



LMV721/LMV722/LMV724

10MHz, RRIO, CMOS, Op Amps

Description

The LMV721, LMV722, LMV724 families of products offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth(10MHz) and slew rate (8.5V/us). The operational amplifiers are unity gain stable and feature an ultra-low input bias current.

The LMV721, LMV722, LMV724 has lower offset voltage, which is guaranteed not upper than 0.5mV at 25°C with $V_S = 5V$, $V_{CM} = V_S/2$.

The LMV721, LMV722, LMV724 families of operational amplifiers under single supplies of 2.1V to 5.5V or dual power supplies of $\pm 1.05V$ to $\pm 2.75V$. The devices are ideal for sensor interfaces, active filters and portable applications.

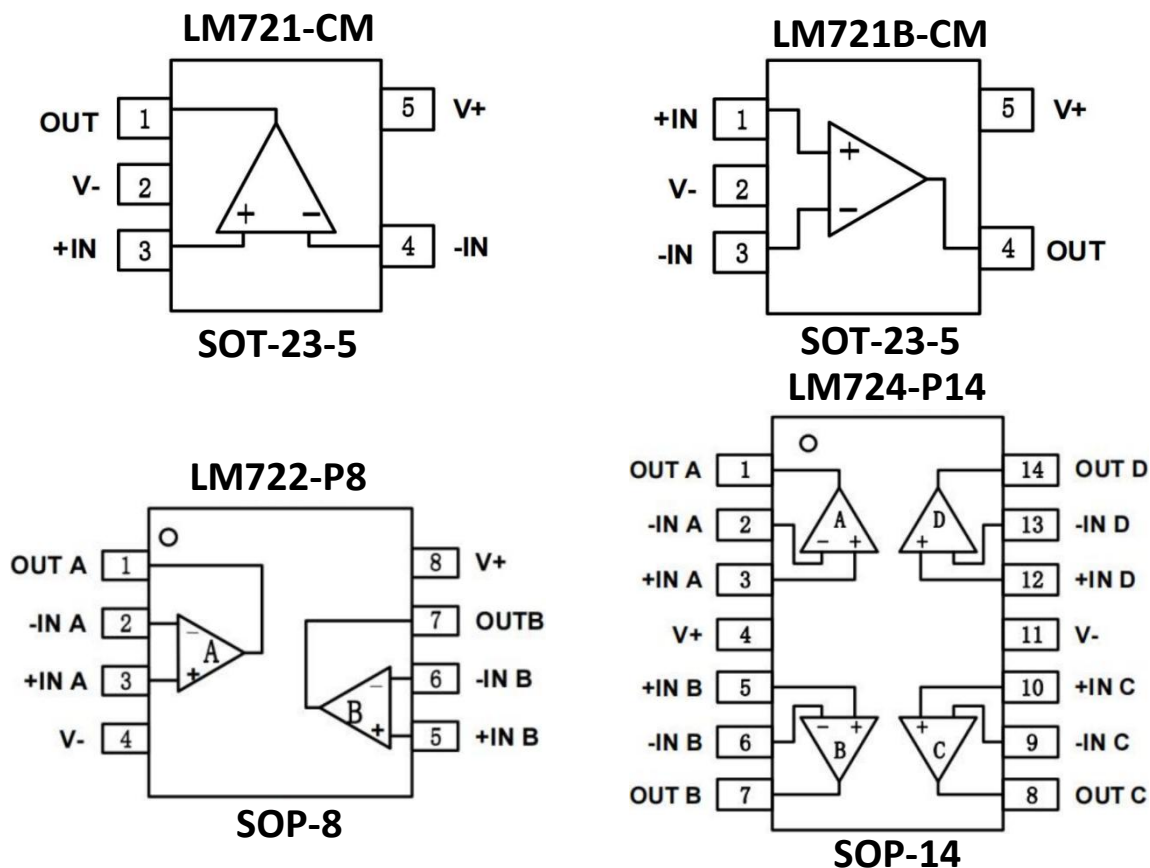
Features

- High gain bandwidth: 10MHz
- Excellent slew rate: 8.5V/us
- Rail-to-rail input and output
- Lower offset voltage: $\pm 3mV$ Max
- Input voltage range: -0.2V to 5.7V with $V_S = 5.5V$
- Supply range: 2.1V to 5.5V
- Operating range: -40°C to 125°C
- Packages: SOT-23-5/SOP-8/SOP-14

