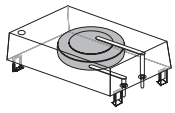
# M4Z28-BR00SH
# M4Z32-BR00SH

## ZEROPOWER® SNAPHAT® (battery)

## Features

- Provides battery backup power for non-volatile ZEROPOWER® and supervisor devices in the 28-pin SNAPHAT® SOIC package
- Removable battery avoids heat associated with surface-mount process
- Snaps directly onto surface-mounted SNAPHAT® SOIC
- Choice of battery capacities
  - M4Z28-BR00SH = 48 mAh
  - M4Z32-BR00SH = 120 mAh
- Keyed insertion to insure proper assembly
- Removable for replacement and proper disposal
- Pb-free package
- Available in tubes or tape & reel



SNAPHAT® (SH)
battery

# Contents

1 Description . . . . . 5

2 Mechanical information . . . . . 6

2.1 Battery characteristics . . . . . 7

2.2 UL recognition . . . . . 7

2.3 Battery life . . . . . 7

2.4 General notes . . . . . 7

3 Maximum ratings . . . . . 9

4 DC and AC parameters . . . . . 10

5 Package mechanical data . . . . . 11

6 Part numbering . . . . . 13

7 Environmental information . . . . . 14

8 Revision history . . . . . 15

# List of tables

Table 1. Signal names . . . . . 5
Table 2. Absolute maximum ratings . . . . . 9
Table 3. Operating and AC measurement conditions . . . . . 10
Table 4. SH – 4-pin SNAPHAT® housing for 48 mAh battery package mech. data . . . . . 11
Table 5. SH – 4-pin SNAPHAT® housing for 120 mAh battery package mech. data . . . . . 12
Table 6. Ordering information scheme . . . . . 13
Table 7. Document revision history . . . . . 15

# List of figures

Figure 1. Logic diagram . . . . . 5
Figure 2. SNAPHAT® insertion/extraction forces . . . . . 6
Figure 3. Battery discharge rates . . . . . 8
Figure 4. DIP extractor tool . . . . . 8
Figure 5. SH – 4-pin SNAPHAT® housing for 48 mAh battery package outline . . . . . 11
Figure 6. SH – 4-pin SNAPHAT® housing for 120 mAh battery package outline . . . . . 12
Figure 7. Recycling symbols . . . . . 14

# 1 Description

The M4Zxx-BR00SH SNAPHAT® top is a detachable lithium power source for ST's non-volatile ZEROPOWER® surface-mount SOIC (MH) package (28-pin).

The SNAPHAT top contains a lithium battery and is designed to be "snapped on" after the SOIC is surface mounted on the PC board. The two-piece solution prevents the battery from being exposed to the high temperatures of the surface mount process.

