

Quad Operational Amplifier for Audio

Features

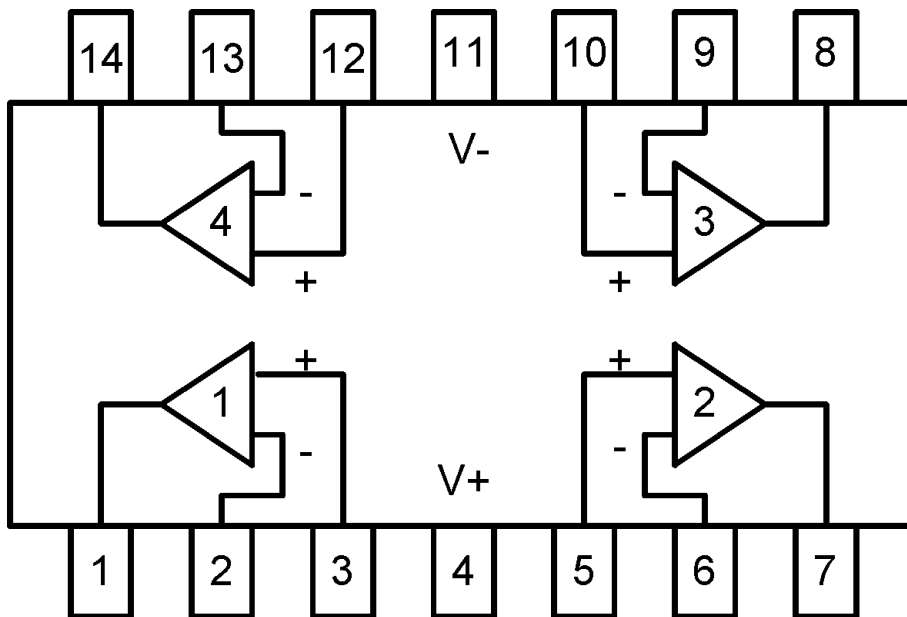
- Operating Voltage : $\pm 1.5 \sim \pm 8V$ or $3 \sim 16V$
- Large DC Voltage Gain: 100 dB
- High input Resistance : $0.8M\Omega$
- Low Input Offset Voltage: $0.7mV$
- Bandwidth(unity gain): $3MHz$
- Bipolar Technology

Description

The AT5558 consists of four independent, high gain, internally compensated amplifiers which were designed specifically to operate from a single or split power supply.

Application areas include transducer amplifier, DC gain blocks and all the conventional operational amplifier circuits. The AT5558 can be directly operated +5V power supply, which is normally used in digital systems.

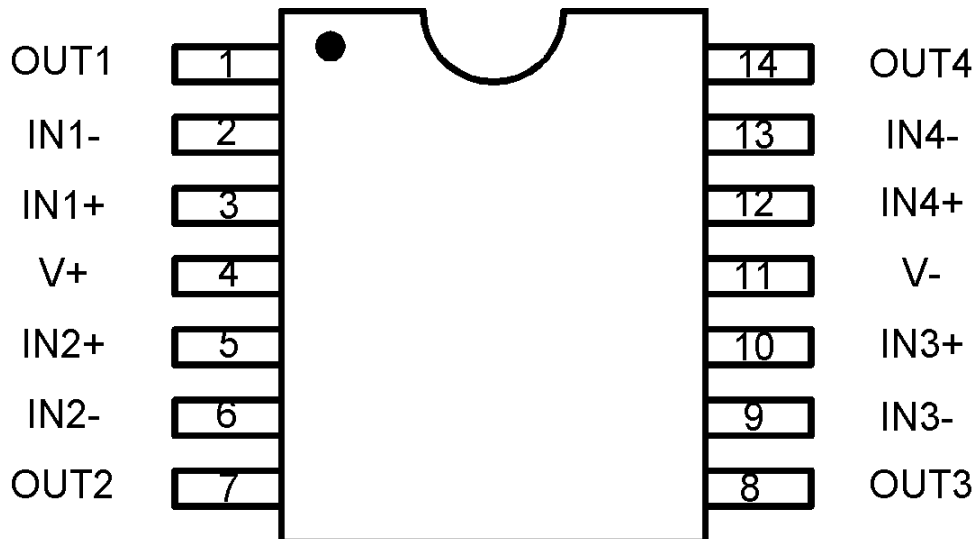
Block Diagram



Pin Descriptions

Pin No.	Pin name	Function
1	OUT1	Output 1
2	IN1-	Negative input 1
3	IN1+	Positive input 1
4	V+	Positive Power Supply
5	IN2+	Positive input 2
6	IN2-	Negative input 2
7	OUT2	Output 2
8	OUT3	Output 3
9	IN3-	Negative input 3
10	IN3+	Positive input 3
11	V-	Negative Power Supply
12	IN4+	Positive input 4
13	IN4-	Negative input 4
14	OUT4	Output 4

