Patents pending for EM 55200U & the embedded Ultrasound Talking Toy feature

1. General Description

EM55200U is a high quality voice synthesizer IC that contains one 4-bit Input port, two 4-bit I/O ports, and a tiny controller. Two of its I/O pins can generate IR or ultrasonic carrier for IR, or ultrasonic application, and 1 of these 2 pins can also act as receiver. By programming the tiny controller, user's application may include section combination, trigger mode, control outputs, keyboard matrix, and other logic functions, which can be implemented easily.

PRELIMINARY

2. Features

- Direct Drive output
- Single power supply
- Crystal/Ring oscillator option
- Power down mode for energy saving
- Reset pin available
- Single ROM (32k x 10 bits) for program and voice data storage. 32 K maximum program address size available
- Readable ROM data
- One 6-bit timer overflow control is provided
- Two stacks for subroutine call
- 5 bits ASPCM synthesis
- 15 steps volume control
- Direct Drive/traditional DAC
- 8 bits resolution D/A.
- 38K Hz modulation carrier for IR or ultrasound transmission
- Built in signal detector for ultrasound receiver function

3. Pin Descriptions

Symbol	I/O	Function
P1.0	I	Bit 0 of Port 1.
P1.1	I	Bit 1 of Port 1.
P1.2	I	Bit 2 of Port 1.
P1.3	I	Bit 3 of Port 1.
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.
P2.3	I/O	Bit 3 of Port 2.This pin also acts as signal output for amplified signal from P31.
P3.0	I/O	Bit 0 of Port 3.
P3.1	I/O	Bit 1 of Port 3. This pin can provide 38KHz carrier signal for IR or ultrasound or acts as signal input pin for ultrasonic or IR signal.
P3.2	I/O	Bit 2 of Port 3. This pin can generate 38KHz square wave.
P3.3	I/O	Bit 3 of Port 3. The pin can be treated as an LED output flashing with volume.
VDD	I	Positive digital power supply.
OSCI	I	Ring oscillator/crystal input pin.
RST	I	Reset Pin
OSCO	O	Crystal output pin.
TEST	I	For testing only.
VSSD	I	Negative digital power supply.
VCC	I	Positive analog power supply
VSSC	I	Negative analog power supply
VO	O	Constant current output/ Push Pull voice output
VO1	O	Push Pull voice output

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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}	0.0	+70.0	^{0}C
Storage Temperature	T_{STG}	-55.0	+125.0	^{0}C

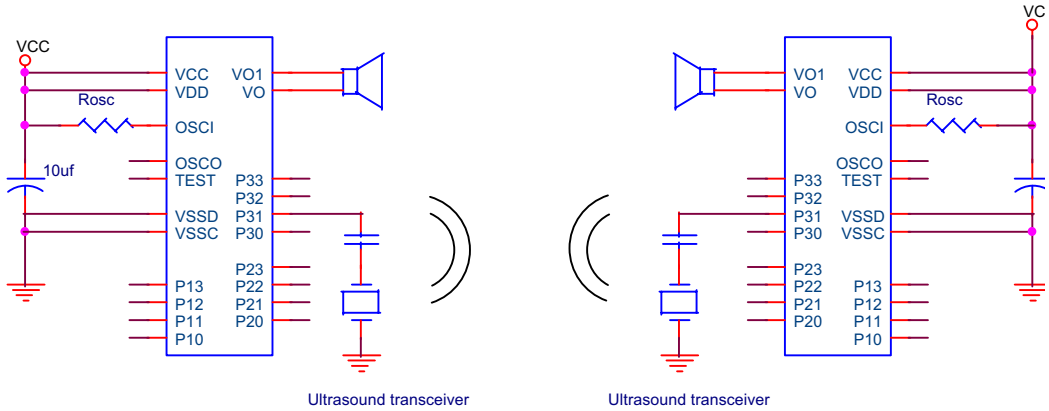
5. Electrical Characteristics

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}	-	350	500	uA	V_{DD}=3V, no load, constant current D/A Operate, receiver circuit enable
			250	350	uA	V_{DD}=3V, no load, constant current D/A Operate, receiver circuit disable
			2	4	mA	V_{DD}=3V, no load, push/pull current D/A Operate
P2,P3,P4 Drive Current	I_{OD}	2.0	3.0	-	mA	V_{DD}=3V, V_O=2.4V
P2 Sink Current (before KEYB)	I_{OS}		3.0	10.0	uA	V_{DD}=3V, V_O=3V
P2 Sink Current (after KEYB)	I_{OS}	2.3	3.5	-	mA	V_{DD}=3V, V_O=0.4V
P3,P4 Sink Curren	I_{OS}	2.3	3.5	-	mA	V_{DD}=3V, V_O=0.4V
P1 Input Current	I_{IH}	-	3.0	10.0	uA	V_{DD}=3V
VO Output Current	I_{VO}	4.0	5.0	6.0	mA	V_{DD}=3V, V_O=0.7V
			5.1	6.3	mA	V_{DD}=4.5V, V_O=0.7V
VO1, VO Output Current	I_{VO}	120	150	180	mA	V_{DD}=3V
Oscillation Resistor	R	-	100	-	KΩ	V_{DD}=3V
Oscillation Freq.	F_{OSC}	1.08	1.2	1.32	MHz	V_{DD}=2.2~5.2V
Min. Detected Voltage when P31 functions as Receiver.	Vac	5	-	-	mV	V_{DD}=2.2~5.2V Vac is defined as Vp-p and AC voltage at 40 KHz frequency

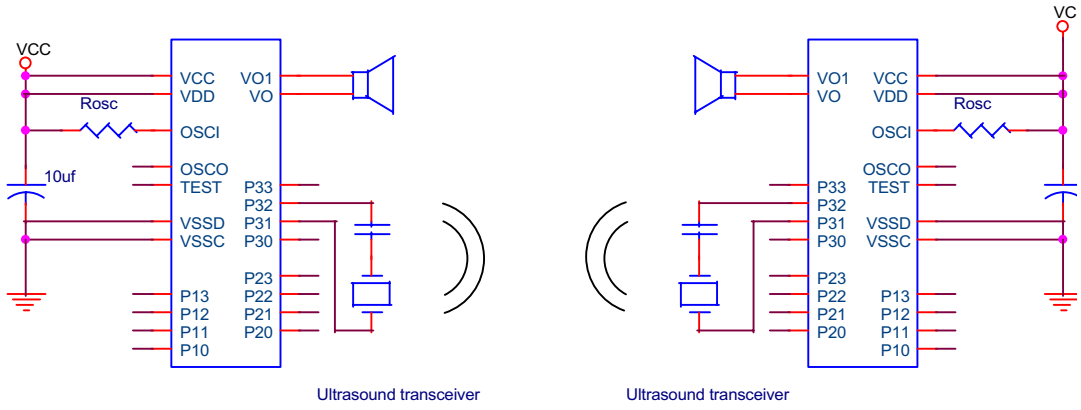
PRELIMINARY

6. Application Circuit

Single End Application Circuit for Ultrasound:



Dual Port Application Circuit for Ultrasound:



7. Ultrasound Application For Talking Toy

