Dual Single Supply 3V, 100MHz Video Op-Amp

April 2003

FEATURES

- **400V/µs Slew Rate**
- **100MHz Gain Bandwidth Product**
- **Wide Supply Range 2.7V to 12.6V**
- **Output Swings Rail-to-Rail**
- **Input Common Mode Range Includes Ground**
- Low Cost
- High Output Drive: 50mA
- Channel Separation: 90dB at 10MHz
- Specified on 3V, 5V, and ±5V Supplies
- Input Offset Voltage: 1mV
- 8-Pin MSOP Package
- Operating Temperature Range: –40°C to 85°C
- Low Power Dissipation: 20mW Per Amplifier on Single 5V

APPLICATIONS

- Video Line Driver
- Automotive Displays
- RGB Amplifiers
- Coaxial Cable Drivers
- Low Voltage High Speed Signal Processing

DESCRIPTION

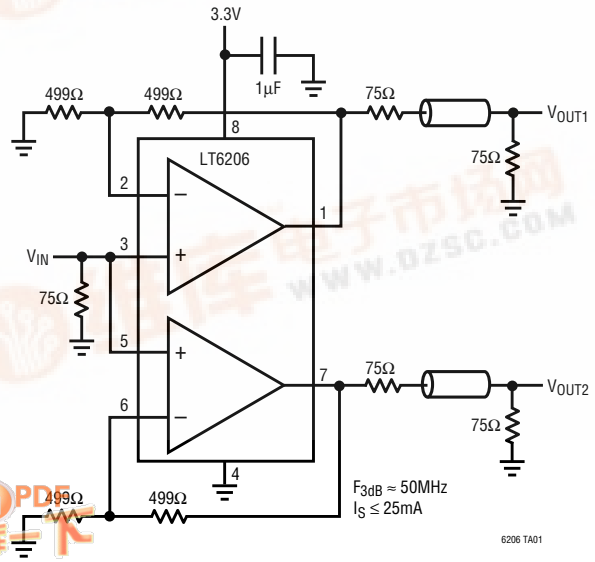
The LT®6206 is a low cost dual voltage feedback amplifier that features a 100MHz gain-bandwidth product, a 400V/µs slew rate and a 50mA output current. The LT6206 has an input range which includes ground and an output which swings within 60mV of either supply rail, making it well suited for single supply operation.

The LT6206 maintains its performance for supplies from 2.7V to 12.6V and is specified at 3V, 5V and ±5V. The inputs can be driven beyond the supplies without damage or phase reversal of the output. Isolation between channels is high, over 90dB at 10MHz.

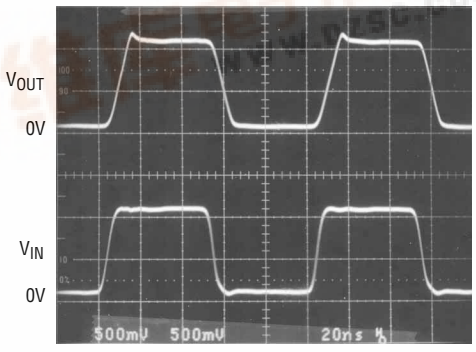
The LT6206 is available in an 8-lead MSOP package with the standard op amp pinout. The device is specified over the commercial and industrial temperature range.

TYPICAL APPLICATION

Baseband Video Splitter/Cable Driver



Output Step Response



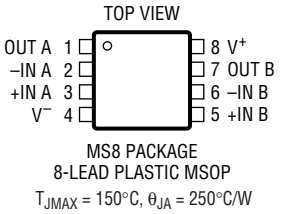
VS = 3.3V
VIN = 0.1V TO 1.1V
f = 10MHz
20ns/DIV

ABSOLUTE MAXIMUM RATINGS

(Note 1)

Total Supply Voltage (V^+ to V^-) 12.6V
Input Current ..... ±10mA
Input Voltage Range (Note 2) ..... $\pm V_S$
Output Short-Circuit Duration (Note 3) ..... Indefinite
Pin Current When Exceeding Supplies (Note 9) 25mA
Operating Temperature Range .....–40°C to 85°C
Specified Temperature Range (Note 4) ....–40°C to 85°C
Storage Temperature Range .....–65°C to 150°C
Maximum Junction Temperature ..... 150°C
Lead Temperature (Soldering, 10 sec)..... 300°C

PACKAGE/ORDER INFORMATION



MS8 PACKAGE
8-LEAD PLASTIC MSOP
T_{JMAX} = 150°C, θ_{JA} = 250°C/W

ORDER PART NUMBER
LT6206CMS8 LT6206IMS8
MS8 PART MARKING
LTH3 LTH4

Consult LTC Marketing for parts specified with wider operating temperature ranges.

ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the specified temperature range, otherwise specifications are at T_A = 25°C. V_S = 3V,0V; V_S = 5V, 0V; V_{CM} = V_{OUT} = 1V, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{OS}	Input Offset Voltage		 ●		1	3.5 5	mV mV
	Input Offset Voltage Match (Channel-to-Channel) (Note 5)		 ●		1	3 4	mV mV
	Input Offset Voltage Drift (Note 6)		●		7	15	µV/°C
I_B	Input Bias Current		●		18	30	µA
I_{OS}	Input Offset Current		●		0.6	3	µA
	Input Noise Voltage	0.1Hz to 10Hz			2		μV_{P-P}
e_n	Input Noise Voltage Density	f = 10kHz			9		$nV/\sqrt{Hz}$
i_n	Input Noise Current Density	f = 10kHz			4		$pA/\sqrt{Hz}$
	Input Resistance	V_{IN} = 0V to V_{CC} – 2V			1		MΩ
	Input Capacitance				2		pF
CMRR	Common Mode Rejection Ratio	V_{CM} = 0 to V_{CC} – 2V	●	78	90		dB
	Input Voltage Range		●	0		V_{CC} – 2	V
PSRR	Power Supply Rejection Ratio	V_S = 3V to 12V V_{CM} = V_{OUT} = 0.5V	●	67	75		dB

ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the specified temperature range, otherwise specifications are at T_A = 25°C. V_S = 3V,0V; V_S = 5V, 0V; V_{CM} = V_{OUT} = 1V, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
	Minimum Supply Voltage		●			2.7	V
A_{VOL}	Large-Signal Voltage Gain	V_S = 5V, V_O = 0.5V to 4.5V, R_L = 1k	●	30	100		V/mV
		V_S = 5V, V_O = 1V to 3V, R_L = 150Ω	●	5	20		V/mV
		V_S = 3V, V_O = 0.5V to 2.5V, R_L = 1k	●	20	60		V/mV
V_{OL}	Output Voltage Swing Low (Note 7)	No Load, Input Overdrive = 30mV	●		10	25	mV
		I_{SINK} = 5mA	●		75	150	mV
		V_S = 5V, I_{SINK} = 25mA	●		300	500	mV
		V_S = 3V, I_{SINK} = 15mA	●		200	350	mV
V_{OH}	Output Voltage Swing High (Note 7)	No Load, Input Overdrive = 30mV	●		60	100	mV
		I_{SOURCE} = 5mA	●		140	250	mV
		V_S = 5V, I_{SOURCE} = 25mA	●		650	1200	mV
		V_S = 3V, I_{SOURCE} = 15mA	●		300	500	mV
I_{SC}	Short-Circuit Current	V_S = 5V, Output Shorted to GND		35	50		mA
			●	25			mA
		V_S = 3V, Output Shorted to GND		30	40		mA
			●	20			mA
I_S	Supply Current per Amplifier				4	5	mA
			●			5.75	mA
GBW	Gain Bandwidth Product	f = 2MHz	●	65	100		MHz
SR	Slew Rate	V_S = 5V, A_V = 2, R_F = R_G = 1k V_O = 1V to 4V, Measure from 1.5V to 3.5V			400		V/µs
	Channel Separation	f = 10MHz			90		dB
FPBW	Full Power Bandwidth	V_{OUT} = $2V_{P-P}$ (Note 8)			64		MHz
t_S	Settling time to 3%	V_S = 5V, ΔV_{OUT} = 2V, A_V = –1, R_L = 150Ω			20		ns
	Differential Gain	V_S = 5V, A_V = 2, R_L = 150Ω, Black Level =1V			0.05		%
	Differential Phase	V_S = 5V, A_V = 2, R_L = 150Ω, Black Level =1V			0.08		Deg

