

Product Specification

XBLW LM324B

Quad Operational Amplifier

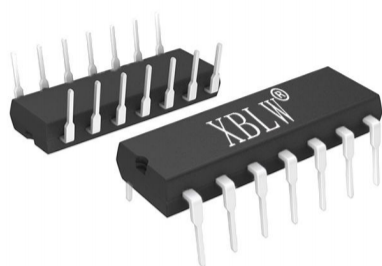
WEB | www.xinboleic.com



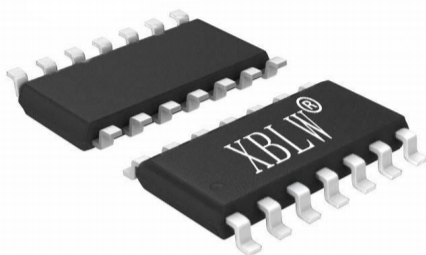
Descriptions

The LM324B consists of four independent, high gain operational amplifiers with frequency compensation implemented internally. It suits for radio recorders and audio systems as tone equalization network and also used in other situations.

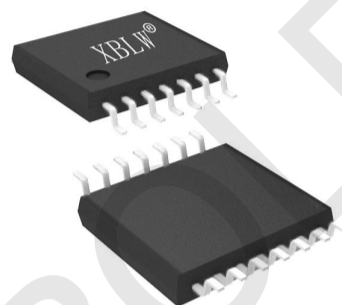
The chip is available in DIP 14 (Power Dissipation : 720mW) and SOP 14 plastic package (Power Dissipation : 400mW).



DIP-14



SOP-14



TSSOP-14

Feature

- No External Phase Compensation Circuit Required
- Supply Voltage Range:
Single Power Supply: $V_{CC}=3\sim 32V$
Dual Power Supply: $V_{CC} = \pm 1.5V \sim 16V$
- Low Power Consumption: $I_{CC} = 0.6mA$ (typical) ($R_L = \infty$)
- Input Voltage Range Close To Ground Level

Applications

- Transducer Amplifiers
- DC Gain Blocks
- Conventional Op Amp Circuits

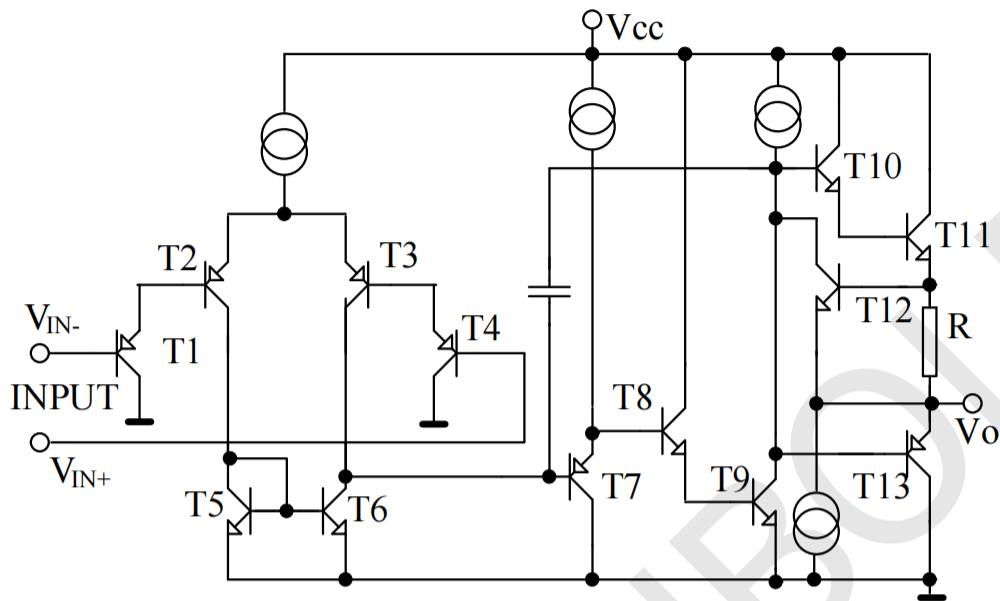
Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW LM324BN	DIP-14	LM324BN	Tube	1000pcs/Box
XBLW LM324BDTR	SOP-14	LM324B	Tape	2500pcs/Reel
XBLW LM324BTDTR	TSSOP-14	LM324BT	Tape	3000pcs/Reel

