

DESCRIPTION

The OPA338 series rail-to-rail output CMOS operational amplifiers are designed for low cost and miniature applications.

OPA338 op amps provide low bias current, highspeed operation, high open-loop gain, and rail-to-rail output swing. They operate on a single supply with operation as low as 2.5V while drawing only 525µA quiescent current. In addition, the input common-mode voltage range includes ground—ideal for single-supply operation.

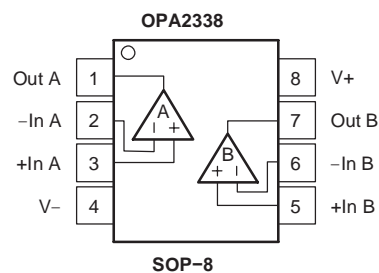
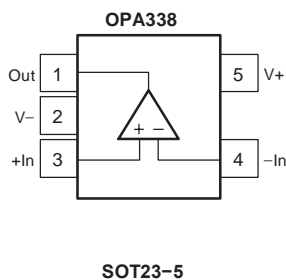
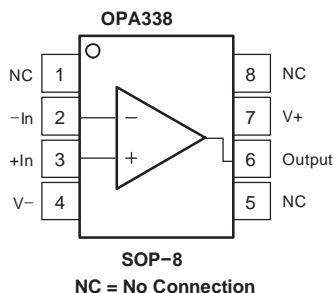
The OPA338 series is optimized for gains greater than or equal to 5. They are easy-to-use and free from phase inversion and overload problems found in some other op amps. Excellent performance is maintained as the amplifiers swing to their specified limits. The dual versions feature completely independent circuitry for lowest crosstalk and freedom from interaction, even when overdriven or overloaded.

FEATURES

- SINGLE-SUPPLY OPERATION
- RAIL-TO-RAIL OUTPUT SWING
- FET-INPUT: $I_B = 10\text{pA max}$
- HIGH SPEED:
 OPA337: 3MHz, 1.2V/µs (G = 1)
 OPA338: 12.5MHz, 4.6V/µs (G = 5)
- OPERATION FROM 2.5V to 5.5V
- HIGH OPEN-LOOP GAIN: 120dB
- LOW QUIESCENT CURRENT: 525µA/amp
- SINGLE AND DUAL VERSIONS

APPLICATIONS

- BATTERY-POWERED INSTRUMENTS
- PHOTODIODE PRE-AMPS
- MEDICAL INSTRUMENTS
- TEST EQUIPMENT
- AUDIO SYSTEMS
- DRIVING ADCs
- CONSUMER PRODUCTS



ELECTRICAL CHARACTERISTICS: $V_S = 2.7V$ to $5.5V$

Boldface limits apply over the specified temperature range, $-40^{\circ}C$ to $+85^{\circ}C$, $V_S = 5V$.

At $T_A = +25^{\circ}C$ and $R_L = 25k\Omega$ connected to $V_S/2$, unless otherwise noted.