**Figure 1. Logic diagram**

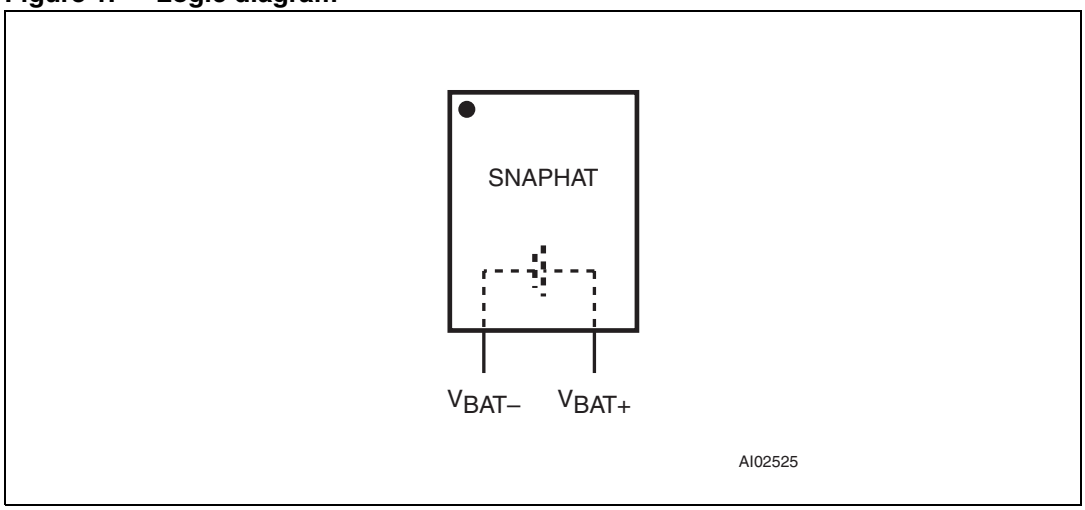



**Table 1. Signal names**

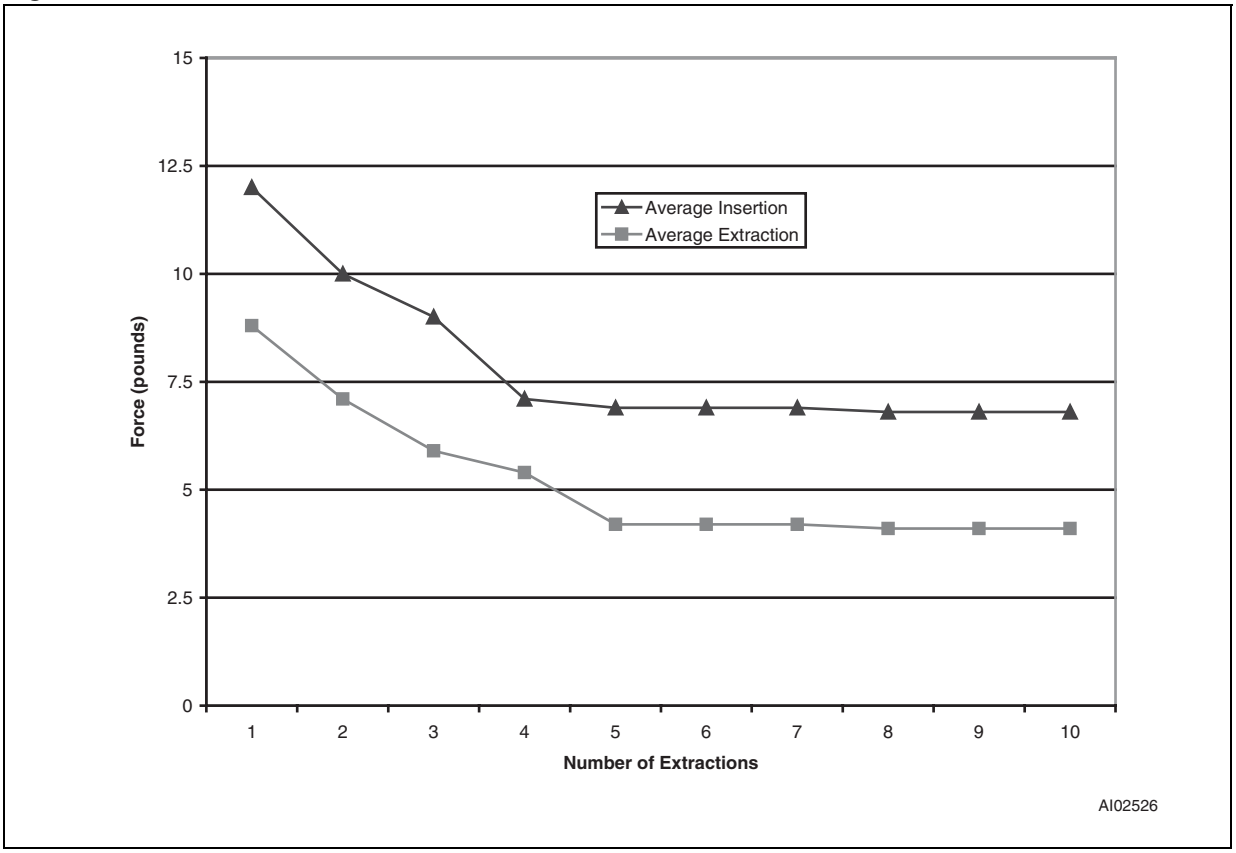
| | |
|---|---|
| $V_{BAT-}$ | Negative voltage |
| $V_{BAT+}$ | Positive voltage |

