19-1500; Rev 0; 4/00

MAXIM

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

General Description

The MAX4285/MAX4286 single and MAX4287/MAX4288/MAX4387/MAX4388 dual ADC buffer amplifiers feature high-speed performance and single +3V supply operation. The MAX4285/MAX4286/MAX4288 and MAX4388 offer a disable feature that reduces power-supply current and places the outputs in a high-impedance state. All six devices operate from a +2.85V to +6.5V single supply or from ±1.425V to ±3.25V dual supplies. The common-mode input voltage range extends to the negative power-supply rail (ground in single-supply applications).

These devices require 20mA of quiescent supply current per amplifier while achieving a 250MHz -3dB bandwidth and a 350V/µs slew rate. The combination of an 8ns (to 0.1%) settling time, 88dBc (f = 5MHz) of SFDR, and up to 100mA output drive makes these amplifiers ideal for high-speed ADC drivers for communications and instrumentation applications. In addition, when disabled, their high output impedance makes them ideal for multiplexing applications.

The MAX4285/MAX4286 are available in space-saving 6-pin SOT23 and 8-pin SO packages. The MAX4287/MAX4387 come in 8-pin µMAX and 8-pin SO packages, while the MAX4288/MAX4388 come in 10-pin µMAX and 14-pin SO packages.

Applications

High-Speed ADC Drivers

Communications Equipment

Instrumentation

CCD Imaging Systems

Ultrasound

Typical Operating Circuit appears at end of data sheet.

Pin Configurations appear at end of data sheet.

Features

- **High Speed at 3V**
  250MHz -3dB Bandwidth (MAX4285/87/88)
  150MHz -3dB Bandwidth (MAX4286, MAX4387/88)
  350V/µs Slew Rate
- **+2.85V to +6.5V Single-Supply Operation**
- **Input Common-Mode Range Extends to V_{EE}**
- **Low Distortion at 5MHz**
  -88dBc SFDR
- **High Output Current Drive: -106mA to +77mA**
- **6ns Settling Time to 0.1%**
- **High-Speed Enable/Disable**
  40ns Enable Time
  50ns Disable Time
  High Output Impedance
- **Space-Saving SOT23 and µMAX Packages**

Ordering Information

PART	TEMP. RANGE	PIN-PACKAGE	SOT TOP MARK
MAX4285EUT-T	-40°C to +85°C	6 SOT23-6	**AABQ**
MAX4285ESA	-40°C to +85°C	8 SO	—
MAX4286EUT-T	-40°C to +85°C	6 SOT23-6	**AABR**
MAX4286ESA	-40°C to +85°C	8 SO	—
MAX4287EUA	-40°C to +85°C	8 µMAX	—
MAX4287ESA	-40°C to +85°C	8 SO	—

Ordering Information continued at end of data sheet.

Selector Guide

PART	OP AMPS PER PKG	MIN GAIN	-3dB BANDWIDTH (AT MIN GAIN)	HIGH-SPEED DISABLE	PIN-PACKAGE
MAX4285	1	1	250MHz	Yes	6-pin SOT23, 8-pin SO
MAX4286	1	5	150MHz	Yes	6-pin SOT23, 8-pin SO
MAX4287	2	1	250MHz	No	8-pin µMAX/SO
MAX4288	2	1	250MHz	Yes	10-pin µMAX/14-pin SO
MAX4387	2	5	150MHz	No	8-pin µMAX/SO
MAX4388	2	5	150MHz	Yes	10-pin µMAX, 14-pin SO

For free samples and the latest literature, visit www.maxim-ic.com or phone 1-800-998-8800. For small orders, phone 1-800-835-8769

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC} - V_{EE}) .....-0.3V to +7.5V
Input Voltage Range (IN+, IN-) .....(V_{EE} - 0.3V) to (V_{CC} + 0.3V)
Differential Input Voltage .....-0.3V to +7.5V
Voltage at $\overline{DISABLE}$ .....(V_{EE} - 0.3V) to (V_{CC} + 0.3V)
Current into IN+, IN-, $\overline{DISABLE}$ .....±20mA
Output Short-Circuit Duration .....Indefinite
Continuous Power Dissipation (T_A = +70°C)
6-Pin SOT23 (derate 7.1mW/°C above +70°C).....571mW
8-Pin µMAX (derate 4.1mW/°C above +70°C) 330mW
10-Pin µMAX (derate 5.6mW/°C above +70°C) 444mW
8-Pin SO (derate 5.88mW/°C above +70°C).....471mW
14-Pin SO (derate 8.3mW/°C above +70°C).....667mW
Operating Temperature Range .....-40°C to +85°C
Junction Temperature .....+150°C
Storage Temperature Range .....-65°C to +150°C
Lead Temperature (soldering, 10s) .....+300°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ = 3V, R_L = ∞, V_{CM} = 1V, and T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Operating Supply Voltage Range		Guaranteed by PSRR test		2.85		6.5	V
Input Common-Mode Voltage Range	V_{CM}	Guaranteed by CMRR test		V_{EE}		V_{CC} - 1.25	V
Input Offset Voltage	V_{OS}	MAX4_87EU_/MAX4_88EU_/MAX4_8_ES_			±0.1	±8	mV
		MAX4285EUT-T/MAX4286EUT-T			±1.5	±12	
Input Offset-Voltage Temperature Coefficient	TC_{VOS}				26		µV/°C
Input Offset-Voltage Matching	ΔV_{OS}	MAX4287/88 and MAX4387/88			±0.2		mV
Input Bias Current	I_B				13	35	µA
Input Offset Current	I_{OS}				0.2	8	µA
Input Resistance	R_{IN}	Differential (-10mV ≤ V_{IN} ≤ +10mV)			38		kΩ
		Common mode (V_{EE} ≤ V_{CM} ≤ V_{CC} - 1.25V)			600		
Common-Mode Rejection Ratio	CMRR	V_{EE} ≤ V_{CM} ≤ V_{CC} - 1.25V	MAX4_87EU_/ MAX4_88EU_/ MAX4_8_ES_		50	73	dB
			MAX4285EUT-T/ MAX4286EUT-T		45	68	
Open-Loop Gain	A_{VOL}	VEE + 0.4V ≤ V_{OUT} ≤ V_{CC} - 0.4V	R_L = 2kΩ	75	94		dB
			R_L = 300Ω	65	94		
			R_L = 100Ω	60	85		

DC ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ = 3V, R_L = ∞, V_{CM} = 1V, and T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at T_A = +25°C.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Output Current Drive	I_{OUT}	R_L = 20Ω to V_{EE}			77		mA
		R_L = 20Ω to V_{CC}			106		
Power-Supply Rejection Ratio	PSRR	V_{CC} = 2.85V to 6.5V		40	50		dB
Disabled Output Leakage Current	I_{LEAK}	$\overline{DISABLE_}$ = V_{EE}, $V_{EE} \le V_{OUT} \le V_{CC}$			700		nA
$\overline{DISABLE_}$ Logic Low Threshold	V_{IL}					V_{CC} - 2	V
$\overline{DISABLE_}$ Logic High Threshold	V_{IH}			V_{CC} - 1			V
$\overline{DISABLE_}$ Logic Input Low Current	I_{IL}	$\overline{DISABLE_}$ = V_{EE}			±3	±22	µA
$\overline{DISABLE_}$ Logic Input High Current	I_{IH}	$\overline{DISABLE_}$ = V_{CC}			±3	±22	µA
Quiescent Supply Current (per Amplifier)	I_{SY}	V_{CC} = 3V	Normal mode		20	24	mA
			Disabled mode, $\overline{DISABLE_}$ = V_{EE}		1	3	
		V_{CC} = 5V	Normal mode		23	28	
			Disabled mode, $\overline{DISABLE_}$ = V_{EE}		1	3	

