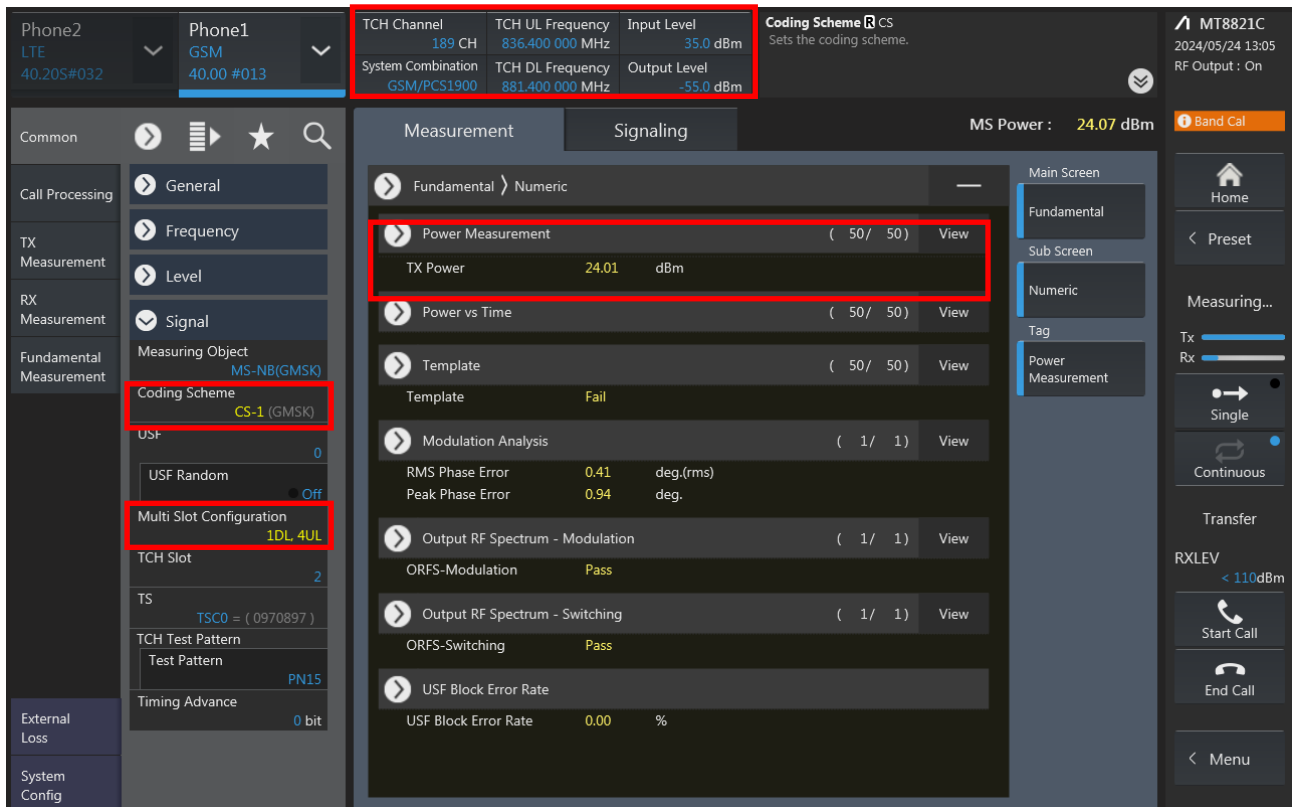


Appendix H. 2G/3G/LTE/5G FR1/LTE CA connection diagram

General Note:

The power measurement for 2G/3G/LTE/5G FR1/LTE CA is to establish a connection between device and call box, and via call box to configure Bands, channel, BWs, RB size, carrier aggregation of CA, frequency channels, SCS and maximum output power. Hereunder is screenshot call box connection information for 2G/3G/LTE/5G FR1/LTE CA.

