16 bits Digital-to Analog Converter

General Description

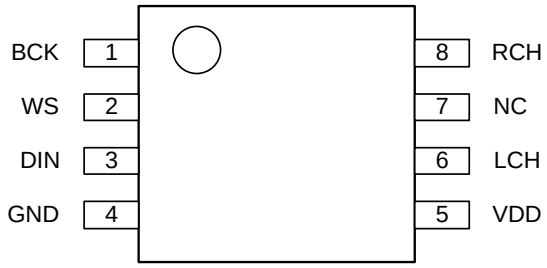
ET8211 is a 16 bits Digital-to-Analog Converter IC utilizing CMOS Technology specially designed for stereo audio applications. ET8211 converts the 16 bits serial data into an analog output voltage. The voltage of each output channel of ET8211 is driven by an operational amplifier allowing easy analog output.

Features

- CMOS Technology
- Low Power Consumption
- Two Voltage Output Channels in the same chip
- 16-bits Dynamic Range
- Low Total Harmonic Distortion
- 3.3/5.0 Volts Power Supply
- Part and Package

Part Name	Package
ET8211	SOP8

Pin Configuration

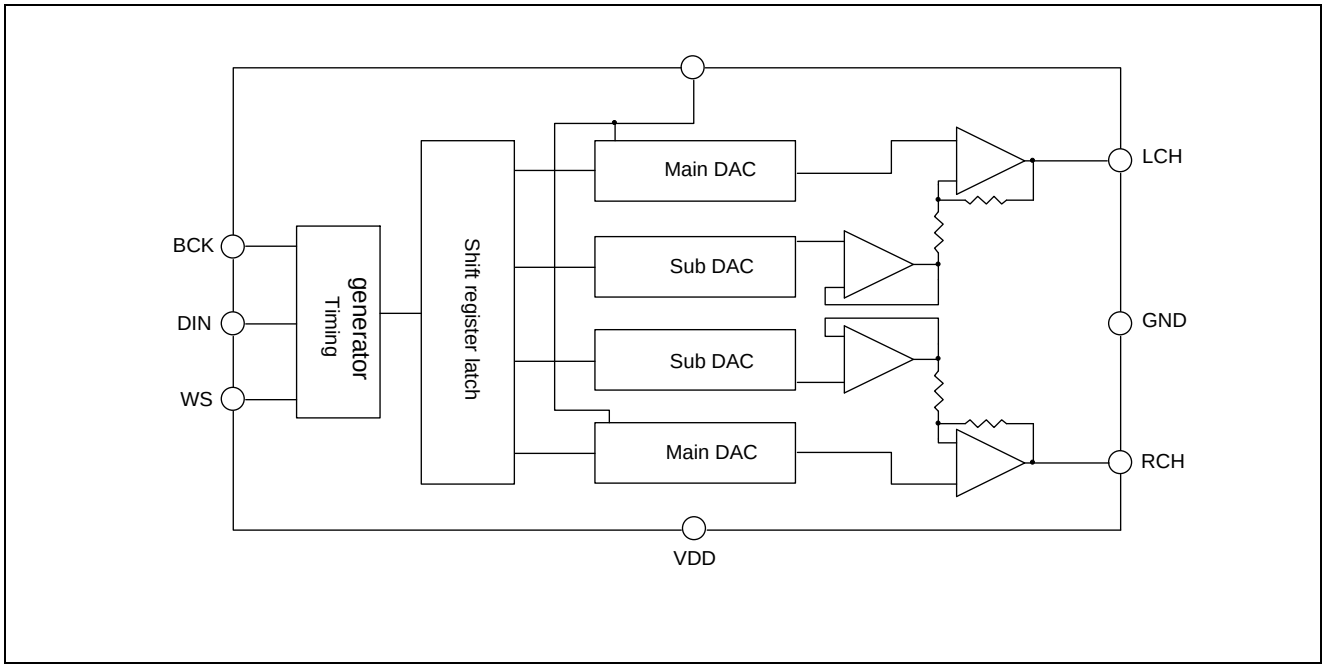


TOP VIEW

Pin Description

No.	Pin Name	I/O	Function Description
1	BCK	I	Bit Serial Clock Input Pin
2	WS	I	Word Select Input Pin
3	DIN	I	Data Input Pin
4	GND	—	Ground
5	VDD	Power	Positive Power Supply
6	LCH	O	Left Channel Output Pin
7	NC	—	Reference
8	RCH	O	Right Channel Output Pin

Block Diagram



Functional Description

ET8211 receives serial input data whose format consists of 16 bits word length. The last 16 bits word before "WS" changes is recognized as the input data. Both left and right data words are time multiplexed.

