

# AX358P / AX358S

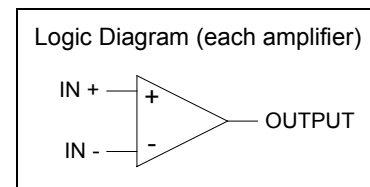
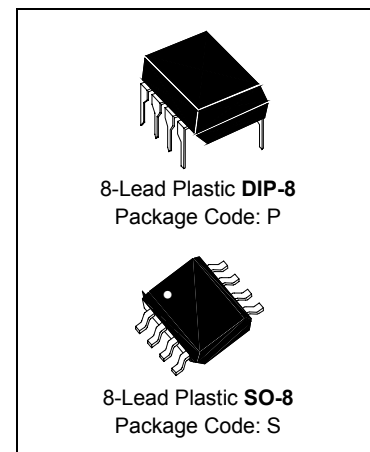
Low Power Dual Operational Amplifiers

## Description

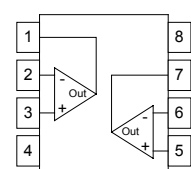
These devices consist of two independent, high gain, internally frequency-compensated operational amplifiers designed operate from a single supply over a wide range of voltages. Operation from split supplies also is possible if the difference between the two supplies is 3V to 32V, and  $V_{CC}$  is at least 1.5V more positive than the input common-mode voltage, The low supply-current drain is independent of the magnitude of the power supply voltage.

## Features

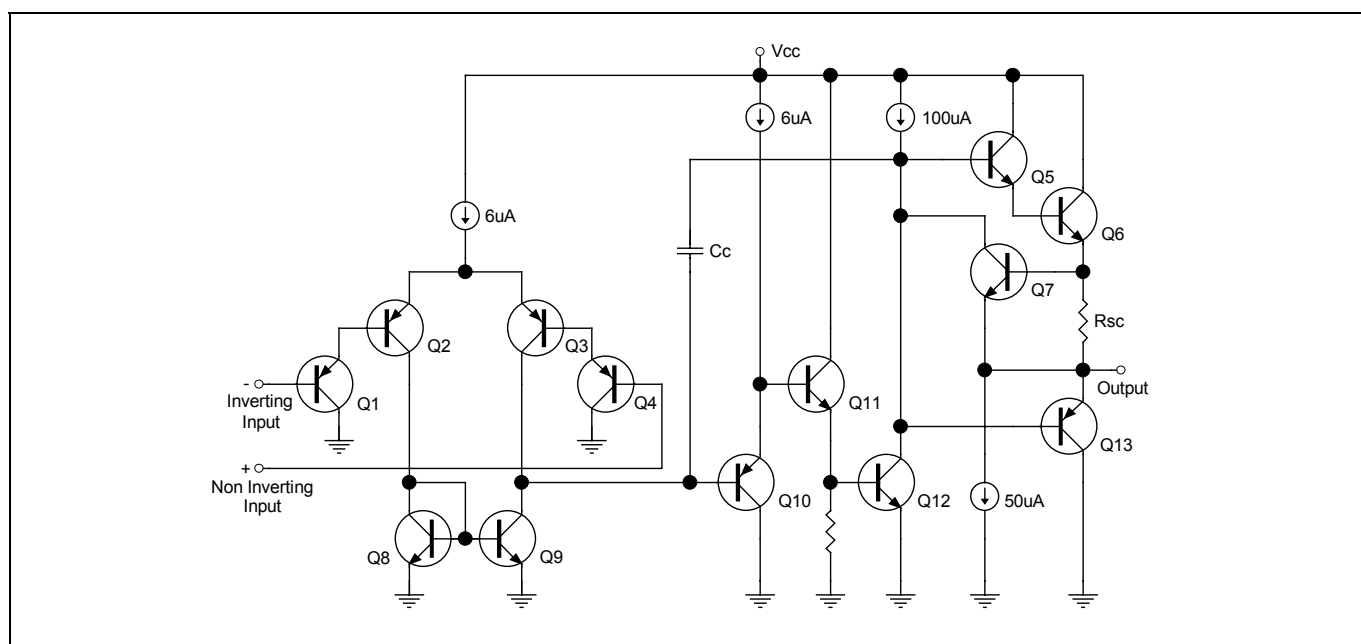
- Two internally compensated OP amps
- Internally frequency compensated for unity gain
- Short Circuit Protected Outputs
- Wide power supply range:  $3V_{DC}$  to  $32V_{DC}$  (Single supply)
- Input common-mode voltage range includes ground
- Large output voltage swing:  $0V_{DC}$  to  $V_{CC}-1.5V_{DC}$



## Pin Configurations

	Pin 1: Output 1	Pin 5 : Non Inverting Input 2
	Pin 2: Inverting Input 1	Pin 6 : Inverting Input 2
	Pin 3: Non Inverting Input 1	Pin 7 : Output 2
	Pin 4: $V_{EE}$	Pin 8 : $V_{CC}$