PinOut



Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	unit
Power supply voltage	V+/V-	±8	V
Differential Input Voltage	V _{ID}	±14	V
Input Voltage	V _{IN}	±7	
Power Dissipation	P _D	500	mW
Operating temperature	T _{opr}	0~+85	°C
Storage temperature	T _{stg}	-55~+150	°C

*Stresses beyond those listed under “ absolute maximum ratings” may cause permanent damage to the device. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Recommended Operating Condition

Parameter	Symbol	Limits	unit
Power supply voltage	V+/V-	±1.5~±8(3~16)	V

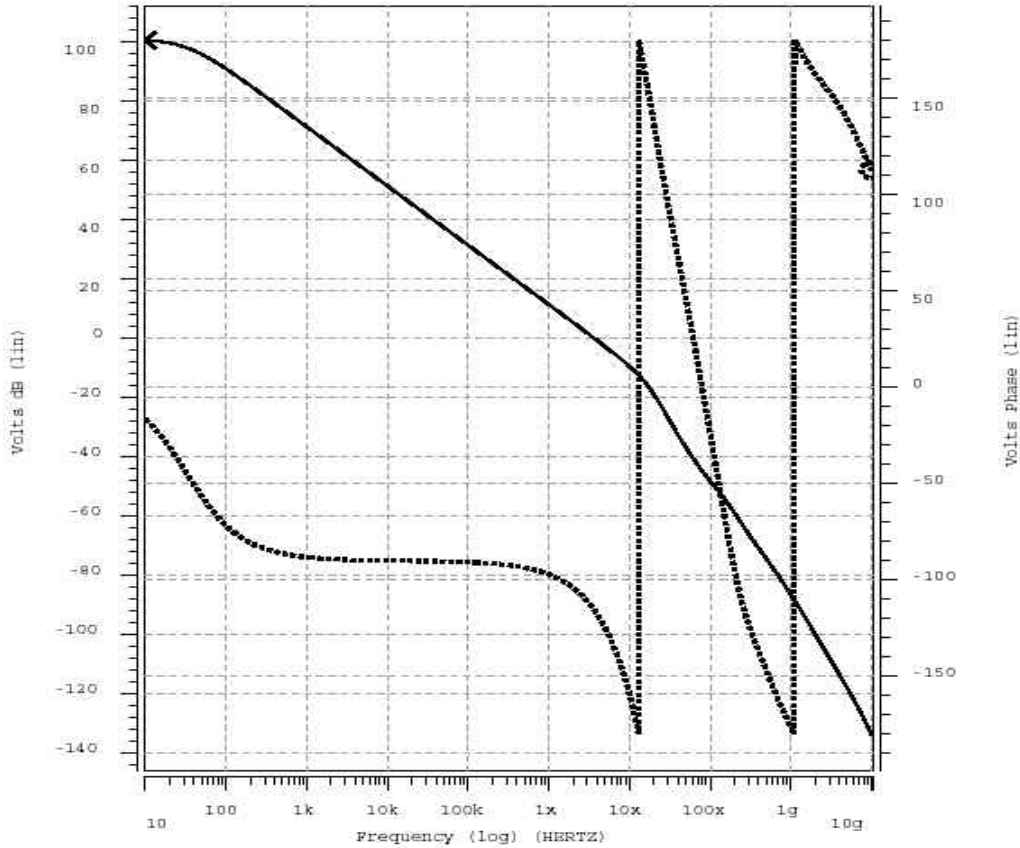
Electrical characteristics (unless otherwise noted, Ta = 25°C, V+ = 6V, V- = -6V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input Offset Voltage	V _{IO}	-	0.7	-	mV	R _S ≤ 10KΩ
Input Offset Current	I _{IO}	-	5	200	nA	
Input Bias Current	I _B	-	70	500	nA	
Input Resistance	R _{IN}	0.5	0.8	-	mΩ	
Input Voltage Range	V _{in}	-	-	±5	V	
Large Signal Voltage Gain	A _v	-	100	-	dB	
Gain Bandwidth	GBW	-	3	-	MHz	
Phase Margin	θ _m	-	60	-	deg.	
Output Voltage Swing	V _{sw}	-	+5.09/ -4.86	-	V	R _L = 10KΩ
DC common mode Rejection ratio	CMRR	-	98	-	dB	
Power supply rejection Ratio	PSRR	-	95	-	dB	
Slew rate	SR	1.0	1.3	-	V/μS	R _L = 2KΩ C _L = 100pF
Input Noise Voltage	V _{noise}	-	1.94	-	uV _{rms}	
Output Resistance	R _o	-	75	-	Ω	
Output Short-Circuit Current	I _{os}	-	100	-	mA	*
Channel separation	α	-	100	-	dB	f = 1KHz~20KHz
Rise Time	T _r	-	55	-	ns	
Operating Current	I _{cc}	-	5.5	10	mA	

