1.3GHz Low Noise, Low Distortion Differential ADC Driver for 140MHz IF

FEATURES

- 1.3GHz –3dB Bandwidth
- Fixed Gain of 10V/V (20dB)
- 40.8dBm OIP3 at 140MHz
- 0.91nV/√Hz Internal Op Amp Noise
- 2.1nV/√Hz Total Input Noise
- 6.1dB Noise Figure
- Differential Inputs and Outputs
- 200Ω Input Impedance
- 2.85V ~ 3.5V Supply Voltage
- 50mA Supply Current (150mW)
- 1V to 1.6V Output Common Mode Voltage, Adjustable
- DC- or AC-Coupled Operation
- Max Differential Output Swing 4.4V_{P-P}
- Small 16-Lead 3mm × 3mm × 0.75mm QFN Package

APPLICATIONS

- Differential ADC Driver
- Differential Driver/Receiver
- Single Ended to Differential Conversion
- IF Sampling Receivers
- SAW Filter Interfacing

DESCRIPTION

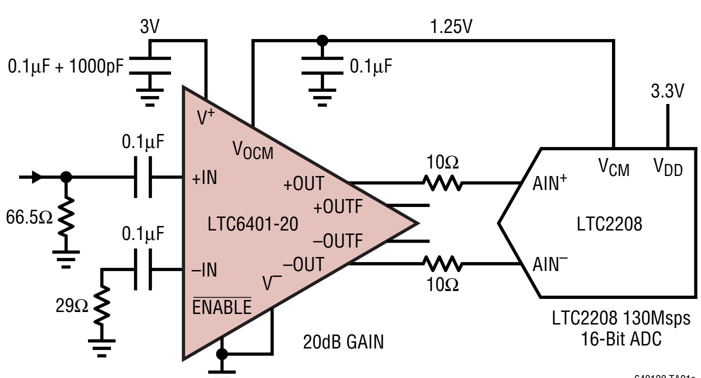
The LTC®6401-20 is a high-speed differential amplifier targeted at processing signals from DC to 140MHz. The part has been specifically designed to drive 12-, 14- and 16-bit ADCs with low noise and low distortion, but can also be used as a general-purpose broadband gain block.

The LTC6401-20 is easy to use, with minimal support circuitry required. The output common mode voltage is set using an external pin, independent of the inputs, which eliminates the need for transformers or AC-coupling capacitors in many applications. The gain is internally fixed at 20dB (10V/V).

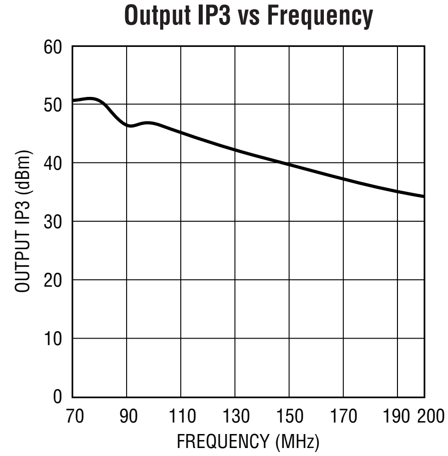
The LTC6401-20 saves space and power compared to alternative solutions using IF gain blocks and transformers. The LTC6401-20 is packaged in a compact 16-lead 3mm × 3mm QFN package and operates over the –40°C to 85°C temperature range.

TYPICAL APPLICATION

Single-Ended to Differential ADC Driver



Output IP3 vs Frequency



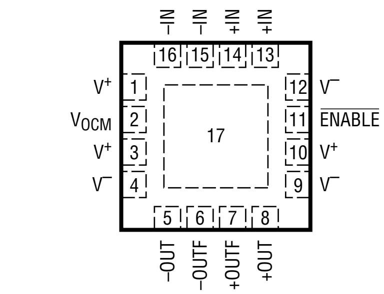
ABSOLUTE MAXIMUM RATINGS

(Note 1)

Supply Voltage (V_{CC} – V_{EE}) 3.6V
Input Current (INP, INM) ....±10mA
Output Short-Circuit Duration (Note 2) .... Indefinite
Operating Temperature Range
(Note 3) .... –40°C to 85°C
Specified Temperature Range
(Note 4) .... –40°C to 85°C
Storage Temperature Range.................. –65°C to 125°C
Maximum Junction Temperature .... 125°C
Lead Temperature (Soldering, 10 sec) .... 300°C

PIN CONFIGURATION

TOP VIEW



UD PACKAGE
16-LEAD (3mm × 3mm) PLASTIC QFN
T_{JMAX} = 125°C, θ_{JA} = 68°C/W, θ_{JC} = 4.2°C/W
EXPOSED PAD (PIN 17) IS V–, MUST BE SOLDERED TO PCB

ORDER INFORMATION

LEAD FREE FINISH	TAPE AND REEL	PART MARKING*	PACKAGE DESCRIPTION	TEMPERATURE RANGE
LTC6401CUD-20#PBF	LTC6401CUD-20#TRPBF	LCDB	16-Lead (3mm × 3mm) Plastic QFN	0°C to 70°C
LTC6401IUD-20#PBF	LTC6401IUD-20#TRPBF	LCDB	16-Lead (3mm × 3mm) Plastic QFN	–40°C to 85°C

Consult LTC Marketing for parts specified with wider operating temperature ranges. *The temperature grade is identified by a label on the shipping container.
Consult LTC Marketing for information on non-standard lead based finish parts.

For more information on lead free part marking, go to: http://www.linear.com/leadfree/
For more information on tape and reel specifications, go to: http://www.linear.com/tapeandreel/

LTC6400 AND LTC6401 SELECTOR GUIDE

Please check each datasheet for complete details.

PART NUMBER	GAIN (dB)	GAIN (V/V)	Z_{IN} (DIFFERENTIAL) (Ω)	I_{CC} (mA)
LTC6401-8	8	2.5	400	45
LTC6401-14	14	5	200	45
LTC6401-20	20	10	200	50
LTC6401-26	26	20	50	45
LTC6400-8	8	2.5	400	80
LTC6400-14	14	5	200	80
LTC6400-20	20	10	200	90
LTC6400-26	26	20	50	80

In addition to the LTC6401 family of amplifiers, a lower distortion LTC6400 family is available. The LTC6400 shows higher linearity especially at input frequency above 140MHz at the expense of higher supply current. Please refer to the separate LTC6400 data sheets for complete details.

