TB9300 Base Station/Repeater

Specifications Manual

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Contents

Preface

Scope of Manual

Welcome to the Specifications Manual for the TB9300 base station. This manual provides general, performance, and physical specifications for the TB9300 Rx only (when no PA is available), TB9300 50 W and 100 W base stations.

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 Partner Portal website (https://partnerinfo.taitradio.com).

- TB9300 Installation and Operation Manual (MBC-00008-xx)
- TN9300 DMR Tier 2 Conventional Radio Network System Manual (MNB-00005-xx)
- TN9300 DMR Tier 3 Trunked Radio Network System Manual (MNB-00003-xx)
- Tait Core Networks Installation and Configuration Manual (MNB-00012-xx)
- Safety and Compliance Information (MBA-00012-xx)
- DMR Channel Group System Manual (MNB-00010-xx)

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

Technical notes are also 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. For more information contact your regional Tait office.

Publication Record

Issue	Publication Date	Description
29	August 2023	Updated for release 3.50 and later ■ H/W version 3 PMU added ■ "Analog Audio - Gating Operation" on page 29 updated ■ "External General Purpose Digital Outputs" on page 38 added
28	May 2023	Updated for release 3.45 and later ■ "Audio Delay" on page 39 updated
27	December 2022	Updated for release 3.40 and later ■ "Unbalanced Interface" on page 39 added ■ "Connections" on page 51 updated ■ "Appendix A Frequency Response Diagrams" updated
26	August 2022	Updated for release 3.35 and later ■ "Regulatory Information" on page 9 updated ■ "Frequency Bands and Sub-bands" on page 9 updated ■ "Receiver" on page 25 frequencies updated ■ "Digital RF" on page 26 updated ■ "Transmitter" on page 30 frequencies updated

Issue	Publication Date	Description
25	April 2022	Updated for 3.30 release and later ■ Minor updates ■ "Requirements for Delay, Jitter, Loss and Duplication" on page 35 minimum bandwidth updated
24	November 2021	Updated for 3.25 release ■ "Channel Details" on page 43 updated
23	May 2021	Changes for 3.20 release ■ Simplex content added ■ Receiver "Analog Audio - General" on page 28 updated ■ Transmitter "Analog Audio - Modulation Characteristics" on page 33 updated ■ "Antenna Relay Output" on page 41 added
22	November 2020	Changes for version 3.15 release Minor updates throughout Updated table in "Channel Group Size" Major updates to compliance table
21	June 2020	Changes for version 3.10 release Minor updates throughout Compliance Standards table updated Updated emission designators
20	November 2019	Changes for version 3.05 release Minor updates throughout Added typical digital unfaded sensitivity specs Updated emission designators Updated adjacent power and receive voter content
19	July 2019	Changes for version 3.00 release Minor updates throughout Updated System Interface (DB-25) input high threshold
18	March 2019	Changes for version 2.60 release Analog line information added Added Channel Group manual to associated documents Added DMR Rx only base station to scope of manual Added Isolation Off-state specification
17	December 2018	Changes for version 2.55 release Updated MTBF value H4 band included Analog line operation Receiver disable function
16	July 2018	Changes for version 2.50 release H5 band added. Limiting deviation specifications updated. General updates throughout.
15	March 2018	Changes for version 2.45 release Publication Record has been switched so most recent changes appear at the top Under "Analog Audio - General", 'Limiting Deviation' is now 73% "Frequency Bands and Sub-Bands" updated for clarity

1 Base Station Specifications

The performance figures given in these specifications are applicable only to equipment operating as an integral part of a TB9300 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 TB9300 is available in the following configurations:

- 50 W single or dual base station with PMU
- 100 W single base station with PMU.
- Rx only base station (when no PA is available)

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 the specifications in this document are described in the following standards:

- EN 300 086 (version 2.1.2)
- EN 300 113 (version 2.2.1)
- EN 300 219 (version 2.1.1)
- EN 301 929 Version 2.1.1)
- EN 301 489 (version 1.9.2)
- CFR Title 47 Part 15B
- CFR Title 47 Part 22, 90
- TIA/EIA-603/603-E
- AS/NZS 4295
- RSS-119

Emission Designators

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

Emission Designator	Common Name	Modulation Scheme	Operating Modes
7K60F2D	MPT Control	FFSK	control channel/traffic channel data
8K00FXD or 7K60FXD	2-slot DMR	4FSK	data/control channel
8K00FXD or 7K60FXW	2-slot DMR	4FSK	digital voice/data/control channel

You can obtain further details on test methodology and conditions of 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.

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

Refer to "Compliance Standards" for details of which bands support which air interfaces.

Frequency Identification	Frequency Band and Sub-band	50W	100W
B band	B2 = 136 MHz to 156 MHz B3 = 148 MHz to 174 MHz	✓ ✓	✓ ✓
C band	C1 = 174 MHz to 193 MHz C3 = 216 MHz to 225 MHz	✓ ✗	✗ ✓
G band	G4 = 330 MHz to 380 MHz	✓	✗
H band	H1 = 400 MHz to 440 MHz H2 = 440 MHz to 480 MHz H3 = 470 MHz to 520 MHz H4 = 380 MHz to 420 MHz	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓
	H5 = 400 MHz to 470 MHz	✓	✗
K band	K4 Transmit: 762 - 776 & 850 - 870 MHz Receive: 792 - 824 MHz	✓	✓
	K8 Transmit: 757 - 758 MHz Receive: 787 - 788 MHz	✗	✓
L band	L2 = 896 MHz to 902 MHz (receive) L2 = 927 MHz to 941 MHz (transmit)	✗ ✗	✓ ✓

Note that the shaded areas denote frequencies that have reached end-of-life, and whilst currently supported, are no longer available for the TB9300. They are available for the TB9400, where B2 and B3 bands can be replaced by the B1 band.

In Brazil, for K and L bands, the TB9300 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 TB9300 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)	< 9%
Inrush current	
230VAC	< 40 A @ < 4 ms
115VAC	< 20 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)
General	
Input-to-chassis isolation	1500 VAC, 50 Hz, 1 minute
Output-to-chassis isolation	500 VAC, 50 Hz, 1 minute

DC Input

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

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 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	12 V	24 V	48 V
H/W version 3 PMU	100 mA	100 mA	80 mA
Battery protection startup voltage to user-programmed startup voltage[d]	40 mA typical at 10.8 V	30.1 mA typical at 21.6 V	13.2 mA typical at 43.2 V
Operating current	refer to “Power and Current Consumption” on page 14		

d. At initial power-up; or, after battery protection has occurred, when the input voltage rises above the battery protection startup voltage (with the 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[e]
Wrong input voltage	electronic lock-out
Wrong input voltage polarity	shunt diode

e. Provided by user.

Outputs

28 VDC output

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

a. 100 MHz bandwidth.

b. 10% to 100% loadstep.

