Preliminary Datasheet - Specifications subject to change

BS424-2

BS424-4

Please note that these pictures will be updated

DAMM® MultiTech Indoor Base Station BS424-2 and BS424-4

Description
The DAMM MultiTech Indoor Base Stations B424-2 and BS424-4 are multi-carrier, multi-technology indoor base stations. They act as a complete system, including switching functionality, network management, gateways, and other decentralised system components

The BS424-2 can operate up to eight carriers and the BS424-4 up to 16 carriers, each in any technology mode:

- TETRA
- DMR T3
- DMR T2
- Analog

The multi-carrier and multi-technology features enable one single base station to operate a TETRA, a DMR and an Analog carrier or any other mix up to a maximum of 4 carriers per BS422-HR, enabling seamless communication across these technologies.

With an optimum no. of 3 logical carriers (e.g. 10 W TETRA) it is possible to operate up to 12 carriers providing 47 simultaneous TETRA, 24 DMR or 12 analog channels.

Full integration in the DAMM System
Both the BS424-4 and the BS424-2 are fully integrated in the DAMM TetraFlex® system and support all applications and features known from our single-tech product line. Customers can seamlessly extend existing single-tech networks with the DAMM MultiTech product lines while benefitting from the new options like mixed operations of TETRA, DMR Tier III and Analog.

Best-in-class RF handling
The BS424 is provided with full dual RX diversity, offering outstanding sensitivity, and has a built-in duplex filter for each BS422-HR.

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 Mid-Band to the 800MHz band, independent of operation mode, allows for agile spectrum adaptation no matter if it is in TETRA, DMR or Analog mode. A table with the optimum carrier numbers versus TX power per technology is seen here.

KEY FEATURES

- Very high capacity (8/16 carriers)
- Multi-technology (TETRA/DMR/ Analog)
- High Power RF carrier (50 W/100 W)
- Small form factor
- Low OPEX

Carrier Technology	TX Power		BS424-2	BS424-4
		BS422-HR	Opt.Num.	Opt.Num.
TETRA carriers	10 W	3	6	12
	25 W	2	4	8
	(50W)	(1)	(2)	(4)
DMR/Analog carriers	20 W	3	6	12
	50 W	2	4	8
	100 W	1	2	4

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The maximum number of 4 carriers in each can be obtained with reduced TX power

BS422-HR
The BS424 comes with rack-mounted versions of the DAMM BS422 MultiTech Base Station as a high-power (BS422-HR) variant. The BS422-HP provides a transmit power of 1 x 50 W or up to 3 x 10 W per channel TETRA operation. In DMR and analog modes it provides up to 100 W in single-carrier mode or 3 x 20 W in multi-carrier mode.
Each BS422-HR are provided with 4 USB ports and a display port connection to connect a monitor, mouse and keyboard for easy local maintenance. LED indicators reflect the current operation status, and a blower output connector supplies the fan unit. The 14V DC output is designed as a multiple 2 to 4 redundancy power supply to supply all auxiliary components like the DAMM Ethernet Switch SW422, the USB Hub UH422 and one or two DAMM Computer PC422.

The control plate at the front of the BS422-HR provides:
- 4 x USB
- 7 Status LEDs
- Display Port

The 8 Status LEDs provides:
1. Power
2. TX
3. NC1
4. NC2
5. L1
6. L2
7. L3

Multiple carriers and technologies in one unit
Each of the BS422-HR units supports up to 4 carriers, and thanks to the multi-technology design it is possible to run a different technology on each carrier, i.e. TETRA, DMR Tier III, DMR Tier II or Analog. Our core-connected design ensures seamless interoperability between the different technologies, delivering maximum flexibility for any kind of application.

Flexible installation
Installation of the BS424 is both simple and flexible. All connections are done either from the front or on top of cabinet. This means that it can be placed close to a wall as there are no connections on the back of the rack.

AC power supply with redundancy
The BS424 is designed for -48VDC as well as 120/230 VAC where the AC mains can have a second or the third redundant PSU units. In addition, the AC supply can be established from two circuits (AC1 and AC2).

DAMM Power Distributor PD424
The integrated power distributor has individual on/off switches for up to four BS422-HR units to provide easy maintenance, component replacement and upgrade of the base station.

Redundancy
Every carrier module includes an integrated base station controller (node controller, NC), eliminating the need for separate hardware and enabling very flexible installation options. With both two PC422 and two- and four-carrier modules respectively a full hot standby redundancy, on both node controller level and carrier level is achieved to provide a highly redundant system.