GSM



The screenshot displays the configuration and measurement settings for a GSM connection. Key parameters are highlighted with red boxes:

- Phone1:** GSM, 40.00 #013
- TCH Channel:** 189 CH
- TCH UL Frequency:** 836.400 000 MHz
- Input Level:** 35.0 dBm
- System Combination:** GSM/PCS1900
- TCH DL Frequency:** 881.400 000 MHz
- Output Level:** -55.0 dBm
- Coding Scheme:** CS
- Coding Scheme (Fundamental):** CS-1 (GMSK)
- Multi Slot Configuration:** 1DL, 4UL
- TX Power (Measurement):** 24.01 dBm

Additional measurement data shown includes:

- MS Power: 24.07 dBm
- Power vs Time: (50 / 50) View
- Template: Fail
- Modulation Analysis: (1 / 1) View
- RMS Phase Error: 0.41 deg.(rms)
- Peak Phase Error: 0.94 deg.
- Output RF Spectrum - Modulation: (1 / 1) View
- ORFS-Modulation: Pass
- Output RF Spectrum - Switching: (1 / 1) View
- ORFS-Switching: Pass
- USF Block Error Rate: 0.00 %



WCDMA

Phone2 LTE 40.20S#032 | Phone1 W-CDMA 40.00 #013

UL Channel	UL Frequency	Input Level
9400 CH	1 880.000 000 MHz	35.0 dBm
DL Channel	DL Frequency	Output Level
9800 CH	1 960.000 000 MHz	-65.7 dBm

Average Count PWR_AVG: Sets the average count (measurement count) for power measurement.

UE Power : 22.6 dBm

Measurement: Fundamental | Numeric

Power Measurement (50 / 50)

TX Power	23.28	dBm
----------	-------	-----

Frequency Error (1 / 1)

Carrier Frequency Error	-0.0002	kHz
Freq. Err	0.00	ppm

Occupied Bandwidth (1 / 1) View

OBW	4.163	MHz
-----	-------	-----

Spectrum Emission Mask (1 / 1) View

SEM	Pass
-----	------

Adjacent Channel Power (1 / 1)

ACLR(-5MHz)	-40.24	dB
ACLR(+5MHz)	-42.79	dB

Modulation Analysis (1 / 1) View

EVM	5.15	%(rms)
-----	------	--------

Peak Code Domain Error (1 / 1)

PCDE	-39.86	dB
------	--------	----

Meas Setup: Power Control All 1

LTE

Phone2 LTE 40.20S#032 | Phone1 LTE 40.20S#032

UL Channel	TPC Pattern	Input Level
18900 ch	All +3dB	35.0 dBm
Operation Band	Channel Bandwidth	Output Level
2	20 MHz	-54.2 dBm

Power Measurement - Meas. Count PWR_AVG: This sets the measurement count of the power measurement.

UE Power : 25.4 dBm

Measurement: Fundamental | Numeric

Power Measurement (50 / 50)

