THE DATASHEET OF

TS1874IN

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TS1871-TS1872-TS1874

1.8V input/output rail-to-rail low power operational amplifiers

Features

- Operating range from V_{CC} = 1.8V to 6V
- Rail-to-rail input and output
- Extended V_{icm} (V_{DD} - 0.2V to V_{CC} + 0.2V)
- Low supply current (400µA)
- Gain bandwidth product (1.6MHz)
- High unity gain stability
- ESD tolerance (2kV)
- Latch-up immunity
- Available in SOT23-5 micro package

Applications

- Battery-powered applications (toys)
- Portable communication devices (cell phones)
- Audio driver (headphone drivers)
- Laptop/notebook computers

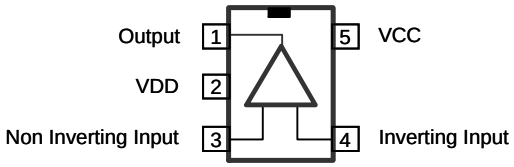
Description

The TS187x (single, dual and quad) is an operational amplifier family able to operate with voltages as low as 1.8V and that features both input and output rail-to-rail.

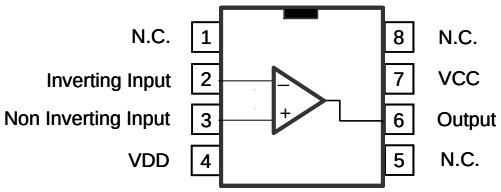
The common mode input voltage extends 200mV beyond the supply voltages at 25°C while the output voltage swing is within 100mV of each rail with a 600Ω load resistor. This device consumes typically 400µA per channel while offering 1.6MHz of gain-bandwidth product. The amplifier provides high output drive capability typically at 65mA load.

These features make the TS187x family ideal for sensor interface, battery-supplied and portable applications.

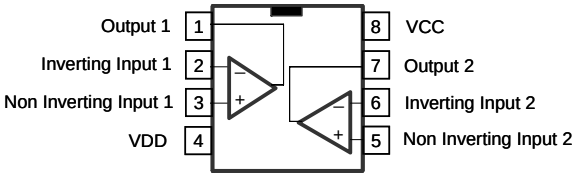
TS1871ILT



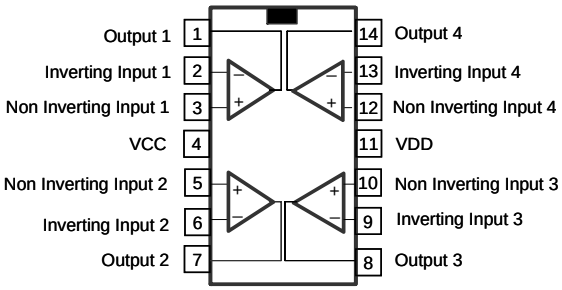
TS1871ID/IDT



TS1872IN-TS1872ID/IDT-TS1872IST TS1872IPT



TS1874IN-TS1874ID/IDT-TS1874IPT



Contents

1 Absolute maximum ratings and operating conditions 3

2 Electrical characteristics 5

3 Package information 16

3.1 SOT23-5 package information 16

3.2 DIP8 package information 17

3.3 SO-8 package information 18

3.4 TSSOP8 package information 19

3.5 MiniSO-8 package 20

3.6 DIP14 package information 21

3.7 SO-14 package information 22

3.8 TSSOP14 package information 23

4 Ordering information 24

5 Revision history 25

1 Absolute maximum ratings and operating conditions

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage(1)	7	V
V_{id}	Differential input voltage(2)	±1	V
V_{in}	Input voltage	V_{DD} -0.3 to V_{CC} +0.3	V
T_{stg}	Storage temperature	-65 to +150	°C
T_j	Maximum junction temperature	150	°C
R_{thja}	Thermal resistance junction to ambient (3) SOT23-5 DIP8 DIP14 MiniSO-8 SO-8 SO-14 TSSOP8 TSSOP14	 250 85 66 190 125 103 120 100	°C/W
R_{thjc}	Thermal resistance junction to case SOT23-5 DIP8 DIP14 MiniSO-8 SO-8 SO-14 TSSOP8 TSSOP14	 81 41 33 39 40 31 37 32	°C/W
ESD	HBM: human body model(4)	2	kV
	MM: machine model(5)	200	V
	CDM: charged device model(6)	1.5	kV
	Latch-up immunity	200	mA
	Lead temperature (soldering, 10 sec)	250	°C
	Output short-circuit duration	see note(7)	

1. All voltage values, except differential voltage are with respect to network terminal.
2. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal. If V_{id} > ±1V, the maximum input current must not exceed ±1mA. When V_{id} > ±1V, add an input series resistor to limit input current.
3. Short-circuits can cause excessive heating. Destructive dissipation can result from simultaneous short-circuits on all amplifiers.
4. Human body model: A 100pF capacitor is charged to the specified voltage, then discharged through a 1.5kΩ resistor between two pins of the device. This is done for all couples of connected pin combinations while the other pins are floating.
5. Machine model: A 200pF capacitor is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor < 5Ω). This is done for all couples of connected pin combinations while the other pins are floating.
6. Charged device model: all pins and the package are charged together to the specified voltage and then discharged directly to the ground through only one pin. This is done for all pins.
7. Short-circuits from the output to V_{CC} can cause excessive heating. The maximum output current is approximately 80mA, independent of the magnitude of V_{CC}. Destructive dissipation can result from simultaneous short-circuits on all amplifiers.

Table 2. Operating conditions

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	1.8 to 6	V
V_{icm}	Common mode input voltage range T_{oper} = 25°C, $1.8 \leq V_{CC} \leq 6V$ $T_{min} < T_{oper} < T_{max}$, $1.8 \leq V_{CC} \leq 6V$	 V_{DD} - 0.2 to V_{CC} + 0.2 V_{DD} to V_{CC}	V
T_{oper}	Operating free air temperature range	-40 to + 125	°C

2 Electrical characteristics

Table 3. Electrical characteristics at V_{CC} = +1.8V with V_{DD} = 0V, C_L & R_L connected to $V_{CC}/2$, and T_{amb} = 25°C (unless otherwise specified)(1)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage	**$V_{icm} = V_{out} = V_{CC}/2$** TS1871A/2A/4A $T_{min} \le T_{amb} \le T_{max}$ TS1871/2/4 $T_{min} \le T_{amb} \le T_{max}$		 0.1	1 1.5 3 6	mV
ΔV_{io}	Input offset voltage drift			2		µV/°C
I_{io}	Input offset current	$V_{icm} = V_{out} = V_{CC}/2$ (2) $T_{min} \le T_{amb} \le T_{max}$		3	30 60	nA
I_{ib}	Input bias current	$V_{icm} = V_{out} = V_{CC}/2$(1) $T_{min} \le T_{amb} \le T_{max}$		40	125 150	nA
CMR	Common mode rejection ratio 20 log ($\Delta V_{ic}/\Delta V_{io}$)	$0 \le V_{icm} \le V_{CC}$, $V_{out} = V_{CC}/2$ $T_{min} \le T_{amb} \le T_{max}$	55 52	77		dB
A_{vd}	Large signal voltage gain	**V_{out} = 0.5V to 1.3V** R_L = 2kΩ R_L = 600Ω	 77 70	 92 85		dB
V_{OH}	High level output voltage	**V_{id} = 100mV** R_L = 2kΩ R_L = 600Ω $T_{min} \le T_{amb} \le T_{max}$, R_L = 2kΩ $T_{min} \le T_{amb} \le T_{max}$, R_L = 600Ω	 1.65 1.62 1.65 1.62	 1.77 1.74		V
V_{OL}	Low level output voltage	**V_{id} = -100mV** R_L = 2kΩ R_L = 600Ω $T_{min} \le T_{amb} \le T_{max}$, R_L = 2kΩ $T_{min} \le T_{amb} \le T_{max}$, R_L = 600Ω		 88 115	 100 150 100 150	mV
I_o	Output source current	V_{id} = 100mV, $V_O = V_{DD}$	20	65		mA
	Output sink current	V_{id} = -100mV, $V_O = V_{CC}$	20	65		
I_{CC}	Supply current (per amplifier)	**$V_{out} = V_{CC}/2$** A_{VCL} = 1, no load $T_{min} \le T_{amb} \le T_{max}$		400	560 600	µA
GBP	Gain bandwidth product	R_L = 10kΩ, C_L = 100pF, f = 100kHz	0.9	1.6		MHz
SR	Slew rate	R_L = 10kΩ, C_L = 100pF, A_V = 1	0.38	0.54		V/µs
ϕm	Phase margin	C_L = 100pF		53		Degrees
en	Input voltage noise	f = 1kHz		27		nV/√Hz
THD	Total harmonic distortion			0.01		%

1. All parameter limits at temperatures different from 25°C are guaranteed by correlation.
2. Maximum values include unavoidable inaccuracies of the industrial tests.

Table 4. Electrical characteristics at V_{CC} = +3V with V_{DD} = 0V, C_L & R_L connected to $V_{CC}/2$, and T_{amb} = 25°C (unless otherwise specified)(1)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage	**$V_{icm} = V_{out} = V_{CC}/2$** TS1871A/2A/4A $T_{min} \le T_{amb} \le T_{max}$ TS1871/2/4 $T_{min} \le T_{amb} \le T_{max}$		0.1	1 1.5 3 6	mV
ΔV_{io}	Input offset voltage drift			2		µV/°C
I_{io}	Input offset current	$V_{icm} = V_{out} = V_{CC}/2$ (2) $T_{min} \le T_{amb} \le T_{max}$		3	30 60	nA
I_{ib}	Input bias current	$V_{icm} = V_{out} = V_{CC}/2$ (1) $T_{min} \le T_{amb} \le T_{max}$		4	125 150	nA
CMR	Common mode rejection ratio 20 log ($\Delta V_{ic}/\Delta V_{io}$)	$0 \le V_{icm} \le V_{CC}$, $V_{out} = V_{CC}/2$ $T_{min} \le T_{amb} \le T_{max}$	60 57	80		dB
A_{vd}	Large signal voltage gain	**V_{out} = 0.5V to 2.5V** R_L = 2kΩ R_L = 600Ω	80 74	92 95		dB
V_{OH}	High level output voltage	**V_{id} = 100mV** R_L = 2kΩ R_L = 600Ω $T_{min} \le T_{amb} \le T_{max}$, R_L = 2kΩ $T_{min} \le T_{amb} \le T_{max}$, R_L = 600Ω	2.82 2.80 2.82 2.80	2.95 2.95		V
V_{OL}	Low level output voltage	**V_{id} = -100mV** R_L = 2kΩ R_L = 600Ω $T_{min} \le T_{amb} \le T_{max}$, R_L = 2kΩ $T_{min} \le T_{amb} \le T_{max}$, R_L = 600Ω		88 115	120 160 120 160	mV
I_o	Output source current	V_{id} = 100mV, $V_O = V_{DD}$	20	80		mA
	Output sink current	V_{id} = -100mV, $V_O = V_{CC}$	20	80		
I_{CC}	Supply current (per amplifier)	**$V_{out} = V_{CC}/2$** A_{VCL} = 1, no load $T_{min} \le T_{amb} \le T_{max}$		450	650 690	µA
GBP	Gain bandwidth product	R_L = 10kΩ, C_L = 100pF, f = 100kHz	1	1.7		MHz
SR	Slew rate	R_L = 10kΩ, C_L = 100pF, A_V = 1	0.42	0.6		V/µs
ϕm	Phase margin	C_L = 100pF		53		Degrees
en	Input voltage noise	f = 1kHz		27		nV/√Hz
THD	Total harmonic distortion			0.01		%

1. All parameter limits at temperatures different from 25°C are guaranteed by correlation.
2. Maximum values include unavoidable inaccuracies of the industrial tests.

