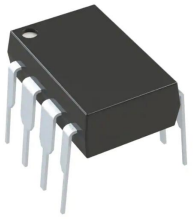
D5534
Low-Noise Operational Amplifier

General Description



DIP8

SOP8

The D5534 is high-performance operational amplifiers combining excellent dc and ac characteristics. Some of the features include very low noise, high output-drive capability, high unity-gain and maximum-output-swing bandwidths, low distortion, and high slew rate.

These operational amplifiers are compensated internally for a gain equal to or greater than three. Optimization of the frequency response for various applications can be obtained by use of an external compensation capacitor between COMP and COMP/BAL. The devices feature input-protection diodes, output short-circuit protection, and offset-voltage nulling capability with use of the BALANCE and COMP/BAL pins (see the application circuit diagram).

For the D5534, a maximum limit is specified for the equivalent input noise voltage.

D5534 is available in DIP8 or SOP8 package.

Features

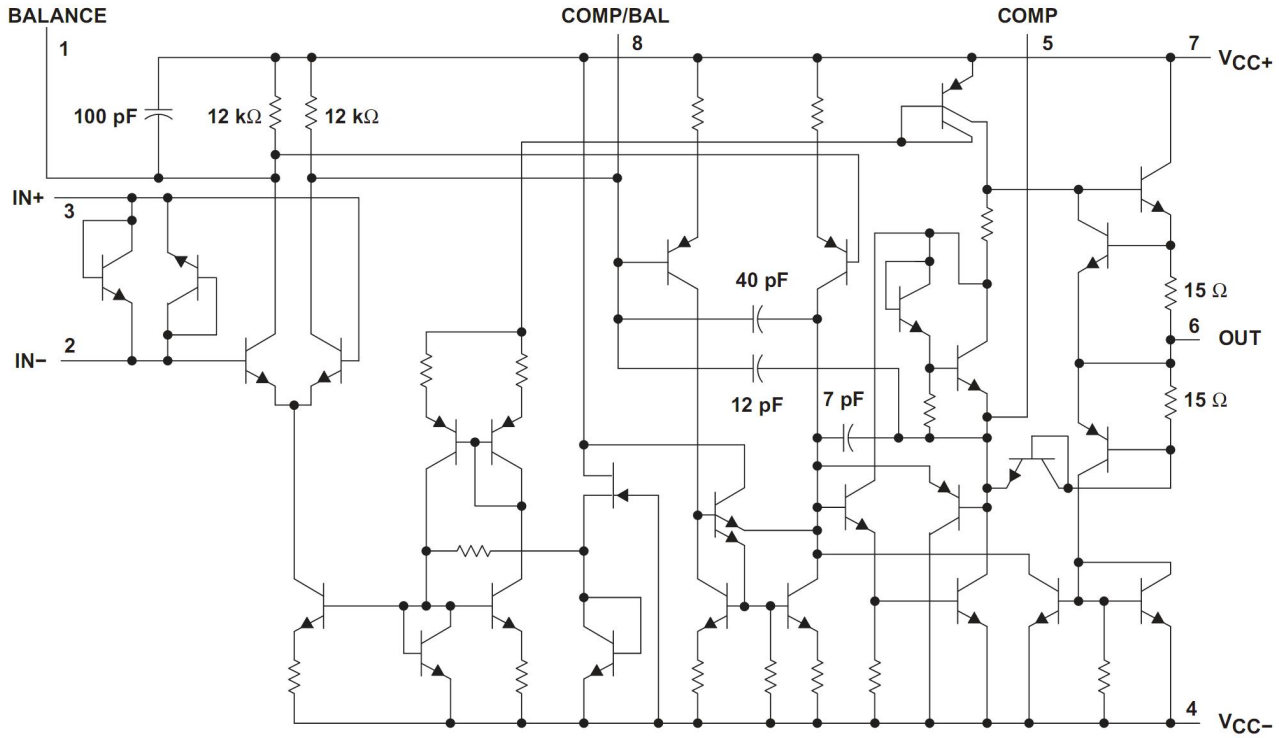
- Built-in EQ Amp, REC Amp, Monitor Amp, Mic (Mixing) Amp
- Equivalent Input Noise Voltage : $3.5nV/\sqrt{Hz}$ Type
- Unity-Gain Bandwidth：10MHz Type
- Common-Mode Rejection Ratio：100dB Type
- High DC Voltage Gain：100V/mV Type
- Peak-to-Peak Output Voltage Swing： 32V Type With $V_{CC\pm}$=±18V and R_L=600Ω
- High Slew Rate：13V/μs Type
- Wide Supply-Voltage Range ： ±3V to ±20V
- Low Harmonic Distortion
- Offset Nulling Capability
- External Compensation Capability