Applications

- Sensors
- Active Filters
- Test Equipment
- Driving A/D Converters
- Photodiode Amplification

Pin Configuration





LMV721/LMV722/LMV724

Ordering Information

Type	Marking	Package
LMV721-CM	LMV721	SOT-23-5
LMV721B-CM	-	SOT-23-5
LM722-P8	LMV722	SOP-8
LM724-P14	LMV724	SOP-14

Absolute Maximum Ratings

Over operating free-air temperature range(unless otherwise noted)⁽¹⁾

Parameter	Symbol	Min	Max	Unit
Supply Voltage, $V_S = (V+) - (V-)$	V_S		7	V
Signal Input Voltage ⁽²⁾	V_{IN}	(V-)-0.5	(V+)+0.5	V
Signal Output Voltage ⁽³⁾	V_{OUT}	(V-)-0.5	(V+)+0.5	V
Signal Input Current	I_{IN}	-10	10	mA
Signal Output Current	I_{OUT}	-150	150	mA
Maximum Junction Temperature	T_J		150	°C
Storage Temperature Range	T_{STG}	-65	150	°C

Note 1: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

Note 2: Input terminals are diode-clamped to the power-supply rails. Input signals that can swing more than 0.5V beyond the supply rails should be current-limited to 10mA or less.

Note 3: Output terminals are diode-clamped to the power-supply rails. Output signals that can swing more than 0.5V beyond the supply rails should be current-limited to ± 150 mA or less.

ESD Ratings

Parameter		Symbol	Value	Unit
Electrostatic Discharge	Human-body model (HBM)	$V_{(ESD)}$	± 4500	V

Recommended Operating Conditions

Over operating free-air temperature range(unless otherwise noted)

Parameter		Symbol	Min	Typ	Max	Unit
Supply Voltage, $V_S = (V+) - (V-)$	Signal-supply	V_S	2.1		5.5	V
	Dual-supply		1.05		2.75	V
Operating Temperature Range		T_A	-40	25	125	°C



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Electrical Characteristics($T_A=25^{\circ}\text{C}$ $V_{CC}=2.7\text{V}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Power Supply						
Operating Voltage Range	V _S		2.1		5.5	V
Quiescent Current/Amplifier	I _Q	V _S =5V,IN+=V-,IN-=OUT		0.4		mA
Power-Supply Rejection Ration	PSRR	V _S =2.5V~5.5V,V _{CM} =(V-)+0.5V	75			dB
Turn-on Time	t _{ON}			12		μs
Input						
Input Offset Voltage	V _{OS}	V _{CM} =V _S /2,LMV721	-3	±0.2	3	mV
		V _{CM} =V _S /2,LMV722	-3	±0.2	3	
		V _{CM} =V _S /2,LMV724	-3	±0.3	3	
Input Offset Voltage Average Drift	ΔV _{OS}	T _A =-40°C~125°C		±2.6		μV/°C
Input Bias Current	I _B		-10	±1	10	pA
Input Offset Current	I _{OS}		-10	±1	10	pA
Common-Mode Voltage Range	V _{CM}	V _S =5.5V	-0.2		5.7	V
Common-Mode Rejection Ration	CMRR	V _S =5.5V,V _{CM} =-0.2V~4V	70			dB
		V _S =5.5V,V _{CM} =-0.2V~5.7V	65			
Output						
Open-Loop Voltage Gain	A _{OL}	R _L =2KΩ,V _{OUT} =0.15V~4.85V	86			dB
		R _L =10KΩ,V _{OUT} =0.05V~4.95V	96			
Output Swing From Rail		R _L =2KΩ		50		mV
		R _L =10KΩ		10		
Output Current Source	I _{OUT}			140		mA
Frequency Response						
Slew Rate	SR			8.5		V/μs
Gain-Bandwidth Product	GBP			10		MHz
Phase Margin	PM			62		°
Setting Time,0.1%	ts			0.5		μs
Overload Recovery Time		V _{IN} *Gain≥V _S		3.2		μs
Noise						
Input Voltage Noise Density	en	f=1KHz		9.5		nV/√Hz
		f=10KHz		6.5		nV/√Hz



