Application Note

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LTE Measurements

Radio Communication Analyzer MT8820C/MT8821C

Revision History

Ver. No	Date	Contents	Related product software version
1.00	May 2015	MT8820C/21C LTE Application Note (Ver. 1.00) is based on MT8820C LTE Application Note (Ver. 15.00). Overall: Added MT8821C option model names to MT8820C option model names Overall: Added DL CA and UL CA test procedures for MT8821C Added MT8821C software specification.	MX882012C/42C Ver. 23.20 MX882112C/42C Ver. 30.00
2.00	Sep 2015	• **1.5.2** Added FDD-TDD 2,3DL/1UL CA, SISO and MIMO to Supported CA Combination of MT8821C. • **2.4 / 3.6 / 5.3** Added MT8821C connection/RX-measurement/ IP-data-transfer-test procedures for 4DL CA. • **3.3** Added MT8821C measurement procedures for Inter-band UL CA. • **3.7** Added MT8821C UL Throughput measurement procedure for SCC. • **7** Added MT8821C VoLTE Echoback test procedure. • **Annex B.2** Added mention of Carrier Leakage Frequency for measurements on MT8821C intra-band contiguous CC. • **Annex B.3** Added description about optimization of TCP Throughput by Iperf. • **AnnexB.4** Added maximum rate setting for DL 256QAM.	MX882012C/42C Ver23.20 MX882112C/42C Ver30.10
3.00	Dec 2015	• 1.2 Supported 6.2.3_2, 6.6.2.1_1, 6.6.2.3_2 of 3GPP Measurement Specification for MT8820C • 2.2 Added MT8820C setting procedures for FDD-TDD 2DL/1UL CA. • 3.4.1 Modified test procedures for MT8820C. • 3.4.5 Modified test procedures for MT8820C.	MX882012C/42C Ver23.30 MX882112C/42C Ver30.12
4.00	Jan 2016	• **8** Added MT8821C SMS test procedure.	MX882012C/42C Ver23.30 MX882112C/42C Ver30.20

5.00	Mar 2016	• **1.2** Updated 3GPP measurement standard list (2015-12) • **1.3** Added Band 45, 65-67. • **1.5.2 / 2.5 / 3.7** Added 5DL CA test procedures. • **3.3 / 3.4 / 3.5** Added test procedures associated with updating 3GPP measurement standard list. • **5.4** Added IP Data Application. • **8** Added 4x4 MIMO test procedures.	MX882012C/42C Ver23.30 MX882112C/42C Ver30.30
6.00	June 2016	• **1.2** Supported 7.4A.3_H,7.4A.4_H of 3GPP Measurement Specification for MT8821C. • **3.4** Added 7.4A.3_H,7.4A.4_H of 3GPP Measurement Specification for MT8821C test procedure. • **3.4.11** Modified test procedures.	MX882012C/42C Ver23.30 MX882112C/42C Ver30.32

Contents

1. LTE Measurement Software

1.1. Specifications

1.1.1. MT8820C

1.1.1.1. MX882012C/13C (Call Processing)

Table 1.1.1.1-1 LTE Measurement Software Specifications (MX882012C/13C)

Measurement Item	Specifications	
Electrical	Typical values (typ.) are only for reference and are not guaranteed.	
Modulation Analysis	Frequency	400 to 2700 MHz 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–40 to +35 dBm (Main1)
	Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy +15 Hz)
	Modulation accuracy	
	Residual vector error	≤2.5% (400 to 2700 MHz) (3400 to 3800 MHz, 18° to 28°C) (When measurement count is 20) ≤3.0% (3400 to 3800 MHz, 20 measurements)
	In-band Emissions	≤–40 dB (≥–10 dBm, Allocated RB≤18)
	Measurement object	PUSCH, PRACH, PUCCH
Amplitude Measurement	Frequency	400 to 2700 MHz 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–60 to +35 dBm (Main1)
	Measurement accuracy	±0.5 dB (–20 to +35 dBm), typ. ±0.3 dB (–20 to +35 dBm) ±0.7 dB (–50 to –20 dBm) ±0.9 dB (–60 to –50 dBm) 400 to 2700 MHz, 10° to 40°C after calibration ±0.5 dB (–20 to +35 dBm, 18° to 28°C), typ. ±0.3 dB (–20 to +35 dBm, 18° to 28°C), ±0.7 dB (–50 to –20 dBm), ±0.9 dB (–60 to –50 dBm), 3400 to 3800 MHz, 10° to 40°C after calibration
	Linearity	±0.2 dB (–40 to 0 dB, ≥–50 dBm) ±0.4 dB (–40 to 0 dB, ≥–60 dBm) 400 to 2700 MHz ±0.2 dB (–40 to 0 dB, ≥–50 dBm, 18° to 28°C), ±0.3 dB (–40 to 0 dB, ≥–50 dBm) ±0.4 dB (–40 to 0 dB, ≥–60 dBm) 3400 to 3800 MHz, 10° to 40°C after calibration
	Relative measurement error	<2 dB typ. ±0.10 dB (–40 to 0 dB, ≥–50 dBm)

Measurement Item	Specifications	
	Measurement object	PUSCH, PRACH, PUCCH
Occupied Bandwidth	Frequency	400 to 2700 MHz
		3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–10 to +35 dBm (Main1)
Adjacent Channel Leakage Power	Frequency	400 to 2700 MHz
		3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–10 to +35 dBm (Main1)
	Measurement point	E-UTRA ACLR1 UTRA ACLR1 UTRA ACLR2
	Measurement range	≥45 dB (E-UTRA ACLR1) ≥50 dB (UTRA ACLR1) ≥55 dB (UTRA ACLR2)
Spectrum Emission Mask	Frequency	400 to 2700 MHz
		3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–10 to +35 dBm (Main1)
RF Signal Generator	Output frequency	400 to 2700 MHz (1-Hz steps)
		3400 to 3800 MHz (1-Hz steps) (Can be used when installing MT8820C-018 option)
	AWGN level	Off, –20 to +5 dB (0.1-dB steps, Relative level with Ior (Total power))
	AWGN level accuracy	±0.2 dB (Relative level accuracy with Ior)
Throughput Measurement	Function	Measures throughput using RMC
	Measurement object	ACK and NACK reported from UE
Call Processing	Call control	Position registration, Call processing using RMC
	(Executes each processing in 3GPP standards and performs Pass/Fail evaluation)	
	UE Control	Output level
	(Executes each UE control in 3GPP standards)	

1.1.1.2. MX882012C/13C-006

Table 1.1.1.2-1 LTE FDD/TDD IP Data Transfer

Item	Specifications
Function	The Ethernet port of the LTE measurement hardware can be used to transfer data to external devices.

1.1.1.3. MX882012C/13C-011

Table 1.1.1.3-1 LTE FDD/TDD 2x2 MIMO DL

Item	Specifications
Function	This can be used to measure the Rx performance of 2x2 MIMO mobile wireless terminals.
RF Signal Generator	Output frequency: 400 to 2700 MHz (1-Hz steps) 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.1.4. MX882012C/13C-016

Table 1.1.1.4-1 LTE FDD/TDD CS Fallback to W-CDMA/GSM

Item	Specification
Function	Supports CS fallback to W-CDMA or GSM using MT8820Cs

1.1.1.5. MX882012C/13C-017

Table 1.1.1.5-1 LTE FDD/ TDD CS Fallback to CDMA2000

Item	Specification
Function	Supports CS fallback to CDMA2000 using MT8820Cs

1.1.1.6. MX882013C-018

Table 1.1.1.6-1 LTE TDD CS Fallback to TD-SCDMA/GSM

Item	Specification
Function	Supports CS fallback to TD-SCDMA or GSM using MT8820Cs

1.1.1.7. MX882012C/13C-021

Table 1.1.1.7-1 LTE-Advanced FDD/TDD DL CA Measurement Software

Item	Specification
Function	The reception measurements of DL 2CCs and UL 1CC described in Chapter 7 of 3GPP TS 36.521-1 and the maximum throughput tests are supported. The maximum throughput test for DL CA 2x2 MIMO is supported by using with the MX882012C/13C -011 2x2 MIMO DL option.
RF Signal Generator	Output frequency: 400 to 2700 MHz (1-Hz steps) 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.1.8. MX882012C/13C-022

Table 1.1.1.8-1 LTE-Advanced FDD/TDD UL CA Measurement Software

Item	Specification
Function	When this option is installed with the LTE Advanced FDD/TDD DL CA measurement software (MX882012C/13C-021) it supports a function to operate as a Mobile Wireless Device and measurements for RF Transition and Reception on UL CA. Intra-Band Contiguous DL CA and UL CA is NOT supported.
Modulation Analysis	Equivalent to MX882012C/13C in respective CC measurements
RF Power	Equivalent to MX882012C/13C in respective CC measurements
Occupied Bandwidth	Equivalent to MX882012C/13C in respective CC measurements
Adjacent Channel Leakage Power	Equivalent to MX882012C/13C in respective CC measurements
Spectrum Emission Mask	Equivalent to MX882012C/13C in respective CC measurements
RF Signal Generator	Output frequency: 400 to 2700 MHz (1-Hz steps) 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.1.9. MX882012C/13C-026

Table 1.1.1.9-1 LTE-Advanced FDD/TDD DL CA IP Data Transfer

Item	Specifications
Function	IP data transfer with external devices by using Ethernet port of LTE measurement hardware is supported in DL CA.

1.1.1.10. MX882012C/13C-031

Table 1.1.1.10-1 LTE-Advanced FDD/TDD DL CA 3CCs Measurement Software

Item	Specifications
Function	The reception measurements for DL 3CCs and UL 1CC, and maximum throughput tests are supported. The maximum throughput test for DL CA 2x2 MIMO is supported by using with the MX882012C/13C-011 LTE FDD/TDD 2x2 MIMO DL option.
RF Signal Generator	Output frequency: 400 to 2700 MHz (1-Hz steps) 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.1.11. MX882042C/43C (Non-Call Processing)

Table 1.1.1.11-1 Measurement Software Specifications (MX882042C/43C) (1/2)

Measurement Item	Specifications	
Electrical	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/Modulation Measurement	Frequency	400 to 2700 MHz 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–40 to +35 dBm (Main1)
	Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy +15 Hz)
	Modulation accuracy	
	Residual vector error	≤2.5% (400 to 2700 MHz) (3400 to 3800 MHz, 18° to 28°C) (When measurement count is 20) ≤3.0% (3400 to 3800 MHz, 20 measurements)
	In-band Emissions	≤–40 dB (≥–10 dBm, Allocated RB≤18)
	Measurement object	PUSCH
Amplitude Measurement	Frequency	400 to 2700 MHz 3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–60 to +35 dBm (Main1)
	Measurement accuracy	±0.5 dB (–20 to +35 dBm) typ. ±0.3 dB (–20 to +35 dBm) ±0.7 dB (–50 to –20 dBm) ±0.9 dB (–60 to –50 dBm) 400 to 2700 MHz, 10° to 40°C after calibration ±0.5 dB (–20 to +35 dBm, 18° to 28°C), typ. ±0.3 dB (–20 to +35 dBm, 18 to 28°C), ±0.7 dB (–50 to –20 dBm), ±0.9 dB (–60 to –50 dBm), 3400 to 3800 MHz, 10° to 40°C after calibration
	Linearity	±0.2 dB (–40 to 0 dB, ≥–50 dBm), ±0.4 dB (–40 to 0 dB, ≥–60 dBm), 400 to 2700 MHz ±0.2 dB (–40 to 0 dB, ≥–50 dBm, 18° to 28°C), ±0.3 dB (–40 to 0 dB, ≥–50 dBm), ±0.4 dB (–40 to 0 dB, ≥–60 dBm), 3400 to 3800 MHz, 10° to 40°C after calibration
	Relative measurement error	<2 dB typ. ±0.10 dB (–40 to 0 dB, ≥–50 dBm)
	Measurement object	PUSCH

Table 1.1.1.11-2 Measurement Software Specifications (MX882042C/43C) (2/2)

Measurement Item	Specifications	
Occupied Bandwidth	Frequency	400 to 2700 MHz
		3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–10 to +35 dBm (Main1)
Adjacent Channel Leakage Power	Frequency	400 to 2700 MHz
		3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–10 to +35 dBm (Main1)
	Measurement point	E-UTRA ACLR1 UTRA ACLR1 UTRA ACLR2
	Measurement range	≥45 dB (E-UTRA ACLR1) ≥50 dB (UTRA ACLR1) ≥55 dB (UTRA ACLR2)
Spectrum Emission Mask	Frequency	400 to 2700 MHz
		3400 to 3800 MHz (Can be used when installing MT8820C-018 option)
	Input level	–10 to +35 dBm (Main1)

1.1.2. MT8821C

1.1.2.1. MX882112C/13C (Call Processing)

Table 1.1.2.1-1 LTE Measurement Software Specifications (MX882112C/13C) (1/3)

Measurement Item	Specifications	
Electrical	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/Modulation measurement	Frequency	400 to 3800 MHz 3800 to 5000 MHz (Can be used when installing MT8821C-019 option) For frequencies below 500 MHz, only the following range meets the specifications: 452.5 to 457.5 MHz (LTE OperatingBand31)
	Input level	–40 to +35 dBm (Main1/2)
	Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy +15 Hz)
	Modulation accuracy	
	Residual vector error	≤ 2.5% (400 MHz ≤ Freq. ≤ 3800 MHz) (When measurement count is 20) ≤ 3.5% (3800 MHz < Freq. ≤ 5000 MHz) (When measurement count is 20)
	In-band Emissions	≤–40 dB (≥–10 dBm, Allocated RB ≤ 18)
	Measurement object	PUSCH, PRACH, PUCCH
Amplitude Measurement	Frequency	400 to 3800 MHz 3800 to 5000 MHz (Can be used when installing MT8821C-019 option) For frequencies below 500 MHz, only the following range meets the specifications: 452.5 to 457.5 MHz (LTE OperatingBand31)
	Input level	–60 to +35 dBm (Main1/2)
	Measurement accuracy	±0.5 dB (–20 to +35 dBm) typ. ±0.3 dB (–20 to +35 dBm) ±0.7 dB (–50 to –20 dBm) ±0.9 dB (–60 to –50 dBm) 400 MHz ≤ Freq. ≤ 3800 MHz 10° to 40°C after calibration ±0.7 dB (–20 to +35 dBm) ±0.9 dB (–50 to –20 dBm) ±1.1 dB (–60 to –50 dBm) 3800 MHz <freq.≤ 5000 MHz 20° to 30°C after calibration
	Linearity	±0.2 dB (–40 to 0 dB, ≥–50 dBm) ±0.4 dB (–40 to 0 dB, ≥–60 dBm) 400 to 5000 MHz
	Measurement object	PUSCH, PRACH, PUCCH

Table 1.1.2.1-1: LTE Measurement Software Specifications (MX882112C/13C) (2/3)

Measurement Item	Specifications	
Occupied Bandwidth	Frequency	400 to 3800 MHz
		3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
		For frequencies below 500 MHz, only the following range meets the specifications:
		452.5 to 457.5 MHz (LTE OperatingBand31)
	Input level	–10 to +35 dBm (Main1/2)
	Channel bandwidth	1.4 MHz, 3 MHz, 5 MHz (452.5 MHz ≤ UL frequency ≤ 457.5 MHz)
		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz (500 MHz ≤ UL frequency)
Adjacent Channel Leakage Power	Frequency	400 to 3800 MHz
		3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
		For frequencies below 500 MHz, only the following range meets the specifications:
		452.5 to 457.5 MHz (LTE OperatingBand31)
	Input level	–10 to +35 dBm (Main1/2)
	Measurement point	E-UTRA ACLR1 UTRA ACLR1 UTRA ACLR2
	Measurement range	≥ 45 dB (E-UTRA ACLR1) ≥ 50 dB (UTRA ACLR1) ≥ 55 dB (UTRA ACLR2)
	Channel bandwidth	1.4 MHz, 3 MHz, 5 MHz (452.5 MHz ≤ UL frequency ≤ 457.5 MHz)
		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz 20 MHz (500 MHz ≤ UL frequency)
Spectrum Emission Mask	Frequency	400 to 3800 MHz
		3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
		For frequencies below 500 MHz, only the following range meets the specifications:
		452.5 to 457.5 MHz (LTE OperatingBand31)
	Input level	–10 to +35 dBm (Main1/2)
	Channel bandwidth	1.4 MHz, 3 MHz, 5 MHz (452.5 MHz ≤ UL frequency ≤ 457.5 MHz)
		1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz (500 MHz ≤ UL frequency)

Table 1.1.2.1-1: LTE Measurement Software Specifications (MX882112C/13C) (3/3)

Measurement Item	Specifications	
RF Signal Generator	Output frequency	400 to 3800 MHz (1-Hz steps)
		3800 to 6000 MHz (1-Hz steps) (Can be used when installing MT8821C-019 option)
	AWGN level	Off, –20 to +5 dB (0.1-dB steps, Relative level with Ior (Total power))
	AWGN level accuracy	±0.2 dB (Relative level accuracy with Ior)
Throughput Measurement	Function	Measures throughput using RMC
	Measurement object	ACK and NACK reported from UE
Call Processing	Call control	Position registration, Call processing using RMC
	(Executes each processing in 3GPP standards and performs Pass/Fail evaluation)	
	UE Control	Output level
	(Executes each UE control in 3GPP standards)	

1.1.2.2. MX882112C/13C-006

Table 1.1.2.2-1 LTE FDD/TDD IP Data Transfer

Item	Specifications
Function	The Ethernet port of the LTE measurement hardware can be used to transfer data to external devices.

1.1.2.3. MX882112C/13C-011

Table 1.1.2.3-1 LTE FDD/TDD 2x2 MIMO DL

Item	Specifications
Function	This can be used to measure the Rx performance of 2x2 MIMO mobile wireless terminals.
RF Signal Generator	Output frequency: 400 to 3800 MHz (1-Hz steps) 400 to 6000 MHz (Can be used when installing MT8821C-019 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.2.4. MX882112C/13C-012

Table 1.1.2.4-1 LTE FDD/TDD 4x4 MIMO DL

Item	Specifications
Function	This can be used to measure the Rx performance of 4x4 MIMO mobile wireless terminals.
RF Signal Generator	Output frequency: 400 to 3800 MHz (1-Hz steps) 400 to 6000 MHz (Can be used when installing MT8821C-019 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.2.5. MX882112C/13C-016

Table 1.1.2.5-1 LTE FDD/TDD CS Fallback to W-CDMA/GSM

Item	Specification
Function	Supports CS fallback to W-CDMA or GSM using MT8821C

1.1.2.6. MX882112C/13C-017

Table 1.1.2.6-1 LTE FDD/ TDD CS Fallback to CDMA2000

Item	Specification
Function	Supports CS fallback to CDMA2000 using MT8821C

1.1.2.7. MX882113C-018

Table 1.1.2.7-1 LTE TDD CS Fallback to TD-SCDMA/GSM

Item	Specification
Function	Supports CS fallback to TD-SCDMA or GSM using MT8821C

1.1.2.8. MX882112C/13C-021

Table 1.1.2.8-1 LTE-Advanced FDD/TDD DL CA Measurement Software

Item	Specification
Function	The reception measurements for DL 2CCs and UL 1CC described in Chapter 7 of 3GPP TS 36.521-1 and the maximum throughput tests are supported. The maximum throughput test for DL CA 2x2 MIMO is supported by using with the MX882012C/13C -011 2x2 MIMO DL option.
RF Signal Generator	Output frequency: 400 to 2700 MHz (1-Hz steps) 3400 to 3800 MHz (Can be used when installing MT8821C-018 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.2.9. MX882112C/13C-022

Table 1.1.2.9-1 LTE-Advanced FDD/TDD UL CA Measurement Software

Item	Specification
Function	This can be used to measure the functions and Tx/Rx performance of UEs at 2CCs UL CA. Frequency 500 to 3800 MHz 3800 to 4200 MHz (Can be used when installing MT8821C-019 option)
Modulation Analysis	Same as MX882112C for CC measurements. The measurement target is only PUSCH.

Table 1.1.2.9-2 LTE-Advanced FDD/TDD UL CA Measurement Software (Cont'd)

Amplitude Measurement	Same as MX882112C except measurement accuracy and linearity in CC measurements. The measurement target is only PUSCH. Measurement accuracy ±0.7 dB (–20 to +35 dBm) ±0.9 dB (–50 to –20 dBm) 500 MHz ≤ Freq. ≤ 3000 MHz 10° to 40°C after calibration ±1.0 dB (–50 to +35 dBm) ±1.3 dB (–60 to –50 dBm) 3000 MHz < Freq. ≤ 3800 MHz 10° to 40°C after calibration ±1.0 dB (–50 to +35 dBm), ±1.3 dB (–60 to –50 dBm), 3800 MHz < Freq. ≤ 4200 MHz, 20° to 30°C after calibration (At Intra-band Contiguous CA SCC, PCC+SCC measurement) Linearity ±0.2 dB (–40 to 0 dB, ≥–50 dBm, 20° to 30°C after calibration), ±0.4 dB (–40 to 0 dB, ≥–60 dBm, 20° to 30°C after calibration), 500 to 4200 MHz
Occupied Bandwidth	Same as MX882112C at CC or Contiguous CC measurements. The measurement target is only PUSCH.
Adjacent Channel Leakage Power	Same as MX882112C at CC or Contiguous CC measurements. The measurement target is only PUSCH.
Spectrum Emission Mask	Same as MX882112C at CC or Contiguous CC measurements. The measurement target is only PUSCH.
RF Signal Generator	Output frequency 400 to 3800 MHz (1-Hz steps) 3800 to 6000 MHz (1-Hz steps) (Can be used when installing MT8821C-019 option)
Throughput Measurement	Function Throughput measurement using RMC Measurement target ACK and NACK reported from UE

1.1.2.10. MX882112C/13C-026

Table 1.1.2.10-1 LTE-Advanced FDD/TDD DL CA IP Data Transfer

Item	Specifications
Function	At DL CA, IP data transfer is supported by using the internal server of the MT8821C, or IP data transfer with external devices is supported by using the Ethernet port of the LTE measurement hardware.

1.1.2.11. MX882112C/13C-031

Table 1.1.2.11-1 LTE-Advanced FDD/TDD DL CA 3CCs Measurement Software

Item	Specifications
Function	The reception measurements for DL 3CCs and UL 1CC, and the maximum throughput tests are supported. The maximum throughput test for DL CA 2x2 MIMO is supported by using with the MX882012C/13C-011 LTE FDD/TDD 2x2 MIMO DL option.
RF Signal Generator	Output frequency: 400 to 3800 MHz (1-Hz steps) 400 to 6000 MHz (Can be used when installing MT8821C-019 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.2.12. MX882112C/13C-036

Table 1.1.2.12-1 LTE-Advanced FDD/TDD DL CA 3CCs IP Data Transfer

Item	Specifications
Function	At DL CA 3CCs, IP data transfer is supported by using the internal server of the MT8821C, or IP data transfer with external devices is supported by using the Ethernet port of the LTE measurement hardware.

1.1.2.13. MX882112C/13C-041

Table 1.1.2.13-1 LTE-Advanced FDD/TDD DL CA 4CCs Measurement Software

Item	Specifications
Function	The reception measurements for DL 4CCs and UL 1CC, and the maximum throughput tests are supported. The maximum throughput test for DL CA 2x2 MIMO is supported by using with the MX882012C/13C-011 LTE FDD/TDD 2x2 MIMO DL option.
RF Signal Generator	Output frequency: 400 to 3800 MHz (1-Hz steps) 400 to 6000 MHz (Can be used when installing MT8821C-019 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.2.14. MX882112C/13C-046

Table 1.1.2.14-1 LTE-Advanced FDD/TDD DL CA 4CCs IP Data Transfer

Item	Specifications
Function	At DL CA 4CCs, IP data transfer is supported by using the internal server of the MT8821C, or IP data transfer with external devices is supported by using the Ethernet port of the LTE measurement hardware.

1.1.2.15. MX882112C/13C-051

Table 1.1.2.15-1 LTE-Advanced FDD/TDD DL CA 5CCs Measurement Software

Item	Specifications
Function	The reception measurements for DL 5CCs and UL 1CC, and the maximum throughput tests are supported.
RF Signal Generator	Output frequency: 400 to 3800 MHz (1-Hz steps) 400 to 6000 MHz (Can be used when installing MT8821C-019 option)
Throughput Measurement	Function: Throughput measurement using RMC Measurement target: ACK and NACK reported from UE

1.1.2.16. MX882142C/43C (Non-Call Processing)

Table 1.1.2.16-1 Measurement Software Specifications (MX882042C/43C) (1/2)

Measurement Item	Specifications	
Electrical	Typical values (typ.) are only for reference and are not guaranteed.	
Frequency/Modulation Measurement	Frequency	400 to 3800 MHz 3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
	Input level	–40 to +35 dBm (Main1/2)
	Carrier frequency accuracy	±(Set frequency × Reference oscillator accuracy +15 Hz)
	Modulation accuracy	
	Residual vector error	≤2.5% (400 to 3800 MHz) (When measurement count is 20) ≤3.5% (3800 to 5000 MHz) (When measurement count is 20)
	In-band Emissions	≤–40 dB (≥–10 dBm, Allocated RB≤18)
	Measurement object	PUSCH
Amplitude Measurement	Frequency	400 to 3800 MHz 3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
	Input level	–60 to +35 dBm (Main1/2)
	Measurement accuracy	±0.5 dB (–20 to +35 dBm) typ. ±0.3 dB (–20 to +35 dBm) ±0.7 dB (–50 to –20 dBm) ±0.9 dB (–60 to –50 dBm) 400 to 3800 MHz, 10° to 40°C after calibration ±0.7 dB (–20 to +35 dBm) ±0.9 dB (–50 to –20 dBm) ±1.1 dB (–60 to –50 dBm) 3800 to 5000 MHz, 10° to 40°C after calibration
	Linearity	±0.2 dB (–40 to 0 dB, ≥–50 dBm) ±0.4 dB (–40 to 0 dB, ≥–60 dBm) 400 to 5000 MHz
	Measurement object	PUSCH

Table 1.1.2.16-2 Measurement Software Specifications (MX882042C/43C) (2/2)

Measurement Item	Specifications	
Occupied Bandwidth	Frequency	400 to 3800 MHz
		3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
	Input level	–10 to +35 dBm (Main1/2)
Adjacent Channel Leakage Power	Frequency	400 to 3800 MHz
		3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
	Input level	–10 to +35 dBm (Main1/2)
	Measurement point	E-UTRA ACLR1 UTRA ACLR1 UTRA ACLR2
	Measurement range	≥45 dB (E-UTRA ACLR1) ≥50 dB (UTRA ACLR1) ≥55 dB (UTRA ACLR2)
Spectrum Emission Mask	Frequency	400 to 3800 MHz
		3800 to 5000 MHz (Can be used when installing MT8821C-019 option)
	Input level	–10 to +35 dBm (Main1/2)

1.1.2.17. MX882164C

Table 1.1.2.17-1 LTE VoLTE Echoback Option Specifications

Item	Specification
Function	The communication test with the UE that supports VoLTE is available by installing this software on the MT8821C on which the MX882112C or MX882113C is already installed.

1.2. 3GPP Measurement Specification (3GPP TS 36.521-1 V12.8.0(2015-12)) Table

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
6	**Transmitter Characteristics**					
6.2.2	UE Maximum Output Power		√√	√√	√√	√√
6.2.2_1	UE Maximum Output Power for HPUE		√√	√√	√√	√√
6.2.2A	UE Maximum Output Power for CA					
6.2.2A.1	UE Maximum Output Power for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.2.2A.2	UE Maximum Output Power for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.2.2A.3	UE Maximum Output Power for CA (intra-band non-contiguous DL CA and UL CA)		X	X	X	X
6.2.3	Maximum Power Reduction (MPR)		√√	√√	√√	√√
6.2.3_1	Maximum Power Reduction (MPR) for HPUE		√√	√√	√√	√√
6.2.3_2	Maximum Power Reduction (MPR) for Multi-Cluster PUSCH		√√*[8]	X*[8]	√√	√√
6.2.3A	Maximum Power Reduction (MPR) for CA					
6.2.3A.1	Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.2.3A.2	Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.2.3A.3	Maximum Power Reduction (MPR) for CA (intra-band non-contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
6.2.4	Additional Maximum Power Reduction (A-MPR)		√√*[3]	√√	√√*[3]	√√
6.2.4_1	Additional Maximum Power Reduction (A-MPR) for HPUE		√√*[3]	√√	√√*[3]	√√
6.2.4A	Additional Maximum Power Reduction (A-MPR) for CA					
6.2.4A.1	Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.2.4A.2	Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.2.4A.3	Additional Maximum Power Reduction (A-MPR) for CA (intra-band non-contiguous DL CA and UL CA) *[5]		X	X	X	X
6.2.5	Configured UE Transmitted Output Power		√√*[3]	√√	√√*[3]	√√
6.2.5_1	Configured UE transmitted Output Power for HPUE		√√*[3]	√√	√√*[3]	√√
6.2.5A	Configured transmitted power for CA					
6.2.5A.1	Configured UE transmitted Output Power for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.2.5A.2	Void					
6.2.5A.3	Configured UE transmitted Output Power for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.2.5A.4	Configured UE transmitted Output Power for CA (intra-band non-contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
6.3	Output Power Dynamics					
6.3.1	Void					
6.3.2	Minimum Output Power		√√	√√	√√	√√
6.3.2A	Minimum Output Power for CA					
6.3.2A.1	Minimum Output Power for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√
6.3.3	Transmit OFF Power		X	√√	X	√√
6.3.3A	UE Transmit OFF Power for CA					
6.3.3A.1	UE Transmit OFF Power for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.3.3A.2	UE Transmit OFF power for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.3.3A.3	UE Transmit OFF power for CA (intra-band non-contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.3.4	ON/OFF Time Mask					
6.3.4.1	General ON/OFF time Mask		X	√√	X	√√
6.3.4.2	PRACH and SRS time Mask					
6.3.4.2.1	PRACH time Mask		X	√√	X	√√
6.3.4.2.2	SRS time Mask		X	√√	X	√√
6.3.4A	ON/OFF time Mask for CA					
6.3.4A.1.1	General ON/OFF time Mask for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.3.4A.1.2	General ON/OFF time mask for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.3.4A.1.3	General ON/OFF time mask for CA (intra-band non-contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
6.3.5	Power Control					
6.3.5.1	Power Control Absolute power tolerance		X	√√	X	√√
6.3.5.2	Power Control Relative power tolerance		X	√√	X	√√
6.3.5.3	Aggregate power control tolerance		X	√√	X	√√
6.3.5_1	Power Control for HPUE					
6.3.5_1.1	Power Control Absolute power tolerance for HPUE		X	√√	X	√√
6.3.5_1.2	Power Control Absolute power tolerance for HPUE		X	√√	X	√√
6.3.5_1.3	Aggregate power control tolerance for HPUE		X	√√	X	√√
6.3.5A	Power Control for CA					
6.3.5A.1	Power Control Absolute power tolerance for CA					
6.3.5A.1.1	Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.3.5A.2	Power Control Relative power tolerance for CA					
6.3.5A.2.1	Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA)		X	X	X	√√
6.3.5A.3	Aggregate power control tolerance for CA					
6.3.5A.3.1	Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)		X	X	X	√√

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing *1	Call Processing	Non-Call Processing *1	Call Processing
6.4	Void					
6.5	Transmit signal quality					
6.5.1	Frequency Error		√√	√√	√√	√√
6.5.1A	Frequency error for CA					
6.5.1A.1	Frequency error for CA (intra-band Contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√
6.5.1A.2	Frequency error for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.5.1A.3	Frequency error for CA (intra-band non-contiguous DL CA and UL CA)	12C/13C-022	X	X	X	√√
6.5.2	Transmit modulation					
6.5.2.1	Error Vector Magnitude (EVM)		√√	√√	√√	√√
6.5.2.1A	PUSCH-EVM with exclusion period		√√	√√	√√	√√
6.5.2.2	Carrier leakage		√√	√√	√√	√√
6.5.2.3	In-band emissions for non allocated RB		√√	√√	√√	√√
6.5.2.4	EVM equalizer spectrum flatness		√√	√√	√√	√√
6.5.2A	Transmit modulation for CA					
6.5.2A.1.1	Error Vector Magnitude (EVM) for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√
6.5.2A.2.1	Carrier leakage for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√
6.5.2A.3.1	In-band emissions for non allocated RB for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
6.6	Output RF spectrum emissions					
6.6.1	Occupied bandwidth		√√	√√	√√	√√
6.6.1A	Occupied bandwidth for CA					
6.6.1A.1	Occupied bandwidth for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√
6.6.1A.2	Occupied bandwidth for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.6.1A.3	Occupied bandwidth for CA (intra-band non-contiguous DL CA and UL CA)		X	X	X	X
6.6.2	Out-of-band emission					
6.6.2.1	Spectrum Emission Mask		√√	√√	√√	√√
6.6.2.1_1	Spectrum Emission Mask for Multi-Cluster PUSCH		√√*[8]	X *[8]	√√	√√
6.6.2.1A	Spectrum emission mask for CA					
6.6.2.1A.1	Spectrum emission mask for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√
6.6.2.1A.2	Spectrum Emission Mask for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
6.6.2.1A.3	Spectrum Emission Mask for CA (intra-band non-contiguous DL CA and UL CA)		X	X	X	X
6.6.2.2	Additional Spectrum Emission Mask		√√*[3]	√√	√√*[3]	√√
6.6.2.2A	Additional Spectrum Emission Mask for CA					
6.6.2.2A.1	Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
6.6.2.3	Adjacent Channel Leakage power Ratio		√√	√√	√√	√√
6.6.2.3_1	Adjacent Channel Leakage power Ratio for HPUE		√√	√√	√√	√√
6.6.2.3_2	Adjacent Channel Leakage Power Ratio for Multi-Cluster PUSCH		√√*[8]	X*[8]	√√	√√
6.6.2.3A	Adjacent Channel Leakage power Ratio for CA					
6.6.2.3A.1	Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	X	√√	√√
6.6.2.3A.2	Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
6.6.3	Spurious emissions					
6.6.3.1	Transmitter Spurious emissions	Requires External Equipment	–	√*[2]	–	√*[2]
6.6.3.1A	Transmitter Spurious emissions for CA					
6.6.3.1A.1	Transmitter Spurious emissions for CA (intra-band contiguous DL CA and UL CA)		X	X	X	X
6.6.3.1A.2	Transmitter Spurious emissions for CA (inter-band DL CA and UL CA)		X	X	X	X
6.6.3.2	Spurious emission band UE co-existence	Requires External Equipment	–	√*[2]	–	√*[2]
6.6.3.2A	Spurious emission band UE co-existence for CA					
6.6.3.2A.1	Spurious emission band UE co-existence for CA (intra-band contiguous DL CA and UL CA)		X	X	X	X
6.6.3.2A.2	Spurious emission band UE co-existence for CA (inter-band DL CA and UL CA)		X	X	X	X
6.6.3.3	Additional spurious emissions	Requires External Equipment	–	√*[2]	–	√*[2]
6.6.3.3A	Additional spurious emissions for CA					
6.6.3.3A.1	Additional spurious emissions for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	√*[2], *[7]	X	√*[2]
6.6.3.3A.2	Additional spurious emissions for CA ((inter-band DL CA and UL CA)	12C/13C-022				
6.6.3.3A.3	Additional spurious emissions for CA (intra-band non-contiguous DL CA and UL CA)	12C/13C-022				

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*1	Call Processing	Non-Call Processing*1	Call Processing
6.7	Transmit intermodulation	Requires External Equipment	—	√*2	—	√*2
6.7A	Transmit intermodulation for CA					
6.7A.1	Transmit intermodulation for CA (intra-band contiguous DL CA and UL CA)		X	X	X	X
6.7A.2	Transmit intermodulation for CA (inter-band DL CA and UL CA)		X	X	X	X

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*1	Call Processing	Non-Call Processing*1	Call Processing
7	**Receiver Characteristics**					
7.3	Reference sensitivity level		√√*4	√√	√√*4	√√
7.3A	Reference sensitivity level for CA					
7.3A.1	Reference sensitivity level for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	√√	X	√√
7.3A.2	Reference sensitivity level for CA (intra-band contiguous DL CA without UL CA)	12C/13C-021	X	√√	X	√√
7.3A.3	Reference sensitivity level for CA (inter-band DL CA without UL CA)	12C/13C-021	X	√√	X	√√
7.3A.4	Reference sensitivity level for CA (intra-band non-contiguous DL CA without UL CA)		X	√√	X	√√
7.3A.5	Reference sensitivity level for CA (3DL CA without UL CA)	12C/13C-031	X	√√	X	√√
7.3A.6	Reference sensitivity level for CA (inter-band DL CA and UL CA)	12C/13C-022	X	√√	X	√√
7.3B	Reference sensitivity level for UL-MIMO		X	X	X	X
7.3D	Reference sensitivity level for ProSe		X	X	X	X
7.3D.1	Reference sensitivity level for ProSe Direct Discovery		X	X	X	X
7.3D.2	Reference sensitivity level for ProSe Direct Communication		X	X	X	X
7.3E	Reference sensitivity level for UE category 0		X	X	X	X

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
7.4	Maximum input level		√√*[4]	√√	√√*[4]	√√
7.4_H	Maximum input level for 256QAM in DL		X	X	X	√√
7.4A	Maximum input level for CA					
7.4A.1	Maximum input level for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022	X	√√	X	√√
7.4A.1_H	Maximum input level for CA (intra-band contiguous DL CA and UL CA) for 256QAM in DL	12C/13C-022	X	X	X	√√
7.4A.2	Maximum input level for CA (intra-band contiguous DL CA without UL CA)	12C/13C-021	X	√√	X	√√
7.4A.2_H	Maximum input level for CA (intra-band contiguous DL CA without UL CA) for 256QAM in DL	12C/13C-022	X	X	X	√√
7.4A.3	Maximum input level for CA (inter-band DL CA without UL CA)	12C/13C-021	X	√√	X	√√
7.4A.3_H	Maximum input level for CA (inter-band DL CA without UL CA) for 256QAM in DL	12C/13C-021	X	X	X	√√
7.4A.4	Maximum input level for CA (intra-band non-contiguous DL CA without UL CA)	12C/13C-021	X	√√	X	√√
7.4A.4_H	Maximum input level for CA (intra-band non-contiguous DL CA without UL CA) for 256QAM in DL	12C/13C-021	X	X	X	√√
7.4A.5	Maximum input level for CA (3DL CA without UL CA)	12C/13C-031	X	√√	X	√√
7.4A.5_H	Maximum input level for CA (3DL CA without UL CA) for 256QAM in DL	12C/13C-031	X	X	X	√√
7.4B	Maximum input level for UL-MIMO		X	X	X	X
7.4E	Maximum input level for UE category 0		X	X	X	X

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*1	Call Processing	Non-Call Processing*1	Call Processing
7.5	Adjacent Channel Selectivity (ACS)	Requires External Equipment	√*2, *4	√*2	√*2, *4	√*2
7.5A	Adjacent Channel Selectivity (ACS) for CA					
7.5A.1	Adjacent Channel Selectivity (ACS) for CA (Intra-band Contiguous DL CA and UL CA)	12C/13C-022 Requires External Equipment	X	√*2	X	√*2
7.5A.2	Adjacent Channel Selectivity (ACS) for CA (intra-band contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*2	X	√*2
7.5A.3	Adjacent Channel Selectivity (ACS) for CA (inter-band DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*2	X	√*2
7.5A.4	Adjacent Channel Selectivity (ACS) for CA (intra-band non-contiguous DL CA without UL CA) *5	12C/13C-021 Requires External Equipment	X	√*2	X	√*2
7.5A.5	Adjacent Channel Selectivity (ACS) for 3DL CA without UL CA	12C/13C-031 Requires External Equipment	X	√*2	X	√*2
7.5B	Adjacent Channel Selectivity (ACS) for UL-MIMO		X	X	X	X
7.5E	Adjacent Channel Selectivity (ACS) for category 0		X	X	X	X

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
7.6	Blocking characteristics					
7.6.1	In-band blocking	Requires External Equipment	√*[2], *[4]	√*[2]	√*[2], *[4]	√*[2]
7.6.1A	In-band blocking for CA					
7.6.1A.1	In-band blocking for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.1A.2	In-band blocking for CA (intra-band contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.1A.3	In-band blocking for CA (inter-band DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.1A.4	In-band blocking for CA (intra-band non-contiguous DL CA without UL CA) *[5]	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.1A.5	In-band blocking for CA (3DL CA without UL CA)	12C/13C-031 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.1B	In-band blocking for UL-MIMO		X	X	X	X
7.6.1E	In-band blocking for UE category 0		X	X	X	X
7.6.2	Out-of-band blocking	Requires External Equipment	√*[2], *[4]	√*[2]	√*[2], *[4]	√*[2]
7.6.2A	Out-of-band blocking for CA					
7.6.2A.1	Out-of-band blocking for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022 Requires External Equipment	X	√*[2]	X	√*[2]

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
7.6.2A.2	Out-of-band blocking for CA (intra-band contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.2A.3	Out-of-band blocking for CA (inter-band DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.2A.4	Out-of-band blocking for CA (intra-band non-contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.2A.5	Out-of-band blocking for CA (3DL CA without UL CA)	12C/13C-031 Requires External Equipment	X	√*[2]	X	√*[2]
7.6.2B	Out-of-band blocking for UL-MIMO		X	X	X	X
7.6.2E	Out-of-band blocking for UE category 0		X	X	X	X

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*1	Call Processing	Non-Call Processing*1	Call Processing
7.6.3	Narrow band Blocking	Requires External Equipment	√*2, *4	√*2	√*2, *4	√*2
7.6.3A	Narrow band Blocking for CA					
7.6.3A.1	Narrow band Blocking for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022 Requires External Equipment	X	√*2	X	√*2
7.6.3A.2	Narrow band Blocking for CA (intra-band contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*2	X	√*2
7.6.3A.3	Narrow band Blocking for CA (inter-band DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*2	X	√*2
7.6.3A.4	Narrow band Blocking for CA (intra-band non-contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*2	X	√*2
7.6.3A.5	Narrow band blocking for CA (3DL CA without UL CA)	12C/13C-031 Requires External Equipment	X	√*2	X	√*2
7.6.3B	Narrow band blocking for UL-MIMO		X	X	X	X
7.6.3E	Narrow band blocking for UE category 0		X	X	X	X

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
7.7	Spurious response	Requires External Equipment	√*[2, *4]	√*[2]	√*[2, *4]	√*[2]
7.7A	Spurious response for CA					
7.7A.1	Spurious response for CA (intra-band contiguous DL CA and UL CA)	12C/13C-022 Requires External Equipment	X	√*[2]	X	√*[2]
7.7A.2	Spurious response for CA (intra-band contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.7A.3	Spurious response for CA (inter-band DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.7A.4	Spurious response for CA (intra-band non-contiguous DL CA without UL CA)	12C/13C-021 Requires External Equipment	X	√*[2]	X	√*[2]
7.7A.5	Spurious response for CA (3DL CA without UL CA)	12C/13C-031 Requires External Equipment	X	√*[2]	X	√*[2]
7.7B	Spurious response for UL-MIMO		X	X	X	X
7.7E	Spurious response for UE category 0	Requires External Equipment	X	X	X	√*[2]

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
7.8	Intermodulation characteristics					
7.8.1	Wide band Intermodulation	Requires External Equipment	√*[2], *[4]	√*[2]	√*[2], *[4]	√*[2]
7.8.1A	Wide band Intermodulation for CA					
7.8.1A.1	Wide band Intermodulation for CA (Intra-band Contiguous DL CA and UL CA)	12C/13C-022 Requires External Equipment	X	√*[2]	X	√*[2]
7.8.1A.2	Wide band Intermodulation for CA (Intra-band Contiguous DL CA without UL CA)	12C/13C--021 Requires External Equipment	X	√*[2]	X	√*[2]
7.8.1A.3	Wide band Intermodulation for CA (Inter-band DL CA without UL CA)	12C/13C--021 Requires External Equipment	X	√*[2]	X	√*[2]
7.8.1A.4	Wideband intermodulation for CA (intra band non-contiguous DL CA without UL CA)	12C/13C-022 Requires External Equipment	X	√*[2]	X	√*[2]
7.8.1A.5	Wideband intermodulation for CA (3DL CA without UL CA)	12C/13C-031 Requires External Equipment	X	√*[2]	X	√*[2]
7.8.1B	Wide band Intermodulation for UL-MIMO		X	X	X	X
7.8.1E	Wide band Intermodulation for UE category 0		X	X	X	X
7.8.2	Void					

	Item	Comment	MT8820C		MT8821C	
			Non-Call Processing*[1]	Call Processing	Non-Call Processing*[1]	Call Processing
7.9	Spurious emissions	Requires External Equipment	X	√	X	√
7.9A	Spurious emissions for CA	12C/13C-021 Requires External Equipment	X	√	X	√
7.9E	Spurious emissions for UE category 0		X	X	X	X
7.10	Void					
7.10A	Receiver image for CA*[6]					

√√: Supported | √: Requires external equipment (SPA or SG) | –: Measure by SPA | △: Future Support | X: No Support

*1: Non-Call Processing does not support call processing function. In addition, because Loop Back and UL Power Control of payload data cannot be controlled, UEs must output signals matching test conditions.
*2: This application note does not explain measurement procedures for appropriate test items.
*3: Supports measurements only (broadcast information is fixed).
*4: Outputs DL RMC defined from TS 36.521-1 Annex A Table A.3.2-1 to Table A.3.2-4 in fixed pattern (ARB).
Throughput measurements supported at UE side.
*6: TS 36.101 [2] clause 7.10.1A specifies minimum requirements for receiver image for CA but recommends that these requirements do not need to be tested.
*7: MX882012C/13C-022 option does not support Intra-band contiguous DL CA and UL CA. MX882112C/13C support this test item.
*8: MX882012C/13C support s this test item (remote command only).

1.3. Operation Bands

MT8820C supports Operation bands 1 to 14 and 17 to 44.
MT8821C supports Operation bands 1 to 14, 17 to 45, 65 to 67, 252 and 255.

Table 1.3-1 E-UTRA Channel Numbers and Default UE TX-RX Frequency Separation (From 3GPP TS36.101 Table 5.7.3-1 and Table 5.7.4-1)

Band	Free Sep (MHz)	Downlink			Uplink		
		F_{DL_low} (MHz)	$N_{Offs\text{-}DL}$	Range of N_{DL}	F_{UL_low} (MHz)	$N_{Offs\text{-}UL}$	Range of N_{UL}
1	190	2110	0	0~599	1920	18000	18000~18599
2	80	1930	600	600~1199	1850	18600	18600~19199
3	95	1805	1200	1200~1949	1710	19200	19200~19949
4	400	2110	1950	1950~2399	1710	19950	19950~20399
5	45	869	2400	2400~2649	824	20400	20400~20649
6	45	875	2650	2650~2749	830	20650	20650~20749
7	120	2620	2750	2750~3449	2500	20750	20750~21449
8	45	925	3450	3450~3799	880	21450	21450~21799
9	95	1844.9	3800	3800~4149	1749.9	21800	21800~22149
10	400	2110	4150	4150~4749	1710	22150	22150~22749
11	48	1475.9	4750	4750~4949	1427.9	22750	22750~22949
12	30	729	5010	5010~5179	699	23010	23010~23179
13	–31	746	5180	5180~5279	777	23180	23180~23279
14	–30	758	5280	5280~5379	788	23280	23280~23379
...	-----	-----	-----	-----	-----	-----	-----
17	30	734	5730	5730~5849	704	23730	23730~23849
18	45	860	5850	5850~5999	815	23850	23850~23999
19	45	875	6000	6000~6149	830	24000	24000~24149
20	–41	791	6150	6150~6449	832	24150	24150~24449
21	48	1495.9	6450	6450~6599	1447.9	24450	24450~24599
22*[1]	100	3510	6600	6600~7399	3410	24600	24600~25399
23	180	2180	7500	7500~7699	2000	25500	25500~25699
24	–101.5	1525	7700	7700~8039	1626.5	25700	25700~26039
25	80	1930	8040	8040~8689	1850	26040	26040~26689
26	45	859	8690	8690~9039	814	26690	26690~27039
27	45	852	9040	9040~9209	807	27040	27040~27209
28	55	758	9210	9210~9659	703	27210	27210~27659
29	-	717	9660	9660~9769	N/A		
30	45	2350	9770	9770~9869	2305	27660	27660~27759

Table 1.3-1 E-UTRA Channel Numbers and Default UE TX-RX Frequency Separation (From 3GPP TS36.101 Table 5.7.3-1 and Table 5.7.4-1) (Cont'd)

Band	Freq Sep (MHz)	Downlink			Uplink		
		F_{DL_low} (MHz)	$N_{Offs\text{-}DL}$	Range of N_{DL}	F_{UL_low} (MHz)	$N_{Offs\text{-}UL}$	Range of N_{UL}
31	10	462.5	9870	9870~9919	452.5	27760	27760~27809
32	-	1452	9920	9920~10359	N/A		
33	0	1900	36000	36000~36199	1900	36000	36000~36199
34	0	2010	36200	36200~36349	2010	36200	36200~36349
35	0	1850	36350	36350~36949	1850	36350	36350~36949
36	0	1930	36950	36950~37549	1930	36950	36950~37549
37	0	1910	37550	37550~37749	1910	37550	37550~37749
38	0	2570	37750	37750~38249	2570	37750	37750~38249
39	0	1880	38250	38250~38649	1880	38250	38250~38649
40	0	2300	38650	38650~39649	2300	38650	38650~39649
41	0	2496	39650	39650~41589	2496	39650	39650~41589
42*[1]	0	3400	41590	41590~43589	3400	41590	41590~43589
43*[1]	0	3600	43590	43590~45589	3600	43590	43590~45589
44	0	703	45590	45590~46589	703	45590	45590~46589
45	0	1447	46590	46590～46789	1447	46590	46590～46789
---	---	---	---	---	---	---	---
65	190	2110	65536	65536～66435	1920	131072	131072～131971
66	400	2110	66436	66436～67335	1710	131972	131972～132671
67	-	738	67336	67336～67535	N/A		
---	---	---	---	---	---	---	---
252*[2]	-	5150	255144	255144~256143	N/A		
---	---	---	---	---	---		
255*[2]	-	5725	260894	260894~262143	N/A		

1:** ***MT8820C-018 option must be installed in MT8820C to use operation bands 22, 42, and 43.
2:** ***MT8820C does not support these bands. MT8821C-019 option must be installed in MT8821C to use operation bands 252 and 255.

1.4. BAND 13 SUPPLEMENTARY RF CONFORMANCE Measurement Specification Table

	Item	Comment	Non-Call Processing*1	Call Processing
2.7	PUCCH OVER-PROVISIONING FUNCTIONAL TEST		X	√√
2.9	SPURIOUS EMISSIONS WITH TX GATING	Requires External Equipment	X	√

√√: Supported | **√:** Requires external equipment (SPA or SG) | **–:** Measure by SPA | **△:** Future Support | **X:** No Support

*1: Non-Call Processing does not support call processing function. In addition, because Loop Back and UL Power Control of payload data cannot be controlled, UEs must output signals matching test conditions.

1.5. Supported CA Combination

1.5.1. MT8820C

CA Combination	RMC (RF Meas.)/ Packet (IP Data)	Support status	Options *1	Remark
FDD CA				
FDD 2DL /1UL CA SISO	RMC	√√	12C-021	
	Packet	√√	12C-006,021.026	Need two application servers
FDD 2DL /1UL CA, 2x2 MIMO	RMC	√√	12C-011, 021	
	Packet	√√	12C-006, 011, 021, 026	Need two application servers
FDD 2DL /2UL CA, SISO	RMC	√√	12C-021, 022	
	Packet	X	----	
FDD 2DL /2UL CA, 2x2 MIMO	RMC	√√	12C-011, 021, 022	
	Packet	X	----	
FDD 3DL /1UL CA, SISO	RMC	√√	12C-021, 031	
	Packet	X	----	
FDD 3DL/1UL CA, 2x2L MIMO	RMC	√√	12C-011, 021, 022	
	Packet	X	----	
FDD 3DL /2UL CA, SISO	RMC	√√	12C-021, 022, 031	
	Packet	X	----	
FDD 3DL /2UL CA, 2x2 MIMO	RMC	√√	12C-011, 021, 022, 031	
	Packet	X	----	
TDD CA				
TDD 2DL /1UL CA, SISO	RMC	√√	13C-021	
	Packet	√√	13C-006, 021, 026	Need two application servers
TDD 2DL /1UL CA, 2x2 MIMO	RMC	√√	13C-011, 021	
	Packet	√√	13C-006, 011, 021,026	Need two application servers
TDD 2DL /2UL CA, SISO	RMC	√√	13C-021, 022	
	Packet	X	----	
TDD 2DL /2UL CA, 2x2 MIMO	RMC	√√	13C-011, 021, 022	
	Packet	X	----	

TDD 3DL /1UL CA, SISO	RMC	√√	13C-021, 031	
	Packet	X	----	
TDD 3DL/1UL CA, 2x2L MIMO	RMC	√√	13C-011, 021, 031	
	Packet	X	----	
TDD 3DL /2UL CA, SISO	RMC	√√	13C-021, 022, 031	
	Packet	X	----	
TDD 3DL /2UL CA, 2x2 MIMO	RMC	√√	13C-011, 021, 022, 031	
	Packet	X	----	
FDD-TDD CA				
FDD-TDD 2DL /1UL CA, SISO	RMC	√√	12C-021 13C-021	
	Packet	X	----	
FDD-TDD 2DL /1UL CA, 2x2 MIMO	RMC	√√	12C-011, 021 13C-011, 021	
	Packet	X	----	
FDD-TDD 2DL /2UL CA, SISO	RMC	X	----	
	Packet	X	----	
FDD-TDD 2DL /2UL CA, 2x2 MIMO	RMC	X	----	
	Packet	X	----	
FDD-TDD 3DL /1UL CA, SISO	RMC	X	----	
	Packet	X	----	
FDD-TDD 3DL/1UL CA, 2x2L MIMO	RMC	X	----	
	Packet	X	----	
FDD-TDD 3DL /2UL CA, SISO	RMC	X	----	
	Packet	X	----	
FDD-TDD 3DL /2UL CA, 2x2 MIMO	RMC	X	----	
	Packet	X	----	

√√**:** Supported | √**:** Partially Supported | △**:** Future Support | X**:** No Support

*1: This option combination is mandatory for the MT8820C operating as PCC. It is not a required CA option for MT8820C operating as SCC.

Note: “12C” means MX882012C
Note: “13C” means MX882013C
Note: Requires MT8820C-012 option to use 12C/13C-011 2x2MIMO DL option

1.5.2. MT8821C

CA Combination	RMC (RF Meas.)/ Packet (IP Data)	Support status	Options	Remark
FDD CA				
FDD 2DL /1UL CA, SISO	RMC	√√	12C-021	
	Packet	√√	12C-006, 021, 026	
FDD 2DL /1UL CA, 2x2 MIMO	RMC	√√	12C-011, 021	
	Packet	√√	12C-006, 011, 021, 026	
FDD 2DL /2UL CA, SISO	RMC	√√	12C-021, 022	
	Packet	X	----	
FDD 2DL /2UL CA, 2x2 MIMO	RMC	√√	12C-011, 021, 022	
	Packet	X	----	
FDD 3DL /1UL CA, SISO	RMC	√√	12C-021, 031	
	Packet	√√	12C-006, 021, 026, 031, 036	Need two application servers
FDD 3DL/1UL CA, 2x2L MIMO	RMC	√√	12C-011, 021, 031	
	Packet	√√	12C-006, 011, 021, 026, 031, 036	Need two application servers
FDD 3DL /2UL CA, SISO	RMC	√√	12C-021, 022, 031	
	Packet	X	----	
FDD 3DL /2UL CA, 2x2 MIMO	RMC	√√	12C-011, 021, 022, 031	
	Packet	X	----	
FDD 4DL /1UL CA , SISO	RMC	√√	12C-021,031,041	
	Packet	√√	12C-006,021,026,031,036, 041,046	Need two application servers
FDD 4DL/1UL CA , 2x2L MIMO	RMC	√√	12C-011,021,031,041	
	Packet	√√	12C-006,011,021,026,031, 036,041,046	Need two application servers
FDD 4DL /2UL CA , SISO	RMC	√√	12C-021,022,031,041	
	Packet	X	----	
FDD 4DL /2UL CA , 2x2 MIMO	RMC	√√	12C-011,021,022,031,041	
	Packet	X	----	
FDD 5DL /1UL CA , SISO	RMC	√	12C-021,031,041,051	
	Packet	X	----	
FDD 5DL/1UL CA , 2x2L MIMO	RMC	X	----	
	Packet	X	----	
FDD 5DL /2UL CA , SISO	RMC	√	12C-021,022,031,041,051	
	Packet	X	----	
FDD 5DL /2UL CA , 2x2 MIMO	RMC	X	----	
	Packet	X	----	

TDD CA				
TDD 2DL /1UL CA, SISO	RMC	√√	13C-021	
	Packet	√√	13C-006, 021, 026	
TDD 2DL /1UL CA, 2x2 MIMO	RMC	√√	13C-011, 021	
	Packet	√√	13C-006, 011, 021, 026	
TDD 2DL /2UL CA, SISO	RMC	√√	13C-021, 022	
	Packet	X	----	
TDD 2DL /2UL CA, 2x2 MIMO	RMC	√√	13C-011, 021, 022	
	Packet	X	----	
TDD 3DL /1UL CA, SISO	RMC	√√	13C-021, 031	
	Packet	√√	13C-006, 021, 026, 031, 036	Need two application servers
TDD 3DL/1UL CA, 2x2 MIMO	RMC	√√	13C-011, 021, 031	
	Packet	√√	13C-006, 011, 021, 026, 031, 036	Need two application servers
TDD 3DL /2UL CA, SISO	RMC	√√	13C-021, 022, 031	
	Packet	X	----	
TDD 3DL /2UL CA, 2x2 MIMO	RMC	√√	13C-011, 021, 022, 031	
	Packet	X	----	
TDD 4DL /1UL CA , SISO	RMC	√√	13C-021,031,041	
	Packet	√√	13C-006,021,026,031,036, 041,046	Need two application servers
TDD 4DL/1UL CA , 2x2L MIMO	RMC	√√	13C-011,021,031,041	
	Packet	√√	13C-006,011,021,026,031, 036,041,046	Need two application servers
TDD 4DL /2UL CA , SISO	RMC	√√	13C-021,022,031,041	
	Packet	X	----	
TDD 4DL /2UL CA , 2x2 MIMO	RMC	√√	13C-011,021,022,031,041	
	Packet	X	----	
TDD 5DL /1UL CA , SISO	RMC	√	13C-021,031,041,051	
	Packet	X	----	
TDD 5DL/1UL CA , 2x2L MIMO	RMC	X	----	
	Packet	X	----	
TDD 5DL /2UL CA , SISO	RMC	√	13C-021,022,031,041,051	
	Packet	X	----	
TDD 5DL /2UL CA , 2x2 MIMO	RMC	X	----	
	Packet	X	----	

FDD-TDD CA				
FDD-TDD 2DL /1UL CA, SISO	RMC	√√	12C-021 13C-021	For PCell TDD, only Uplink/Downlink Configuration 1 is supported.
	Packet	√√	12C-026 13C-026	For PCell TDD, only Uplink/Downlink Configuration 1 is supported.
FDD-TDD 2DL /1UL CA, 2x2 MIMO	RMC	√√	12C-011, 021 13C-011, 021	For PCell TDD, only Uplink/Downlink Configuration 1 is supported.
	Packet	√√	12C-011,026 13C-011,026	For PCell TDD, only Uplink/Downlink Configuration 1 is supported.
FDD-TDD 2DL /2UL CA, SISO and MIMO		X	----	
FDD-TDD 3DL /1UL CA, SISO	RMC	√√	12C-021, 031 13C-021, 031	For PCell TDD, only Uplink/Downlink Configuration 1 is supported.
	Packet	X	----	
FDD-TDD 3DL/1UL CA, 2x2L MIMO	RMC	√√	12C-011, 021, 031 13C-011, 021, 031	For PCell TDD, only Uplink/Downlink Configuration 1 is supported.
	Packet	X	----	
FDD-TDD 3DL /2UL CA , SISO and MIMO		X	----	
FDD-TDD 4DL / xUL CA, SISO and MIMO		X	----	
FDD-TDD 5DL / xUL CA, SISO and MIMO		X	----	

√√: Supported | √: Partially Supported | △: Future Support | X: No Support

Note: “12C” means MX882112
Note: “13C” means MX882113C
Note: Requires MT8821C-012 option to use 12C/13C-011 2x2MIMO DL option or 12C/13C-051 LTE-Advanced FDD/TDD DL CA 5CCs Measurement Software.

2. The Basic Operations

2.1. LTE non CA

The following test procedures can be used for the MT8820C and MT8821C.

2.1.1. Connection Diagram

2.1.1.1. Connection Diagram for MT8820C Non CA

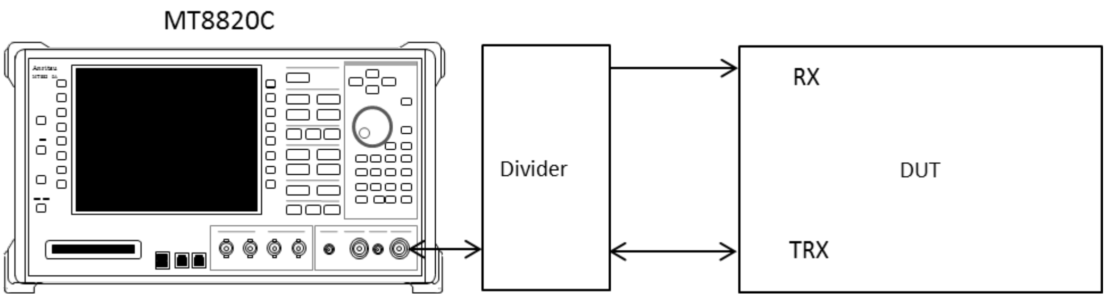


Figure 2.1.1-1 ***Connection Diagram for Single Cell, Tx and Rx Test (MT8820C, using divider)***

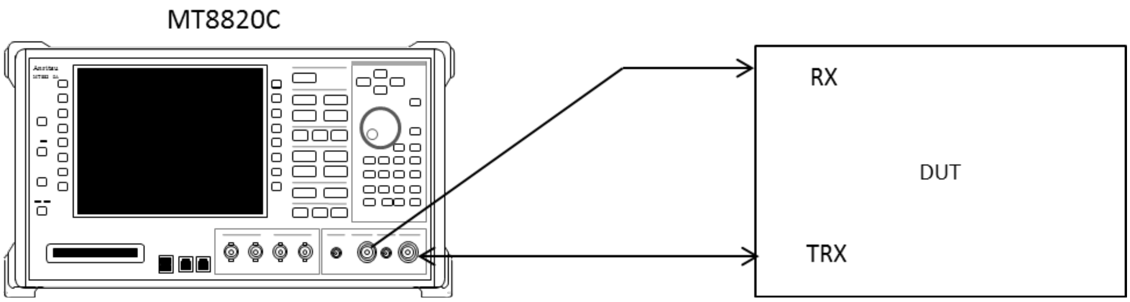


Figure 2.1.1-2 ***Connection Diagram for Single Cell, Tx and Rx Test (MT8820C, antenna configuration set to Rx Diversity)***

2.1.1.2. Connection Diagram for MT8821C Non CA

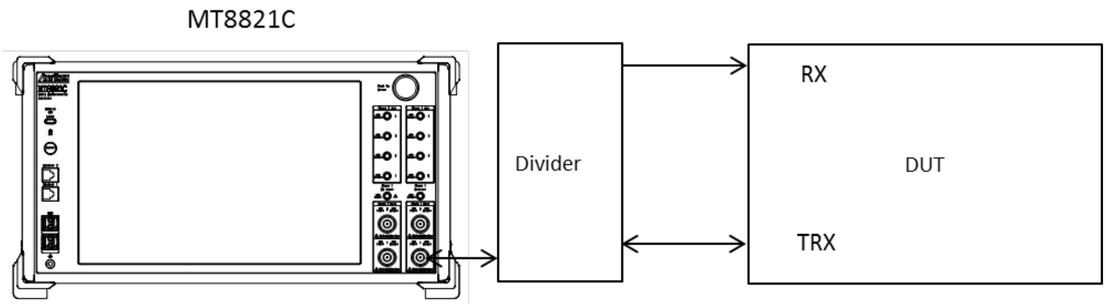


Figure 2.1.1-3 ***Connection Diagram for Single Cell, Tx and Rx Test (MT8821C, using divider)***

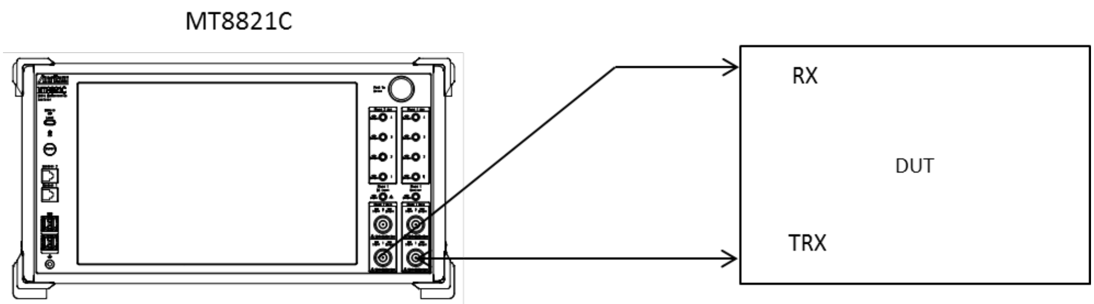


Figure 2.1.1-4 ***Connection Diagram for Single Cell, Tx and Rx Test (MT8821C, antenna configuration set to Rx Diversity)***

2.1.2. Initial Condition Setting

This sets the initial condition before measurement.
The following test configuration example shows the settings when Operating Band is 1, Test Frequency is Mid range, and Test Channel Bandwidth is 5 MHz.

1. Execute **PRESET** to set default parameter.
2. Execute **ULCHAN 18300** to set **Common Parameter - Frequency - UL Channel and DL Channel** to **18300** and **300**, respectively.
3. Execute **BANDWIDTH 5MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **5 MHz**.

2.1.3. Location Registration

This performs UE location registration after setting the initial conditions.

1. Connect UE and MT8820C/MT8821C.
2. Execute **CALLPROC ON** to set **Common Parameter - Call processing** to **ON**.
3. Execute **CALLSO** to clear call processing status.
4. Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
5. Turn on UE power.
6. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
   Repeat step 6 when the checked status is not 2 (= Idle (Regist)).

2.1.4. Test Mode Connection and Disconnection

Connect to the Test Mode after UE location registration.
After connecting to the Test Mode, disconnection is performed if necessary.

- Connection

1. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
2. Execute **CALLSA** to connect to Test Mode.
3. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

- Disconnection

1. Execute **CALLSO** to disconnect from Test Mode.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 2 (= Idle (Regist)).

2.1.5. Broadcast Information Update

When changing broadcast information, the UE must be notified of the change using one of the following methods. The method differs according to the UE in use.

A) Execute RRC Connection Reconfiguration

Notify the broadcast information update using the RRC Connection Reconfiguration message.
It updates information without ending a call. Use this procedure.

1. Execute **RRCUPDATE RRCMSG** to set **Call Processing Parameter - radioResourceConfigCommon Update** to **RRC Message**.

NOTE 1: This setting is required once at the beginning of the measurement sequence.

B) Execute Paging

Notify the broadcast information update using Paging.
It updates information without ending a call. The MT8821C waits until the Paging information is reflected.
Use this procedure when procedure A cannot be used.

Waiting time at MT8821C
modificationPeriodCoeff [n] x defaultPagingCycle [rf = 10 ms]

NOTE 1: Setting both to the minimum value before position registration minimizes waiting time.
(Example) modificationPeriodCoeff (n2) × defaultPagingCycle (rf32) = 640 ms

1. Execute **RRCUPDATE PAGING** to set **Call Processing Parameter - radioResourceConfigCommon Update** to **Paging**.

NOTE 2: This setting is required once at the beginning of the measurement sequence.

C) Turn UE power OFF and ON

Turn the UE power OFF and ON to update the broadcast information.
Use this procedure when procedures A and B cannot be used.

1. Disconnect Test Mode (→2.1.4).
2. Turn off UE power.
3. Turn on UE power.
4. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
   Repeat steps 4 when the checked status is not 2 (= Idle (Regist)).
5. Connect to Test Mode (→2.1.4).

NOTE 1: This procedure is required to update the broadcast information.

2.2. 2DL CA without UL CA/2DL CA with UL CA

In this chapter, the 2CA test procedure is different between the MT8820C and MT8821C.
This chapter explains each test procedure for the MT8820C and MT8821C, respectively.

Note:

For the MT8820C test procedure, the measurement procedure explained in this chapter is an example where [PCC] and [SCC] are used as Primary Cell and Secondary Cell respectively for LTE-Advanced FDD DL CA connection. Refer to the operation manual for details of the GPIB commands and manual operations. Characters in **BOLD RED** (PCC operations), **BOLD BLUE** (SCC-1 operations) and **BOLD GREEN** (both PCC and SCC operations) are GPIB commands.

Operation	Description
Operation for PCC	**[PCC]**
Operation for SCC-1	**[SCC-1]**
Operation for all CCs	**[PCC/SCC]**

2.2.1. Connection Diagram

2.2.1.1. Connection Diagram for MT8820C 2DL/1UL CA or 2DL/2UL CA

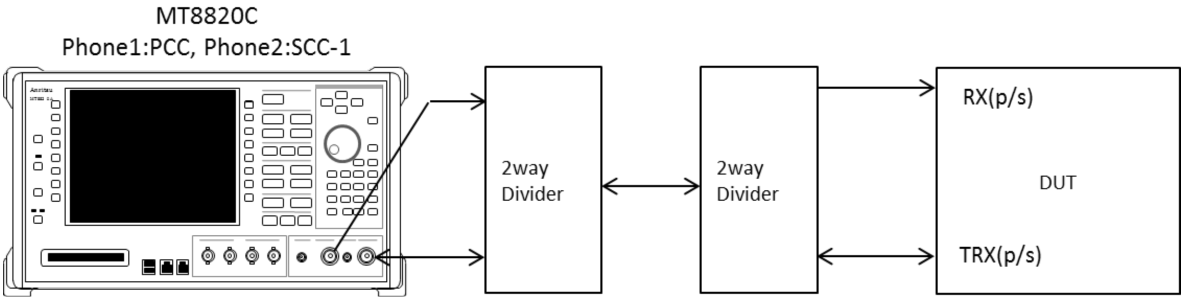


Figure 2.2.1-1 ***Connection Diagram for 2DL/1UL CA or 2DL/2UL CA, Tx and Rx test (MT8820C with PPM HW, using divider)***

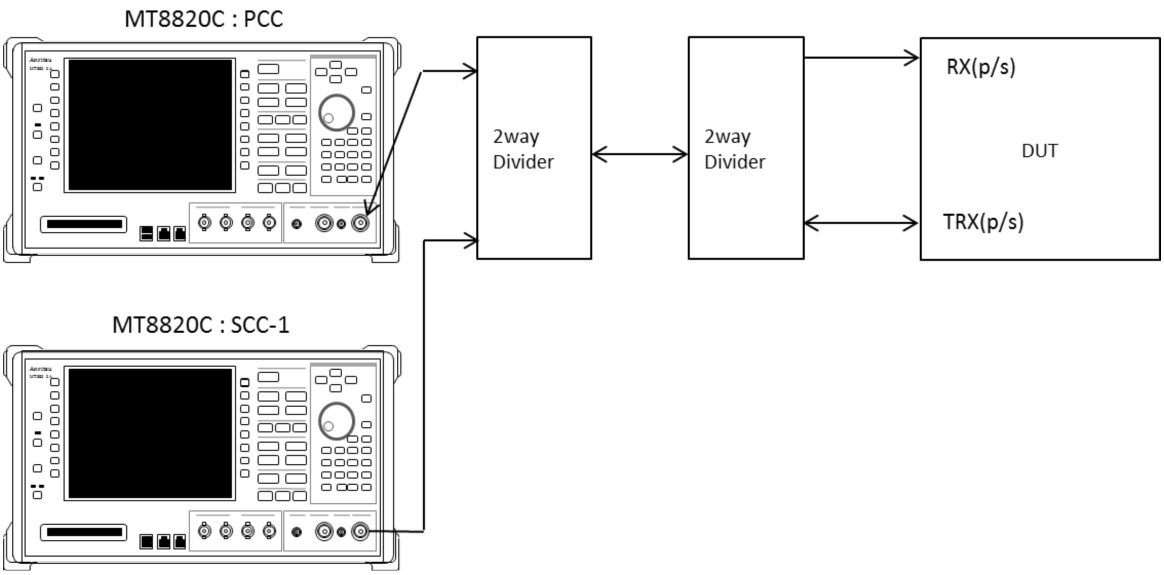
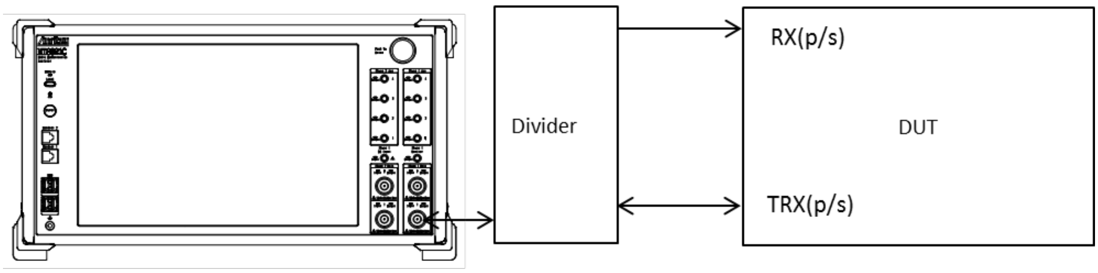


Figure 2.2.1-2 ***Connection Diagram for 2DL/1UL CA or 2DL/2UL CA Tx and Rx test (MT8820Cs with SPM HW, using dividers)***

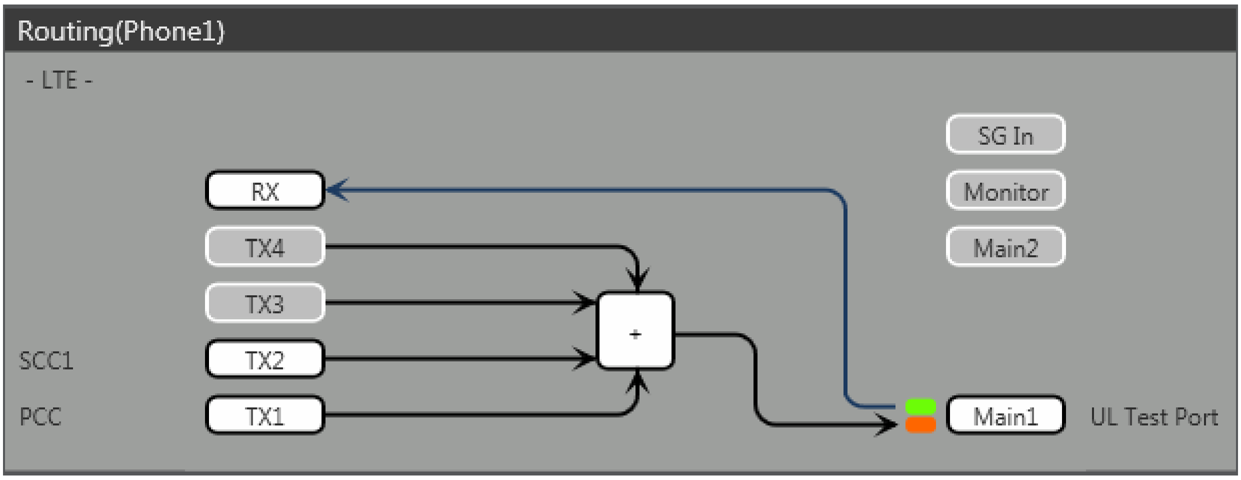
2.2.1.2. Connection Diagram for MT8821C 2DL/1UL CA

2.2.1.2.1. Connection using Main Connector

This example shows the connection diagram for the 2DL/1UL CA condition. DL signals of PCC and SCC1 are combined by the internal combiners of the MT8821C and output at Main1 connector of Phone1.



