# TB9400 Base Station/Repeater

# Specifications Manual

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# Contents

# Preface

## Scope of Manual

Welcome to the Specifications Manual for the TB9400 base station/ repeater. This manual provides general, performance and physical specifications for the TB9400 50 W and 100 W base stations/repeaters.

In the following, unless mentioned specifically, this manual will use the term “base station” to mean both base station and repeater.

## Document Conventions

Within this manual, four types of alerts may be given to the reader. The following paragraphs illustrate each type of alert and its associated symbol.

**Warning** **This alert is used when there is a hazardous situation which, if not avoided, could result in death or serious injury.**

**Caution** This alert is used when there is a hazardous situation which, if not avoided, could result in minor or moderate injury.

**Notice** This alert is used to highlight information that is required to ensure procedures are performed correctly. Incorrectly performed procedures could result in equipment damage or malfunction.

This icon is used to draw your attention to information that may improve your understanding of the equipment or procedure.

# Associated Documentation

The following associated documentation for this product is available on the Tait support website.

- TB9400 Installation and Operation Manual (MBC-00001-**xx**)
- TN9400 P25 Trunked Network Maintenance Manual (MNC-00001-**xx**)
- TaitNet P25 Trunked Networks with TB9400 Base Stations System Manual (MBA-00064-**xx**)
- TaitNet Analog Conventional Networks with TB9400 Base Stations System Manual (MND-00001-xx)
- Safety and Compliance Information (MBA-00012-xx)

The characters **xx** represent the issue number of the documentation.

Technical notes are published from time to time to describe applications for Tait products, to provide technical details not included in manuals, and to offer solutions for any problems that arise. Technical notes are available in PDF format from the Tait support website. For more information contact your regional Tait office.

# Publication Record

| Issue | Publication Date | Description |
|---|---|---|
| 1 | May 2012 | First release |
| 2 | November 2012 | Changes for version 1.15 release.<br>Additions<br>■ operating temperature range<br>■ Btu load values<br>Updates<br>■ power and current consumption<br>■ compliance standards |
| 3 | June 2013 | Changes for version 1.20 release.<br>Additions<br>■ B3-band base station specifications<br>Updates<br>■ compliance standards |
| 4 | November 2013 | Changes for version 1.30 release.<br>Additions<br>■ H-band base station specifications<br>■ Dual 50W and receive-only base station specifications<br>Updates<br>■ compliance standards |

| Issue | Publication Date | Description |
|---|---|---|
| 5 | December 2014 | Changes for version 1.45 release.<br>Additions<br>■ K4 band receive-only base station specifications<br>■ P25 Phase 2 specifications<br>Updates<br>■ P25 Phase 2 emission designators<br>■ compliance standards |
| 6 | April 2015 | Changes for version 2.00 release.<br>Additions<br>■ K4 band 50W base station specifications<br>■ peak-to-average power level specifications<br>Updates<br>■ base station MTBF<br>■ compliance standards |
| 7 | July 2015 | Changes for version 2.05 release.<br>Additions<br>■ information on receive-only base stations and receiver modules<br>■ 1PPS jitter specification<br>Updates<br>■ external frequency reference stability specification<br>■ compliance standards |
| 8 | November 2015 | Changes for version 2.10 release.<br>Additions<br>■ information on analog base stations<br>Updates<br>■ compliance standards |
| 9 | April 2016 | Changes for version 2.15 release.<br>Additions<br>■ Clarification of repeater vs. base station for K and L bands in Brazil |
| 10 | June 2016 | Changes for version 2.20 release.<br>Additions<br>■ table added to section 1.5 Analog RF specifying that the TB9400 only supports Narrow Bandwidth<br>■ inclusion of B band alongside G and F |
| 11 | November 2016 | Changes for version 2.25 release.<br>Additions<br>■ General updates.<br>■ Information added in regards to the QoS requirements (delay, jitter, loss, duplication).<br>■ Fix Anatel approvals |

| Issue | Publication Date | Description |
|---|---|---|
| 12 | March 2017 | Changes for version 2.30 release.<br>General updates<br>Updated “Requirements for Delay, Jitter, Loss and Duplication” on page 31 |
| 13 | July 2017 | Changes for version 2.35 release.<br>General updates<br>Addition of the new H3 band throughout<br>Added some missing K4 band info<br>Removed some erroneous K8 information<br>Updated receive voter limitations<br>Updated “RF and EMC Compliances” on page 45<br>Updated information in “Requirements for Delay, Jitter, Loss and Duplication” on page 31 |

# 1 Base Station Specifications

The performance figures given in these specifications are applicable only to equipment operating as an integral part of a TB9400 base station. These performance figures are minimum figures, unless otherwise indicated, for equipment operating at standard room temperature (+22°C to +28°C [+71.6°F to +82.4°F]) and standard test voltages as follows:

- AC power management unit (PMU) - 120 VAC and 230 VAC
- 12 V DC PMU - 12 VDC
- 24 V DC PMU - 24 VDC
- 48 V DC PMU - 48 VDC.

The TB9400 is available in the following configurations:

- 50 W single or dual base station with PMU
- 100 W single base station with PMU
- receive-only base station - up to four receivers (receive-only reciters) with PMU.

**Notice** The software release notes list known issues or limitations of the base station that may vary from the specifications published in this document. Please refer to the current software release notes for any variations to the specifications in this document.

## 1.1 Regulatory Information

**Test Methods**

Where applicable, the test methods used to obtain these specifications are those described in the following standards:

- TIA-102.CAAA-D
- TIA-102.CCAA-A
- EN 300 086
- EN 300 113
- EN 300 219
- EN 301 489
- CFR Title 47 Part 15
- TIA/EIA-603/603-D
- AS/NZS 4295

**Emission Designators**

This equipment is compatible with the emissions listed in the following table.

| Emission Designator | Common Name | Modulation Scheme | Operating Modes |
|---|---|---|---|
| 11K0F3E | FM | analog FM | analog voice |
| 8K10F1E | P25 Phase 1 | C4FM | digital voice |
| 8K10F1D | P25 Phase 1 | C4FM | data/control channel |
| 8K10F7W | P25 Phase 1 | C4FM | digital voice/data/ control channel |
| 8K70D1W | P25 Phase 1 linear simulcast modulation | CQPSK | digital voice |
| 8K70D7W | P25 Phase 1 linear simulcast modulation | CQPSK | digital voice/data/ control channel |
| 9K80D7W | P25 Phase 2 linear simulcast and non-simulcast modulation | H-DQPSK | digital voice/data |
| 6K80D7W | test mode only | H-D8PSK | digital voice/data |

You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait.

## 1.2 Frequency Bands and Sub-bands

Many of the performance figures in this manual are applicable to all frequency bands. In some cases the figures refer to specific bands or sub-bands, and these are identified with the letters listed in the following table.

The table also indicates which base station configurations are currently available in each frequency band.

