



SATELLITE GROUND SEGMENT

PRODUCT OVERVIEW

BHE BONN HUNGARY ELECTRONICS LTD.

WWW.BHE-MW.EU



SATELLITE GROUND SEGMENT PRODUCT OVERVIEW

ONGOING AND RECENT REFERENCES

The recent years witness a vivid design- and manufacturing activity of satellite ground products based on our 25+ years space heritage. New LNA-, converter-, oscillator, SSPA-, TLT- and TM/TC models have been created in our Budapest, Hungary based headquarters as direct reply to customer requests and as result of taking part in cutting-edge activities both in the satellite ground and space segments.

"Gaganyaan" is an ongoing project of ISRO Human Spaceflight Program in which our up/down converters and fine step synthesizers should find application.

Our frequency converters are used for communication in ISRO's first and second Moon exploration missions "Chandrayaan 1" and "Chandrayaan 2". Our S- and Ku-band tracking down converters are widely used in ISRO ground- and ship-based tracking stations for communication with India's First Mars Orbiting Satellite "Mangalyaan".

BHE developed various RF and microwave devices for ESA DSN Stations, converters for DLR Tracking Stations, as well as converters and SSPAs for the German Antarctic Receiving Station GARS O'Higgins.

Our satellite video receivers are used by the Indonesian Space Agency LAPAN in their daily work with the Indonesian LAPAN-TubSat satellites.

The German DLR and the Korean KARI use BHE's satellite control transmitters on their ground stations.

Beside the ground segment solutions, we have developed some products for onboard applications. For example, one of the major US satellite service providers uses BHE's SDR based redundant digital on-board modulator in their AIS constellation. Our high quality S-band, 40W Solid State Power Amplifier is in operation on the International Space Station Zvezda module.

LOW NOISE
AMPLIFIERS

KA-BAND 1:2
REDUNDANT
LNA SYSTEM

FREQUENCY
CONVERTERS

TRACKING AND
TM/TC

TEST LOOP
TRANSLATORS

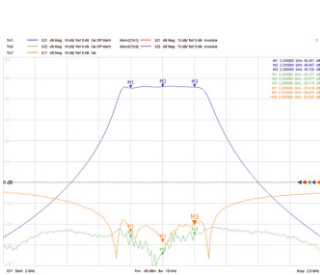
SOLID STATE
POWER
AMPLIFIERS

SYNTHESIZERS
AND
OSCILLATORS

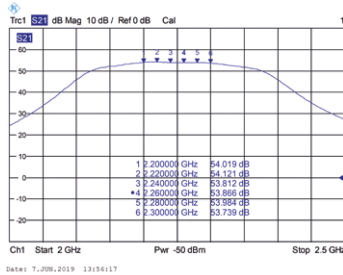
MODULATORS,
TRANSMITTERS

LOW NOISE AMPLIFIERS

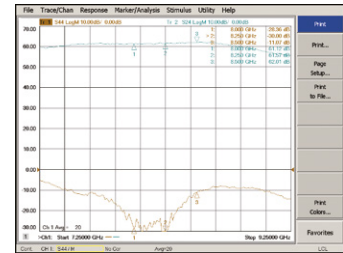
Our Low Noise Amplifiers are designed and manufactured for use in SatCom equipment where highly reliable signal amplification, high dynamic range and steep skirt characteristics are important requirements. The LNA product range covers the SatCom frequency spectrum from S- up to the Q-band and environmental temperature range from -40°C up to +70°C with many workhorses, a lot of gap fillers and some specially designed models, all of them providing the best parameters of the GaAs HEMT technology. Water- and weather-proof sealing is a must for operation in harsh environmental conditions at all meridians and circles of latitude.



