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-kΩ load. These devices offer excellent dynamic response (BW = 5.5 MHz, SR = 6 V/μs), 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.

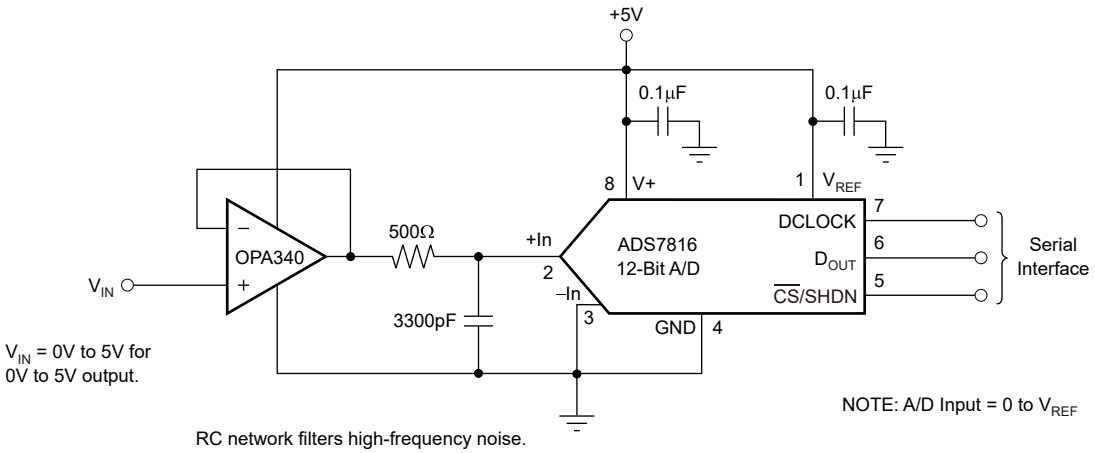
2.Features

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

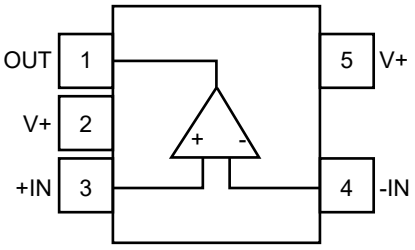
3.Applications

- Driving A/D Converters
- PCMCIA Cards
- Data Acquisition
- Process Control
- Audio Processing
- Communications
- Active Filters
- Test Equipment

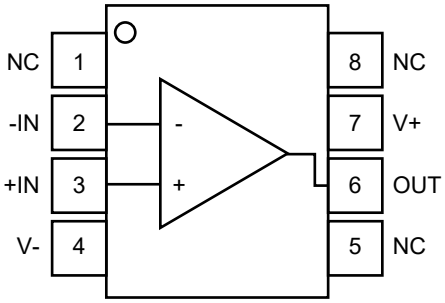
4.OPA340 in Noninverting Configuration Driving ADS7816



5.1 Pinning Information (OPA340)



SOT-23

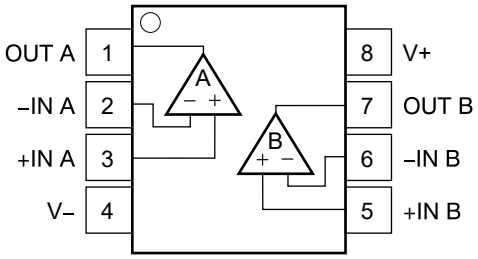


SOP-8

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)

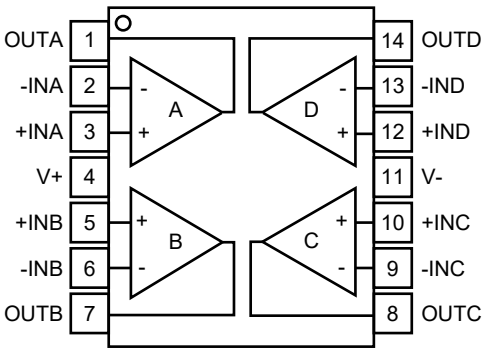


SOP-8

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 JESD22-C101(2)		±250	V

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

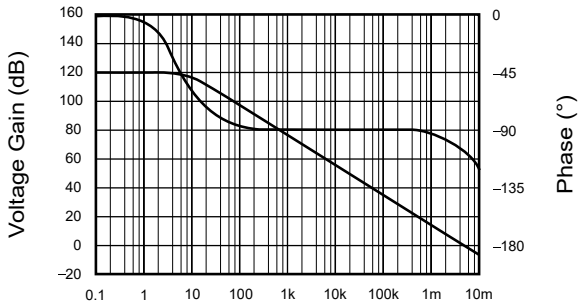
At T_A=+25°C, R_L=10kΩ connected to V_S=1.8V to 5.5V, and V_{CM}=V_{OUT}=midsupply (unless otherwise noted).

