

1.Description

The UMW OPA340 series operate on a single supply as low as 2.5 V with an input common-mode voltage range that extends 500 mV below ground and 500 mV above the positive supply. Output voltage swing is to within 1 mV of the supply rails with a 100-k Ω load. These devices offer excellent dynamic response (BW = 5.5 MHz, SR = 6 V/ μ s), yet quiescent current is only 750 A. Dual and quad designs feature completely independent circuitry for lowest crosstalk and freedom from interaction. All are specified from -40°C to 85°C and operate from -55°C to 125°C .

3.Applications

- Driving A/D Converters
- PCMCIA Cards
- Data Acquisition
- Process Control

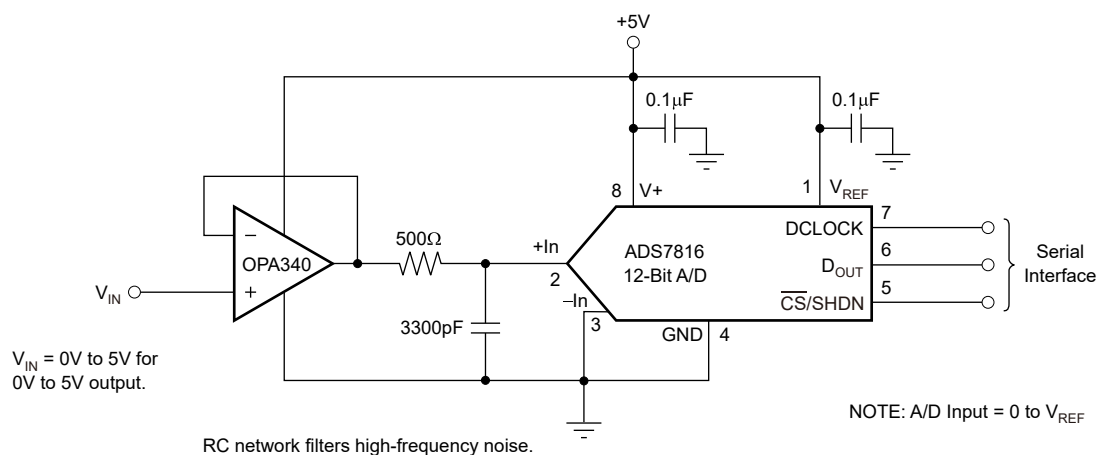
2.Features

- Rail-to-Rail Input
- Rail-to-Rail Output (Within 1mV)
- MicroSize Packages
- Wide Bandwidth: 5.5 MHz
- High Slew Rate: 6 V/ μ s
- Low THD + Noise: 0.0007% (f=1kHz)
- Low Quiescent Current: 750 μ A/Channel
- Single, Dual, and Quad Versions

- Audio Processing
- Communications
- Active Filters
- Test Equipment

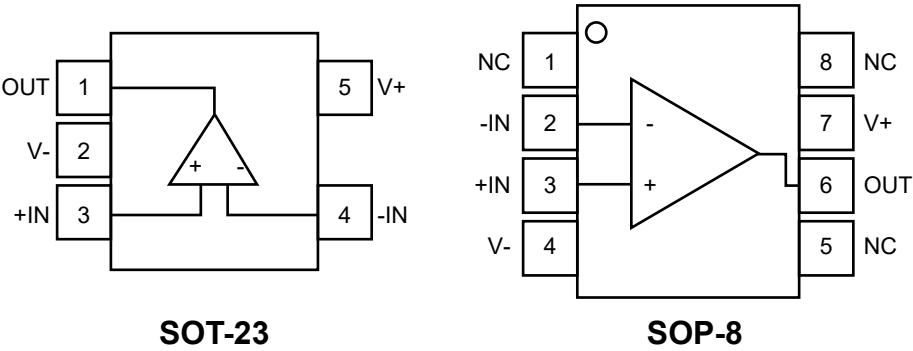


4. OPA340 in Noninverting Configuration Driving ADS7816





5.1 Pinning Information (OPA340)

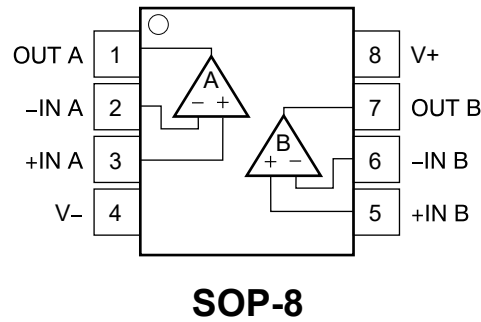


Pin Functions

PIN			I/O	Description
Name	SOT-23	SOP		
-INA	4	2	I	Negative (inverting) input
+INA	3	3	I	Positive (noninverting)input
NC	-	1,5,8	-	No internal connection (can be left floating)
OUT	1	6	O	Output
V-	2	4	-	Negative (lowest) power supply
V+	5	7	-	Positive (highest) power supply