# 2 Mechanical information

Electrical connection to the SOIC is made through two pins that connect to the press fitted sockets at one end of the SOIC. Critical contact points between the pins and sockets are gold-plated to resist oxidation. Internally, each socket contains six independent contact fingers to form redundant connections between the two components. These sockets were designed to provide high point contact force to provide the lowest possible contact resistance. The SNAPHAT® top also incorporates four molded-in retaining clips which hold onto the ends of the SOIC insuring mechanical and electrical connection even under severe mechanical shock and vibration. The combined SOIC and SNAPHAT assembly can sustain shock levels in excess of 100 g without separating. This package also passes variable frequency testing in accordance with MIL-STD-883, method 2007.2, condition A.

*Figure 2* illustrates the affect of repeated insertion and extraction of the SNAPHAT top to the SOIC. The force required to extract the SNAPHAT, and then to re-insert it, reduces each time. After four or five extractions, the reduction starts to become unnoticeable and the force required remains at a fairly constant figure. Typically, though, the SNAPHAT will only need to be extracted and re-inserted once in its lifetime.

**Figure 2. SNAPHAT® insertion/extraction forces**



## 2.1 Battery characteristics

*Figure 3 on page 8* illustrates the lithium coin cell discharge rate for a given load. This demonstrates the characteristically flat voltage level supplied by the battery until very near the end of its life. These discharge levels have been greatly accelerated in comparison to the normal, actual usage.

*Note: These batteries contain no mercury (Hg), cadmium (Cd), or lead (Pb).*

## 2.2 UL recognition

The M4Zxx-BR00SH has been recognized by Underwriters Laboratories under their Component Recognition Program and carries U.L. File Number E89556.

## 2.3 Battery life

For information on data retention life and battery storage life, please refer to the application note AN1012.

## 2.4 General notes

ST has conducted experiments using a manual press which determined that if approximately 60 pounds of force is applied to the top of the SNAPHAT®, battery damage and/or die cracks could be induced. As *Figure 2 on page 6* specifies, only an average of less than 13 force-pounds is required for proper insertion. We recommend that no more than 40 pounds of force be applied during SNAPHAT® insertion.

If a manual press is employed, it is very important that it be calibrated such that it cannot exceed this limit.

To remove the SNAPHAT® top for replacement, a DIP/IC extractor tool should be used (see Figure 4). The SNAPHAT top should be grabbed by the narrow end to avoid bending the pins.

**Caution:** To avoid draining battery do NOT place SNAPHAT pins into conductive foam.

**Caution:** To avoid damaging SNAPHAT sockets do NOT wave solder SOIC.

**Figure 3. Battery discharge rates**

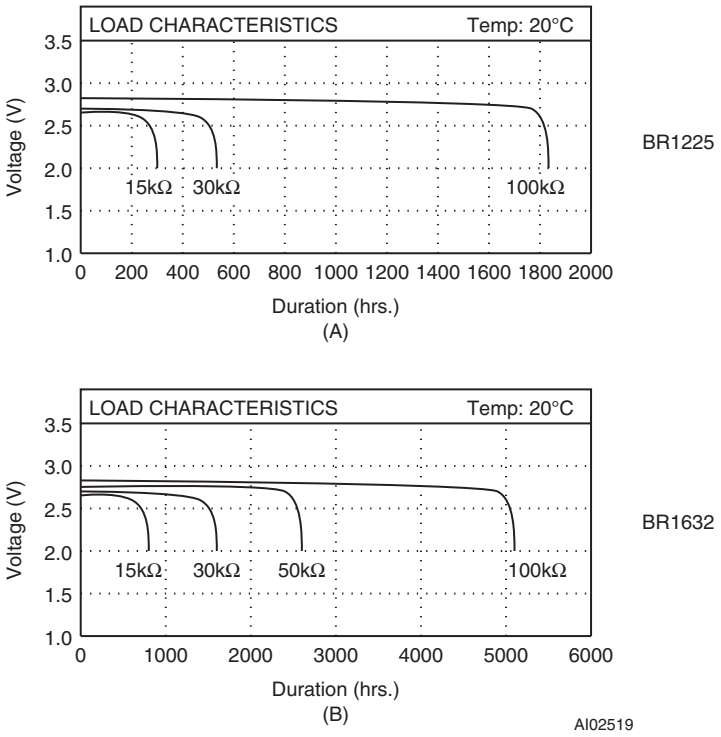
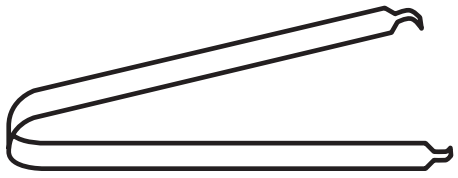



