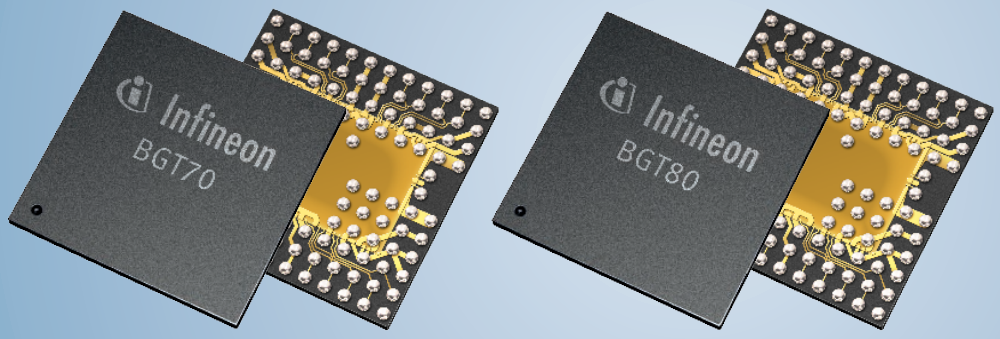


Product Brief

E-Band Radio Frontend – Reference Design

70-80GHz FDD radio Frontend based on Infineon E-Band transceiver chipsets BGT70 and BGT80

Broadband wireless backhaul technologies have become a key element of cost-effective high speed wireless networks. With the explosive growth in wireless data traffic, telecom companies need to deploy multi-gigabit backhaul links. With 10GHz bandwidth available in the lightly licensed E-Band spectrum and advances in semiconductor technology, E-Band links have gained momentum. Infineon's mmWave Transceivers BGT70/BGT80 enable such high-performance Gbps links. With its advanced SiGe:C technology, these transceivers are highly integrated and housed in eWLB packages thus offering customers performance, price and time to market advantages.

The RF frontend reference design (Figure 1) has two RF modules mounted on a compact mother-board. The RF module is designed on RO3003 PCB and the transitions (Differential to Single Ended, Differential to Waveguide) have been optimized to achieve minimum losses on board. In order to cover longer distances with complex modulation schemes (64-QAM) in real applications, a GaAs power amplifier is wire-bonded at the output of BGT70 and BGT80.

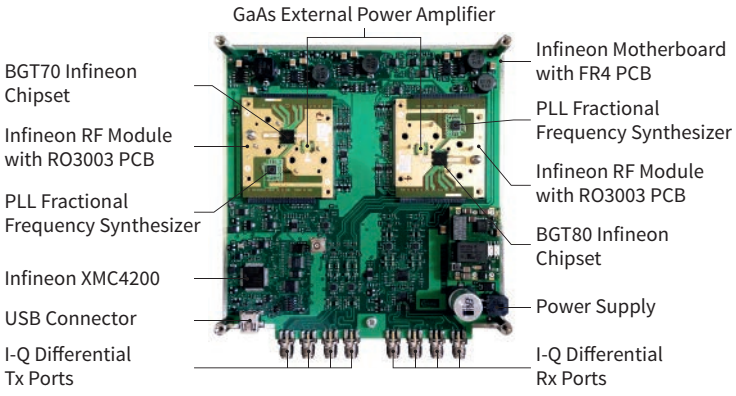
The motherboard has analog differential I-Q interfaces, baseband filters, receiver gain control, XMC4200 Infineon microprocessor, control circuitry for de-biasing the Power Amplifier and DC/DC converters for the power supply.

A diplexer is mounted directly on transceiver mechanics to achieve a small form factor of the final assembly. An additional slot for the diplexer allows testing of both the Low and High Band using the same board.

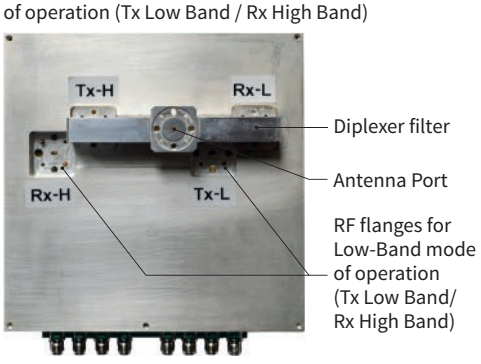
Reference Design Features

- +16dBm of output power with 16-QAM
- 1Gbit/s full-duplex data rate
- Support ETSI 500MHz channel spacing with configurable modulation from QPSK to 64-QAM
- FDD mode of operation
- BGT70/BGT80 based design with Rx AGC loop, Tx-Rx baseband filters and additional power amplifier to achieve +22dBm P_{sat} at antenna port
- Single hardware version for low-band and high-band modes of operation
- Wide range of power supply voltage 20 … 60VDC

