

Low Power Dissipation, Low Offset, CMOS, Rail-to-Rail Input and Output Operational Amplifier

PRODUCT DESCRIPTION

The MS8117S/MS8127 is single/dual-channel operational amplifier and featured by low power dissipation, rail-to-rail input and output, low input offset voltage and low current noise. The specific characteristics could be expressed as follows: The MS8117S/MS8127 can operates in single power supply from 1.8V to 5V or dual power supply; Low power dissipation and low noise features make the MS8117S/MS8127 used in mobile devices; Rail-to-rail feature makes it used in the buffer of CMOS, ADCs, DACs, ASICs or the system with low power dissipation and wide output swing.

FEATURES

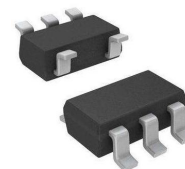
- Low Offset Voltage: 50uV (Typ)
- Low Input Bias Current: 10pA (Max@25°C)
- Single Power Supply: 1.8V to 5V
- Low Noise: 24nV/√Hz
- Micro Power Dissipation: 40uA (single amp)
- No Phase Reversal
- Stable Unit Gain

APPLICATIONS

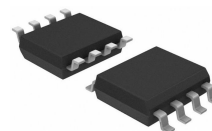
- Battery-powered Device
- Multi-order Filter
- ADC Front Driving
- DAC Driving/Level Shift
- Low Power Dissipation, ASIC Input and Output Amplifier

PRODUCT SPECIFICATION

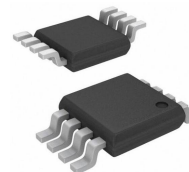
Part Number	Package	Marking
MS8117S	SOT23-5	8117S
MS8127	SOP8	MS8127
MS8127M	MSOP8	MS8127M



SOT23-5

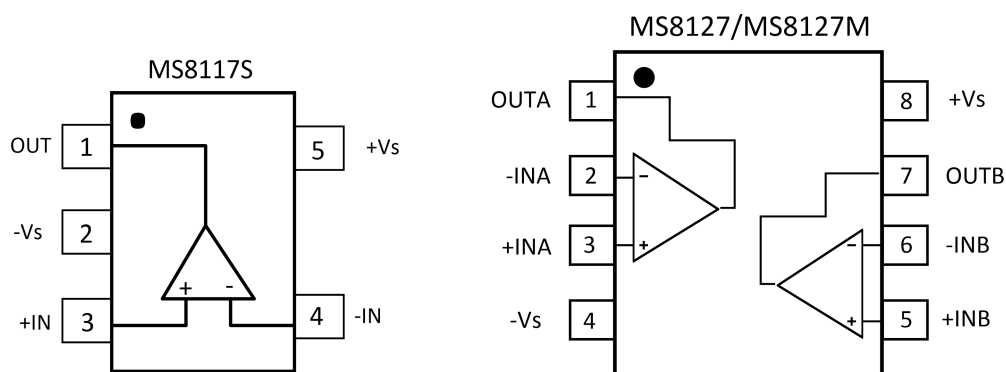


SOP8



MSOP8

PIN CONFIGURATION



PIN DESCRIPTION

Pin	Name	Type	Description
MS8117S			
1	OUT	O	Channel Output
2	-Vs	-	Negative Power Supply
3	+IN	I	Positive Input
4	-IN	I	Negative Input
5	+Vs	-	Positive Power Supply
MS8127/MS8127M			
1	OUTA	O	Channel A Output
2	-INA	I	Negative Input (Channel A)
3	+INA	I	Positive Input (Channel A)
4	-Vs	-	Negative Power Supply
5	+INB	I	Positive Input (Channel B)
6	-INB	I	Negative Input (Channel B)
7	OUTB	O	Channel B Output
8	+Vs	-	Positive Power Supply

ABSOLUTE MAXIMUM RATINGS

Any exceeding absolute maximum rating application causes permanent damage to device. Because long-time absolute operation state affects device reliability. Absolute ratings just conclude from a series of extreme tests. It doesn't represent chip can operate normally in these extreme conditions.