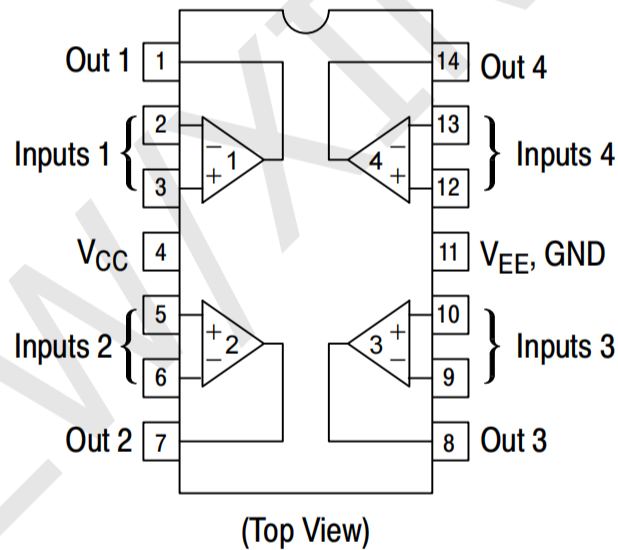
Principle Introduction

LM324B is composed of four identical operational amplifiers. The unit circuit is shown in the figure. Its working principle is briefly described as follows: The input signal is added to the base of T1 and T4, and after differential amplification; T8 and T9 form the intermediate stage in compound amplification; the output stage is composed of T10 ~ T13. Among them, T12 is a protection tube. When the output current is too large, the voltage drop on R increases, causing T12 to saturate conducting, and the collector potential of T12 decreases to nearly $1/2 V_{CC}$, so that the push-pull tubes T10, T11 and T13 are cut off, thereby playing a protective role. Capacitor C is a phase compensation capacitor.

Circuit Diagram



Pin Connections



Pins Configuration

NO.	Function	Symbol	NO.	Function	Symbol
1	Output 1	OUT 1	8	Output 3	OUT 3
2	Reverse Input 1	IN - (1)	9	Reverse Input 3	IN - (3)
3	Forward Input 2	IN+ (2)	10	Positive Input 3	IN+ (3)
4	Power Supply	VCC	11	Ground	GND
5	Forward Input 2	IN+ (2)	12	Positive Input 4	IN+ (4)
6	Reverse Input 2	IN - (1)	13	Reverse Input 4	IN - (4)
7	Output 2	OUT 2	14	Output 4	OUT 4

Absolute Maximum Ratings

TA=25°C, unless otherwise noted

Parameter Name	Symbol	Test conditions	Rating	Unit
Power Supply	V _{CC}		32	V
Differential Input Voltage	V _{ID}		32	V
Maximum Input Voltage	V _{IN}		-0.3 ~ 32	V
Allowable Power Dissipation	P _D	DIP SOP	720 400	mW
Operating Temperature	T _{opr}		0 ~ +70	°C
Storage Temperature	T _{stg}		-55 ~ +125	°C

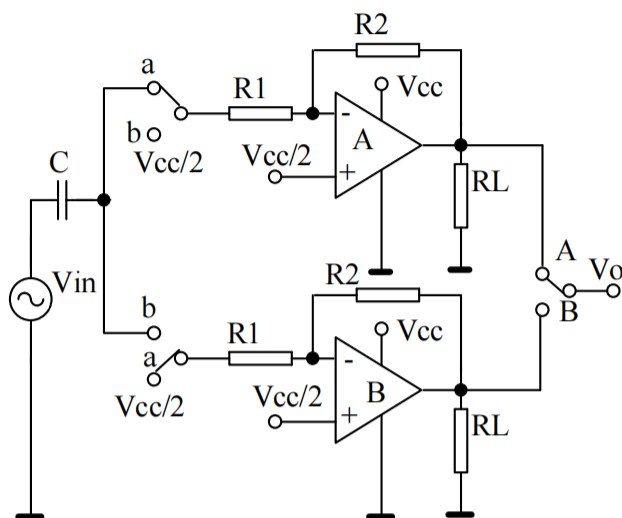
ELECTRICAL CHARACTERISTICS

Unless otherwise noted, T_{amb} = 25°C, V_{CC} = 5.0V

Parameters	Symbol	Test conditions	Min.	TYP.	Max.	Unit
Input Offset Voltage	V _{IO}			±2	±5	mV
Input Offset Current	I _{IO}	I _{in} (+) / I _{in} (-)		±5	±50	nA
Input Bias Current	I _{BA}			45	250	nA
Input Common Mode Voltage Range	V _{ICM}		0		V _{CC} - 1.5	V
Common Mode Rejection Ratio	K _{CMR}		65	80		dB
Strong Signal Voltage Gain	G _V	V _{CC} = 1.5V, R _L ≥ 2KΩ	25	100		V / mA
Output Voltage Range	V _O		0		V _{CC} - 1.5	V
Power Supply Ripple Rejection Ratio	P _{SRR}		65	100		dB
Channel Separation	C _S	f = 1 kHz ~ 20 kHz		120		dB
Current Consumption (1)	I _{CC}			0.6	2	mA
Current Consumption (2)	I _{CC}	V _{CC} = 2.0V		1.5	3	mA
Output Current (1)	I _O	V _{in+} = 1V, V _{in-} = 0V	20	40		mA
Output Current (2)	I _O	V _{in+} = 0V, V _{in-} = 1V	10	20		mA

Test Parameter Diagram

Null refers to the Amplifier.