<Connection Diagram>



<Internal Routing Diagram>

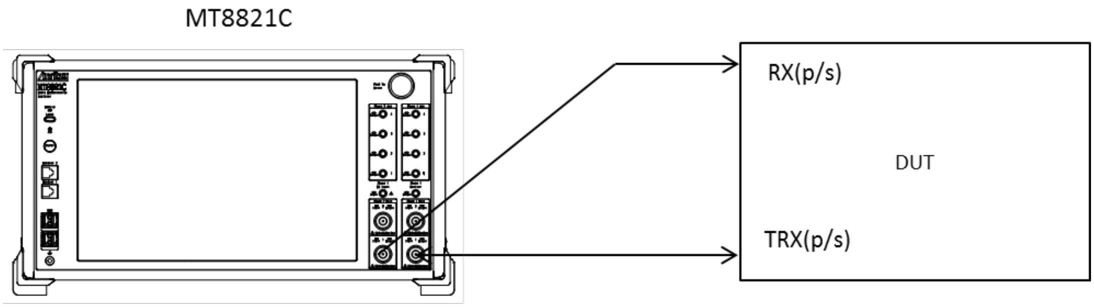
Figure 2.2.1-3 ***Connection Diagram and Internal Routing Diagram for 2DL CA and 1UL CA, Tx and Rx test (MT8821C, using dividers)***

[Routing setting procedure]

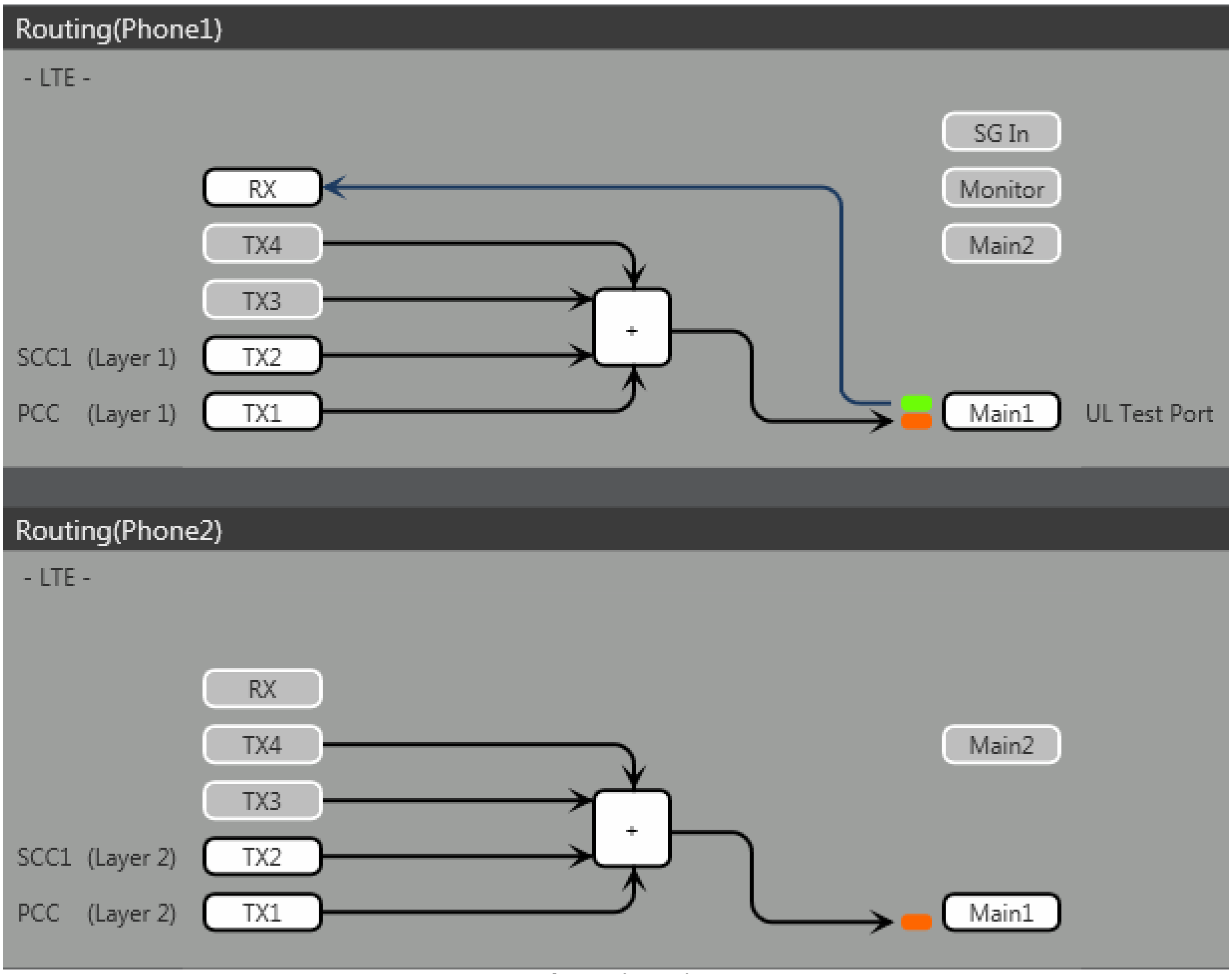
1. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx1** to **Main**.
2. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx2** to **Main**.

2.2.1.2.2. Connection using Main Connector (Rx diversity)

This example shows the connection diagram for the 2DL/1UL CA and Rx diversity condition. DL signals of PCC and SCC1 are combined by the internal combiners of MT8821C and output at both Main1 connector of Phone1 and Main1 connector of Phone2.



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.2.1-4 ***Connection Diagram and Internal Routing Diagram for 2DL CA and 1UL CA, Tx and Rx Test (MT8821C, antenna configuration set to Rx Diversity)***

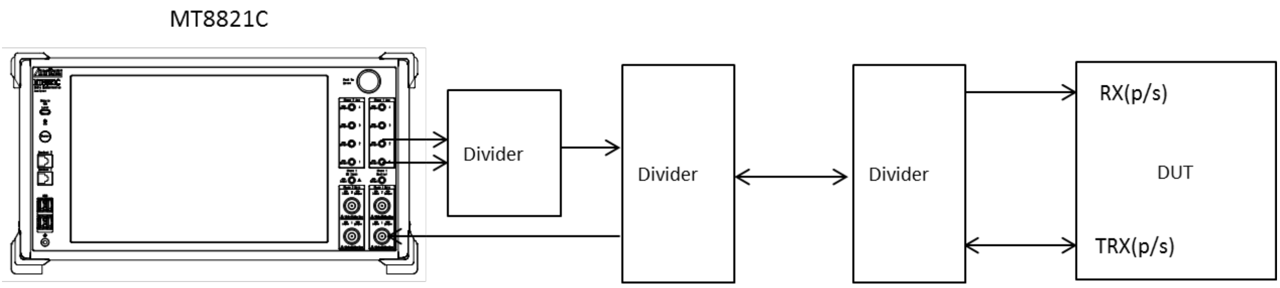
[Routing setting procedure]

1. Execute **ANTCONFIG RX_DIVERSITY** to set **Common Parameter - Antenna Configuration** to **Rx Diversity**.
2. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx1** to **Main**.
3. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx2** to **Main**.
4. Execute **TXOUT_P2 1, MAIN** to set the output connector **System Config – Routing (Phone2) - Tx1** to **Main**.
5. Execute **TXOUT_P2 2, MAIN** to set the output connector **System Config – Routing (Phone2) - Tx2** to **Main**.

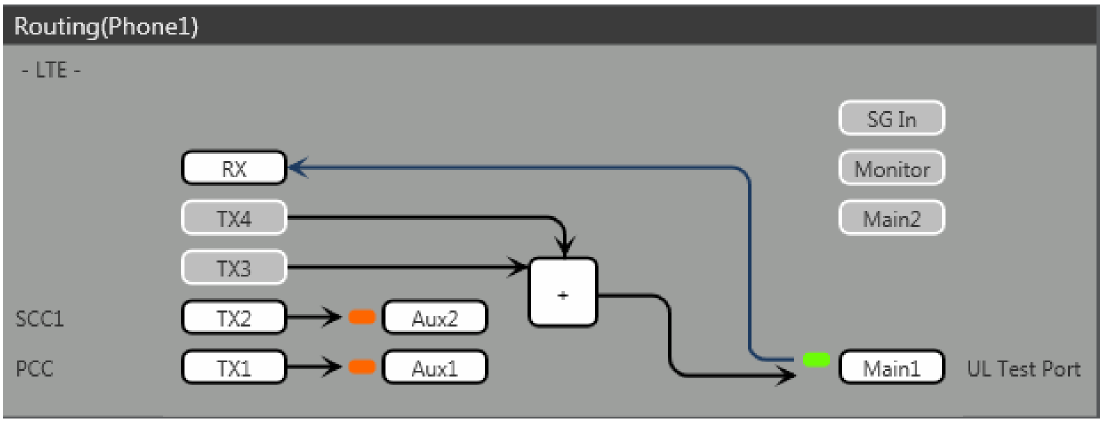
Note: When Both the Phone1 and Phone2 LTE measurement software are active, Receiver Diversity can be selected at the Phone1 side only.

2.2.1.2.3. Connection using Aux Connector

This example shows the connection diagram for the 2DL/1UL CA condition using Aux connectors. The DL signal of PCC is output at the Aux1 connector and that of SCC-1 is output at the Aux2 connector, respectively



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.2.1-5 ***Connection Diagram and Internal Routing Diagram for 2DL CA and 1UL CA, Tx and Rx Test (MT8821C, using Aux connectors)***

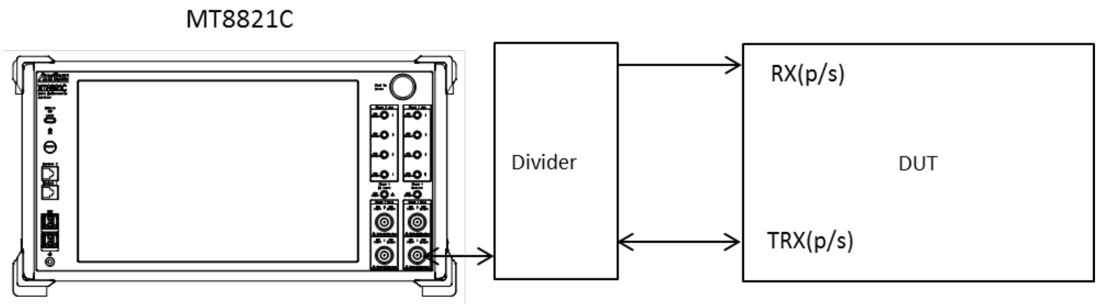
[Routing setting procedure]

1. Execute **TXOUT 1, AUX** to set the output connector **System Config – Routing (Phone1) - Tx1** to **Aux1**.
2. Execute **TXOUT 2, AUX** to set the output connector **System Config – Routing (Phone1) - Tx2** to **Aux2**.

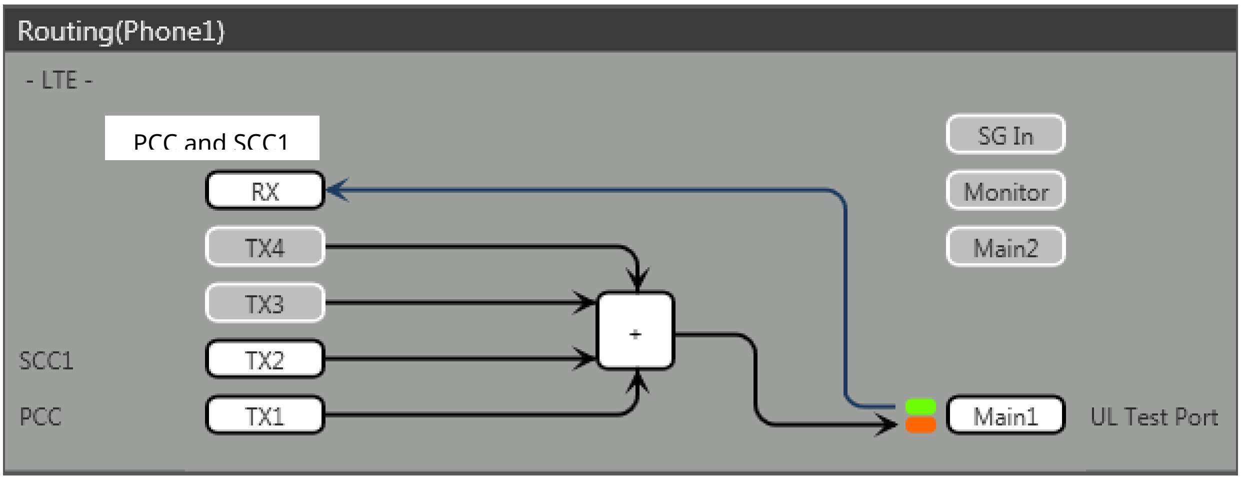
2.2.1.3. Connection Diagram for MT8821C 2DL/2UL CA

2.2.1.3.1. Connection using Main Connector

This example shows the connection diagram for the 2DL/2UL CA condition. The DL signals of PCC and SCC1 are combined by the internal combiners of the MT8821C and output at the Main1 connector of Phone1.
The MT8821C can measure the Tx signals of both of PCC and SCC1 at the Main1 connector of Phone1.



<Connection Diagram>



<Internal Routing Diagram>

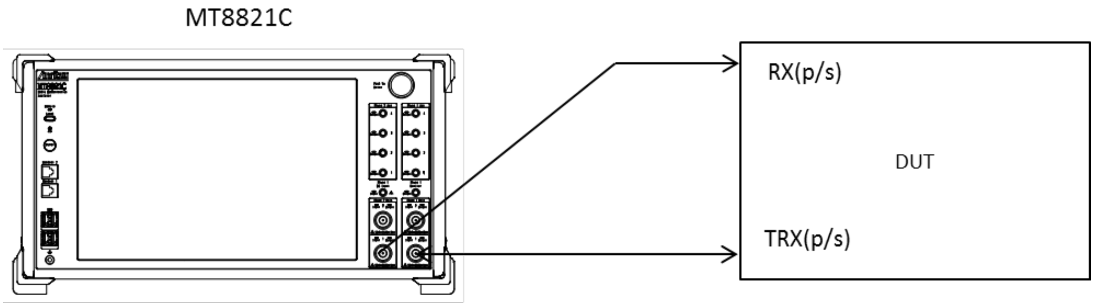
Figure 2.2.1-6 ***Connection Diagram and Internal Routing Diagram for 2DL CA and 2UL CA, Tx and Rx Test (MT8821C, using divider)***

[Routing setting procedure]

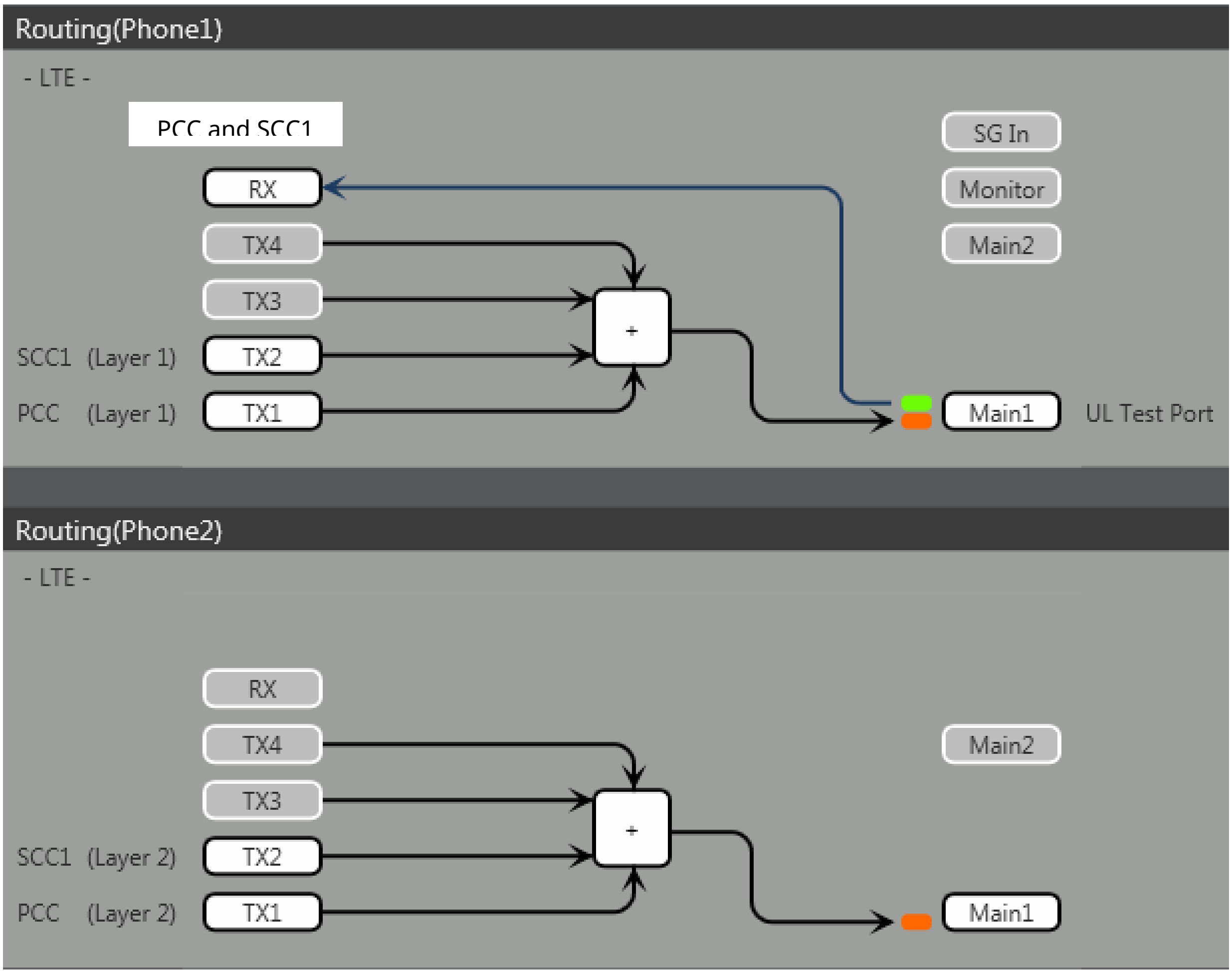
1. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx1** to **Main**.
2. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx2** to **Main**.

2.2.1.3.2. Connection using Main Connector (Rx diversity)

This example shows the connection diagram for the 2DL/1UL CA and Rx diversity condition. The DL signals of PCC and SCC1 are combined by the internal combiners of MT8821C and output at both Main1 connector of Phone1 and Main1 connector of Phone2.



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.2.1-7 ***Connection Diagram and Internal Routing Diagram for 2DL CA and 2UL CA, Tx and Rx Test (MT8821C, antenna configuration set to Rx Diversity)***

[Routing setting procedure]

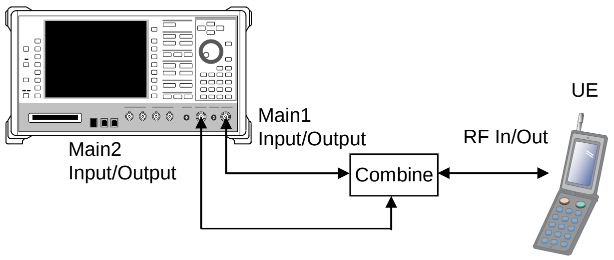
1. Execute **ANTCONFIG, RX_DIVERSITY** to set **Common Parameter - Antenna Configuration** to **Rx Diversity**.
2. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx1** to **Main**.
3. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing (Phone1) - Tx2** to **Main**.
4. Execute **TXOUT_P2 1, MAIN** to set the output connector **System Config – Routing (Phone2) - Tx1** to **Main**.
5. Execute **TXOUT_P2 2, MAIN** to set the output connector **System Config – Routing (Phone2) - Tx2** to **Main**.

2.2.2. Synchronizing Frame Timing between 2 Cells

This chapter is only for the MT8820C.
The frame timing between two cells must be synchronized when connecting using LTE-Advanced (CA).

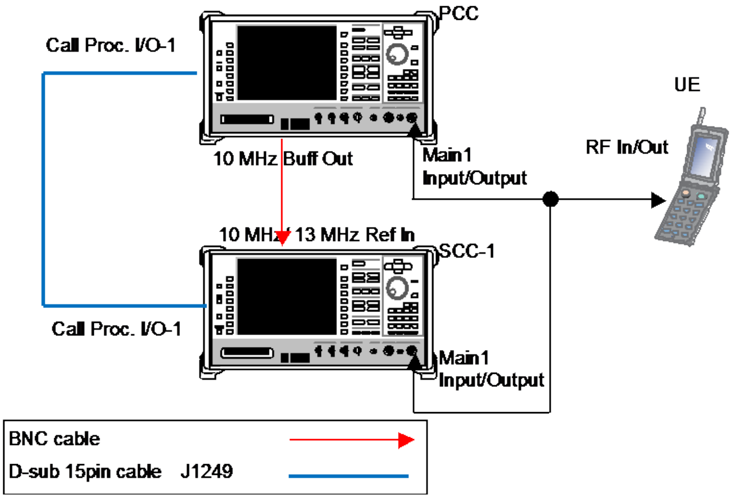
<Using Main 1 and Main 2 with one MT8820C unit including ParallelPhone measurement option>

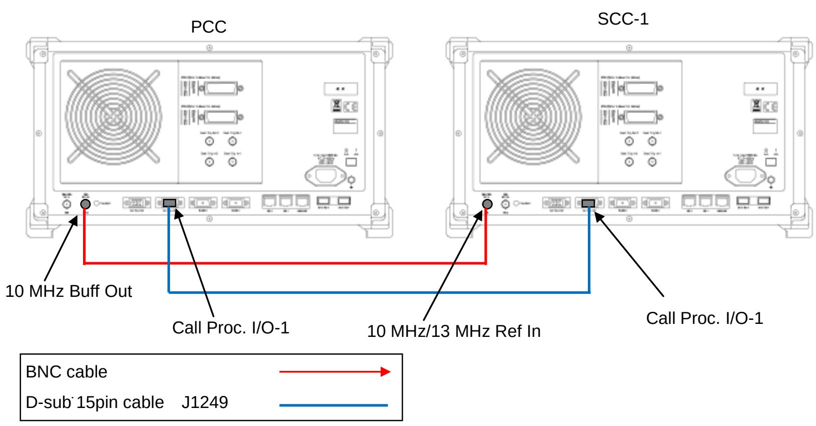
1. **[SCC-1]** Execute **ENTERSYNC INT_SLAVE** to set the frame timing synchronization processing slave status.
2. **[PCC]** Execute **ENTERSYNC MASTER** to perform frame timing synchronization processing.
3. **[SCC-1]** Execute **ENTERSYNC?** to query that the response is 1 (synchronization established).



<Using two MT8820C units>

1. Setup the two MT8820C units as shown below.





DL CA 2CCs Test Connection Setup

2. **[SCC-1]** Execute **REF 10MHZEXT** to set **Ref. Frequency** to **10 MHz (EXT)**.
3. **[SCC-1]** Execute **ENTERSYNC EXT_SLAVE** to set the frame timing synchronization processing slave status.
4. **[PCC]** Execute **ENTERSYNC MASTER** to perform frame timing synchronization processing.
5. **[SCC-1]** Execute **ENTERSYNC?** to query that the response is 1 (synchronization established).

NOTE 1: Since the DL CA 2CCs test connections differ according to the terminal specifications, check the connections described in TS36.508 Figure A.32a, b, c.

2.2.3. Initial Condition Setting

The initial conditions must be set before measurement.
A setting example for UL/DL Channel at each condition is shown in the following table.

Component Carrier	Channel	Intra-Band (FDD)	Inter-Band (FDD)	Intra-Band (TDD)	Inter-Band (TDD)
PCC	UL Channel	18200 (Band1)	18200 (Band1)	38000 (Band38)	38000 (Band38)
	DL Channel	200 (Band1)	200 (Band1)	38000 (Band38)	38000 (Band38)
	Bandwidth	20MHz	10MHz	10MHz	10MHz
SCC-1	UL Channel	18398 (Band1)	20525 (Band5)	-	39150 (Band40)
	DL Channel	398 (Band1)	2525 (Band5)	38099 (Band38)	39150 (Band40)
	Bandwidth	20MHz	10MHz	10MHz	10MHz

NOTE 1: UL CA Measurement requires UL Channel setting.
NOTE 2: For MT8820C, Intra-Band Contiguous on UL CA is NOT supported.

2.2.3.1. MT8820C

2.2.3.1.1. Setting Example 1 (Intra-Band Contiguous FDD DL CA and UL CA)

This chapter describes a setting example for Duplex Mode set to FDD, Intra-Band DL CA and UL CA.
Set both Test Channel Bandwidth PCC and SCC to 20 MHz.

1. **[PCC/SCC]** Execute **PRESET** to initialize parameters.
2. **[PCC]** Execute **CHCODING RMC_DLUL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC(DL/UL CA-PCC)**.
3. **[PCC]** Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **ON**.
4. **[PCC]** Execute **DLCHAN 200** to set **Common Parameter - Frequency - DL Channel** to **200** simultaneously with UL Channel to **18200**.
5. **[PCC]** Execute **DLCHAN_SCC1 398** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL Channel** to **398**
6. **[PCC]** Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **20 MHz**.
7. **[PCC]** Execute **BANDWIDTH_SCC1 20MHZ** to set **Call Processing Parameter - Carrier aggregation SCC-1 - Channel Bandwidth** to **20 MHz**.
8. **[SCC-1]** Execute **CHCODING RMC_DLUL_CA_SCC** to set **Common Parameter - Channel Coding** to **RMC (DL/UL CA - SCC)**.
9. **[SCC-1]** Execute **CALLPROC OFF** to set **Common Parameter - Call Processing** to **OFF**.
10. **[SCC-1]** Execute **DLCHAN 398** to set **Common Parameter - Frequency - DL Channel** to **398** simultaneously with **UL Channel** to **18299**.
11. **[SCC-1]** Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **20 MHz**.

2.2.3.1.2. Setting Example 2 (Inter Band FDD DL CA without UL CA)

This chapter describes a setting example for Duplex Mode set to FDD, Inter-Band DL CA without UL CA.

1. **[PCC/SCC]** Execute **PRESET** to initialize parameters.
2. **[PCC]** Execute **CHCODING RMC_DL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC(DL CA-PCC)**.
3. **[PCC]** Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **ON**.
4. **[PCC]** Execute **DLCHAN 200** to set **Common Parameter - Frequency - DL Channel** to **200** simultaneously with **UL Channel** to **18200**.
5. **[PCC]** Execute **DLCHAN_SCC1 2525** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL Channel** to **2525**.
6. **[PCC]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **10 MHz**.
7. **[PCC]** Execute **BANDWIDTH_SCC1 10MHZ** to set **Call Processing Parameter - Carrier aggregation SCC-1 - Channel Bandwidth** to **10 MHz**.
8. **[SCC-1]** Execute **CHCODING RMC_DLUL_CA_SCC** to set **Common Parameter - Channel Coding** to **RMC (DL/UL CA - SCC)**.
9. **[SCC-1]** Execute **CALLPROC OFF** to set **Common Parameter - Call Processing** to **OFF**.
10. **[SCC-1]** Execute **DLCHAN 2525** to set **Common Parameter - Frequency - DL Channel** to **2525**.
11. **[SCC-1]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **10 MHz**.

2.2.3.1.3. Setting Example 3 (Intra-Band TDD DL CA without UL CA)

This chapter describes a setting example for Duplex Mode set to TDD, Intra-Band DL CA without UL CA.
The Uplink/Downlink Configuration is set to 1, and Special Subframe Configuration is set to 4.
Follow the procedure in Chapter 2.2.3.1.2 replacing Step 4, 5, 10 and 11, followed by Step 14 and 15 as below.

4. **[PCC]** Execute **DLCHAN 38000** to set **Common Parameter - Frequency - DLChannel** simultaneously with **UL Channel** to **38000**.
5. **[PCC]** Execute **DLCHAN_SCC1 38099** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL Channel** to **38099**.

10. **[SCC-1]** Execute **ULCHAN_PCC 38000** to set **Call Processing Parameter - Carrier aggregation PCC - UL Channel** to **38000.**
11. **[SCC-1]** Execute **DLCHAN 38099** to set **Common Parameter – Frequency - DL Channel** to **38099**.

14. **[PCC/SCC]** Execute **TDDULDLCONF 1** to set **Common Parameter - TDD Uplink/Downlink Configuration** to **1**.
15. **[PCC/SCC]** Execute **TDDSSFCONF 4** to set **Common Parameter - TDD Special Subframe Configuration** to **4**.

    NOTE 1: Set same value as Uplink/Downlink Configuration in PCC and SCC.
    NOTE 2: Set same value as Special Subframe Configuration in PCC and SCC.

2.2.3.1.4. Setting Example 4 (Inter-Band TDD DL CA and UL CA)

This chapter describes a setting example for Duplex Mode set to TDD, Inter-Band DL CA and UL CA
The Uplink/Downlink Configuration is set to 2, and Special Subframe Configuration is set to 5.
Follow the procedure in Chapter 2.2.3.1.1 replacing with Step 4, 5, 10 and 11, followed by Step 12 and 13 as below.

4. **[PCC]** Execute **DLCHAN 38000** to set **Common Parameter - Frequency - DL Channel** simultaneously with **UL Channel** to **38000**.
5. **[PCC]** Execute **DLCHAN_SCC1 39150** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL Channel** to **39150**.

10. **[SCC-1]** Execute **DLCHAN 39150** to set **Common Parameter - Frequency - DL Channel** simultaneously with **UL Channel** to **39150**.

12. **[PCC/SCC]** Execute **TDDULDLCONF 2** to set **Common Parameter - TDD Uplink/Downlink Configuration** to **2**.
13. **[PCC/SCC]** Execute **TDDSSFCONF 5** to set **Common Parameter - TDD Special Subframe Configuration** to **5**.

    NOTE 1: Set same value as Uplink/Downlink Configuration in PCC and SCC.
    NOTE 2: Set same value as Special Subframe Configuration in PCC and SCC.

2.2.3.1.5. Setting Example 5 (FDD-TDD DL CA without UL CA for PCell FDD)

This chapter describes a setting example for PCC Duplex Mode set to FDD, SCC Duplex Mode set to TDD, DL CA without UL CA. The SCC Uplink/Downlink Configuration is set to 2, and Special Subframe Configuration is set to 5.

1. **[PCC/SCC]** Execute **PRESET** to initialize parameters.
2. **[PCC]** Execute **CHCODING RMC_DLUL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC(DL/UL CA-PCC)**.
3. **[PCC]** Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **ON**.
4. **[PCC]** Execute **DLCHAN 200** to set **Common Parameter - Frequency - DL Channel** to **200** simultaneously with UL Channel to **18200**.
5. **[PCC]** Execute **DLCHAN_SCC1 38000** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL Channel** to **38000**
6. **[PCC]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **10 MHz**.
7. **[PCC]** Execute **BANDWIDTH_SCC1 10MHZ** to set **Call Processing Parameter - Carrier aggregation SCC-1 - Channel Bandwidth** to **10 MHz**.
8. **[PCC]** Execute **TDDULDLCONF_SCC1 2** to set **Call Processing Parameter - Carrier aggregation SCC-1 - TDD Uplink/Downlink Configuration** to **2**.
9. **[PCC]** Execute **TDDSSFCONF_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - TDD Special Subframe Configuration** to **5**.
10. **[SCC-1]** Execute **CHCODING RMC_DLUL_CA_SCC** to set **Common Parameter - Channel Coding** to **RMC (DL/UL CA - SCC)**.
11. **[SCC-1]** Execute **CALLPROC OFF** to set **Common Parameter - Call Processing** to **OFF**.
12. **[SCC-1]** Execute **DLCHAN 38000** to set **Common Parameter - Frequency - DL Channel** to **38000**.
13. **[SCC-1]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **10 MHz**.
14. **[SCC-1]** Execute **ULCHAN_PCC 18200** to set **Call Processing Parameter - Carrier aggregation PCC - UL Channel** to **18200**.

2.2.3.1.6. Setting Example 6 (FDD-TDD DL CA without UL CA for PCell TDD)

This chapter describes a setting example for PCC Duplex Mode set to TDD, SCC Duplex Mode set to FDD, DL CA without UL CA. PCC supports only Uplink/Downlink Configuration 1.

1. **[PCC/SCC]** Execute **PRESET** to initialize parameters.
2. **[PCC]** Execute **CHCODING RMC_DLUL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC(DL/UL CA-PCC)**.
3. **[PCC]** Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **ON**.
4. **[PCC]** Execute **DLCHAN 38000** to set **Common Parameter - Frequency - DL Channel** simultaneously with UL Channel to **38000**.
5. **[PCC]** Execute **DLCHAN_SCC1 200** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL Channel** to **200**
6. **[PCC]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **10 MHz**.
7. **[PCC]** Execute **BANDWIDTH_SCC1 10MHZ** to set **Call Processing Parameter - Carrier aggregation SCC-1 - Channel Bandwidth** to **10 MHz**.
8. **[PCC]** Execute **TDDULDLCONF 1** to set **Common Parameter - TDD Uplink/Downlink Configuration** to **1**.
9. **[PCC]** Execute **TDDSSFCONF 4** to set **Common Parameter - TDD Special Subframe Configuration** to **4**.
10. **[SCC-1]** Execute **CHCODING RMC_DLUL_CA_SCC** to set **Common Parameter - Channel Coding** to **RMC (DL/UL CA - SCC)**.
11. **[SCC-1]** Execute **CALLPROC OFF** to set **Common Parameter - Call Processing** to **OFF**.
12. **[SCC-1]** Execute **DLCHAN 200** to set **Common Parameter - Frequency - DL Channel** to **200**.
13. **[SCC-1]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Frequency - Channel Bandwidth** to **10 MHz**.
14. **[SCC-1]** Execute **ULCHAN_PCC 38000** to set **Call Processing Parameter - Carrier aggregation PCC - UL Channel** to **38000**.
15. **[SCC-1]** Execute **TDDULDLCONF_PCC 1** to set **Call Processing Parameter - Carrier aggregation PCC - TDD Uplink/Downlink Configuration** to **1**.

2.2.3.2. MT8821C

2.2.3.2.1. Setting Example 1 (Intra-Band FDD DL CA and UL CA)

This chapter describes a setting example for Duplex Mode set to FDD, Intra-Band DL CA and UL CA.
Set both Test Channel Bandwidth PCC and SCC to 20 MHz.

6. Execute **PRESET** to initialize parameters.
7. Execute **CHCODING RMC_DLUL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC(DL/UL CA)**.
8. Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **ON**.
9. Execute **DLCHAN 200** to set **Common Parameter - Frequency - DL Channel** to **200** simultaneously with **UL Channel** to **18200**.
10. Execute **DLCHAN_SCC1 398** to set **Common Parameter - SCC-1 - DL Channel** to **398**.
11. Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Channel Bandwidth** to **20 MHz**.
12. Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter - SCC-1 - Channel Bandwidth** to **20 MHz**.

2.2.3.2.2. Setting Example 2 (Inter-Band FDD DL CA without UL CA)

This chapter describes a setting example for Duplex Mode set to FDD, Inter-Band DL CA without UL CA.

1. Execute **PRESET** to initialize parameters.
2. Execute **CHCODING RMC_DL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC(DL CA)**.
3. Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **ON**.
4. Execute **DLCHAN 200** to set **Common Parameter - Frequency - DL Channel** to **200** simultaneously with **UL Channel** to **18200**.
5. Execute **DLCHAN_SCC1 2525** to set **Common Parameter - SCC-1 - DL Channel** to **2525**.
6. Execute **BANDWIDTH 10MHz** to set **Common Parameter - Channel Bandwidth** to **10 MHz**.
7. Execute **BANDWIDTH_SCC1 10MHZ** to set **Common Parameter - SCC-1 - Channel Bandwidth** to**10 MHz**.

2.2.3.2.3. Setting Example 3 (Intra-Band TDD DL CA without UL CA)

This chapter describes a setting example for Duplex Mode set to TDD, Intra-Band DL CA without UL CA.
The Uplink/Downlink Configuration is set to 1, and Special Subframe Configuration is set to 4.
Follow the procedure in Chapter 2.2.3.2.2 replacing Step 4, 5 and followed by Step 6 and 7 as below.

4. Execute **DLCHAN 38000** to set **Common Parameter - DLChannel** simultaneously with **UL Channel** to **38000**.
5. Execute **DLCHAN_SCC1 38099** to set **Common Parameter - SCC-1 - DL Channel** to **38099**.
6. Execute **TDDULDLCONF 1** to set **Common Parameter - TDD Uplink/Downlink Configuration** to **1**.
7. Execute **TDDSSFCONF 4** to set **Common Parameter - TDD Special Subframe Configuration** to **4**.

NOTE 1: Set same value as Uplink/Downlink Configuration in PCC and SCC.
NOTE 2: Set same value as Special Subframe Configuration in PCC and SCC.

2.2.3.2.4. Setting Example 4 (Inter Band TDD DL CA and UL CA)

This chapter describes a setting example for Duplex Mode set to TDD, Inter-Band DL CA and UL CA.
The Uplink/Downlink Configuration is set to 2, and Special Subframe Configuration is set to 5.
Follow the procedure in Chapter 2.2.3.2.1 replacing with Step 4, 5 and followed by Step 6 and 7 as below.

4. Execute **DLCHAN 38000** to set **Common Parameter - DL Channel** simultaneously with **UL Channel** to **38000**.
5. Execute **DLCHAN_SCC1 39150** to set **Common Parameter - SCC-1 - DL Channel** to **39150**.
6. Execute **TDDULDLCONF 2** to set **Common Parameter - TDD Uplink/Downlink Configuration** to **2**.
7. Execute **TDDSSFCONF 5** to set **Common Parameter - TDD Special Subframe Configuration** to **5**.

NOTE 1: Set same value as Uplink/Downlink Configuration in PCC and SCC.
NOTE 2: Set same value as Special Subframe Configuration in PCC and SCC.

2.2.4. Location Registration

This performs UE location registration after setting the initial conditions (→2.2.3).

2.2.4.1. MT8820C

1. Connect the UE and MT8820C.
2. **[SCC-1]** Execute **LVL OFF** to set **SCell Common Parameter - Output** to **Off**.
3. **[PCC]** Execute **CALLSO** to clear the call processing status.
4. **[PCC]** Execute **CALLSTAT?** to query the call processing status is 1 (= idle).
5. Set the UE to On.
6. **[PCC]** Execute **CALLSTAT?** to query the call processing status is 2 (= Idle (Regist)).
   (If not 2 (= Idle (Regist)), repeat step 6.)
7. **[SCC-1]** Execute **LVL ON** to set **SCell output** to **off**.

2.2.4.2. MT8821C

1. Connect UE and MT8821C.
2. Execute **CALLPROC ON** to set **Common Parameter - Call processing** to **ON**.
3. Execute **CALLSO** to clear call processing status.
4. Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
5. Turn on UE power.
6. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
   Repeat step 6 when the checked status is not 2 (= Idle (Regist)).

2.2.5. Test Mode Connection and Disconnection

Refer to chapter 2.1.4.

2.2.6. Inter-Frequency Handover

This chapter describes a setting example when Operating Band is 1, and Test Frequency is High range.

2.2.6.1. MT8820C

<Changing PCC channel>

1. **[PCC]** Execute **DLCHAN 302** to set **Common Parameter - Frequency - UL Channel** and **DL Channel** to **18302** and **302**, respectively.
2. **[SCC-1]** Execute **ULCHAN_PCC 18302** to set **Call Processing Parameter - Carrier aggregation PCC - UL Channel** to **18302**.
3. **[PCC]** Execute **CALLSTATIC?** to confirm call processing status is **6 (= Connected)**

<Changing SCC channel>

4. **[SCC-1]** Execute **DLCHAN 500** to set **Common Parameter - DL Channel** to **500**.
5. **[PCC]** Execute **DLCHAN_SCC1 500** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL Channel** to **500**.
6. **[PCC]** Execute **CALLSTATIC?** to confirm call processing status is **6 (= Connected)**

NOTE: Change the SCC-1 Channel before the PCC Channel. If the PCC Channel is changed first, the UE might lose sight of SCC-1.

< Changing PCC channel and SCC-1 channel at same time >

Cell	Channel (before)	Channel (after)
PCC	300	498
SCC-1	498	300

1. **[PCC]** Execute **ACT_SCC1 OFF** to set **Call Processing Parameter - Carrier Aggregation - SCC-1 Activation** to **Off**.
2. **[SCC-1]** Execute **DLCHAN 300** to set **Common Parameter - DL Channel** to **300**.
3. **[PCC]** Execute **DLCHAN 498, 300** to set **Common Parameter - UL Channel** and **DL Channel** to **18498** and **498**, respectively.
   Moreover, set **Call Processing Parameter - Carrier Aggregation - SCC-1 DL Channel** to **300**.
4. **[SCC-1]** Execute **ULCHAN_PCC 18498** to set **Call Processing Parameter - Carrier aggregation PCC - UL Channel** to **18498**.
5. **[PCC]** Execute **ACT_SCC1 ON** to set **Call Processing Parameter - Carrier Aggregation - SCC-1 Activation** to **On**.

NOTE: The ULCHAN_PCC Command need not be run for UL CA.

2.2.6.2. MT8821C

<Changing PCC channel>
1. Execute **DLCHAN 302** to set **Common Parameter - UL Channel** and **DL Channel** to **18302** and **302**, respectively.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

<Changing SCC-1 channel>
1. Execute **DLCHAN_SCC1 500** to set **Common Parameter - SCC-1 - DL Channel** to **500**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

<Changing PCC channel and SCC-1 channel at the same time>11

Cell	Channel (before HO)	Channel (after HO)
PCC	300	498
SCC-1	498	300

1. Execute **DLCHAN 498, 300** to set **Common Parameter - UL Channel and DL Channel** to **18498** and **498**, respectively. Moreover, set **Call Processing Parameter - SCC-1 DL Channel** to **300**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

<Swap PCC and SCC-1 simultaneously>
The SWAPHO command can completely swap PCC and SCC-1, including the channel bandwidth, DL/UL channel and frequency setting, level setting and DL/UL RMC setting.

1. Execute **TCC_SWAPHO SCC1** to set **Call Processing Parameter - Carrier Aggregation - Target CC for Swap HO** to **SCC1**.
2. Execute **SWAPHO** to swap PCC and SCC-1 by handover procedure.
3. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

2.2.7. Bandwidth Handover

This chapter describes a setting example when Channel Bandwidth PCC and SCC are 20 MHz and 15 MHz, respectively.

2.2.7.1. MT8820C

<Changing PCC Bandwidth>
1. **[PCC]** Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Channel Bandwidth** to **20 MHz**.
2. **[SCC-1]** Execute **BANDWIDTH_PCC 20MHZ** to set **Call Processing Parameter - Carrier aggregation PCC - Channel Bandwidth** to **20 MHz**.
3. **[PCC]** Execute **CALLSTATIC?** to confirm call processing status is **6 (= Connected)**

<Changing SCC Bandwidth>
3. **[PCC]** Execute **BANDWIDTH_SCC1 15MHZ** to set **Call Processing Parameter - Carrier aggregation SCC-1 - Channel Bandwidth** to **15 MHz**.
4. **[SCC-1]** Execute **BANDWIDTH 15MHZ** to set **Common Parameter - Channel Bandwidth** to **15 MHz**.
5. **[PCC]** Execute **CALLSTATIC?** to confirm call processing status is **6 (= Connected)**

2.2.7.2. MT8821C

<Changing PCC Bandwidth>
1. Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Channel Bandwidth** to **20 MHz**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

<Changing SCC Bandwidth>
3. Execute **BANDWIDTH_SCC1 15MHZ** to set **Common Parameter - SCC-1 - Channel Bandwidth** to **15 MHz**.
4. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

2.2.8. Changing DL/UL RB Allocation and MCS Index of each CCs

This chapter describes a setting example when Channel Bandwidth is 10 MHz.

2.2.8.1. MT8820C

1. Changing PCC DL RB Allocation and MCS Indexes

1. **[PCC]** Execute **DLRMC_RB 25** to set **Common Parameter - DL RMC - Number of RB** to **25**.
2. **[PCC]** Execute **DLIMCS1 5** to set **Common Parameter - DL RMC - MCS Index 1** to **5**.
3. **[PCC]** Execute **DLIMCS2 6** to set **Common Parameter - DL RMC - MCS Index 2** to **6**.
4. **[PCC]** Execute **DLIMCS3 7** to set **Common Parameter - DL RMC - MCS Index 3** to **7**.

<When TDD CA>

5. **[PCC]** Execute **DLIMCS4 8** to set **Common Parameter - DL RMC - MCS Index 4** to **8**.

2. Changing SCC-1 DL RB Allocation and MCS Indexes

1. **[PCC]** Execute **DLRMC_RB_SCC1 25** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - Number of RB** to **25**.
2. **[PCC]** Execute **DLIMCS1_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **5**.
3. **[PCC]** Execute **DLIMCS2_SCC1 6** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **6**.
4. **[PCC]** Execute **DLIMCS3_SCC1 7** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **7**.
5. **[SCC-1]** Execute **DLRMC_RB 25** to set **Common Parameter - DL RMC - Number of RB** to **25**.
6. **[SCC-1]** Execute **DLIMCS1 5** to set **Common Parameter - DL RMC - MCS Index 1** to **5**.
7. **[SCC-1]** Execute **DLIMCS2 6** to set **Common Parameter - DL RMC - MCS Index 2** to **6**.
8. **[SCC-1]** Execute **DLIMCS3 7** to set **Common Parameter - DL RMC - MCS Index 3** to **7**.

<When TDD CA>

9. **[PCC]** Execute **DLIMCS4_SCC1 8** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 4** to **8**.
10. **[SCC-1]** Execute **DLIMCS4 8** to set **Common Parameter - DL RMC - MCS Index 4** to **8**.

3. Changing PCC UL RB Allocation and MCS Index

1. **[PCC]** Execute **ULRMC_RB 20** to set **Common Parameter - UL RMC - Number of RB** to **20**.
2. **[PCC]** Execute **ULRB_START 5** to set **Common Parameter - UL RMC - Starting RB** to **5**.
3. **[PCC]** Execute **ULIMCS 6** to set **Common Parameter - UL RMC - MCS Index** to **6**.

<When DL CA without UL CA>

4. **[SCC-1]** Execute **ULRMC_RB_PCC 20** to set **Call Processing Parameter - Carrier aggregation PCC - UL RMC - Number of RB** to **20**.
5. **[SCC-1]** Execute **ULRB_START_PCC 5** to set **Call Processing Parameter – Carrier aggregation PCC - UL RMC - Starting RB** to **5**.
6. **[SCC-1]** Execute **ULIMCS_PCC 6** to set **Call Processing Parameter - Carrier aggregation PCC - UL RMC - MCS Index** to **6**.

4. Changing SCC-1 UL RB Allocation and MCS Index

1. **[SCC-1]** Execute **ULRMC_RB 20** to set **Common Parameter - UL RMC - Number of RB** to **20**.
2. **[SCC-1]** Execute **ULRB_START 5** to set **Common Parameter - UL RMC - Starting RB** to **5**.
3. **[SCC-1]** Execute **ULIMCS 6** to set **Common Parameter - UL RMC - MCS Index** to **6**.

2.2.8.2. MT8821C

1. Changing PCC DL RB Allocation and MCS Indexes

1. Execute **DLRMC_RB 25** to set **Common Parameter - DL RMC - Number of RB** to **25**.
2. Execute **DLIMCS1 5** to set **Common Parameter - DL RMC - MCS Index 1** to **5**.
3. Execute **DLIMCS2 6** to set **Common Parameter - DL RMC - MCS Index 2** to **6**.
4. Execute **DLIMCS3 7** to set **Common Parameter - DL RMC - MCS Index 3** to **7**.

<When TDD CA>

5. Execute **DLIMCS4 8** to set **Common Parameter - DL RMC - MCS Index 4** to **8**.

2. Changing SCC-1 DL RB Allocation and MCS Indexes

1. Execute **DLRMC_RB_SCC1 25** to set **Common Parameter - SCC-1 - DL RMC - Number of RB** to **25**.
2. Execute **DLIMCS1_SCC1 5** to set **Common Parameter - SCC-1 - DL RMC - MCS Index 1** to **5**.
3. Execute **DLIMCS2_SCC1 6** to set **Common Parameter - SCC-1 - DL RMC - MCS Index 2** to **6**.
4. Execute **DLIMCS3_SCC1 7** to set **Common Parameter - SCC-1 - DL RMC - MCS Index 3** to **7**.

<When TDD CA>

5. Execute **DLIMCS4_SCC1 8** to set **Common Parameter - SCC-1 - DL RMC - MCS Index 4** to **8**.

3. Changing PCC UL RB Allocation and MCS Index

1. Execute **ULRMC_RB 20** to set **Common Parameter - UL RMC - Number of RB** to **20**.
2. Execute **ULRB_START 5** to set **Common Parameter - UL RMC - Starting RB** to **5**.
3. Execute **ULIMCS 6** to set **Common Parameter - UL RMC - MCS Index** to **6**.
4. Execute **ULRMC_MOD QPSK** to set **Common Parameter - UL RMC - Modulation** to **QPSK**.

4. Changing SCC-1 UL RB Allocation and MCS Index

1. Execute **ULRMC_RB_SCC1 1** to set **Common Parameter - SCC-1 - UL RMC - Number of RB** to **1**.
2. Execute **ULRB_START_SCC1 49** to set **Common Parameter - SCC-1 - UL RMC - Starting RB** to **49**.
3. Execute **ULIMCS_SCC1 5** to set **Common Parameter - SCC-1 - UL RMC - MCS Index** to **5**.
4. Execute **ULRMC_MOD_SCC1 QPSK** to set **Common Parameter - SCC-1 - UL RMC - Modulation** to **QPSK**.

2.3. 3DL CA

The following test procedure has some differences between the MT8820C and MT8821C.
This chapter explains each test procedure for the MT8820C and MT8821C, respectively.

For the MT8820C, the measurement procedure explained in this chapter is an example where [PCC], [SCC-1] and [SCC-2] are used as Primary Cell, Secondary Cell 1 and Secondary Cell 2, respectively, for LTE-Advanced FDD DL CA connection. Refer to the operation manual for details of the GPIB commands and manual operations. Colored characters are GPIB commands.

Operation	Description
Operation for PCC	**[PCC]**
Operation for SCC-1	**[SCC-1]**
Operation for SCC-2	**[SCC-2]**
Operation for all SCCs	**[SCC-1/2]**
Operation for all CCs	**[PCC/SCC]**

2.3.1. Connection Diagram

2.3.1.1. Connection Diagram for MT8820C 3DL/1UL CA

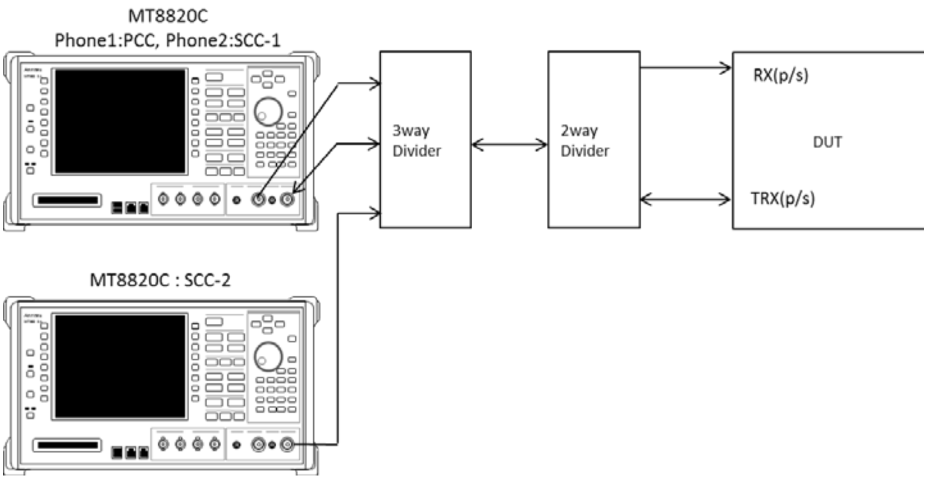


Figure 2.3.1-1 ***Connection Diagram for 3DL/1UL CA, Rx Test***
(MT8820C with PPM HW and MT8820C with SPM HW, using dividers)

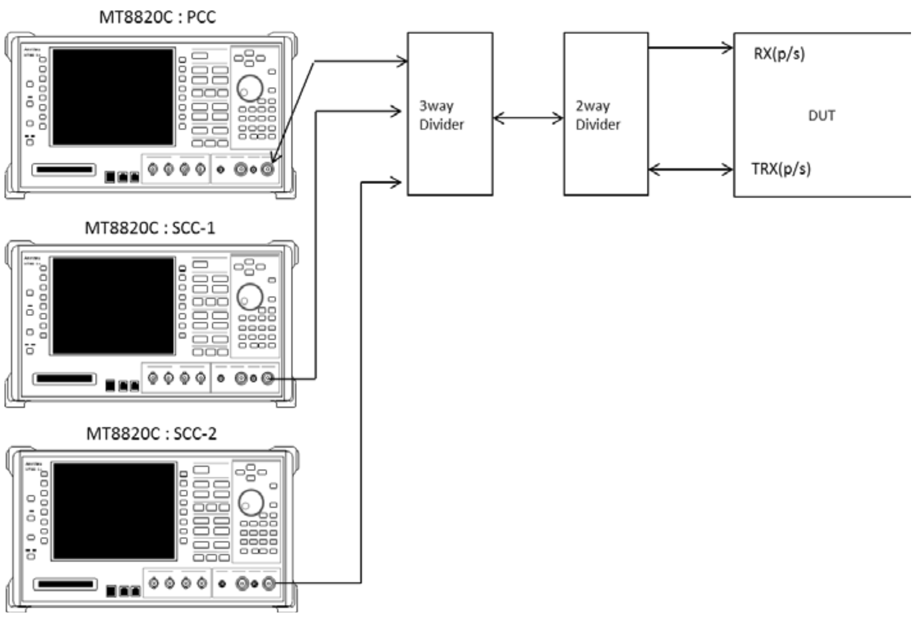
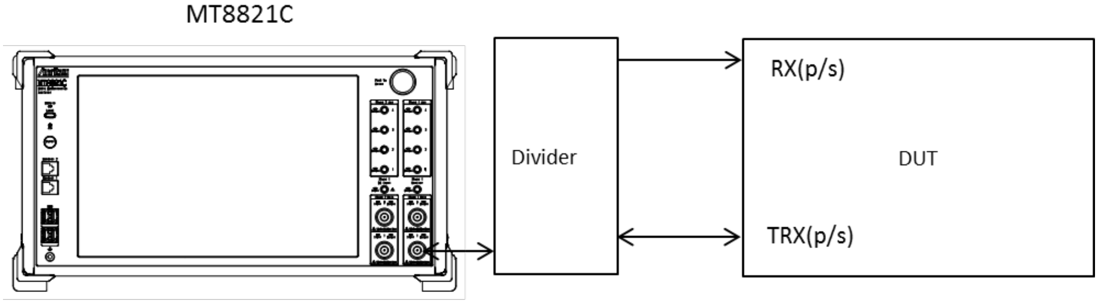


Figure 2.3.1-2 ***Connection Diagram for 3DL/1UL CA, Rx Test***
(MT8820Cs with SPM HW, using dividers)

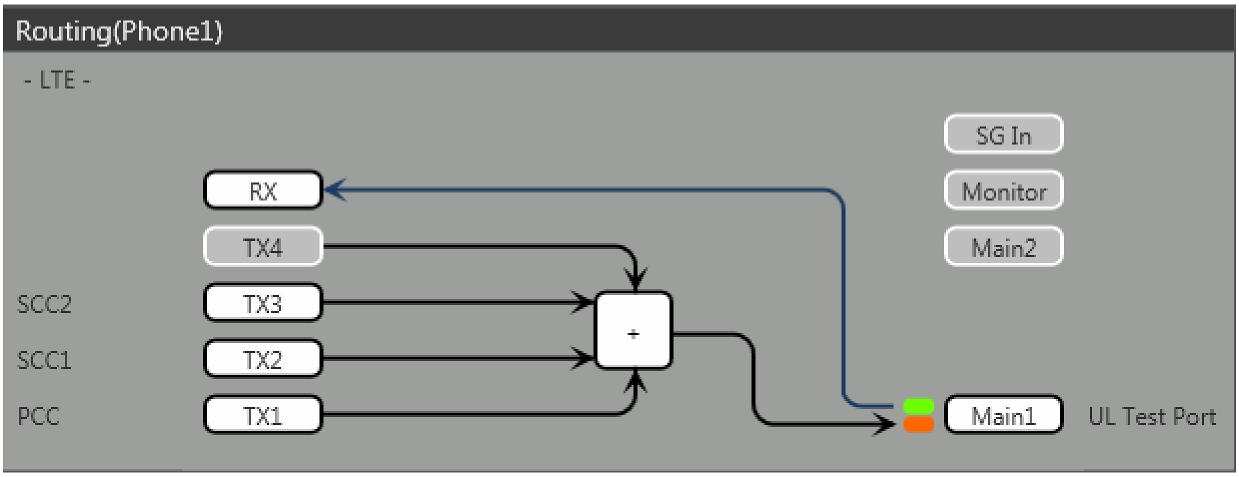
2.3.1.2. Connection Diagram for MT8821C 3DL/1UL CA

2.3.1.2.1. Connection using Main Connector

This example shows the connection diagram for the 3DL/1UL CA condition. The DL signals of PCC, SCC1 and SCC2 are combined by the internal combiners of MT8821C and output at Main1 connector of Phone1.



<Connection Diagram>



<Internal Routing Diagram>

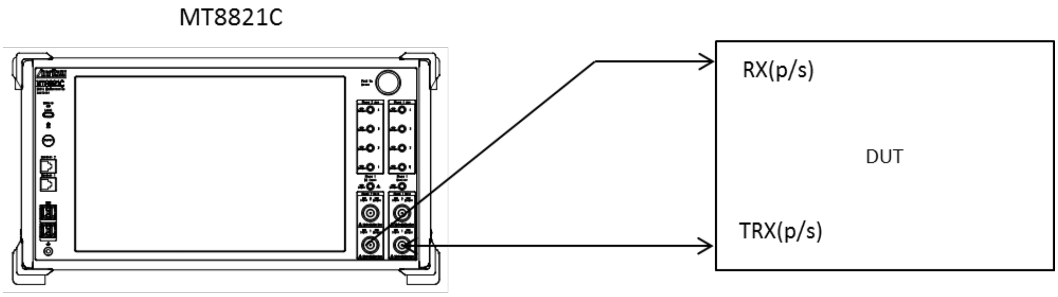
Figure 2.3.1-3 ***Connection Diagram and Internal Routing Diagram for 3DL /UL CA, Tx and Rx Test (MT8821C, using dividers)***

[Routing setting procedure]

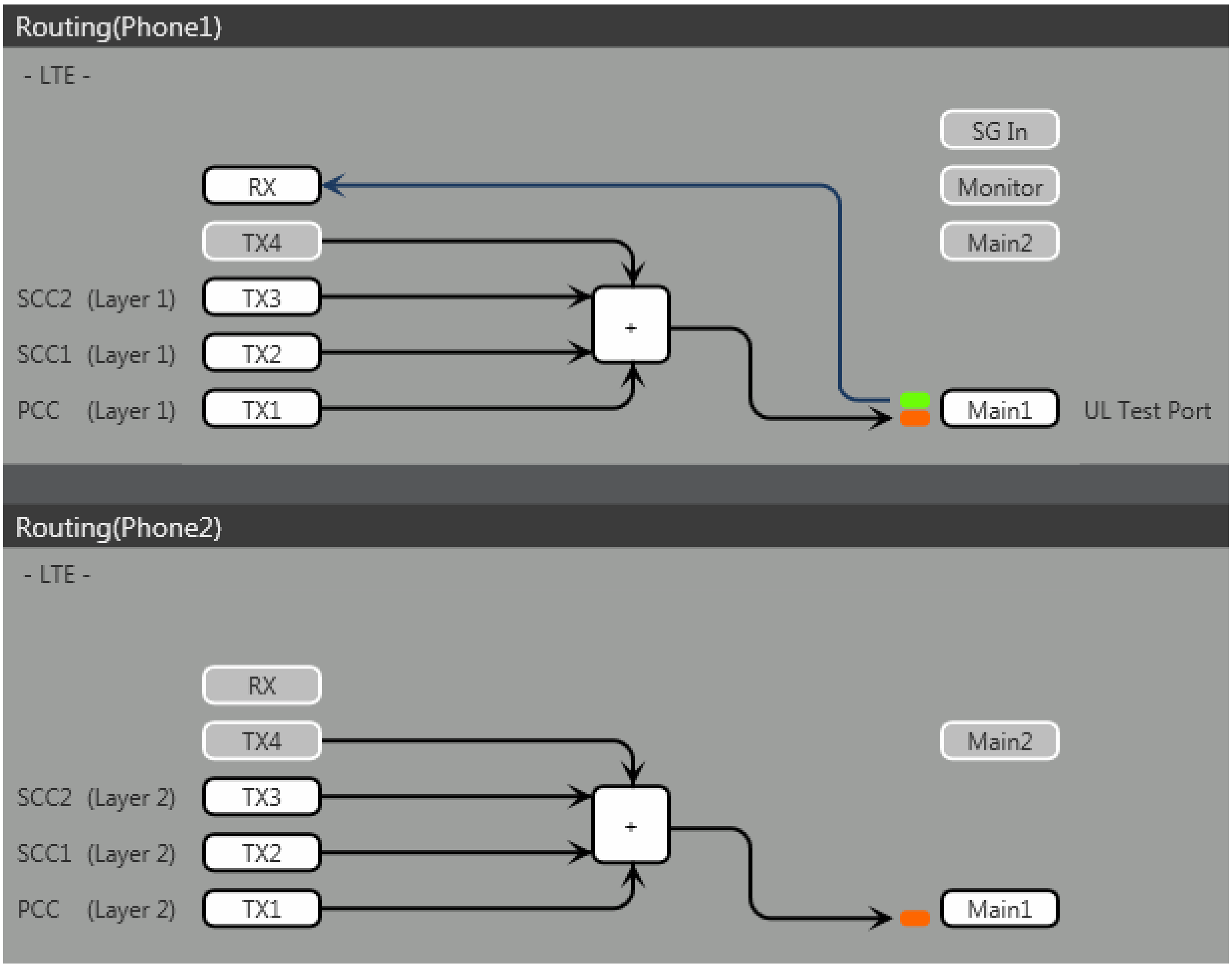
1. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing(Phone1) - Tx1** to **Main**.
2. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing(Phone1) - Tx2** to **Main**.
3. Execute **TXOUT 3, MAIN** to set the output connector **System Config – Routing(Phone1) - Tx3** to **Main**.

2.3.1.2.2. Connection using Main Connector (Rx diversity)

This example shows the connection diagram for the 3DL/1UL CA and Rx diversity condition. The DL signals of PCC, SCC1 and SCC2 are combined by the internal combiners of MT8821C and output at both Main1 connector of Phone1 and Main1 connector of Phone2.



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.3.1-4 ***Connection Diagram for 3DL/1UL CA, Tx and Rx Test (MT8821C, antenna configuration set to Rx Diversity)***

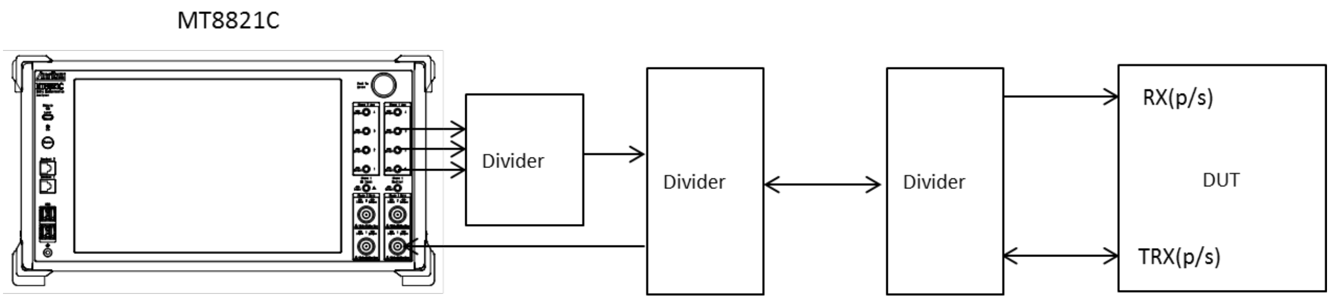
[Routing setting procedure]

1. Execute **ANTCONFIG RX_DIVERSITY** to set **Common Parameter - Antenna Configuration** to **Rx Diversity**.
2. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing(Phone1) - Tx1** to **Main**.
3. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing(Phone1) - Tx2** to **Main**.
4. Execute **TXOUT 3, MAIN** to set the output connector **System Config – Routing(Phone1) - Tx3** to **Main**.
5. Execute **TXOUT_P2 1, MAIN** to set the output connector **System Config – Routing(Phone2) - Tx1** to **Main**.
6. Execute **TXOUT_P2 2, MAIN** to set the output connector **System Config – Routing(Phone2) - Tx2** to **Main**.
7. Execute **TXOUT_P2 3, MAIN** to set the output connector **System Config – Routing(Phone2) - Tx3** to **Main**.

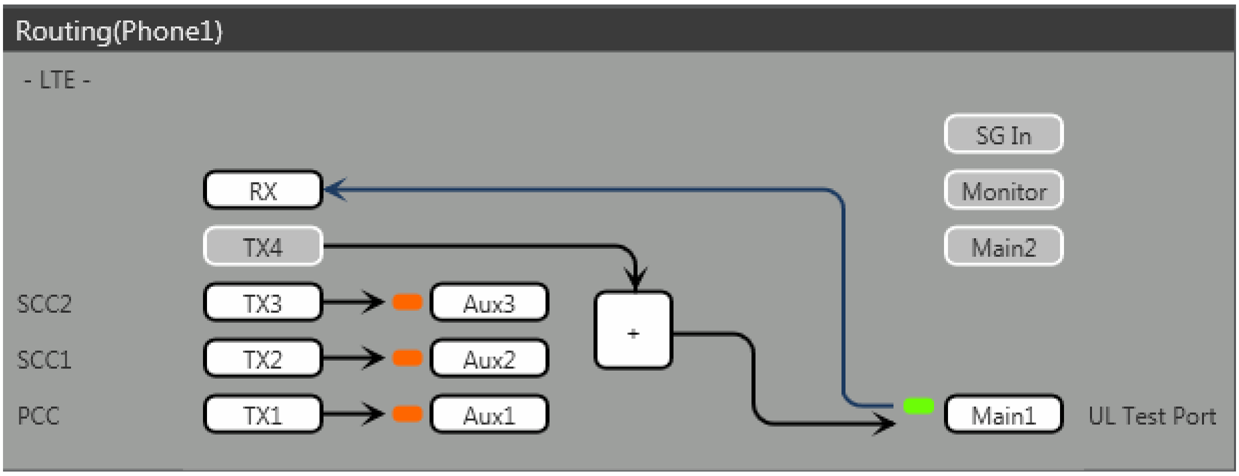
Note: When Both the Phone1 and Phone2 LTE measurement software are active, Receiver Diversity can be selected at the Phone1 side only.

2.3.1.2.3. Connection using Aux Connector

This example shows the connection diagram for the 3DL/1UL CA condition using Aux connectors. The DL signal of PCC is output at Aux1, that of SCC-1 is output at Aux2, and that of SCC2 is output at Aux3.



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.3.1-5 ***Connection Diagram and Internal Routing Diagram for 3DL CA and 1UL CA, Tx and Rx Test (MT8821C, using Aux connectors)***

[Routing setting procedure]

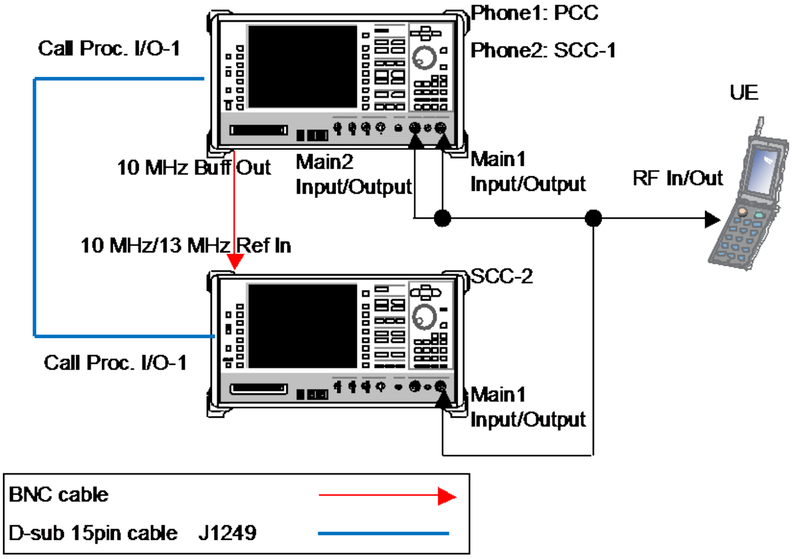
1. Execute **TXOUT 1, AUX** to set the output connector **System Config – Routing(Phone1) - Tx1** to **Aux1**.
2. Execute **TXOUT 2, AUX** to set the output connector **System Config – Routing(Phone1) - Tx2** to **Aux2**.
3. Execute **TXOUT 3, AUX** to set the output connector **System Config – Routing(Phone1) - Tx3** to **Aux3**.

2.3.2. Synchronizing Frame Timing among 3 Cells

This chapter is only for the MT8820C.
The frame timing among three cells must be synchronized when connecting with LTE-Advanced (CA) LTE-Advanced FDD DL CA 3CCs. Use three MT8820C units to connect with LTE-Advanced (CA) LTE-Advanced FDD DL CA 3CCs. However, when making SISO measurement, the connection can be made using two MT8820C units (one of the two units includes ParallelPhone measurement option).

<Using two MT8820C units (one of two units includes ParallelPhone measurement option)>

1. Connect the two MT8820C units as shown in the figure below.

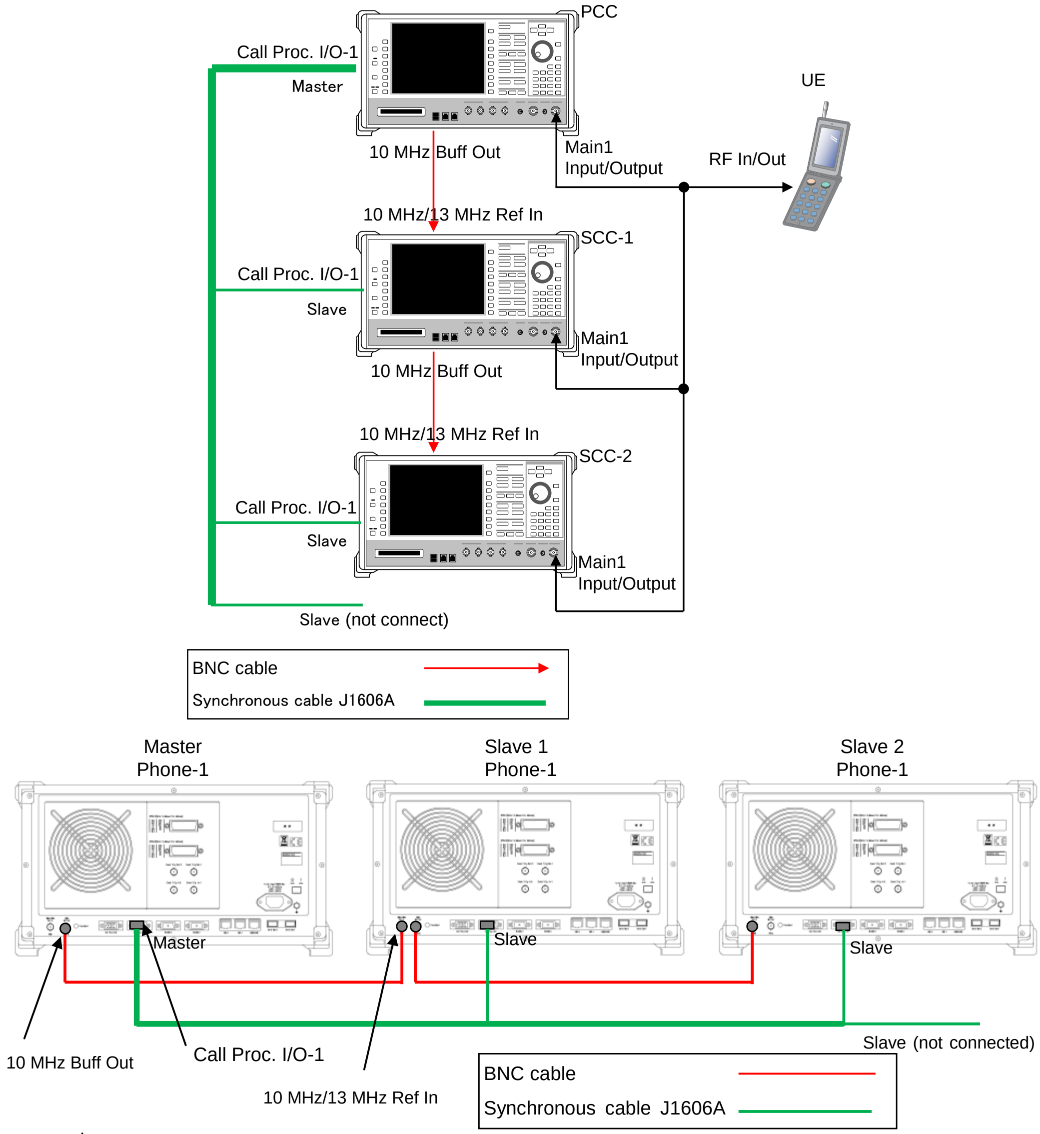


Connection Example for FDD DL CA 3CCs SISO Testing (using two MT8820C units)

2. **[SCC-1]** Execute **ENTERSYNC INT_SLAVE** to set the frame timing synchronization processing slave status.
3. **[SCC-2]** Execute **ENTERSYNC EXT_SLAVE** to set the frame timing synchronization processing slave status.
4. **[PCC]** Execute **ENTERSYNC MASTER** to perform frame timing synchronization processing.
5. **[SCC-1/2]** Execute **ENTERSYNC?** to query the call processing status.
6. **[SCC-1/2]** Check that the response of step 5 is 1 (synchronization established).

<Using three MT8820C units>

1. Connect three MT8820C units as shown in the figure below.



Connection Example for FDD DL CA 3CCs Testing (using three MT8820C units)

2. **[SCC-1/2]** Execute **REF 10MHZEXT** to **Ref. Frequency** to **10 MHz (EXT)**.
3. **[SCC-1/2]** Execute **ENTERSYNC EXT_SLAVE** to set the frame timing synchronization processing slave status.
4. **[PCC]** Execute **ENTERSYNC MASTER** to perform frame timing synchronization processing.
5. **[SCC-1/2]** Execute **ENTERSYNC?** to query the call processing status.
6. **[SCC-1/2]** Check that the response of step 5 is 1 (synchronization established).

2.3.3. Initial Condition Setting

The initial conditions must be set before measurement.
An example of the following settings is shown below.

Component Carrier	Channel	FDD	TDD	Channel Bandwidth
PCC	UL Channel	18200 (Band1)	38000 (Band38)	10 MHz
	DL Channel	200 (Band1)	38000 (Band38)	
SCC-1	DL Channel	2525 (Band5)	39150 (Band40)	20 MHz
SCC-2	DL Channel	4450 (Band10)	39500 (Band40)	10 MHz

2.3.3.1. MT8820C

2.3.3.1.1. Setting Example 1 (FDD)

1. **[PCC/SCC]** Execute **PRESET** to set the default parameters.
2. **[PCC]** Execute **CHCODING RMC_DL_CA_PCC** to set **Channel Coding** to **RMC (DL CA - PCC)**.
3. **[SCC-1]** Execute **CHCODING RMC_DL_CA_SCC** to set **Channel Coding** to **RMC (DL CA - SCC)**.
4. **[SCC-2]** Execute **CHCODING RMC_DL_CA_SCC** to set **Channel Coding** to **RMC (DL CA - SCC)**.
5. **[PCC/SCC]** Execute **DLSCC 2** to set **the number of SCC** to **2**.

6. **[PCC]** Execute **CALLPROC ON** to set **Call Processing** to **On**.
7. **[PCC]** Execute **DLCHAN 300** to set **UL Channel and DL Channel** to **18300** and **300**, respectively.
8. **[PCC]** Execute **DLCHAN_SCC1 2525** to set **DL Carrier aggregation SCC-1 - DL Channel** to **2525**.
9. **[PCC]** Execute **DLCHAN_SCC2 4450** to set **DL Carrier aggregation SCC-2 - DL Channel** to **4450**.
10. **[PCC]** Execute **BANDWIDTH 10MHZ** to set **Channel Bandwidth** to **10 MHz**.
11. **[PCC]** Execute **BANDWIDTH_SCC1 20MHZ** to set **DL Carrier aggregation SCC-1 - Channel Bandwidth** to **20 MHz**.
12. **[PCC]** Execute **BANDWIDTH_SCC2 10MHZ** to set **DL Carrier aggregation SCC-2 - Channel Bandwidth** to **10 MHz**.

13. **[SCC-1]** Execute **CALLPROC OFF** to set **Call Processing** to **Off**.
14. **[SCC-1]** Execute **ULCHAN_PCC 18300** to set **DL Carrier aggregation PCC - UL Channel** to **18300**.
15. **[SCC-1]** Execute **DLCHAN 2525** to set **DL Channel** to **2525**.
16. **[SCC-1]** Execute **BANDWIDTH_PCC 10MHZ** to set **DL Carrier aggregation PCC - Channel Bandwidth** to **10 MHz**.
17. **[SCC-1]** Execute **BANDWIDTH 20MHZ** to set **Channel Bandwidth** to **20 MHz**.
18. **[SCC-2]** Execute **CALLPROC OFF** to set **Call Processing** to **Off**.
19. **[SCC-2]** Execute **ULCHAN_PCC 18300** to set **DL Carrier aggregation PCC - UL Channel** to **18300**.
20. **[SCC-2]** Execute **DLCHAN 4450** to set **DL Channel** to **4450**.
21. **[SCC-2]** Execute **BANDWIDTH_PCC 10MHZ** to set **DL Carrier aggregation PCC - Channel Bandwidth** to **10 MHz**.
22. **[SCC-2]** Execute **BANDWIDTH 10MHZ** to set **Channel Bandwidth** to **10 MHz**.

2.3.3.1.2. Setting Example 2 (TDD)

The procedure at Chapter 2.3.3.1.1 is used, substituting the following steps to set Uplink/Downlink Configuration and Special Subframe Configuration.

7. **[PCC]** Execute **DLCHAN 38000** to set **DL Channel and UL Channel** to **38000** simultaneously.
8. **[PCC]** Execute **DLCHAN_SCC1 39150** to set **DL Carrier aggregation SCC-1 - DL Channel** to **39150**.
9. **[PCC]** Execute **DLCHAN_SCC2 39500** to set **DL Carrier aggregation SCC-2 - DL Channel** to **39500**.

14. **[SCC-1]** Execute **ULCHAN_PCC 38000** to set **DL Carrier aggregation PCC - UL Channel** to **38000**.
15. **[SCC-1]** Execute **DLCHAN 39150** to set **DL Channel** to **39150**.

19. **[SCC-2]** Execute **ULCHAN_PCC 38000** to set **DL Carrier aggregation PCC - UL Channel** to **38000**.
20. **[SCC-2]** Execute **DLCHAN 39500** to set **DL Channel** to **39500**.

23. **[PCC/SCC]** Execute **TDDULDLCONF 1** to set **TDD Uplink/Downlink Configuration** to **1**.
24. **[PCC/SCC]** Execute **TDDSSFCONF 4** to set **TDD Special Subframe Configuration** to **4**.