## Schematic Diagram



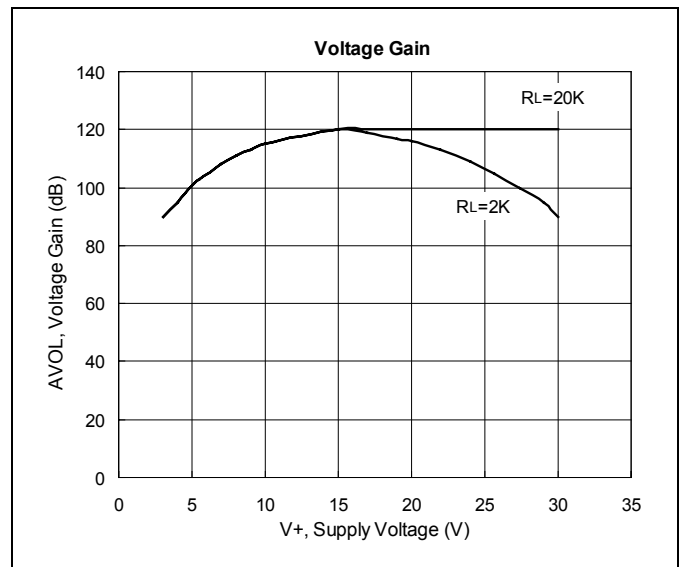
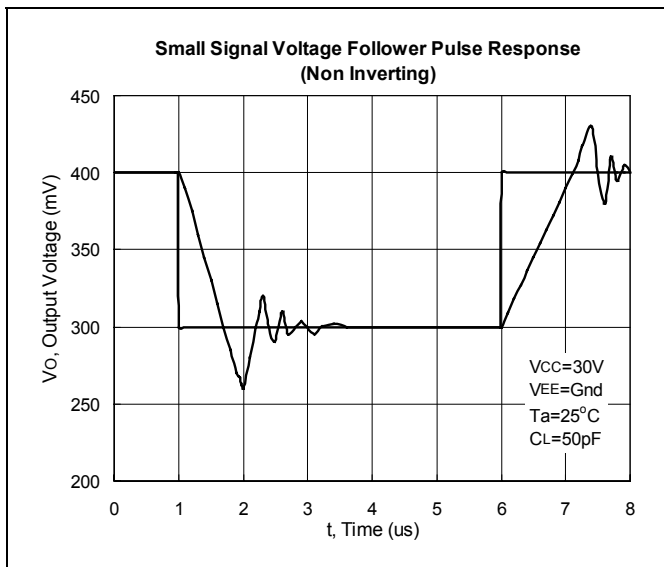
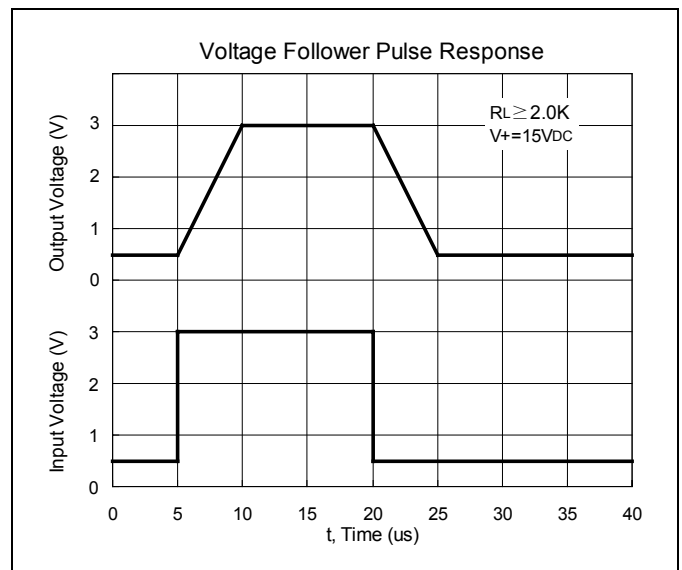
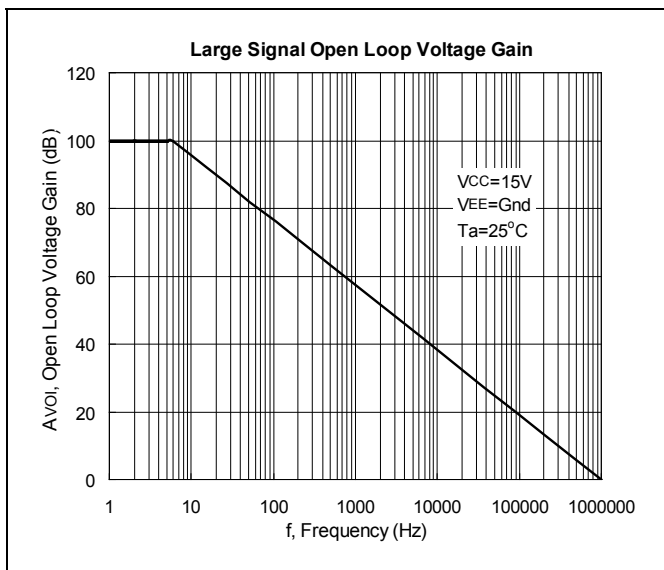
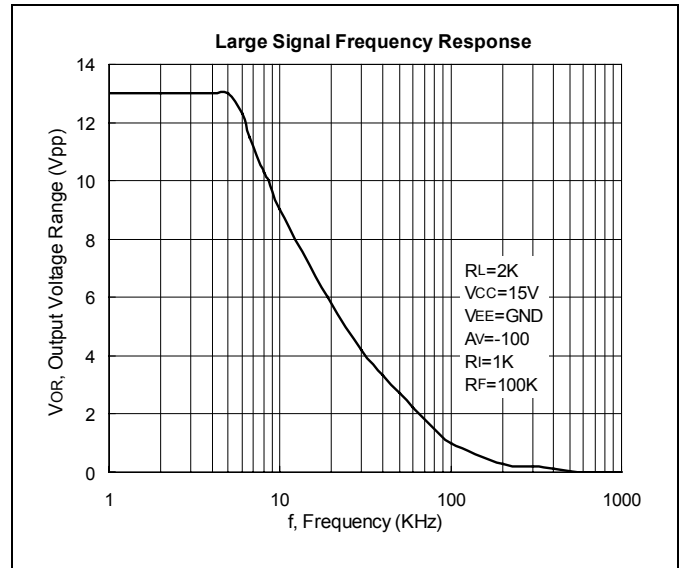
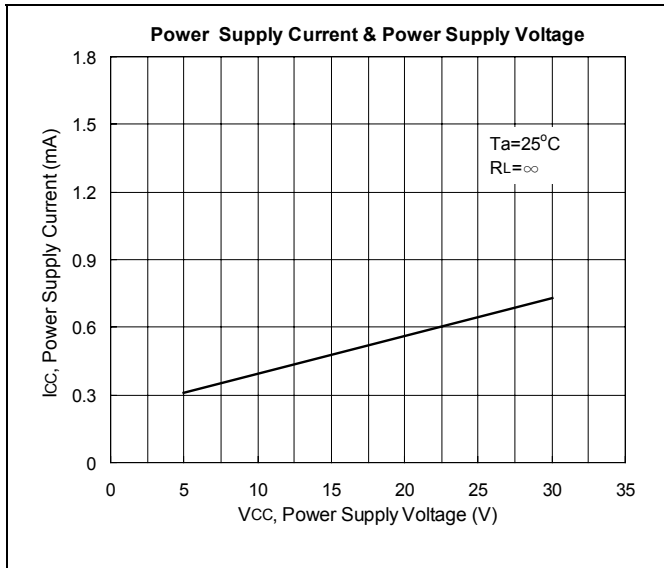
### Absolute Maximum Ratings (Ta=25°C, unless otherwise specified)

