

OKI Semiconductor

MSM7545

Voice Scrambler for Cordless Telephone

GENERAL DESCRIPTION

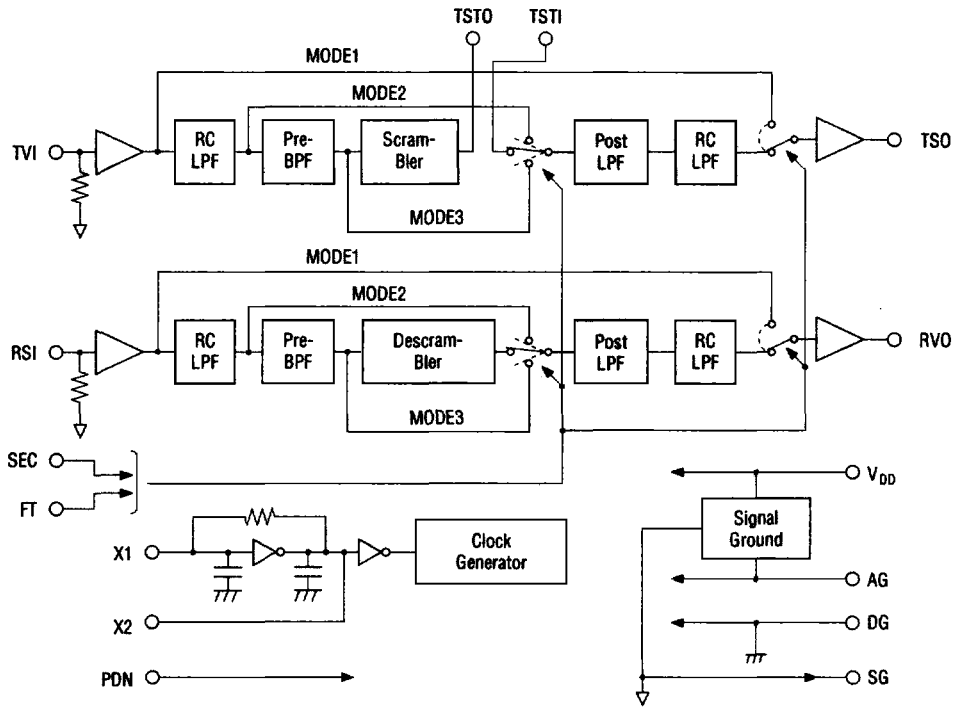
MSM7545 is a voice scrambler LSI for cordless telephone.

This LSI converts voice signal into scrambled voice signal and also restores scrambled voice signal to voice signal.

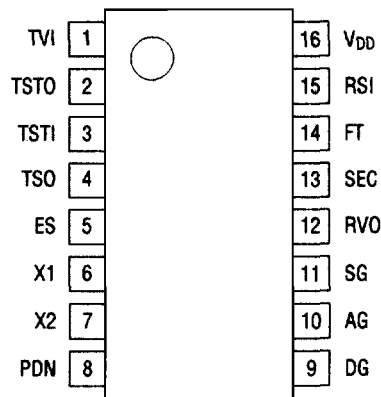
FEATURES

- This chip is available to transmit modem signal and also transmit scrambled voice signal through wireless transmit path (0.3 kHz to 3.0 kHz).
- Transmit function and receive function operate separately.
- Built-in band path filter (before voice scrambler).
- Built-in low path filter (after voice scrambler).
- Built-in crystal oscillation circuit.
- Wide range power supply voltage (2.8 V to 5.5 V).
- Package:
16-pin plastic SOP (SOP16-P-300-K) (Product name : MSM7545MS-K)

BLOCK DIAGRAM



PIN CONFIGURATION (TOP VIEW)