NOTE 1: Set the same value as Uplink/Downlink Configuration in PCC and SCC.
NOTE 2: Set the same value as Special Subframe Configuration in PCC and SCC.

2.3.3.2. MT8821C

2.3.3.2.1. Setting Example 1 (FDD)

23. Execute **PRESET** to set the default parameters.
24. Execute **CHCODING RMC_DL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC (DL CA)**.
25. Execute **DLSCC 2** to set **Call Processing Parameter - Number of DL SCC** to **2**.

26. Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **On**.
27. Execute **DLCHAN 300** to set **Common Parameter - UL Channel** and **DL Channel** to **18300** and **300**, respectively.
28. Execute **DLCHAN_SCC1 2525** to set **Common Parameter - SCC-1 - DL Channel** to **2525**.
29. Execute **DLCHAN_SCC2 4450** to set **Common Parameter - SCC-2 - DL Channel** to **4450**.
30. Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Channel Bandwidth** to **10 MHz**.
31. Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter - SCC-1 - Channel Bandwidth** to **20 MHz**.
32. Execute **BANDWIDTH_SCC2 10MHZ** to set **Common Parameter - SCC-2 - Channel Bandwidth** to **10 MHz**.

2.3.3.2.2. Setting Example 2 (TDD)

The procedure at Chapter 2.3.3.2.1 is used, substituting the following steps to set Uplink/Downlink Configuration and Special Subframe Configuration.

5. Execute **DLCHAN 38000** to set **Common Parameter - DL Channel** and **UL Channel** to **38000** simultaneously.
6. Execute **DLCHAN_SCC1 39150** to set **Common Parameter - SCC-1 - DL Channel** to **39150**.
7. Execute **DLCHAN_SCC2 39500** to set **Common Parameter - SCC-2 - DL Channel** to **39500**.

11. Execute **TDDULDLCONF 1** to set **Common Parameter - TDD Uplink/Downlink Configuration** to **1**.
12. Execute **TDDSSFCONF 4** to set **Common Parameter - TDD Special Subframe Configuration** to **4**.

NOTE 1: Set the same value as Uplink/Downlink Configuration in PCC and SCC.
NOTE 2: Set the same value as Special Subframe Configuration in PCC and SCC.
NOTE 3: The differential UL/DL Configuration on each CC is not supported.

2.3.4. Location Registration

This performs UE location registration after setting the initial conditions (→2.3.3).

2.3.4.1. MT8820C

1. Connect the UE and MT8820C.
2. **[SCC-1/2]** Execute **LVL OFF** to set **SCC-1/2 output** to **Off**.
3. **[PCC]** Execute **CALLSO** to clear the call processing status.
4. **[PCC]** Execute **CALLSTAT?** to query the call processing status is 1 (= idle).
5. Turn on the UE power.
6. **[PCC]** Execute **CALLSTAT?** to query the call processing status is 2 (= Idle(Regist)).
   (If not 2 (= Idle(Regist)), repeat step 6.)
7. **[SCC-1/2]** Execute **LVL ON** to set **SCC-1/2 output** to **On**.

2.3.4.2. MT8821C

1. Connect the UE and MT8821C.
2. Execute **CALLPROC ON** to set **Common Parameter - Call processing** to **ON**.
3. Execute **CALLSO** to clear call processing status.
4. Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
5. Turn on the UE power.
6. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
   Repeat step 6 when the checked status is not 2 (= Idle (Regist)).

2.3.5. Test Mode Connection and Disconnection

Refer to chapter 2.1.4.

2.3.6. Inter-Frequency Handover

For SCC-2, the following steps are added to the procedure in Chapter 2.2.6.
This chapter describes an example for FDD.

2.3.6.1. MT8820C

<Changing SCC-2 channel>

5. **[SCC-2]** Execute **DLCHAN 400** to set **Common Parameter - DL Channel** to **400**.
6. **[PCC]** Execute **DLCHAN_SCC2 400** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL Channel** to **400**.

   NOTE: Change SCC-2 Channel before the PCC Channel. If the PCC Channel is changed first, the UE might lose sight of SCC-2.

<Changing PCC channel, SCC-1 channel and SCC-2 channel at same time>

Cell	Channel (before)	Channel (after)
PCC	300	102
SCC-1	498	300
SCC-2	102	498

1. **[PCC]** Execute **ACT_SCC1 OFF** to set **Call Processing Parameter - Carrier Aggregation SCC-1 Activation** to **off**.
2. **[PCC]** Execute **ACT_SCC2 OFF** to set **Call Processing Parameter - Carrier Aggregation SCC-2 Activation** to **off**.
3. **[SCC-1]** Execute **DLCHAN 300** to set **Common Parameter - DL Channel** to **300**.
4. **[SCC-2]** Execute **DLCHAN 498** to set **Common Parameter - DL Channel** to **498**.
5. **[PCC]** Execute **DLCHAN 102, 300, 498** to set **Common Parameter - UL Channel and DL Channel** to **18102** and **102**, respectively.
   Moreover, set **SCC-1 DL Channel** to **300** and **SCC-2 DL Channel** to **498**.
6. **[SCC-1]** Execute **ULCHAN_PCC 18102** to set **DL Carrier aggregation PCC - UL Channel** to **18102**.
7. **[SCC-2]** Execute **ULCHAN_PCC 18102** to set **DL Carrier aggregation PCC - UL Channel** to **18102**.
8. **[PCC]** Execute **ACT_SCC1 ON** to set **SCC-1 Activation** to **on**.
9. **[PCC]** Execute **ACT_SCC2 ON** to set **SCC-2 Activation** to **on**.

2.3.6.2. MT8821C

<Changing SCC-2 channel>

1. Execute **DLCHAN_SCC2 400** to set **Common Parameter - SCC-2 - DL Channel** to **400**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

< Changing PCC channel, SCC-1 channel and SCC-2 channel at same time >

Cell	Channel (before)	Channel (after)
PCC	300	102
SCC-1	498	300
SCC-2	102	498

1. Execute **DLCHAN 102, 300, 498** to set **Common Parameter - UL Channel and DL Channel** to **18102** and **102**, respectively. Moreover, set **Common Parameter - SCC-1 DL Channel** to **300** and **SCC-2 DL Channel** to **498**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

2.3.7. Bandwidth Handover

For SCC-2, the following steps are added to the procedure in Chapter 2.2.7.
This chapter describes an example to set parameters in the following table.

Parameter		Setting Value
Channel Bandwidth	PCC	20 MHz
	SCC-1	15 MHz
	SCC-2	10 MHz

2.3.7.1. MT8820C

<Changing SCC-2 Bandwidth>

1. **[PCC]** Execute **BANDWIDTH_SCC2 10MHZ** to set **DL Carrier aggregation SCC-2 - Channel Bandwidth** to **10 MHz**.
2. **[SCC-2]** Execute **BANDWIDTH 10MHZ** to set **Channel Bandwidth** to **10 MHz**.

2.3.7.2. MT8821C

<Changing SCC-2 Bandwidth>

1. Execute **BANDWIDTH_SCC2 10MHZ** to set **Common Parameter - SCC-2 - Channel Bandwidth** to **10 MHz**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

2.3.8. Changing DL/UL RB Allocation and MCS Index of Each CCs

The change procedure for DL/UL RB allocation and MCS Index for PCC and SCC is same as 2CA (refer to Chapter 2.2.8). This chapter focuses on SCC-2 and describes how to change the SCC-2 DL RB allocation and MCS Index.

2.3.8.1. MT8820C

1. Changing SCC-2 DL RB Allocation and MCS Indexes

For SCC-2, the following steps are added to the procedure in Chapter 2.2.8.
This chapter describes an example where the Channel Bandwidth is 10 MHz.

1. **[PCC]** Execute **DLIMCS1_SCC2 11** to set **DL Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **11**.
2. **[PCC]** Execute **DLIMCS2_SCC2 12** to set **DL Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **12**.
3. **[PCC]** Execute **DLIMCS3_SCC2 13** to set **DL Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **13**.

4. **[SCC-2]** Execute **DLRMC_RB 25** to set **DL RMC - Number of RB** to **25**.
5. **[SCC-2]** Execute **DLIMCS1 11** to set **DL RMC - MCS Index 1** to **11**.
6. **[SCC-2]** Execute **DLIMCS2 12** to set **DL RMC - MCS Index 2** to **12**.
7. **[SCC-2]** Execute **DLIMCS3 13** to set **DL RMC - MCS Index 3** to **13**.

<When TDD CA>

8. **[PCC]** Execute **DLIMCS1_SCC4 8** to set **DL Carrier aggregation SCC-2 - DL RMC - MCS Index 4** to **8**.
9. **[SCC-1]** Execute **DLIMCS4 8** to set **DL RMC - MCS Index 4** to **8**.

2.3.8.2. MT8821C

1. Changing SCC-2 DL RB Allocation and MCS Indexes

For SCC-2, the following steps are added to the procedure in Chapter 2.2.8
This chapter describes an example where the Channel Bandwidth is 10 MHz.

1. Execute **DLIMCS1_SCC2 11** to set **Common Parameter - SCC-2 - DL RMC - MCS Index 1** to **11**.
2. Execute **DLIMCS2_SCC2 12** to set **Common Parameter - SCC-2 - DL RMC - MCS Index 2** to **12**.
3. Execute **DLIMCS3_SCC2 13** to set **Common Parameter - SCC-2 - DL RMC - MCS Index 3** to **13**.

<When TDD CA>

4. Execute **DLIMCS4_SCC2 8** to set **Common Parameter - SCC-2 - DL RMC - MCS Index 4** to **8**.

2.4. 4DL CA

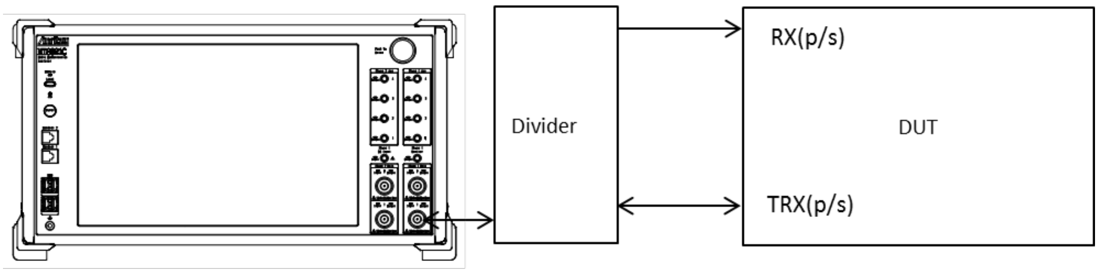
The following test procedures can be used for the MT8821C only.

2.4.1. Connection Diagram

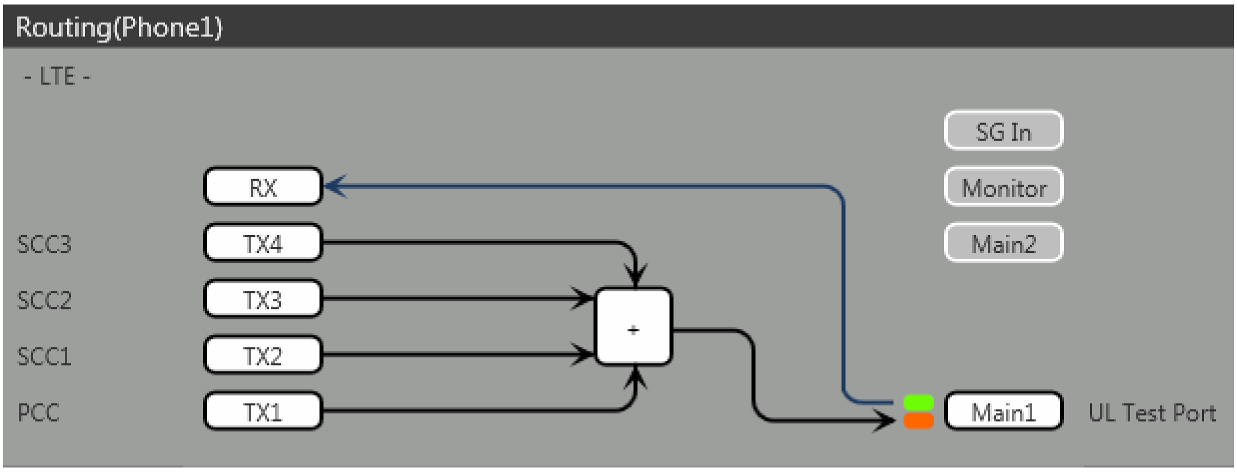
2.4.1.1. Connection Diagram for MT8821C 4DL/1UL CA

2.4.1.1.1. Connection using Main Connector

This example shows the connection diagram for 4DL/1UL CA. The DL signals of PCC, SCC1 SCC2 and SCC3 are combined by the internal combiners of MT8821C and output at Main1 connector of Phone1.



<Connection Diagram>



<Internal Routing Diagram>

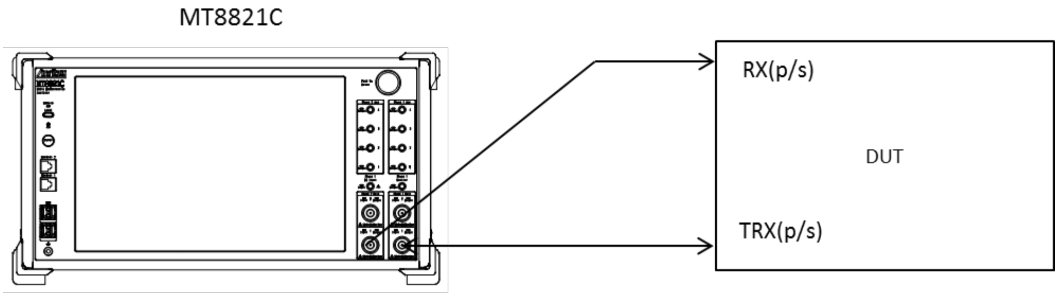
Figure 2.4.1-1 ***Connection Diagram and Internal Routing Diagram for 4DL /UL CA, Tx and Rx Test (MT8821C, using divider)***

[Routing setting procedure]

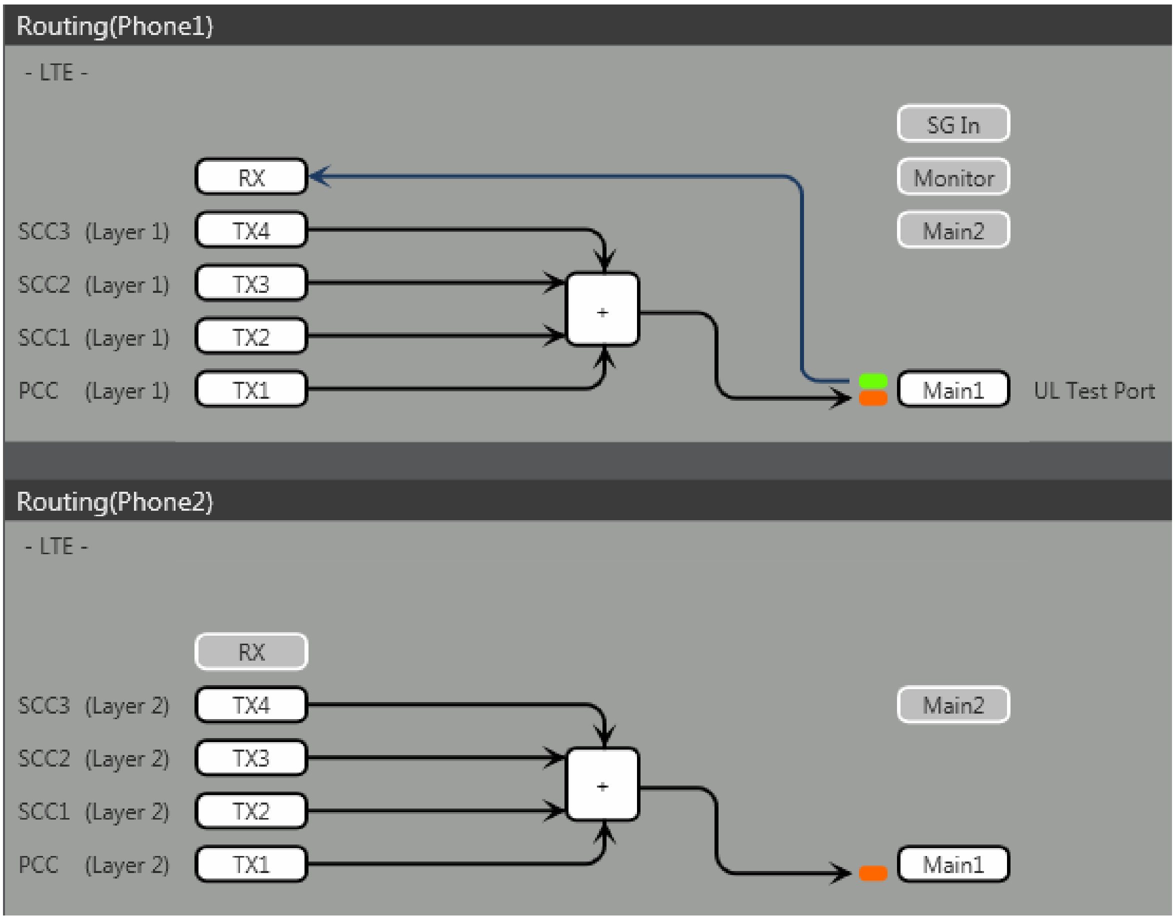
1. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx1** to **Main**.
2. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx2** to **Main**.
3. Execute **TXOUT 3, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx3** to **Main**.
4. Execute **TXOUT 4, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx4** to **Main**.

2.4.1.1.2. Connection using Main Connector (Rx diversity)

This example shows the connection diagram for 4DL/1UL CA and Rx diversity. The DL signals for PCC, SCC1 SCC2 and SCC3 are combined by the internal combiner of MT8821C and output at both Main1 connector of Phone1 and Main1 connector of Phone2.



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.4.1-2 *Connection Diagram for 4DL/1UL CA, Tx and Rx Test (MT8821C, antenna configuration set to Rx Diversity)*

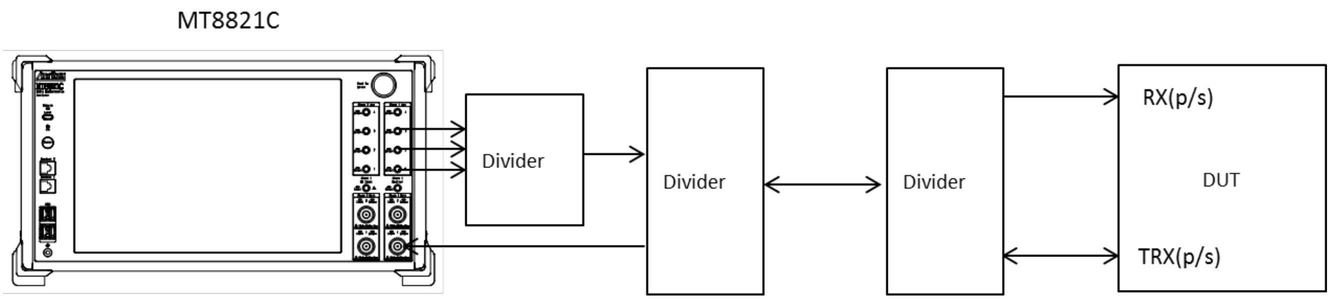
[Routing setting procedure]

1. Execute **ANTCONFIG RX_DIVERSITY** to set **Common Parameter – Antenna Configuration** to **Rx Diversity**.
2. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx1** to **Main**.
3. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx2** to **Main**.
4. Execute **TXOUT 3, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx3** to **Main**.
5. Execute **TXOUT 4, MAIN** to set the output connector **System Config – Routing(Phone1) – Tx4** to **Main**.
6. Execute **TXOUT_P2 1, MAIN** to set the output connector **System Config – Routing(Phone2) – Tx1** to **Main**.
7. Execute **TXOUT_P2 2, MAIN** to set the output connector **System Config – Routing(Phone2) – Tx2** to **Main**.
8. Execute **TXOUT_P2 3, MAIN** to set the output connector **System Config – Routing(Phone2) – Tx3** to **Main**.
9. Execute **TXOUT_P2 4, MAIN** to set the output connector **System Config – Routing(Phone2) – Tx4** to **Main**.

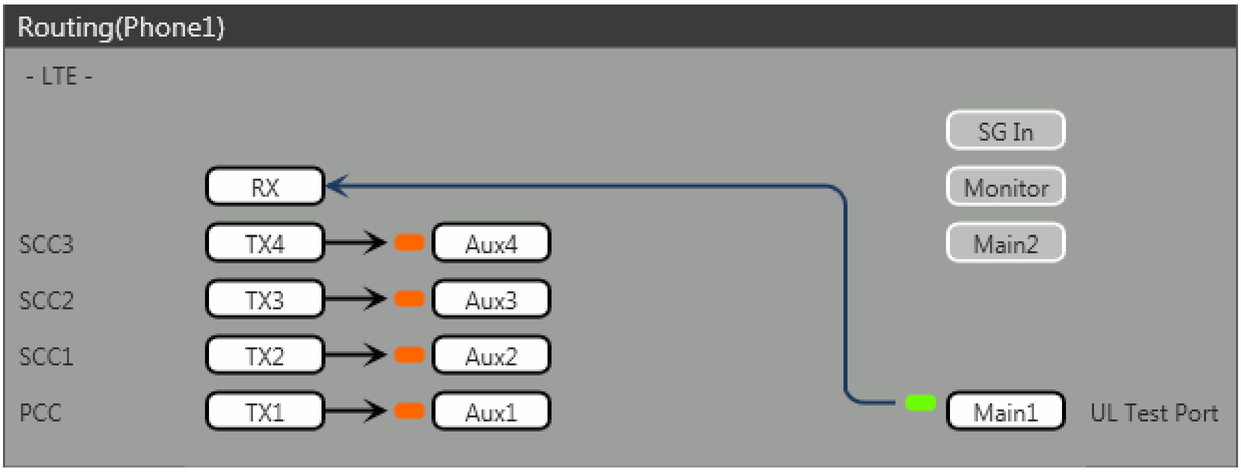
NOTE: When Both the Phone1 and Phone2 LTE measurement software are active, Rx Diversity can be selected at the Phone1 side only.

2.4.1.1.3. Connection using Aux Connector

This example shows the connection diagram for 4DL/1UL CA using Aux connectors. The DL signal for PCC is output at Aux1, that for SCC-1 is output at Aux2, that for SCC-2 is output at Aux3, and that for SCC3 is output at Aux4.



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.4.1–3 ***Connection Diagram and Internal Routing Diagram for 4DL CA and 1UL CA, Tx and Rx Test (MT8821C, using Aux connectors)***

[Routing setting procedure]

1. Execute **TXOUT 1, AUX** to set the output connector **System Config – Routing(Phone1) – Tx1** to **Aux1**.
2. Execute **TXOUT 2, AUX** to set the output connector **System Config – Routing(Phone1) – Tx2** to **Aux2**.
3. Execute **TXOUT 3, AUX** to set the output connector **System Config – Routing(Phone1) – Tx3** to **Aux3**.
4. Execute **TXOUT 4, AUX** to set the output connector **System Config – Routing(Phone1) – Tx4** to **Aux4**.

2.4.2. Initial Condition Setting

The initial conditions must be set before measurement.
An example of the following settings is shown below.

Component Carrier	Channel	FDD		TDD		Channel Bandwidth
PCC	UL Channel	18300	(Band1)	38000	(Band38)	10 MHz
	DL Channel	300	(Band1)	38000	(Band38)	
SCC-1	DL Channel	2525	(Band5)	39150	(Band40)	20 MHz
SCC-2	DL Channel	4450	(Band10)	39500	(Band40)	10 MHz
SCC-2	DL Channel	444	(Band10)	38144	(Band40)	20 MHz

2.4.2.1. MT8821C

2.4.2.1.1. Setting Example 1 (FDD)

1. Execute **PRESET** to set the default parameters.
2. Execute **CHCODING RMC_DL_CA_PCC** to set **Common Parameter – Channel Coding** to **RMC (DL CA)**.
3. Execute **DLSCC 3** to set **Call Processing Parameter – Number of DL SCC** to **3**.

4. Execute **CALLPROC ON** to set **Common Parameter – Call Processing** to **On**.
5. Execute **DLCHAN 300** to set **Common Parameter – UL Channel** and **DL Channel** to **18300** and **300**, respectively.
6. Execute **DLCHAN_SCC1 2525** to set **Common Parameter – SCC-1 – DL Channel** to **2525**.
7. Execute **DLCHAN_SCC2 4450** to set **Common Parameter – SCC-2 – DL Channel** to **4450**.
8. Execute **DLCHAN_SCC3 444** to set **Common Parameter – SCC-3 – DL Channel** to **444**.
9. Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Channel Bandwidth** to **10 MHz**.
10. Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter – SCC-1 – Channel Bandwidth** to **20 MHz**.
11. Execute **BANDWIDTH_SCC2 10MHZ** to set **Common Parameter – SCC-2 – Channel Bandwidth** to **10 MHz**.
12. Execute **BANDWIDTH_SCC3 20MHZ** to set **Common Parameter – SCC-3 – Channel Bandwidth** to **20 MHz**.

2.4.2.1.2. Setting Example 2 (TDD)

The procedure described in Chapter 2.3.3.2.1 is used, but substituting the following steps to set Uplink/Downlink Configuration and Special Subframe Configuration.

5. Execute **DLCHAN 38000** to set **Common Parameter – DL Channel** and **UL Channel** to **38000** simultaneously.
6. Execute **DLCHAN_SCC1 39150** to set **Common Parameter – SCC-1 – DL Channel** to **39150**.
7. Execute **DLCHAN_SCC2 39500** to set **Common Parameter – SCC-2 – DL Channel** to **39500**.
8. Execute **DLCHAN_SCC3 38144** to set **Common Parameter – SCC-3 – DL Channel** to **38144**.

13. Execute **TDDULDLCONF 1** to set **Common Parameter – TDD Uplink/Downlink Configuration** to **1**.
14. Execute **TDDSSFCONF 4** to set **Common Parameter – TDD Special Subframe Configuration** to **4**.

NOTE 1: Set the same value as Uplink/Downlink Configuration in PCC and SCC.
NOTE 2: Set the same value as Special Subframe Configuration in PCC and SCC.
NOTE 3: The differential UL/DL Configuration on each CC is not supported.

2.4.3. Location Registration

This performs UE location registration after setting the initial conditions (→2.4.2).

2.4.3.1. MT8821C

1. Connect the UE and MT8821C.
2. Execute **CALLPROC ON** to set **Common Parameter – Call processing** to **ON**.
3. Execute **CALLSO** to clear the call processing status.
4. Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
5. Turn on the UE power.
6. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
   Repeat step 6 when the checked status is not 2 (= Idle (Regist)).

2.4.4. Test Mode Connection and Disconnection

Refer to Chapter 2.1.4.

2.4.5. Inter-Frequency Handover

For SCC–3, the following steps are added to the procedure in Chapter 2.3.6.
This chapter describes an example for FDD.

2.4.5.1. MT8821C

<Changing SCC–3 channel>

1. Execute **DLCHAN_SCC3 400** to set **Common Parameter – SCC-3 – DL Channel** to **400**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

< Changing PCC channel, SCC–1 channel SCC–2 channel and SCC–3 channel at same time >

Cell	Channel (before)	Channel (after)
PCC	300	444
SCC–1	498	300
SCC–2	102	498
SCC–3	444	102

3. Execute **DLCHAN 444, 300, 498, 102** to set **Common Parameter – UL Channel and DL Channel** to **18444** and **444**, respectively. Moreover, set **Common Parameter – SCC–1 DL Channel** to **300 ,** **SCC–2 DL Channel** to **498** and **SCC–3 DL Channel** to **102**.
4. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

2.4.6. Bandwidth Handover

For SCC–3, the following steps are added to the procedure in Chapter 2.3.7
This chapter describes an example to set parameters in the following table.

Parameter		Setting Value
Channel Bandwidth	PCC	20 MHz
	SCC–1	15 MHz
	SCC–2	10 MHz
	SCC–3	10 MHz

2.4.6.1. MT8821C

<Changing SCC–3 Bandwidth>

3. Execute **BANDWIDTH_SCC3 10MHZ** to set **Common Parameter – SCC-3 – Channel Bandwidth** to **10 MHz**.
4. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

2.4.7. Changing DL/UL RB Allocation and MCS Index of Each CCs

The change procedure for DL/UL RB allocation and MCS Index for PCC and SCC is the same as 2CA/3CA (refer to Chapter 2.2.8 and 2.3.8). This chapter focuses on SCC–3 and describes how to change the SCC–3 DL RB allocation and MCS Index.

2.4.7.1. MT8821C

1. Changing SCC–3 DL RB Allocation and MCS Indexes

For SCC–3, the following steps are added to the procedure in Chapter 2.3.8
This chapter describes an example where the Channel Bandwidth is 10 MHz.

1. Execute **DLIMCS1_SCC3 11** to set **Common Parameter – SCC-3 – DL RMC - MCS Index 1** to **11**.
2. Execute **DLIMCS2_SCC3 12** to set **Common Parameter – SCC-3 – DL RMC - MCS Index 2** to **12**.
3. Execute **DLIMCS3_SCC3 13** to set **Common Parameter – SCC-3 – DL RMC - MCS Index 3** to **13**.

<When TDD CA>

4. Execute **DLIMCS4_SCC3 8** to set **Common Parameter – SCC-3 – DL RMC - MCS Index 4** to **8**.

2.5. 5DL CA

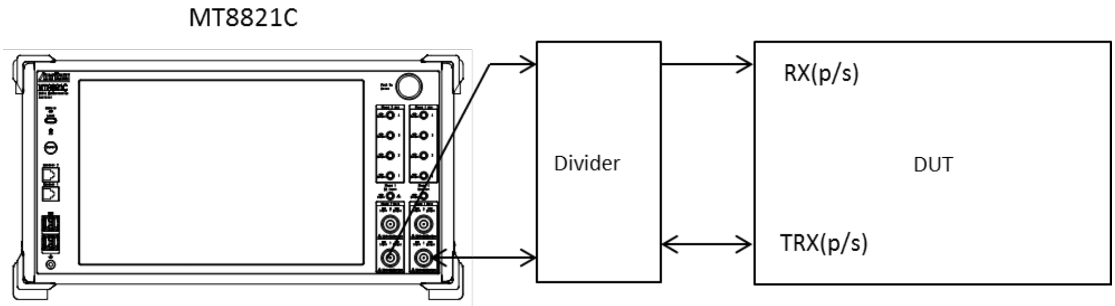
The following test procedures can be used for the MT8821C only.

2.5.1. Connection Diagram

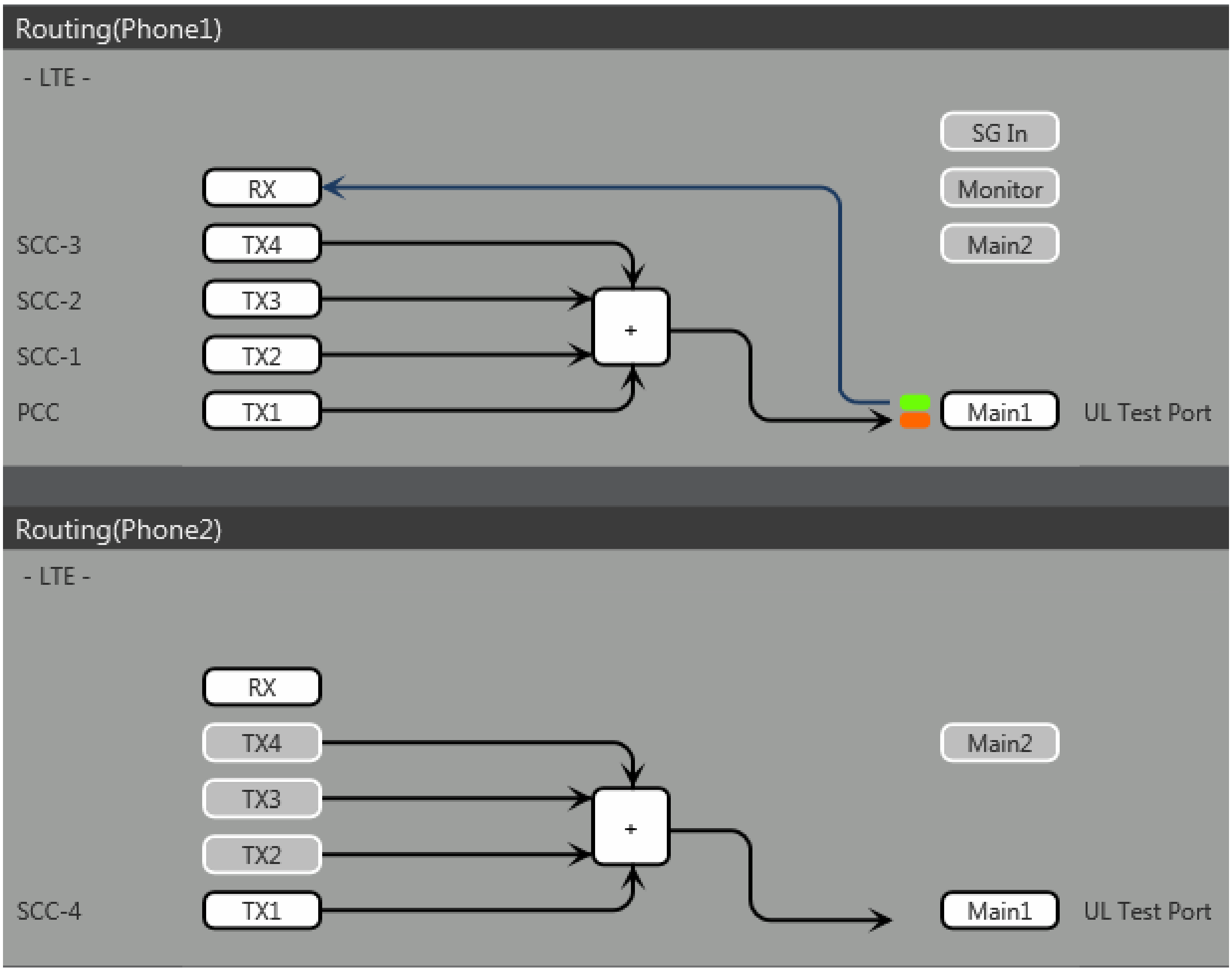
2.5.1.1. Connection Diagram for MT8821C 5DL/1UL CA

2.5.1.1.1. Connection using Main Connector

This example shows the connection diagram for 5DL/1UL CA. The DL signals of PCC, SCC1 SCC2 and SCC3 are combined by the internal combiners of MT8821C and output at Main1 connector of Phone1. The DL signals of SCC4 output at Main1 connector of Phone2.



<Connection Diagram>



<Internal Routing Diagram>

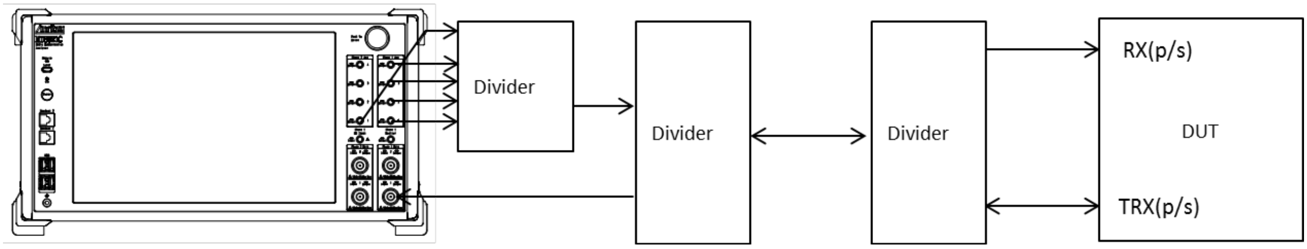
Figure 2.5.1-1 ***Connection Diagram and Internal Routing Diagram for 5DL /1UL CA, Tx and Rx Test (MT8821C, using divider)***

[Routing setting procedure]

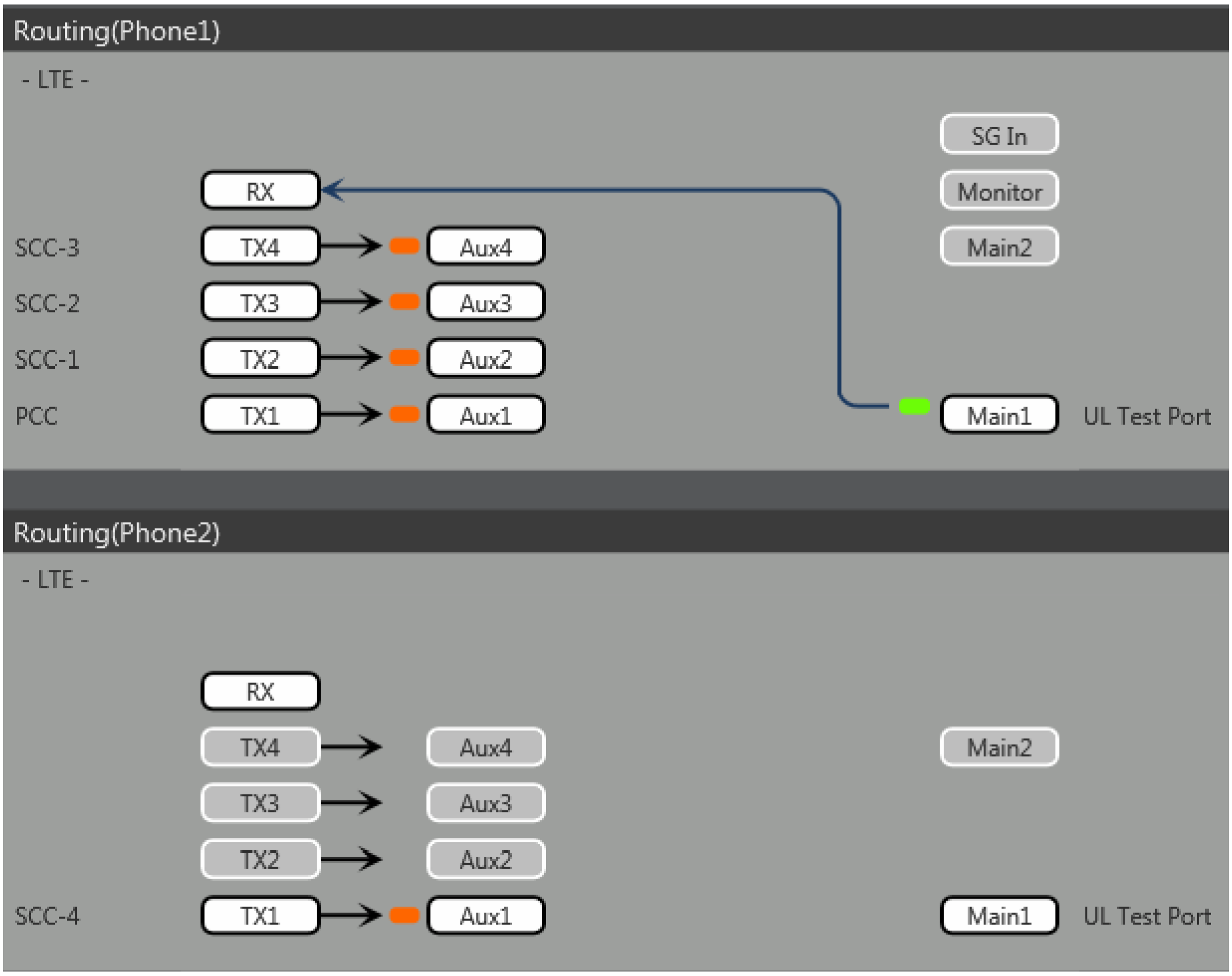
1. Execute **TXOUT 1, MAIN** to set the output connector **System Config – Routing (Phone1) – Tx1** to **Main**.
2. Execute **TXOUT 2, MAIN** to set the output connector **System Config – Routing (Phone1) – Tx2** to **Main**.
3. Execute **TXOUT 3, MAIN** to set the output connector **System Config – Routing (Phone1) – Tx3** to **Main**.
4. Execute **TXOUT 4, MAIN** to set the output connector **System Config – Routing (Phone1) – Tx4** to **Main**.
5. Execute **TXOUT_P2 1, MAIN** to set the output connector **System Config – Routing (Phone2) – Tx1** to **Main**.

2.5.1.1.2 Connection using Aux Connector

This example shows the connection diagram for 4DL/1UL CA using Aux connectors. The DL signal for PCC is output at Aux1, that for SCC-1 is output at Aux2, that for SCC-2 is output at Aux3, and that for SCC3 is output at Aux4.



<Connection Diagram>



<Internal Routing Diagram>

Figure 2.5.1–3 *Connection Diagram and Internal Routing Diagram for 5DL CA and 1UL CA, Tx and Rx Test (MT8821C, using Aux connectors)*

[Routing setting procedure]
1. Execute **TXOUT 1, AUX** to set the output connector **System Config – Routing(Phone1) – Tx1** to **Aux1**.
2. Execute **TXOUT 2, AUX** to set the output connector **System Config – Routing(Phone1) – Tx2** to **Aux2**.
3. Execute **TXOUT 3, AUX** to set the output connector **System Config – Routing(Phone1) – Tx3** to **Aux3**.
4. Execute **TXOUT 4, AUX** to set the output connector **System Config – Routing(Phone1) – Tx4** to **Aux4**.
5. Execute **TXOUT_P2 1, AUX** to set the output connector **System Config – Routing(Phone2) – Tx1** to **Aux1**.

2.5.2. Initial Condition Setting

The initial conditions must be set before measurement.
An example of the following settings is shown below.

Component Carrier	Channel	FDD		TDD		Channel Bandwidth
PCC	UL Channel	18300	(Band1)	38000	(Band38)	10 MHz
	DL Channel	300	(Band1)	38000	(Band38)	
SCC–1	DL Channel	2525	(Band5)	39150	(Band40)	20 MHz
SCC–2	DL Channel	4450	(Band10)	39500	(Band40)	10 MHz
SCC–3	DL Channel	444	(Band10)	38144	(Band40)	20 MHz
SCC–4	DL Channel	1575	(Band3)	38450	(Band39)	10 MHz

2.5.2.1. MT8821C

2.5.2.1.1. Setting Example 1 (FDD)

1. Execute **PRESET** to set the default parameters.
2. Execute **CHCODING RMC_DL_CA_PCC** to set **Common Parameter – Channel Coding** to **RMC (DL CA)**.
3. Execute **DLSCC 4** to set **Call Processing Parameter – Number of DL SCC** to **4**.

4. Execute **CALLPROC ON** to set **Common Parameter – Call Processing** to **On**.
5. Execute **DUP_CC_SRC SCC2** to set **Common Parameter – SCC4- Duplicate CC Source** to **SCC2.**
6. Execute **DLCHAN 300** to set **Common Parameter – UL Channel** and **DL Channel** to **18300** and **300**, respectively.
7. Execute **DLCHAN_SCC1 2525** to set **Common Parameter – SCC-1 – DL Channel** to **2525**.
8. Execute **DLCHAN_SCC2 4450** to set **Common Parameter – SCC-2 – DL Channel** to **4450**.
9. Execute **DLCHAN_SCC3 444** to set **Common Parameter – SCC-3 – DL Channel** to **444**.
10. Execute **DLCHAN_SCC4 1575** to set **Common Parameter – SCC-4 – DL Channel** to **1575**.
11. Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Channel Bandwidth** to **10 MHz**.
12. Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter – SCC-1 – Channel Bandwidth** to **20 MHz**.
13. Execute **BANDWIDTH_SCC2 10MHZ** to set **Common Parameter – SCC-2 – Channel Bandwidth** to **10 MHz**.
14. Execute **BANDWIDTH_SCC3 20MHZ** to set **Common Parameter – SCC-3 – Channel Bandwidth** to **20 MHz**.

2.5.2.1.2. Setting Example 2 (TDD)

The procedure described in Chapter 2.3.3.2.1 is used, but substituting the following steps to set Uplink/Downlink Configuration and Special Subframe Configuration.

6. Execute **DLCHAN 38000** to set **Common Parameter – DL Channel** and **UL Channel** to **38000** simultaneously.
7. Execute **DLCHAN_SCC1 39150** to set **Common Parameter – SCC-1 – DL Channel** to **39150**.
8. Execute **DLCHAN_SCC2 39500** to set **Common Parameter – SCC-2 – DL Channel** to **39500**.
9. Execute **DLCHAN_SCC3 38144** to set **Common Parameter – SCC-3 – DL Channel** to **38144**.
10. Execute **DLCHAN_SCC4 38450** to set **Common Parameter – SCC-4 – DL Channel** to **38450**.

15. Execute **TDDULDLCONF 1** to set **Common Parameter – TDD Uplink/Downlink Configuration** to **1**.
16. Execute **TDDSSFCONF 4** to set **Common Parameter – TDD Special Subframe Configuration** to **4**.

NOTE 1: Set the same value as Uplink/Downlink Configuration in PCC and SCC.
NOTE 2: Set the same value as Special Subframe Configuration in PCC and SCC.
NOTE 3: The differential UL/DL Configuration on each CC is not supported.

2.5.3. Location Registration

This performs UE location registration after setting the initial conditions (→2.5.2).

2.5.3.1. MT8821C

1. Connect the UE and MT8821C.
2. Execute **CALLPROC ON** to set **Common Parameter – Call processing** to **ON**.
3. Execute **CALLSO** to clear the call processing status.
4. Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
5. Turn on the UE power.
6. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
   Repeat step 6 when the checked status is not 2 (= Idle (Regist)).

2.5.4. Test Mode Connection and Disconnection

Refer to Chapter 2.1.4.

2.5.5. Inter-Frequency Handover

For SCC–4, the following steps are added to the procedure in Chapter2.4.5
This chapter describes an example for FDD.

2.5.5.1. MT8821C

<Changing SCC–**4** channel>

1. Execute **DLCHAN_SCC4 1550** to set **Common Parameter – SCC-4 – DL Channel** to **1550**.
2. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (= Connected).

3. TRX Measurements (Fundamental Measurements)

This chapter describes how to test TRX measurement using GPIB remote control software commands. For details of GPIB commands and manual operation, refer to the LTE operation manual. GPIB commands are in red bold. At Normal UE, the UE power class is assumed to be Class3. At HPUE, the UE power class is assumed to be Class1.

Before starting TRX measurement, do the following to ensure the call processing status is connected.

1. Initial Condition Setting(→2.1.2)
2. Broadcast Information Update(→2.1.5)
3. Location registration(→2.1.3)
4. Test Mode Connection(→2.1.4)

Then, set the average count for each measurement items to 20 times, except for special conditions.

3.1. TX Measurements

The following test procedures can be used for both the MT8820C and MT8821C.

3.1.1. UE Maximum Output Power (6.2.2)

This chapter describes UL measurement examples where (Modulation, RB) is (QPSK, 1), or (QPSK, PartialRB)

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set **the average count of power measurement** to **20 times**.
2. Execute **TP_MAXPWR_LL 20.3** to set **TX1 - Max. Power (QPSK/1RB/PartialRB) Pass/Fail lower limit** to **20.3 dBm**.
3. Execute **TP_MAXPWR_UL 25.7** to set **TX1 - Max. Power (QPSK/1RB/PartialRB) Pass/Fail upper limit** to **25.7 dBm**.

[(QPSK, 1RB) measurements]

4. Execute **TESTPRM TX_MAXPWR_Q_1** to set **Test Parameter** to **TX1 - Max. Power (QPSK/1RB)**.
5. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min (#0)**.
6. Execute **SWP** to measure the power.
7. Execute **POWER? AVG** to read the TX power measurement result.
8. Execute **POWERPASS?** to check that the TX power measurement Pass/Fail judgment is Pass.
9. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max (#max)**.
10. Execute steps 6 to 8.

[(QPSK, PartialRB) measurements]

4. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 - Max. Power (QPSK/PartialRB)**.
5. Execute steps 5 to 9.

NOTE 1: At 1RB allocation, Min (#0), Mid (#Nrb/2), and Max (#max) used in this application note each correspond to RB #0, RB #[N_{RB}^{UL}/2] and RB #max, respectively, described in TS 36.521-1.

NOTE 2: At PartialRB allocation Min (#0) and Max (#max) used in this application note each correspond to RB #0 and RB# (max +1 - RB allocation),respectively, described in TS 36.521-1.

NOTE 3: The 1RB allocation UL RB Position is divided as follows:

When $BW_{Channel}$ > $\triangle_{TC}$, Min (#0) and Max (#max)
When $BW_{Channel}$ – $\triangle_{TC}$, Min (#0)
When $BW_{Channel}$ = (F_{UL_high} - F_{UL_low}), Min (#0), Mid (#Nrb/2) and Max (#max)

NOTE 4: The UL RB Position of PartialRB allocation is Min (#0).

NOTE 5: The usual Pass/Fail evaluation value is set to the Band 1 default value described in TS36.521-1. Since the evaluation value differs according to the Band, set the evaluation value described in TS36.521-1 Table 6.2.2.5-1 at:

•TP_MAXPWR_LL
•TP_MAXPWR_UL

For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

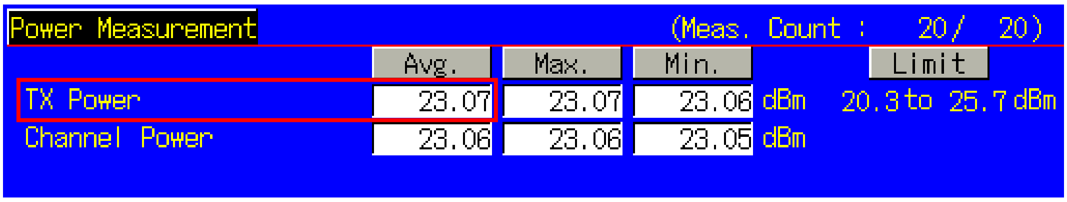


Figure 3.1.1-1 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/1RB) (MT8820C)***

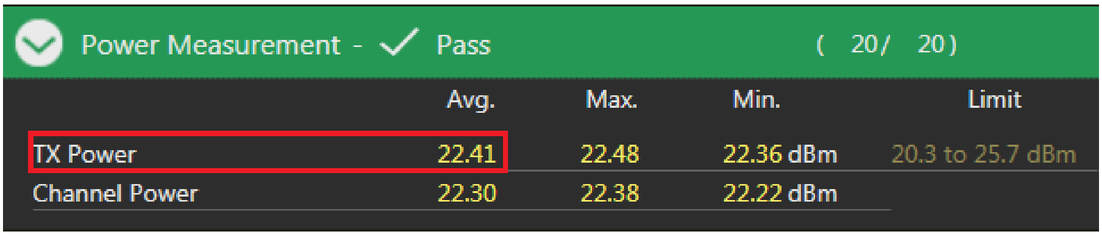


Figure 3.1.1-2 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/1RB) (MT8821C)***

3.1.2. UE Maximum Output Power for HPUE (6.2.2_1)

The measurement can be performed using the same procedure as Chapter 3.1.1, except the Pass/Fail evaluation limits value settings.

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set the average count for power measurement to 20 times.
2. Execute **TP_MAXPWR_LL 27.3** to set **TX1 - Max. Power (QPSK/1RB/PartialRB)** Pass/Fail lower limit to **27.3 dBm**.
3. Execute **TP_MAXPWR_UL 33.7** to set **TX1 - Max. Power (QPSK/1RB/PartialRB)** Pass/Fail upper limit to **33.7 dBm**.

3.1.3. Maximum Power Reduction (MPR) (6.2.3)

This chapter describes UL measurement examples where (Modulation, RB) is (QPSK, FullRB), (16QAM, PartialRB), or (16QAM, FullRB).

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set **the average count of power measurement** to **20 times**.
2. Execute **TP_MPR1_LL 19.3** to set **TX1 - Max. Power (QPSK/FullRB)** Pass/Fail lower limit to **19.3 dBm**.
3. Execute **TP_MPR1_UL 25.7** to set **TX1- Max. Power (QPSK/FullRB)** Pass/Fail upper limit to **25.7 dBm**.
4. Execute **TP_MPR2_LL 19.3** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail lower limit to **19.3 dBm**.
5. Execute **TP_MPR2_UL 25.7** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail upper limit to **25.7 dBm**.
6. Execute **TP_MPR3_LL 18.3** to set **TX1 - Max. Power (16QAM/FullRB)** Pass/Fail lower limit to **18.3 dBm**.
7. Execute **TP_MPR3_UL 25.7** to set **TX1 - Max. Power (16QAM/FullRB)** Pass/Fail upper limit to **25.7 dBm**.

[(QPSK, FullRB) measurements]

8. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
9. Execute **SWP** to measure the power.
10. Execute **POWER? AVG** to read the TX power measurement result.
11. Execute **POWERPASS?** to check that the TX power measurement Pass/Fail judgment is Pass.

[(16QAM, PartialRB) measurements]

12. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 - Max. Power (16QAM/PartialRB)**.
13. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min (#0)**.
14. Execute steps 9 to 11.

[(16QAM, FullRB) measurements]

15. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 - Max. Power (16QAM/FullRB)**.
16. Execute steps 9 to 11.

NOTE 1: The UL RB Position for PartialRB allocation is Min (#0).

NOTE 2: The usual Pass/Fail evaluation value is set to the Band 1 default value described in TS36.521-1. Since the evaluation value differs according to the Band, set the evaluation value described in TS36.521-1 Table 6.2.3.5-1 at:

- ***TP_MPR1_LL***
- ***TP_MPR1_UL***
- ***TP_MPR2_LL***
- ***TP_MPR2_UL***
- ***TP_MPR3_LL***
- ***TP_MPR3_UL***

For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

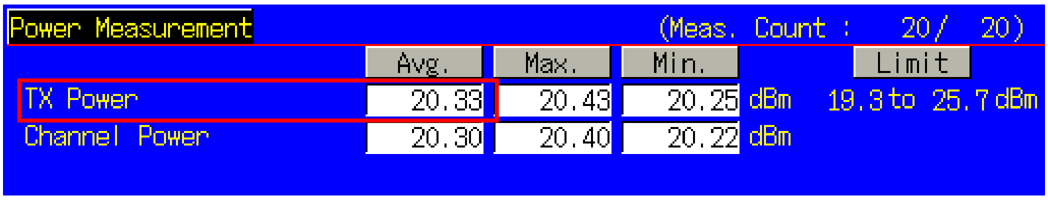


Figure 3.1.3-1 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/FullRB) (MT8820C)***

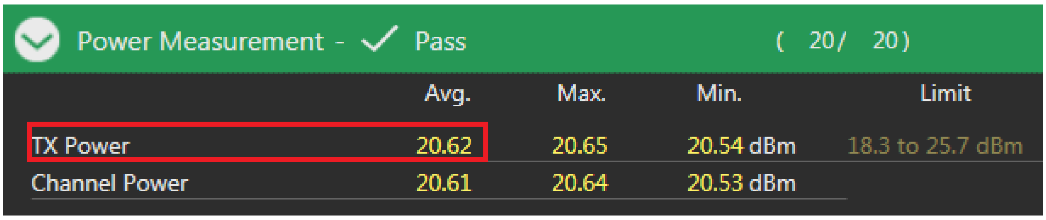


Figure 3.1.3-2 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (16QAM/FullRB) (MT8821C)***

3.1.4. Maximum Power Reduction (MPR) for HPUE (6.2.3_1)

The measurement can be performed using the same procedure as Chapter 3.1.3 except the Pass/Fail evaluation limits value setting.

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set **the average count of power measurement** to **20 times**.
2. Execute **TP_MPR1_LL 26.3** to set **TX1 - Max. Power (QPSK/FullRB)** Pass/Fail lower limit to **26.3 dBm**.
3. Execute **TP_MPR1_UL 33.7** to set **TX1- Max. Power (QPSK/FullRB)** Pass/Fail upper limit to **33.7 dBm**.
4. Execute **TP_MPR2_LL 26.3** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail lower limit to **26.3 dBm**.
5. Execute **TP_MPR2_UL 33.7** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail upper limit to **33.7 dBm**.
6. Execute **TP_MPR3_LL 25.3** to set **TX1 - Max. Power (16QAM/FullRB)** Pass/Fail lower limit to **25.3 dBm**.
7. Execute **TP_MPR3_UL 33.7** to set **TX1 - Max. Power (16QAM/FullRB)** Pass/Fail upper limit to **33.7 dBm**.

3.1.5. Maximum Power Reduction (MPR) for Multi-Cluster PUSCH (6.2.3_2)

This chapter describes the measurement examples for the following conditions.

First example: Channel Bandwidth = 20 MHz, UL Modulation is 16QAM,
UL Number of RB and Starting RB of Cluster1 is 4,0 respectively, and
UL Number of RB and Starting RB of Cluster2 is 92,8 respectively.

Second example: Channel Bandwidth = 20MHz, UL Modulation is 16QAM,
UL Number of RB and Starting RB of Cluster1 is 92,0 respectively and
UL Number of RB and Starting RB of Cluster2 is 4,96 respectively.

[Pass/Fail evaluation limits value setting for first example]

1. Execute **PWR_AVG 20** to set **the average count of power measurement** to **20 times**.
2. Execute **TP_MPR2_LL 19.3** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail lower limit to **19.3 dBm**.
3. Execute **TP_MPR2_UL 25.7** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail upper limit to **25.7 dBm**.

[(16QAM, PartialRB) measurements for first example]

4. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 - Max. Power (16QAM/PartialRB)**.
5. Execute **CHCONFIG PUSCH_MULTI** to set **Common Parameter - RMC Configuration** to **PUSCH(Multi Cluster)**.
6. Execute **ULRB_MULTI 4,0,92,8** to set **Common Parameter - UL RMC - 1st PUSCH Number of RB** to **4**, **1st PUSCH Starting RB** to **0**, **2nd PUSCH Number of RB** to **92**, and **2nd PUSCH Starting RB** to **8**.
7. Execute **SWP** to measure the power.
8. Execute **POWER? AVG** to read the TX power measurement result.
9. Execute **POWERPASS?** to check that the TX power measurement Pass/Fail judgment is Pass.

[Pass/Fail evaluation limits value setting for second example]

10. Execute **PWR_AVG 20** to set **the average count of power measurement** to **20 times**.
11. Execute **TP_MPR2_LL 19.3** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail lower limit to **19.3 dBm**.
12. Execute **TP_MPR2_UL 25.7** to set **TX1 - Max. Power (16QAM/PartialRB)** Pass/Fail upper limit to **25.7 dBm**.

[(16QAM, PartialRB) measurements for second example]

13. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 - Max. Power (16QAM/PartialRB)**.
14. Execute **CHCONFIG PUSCH_MULTI** to set **Common Parameter - RMC Configuration** to **PUSCH(Multi Cluster)**.
15. Execute **ULRB_MULTI 92,0,4,96** to set **Common Parameter - UL RMC - 1st PUSCH Number of RB** to **92**, **1st PUSCH Starting RB** to **0**, **2nd PUSCH Number of RB** to **4**, and **2nd PUSCH Starting RB** to **96**.
16. Execute steps 7 to 9.

NOTE 1: The usual Pass/Fail evaluation value is set to the Band 1 default value described in TS36.521-1. Since the evaluation value differs according to the Band, set the evaluation value described in TS36.521-1 Table 6.2.3_2.5-1 or Table 6.2.3_2.5-2 at:

- ***TP_MPR2_LL***
- ***TP_MPR2_UL***

For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

3.1.6. Configured UE transmitted Output Power (6.2.5)

This chapter describes a UL measurement example where (Modulation, RB) is (QPSK, PartialRB).

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set **the average count of Power measurement** to **20 times**.
2. Execute **TP_CONFPWR1_TOL 7.7** to set **TX2 - Configured UE transmitted Output Power (Test Point 1)** Pass/Fail Judgment.
3. Execute **TP_CONFPWR2_TOL 6.7** to set **TX2 - Configured UE transmitted Output Power (Test Point 2)** Pass/Fail Judgment.
4. Execute **TP_CONFPWR3_TOL 5.7** to set **TX2 - Configured UE transmitted Output Power (Test Point 3)** Pass/Fail Judgment.

[Measurements]

5. Execute **TESTPRM TX_CONF_PWR1** to set **Test Parameter** to **TX2 - Configured Power (Test Point 1)**.
6. Execute **SWP** to measure power.
7. Execute **POWER? AVG** to read the TX Power measurement result.
8. Execute **POWERPASS?** to check that the TX Power measurement Pass/Fail judgment is Pass.
9. Execute **TESTPRM TX_CONF_PWR2** to set **Test Parameter** to **TX2 - Configured Power (Test Point 2)**.
10. Execute steps 6 to 8.
11. Execute **TESTPRM TX_CONF_PWR3** to set **Test Parameter** to **TX2 - Configured Power (Test Point 3)**.
12. Execute steps 6 to 8.

NOTE 1: The UL RB Position of PartialRB allocation is Min (#0).

NOTE 2: The Pass/Fail evaluation value is initialized as described in TS36.521-1 Table 6.2.5.5-1 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set

- ***TP_CONFPWR1_TOL 8.0***
- ***TP_CONFPWR2_TOL 7.0***
- ***TP_CONFPWR3_TOL 6.0***

as described in TS36.521-1 Table 6.2.5.5-1.
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

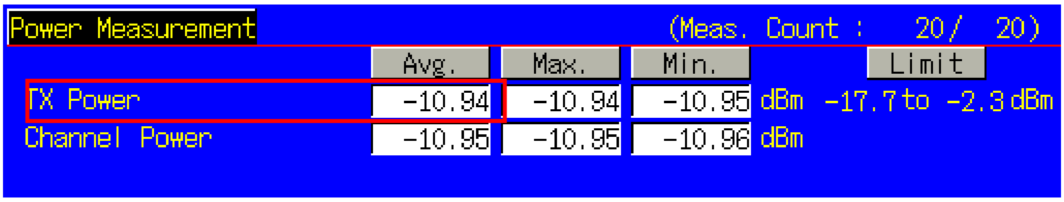


Figure 3.1.6-1 ***Example of Measurement Result when Test Parameter is TX2 - Configured Power (Test Point 1) (MT8820C)***

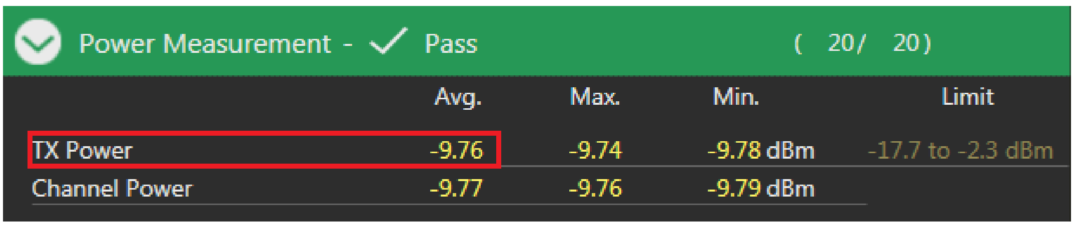


Figure 3.1.6-2 ***Example of Measurement Result when Test Parameter is TX2 - Configured Power (Test Point 1) (MT8821C)***

3.1.7. Configured UE transmitted Output Power for HPUE (6.2.5_1)

The measurement can be performed using the same procedure as in Chapter 3.1.5.
For Test Point 4, add the following steps to the procedure.

13. Execute **MAXULPWR 20** to set **p-Max value** to **20**.
14. Execute steps 6 to 8.

3.1.8. Minimum Output Power (6.3.2)

This chapter describes a UL measurement example where (Modulation, RB) is (QPSK, FullRB).

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set **the average count of Power measurement** to **20 times**.
2. Execute **TP_MINPWR_UL -39.0** to set **TX1 - Min. Power** Pass/Fail judgment.

[Measurements]

3. Execute **TESTPRM TX_MINPWR** to set **Test Parameter** to **TX1 - Min. Power**.
4. Execute **SWP** to measure the power.
5. Execute **CHPWR? AVG** to read the Channel Power measurement result.
6. Execute **CHPWRPASS?** to check that the Channel Power measurement Pass/Fail judgment is Pass.

NOTE 1: The Pass/Fail evaluation value is initialized as described in TS36.521-1 Table 6.3.2.5-1 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set:
•TP_MINPWR_UL -38.7

as described in TS36.521-1 Table 6.3.2.5-1.
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

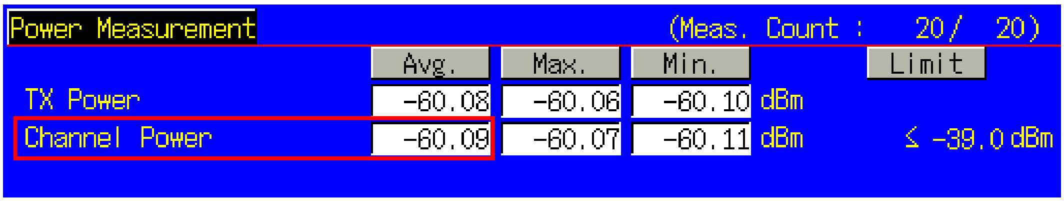


Figure 3.1.8-1 ***Example of Measurement Result when Test Parameter is TX1 - Min. Power (MT8820C)***

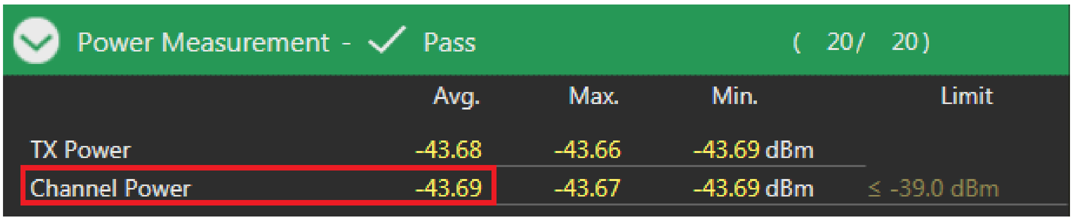


Figure 3.1.8-2 ***Example of Measurement Result when Test Parameter is TX1 - Min. Power (MT8821C)***

3.1.9. General ON/OFF time mask (6.3.4.1)

[Pass/Fail evaluation limits value setting]

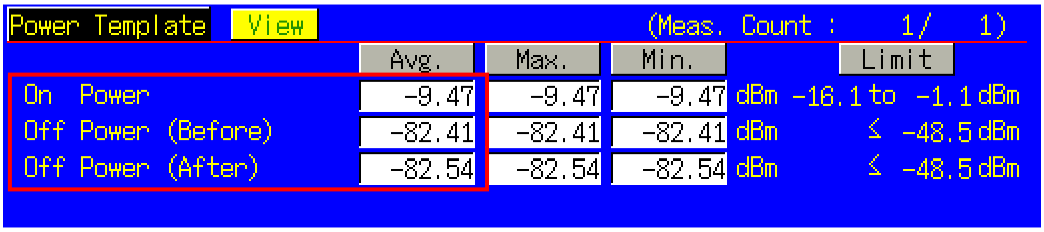
1. Execute **TP_OFFPWR_UL -48.5** to set **TX2 - General Time Maskof Off Power** Pass/Fail judgment.
2. Execute **TP_TMASK_GEN_TOL 7.5** to set **TX2 - General Time Maskof On Power** Pass/Fail judgment.

[Measurements]

3. Execute **TESTPRM TX_GEN_TMASK** to set **Test Parameter** to **TX2 - General Time Mask**.
4. Execute **PT_WDR ON** to enable Power Template wide dynamic range measurement.
5. Execute **SWP** to measure Power Template.
6. Execute **ONPWR? AVG** to read the On Power measurement result.
7. Execute **ONPWRPASS?** to check that the On Power measurement Pass/Fail judgment is Pass.
8. Execute **OFFPWR_BEFORE? AVG** to read the Off Power (Before) measurement result.
9. Execute **OFFPWR_AFTER? AVG** to read the Off Power (After) measurement result.
10. Execute **OFFPWRPASS?** to check that the Off Power measurement Pass/Fail judgment is Pass.

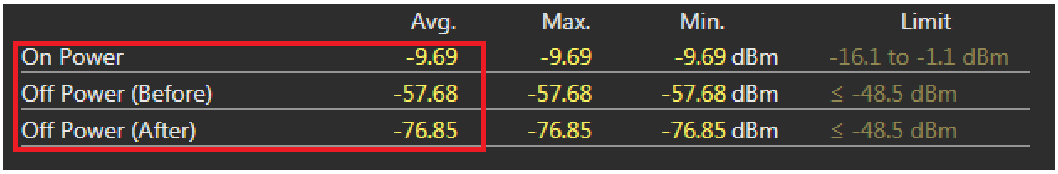
NOTE 1: The Pass/Fail evaluation value is initialized as described in TS36.521-1 Table 6.3.4.1.5-1 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set:
•TP_OFFPWR_UL -48.2
•TP_TMASK_GEN_TOL 7.8

as described in TS36.521-1 Table 6.3.4.1.5-1.
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.



	Avg.	Max.	Min.		Limit
On Power	-9.47	-9.47	-9.47	dBm	-16.1 to -1.1 dBm
Off Power (Before)	-82.41	-82.41	-82.41	dBm	≦ -48.5 dBm
Off Power (After)	-82.54	-82.54	-82.54	dBm	≦ -48.5 dBm

Figure 3.1.9-1 ***Example of Measurement Result when Test Parameter is TX2 - General Time Mask (MT8820C)***



	Avg.	Max.	Min.	Limit
On Power	-9.69	-9.69	-9.69 dBm	-16.1 to -1.1 dBm
Off Power (Before)	-57.68	-57.68	-57.68 dBm	≤ -48.5 dBm
Off Power (After)	-76.85	-76.85	-76.85 dBm	≤ -48.5 dBm

Figure 3.1.9-2 ***Example of Measurement Result when Test Parameter is TX2 - General Time Mask (MT8821C)***

3.1.10. PRACH time mask (6.3.4.2.1)

[Pass/Fail evaluation limits value setting]

1. Execute **TP_OFFPWR_UL -48.5** to set **Idle/Call - PRACH Time Mask of Off Power** Pass/Fail judgment.
2. Execute **TP_TMASK_PRACH_TOL 7.5** to set **Idle/Call - PRACH Time Mask of On Power** Pass/Fail judgment.

[Measurements]

3. Execute **TESTPRM IDLE_PRACH_TMASK** to set **Test Parameter** to **Idle/Call - PRACH Time Mask**.
4. Execute **SWPANDPG** when call processing is Idle (Regist) and **SWP** when Connected to measure Power Template (PRACH).
5. Execute **ONPWR? AVG** to read the On Power measurement result.
6. Execute **ONPWRPASS?** to check the On Power measurement Pass/Fail judgment is Pass.
7. Execute **ONPWRPASS?** to check the On Power measurement Pass/Fail judgment is Pass.
8. Execute **OFFPWR_AFTER? AVG** to read the Off Power (After) measurement result.
9. Execute **OFFPWRPASS?** to check that the Off Power measurement Pass/Fail judgment is Pass.

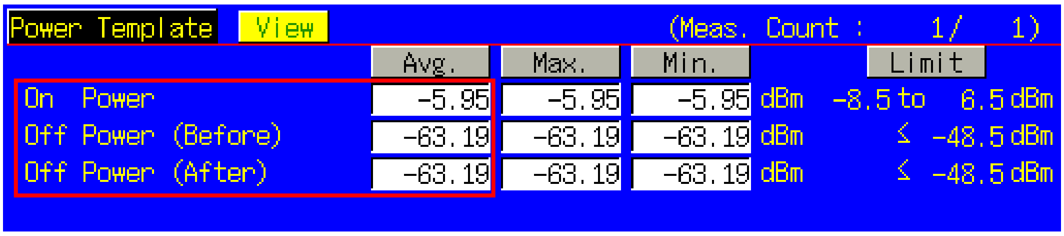
NOTE 1: The Pass/Fail evaluation value is initialized as described in TS36.521-1 Table 6.3.4.2.1.5-1 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set:

•TP_OFFPWR_UL -48.2

•TP_TMASK_PRACH_TOL 7.8

as described in TS36.521-1 Table 6.3.4.2.1.5-1.

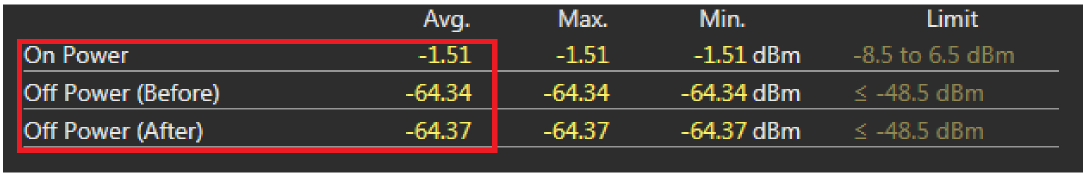
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.



Power Template View (Meas. Count : 1/ 1)

	Avg.	Max.	Min.		Limit
On Power	-5.95	-5.95	-5.95	dBm	-8.5 to 6.5 dBm
Off Power (Before)	-63.19	-63.19	-63.19	dBm	≦ -48.5 dBm
Off Power (After)	-63.19	-63.19	-63.19	dBm	≦ -48.5 dBm

Figure 3.1.10-1 ***Example of Measurement Result when Test Parameter is Idle/Call - PRACH Time Mask (MT8820C)***



	Avg.	Max.	Min.	Limit
On Power	-1.51	-1.51	-1.51 dBm	-8.5 to 6.5 dBm
Off Power (Before)	-64.34	-64.34	-64.34 dBm	≤ -48.5 dBm
Off Power (After)	-64.37	-64.37	-64.37 dBm	≤ -48.5 dBm

Figure 3.1.10-2 ***Example of Measurement Result when Test Parameter is Idle/Call - PRACH Time Mask (MT8821C)***

3.1.11. SRS time mask (6.3.4.2.2)

[Pass/Fail evaluation limits value setting]

1. Execute **TP_OFFPWR_UL -48.5** to set **TX3 - SRS Time Mask of Off Power** Pass/Fail judgment.
2. Execute **TP_TMASK_SRS_TOL 7.5** to set **TX3 - SRS Time Mask of On Power** Pass/Fail judgment.

[Measurements]

3. Execute **TESTPRM TX_SRS_TMASK** to set **Test Parameter** to **Idle/Call - SRS Time Mask**.
4. Execute **SWP** to measure Power Template (SRS).
5. Execute **ONPWR? AVG** to read the On Power measurement result.
6. Execute **ONPWRPASS?** to check the On Power measurement Pass/Fail judgment is Pass.
7. Execute **OFFPWR_BEFORE? AVG** to read the Off Power (Before) measurement result.
8. Execute **OFFPWR_AFTER? AVG** to read the Off Power (After) measurement result.]
9. Execute **OFFPWRPASS?** to check that the Off Power measurement Pass/Fail judgment is Pass.

NOTE 1: The Pass/Fail evaluation value is initialized as described in TS36.521-1 Table 6.3.4.2.2.5-1 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set:

- ***TP_OFFPWR_UL -48.2***
- ***TP_TMASK_SRS_TOL 7.8***

as described in TS36.521-1 Table 6.3.4.2.2.5-1.

For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

Power Template View (Meas. Count : 1/ 1)

	Avg.	Max.	Min.		Limit
On Power	-4.20	-4.20	-4.20	dBm	-10.1 to 4.9 dBm
Off Power (Before)	-83.47	-83.47	-83.47	dBm	≦ -48.5 dBm
Off Power (After)	-83.66	-83.66	-83.66	dBm	≦ -48.5 dBm

Figure 3.1.11-1 ***Example of Measurement Result when Test Parameter is Idle/Call - SRS Time Mask (MT8820C)***

	Avg.	Max.	Min.	Limit
On Power	-1.96	-1.96	-1.96 dBm	-10.1 to 4.9 dBm
Off Power (Before)	-76.86	-76.86	-76.86 dBm	≤ -48.5 dBm
Off Power (After)	-76.73	-76.73	-76.73 dBm	≤ -48.5 dBm

Figure 3.1.11-2 ***Example of Measurement Result when Test Parameter is Idle/Call - SRS Time Mask (MT8821C)***

3.1.12. Power Control Absolute power tolerance (6.3.5.1)

[Pass/Fail evaluation limits value setting]

1. Execute **TP_PCTABS_TOL 10.0** to set **TX3 - Absolute Power (Test Point1)** Pass/Fail judgment.

[Measurements]

2. Execute **TESTPRM TX_PCTABS1** to set **Test Parameter** to **TX3 - Absolute Power (Test Point1)**.
3. Execute **SWP** to measure Power Control Tolerance (Absolute Power).
4. Execute **PCTPWR?** to read the Absolute Power (dBm) measurement result.
5. Execute **PCTPASS?** to check that the Absolute Power measurement Pass/Fail judgment is Pass.
6. Execute **TESTPRM TX_PCTABS2** to set **Test Parameter** to **TX3 - Absolute Power (Test Point2)**.
7. Execute steps 3 to 5.

NOTE 1: The Pass/Fail evaluation value is initialized as described in TS36.521-1 Table 6.3.5.1.5-1 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set:

•TP_PCTABS_TOL 10.4

as described in TS36.521-1 Table 6.3.5.1.5-1.

