



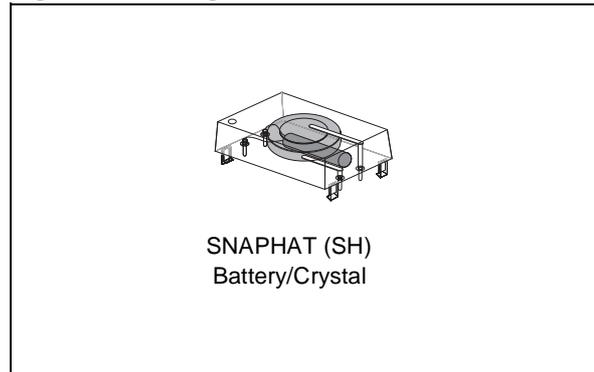
# M4T28-BR12SH M4T32-BR12SH

## TIMEKEEPER® SNAPHAT® (Battery & Crystal)

### FEATURES SUMMARY

- PROVIDES BATTERY BACKUP POWER FOR NON-VOLATILE TIMEKEEPERS® and CONTROLLERS IN THE SNAPHAT SOIC PACKAGE
- REMOVABLE BATTERY AVOIDS HEAT ASSOCIATED WITH SURFACE MOUNT PROCESS
- SNAPS DIRECTLY ONTO SURFACE-MOUNTED SNAPHAT SOIC
- CHOICE OF BATTERY CAPACITIES:
  - M4T28-BR12SH = 48 mAh
  - M4T32-BR12SH = 120 mAh
- KEYED INSERTION TO INSURE PROPER ASSEMBLY
- REMOVABLE FOR REPLACEMENT and PROPER DISPOSAL
- AVAILABLE IN TUBES OR TAPE & REEL
- FOR USE WITH THE 28 and 44-PIN SOIC VERSIONS OF THE TIMEKEEPER® PRODUCT FAMILIES

Figure 1. Package



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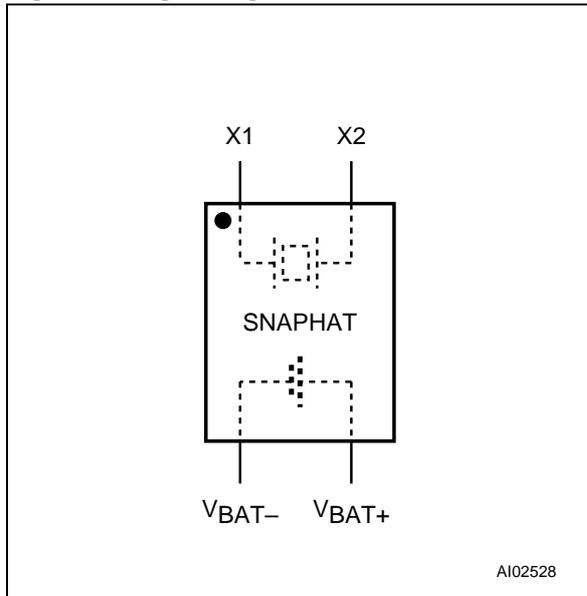
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**SUMMARY DESCRIPTION**

The M4TXX-BR12SH SNAPHAT® top is a detachable lithium power source for ST's non-volatile TIMEKEEPER surface mount SOIC (MH) package (28 and 44-pin).

The SNAPHAT top contains both the battery and crystal and is designed to be “snapped on” after the SOIC is surface mounted on the PC board. Thus the two piece solution avoids the battery and crystal from having to be exposed to the high temperatures of the surface mount process.

