National Semiconductor

LMH6618 Single/LMH6619 Dual 130 MHz, 1.25 mA RRIO Operational Amplifiers

General Description

The LMH6618 (single, with shutdown) and LMH6619 (dual) are 130 MHz rail-to-rail input and output amplifiers designed for ease of use in a wide range of applications requiring high speed, low supply current, low noise, and the ability to drive complex ADC and video loads. The operating voltage range extends from 2.7V to 11V and the supply current is typically 1.25 mA per channel at 5V. The LMH6618 and LMH6619 are members of the PowerWise® family and have an exceptional power-to-performance ratio.

The amplifier's voltage feedback design topology provides balanced inputs and high open loop gain for ease of use and accuracy in applications such as active filter design. Offset voltage is typically 0.1 mV and settling time to 0.01% is 120 ns which combined with an 100 dBc SFDR at 100 kHz makes the part suitable for use as an input buffer for popular 8-bit, 10-bit, 12-bit and 14-bit mega-sample ADCs.

The input common mode range extends 200 mV beyond the supply rails. On a single 5V supply with a ground terminated 150Ω load the output swings to within 37 mV of the ground rail, while a mid-rail terminated 1 kΩ load will swing to 77 mV of either rail, providing true single supply operation and maximum signal dynamic range on low power rails. The amplifier output will source and sink 35 mA and drive up to 30 pF loads without the need for external compensation.

The LMH6618 has an active low disable pin which reduces the supply current to 72 µA and is offered in the space saving 6-Pin TSOT23 package. The LMH6619 is offered in the 8-Pin SOIC package. The LMH6618 and LMH6619 are available with a −40°C to +125°C extended industrial temperature grade.

Features

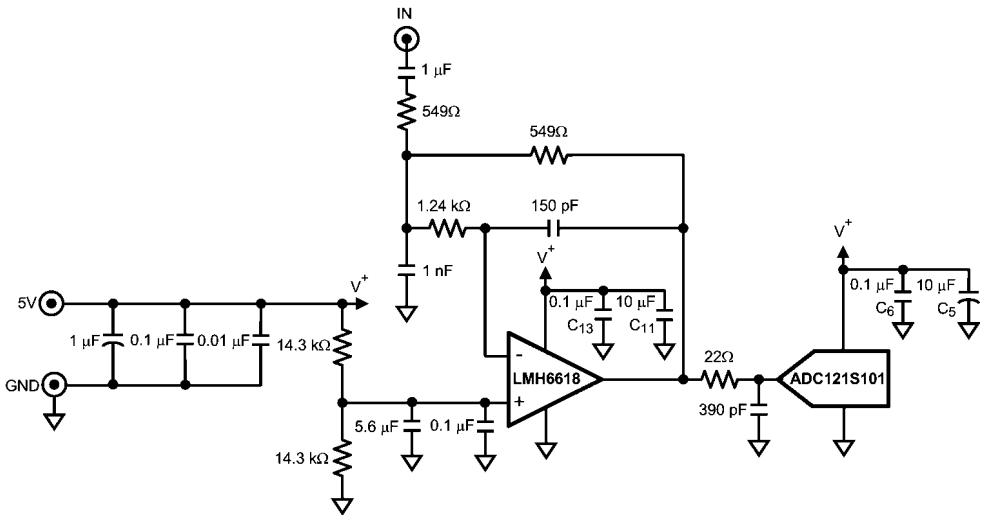
V_S = 5V, R_L = 1 kΩ, T_A = 25°C and A_V = +1, unless otherwise specified.

- Operating voltage range 2.7V to 11V
- Supply current per channel 1.25 mA
- Small signal bandwidth 130 MHz
- Input offset voltage (limit at 25°C) ±0.6 mV
- Slew rate 55 V/µs
- Settling time to 0.1% 90 ns
- Settling time to 0.01% 120 ns
- SFDR (f = 100 kHz, A_V = +1, V_{OUT} = 2 V_{PP}) 100 dBc
- 0.1 dB bandwidth (A_V = +2) 15 MHz
- Low voltage noise 10 nV/√Hz
- Industrial temperature grade −40°C to +125°C
- Rail-to-Rail input and output