16-Pin Plastic SOP

PIN DESCRIPTION

Pin No.	Name	Description															
1	TVI	Transmit voice signal input.															
2	TSTO	Device test.															
3	TSTI	TSTO and TSTI should be connected directly.															
4	TSO	Scrambled voice signal output.															
5	ES	Device test. Please left open.															
6	X1	Input and output connected to the crystal oscillator. 3.6864 MHz crystal shall be connected. When an external clock is applied for MSM7545's oscilation source, it has to be input to X2. In this case, X2 has to be AC coupled with external clock by the capacitor of 200 pF and X1 shall be left open. Refer to application circuit.															
7	X2																
8	PDN	Power down control "1" : Power down "0" : Power on When digital "1" is applied to PDN pin, all the path is powered down.															
9	DG	Digital ground, 0 V.															
10	AG	Analog ground, 0 V.															
11	SG	Built-in analog signal ground. The DC voltage is approximately half of V _{DD} . It is necessary to put a bypass capacitor from SG to GND and SG to V _{DD} in close approximately to the device.															
12	RVO	Received voice signal output.															
13	SEC	Scramble mode and trough mode selection. Refer to FT pin description.															
14	FT	Voice signal path selection.															
		<table border="1"> <thead> <tr> <th>FT</th> <th>SEC</th> <th>Signal path</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>Through mode 1 : Input AMP output is connected to output buffer.</td> </tr> <tr> <td>0</td> <td>1</td> <td>Voice scrambler and descrambler work.</td> </tr> <tr> <td>1</td> <td>0</td> <td>Through mode 2 : Only POST LPF is connected to the path. This mode is available to use as a splatter filter.</td> </tr> <tr> <td>1</td> <td>1</td> <td>Through mode 3 : All filter is connected, scrambler and descrambler doesn't work.</td> </tr> </tbody> </table>	FT	SEC	Signal path	0	0	Through mode 1 : Input AMP output is connected to output buffer.	0	1	Voice scrambler and descrambler work.	1	0	Through mode 2 : Only POST LPF is connected to the path. This mode is available to use as a splatter filter.	1	1	Through mode 3 : All filter is connected, scrambler and descrambler doesn't work.
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1	1	Through mode 3 : All filter is connected, scrambler and descrambler doesn't work.															
Transmit path and Receive path also work.																	
15	RSI	Scrambled voice input.															
16	V _{DD}	Power supply. A bypass capacitor between V _{DD} and AG, DG is indispensable to ensure the performance.															

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Condition	Rating	Unit
Power Supply Voltage	V_{DD}	Ta = 25°C With respect to AG and DG	-0.3 to 7.0	V
Analog Input Voltage *1	V_{IA}		-0.3 to $V_{DD} + 0.3$	
Digital Input Voltage *2	V_{ID}		-0.3 to $V_{DD} + 0.3$	
Operating Temperature	T_{op}	—	-30 to 70	°C
Storage Temperature	T_{STG}	—	-55 to 150	

*1 TVI, RSI, TSTI

*2 PDN, FT, SEC

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage	V_{DD}	—	2.8	3.6	5.5	V
	AG, DG	—	—	0	—	
Operating Temperature	T_{op}	—	-30	25	70	°C
Cristal Frequency	f_{XTAL}	—	3.6790	3.6864	3.6938	MHz

ELECTRICAL CHARACTERISTICS

DC and Digital Interface Characteristics

(V_{DD} = 2.8 V to 5.5 V, T_a = -30°C to 70°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
Power Supply Current	I _{DD}	Operating mode	3.6 V	—	3.0	—	mA
			5.5 V	—	8.5	14.0	
	I _{DD5}	Power down mode	3.6 V	—	1.0	20	μA
			5.5 V	—	1.0	20	
Input Leakage Current *1	I _{IL}	V _{IN} = 0 V	-10	—	10		
	I _{IH}	V _{IN} = V _{DD}	-10	—	10		
Input Voltage *1	V _{IL}	—	0	—	0.6	V	
	V _{IH}	—	0.8V _{DD}	—	V _{DD}		

*1 PDN, FT, SEC

Internal Signal Ground (SG)

(V_{DD} = 2.8 V to 5.5 V, T_a = -30°C to 70°C)

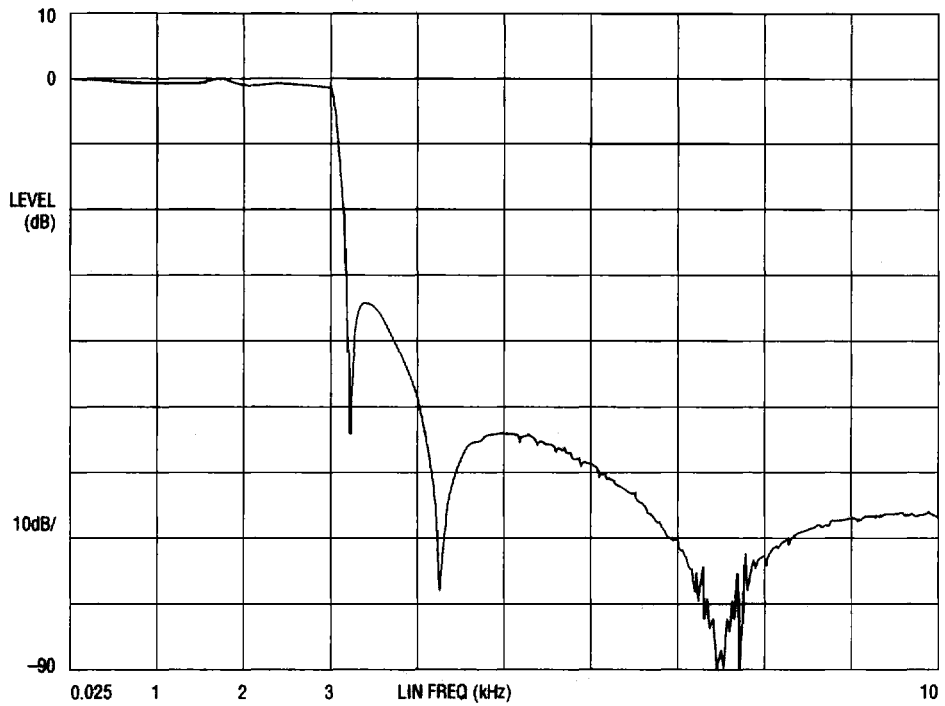
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
DC Voltage	V _{SG}	Without DC Load	$\frac{V_{DD}}{2} - 0.1$	$\frac{V_{DD}}{2}$	$\frac{V_{DD}}{2} + 0.1$	V

