

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 (A)

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 <u>LM158A</u>

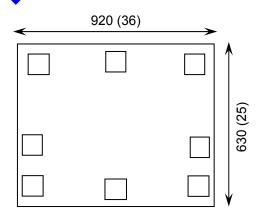
Supply Formats:

- Default Die in Waffle Pack (400 per tray capacity)
- *awn 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 bandwick (unity gain)
- Temperature compensated I_B: 45 nA
- Wide power supply range, single upply: 3V-32V or dual supplies: ±1.5V o ±6V
- 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 Complon-Mode Voltage range includes GND

Die Dimensions in µm (mils)



Mechanical Specification

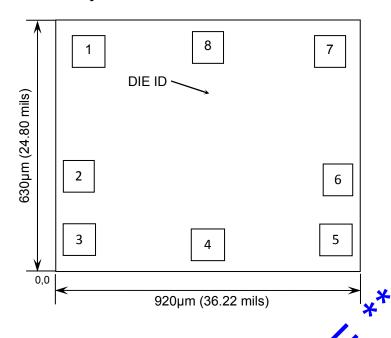
Die Size (Unsawn)	920 x 630	μm	
Die Size (Offsawii)	36 x 25	mils	
Minimum David David Cina	85 x 85	μm	
Minimum Bond Pad Size	3.35 x 3.35	mils	
Die Thieles	350 (±20)	μm	
Die Thickness	13.78 (±0.79)	mils	
Top Metal Composition	Al 1%Si 1.1μ	m	
Back Metal Composition	N/A – Bare Si		





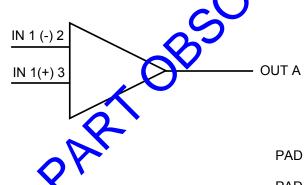
Pad Layout and Functions

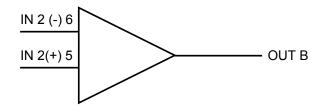
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PAD	FUNCTION	COORDINATES			
		X	Y		
1	OUTPUT A	0.1285	0.5015		
2	- INPUT A	0.1125	0.2425		
3	+ INCUT	0.1125	0.1125		
4	GND	0.4600	0.1075		
5	+INPUT B	0.8075	0.1125		
	- INPUT B	0.8075	0.2425		
	ОИТРИТ В	0.7915	0.5015		
8	V _{CC}	0.4600	0.5175		
CHIP 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	X
Input Differential Voltage Range	V_{IDR}	32	
Input Common Mode Voltage Range	V_{ICR}	-0.3 to 32	V
Output Short Circuit to Ground	-	Continuous	-
Junction Temperature	T_J	150	°C
Input Current (per pin) ²	I _{IN}	50	mA

^{1.} Operation above the absolute maximum rating may cause device failure. Operation at the absolute haximum 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	* 5	+125	°C

DC Electrical Characteristics (T_A 55 % +125°C unless otherwise specified)