Protection

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

Auxiliary Power Supply

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

a. Output voltage is user-selectable on H/W version 3 PMU.

b. 100 MHz bandwidth.

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

General

Input-to-output isolation	1000 VAC, 50 Hz, 1 minute
Output-to-chassis isolation	500 VAC, 50 Hz, 1 minute

1.4 Power and Current Consumption

The specifications in this section refer to the TB9300 base station fitted with a PMU. Listed performance figures are typical.

The transmission measurements were taken when the base station was transmitting at the stated RF output power, with all the front panel fans running.

The standby measurements were taken when the base station was not receiving or transmitting, with no front panel fans running.

All measurements were carried out with no load on the auxiliary power supply.

1.4.1 120 VAC Input

Transmit

		A	VA	W
B Band	Single 50 W base station			
	Minimum RF output power (5 W)	825 mA	99 VA	92 W
	Maximum RF output power (50 W)	1.5 A	175 VA	171 W
	Dual 50 W base station[a]			
	Minimum RF output power (5 W)	1.3 A	154 VA	149 W
	Maximum RF output power (50 W)	2.7 A	321 VA	319 W
	a. Both channels transmitting.			
	100 W base station			
	Minimum RF output power (10 W)	1.2 A	145 VA	140 W
	50% RF output power (50 W)	2.1 A	247 VA	244 W
	Maximum RF output power (100 W)	2.8 A	333 VA	331 W
G and H Band	Single 50 W base station			
	Minimum RF output power (5 W)	860 mA	103 VA	96 W
	Maximum RF output power (50 W)	1.6 A	191 VA	187 W
	Dual 50 W base station[b]			
	Minimum RF output power (5 W)	1.3 A	156 VA	152 W
	Maximum RF output power (50 W)	2.9 A	348 VA	345 W
	b. Both channels transmitting.			
	100 W base station			
	Minimum RF output power (10 W)	1.3 A	151 VA	147 W
	50% RF output power (50 W)	2.1 A	254 VA	252 W
	Maximum RF output power (100 W)	2.8 A	338 VA	341 W
K Band	Single 50 W base station			
	Minimum RF output power (5 W)	905 mA	109 VA	101 W
	Maximum RF output power (50 W)	1.7 A	204 VA	201 W
	Dual 50 W base station[c]			
	Minimum RF output power (5 W)	1.3 A	156 VA	152 W
	Maximum RF output power (50 W)	2.9 A	348 VA	345 W
	c. Both channels transmitting.			
	100 W base station			
	Minimum RF output power (10 W)	1.3 A	156 VA	152 W
	50% RF output power (50 W)	2.2 A	264 VA	261 W
	Maximum RF output power (100 W)	3 A	360 VA	357 W

Transmit (Continued)

L2 Band

100 W base station			
Minimum RF output power (10 W)	1.3 A	156 VA	152 W
50% RF output power (50 W)	2.2 A	264 VA	261 W
Maximum RF output power (100 W)	3 A	360 VA	357 W

Standby

	A	VA	W
Single 50 W and 100 W base station	355 mA	43 VA	27 W
Dual 50 W base station	470 mA	56 VA	47 W

1.4.2 230 VAC Input

Transmit

		A	VA	W
B Band	Single 50 W base station			
	Minimum RF output power (5 W)	615 mA	141 VA	82 W
	Maximum RF output power (50 W)	920 mA	212 VA	167 W
	Dual 50 W base station[a]			
	Minimum RF output power (5 W)	800 mA	184 VA	140 W
	Maximum RF output power (50 W)	1.5 A	337 VA	309 W
	a. Both channels transmitting.			
	100 W base station			
	Minimum RF output power (10 W)	770 mA	177 VA	129 W
	50% RF output power (50 W)	1.2 A	264 VA	234 W
	Maximum RF output power (100 W)	1.5 A	349 VA	323 W
G and H Band	Single 50 W base station			
	Minimum RF output power (5 W)	640 mA	148 VA	86 W
	Maximum RF output power (50 W)	950 mA	220 VA	179 W
	Dual 50 W base station[b]			
	Minimum RF output power (5 W)	855 mA	197 VA	152 W
	Maximum RF output power (50 W)	1.6 A	362 VA	338 W
	b. Both channels transmitting.			
	100 W base station			
	Minimum RF output power (10 W)	810 mA	186 VA	138 W
	50% RF output power (50W)	1.2 A	277 VA	245 W
	Maximum RF output power (100 W)	1.6 A	357 VA	336 W
K Band	Single 50 W base station			
	Minimum RF output power (5 W)	660 mA	152 VA	92 W
	Maximum RF output power (50 W)	1 A	230 VA	193 W
	Dual 50 W base station[c]			
	Minimum RF output power (5 W)	855 mA	197 VA	152 W
	Maximum RF output power (50 W)	1.5 A	345 VA	323 W
	c. Both channels transmitting.			
	100 W base station			
	Minimum RF output power (10 W)	835 mA	192 VA	144 W
	50% RF output power (50 W)	1.2 A	276 VA	246 W
	Maximum RF output power (100 W)	1.6 A	368 VA	346 W

Transmit (Continued)

L2 Band

100 W base station			
Minimum RF output power (10 W)	835 mA	192 VA	144 W
50% RF output power (50 W)	1.2 A	276 VA	246 W
Maximum RF output power (100 W)	1.6 A	368 VA	346 W

Standby

	A	VA	W
Single 50 W and 100 W base station	500 mA	114 VA	28 W
Dual 50 W base station	525 mA	120 VA	46 W

1.4.3 12 VDC Input

Transmit

		A	W
B Band	Single 50 W base station		
	Minimum RF output power (5 W)	6.9 A	82 W
	Maximum RF output power (50 W)	13.6 A	164 W
	Dual 50 W base station[a]		
	Minimum RF output power (5 W)	11.3 A	136 W
	Maximum RF output power (50 W)	25.9 A	310 W
	a. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	10.7 A	128 W
	50% RF output power (50 W)	19.4 A	232 W
	Maximum RF output power (100 W)	27.3 A	327 W
G and H Band	Single 50 W base station		
	Minimum RF output power (5 W)	7.2 A	86 W
	Maximum RF output power (50 W)	14.5 A	174 W
	Dual 50 W base station[b]		
	Minimum RF output power (5 W)	12.4 A	149 W
	Maximum RF output power (50 W)	28.2 A	338 W
	b. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	11.3 A	136 W
	50% RF output power (50 W)	20.5 A	246 W
	Maximum RF output power (100 W)	28.5 A	342 W
K Band	Single 50 W base station		
	Minimum RF output power (5 W)	7.7 A	92 W
	Maximum RF output power (50 W)	16.4 A	197 W
	Dual 50 W base station[c]		
	Minimum RF output power (5 W)	12.2 A	146 W
	Maximum RF output power (50 W)	28.2 A	338 W
	c. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	12 A	144
	50% RF output power (50 W)	22 A	264 W
	Maximum RF output power (100 W)	31.1 A	373 W

