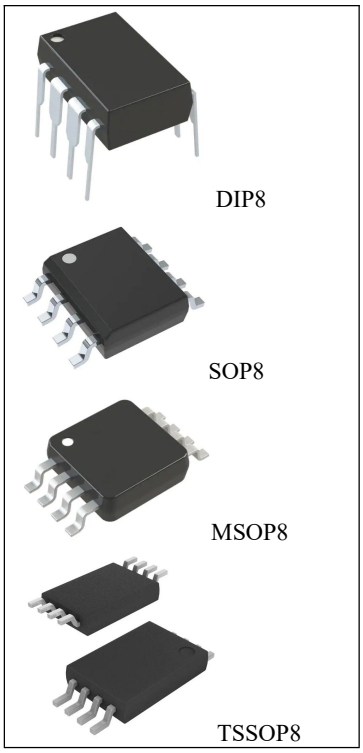
Silicore
芯谷科技

D358
Low Power Dual Operational Amplifier



Description

The D358 consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

D358 is available in DIP8, SOP8,MSOP8 and TSSOP8 packages.

Features

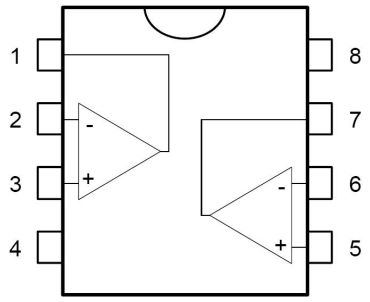
- Internally frequency compensated for unity gain
- Large dc voltage gain: 100 dB
- Wide bandwidth (unity gain): 1 MHz (temperature compensated)
- Wide power supply range: — Single supply: 3V to 36V
  — or dual supplies: ±1.5V to ±18V
- Very low supply current drain (500 μA)—essentially independent of supply voltage.
- Low input offset voltage: 2 mV
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- Large output voltage swing: 0V to V+- 1.5V

Package Information

Part NO.	Order NO.	Package Description	Package Marking	Package Option
D358	D358	DIP8	CHMC D358 SXXXX	50/Tube
D358	D358F	SOP8	CHMC D358 SXXXX	100/Tube 4000/Reel
D358	D358M	MSOP8	CHMC D358 SXXXX	100/Tube 4000/Reel
D358	D358T	TSSOP8	CHMC D358 SXXXX	100/Tube 4000/Reel

CHMC:Trademark D358:Part NO. SXXXX:Lot NO.

Block Configuration

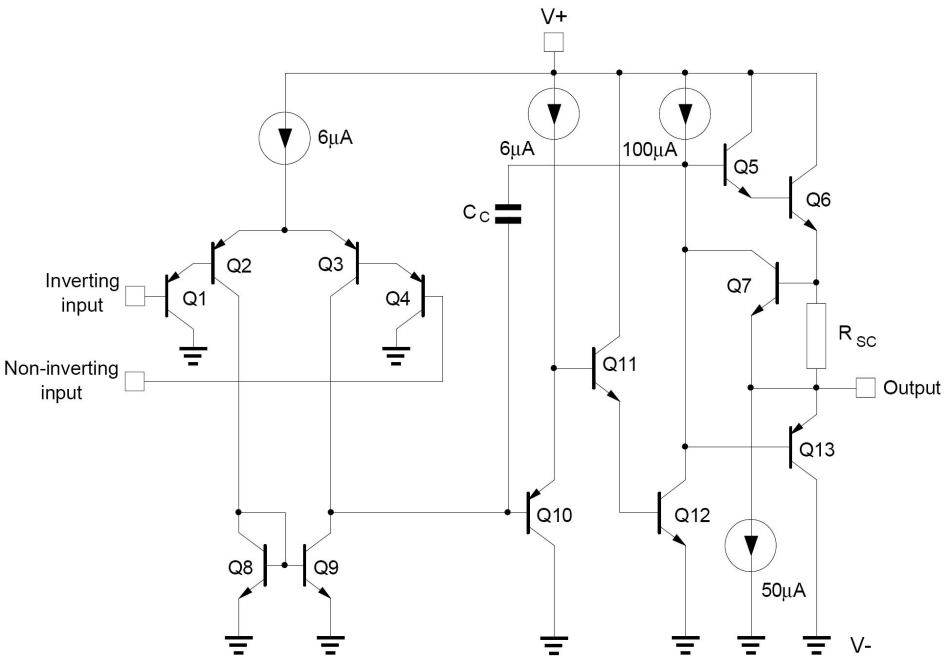


D358(DIP8/SOP8/MSOP8/TSSOP8)