BLSC12
S11, S21 and S22 graphs



BLSC49
Gain over frequency



BLXC14
S11 and S21 curves



BLSC12
S-band LNA



BLSC16
Wide band LNA

KA-BAND 1:2 REDUNDANT LNA SYSTEM

This Ka-band (17.7 - 21.2 GHz) 1:2 Redundant LNA system consists of two separated blocks, the LNA Plate and the Indoor Controller. The LNA Plate is designed for hub-mounted conditions (typically in ground stations), while the indoor controller is located in a 19" rack, and it can be used in the control room to monitor and control the system. The indoor controller has redundant hot swappable AC/DC power supply for higher reliability. The complete system can handle two additional LNA units for tracking purposes as well.

The single LNA module can be also used as a separate product, in a modern solid state communication equipment, where high reliability microwave signal amplification, high dynamic range are important factors. This microwave LNA is constructed using Gallium Arsenide HEMT amplifier stages of high reliability. Due to the weather-proof sealing, it can be used effectively in harsh environmental conditions as well.

Typical LNA parameters: Noise Figure < 120K, Gain = 55dB, IP3 = +28dBm min.



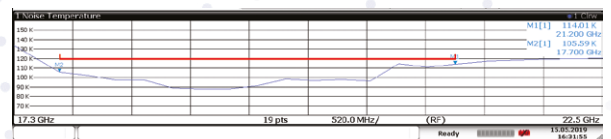
BZEI10
Indoor Controller



BZEL10
LNA Plate



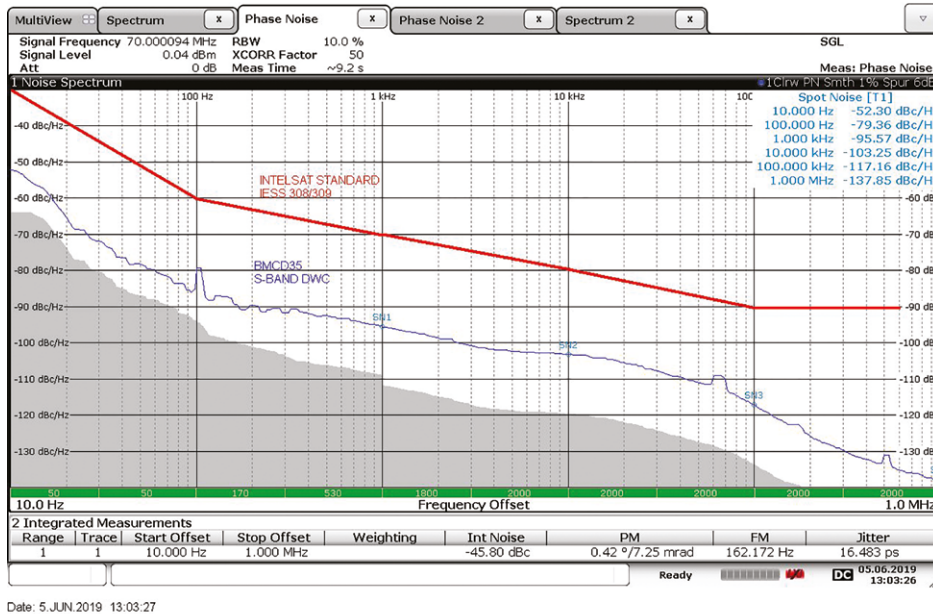
BZEL12
Single LNA



BZEL12
Noise temperature deeply below 120K

FREQUENCY CONVERTERS

BHE designs and manufactures high-performance (low phase noise, low noise temperature, low harmonics and spurious level, adjustable gain, both external and internal reference driven) down- and upconverters from the L- up to the Q-band, for indoor and outdoor use. Indoor units are produced in 19" rackmount construction, while the outdoor ones feature at least IP67 protection and 24/7 operation, as reliability is an emphasized criterion. Our range of products covers also many models of block-downconverters (BDCs), block-upconverters (BUCs) and tuneable frequency converters. All these units feature various remote control capabilities (RS-232, RS-422, RS-485, Ethernet) in addition to manual control capability.



