LM158DT-HX/LM258DT-HX/LM358DT-HX Low Power Dual Operational Amplifier

Description

The LM158DT-HX/LM258DT-HX/LM358DT-HX integrates two independent, high-gain operational amplifiers, each featuring internal frequency compensation. These op-amps operate over a wide supply voltage range and are fully compatible with both single-supply and split-supply configurations. The device exhibits low quiescent supply current—largely independent of supply voltage—making it especially well-suited for battery-powered applications.

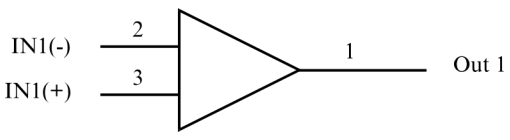
When your design requires conventional op-amp functionality, the LM158DT-HX/LM258DT-HX/LM358DT-HX enables simplified implementation using only a single power supply. A standard +5 VDC rail—commonly available in virtually any digital system or personal computer application—is sufficient; there is no need for an additional ±15 V supply solely to support interface circuitry.

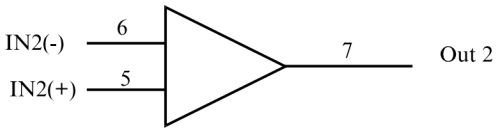
The LM158DT-HX/LM258DT-HX/LM358DT-HX is a versatile, robust, and widely applicable operational amplifier—ideal for countless applications, including signal conditioning from diverse transducers, DC gain stages, and general-purpose analog signal processing. The accompanying pages provide practical application examples to help you rapidly implement and validate your design.

Features

- ★ Internally frequency compensated for unity gain
- ★ Large DC voltage gain: 100dB
- ★ Wide power supply range:
  3V ~ 32V (or ±1.5V ~ ±16V)
- ★ Input common-mode voltage range includes ground
- ★ Large output voltage swing: 0V DC to VCC-1.5V DC
- ★ Power drain suitable for battery operation
- ★ Low input offset voltage and offset current
- ★ Differential input voltage range equal to the power supply voltage

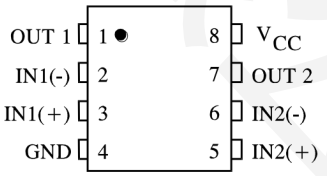
LOGIC DIAGRAM

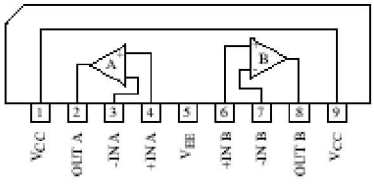




PIN 4 = GND
PIN 8=V_{CC}

PIN ASSIGNMENT





Operating temperature range

LM158DT-HX	LM258DT-HX	LM358DT-HX
-55°C to +125°C	-40°C to +105°C	0°C to +70°C

Naximum ratings*

Symbol	Parameter	Value	Unit
V_{CC}	Power Supply Voltages Single Supply Split Supplies	 32 ±16	V
V_{IDR}	Input Differential Voltage Range (1)	±32	V
V_{ICR}	Input Common Mode Voltage Range	-0.3 to 32	V
I_{SC}	Output Short Circuit Duration	Continuous	
T_J	Junction Temperature Plastic Packages	 150	℃
Tstg	Storage Temperature Plastic Packages	 -55 to +125	℃
I_{IN}	Input Current, per pin (2)	50	mA
T_L	Lead Temperature, 1mm from Case for 10 Seconds	260	℃

* 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.

Functional operation should be restricted to the Recommended Operating Conditions.
+Derating - Plastic DIP: - 10 mW/℃ from 65° to 125℃

Notes:
1. Split Power Supplies.
2. V_{IN}<-0.3V. This input current will only exist when voltage at any of the input leads is driven negative.

Recommended operating conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage	±2.5 or 5.0	±15 or 30	V
T_A	Operating Temperature, All Package Types	-40	+105	℃

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{IN} and V_{OUT} should be constrained to the range GND≤(V_{IN} or V_{OUT})≤V_{CC}.

Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

Dc electrical characteristics (TA=-40 to +105℃)

Symbol	Parameter	Test Conditions	Guaranteed Limit			Unit
			Min	Typ	Max	
V_{IO}	Maximum Input Offset Voltage	V_O=1.4V V_{CC}=5.0-30V;R_S=0Ω V_{ICM}=0V to V_{CC}-1.7V			9.0 5.0*	mV
$\Delta V_{IO}/\Delta T$	Input Offset Voltage Drift	R_S=0Ω, V_{CC}=30V		7.0		μV/℃
I_{IO}	Maximum Input Offset Current	V_{CC}=5.0V			150 50*	nA
$\Delta I_{IO}/\Delta T$	Input Offset Current Drift	R_S=0Ω, V_{CC}=30V		10		pA/℃
I_{IB}	Maximum Input Bias Current	V_{CC}=5.0V			500 250*	nA
V_{ICR}	Input Common Mode Voltage Range	V_{CC}=30V	0		28	V
I_{CC}	Maximum Power Supply Current	R_L=∞,V_{CC}=30V,V_0=0V R_L=∞,V_{CC}=5V,V_0=0V	0.3 0.3		3 1.2	mA
A_{VOL}	Minimum Large Signal Open-Loop Voltage Gain	V_{CC}=15V, R_L≥2KΩ	15 25*			V/mV
V_{OH}	Minimum Output High-Level Voltage Swing	V_{CC}=30V,R_L=2KΩ V_{CC}=30V,R_L=10KΩ	26 27			V
V_{OL}	Maximum Output Low-Level Voltage Swing	V_{CC}=5V,R_L=10KΩ			20	mV
CMR	Common Mode Rejection	V_{CC}=30V, R_S=10KΩ	65*			dB
PSR	Power Supply Rejection	V_{CC}=30V	65*			dB
CS	Channel Separation	f=1KHz to 20KHz,V_{CC}=30V	-120*			dB
I_{SC}	Maximum Output Short Circuit to GND	V_{CC}=5.0V V_0=0V			60*	mA
I_{source}	Minimum Source Output Current	V_{IN+}=1V, V_{IN-}=0V, V_{CC}=15V, V_0=2V	10			mA
I_{sink}	Minimum Output Sink Current	V_{IN+}=0V, V_{IN-}=1V, V_{CC}=15V, V_0=15V V_{IN+}=0V, V_{IN-}=1V, V_{CC}=15V, V_0=0.2V	5 10* 12*			mA μA
V_{IDR}	Differential Input Voltage Range	All V_{IN}≥GND or V-Supply (if used)			V_{CC}*	V