PARAMETER	SYMBOL	BOL CONDITIONS		LIMITS			LIMITO	
PARAIVIETER	STWIDOL			MIN	TYP	MAX	UNITS	
Input Offset Voltage	V _{IO}	V =1.4V, V _{CC} = 5V - 30V;	25°C	-	2	5	mV	
input Onset voltage	VIO	$R_S = 0\Omega$, $V_{CC} = 0$ to $V_{CC} = 1.7$ V	125°C	-	-	7	IIIV	
Input Offset Voltage Drift	ΔΥ _{ΙΟ} ΔΤ	$V_{CC} = 30V; R_S =$	0Ω	-	7	-	μV/°C	
		\/ _ F\/	25°C	-	3	30	^	
Input Offset Current	I _{IO}	V _{CC} = 5V	125°C	-	-	100	- nA	
Input Offset Current Drift	ΔΙ _{ΙΟ} /ΔΤ	$V_{CC} = 30V; R_S = 0\Omega$		-	10	300	pA/°C	
Input Bas Current	I _{IB}	V _{CC} = 5V	25°C	-	45	150	nA	
input bits Current	IB	v _{CC} – 5v	125°C	-	40	300	IIA	
Supply Current		R _L =∞,V _{CC} =5V, V _O	= 0V	-	0.5	1.2	m A	
Supply Current	I _{cc}	$R_L=\infty, V_{CC}=30V, V_O=0V$		-	1	2	mA	
Common Mode Input	W	\/ - 20\/	25°C	0	-	V _{CC} -1.5	V	
Voltage range	V _{ICR}	$V_{CC} = 30V$		0	-	V _{CC} -2	V	
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	SYMBOL	L CONDITIONS		LIMITS			UNTS
PARAMETER	STWIBOL	CONDITIONS	•	MIN	TYP	MAX	OINI 3
Large-Signal Open-	A _{VOL}	V _{CC} =15V	25°C	50	100	-	V/mV
Loop Voltage Gain	, WOL	R _L ≥ 2KΩ	125°C	25	-	-	V////V
Output High-Level	V _{OH}	V _{CC} =30V, R _L =2l	ΚΩ	26	-	4	V
Voltage swing	V OH	V _{CC} =30V, R _L =10	ΚΩ	27	28	11-	V
Output Low-Level Voltage swing	V _{OL}	V _{CC} =5V, R _L =10I	ΚΩ	-	5	20	mV
Common-Mode Rejection Ratio	CMRR	V_{CC} =30V, R _S =10KΩ, T _A = 25°C		70	C 5	-	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		15	-120	-	dB
Output Short-Circuit current to GND	I _{SC}	$V_{CC} = 5V, V_{O} = 0V$ $T_{A} = 25^{\circ}C$		O -,	40	60	mA
Output Source	1	V_{IN} + = 1V, V_{IN} - =0V,	25°C/	20	40	-	mA
Current	ISOURCE	$V_{CC} = 15V, V_{O} = 2V$	125°C	10	20	-	ША
		V_{IN} + = 0V, V_{IN} - = 1V,	25°C	10	20	-	mA
		$V_{CC} = 15V, V_{O} = 2V,$	125°C	5	8	-	IIIA
Output Sink Current	Isink	V_{IN} + = $0 V_{IN}$ = V_{CC} 15V, V_{D} = 0 A = 25°C	1V, .2V,	12	50	-	μА

Typical Characteristics

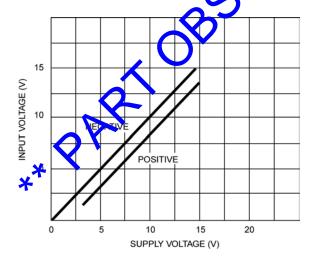


FIGURE 1. Input Voltage Range versus Supply Voltage

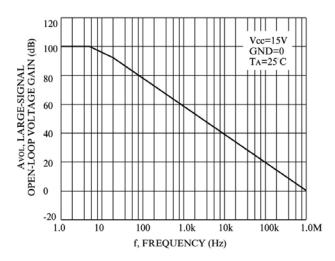


FIGURE 2. Open-Loop Frequency





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Typical Characteristics continued

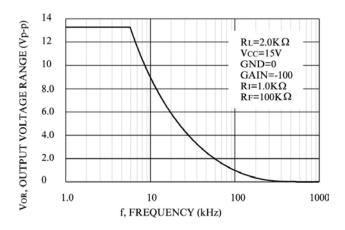


FIGURE 3. Large-Signal Frequency response

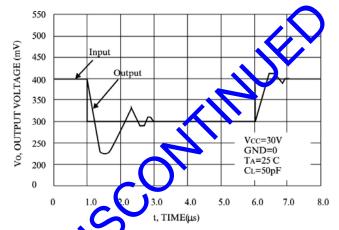


FIGURE Chall-Signal Voltage Follower Pulse Response (Non-inverting)

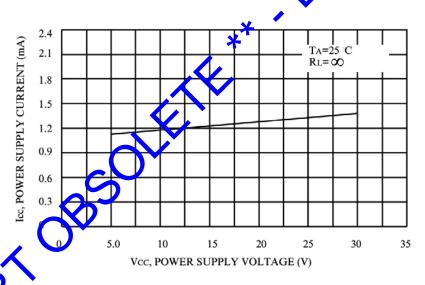


FIGURE 5. Power Supply Current versus Power Supply Voltage





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Typical Characteristics continued

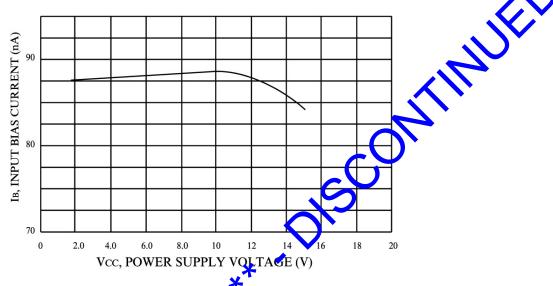


FIGURE 6. Low frequency Op-Amp with Offset adjust

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