Table 5. Electrical characteristics at V_{CC} = +5V with V_{DD} = 0V, C_L & R_L connected to $V_{CC}/2$, and T_{amb} = 25°C (unless otherwise specified) (1)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{io}	Input offset voltage	**$V_{icm} = V_{out} = V_{CC}/2$** TS1871A/2A/4A $T_{min} \le T_{amb} \le T_{max}$ TS1871/2/4 $T_{min} \le T_{amb} \le T_{max}$		0.1	1 1.5 3 6	mV
ΔV_{io}	Input offset voltage drift			2		µV/°C
I_{io}	Input offset current	$V_{icm} = V_{out} = V_{CC}/2$ (2) $T_{min} \le T_{amb} \le T_{max}$		3	30 60	nA
I_{ib}	Input bias current	$V_{icm} = V_{out} = V_{CC}/2$ (1) $T_{min} \le T_{amb} \le T_{max}$		70	130 150	nA
CMR	Common mode rejection ratio 20 log ($\Delta V_{ic}/\Delta V_{io}$)	$0 \le V_{icm} \le V_{CC}$, V_{out} not equal to $V_{CC}/2$ $T_{min} \le T_{amb} \le T_{max}$	65 62	85		dB
SVR	Supply voltage rejection ratio 20 log ($\Delta V_{cc}/\Delta V_{io}$)	V_{CC} = 1.8 to 5V	70	90		dB
A_{vd}	Large signal voltage gain	**V_{out} = 1V to 4V** R_L = 2kΩ R_L = 600Ω	83 77	92 85		dB
V_{OH}	High level output voltage	**V_{id} = 100mV** R_L = 2kΩ R_L = 600Ω $T_{min} \le T_{amb} \le T_{max}$, R_L = 2kΩ $T_{min} \le T_{amb} \le T_{max}$, R_L = 600Ω	4.80 4.75 4.80 4.75	4.95 4.90		V
V_{OL}	Low level output voltage	**V_{id} = -100mV** R_L = 2kΩ R_L = 600Ω $T_{min} \le T_{amb} \le T_{max}$, R_L = 2kΩ $T_{min} \le T_{amb} \le T_{max}$, R_L = 600Ω		88 115	130 188 130 188	mV
I_o	Output source current	V_{id} = 100mV, $V_O = V_{DD}$	20	80		mA
	Output sink current	V_{id} = -100mV, $V_O = V_{CC}$	20	80		
I_{CC}	Supply current (per amplifier)	**$V_{out} = V_{CC}/2$** A_{VCL} = 1, no load $T_{min} \le T_{amb} \le T_{max}$		500	835 875	µA
GBP	Gain bandwidth product	R_L = 10kΩ, C_L = 100pF, f = 100kHz	1	1.8		MHz
SR	Slew rate	R_L = 10kΩ, C_L = 100pF, A_V = 1	0.42	0.6		V/µs
ϕm	Phase margin	C_L = 100pF		55		Degrees
en	Input voltage noise	f = 1kHz		27		nV/√Hz
THD	Total harmonic distortion			0.01		%

1. All parameter limits at temperatures different from 25°C are guaranteed by correlation.
2. Maximum values include unavoidable inaccuracies of the industrial tests.