Transmit (Continued)

L2 Band

100 W base station

Minimum RF output power (10 W)	12 A	144 W
50% RF output power (50 W)	22 A	264 W
Maximum RF output power (100 W)	31.1 A	373 W

Standby

	A	W
Single 50 W and 100 W base station	1.8 A	22 W
Dual 50 W base station	3 A	36 W

1.4.4 24 VDC Input

Transmit

		A	W
B Band	Single 50 W base station		
	Minimum RF output power (5 W)	3.5 A	84 W
	Maximum RF output power (50 W)	6.9 A	165 W
	Dual 50 W base station[a]		
	Minimum RF output power (5 W)	5.8 A	139 W
	Maximum RF output power (50 W)	12.7 A	304 W
	a. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	5.4 A	129 W
	50% RF output power (50 W)	9.7 A	232 W
	Maximum RF output power (100 W)	13.3 A	319 W
G and H Band	Single 50 W base station		
	Minimum RF output power (5 W)	3.5 A	84 W
	Maximum RF output power (50 W)	7.1 A	171 W
	Dual 50 W base station[b]		
	Minimum RF output power (5 W)	6 A	145 W
	Maximum RF output power (50 W)	13.4 A	322 W
	b. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	5.5 A	132 W
	50% RF output power (50 W)	9.8 A	235 W
	Maximum RF output power (100 W)	13.3 A	319 W
K Band	Single 50 W base station		
	Minimum RF output power (5 W)	3.7 A	89 W
	Maximum RF output power (50 W)	7.8 A	187 W
	Dual 50 W base station[c]		
	Minimum RF output power (5 W)	5.8 A	139 W
	Maximum RF output power (50 W)	13.2 A	317 W
	c. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	5.7 A	137 W
	50% RF output power (50 W)	10.4 A	250 W
	Maximum RF output power (100 W)	14.4 A	346 W

Transmit (Continued)

L2 Band

100 W base station		
Minimum RF output power (10 W)	5.7 A	137 W
50% RF output power (50 W)	10.4 A	250 W
Maximum RF output power (100 W)	14.4 A	346 W

Standby

	A	W
Single 50 W and 100 W base station	910 mA	22 W
Dual 50 W base station	1.3 A	31 W

1.4.5 48 VDC Input

Transmit

		A	W
B Band	Single 50 W base station		
	Minimum RF output power (5 W)	1.6 A	78 W
	Maximum RF output power (50 W)	3.3 A	156 W
	Dual 50 W base station[a]		
	Minimum RF output power (5 W)	2.7 A	131 W
	Maximum RF output power (50 W)	6.1 A	291 W
	a. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	2.5 A	122 W
	50% RF output power (50 W)	4.6 A	219 W
	Maximum RF output power (100 W)	6.2 A	298 W
G and H Band	Single 50 W base station		
	Minimum RF output power (5 W)	1.7 A	83 W
	Maximum RF output power (50 W)	3.5 A	168 W
	Dual 50 W base station[b]		
	Minimum RF output power (5 W)	2.9 A	139 W
	Maximum RF output power (50 W)	6.5 A	312 W
	b. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	2.7 A	131 W
	50% RF output power (50 W)	4.8 A	232 W
	Maximum RF output power (100 W)	6.6 A	315 W
K Band	Single 50 W base station		
	Minimum RF output power (5 W)	1.8 A	86 W
	Maximum RF output power (50 W)	3.8 A	182 W
	Dual 50 W base station[c]		
	Minimum RF output power (5 W)	2.9 A	139 W
	Maximum RF output power (50 W)	6.5 A	312 W
	c. Both channels transmitting.		
	100 W base station		
	Minimum RF output power (10 W)	2.8 A	134 W
	50% RF output power (50 W)	5.1 A	245 W
	Maximum RF output power (100 W)	7.1 A	341 W

Transmit (Continued)

L2 Band

100 W base station		
Minimum RF output power (10 W)	2.8 A	134 W
50% RF output power (50 W)	5.1 A	245 W
Maximum RF output power (100 W)	7.1 A	341 W

Standby

	A	W
Single 50 W and 100 W base station	438 mA	21 W
Dual 50 W base station	700 mA	34 W

1.5 Receiver

General

Frequency bands

B2 band*	136 MHz to 156 MHz
B3 band*	148 MHz to 174 MHz
C1 band	174 MHz to 193 MHz
C3 band	216 MHz to 225 MHz
G4 band	330 MHz to 380 MHz
H1 band*	400 MHz to 440 MHz
H2 band*	440 MHz to 480 MHz
H3 band*	470 MHz to 520 MHz
H4 band*	380 MHz to 420 MHz
H5 band	400 MHz to 470 MHz
K4 band*	794 MHz to 824 MHz
K8 band	787 MHz to 788 MHz
L2 band	896 MHz to 902 MHz

* Note that these frequencies have reached end-of-life, and whilst currently supported, are no longer available for the TB9300. They are available for the TB9400, where B2 and B3 bands can be replaced by the B1 band.

Type	Triple conversion superheterodyne; first conversion is analog, second is hybrid, and third is digital
Frequency increments	
B and C bands	2.5 kHz and 3.125 kHz
G, H, K and L2 bands	5 kHz and 6.25 kHz
Switching range[a]	
B and C bands	±2 MHz
H1, H2 & H3 bands	±5 MHz
G, H4, H5, & K4 bands	Full band
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, C, and G bands	±1 Hz ± multiplied accuracy of external reference
K and L2 bands	±2 Hz ± multiplied accuracy of external reference
RSSI	≤–125 dBm to –30 dBm

a. The frequency range, measured from the tuned frequency, that can be used without needing to retune the front end or recalibrate the RSSI. Bands with full switching range do not require manual tuning.

General (Continued)

IF stages - B2 and B3 and C bands	
Frequencies	
Analog	16.9 MHz
Digital	16.9 MHz and 0 Hz
IF stages - G, H, K and L2 bands	
Frequencies	
Analog	70.1 MHz
Digital	8.66 MHz and 0 Hz

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

Digital RF

Digital unfaded sensitivity[a]	
Guaranteed	<–120dBm @ 5% BER (DAQ 2.0) <–118.5dBm @ 2.6% BER (DAQ 3.0) <–118dBm @ 2% BER (DAQ 3.4) <–117dBm @ 1% BER (DAQ 4.0)
Typical	<–122dBm (0.18µV) @ 5% BER

a. Center of switching range at 25°C.