**Figure 4. DIP extractor tool**



# 3 Maximum ratings

Stressing the device above the rating listed in the absolute maximum ratings table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Refer also to the STMicroelectronics SURE Program and other relevant quality documents.

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $T_A$ | Ambient operating temperature | –40 to 85 | °C |
| $T_{STG}$ | Storage temperature ($V_{CC}$ off, oscillator off) | –40 to 85 | °C |

**Caution:** *Do NOT wave solder SOIC to avoid damaging SNAPHAT® sockets.*

# 4 DC and AC parameters

This section summarizes the operating and measurement conditions, as well as the DC and AC characteristics of the device. The parameters in the following DC and AC characteristic tables are derived from tests performed under the measurement conditions listed in the relevant tables. Designers should check that the operating conditions in their projects match the measurement conditions when using the quoted parameters.

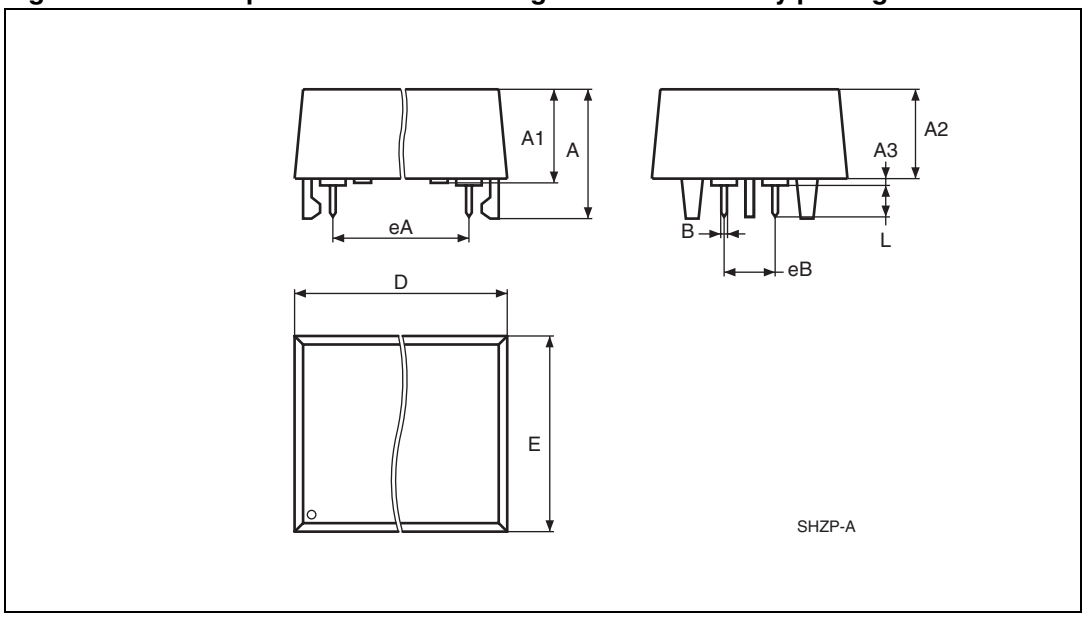
**Table 3. Operating and AC measurement conditions**

| Parameter | M4Z28-BR00SH | M4Z32-BR00SH | Unit |
|---|---|---|---|
| Nominal battery voltage ($V_{CC}$) | 2.8 | 2.8 | V |
| Nominal battery capacity | 48 | 120 | mAh |
| Battery chemistry | Li(CF) | Li(CF) | |

