BS418H - BASE STATION HIGH POWER WITH 8 CARRIER

Description

DAMM BS418H - High Power is an 8-carrier TETRA indoor base station and is complementary to DAMM BS421 and BS418, BS414 and BS411 TETRA base stations. The BS418 High Power may be used in networks where high traffic capacity is required (up to 31 Erlang) and where terminals operate with more than 1,8W output power.

It is designed for a fully IP based connectivity and allows for remote supervision and diagnostic, test, control, setting and software update, file transfer and SNMP. Its embedded Operate & Maintenance (OM) system is reached by means of Windows desktop.

The BS418 High Power support discontinuous transmission fully GPS synchronized. This allows a dramatic decrease in power consumption, as only the active TR412 (‘s) needs to be powered, until traffic load requires more carriers to be on air.

BS418 High Power fully supports Voice + Data services in full and half duplex modes, compliant with the ETSI EN 300 392

Access to all field replaceable units (FRU) is from the front, protected by a lockable door, and all external connectors in located on top of the rack.

The BS418 High Power consists of the base station controller, the transceiver modules, the combiner system and the filter system. In the receiver path a separate Tower Mounted Amplifier/Duplexer (TMD412) is an integrated functional part of BS418 High Power.

The TMD412 is designed for mast/tower mounting. Substantially the unit is a receiver amplifier with build in duplex filter. For use with the High Power base station the TMD412 shall be coupled as amplifier alone.

The TMD412 amplification of the received signals fully eliminates the feeder cable loss by up to 8dBm, which gives superior radio coverage performance and link balance.

The BS418 High Power rack contains (see figure 1 and 2):

TR Cassette for BS418H, CAS411H, with slots for 8 Transceivers and 2 Base Station Controllers. This cassette contains also a blower section with 6 high flow blowers, which regulates the airflow through the base station in two steps controlled by the temperature in the transceivers.

Base Station Controller, BSC412.
The operating system in the BSC412 executes DAMM’s TetraFlex® system software and may as well execute Tetra system software from DAMM OEM Partner.
By installing a second redundant BCS412 in the BS418 High Power rack, reliability will be improved.
BSC412 is equipped with an internal GPS receiver giving accurate time, date and frequency synchronization of all installed TR412’s and to allow the base station to run full time synchronous with other base stations in a network. This is necessary for optimum cell-reselection and seamless handover from mobiles. Missing GPS signals will cause the internal high stability oscillator to take over synchronization.
The GPS sync input signal from a single GPS antenna may as well allow for external synchronization in tunnels solutions and in other operational areas where GPS signals cannot be received directly.
It is provided with an enhanced processer with the ability to handle a complete TETRA site. It contains enhanced Ethernet LAN and WAN connections intended for Voice over IP switching. Dongle management of software licenses can be provided via an USB port.

Power Supply, PS419 Is a universal unit used in all versions of the BS418 Base Stations. The PS419 Cassette consists of a Power Supply Controller and up to 3 PS419 Power supply units, to secure N+1 redundancy and allow for both standard and high power transceivers.

Together with the **PS418** Power Supply it is a dual output unit delivering both +14V and +26V output voltage, where the +14V output feeds all units in the BS and the +26V output feeds the Power Amplifier in the TR412.

The PS419 Power Supply is designed to run on both AC mains and DC battery input. In addition it is able to charge a 48V back-up battery.

When running with AC input the PS419 Power Supply accepts 100 to 240 V AC, 45-66Hz, covering all commonly used AC mains standards. It can power the Base Station and simultaneously feed other units with –48 VDC and charge an optionally connected -48V back-up battery.

When running on an external battery the PS419 Power supply accepts –48 VDC standards used in telecom installations.

The PS419 Power Supply Cassette is designed to run with up to 3 PS419 Power Supply with load sharing to increase the total output power and to allow n+1 redundancy.

Transceiver, TR412H
The TR412 High Power Transceiver is a complete TETRA carrier unit
The TX section contains a linear, low noise transmitter linearized with a Cartesian loop. It can deliver a peak output power of 150W, giving a nominal output power of 62,5W TETRA. Modulation and power control is performed in software of the DSP. The output amplifier is protected with a VSWR protection circuit and a temperature protection scheme. The forward and reflected power can be measured with built-in RMS power meters. An RFTL output is available for Base Station test.
The RX is a double super-heterodyne high dynamic range receiver provided with dual diversity with separate RX paths all the way to the DSP. The final selectivity, diversity combination, demodulation etc. is made in DSP software.
The 16-bit micro-controller handles the general control functions of the transceiver, boot of DSP, O&M communications etc. It also handles the packet mode communication on the HDLC bus to the BSC412.
All internal frequencies are generated with PLL's locked to the information coming from the BSC.