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
	Over temperature		R_L=10kΩ, A_{OL}≥106dB T_A=-40°C to +85°C, V_S=5V			50	mV
	Over temperature		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

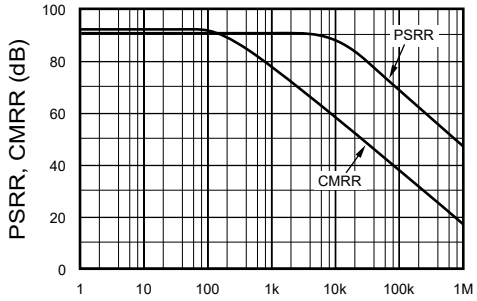
(2) Output voltage swings are measured between the output and power-supply rails.

11.1 Typical characteristic



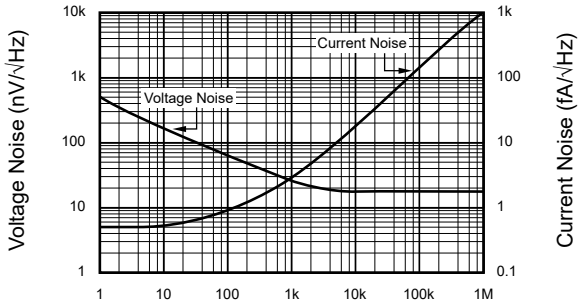
Frequency (Hz)

Figure 1: Open-Loop Gain/Phase vs Frequency



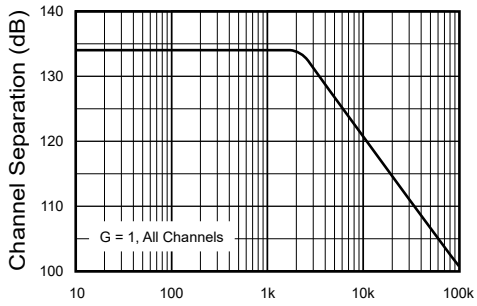
Frequency (Hz)

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



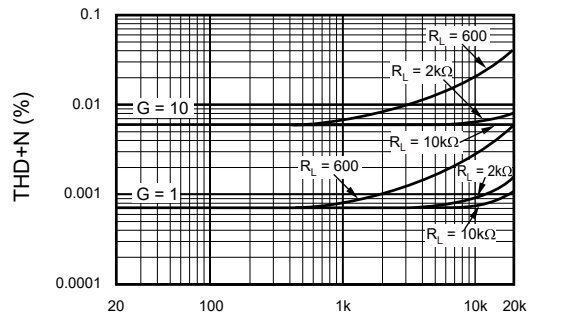
Frequency (Hz)

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



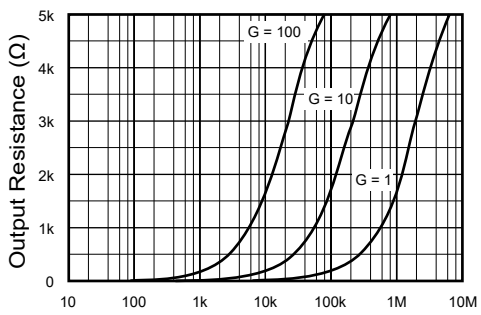
Frequency (Hz)

Figure 4: Channel Separation vs Frequency



Frequency (Hz)

Figure 5: Total Harmonic Distortion + Noise vs Frequency



Frequency (Hz)