Figure 1. Input offset voltage distribution

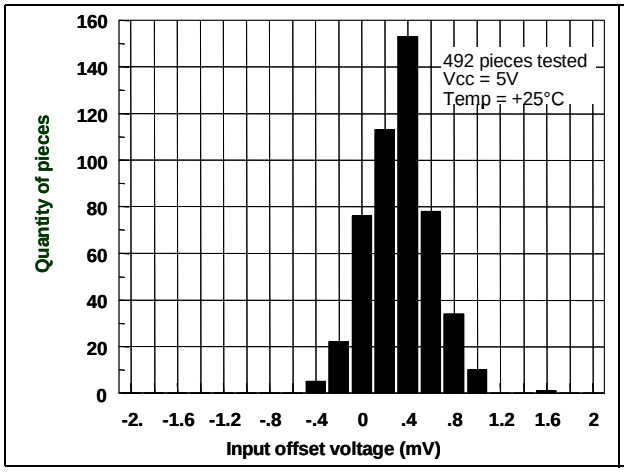


Figure 2. Input offset voltage vs. temperature

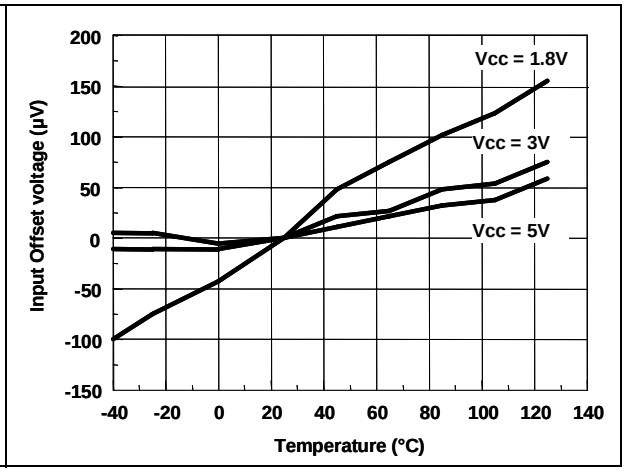


Figure 3. Input bias current vs. temperature

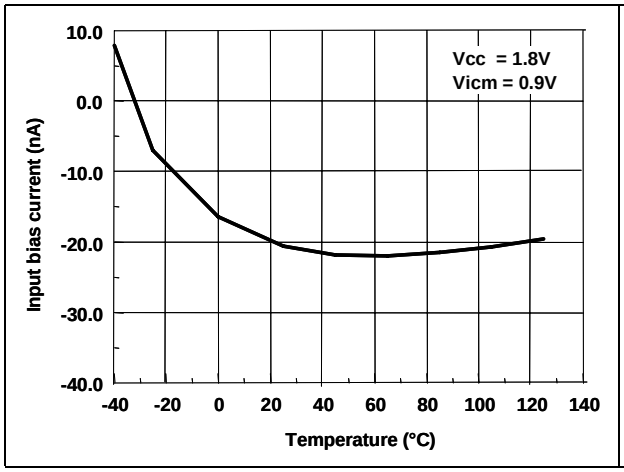


Figure 4. Input bias current vs. temperature

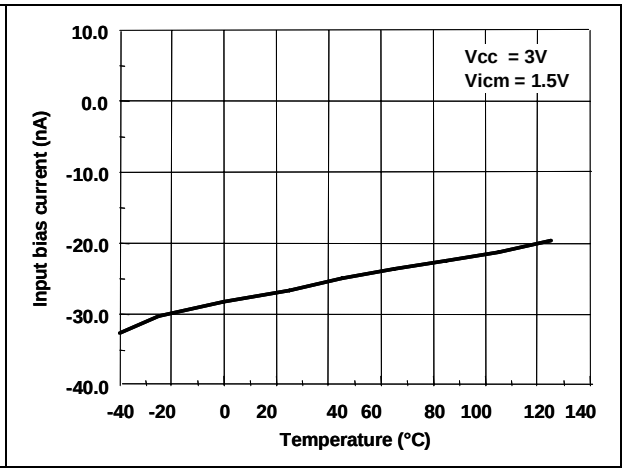


Figure 5. Supply current/amplifier vs. supply voltage

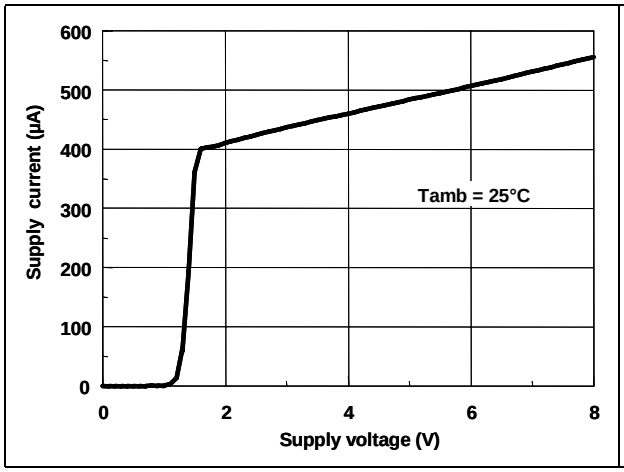


Figure 6. Supply current/amplifier vs. temperature

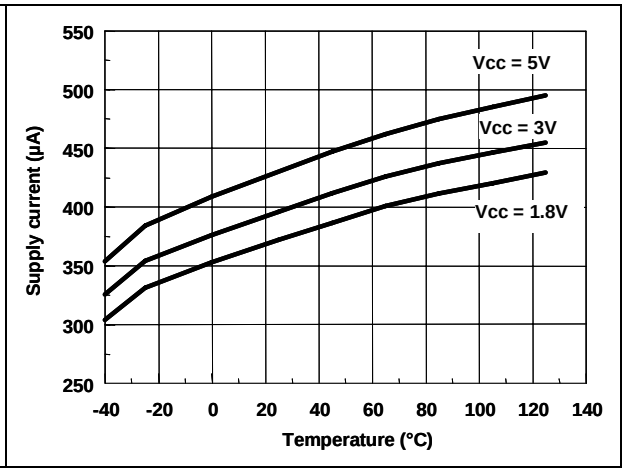


Figure 7. Common mode rejection vs. temperature

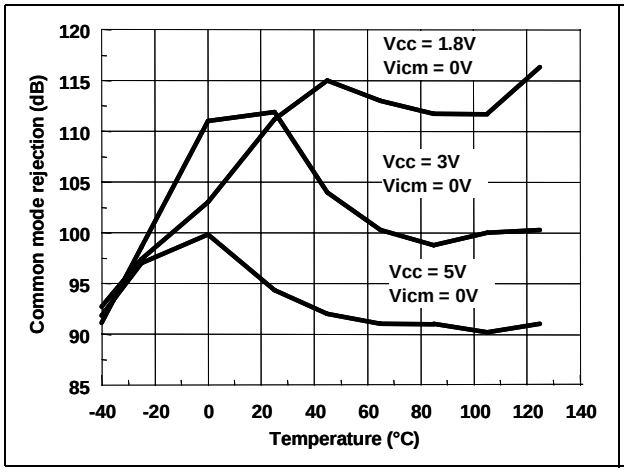


Figure 8. Supply voltage rejection vs. temperature

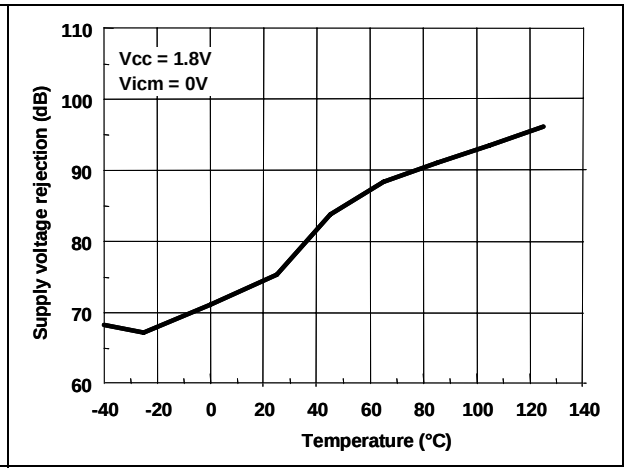


Figure 9. Supply voltage rejection vs. temperature

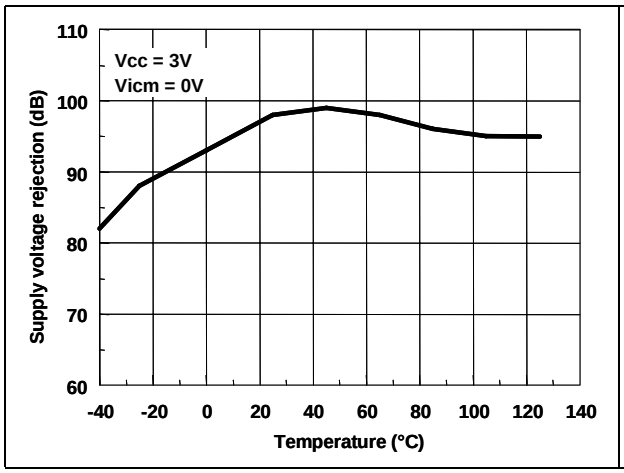


Figure 10. Supply voltage rejection vs. temperature

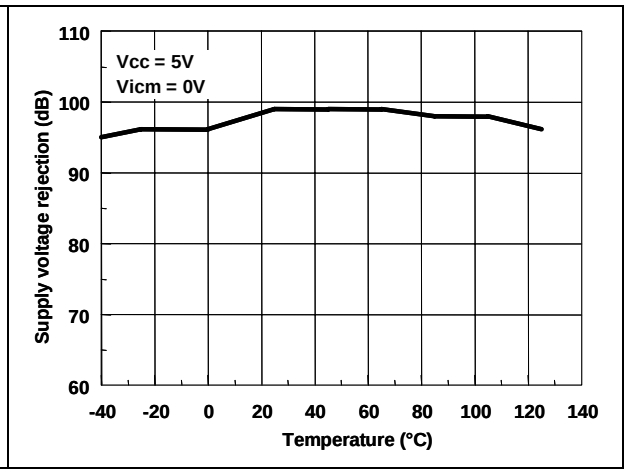


Figure 11. Power supply voltage rejection vs. frequency

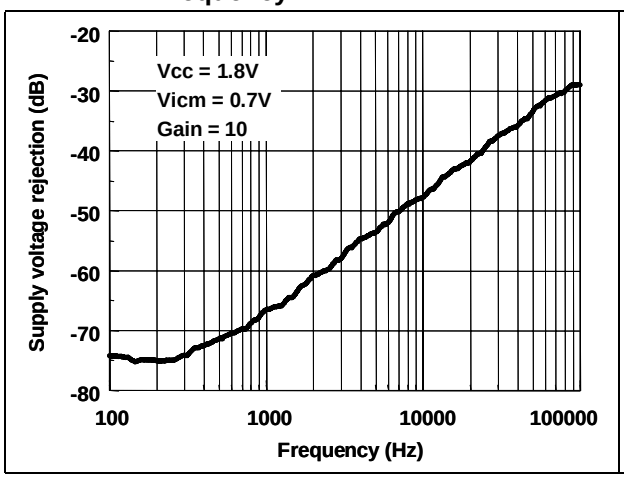


Figure 12. Open loop gain vs. frequency

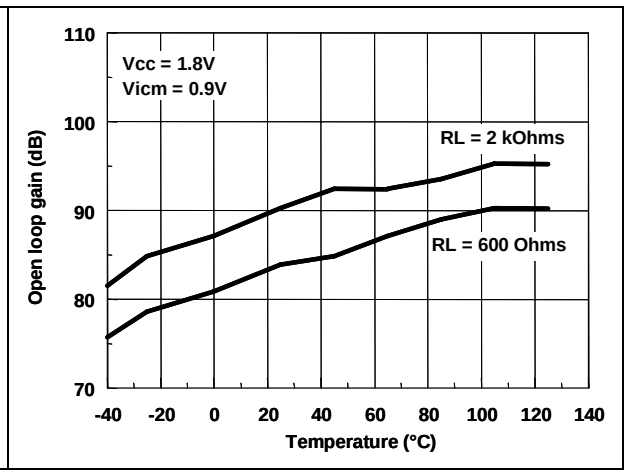


