

Ultra-Low Power, Zero Drift Op-Amps



TSU111 in Electrochemical
Toxic Gas Sensor

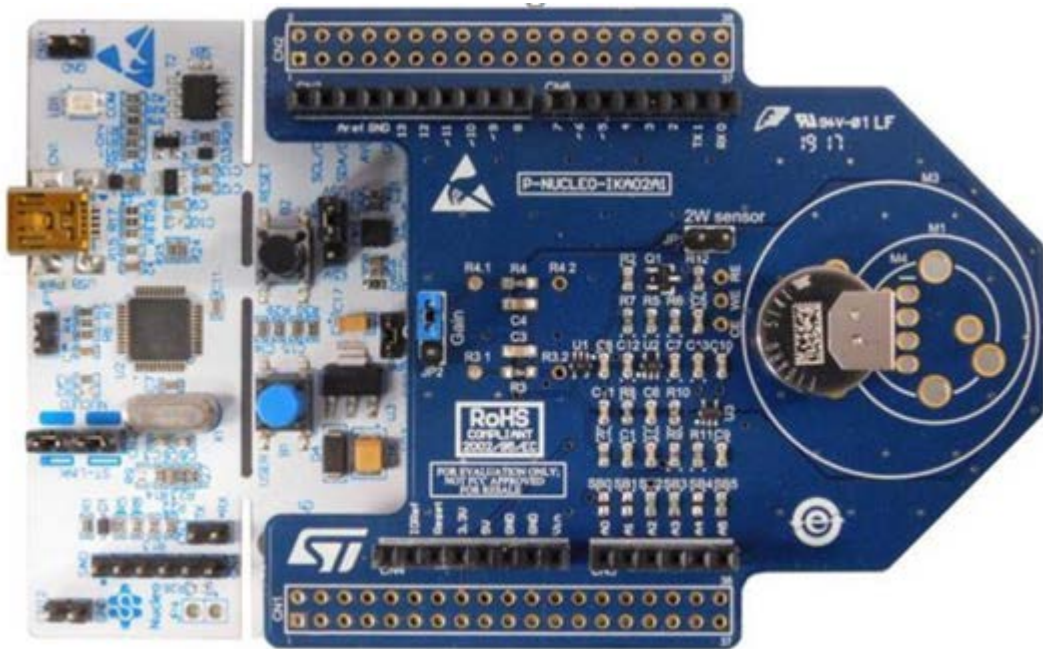
TSZ Series
Zero-Drift Op-Amps

ST Ultra-Low Power
Precision Amplifiers

Mobile App and e-Design Suite

Electrochemical Toxic Gas Sensor

TSU111 High-precision and low-power Zero-Drift Operational Amplifiers



- Footprint compatible with two-, three- and four-electrode electrochemical sensors (PCD13,5, PCD17, Mini and TGS5141)
- **Signal conditioning based on TSU111 High-precision and low-power Zero-Drift Operational Amplifiers**
- Ultra-low-current precision analog temperature sensor STLM20 for compensation of gas readings
- STM32 Ultra-low-power Arm® Cortex®-M0+ MCU (32 MHz max.) with 64 Kbytes Flash and 8 Kbytes of SRAM
- Figaro TGS5141 Carbon monoxide coin-cell sensor
- Expected lifetime > 10 years



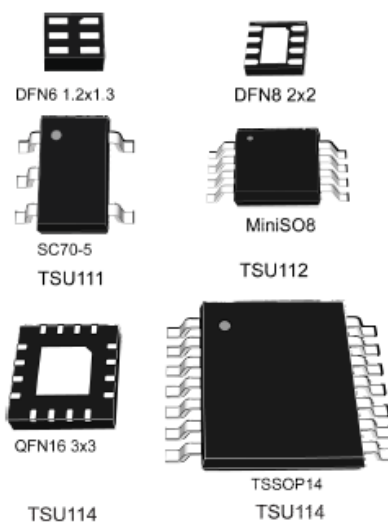
Nanopower (900nA), high accuracy (150µV) Zero Drift 5V Operational Amplifier

