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 Vs = 5V, VCM = Vs/2.

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

FEATURES

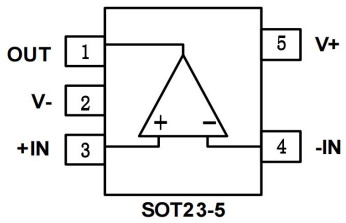
- HIGH GAIN BANDWIDTH: 10MHz
- EXCELLENT SLEW RATE: 8.5V/us
- RAIL-TO-RAIL INPUT AND OUTPUT
- LOWER OFFSET VOLTAGE: ±3mV Max
- INPUT VOLTAGE RANGE: -0.2V to +5.7V with Vs = 5.5V
- SUPPLY RANGE: +2.1V to +5.5V
- OPERATING RANGE: -40℃ TO +125℃
- Micro SIZE PACKAGES: SOT23-5

APPLICATIONS

- SENSORS
- ACTIVE FILTERS
- TEST EQUIPMENT
- DRIVING A/D CONVERTERS
- PHOTODIODE AMPLIFICATION

Pin Configuration

LMV721



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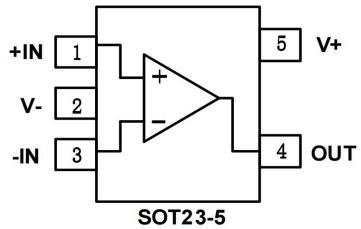
LMV721B



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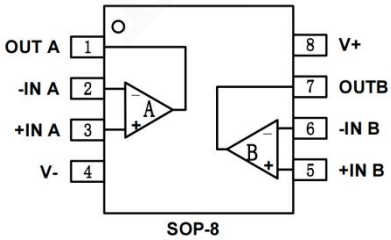
LMV722



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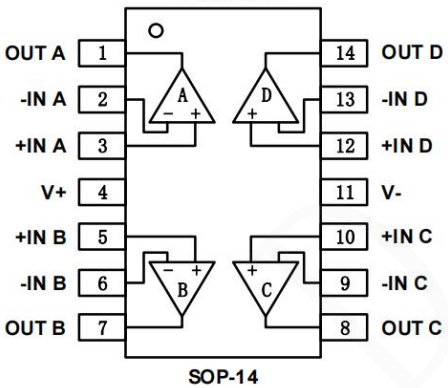
LMV724



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Absolute Maximum Ratings

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

PARAMETER	MIN	MAX	UNIT
Supply Voltage, Vs=(V+) - (V-)		7	V
Signal Input Voltage(2)	(V-)-0.5	(V+)+0.5	V
Signal Output Voltage(3)	(V-)-0.5	(V+)+0.5	V
Signal Input Current	-10	+10	mA
Signal Output Current	-150	+150	mA
Maximum Junction Temperature		+150	℃
Storage Temperature Range	-65	+150	℃

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 ±150mA or less.

ESD Ratings

SYMBOL	PARAMETER		VALUE	UNIT
V(ESD)	Electrostatic discharge	Human-body model (HBM)	±4500	V

Recommended Operating Conditions

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

PARAMETER		MIN	TYP	MAX	UNIT
Supply Voltage, Vs=(V+) - (V-)	Signal-supply	2.1		5.5	V
	Dual-supply	1.05		2.75	V
Operating Temperature Range		-40	+25	+125	℃

ELECTRICAL CHARACTERISTICS

(At TA=+25℃, Vs=5V, RL=10kΩ connected to VS/2, and VOUT=VS/2, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	LMV721, LMV722, LMV724			
			MIN	TYP	MAX	UNIT
POWER SUPPLY						
Operating Voltage Range	V_S		2.1		5.5	V
Quiescent Current/Amplifier	I_Q	Vs=5V, IN+=V-, IN-=OUT		0.4		mA
Power-Supply Rejection Ratio	PSRR	Vs=2.5V to 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	mV
		V_{CM}= V_S/2, LMV724	-3	±0.3	+3	mV
Input Offset Voltage Average Drift	V_{OS} TC	T_A=-40℃~+125℃		±2.6		uV/℃
Input Bias Current	I_B		-10	±1	+10	pA
Input Offset Current	I_{OS}		-10	±1	+10	pA
Common-Mode Voltage Range	V_{CM}	Vs=5.5V	-0.2		5.7	V
Common-Mode Rejection Ratio	CMRR	Vs= 5.5V, V_{CM}=-0.2V to 4V	70			dB
		Vs= 5.5V, V_{CM}=-0.2V to 5.7V	65			dB
OUTPUT						
Open-Loop Voltage Gain	A_{OL}	R_L=2KΩ, V_O=0.15V to 4.85V	86			dB
		R_L=10KΩ, V_O=0.05V to 4.95V	96			dB
Output Swing From Rail		R_L=2KΩ		50		mV
		R_L=10KΩ		10		mV
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