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

AC ELECTRICAL CHARACTERISTICS

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ = 3V, R_L = 300Ω to $V_{CC}/2$, V_{CM} = 1V, A_{VCL} = +1V/V for MAX4285/MAX4287/MAX4288, A_{VCL} = +5V/V for MAX4286 and MAX4387/MAX4388, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Small-Signal -3dB Bandwidth	BW_{SS}	V_{OUT} = 100mVp-p	MAX4285/87/88		250		MHz
			MAX4286 and MAX4387/88		150		
Large-Signal -3dB Bandwidth	BW_{LS}	V_{OUT} = 1Vp-p			200		MHz
Bandwidth for 0.1dB Flatness	$BW_{0.1dB}$	V_{OUT} = 100mVp-p	MAX4285/87/88		100		MHz
			MAX4286 and MAX4387/88		50		
Slew Rate	SR	V_{OUT} = 1V step, 10% to 90%			350		V/µs
Rise Time	t_R	V_{OUT} = 1V step, 10% to 90%			2.2		ns
Fall Time	t_F	V_{OUT}= 1V step, 90% to 10%			2.8		ns
Settling Time (0.1%)	$t_{S\ 0.1\%}$	V_{OUT} = 1V step	MAX4285/87/88		6		ns
			MAX4286 and MAX4387/88		14		
Overload Recovery Time		10% overdrive			25		ns
Spurious-Free Dynamic Range	SFDR	V_{OUT} = 0.5Vp-p	f_C = 100kHz		88		dBc
			f_C = 1MHz		88		
			f_C = 5MHz		87		
			f_C = 10MHz		79		
			f_C = 20MHz		70		
			f_C = 60MHz		50		
Two-Tone Third-Order Intercept	IP^3	f_C = 20MHz			34		dBm
Input Noise Voltage Density	e_n	f = 1MHz			10		$nV/\sqrt{Hz}$
Input Noise Current Density	i_n	f = 1MHz			2.1		$pA/\sqrt{Hz}$
Input Capacitance	C_{IN}				2		pF
Output Impedance	Z_{OUT}	f = 10MHz			0.5		Ω
Enable Time	t_{ON}	V_{OUT} = 1V, to within 0.1%			40		ns
Disable Time	t_{OFF}	V_{OUT} = 1V, to within 0.1%			50		
Crosstalk	X_{TALK}	MAX4287/88 and MAX4387/88, f = 10MHz, V_{OUT} = 1Vp-p			85		dBc

AC ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = +5V, V_{EE} = 0, $\overline{DISABLE_}$ = 5V, R_L = 300Ω to $V_{CC}/2$, V_{CM} = 2.5V, A_{VCL} = +1V/V for MAX4285/MAX4287/MAX4288, A_{VCL} = +5V/V for MAX4286 and MAX4387/MAX4388, T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Small-Signal -3dB Bandwidth	BW_{SS}	V_{OUT} = 100mVp-p	MAX4285/87/88		220		MHz
			MAX4286 and MAX4387/88		130		
Large-Signal -3dB Bandwidth	BW_{LS}	V_{OUT} = 1Vp-p			195		MHz
Bandwidth for 0.1dB Flatness	$BW_{0.1dB}$	V_{OUT} = 100mVp-p	MAX4285/87/88		75		MHz
			MAX4286 and MAX4387/88		40		
Slew Rate	SR	V_{OUT} = 2V step, 10% to 90%			385		V/µs
Rise Time	t_R	V_{OUT} = 2V step, 10% to 90%			4.2		ns
Fall Time	t_F	V_{OUT}= 2V step, 90% to 10%			2.9		ns
Settling Time (0.1%)	$t_{S\ 0.1\%}$	V_{OUT} = 2V step	MAX4285/87/88		8		ns
			MAX4286 and MAX4387/88		10		
Spurious-Free Dynamic Range	SFDR	V_{OUT} = 1Vp-p	f_C = 100kHz		86		dBc
			f_C = 1MHz		86		
			f_C = 5MHz		86		
			f_C = 10MHz		77		
			f_C = 20MHz		64		
			f_C = 60MHz		45		
Two-Tone Third-Order Intercept	IP3	f_C = 20MHz			40		dBm
Input Noise Voltage Density	e_n	f = 1MHz			6.5		nV/√Hz
Input Noise Current Density	i_n	f = 1MHz			1.9		pA/√Hz
Input Capacitance	C_{IN}				2		pF
Output Impedance	Z_{OUT}	f = 10MHz			0.5		Ω
Enable Time	t_{ON}	V_{OUT} = 1V, to within 0.1%			40		ns
Disable Time	t_{OFF}	V_{OUT} = 1V, to within 0.1%			35		
Crosstalk	X_{TALK}	MAX4287/88 and MAX4387/88, f = 10MHz, V_{OUT} = 2Vp-p			85		dBc

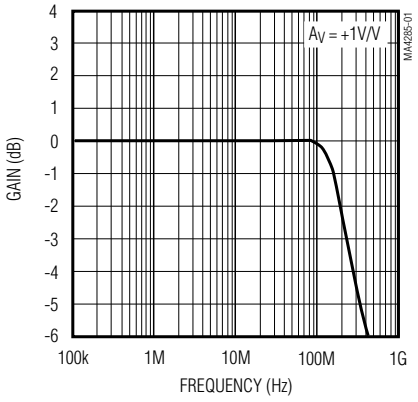
Note 1: The MAX428_EUT (SOT23) are 100% production tested at T_A = +25°C. Specifications over temperature limits are guaranteed by design.

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

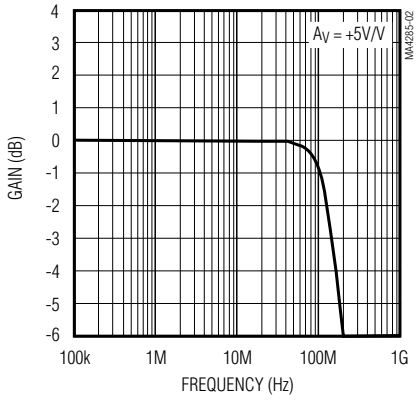
Typical Operating Characteristics

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ ≥ 2V, R_L = 300Ω to $V_{CC}/2$, V_{CM} = +1.0V, T_A =+25°C, unless otherwise noted.)