Digital selectivity	
B, C and H bands	≥82dB @ 1% BER
G band	≥80dB @ 1% BER
H5 band	≥79dB @ 1% BER
K and L2 bands	≥77dB @ 1% BER
Digital spurious response attenuation	≥90dB
Digital intermodulation response attenuation[b]	≥78dB @ 1% BER unfaded

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

Digital blocking rejection	
>1MHz	100dB @ 1% BER
Digital co-channel rejection	12dB

Analog RF

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

Sensitivity[a,b]

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

a. 12 dB SINAD.

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

Maximum usable sensitivity[c,d]

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

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

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

FM quieting[e]

Narrowband	–113 dBm

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

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

B, C, G and H bands	45 dB (ANSI/TIA) 43 dB (ANSI/TIA)
K and L Bands	

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

Selectivity[g]	EIA-603[h]	TIA/EIA-603-D[h]	ETSI
B, C, G and H bands	85 dB	50 dB	85 dB
K and L Bands	79 dB	45 dB	—

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

h. The EIA-603 is a single tone test method. The TIA/EIA-603-D is a two-tone test method.

Signal displacement bandwidth	≥1 kHz

Analog RF

Spurious response attenuation	≥100 dB (ANSI/TIA) ≥90 dB (ETSI)
Intermodulation response attenuation[i]	
B, C, G and H bands	80 dB (ETSI) 80 dB (ANSI/TIA)
K and L Bands	

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

Blocking rejection	
B, C, G and H bands	
1–10 MHz	100 dB (ETSI)
>10 MHz	110 dB (ETSI)
±1, ±2, ±5 and ±10 MHz	100 dB (ANSI/TIA)
K and L Bands	
1–10 MHz	100 dB (ANSI/TIA)
>10 MHz	110 dB (ANSI/TIA)
±1, ±2, ±5 and ±10 MHz	100 dB (ANSI/TIA)
Co-channel rejection	
Narrowband	–8 dB
Amplitude characteristic[j]	≤3 dB (ETSI)

j. RF Input Level –107 dBm to –13 dBm.

Analog Audio - General

Frequency response (FM demodulator to G.711)	
Bandwidth (subaudible signaling enabled)	339 Hz - 3 kHz
Bandwidth (subaudible signaling disabled)	185 Hz - 3 kHz
De-emphasis	within +1, -3 dB of a -6 dB/octave de-emphasis curve (ref 1 kHz).
Pre-emphasis	within +1, -3 dB of a +6 dB/octave pre-emphasis curve (ref 1 kHz)
Flat	within +1, -3 dB (ref 1 kHz)
	For more information, refer to “Appendix A Frequency Response Diagrams” on page 54.

Analog Audio - CTCSS

High pass (subaudible) filter

Hum and noise[a]	30 dB minimum at 250.3 Hz 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	6.5 dB
Opening time	60 ms typical
Closing time	60 ms typical

RSSI gating

Opening level	-117 dB to -70 dBm
Accuracy[a]	± 0.1 dB
RF hysteresis	4 dB
Opening time	20 ms maximum
Closing time	20 ms maximum

a. Assumes that RSSI has been calibrated (WebUI) at the receiver frequency

Receiver gate logical combinations:

SINAD gating only	Provides for robust operation
RSSI gating only	Provides for rapid operation
SINAD OR RSSI gating	Gate operates rapidly and provides robust operation while SINAD condition is met
SINAD AND RSSI gating	Can reject low level interfering signals

1.6 Transmitter

The specifications in this section pertain only to the combination of a TB9300 reciter with a 50 W or 100 W power amplifier.

General

Frequency bands

B2 band*	136 MHz to 156 MHz
B3 band*	148 MHz to 174 MHz
C1 band	174 MHz to 193 MHz
C3 band	216 MHz to 225 MHz
G4 band	330 MHz to 380 MHz
H1 band*	400 MHz to 440 MHz
H2 band*	440 MHz to 480 MHz
H3 band*	470 MHz to 520 MHz
H4 band*	380 MHz to 420 MHz
H5 band	400 MHz to 470 MHz
K4 band*	762 MHz to 776 MHz and 850 MHz to 870 MHz
K8 band	757 MHz to 758 MHz
L2 band	927 MHz to 941 MHz

* Note that these frequencies have reached end-of-life, and whilst currently supported, are no longer available for the TB9300. They are available for the TB9400, where B2 and B3 bands can be replaced by the B1 band.

Frequency increments

B and C bands	2.5 kHz and 3.125 kHz
G4, H, K and L2 bands	5 kHz and 6.25 kHz

Frequency stability[a]	±0.5 ppm –30°C to +60°C (–22 °F to +140 °F)

a. For K band (700 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 37.

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]	±0.5 dB into a 50 Ω load

b. Within normal operating voltages and temperatures; measured directly on PA output.

Duty cycle	100% at maximum rated output power[c] at +60 °C (+140 °F) ambient temperature

c. Measured directly on PA output.

General (Continued)

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

d. Under power foldback.

Protection	
Temperature	power foldback to 10% if RF power devices exceed safe operating conditions
Current	power foldback and shutdown if RF power devices exceed safe operating currents
Supply voltage	power foldback to 10% 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 10% at VSWR extremes; continuous analog power foldback to maintain 100% duty cycle into mismatched loads

Adjacent channel power All modulation types	
Steady state	<–60 dBc (EN 300 113 & EN 300 086)
Transient	<–50 dBc (EN 300 113)

Modulation fidelity	<2%

Intermodulation	–40 dBc with interfering signal at –30 dBc at TB9300 base station RF output. For Europe, 70 dB ratio is achieved using an external Circulator/Isolator with a minimum isolation of 30 dB and less than 0.5 dB insertion loss.

Sideband noise[e]	
± 2.5 kHz	< –120 dBc/Hz
± 100 kHz	< –145 dBc/Hz
≥ ± 1.5 MHz	< –154 dBc/Hz at 50 W < –157 dBc/Hz at 100 W

e. No modulation, measured from center frequency.

Radiated spurious emissions	
Transmit - B and C bands	< –36 dBm 30 MHz to 1 GHz < –30 dBm 1 GHz to 4 GHz
Transmit - G and H bands	< –36 dBm 30 MHz to 1 GHz < –30 dBm 1 GHz to 4 GHz[f] < –30 dBm 1 GHz to 12.75 GHz[g]
Transmit - K and L2 band	<–20 dBm to 9 GHz
Standby	<–57 dBm to 1 GHz <–47 dBm 1 GHz to 4 GHz

General (Continued)

f. Transmit frequency below 470 MHz.

g. Transmit frequency above 470 MHz.

Conducted spurious emissions	
Transmit - B and C band	< –36 dBm 9 kHz to 1 GHz < –30 dBm 1 GHz to 4 GHz
Transmit - G and H band	< –36 dBm 30 MHz to 1 GHz < –30 dBm 1 GHz to 4 GHz[h] < –30 dBm 1 GHz to 12.75 GHz[i]
Transmit - K and L2 band	<–20 dBm to 9 GHz
Standby	<–57 dBm to 1 GHz <–47 dBm 1 GHz to 12.75 GHz

h. Transmit frequency below 470 MHz.

i. Transmit frequency above 470 MHz.