For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

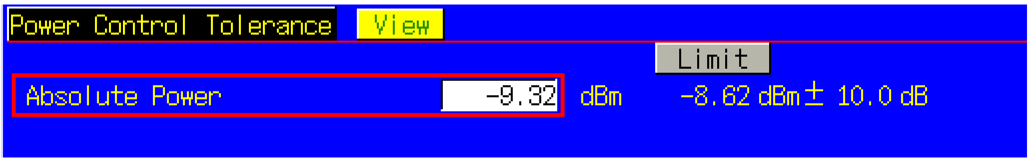


Figure 3.1.12-1 ***Example of Measurement Result when Test Parameter is TX3 - Absolute Power (Test Point1) (MT8820C)***

Figure 3.1.12-2 ***Example of Measurement Result when Test Parameter is TX3 - Absolute Power (Test Point1) (MT8821C)***

3.1.13. Power Control Relative power tolerance (6.3.5.2)

1. Execute **TESTPRM TX_PCTREL_UP_A** to set **Test Parameter** to **TX3 - Relative Power (Ramping UP A)**.
2. Execute **SWP** to measure Power Control Tolerance (Relative Power).
3. Execute **PCTPWR?** to read the Relative Power (dB) measurement result.
4. Execute **PCTPASS?** to check that the Relative Power measurement Pass/Fail judgment is Pass.
5. Execute **TESTPRM TX_PCTREL_UP_B** to set **Test Parameter** to **TX3 - Relative Power (Ramping UP B)**.
6. Execute steps 2 to 4.
7. Execute **TESTPRM TX_PCTREL_UP_C** to set **Test Parameter** to **TX3 - Relative Power (Ramping UP C)**.
8. Execute steps 2 to 4.
9. Execute **TESTPRM TX_PCTREL_DOWN_A** to set **Test Parameter** to **TX3 - Relative Power (Ramping Down A)**.
10. Execute steps 2 to 4.
11. Execute **TESTPRM TX_PCTREL_DOWN_B** to set **Test Parameter** to **TX3 - Relative Power (Ramping Down B)**.
12. Execute steps 2 to 4.
13. Execute **TESTPRM TX_PCTREL_DOWN_C** to set **Test Parameter** to **TX3 - Relative Power (Ramping Down C)**.
14. Execute steps 2 to 4.
15. Execute **TESTPRM TX_PCTREL_ALT** to set **Test Parameter** to **TX3 - Relative Power (Alternating)**.
16. Execute steps 2 to 4.

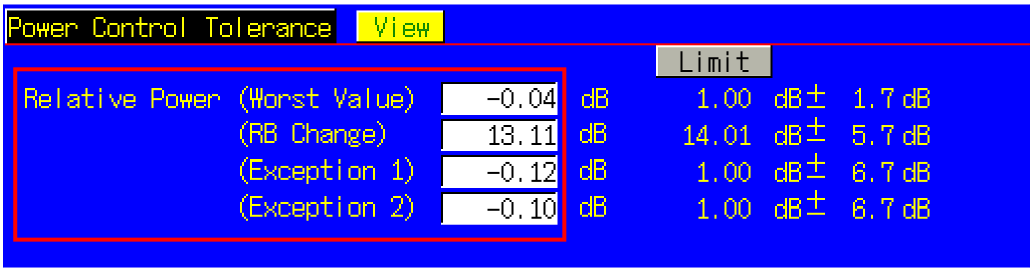


Figure 3.1.13-1 ***Example of Measurement Result when Test Parameter is TX3 - Relative Power (Ramping UP A) (MT8820C)***

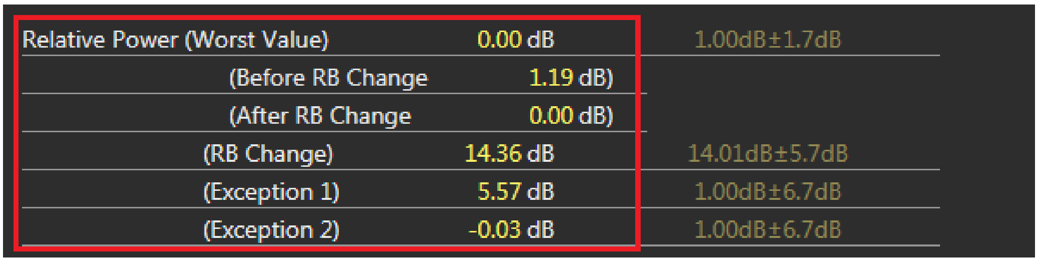


Figure 3.1.13-2 ***Example of Measurement Result when Test Parameter is TX3 - Relative Power (Ramping UP A) (MT8821C)***

3.1.14. Aggregate Power Control tolerance (6.3.5.3)

1. Execute **TESTPRM TX_PCTAGG_PUSCH** to set **Test Parameter** to **TX3 - Aggregate Power (PUSCH Sub-test)**.
2. Execute **SWP** to measure Power Control Tolerance (Aggregate Power).
3. Execute **PCTPWR?** to read the Aggregate Power (dB) measurement result.
4. Execute **PCTPASS?** to check that the Aggregate Power measurement Pass/Fail judgment is Pass.
5. Execute **TESTPRM TX_PCTAGG_PUCCH** to set **Test Parameter** to **TX3 - Aggregate Power (PUCCH Sub-test)**.
6. Execute steps 2 to 4.

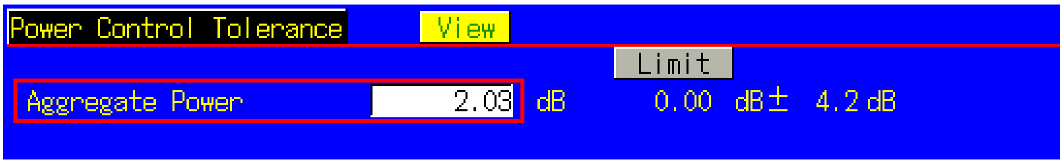


Figure 3.1.14-1 ***Example of Measurement Result when Test Parameter is TX3 - Aggregate Power (PUSCH Sub-test) (MT8820C)***

Figure 3.1.14-2 ***Example of Measurement Result when Test Parameter is TX3 - Aggregate Power (PUSCH Sub-test) (MT8821C)***

3.1.15. Power Control Absolute power tolerance for HPUE (6.3.5.1_1.1)

This measurement can be performed using the same procedure as in Chapter 3.1.12, and adding the following step after Step 2 and 6.

Execute **NOMPUSCH power -85** to set **p0-NominalPUSCH** to **-85**

3.1.16. Power Control Relative power tolerance for HPUE (6.3.5.2_1.2)

This measurement can be performed using the same procedure as in Chapter 3.1.13, and adding the following step after Step 9.

Execute **ILVL 26.0** to set **Input Level** to **26.0dBm**

3.1.17. Aggregate power control tolerance for HPUE (6.3.5_1.3)

This measurement can be performed using the same procedure as in Chapter 3.1.14.

3.1.18. Frequency Error (6.5.1)

This chapter describes a UL measurement example for where (Modulation, RB) is (QPSK, FullRB).

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times**.
2. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
3. Execute **SWP** to perform Modulation Analysis measurement.
4. Execute **WORST_CARRFERR? HZ** to read the Carrier Frequency Error (Hz) measurement result.
5. Execute **WORST_CARRFERR? PPM** to read the Carrier Frequency Error (ppm) measurement result.
6. Execute **CARRFERRPASS?** to check that the Carrier Frequency Error Pass/Fail judgment is Pass.

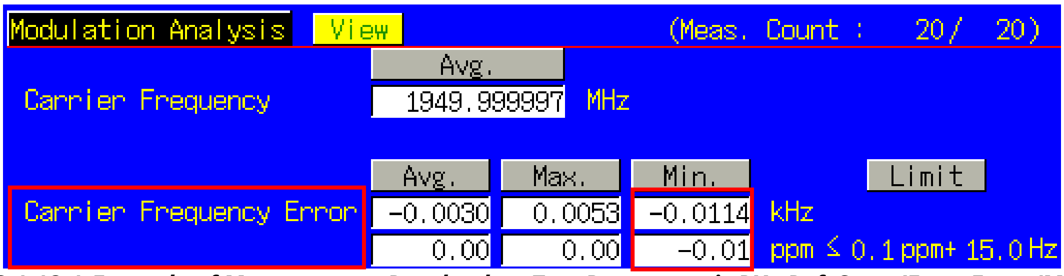


Figure 3.1.18-1 ***Example of Measurement Result when Test Parameter is RX - Ref. Sens./Freq. Error (MT8820C)***

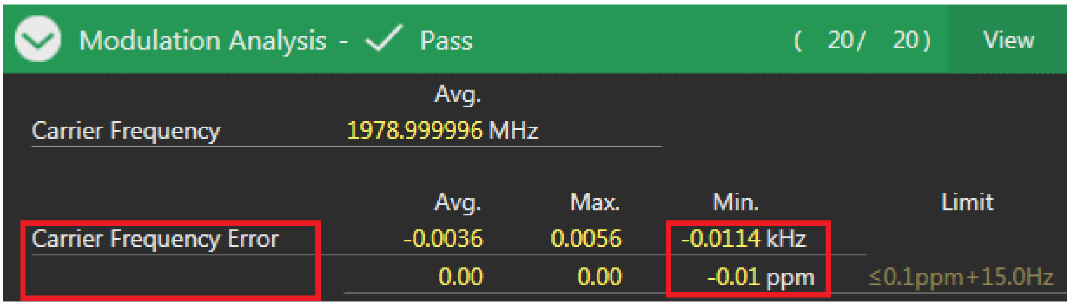


Figure 3.1.18-2 ***Example of Measurement Result when Test Parameter is RX - Ref. Sens./Freq. Error (MT8821C)***

3.1.19. Error Vector Magnitude (EVM) - PUSCH (6.5.2.1)

This chapter describes UL measurement examples where (Modulation, RB) is (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB) or (16QAM, FullRB).

1. Execute **MOD_AVG 20** to set the average count of Modulation Analysis to 20 times.

[(QPSK, PartialRB) measurements]

2. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 - Max. Power (QPSK/PartialRB)**.
3. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min (#0)**.
4. Execute **SWP** to measure Modulation Analysis.
5. Execute **EVM? AVG** to read the EVM measurement result.
6. Execute **EVMPASS?** to check that the EVM Pass/Fail judgment is Pass.
7. Execute **RSEVM? AVG** to read the Reference Signal EVM measurement result.
8. Execute **RSEVMPASS?** to check that the Reference Signal EVM Pass/Fail judgment is Pass.
9. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max (#max)**.
10. Execute steps 4 to 8.
11. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)**
12. Execute steps 3 to 10.

[(QPSK, FullRB) measurements]

13. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
14. Execute steps 4 to 8.
15. Execute **TESTPRM TX_M40DBM_Q_F** to set **Test Parameter** to **TX1 - EVM @ -40 dBm (QPSK/Full RB).**
16. Execute steps 4 to 8.

[(16QAM, PartialRB) measurements]

17. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 - Max. Power (16QAM/PartialRB)**.
18. Execute steps 3 to 10.
19. Execute **TESTPRM TX_M40DBM_16_P** to set **Test Parameter** to **TX1 - EVM @ -40 dBm (16QAM/Partial RB)**.
20. Execute steps 3 to 10.

[(16QAM, FullRB) measurements]

21. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 - Max. Power (16QAM/FullRB)**.
22. Execute steps 4 to 8.
23. Execute **TESTPRM TX_M40DBM_16_F** to set **Test Parameter** to **TX1 - EVM @ -40 dBm (16QAM/Full RB)**.
24. Execute steps 4 to 8.

NOTE 1: The UL RB Position for PartialRB allocation is Min (#0) or Max (#max).

3.1.20. Error Vector Magnitude (EVM) - PUCCH (6.5.2.1)

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times**.
2. Execute **TESTPRM TX_PUCCH_MAX** to set **Test Parameter** to **TX2 - PUCCH EVM** @MAX.
3. Execute **SWP** to measure Modulation Analysis.
4. Execute **EVM? AVG** to read the EVM measurement result.
5. Execute **EVMPASS?** to check that the EVM Pass/Fail judgment is Pass.
6. Execute **TESTPRM TX_PUCCH_M40DBM** to set **Test Parameter** to **TX2 - PUCCH EVM/IBE @ -40 dBm**.
7. Execute steps 3 to 5.

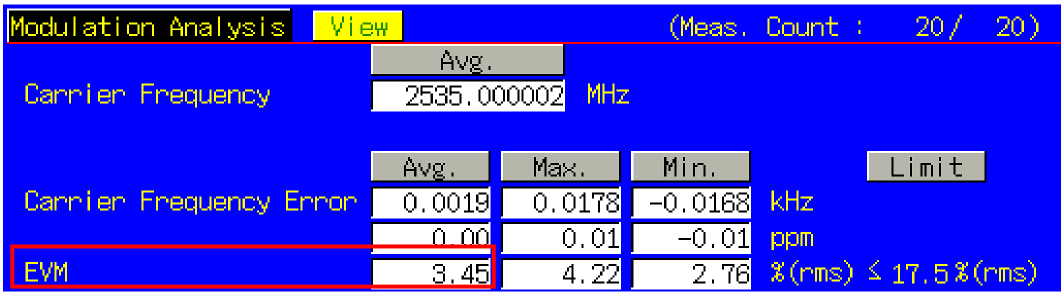


Figure 3.1.20-1 ***Example of Measurement Result when Test Parameter is TX2 - PUCCH EVM @ MAX (MT8820C)***

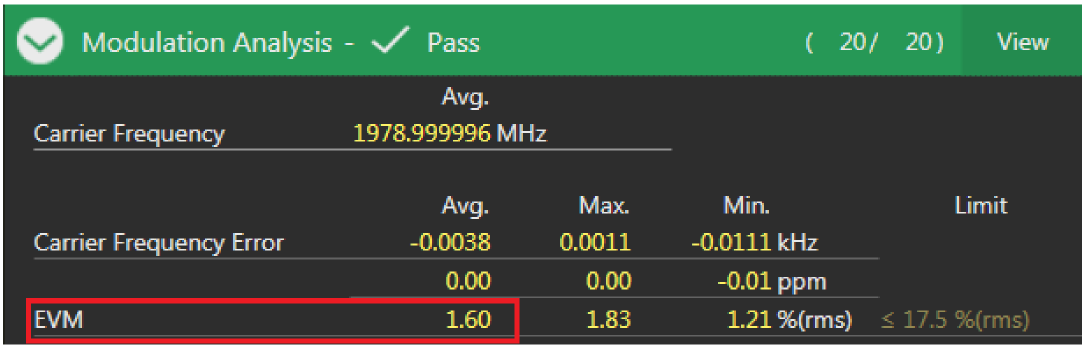


Figure 3.1.20-2 ***Example of Measurement Result when Test Parameter is TX2 - PUCCH EVM @ MAX (MT8821C)***

3.1.21. Error Vector Magnitude (EVM) - PRACH (6.5.2.1)

1. Execute **TESTPRM IDLE_PRACHEVM1** to set **Test Parameter** to **Idle - PRACH EVM (Test Point1)**.
2. Execute **SWPANDPG** when call processing is Idle (Regist) and **SWP** when processing is Connected to measure Modulation Analysis (PRACH).
3. Execute **EVM? AVG** to read the EVM measurement result.
4. Execute **EVMPASS?** to check that the EVM Pass/Fail judgment is Pass.
5. Execute **TESTPRM IDLE_PRACHEVM2** to set **Test Parameter** to **Idle/Call - PRACH EVM (Test Point2)**.
6. Execute steps 2 to 4.

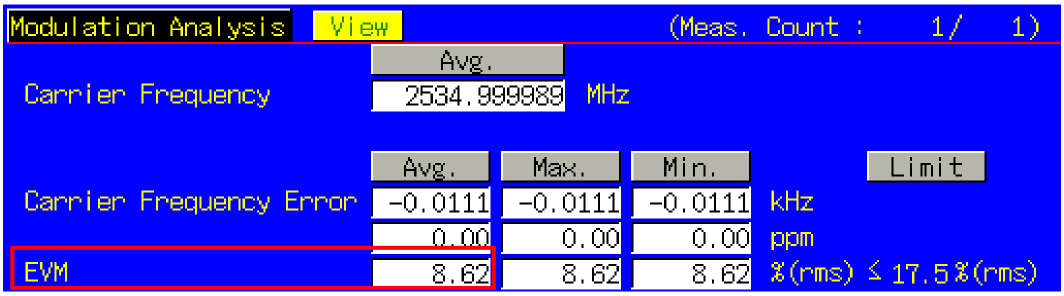


Figure 3.1.21-1 ***Example of Measurement Result when Test Parameter is Idle/Call - PRACH EVM (Test Point1) (MT8820C)***

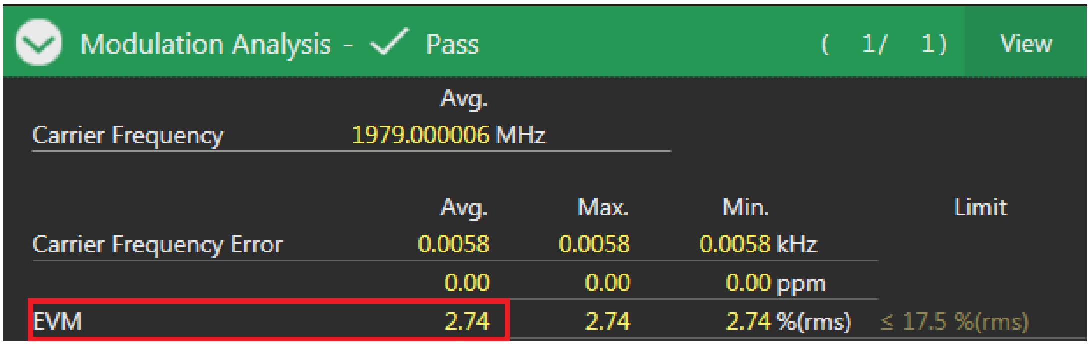


Figure 3.1.21-2 ***Example of Measurement Result when Test Parameter is Idle/Call - PRACH EVM (Test Point1) (MT8821C)***

3.1.22. PUSCH-EVM with exclusion period (6.5.2.1A)

Measures using the 10 MHz Channel Bandwidth defined in the measurement standards.
Set the average measurement count to 16 times because the average for 16 timeslots is described in the standards.
This chapter describes the measurement examples for UL (Modulation) is (QPSK) or (16QAM).

1. Execute **BANDWIDTH 10MHZ** to set **Channel Bandwidth** to **10 MHz**.
2. Execute **MOD_AVG 16** to set the **average count of Modulation Analysis** to **16 times**.

[(QPSK) measurements]

3. Execute **TESTPRM TX_EVMEXP_Q** to set **Test Parameter** to **TX3 - EVM with Exclusion Period (QPSK)**.
4. Execute **SWP** to measure Modulation Analysis.
5. Execute **EVM? AVG** to read the EVM measurement result.
6. Execute **EVMPASS?** To check that the EVM Pass/Fail judgment is Pass.

[(16QAM) measurements]

7. Execute **TESTPRM TX_EVMEXP_16** to set **Test Parameter** to **TX3 - EVM with Exclusion Period (16QAM)**.
8. Execute steps 4 to 6.

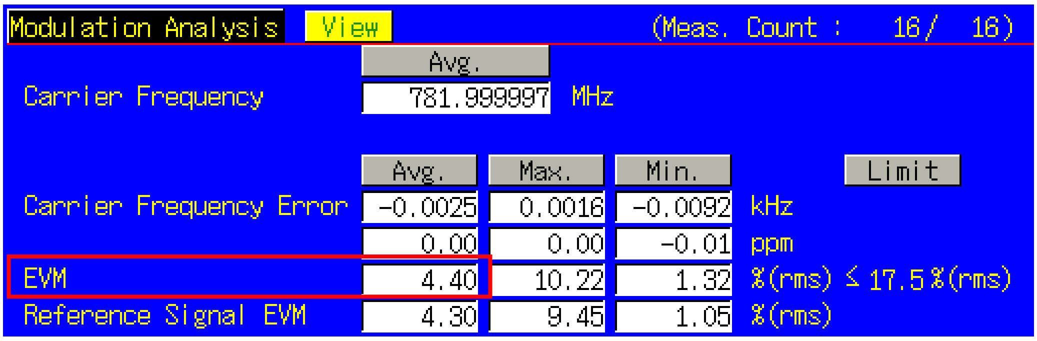


Figure 3.1.22-1 ***Example of Measurement Result when Test Parameter is TX3 - EVM with Exclusion Period (QPSK) (MT8820C)***

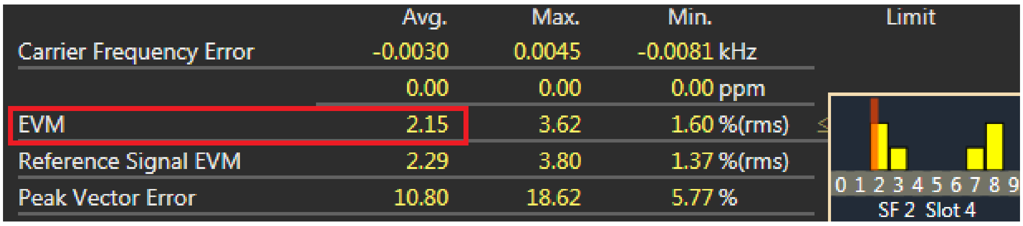


Figure 3.1.22-2 ***Example of Measurement Result when Test Parameter is TX3 - EVM with Exclusion Period (QPSK) (MT8821C)***

3.1.23. Carrier leakage (6.5.2.2)

This chapter describes a UL measurement example where (Modulation, RB) is (QPSK, PartialRB).

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times**.
2. Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 - IBE/LEAK @ 0 dBm**.
3. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min(#0)**.
4. Execute **SWP** to measure Modulation Analysis.
5. Execute **CARRLEAK? MAX** to read the Carrier Leakage measurement result.
6. Execute **CARRLEAKPASS?** to check that the Carrier Leakage Pass/Fail judgment is Pass.
7. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max(#max)**
8. Execute steps 4 to 6.
9. Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 - IBE/LEAK @ -30 dB**.
10. Execute steps 3 to 8.
11. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 - EVM/IBE/LEAK @ -40 dBm** (QPSK/PartialRB).
12. Execute steps 3 to 8.

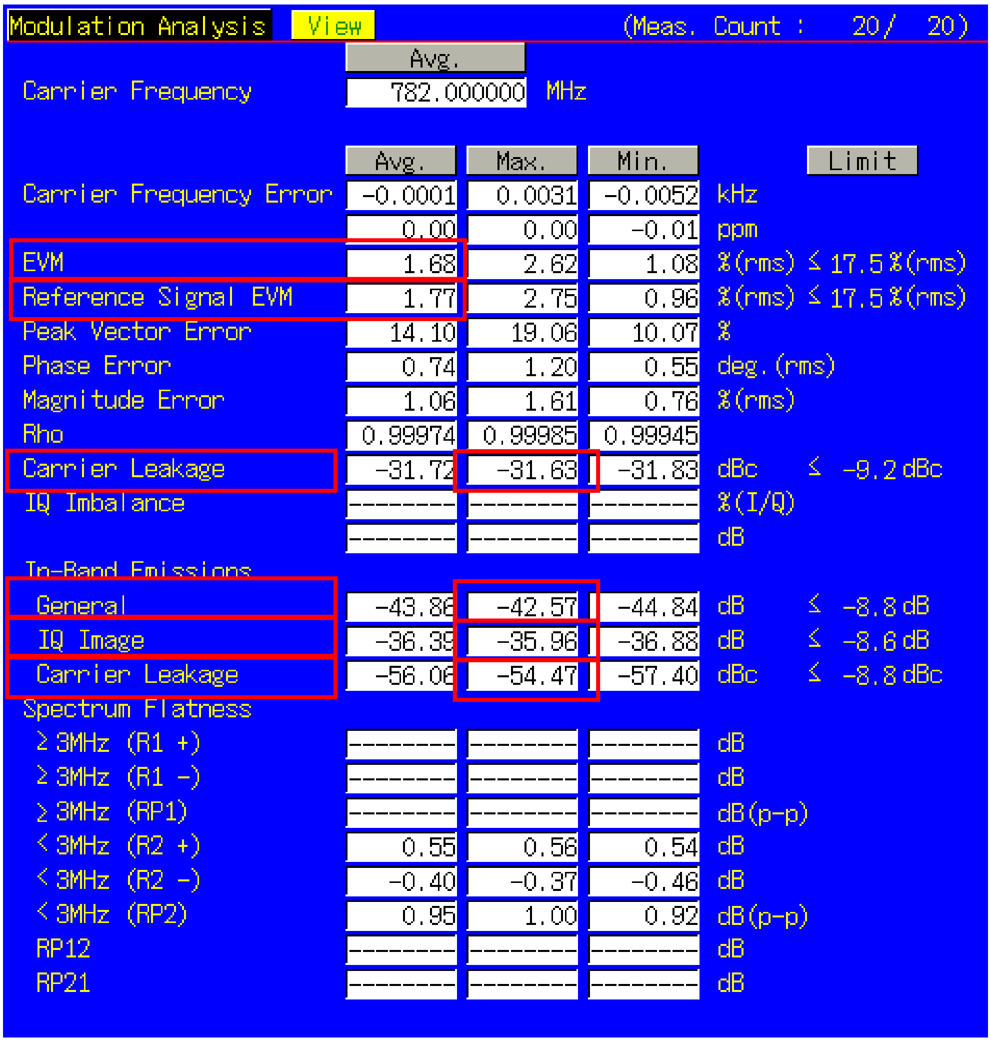
NOTE 1: The UL RB Position of PartialRB allocation is Min (#0) or Max (#max).

3.1.24. In-band emissions for non allocated RB - PUSCH (6.5.2.3)

This chapter describes a UL measurement example where (Modulation, RB) is (QPSK, PartialRB).

1. Execute **MOD_AVG 20** to **set the average count of Modulation Analysis** to **20 times**.
2. Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 - IBE/LEAK @ 0 dBm**.
3. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min(#0)**.
4. Execute **SWP** to measure Modulation Analysis.
5. Execute **INBANDE_GEN? MAX** to read the In-band Emissions (General) measurement result.
6. Execute **INBANDE_IMG? MAX** to read the In-band Emissions (IQ Image) measurement result.
7. Execute **INBANDE_LEAK? MAX** to read the In-band Emissions (Carrier Leakage) measurement result.
8. Execute **INBANDEPASS?** to check that the In-band Emissions Pass/Fail judgment is Pass.
9. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max(#max)**.
10. Execute steps 4 to 8.
11. Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 - IBE/LEAK @ -30 dBm**.
12. Execute steps 3 to 10.
13. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 - EVM/IBE/LEAK @ -40 dBm** (QPSK/PartialRB).
14. Execute steps 3 to 10.

NOTE 1: The UL RB Position for PartialRB allocation is Min (#0) or Max (#max).

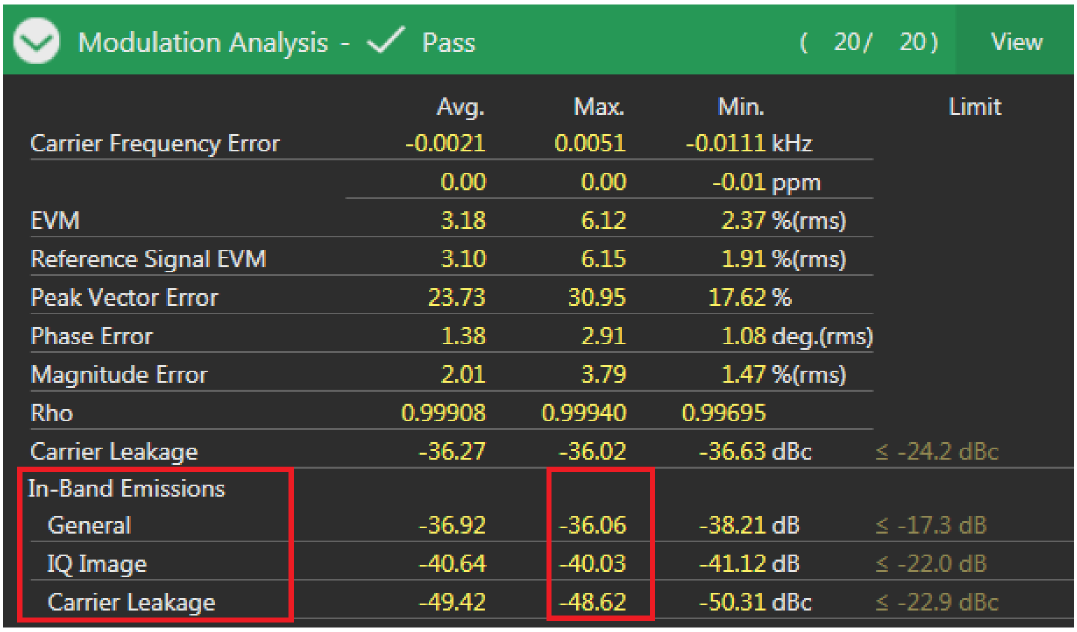


Modulation Analysis View (Meas. Count : 20/ 20)

	Avg.			
Carrier Frequency	782.000000	MHz		

	Avg.	Max.	Min.		Limit
Carrier Frequency Error	-0.0001	0.0031	-0.0052	kHz	
	0.00	0.00	-0.01	ppm	
EVM	1.68	2.62	1.08	%(rms)	≦ 17.5 %(rms)
Reference Signal EVM	1.77	2.75	0.96	%(rms)	≦ 17.5 %(rms)
Peak Vector Error	14.10	19.06	10.07	%	
Phase Error	0.74	1.20	0.55	deg.(rms)	
Magnitude Error	1.06	1.61	0.76	%(rms)	
Rho	0.99974	0.99985	0.99945		
Carrier Leakage	-31.72	-31.63	-31.83	dBc	≦ -9.2 dBc
IQ Imbalance	--------	--------	--------	%(I/Q)	
	--------	--------	--------	dB	
In-Band Emissions					
General	-43.86	-42.57	-44.84	dB	≦ -8.8 dB
IQ Image	-36.39	-35.96	-36.88	dB	≦ -8.6 dB
Carrier Leakage	-56.06	-54.47	-57.40	dBc	≦ -8.8 dBc
Spectrum Flatness					
≧ 3MHz (R1 +)	--------	--------	--------	dB	
≧ 3MHz (R1 -)	--------	--------	--------	dB	
≧ 3MHz (RP1)	--------	--------	--------	dB(p-p)	
＜ 3MHz (R2 +)	0.55	0.56	0.54	dB	
＜ 3MHz (R2 -)	-0.40	-0.37	-0.46	dB	
＜ 3MHz (RP2)	0.95	1.00	0.92	dB(p-p)	
RP12	--------	--------	--------	dB	
RP21	--------	--------	--------	dB	

Figure 3.1.24-1 ***Example of Measurement Result when Test Parameter is TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB) (MT8820C)***



Modulation Analysis - Pass (20/ 20) View

	Avg.	Max.	Min.		Limit
Carrier Frequency Error	-0.0021	0.0051	-0.0111	kHz	
	0.00	0.00	-0.01	ppm	
EVM	3.18	6.12	2.37	%(rms)	
Reference Signal EVM	3.10	6.15	1.91	%(rms)	
Peak Vector Error	23.73	30.95	17.62	%	
Phase Error	1.38	2.91	1.08	deg.(rms)	
Magnitude Error	2.01	3.79	1.47	%(rms)	
Rho	0.99908	0.99940	0.99695		
Carrier Leakage	-36.27	-36.02	-36.63	dBc	≦ -24.2 dBc
In-Band Emissions					
General	-36.92	-36.06	-38.21	dB	≦ -17.3 dB
IQ Image	-40.64	-40.03	-41.12	dB	≦ -22.0 dB
Carrier Leakage	-49.42	-48.62	-50.31	dBc	≦ -22.9 dBc

Figure 3.1.24-2 ***Example of Measurement Result when Test Parameter is TX1 - IBE/LEAK @ 0 dBm (QPSK/PartialRB) (MT8821C)***

3.1.25. In-band emissions for non allocated RB - PUCCH (6.5.2.3)

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times**.
2. Execute **TESTPRM TX_PUCCH_0DBM** to set **Test Parameter** to **TX2 - PUCCH IBE @ 0 dBm**.
3. Execute **SWP** to measure Modulation Analysis.
4. Execute **INBANDE_GEN? MAX** to read the In-band Emissions (General) measurement result.
5. Execute **INBANDE_IMG? MAX** to read the In-band Emissions (IQ Image) measurement result.
6. Execute **INBANDE_LEAK? MAX** to read the In-band Emissions (Carrier Leakage) measurement result.
7. Execute **INBANDEPASS?** to check that the In-band Emissions Pass/Fail judgment is Pass.
8. Execute **TESTPRM TX_PUCCH_M30DBM** to set **Test Parameter** to **TX2 - PUCCH IBE @ -30 dBm**.
9. Execute steps 3 to 7.
10. Execute **TESTPRM TX_PUCCH_M40DBM** to set **Test Parameter** to **TX2 - PUCCH EVM/IBE @ -40 dBm**.
11. Execute steps 3 to 7.

NOTE 1: The UL RB Position for PartialRB allocation is Min (#0) or Max (#max).

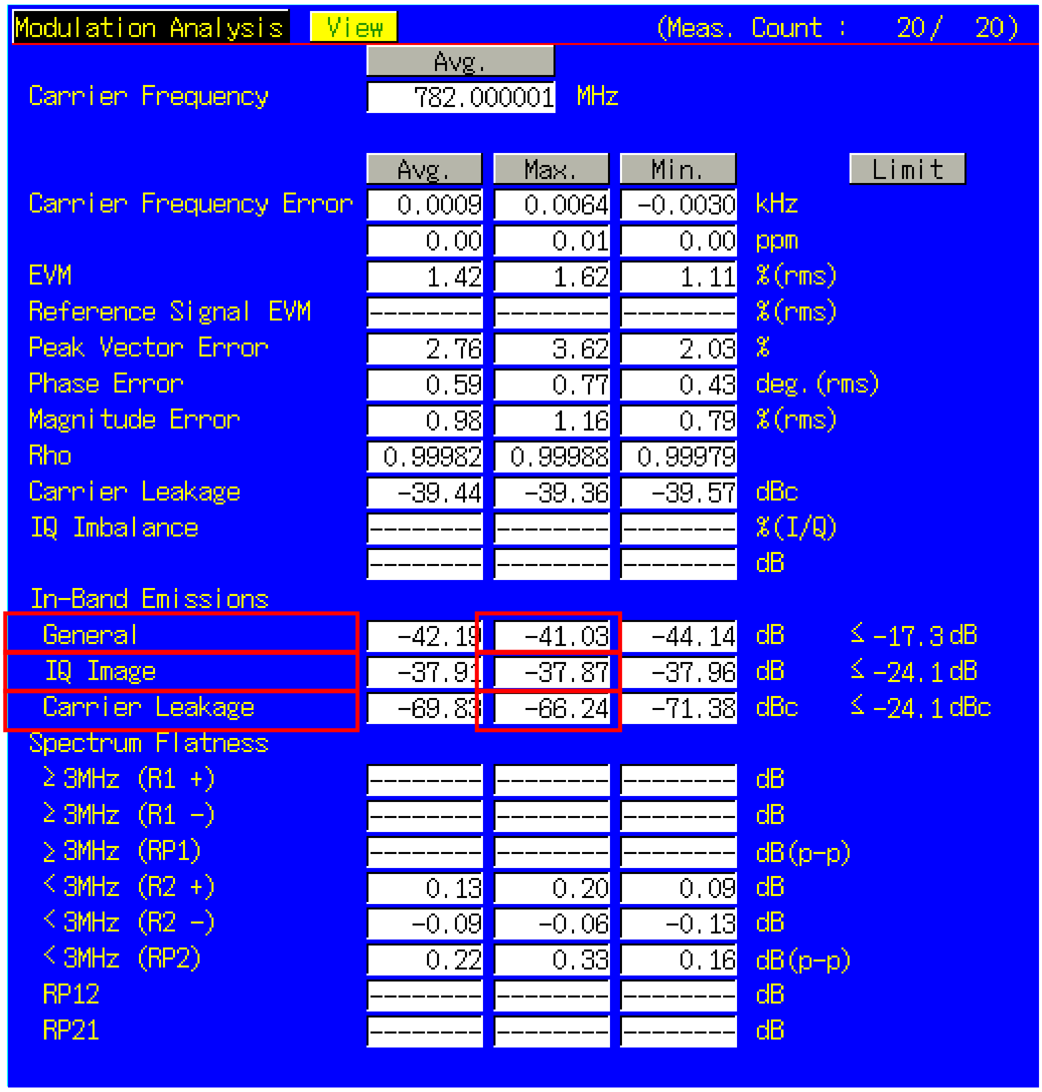


Figure 3.1.25-1 ***Example of Measurement Result when Test Parameter is TX2 - PUCCH IBE @ 0 dBm (MT8820C)***

Modulation Analysis - Pass (20/ 20) View

	Avg.	Max.	Min.		Limit
Carrier Frequency Error	-0.0023	0.0034	-0.0068	kHz	
	0.00	0.00	0.00	ppm	
EVM	1.83	2.07	1.39	%(rms)	
Peak Vector Error	3.79	4.88	2.59	%	
Phase Error	0.75	0.89	0.56	deg.(rms)	
Magnitude Error	1.29	1.57	0.95	%(rms)	
Rho	0.99967	0.99981	0.99958		
Carrier Leakage	-36.62	-36.00	-37.24	dBc	
In-Band Emissions					
General	-40.57	-38.21	-42.19	dB	≤ -17.3 dB
IQ Image	-40.93	-40.85	-41.04	dB	≤ -24.0 dB
Carrier Leakage	-68.29	-66.79	-70.45	dBc	≤ -24.0 dBc
Spectrum Flatness					
≥3MHz (R1 +)	0.19	0.29	0.14	dB	
≥3MHz (R1 -)	-0.14	-0.09	-0.19	dB	
≥3MHz (RP1)	0.33	0.48	0.24	dB(p-p)	

Figure 3.1.25-2 ***Example of Measurement Result when Test Parameter is TX2 - PUCCH IBE @ 0 dBm (MT8821C)***

3.1.26. EVM equalizer spectrum flatness (6.5.2.4)

This chapter describes a UL measurement example where (Modulation, RB) is (QPSK, FullRB).

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times**.
2. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
3. Execute **SWP** to measure Modulation Analysis.
4. Execute **SPECFLAT_RP1? MAX** to read the MAX Spectrum Flatness (Spectrum Flatness ≥ 3 MHz (PR1)) measurement result.
5. Execute **SPECFLAT_RP2? MAX** to read the MAX Spectrum Flatness (Spectrum Flatness < 3 MHz (PR2)) measurement result.
6. Execute **SPECFLAT_RP12? MAX** to read the MAX Spectrum Flatness (Spectrum Flatness RP12) measurement result.
7. Execute **SPECFLAT_RP21? MAX** to read the MAX Spectrum Flatness (Spectrum Flatness RP21) measurement result.
8. Execute **SPECFLATPASS?** to check that the Spectrum Flatness Pass/Fail judgment is Pass.

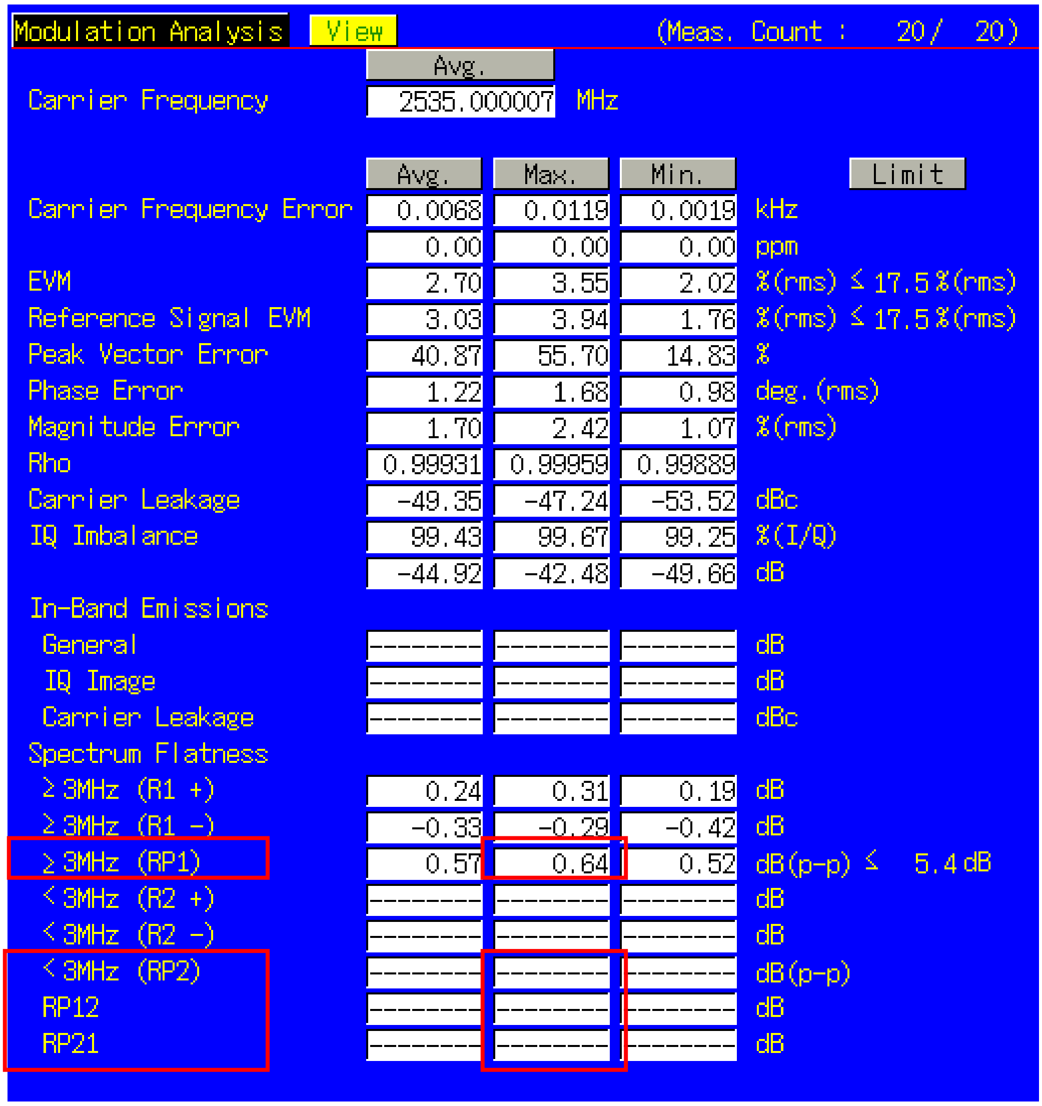


Figure 3.1.26-1 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/FullRB) (MT8820C)***

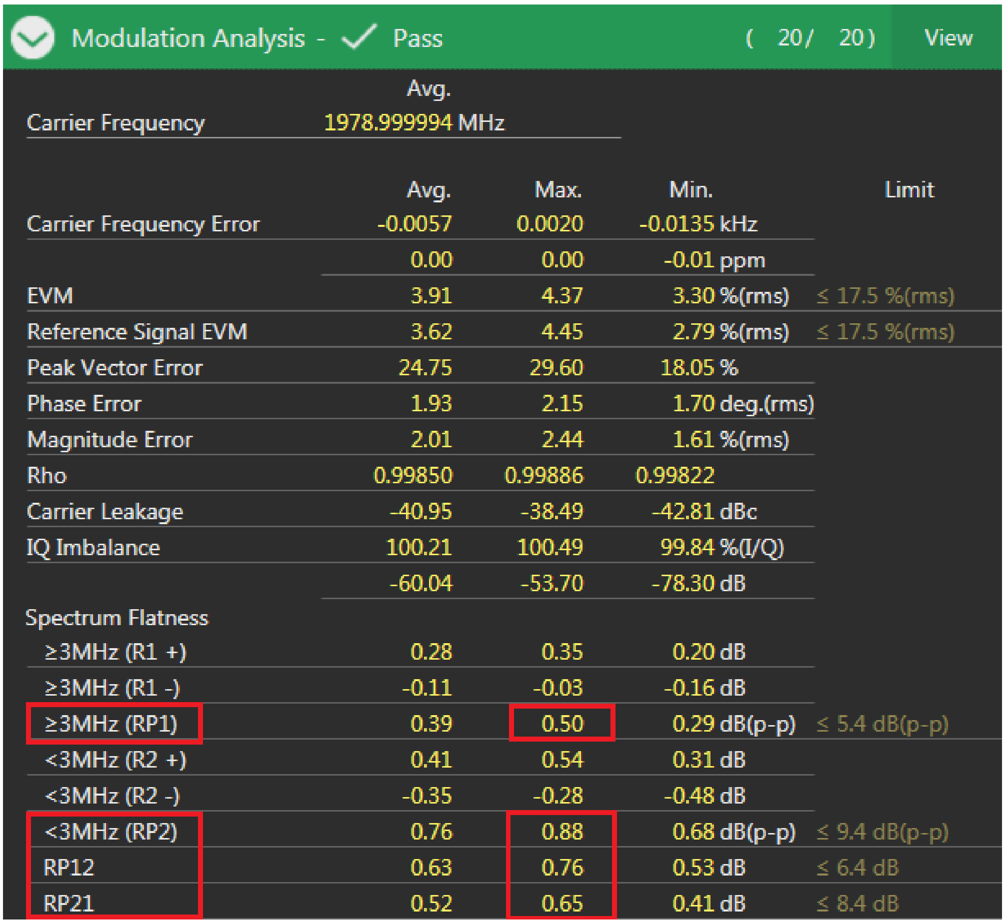


Figure 3.1.26-2 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/FullRB) (MT8821C)***

3.1.27. Occupied bandwidth (6.6.1)

This chapter describes a UL measurement example where (Modulation, RB) is (QPSK, FullRB).

1. Execute **OBW_AVG 20** to set **the average count of Occupied Bandwidth** to **20 times**.
2. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
3. Execute **SWP** to measure the Occupied Bandwidth.
4. Execute **OBW?** to read the OBW measurement result.
5. Execute **OBWPASS?** to check that the OBW Pass/Fail judgment is Pass.

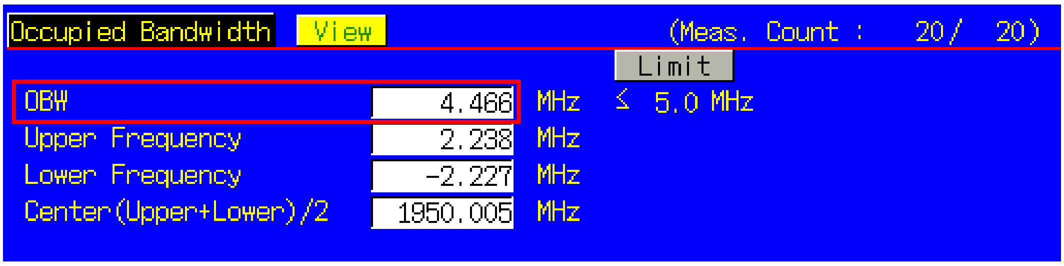


Figure 3.1.27-1 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/FullRB) (MT8820C)***

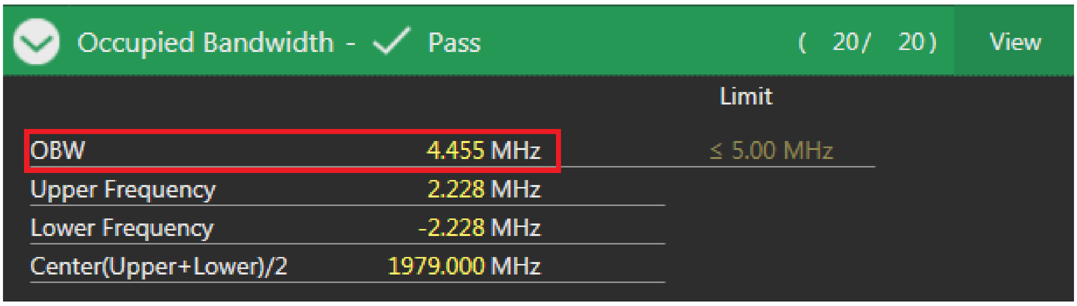


Figure 3.1.27-2 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/FullRB) (MT8821C)***

3.1.28. Spectrum Emission Mask (6.6.2.1)

This chapter describes UL measurement examples where (Modulation, RB) is (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB), or (16QAM, FullRB).

[Pass/Fail evaluation limits value setting]

1. Execute **SEM_AVG 20** to set the **average count of Spectrum Emission Mask** to **20 times**.
2. Execute **TP_SEM5MHZ_1 -13.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 0 - 1 MHz**.
3. Execute **TP_SEM5MHZ_2 -8.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 1 - 5 MHz**.
4. Execute **TP_SEM5MHZ_3 -11.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 5 - 6 MHz**.
5. Execute **TP_SEM5MHZ_4 -23.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 6 - 10 MHz**.

[(QPSK, PartialRB) measurements]

6. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 - Max. Power (QPSK/PartialRB)**.
7. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min (#0)**.
8. Execute **SWP** to measure the Spectrum Emission Mask.
9. Execute **SEMPASS?** to check that the SEM Pass/Fail judgment is Pass.
10. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max (#max)**.
11. Execute steps 8 to 9.

[(QPSK, FullRB) measurements]

12. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
13. Execute steps 8 to 9.

[(16QAM, PartialRB) measurements]

14. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 - Max. Power (16QAM/PartialRB)**.
15. Execute steps 7 to 11.

[(16QAM, FullRB) measurements]

16. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 - Max. Power (16QAM/FullRB)**.
17. Execute steps 8 to 9.

NOTE 1: The PartialRB allocation UL RB Position is divided as follows:

When Test Frequency is Low range, Max (#max)
When Test Frequency is Mid range, Min (#0) and Max (#max)
When Test Frequency is High range, Min (#0)

NOTE 2: The Pass/Fail evaluation value is initialized as described in TS36.521-1 6.6.2.1.5, 6.6.2.2.5 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set:

- ***TP_SEM**MHZ_1***
- ***TP_SEM**MHZ_2***
- ***TP_SEM**MHZ_3***
- ***TP_SEM**MHZ_4***

as described in TS36.521-1 6.6.2.1.5, 6.6.2.2.5. (** = 1.4, 3, 5, 10, 15, 20).
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

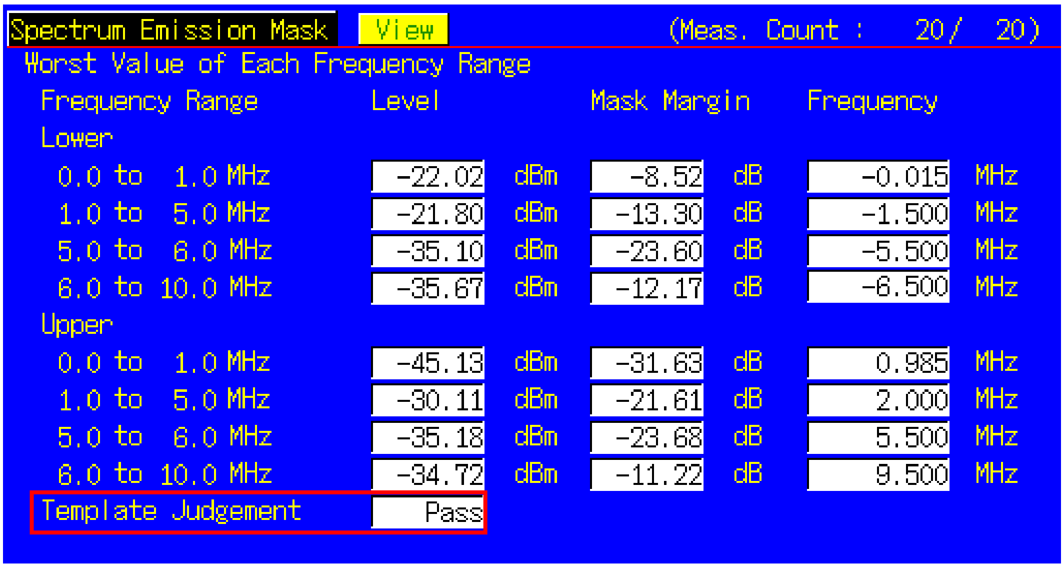


Figure 3.1.28-1 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/PartialRB) (MT8820C)***

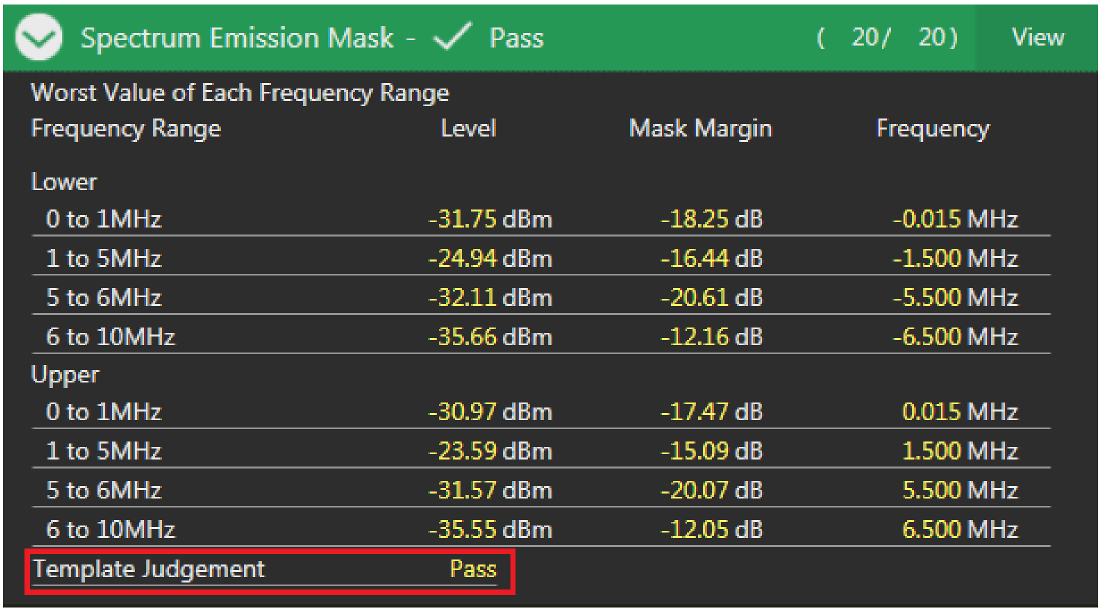


Figure 3.1.28-2 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/PartialRB) (MT8821C)***

3.1.29. Spectrum Emission Mask for Multi-Cluster PUSCH (6.6.2.1_1)

This chapter describes measurement examples for the following conditions.

First example: Channel Bandwidth = 20 MHz, UL Modulation is 16QAM,
UL Number of RB and Starting RB of Cluster1 is 4,0 respectively and
UL Number of RB and Starting RB of Cluster2 is 4,96 respectively.

Second example: Channel Bandwidth = 20 MHz, UL Modulation is 16QAM,
UL Number of RB and Starting RB of Cluster1 is 92,0 respectively and
UL Number of RB and Starting RB of Cluster2 is 4,96 respectively.

[Pass/Fail evaluation limits value setting]

1. Execute **SEM_AVG 20** to set **the average count of Spectrum Emission Mask** to **20 times**.
2. Execute **TP_SEM5MHZ_1 -13.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 0 - 1 MHz**.
3. Execute **TP_SEM5MHZ_2 -8.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 1 - 5 MHz**.
4. Execute **TP_SEM5MHZ_3 -11.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 5 - 6 MHz**.
5. Execute **TP_SEM5MHZ_4 -23.5** to set the Pass/Fail judgment of **Spectrum Emission Mask Frequency Range 6 - 10 MHz**.

[(16QAM, PartialRB) measurements for first example]

6. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 - Max. Power (16QAM/PartialRB)**.
7. Execute **CHCONFIG PUSCH_MULTI** to set **Common Parameter - RMC Configuration** to **PUSCH(Multi Cluster)**.
8. Execute **ULRB_MULTI 4,0,4,96** to set **Common Parameter - UL RMC - 1st PUSCH Number of RB** to **4**, **1st PUSCH Starting RB** to **0**, **2nd PUSCH Number of RB** to **4**, and **2nd PUSCH Starting RB** to **96**.
9. Execute **SWP** to measure Spectrum Emission Mask.
10. Execute **SEMPASS?** to check that the SEM Pass/Fail judgment is Pass.

[(16QAM, PartialRB) measurements for second example]

11. Execute **ULRB_MULTI 92,0,4,96** to set **Common Parameter - UL RMC - 1st PUSCH Number of RB** to **92**, **1st PUSCH Starting RB** to **0**, **2nd PUSCH Number of RB** to **4**, and **2nd PUSCH Starting RB** to **96**.
12. Execute steps 9 and 10.

NOTE 1: The Pass/Fail evaluation value is initialized as described in TS36.521-1 6.6.2.1.5, 6.6.2.2.5 and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, set:

- ***TP_SEM**MHZ_1***
- ***TP_SEM**MHZ_2***
- ***TP_SEM**MHZ_3***
- ***TP_SEM**MHZ_4***

as described in TS36.521-1 6.6.2.1.5, 6.6.2.2.5. (** = 1.4, 3, 5, 10, 15, 20).
For the Pass/Fail evaluation values, refer to chapter 3.7.4 Test Parameter Limit in the operation manual.

3.1.30. Adjacent Channel Leakage Power Ratio (6.6.2.3)

This chapter describes UL measurement examples where (Modulation, RB) is (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB) or (16QAM, FullRB).

[Pass/Fail evaluation limits value setting]
1. Execute **ACLR_AVG 20** to set the **average count of Adjacent Channel Power** to **20 times**.
2. Execute **TP_ACLR_E -36.2** to set **E-UTRA Pass/Fail limit value** to **–36.2 dB**.
3. Execute **TP_ACLR_U1 -32.2** UTRA$_{ACLR1}$ to set **Pass/Fail limit value** to **–32.2 dB**.
4. Execute **TP_ACLR_U2 -35.2** UTRA$_{ACLR1}$ to set **Pass/Fail limit value** to **–35.2 dB**.

[(QPSK, PartialRB) measurements]
5. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 - Max. Power (QPSK/PartialRB)**.
6. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min(#0)**.
7. Execute **SWP** to measure the Adjacent Channel Power.
8. Execute **MODPWRPASS?** to check that the ACLR Pass/Fail judgment is Pass.
9. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max(#max)**.
10. Execute steps 7 to 8.

[(QPSK, FullRB) measurements]
11. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
12. Execute steps 7 to 8.

[(16QAM, PartialRB) measurements]
13. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to**TX1 - Max. Power (16QAM/PartialRB))**.
14. Execute steps 6 to 10.

[(16QAM, FullRB) measurements]
15. **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 - Max. Power (16QAM/FullRB)**.
16. Execute steps 7 to 8.

NOTE 1: The PartialRB allocation UL RB Position is divided as follows:

When Test Frequency is Low range, Max (#max)
When Test Frequency is Mid range, Min (#0) and Max (#max)
When Test Frequency is High range, Min (#0)

NOTE 2: At HPUE measurement, set a value that does not affect the decision limit for UTRA$_{ACLR1}$ and UTRA$_{ACLR2}$ because they are not defined by 3GPP.

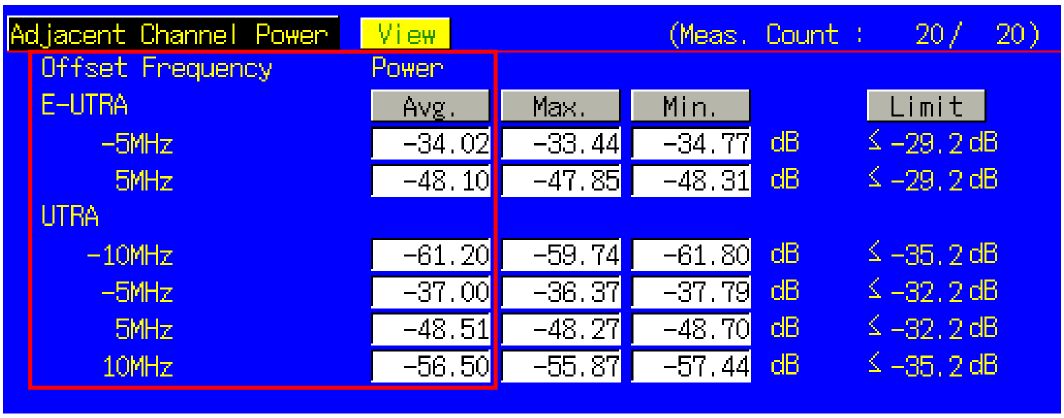
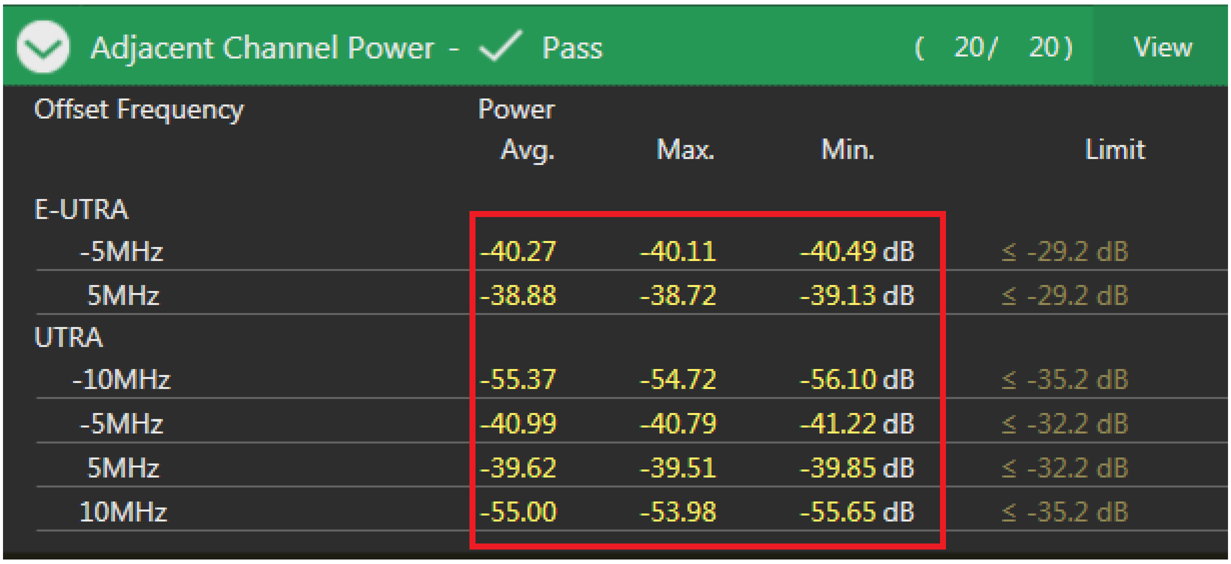


Figure 3.1.30-1 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/PartialRB) (MT8820C)***


Adjacent Channel Power - ✓ Pass (20/ 20) View

Offset Frequency	Power Avg.	Max.	Min.	Limit
E-UTRA				
-5MHz	-40.27	-40.11	-40.49 dB	≤ -29.2 dB
5MHz	-38.88	-38.72	-39.13 dB	≤ -29.2 dB
UTRA				
-10MHz	-55.37	-54.72	-56.10 dB	≤ -35.2 dB
-5MHz	-40.99	-40.79	-41.22 dB	≤ -32.2 dB
5MHz	-39.62	-39.51	-39.85 dB	≤ -32.2 dB
10MHz	-55.00	-53.98	-55.65 dB	≤ -35.2 dB

Figure 3.1.30-2 ***Example of Measurement Result when Test Parameter is TX1 - Max. Power (QPSK/PartialRB) (MT8821C)***

3.1.31. Adjacent Channel Leakage Power Ratio for HPUE (6.6.2.3_1)

This measurement can be performed using the same procedure as in Chapter 3.1.30, except the Pass/Fail evaluation limits value setting.

[Pass/Fail evaluation limits value setting]

1. Execute **TP_ACLR_E -36.2** to set **E-UTRA Pass/Fail limit** to **–36.2 dB**.
2. Execute **TP_ACLR_U1 0** $\mathrm{UTRA}_{\mathrm{ACLR1}}$ to set **Pass/Fail limit** to **0 dB**.
3. Execute **TP_ACLR_U2 0** $\mathrm{UTRA}_{\mathrm{ACLR1}}$ to set **Pass/Fail limit** to **0 dB**.

3.1.32. Adjacent Channel Leakage Power Ratio for Multi-Cluster PUSCH (6.6.2.3_2)

This chapter describes measurement examples for following conditions.

First example:	Channel Bandwidth = 20 MHz, UL Modulation is 16QAM, UL Number of RB and Starting RB of Cluster1 is 4,0 respectively and UL Number of RB and Starting RB of Cluster2 is 4,96 respectively.
Second example:	Channel Bandwidth = 20 MHz, UL Modulation is 16QAM, UL Number of RB and Starting RB of Cluster1 is 92,0 respectively and UL Number of RB and Starting RB of Cluster2 is 4,96 respectively.

[Pass/Fail evaluation limits value setting]

1. Execute **ACLR_AVG 20** to set the **average count of Adjacent Channel Power** to **20 times**.
2. Execute **TP_ACLR_E -36.2** to set **E-UTRA Pass/Fail limit value** to **–36.2 dB**.
3. Execute **TP_ACLR_U1 -32.2** $\mathrm{UTRA}_{\mathrm{ACLR1}}$ to set **Pass/Fail limit value** to **–32.2 dB**.
4. Execute **TP_ACLR_U2 -35.2** $\mathrm{UTRA}_{\mathrm{ACLR1}}$ to set **Pass/Fail limit value** to **–35.2 dB**.

[(16QAM, PartialRB) measurements for first example]

5. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to**TX1 - Max. Power (16QAM/PartialRB))**.
6. Execute **CHCONFIG PUSCH_MULTI** to set **Common Parameter - RMC Configuration** to **PUSCH(Multi Cluster)**.
7. Execute **ULRB_MULTI 4,0,4,96** to set **Common Parameter - UL RMC - 1st PUSCH Number of RB** to **4**, **1st PUSCH Starting RB** to **0**, **2nd PUSCH Number of RB** to **4**, and **2nd PUSCH Starting RB** to **96**.
8. Execute **SWP** to measure the Adjacent Channel Power.
9. Execute **MODPWRPASS?** to check that the ACLR Pass/Fail judgment is Pass.

[(16QAM, PartialRB) measurements for second example]

1. Execute **ULRB_MULTI 92,0,4,96** to set **Common Parameter - UL RMC - 1st PUSCH Number of RB** to **92**, **1st PUSCH Starting RB** to **0**, **2nd PUSCH Number of RB** to **4**, and **2nd PUSCH Starting RB** to **96**.
2. Execute steps 8 and 9.

3.1.33. Additional Maximum Power Reduction (A-MPR) (6.2.4)

Because there are no test parameters supporting Additional Maximum Power Reduction tests and Additional Spectrum Emission Mask tests, select the basic parameter (TX1 - Max. Power (QPSK/FullRB)) and set parameters and standard values required for the test individually.

This chapter describes UL measurement examples where (Modulation, RB) are (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB) or(16QAM, FullRB) when additionalSpectrumEmission is NS_03 and Test Frequency is Mid range.

1. Execute **BAND 2** to set **Operating Band** to **2**.
2. Execute **PWR_AVG 20** to set the **average count of Power Measurement** to **20 times**.
3. Execute **SEM_AVG 20** to set the **average count of Spectrum Emission Mask** to **20 times**.
4. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test parameter** to **TX1 - Max. Power(QPSK/FullRB)**.
5. Execute **ALLMEASITEMS_OFF** to set **all fundamental measurement items** to **OFF**.
6. Execute **PWR_MEAS ON** to set **Power measurement** to **ON**.
7. Execute **SEM_MEAS ON** to set **Spectrum Emission Mask measurement** to **ON**.
8. Execute **SIB2_NS NS_03** to set **additionalSpectrumEmission** to **NS_03**.

[(QPSK, PartialRB) measurements]

9. Execute **ULRMC_MOD QPSK** to set **UL RMC modulation** to **QPSK**.
10. Execute **ULRMC_RB 8** to set **UL RB number** to **8**.
11. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min(#0)**.
12. Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm**.
13. Execute **TP_MPR1_LL 19.3** to set **TX Power measurement Pass/Fail lower limit** **19.3 dBm**.
14. Execute **SWP** to measure the power.
15. Execute **POWER? AVG** to read the Tx Power measurement result.
16. Execute **POWERPASS?** to check the measurement result is PASS.
17. Execute **SEMPASS?** to check the SEM result is PASS.
18. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max (#max)**.
19. Execute step 14 to 17.
20. Execute **ULRMC_RB 6** to set **UL RB number** to **6**.
21. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min(#0)**.
22. Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm**.
23. Execute **TP_MPR1_LL 20.3** to set **TX Power measurement Pass/Fail lower limit** **20.3 dBm**.
24. Execute step 14 to 17.
25. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max(#max)**.
26. Execute steps 14 to 17.

[(QPSK, FullRB) measurements]

27. Execute **ULRMC_RB 25** to set **UL RB number** to **25**.
28. Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm**.
29. Execute **TP_MPR1_LL 18.33** to set **TX Power measurement Pass/Fail lower limit** to **18.3 dBm**.
30. Execute steps 14 to 17.

[(16QAM, PartialRB) measurements]

31. Execute **ULRMC_MOD 16QAM** to set **UL RMC modulation method** to **16QAM**.
32. Execute **ULRMC_RB 8** to set **UL RB number** to **8**.
33. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min (#0)**.
34. Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm**.
35. Execute **TP_MPR1_LL 18.3** to set **TX Power measurement Pass/Fail lower limit** to **18.3 dBm**.
36. Execute steps 14 to 17.
37. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max (#max)**.
38. Execute steps 14 to 17.

[(16QAM, FullRB) measurements]

39. Execute **ULRMC_RB 25** to set **UL RB number** to **25**.
40. Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm**.
41. Execute **TP_MPR1_LL 16.8** to set **TX Power measurement Pass/Fail lower limit** to **16.8 dBm**.
42. Execute steps 14 to 17.

NOTE 1: The UL RB Position for PartialRB allocation is divided as follows:

When Test Frequency is Low range, Max (#max)
When Test Frequency is Mid range, Min (#0) and Max (#max)
When Test Frequency is High range, Min (#0)

NOTE 2: There is no need to set separately because the Pass/Fail evaluation value for Spectrum Emission Mask measurement changes in accordance with the additionalSpectrumEmission setting.

NOTE 3: The usual Pass/Fail evaluation value is set to the Band 1 default value described in TS36.521-1. Since the evaluation value differs according to the Band, set the evaluation value described in TS36.521-1 Table 6.2.4.5-1 at:
TP_MPR1_LL
TP_MPR1_UL
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

3.1.34. Additional Maximum Power Reduction (A-MPR) for HPUE (6.2.4_1)

Because there are no test parameters supporting Additional Maximum Power Reduction for HPUE test, select the basic parameter (TX1 - Max. Power (QPSK/FullRB)) and set parameters and the pass/fail evaluation limits for each test condition/requirement.

This chapter describes UL measurement examples where (Modulation, RB) are (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB) or (16QAM, FullRB) when additionalSpectrumEmission is NS_06 and Test Frequency is Mid range.

1. Execute **BAND 14** to set **Operating Band** to **2**.
2. Execute **PWR_AVG 20** to set the **average count of power measurement** to **20 times**.
3. Execute **SEM_AVG 20** to set the **average count of Spectrum Emission Mask** to **20 times**.
4. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
5. Execute **ALLMEASITEMS_OFF** to set **fundamental measurement items** to **OFF** at one time.
6. Execute **PWR_MEAS ON** to set **Power measurement** to **ON**.
7. Execute **SEM_MEAS ON** to set **Spectrum Emission Mask measurement** to **ON**.
8. Execute **SIB2_NS NS_06** to set **additionalSpectrumEmission** to **NS_06**.

[(QPSK, PartialRB) measurements]

9. Execute **ULRMC_MOD QPSK** to set **UL RMC modulation** to **QPSK**.
10. Execute **ULRMC_RB 8** to set **UL RB number** to **8**.
11. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min (#0)**.
12. Execute **TP_MPR1_UL 33.7** to set **TX Power measurement Pass/Fail upper limit** to **33.7 dBm**.
13. Execute **TP_MPR1_LL 26.3** to set **TX Power measurement Pass/Fail lower limit** to **26.3 dBm**.
14. Execute **SWP** to measure the power.
15. Execute **POWER? AVG** to read the TX Power measurement result.
16. Execute **POWERPASS?** to check the measurement result is PASS.
17. Execute **SEMPASS?** to check the SEM result is PASS.
18. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max (#max)**.
19. Execute step 14 to 17.

[(QPSK, FullRB) measurements]

20. Execute **ULRMC_RB 25** to set **UL RB number** to **25**.
21. Execute **TP_MPR1_UL 33.7** to set **TX Power measurement Pass/Fail upper limit** to **33.7 dBm**.
22. Execute **TP_MPR1_LL 26.3** to set **TX Power measurement Pass/Fail lower limit** to **26.3 dBm**.
23. Execute steps 14 to 17.

[(16QAM, PartialRB) measurements]

24. Execute **ULRMC_MOD 16QAM** to set **UL RMC modulation method** to **16QAM**.
25. Execute **ULRMC_RB 8** to set **UL RB number** to **8**.
26. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min(#0)**.
27. Execute **TP_MPR1_UL 33.7** to set **TX Power measurement Pass/Fail upper limit** to **33.7 dBm**.
28. Execute **TP_MPR1_LL 26.3** to set **TX Power measurement Pass/Fail lower limit** to **26.3 dBm**.
29. Execute steps 14 to 17.
30. Execute **ULRB_POS MAX** to set **UL RB Position** to **Max(#max)**.
31. Execute steps 14 to 17.

NOTE 1: The UL RB Position for PartialRB allocation is divided as follows:

When Test Frequency is Low range, Max (#max)
When Test Frequency is Mid range, Min (#0) and Max (#max)
When Test Frequency is High range, Min (#0)

NOTE 2: There is no need to set separately because the Pass/Fail evaluation value for Spectrum Emission Mask measurement changes in accordance with the additionalSpectrumEmission setting.

NOTE 3: The usual Pass/Fail evaluation value is set to the Band 1 default value described in TS36.521-1. Since the evaluation value differs according to the Band, set the evaluation value described in TS36.521-1 Table 6.2.4_1.5-1 at:
TP_MPR1_LL
TP_MPR1_UL
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

3.1.35. Additional Spectrum Emission Mask (6.6.2.2)

This measurement can be performed using the same procedure as in Chapter 3.1.33.

3.2. RX Measurements

The following test procedure can be used for the MT8820C and MT8821C.

3.2.1. Reference sensitivity level (7.3)

1. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
2. Execute **ULRB_START 0** to set **Common Parameter - UL RMC - Starting RB** to **0**.
3. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter - Throughput - Number of Samples** to **10000**.
4. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput - Early Decision** to **On**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUT? PER** to read the Throughput measurement result (%).
7. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Perform step 3 to locate UL RMC - Number of RB as close as possible to the DL as described in TS36.521-1 Table 7.3.3-2 Note 1. When the Operation Band is 20 or 31, execute the following as described in Note 3/4.

•For Operation Band 20 and Channel Bandwidth 15 MHz: ULRB_START 11
•For Operation Band 20 and Channel Bandwidth 20 MHz: ULRB_START 16
•For Operation Band 31 and Channel Bandwidth 3 MHz: ULRB_START 9
•For Operation Band 31 and Channel Bandwidth 5 MHz: ULRB_START 10

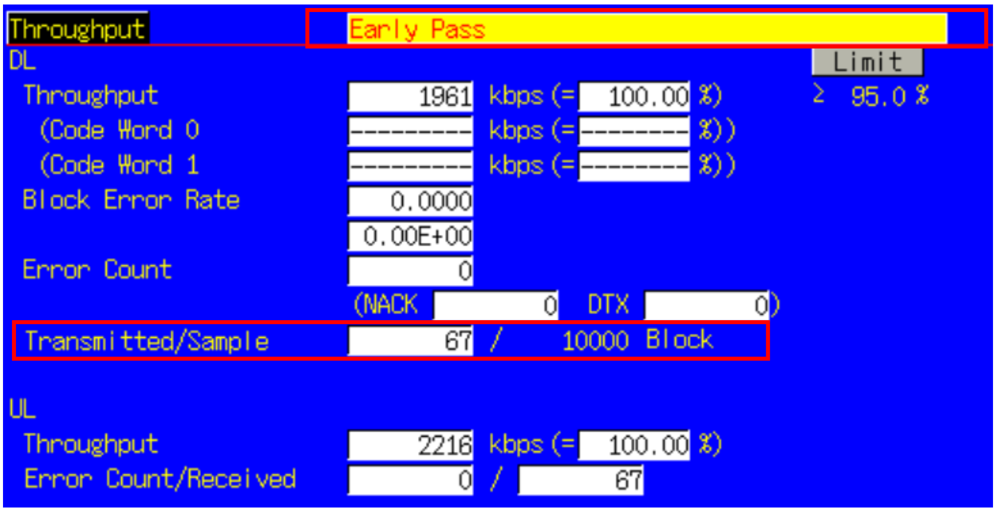


Figure 3.2.1-1 ***Example of Measurement Result when Test Parameter is RX - Ref. Sens./Freq. Error (MT8820C)***

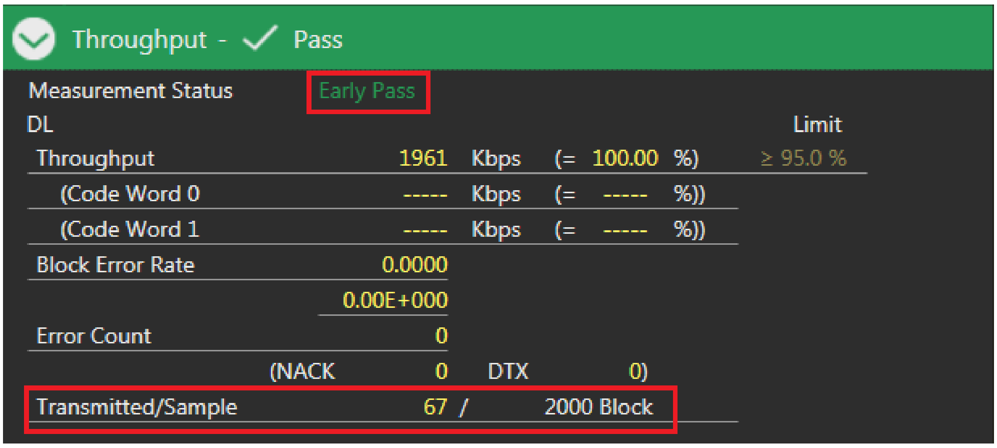


Figure 3.2.1-2 ***Example of Measurement Result when Test Parameter is RX - Ref. Sens./Freq. Error (MT8821C)***

3.2.2. Maximum input level (7.4)

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX - Max. Input Level**.
2. Execute **ULRB_START 0** to set **Common Parameter - UL RMC - Starting RB** to **0**.
3. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter - Throughput - Number of Sample** to **10000**.
4. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter - Throughput - Early Decision** to **On**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUT? PER** to read the Throughput measurement result (%).
7. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: When the Carrier Frequency exceeds 3 GHz, set:
•Output Level –26.0 dBm
as described in TS36.521-1 Table 7.4.5-1.

