

1. Description

The UMW RS6331, RS6332, RS6334, RS6331S RS6332S families of products offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth (1.6MHz) and slew rate of 0.8V/us. The op-amps are unity gain stable and feature an ultra-low input bias current.

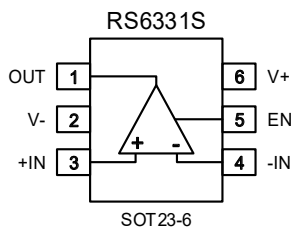
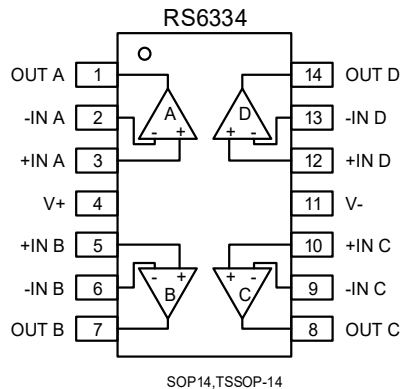
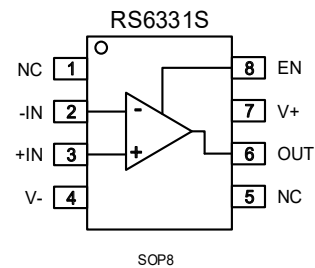
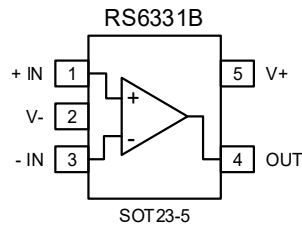
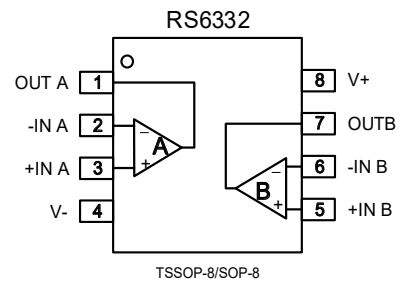
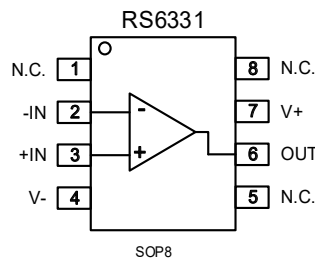
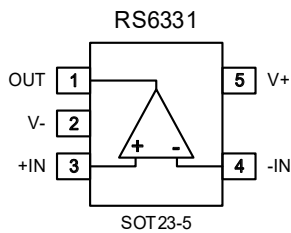
2. Features

- HIGH GAIN BANDWIDTH: 1.6MHz
- RAIL-TO-RAIL INPUT AND OUTPUT
0.6mV Typical V_{os}
- INPUT VOLTAGE RANGE: -0.1V to +5.6V
with $V_s = 5.5V$
- SUPPLY RANGE: +2.5V to +5.5V
- SHUTDOWN: RS6331S/RS6332S
- SPECIFIED UP TO +125° C

3. Applications

- Sensors
- Photodiode Amplification
- Active Filters
- Test Equipment
- Driving A/D Converters

4. Pinning information





5. Absolute Maximum Ratings ⁽¹⁾

Parameter		Value
Supply Voltage, V+ to V-		7V
Input Terminals, Voltage ⁽²⁾		-0.5 to (V+) + 0.5V
Input Terminals, Current ⁽²⁾		±10mA
Storage Temperature		-65°C to +150°C
Operating Temperature		-40°C to +125°C
Junction Temperature		150°C
Package Thermal Resistance @ T _A = +25°C		
SOT23-5, SOT23-6		200°C/W
MSOP-10, SOIC-8, TSSOP-8		150°C/W
SOIC-14, TSSOP-14		100°C/W
Lead Temperature (Soldering, 10s)		260°C
ESD Susceptibility	HBM	5000V
	MM	400V

Notice:

(1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

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



6. Electrical Characteristics

(At $T_A=+25^\circ\text{C}$, $V_S=5\text{V}$, $R_L=10\text{k}\Omega$ connected to $V_S/2$, and $V_{OUT}=V_S/2$, unless otherwise noted.)

