



Appendix D-4. 2G/3G/LTE/5G FR1/UL and DL CA connection diagram

General Note:

The power measurement for 2G/3G/LTE/5G FR1/UL and DL 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/UL and DL CA.

GSM

The screenshot displays a mobile testing application interface with the following components:

- Top Bar:** Phone2 (LTE 40.205#032) and Phone1 (GSM 40.00 #013). A table shows TCH Channel (189 CH), TCH UL Frequency (836.400 000 MHz), Input Level (35.0 dBm), TCH DL Frequency (881.400 000 MHz), and Output Level (-55.0 dBm). Coding Scheme is CS.
- Left Panel:** Call Processing (General, Frequency, Level, Signal), TX Measurement, RX Measurement, Fundamental Measurement (Measuring Object: MS-NB(GMSK), Coding Scheme: CS-1 (GMSK), USF: 0, USF Random: Off, Multi Slot Configuration: 1DL, 4UL, TCH Slot: 2, TS: TSC0 = (0970897), TCH Test Pattern: PN15), External Loss (0 bit), System Config.
- Main Panel:** Measurement and Signaling tabs. The Measurement tab shows:
 - Power Measurement (TX Power: 24.01 dBm)
 - Power vs Time
 - Template (Fail)
 - Modulation Analysis (RMS Phase Error: 0.41 deg.(rms), Peak Phase Error: 0.94 deg.)
 - Output RF Spectrum - Modulation (ORFS-Modulation: Pass)
 - Output RF Spectrum - Switching (ORFS-Switching: Pass)
 - USF Block Error Rate (0.00 %)
- Right Panel:** MS Power: 24.07 dBm, Band Cal, Home, Preset, Measuring... (Tx/Rx bars), Single/Continuous, Transfer, RXLEV (< 110dBm), Start Call, End Call, Menu.



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.

Common: Authentication / Integrity, Integrity Protection On, SIM Model Number P0035, Authentication Algorithm XOR, Authentication Key Ki 00112233 44556677 8899AABB CCDDDEFF, AMF 0000 H, Opc 00000000 00000000 00000000 00000000, Connection Setting, Measurement Report, Meas Setup: Inner Loop Power Control, Power Control Algorithm Algorithm 1, TPC StepSize 1dB, External Loss Power Control All 1, System Config 10101 01010 10101 01010 10101 01010

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)	OBW	4.163 MHz
Spectrum Emission Mask (1 / 1)	SEM	Pass
Adjacent Channel Power (1 / 1)	ACLR(-5MHz)	-40.24 dB
	ACLR(+5MHz)	-42.79 dB
Modulation Analysis (1 / 1)	EVM	5.15 %(rms)
Peak Code Domain Error (1 / 1)	PCDE	-39.86 dB

UE Power : 22.6 dBm

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.