Symbol	Parameter	Range	Units
V <sub>CC</sub>	Power Supply Voltage (Single Supply)	32	V <sub>DC</sub>
V <sub>CC</sub> , V <sub>EE</sub>	Power Supply Voltage (Split Supplies)	±16	V <sub>DC</sub>
V <sub>IDR</sub>	Input Differential Voltage Range	±32	V <sub>DC</sub>
V <sub>ICR</sub>	Input Common Mode Voltage Range	-0.3 to +32	V <sub>DC</sub>
t <sub>SC</sub>	Output Short Circuit Duration	Continuous	
T <sub>J</sub>	Junction Temperature	150	°C
T <sub>stg</sub>	Storage Temperature Range	-55 to +125	°C
T <sub>A</sub>	Operating Ambient Temperature Range	0 to +70	°C
P <sub>D</sub>	Maximum Power Dissipation (DIP-8) Maximum Power Dissipation (SO-8)	800 500	mW

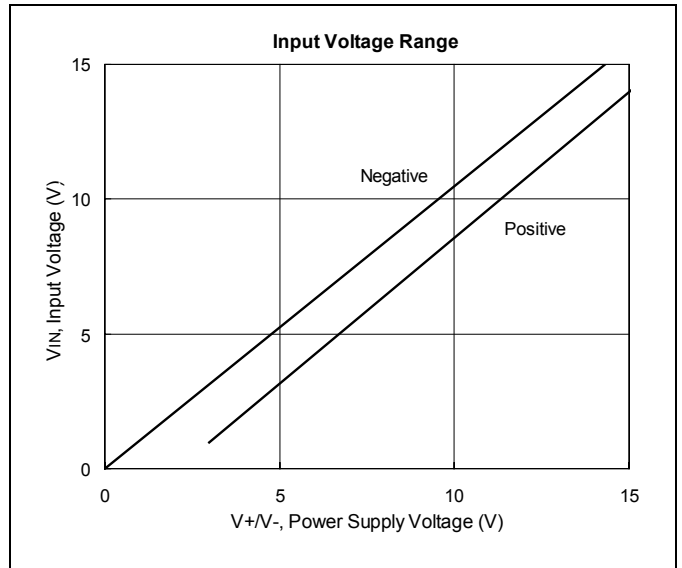
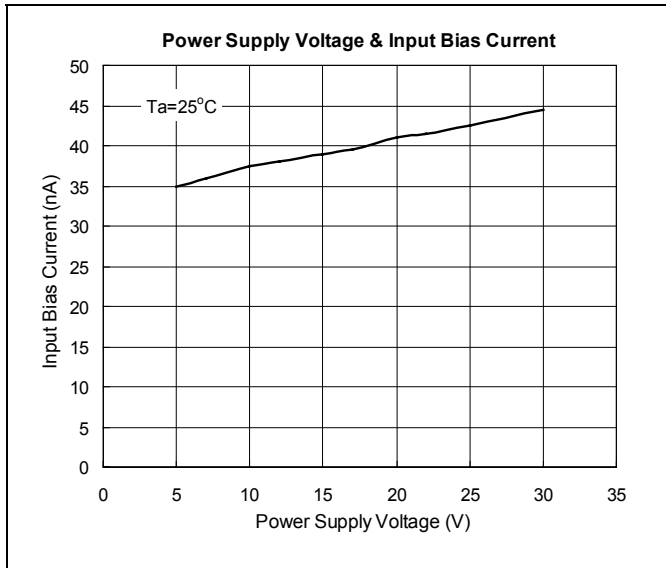
### Electrical Characteristics (V<sub>CC</sub>=5V, V<sub>EE</sub>=Ground, Ta=25°C, unless otherwise specified)

