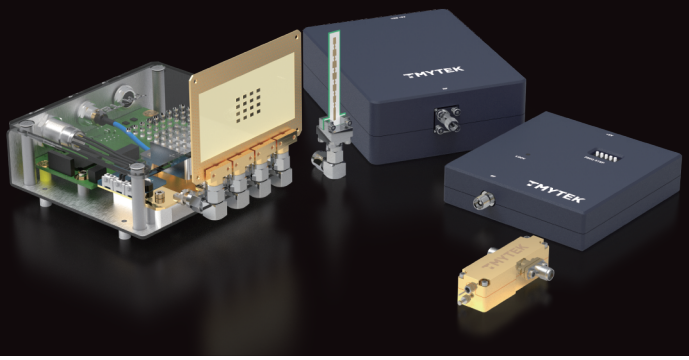
5G mmWave Developer Kit

TMYTEK



The millimeter-wave (mmWave) technology realizes the true 5G vision. Furthermore, the high-frequency band is also extensively used in the satellite communication and IoT industries. Therefore, it is essential for the next generation of wireless communication engineering students to acquire mmWave and beamforming knowledge. What better way than to utilize the TMYTEK 5G mmWave Developer Kit as it includes all the RF components needed for course preparation.

Benefits

The TMYTEK 5G mmWave Developer Kit is a comprehensive package that integrates both hardware and software. The kit includes signal source, array antenna, beamformer, amplifier, power detector, and RF cables to allow engineering students to set up a 5G communication system and observe beamforming results on instruments, conduct creative and innovative research on antenna design or protocol validation. The Developer Kit with well-designed courseware is perfect for teaching students the principles of the phased array, beamforming, constructive/destructive interference, beam steering, and more.

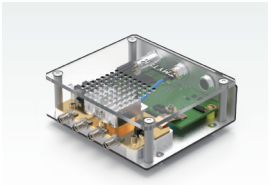
- Comprehensive toolkit including all RF components needed
- Courseware ready for next-generation engineers and researchers
- mmWave system prototyping
- Antenna, RF front-end, to protocol development

Package Includes

Hardware

Signal Source - PLO

- Freq: 26.5 - 29.5 GHz
- Freq. Step: 8
- Output Power: 8 dBm @ 28 GHz



5G FR2 Beamformer - BBoard

- Freq: 26.5 - 29.5GHz
- Up to 4 Controllable RF Channels
- 15 dB Gain Control Range
- Max Gain: 18dB Tx
- 360 deg phase range

Power Detector

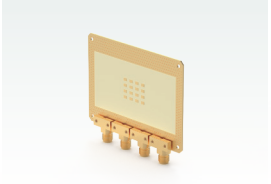
- Freq: 100MHz - 40GHz
- 35dB Linear Dynamic Range (< ± 1dB Error)

28 GHz Coco Antenna

- Freq: 27 - 29 GHz
- Gain: 7 dBi @ 28GHz
- Omni-directional radiation at horizontal plane (within ± 1dB gain variation)