Refer to "Compliance Standards" on page 44 for details about which bands or sub-bands have been tested and approved to appropriate national and international compliance standards.

| Frequency Identification | Frequency Band and Sub-band | 50W | 100W | Receive-only |
|---|---|---|---|---|
| B band | B3 = 148MHz to 174MHz | ✓ | ✓ | ✓ |
| H band | H1 = 400MHz to 440MHz<br>H2 = 440MHz to 480MHz<br>H3 = 470MHz to 520MHz | ✓ | ✓ | ✓ |
| K band | K4 = 762MHz to 870MHz[a] | ✓ | ✓ | ✓ |

a. The actual frequency coverage in this band is:

Transmit: 762MHz to 776MHz, and 850MHz to 870MHz
Receive: 792MHz to 824MHz

In Brazil, for K band, the TB9400 is considered to be configured as a base station with retransmission of receive frequencies.

# 1.3 Power Supply

The specifications in this section refer to the TB9400 base station fitted with a PMU.

### AC Input

| | |
|---|---|
| **Input** | |
| Voltage | 88 VAC to 264 VAC |
| Frequency | 50 Hz to 60 Hz |
| Power factor | > 0.95 |
| Total harmonic distortion (THD) | < 8% |
| Inrush current | |
| 230 VAC | < 30 A @ < 4 ms |
| 115 VAC | < 15 A @ < 4 ms |
| Leakage current | < 3.5 mA/240 VAC |
| **Protection** | |
| Fault current (input) | 10 A fuse |
| Transient suppression | 275 V MOV (line-to-line) |
| Overvoltage inhibit (self recovering) | 275 VAC ±10 V |
| Undervoltage signal | 83 VAC ±5 V |
| **General** | |
| Efficiency at rated output[a] | 86% |
| Input-to-chassis isolation | 1500 VAC, 50 Hz, 1 minute |
| Output-to-chassis isolation | 500 VAC, 50 Hz, 1 minute |

a. At 230 VAC.

## DC Input

| Input voltage | 12V PMU | 24V PMU | 48V PMU |
|---|---|---|---|
| User-programmable alarms[a] | | | |
| Low battery voltage | 10V to 14V | 20V to 28V | 40V to 56V |
| High battery voltage | 14V to 17.5V | 28V to 35V | 56V to 70V |
| User-programmable limits[b] | | | |
| Startup voltage (after shutdown) | 10.9V to 15V ±0.3V | 21.8V to 30V ±0.5V | 43.6V to 60V ±1V |
| Shutdown voltage | 10V to 13.5V ±0.3V | 20V to 27V ±0.5V | 40V to 54V ±1V |
| Battery protection (fail-safe) limits[c] | | | |
| Startup voltage | 10.8V ±0.2V | 21.6V ±0.5V | 43.2V ±1V |
| Undervoltage shutdown | 9.5V ±0.3V | 19V ±0.5V | 38V ±1V |
| Overvoltage shutdown | 18.1V ±0.3V | 36.2V ±0.5V | 72.4V ±1V |
| Overvoltage shutdown reset | 17.1V ±0.3V | 34.2V ±0.5V | 68.4V ±1V |

a. User-programmable alarms can be set for low or high battery voltage, using the web interface. The alarms will be triggered when the set voltage levels are reached. These limits are subject to the tolerances of the battery protection circuitry, as stated in “Battery Protection (Fail-safe) Limits” above.

b. The user-programmable startup and shutdown limits allow for adjustable startup and shutdown voltages. Using the web interface, these limits can be adjusted for different numbers of battery cells, or for the particular requirements of the base station operation. Once the limits are reached, the PMU will shutdown. These limits are subject to the tolerances of the battery protection circuitry.

c. The battery protection limits are set in hardware at the factory and cannot be adjusted by the user. These limits will not be reached under normal operation conditions, but are provided as “fail-safe” measures to protect the battery from deep discharge.

| Input current | 12V | 24V | 48V |
|---|---|---|---|
| 0V to battery protection startup voltage[d] | 2mA maximum | 2mA maximum | 1.2mA maximum |
| Battery protection startup voltage to user-programmed startup voltage[e] | 40mA typical at 10.8V | 30.1mA typical at 21.6V | 13.2mA typical at 43.2V |
| Operating current | refer to “Power and Current Consumption” on page 15 | | |

d. When the input voltage drops below the battery protection undervoltage shutdown limit, and until the voltage rises above the battery protection startup voltage.

e. At initial power-up; or, after battery protection has occurred, when the input voltage rises above the battery protection startup voltage (PMU now under control of its microcontroller), but is still below the user-programmed startup voltage

| Protection | |
|---|---|
| Fault current (input) | circuit breaker or fuse in external wiring[f] |
| Wrong input voltage | electronic lock-out |
| Wrong input voltage polarity | shunt diode |

f. Provided by user.

| General | |
|---|---|
| Efficiency at rated output | |
| 12VDC | 82% |
| 24VDC | 85% |
| 48VDC | 90% |

## Outputs

28VDC output

| | |
|---|---|
| Voltage | 28V |
| Current | 14A maximum |
| Regulation | ±0.5% |
| Ripple and noise[a] | 50mV pp |
| Ripple and noise rms | 10mV rms |
| Transient response on 28V loadstep[b] | 2% overshoot and recover within 0.6ms |

a. 100MHz bandwidth.

b. 10% to 100% loadstep.

Protection

| | |
|---|---|
| Overload | electronic current limit above 16A |
| Short circuit | hiccup mode, self-resetting |
| Overvoltage | |
| AC module | electronic shutdown latch (33.5V) |
| DC module | electronic hysteric control (33.5V) |

## Auxiliary Power Supply

| DC input voltage | 28V ±15% | | |
|---|---|---|---|
| **DC output** | **12V** | **24V** | **48V** |
| Voltage | 13.65V | 27.3V | 54.6V |
| Current | 3A maximum | 1.5A maximum | 750mA maximum |
| Regulation | ±2% | ±2% | ±2% |
| Ripple and noise[a] | 50mV pp | 50mV pp | 50mV pp |
| Ripple and noise rms | 10mV rms | 10mV rms | 10mV rms |
| Zero load ripple | 100mVpp | 100mVpp | 100mVpp |

a. 100MHz bandwidth.

| **Protection** | **12V** | **24V** | **48V** |
|---|---|---|---|
| Overload/short circuit | electronic current limit | electronic current limit | electronic current limit |
| Overvoltage | 16V Zener diode | 32V Zener diode | 62V Zener diode |

General

| | |
|---|---|
| Efficiency at rated output | 88% |
| Input-to-output isolation | 1000VAC, 50Hz, 1 minute |
| Output-to-chassis isolation | 500VAC, 50Hz, 1 minute |

## 1.4 Power and Current Consumption

The specifications in this section refer to the TB9400 base station fitted with a PMU. The performance figures are typical figures.

The transmit measurements were carried out with the base station transmitting at the stated RF output power with all front panel fans running. The standby measurements were carried out with the base station not receiving or transmitting and no front panel fans running. All measurements were carried out with no load on the auxiliary power supply.