PARAMETER	CONDITION	OPA338, OPA2338			UNIT
		MIN	TYP ⁽¹⁾	MAX	
OFFSET VOLTAGE					
Input Offset Voltage V_{OS}			± 0.5	± 3	mV
$T_A = -40^{\circ}C$ to $+85^{\circ}C$				± 3.5	mV
vs Temperature dV_{OS}/dT			± 2		$\mu V/^{\circ}C$
vs Power-Supply Rejection Ratio PSRR	$V_S = 2.7V$ to $5.5V$		25	125	$\mu V/V$
$T_A = -40^{\circ}C$ to $+85^{\circ}C$	$V_S = 2.7V$ to $5.5V$			125	$\mu V/V$
Channel Separation (dual versions)	dc		0.3		$\mu V/V$
INPUT BIAS CURRENT					
Input Bias Current I_B			± 0.2	± 10	pA
$T_A = -40^{\circ}C$ to $+85^{\circ}C$			See Typical Curve		
Input Offset Current I_{OS}			± 0.2	± 10	pA
NOISE					
Input Voltage Noise, $f = 0.1Hz$ to $10Hz$			6		μV_{PP}
Input Voltage Noise Density, $f = 1kHz$ e_n			26		nV/\sqrt{Hz}
Current Noise Density, $f = 1kHz$ i_n			0.6		fA/\sqrt{Hz}
INPUT VOLTAGE RANGE					
Common-Mode Voltage Range V_{CM}	$T_A = -40^{\circ}C$ to $+85^{\circ}C$	-0.2		$(V+) - 1.2$	V
Common-Mode Rejection Ratio CMRR	$-0.2V < V_{CM} < (V+) - 1.2V$	74	90		dB
$T_A = -40^{\circ}C$ to $+85^{\circ}C$	$-0.2V < V_{CM} < (V+) - 1.2V$	74			dB
INPUT IMPEDANCE					
Differential			$10^{13} 2$		ΩpF
Common-Mode			$10^{13} 4$		ΩpF
OPEN-LOOP GAIN					
Open-Loop Voltage Gain A_{OL}	$R_L = 25k\Omega, 125mV < V_O < (V+) - 125mV$	100	120		dB
$T_A = -40^{\circ}C$ to $+85^{\circ}C$	$R_L = 25k\Omega, 125mV < V_O < (V+) - 125mV$	100			dB
	$R_L = 5k\Omega, 500mV < V_O < (V+) - 500mV$	100	114		dB
$T_A = -40^{\circ}C$ to $+85^{\circ}C$	$R_L = 5k\Omega, 500mV < V_O < (V+) - 500mV$	100			dB
OPA338 FREQUENCY RESPONSE					
Gain-Bandwidth Product GBW	$V_S = 5V, G = 5$		12.5		MHz
Slew Rate SR	$V_S = 5V, G = 5$		4.6		$V/\mu s$
Settling Time: 0.1%	$V_S = 5V, 2V$ Step, $C_L = 100pF, G = 5$		1.4		μs
0.01%	$V_S = 5V, 2V$ Step, $C_L = 100pF, G = 5$		1.9		μs
Overload Recovery Time	$V_{IN} \times G = V_S$		0.5		μs
Total Harmonic Distortion + Noise THD+N	$V_S = 5V, V_O = 3V_{PP}, G = 5, f = 1kHz$		0.0035		%

(1) $V_S = 5V$.

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

ELECTRICAL CHARACTERISTICS: $V_S = 2.7V$ to $5.5V$ (continued)

Boldface limits apply over the specified temperature range, $-40^{\circ}C$ to $+85^{\circ}C$, $V_S = 5V$.

At $T_A = +25^{\circ}C$ and $R_L = 25k\Omega$ connected to $V_S/2$, unless otherwise noted.

