



## SNAPHAT™ WITH INTEGRATED BATTERY AND CRYSTAL

### FEATURES

- Detachable Unit Allowing Replacement
- Integrated 6-pF Watch Crystal for Real-Time Clock Operation
- Integrated Lithium Coin Cell for Nonvolatile Memory Backup
- Protects Battery and Crystal From Conditions Associated with Surface Mount Soldering
- For Use With bq4802YDSH and bq4802LYDSH
- Keyed Insertion to Avoid Incorrect Attachment

### APPLICATIONS

- Telecommunications Base Stations
- Servers
- Handheld Data Collection Equipment

### DESCRIPTION

The bq48SH-28x6 is the top section suitable for any SOIC (DSH) packaged IC including the bq4802YDSH or bq4802LYDSH parallel real-time clock (RTC) and NVSRAM controller.

The fully integrated SNAPHAT™ includes a 6-pF watch crystal and lithium coin cell with 48 mAh of capacity.

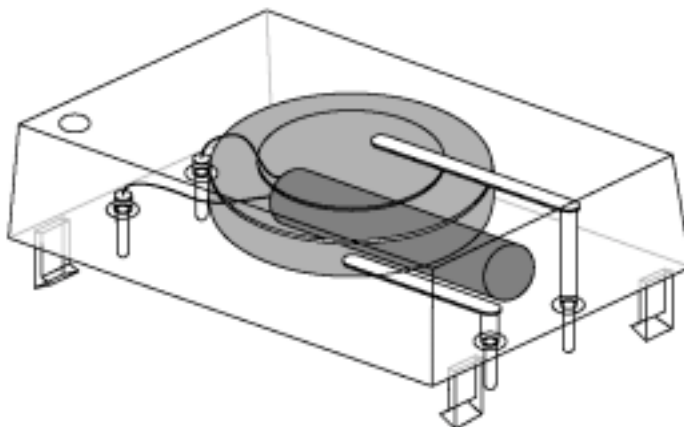
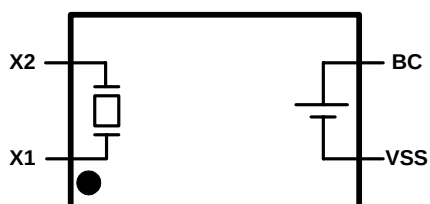
The SNAPHAT™ is designed to be attached after the DSH packaged base SOIC has been soldered preventing the battery and crystal being over-stressed by the soldering temperatures.

#### AVAILABLE OPTIONS

| T <sub>A</sub> | PACKAGED DEVICES | SYMBOL      |
|----------------|------------------|-------------|
|                | SNAPHAT™† (NSH)  |             |
| 0°C to 70°C    | bq48SH-28x6NSH   | bq48SH-28x6 |

† The SNAPHAT™ package is available taped and reeled. Add an R suffix to the device type (e.g. bq48SH-28x6NSHR to order quantities of 2,500 devices per reel.

### CONNECTION DIAGRAMS



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**absolute maximum ratings over operating free-air temperature (unless otherwise noted)<sup>†</sup>**Operating temperature range,  $T_J$  ..... 0°C to 70°CStorage temperature range,  $T_{stg}$  ..... –40°C to 85°C

Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds ..... 260°C

<sup>†</sup> Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

**recommended operating conditions**

|                                   | TYP | UNIT |
|-----------------------------------|-----|------|
| Nominal battery voltage, $V_{CC}$ | 2.8 | V    |
| Nominal battery capacity          | 48  | mAh  |

**crystal specifications (DT-35 or equivalent)**

| PARAMETER                                 | TEST CONDITIONS | MIN    | TYP    | MAX    | UNIT       |
|-------------------------------------------|-----------------|--------|--------|--------|------------|
| $f_O$ Oscillation frequency               |                 |        | 32.768 |        | kHz        |
| $C_L$ Load capacitance                    |                 |        | 6      |        | pF         |
| $T_P$ Temperature turnover point          |                 | 20     | 25     | 30     | °C         |
| $k$ Parabolic curvature constant          |                 |        |        | –0.042 | ppm/°C     |
| $Q$ Quality factor                        |                 | 40,000 | 70,000 |        |            |
| $R_1$ Series resistance                   |                 |        |        | 45     | k $\Omega$ |
| $C_O$ Shunt capacitance                   |                 |        | 1.1    | 1.8    | pF         |
| $C_O/C_1$ Capacitance ratio               |                 |        | 430    | 600    |            |
| $D_L$ Drive level                         |                 |        |        | 1      | $\mu$ W    |
| $\Delta f/f_O$ Aging (first year at 25°C) |                 |        | 1      |        | ppm        |