TX Power	25.12	dBm
----------	-------	-----

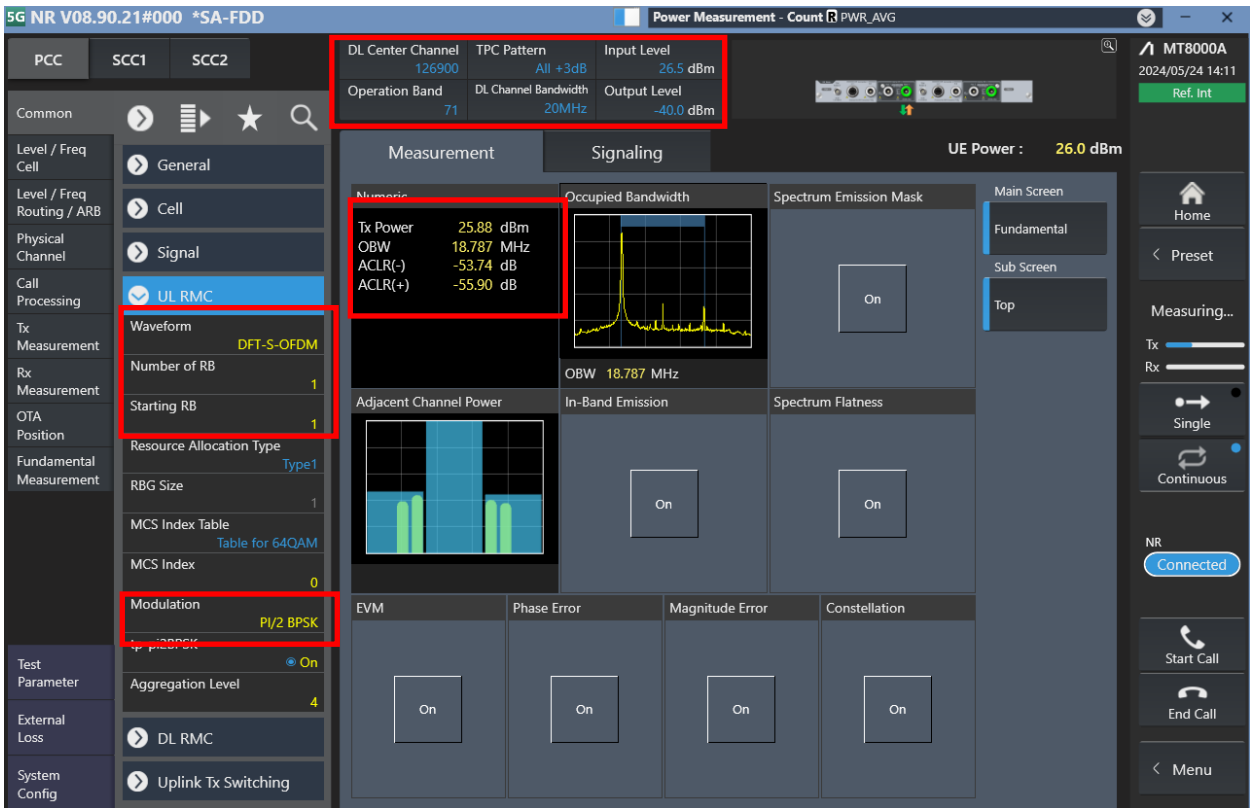
Modulation Analysis (1 / 1) View

Freq. Err	0.00	ppm
EVM	1.35	%(rms)