Transient behavior - B and H bands	complies with EN 300 113

Simulcast

Launch time accuracy[a]	±1.5 µs

a. Launch time offset, adjustable in 1 µs increments.

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

b. Carrier frequency offset, adjustable in 0.1 Hz increments.

Supported simulcast modulation schemes	
DMR	4FSK

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

Simplex

Coaxial relay operating time	30 ms (maximum)[a]
Isolation (off-state)	> 40 dB

a. **Warning**: A coaxial relay that takes longer than 30 ms to operate risks damage to the PA.

Analog Audio - General

Peak deviation	
Narrowband	≤2.5 kHz
Nominal deviation selection[a]	55% to 65% of peak deviation
Limiting deviation[b]	94% of maximum system deviation
CWID deviation	40% of peak deviation

a. For a level of –10 dBm0 applied to the line input.

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

Analog Audio - Modulation Characteristics

Frequency Response (G.711 to FM modulator)	
Bandwidth (subaudible signaling enabled)	307 Hz - 3 kHz
Bandwidth (subaudible signaling disabled)	134 Hz - 3 kHz
Pre-emphasized response	within +1, –3 dB of a 6 dB/octave pre-emphasis curve (ref. 1 kHz)
Flat response	within +0.5, –1.5 dB of output level at 1 kHz
	For more information, refer to “Appendix A Frequency Response Diagrams” on page 54.
Distortion	<2%
Hum and noise[d]	
Narrowband	–50 dB typical (ETSI)

d. 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

Analog Audio - CTCSS (Continued)

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]	< 0.01%	
Packet Loss	< 0.01%	
Latency	< 40 ms	< 150 ms
Jitter	< 20 ms	< 100 ms
Skew	< 40 ms recommended	< 270 ms
Minimum bandwidth for user traffic (voice, control channel, packet data)	64 kbit/s per physical channel	
Minimum bandwidth to carry management traffic (web, logs, SNMP).	100 kb/s per site	
Minimum bandwidth to meet jitter requirements on a non-fragmenting link	600 kb/s per site up to 5 physical channels	

a. ‘C plane’ and ‘U plane’ are telco terms for distinguishing call setup and user traffic.

1.7.2 Channel Group Size

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

'Channel group size' is the number of receivers and transceivers in a channel group.

'Vote contributors' are the number of active receivers that will contribute to a voted output.

		Series 1	Series 2
Channel Type	**Vote Contributors**	**Channel Group Size**	**Channel Group Size**
All DMR (trunked and conventional)	all base stations	10	28

In systems with a mixture of Series 1 and Series 2 base stations, the channel group sizes in the above table will depend on whether the channel group master is a Series 1 or Series 2 base station.

1.7.3 Digital Air Interface

Vocoder	AMBE+2
Digital Protocol	DMR ETSI-TS102 361 -1, -2, -3, -4

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	IEEE 802.3 and 802.3u

1.8.3 System Interface (DB-25)

External General Purpose Digital Inputs

Input low threshold	V_{IL} < 0.6 V
Input high threshold	V_{IH} > 2.3 V
Internal pull-up (5V)	≥ 10 kΩ
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)

External General Purpose Digital Outputs

Low level	< 0.4 V
High level	< 30 V
Low level sink current	< 5.0 mA
High level current	< 100 μA

1.8.4 Balanced Interface

Line Output - Balanced

Audio Headroom The largest sine-wave signal that meets distortion specifications	+10 dBm
Input Level Range For an output signal of 60% deviation at 1 kHz Adjustable over this range	-30 dBm to +0 dBm
Output impedance	600 Ω balanced
Return loss	> 20 dB
Impedance balance about earth (ITU-T G.117)	> 46 dB
Frequency response ('speech' setting)	300 Hz to 3 kHz
Passband ripple (compared with 1 kHz)	-3 dB to +1 dB
Distortion (RF to line) Applicable over a level adjustment range up to the audio headroom limit Applicable over the entire frequency response range	3 %

Line Input - Balanced

Audio headroom	+10 dBm
Input Level Range For an output signal of 60% deviation at 1kHz Adjustable over this range	-30 dBm to 0 dBm
Impedance	600 Ω balanced
Return loss	>20 dB
Impedance balance about earth ITU G.117	>46 dB
Frequency response	300 Hz to 3 kHz
Distortion (line to RF)	3%

1.8.5 Unbalanced Interface

Line Output - Unbalanced

Linear range of operation	1 to 3 V

Line Input - Unbalanced

Linear range of operation	1 to 3 V

1.8.6 Audio Delay

Transmit direction: 70 ms max (signal applied to a balanced/unbalanced input)

Receive direction: 70 ms max (signal sampled on a balanced/unbalanced output)

Delay distortion: ≤ 40 µspp 300 Hz to 3 kHz (relative to 1 kHz)

Delay distortion is the pulse distortion that arises because different frequency components have different delays.

1.8.7 Rx Gate Output

The Rx gate output indicates a valid analog received signal.

Logic state: Active low

Logic type: Open drain transistor connection

The Rx Gate output is not the same as an M-wire output:

Large negative voltages (traditionally associated with E&M signaling) can damage the reciter hardware when applied directly.

Tait offers an isolation adapter that provides E&M isolated signaling (order number TBC101A).

Electrical Characteristics

Parameter	Specification	Comments
Low voltage level	<0.4 V	Rx gate activated
High voltage level	0 to 30 V	Protection
Low level output current	<250 mA	
High level output current	<100 µA at 30 V	

1.8.8 RSSI Output

Parameter	Value	Unit
Configurable RF input range	-120 .. -60	dBm
Configurable output range	1 .. 4.5	V
Maximum output range Series 1	0.8 .. 4.6	V
Maximum output range Series 2	0.5 .. 4.9	V
Accuracy	+/- 300	mV
Response time	< 70	ms
Output impedance	100	Ohm

1.8.9 Antenna Relay Output

The antenna relay output will be active when the base station transmits, if the antenna relay is enabled in the WebUI.

Logic state: Active low

Logic type: Open drain transistor connection

Antenna relay operation applies to analog conventional mode when using DMR firmware.

Electrical Characteristics

Parameter	Specification	Comments
Low voltage level	< 0.4 V	Antenna relay activated
High voltage level	0 to 30 V	Protection
Low level output current	< 250 mA	
High level output current	< 100 µA at 30V	

1.8.10 Tx Key Input

The Tx Key input is not the same as an E-wire input:

Large negative voltages (traditionally associated with E&M signaling) can damage the reciter hardware if applied directly.

Tait offers an isolation adapter that provides E&M isolated signaling (order number TBC101A).

