

LTC1591/LTC1597

ABSOLUTE MAXIMUM RATINGS (Note 1)

V_{CC} to AGND	–0.5V to 7V
V_{CC} to DGND	–0.5V to 7V
AGND to DGND	$V_{CC} + 0.5V$
DGND to AGND	$V_{CC} + 0.5V$
REF, R_{OFS} , R_{FB} , R_1 , R_{COM} to AGND, DGND	$\pm 25V$
Digital Inputs to DGND	–0.5V to ($V_{CC} + 0.5V$)
I_{OUT1} to AGND	–0.5V to ($V_{CC} + 0.5V$)
Maximum Junction Temperature	125°C

Operating Temperature Range	
LTC1591C/LTC1591-1C	
LTC1597C/LTC1597-1C	0°C to 70°C
LTC1591I/LTC1591-1I	
LTC1597I/LTC1597-1I	–40°C to 85°C
Storage Temperature Range	–65°C to 150°C
Lead Temperature (Soldering, 10 sec)	300°C

PACKAGE/ORDER INFORMATION

TOP VIEW REF [1] CLR [28] R_{COM} [2] NC [27] R_1 [3] NC [26] R_{OFS} [4] D0 [25] R_{FB} [5] D1 [24] I_{OUT1} [6] V_{CC} [23] AGND [7] DGND [22] LD [8] D2 [21] WR [9] D3 [20] D13 [10] D4 [19] D12 [11] D5 [18] D11 [12] D6 [17] D10 [13] D7 [16] D9 [14] D8 [15] G PACKAGE N PACKAGE 28-LEAD PLASTIC SSOP 28-LEAD NARROW PDIP $T_{JMAX} = 125^{\circ}C$, $\theta_{JA} = 95^{\circ}C/W$ (G) $T_{JMAX} = 125^{\circ}C$, $\theta_{JA} = 70^{\circ}C/W$ (N)	ORDER PART NUMBER LTC1591CG LTC1591CN LTC1591IG LTC1591IN LTC1591-1CG LTC1591-1CN LTC1591-1IG LTC1591-1IN	TOP VIEW REF [1] CLR [28] R_{COM} [2] D0 [27] R_1 [3] D1 [26] R_{OFS} [4] D2 [25] R_{FB} [5] D3 [24] I_{OUT1} [6] V_{CC} [23] AGND [7] DGND [22] LD [8] D4 [21] WR [9] D5 [20] D15 [10] D6 [19] D14 [11] D7 [18] D13 [12] D8 [17] D12 [13] D9 [16] D11 [14] D10 [15] G PACKAGE N PACKAGE 28-LEAD PLASTIC SSOP 28-LEAD NARROW PDIP $T_{JMAX} = 125^{\circ}C$, $\theta_{JA} = 95^{\circ}C/W$ (G) $T_{JMAX} = 125^{\circ}C$, $\theta_{JA} = 70^{\circ}C/W$ (N)	ORDER PART NUMBER LTC1597ACG LTC1597ACN LTC1597BCG LTC1597BCN LTC1597-1ACG LTC1597-1ACN LTC1597-1BCG LTC1597-1BCN LTC1597AIG LTC1597AIN LTC1597BIG LTC1597BIN LTC1597-1AIG LTC1597-1AIN LTC1597-1BIG LTC1597-1BIN
Order Options Tape and Reel: Add #TR Lead Free: Add #PBF Lead Free Tape and Reel: Add #TRPBF Lead Free Part Marking: http://www.linear.com/leadfree/			

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

ELECTRICAL CHARACTERISTICS

$V_{CC} = 5V \pm 10\%$, $V_{REF} = 10V$, $I_{OUT1} = AGND = DGND = 0V$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		LTC1591/-1 MIN TYP MAX	LTC1597B/-1B MIN TYP MAX	LTC1597A/-1A MIN TYP MAX	UNITS
Accuracy							
	Resolution		●	14	16	16	Bits
	Monotonicity		●	14	16	16	Bits
INL	Integral Nonlinearity	(Note 2) T _A = 25°C T _{MIN} to T _{MAX}	●	±1 ±1	±2 ±2	±0.25 ±1 ±0.35 ±1	LSB LSB
DNL	Differential Nonlinearity	T _A = 25°C T _{MIN} to T _{MAX}	●	±1 ±1	±1 ±1	±0.2 ±1 ±0.2 ±1	LSB LSB
GE	Gain Error	Unipolar Mode (Note 3) T _A = 25°C T _{MIN} to T _{MAX}	●	±4 ±6	±16 ±24	2 ±16 3 ±16	LSB LSB
		Bipolar Mode (Note 3) T _A = 25°C T _{MIN} to T _{MAX}	●	±4 ±6	±16 ±24	2 ±16 3 ±16	LSB LSB
	Gain Temperature Coefficient	(Note 4) ΔGain/ΔTemperature	●	1 2	1 2	1 2	ppm/°C
	Bipolar Zero-Scale Error	T _A = 25°C T _{MIN} to T _{MAX}	●	±3 ±5	±10 ±16	±5 ±8	LSB LSB
I _{LKG}	OUT1 Leakage Current	(Note 5) T _A = 25°C T _{MIN} to T _{MAX}	●	±5 ±15	±5 ±15	±5 ±15	nA nA
PSRR	Power Supply Rejection Ratio	V _{CC} = 5V ±10	●	±0.1 ±1	±0.4 ±2	±0.4 ±2	LSB/V

$V_{CC} = 5V \pm 10\%$, $V_{REF} = 10V$, $I_{OUT1} = AGND = DGND = 0V$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Reference Input						
R_{REF}	DAC Input Resistance (Unipolar)	(Note 6)	●	4.5	6 10	k Ω
$R1/R2$	R1/R2 Resistance (Bipolar)	(Notes 6, 13)	●	9	12 20	k Ω
R_{OFS}, R_{FB}	Feedback and Offset Resistances	(Note 6)	●	9	12 20	k Ω

AC Performance (Note 4)

	Output Current Settling Time	(Notes 7, 8)		1	μs
	Midscale Glitch Impulse	(Note 12)		2	nV-s
	Digital-to-Analog Glitch Impulse	(Note 9)		1	nV-s
	Multiplying Feedthrough Error	$V_{REF} = \pm 10V$, 10kHz Sine Wave		1	mV _{P-P}
THD	Total Harmonic Distortion	(Note 10)		108	dB
	Output Noise Voltage Density	(Note 11)		10	nV/ $\sqrt{Hz}$
	Harmonic Distortion (Digital Waveform Generation)	Unipolar Mode (Note 14)			
		2nd Harmonic		94	dB
		3rd Harmonic		101	dB
		SFDR		94	dB
		Bipolar Mode (Note 14)			
		2nd Harmonic		94	dB
		3rd Harmonic		101	dB
		SFDR		94	dB

ELECTRICAL CHARACTERISTICS The ● denotes specifications that apply over the full operating temperature range. $V_{CC} = 5V \pm 10\%$, $V_{REF} = 10V$, $I_{OUT1} = AGND = DGND = 0V$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.

SYMBOL	PARAMETER	CONDITIONS		MIN	TYP	MAX	UNITS
Analog Outputs (Note 4)							
C_{OUT}	Output Capacitance (Note 4)	DAC Register Loaded to All 1s: C_{OUT1} DAC Register Loaded to All 0s: C_{OUT1}	● ●		115 70	130 80	pF pF
Digital Inputs							
V_{IH}	Digital Input High Voltage		●	2.4			V
V_{IL}	Digital Input Low Voltage		●			0.8	V
I_{IN}	Digital Input Current		●		0.001	± 1	μA
C_{IN}	Digital Input Capacitance	(Note 4) $V_{IN} = 0V$	●			8	pF
Timing Characteristics							
t_{DS}	Data to $\overline{WR}$ Setup Time		●	60			ns
t_{DH}	Data to $\overline{WR}$ Hold Time		●	0			ns
t_{WR}	$\overline{WR}$ Pulse Width		●	60			ns
t_{LD}	LD Pulse Width		●	110			ns
t_{CLR}	Clear Pulse Width		●	60			ns
t_{LWD}	$\overline{WR}$ to LD Delay Time		●	0			ns
Power Supply							
V_{DD}	Supply Voltage		●	4.5	5	5.5	V
I_{DD}	Supply Current	Digital Inputs = 0V or V_{CC}	●			10	μA

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: $\pm 1LSB = \pm 0.006\%$ of full scale = $\pm 61ppm$ of full scale for the LTC1591/LTC1591-1. $\pm 1LSB = \pm 0.0015\%$ of full scale = $\pm 15.3ppm$ of full scale for the LTC1597/LTC1597-1.