*=@25℃

Typical performance characteristics

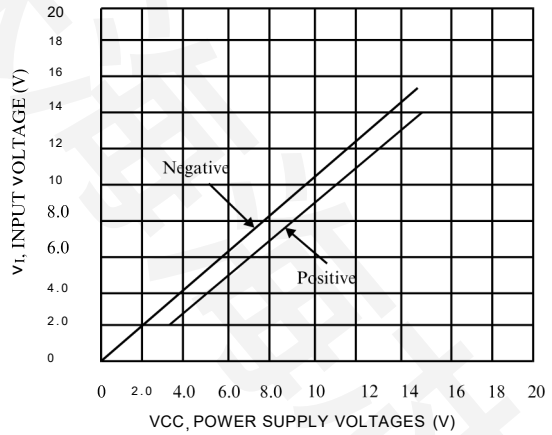


Figure 1.Input Voltage Range

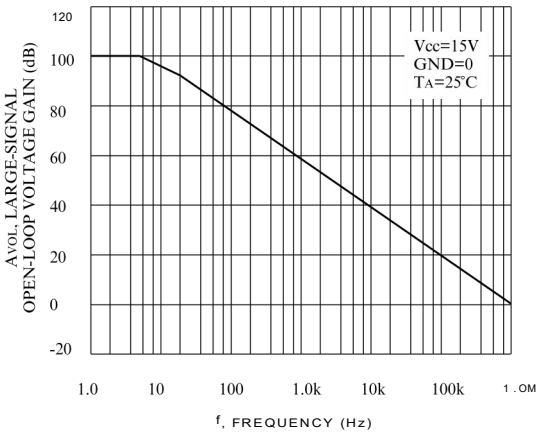


Figure 2. Open-Loop Frequency

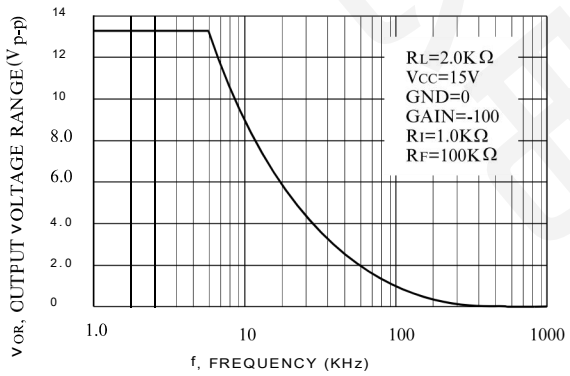


Figure 3. Large-Signal Frequency Response

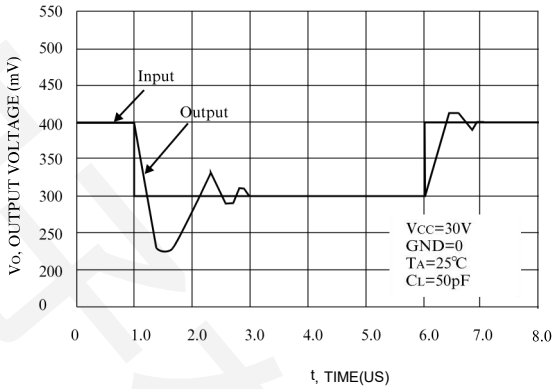


Figure 4. Small-Signal Voltage Follower Pulse Response (Noninverting)

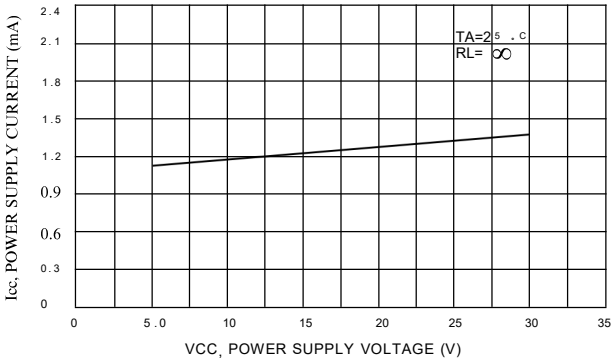


Figure 5. Power Supply Current versus Power Supply Voltage

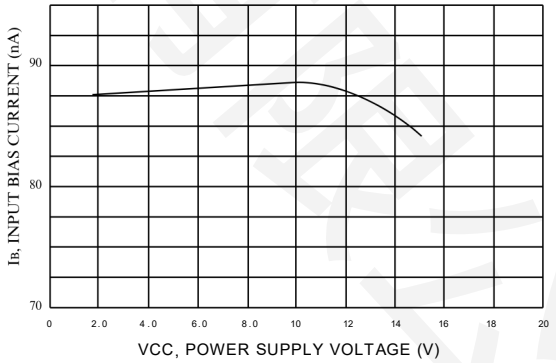
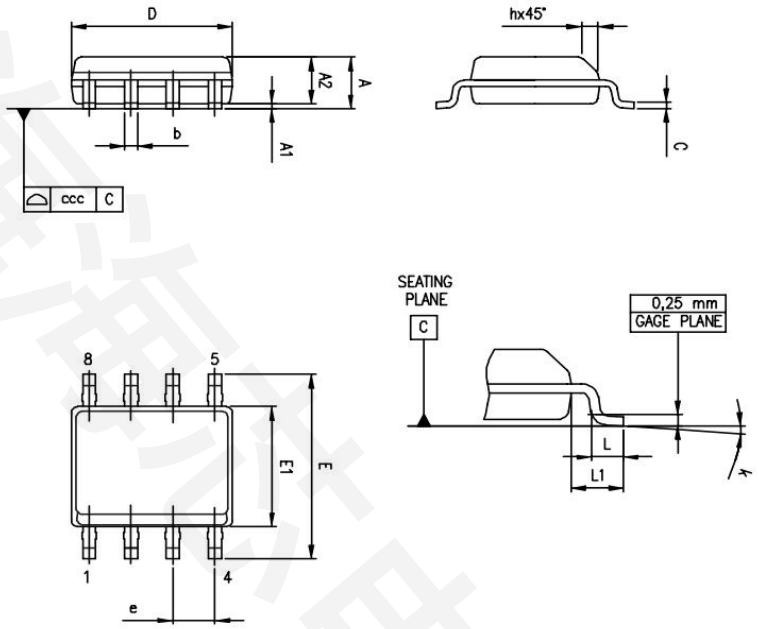


Figure 6. Input Bias Current versus Power Supply VoItage

Package dimensions

SO8 package



SO8 mechanical data

Ref	Dimensions					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
A			1.75			0.069
A1	0.10		0.25	0.004		0.010
A2	1.25			0.049		
b	0.28		0.48	0.011		0.019
c	0.17		0.23	0.007		0.010
D	4.80	4.90	5.00	0.189	0.193	0.197
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e		1.27			0.050	
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
L1		1.04			0.040	
k	0°		8°	0°		8°
ccc			0.10			0.004