NOTE 2: Perform step 3 to locate UL RMC - Number of RB as close as possible to the DL as described in TS36.521-1 Table 7.3.3-2 Note 1. When the Operation Band is 20 or 31, execute the following as described in Note 3/4.

•For Operation Band 20 and Channel Bandwidth 15 MHz: ULRB_START 11
•For Operation Band 20 and Channel Bandwidth 20 MHz: ULRB_START 16
•For Operation Band 31 and Channel Bandwidth 3 MHz: ULRB_START 9
•For Operation Band 31 and Channel Bandwidth 5 MHz: ULRB_START 10

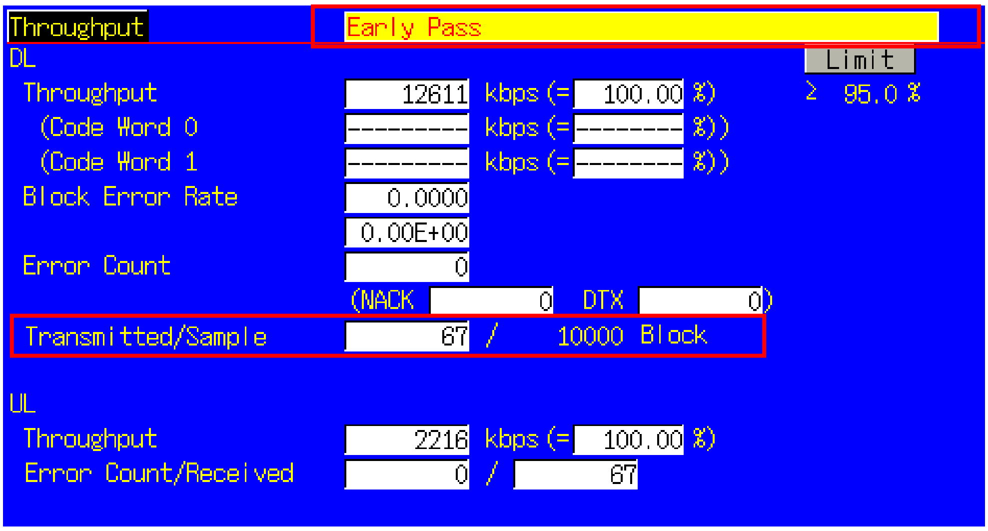


Figure 3.2.2-1 ***Example of Measurement Result when Test Parameter is RX - Max. Input Level (MT8820C)***

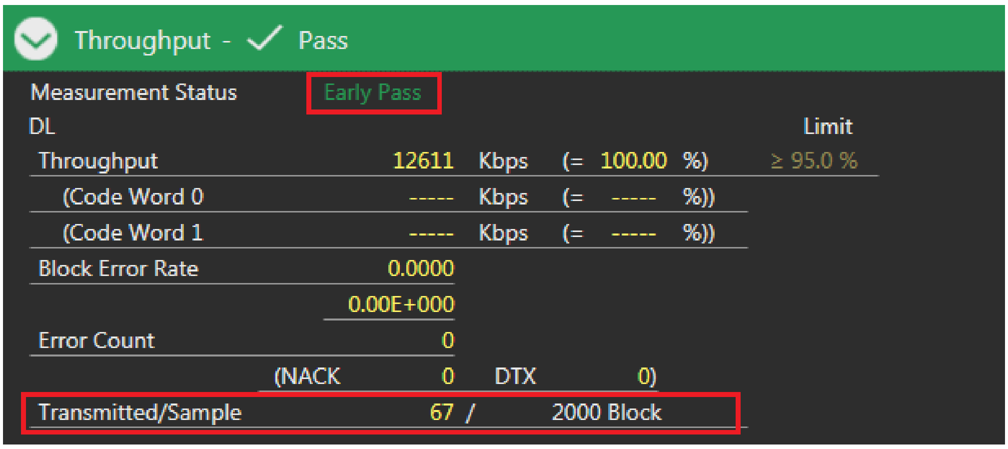


Figure 3.2.2-2 ***Example of Measurement Result when Test Parameter is RX - Max. Input Level (MT8821C)***

3.2.3. Maximum input level for 256QAM in DL (7.4_H) (MT8821C Only)

1. Execute **DLRMC_256QAM** to set **DL RMC – 256QAM** to **Enabled**.
2. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX - Max. Input Level**.
3. Execute **ULRB_START 0** to set **Common Parameter - UL RMC - Starting RB** to **0**.
4. Execute **OLVL -27.7** to set **Common Parameter - Output Level** to **-27.7dBm**.
5. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter - Throughput - Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter - Throughput - Early Decision** to **On**.
7. Execute **SWP** to measure the Throughput.
8. Execute **TPUT? PER** to read the Throughput measurement result (%).
9. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: When the Carrier Frequency exceeds 3 GHz, set:
•Output Level –28.0 dBm
as described in TS36.521-1 Table 7.4_H.5-1.

3.2.4. Spurious emissions (7.9)

Perform Rx spurious emission tests using an external spectrum analyzer.

1. Connect the MT8821C, spectrum analyzer and UE.
2. Execute **CALLDROP OFF** to set **Call Processing Parameter - Call Drop function** to **OFF**.
3. Execute **ULRMC_RB 0** to set **Common Parameter - UL RMC - Number of RB** to **0**.
4. Execute **DLRMC_RB 0** to set **Common Parameter - DL RMC - Number of RB** to **0**.
5. Measure the Rx spurious emissions using the spectrum analyzer.
6. Check that maximum level at each frequency bandwidth is lower than the standardized value.

NOTE 1: Refer to 3GPP TS36.508 Annex A, Figure A.8 for the connection between the MT8821C, spectrum analyzer and UE.

3.3. TX Measurements for CA

3.3.1. TX Measurements for Inter-band CA

This chapter explains the test procedure for Inter–band CA measurement specified in 3GPP TS 36.521–1.

The following test procedures are different between the MT8820C and MT8821C.
This chapter explains each test procedure for the MT8820C and MT8821C.

3.3.1.1. UE Maximum Output Power for CA (inter-band DL CA and UL CA) (6.2.2A.2)

3.3.1.1.1. MT8820C

[Acceptable Value Setting]

1. **[PCC/SCC]** Execute **PWR_AVG 20** to set the **average count for Power Measurement** to **20**
2. **[PCC/SCC]** Execute **TP_MAXPWR_LL 20.3** to set **TX1 – Max. Power (QPSK/1RB/PartialRB) Pass/Fail** lower limit to **20.3 dBm**.
3. **[PCC/SCC]** Execute **TP_MAXPWR_UL 25.7** to set **TX1 – Max. Power (QPSK/1RB/PartialRB) Pass/Fail** upper limit to **25.7 dBm.**

[(QPSK, 1RB) measurements]

4. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_Q_1** to set **Test Parameter to TX1 – Max. Power**
5. **(QPSK/1RB).**
6. **[PCC/SCC]** Execute **ULRMC_RB 1** to set **UL RMC – Number of RB** to **1**.
7. **[PCC/SCC]** Execute **ULRB_POS MIN** to **set UL RB Position** to **Min(#0).**
8. **[PCC/SCC]** Execute **SWP** to measure the Power.
9. **[PCC/SCC]** Execute **POWER? AVG** to read the TX power measurement result.
10. **[PCC/SCC]** Execute **POWERPASS?** to check that the TX power measurement Pass/Fail judgment is Pass.

[(QPSK, PartialRB) measurements]

11. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 – Max. Power (QPSK/PartialRB)**.
12. Execute steps 7 to 9.

3.3.1.1.2. MT8821C

[Acceptable Value Setting]

1. Execute **PWR_AVG 20** to set **the average count for Power Measurement** to **20**
2. Execute **TP_MAXPWR_LL 20.3** to set **TX1 – Max. Power (QPSK/1RB/PartialRB) Pass/Fail lower limit** to **20.3 dBm.**
3. Execute **TP_MAXPWR_UL 25.7** to set **TX1 – Max. Power (QPSK/1RB/PartialRB) Pass/Fail upper limit** to **25.7 dBm.**

[(QPSK, 1RB) measurements]

1. Execute **TESTPRM TX_MAXPWR_Q_1** to set **Test Parameter** to **TX1 – Max. Power(QPSK/1RB).**
2. Execute **ULRB_POS MIN** to set **PCC UL RB Position** to **Min(#0)**.
3. Execute **ULRB_POS_SCC1 MIN** to set **SCC–1 UL RB Position** to **Min(#0)**.
4. Execute **SWP** to measure the Power.
5. Execute **POWER? AVG,PCC** to read the PCC TX power measurement result.
6. Execute **POWERPASS? PCC** to check that the PCC TX power measurement Pass/Fail judgment is Pass.
7. Execute **POWER? AVG,SCC1** to read the SCC–1 TX power measurement result.
8. Execute **POWERPASS? SCC1** to check that the SCC–1 TX power measurement Pass/Fail judgment is Pass.

NOTE 1: The tolerance (lower limit) is relaxed by 1.5dB for transmission bandwidths confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.
NOTE 2: The Band 1 tolerance value defined in TS36–521–1 is set as the initial value for Pass/Fail judgment.
The following Pass/Fail judgment values change depending on the bands.
•TP_MAXPWR_LL
•TP_MAXPWR_UL

3.3.1.2. Maximum Power Reduction (MPR) for CA (inter-band DL CA and UL CA) (6.2.3A.2)

This chapter describes the measurement examples for when the UL (Modulation, RB) is (QPSK, FullRB) or (16QAM, FullRB).

3.3.1.2.1. MT8820C

[Acceptable Value Setting]

1. **[PCC/SCC]** Execute **PWR_AVG 20** to set **average count of Power measurement** to **20**.
2. **[PCC/SCC]** Execute **TP_MPR1_LL 19.3** to set **TX1 – Max. Power (QPSK/FullRB) Pass/Fail lower limit** to **19.3 dBm.**
3. **[PCC/SCC]** Execute **TP_MPR1_UL 25.7** to set **TX1 – Max. Power (QPSK/FullRB) Pass/Fail upper limit** to **25.7 dBm.**
4. **[PCC/SCC]** Execute **TP_MPR2_LL 19.3** to set **TX1 – Max. Power (16QAM/PartialRB) Pass/Fail lower limit** to **19.3 dBm.**
5. **[PCC/SCC]** Execute **TP_MPR2_UL 25.7** to set **TX1 – Max. Power (16QAM/PartialRB) Pass/Fail upper limit** to **25.7 dBm.**
6. **[PCC/SCC]** Execute **TP_MPR3_LL 18.3** to set **TX1 - Max. Power (16QAM/FullRB) Pass/Fail lower limit** to **18.3 dBm.**
7. **[PCC/SCC]** Execute **TP_MPR3_UL 25.7** to set **TX1 - Max. Power (16QAM/FullRB) Pass/Fail upper limit** to **25.7 dBm.**

[(QPSK, FullRB) measurements]

8. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power(QPSK/FullRB).**
9. **[PCC/SCC]** Execute **SWP** to measure the power.
10. **[PCC/SCC]** Execute **POWER? AVG** to read the TX power measurement result.
11. **[PCC/SCC]** Execute **POWERPASS?** to check that the TX power measurement Pass/Fail judgment is Pass.

[(16QAM, PartialRB) measurements]

12. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 – Max. Power (16QAM/PartialRB).**
13. **[PCC/SCC]** Set **UL RMC – Number of RB and Starting RB**.
14. Execute steps 9 to 11.

[(16QAM, FullRB) measurements]

15. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power (16QAM/FullRB).**
16. Execute steps 9 to 11.

3.3.1.2.2. MT8821C

[Acceptable Value Setting]

1. Execute **PWR_AVG 20** to set **average count of Power measurement** to **20.**
2. Execute **TP_MPR1_LL 19.3** to set **TX1 – Max. Power (QPSK/FullRB) Pass/Fail lower limit** to **19.3 dBm.**
3. Execute **TP_MPR1_UL 25.7** to set **TX1 – Max. Power (QPSK/FullRB) Pass/Fail upper limit** to **25.7 dBm**.
4. Execute **TP_MPR2_LL 19.3** to set **TX1 – Max. Power (16QAM/PartialRB) Pass/Fail lower limit** to **19.3 dBm.**
5. Execute **TP_MPR2_UL 25.7** to set **TX1 – Max. Power (16QAM/PartialRB) Pass/Fail upper limit** to **25.7 dBm.**
6. Execute **TP_MPR3_LL 18.3** to set **TX1 – Max. Power (16QAM/FullRB) Pass/Fail lower limit** to **18.3 dBm.**
7. Execute **TP_MPR3_UL 25.7** to set **TX1 – Max. Power (16QAM/FullRB) Pass/Fail upper limit** to **25.7 dBm.**

[(QPSK, FullRB) measurements]

8. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power(QPSK/FullRB).**
9. Execute **SWP** to measure the power.
10. Execute **POWER? AVG,PCC** to read the PCC TX power measurement result.
11. Execute **POWERPASS? PCC** to check that the PCC TX power measurement Pass/Fail judgment is Pass.
12. Execute **POWER? AVG,SCC1** to read the SCC–1 TX power measurement result.
13. Execute **POWERPASS? SCC1** to check that the SCC–1 TX power measurement Pass/Fail judgment is Pass.

[(16QAM, PartialRB) measurements]

14. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 – Max. Power(16QAM/PartialRB).**
15. Set **PCC and SCC–1 UL RMC – Number of RB and Starting RB.**
16. Execute steps 9 to 13.

[(16QAM, FullRB) measurements]

17. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power(16QAM/FullRB).**
18. Execute steps 9 to 13.

NOTE 1: The Band 1 tolerance value defined in TS36.521–1 is set as the initial value for Pass/Fail judgment. The following Pass/Fail judgment values are set according to the Configuration ID.

- ***TP_MPR1_LL***
- ***TP_MPR1_UL***
- ***TP_MPR2_LL***
- ***TP_MPR2_UL***
- ***TP_MPR3_LL***
- ***TP_MPR3_UL***

3.3.1.3. Additional Maximum Power Reduction (A-MPR) for CA (inter-band DL CA and UL CA) (6.2.4A.2)

This chapter describes the measurement examples when for UL (Modulation, RB) is (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB) or (16QAM, FullRB), additionalSpectrumEmission is NS_01 and Test Frequency is Mid range.

3.3.1.3.1. MT8820C

1. **[PCC/SCC]** Execute **PWR_AVG 20** to set **the average count of Power Measurement** to **20 times.**
2. **[PCC/SCC]** Execute **SEM_AVG 20** to set **the average count of Spectrum Emission Mask** to **20 times.**
3. **[PCC/SCC]** Execute **SIB2_NS NS_01** to set **additionalSpectrumEmission** to **NS_01.**
4. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power(QPSK/FullRB).**
5. **[PCC/SCC]** Execute **ALLMEASITEMS_OFF** to set **all fundamental measurement items** to **OFF.**
6. **[PCC/SCC]** Execute **PWR_MEAS ON** to set **Power Measurement** to **ON.**
7. **[PCC/SCC]** Execute **SEM_MEAS ON** to set **Spectrum Emission Mask Measurement** to **ON.**

[(QPSK, PartialRB/FullRB) measurements]

8. **[PCC/SCC]** Set **UL RMC–Number of RB and Starting RB.**
9. **[PCC/SCC]** Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm.**
10. **[PCC/SCC]** Execute **TP_MPR1_LL 19.3** to set **TX Power measurement Pass/Fail lower limit** to **19.3 dBm.**
11. **[PCC/SCC]** Execute **SWP** to measure the power.
12. **[PCC/SCC]** Execute **POWER? AVG** to read the TX Power measurement result.
13. **[PCC/SCC]** Execute **POWERPASS?** to check that the TX Power Pass/Fail judgment is Pass.
14. **[PCC/SCC]** Execute **SEMPASS?** to check that SEM Pass/Fail judgment is Pass.

[(16QAM, PartialRB/FullRB) measurements]

15. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power (16QAM/FullRB).**
16. Execute steps 8 to 14.

3.3.1.3.2. MT8821C

1. Execute **PWR_AVG 20** to set **the average count of Power Measurement** to **20 times.**
2. Execute **SEM_AVG 20** to set **the average count of Spectrum Emission Mask** to **20 times.**
3. Execute **SIB2_NS NS_01** to set **additionalSpectrumEmission** to **NS_01.**
4. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power(QPSK/FullRB).**
5. Execute **ALLMEASITEMS_OFF** to set **all fundamental measurement items** to **OFF.**
6. Execute **PWR_MEAS ON** to set **Power Measurement** to **ON.**
7. Execute **SEM_MEAS ON** to set **Spectrum Emission Mask Measurement** to **ON.**

[(QPSK, PartialRB/FullRB) measurements]

8. Set **PCC and SCC–1 UL RMC-Number of RB and Starting RB.**
9. Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm.**
10. Execute **TP_MPR1_LL 19.3** to set **TX Power measurement Pass/Fail lower limit** to **19.3 dBm.**
11. Execute **SWP** to measure the power.
12. Execute **POWER? AVG,PCC** to read the PCC TX Power measurement result.
13. Execute **POWERPASS? PCC** to check that the PCC TX Power Pass/Fail judgment is Pass.
14. Execute **SEMPASS? PCC** to check that the PCC SEM Pass/Fail judgment is Pass.
15. Execute **POWER? AVG,SCC1** to read the SCC–1 TX Power measurement result.
16. Execute **POWERPASS? SCC1** to check that the SCC–1 TX Power Pass/Fail judgment is Pass.
17. Execute **SEMPASS? SCC1** to check that the SCC–1 SEM Pass/Fail judgment is Pass.

[(16QAM, PartialRB/FullRB) measurements]

18. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power(16QAM/FullRB).**
19. Execute steps 8 to 17.

NOTE 1: The Band 1 tolerance value defined in TS36.521–1 is set as the initial value for Pass/Fail judgment. The following Pass/Fail judgment values are set according to the Configuration ID.
•TP_MPR1_LL
•TP_MPR1_UL

3.3.1.4. Configured UE Transmitted Output Power for CA (inter-band DL CA and UL CA) (6.2.5A.3)

3.3.1.4.1. MT8820C

[Acceptable Value Setting]

1. **[PCC/SCC]** Execute **PWR_AVG 20** to set **the average count of Power measurement** to **20 times.**
2. **[PCC/SCC]** Execute **TP_CONFPWR1_TOL 7.7** to set **TX2 – Configured UE transmitted Output Power (Test Point 1) Pass/Fail Judgment.**
3. **[PCC/SCC]** Execute **TP_CONFPWR2_TOL 6.7** to set **TX2 – Configured UE transmitted Output Power (Test Point 2) Pass/Fail Judgment.**
4. **[PCC/SCC]** Execute **TP_CONFPWR3_TOL 5.7** to set **TX2 – Configured UE transmitted Output Power (Test Point 3) Pass/Fail Judgment.**

[Measurements]

5. **[PCC/SCC]** Execute **TESTPRM TX_CONF_PWR1** to set T**est Parameter** to **TX2 – Configured Power (Test Point 1).**
6. **[PCC/SCC]** Execute **SWP** to measure the power.
7. **[PCC/SCC]** Execute **POWER? AVG** to read the TX Power measurement result.
8. **[PCC/SCC]** Execute **TESTPRM TX_CONF_PWR2** to set **Test Parameter** to T**X2 – Configured Power (Test Point 2).**
9. Execute steps 6 to 7.
10. **[PCC/SCC]** Execute **TESTPRM TX_CONF_PWR3** to set **Test Parameter** to **TX2 – Configured Power (Test Point 3).**
11. Execute steps 6 to 7.

3.3.1.4.2. MT8821C

[Acceptable Value Setting]

1. Execute **PWR_AVG 20** to set **the average count of Power measurement** to **20 times.**
2. Execute **TP_CONFPWR1_TOL 7.7** to set **TX2 – Configured UE transmitted Output Power (Test Point 1) Pass/Fail Judgment.**
3. Execute **TP_CONFPWR2_TOL 6.7** to set **TX2 – Configured UE transmitted Output Power (Test Point 2) Pass/Fail Judgment.**
4. Execute **TP_CONFPWR3_TOL 5.7** to set **TX2 – Configured UE transmitted Output Power (Test Point 3) Pass/Fail Judgment.**

[Measurements]

5. Execute **TESTPRM TX_CONF_PWR1** to set **Test Parameter** to **TX2 – Configured Power(Test Point 1).**
6. Execute **SWP** to measure the power.
7. Execute **POWER? AVG,PCC** to read the PCC TX Power measurement result.
8. Execute **POWER? AVG,SCC1** to read the SCC–1 TX Power measurement result.
9. Execute **TESTPRM TX_CONF_PWR2** to set **Test Parameter** to **TX2 – Configured Power(Test Point 2).**
10. Execute steps 6 to 8.
11. Execute **TESTPRM TX_CONF_PWR3** to set **Test Parameter** to **TX2 – Configured Power(Test Point 3).**
12. Execute steps 6 to 8.

NOTE 1: The tolerance (lower limit) is relaxed by 1.5dB for transmission bandwidths confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.

NOTE 2: The relief requirement $\Delta T_{IB,c}$ is applied to each band for Inter–band CA
Refer to TS36.521–1 Table 6.2.5.3-2 for $\Delta T_{IB,c}$.

The following conditions are applied to compatible UEs with more than one Inter–band CA Configuration.

For carrier frequency $f \leq 1$ GHz: mean value of $\Delta T_{IB,c}$ in compatible Band Configuration
For carrier frequency > 1 GHz: maximum value of $\Delta T_{IB,c}$ in compatible Band Configuration

3.3.1.5. Minimum Output Power

3.3.1.5.1. MT8820C

[Acceptable Value Setting]

1. **[PCC/SCC]** Execute **PWR_AVG 20** to set **the average count of Power measurement** to **20 times.**
2. **[PCC/SCC]** Execute **TP_MINPWR_UL -39.0** to set **TX1 – Min. Power Pass/Fail judgment.**

[Measurements]

3. **[PCC/SCC]** Execute **TESTPRM TX_MINPWR** to set **Test Parameter** to **TX1 – Min. Power.**
4. **[PCC/SCC]** Execute **SWP** to measure the power.
5. **[PCC/SCC]** Execute **CHPWR? AVG** to read the Channel Power measurement result.
6. **[PCC/SCC]** Execute **CHPWRPASS?** to check that the Channel Power measurement Pass/Fail judgment is Pass.

3.3.1.5.2. MT8821C

[Acceptable Value Setting]

1. Execute **PWR_AVG 20** to set **the average count of Power measurement** to **20 times.**
2. Execute **TP_MINPWR_UL -39.0** to set **TX1 – Min. Power Pass/Fail judgment.**

[Measurements]

3. Execute **TESTPRM TX_MINPWR** to set **Test Parameter** to **TX1 – Min. Power.**
4. Execute **SWP** to measure the power.
5. Execute **CHPWR? AVG,PCC** to read the PCC Channel Power measurement result.
6. Execute **CHPWRPASS? PCC** to check that the PCC Channel Power measurement Pass/Fail judgment is Pass.
7. Execute **CHPWR? AVG,SCC1** to read SCC–1 Channel Power measurement result.
8. Execute **CHPWRPASS? SCC1** to check that the SCC–1 Channel Power measurement Pass/Fail judgment is Pass.

NOTE 1: Pass/Fail judgment values differ depending on the Carrier Frequency f.

f ≤ 3.0GHz	***: ≤ –39 dBm (initial value)***
3.0GHz < f ≤ 4.2GHz	***: ≤ –38.7 dBm***

3.3.1.6. UE Transmit OFF Power for CA (inter-band DL CA and UL CA) (6.3.3A.2)

Refer to Chapter 3.3.1.7

3.3.1.7. General ON/OFF Time Mask for CA (inter-band DL CA and UL CA) (6.3.4A.1.2)

3.3.1.7.1. MT8820C

[Acceptable Value Setting]

1. **[PCC/SCC]** Execute **TP_OFFPWR_UL -48.5** to set **TX2 – General Time Mask Off Power Pass/Fail judgment.**
2. **[PCC/SCC]** Execute **TP_TMASK_GEN_TOL 7.5** to set **TX2 – General Time Mask On Power Pass/Fail judgment.**

[Measurements]

3. **[PCC/SCC]** Execute **TESTPRM TX_GEN_TMASK** to set **Test Parameter** to **TX2 – General Time Mask.**
4. **[PCC/SCC]** Execute **PT_WDR ON** to enable **Power Template Wide Dynamic Range measurement.**
5. **[PCC/SCC]** Execute **SWP** to measure the Power Template.
6. **[PCC/SCC]** Execute **ONPWR? AVG** to read the On Power measurement result.
7. **[PCC/SCC]** Execute **ONPWRPASS?** to check that the On Power measurement Pass/Fail judgment is Pass.
8. **[PCC/SCC]** Execute **OFFPWR_BEFORE? AVG** to read the Off Power (Before) measurement result.
9. **[PCC/SCC]** Execute **OFFPWR_AFTER? AVG** to read the Off Power (After) measurement result.
10. **[PCC/SCC]** Execute **OFFPWRPASS?** to check that the Off Power measurement Pass/Fail judgment is Pass.

3.3.1.7.2. MT8821C

[Acceptable Value Setting]

1. Execute **TP_OFFPWR_UL -48.5** to set **TX2 – General Time Mask Off Power Pass/Fail judgment.**
2. Execute **TP_TMASK_GEN_TOL 7.5** to set **TX2 – General Time Mask On Power Pass/Fail judgment.**

[Measurements]

3. Execute **TESTPRM TX_GEN_TMASK** to set **Test Parameter to TX2 – General Time Mask.**
4. Execute **PT_WDR ON** to enable **Power Template Wide Dynamic Range measurement.**
5. Execute **SWP** to measure the Power Template.
6. Execute **ONPWR? AVG,PCC** to read the PCC On Power measurement result.
7. Execute **ONPWRPASS? PCC** to check that the PCC On Power measurement Pass/Fail judgment is Pass.
8. Execute **OFFPWR_BEFORE? AVG,PCC** to read the PCC Off Power (Before) measurement result.
9. Execute **OFFPWR_AFTER? AVG,PCC** to read the PCC Off Power (After) measurement result.
10. Execute **OFFPWRPASS? PCC** to check that the PCC Off Power measurement Pass/Fail judgment is Pass.
11. Execute **ONPWR? AVG,SCC1** to read the SCC–1 On Power measurement result.
12. Execute **ONPWRPASS? SCC1** to check that the the SCC–1 On Power measurement Pass/Fail judgment is Pass.
13. Execute **OFFPWR_BEFORE? AVG,SCC1** to read the SCC–1 Off Power (Before) measurement result.
14. Execute **OFFPWR_AFTER? AVG,SCC1** to read the SCC–1 Off Power (After) measurement result.
15. Execute **OFFPWRPASS? SCC** to check that the the SCC–1 Off Power measurement Pass/Fail judgment is Pass.

NOTE 1: Pass/Fail judgment values for Transmitted Off Power differ depending on the Carrier Frequency f

f ≤ 3.0GHz	***: ≤ –48.5 dBm (initial value)***
3.0GHz < f ≤ 4.2GHz	***: ≤ –48.2 dBm***

NOTE 2: ON Power tolerance values differ depending on the Carrier Frequency f

f ≤ 3.0GHz	***: ±7.5 dB (initial value)***
3.0GHz < f ≤ 4.2GHz	***: ±7.8 dB***

3.3.1.8. Power Control Absolute Power Tolerance

3.3.1.8.1. MT8820C

[Acceptable Value Setting]

1. **[PCC/SCC]** Execute **TP_PCTABS_TOL 10.0** to set **TX3 – Absolute Power (Test Point1) Pass/Fail judgment.**

[Measurements]

2. **[PCC/SCC]** Execute **TESTPRM TX_PCTABS1** to set **Test Parameter** to**TX3 – Absolute Power (Test Point1).**
3. **[PCC/SCC]** Execute **SWP** to measure the Power Control Tolerance (Absolute Power).
4. **[PCC/SCC]** Execute **PCTPWR?** to read the Absolute Power (dBm) measurement result.
5. **[PCC/SCC]** Execute **PCTPASS?** to check that the Absolute Power measurement Pass/Fail judgment is Pass.
6. **[PCC/SCC]** Execute **TESTPRM TX_PCTABS2** to set **Test Parameter** to **TX3 – Absolute Power (Test Point2).**
7. Execute step 3 to 5.

3.3.1.8.2. MT8821C

[Acceptable Value Setting]

1. Execute **TP_PCTABS_TOL 10.0** to set **TX3 – Absolute Power (Test Point1) Pass/Fail judgment.**

[Measurements]

2. Execute **TESTPRM TX_PCTABS1** to set **Test Parameter** to **TX3 – Absolute Power (Test Point1).**
3. Execute **SWP** to measure the Power Control Tolerance (Absolute Power).
4. Execute **PCTPWR? PCC** to read the PCC Absolute Power (dBm) measurement result.
5. Execute **PCTPASS? PCC** to check that the PCC Absolute Power measurement Pass/Fail judgment is Pass.
6. Execute **PCTPWR? SCC1** to read the SCC–1 Absolute Power (dBm) measurement result.
7. Execute **PCTPASS? SCC1** to check that the SCC–1 Absolute Power measurement Pass/Fail judgment is Pass.
8. Execute **TESTPRM TX_PCTABS2** to set **Test Parameter** to **TX3 – Absolute Power (Test Point2).**
9. Execute step 3 to 7.

NOTE 1: The Pass/Fail judgment value for Expected Measured Power differs depending the Carrier Frequency f.

f ≤ 3.0GHz	***: ≤ 10.0 dBm (as the initial value)***
3.0GHz < f ≤ 4.2GHz	***: ≤ 10.4 dBm***

3.3.1.9. Power Control Relative Power Tolerance

3.3.1.9.1. MT8820C

[Measurements]

1. **[PCC/SCC]** Execute **TESTPRM TX_PCTREL_UP_A** to set **Test Parameter** to **TX3 – Relative Power(Ramping Up A).**
2. **[PCC/SCC]** Execute **SWP** to measure the Power Control Tolerance (Relative Power).
3. **[PCC/SCC]** Execute **PCTPWR?** to read the Relative Power (dB) measurement result.
4. **[PCC/SCC]** Execute **PCTPASS?** to check that the Relative Power measurement Pass/Fail judgment is Pass.
5. **[PCC/SCC]** Execute **TESTPRM TX_PCTREL_UP_B** to set **Test Parameter** to **TX3 – Relative Power(Ramping Up B).**
6. Execute steps 2 to 4.
7. **[PCC/SCC]** Execute **TESTPRM TX_PCTREL_UP_C** to set **Test Parameter** to **TX3 – Relative Power(Ramping Up C).**
8. Execute steps 2 to 4.
9. **[PCC/SCC]** Execute **TESTPRM TX_PCTREL_DOWN_A** to set **Test Parameter** to **TX3 – Relative Power(Ramping Down A).**
10. Execute steps 2 to 4.
11. **[PCC/SCC]** Execute **TESTPRM TX_PCTREL_DOWN_B** to set **Test Parameter** to **TX3 – Relative Power(Ramping Down B).**
12. Execute steps 2 to 4.
13. **[PCC/SCC]** Execute **TESTPRM TX_PCTREL_DOWN_C** to set **Test Parameter** to **TX3 – Relative Power(Ramping Down C).**
14. Execute steps 2 to 4.
15. **[PCC/SCC]** Execute **TESTPRM TX_PCTREL_ALT** to set **Test Parameter** to **TX3 – Relative Power(Alternating).**
16. Execute steps 2 to 4.

3.3.1.9.2. MT8821C

[Measurements]

1. Execute **TESTPRM TX_PCTREL_UP_A** to set **Test Parameter** to **TX3 – Relative Power (Ramping Up A).**
2. Execute **SWP** to measure the Power Control Tolerance (Relative Power).
3. Execute **PCTPWR? PCC** to read the PCC Relative Power (dB) measurement result.
4. Execute **PCTPASS? PCC** to check that the PCC Relative Power measurement Pass/Fail judgment is Pass.
5. Execute **PCTPWR? SCC1** to read the SCC–1 Relative Power (dB) measurement result.
6. Execute **PCTPASS? SCC1** to check that the SCC-1 Relative Power measurement Pass/Fail judgment is Pass.
7. Execute **TESTPRM TX_PCTREL_UP_B** to set **Test Parameter** to **TX3 – Relative Power (Ramping Up B).**
8. Execute steps 2 to 6.
9. Execute **TESTPRM TX_PCTREL_UP_C** to set **Test Parameter** to **TX3 – Relative Power (Ramping Up C).**
10. Execute steps 2 to 6.
11. Execute **TESTPRM TX_PCTREL_DOWN_A** to set **Test Parameter** to **TX3 – Relative Power(Ramping Down A).**
12. Execute steps 2 to 6.
13. Execute **TESTPRM TX_PCTREL_DOWN_B** to set **Test Parameter** to **TX3 – Relative Power(Ramping Down B).**
14. Execute steps 2 to 6.
15. Execute **TESTPRM TX_PCTREL_DOWN_C** to set **Test Parameter** to **TX3 – Relative Power(Ramping Down C).**
16. Execute steps 2 to 6.
17. Execute **TESTPRM TX_PCTREL_ALT** to set **Test Parameter** to **TX3 – Relative Power(Alternating).**
18. Execute steps 2 to 6.

NOTE 1: The tolerance for RB Change subframe is varied for transmission bandwidths confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.

3.3.1.10. Aggregate Power Control Tolerance

3.3.1.10.1. MT8820C

[Measurements]

1. **[PCC/SCC]** Execute **TESTPRM TX_PCTAGG_PUSCH** to set **Test Parameter** to **TX3 – Aggregate Power (PUSCH Sub–test).**
2. **[PCC/SCC]** Execute **SWP** to measure the Power Control Tolerance (Aggregate Power).
3. **[PCC/SCC]** Execute **PCTPWR?** to read the Aggregate Power (dB) measurement result.
4. **[PCC/SCC]** Execute **PCTPASS?** to check that the Aggregate Power measurement Pass/Fail judgment is Pass.
5. **[PCC/SCC]** Execute **TESTPRM TX_PCTAGG_PUCCH** to set **Test Parameter** to **TX3 – Aggregate Power (PUCCH Sub–test).**
6. **[PCC]** Execute **SWP** to measure the Power Control Tolerance (Aggregate Power).
7. **[PCC]** Execute **PCTPWR?** to read the Aggregate Power (dB) measurement result.
8. **[PCC]** Execute **PCTPASS?** to check that the Aggregate Power measurement Pass/Fail judgment is Pass.

3.3.1.10.2. MT8821C

[Measurements]

1. Execute **TESTPRM TX_PCTAGG_PUSCH** to set **Test Parameter** to **TX3 – Aggregate Power (PUSCH Sub-test).**
2. Execute **SWP** to measure the Power Control Tolerance (Aggregate Power).
3. Execute **PCTPWR? PCC** to read the PCC Aggregate Power (dB) measurement result.
4. Execute **PCTPASS? PCC** to check that the PCC Aggregate Power measurement Pass/Fail judgment is Pass.
5. Execute **PCTPWR? SCC1** to read the SCC–1 Aggregate Power (dB) measurement result.
6. Execute **PCTPASS? SCC1** to check that the SCC–1 Aggregate Power measurement Pass/Fail judgment is Pass.
7. Execute **TESTPRM TX_PCTAGG_PUCCH** to set **Test Parameter** to **TX3 – Aggregate Power (PUCCH Sub-test).**
8. Execute **SWP** to measure the Power Control Tolerance (Aggregate Power).
9. Execute **PCTPWR? PCC** to read the PCC Aggregate Power (dB) measurement result.
10. Execute **PCTPASS? PCC** to check that the PCC Aggregate Power measurement Pass/Fail judgment is Pass.

3.3.1.11. Frequency error for CA (inter-band DL CA and UL CA) (6.5.1A.2)

3.3.1.11.1. MT8820C

[Measurements]

1. **[PCC/SCC]** Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**
2. **[PCC/SCC]** Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error.**
3. **[PCC/SCC]** Set **UL RMC – Number of RB.**
4. **[PCC/SCC]** Execute **SWP** to measure the Modulation Analysis.
5. **[PCC/SCC]** Execute **WORST_CARRFERR? HZ** to read the Carrier Frequency Error (Hz) measurement result.
6. **[PCC/SCC]** Execute **WORST_CARRFERR? PPM** to read the Carrier Frequency Error (ppm) measurement result.
7. **[PCC/SCC]** Execute **CARRFERRPASS?** To check that the Carrier Frequency Error Pass/Fail judgment is Pass.

3.3.1.11.2. MT8821C

[Measurements]

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**
2. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error.**
3. Set **PCC and SCC–1 UL RMC – Number of RB and Starting RB.**
4. Execute **SWP** to measure the Modulation Analysis.
5. Execute **WORST_CARRFERR? HZ,PCC** to read the PCC Carrier Frequency Error (Hz) measurement result.
6. Execute **WORST_CARRFERR? PPM,PCC** to read the PCC Carrier Frequency Error (ppm) measurement result.
7. Execute **CARRFERRPASS? PCC** to check that the PCC Carrier Frequency Error Pass/Fail judgment is Pass.
8. Execute **WORST_CARRFERR? HZ,SCC1** to read the SCC–1 Carrier Frequency Error (Hz) measurement result.
9. Execute **WORST_CARRFERR? PPM,SCC1** to read the SCC–1 Carrier Frequency Error (ppm) measurement result.
10. Execute **CARRFERRPASS? SCC1** to check that the SCC–1 Carrier Frequency Error Pass/Fail judgment is Pass.

3.3.1.12. Error Vector Magnitude (EVM)

This chapter describes measurement examples for UL (Modulation, RB) (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB) and (16QAM, FullRB).

3.3.1.12.1. MT8820C

1. **[PCC/SCC]** Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**

[(QPSK, PartialRB/FullRB) measurements]

2. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB).**
3. **[PCC/SCC]** Set **UL RMC – Number of RB and Starting RB.**
4. **[PCC/SCC]** Execute **SWP** to measure the Modulation Analysis.
5. **[PCC/SCC]** Execute **EVM? AVG** to read the EVM measurement result.
6. **[PCC/SCC]** Execute **EVMPASS?** to check that the EVM Pass/Fail judgment is Pass.
7. **[PCC/SCC]** Execute **RSEVM? AVG** to read the Reference Signal EVM measurement result.
8. **[PCC/SCC]** Execute **RSEVMPASS?** to check that the Reference Signal EVM Pass/Fail judgment is Pass.
9. **[PCC/SCC]** Execute **TESTPRM TX_M40DBM_Q_F** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/FullRB).**
10. Execute steps 3 to 8.

[(16QAM, PartialRB/FullRB) measurements]

11. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power (16QAM/FullRB).**
12. Execute steps 3 to 8.
13. **[PCC/SCC]** Execute **TESTPRM TX_M40DBM_16_F** to set **Test Parameter** to **TX1 – EVM @ –40 dBm (16QAM/FullRB).**
14. Execute steps 3 to 8.

3.3.1.12.2. MT8821C

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**

[(QPSK, PartialRB/FullRB) measurements]

2. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB).**
3. Set **PCC and SCC–1 UL RMC – Number of RB and Starting RB.**
4. Execute **SWP** to measure the Modulation Analysis.
5. Execute **EVM? AVG,PCC** to read the PCC EVM measurement result.
6. Execute **EVMPASS? PCC** to check that the PCC EVM Pass/Fail judgment is Pass.
7. Execute **RSEVM? AVG,PCC** to read the PCC Reference Signal EVM measurement result.
8. Execute **RSEVMPASS? PCC** to check that the PCC Reference Signal EVM Pass/Fail judgment is Pass.
9. Execute **EVM? AVG,SCC1** to read the SCC–1 EVM measurement result.
10. Execute **EVMPASS? SCC1** to check that the SCC–1 EVM Pass/Fail judgment is Pass.
11. Execute **RSEVM? AVG,SCC1** to read the SCC–1 Reference Signal EVM measurement result.
12. Execute **RSEVMPASS? SCC1** to check that the SCC-1 Reference Signal EVM Pass/Fail judgment is Pass.
13. Execute **TESTPRM TX_M40DBM_Q_F** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/FullRB).**
14. Execute steps 3 to 12.

[(16QAM, PartialRB/FullRB) measurements]

15. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power (16QAM/FullRB).**
16. Execute steps 3 to 12.
17. Execute **TESTPRM TX_M40DBM_16_F** to set **Test Parameter** to **TX1 – EVM @ –40 dBm (16QAM/FullRB).**
18. Execute steps 3 to 12.

NOTE 1: The Input Level may vary depending on the Carrier Frequency f under the TX1 - EVM/IBE/LEAK @ –40dBm (16QAM/FullRB) condition.

$f \leq$ 3.0GHz	***: –36.8 dBm ± 3.2dB***
3.0GHz < $f \leq$ 4.2GHz	***: –36.5 dBm ± 3.5dB***

3.3.1.13. Carrier Leakage

3.3.1.13.1. MT8820C

[Measurements]

1. **[PCC/SCC]** Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**
2. **[PCC/SCC]** Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ 0 dBm.**
3. **[PCC/SCC]** Set **UL RMC – Number of RB and Starting RB.**
4. **[PCC/SCC]** Execute **SWP** to measure the Modulation Analysis.
5. **[PCC/SCC]** Execute **CARRLEAK? MAX** to read the Carrier Leakage measurement result.
6. **[PCC/SCC]** Execute **CARRLEAKPASS?** to check that the Carrier Leakage Pass/Fail judgment is Pass.
7. **[PCC/SCC]** Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ –30 dBm.**
8. Execute steps 3 to 6.
9. **[PCC/SCC]** Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/PartialRB).**
10. Execute steps 3 to 6.

3.3.1.13.2. MT8821C

[Measurements]

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**
2. Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ 0 dBm.**
3. Set **PCC and SCC–1 UL RMC – Number of RB and Starting RB.**
4. Execute **SWP** to measure the Modulation Analysis.
5. Execute **CARRLEAK? MAX,PCC** to read the PCC Carrier Leakage measurement result.
6. Execute **CARRLEAKPASS? PCC** to check that the PCC Carrier Leakage Pass/Fail judgment is Pass.
7. Execute **CARRLEAK? MAX,SCC1** to read the SCC–1 Carrier Leakage measurement result.
8. Execute **CARRLEAKPASS? SCC1** to check that the SCC–1 Carrier Leakage Pass/Fail judgment is Pass.
9. Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ –30 dBm.**
10. Execute steps 3 to 8.
11. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/PartialRB).**
12. Execute steps 3 to 8.

3.3.1.14. In-band Emissions for non-allocated RB

3.3.1.14.1. MT8820C

[Acceptable Value Setting]

1. **[PCC/SCC]** Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**
2. **[PCC/SCC]** Execute **TP_INBANDE_GEN_D -57.0** to set **General Pass/Fail judgment of TX1 – IBE/LEAK @ 0dBm.**

[Measurements]

3. **[PCC/SCC]** Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ 0 dBm.**
4. **[PCC/SCC]** Set **UL RMC – Number of RB and Starting RB.**
5. **[PCC/SCC]** Execute **SWP** to measure the Modulation Analysis.
6. **[PCC/SCC]** Execute **INBANDE_GEN? MAX** to read the In–Band Emissions (General) measurement result.
7. **[PCC/SCC]** Execute **INBANDE_IMG? MAX** to read the In–Band Emissions (IQ Image) measurement result.
8. **[PCC/SCC]** Execute **INBANDE_LEAK? MAX** to read the In–Band Emissions (Carrier Leakage) measurement result.
9. **[PCC/SCC]** Execute **INBANDEPASS?** to check that the In–Band Emissions Pass/Fail judgment is Pass.
10. **[PCC/SCC]** Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ –30 dBm.**
11. Execute steps 4 to 9.
12. **[PCC/SCC]** Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/PartialRB).**
13. Execute steps 4 to 9.

3.3.1.14.2. MT8821C

[Acceptable Value Setting]

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times.**
2. Execute **TP_INBANDE_GEN_D -57.0** to set **General Pass/Fail judgment of TX1 – IBE/LEAK @ 0dBm.**

[Measurements]

3. Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ 0 dBm.**
4. Set **PCC and SCC–1 UL RMC – Number of RB and Starting RB.**
5. Execute **SWP** to measure the Modulation Analysis.
6. Execute **INBANDE_GEN? MAX,PCC** to read the PCC In–Band Emissions (General) measurement result.
7. Execute **INBANDE_IMG? MAX,PCC** to read the PCC In–Band Emissions (IQ Image) measurement result.
8. Execute **INBANDE_LEAK? MAX,PCC** to read the PCC In–Band Emissions (Carrier Leakage) measurement result.
9. Execute **INBANDEPASS? PCC** to check that the PCC In–Band Emissions Pass/Fail judgment is Pass.
10. Execute **INBANDE_GEN? MAX,SCC1** to read the SCC -1In–Band Emissions (General) measurement result.
11. Execute **INBANDE_IMG? MAX,SCC1** to read the SCC-1 In–Band Emissions (IQ Image) measurement result.
12. Execute **INBANDE_LEAK? MAX,SCC1** to read the SCC-1 In–Band Emissions (Carrier Leak) measurement result.
13. Execute **INBANDEPASS? SCC1** to check that the SCC–1 In–Band Emissions Pass/Fail judgment is Pass.
14. Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ –30 dBm.**
15. Execute steps 4 to 13.
16. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/PartialRB).**
17. Execute steps 4 to 13.

3.3.1.15. Occupied Bandwidth for CA (inter-band DL CA and UL CA) (6.6.1A.2)

3.3.1.15.1. MT8820C

[Measurements]

1. **[PCC/SCC]** Execute **OBW_AVG 20** to set **the average count for Occupied Bandwidth** to **20 times.**
2. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB).**
3. **[PCC/SCC]** Execute **SWP** to measure the Occupied Bandwidth (OBW).
4. **[PCC/SCC]** Execute **OBW?** to read the OBW measurement result.
5. **[PCC/SCC]** Execute **OBWPASS?** to check that the OBW Pass/Fail judgment is Pass.

3.3.1.15.2. MT8821C

[Measurements]

1. Execute **OBW_AVG 20** to set **the average count for Occupied Bandwidth** to **20 times.**
2. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB).**
3. Execute **SWP** to measure Occupied Bandwidth (OBW).
4. Execute **OBW? PCC** to read the PCC OBW measurement result.
5. Execute **OBWPASS? PCC** to check that the PCC OBW Pass/Fail judgment is Pass.
6. Execute **OBW? SCC1** to read the SCC–1 OBW measurement result.
7. Execute **OBWPASS? SCC1** to check that the SCC–1 OBW Pass/Fail judgment is Pass.

3.3.1.16. Spectrum emission mask for CA (inter-band DL CA and UL CA) (6.6.2.1A.2)

3.3.1.16.1. MT8820C

[Acceptable Value setting]

1. **[PCC/SCC]** Execute **SEM_AVG 20** to set **the average count of Spectrum Emission Mask** to **20 times.**
2. **[PCC/SCC]** Execute **TP_SEM5MHZ_1 -13.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 0 – 1 MHz.**
3. **[PCC/SCC]** Execute **TP_SEM5MHZ_2 -8.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 1 – 5 MHz**.
4. **[PCC/SCC]** Execute **TP_SEM5MHZ_3 -11.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 5 – 6 MHz.**
5. **[PCC/SCC]** Execute **TP_SEM5MHZ_4 -23.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 6 – 10 MHz.**

[(QPSK, PartialRB/FullRB) Measurements]

6. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB).**
7. **[PCC/SCC]** Set **UL RMC–Number of RB and Starting RB**.
8. **[PCC/SCC]** Execute **SWP** to measure the Spectrum Emission Mask.
9. **[PCC/SCC]** Execute **SEMPASS?** to check that the SEM Pass/Fail judgment is Pass.

[(16QAM, PartialRB/FullRB) Measurements]

10. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power (16QAM/FullRB).**
11. Execute steps 7 to 9.

3.3.1.16.2. MT8821C

[Acceptable Value setting]

1. Execute **SEM_AVG 20** to set **the average count of Spectrum Emission Mask** to **20 times.**
2. Execute **TP_SEM5MHZ_1 -13.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 0 – 1 MHz.**
3. Execute **TP_SEM5MHZ_2 -8.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 1 – 5 MHz.**
4. Execute **TP_SEM5MHZ_3 -11.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 5 – 6 MHz.**
5. Execute **TP_SEM5MHZ_4 -23.5** to set **Pass/Fail judgment of Spectrum Emission Mask Frequency Range 6 – 10 MHz.**

[(QPSK, PartialRB/FullRB) Measurements]

6. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB).**
7. Set **PCC and SCC–1 UL RMC–Number of RB and Starting RB.**
8. Execute **SWP** to measure the Spectrum Emission Mask.
9. Execute **SEMPASS? PCC** to check that the PCC SEM Pass/Fail judgment is Pass.
10. Execute **SEMPASS? SCC1** to check that the SCC–1 SEM Pass/Fail judgment is Pass.

[(16QAM, PartialRB/FullRB) Measurements]

11. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 - Max. Power (16QAM/FullRB).**
12. Execute steps 7 to 10.

NOTE 1: The Pass/Fail evaluation value is initialized as described in TS36.521-1 6.6.2.1A.2.5, and used when the Carrier Frequency is 3 GHz or less. When the Carrier Frequency exceeds 3 GHz, and network signaled value is either NS03, NS06 or NS07, set:

- ***TP_SEM**MHZ_1***
- ***TP_SEM**MHZ_2***
- ***TP_SEM**MHZ_3***
- ***TP_SEM**MHZ_4***

as described in TS36.521-1 6.6.2.1A.2.5. (** = 1.4, 3, 5, 10, 15, 20).
For the Pass/Fail evaluation values, refer to Chapter 3.7.4 Test Parameter Limit in the operation manual.

3.3.1.17. Additional Spectrum Emission Mask

Refer to Chapter 3.3.1.3

3.3.1.18. Adjacent Channel Leakage power Ratio for CA (inter-band DL CA and UL CA) (6.6.2.3A.2)

3.3.1.18.1. MT8820C

[Pass/Fail evaluation limits value setting]

1. **[PCC/SCC]**Execute **ACLR_AVG 20** to set the **average count of Adjacent Channel Power** to **20 times**.
2. **[PCC/SCC]**Execute **TP_ACLR_E -29.2** to set **E-UTRA Pass/Fail limit value** to **–29.2 dB**.
3. **[PCC/SCC]**Execute **TP_ACLR_U1 -32.2** $UTRA_{ACLR1}$ to set **Pass/Fail limit value** to **–32.2 dB**.
4. **[PCC/SCC]**Execute **TP_ACLR_U2 -35.2** $UTRA_{ACLR1}$ to set **Pass/Fail limit value** to **–35.2 dB**.

[(QPSK, PartialRB) measurements]

5. **[PCC/SCC]**Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 - Max. Power (QPSK/PartialRB)**.
6. **[PCC/SCC]**Execute **ULRB_POS MIN** to set **UL RB Position** to **Min (#0)**.
7. **[PCC/SCC]**Execute **SWP** to measure the Adjacent Channel Power.
8. **[PCC/SCC]**Execute **MODPWRPASS?** to check that the ACLR Pass/Fail judgment is Pass.
9. **[PCC/SCC]**Execute **ULRB_POS MAX** to set **UL RB Position** to **Max (#max)**.
10. Execute steps 7 to 8.

[(QPSK, FullRB) measurements]

11. **[PCC/SCC]**Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
12. Execute steps 7 to 8.

[(16QAM, PartialRB) measurements]

13. **[PCC/SCC]**Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to**TX1 - Max. Power (16QAM/PartialRB))**.
14. Execute steps 6 to 10.

[(16QAM, FullRB) measurements]

15. **[PCC/SCC]** Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 - Max. Power (16QAM/FullRB)**.
16. Execute steps 7 to 8.

3.3.1.18.2. MT8821C

[Pass/Fail evaluation limits value setting]

1. Execute **ACLR_AVG 20** to set the **average count of Adjacent Channel Power** to **20 times**.
2. Execute **TP_ACLR_E -29.2** to set **E-UTRA Pass/Fail limit value** to **–29.2 dB**.
3. Execute **TP_ACLR_U1 -32.2** $UTRA_{ACLR1}$ to set **Pass/Fail limit value** to **–32.2 dB**.
4. Execute **TP_ACLR_U2 -35.2** $UTRA_{ACLR1}$ to set **Pass/Fail limit value** to **–35.2 dB**.

[(QPSK, PartialRB) measurements]

5. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 - Max. Power (QPSK/PartialRB)**.
6. Execute **ULRB_POS MIN** to set **PCC UL RB Position** to **Min (#0)**.
7. Execute **ULRB_POS_SCC1 MIN** to set **SCC-1 UL RB Position** to **Min (#0)**.
8. Execute **SWP** to measure the Adjacent Channel Power.
9. Execute **MODPWRPASS? PCC** to check that the PCC ACLR Pass/Fail judgment is Pass.
10. Execute **MODPWRPASS? SCC1** to check that the SCC -1ACLR Pass/Fail judgment is Pass.
11. Execute **ULRB_POS MAX** to set **PCC UL RB Position** to **Max (#max)**.
12. Execute **ULRB_POS_SCC1 MAX** to set **SCC -1UL RB Position** to **Max (#max)**.
13. Execute steps 8 to 10.

[(QPSK, FullRB) measurements]

14. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 - Max. Power (QPSK/FullRB)**.
15. Execute steps 8 to 10.

[(16QAM, PartialRB) measurements]

16. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to**TX1 - Max. Power (16QAM/PartialRB))**.
17. Execute steps 6 to 13.

[(16QAM, FullRB) measurements]

18. **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 - Max. Power (16QAM/FullRB)**.
19. Execute steps 8 to 10.

3.3.2. TX Measurements for Intra-band Contiguous CA

This chapter explains the test procedure for Intra–band Contiguous CA measurement specified in 3GPP TS 36.521–1.

Not all Intra–band Contiguous CA measurements are supported by MT8820C. Refer to Table 1.2 for the list of supported measurement items.

Additionally, the MT8820C has the following limitations for Intra–band contiguous CA measurement.

- Supports test execution through remote commands only.
- Certain measurement items require manual computation of results.
- Does not support Pass/Fail judgement for some measurement items, requiring user to manually determine whether measurement results is Pass or Fail.

3.3.2.1. UE Maximum Output Power for CA (intra-band contiguous DL CA and UL CA) (6.2.2A.1)

3.3.2.1.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.1.2. MT8821C

This subsection describes UL measurement examples for Intra-band Contiguous UL CA where (Modulation, RB) is (QPSK, 1) or (QPSK, PartialRB)

First example:	PCC N_{RB} = 100, SCC N_{RB} = 25, N_{RB_alloc} = 1
	PCC and SCC RB allocations(L_{CRB}@RB_{start}) are P_1@0 and S_0@0, respectively
Second example:	PCC N_{RB} = 100, SCC N_{RB} = 100, N_{RB_alloc} = 18
	PCC and SCC RB allocations(L_{CRB}@RB_{start}) are P_18@0 and S_0@0, respectively

[Pass/Fail evaluation limit value setting]

1. Execute **PWR_AVG 20** to set the **average count for Power Measurement** to 20
2. Execute **TP_MAXPWR_LL 20.3, CONTCC** to set **TX1 – Max. Power (QPSK/1RB/PartialRB) Pass/Fail lower limit** for Intra–band Contiguous UL CA to **20.3 dBm**.
3. Execute **TP_MAXPWR_UL 25.7, CONTCC** to set **TX1 – Max. Power (QPSK/1RB/PartialRB) Pass/Fail upper limit** for Intra–band Contiguous UL CA to **25.7 dBm**.

[(QPSK, 1RB) measurements]

4. Execute **TESTPRM TX_MAXPWR_Q_1** to set **Test Parameter** to **TX1 – Max. Power (QPSK/1RB)**.
5. Execute **ULRB_POS MIN** to set **UL RB Position** to **Min(#0)**.
6. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **0**.
7. Execute **SWP** to measure the power.
8. Execute **POWER? AVG** to read the TX power measurement result.
9. Execute **POWERPASS?** to check that the TX power measurement Pass/Fail judgment is Pass.

[(QPSK, PartialRB) measurements]

10. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 – Max. Power (QPSK/PartialRB)**.
11. Execute step 6 to 9.

NOTE 1: ***The tolerance (lower limit) is relaxed by 1.5dB for transmission bandwidths confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.***

NOTE 2: ***The Band 1 tolerance value defined in TS36–521–1 is set as the initial value for Pass/Fail judgment.***
The Pass/Fail judgment value varies depending on the band.
The following judgment values are set in accordance with TS36.521–1 Table 6.2.2A.1.5–1.
- ***TP_MAXPWR_LL***
- ***TP_MAXPWR_UL***

Refer to 3.7.4 Test Parameter Limit in the operation manual for Pass/Fail Judgment values.

3.3.2.2. Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA) (6.2.3A.1)

3.3.2.2.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.2.2. MT8821C

This chapter describes UL measurement examples for Intra–band contiguous UL CA measurement where (Modulation, RB) is (QPSK, FullRB), (16QAM, PartialRB), or (16QAM, FullRB).

First example: PCC N_{RB} = 100, SCC N_{RB} = 25, N_{RB_alloc} = 125, Modulation = QPSK
PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_100@0 and S_25@0, respectively
Second example: PCC N_{RB} = 100, SCC N_{RB} = 100, N_{RB_alloc} = 18, Modulation = 16QAM
PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_18@0 and S_0@0, respectively
Third example: PCC N_{RB} = 100, SCC N_{RB} = 100, N_{RB_alloc} = 200, Modulation = 16QAM
PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_100@0 and S_100@0, respectively

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set the **average count of Power measurement** to **20 times**.
2. Execute **TP_MPR1_LL 18.3, CONTCC** to set **TX1 – Max. Power (QPSK/FullRB) Pass/Fail lower limit** for Intra–band Contiguous UL CA to **18.3 dBm**.
3. Execute **TP_MPR1_UL 25.7, CONTCC** to set **TX1 – Max. Power (QPSK/FullRB) Pass/Fail upper limit** for Intra–band Contiguous UL CA to **25.7 dBm**.
4. Execute **TP_MPR2_LL 19.3, CONTCC** to set **TX1 – Max. Power (16QAM/PartialRB) Pass/Fail lower limit** for Intra–band Contiguous UL CA to **19.3 dBm**.
5. Execute **TP_MPR2_UL 25.7, CONTCC** to set **TX1 – Max. Power (16QAM/PartialRB) Pass/Fail upper limit** for Intra–band Contiguous UL CA to **25.7 dBm**.
6. Execute **TP_MPR3_LL 16.8, CONTCC** to set **TX1 – Max. Power (16QAM/FullRB) Pass/Fail lower limit** for Intra–band Contiguous UL CA to **16.8 dBm**.
7. Execute **TP_MPR3_UL 25.7, CONTCC** to set **TX1 - Max. Power (16QAM/FullRB) Pass/Fail upper limit** for Intra–band Contiguous UL CA to **25.7 dBm**.

[(QPSK, FullRB) measurements]

8. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB)**.
9. Execute **SWP** to measure the power.
10. Execute **POWER? AVG** to read the TX power measurement result.
11. Execute **POWERPASS?** to check that the TX power measurement Pass/Fail judgment is Pass.

[(16QAM, PartialRB) measurements]

12. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 – Max. Power (16QAM/PartialRB)**.
13. Execute **ULRMC_RB 18** to set **Common Parameter – UL RMC – Number of RB** to **18**.
14. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC–1 – UL RMC – Number of RB** to **0**.
15. Execute steps 9 to 11.

[(16QAM, FullRB) measurements]

16. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power (16QAM/FullRB)**.
17. Execute steps 9 to 11.

NOTE 1: The tolerance for MPR measurement differs depending on the Configuration ID at TS36.521–1 Table 6.2.3A.1.5-1.

NOTE 2: The Band 1 tolerance value defined in TS36–521–1 is set as the initial value for Pass/Fail judgment.
The following Pass/Fail judgment values are set according to the Configuration ID.

- ***TP_MPR1_LL***
- ***TP_MPR1_UL***
- ***TP_MPR2_LL***
- ***TP_MPR2_UL***
- ***TP_MPR3_LL***
- ***TP_MPR3_UL***

Refer to 3.7.4 Test Parameter Limit in the operation manual for the Pass/Fail judgment values.

3.3.2.3. Additional Maximum Power Reduction (A-MPR) for CA (intra-band contiguous DL CA and UL CA) (6.2.4A.1)

3.3.2.3.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.3.2. MT8821C

This chapter describes UL measurement examples for Intra–band contiguous UL CA measurement where (Modulation, RB) is (QPSK, PartialRB), (QPSK, FullRB), or (16QAM, PartialRB) and Test Frequency is Mid range.

First example: additionalSpectrumEmission is NS_01
PCC N_{RB} = 75, SCC N_{RB} = 75, N_{RB_alloc} = 1, Modulation = QPSK
PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_1@0 and S_0@0, respectively

Second example: additionalSpectrumEmission is NS_04,
PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 18, Modulation = 16QAM
PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_0@0 and S_18@0, respectively

1. Execute **PWR_AVG 20** to set to measure Power **average count of Power Measurement** to **20 times**.
2. Execute **SEM_AVG 20** to set to measure Power **average count of Spectrum Emission Mask** to **20 times**.
3. Execute **SIB2_NS NS_01** set to **Call Processing Parameter – additionalSpectrumEmission** to **NS_01**.
4. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB)**.
5. Execute **ALLMEASITEMS_OFF** to set **all fundamental measurement items** to **OFF**.
6. Execute **PWR_MEAS ON** to set **Power Measurement** to **ON**.
7. Execute **SEM_MEAS ON** to set **Spectrum Emission Mask Measurement** to **ON**.

[(QPSK, PartialRB/FullRB) measurements]

8. Execute **ULRMC_RB 18** to set **Common Parameter – UL RMC – Number of RB** to **18**.
9. Execute **ULRB_START 0** to set **Common Parameter – UL RMC – Starting RB** to **0**.
10. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **0**.
11. Execute **ULRB_START_SCC1 0** to set **Common Parameter – SCC-1 UL RMC – Starting RB** to **0**.
12. Execute **TP_MPR1_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm** (refer to TS36.521–1 Table 6.2.4A.1.5–1 to 6).
13. Execute **TP_MPR1_LL 5.3** to set **TX Power measurement Pass/Fail lower limit** **5.3 dBm** (refer to TS36.521-1 Table 6.2.4A.1.5–1 through to 6).
14. Execute **SWP** to measure the power.
15. Execute **POWER? AVG** to read the TX Power measurement result.
16. Execute **POWERPASS?** to check that the TX Power Pass/Fail judgment is Pass.
17. Execute **SEMPASS?** to check that the SEM Pass/Fail judgment is Pass.
18. Execute steps 8 to 17 after changing the Configuration ID by referring to TS36.521–1 Table 6.2.4A.1.4.1–1.

[(16QAM, PartialRB) measurements]

19. Execute **SIB2_NS NS_04** set to **Call Processing Parameter – additionalSpectrumEmission** to **NS_04**.
20. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to**TX1 – Max. Power (16QAM/PartialRB)**.
21. Execute **ULRMC_RB 0** to set **Common Parameter – UL RMC – Number of RB** to **0**.
22. Execute **ULRMC_RB_SCC1 15** to set **Common Parameter – SCC-1 – UL RMC - Number of RB** to **15**.
23. Execute **ULRB_START_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC - Starting RB** to **0**.
24. Execute **TP_MPR2_UL 25.7** to set **TX Power measurement Pass/Fail upper limit** to **25.7 dBm** (refer to TS36.521–1 Table 6.2.4A.1.5–1 to 6).
25. Execute **TP_MPR2_LL 20.3** to set **TX Power measurement Pass/Fail lower limit** to **20.3 dBm** (refer to TS36.521–1 Table 6.2.4A.1.5–1 to 6).
26. Execute steps 14 to 17.
27. Execute steps 8 to 17 after changing the Configuration ID by referring to TS36.521–1 Table 6.2.4A.1.4.1–4.

NOTE 1: The tolerance for A–MPR measurement differs depending on the Configuration ID in TS36.521–1 Table 6.2.4A.1.5–1 through 6.
The Band 1 determination value defined at TS36.521–1 is set as the Pass/Fail judgment default value. Therefore, re–input is required after the Configuration ID for:
- ***TP_MPR1_LL***
- ***TP_MPR1_UL***

Refer to 3.7.4 Test Parameter Limit in the operation manual for Pass/Fail judgment values.

3.3.2.4. Configured UE transmitted Output Power for CA (intra-band contiguous DL CA and UL CA) (6.2.5A.1)

3.3.2.4.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.4.2. MT8821C

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set the **average count of Power measurement** to **20 times**.
2. Execute **TP_CONFPWR1_TOL 7.7,CONTCC** to set **TX2 – Configured UE transmitted Output Power (Test Point 1)** Pass/Fail Judgment for Contiguous CC.
3. Execute **TP_CONFPWR2_TOL 6.7,CONTCC** to set **TX2 – Configured UE transmitted Output Power (Test Point 2)** Pass/Fail Judgment for Contiguous CC.
4. Execute **TP_CONFPWR3_TOL 5.7,CONTCC** to set **TX2 – Configured UE transmitted Output Power (Test Point 3)** Pass/Fail Judgment for Contiguous CC.

[Measurements]

5. Execute **TESTPRM TX_CONF_PWR1** to set **Test Parameter** to**TX2 – Configured Power (Test Point 1)**.
6. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **0**.
7. Execute **SWP** to measure the power.
8. Execute **POWER? AVG** to read the TX Power measurement result.
9. Execute **TESTPRM TX_CONF_PWR2** to set **Test Parameter** to **TX2 – Configured Power (Test Point 2)**.
10. Execute steps 6 to 8.
11. Execute **TESTPRM TX_CONF_PWR3** to set **Test Parameter** to **TX2 – Configured Power (Test Point 3)**.
12. Execute 6 to 8.

NOTE 1: ***The tolerance (lower limit) is relaxed by 1.5dB for transmission bandwidths confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.***

NOTE 2: ***Pass/Fail judgment values vary depending on the Carrier Frequency f.***

f – 3.0 GHz	***:pMax ±7.7 dBm (at Test Point 1)***
	: pMax ±6.7 dBm (at Test Point 2)
	: pMax ±5.7 dBm (at Test Point 3)
3.0 GHz < f ≤ 4.2 GHz	***: pMax ±8.0 dBm (at Test Point 1)***
	: pMax ±7.0 dBm (at Test Point 2)
	: pMax ±6.0 dBm (at Test Point 3)

3.3.2.5. Minimum Output Power for CA (intra-band contiguous DL CA and UL CA) (6.3.2A.1)

3.3.2.5.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.5.2. MT8821C

This subsection describes an example of intra–band measurement.

[Pass/Fail evaluation limits value setting]

1. Execute **PWR_AVG 20** to set the **average count of Power measurement** to **20 times**.
2. Execute **TP_MINPWR_UL -39.0, PCC** to set **TX1 – Min. Power** Pass/Fail judgment for PCC.
3. Execute **TP_MINPWR_UL -39.0, SCC1** to set **TX1 – Min. Power** Pass/Fail judgment for SCC-1.

[Measurements]

4. Execute **TESTPRM TX_MINPWR** to set **Test Parameter** to **TX1 – Min. Power.**
5. Execute **SWP** to measure the power.
6. Execute **CHPWR? AVG, PCC** to read the Channel Power measurement result for PCC.
7. Execute **CHPWR? AVG, SCC1** to read the Channel Power measurement result for SCC–1.
8. Execute **CHPWRPASS? PCC** to check that the Channel Power measurement Pass/Fail judgment for PCC is Pass.
9. Execute **CHPWRPASS? SCC-1** to check that the Channel Power measurement Pass/Fail judgment for SCC–1 is Pass.
10. Execute **CHPWRPASS?** to check that the Channel Power measurement Pass/Fail judgment for all CCs is Pass.

NOTE 2: Pass/Fail judgment values differ depending on the Carrier Frequency f.

f ≤ 3.0GHz	***: ≤ –39 dBm (as the initial value)***
3.0GHz < f ≤ 4.2GHz	***: ≤ –38.7 dBm***

3.3.2.6. UE Transmit OFF power for CA (intra-band contiguous DL CA and UL CA) (6.3.3A.1)

Refer to Chapter 3.3.2.7.

3.3.2.7. General ON/OFF time mask for CA (intra-band contiguous DL CA and UL CA) (6.3.4A.1.1)

3.3.2.7.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.7.2. MT8821C

This subsection describes an example of intra-band measurement.

[Pass/Fail evaluation limits value setting]

1. Execute **TP_OFFPWR_UL -48.5, PCC** to set **TX2 – General Time Maskof Off Power** Pass/Fail judgment for PCC.
2. Execute **TP_TMASK_GEN_TOL 7.5, PCC** to set **TX2 – General Time Maskof On Power** Pass/Fail judgment for PCC.
3. Execute **TP_OFFPWR_UL -48.5, SCC1** to set **TX2 – General Time Maskof Off Power** Pass/Fail judgment for SCC1.
4. Execute **TP_TMASK_GEN_TOL 7.5, SCC1** to set **TX2 – General Time Maskof On Power** Pass/Fail judgment for SCC1.

[Measurements]

5. Execute **TESTPRM TX_GEN_TMASK** to set **Test Parameter** to **TX2 – General Time Mask**.
6. Execute **PT_WDR ON** to enable Power Template Wide Dynamic Range measurement.
7. Execute **SWP** to measure the Power Template.
   The following procedure is for validating the PCC result.
8. Execute **ONPWR? AVG, PCC** to read the On Power measurement result for PCC.
9. Execute **ONPWRPASS? PCC** to check that the On Power measurement Pass/Fail judgment for PCC is Pass.
10. Execute **OFFPWR_BEFORE? AVG, PCC** to read the Off Power (Before) measurement result for PCC.
11. Execute **OFFPWR_AFTER? AVG, PCC** to read the Off Power (After) measurement result for PCC.
12. Execute **OFFPWRPASS? PCC** to check that the Off Power measurement Pass/Fail judgment for PCC is Pass.
    The following procedure is for validating the SCC–1 result.
13. Execute **ONPWR? AVG, SCC1** to read the On Power measurement result for SCC–1.
14. Execute **ONPWRPASS? SCC1** to check that the On Power measurement Pass/Fail judgment for SCC–1 is Pass.
15. Execute **OFFPWR_BEFORE? AVG, SCC1** to read the Off Power (Before) measurement result for SCC–1.
16. Execute **OFFPWR_AFTER? AVG, SCC1** to read the Off Power (After) measurement result for SCC–1.
17. Execute **OFFPWRPASS? SCC1** to check that the Off Power measurement Pass/Fail judgment for SCC–1 is Pass.

NOTE: Pass/Fail judgment values for Transmitted Off Power differ depending on the Carrier Frequency f.

f ≤ 3.0 GHz:	***≤–48.5 dBm (initial value)***
3.0GHz < f ≤ 4.2 GHz:	***≤–48.2 dBm***

3.3.2.8. Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA) (6.3.5A.1.1)

3.3.2.8.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.8.2. MT8821C

This subsection describes an example of intra–band measurement.

[Pass/Fail evaluation limits value setting]

1. Execute **TP_PCTABS_TOL 10.0, PCC** to set **TX3 – Absolute Power (Test Point1/2)** Pass/Fail judgment for PCC.
2. Execute **TP_PCTABS_TOL 10.0, SCC1** to set **TX3 – Absolute Power (Test Point1/2)** Pass/Fail judgment for SCC–1.

[Measurements]

3. Execute **TESTPRM TX_PCTABS1** to set **Test Parameter** to**TX3 – Absolute Power (Test Point1)**.
4. Execute **SWP** to measure Power Control Tolerance(Absolute Power).
5. Execute **PCTPWR? PCC** to read the Absolute Power (dBm) measurement result for PCC.
6. Execute **PCTPWR? SCC1** to read the Absolute Power (dBm) measurement result for SCC-1.
7. Execute **PCTPASS? PCC** to check that the Absolute Power measurement Pass/Fail judgment for PCC is Pass.
8. Execute **PCTPASS? SCC1** to check that the Absolute Power measurement Pass/Fail judgment for SCC-1 is Pass.
9. Execute **PCTPASS?** to check that the Absolute Power measurement Pass/Fail judgment for all CCs is Pass.
10. Execute **TESTPRM TX_PCTABS2** to set **Test Parameter** to **TX3 - Absolute Power (Test Point2)**.
11. Execute steps 4 to 9.

NOTE: The Pass/Fail judgment value for Expected Measured Power differs depending on the Carrier Frequency f.

f ≤ 3.0 GHz:	***≤10.0 dBm (initial value)***
3.0GHz < f ≤ 4.2 GHz:	***≤10.4 dBm***

3.3.2.9. Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA) (6.3.5A.2.1)

3.3.2.9.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.9.2. MT8821C

This subsection describes an example of intra–band measurement.

[Pass/Fail evaluation limits value setting]

1. Execute **TP_PCTREL_RMP_TOL 1.7, PCC** to set **TX3 – Relative Power (Ramping Up/Down)** Pass/Fail tolerance of subframes before/after RB change for PCC.
2. Execute **TP_PCTREL_RMP_TOL 1.7, SCC1** to set **TX3 – Relative Power (Ramping Up/Down)** Pass/Fail tolerance of subframes before/after RB change for SCC–1.
3. Execute **TP_PCTREL_RMP_CNG_TOL1 4.7, PCC** to set **TX3 – Relative Power (Ramping Up/Down)** RB Change Pass/Fail tolerance for PCC.
4. Execute **TP_PCTREL_RMP_CNG_TOL1 4.7, SCC1** to set **TX3 – Relative Power (Ramping Up/Down)** RB Change Pass/Fail tolerance for SCC-1.
5. Execute **TP_PCTREL_RMP_CNG_TOL2 5.7, PCC** to set **TX3 – Relative Power (Ramping Up/Down)** RB Change Pass/Fail tolerance for PCC.
6. Execute **TP_PCTREL_RMP_CNG_TOL2 5.7, SCC1** to set **TX3 – Relative Power (Ramping Up/Down)** RB Change Pass/Fail tolerance for SCC-1.
7. Execute **TP_PCTREL_RMP_CNG_TOL3 6.7, PCC** to set **TX3 – Relative Power (Ramping Up/Down/Down)** RB Change Pass/Fail tolerance for PCC.
8. Execute **TP_PCTREL_RMP_CNG_TOL3 6.7, SCC1** to set **TX3 – Relative Power (Ramping Up/Down/Down)** RB Change Pass/Fail tolerance for SCC-1.
9. Execute **TP_PCTREL_RMP_E 6.7, PCC** to set **TX3 – Relative Power (Ramping Up/Down)** tolerance of the Exception points for PCC.
10. Execute **TP_PCTREL_RMP_E 6.7, SCC1** to set **TX3 – Relative Power (Ramping Up/Down)** tolerance of the Exception points for SCC-1.
11. Execute **TP_PCTREL_ALT_TOL 6.7, PCC** to set **TX3 – Relative Power (Alternating)** Pass/Fail tolerance for PCC.
12. Execute **TP_PCTREL_ALT_TOL 6.7, SCC1** to set **TX3 – Relative Power (Alternating)** Pass/Fail tolerance for SCC–1.

[Measurements]

1. Execute **TESTPRM TX_PCTREL_UP_A** to set **Test Parameter** to**TX3 – Relative Power (Ramping Up A)**.
2. Execute **SWP** to measure Power Control Tolerance (Relative Power).
3. Execute **PCTPWR? PCC** to read the Relative Power (dB) measurement result for PCC.
4. Execute **PCTPWR2? PCC** to read the Relative power (dB) measurement result at RB Change for PCC .
5. Execute **PCTPASS? PCC** to check that the Relative Power measurement Pass/Fail judgment for PCC is Pass.
6. Execute **PCTPWR? SCC1** to read the Relative Power (dB) measurement result for SCC–1.
7. Execute **PCTPWR2? SCC1** to read the Relative power (dB) measurement result at RB Change for SCC–1 .
8. Execute **PCTPASS? SCC1** to check that the Relative Power measurement Pass/Fail judgment for SCC–1 is Pass.
9. Execute **PCTPASS?** to check that the Relative Power measurement Pass/Fail judgment for all CCs is Pass.
10. Execute **TESTPRM TX_PCTREL_UP_B** to set **Test Parameter** to **TX3 – Relative Power (Ramping Up B)**.
11. Execute steps 2 to 9.
12. Execute **TESTPRM TX_PCTREL_UP_C** to set **Test Parameter** to **TX3 – Relative Power (Ramping Up C)**.
13. Execute steps 2 to 9.
14. Execute **TESTPRM TX_PCTREL_DOWN_A** to set **Test Parameter** to **TX3 – Relative Power (Ramping Down A)**.
15. Execute steps 2 to 9.
16. Execute **TESTPRM TX_PCTREL_DOWN_B** to set **Test Parameter** to**TX3 – Relative Power (Ramping Down B)**.
17. Execute steps 2 to 9.
18. Execute **TESTPRM TX_PCTREL_DOWN_C** to set **Test Parameter** to **TX3 – Relative Power (Ramping Down C)**.
19. Execute steps 2 to 9.

20. Execute **TESTPRM TX_PCTREL_ALT** to set **Test Parameter** to**TX3 – Relative Power (Alternating)**.
21. Execute steps 2 to 9 except 4 and 7.

NOTE 1: The tolerance of RB Change subframe is varied for transmission bandwidths confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high}.

3.3.2.10. Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA) (6.3.5A.3.1)

3.3.2.10.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.10.2. MT8821C

This subsection describes an example of intra-band measurement.

