General Description

The GP33 series devices are low temperature drift (20ppm/℃ maximum), low-power, high-precision CMOS voltage reference, featuring ±0.1% initial accuracy, low operating current with power consumption less than 500μA. This device also offers very low output noise of 15 μV_{PP}/V, which enables its ability to maintain high signal integrity with high-resolution data converters in noise critical systems.

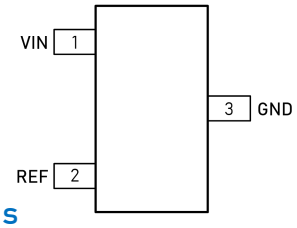
Packaged in the same SOT23-3 package, GP33xx offers enhanced specifications and pin-to-pin replacement for REF33xx and LM4132. Stability and system reliability are further improved by the low output-voltage hysteresis of the device and low long-term output voltage drift. GP33xx is specified for the wide temperature range of −40 to +125 ℃.

Features and Benefits

- Voltage options: 1.25V, 2.048V, 2.5V, 3.0V, 3.3V, 4.096V,1.5V,1.8V
- Initial accuracy: ±0.1% (maximum)
- Low temperature coefficient: 20 ppm/℃ (maximum)
- Output 1/f noise at 0.1 to 10 Hz: 15 μVPP/V
- Supply voltage: 2.7 to 5.5 V
- Power consumption: < 500 μA
- Startup time: <400us
- Operating temperature: −40 to 125 ℃
- Output Current: ±5mA

Pin Configuration

SOT-23-3L
(Top View)



Applications

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

Pin Description

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

Ordering Inormation (1)

Type Number	Output Voltage	Quantity	Operating Temperature	Package Name	Marking Code
GP3312T20YT3	1.25V	3000	−40 to 125 ℃	SOT-23-3	3AYWR
GP3320T20YT3	2.048V	3000	−40 to 125 ℃	SOT-23-3	3BYWR
GP3325T20YT3	2.5V	3000	−40 to 125 ℃	SOT-23-3	3CYWR
GP3330T20YT3	3.0V	3000	−40 to 125 ℃	SOT-23-3	3DYWR
GP3333T20YT3	3.3V	3000	−40 to 125 ℃	SOT-23-3	3EYWR
GP3340T20YT3	4.096V	3000	−40 to 125 ℃	SOT-23-3	3FYWR
GP3315T20YT3	1.5V	3000	−40 to 125 ℃	SOT-23-3	3GYWR
GP3318T20YT3	1.8V	3000	−40 to 125 ℃	SOT-23-3	3HYWR

(1) Please contact to your Linearin representative for the latest availability information and product details.

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

Operating Ambient Temperature Range	−40 to 125 ℃
Storage Temperature Range	−50 to 125 ℃
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.

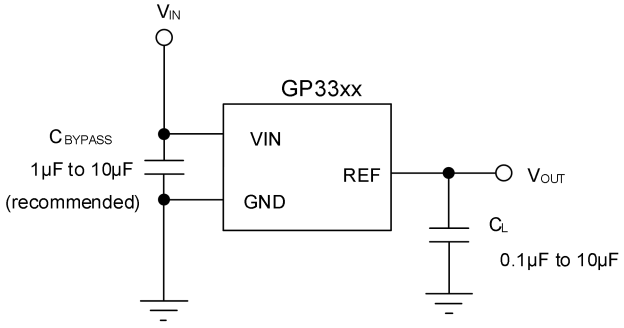
Recommended Operating Conditions

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

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	μA
V_{OUT}	Output voltage	GP3312		1.25		V
		GP3320		2.048		V
		GP3325		2.5		V
		GP3330		3.0		V
		GP3333		3.3		V
		GP3340		4.096		V
		GP3315		1.5		V
		GP3318		1.8		V
ΔV_{OUT}	Output voltage accuracy		−0.1		0.1	%
Vnoise	Output Noise	0.1Hz~10Hz		15		uVpp/V
T_C	Temperature coefficient	−40 to 125 ℃			20	ppm/℃
V_{IN}–V_{OUT}	Dropout Voltage			200		mV
ΔV_{OUT} /ΔV_{IN}	Line Regulation				100	ppm/V
ΔV_{OUT}/ ΔI_L	Load Regulation				50	ppm/mA
dT	Thermal hysteresis			80		ppm
	Long-term stability	0h to 1000h at 25 ℃		200		ppm
I_{SC}	Short-circuit current	Souring and sinking		50		mA
	Capacitive load		0.1		10	μF
	Turn-on setting time				400	us