Test Parameter: Number of RB 1, Starting RB 0

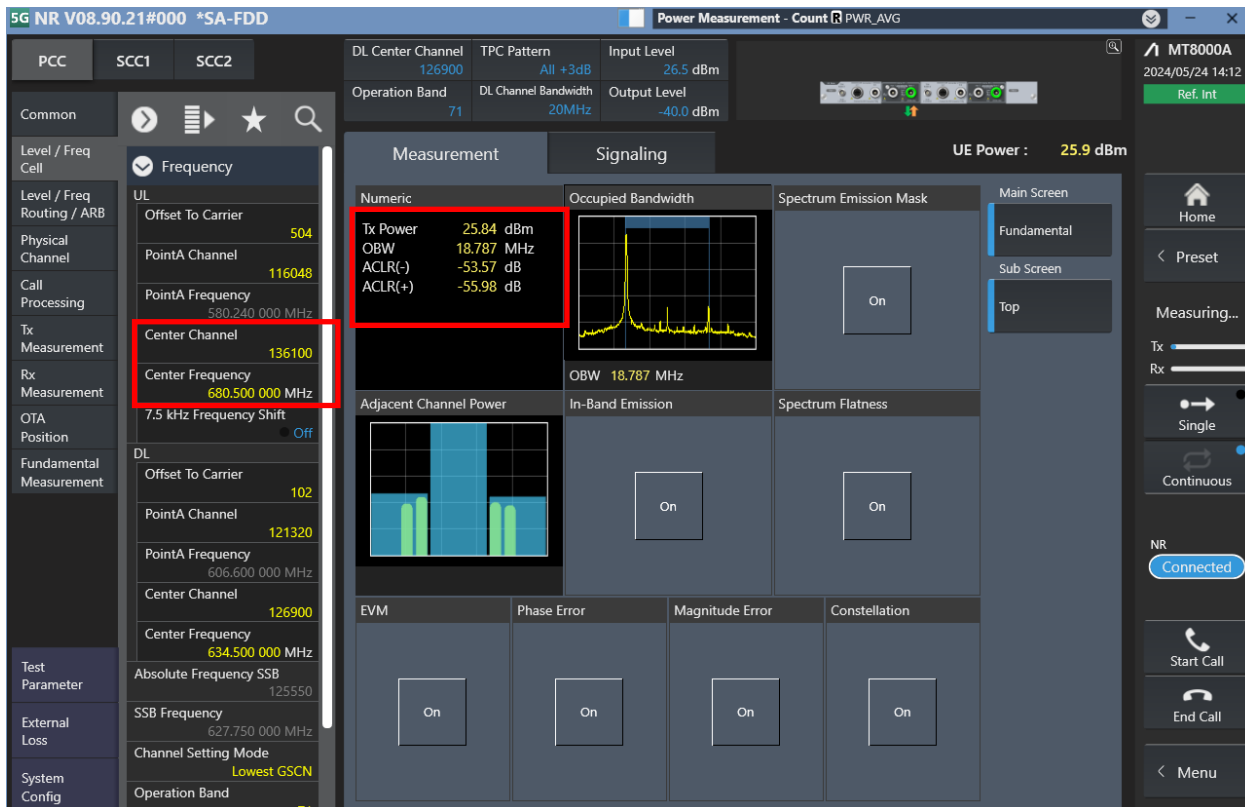
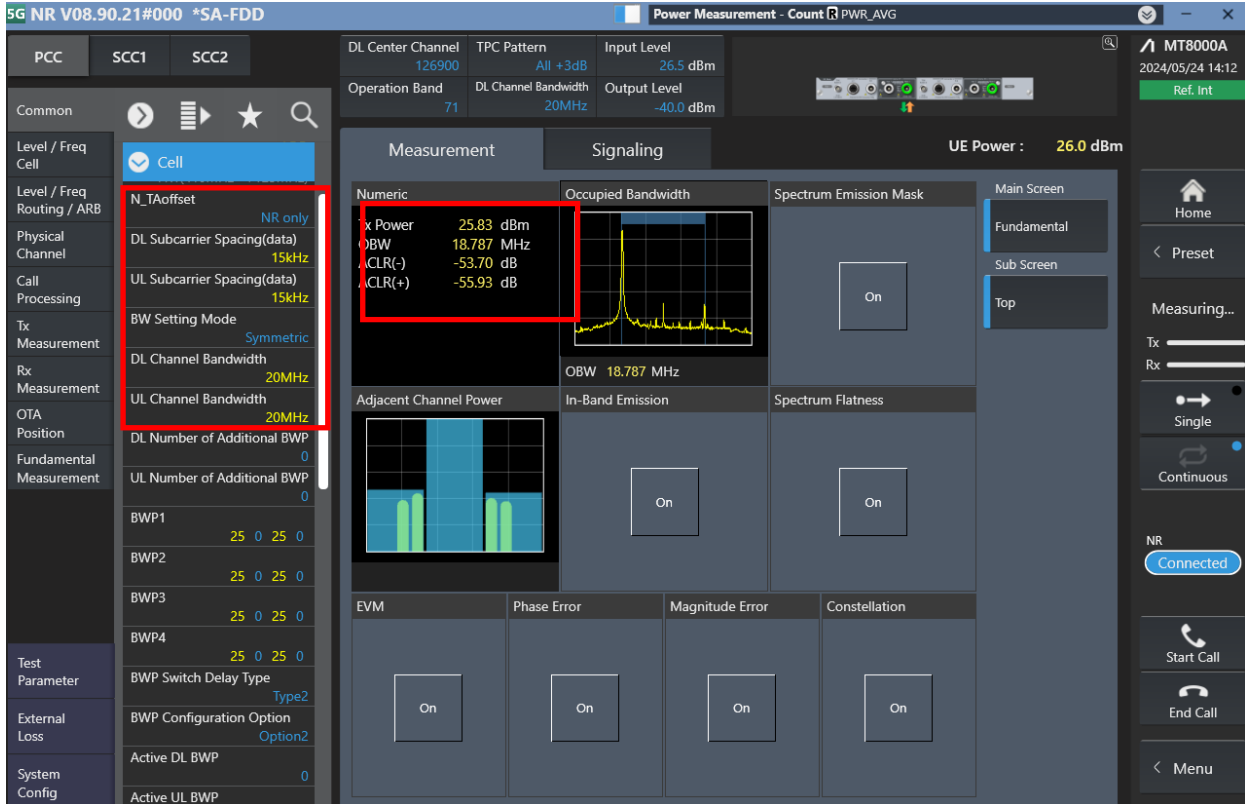
Band Definition: MCS Index 5 QPSK 5 72 8

