

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

# TC9250F, TC9250P

## 16 BITS RESISTER STRINGS DA CONVERTER

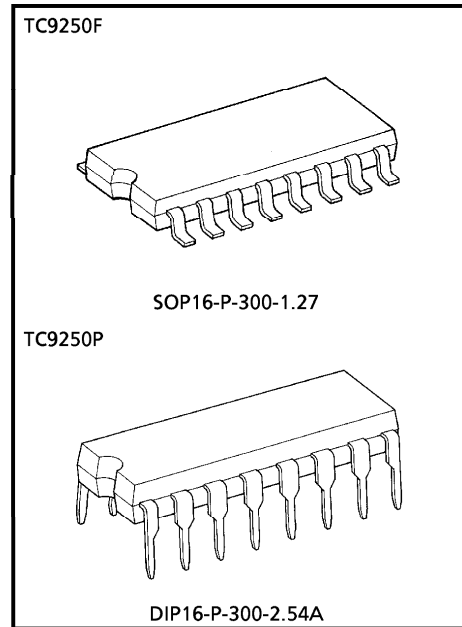
TC9250F, TC9250P is 16 bits resistor strings DA converter for digital audio. Data input accepts 1fs~8fs. It is possible to construct the DA converter unit at a low price.

### FEATURES

- Data input accepts 1fs~8fs.
- Built-in twin DA converter.
- Simultaneous outputs to L-ch and R-ch.
- Built-in output buffer.
- DA converter characteristics is as follows.

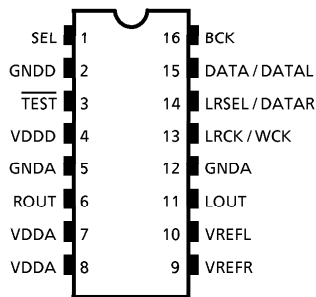
THD + N	S / N	D-RANGE
- 65dB (Typ.)	100dB (Typ.)	93dB (Typ.)

- 2 kinds of package, 16 pin flat package and 16 pin DIP.

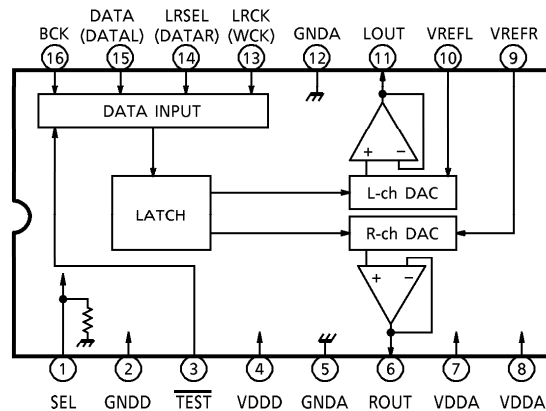


Weight  
 SOP16-P-300-1.27 : 0.16g (Typ.)  
 DIP16-P-300-2.54A : 1.00g (Typ.)