Typical Application



Layout Guidelines

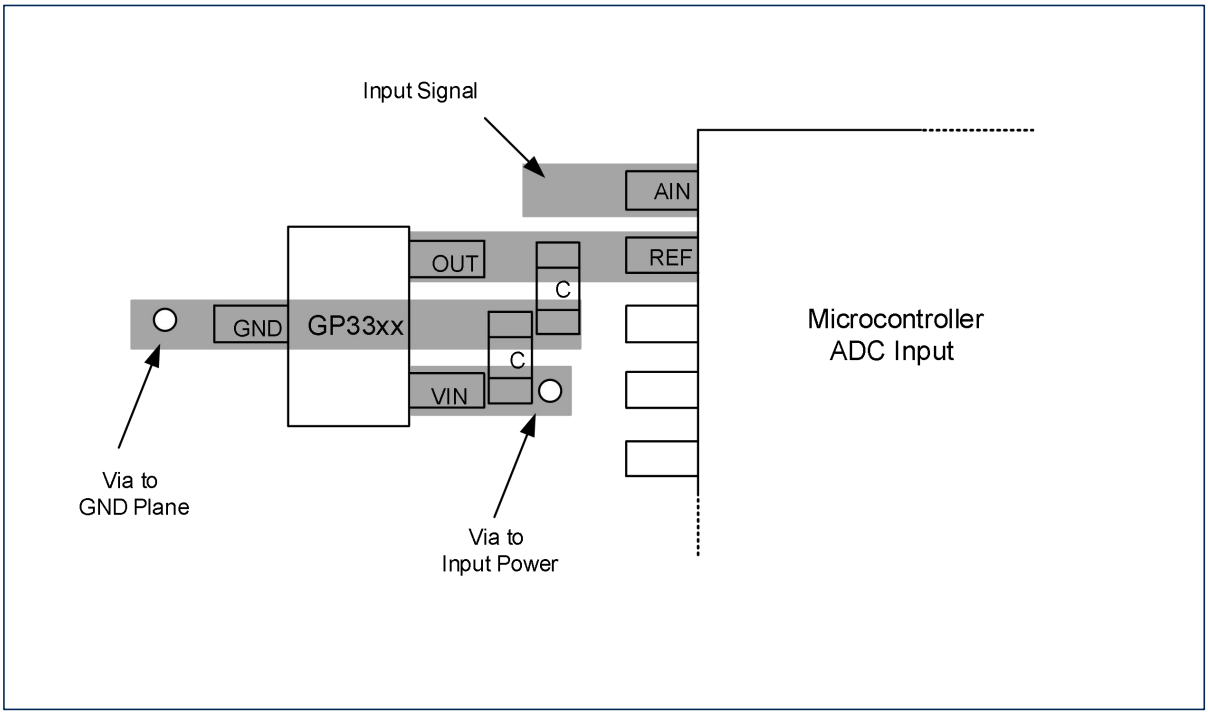
For optimal performance of this design， please follow standard printed circuit board (PCB) layout guidelines, including proper decoupling close to all integrated circuits and adequate power and ground connections with large copper pours.

As shown below an example of a PCB layout for a data acquisition system using the GP33xx.

Some key considerations are:

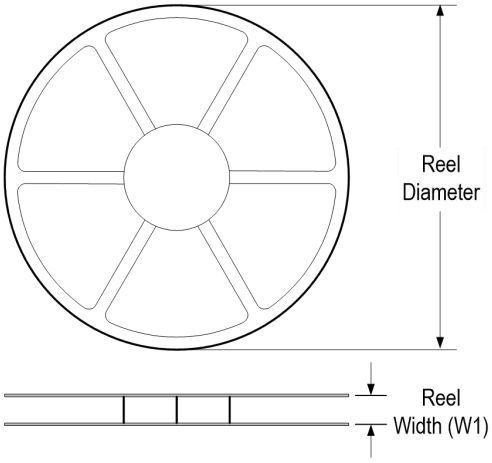
- Connect a low-ESR, 1μF ceramic capacitor at the IN pin for bypass, and a 0.1uF to 10uF ceramic capacitor at the OUT pin for stability of the GP33xx.
- Decouple other active devices in the system per the device specifications.
- Use a solid ground plane helps distribute heat and reduces EMI noise pickup.
- 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

