

通訊訊號處理實驗室/信道科技 (CSPLab/CSPTek)

七館R70833
指導老師:黃正光老師

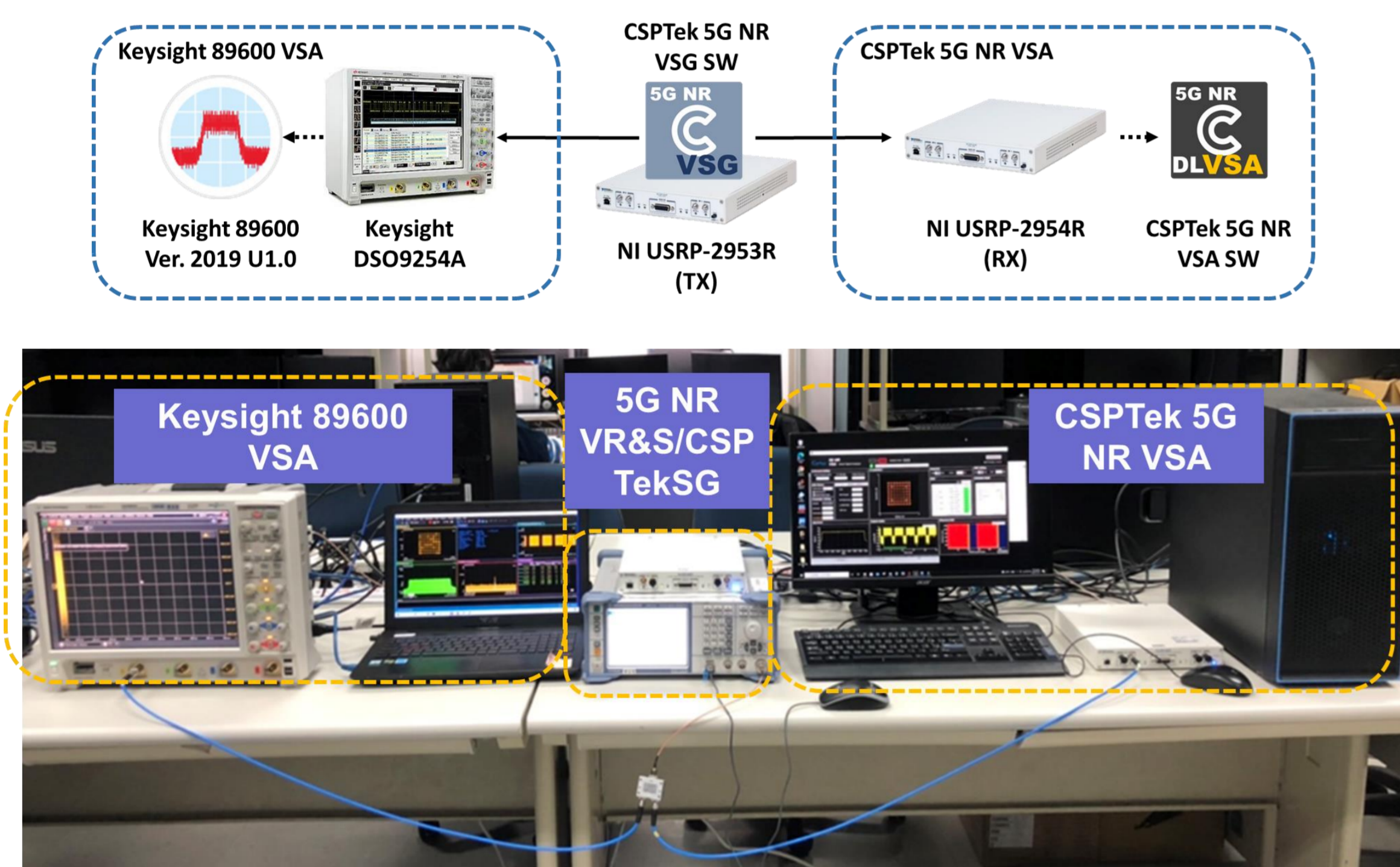
實驗室簡介

CSP實驗室研究專長為通訊信號處理、軟體無線電(SDR)實現、主流無線傳輸系統實體層設計(如5G NR/WiFi 802.11 family/Bluetooth/NB-IoT/LTE等)、MIMO通訊系統、感知無線電及雷達訊號處理等。

