Low-Drift, Low-Power, Small-Footprint Series Voltage Reference

Features

- Voltage options: 1.25 V, 2.048 V, 2.5 V, 3.0 V, 3.3 V, 4.096 V
- Initial accuracy: ±0.15% (maximum)
- Low temperature coefficient: 30 ppm/℃ (maximum)
- Output 1/f noise at 0.1 to 10 Hz: 20 $\mu V_{PP}/V$
- Supply voltage: 2.7 to 5.5 V
- Power consumption: < 500 μA
- Startup time: < 400 μs
- Operating temperature: −40 to 125℃
- Output Current: ±5 mA

SOT-23-3

Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
REF3012AIM3/TR	SOT-23-3	R30A	REEL	3000pcs/reel
REF3020AIM3/TR	SOT-23-3	R30B	REEL	3000pcs/reel
REF3025AIM3/TR	SOT-23-3	R30C	REEL	3000pcs/reel
REF3030AIM3/TR	SOT-23-3	R30F	REEL	3000pcs/reel
REF3033AIM3/TR	SOT-23-3	R30D	REEL	3000pcs/reel
REF3040AIM3/TR	SOT-23-3	R30E	REEL	3000pcs/reel

General Description

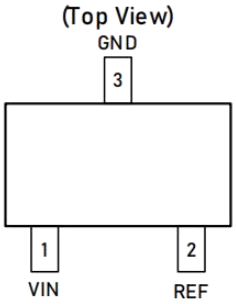
The REF30xx series devices are low temperature drift (30 ppm/℃ maximum), low-power, high-precision CMOS voltage reference, featuring ±0.15% initial accuracy, low operating current with power consumption less than 500 μA. This device also offers very low output noise of 15 $\mu V_{PP}/V$, which enables its ability to maintain high signal integrity with high-resolution data converters in noise critical systems.

Packaged in the same SOT-23-3 package, REF30xx offers enhanced specifications and pin-to-pin replacement for REF30xx and LM4132. Stability and system reliability are further improved by the low output-voltage hysteresis of the device and low long-term output voltage drift. REF30xx is specified for the wide temperature range of −40 to +125℃.

Applications

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

Pin Configuration



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Pin Description

Pin.	Symbol	Description
1	VIN	Power supply voltage
2	REF	Reference voltage outputs , an external capacitor is required.
3	GND	Ground.

Limiting Value

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

Condition	Value
Operating Ambient Temperature Range	−40 to 125 ℃
Storage Temperature Range	−50 to 125 ℃
Lead Temperature (Soldering, 10 seconds)	260 ℃
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.

