP type
- Dual-clock operation
- Main oscillator
  - 3.58MHz or 400khz can be selected by code option
  - crystal or RC oscillator can be selected by code option
- Sub-oscillator
  - Connect to 32.768KHz crystal only
- Memory
  - 16384(16K) x 16 bit program ROM (including 64K x 4 bit look-up table)
  - 5120(5K) x 4 bit data RAM (including 16 nibbles x 16 pages working registers)
  - 40 x 16 LCD data RAM
- 40 input/output pins
  - Port for input only: 3 ports/12 pins
  - Input/output ports: 3 ports/12 pins
  - High sink current output port for LED driving: 1 port /4 pins
  - Port for output only: 1 port/ 4 pins
  - DC output port: 2 ports/ 8 pins (selected by code option)
- Power-down mode
  - Hold mode: no operation (main oscillator and sub-oscillator still operate)
  - Stop mode: no operation (main oscillator and sub-oscillator are stopped)
  - Slow mode: main oscillator is stopped, system is operated by the sub-oscillator (32.768KHz)

- Eleven interrupt sources
  - Four internal interrupts (Divider0, Divider1, Timer 0, Timer 1)
  - Seven external interrupts (RC.0-3, P1.2(/INT0), Serial Port, P1.3(/INT1))
- LCD driver output
  - 40 segments x 16 commons
  - 1/8 or 1/16 duty (selected by code option) 1/5 bias driving mode
  - Clock source should be the sub-oscillator clock in the dual-clock operation mode
  - 8 level software LCD contrast adjusting
  - LCD operating voltage source could come from Vdd or Vlcd1-pin input
- MFP output pin
  - Output is software controlled to generate modulating or nonmodulating frequency, normally as key tone generator
  - Works as frequency output specified by Timer 1
  - Key tone generator
- DTMF output pin
  - Output is one channel Dual Tone Multi-Frequency signal for dialling
- 8-bit Serial I/O Interface
  - 8-bit transmit/receive mode by internal or external clock source
- Two built-in 14-bit frequency dividers
  - Divider0: the clock source is the main oscillator (Fosc)
  - Divider1: the clock source is the sub-oscillator (Fs)
- Two built-in 8-bit programmable countdown timers
  - Timer 0: one of two internal clock frequencies (FOSC/4 or FOSC/1024) can be selected
  - Timer 1: with auto-reload function and one of two internal clock frequencies (FOSC or FOSC/64 or Fs) can be selected (signal output through MFP pin)
- Built-in 18/14-bit watchdog timer selectable for system reset determined by code option
- Powerful instruction set: 1XX instructions
- 16-level stack buffer
- Package type : 100-pin QFP