Main features

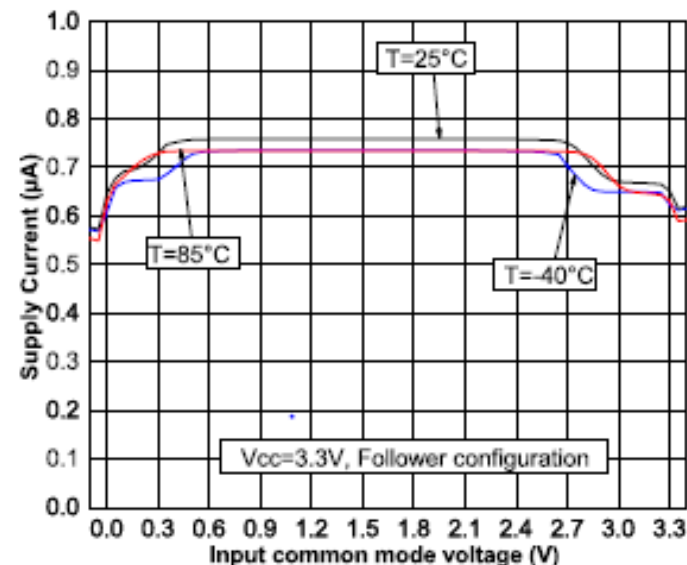
- Very high accuracy and stability:
 - Offset voltage 150µV max. at 25°C
 - 235µV max. over temperature (-40 to 85°C)
 - $\Delta V_{io}/\Delta T$ input offset voltage drift: 1.4µV/°C (-40°C to 85°C)
- Low input bias current: 10pA max. at 25 °C
- Rail-to-rail input and output
- Low supply voltage: 1.5V to 5.5V (CR2032 compatible)
- Micro power consumption:
 - 900nA current consumption typ. at 25°C,
 - 1480nA max over temperature (-40 to 85°C)
- Gain bandwidth product: 11.5KHz typ.

Benefits

- Sub-1µA consumption
- High accuracy without calibration



Supply current vs. Vicm



TYPICAL APPLICATIONS

- Gas sensors: CO, O2, and H2S; PIR sensors
- Signal conditioning for energy harvesting
- Ultra long-life battery-powered applications
- Active RFID tags



TSZ Series: Zero-Drift Op-Amps

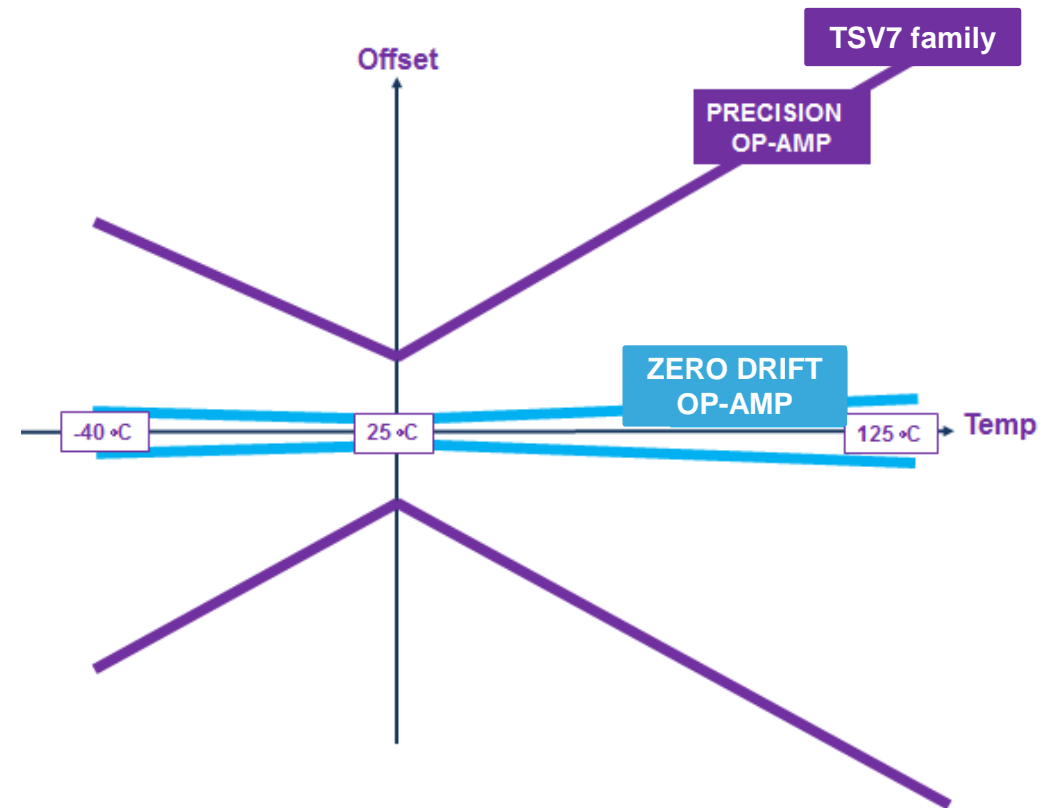
Zero-Drift Op-Amps do not drift!

