

SEMICOMM Technology Co., Ltd.

TRX / TRS Wireless Test Set

Signaling/Non-Signaling
cover sub-6GHz / 5G NR FR2 mmWave

Cost effective testing solutions for R&D lab, DVT, Production test

- ▶ Various standard 5G NR 、LTE & LTE-Advanced 、3G 、NB-IoT 、WLAN 、GNSS 、 and custom IQ waveforms
- ▶ Integrate **Keysight** Vector Signal Generator IQ Libraries Suite and Vector Signal Analysis 89600
- ▶ 4 ports Vector Signal Generator and 4 ports Vector Signal Analysis
- ▶ 2 x 2 / 4 x 4 MIMO Testing
- ▶ LTE / 5G NR FR1 & FR2 UE Signaling Testing Solution
- ▶ Cost Effective Manufacturing Testing Solution
- ▶ mmWave FR2 24GHz ~ 40GHz UP/DOWN Converter
- ▶ Cost effective 5G NR FR2 Compact Antenna Test Range **CATR** manufacturing testing solution

TRX/TRS Wireless Test Set

sub-6GHz and mmWave

TRX / TRS Wireless Test Set

Description

TRX is a cost-effective Wireless test set. The frequency covers the Sub 6GHz. With mmWave UDC28/39 up/down converter , the test system can support 5G NR 24GHz~40GHz mmWave applications. The TRX can generate and analyze various standard compatible and custom waveforms, including various wireless mobile standards 3G, LTE,WLAN and covers the latest 5G NR, WIFI6, and custom IQ baseband model.

Non-Signaling

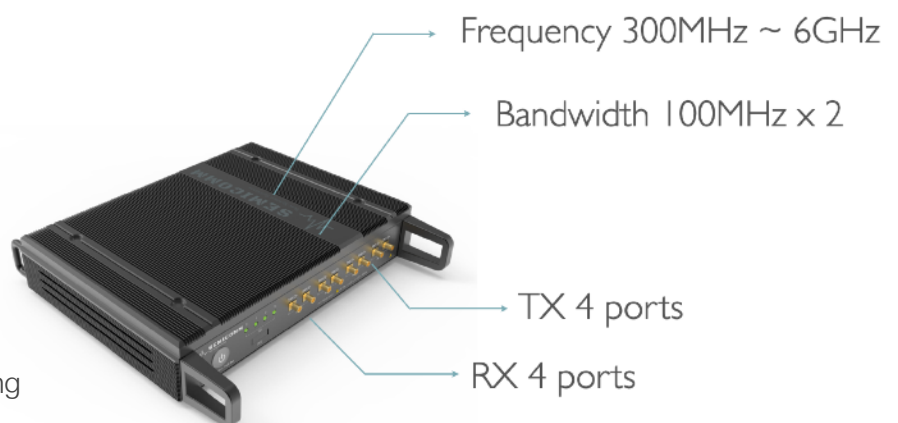
TRX support Keysight PathWave software at R&D and production line; MATLAB software, Python, C language at education research or various open source code for R&D including 5G NR wireless communication signal generation and signal analysis provide flexible functions.

Signaling

TRS is a cost-effective mobile call box testing solution. The frequency covers the Sub 6GHz. With mmWave UDC28/39 up/down converter , the test system can extend to 5G NR FR2 mmWave connection. The solution can support NSA and SA mode and max to eNB 6CA and gNB 8CA. TRS production application can operate multi-UE testing in asynchronization mode.

