

AX358P / AX358S

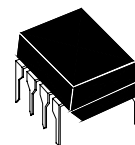
Low Power Dual Operational Amplifiers

Description

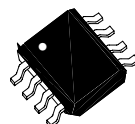
These devices consist of two independent, high gain, internally frequency-compensated operational amplifiers designed operate from a single supply over a wide range of voltages. Operation from split supplies also is possible if the difference between the two supplies is 3V to 32V, and V_{CC} is at least 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 $V_{CC}-1.5V_{DC}$

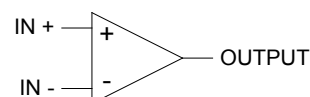


8-Lead Plastic **DIP-8**
Package Code: P



8-Lead Plastic **SO-8**
Package Code: S

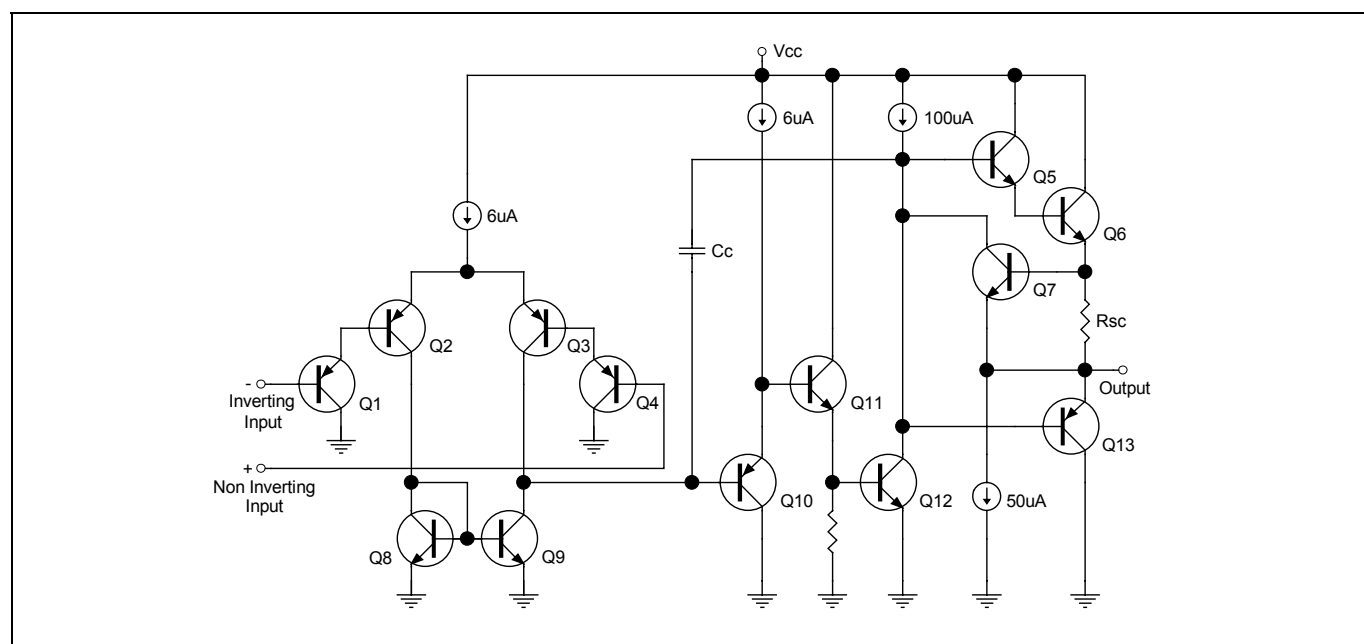
Logic Diagram (each amplifier)