FEATURES

- Offset: (TSZ12x)
+/- 1 μV typ
+/- 8 μV worst case
- Offset drift: (TSZ12x)
10 $\text{nV}/^\circ\text{C}$ typ
30 $\text{nV}/^\circ\text{C}$ max
- 400 kHz GBW (TSZ12x)
- 3 MHz GBW (TSZ18x)
- Operating range: 1.8 to 5.5 V
- Temperature range: -40 to 125 $^\circ\text{C}$
- Rail-to-rail input and output
- ESD: 4kV HBM
- Qualified for automotive applications
- Available in tiny packages:
 - SOT23 and SC70, DFN6 1,2x1,3 for single
 - MiniSO8, SO8, DFN8 2x2 for dual
 - QFN16 3x3, TSSOP14 for quad

APPLICATIONS

- Portable instrumentation
- Battery-powered devices
- Sensor interfaces
- Medical instrumentation
- Electronic scales
- Temperature measurement
- Automotive current measurement



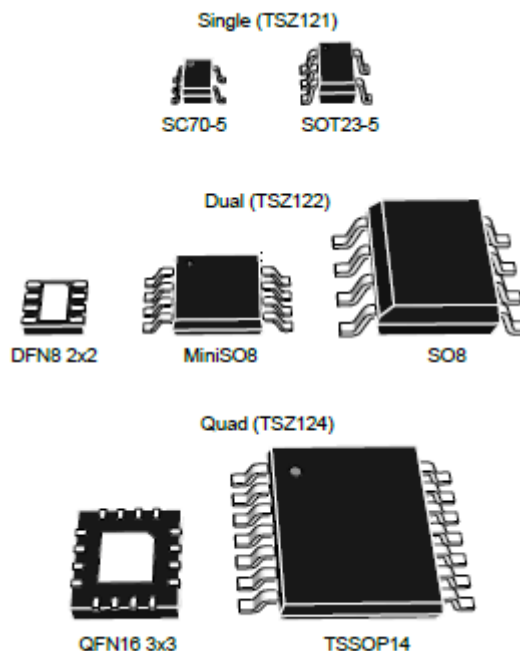
Very high accuracy (5 μ V) Zero Drift 5V Operational Amplifiers

Main features

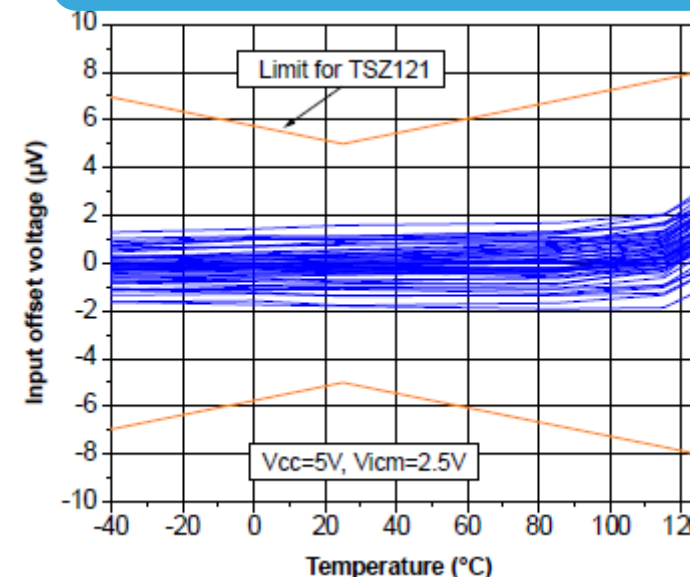
- Very high accuracy and stability:
 - Offset voltage 5 μ V max at 25 $^{\circ}$ C
 - 8 μ V over full temperature range (-40 $^{\circ}$ C to 125 $^{\circ}$ C)
 - $\Delta V_{io}/\Delta T$ input offset voltage drift: 30nV/ $^{\circ}$ C (-40 $^{\circ}$ C to 125 $^{\circ}$ C)
- Rail-to-rail input and output
- Low supply voltage: 1.8V - 5.5V
- Low power consumption: 40 μ A max. at 5V
- Gain bandwidth product: 400KHz
- Micro-packaging options

