Winbond Electronics Corp.

ADPCM VOICE SYNTHESIZER
ENHANCED PowerSpeech™

GENERAL DESCRIPTION

The W581XX is a programmable IC speech synthesizer that utilizes the ADPCM coding method to generate all types of sound effects. The W581XX's LOAD and JUMP commands and eight programmable registers provide powerful user-programmable functions that make this chip suitable for an extremely wide range of speech IC applications.

The W581XX family includes the W58101, W58102, W58103, W58104, W58105, W58106, W58110, W58115 and W58120. The playback lengths for each of these products is shown below:

BODY	W58101	W58102	W58103	W58104	W58105	W58106	W58110	W58115	W58120
Second	3 Sec	6 Sec	9 Sec	12 Sec	20 Sec	30 Sec	40 Sec	60 Sec	80 Sec

Note: All of the playback lengths are estimates for typical applications.

FEATURES

- Wide operating voltage range: 2.4 to 5.5 volts
- Programmable speech synthesizer
- 4-bit ADPCM synthesis method and 8-bit D/A converter
- Maximum 4 trigger inputs
- Fading effect (patent pending) control for each voice segment
- Maximum two LEDs and five STOP outputs
- Flexible functions programmable through the following:
  - LD (load), JP (jump) commands
  - 8 general registers: R0–R7
  - Three special registers: EN, STOP, and MODE
  - Conditional instructions
  - Speech equation
- Programmable power-on initialization (POI), which can be interrupted by trigger inputs
- Interrupt or non-interrupt for rising or falling edge of each trigger pin (this feature determines retriggerable, non-retriggerable, overwrite, and non-overwrite features of each trigger pin)
- LED On/Off control can be set independently in each GO instruction of speech equations
- Independent control of LED 1 and LED 2
- Total of 256 voice group entries available for programming
  (Including eight hardware and 248 software group entry points)
- CPU interface

Publication Release Date: December 1996
Revision A1

- The following mask options are available:
  - LED flash type: synchronous/alternate
  - LED1 section-controlled: Yes/No
  - LED2 section-controlled/STPC-controlled
  - LED volume controlled: No/Yes
  - Normal/CPU mode
  - STPE or BUSY selection
  - STPD or FTEST selection
- The following register controls are available:
  - Trigger input debounce time: Long/Short
  - Pin option for LED2/STPC
  - LED turn-on mode: Flash/DC

PAD DESCRIPTION

NO.	NAME	I/O	FUNCTION
1	TG1	I	Trigger Input 1
2	TG2	I	Trigger Input 2
3	TG3	I	Trigger Input 3
4	TG4	I	Trigger Input 4
5	LED1	O	LED 1
6	STPB	O	Stop signal B
7	STPA	O	Stop signal A
8	STPD/FTEST	O	Stop D or Frequency test output
9	LED2/STPC	O	LED2 signal output or Stop C output
10	SPK	O	Current output for driving an external speaker
11	V_{SS}	-	Negative power supply
12	$\overline{RESET}$	I	Reset pin (low active)
13	V_{DD}	-	Positive power supply
14	OSC	I	Oscillation frequency control, connect Rosc to V_{DD}
15	STPE/BUSY	O	Stop E or Busy signal output
16	TEST	I	For test usage

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	CONDITIONS	RATED VALUE	UNIT
Power Supply	V_{DD}–V_{SS}	-	-0.3 to +7.0	V
Input Voltage	V_{IN}	All Inputs	V_{SS} -0.3 to V_{DD} +0.3	V
Storage Temp.	T_{STG}	-	-55 to +150	°C
Operating Temp.	T_{OPR}	-	0 to +70	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