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Typical Characteristics

At $T_A=25^{\circ}\text{C}$, $V_S=5\text{V}$, $R_L=10\text{K}\Omega$ connected to $V_S/2$. $V_{\text{OUT}}=V_S/2$, unless otherwise noted.

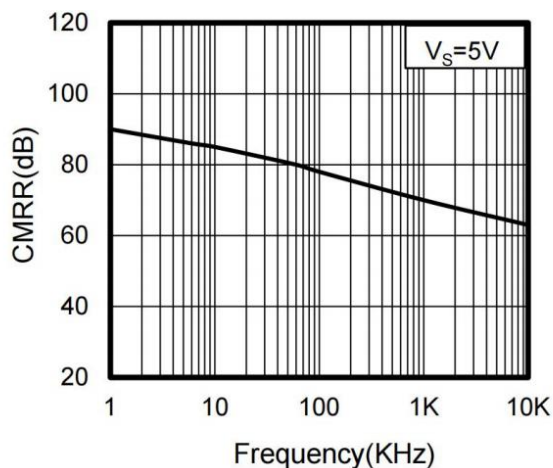


Figure 1. Common-Mode Rejection Ratio vs Frequency

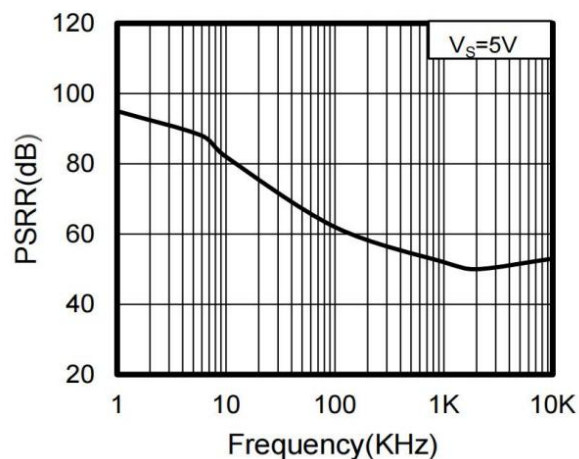


Figure 2. Power-Supply Rejection Ratio vs Frequency

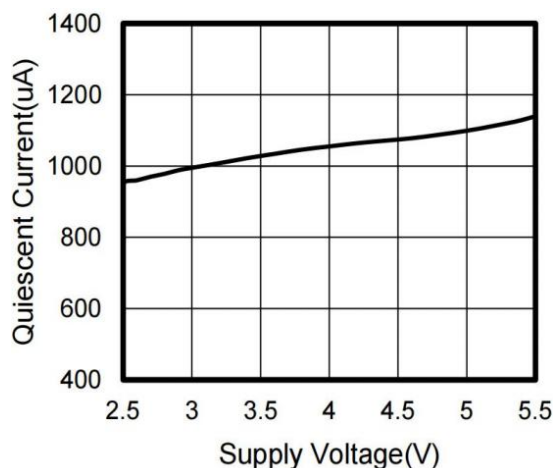


Figure 3. Quiescent Current vs Supply Voltage

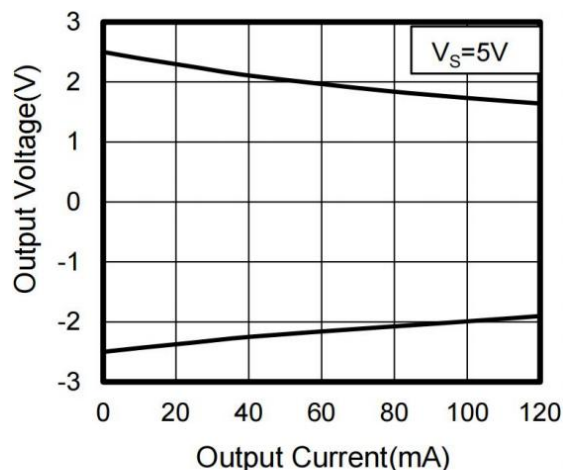


Figure 4. Output Voltage vs Output Current

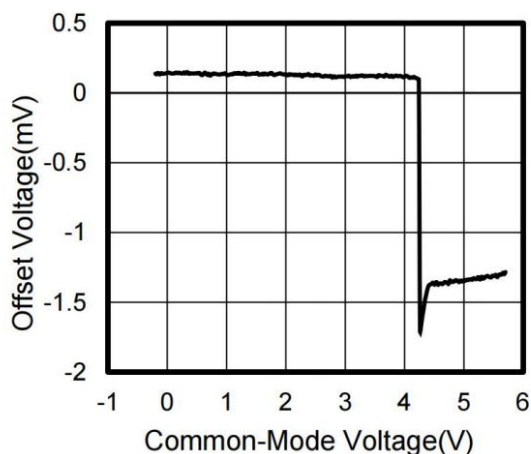


Figure 5. Offset Voltage vs Common-Mode Voltage

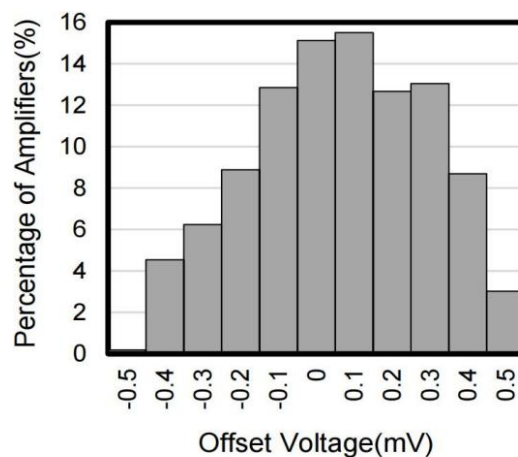
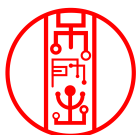


Figure 6. Offset Voltage Production Distribution



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Layout

Layout Guideline

Attention to good layout practices is always recommended. Keep traces short. When possible, use a PCB ground plane with surface-mount components placed as close to the device pins as possible.

Place a 0.1 μ F capacitor closely across the supply pins.

These guidelines should be applied throughout the analog circuit to improve performance and provide benefits such as reducing the EMI susceptibility.

