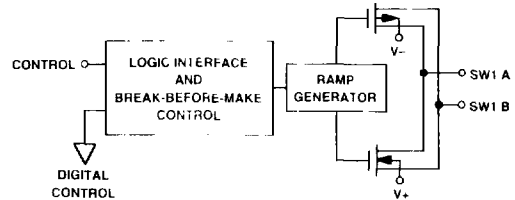


## SSM2404

### FEATURES

- “Clickless” Bilateral Audio Switching
- Four SPST Switches in a 20-Pin Package
- Ultralow THD+N: 0.0008% @ 1 kHz (2 V rms,  $R_L = 100\text{ k}\Omega$ )
- Low Charge Injection: 35 pC typ
- High OFF Isolation: -100 dB typ ( $R_L = 10\text{ k}\Omega$  @ 1 kHz)
- Low Crosstalk: -94 dB typ ( $R_L = 10\text{ k}\Omega$  @ 1 kHz)
- Low ON Resistance: 28  $\Omega$  typ
- Low Supply Current: 900  $\mu\text{A}$  typ
- Single or Dual Supply Operation: +11 V to +24 V or  $\pm 5.5\text{ V}$  to  $\pm 12\text{ V}$
- Guaranteed Break-Before-Make
- TTL and CMOS Compatible Logic Inputs
- Low Cost-Per-Switch

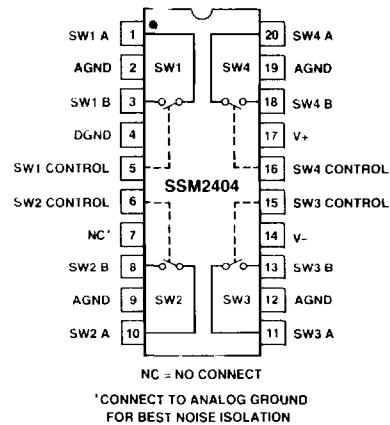
### BLOCK DIAGRAM OF ONE SWITCH CHANNEL



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### PIN CONNECTIONS

Epoxy Mini-DIP (P Suffix)  
and SOIC (S Suffix)



### GENERAL DESCRIPTION

The SSM2404 integrates four SPST analog switches in a single 20-pin package. Developed specifically for high performance audio applications, distortion and noise are negligible over the full operating range of 20 Hz to 20 kHz. With very low charge injection of 35 pC, “clickless” audio switching is possible, even under the most demanding conditions.

Switch control is realized by conventional TTL or CMOS logic. Guaranteed “break-before-make” operation assures that all switches in a large system will open before any switch reaches the ON state.

Single or dual supply operation is possible. Additional features include -100 dB OFF isolation, -94 dB crosstalk and 28  $\Omega$  ON resistance. Optional current-mode switching permits an extended signal-handling range. Although optimized for large load impedances, the SSM2404 maintains good audio performance even under low load impedance conditions.