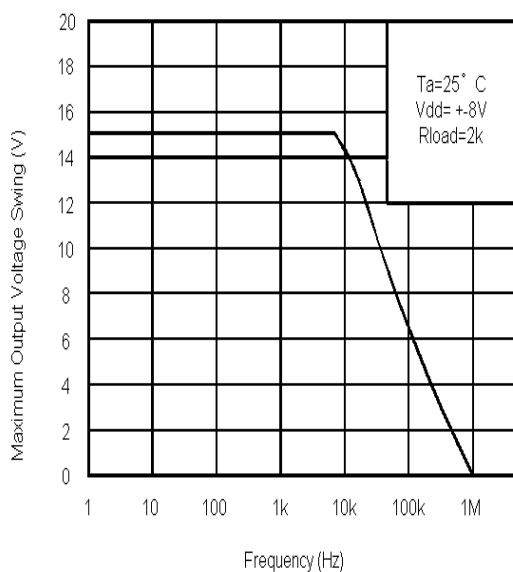
*1 Due to power dissipation issue, it is not allowed for both channels to operate at this condition at the same moment.

Typical Curve

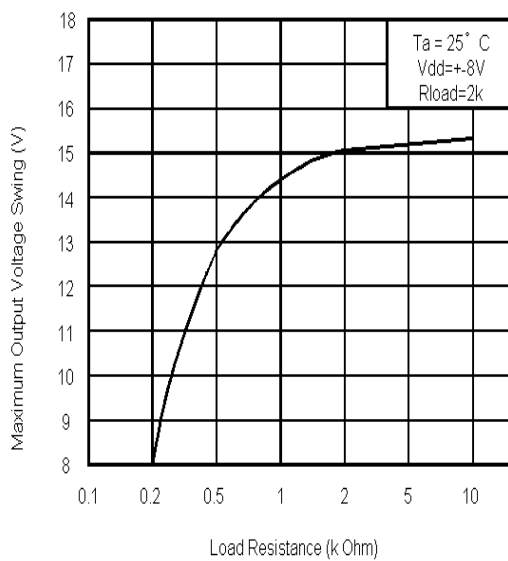
Open-Loop Gain Bandwidth and Phase Margin



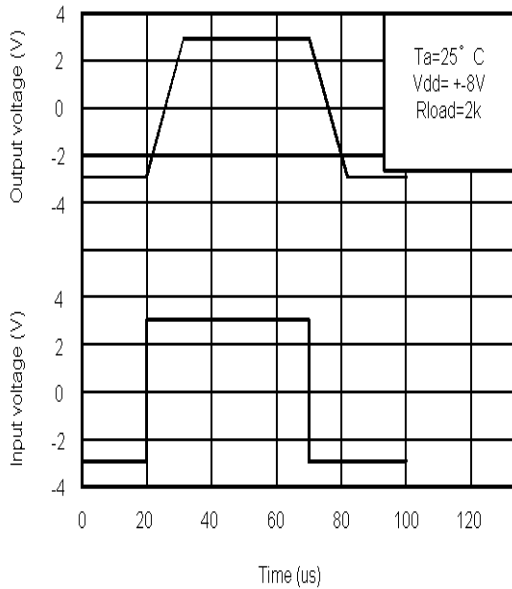
Maximum Output Voltage Swing vs Frequency



