MAX16969

500mA–3A Automotive Hi-Speed USB Protector with Apple iPod Fast-Charge Detection and USB Host-Charger Port Detection

Fully Integrated Automotive-Grade USB Protector with Apple and USB Host Charger Detection

Request Full Data Sheet

Description

The MAX16969 provides high-ESD and short-circuit protection for the low-voltage internal USB data and USB power line in automotive radio, navigation, connectivity, and USB hub applications. The device supports both Hi-Speed USB (480Mbps) and full-speed USB (12Mbps) operation. In addition, the device also includes integrated circuitry to enable fast-charging for consumer devices adhering to either the Apple method or the Hi-Speed USB host-charger port-detection protocol.

The short-circuit protection features include short-to-battery on the protected HVBUS, HVD+, and HVD- outputs, as well as short-to-HVBUS on the protected HVD+ and HVD- outputs. The device is capable of a short-to-battery condition of up to +18V. Short-to-GND and overcurrent protection are also provided on the HVBUS output to protect the internal BUS power rail from overcurrent faults.

The device features high-ESD protection to ±15kV Air Gap method and ±8kV Contact method on all protected HVBUS, HVD+, and HVD- outputs.

The device features two low 4.0Ω on-resistance Hi-Speed USB switches, a current-limited low-voltage 22mΩ BUS switch, and provides an integrated high-voltage external power-switch controller. The BUS switch can start up into large capacitive noncompliant USB loads. The device also features an enable input, a fault output, integrated Apple iPod®/iPhone® fast-charging termination resistors, and an integrated host-charger port-detection circuit adhering to the USB 2.0 battery charging specification.

The device is available in a 16-pin QSOP package, and operates over -40°C to +105°C temperature range.

Key Features

- Two 4.0Ω (typ) R_{ON} USB 2.0 Data Switches
- Current-Limited 22mΩ (typ) BUS Switch with High-Capacitive Load Capability
- 480Mbps or 12Mbps USB 2.0 Operation
- Short-to-Battery and Short-to-GND Protection on Protected HVBUS Output
- Short-to-Battery and Short-to-HVBUS Protection on Protected HVD+ and HVD- Outputs
- 20ms Fault-Blanking Timeout Period
- Integrated Overcurrent and Short-Circuit Autoretry
- Integrated Apple iPod Fast-Charge Termination Resistors
- Integrated USB Host-Charger Port-Detection Circuitry
- High ESD Protection (HVD+, HVD-, HVBUS)
    - ±15kV Human Body Model
    - ±15kV IEC 61000-4-2 Air Gap
    - ±8kV IEC 61000-4-2 Contact
- 16-Pin (3.90mm x 4.94mm) QSOP Package
- -40°C to +105°C Operating Temperature Range
- AEC-Q100 Qualified

Applications/Uses

- Automotive USB Protection
- Rapid Charging for Apple-Compliant Devices

• Device	Fab Process	Technology	Sample size	Rejects	FIT at 25°C	FIT at 55°C
MAX16969DGEE/V+*	S4	BiCMOS	1492	0	0.14	2.42
MAX16969BGEE/V+CLV*	S4	BiCMOS	1492	0	0.14	2.42
MAX16969EVKIT+*	S4	BiCMOS	1492	0	0.14	2.42
MAX16969BGEE/V+*	S4	BiCMOS	1492	0	0.14	2.42
MAX16969BGEE/V+T*	S4	BiCMOS	1492	0	0.14	2.42
MAX16969DGEE/V+T*	S4	BiCMOS	1492	0	0.14	2.42

Note : The failure rates are summarized by technology and mapped to the associated material part numbers. The failure rates are highly dependent on the number of units tested.

Quality Management System >
Environmental Management System >

Key Specs

Part Number	USB	Power Switches	Data Switches	Current Limit (mA)	Current Limit (mA)	Fault Indicator	Current Limit Accuracy (%)	Current Limit Set By	Lowest Adj. Setting (A)	R_{ON} (Ω)	V_{SUPPLY} (V)	V_{SUPPLY} (V)	Supported Charging Configurations	Oper. Temp. (°C)	Package/ Pins
				min	max					typ	min	max			
MAX16969	Yes	1	1	500	3000	Yes	20	Resistor	0.67	0.022	4.75	5.25	BC1.1 iPod/iPhone	-40 to +105	See Data Sheet