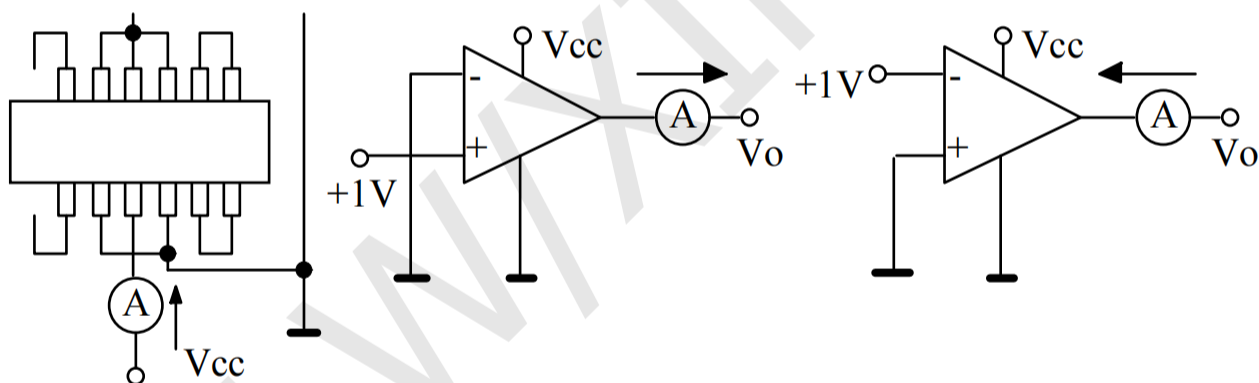
SW: A

$$Cs(A \rightarrow B) = 20 \log(R2 * V_{OA}) / (R1 * V_{OB})$$

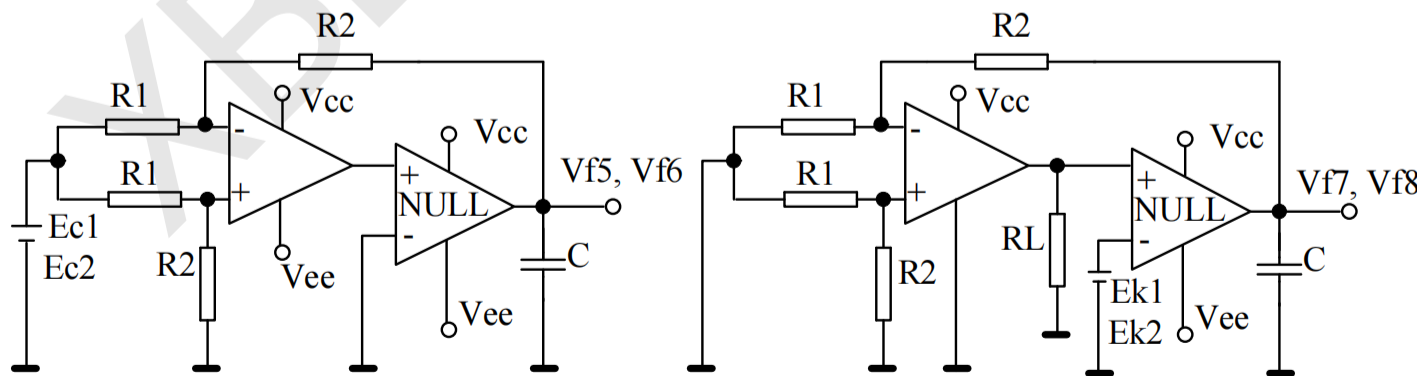
SW: B

$$Cs(B \rightarrow A) = 20 \log(R2 * V_{OB}) / (R1 * V_{OA})$$

Channel separation Cs test diagram