Figure 13. Open loop gain vs. temperature

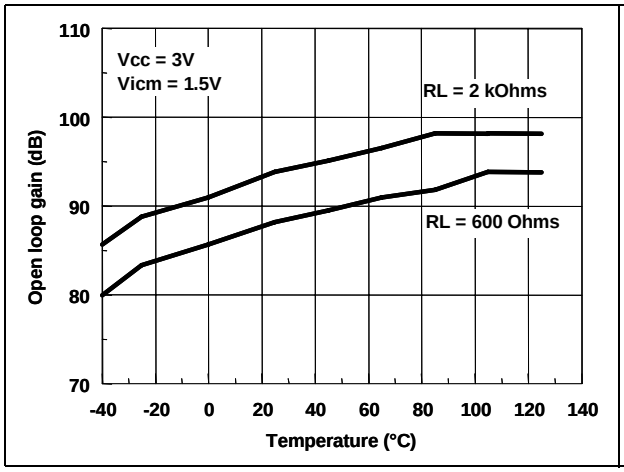


Figure 14. Open loop gain vs. temperature

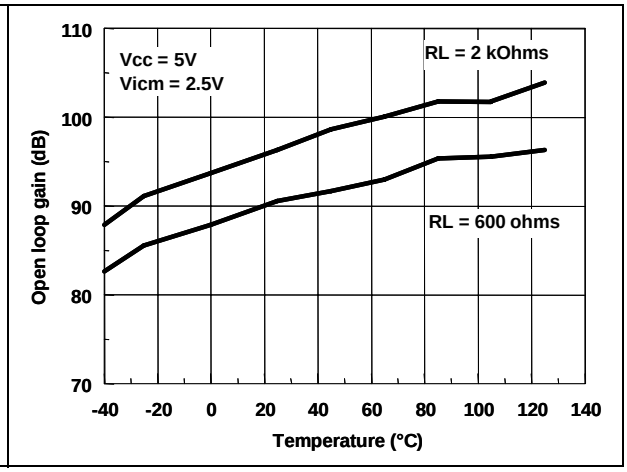


Figure 15. High level output voltage vs. temperature

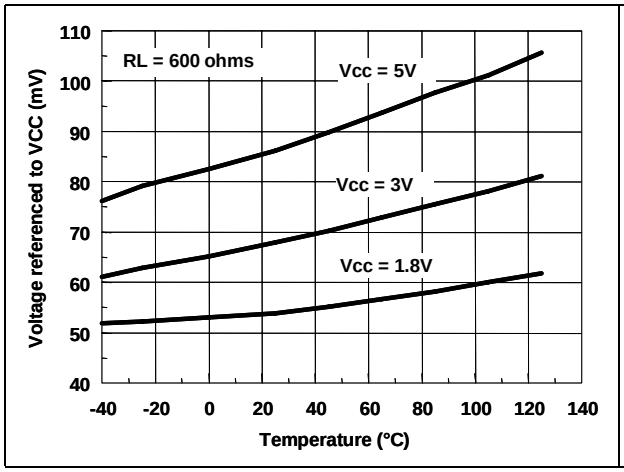


Figure 16. Low level output voltage vs. temperature

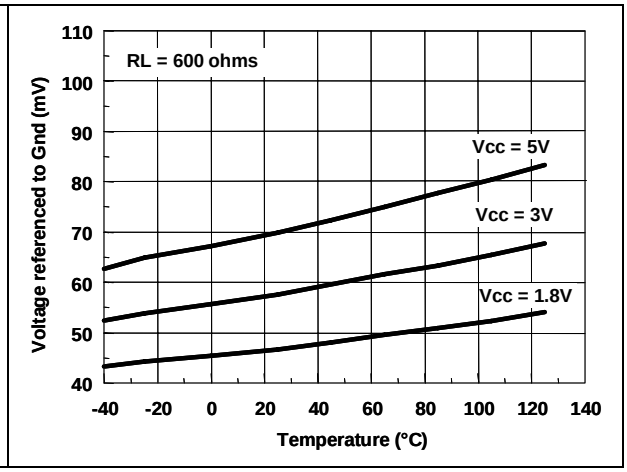


Figure 17. High level output voltage vs. temperature

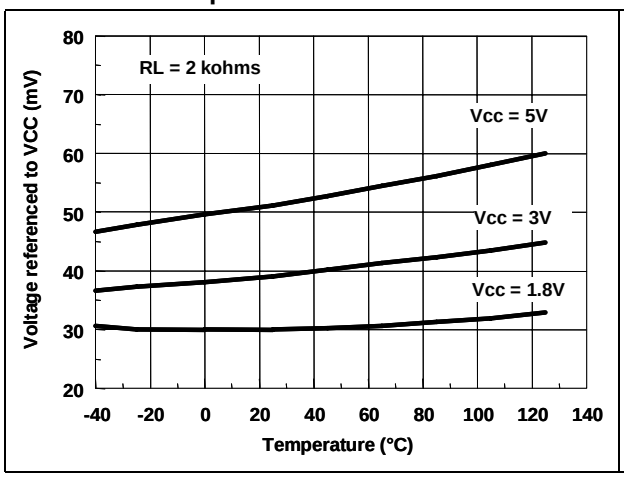


Figure 18. Low level output voltage vs. temperature

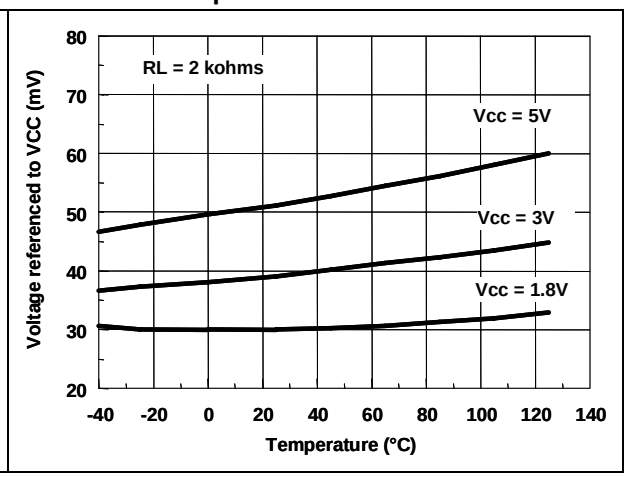


Figure 19. Output current vs. temperature

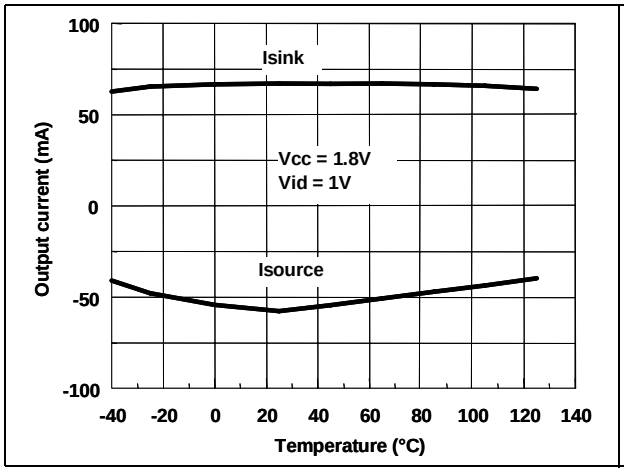


Figure 20. Output current vs. temperature

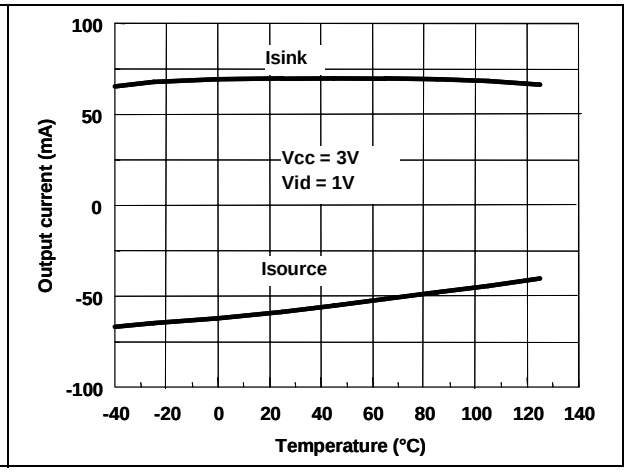


Figure 21. Output current vs. temperature

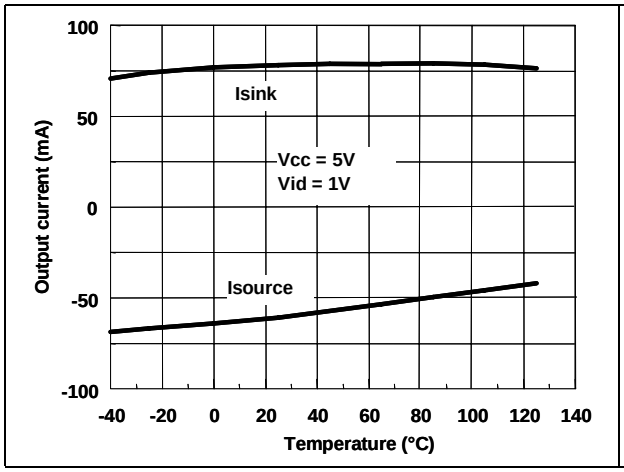


Figure 22. Output current vs. output voltage

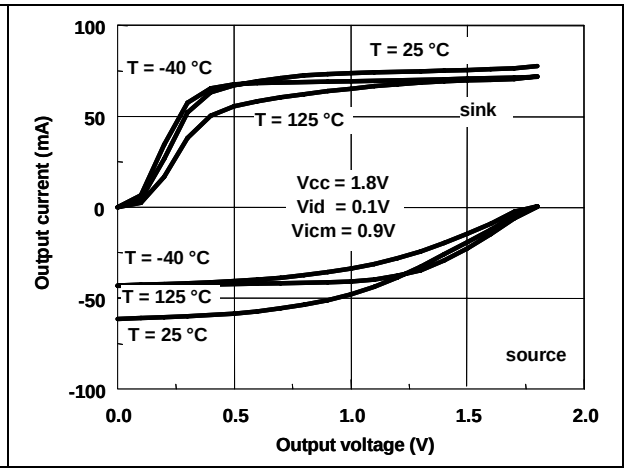


Figure 23. Output current vs. output voltage

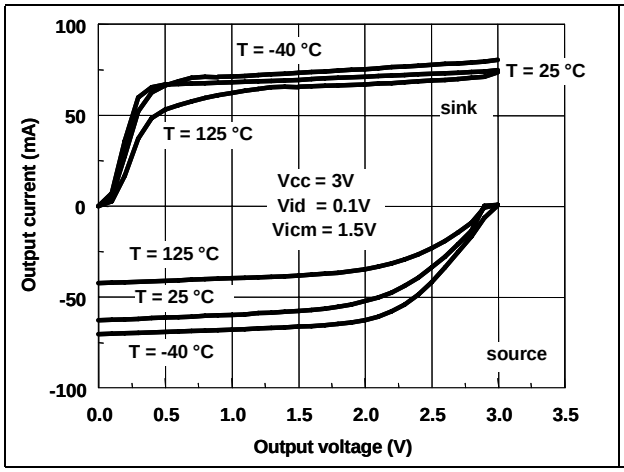


Figure 24. Output current vs. output voltage

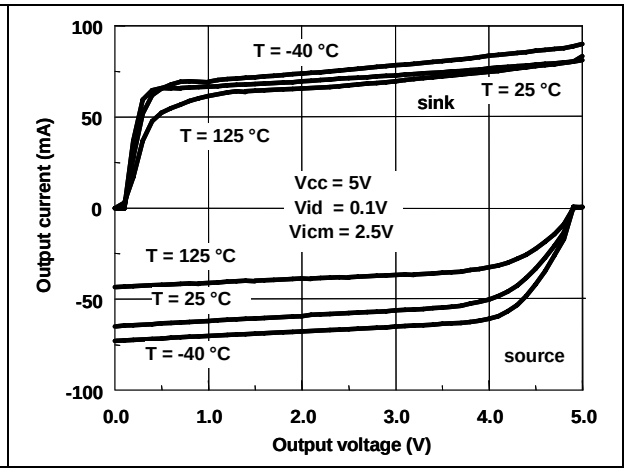