Figure 1 RF Frontend Reference Design

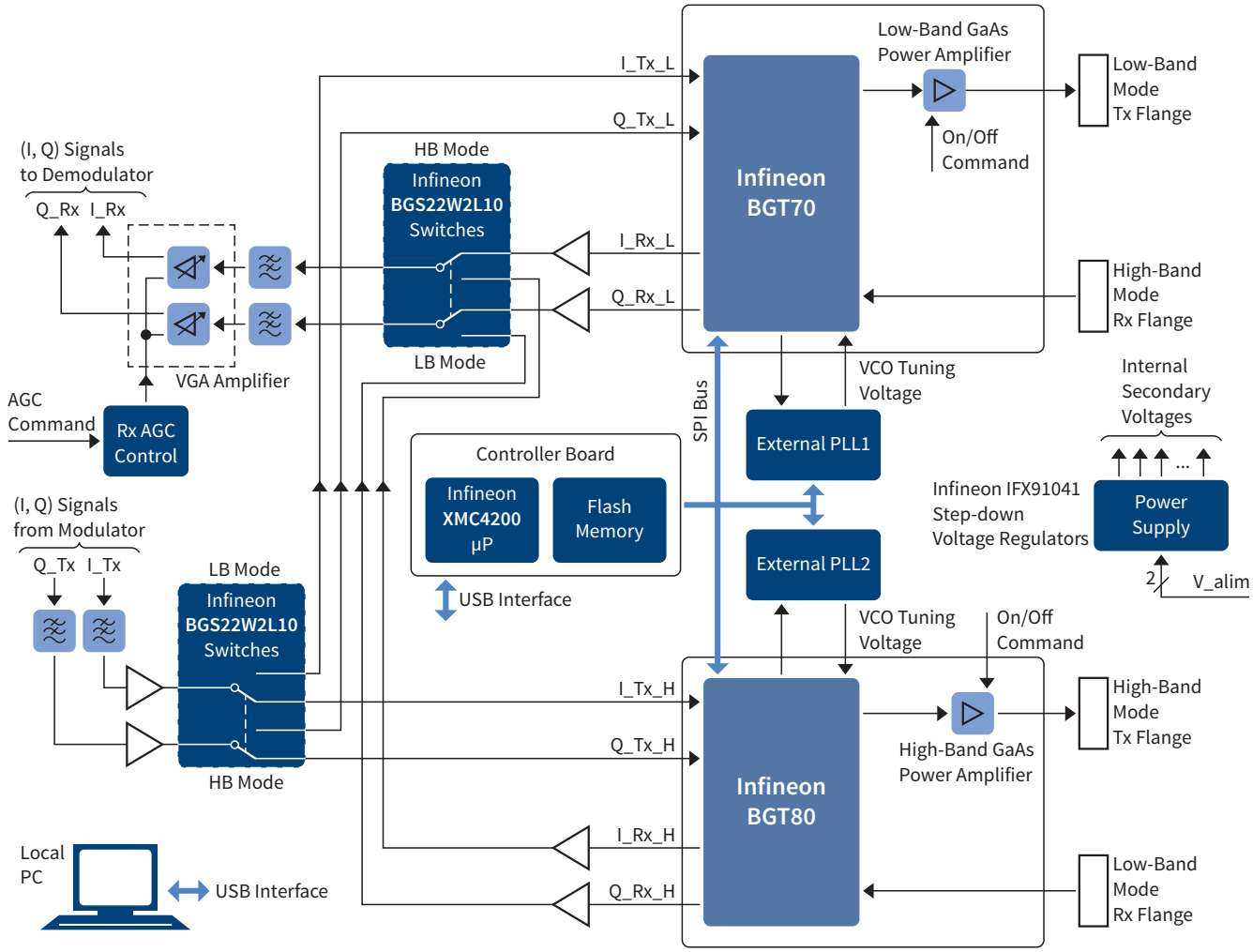


Diplexer in the picture is mounted for High-Band mode of operation (Tx Low Band / Rx High Band)