Layout Example

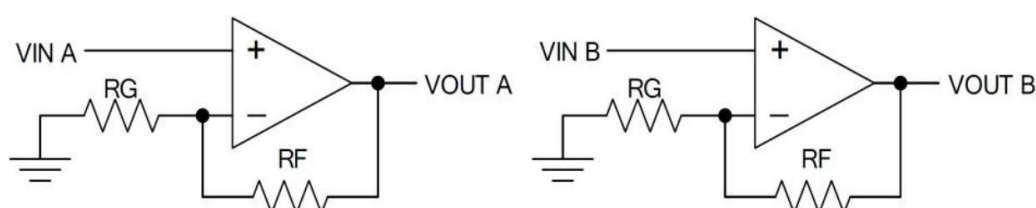


Figure 7. Schematic Representation

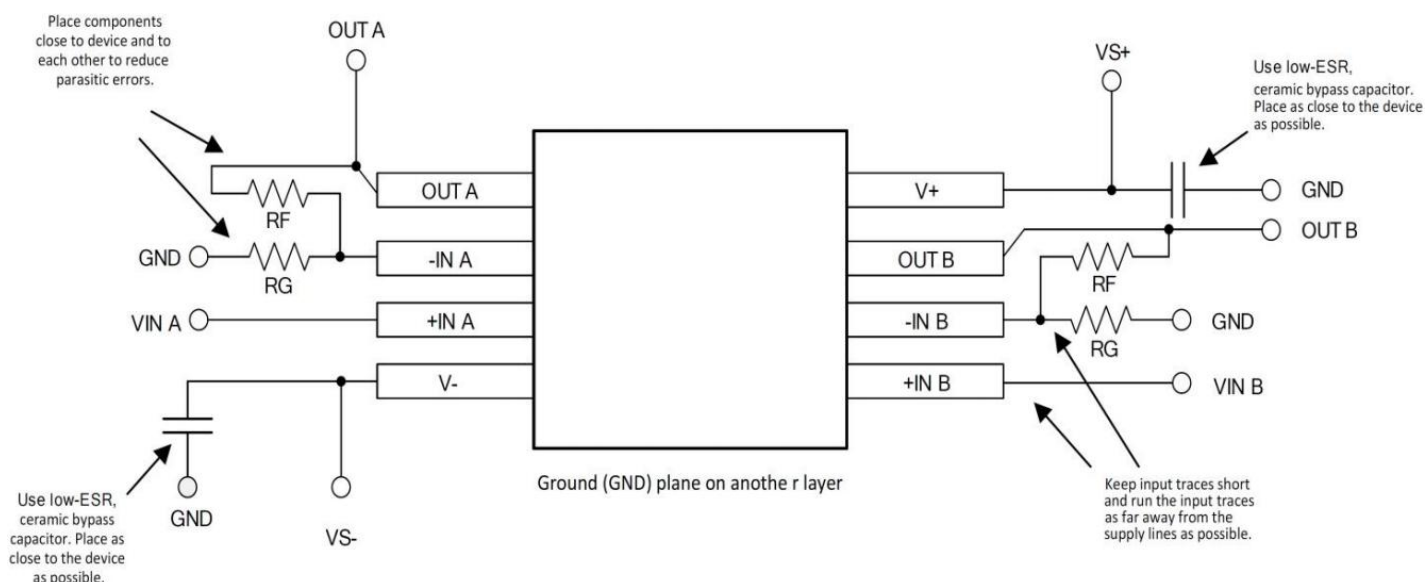


Figure 8. Layout Example

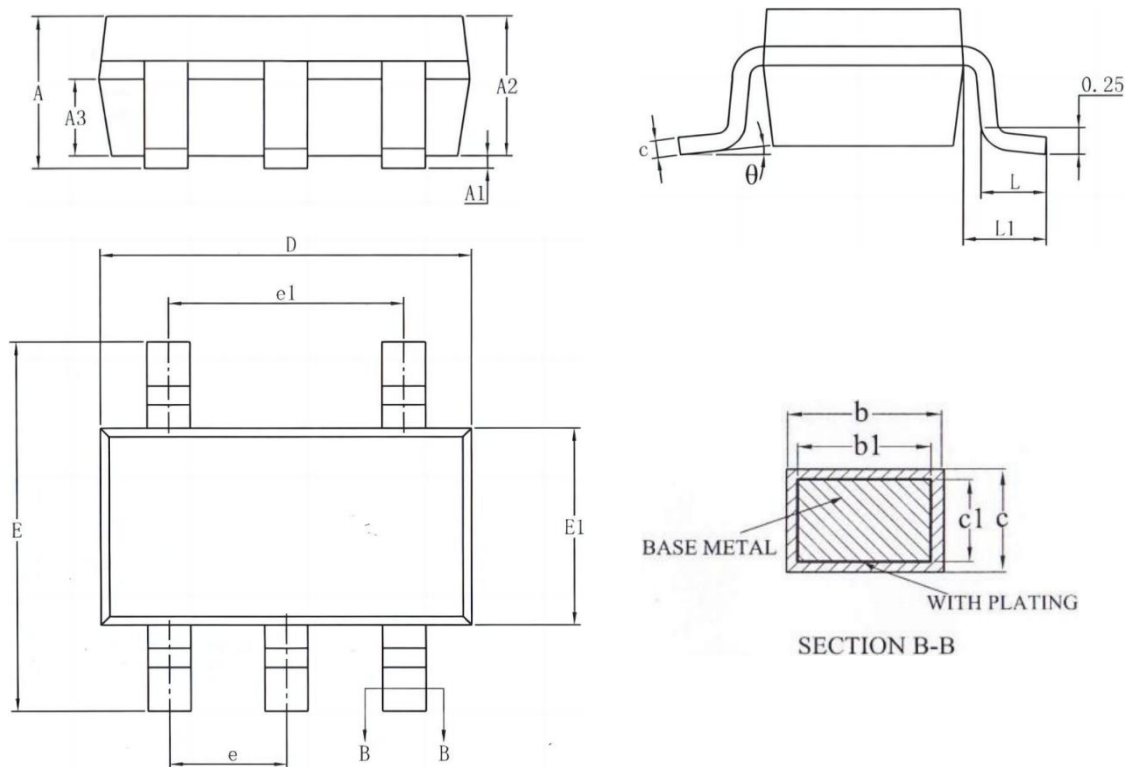


LMV721/LMV722/LMV724

Package Information

SOT-23-5

Dimensions in mm



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	-	-	1.25	D	2.82	2.92	3.02
A1	0.04	-	0.10	E	2.60	2.80	3.00
A2	1.00	1.10	1.20	E1	1.50	1.60	1.70
A3	0.60	0.65	0.70	e	0.95 BSC		
b	0.33	-	0.41	e1	1.90 BSC		
b1	0.32	0.35	0.38	L	0.30	-	0.60
c	0.15	-	0.19	L1	0.60 REF		
c1	0.14	0.15	0.16	θ	0°	-	8°