5.2 Pinning Information (OPA2340)

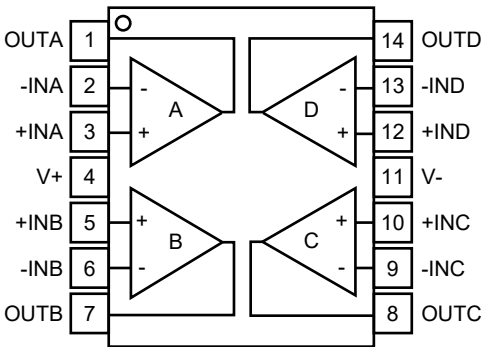


Pin Functions

PIN		I/O	Description
Name	SOP		
-INA	2	I	Negative (inverting)input channel A
+INA	3	I	Positive (noninverting)input channel A
-INB	6	I	Negative (inverting) input channel B
+INB	5	I	Positive (noninverting)input channel B
OUTA	1	O	Output channel A
OUTB	7	O	Output channel B
V-	4	-	Negative (lowest) power supply
V+	8	-	Positive (highest) power supply



5.3 Pinning Information (OPA2340)



SOP-14

Pin Functions

PIN		I/O	Description
Name	SOP		
-INA	2	I	Negative (inverting) input channel A
-INB	6	I	Negative (inverting)input channel B
-INC	9	I	Negative (inverting) input channel C
-IND	13	I	Negative (inverting) input channel D
+INA	3	I	Positive (noninverting) input channel A
+INB	5	I	Positive (noninverting)input channel B
+INC	10	I	Positive (noninverting) input channel C
+IND	12	I	Positive (noninverting) input channel D
NC	-	-	No internal connection (can be left floating)
OUTA	1	O	Output, channel A
OUTB	7	O	Output, channel B
OUTC	8	O	Output, channel C
OUTD	14	O	Output, channel D
V-	11	-	Negative (lowest) power supply
V+	4	-	Positive (highest) power supply



6. Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)⁽¹⁾

Parameter		Symbol	Min	Max	Units
Voltage	Supply voltage			5.5	V
	Signal input terminals ⁽²⁾		-0.5	0.5	V
Current	Signal input terminals ⁽²⁾		-10	10	mA
	Output short circuit ⁽³⁾		Continuous		
Temperature	Operating	T _A	-55	125	°C
	Junction	T _J		150	°C
	Storage	T _{STG}	-55	125	°C

Notes:

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5 V beyond the supply rails should be current limited to 10 mA or less.

(3) Short-circuit to ground, one amplifier per package

7. ESD Ratings

Parameter		Symbol	Value	Units
Electrostatic discharge	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	V _(ESD)	±600	V
	Charged-device model (CDM), per JEDEC specification		±250	V
	JESD22-C101 ⁽²⁾			



8. Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

Parameter	Min	Max	Units
Supply voltage	2.7	5.5	V
Specified temperature	-40	125	°C

9.1 Thermal Information (OPA340)

Thermal Metric ⁽¹⁾	Symbol	(SOT-23)	(SOP)	(SOP)	Units
		5 Pins	8 Pins	14 Pins	
Junction-to-ambient thermal resistance	$R_{\theta JA}$	207.9	142	83.8	°C/W
Junction-to-case (top) thermal resistance	$R_{\theta JC(top)}$	71.2	90.2	70.7	°C/W
Junction-to-board thermal resistance	$R_{\theta JB}$	36	82.5	59.5	°C/W
Junction-to-top characterization parameter	ψ_{JT}	2	39.4	11.6	°C/W
Junction-to-board characterization parameter	ψ_{JB}	35.2	82	37.7	°C/W
Junction-to-case(bottom)thermal resistance	$R_{\theta JC(bot)}$	-	-	-	°C/W

9.2 Thermal Information (OPA2340)

Thermal Metric ⁽¹⁾	Symbol	(SOP)	Units
		8 Pins	
Junction-to-ambient thermal resistance	$R_{\theta JA}$	138.4	°C/W
Junction-to-case (top) thermal resistance	$R_{\theta JC(top)}$	89.5	°C/W
Junction-to-board thermal resistance	$R_{\theta JB}$	78.6	°C/W
Junction-to-top characterization parameter	ψ_{JT}	29.9	°C/W
Junction-to-board characterization parameter	ψ_{JB}	78.1	°C/W
Junction-to-case(bottom)thermal resistance	$R_{\theta JC(bot)}$	-	°C/W



10. Electrical Characteristics

At $T_A = +25^\circ\text{C}$, $R_L = 10\text{k}\Omega$ connected to $V_S = 1.8\text{V}$ to 5.5V , and $V_{CM} = V_{OUT} = \text{mid supply}$ (unless otherwise noted).

