MOBIT Telecom Ltd.

SAT406

Technical Specifications - rev-4.1

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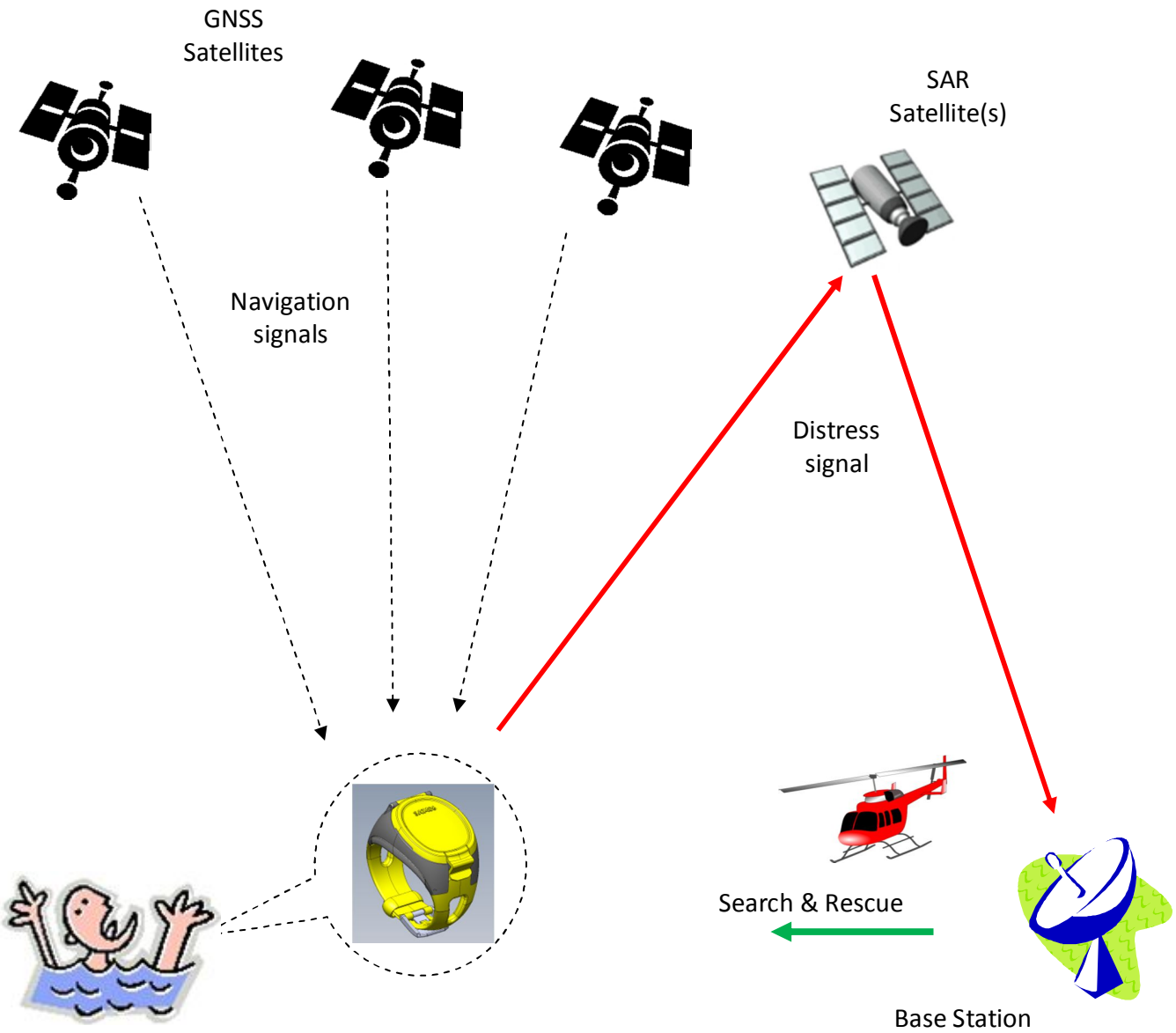
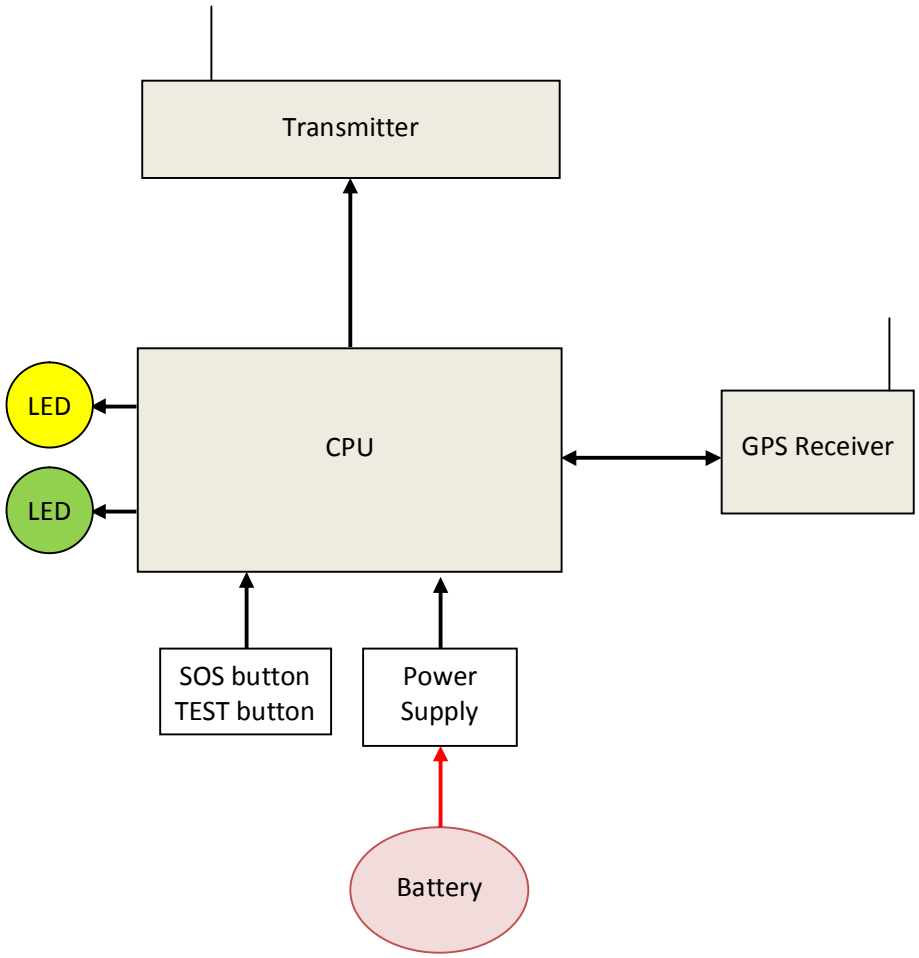
1 Introduction