Parameter	Symbol	Ratings	Unit
Power Supply	V _s	6	V
Input Voltage		-V _s -0.3 ~ +V _s +0.3	V
Differential Input Voltage		±6	V
Junction Temperature		-65 ~ 150	°C
Operating Temperature	T _A	-40 ~ 125	°C
Storage Temperature	T _{stg}	-60 ~ 150	°C
Lead Temperature (10s)		260	°C

ELECTRICAL CHARACTERISTICS(5V)

Unless otherwise noted, $V_{CC}=5V$, $V_{CM}=2.5V$, $T_A=25^{\circ}C$.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input Characteristics						
Input Offset Voltage	VOS	$-0.3V < V_{CM} < +5.3V, @25^{\circ}C$		50	300	μV
		$-0.3V < V_{CM} < +5.3V, -40^{\circ}C \leq T_A \leq 100^{\circ}C$			300	
		$-0.3V < V_{CM} < +5.3V, 100^{\circ}C \leq T_A \leq 125^{\circ}C$			1350	
Input Bias Current	IB	@25 $^{\circ}C$		2	10	pA
		$-40^{\circ}C \leq T_A \leq 85^{\circ}C$			110	pA
		$-40^{\circ}C \leq T_A \leq 100^{\circ}C$			781	pA
		$100^{\circ}C \leq T_A \leq 125^{\circ}C$			3500	pA
Input Offset Current	IOS	@25 $^{\circ}C$		1	5	pA
		$-40^{\circ}C \leq T_A \leq 85^{\circ}C$			50	pA
		$-40^{\circ}C \leq T_A \leq 100^{\circ}C$			250	pA
		$100^{\circ}C \leq T_A \leq 125^{\circ}C$			360	pA
Common-mode Rejection Ratio	CMRR	$0V \leq V_{CM} \leq 5.0V$		75		dB
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$	68			
Large Signal Gain	AVO	$R_L=10k\Omega, V_O=0.5V \sim 4.5V$	85	90		dB
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-40^{\circ}C \leq T_A \leq 100^{\circ}C$		5	10	$\mu V/^{\circ}C$
		$100^{\circ}C \leq T_A \leq 125^{\circ}C$			50	
Input Capacitance	CDIFF			1.9		pF
	CCM			2.5		pF
Output Characteristics						
Output High Voltage	VOH	$I_L=1mA$	4.95	4.98		V
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$	4.9			
		$I_L=10mA$		4.7		V
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$	4.50			
Output Low Voltage	VOL	$I_L=1mA$		20	30	V
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$			50	
		$I_L=10mA$		190	275	V
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$			335	
Short-circuit Current	ISC			± 70		mA
Closed-loop Output Impedance	ZOUT	$f=10kHz, A_V=1$		15		Ω

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Power Supply						
Power Supply Rejection Ratio	PSRR	2.2V < V _{CM} < 5V	67	80		dB
		-40°C ≤ T _A ≤ 125°C	64			dB
Static Current	I _{SY}	V _O =V _{CC} /2		45		μA
		-40°C ≤ T _A ≤ 125°C			50	
Dynamic Characteristics						
Gain Bandwidth Product	GBP			0.55		MHz
Slew Rate	SR			0.4		V/μs
Setup Time 0.1%	t _s	G=±1,2Vstep C _L =20pF,R _L =1kΩ		23		us
Phase Margin	Φ _o	R _L =100kΩ,R _L =10kΩ,C _L =20pF		65		Deg
Noise Characteristics						
Peak-to-Peak Noise				2.3	3.5	uV
Voltage Noise Density	e _n	f=1kHz		35		nV/√Hz
		f=10kHz		31		nV/√Hz
Current Noise Density	i _n	f=1kHz		0.05		pA/√Hz

ELECTRICAL CHARACTERISTICS(1.8V)