Parameter	Symbol	Conditions	T_J	Min	Typ	Max	Units
Operating Voltage Range	V_S		25°C	2.5		5.5	V
Quiescent Current/Amplifier	I_Q		25°C		58	80	μA
Power-Supply Rejection Ratio	PSRR	$V_S=2.5\text{V to }5.5\text{V}$	25°C	72	90		dB
		$V_{CM}=(V_-)+0.5\text{V}$	$-40^\circ\text{C to }125^\circ\text{C}$	65			dB
Input Offset Voltage	V_{OS}		25°C		0.6	3	mV
Input Offset Voltage Average Drift	$V_{OS}TC$	$-40^\circ\text{C to }125^\circ\text{C}$			2		$\mu\text{V}/^\circ\text{C}$
Input Bias Current	I_B		25°C		1	10	pA
Input Offset Current	I_{OS}		25°C		1	10	pA
Common-Mode Voltage Range	V_{CM}	$V_S=5.5\text{V}$	25°C	-0.1		5.6	V
Common-Mode Rejection Ratio	CMRR	$V_S=5.5\text{V}$	25°C	71	90		dB
		$V_{CM}=-0.1\text{V to }4\text{V}$	$-40^\circ\text{C to }125^\circ\text{C}$	68			dB
		$V_S=5.5\text{V}$	25°C	60	80		dB
		$V_{CM}=-0.1\text{V to }5.6\text{V}$	$-40^\circ\text{C to }125^\circ\text{C}$	57			dB
Open-Loop Voltage Gain	AOL	$R_L=2\text{K}\Omega$	25°C	94	105		dB
		$V_O=0.15\text{V to }4.85\text{V}$	$-40^\circ\text{C to }125^\circ\text{C}$	85			dB
		$R_L=10\text{K}\Omega$	25°C	100	110		dB
		$V_O=0.05\text{V to }4.95\text{V}$	$-40^\circ\text{C to }125^\circ\text{C}$	90			dB
Output Swing From Rail		$R_L=2\text{K}\Omega$	25°C		25		mV
		$R_L=10\text{K}\Omega$	25°C		8		mV
Output Short-Circuit Current	I_{OUT}		25°C		55		mA
Slew Rate	SR		25°C		0.8		$\text{V}/\mu\text{s}$
Gain-Bandwidth Product	GBP		25°C		1.6		MHz
Phase Margin	PM		25°C		64		$^\circ$



Parameter	Symbol	Conditions	T _J	Min	Typ	Max	Units
Setting Time,0.1%	t _s				1.3		μs
Overload Recovery Time		V _{IN} ·Gain≥V _S			2.3		μs
Input Voltage Noise Density	e _n	f=1KHz	25°C		22		nV/√Hz
		f=10KHz	25°C		20		nV/√Hz
Supply Current in Shutdown	I _{Q(OFF)}		25°C		<1		μA
	t _{OFF}		25°C		3		μs
	t _{ON}		25°C		20		μs
Shut Down	V _L		25°C	V-		(V-)+0.8	V
Amplifier Is Active	V _H		25°C	(V-)+2		V+	V



7.1 Typical characteristic

<p>Figure 1: Open-loop Gain And Phase vs Frequency</p>	<p>Figure 2: Common-mode Rejection Ratio vs Frequency</p>
<p>Figure 3: Input Voltage Noise Spectral Density vs Frequency</p>	<p>Figure 4: Power-supply Rejection Ratio vs Frequency</p>
<p>Figure 5: Quiescent Current vs Temperature</p>	<p>Figure 6: Quiescent Current vs Temperature</p>