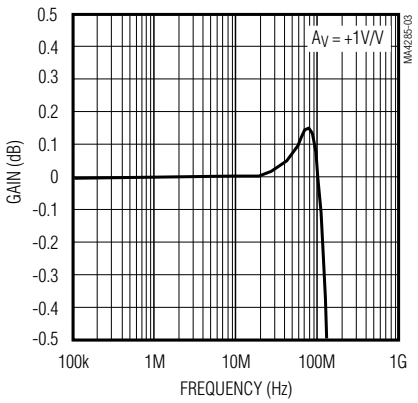
MAX4285/MAX4287/MAX4288 SMALL-SIGNAL GAIN vs. FREQUENCY



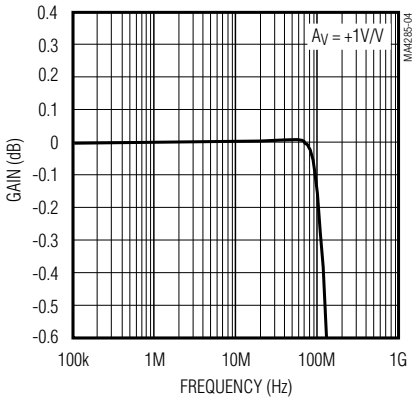
MAX4286/MAX4387/MAX4388 SMALL-SIGNAL GAIN vs. FREQUENCY



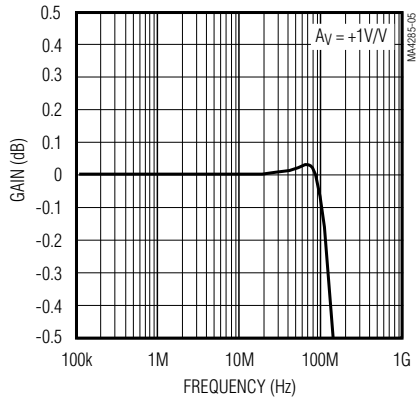
MAX4285/MAX4387/MAX4288 GAIN FLATNESS vs. FREQUENCY (R_{LOAD} = 100Ω)



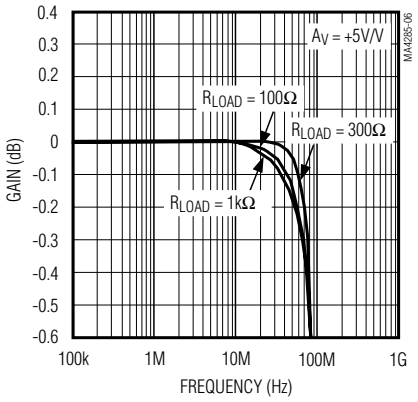
MAX4285/MAX4287/MAX4288 GAIN FLATNESS vs. FREQUENCY (R_{LOAD} = 300Ω)



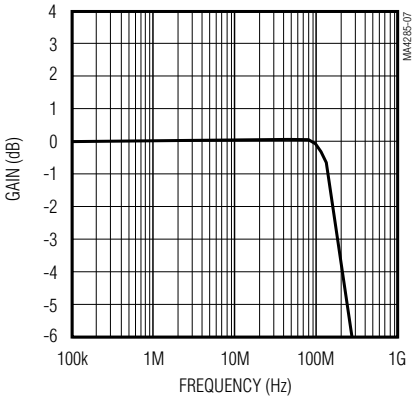
MAX4285/MAX4287/MAX4288 GAIN FLATNESS vs. FREQUENCY (R_{LOAD} = 1kΩ)



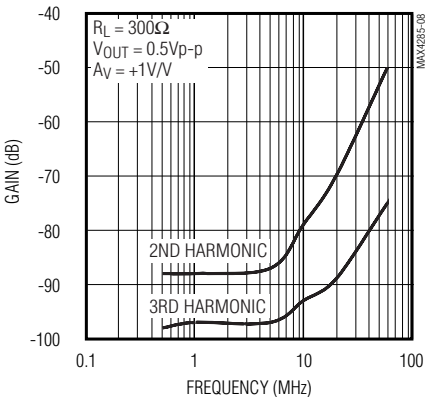
MAX4286/MAX4387/MAX4388 GAIN FLATNESS vs. FREQUENCY



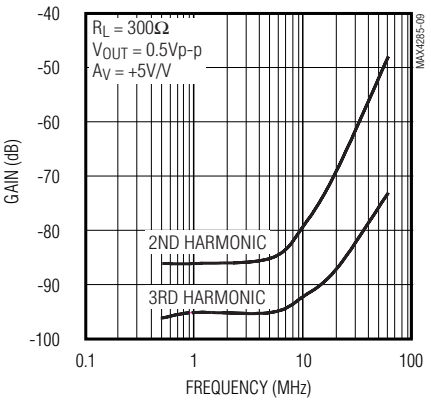
LARGE-SIGNAL GAIN vs. FREQUENCY



MAX4285/MAX4287/MAX4288 DISTORTION vs. FREQUENCY



MAX4286/MAX4387/MAX4388 DISTORTION vs. FREQUENCY

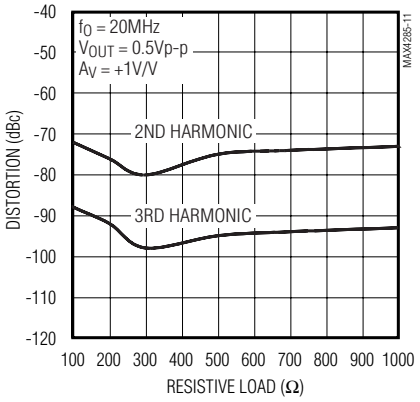


+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

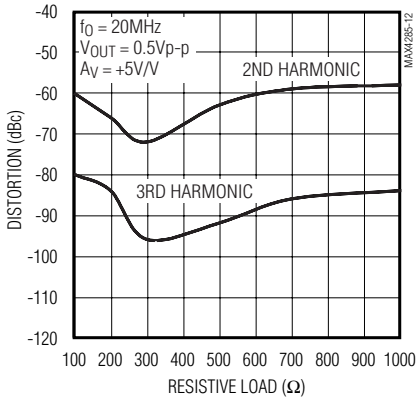
Typical Operating Characteristics (continued)

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ ≥ 2V, R_L = 300Ω to V_{CC}/2, V_{CM} = +1.0V, T_A =+25°C, unless otherwise noted.)

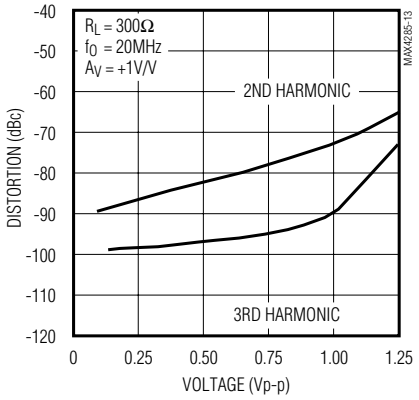
MAX4285/MAX4287/MAX4288
DISTORTION vs. LOAD



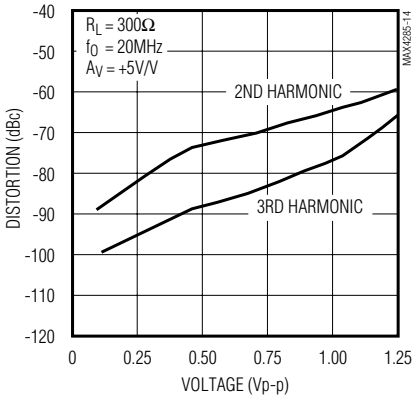
MAX4286/MAX4387/MAX4388
DISTORTION vs. LOAD



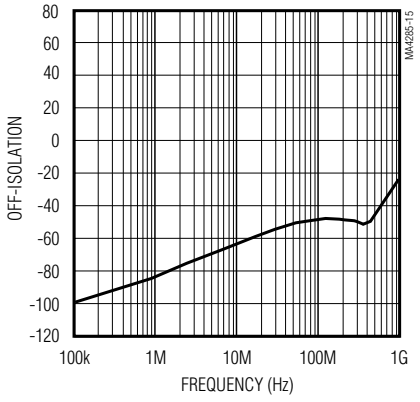
MAX4285/MAX4287/MAX4288
DISTORTION vs. SWING



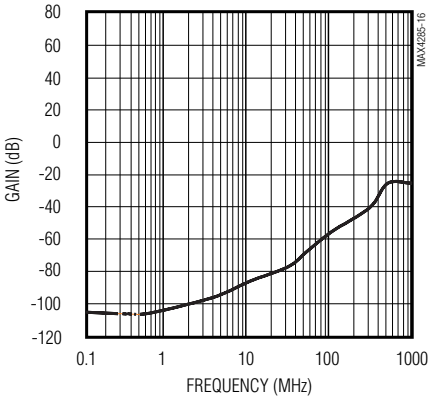
MAX4286/MAX4387/MAX4388
DISTORTION vs. SWING