LINEAR TECHNOLOGY

DC ELECTRICAL CHARACTERISTICS

The ● denotes the specifications which apply over the full operating temperature range, otherwise specifications are at T_A = 25°C. V^+ = 3V, V^- = 0V, +IN = –IN = V_{OCM} = 1.25V, $\overline{ENABLE}$ = 0V, No R_L unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Input/Output Characteristic							
G_{DIFF}	Gain	V_{IN} = ±100mV Differential	●	19.4	20	20.6	dB
G_{TEMP}	Gain Temperature Drift	V_{IN} = ±100mV Differential	●		1		mdB/°C
$V_{SWINGMIN}$	Output Swing Low	Each Output, V_{IN} = ±600mV Differential	●		90	170	mV
$V_{SWINGMAX}$	Output Swing High	Each Output, V_{IN} = ±600mV Differential	●	2.3	2.44		V
$V_{OUTDIFFMAX}$	Maximum Differential Output Swing	1dB Compressed			4.4		V_{P-P}
I_{OUT}	Output Current Drive	Single-Ended	●	10			mA
V_{OSDIFF}	Input Differential Offset Voltage		●	–2		2	mV
TCV_{OSDIFF}	Input Differential Offset Voltage Drift	T_{MIN} to T_{MAX}	●		1.4		µV/°C
I_{VRMIN}	Input Common Mode Voltage Range, MIN					1	V
I_{VRMAX}	Input Common Mode Voltage Range, MAX			1.6			V
R_{INDIFF}	Input Resistance	Differential	●	170	200	230	Ω
C_{INDIFF}	Input Capacitance	Differential, Includes Parasitic			1		pF
$R_{OUTDIFF}$	Output Resistance	Differential	●	18	25	32	Ω
$C_{OUTDIFF}$	Output Capacitance	Differential, Includes Parasitic			1		pF
$R_{OUTFDIFF}$	Filtered Output Resistance	Differential	●	85	100	115	Ω
$C_{OUTFDIFF}$	Filtered Output Capacitance	Differential, Includes Parasitic			2.7		pF
CMRR	Common Mode Rejection Ratio	Input Common Mode Voltage 1.1V~1.4V	●	45	66		dB
Output Common Mode Voltage Control							
G_{CM}	Common Mode Gain	V_{OCM} = 1V to 1.6V			1		V/V
V_{OCMMIN}	Output Common Mode Range, MIN		 ●			1 1.1	V V
V_{OCMMAX}	Output Common Mode Range, MAX		 ●	1.6 1.5			V V
V_{OSCM}	Common Mode Offset Voltage	V_{OCM} = 1.1V to 1.5V	●	–15		15	mV
TCV_{OSCM}	Common Mode Offset Voltage Drift	T_{MIN} to T_{MAX}	●		6		µV/°C
IV_{OCM}	V_{OCM} Input Current		●		5	15	µA
$\overline{ENABLE}$ Pin							
V_{IL}	$\overline{ENABLE}$ Input Low Voltage		●			0.8	V
V_{IH}	$\overline{ENABLE}$ Input High Voltage		●	2.4			V
I_{IL}	$\overline{ENABLE}$ Input Low Current	$\overline{ENABLE}$ = 0.8V	●			0.5	µA
I_{IH}	$\overline{ENABLE}$ Input High Current	$\overline{ENABLE}$ = 2.4V	●		1.2	3	µA
Power Supply							
V_S	Operating Supply Range		●	2.85	3	3.5	V
I_S	Supply Current	$\overline{ENABLE}$ = 0.8V	●	38	50	62	mA
I_{SHDN}	Shutdown Supply Current	$\overline{ENABLE}$ = 2.4V	●		1	3	mA
PSRR	Power Rejection Ratio (Differential Outputs)	2.85V to 3.5V	●	58	84		dB

AC ELECTRICAL CHARACTERISTICS

Specifications are at T_A = 25°C. V^+ = 3V, V^- = 0V, +IN and –IN floating, V_{OCM} = 1.25V, $\overline{ENABLE}$ = 0V, No R_L unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
–3dBBW	–3dB Bandwidth	200mV$_{P-P,OUT}$ (Note 7) 200mV$_{P-P,OUT}$ (Note 5)		1.25 1.08		GHz GHz
0.1dBBW	Bandwidth for 0.1dB Flatness	200mV$_{P-P,OUT}$ (Note 7)		0.13		GHz
0.5dBBW	Bandwidth for 0.5dB Flatness	200mV$_{P-P,OUT}$ (Note 7)		0.25		GHz
1/f	1/f Noise Corner			20		kHz
SR	Slew Rate	Differential		4.5		kV/µs
$t_{S1\%}$	1% Settling Time	2V$_{P-P,OUT}$ (Note 7)		2		ns
t_{OVDR}	Overdrive Recovery Time	1.9V$_{P-P,OUT}$ (Note 7)		7		ns
t_{ON}	Turn-On Time			220		ns
t_{OFF}	Turn-Off Time			220		ns
–3dBBW$_{CM}$	Common Mode Small Signal –3dB BW	0.1V$_{P-P}$ at V$_{OCM}$, Measured Single-Ended at Output (Note 7)		15		MHz
BW$_{OUTCM}$	Output Common Mode Rejection BW			300		MHz
70MHz Input Signal						
HD$_{2,70M}$/HD$_{3,70M}$	Second/Third Order Harmonic Distortion	2V$_{P-P,OUT}$, R$_L$ = 400Ω (Note 6)		–91/–80		dBc
		2V$_{P-P,OUT}$, No R$_L$ (Note 6)		–88/–91		dBc
		2V$_{P-P,OUTFILT}$, No R$_L$ (Note 6)		–88/–92		dBc
IMD$_{3,70M}$	Third-Order Intermodulation (f1 = 69.5MHz f2 = 70.5MHz)	2V$_{P-P,OUT}$ Composite, R$_L$ = 400Ω (Note 6)		–93		dBc
		2V$_{P-P,OUT}$ Composite, No R$_L$ (Note 6)		–93		dBc
		2V$_{P-P,OUTFILT}$ Composite, No R$_L$ (Note 6)		–93		dBc
OIP$_{3,70M}$	Third-Order Output Intercept Point (f1 = 69.5MHz f2 = 70.5MHz)	2V$_{P-P,OUT}$ Composite, No R$_L$ (Notes 6, 8)		50.5		dBm
P$_{1dB,70M}$	1dB Compression Point	R$_L$ = 375Ω (Notes 5, 8)		17.3		dBm
NF$_{70M}$	Noise Figure	R$_L$ = 375Ω (Note 5)		6.1		dB
e$_{IN,70M}$	Input Referred Voltage Noise Density	R$_L$ = 375Ω (Note 5); Includes Resistors		2.1		nV/√Hz
e$_{ON,70M}$	Output Referred Voltage Noise Density	R$_L$ = 375Ω (Note 5)		21.5		nV/√Hz
140MHz Input Signal						
HD$_{2,140M}$/HD$_{3,140M}$	Second/Third Order Harmonic Distortion	2V$_{P-P,OUT}$, R$_L$ = 400Ω (Note 6)		–80/–57		dBc
		2V$_{P-P,OUT}$, No R$_L$ (Note 6)		–81/–60		dBc
		2V$_{P-P,OUTFILT}$, No R$_L$ (Note 6)		–80/–65		dBc
IMD$_{3,140M}$	Third-Order Intermodulation (f1 = 139.5MHz f2 = 140.5MHz)	2V$_{P-P,OUT}$ Composite, R$_L$ = 400Ω (Note 6)		–71		dBc
		2V$_{P-P,OUT}$ Composite, No R$_L$ (Note 6)		–74		dBc
		2V$_{P-P,OUTFILT}$ Composite, No R$_L$ (Note 6)		–72		dBc
OIP$_{3,140M}$	Third-Order Output Intercept Point (f1 = 139.5MHz f2 = 140.5MHz)	2V$_{P-P,OUT}$ Composite, No R$_L$ (Notes 6, 8)		40.8		dBm
P$_{1dB,140M}$	1dB Compression Point	R$_L$ = 375Ω (Notes 5, 8)		18		dBm
NF$_{140M}$	Noise Figure	R$_L$ = 375Ω (Note 5)		6.4		dB
e$_{IN,140M}$	Input Referred Voltage Noise Density	R$_L$ = 375Ω (Note 5); Includes Resistors		2.1		nV/√Hz
e$_{ON,140M}$	Output Referred Voltage Noise Density	R$_L$ = 375Ω (Note 5)		22		nV/√Hz
IMD$_{3,130M/150M}$	Third-Order Intermodulation (f1 = 130MHz f2 = 150MHz) Measure at 170MHz	2V$_{P-P,OUT}$ Composite, R$_L$ = 375Ω (Note 6)	–65	–69		dBc