Applications

- ADC driver
- DAC buffer
- Active filters
- High speed sensor amplifier
- Current sense amplifier
- Portable video
- STB, TV video amplifier

Typical Application



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Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

ESD Tolerance (Note 2)	
Human Body Model	
For input pins only	2000V
For all other pins	2000V
Machine Model	200V
Supply Voltage ($V_S = V^+ - V^-$)	12V
Junction Temperature (Note 3)	150°C max

Operating Ratings (Note 1)

Supply Voltage ($V_S = V^+ - V^-$)	2.7V to 11V
Ambient Temperature Range (Note 3)	−40°C to +125°C
Package Thermal Resistance (θ_{JA})	
6-Pin TSOT23	231°C/W
8-Pin SOIC	160°C/W

+3V Electrical Characteristics

Unless otherwise specified, all limits are guaranteed for T_J = +25°C, V^+ = 3V, V^- = 0V, $\overline{DISABLE}$ = 3V, $V_{CM} = V_O = V^+/2$, A_V = +1 (R_F = 0Ω), otherwise R_F = 2 kΩ for $A_V \neq +1$, R_L = 1 kΩ || 5 pF. **Boldface** Limits apply at temperature extremes. (Note 4)

Symbol	Parameter	Condition	Min (Note 8)	Typ (Note 7)	Max (Note 8)	Units
Frequency Domain Response						
SSBW	−3 dB Bandwidth Small Signal	A_V = 1, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}		120		MHz
		A_V = 2, −1, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}		56		
GBW	Gain Bandwidth (LMH6618)	A_V = 10, R_F = 2 kΩ, R_G = 221Ω, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}	55	71		MHz
GBW	Gain Bandwidth (LMH6619)	A_V = 10, R_F = 2 kΩ, R_G = 221Ω, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}	55	63		MHz
LSBW	−3 dB Bandwidth Large Signal	A_V = 1, R_L = 1 kΩ, V_{OUT} = 2 V_{PP}		13		MHz
		A_V = 2, R_L = 150Ω, V_{OUT} = 2 V_{PP}		13		
Peak	Peaking	A_V = 1, C_L = 5 pF		1.5		dB
0.1 dBBW	0.1 dB Bandwidth	A_V = 2, V_{OUT} = 0.5 V_{PP} , $R_F = R_G$ = 825Ω		15		MHz
DG	Differential Gain	A_V = +2, 4.43 MHz, 0.6V < V_{OUT} < 2V, R_L = 150Ω to $V^+/2$		0.1		%
DP	Differential Phase	A_V = +2, 4.43 MHz, 0.6V < V_{OUT} < 2V, R_L = 150Ω to $V^+/2$		0.1		deg
Time Domain Response						
t_r/t_f	Rise & Fall Time	2V Step, A_V = 1		36		ns
SR	Slew Rate	2V Step, A_V = 1	36	46		V/µs
$t_{s\_0.1}$	0.1% Settling Time	2V Step, A_V = −1		90		ns
$t_{s\_0.01}$	0.01% Settling Time	2V Step, A_V = −1		120		
Noise and Distortion Performance						
SFDR	Spurious Free Dynamic Range	f_C = 100 kHz, V_{OUT}= 2 V_{PP}, R_L = 1 kΩ		100		dBc
		f_C = 1 MHz, V_{OUT} = 2 V_{PP}, R_L = 1 kΩ		61		
		f_C = 5 MHz, V_{OUT} = 2 V_{PP}, R_L = 1 kΩ		47		
e_n	Input Voltage Noise Density	f = 100 kHz		10		$nV/\sqrt{Hz}$
i_n	Input Current Noise Density	f = 100 kHz		1		$pA/\sqrt{Hz}$
CT	Crosstalk (LMH6619)	f = 5 MHz, V_{IN} = 2 V_{PP}		80		dB
Input, DC Performance						
V_{OS}	Input Offset Voltage	V_{CM} = 0.5V (pnp active) V_{CM} = 2.5V (npn active)		0.1	±0.6 **±1.0**	mV
TCV_{OS}	Input Offset Voltage Temperature Drift	(Note 5)		0.8		µV/°C
I_B	Input Bias Current	V_{CM} = 0.5V (pnp active)		−1.4	**−2.6**	µA
		V_{CM} = 2.5V (npn active)		+1.0	**+1.8**	
I_{OS}	Input Offset Current			0.01	**±0.27**	µA