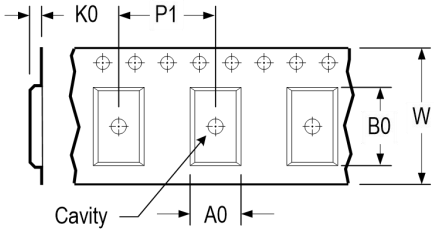


Tape and Reel Information

REEL DIMENSIONS

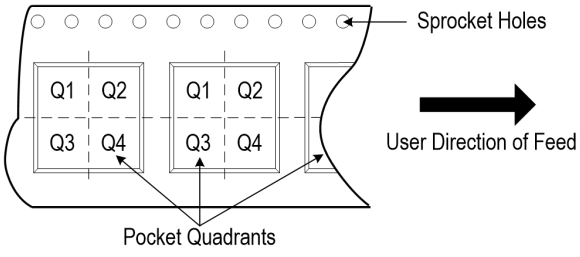


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIETATION IN TAPE

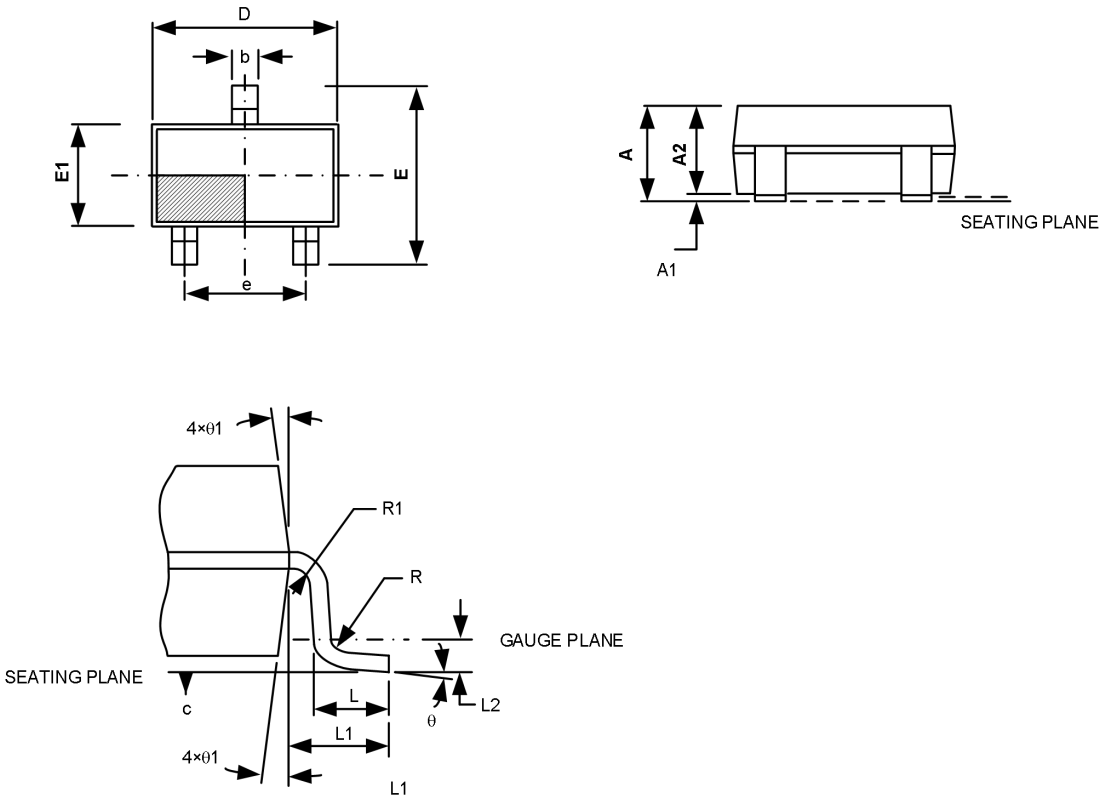


* All dimensions are nominal

Device	Package Type	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin 1 Quadrant
GP3312T20YT3	SOT23	3	3 000	178	9.0	3.3	3.2	1.5	4.0	8.0	Q3

Package Outlines

DIMENSIONS, SOT-23-3L



Symbol	Min.	Typ.	Max.
A	–	–	1.35
A1	0	–	0.15
A2	1.0	1.1	1.2
b	0.35	–	0.45
b1	0.32	–	0.38
C	0.14	–	0.20
C1	0.14	0.15	0.16
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	1.8	1.9	2.0
L	0.35	0.45	0.6
L1	0.6REF		
L2	0.25REF		
R	0.1	–	–
R1	0.1	–	0.25
θ	0°	4°	8°
θ1	5°	10°	15°

(Unit: mm)