### PIN CONNECTION



### BLOCK DIAGRAM



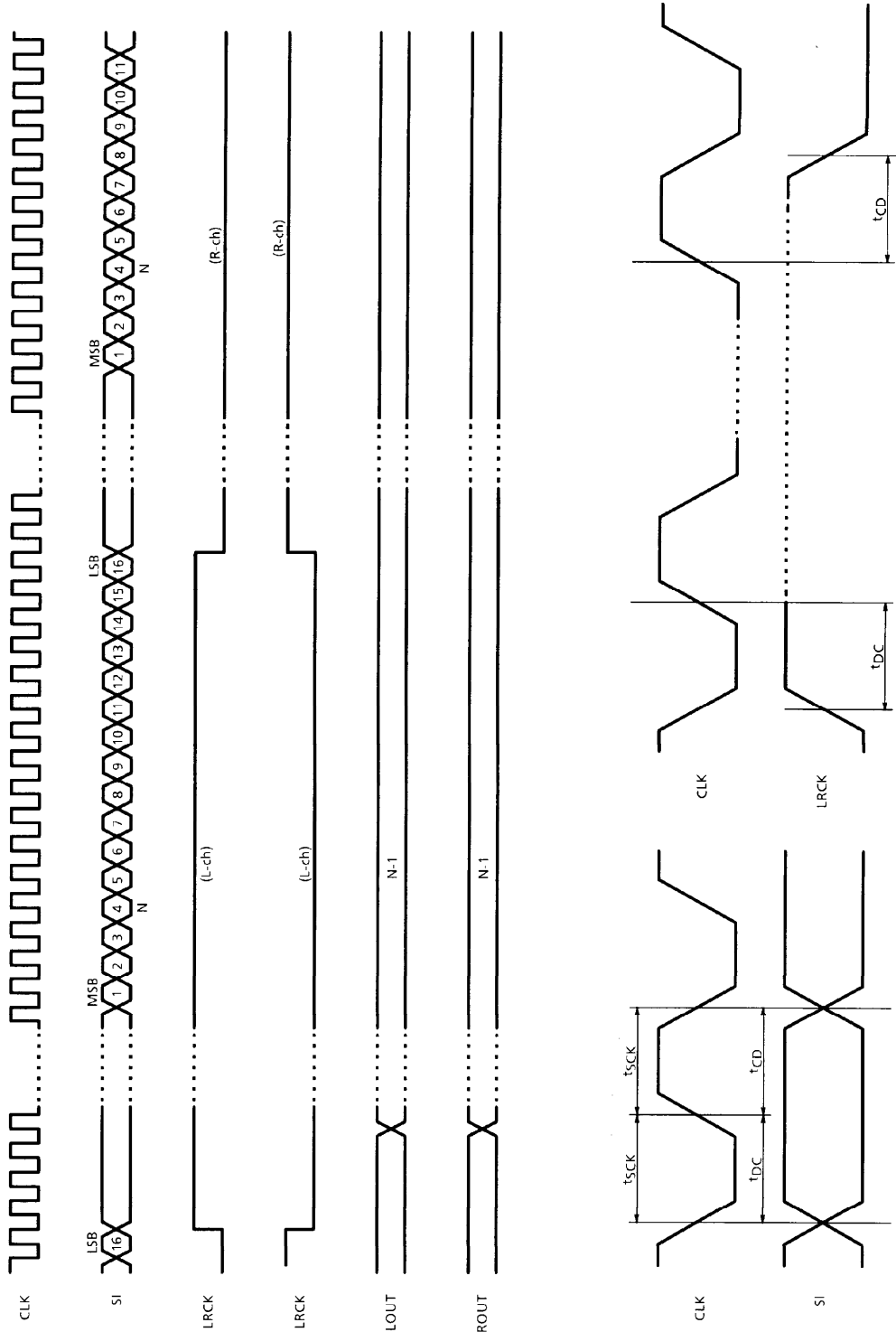
980910EBA2

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**PIN FUNCTION**

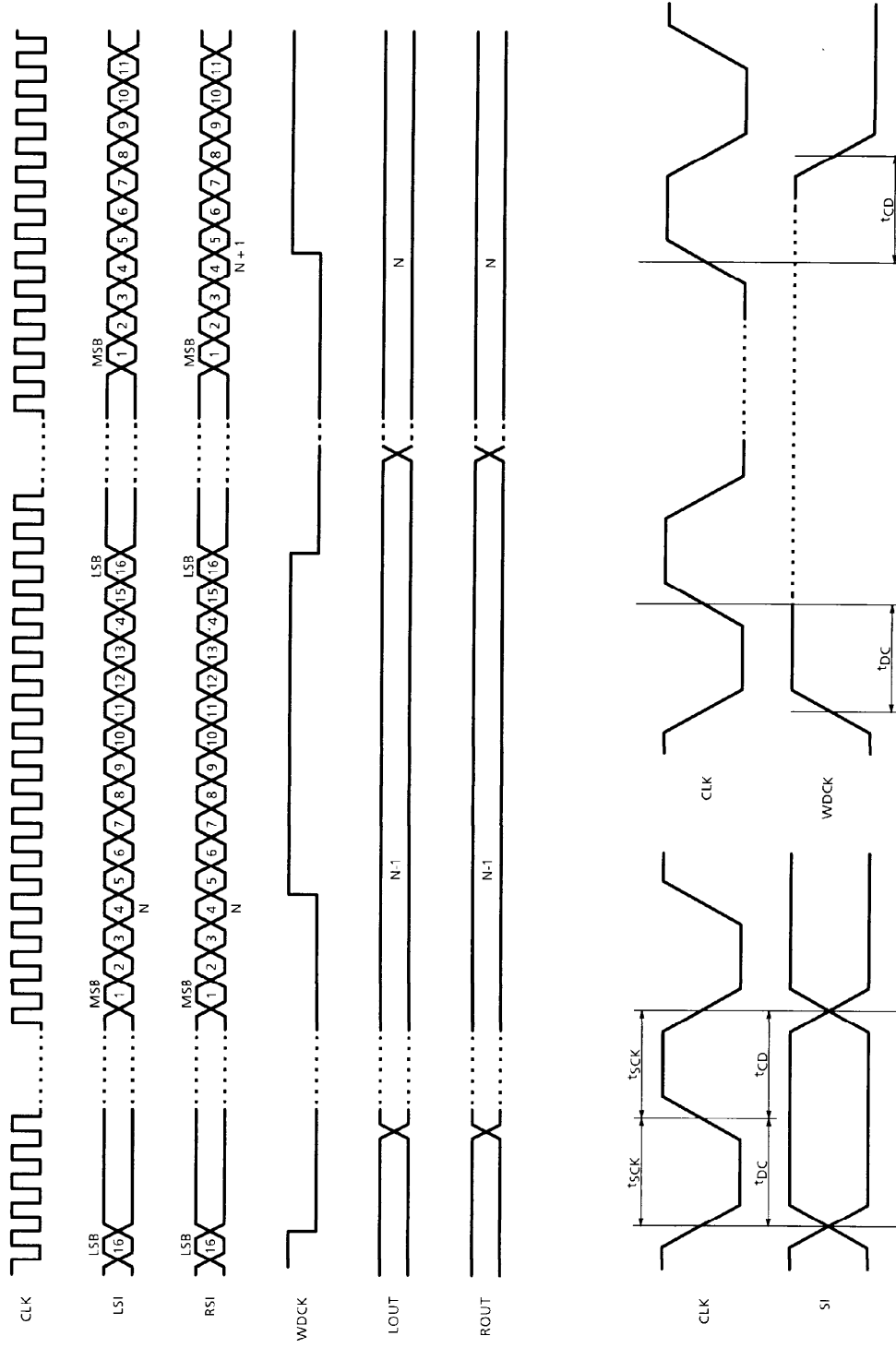
PIN No.	SYMBOL	I/O	FUNCTION / OPERATION	REMARKS											
1	SEL	I	Input data selection terminal. At "L" or open, L-ch and R-ch serial data input pin15. At "H", L-ch data input pin15 and R-ch data input pin14.	Pull-down Resistance											
2	GNDD	—	Logic grand terminal.												
3	TEST	I	Test terminal. Normally, use at "L".												
4	VDDD	—	Logic power supply terminal.												
5	GNDA	—	Analog grand terminal.												
6	ROUT	O	R-ch analog output terminal.												
7	VDDA	—	Analog power supply terminal.												
8	VDDA														
9	VREFR	—	R-ch reference voltage terminal.												
10	VREFL	—	L-ch reference voltage terminal.												
11	LOUT	O	L-ch analog output terminal.												
12	GNDA	—	Analog grand terminal.												
13	LRCK/WCK	I	At pin1 "H" or "OPEN", LR clock input terminal. At pin1 "L", word clock input terminal.												