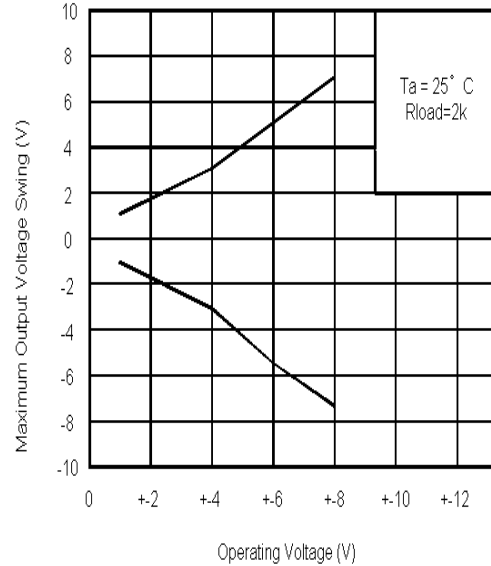
Maximum Output Voltage Swing vs Load Resistance



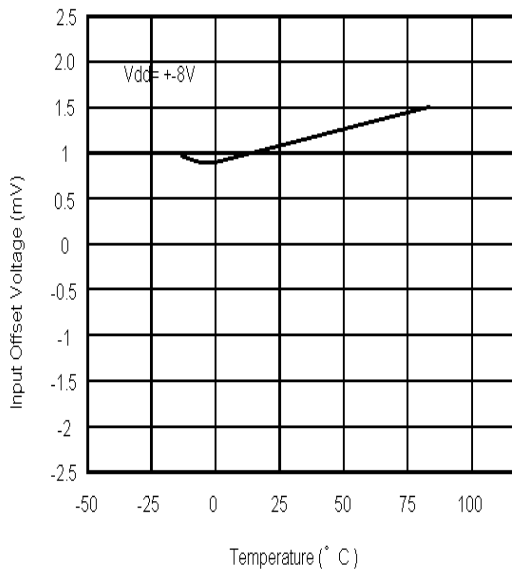
Voltage Follower pulse response



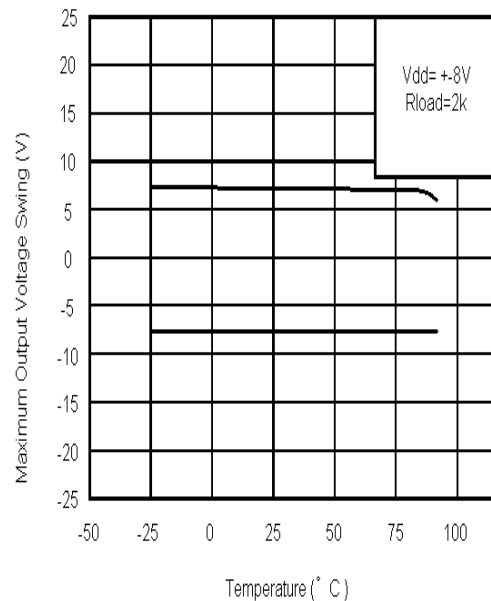
Maximum Output Voltage Swing vs Operating Voltage