Package Information

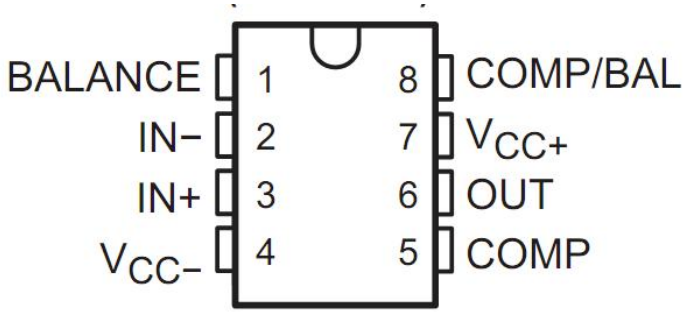
Part NO.	Order NO.	Package Description	Package Marking	Package Option
D5534	D5534	DIP8	CHMC D5534 SXXXX	50/Tube
D5534	D5534F	SOP8	CHMC D5534 SXXXX	100/Tube 4000/Reel

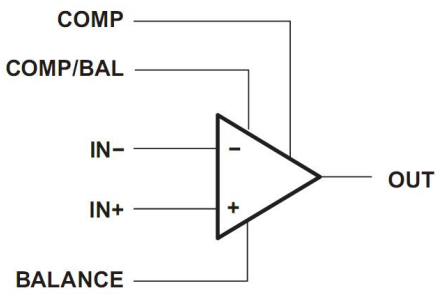
CHMC:Trademark D5534:Part NO. SXXXX:Lot NO.

Functional Block Diagram



Pin Configration





D5534(DIP8/SOP8)

Absolute Maximum Ratings（Tamb=25℃）

Parameter Name		Symbol	Value	Unit
Supply Voltage *1		Vcc+	22	V
		Vcc-	-22	
Input Voltage Enter Input *1,2			Vcc+	
Input Current *3			±10	mA
Duration of Output Short Circuit *4			Unlimited	
Package Thermal Impedance *5,6	DIP8	θ_{JA}	97	℃/W
	SOP8		85	
Operating Virtual Junction Temperature		T_J	150	℃
Storage Temperature		Tstg	-65 ~ +150	℃

*Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

*1. All voltage values, except differential voltages, are with respect to the midpoint between V_{CC+} and V_{CC-}.

*2. The magnitude of the input voltage must never exceed the magnitude of the supply voltage.

*3. Excessive current will flow if a differential input voltage in excess of approximately 0.6V is applied between the inputs, unless some limiting resistance is used.

*4. The output may be shorted to ground or to either power supply. Temperature and/or supply voltages must be limited to ensure the maximum dissipation rating is not exceeded.

*5. Maximum power dissipation is a function of $T_{J(max)}$, θ_{JA}, and T_A. The maximum allowable power

dissipation at any allowable ambient temperature is $P_D = (T_{J(max)} - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.

*6. The package thermal impedance is calculated in accordance with JESD 51-7.

