8.3.15 V$_{BAT}$ (Battery Voltage)

This pin is connected to the battery input prior to the reverse blocking diode. This pin is used in conjunction with the PV and DIV_ON pins.

8.3.16 V$_{SUP}$ (Supply Voltage)

V$_{SUP}$ is the power supply pin. V$_{SUP}$ is connected to the battery through an external reverse battery-blocking diode (see Figure 8-3). The V$_{SUP}$ pin is a high-voltage-tolerant pin. Decoupling capacitors of 100 nF are recommended to be connected close to this pin to improve the transient performance. If there is a loss of power at the ECU level, the device has extremely low leakage from the LIN pin, which does not load the bus down. This is optimal for LIN systems in which some of the nodes are unpowered (ignition supplied) while the rest of the network remains powered (battery supplied). When V$_{SUP}$ drops low enough the regulated output drops out of regulation. The LIN bus works with a V$_{SUP}$ as low as 5.5 V, but at a lower voltage, the performance is indeterminate and not guaranteed. If V$_{SUP}$ voltage level drops enough, it triggers the UV$_{SUP}$, and if it keeps dropping, at some point it passes the POR threshold.

8.3.17 GND (Ground)

GND is the device ground connection. The device can operate with a ground shift as long as the ground shift does not reduce the V$_{SUP}$ below the minimum operating voltage. If there is a loss of ground at the ECU level, the device has extremely low leakage from the LIN pin, which does not load the bus down. This is optimal for LIN systems in which some of the nodes are unpowered (ignition supplied) while the rest of the network remains powered (battery supplied).

8.3.18 EN or nINT (Enable Input or Interrupt Output)

When configured as pin control, this pin becomes the transceiver enable control, EN. EN controls the operational modes of the device. When EN is high, the device can enter normal or fast operating modes allowing a transmission path from TXD to LIN and from LIN to RXD. When EN is low, the device can enter standby or sleep mode depending upon the state of the TXD pin. The device can enter normal mode only after wake up. EN has an internal pull-down resistor to ensure the device remains in low power mode even if EN floats. EN should be held low until V$_{SUP}$ reaches the expected system voltage level.

When configured as SPI control, this pin becomes the processor interrupt pin. When the TLIN1431x-Q1 requires the attention of the processor, this pin is pulled low.

8.3.19 nRST (Reset Input and Reset Output)

The nRST pin is a bi-directional open-drain low side driver that serves three functions, a V$_{CC}$ monitor output for under-voltage events, restart mode indicator and a device input reset. The pin is nRST in Pin Control Mode and the defaulted function for SPI mode. This pin is internally pulled up to V$_{INT}$ by a 45 kΩ resistor. V$_{INT}$ represents the TLIN1431-Q1 IO voltage level and may or may not be V$_{CC}$. It is recommended to use an external 10 kΩ pull-up to the processor IO voltage rail. The pin can determine when an input pulse of t$_{nRSTIN}$ is applied causing the device to enter restart mode. When an under-voltage event takes place, the nRST is latched low after a 30 µs filter and the device transitions to restart mode, fail-safe mode disabled, or fail-safe mode after the t$_{UVFLTR}$ has expired. When in restart and V$_{CC}$ exceeds the UV$_{CCR}$ threshold, the t$_{RSTN\_act}$ timer starts. After this timer times out, the device transitions to standby mode, and the nRST pin is released. If a thermal shutdown event takes place, the signal is pulled to ground. When the device is configured by SPI, the pin can be programmed to become the watchdog output trigger to reset the processor. When the watchdog times out, this signal is pulled low for time of t$_{NRST\_TOG}$ and then released back to V$_{CC}$. If both are needed for SPI configuration it is recommended to add an external circuit off the LIMP pin to serve as the watchdog output trigger to reset the processor. Note the LIMP pin output is a high voltage output based upon V$_{SUP}$ and care must be taken when connecting to a lower voltage device.

8.3.20 V$_{CC}$ (Supply Output)

The V$_{CC}$ terminal is the regulated output based on the applicable voltage, 3.3 V or 5 V with up to 125 mA from 12 V supply voltage. This pin is used to power external devices and when using high-k boards and thermal management best practices full capability can be realized. The regulated voltage accuracy is ±2.5%.