The ● denotes specifications which apply over the specified temperature range, otherwise specifications are at T_A = 25°C. V_S = ±5V; V_{CM} = V_{OUT} = 0V, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
V_{OS}	Input Offset Voltage				1.3	4.5	mV
			●			6	mV
	Input Offset Voltage Match				1	3	mV
	(Channel-to-Channel) (Note 5)		●			4	mV
	Input Offset Voltage Drift (Note 6)		●		10	18	µV/°C
I_B	Input Bias Current		●		18	30	µA
I_{OS}	Input Offset Current		●		0.6	3	µA
	Input Noise Voltage	0.1Hz to 10Hz			2		μV_{P-P}
e_n	Input Noise Voltage Density	f = 10kHz			9		$nV/\sqrt{Hz}$
i_n	Input Noise Current Density	f = 10kHz			4		$pA/\sqrt{Hz}$
	Input Resistance	V_{IN} = –5V to 3V	●		1		MΩ
	Input Capacitance				2		pF

ELECTRICAL CHARACTERISTICS

The ● denotes specifications which apply over the specified temperature range, otherwise specifications are at T_A = 25°C. V_S = ±5V; V_{CM} = V_{OUT} = 0V, unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
CMRR	Common Mode Rejection Ratio	V_{CM} = –5V to 3V	●	78	90		dB
	Input Voltage Range		●	–5		3	V
PSRR	Power Supply Rejection Ratio	V_S = ±2V to ±6V	●	67	75		dB
A_{VOL}	Large-Signal Voltage Gain	V_O = –4V to 4V, R_L = 1k	●	50	133		V/mV
		V_O = –3V to 3V, R_L = 150Ω	●	7.5	20		V/mV
	Output Voltage Swing	No Load, Input Overdrive = 30mV I_{OUT} = ±5mA I_{OUT} = ±25mA	● ● ●	±4.88 ±4.75 ±3.8	±4.92 ±4.85 ±4.35		mV mV mV
I_{SC}	Short-Circuit Current	Short to Ground	 ●	±40 ±30	±60		mA mA
I_S	Supply Current per Amplifier		 ●		4.5	5.6 6.5	mA mA
GBW	Gain Bandwidth Product	f = 2MHz	●	65	100		MHz
SR	Slew Rate	A_V = –1, R_L = 1k V_O = –4V to 4V, Measure from –3V to 3V		350	550		V/µs
	Channel Separation	f = 10MHz			90		dB
FPBW	Full Power Bandwidth	V_{OUT} = $8V_{P-P}$ (Note 8)		14	22		MHz
t_S	Settling Time to 3%	ΔV_{OUT} = 2V, A_V = –1, R_L = 150Ω			20		ns
	Differential Gain Differential Phase	A_V = 2, R_L = 150Ω, Black Level = 1V A_V = 2, R_L = 150Ω, Black Level = 1V			0.05 0.1		% Deg

Note 1: Absolute Maximum ratings are those values beyond which the life of a device may be impaired.

Note 2: The inputs are protected by back-to-back diodes. If the differential input voltage exceeds 1.4V, the input current should be limited to less than 10mA.

Note 3: A heat sink may be required to keep the junction temperature below absolute maximum. This depends on the power supply voltage and how many amplifiers are shorted.

Note 4: The LT6206C is guaranteed to meet specified performance from 0°C to 70°C and is designed, characterized and expected to meet specified performance from –40°C to 85°C but is not tested or QA sampled at these temperatures. The LT6206I is guaranteed to meet specified performance from –40°C to 85°C.

Note 5: Matching parameters are the difference between the two amplifiers of the LT6206.

Note 6: This parameter is not 100% tested.

Note 7: Output voltage swings are measured between the output and power supply rails.

Note 8: Full power bandwidth is calculated from the slew rate measurement: $FPBW = SR/2\pi V_{PEAK}$.

Note 9: There are reverse biased ESD diodes on all inputs and outputs. If these pins are forced beyond either supply, unlimited current will flow through these diodes. If the current is transient in nature and limited to less than 25mA, no damage to the device will occur.

RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1253/LT1254	Low Cost Dual and Quad Video Amplifiers	–3dB Bandwidth = 90MHz, Current Feedback
LT1395/LT1396/LT1397	Single Dual Quad 400MHz Current Feedback Amplifiers	0.1dB Flatness to 100MHz, 80mA Output Drive
LT1675	RGB Multiplexer with Current Feedback Amplifiers	–3dB Bandwidth = 250MHz, 100MHz Pixel Switching
LT1809/LT1810	Single/Dual, 180MHz, Rail-to-Rail Input and Output Amplifiers	350V/µs Slew Rate, Shutdown, Low Distortion –90dBc at 5MHz
LT6550/LT6551	3.3V Triple and Quad Video Amplifiers	Internal Gain of 2, 110MHz –3dB Bandwidth, Input Common Modes to Ground

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