ELECTRICAL CHARACTERISTICS

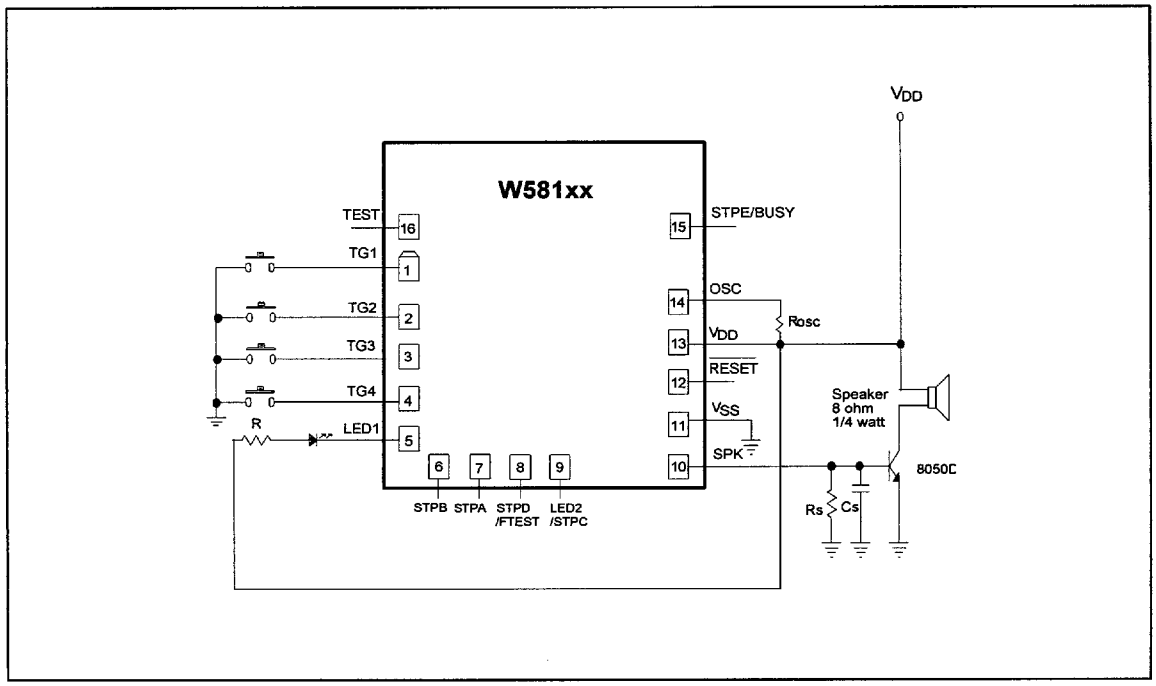
(T_A = 25° C, V_{SS} = 0V)

PARAMETER	SYM.	CONDITIONS	LIMITS			UNIT
			MIN.	TYP.	MAX.	
Operating Voltage	V_{DD}	-	2.4	4.5	5.5	V
Input Voltage	V_{IL}	-	V_{SS} -0.3	-	0.3 V_{DD}	V
	V_{IH}		0.7 V_{DD}	-	V_{DD}	
Standby Current	I_{DD}	V_{DD} = 5V, all I/O pins unconnected, no playing	-	-	1	µA
Operating Current	I_{OP1}	V_{DD} = 3V, No Load	-	-	400	µA
	I_{OP2}	V_{DD} = 5V, No Load	-	-	800	
Input Current for TG1–TG4 Pins	I_{IN1}	V_{DD} = 3V, V_{IN} = 0V	-	-	-6	µA
Input Current for $\overline{\text{RESET}}$ Pin	I_{IN3}	V_{DD} = 3V, V_{IN} = 0V	-	-	-30	µA
SPK (D/A full scale)	I_O	V_{DD} = 4.5V, R_L = 100Ω	-4.0	-5.0	-6.0	mA
Output Current of LED1/2	I_{OL1}	V_{DD} = 3V, V_{OUT} = 1V	8	-	-	mA
	I_{OL2}	V_{DD} = 4.5V, V_{OUT} = 1V	12	-	-	
Output Current of STPA-STPE	I_{OL}	V_{DD} = 3V, V_{IN} = 0.4V	1	-	-	mA
	I_{OH}	V_{DD} = 3V, V_{OUT} = 2.6V	-1	-	-	
Oscillation Freq.	F_{OSC1}	V_{DD} = 5V, R_{OSC} = Typ.	2.7	3	3.3	MHz
Osc. Freq. Deviation by Voltage Drop	$\left\lvert\frac{\Delta F_{OSC}}{F_{OSC}}\right\rvert$	$\left\lvert\frac{F(3.0V)-F(2.4V)}{F(3.0V)}\right\rvert$	-	4	7.5	%
Debounce Time.	T_{DEB1}	R_{OSC} = Typ., SR = 6 KHz	20	30	40	mS
	T_{DEB2}	R_{OSC} = Typ., SR = 6 KHz	166	250	332	µS

R_{OSC} = Typ. = 1.2M ohm

Winbond Electronics Corp.

TYPICAL APPLICATION CIRCUIT



Notes:

1. In principle, the playing speed determined by R_{OSC} should correspond to the sampling rate during the coding phase. However, the playing speed may be adjusted by varying R_{OSC}.
2. R_S is an optional current-dividing resistor. If R_S is added, the resistance should be between 470 and 750Ω.
3. R is used to limit the current on the LED.
4. C_S is optional.
5. The DC current gain β of transistor 8050 ranges from 120 to 200.
6. All unused trigger pins can be left open because of their internal pull-high resistance.
7. No warranty for production.