W742S82A DATA SHEET

4-BIT TELEPHONE CONTROLLER

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1. GENERAL DESCRIPTION

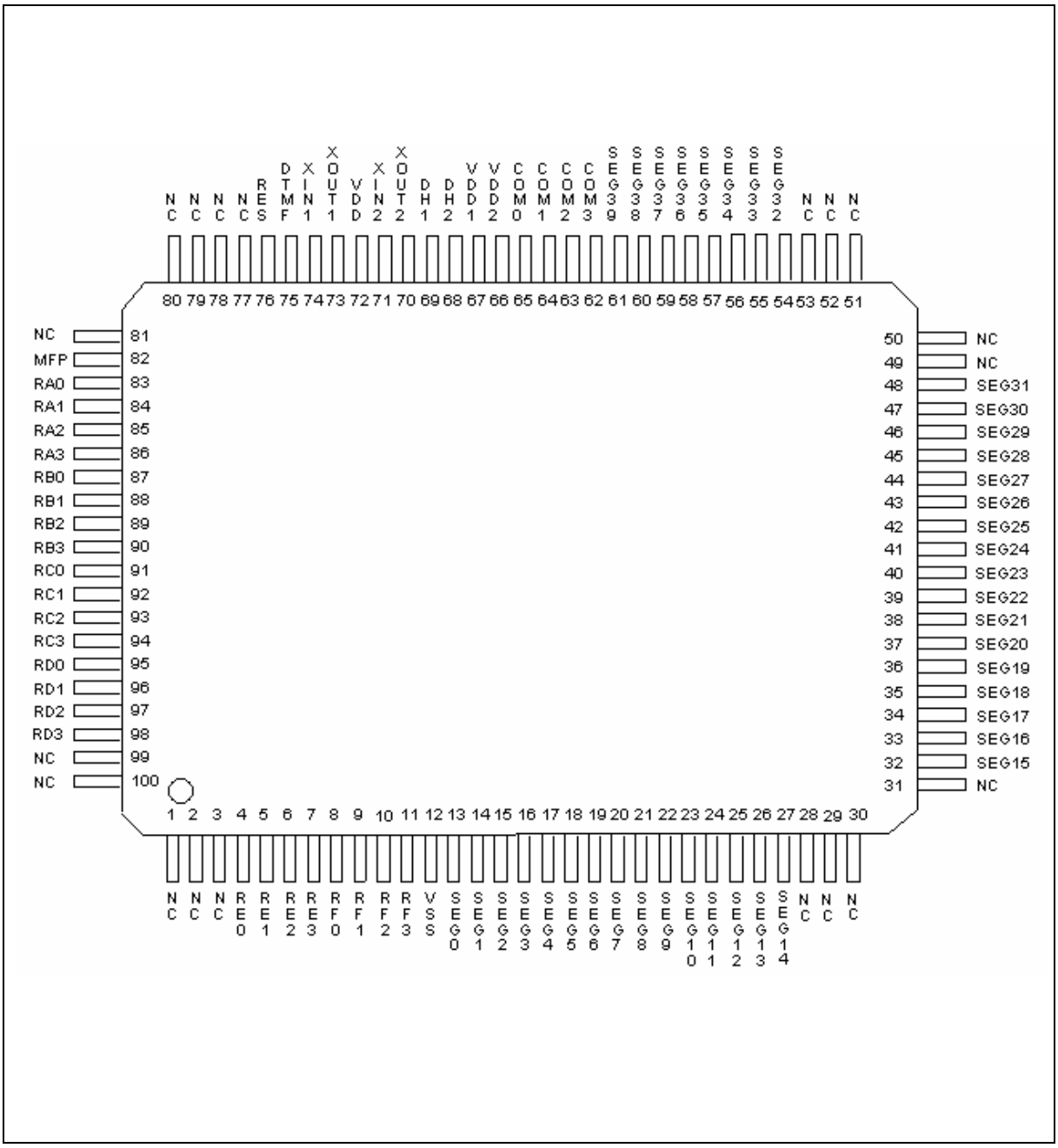
The W742S82A is a high-performance 4-bit micro controller (μC) that provides an LCD driver. The device contains a 4-bit ALU, two 8-bit timers, two dividers (for two oscillators) in dual-clock operation, a 40 × 4 LCD driver, six 4-bit I/O ports (including 1 output port for LED driving), and one channel DTMF generator. There are also five interrupt sources and 16-levels of subroutine nesting for interrupt applications. The W742S82A operates on very low current and has two power reduction modes, are the dual-clock slow operation and STOP mode, which help to minimize power dissipation.