TX Combiner, TC411.
The TC411 is a 4-way TX cavity combiner module used to combine the individual TX outputs to a single cable.
The TC411 consists of 4 motor-tuned ¼ or ¾ λ TEM resonators. The inputs are provided with dual circulators with high-power loads, which are able to dissipate the reflected power when the TX antenna is missing or the cavity is tuned to a frequency not matching the transmitter. An RF detector is provided on the high-power load used for manual adjustment and alarm generation.
The TC411 is equipped with the TCC411 TC Combiner Controller with built-in micro-controller, which controls the motors.

At power-up, the micro-controller initializes the tuning position against a mechanical end stop. The TCC411 is connected to the O&M UART bus and can be reached with O&M commands from the BSC412.

TX Filter, TF411.
The TF411 is a high power TX filter, which reduces the radiation in the RX band, and is connected to the TX antenna socket located on top of rack.

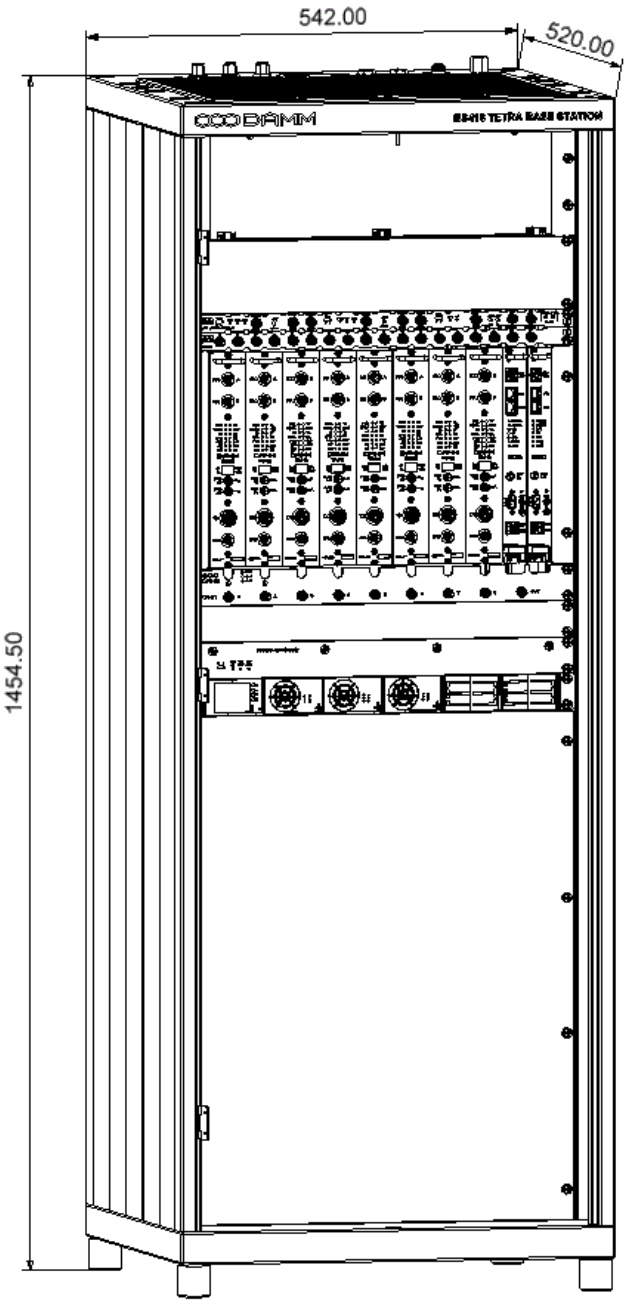
Tower Mounted Amplifier/Duplexer, TMD412.
The TMD412 contains two low-loss highly selective RX filters and two low-noise high dynamic range amplifiers which amplify the RXA and RXB signals.
The TMD412 also contains a duplex filter, combining the TX and RXA signals to one antenna, which shall not be used for High Power.

Antenna Interface, AI411.
The AI411 Antenna Interface unit is used in all Base Station and contains all the necessary circuit to support a complete Radio Cell including support of the Tower Mounted Amplifier/Duplexer TMD412 with all functions.

The two independent RX multi-coupler amplifiers are built with low-noise high dynamic range transistors. They have DC-insertion in the feeders for the TMA/TMD and alarm circuits to monitor the TMA/TMD's and the internal amplifiers´ current consumption. Included in the input are variable input attenuators to adjust for actual cable loss.
An RF Power Detector is used to supervise the forward and reflected power at the TX antenna connector. The detectors are temperature-compensated and the output levels can be fine adjusted.

