

PRODUCT SHEET

DAMM® MultiTech Outdoor Base Station BS422-S and BS422-SP with Power Supply



DAMM® MultiTech Outdoor Base Station BS422-S and BS422-SP

The DAMM MultiTech Outdoor Base Station BS422 is a multi-carrier, multi-technology outdoor base station. It comes in two versions: the standard BS422-S version and the BS422-SP with a built-in AC mains power supply. Both variants act as a complete system integrated into one box, including switching functionality, network management, gateways and other decentralised system components.

They can operate up to four carriers, each in any technology mode:

- TETRA
- DMR
- Analog

Multiple carriers and technologies in one base station

Each BS422 can contain up to four carriers, and thanks to the multi-technology design it is possible to run a different technology on each carrier, i.e. DMR, TETRA or Analog. Our core-connected design ensures seamless interoperability between the different technologies, delivering maximum flexibility for any kind of application.

Full integration in the DAMM® System

Both the BS422-S and the BS422-SP are fully integrated in the DAMM system and support all applications and features known from our single-tech product line. Customers can seamlessly extend existing single-tech networks with the new MultiTech product lines while benefitting from the new options like mixed operations of TETRA, DMR and analog modes.

Best-in-class RF handling

The BS422-S and BS422-SP are provided with dual receiver diversity, offering outstanding sensitivity and have a built-in duplex filter.

The innovative design enables high transmit power in a very compact design, improving the coverage while keeping the operational costs low. The maximum transmit power varies between the different technologies.

Wide frequency ranges from the 80MHz to the 800MHz band, independent of operation mode, allows for agile spectrum adaptation no matter if it is in TETRA, DMR or Analog mode.

The built-in GNSS antenna – which is also suitable for Galileo and GPS satellite signals – makes the installation process simple and cost efficient. However, if preferred an external GNSS antenna can be used as well.

Flexible installation, even in harsh environments

The outdoor base stations are designed to be mounted in the top of a mast close to the antennas. This eliminates the traditional TX and RX signal degradations due to feeder loss and reduces the cost considerably.

The BS422-SP with its built-in AC power supply provides an exceptional, cost-efficient single-box solution when a service box is not required. It is either AC or DC powered and therefore a perfect match for the DAMM Transport Box TB422.

Both variants are designed for harsh climatic environmental conditions, are IP65-protected and can be installed in almost any environment where it is required.

KEY FEATURES

- 25W RF TETRA carrier
- 50W RF DMR or analog carrier
- 1 to 4 carriers
- Integrated mains power supply and backup battery (BS422-SP)



Superior radio performance

Both BS422 variants provide a maximum of 25W in TETRA and 50W in DMR and Analog mode at the antenna connector providing superior performance compared to most other available solutions.

AC power supply and built-in battery

The BS422-SP offers the same features as the standard BS422-S but is designed with an AC power supply. It also has a built-in backup battery as an option, which can operate the system for about one hour at 10W TX power (TETRA).

BS422-SP LTE Modem

The BS422-SP may be ordered with an LTE module. The LTE option, which includes a built-in antenna, provides seamless connectivity without regular backbone connection so that users on site stay connected with users in their home network. Also an external antenna connector is available to improve connectivity where necessary.

Frequency bands

Both variants are available in various frequency bands from mid-band to high UHF. The versions offer up to a 150kHz wideband spectrum (center frequency placement) for up to four carriers.

VHF

Band	Mid-band	VHF
TR RX/TX	68–87.5MHz	146–174MHz
Duplex spacing	0.5MHz	1MHz
TX carrier bandwidth	74kHz	74kHz
Carrier #	1–2	1–4
Duplex filter bandwidth	0.5MHz	1MHz
Other freq. on request		

UHF

Band	UHF	UHF	UHF	800MHz
TR RX/TX	380–400MHz	410–430MHz	450–470MHz	805–870MHz
Duplex spacing	10MHz	10MHz	10MHz	45MHz
TX carrier bandwidth	150kHz	150kHz	150kHz	150kHz
Carrier #	1–4	1–4	1–4	1–4
Duplex filter bandwidth	3.5MHz	3.5MHz	3.5MHz	10MHz
Other freq. on request				

Redundancy

A fully integrated node controller eliminates the need for separate hardware and enables very flexible installation options. Redundancy is achieved by using a second BS422-S/BS422-SP. With such a setup there is no single point of failure.

Frequency sharing

The ability to operate the BS422 in frequency sharing mode for TETRA, DMR or Analog makes the BS422 an ideal solution for installations where frequency scarcity is an issue. This option also enables easy and improved indoor coverage, a clear advantage compared to standard repeater systems in the market. Other advantages include full output power, full feature operation set (when isolated from the master node), full network management, redundancy, alarm handling and log system integration.

Up to 10 base stations can be connected to one BS422 as a master unit.

System expansion

The BS422-S/BS422-SP setup is software controlled, and licenses settings define the number/size of each technology as well as the number of subscribers, profiles and organisations. The software licenses can be changed at any time and so an upgrade of a network can be done when the need arises. The update is done remotely and without handling of large files over the network.