5GNR FR1



The screenshot displays the 'Power Measurement - Count PWR_AVG' window in a test software. The interface is divided into several sections:

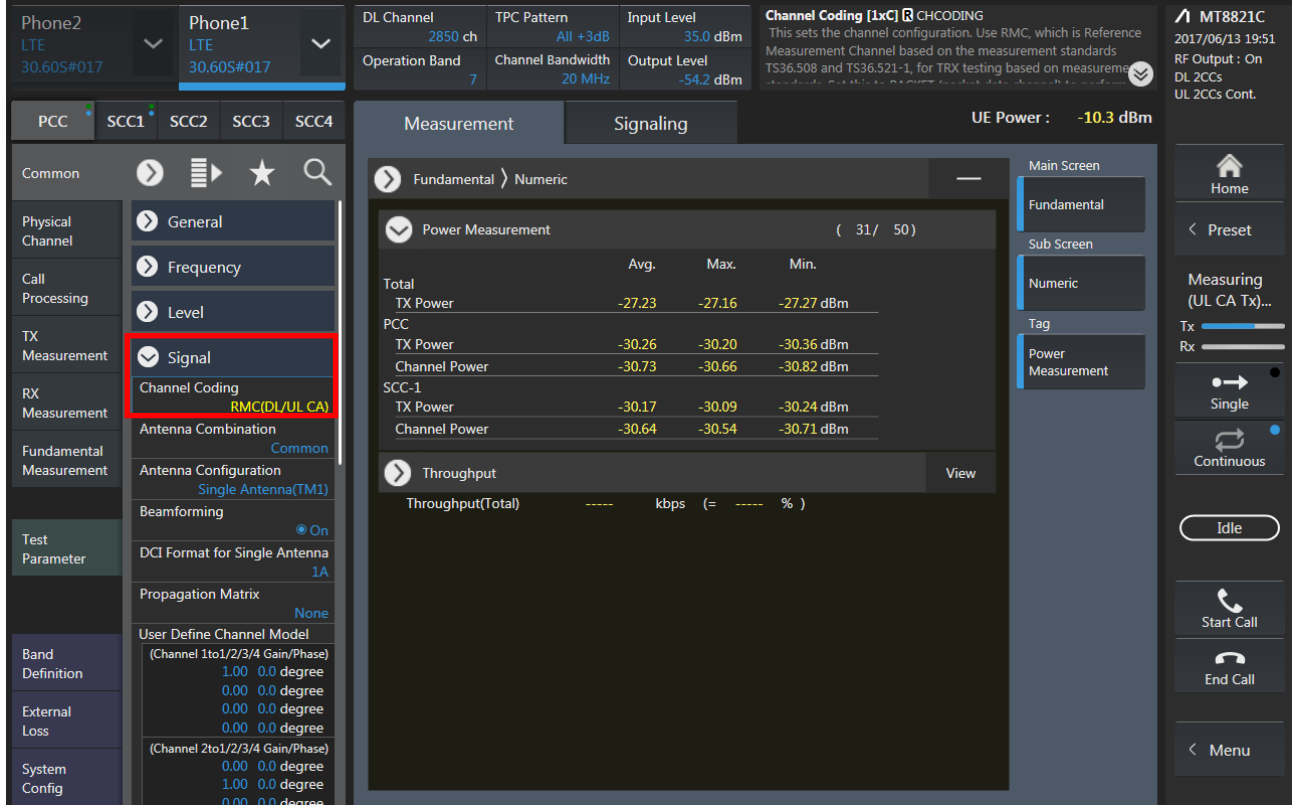
- Configuration (Left Panel):**
 - Waveform: DFT-S-OFDM
 - Modulation: **PI/2 BPSK** (highlighted with a red box)
 - Aggregation Level: 4
 - DL RMC: On
 - Uplink Tx Switching: On
- Measurement Summary (Top Center):**
 - DL Center Channel: 126900
 - TPC Pattern: All +3dB
 - Input Level: 26.5 dBm
 - Operation Band: 71
 - DL Channel Bandwidth: 20MHz
 - Output Level: -40.0 dBm
- Measurement Data (Middle Left):**
 - Tx Power: 25.88 dBm
 - OBW: 18.787 MHz
 - ACL(-): -53.74 dB
 - ACL(+): -55.90 dB
- Occupied Bandwidth (Middle Right):**
 - OBW: 18.787 MHz
 - Graph showing frequency spectrum with a peak at approximately 18.787 MHz.
- Other Measurements (Bottom):**
 - Adjacent Channel Power: Graph showing power levels in adjacent channels.
 - In-Band Emission: On
 - Spectrum Flatness: On
 - EVM: On
 - Phase Error: On
 - Magnitude Error: On
 - Constellation: On
- Right Panel:**
 - UE Power: 26.0 dBm
 - MT8000A
 - 2024/05/24 14:11
 - Ref. Int
 - Buttons: Home, Preset, Measuring..., Single, Continuous, NR Connected, Start Call, End Call, Menu



