

5G era is coming soon. Massive deployment is expected in 2021 worldwide. IMT-2020 defines eMBB, URLLC, and mMTC, which are keys to successful 5G communications. TMYTEK has developed a scalable and flexible system consists of BBox (a ready-to-use beamformer) and UD Box (an up/down converter) to help our customers move onto 5G beamforming developments and tests with ease.

Our broadband UD Box comprises the mixer(s), internal LO built by our excellent phase noise PLO and optional filters. More details are below.

### Features

- RF: 24 to 44 GHz
- IF: 0.01 to 14 GHz
- Adjustable LO frequency: 24 to 44 GHz
- Conversion Loss: 12 dB (typical)
- Integrated with internal LO source
- Choices of single or dual channels
- Up and down conversion in the same box
- Easy-to-use
- Ideal for 5G communication application
- RoHS Compliant



Figure 1. UD Box 5G

### Function Block Diagram

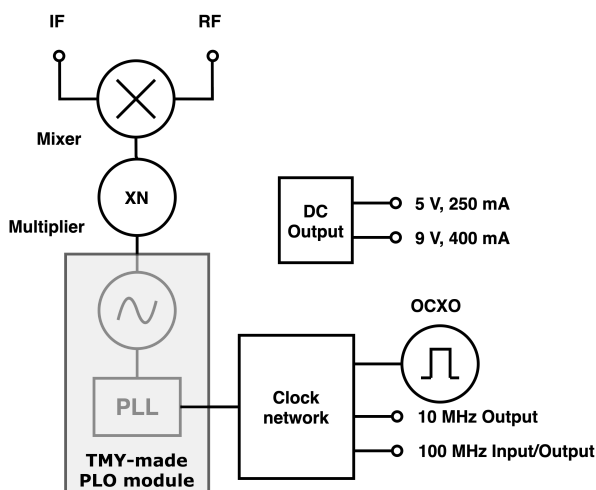


Figure 2. UD Box 5G Single Channel Block Diagram

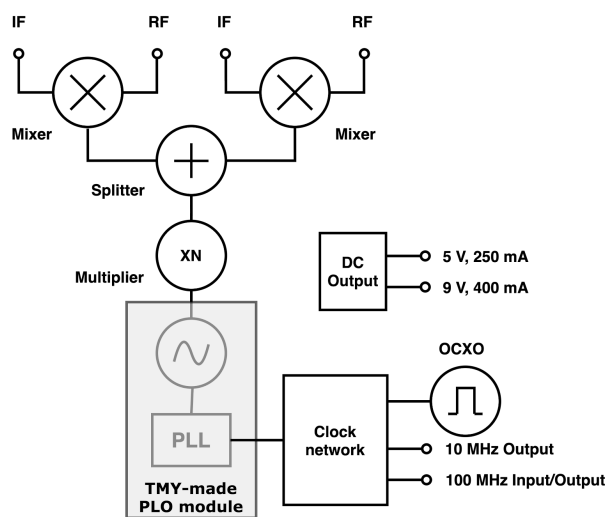


Figure 3. UD Box 5G Dual Channel Block Diagram

## RF Specifications

Parameter	Conditions	Unit	Min.	Typ.	Max.
RF Frequency	---	GHz	24	---	44
IF Frequency	---	GHz	0.01	---	14
LO Frequency	---	GHz	24	---	44
LO Frequency Resolution	---	MHz	---	0.01	---
Reference Clock Stability	-30 ~ +70 degree	ppb	-50	---	50
Conversion Loss	Full band	dB	---	12	---
IF to RF Isolation	With filter / No filter	dB	70 / 12* <sup>1</sup>	---	---
RF to IF Isolation	With filter / No filter	dB	46 / 18* <sup>1</sup>	---	---
Lo to RF Leakage	Full band	dBm	-22	---	---
Lo to IF Leakage	Full band	dBm	-22	---	---
Tx Output P1dB	RF = 28/39 GHz Tested at RF1 and RF2 port	dBm	0	---	---
Rx Input P1dB	RF = 28/39 GHz Tested at RF1 and RF2 port	dBm	10	---	---
Rx Noise Figure	28/39 GHz	dB	---	13.8	---
RF Return Loss	Full band	dB	6	10	---
IF Return Loss	Full band	dB	8	10	---
Warm Up Time	---	minutes	---	30* <sup>2</sup>	---