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



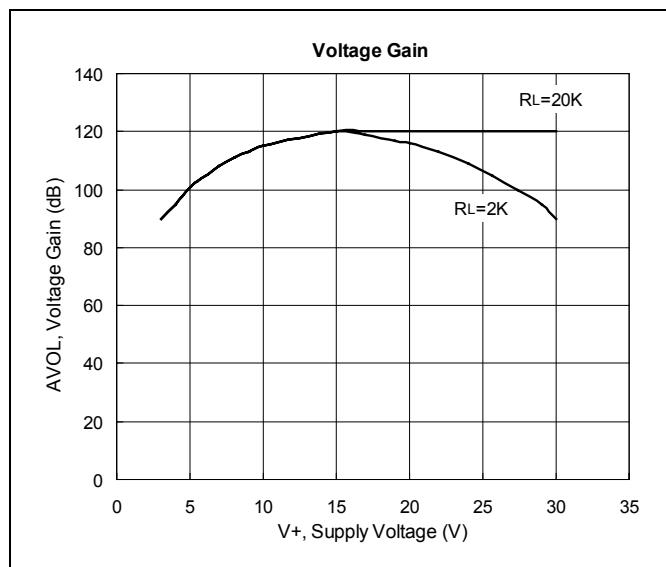
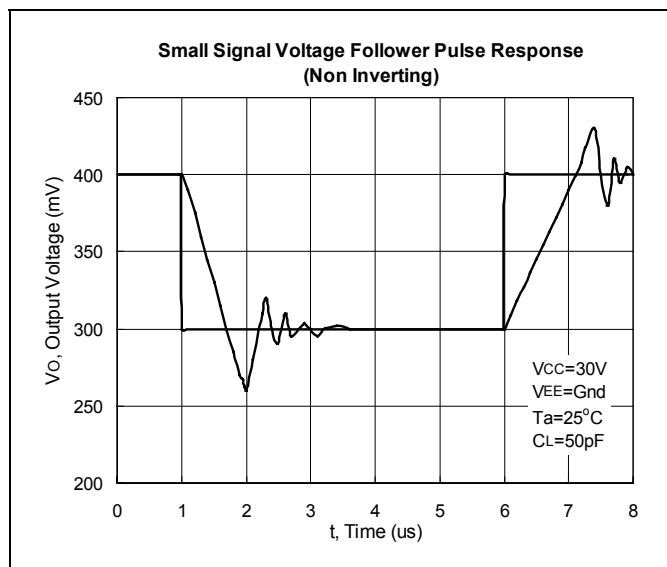
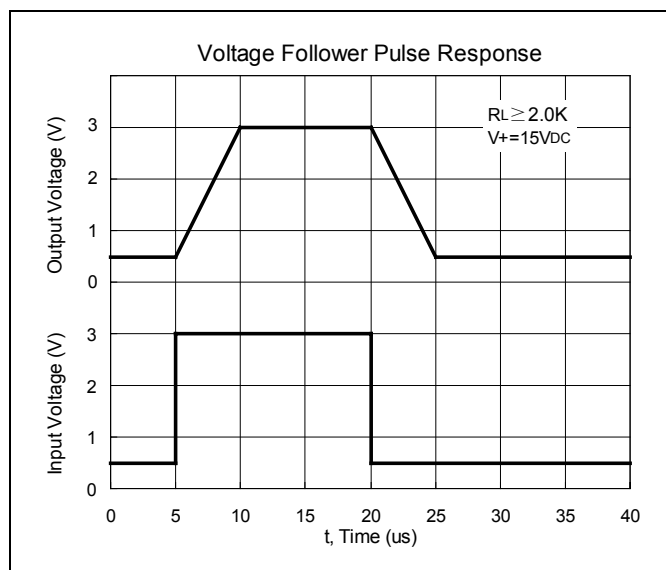