[Measurements]

1. Execute **TESTPRM TX_PCTAGG_PUSCH** to set **Test Parameter** to **TX3 – Aggregate Power (PUSCH Sub-test)**.
2. Execute **SWP** to measure Power Control Tolerance (Aggregate Power).
3. Execute **PCTPWR? PCC** to read the Aggregate Power (dB) measurement result for PCC.
4. Execute **PCTPASS? PCC** to check that the Aggregate Power measurement Pass/Fail judgment for PCC is Pass.
5. Execute **PCTPWR? SCC1** to read the Aggregate Power (dB) measurement result for SCC-1.
6. Execute **PCTPASS? SCC1** to check that the Aggregate Power measurement Pass/Fail judgment for SCC-1 is Pass.
7. Execute **PCTPASS?** to check that the Aggregate Power measurement Pass/Fail judgment for all CCs is Pass.
8. Execute **TESTPRM TX_PCTAGG_PUCCH** to set **Test Parameter** to **TX3 – Aggregate Power (PUCCH Sub-test)**.
9. Execute **SWP** to measure the Power Control Tolerance (Aggregate Power).
10. Execute **PCTPWR?** to read the Aggregate Power (dB) measurement result.
11. Execute **PCTPASS?** to check that the Aggregate Power measurement Pass/Fail judgment is Pass.

3.3.2.11. Frequency error for CA (intra-band contiguous DL CA and UL CA) (6.5.1A.1)

3.3.2.11.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.11.2. MT8821C

[Measurements]

1. Execute **MOD_AVG 20** to set the **average count of Modulation Analysis** to **20 times**.
2. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error**.
3. Execute **TPUT_MEAS OFF** to set **Throughput Measurement** to **OFF**.
4. Set **UL RMC – Number of RB** by according to TS36.521-1 Table 6.5.1A.1.4.1-1.
5. Execute **SWP** to measure the Modulation Analysis.
6. Execute **WORST_CARRFERR? HZ,PCC** to read the Carrier Frequency Error (Hz) measurement result for PCC.
7. Execute **WORST_CARRFERR? PPM,PCC** to read the Carrier Frequency Error (ppm) measurement result for PCC.
8. Execute **CARRFERRPASS? PCC** to check that the Carrier Frequency Error Pass/Fail judgment for PCC is Pass.
9. Execute **WORST_CARRFERR? HZ,SCC1** to read the Carrier Frequency Error (Hz) measurement result for SCC-1.
10. Execute **WORST_CARRFERR? PPM,SC1** to read the Carrier Frequency Error (ppm) measurement result for SCC-1.
11. Execute **CARRFERRPASS? SCC1** to check that the Carrier Frequency Error Pass/Fail judgment of SCC-1 is Pass.
12. Execute **CARRFERRPASS?** to check that the Carrier Frequency Error Pass/Fail judgment for all CCs is Pass.

3.3.2.12. Error Vector Magnitude (EVM) for CA (intra-band contiguous DL CA and UL CA) (6.5.2A.1-1)

3.3.2.12.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.12.2. MT8821C

This subsection describes UL measurement examples for intra–band measurement where (Modulation, RB) is (QPSK, PartialRB), (QPSK, FullRB), (16QAM, PartialRB) or (16QAM, FullRB).

First example:	PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 12, Modulation = QPSK PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_12@0 and S_0@0, respectively
Second example:	PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 100, Modulation = QPSK, PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_100@0 and S_0@0 respectively
Third example:	PCC N_{RB} = 50, SCC N_{RB} = 100, N_{RB_alloc} = 12, Modulation = 16QAM PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_12@0 and S_0@0, respectively
Fourth example:	PCC N_{RB} = 100, SCC N_{RB} = 100, N_{RB_alloc} = 100, Modulation = 16QAM PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_100@0 and S_0@0, respectively

1. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times**.

For Intra-band measurement, the Carrier Leakage Frequency Parameter must be set properly set before the start of the measurement sequence. For more information, see Annex B.2.
[Carrier Leakage Frequency Setting]

2. Execute **IBEM_CLFR CFR** to set **Carrier Leakage Frequency** to **at Carrier Frequency Center**.

[(QPSK, PartialRB) measurements]

3. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 – Max. Power (QPSK/PartialRB)**.
4. Execute **ULRMC_RB 12** to set **Common Parameter - UL RMC – Number of RB** to **12**.
5. Execute **ULRB_START 0** to set **Common Parameter - UL RMC – Starting RB** to **0**.
6. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC–1 – UL RMC – Number of RB** to **0**.
7. Execute **ULRB_START_SCC1 0** to set **Common Parameter – SCC–1 UL RMC – Starting RB** to **0**.
8. Execute **SWP** to measure Modulation Analysis.
9. Execute **EVM? AVG** (or **EVM? AVG,PCC**) to read the EVM measurement result.
10. Execute **EVMPASS?** (or **EVMPASS? PCC**) to check that the EVM Pass/Fail judgment is Pass.
11. Execute **RSEVM? AVG** (or **RSEVM? AVG,PCC**) to read the Reference Signal EVM measurement result.
12. Execute **RSEVMPASS?** (or **RSEVMPASS? PCC**) to check that the Reference Signal EVM Pass/Fail judgment is Pass.
13. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/PartialRB)**.
14. Execute steps 4 to 12.

[(QPSK, FullRB) measurements]

15. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to**TX1 – Max. Power (QPSK/FullRB)**.
16. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **0**.
17. Execute **ULRB_START_SCC1 0** to set **Common Parameter – SCC-1 UL RMC – Starting RB** to **0**.
18. Execute **SWP** to measure Modulation Analysis.
19. Execute **EVM? AVG** (or **EVM? AVG,PCC**) to read the EVM measurement result.
20. Execute **EVMPASS?** (or **EVMPASS? PCC**) to check that the EVM Pass/Fail judgment is Pass.
21. Execute **RSEVM? AVG** (or **RSEVM? AVG,PCC**) to read the Reference Signal EVM measurement result.
22. Execute **RSEVMPASS?** (or **RSEVMPASS? PCC**) to check that the Reference Signal EVM Pass/Fail judgment is Pass.
23. Execute **TESTPRM TX_M40DBM_Q_F** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/FullRB)**.
24. Execute steps 16 to 22.

[(16QAM, PartialRB) measurements]

25. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to**TX1 – Max. Power (16QAM/PartialRB)**.
26. Execute steps 4 to 12.
27. Execute **TESTPRM TX_M40DBM_16_P** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm (16QAM/PartialRB)**.
28. Execute steps 4 to 12.

[(16QAM, FullRB) measurements]

29. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to**TX1 – Max. Power (16QAM/FullRB)**.
30. Execute steps 16 to 22.
31. Execute **TESTPRM TX_M40DBM_16_F** to set **Test Parameter** to **TX1 – EVM @ –40 dBm (16QAM/FullRB)**.
32. Execute steps 16 to 22.

NOTE 1: The input Level may vary depending on the Carrier Frequency f under TX1 – EVM/IBE/LEAK @ –40dBm (16QAM/FullRB) condition.

f ≤ 3.0GHz	***: –36.8 dBm ± 3.2dB***
3.0GHz < f ≤ 4.2GHz	***: –36.5 dBm ± 3.5dB***

3.3.2.13. Carrier leakage for CA (intra-band contiguous DL CA and UL CA) (6.5.2A.2-1)

3.3.2.13.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.13.2. MT8821C

This subsection describes an example of intra–band measurement.

Example: PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 12, Modulation = QPSK
PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_18@0 and S_0@0, respectively

For Intra-band measurement, Carrier Leakage Frequency Parameter must be set properly before the start of the measurement sequence. For more information, see Annex B.2.

[Carrier Leakage Frequency Setting]

1. Execute **IBEM_CLFR CFR** to set **Carrier Leakage Frequency** to **at Carrier Frequency Center**.

[Measurements]

2. Execute **MOD_AVG 20** to set **the average count of Modulation Analysis** to **20 times**.
3. Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ 0 dBm**.
4. Execute **ULRMC_RB_PCC 18** to set **Common Parameter – PCC – UL RMC – Number of RB** to **18**.
(For other Configuration ID setting, set UL RMC – Number of RB and Starting RB according to TS36.521–1 Table 6.5.2A.2.1.4.1–1.)
5. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter - SCC–1 – UL RMC – Number of RB** to **0**.
6. Execute **SWP** to measure the Modulation Analysis.
7. Execute **CARRLEAK? MAX** (or **CARRLEAK? MAX,PCC**) to read the Carrier Leakage measurement result.
8. Execute **CARRLEAKPASS?** (or **CARRLEAKPASS? PCC**) to check that the Carrier Leakage Pass/Fail judgment is Pass.
9. Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ –30 dBm**.
10. Execute steps 4 to 8.
11. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to**TX1 – EVM/IBE/LEAK @ –40 dBm (QPSK/PartialRB)**.
12. Execute steps 4 to 8.

NOTE 1: The input level varies depending on the Carrier Frequency f under the TX1–IBE/LEAK @ 0dBm condition.

f ≤ 3.0 GHz: 3.2 dBm ±3.2 dB
3.0 GHz < f ≤ 4.2 GHz: 3.5 dBm ±3.5 dB

NOTE 2: The input level varies depending on the Carrier Frequency f under TX1–IBE/LEAK @ –30dBm condition.

f ≤ 3.0 GHz: –26.8 dBm ±3.2 dB
3.0 GHz < f ≤ 4.2 GHz: –26.5 dBm ± 3.5 dB

NOTE 3: The input level varies depending on the Carrier Frequency f under the TX1–EVM/IBE/LEAK @ –40dBm condition.

f ≤ 3.0 GHz: –36.8 dBm ±3.2dB
3.0GHz < f ≤ 4.2 GHz: –36.5 dBm ±3.5dB

3.3.2.14. In-band emissions for non allocated RB for CA (intra-band contiguous DL CA and UL CA) (6.5.2A.3-1)

3.3.2.14.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.14.2. MT8821C

This subsection describes an example of intra–band measurement.

Example: PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 12, Modulation = QPSK
PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_12@0 and S_0@0, respectively

For Intra–band measurement, the Carrier Leakage Frequency Parameter must be set properly set before the start of measurement sequence. For more information, see Annex B.2.

[Carrier Leakage Frequency Setting]

1. Execute **IBEM_CLFR CFR** to set **Carrier Leakage Frequency** to **at Carrier Frequency Center**.

[Pass/Fail evaluation limits value setting]

2. Execute **MOD_AVG 20** to set the **average count of Modulation Analysis** to **20 times**.
3. Execute **TP_INBANDE_GEN_A -29.2** (or **TP_INBANDE_GEN_A -29.2, PCC**) to set General Pass/Fail judgment of **TX1 - IBE/LEAK @ 0/–30/–40 dBm** for PCC.
4. Execute **TP_INBANDE_GEN_B -24.2** (or **TP_INBANDE_GEN_B -24.2, PCC**) to set General Pass/Fail judgment of **TX1 - IBE/LEAK @ 0/–30/–40 dBm** for PCC.
5. Execute **TP_INBANDE_GEN_C -2.2** (or **TP_INBANDE_GEN_C -2.2, PCC**) to set General Pass/Fail judgment of **TX1 - IBE/LEAK @ 0/–30/–40 dBm** for PCC.
6. Execute **TP_INBANDE_GEN_D -56.2** (or **TP_INBANDE_GEN_D -56.2, PCC**) to set General Pass/Fail judgment of **TX1 - IBE/LEAK @ 0/–30/–40 dBm** for PCC.
7. Execute **TP_INBANDE_IMG –24.2** (or **TP_INBANDE_IMG –24.2, PCC**) to set General Pass/Fail judgment of **TX1 - IBE/LEAK @ 0/–30/–40 dBm** for PCC.
8. Execute **TP_INBANDE_LEAK_0DBM –24.2** (or **TP_INBANDE_LEAK_0DBM –24.2, PCC**) to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ 0 dBm** for PCC.
9. Execute **TP_INBANDE_LEAK_M30DBM –19.2** (or **TP_INBANDE_LEAK_M30DBM –19.2, PCC**) to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ –30 dBm** for PCC.
10. Execute **TP_INBANDE_LEAK_M40DBM –9.2** (or **TP_INBANDE_LEAK_M40DBM –9.2, PCC**) to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ –40 dBm** for PCC.
11. Execute **TP_INBANDE_GEN_A -29.2, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ 0/–30/–40 dBm** for SCC–1.
12. Execute **TP_INBANDE_GEN_B -24.2, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ 0/–30/–40 dBm** for SCC–1.
13. Execute **TP_INBANDE_GEN_C -2.2, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ 0/–30/–40 dBm** for SCC–1.
14. Execute **TP_INBANDE_GEN_D -57.0, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ 0/–30/–40 dBm** for SCC–1.
15. Execute **TP_INBANDE_IMG –24.2, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ 0/–30/–40 dBm** for SCC–1.
16. Execute **TP_INBANDE_LEAK_0DBM –24.2, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ 0 dBm** for SCC–1.
17. Execute **TP_INBANDE_LEAK_M30DBM –19.2, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ –30 dBm** for SCC–1.
18. Execute **TP_INBANDE_LEAK_M40DBM –9.2, SCC1** to set General Pass/Fail judgment of **TX1 – IBE/LEAK @ –40 dBm** for SCC–1.

[Measurements for test configuration of first example]

19. Execute **TESTPRM TX_0DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ 0 dBm**.
20. Execute **ULRMC_RB 12** to set **Common Parameter – UL RMC – Number of RB** to **12**.
(For other Configuration ID setting, set Common Parameter – UL RMC – Number of RB and Starting RB according to TS36.521–1 Table 6.5.2A.3.1.4.1–1.)
21. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC - Number of RB** to **0**.
22. Execute **SWP** to measure the Modulation Analysis.
23. Execute **INBANDE_GEN? MAX** (or **INBANDE_GEN? MAX, PCC**) to read the In–band Emissions (General) measurement result of PCC (allocated component carrier).
24. Execute **INBANDE_IMG? MAX** (or **INBANDE_IMG? MAX, PCC**) to read the In–band Emissions (IQ Image)

measurement result of PCC (allocated component carrier).

25. Execute **INBANDE_LEAK? MAX** (or **INBANDE_LEAK? MAX, PCC**) to read the In–band Emissions (Carrier Leakage) measurement result of PCC (allocated component carrier).
26. Execute **INBANDEPASS?** (or **INBANDEPASS? PCC**) to check that the In–band Emissions Pass/Fail judgment of PCC (allocated component carrier) is Pass.
27. Execute **INBANDE_GEN? MAX, SCC1** to read the In–band Emissions (General) measurement result of SCC-1 (not allocated component carrier).
28. Execute **INBANDE_IMG? MAX, SCC1** to read the In–band Emissions (IQ Image) measurement result of SCC-1 (not allocated component carrier).
29. Execute **INBANDE_LEAK? MAX, SCC1** to read the In–band Emissions (Carrier Leakage) measurement result of SCC-1 (not allocated component carrier).
30. Execute **INBANDEPASS? SCC1** to check that the In–band Emissions Pass/Fail judgment of SCC-1 (not allocated component carrier) is Pass.
31. Execute **TESTPRM TX_M30DBM** to set **Test Parameter** to **TX1 – IBE/LEAK @ –30 dBm**.
32. Execute steps 20 to 30.
33. Execute **TESTPRM TX_M40DBM_Q_P** to set **Test Parameter** to **TX1 – EVM/IBE/LEAK @ –40 dBm** (QPSK/PartialRB).
34. Execute steps 20 to 30.

3.3.2.15. Occupied bandwidth for CA (intra-band contiguous DL CA and UL CA) (6.6.1A.1)

3.3.2.15.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.15.2. MT8821C

This subsection describes an example of intra–band measurement.

[Measurements]

1. Execute **OBW_AVG 20** to set **the average count for Occupied Bandwidth** to **20 times**.
2. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB)**.
3. Execute **SWP** to measure the Occupied Bandwidth (OBW).
4. Execute **OBW?** to read the OBW measurement result.
5. Execute **OBWPASS?** to check that the OBW Pass/Fail judgment is Pass.

3.3.2.16. Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA) (6.6.2.1A.1)

3.3.2.16.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.16.2. MT8821C

This subsection describes examples of inter-band measurement.

First Example:	$BW_{Channel\_CA}$ is 39.8 MHz, PCC N_{RB} = 100, SCC N_{RB} = 100, N_{RB_alloc} = 200, Modulation = QPSK, PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_100@0 and S_100@0, respectively
Second Example:	$BW_{Channel\_CA}$ is 39.8 MHz, PCC N_{RB} = 100, SCC N_{RB} = 100, N_{RB_alloc} = 18, Modulation = QPSK, PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_18@0 and S_0@0, respectively
Third Example:	$BW_{Channel\_CA}$ is 29.9 MHz, PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 150, Modulation = 16QAM, PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_100@0 and S_50@0, respectively
Fourth Example:	$BW_{Channel\_CA}$ is 29.9 MHz, PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 12, Modulation = 16QAM, PCC and SCC RB allocations (L_{CRB}@RB_{start}) are P_12@0 and S_0@0, respectively

[Pass/Fail evaluation limits value setting for $BW_{Channel\_CA}$ 39.8 MHz]

1. Execute **SEM_AVG 20** to set the **average count of Spectrum Emission Mask** to **20 times**.
2. Execute **TP_SEM_CONTCC_1 -22.5** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 0 – 1 MHz**.
3. Execute **TP_SEM_CONTCC _2 -8.5** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 1 – 5 MHz**.
4. Execute **TP_SEM_CONTCC _3 -11.5** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 5 – 39.8 MHz**.
5. Execute **TP_SEM_CONTCC _4 -23.5** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 39.8 – 44.8 MHz**.

[(QPSK, FullRB) Measurements for $BW_{Channel\_CA}$ 39.8 MHz]

6. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB)**.
7. Execute **ULRMC_RB 100** to set **Common Parameter - UL RMC – Number of RB** to **100**.
8. Execute **ULRMC_RB_SCC1 100** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **100**.
   (For other Configuration ID setting, Set Common Parameter – PCC/SCC-1 -– UL RMC-Number of RB and Starting RB according to TS36.521–1 Table 6.6.2.1A.1.4.1–1.)
9. Execute **SWP** to measure Spectrum Emission Mask.
10. Execute **TTL_WORST_SEM_LV?** to check the spectrum worst value level.
11. Execute **SEMPASS?** to check that the SEM Pass/Fail judgment is Pass.

[(QPSK, PartialRB) Measurements for $BW_{Channel\_CA}$ 39.8 MHz]

12. Execute **TESTPRM TX_MAXPWR_Q_P** to set **Test Parameter** to **TX1 – Max. Power (QPSK/PartialRB)**.
13. Execute **ULRMC_RB 18** to set **Common Parameter – UL RMC – Number of RB** to **18**.
14. Execute **ULRB_START 0** to set **Common Parameter – UL RMC – Starting RB** to **0**.
15. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC - Number of RB** to **0**.
    (For other Configuration ID setting, Set Common Parameter - PCC/SCC-1 – UL RMC-Number of RB and Starting RB according to TS36.521–1 Table 6.6.2.1A.1.4.1–1.)
16. Execute steps 9 to 11.

[Pass/Fail evaluation limits value setting for $BW_{Channel\_CA}$ 29.9 MHz]

1. Execute **SEM_AVG 20** to set the **average count of Spectrum Emission Mask** to **20 times**.
2. Execute **TP_SEM_CONTCC_1 -21.0** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 0 - 1 MHz**.
3. Execute **TP_SEM_CONTCC _2 -8.5** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 1 - 5 MHz**.
4. Execute **TP_SEM_CONTCC _3 -11.5** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 5 – 24.95 MHz**.
5. Execute **TP_SEM_CONTCC _4 -23.5** to set the Pass/Fail judgment for **Spectrum Emission Mask Frequency Range 24.95 – 34.9 MHz**.

[(16QAM, FullRB) Measurements for $BW_{Channel\_CA}$ 29.9 MHz]

6. Execute **TESTPRM TX_MAXPWR_16_F** to set **Test Parameter** to **TX1 – Max. Power (16QAM/FullRB)**.
7. Execute **ULRMC_RB 100** to set **Common Parameter – UL RMC – Number of RB** to **100**.
8. Execute **ULRMC_RB_SCC1 100** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **100**.
   (For other Configuration ID setting, Set Common Parameter – PCC/SCC–1 – UL RMC-Number of RB and Starting RB according to TS36.521–1 Table 6.6.2.1A.1.4.1–1.)
9. Execute steps 9 to 11.

[(16QAM, PartialRB) Measurements for $BW_{Channel\_CA}$ 29.9MHz]

1. Execute **TESTPRM TX_MAXPWR_16_P** to set **Test Parameter** to **TX1 – Max. Power (16QAM/PartialRB)**.
2. Execute **ULRMC_RB 12** to set **Common Parameter – UL RMC – Number of RB** to **12**.
3. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC–1 – UL RMC – Number of RB** to **0**.
   (For other Configuration ID setting, set Common Parameter - PCC/SCC–1 UL RMC-Number of RB and Starting RB according to TS36.521–1 Table 6.6.2.1A.1.4.1–1.)
4. Execute steps 9 to 11.

3.3.2.17. Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA) (6.6.2.2A.1)

Refer to Chapter **3.3.2.3**.

3.3.2.18. Adjacent Channel Leakage power Ratio for CA (intra-band contiguous DL CA and UL CA) (6.6.2.3A.1)

3.3.2.18.1. MT8820C

This measurement item is not supported by MT8820C.
Refer to Chapter 1.2.

3.3.2.18.2. MT8821C

This subsection describes an example of intra–band measurement.

[Measurements]

1. Execute **ACLR_AVG 20** to set **the average count for Adjacent Channel Leakage Ratio** to **20 times**.
2. Execute **TESTPRM TX_MAXPWR_Q_F** to set **Test Parameter** to **TX1 – Max. Power (QPSK/FullRB)**.
3. Execute **SWP** to measure the Adjacent Channel Power.
4. Execute **TTL_MODPWR?** to read the ACLR measurement result.
5. Execute **MODPWRPASS?** to check that the ACLR Pass/Fail judgment is Pass.

3.3.3. TX Measurements for Intra-band Non-Contiguous CA

3.3.3.1. UE Maximum Output Power for CA (intra-band non-contiguous DL CA and UL CA) (6.2.2A.3)

This measurement item is not yet supported by MT8820C and MT8821C.
Refer to chapter 1.2.

3.3.3.2. Maximum Power Reduction (MPR) for CA (intra-band contiguous DL CA and UL CA) (6.2.3A.3)

Measurement procedure is the same with inter-band CA measurement.
Refer to chapter 3.3.1.2

3.3.3.3. Additional Maximum Power Reduction (A-MPR) for CA (intra-band non-contiguous DL CA and UL CA) (6.2.4A.3)

This measurement item is not yet supported by MT8820C and MT8821C.
Refer to chapter 1.2.

3.3.3.4. Configured UE transmitted Output Power for CA (intra-band non-contiguous DL CA and UL CA) (6.2.5A.3)

Measurement procedure is the same with inter-band CA measurement.
Refer to chapter 3.3.1.4

3.3.3.5. UE Transmit OFF Power for CA (intra-band non-contiguous DL CA and UL CA) (6.3.3A.3)

Refer to chapter 3.3.3.6.

3.3.3.6. General ON/OFF Time Mask for CA (intra-band non-contiguous DL CA and UL CA) (6.3.4A.1.3)

Measurement procedure is the same with inter-band CA measurement.
Refer to chapter 3.3.1.7.

3.3.3.7. Frequency error for CA (intra-band non-contiguous DL CA and UL CA) (6.5.1A.3)

Measurement procedure is the same with inter-band CA measurement.
Refer to chapter 3.3.1.11.

3.3.3.8. Occupied bandwidth for CA (intra-band non-contiguous DL CA and UL CA) (6.6.1A.3)

This measurement item is not yet supported by MT8820C and MT8821C.
Refer to chapter 1.2.

3.3.3.9. Spectrum emission mask for CA (intra-band non-contiguous DL CA and UL CA) (6.6.2.1A.3)

This measurement item is not yet supported by MT8820C and MT8821C.
Refer to chapter 1.2.

3.4. RX Measurements for CA

The following test procedures are different between the MT8820C and MT8821C.
This chapter explains each test procedure for the MT8820C and MT8821C.

3.4.1. Reference sensitivity level for CA (intra-band contiguous DL CA and UL CA) (7.3A.1)

3.4.1.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
2. **[PCC]** Execute **ULRB_START 0** to set **UL RMC – Starting RB** to **0**.
3. **[PCC]** Execute **DLIMCS1_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **5**.
4. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
5. **[PCC]** Execute **DLIMCS3_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **5**.

<When TDD CA>

6. **[PCC]** Execute **DLIMCS4_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 4** to **5**.
7. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
8. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
9. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
10. **[PCC]** Execute **SWP** to measure the Throughput.
11. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

> ***NOTE: Since* Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4 *depends on the Channel Bandwidth, set the value in TS36.521-1 Table A.3.2-1 or A.3.2-2.***

3.4.1.2. MT8821C

1. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error**.
2. Execute **MOD_MEAS OFF** to set **Modulation Analysis Measurement** to **OFF**.
3. Execute **ULRB_START 0** to set **Common Parameter – UL RMC - Starting RB** to **0**.
4. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
5. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
6. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
7. Execute **SWP** to measure the Throughput.
8. Execute **TPUT? PER** to read the Throughput measurement result (%)
9. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

> ***NOTE: Since PCC/SCC1 UL RMC - Number of RB depends on the Operation Band, set the value in TS36.521–1 Table 7.3A.1.4.1–1 and 7.3A.1.3–1.***

3.4.2. Reference sensitivity level for CA (intra-band contiguous DL CA without UL CA) (7.3A.2)

Refer to Chapter 3.4.1.

> ***NOTE: Since PCC/SCC1 UL RMC – Number of RB depends on the Operation Band, set the value in TS36.521–1 Table 7.3A.2.4.1–1.***

3.4.3. Reference sensitivity level for CA (inter-band DL CA without UL CA) (7.3A.3)

This measurement can be performed using the same procedure as in Chapter 3.4.1 by substituting the following steps.

10. Execute **DLCHAN 6075,300** to set **Common Parameter – UL and DL Channel for PCC** to **24075** and **6075**, and switch PCC and SCC Channel.
    (This example is for Band1 and 19.)
11. Execute steps 1 to 7.

NOTE 1: Since PCC/SCC1 UL RMC – Number of RB depends on the Operation Band, set the value in TS36.521–1 Table 7.3A.2.4.1–1.

NOTE 2: When the test case is 7.3A.3, perform step 6 to locate UL RMC – Number of RB as close as possible to the DL as described in TS36.521–1 Table 7.3A.3.5–2 NOTE 4.

NOTE 3: When the test case is 7.3A.3, perform step 6 to locate UL RMC – Number of RB as close as possible to the SCC DL as described in TS36.521–1 Table 7.3A.3.5–2 NOTE 1. When Band Combination is 4A–17A, execute the following as described in TS36.521–1 Table 7.3A.3.5–2 NOTE 3.

•For Channel Bandwidth 5 MHz: ULRB_START 9
•For Channel Bandwidth 10 MHz: ULRB_START 17

3.4.4. Reference sensitivity level for CA (intra-band non-contiguous DL CA without UL CA) (7.3A.4)

Refer to chapter 3.4.1.

NOTE 1: Since PCC/SCC1 UL RMC – Number of RB depends on the Operation Band, set the value in TS36.521–1 Table 7.3A.4.4.1–1.

NOTE 2: When the test case is 7.3A.4, perform step 6 to locate UL RMC - Number of RB as close as possible to the DL as described in TS36.521–1 Table 7.3A.4.5–2 NOTE 4.

3.4.5. Maximum input level for CA (intra-band contiguous DL CA and UL CA) (7.4A.1)

This chapter describes a measurement example for intra-band measurement.

Example: PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 50,
PCC and SCC DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S_50@0, respectively.
PCC and SCC UL allocations (L_{CRB}@RB_{start}) are P_50@0 and S_0@0, respectively.

3.4.5.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. **[SCC-1]** Execute **ULRMC_RB 0** to **set Common Parameter – UL RMC – Number of RB** to **0**.
3. **[SCC-1]** Execute **OLVL_SCC1 -28.7** to set **Common Parameter – Output Level(Total)** to **–28.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. **[PCC]** Execute **DLIMCS1_SCC1 27** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **27**.
5. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
6. **[PCC]** Execute **DLIMCS3_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **26**.
7. **[PCC]** Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
8. **[PCC]** Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
9. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision – Target CC** to **PCC+SCC**.
10. **[PCC]** Execute **SWP** to measure the Throughput.
11. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
12. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE:** Since* **Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4** ***depends on the Channel Bandwidth, set the value in TS36.521-1 Table A.3.2-3 or A.3.2-4.

3.4.5.2. MT8821C

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **0**.
3. Execute **OLVL_SCC1 -28.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–28.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
5. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
6. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
7. Execute **SWP** to measure the Throughput.
8. Execute **TPUT? PER** to read the Throughput measurement result (%).
9. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.1.4.1–1 and Table 7.3A.1.3–1.

NOTE 2: The output power for each CC depends on Transmission Bandwidth and the Carrier Frequency f as described in TS36.521–1.

Power in largest transmission bandwidth CC
$f \leq 3.0$ GHz: –25.7 dBm
3.0 GHz < $f \leq 4.2$ GHz: –26.0 dBm
Power in each other CC
$f \leq 3.0$ GHz: –25.7 + 10Log($N_{RB,c}$/$N_{RBlargestBW}$) dBm
3.0 GHz < $f \leq 4.2$ GHz: –26.0 + 10Log($N_{RB,c}$/$N_{RBlargestBW}$) dBm

3.4.6. Maximum input level for CA (intra-band contiguous DL CA and UL CA) for 256QAM in DL (7.4A.1_H) (MT8821C Only)

The test condition is same as chapter 3.4.5.

1. Execute **DLRMC_256QAM** to set **DL RMC – 256QAM** to **Enabled**.
2. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
3. Execute **ULRMC_RB_SCC1 0** to set **Common Parameter – SCC-1 – UL RMC – Number of RB** to **0**.
4. Execute **OLVL -27.7** to set **Common Parameter - Output Level** to **-27.7dBm** (-27.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
5. Execute **OLVL_SCC1 -30.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–30.7 dBm** (-27.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
6. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
7. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
8. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
9. Execute **SWP** to measure the Throughput.
10. Execute **TPUT? PER** to read the Throughput measurement result (%).
11. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.1_H.4.1-1.

NOTE 2: The output power for each CC depends on Transmission Bandwidth and the Carrier Frequency f as described in TS36.521–1.

Power in largest transmission bandwidth CC
f ≤ 3.0 GHz: –27.7 dBm
3.0 GHz < f ≤ 4.2 GHz: –28.0 dBm
Power in each other CC
f ≤ 3.0 GHz: –27.7 + 10Log($N_{RB,c}$/$N_{RBlargestBW}$) dBm
3.0 GHz < f ≤ 4.2 GHz: –28.0 + 10Log($N_{RB,c}$/$N_{RBlargestBW}$) dBm

3.4.7. Maximum input level for CA (intra-band contiguous DL CA without UL CA) (7.4A.2)

Refer to Chapter 3.4.5 except for step 2.

NOTE 1: Since UL RMC – Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value for each CC according to TS36.521–1 Table 7.4A.2.4.1–1 and Table 7.3A.1.3–1.

NOTE 2: The output power for each CC depends on the Transmission Bandwidth and the Carrier Frequency f as described in TS36.521–1.

Power in largest transmission bandwidth CC
$f \le 3.0$ GHz: –25.7 dBm
3.0 GHz < $f \le 4.2$ GHz: –26.0 dBm
Power in each other CC
$f \le 3.0$ GHz: $-25.7 + 10Log(N_{RB,c}/N_{RBlargestBW})$ dBm
3.0 GHz < $f \le 4.2$ GHz: $-26.0 + 10Log(N_{RB,c}/N_{RBlargestBW})$ dBm

3.4.8. Maximum input level for CA (intra-band contiguous DL CA without UL CA) for 256QAM in DL(7.4A.2_H) (MT8821C Only)

This chapter describes the measurement examples for CA Bandwidth Calss C.
The test condition is same as chapter 3.4.5.

1. Execute **DLRMC_256QAM** to set **DL RMC – 256QAM** to **Enabled**.
2. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
3. Execute **OLVL -27.7** to set **Common Parameter - Output Level** to **-27.7dBm** (-27.7+ $10Log(N_{RB,c}/N_{RBlargestBW})$).
4. Execute **OLVL_SCC1 -30.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–30.7 dBm** (-25.7+ $10Log(N_{RB,c}/N_{RBlargestBW})$).
5. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUT? PER** to read the Throughput measurement result (%).
10. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.2_H.4.1-1.

NOTE 2: The output power for each CC depends on Transmission Bandwidth and the Carrier Frequency f as described in TS36.521–1.

Power in largest transmission bandwidth CC (B, C)
$f \le 3.0$ GHz: -30.7dBm, -27.7 dBm
3.0 GHz < $f \le 4.2$ GHz:-31.0dBm, -28.0 dBm
Power in each other CC (B, C)
$f \le 3.0$ GHz: -30.7, $-27.7 + 10Log(N_{RB,c}/N_{RBlargestBW})$ dBm
3.0 GHz < $f \le 4.2$ GHz: -31.0, $-28.0 + 10Log(N_{RB,c}/N_{RBlargestBW})$ dBm

3.4.9. Maximum input level for CA (inter-band DL CA without UL CA) (7.4A.3)

This chapter describes the measurement examples for intra-band measurement.

Example: PCC DL Channel = 300 (Band1), SCC DL Channel is 6075
PCC N_{RB} = 100, SCC N_{RB} = 50, N_{RB_alloc} = 50,
PCC and SCC DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S_50@0, respectively.
PCC and SCC UL allocations (L_{CRB}@RB_{start}) are P_100@0 and S_0@0, respectively.

This measurement can be performed using the same procedure as in Chapter 3.4.7, by substituting the following steps.

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
3. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
4. Execute **TPUT_EARLY_TARCC SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **SCC**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.
7. Execute **DLCHAN 6075,300** to set **UL and DL Channel for PCC** to **24075** and **6075**, and switch the PCC and SCC Channel.
8. Execute steps 5 to 6.

3.4.10. Maximum input level for CA (inter-band DL CA without UL CA) for 256QAM in DL (7.4A.3_H) (MT8821C Only)

The test condition is same as chapter 3.4.9.

1. Execute **DLRMC_256QAM** to set **DL RMC – 256QAM** to **Enabled**.
2. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
3. Execute **OLVL -27.7** to set **Common Parameter - Output Level** to **-27.7dBm**.
4. Execute **OLVL_SCC1 -27.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–27.7 dBm**.
5. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.
10. Execute **DLCHAN 6075,300** to set **UL and DL Channel for PCC** to **24075** and **6075**, and switch the PCC and SCC Channel.
11. Execute steps 8 to 9.

NOTE 1: The output power for each CC depends on the Carrier Frequency f as described in TS36.521–1.

Power in Transmission Bandwidth Configuration
$f \leq 3.0$ GHz: -27.7 dBm
3.0 GHz < $f \leq 4.2$ GHz:--28.0 dBm

3.4.11. Maximum input level for CA (intra-band non-contiguous DL CA without UL CA) (7.4A.4)

The test condition is same as chapter3.4.5.

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
3. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
4. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUT? PER** to read the Throughput measurement result (%).
7. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.4.4.1–1.

NOTE 2: The output power for each CC depends on the Carrier Frequency f as described in TS36.521–1.

Power in Transmission Bandwidth Configuration for each CC
f ≤ 3.0 GHz: –25.7 dBm
3.0 GHz < f ≤ 4.2 GHz: –26.0 dBm

3.4.12. Maximum input level for CA (intra-band non-contiguous DL CA without UL CA) for 256QAM in DL (7.4A.4_H) (MT8821C Only)

The test condition is same as chapter3.4.5.

1. Execute **DLRMC_256QAM** to set **DL RMC – 256QAM** to **Enabled**.
2. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
3. Execute **OLVL -27.7** to set **Common Parameter - Output Level** to **-27.7dBm**.
4. Execute **OLVL_SCC1 -27.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–27.7 dBm**.
5. Execute **TPUT_SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUT? PER** to read the Throughput measurement result (%).
10. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.4_H.4.1-1.

NOTE 2: The output power for each CC depends on the Carrier Frequency f as described in TS36.521–1.

Power in Transmission Bandwidth Configuration for each CC
f ≤ 3.0 GHz: -27.7 dBm
3.0 GHz < f ≤ 4.2 GHz:--28.0 dBm

3.4.13. Spurious emissions for CA (7.9A)

To perform Rx spurious emission tests, an external spectrum analyzer is required.
The following is an example where PCC N_{RB} and SCC1 N_{RB} is set to 50.

3.4.13.1. MT8820C

1. Connect the MT8820C, spectrum analyzer and UE.
2. **[PCC/SCC]** Execute **CALLDROP OFF** to set **Call Processing Parameter - Call Drop function** to **OFF**.
3. **[PCC]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Channel Bandwidth** to **10 MHz**.
4. **[SCC-1]** Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Channel Bandwidth** to**10 MHz**.
5. **[PCC]** Execute **ULRMC_RB 0** to set **Common Parameter - UL RMC - Number of RB** to **0**.
6. **[PCC]** Execute **DLRMC_RB 50** to set **Common Parameter - DL RMC - Number of RB** to **50**.
7. **[SCC-1]** Execute **DLRMC_RB 50** to set **Common Parameter - DL RMC - Number of RB** to **50**.
8. Measure the Rx spurious emissions using the spectrum analyzer.
9. Check that maximum level at each frequency bandwidth does not exceed the limits specified in the test standards.

NOTE 1: Refer to 3GPP TS36.508 Annex A, Figure A.8 for the connection between the MT8820C, spectrum analyzer and UE.

3.4.13.2. MT8821C

10. Connect the MT8821C, spectrum analyzer and UE.
11. Execute **CALLDROP OFF** to set **Call Processing Parameter - Call Drop function** to **OFF**.
12. Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Channel Bandwidth** to **10 MHz**.
13. Execute **BANDWIDTH_SCC1 10MHZ** to set **Common Parameter - SCC-1 - Channel Bandwidth** to**10 MHz**.
14. Execute **ULRMC_RB 0** to set **Common Parameter - UL RMC - Number of RB** to **0**.
15. Execute **DLRMC_RB 50** to set **Common Parameter - DL RMC - Number of RB** to **50**.
16. Execute **DLRMC_RB_SCC1 50** to set **Common Parameter - SCC-1 - DL RMC - Number of RB** to **50**.
17. Measure the Rx spurious emissions using the spectrum analyzer.
18. Check that maximum level at each frequency bandwidth does not exceed the limits specified in the test standard.

NOTE 1: Refer to 3GPP TS36.508 Annex A, Figure A.8 for the connection between the MT8821C, spectrum analyzer and UE.

3.5. RX Measurements for 3DL CA

3.5.1. Throughput Measurement Example

3.5.1.1. MT8820C

1. Synchronize the frame timing between 3 cells (→2.3.2)
2. Perform Initial Condition setting. (→2.3.3)
3. Perform UE Location registration. (→2.3.4)
4. Connect to Test Mode.(→2.3.5)
5. **[PCC]** Execute **TPUT_MEAS ON** to set **Throughput Measurement** to **On**.
6. **[PCC]** Execute **SWP** to measure the power.
7. **[PCC]** Execute **TPUT? PCC** to confirm the PCC Throughput measurement result.
8. **[PCC]** Execute **TPUT? SCC1** to confirm the SCC1 Throughput measurement result.
9. **[PCC]** Execute **TPUT? SCC2** to confirm the SCC2 Throughput measurement result.
10. **[PCC]** Execute **TPUT_BLERCNTNACK? PCC** to confirm the PCC Error Count (NACK).
11. **[PCC]** Execute **TPUT_BLERCNTNACK? SCC1** to confirm the SCC1 Error Count (NACK).
12. **[PCC]** Execute **TPUT_BLERCNTNACK? SCC2** to confirm the SCC2 Error Count (NACK).
13. **[PCC]** Execute **TPUT_BLERCNTDTX? PCC** to confirm the PCC Error Count (DTX).
14. **[PCC]** Execute **TPUT_BLERCNTDTX? SCC1** to confirm the SCC1 Error Count (DTX).
15. **[PCC]** Execute **TPUT_BLERCNTDTX? SCC2** to confirm the SCC2 Error Count (DTX).

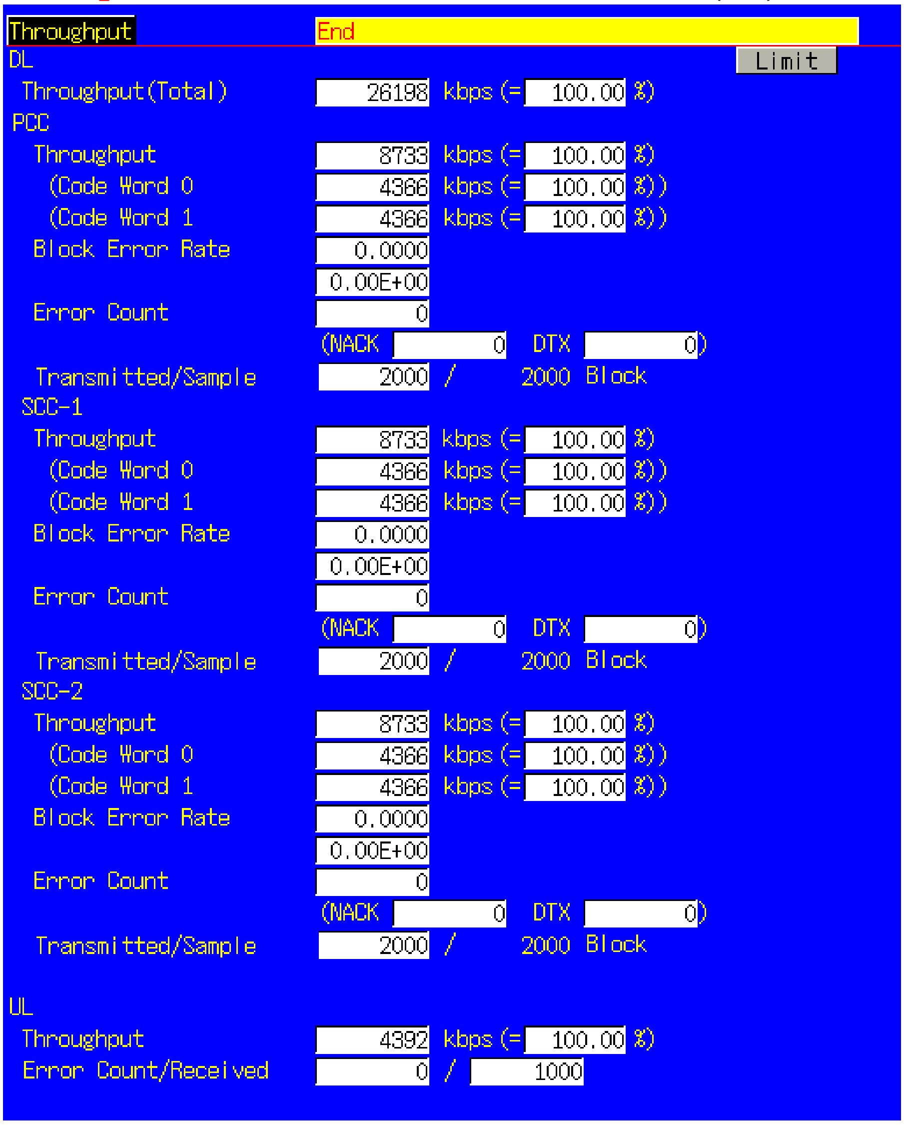


Figure 3.5.1-1 ***Example of FDD DL CA 3CCs Throughput Measurement Result (MT8820C)***

3.5.1.2. MT8821C

1. Perform Initial Condition setting. (→2.3.3)
2. Perform UE Location registration. (→2.3.4)
3. Connect to Test Mode.(→2.3.5)
4. Execute **TPUT_MEAS ON** to set **Throughput Measurement** to **On**.
5. Execute **SWP** to measure the power.
6. Execute **TPUT? PCC** to confirm the PCC Throughput measurement result.
7. Execute **TPUT? SCC1** to confirm the SCC1 Throughput measurement result.
8. Execute **TPUT? SCC2** to confirm the SCC2 Throughput measurement result.
9. Execute **TPUT_BLERCNTNACK? PCC** to confirm the PCC Error Count (NACK).
10. Execute **TPUT_BLERCNTNACK? SCC1** to confirm the SCC1 Error Count (NACK).
11. Execute **TPUT_BLERCNTNACK? SCC2** to confirm the SCC2 Error Count (NACK).
12. Execute **TPUT_BLERCNTDTX? PCC** to confirm the PCC Error Count (DTX).
13. Execute **TPUT_BLERCNTDTX? SCC1** to confirm the SCC1 Error Count (DTX).
14. Execute **TPUT_BLERCNTDTX? SCC2** to confirm the SCC2 Error Count (DTX).

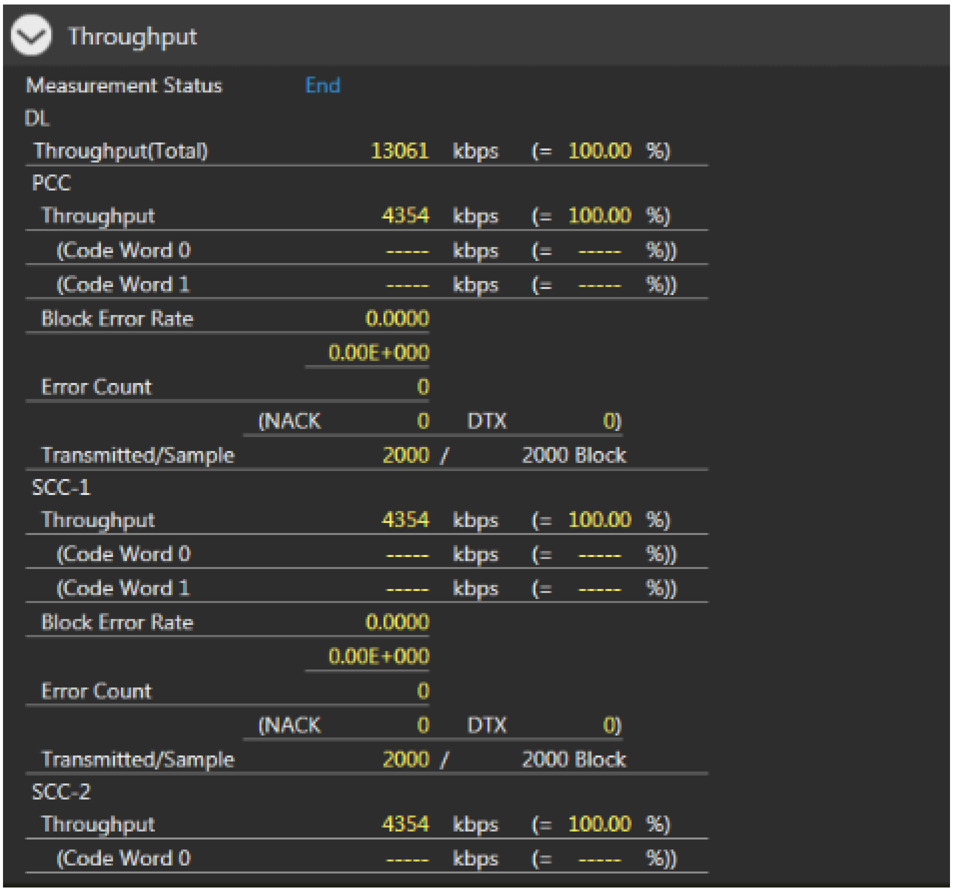


Figure 3.5.1-2 ***Example of FDD DL CA 3CCs Throughput Measurement Result (MT8821C)***

3.5.2. Reference sensitivity level for CA (3DL with Intra-band contiguous CA) (7.3A.5)

This chapter describes a measurement example for 3DL with intra-band contiguous CA measurement.

Example: PCC DL Channel = 39705 (Band41), SCC1 DL Channel = 39849 (Band41),
SCC2 DL Channel = 40020 (Band41)
Lowest N_{RB_agg},
PCC N_{RB} = 100, SCC1 N_{RB} = 100, SCC2 N_{RB} = 75,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S1_100@0 and S2_75@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_50@0.

3.5.2.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
2. **[PCC]** Execute **DLIMCS1_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **5**.
3. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
4. **[PCC]** Execute **DLIMCS3_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **5**.
5. **[PCC]** Execute **DLIMCS4_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 4** to **5**.
6. **[PCC]** Execute **DLIMCS1_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **5**.
7. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
8. **[PCC]** Execute **DLIMCS3_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **5**.
9. **[PCC]** Execute **DLIMCS4_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 4** to **5**.
10. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
11. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
12. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
13. **[PCC]** Execute **SWP** to measure the Throughput.
14. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
15. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-1 or A.3.2-2 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.2.2. MT8821C

1. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error**.
2. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
3. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
4. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUT? PER** to read the Throughput measurement result (%)
7. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the Operation Band, please set the Number of RB/Starting RB value for each CC according to TS36.521-1 Table 7.3A.5.4.1-1 and Table 7.3.5-2.
NOTE 2: Set the output power for each CC according to TS36.521-1 Table 7.3A.5.5-1.

3.5.3. Reference sensitivity level for CA (3DL with Inter-band CA) (7.3A.5)

This chapter describes a measurement example for 3DL with inter-band CA measurement.

Example: PCC DL Channel = 300 (Band1), SCC1 DL Channel = 1850 (Band3),
SCC2 DL Channel = 6100 (Band19)
PCC N_{RB} = 100, SCC1 N_{RB} = 100, SCC2 N_{RB} = 50,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S1_100@0 and S2_50@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_45@0.

3.5.3.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
2. **[PCC]** Execute **DLIMCS1_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **5**.
3. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
4. **[PCC]** Execute **DLIMCS3_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **5**.
5. **[PCC]** Execute **DLIMCS1_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **5**.
6. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
7. **[PCC]** Execute **DLIMCS3_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **5**.
8. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
9. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
10. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
11. **[PCC]** Execute **SWP** to measure the Throughput.
12. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
13. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-1 or A.3.2-2 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.3.2. MT8821C

1. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error**.
2. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
3. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
4. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUT? PER** to read the Throughput measurement result (%)
7. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the Operation Band, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.3A.5.4.1-2 and Table 7.3.5-2.
NOTE 2: Set the output power for each CC according to TS36.521-1 Table 7.3A.5.5-3.

3.5.4. Reference sensitivity level for CA (3DL with Intra-band contiguous + Inter-band CA) (7.3A.5)

This chapter describes a measurement example for 3DL with intra-band contiguous and inter-band CA measurement.

Example: PCC DL Channel = 1300 (Band3), SCC1 DL Channel = 1498 (Band3),
SCC2 DL Channel = 3100 (Band7)
Highest N_{RB_agg},
PCC N_{RB} = 100, SCC1 N_{RB} = 100, SCC2 N_{RB} = 100,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S1_100@0 and S2_100@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_100@0.

3.5.4.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
2. **[PCC]** Execute **DLIMCS1_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **5**.
3. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
4. **[PCC]** Execute **DLIMCS3_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **5**.
5. **[PCC]** Execute **DLIMCS1_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **5**.
6. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
7. **[PCC]** Execute **DLIMCS3_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **5**.
8. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
9. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
10. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
11. **[PCC]** Execute **SWP** to measure the Throughput.
12. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
13. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-1 or A.3.2-2 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.4.2. MT8821C

1. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error**.
2. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
3. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
4. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUT? PER** to read the Throughput measurement result (%)
7. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the Operation Band, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.3A.5.4.1-3 and Table 7.3.5-2.
NOTE 2: Set the output power for each CC according to TS36.521-1 Table 7.3A.5.5-5.

3.5.5. Reference sensitivity level for CA (3DL with Intra-band non- contiguous + Inter-band CA) (7.3A.5)

This chapter describes a measurement example for 3DL with intra-band non-contiguous and inter-band CA measurement.

Example: PCC DL Channel = 2525 (Band5), SCC1 DL Channel = 1100 (Band2),
SCC2 DL Channel = 700 (Band2)
PCC N_{RB} = 50, SCC1 N_{RB} = 100, SCC2 N_{RB} = 100,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_50@0 and S1_100@0 and S2_100@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_25@0.

3.5.5.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
2. **[PCC]** Execute **OLVL -95.0** to set **Common Parameter – Output Level(Total)** to **–95.0 dBm**.
3. **[PCC]** Execute **DLIMCS1_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **5**.
4. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
5. **[PCC]** Execute **DLIMCS3_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **5**.
6. **[PCC]** Execute **DLIMCS1_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **5**.
7. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
8. **[PCC]** Execute **DLIMCS3_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **5**.
9. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
10. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
11. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
12. **[PCC]** Execute **SWP** to measure the Throughput.
13. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
14. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-1 or A.3.2-2 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.5.2. MT8821C

1. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error**.
2. Execute **OLVL -95.0** to set **Common Parameter – Output Level(Total)** to **–95.0 dBm**.
3. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
4. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
5. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
6. Execute **SWP** to measure the Throughput.
7. Execute **TPUT? PER** to read the Throughput measurement result (%)
8. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the Operation Band, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.3A.5.4.1-4 and Table 7.3.5-2.
NOTE 2: Set the output power for each CC according to TS36.521-1 Table 7.3A.5.5-6.

3.5.6. Reference sensitivity level for CA (3DL with Intra-band non- contiguous + Intra-band CA) (7.3A.5)

This chapter describes a measurement example for 3DL with intra-band non-contiguous and intra-band CA measurement.

Example: PCC DL Channel = 41490 (Band41), SCC1 DL Channel = 41292 (Band41),
SCC2 DL Channel = 39750 (Band41)
PCC N_{RB} = 100, SCC1 N_{RB} = 100, SCC2 N_{RB} = 100,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S1_100@0 and S2_100@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_100@0.

3.5.6.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
2. **[PCC]** Execute **OLVL -95.0** to set **Common Parameter – Output Level(Total)** to **–95.0 dBm**.
3. **[PCC]** Execute **DLIMCS1_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **5**.
4. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
5. **[PCC]** Execute **DLIMCS3_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **5**.
6. **[PCC]** Execute **DLIMCS4_SCC1 5** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 4** to **5**.
7. **[PCC]** Execute **DLIMCS1_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **5**.
8. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
9. **[PCC]** Execute **DLIMCS3_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **5**.
10. **[PCC]** Execute **DLIMCS4_SCC2 5** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 4** to **5**.
11. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
12. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
13. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
14. **[PCC]** Execute **SWP** to measure the Throughput.
15. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
16. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-1 or A.3.2-2 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.6.2. MT8821C

1. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX – Ref. Sens./Freq. Error**.
2. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
3. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
4. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
5. Execute **SWP** to measure the Throughput.
6. Execute **TPUT? PER** to read the Throughput measurement result (%)
7. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the Operation Band, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.3A.5.4.1-5 and Table 7.3.5-2.
NOTE 2: Set the output power for each CC according to TS36.521-1 Table 7.3A.5.5-7.

3.5.7. Maximum input level for CA (3DL with Intra-band contiguous CA) (7.4A.5)

This chapter describes a measurement example for 3DL with intra-band contiguous CA measurement.

Example: PCC DL Channel = 40451 (Band41), SCC1 DL Channel = 40595 (Band41),
SCC2 DL Channel = 40766 (Band41)
Lowest N_{RB_agg},
PCC N_{RB} = 50, SCC1 N_{RB} = 100, SCC2 N_{RB} = 75,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_50@0 and S1_100@0 and S2_75@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_50@0.

3.5.7.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. **[PCC]** Execute **OLVL -28.7** to set **Common Parameter – Output Level(Total)** to **–28.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
3. **[SCC-1]** Execute **OLVL_SCC1 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. **[SCC-2]** Execute **OLVL_SCC2 -26.9** to set **Common Parameter – Output Level(Total)** to **–26.9 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
5. **[PCC]** Execute **DLIMCS1_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **26**.
6. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
7. **[PCC]** Execute **DLIMCS3_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **26**.
8. **[PCC]** Execute **DLIMCS4_SCC1 27** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 4** to **27**.
9. **[PCC]** Execute **DLIMCS1_SCC2 27** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **27**.
10. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
11. **[PCC]** Execute **DLIMCS3_SCC2 26** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **26**.
12. **[PCC]** Execute **DLIMCS4_SCC2 27** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 4** to **27**.
13. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
14. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
15. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
16. **[PCC]** Execute **SWP** to measure the Throughput.
17. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
18. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-3 or A.3.2-4 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.7.2. MT8821C

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **OLVL -28.7** to set **Common Parameter – Output Level(Total)** to **–28.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
3. Execute **OLVL_SCC1 -25.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. Execute **OLVL_SCC2 -26.9** to set **Common Parameter – SCC-2 – Output Level(Total)** to **–26.9 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
5. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUT? PER** to read the Throughput measurement result (%)
10. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.5.4.1-1 and Table 7.3.5-2.
NOTE 2: The output power for each CC depends on Transmission Bandwidth, the Carrier Frequency f and CA Bandwidth Class as described in TS36.521-1 Table 7.4A.5.5-1 and Table 7.4A.5.5-2.

3.5.8. Maximum input level for CA (3DL with Inter-band CA) (7.4A.5)

This chapter describes a measurement example for 3DL with inter-band CA measurement.

Example: PCC DL Channel = 300 (Band1), SCC1 DL Channel = 1575 (Band3),
SCC2 DL Channel = 6075 (Band19)
Highest N_{RB_agg},
PCC N_{RB} = 100, SCC1 N_{RB} = 100, SCC2 N_{RB} = 75,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S1_100@0 and S2_75@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_75@0.

3.5.8.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. **[PCC]** Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
3. **[SCC-1]** Execute **OLVL_SCC1 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
4. **[SCC-2]** Execute **OLVL_SCC2 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
5. **[PCC]** Execute **DLIMCS1_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **26**.
6. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
7. **[PCC]** Execute **DLIMCS3_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **26**.
8. **[PCC]** Execute **DLIMCS1_SCC2 27** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **27**.
9. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
10. **[PCC]** Execute **DLIMCS3_SCC2 26** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **26**.
11. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
12. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
13. **[PCC]** Execute **TPUT_EARLY_TARCC SCC** to set **Target CC** to **SCC**.
14. **[PCC]** Execute **SWP** to measure the Throughput.
15. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
16. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-3 or A.3.2-4 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.8.2. MT8821C

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
3. Execute **OLVL_SCC1 -25.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–25.7 dBm**.
4. Execute **OLVL_SCC2 -25.7** to set **Common Parameter – SCC-2 – Output Level(Total)** to **–25.7 dBm**.
5. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUT? PER** to read the Throughput measurement result (%)
10. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.5.4.1-2 and Table 7.3.5-2.
NOTE 2: The output power for each CC depends on Transmission Bandwidth, the Carrier Frequency f and CA Bandwidth Class as described in TS36.521-1 Table 7.4A.5.5-1 and Table 7.4A.5.5-2.

3.5.9. Maximum input level for CA (3DL with Intra-band contiguous + Inter-band CA) (7.4A.5)

This chapter describes a measurement example for 3DL with intra-band contiguous and inter-band CA measurement.

Example: PCC DL Channel = 1476 (Band3), SCC1 DL Channel = 1764 (Band3),
SCC2 DL Channel = 3100 (Band7)
Highest N_{RB_agg},
PCC N_{RB} = 100, SCC1 N_{RB} = 100, SCC2 N_{RB} = 100,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S1_100@0 and S2_100@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_100@0.

3.5.9.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. **[PCC]** Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
3. **[SCC-1]** Execute **OLVL_SCC1 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. **[SCC-2]** Execute **OLVL_SCC2 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
5. **[PCC]** Execute **DLIMCS1_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **26**.
6. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
7. **[PCC]** Execute **DLIMCS3_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **26**.
8. **[PCC]** Execute **DLIMCS1_SCC2 26** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **26**.
9. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
10. **[PCC]** Execute **DLIMCS3_SCC2 26** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **26**.
11. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
12. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
13. **[PCC]** Execute **TPUT_EARLY_TARCC SCC** to set **Target CC** to **SCC**.
14. **[PCC]** Execute **SWP** to measure the Throughput.
15. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
16. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-3 or A.3.2-4 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.9.2. MT8821C

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
3. Execute **OLVL_SCC1 -25.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. Execute **OLVL_SCC2 -25.7** to set **Common Parameter – SCC-2 – Output Level(Total)** to **–25.7 dBm**.
5. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUT? PER** to read the Throughput measurement result (%)
10. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.5.4.1-3 and Table 7.3.5-2.
NOTE 2: The output power for each CC depends on Transmission Bandwidth, the Carrier Frequency f and CA Bandwidth Class as described in TS36.521-1 Table 7.4A.5.5-1 and Table 7.4A.5.5-2.

3.5.10. Maximum input level for CA (3DL with Intra-band non- contiguous + Inter-band CA) (7.4A.5)

This chapter describes a measurement example for 3DL with intra-band non-contiguous and inter band CA measurement.

Example: PCC DL Channel = 1175 (Band2), SCC1 DL Channel = 625 (Band2),
SCC2 DL Channel = 2525 (Band5)
PCC N_{RB} = 25, SCC1 N_{RB} = 25, SCC2 N_{RB} = 25,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_25@0 and S1_25@0 and S2_25@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_25@0.

3.5.10.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. **[PCC]** Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
3. **[SCC-1]** Execute **OLVL_SCC1 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
4. **[SCC-2]** Execute **OLVL_SCC2 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
5. **[PCC]** Execute **DLIMCS1_SCC1 25** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **25**.
6. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
7. **[PCC]** Execute **DLIMCS3_SCC1 23** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **23**.
8. **[PCC]** Execute **DLIMCS1_SCC2 25** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **25**.
9. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
10. **[PCC]** Execute **DLIMCS3_SCC2 23** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **23**.
11. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
12. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
13. **[PCC]** Execute **TPUT_EARLY_TARCC SCC** to set **Target CC** to **SCC**.

14. **[PCC]** Execute **SWP** to measure the Throughput.
15. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
16. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-3 or A.3.2-4 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.10.2. MT8821C

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
3. Execute **OLVL_SCC1 -25.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–25.7 dBm**.
4. Execute **OLVL_SCC2 -25.7** to set **Common Parameter – SCC-2 – Output Level(Total)** to **–25.7 dBm**.
5. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUT? PER** to read the Throughput measurement result (%)
10. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.5.4.1-4 and Table 7.3.5-2.
NOTE 2: The output power for each CC depends on Transmission Bandwidth, the Carrier Frequency f and CA Bandwidth Class as described in TS36.521-1 Table 7.4A.5.5-1 and Table 7.4A.5.5-2.

3.5.11. Maximum input level for CA (3DL with Intra-band non- contiguous + Intra-band CA) (7.4A.5)

This chapter describes a measurement example for 3DL with intra-band non-contiguous and inter band CA measurement.

Example: PCC DL Channel = 41490 (Band41), SCC1 DL Channel = 41292 (Band41),
SCC2 DL Channel = 39750 (Band41)
PCC N_{RB} = 100, SCC1 N_{RB} = 100, SCC2 N_{RB} = 100,
PCC and SCC1 and SCC2 DL allocations (L_{CRB}@RB_{start}) are P_100@0 and S1_100@0 and S2_100@0, respectively.
PCC UL allocations (L_{CRB}@RB_{start}) are P_100@0.

3.5.11.1. MT8820C

1. **[PCC/SCC]** Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. **[PCC]** Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
3. **[SCC-1]** Execute **OLVL_SCC1 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. **[SCC-2]** Execute **OLVL_SCC2 -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm**.
5. **[PCC]** Execute **DLIMCS1_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 1** to **26**.
6. **[PCC]** Execute **DLIMCS2_SCC1 -1** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 2** to **N/A**.
7. **[PCC]** Execute **DLIMCS3_SCC1 26** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 3** to **26**.
8. **[PCC]** Execute **DLIMCS4_SCC1 27** to set **Call Processing Parameter - Carrier aggregation SCC-1 - DL RMC - MCS Index 4** to **27**.
9. **[PCC]** Execute **DLIMCS1_SCC2 26** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 1** to **26**.
10. **[PCC]** Execute **DLIMCS2_SCC2 -1** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 2** to **N/A**.
11. **[PCC]** Execute **DLIMCS3_SCC2 26** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 3** to **26**.
12. **[PCC]** Execute **DLIMCS4_SCC2 27** to set **Call Processing Parameter - Carrier aggregation SCC-2 - DL RMC - MCS Index 4** to **27**.
13. **[PCC]** Execute **TPUT SAMPLE 10000** to set **the Throughput measurement sample count** to **10000**.
14. **[PCC]** Execute **TPUT_EARLY ON** to set **Early Decision** to **On**.
15. **[PCC]** Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Target CC** to **PCC+SCC**.
16. **[PCC]** Execute **SWP** to measure the Throughput.
17. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
18. **[PCC]** Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE: Since the following parameters depend on the Channel Bandwidth, please set the values according to Table A.3.2-3 or A.3.2-4 in TS36.521-1.
However, set DL RMC - MCS Index 4 only for TDD Bands.
Carrier aggregation SCC-1 - DL RMC - MCS Index 1 to 4
Carrier aggregation SCC-2 - DL RMC - MCS Index 1 to 4

3.5.11.2. MT8821C

1. Execute **TESTPRM RX_MAX** to set **Test Parameter** to **RX – Max. Input Level**.
2. Execute **OLVL -25.7** to set **Common Parameter – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
3. Execute **OLVL_SCC1 -25.7** to set **Common Parameter – SCC-1 – Output Level(Total)** to **–25.7 dBm** (-25.7+ 10Log($N_{RB,c}$/$N_{RBlargestBW}$)).
4. Execute **OLVL_SCC2 -25.7** to set **Common Parameter – SCC-2 – Output Level(Total)** to **–25.7 dBm**.
5. Execute **TPUT SAMPLE 10000** to set **Rx Measurement Parameter – Throughput – Number of Sample** to **10000**.
6. Execute **TPUT_EARLY ON** to set **Rx Measurement Parameter – Throughput – Early Decision** to **On**.
7. Execute **TPUT_EARLY_TARCC PCC_SCC** to set **Rx Measurement Parameter – Throughput – Early Decision - Target CC** to **PCC+SCC**.
8. Execute **SWP** to measure the Throughput.
9. Execute **TPUT? PER** to read the Throughput measurement result (%)
10. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.

NOTE 1: Since UL RMC - Number of RB/Starting RB depends on the CA Configuration, set the Number of RB/Starting RB value foreach CC according to TS36.521-1 Table 7.4A.5.4.1-5 and Table 7.3.5-2.
NOTE 2: The output power for each CC depends on Transmission Bandwidth and the Carrier Frequency f and CA Bandwidth Class as described in TS36.521-1 Table 7.4A.5.5-1 and Table 7.4A.5.5-2.

RX Measurements for 4DL CA

This feature is supported only by the MT8821C.

3.5.12. Throughput Measurement Example

1. Perform Initial Condition setting. (→2.4.2)
2. Perform UE Location registration. (→2.4.3)
3. Connect to Test Mode. (→2.4.4)
4. Execute **TPUT_MEAS ON** to set **Throughput Measurement** to **On**.
5. Execute **SWP** to measure the power.
6. Execute **TPUT? PCC** to confirm the PCC Throughput measurement result.
7. Execute **TPUT? SCC1** to confirm the SCC1 Throughput measurement result.
8. Execute **TPUT? SCC2** to confirm the SCC2 Throughput measurement result.
9. Execute **TPUT? SCC3** to confirm the SCC3 Throughput measurement result.
10. Execute **TPUT_BLERCNTNACK? PCC** to confirm the PCC Error Count (NACK).
11. Execute **TPUT_BLERCNTNACK? SCC1** to confirm the SCC1 Error Count (NACK).
12. Execute **TPUT_BLERCNTNACK? SCC2** to confirm the SCC2 Error Count (NACK).
13. Execute **TPUT_BLERCNTNACK? SCC3** to confirm the SCC3 Error Count (NACK).
14. Execute **TPUT_BLERCNTDTX? PCC** to confirm the PCC Error Count (DTX).
15. Execute **TPUT_BLERCNTDTX? SCC1** to confirm the SCC1 Error Count (DTX).
16. Execute **TPUT_BLERCNTDTX? SCC2** to confirm the SCC2 Error Count (DTX).
17. Execute **TPUT_BLERCNTDTX? SCC3** to confirm the SCC3 Error Count (DTX).

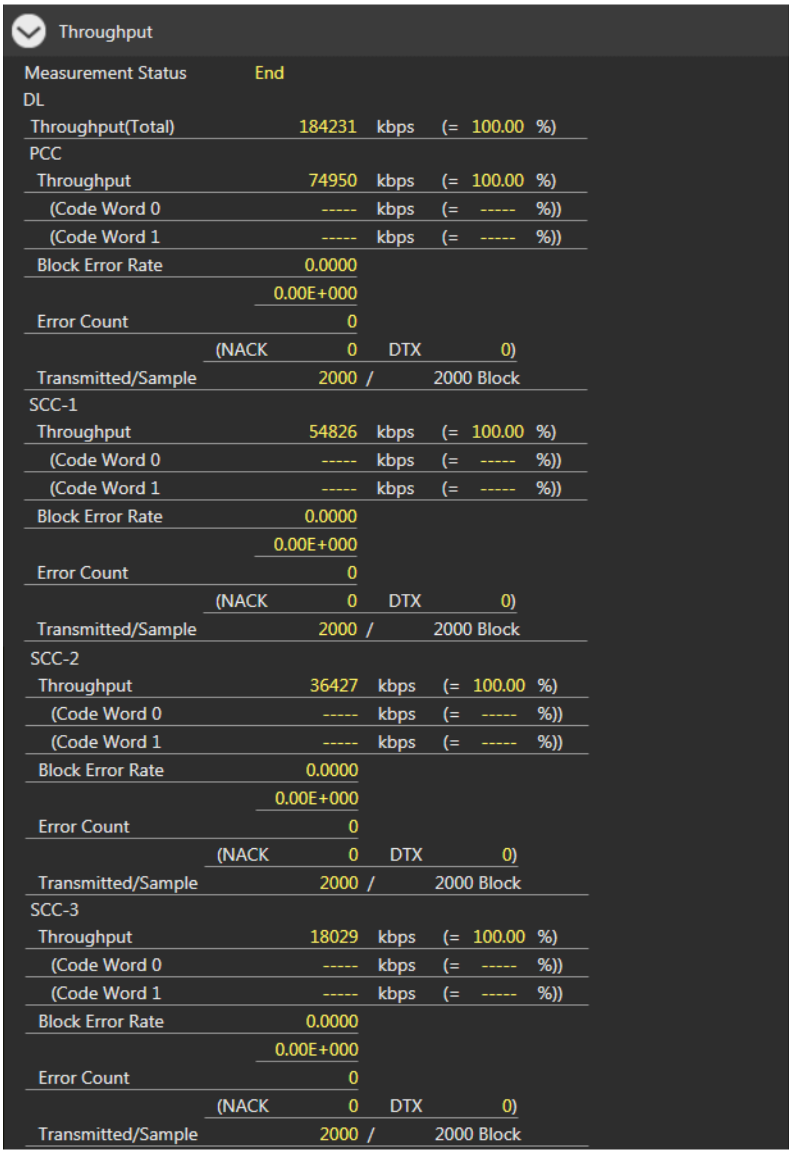


Figure 3.5.12-1 ***Example of FDD DL CA 4CCs Throughput Measurement Result (MT8821C)***

3.6. RX Measurements for 5DL CA

This feature is supported only by the MT8821C.

3.6.1. Throughput Measurement Example

1. Perform Initial Condition setting. (→2.5.2)
2. Perform UE Location registration. (→2.5.3)
3. Connect to Test Mode. (→2.5.4)
4. Execute **TPUT_MEAS ON** to set **Throughput Measurement** to **On**.
5. Execute **SWP** to measure the power.
6. Execute **TPUT? PCC** to confirm the PCC Throughput measurement result.
7. Execute **TPUT? SCC1** to confirm the SCC1 Throughput measurement result.
8. Execute **TPUT? SCC2** to confirm the SCC2 Throughput measurement result.
9. Execute **TPUT? SCC3** to confirm the SCC3 Throughput measurement result.
10. Execute **TPUT? SCC4** to confirm the SCC4 Throughput measurement result.
11. Execute **TPUT_BLERCNTNACK? PCC** to confirm the PCC Error Count (NACK).
12. Execute **TPUT_BLERCNTNACK? SCC1** to confirm the SCC1 Error Count (NACK).
13. Execute **TPUT_BLERCNTNACK? SCC2** to confirm the SCC2 Error Count (NACK).
14. Execute **TPUT_BLERCNTNACK? SCC3** to confirm the SCC3 Error Count (NACK).
15. Execute **TPUT_BLERCNTNACK? SCC4** to confirm the SCC4 Error Count (NACK).
16. Execute **TPUT_BLERCNTDTX? PCC** to confirm the PCC Error Count (DTX).
17. Execute **TPUT_BLERCNTDTX? SCC1** to confirm the SCC1 Error Count (DTX).
18. Execute **TPUT_BLERCNTDTX? SCC2** to confirm the SCC2 Error Count (DTX).
19. Execute **TPUT_BLERCNTDTX? SCC3** to confirm the SCC3 Error Count (DTX).
20. Execute **TPUT_BLERCNTDTX? SCC4** to confirm the SCC4 Error Count (DTX).

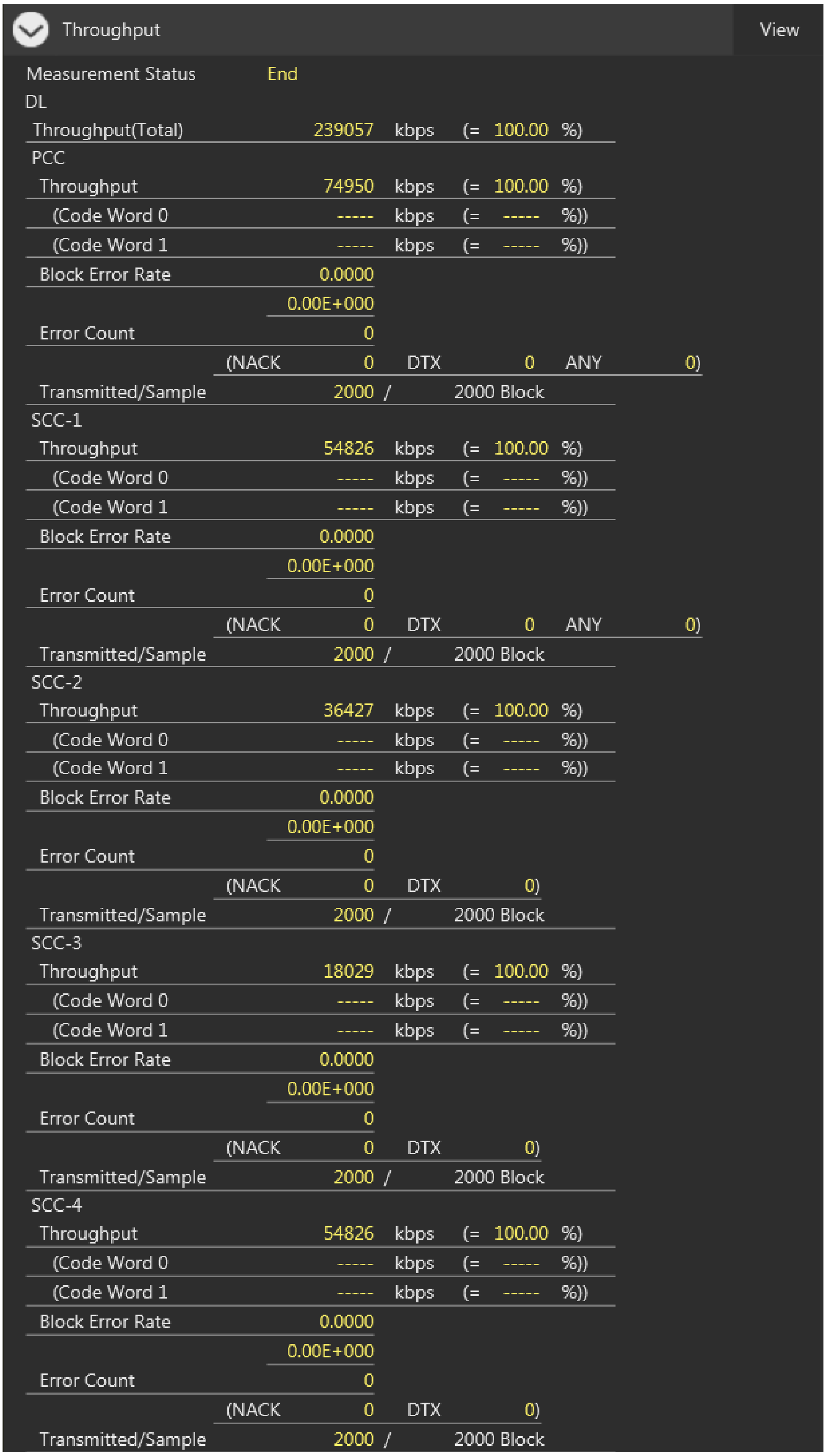


Figure 3.6.1-1 ***Example of FDD DL CA 5CCs Throughput Measurement Result (MT8821C)***

3.7. RX Measurements for MT8821C UL CA 2CCs

The MT8821C can measure the UL uplink throughput for the Total, PCC, and SCC–1 for UL CA,and display the measurement results on Phone1.

3.7.1. Restrictions

There are some restrictions as follows when SCC UL Throughput Measurement is enabled.

- Phone 2 cannot be used.
- SCC–1 UL Throughput and TX cannot be measured simultaneously.
  - Set all measurement items except throughput to OFF.

