"Deep Sleep" Load Switch Prevents Battery Discharge During Product Shipment

From GLF Integrated Power, a producer of ultra-low-power battery protection ICs for portable and wearable electronics, the GLF76321 IQSmart IC is a load switch with a "Deep Sleep" power conservation mode. While in this mode, the device operates with a typical standby current (I_{SD}) of just 7 nA – which is negligible compared to the typical self-discharge of Li-ion batteries. By virtually disconnecting the battery during shipment and storage, the GLF76321 enables products to operate immediately out of the box without the need for recharging.

The prolonged idle state of an electronic product during shipment and storage is one of the major contributors to battery discharge and sometimes of its rechargeable battery's longevity. Some vendors prefer to ship their products without batteries or to insert a mechanical barrier to prevent discharge.

Nevertheless, many products are shipped with batteries pre-installed and charged. Self-discharge for Li-Ion batteries is 5% in first 24 hours and approximately 1% to 2% per month. Without disconnecting the battery, the system leakage can contribute an additonal 3% to 5% (and up to 10% per month) to the discharge. For this reason, most pre-installed battery-powered devices require an initial recharge by the customer upon opening the product. GLF solves this battery-life issue by offering an ultra-low leakage current that is up to 50 times lower than similar devices.

"The GLF76321 IQSmart IC completely changes the battery-charging scenario for mobile, wearable and IoT device OEMs," said Eileen Sun, president, and CEO at GLF Integrated Power. "Now they can store and ship their devices with confidence. The GLF76321's Sleep Mode basically disconnects the battery from the system during storage and shipping—and then reconnects and enables operation with a simple push of a button." (See Figs. 1 and 2.)

The GLF76321 supports two methods for entering/leaving Deep Sleep mode. User operation can be initiated or exited by pulling the SRO pin to low for a predefined delay; or for logic or interrupt control by a signal to the OFF pin. The GLF76321 includes an integrated 1-ms slew rate control and output discharge functions. The GLF76X21 family also includes devices with True Power Reset option. Other specs include an output rating of 2 A, an input range of 1.5 V to 5.5 V.

The GLF76x21 is available in 0.97-mm x 1.47-mm x 0.55-mm wafer-level chip-scale package (WLCSP). For more information, see the GLF76321 product page.

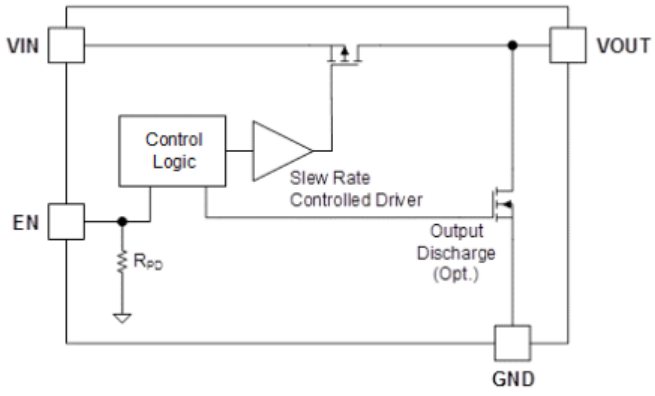
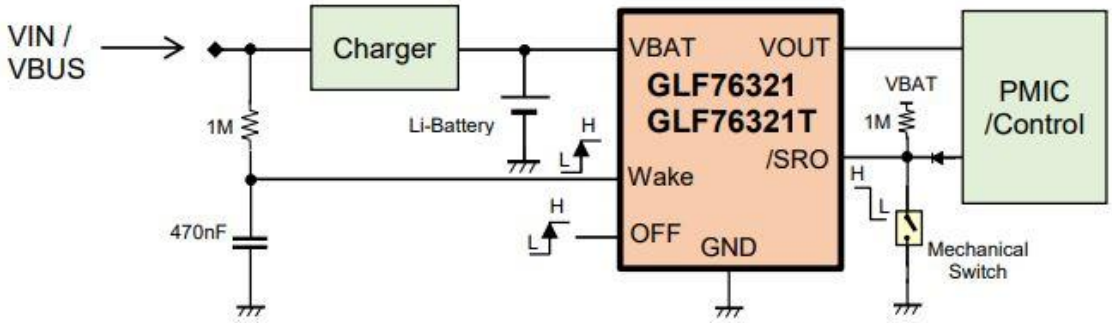
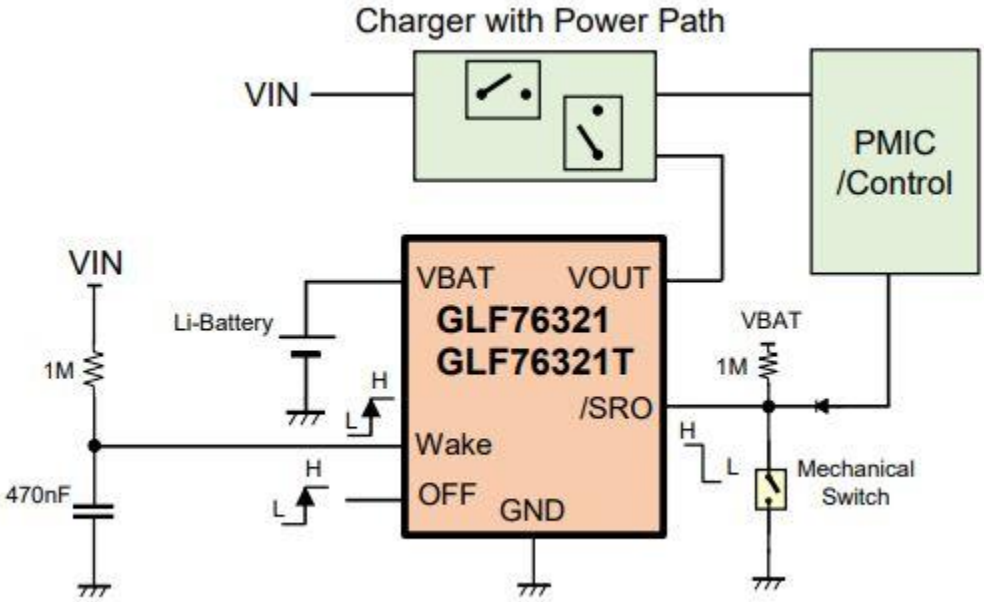


Fig. 1.Intended for use in portable devices, the GLF76321 IQSmart load switch draws just 7 nA in standby, which is negligible compared to the typical self-discharge of Li-ion batteries. This chipscale packaged IC (shown on left) enables wearables, mobile and IoT devices to be shipped and stored with charged batteries so they can operate right out of the box. The GLF76321 includes integrated 1-ms slew rate control and output discharge functions.



(a)



(b)

Fig. 2. Typical application circuits. The GLF76321 load switch can be used in combination with a standalone charger IC (a) or a charger that incorporates power path switching (b).