Symbol	Parameter	Test Conditions	AX358P/S			Unit
			Min	Typ	Max	
V <sub>IO</sub>	Input Offset Voltage	V <sub>CC</sub> =5V~30V, V <sub>ICR</sub> =0V~V <sub>CC</sub> -1.5V, V <sub>O</sub> =1.4V, R <sub>S</sub> =0Ω	-	2	7	mV
I <sub>IO</sub>	Input Offset Current	I <sub>IN(+)</sub> -I <sub>IN(-)</sub>	-	-	30	nA
I <sub>IB</sub>	Input Bias Current	I <sub>IN(+)</sub> or I <sub>IN(-)</sub>	-	35	200	nA
A <sub>VOL</sub>	Large Signal Voltage Gain	V <sub>CC</sub> =15V, R <sub>L</sub> =2KΩ	25	100	-	V/mV
CMR	Common-Mode Rejection Ratio	V <sub>CM</sub> =0V~V <sub>CC</sub> -1.5V	65	85	-	dB
CS	Channel Separation	1KHz≤f≤20KHz	-	-120	-	dB
PSR	Power Supply Rejection	V <sub>CC</sub> =5V~30V	65	100	-	dB
ΔV <sub>IO</sub> /ΔT	Average Temperature Coefficient of Input Offset Voltage	R <sub>S</sub> =0Ω	-	7	-	uV/°C
ΔI <sub>IO</sub> /ΔT	Average Temperature Coefficient of Input Offset Current	R <sub>S</sub> =0Ω	-	10	-	pA/°C
V <sub>ICR</sub>	Input Common Mode Voltage Range	V <sub>CC</sub> =30V			V <sub>CC</sub> -2V	V
V <sub>OH</sub>	Output Voltage (High Limit)	V <sub>CC</sub> =30V, R <sub>L</sub> =2KΩ	26	27	-	V
		V <sub>CC</sub> =30V, R <sub>L</sub> =10KΩ	27	28	-	
V <sub>OL</sub>	Output Voltage (Low Limit)	R <sub>L</sub> =10KΩ	-	5	20	mV
I <sub>CC</sub>	Supply current	R <sub>L</sub> =∞, V <sub>CC</sub> =30V	-	1	2	mA
I <sub>Source</sub>	Output Source Current	V <sub>CC</sub> =15V, V <sub>IN+</sub> =1V, V <sub>IN-</sub> =0V, V <sub>O</sub> =2V	20	40	-	mA
I <sub>Sink</sub>	Output Sink Current	V <sub>CC</sub> =15V, V <sub>IN+</sub> =0V, V <sub>IN-</sub> =1V, V <sub>O</sub> =2V	10	20	-	mA
I <sub>CC</sub>	Power Supply Current	V <sub>CC</sub> =30V, Ta=T <sub>high</sub> to T <sub>low</sub>	-	1	2	mA
		V <sub>CC</sub> =5V, Ta=T <sub>high</sub> to T <sub>low</sub>	-	0.6	1.2	mA
I <sub>SC</sub>	Output Short Circuit to Ground	V <sub>CC</sub> =5V, GND at -5V, V <sub>O</sub> =0V	-	40	60	mA