Symbol	Parameter	Condition	Min (Note 8)	Typ (Note 7)	Max (Note 8)	Units
C_{IN}	Input Capacitance			1.5		pF
R_{IN}	Input Resistance			8		MΩ
CMVR	Common Mode Voltage Range	DC, CMRR ≥ 65 dB	−0.2		3.2	V
CMRR	Common Mode Rejection Ratio	V_{CM} Stepped from −0.1V to 1.4V	78	96		dB
		V_{CM} Stepped from 2.0V to 3.1V	81	107		
A_{OL}	Open Loop Voltage Gain	R_L = 1 kΩ to +2.7V or +0.3V	85	98		dB
		R_L = 150Ω to +2.6V or +0.4V	76	82		
Output DC Characteristics						
V_{OUT}	Output Voltage Swing High (LMH6618) (Voltage from V^+ Supply Rail)	R_L = 1 kΩ to $V^+/2$		50	56 **62**	mV from either rail
		R_L =150Ω to $V^+/2$		160	172 **198**	
	Output Voltage Swing Low (LMH6618) (Voltage from V^- Supply Rail)	R_L = 1 kΩ to $V^+/2$		60	66 **74**	
		R_L = 150Ω to $V^+/2$		170	184 **217**	
		R_L = 150Ω to V^-		29	39 **43**	
	Output Voltage Swing High (LMH6619) (Voltage from V^+ Supply Rail)	R_L = 1 kΩ to $V^+/2$		50	56 **62**	mV from either rail
		R_L =150Ω to $V^+/2$		160	172 **198**	
	Output Voltage Swing Low (LMH6619) (Voltage from V^- Supply Rail)	R_L = 1 kΩ to $V^+/2$		62	68 **76**	
		R_L =150Ω to $V^+/2$		175	189 **222**	
		R_L = 150Ω to V^-		34	44 **48**	
I_{OUT}	Linear Output Current	V_{OUT} = $V^+/2$ (Note 6)	±25	±35		mA
R_{OUT}	Output Resistance	f = 1 MHz		0.17		Ω
Enable Pin Operation						
	Enable High Voltage Threshold	Enabled	2.0			V
	Enable Pin High Current	$V_{\overline{DISABLE}}$ = 3V		0.04		µA
	Enable Low Voltage Threshold	Disabled			1.0	V
	Enable Pin Low Current	$V_{\overline{DISABLE}}$ = 0V		1		µA
t_{on}	Turn-On Time			25		ns
t_{off}	Turn-Off Time			90		ns
Power Supply Performance						
PSRR	Power Supply Rejection Ratio	DC, V_{CM} = 0.5V, V_S = 2.7V to 11V	84	104		dB
I_S	Supply Current (LMH6618)	R_L = ∞		1.2	1.5 **1.7**	mA
	Supply Current (LMH6619) (per channel)	R_L = ∞		1.2	1.5 **1.75**	
I_{SD}	Disable Shutdown Current	$\overline{DISABLE}$ = 0V		59	85	µA

+5V Electrical Characteristics

Unless otherwise specified, all limits are guaranteed for T_J = +25°C, V^+ = 5V, V^- = 0V, $\overline{DISABLE}$ = 5V, $V_{CM} = V_O = V^+/2$, A_V = +1 (R_F = 0Ω), otherwise R_F = 2 kΩ for $A_V \neq +1$, R_L = 1 kΩ || 5 pF. **Boldface** Limits apply at temperature extremes.