Pin Description

Pin No.	Pin Name	Description
1	OUT1	Channel-1 Output
2	IN1-	Channel-1 Inverting Input
3	IN1+	Channel-1 Non-Inverting Input
4	V-	Vcc-
5	IN2+	Channel-2 Non-Inverting Input
6	IN2-	Channel-2 Inverting Input
7	OUT2	Channel-2 Output
8	V+	Vcc+

Equivalent Circuit (1/2 D358)



Absolute Maximum Ratings (Ta=25°C)

Characteristic		Value	Unit
Supply Voltage, V^+		36 or ±18	V
Differential Input Voltage		36	V
Input Voltage		-0.3~36	V
Output Short-Circuit to GND (Note1) （V^+≤15V and Ta=25℃）		Continuous	
Input Current （V_{IN}<-0.3V） (Note2)		50	mA
Thermal Resistance Junction to Ambient ($R_{\theta-JA}$) (Note3)	DIP8	85	°C/W
	SOP8	125	
	MSOP8	190	
	TSSOP8	120	
Thermal Resistance Junction to Case ($R_{\theta-JC}$) (Note3)	DIP8	41	°C/W
	SOP8	40	
	MSOP8	56	
	TSSOP8	37	
Operating Temperature Range		-25~+85	°C
Storage Temperature Range		-65~+150	°C

Note 1: Short-circuits from the output to V+ can cause excessive heating and eventual destruction. The maximum output current is approximately 40mA independent of the magnitude of V+. At values of supply voltage in excess of +15VDC, continuous short-circuits can exceed the power dissipation ratings and cause eventual destruction.

Note 2: This input current only exists when the voltage at any of the input leads is driven negative. It is due to the collector-base junction of the input PNP transistor becoming forward biased and thereby acting as input diode clamps. In addition to this diode action, there is also NPN parasitic action on the IC chip. This transistor action can cause the output voltages of the Op-amps to go to the V+ voltage level (or to ground for a large overdrive) for the time during which an input is driven negative.

This is not destructive and normal output is restored for input voltages above -0.3 V.

Note 3: Short-circuits can cause excessive heating and destructive dissipation. R_θ are typical values.

Electrical Characteristics (Ta=25℃,V+=5.0V,V-=0V, unless otherwise specified)

Parameter		Test Conditions		Min.	Typ.	Max.	Unit
Input Offset Voltage					1	3	mV
		Ta=Full Range				7	
Input Bias Current					25	250	nA
		Ta=Full Range			50	500	
Input Offset Current					5	50	nA
		Ta=Full Range				150	
Common-Mode Input Voltage Range		V^+=30V		0		V^+-1.5	V
		Ta=Full Range		0		V^+-2	
Supply Current		Over Full Temperature Range, R_L=∞ on all Op Amps	V^+=30V		1.0	3.0	mA
			V^+=5V		0.5	1.2	
Large Signal Voltage Gain		V^+=15V，R_L≥2kΩ，Vo=1V to 11V		50	100		V/mV
		Ta=Full Range		25			
Common-Mode Rejection Ratio		V_{CM}=0~V^+-1.5V		70	90		dB
Power Supply Rejection Ratio		V^+=5V~30V		75	100		dB
Channel Separation		f=1 kHz ~20kHz, Input Referenced			-120		dB
Output Current	Source	$V_{IN(+)}$=1V,$V_{IN(-)}$=0V,V^+=15V,Vo=2V		20	40		mA
	Sink	$V_{IN(-)}$=1V,$V_{IN(+)}$=0V,V^+=15V,Vo=2V		10	20		mA
		$V_{IN(-)}$=1V,$V_{IN(+)}$=0V,V^+=15V,Vo=200mV		12	50		μA
Short Circuit to Ground		V^+=15V			40	60	mA
Output Voltage Swing	V_{OH}	V^+=30V	R_L=2kΩ	26			V
			R_L=10kΩ	27	28		V
	V_{OL}	V^+=5V，R_L=10kΩ			5	20	mV
Gain Bandwidth Product					1.0		MHz
Slew Rate					0.4		V/μs

Note : With the D358, all temperature specifications are limited to -25℃ ≤ Ta ≤ +85℃.

