

SP0-512 Text to Speech IC

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Version 1.3

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Summary:

The **SP0-512 RoboVoice Text to Speech IC** is a pre-programmed microcontroller that accepts English text from a serial connection, converts that text to phoneme codes then generates audio. It is ideal for adding a robot voice to your embedded designs.

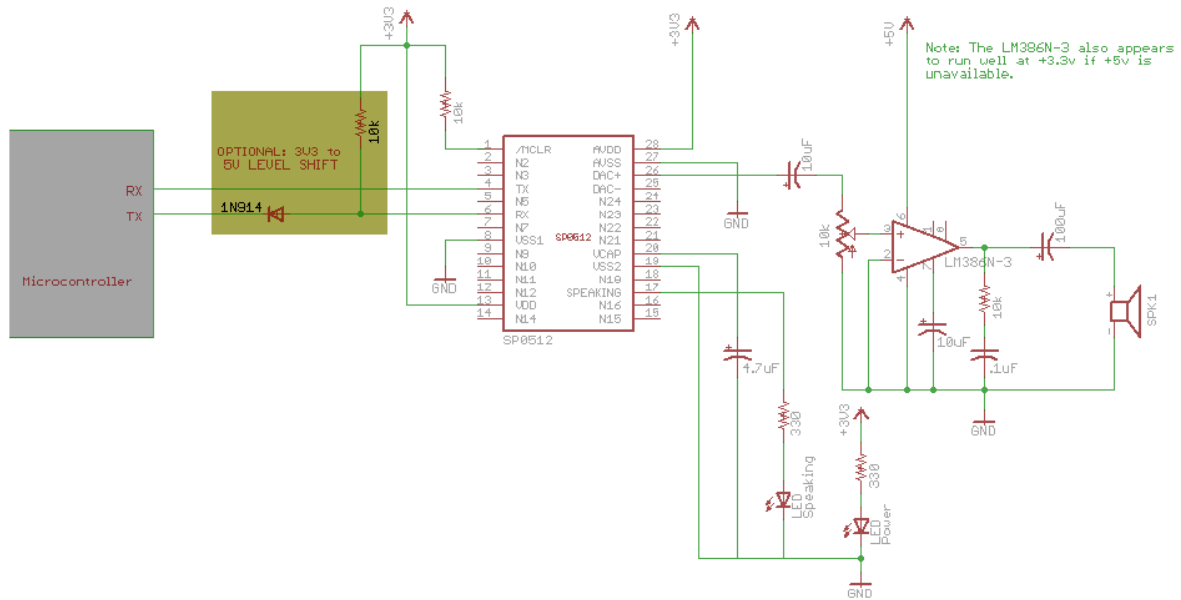
Features:

- Single chip text to speech IC
- Low power
- Communicates using a simple serial port. (9600 N81)
- 800 Rules that convert English text into phoneme codes
- Built in 16-Bit @ 16KHz DAC. No external filter required.

Pins:

#	Name	Notes
1	!MCLR	See dsPic33 datasheet for reset circuit
4	TX	Transmit to host
6	RX	Recieve from host
8	Vss (GND)	
13	3.3v (VDD)	
17	Speaking	High when device is speaking
19	Vss (GND)	
20	VCap	CPU logic filter capacitor connection. (10 μ F Tantalum to ground)
25	DAC+	Postive DAC signal
26	DAC-	Negative DAC signal
27	AVSS (GND)	Analog GND
28	AVDD - 3.3V	Analog reference

Sample Circuit:



References:

The SP0-512 RoboVoice is based on the Microchip dsPIC33FJ64GP802 microcontroller. The datasheet is available at <http://ww1.microchip.com/downloads/en/DeviceDoc/70292F.pdf>. User's should refer to this document for greater detail about the chip itself.

General Control Codes:

Control codes can be embedded in text strings to alter the parameters of speech. Codes are enclosed in square brackets to indicate that they should be executed and not spoken. Brackets may contain one code or several codes separated by commas ().

For example, the string “[BD]This [BD]is [BD]a [BD]test” will say the words “this is a test” while lowering the pitch as each word is spoken.