Symbol	Parameter	Condition	Min (Note 8)	Typ (Note 7)	Max (Note 8)	Units
Frequency Domain Response						
SSBW	–3 dB Bandwidth Small Signal	A_V = 1, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}		130		MHz
		A_V = 2, –1, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}		53		
GBW	Gain Bandwidth (LMH6618)	A_V = 10, R_F = 2 kΩ, R_G = 221Ω, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}	54	64		MHz
GBW	Gain Bandwidth (LMH6619)	A_V = 10, R_F = 2 kΩ, R_G = 221Ω, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}	54	57		MHz
LSBW	–3 dB Bandwidth Large Signal	A_V = 1, R_L = 1 kΩ, V_{OUT} = 2 V_{PP}		15		MHz
		A_V = 2, R_L = 150Ω, V_{OUT} = 2 V_{PP}		15		
Peak	Peaking	A_V = 1, C_L = 5 pF		0.5		dB
0.1 dBBW	0.1 dB Bandwidth	A_V = 2, V_{OUT} = 0.5 V_{PP}, $R_F = R_G$ = 1 kΩ		15		MHz
DG	Differential Gain	A_V = +2, 4.43 MHz, 0.6V < V_{OUT} < 2V, R_L = 150Ω to $V^+/2$		0.1		%
DP	Differential Phase	A_V = +2, 4.43 MHz, 0.6V < V_{OUT} < 2V, R_L = 150Ω to $V^+/2$		0.1		deg
Time Domain Response						
t_r/t_f	Rise & Fall Time	2V Step, A_V = 1		30		ns
SR	Slew Rate	2V Step, A_V = 1	44	55		V/µs
$t_{s\_0.1}$	0.1% Settling Time	2V Step, A_V = –1		90		ns
$t_{s\_0.01}$	0.01% Settling Time	2V Step, A_V = –1		120		
Distortion and Noise Performance						
SFDR	Spurious Free Dynamic Range	f_C = 100 kHz, V_{OUT} = 2 V_{PP}, R_L = 1 kΩ		100		dBc
		f_C = 1 MHz, V_{OUT} = 2 V_{PP}, R_L = 1 kΩ		88		
		f_C = 5 MHz, V_O = 2 V_{PP}, R_L = 1 kΩ		61		
e_n	Input Voltage Noise Density	f = 100 kHz		10		$nV/\sqrt{Hz}$
i_n	Input Current Noise Density	f = 100 kHz		1		$pA/\sqrt{Hz}$
CT	Crosstalk (LMH6619)	f = 5 MHz, V_{IN} = 2 V_{PP}		80		dB
Input, DC Performance						
V_{OS}	Input Offset Voltage	V_{CM} = 0.5V (pnp active) V_{CM} = 4.5V (npn active)		0.1	±0.6 **±1.0**	mV
TCV_{OS}	Input Offset Voltage Temperature Drift	(Note 5)		0.8		µV/°C
I_B	Input Bias Current	V_{CM} = 0.5V (pnp active)		–1.5	**–2.4**	µA
		V_{CM} = 4.5V (npn active)		+1.0	**+1.9**	
I_{OS}	Input Offset Current			0.01	**±0.26**	µA
C_{IN}	Input Capacitance			1.5		pF
R_{IN}	Input Resistance			8		MΩ
CMVR	Common Mode Voltage Range	DC, CMRR ≥ 65 dB	–0.2		5.2	V
CMRR	Common Mode Rejection Ratio	V_{CM} Stepped from –0.1V to 3.4V	81	98		dB
		V_{CM} Stepped from 4.0V to 5.1V	84	108		
A_{OL}	Open Loop Voltage Gain	R_L = 1 kΩ to +4.6V or +0.4V	84	100		dB
		R_L = 150Ω to +4.5V or +0.5V	78	83		

