

# **RF Exposure Technical Brief**

## **Supplementary to Teltest report 3626**

**Equipment:** TDAB1A Data Terminal

**IC identification** 737A-TDAB1A

**Rated transmit power:** 25W

**Frequency range:** 136 → 174 MHz

**Test standard:** RSS102 issue 4

**Reference Standard:** IEEE C95.3 -2002

### **Contents**

RSS102 Annex A - RF Technical Brief Cover Sheet.....	2
RSS102 Annex B - Declaration of RF Exposure Compliance .....	3
Safe Distance calculations – Uncontrolled environment .....	4
Minimum distance requirement stated in the user manual .....	5
References: .....	5

## RSS102 Annex A - RF Technical Brief Cover Sheet

All Fields must be completed with the requested information or the following codes:  
N/A for Not Applicable, N/P for Not Performed or N/V for Not Available.  
Where applicable, check appropriate box.

1. COMPANY NUMBER: **737A**
2. MODEL NUMBER: **TDAB1A**
3. MANUFACTURER: **Tait Communications**
4. TYPE OF EVALUATION: **(d) RF Exposure Evaluation.)**

Note: The worst-case scenario (i.e. highest measured value obtained) shall be reported.

(a) SAR Evaluation: Device Used in the Vicinity of the Human Head

- Multiple transmitters: Yes ☐ No ☐
- Evaluated against exposure limits: General Public Use ☐ Controlled Use ☐
- Duty cycle used in evaluation: \_\_\_\_ N/A \_\_\_\_ %
- Standard used for evaluation: \_\_\_\_ N/A \_\_\_\_
- SAR value: \_\_\_\_ N/A \_\_\_\_ W/kg Measured ☐ Computed ☐ Calculated ☐

(b) SAR Evaluation: Body-Worn Device and Body-Supported Device

- Multiple transmitters: Yes ☐ No ☐
- Evaluated against exposure limits: General Public Use ☐ Controlled Use ☐
- Duty cycle used in evaluation: \_\_\_\_ N/A \_\_\_\_ %
- Standard used for evaluation: \_\_\_\_ N/A \_\_\_\_
- SAR value: \_\_\_\_ N/A \_\_\_\_ W/kg Measured ☐ Computed ☐ Calculated ☐

(c) SAR Evaluation: Limb-Worn Device

- Multiple transmitters: Yes ☐ No ☐
- Evaluated against exposure limits: General Public Use ☐ Controlled Use ☐
- Duty cycle used in evaluation: \_\_\_\_ N/A \_\_\_\_ %
- Standard used for evaluation: \_\_\_\_ N/A \_\_\_\_
- SAR value: \_\_\_\_ N/A \_\_\_\_ W/kg Measured ☐ Computed ☐ Calculated ☐

(d) RF Exposure Evaluation

- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐

- Duty cycle used in evaluation: 25 %
- Standard used for evaluation: IEEE C95.3 -2002
- Measurement distance: 1 m
- RF field strength value: 1.2 V/m ☐ A/m ☐ W/m<sup>2</sup> ☒

Measured ☐ Computed ☐ Calculated ☒

## **RSS102 Annex B - Declaration of RF Exposure Compliance**

ATTESTATION: I attest that the information provided in Annex A is correct; that the Technical Brief was prepared and the information contained therein is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed; and that the device meets the SAR and/or RF field strength limits of RSS-102.

Signature:



Date:

**4 March 2015**

NAME:

**Mike James**

TITLE:

**Laboratory Technical Manager**

COMPANY:

**Teltest Laboratories  
Tait Communications**

## Safe Distance calculations – Uncontrolled environment

Transmitter Power: 25W  
Transmitter Duty Cycle: 25%  
Antenna Type: 4 Element Yagi  
Antenna Gain: 9dBi  
Antenna Length: 0.86m  
Calculation frequency: 174MHz

RF Field Strength limit for uncontrolled environments (RSS102 table 4.2) 30MHz to 300MHz

Limit =  $2 \text{ Wm}^2$

### Near field Calculation

*Equation 39 of IEEE C93.3-2002*

$$S_{near} = \frac{P}{(2 \pi d h)}$$

Rearranged to find d

$$d = \frac{P}{(2 \pi S_{near} h)}$$

For 25W @ 25%

$$\begin{aligned} d &= \frac{6.25}{2\pi \times 2 \times 0.86} \\ &= 0.6m \end{aligned}$$

### Fresnel region and far field calculation

*Equation 37 of IEEE C93.3-2002*

$$S_{far} = \frac{P G}{4 \pi d^2}$$

Rearranged to find d

$$d = \sqrt{\frac{P G}{4 \pi S_{far}}}$$

For 25W @ 25%

$$\begin{aligned} d &= \sqrt{\frac{6.25 \times 7.9}{4 \pi \times 2}} \\ &= 1.4m \end{aligned}$$

### Far Field boundary calculation

The near field equation may be applied for several metres from the antenna, but may over predict the power density at longer distances. To determine which result should be used the crossover point where the predicted field strengths are the same is calculated.

$$S_{near} = S_{far}$$
$$\frac{P}{(2 \pi d h)} = \frac{P G}{4 \pi d^2}$$

Rearranged to find d

$$d = \frac{Gh}{2}$$
$$d = \frac{7.9 \times 0.86}{2}$$
$$= 3.4m$$

For a 0.86m antenna at 174MHz, the crossover point is 3.4m. Therefore the near-field calculation is appropriate and the minimum safe distance for the general public is 0.58m.

### **Minimum distance requirement stated in the user manual**

For convenience the derived figure of 0.58m is rounded up to 1m giving the following for 25W (25%)

Near field calculation:

$$S = \frac{6.25}{2 \pi \times 1 \times 0.86}$$
$$= 1.2 W/m^2$$

Where: S=power density in W/m<sup>2</sup>

P= net power output to the antenna (W)

d = radius of a cylinder around the antenna (m)

h = aperture height of antenna (m)

G = linear gain of antenna relative to an isotropic radiator (5.1dBi = 3.24 linear terms)

F = frequency (MHz)

### **References:**

1. RSS102 issue 4 March 2010 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
2. IEEE Std C95.3-2002 IEEE Recommended Practice for Measurements and Computations of Radio Frequency

End