Automotive-Grade LDOs Offer High Accuracy And Low Quiescent Current

Nexperia's NEX90XXXX-Q100 series of AEC-Q100-qualified general-purpose low-dropout voltage regulators (LDOs) with ultra-low quiescent current includes tracking LDOs with high tracking accuracy and protected outputs, capable of direct connection to vehicle batteries thanks to their wide input voltage tolerance. These LDOs are thermally enhanced and can generate a stable voltage source under cold-crank conditions for ripple-sensitive loads in automotive applications including infotainment systems, ADASs as well as telematics, and lighting systems.

In this series, the tracking LDOs are the 70-mA rated NEX91207-Q100 devices. The series also includes the 300-mA NEX90x30-Q100 and the 150-mA NEX90x15-Q100, which are general-purpose LDOs.

The tracking LDOs' outstanding output protection enables their use in body control modules, zone controller units and power train systems, even in scenarios involving off-board loads such as sensors. Beyond automotive applications, these LDOs are well-suited for industrial applications, including power tools, e-bikes and battery packs.

In battery-powered automotive applications, low quiescent current (I_q) and shutdown current (I_{SHUT}) are critical for saving energy and extending battery lifetime. Always-on systems require ultra-low I_q and stable output cross temperature range. In CAN-wake systems and some systems with sleep state, ultra-low I_{SHUT} is essential to minimize battery drain even in deep-sleep (disable) mode.

Consuming only 5.3 µA (typical) quiescent current at light load and 300 nA (typical) shutdown current under disabled mode, these LDOs are well suited for powering always-on components like microcontrollers (MCUs), controller area network (CAN) or local interconnect network (LIN) transceivers in standby and CAN-wake systems.

The tracking LDOs further address off-board or off-PCB powered scenarios, such as powering sensors. These applications often require robust output protection, including safeguards against short-to-ground, short-to-battery and reverse-current conditions. These challenges are addressed by the comprehensive protection features of the tracking LDOs in this series, ensuring reliable operation in demanding environments. Additionally, for ratiometric sensing or measurement applications, the tracking LDOs deliver exceptional output accuracy, tracking supply voltages of analog-to-digital converters (ADCs) or MCUs within ±5 mV.

The general LDOs generate a stable (±2% accuracy) 3-V or 5-V output from a wide input voltage range (3 V to 40 V), allowing them to be connected directly to a car battery without the requirement for additional pre-regulation. Integrated protection features include short-circuit, overcurrent and thermal shutdown.

Furthermore, these LDOs can operate over a -40°C to 125°C (ambient) and -40°C to 150°C (junction) temperature range. The series also features devices with a power good (PG) output voltage status monitor that can be used to support functional safety-related system designs.

The NEX90x30-Q100 LDOs provide 300 mA of output current capability and are available in a choice of packages including the thermally enhanced, bottom-side cooled 8-pin HTSSOP measuring 3 mm x 3 mm (see the figure) and a DFN6 package measuring only 2 mm x 2 mm. For lower loading current applications, NEX90x15-Q100 devices with 150-mA output current capability are more cost effective with flexible package choices of SOT23-5, SOT223-4 and HWSON6 (DFN-6). The tracking LDO NEX91207-Q100 has a 70-mA output current and comes in SOT23-5 and SOT23-5S package.

For more information, see the linear & low-dropout (LDO) regulator ICs page.

Figure. The NEX90XXXX-Q100 series of AEC-Q100-qualified LDO voltage regulators includes tracking LDOs with high tracking accuracy and protected outputs, capable of direct connection to vehicle batteries thanks to their wide input voltage tolerance. The 8-pin HTSSOP package for the 300-mA NEX90x30-Q100 LDOs, which is not a tracking LDO, is pictured here.