14	LRSEL/DATAR	I	At pin1 "L", LR channel data selection terminal. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">LRSEL INPUT</th> <th colspan="2">LRCK</th> </tr> <tr> <th>"L"</th> <th>"H"</th> </tr> </thead> <tbody> <tr> <td>"L"</td> <td>R-ch data input</td> <td>L-ch data input</td> </tr> <tr> <td>"H"</td> <td>L-ch data input</td> <td>R-ch data input</td> </tr> </tbody> </table> At pin1 "H", R-ch data input terminal.	LRSEL INPUT	LRCK		"L"	"H"	"L"	R-ch data input	L-ch data input	"H"	L-ch data input	R-ch data input	
LRSEL INPUT	LRCK														
	"L"	"H"													
"L"	R-ch data input	L-ch data input													
"H"	L-ch data input	R-ch data input													
15	DATA/DATAL	I	At pin1 "L", L-ch and R-ch data input terminal. At pin1 "H", L-ch data input terminal.												
16	BCK	I	Bit clock input terminal.												

1-1 DATA INPUT TIMING (SEL = "L")



Downloaded from [Elcodis.com](http://Elcodis.com) electronic components distributor

1-2 DATA INPUT TIMING (SEL = "H")



## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>DD</sub>	-0.3~6.0	V
Input Voltage	V <sub>IN</sub>	-0.3~V <sub>DD</sub> +0.3	V
Power Dissipation	TC9250F	P <sub>D</sub>	mW
	TC9250P		
		300	
Operating Temperature	T <sub>opr</sub>	-20~85	°C
Storage Temperature	T <sub>stg</sub>	-40~125	°C

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta = 25°C, V<sub>DD</sub> = 5V)