LTE Uplink and Downlink Carrier Aggregation configurations:

1. Select “RMC (DL/UL CA)” for Uplink Carrier Aggregation;
Select “RMC (DL CA)” for Downlink Carrier Aggregation.
For example, Uplink Carrier Aggregation:

Detailed operation: PCC → Common → Signal → Channel Coding → Select **【RMC (DL/UL CA)】**



The screenshot shows the LTE test equipment interface. On the left, the 'Signal' menu is highlighted in red, with 'Channel Coding RMC(DL/UL CA)' selected. The main display shows 'Power Measurement' data for PCC and SCC-1. The 'Throughput' section is also visible.

	Avg.	Max.	Min.
Total TX Power	-27.23	-27.16	-27.27 dBm
PCC TX Power	-30.26	-30.20	-30.36 dBm
PCC Channel Power	-30.73	-30.66	-30.82 dBm
SCC-1 TX Power	-30.17	-30.09	-30.24 dBm
SCC-1 Channel Power	-30.64	-30.54	-30.71 dBm



- 2. PCC parameter Settings: select the PCC tab and Set operating band, BW, channel and RB configurations for PCC.

The screenshot displays a mobile testing application interface. At the top, there are two phone profiles: Phone2 (LTE, 30.60S#017) and Phone1 (LTE, 30.60S#017). Below this, a navigation bar includes tabs for PCC, SCC1, SCC2, SCC3, and SCC4. The PCC tab is selected and highlighted with a red box. The main area is divided into two sections: 'Measurement' and 'Signaling'. The 'Measurement' section shows 'Fundamental' and 'Numeric' views. The 'Numeric' view displays 'Power Measurement' and 'Modulation Analysis' data. The 'Modulation Analysis' table is as follows:

	PCC	Freq. Err	*****	ppm
PCC	EVm	*****		%(rms)
SCC-1	Freq. Err	*****		ppm
SCC-1	EVm	*****		%(rms)

The 'Signaling' section shows 'DL RMC - Number of RB [1x] [R] DL RMC_RB' with a note: 'This sets number of Resource Blocks (RBs) for Downlink signals.' The 'DL Channel' is set to 2850 ch, 'Operation Band' to 7, 'TPC Pattern' to All +3dB, 'Channel Bandwidth' to 20 MHz, 'Input Level' to 35.0 dBm, and 'Output Level' to -54.2 dBm. The 'DL RMC - Number of RB' is set to 0. The 'UE Power' is -15.8 dBm. The interface also includes a 'Reference Signal not found' warning and various control buttons like Home, Preset, Single, Continuous, Idle, Start Call, End Call, and Menu.



- 3. SCC parameter Settings: select the SCC tab and Set operating band, BW, channel and RB configurations for SCC.

The screenshot displays a mobile testing application interface. At the top, it shows 'Phone2' and 'Phone1' both set to 'LTE' with the number '30.60S#017'. Below this, there are tabs for 'PCC', 'SCC1', 'SCC2', 'SCC3', and 'SCC4', with 'SCC1' selected and highlighted by a red box. The 'DL Channel' is set to '3048 ch', 'Operation Band' is '7', 'Channel Bandwidth' is '20 MHz', and 'Output Level' is '-54.2 dBm'. The 'Activation' and 'Output' status are both 'On'. A notification for 'SCC-1/2/3/4 - DL Channel [21C only]' is visible, stating that the downlink channel and frequency are changed automatically. The 'UE Power' is shown as '-11.2 dBm'. On the left, a 'Physical Channel' menu is open, with 'DL RMC' selected and highlighted by a red box. Below it, 'Number of RB' is set to '0' and 'Starting RB' is set to '0'. The 'Modulation Analysis' section shows 'TX Power' as '***** dBm'. A table of modulation analysis data is displayed:

Modulation Analysis		(1 / 1)		View
PCC	Freq. Err	*****	ppm	
PCC	EVM	*****	%(rms)	
SCC-1	Freq. Err	*****	ppm	
SCC-1	EVM	*****	%(rms)	

On the right side, there are navigation buttons for 'Home', 'Preset', 'Reference Signal not found', 'Single', 'Continuous', 'Idle', 'Start Call', 'End Call', and 'Menu'. The 'Reference Signal not found' button is highlighted in red.



4. Select the PCC tab, and select max power;

Click the “Connect” button at the Right of the screen.

The screenshot displays a mobile testing application interface. At the top, it shows 'Phone2' and 'Phone1' settings, both on LTE with frequency 30.605#017. The 'DL Channel' is set to 2850 ch, and the 'TPC Pattern' is 'All +3dB'. The 'Input Level' is 35.0 dBm and the 'Output Level' is -54.2 dBm. The 'Channel Coding' is [1xC] CHCODING. The 'UE Power' is 21.0 dBm. The interface is divided into several sections: 'Physical Channel', 'Call Processing', 'TX Measurement', 'RX Measurement', 'Fundamental Measurement', 'Test Parameter', and 'Band Definition'. The 'Fundamental Measurement' section is active, showing 'Power Measurement' and 'Throughput' data. The 'Power Measurement' table is highlighted with a red box and contains the following data:

	Avg.	Max.	Min.
Total TX Power	21.90	21.95	21.77 dBm
PCC TX Power	21.00	21.23	20.10 dBm
PCC Channel Power	20.99	21.23	20.09 dBm
SCC-1 TX Power	14.64	16.91	13.63 dBm
SCC-1 Channel Power	14.64	16.90	13.62 dBm

The 'Throughput' section shows 'DL Throughput(Total)' at 15768 kbps (100.00%) and 'PCC Throughput' at 7884 kbps (100.00%). The 'Block Error Rate' is 0.0000 and the 'Error Count' is 0. The 'Transmitted/Sample' is 1350 / 2000 Block. On the right side of the screen, there is a 'Connected' button highlighted with a red box, along with 'Start Call' and 'End Call' buttons. The bottom right corner shows a 'Menu' button.