AC ELECTRICAL CHARACTERISTICS

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: As long as output current is below 10mA and junction temperature is below the Absolute Maximum Ratings, no damage to the part will occur.

Note 3: The LTC6401C and LTC6401I are guaranteed functional over the operating temperature range of –40°C to 85°C.

Note 4: The LTC6401C is guaranteed to meet specified performance from 0°C to 70°C. It 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 LTC6401I is guaranteed to meet specified performance from –40°C to 85°C.

Note 5: Input balun 1:4, output balun 4:1, differential load resistance 375Ω.

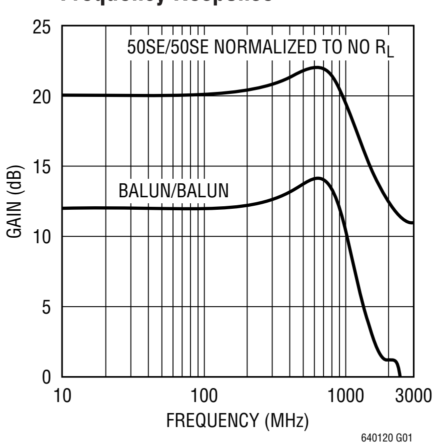
Note 6: Input balun 1:4.

Note 7: Each input AC couple to 50Ω, each output AC couple to 87.5Ω, input differential shunt resistor 200Ω.

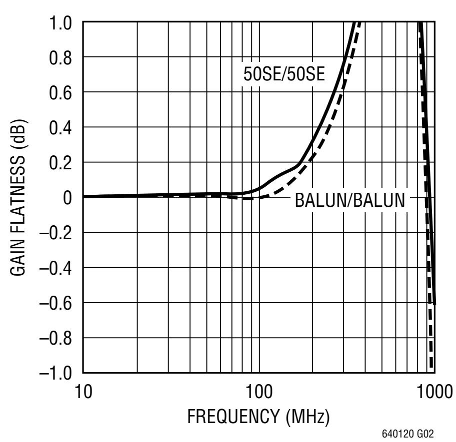
Note 8: Since the LTC6401-20 is a feedback amplifier with low output impedance, a resistive load is not required when driving an AD converter. Therefore, typical output power is very small. In order to compare the LTC6401-20 with amplifiers that require 50Ω output load, the LTC6401-20 output voltage swing driving a given R_L is converted to OIP_3 and P_{1dB} as if it were driving a 50Ω load. Using this modified convention, $2V_{P-P}$ is by definition equal to 10dBm, regardless of the actual R_L.

TYPICAL PERFORMANCE CHARACTERISTICS

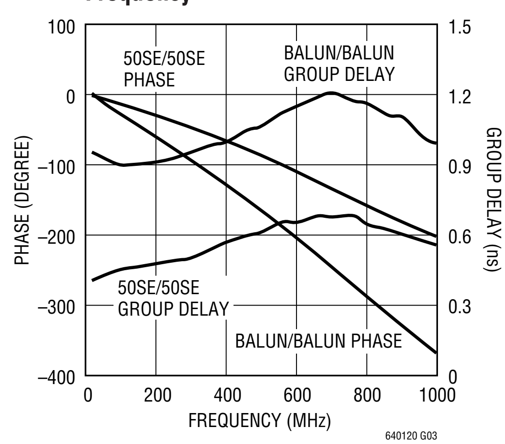
Frequency Response



Gain 0.1dB Flatness

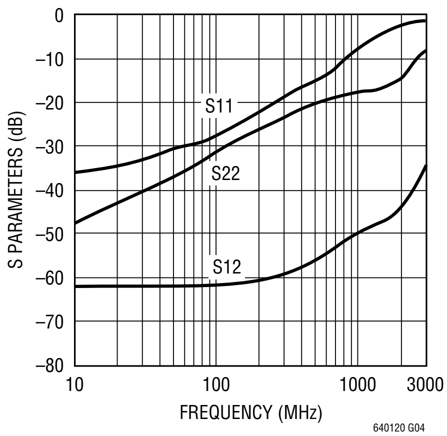


S21 Phase and Group Delay vs Frequency

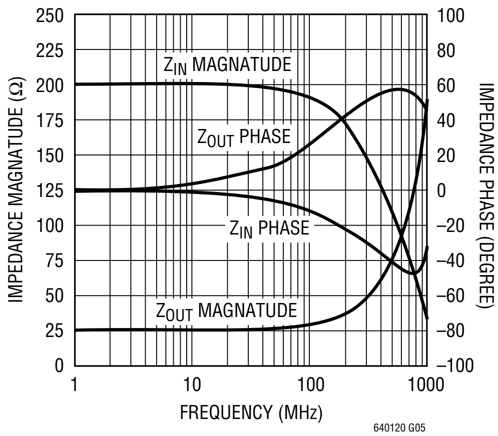


TYPICAL PERFORMANCE CHARACTERISTICS

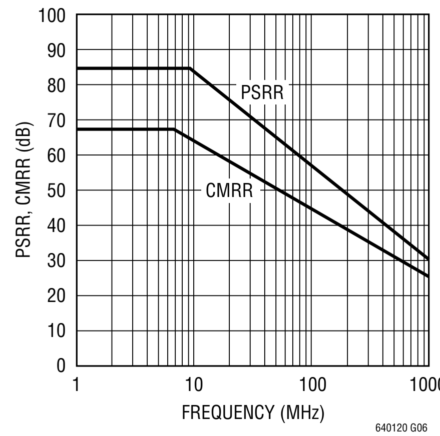
Input and Output Reflection and Reverse Isolation vs Frequency



