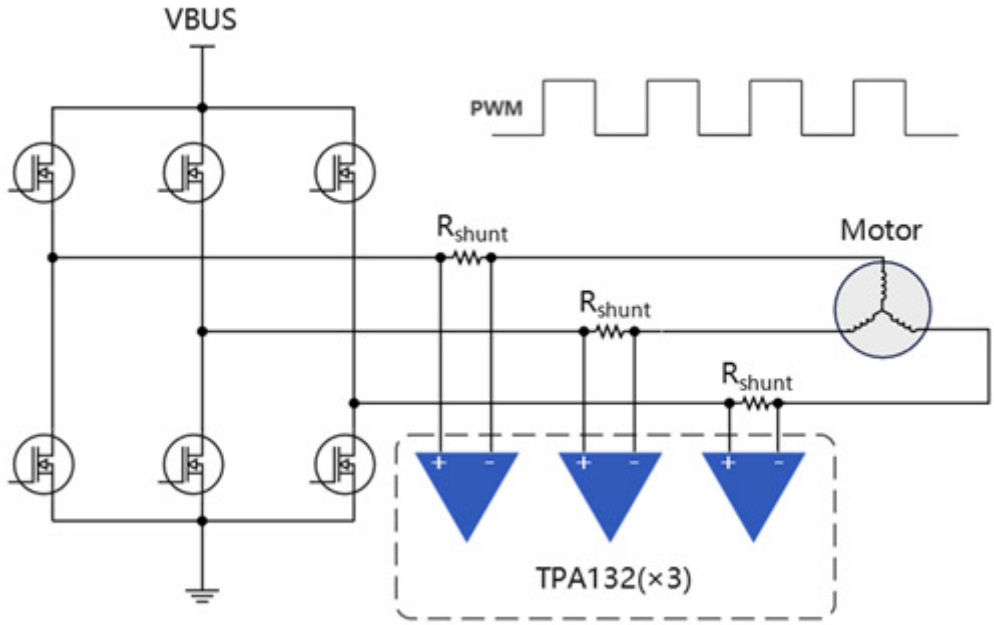
3PEAK Releases Its First Automotive-grade Current-Sense Amplifier TPA132Q with PWM Rejection, Empowering New Energy Automotive Motor Drives and Industrial Control Intelligent Sensing!

3PEAK (stock code: 688536), a semiconductor supplier focusing on high-performance analog chips and embedded processors, has launched the TPA132Q, an automotive-grade bidirectional current-sense amplifier with enhanced PWM rejection.

The TPA132Q features exceptional current sensing precision and fast response in high-frequency noise environments. It can be widely used in fields such as new energy automotive motor drives, power management and industrial automation.

In automotive motor drives, industrial control, and other applications, Pulse Width Modulation (PWM) signals are commonly used to regulate the speed and position of motors or control the on/off state of valves. The PWM signals regulate voltage and current through frequent switching operations. However, these high-frequency switching operations can cause fast common-mode transitions(ΔV/Δt), leading to noise interference and transition errors in current sensing circuits.

The TPA132Q is an ideal choice for current sensing in such applications thanks to its enhanced PWM rejection capability, ultra-wide common-mode voltage range (–4 V to 80 V), high bandwidth (1 MHz), high precision and low drift.