Note 3: Using internal feedback resistor.

Note 4: Guaranteed by design, not subject to test.

Note 5: $I_{(OUT1)}$ with DAC register loaded to all 0s.

Note 6: Typical temperature coefficient is 100ppm/°C.

Note 7: I_{OUT1} load = 100 Ω in parallel with 13pF.

Note 8: To 0.006% for a full-scale change, measured from the rising edge of LD for the LTC1591/LTC1591-1. To 0.0015% for a full-scale change, measured from the rising edge of LD for the LTC1597/LTC1597-1.

Note 9: $V_{REF} = 0V$. DAC register contents changed from all 0s to all 1s or all 1s to all 0s.

Note 10: $V_{REF} = 6V_{RMS}$ at 1kHz. DAC register loaded with all 1s.

Note 11: Calculation from $e_n = \sqrt{4kTRB}$ where: k = Boltzmann constant (J/°K), R = resistance (Ω), T = temperature (°K), B = bandwidth (Hz).

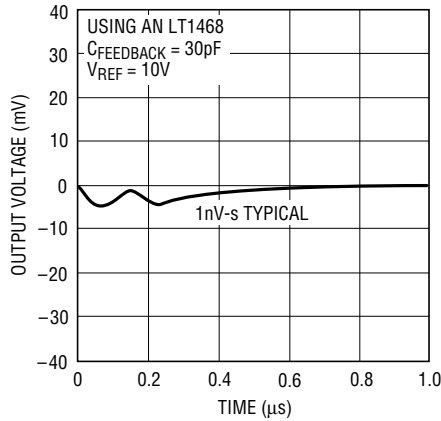
Note 12: Midscale transition code: 01 1111 1111 1111 to 10 0000 0000 0000 for the LTC1591/LTC1591-1 and 0111 1111 1111 1111 to 1000 0000 0000 0000 for the LTC1597/LTC1597-1.

Note 13: R1 and R2 are measured between R1 and R_{COM} , REF and R_{COM} .

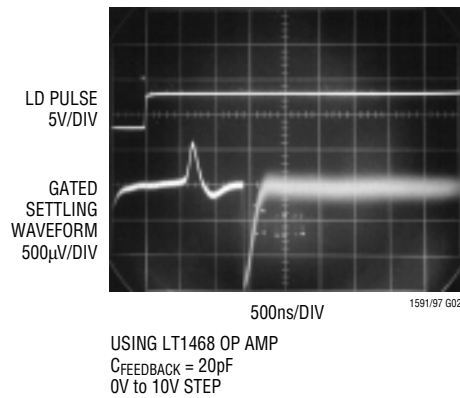
Note 14: Measured using the LT1468 op amp in unipolar mode for I/V converter and LT1468 I/V and LT1001 reference inverter in bipolar mode. Sample Rate = 50kHz, Signal Frequency = 1kHz, $V_{REF} = 5V$, $T_A = 25^\circ C$.

TYPICAL PERFORMANCE CHARACTERISTICS (LTC1591/LTC1597)

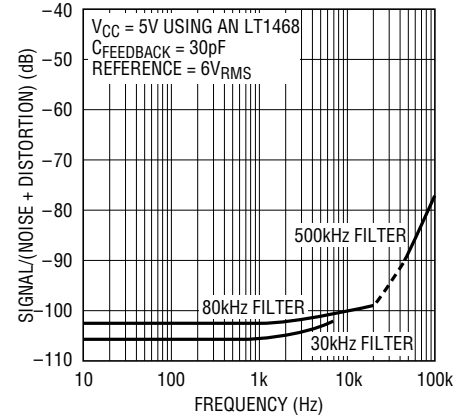
Midscale Glitch Impulse



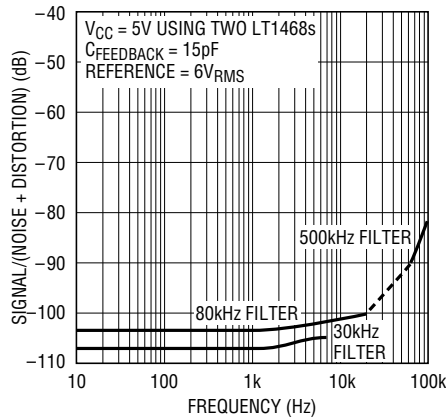
Full-Scale Settling Waveform



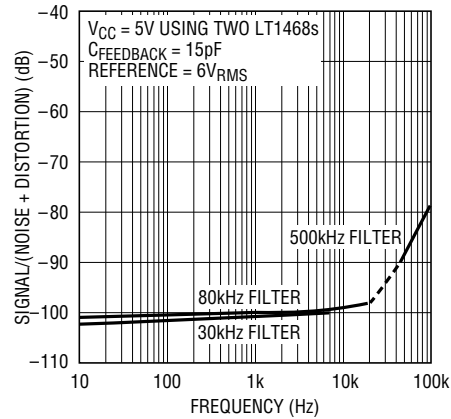
Unipolar Multiplying Mode Signal-to-(Noise + Distortion) vs Frequency



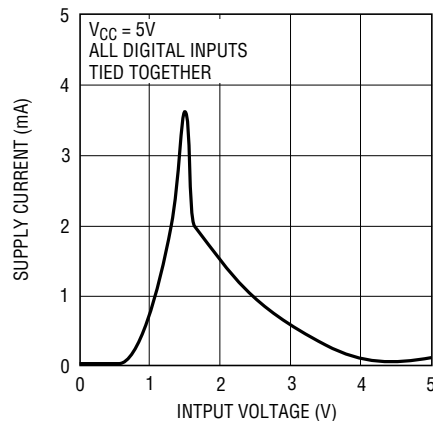
Bipolar Multiplying Mode Signal-to-(Noise + Distortion) vs Frequency, Code = All Zeros



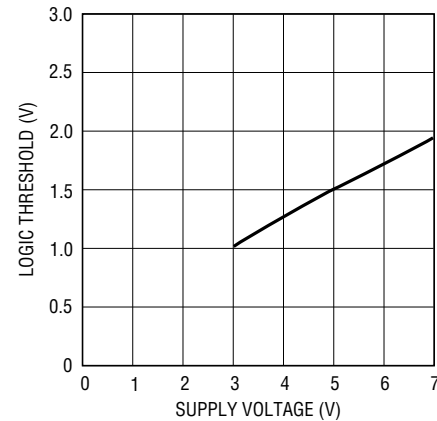
Bipolar Multiplying Mode Signal-to-(Noise + Distortion) vs Frequency, Code = All Ones



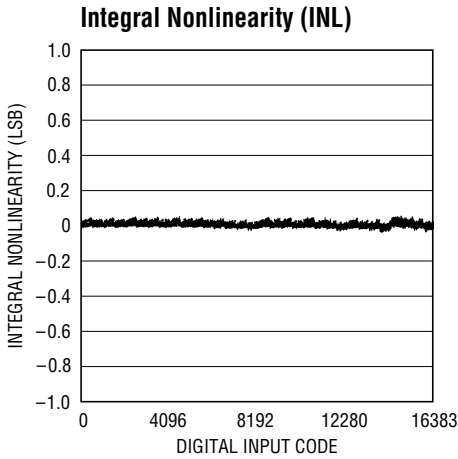
Supply Current vs Input Voltage



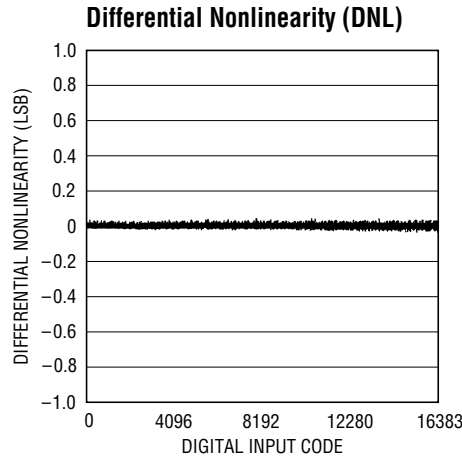
Logic Threshold vs Supply Voltage



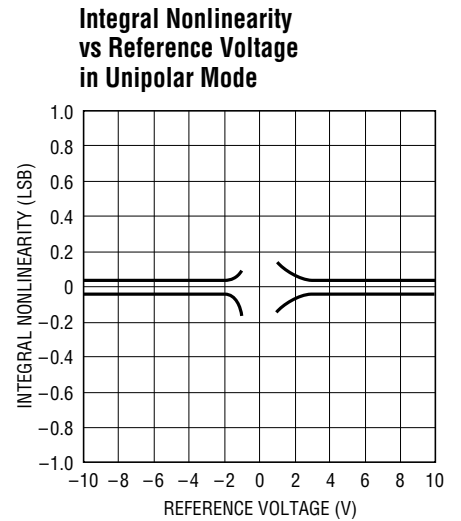
TYPICAL PERFORMANCE CHARACTERISTICS (LTC1591)