### 1.4.1 120VAC Input

**Transmit**

| | A | VA | W |
|---|---|---|---|
| Single 50W base station | | | |
| Minimum RF output power (5W) | 1A | 120VA | 117W |
| Maximum RF output power (50W) | 1.9A | 238VA | 235W |
| Dual 50W base station[a] | | | |
| Minimum RF output power (5W) | 1.7A | 207VA | 204W |
| Maximum RF output power (50W) | 2A | 450VA | 440W |
| 100W base station | | | |
| Minimum RF output power (10W) | 1.6A | 192VA | 189W |
| 50% RF output power (50W) | 2.4A | 295VA | 290W |
| Maximum RF output power (100W) | 3.3A | 400VA | 395W |

a. Both base stations transmitting.

**Standby**

| | A | VA | W |
|---|---|---|---|
| Single 50W and 100W base station | 370mA | 44VA | 30W |
| Dual 50W base station | 490mA | 59VA | 50W |

### 1.4.2 230VAC Input

#### Transmit

| | A | VA | W |
|---|---|---|---|
| Single 50W base station | | | |
| Minimum RF output power (5W) | 700mA | 159VA | 108W |
| Maximum RF output power (50W) | 1.1A | 250VA | 220W |
| Dual 50W base station[a] | | | |
| Minimum RF output power (5W) | 1A | 230VA | 196W |
| Maximum RF output power (50W) | 2A | 460VA | 440W |
| 100W base station | | | |
| Minimum RF output power (10W) | 970mA | 223VA | 183W |
| 50% RF output power (50W) | 1.3A | 310VA | 285W |
| Maximum RF output power (100W) | 1.7A | 395VA | 375W |

a. Both base stations transmitting.

#### Standby

| | A | VA | W |
|---|---|---|---|
| Single 50W and 100W base station | 510mA | 117VA | 31W |
| Dual 50W base station | 510mA | 117VA | 45W |

### 1.4.3 12VDC Input

**Transmit**

| | A | W |
|---|---|---|
| Single 50W base station | | |
| Minimum RF output power (5W) | 8.8A | 106W |
| Maximum RF output power (50W) | 18A | 216W |
| Dual 50W base station[a] | | |
| Minimum RF output power (5W) | 16A | 192W |
| Maximum RF output power (50W) | 36A | 432W |
| 100W base station | | |
| Minimum RF output power (10W) | 14.6A | 176W |
| 50% RF output power (50W) | 23.6A | 285W |
| Maximum RF output power (100W) | 32A | 385W |

a. Both base stations transmitting.

**Standby**

| | A | W |
|---|---|---|
| Single 50W and 100W base station | 2.0A | 24W |
| Dual 50W base station | 3.3A | 39W |

### 1.4.4 24VDC Input

#### Transmit

| | A | W |
|---|---|---|
| Single 50W base station | | |
| Minimum RF output power (5W) | 4.4A | 106W |
| Maximum RF output power (50W) | 9A | 216W |
| Dual 50W base station[a] | | |
| Minimum RF output power (5W) | 7.9A | 190W |
| Maximum RF output power (50W) | 17A | 408W |
| 100W base station | | |
| Minimum RF output power (10W) | 7.1A | 171W |
| 50% RF output power (50W) | 11.8A | 285W |
| Maximum RF output power (100W) | 15.5A | 370W |

a. Both base stations transmitting.

#### Standby

| | A | W |
|---|---|---|
| Single 50W and 100W base station | 975mA | 23W |
| Dual 50W base station | 1.6A | 39W |

### 1.4.5 48 VDC Input

#### Transmit

| | A | W |
|---|---|---|
| Single 50 W base station | | |
| Minimum RF output power (5 W) | 2.1 A | 101 W |
| Maximum RF output power (50 W) | 4.2 A | 202 W |
| Dual 50 W base station[a] | | |
| Minimum RF output power (5 W) | 3.7 A | 178 W |
| Maximum RF output power (50 W) | 7.8 A | 374 W |
| 100 W base station | | |
| Minimum RF output power (10 W) | 3.2 A | 155 W |
| 50% RF output power (50 W) | 5.5 A | 265 W |
| Maximum RF output power (100 W) | 7.4 A | 355 W |

a. Both base stations transmitting.

#### Standby

| | A | W |
|---|---|---|
| Single 50 W and 100 W base station | 480 mA | 23 W |
| Dual 50 W base station | 780 mA | 38 W |

# 1.5 Receiver

## General

| | |
|---|---|
| Frequency bands | |
| B3 band | 148 MHz to 174 MHz |
| H1 band | 400 MHz to 440 MHz |
| H2 band | 440 MHz to 480 MHz |
| H3 band | 470 MHz to 520 MHz |
| K4 band | 794 MHz to 824 MHz |
| Type | triple conversion superheterodyne; first conversion is analog, second is hybrid, and third is digital |
| Frequency increments | |
| B band | 2.5 kHz and 3.125 kHz |
| H and K4 bands | 5 kHz and 6.25 kHz |
| Switching range[a] | |
| B band | ±2 MHz |
| H band and K4 bands | ±5 MHz |

a. The frequency range, measured from the tuned frequency, that can be used without needing to retune the front end or recalibrate the RSSI.

| | |
|---|---|
| Input load impedance | 50 Ω nominal (VSWR <2:1) |
| RF input protection | no degradation after 5 minutes exposure to on-channel signals at +20 dBm (2.2 V) |
| Frequency stability | |
| Internal reference | ±0.5 ppm –30 °C to +60 °C (–22 °F to +140 °F) |
| External reference | |
| B band | ±1 Hz ± multiplied accuracy of external reference |
| H band | ±1 Hz ± multiplied accuracy of external reference |
| K band | ±2 Hz ± multiplied accuracy of external reference |
| RSSI | ≤–125 dBm to –30 dBm |
| IF stages - B band | |
| Frequencies | |
| Analog | 16.9 MHz |
| Digital | 16.9 MHz and 0 Hz |
| Analog IF bandwidth | 9 kHz, –3 dB |
| Digital IF bandwidth | 8.06 kHz, –3 dB |
| IF stages - H and K4 bands | |
| Frequencies | |
| Analog | 70.1 MHz |
| Digital | 8.66 MHz and 0 Hz |
| Analog IF bandwidth | 9 kHz, –3 dB |
| Digital IF bandwidth | 8.06 kHz, –3 dB |

## General (Continued)

| | |
|---|---|
| Spurious Emissions | |
| Conducted | <–90 dBm 9 kHz to 2 GHz<br><–70 dBm 2 GHz to 12.75 GHz |
| Radiated | <–57 dBm 30 MHz to 1 GHz<br><–47 dBm 1 GHz to 4 GHz |

## Digital RF

The test methods used to obtain these figures are those described in TIA-102.CAAA-D for P25 Phase 1, and TIA-102.CCAA-A for P25 Phase 2.

| | |
|---|---|
| Digital unfaded sensitivity[a] | <–120 dBm @ 5% BER |
| Digital faded sensitivity[a] | –112 dBm @ 5% BER |
| a. At 25°C. | |
| Digital adjacent channel rejection | 60 dB |
| Digital signal displacement bandwidth | 1 kHz |
| Digital spurious response attenuation | ≥100 dB |
| Digital intermodulation response attenuation | 85 dB |
| Digital blocking rejection | |
| 1 to 10 MHz | 100 dB |
| Digital co-channel rejection | 9 dB |

## Analog RF

| | Channel Spacing | Modulation 100% Deviation (Nominal) | Receiver IF Bandwidth |
|---|---|---|---|
| Narrow Bandwidth (NB) | 12.5kHz | +/-2.5kHz | 7.5kHz |

Sensitivity[a,b]

| | |
|---|---|
| De-emphasized response | |
| Centre of switching range | <–119dBm (0.25μV) at 25°C |
| Edge of switching range | <–117dBm (0.32μV) at 25°C |

a. 12dB SINAD.

b. Up to 2dB degradation at extremes of temperature.