Typical Application (Single Supply Voltage, V+=5.0V,V-=0V)

Figure 1. AC coupled inverting amplifier

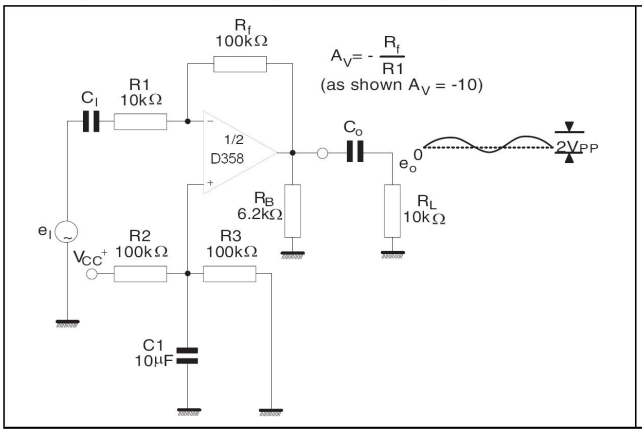


Figure 2. Non-inverting DC amplifier

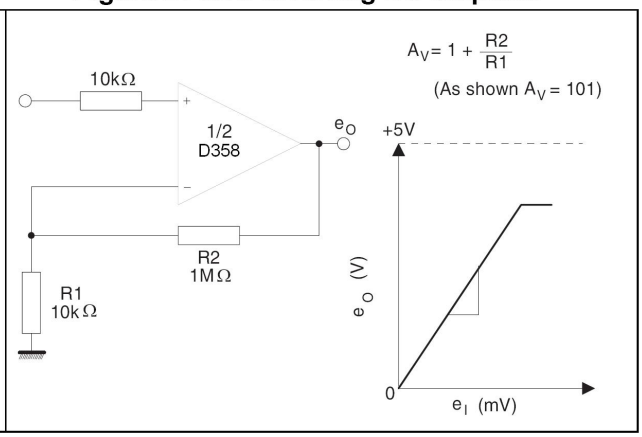


Figure 3. AC coupled non-inverting amplifier