Figure 25. Gain and phase vs. frequency

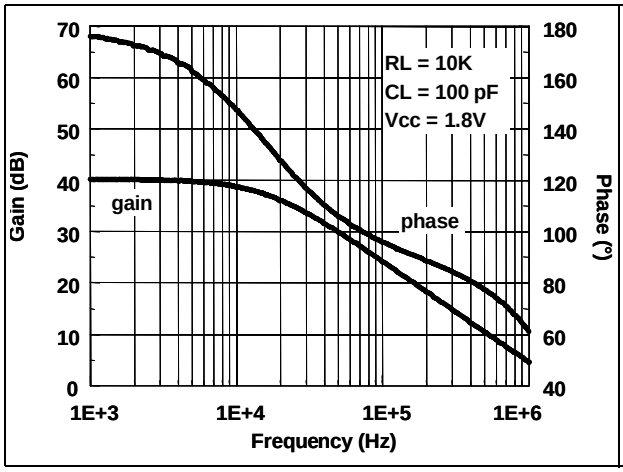


Figure 26. Gain and phase vs. frequency

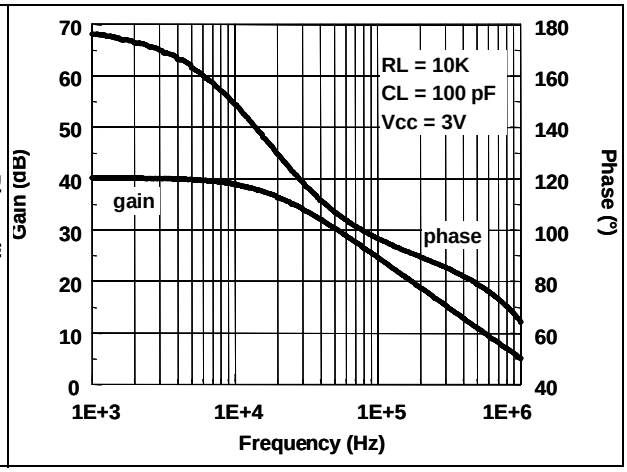


Figure 27. Gain and phase vs. frequency

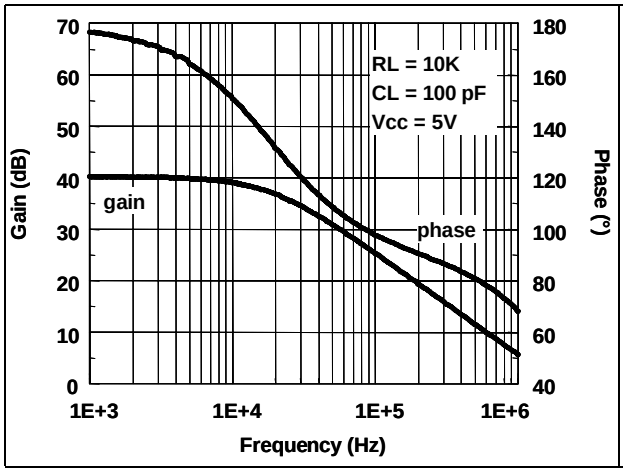


Figure 28. Gain bandwidth product vs. temperature

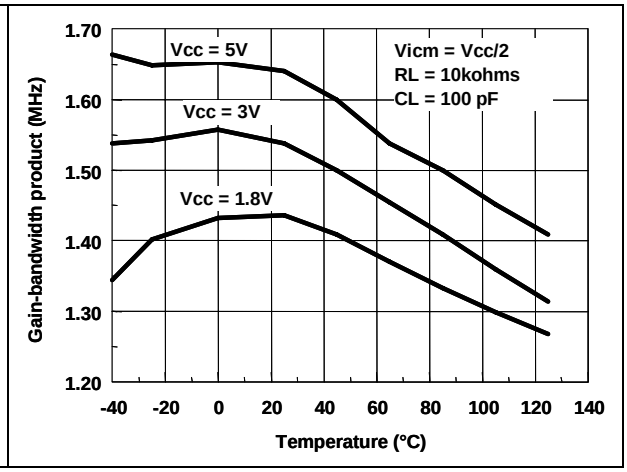


Figure 29. Gain bandwidth product vs. supply voltage

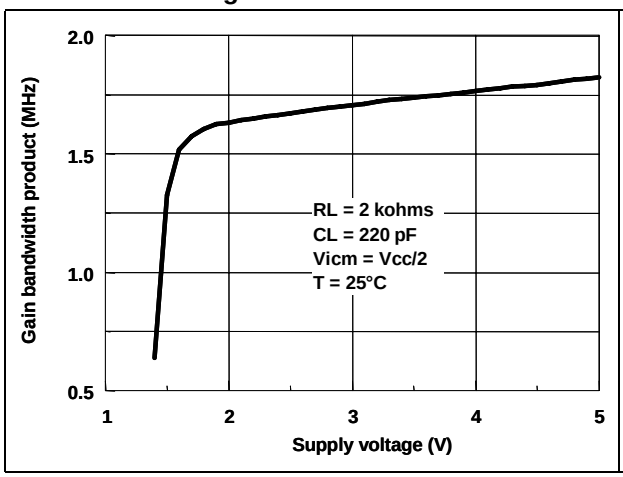


Figure 30. Slew rate vs. temperature

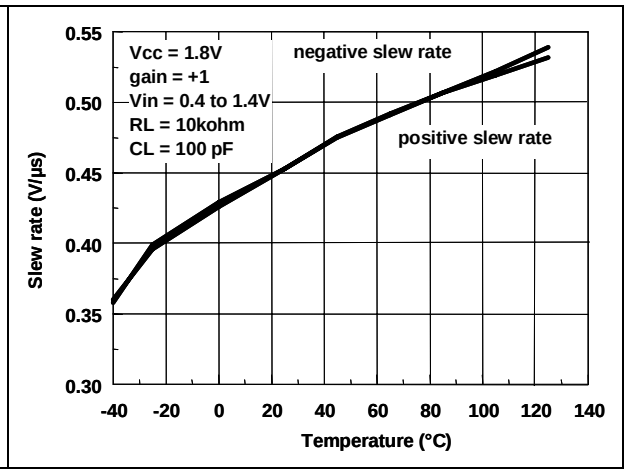


Figure 31. Slew rate vs. temperature

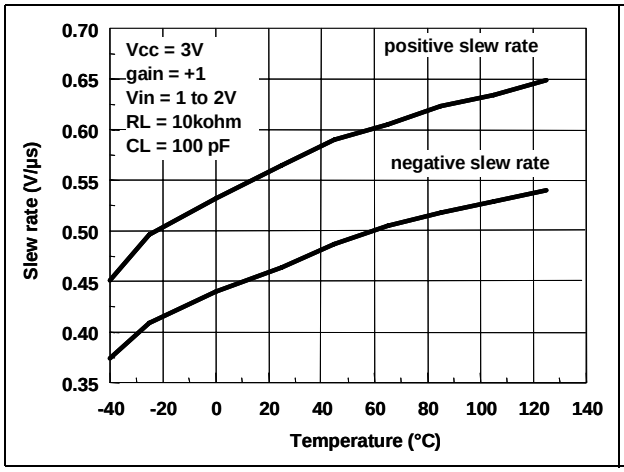


Figure 32. Slew rate vs. temperature

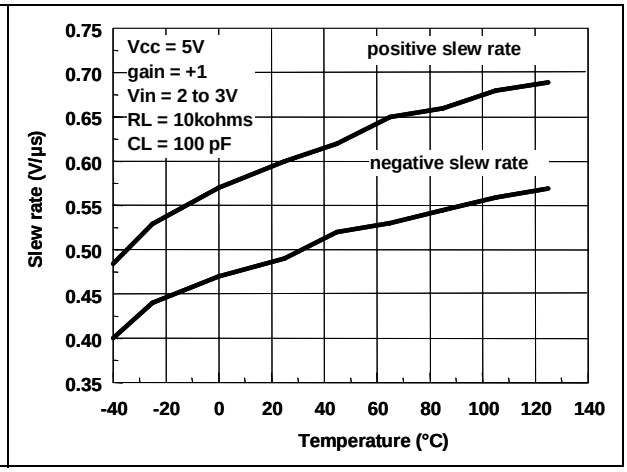


Figure 33. Phase margin vs. load capacitor

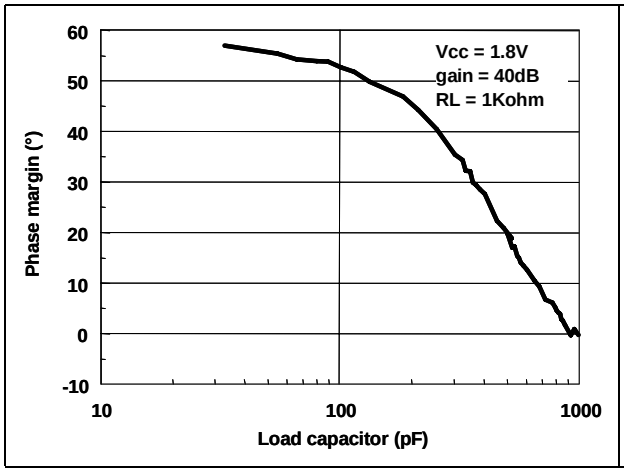


Figure 34. Phase margin vs. output current

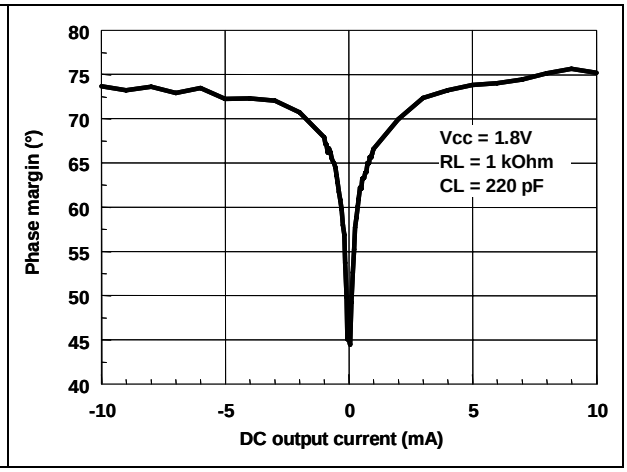


Figure 35. Gain margin vs. output current

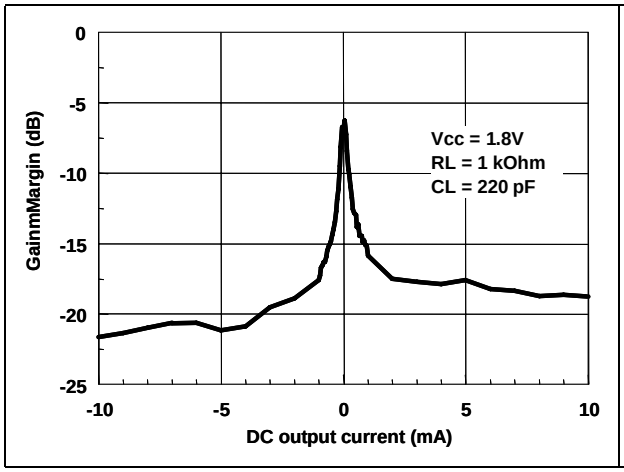


Figure 36. Equivalent input noise vs. frequency

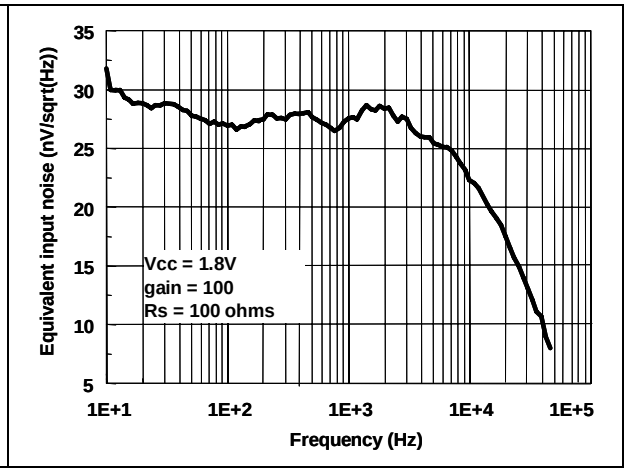


Figure 37. Distortion vs. output voltage

