

Single chip Li-ion and Li-polymer battery protection device

MTC-80904

Product Brief

Rev.1.5 - September 17, 2002

1.1 General Description

The MTC-80904 offers a total solution for the protection of single cell Li-ion and Li-polymer battery packs. The IC offers full battery protection functionality without the need for any external components. As such, the MTC-80904 offers a very compact & complete solution for full battery protection in a wide range of portable applications.

1.2 Applications

The MTC-80904 is designed for use in single cell Li-ion and Li-polymer battery packs for a wide range of applications like cell phones, PDAs, headphones and digital cameras.

1.3 Features

The MTC-80904 is built as a mono-lithic integration of a protective device and a fully bi-directional low ohmic switch.

Levels of Protection:

- Cell over-voltage protection 4.2 - 4.35 V
- Cell under-voltage protection 2.50 V
- Over-charge current protection (DC max) 4 A
- Over-discharge current protection (DC max) 2.4 A
- Short circuit protection (max) 6 A
- Reverse polarity protection
- Battery cell over-temperature protection 80 °C

Electrical characteristics:

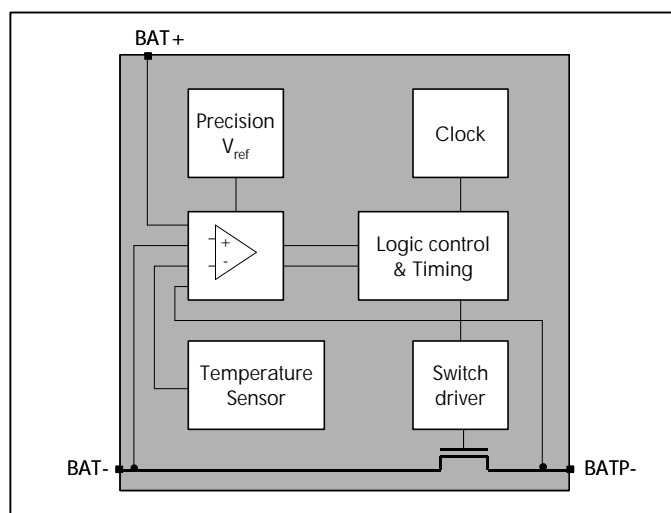
- Voltage level accuracy $\pm 20\text{mV}$
- Current consumption in under-voltage mode $< 1\mu\text{A}$
- Normal operating current $< 10\mu\text{A}$
- On-resistance $= 50\text{ m}\Omega$

Package:

- Land Grid Array (LGA) package (LxWxH) 9 x 3.5 x 0.95 mm

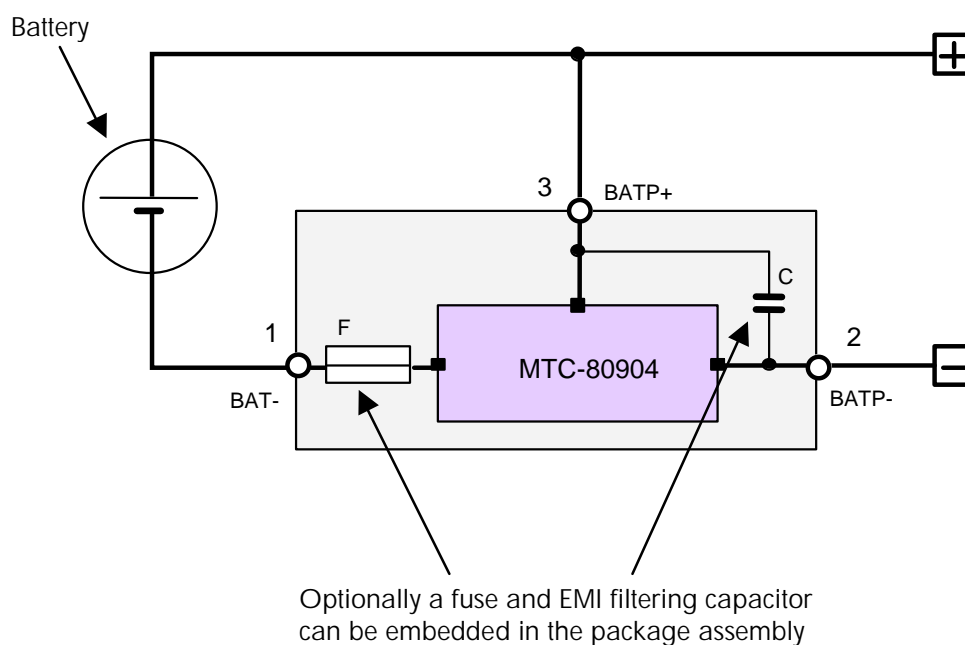
1.4 Ordering Information

For more information about local sales offices: mixed_battery_europe@amis.com



Block Diagram

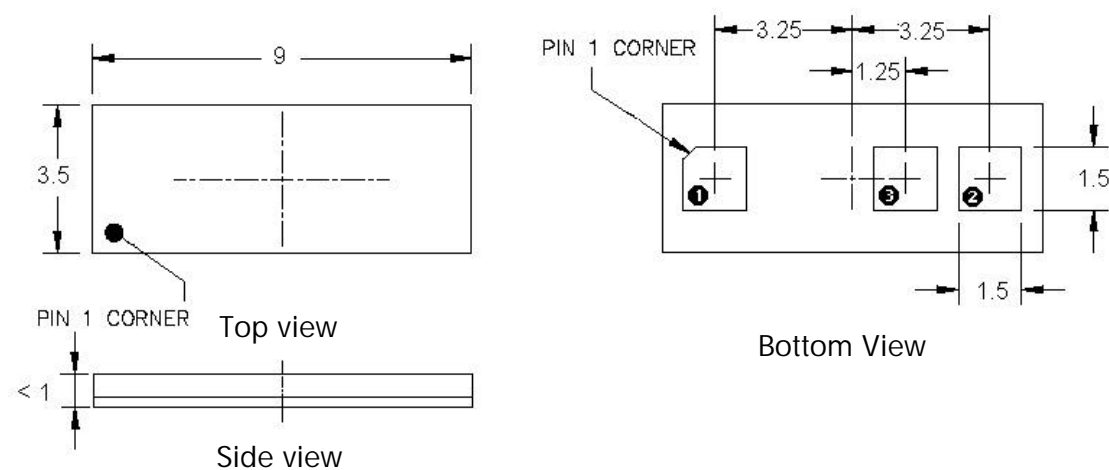
2. Typical Application Diagram



3. Pin Configuration

3.1 Land Grid Array

(all dimensions are typical values in mm)



3.2 Pin Description

Pin	Symbol	Pin description
❶	BAT-	Battery min connection
❷	BATP-	Battery pack min connection
❸	BATP+	Positive Supply connection of ic

Remark: BATP + = BAT +

4. Functional description

4.1 Absolute Maximum Ratings

PIN	Condition	Min	Max	Unit
VBATP+ (3)	VBAT- (1)=0	-0.3	20	V
	VBATP- (2)=0	-0.3	20	V
	VBAT- (1)=0 & VBATP- (2)= VBATP+ (3)	-16	20	V
	VBATP- (2)=0 & VBAT- (1)= VBATP+ (3)	-16	20	V
VBATP- (2)	VBAT- (1)=0	-16	16	V
VBAT- (1)	VBATP- (2)=0	-16	16	V

Absolute Maximum ratings are threshold limit values that must be not exceeded ever for an instant under any conditions. Operation above these absolute maximum ratings may cause degradation or permanent damage to the device. These are stress ratings only and do not necessarily imply functional operation below these limits.

4.2 Electrical Characteristics

Operating ranges: -20 to 80°C ambient. Unless noted otherwise all parameters are specified at Tamb = 25°C

4.2.1 Current consumption

Parameter	Conditions	Min	Typ	Max	Units
Sleep mode	V < UV, no charger		0.8	1	μA
Operating current	V between UV and OV, low current through switch		7	10	μA
Charge mode	charger connected			100	μA

Note : The specified figures for maximum bias current are averages over a large time interval.

