Winbond @i-toys Controller

W55FC200

Data Sheet

Contents

General Description

Using Internet technologies to connect to web sites that offer more & more contents and play options is one of the most important function of Winbond Internet toy controller W55FC200 which is capable of downloading toy's sound files or motion data from toy company web site as well as allows toy's contents can be uploaded to PC.

Similarly, the PC enhanced interactive toy is one of the most important application of Winbond Internet toy controller W55FC200 which can be allowed to download additional commands or motion data into the body of toys for extended play.

At this moment, Winbond supports a total solution to combine toys and Internet related applications which we call Winbond @i-toys solution. We support the total solutions for toy's contents updateable, personalized, and interactive applications. Therefore, designer can quickly design Internet toys & download sound files data or motion program from web site or local PC's HD/CD to change the toy's contents or scenarios.

1.1 W55FC200 Functional Description

- W55FC200 provides optional data download from PC´s parallel-port or serial-port interface.
- There is no any PC's system compatibility problem.
- Automatically detect PC´s download interface which toy is already connected.
- Bi-directional upload & download speech, melody, and program between PC and toys.
- Provides 30 ~ 33 Kbps data download transmission rate (@ 10^{-3} BER).
- Automatically data error detection & recovery once data downloading or uploading.
- Download data re-send request while transmission data error is occurring.
- Allowing up to 16Mbits external flash memory cascading function for longer speech duration download applications (around 8.5 minutes speech duration @ 30Kbps).

1.2 W55FC200 Features

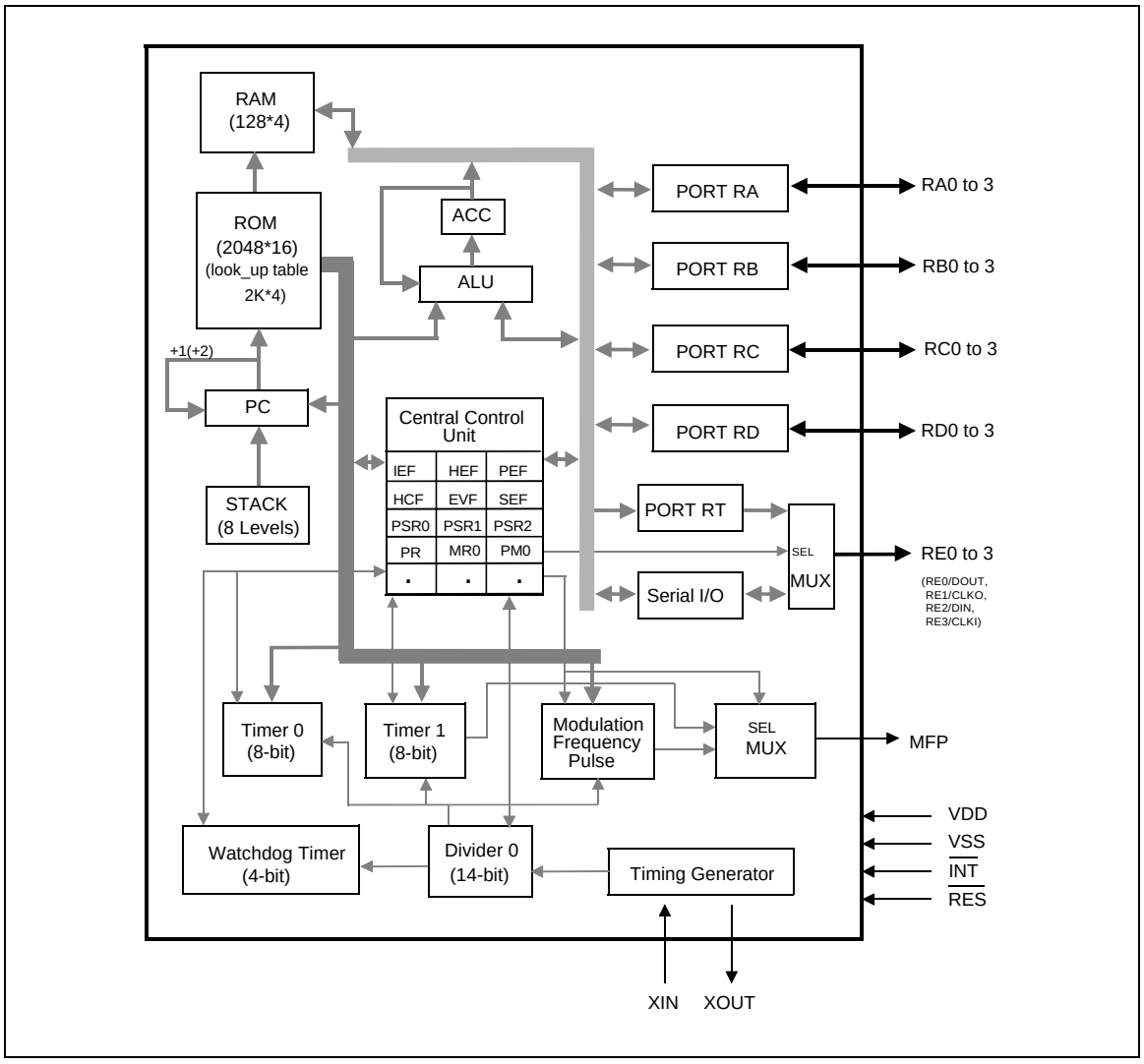
- Operating Voltage: 2.4V ~ 5.5V
- Crystal Oscillation Circuit:
  - Crystal/Ceramic oscillator: up to 4 MHz
- Power-down Mode
  - Hold Mode: no operation (except for oscillator)
  - Stop Mode: no operation (including oscillator)
- Package:
  - PDIP-28
  - SOP-28
  - DICE-29