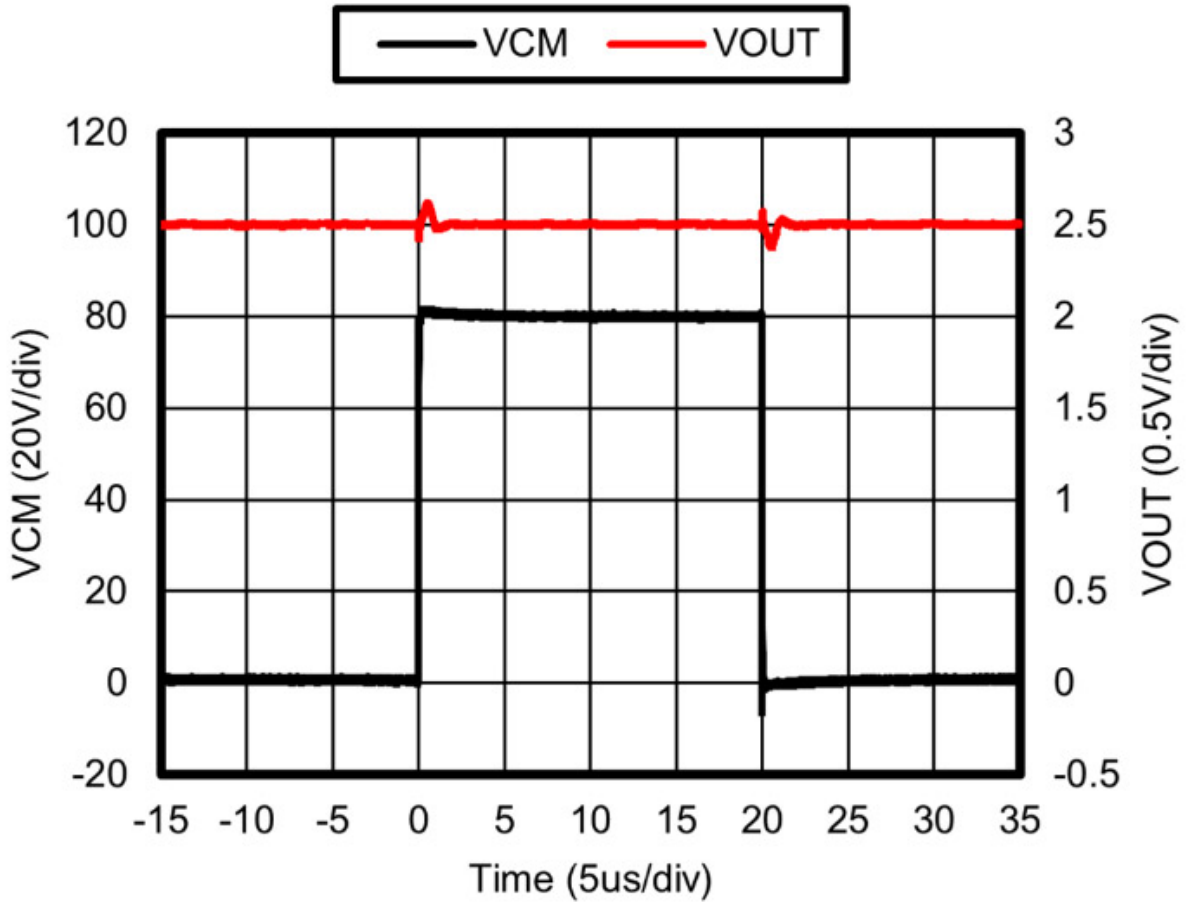


Typical Application of TPA132Q

Advantages of TPA132Q Enhanced PWM Rejection

The TPA132Q features a unique circuit design that effectively rejects the input common-mode transitions caused by PWM signals. This ensures high current sensing precision and stability in high-