Figure 6: Closed-Loop Output Impedance vs Frequency

11.2 Typical characteristic

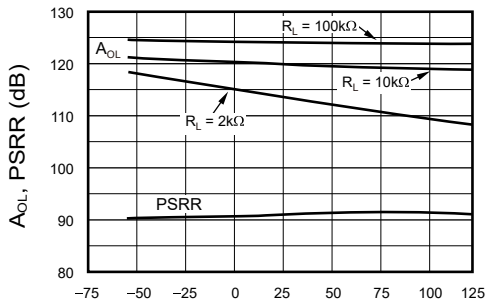


Figure 7: Open-Loop Gain and Power-Supply Rejection vs Temperature

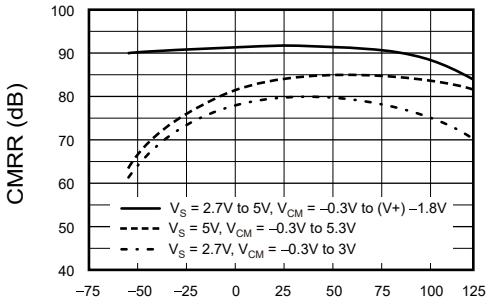


Figure 8: Common-Mode Rejection vs Temperature

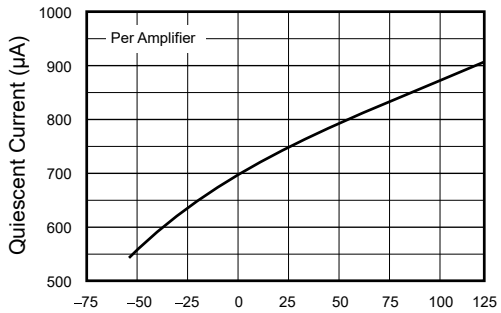


Figure 9: Quiescent Current vs Temperature

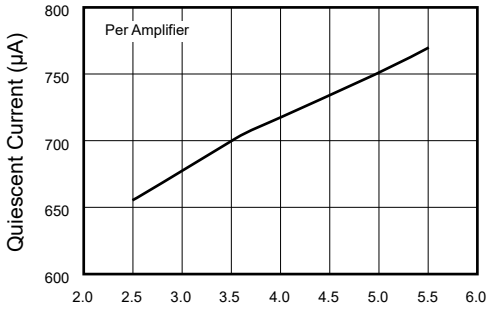


Figure 10: Quiescent Current vs Supply Voltage

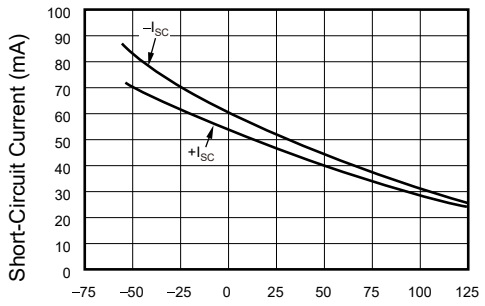


Figure 11: Short-Circuit Current vs Temperature