CSP實驗室由黃正光教授於1997年創立，實驗室的使命是使每位成專業學識、研究能力及品格態度等三方面均能充分增長; 在研究目標上，我們針對各種先進之無線通訊系統，以Top-Down設計方式創新並實現其實體層之收發機，包括演算法設計、電腦模擬、儀器實測驗證、與SDR實現。CSPLAB已建置各種先進設備，研究計畫不斷，成果豐碩，與業界常有交流及合作，氣氛和諧，人才輩出。

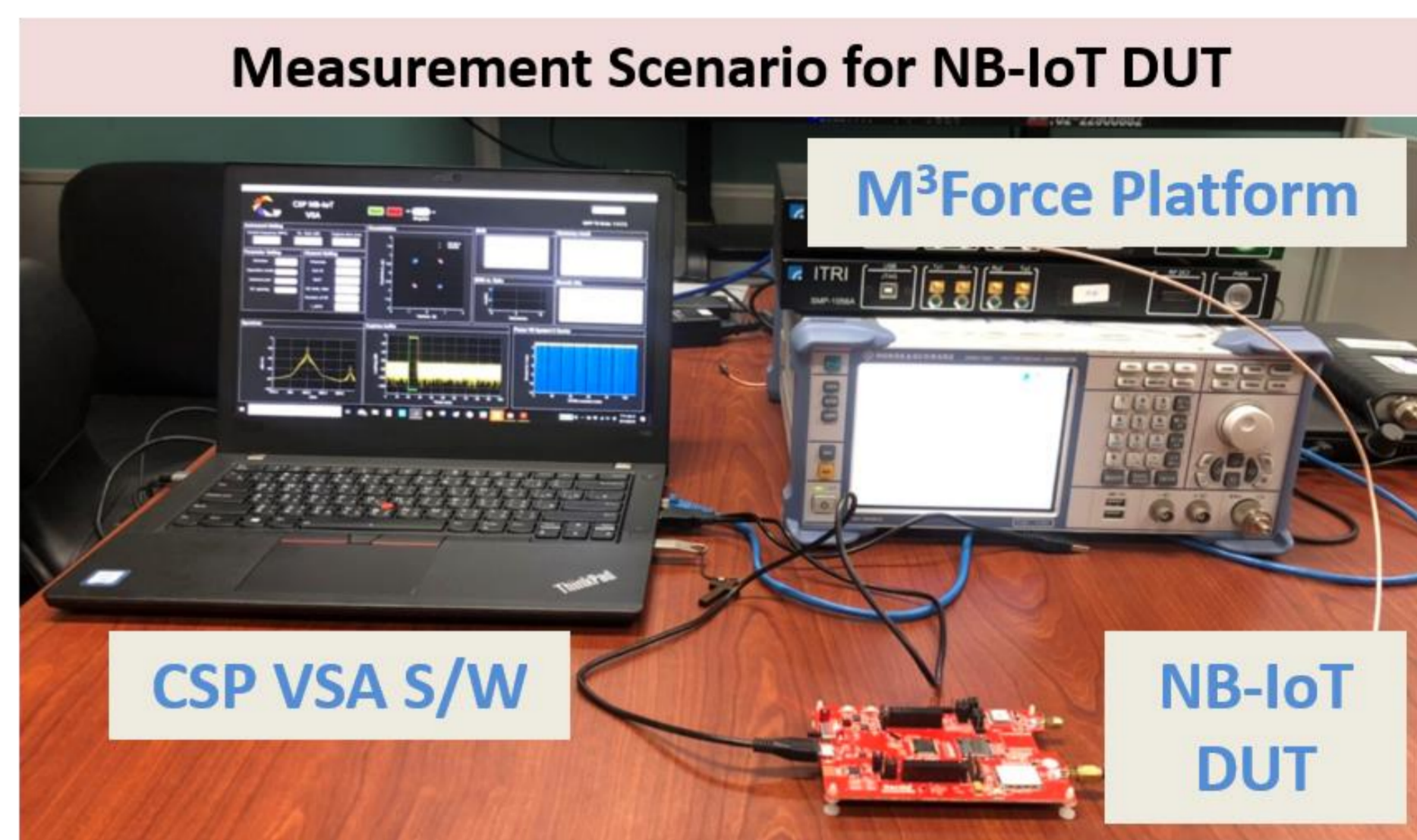
研究成果概述

Testing 5G NR FR1 by CSP VST



CSP VST		Keysight 89600		Keysight 89600		CSP 5G VSA	
Cell ID	1001	Cell ID	1001	Cell ID	1001	Cell ID	1001
PSS EVM	1.42%	PSS EVM	1.42%	PSS EVM	1.42%	PSS EVM	1.38%
SSS EVM	1.62%	SSS EVM	1.62%	SSS EVM	1.62%	SSS EVM	1.43%
PBCH EVM	1.26%	PBCH EVM	1.26%	PBCH EVM	1.26%	PBCH EVM	1.80%
PDCCH EVM	1.16%	PDCCH EVM	1.16%	PDCCH EVM	1.16%	PDCCH EVM	1.78%
PDSCH EVM	1.76%	PDSCH EVM	1.76%	PDSCH EVM	1.76%	PDSCH EVM	1.99%
PDSCH DMRS EVM	1.22%	PDSCH DMRS EVM	1.22%	PDSCH DMRS EVM	1.22%	PDSCH DMRS EVM	1.42%
Freq. offset	4829 kHz	Freq. offset	4829 kHz	Freq. offset	4829 kHz	Freq. offset	4841 kHz
IQ offset	-39.813 dB	IQ offset	-39.813 dB	IQ offset	-39.813 dB	IQ offset	-35.18 dB
IQ Gain imbalance	N/A	IQ Gain imbalance	N/A	IQ Gain imbalance	N/A	IQ Gain imbalance	0.376 dB
IQ Phase imbalance	N/A	IQ Phase imbalance	N/A	IQ Phase imbalance	N/A	IQ Phase imbalance	7.2 deg