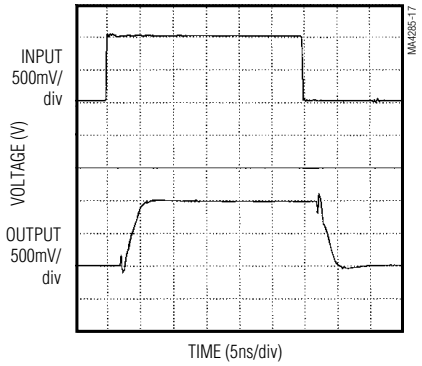
MAX4285/MAX4286/MAX4288/MAX4388
OFF-ISOLATION vs. FREQUENCY



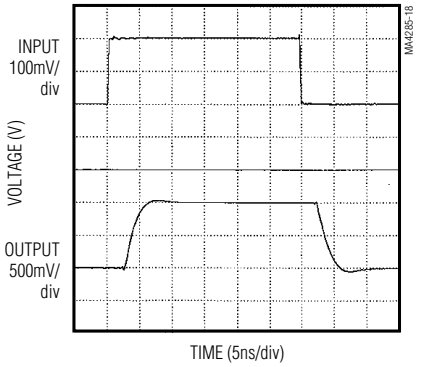
MAX4287/MAX4288/MAX4387/MAX4388
CROSSTALK vs. FREQUENCY



MAX4285/MAX4287/MAX4288
LARGE-SIGNAL PULSE RESPONSE
(A_V = +1V/V)



MAX4286/MAX4387/MAX4388
LARGE-SIGNAL PULSE RESPONSE
(A_V = +5V/V)

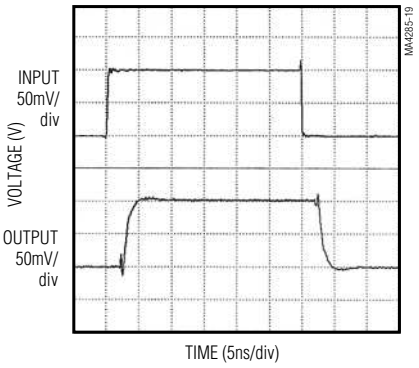


+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

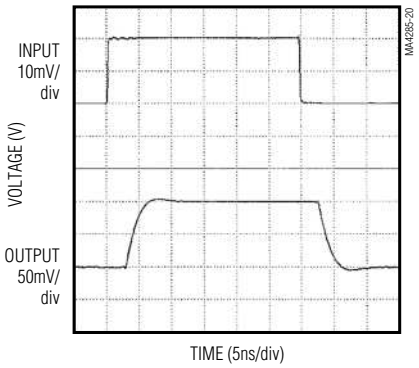
Typical Operating Characteristics (continued)

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ ≥ 2V, R_L = 300Ω to $V_{CC}/2$, V_{CM} = +1.0V, T_A =+25°C, unless otherwise noted.)

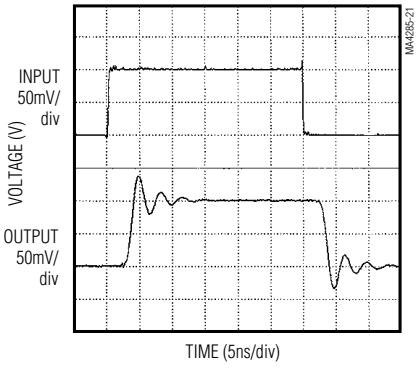
MAX4285/MAX4287/MAX4288 SMALL-SIGNAL PULSE RESPONSE (A_V = +1V/V)



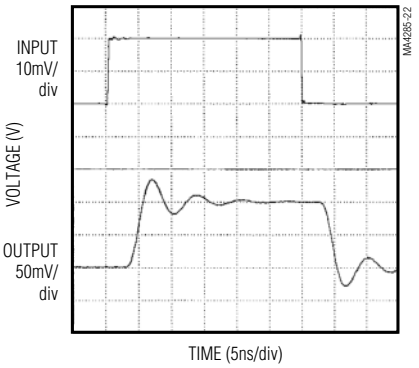
MAX4286/MAX4387/MAX4388 SMALL-SIGNAL PULSE RESPONSE (A_V = +5V/V)



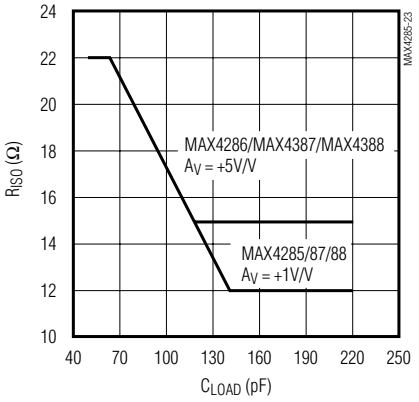
MAX4285/MAX4287/MAX4288 SMALL-SIGNAL PULSE RESPONSE (C_{LOAD} = 22pF, A_V = +1V/V)



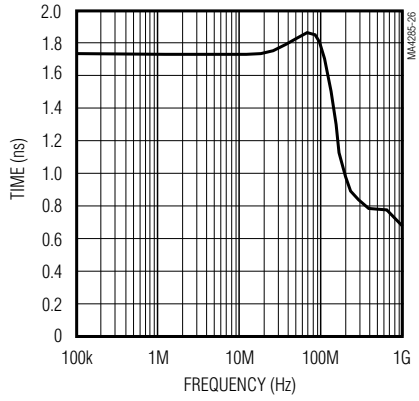
MAX4286/MAX4387/MAX4388 SMALL-SIGNAL PULSE RESPONSE (C_{LOAD} = 47pF, A_V = +5V/V)



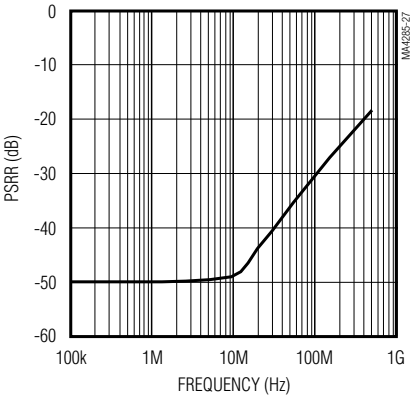
ISOLATION RESISTANCE vs. LOAD CAPACITANCE



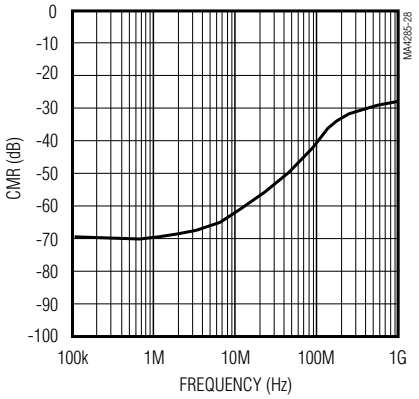
GROUP DELAY vs. FREQUENCY



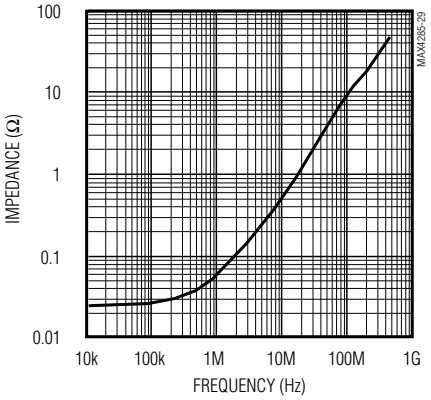
POWER-SUPPLY REJECTION RATIO vs. FREQUENCY