# 5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

**Figure 5. SH – 4-pin SNAPHAT® housing for 48 mAh battery package outline**

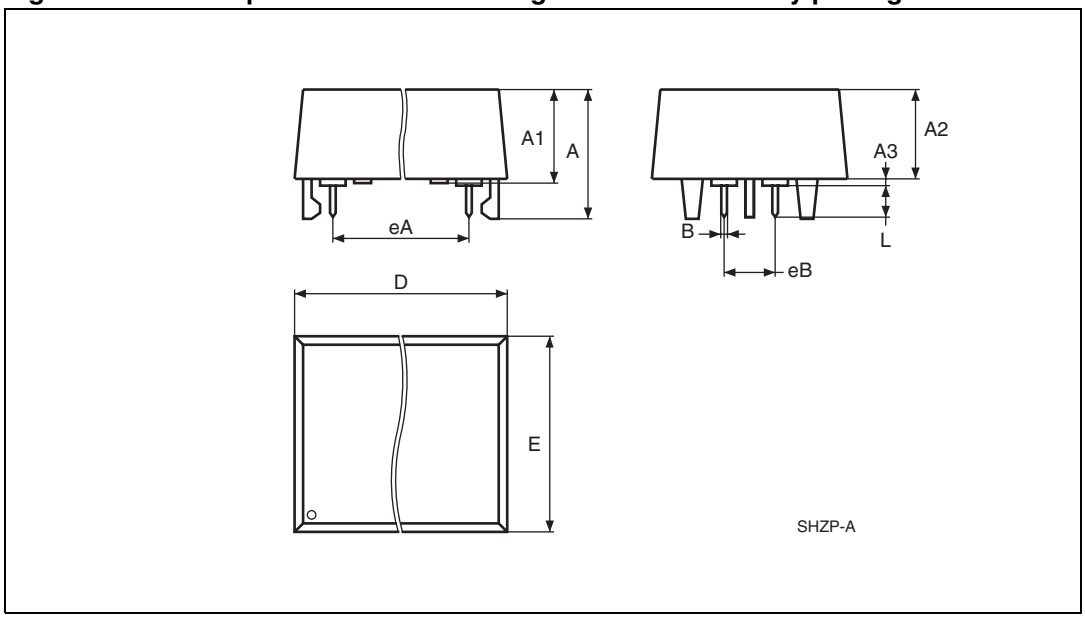



*Note: Drawing is not to scale.*

**Table 4. SH – 4-pin SNAPHAT® housing for 48 mAh battery package mech. data**

| Symbol | mm | | | inches | | |
|---|---|---|---|---|---|---|
| | Typ | Min | Max | Typ | Min | Max |
| A | | | 9.78 | | | 0.385 |
| A1 | | 6.73 | 7.24 | | 0.265 | 0.285 |
| A2 | | 6.48 | 6.99 | | 0.255 | 0.275 |
| A3 | | | 0.38 | | | 0.015 |
| B | | 0.46 | 0.56 | | 0.018 | 0.022 |
| D | | 21.21 | 21.84 | | 0.835 | 0.860 |
| E | | 14.22 | 14.99 | | 0.560 | 0.590 |
| eA | | 15.55 | 15.95 | | 0.612 | 0.628 |
| eB | | 3.20 | 3.61 | | 0.126 | 0.142 |
| L | | 2.03 | 2.29 | | 0.080 | 0.090 |

**Figure 6. SH – 4-pin SNAPHAT® housing for 120 mAh battery package outline**




*Note: Drawing is not to scale.*

**Table 5. SH – 4-pin SNAPHAT® housing for 120 mAh battery package mech. data**

| Symbol | mm | | | inches | | |
|---|---|---|---|---|---|---|
| | Typ | Min | Max | Typ | Min | Max |
| A | | | 10.54 | | | 0.415 |
| A1 | | 8.00 | 8.51 | | 0.315 | 0.335 |
| A2 | | 7.24 | 8.00 | | 0.285 | 0.315 |
| A3 | | | 0.38 | | | 0.015 |
| B | | 0.46 | 0.56 | | 0.018 | 0.022 |
| D | | 21.21 | 21.84 | | 0.835 | 0.860 |
| E | | 17.27 | 18.03 | | 0.680 | 0.710 |
| eA | | 15.55 | 15.95 | | 0.612 | 0.628 |
| eB | | 3.20 | 3.61 | | 0.126 | 0.142 |
| L | | 2.03 | 2.29 | | 0.080 | 0.090 |