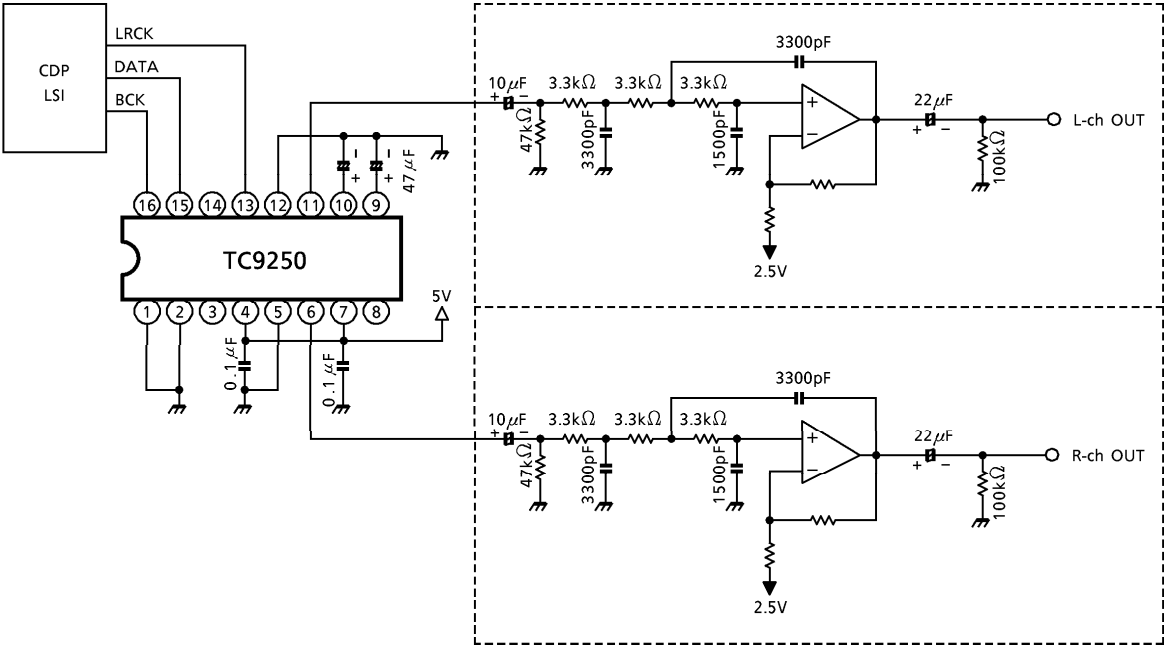
## DC characteristic

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V <sub>DD</sub>	1	Ta = -35~85°C	4.5	5.0	5.5	V
Power Dissipation	I <sub>DD</sub>	1	fs = 44.1kHz, 8 times data input	—	2.0	6.0	mA
Input Voltage	V <sub>IH</sub>	1		V <sub>DD</sub> × 0.7	—	V <sub>DD</sub>	V
	V <sub>IL</sub>			0	—	V <sub>DD</sub> × 0.3	
Output Resister	R <sub>L</sub>	—	ROUT, LOUT terminal	5	—	—	kΩ
Convert Frequency	fs	1		—	—	400	kHz
Clock Frequency	f <sub>CLK</sub>	1		—	—	10	MHz
Clock Pulse Width	f <sub>SCK</sub>	1		40	—	—	ns
SI, LRCK Setuptime	t <sub>DC</sub>	1		12	—	—	ns
SI, LRCK Holdtime	t <sub>CD</sub>	1		12	—	—	ns

## AC characteristic

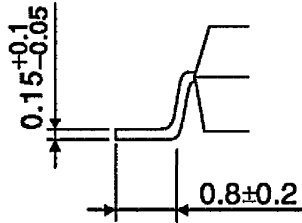
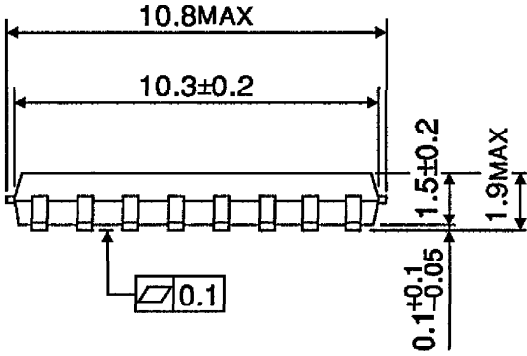
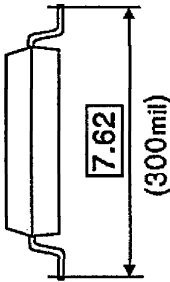
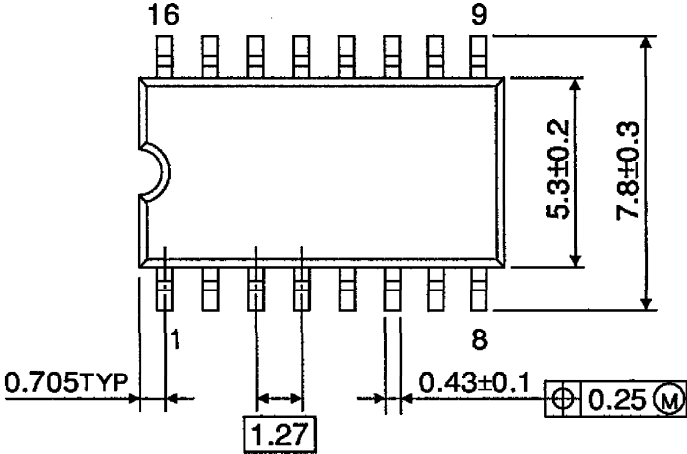
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Resolution	RES	—		—	16	—	bit
Noise Distortion	THD + N	1	f <sub>IN</sub> = 1kHz, 0dB 20kHz LPF ON	—	-65	-60	dB
S/N	S/N	—	JIS-A	96	100	—	dB
Dynamic Range	DR	—	f <sub>IN</sub> = 1kHz, -60dB, JIS-A ON	90	93	—	dB
Cross-Talk	CT	—	One channel 1kHz 0dB input	85	95	—	dB
Full Scale Output Voltage	V <sub>FS</sub>	—	1kHz 0dB output	—	2.0	2.3	V <sub>p-p</sub>