Maximum usable sensitivity[c,d]

| | |
|---|---|
| De-emphasized response | |
| Centre of switching range | <–116dBm (0.35μV) at 25°C |
| Edge of switching range | <–114dBm (0.45μV) at 25°C |

c. Sensitivity for 20dB SINAD, psophometrically weighted, RF source modulated at 60% deviation with 1kHz.

d. Up to 2dB degradation at extremes of temperature.

FM quieting[e] –113dBm

e. 20dB FM quieting, measured with de-emphasis on.

Ultimate signal-to-noise ratio (at –47dBm)[f]

| | |
|---|---|
| B, G and H bands | 45dB (ANSI/TIA)<br>50dB (CEPT - psophometric) |
| K4 band | 43dB (ANSI/TIA) |

f. Up to 5dB degradation at extremes of switching range and temperature.

| Selectivity[g] | EIA-603 | TIA/EIA-603-D | ETSI |
|---|---|---|---|
| B, G and H bands | 85dB | 50dB | 85dB |
| K4 band | 79dB | 45dB | — |

g. Up to 5dB degradation at extremes of switching range and temperature.

| | |
|---|---|
| Signal displacement bandwidth | ≥1kHz |
| Spurious response attenuation | ≥100dB (ANSI/TIA)<br>≥90dB (ETSI) |

## Analog RF (Continued)

| | |
|---|---|
| Intermodulation response attenuation[h] | |
| B, G and H bands | 80dB (ETSI) |
| K4 band | 80dB (ANSI/TIA) |

h. Up to 5dB degradation at extremes of switching range and temperature.

| | |
|---|---|
| Blocking rejection | |
| B, G and H bands | |
| 1–10MHz | 100dB (ETSI) |
| >10MHz | 110dB (ETSI) |
| ±1, ±2, ±5 and ±10MHz | 100dB (ANSI/TIA) |
| K4 band | |
| 1–10MHz | 100dB (ANSI/TIA) |
| >10MHz | 110dB (ANSI/TIA) |
| ±1, ±2, ±5 and ±10MHz | 100dB (ANSI/TIA) |
| Co-channel rejection | –8dB |
| Amplitude characteristic[i] | ≤3dB (ETSI) |

i. RF Input Level –107dBm to –13dBm.

## Analog Audio - General

| | |
|---|---|
| Frequency response | de-emphasized (750 µs)<br>For more information refer to "Appendix A – Frequency Response Diagrams" on page 47. |
| De-emphasized response | |
| Bandwidth | 300 Hz to 3 kHz |
| Response | within +1, –3 dB of a –6 dB/octave de-emphasis curve (ref. 1 kHz) |

## Analog Audio - CTCSS

| | |
|---|---|
| High pass (subaudible) filter | |
| Bandwidth | 300 Hz to 3 kHz |
| Response | within +1, –3 dB of a –6 dB/octave de-emphasis curve (ref. 1 kHz) |
| Hum and noise[a] | 30 dB minimum at 250.3 Hz<br>35 dB typical (67 Hz to 240 Hz) |

a. 1 kHz at 60% system deviation, CTCSS at 10% system deviation.

| | |
|---|---|
| Tone detect | |
| Tone squelch opening | better than 6 dB SINAD |
| Tone detect bandwidth | |
| Accept | ±2 Hz typical |
| Reject | ±3.6 Hz typical |
| Response time (open) | ≤150 ms typical |

## Analog Audio - Gating Operation

| | |
|---|---|
| SINAD gating | |
| Opening level | 6 dB to 20 dB SINAD |
| Accuracy | ±3 dB |
| RF hysteresis | 4 dB |
| Opening time | 60 ms typical |
| Closing time | 60 ms typical |

# 1.6 Transmitter

The specifications in this section pertain only to the combination of a TB9400 reciter with a 50 W or 100 W power amplifier.

### General

| | |
|---|---|
| Frequency bands | |
| B3 band | 148 MHz to 174 MHz |
| H1 band | 400 MHz to 440 MHz |
| H2 band | 440 MHz to 480 MHz |
| H3 band | 470 MHz to 520 MHz |
| K4 band | 762 MHz to 776 MHz and 850 MHz to 870 MHz |
| Modulation types | 11K0F3E, 8K10F1E, 8K10F1D, 8K10F7W, 8K70D1W, 8K70D7W, 9K80D7W, 6K80D7W |
| Frequency increments | |
| B3 band | 2.5 kHz and 3.125 kHz |
| H and K4 bands | 5 kHz and 6.25 kHz |
| Frequency stability[a] | ±0.5 ppm –30°C to +60°C (–22°F to +140°F) |
| Output load impedance | 50 Ω nominal |
| Output power | |
| 50 W PA | |
| Rated Power | 50 W |
| Range of Adjustment | 5 W to 50 W in 1 W steps |
| 100 W PA | |
| Rated power | 100 W |
| Range of adjustment | 10 W to 100 W in 1 W steps |
| Output power accuracy[b] | |
| Within normal operating voltages and temperatures | +0.5/–0 dB into a 50 Ω load |
| At extremes of temperature and altitude | +0.5/–1.5 dB into a 50 Ω load |
| Peak-to-average power level[c] | peak power is +2.7 dB above average rated power |

a. For K4 band (762 MHz to 776 MHz) the internal frequency reference accuracy is inadequate, and an external reference must be used. The stability of this reference should be better than 100 parts per billion. See "External Frequency Reference Input (BNC)" on page 33.

b. Measured directly on PA output.

c. LSM and P25 Phase 2 only.