1.3 W55FC200 Pin Description

Symbol	I/O	Function
XIN	I	Input pin for oscillator. Connected to crystal to generate system clock.
XOUT	O	Output pin for oscillator. Connected to crystal to generate system clock.
RA0–RA3	I/O	Input/Output port. Input/output mode specified by port mode 1 register (PM1). When used as output port, can provide high sink current for driving LED.
RB0–RB3	I/O	Input/Output port. Input/output mode specified by port mode 2 register (PM2). When used as output port, can provide high sink current for driving LED.
RC0–RC3	I/O	Input/Output port. Input/output mode specified by port mode 4 register (PM4). Each pin has an independent interrupt capability in input mode.
RD0–RD3	I/O	Input/Output port. Input/output mode specified by port mode 5 register (PM5).
RE0/DOUT, RE1/CLKO, RE2/DIN, RE3/CLKI	I/O	Special input/output port. This port can be configured by software to act as the output of internal port RT or the serial I/O port. When used as output port, can provide high sink current for driving LED.
MFP	O	Output pin only. This pin can output modulating or nonmodulating frequency, or Timer 1 clock output specified by mode register 1 (MR1).
$\overline{\text{INT}}$	I	External interrupt pin with pull-high resistor.
$\overline{\text{RES}}$	I	System reset pin with pull-high resistor.
VDD	I	Positive power supply (+).
VSS	I	Negative power supply (-).

System Description

2.1 W55FC200 System Block Diagram



2.2 W55FC200 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.

2.3 W55FC200 DC Characteristics

(VDD-VSS = 3.0 V, Fosc. = 32.768 KHz, Ta = 25° C; unless otherwise specified)

Parameter	Sym.	Conditions	Min.	Typ.	Max.	Unit
Op. Voltage	VDD	-	2.2	-	5.5	V
Op. Current (Crystal type)	IOP1	No load (Ext-V)	-	8	20	µA
Op. Current (RC type)	IOP2	No load (Ext-V)	-	35	65	µA
Hold Current (Crystal type)	IHM1	Hold mode No load (Ext-V)	-	4	6	µA
Hold Current (RC type)	IHM2	Hold mode No load (Ext-V)	-	16	40	µA
Stop Current (Crystal type)	ISM1	Stop mode No load (Ext-V)	-	0.1	2	µA
Stop Current (RC type)	ISM2	Stop mode No load (Ext-V)	-	0.1	2	µA
Input Low Voltage	VIL	-	VSS	-	0.3 VDD	V
Input High Voltage	VIH	-	0.7 VDD	-	VDD	V
MFP Output Low Voltage	VML	IOL = 3.5mA	-	-	0.4	V
MFP Output High Voltage	VMH	IOH = -3.5mA	2.4	-	-	V
Port RA, RB Sink Current	IABL	VOL = 0.9V	9	-	-	mA
Port RA, RB Source Current	IABH	VOH = 2.4V	0.4	1.2	-	mA
Port RC, RD Output Low Voltage	VCDL	IOL = 2.0 mA	-	-	0.4	V
Port RC, RD Output High Voltage	VCDH	IOH = -2.0 mA	2.4	-	-	V
Port RE Sink Current	IEL	VOL = 0.9V	9	-	-	mA
Port RE Source Current	IEH	VOH = 2.4V	0.4	1.2	-	mA

DC Characteristics, continued

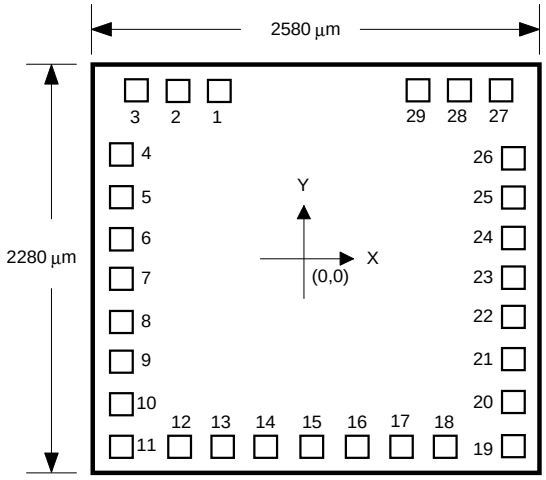
Parameter	Sym.	Conditions	Min.	Typ.	Max.	Unit
$\overline{INT}$ Pull-up Resistor	RINT	-	50	250	1000	KΩ
DIN Pin Pull-up Resistor	RDIN	RE.2 used as serial input pin	50	250	1000	KΩ
$\overline{RES}$ Pull-up Resistor	RRES	-	20	100	500	KΩ

2.4 W55FC200 AC Characteristics

(VDD-VSS = 3.0 V, Ta = 25° C; unless otherwise specified)

Parameter	Sym.	Conditions	Min.	Typ.	Max.	Unit
Op. Frequency	Fosc	RC type	-	-	4000	KHz
		Crystal type 1 (Option low speed type)	-	32.768	-	
		Crystal type 2 (Option high speed type)	400	-	4190	
Frequency Deviation by Voltage drop for RC Oscillator	$\frac{\Delta f}{f}$	$\frac{f(3V) - f(2.4V)}{f(3V)}$	-	-	10	%
Instruction Cycle Time	TI	One machine cycle	-	4/Fosc	-	S
Serial Port Data Ready Time	TDR	-	200	-	-	nS
Serial Port Data Hold Time	TDH	-	200	-	-	nS
Reset Active Width	TRAW	Fosc=32.768 KHz	1	-	-	µS
Interrupt Active Width	TIAW	Fosc=32.768 KHz	1	-	-	µS

2.5 W55FC200 Bonding Diagram



Note: The chip substrate must be connected to system ground (VSS).

Pad No.	Pad Name	X	Y	Pad No.	Pad Name	X	Y
1	RA2	-576.30	943.70	**16**	RC0	215.10	-965.00
2	RA3	-819.50	943.70	**17**	RC1	476.30	-965.00
3	$\overline{\text{INT}}$	-1063.00	943.70	**18**	RC2	722.30	-965.00
4	$\overline{\text{RES}}$	-1115.00	671.70	**19**	RC3	1113.90	-959.30
5	VSS	-1115.00	464.20	**20**	VDD	1113.90	-749.30
6	RE0	-1115.00	207.00	**21**	RD0	1113.90	-492.10
7	RE1	-1115.00	-21.00	**22**	RD1	1113.90	-264.10
8	RE2	-1115.00	-264.20	**23**	RD2	1113.90	-20.90
9	RE3	-1115.00	-492.20	**24**	RD3	1113.90	207.10
10	VSS	-1115.00	-749.40	**25**	VDD	1113.90	464.30
11	RB0	-1115.00	-965.00	**26**	XOUT	1113.90	738.00
12	RB1	-813.30	-965.00	**27**	XIN	1061.30	943.70
13	RB2	-552.10	-965.00	**28**	RA0	752.20	943.70
14	RB3	-302.10	-965.00	**29**	RA1	509.00	943.70
15	MFP	-40.90	-965.00				

Winbond Electronics Corp.

Headquarters
No. 4, Creation Rd. III,
Science-Based Industrial Park,
Hsinchu, Taiwan
TEL: 886-3-5770066
FAX: 886-3-5792697
http://www.winbond.com.tw/
Voice & Fax-on-demand: 886-2-27197006

Taipei Office
11F, No. 115, Sec. 3, Min-Sheng East Rd.,
Taipei, Taiwan
TEL: 886-2-27190505
FAX: 886-2-27197502

Winbond Electronics (H.K.) Ltd.
Rm. 803, World Trade Square, Tower II,
123 Hoi Bun Rd., Kwun Tong,
Kowloon, Hong Kong
TEL: 852-27513100
FAX: 852-27552064

Winbond Electronics North America Corp.
Winbond Memory Lab.
Winbond Microelectronics Corp.
Winbond Systems Lab.
2727 N. First Street, San Jose,
CA 95134, U.S.A.
TEL: 408-9436666
FAX: 408-5441798