\*<sup>1</sup> With optional n257 filter

\*<sup>2</sup> Suggested warm up time

## DC and Clock Specifications

Parameter	Conditions	Unit	Min.	Typ.	Max.
DC Power Consumption	---	W	---	20	24
Supply Voltage	---	V	---	15	---
Accessories DC Power Supply	Single Channel	V	---	5/9	---
		mA	---	250/400	---
	Dual Channel	V	---	5/9	---
		mA	---	250/400	---
Reference Clock	Out	MHz	---	10	---
	In / Out	MHz	---	100	---

## Software Specifications

Parameter	Conditions	Unit	Min.	Typ.	Max.
Switch time	---	ms	---	100	---
PC OS	Windows 7/8/10				
API Support Language	C#, C/C++, Python, LabView				
Control Interface	Ethernet				

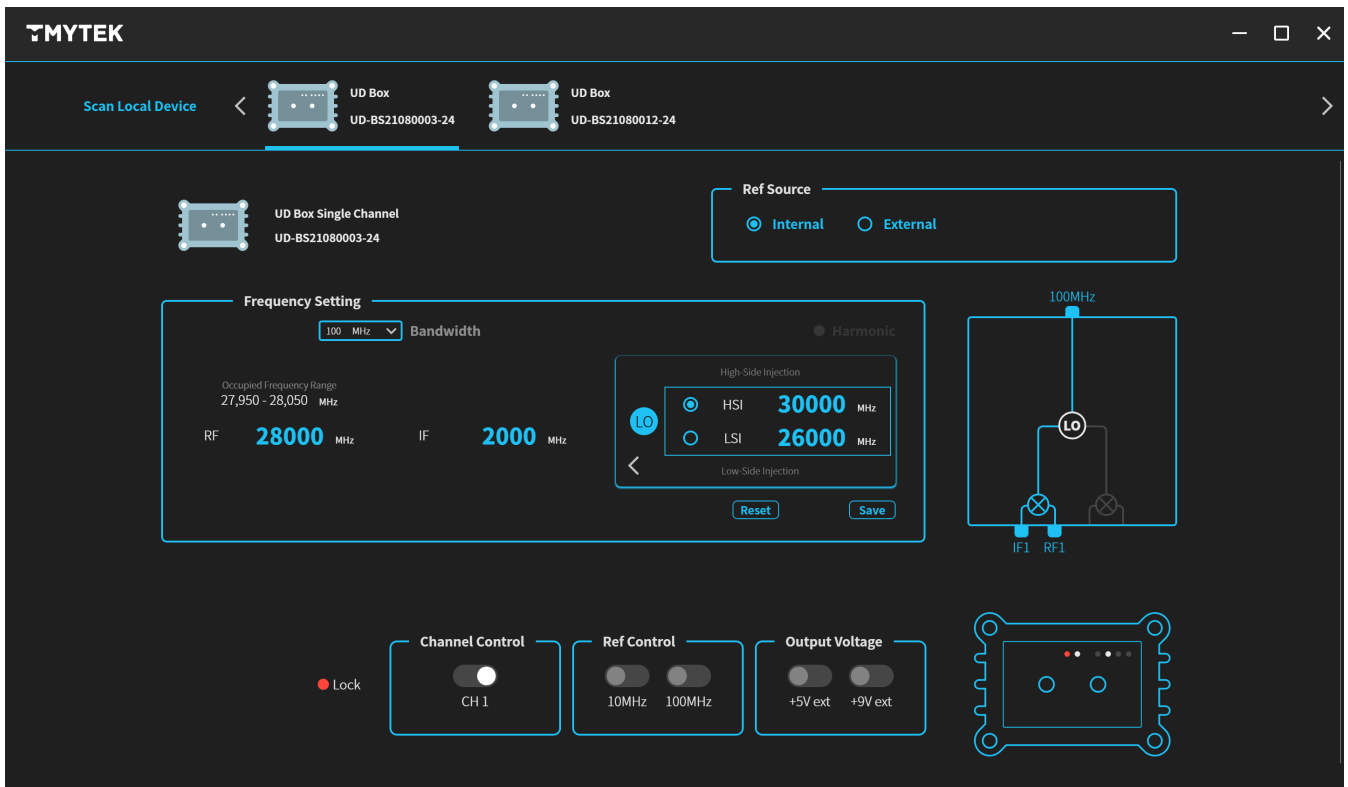


Figure 4. Controlling UD Box 5G using TMYLAB Kit

## Connector Specifications

Parameter	Conditions	Location	Type and Function
RF	Single Channel	Front Panel	Single 2.4 mm connector
	Dual Channel	Front Panel	Two 2.4 mm connectors