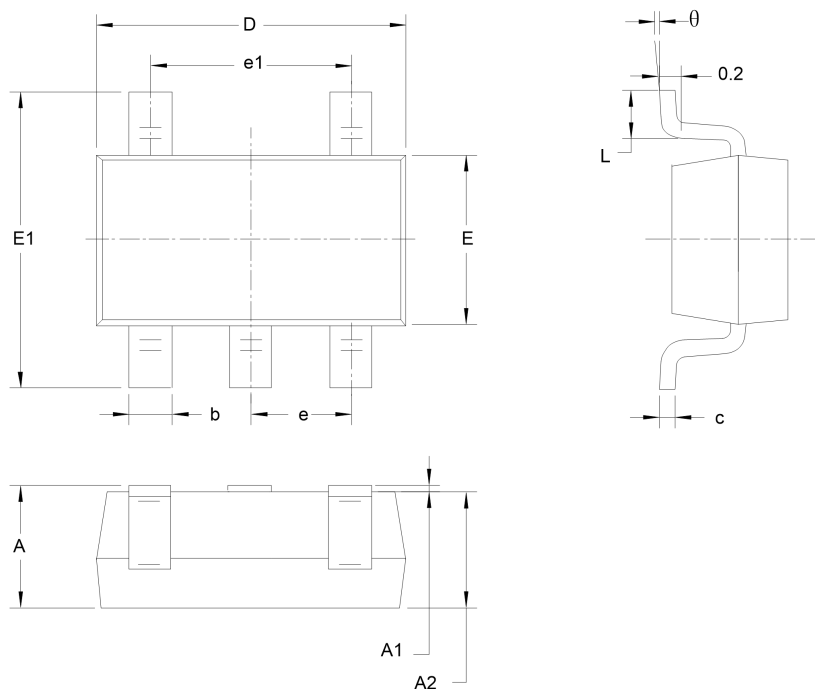
Unless otherwise noted, $V_{CC}=1.8V$, $V_{CM}=0.9V$, $T_A=25^{\circ}C$.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input Characteristics						
Input Offset Voltage	V_{OS}	$-0.3V < V_{CM} < +2.0V, @25^{\circ}C$		50	300	μV
		$-0.3V < V_{CM} < +2.0V, -40^{\circ}C \leq T_A \leq 100^{\circ}C$			300	
		$-0.3V < V_{CM} < +2.0V, 100^{\circ}C \leq T_A \leq 125^{\circ}C$			1000	
Input Bias Current	I_B	@25 $^{\circ}C$		2	10	pA
		$-40^{\circ}C \leq T_A \leq 85^{\circ}C$			110	pA
		$-40^{\circ}C \leq T_A \leq 100^{\circ}C$			780	pA
		$100^{\circ}C \leq T_A \leq 125^{\circ}C$			3500	pA
Input Offset Current	I_{OS}	@25 $^{\circ}C$		1	5	pA
		$-40^{\circ}C \leq T_A \leq 85^{\circ}C$			50	pA
		$-40^{\circ}C \leq T_A \leq 100^{\circ}C$			250	pA
		$100^{\circ}C \leq T_A \leq 125^{\circ}C$			360	pA
Common-mode Rejection Ratio	CMRR	$0V \leq V_{CM} \leq 1.8V$	58	75		dB
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$	55			
Large Signal Gain	A_{VO}	$R_L=10k\Omega, V_O=0.5V \sim 1.7V$	85	90		dB
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$	$-40^{\circ}C \leq T_A \leq 100^{\circ}C$		5	10	$\mu V/^{\circ}C$
		$100^{\circ}C \leq T_A \leq 125^{\circ}C$			50	
Input Capacitance	C_{DIFF}			2.1		pF
	C_{CM}			3.8		pF
Output Characteristics						
Output High Voltage	V_{OH}	$I_L=1mA$	1.65	1.73		V
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$	1.6			
Output Low Voltage	V_{OL}	$I_L=1mA$		44	60	mV
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$			80	
Short-circuit Current	I_{SC}			± 70		mA
Closed-loop Output Impedance	Z_{OUT}	$f=10kHz, A_V=1$		15		Ω

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Power Supply						
Power Supply Rejection Ratio	PSRR	$0.9V \leq V_{CM} \leq 1.8V$	67	80		dB
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$	64			dB
Static Current	I _{SY}	$V_O = V_{CC}/2$		45		μA
		$-40^{\circ}C \leq T_A \leq 125^{\circ}C$			50	
Dynamic Characteristics						
Gain Bandwidth Product	GBP			0.45		MHz
Slew Rate	SR			0.4		V/μs
Setup Time 0.1%	t _s	G=±1,2Vstep C _L =20pF,R _L =1kΩ		6.5		us
Phase Margin	Φ _o	R _L =100kΩ,R _L =10kΩ, C _L =20pF		65		Deg
Noise Characteristics						
Peak-to-Peak Noise				2.3	3.5	uV
Voltage Noise Density	e _n	f=1kHz		35		nV/√Hz
		f=10kHz		31		nV/√Hz
Current Noise Density	i _n	f=1kHz		0.05		pA/√Hz