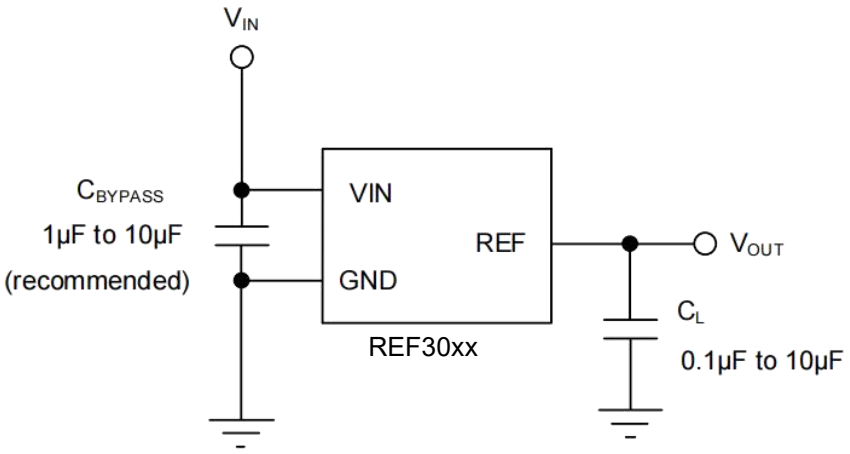
Recommended Operating Conditions

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

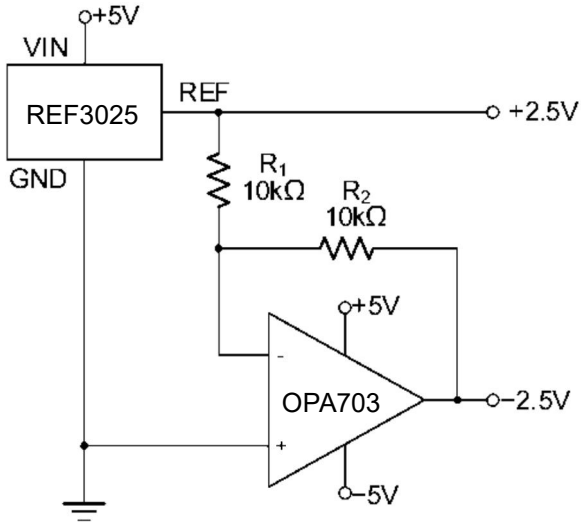
Electrical Characteristics

Parameter	Symbol	Description	Min.	Typ.	Max.	Unit
Power supply voltage	V_{IN}		2.7	5	5.5	V
Power consumption	I_{CC}	VCC = 5.0 V, no load.		300	500	μA
Output voltage	V_{OUT}	REF3012		1.25		V
		REF3020		2.048		V
		REF3025		2.5		V
		REF3030		3.0		V
		REF3033		3.3		V
		REF3040		4.096		V
Output voltage accuracy	ΔV_{OUT}		−0.15		0.15	%
Output Noise	Vnoise	0.1 to 10 Hz		20		μVpp/V
Temperature coefficient	T_C	-40 to 125ºC			30	ppm/℃
Dropout Voltage	$V_{IN}-V_{OUT}$			200		mV
Įine Regulation	$\Delta V_{OUT}/\Delta V_{IN}$			100		ppm/V
Įoad Regulation	$\Delta V_{OUT}/\Delta I_L$			50		ppm/mA
Thermal hysteresis	dT			80		ppm
Įong-term stability		0h to 1000h at 25ºC		200		ppm
Short-circuit current	I_{SC}	Souring and sinking		50		mA
Capacitive load			0.1		10	μF
Turn-on setting time					400	μs

Typical Application



Negative Reference Voltage



REF3025 Combined With OPA703 to Create Positive and Negative Reference Voltages

Layout

Layout Guidelines

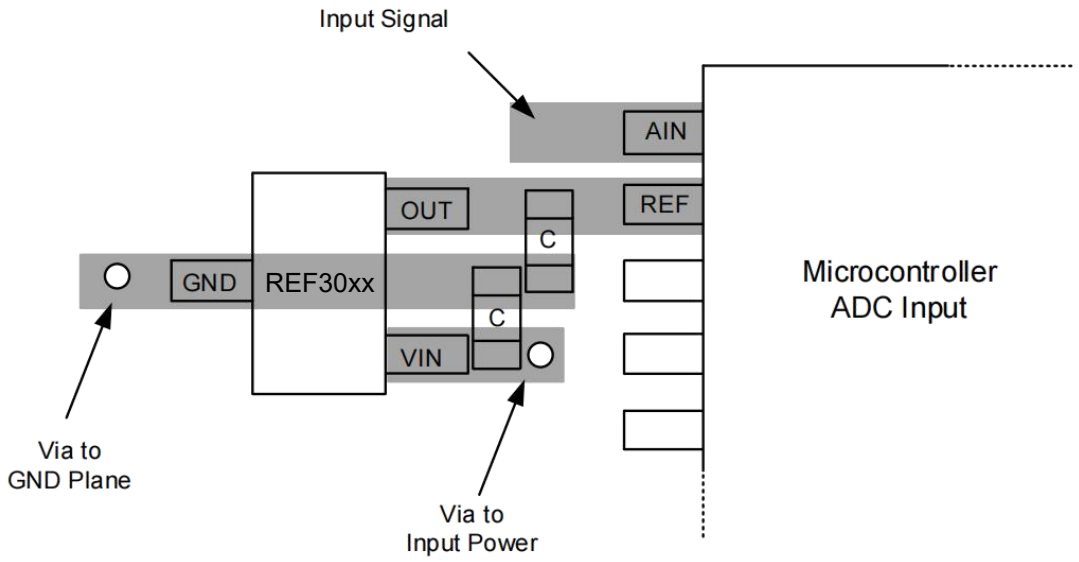
For optimal performance of this design， please follow standard printed circuit board (PCB) layout guidelines,including proper decoupling close to all integrated circuits and adequate power and ground connections with large copper pours.

As shown below an example of a PCB layout for a data acquisition system using the REF30xx.

Some key considerations are:

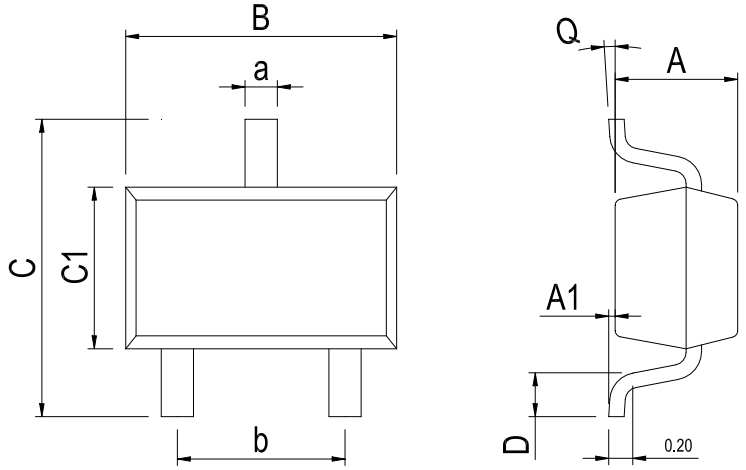
- Connect a low-ESR, 1 μF ceramic capacitor at the IN pin for bypass, and a 0.1 μF to 10 μF ceramic capacitor at the OUT pin for stability of the REF30xx.
- Decouple other active devices in the system per the device specifications.
- Use a solid ground plane helps distribute heat and reduces EMI noise 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



Physical Dimensions

SOT-23-3



Dimensions In Millimeters(SOT-23-3)									
Symbol:	**A**	**A1**	**B**	**C**	**C1**	**D**	**Q**	**a**	**b**
Min:	1.00	0.00	2.82	2.65	1.50	0.30	0°	0.30	1.90 BSC
Max:	1.15	0.15	3.02	2.95	1.70	0.60	8°	0.50	

Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2018-11	New	1-8
V1.1	2025-6	Document Reformatting	1-8

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