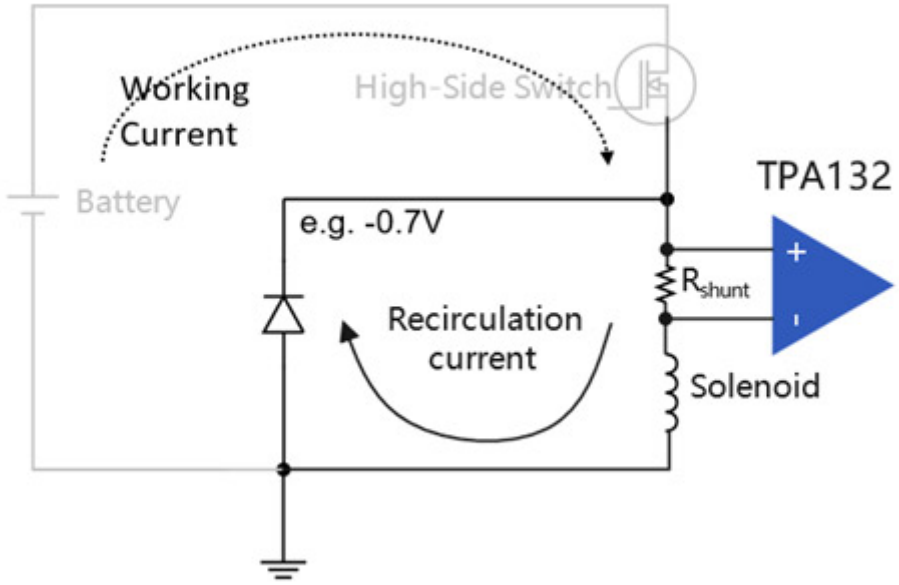
frequency noise environments such as motor drives and solenoid valve controls. The figure below shows that the common-mode output voltage remains stable when the common-mode input voltage jumps from 0 V to 80 V. In addition, the TPA132Q provides a DC common-mode rejection ratio (CMRR) of up to 150 dB.



Common-mode Transition Response of TPA132Q

Wide Common-mode Voltage Range

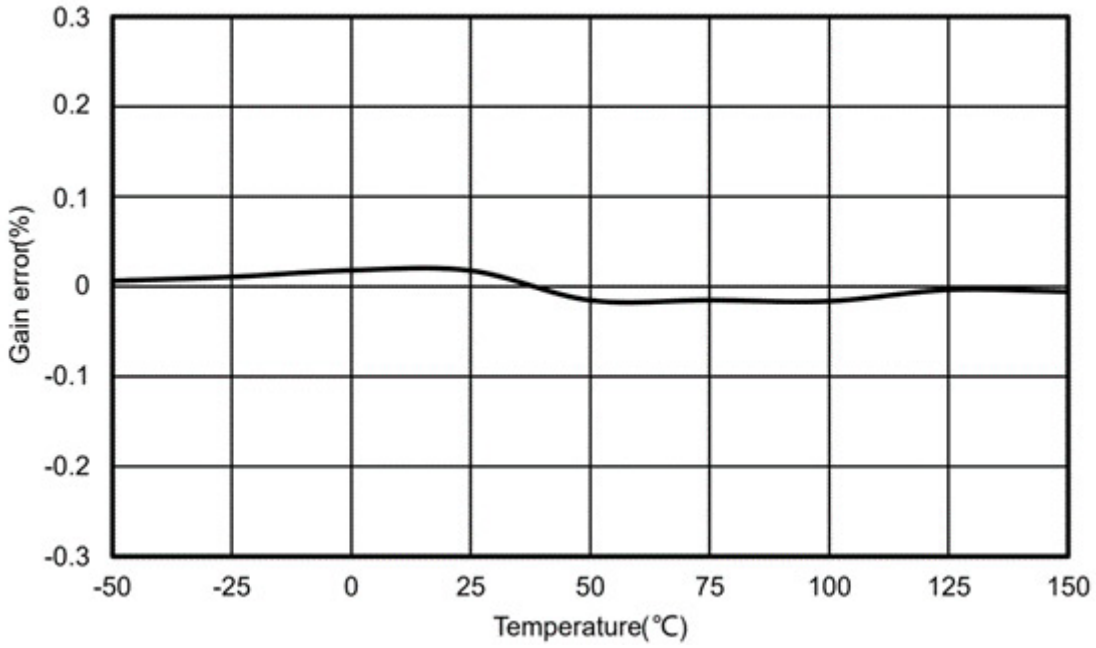
The TPA132Q's wide common-mode voltage range (–4 V to 80 V) enables reliable operation in various harsh environments, preventing sensing errors that can occur when voltages exceed the specified range. This makes it suitable for both high-side and low-side sensing scenarios. For example, in solenoid valve applications, the TPA132Q can operate normally when the high-side switch transitions from on to off, even when the common-mode voltage varies from +48 V to –0.7 V due to inductive load effects (from the solenoid valve coils) on the current.