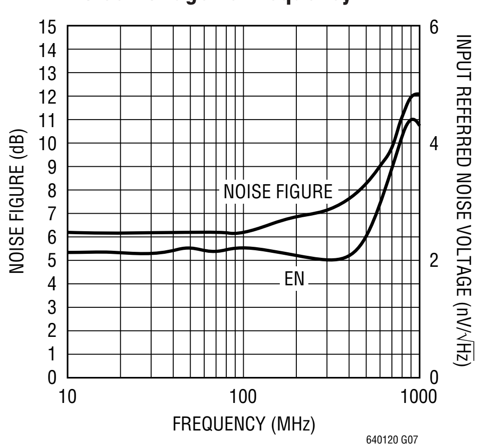
Input and Output Impedance vs Frequency



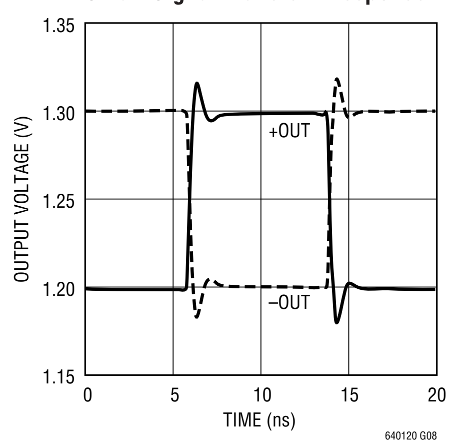
PSRR and CMRR vs Frequency



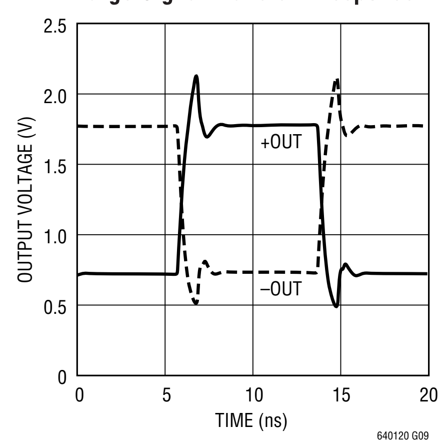
Noise Figure and Input Referred Noise Voltage vs Frequency



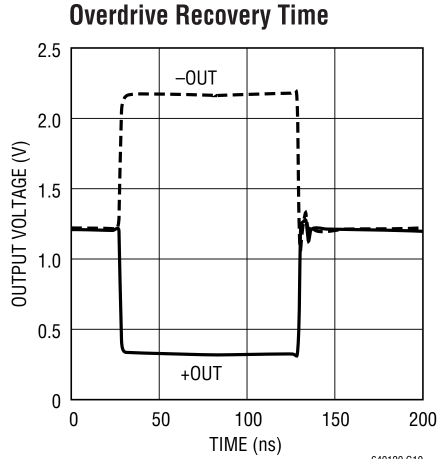
Small Signal Transient Response



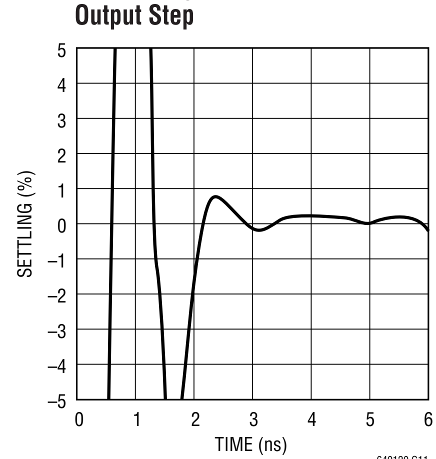
Large Signal Transient Response



Overdrive Recovery Time

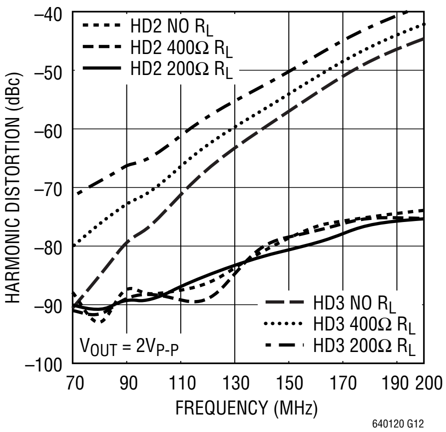


1% Settling Time for 2V Output Step

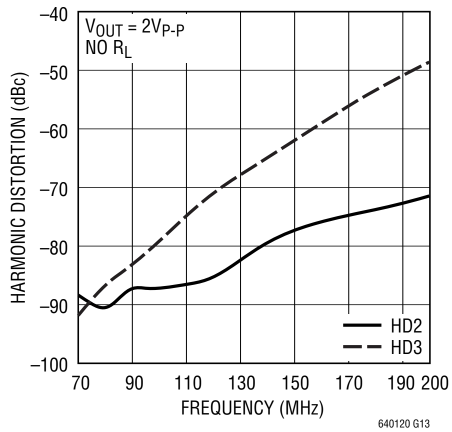


TYPICAL PERFORMANCE CHARACTERISTICS

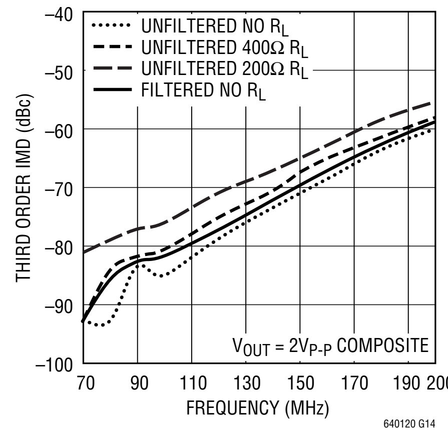
Harmonic Distortion (Unfiltered) vs Frequency Differential Input



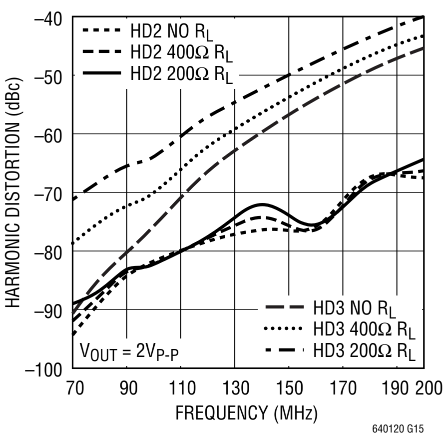
Harmonic Distortion (Filtered) vs Frequency Differential Input



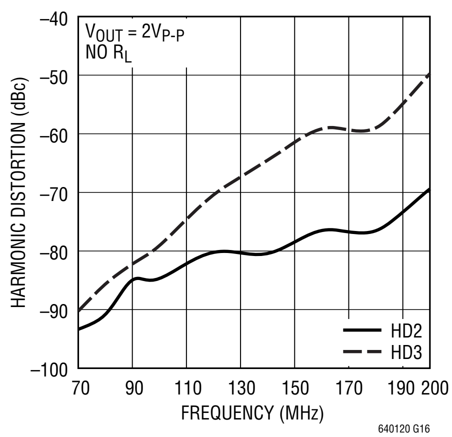
Third Order Intermodulation Distortion vs Frequency Differential Input