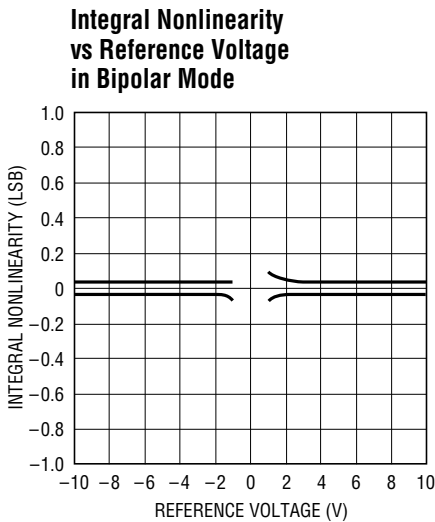
1591 G01



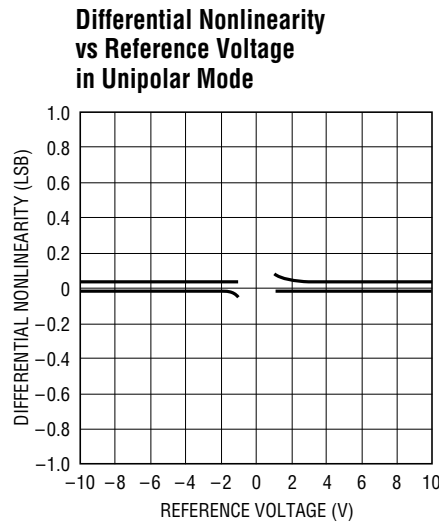
1591 G02



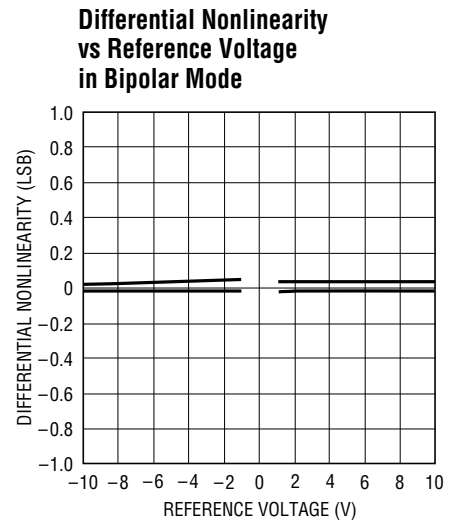
1591 G03



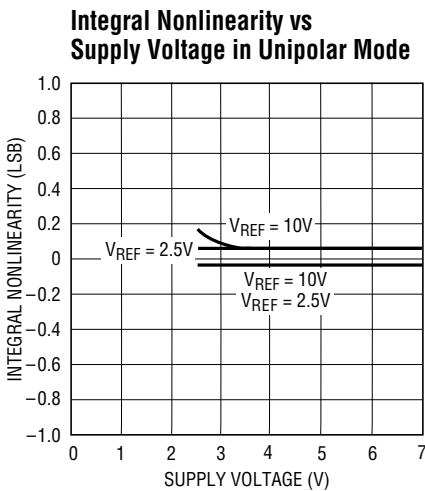
1591 G04



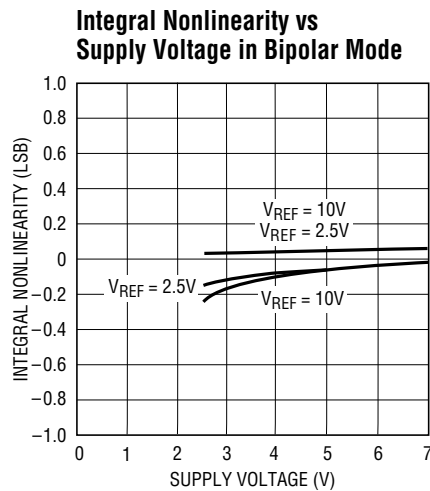
1591 G05



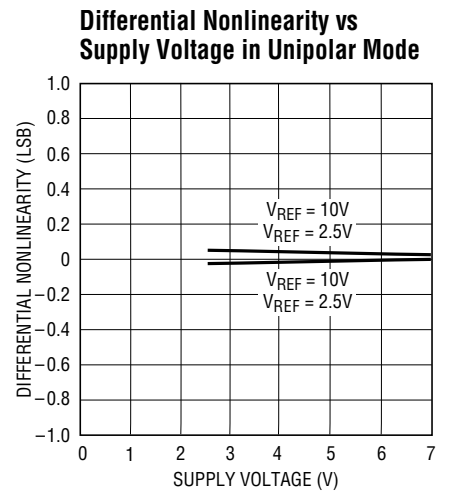
1591 G06



1591 G07



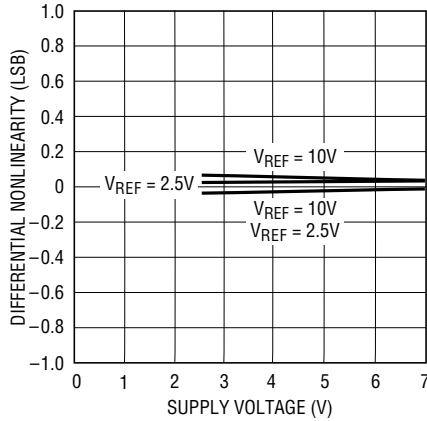
1591 G08



1591 G09
15917fa

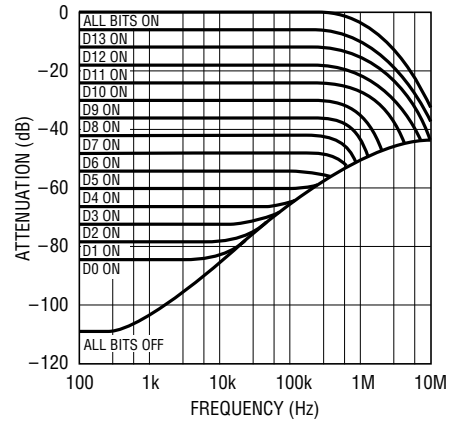
TYPICAL PERFORMANCE CHARACTERISTICS (LTC1591)

Differential Nonlinearity vs Supply Voltage in Bipolar Mode

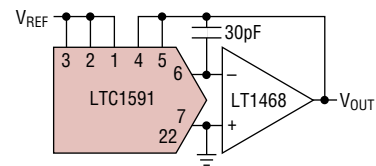


1591 G10

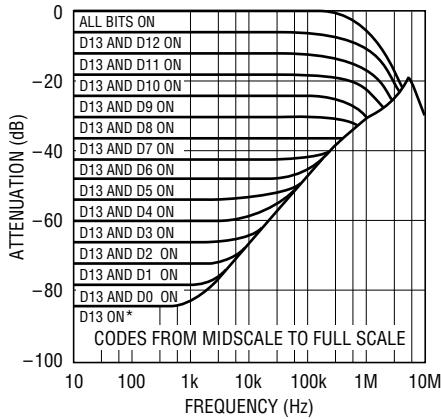
Unipolar Multiplying Mode Frequency Response vs Digital Code