Parameter		Symbol	Conditions	Min	Typ ⁽¹⁾	Max	Units	
Input offset voltage		V _{OS}	V _S =5V		±150	±500	μV	
Input offset voltage versus temperature		dV _{OS} /dT	T _A =-40°C to +85°C, V _S =5V		±2.5		μV/°C	
Input offset voltage vs power supply		PSRR	V _S =2.7V to 5.5V, V _{CM} =0V		30	120	μV/V	
	Over temperature		V _S =2.7V to 5.5V, V _{CM} =0V T _A =-40°C to +85°C, V _S =5V			120	μV/°C	
Channel separation, DC					0.2		μV/V	
Input bias current		I _S			±0.2	±10	pA	
	Over temperature		T _A =-40°C to +85°C, V _S =5V			±60	pA	
Input offset current		I _{OS}			±0.2	±10	pA	
Input voltage noise			f=0.1kHz to 50kHz		8		μV _{RMS}	
Input voltage noise density		e _n	f=1kHz		25		nV/√Hz	
Current noise density		i _n	f=1kHz		3		fA/√Hz	
Common-mode voltage range		V _{CM}		-0.3		(V+)+0.3	V	
Common-mode rejection ratio		CMRR	-0.3V<V _{CM} <(V+)-1.8V	80	92		dB	
			V _S =5V, -0.3V<V _{CM} <5.3V	70	84		dB	
			V _S =2.7V, -0.3V<V _{CM} <3V	66	80		dB	
Differential					10 ¹³ 3		Ω pF	
Common-mode					10 ¹³ 6		Ω pF	
Open-loop voltage gain		A _{OL}	R _L =100kΩ, 5mV<V _O <(V+)-5mV	106	124		dB	
			R _L =10kΩ, 5mV<V _O <(V+)-50mV	100	120		dB	
			R _L =2kΩ, 200mV<V _O <(V+)-200mV	94	114		dB	
	Over temperature		R _L =100kΩ, 5mV<V _O <(V+)-5mV T _A =-40°C to +85°C, V _S =5V	106		106	dB	
			R _L =10kΩ, 5mV<V _O <(V+)-50mV T _A =-40°C to +85°C, V _S =5V	100		100	dB	
			R _L =2kΩ, 200mV<V _O <(V+)-200mV T _A =-40°C to +85°C, V _S =5V	94		94	dB	



Parameter		Symbol	Conditions	Min	Typ ⁽¹⁾	Max	Units
Gain-bandwidth product		GBW	G=1		5.5		MHz
Slew rate		SR	V _S =5V, G=1, C _L =100pF		6		V/μs
Settling time, 0.1%			V _S =5V 2-V step, C _L =100pF		1		μs
Settling time, 0.01%			V _S =5V 2-V step, C _L =100pF		1.6		μs
Overload recovery time			V _{IN} ×G=V _S		0.2		μs
Total harmonic distortion + noise		THD+N	V _S =5V, V _O =3V _{PP} ⁽²⁾ G=1, f=1kHz		0.0007%		
Voltage output swing from rail ⁽²⁾			R _L =100kΩ, A _{OL} ≥106dB		1	5	mV
			R _L =10kΩ, A _{OL} ≥106dB		10		mV
			R _L =2kΩ, A _{OL} ≥106dB		40		mV
	Over temperature		R _L =100kΩ, A _{OL} ≥106dB T _A =-40°C to +85°C, V _S =5V			5	mV
			R _L =10kΩ, A _{OL} ≥106dB T _A =-40°C to +85°C, V _S =5V			50	mV
			R _L =2kΩ, A _{OL} ≥106dB T _A =-40°C to +85°C, V _S =5V			200	mV
Short-circuit current		I _{SC}			±50		mA
Capacitive load drive		C _{LOAD}		See Typical Characteristics			
Specified voltage range		V _S		2.7		5	V
Operating voltage range			Lower end		2.5		V
			Higher end		5.5		V
Quiescent current (per amplifier)		I _Q	I _O =0, V _S =5V		750	950	μA
	Over temperature		I _O =0, V _S =5V, T _A =-40°C to +85°C			100	μA
Specified range				-40		85	°C
Operating range				-55		125	°C
Storage range				-55		125	°C

(2) Output voltage swings are measured between the output and power-supply rails.