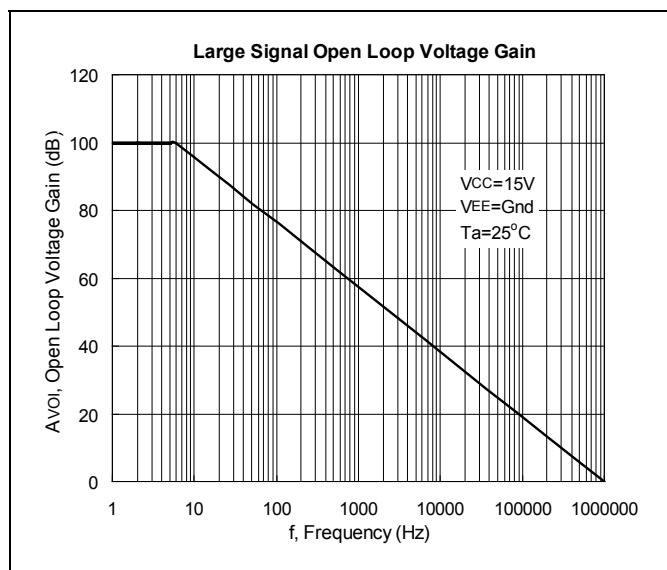
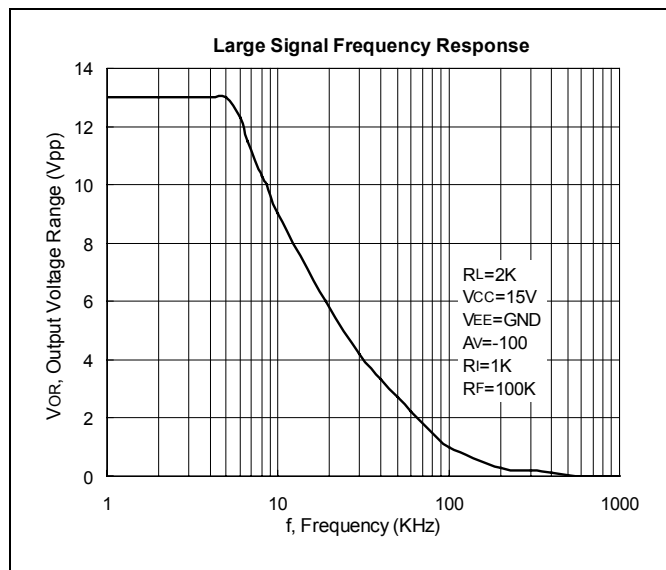
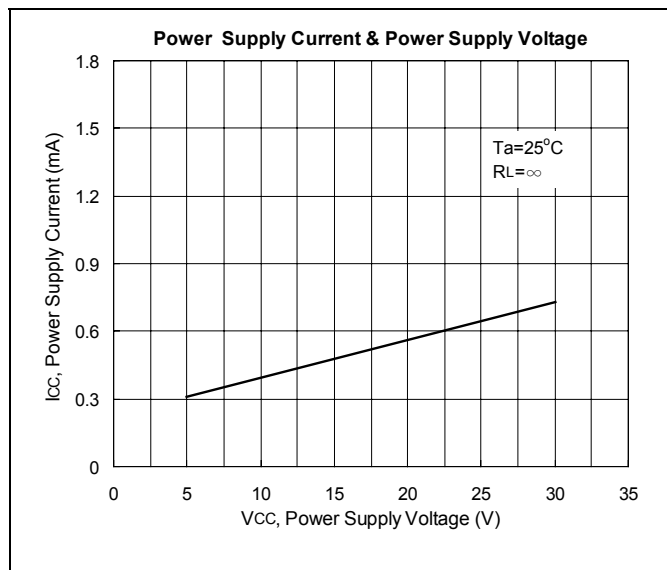
Absolute Maximum Ratings (Ta=25°C, unless otherwise specified)