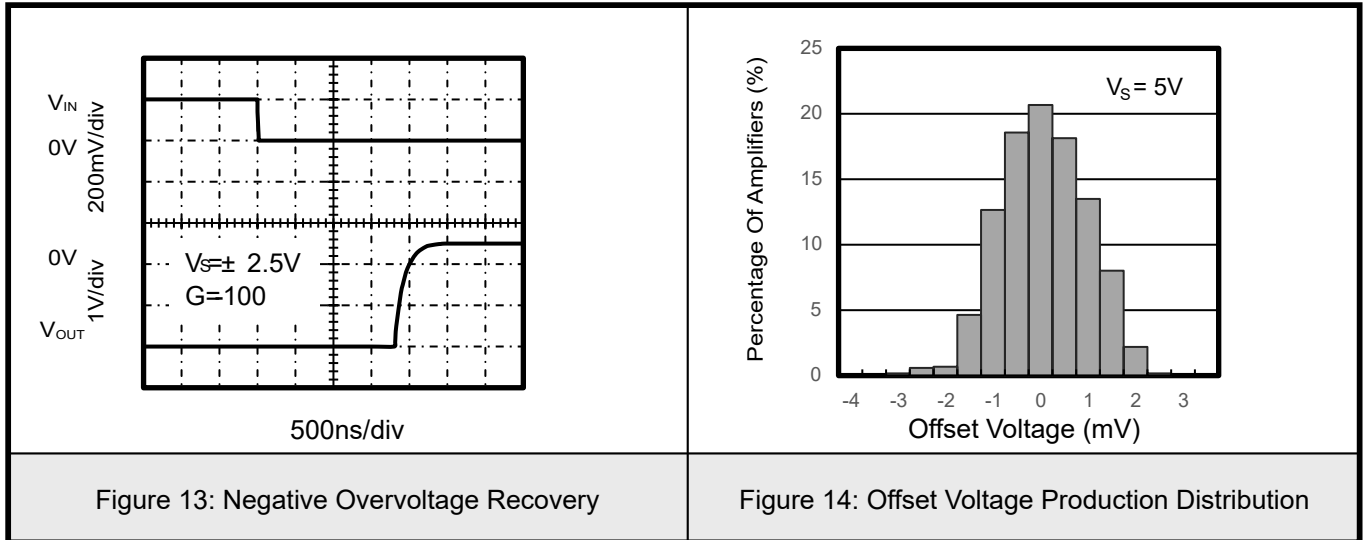


7.2 Typical characteristic

<p>Figure 7: Sink Current vs Temperature</p>	<p>Figure 8: Source Current vs Temperature</p>
<p>Figure 9: Input Bias Current vs Temperature</p>	<p>Figure 10: Small-signal Step Response</p>
<p>Figure 11: Large-signal Step Response</p>	<p>Figure 12: Positive Overvoltage Recovery</p>