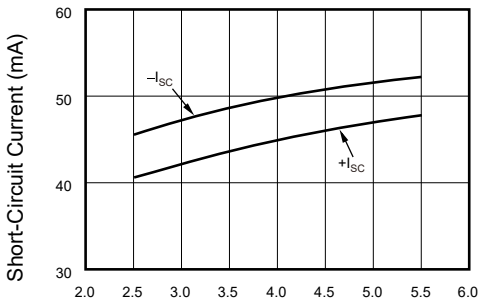


Figure 12: Short-Circuit Current vs Supply Voltage

11.3 Typical characteristic

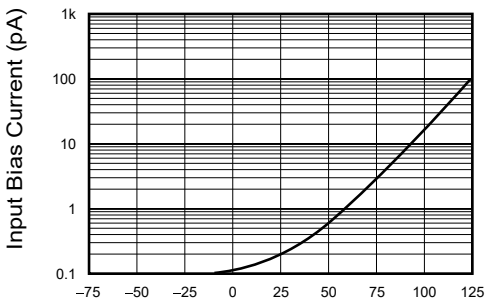


Figure 13: Input Bias Current vs Temperature

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

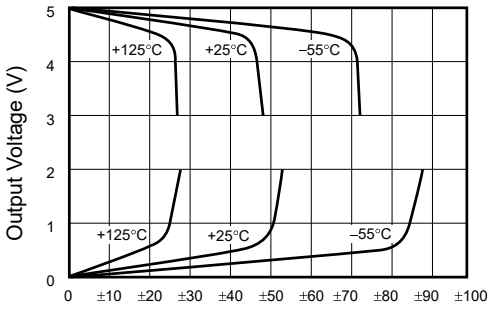


Figure 15: Output Voltage Swing vs Output Current

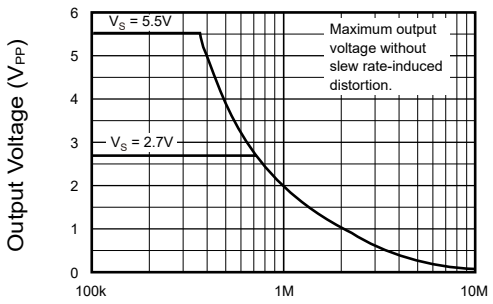


Figure 16: Maximum Output Voltage vs Frequency

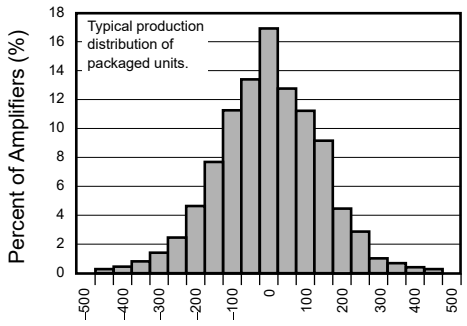


Figure 17: Offset Voltage Production Distribution

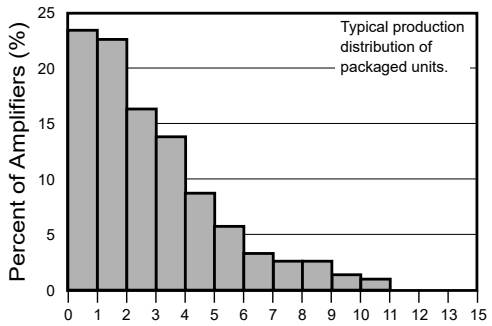