IF	Single Channel	Front Panel	Single 2.92 mm connector
	Dual Channel	Front Panel	Two 2.92 mm connectors
Power DC IN		Back Panel	Input DC power
Frequency Control		Back Panel	Ethernet Port LO frequency control
ON/OFF Button		Back Panel	Power ON/OFF switch
Reference Clock Port	10MHz	Back Panel	BNC connector
	100 MHz	Back Panel	SMA connector
DC Power Output Port		Back Panel	Output 5V and 9V DC power

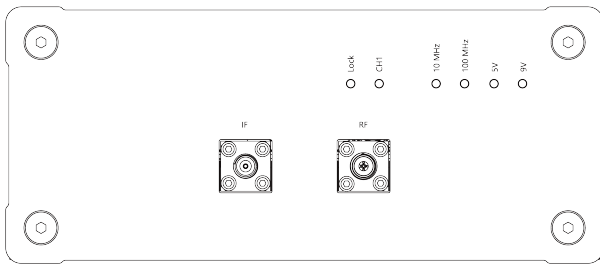


Figure 5. UD Box 5G Front Panel – Single Channel

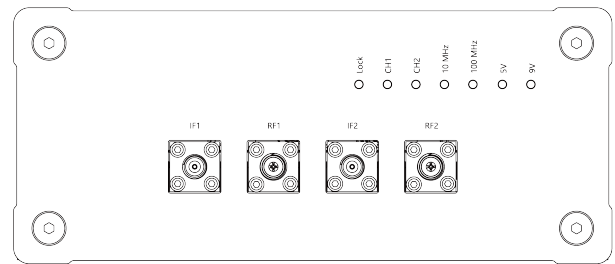


Figure 6. UD Box 5G Front Panel – Dual Channel

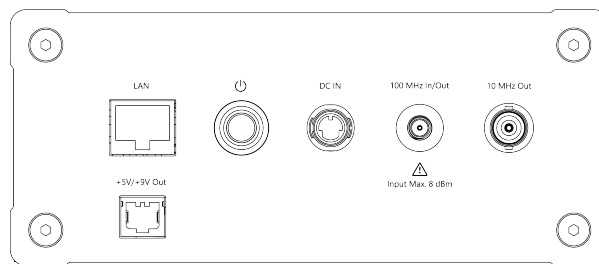


Figure 7. UD Box 5G Back Panel

## Package Details

TMYTEK's connectorized packaging:

Parameter	Condition	Unit	Main body	Connector included
Dimension	Length	mm	120.6	142.8
	Width	mm	152	152
	Height	mm	65	65
Weight	unit	g	---	889
Material	Aluminum	---	---	---