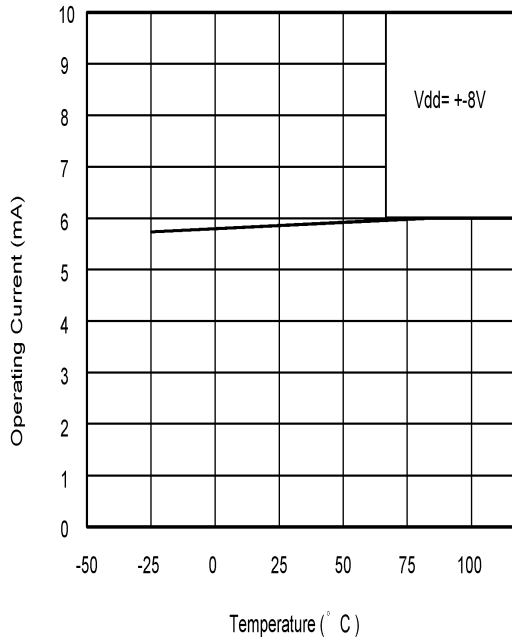
Input Offset Voltage vs Temperature



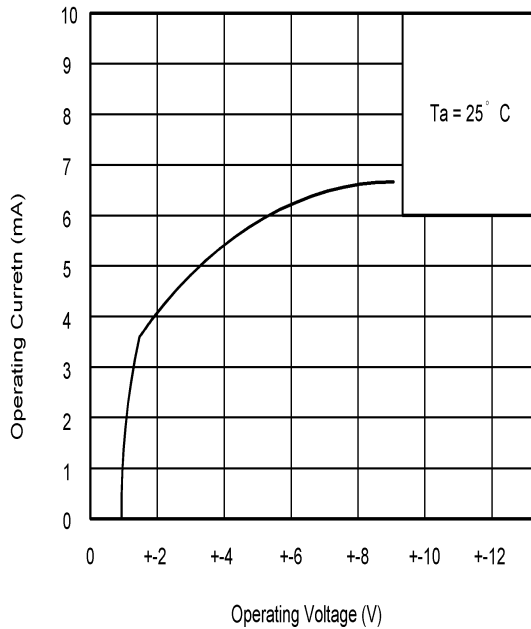
Maximum Output Voltage Swing vs Temperature