APPLICATION CIRCUIT (Test circuit 1)



PACKAGE DIMENSIONS  
SOP16-P-300-1.27

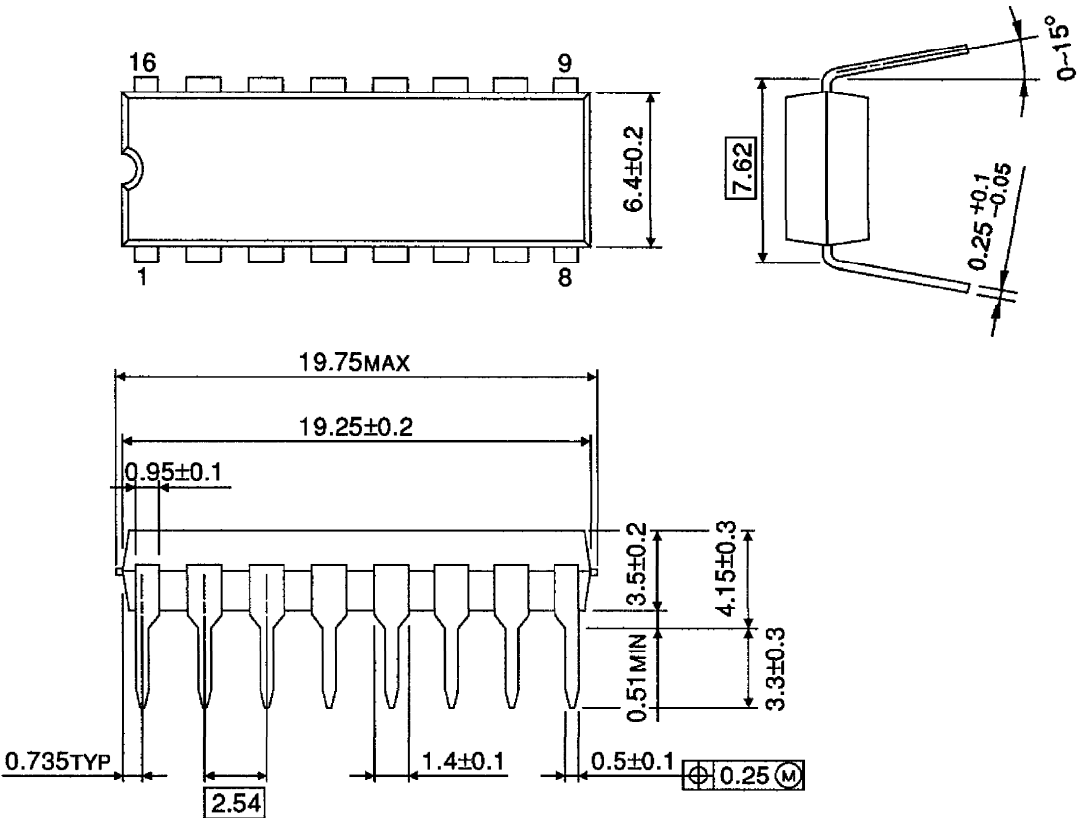
Unit : mm



Weight : 0.16g (Typ.)

PACKAGE DIMENSIONS  
DIP16-P-300-2.54A

Unit : mm



Weight : 1.00g (Typ.)