Rail-to-Rail Output Audio Amplifiers

SSM2275/SSM2475*

FEATURES
Single or Dual-Supply Operation
Excellent Sonic Characteristics
Low Noise: 7 nV/√Hz
Low THD: 0.0006%
Rail-to-Rail Output
High Output Current: ±50 mA
Low Supply Current: 1.7 mA/Amplifier
Wide Bandwidth: 8 MHz
High Slew Rate: 12 V/μs
No Phase Reversal
Unity Gain Stable
Stable Parameters Over Temperature

APPLICATIONS
Multimedia Audio
Professional Audio Systems
High Performance Consumer Audio
Microphone Preamplifier
MIDI Instruments

GENERAL DESCRIPTION

The SSM2275 and SSM2475 use the Butler Amplifier front end, which combines both bipolar and FET transistors to offer the accuracy and low noise performance of bipolar transistors and the slew rates and sound quality of FETs. This product family includes dual and quad rail-to-rail output audio amplifiers that achieve lower production costs than the industry standard OP275 (the first Butler Amplifier offered by Analog Devices). This lower cost amplifier also offers operation from a single 5 V supply, in addition to conventional ±15 V supplies. The ac performance meets the needs of the most demanding audio applications, with 8 MHz bandwidth, 12 V/μs slew rate and extremely low distortion.

The SSM2275 and SSM2475 are ideal for application in high performance audio amplifiers, recording equipment, synthesizers, MIDI instruments and computer sound cards. Where cascaded stages demand low noise and predictable performance, SSM2275 and SSM2475 are a cost effective solution. Both are stable even when driving capacitive loads.

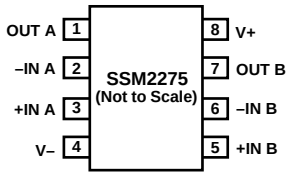
The ability to swing rail-to-rail at the outputs (see Applications section) and operate from low supply voltages enables designers to attain high quality audio performance, even in single supply systems. The SSM2275 and SSM2475 are specified over the extended industrial (–40°C to +85°C) temperature range. The SSM2275 is available in 8-lead plastic DIPs, SOICs, and microSOIC surface-mount packages. The SSM2475 is available in narrow body SOICs and thin shrink small outline (TSSOP) surface-mount packages.

*Protected by U.S. Patent No. 5,101,126.

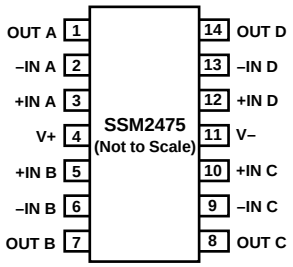
REV. A

PIN CONFIGURATIONS

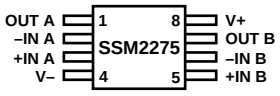
8-Lead Narrow Body SOIC (SO-8)



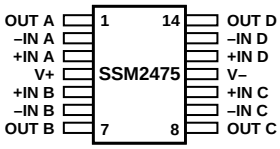
14-Lead Narrow Body SOIC (R-14)



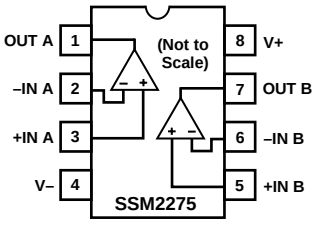
8-Lead microSOIC (RM-8)



14-Lead TSSOP (RU-14)



8-Lead Plastic DIP (N-8)



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SSM2275/SSM2475–SPECIFICATIONS