Parameter Name	Symbol	Value		Unit
Supply Voltage	V_{CC+}	5	15	V
Supply Voltage	V_{CC-}	-5	-15	V
Operating Free-air Temperature Range	T_A	-40	85	℃

Electrical Characteristics（Unless otherwise specified，$V_{CC\pm} = \pm 15$ V, $T_A = 25°C$）

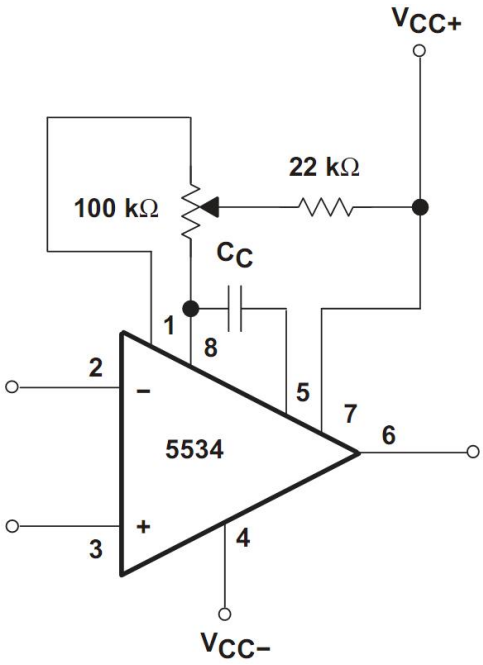
Parameter Name	Test Conditions		Symbol	Min.	Type	Max.	Unit
Input Offset Voltage	V_O=0 R_S=50Ω	T_A = 25°C	V_{IO}		0.5	4	mV
		T_A = Full Range				5	
Input Offset Current	V_O=0	T_A = 25°C	I_{IO}		20	300	nA
		T_A = Full Range				400	
Input Bias Current	V_O=0	T_A = 25°C	I_{IB}		500	1500	nA
		T_A = Full Range				2000	
Common-mode Input Voltage Range			V_{ICR}	±12	±13		V
Maximum Peak-to-peak Output Voltage Swing	R_L≥600Ω	$V_{CC\pm}$ =±15V	$V_{O(PP)}$	24	26		V
		$V_{CC\pm}$ =±18V		30	32		
Large-signal Differential Voltage Amplification	V_O=±10V R_L>600Ω	T_A = 25°C	A_{VD}	25	100		V/mV
		T_A = Full Range		15			
Small-signal Differential Voltage Amplification	f=10kHz	C_C=0	Avd		6		V/mV
		C_C=22pF			2.2		
Maximum-output-swing Bandwidth	V_O=±10V	C_C=0	B_{OM}		200		kHz
		C_C=22pF			95		
	$V_{CC\pm}$ = ±18V, V_O = ±14V, R_L ≥600Ω, C_C=22pF				70		
Unity-gain Bandwidth	C_C = 22pF, C_L = 100pF		B_1		10		MHz
Input Resistance			ri	30	100		kΩ
Output Impedance	A_{VD} = 30dB, R_L ≥600Ω, C_C = 22pF, f = 10kHz		Z_O		0.3		Ω
Common-mode Rejection Ratio	V_O = 0, V_{IC} = V_{ICR}min, R_S = 50Ω		C_{MRR}	70	100		dB
Supply-voltage Rejection Ratio ($\Delta V_{CC}/\Delta V_{IO}$)	V_{CC+} = ±9V to ±15V, R_S = 50Ω, V_O = 0		k_{SVR}	80	100		dB
Output Short-circuit Current			I_{OS}		38		mA
Supply Current	V_O = 0, No load	T_A = 25°C	I_{CC}		4	8	mA

*All characteristics are measured under open-loop conditions with zero common-mode input voltage, unless otherwise specified.