3.7.2. Required options

option	name	units	remarks
MT8821C−008	LTE Measurement Hardware	2	for SCC UL Throughput Measurement
MT8821C−012	Parallel Phone Measurement Hardware	1	for SCC UL Throughput Measurement
MT8821C−025	2nd RF for Phone1	1	for DL 2CA / UL 2CA
MT8821C−026	3rd RF for Phone1	1	for DL 3CA / UL 2CA
MT8821C−027	4th RF for Phone1		for DL 4CA / UL 2CA
MT8821C−028	2nd RF for Phone2	1	for DL 2CA MIMO / UL 2CA
MT8821C−029	3rd RF for Phone2	1	for DL 3CA MIMO / UL 2CA
MT8821C−030	4th RF for Phone2		for DL 4CA MIMO / UL 2CA
MX88211xC	LTE FDD or TDD Measurement Software	1	
MX88211xC−021	LTE−Advanced FDD or TDD DL CA Measurement Software	1	for DL 2CA
MX88211xC−022	LTE−Advanced FDD or TDD UL CA Measurement Software	1	for UL 2CA
MX88211xC−031	LTE−Advanced FDD or TDD DL 3CA Measurement Software	1	for DL 3CA
MX88211xC−041	LTE−Advanced FDD or TDD DL 4CA Measurement Software	1	for DL 4CA

3.7.3. Connection Diagram

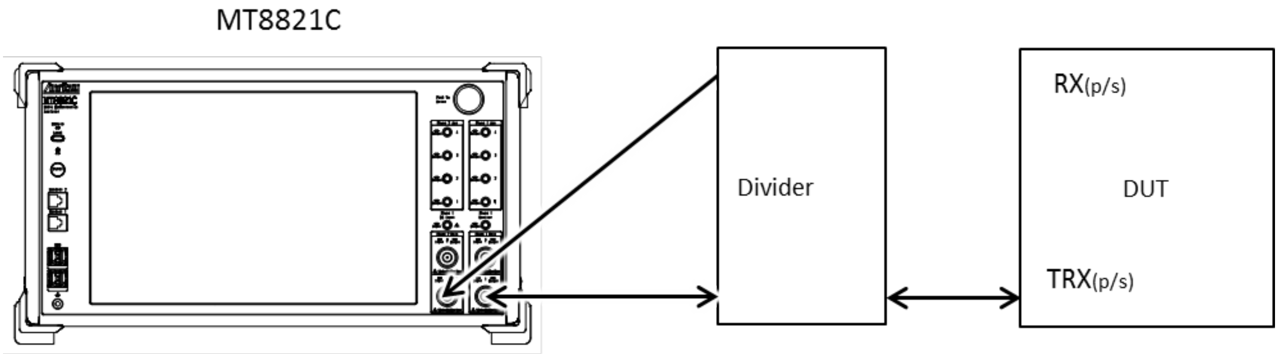


Figure 3.7.3-1 Connection Diagram of SCC UL Throughput (DL SISO)

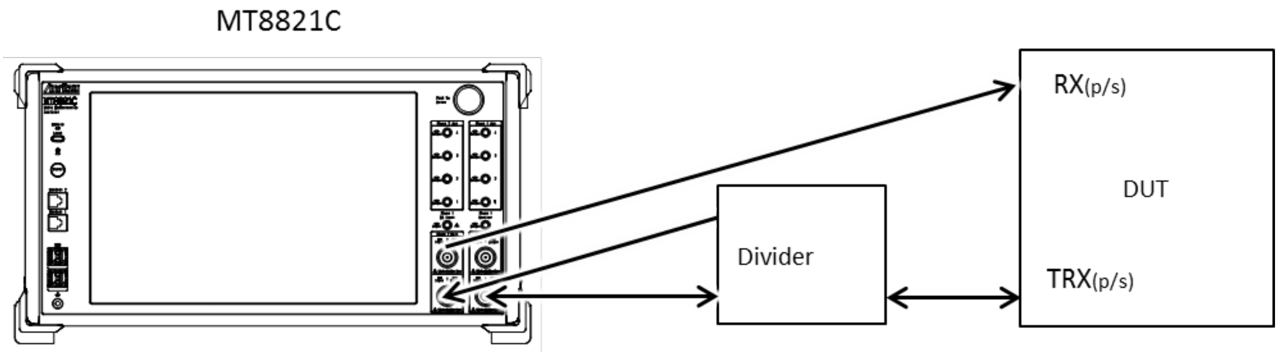


Figure 3.7.3-2 Connection Diagram of SCC UL Throughput (DL MIMO)

NOTE :

Input the PCC and SCC– 1 uplink signal to both of Phone1 and 2.

For DL MIMO, connect the input and output of Phone2 to different terminals.

3.7.4. UL Throughput Measurement

This chapter describes the procedure for this method.

Example: FDD DL 3CA MIMO / UL 2CA

3.7.4.1. Parameter settings

No.	Procedure	Remote Command
1.	Load LTE software at Phone1 and 2.	STDLOAD2 LTE
2.	Perform Preset Enter Sync at Phone 1. Refer to 3.1 Preset Enter Sync (v30.10).	PRESET SYNC
3.	Set to Main2 at Phone2 DL terminal so MT8821C receives SCC-1 uplink signal by Main1.	DLTPSEL_P2 2
4.	Set the following parameters.	-

Parameters			PCC	SCC-1	SCC-2	Remote Command
Common	General	Call Processing	On			CALLPROC ON
	Frequency	Frame Structure	FDD	FDD	FDD	FRAMETYPE FDD FRAMETYPE_SCC1 FDD FRAMETYPE_SCC2 FDD
		Operation Band	1	3	5	BAND 1 BAND_SCC2 3 BAND_SCC3 5
		UL Channel	18300	19575	20525	ULCHAN 18300,19575,20525
		DL Channel	300	1575	2525	DLCHAN 300,1575,2525
		Channel Bandwidth	20MHz	10MHz	10MHz	BANDWIDTH 20MHZ,10MHZ,20MHZ
	Level	External Loss NOTE1	On			EXTLOSSW ON
		Main UL	5dB NOTE2			ULEXTLOSS 5
		Main UL (Phone2)	5dB NOTE2			ULEXTLOSS_P2 5
		Main DL	5dB NOTE2			DLEXTLOSS 5
		Main DL (Phone2, 2nd Antenna)	5dB NOTE2			DLEXTLOSS_P2 5
	Signal	Channel Coding	RMC (DL/UL CA)			CHCODING RMC_DLUL_CA_PCC
		Antenna Configuration	2x2 MIMO (Open Loop)			ANTCONFIG OPEN_LOOP
Call Processing	Carrier Aggregation	Number of DL SCC	2			DLSCC 2
RX Measurement	Throughput	SCC UL Throughput Measurement Note3	On			UL_TPUT_SCC_MEAS ON
Fundamental Measurement	Measurement Item	Power Measurement	Off			PWR_MEAS OFF
		Power Template	Off			PWRTEMP_MEAS OFF
		Occupied Bandwidth	Off			OBW_MEAS OFF
		Spectrum Emission Mask	Off			SEM_MEAS OFF
		Adjacent Channel Power	Off			ACLR_MEAS OFF
		Modulation Analysis	Off			MOD_MEAS OFF
		Throughput	On			TPUT_MEAS ON
		CQI	Off			CQI_MEAS OFF

NOTE 1 :

When External Loss is set to Common, set to Common External Loss – Phone2.

NOTE 2 :

Set to the appropriate value for test environment.

NOTE 3 :

Set SCC UL Throughput Measurement later than Channel Coding. When SCC UL Throughput Measurement is set, the Frame timing for Phone1 synchronizes automatically with Phone2. (When PRESET SYNC is executed, it is already synchronized with the Phone1 and 2 Frame timing.)

3.7.4.2. Call Connection

No.	Call Connection Procedure	Remote Command
1.	Turn on UE power.	-
2.	Wait until position registration is completed. Call Processing Status = Idle (Regist)	CALLSTAT? (= 2)
3.	Connect in Test Mode. > Call Start	CALLSA
4.	Confirm call connected. Call Processing Status = Connected	CALLSTAT? (= 6)

3.7.4.3. Measurement

No.	Call Connection Procedure	Remote Command
1.	Perform measurement. > Single > Continuous	SNGLS SWP
2.	Wait until measurement completed. Measurement Status = End	SWP? (= 0)
3.	Open throughput result screen. Measurement tab > Numeric > Throughput	RLSTAREA MEASTAB,FMEAS,NUM,TPUT
4.	Confirm uplink error free throughput.	UL_TPUT? UL_TPUT? PCC UL_TPUT? SCC1

3.8. Test Parameters Supporting 3GPP Test Items

Table 3.8-1 to **Table 3.8-5** show the relationship between 3GPP TS36.521-1 defined test items and test parameters. Set test parameters matching each test item to test.

No. in **Table 3.8-1** to **Table 3.8-5** corresponds to No. in **Table 3.9-1** to **Table 3.9-6**.

Table 3.8-1: 3GPP Test Items and Test Parameters (1/5)

3GPP Test Item	No.	Test Parameter
6.2.2 UE Maximum Output Power	4	TX1 - Max. Power (QPSK/1RB)
	5	TX1 - Max. Power (QPSK/PartialRB)
6.2.2_1 Maximum Output Power for HPUE	4	TX1 - Max. Power (QPSK/1RB)
	5	TX1 - Max. Power (QPSK/PartialRB)
6.2.2A UE Maximum Output Power for CA	4	TX1 - Max. Power (QPSK/1RB)
	5	TX1 - Max. Power (QPSK/PartialRB)
6.2.3 Maximum Power Reduction (MPR)	6	TX1 - Max. Power (QPSK/FullRB)
	7	TX1 - Max. Power (16QAM/PartialRB)
	8	TX1 - Max. Power (16QAM/FullRB)
6.2.3_1 Maximum Power Reduction (MPR) for HPUE	6	TX1 - Max. Power (QPSK/FullRB)
	7	TX1 - Max. Power (16QAM/PartialRB)
	8	TX1 - Max. Power (16QAM/FullRB)
6.2.3A Maximum Power Reduction (MPR) for CA	6	TX1 - Max. Power (QPSK/FullRB)
	7	TX1 - Max. Power (16QAM/PartialRB)
	8	TX1 - Max. Power (16QAM/FullRB)
6.2.4 Additional Maximum Power Reduction (A-MPR)	6	TX1 - Max. Power (QPSK/FullRB)
6.2.4_1 Additional Maximum Power Reduction (A-MPR) for HPUE	6	TX1 - Max. Power (QPSK/FullRB)
6.2.4A Additional Maximum Power Reduction (A-MPR) for CA	6	TX1 - Max. Power (QPSK/FullRB)
6.2.5 Configured UE Transmitted Output Power	17	TX2 - Configured Power (Test Point 1)
	18	TX2 - Configured Power (Test Point 2)
	19	TX2 - Configured Power (Test Point 3)
6.2.5_1 Configured UE Transmitted Output Power for HPUE	17	TX2 - Configured Power (Test Point 1)
	18	TX2 - Configured Power (Test Point 2)
	19	TX2 - Configured Power (Test Point 3)
6.2.5A Configured UE Transmitted Output Power for CA	17	TX2 - Configured Power (Test Point 1)
	18	TX2 - Configured Power (Test Point 2)
	19	TX2 - Configured Power (Test Point 3)
6.3.2 Minimum Output Power	9	TX1 - Min. Power
6.3.2A.1 Minimum Output Power for CA (intra-band contiguous DL CA and UL CA)	9	TX1 - Min. Power
6.3.4.1 General ON/OFF time mask	16	TX2 - General Time Mask
6.3.4A.1 General ON/OFF Time Mask for CA	16	TX2 - General Time Mask
6.3.4.2.1 PRACH time mask	1	Idle/Call - PRACH Time Mask
6.3.4.2.2 SRS time mask	43	TX3 - SRS Time Mask

Table 3.8-2: 3GPP Test Items and Test Parameters (2/5)

3GPP Test Item	No.	Test Parameter
6.3.5.1 Power Control Absolute power tolerance	24	TX3 - Absolute Power (Test Point1)
	25	TX3 - Absolute Power (Test Point2)
6.3.5_1.1 Power Control Absolute power tolerance for HPUE	24	TX3 - Absolute Power (Test Point1)
	25	TX3 - Absolute Power (Test Point2)
6.3.5A.1.1 Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA)	24	TX3 - Absolute Power (Test Point1)
	25	TX3 - Absolute Power (Test Point2)
6.3.5.2 Power Control Relative power tolerance	32	TX3 - Relative Power (Ramping Up A)
	33	TX3 - Relative Power (Ramping Up B)
	34	TX3 - Relative Power (Ramping Up C)
	35	TX3 - Relative Power (Ramping Down A)
	36	TX3 - Relative Power (Ramping Down B)
	37	TX3 - Relative Power (Ramping Down C)
	38	TX3 - Relative Power (Alternating)
6.3.5_1.2 Power Control Relative Power Tolerance for HPUE	32	TX3 - Relative Power (Ramping Up A)
	33	TX3 - Relative Power (Ramping Up B)
	34	TX3 - Relative Power (Ramping Up C)
	35	TX3 - Relative Power (Ramping Down A)
	36	TX3 - Relative Power (Ramping Down B)
	37	TX3 - Relative Power (Ramping Down C)
	38	TX3 - Relative Power (Alternating)
6.3.5A.2.1 Power Control Relative Power Tolerance for CA (intra-band contiguous DL CA and UL CA)	32	TX3 - Relative Power (Ramping Up A)
	33	TX3 - Relative Power (Ramping Up B)
	34	TX3 - Relative Power (Ramping Up C)
	35	TX3 - Relative Power (Ramping Down A)
	36	TX3 - Relative Power (Ramping Down B)
	37	TX3 - Relative Power (Ramping Down C)
	38	TX3 - Relative Power (Alternating)
6.3.5.3 Aggregate power control tolerance	39	TX3 - Aggregate Power (PUSCH Sub-test)
	40	TX3 - Aggregate Power (PUCCH Sub-test)
6.3.5_1.3 Aggregate power control tolerance for HPUE	39	TX3 - Aggregate Power (PUSCH Sub-test)
	40	TX3 - Aggregate Power (PUCCH Sub-test)
6.3.5A.3.1 Aggregate power control tolerance (for CA (intra-band contiguous DL CA and UL CA)	39	TX3 - Aggregate Power (PUSCH Sub-test)
	40	TX3 - Aggregate Power (PUCCH Sub-test)

Table 3.8-3: 3GPP Test Items and Test Parameters (3/5)

3GPP Test Item		No.	Test Parameter
6.5.1 Frequency Error		44	RX - Ref. Sens./Freq.Error
6.5.1A Frequency Error for CA		44	RX - Ref. Sens./Freq.Error
6.5.2.1 Error Vector Magnitude (EVM) – PUSCH		5	TX1 - Max. Power (QPSK/PartialRB)
		6	TX1 - Max. Power (QPSK/FullRB)
		7	TX1 - Max. Power (16QAM/PartialRB)
		8	TX1 - Max. Power (16QAM/FullRB)
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
		13	TX1 - EVM @ -40 dBm (QPSK/Full RB)
		14	TX1 - EVM @ -40 dBm (16QAM/Partial RB)
		15	TX1 - EVM @ -40 dBm (16QAM/Full RB)
6.5.2.1 Error Vector Magnitude (EVM) – PUCCH		20	TX2 - PUCCH EVM @ Max.
		23	TX2 - PUCCH EVM/IBE @ -40 dBm
6.5.2.1 Error Vector Magnitude (EVM) – PRACH		2	Idle/Call - PRACH EVM (Test Point1)
		3	Idle/Call - PRACH EVM (Test Point2)
6.5.2.1A PUSCH-EVM with exclusion period		41	TX3 - EVM with Exclusion Period (QPSK)
		42	TX3 - EVM with Exclusion Period (16QAM)
6.5.2.2 Carrier leakage		10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
6.5.2.3 in-band emissions for Non-allocated RB - PUSCH	General	10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
	IQ Image	10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
	Carrier Leakage	10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
6.5.2.3 In-band emissions for Non-allocated RB - PUCCH	General	21	TX2 - PUCCH IBE @ 0 dBm
		22	TX2 - PUCCH IBE @ -30 dBm
		23	TX2 - PUCCH EVM/IBE @ -40 dBm
	IQ Image	21	TX2 - PUCCH IBE @ 0 dBm
		22	TX2 - PUCCH IBE @ -30 dBm
		23	TX2 - PUCCH EVM/IBE @ -40 dBm
	Carrier Leakage	21	TX2 - PUCCH IBE @ 0 dBm
		22	TX2 - PUCCH IBE @ -30 dBm
		23	TX2 - PUCCH EVM/IBE @ -40 dBm
6.5.2.4 EVM equalizer spectrum flatness		6	TX1 - Max. Power (QPSK/FullRB)

Table 3.8-4: 3GPP Test Items and Test Parameters (4/5)

3GPP Test Item		No.	Test Parameter
6.5.2A.1.1 Error Vector Magnitude (EVM) for CA (intra-band contiguous DL CA and UL CA)		5	TX1 - Max. Power (QPSK/PartialRB)
		6	TX1 - Max. Power (QPSK/FullRB)
		7	TX1 - Max. Power (16QAM/PartialRB)
		8	TX1 - Max. Power (16QAM/FullRB)
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
		13	TX1 - EVM @ -40 dBm (QPSK/Full RB)
		14	TX1 - EVM @ -40 dBm (16QAM/Partial RB)
		15	TX1 - EVM @ -40 dBm (16QAM/Full RB)
6.5.2A.2.1 Carrier leakage for CA (intra-band contiguous DL CA and UL CA)		10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
6.5.2A.3.1 In-band emissions for Non-allocated RB for CA (intra-band contiguous DL CA and UL CA)	General	10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
	IQ Image	10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
	Carrier Leakage	10	TX1 - IBE/LEAK @ 0 dBm
		11	TX1 - IBE/LEAK @ -30 dBm
		12	TX1 - EVM/IBE/LEAK @ -40 dBm (QPSK/PartialRB)
6.6.1 Occupied bandwidth		6	TX1 - Max. Power (QPSK/FullRB)
6.6.1A Occupied bandwidth for CA		6	TX1 - Max. Power (QPSK/FullRB)
6.6.2.1 Spectrum Emission Mask		5	TX1 - Max. Power (QPSK/PartialRB)
		6	TX1 - Max. Power (QPSK/FullRB)
		7	TX1 - Max. Power (16QAM/PartialRB)
		8	TX1 - Max. Power (16QAM/FullRB)
6.6.2.1A Spectrum Emission Mask for CA		5	TX1 - Max. Power (QPSK/PartialRB)
		6	TX1 - Max. Power (QPSK/FullRB)
		7	TX1 - Max. Power (16QAM/PartialRB)
		8	TX1 - Max. Power (16QAM/FullRB)
6.6.2.2 Additional Spectrum Emission Mask		6	TX1 - Max. Power (QPSK/FullRB)
6.6.2.2A.1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA)		6	TX1 - Max. Power (QPSK/FullRB)
6.6.2.3 Adjacent Channel Leakage power Ratio		5	TX1 - Max. Power (QPSK/PartialRB)
		6	TX1 - Max. Power (QPSK/FullRB)
		7	TX1 - Max. Power (16QAM/PartialRB)
		8	TX1 - Max. Power (16QAM/FullRB)

Table 3.8-5: 3GPP Test Items and Test Parameters (5/5)

3GPP Test Item	No.	Test Parameter
6.6.2.3_1 Adjacent Channel Leakage power Ratio for HPUE	5	TX1 - Max. Power (QPSK/PartialRB)
	6	TX1 - Max. Power (QPSK/FullRB)
	7	TX1 - Max. Power (16QAM/PartialRB)
	8	TX1 - Max. Power (16QAM/FullRB)
6.6.2.3A Adjacent Channel Leakage power Ratio for CA	5	TX1 - Max. Power (QPSK/PartialRB)
	6	TX1 - Max. Power (QPSK/FullRB)
	7	TX1 - Max. Power (16QAM/PartialRB)
	8	TX1 - Max. Power (16QAM/FullRB)
7.3 Reference sensitivity level	44	RX - Ref. Sens./Freq.Error
7.3A Reference sensitivity level for CA	44	RX - Ref. Sens./Freq.Error
7.4 Maximum input Level	45	RX - Max. Input Level
7.4A Maximum input level for CA	45	RX - Max. Input Level

3.9. Remote Commands List Limiting Pass/Fail Judgment

Remote commands limiting Pass/Fail judgment when selecting Test Parameter are shown in **Table 3.9-1** to **Table 3.9-6**
No. in **Table 3.8-1** to **Table 3.8-5** corresponds to No. in **Table 3.9-1** to **Table 3.9-6**

Remote Commands for UL CA Tx measurement are available in MT8821C only.

Table 3.9-1: Remote Commands List Limiting Pass/Fail Judgment (1/6)

3GPP Test Item	No.	Channel Bandwidth (MHz)	Remote Command
6.2.2 UE Maximum Output Power	4, 5	-----	TP_MAXPWR_LL TP_MAXPWR_UL
6.2.2_1 Maximum Output Power for HPUE	4, 5	-----	TP_MAXPWR_LL TP_MAXPWR_UL
6.2.2A UE Maximum Output Power for CA	4, 5	-----	TP_MAXPWR_LL limit, CONTCC *1 TP_MAXPWR_UL limit, CONTCC *1
6.2.3 Maximum Power Reduction (MPR)	6	-----	TP_MPR1_LL TP_MPR1_UL
	7		TP_MPR2_LL TP_MPR2_UL
	8		TP_MPR3_LL TP_MPR3_UL
6.2.3_1 Maximum Power Reduction (MPR) for HPUE	6	-----	TP_MPR1_LL TP_MPR1_UL
	7		TP_MPR2_LL TP_MPR2_UL
	8		TP_MPR3_LL TP_MPR3_UL
6.2.3A Maximum Power Reduction (MPR) for CA	6	-----	TP_MPR1_LL limit, CONTCC *1 TP_MPR1_UL limit, CONTCC *1
	7		TP_MPR2_LL limit, CONTCC *1 TP_MPR2_UL limit, CONTCC *1
	8		TP_MPR3_LL limit, CONTCC *1 TP_MPR3_UL limit, CONTCC *1
6.2.4 Additional Maximum Power Reduction (A-MPR)	6	-----	TP_MPR1_UL TP_MPR1_LL
6.2.4_1 Additional Maximum Power Reduction (A-MPR) for HPUE	6	-----	TP_MPR1_UL TP_MPR1_LL
6.2.4A Additional Maximum Power Reduction (A-MPR) for CA	6	-----	TP_MPR1_UL limit, CONTCC *1 TP_MPR1_LL limit, CONTCC *1
6.2.5 Configured UE Transmitted Output Power	17	-----	TP_CONFPWR1_TOL
	18		TP_CONFPWR2_TOL
	19		TP_CONFPWR3_TOL

Table 3.9-2: Remote Commands List Limiting Pass/Fail Judgment (2/6)

3GPP Test Item	No.	Channel Bandwidth (MHz)	Remote Command
6.2.5_1 Configured UE transmitted Output power for HPUE	17	-----	TP_CONFPWR1_TOL
	18		TP_CONFPWR2_TOL
	19		TP_CONFPWR3_TOL
6.2.5A Configured UE Transmitted Output power for CA	17	-----	TP_CONFPWR1_TOL limit, CONTCC *[1]
	18		TP_CONFPWR2_TOL limit, CONTCC *[1]
	19		TP_CONFPWR3_TOL limit, CONTCC *[1]
6.3.2 Minimum Output Power	9	-----	TP_MINPWR_UL
6.3.2A.1 Minimum Output Power for CA (intra-band contiguous DL CA and UL CA)	9	-----	TP_MINPWR_UL limit, PCC *[1] TP_MINPWR_UL limit, SCC1 *[1]
6.3.4.1 General ON/OFF time mask	16	-----	TP_TMASK_GEN_TOL TP_OFFPWR_UL
6.3.4A.1 General ON/OFF time mask for CA	16	-----	TP_TMASK_GEN_TOL limit, PCC *[1] TP_OFFPWR_UL limit, PCC *[1] TP_TMASK_GEN_TOL limit, SCC1 *[1] TP_OFFPWR_UL limit, SCC1 *[1]
6.3.4.2.1 PRACH time mask	1	-----	TP_TMASK_PRACH_TOL TP_OFFPWR_UL
6.3.4.2.2 SRS time mask	43	-----	TP_TMASK_SRS_TOL TP_OFFPWR_UL
6.3.5.1 Power Control Absolute power tolerance	24, 25	-----	TP_PCTABS_TOL
6.3.5_1.1 Power Control Absolute power tolerance for HPUE	24, 25	-----	TP_PCTABS_TOL
6.3.5A.1.1 Power Control Absolute power tolerance for CA (intra-band contiguous DL CA and UL CA)	24, 25	-----	TP_PCTABS_TOL limit, PCC *[1] TP_PCTABS_TOL limit, SCC1 *[1]
6.3.5.2 Power Control Relative power tolerance	32	-----	TP_PCTREL_RMP_TOL TP_PCTREL_RMP_CNG_TOL1 TP_PCTREL_RMP_CNG_TOL2 TP_PCTREL_RMP_CNG_TOL3 TP_PCTREL_RMP_E
	33		
	34		
	35		
	36		
	37		
	38		TP_PCTREL_ALT_TOL

Table 3.9-3: Remote Commands List Limiting Pass/Fail Judgment (3/6)

3GPP Test Item	No.	Channel Bandwidth (MHz)	Remote Command
6.3.5_1.2 Power Control Relative Power Tolerance for HPUE	32	-----	TP_PCTREL_RMP_TOL TP_PCTREL_RMP_CNG_TOL1 TP_PCTREL_RMP_CNG_TOL2 TP_PCTREL_RMP_CNG_TOL3 TP_PCTREL_RMP_E
	33		
	34		
	35		
	36		
	37		
	38		TP_PCTREL_ALT_TOL
6.3.5A.2.1 Power Control Relative power tolerance for CA (intra-band contiguous DL CA and UL CA)	32	-----	TP_PCTREL_RMP_TOL limit, PCC *[1] TP_PCTREL_RMP_CNG_TOL1 limit, PCC *[1] TP_PCTREL_RMP_CNG_TOL2 limit, PCC *[1] TP_PCTREL_RMP_CNG_TOL3 limit, PCC *[1] TP_PCTREL_RMP_E limit, SCC1 *[1] TP_PCTREL_RMP_TOL limit, SCC1 *[1] TP_PCTREL_RMP_CNG_TOL1 limit, SCC1 *[1] TP_PCTREL_RMP_CNG_TOL2 limit, SCC1 *[1] TP_PCTREL_RMP_CNG_TOL3 limit, SCC1 *[1] TP_PCTREL_RMP_E limit, SCC1 *[1]
	33		
	34		
	35		
	36		
	37		
	38		TP_PCTREL_ALT_TOL limit, PCC *[1] TP_PCTREL_ALT_TOL limit, SCC1 *[1]
6.3.5.3 Aggregate Power control tolerance	39	-----	TP_PCTAGG_PUSCH_TOL
	40		TP_PCTAGG_PUCCH_TOL
6.3.5_1.3 Aggregate Power control tolerance for HPUE	39	-----	TP_PCTAGG_PUSCH_TOL
	40		TP_PCTAGG_PUCCH_TOL
6.3.5A.3.1 Aggregate power control tolerance for CA (intra-band contiguous DL CA and UL CA)	39	-----	TP_PCTAGG_PUSCH_TOL
	40		TP_PCTAGG_PUCCH_TOL

Table 3.9-4: Remote Commands List Limiting Pass/Fail Judgment (4/6)

<table>
<tr><th colspan="2">3GPP Test Item</th><th>No.</th><th>Channel Bandwidth (MHz)</th><th>Remote Command</th></tr>
<tr><td colspan="2">6.5.1 Frequency Error</td><td>44</td><td>-----</td><td>TP_FERR_PPM
TP_FERR_HZ</td></tr>
<tr><td colspan="2">6.5.1A Frequency Error for CA</td><td>44</td><td>-----</td><td>TP_FERR_PPM
TP_FERR_HZ</td></tr>
<tr><td colspan="2" rowspan="2">6.5.2.1 Error Vector Magnitude (EVM) - PUSCH
6.5.2.1A PUSCH-EVM with exclusion period</td><td>5, 6,
12, 13
41</td><td rowspan="2">-----</td><td>TP_EVM_QPSK
TP_RSEVM_QPSK</td></tr>
<tr><td>7, 8,
14, 15
42</td><td>TP_EVM_16QAM
TP_RSEVM_16QAM</td></tr>
<tr><td colspan="2">6.5.2.1 Error Vector Magnitude (EVM) - PUCCH</td><td>20, 23</td><td>-----</td><td>TP_EVM_PUCCH</td></tr>
<tr><td colspan="2">6.5.2.1 Error Vector Magnitude (EVM) - PRACH</td><td>2, 3</td><td>-----</td><td>TP_EVM_PRACH</td></tr>
<tr><td colspan="2" rowspan="3">6.5.2.2 Carrier Leakage</td><td>10</td><td rowspan="3">-----</td><td>TP_CARRLEAK_0DBM</td></tr>
<tr><td>11</td><td>TP_CARRLEAK_M30DBM</td></tr>
<tr><td>12</td><td>TP_CARRLEAK_M40DBM</td></tr>
<tr><td rowspan="5">6.5.2.3 In-band Emissions
for non allocated RB
- PUSCH/PUCCH</td><td>General</td><td rowspan="2">10, 11,
12, 21,
22, 23</td><td rowspan="5">-----</td><td>TP_INBANDE_GEN_A
TP_INBANDE_GEN_B
TP_INBANDE_GEN_C
TP_INBANDE_GEN_D</td></tr>
<tr><td>IQ Image</td><td>TP_INBANDE_IMG</td></tr>
<tr><td rowspan="3">Carrier Leakage</td><td>10, 21</td><td>TP_INBANDE_LEAK_0DBM</td></tr>
<tr><td>11, 22</td><td>TP_INBANDE_LEAK_M30DBM</td></tr>
<tr><td>12, 23</td><td>TP_INBANDE_LEAK_M40DBM</td></tr>
<tr><td colspan="2">6.5.2.4 EVM equalizer spectrum flatness</td><td>6</td><td>-----</td><td>TP_SPECFLAT1_PP
TP_SPECFLAT1_RD
TP_SPECFLAT2_PP
TP_SPECFLAT2_RD</td></tr>
<tr><td colspan="2" rowspan="2">6.5.2A.1.1 Error Vector Magnitude (EVM) for A (intra-band contiguous DL CA and UL CA)</td><td>5, 6,
12, 13</td><td rowspan="2">-----</td><td>TP_EVM_QPSK limit, PCC *1
TP_RSEVM_QPSK limit, PCC *1
TP_EVM_QPSK limit, SCC1 *1
TP_RSEVM_QPSK limit, SCC1 *1</td></tr>
<tr><td>7, 8,
14, 15</td><td>TP_EVM_16QAM limit, PCC *1
TP_RSEVM_16QAM limit, PCC *1
TP_EVM_16QAM limit, SCC1 *1
TP_RSEVM_16QAM limit, SCC1 *1</td></tr>
<tr><td colspan="2" rowspan="3">6.5.2A.2.1 Carrier leakage for CA (intra-band contiguous DL CA and UL CA)</td><td>10</td><td rowspan="3">-----</td><td>TP_CARRLEAK_0DBM</td></tr>
<tr><td>11</td><td>TP_CARRLEAK_M30DBM</td></tr>
<tr><td>12</td><td>TP_CARRLEAK_M40DBM</td></tr>
</table>

Table 3.9-5: Remote Commands List Limiting Pass/Fail Judgment (5/6)

3GPP Test Item		No.	Channel Bandwidth (MHz)	Remote Command
6.5.2A.3.1 in-band emissions for non allocated RB for CA (intra-band contiguous DL CA and UL CA)	General	10, 11, 12, 21, 22, 23	-----	TP_INBANDE_GEN_A limit, PCC *1 TP_INBANDE_GEN_B limit, PCC *1 TP_INBANDE_GEN_C limit, PCC *1 TP_INBANDE_GEN_D limit, PCC *1 TP_INBANDE_GEN_A limit, SCC1 *1 TP_INBANDE_GEN_B limit, SCC1 *1 TP_INBANDE_GEN_C limit, SCC1 *1 TP_INBANDE_GEN_D limit, SCC1 *1
	IQ Image			TP_INBANDE_IMG limit, PCC *1 TP_INBANDE_IMG limit, SCC1 *1
	Carrier Leakage	10, 21		TP_INBANDE_LEAK_0DBM limit, PCC *1 TP_INBANDE_LEAK_0DBM limit, SCC1 *1
		11, 22		TP_INBANDE_LEAK_M30DBM limit, PCC *1 TP_INBANDE_LEAK_M30DBM limit, SCC1 *1
		12, 23		TP_INBANDE_LEAK_M40DBM limit, PCC TP_INBANDE_LEAK_M40DBM limit, SCC1
6.6.1 Occupied bandwidth		6	1.4	TP_OBW_1.4MHZ
			3	TP_OBW_3MHZ
			5	TP_OBW_5MHZ
			10	TP_OBW_10MHZ
			15	TP_OBW_15MHZ
			20	TP_OBW_20MHZ
6.6.1A Occupied bandwidth for CA		6	-----	TP_OBW_CONTCC
6.6.2.1 Spectrum Emission Mask		5, 6, 7, 8	1.4	TP_SEM1.4MHZ_1 TP_SEM1.4MHZ_2 TP_SEM1.4MHZ_3 TP_SEM1.4MHZ_4
			3	TP_SEM3MHZ_1 TP_SEM3MHZ_2 TP_SEM3MHZ_3 TP_SEM3MHZ_4
			5	TP_SEM5MHZ_1 TP_SEM5MHZ_2 TP_SEM5MHZ_3 TP_SEM5MHZ_4

Table 3.9-6: Remote Commands List Limiting Pass/Fail Judgment (6/6)

3GPP Test Item	No.	Channel Bandwidth (MHz)	Remote Command
6.6.2.1 Spectrum Emission Mask	5, 6, 7, 8	10	TP_SEM10MHZ_1 TP_SEM10MHZ_2 TP_SEM10MHZ_3 TP_SEM10MHZ_4
		15	TP_SEM15MHZ_1 TP_SEM15MHZ_2 TP_SEM15MHZ_3 TP_SEM15MHZ_4
		20	TP_SEM20MHZ_1 TP_SEM20MHZ_2 TP_SEM20MHZ_3 TP_SEM20MHZ_4
6.6.2.1A Spectrum Emission Mask for CA	5, 6, 7, 8	-----	TP_SEM_CONTCC_1 *1 TP_SEM_CONTCC_2 *1 TP_SEM_CONTCC_3 *1 TP_SEM_CONTCC_4 *1 TP_SEM_CONTCC_5 *1 TP_SEM_CONTCC_6 *1
6.6.2.2 Additional Spectrum Emission Mask	6	-----	TP_MPR1_UL TP_MPR1_LL
6.6.2.2A.1 Additional Spectrum Emission Mask for CA (intra-band contiguous DL CA and UL CA)	6	-----	TP_MPR1_UL limit, CONTCC *1 TP_MPR1_LL limit, CONTCC *1
6.6.2.3 Adjacent Channel Leakage power Ratio	5, 6, 7, 8	-----	TP_ACLR_E TP_ACLR_U1 TP_ACLR_U2 TP_ACLR_LL
6.6.2.3_1 Adjacent Channel Leakage power Ratio for HPUE	5, 6, 7, 8	-----	TP_ACLR_E TP_ACLR_U1 TP_ACLR_U2 TP_ACLR_LL
6.6.2.3A Adjacent Channel Leakage power Ratio for CA	5, 6, 7, 8		TP_ACLR_E limit, CONTCC *1 TP_ACLR_U1 limit, CONTCC *1 TP_ACLR_U2 limit, CONTCC *1 TP_ACLR_LL limit, CONTCC *1
7.3 Reference sensitivity level	44	-----	TP_REFSENS
7.3A Reference sensitivity level for CA	44	-----	TP_REFSENS
7.4 Maximum input level	45	-----	TP_MAXINPT
7.4A Maximum input level for CA	45	-----	TP_MAXINPT

***1: Available on MT8821C only**

4. BAND 13 SUPPLEMENTARY RF CONFORMANCE MEASUREMENT

The following test procedure can be used with both the MT8820C and MT8821C.

4.1. PUCCH OVER-PROVISIONING FUNCTIONAL TEST (2.7)

Check whether the allocated PUCCH performs the correct ACK/NACK report. Test at 10 MHz.

1. Execute **BANDWIDTH 10MHZ** to set **Common Parameter - Channel Bandwidth** to **10 MHz**.
2. Connect to Test Mode.(→2.1.4)
3. Execute **TESTPRM RX_SENS** to set **Test Parameter** to **RX - Ref. Sens./Freq. Error**.
4. Execute **TPUT_SAMPLE 10000** to **Rx Measurement Parameter - Throughput - Number of Sample** to **10000**.
5. Execute **DLRMC_RB 50** to set **Common Parameter - DLRMC - Number of RB** to **50**.
6. Execute **CHCONFIG PUCCH** to set **Common Parameter - RMC Configuration** to **PUCCH**.
7. Execute **OLVL -91.0** to set **Common Parameter - Output Level** to **–91.0 dBm**.
8. Execute **SIB2_NS NS_07** to set **Call Processing Parameter - additional SpectrumEmission** to **NS_07**.
9. Execute **NRBCQI 26** to set **Call Processing Parameter - nRB-CQI** to **26**.
10. Execute **SWP** to measure the Throughput.
11. Execute **TPUT? PER** to read Throughput measurement result (%).
12. Execute **TPUTPASS?** to check that the Throughput measurement Pass/Fail judgment is Pass.
13. Execute **NRBCQI 28** to set **Call Processing Parameter - nRB-CQI** to **28**.
14. Execute steps 10 to 12.

4.2. SPURIOUS EMISSIONS WITH TX GATING (2.9)

Perform spurious emission tests using an external spectrum analyzer. Inputting the MT8821C frame signal to an external spectrum analyzer using the MN8110 hardware option supports spurious emission measurements synchronized with Tx Gating.

NOTE 1: Use Call Proc I/O for MT8821C and MN8110 connection.
NOTE 2: Use Frame Trigger Output connector for MN8110 output.
NOTE 3: Set Trigger source to External and Gate Length to 1 ms.

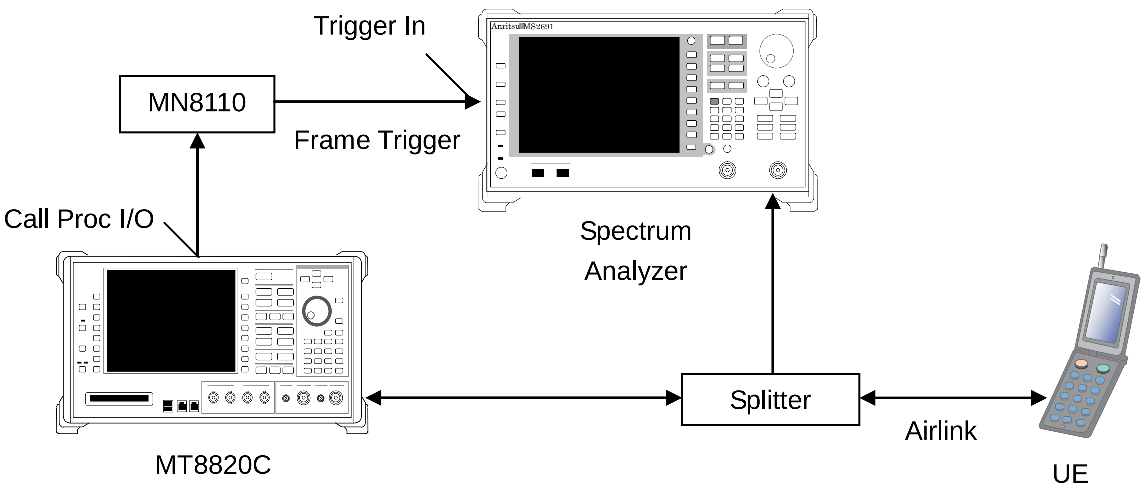
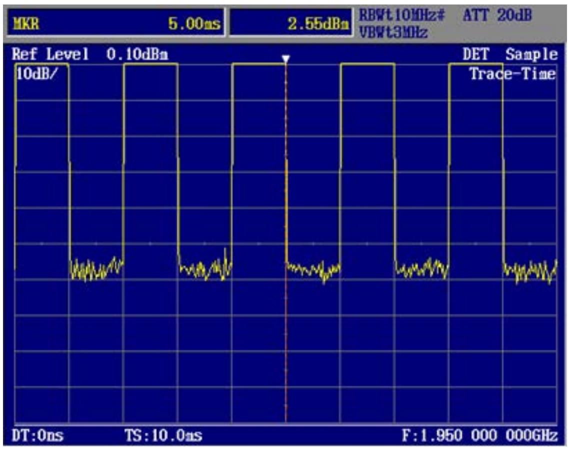
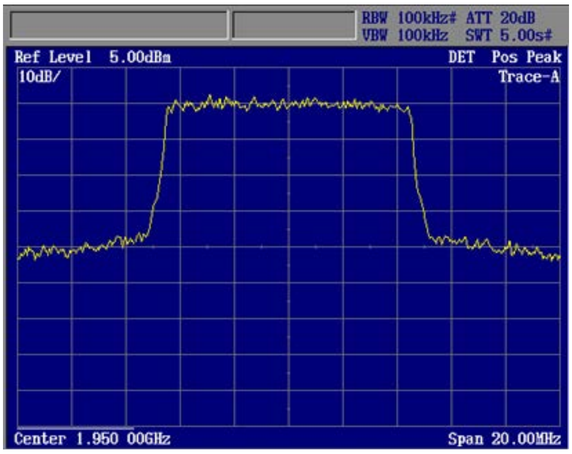


Figure 4.2-1 ***Setup for Spurious Emissions with Tx Gating Test***

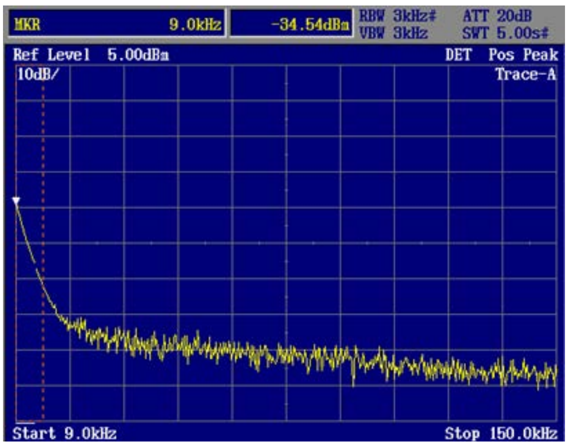
1. Connect the MT8821C, MN8110, spectrum analyzer and UE.
2. Connect to Test Mode.(→2.1.4)
3. Execute **CHCONFIG PUSCH_2** to set **Common Parameter - RMC Configuration** to **PUSCH (per 2 subframe)**.
4. Execute **DLRMC_RB 0** to set **Common Parameter - DLRMC Number of RB** to **0**.
5. Measure spurious emissions using the spectrum analyzer.
6. Check that the maximum level of the frequency bandwidth does not exceed the test specifications limit.



Time domain



Frequency domain



Spurious emissions

Figure 4.2-2 ***Spurious Emissions Measurement with Tx Gating Test***

5. IP Data Transfer Test

5.1. IP Data Transfer Test for Non CA (single cell)

The IP data transfer between an application server connected to the MT8820C/MT8821C and the UE can be tested by installing the 12C/13C-006 IP Data Transfer option in the MT8820C. Furthermore, adding the 12C/13C-011 FDD/TDD 2x2 MIMO DL option supports the Downlink 2x2MIMO IP Data Transfer Test.
The following test procedure is based on hands-on operation. Refer to the LTE measurement software operation manual for the basic operation and remote commands.

5.1.1. Connection Diagram

5.1.1.1. Layer Configuration

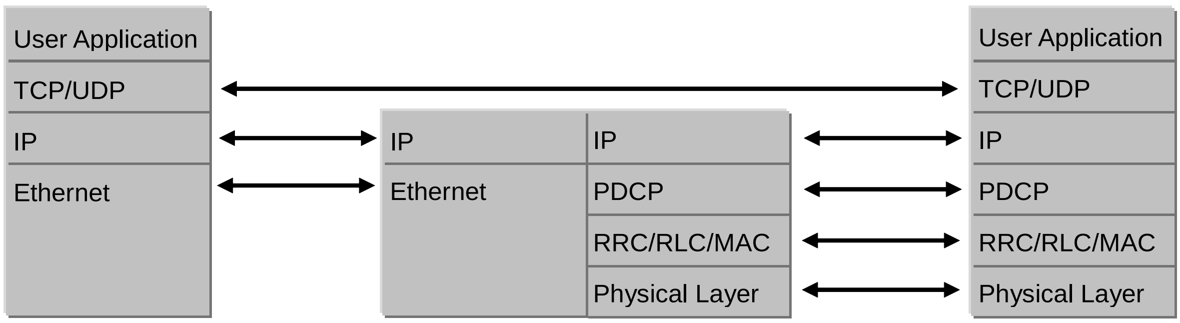


Figure 5.1.1-1 ***Layer Configuration***

5.1.1.2. Connection Diagram for IP Data Verification using MT8820C

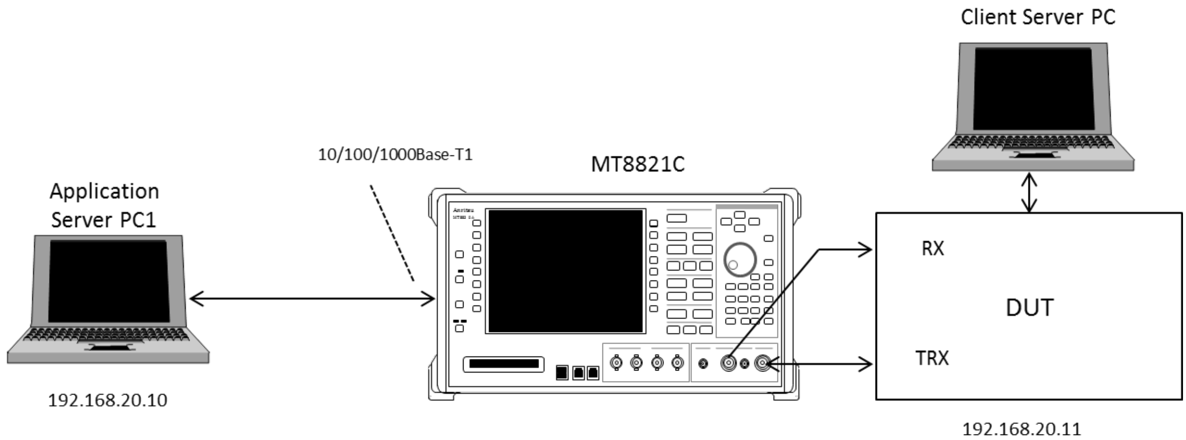


Figure 5.1.1-2 ***Connection Diagram for IP Data Transfer***
(MT8820C, using external server, antenna configuration set to 2x2 MIMO)

5.1.1.3. Connection Diagram for IP Data Verification using MT8821C

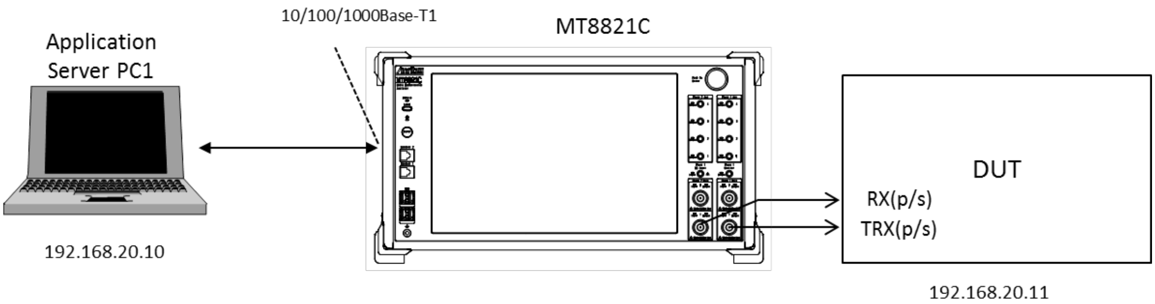
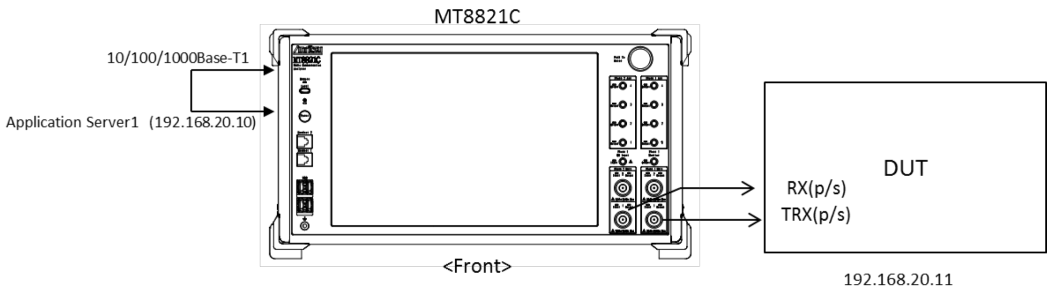


Figure 5.1.1-3 ***Connection Diagram for IP Data Transfer***
(MT8821C, using external server, antenna configuration set to 2x2 MIMO)



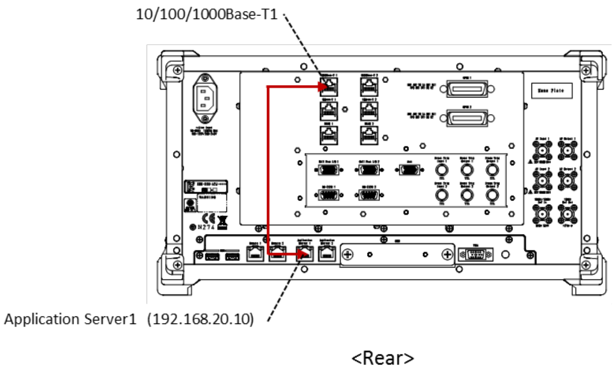


Figure 5.1.1-4 ***Connection Diagram for IP Data Transfer***
(MT8821C, using internal server, antenna configuration set to 2x2 MIMO)

<Required Equipment>
- LTE mobile terminal supporting IP connection
- RF cable to connect MT8821C and LTE mobile terminal
- Application server PC with LAN adapter supporting 1000Base-TX
- Client PC (if DUT is modem type or using tethering function)
- Crossover cable to connect MT8821C and application server
- UDP/TCP Throughput measurement software (installed in application server and client PCs)*[1]

*1: This test uses the open-source software Iperf to measure throughput. It can be downloaded from the Internet. After downloading, copy the execute file (Iperf.exe) to the root of the C: drives in the application server and client PCs.

* Windows is registered trademark of Microsoft Corporation in the USA and other countries.

NOTES:

- ***There is no need to connect the server PC and MT8820C with a router when testing IP data transfer using IPv6. Connect the server PC and MT8820C as shown above.***
- ***The IPv6 address is assigned automatically to the UE in use. A UE not supporting automatic IPv6 address assignment uses the IP address set at IPv6Client IP Address of the MT8820C.***
- ***Check that the UE supports IPv6 before testing IP data transfer using IPv6. Connect the UE and MT8820C to check the PDN Type on the UE Report screen. The UE supports IPv6 when either IPv4v6 or IPv6 is displayed in PDN Type on the UE Report screen.***

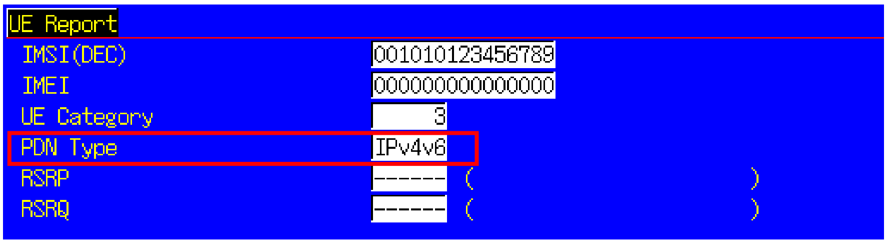


Figure 5.1.1-5 ***UE Report Screen (MT8820C)***

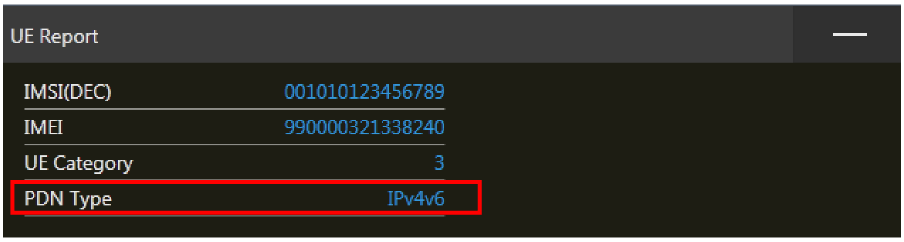


Figure 5.1.1-6 ***UE Report Screen (MT8821C)***

5.1.2. Application Server Connection and Setting

With the MT8820C/MT8821C powered-down (OFF), use a crossover Ethernet cable to connect the 1000Base-TX/100Base-TX/10Base-T port on the back panel of the MT8820C/MT8821C to the application server.

Figure 5.1.2-1 ***1000Base-TX Port (MT8820C)***

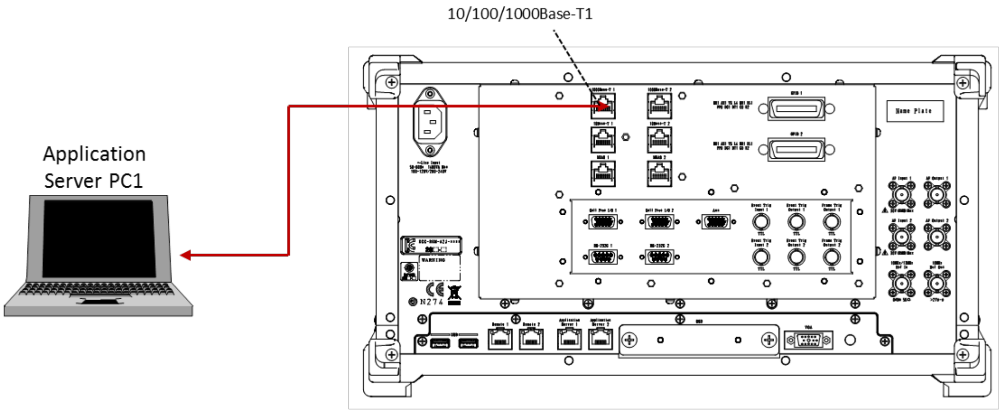


Figure 5.1.2-2 ***1000Base-TX Port (MT8821C)***

5.1.2.1. IPv4

Setting TCP/IP of Application Server PC.

1. Open the Local Area Connection Properties window at the application server PC and put a checkmark in the Internet Protocol (TCP/IP) checkbox.

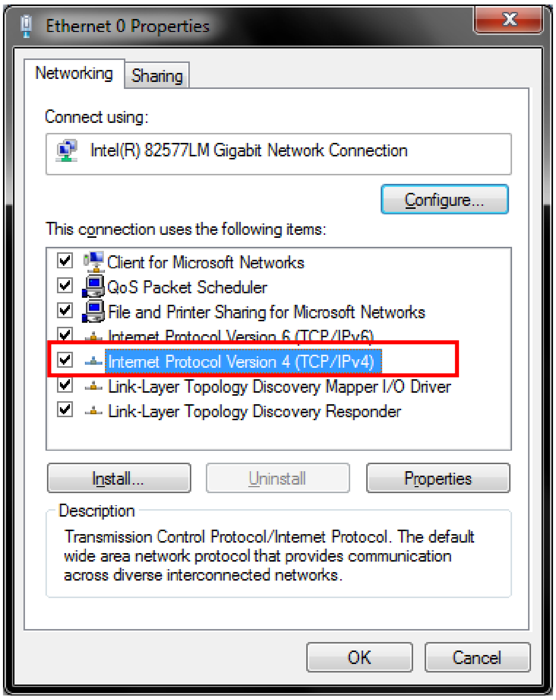


Figure 5.1.2.1-1 ***Local Area Network Connection Properties***

2. Double-click Internet Protocol (TCP/IP) to open the Internet Protocol (TCP/IP) Properties window.

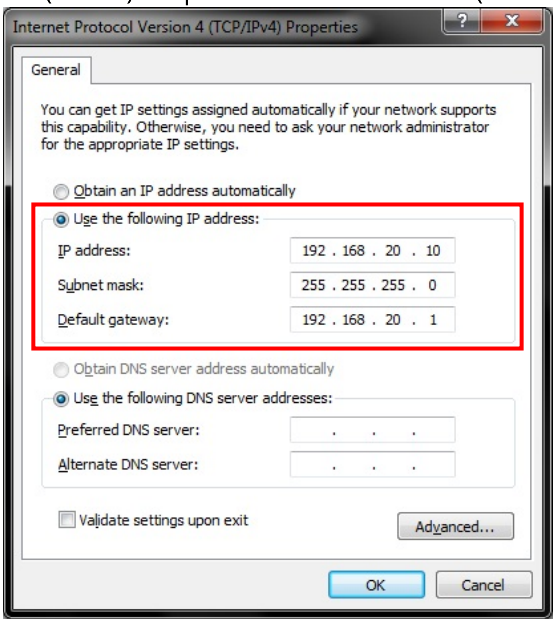


Figure 5.1.2.1-2 ***Internet Protocol (TCP/IP) Properties Window***

3. Choose [Use the following IP address] and set [IP address] and [Subnet mask] as follows:
   IP address: 192.168.20.10
   Subnet mask: 255.255.255.0
4. Click [OK] to close the Internet Protocol (TCP/IP) Properties window.

5. Select the [Advanced] tab at the Local Area Connection Properties window and disable the Windows firewall.

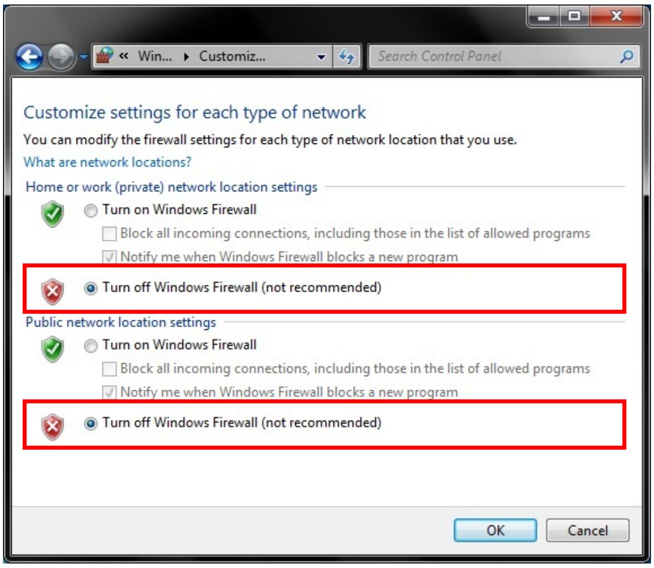


Figure 5.1.2.1-3 ***Advanced Tab of Local Area Network Connection Properties Window***

6. Click [OK] to close the window.
7. Start the MT8821C.
8. Select and load the LTE measurement software to Phone1.
9. After loading, start the LTE measurement software on Phone1.
10. When testing in a 2x2MIMO environment, select and load the LTE measurement software on to Phone2 as well.
11. After loading, start the LTE measurement software on Phone2.

5.1.2.2. IPv6

5.1.2.2.1. Windows XP

The following procedure is only for a Windows XP PC in which TCP/IP Version 6 is not installed.

1. Open the Local Area Connection properties screen of the server/client PC and uncheck the following items.
   - Microsoft Client for Network
   - Microsoft File and Printer sharing for Network
   - QoS Packet Scheduler

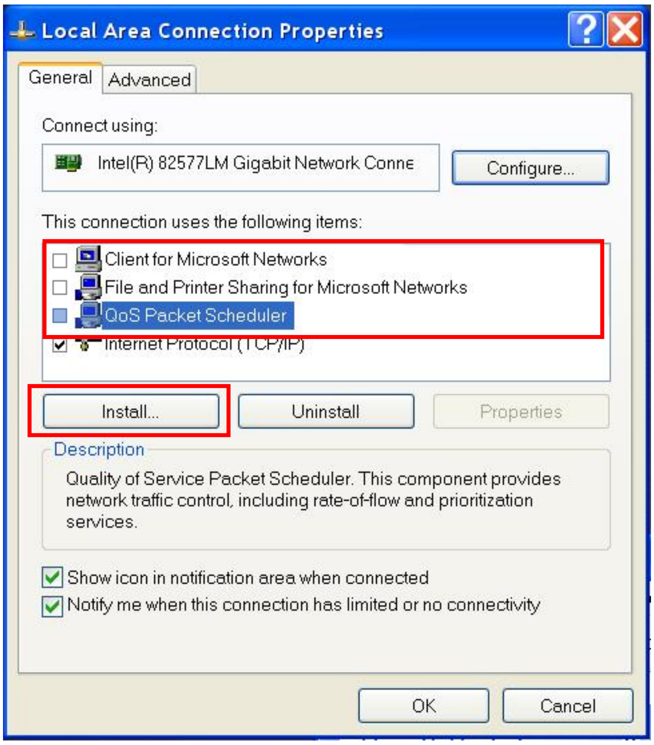


Figure 5.1.2.2.1-1 ***Local Area Connection Properties Screen (Windows XP)***

2. Click the [**Install**] button to open the following Network Component Type Selection screen.

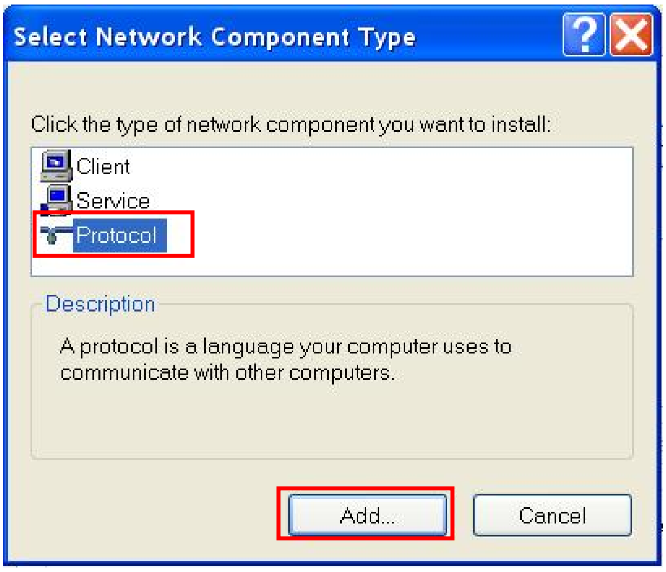


Figure 5.1.2.2.1-2 ***Network Component Type Selection Screen (Windows XP)***

3. Select [**Protocol**] and click the [**Add**] button to open the following Network Protocol Selection screen.

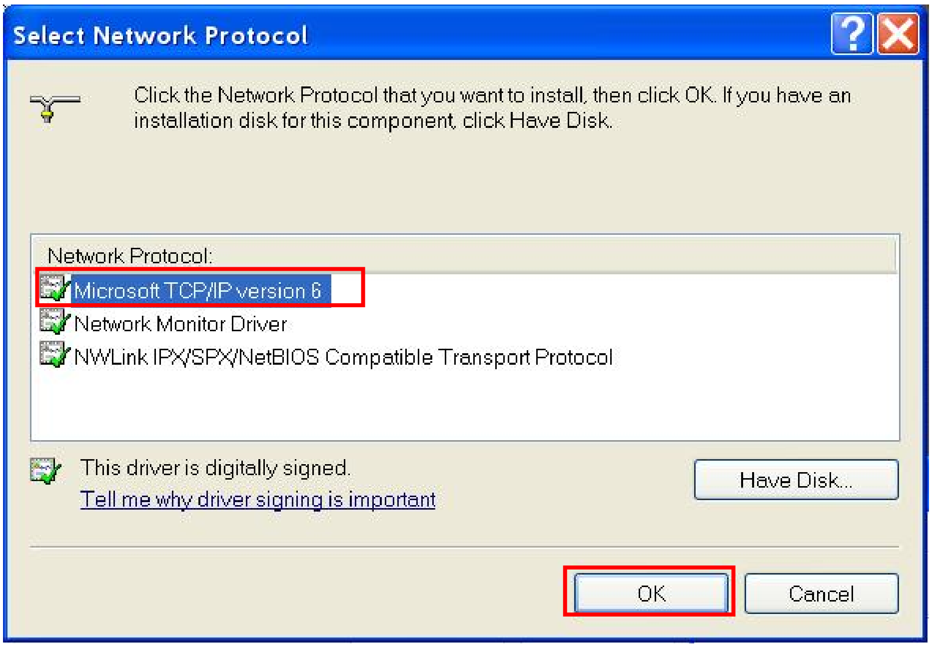


Figure 5.1.2.2.1-3 ***Network Protocol Selection Screen (Windows XP)***

4. Select [**Microsoft TCP/IP version 6**] and click the [**OK**] button to complete the TCP/IP version 6 installation.
5. Open the Windows Command Prompt application.
6. Run the “ipconfig” command to check the server PC IP configuration.

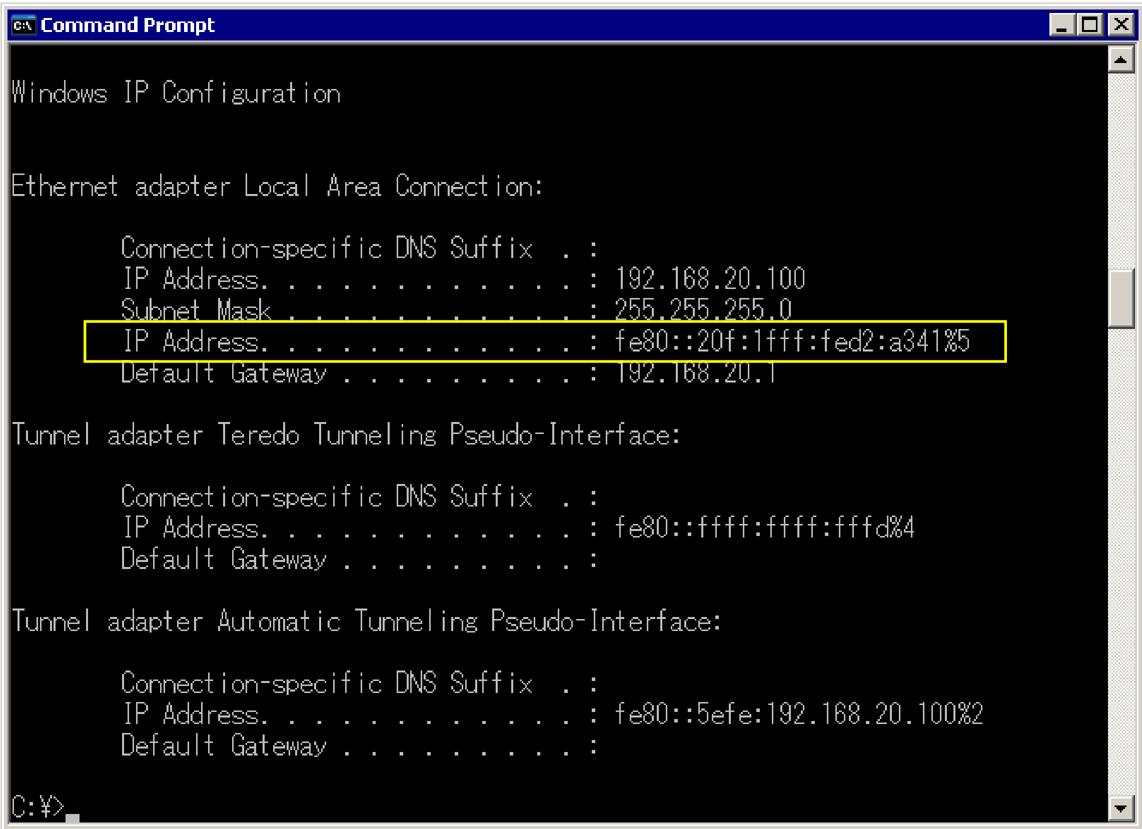


Figure 5.1.2.2.1-4 ***Server PC IP Configuration Screen***

7. Run the “netsh int ipv6 show int” command and confirm the Index No. (Idx) allocated to the Local Area Connection. This Index No. is required at the next step to set the IP address.

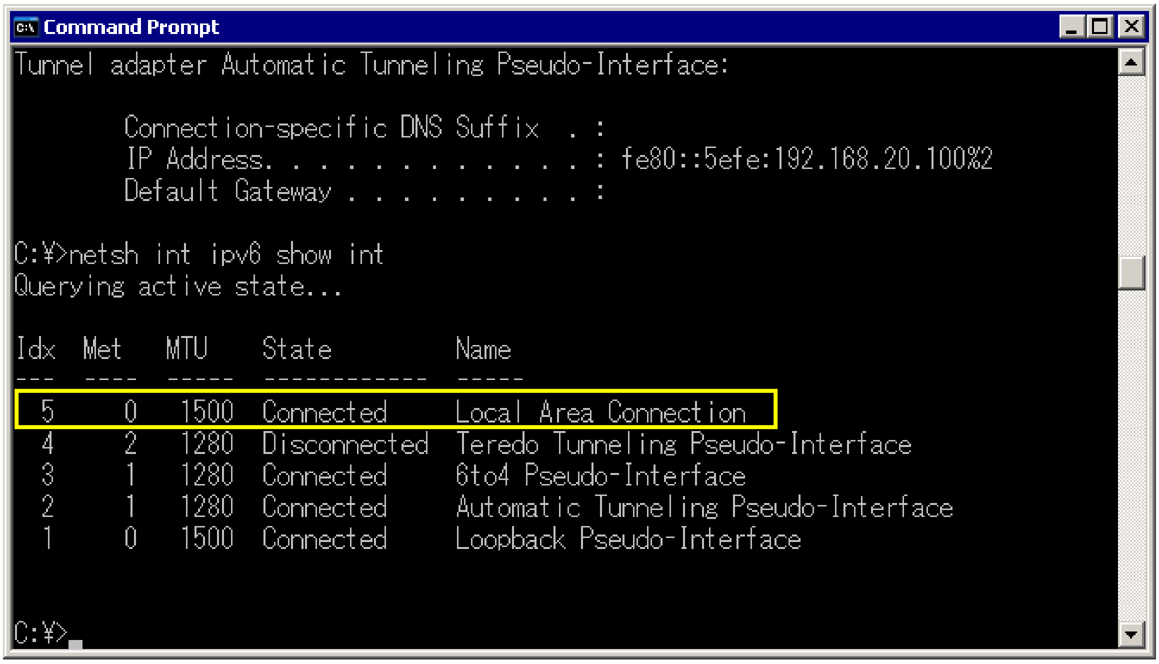


Figure 5.1.2.2.1-5 ***Query Result for Index No. Screen***

8. Run the “netsh int ipv6 set address 5 2001::2” command to set the IP address.
The IP address set by this procedure is set to match the address set at [IPV6 Server IP Address] of the MT8821C.

NOTE:

- ***Places with contiguous 0s in the IPv6 Server IP Address captured at Index No IP Address of step 4 ‘netsh int ipv6 set’ are abbreviated as::. For example IPv6 Server IP Address <u>2001:0000:0000:0000:0000:0000:0000:0002 displayed in the following screen is abbreviated to 2001::2</u>.***

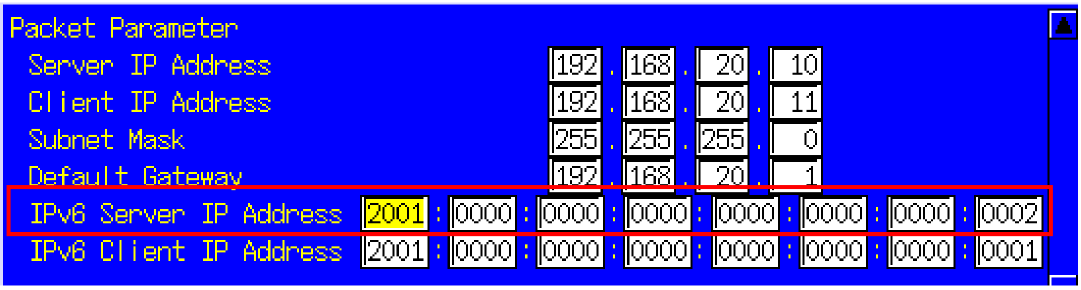


Figure 5.1.2.2.1-6 ***IPv6 Address Setting Screen***

9. Run the “ipconfig” command again to check that the IP address set at step 5 has been set correctly.

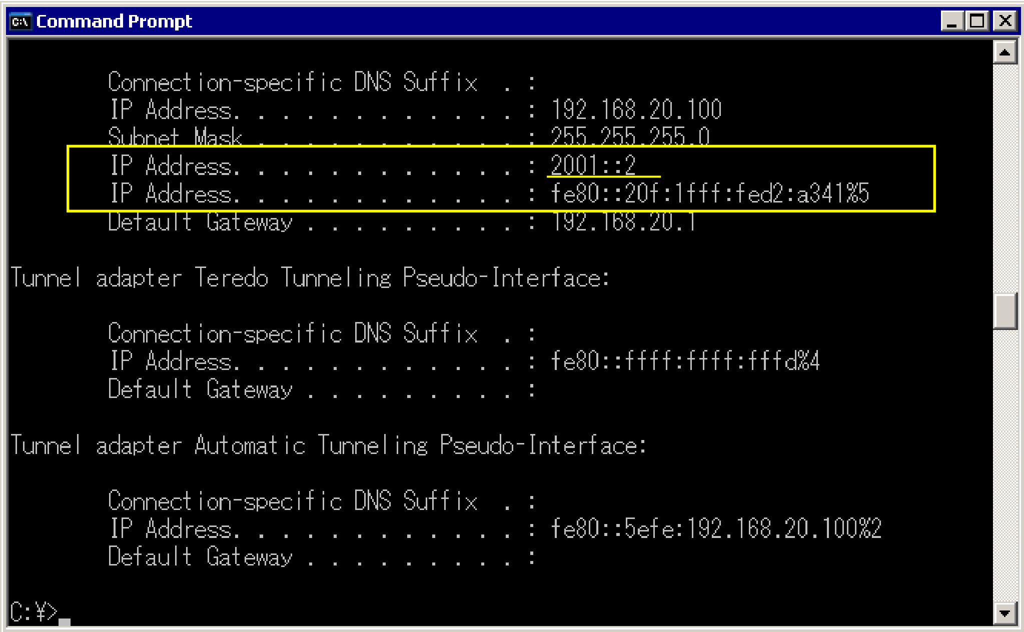


Figure 5.1.2.2.1-7 ***Server PC IP Configuration after IP Address Setting***

5.1.2.2.2. Windows 7/Vista

Set TCP/IP of Application Server PC.

NOTE:

- ***The TCP/IP version 6 installation procedure is not required.***
- ***Disable the Windows firewall.***

1. Open the Local Area Connection properties screen of the server/client PC and uncheck the following items.
    - Microsoft Client for Network
    - Microsoft File and Printer sharing for Network
    - QoS Packet Scheduler
2. Double-click [**Internet Protocol Version 6 (TCP/IPv6)**] to open the Internet Protocol Version 6 (TCP/IPv6) properties screen.

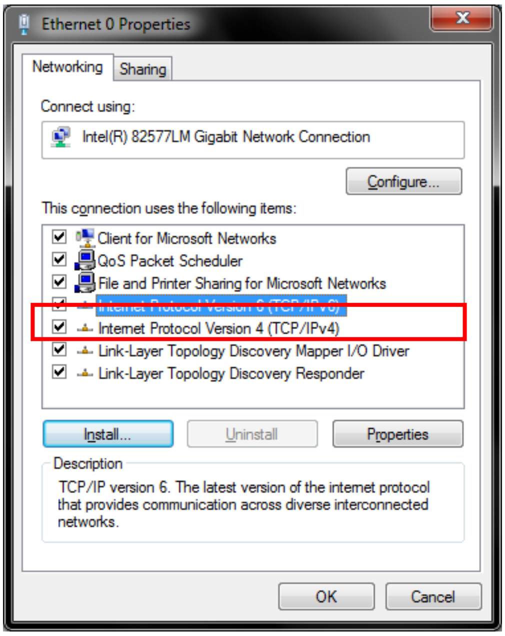


Figure 5.1.2.2.2-1 ***Local Area Connection Properties Screen (Windows 7)***

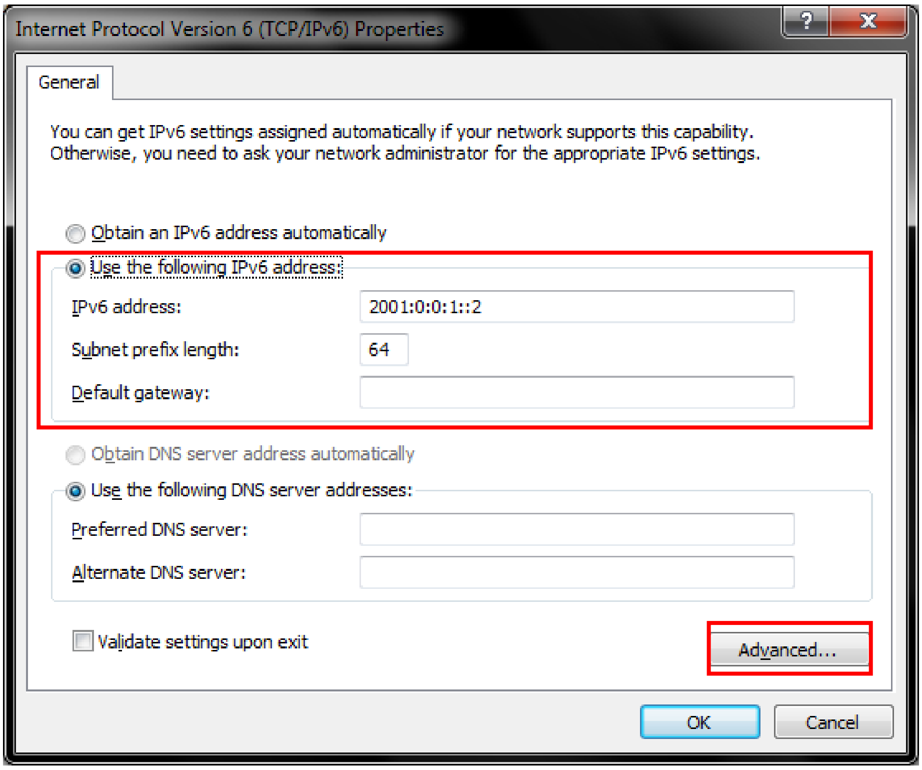


Figure 5.1.2.2.2-2 ***Internet Protocol Version 6 (TCP/IPv6) Properties Screen (Windows 7)***

3. Select [**Use following IPv6 address**] and set [**IPv6 address**] and [**Subnet prefix length**] as described below.
   The IPv6 address set by this procedure matches the IP address set at [**IPV6 Server IP Address**] of the MT8821C.
   To check [**IPV6 Server IP Address**] of the MT8821C, refer to chapter 5.1.2.2.1
   - IPv6 address: 2001::2
   - Subnet prefix length: 64

NOTE:

- ***Places in the address with contiguous 0s are abbreviated as::. For example, IPv6 Server IP Address <u>2001:0000:0000:0000:0000:0000:0000:0002 is abbreviated to 2001::2.</u>***

4. Click [**OK**] and close the properties screen for Internet Protocol Version 6 (TCP/IPv6).

5.1.3. Client PC Connection and Setting

The client PC connection and setting depend on the mobile terminal. Set according to the connection method used.