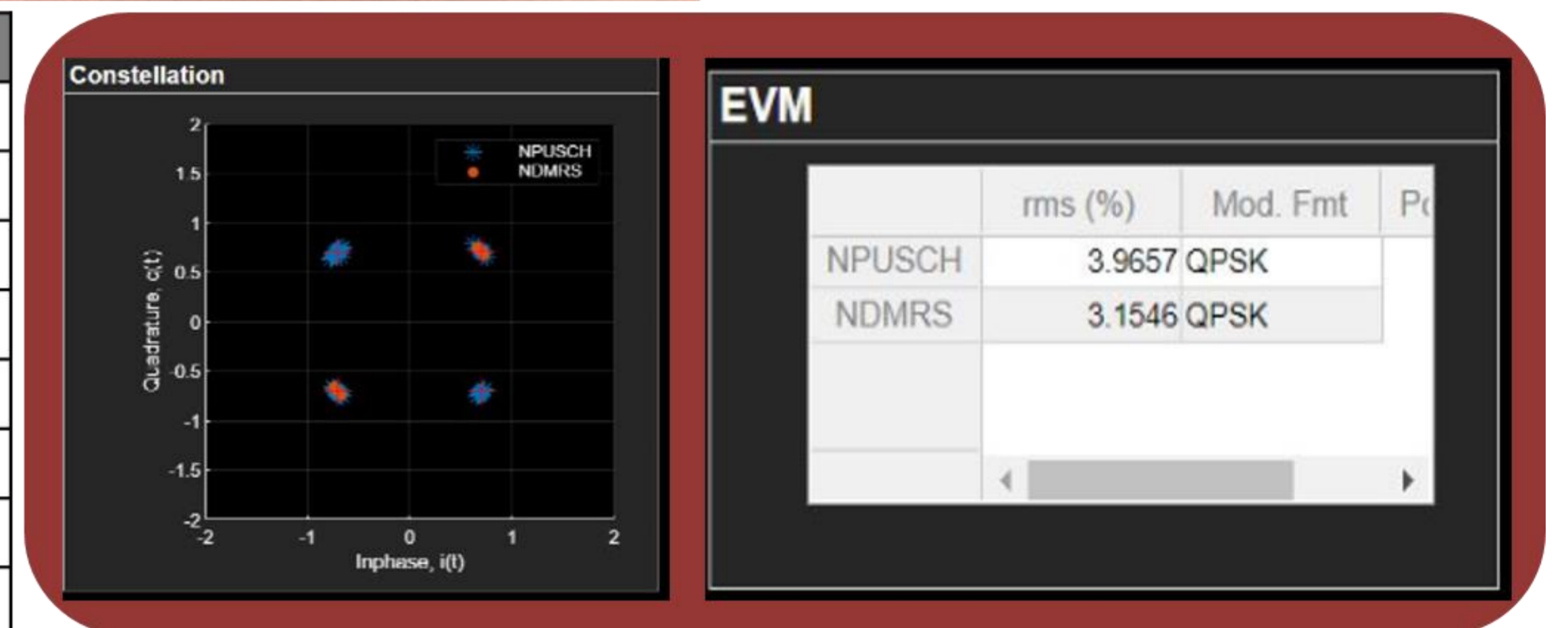
Testing NB-IoT DUT by CSP VST



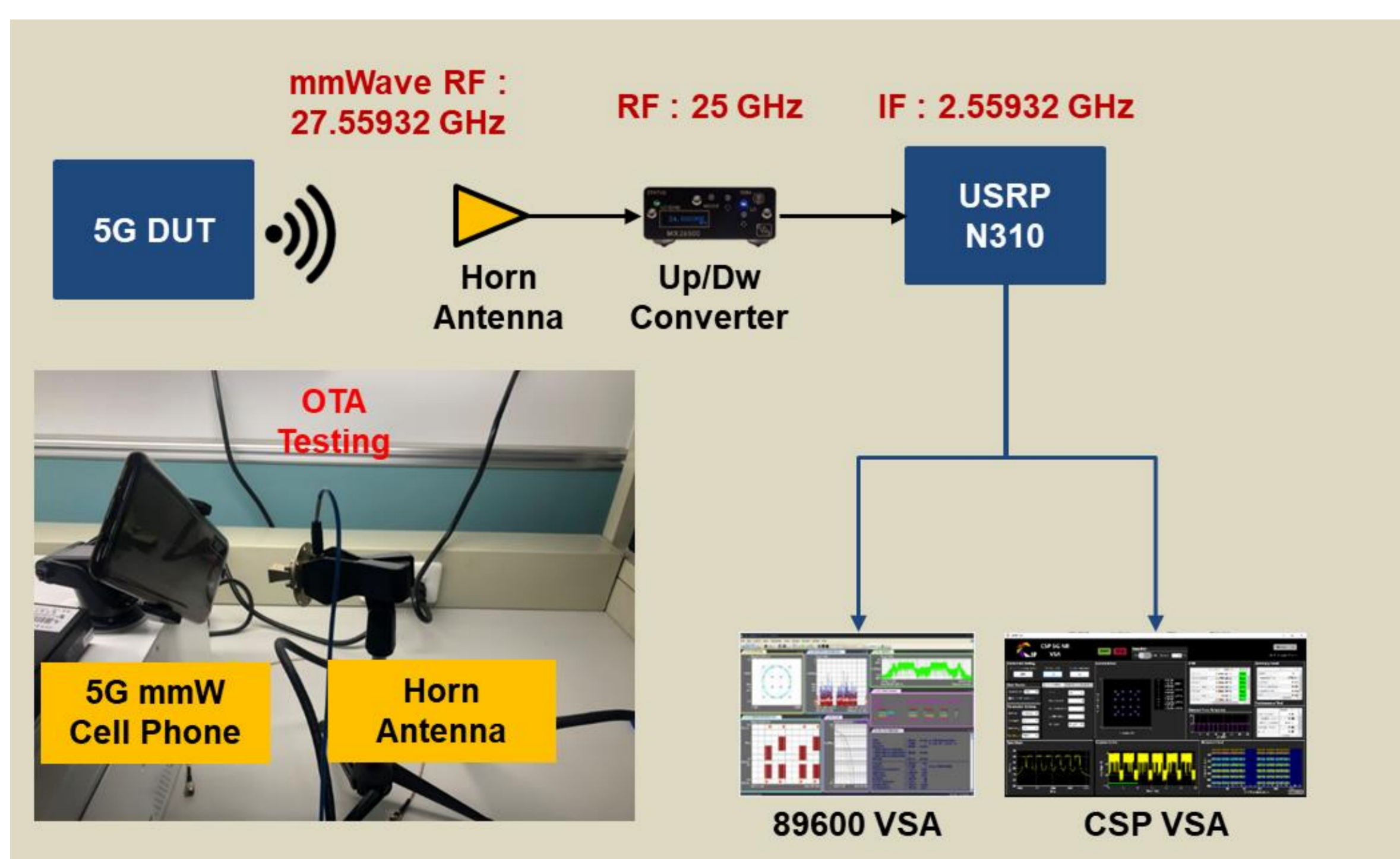
Testing Parameters

- Center Freq. : 880.1 MHz
- Channel bandwidth : 180 kHz
- Duplexing : Type B half FDD
- Support mode : Standalone
- Up Tx mode : Single-tone
- Subcarrier spacing : 15 kHz
- MCS : UL : 8 (pi/4-QPSK)

Measurement items
Frequency Error
Error Vector Magnitude (EVM)
IQ-Component
DC Offset
Channel Response
Occupied Bandwidth
Resource Grid Plan
RSSI, RSRP, RSRQ