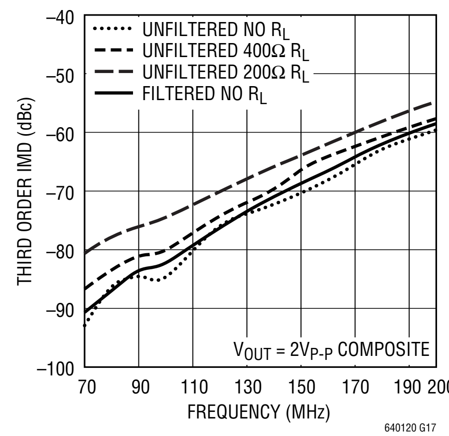
Harmonic Distortion (Unfiltered) vs Frequency Single-Ended Input



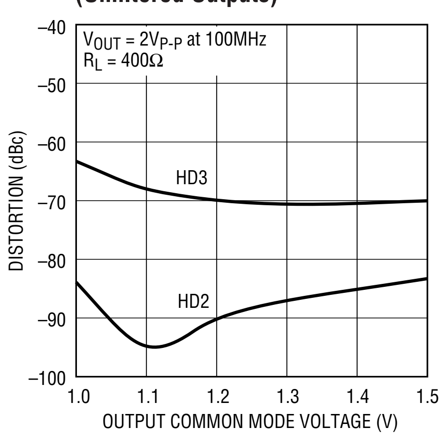
Harmonic Distortion (Filtered) vs Frequency Single-Ended Input



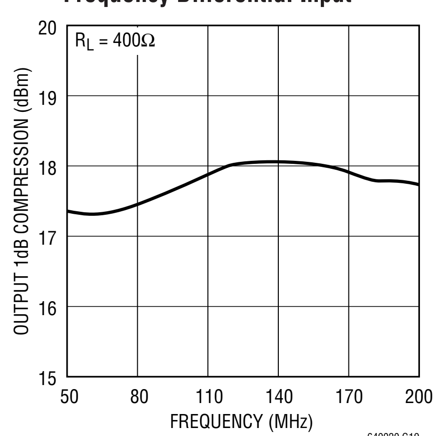
Third Order Intermodulation Distortion vs Frequency Single-Ended Input



Harmonic Distortion vs Output Common Mode Voltage (Unfiltered Outputs)

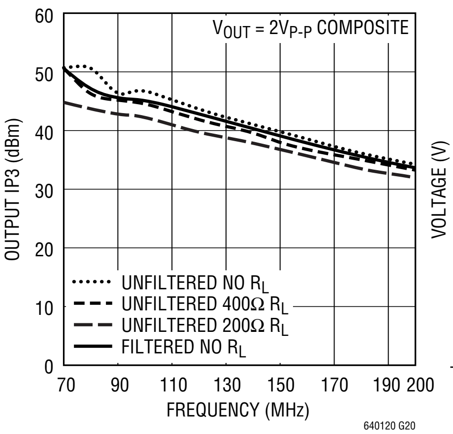


Output 1dB Compression Point vs Frequency Differential Input

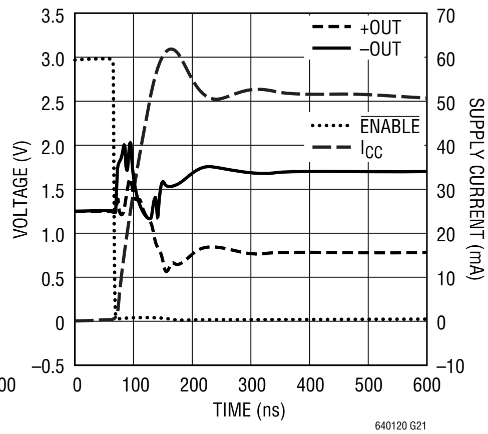


TYPICAL PERFORMANCE CHARACTERISTICS

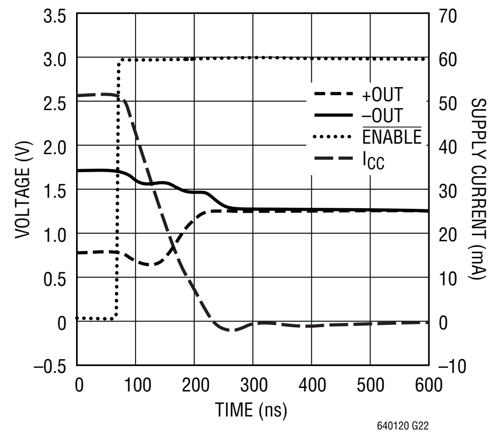
Output Third Order Intercept vs Frequency Differential Input



Turn-On Time



Turn-Off Time



PIN FUNCTIONS

V^+ (Pins 1, 3, 10): Positive Power Supply (Normally tied to 3V or 3.3V). All three pins must be tied to the same voltage. Bypass each pin with 1000pF and 0.1µF capacitors as close to the pins as possible.

V_{OCM} (Pin 2): This pin sets the output common mode voltage. A 0.1µF external bypass capacitor is recommended.

V^- (Pins 4, 9, 12, 17): Negative Power Supply (GND). All four pins must be connected to the same voltage/ground.

–OUT, +OUT (Pins 5, 8): Unfiltered Outputs. These pins have series resistors R_{OUT} 12.5Ω.

–OUTF, +OUTF (Pins 6, 7): Filtered Outputs. These pins have 50Ω series resistors and a 1.7pF shunt capacitor.

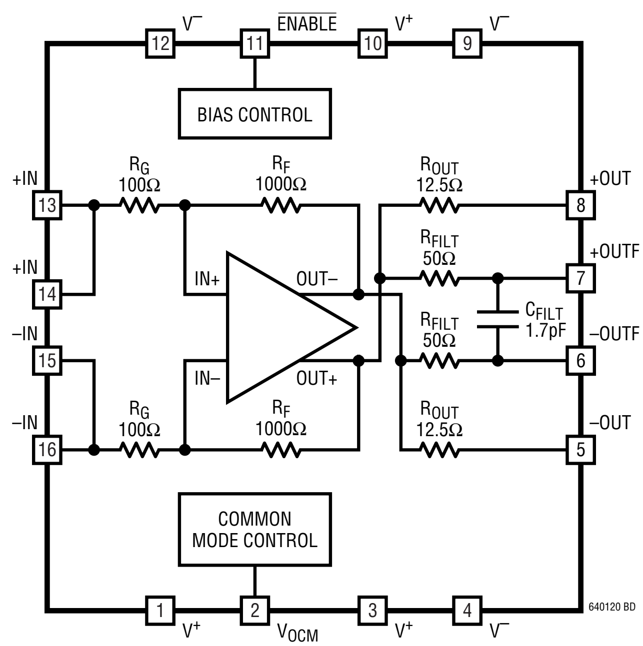
$\overline{\text{ENABLE}}$ (Pin 11): This pin is a logic input referenced to V^-. If low, the part is enabled. If high, the part is disabled and draws approximately 1mA supply current.

+IN (Pins 13, 14): Positive Input. Pins 13 and 14 are internally shorted together.

–IN (Pins 15, 16): Negative Input. Pins 15 and 16 are internally shorted together.

Exposed Pad (Pin 17): V^-. The Exposed Pad must be connected to the same voltage/ground as pins 4, 9, 12.