Consumption current Icc and output current Io test diagram

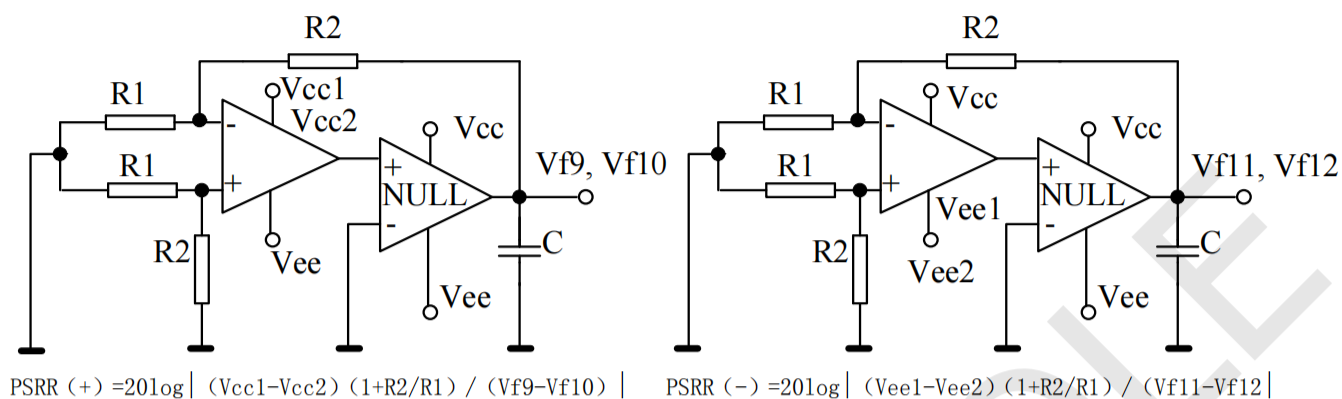


$$CMR = 20 \log \left| \frac{(Ec1 - Ec2) (1 + R2/R1)}{(Vf5 - Vf6)} \right|$$

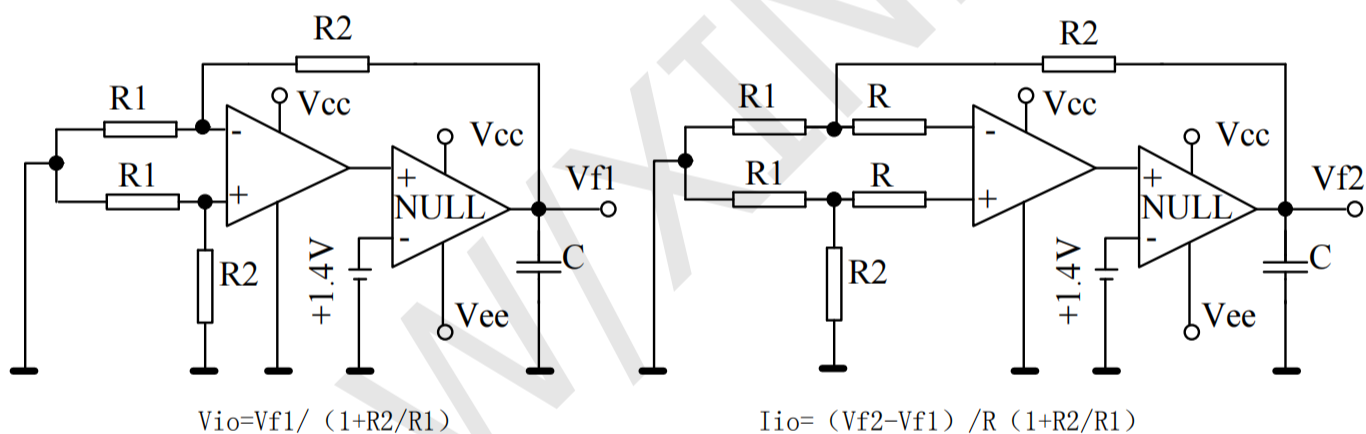
$$Gv = \frac{(Ek1 - Ek2) (1 + R2/R1)}{(Vf8 - Vf7)}$$