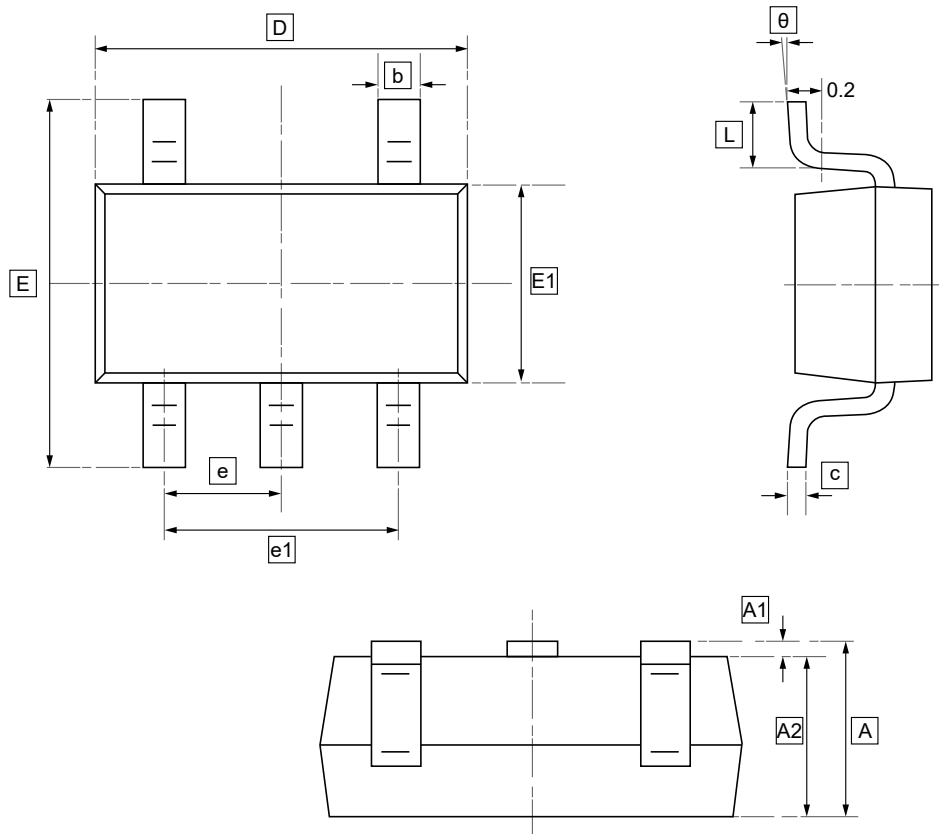


7.3 Typical characteristic





8.1 SOT23-5 Package Outline Dimensions

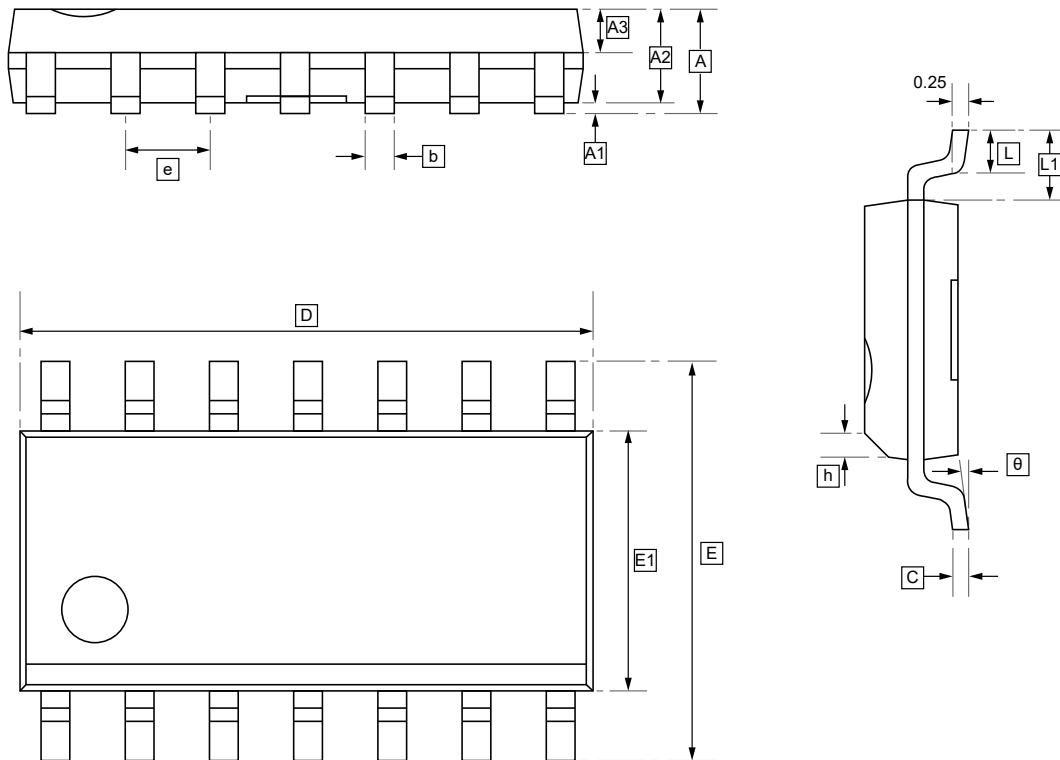


DIMENSIONS (mm are the original dimensions)