Symbol	Parameter	Range	Units
V_{CC}	Power Supply Voltage (Single Supply)	32	V_{DC}
V_{CC}, V_{EE}	Power Supply Voltage (Split Supplies)	± 16	V_{DC}
V_{IDR}	Input Differential Voltage Range	± 32	V_{DC}
V_{ICR}	Input Common Mode Voltage Range	-0.3 to +32	V_{DC}
t_{SC}	Output Short Circuit Duration	Continuous	
T_J	Junction Temperature	150	°C
T_{stg}	Storage Temperature Range	-55 to +125	°C
T_A	Operating Ambient Temperature Range	0 to +70	°C
P_D	Maximum Power Dissipation (DIP-8) Maximum Power Dissipation (SO-8)	800 500	mW

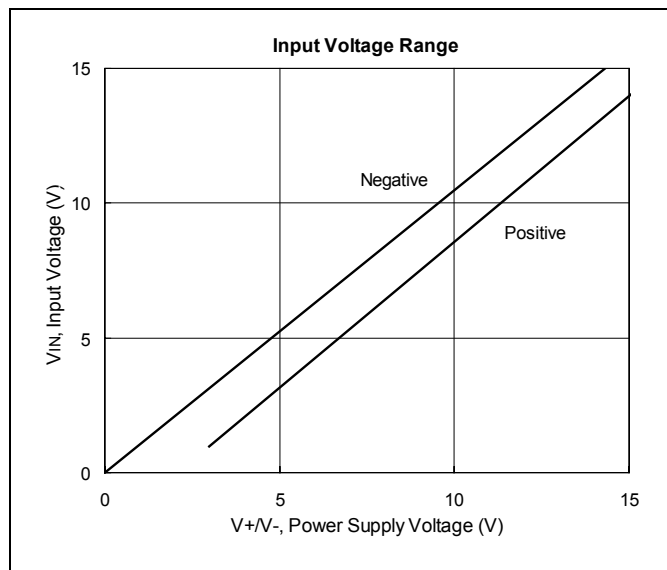
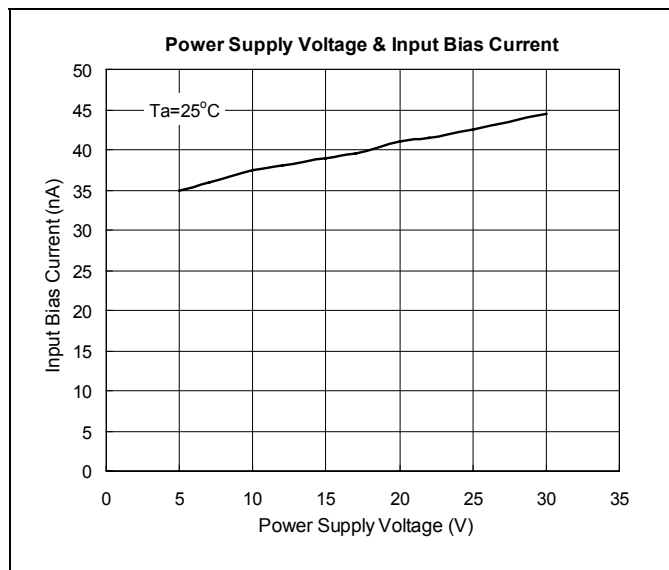
Electrical Characteristics ($V_{CC}=5V$, $V_{EE}=\text{Ground}$, $T_a=25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameter	Test Conditions	AX358P/S			Unit
			Min	Typ	Max	
V_{IO}	Input Offset Voltage	$V_{CC}=5V\sim 30V$, $V_{ICR}=0V\sim V_{CC}-1.5V$, $V_O=1.4V$, $R_S=0\Omega$	-	2	7	mV
I_{IO}	Input Offset Current	$I_{IN(+)}-I_{IN(-)}$	-	-	30	nA
I_{IB}	Input Bias Current	$I_{IN(+)}$ or $I_{IN(-)}$	-	35	200	nA
A_{VOL}	Large Signal Voltage Gain	$V_{CC}=15V$, $R_L=2K\Omega$	25	100	-	V/mV