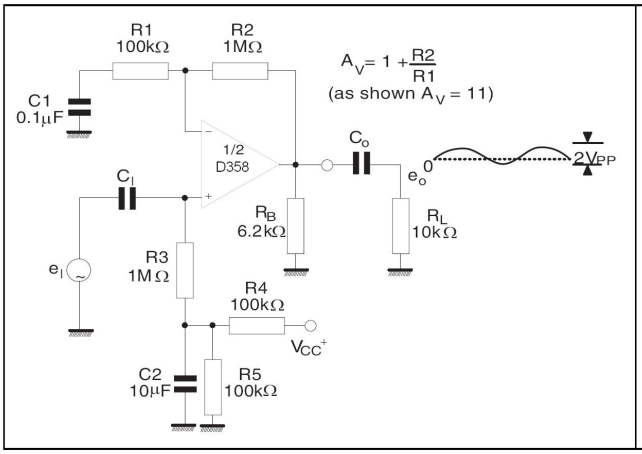


Figure 4. DC summing amplifier

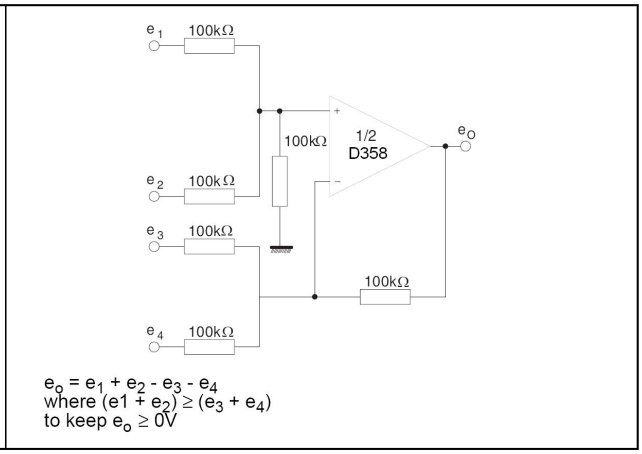


Figure 5. High input Z, DC differential amplifier

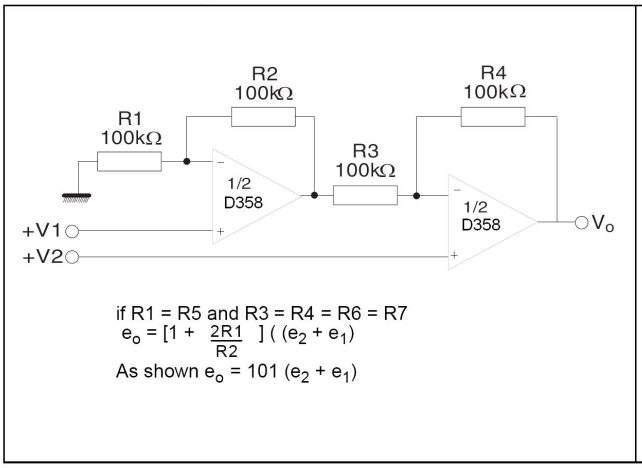


Figure 6. High input Z adjustable gain DC instrumentation amplifier

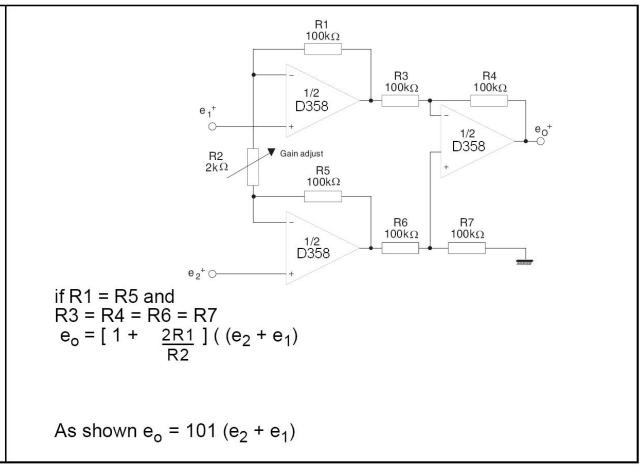