SAT406 is a Personal Locator Beacon (PLB) in form of a wrist watch, for Search and Rescue (SAR) of people in distress, certified (TAC 238) and served by the Cospas-Sarsat system.

2 System Overview



3 PLB Block Diagram



4 Electrical Requirements

4.1 RF

1. Transmission frequency: 406.040 MHz.
2. Long term Frequency stability: better than ±5KHz in 5 years.
3. Short term Frequency stability: better than 0.8 Hz in 100ms.
4. Power output: 4W ± 1 dB.
5. Load Protection: not damaged at any VSWR, including open or shorted antenna.

4.2 Antenna (at azimuth 0° - 360° and elevation 10° - 50°)

1. VSWR: max 1.5:1.
2. Antenna gain: -3dBi to 4dBi.
3. Test configurations (per Cospas-Sarsat T.007 spec): B.2 (on Ground) and B.5 (above Ground).

4.3 Transmission Timing

1. Burst transmission time: 520ms ± 1%.
2. Burst Repetition Period: 50 ± 2.5 sec, pseudo randomly distributed.
3. First transmission starting 3min upon activation.

4.4 Modulation

1. Phase Shift Keying (PSK), ±1.1 ± 0.1 radians peak.
2. Bit Rate: 400 ± 1% bps.

4.5 Battery

1. Battery life in standby mode: 2.5 years min.
2. Battery life in SOS mode (after 2.5 years standby): 24 hours min. (at -20°C to +55°C)