1591G11

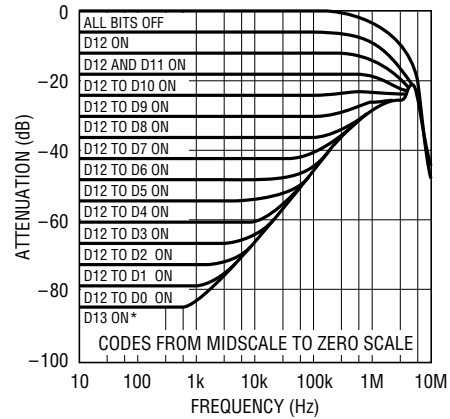


Bipolar Multiplying Mode Frequency Response vs Digital Code



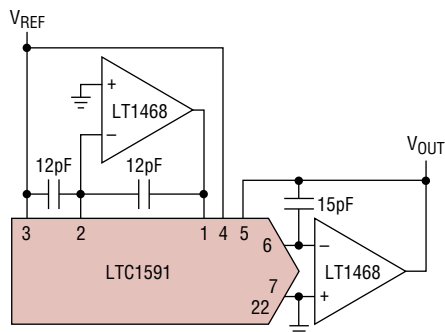
1591 G12

Bipolar Multiplying Mode Frequency Response vs Digital Code

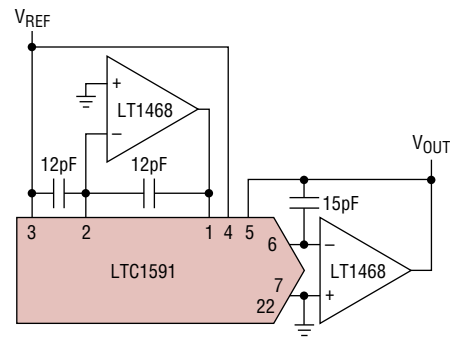


1591G13

*DAC ZERO VOLTAGE OUTPUT LIMITED BY BIPOLAR ZERO ERROR TO -84dB TYPICAL (-70dB MAX)

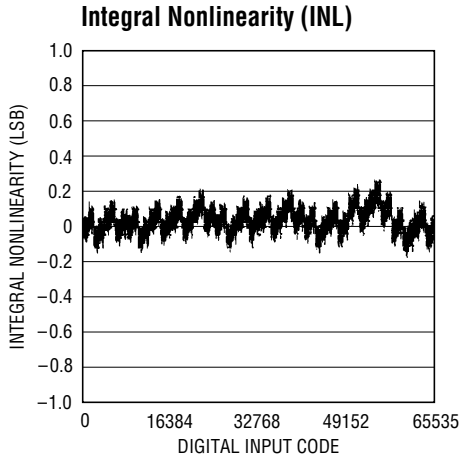


*DAC ZERO VOLTAGE OUTPUT LIMITED BY BIPOLAR ZERO ERROR TO -84dB TYPICAL (-70dB MAX)

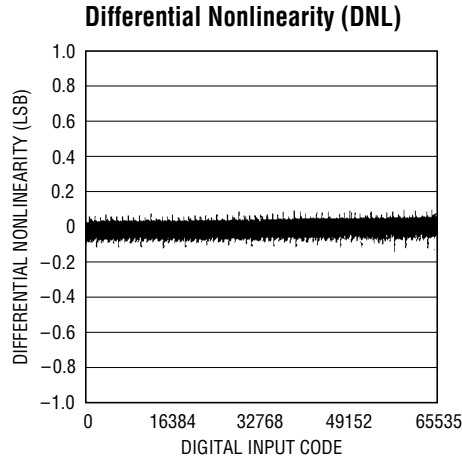


15917fa

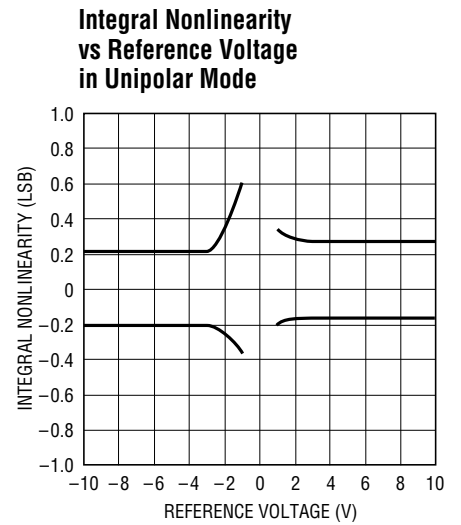
TYPICAL PERFORMANCE CHARACTERISTICS (LTC1597)