**Figure 2. Logic Diagram**



**Table 1. Signal Names**

X1	Crystal Input
X2	Crystal Output
V <sub>BAT-</sub>	Negative Voltage
V <sub>BAT+</sub>	Positive Voltage

## M4T28-BR12SH, M4T32-BR12SH

### MAXIMUM RATING

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 <sub>A</sub>	Ambient Operating Temperature	Grade 1	0 to 70	°C
		Grade 6	-40 to 85	°C
T <sub>STG</sub>	Storage Temperature (V <sub>CC</sub> Off, Oscillator Off)	SNAPHAT	-40 to 85	°C

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

### 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 Measure-

ment 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	M4T28-BR12SH	M4T32-BR12SH	Unit
Nominal Battery Voltage (V <sub>CC</sub> )	2.8	2.8	V
Nominal Battery Capacity	48	120	mAh
Battery Chemistry	Li(CF)	Li(CF)	
Crystal Load Capacitance (C <sub>L</sub> )	12.5	12.5	pF
Nominal Crystal Frequency	32.768	32.768	kHz
Crystal Series Resistance	60	60	kΩ

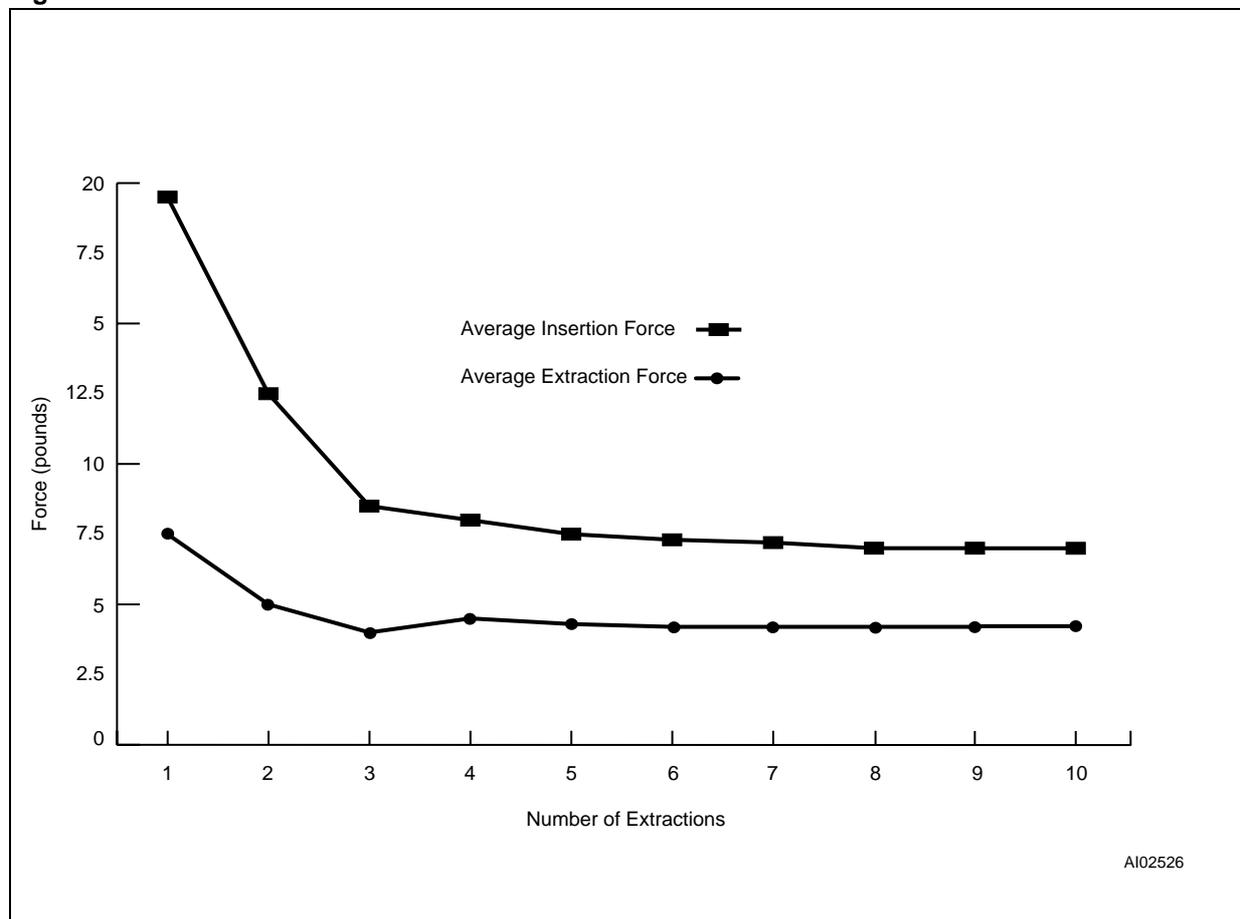
**MECHANICAL INFORMATION**

Electrical connection to the SOIC is made through four pins that connect to the four press fitted sockets at each 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 with 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 3 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 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 will only need to be extracted and re-inserted once in its lifetime.

**Figure 3. SNAPHAT Insertion/Extraction Forces**



**Battery Characteristics**

Figure 4 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 M4Txx-BR12SH has been recognized by Underwriters Laboratories under their Component Recognition Program and carries U.L. File Number E89556.

**Battery Life**

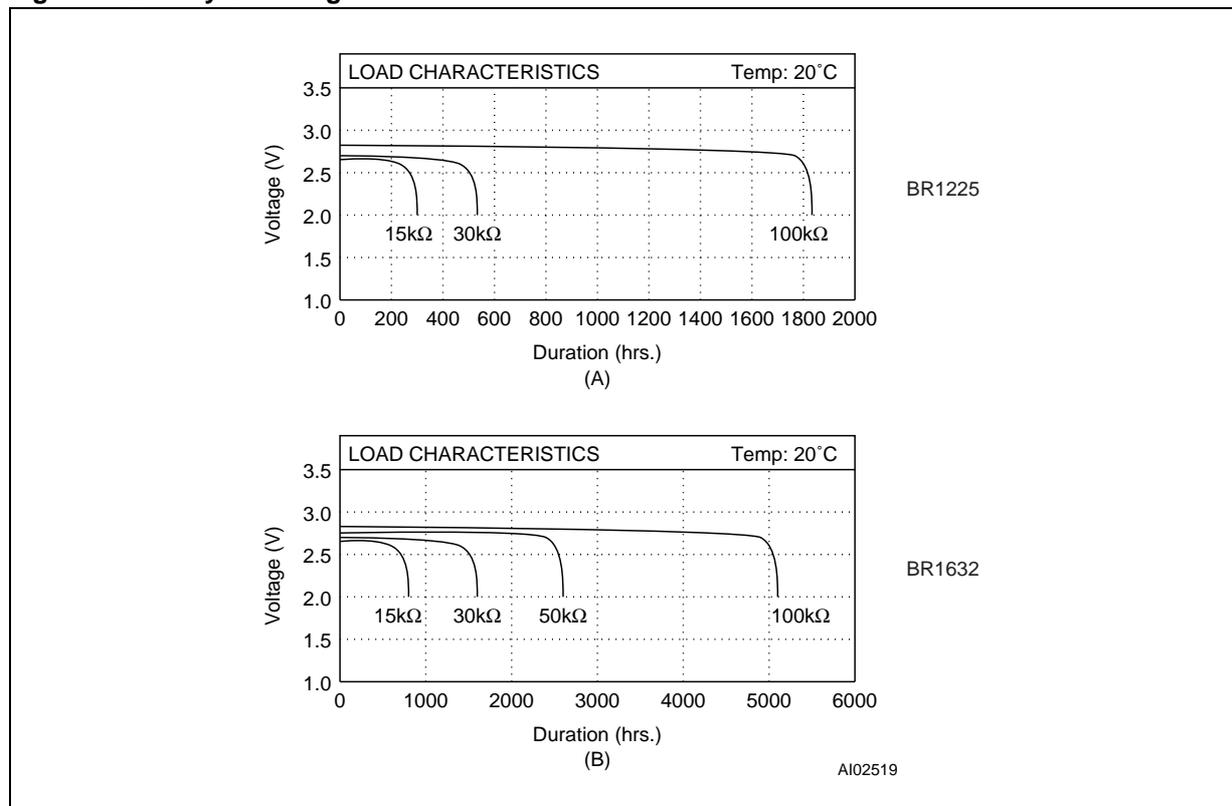
For information on Data Retention Life and Battery Storage Life, please refer to the Application Note AN1012.

