1. GENERAL DESCRIPTION

EM55000S series is a series of 3 to 15 seconds single chip high quality voice synthesizer IC. It is based on a tiny controller and is very suitable for low cost high quality toy market application.

2. FEATURES

- 3 to 15 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) : 4.3 / 5 / 6 / 7.5 / 10 / 15

Product	EM55003S	EM55005S	EM55007S	EM55009S	EM55012S	EM55015S
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 (nibbles)	32					
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, P2.3, P3.2, P3.3	
IR	No	Yes				
Voice silence compression	No	Yes				
Flash with Volume (pin)	Yes (P2.1)	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 (for EM55012S, EM55015S)
P2.3	I/O	Bit 3 of Port 2 (for EM55012S, EM55015S)
P3.2	I/O	Bit 2 of Port 3 (for EM55005S, EM55007S, EM55009S, EM55012S, EM55015S)
P3.3	I/O	Bit 3 of Port 3 (for EM55005S, EM55007S, EM55009S, EM55012S, EM55015S)
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
VO	O	PWM output 1
VO1	O	PWM output 2
TEST	I	For testing only.

4. ABSOLUTE MAXIMUM RATINGS

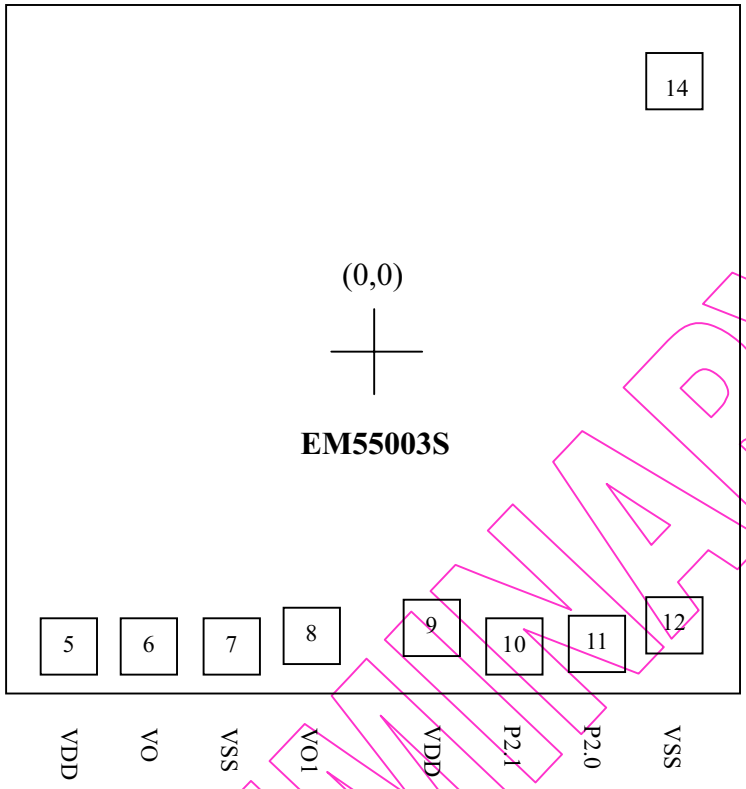
Items	Symbol	Min	Max	Unit
Supply Voltage	V_{DD}-V_{SS}	-0.3	+6.0	V
Input Voltage	V_{IN}	V_{SS}-0.3	V_{DD}+0.3	V
Operating Temperature	T_{OP}	-20.0	+70.0	^{0}C
Storage Temperature	T_{STG}	-55.0	+125.0	^{0}C

5. ELECTRICAL CHARACTERISTICS

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

Items	Sym	Min.	Typ.	Max.	Unit	Condition
Operating Voltage	V_{DD}	2.2	3.0	5.5	V	
Standby Current	I_{DDS}	-	-	2.0	uA	V_{DD}=3V
Operating Current	I_{DDO}	-	250	350	uA	V_{DD}=3V, no load, PWM D/A stop
P2, P3 Drive Current	I_{OD}	2.0	3.0	4.5	mA	V_{DD}=3V, V_O=2.4V
P2 Sink Current	I_{OS}	-	3.0	10.0	uA	V_{DD}=3V
P3 Sink Current	I_{OS}	2.3	3.5	4.5	mA	V_{DD}=3V, V_O=0.4V
VO1, VO Output Current	I_{VO}	110	130	-	mA	V_{DD}=3V, Vo1=Vo=1.5 V
Oscillation Resistor	R	-	220	-	KΩ	V_{DD}=3V
Oscillation Freq.	F_{OSC}	1.75	1.92	2.1	MHz	V_{DD}=3V