Common-mode rejection CMR and common-mode input voltage range VICM test chart

Voltage gain Gv test diagram

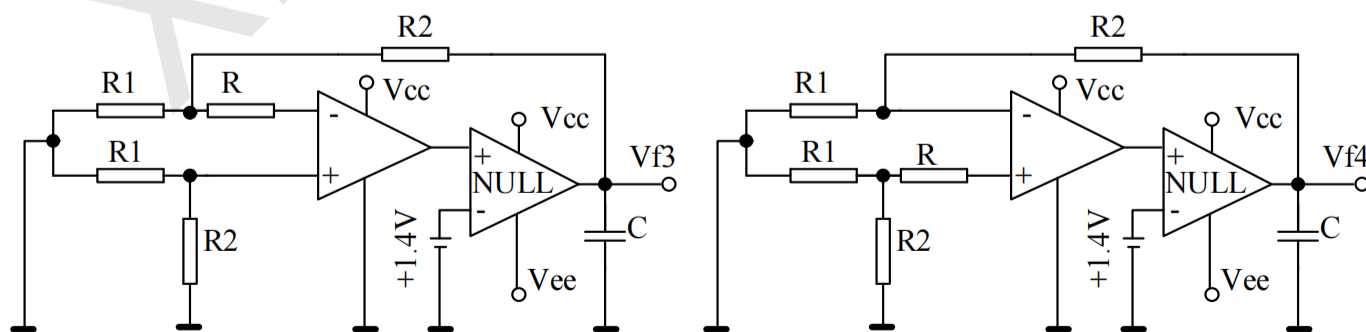


Power ripple rejection ratio PSRR test diagram



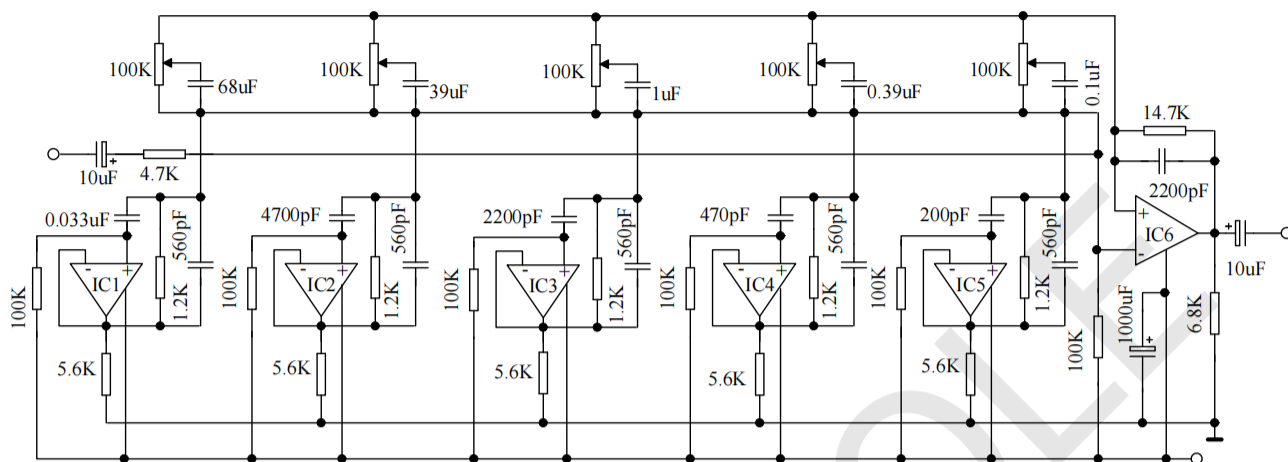
Input offset voltage Vio test diagram

Input offset current Iio test diagram

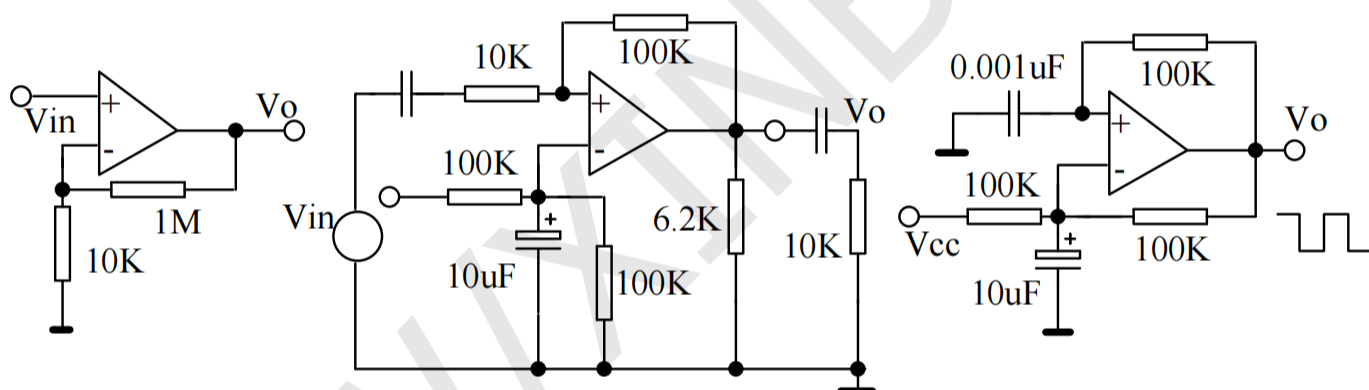


Input bias current IBA test diagram

APPLICATIONS