Operating Characteristics（Unless otherwise specified，$V_{CC\pm}$ = ±15V, T_A =25°C）

Parameter Name	Test Conditions	Symbol	Min	Typ.	Max	Unit
Slew Rate	C_C=0	SR		13		V/μs
	C_C=22pF			6		
Rise Time	V_I = 50mV, A_{VD} =1, R_L = 600Ω, C_C = 22pF C_L = 100pF	tr		20		ns
Overshoot Factor				20		%
Rise Time	V_I = 50mV, A_{VD} =1, R_L = 600Ω, C_C = 47pF C_L = 500pF			50		ns
Overshoot Factor				35		%
Equivalent Input Noise Voltage	f=30Hz	Vn		5.5	7	$nV/\sqrt{Hz}$
	f=1kHz			3.5	4.5	
Equivalent Input Noise Current	f=30Hz	In		1.5		$nV/\sqrt{Hz}$
	f=1kHz			0.4		
Average Noise Figure	R_S = 5kΩ, f =10Hz to 20kHz	$\overline{F}$		0.9		dB

Application Circuit



Frequency Compensation and Offset-Voltage Nulling Circuit

Characteristics Curve

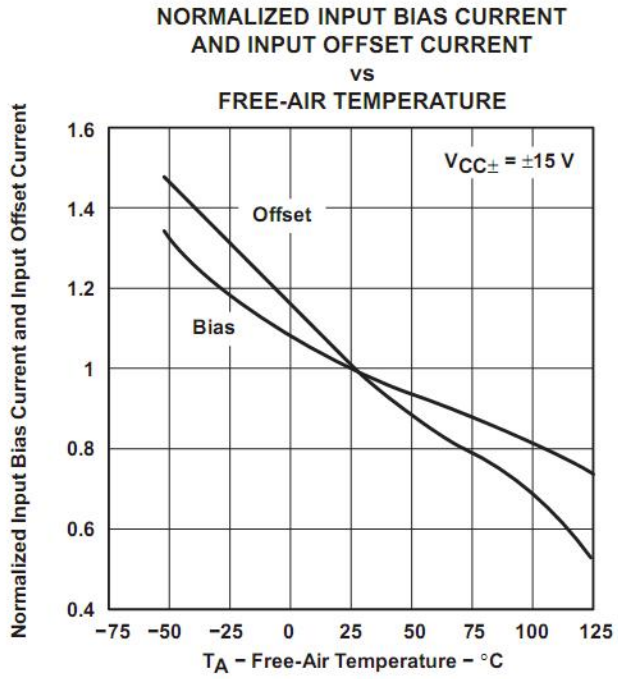


