

Low power, Dual Operational Amplifier in bare die form

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Description

The LM158 consists of x2 independent, high gain, internally frequency compensated operational amplifiers operating from a single power supply as low as 3V or as high as 32V. The device is useful in interface circuits with digital systems and can be operated from the single common 5V power supply. The device also finds use in transducer amplifiers, DC gain blocks & many other conventional op-amp circuits which benefit from the single power supply capability. $I_{\rm Q}$ per amplifier is about 1/5 of the industry 741. Split-supply operation is also possible with supply current drain independent of voltage supplied for low power. The die size is one of the smallest in the industry.

Ordering Information

The following part suffixes apply:

- No suffix MIL-STD-883 /2010B Visual Inspection
- "H" MIL-STD-883 /2010B Visual Inspection
 + MIL-PRF-38534 Class H LAT
- "K" MIL-STD-883 /2010A Visual Inspection (Space)
 + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com\quality\bare-die-lot-qualification

For a higher electrical grade version of this product see LM158A

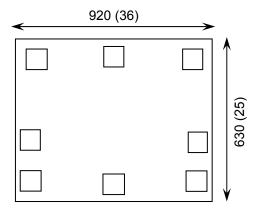
Supply Formats:

- Default Die in Waffle Pack (400 per tray capacity)
- Sawn Wafer on Tape On request
- Unsawn Wafer On request
- Die Thickness <> 350µm(15 Mils) On request
- Assembled into Ceramic Package On request

Features:

- Temperature compensated bandwidth (unity gain)
- Temperature compensated I_B: 45nA
- Wide power supply range, single supply: 3V-32V or dual supplies: ±1.5V to ±16V
- Low V_{OS}: 2mV, and I_{OS}: 3nA
- Differential input voltage range equal to the power supply voltage
- Large output voltage: 0V to V_{CC} -1.5V swing
- Input Common-Mode Voltage range includes GND

Die Dimensions in µm (mils)



Mechanical Specification

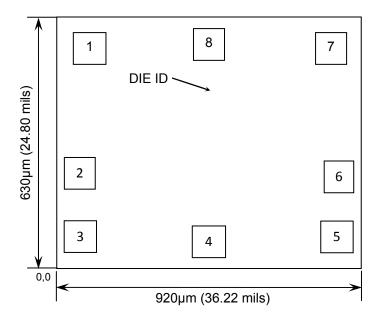
Die Size (Unsawn)	920 x 630 36 x 25	µm mils	
Minimum Bond Pad Size	85 x 85 3.35 x 3.35	μm mils	
Die Thickness	350 (±20) 13.78 (±0.79)	µm mils	
Top Metal Composition	Al 1%Si 1.1μm		
Back Metal Composition	N/A – Bare Si		





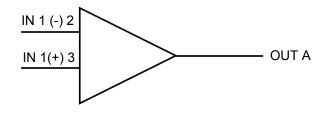
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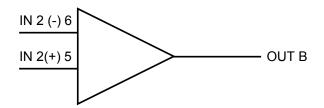
Pad Layout and Functions



PAD	FUNCTION	COORDINATES (mm)			
		X	Y		
1	OUTPUT A	0.1285	0.5015		
2	– INPUT A	0.1125	0.2425		
3	+ INPUT A	0.1125 0.112			
4	GND	0.4600	0.1075		
5	+ INPUT B	0.8075	0.1125		
6	– INPUT B	0.8075	0.2425		
7	OUTPUT B	0.7915	0.5015		
8	V _{cc}	0.4600	0.5175		
CHIP BACK POTENTIAL IS FLOAT					

Logic Diagram





PAD 8 = V_{CC}

PAD 4 = GND





Absolute Maximum Ratings¹

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PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage – Single Supply	V _{cc}	32	V
Supply Voltage – Split Supply	• • • • • • • • • • • • • • • • • • • •	±16	V
Input Differential Voltage Range	V_{IDR}	32	V
Input Common Mode Voltage Range	V_{ICR}	-0.3 to 32	V
Output Short Circuit to Ground	-	Continuous	-
Junction Temperature	Τ _J	150	°C
Input Current (per pin) ²	I _{IN}	50	mA

Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability.

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS
DC Supply Voltage	V _{CC}	±2.5 or 5	±15 or 30	V
Operating Temperature	T _A	-55	+125	°C

DC Electrical Characteristics (T_A = -55°C to +125°C unless otherwise specified)

		,			•	•	
PARAMETER	SYMBOL	CONDITIONS		LIMITS			UNITS
TAIVAIVILTEIX	STWIDGE			MIN	TYP	MAX	UNITS
Input Offset Voltage	V _{IO}	$V_{O} = 1.4V,$ $V_{CC} = 5V - 30V;$	25°C	-	2	5	mV
input Onset voltage	V IO	$R_S = 0\Omega$, $V_{ICM}=0V$ to $V_{CC}-1.7V$	125°C	-	-	7	IIIV
Input Offset Voltage Drift	ΔV _{IO} /ΔΤ	$V_{CC} = 30V; R_S = 0\Omega$		-	7	-	μV/°C
land to Office to Comment		\\\ - F \\	25°C	-	3	30	0
Input Offset Current I _{IO}	V _{CC} = 5V		-	-	100	- nA	
Input Offset Current Drift	ΔΙ _{ΙΟ} /ΔΤ	$V_{CC} = 30V; R_S = 0\Omega$		-	10	300	pA/°C
Input Bias Current		V _{CC} = 5V	25°C	-	45	150	nA
input bias Current	as Current I_{IB} $V_{CC} = 5V$		125°C	-	40	300	TIA TIA
Supply Current		R _L =∞,V _{CC} =5V, V _O :	= 0V	-	0.5	1.2	mΛ
Supply Current	Supply Current I _{CC}		$R_L=\infty, V_{CC}=30V, V_O=0V$		1	2	mA
Common Mode Input	V	V _{CC} = 30V	25°C	0	-	V _{CC} -1.5	V
Voltage range	V _{ICR}	VICR VCC - 30V	125°C	0	-	V _{CC} -2	
Differential Input Voltage range	V _{IDR}	All $V_{IN} \ge GND$ or V_{CC} - (if used)		-	-	V _{CC}	V