Connectivity: Power/Ethernet/synchronization

BS422-S

The BS422-S can be powered via -48VDC or via Power-over-Ethernet (PoE).

BS422-SP

The BS422-SP can be powered via -48VDC or 100–240VAC or optionally another DC supply. On top of that it supports charging and discharging of the optional BAT422BS1 or an external battery (battery in/out).

Power consumption

Power consumption depends on a number of factors including output power, the number of carriers, battery charging and ambient temperatures.

When multiple carriers are used, a unique possibility for power savings becomes possible. If a one-carrier setup is used it becomes equal to single-tech units using just one carrier. However, with two carriers (either using the same or a different technology) up to 30% power intake is saved. With three carriers up to 45% power intake is saved and finally with four carriers a power reduction of up to 55% is achieved. This can be an important parameter when operating 24/7 and can be seen as best-in-class for these product types.

Each BS422-S/BS422-SP offers an EXT and an INT connection interface. The INT connection is used for communication between the nodes based on a multicast IP, whereas the EXT connection is used to integrate applications and third-party products like PABX systems or dispatchers.

Synchronization between the BS422-S/BS422-SP base stations is possible via:

- GNSS – Global Navigation Satellite System receiver
- Precision Time Protocol (PTP, IEEE1588) synchronization over LAN.

Specifications

Frequency bands	Value
RX=68–87.5MHz, TX=68–87.5MHz, BW=0.5MHz	Mid-band
RX=146–174MHz, TX=146–174MHz, BW=1MHz	VHF
RX=380–390MHz, TX=390–400MHz, BW=3.5MHz	UHF
RX=410–420MHz, TX=420–430MHz, BW=3.5MHz	UHF
RX=450–460MHz, TX=460–470MHz, BW=3.5MHz	UHF
RX=455–465MHz, TX=450–460MHz, BW=1MHz	UHF
RX=460–470MHz, TX=455–465MHz, BW=1MHz	UHF
RX=805–825MHz, TX=850–870MHz, BW=10MHz	800MHz
(Other frequencies on request)	

Base station bandwidth options	Value
Carrier bandwidth	See table above
Max. no. of carriers per base station	4

Operation modes (carrier modes)	Channel bandwidth
TETRA	25kHz (20kHz FCC)
DMR Tier II & III	12.5kHz
Analog	12.5, 20, 25kHz

Common RX/TX	Value
Synthesizer frequency step	6.25kHz
Frequency accuracy	Locked to synch. source
Timing accuracy	+/-14us ref. synch. source
Duplexer	Built in

Transmitter	Value
Output power TETRA mode	0.2W to 25W ¹
Output power DMR mode	0.2W to 50W ¹
Output power Analog mode	0.2W to 50W ¹
TX power limitation above	+85°C (PA temperature)

Receiver	Value
TETRA RX static sensitivity	-121dBm typ.
TETRA RX dynamic sensitivity with diversity (TU50 at 4% BER)	-118dBm typ.
TETRA RX dynamic sensitivity without diversity (TU50 at 4% BER)	-112dBm typ.
DMR RX static sensitivity (at 1% BER)	-121dBm typ.
Analog RX static sensitivity (20dB SINAD)	-121dBm typ.
Diversity	Dual as standard

¹ Output at antenna connector, one carrier only; for multi-carrier setup please see examples in separate table

Specifications

Computer module	Value
Operating system	Windows 10 IoT Enterprise
Ethernet LAN/WAN (voice over IP)	10/100Mbit/s

Synchronization source	Value
1 PPS source	GNSS
Precision Time Protocol (PTP)	IEEE1588

Antenna configuration	Value
Minimum antenna setup, no diversity	One combined TX/RX
Minimum antenna setup, dual diversity	One TX/RX A, one RX B
Antenna setup with two BS422-S/BS422-SP, dual diversity	Two combined RX/TX antennas
GPS antenna	Passive or active (+5VDC)

Connectors	Value
RX connectors RX A and RX B	N female
TX connector	N female
GPS antenna connector	N female
LTE antenna	BNC Connector
Combined power, WAN/LAN and sync connector	Sub D-25 male
DC power input	Screw terminal 3 x 4mm ² ; +, PE, -
AC power input in BS422-SP only	Screw terminal 3 x 4mm ² ; L, PE, N
DC power output in BS422-SP only	Screw terminal 3 x 4mm ² ; +, PE, -
DC power input/output (optional) in BS422-SP	Screw terminal 3 x 4mm ² ; +, PE, -

DC power supply (BS422-S and BS422-SP)	Value
Power source	-44VDC to -60VDC
	-48VDC SELV (nominal)
Power-over-Ethernet ²	8-wire PoE (4 WAN + 4 LAN)
Power consumption, idle mode	20W typ.
Power consumption, active mode (diff. modes, see separate table)	Max. 200W

Power Supply (BS422-SP only)	Value
AC supply	90–264VAC
AC input frequency	47–63Hz
Power factor	Min. 0.95, typ. 0.99
Max. fuse before PS	10A T
DC in	-48VDC SELV
External battery IN/OUT	-48VDC SELV