Benefits

- High accuracy without calibration
- Accuracy virtually unaffected by temperature



Input offset voltage vs. temperature



TYPICAL APPLICATIONS

- Battery-powered applications
- High accuracy signal conditioning
- Portable Medical instrumentation
- Analog Sensors signal amplification



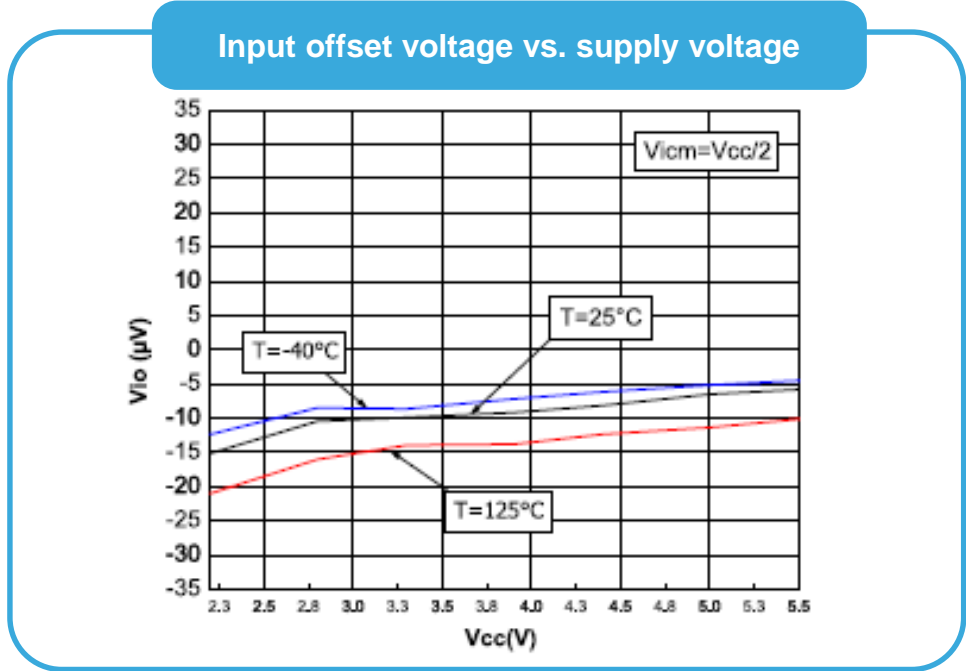
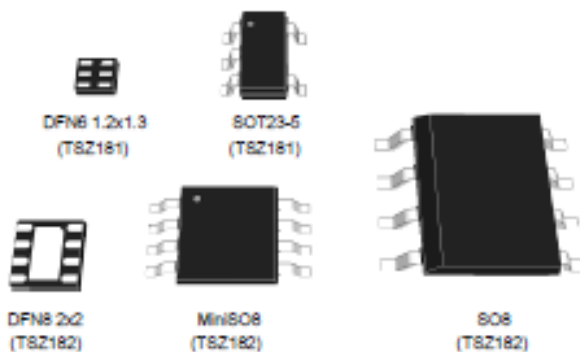
High accuracy (25µV), High Speed (3MHz) Zero Drift 5V Operational Amplifiers

Main features

- Very high accuracy and stability:
 - Offset voltage 25µV max at 25°C
 - 35µV over full temperature range (-40°C to 125°C)
 - $\Delta V_{io}/\Delta T$ input offset voltage drift: 100nV/°C (-40°C to 125°C)
- Rail-to-rail input and output
- Low supply voltage: 2.2 - 5.5V
- Low power consumption: 1mA max. at 5V
- Gain bandwidth product: 3MHz
- Micro package options available

Benefits

- High accuracy without calibration
- Accuracy stable in temperature
- Automotive Grade



- ### TYPICAL APPLICATIONS
- Automotive current measurements
 - High accuracy signal conditioning
 - Portable Medical instrumentation
 - Analog Sensors signal amplification





ST Zero-Drift amplifiers

Best in precision and current consumption

- TSZ121
- TSZ122
- TSZ124
- TSZ181
- TSZ182
- TSU111
- TSU112
- TSU114

1000 factor gain !