CMR	Common-Mode Rejection Ratio	$V_{CM}=0V\sim V_{CC}-1.5V$	65	85	-	dB
CS	Channel Separation	$1KHz\leq f\leq 20KHz$	-	-120	-	dB
PSR	Power Supply Rejection	$V_{CC}=5V\sim 30V$	65	100	-	dB
$\Delta V_{IO}/\Delta T$	Average Temperature Coefficient of Input Offset Voltage	$R_S=0\Omega$	-	7	-	$\mu V/^\circ C$
$\Delta I_{IO}/\Delta T$	Average Temperature Coefficient of Input Offset Current	$R_S=0\Omega$	-	10	-	$pA/^\circ C$
V_{ICR}	Input Common Mode Voltage Range	$V_{CC}=30V$			$V_{CC}-2V$	V
V_{OH}	Output Voltage (High Limit)	$V_{CC}=30V$, $R_L=2K\Omega$	26	27	-	V
		$V_{CC}=30V$, $R_L=10K\Omega$	27	28	-	
V_{OL}	Output Voltage (Low Limit)	$R_L=10K\Omega$	-	5	20	mV
I_{CC}	Supply current	$R_L=\infty$, $V_{CC}=30V$	-	1	2	mA
I_{Source}	Output Source Current	$V_{CC}=15V$, $V_{IN+}=1V$, $V_{IN-}=0V$, $V_O=2V$	20	40	-	mA
I_{Sink}	Output Sink Current	$V_{CC}=15V$, $V_{IN+}=0V$, $V_{IN-}=1V$, $V_O=2V$	10	20	-	mA
I_{CC}	Power Supply Current	$V_{CC}=30V$, $T_a=T_{high}$ to T_{low}	-	1	2	mA
		$V_{CC}=5V$, $T_a=T_{high}$ to T_{low}	-	0.6	1.2	mA
I_{SC}	Output Short Circuit to Ground	$V_{CC}=5V$, GND at -5V, $V_O=0V$	-	40	60	mA