Please refer to the diagrams for timing and input signal formats.

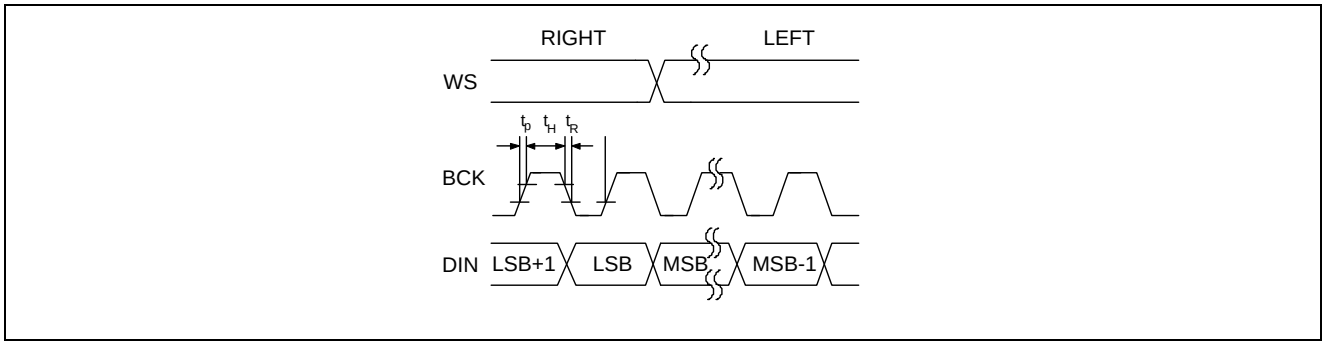


Figure1: Japanese input signal format

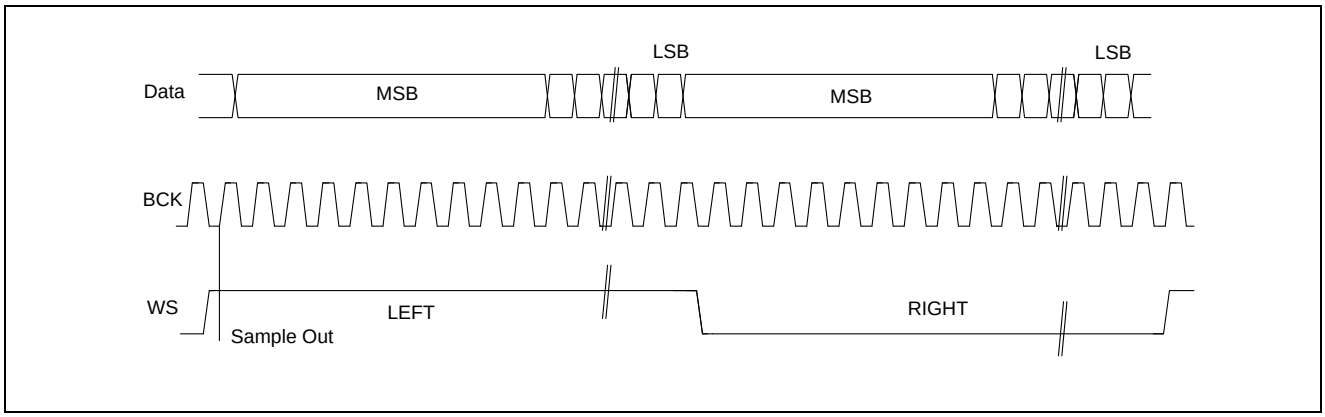


Figure 2: Timing and Input Signal Formats

Bit 1, the most significant of all must always be the first. The serial input data is shifted and latched for the Right and Left Channels.

If the Word Select (WS) Input Data is on a LOW Level, the input data is placed in the right input register. Likewise, if the WS Input Data is on a HIGH Level, the input data is placed in the left input register.