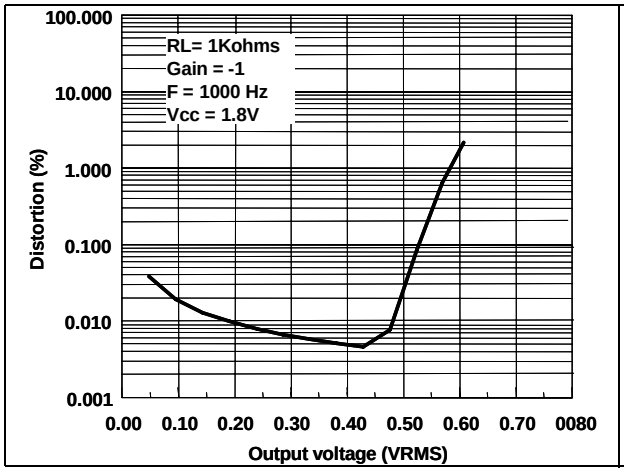


Figure 38. Distortion vs. output voltage

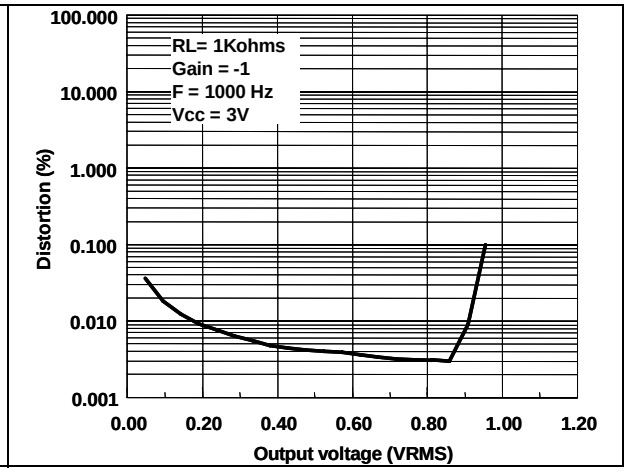


Figure 39. Distortion vs. output voltage

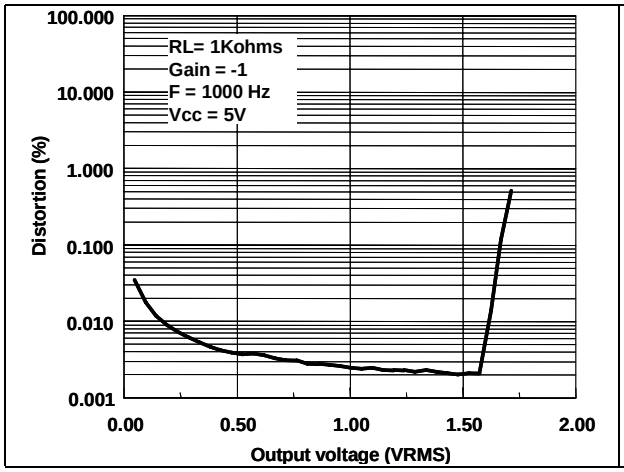


Figure 40. Distortion vs. output voltage

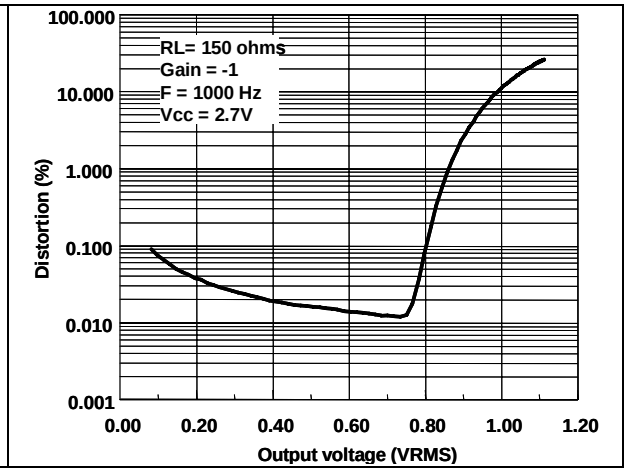


Figure 41. Distortion vs. output voltage

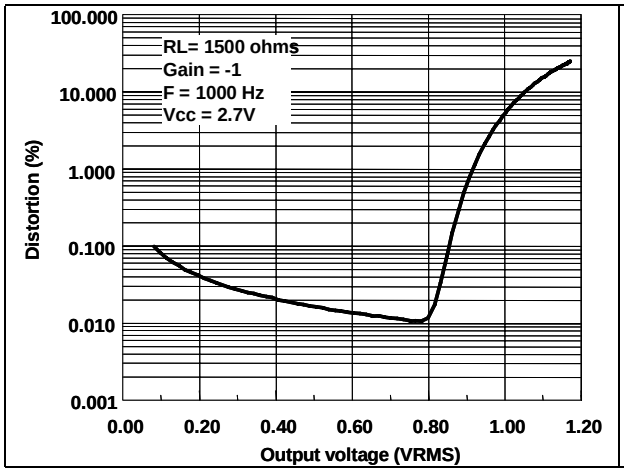


Figure 42. Distortion vs. output voltage

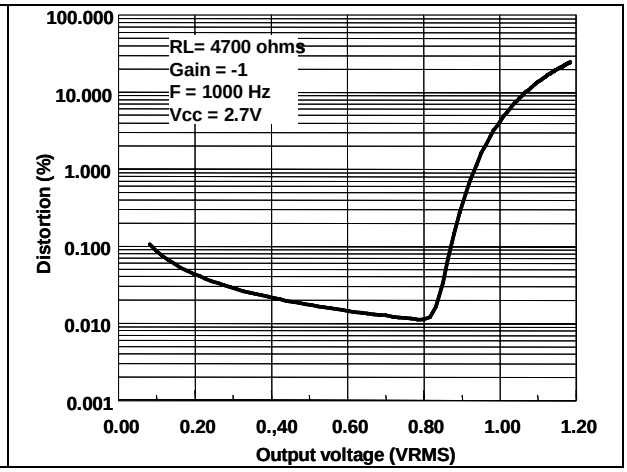


Figure 43. Distortion vs. frequency

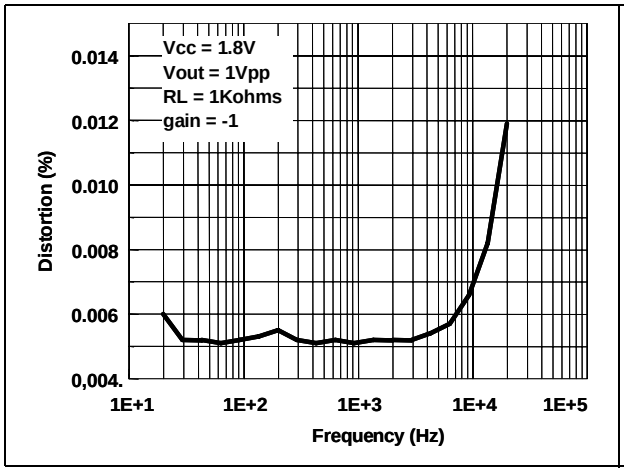


Figure 44. Distortion vs. frequency

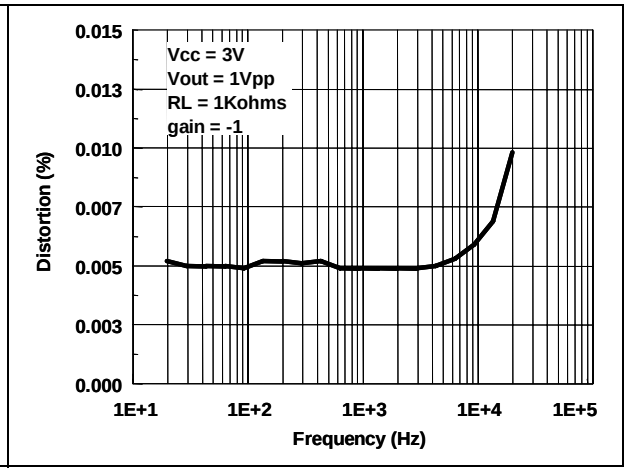


Figure 45. Distortion vs. frequency

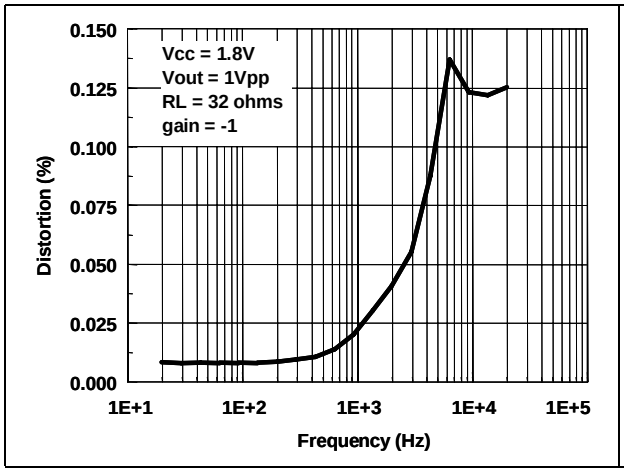


Figure 46. Distortion vs. frequency

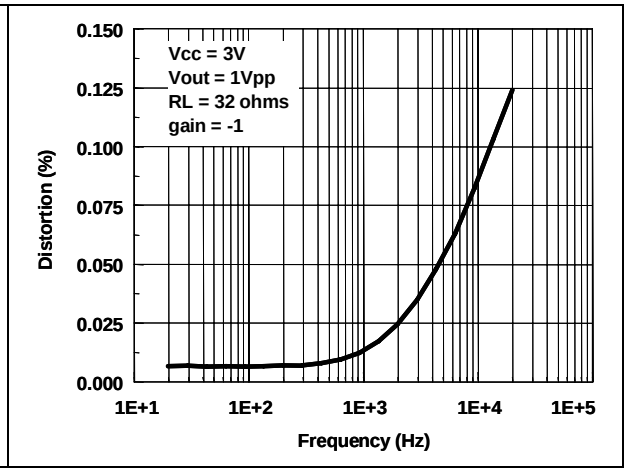
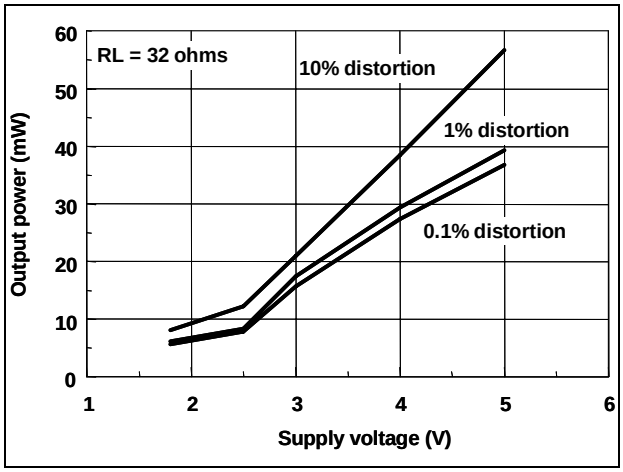


Figure 47. Output power vs. supply voltage



3 Package information

In order to meet environmental requirements, STMicroelectronics offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an STMicroelectronics trademark. ECOPACK specifications are available at: www.st.com.