Symbol	Parameter	Condition	Min (Note 8)	Typ (Note 7)	Max (Note 8)	Units
Output DC Characteristics						
V_{OUT}	Output Voltage Swing High (LMH6618) (Voltage from V^+ Supply Rail)	R_L = 1 kΩ to $V^+/2$		60	73 **82**	mV from either rail
		R_L = 150Ω to $V^+/2$		230	255 **295**	
	Output Voltage Swing Low (LMH6618) (Voltage from V^- Supply Rail)	R_L = 1 kΩ to $V^+/2$		75	83 **96**	
		R_L = 150Ω to $V^+/2$		250	270 **321**	
		R_L = 150Ω to V^-		32	43 **45**	
	Output Voltage Swing High (LMH6619) (Voltage from V^+ Supply Rail)	R_L = 1 kΩ to $V^+/2$		60	73 **82**	mV from either rail
		R_L = 150Ω to $V^+/2$		230	255 **295**	
	Output Voltage Swing Low (LMH6619) (Voltage from V^- Supply Rail)	R_L = 1 kΩ to $V^+/2$		77	85 **98**	
		R_L = 150Ω to $V^+/2$		255	275 **326**	
		R_L = 150Ω to V^-		37	48 **50**	
I_{OUT}	Linear Output Current	V_{OUT} = $V^+/2$ (Note 6)	±25	±35		mA
R_{OUT}	Output Resistance	f = 1 MHz		0.17		Ω
Enable Pin Operation						
	Enable High Voltage Threshold	Enabled	3.0			V
	Enable Pin High Current	$V_{\overline{DISABLE}}$ = 5V		1.2		µA
	Enable Low Voltage Threshold	Disabled			2.0	V
	Enable Pin Low Current	$V_{\overline{DISABLE}}$ = 0V		2.5		µA
t_{on}	Turn-On Time			25		ns
t_{off}	Turn-Off Time			90		ns
Power Supply Performance						
PSRR	Power Supply Rejection Ratio	DC, V_{CM} = 0.5V, V_S = 2.7V to 11V	84	104		dB
I_S	Supply Current (LMH6618)	R_L = ∞		1.25	1.5 **1.7**	mA
	Supply Current (LMH6619) (per channel)	R_L = ∞		1.3	1.5 **1.75**	
I_{SD}	Disable Shutdown Current	$\overline{DISABLE}$ = 0V		72	105	µA

±5V Electrical Characteristics

Unless otherwise specified, all limits are guaranteed for T_J = +25°C, V^+ = 5V, V^- = −5V, $\overline{DISABLE}$ = 5V, V_{CM} = V_O = 0V, A_V = +1 (R_F = 0Ω), otherwise R_F = 2 kΩ for $A_V \neq +1$, R_L = 1 kΩ || 5 pF. **Boldface** Limits apply at temperature extremes.

Symbol	Parameter	Condition	Min (Note 8)	Typ (Note 7)	Max (Note 8)	Units
Frequency Domain Response						
SSBW	−3 dB Bandwidth Small Signal	A_V = 1, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}		140		MHz
		A_V = 2, −1, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}		53		
GBW	Gain Bandwidth (LMH6618)	A_V = 10, R_F = 2 kΩ, R_G = 221Ω, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}	54	65		MHz
GBW	Gain Bandwidth (LMH6619)	A_V = 10, R_F = 2 kΩ, R_G = 221Ω, R_L = 1 kΩ, V_{OUT} = 0.2 V_{PP}	54	58		MHz

Symbol	Parameter	Condition	Min (Note 8)	Typ (Note 7)	Max (Note 8)	Units
LSBW	−3 dB Bandwidth Large Signal	A_V = 1, R_L = 1 kΩ, V_{OUT} = 2 V_{PP}		16		MHz
		A_V = 2, R_L = 150Ω, V_{OUT} = 2 V_{PP}		15		
Peak	Peaking	A_V = 1, C_L = 5 pF		0.05		dB
0.1 dBBW	0.1 dB Bandwidth	A_V = 2, V_{OUT} = 0.5 V_{PP}, R_F = R_G = 1.21 kΩ		15		MHz
DG	Differential Gain	A_V = +2, 4.43 MHz, 0.6V < V_{OUT} < 2V, R_L = 150Ω to V+/2		0.1		%
DP	Differential Phase	A_V = +2, 4.43 MHz, 0.6V < V_{OUT} < 2V, R_L = 150Ω to V+/2		0.1		deg
Time Domain Response						
t_r/t_f	Rise & Fall Time	2V Step, A_V = 1		30		ns
SR	Slew Rate	2V Step, A_V = 1	45	57		V/µs
$t_{s\_0.1}$	0.1% Settling Time	2V Step, A_V = −1		90		ns
$t_{s\_0.01}$	0.01% Settling Time	2V Step, A_V = −1		120		
Noise and Distortion Performance						
SFDR	Spurious Free Dynamic Range	f_C = 100 kHz, V_{OUT} = 2 V_{PP}, R_L = 1 kΩ		100		dBc
		f_C = 1 MHz, V_{OUT} = 2 V_{PP}, R_L = 1 kΩ		88		
		f_C = 5 MHz, V_{OUT} = 2 V_{PP}, R_L = 1 kΩ		70		
e_n	Input Voltage Noise Density	f = 100 kHz		10		$nV/\sqrt{Hz}$
i_n	Input Current Noise Density	f = 100 kHz		1		$pA/\sqrt{Hz}$
CT	Crosstalk (LMH6619)	f = 5 MHz, V_{IN} = 2 V_{PP}		80		dB
Input DC Performance						
V_{OS}	Input Offset Voltage	V_{CM} = −4.5V (pnp active) V_{CM} = 4.5V (npn active)		0.1	±0.6 **±1.0**	mV
TCV_{OS}	Input Offset Voltage Temperature Drift	(Note 5)		0.9		µV/°C
I_B	Input Bias Current	V_{CM} = −4.5V (pnp active)		−1.5	**−2.4**	µA
		V_{CM} = 4.5V (npn active)		+1.0	**+1.9**	
I_{OS}	Input Offset Current			0.01	**±0.26**	µA
C_{IN}	Input Capacitance			1.5		pF
R_{IN}	Input Resistance			8		MΩ
CMVR	Common Mode Voltage Range	DC, CMRR ≥ 65 dB	−5.2		5.2	V
CMRR	Common Mode Rejection Ratio	V_{CM} Stepped from −5.1V to 3.4V	84	100		dB
		V_{CM} Stepped from 4.0V to 5.1V	83	108		
A_{OL}	Open Loop Voltage Gain	R_L = 1 kΩ to +4.6V or −4.6V	86	95		dB
		R_L = 150Ω to +4.3V or −4.3V	79	84		