**General Notes**

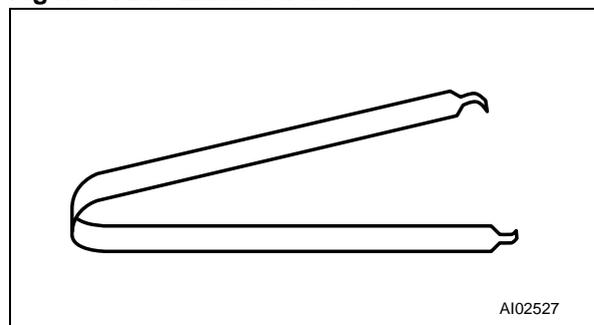
To remove the SNAPHAT® top for replacement, a DIP/IC extractor tool should be used (see Figure 5). The SNAPHAP top should be grabbed by the narrow end to avoid bending the pins.

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

**Figure 4. Battery Discharge Rates**



**Figure 5. DIP Extractor Tool**



**PART NUMBERING**

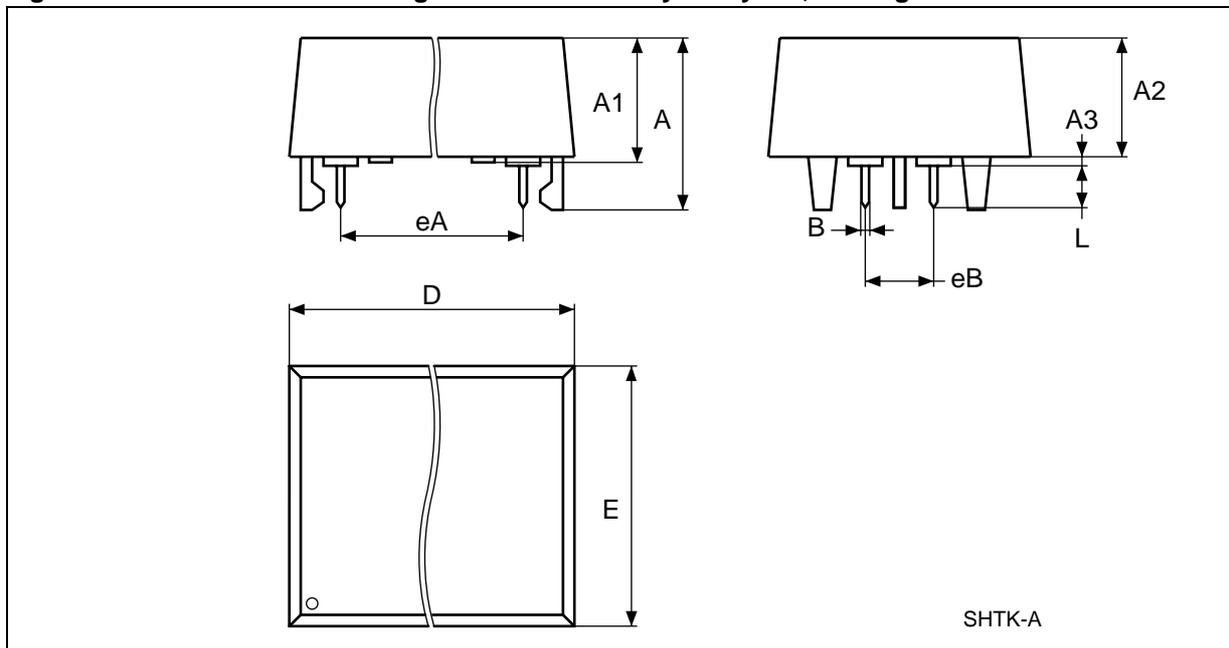
**Table 4. Ordering Information Scheme**