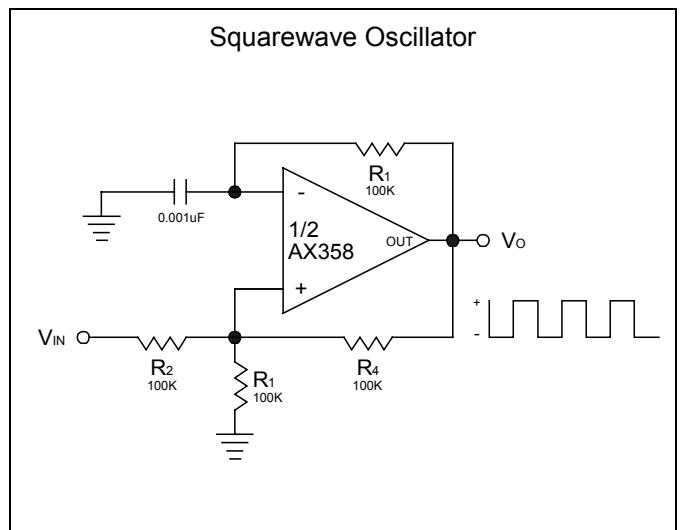
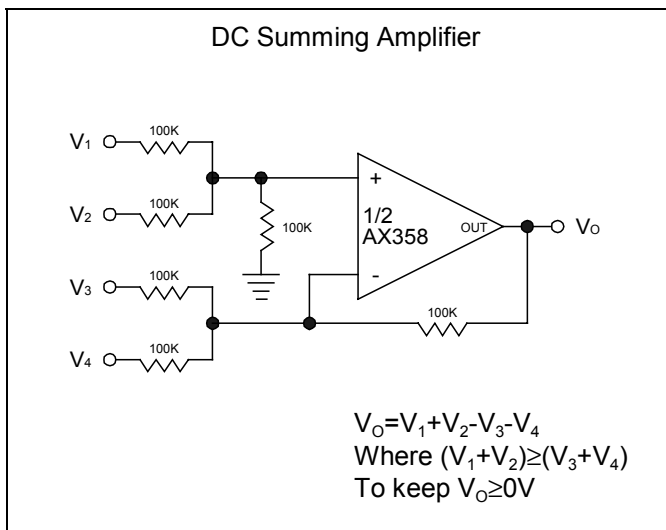
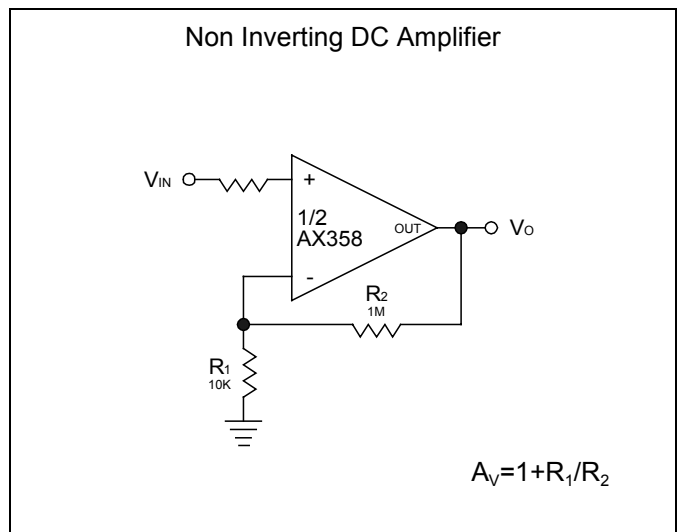
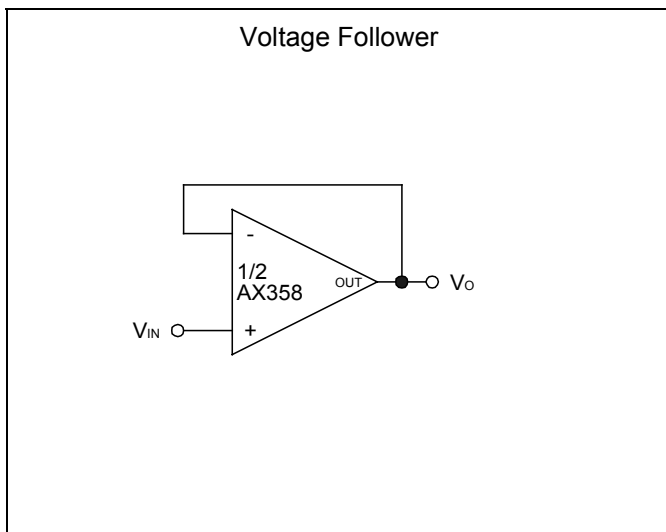
## Characteristics Curve