Logic state: Active low.

Electrical Characteristics

Parameter	Specification	Comments
Low voltage level	<= +0.8 V	Input active
High voltage level	>= +2 V	Input inactive
Input hysteresis	>= 0.4 V	
Input resistance	>= 10 kΩ	To +5 rail
Maximum external pull up voltage	<= 20 V	

1.8.11 1PPS Timing Reference Input (BNC)

Input low threshold	V_{IL} < 0.6 V
Input high threshold	V_{IH} > 2.3 V
Input termination	470 Ω + 5% (AC terminated)
Transient input voltage	$\|V_{IN}\|$ < 15 V
Frequency	1 PPS
Polarity	rising edge represents a timing reference
Maximum jitter	±50 ns

1.9 Miscellaneous

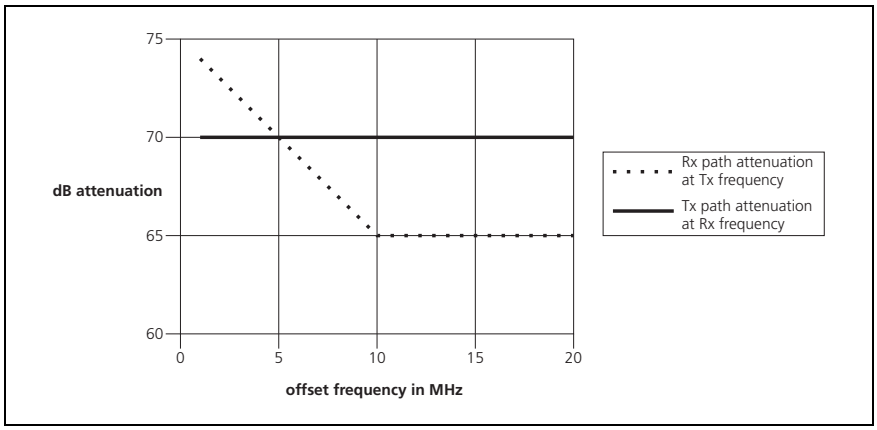
1.9.1 Channel Details

Number of channels	4000
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 no more than 1 dB of receiver desensitization (from the specified sensitivity), with 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
B Band	Single 50 W base station	121 W	413 Btu/h
	Dual 50 W base station	219 W	747 Btu/h
	100 W base station	231 W	788 Btu/h
G & H Band	Single 50 W base station	137 W	467 Btu/h
	Dual 50 W base station	244 W	833 Btu/h
	100 W base station	245 W	836 Btu/h
K Band	Single 50 W base station	151 W	516 Btu/h
	Dual 50 W base station	245 W	837 Btu/h
	100 W base station	257 W	878 Btu/h
L2 Band	100 W base station	257 W	878 Btu/h

1.9.5 Dimensions and Weight

Dimensions		
Height	176.8 mm (7 in)	
Width	482.6 mm (19 in)	
Length		
Subrack only	385 mm (15.2 in)	
Including front panel	400.5 mm (15.8 in)	
Weight[a]	H/W version 1 and 2 PMU	H/W version 3 PMU
Single 50 W base station	21.5 kg (47.4 lb)	18.5 kg (40.8 lb)
Dual 50 W base station	28.6 kg (63.1 lb)	25.6 kg (56.5 lb)
100 W base station	22.8 kg (50.3 lb)	19.8 kg (43.7 lb)

a. With AC and DC PMU.

1.9.6 Reliability

MTBF	140,000 hours minimum (based on field returns)

2 Module Specifications

This chapter provides hardware specifications for the individual modules used in the TB9300 base station:

- Reciter
- 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

2.1.1 Identifying the Reciter

You can identify the model and hardware configuration of a reciter 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 product codes is not intended to suggest that any combination of features is necessarily available in any one reciter. Consult your regional Tait office for more information regarding the availability of specific models and options.

Product Code	Description
T01-01105-**X**XXX	**Frequency Band and Sub-band** C = 136 MHz to 156 MHz (B2 band) D = 148 MHz to 174 MHz (B3 band) E = 174 MHz to 193 MHz (C1 band) F = 216 MHz to 225 MHz (C3 band) G = 330 MHz to 380 MHz (G4 band) K = 400 MHz to 440 MHz (H1 band) L = 440 MHz to 480 MHz (H2 band) M = 470 MHz to 520 MHz (H3 band) U = 380 MHz to 420 MHz (H4 band) S = 400 MHz to 470 MHz (H5 band) T = 787 MHz to 788 MHz (K8 band receive) T = 757 MHz to 758 MHz (K8 band transmit) N = 762 MHz to 870 MHz (K4 band)[a] Q = 896 MHz to 902 MHz (L2 band receive) Q = 927 MHz to 941 MHz (L2 band transmit)
T01-01105-X**X**XX	A = standard
T01-01105-XX**X**X	A = default
T01-01105-XXX**X**	A = default

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

2.1.2 Physical Details

Cooling	forced air via front panel fan
Connectors	
RF input	BNC female
Transmit forward RF output	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
1PPS input	BNC female
Ethernet	RJ45
System inputs and outputs	DB-25 connector
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
T01-01136-**X**XXX	**Frequency Band** C = 136 MHz to 174 MHz (B band) E = 174 MHz to 193 MHz (C1 band) F = 216 MHz to 225 MHz (C3 band) H = 330 MHz to 380 MHz (G4 band) J = 380 MHz to 520 MHz (H band) N = 762 MHz to 870 MHz (K4 band)[a] Q = 850 MHz to 941 MHz (L band)
T01-01136-X**X**XX	A = 50 W B = 100 W
T01-01136-XX**X**X	A = default
T01-01136-XXX**X**	A = default

a. The actual frequency coverage in this band when used with a K-band TB9300 reciter is 762 MHz to 776 MHz and 850 MHZ to 870 MHz.

2.2.2 Physical Details

Cooling	forced air over heatsink via front panel fan
Connectors	
28 VDC Input	Phoenix MVSTBR2.5HC/2-ST/5.08 female
RF Input	SMA female
Recommended SMA Torque	0.6 N·m (5 lbf·in)
RF Output	N-type female
Control and Alarm	16-way IDC male
Dimensions	
Height	86 mm (3.4 in)
Length	350 mm (13.8 in)
Width	
50 W PA	144 mm (5.7 in)
100 W PA	177 mm (7 in)
Weight	
50 W PA	4.6 kg (10.1 lb)
100 W PA	5.9 kg (13.0 lb)

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.