6. PAD DIAGRAM



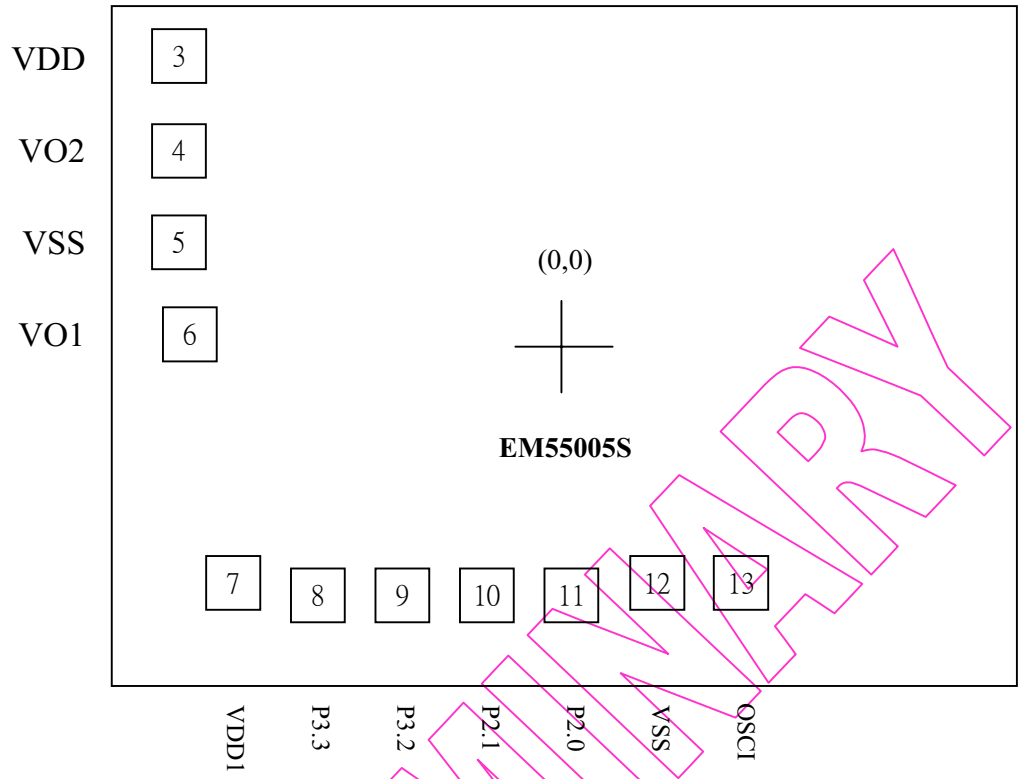
Pin NO.	Symbol	X	Y
1	NC		
2	NC		
3	NC		
4	NC		
5	VDD	-458.9	-397.9
6	VO	-338.9	-397.9
7	VSS	-218.9	-397.9
8	VO1	-98.9	-397.9

Pin NO.	Symbol	X	Y
9	VDD	69.2	-368.4
10	P2.1	193.9	-383.4
11	P2.0	318.6	-383.4
12	VSS	443.6	-368.4
13	NC		
14	OSCI	458.6	381.8
15	NC		
16	NC		

Chip size : 1180 * 1100 um

For PCB layout, IC substrate must be connected to VSS.

Note : VO should be floating or connected to VSS when not in use.



Pin NO.	Symbol	X	Y	Pin NO.	Symbol	X	Y
1	NC			10	P2.1	-96.4	-354.4
2	NC			11	P2.0	28.3	-354.4
3	VDD	-544.0	399.1	12	VSS	153.3	-339.4
4	VO2	-544.0	279.1	13	OSCI	296.5	-341.3
5	VSS	-544.0	159.1	14	NC		
6	VO1	-523.9	39.1	15	NC		
7	VDD1	-470.5	-339.4	16	NC		
8	P3.3	-345.8	-354.4	17	NC		
9	P3.2	-221.1	-354.4	18	NC		

Chip size : 1400 * 1050 um

For PCB layout, IC substrate must be connected to VSS.

Note : VO should be floating or connected to VSS when not in use.