Op-Amp type	Standard	Precision	Chopper Zero-Drift
Input offset Voltage	5mV	400μV	5μV
Offset drift	30μV / °C	1μV / °C	30nV / °C
1/f noise	High	Medium	No



Ultra Low Power, Precision Amplifiers



Precision Op-Amps are the primary link between analog sensors and the digital world. ST zero-drift Op-Amps have high accuracy and low power, ideal for battery powered analog sensors



Products	Features (25°C)
TSU101 TSU102 TSU104	580nA typ. Ultra-Low Power Consumption 1.5V min Supply Voltage 5pA max Input Bias Current
TSU111 TSU112 TSU114	900nA Ultra-Low Power Consumption 10pA max Input Bias Current Good Accuracy 150µV max Vio
TSZ181 TSZ182	Excellent Accuracy 25µV max Vio Gain bandwidth product: 3MHz Automotive Grade Available
TSZ121 TSZ122 TSZ124	Outstanding Accuracy 5µV max Vio Lowest drift 30nV/°C (-40°C to 125°C) Best for Galvanic configuration





Op-Amps & Comparators

The best choice for longevity, robustness and power efficiency



Key Op-Amp Product Lines

TSZ series Ultra High Precision

TSU series Ultra-Low Power

TSX series 16V Low Power and Precision

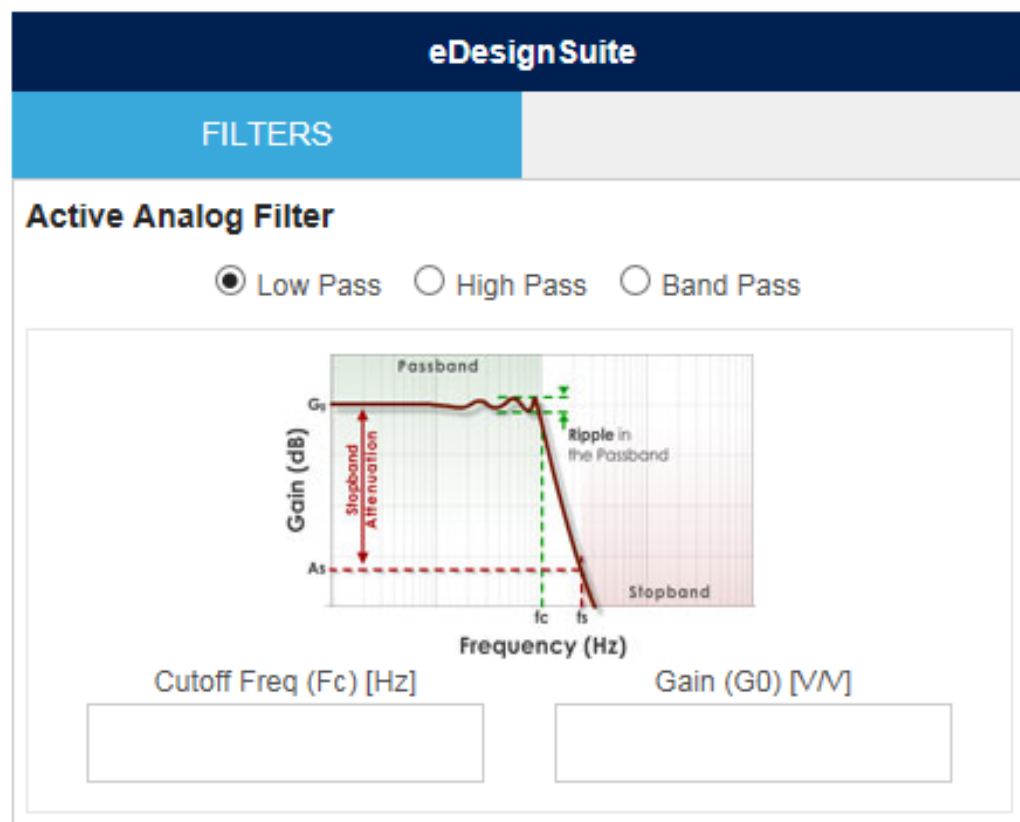
TSV series Low Voltage, Low Power

TSC series High Side Current Sensing

TSB series 36 V, Low Power and Precision

State-of-the-art analog technologies for
high-performance products

Mobile App and e-Design Suite



START DESIGN



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ST op-amps
STMICROELECTRONICS INC