4.2.2 Switch on-resistance

Parameter	Conditions	Min	Typ	Max	Units
R-on	normal operation mode; UV < V < OV			50	mΩ

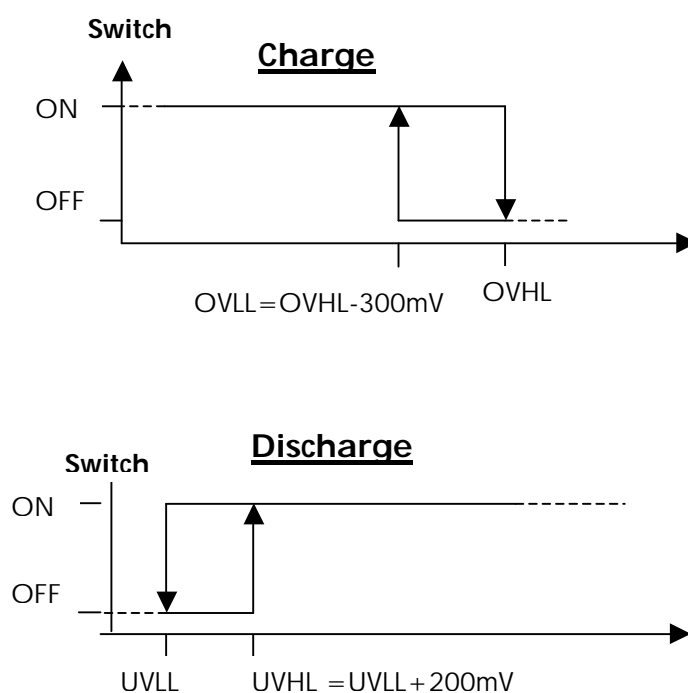
Note : The specified on-resistance is independent of the battery voltage in the normal operation mode.

4.2.3 Charge and discharge voltage limits

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Over voltage (high limit)	OVHL	Transition from normal to overcharge [1]		4.20 4.25 4.30 4.35		V
Overcharge release hysteresis	OVLL	Transition from overcharge to normal, level related to overcharge voltage [1]		-300		mV
Under voltage (low limit)	UVLL	From normal to under-voltage condition		2.50		V
Over-discharge release hysteresis	UVHL	From under-voltage to normal, level related to under-voltage detect		200		mV
Precision of voltage levels		25°C		20		mV

Note :

[1] The four different OVHL and OVLL levels are fixed during production



4.2.3 Charge and discharge current limits

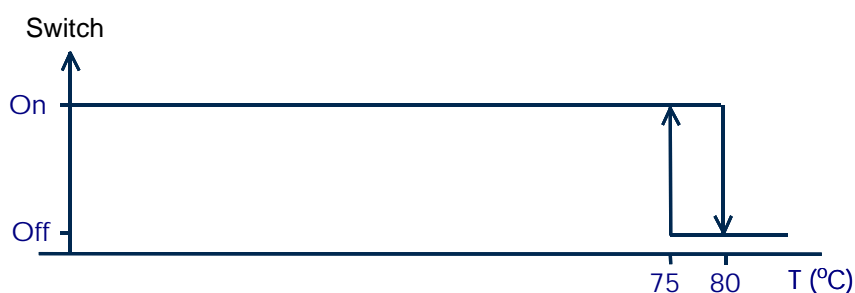
Parameter	Conditions	Min	Typ	Max	Units
Over-current-detect charging	Switch is ON	2	3	4	A
Over-current-detect discharging	Switch is ON	1.2	1.8	2.4	A
Short-circuit detection	Switch is ON	4	5	6	A

4.2.4 Timing characteristics

Parameter	Conditions	Min	Typ	Max	Units
Overcharge det. Time	delay time before interrupt charging		1		s
Underdischarge det. Time	delay time before interrupt discharging		1		s
Over-current detection delay		1	2	4	ms
Sampling interval time	time-out before new sample of the fault condition		100		ms
Short circuit			300		μs

4.3 Temperature protection

Parameter	Conditions	Min	Typ	Max	Units
Over-temperature	high temperature limit to interrupt charging		80		°C
temperature hysteresis			5		°C



5. Land Grid Array Package

The LGA package is ultra-compact. Typical maximum dimensions of the LGA package are listed in the table below.

Description	Typical Value	Unit
body length	9	mm
body width	3.5	mm
thickness	0.95	mm

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