2. FEATURES

- Operating voltage: 2.4V – 5.5V
- Dual-clock operation or single-clock operation (By option)
- Main-oscillator
  - Connect to 3.58 MHz crystal or 400 KHz that can be selected by option code
  - Crystal or RC oscillator can be selected by code option
- Sub-oscillator
  - Connect to 32768 Hz crystal only
- Memory
  - 16384 x 16 bits program MASK ROM (including 64K x 4 bit look-up table)
  - 2048 x 4 bits data RAM (including 16 nibbles x 16 pages working registers)
  - 40 x 4 LCD data RAM
- 24 input/output pins
  - Port for input only: 1 ports/4 pins (RC)
  - Input/output ports: 3 ports/12 pins (RA, RB & RD)
  - High sink current output port for LED driving: 1 port /4 pins (RE)
  - Port for output only: 1 port/ 4 pins (RF)
- Power-down mode
  - Hold function: no operation (main-oscillator and sub-oscillator still operate)
  - Stop function: no operation (main-oscillator and sub-oscillator are stopped)
  - Dual-clock slow operation mode: the system will operate by the sub-oscillator (FOSC = Fs and Fm is stopped)
- Five types of interrupts
  - Four internal interrupts (Divider0, Divider1, Timer 0, Timer 1)
  - One external interrupts (RC Port)

- LCD driver output
  - 40 segments x 4 commons
  - 1/4 duty 1/3 bias driving mode
  - Clock source should be the sub-oscillator clock in the dual-clock operation mode
- MFP output pin
  - Output is software selectable as modulating or non-modulating frequency
  - Works as frequency output specified by Timer 1
- DTMF output pin
  - Output is one channel Dual Tone Multi-Frequency signal for dialing
- Two built-in 14-bit frequency dividers
  - Divider0: the clock source is the output of the main-oscillator
  - Divider1: the clock source is the output of the sub-oscillator (dual-clock mode) or the Fosc/128 (single-clock mode)
- 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 three internal clock frequencies (FOSC, FOSC/64 or Fs) can be selected by MR1 register; and the specified frequency can be delivered to MFP pin
- Built-in 18/15-bit watchdog timer selectable for system reset; enable the watchdog timer or not is determined by code option
- Powerful instruction set
- 16-levels subroutine (include interrupt) nesting