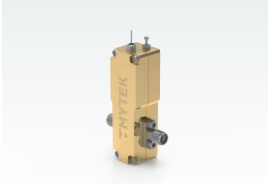
RF Cables

- Support Up to 40GHz
- Low Insertion Loss



5G FR2 Array Antenna

- Freq: 26.5 - 29.5GHz
- Antenna Array Gain: 15dB
- 4 channels



Amplifier

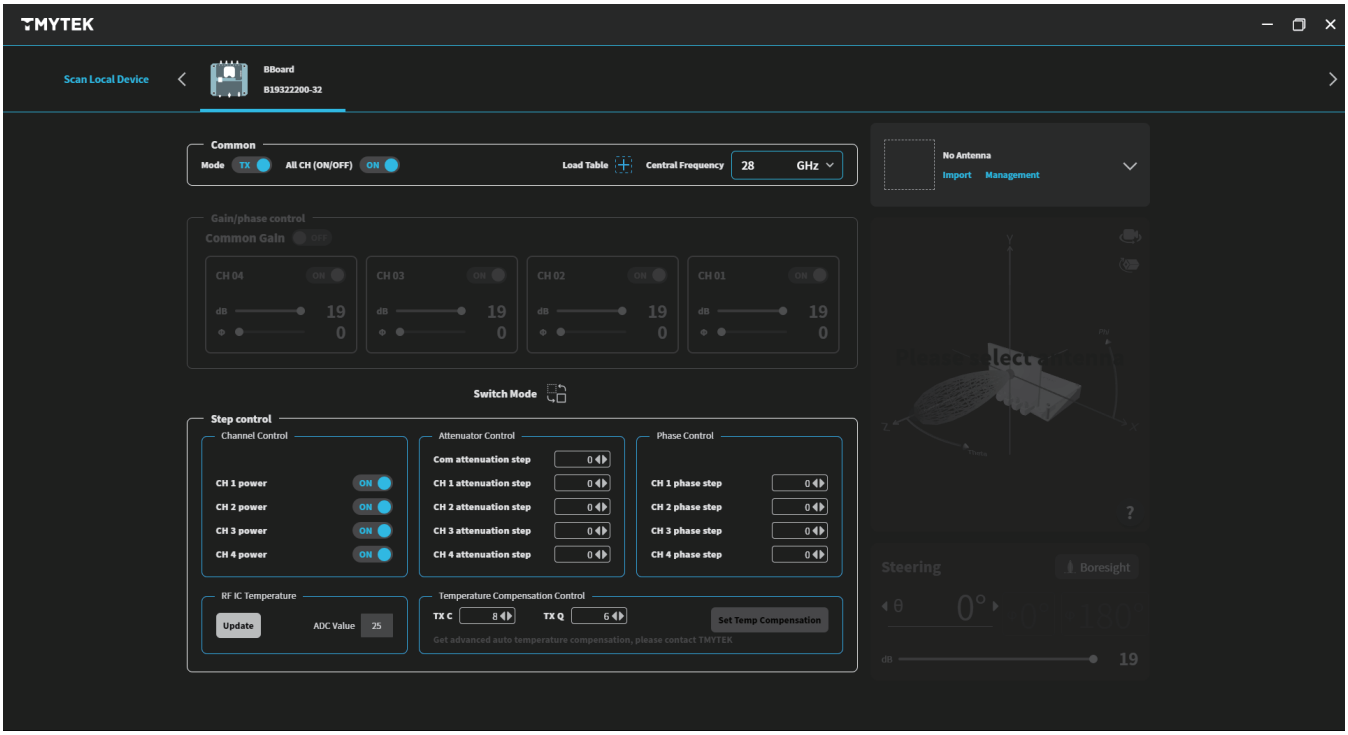
- Freq: 20 - 40GHz
- Gain: 12dB
- Noise Figure: 3.5dB

Power Combiner

- Freq: 10 - 40GHz
- Insertion Loss: 1.0dB Max
- Isolation: 15dB Min

TMXLAB Kit (TLK)