H/W version 1 and 2 PMU

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

H/W version 3 PMU

Product Code	Description
T01-01140-**X**XAA	A = AC module B = DC module
T01-01140-X**X**AA	A = AC only B = 12 V DC C = 24 V DC D = 48 V DC

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	H/W version 1 and 2 PMU	H/W version 3 PMU
AC PMU	4.8 kg (10.6 lb)	3.2 kg (7.1 lb)
DC PMU	5.1 kg (11.2 lb)	3.0 kg (6.6 lb)
AC and DC PMU	7.0 kg (15.4 lb)	4.0 kg (8.8 lb)

2.3.3 Connections

The following specifications refer to the external wiring and connectors that 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]	8 AWG	10 AWG	12 AWG
Flexible wire cross section[b]	10 mm^2	6 mm^2	4 mm^2

a. Battery.

b. For a length of 4.6 m (15 ft), the DC input leads should be of a suitable gauge to ensure no more than a 3% drop in voltage at the PMU input 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 TB9300 base station has been tested and approved for the national and international compliance standards that are listed on the following page. These standards only apply to equipment operating as an integral part of a TB9300 base station.

You can obtain further details of test methods and the conditions that 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 tables show which variants of the TB9300 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.

		B2 & B3 Band		C1 Band	C3 Band	H Band		K4 Band		L2 Band
		50 W	100W	50 W	100W	50 W	100W	50 W	100W	100W
DMR/MPT	CFR Title 47 Parts 22 and 90 (USA)	✓	✓		✓	✓[a]	✓[a]	✓	✓	✓
	RSS-119 (CANADA)	✓	✓		✓	✓[a]	✓[a]	✓	✓	✓
	EN 300 113 (CE)	✓	✓	✓		✓[b]	✓[b]			
	AS/NZS 4768 Appendix A	✓	✓			✓[b]	✓[b]			
	Anatel Act #944:2018 (BRAZIL)	✓	✓			✓	✓			
	Anatel Act #943:2018					✓	✓		✓	
RF - Analog	CFR Title 47 Parts 22 and 90 (FCC)	✓	✓		✓	✓[a]	✓[a]	✓	✓	✓
	EN 300 086	✓	✓	✓		✓[b]	✓[b]			
	AS/NZS 4295 Appendix B	✓	✓			✓[b]	✓[b]			
EMC	CFR Title 47 Part 15 (FCC) RSS-Gen (IC)	✓	✓		✓	✓[a]	✓[a]	✓	✓	✓
	EN 301 489-1, EN 301 489-5	✓	✓	✓		✓[b]	✓[b]			
	Anatel Act #952:2018	✓[c]	✓[c]			✓	✓		✓	

a. H1 and H2 bands

b. H1, H2, H3, H4 and H5 bands

c. B3 band only

Safety and Environmental Compliances

The TB9300 base station has been tested and approved to the following standards.

Safety	EN62368 UL 60950-1 (E223047)[a] AS/NZS 60950-1, Q090114[a] UL62368 (E252373)[b] A/SNZS 623368[b]	
Environmental	Low Pressure (Altitude)[c]	MIL-STD-810G Method 500.5 Procedure 2
	Vibration	MIL-STD-810G Method 514.6 Procedure 1
	Shock	MIL-STD-810G Method 516.6 Procedure 1