Figure 1

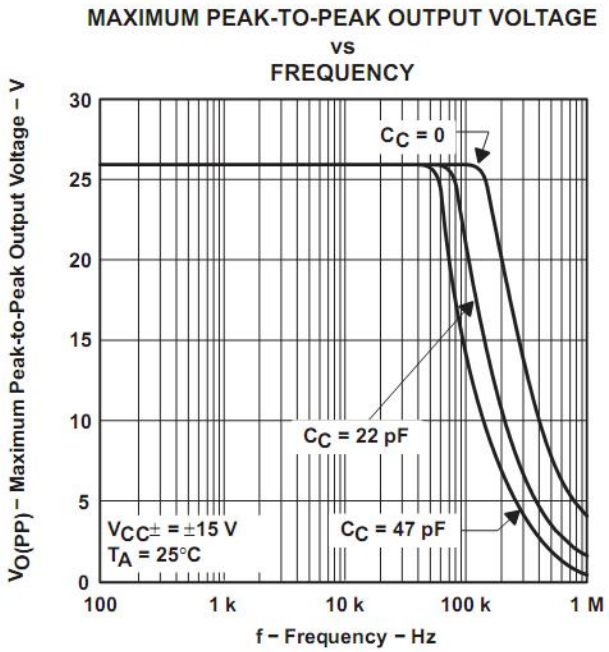


Figure 2

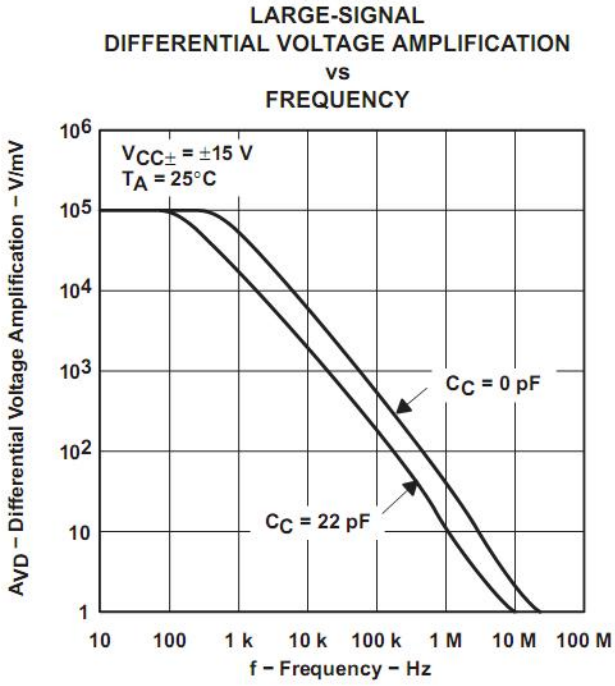


Figure 3

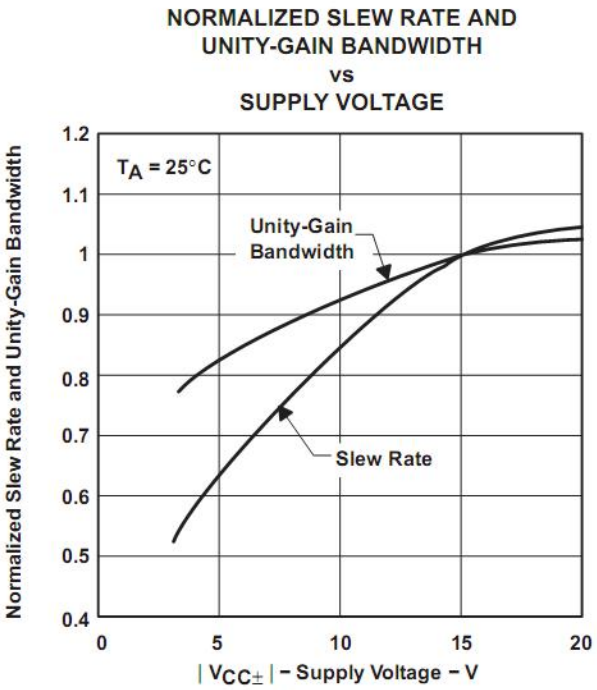


Figure 4

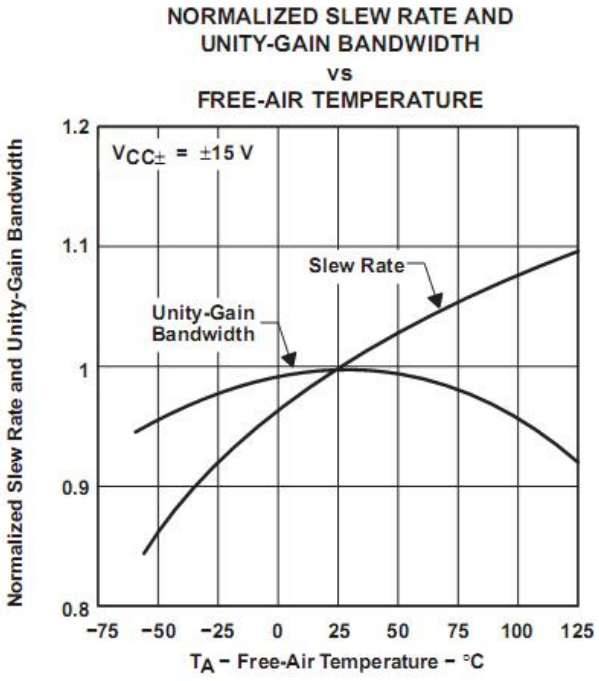


Figure 5

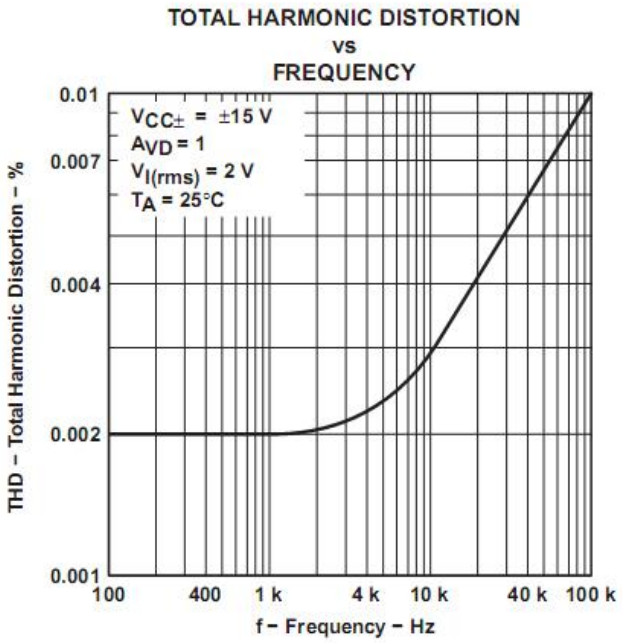


Figure 6

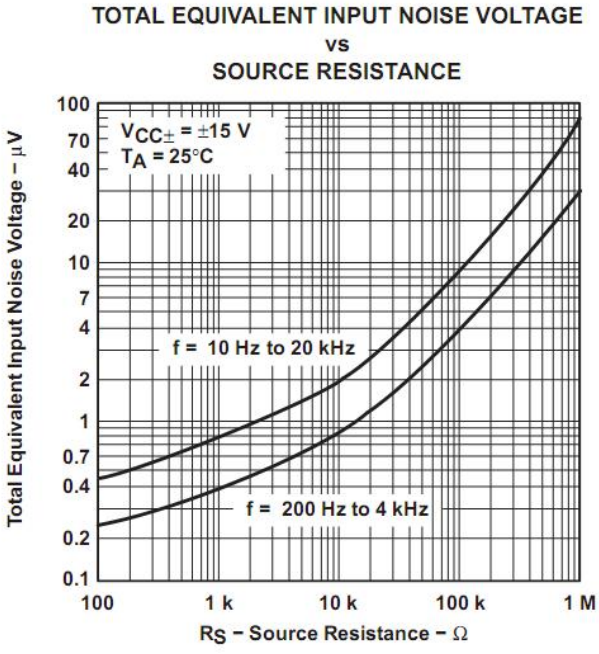
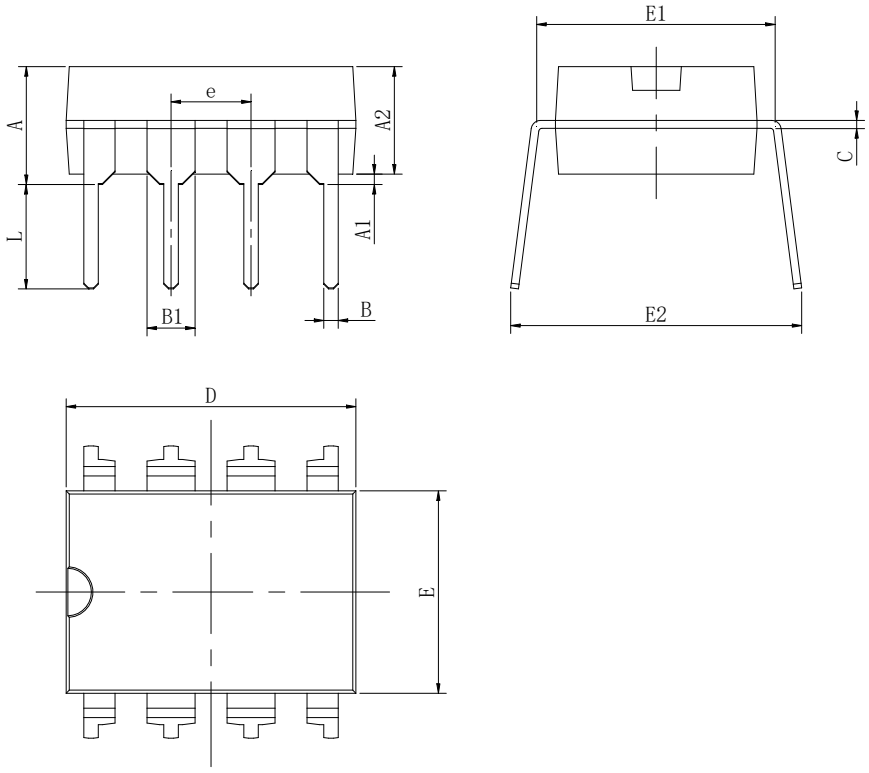