Negative Voltage Input of TPA132Q in Solenoid Valve Application

High Precision and Low Drift

Accurate current sensing is crucial for industrial control applications such as motor drives and solenoid valves. The TPA132Q has extremely low gain error (±0.05%), gain temperature drift (1.5 ppm/°C), offset voltage (±20 µV), and offset temperature drift (0.15 µV/°C), ensuring high precision and long-term stability in current sensing.

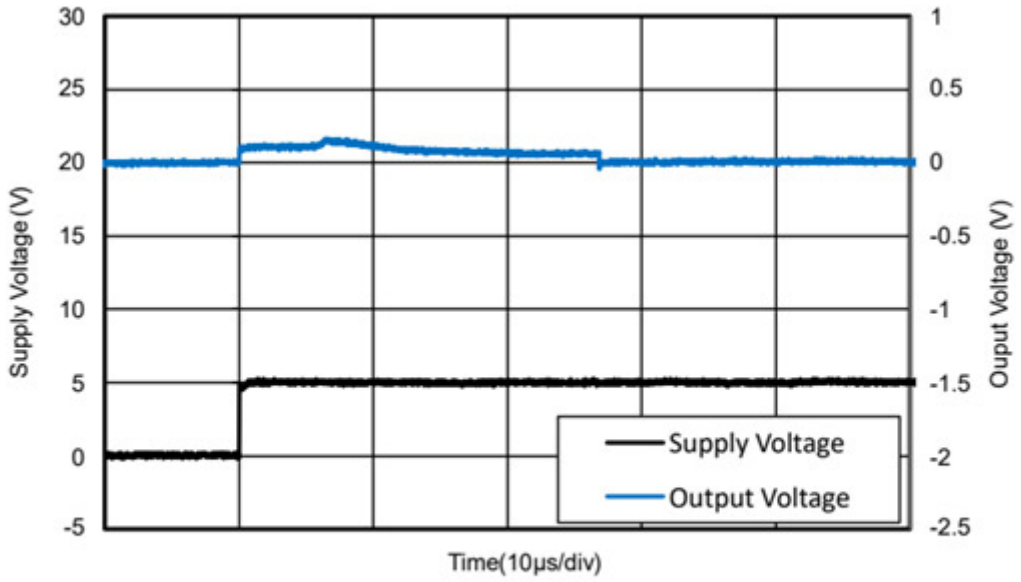


Gain Error and Temperature Drift Curve of TPA132Q

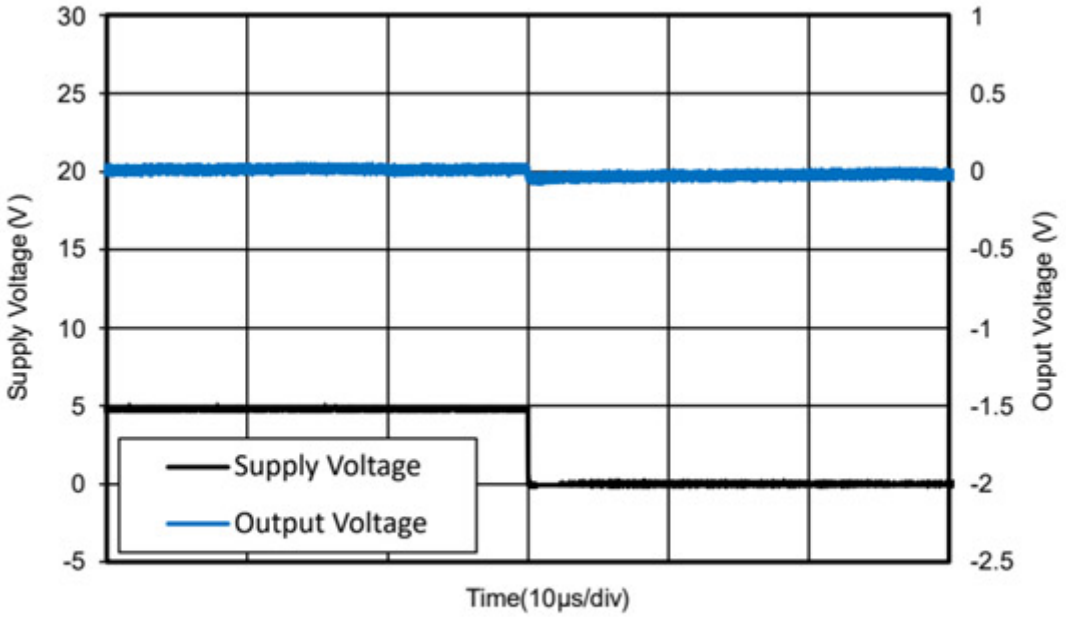
Glitch-Free Output Signal During Power-up and Power-down Transitions