E-Band Radio Frontend – Reference Design

Figure 2 Block Diagram of 70-80GHz FDD Radio Frontend

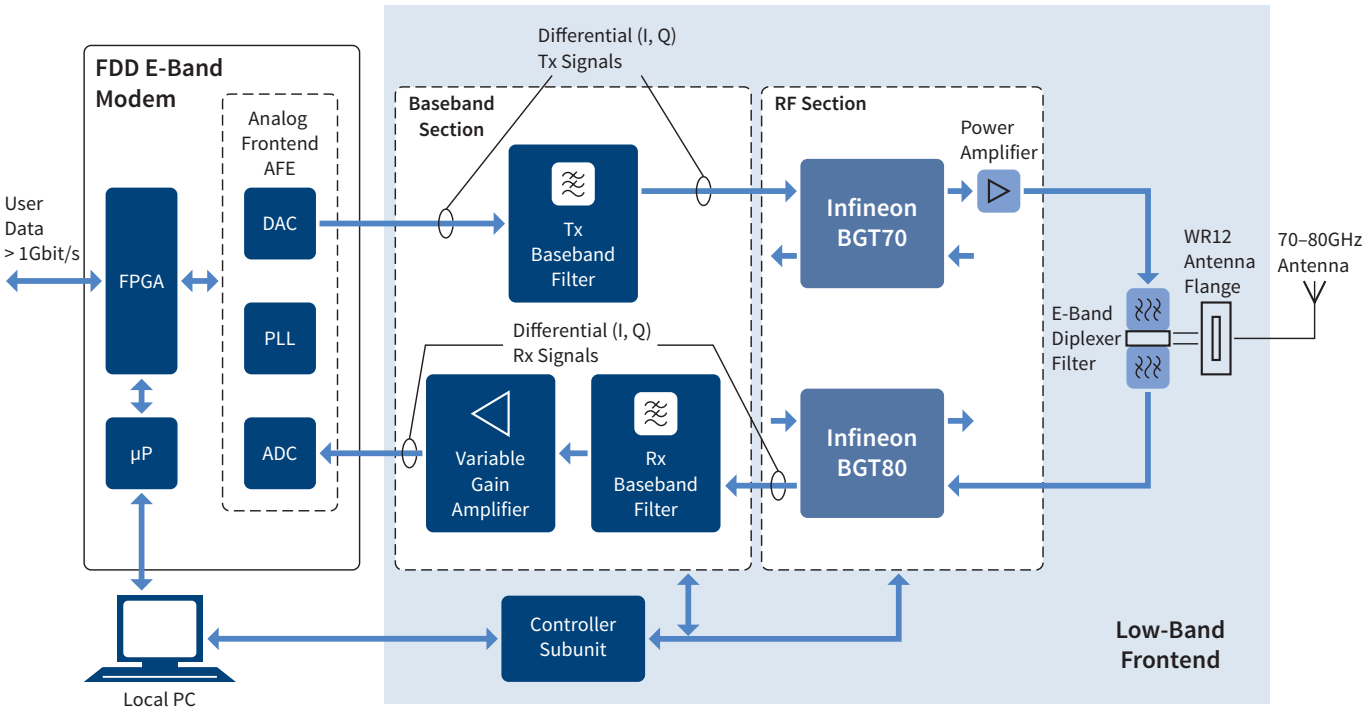


Main Technical Parameters

Operating frequency ranges:	71 … 76GHz/81 … 86GHz
Supported channel bandwidth:	50MHz … 500MHz
Output saturation power at antenna port:	P_{sat} = +22dBm typical
Transmitter output power at antenna port:	P_{Tx} = +16dBm typical @ 16-QAM modulation
Tx dynamic range of power setting:	20dB
Tx OIP3 at antenna port:	+27dBm typical
Tx phase noise:	-80dBc/Hz typ. @ 100kHz offset
Rx noise figure 70GHz band:	10.5dB typical at antenna port
Rx noise figure 80GHz band:	11.5dB typical at antenna port
Rx phase noise:	-80dBc/Hz typ. @ 100kHz offset
Diplexer insertion loss:	< 0.5dB
Diplexer return loss at antenna port:	> 18dB
Power consumption (BGT Tx/BGT Rx/GaAs PA):	1.5/1.2/3.36W

E-Band Radio System – Reference Design

Figure 3 System Reference Design



Bidirectional 70–80GHz radio link using a pair of Low-Band / High-Band frontends

The current System Reference Design (Figure 3) uses the mmWave Modem module (ESM-2506) from Escape Communications to achieve > 1Gbps links. ESM-2506 is high data rate modem that provides 1Gbps full-duplex GbE data using 64-QAM modulation in a 250MHz ETSI channel. The modem board has a powerful microprocessor, Power-over-Ethernet (PoE) and analog I/Q baseband interfaces which drive BGT70 and BGT80 in the current design.