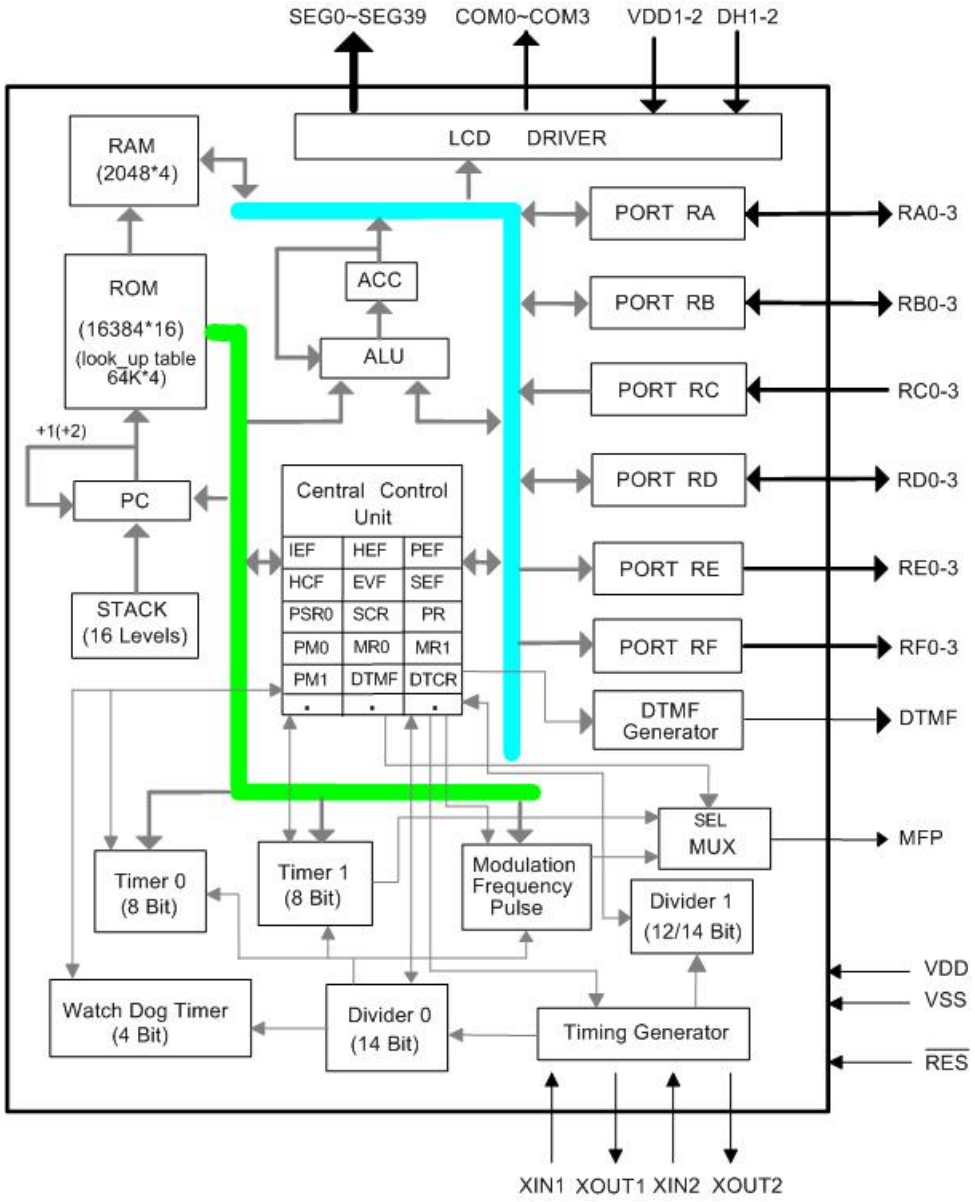
3. PIN CONFIGURATION



4. PIN DESCRIPTION

SYMBOL	I/O	FUNCTION
XIN2	I	Input pin for sub-oscillator. Connected to 32.768KHz crystal only.
XOUT2	O	Output pin for sub-oscillator with internal oscillation capacitor. Connected to 32.768KHz crystal only.
XIN1	I	Input pin for main-oscillator. Connected to 3.58MHz or 400KHz crystal or RC to generate system clock.
XOUT1	O	Output pin for main-oscillator. Connected to 3.58MHz or 400KHz crystal or RC to generate system clock.
RA0-RA3	I/O	Input/Output port. Input/output mode specified by port mode 1 register (PM1).
RB0-RB3	I/O	Input/Output port. Input/output mode specified by port mode 2 registers (PM2).
RC0-RC3	I	4-bit port for input only. Each pin has an independent interrupt capability.
RD0-RD3	I/O	Input/Output port. Input/output mode specified by port mode 5 registers (PM5).
RE0-RE3	O	Output port only. With high sink current capacity for the LED application.
RF0-RF3	O	Output port only.
MFP	O	Output pin only. This pin can output modulating or non-modulating frequency, or Timer 1 specified frequency. It can be selected by bit 0 of BUZCR (BUZCR.0).
DTMF	O	This pin can output dual-tone multi-frequency signal for dialing.
$\overline{\text{RES}}$	I	System reset pin with pull-high resistor.
SEG0- SEG39	O	LCD segment output pins.
COM0- COM3	O	LCD common signal output pins. The LCD alternating frequency can be selected by code option.
DH1, DH2	I	Connection terminals for voltage double (halve) capacitor.
VDD1 VDD2	I	Positive (+) supply voltage terminal. Refer to Functional Description.
VDD	I	Positive power supply (+).
VSS	I	Negative power supply (-).
VPP	I	This pin has the built-in pull-low resistor.
MODE	I	This pin has the built-in pull-low resistor.
DATA	I/O	This pin has the built-in pull-low resistor.