4.6 Transmitted Message

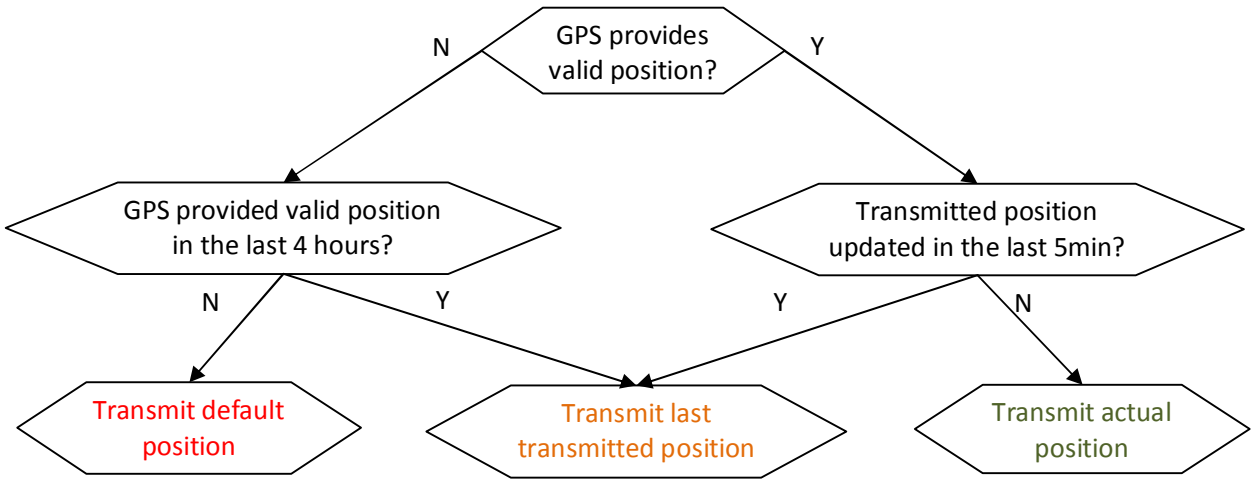
Long message, standard Location Protocol – 144 bits per message:

	Bit Sync	***Frame Sync***	***First Protected Data Field (PDF-1)***								***BCH-1***	***PDF-2***			***BCH-2***
	Bit Sync	Frame Sync	Format Flag	Protocol Flag	Country Code	Protocol Code	ID		Pos. x ¼ deg		21-Bit BCH Code	Supplementary data	Pos. offset x 1 min x 4 sec		12-Bit BCH Code
							Type app	SN	LAT	LON			Δ LAT	Δ LON	
Bit No.	1-15	16-24	25	26	27-36	37-40	41-50	51-64	65-74	75-85	86-106	107-112	113-122	123-132	133-144
bits	15	9	1	1	10	4	10	14	10	11	21	6	10	10	12
Distress Message	111 1111 1111 1111	0 0010 1111	1	0	011 0101 100 (428=IS)	0 111			LAT	LON	BCH of PDF1	11 0110	ΔLAT	ΔLON	BCH of PDF2
Test message		0 1101 0000					0 0111 0111 0 (238)	000 0000 1110 101 (#117)	Def: 0 1111 1111 1	Def: 011 1111 1111			Def: 10 0000 1111	Def: 10 0000 1111	
15 Hex example (Israel, #117, default location)				**3**	**58**	**E**	**77**	**00EA**	**FF**	**BFF**					

4.7 Encoded GNSS Position Report

1. The acquired GPS position is transmitted, but not updated more frequently than every 5min.
2. The default position is transmitted if no valid GPS position was acquired in 4h or more.
3. Position LAT/LON coordinates reported in WGS-84 geodetic reference system.

Position Reporting



5 Operational Requirements

5.1 SOS (distress) Mode

Pressing the SOS button for ~3s puts the PLB in SOS mode, in which the PLB transmits distress messages every 50s ± 2.5s until the battery is exhausted or until deactivated.