**TERMINAL FUNCTIONS**

| TERMINAL |     | I/O | DESCRIPTION               |
|----------|-----|-----|---------------------------|
| NAME     | NO. |     |                           |
| BC       | 3   | O   | Battery positive terminal |
| VSS      | 2   | I   | Battery negative terminal |
| X1       | 1   | I   | Crystal input             |
| X2       | 4   | O   | Crystal output            |

## functional description

### connections

The SOIC (DSH) is connected to the SNAPHAT™ containing the battery and crystal through four pins that insert into four press-fitted sockets in the SOIC (DSH) where the contact area is gold plated. Each of the sockets internally contains six independent contacts to ensure solid reliable connectivity and minimize contact resistance.

Four molded retaining clips on the SNAPHAT™ also help fasten the SOIC (DSH), ensuring mechanical and electrical connection even under severe mechanical shock and vibration. The combined SOIC (DSH) 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 1 illustrates the effect of repeated insertion and extraction of the SNAPHAT™ top to the SOIC (DSH). The force required to extract the SNAPHAT™, and then to re-insert it, reduces each time. After three or four extractions, though, the reduction starts to become unnoticeable, and the force required remains at a fairly constant figure. Typically, though, the SNAPHAT needs to be extracted and re-inserted only once in its lifetime.

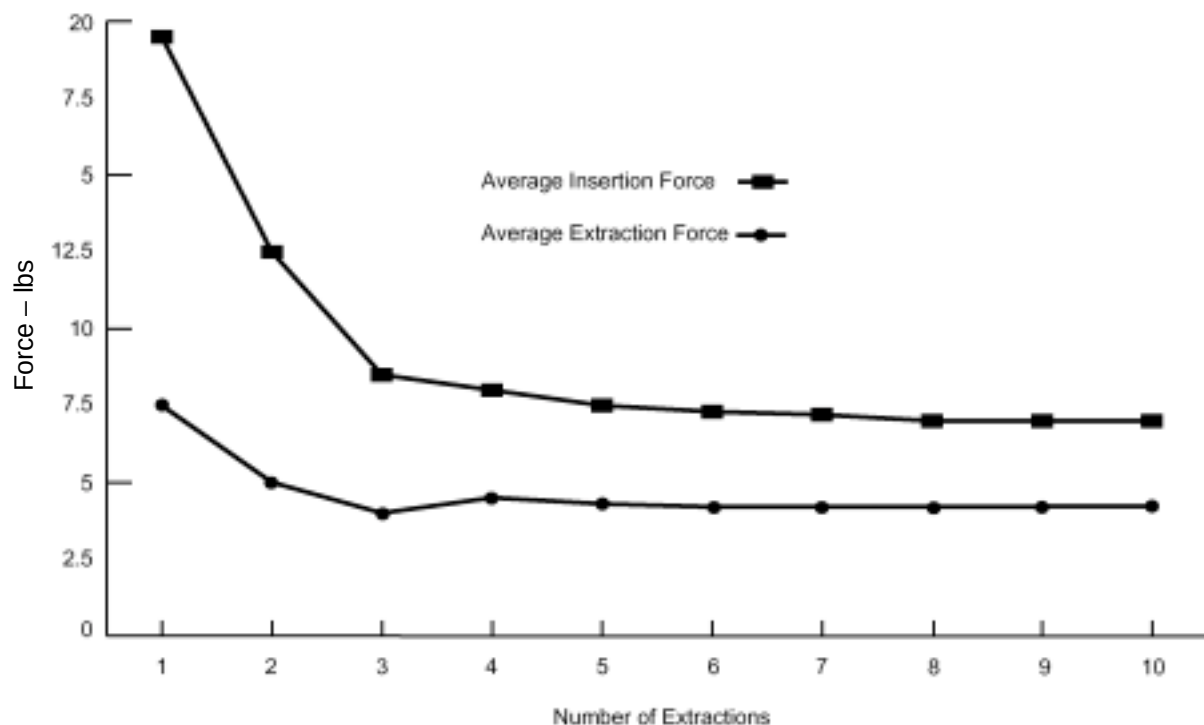


Figure 1. SNAPHAT Insertion and Extraction Forces

**functional description (continued)****battery characteristics**

Figure 2 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.

**UL recognition**

The bq48SH-28x6 has been recognized by Underwriters Laboratories under their Component Recognition Program and carries UL File No. E89556.