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°



8.2 SOP-14 Package Outline Dimensions



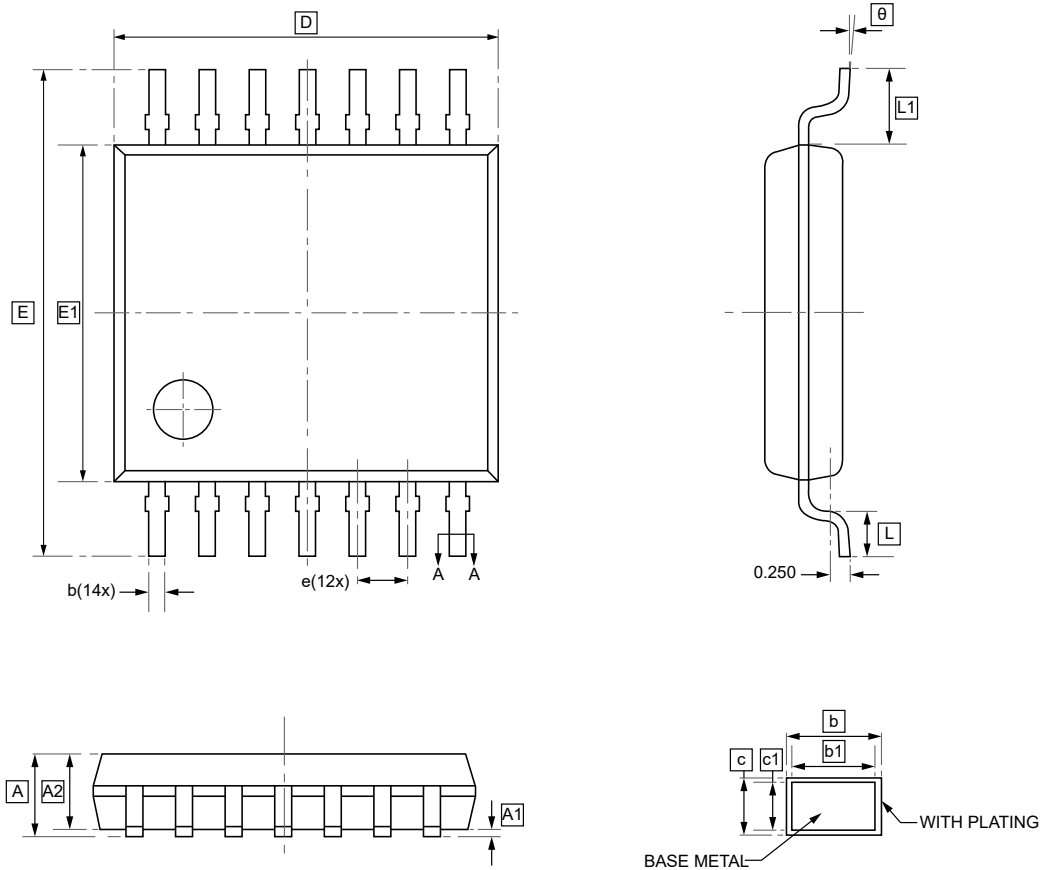
DIMENSIONS (mm are the original dimensions)