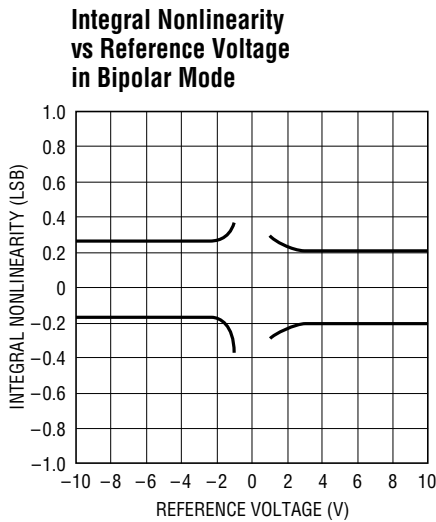
1597 G01



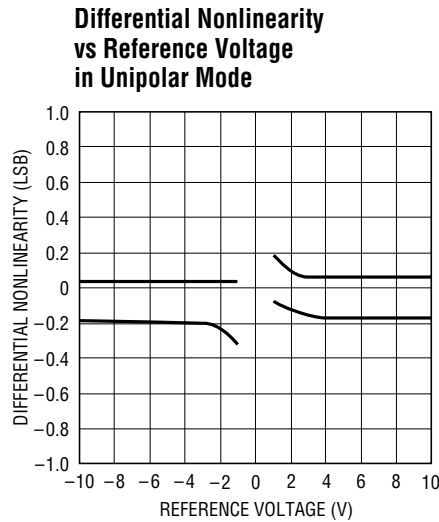
1597 G02



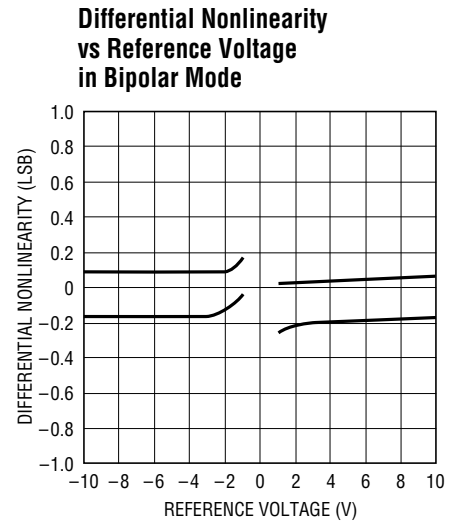
1597 G03



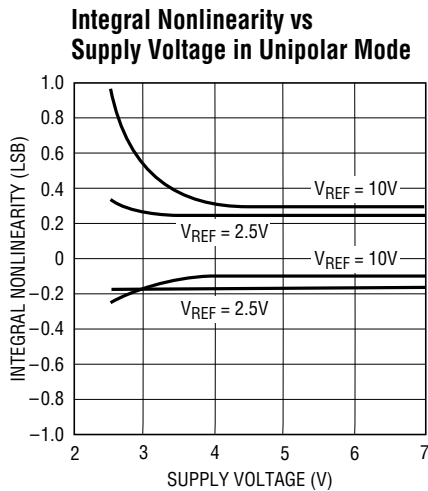
1597 G04



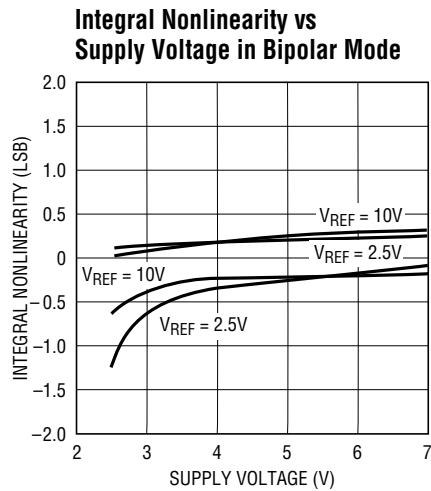
1597 G05



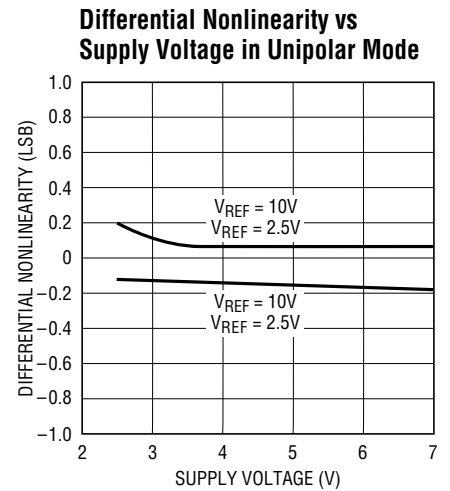
1597 G06



1597 G07



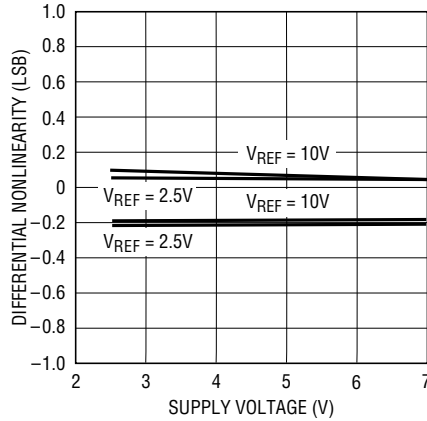
1597 G08



1597 G09
15917fa

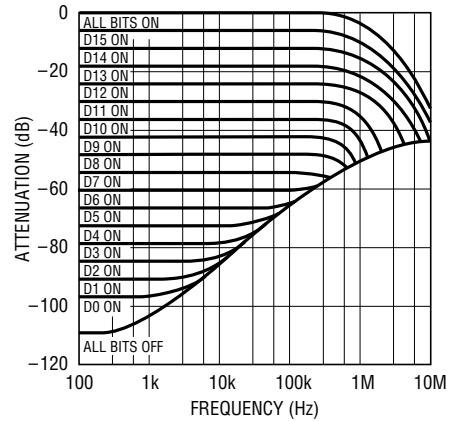
TYPICAL PERFORMANCE CHARACTERISTICS (LTC1597)

Differential Nonlinearity vs Supply Voltage in Bipolar Mode

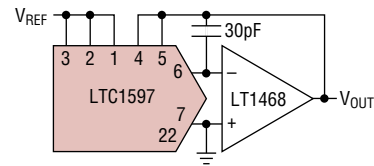


1597 G10

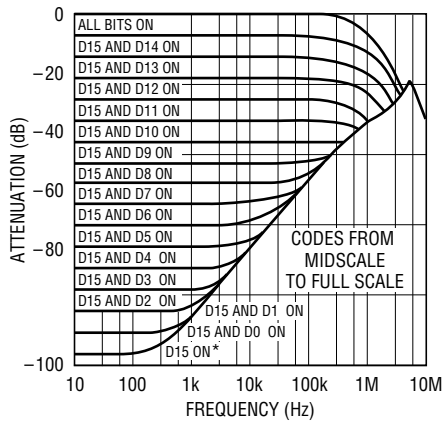
Unipolar Multiplying Mode Frequency Response vs Digital Code



1597G11

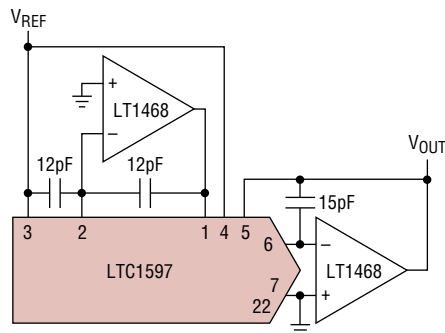


Bipolar Multiplying Mode Frequency Response vs Digital Code

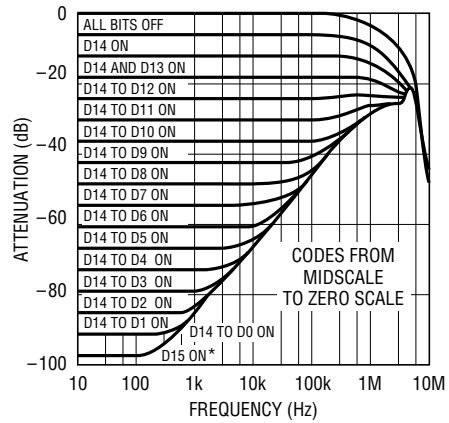


1597 G12

*DAC ZERO VOLTAGE OUTPUT LIMITED BY BIPOLAR ZERO ERROR TO -96dB TYPICAL (-78dB MAX, A GRADE)

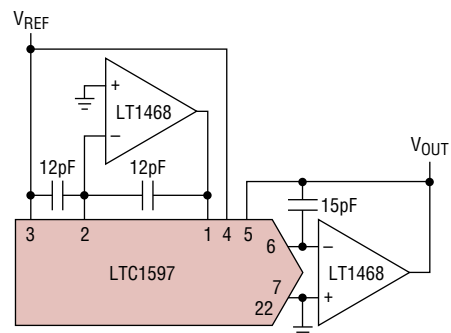


Bipolar Multiplying Mode Frequency Response vs Digital Code



1597 G13

*DAC ZERO VOLTAGE OUTPUT LIMITED BY BIPOLAR ZERO ERROR TO -96dB TYPICAL (-78dB MAX, A GRADE)



15917fa

PIN FUNCTIONS

LTC1591

REF (Pin 1): Reference Input and 4-Quadrant Resistor R2. Typically $\pm 10V$, accepts up to $\pm 25V$. In 2-Quadrant mode this is the reference input. In 4-quadrant mode, this pin is driven by external inverting reference amplifier.

R_{COM} (Pin 2): Center Tap Point of the Two 4-Quadrant Resistors R1 and R2. Normally tied to the inverting input of an external amplifier in 4-quadrant operation, otherwise shorted to the REF pin. See Figures 1a and 2a.

R1 (Pin 3): 4-Quadrant Resistor R1. In 2-quadrant operation short to the REF pin. In 4-quadrant mode tie to R_{OFFS} (Pin 4).

R_{OFFS} (Pin 4): Bipolar Offset Resistor. Typically swings $\pm 10V$, accepts up to $\pm 25V$. In 2-quadrant operation tie to R_{FB}. In 4-quadrant operation tie to R1.

R_{FB} (Pin 5): Feedback Resistor. Normally tied to the output of the current to voltage converter op amp. Swings to $\pm V_{REF}$. V_{REF} is typically $\pm 10V$.

I_{OUT1} (Pin 6): DAC Current Output. Tie to the inverting input of the current to voltage converter op amp.

AGND (Pin 7): Analog Ground. Tie to ground.

LD (Pin 8): DAC Digital Input Load Control Input. When LD is taken to a logic high, data is loaded from the input register into the DAC register, updating the DAC output.

WR (Pin 9): DAC Digital Write Control Input. When $\overline{WR}$ is taken to a logic low, data is loaded from the digital input pins into the 14-bit wide input register.

DB13 to D2 (Pins 10 to 21): Digital Input Data Bits.

DGND (Pin 22): Digital Ground. Tie to ground.

V_{CC} (Pin 23): The Positive Supply Input. $4.5V \leq V_{CC} \leq 5.5V$. Requires a bypass capacitor to ground.

DB1, DB0 (Pins 24, 25): Digital Input Data Bits.

NC (Pins 26, 27): No Connect.

CLR (Pin 28): Digital Clear Control Function for the DAC. When CLR is taken to a logic low, it sets the DAC output and all internal registers to zero code for the LTC1591 and midscale code for the LTC1591-1.

LTC1597

REF (Pin 1): Reference Input and 4-Quadrant Resistor R2. Typically $\pm 10V$, accepts up to $\pm 25V$. In 2-Quadrant mode this is the reference input. In 4-quadrant mode, this pin is driven by external inverting reference amplifier.