² PoE max. power is 90W where output power will be limited accordingly

Specifications

Environmental	Value
Storage temperature range (ambient air temperature)	-40°C to +85°C
Operating temperature range (ambient air temperature)	-25°C to +55°C
Maximum enclosure temperature (PA protective limitation)	+85°C

Built-in GNSS Antenna	Value
GNSS	Galileo and GPS
Stop band attenuation	>45dB @ ±75MHz
Total gain	23.5dBi
Polarization	Right-hand circular polarization (RHCP)

Physical (BS422-S)	Value
Dimensions excl. mounting bracket (H x W x D)	340 x 250 x 205mm
Weight	12kg
Wind area	0.08m ²
Encapsulation (dust and water protection)	IP65

Physical (BS422-SP)	Value
Dimensions excl. mounting bracket (H x W x D)	340 x 250 x 245mm
Weight (w/o battery)	13.6kg
Weight with battery	14.8kg
Wind area	0.08m ²
Encapsulation (dust and water protection)	IP65
Power switch	ON/OFF rocker

Hardware options

BAT422BS1 Battery Module option (BS422-SP only)	Value
Nominal voltage	50.4V
Battery voltage range	42.0V to 57.4V
Number of battery cells	14 pcs
Cell type	US18650VTC6 (3120mAh)
Rated capacity	2.5Ah / 126Wh
Max. discharge current	4A
Max. charge voltage	57.4V
Max. charge current	3A
Standard charge current	1.5A
Discharge temperature	-20°C to +80°C (cell temperature)
Charge temperature	0°C to +60°C (cell temperature)
Weight	1.2kg

Specifications

LTE Module Option (BS422-SP only)	Value
AirPrime Module	EM7565
Standards Compliance	LTE 3GPP Release 12 UMTS 3GPP Release 9
Frequency bands	2, 4, 5, 7, 12, 13, 26, 30, 41
SIM	Dual Nano SIM
Built-in LTE Antenna	690–2700MHz

Power output per carrier and power consumption³

Power ⁴ input @ VHF 160MHz	TETRA		DMR		Analog	
	Output [W]	Input [W]	Output [W]	Input [W]	Output [W]	Input [W]
Idle	-	20	-	20	-	20
1 carrier	25	150	50	200	50	200
2 carriers	10	145	15	160	15	160
3 carriers	4.4	125	9	165	9	160
4 carriers	2.5	115	7	165	7	165

Power ⁴ input @ UHF 460MHz and 850MHz	TETRA		DMR		Analog	
	Output [W]	Input [W]	Output [W]	Input [W]	Output [W]	Input [W]
Idle	-	21	-	21	-	21
1 carrier	25	150	50	200	50	200
2 carriers	10	120	15	160	15	160
3 carriers	4.4	100	9	170	9	155
4 carriers	2.5	90	7	170	7	170

Ordering

Item number	BS422-S
10522101	BS422-S Outdoor 68–87.5/68–87.5MHz
10522111	BS422-S Outdoor 146–174/146–174MHz
10522131	BS422-S Outdoor 380–390/390–400MHz
10522141	BS422-S Outdoor 410–420/420–430MHz
10522142	BS422-S Outdoor 450–460/460–470MHz
10522143	BS422-S Outdoor 455–465/450–460MHz
10522145	BS422-S Outdoor 460–470/455–465MHz
10522181	BS422-S Outdoor 805–825/850–870MHz

Item number	BS422-SP
10522201	BS422-SP Outdoor w PS 68–87.5/68–87.5MHz
10522211	BS422-SP Outdoor w PS 146–174/146–174MHz
10522231	BS422-SP Outdoor w PS 380–390/390–400MHz
10522241	BS422-SP Outdoor w PS 410–420/420–430MHz
10522242	BS422-SP Outdoor w PS 450–460/460–470MHz
10522243	BS422-SP Outdoor w PS 455–465/450–460MHz
10522245	BS422-SP Outdoor w PS 460–470/455–465MHz
10522281	BS422-SP Outdoor w PS 805–825/850–870MHz

³ Power consumption for BS422-SP based on DC supply, AC power consumption is typically 10% higher

⁴ All numbers are typical values. PA – efficiency drops with multi-carrier setup => power intake can be limited due to heat dissipation.

Ordering options and accessories

Item number	Description	BS422-S	BS422-SP
acc10528001	System Connector for BS422 LAN/WAN, 48VDC	X	X
acc10528003	AC/DC Connector for BS422		X
acc10528004	Out/Batt. Connector for BS422		X
20528610	BAT422BS1 Battery Module 48V 2.5Ah		X
acc105314	GA422 GNSS GPS Antenna (without cable)	X	X
acc205081	Mounting plate for BS/SB421 30-102mm (included in BS422-S and BS422-SP)	X	X
acc205190	Clamp kit 30-51mm	X	X
acc205191	Clamp kit 50-102mm	X	X
acc205192	Mounting kit 100-153mm (for larger diameter masts)	X	X
acc205193	Mounting kit 150-200mm (for larger diameter masts)	X	X
accLTE	LTE Modem		X
105326	EXT/External LTE antenna		X
105360	TB422 Transport Box		X