# SSM2404—SPECIFICATIONS

( $V_S = \pm 12\text{ V}$ ,  $T_A = +25^\circ\text{C}$ , unless otherwise noted.  
Typical specifications apply at  $T_A = +25^\circ\text{C}$ .)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>AUDIO PERFORMANCE</b>						
Total Harmonic Distortion Plus Noise	THD+N	1 kHz, with 80 kHz Filter, $R_L = 100\text{ k}\Omega$ , $V_{IN} = 2\text{ V rms}$		0.0008		%
Spectral Noise Density	$e_n$	20 Hz to 20 kHz		0.8		nV/ $\sqrt{\text{Hz}}$
Wideband Noise Density	$e_n$ p-p	20 Hz to 20 kHz		0.6		$\mu\text{V p-p}$
<b>ANALOG SIGNAL SECTION</b>						
Analog Voltage Range	$V_A$	$V_{INH} = 2.4\text{ V}$ , $I_A = +2\text{ mA}$		+12		V
Analog Current Range	$I_A$	$V_{INH} = 2.4\text{ V}$ , $V_A = 0\text{ V}$		+10		mA
ON Resistance	$R_{ON}$	$I_A = +10\text{ mA}$ , $V_A = \pm 10\text{ V dc}$		28	45	$\Omega$
$R_{ON}$ Matching	$R_{ON\ Match}$	$I_A = +10\text{ mA}$ , $V_A = 0\text{ V}$		1		%
ON Leakage Current	$I_{S(ON)}$	$V_A = +10\text{ V}$	20	0.1	+20	nA
OFF Leakage Current	$I_{S(OFF)}$	$V_A = +10\text{ V}$	20	0.1	+20	nA
Charge Injection	Q			35		pC
ON-State Input Capacitance	$C_{ON}$	$V_A = 5\text{ V rms}$		31		pF
OFF-State Input Capacitance	$C_{OFF}$	$V_A = 5\text{ V rms}$		17		pF
OFF Isolation	$I_{COFF}$	$V_A = 50\text{ mV rms}$ , $f = 1\text{ kHz}$ , $R_L = 10\text{ k}\Omega$		100		dB
Channel-to-Channel Crosstalk	$C_L$	$V_A = 50\text{ mV rms}$ , $f = 1\text{ kHz}$ , $R_L = 10\text{ k}\Omega$		94		dB
<b>CONTROL SECTION</b>						
Digital Input High	$V_{INH}$	DGND = 0 V	2.4		$V_S$	V
Digital Input Low	$V_{INL}$	DGND = 0 V	0		0.8	V
Turn-On Time <sup>1</sup>	$t_{ON}$	See Test Circuit		8	50	ms
Turn-Off Time <sup>2</sup>	$t_{OFF}$	See Test Circuit		5	30	ms
Break-Before-Make Time Delay	$t_{ON-t_{OFF}}$			3	20	ms
Logic Input Current						
Logic HI		$V_{INH} = 2.4\text{ V}$	-1000	1.3	+1000	nA
Logic LO		$V_{INL} = 0.8\text{ V}$	1000	1.0	+1000	nA
<b>POWER SUPPLY</b>						
Supply Voltage Range	$V_S$	Single Supply Dual Supply	+11 +5.5		+24 $\pm 12$	V
Positive Supply Current	$I_{SY+}$	All Channels On		0.9	5	mA
Negative Supply Current	$I_{SY-}$	All Channels On	1.5	0.6		mA
Ground Current		All Channels On	2.0	0.3		mA

## NOTES

<sup>1</sup>Turn-on time is measured from the time the logic input reaches the 50% point to the time the output reaches 50% of the final value.

<sup>2</sup>Turn-off time is measured from the time the logic input reaches the 50% point to the time the output reaches 50% of the initial value.

Specifications subject to change without notice.

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage	
Single Supply	+27 V
Dual Supply	+13.5 V
Analog Input Voltage ( $V_A$ )	$V_S$
Logic Input Voltage ( $V_{IN(L,H)}$ )	$V_S$
Maximum Current Through Any Switch	20 mA
Operating Temperature Range	40°C to +85°C
Storage Temperature Range	-65°C to +150°C
Junction Temperature ( $T_J$ )	+150°C
Lead Temperature (Soldering, 60 sec)	+300°C
Thermal Resistance <sup>1</sup>	
20-Pin Plastic DIP (P): $\theta_{JA} = 74$ , $\theta_{JC} = 32$	°C/W
20-Pin SOIC (S): $\theta_{JA} = 90$ , $\theta_{JC} = 27$	°C/W

## NOTE

<sup>1</sup> $\theta_{JA}$  is specified for worst case mounting conditions, i.e.,  $\theta_{JC}$  is specified for device in socket for P-DIP package.

## ORDERING GUIDE

Model	Operating Temperature Range	Package	Package Option*
SSM2404P	40°C to +85°C	20-Pin Plastic DIP	N-20
SSM2404S	40°C to +85°C	20-Pin SOIC	R-20

\*N = Plastic DIP, R = SOIC. For outline information see Package Information section.