



ACE40318N

I²C Control 3A, Single Cell Li-Ion DC/DC Switching Charger

Description

The ACE40318N is a fully-integrated switching battery charger with system power path management devices for single cell Li-ion and Li-polymer battery in a wide range of tablet and other portable devices. Its low impedance power path optimizes switching conversion efficiency, reduces battery charging time and extends battery life during the discharging mode. The I²C serial interface with charging and system settings makes the device a truly flexible solution.

The device supports a wide range of input sources, including standard USB port and high power DC adapter. The ACE40318N takes the result from detection circuit in the system, such as USB PHY device. The ACE40318N meets USB On-the-Go operation power rating specification by supplying 5.15V (programmable) on BUS with current limit up to 1.2A (programmable).

The power path management regulates the system voltage slightly above battery voltage but does not drop below 3.5V minimum system voltage (programmable). With this feature, the switching converter will keep working to support the system load even when the battery is completely depleted or removed. When the input current limit or voltage limit is reached, the power path management will reduce the charging current to zero firstly. If the system load continues to increase, the power path will discharge the battery to provide the power required by system. This supplement mode operation prevents overloading the input source.

The device initiates and completes a charging cycle without software control. It automatically detects the battery voltage and charges the battery in five phases: battery short, preconditioning, constant current and constant voltage and top-off charging (optional). At the end of the charging cycle, the charger automatically will terminate when the charge current is below a preset limit in the constant voltage phase. When the full battery falls below the recharge threshold, the charger will automatically start another charging cycle. The ACE40318N can be compliant with JEITA spec for the 4.2V Li-ion battery.

The device provides various safety features for battery charging and system operation, including negative thermistor monitoring, charging safety timer and over-voltage / over-current protections. The thermal regulation will reduce charge current when the junction temperature exceeds 110°C (programmable).

The STAT output reports the charging status and any fault conditions. The /PG output in the ACE40318N indicates if a good power source is present. The INT immediately will notify the host when a fault occurs.



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Features

- High Efficiency 3A 1.5MHz Buck Mode Charger
- Support 3.9V-13.5V Input Voltage Range
- Programmable IDPM/VDPM to Support the USB and Adapter
- 3.856V-4.624V Adjustable Charge Voltage
- Support Narrow VDCPower Path Management
- JEITA Compliance
- $\pm 0.5\%$ Charge Voltage Regulation
- Charge Status Outputs for LED or Host Processor
- Maximum 1.2A 1.5MHz Boost OTG Current
- 4.85V-5.3V Adjustable OTG Output Voltage
- Selectable OTG Output Current Limit
- $\pm 1.5\%$ Output Regulation in Boost Mode
- Soft-Start up to 500 μ F Capacitive Load
- Constant Current (CC) Limit
- Full BATFET Control to Support Shipping Mode, Wake up, and System Reset
- Safety
- Battery Temperature Sensing for Charge and Boost Mode
- Battery Charging Safety Timer
- Thermal Regulation and Thermal Shutdown
- Input/System over-Voltage Protection
- MOSFET over-Current Protection
- Low Battery Leakage Current and Support Shipping Mode

Application

- Smart Phone
- Tablet PC
- Power Bank
- Portable Internet Devices



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Absolute Maximum Ratings (Note 1)

Parameter		Value
BUS, VAC, PMID, LX		-0.3V to 18V
BAT, SYS, REGN, PSEL, /PG, STAT, SCL, SDA, /INT, /CE, NTC, /QON, BST-LX		-0.3V to 6V
Package Thermal Resistance (Notes 2)	θ_{JA}	27.5°C/W
	θ_{JC} (top)	18°C/W
	θ_{JB}	8°C/W
	ψ_{JT}	0.35°C/W
Junction Temperature Range		-40°C to 150°C
Operating Temperature Range		-40°C to 150°C
Storage Temperature		-65°C to 150°C
Lead Temperature (Soldering, 10s)		300°C
ESD Susceptibility	HBM (Human Body Mode)	2kV
	CDM (Charged Device Mode)	200V

Recommended Operating Conditions (Note 3)

Parameter		Value
BUS, VAC, PMID, LX		0V to 16V
BAT, SYS, REGN, PSEL, /PG, STAT, SCL, SDA, /INT, /CE, NTC, /QON, BST-LX		0V to 5.5V
Junction Temperature Range		-40°C to 125°C
Ambient Temperature Range		-40°C to 85°C

Note 1: Stresses beyond the “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Note 2: θ_{JA} is tested under still air while ambient temperature 25°C and mounted on a 4-layer high effective PCB with thermal via in accordance with JESD51-5, -7.

Note 3: The device is not guaranteed to function outside its operating conditions.

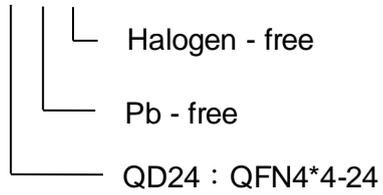


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Ordering Information

ACE40318N XX + H



Halogen - free

Pb - free

QD24 : QFN4*4-24



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Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Technology Co., LTD. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ACE Technology Co., LTD.
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