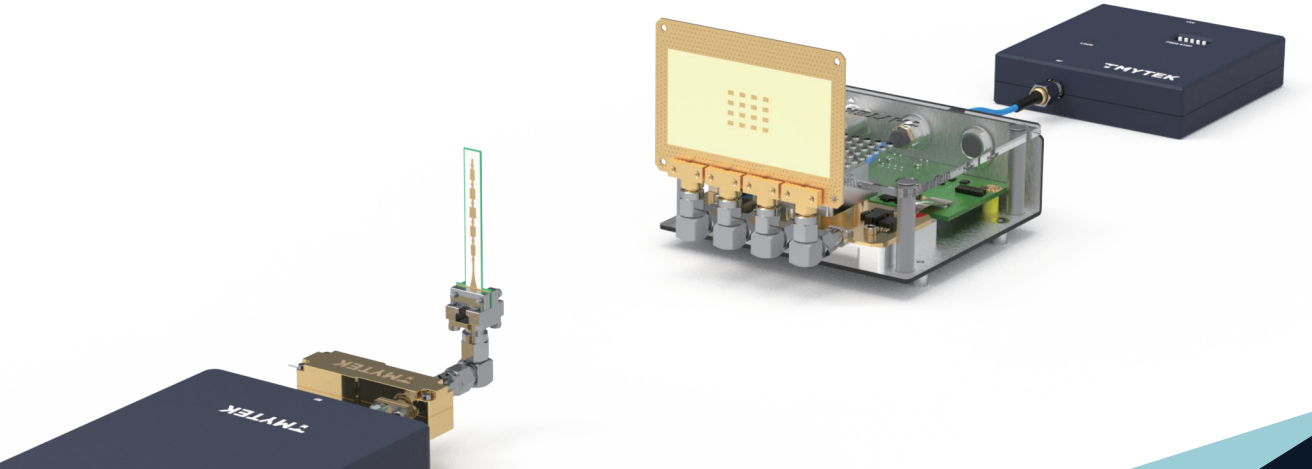
Intuitive GUI TMXLAB Kit (TLK) connects to the BBoard via the LAN port to control the phase and amplitude of each RF port to form the beams. An API is included and it is compatible with LabVIEW, Matlab, Python, C#, C++, and other programming languages.



Coursewares

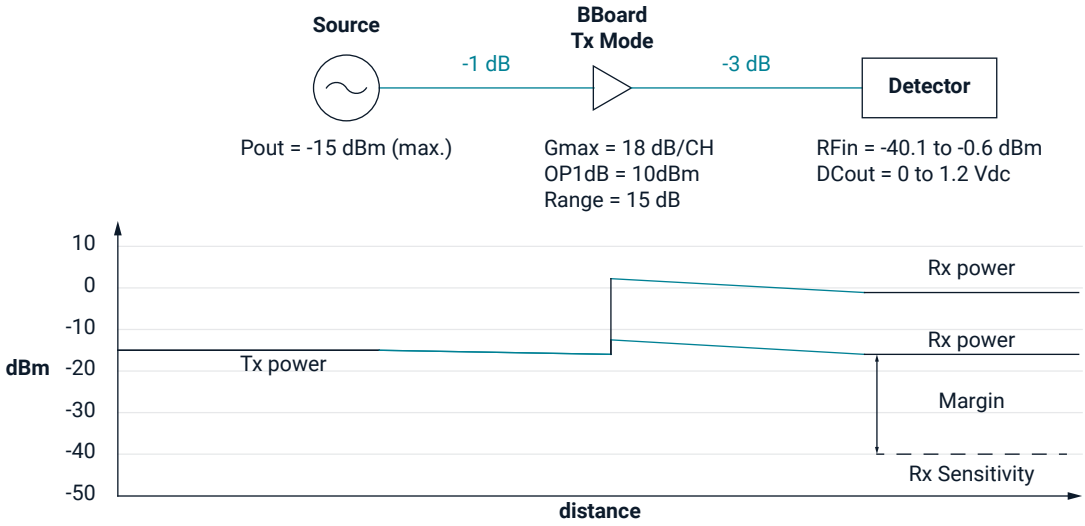
The Developer Kit is excellent for both educational and R&D purposes. TMYTEK created a versatile 5G mmWave courseware and Lab Cookbook to teach the principles behind beamforming and experiments to understand the propagation property of millimeter-wave signals. The courseware introduces the link budget in the scenario of array antenna, adjustment, and measurement of each RF channel gain, constructive vs destructive interference, beamforming & beam steering. The courseware offers the following benefits to students:

- Familiarize with mmWave RF front-end
- Understand array antenna link budget
- Understand constructive and destructive interference
- Manipulate phase shifters and observe the results in the power detector
- Verify the theory about phased array
- Hands-on experiment beamforming and beam control
- Beam pattern measurement