R_{COM} (Pin 2): Center Tap Point of the Two 4-Quadrant Resistors R1 and R2. Normally tied to the inverting input of an external amplifier in 4-quadrant operation, otherwise shorted to the REF pin. See Figures 1b and 2b.

R1 (Pin 3): 4-Quadrant Resistor R1. In 2-quadrant operation short to the REF pin. In 4-quadrant mode tie to R_{OFFS} (Pin 4).

R_{OFFS} (Pin 4): Bipolar Offset Resistor. Typically swings $\pm 10V$, accepts up to $\pm 25V$. In 2-quadrant operation tie to R_{FB}. In 4-quadrant operation tie to R1.

R_{FB} (Pin 5): Feedback Resistor. Normally tied to the output of the current to voltage converter op amp. Swings to $\pm V_{REF}$. V_{REF} is typically $\pm 10V$.

I_{OUT1} (Pin 6): DAC Current Output. Tie to the inverting input of the current to voltage converter op amp.

AGND (Pin 7): Analog Ground. Tie to ground.

LD (Pin 8): DAC Digital Input Load Control Input. When LD is taken to a logic high, data is loaded from the input register into the DAC register, updating the DAC output.

WR (Pin 9): DAC Digital Write Control Input. When $\overline{WR}$ is taken to a logic low, data is loaded from the digital input pins into the 16-bit wide input register.

DB15 to D4 (Pins 10 to 21): Digital Input Data Bits.

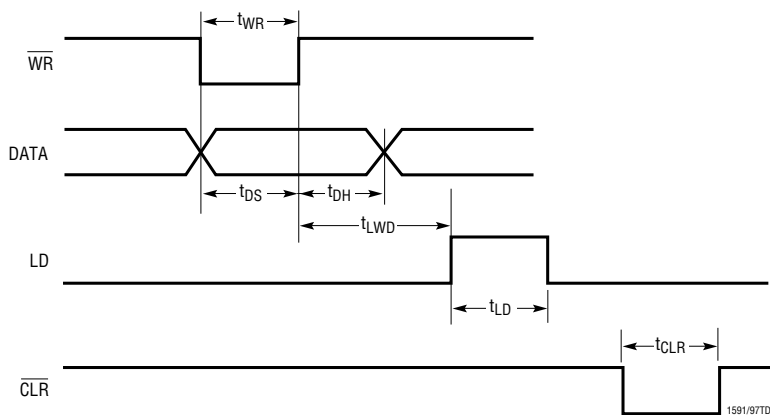
DGND (Pin 22): Digital Ground. Tie to ground.

V_{CC} (Pin 23): The Positive Supply Input. $4.5V \leq V_{CC} \leq 5.5V$. Requires a bypass capacitor to ground.

DB3 to DB0 (Pins 24 to 27): Digital Input Data Bits.

CLR (Pin 28): Digital Clear Control Function for the DAC. When CLR is taken to a logic low, it sets the DAC output and all internal registers to zero code for the LTC1597 and midscale code for the LTC1597-1.

TIMING DIAGRAM



APPLICATIONS INFORMATION

Description

The LTC1591/LTC1597 are 14-/16-bit multiplying, current output DACs with a full parallel 14-/16-bit digital interface. The devices operate from a single 5V supply and provide both unipolar 0V to -10V or 0V to 10V and bipolar $\pm 10\text{V}$ output ranges from a 10V or -10V reference input. They have three additional precision resistors on chip for bipolar operation. Refer to the block diagrams regarding the following description.

The 14-/16-bit DACs consist of a precision R-2R ladder for the 11/13LSBs. The 3MSBs are decoded into seven segments of resistor value R. Each of these segments and the R-2R ladder carries an equally weighted current of one eighth of full scale. The feedback resistor R_{FB} and 4-quadrant resistor R_{OFS} have a value of $R/4$. 4-quadrant resistors R1 and R2 have a magnitude of $R/4$. R1 and R2 together with an external op amp (see Figure 2) invert the reference input voltage and applies it to the 14-/16-bit DAC input REF, in 4-quadrant operation. The REF pin presents a constant input impedance of $R/8$ in unipolar mode and $R/12$ in bipolar mode. The output impedance of the current output pin I_{OUT1} varies with DAC input code. The I_{OUT1} capacitance due to the NMOS current steering switches also varies with input code from 70pF to 115pF. An added feature of these devices, especially for waveform generation, is a proprietary deglitcher that reduces glitch energy to below 2nV-s over the DAC output voltage range.

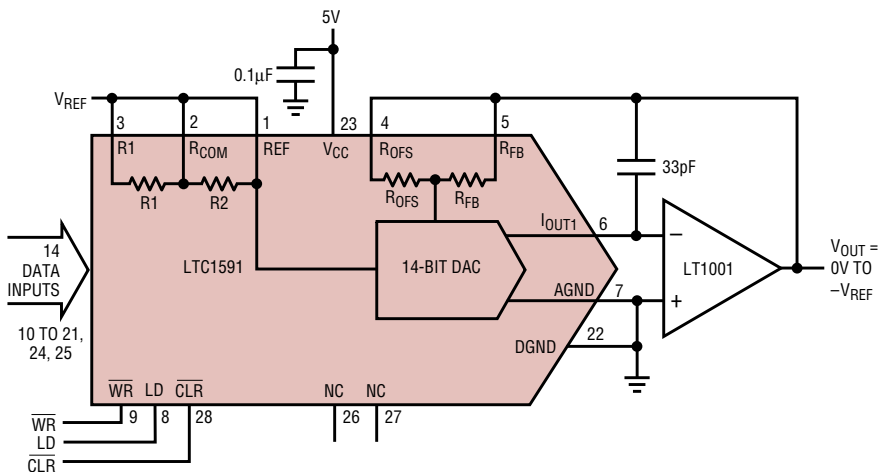
Digital Section

The LTC1591/LTC1597 are 14-/16-bit wide full parallel data bus inputs. The devices are double-buffered with two 14-/16-bit registers. The double-buffered feature permits the update of several DACs simultaneously. The input register is loaded directly from a 16-bit microprocessor bus when the $\overline{\text{WR}}$ pin is brought to a logic low level. The second register (DAC register) is updated with the data from the input register when the $\overline{\text{LD}}$ pin is brought to a logic high level. Updating the DAC register updates the DAC output with the new data. To make both registers transparent for flowthrough mode, tie $\overline{\text{WR}}$ low and $\overline{\text{LD}}$ high. However, this defeats the deglitcher operation and output glitch impulse may increase. The deglitcher is activated on the rising edge of the $\overline{\text{LD}}$ pin. The versatility of the interface also allows the use of the input and DAC registers in a master slave or edge-triggered configuration. This mode of operation occurs when $\overline{\text{WR}}$ and $\overline{\text{LD}}$ are tied together. The asynchronous clear pin resets the LTC1591/LTC1597 to zero scale and the LTC1591-1/LTC1597-1 to midscale. $\overline{\text{CLR}}$ resets both the input and DAC registers. These devices also have a power-on reset. Table 1 shows the truth table for the LTC1591/LTC1597.

Unipolar Mode

(2-Quadrant Multiplying, $V_{OUT} = 0\text{V}$ to $-V_{REF}$)

The LTC1591/LTC1597 can be used with a single op amp to provide 2-quadrant multiplying operation as shown in Figure 1. With a fixed -10V reference, the circuits shown give a precision unipolar 0V to 10V output swing.