COMMON-MODE REJECTION vs. FREQUENCY



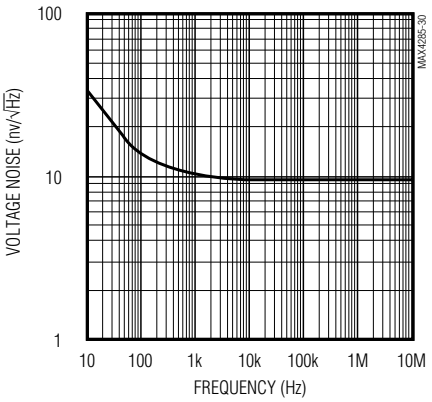
OUTPUT IMPEDANCE vs. FREQUENCY



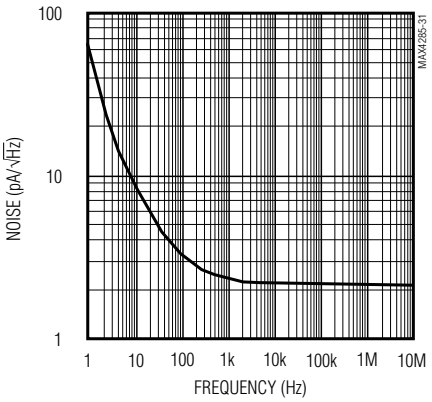
Typical Operating Characteristics (continued)

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ ≥ 2V, R_L = 300Ω to $V_{CC}/2$, V_{CM} = +1.0V, T_A =+25°C, unless otherwise noted.)

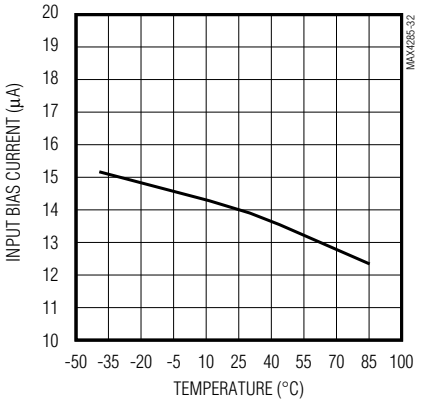
VOLTAGE NOISE DENSITY vs. FREQUENCY



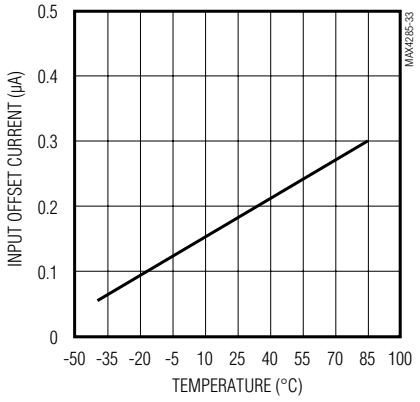
CURRENT NOISE DENSITY vs. FREQUENCY



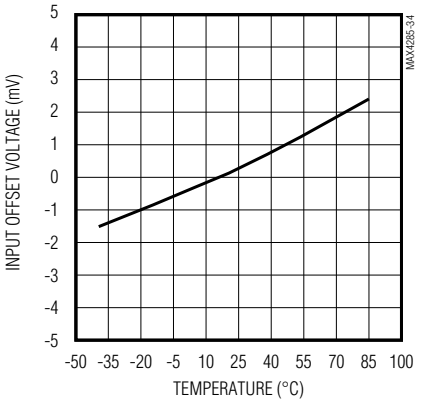
INPUT BIAS CURRENT vs. TEMPERATURE



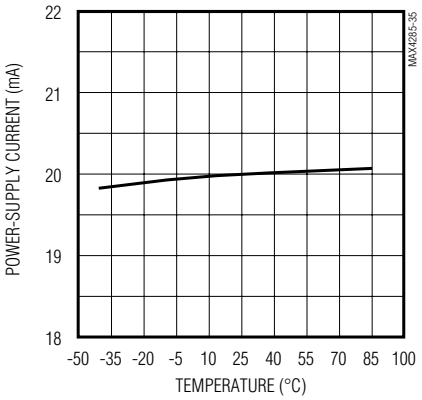
INPUT OFFSET CURRENT vs. TEMPERATURE



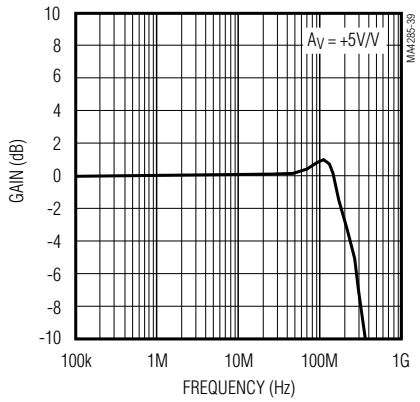
INPUT OFFSET VOLTAGE vs. TEMPERATURE



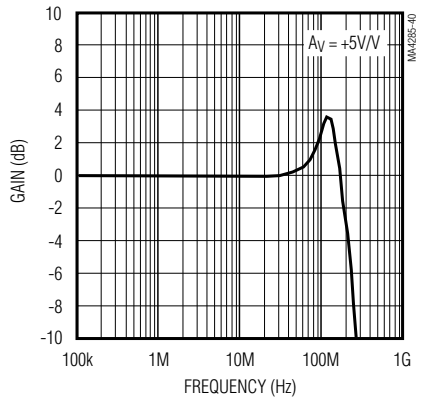
POWER-SUPPLY CURRENT vs. TEMPERATURE



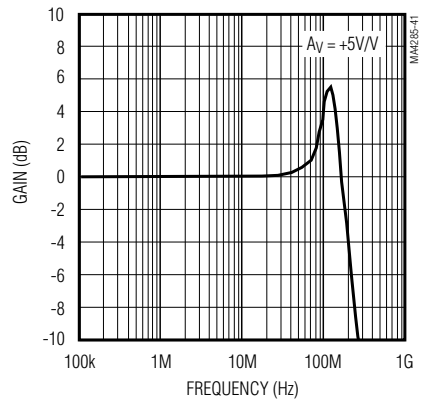
MAX4286 SMALL-SIGNAL GAIN vs. FREQUENCY (C_{LOAD} = 22pF)



MAX4286 SMALL-SIGNAL GAIN vs. FREQUENCY (C_{LOAD} = 37pF)



MAX4286 SMALL-SIGNAL GAIN vs. FREQUENCY (C_{LOAD} = 47pF)

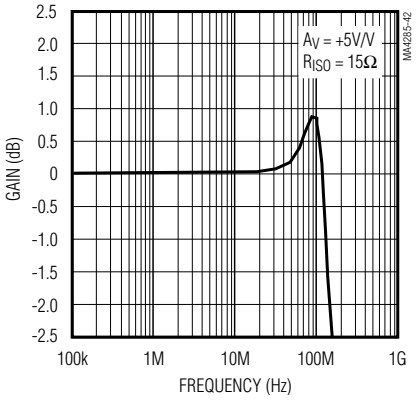


+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

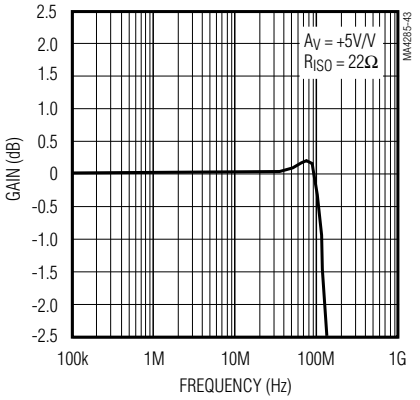
Typical Operating Characteristics (continued)

(V_{CC} = +3V, V_{EE} = 0, $\overline{DISABLE_}$ ≥ 2V, R_L = 300Ω to $V_{CC}/2$, V_{CM} = +1.0V, T_A =+25°C, unless otherwise noted.)