Receiver Multi-coupler Divider, RMD411.
The RMD411 divides the RXA and RXB signals and feed them to the receiver part of the TR412

Figure1: DAMM Standard 30U - BS418H



3HE CON412 CONNECTION BOX
TF411 TX FILTER

2HE (SPARE) DEPTH 300mm

½HE AI411 ANTENNA INTERFACE
½HE RMD411 RECEIVER MULTICOUPLER DIVIDER

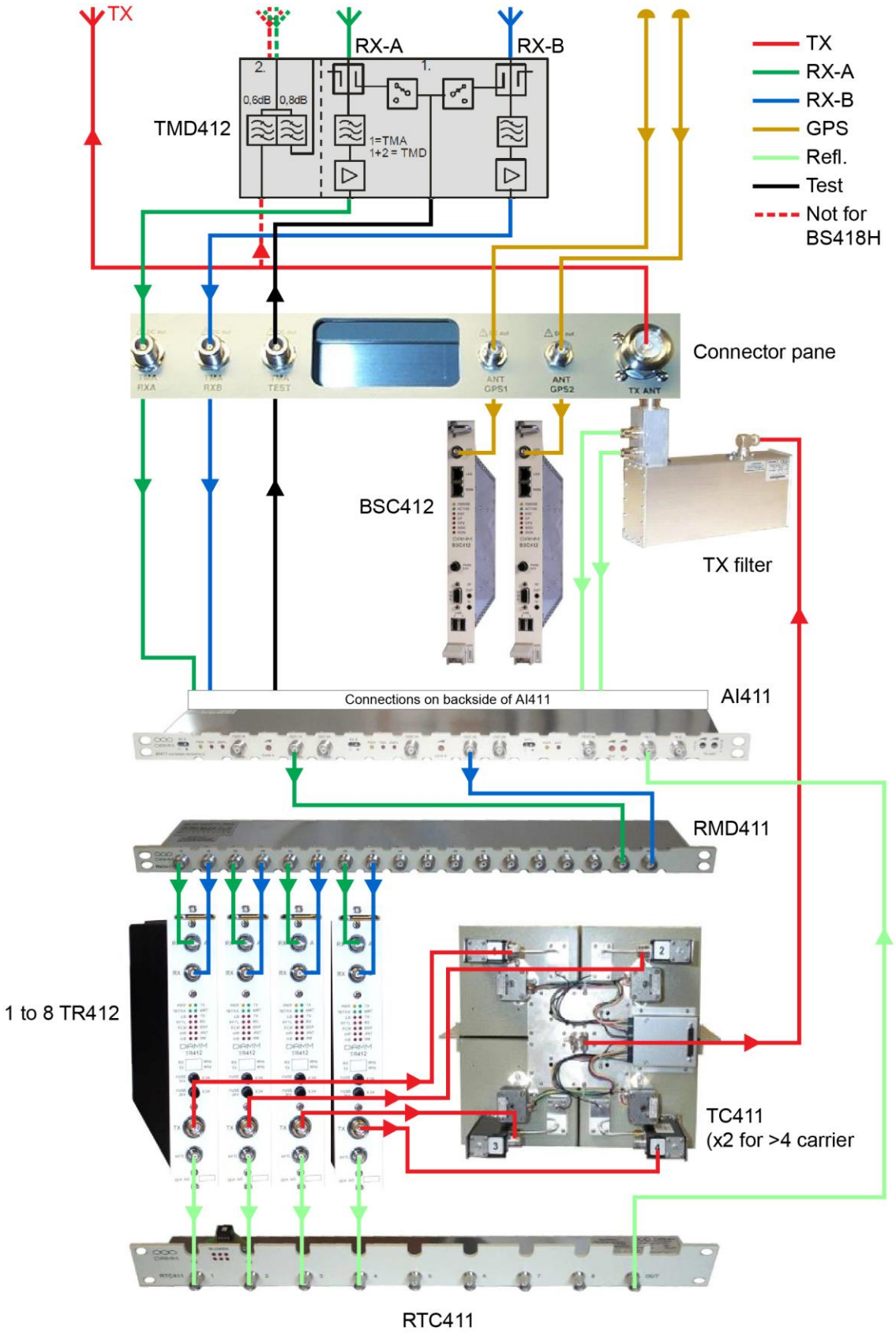
6HE CAS411 TR CASSETTE
8 x TR412 TRANCEIVER
2 x BSC412 BASE STATION CONTROLLER

1HE RTC411 TEST LOOP COMBINER
1HE AIR FLOW
1HE PS418 POWER SUPPLY
1HE PS419 POWER SUPPLY

14HE 2 x TC411 4-WAY TX COMBINER

CAB418 CABINET

Figure 2: BS418H RF Signal Paths (Shown with 4 carrier)



