

芯伯乐®  
X I N B O L E

# Product Specification

XBLW REF31XX

15ppm/°C Maximum, SOT-23 Series Voltage Reference

WEB | [www.xinboleic.com](http://www.xinboleic.com)



## Descriptions

The REF31XX series devices are low temperature drift (20ppm/°C maximum), low-power, high-precision CMOS voltage reference, featuring  $\pm 0.1\%$  initial accuracy, low operating current with power consumption less than 500 $\mu$ A. This device also offers very low output noise of 15  $\mu$ VPP/V, which enables its ability to maintain high signal integrity with high-resolution data converters in noise critical systems.

Packaged in the same SOT23-3 package, Stability and system reliability are further improved by the low output-voltage hysteresis of the device and low long-term output voltage drift.

REF31XX is specified for the wide temperature range of  $-40$  to  $+125$  °C.

## Applications

- Data acquisition (DAQ)
- PLC analog I/O modules
- Field transmitters
- Motor drive control module
- Battery test equipment
- LCR meters

## Features and Benefits

- Voltage options: 1.25V, 1.5V, 2.048V, 2.5V, 3.0V, 3.3V, 4.096V
- Initial accuracy:  $\pm 0.1\%$  (maximum)
- Low temperature coefficient: 20 ppm/°C (maximum)
- Output 1/f noise at 0.1 to 10 Hz: 15  $\mu$ VPP/V
- Supply voltage: 2.7 to 5.5 V
- Power consumption: < 500  $\mu$ A
- Startup time: <400us
- Operating temperature:  $-40$  to  $125$  °C
- Output Current:  $\pm 5$ mA

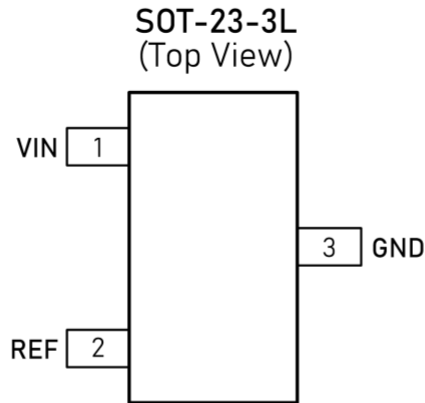


SOT-23-3L

## Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty	Output Voltage
XBLW REF3112AIDBZR	SOT-23-3L	R31A	Tape	3000Pcs/Reel	1.25V
XBLW REF3120AIDBZR	SOT-23-3L	R31B	Tape	3000Pcs/Reel	2.048V
XBLW REF3125AIDBZR	SOT-23-3L	R31C	Tape	3000Pcs/Reel	2.5V
XBLW REF3130AIDBZR	SOT-23-3L	R31E	Tape	3000Pcs/Reel	3.0V
XBLW REF3133AIDBZR	SOT-23-3L	R31F	Tape	3000Pcs/Reel	3.3V
XBLW REF3140AIDBZR	SOT-23-3L	R31D	Tape	3000Pcs/Reel	4.096V

## Pin Configuration



## Pin Description

Pin. Name	Pin Description
VIN	Power supply voltage
GND	Ground.
REF	Reference voltage outputs , an external capacitor is required.

## Absolute Maximum Ratings

In accordance with the Absolute Maximum Rating System (IEC 60134).

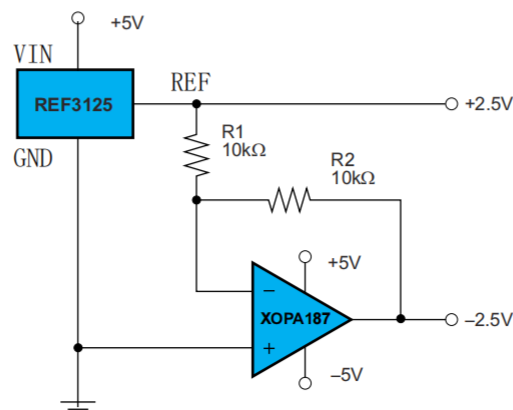
Operating Ambient Temperature Range	-40 to 125 °C
Storage Temperature Range	-50 to 125 °C
Input Voltage Range	-0.3 V to 5.5 V
ESD protection	> 3000 V

*Note: Stresses exceeding those listed in the Maximum Rating table may damage the device. Operation beyond the maximum Rating conditions or under harsh conditions may affect product reliability and function.*

## Recommended Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_{IN}$	Supply input voltage	$V_{OUT}+0.2$		5.5	V
$I_{CC}$	Output current range	-5		5	mA

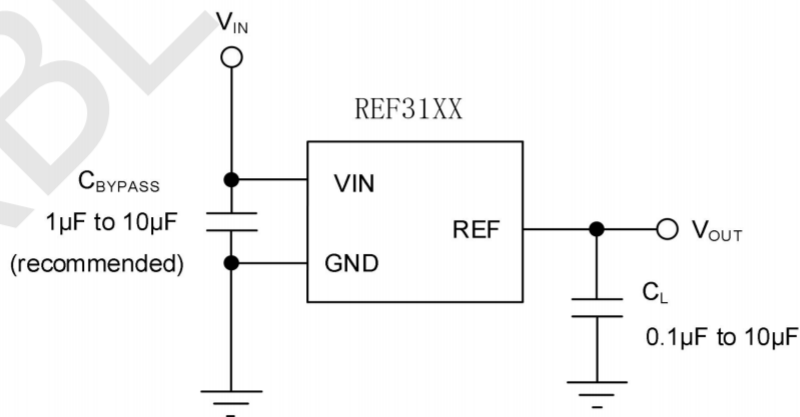
## Typical applications of negative reference voltage