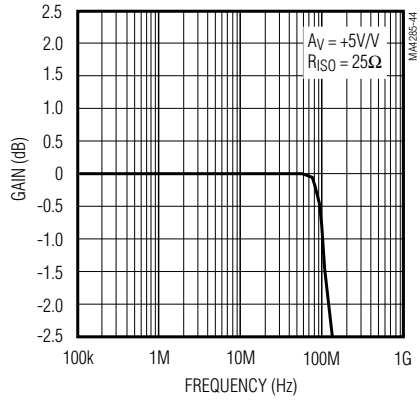
MAX4286
SMALL-SIGNAL GAIN vs. FREQUENCY
C_{LOAD} II R_{ISO} (C_{LOAD} = 37pF)



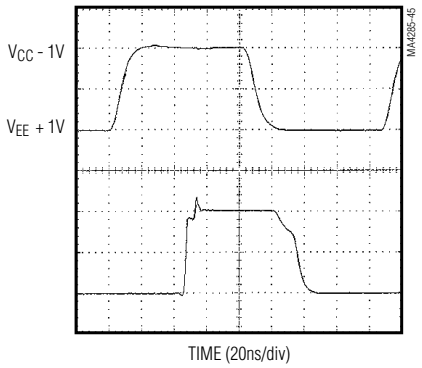
MAX4286
SMALL-SIGNAL GAIN vs. FREQUENCY
C_{LOAD} II R_{ISO} (C_{LOAD} = 37pF)



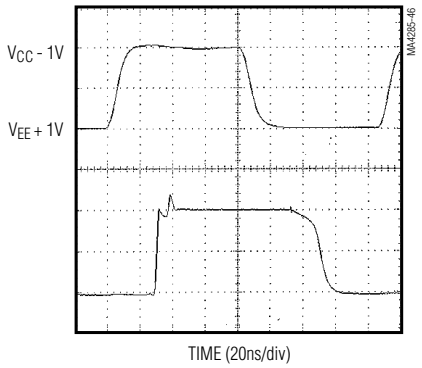
MAX4286
SMALL-SIGNAL GAIN vs. FREQUENCY
C_{LOAD} II R_{ISO} (C_{LOAD} = 37pF)



ENABLE/DISABLE RESPONSE
TIME (V_{CC} = 5V)



ENABLE/DISABLE RESPONSE
TIME (V_{CC} = 3V)



Pin Description

PIN					NAME	FUNCTION
MAX4285 MAX4286		MAX4287 MAX4387	MAX4288 MAX4388			
6-PIN SOT23-6	8-PIN SO	8-PIN µMAX/SO	10-PIN µMAX	14-PIN SO		
—	1, 5	—	—	5, 7, 8, 10	N.C.	Not Internally Connected. Connect to ground or leave unconnected.
1	6	—	—	—	OUT	Amplifier Output
2	4	4	4	4	V_{EE}	Negative Power Supply, or Ground in Single-Supply Operation
3	3	—	—	—	IN+	Noninverting Input
4	2	—	—	—	IN-	Inverting Input
5	8	—	—	—	$\overline{DISABLE}$	Disable (active low)
—	—	—	5	6	$\overline{DISABLEA}$	Disable Amplifier A (active low)
—	—	—	6	9	$\overline{DISABLEB}$	Disable Amplifier B (active low)
6	7	8	10	14	V_{CC}	Positive Power Supply
—	—	1	1	1	OUTA	Amplifier A Output
—	—	2	2	2	INA-	Amplifier A Inverting Input
—	—	3	3	3	INA+	Amplifier A Noninverting Input
—	—	5	7	11	INB+	Amplifier B Noninverting Input
—	—	6	8	12	INB-	Amplifier B Inverting Input
—	—	7	9	13	OUTB	Amplifier B Output

Detailed Description

The MAX4285–MAX4288 and MAX4387/MAX4388 are voltage-feedback op amps, intended for use as ADC input buffers. They operate from a single +2.85V to +6.5V supply or dual ±1.425V to ±3.25V supplies. Their high output drive, wide bandwidth, fast settling, low noise, and low distortion make them ideal for the brutal task of meeting the dynamic input drive requirements of high-speed ADCs or other demanding applications.

The MAX4285/MAX4286/MAX4288 and MAX4388 have a high-speed disable mode that places the outputs in a high-impedance state and lowers operating supply current to 1mA. The enable time is typically 40ns, and the disable time is typically 50ns. The MAX4285/MAX4286 have a single enable pin ($\overline{DISABLE}$), and the MAX4288/MAX4388 have dual disable pins ($\overline{DISABLEA}$, $\overline{DISABLEB}$).

The MAX4285/MAX4287/MAX4288 are internally compensated for unity-gain stability. The MAX4286/MAX4387/MAX4388 are compensated for gains of +5V/V or greater.

Applications Information

Inverting and Noninverting Configurations

Select the gain-setting feedback (R_F) and input (R_G) resistor values considering the following criteria: large resistor values increase voltage noise and interact with the amplifier's input and PC board capacitance to effect system bandwidth. This generates undesirable poles and zeros that decrease bandwidth or cause oscillations.

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

For example, a noninverting gain-of-two configuration ($R_F = R_G$) using 1kΩ resistors, combined with 2pF typical amplifier input capacitance, generates a pole at 159MHz. Since this pole is within the amplifier bandwidth, it jeopardizes stability. Reducing these 1kΩ resistors to 100Ω extends the pole frequency to 1.59GHz, but affects output swing by adding 200Ω in parallel with the amplifier's load resistor. The typical value for R_F is 300Ω.

Layout and Power-Supply Bypassing

These amplifiers operate from a single +2.85V to +6.5V power supply or from ±1.425V to ±3.25V dual supplies. For single-supply operation, bypass V_{CC} to ground with a 0.1nF capacitor as close to the pin as possible, with a 0.1µF capacitor in parallel. If operating with dual supplies, bypass each supply with capacitors to ground.

Observe the following guidelines:

- A solid ground plane is essential for good high-frequency behavior.
- Where possible, use multiple ground vias.
- Use a PC board with at least two layers. Avoid areas of unreferenced copper-clad.
- Keep signal traces as short and as straight as possible. Do not make sharp turns; round all trace corners.
- Use a constant-impedance board design if possible.

High-Speed Disable

The MAX4285/MAX4286/MAX4288 and MAX4388 feature a disable ($\overline{DISABLE_}$) input that places the amplifier in a low-power, high-output-impedance state. When $\overline{DISABLE_}$ is asserted, the amplifier's output impedance is typically 35kΩ. This high output impedance, combined with the low 2pF output capacitance, make these devices ideal for ADC input multiplexing applications or switch applications. Typical enable/disable times are 40ns/50ns.

Output Capacitive Loading and Stability

These op amps are optimized for AC performance. They are not designed to drive highly reactive loads, which decrease phase margin and may produce excessive ringing and oscillation. A small isolation resistor (usually 20Ω to 30Ω) placed before the reactive load reduces possible ringing and oscillation (Figure 1). At higher capacitive loads, AC performance is dependent on the interaction of the load capacitance, the isolation resistor, and on-board layout.