TYPICAL CHARACTERISTICS

At T_A=+25℃, Vs=5V, RL = 10kΩ connected to V_S/2, V_{OUT}=V_S/2, unless otherwise noted.

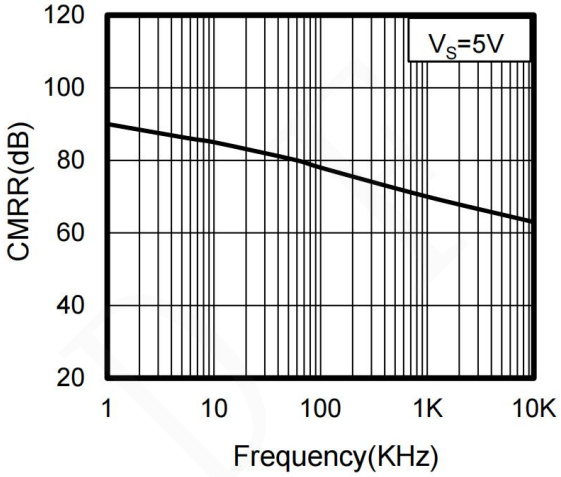


Figure 1. Common-Mode Rejection Ratio vs Frequency

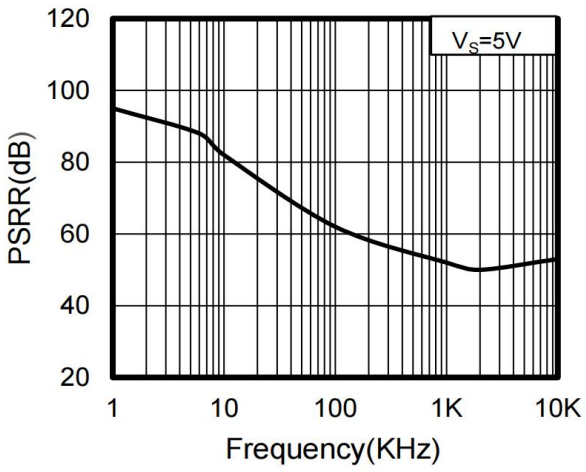


Figure 2. Power-Supply Rejection Ratio vs Frequency

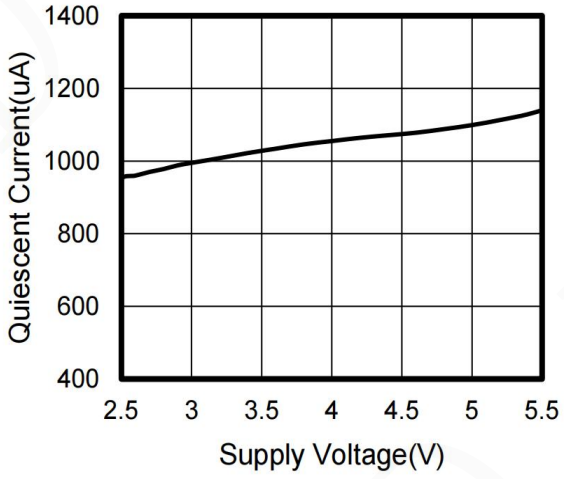


Figure 3. Quiescent Current vs Supply Voltage

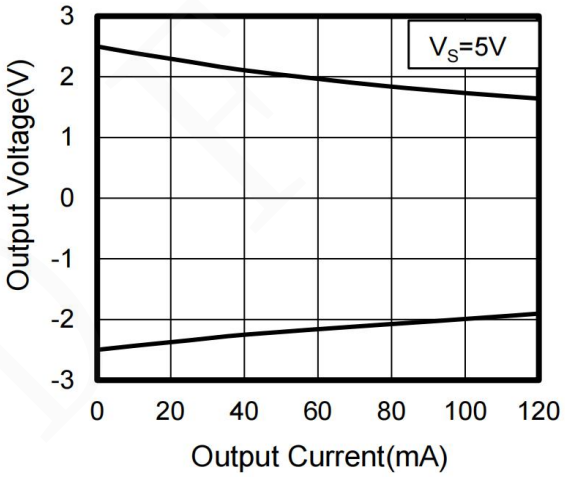


Figure 4. Output Voltage vs Output Current

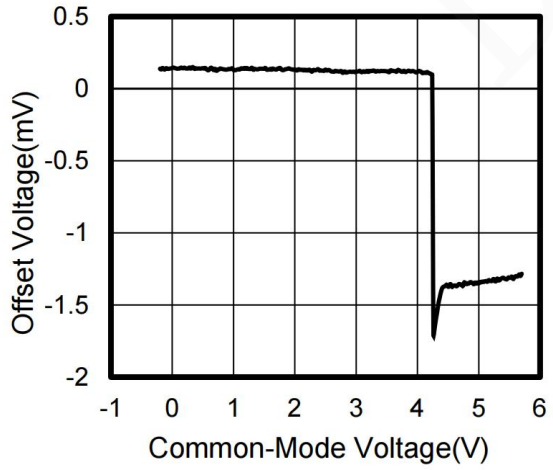


Figure 5. Offset Voltage vs Common-Mode Voltage

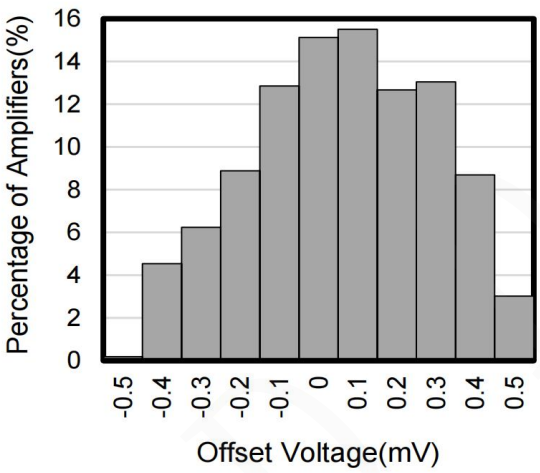


Figure 6. Offset Voltage Production Distribution

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 0.1uF 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

