



Improve power consumption and system protection

Electronics power management load switch ICs

Load switches play a critical role in electronic systems. Load switch ICs are non-discrete electronic switches used for power management to control the power supply, by turning on and turning off a power rail to a load. The NPS4053 5.5 V 55 mOhm load switch switch limits the output current to a constant current by using a constant-current mode when the output load exceeds the current limit threshold or shorted. An internal voltage comparator disables the load switch when the output voltage is higher than the input to protect devices on the input side of the switch. The FLG pin is an active low output to indicate overcurrent, over temperature and reverse voltage conditions.

Features and Benefits

- › Wide Input voltage: 2.5 V to 5.5 V
- › 110 mA to 2.5 A adjustable current limit to meet multiple applications
- › Adjustable current limit version to simplify circuit design
- › ILIM pin can be shorted to GND or floating to make system robust
- › 6% current limit accuracy at 1.2 A
- › Active reverse current blocking to prevent previous system from damage
- › 15 kV ESD Protection per IEC 61000-4-2
- › Constant-on or latch-off after over current

Applications

- › Laptops, notebooks and PCs
- › USB ports/hubs, docking station and desktops
- › Set top box
- › HDTV
- › VoIP phones
- › Printers
- › Optical socket protection
- › Current limiting circuits

Nexperia Load Switch Power Management

Nexperia NPS40XX load switch ICs are highly integrated Power Management Integrated Circuits (PMICs) designed to efficiently control power rails within electronic systems. Load switches serve as indispensable components for managing power distribution and enabling the smooth operation of various loads. Nexperia load switch ICs consist of a voltage input pin, a voltage output pin, an ON pin (this pin is named EN for some devices) and a ground pin. When a voltage is applied to the input pin, the load switch IC remains in an off-state until the enable pin is triggered or driven to its enabled state. This means that the load switch pass element (typically a MOSFET) will only activate and allow current to flow to the output once the enable pin is set high or low depending on its active state. Nexperia load switch ICs ensure precise control over power delivery, making them an ideal choice for efficient and reliable power management in electronic systems.

Nexperia's load switches include features such as fault control to determine fault events, True Reverse Current Blocking (TRCB), and Over Temperature Protection (OTP). Load switches are comprised of an internal pass FET that acts like a relay to turn on and off the output voltage depending on the state of the EN signal. Each load switch has a characteristic on-resistance that is primarily determined by the FET used in the load switch. The NPS40XX series of load switch has a fault flag response pin which asserts low under the following conditions: overcurrent, over temperature and reverse voltage conditions. This allows the user to know if something is wrong downstream as well as if the load switch itself has any issues. The NPS40xx series of load switch has a constant current limit control built in that limits current at the load when the current through the pass FET has been exceeded. This behaves as an over current protection for downstream devices connected to OUT.

Nexperia's NPS40XX load switches are designed in plastic thermal enhanced ultra thin small outline packages, no leads; 6 terminals; 0.65 mm pitch; 2.0 mm x 2.0 mm x 0.75 mm. Nexperia's load switches are well suited for many products, including smartphones, tablets, laptops, digital cameras, watches and wearables, portable instruments, as well as other battery-operated devices as well as a large range of industrial, consumer, computing and automotive applications.

Ordering Information

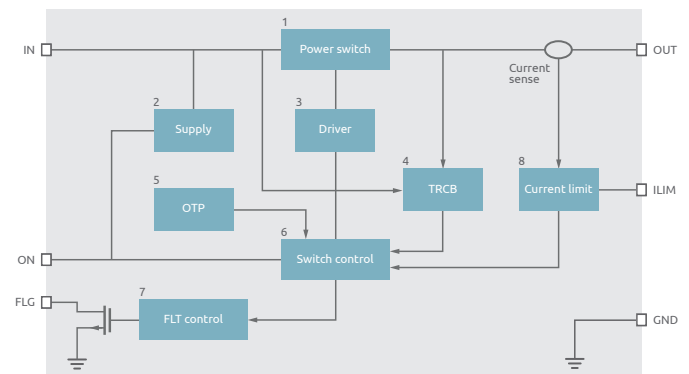
Type number	Package			Version
	Temperature range	Name	Description	
NPS4053GH	-40 °C to +125 °C	HWSON6	Plastic thermal enhanced very very thin small outline packages, no leads; 6 terminals; 0.65 mm pitch; 2.0 mm x 2.0 mm x 0.75 mm body	SOT8044-1

Benefits of Load Switch in Power Chain Design

One of the benefits of using load switches in the power chain is the control of point-of-load power sequencing. Controlling the sequencing of the power rails also helps control the amount of inrush current to the load during power-up. This ultimately reduces the stress on the system and prevents any unwanted reverse bias conditions. Many designs, including those that use processors, must adhere to a strict power sequence to properly function. When loads are not being used by the system, the load switch can be put into standby mode by toggling the EN pin. This effectively disables the integrated circuit and the downstream load.

An advantage of integrated load switches over discrete solutions is that they combine multiple functions into a single device, including the switch itself, driver circuitry, protection features, and diagnostic capability. This integration eliminates the need for external components, such as MOSFETs and resistors, which simplifies the design process and reduces overall system cost. Additionally, integrated load switches offer better thermal performance, higher switching speeds, and smaller form factors than discrete components. They also provide more reliable and consistent performance due to the tight integration of components and better control over manufacturing processes. Overall, the use of integrated load switches can lead to significant improvements in system performance, cost-effectiveness, and space utilization.

Block diagram – NPS40XX Load Switch



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