3.1 SOT23-5 package information

Figure 48. SOT23-5 package mechanical drawing

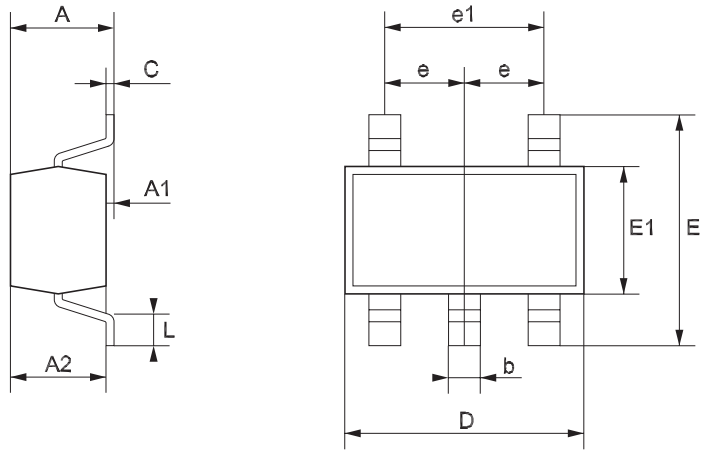


Table 6. SOT23-5 package mechanical data

Ref.	Dimensions					
	Millimeters			Mils		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.90		1.45	35.4		57.1
A1	0.00		0.15	0.00		5.9
A2	0.90		1.30	35.4		51.2
b	0.35		0.50	13.7		19.7
C	0.09		0.20	3.5		7.8
D	2.80		3.00	110.2		118.1
E	2.60		3.00	102.3		118.1
E1	1.50		1.75	59.0		68.8
e		0.95			37.4	
e1		1.9			74.8	
L	0.35		0.55	13.7		21.6

3.2 DIP8 package information

Figure 49. DIP8 package mechanical drawing

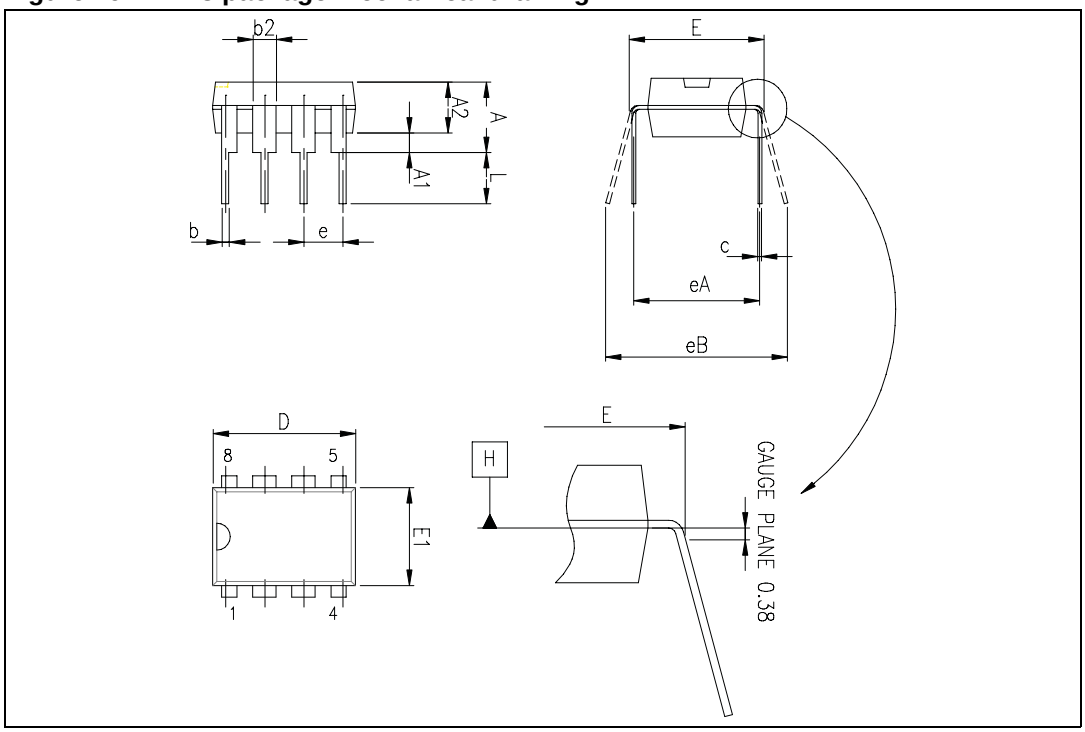


Table 7. DIP8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			5.33			0.210
A1	0.38			0.015		
A2	2.92	3.30	4.95	0.115	0.130	0.195
b	0.36	0.46	0.56	0.014	0.018	0.022
b2	1.14	1.52	1.78	0.045	0.060	0.070
c	0.20	0.25	0.36	0.008	0.010	0.014
D	9.02	9.27	10.16	0.355	0.365	0.400
E	7.62	7.87	8.26	0.300	0.310	0.325
E1	6.10	6.35	7.11	0.240	0.250	0.280
e		2.54			0.100	
eA		7.62			0.300	
eB			10.92			0.430
L	2.92	3.30	3.81	0.115	0.130	0.150

3.3 SO-8 package information

Figure 50. SO-8 package mechanical drawing

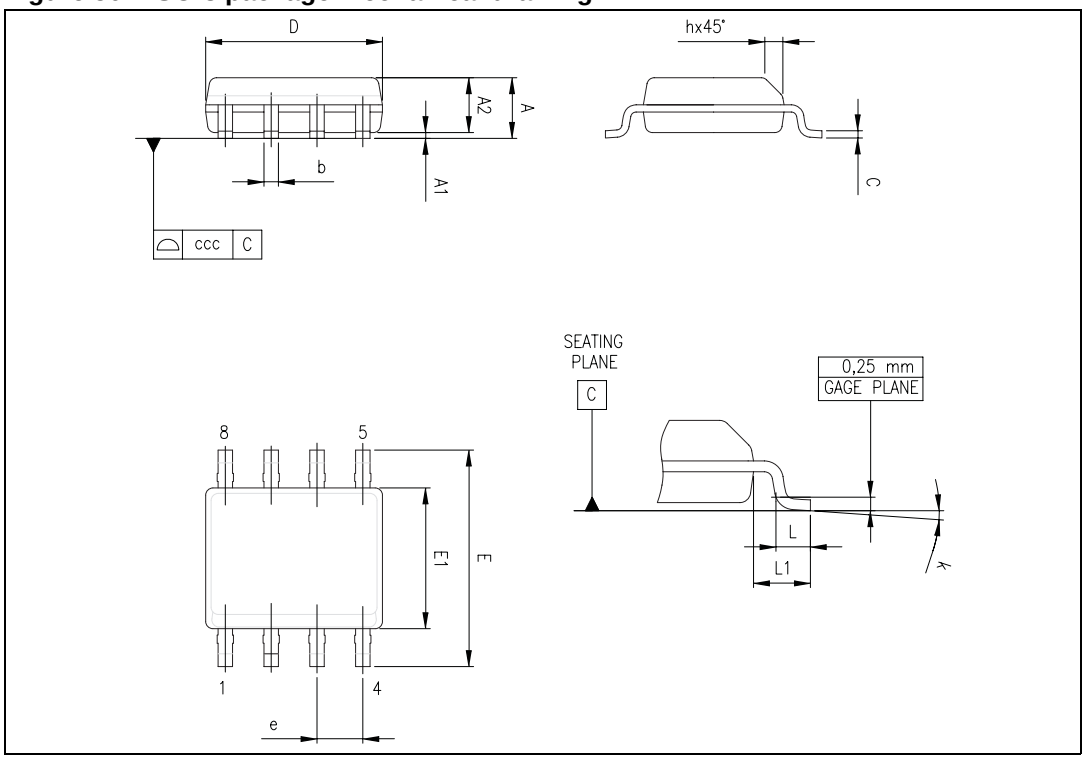


Table 8. SO-8 package mechanical data

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
H	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
k	1°		8°	1°		8°
ccc			0.10			0.004

3.4 TSSOP8 package information

Figure 51. TSSOP8 package mechanical drawing

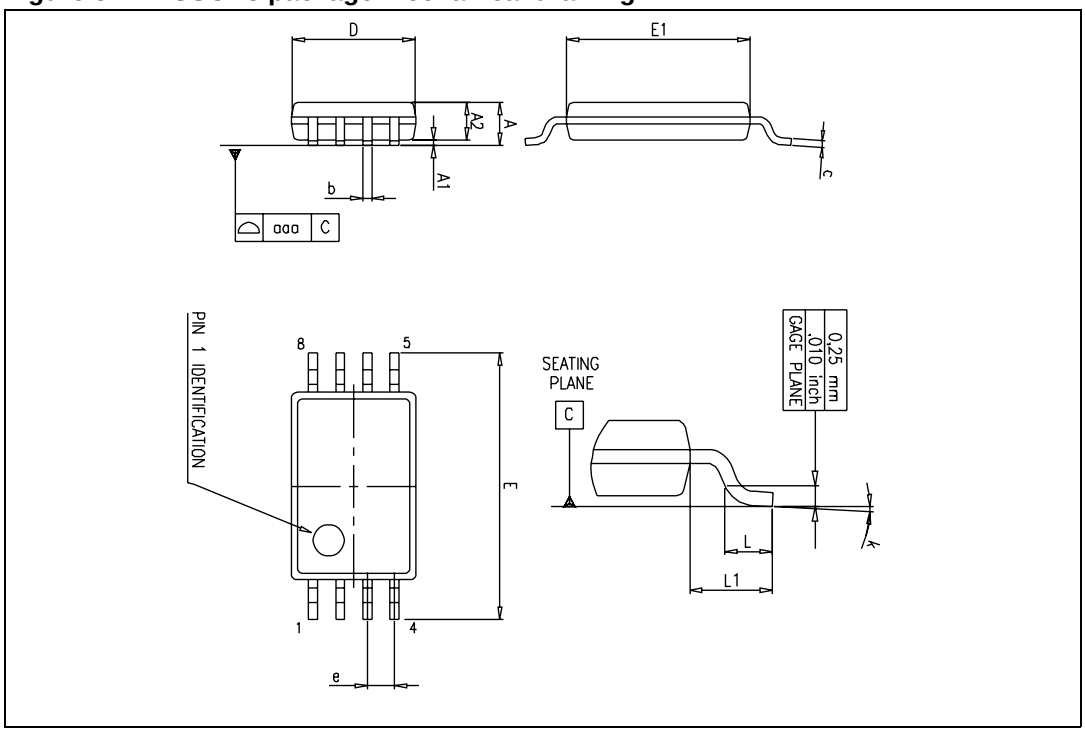


Table 9. TSSOP8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.2			0.047
A1	0.05		0.15	0.002		0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.008
D	2.90	3.00	3.10	0.114	0.118	0.122
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
e		0.65			0.0256	
k	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		1			0.039	
aaa		0.1			0.004	