## General (Continued)

| | |
|---|---|
| Duty cycle | |
| Up to 3600 m (11810 ft) altitude | 100% at maximum rated output power[d] at +60°C (+140°F) ambient temperature |
| Above 3600 m (11810 ft) altitude | 100% at maximum rated output power[d] at +50°C (+122°F) ambient temperature, or output power derated by 1.5 dB at +60°C (+140°F) |

d. Measured directly on PA output.

| | |
|---|---|
| Mismatch capability | |
| Ruggedness | open and short circuit load at any phase angle for one hour[e] |
| Stability | 5:1 load VSWR at all phase angles[e] |

e. Under power foldback.

| | |
|---|---|
| Protection[f] | |
| Temperature | power foldback to 35 W if RF power devices exceed safe operating conditions |
| Current | power foldback and shutdown if RF power devices exceed safe operating currents for more than 5 seconds |
| Supply voltage | power foldback to 35 W when supply voltage is 24 V to 26 V and 30 V to 32 V; shutdown when supply voltage is <24 V and >32 V |
| VSWR | power foldback to 35 W when VSWR >3:1 |
| Feedback loop instability | power reduces to maintain loop stability within safe margins |

f. Power foldback to 35 W occurs only if the output power is set to more than 35 W. If the output power is set to less than 35 W, the power stays at the set level during foldback conditions.

| | |
|---|---|
| Adjacent channel power[g] | |
| All modulation types | < –67 dBc TIA-102.CAAA and TIA-102.CCAA |
| Adjacent channel power (B3 and H bands only) | |
| All modulation types | < –60 dBc EN 300 113 |

g. 762-776 MHz band complies with FCC 47 CFR 27.53(e)(6) and 47 CFR 90.543(a)

| | |
|---|---|
| Modulation emission spectrum | TIA-102.CAAB-D paragraphs 3.2.5.1 and 3.2.5.2, LSM, and TIA-102.CCAB paragraph 3.2.5.1 |
| Modulation fidelity | <2% TIA-102.CAAA and TIA-102.CCAA |
| Intermodulation | better than 65 dB TIA-102.CAAA and TIA-102.CCAA (typical) |

## General (Continued)

Sideband noise[h]

| | |
|---|---|
| ±12.5κHζ | < –120dBc/Hz |
| ±100kHz | < –130dBc/Hz |
| ≥±1.5MHz | < –154dBc/Hz at 50W<br>< –157dBc/Hz at 100W |

h. No modulation, measured from center frequency.

Radiated spurious emissions

| | |
|---|---|
| Transmit - B3 band | < –36dBm 30 MHz to 1GHz<br>< –30dBm 1GHz to 4GHz |
| Transmit - H band | < –36dBm 30MHz to 1GHz<br>< –30dBm 1GHz to 4GHz[i]<br>< –30dBm 1GHz to 12.75GHz[j] |
| Transmit - K4 band | <–20dBm to 9GHz |
| Standby | <–57dBm to 1GHz<br><–47dBm 1GHz to 4GHz |

i. Transmit frequency below 470MHz.

j. Transmit frequency above 470MHz.

Conducted spurious emissions

| | |
|---|---|
| Transmit - B3 band | < –36dBm 9 kHz to 1GHz<br>< –30dBm 1GHz to 4GHz |
| Transmit - H band | < –36dBm 30MHz to 1GHz<br>< –30dBm 1GHz to 4GHz[k]<br>< –30dBm 1GHz to 12.75GHz[l] |
| Transmit - K4 band | <–20dBm to 9GHz |
| Standby | <–57dBm to 1GHz<br><–47dBm 1GHz to 12.75GHz |

k. Transmit frequency below 470MHz.

l. Transmit frequency above 470MHz.

| | |
|---|---|
| Transient behavior - B3 and H bands | complies with EN 300 113-1 v1.7.1 and EN 300 113-2 v1.5.1 |

## Simulcast

| | |
|---|---|
| Launch time accuracy[a] | ±1.5µs |

a. Launch time offset adjustable in 1µs increments.

| | |
|---|---|
| Deviation accuracy | 0.2dB |
| Frequency accuracy[b] | <1Hz |

b. Carrier frequency offset adjustable in 0.1Hz increments.

## Simulcast (Continued)

| | |
|---|---|
| Supported simulcast modulation schemes | |
| P25 | C4FM<br>LSM<br>H-DQPSK |
| Analog | FM |
| Receive voter limitations[c] | |
| Maximum number of receivers | 20 |
| Maximum marshaling duration: | |
| P25 | 300ms (simulcast operation) |
| Analog | 150ms (simulcast operation) |
| Maximum central voter speech packet arrival time skew | 100 ms |

c. For a discussion of the significance of these limitations, see the System Manual.

## Analog Audio - General

| | |
|---|---|
| Peak deviation | ≤2.5 kHz |
| Limiting deviation[a] | ≥90% of peak deviation for the configured bandwidth |

a. With modulation input driven at a frequency of 1 kHz, and at a level 20 dB above the nominal level of 60% deviation.

| | |
|---|---|
| Nominal deviation (average)[b] | 55% to 65% of peak deviation |

b. For a level of –10 dBm0 applied to the G.711/IP input.

| | |
|---|---|
| CWID deviation | 40% of peak deviation |

## Analog Audio - Modulation Characteristics

| | |
|---|---|
| Frequency response (below limiting) | flat or pre-emphasized<br>For more information refer to "Appendix A – Frequency Response Diagrams" on page 47. |
| G.711 inputs | |
| Pre-emphasised response | |
| Bandwidth | 300 Hz to 3 kHz |
| Below limiting | within +1, –3 dB of a 6 dB/octave pre-emphasis curve (ref. 1 kHz) |
| Flat response | |
| Bandwidth | 300 Hz to 3 kHz |
| Response | within +0.5, –1.5 dB of output level at 1 kHz |

### Analog Audio - Modulation Characteristics (Continued)

| | |
|---|---|
| Above limiting response | within +1, –2 dB of a flat response (ref. 1 kHz) |
| Distortion | <2% |
| Hum and noise[c] | –50 dB typical (ETSI) |

c. Up to 5 dB degradation at extremes of switching range and temperature.

### Analog Audio - CTCSS

| | |
|---|---|
| Standard tones | all 37 ANSI/TIA group A, B and C tones plus 13 commonly used tones |
| Frequency error (from ANSI/TIA tones) | 0.08% maximum |
| Generated tone distortion | 1.2% maximum |
| Generated tone flatness | flat across 67 Hz to 250.3 Hz to within 1 dB |
| Modulation level | Adjustable |
| Modulated distortion | <5% |

# 1.7 Network

## 1.7.1 Requirements for Delay, Jitter, Loss and Duplication

| Standard Requirements | Recommended | Required |
|---|---|---|
| Out of order C plane and U plane packets[a] | Less than 0.01% | |
| Packet Loss | Less than 0.01% | |
| Latency | Less than 40 ms | < 150 ms |
| Jitter | Less than 20 ms | < 100 ms |
| Skew | Less than 80 ms | |
| Minimum bandwidth to carry C+U traffic | 108kb/s per physical channel | |
| Minimum bandwidth to carry M traffic | 100kb/s per site | |
| Minimum bandwidth to meet jitter requirements on non-fragmenting link. | 600kb/s per site up to 5 physical channels | |

a. C plane and U plane are references to telco terminology distinguishing call setup and user traffic.

### 1.7.2 Channel Group Size

‘Channel group size’ is the number of members (transceivers or receivers) in a channel group.

‘Vote contributors’ are the number of active receivers that will contribute to the voted output. When a channel group has more than 14 vote contributors, the channel group enables an automatic 10 contributor limit on the current streams in order to maintain an acceptable responsiveness to management functions such as the web user interface.