Symbol	Parameter	Condition	Min (Note 8)	Typ (Note 7)	Max (Note 8)	Units
Output DC Characteristics						
V_{OUT}	Output Voltage Swing High (LMH6618) (Voltage from V^+ Supply Rail)	R_L = 1 kΩ to GND		100	111 **126**	mV from either rail
		R_L = 150Ω to GND		430	457 **526**	
	Output Voltage Swing Low (LMH6618) (Voltage from V^- Supply Rail)	R_L = 1 kΩ to GND		110	121 **136**	
		R_L = 150Ω to GND		440	474 **559**	
		R_L = 150Ω to V^-		35	51 **52**	
	Output Voltage Swing High (LMH6619) (Voltage from V^+ Supply Rail)	R_L = 1 kΩ to GND		100	111 **126**	mV from either rail
		R_L = 150Ω to GND		430	457 **526**	
	Output Voltage Swing Low (LMH6619) (Voltage from V^- Supply Rail)	R_L = 1 kΩ to GND		115	126 **141**	
		R_L = 150Ω to GND		450	484 **569**	
		R_L = 150Ω to V^-		45	61 **62**	
I_{OUT}	Linear Output Current	V_{OUT} = V^+/2 (Note 6)	±25	±35		mA
R_{OUT}	Output Resistance	f = 1 MHz		0.17		Ω
Enable Pin Operation						
	Enable High Voltage Threshold	Enabled	0.5			V
	Enable Pin High Current	$V_{\overline{DISABLE}}$ = +5V		16		µA
	Enable Low Voltage Threshold	Disabled			–0.5	V
	Enable Pin Low Current	$V_{\overline{DISABLE}}$ = –5V		17		µA
t_{on}	Turn-On Time			25		ns
t_{off}	Turn-Off Time			90		ns
Power Supply Performance						
PSRR	Power Supply Rejection Ratio	DC, V_{CM} = –4.5V, V_S = 2.7V to 11V	84	104		dB
I_S	Supply Current (LMH6618)	R_L = ∞		1.35	1.6 **1.9**	mA
	Supply Current (LMH6619) (per channel)	R_L = ∞		1.45	1.65 **2.0**	
I_{SD}	Disable Shutdown Current	$\overline{DISABLE}$ = –5V		103	140	µA

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not guaranteed. For guaranteed specifications and the test conditions, see the Electrical Characteristics.

Note 2: Human Body Model, applicable std. MIL-STD-883, Method 3015.7. Machine Model, applicable std. JESD22-A115-A (ESD MM std. of JEDEC)

Field-Induced Charge-Device Model, applicable std. JESD22-C101-C (ESD FICDM std. of JEDEC).