Analog Interface Characteristics

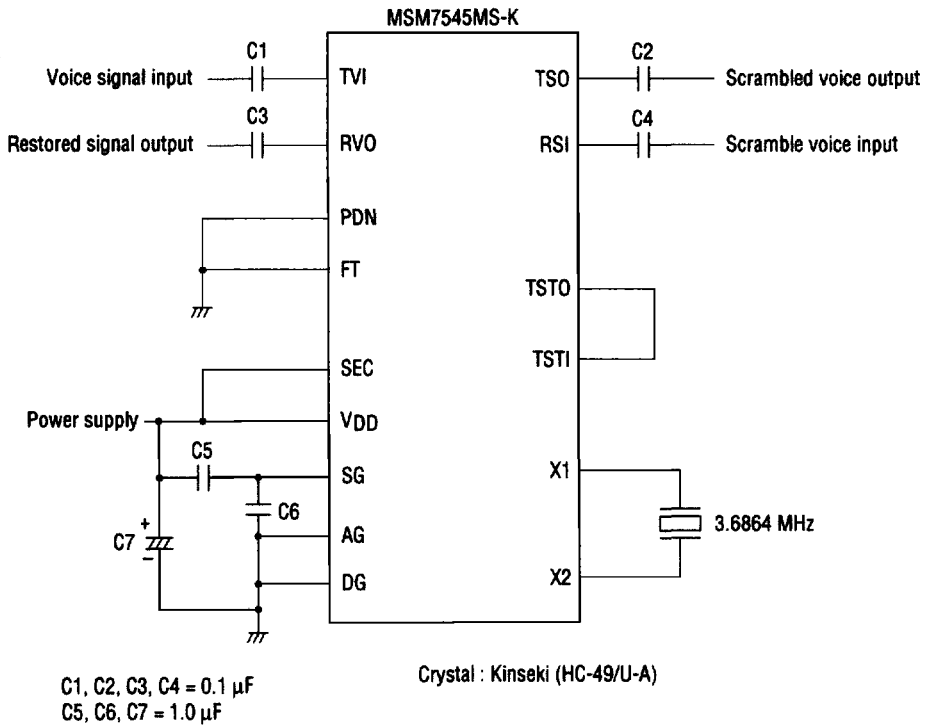
(V_{DD} = 2.8 V to 5.5 V, T_a = -30°C to 70°C)

Parameter	Symbol	Pin	Condition	Min.	Typ.	Max.	Unit	
Input Resistance	R _{IR}	TVI, RSI	f _{IN} ≤ 4 kHz	40	100	300	kΩ	
Maximum Input Signal Level	V _{IN}	TVI, RSI TSTI	f _{IN} = 1 kHz	V _{DD} = 2.8 V	—	—	1.2	V _{pp}
				V _{DD} = 5.0 V	—	—	2.4	
Gain	G _{IN}	TSO	f _{IN} = 1 kHz	-1	0	+1	dB	
Output Resistance	R _{OUT}		f _{IN} ≤ 4 kHz	—	—	1	kΩ	
Output Load Resistance	R _{LOAD}		—	40	—	—		
Output Distortion	H _{DST}		RVO	f _{IN} = 1 kHz, 1 V _{pp} (SEC = "1", FT = "1")	—	—	1	%
Output Load Capacitance	C _{LOAD}	—		—	—	40	pF	
Output DC Voltage	V _{OC}	—		—	$\frac{V_{DD}}{2} - 0.1$	$\frac{V_{DD}}{2}$	$\frac{V_{DD}}{2} + 0.1$	V

POST-LPF FREQUENCY RESPONSE



APPLICATION CIRCUIT



External Clock Application