The table below defines vote contributors and channel group size for each channel type:

| Channel type | Vote contributors | Channel group size |
|---|---|---|
| Analog | 14[a] / 10[b] | 20 |
| P25 Failsoft | 14 | 14 |
| P25 Trunked Control Channel | 14 | 14 |
| P25 Trunked Traffic Channel Phase 1 | 14 | 14 |
| P25 Trunked Traffic Channel Phase 2 | 14 | 14 |
| P25 Conventional | 14[a] / 10[b] | 20 |

a. When channel group size is less than or equal to 14.

b. When channel group size is greater than 14.

# 1.8 System Connections

## 1.8.1 External Frequency Reference Input (BNC)

| | |
|---|---|
| Frequencies[a] | 10 MHz or 12.8 MHz |
| Lock range | ±50 Hz |
| Input level | 500 mVpp to 5 Vpp |
| Input impedance | ≥1 kΩ |

a. Automatically detected by the reciter.

## 1.8.2 Ethernet Interface (RJ45)

| | |
|---|---|
| Transceiver | 10/100 Base-Tx/Rx (Auto-MDIX) |
| IEEE-spec | IEEE802.3 and 802.3u |

## 1.8.3 System Interface 25-Way D-range

**External General Purpose Digital Inputs**

| | |
|---|---|
| Input low threshold | $V_{IL}$ < 0.6 V |
| Input high threshold | $V_{IH}$ > 1.2 V |
| Input source current | $I_{IL}$ < 1 mA ($V_{IL}$ = 0 V) |
| Continuous input voltage | $\|V_{IN}\|$ < 30 V |
| Transient input voltage | $\|V_{IN}\|$ < 35 V (t < 1 s) |

### 1.8.4 1PPS Timing Reference Input (BNC)

| | |
|---|---|
| Input low threshold | $V_{IL}$ <0.6V |
| Input high threshold | $V_{IH}$ >1.2V |
| Input termination | 470Ω + 5% (AC terminated) |
| Transient input voltage | $\|V_{IN}\|$ <15V |
| Frequency | 1PPS (required for Simulcast and TDMA) |
| Polarity | rising edge represents timing reference |
| Maximum jitter | ±1µS |

# 1.9 Miscellaneous

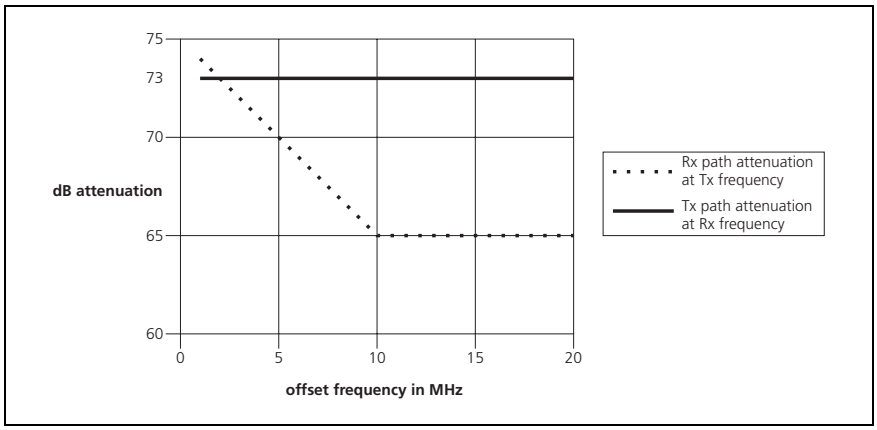
## 1.9.1 Channel Details

| | |
|---|---|
| Number of channels | 1000 |
| Channel change time | 300 ms |

## 1.9.2 Duplexer Attenuation Requirements

The following graph shows the attenuation requirements for duplexers used with the base station. The dotted plot represents the attenuation required in the Rx path at the Tx frequency, while the continuous plot shows the attenuation required in the Tx path at the Rx frequency.

A 100 W transmitter is assumed. The quoted attenuation will ensure not more than 1 dB receiver desensitization (from the specified sensitivity), and has a 5 dB margin built in.




## 1.9.3 Operating Temperature Range

| | |
|---|---|
| Operating temperature range | –30°C to +60°C (–22°F to +140°F) ambient temperature[a] |

a. Ambient temperature is defined as the temperature of the air at the intake to the cooling fans.

### 1.9.4 Heat Load Values

These measurements were carried out with the base station transmitting at its rated output power with all front panel fans running. All measurements were carried out with no load on the auxiliary power supply.

| | W | Btu/h |
|---|---|---|
| Base station[a] | | |
| Single 50W | 185W | 631Btu/h |
| Dual 50W | 340W | 1160Btu/h |
| 100W | 295W | 1007Btu/h |

a. Transmitting at rated output power.

### 1.9.5 Dimensions and Weight

| | |
|---|---|
| Dimensions | |
| Height | 176.8mm (7in) |
| Width | 482.6mm (19in) |
| Length | |
| Subrack only | 385mm (15.2in) |
| Including front panel | 400.5mm (15.8in) |
| Weight[a] | |
| Single 50W Base Station | 19.6kg (43.2lb) |
| Dual 50W Base Station | 24.8kg (54.7lb) |
| 100W base station | 21.1kg (46.5lb) |
| Receive-only | |
| 1 receiver | 16.9kg (37.3lb) |
| 2 receivers | 19.3kg (42.5lb) |
| 3 receivers | 21.7kg (47.8lb) |
| 4 receivers | 24.1kg (53.1lb) |

a. With AC and DC PMU.

### 1.9.6 Reliability

| | |
|---|---|
| MTBF | >80,000 hours (based on field returns) |

# 2 Module Specifications

This chapter provides hardware specifications for the individual modules used in the TB9400 base station:

- reciter and receiver
- PA
- PMU.

**Notice** The software release notes list known issues or limitations of the base station that may vary from the specifications published in this document. Please refer to the current software release notes for any variations to the specifications in this document.

# 2.1 Reciter and Receiver

## 2.1.1 Identifying the Reciter and Receiver

You can identify the model and hardware configuration of a reciter and receiver by referring to the product code printed on labels on the front and rear panels. The meaning of each character in the product code is explained in the table below.