Typical phase noise plot of BMCD35 type S-band downconverter



BMCD34
Ku-band low noise DWK



BMCU20
S-band upconverter



BMCU55
L- to Ku-band block-UPC



BMCU15
5W K-band UPC



BMCD63
S-band downconverter

TRACKING AND TM/TC

Our product range for all frequency bands covers 2-, 3- and for S-band even a 6-channel indoor- and outdoor high performance tracking converters with 1kHz step. These units convert the Rx signal from the referred frequency band to the IF frequency of 70MHz or 720MHz that is suitable for further processing by the tracking receivers. Our converters meet and provide the very strict phase- and amplitude coherence requirements between the Rx channels that is necessary for perfect functioning of the system over the full frequency- and temperature range.

One of our most known downconverters is the model BMCD35 that is deployed on many vessels cruising on the Indian- and Pacific Ocean, taking and still taking essential part in the Indian MARS- and Chandrayaan 1 & 2 program.



BMCD80
S-band 6 ch DWC



BMCD39
Ka to S-band 3 ch DWC



BMCD35
S-band 3 ch DWC



BMCD99
Ka-band 2 ch DWC

TEST LOOP TRANSLATORS

Our Test Loop Translators (TLTs) cover the frequency spectrum from S-band up to Ku-band, providing the capability of testing the complete data link from the ground. They mostly feature IP67 protection level, to be mounted directly next to the antenna. Of course, 19" rack mountable models are also represented. These TLT units are capable of tuning the complete frequency band by fine frequency steps, provide low phase noise and support system testing by adjustable signal levels.



BMCD43
C-band TLT



BMCD41
C-band TLT



BMCU29
S-band TLT



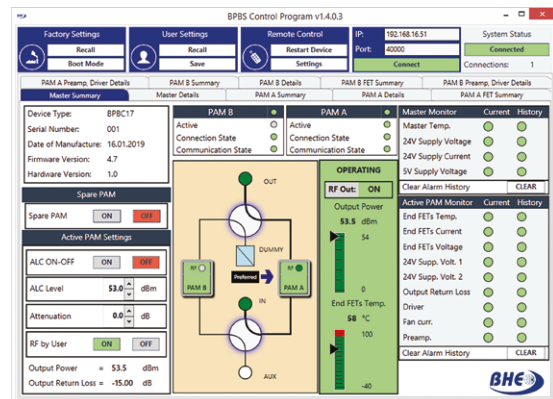
BMCD57
C-band TLT

SOLID STATE POWER AMPLIFIERS

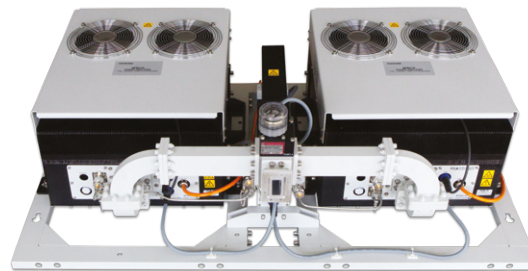
As key part of satellite communication systems BHE developed and manufactured numbers of amplifiers that resulted in a comprehensive SSPA portfolio with standard and custom-tailored solutions. Flexibility, reliability and 25+ years of experience make BHE be professional SSPA manufacturer. Our SSPA product range covers the most intensively used S-band SatCom frequency spectrum, and a couple of powerful X-band models are also in the offering. Output power levels range from 25W up to 500W. The SSPA models are available for both indoor and outdoor use, in single and 1:1 redundant construction. Basically GaN semiconductor technology is applied. Due to BHE's Smart Amplifier concept, modules and parts can be controlled and monitored via PC based Graphical User Interface down to transistor level. Ethernet, RS-232, RS-485 and RS-422 interfaces are applied as remote control for gain, output power, RF On/Off etc.



