ADPCM VOICE SYNTHESIZER
ROM-LESS ENHANCED *PowerSpeech*ä

GENERAL DESCRIPTION

The W58100 is a CMOS IC that is used solely for the purpose of demonstrating the W581xx series enhanced *PowerSpeech*™ products.

The W58100 employs the same JUMP-GO architecture as Winbond's other *PowerSpeech*™ products. Unlike standard products, however, the W58100 does not include built-in memory, because the chip is designed to serve only as a demonstration chip for the W581xx series ICs. Hence the W58100 must be operated with an external memory device (e.g., a flash EPROM memory IC). The W58100's LOAD and JUMP commands and 8 programmable registers provide powerful user-programmable functions that make this chip suitable for a wide range of speech IC applications.

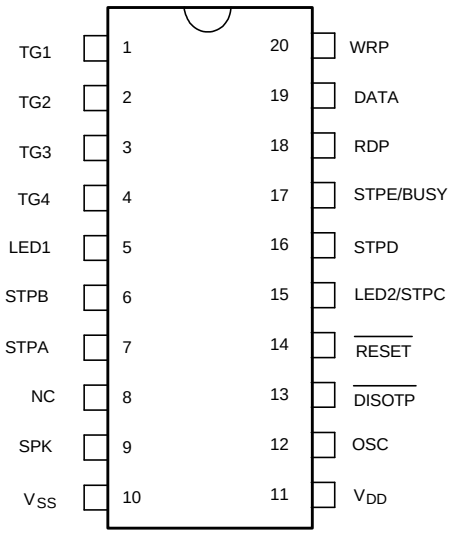
FEATURES

- Wide operating voltage range: 2.4 to 5.5 volts
- Serves as a demo chip for W581xx series products (no built-in ROM)
- 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
- 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

- The following register controls are available:
  – Trigger input debounce time: Long/Short
  – Pin option for LED2/STPC
  – LED turn-on mode: Flash/DC

PIN CONFIGURATION



PIN 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	NC	-	Not connected
9	SPK	O	Current output for driving an external speaker
10	VSS	-	Negative power supply
11	VDD	-	Positive power supply
12	OSC	I	Oscillation frequency control, connect Rosc to VDD
13	$\overline{\text{DISOTP}}$	I	Disable all of the serial interface pins (low active)
14	$\overline{\text{RESET}}$	I	Reset pin (low active)
15	LED2/STPC	O	LED2 signal output or Stop C output
16	STPD	O	Stop D output
17	STPE/BUSY	O	Stop E or Busy signal output
18	RDP	O	Read pulse clock output for serial interface
19	DATA	I/O	Bidirectional Data Pin for the serial interface
20	WRP	O	Write pulse clock output for serial interface

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	CONDITIONS	RATING	UNIT
Power Supply	VDD–VSS	-	-0.3 to +7.0	V
Input Voltage	VIN	All Inputs	VSS -0.3 to VDD +0.3	V
Storage Temp.	TSTG	-	-55 to +150	°C
Operating Temp.	TOPR	-	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.