Operating Current vs Temperature

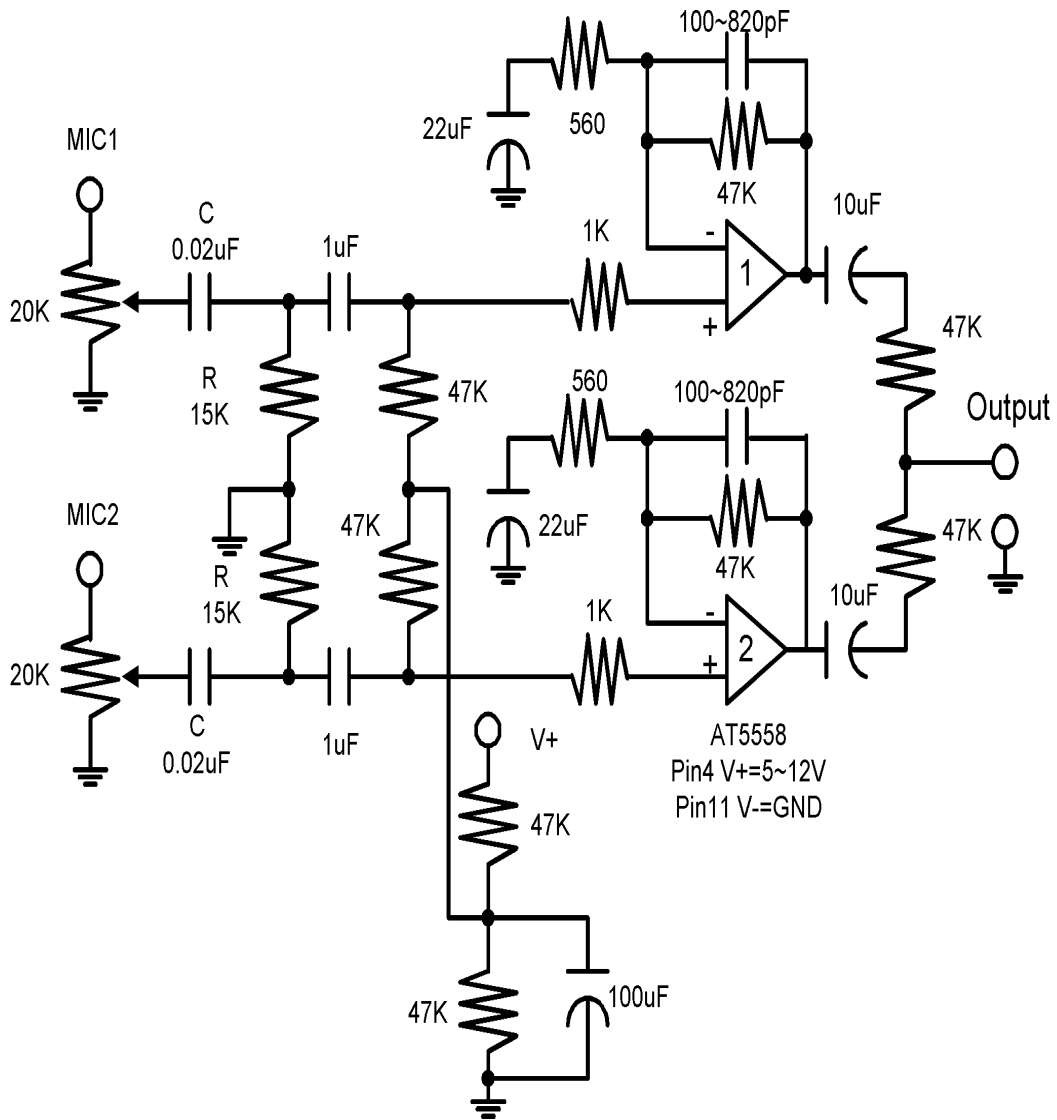


Operating Current vs Operating Voltage

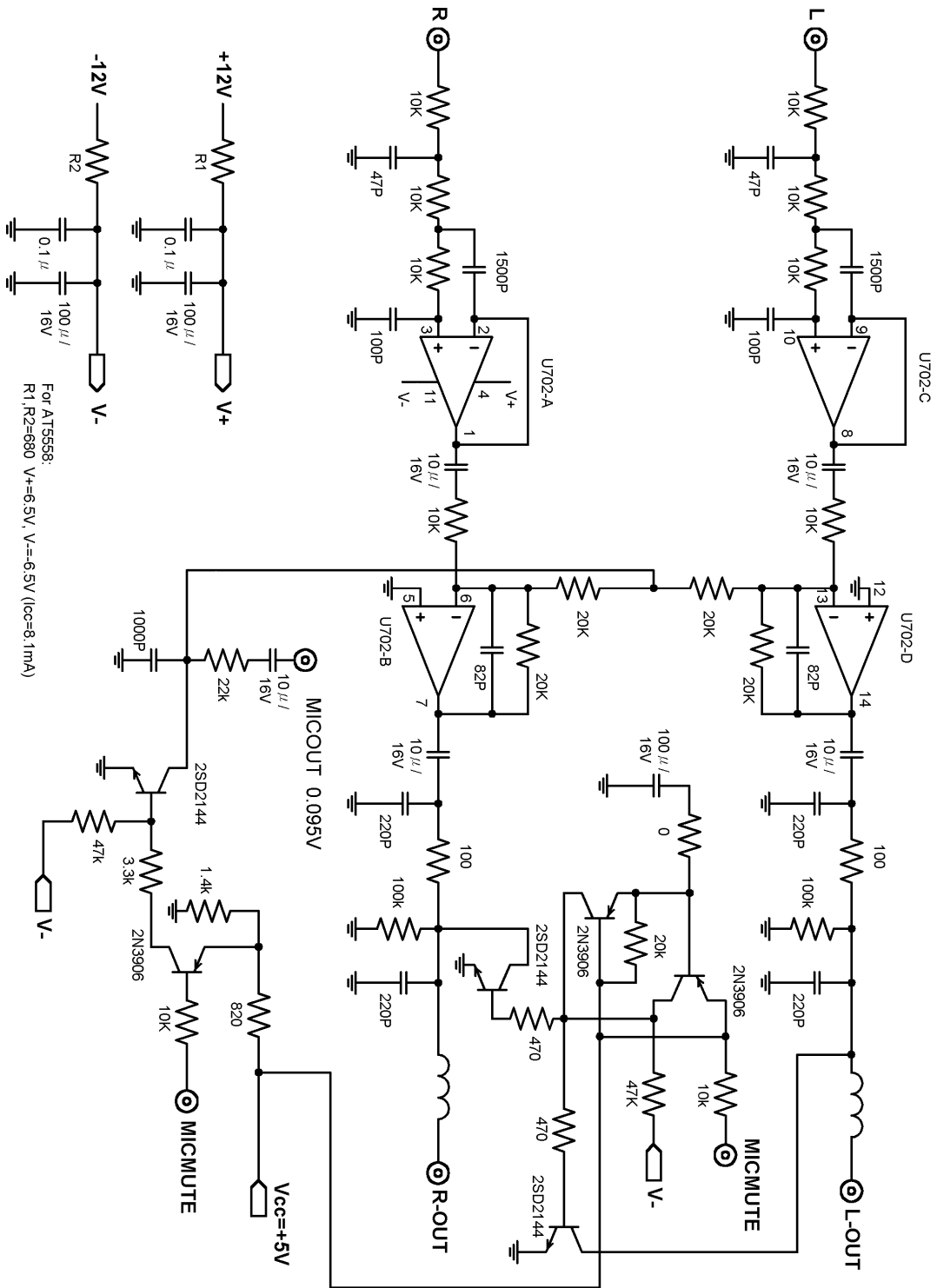


Application Circuit

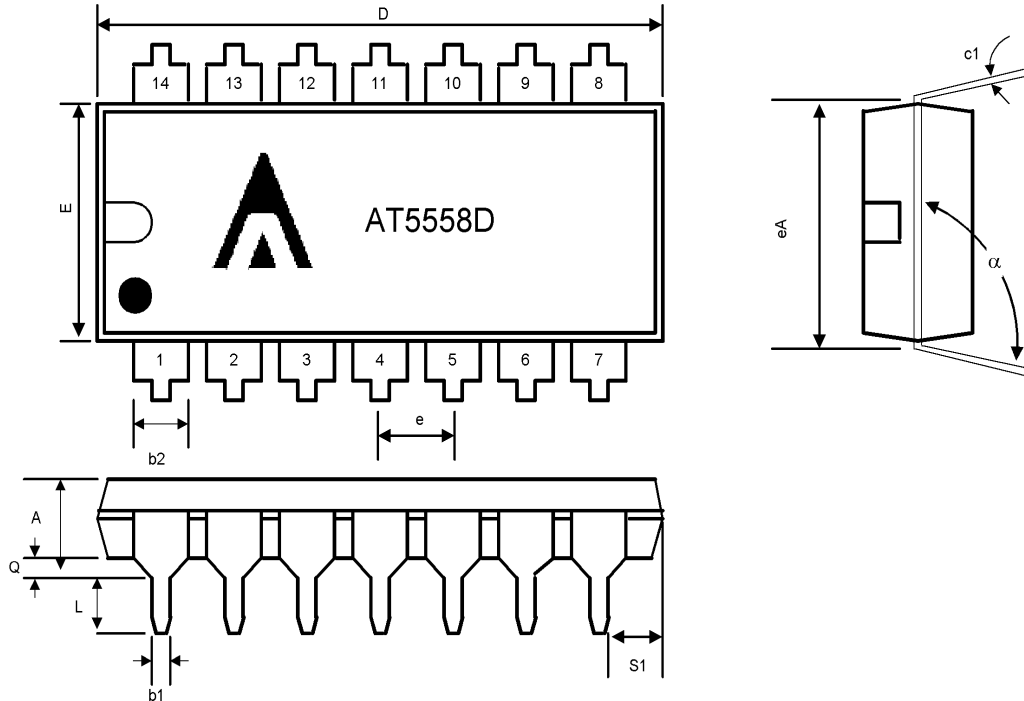
MIC Pre-Amp circuit for ECHO Application



- Change the value of the R and C to adjust the cutoff frequency of the high pass filter as you like.
- The output is connected to the input point of the echo application circuit.