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°



8.3 TSSOP-14 Package Outline Dimensions



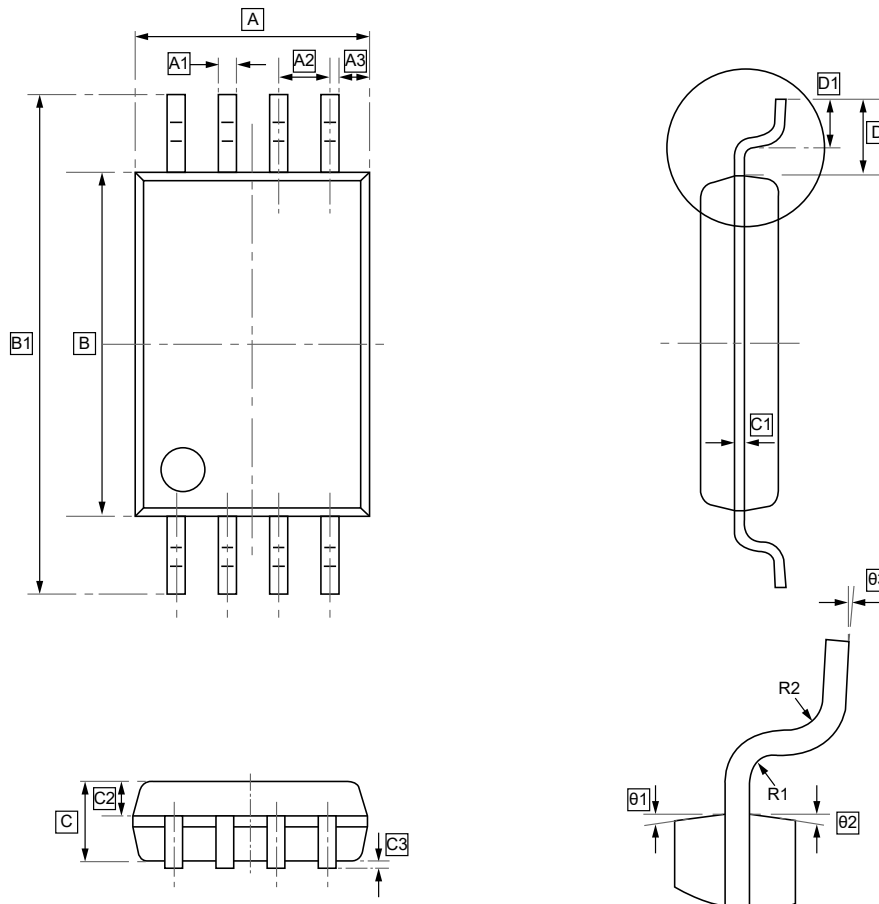
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	b1	c	c1	D	E	E1	e	L1
Min	-	0.05	0.90	0.20	0.19	0.13	0.120	4.90	6.20	4.30	0.65	0.85
Max	1.20	0.15	1.05	0.28	0.25	0.17	0.14	5.10	6.60	4.50	BSC	1.15

Symbol	L	θ
Min	0.45	0°
Max	0.75	8°



8.4 TSSOP-8 Package Outline Dimensions



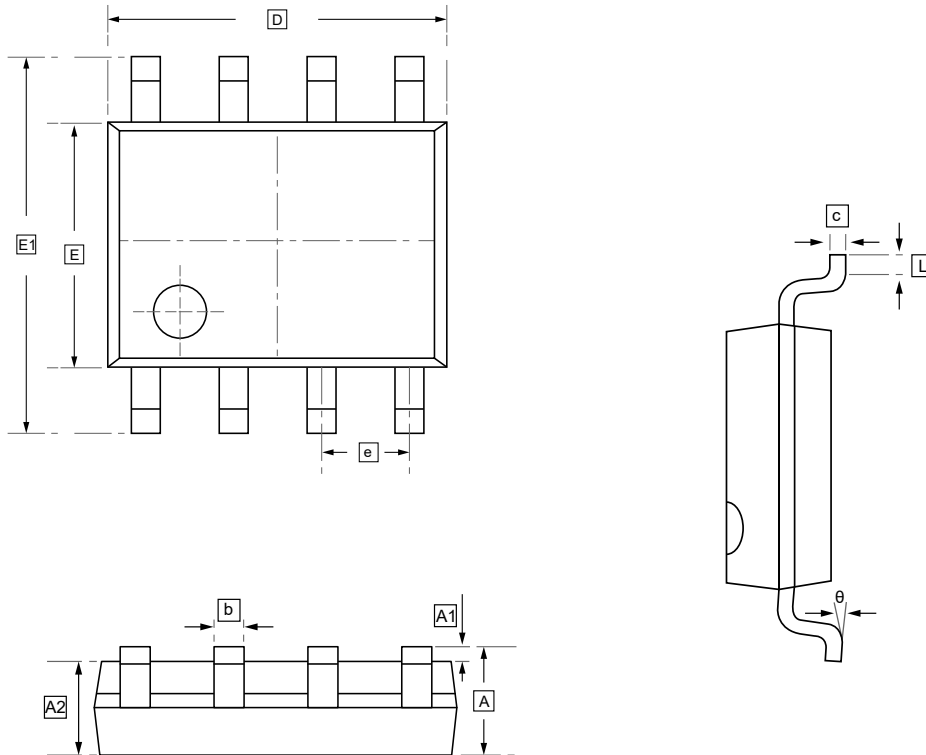
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	C	C1	C2	C3	D	D1
Min	2.90	0.20	0.65	0.36	4.30	6.30	0.95	0.127	0.39	0.05	1.00	0.50
Max	3.10	0.30	TYP	0.46	4.50	6.50	1.05	TYP	0.49	0.15	REF	0.70