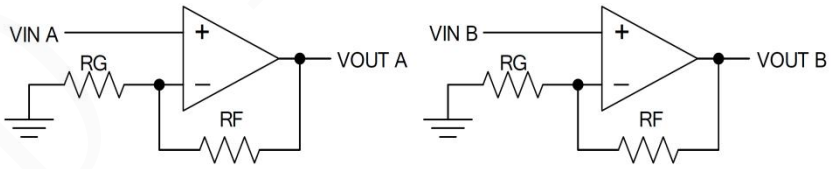


Figure 7. Schematic Representation

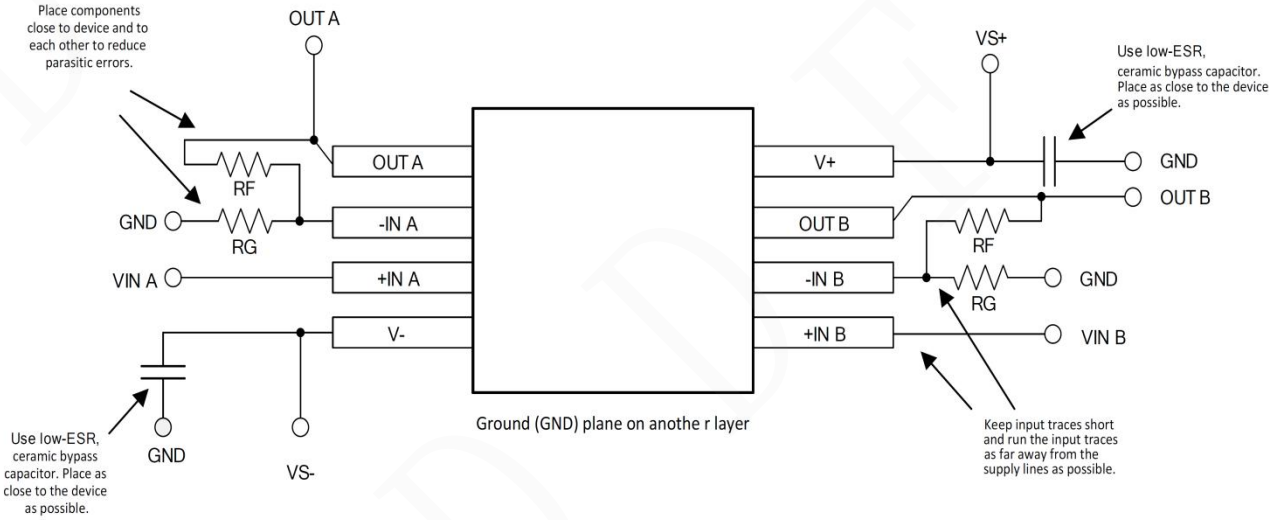
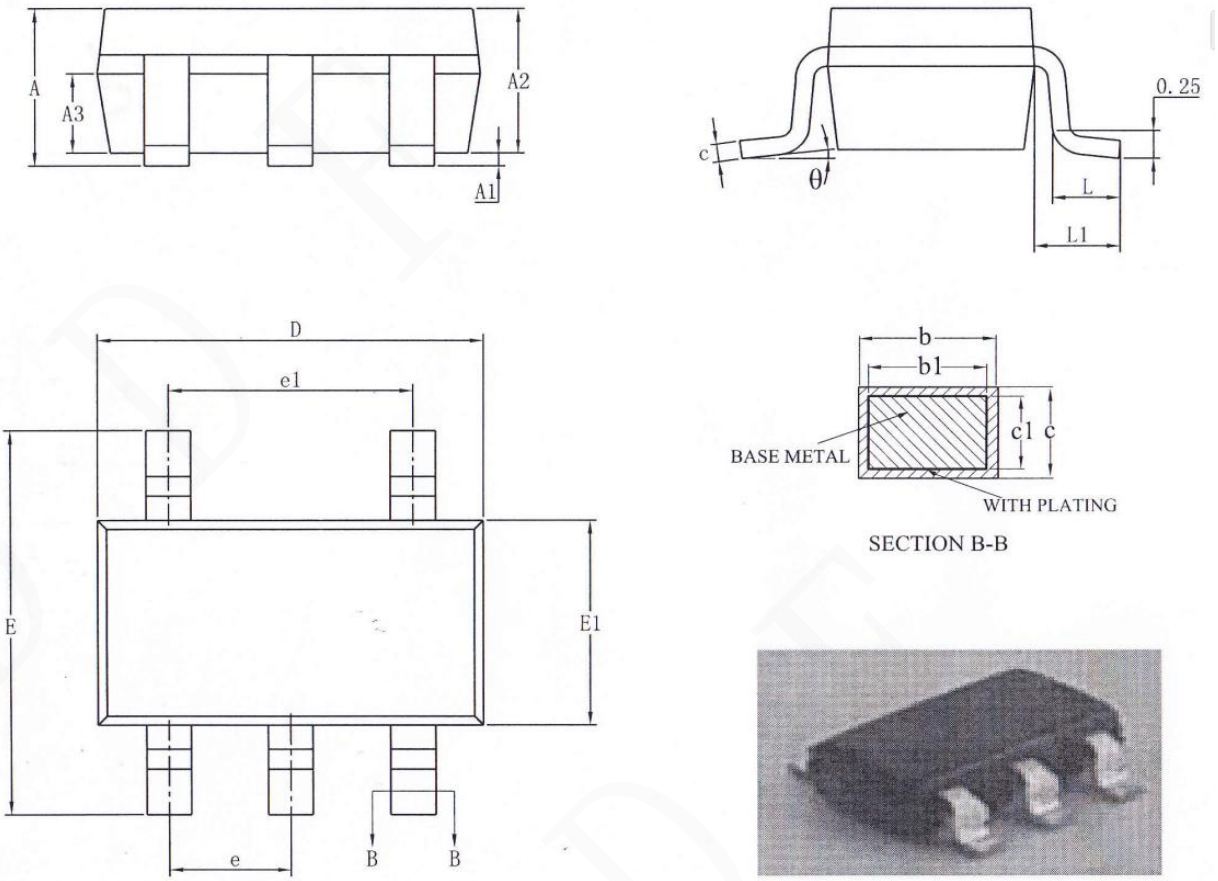