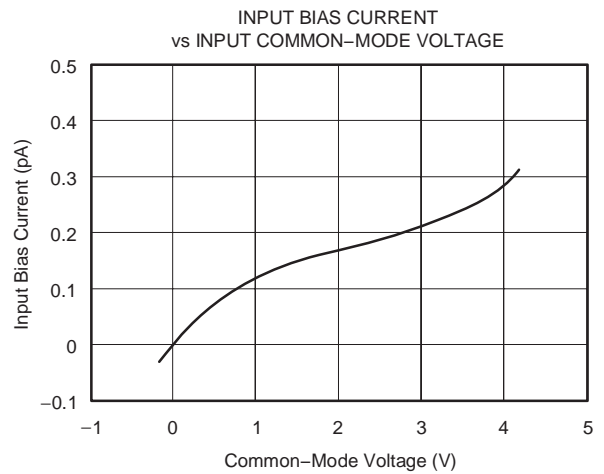
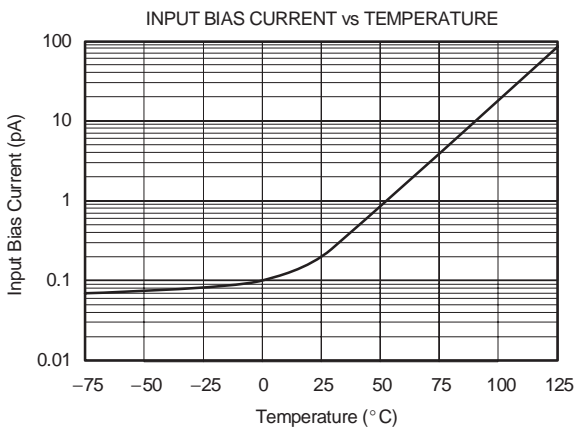
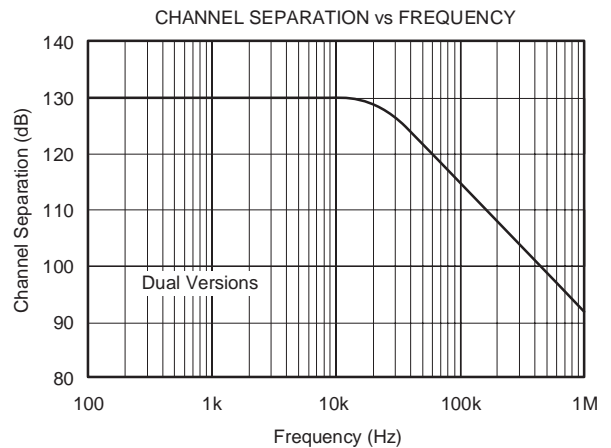
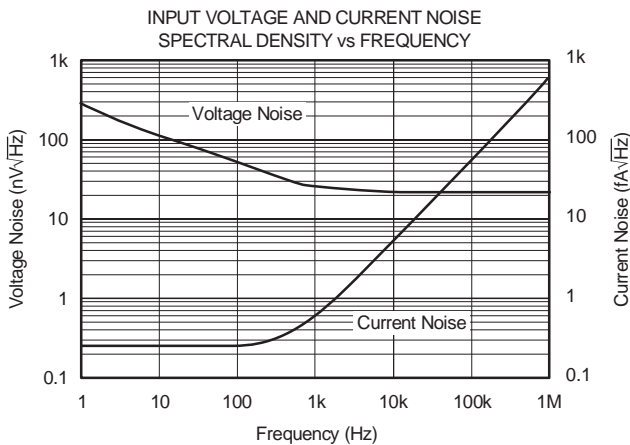
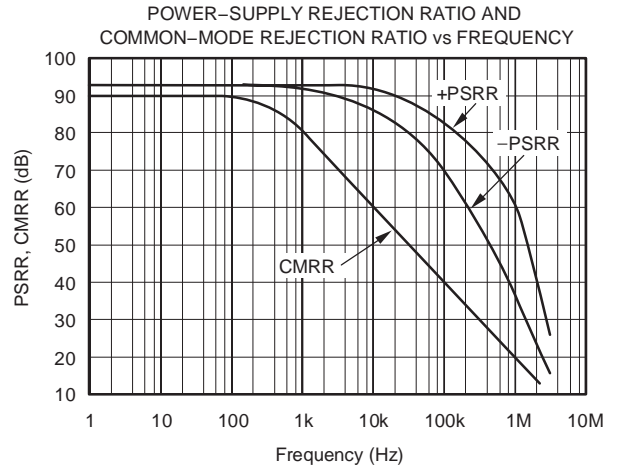
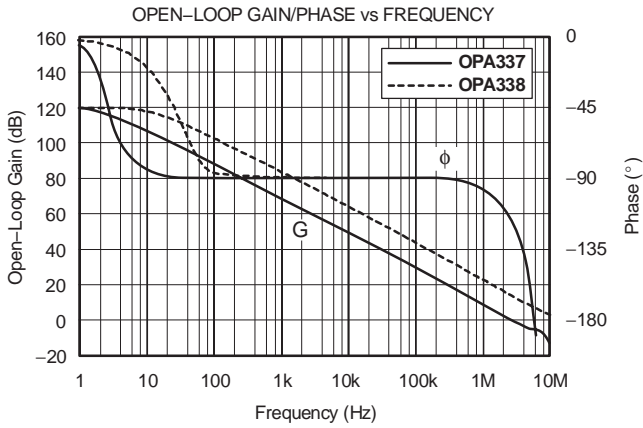
PARAMETER	CONDITION	OPA338, OPA2338			UNIT
		MIN	TYP ⁽¹⁾	MAX	
OUTPUT					
Voltage Output Swing from Rail ⁽²⁾	$R_L = 25k\Omega, A_{OL} \geq 100dB$		40	125	mV
$T_A = -40^{\circ}C$ to $+85^{\circ}C$	$R_L = 25k\Omega, A_{OL} \geq 100dB$			125	mV
	$R_L = 5k\Omega, A_{OL} \geq 100dB$		150	500	mV
$T_A = -40^{\circ}C$ to $+85^{\circ}C$	$R_L = 5k\Omega, A_{OL} \geq 100dB$			500	mV
Short-Circuit Current			± 9		mA
Capacitive Load Drive		See Typical Curve			
POWER SUPPLY					
Specified Voltage Range	V_S	$T_A = -40^{\circ}C$ to $+85^{\circ}C$	2.7	5.5	V
Minimum Operating Voltage			2.5		V
Quiescent Current (per amplifier)	I_Q	$I_O = 0$		1	mA
$T_A = -40^{\circ}C$ to $+85^{\circ}C$		$I_O = 0$		1.2	mA
TEMPERATURE RANGE					
Specified Range			-40	+85	$^{\circ}C$
Operating Range			-55	+125	$^{\circ}C$
Storage Range			-55	+125	$^{\circ}C$
Thermal Resistance	θ_{JA}				
SO-8 Surface-Mount			150		$^{\circ}C/W$