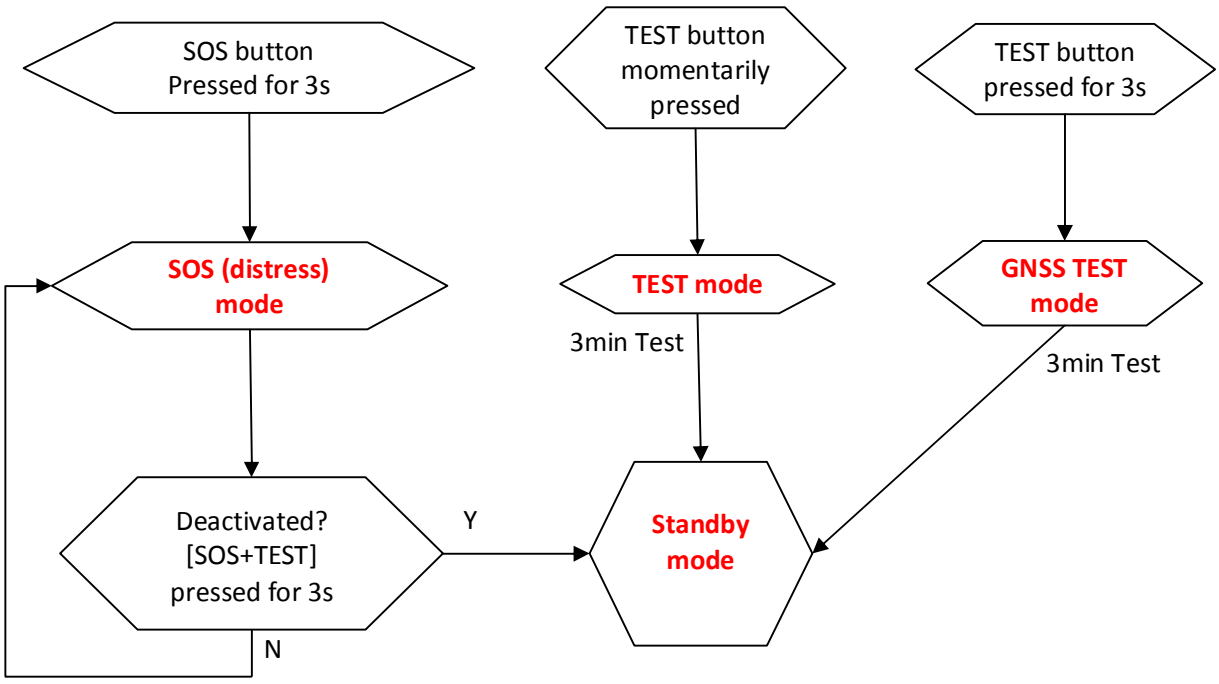
5.2 Self-Test

1. Pressing Test button momentarily invokes standard self-TEST: PLB checking itself for 3min with GPS receiver off, then transmitting a single TEST burst and reporting test results by LED indications.
2. Pressing Test button for 3sec invokes GNSS-self-TEST: PLB checking itself for 3min with GPS receiver on, then transmitting a single TEST burst and reporting test results by LED indications.
3. Maximum number of GNSS-self-tests between successive battery replacements – 6.
   After that, only standard self-tests are generated even if TEST button is pressed for a long time.

5.3 LED Indications

1. Orange LED: in SOS and TEST, blinks every 3-4 seconds and faster 4 seconds before transmission.
2. Green LED: in TEST and SOS, blinks for 1 second immediately upon transmission if transmission frequency and transmission power are good.
3. GNSS Fix indication: in SOS and GNSS-self-TEST, [orange + green] LEDs blink simultaneously and rapidly 4 seconds before transmission.

Operation Mode Transitions



6 Mechanical Requirements

1. Size (measured on the wrist, excluding straps):
   - With Antenna stowed: 70 x 55 x 20 mm
   - With Antenna deployed: 70 x 55 x 60 mm
2. Weight: 95 gr.
3. Color: the exterior finished with highly visible yellow or orange.
4. Labeling:
   - 15Hex ID
   - Battery Expiry Date
   - Operating temperature (class 2 = -20°C to 55°C)
   - Minimum duration of continuous operation (24h)

7 Environmental Requirements

7.1 Temperature

1. Operation Temperature: -20°C to 55°C (class 2).
2. Storage Temperature: -30°C to +60°C.

7.2 Immersion

IP68 - The PLB shall withstand immersion in water to a depth of 3m for 30min.

7.3 Salt Fog

The PLB shall perform at least 24h at 5% Salt Fog atmosphere.

7.4 Drop

The PLB shall withstand dropping from a height of 1m to a hard surface.

7.5 Low Pressure (Altitude)

The PLB shall operate normally to an altitude of 40,000 feet above sea level.

8 Applicable Documents

1. Specification for Cospas-Sarsat 406 MHz Distress Beacons
   https://www.cospas-sarsat.int/images/stories/SystemDocs/Current/CS-T-001-Oct2014.pdf

2. Cospas-Sarsat 406 MHz Distress Beacon Type Approval Standard
   https://www.cospas-sarsat.int/images/stories/SystemDocs/Current/CS-T-007-Oct2014.pdf