11.1 Typical characteristic

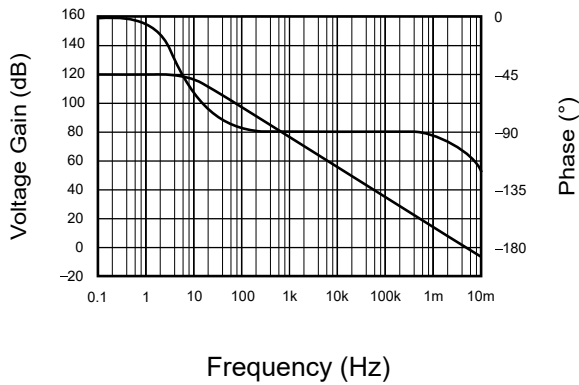


Figure 1: Open-Loop Gain/Phase vs Frequency

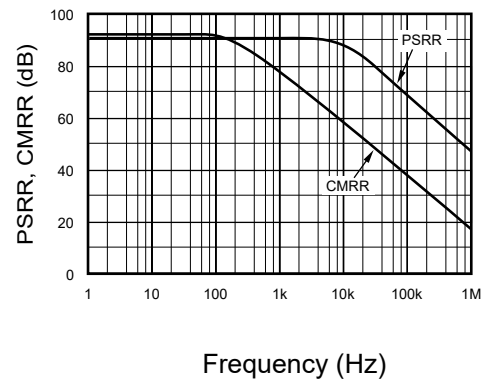


Figure 2: Power-Supply and Common-Mode Rejection vs Frequency

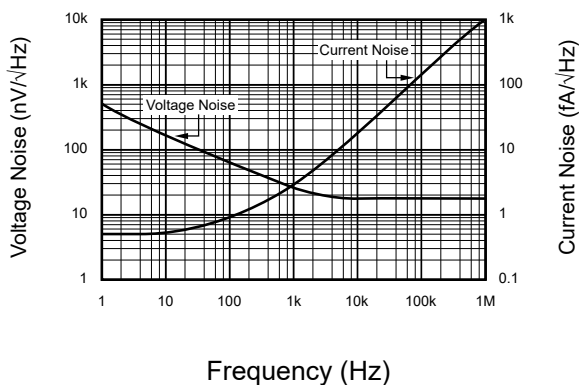


Figure 3: Input Voltage and Current Noise Spectral Density vs Frequency

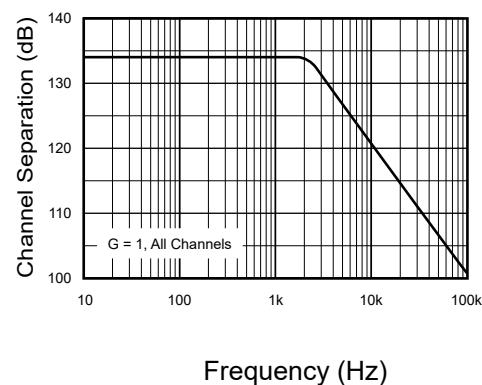


Figure 4: Channel Separation vs Frequency

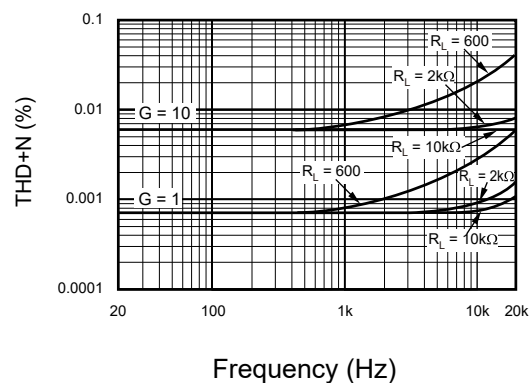


Figure 5: Total Harmonic Distortion + Noise vs Frequency

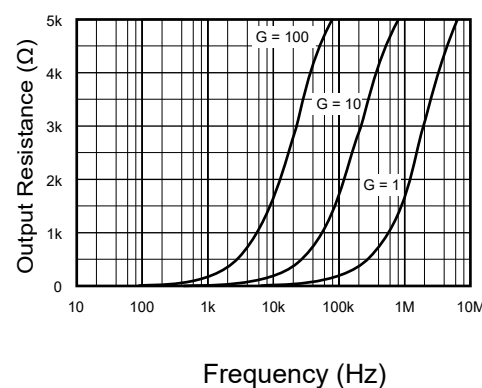


Figure 6: Closed-Loop Output Impedance vs Frequency



11.2 Typical characteristic