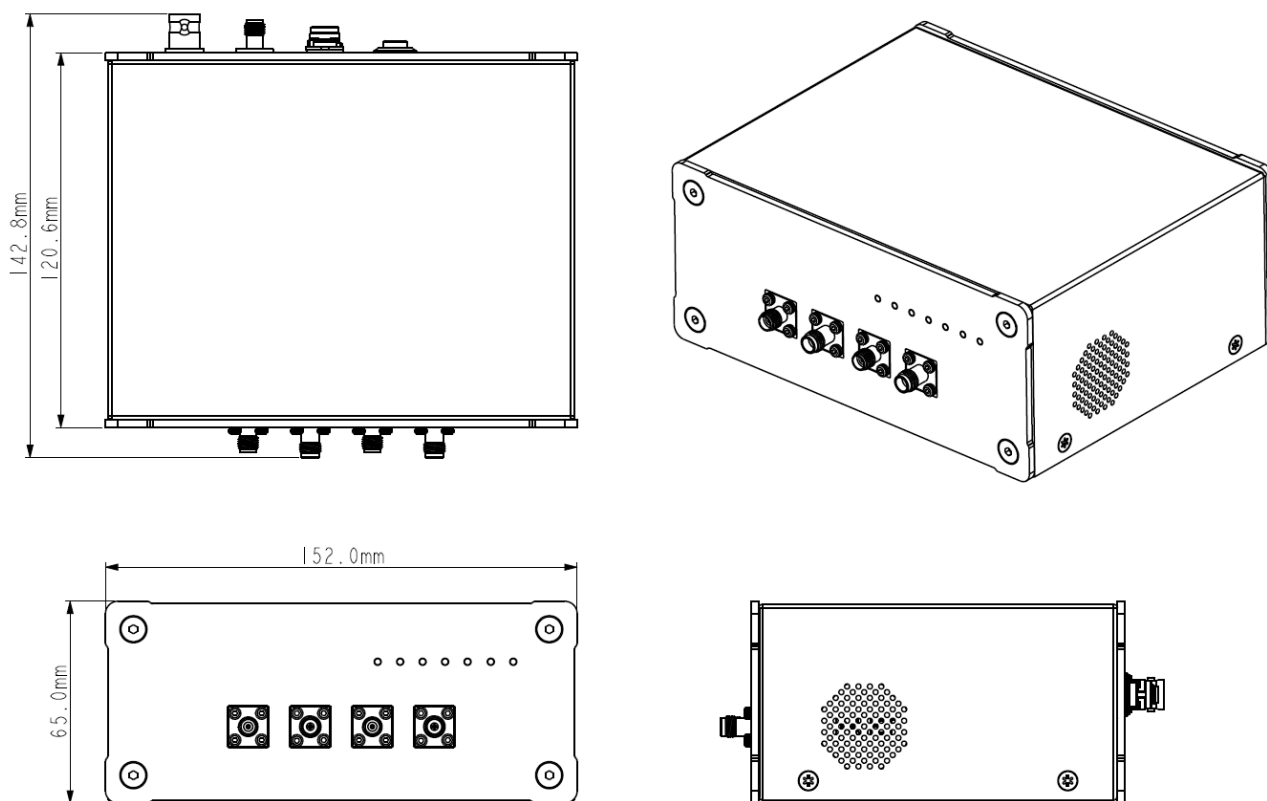


Figure 8. UD Box 5G Mechanical Drawing

## Accessories Specifications

The following accessories are developed by TMYTEK for use with UD Box under different applications (with emphasis on the 5G application). Please consult us for detailed accessories' specifications.

Item Type	3GPP Band	Units	Operating Frequency
RF Filter	n257	GHz	26.5 - 29.5
	n260	GHz	37 - 40
	n261	GHz	27.5 - 28.5
IF Filter	---	GHz	0 - 6
	---	GHz	0 - 15
Amplifier	---	GHz	20 - 40