Figure 8. Layout Example

PACKAGE OUTLINE DIMENSIONS

SOT23-5



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.25
A1	0.04	—	0.10
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	—	0.41
b1	0.32	0.35	0.38
C	0.15	—	0.19
c1	0.14	0.15	0.16
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
e1	1.90BSC		
L	0.30	—	0.60
L1		0.60REF	
θ	0	—	8°

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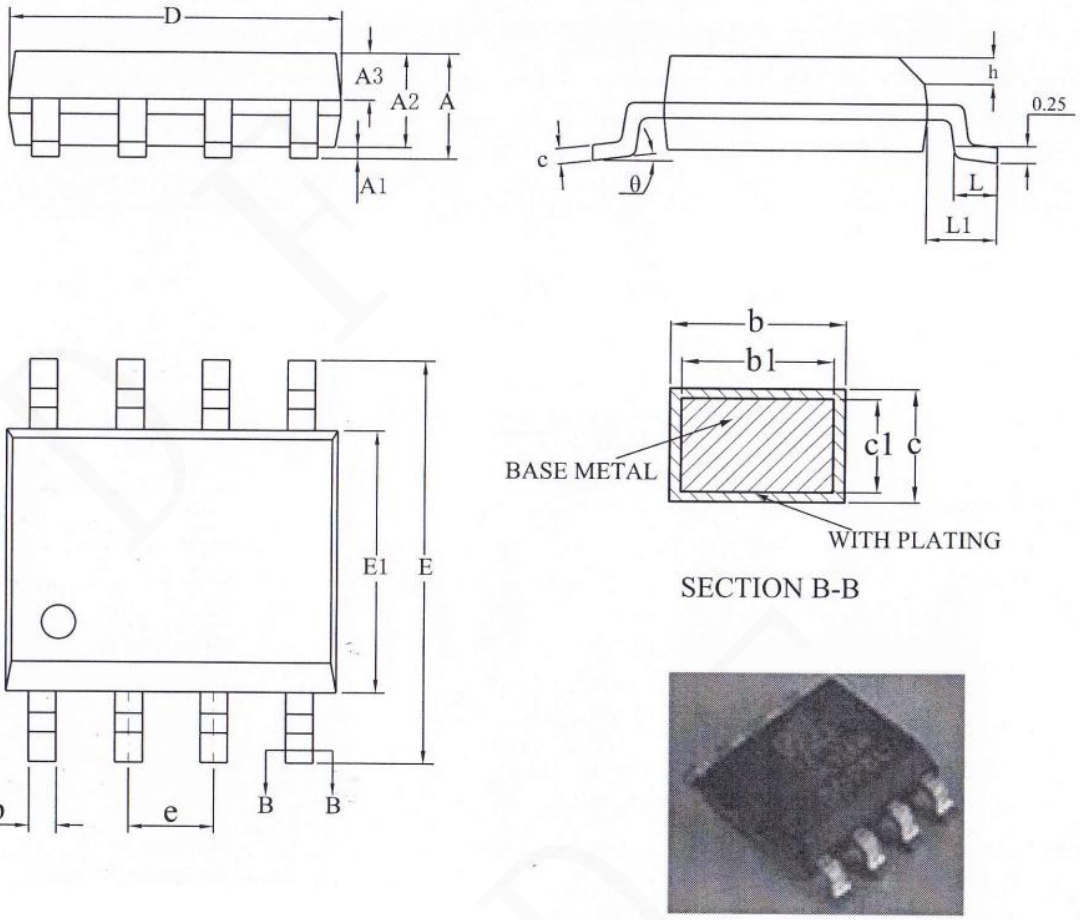