# 6 Part numbering

**Table 6. Ordering information scheme**

Example: M4Z 28-BR00 SH 1 TR

**Device type**

M4Z

**Battery voltage and capacity**

28-BR00 = BR1225, 3 V, 48 mAh

32-BR00 = BR1632, 3 V, 120 mAh

**Package**

SH = SNAPHAT®

**Temperature range**

1 = –40 to 85°C

**Shipping method**

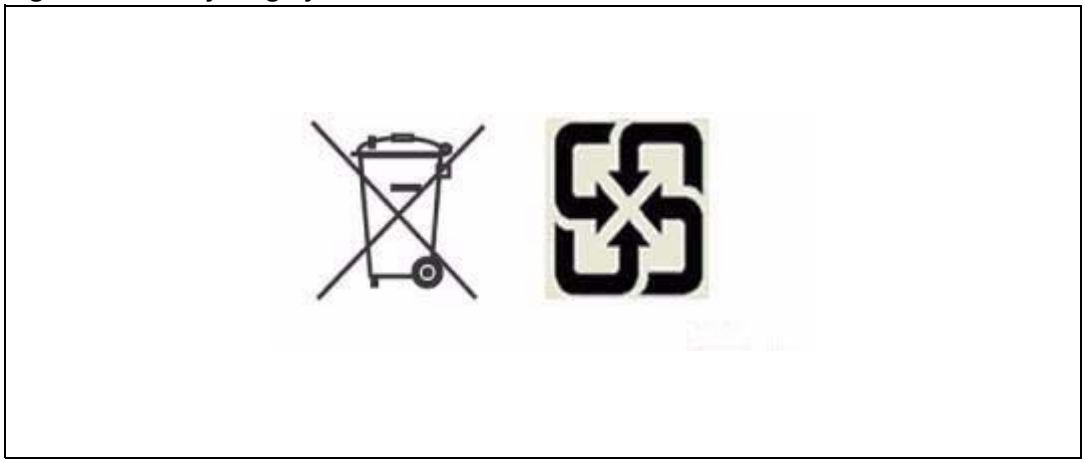
blank = ECOPACK® package, tubes

TR = ECOPACK® package, tape & reel

For a list of available options (e.g., speed, package) or for further information on any aspect of this device, please contact the ST sales office nearest to you.

# 7 Environmental information

**Figure 7. Recycling symbols**



This product contains a non-rechargeable lithium (lithium carbon monofluoride chemistry) button cell battery fully encapsulated in the final product.

Recycle or dispose of batteries in accordance with the battery manufacturer's instructions and local/national disposal and recycling regulations.

Please refer to the following web site address for additional information regarding compliance statements and waste recycling.

Go to www.st.com/nvram, then select "Lithium Battery Recycling" from "Related Topics".

# 8 Revision history

**Table 7. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| Nov-1999 | 1 | First issue |
| 29-May-2001 | 2 | Reformatted |
| 04-Jun-2001 | 2.1 | Basic textual changes from reformatting activity |
| 10-Jul-2001 | 2.2 | Remove references to “crystal;” change references to “supervisor” from controller; clarify temperature characteristics |
| 21-Jan-2002 | 2.3 | Change to include crystal accuracy (*Table 3.*); add text for SNAPHAT® insertion force tolerance and battery characteristics note |
| 20-Aug-2002 | 2.4 | Update insertion/extraction forces (*Figure 2.*) |
| 14-Mar-2003 | 2.5 | Add Pb-free note on page 1 |
| 26-Feb-2009 | 3 | Reformatted document; updated *Section 5: Package mechanical data*, *Section 2.4: General notes*, and *Table 6*; added *Section 7: Environmental information*. |

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