BLOCK DIAGRAM



APPLICATIONS INFORMATION

Circuit Operation

The LTC6401-20 is a low noise and low distortion fully differential op amp/ADC driver with:

- Operation from DC to 1.3GHz –3dB bandwidth impedance
- Fixed gain of 10V/V (20dB)
- Differential input impedance 200Ω
- Differential output impedance 25Ω
- Differential impedance of output filter 100Ω

The LTC6401-20 is composed of a fully differential amplifier with on chip feedback and output common mode voltage control circuitry. Differential gain and input impedance are set by 100Ω/1000Ω resistors in the feedback network. Small output resistors of 12.5Ω improve the circuit stability over various load conditions. They also provide a possible external filtering option, which is often desirable when the load is an ADC.

Filter resistors of 50Ω are available for additional filtering. Lowpass/bandpass filters are easily implemented with just a couple of external components. Moreover, they offer single-ended 50Ω matching in wideband applications and no external resistor is needed.

The LTC6401-20 is very flexible in terms of I/O coupling. It can be AC- or DC-coupled at the inputs, the outputs or both. Due to the internal connection between input and output, users are advised to keep input common mode voltage between 1V and 1.6V for proper operation. If the inputs are AC-coupled, the input common mode voltage is automatically biased close to V_{OCM} and thus no external circuitry is needed for bias. The LTC6401-20 provides an output common mode voltage set by V_{OCM}, which allows driving an ADC directly without external components such as a transformer or AC coupling capacitors. The input signal can be either single-ended or differential with only minor differences in distortion performance.

Input Impedance and Matching

The differential input impedance of the LTC6401-20 is 200Ω. If a 200Ω source impedance is unavailable, then the differential inputs may need to be terminated to a lower value impedance, e.g. 50Ω, in order to provide an impedance match to the source. Several choices are available. One approach is to use a differential shunt resistor (Figure 1). Another approach is to employ a wideband transformer (Figure 2). Both methods provide a wideband match. The termination resistor or the transformer must be placed close to the input pins in order to minimize the reflection due to input mismatch. Alternatively, one could apply a narrowband impedance match at the inputs of the LTC6401-20 for frequency selection and/or noise reduction.

Referring to Figure 3, LTC6401-20 can be easily configured for single-ended input and differential output without a balun. The signal is fed to one of the inputs through a matching network while the other input is connected to the same matching network and a source resistor. Because the return ratios of the two feedback paths are equal, the

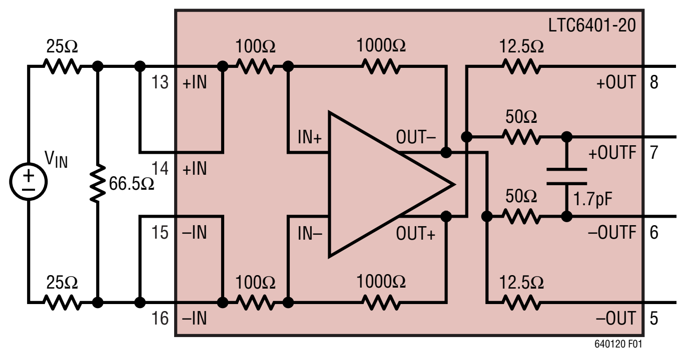


Figure 1. Input Termination for Differential 50Ω Input Impedance Using Shunt Resistor

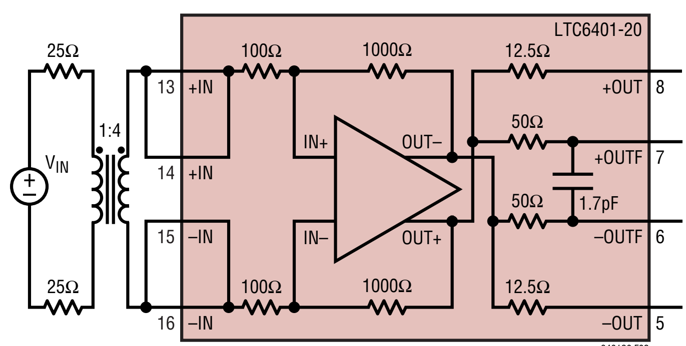


Figure 2. Input Termination for Differential 50Ω Input Impedance Using a 1:4 Balun

APPLICATIONS INFORMATION

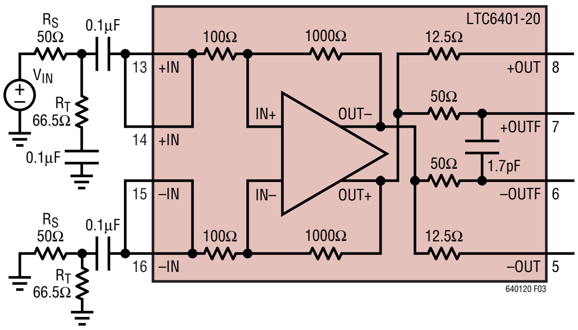


Figure 3. Input Termination for Single-Ended 50Ω Input Impedance

two outputs have the same gain and thus symmetrical swing. In general, the single-ended input impedance and termination resistor R_T are determined by the combination of R_S, R_G and R_F. For example, when R_S is 50Ω, it is found that the single-ended input impedance is 200Ω and R_T is 66.5Ω in order to match to a 50Ω source impedance.

The LTC6401-20 is unconditionally stable. However, the overall differential gain is affected by both source impedance and load impedance as shown in Figure 4:

$$A_V = \left|\frac{V_{OUT}}{V_{IN}}\right| = \frac{2000}{R_S + 200} \bullet \frac{R_L}{25 + R_L}$$

The noise performance of the LTC6401-20 also depends upon the source impedance and termination. For example, an input 1:4 balun transformer in Figure 2 improves SNR by adding 6dB of gain at the inputs. A trade-off between gain and noise is obvious when constant noise figure circle and constant gain circle are plotted within the same

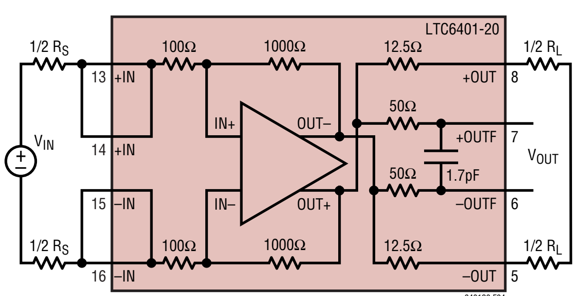


Figure 4. Calculate Differential Gain

input Smith Chart, based on which users can choose the optimal source impedance for a given gain and noise requirement.

Output Match and Filter

The LTC6401-20 can drive an ADC directly without external output impedance matching. Alternatively, the differential output impedance of 25Ω can be matched to higher value impedance, e.g. 50Ω, by series resistors or an LC network.

The internal low pass filter outputs at +OUTF/–OUTF have a –3dB bandwidth of 590MHz. External capacitor can reduce the low pass filter bandwidth as shown in Figure 5. A bandpass filter is easily implemented with only a few components as shown in Figure 6. Three 39pF capacitors and a 16nH inductor create a bandpass filter with 165MHz center frequency, –3dB frequencies at 138MHz and 200MHz.