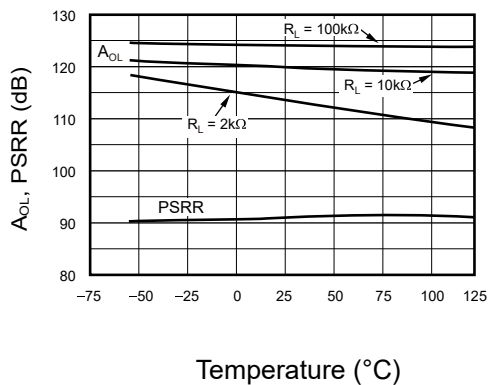


Figure 7: Open-Loop Gain and Power-Supply Rejection vs Temperature

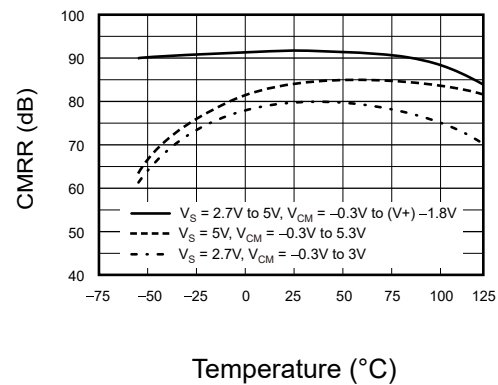


Figure 8: Common-Mode Rejection vs Temperature

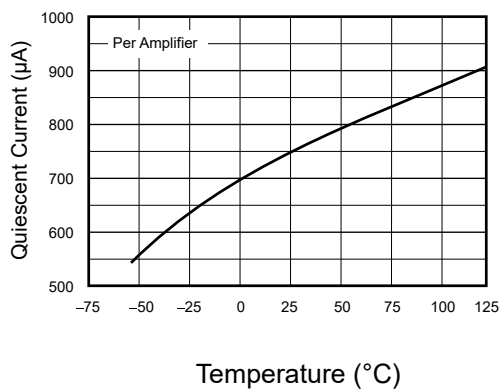


Figure 9: Quiescent Current vs Temperature

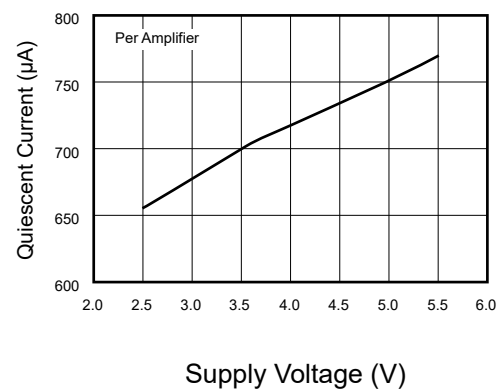


Figure 10: Quiescent Current vs Supply Voltage

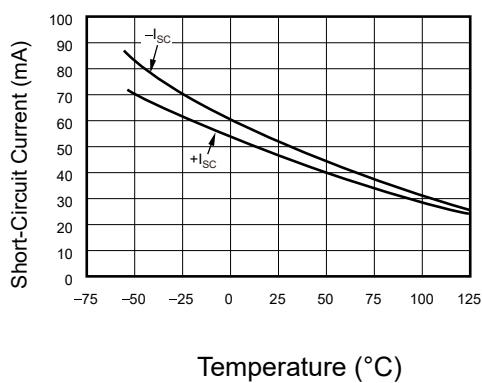


Figure 11: Short-Circuit Current vs Temperature

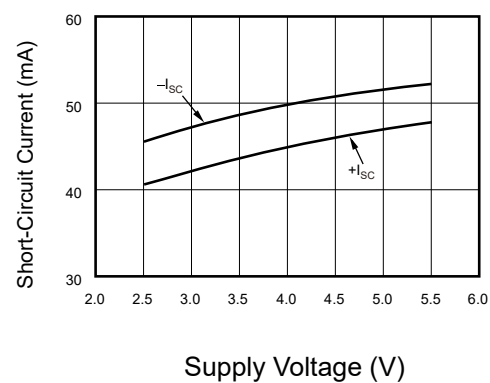


Figure 12: Short-Circuit Current vs Supply Voltage



11.3 Typical characteristic

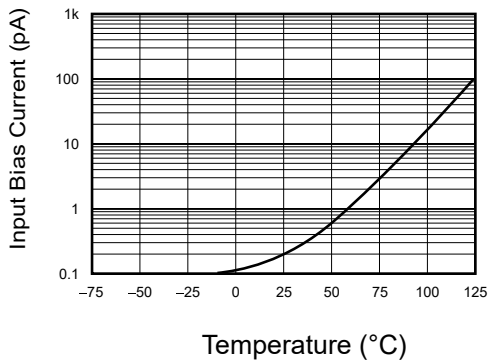


Figure 13: Input Bias Current vs Temperature

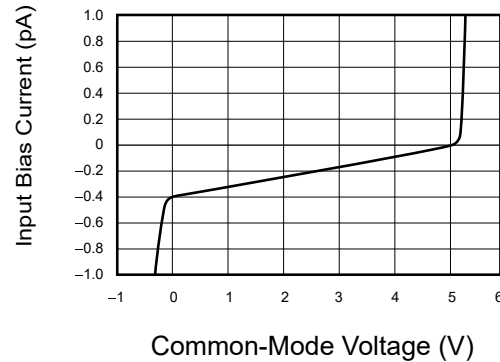


Figure 14: Input Bias Current vs Input Common-Mode Voltage

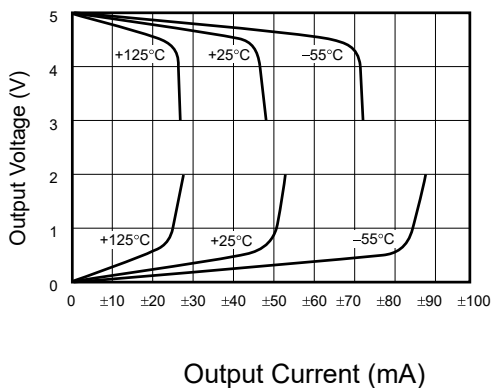


Figure 15: Output Voltage Swing vs Output Current

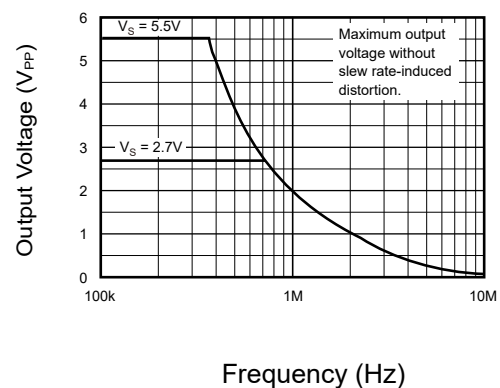


Figure 16: Maximum Output Voltage vs Frequency

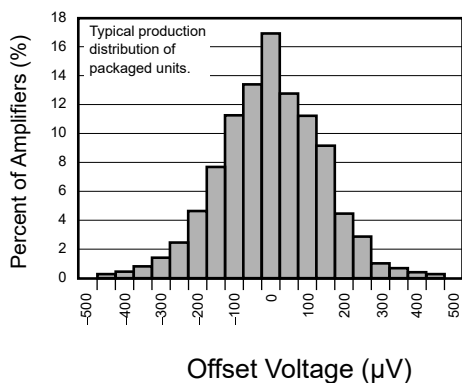


Figure 17: Offset Voltage Production Distribution

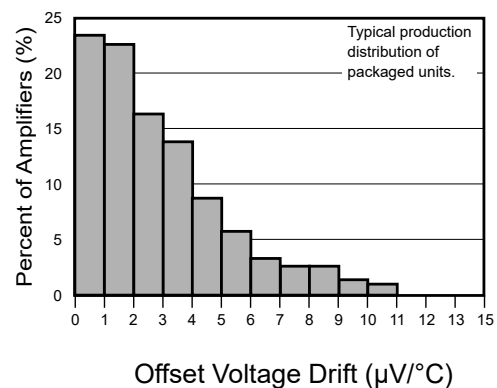
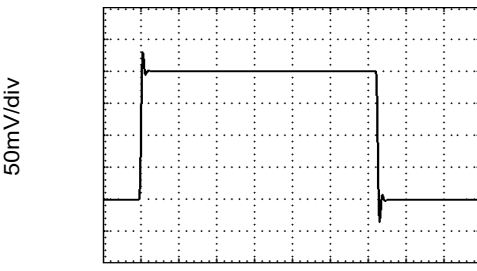
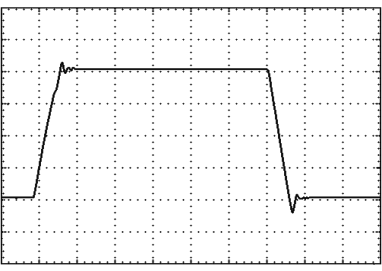
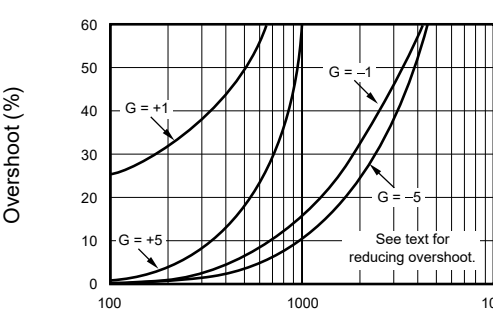
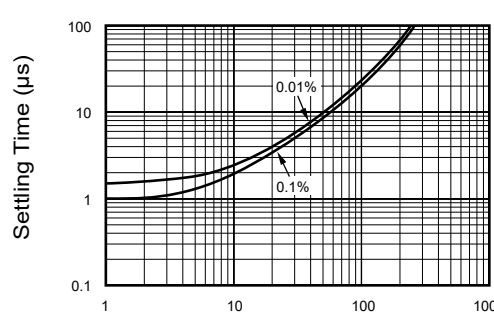