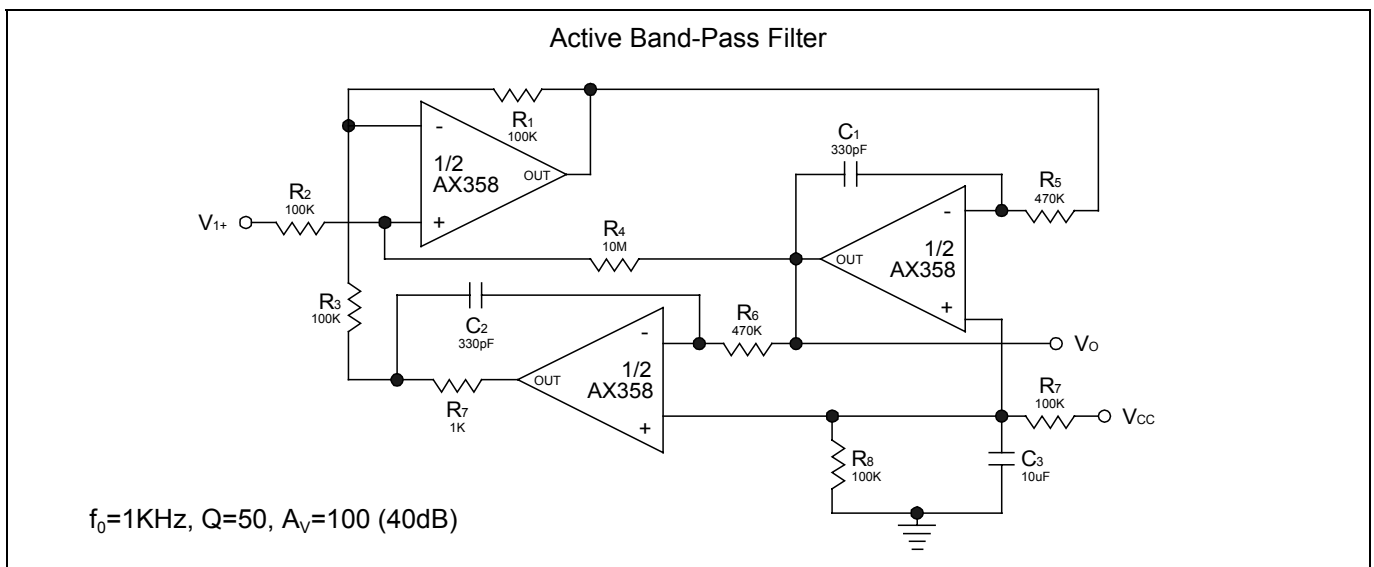
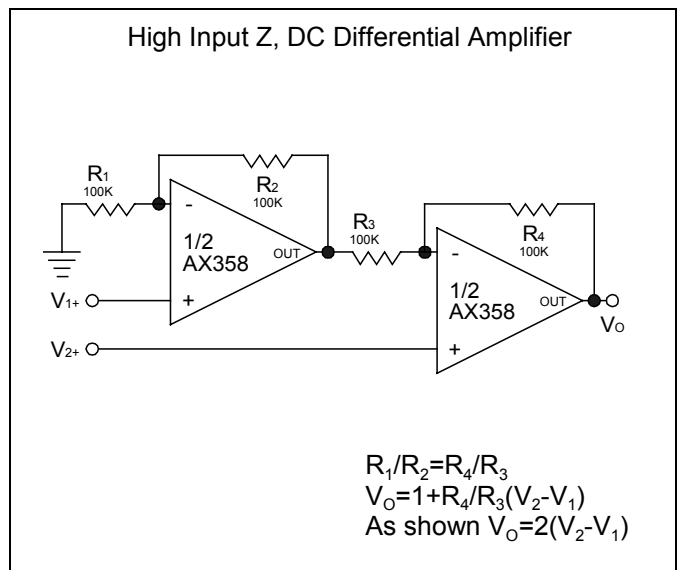
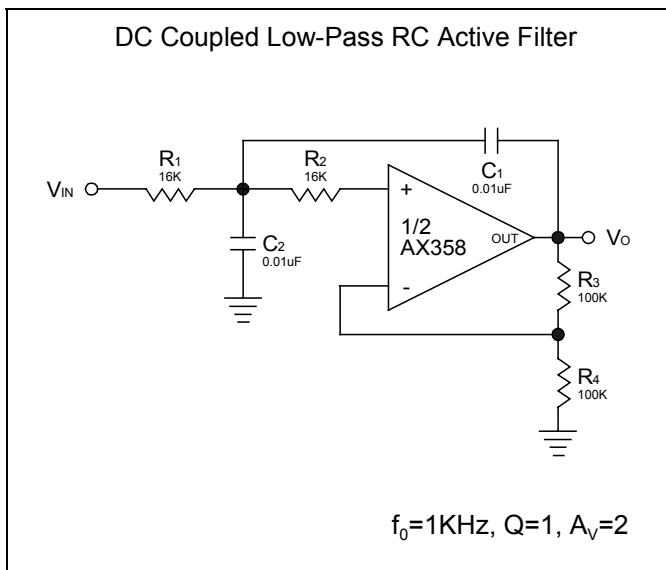
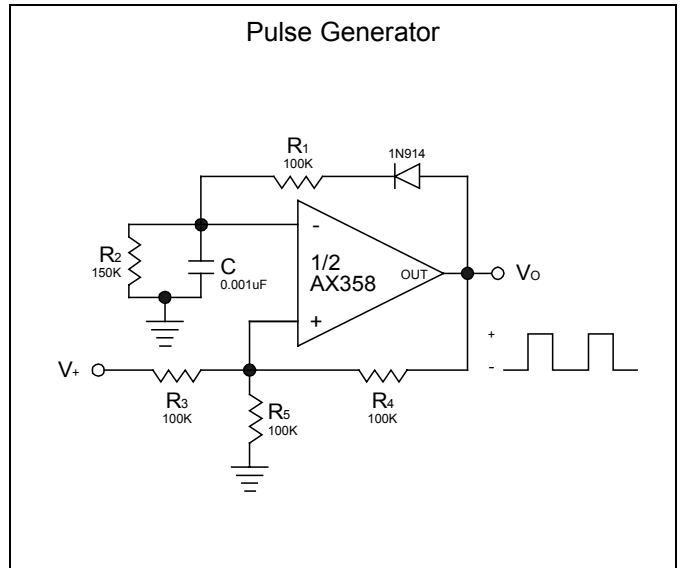
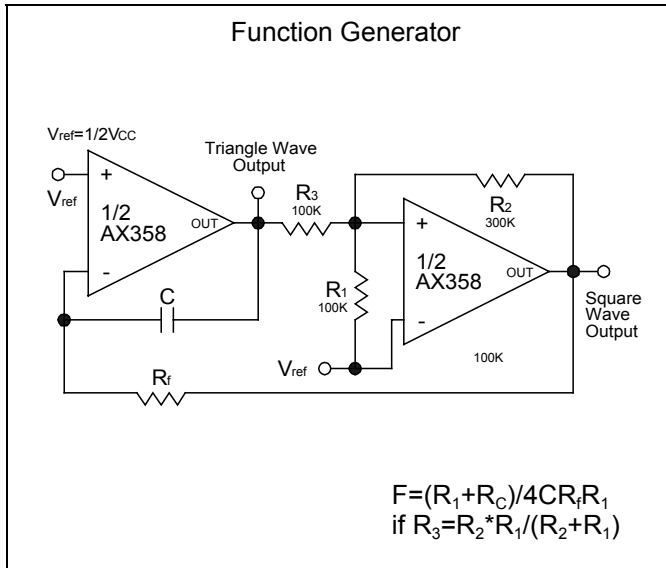
## Characteristics Curve