(1) $V_S = 5V$.

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

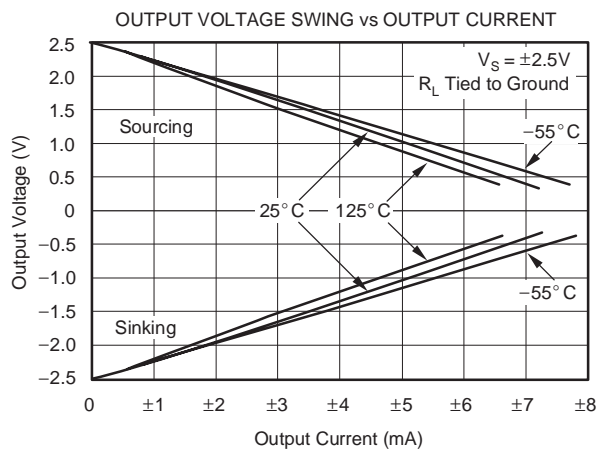
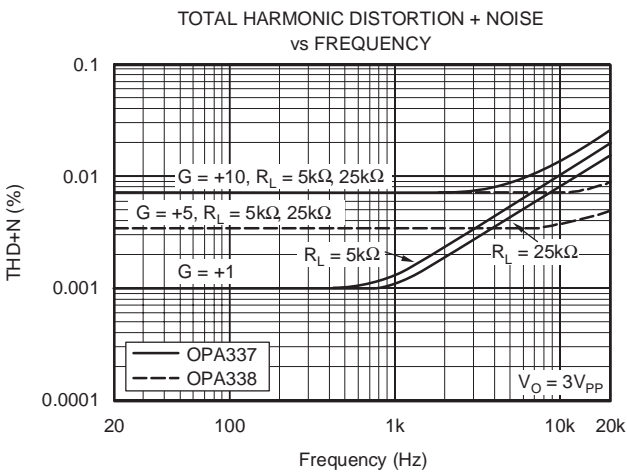
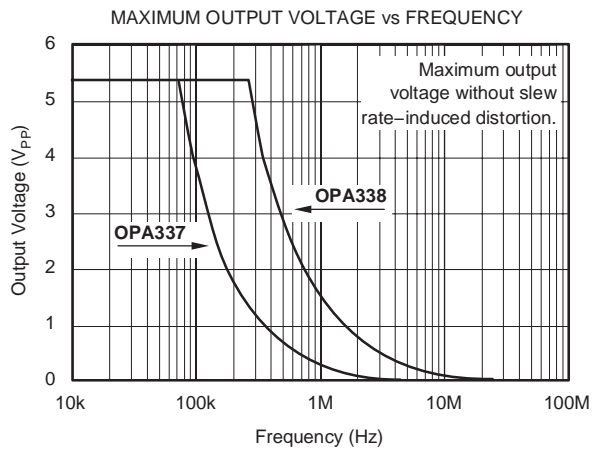
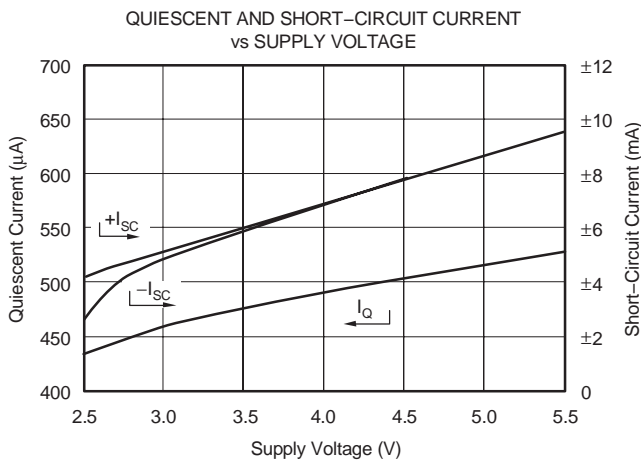
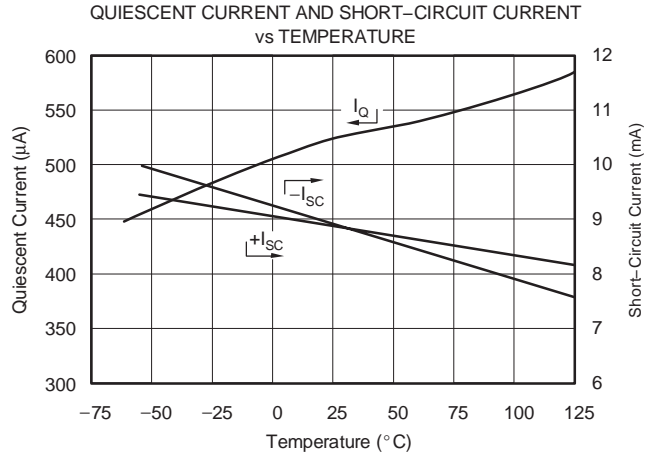
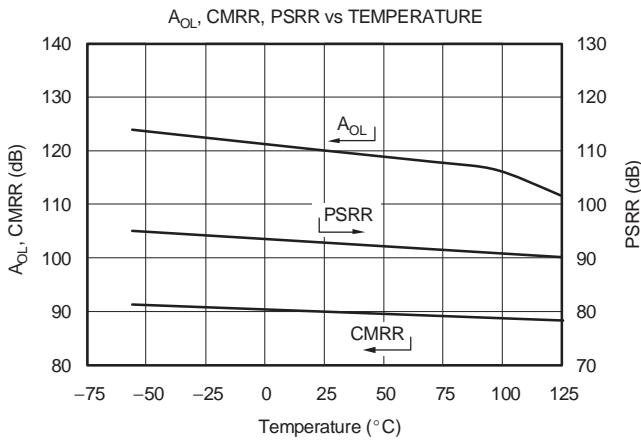
TYPICAL CHARACTERISTICS

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



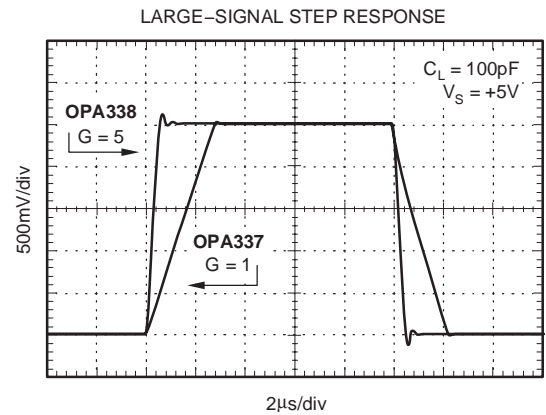
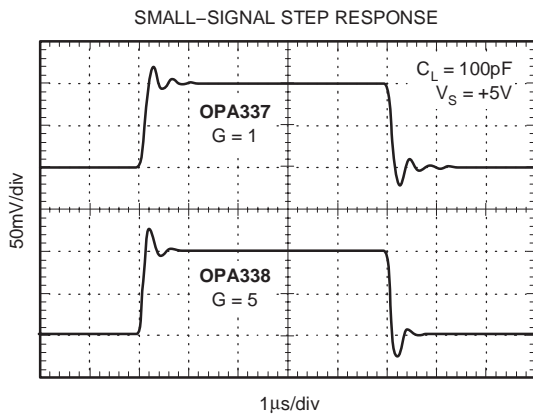
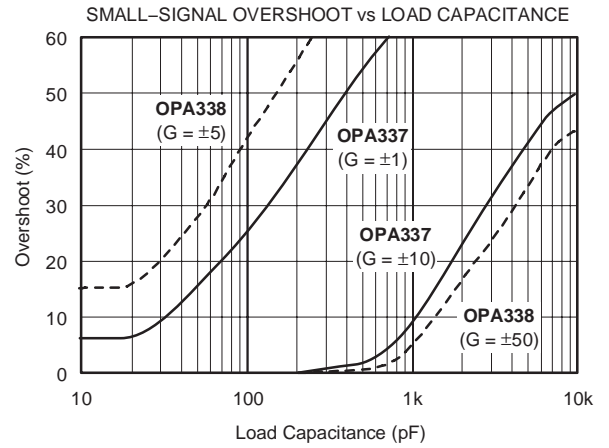
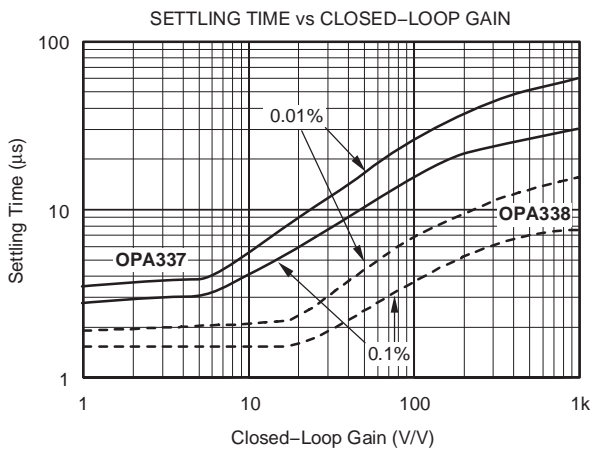
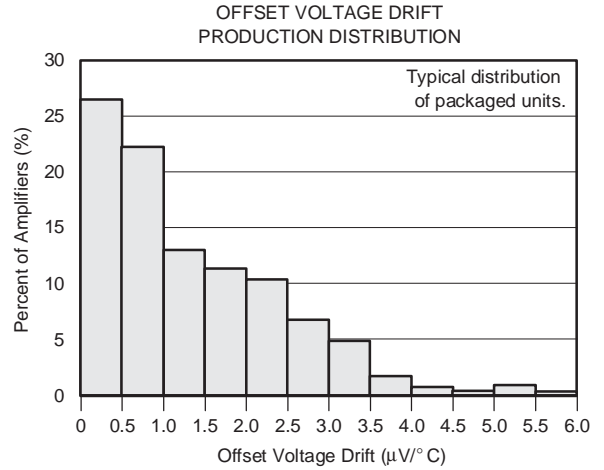
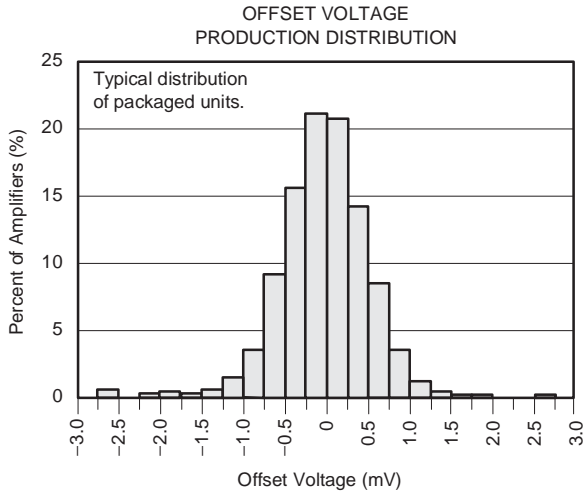
TYPICAL CHARACTERISTICS (continued)