Figure 18: Offset Voltage Drift Magnitude Production Distribution

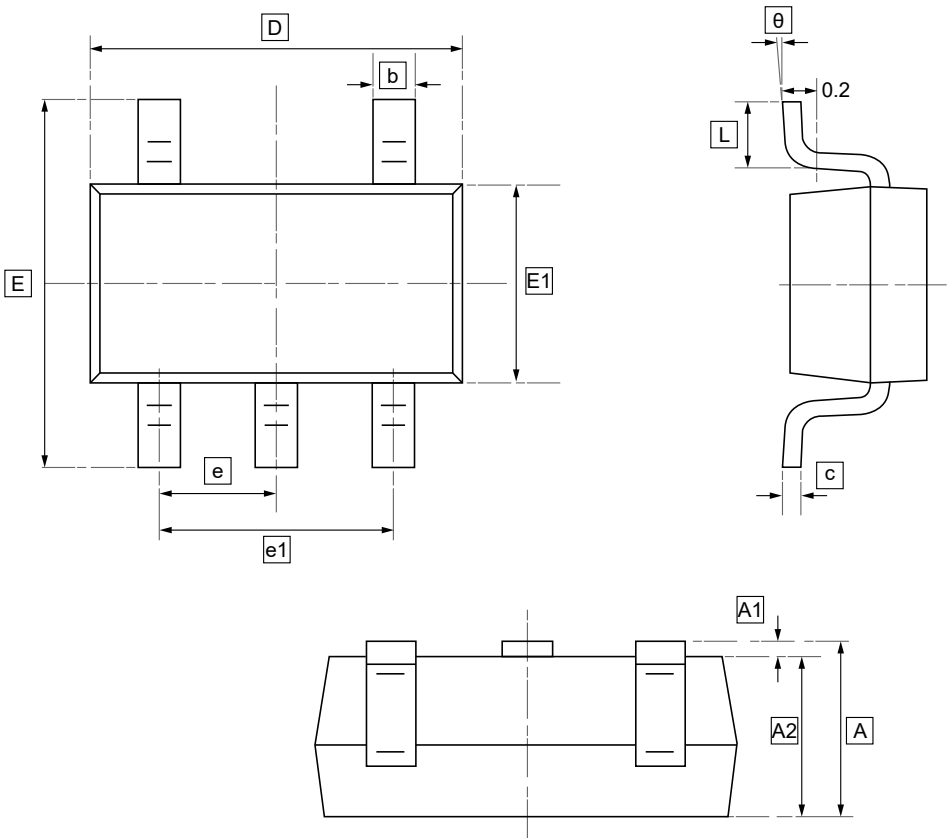


11.4 Typical characteristic

 50mV/div 1µs/div	 1V/div 1µs/div
Figure 19: Small-Signal Step Response	Figure 20: Large-Signal Step Response
 Overshoot (%) Load Capacitance (pF)	 Settling Time (µs) Closed-Loop Gain (V/V)
Figure 21: Small-Signal Overshoot vs Load Capacitance	Figure 22: Settling Time vs Closed-Loop Gain



12.1 SOT-23-5 Package Outline Dimensions

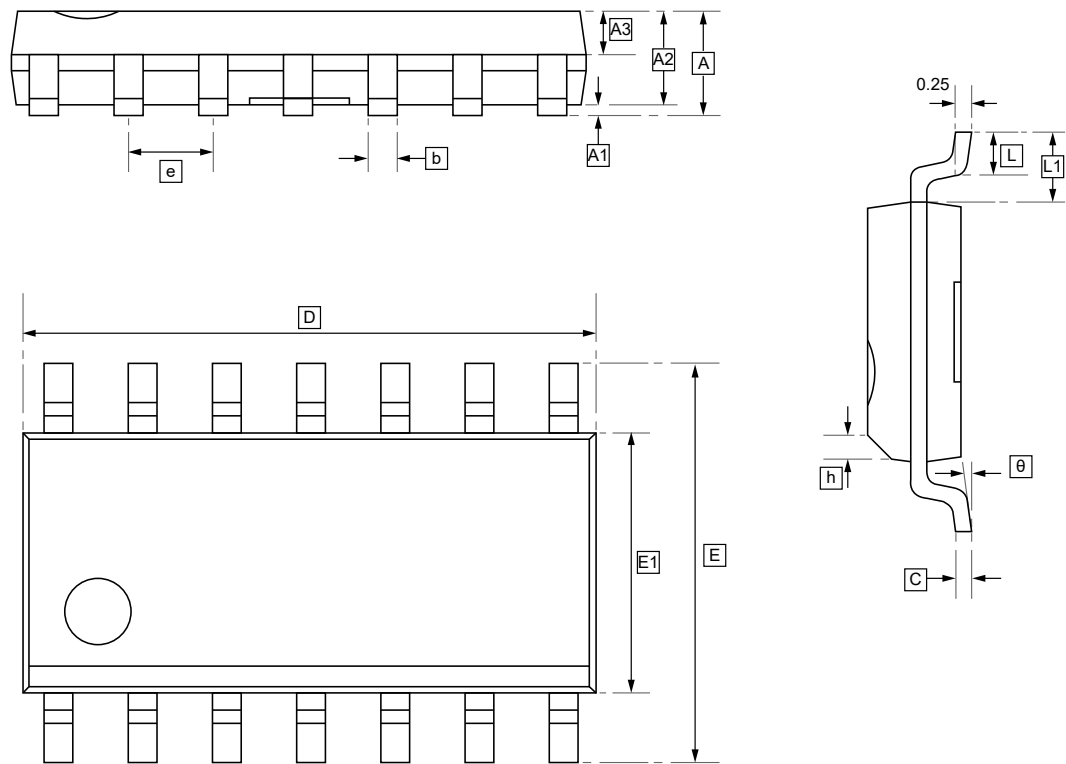


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E1	E	e	e1	L	θ
Min	1.050	0.000	1.050	0.300	0.100	2.820	1.500	2.650	0.950	1.800	0.300	0°
Max	1.250	0.100	1.150	0.500	0.200	3.020	1.700	2.950	BSC	2.000	0.600	8°