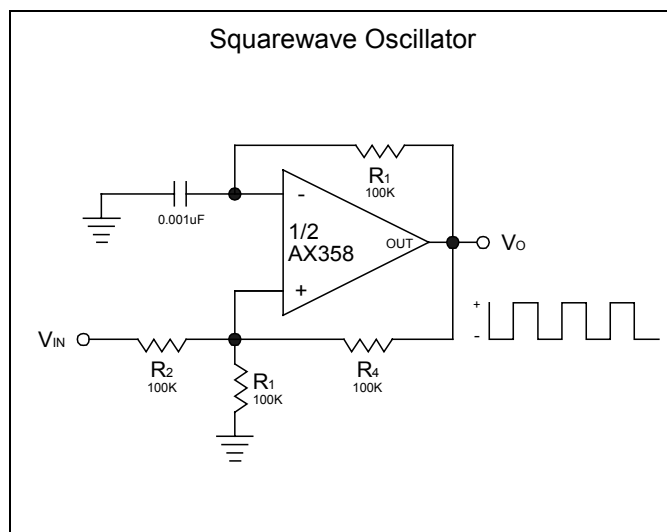
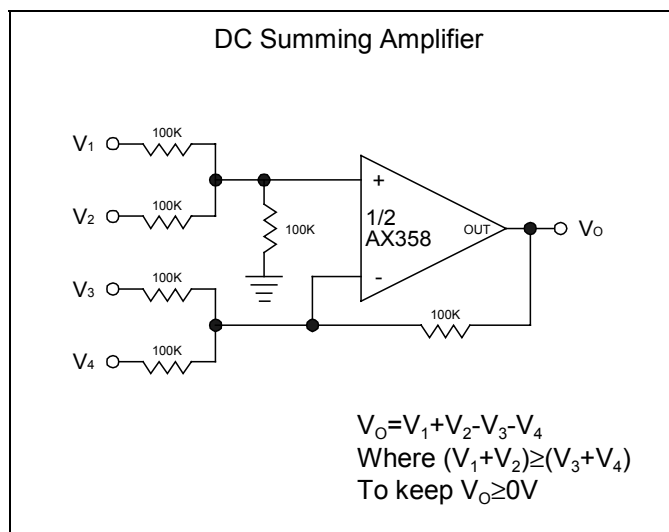
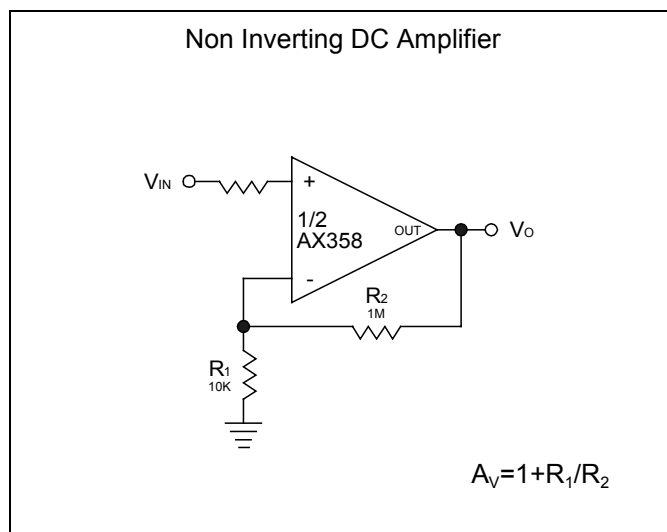
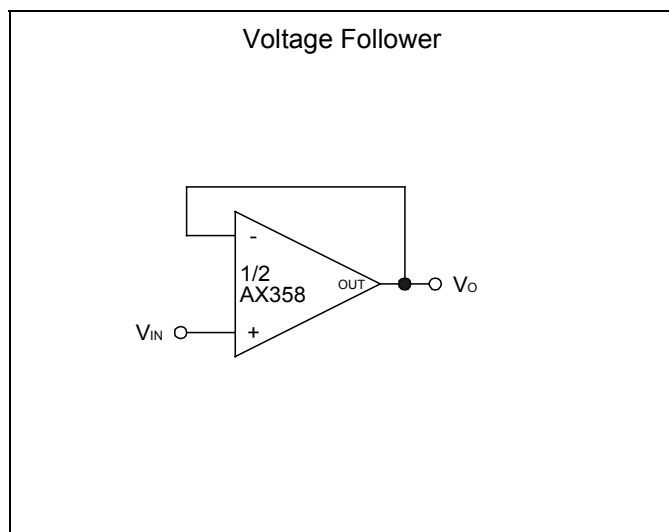
Characteristics Curve