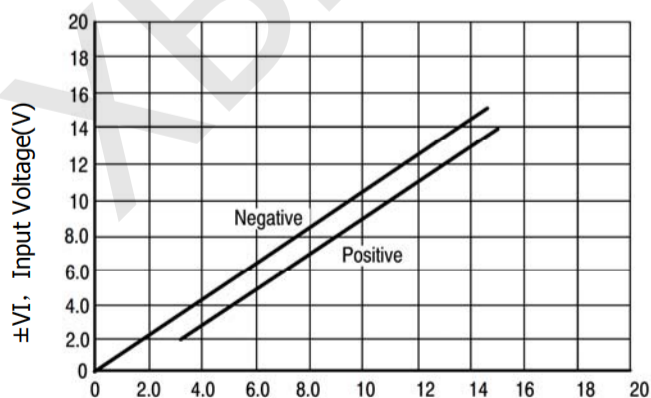


The LM324B is used in five-frequency tone control circuits

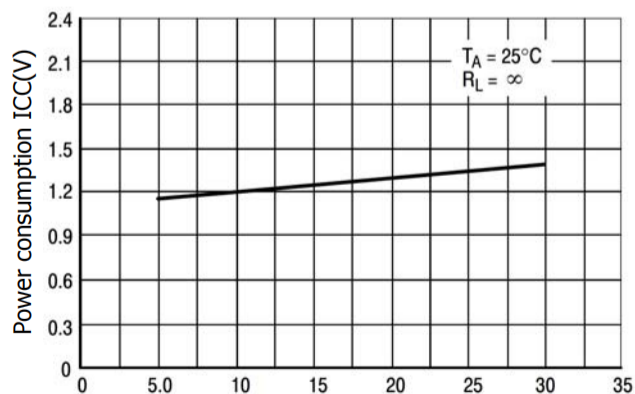


Other applications of LM324B

CHARACTERISTIC CURVES



Supply voltage (V)
Input voltage range

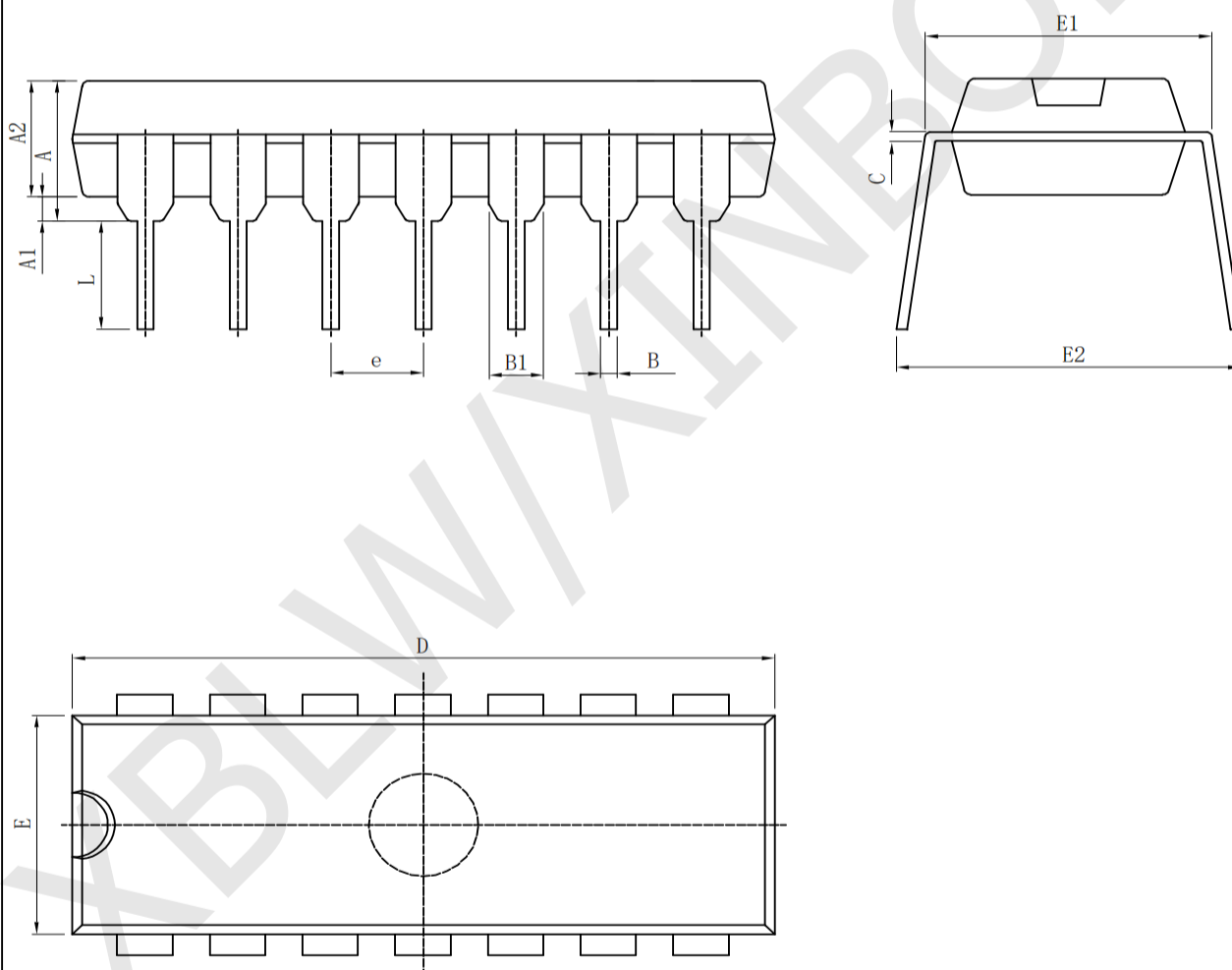


Power supply voltage (V)
Power consumption

Package Information

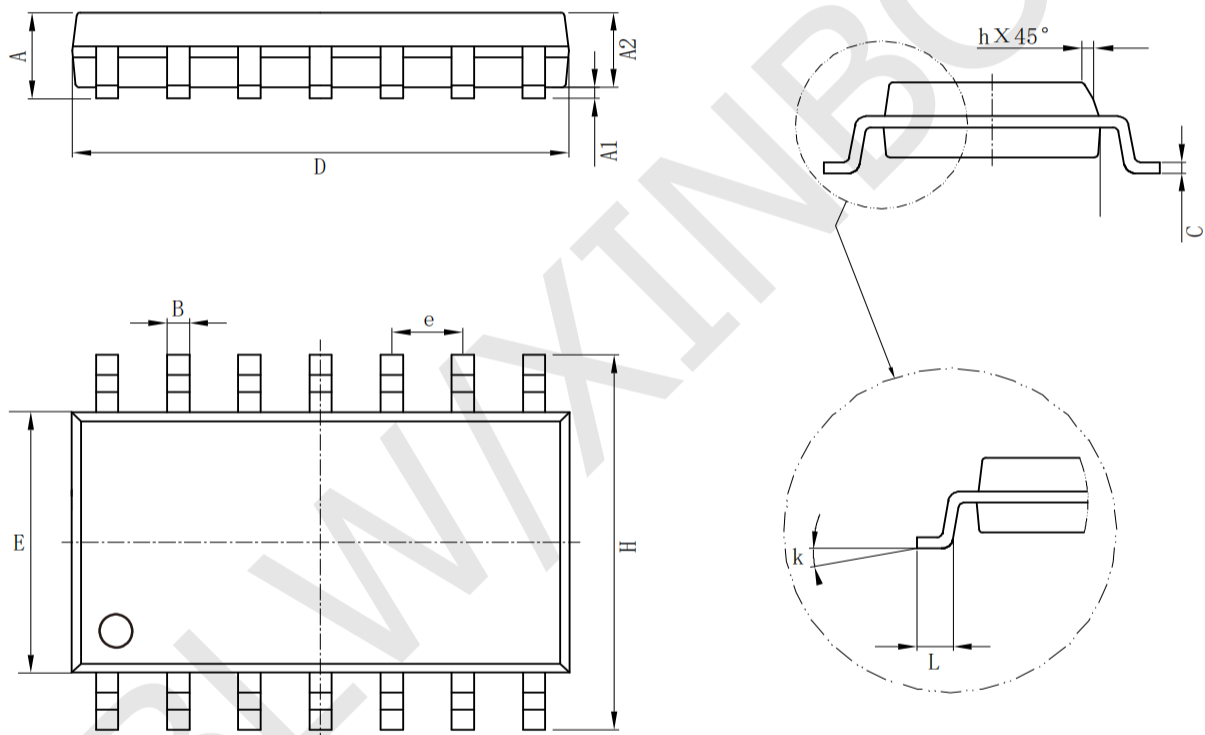
· DIP-14

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A		3.710	4.310	A		0.146	0.170
A1		0.510		A1		0.020	
A2		3.200	3.600	A2		0.126	0.142
B		0.380	0.570	B		0.015	0.022
B1		1.524 (BSC)		B1		0.060 (BSC)	
C		0.204	0.360	C		0.008	0.014
D		18.800	19.200	D		0.740	0.756
E		6.200	6.600	E		0.244	0.260
E1		7.320	7.920	E1		0.288	0.312
e		2.540 (BSC)		e		0.100 (BSC)	
L		3.000	3.600	L		0.118	0.142
E2		8.400	9.000	E2		0.331	0.354