Example:	M4T	28-BR12	SH	1	TR
<b>Device Type</b>	M4T				
<b>Battery Voltage and Capacity</b>		28-BR12 = BR1225, 3 V, 48 mAh 32-BR12 = BR1632, 3 V, 120 mAh			
<b>Package</b>			SH = SNAPHAT®		
<b>Temperature Range</b>				1 = 0 to 70 °C 6 = -40 to 85°C	
<b>Shipping Method</b>					blank = Tubes TR = 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.

PACKAGE MECHANICAL INFORMATION

Figure 6. SH - SNAPHAT Housing for 48 mAh Battery & Crystal, Package Outline

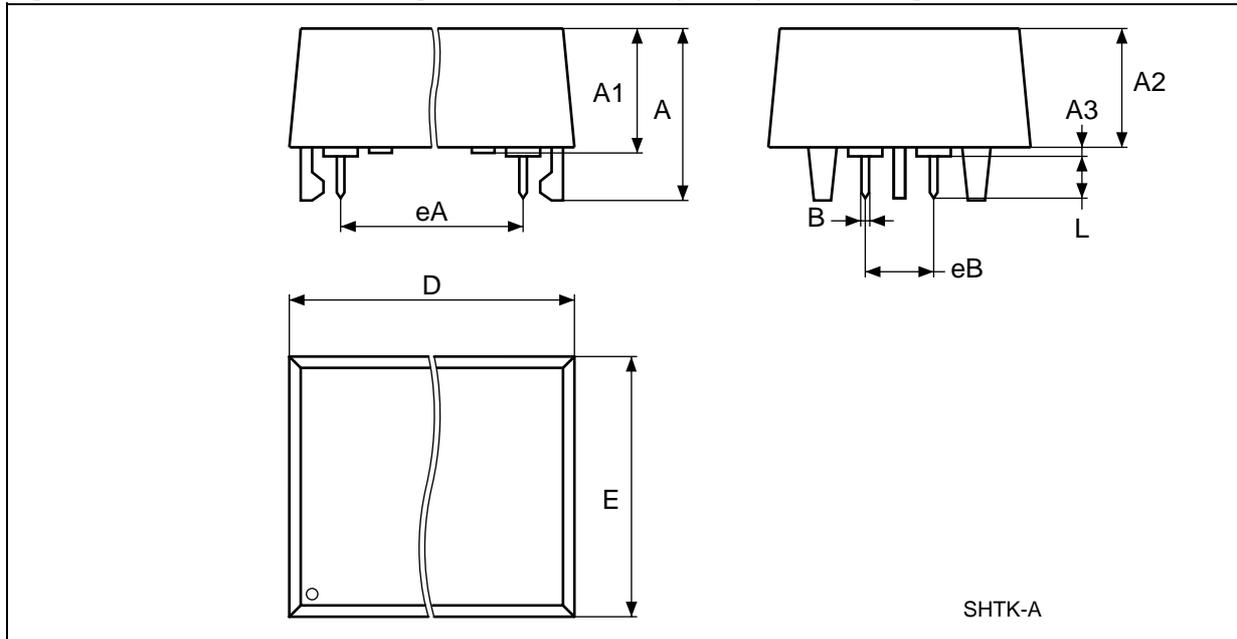


Note: Drawing is not to scale.

Table 5. SH - SNAPHAT Housing for 48 mAh Battery & Crystal, Package Mechanical Data

Symb	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 7. SH - SNAPHAT Housing for 120 mAh Battery & Crystal, Package Outline



Note: Drawing is not to scale.

Table 6. SH - SNAPHAT Housing for 120 mAh Battery & Crystal, Package Mechanical Data

Symb	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

**REVISION HISTORY**

**Table 7. Document Revision History**

<b>Date</b>	<b>Revision Details</b>
November 1999	First Issue
03/01/01	Reformatted

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