Lab 1: Link budget and gain control

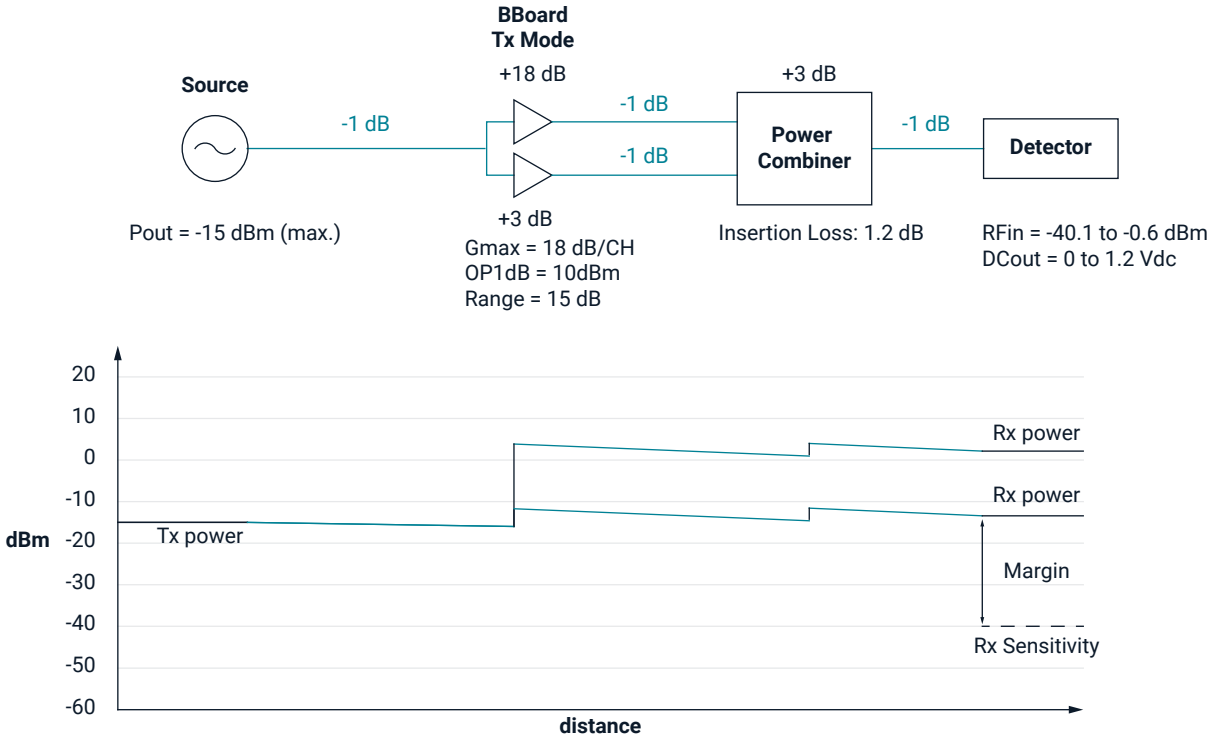
Objective: Understand the link budget in a mmWave system and control the gain of each channel on BBoard



Lab 2: Constructive and destructive interferences

Objective: Learn the principles of beamforming: constructive vs destructive interferences