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



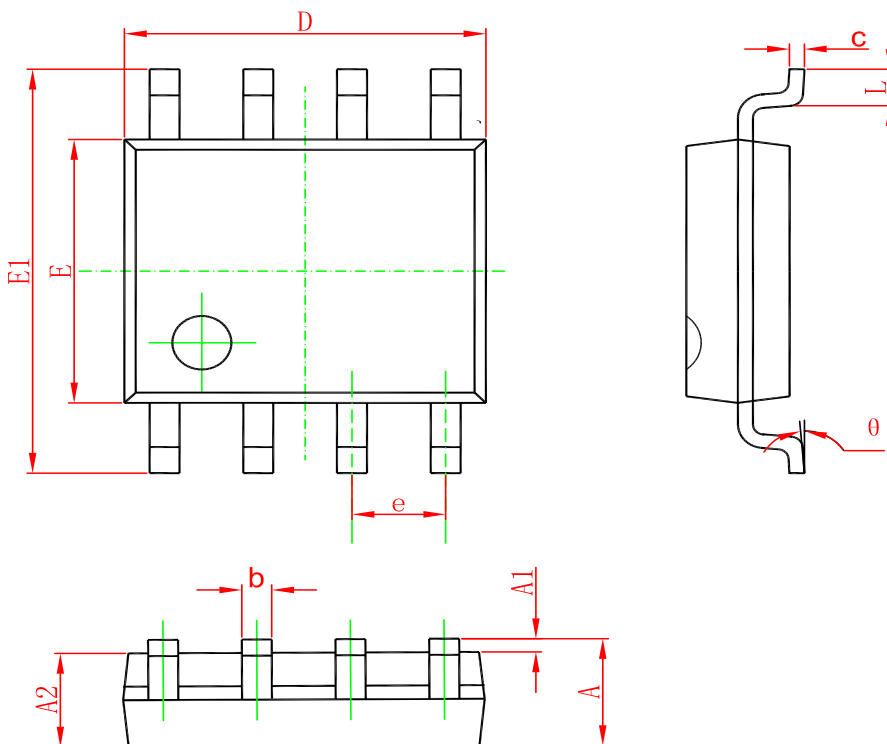
TYPICAL CHARACTERISTICS (continued)

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



Package Dimension

SOP-8



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	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Ordering information

Order code	Package	Baseqty	Deliverymode	Marking
UMW OPA338NA	SOT23-5	3000	Tape and reel	A38 U
UMW OPA2338UA	SOP-8	2500	Tape and reel	OPA2338UA
UMW OPA338UA	SOP-8	2500	Tape and reel	OPA338UA

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Operational Amplifiers - Op Amps](#) category:

Click to view products by [Youtai](#) manufacturer:

Other Similar products are found below :

[430227FB](#) [LT1678IS8](#) [NCV33202DMR2G](#) [NJM324E](#) [M38510/13101BPA](#) [NTE925](#) [AZV358MTR-G1](#) [AP4310AUMTR-AG1](#)
[AZV358MMTR-G1](#) [SCY33178DR2G](#) [NCV20034DR2G](#) [NTE778S](#) [NTE871](#) [NTE937](#) [NJU7057RB1-TE2](#) [SCY6358ADR2G](#)
[NJM2904CRB1-TE1](#) [UPC4570G2-E1-A](#) [UPC4741G2-E1-A](#) [UPC4574GR-9LG-E1-A](#) [NJM8532RB1-TE1](#) [EL2250CS](#) [EL5100IS](#) [EL5104IS](#)
[EL5127CY](#) [EL5127CYZ](#) [EL5133IW](#) [EL5152IS](#) [EL5156IS](#) [EL5162IS](#) [EL5202IY](#) [EL5203IY](#) [EL5204IY](#) [EL5210CS](#) [EL5210CYZ](#)
[EL5211IYE](#) [EL5220CY](#) [EL5223CLZ](#) [EL5223CR](#) [EL5224ILZ](#) [EL5227CLZ](#) [EL5227CRZ](#) [EL5244CS](#) [EL5246CS](#) [EL5246CSZ](#) [EL5250IY](#)
[EL5251IS](#) [EL5257IS](#) [EL5260IY](#) [EL5261IS](#)