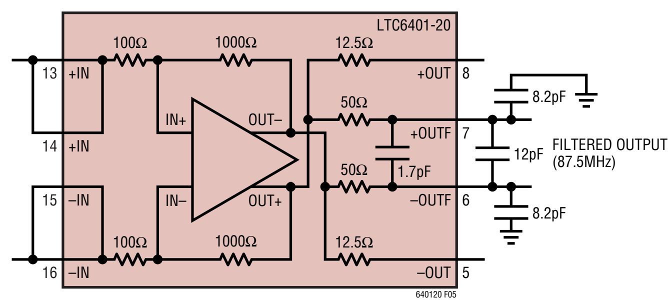


Figure 5. LTC6401-20 Internal Filter Topology Modified for Low Filter Bandwidth (Three External Capacitors)

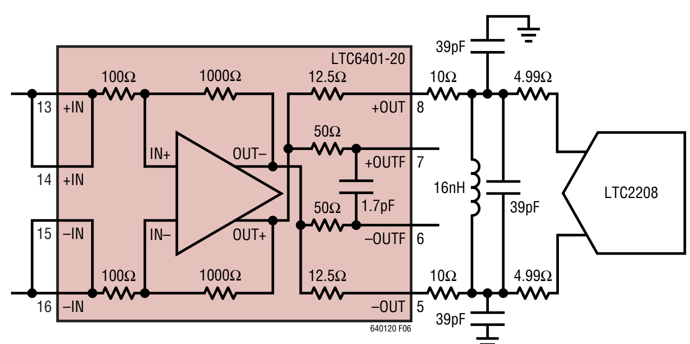


Figure 6. LTC6401-20 Internal Filter Topology Modified for Bandpass Filtering (Three External Capacitors, One External Inductor)

APPLICATIONS INFORMATION

Output Common Mode Adjustment

The LTC6401-20's output common mode voltage is set by the V_{OCM} pin, which is a high impedance input. The output common mode voltage is capable of tracking V_{OCM} in a range from 1V to 1.6V. Bandwidth of V_{OCM} control is typically 15MHz, which is dominated by a low pass filter connected to the V_{OCM} pin and is aimed to reduce common mode noise generation at the outputs. Indeed the internal common mode feedback loop has a –3dB bandwidth around 300MHz, allowing fast common mode rejection at the outputs of the LTC6401-20. The V_{OCM} pin should be tied to a DC bias voltage where a 0.1µF bypass capacitor is recommended. When interfacing with A/D converters such as the LT22xx families, the V_{OCM} can be normally connected to the V_{CM} pin of the ADC.

Driving A/D Converters

The LTC6401-20 has been specifically designed to interface directly with high speed A/D converters. In Figure 7, an example schematic shows the LTC6401-20 with a single-ended input driving the LTC2208, which is a 16-bit, 130Msps ADC. Two external 10Ω resistors help eliminate potential resonance associated with stray capacitance of PCB traces and bond wires of either the ADC input or the driver output. V_{OCM} of the LTC6401-20 is connected to V_{CM} of the LTC2208 V_{CM} pin at 1.25V. Alternatively, a single-ended input signal can be converted to differential signal via a balun and fed to the input of the LTC6401-20.

The balun also converts input impedance to match 50Ω source impedance.

Figure 8 summarizes the spurious free dynamic range (SFDR) of the whole system for single-ended input.

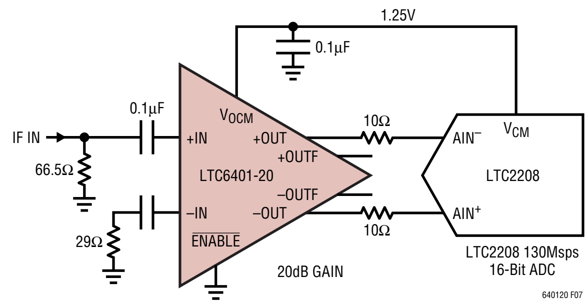


Figure 7. Single-Ended Input to LTC6401-20 and LTC2208

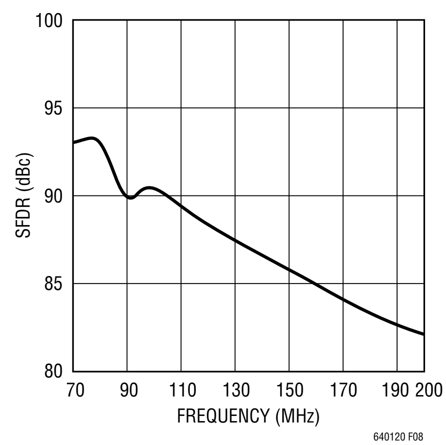
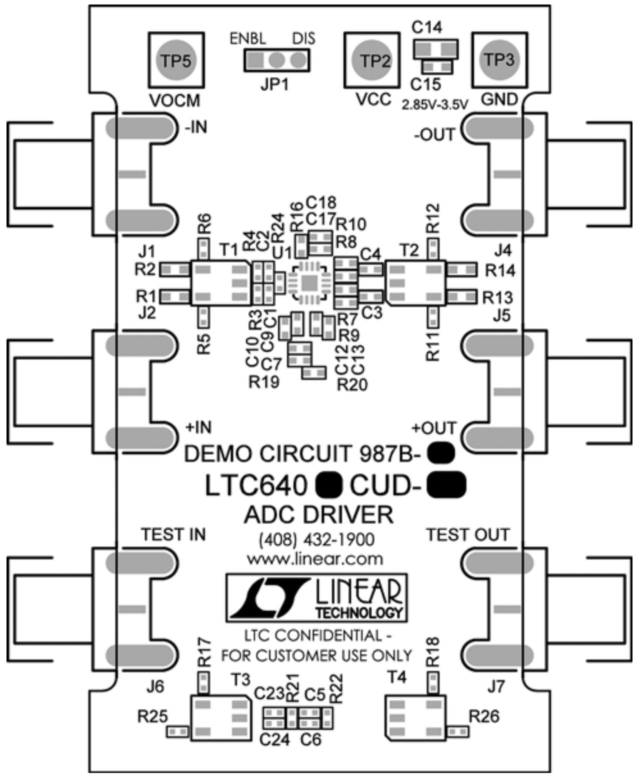