^{2.} V_{IN} < -0.3V. This input current exists when voltage is driven negative at any of the input leads



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DC Electrical Characteristics continued (T_A = -55°C to +125°C unless otherwise specified)

PARAMETER	CAMBOI	SYMBOL CONDITIONS		LIMITS			LIMITO
PARAMETER	STIVIBOL			MIN	TYP	MAX	UNITS
Large-Signal Open-	A _{VOL}	V _{CC} =15V	25°C	50	100	-	V/mV
Loop Voltage Gain	AVOL	R _L ≥ 2KΩ	125°C	25	-	-	V/IIIV
Output High-Level	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	V _{CC} =30V, R _L =2h	(Ω	26	-	-	V
Voltage swing	V _{OH}	V _{CC} =30V, R _L =10	ΚΩ	27	28	-	V
Output Low-Level Voltage swing	V _{OL}	V _{CC} =5V, R _L =10h	C Ω	-	5	20	mV
Common-Mode Rejection Ratio	CMRR	V_{CC} =30V, R _S =10KΩ, T _A = 25°C		70	85	-	dB
Power Supply Rejection Ratio	PSSR	V _{CC} =30V, T _A = 25°C		65	100	-	dB
Crosstalk Attenuation	V _{O1} /V _{O2}	f =1KHz to 20KHz, V_{CC} =30V, T_A = 25°C		-	-120	-	dB
Output Short-Circuit current to GND	I _{sc}	$V_{CC} = 5V, V_{O} = 0V$ $T_{A} = 25^{\circ}C$		-	40	60	mA
Output Source		V_{IN} + = 1V, V_{IN} - =0V,	25°C	20	40	-	mA
Current	rrent	$V_{CC} = 15V, V_{O} = 2V$	125°C	10	20	-	111/
		V_{IN} + = 0V, V_{IN} - =1V, V_{CC} =15V, V_{O} = 2V,	25°C	10	20	-	mA
			125°C	5	8	-	IIIA
Output Sink Current	Isink	V_{IN} + = 0V, V_{IN} - =1V, V_{CC} =15V, V_{O} = 0.2V, T_{A} = 25°C		12	50	-	μА

Typical Characteristics

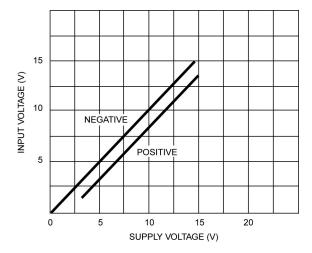


FIGURE 1. Input Voltage Range versus Supply Voltage

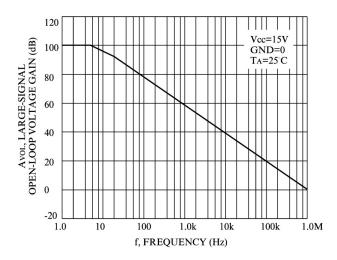


FIGURE 2. Open-Loop Frequency





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Typical Characteristics continued

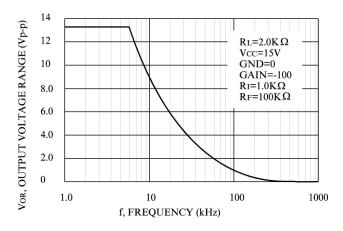


FIGURE 3. Large-Signal Frequency response

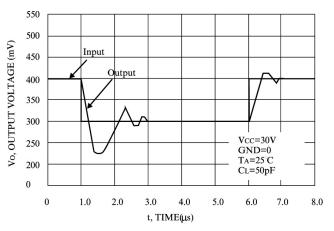


FIGURE 4. Small-Signal Voltage Follower Pulse Response (Non-inverting)

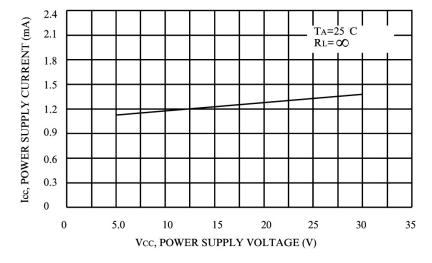


FIGURE 5. Power Supply Current versus Power Supply Voltage





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Typical Characteristics continued

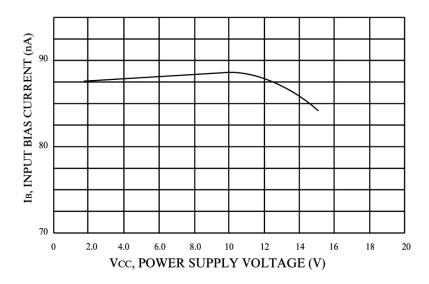


FIGURE 6. Low frequency Op-Amp with Offset adjust

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