Figure 18: Offset Voltage Drift Magnitude Production Distribution

11.4 Typical characteristic

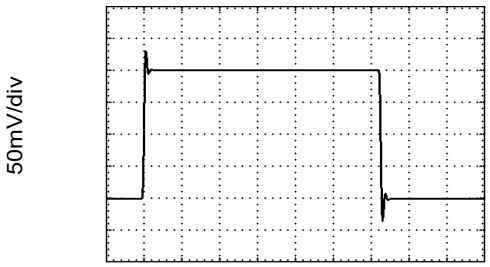


Figure 19: Small-Signal Step Response

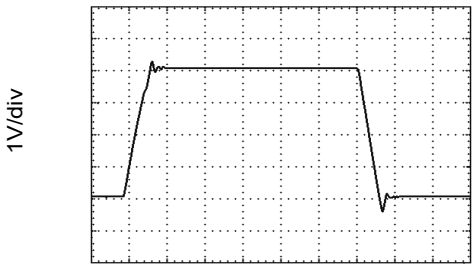


Figure 20: Large-Signal Step Response

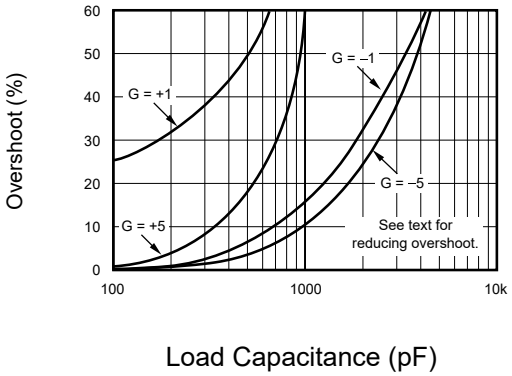


Figure 21: Small-Signal Overshoot vs Load Capacitance

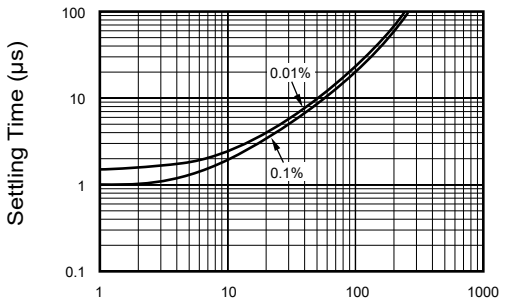
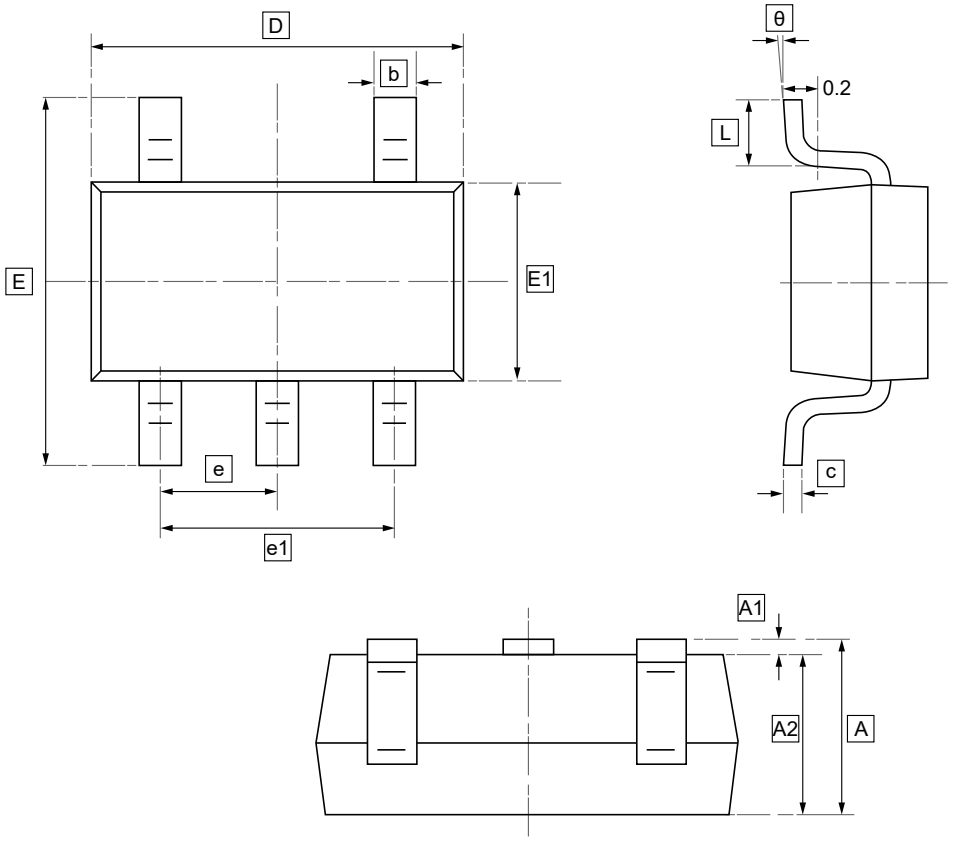


Figure 22: Settling Time vs Closed-Loop Gain

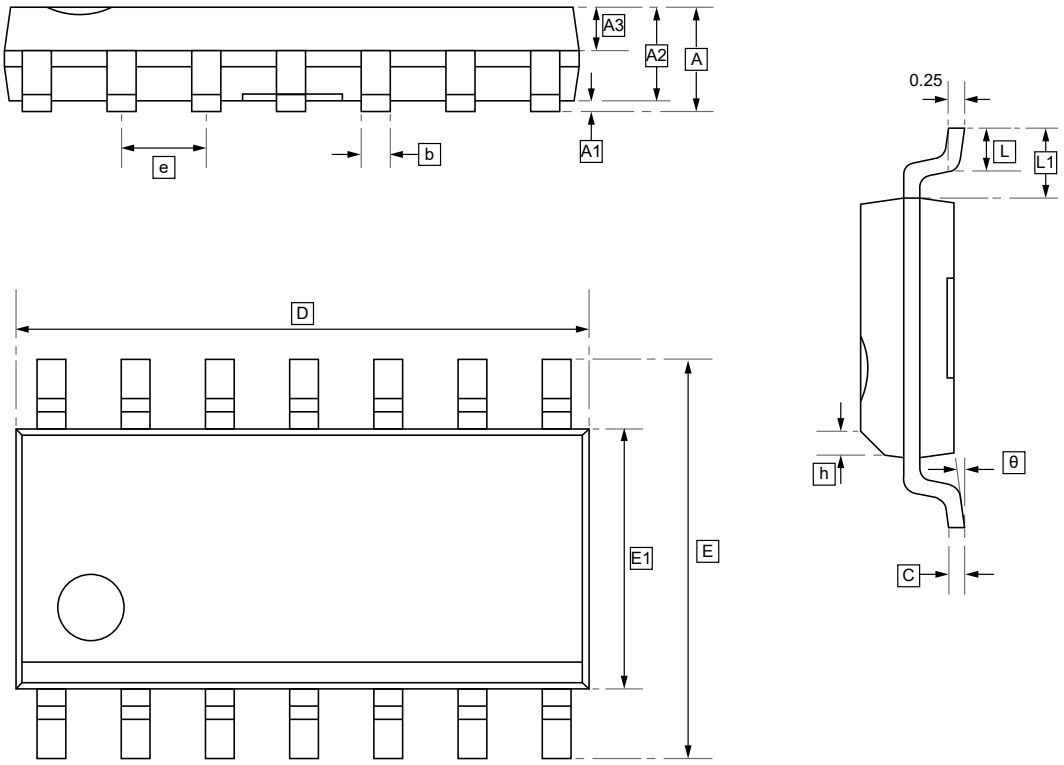
12.1 SOT-23-5 Package Outline Dimensions