Symbol	R1	R2	θ1	θ2	θ3
Min	0.15	0.15	12°	12°	0°
Max	TYP	TYP	TYP4	TYP4	7°



8.5 SOP-8 Package Outline Dimensions

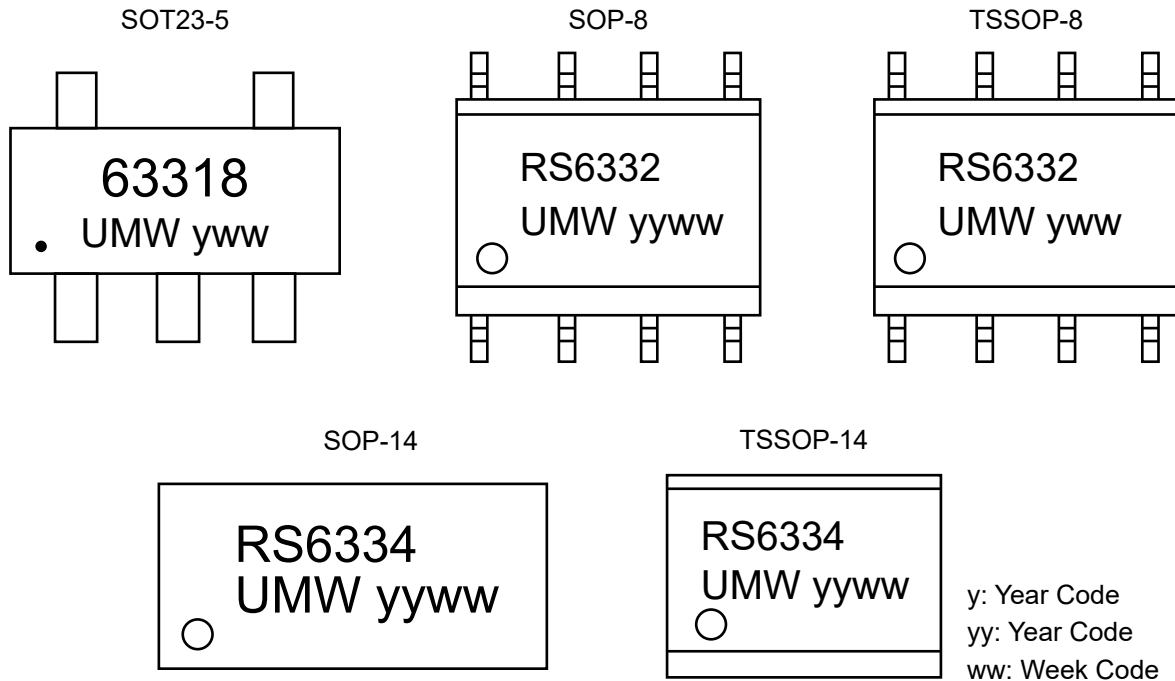


DIMENSIONS (mm are the original dimensions)

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°



9. Ordering information



Order Code	Marking	Package	Base QTY	Delivery Mode
UMW RS6331XF	6331	SOT23-5	3000	Tape and reel
UMW RS6331BXF	63318	SOT23-5	3000	Tape and reel
UMW RS6332XK	RS6332	SOP-8	2500	Tape and reel
UMW RS6334XP	RS6334	SOP-14	2500	Tape and reel
UMW RS6334XQ	RS6334	TSSOP-14	4000	Tape and reel
UMW RS6332XQ	RS6332	TSSOP-8	4000	Tape and reel



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