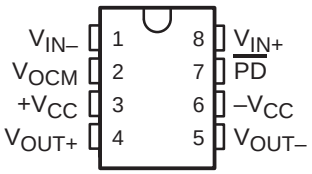
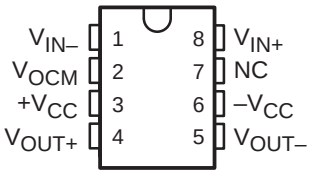
- **Differential-Input/Differential-Output**
  - **Simple Single-Ended to Differential Conversion**
  - **Balanced Ouputs Reject Common-Mode Noise**
- **High Performance**
  - **144 MHz –3 dB Bandwidth**
  - **830 V/μs Slew Rate**
  - **–82 dB HD3 at 10 MHz**
  - **9 nV/√Hz Input-Referred Noise**
- **Low-Power Supply Range**
  - **I_{CC} = 880 μA in Shutdown Mode**
- **Wide Power Supply Range**
  - **V_{CC} = 5 V single supply to ±15 V**

THS4150
D OR DGN PACKAGE
(TOP VIEW)



THS4151
D OR DGN PACKAGE
(TOP VIEW)



description

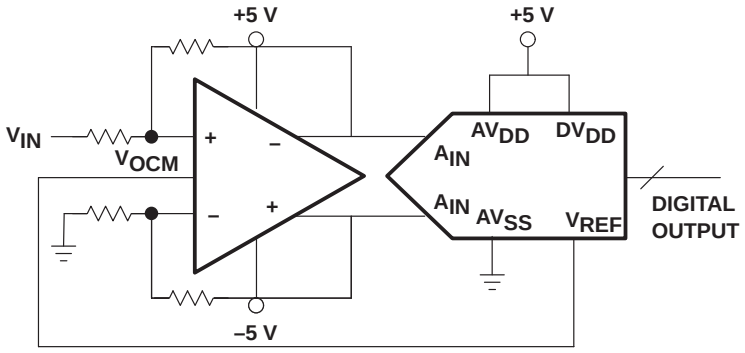
The THS415x is one in a family of differential-input/differential-output devices fabricated using Texas Instruments' state-of-the-art BiCom I complementary bipolar process.

The THS415x consists of a true differential signal path from input to output. This results in excellent common-mode noise rejection and improved total harmonic distortion. Not only does the device provide balanced, differential outputs, but internal feedback reduces the effects of parametric differences in gain-setting components between sides.

Designed for high-performance, 12-bit applications, the THS415x has 144 MHz bandwidth, 830 V/μs slew rate, and –82 dB third harmonic distortion at 1 MHz. Combined with its differential outputs, these specifications make the THS415x ideal for driving high-performance analog-to-digital converters.

The THS415x also offers many advantages for improving system designs. Its differential outputs make single-ended to differential conversion simple and efficient. The V_{OCM} input provides easy level-shifting and, when driven by an ADC reference voltage, ensures that the ADC differential inputs are centered in its dynamic range.

typical ADC application circuits



PRODUCT PREVIEW

description (continued)

Its inherent common-mode noise rejection makes the THS415x ideal for distributing critical signals across a printed-circuit board.

The THS415x is offered in a standard 8-pin SOIC package (D) and an 8-pin MSOP PowerPAD™ package (DGN). The low-power shutdown capability is offered as an option in the THS4150. The device operates over the industrial temperature range of –40°C to 85°C.

HIGH-SPEED xDSL LINE DRIVER/RECEIVER FAMILY

DEVICE	NUMBER OF CHANNELS	PACKAGE TYPES		SHUTDOWN
		SOIC	MSOP	
THS4150	1	8	8	X
THS4151	1	8	8	–

AVAILABLE OPTIONS

T_A	PACKAGED DEVICES	
	SMALL OUTLINE (D)	MSOP PowerPAD™ (DGN)
0°C to 70°C	THS4150CD THS4151CD	THS4150CDGN THS4151CDGN
–40°C to 85°C	THS4150ID THS4151ID	THS4150IDGN THS4151IDGN

absolute maximum ratings over operating free–air temperature range (unless otherwise noted)†

Supply voltage, V_{CC}– to V_{CC}+ . . . . . ±16.5 V
Input voltage, V_I . . . . . $\pm V_{CC}$
Output current, I_O . . . . . 150 mA
Differential input voltage, V_{ID} . . . . . ±4 V
Continuous total power dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature, T_A: C suffix . . . . . 0°C to 70°C
I suffix . . . . . –40°C to 85°C
Storage temperature, T_{stg} . . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 Inch) from case for 10 seconds . . . . . 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 under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D	740 mW	6 mW/°C	470 mW	380 mW
DGN	1.71 mW	17.1 mW/°C	941 mW	685 mW

recommended operating conditions

		MIN	TYP	MAX	UNIT
Supply voltage, V_{CC}+ and V_{CC}–		±2.5		±15	V
Operating free-air temperature, T_A	C suffix	0		70	°C
	I suffix	–40		85	

electrical characteristics, V_{CC} = 5 V, R_L = 800 Ω, T_A = 25°C (unless otherwise noted)

dynamic performance

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
BW	Small signal bandwidth (–3 dB)	Gain = –1		144		MHz
SR	Slew rate	Gain = –1		830		V/μs
t_S	Settling time to 0.1%	Step voltage = 2 V, Gain = –1		15		ns
	Settling time to 0.01%			408		ns

distortion performance

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
THD	Total harmonic distortion	f = 1 MHz				dBc
	Differential gain error	Gain = 2 NTSC, 40 IRE modulation				
	Differential phase error					
	Spurious free dynamic range					dB
	Intermodulation distortion					dB
	Third-order intercept					dB

noise performance

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_n	Input voltage noise	f = 10 kHz		7.5		nV/√Hz
I_n	Input current noise	f = 10 kHz		1.53		pA/√Hz

dc performance

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OS}	Input offset voltage	T_A = 25°C				mV
	Offset drift	T_A = full range				μV/°C
I_{IB}	Input bias current			8.2		μA
I_{OS}	Input offset current					nA
	Offset drift					nA/°C

input characteristics

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
CMRR	Common-mode refection ratio	V_{ICR} = 0 V to 5 V, T_A = full range				dB
V_{ICR}	Common-mode input voltage range			–4 to 4.5		V
R_I	Input resistance					MO
C_I	Input capacitance					pF
R_O	Output resistance	Open loop				O

output characteristics

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
	Output voltage swing		T_A = 25°C		–3.8 to 3.8		V
I_O	Output current				60		mA

PRODUCT PREVIEW

electrical characteristics, V_{CC} = 5 V, R_L = 800 Ω, T_A = 25°C (unless otherwise noted) (continued)

power supply

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{CC}	Supply voltage range	Single supply		5		V
		Split supply		±15		
I_{CC}	Quiescent current (per amplifier)	T_A = full range		20		mA
PSRR	Power supply rejection ratio	T_A = 25°C		89		dB
		T_A = full range				

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