Output Drive Capability

The MAX4285–MAX4288 and MAX4387/MAX4388 have an output sink capability of 106mA and a source capability of 77mA. This high current ability allows them to drive low-impedance and dynamic-impedance ADC inputs. The linear output range of these devices is (V_{EE} + 0.4V) to (V_{CC} - 0.4V). Operation beyond this range is not recommended due to reduced gain and phase margin.

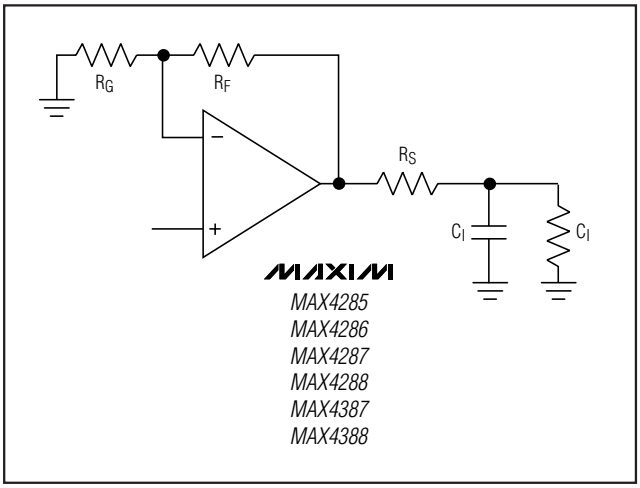


Figure 1. Using an Isolation Resistor (R_S) for High Capacitive Loads

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

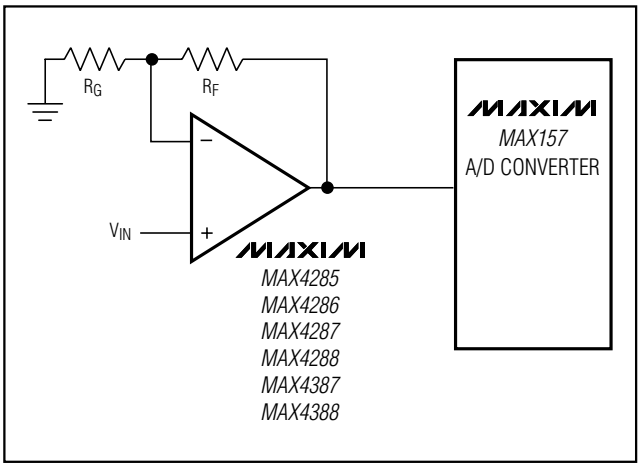
Ordering Information (continued)

PART	TEMP. RANGE	PIN-PACKAGE	SOT TOP MARK
MAX4288EUB	-40°C to +85°C	10 µMAX	—
MAX4288ESD	-40°C to +85°C	14 SO	—
MAX4387EUA	-40°C to +85°C	8 µMAX	—
MAX4387ESA	-40°C to +85°C	8 SO	—
MAX4388EUB	-40°C to +85°C	10 µMAX	—
MAX4388ESD	-40°C to +85°C	14 SO	—

Chip Information

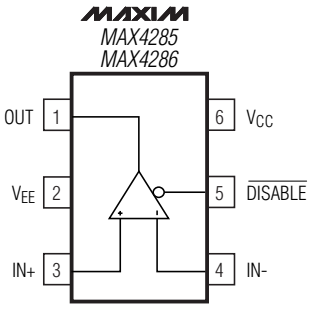
TRANSISTOR COUNT: MAX4285/MAX4286 : 114
MA4287/MAX4288/
MAX4387/MAX4388 : 227

Typical Operating Circuit

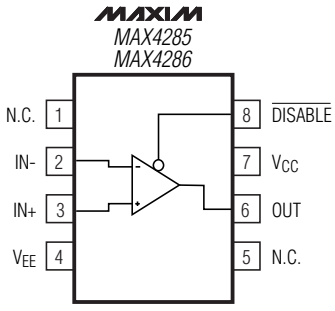


Pin Configurations

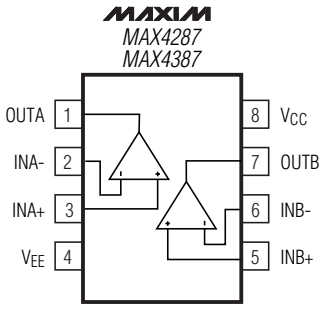
TOP VIEW



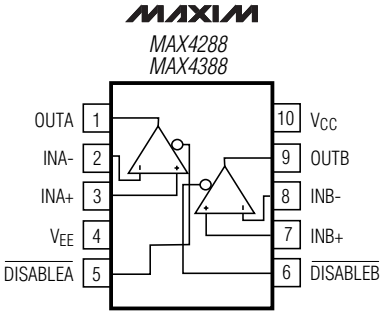
6-PIN SOT23



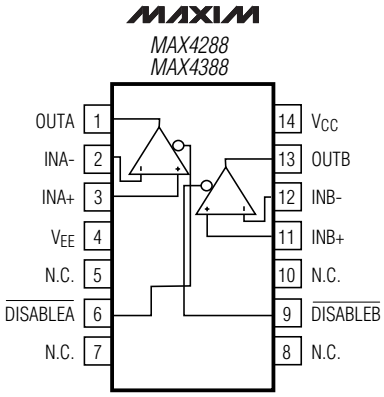
8-PIN SO



8-PIN SO/µMAX



10-PIN µMAX

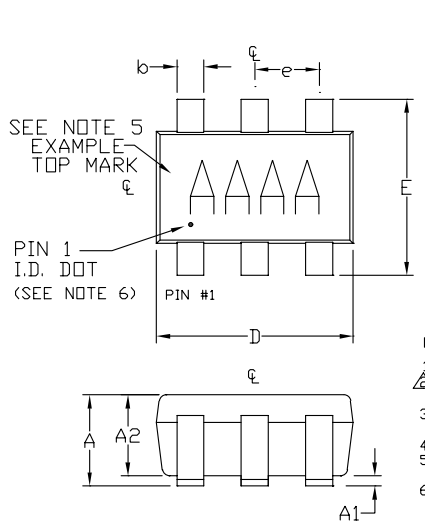


14-PIN SO

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

Package Information

6LSOT.EPS

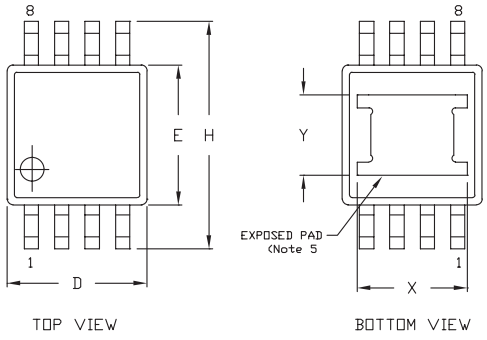


SYMBOL	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
b	0.35	0.50
C	0.08	0.20
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.75
L	0.35	0.55
e	0.95 REF	
α	0°	10°

NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. FOOT LENGTH MEASURED AT INTERCEPT POINT BETWEEN DATUM A & LEAD SURFACE.
3. PACKAGE OUTLINE EXCLUSIVE OF MOLD FLASH & METAL BURR.
4. PACKAGE OUTLINE INCLUSIVE OF SOLDER PLATING.
5. PIN 1 IS LOWER LEFT PIN WHEN READING TOP MARK FROM LEFT TO RIGHT. (SEE EXAMPLE TOP MARK)
6. PIN 1 I.D. DOT IS 0.3 MM ø MIN. LOCATED ABOVE PIN 1.