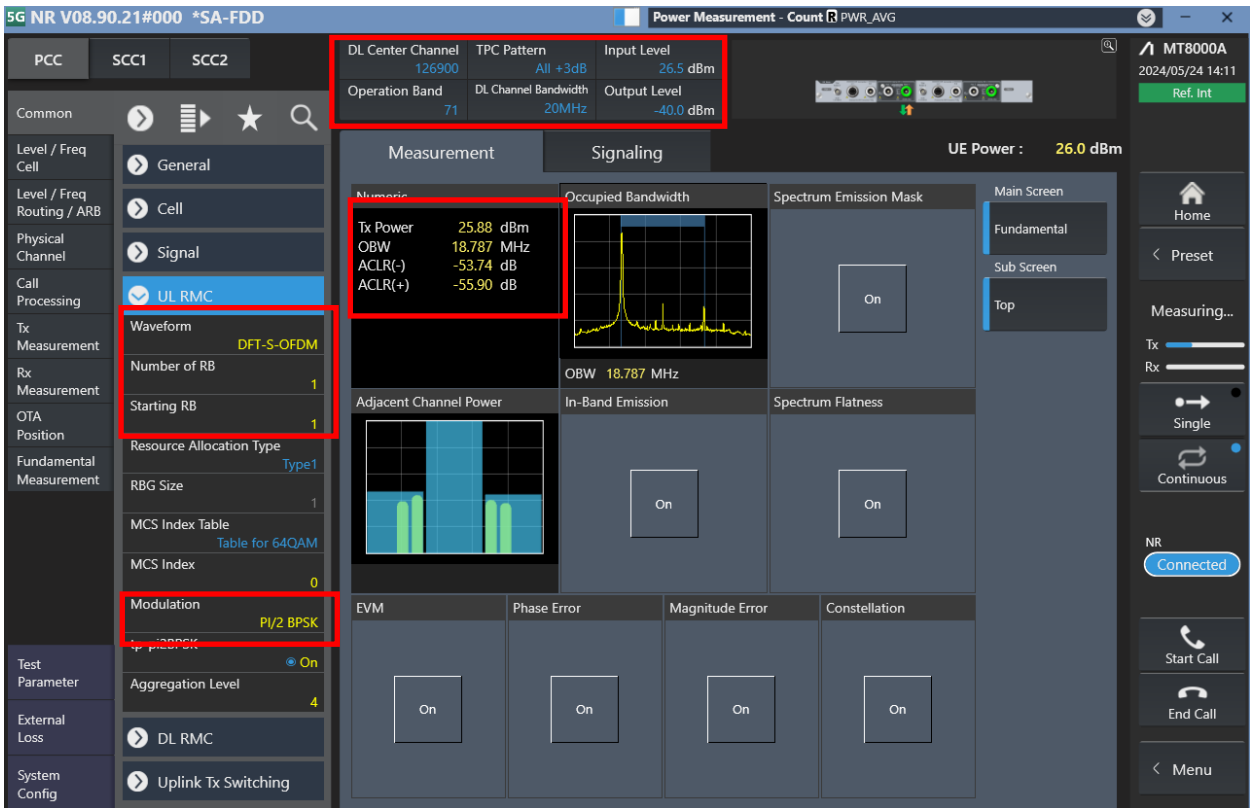
Common: General, Frequency, Level, Signal, UL RMC, UL Allocation Mode Normal, RB Pos. Min(#0), Test Parameter: Number of RB 1, Starting RB 0, Max UL Throughput 72 kbps, Band Definition: MCS Index 5 QPSK 5 72 8, External Loss 256QAM Disabled, System Config DL RMC

Measurement: Fundamental | Numeric

Power Measurement (50 / 50)	TX Power 25.12 dBm	
Modulation Analysis (1 / 1)	Freq. Err	0.00 ppm
	EVM	1.35 %(rms)