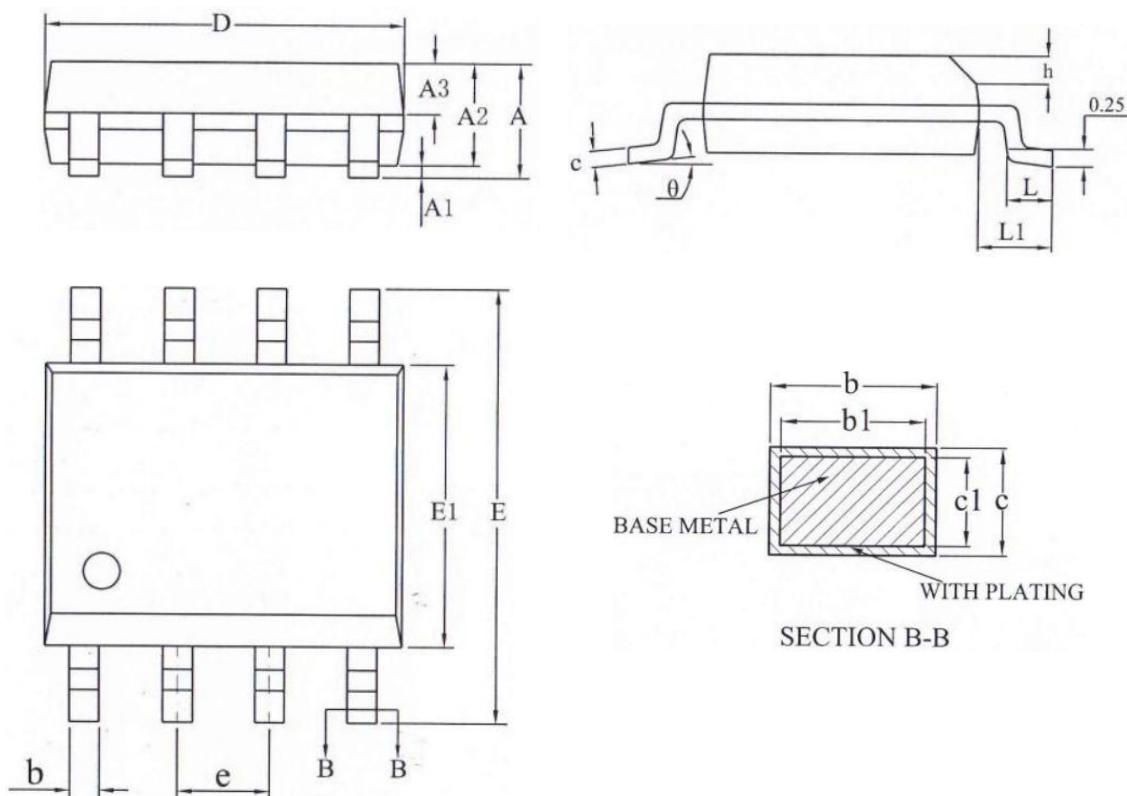


LMV721/LMV722/LMV724

Package Information

SOP-8

Dimensions in mm



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	-	-	1.75	D	4.80	4.90	5.00
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.40	1.50	E1	3.80	3.90	4.00
A3	0.60	0.65	0.70	e	1.27 BSC		
b	0.39	-	0.47	h	0.25	-	0.50
b1	0.38	0.41	0.44	L	0.50	-	0.80
c	0.20	-	0.24	L1	1.05 REF		
c1	0.19	0.20	0.21	θ	0°	-	8°

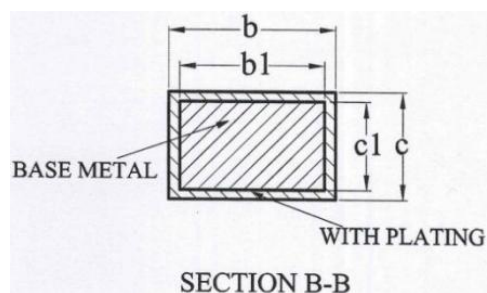
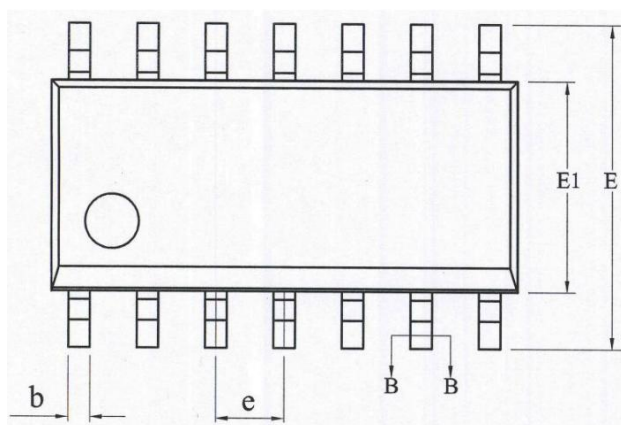
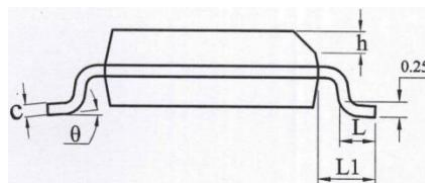
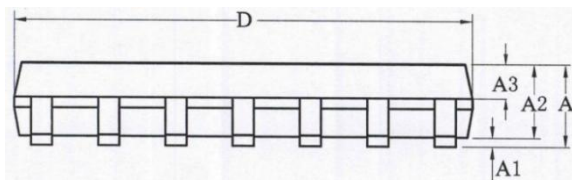


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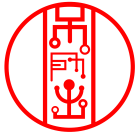
Package Information

SOP-14

Dimensions in mm



Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Nom	Max		Min	Nom	Max
A	-	-	1.75	D	8.55	8.65	8.75
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.40	1.50	E1	3.80	3.90	4.00
A3	0.60	0.65	0.70	e	1.27 (BSC)		
b	0.39	-	0.47	h	0.25	-	0.50
b1	0.38	0.41	0.44	L	0.50	-	0.80
c	0.20	-	0.24	L1	1.05 (REF)		
c1	0.19	0.20	0.21	θ	0°	-	8°



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