Code	Description
BU	Ramp Pitch Up
BD	Ramp Pitch Down
RESET	Reset pitch, speed, volume, glottal pulse, formant offsets and selected oscillator.
PRESET	Reset pitch to default frequency of 100Hz.
PUP	Increase pitch frequency by 4Hz.
PDN	Decrease pitch frequency by 4Hz.
PLUP	Increase pitch frequency by 20Hz.
PLDN	Decrease pitch frequency by 20Hz.
GLOT1	Use reverse ramp glottal pulse.
GLOT2	Use polynomial glottal pulse. (Default)
SRESET	Reset speed to default (100).
S1-S15	Set speaking speed from 1 to 15 with 1 being the fastest speed and 15 being the slowest. Default speaking speed is V?.
VRESET	Reset volume to default (V15) full volume.
V1-V15	Set volume from 1 to 15 where 15 is full volume.
	Select formant oscillator 1
	Select formant oscillator 2
	Select formant oscillator 3
FU100	Add 100Hz to selected formant oscillator frequency.
FD100	Subtract 100Hz from selected formant oscillator frequency.

FU500	Add 500Hz to selected formant oscillator frequency.
FD500	Subtract 500Hz from selected formant oscillator frequency.
FU1000	Add 1000Hz to selected formant oscillator frequency.
FD1000	Subtract 1000Hz from selected formant oscillator frequency.

Musical Note Control Codes:

The following control codes set the frequency of Formant 0 and can be used make the RoboVoice sing.

For example, the string “[G2]This [A2]is [B2]a [D3]test” will sing the words “This is a test”.

Note	Frequency (Hz)
C0	16.35
C#0/Db0	17.32
D0	18.35
D#0/Eb0	19.45
E0	20.60
F0	21.83
F#0/Gb0	23.12
G0	24.50
G#0/Ab0	25.96

A0	27.50
A#0/Bb0	29.14
B0	30.87
C1	32.70
C#1/Db1	34.65
D1	36.71
D#1/Eb1	38.89
E1	41.20
F1	43.65
F#1/Gb1	46.25
G1	49.00
G#1/Ab1	51.91
A1	55.00
A#1/Bb1	58.27
B1	61.74
C2	65.41
C#2/Db2	69.30
D2	73.42
D#2/Eb2	77.78

E2	82.41
F2	87.31
F#2/Gb2	92.50
G2	98.00
G#2/Ab2	103.83
A2	110.00
A#2/Bb2	116.54
B2	123.47
C3	130.81
C#3/Db3	138.59
D3	146.83
D#3/Eb3	155.56
E3	164.81
F3	174.61
F#3/Gb3	185.00
G3	196.00
G#3/Ab3	207.65
A3	220.00
A#3/Bb3	233.08

B3	246.94
C4	261.63
C#4/Db4	277.18
D4	293.66
D#4/Eb4	311.13
E4	329.63
F4	349.23
F#4/Gb4	369.99
G4	392.00
G#4/Ab4	415.30
A4	440.00
A#4/Bb4	466.16
B4	493.88

Phoneme Control Codes

Phoneme control codes can be used to create words with a desired pronunciation. For example, sending the following string with control codes “[F, AH, M, L, Y]” would cause the SP0-512 to speak the word “family”.

PA2	Pause 2 - 40 MS at default speed
PA3	Pause 3 - 60 MS at default speed
PA4	Pause 4 - 80 MS at default speed
PA5	Pause 5 - 100 MS at default speed
IY	
IH	
EH	
AY	
UH	
AX	
OW	
UX	
ER	
L	
R	
Y	

B	
D	
G	
M	
N	
NG	
P	
T	
K	
F	
TH	
S	
SH	
V	
THE	
Z	
ZH	
W	
IYRR	

EYRR	
EYIY	
AH	fAmily
AWRR	
OURR	
OH	
UH1	
UW1	
ER1	
OHIH	
OU	
OWIY	
H	
J	
CH	
G1	Ending G
D1	Ending D
B1	Ending B
J1	Ending J

P1	Ending P
BEEP	Generates a tone.