Characteristics Curve

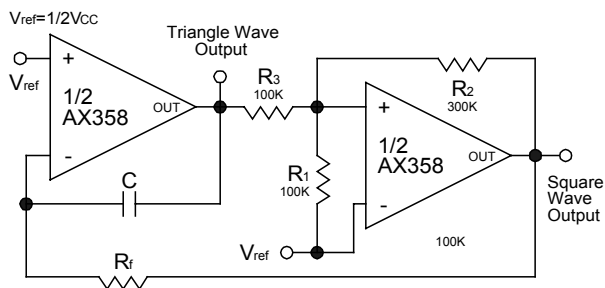


Typical Application Circuit



Typical Application Circuit

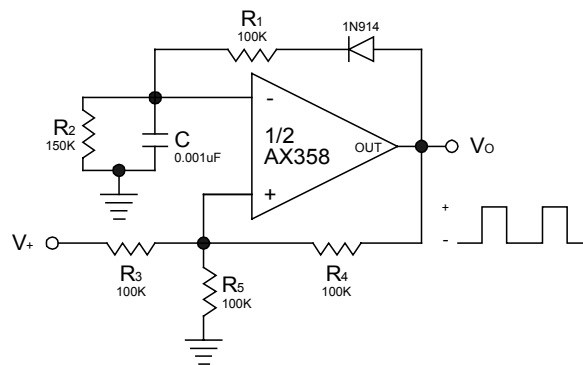
Function Generator



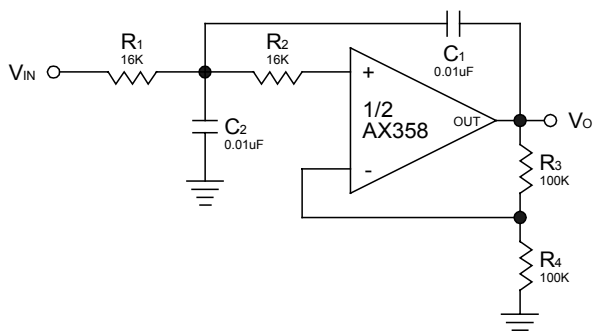
$$F = (R_1 + R_C) / 4CR_f R_1$$

if $R_3 = R_2 \cdot R_1 / (R_2 + R_1)$

Pulse Generator

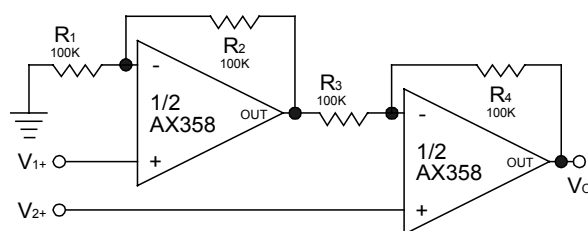


DC Coupled Low-Pass RC Active Filter



$$f_0 = 1\text{KHz}, Q=1, A_v=2$$

High Input Z, DC Differential Amplifier

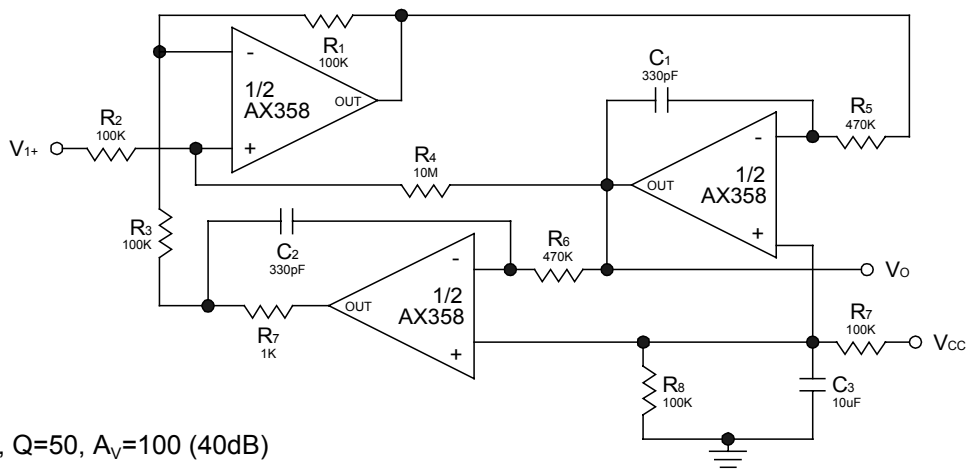


$$R_1/R_2 = R_4/R_3$$

$$V_O = 1 + R_4/R_3 (V_2 - V_1)$$

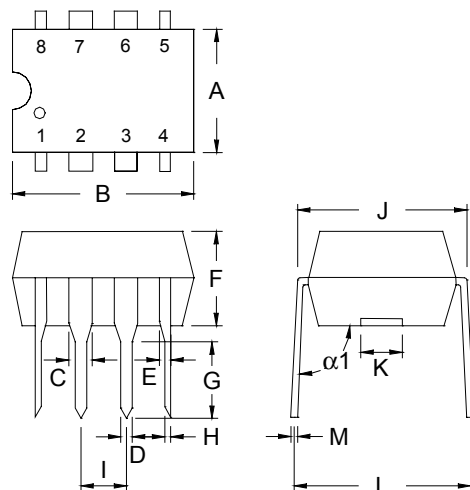
As shown $V_O = 2(V_2 - V_1)$

Active Band-Pass Filter



$$f_0 = 1\text{KHz}, Q=50, A_v=100 (40\text{dB})$$

DIP-8 Dimension



8-Lead DIP-8
Plastic Package
AVANTICS Code: P

Marking:

Pb Free Mark
Pb-Free: "A" (Note)
Normal: None

Date Code Control Code

Note: Green label is used for pb-free packing

Pin Style: 1.Output 1 2.Inverting input 1
3.Non inverting input 1 4.V_{EE}
5.Non inverting input 2
6.Inverting input 2 7. Output 2 8.V_{CC}