BPBC17
GUI – PAM B FET Summary



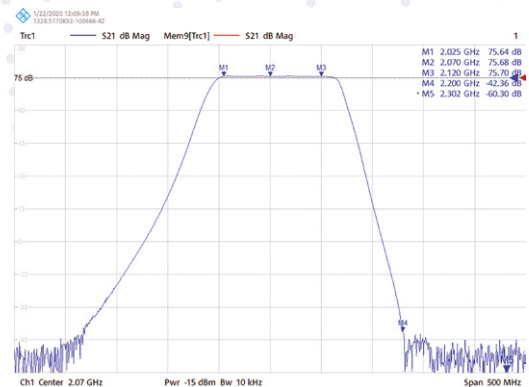
BPBC17
GUI - Master Summary



BPBC17
X-band 200W 1:1 red. SSPA



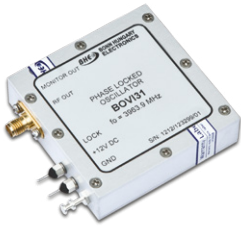
BPBS49
S-band 200W single SSPA



BPBS49
S21 graph

SYNTHESIZERS AND OSCILLATORS

We design and manufacture for the above mentioned complete frequency band high performance (fine step, low or very low phase noise, compact size) tuneable frequency synthesizers, as well as fixed frequency PLOs with excellent parameters (BOVI and BOVX product range), driven by internal or external reference signal fixed frequency. These units can be used as signal sources of frequency converters, as well as for test and measurement purposes. Our tuneable synthesizers can be controlled in various ways (e.g. SPI, 3 wires control, RS-232, RS-422, RS-485, Ethernet or even via keyboard and display) according to user needs.



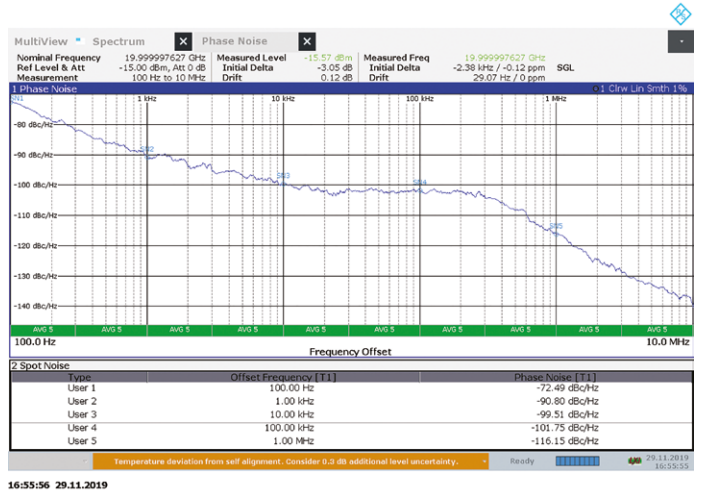
BOVI31
C-band PLO



BSVQ16
Wideband synthesizer
(2-18GHz)



BSVQ19
Ku-band synthesizer



Phase noise of wideband (BSVK12, 0.5-20GHz) synthesizer

MODULATORS, TRANSMITTERS

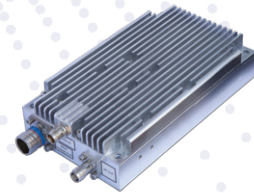
Our modulators produce from the incoming analogue or digital signals FM, PM, QPSK and SOQPSK modulated signals in the specified frequency band on various power levels according to the user requirements.



BUMT20
S-band FM video/data transmitter



BUMT37
VHF band FM/PM modulator



BUMT33
S-band telemetry transmitter



Facility Security Clearance since 2020

These certificates refer to BHE's quality management systems. All our products are manufactured according to ISO 9001. Other, sector-specific management systems are only used in case of the customer's explicit request.

**SATELLITE GROUND
SEGMENT**
PRODUCT OVERVIEW

BHE
BONN HUNGARY
ELECTRONICS LTD.

Tel: +36 (1) 233 2138
Fax: +36 (1) 233 2506
Web: www.bhe-mw.eu
Email: sales@bhe-mw.eu



Ipari Park Str. 10. Budapest, H-1044 Hungary
P.O. Box 164. Budapest, H-1325 Hungary