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

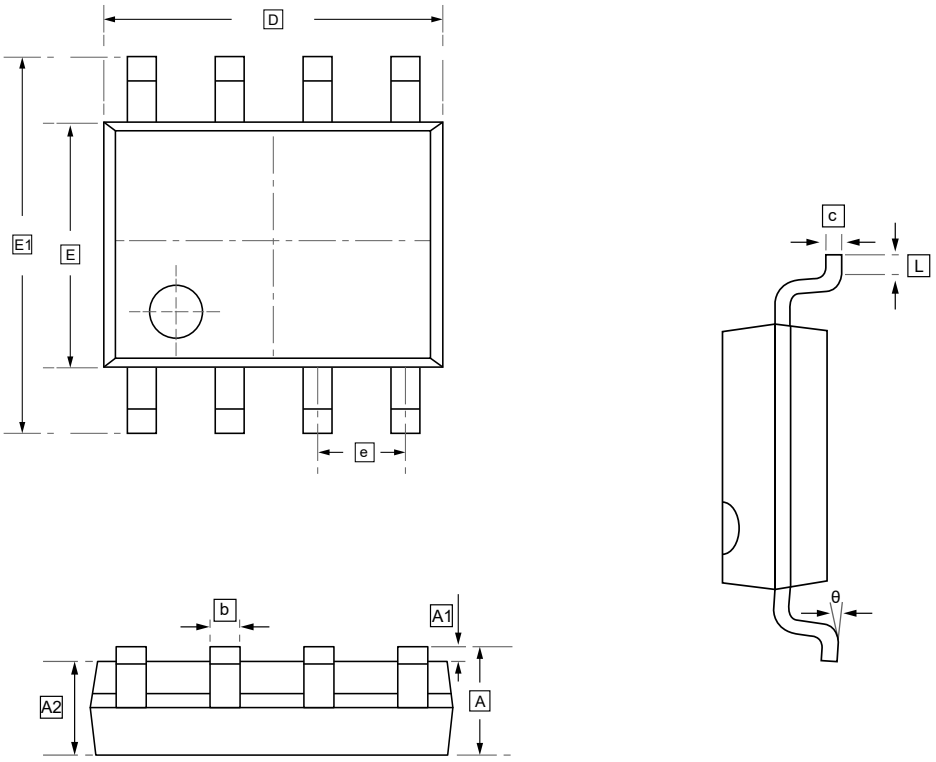


DIMENSIONS (mm are the original dimensions)

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

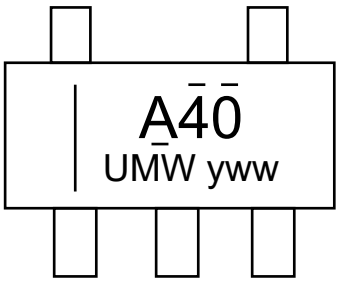


DIMENSIONS (mm are the original dimensions)

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°

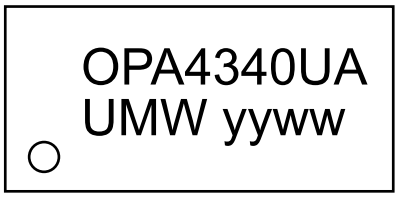
13.Ordering information

SOT23-5



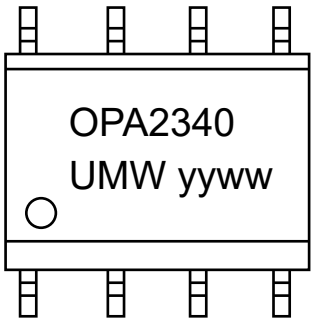
yww: Batch Code

SOP-14



yy: Year Code
ww: Week Code

SOP-8



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

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