Unipolar Binary Code Table

DIGITAL INPUT BINARY NUMBER IN DAC REGISTER				ANALOG OUTPUT V_{OUT}
MSB		LSB		
1111	1111	11		$-V_{REF}$ (16,383/16,384)
1000	0000	00		$-V_{REF}$ (8,192/16,384) = $-V_{REF}/2$
0000	0000	01		$-V_{REF}$ (1/16,384)
0000	0000	00		0V

1591/97 F01a

Figure 1a. Unipolar Operation (2-Quadrant Multiplication) $V_{OUT} = 0\text{V}$ to $-V_{REF}$

15917fa

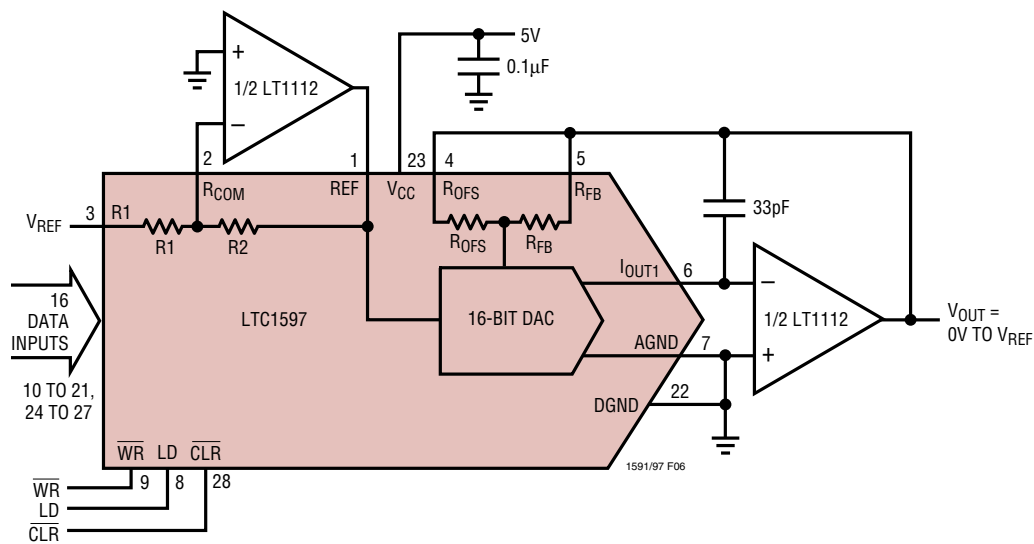


1591/97 F02b

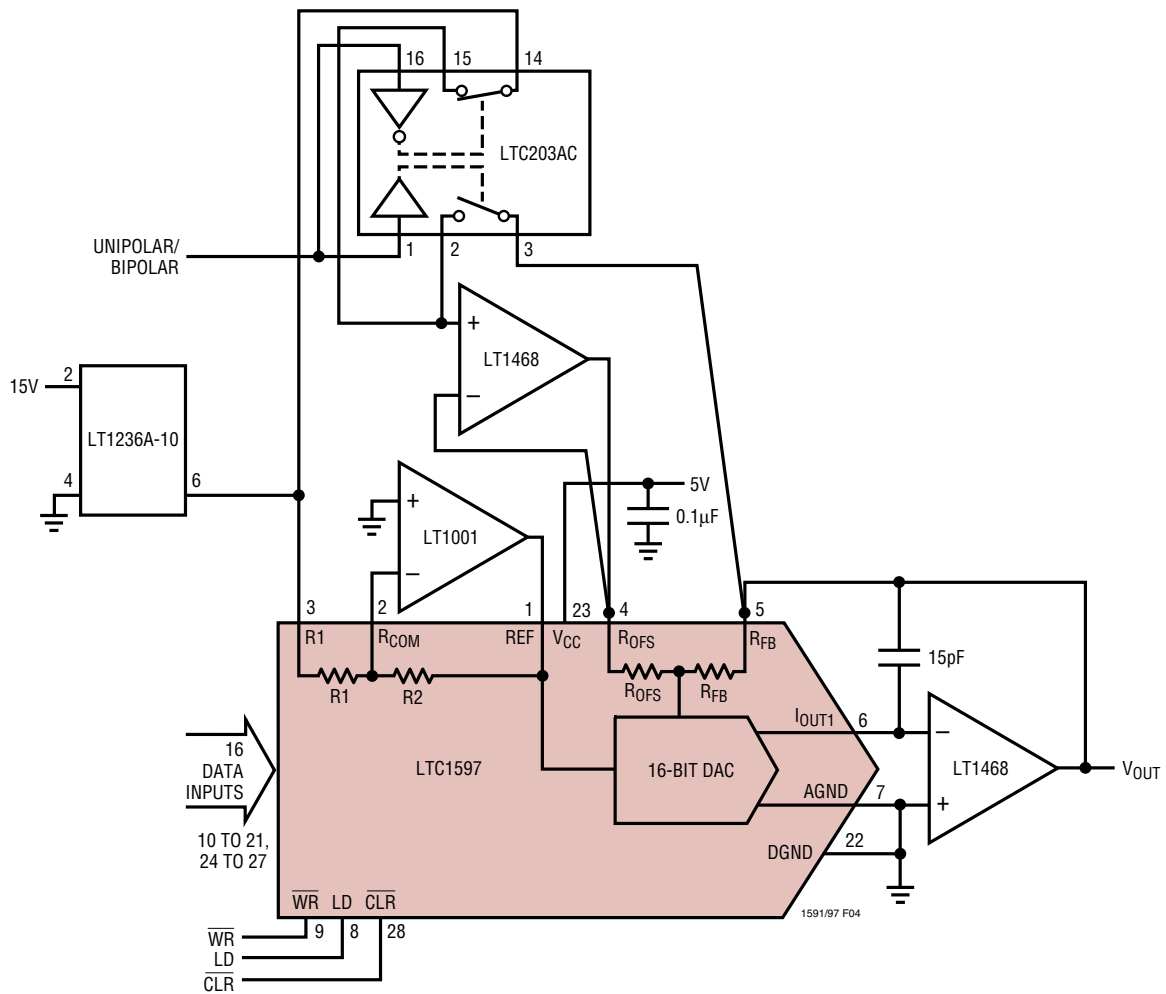
15917fa

TYPICAL APPLICATIONS

Noninverting Unipolar Operation (2-Quadrant Multiplication) $V_{OUT} = 0V$ to V_{REF}



TYPICAL APPLICATIONS

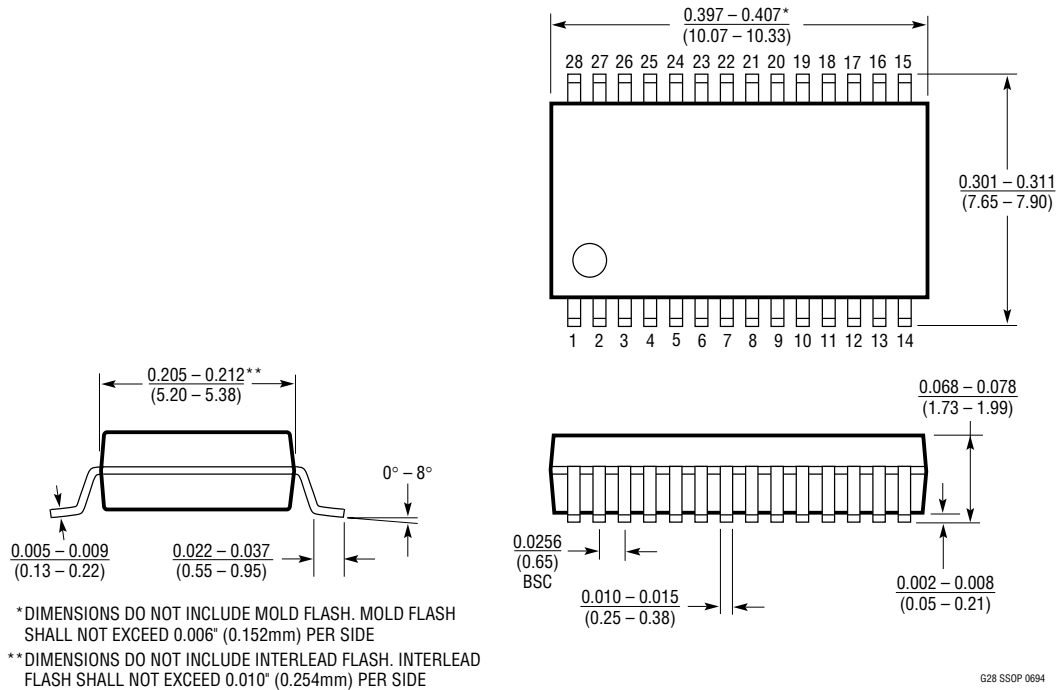
16-Bit V_{OUT} DAC Programmable Unipolar/Bipolar Configuration

The diagram illustrates the internal architecture of the LT1236A-10 PLL. It features a 15V supply connected to the LT1236A-10 chip. The LT1001 phase-locked loop is connected to the 5V supply and the 0.1µF capacitor. The LT1597 16-bit DAC is connected to the 5V supply and the 0.1µF capacitor. The LT1468 op-amp is connected to the 5V supply and the 0.1µF capacitor. The output frequency is given by the formula $f_0 = \frac{M(f_c)}{2^n}$.