**Notice** This explanation of reciter and receiver product codes is not intended to suggest that any combination of features is necessarily available in any one reciter or receiver. Consult your regional Tait office for more information regarding the availability of specific models and options.

| Product Code | Description |
|---|---|
| T01-0110**X**-XXXX | 3 = reciter<br>4 = receiver[a] |
| T01-0110X-**X**XXX | **Frequency Band and Sub-band**<br>D = 148MHz to 174MHz (B3 band)<br>K = 400MHz to 440MHz (H1 band)<br>L = 440MHz to 480MHz (H2 band)<br>M = 470MHz to 520MHz (H3 band)<br>N = 762MHz to 870MHz (K4 band)[b] |
| T01-0110X-X**X**XX | A = standard |
| T01-0110X-XX**X**X | A = default |
| T01-0110X-XXX**X** | A = default |

a. Receive-only base stations are currently available for operation only on B3 and K4 bands.

b. The actual frequency coverage in this band is:
Transmit: 762MHz to 776MHz and 850MHz to 870MHz
Receive: 792MHz to 824MHz

### 2.1.2 Physical Details

| | |
|---|---|
| Cooling | forced air via front panel fan |
| Connectors | |
| RF input | BNC female |
| Transmit forward RF output | SMA female |
| Transmit reverse RF input | SMA female |
| Recommended SMA torque | 0.6 N·m (5 lbf·in) |
| Control, alarm and 28 VDC input | 20-way IDC male |
| External reference frequency input | BNC female |
| 1 PPS input | BNC female |
| Ethernet | RJ45 |
| System inputs and outputs | 25-way D-range |
| Dimensions | |
| Height | 144 mm (5.7 in) |
| Width | 54.6 mm (2.1 in) |
| Length | 321.5 mm (12.7 in) |
| Weight | 2.4 kg (5.3 lb) |

# 2.2 PA

## 2.2.1 Identifying the PA

You can identify the model and hardware configuration of a PA by referring to the product code printed on labels on the front and rear panels. The meaning of each character in the product code is explained in the table below.

**Notice** This explanation of PA product codes is not intended to suggest that any combination of features is necessarily available in any one PA. Consult your regional Tait office for more information regarding the availability of specific models and options.

| Product Code | Description |
|---|---|
| T01-01121-**X**XXX | **Frequency Band and Sub-band**<br>D = 148MHz to 174MHz (B3 band)<br>K = 400MHz to 440MHz (H1 band)<br>L = 440MHz to 480MHz (H2 band)<br>M = 470MHz to 520MHz (H3 band)<br>N = 762MHz to 870MHz (K4 band)[a] |
| T01-01121-X**X**XX | A = 50W<br>B = 100W |
| T01-01121-XX**X**X | A = default |
| T01-01121-XXX**X** | A = default |

a. The actual frequency coverage in this band when used with a K4-band TB9400 reciter is 762MHz to 776MHz and 850MHZ to 870MHz.

## 2.2.2 Physical Details

| | |
|---|---|
| Cooling | forced air over heatsink via front panel fan |
| Connectors | |
| 28VDC input | Phoenix MSTBA2.5HC/2-G-5.08 male |
| Transmit forward RF input | SMA female |
| Transmit reverse RF output | SMA female |
| Recommended SMA torque | 0.6N·m (5lbf·in) |
| RF output | N-type female |
| Control and alarm | 8-way IDC male |
| Dimensions - 50W PA | |
| Height | 144mm (5.7in) |
| Width | 54.6mm (2.1in) |
| Length | 320.6mm (12.6in) |
| Dimensions - 100W PA | |
| Height | |
| With duct | 144mm (5.7in) |
| Without duct | 60mm (2.4in) |
| Width | 177mm (7.0in) |
| Length | 321.8mm (12.7in) |
| Weight | |
| 50W PA | 2.7kg (6.0lb) |
| 100W PA | 4.2kg (9.3lb) |

# 2.3 PMU

## 2.3.1 Identifying the PMU

You can identify the model and hardware configuration of a PMU by referring to the product code printed on labels on the front and rear panels. The meaning of each character in the product code is explained in the table below.

**Notice** This explanation of PMU product codes is not intended to suggest that any combination of features is necessarily available in any one PMU. Consult your regional Tait office for more information regarding the availability of specific models and options.

| Product Code | Description |
|---|---|
| TBA**X**XXX-XXXX | 3 = PMU |
| TBA3**X**XX-XXXX | 0 = default |
| TBA3X**X**X-XXXX | 0 = AC module not fitted<br>A = AC module fitted |
| TBA3XX**X**-XXXX | 0 = DC module not fitted<br>1 = 12V DC module fitted<br>2 = 24V DC module fitted<br>4 = 48V DC module fitted |
| TBA3XXX-**X**XXX | 0 = standby power supply card not fitted<br>1 = 12VDC standby power supply card fitted<br>2 = 24VDC standby power supply card fitted<br>4 = 48VDC standby power supply card fitted |
| TBA3XXX-X**X**XX | 0 = auxiliary power supply board not fitted<br>1 = 12VDC auxiliary power supply board fitted<br>2 = 24VDC auxiliary power supply board fitted<br>4 = 48VDC auxiliary power supply board fitted |
| TBA3XXX-XX**X**X | 0 = default |
| TBA3XXX-XXX**X** | 0 = default |

## 2.3.2 Physical Details

| | |
|---|---|
| Cooling | forced air over heatsink via front panel fan |
| Dimensions | |
| Height | 143.5 mm (5.6 in) |
| Width | 121.4 mm (4.8 in) |
| Length | |
| AC PMU | 324 mm (12.8 in) |
| DC PMU | 337 mm (13.3 in) |
| AC and DC PMU | 337 mm (13.3 in) |
| Weight | |
| AC PMU | 4.8 kg (10.6 lb) |
| DC PMU | 5.1 kg (11.2 lb) |
| AC and DC PMU | 7.0 kg (15.4 lb) |

## 2.3.3 Connections

The following specifications refer to the external wiring and connectors which are connected to the PMU. They do not refer to the wiring and connectors built into the PMU itself.

AC input

| | |
|---|---|
| Connector type | IEC female |
| Current rating | 6 A |

DC input[a]

| | | | |
|---|---|---|---|
| Connector type | M6 screw into threaded fitting on bus bar | | |
| Recommended screw torque | 2–2.5 N·m (18–20 lbf·in) | | |
| | 12 V | 24 V | 48 V |
| Connector current rating | 50 A | 25 A | 12 A |
| Flexible wire size[b] | 2 AWG | 5 AWG | 8 AWG |
| Flexible wire cross section[b] | 35 $mm^2$ | 16 $mm^2$ | 8 $mm^2$ |

a. Battery.

b. For a length of 1.5 m to 2 m (5 ft to 6.5 ft) (typical); the DC input leads should be of a suitable gauge to ensure no more than 3% drop at maximum load over the required length of lead.

DC output - low current
(from auxiliary power supply)

| | |
|---|---|
| Connector type | Phoenix MVSTBR2.5HC/2-ST/5.08 female |
| Flexible wire size | 20 AWG to 11 AWG |

# 3 Compliance Standards

The TB9400 base station has been tested and approved to appropriate national and international compliance standards. These standards are listed on the following page. The standards quoted in these specifications are applicable only to equipment operating as an integral part of a TB9400 base station.

You can obtain further details of test methods and the conditions which apply for compliance testing in all countries from Tait.

**Notice** The software release notes list known issues or limitations of the base station that may vary from the specifications published in this document. Please refer to the current software release notes for any variations to the specifications in this document.

## RF and EMC Compliances

The following table shows which variants of the TB9400 have been tested and approved to the listed standards.