Specification

Parameter	Value
Frequency Bands:	
RX=350-360MHz, TX=360-370MHz, BW=5MHz	
RX=380-390MHz, TX=390-400MHz, BW=5MHz	EU Public safety
RX=410-420MHz, TX=420-430MHz, BW=5MHz	
RX=450-460MHz, TX=460-470MHz, BW=5MHz	
RX=805-825MHz, TX=850-870MHz, BW=14MHz	
Common TX/RX:	
Synthesizer frequency step	12,5kHz and 6,25 kHz
Frequency accuracy	Locked to GPS
Timing accuracy	+/-14us ref. GPS timing
Duplexer- Amplifier:	
RX feeder loss compensation max.	8 dB nom.
Transmitter;	
Output power before combiner	1 to 62,5W
Output power after cavity combiner and TX filter	½ to 25W
TX linearization scheme	Cartesian Loop
Forward and reflected power meter	0.1W to 99.9W
Receiver:	
Note: The TMD412 Tower Mounted Amplifier/Duplexer is a functional an integral part of BS41x range. The two RX amplifiers in the TMA/TMD are included in the RX sensitivity values.	
Diversity	Dual as standard
RX sensitivity with diversity. Static	-121dBm
RX sensitivity without diversity. Static	-117dBm
RX sensitivity with diversity. Dynamic TU50 at 4% BER	-118dBm
RX sensitivity without diversity. Dynamic TU50 at 4% BER	-112dBm
Noise figure	3.5dB typ.
3rd –order IM input intercept point	+13dBm typ.
Intermediate frequencies	45MHz and 144kHz
RSSI dynamic range	Noise floor to -43dBm
Base Station Control Unit	
Operating system:	
Host processor	Intel Atom D510 1.66 GHz
RAM	2GByte
Operating system	Windows WES2009
Synchronisation of date/time	From GPS or External sync.
Non synchronized operation	Built-in oscillator
Co-processor	HDLC buses to TR412 and TC411
CF Disk Multiple partition	8GB (2GB+2GB+4GB)
Optional CF Disk Multiple partition	16GB (2GB+2GB+12GB)
Ethernet including voice over IP	10/100Mbit
Synchronization	1 sec pulse in/out

Antenna configuration:	
Using TMD412 coupled as amplifier, dual diversity	One TX, One RX A, One RX B
GPS antenna	Passive or Active (+5V DC)
Combiner:	
4-way cavity combiner, motor tuned	Standard
Channel spacing cavity combiner	>175kHz, >225kHz in 800Mhz Band
Internal connectors between Base Station rack and TMD412:	
RXA – RXB and Test	N Female
External Connectors:	
Directly on BS rack or TMD412:	
TX	7/16
2 x GPS antenna connector one for each BSC412	BNC on top of Rack
Earth Base Station	Rear right top of the rack
Earth TMD412	Mounting Plate
Via Connection Box	
AC Mains connector 100 to 240 V AC (Phase, 0, GND)	Screw-type for 6sq. mm. max
External DC supply or battery connector -48V DC (-48, 0, GND)	Screw-type for 10sq. mm. max
- 48V out for external router/modem etc. (-48, 0, GND)	Screw terminal 3 x 2.5#
External battery temperature sensor	RJ12
BSC1 and BSC2 Ethernet LAN/WAN connections	RJ45 (x8)
Number of RJ45 patch-field positions	3
External alarm connector (8xIn/GND and 2xOut/+14V)	LSA for 0,4-0,6 mm solid wire
External 1 sec. Sync (BSC1 and BSC2)	LSA for 0,4-0,6 mm solid wire
Power Supply:	
Power source	-48VDC or 100-185 / 185-240VAC, 45-66Hz
Power consumption basic rack without carriers	152W
Power consumption per active carrier at 25W output	200W
Power consumption per “standby carrier	14W
Power consumption with 8 active carriers at 8 x 25W output	1760W
Output for external battery, adjustable	-43,5 to 57,6VDC – max 14A (per. PS419)
Output for other units, fixed, (alternative to charging battery)	-48VDC - 12A
Physical:	
BS418H Rack 30U (Optional 36U)	
Dimensions (HxWxD), excl. connectors	1455x542x520 mm
Weight, fully equipped	117kg
Storage temperature range	-40ºC to +85º C
Operating temperature range	-20º C to +55º C
Encapsulation	IP20
TMD412:	
Dimensions (HxWxD), excl. connectors	337x245x130mm
Weight (incl. Mounting accessories)	8.9kg
Wind area	0.1sq.m
Storage temperature range	-55 to +70 Celsius
Operating temperature range	-25 to +55 Celsius
Encapsulation	IP65