12.2 SOP-14 Package Outline Dimensions



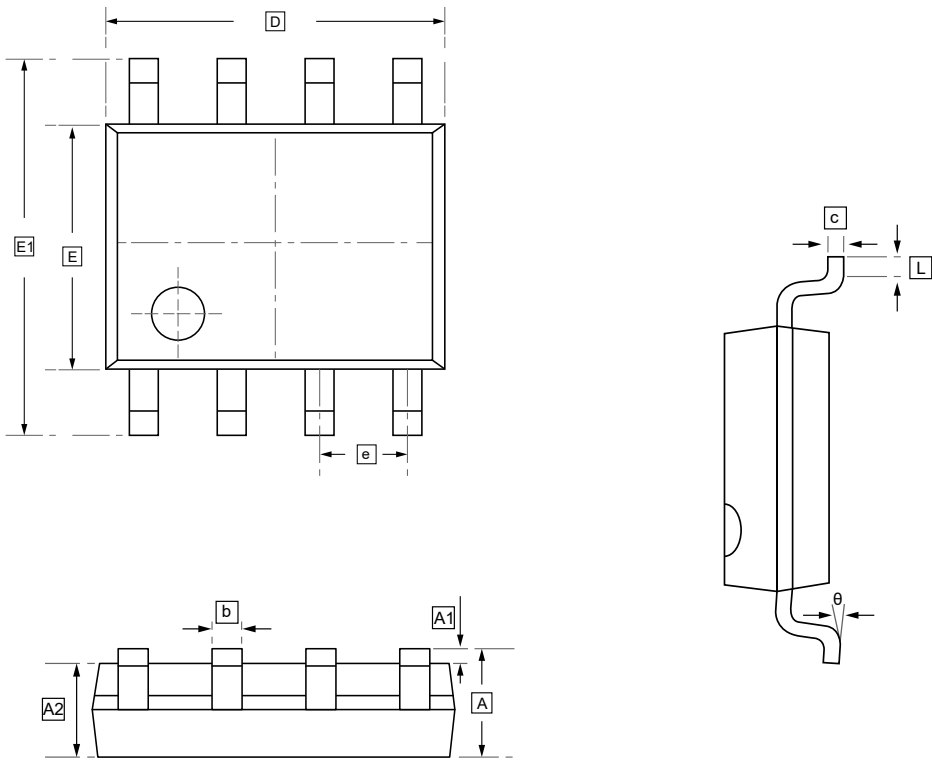
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	C	D	E	E1	e	h	L
Min	-	0.05	1.35	0.65	0.203	0.17	8.45	5.80	3.80	1.24	0.25	0.40
Max	1.75	0.25	1.55	0.75	0.305	0.25	8.85	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°



12.3 SOP-8 Package Outline Dimensions

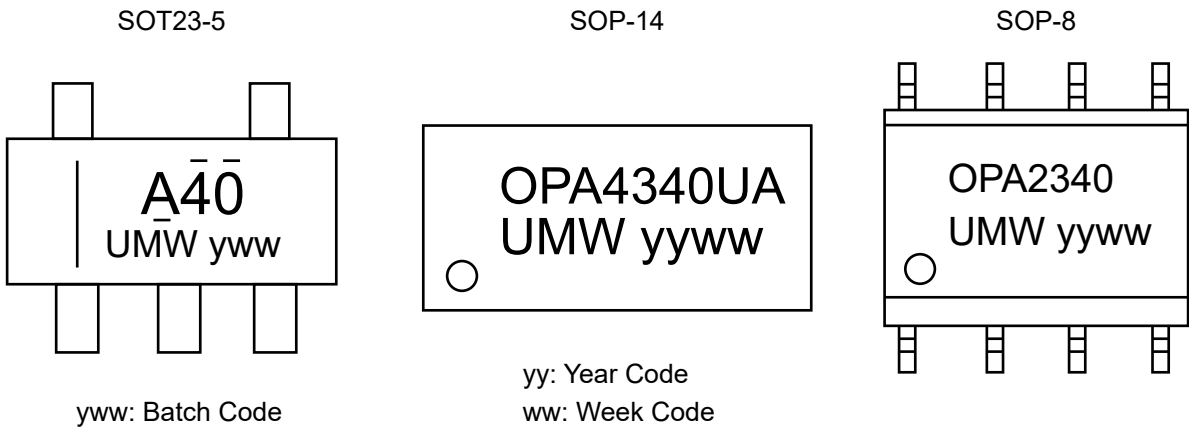


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°



13.Ordering information



Order Code	Marking	Package	Base QTY	Delivery Mode
UMW OPA4340UA	OPA4340UA	SOP-14	2500	Tape and reel
UMW OPA2340UA	OPA2340UA	SOP-8	2500	Tape and reel
UMW OPA340UA	OPA340UA	SOP-8	2500	Tape and reel
UMW OPA340NA	A40	SOT23-5	3000	Tape and reel



14.Disclaimer

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