In addition to the state-of-the-art performances of BGT70/80 and ESM-2506, the system reference design provide customers with a reliable solution which has smaller form factor, high degree of flexibility, lower costs and accelerates product time to market. A BGT70/80-based system architecture can be applied to either FDD or TDD modes of operation, in licensed and unlicensed bands according to different customer requirements.

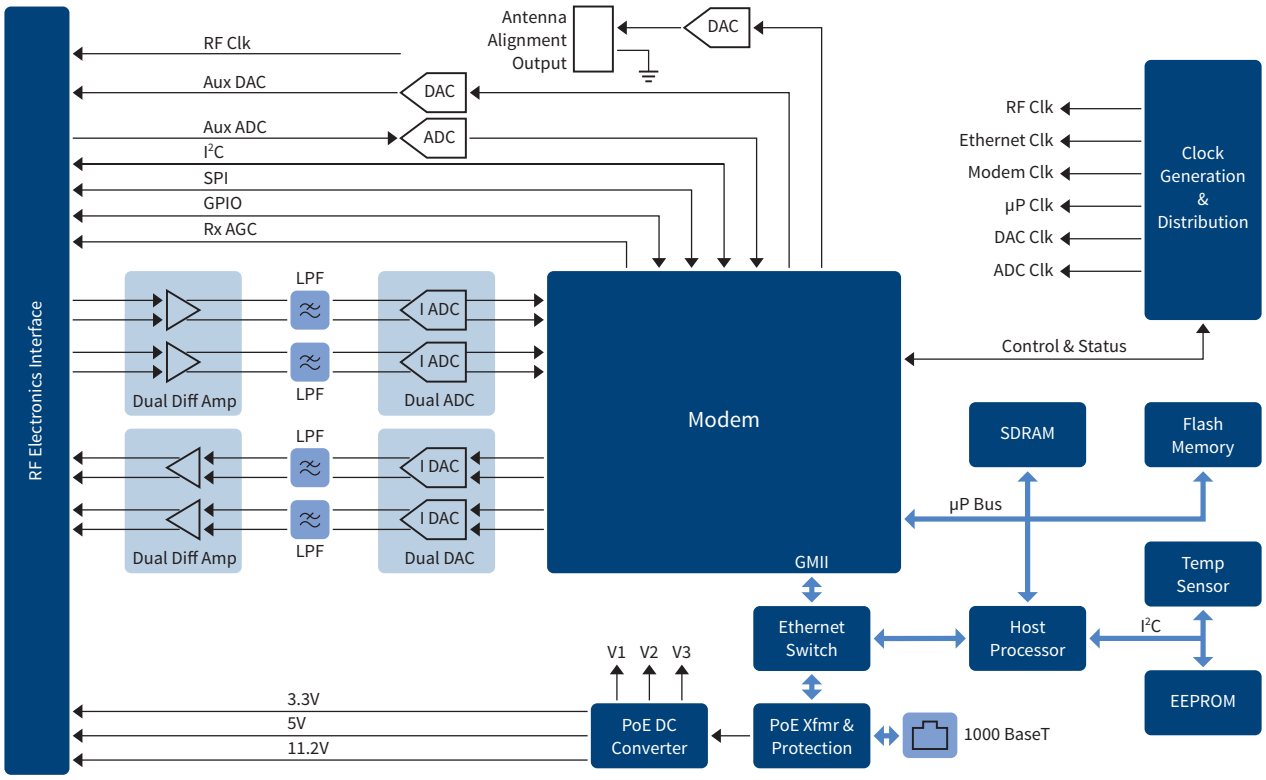
Applications

- LTE, WiMAX and HSDPA+ wireless backhaul in E-Band
- Private networks and campus connectivity
- Fiber extensions and replacements
- High definition video surveillance and monitoring
- Public safety applications
- Triple-play (voice, data and video) transmission
- Critical infrastructure protection

E-Band Radio System – Reference Design

The following block diagram (Figure 4) refers to ESM-2506 high-speed E-band modem provided by Escape Communications which has been successfully interfaced with Infineon 70–80GHz Radio Frontend to achieve > 1Gbps links.

Figure 4 Escape Communications Modem



ESM-2506 E-Band Modem – Main Technical Characteristics

- All-digital Gigabit Ethernet (GigE) modem
- FDD mode of operation
- Support of ETSI channel spacing with configurable modulation from QPSK to 64-QAM
- 1Gbit/s full-duplex data rate
- Hitless Adaptive Code Modulation (ACM)
- Configurable forward error correction
- Layer 2 GigE switch supporting In-band management, flow control, support of Jumbo frames, and QoS
- Http web Graphical User Interface

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