OPEN

4+ Age

☆☆☆☆ Not Enough Ratings

What's New [Version History](#)

Version 2.0.1 11mo ago

- Minor bug fix
- User experience improved

Preview

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3 MHz chopper op amp
for high-accuracy signal conditioning

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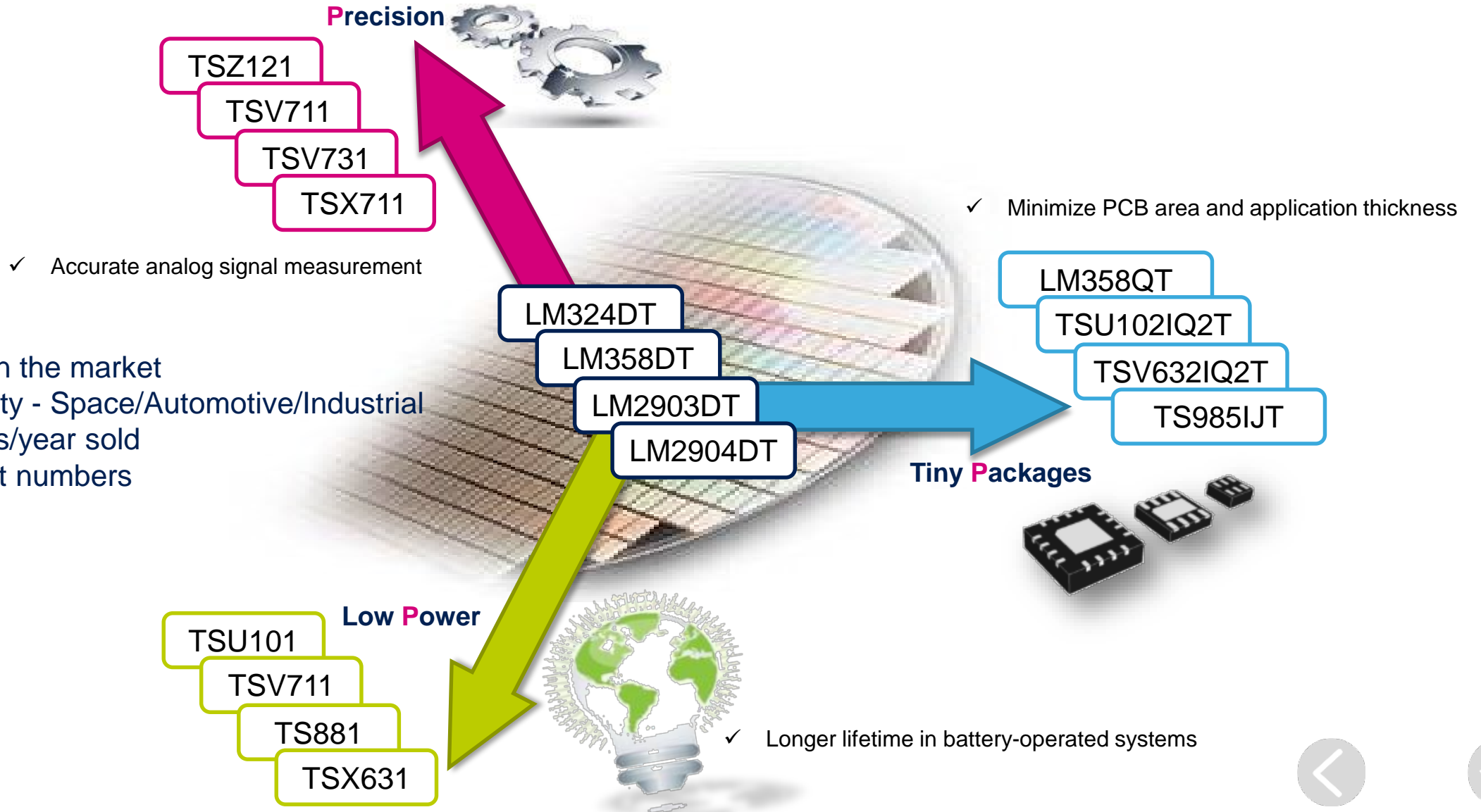
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Amplifiers / Comparators

From General Purpose to High End



- 40+ years on the market
- High reliability - Space/Automotive/Industrial
- 4 billion units/year sold
- 350 root part numbers