MAXIM
PROPRIETARY INFORMATION
TITLE: PACKAGE OUTLINE, SOT23, 6L
APPROVAL | DOCUMENT CONTROL NO. 21-0058 | REV D | 1/1

8LUMAXD.EPS



	INCHES		MILLIMETERS		JEDEC INCHES		JEDEC MILLIMETERS	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
A	0.037	0.043	0.94	1.10	---	0.043	---	1.10
A1	0.002	0.006	0.05	0.15	0.002	0.006	0.05	0.15
B	0.010	0.014	0.25	0.36	0.010	0.016	0.25	0.40
C	0.005	0.007	0.13	0.18	0.005	0.009	0.13	0.23
D	0.116	0.120	2.95	3.05	0.114	0.122	2.9	3.1
e	0.0256 BSC		0.65 BSC		0.0256 BSC		0.64 BSC	
E	0.116	0.120	2.95	3.05	0.114	0.122	2.9	3.1
H	0.188	0.198	4.78	5.03	0.193 BSC		4.9 BSC	
L	0.016	0.026	0.41	0.66	0.016	0.027	0.40	0.70
α	0°	6°	0°	6°	0°	6°	0°	6°
*X	0.087	0.099	2.210	2.515				
*Y	0.062	0.074	1.575	1.880				

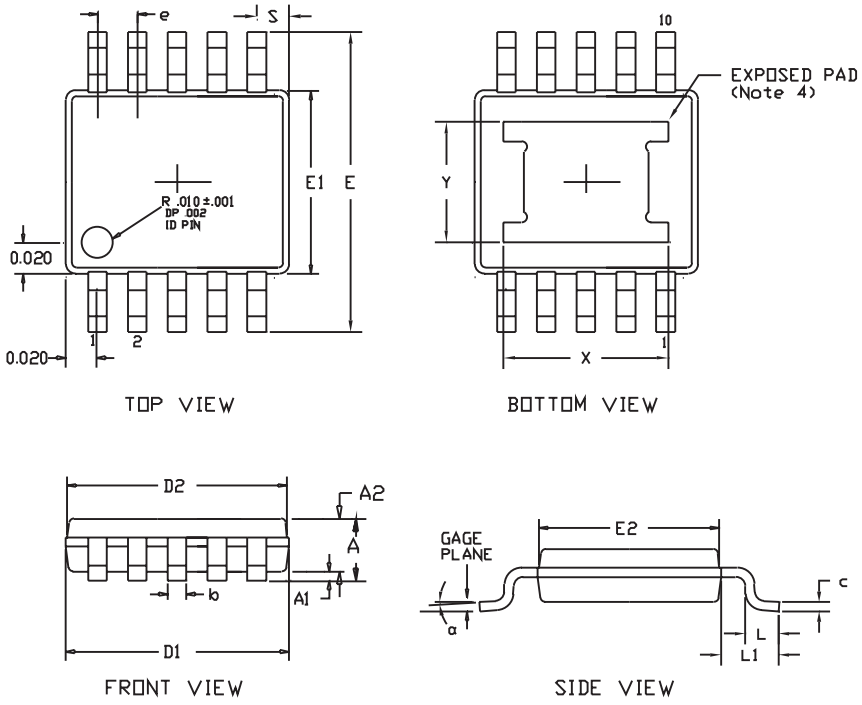
* EXPOSED PAD (Note 5)

NOTES:
1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15 MM (.006").
3. CONTROLLING DIMENSION: MILLIMETERS.
4. MEETS JEDEC MO-187.
5. DIMENSIONS X & Y APPLY TO EXPOSED PAD (EP) VERSIONS ONLY. SEE INDIVIDUAL PRODUCT DATASHEET TO DETERMINE IF A PRODUCT USES EXPOSED PAD PACKAGE.
6. EXPOSED PAD FLUSH WITH BOTTOM OF PACKAGE WITHIN .002".

MAXIM
PROPRIETARY INFORMATION
TITLE: PACKAGE OUTLINE, 8L uMAX WITH EP OPTION
APPROVAL | DOCUMENT CONTROL NO. 21-0036 | REV H | 1/1

Package Information (continued)

10LUMAX.EPS



	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.037	0.043	0.94	1.10
A1	0.002	0.006	0.05	0.15
A2	0.030	0.037	0.75	0.95
D1	0.116	0.120	2.95	3.05
D2	0.114	0.118	2.89	3.00
E1	0.116	0.120	2.95	3.05
E2	0.114	0.118	2.89	3.00
E	0.187	0.199	4.75	5.05
L	0.0157	0.0275	0.40	0.70
L1	0.037 REF		0.940 REF	
b	0.007	0.0106	0.177	0.270
e	0.0197 BSC		.500 BSC	
c	0.0035	0.0078	0.090	0.200
S	0.0196 REF		.498 REF	
α	0°	6°	0°	6°
*X	0.087	0.099	2.210	2.515
*Y	0.062	0.074	1.575	1.880

* EXPOSED PAD
(Note 4

NOTES:
1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15 MM (.006").
3. CONTROLLING DIMENSION: MILLIMETERS.
4. DIMENSIONS X & Y APPLY TO EXPOSED PAD (EP) VERSIONS ONLY. SEE INDIVIDUAL PRODUCT DATASHEET TO DETERMINE IF A PRODUCT USES EXPOSED PAD PACKAGE.
5. EXPOSED PAD FLUSH WITH BOTTOM OF PACKAGE WITHIN .002".

MAXIM

PROPRIETARY INFORMATION

TITLE:

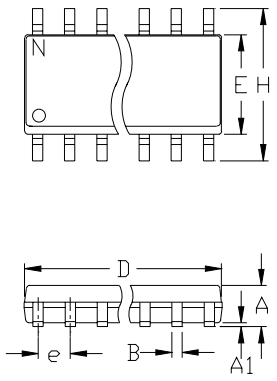
PACKAGE OUTLINE, 10L uMAX WITH EP OPTION

APPROVAL	DOCUMENT CONTROL NO.	REV	
	21-0061	F	1/1

+3V/+5V, 250MHz, SOT23 ADC Buffer Amplifiers with High-Speed Disable

Package Information (continued)

SOICNEPS



	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
B	0.014	0.019	0.35	0.49
C	0.007	0.010	0.19	0.25
e	0.050		1.27	
E	0.150	0.157	3.80	4.00
H	0.228	0.244	5.80	6.20
h	0.010	0.020	0.25	0.50
L	0.016	0.050	0.40	1.27

	INCHES		MILLIMETERS			
	MIN	MAX	MIN	MAX	N	MS012
D	0.189	0.197	4.80	5.00	8	A
D	0.337	0.344	8.55	8.75	14	B
D	0.386	0.394	9.80	10.00	16	C

NOTES:
1. D&E DO NOT INCLUDE MOLD FLASH
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED .15mm (.006")
3. LEADS TO BE COPLANAR WITHIN .102mm (.004")
4. CONTROLLING DIMENSION: MILLIMETER
5. MEETS JEDEC MS012-XX AS SHOWN IN ABOVE TABLE
6. N = NUMBER OF PINS

MAXIM 120 SAN GABRIEL DR SUNNYVALE CA 94086 FAX (408) 737 7194 PROPRIETARY INFORMATION

TITLE: PACKAGE FAMILY OUTLINE: SOIC .150" | 1/1 | DOCUMENT CONTROL NUMBER: 21-0041 A REV

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