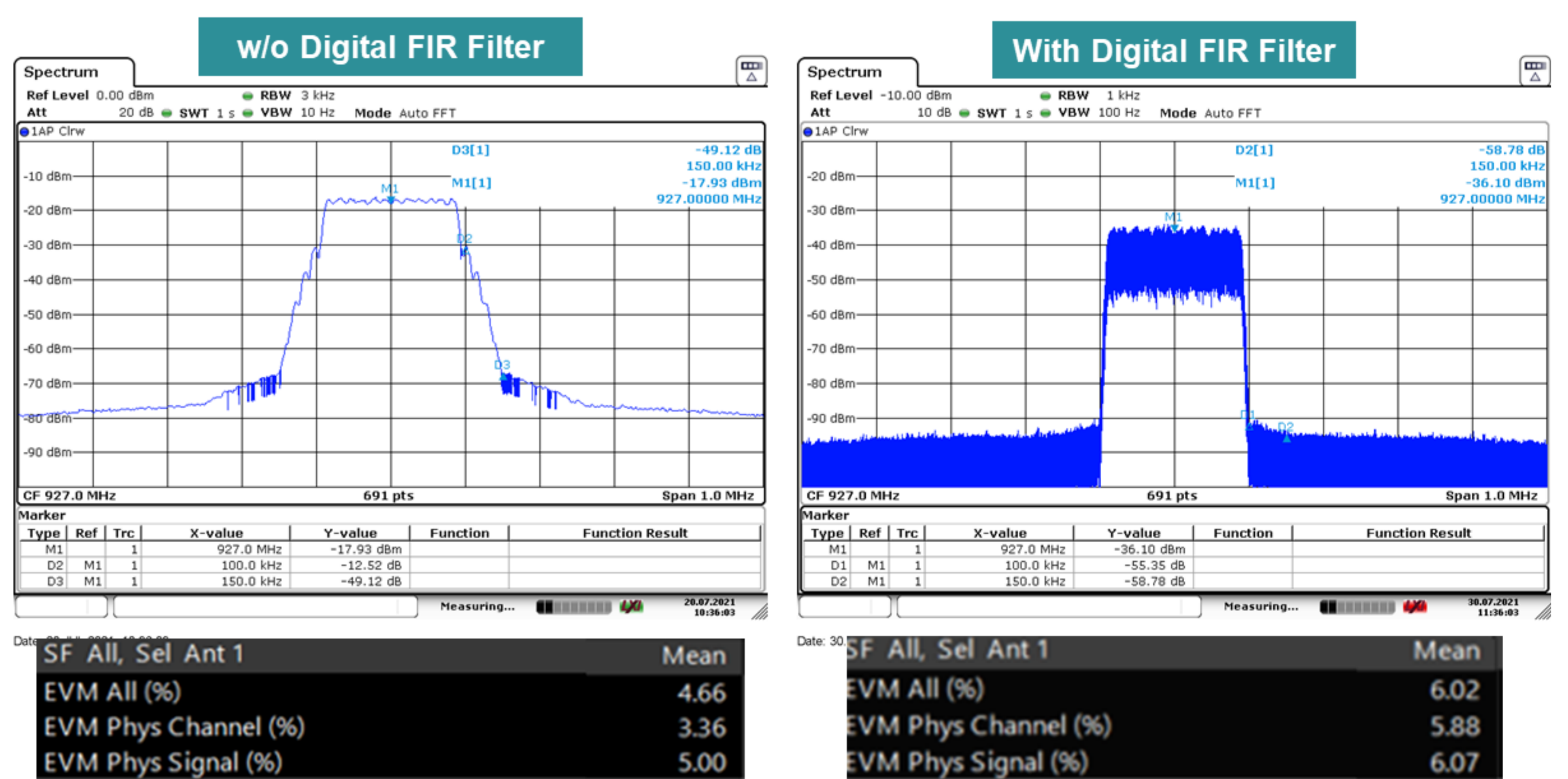
Testing 5G UL FR2 DUT 100MHz



Name	EVM (%rms)	Power per RE (dBm)	Modulation	Num. of RBs	RNTI	BWP ID
PUSCH0	7.912	-52.07	QPSK	5280	0x0	0
PUSCH0_DMRS	8.196	-52.07	QPSK	5280	0x0	0

PUSCH EVM	9.2569 %
PUSCH DMRS EVM	8.7141 %

NB-IoT NTN DL Spectral Improve



	Power level at center	Power downgrade level at 100kHz	EVM %
w/o FIR Filter	-17.93 dBm	-12.52 dB	4.66
FIR Filter	-23.81 dBm	-55.35 dB	6.02