In addition, the AC power supply can be equipped with an extra hot-swappable power module.
Furthermore, the backbone can have a 5G connection by use of the UH422 with 5G module.

Frequency sharing
The ability to operate the BS424 in frequency sharing mode for TETRA, DMR or Analog makes it 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.

Connectivity: Ethernet/synchronization
Synchronization between the base stations is possible via:
- Via one or two GNSS antennas (two antennas are included in the rack)
- Precision time protocol, PTP (IEEE1588) synchronization over LAN
- Internal OCXO

DAMM Ethernet Switch SW422
The built-in Ethernet switch provides five internal (INT) and five external (EXT) connections to connect applications and/or gateways. The INT connection is used for communication between the nodes based on a multi-cast IP, whereas the EXT connection is used to integrate applications or a VPN connection. The switch supports IEEE1588 PTP, Precision Time Protocol.

DAMM Alarm Connector for DIN RAIL AC422
Alarm IOs are provided as part of the standard delivery of the BS424 to provide a maximum of flexibility in various applications.

AC422 Output:
- Alarm level L1, L2, L3

AC422 Input:
- Power reduction IN1
- Door input IN2
- TX off (BS idle mode) IN3

DAMM Alarm Unit for DIN RAIL AU422
With this optional Alarm IO module, the user gets 16 detailed system status outputs as well as 16 generic I/O's by use of the standard USB interface. This module is to be used when the PC422 computer is not present (not ordered) in the BS424 rack

DAMM Computer PC422
The DAMM Computer PC422 has internal (INT) and external (EXT) Gigabit Ethernet connections, USB ports as well as alarm indications. This module can be used to run NC, Node Controller, DAMM TetraFlex® applications or even act as a router.
If the NC is placed/moved to the BS422's in the rack, it becomes possible to use this PC for LC, Local Control, of Alarm's and I/O as well as Group Bridge functions.

5G modem, USB Hub UH422
The BS424 may also be ordered with a 5G module and two 5G/LTE antennas. The 5G option provides seamless connectivity without regular backbone connection. This is a backbone redundancy function. Delivery on request, contact DAMM Sales beforehand.

Frequency bands
Each BS422-HR are available in various frequency bands from mid-band to the 800 MHz band. The versions offer up to a 200 kHz wideband spectrum (center frequency placement) for up to 3 carriers.

VHF

Band	VHF
TR RX/TX	146–174MHz
Duplex spacing*	4.6 MHz
TX bandwidth	102 kHz
Carrier #	1–3
Duplex filter bandwidth	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	5-10MHz	45MHz
TX bandwidth***	200 kHz	200 kHz	200 kHz	200 kHz
Carrier #	1–4	1–4	1–4	1–4
Duplex filter bandwidth**	5MHz	5MHz	5MHz	10MHz
Other freq. on request				

* Customised duplex spacings are available on request
** If duplex spacing is reduced, the filter bandwidth is reduced down to 1 or 2 MHz as well
*** The TX bandwith is reduced to 150 kHz under certain circumstances

Specifications

Parameter	Value
Frequency bands	
RX=146–174MHz, TX=146–174MHz, BW=1MHz	VHF
RX=380–390MHz, TX=390–400MHz, BW=5MHz	UHF
RX=410–420MHz, TX=420–430MHz, BW=5MHz	UHF
RX=450–460MHz, TX=460–470MHz, BW=5MHz	UHF
RX=440–450MHz, TX=445–455MHz, BW=1MHz	UHF
RX=450–460MHz, TX=445–455MHz, 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)	
Number of carriers	
Max. no. of carriers per BS422-HR	4
Optimum no. af logical carriers per BS422-HR (10W TETRA).	3
Max. no. of carriers, BS424-2	8
Max. no. of carriers, BS424-4	16
Operating modes	**Channel Bandwidth**
TETRA	25kHz (20kHz FCC)
DMR Tier III	12.5kHz
Analog	12.5kHz, 20kHz, 25kHz
Common RX/TX	
Synthesizer frequency step	6.25kHz
Frequency accuracy	Locked to sync. source
Timing accuracy	+/- 14µs ref. sync. source
Synchronization source	GNSS or PTP
Duplexer	Built in
Transmitter (BS422-HR)	
Output power TETRA mode	0.5W to 50W
Output power DMR mode	0.5W to 100W
Output power Analog mode	0.5W to 100W
TX power limitation above	+85°C (PA temperature)
Receiver	
TETRA RX static sensitivity	-121dBm typ.
TETRA RX static sensitivity with diversity.	-124dBm 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.
DMR RX static sensitivity with diversity.	-124dBm typ.
Analog RX static sensitivity (20 dB SINAD)	-121dBm typ.
Diversity	Dual as standard