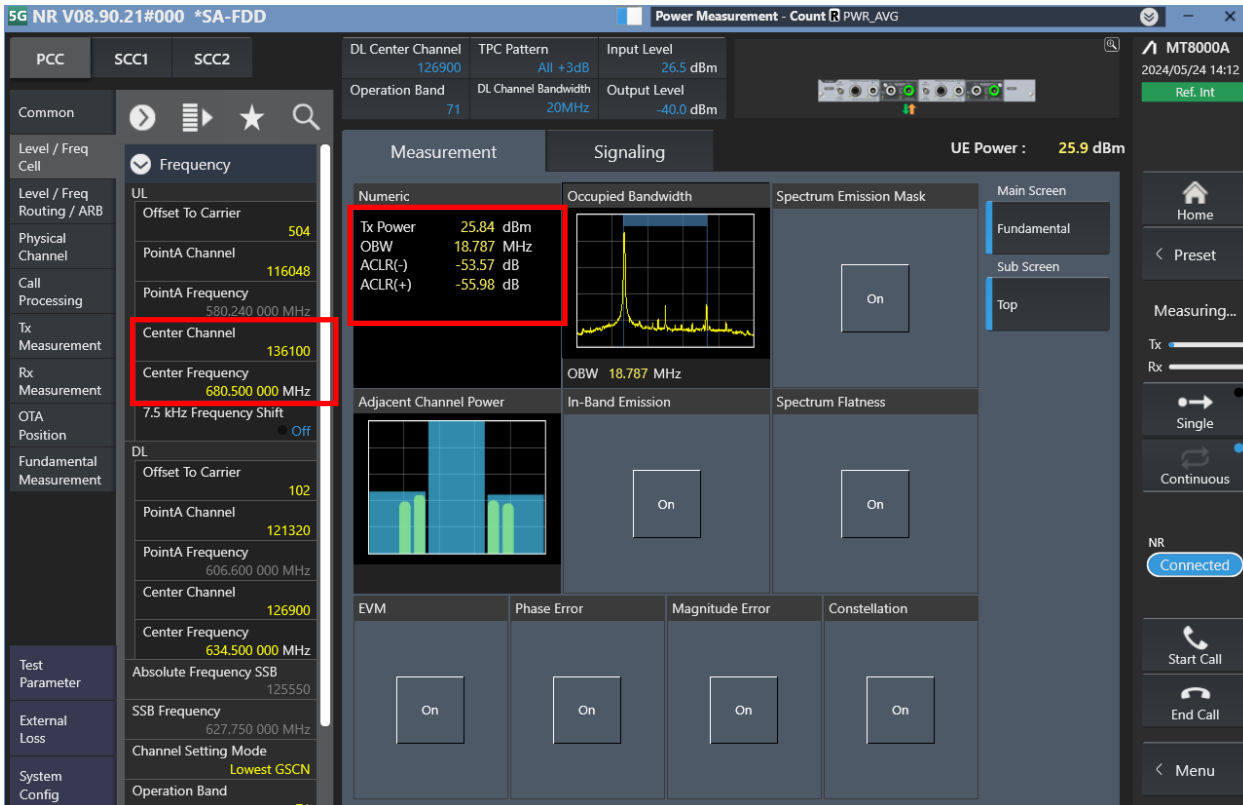
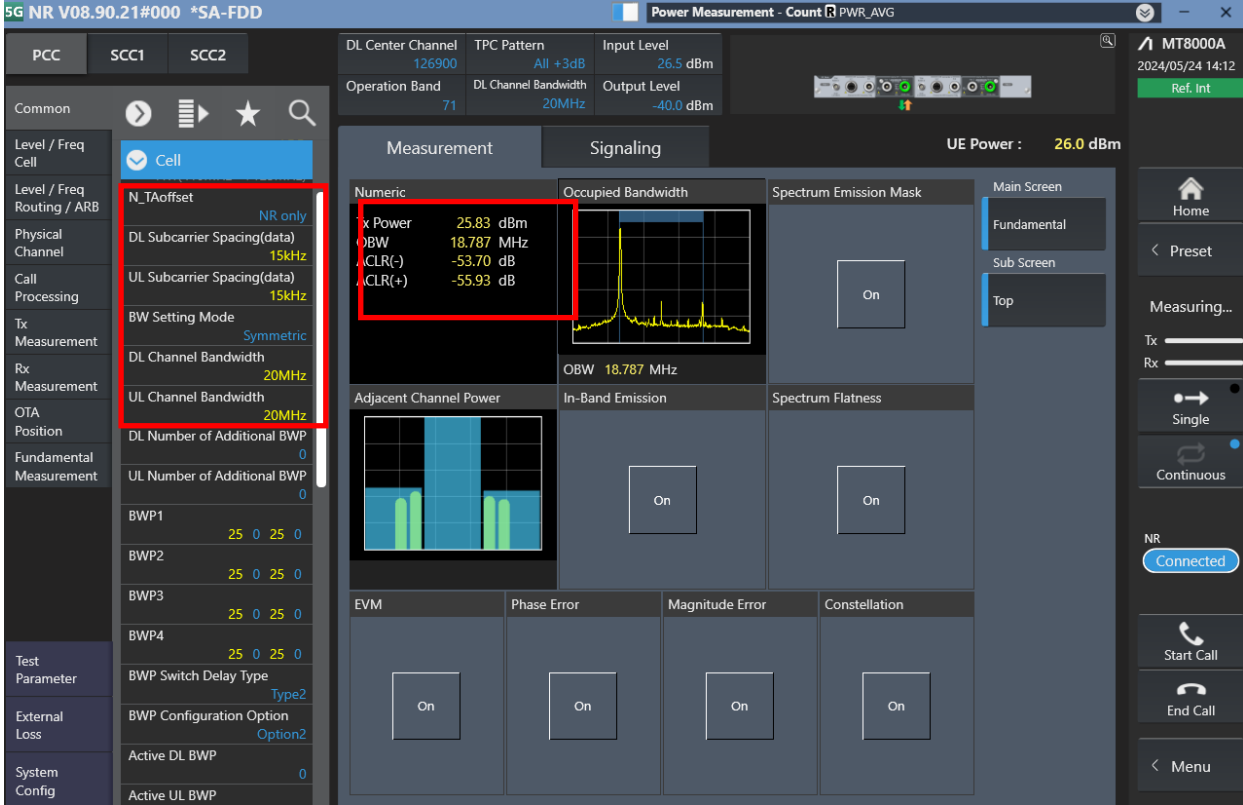
UE Power : 25.4 dBm