ELECTRICAL CHARACTERISTICS (V_S = ±15 V, T_A = +25°C, V_{CM} = 0 V unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			1	4	mV
		–40°C ≤ T_A ≤ +85°C		1	6	mV
Input Bias Current	I_B			250	400	nA
		–40°C ≤ T_A ≤ +85°C		300	500	nA
Input Offset Current	I_{OS}			5	75	nA
		–40°C ≤ T_A ≤ +85°C		15	125	nA
Input Voltage Range	V_{IN}	V_S = ±15 V	–14		+14	V
Common-Mode Rejection Ratio	CMRR	–12.5 V ≤ V_{CM} ≤ +12.5 V	80	100		dB
		–40°C ≤ T_A ≤ +85°C,				
		–12.5 V ≤ V_{CM} ≤ +12.5 V	80	100		V/mV
A_{VO}		R_L = 2 kΩ, –12 V ≤ V_O ≤ +12 V	100	240		V/mV
		–40°C ≤ T_A ≤ +85°C	80	120		V/mV
OUTPUT CHARACTERISTICS						
Output Voltage, High	V_{OH}	I_L ≤ 20 mA	14	14.5		V
		–40°C ≤ T_A ≤ +85°C	14.5	14.7		V
Output Voltage, Low	V_{OL}	I_L = 20 mA		–14	–13.5	V
		I_L = 10 mA		–14.6	–14.4	V
		I_L = 10 mA, –40°C ≤ T_A ≤ +85°C		–14.3	–13.9	V
Output Short Circuit Current Limit	I_{SC}		±25	±50	±75	mA
		–40°C ≤ T_A ≤ +85°C	±17	±40	±80	mA
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	±2.5 V ≤ V_S ≤ ±18 V	85	110		dB
		–40°C ≤ T_A ≤ +85°C	80	105		dB
Supply Current/Amplifier	I_{SY}	V_O = 0 V		1.7	2.9	mA
		–40°C ≤ T_A ≤ +85°C		1.75	3.0	mA
DYNAMIC PERFORMANCE						
Total Harmonic Distortion	THD	R_L = 10 kΩ, f = 1 kHz, V_O = 1 V rms		0.0006		%
Slew Rate	SR	R_L = 2 kΩ‖50 pF	9	12		V/µs
Gain Bandwidth Product	GBW			8		MHz
Channel Separation	CS	R_L = 2 kΩ, f =1 kHz		128		dB
NOISE PERFORMANCE						
Voltage Noise Spectral Density	e_n	f > 1 kHz		8		nV/√Hz
Current Noise Spectral Density	i_n	f > 1 kHz		< 1		pA/√Hz

Specifications subject to change without notice.

ELECTRICAL CHARACTERISTICS (V_S = +5 V, T_A = +25°C, V_{CM} = 2.5 V unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
INPUT CHARACTERISTICS						
Offset Voltage	V_{OS}			1	4	mV
		$-40°C \le T_A \le +85°C$		1	6	mV
Input Bias Current	I_B			250	400	nA
		$-40°C \le T_A \le +85°C$		300	500	nA
Input Offset Current	I_{OS}			5	75	nA
		$-40°C \le T_A \le +85°C$		15	125	nA
Input Voltage Range	V_{IN}		0.3		4.7	V
Common-Mode Rejection Ratio	CMRR	$+0.8\ V \le V_{CM} \le +2\ V$		85		dB
		$-40°C \le T_A \le +85°C$		80		dB
A_{VO}		R_L = 2 kΩ, $-0.5\ V \le V_O \le +4.5\ V$	25	60		V/mV
		$-40°C \le T_A \le +85°C$	20	50		V/mV
OUTPUT CHARACTERISTICS						
Output Voltage, High	V_{OH}	$I_L \le -15$ mA	4.2	4.5		V
		$I_L \le -10$ mA, $-40°C \le T_A \le +85°C$	4.5	4.8		V
Output Voltage, Low	V_{OL}	$I_L \le -15$ mA		0.6	1.0	V
		$I_L \le -10$ mA		0.3	0.5	V
		$I_L \le -10$ mA, $-40°C \le T_A \le +85°C$		0.7	1.1	V
Output Short Circuit Current Limit	I_{SC}	$-40°C \le T_A \le +85°C$		40		mA
POWER SUPPLY						
Supply Current/Amplifier	I_{SY}	V_O = 0 V		1.7	2.9	mA
		$-40°C \le T_A \le +85°C$		1.75	3.0	mA
DYNAMIC PERFORMANCE						
Total Harmonic Distortion	THD	R_L = 10 kΩ, f = 1 kHz, V_O = 1 V rms		0.0006		%
Slew Rate	SR	R_L = 2 kΩ‖50 pF		12		V/µs
Gain Bandwidth Product	GBW	R_L = 2 kΩ‖10 pF		6		MHz
Channel Separation	CS	R_L = 2 kΩ, f =1 kHz		128		dB
NOISE PERFORMANCE						
Voltage Noise Spectral Density	e_n	f > 1 kHz		8		$nV/\sqrt{Hz}$
Current Noise Spectral Density	i_n	f > 1 kHz		< 1		$pA/\sqrt{Hz}$

Specifications subject to change without notice.