Note 3: The maximum power dissipation is a function of $T_{J(MAX)}$, θ_{JA}. The maximum allowable power dissipation at any ambient temperature is $P_D = (T_{J(MAX)} - T_A)/\theta_{JA}$. All numbers apply for packages soldered directly onto a PC Board.

Note 4: Boldface limits apply to temperature range of –40°C to 125°C

Note 5: Voltage average drift is determined by dividing the change in V_{OS} by temperature change.

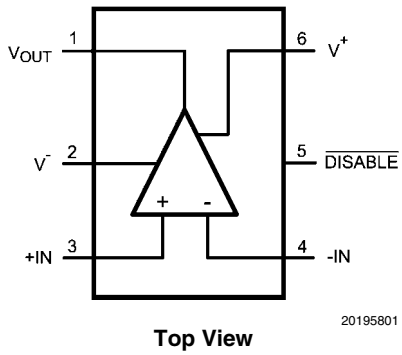
Note 6: Do not short circuit the output. Continuous source or sink currents larger than the I_{OUT} typical are not recommended as it may damage the part.

Note 7: Typical values represent the most likely parametric norm as determined at the time of characterization. Actual typical values may vary over time and will also depend on the application and configuration. The typical values are not tested and are not guaranteed on shipped production material.

Note 8: Limits are 100% production tested at 25°C. Limits over the operating temperature range are guaranteed through correlations using the Statistical Quality Control (SQC) method.