The 16 bits Right/Left Data is then converted to floating point expression whose format consists of 10 bits mantissa and 7 step exponent. This floating point expression is then converted to analog output voltage by the resistor-string. This signal is driven to the Right/Left Channel (RCH/LCH) via the buffer operational amplifier.

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Power Supply Voltage	V_{DD}	-0.3～+7.0	V
Input Voltage	V_I	-0.3～V_{DD} +0.3	V
Junction Temperature	T_J	-55～150	˚C
Storage Temperature	T_{STG}	-65～+150	˚C

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Uint
Power Supply Voltage	V_{DD}	3.0	5.0	5.5	V
Operating Temperature	T_A	-40	25	85	˚C

DC Electrical Characteristics

T_A=25˚C，V_{DD}=+3.3V

Parameter	Symbol	Min.	Typ.	Max.	Uint	Test Condition
Logic input voltage (HIGH)	V_{IH}	0.7V_{DD}	—	V_{DD}	V	
Logic input voltage (LOW)	V_{IL}	0	—	0.3V_{DD}	V	
Output load resistance	R_L	10	—	—	kΩ	ROUT，LOUT Port
Quiescent Current	I_{DD}	—	3	6	mA	f_{IN}=1kHz，0dB
Input Leakage Current	I_{LK}	—	—	0.1	μA	
Input Capacitance(1)	C_I	—	—	5	pF	
Clock frequency	f_{CLK}	—	—	10	MHz	

T_A=25˚C，V_{DD}=+5.0V

Parameter	Symbol	Min.	Typ.	Max.	Uint	Test Condition
Logic input voltage (HIGH)	V_{IH}	0.66 V_{DD}	—	—	V	
Logic input voltage (LOW)	V_{IL}	—	—	0.3V_{DD}	V	
Output load resistance	R_L	10	—	—	kΩ	ROUT，LOUT Port
Quiescent Current	I_{DD}	—	6	9	mA	f_{IN}=1kHz，0dB
Input Leakage Current	I_{LK}	—	—	0.1	μA	
Input Capacitance(1)	C_I	—	—	5	pF	
Clock frequency	f_{CLK}	—	5.6448	18.4	MHz	

Analog Characteristics

T_A=25℃，V_{DD}=+3.3V

Parameter	Symbol	Min.	Typ.	Max.	Uint	Test Condition
Maximum Output Amplitude	V_O	—	1.3	—	V_{PP}	
Total Harmonic Distortion(1)	THD	—	0.1	—	%	f_{IN}=1kHz，0dB
Dynamic Range(1)	DR		16		BIT	
Signal-to-Noise Ratio(1)	S/N	—	82	—	dB	1kHz，0dB
Cross Talk(1)	CT	—	-85	—	dB	f_{IN}=1kHz，0dB

T_A=25℃，V_{DD}=+5.0V

Parameter	Symbol	Min.	Typ.	Max.	Uint	Test Condition
Maximum Output Amplitude	V_O	—	2.5	—	V_{PP}	
Total Harmonic Distortion(1)	THD	—	0.1	—	%	1kHz，0dB
Dynamic Range(1)	DR		16		BIT	
Signal-to-Noise Ratio(1)	S/N	—	82	—	dB	1kHz，0dB
Cross Talk(1)	CT	—	-85	—	dB	f_{IN}=1kHz，0dB

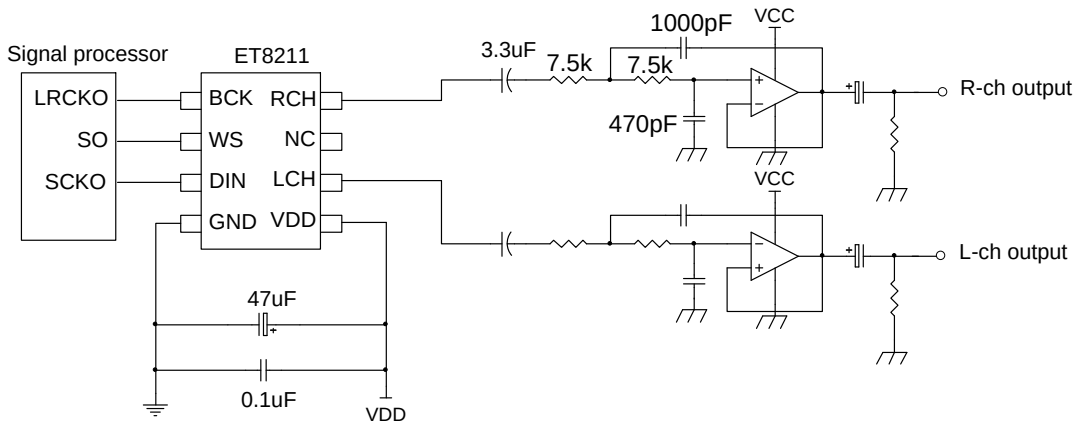
Note1: Guaranteed by design and characterization. Not a FT item.