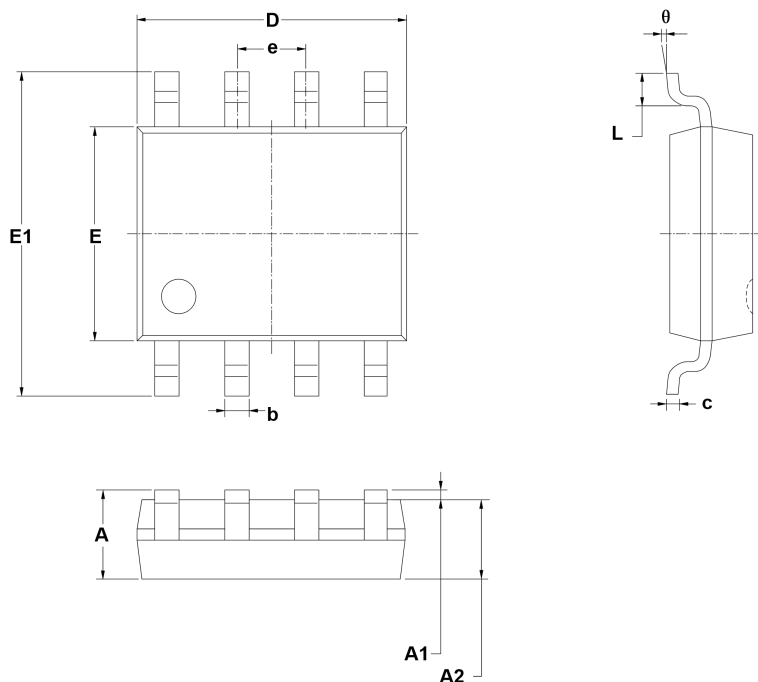
PACKAGE OUTLINE DIMENSIONS

SOT23-5

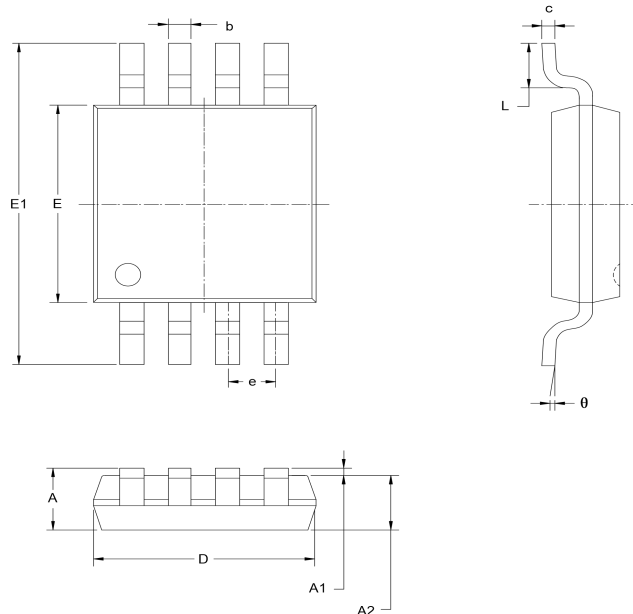


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0 °	8 °	0 °	8 °

MSOP8


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650BSC		0.026BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

MARKING and PACKAGING SPECIFICATIONS

1. Marking Drawing Description



Product Name : MS8117S, MS8127, MS8127M

Product Code : XXXX, XXXXXX

2. Marking Drawing Demand

Laser printing, contents in the middle, font type Arial.

3. Packaging Specifications

Device	Package	Piece/Reel	Reel/Box	Piece /Box	Box/Carton	Piece/Carton
MS8117S	SOT23-5	3000	10	30000	4	120000
MS8127	SOP8	2500	1	2500	8	20000
MS8127M	MSOP8	3000	1	3000	8	24000

STATEMENT

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- The process of improving product is endless. And our company would sincerely provide more excellent product for customer.

**MOS CIRCUIT OPERATION PRECAUTIONS**

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

1. The operator shall ground through the anti-static wristband.
2. The equipment shell must be grounded.
3. The tools used in the assembly process must be grounded.
4. Must use conductor packaging or anti-static materials packaging or transportation.



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