**battery life**

The life expectancy of the battery is greatly affected by temperature and usage profiles. Figure 2 highlights the effective discharge during loading periods, but temperature during loading periods can greatly affect the effective run time as shown in Figure 3.

**general notes**

To remove the SNAPHAT® top for replacement, a DIP/IC extractor tool should be used. The SNAPHAT top should be grasped by the narrow end to avoid bending the pins.

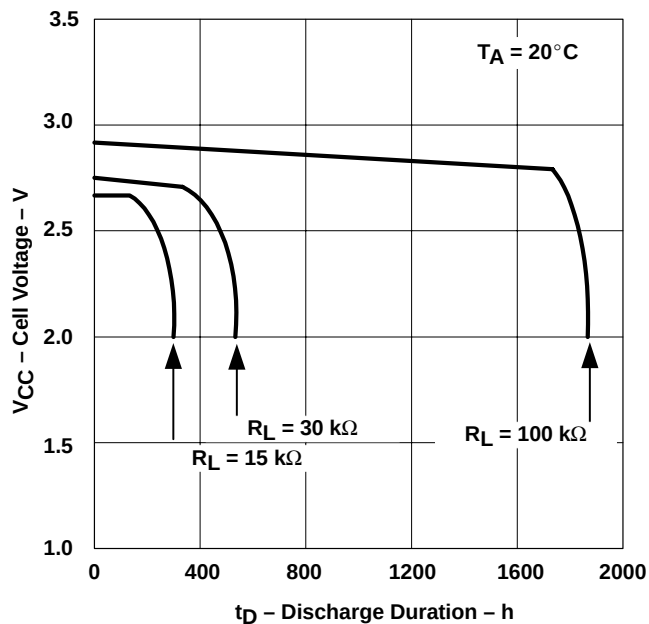
**CAUTION:**

To avoid draining the battery, do NOT place SNAPHAT pins into conductive foam.

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**TYPICAL CHARACTERISTICS**

**BR1225 LITHIUM COIN CELL DISCHARGE RATE  
vs  
CELL VOLTAGE**

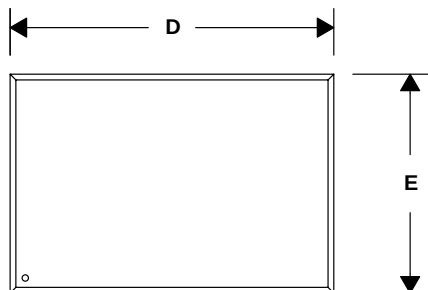


**Figure 2**

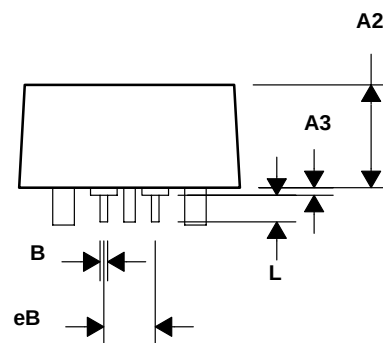
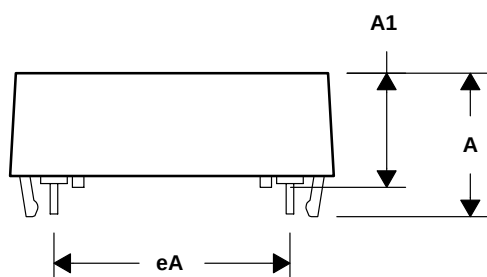
## MECHANICAL DATA

NSH (R-PDIP-P4)

PLASTIC DUAL-IN-LINE



| Dimension | Inches |       | Millimeters |       |
|-----------|--------|-------|-------------|-------|
|           | Min.   | Max.  | Min.        | Max.  |
| A         | –      | 0.385 | –           | 9.78  |
| A1        | 0.265  | 0.285 | 6.73        | 7.24  |
| A2        | 0.255  | 0.275 | 6.48        | 6.99  |
| A3        | –      | 0.015 | –           | 0.38  |
| B         | 0.018  | 0.022 | 0.46        | 0.56  |
| D         | 0.835  | 0.860 | 21.21       | 21.84 |
| E         | 0.560  | 0.590 | 14.22       | 14.99 |
| eA        | 0.612  | 0.628 | 15.54       | 15.95 |
| eB        | 0.126  | 0.142 | 3.20        | 3.61  |
| L         | 0.080  | 0.090 | 2.03        | 2.29  |



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NOTES: A. All linear dimensions are in millimeters.  
 B. This drawing is subject to change without notice.

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