Figure 7. Using symmetrical amplifiers to reduce input current

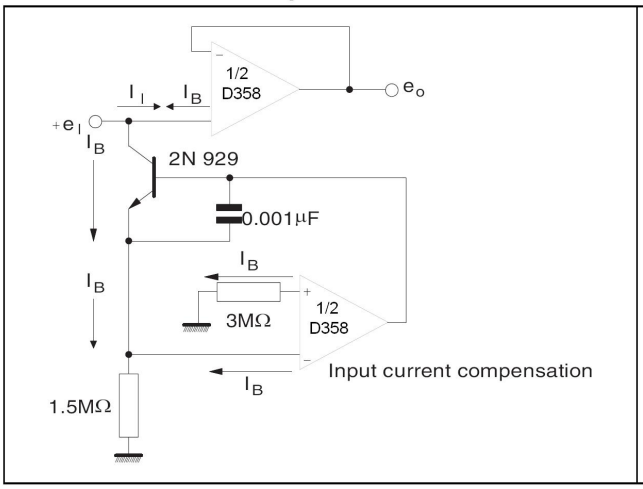


Figure 8. Low drift peak detector

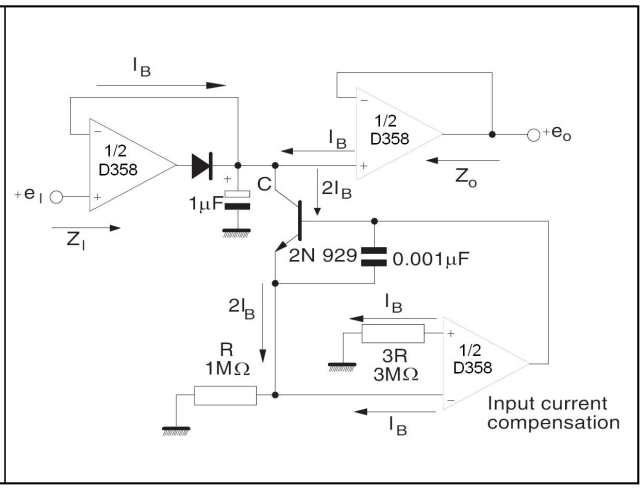
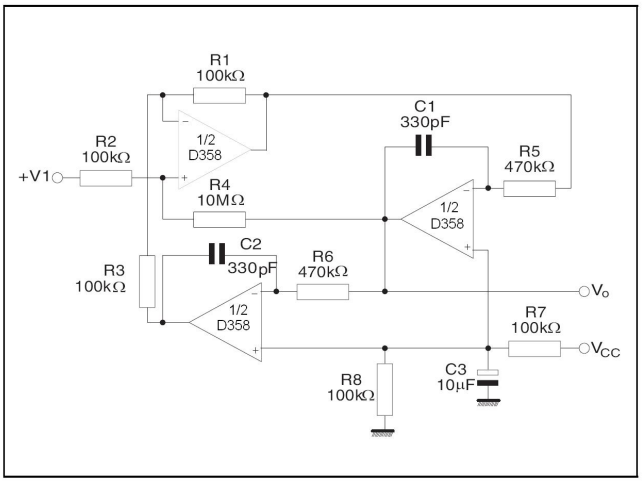
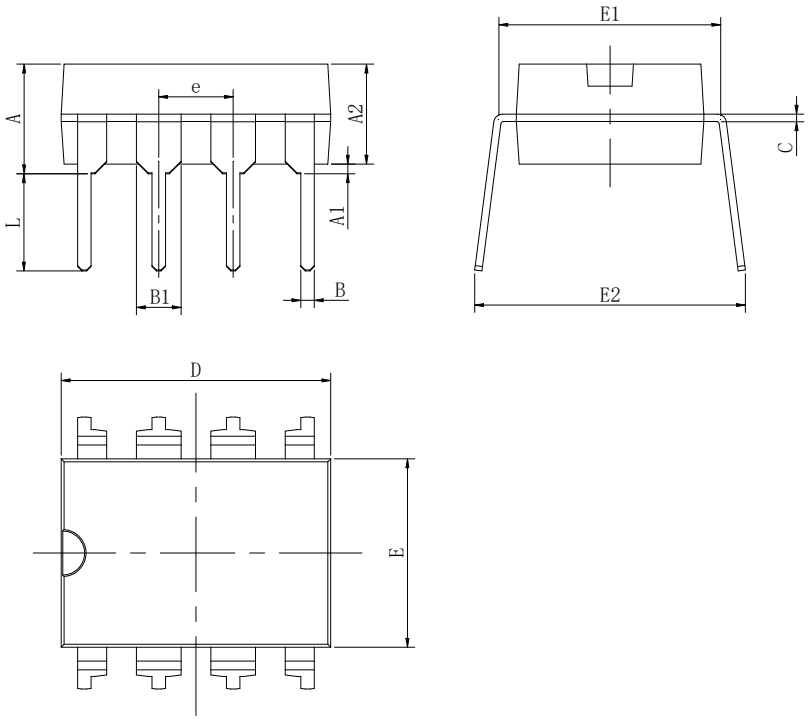