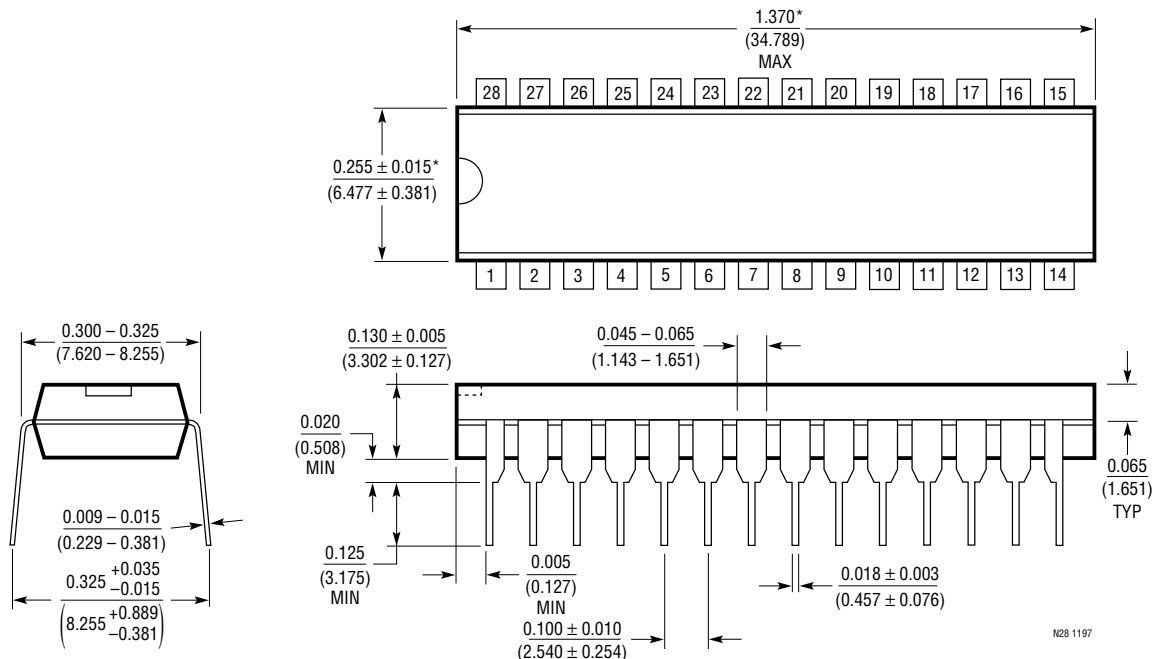
PACKAGE DESCRIPTION

Dimensions in inches (millimeters) unless otherwise noted.

G Package
28-Lead Plastic SSOP (0.209)
 (LTC DWG # 05-08-1640)

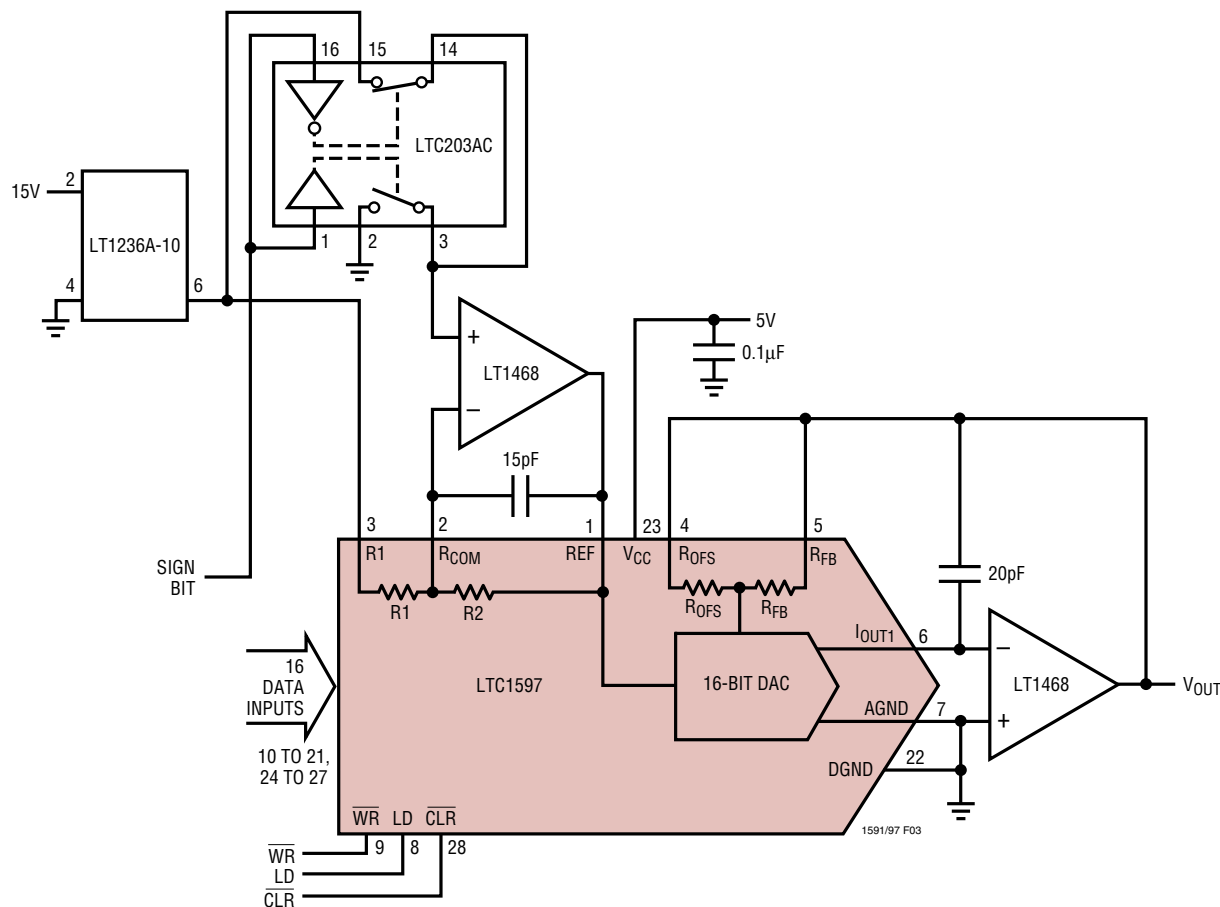


N Package
28-Lead PDIP (Narrow 0.300)
 (LTC DWG # 05-08-1510)



TYPICAL APPLICATION

17-Bit Sign Magnitude DAC with Bipolar Zero Error of 140µV (0.92LSB at 17 Bits) at 25°C



RELATED PARTS

PART NUMBER		DESCRIPTION	COMMENTS
Op Amps	LT1001	Precision Operational Amplifier	Low Offset, Low Drift
	LT1112	Dual Low Power, Precision Picoamp Input Op Amp	Low Offset, Low Drift
	LT1468	90MHz, 22V/µs, 16-Bit Accurate Op Amp	Precise, 1µs Settling to 0.0015%
DACs	LTC1595/LTC1596	Serial 16-Bit Current Output DACs	Low Glitch, ±1LSB Maximum INL, DNL
	LTC1650	Serial 16-Bit Voltage Output DAC	Low Noise and Glitch Rail-to-Rail VOUT
	LTC1658	Serial 14-Bit Voltage Output DAC	Low Power, 8-Lead MSOP Rail-to-Rail VOUT
ADCs	LTC1418	14-Bit, 200ksps 5V Sampling ADC	16mW Dissipation, Serial and Parallel Outputs
	LTC1604	16-Bit, 333ksps Sampling ADC	±2.5V Input, SINAD = 90dB, THD = 100dB
	LTC1605	Single 5V, 16-Bit 100ksps ADC	Low Power, ±10V Inputs
References	LT1236	Precision Reference	Ultralow Drift, 5ppm/°C, High Accuracy 0.05%