For example, Downlink Carrier Aggregation:

Detailed operation: PCC → Common → Signal → Channel Coding → Select 【RMC (DL CA)】

The screenshot shows the 'Channel Coding' menu with 'RMC(DL CA)' selected. The 'Measurement' tab is active, displaying the following data:

Numeric	Occupied Bandwidth	Spectrum Emission Mask	
TX Power: 22.86 dBm	On	On	
Throughput(Total): 15768 kbps			
Adjacent Channel Power	In-Band Emission	Spectrum Flatness	EVM
On	On	On	On
Phase Error	Magnitude Error	Constellation	Throughput
On	On	On	Throughput: 15768 kbps

Check PCC & SCC & DL throughput, Total throughput is 100%

The screenshot shows the 'Throughput' measurement results. The 'Fundamental' tab is active, and the 'Throughput' sub-tab is selected. The data is as follows:

	Avg.	Max.	Min.
TX Power	22.86	22.95	22.83 dBm
Channel Power	22.86	22.95	22.83 dBm

DL		PCC		SCC-1	
Throughput(Total)	15768 kbps	Throughput	7884 kbps	Throughput	7884 kbps
	(= 100.00 %)	(Code Word 0)	----- kbps	(Code Word 0)	----- kbps
		(Code Word 1)	----- kbps	(Code Word 1)	----- kbps
Block Error Rate	0.0000	Block Error Rate	0.0000	Block Error Rate	0.0000
	0.00E+000		0.00E+000		0.00E+000
Error Count	0	Error Count	0	Error Count	0
	(NACK 0 DTX 0 ANY 0)		(NACK 0 DTX 0 ANY 0)		(NACK 0 DTX 0 ANY 0)
Transmitted/Sample	450 / 2000 Block				



Phone2 LTE 30.60S#017 | Phone1 LTE 30.60S#017 | DL Channel 900 ch | TPC Pattern All +3dB | Input Level 35.0 dBm | Channel Coding [1x] CHCODING | MT8821C 2017/06/13 18:00 RF Output : On DL 2CCS

Operation Band 2 | Channel Bandwidth 20 MHz | Output Level -54.2 dBm

Measurement | Signaling | UE Power : 22.8 dBm

Common | Physical Channel | Call Processing | TX Measurement | RX Measurement | Fundamental Measurement | Test Parameter | Band Definition | External Loss | System Config

General | Frequency | Level | Signal | Channel Coding RMC(DL CA) | Antenna Combination Common | Antenna Configuration Single Antenna(TM1) | Beamforming On | DCI Format for Single Antenna 1A | Propagation Matrix None | User Define Channel Model (Channel 1to1/2/3/4 Gain/Phase) 1.00 0.0 degree 0.00 0.0 degree 0.00 0.0 degree 0.00 0.0 degree (Channel 2to1/2/3/4 Gain/Phase) 0.00 0.0 degree 1.00 0.0 degree 0.00 0.0 degree

Fundamental > Numeric

Power Measurement (26 / 50)

	Avg	Max	Min
TX Power	22.86	22.95	22.83 dBm
Channel Power	22.86	22.95	22.83 dBm

Throughput

Measurement Status Measuring...

DL

Throughput(Total)	15768	kbps	(= 100.00 %)
-------------------	-------	------	--------------

PCC

Throughput	7884	kbps	(= 100.00 %)
(Code Word 0)	-----	kbps	(= ----- %)
(Code Word 1)	-----	kbps	(= ----- %)

Block Error Rate 0.0000

Error Count 0.00E+000

Error Count (NACK 0 DTX 0 ANY 0)

Transmitted/Sample 450 / 2000 Block

SCC-1

Throughput	7884	kbps	(= 100.00 %)
(Code Word 0)	-----	kbps	(= ----- %)
(Code Word 1)	-----	kbps	(= ----- %)

Block Error Rate 0.0000

Error Count 0