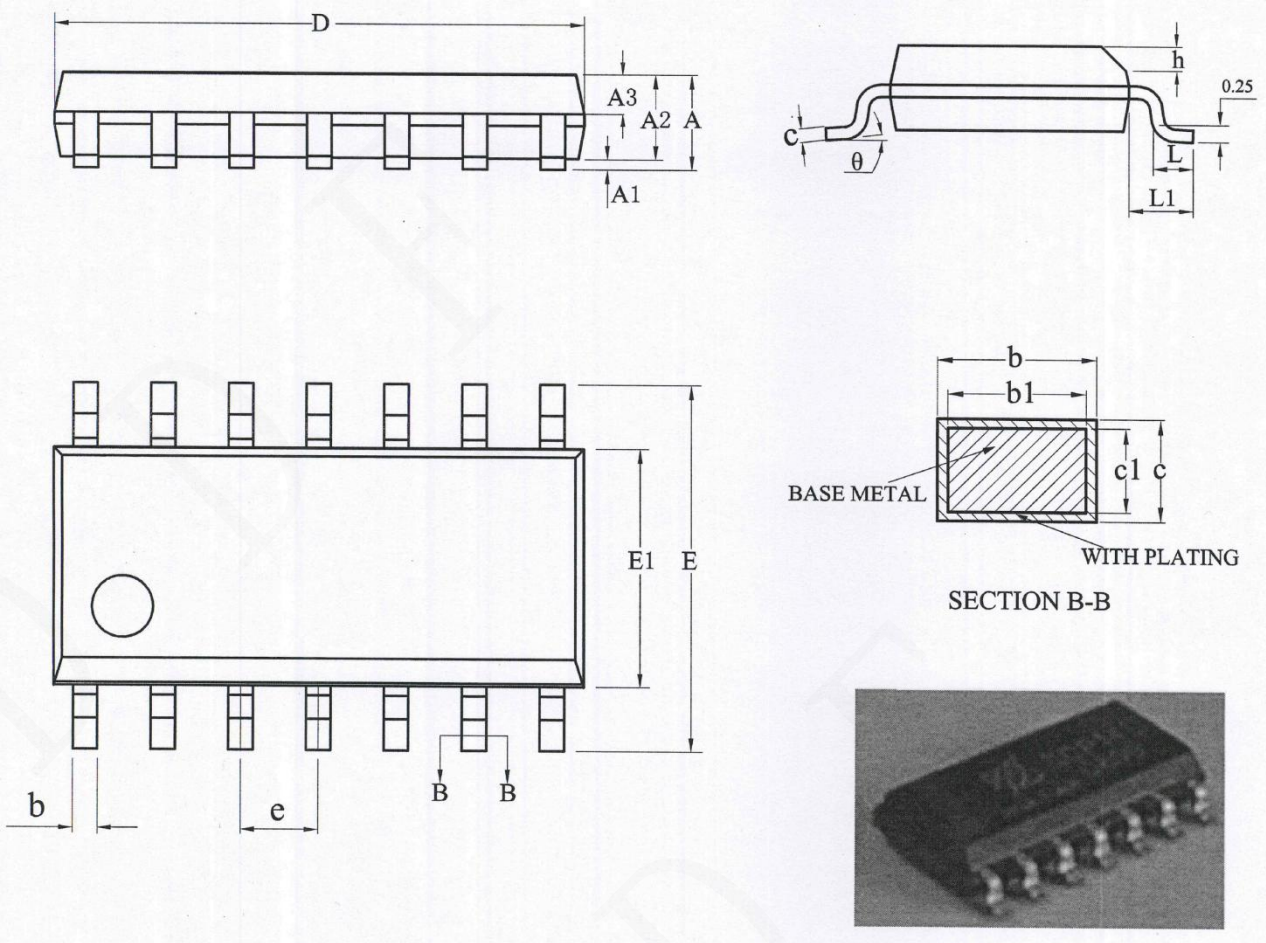


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.47
b1	0.38	0.41	0.44
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	—	0.5
L	0.50	—	0.8
L1	1.05REF		
θ	0	—	8°

SOP14



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.47
b1	0.38	0.41	0.44
C	0.20	—	0.24
c1	0.19	0.20	0.21
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
E	1.27BSC		
h	0.25	—	0.5
L	0.50	—	0.8
L1	1.05REF		
θ	0	—	8°