5. BLOCK DIAGRAM



6. ABSOLUTE MAXIMUM RATINGS

PARAMETER	RATING	UNIT
Supply Voltage to Ground Potential	-0.3 to +7.0	V
Applied Input/Output Voltage	-0.3 to +7.0	V
Power Dissipation	120	mW
Ambient Operating Temperature	0 to +70	°C
Storage Temperature	-55 to +150	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

7. DC CHARACTERISTICS

(VDD-VSS = 3.0 V, Fm = 3.58MHz, Fs = 32.768 KHz, Ta = 25° C, LCD on; unless otherwise specified)

PARAMETER	SYM.	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Op. Voltage	V_{DD}	-	2.4	-	5.5	V
Op. Current (Crystal type)	I_{OP1}	No load (Ext-V) In dual-clock normal operation	-	0.9	2.5	mA
Op. Current (Crystal type)	I_{OP3}	No load (Ext-V) In dual-clock slow operation and Fm is stopped	-	10	20	µA
Hold Current (Crystal type)	I_{HM1}	Hold mode No load (Ext-V) In dual-clock normal operation	-	-	450	µA
Hold Current (Crystal type)	I_{HM3}	Hold mode No load (Ext-V) In dual-clock slow operation and Fm is stopped	-	5	10	µA
Stop Current (Crystal type)	I_{SM1}	Stop mode No load (Ext-V) In dual-clock normal operation	-	-	1	µA
Input Low Voltage	V_{IL}	-	V_{SS}	-	0.3 V_{DD}	V
Input High Voltage	V_{IH}	-	0.7 V_{DD}	-	V_{DD}	V
MFP Output Low Voltage	V_{ML}	I_{OL} = 3.5 mA	-	-	0.4	V
MFP Output High Voltage	V_{MH}	I_{OH} = 3.5 mA	2.4	-	-	V
Port RA, RB, RD and RF Output Low Voltage	V_{ABL}	I_{OL} = 2.0 mA	-	-	0.4	V
Port RA, RB, RD and RF Output high Voltage	V_{ABH}	I_{OH} = 2.0 mA	2.4	-	-	V
LCD Supply Current	I_{LCD}	All Seg. ON	-	-	6	µA
SEG0-SEG39 Sink Current (Used as LCD output)	I_{OL1}	V_{OL} = 0.4V V_{LCD} = 0.0V	90	-	-	µA
SEG0-SEG39 Drive Current (Used as LCD output)	I_{OH1}	V_{OH} = 2.4V V_{LCD} = 3.0V	90	-	-	µA

DC Characteristics, continued

PARAMETER	SYM.	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Port RE Sink Current	I_{EL}	V_{OL} = 0.9V	10	-	-	mA
Port RE Source Current	I_{EH}	V_{OH} = 2.4V	0.4	1.2	-	mA
DTMF Output DC level	V_{TDC}	R_L = 5KΩ, V_{DD} = 2.5 to 3.8V	1.1	-	2.8	V
DTMF Distortion	T_{HD}	R_L = 5KΩ, V_{DD} = 2.5 to 3.8V	-	-30	-23	dB
DTMF Output Voltage	V_{TO}	Low group, R_L = 5KΩ	130	150	170	mVrms
Pre-emphasis		Col/Row	1	2	3	dB
DTMF Output Sink Current	I_{TL}	V_{TO} = 0.5V	0.2	-	-	mA
Pull-up Resistor	R_C	Port RC	150	250	350	KΩ
RES Pull-up Resistor	R_{RES}	-	20	100	500	KΩ

8. AC CHARACTERISTICS

(VDD-VSS = 3.0 V, Fm = 3.58MHz, Fs = 32.768 KHz, Ta = 25° C, LCD on; unless otherwise specified)

PARAMETER	SYM.	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Op. Frequency	FOSC	Crystal type	-	3.58	-	MHz
Instruction Cycle Time	TI	One machine cycle	-	4/FOSC	-	S
Reset Active Width	TRAW	FOSC = 32.768 KHz	1	-	-	μS
Interrupt Active Width	TIAW	FOSC = 32.768 KHz	1	-	-	μS

9. VERSION HISTORY

VERSION	DATE	DESCRIPTION
A1	Sep. 19, 2006	Preliminary Release
A2	Dec. 25, 2006	Formal Release

Important Notice

Winbond products are not designed, intended, authorized or warranted for use as components in systems or equipment intended for surgical implantation, atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, or for other applications intended to support or sustain life. Further more, Winbond products are not intended for applications wherein failure of Winbond products could result or lead to a situation wherein personal injury, death or severe property or environmental damage could occur.

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