In systems such as motor drives, current sensing is essential for achieving closed-loop control. During the power-up or power-down transition, the amplifier's output signal may cause short pulses due to

uncontrollable internal circuit nodes. These short pulses can lead to malfunctions in the subsequent system. The TPA132Q's optimized design prevents false pulses in the output signal during power-up and power-down transitions, even with an 80-V common-mode input.



V_{CC} = 0 V to 5 V, T_{rise} = 30 ns, V_{CM} = 80 V, V_{REF1} = V_{REF2} = 0



V_{CC} = 5 V to 0 V, T_{fall} = 30 ns, V_{CM} = 80 V, V_{REF1} = V_{REF2} = 0

Glitch-Free Output Signal During Power-up and Power-down Transitions of TPA132Q

Features of TPA132Q

1. Supply Voltage: 3.0 V to 5.5 V

2. Common-mode Voltage: –4 V to 80 V

3. Enhanced PWM Rejection

4. No Glitches in the Output During Power-up and Power-down Transitions

5. Low Offset Voltage: ±20 μV

6. High Bandwidth: 1 MHz

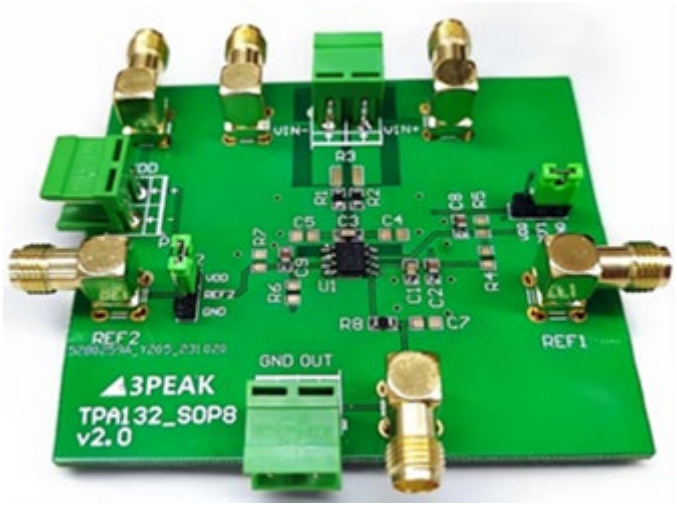
7. Internal Gain Options: 20 V/V, 50 V/V, 100 V/V, 200 V/V(1), 500 V/V

8. Excellent CMRR: 150 dB DC

9. AEC-Q100 Certified

10. Package: SOP8, TSSOP8

For future products, please contact the sales team of 3PEAK for more information.



TPA132Q EVM

TPA13x samples and evaluation boards are available. For inquiries, please contact 3PEAK local sales team, email business@3peak.com, or call the hotline at 021-5109-0810, extension 6016.

Model	Functionality	Package
TPA132	Industrial-Grade Bidirectional current sensing	SOP8, TSSOP8
TPA132Q	Auto-Grade Bidirectional current sensing	SOP8, TSSOP8
TPA135	Industrial-Grade Unidirectional current sensing	SOT23-5

List of Available TPA132x EVMs