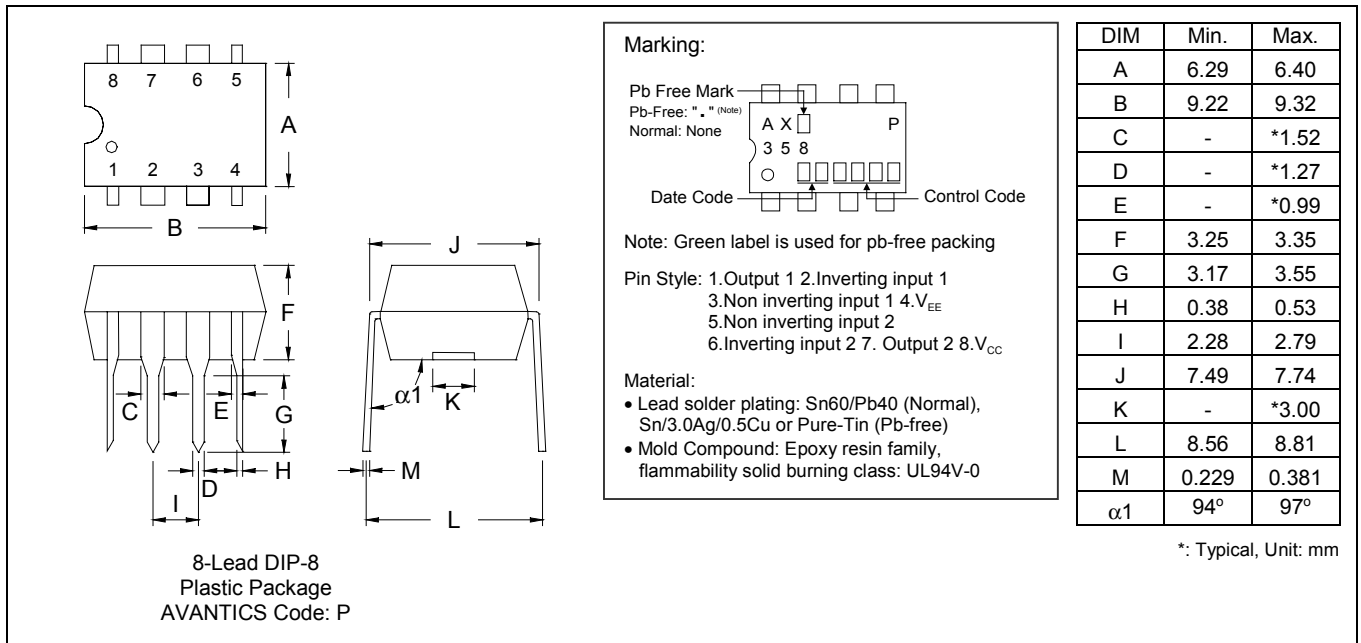
## Typical Application Circuit



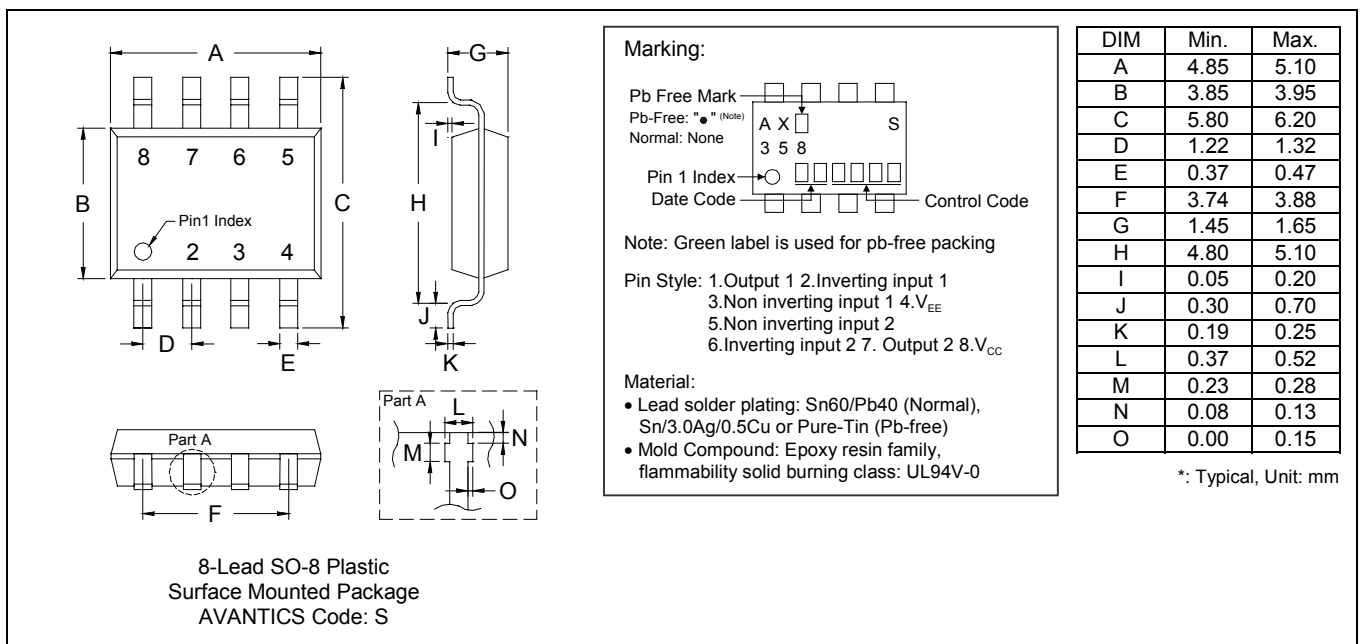
## Typical Application Circuit



## DIP-8 Dimension



## SO-8 Dimension



### Important Notice:

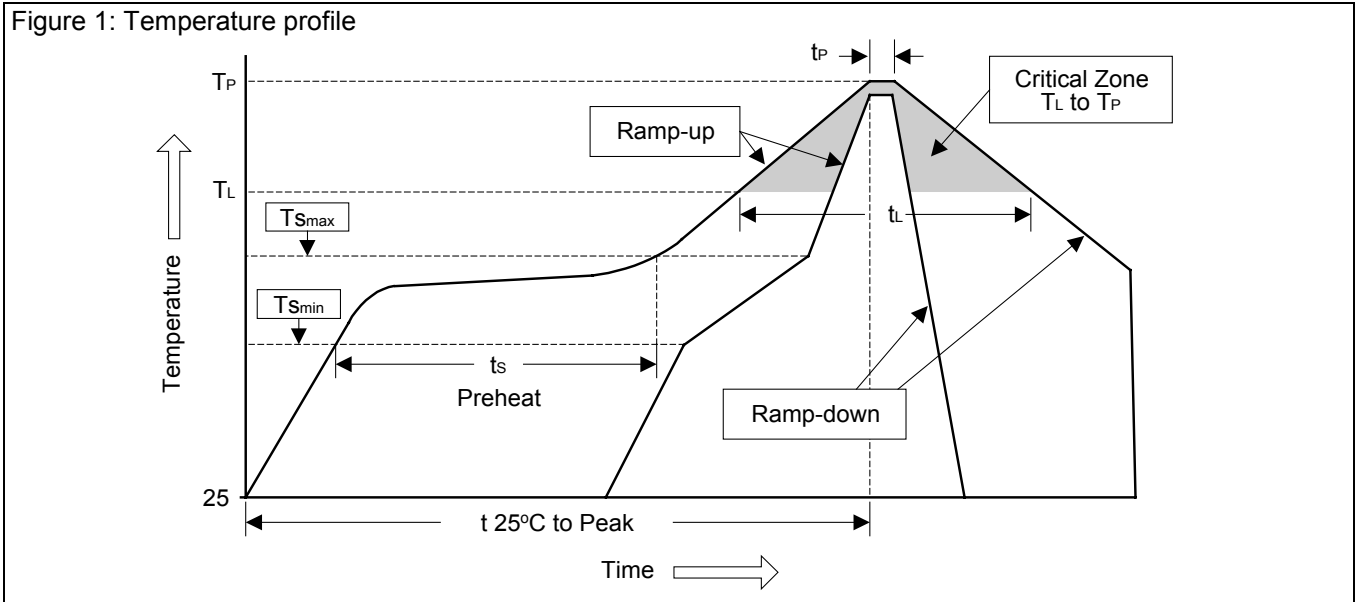
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## Soldering Methods for AVANTICS's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min ( $T_{Smin}$ )	100°C	150°C
- Temperature Max ( $T_{Smax}$ )	150°C	200°C
- Time (min to max) ( $t_s$ )	60~120 sec	60~180 sec
$T_{Smax}$ to $T_L$		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature ( $T_L$ )	183°C	217°C
- Time ( $t_L$ )	60~150 sec	60~150 sec
Peak Temperature ( $T_P$ )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_P$ )	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

### 3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec