EASY SOUND® eSE Series

Tiny Controller-Based Speech Synthesizer with PWM Output

Product Specification

DOC. VERSION 1.1

ELAN MICROELECTRONICS CORP.

January 2005

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ELAN MICROELECTRONICS CORPORATION

Headquarters:
No. 12, Innovation Road 1
Hsinchu Science Park
Hsinchu, Taiwan 308
Tel: +886 3 563-9977
Fax: +886 3 563-9966
http://www.emc.com.tw

Hong Kong:
Elan (HK) Microelectronics Corporation, Ltd.
Rm. 1005B, 10/F Empire Centre
68 Mody Road, Tsimshatsui
Kowloon , HONG KONG
Tel: +852 2723-3376
Fax: +852 2723-7780
elanhk@emc.com.hk

USA:
Elan Information Technology Group
1821 Saratoga Ave., Suite 250
Saratoga, CA 95070
USA
Tel: +1 408 366-8223
Fax: +1 408 366-8220

Europe:
Elan Microelectronics Corp. (Europe)
Siewerdtstrasse 105
8050 Zurich, SWITZERLAND
Tel:+41 43 299-4060
Fax:+41 43 299-4079
http://www.elan-europe.comT

Shenzhen:
Elan Microelectronics Shenzhen, Ltd.
SSMEC Bldg., 3F, Gaoxin S. Ave.
Shenzhen Hi-Tech Industrial Park
Shenzhen, Guandong, CHINA
Tel: +86 755 2601-0565
Fax: +86 755 2601-0500

Shanghai:
Elan Microelectronics Shanghai Corporation, Ltd.
23/Bldg. #115 Lane 572, Bibo Road
Zhangjiang Hi-Tech Park
Shanghai, CHINA
Tel: +86 021 5080-3866
Fax: +86 021 5080-4600

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Specification Revision History

Doc. Version	Revision Description	Date
1.0	Initial version	2004/01/13
1.1	Modify eSA020 ROM Size from 60Kx10 to 64Kx10	2005/01/11

1 General Description

eSE Series is a series of 3 to 80 seconds single chip high quality voice synthesizer IC that provides strong features and uses improved algorithm for achieving pure speech. It is based on a tiny controller and is very suitable for low cost high quality toy market application.

2 Features

- 3 to 80 seconds voice capacity
- 5-bit ASPCM+ speech synthesis
- Port 2 provides wake-up function
- Power down mode for energy saving
- One 6 bit timer overflow control is provided
- 38KHz modulation for IR transmission
- Two stacks for subroutine call
- Direct Drive PWM output for voice
- Sample rate (KHz) : 3.7 / 4.3 / 5 / 6 / 7.5 / 10 / 15

Product	eSE003	eSE005	eSE007	eSE009	eSE012	eSE015
Duration (@ 6K sample rate)	3 sec	5 sec	7 sec	9 sec	12 sec	15 sec
ROM (bits)	10Kx10	16Kx10	28Kx10	32Kx10	44Kx10	48Kx10
PROG. ROM (bits)	8Kx10	16Kx10				
RAM (bits)	32x4		48x4		64x4	
I/O pins	2 I/O	4 I/O			6 I/O	
	P2.0, P2.1	P2.0, P2.1, P3.2, P3.3			P2.0, P2.1, P2.2, P3.1, P3.2, P3.3	
IR	No	Yes				
Voice silence compression	No	Yes				
Flash with Volume (pin)	Yes (P2.1)	Yes (P3.3)				

Product	eSE020	eSE030	eSE040	eSE060	eSE080
Duration (@ 6K sample rate)	20 sec	30 sec	40 sec	60 sec	80 sec
ROM (bits)	64Kx10	96Kx10	128Kx10	192Kx10	256Kx10
PROG. ROM (bits)	32Kx10				
RAM (bits)	64x4				
I/O pins	8 I/O				
	P2.0, P2.1, P2.2, P2.3, P3.0, P3.1, P3.2, P3.3				
IR	Yes				
Voice silence compression	Yes				
Flash with Volume (pin)	Yes (P3.3)				

3 Pin Descriptions

Symbol	I/O	Function
P2.0	I/O	Bit 0 of Port 2
P2.1	I/O	Bit 1 of Port 2
P2.2	I/O	Bit 2 of Port 2 (excluding eSE003, eSE005, eSE007, & eSE009)
P2.3	I/O	Bit 3 of Port 2 (excluding eSE003, eSE005, eSE007, eSE009, eSE012, & eSE015)
P3.0	I/O	Bit 0 of Port 3 (excluding eSE003, eSE005, eSE007, eSE009, eSE012, & eSE015)
P3.1	I/O	Bit 1 of Port 3 (excluding eSE003, eSE005, eSE007, & eSE009)
P3.2	I/O	Bit 2 of Port 3 (excluding eSE003)
P3.3	I/O	Bit 3 of Port 3 (excluding eSE003)
VDD	I	Positive digital power supply.
OSCI	I	Ring oscillator input pin.
VSSD	I	Negative digital power supply.
VCC	I	Positive analog power supply
VSSC	I	Negative analog power supply
VO1	O	PWM output 1
VO2	O	PWM output 2

4 Absolute Maximum Ratings

Items	Symbol	Min	Max	Unit
Supply Voltage	VDD-VSS	–0.3	+6.0	V
Input Voltage	VIN	VSS –0.3	VDD+0.3	V
Operating Temperature	TOP	–20.0	+70.0	0C
Storage Temperature	TSTG	–55.0	+125.0	0C

5 Electrical Characteristics

(25°C, Vdd=3.0 Volts unless otherwise specified)

Items	Sym	Min.	Typ.	Max.	Unit	Condition
Operating Voltage	VDD	2.2	3.0	5.5	V	-
Standby Current	IDDS	-	-	2.0	uA	VDD=3V
Operating Current	IDDO	-	250	350	uA	VDD=3V, no load, PWM D/A stop
P2, P3 Drive Current	IOD	2.0	3.0	4.5	mA	VDD=3V, VO=2.4V
P2 Sink Current	IOS	-	3.0	10.0	uA	VDD=3V
P3 Sink Current	IOS	2.3	3.5	4.5	mA	VDD=3V, VO=0.4V
VO1, VO2 Output Current	IVO	150	180	-	mA	VDD=3V, Vo1=Vo2=1.5 V
Oscillation Resistor	R	-	220	-	KΩ	VDD=3V
Oscillation Freq.	FOSC	1.75	1.92	2.1	MHz	VDD=3V

6 Application Circuit

Important notes for the following application circuits:

1. For noisy power supply application, suppress noise by adding a 0.1µF ceramic capacitor between-
   - Ground and power VCC & IC's VCC pad
   - Ground and power VCC & IC's VDD pad
2. For heavy loading application, it is recommended that an electrolytic capacitor is added between VCC and ground. The recommended capacitor value for button cell applications is 10µF.
3. The recommended value for button cell internal impedance is 750Ω or less.
4. The use of spring direct trigger is not recommended. If you must use such trigger, you need to add a ceramic capacitor between trigger pin and ground to debounce the spring noise. The recommend capacitor value is 0.001 ~ 0.01 µF.

6.1 Heavy Noise Application Circuit