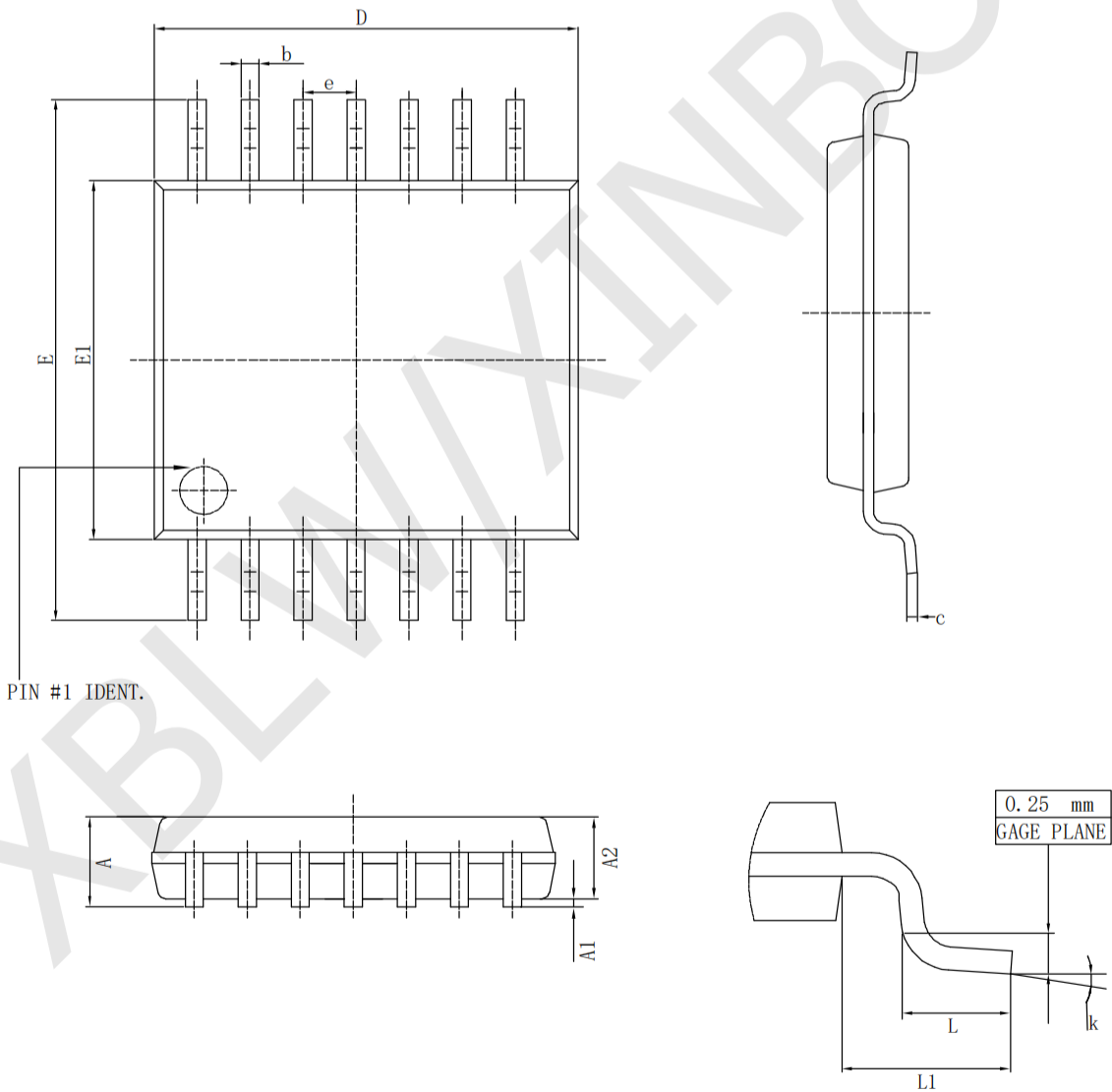
· SOP-14

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min(mm)	Max(mm)			Min(in)	Max(in)
A		1.350	1.750	A		0.050	0.068
A1		0.100	0.250	A1		0.004	0.009
A2		1.100	1.650	A2		0.040	0.060
B		0.330	0.510	B		0.010	0.020
C		0.190	0.250	C		0.007	0.009
D		8.550	8.750	D		0.330	0.340
E		3.800	4.000	E		0.150	0.150
e		1.27		e		0.05	
H		5.800	6.200	H		0.220	0.240
h		0.250	0.500	h		0.009	0.020
L		0.400	1.270	L		0.015	0.050
k		8° (max)		k		8° (max)	



· TSSOP-14

Symbol	Size	Dimensions In Millimeters		Symbol	Size	Dimensions In Inches	
		Min (mm)	Max (mm)			Min (in)	Max (in)
A			1.200	A			0.047
A1		0.050	0.150	A1		0.002	0.006
A2		0.800	1.050	A2		0.031	0.041
b		0.190	0.300	b		0.007	0.012
c		0.090	0.200	c		0.004	0.0089
D		4.900	5.100	D		0.193	0.201
E		6.200	6.600	E		0.244	0.260
E1		4.300	4.500	E1		0.169	0.176
e		0.65		e		0.0256	
L		0.450	0.750	L		0.018	0.030
L1		1.00		L1		0.039	
k		0°	8°	k		0°	8°



Statement:

- XBLW reserves the right to modify the product manual without prior notice! Before placing an order, customers need to confirm whether the obtained information is the latest version and verify the completeness of the relevant information.
- Any semi-guide product is subject to failure or malfunction under specified conditions. It is the buyer's responsibility to comply with safety standards when using XBLW products for system design and whole machine manufacturing. And take the appropriate safety measures to avoid the potential in the risk of loss of personal injury or loss of property situation!
- XBLW products have not been licensed for life support, military, and aerospace applications, and therefore XBLW is not responsible for any consequences arising from the use of this product in these areas.
- If any or all XBLW products (including technical data, services) described or contained in this document are subject to any applicable local export control laws and regulations, they may not be exported without an export license from the relevant authorities in accordance with such laws.
- The specifications of any and all XBLW products described or contained in this document specify the performance, characteristics, and functionality of said products in their standalone state, but do not guarantee the performance, characteristics, and functionality of said products installed in Customer's products or equipment. In order to verify symptoms and conditions that cannot be evaluated in a standalone device, the Customer should ultimately evaluate and test the device installed in the Customer's product device.
- XBLW documentation is only allowed to be copied without any alteration of the content and with the relevant authorization. XBLW assumes no responsibility or liability for altered documents.
- XBLW is committed to becoming the preferred semiconductor brand for customers, and XBLW will strive to provide customers with better performance and better quality products.