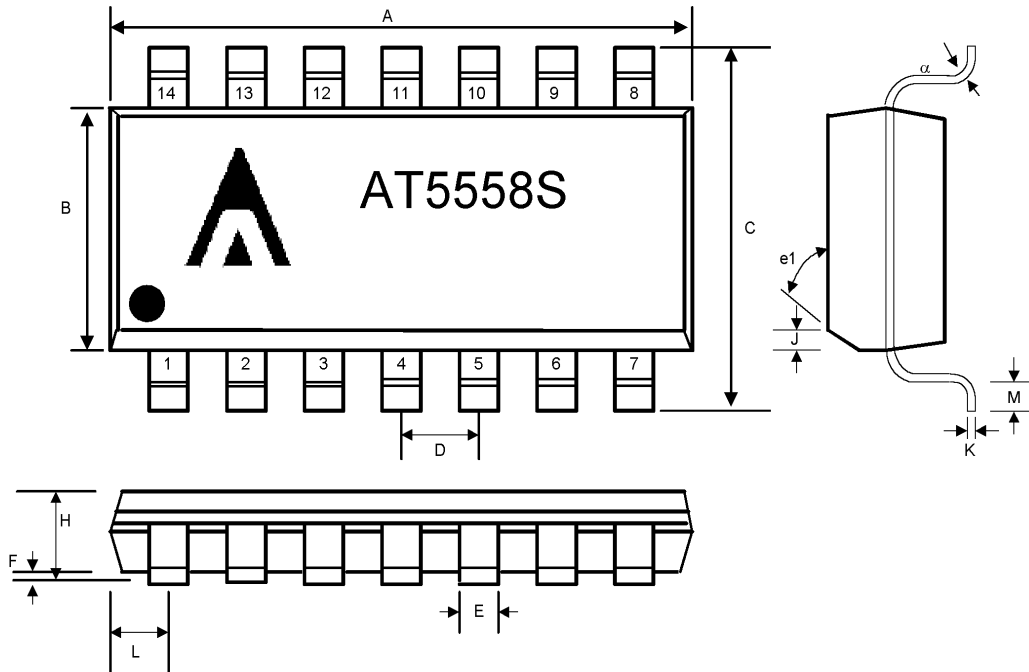


Package Outlines : DIP-14



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	-	0.200	-	5.08	-
b1	0.014	0.023	0.36	0.58	-
b2	0.045	0.065	1.14	1.65	-
c1	0.008	0.015	0.20	0.38	-
D	-	0.785	-	19.94	-
E	0.220	0.310	5.59	7.87	-
e	0.100 BSC		2.54 BSC		-
eA	0.300 BSC		7.62 BSC		-
L	0.125	0.200	3.18	5.08	-
Q	0.015	0.060	0.38	1.52	-
s1	0.005	-	0.13	-	-
α	90 ⁰	105 ⁰	90 ⁰	105 ⁰	-

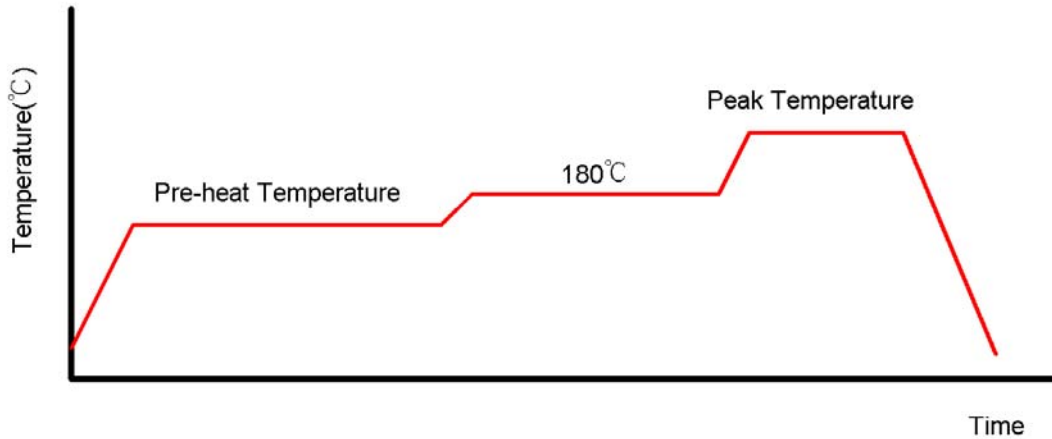
Package Outlines : SOP-14



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.337	0.344	8.55	8.75	-
B	0.150	0.157	3.80	4.00	-
C	0.228	0.244	5.80	6.20	-
E	0.013	0.020	0.33	0.51	-
F	0.004	0.010	0.10	0.25	-
H	0.053	0.069	1.35	1.75	-
D	0.050 BSC		1.27 BSC		-
L	0.012	0.028	0.30	0.70	-
J	0.010	0.020	0.25	0.50	-
K	0.007	0.010	0.19	0.25	-
M	0.016	0.050	0.40	1.27	-
e1	45°		45°		-
α	0°	8°	0°	8°	-

Reflow Condition (IR/Convection or VPR Reflow)

Reference JEDEC Standard J-STD-020A



Classification Reflow Profiles

	Convection or IR/Convection	VPR
Average Heating Rate(180°C to peak)	5°C/second max.	10°C/second max.
Preheat Temperature(125±20°C)	120 seconds max.	
Temperature maintained above 180°C	10~150 seconds	
Time within 5°C of actual Peak Temperature	10~20 seconds	60 seconds
Peak Temperature Range(Note 1)	219~225°C or 235~240°C	219~225°C or 235~240°C
Cooling Rate	6°C /second max.	10°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	

*1 The maximum peak temperatures for IR and VP reflow are depending on package dimensions.

Package Reflow Conditions

Pkg. Thickness ≥2.5mm and all bags	Pkg. Thickness <2.5mm and Pkg. Volume ≥350 mm ³	Pkg. Thickness <2.5mm and Pkg. Volume <350 mm ³
Convection 219~225°C		Convection 235~240°C
VPR 219~225°C		VPR 235~240°C
IR/Convection 219~225°C		IR/Convection 235~240°C