## Electrical Characteristics

Symbol	Parameter	Description	Min.	Typ.	Max.	Unit
$V_{IN}$	Power supply voltage		2.7	5	5.5	V
$I_{CC}$	Power consumption	$V_{CC} = 5.0V$ , no load.		300	500	$\mu A$
$V_{OUT}$	Output voltage	REF3112		1.25		V
		REF3115		1.5		V
		REF3120		2.048		V
		REF3125		2.5		V
		REF3130		3.0		V
		REF3133		3.3		V
		REF3140		4.096		V
$\Delta V_{OUT}$	Output voltage accuracy		-0.1		0.1	%
$V_{noise}$	Output Noise	0.1Hz~10Hz		15		$\mu V_{pp}/V$
$T_C$	Temperature coefficient	-40 to 125 °C			20	ppm/°C
$V_{IN\_V_{OUT}}$	Dropout Voltage			200		mV
$\Delta V_{OUT} / \Delta V_{IN}$	Line Regulation				100	ppm/V
$\Delta V_{OUT} / \Delta I_L$	Load Regulation				50	ppm/mA
dT	Thermal hysteresis			80		ppm
	Long-term stability	0h to 1000h at 25 °C		200		ppm
$I_{SC}$	Short-circuit current	Sourcing and sinking		50		mA
	Capacitive load		0.1		10	$\mu F$
	Turn-on setting time				400	us

## Typical Application



## Layout Guidelines

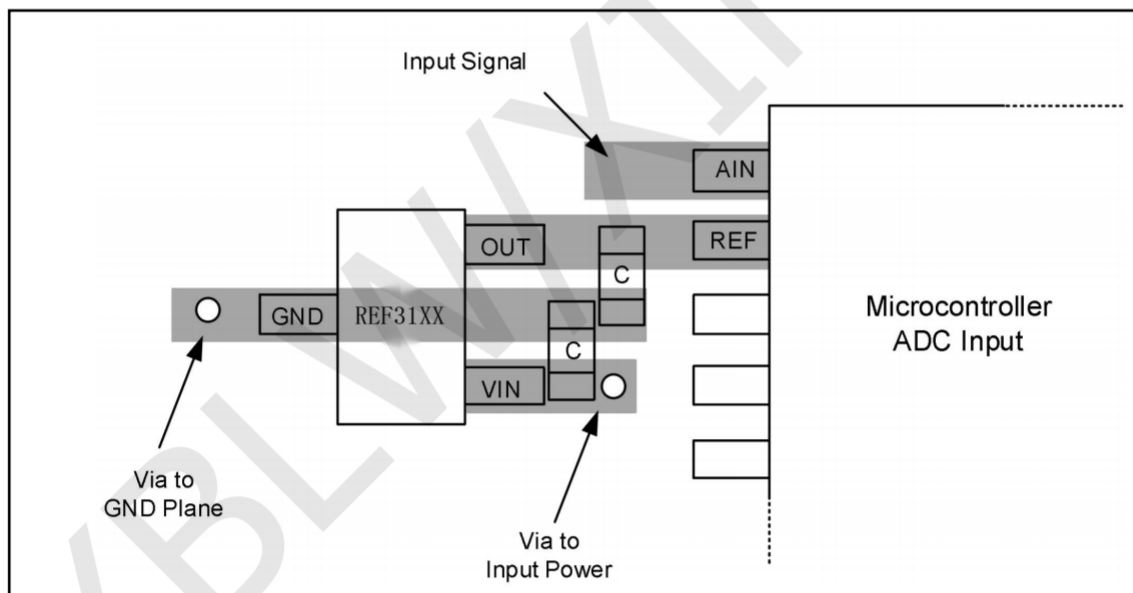
For optimal performance of this design, please follow standard printed circuit board (PCB) layout guidelines, including proper decoupling close to the device and adequate power and ground connections with large copper pours.

As shown below an example of a PCB layout for a data acquisition system using the REF31XX.

Some key considerations are:

- Connect a low-ESR, 1 $\mu$ F ceramic capacitor at the IN pin for bypass, and a 0.1 $\mu$ F to 10 $\mu$ F ceramic capacitor at the OUT pin for stability of the REF31XX.
- Decouple other active devices in the system per the device specifications.
- Use a solid ground plane helps distribute heat and reduces EMI noise pickup.
- Place the external components as close to the device as possible. This configuration prevents parasitic errors (such as the Seebeck effect) from occurring.
- Minimize trace length between the reference and bias connections to the ADC to reduce noise pickup.
- Do not run sensitive analog traces in parallel with digital traces. Avoid crossing digital and analog traces if possible, and only make perpendicular crossings when absolutely necessary.

## Layout Example





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