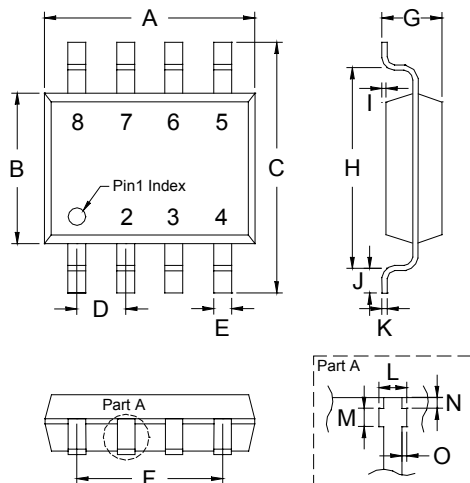
Material:

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.29	6.40
B	9.22	9.32
C	-	*1.52
D	-	*1.27
E	-	*0.99
F	3.25	3.35
G	3.17	3.55
H	0.38	0.53
I	2.28	2.79
J	7.49	7.74
K	-	*3.00
L	8.56	8.81
M	0.229	0.381
α1	94°	97°

*: Typical, Unit: mm

SO-8 Dimension



8-Lead SO-8 Plastic
Surface Mounted Package
AVANTICS Code: S

Marking:

Pb Free Mark
Pb-Free: "A" (Note)
Normal: None

Pin 1 Index
Date Code Control Code

Note: Green label is used for pb-free packing

Pin Style: 1.Output 1 2.Inverting input 1
3.Non inverting input 1 4.V_{EE}
5.Non inverting input 2
6.Inverting input 2 7. Output 2 8.V_{CC}

Material:

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	4.85	5.10
B	3.85	3.95
C	5.80	6.20
D	1.22	1.32
E	0.37	0.47
F	3.74	3.88
G	1.45	1.65
H	4.80	5.10
I	0.05	0.20
J	0.30	0.70
K	0.19	0.25
L	0.37	0.52
M	0.23	0.28
N	0.08	0.13
O	0.00	0.15

*: Typical, Unit: mm

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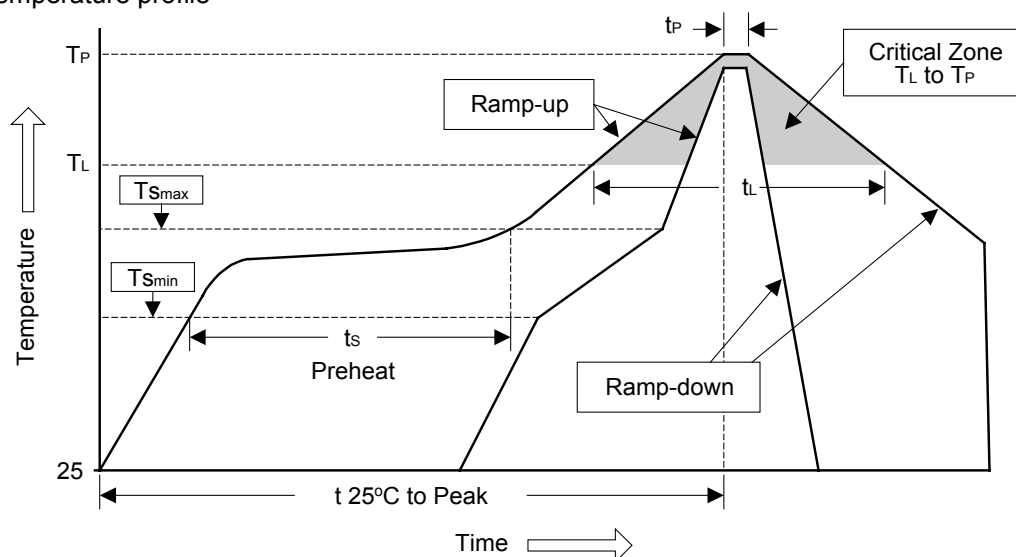
Head Office:

- AVANTICS Microelectronics Corp: No. 255, Cai Lun Rd. Zhangjiang Technology Industrial Park Pudong, Shanghai, China
Tel: 86-021-58955599 Fax: 86-021-58558038

Soldering Methods for AVANTICS's Products

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

Figure 1: Temperature profile



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