A tick indicates the compliance has been received, a date indicates when the compliance is expected to be received, and a blank cell indicates there are currently no plans to apply for this compliance.

| | | B3 Band | | | H Band | | | K4 Band | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 50W | 100W | Receive-only | 50W | 100W | Receive-only | 50W | 100W | Receive-only |
| RF - P25 Phase 1 | CFR Title 47 Parts 15 and 90 (FCC) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | CFR Title 47 Parts 22 and 74 (FCC) | ✓ | ✓ | —[a] | | | | | | —[a] |
| | P25 CAP (P25-CAB-CAI_TEST_REQ March 2010) | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | |
| | RSS-119 (IC) | ✓ | ✓ | —[b] | ✓ | ✓ | —[b] | ✓ | ✓ | —[b] |
| | EN 300 113-1, EN 300 113-2 (ETSI) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | AS/NZS 4768 Appendix A | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | ANATEL Resolution 554 | ✓ | ✓ | —[c] | | | | | ✓ | —[c] |
| RF - P25 Phase 2 | CFR Title 47 Parts 15 and 90 (FCC) | ✓ | ✓ | | ✓ | ✓ | —[e] | ✓ | ✓ | |
| | CFR Title 47 Parts 22 and 74 (FCC) | ✓ | ✓ | | | | | | | |
| | RSS-119 (IC) | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| | EN 300 113-1, EN 300 113-2 (ETSI) | ✓ | ✓ | | ✓ | ✓ | | | | |
| | AS/NZS 4768 Appendix A | ✓ | ✓ | | ✓ | ✓ | | | | |
| | ANATEL Resolution 554 | ✓ | ✓ | | | | | | ✓ | |
| RF - Analog | CFR Title 47 Parts 15 and 90 (FCC) | ✓ | ✓ | ✓ | —[d] | —[d] | ✓ | ✓ | ✓ | ✓ |
| | EN 300 086-1, EN 300 086-2 (ETSI) | —[d] | —[d] | —[d] | —[d] | —[d] | —[d] | | | |
| | AS/NZS 4295 Appendix B | —[d] | —[d] | —[d] | —[d] | —[d] | —[d] | | | |
| EMC | CFR Title 47 Part 15 (FCC) / RSS-Gen (IC) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | EN 301 489-1, EN 301 489-5 (ETSI) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | ANATEL Resolution 442 | ✓ | ✓ | —[c] | | | | | ✓ | —[c] |

a. Not applicable.

b. IC certification of the test report is not required for receive-only base stations. However, the IC labelling requirement must be complied with, as described in Notice 2012-DRS0126 paragraph 2.2.2.1.

c. Not required for receive-only base stations.

d. Date to be confirmed.

e. Subject to Part 15 only.

## Safety and Environmental Compliances

The TB9400 base station has been tested and approved to the following standards.

| | | |
|---|---|---|
| **Safety** | EN 60950-1 (ETSI)<br>UL 60950-1 (E223047)[a]<br>AS/NZS 60950-1, Q090114[a] | |
| **Environmental** | Low Pressure (Altitude)[b] | MIL-STD-810G Method 500.5 Procedure 2 |
| | Humidity | MIL-STD-810G Method 507.5 Procedure 2 |
| | Vibration | MIL-STD-810G Method 514.6 Procedure 1 |
| | Shock | MIL-STD-810G Method 516.6 Procedure 1 |

a. PMU only.

b. 15000 ft (4572 m).

# Appendix A – Frequency Response Diagrams

This appendix shows the transmitter and receiver frequency response diagrams.

**Figure A.1 Receiver frequency response**

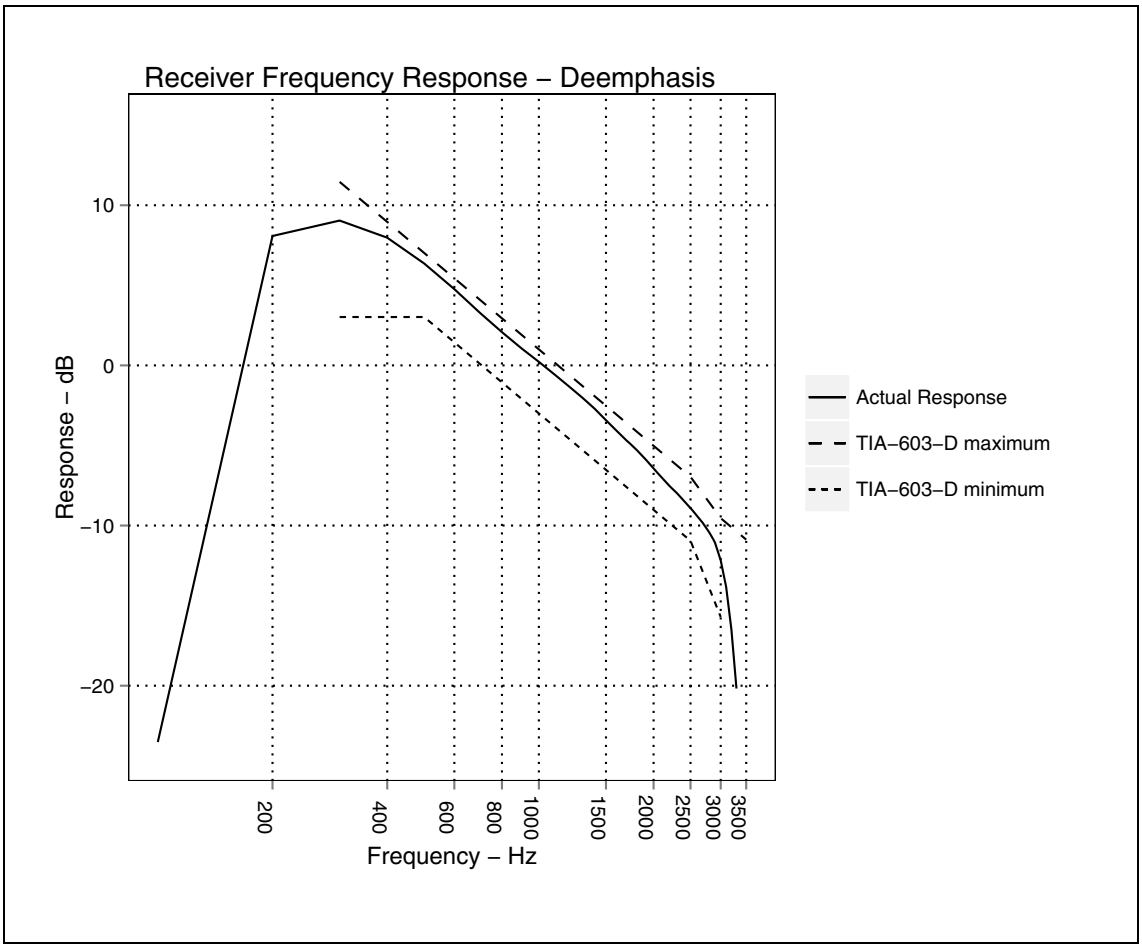


**Figure A.2 Transmitter frequency response**