3.5 MiniSO-8 package

Figure 52. MiniSO-8 package mechanical drawing

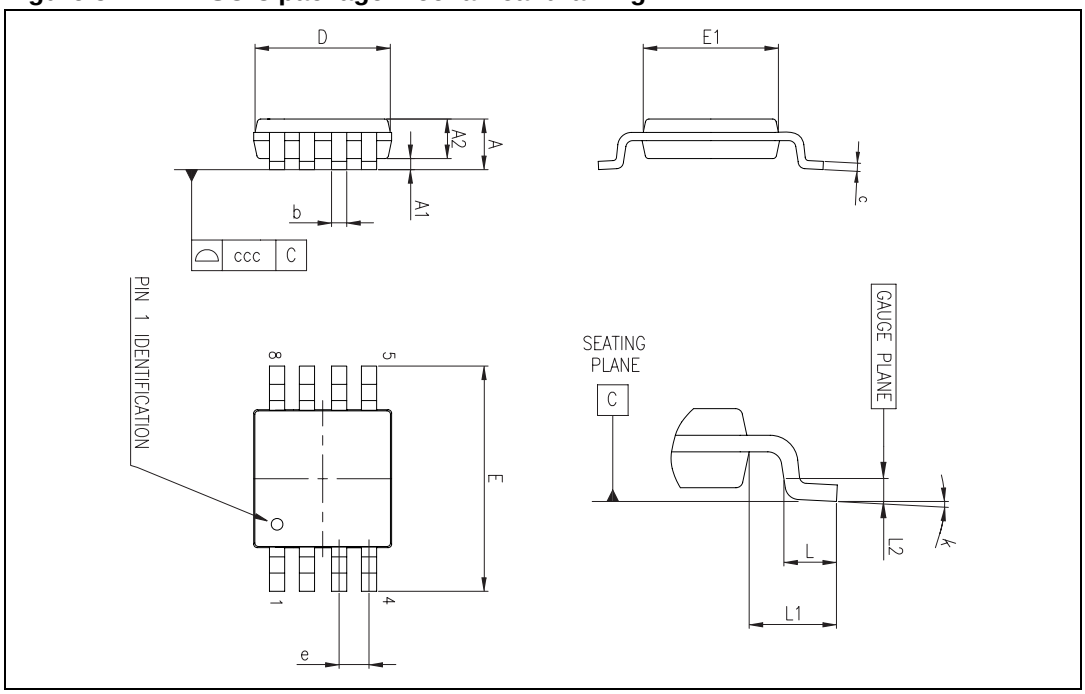


Table 10. MiniSO-8 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.1			0.043
A1	0		0.15	0		0.006
A2	0.75	0.85	0.95	0.030	0.033	0.037
b	0.22		0.40	0.009		0.016
c	0.08		0.23	0.003		0.009
D	2.80	3.00	3.20	0.11	0.118	0.126
E	4.65	4.90	5.15	0.183	0.193	0.203
E1	2.80	3.00	3.10	0.11	0.118	0.122
e		0.65			0.026	
L	0.40	0.60	0.80	0.016	0.024	0.031
L1		0.95			0.037	
L2		0.25			0.010	
k	0°		8°	0°		8°
ccc			0.10			0.004

3.6 DIP14 package information

Figure 53. DIP14 package mechanical drawing

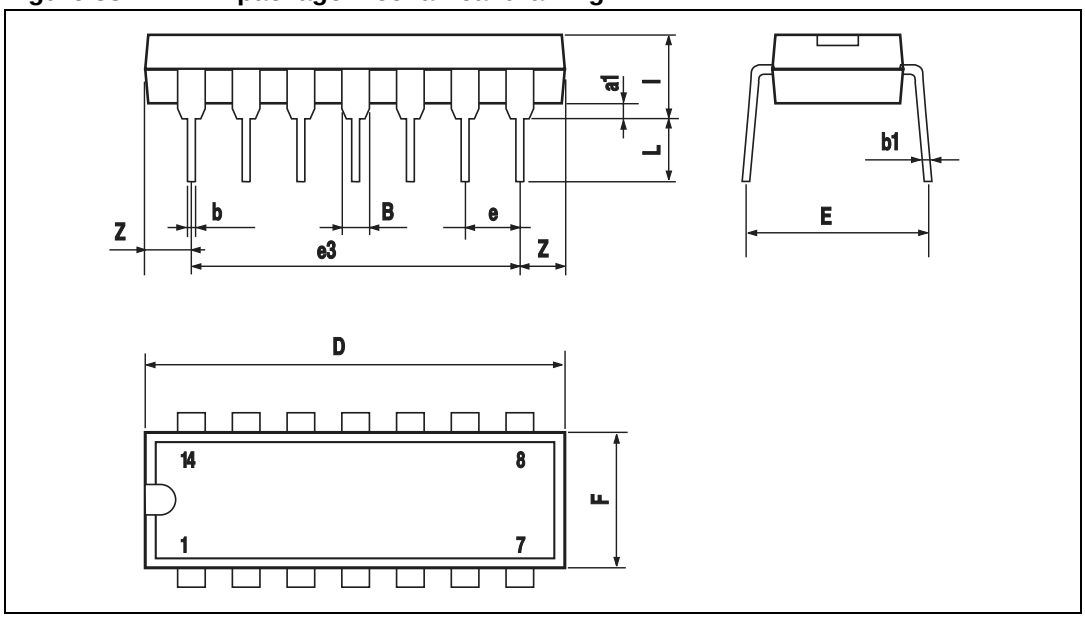


Table 11. DIP14 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100

3.7 SO-14 package information

Figure 54. SO-14 package mechanical drawing

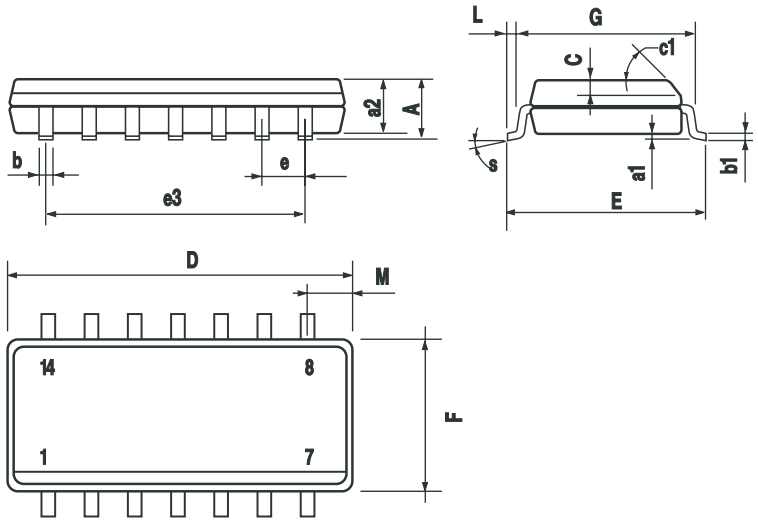


Table 12. SO-14 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.68			0.026
S	8° (max.)					

3.8 TSSOP14 package information

Figure 55. TSSOP14 package mechanical drawing

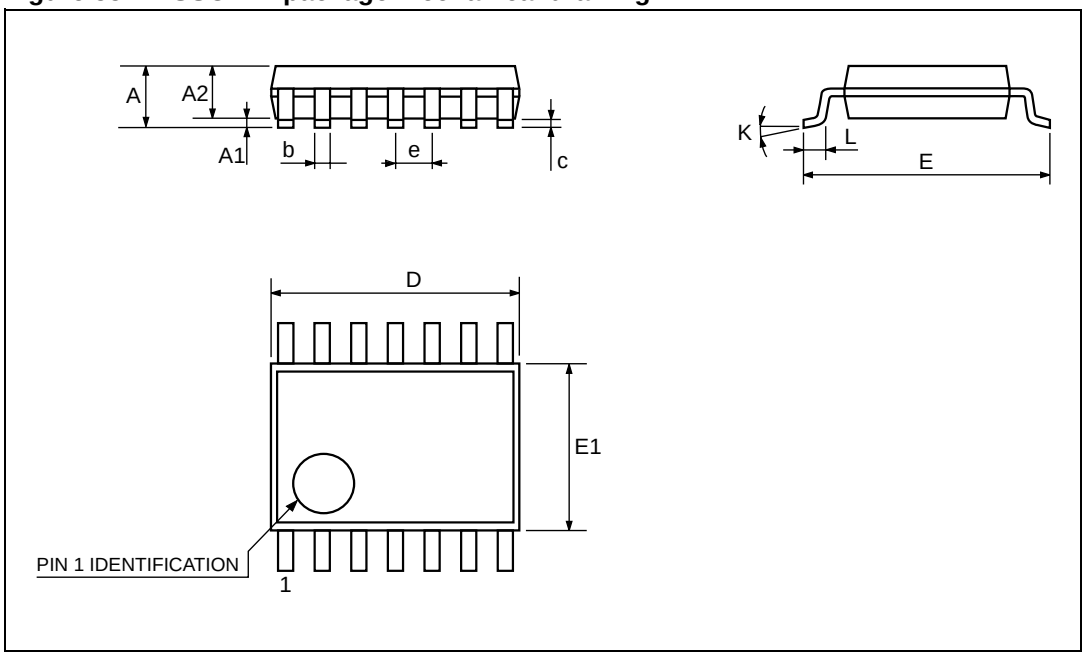


Table 13. TSSOP14 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L1	0.45	0.60	0.75	0.018	0.024	0.030

4 Ordering information

Table 14. Order codes

Order code	Temperature range	Package	Packing	Marking
TS1871ID/IDT TS1871IAID/AIDT	-40°C to +125°C	SO-8	Tube or tape & reel	1871I 1871AI
TS1871IYD/IYDT(1) TS1871IAIYD/AIYDT(1)		SO-8 (Automotive grade)	Tube or tape & reel	1871Y 1871AY
TS1871ILT TS1871AILT		SOT23-5L	Tape & reel	K171 K172
TS1871IYLT(1) TS1871AIYLT(1)		SOT23-5L (Automotive grade)	Tape & reel	K182 K183
TS1872IN TS1872AIN		DIP8	Tube	1872IN 1872AIN
TS1872ID/IDT TS1872AID/AIDT		SO-8	Tube or tape & reel	1872I 1872AI
TS1872IYD/IYDT(1) TS1872AIYD/AIYDT(1)		SO-8 (Automotive grade)	Tube or tape & reel	1872Y 1872AY
TS1872IPT TS1872AIPT		TSSOP8	Tape & reel	1872I 1872A
TS1872IYPT(1) TS1872AIYPT(1)		TSSOP8 (Automotive grade)	Tape & reel	1872Y 872AY
TS1872IST TS1872AIST		MiniSO-8	Tape & reel	K171 K172
TS1874IN TS1874AIN		DIP14	Tube Tube	1874IN 1874AIN
TS1874ID/IDT TS1874AID/AIDT		SO-14	Tube or tape & reel	1874I 1874AI
TS1874IYD/IYDT(1) TS1874AIYD/AIYDT(1)		SO-14 (Automotive grade)	Tube or tape & reel	TS1874Y TS1874AY
TS1874IPT TS1874AIPT		TSSOP14	Tape & reel	1874I 1874AI
TS1874IYPT(1) TS1874AIYPT(1)		TSSOP14 (Automotive grade)	Tape & reel	TS1874Y TS1874AY

1. Qualification and characterization according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 & Q 002 or equivalent are on-going.

5 Revision history

Table 15. Document revision history

Date	Revision	Changes
1-Apr-2002	1	First release.
2-Jan-2005	2	Modifications on AMR *Table 1 on page 3* (explanation of V_{id} and V_i limits).
21-May-2007	3	Added limits over temperature range in *Table 3 on page 5*, *Table 4 on page 6*, *Table 5 on page 7*. Added SVR in *Table 5* (SVR parameter removed from *Table 3* and *Table 4*). Added equivalent input voltage noise in *Table 3*, *Table 4*, and *Table 5*. Added R_{thjc} values in *Table 1*. Added automotive grade part numbers to order codes table. Moved order codes table to *Section 4 on page 24*. Updated format of package information.
17-Jan-2008	4	Updated footnote for automotive grade order codes in *Table 14*.

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