Sled RFID Set
Theory of Operation
Document
(Rev: 21 May 2009)

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0. Revision Notes:

21 May 2009:
     First Release.

1. About

This document describes the "Specified Technical Sales Ltd. Sled RFID set" theory of operation details.

2. System Description

Each sled RFID set consists of the following hardware items.

- Sled unit
- Driver TAG

Sled Unit continuously checks driver TAG signal and the onboard sled unit relay is activated when TAG signal is lost for more than a second. The onboard relay is used to turn off the sled engine.

Each sled unit can be used with up to 6 different TAGs. Any TAG needs to be registered to sled unit before use.

3. Theory of operation – Driver TAG

Driver TAG is a simple transmitter unit. It transmits a packet containing its ID, battery level and txpower data periodically at randomized intervals between 0,3-0,47 seconds. The transmit frequency is 2455 MHz. The txpower is –12dBm.

The TAG circuitry consists of a microcontroller and RF stages. The TAG hardware is an ultra low power design and powered by a small 3V CR2032 type lithium battery.

The microcontroller and RF stages are normally in deep sleep mode. Microcontroller wakes up at preprogrammed time intervals, configures the RF stage and then ask RF stage to transmit a data packet containing TAG UID, TAG battery level and txpower value which the packet is to be transmitted. The TAG battery level is measured about every hour. This operation cycle is repeated till the TAG battery is exhausted.

4. Theory of operation – Sled Unit

The sled unit is an RF receiver with relay output, green/red bicolor LED indicator and a pushbutton. The operating frequency is set to 2455MHz. The power input can be any AC or DC voltage of 4.5V to 18.0V.

The powersupply block is formed of abridge rectifier, filter cap and a linear regulator. A supercap is used on the power circuitry to energize the sled unit

and keep relay activated for a minimum of 2 seconds after the power input is off.

The microcontroller of the sled unit directs all the operational scenarios, drives the LED indicator and relay, services pushbutton activations and controls the 2.4GHz RF transceiver. The antenna used in the sled unit is a simple 50-ohm RG58 cable with a 10cm stripped end.

Pushbutton is pressed to put the sled unit into TAG registration/bypass mode. In registration mode, sled unit clears its TAG registry database and start scanning TAGs in the RF range. It registers up to 6 tags. In registration mode the LED indicator is continuous GREEN. Pressing pushbutton in registration mode switches the sled unit back into operational mode. In operational mode Sled unit continuously waits TAG signal and if TAG signal is not received for a 1 second period, relay will be activated. In operational mode LED indicator will normally blink in GREEN. If the TAG battery level info is low indicator will blink in ORANGE.

When TAG signal is lost LED indicator will be continuous RED.