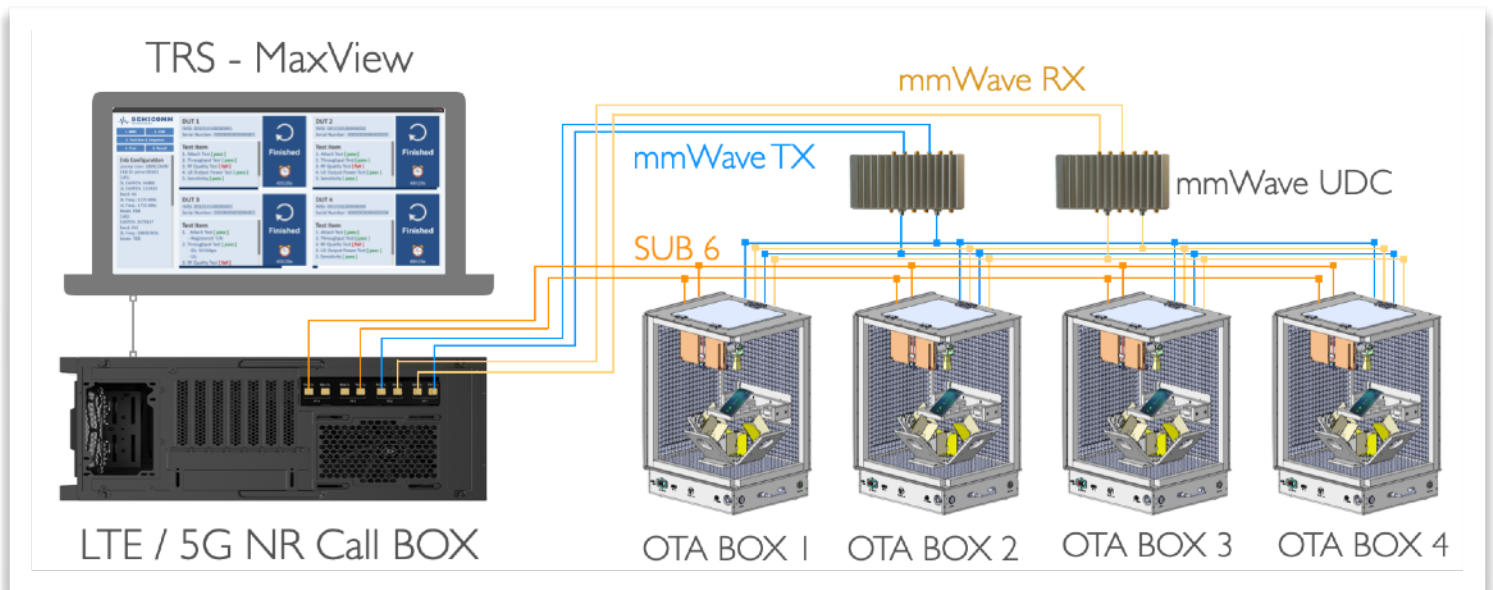
Function

- ▶ 4 TX & 4 RX in one box
- ▶ 2 x 2 / 4 x 4 MIMO Testing
- ▶ Support various standard
- ▶ 5G FR1 / FR2 Testing
- ▶ Manufacturing Testing
- ▶ R&D, DVT and manufacturing testing
- ▶ Modules, end product testing



TRS Signaling Testing Manufacturing test solution

Signaling Multi-UE Testing



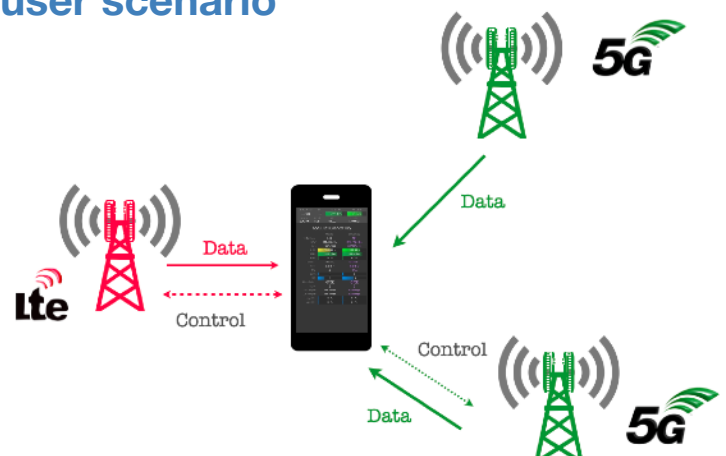
Signaling Testing Function

- ▶ UE registers to 5G networks or 4G EPC . Attach/Detach
- ▶ UE TX Power / EVM / CQI / SNR
- ▶ iPerf Throughput testing / MAC layer Throughput testing
- ▶ Handover from Cell to Cell
- ▶ UE Sensitivity / AGC function test
- ▶ PHY layer to IP layer protocol procedures check

1. IMNC	2. END	3. Test Item & Sequence	4. Test	5. Result
Enb Configuration License User: SEMICOMM ENB ID: p1em00101 CellID: DL EARFCN: 56880 UL EARFCN: 132422 Band: 56 DL Freq: 2155 MHz UL Freq: 1755 MHz Mode: FDD CAID: EARFCN: 2079167 Band: 261 DL Freq: 26000 MHz Mode: TDD				
DUT 1 IMSI: 001010100000001 Serial Number: 000000000000001		Test Item 1. Attach Test [pass] 2. Throughput Test [pass] 3. RF Quality Test [fail] 4. UE Output Power Test [pass] 5. Sensitivity [pass]	Finished 400.25s	
DUT 2 IMSI: 001010100000002 Serial Number: 000000000000002		Test Item 1. Attach Test [pass] 2. Throughput Test [pass] 3. RF Quality Test [fail] 4. UE Output Power Test [pass] 5. Sensitivity [pass]	Finished 400.25s	
DUT 3 IMSI: 001010100000003 Serial Number: 000000000000003		Test Item 1. Attach Test [pass] - Registered: Y/N 2. Throughput Test [pass] - DL: 50 Mbps - UL: 3. RF Quality Test [fail]	Finished 400.25s	
DUT 4 IMSI: 001010100000004 Serial Number: 000000000000004		Test Item 1. Attach Test [pass] 2. Throughput Test [pass] 3. RF Quality Test [fail] 4. UE Output Power Test [pass] 5. Sensitivity [pass]	Finished 400.25s	

The final quality testing with the real user scenario

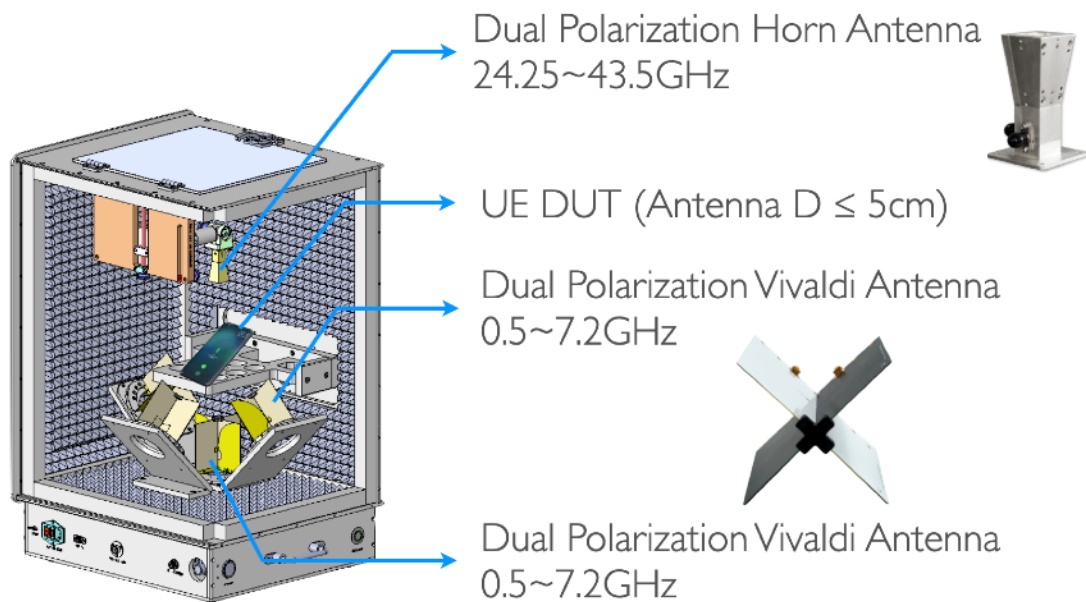
- ▶ SIM card module check
- ▶ Device registration check
- ▶ Antenna assembling check
- ▶ RF performance and Signal Quality check
- ▶ Data Throughput check
- ▶ Device is well calibrated check
- ▶ Software & firmware are loaded correctly



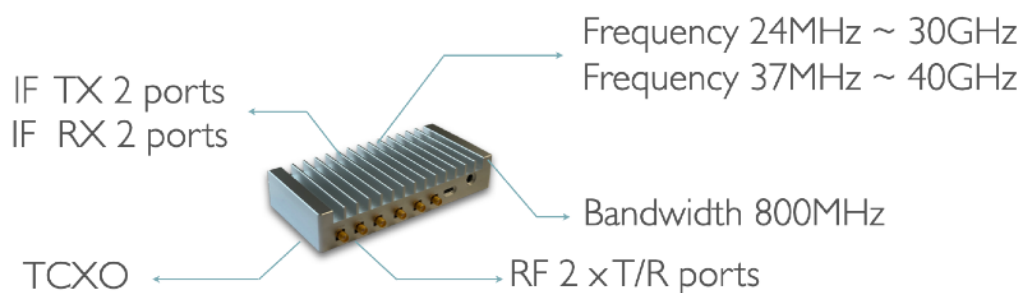
OTA Box / Antenna

Manufacturing test solution

OTA BOX / Antenna



One mmWave antenna panel with $D \leq 5$ cm active at any one time



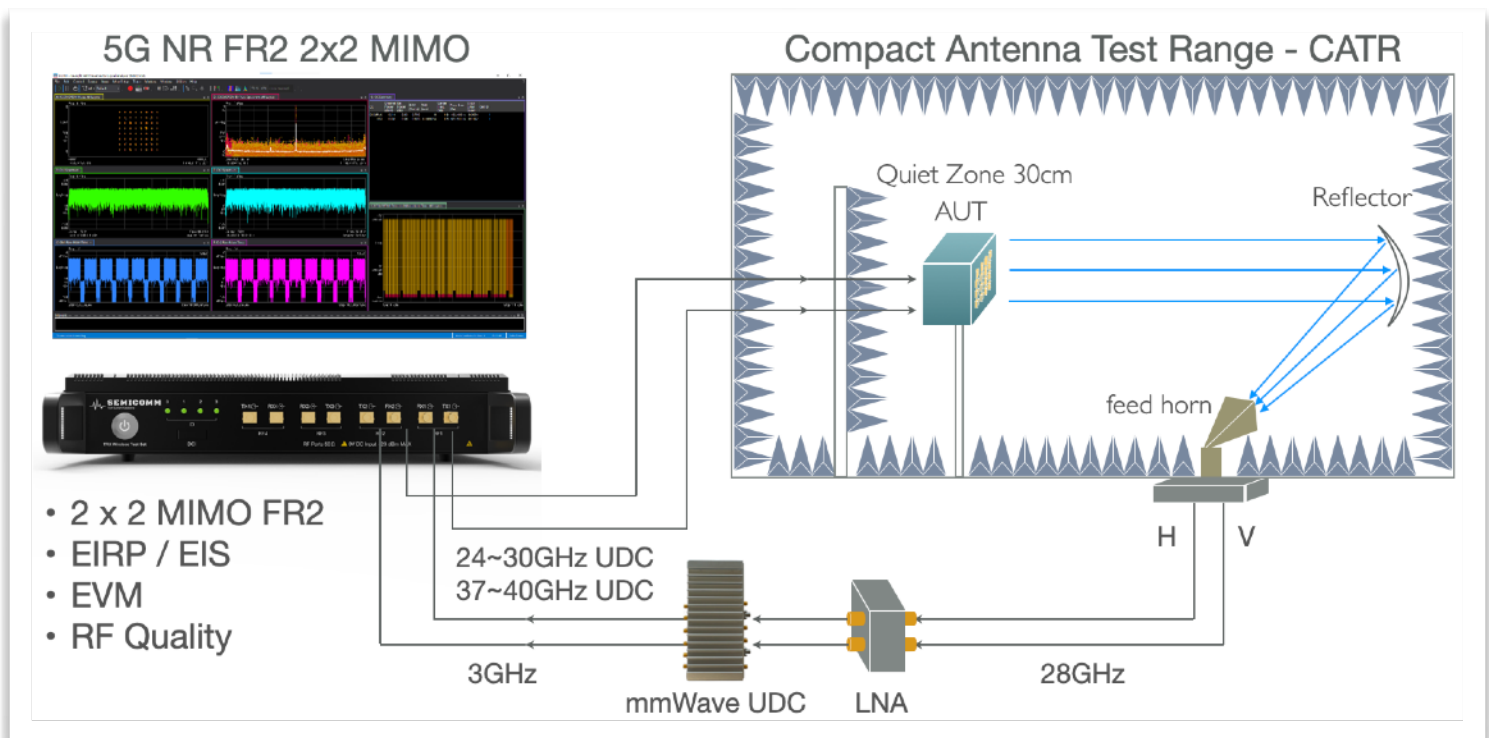
Function

- ▶ One entity frequency Up/ Down conversion for IF-RF transition
- ▶ Excellent EVM performance with ultra low frequency error
- ▶ Dual channels design to meet variety test case
- ▶ Innovative S21 parameter measurement feature for an alternative cost-efficient testing solution
- ▶ Internal/ external LO support mode and external instrument sync-up feature for better EVM performance

TRX Wireless Test Set

FR2 manufacturing test solution

Cost effective 5G NR FR2 manufacturing solution



Any phase coherent antenna panel $\leq 30\text{cm}$

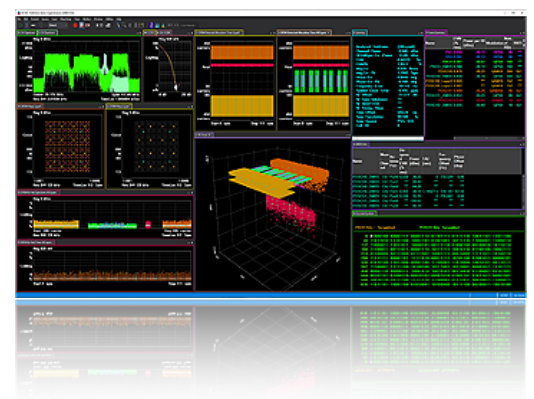
Keysight 89600 VSA

89604CB Cellular Communications Package

- 3G modulation analysis for W-CDMA/HSPA+, TD-SCDMA/HSPA, cdma2000, 1xEV-DO, and 1xEV-DV
- LTE/LTE-Advanced FDD and TDD modulation analysis
- 5G NR modulation analysis
- 89601200C Basic VSA and HW connectivity

J: (CC0) Summary

Analyzed Subframe	[Sf0,sym0]	to [Sf0,sym111]
Channel Power	-4.882	dBm
Channel Power (Active)	-4.560	dBm
OFDMsym Tx. Power	-4.564	dBm
EVM	0.47468	%rms
EVMPk	10.388	%pk
MagErr	0.343	%rms
MagErr Pk	-8.683	%pk
Phase Err	0.0050	deg
Phase Err Pk	0.3902	deg
Frequency Error	709.86	mHz
Frequency Error Worst	709.86	mHz
Symbol Clock Error	0.0013	ppm
IQ Offset	-51.555	dB
IQ Gain Imbalance	***	
IQ Quad Error	***	
IQ Timing Skew	***	
Time Offset	-498.43	us
Sync Correlation	99.97	%
Sync Source	PDSCH DMRS	
Cell ID	1	



89603C Wireless Connectivity Package

- Wireless connectivity modulation analysis for 802.11a/b/g/j/p and Mobile WiMax
- High throughput WLAN modulation analysis for 802.11n/ac/ax/be
- IoT modulation analysis for NB-IoT, RFID, and HRP UWB
- DOCSIS3.1 modulation analysis



TRX Wireless Test Set Specification

TRX 7200	
RF Ports	4 x 4 MIMO
RF Bandwidth (max)	100 MHz+100 MHz
Frequency Range	300 MHz to 6.0 GHz
EVM	≤ -45 dB
TX noise floor	≤ -155 dBm/Hz
MAX Output Power	+4 dBm
Output power step	0.25dB
Phase Noise	0.20 °rms @ 800MHz 0.49 °rms @ 2400MHz 0.75 °rms @ 5500MHz
Noise Figure	12dB @ 800MHz 13.5dB @ 2400MHz 18dB @ 5500MHz
TX RF 1 to RF 2 isolation	65 dB @ 800MHz 60 dB @ 2400MHz 60 dB @ 5500MHz
RX RF 1 to RF 2 isolation	60 dB @ 800MHz 60 dB @ 2400MHz 60 dB @ 5500MHz
Interfaces	USB (JTAG), 1 Gb RJ45 ,10Gb ETH x 2 , Ref CLK IN/OUT , SF SYNC IN/OUT ,RF Digital Control Interface
Power requirements	12V DC Jack, AC Power Adaptor 100 ~ 26.50V / 50 ~ 60Hz
Operation temperature	0°C to +40°C
Dimensions	312 x 298 x 56 mm
Weight	4.5 Kgw

Order Option

TYPE	MODEL	Description
TRX Wireless Test Set	TRX 7200	4 x 4 MIMO , BW 100+100MHz ,300 MHz to 6.0 GHz , Wireless Tester
TRS Call BOX Series	TRS	LTE + 5G NR , SA+NSA , FR1 / FR2 option Manual and Multi Auto test version
mmWave UP/DOWN Converter	UDC28-42B	2.6GHz~5.8GHz to 24~30GHz Up/Down Converter, 4 x IF, 2 x RF
	UDC39-42B	3.3GHz~6.7GHz to 37~40GHz Up/Down Converter, 4 x IF, 2 x RF
CATR R1 System	R1 CATR	Quite Zone Size 30cm , Frequency range 18-90GHz , Dual Polarization Feed Horn 18~26.5GHz / 24~42.0GHz / 40~60.0GHz / 60~90.0GHz Size 180cm x 110cm x 75cm
Production Shielding Box	TRXSB 120	Outer dimension W420 x D603 x H344 (mm) Inner dimension W348.6 x D378.6 x H173.6 (mm) Door size W340 x H150(mm) Shielding performance 26.5GHz to 44GHz > 75dB Include filter , RJ45 connector x 2 , RS232 connector x 1
	TRXSB 130	Outer dimension W572 x D565.5 x H727.5 (mm) Inner dimension W465 x D350 x H525 (mm) Door size W340 x H150(mm) Shielding performance 26.5GHz to 44GHz > 75dB Include filter , RJ45 connector x 2 , RS232 connector x 1
	TRXSB 140	Outer dimension W708.2 x D681.1 x H477.8 (mm) Inner dimension W596.2 x D468.3 x H315.3 (mm) Door size W340 x H150(mm) Shielding performance 26.5GHz to 44GHz > 75dB Include filter , RJ45 connector x 2 , RS232 connector x 1
Keysight VSA 89600 Option	89601301C	Multi-vendor hardware connectivity License certificate, Basic option
	W89604CB	5G NR , LTE/LTE-A FDD,LTE/LTE-A TDD, W-CDMA/HSPA ,CDMA2K/ 1xEV-DV,1xEV-DO , TD-SCDMA
	89603C	WLAN 802.11 , NB-IoT, RFID, HRP UWB, Mobile WiMax, and DOCSIS.

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