a. H/W version 1 and 2 PMUs only

b. H/W version 3 PMU only

c. 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 de-emphasized

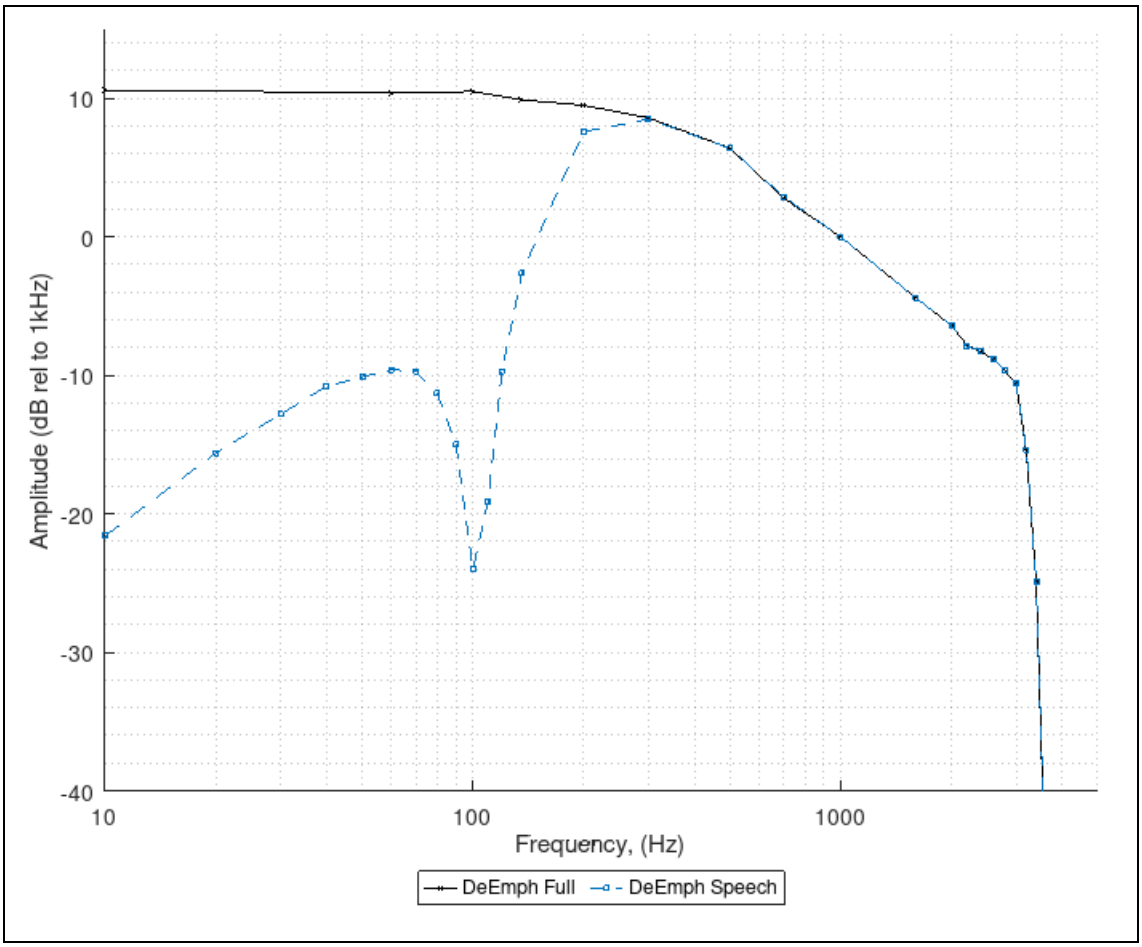


Figure A.2 Receiver frequency response flat

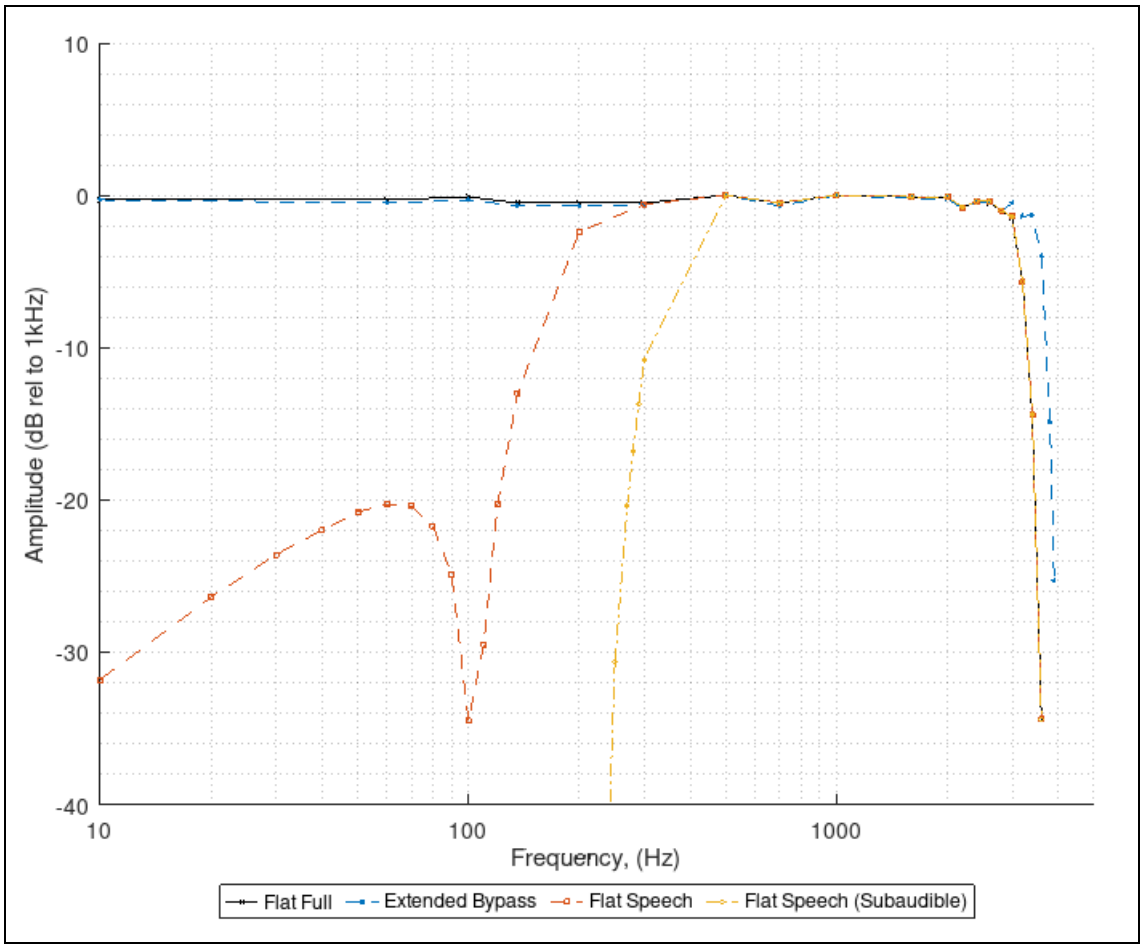


Figure A.3 Transmitter frequency response pre-emphasized

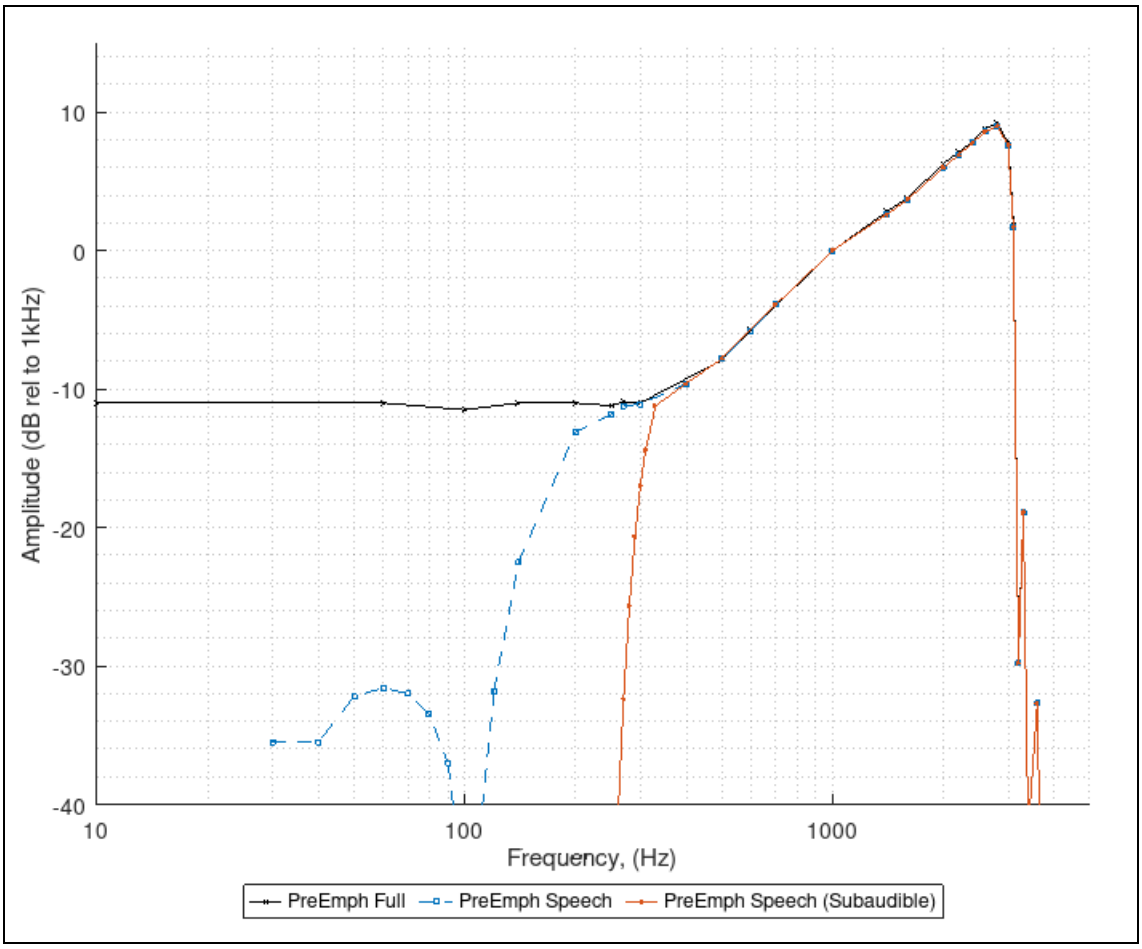


Figure A.4 Transmitter frequency response flat