1. Conduction

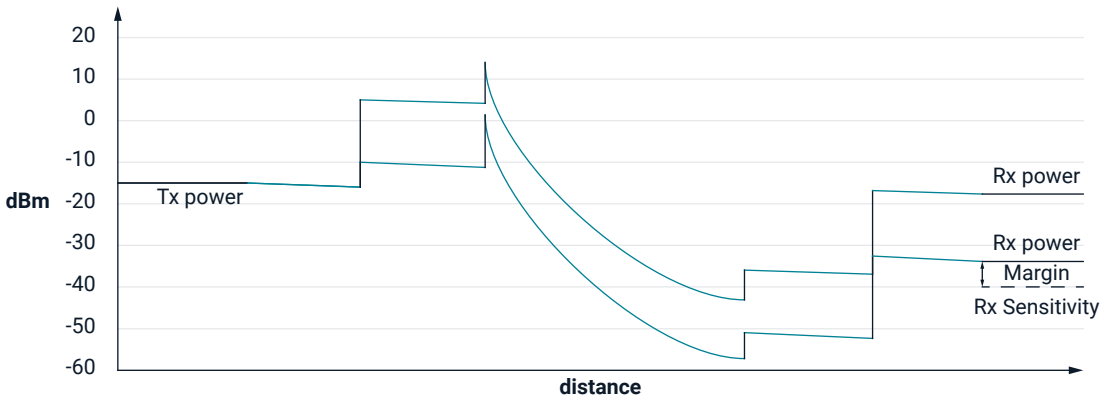


2. Radiative: Taking into account the path loss in the air

Pout = -15 dBm (max.) Gmax = 18 dB/CH
OP1dB = 10dBm
Range = 15 dB

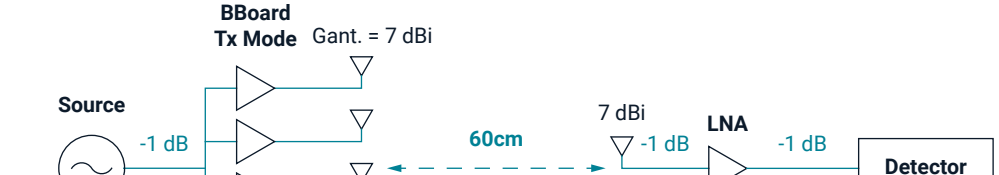
20-40 GHz
G = 20 dB

RFin = -40.1 to -0.6 dBm
DCout = 0 to 1.2 Vdc



Lab 3: Beamforming

Objective: Beam steering and pattern synthesis



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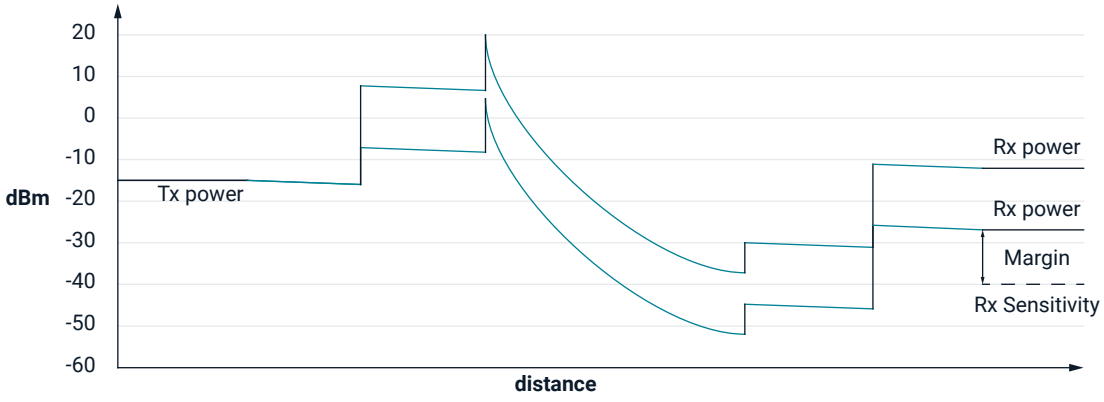

Related Products

Items		Specifications	
Beamformers • Detachable antenna kit • Phase & Gain Calibration • Thermal compensation • SPI interface	BBox One 5G	28 GHz / 39 GHz	16 RF port Phase resolution: 5 deg Gain resolution: 0.5 dB
	BBox Lite 5G	28 GHz / 39 GHz	4 RF port Phase resolution: 5 deg Gain resolution: 0.5 dB
Up/Down converters • Frequency converter • Built-in LO • Excellent EVM performance	UD Box	RF: 24 to 44 GHz IF: 0.01 to 14 GHz LO: 16 to 32 GHz	Single & Dual Channels
	UD Box 5G	RF: 24 to 44 GHz IF: 0.01 to 14 GHz LO: 24 to 44 GHz	Single & Dual Channels
Components	Horn Antenna	25 - 31 GHz 20 - 45 GHz	
	Filter	n257, n260, n261	

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V1.0.2
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