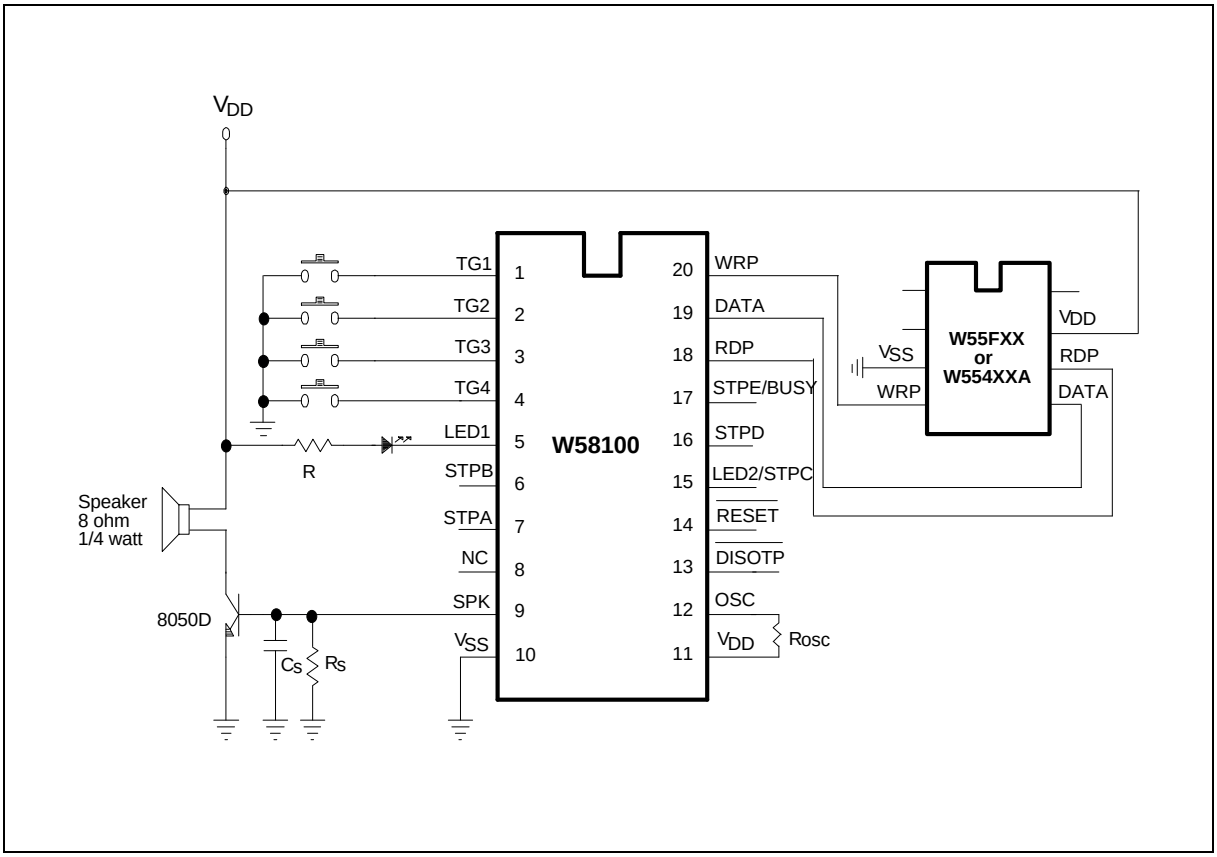
ELECTRICAL CHARACTERISTICS

(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 $\overline{\text{DISOTP}}$ Pin	I_{IN2}	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

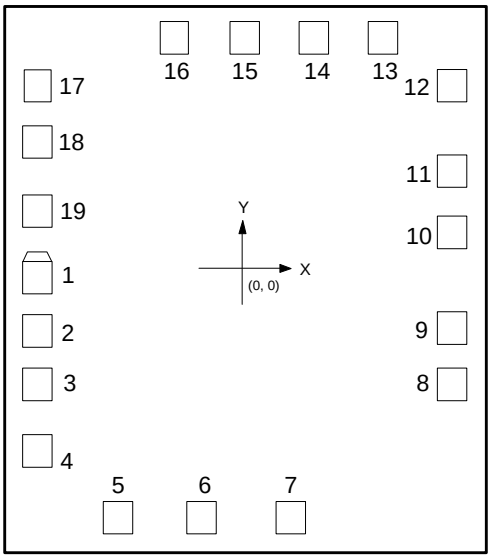
TYPICAL APPLICATION CIRCUIT



Notes:

1. In principle, the playing speed determined by Rosc should correspond to the sampling rate during the coding phase. However, the playing speed may be adjusted by varying Rosc.
2. Rs is an optional current-dividing resistor. If Rs is added, the resistance should be between 470 and 750.
3. R is used to limit the current on the LED.
4. Cs 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.

BONDING PAD DIAGRAM



PAD NO.	PAD NAME
1	TG1
2	TG2
3	TG3
4	TG4
5	LED1
6	STPB
7	STPA
8	SPK
9	VSS
10	VDD
11	OSC
12	$\overline{\text{DISOTP}}$
13	$\overline{\text{RESET}}$
14	LED2/STPC
15	STPD
16	STPE/BUSY
17	RDP
18	DATA
19	WRP

Note: Substrate is tied to VSS.

Headquarters
No. 4, Creation Rd. III,
Science-Based Industrial Park,
Hsinchu, Taiwan
TEL: 886-3-5770066
FAX: 886-3-5792647
http://www.winbond.com.tw/
Voice & Fax-on-demand: 886-2-7197006

Taipei Office
11F, No. 115, Sec. 3, Min-Sheng East Rd.,
Taipei, Taiwan
TEL: 886-2-7190505
FAX: 886-2-7197502

Winbond Electronics (H.K.) Ltd.
Rm. 803, World Trade Square, Tower II,
123 Hoi Bun Rd., Kwun Tong,
Kowloon, Hong Kong
TEL: 852-27513100
FAX: 852-27552064

Winbond Electronics North America Corp.
Winbond Memory Lab.
Winbond Microelectronics Corp.
Winbond Systems Lab.
2730 Orchard Parkway, San Jose,
CA 95134, U.S.A.
TEL: 1-408-9436666
FAX: 1-408-9436668