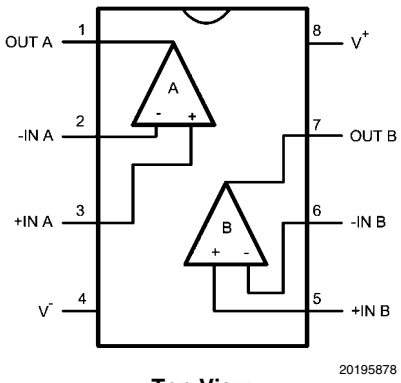
Connection Diagrams

6-Pin TSOT23



Top View

8-Pin SOIC

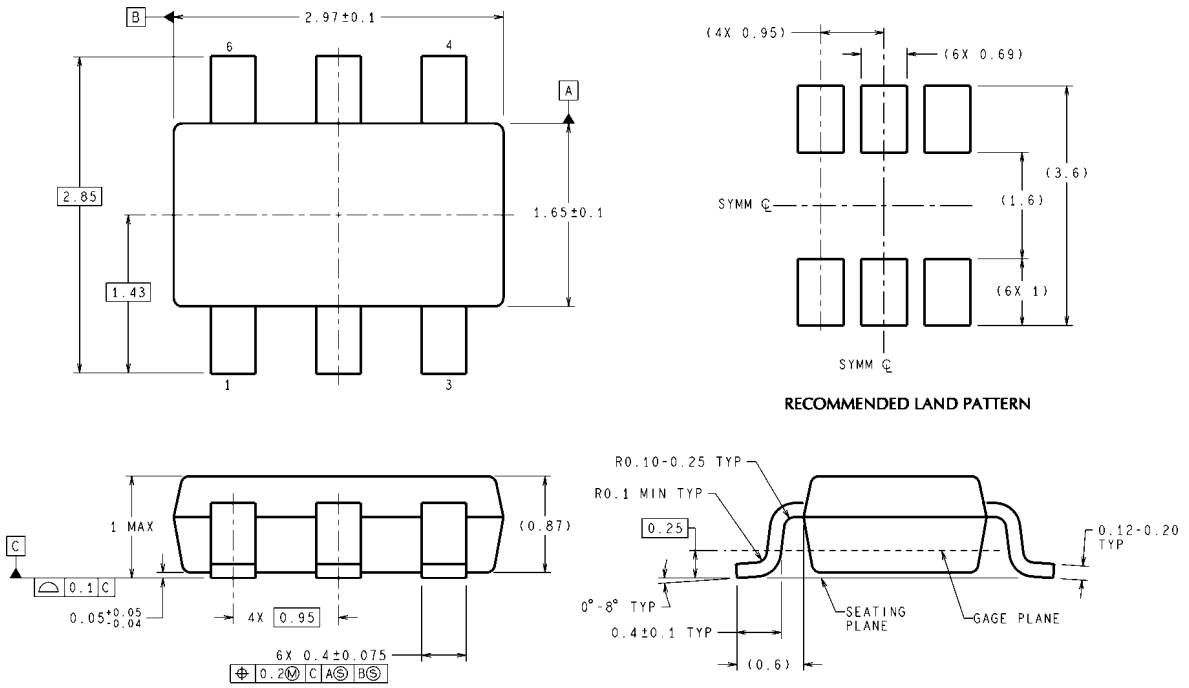


Top View

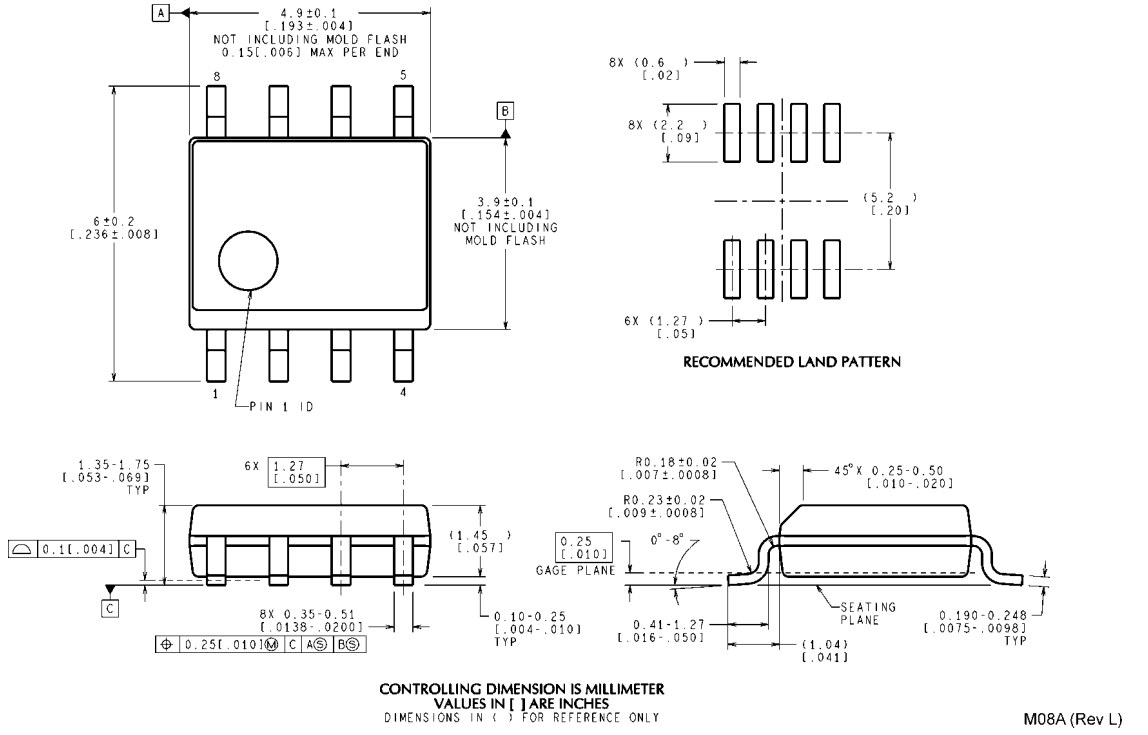
Ordering Information

Package	Part Number	Package Marking	Transport Media	NSC Drawing
6-Pin TSOT23	LMH6618MK	AE4A	1k Units Tape and Reel	MK06A
	LMH6618MKE		250 Units Tape and Reel	
	LMH6618MKX		3k Units Tape and Reel	
8-Pin SOIC	LMH6619MA	LMH6619MA	95 Units/Rail	M08A
	LMH6619MAE		250 Units Tape and Reel	
	LMH6619MAX		2.5k Units Tape and Reel	

Physical Dimensions inches (millimeters) unless otherwise noted



6-Pin TSOT23
NS Package Number MK06A



8-Pin SOIC
NS Package Number M08A