Specifications

Parameter	Value
Computer module PC422	
Operating system	Windows 10 IoT Enterprise
Ethernet LAN/WAN (voice over IP)	10/100Mbit/s
RAM	8 GB
BS422-HR Cover connectors (BS1 to BS4)	
Blower (on heatsink)	RJ Internal
14V out	DC Jack, 3.5 x 1.35 x L16.5mm
Keyboard/mouse	4 x USB 3.0
Local monitor	Display Port
Antenna configuration	
BS424-2	Two combined RX/TX
BS424-4	Two times two combined RX/TX
GPS antenna	Two passive or active (+5VDC)
Connectors on top of the cabinet	
RX/TX connectors	N female x2 or x4
GPS antenna connector	BNC x2
5G antenna connector (optionally)	BNC x2
Earth stud	M10 nut on screw
Mains connector	
Supply voltage DC, DIN rail	-48VDC Screw terminal 3 x 16mm^2; -48V, 0V, PE
Supply voltage AC, DIN rail	100–240VAC, 45–66Hz AC1 or AC2 phases, screw 16mm^2; L1, L2 Screw terminal 2 x 16mm^2; N1, N2, PE1, PE2
Power factor	> 0.99 at 50% load or more
Protection	20 A Fuse in L1 & L2
Max. power consumption BS424-2 (2 x BS422-HR)	600W (estimated)
Max. power consumption BS424-4 (4 x BS422-HR)	1100W (estimated)
Modules	
Ethernet switch	DAMM SW422
PC computer module	DAMM PC422
Alarm connection module	DAMM AC422 (evt. AU422)
USB Hub with Ethernet access	DAMM UH422

Specifications

Parameter	Value
Environmental	
Storage temperature	-40°C to +55°C
Operating temperature	-25°C to +55°C
Encapsulation (dust and water protection)	IP20
Physical (BS424-2) 15U	
Dimensions (H x W x D) excl. connectors	810 x 550 x 520mm
Weight	80kg
Physical (BS424-4) 23U	
Dimensions (H x W x D) excl. connectors	1170 x 550 x 520mm
Weight	102kg

Power output per carrier and power consumption:
For power consumption details, please refer to the DAMM BS422-H product sheet

Ordering

Item number	Description
	----- BS424 Rack -----
106220	BS424-2 Indoor Rack 15U AC+DC Supply
106420	BS424-4-2 Indoor Rack 23U AC+DC Supply
106430	BS424-4-3 Indoor Rack 23U AC+DC Supply
106440	BS424-4-4 Indoor Rack 23U AC+DC Supply
	----- BS422-HR -----
105215 xxx	BS422-HR Rack-Mount Base Station, 1-4 carrier, 70-870 MHz
10521511[2]	BS422-HR Rack-Mount 146-174MHz
10521531[2]	BS422-HR Rack-Mount RX=380-390 TX=390-400
105215410[2]	BS422-HR Rack-Mount RX=410-415 TX=420-425
105215415[2]	BS422-HR Rack-Mount RX=415-420 TX=425-430
105215440[2]	BS422-HR Rack-Mount RX=440-445 TX=445-450
105215450[2]	BS422-HR Rack-Mount RX=450-455 TX=460-465
105215452.5[2]	BS422-HR Rack-Mount RX=452-457 TX=462-467
10521581[2]	BS422-HR Rack-Mount RX=805-825 TX=850-870

[2] For availability please contact DAMM Sales representative

Accessories

Item number	Description
acc105314	GA422 GNSS Antenna with Bracket
acc10532302	SW422-B4 Ethernet Switch 4xBS
acc10532101	PC422 Computer Win 10
acc10532830	UH422 USB HUB w Eth.
30532180	AC422 Alarm Connector for DIN-rail
acc105311[2]	AU422 Alarm Unit (USB connection)
acc10531811	Second PSU, PS424 AC Power Supply 1800W
acc10531811 x2	Second and Third PSU, PS424 AC Power Supply 1800W
acc104954	IP21 upgrade kit 104954