Figure 8. SFDR for the Combination of LTC6401-20 and LTC2208

APPLICATIONS INFORMATION

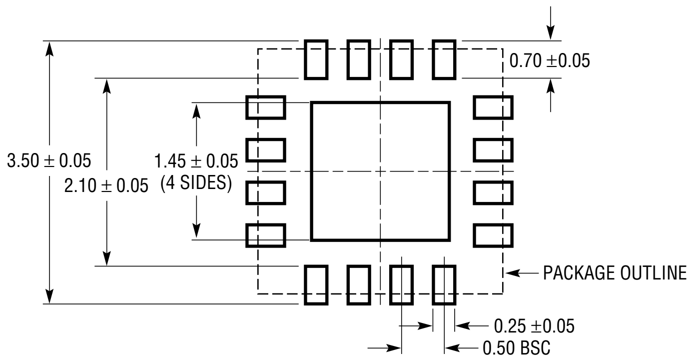
Top Silkscreen



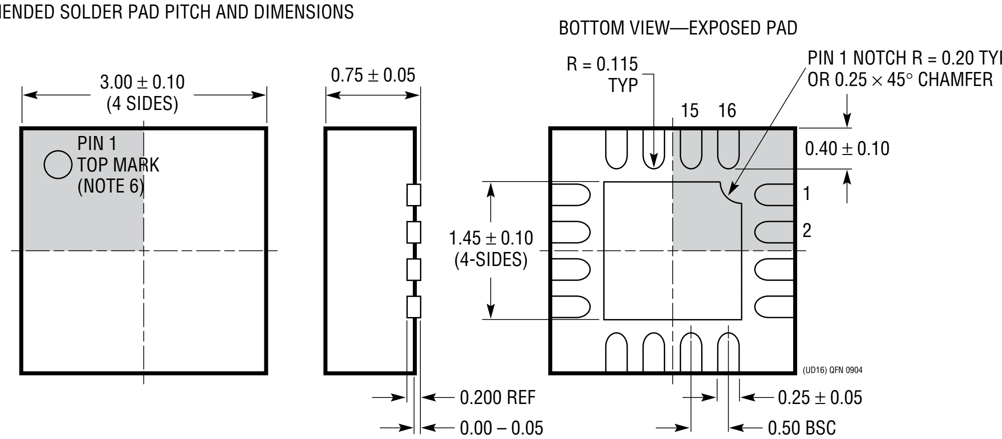
TYPICAL APPLICATIONS

PACKAGE DESCRIPTION

UD Package
16-Lead Plastic QFN (3mm × 3mm)
(Reference LTC DWG # 05-08-1691)



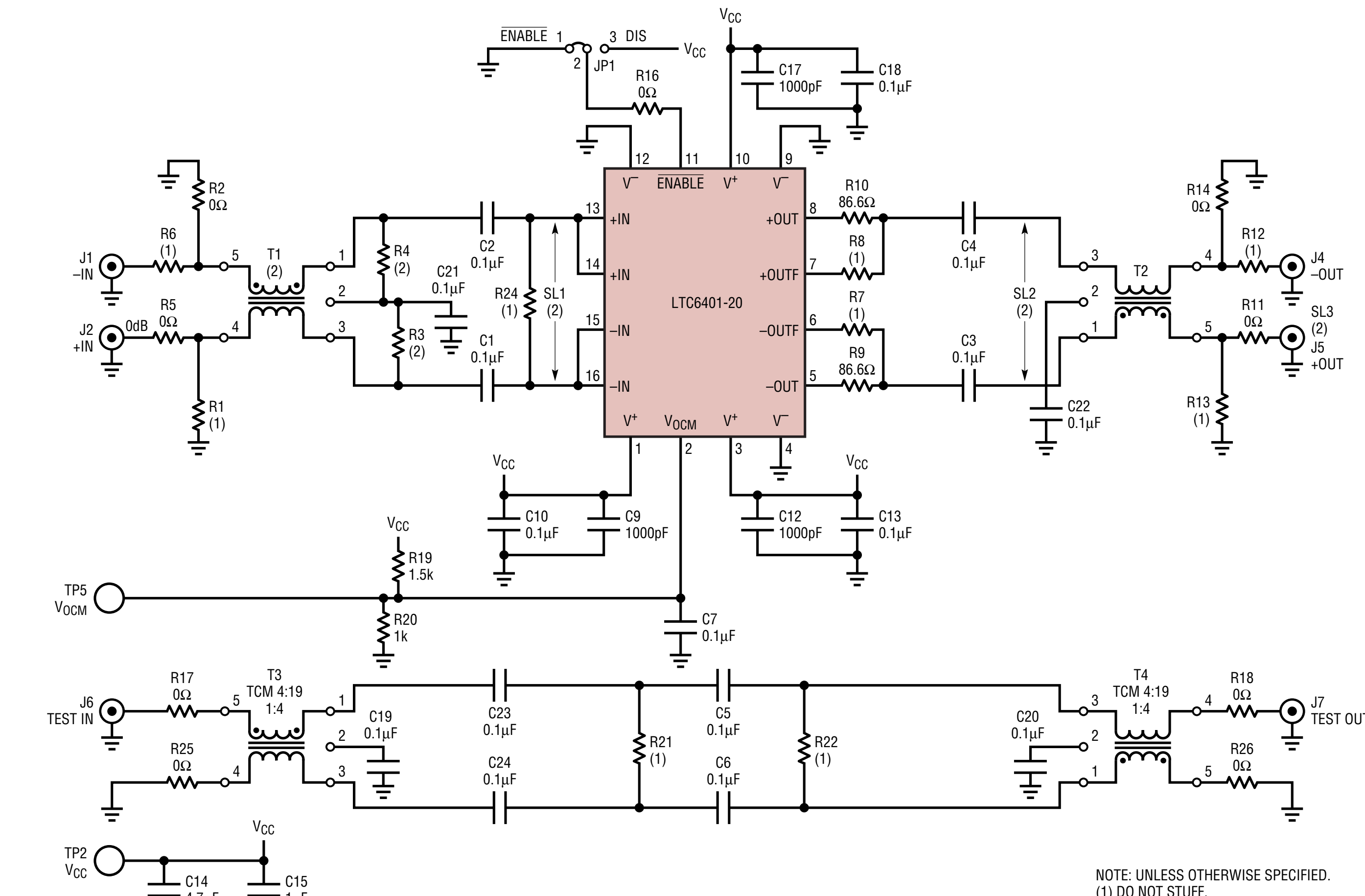
RECOMMENDED SOLDER PAD PITCH AND DIMENSIONS



NOTE:
1. DRAWING CONFORMS TO JEDEC PACKAGE OUTLINE MO-220 VARIATION (WEED-2)
2. DRAWING NOT TO SCALE
3. ALL DIMENSIONS ARE IN MILLIMETERS
4. DIMENSIONS OF EXPOSED PAD ON BOTTOM OF PACKAGE DO NOT INCLUDE MOLD FLASH. MOLD FLASH, IF PRESENT, SHALL NOT EXCEED 0.15mm ON ANY SIDE
5. EXPOSED PAD SHALL BE SOLDER PLATED
6. SHADED AREA IS ONLY A REFERENCE FOR PIN 1 LOCATION ON THE TOP AND BOTTOM OF PACKAGE

TYPICAL APPLICATION

Demo Circuit 987B Schematic (AC Test Circuit)



(2)

VERSION	IC	R3	R4	T1	SL1	SL2	SL3
-G	LTC6401CUD-20	OPEN	OPEN	MINI-CIRCUITS TCM4-19 (1:4)	6dB	20dB	14dB

SL = SIGNAL LEVEL

RELATED PARTS

PART NUMBER	DESCRIPTION	COMMENTS
LT1993-2/LT1993-4/ LT1993-10		
LT5514		
LT5524		
LTC6400-8/LTC6400-14/ LTC6400-20/LTC6400-26		
LTC6401-8/LTC6401-14/ LTC6401-26		
LT6402-6/LT6402-12/ LT6402-20		
LT6411		
LT6600-20		

640120p

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