Figure 9. Active band-pass filter



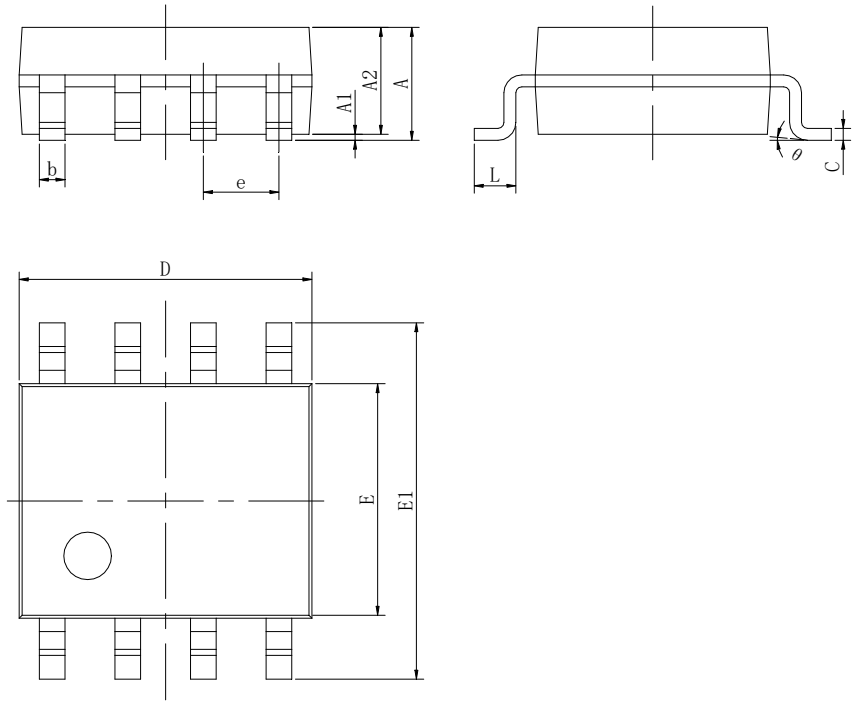
Outline Dimensions

DIP8 Unit: mm



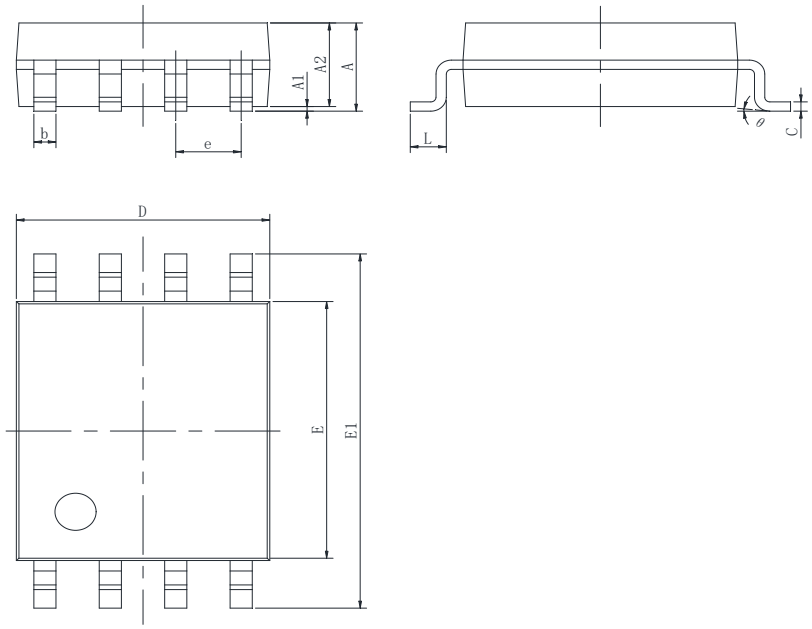
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312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



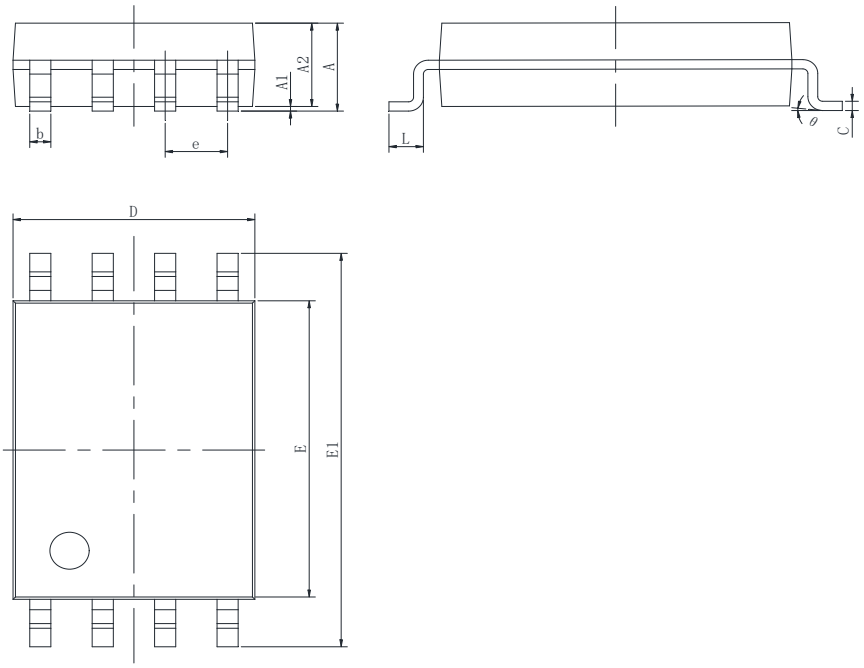
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.071
A1	0.000	0.250	0.000	0.010
A2	1.250	1.550	0.053	0.061
b	0.300	0.510	0.011	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

MSOP8 Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650(BSC)		0.026(BSC)	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

TSSOP8 Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		1.100		0.043
A1	0.020	0.150	0.001	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	2.900	3.100	0.114	0.122
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650(BSC)		0.026(BSC)	
L	0.500	0.700	0.020	0.028
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.

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