5GNR FR1



The screenshot displays the 'Power Measurement - Count PWR_AVG' interface for a 5G NR V08.90.21#000 *SA-FDD test. The interface is divided into several sections:

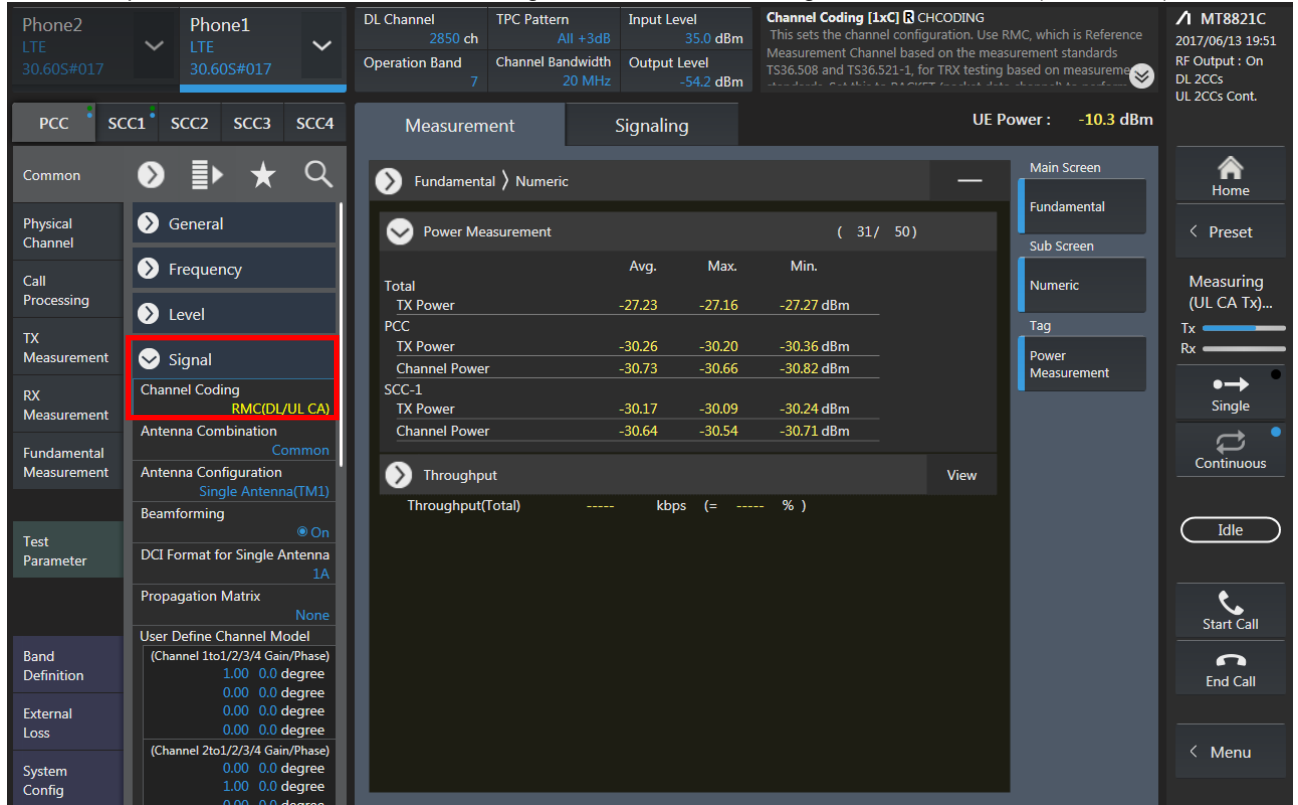
- Configuration (Left Panel):**
 - Waveform: DFT-S-OFDM
 - Modulation: P/2 BPSK
 - Aggregation Level: 4
 - DL RMC: On
 - Uplink Tx Switching: On
- Measurement Summary (Top Center):**
 - DL Center Channel: 126900
 - TPC Pattern: All +3dB
 - Input Level: 26.5 dBm
 - Operation Band: 71
 - DL Channel Bandwidth: 20MHz
 - Output Level: -40.0 dBm
- Measurement Data (Middle Left):**
 - Tx Power: 25.88 dBm
 - OBW: 18.787 MHz
 - ACLR(-): -53.74 dB
 - ACLR(+): -55.90 dB
- Occupied Bandwidth (Middle Right):**
 - Occupied Bandwidth: 18.787 MHz
 - Graph: Spectrum plot showing signal distribution.
- Other Measurements (Bottom):**
 - Adjacent Channel Power: Graph showing adjacent channel levels.
 - In-Band Emission: On
 - Spectrum Flatness: On
 - EVM: On
 - Phase Error: On
 - Magnitude Error: On
 - Constellation: On
- System Status (Right Panel):**
 - UE Power: 26.0 dBm
 - NR Status: Connected
 - Buttons: Home, Preset, Measuring..., Single, Continuous, 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:

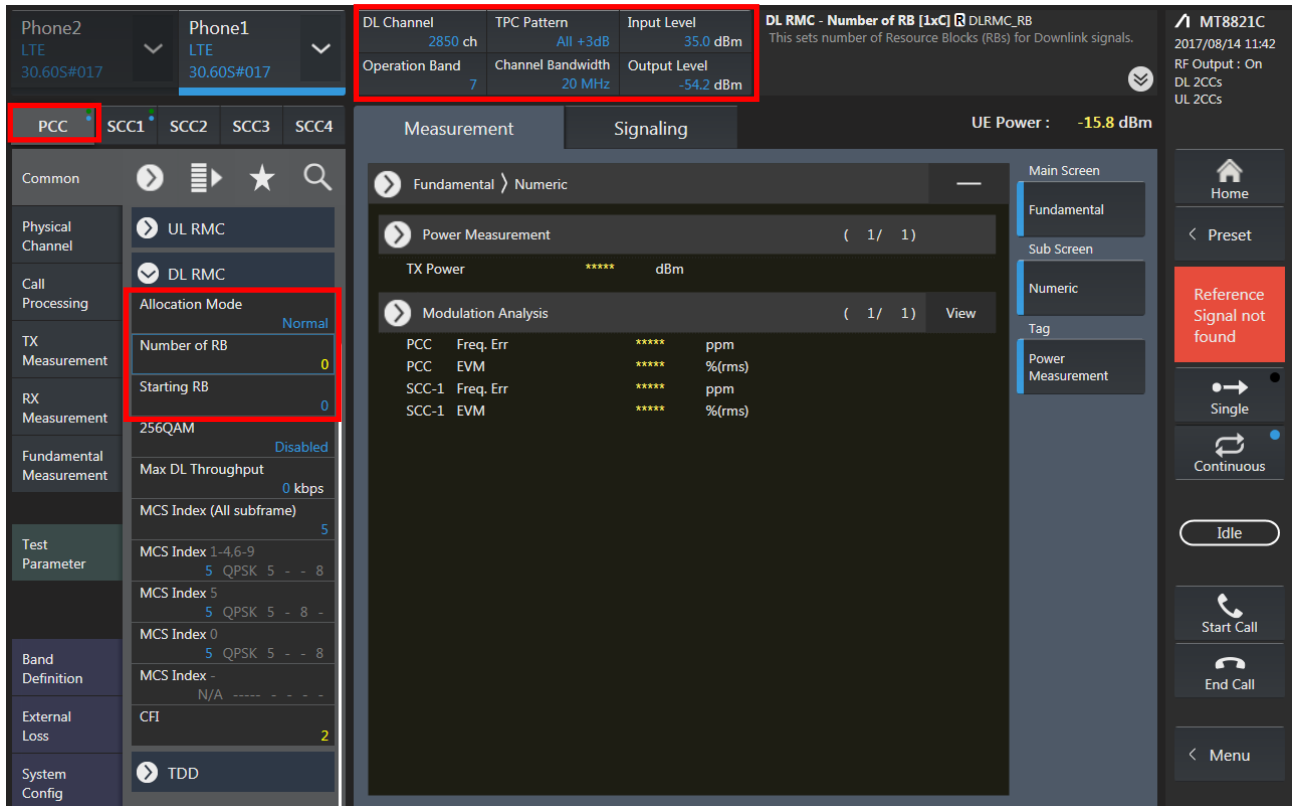
Detailed operation: PCC → Common → Signal → Channel Coding → Select **【RMC (DL/UL CA)】**