Timing Characteristics

T_A=25℃，V_{DD}=+3.3V / 5.0V

Parameter	Symbol	Min.	Typ.	Max.	Uint
H level Time	t_H	25			ns
Rise Time	t_R			20	ns
Fall Time	t_F			20	ns

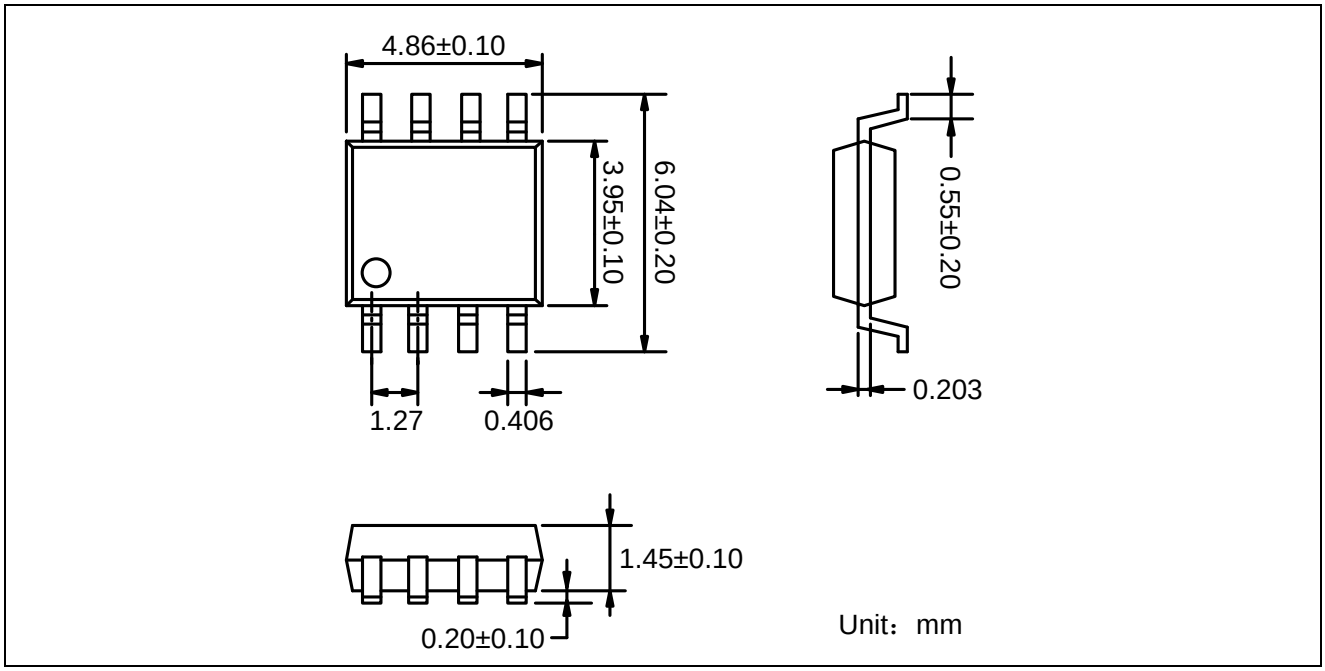
Application Circuit Example



* The above circuit and marked values are for reference only。

Package Dimension

SOP8



Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2016-2-19	Preliminary Version	Liuxm	Liuxm	Liujy
2.3	2023-2-3	Update Typeset	Shibo	Liuxm	Liujy