Figure 9

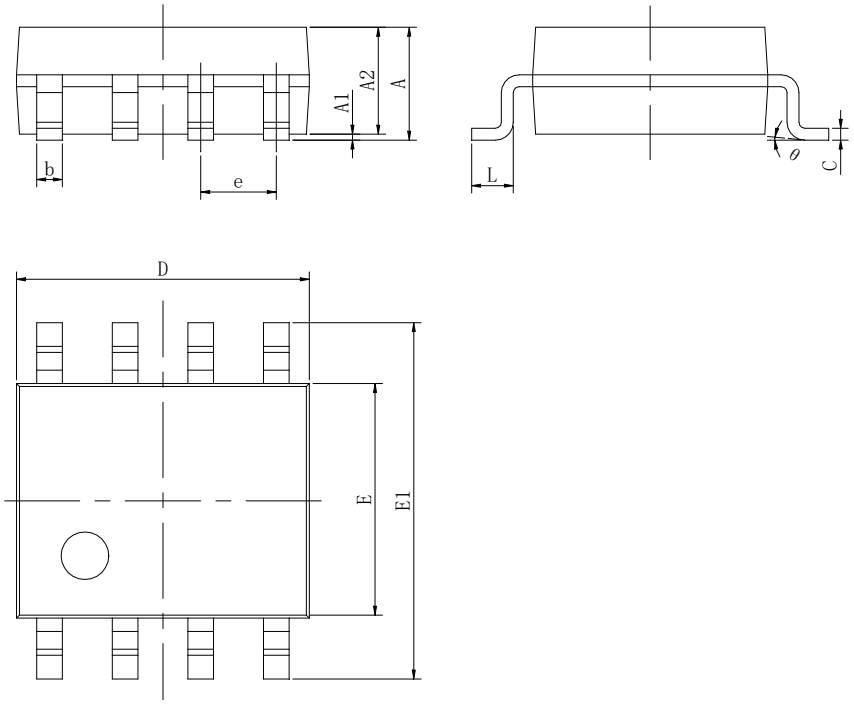
Outline Dimensions

DIP8： Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	7.800	9.000	0.307	0.354

SOP8: Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.071
A1	0.000	0.250	0.000	0.010
A2	1.250	1.550	0.053	0.061
b	0.300	0.510	0.011	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	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°

Statements

- Silicore Technology reserves the right to make changes without further notice to any products or specifications herein. Before customers place an order, customers need to confirm whether datasheet obtained is the latest version, and to verify the integrity of the relevant information.

- Failure or malfunction of any semiconductor products may occur under particular conditions, customers shall have obligation to comply with safety standards when customers use Silicore Technology products to do their system design and machine manufacturing, and take corresponding safety measures in order to avoid potential risk of failure that may cause personal injury or property damage.

- The product upgrades without end, Silicore Technology will wholeheartedly provide customers integrated circuits that have better performance and better quality.