The screenshot shows the configuration and measurement interface of an LTE test equipment. The left sidebar contains various configuration menus, with 'Signal' and 'Channel Coding' highlighted in red. The main display area shows 'Power Measurement' data for PCC and SCC-1, and a 'Throughput' section.

	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

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



The screenshot displays the configuration and measurement interface of a mobile testing application. The top status bar shows 'Phone1 LTE 30.60S#017' and 'DL Channel 2850 ch', 'TPC Pattern All +3dB', 'Input Level 35.0 dBm', 'DL RMC - Number of RB [1x] 0', and 'DL RMC - This sets number of Resource Blocks (RBs) for Downlink signals.' The 'PCC' tab is selected in the top navigation bar. The left sidebar contains various configuration options, with 'DL RMC' and its sub-parameters 'Allocation Mode' (Normal), 'Number of RB' (0), and 'Starting RB' (0) highlighted with a red box. The main display area shows 'Measurement' and 'Signaling' tabs, with 'Fundamental' and 'Numeric' sub-tabs. The 'Power Measurement' section displays 'TX Power ***** dBm'. The 'Modulation Analysis' section shows a table of error rates:

Measurement	Value	Unit
PCC Freq. Err	*****	ppm
PCC EVM	*****	%(rms)
SCC-1 Freq. Err	*****	ppm
SCC-1 EVM	*****	%(rms)

The right sidebar contains navigation buttons: Home, Preset, Reference Signal not found, Single, Continuous, Idle, Start Call, End Call, and Menu. The bottom status bar shows 'MT8821C', '2017/08/14 11:42', 'RF Output : On', 'DL 2CCs', and 'UL 2CCs'.



- 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' and 'Operation Band' is '7'. 'Activation' and 'Output' are both 'On', with 'Channel Bandwidth' at '20 MHz' and 'Output Level' at '-54.2 dBm'. A notification for 'SCC-1/2/3/4 - DL Channel [21C only]' is visible. 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:

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

Other parameters shown include 'Max DL Throughput' (0 kbps), 'MCS Index (All subframe)' (5), 'Partial Subframe Number' (-), 'MCS Index 1-4,6-9' (5 QPSK 5 - - 8), 'MCS Index 5' (5 QPSK 5 - 8 -), 'MCS Index 0' (5 QPSK 5 - - 8), 'MCS Index -' (N/A - - - - -), and 'CFI' (2). The interface also includes a 'Measurement' and 'Signaling' section, a 'Main Screen' menu, and a 'Reference Signal not found' warning.



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

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

The screenshot shows a mobile testing application interface. At the top, it displays 'Phone2 LTE 30.60S#017' and 'Phone1 LTE 30.60S#017'. Below this, there are tabs for 'PCC', 'SCC1', 'SCC2', 'SCC3', and 'SCC4'. The 'PCC' tab is selected. The main display area is divided into 'Measurement' and 'Signaling' sections. The 'Measurement' section shows a table of power measurements for PCC and SCC-1 channels. The 'Throughput' section shows DL and PCC throughput data. On the right side, there is a 'Main Screen' menu with options for 'Fundamental', 'Sub Screen', 'Numeric', and 'Power Measurement'. A 'Connected' button is highlighted with a red box.

	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

	Throughput	(= %)
DL Throughput(Total)	15768 kbps	(= 100.00 %)
PCC Throughput	7884 kbps	(= 100.00 %)
(Code Word 0)	----- kbps	(= ----- %)
(Code Word 1)	----- kbps	(= ----- %)