5.1.4. Initial Condition Setting

The following illustrates how to set-up the measurement condition for Peak Data Rate.
TS36.306 4.1 defines a transmittable data size for the respective UE Categories.

5.1.4.1. MT8820C

5.1.4.1.1. IPv4

1. Run [PRESET] to initialize the parameter settings.
2. Set [Uplink Channel] to 18300.
3. Set [Channel Bandwidth] to 20 MHz.

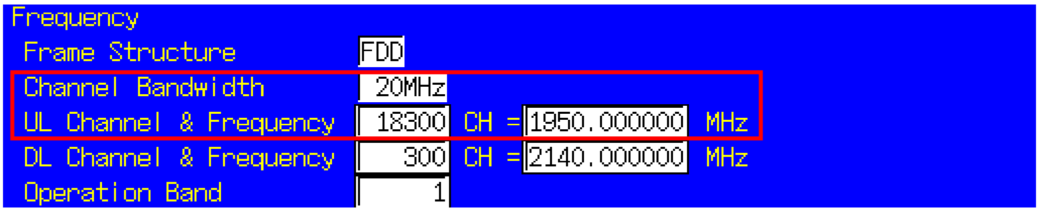


Figure 5.1.4.1.1-1 ***UL Channel/Channel Bandwidth Setting at Common Parameter Screen (MT8820C)***

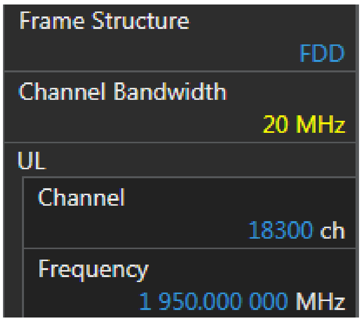


Figure 5.1.4.1.1-2 ***UL Channel/Channel Bandwidth Setting at Common Parameter Screen (MT8821C)***

4. Set [Channel Coding] to Packet.
5. Set [Antenna Configuration] to 2X2 MIMO (Closed Loop Multi Layer). To test a Single Antenna, set to Single.

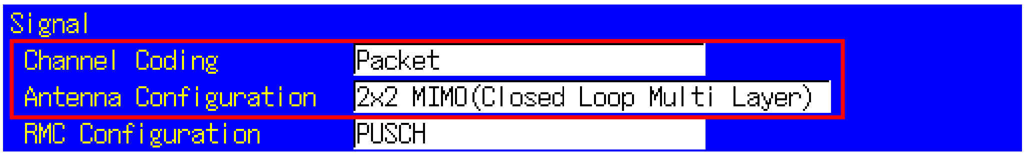


Figure 5.1.4.1.1-3 ***Channel Coding/Antenna Configuration at Common Parameter Screen (MT8820C)***

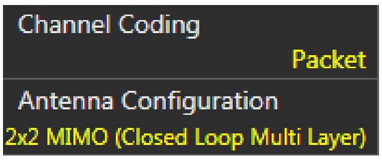


Figure 5.1.4.1.1-4 ***Channel Coding/Antenna Configuration at Common Parameter Screen (MT8821C)***

6. Set a UE Category.

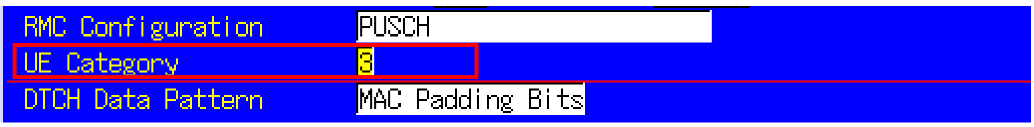


Figure 5.1.4.1.1-5 ***UE Category Setting at Common Parameter Screen (MT8820C)***

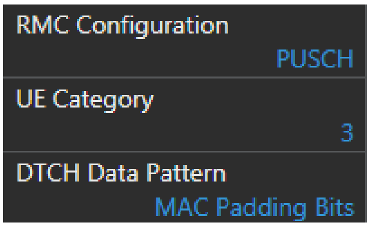


Figure 5.1.4.1.1-6 ***UE Category Setting at Common Parameter Screen (MT8821C)***

7. Set UL/DL RMC - Number of RB to 100 with MCS Index in accordance with the following table for maximizing the transmittable data size of the respective UE Categories.

UE Category	Antenna Configuration	MCS Index			
		UL	DL		
			(1-4,6-9)	(5)	(0)
3	Single	23	28	28	28
	2x2 MIMO (Closed Loop Multi Layer)	23	23	24	23
4	Single	23	28	28	28
	2x2 MIMO (Closed Loop Multi Layer)	23	28	28	28

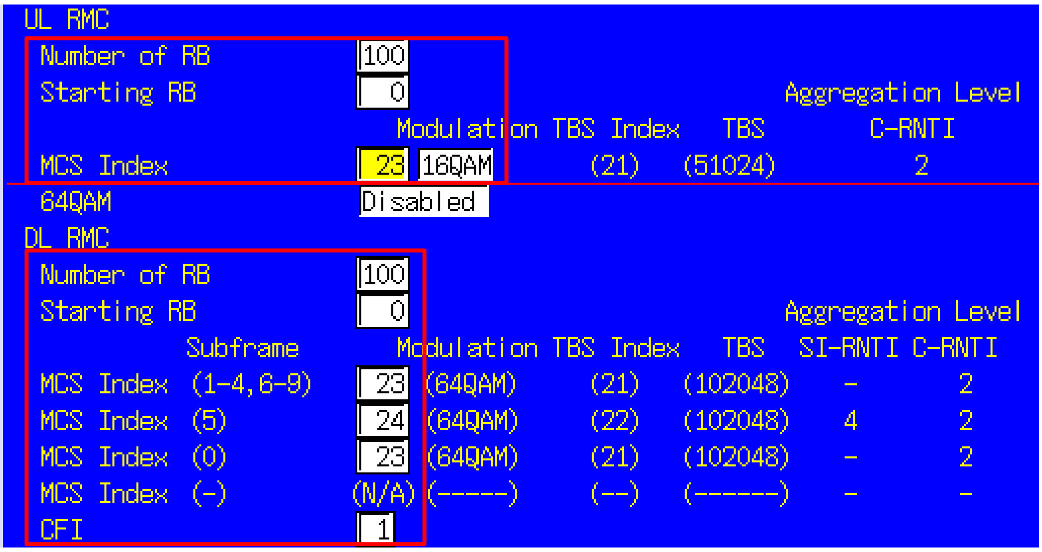


Figure 5.1.4.1.1-7 ***MCS Index Setting at Common Parameter Screen (MT8820C)***

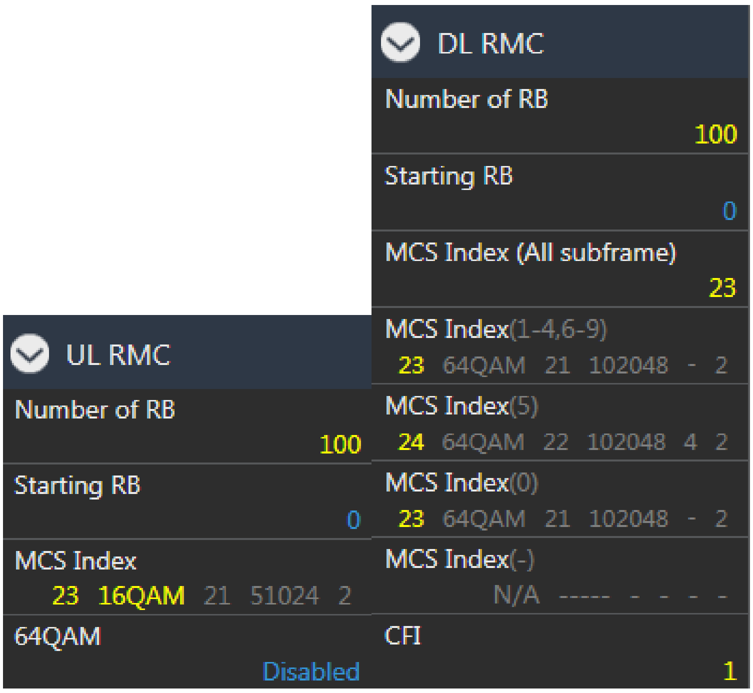


Figure 5.1.4.1.1-8 ***MCS Index Setting at Common Parameter Screen (MT8821C)***

8. Set [Client IP Address] to 192.168.20.11.

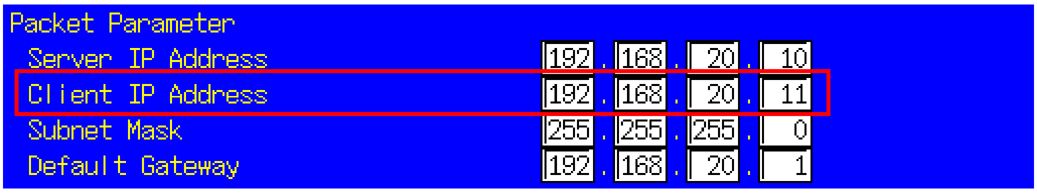


Figure 5.1.4.1.1-9 ***Client IP Address Setting at Call Processing Parameter Screen (MT8820C)***

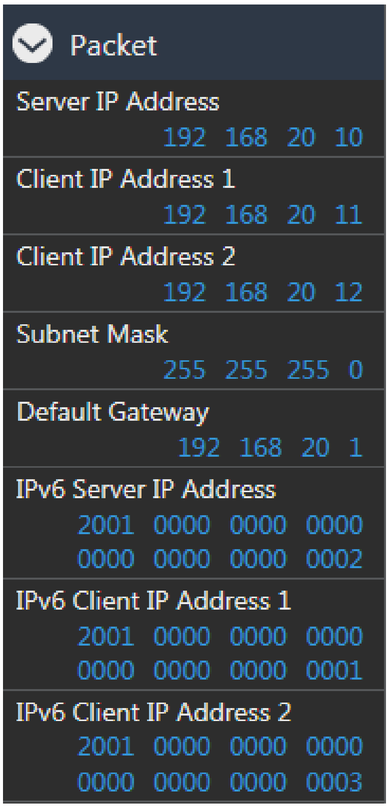


Figure 5.1.4.1.1-10 ***Client IP Address Setting at Call Processing Parameter Screen (MT8821C)***

9. Set [Throughput] at the Fundamental Measurement Parameter screen to On.

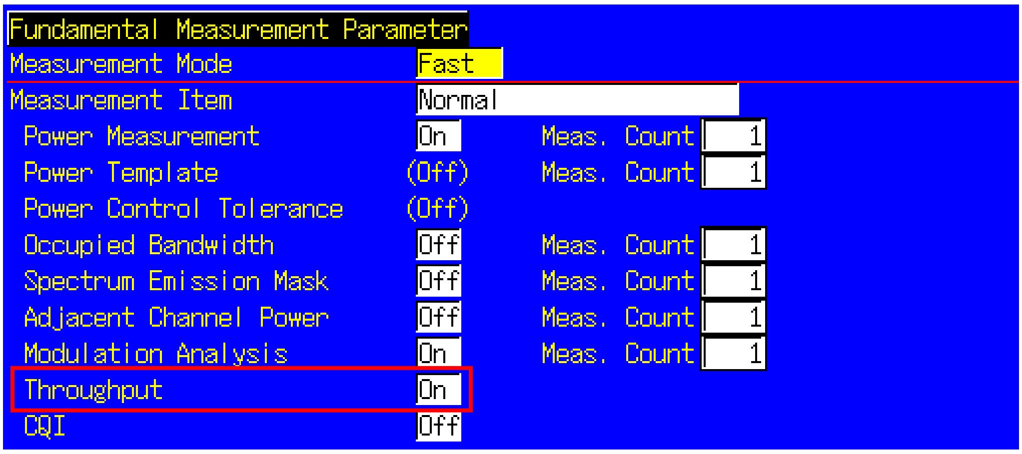


Figure 5.1.4.1.1-11 ***Throughput Measurement Setting at Fundamental Measurement Parameter Screen (MT8820C)***

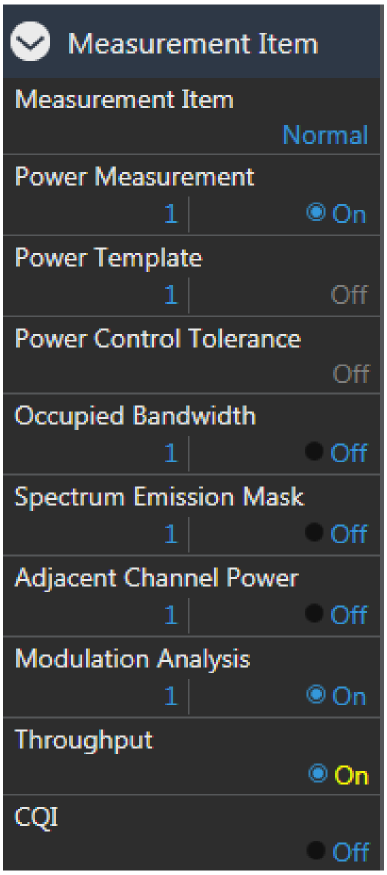


Figure 5.1.4.1.1-12 ***Throughput Measurement Setting at Fundamental Measurement Parameter Screen (MT8821C)***

5.1.4.1.2. IPv6

This measurement can be performed using the same procedure as in Chapter 5.1.4.1.1, by substituting the following steps.

8. Set [**IPv6 Server IP Address**] to 2001::2.
9. Set [**IPv6 Client IP Address**] to 2001::1.

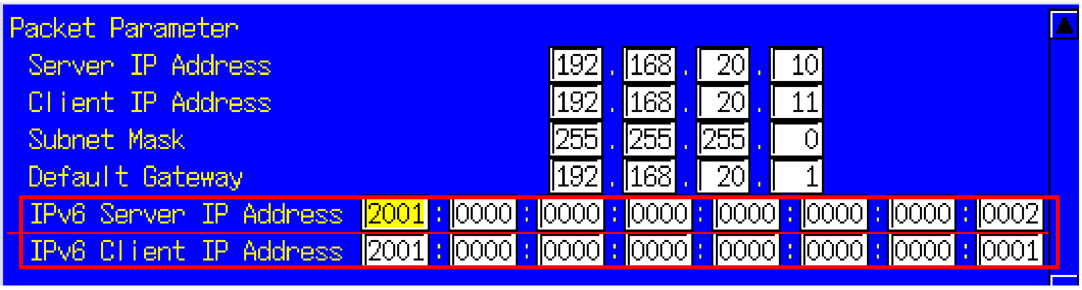


Figure 5.1.4.1.2-1 ***IPv6 Address Setting at Call Processing Parameter Screen (MT8820C)***

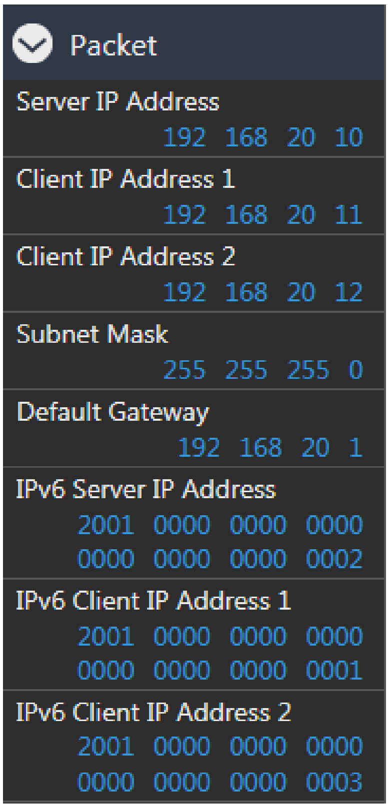


Figure 5.1.4.1.2-2 ***IPv6 Address Setting at Call Processing Parameter Screen (MT8821C)***

5.1.5. Location Registration and Packet Connection

5.1.5.1. IPv4

Perform UE location registration and packet connection.

1. Connect the UE to the MT8821C.
2. Switch on the UE.
3. Wait for packet communication from the mobile terminal to be established.
   The MT8820C/MT8821C Call Processing status changes from Idle→Registration→Connected.
4. Press [Single] to set Input level near to the Tx power measurement result.
   Run the Ping command from the Command Prompt window of the client or application server to confirm the IP connection. The following figure shows the result for the application server.

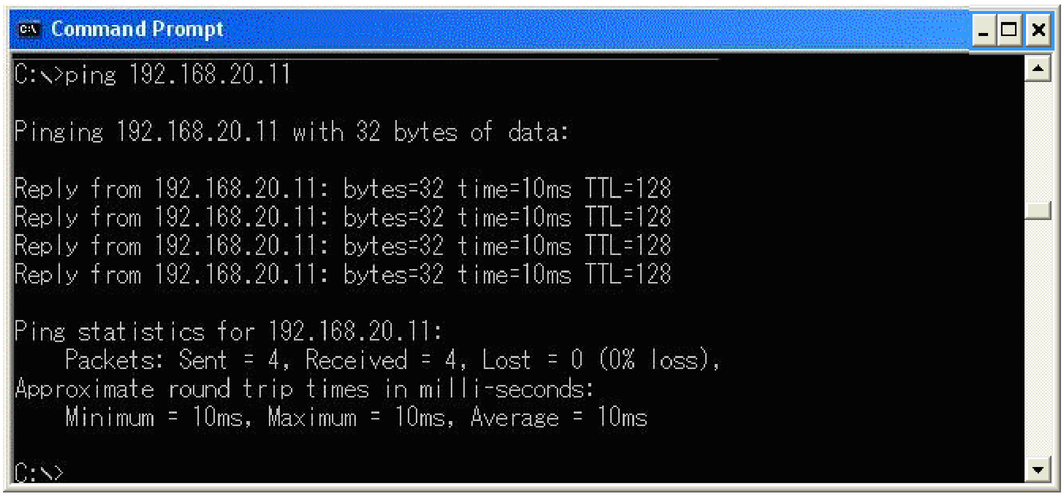


Figure 5.1.5.1-1 ***Ping Result at Application Server***

5. Change [Starting RB], [Number of RB], and [MCS Index] at UL RMC and DL RMC of the Common Parameter Setting screen to change the Transport Block Size (TBS).

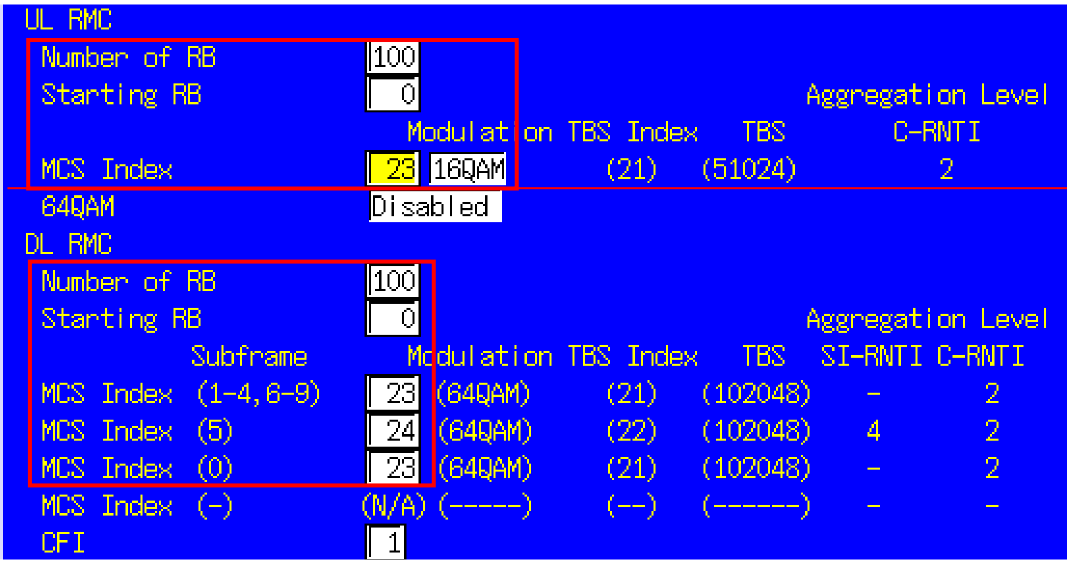


Figure 5.1.5.1-2 ***UL/DL RMC Settings at Common Parameter Setting Screen (MT8820C)***

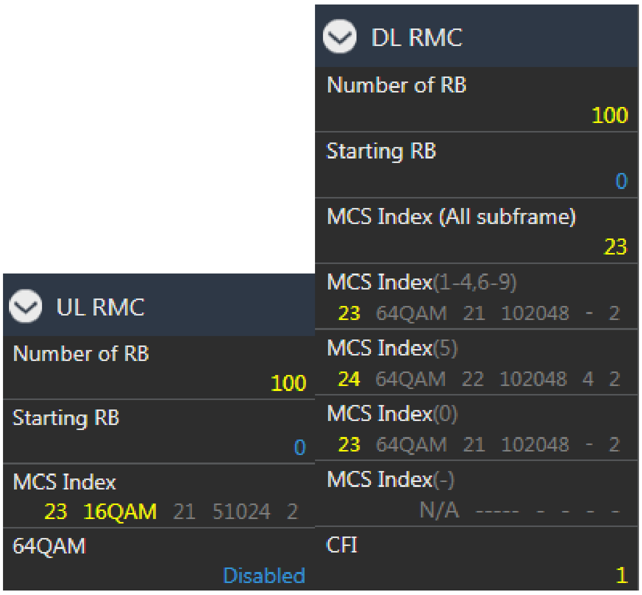


Figure 5.1.5.1-3 ***UL/DL RMC Settings at Common Parameter Setting Screen (MT8821C)***

6. Press [Single] to confirm that the MT8821C downlink signal can be decoded at the UE by using the DL Throughput and the Block Error Rate results of the Fundamental Measurement screen.
   If there is an error, change the RMC settings or Level setting, and repeat steps 5 and 6.

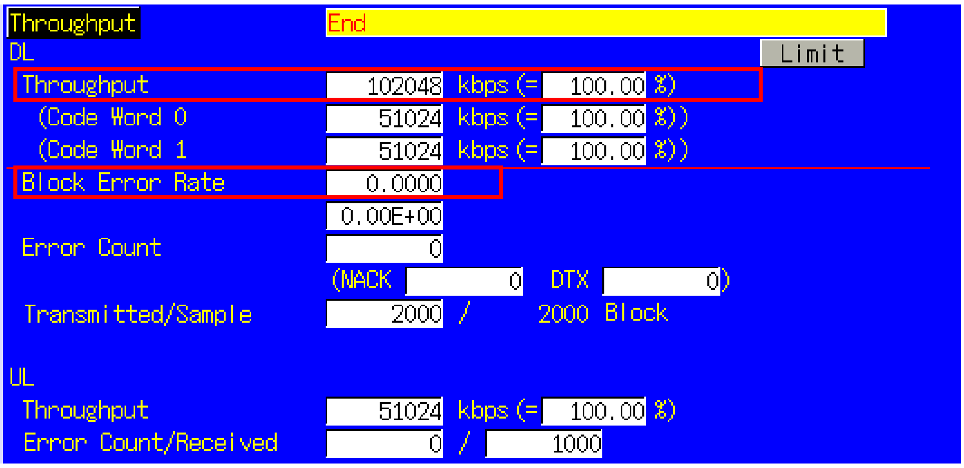


Figure 5.1.5.1-4 ***Throughput Measurement Result for UE Category 3 at Fundamental Measurement Parameter Screen (MT8820C)***

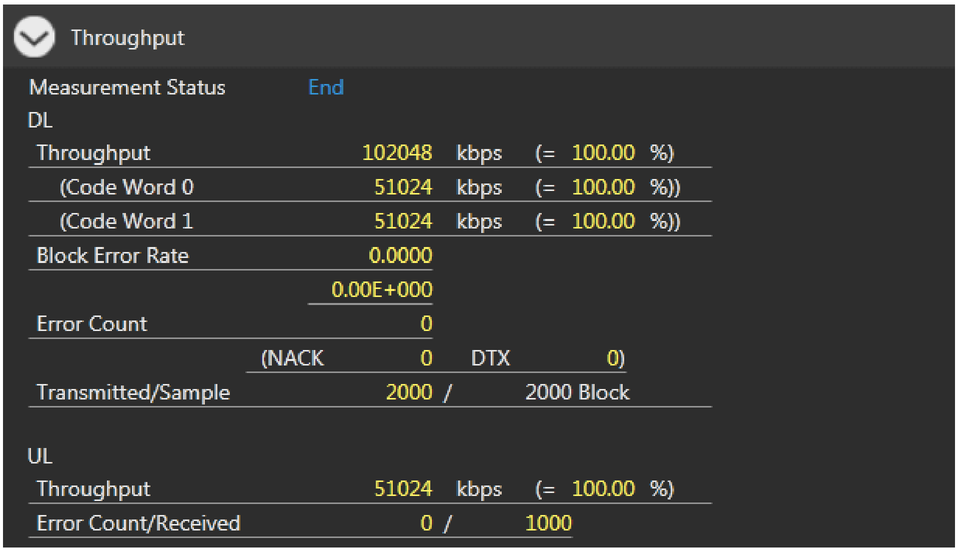


Figure 5.1.5.1-5 ***Throughput Measurement Result for UE Category 3 at Fundamental Measurement Parameter Screen (MT8821C)***

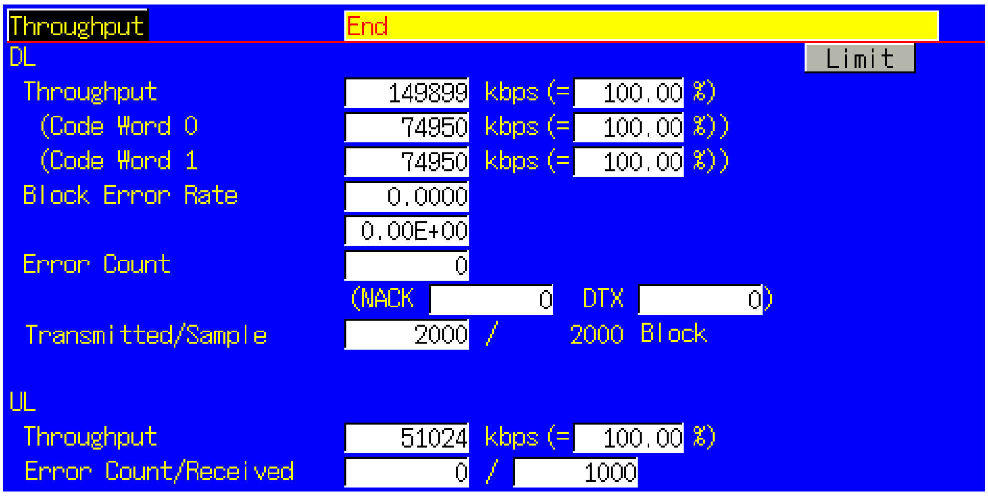


Figure 5.1.5.1-6 ***Throughput Measurement Result for UE Category 4 at Fundamental Measurement Parameter Screen (MT8820C)***

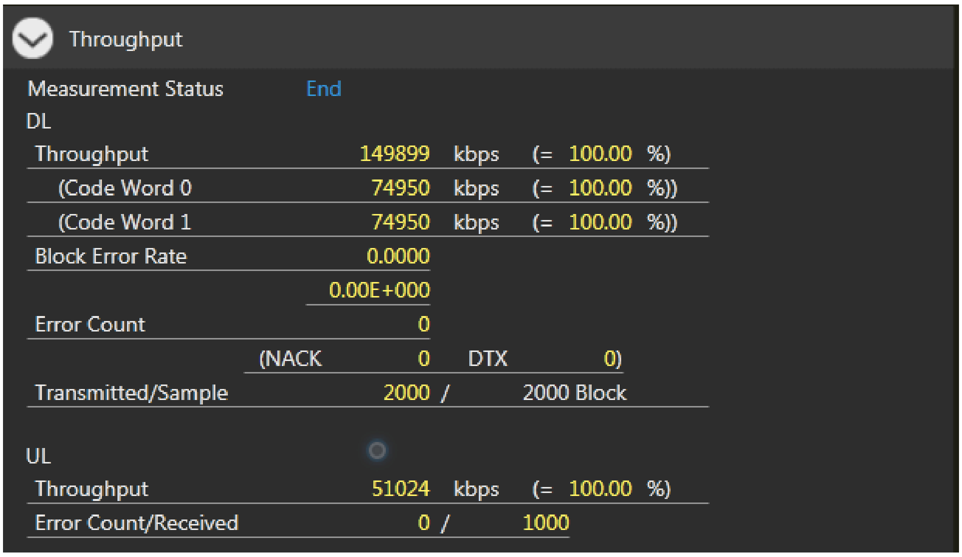


Figure 5.1.5.1-7 ***Throughput Measurement Result for UE Category 4 at Fundamental Measurement Parameter Screen (MT8821C)***

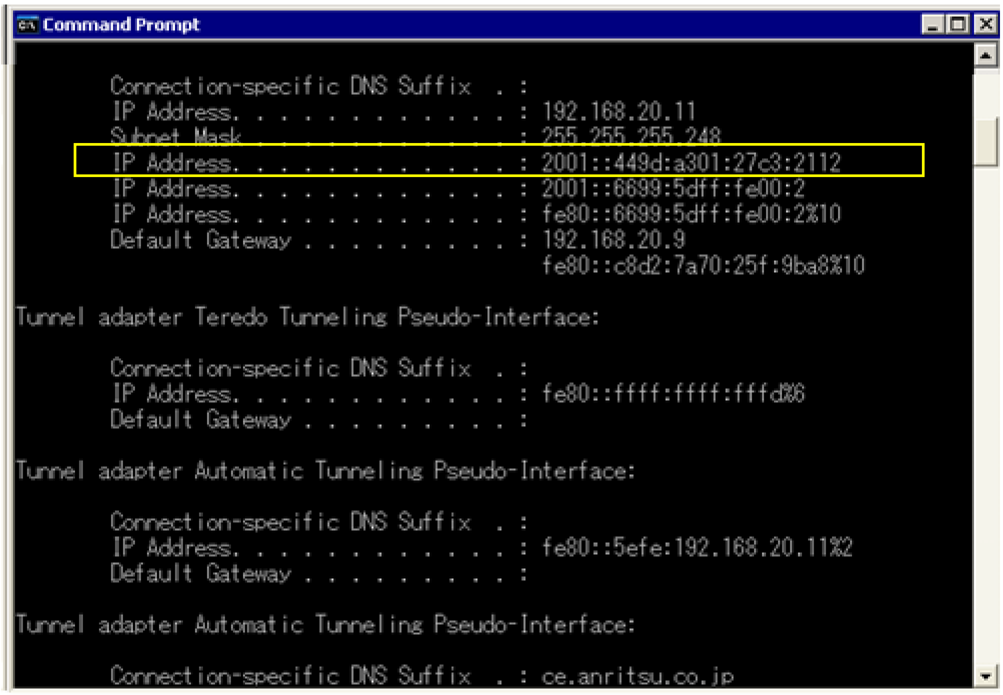
5.1.5.2. IPv6

This measurement can be performed using the same settings as in Chapter 5.1.5.1, by substituting the following steps.

4. Open Command Prompt at the client PC and run the "ipconfig" command. As shown at the following Command Prompt screen, the IPv6 address of the UE starts with the prefix 2001 and has a different Interface ID from the Local Link address.

NOTES:

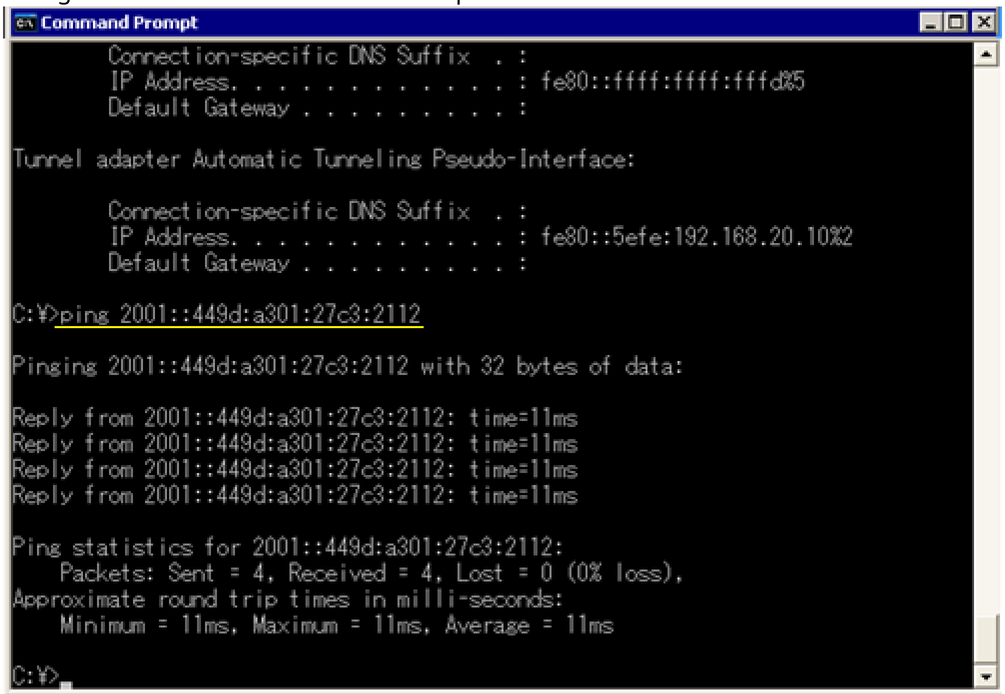
- ***Interface ID specifies the least-significant 64 bits of the IPv6 address.***
- ***The IP address starting with 2001::xxxx:xxxx:xxxx:xxxx at the Command Prompt screen shown below, is called the global address. On the other hand, the IP address starting with fe80::xxxx:xxxx:xxxx:xxxx is called the local link address.***
- ***A UE not supporting automatic IPv6 address assignment uses the IP address set at IPv6Client IP Address of the MT8821C.***



```
Command Prompt
        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : 192.168.20.11
        Subnet Mask . . . . . . . . . . . : 255.255.255.248
        IP Address. . . . . . . . . . . . : 2001::449d:a301:27c3:2112
        IP Address. . . . . . . . . . . . : 2001::6699:5dff:fe00:2
        IP Address. . . . . . . . . . . . : fe80::6699:5dff:fe00:2%10
        Default Gateway . . . . . . . . . : 192.168.20.9
                                            fe80::c8d2:7a70:25f:9ba8%10

Tunnel adapter Teredo Tunneling Pseudo-Interface:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : fe80::ffff:ffff:fffd%6
        Default Gateway . . . . . . . . . :

Tunnel adapter Automatic Tunneling Pseudo-Interface:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : fe80::5efe:192.168.20.11%2
        Default Gateway . . . . . . . . . :

Tunnel adapter Automatic Tunneling Pseudo-Interface:

        Connection-specific DNS Suffix  . : ce.anritsu.co.jp
```

Figure 5.1.5.2-1 ***Client PC IP Configuration***

5. Run the Ping command at the Command Prompt screen of the server PC to confirm the connection status.



```
Command Prompt
        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : fe80::ffff:ffff:fffd%5
        Default Gateway . . . . . . . . . :

Tunnel adapter Automatic Tunneling Pseudo-Interface:

        Connection-specific DNS Suffix  . :
        IP Address. . . . . . . . . . . . : fe80::5efe:192.168.20.10%2
        Default Gateway . . . . . . . . . :

C:¥>ping 2001::449d:a301:27c3:2112

Pinging 2001::449d:a301:27c3:2112 with 32 bytes of data:

Reply from 2001::449d:a301:27c3:2112: time=11ms
Reply from 2001::449d:a301:27c3:2112: time=11ms
Reply from 2001::449d:a301:27c3:2112: time=11ms
Reply from 2001::449d:a301:27c3:2112: time=11ms

Ping statistics for 2001::449d:a301:27c3:2112:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 11ms, Average = 11ms

C:¥>_
```

Figure 5.1.5.2-2 ***Result of Pinging Client PC from Server PC***

5.1.6. TCP/UDP Throughput

5.1.6.1. IPv4

This chapter explains TCP/UDP throughput measurement using the Iperf software for downlink throughput tests. Uplink throughput measurement is supported by switching the application server and client PCs.

1. Open the Command Prompt window on the client PC and run [cd c:¥] to change to the directory with Iperf.exe.
2. Run the following command to put the client PC into the wait status.
   - UDP: [iperf -s -u -w 64K]
   - TCP: [iperf -s -w 64K]

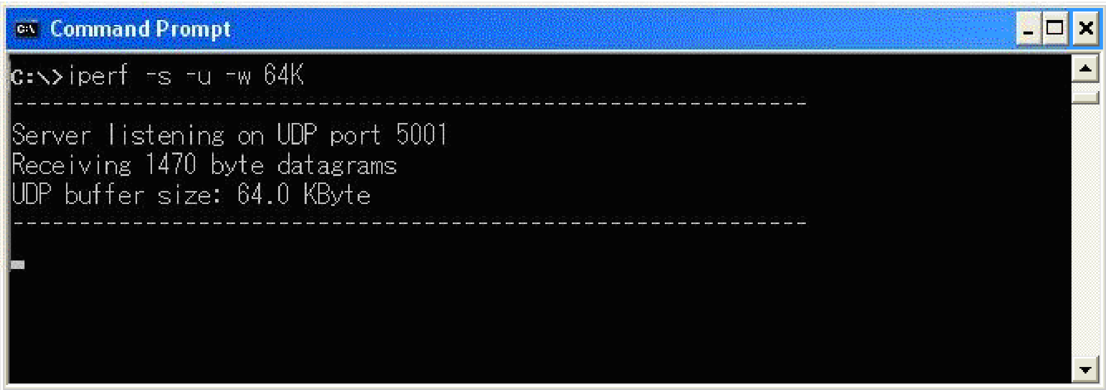


Figure 5.1.6.1-1 ***Screen after Running Iperf Command on Client PC***

3. Open the Command Prompt window on the server PC and run [cd c:¥] to change to the directory with Iperf.exe.
4. Run the following command to send data from the application server.
   - UDP: [iperf -c 192.168.20.11 -b 100M -w -64K]
   - TCP: [iperf -c 192.168.20.11 -w 64K]

   100M in the above command is determined by the measurement results of the previously mentioned UE Category 3 Throughput. For UE Category 4, use 150M.

5. The result is displayed in about 10 seconds.

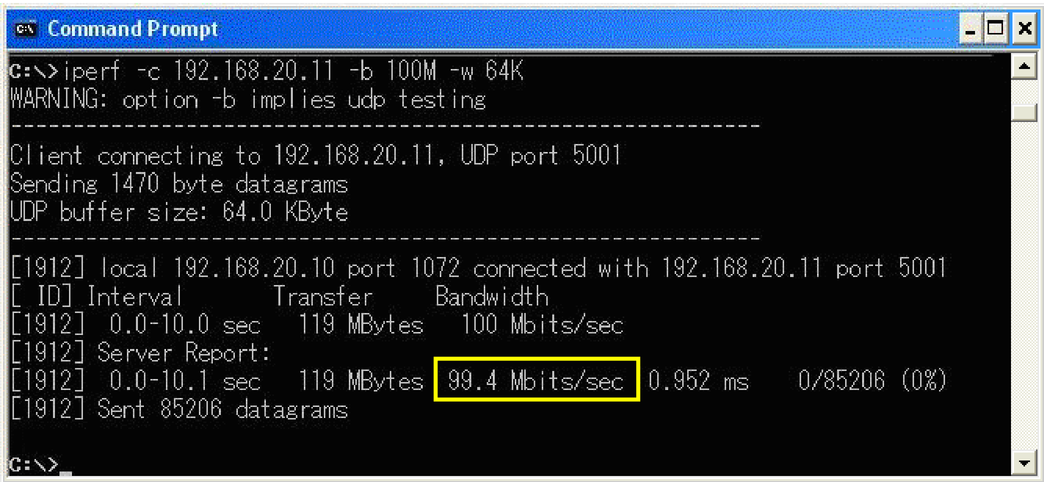


Figure 5.1.6.1-2 ***Screen after Running Iperf Command on Application Server and Result of UDP at UE Category 3***

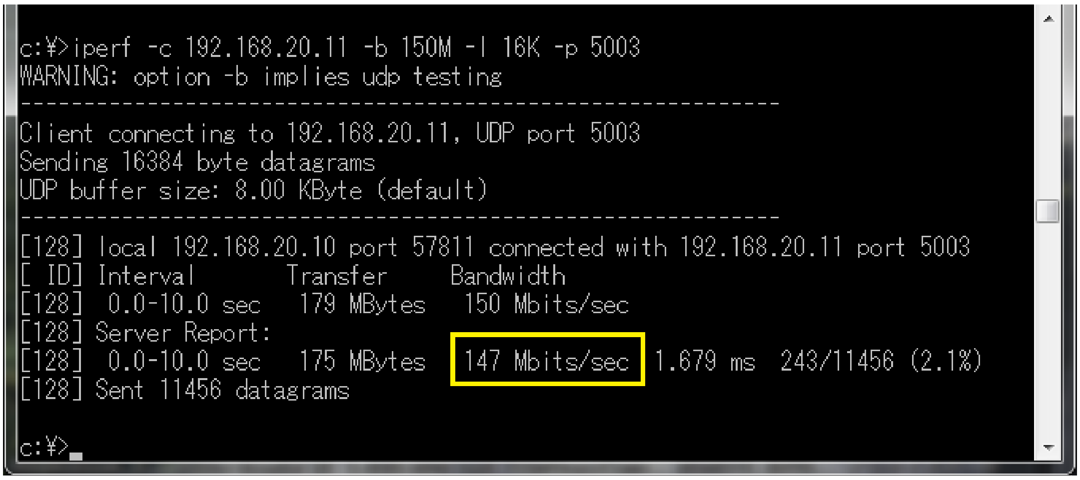


Figure 5.1.6.1-3 ***Screen after Running Iperf Command on Application Server and Result of UDP at UE Category 4***

6. Close the Command Prompt windows at the application server and client PCs.

5.1.6.2. IPv6

This measurement can be performed using the same procedure as in Chapter 5.1.6.1 using IPv6 Address for iperf command and adding the -V option.

5.1.7. IP Data Transfer Test with Connected DRX

This chapter explains how to verify IP Data Transfer with Connected DRX. The connection diagram and setting of Server/Client PCs are the same as chapter 5.1.

5.1.7.1. Initial Condition Setting

This example uses following parameters.

[Example of test condition]

Condition	***Value***
longDRX-Cycle	SF320
drxStartOffset	0
onDurationTimer	PSF20
Drx-InactivityTimer	PSF100
Drx-RetransmissonTimer	PSF16
shortDRX-Cycle	Off

[Procedure]

1. Perform Initial Condition setting. (→5.1.4)
2. Execute **DRXCYCLE SF320** to set **Call Processing Parameter – DRX - longDRX-Cycle** to **SF320**.
3. Execute **DRXSTART 0** to set **Call Processing Parameter – DRX - drxStartOffset** to **0**.
4. Execute **DRXONDURATION ON** to set **Call Processing Parameter – DRX - onDurationTimer** to **PSF20**.
5. Execute **DRXINACTIVITY PSF100** to set **Call Processing Parameter – DRX - Drx-InactivityTimer** to **PSF100**.
6. Execute **DRXRETRANS PSF16** to set **Call Processing Parameter – DRX - Drx-RetransmissionTimer** to **PSF16**.
7. Execute **SDRXCYCLE** to set **Call Processing Parameter – DRX - shortDRX-Cycle** to **OFF**.
8. Execute **SCHEDULING SRBSR** to set **Call Processing Parameter - Scheduling Type** to **Dynamic (SR/BSR)**.

5.1.7.2. Location Registration and Packet Connection

Refer to chapter 5.1.5.
After transitioning to the Connected state the UE enters the Connected DRX mode.

5.1.7.3. IP Data Transfer Test

Refer to chapter 5.1.6.

5.1.7.4. Reconfigure Connected DRX parameters

To reconfigure Connected DRX parameters, re-connect after changing parameters related to Connected DRX.

Example:
Changing longDRX-Cycle from SF320 to SF512.

[Procedure]

1. Execute **CALLSO** to ensure the call processing status is "Idle (Regist)".
2. Execute **CALLSTAT?** to confirm the call processing status is 2 or 1 (= Idle (Regist) or Idle).
3. Execute **DRXCYCLE SF512** to set longDRX-Cycle to SF512.
4. Execute **CALLSA** to ensure the call processing status is "Connected".
5. Execute **CALLSTAT?** to confirm the call processing status is 6 (= Connected).
   After transitioning to the Connected state the UE enters the Connected DRX mode.

5.1.8. RRC State Transition Test
5.1.8.1. Function Overview

This function makes the RRC State transition from the Connected to Idle state automatically when there is no IP Data to be transmitted/received for a certain period of time (Inactivity Timer) while the RRC Status is Connected.

Inactivity Timer
- Starts when there is no UL/DL Packet Data on the PDCP layer at some subframe timing
- Stops and resets when there is UL/DL Packet Data on the PDCP layer at some subframe timing

When the Inactivity Timer expires, the MT8821C sends the RRC Connection Release message to the UE and checks that the RRC State (Call Status) transitions from Connected to Idle(Regist).

NOTE1: This function is enabled only when Channel Coding is Packet or Packet (DL CA PCC).

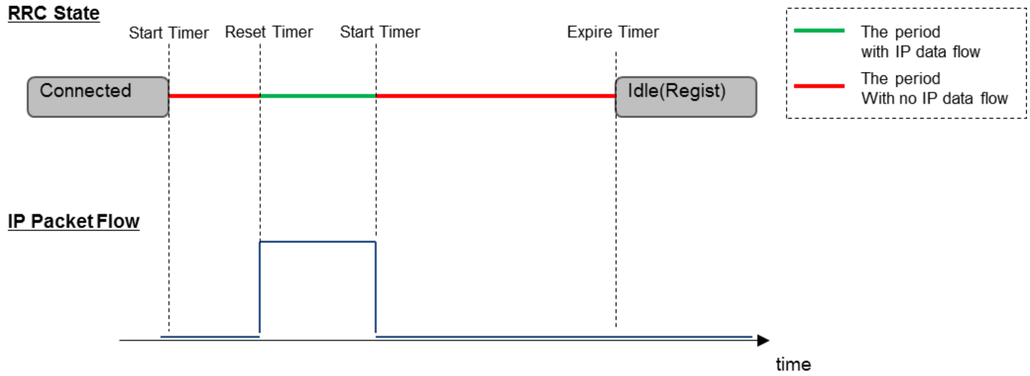


Figure 5.1.8.1-1 ***Overview of RRC State Transition/Inactivity Timer***

5.1.8.2. RRC State Transition Test Setting

This chapter explains the procedure for performing the RRC State Transition Test. The following is an example of setting the Timer to 10 seconds.

[Procedure]

1. Connect the UE and MT8821C.
2. Execute **CHCODING PACKET** to set **Channel Coding** to **Packet**.
3. Execute **STATETRANSTEST ON** to set **Call Processing Parameter - RRC State Transition** to **ON**.
4. Execute **TRANS_TIMER1 10.0** to set **Call Processing Parameter - Inactivity Timer** to **10.0**.
5. Turn on the UE power.
6. Ensure the UE is in the Connected state.
7. Packet communication is performed between the UE and MT8821C. (→5.1.6)
8. 10 seconds after the packet communication ends, the Call Status transitions from Connected to Idle(Regist)

5.2. IP Data Transfer Test for 2DL CA

For MT8820C, Release10 or later DL 2CA

The IP data transfer with the carrier aggregation can be tested by installing the MX882012C-026 LTE FDD DL CA IP Data Transfer option (hereafter MX882012C-026 option) in the MT8820C. Furthermore, using two MT8820C units with the MX882012C-026 option and the MX882012C-011 2x2 MIMO DL option (hereafter MX882012C-011 option) installed supports the IP Data Transfer Test for data rates up to 300 Mbps for DL CA and 2x2 MIMO.

NOTE 1: For the MT8820C, to use the MX882012C-026 option, the MX882012C-006/021 option must be installed in the MT8820C functioning as PCC. Also, the MX882012C-006 option must be installed in the MT8820C functioning as SCC.

NOTE 2: To test DL CA IP Data Transfer, two application servers and two EPS bearers must be established because two MT8820Cs are used and the UE should support Multiple PDN Connection.

The DL CA IP Data Transfer Test requires two application servers because this solution uses two MT8820Cs: connect the first application server to the 1000Base-T/1 port of the MT8820C functioning as PCC, and connect the second application server to that of the MT8820C functioning as SCC.

Furthermore, two EPS Bearers must be established to perform IP data communication with two IP data streams. The MT8820C will establish the default EPS Bearer as the first EPS Bearer during Registration, and establishes the second EPS Bearer by performing the Dedicated EPS Bearer Activation after ensuring Connected state.

The following figure shows the Layer-2 structure and an image of the IP data streams.

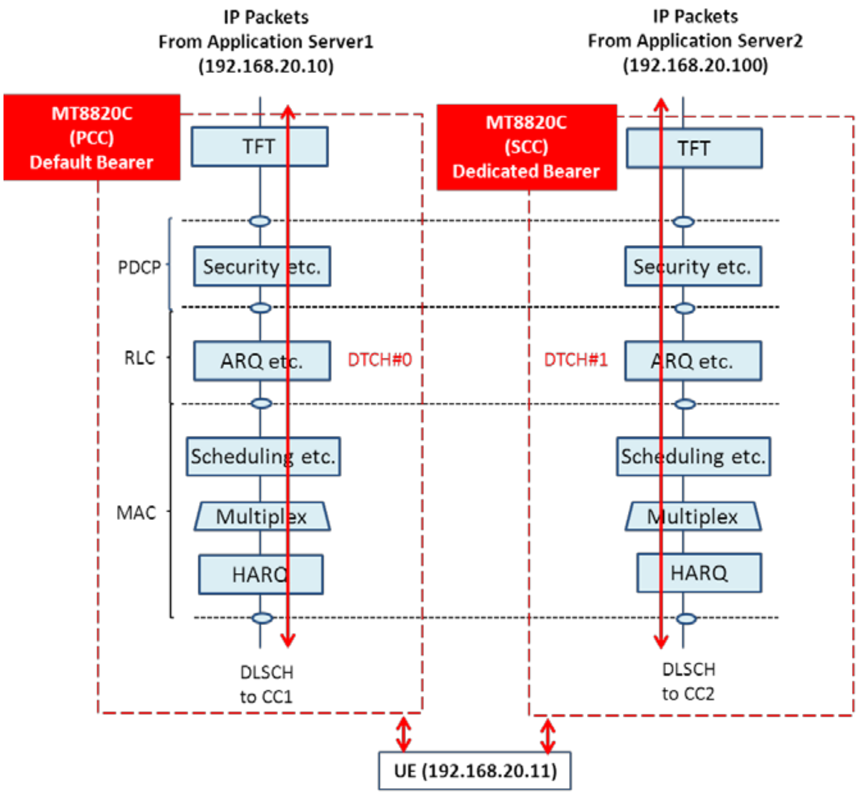


Figure 5.2-1 ***Layer-2 Structure and Image of IP Data Streams (MT8820C)***

The MT8820C functioning as PCC communicates with the UE using the IP data path of the Default EPS Bearer. The MT8820C functioning as SCC communicates with the UE using the IP data path of the Dedicated EPS Bearer. The Dedicated EPS Bearer has a TFT Filter allowing transmission of IP packets only when the source address of the IP packet from the application server matches the IP address setting of the TFT filter. (Therefore, the address of the TFT filter must match the IP address of the application server connected to the MT8820C functioning as SCC).

IP peak data rates up to 300 Mbps can be verified by performing IP communication between the UE and two application servers.

For MT8821C, Release10 or later DL 2CA

The IP data transfer with the carrier aggregation can be tested by installing the MX882112C-026 LTE FDD DL CA IP Data Transfer option (hereafter MX882112C-026 option) in the MT8821C. Furthermore, using the MT8821C unit with the MX882112C-011 2x2 MIMO DL option (hereafter MX882112C-011 option) installed supports the IP Data Transfer Test for data rates up to 300 Mbps for DL CA and 2x2 MIMO.

NOTE 3: To use the MX882112C-026 option, the MX882112C-006/021 option must be installed.

NOTE 4: Throughput may be unsutaible when test IP Data Transfer Test in TCP/IP bi-direction.In this case, please test Downlink and Uplink separatery.

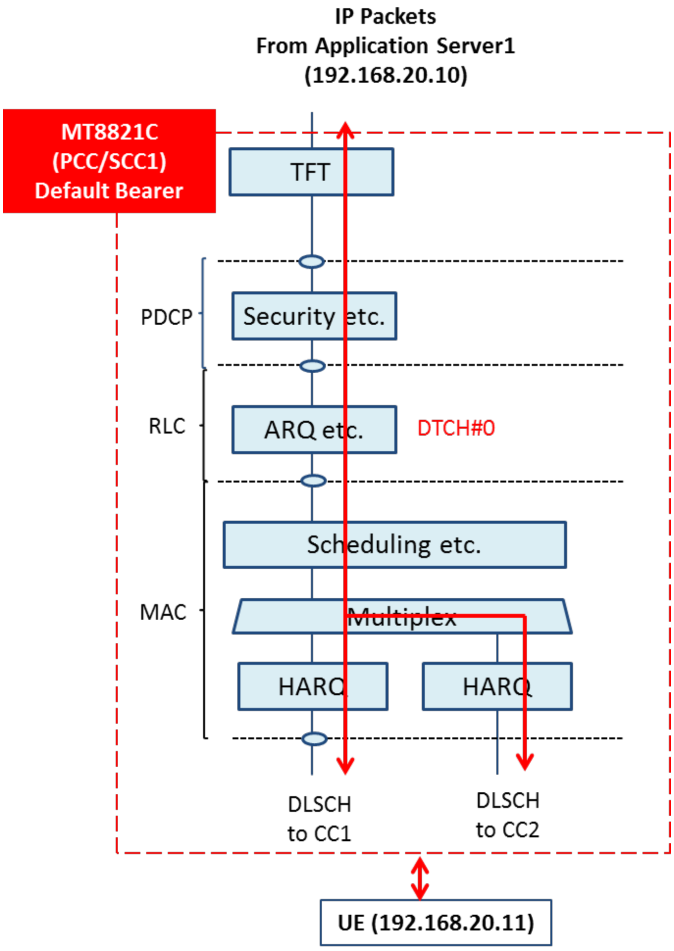


Figure 5.2-2 ***Layer-2 Structure and Image of IP Data Streams (MT8821C)***

5.2.1. Connection Diagram

5.2.1.1. Connection Diagram for IP Data Verification using MT8820C

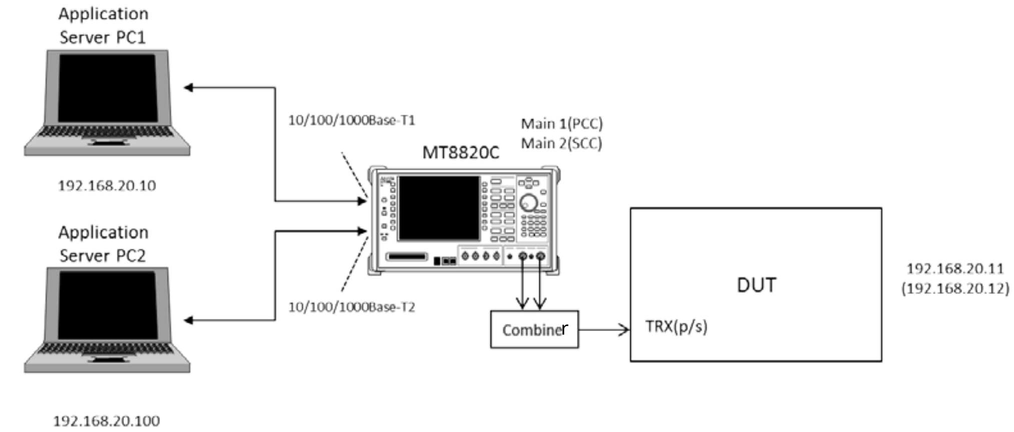


Figure 5.2.1.1-1 ***Connection Diagram for 2DL CA IP Data Transfer (MT8820C, ParallelPhone measurement, antenna configuration set to single)***

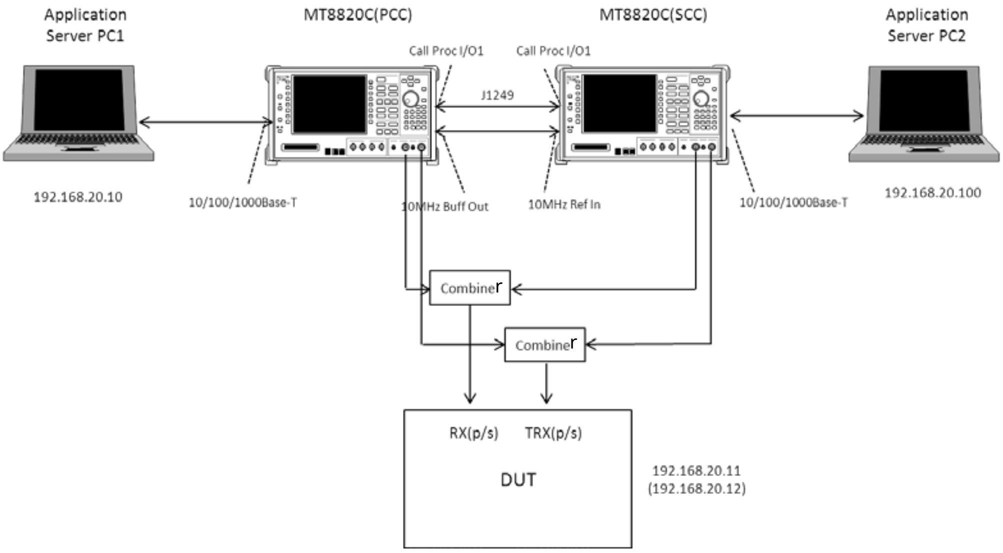


Figure 5.2.1.1-2 ***Connection Diagram for 2DL CA IP Data Transfer (MT8820C, ParallelPhone, antenna configuration set to 2x2 MIMO)***

5.2.1.2. Connection Diagram for IP Data Verification using MT8821C

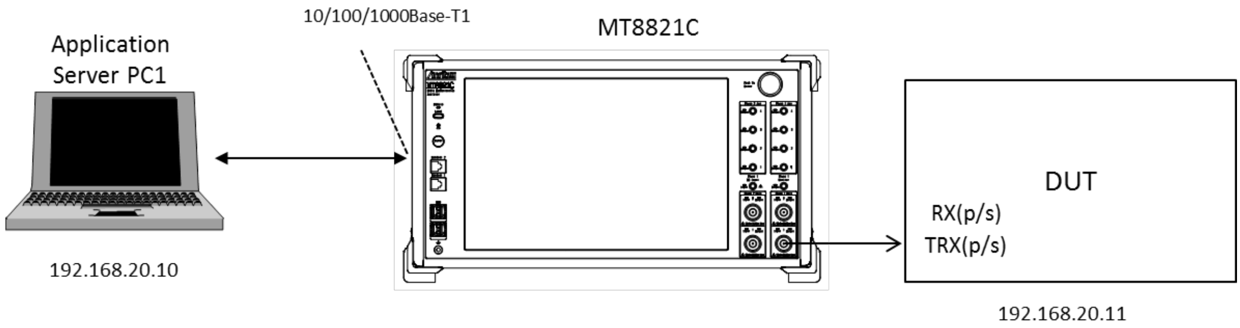


Figure 5.2.1.2-1 ***Connection Diagram for 2DL CA IP Data Transfer (using external server, antenna configuration set to single)***

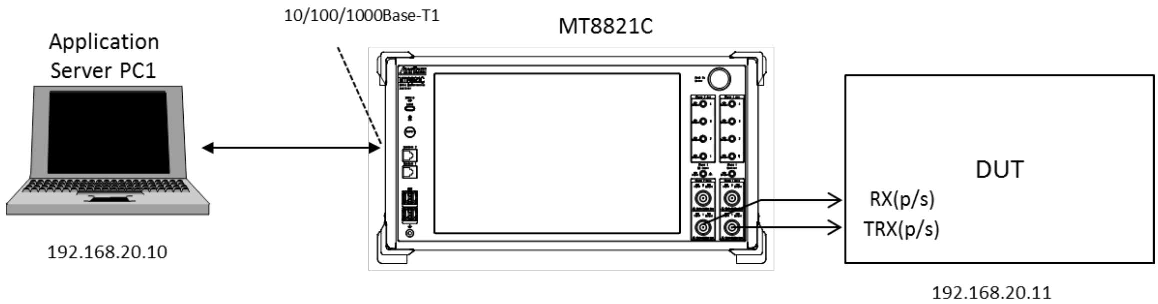


Figure 5.2.1.2-2 ***Connection Diagram for 2DL CA IP Data Transfer (using external server, antenna configuration set to 2x2 MIMO)***

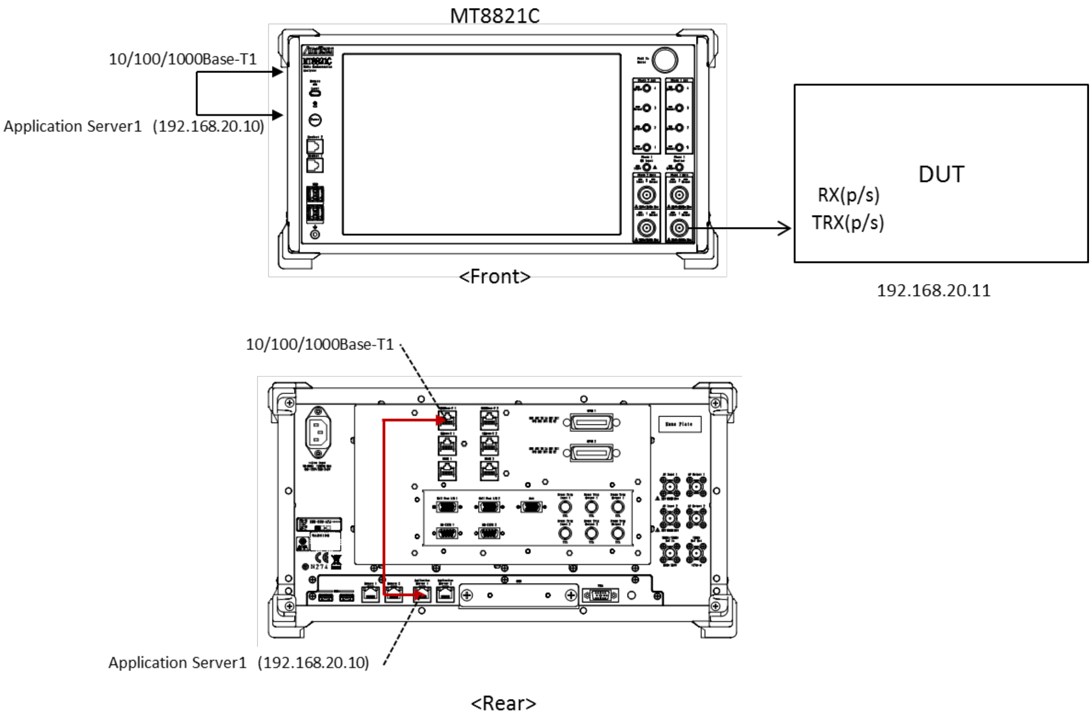
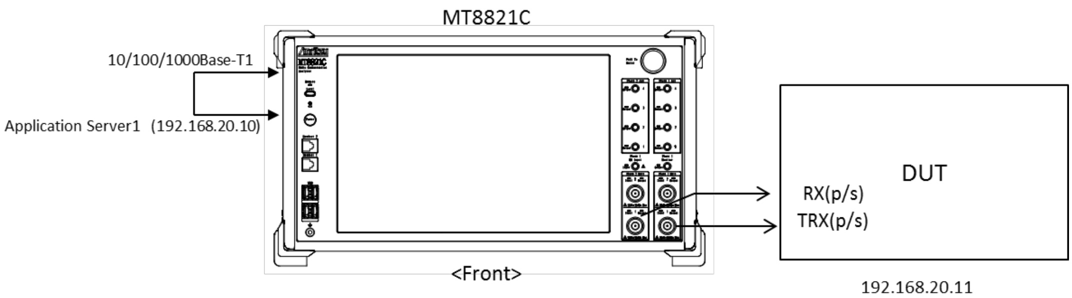


Figure 5.2.1.2-3 ***Connection Diagram for 2DL CA IP Data Transfer (using internal server, antenna configuration set to single)***



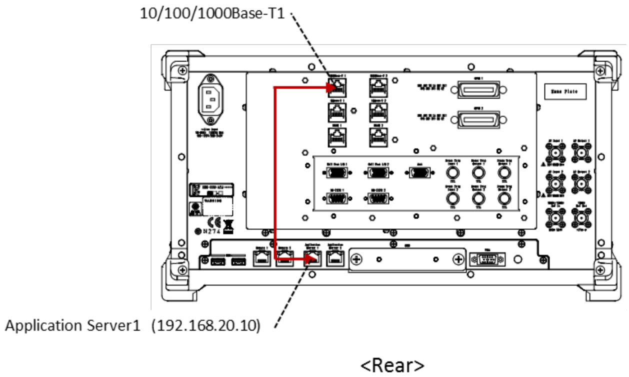


Figure 5.2.1.2-4 ***Connection Diagram for 2DL CA IP Data Transfer (using internal server, antenna configuration set to 2x2 MIMO)***

<Required Equipment>

- LTE mobile terminal supporting IP connection
- RF cable to connect MT8821C and LTE mobile terminal
- Application server PC with LAN adapter supporting 1000Base-TX
- Client PC
- Crossover cable to connect MT8821C and application server
- USB cable*[1] to connect DUT and client PC (if DUT is modem type)
- UDP/TCP Throughput measurement software (installed in application server and client PCs)*[2]

*1: USB **3.0** is recommended.

*2: This test uses the open-source software Iperf to measure throughput. It can be downloaded from the Internet. After downloading, copy the execute file (Iperf.exe) to the root of the C: drives in the application server and client PCs.

* Windows is registered trademark of Microsoft Corporation in the USA and other countries.

5.2.2. Application Server Connection and Setting

5.2.2.1. Using External Application Server for MT8820C

With the MT8820C powered-down (Off), use the crossover Ethernet cable to connect the 1000Base-TX port on the rear panel of the MT8820C to the application server.

When Phone1 is used as PCC and Phone2 is used as SCC-1 for IP data verification for 2DL CA SISO, connect the 1000Base-T1 port on the MT8820C rear panel to the Application Server PC1, and connect the 1000Base-T2 port on the MT8820C rear panel to the Application Server PC2, respectively.
When using two MT8820Cs for IP data verification for 2DL CA 2x2 MIMO IP, connect the 1000Base-T1 port on the rear panel of the MT8820C functioning as PCC to the Application Server PC1, and connect the 1000Base-T1 port on the rear panel of the MT8820C working as SCC-1 to the Application Server PC2, respectively. For details of the connection diagram, refer to **Figure 5.2.1.1-1** or **Figure 5.2.1.1-2** in Chapter 5.2.1.
Set the following IP addresses at each of the Application Servers (PC1/2). To set the IP addresses, refer to Chapter 5.1.2.

Application Server	***Parameter***	***Setting***
Application Server PC1	IP Address	192.168.20.10
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.20.1
Application Server PC2	IP Address	192.168.20.100
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.20.1

5.2.2.2. Using External Application Server for MT8821C

With the MT8821C powered-down (Off), use a crossover Ethernet cable to connect the 1000Base-TX port on the rear panel of the MT8821C to the application server.
Connect the 1000Base-T1 port on the MT8821C rear panel to the Application Server PC1. For details of the connection diagram, refer to **Figure 5.2.1.2-1** or **Figure 5.2.1.2-2** in Chapter 5.2.1.
Set the following IP addresses at each of the Application Servers (PC1/2). To set the IP addresses, refer to Chapter 5.1.2.

Parameter	***Setting***
IP Address	192.168.20.10
Subnet Mask	255.255.255.0
Default Gateway	192.168.20.1

5.2.2.3. Using Internal Application Server of MT8821C

The MT8821C has two Network Interface Cards (hereafter, NIC) internally and these can be used as Application Servers for IP data verification.
Connect the 1000Base-T1 port on the MT8821C rear panel to the Application Server PC1. For details of the connection diagram, refer to **Figure 5.2.1.2-3** or **Figure 5.2.1.2-4** in Chapter 5.2.1.
The following IP addresses are assigned as initial values at Application Server PC1/2

Application Server	***Parameter***	***Setting***
Application Server1	IP Address	192.168.20.10
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.20.1
Application Server2	IP Address	192.168.20.100
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.20.1

5.2.2.3

1. Open the property window for “Network and Sharing Center” at the MT8821C and select “Application Server1” or “Application Server2”.

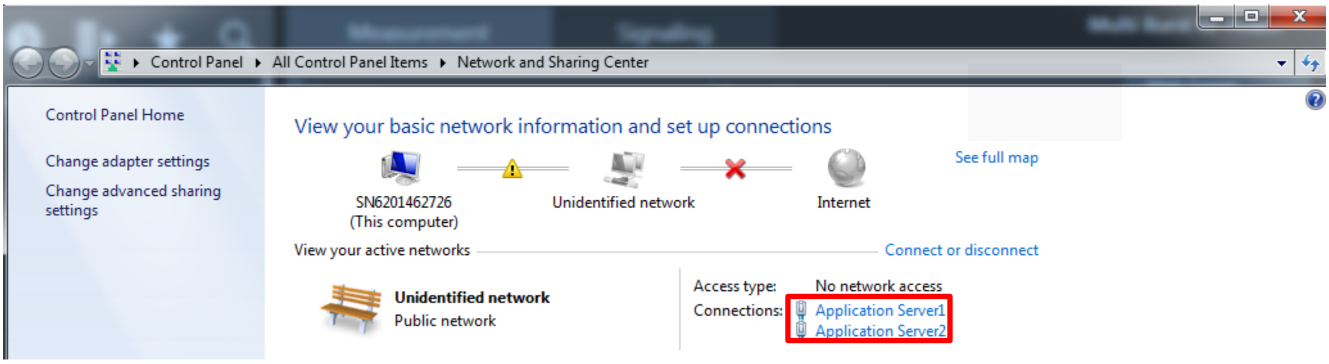


Figure 5.2.2.3-1 ***MT8821C “Network and Sharing Center” Setting Screen***

2. Select “Properties” at “Application Server1/2 Status”.

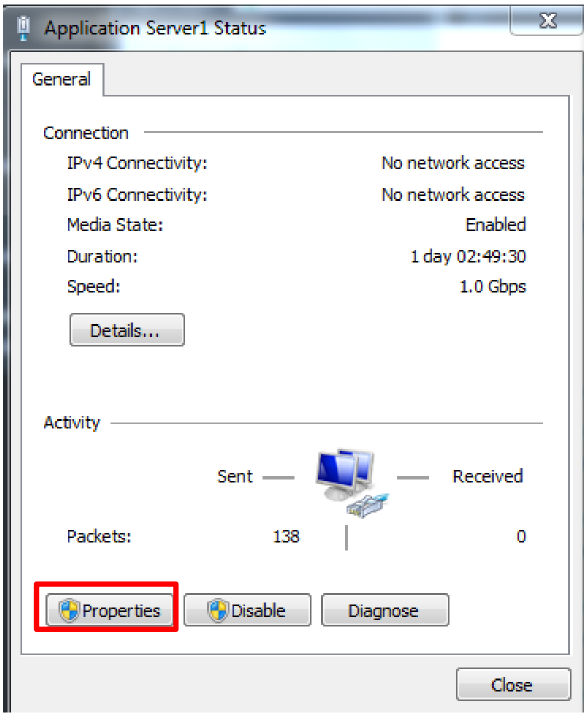


Figure 5.2.2.3-2 ***MT8821C “Application Server Status” Setting Screen (Example shows Application Server1)***

3. Select “Internet Protocol Version4 (TCP/IPv4)”.

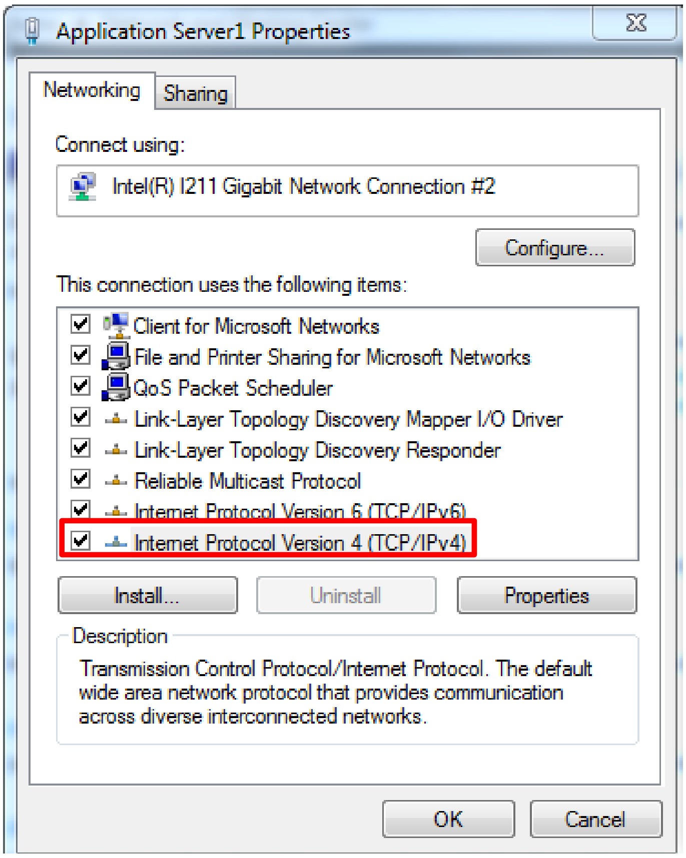


Figure 5.2.2.3-3 ***MT8821C “Application Server Properties” Setting Screen (Example shows Application Server1)***

4. At the Properties screen, select “Use the following IP address” and set each parameter (IP address, Subnet mask and Default gateway), then click “OK”. Select “Internet Protocol Version4 (TCP/IPv4)”.

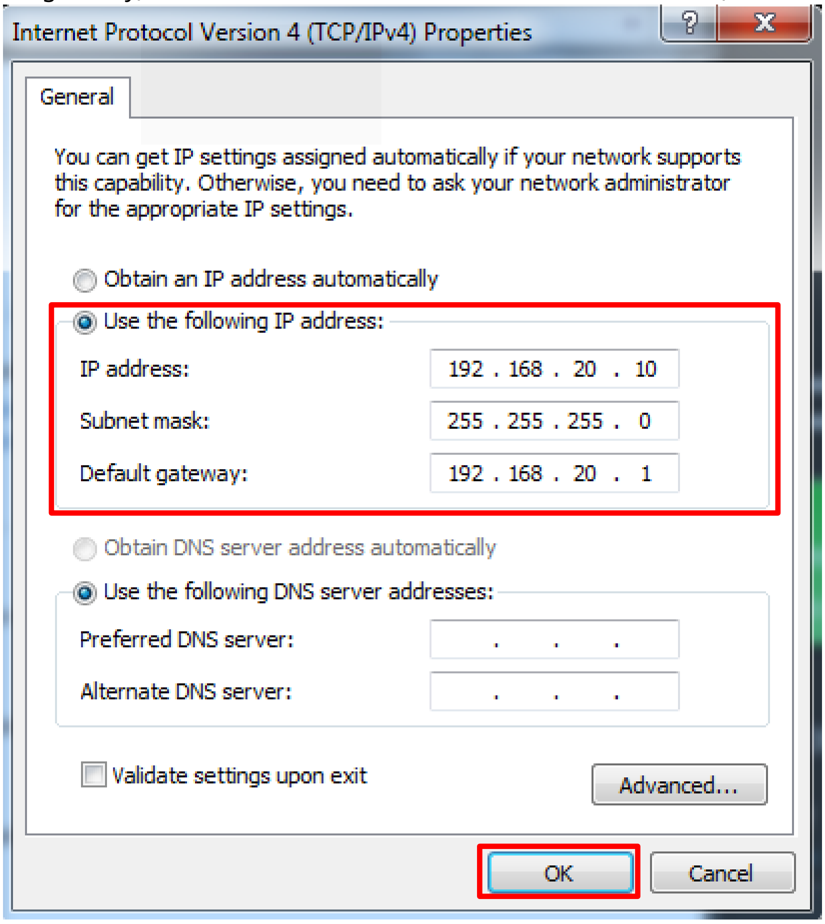


Figure 5.2.2.3-4 ***MT8821C “Internet Protocol Version4 (TCP/IP) Properties” Setting Screen (Example shows Application Server1)***

5. After completing the settings, close each setting screen.

5.2.3. Client PC Connection and Setting

The client PC connection and setting depend on the mobile terminal. Set according to the connection method used.

5.2.4. Synchronizing Frame Timing Between 2 Cells

For synchronizing frame timing, refer to Chapter 2.2.2.

5.2.5. Initial Condition Settings

The following setting is an example of the peak data rate in UE Category 6.

[Example of test conditions]

Serv. Cell	***Parameter***	***Setting***
PCC	Operation Band	1
	DL Channel	300
	UL Channel	18300
	Bandwidth	20 MHz
	Transmission Mode (Antenna Configuration)	Transmission Mode3 (2x2 MIMO (Open Loop))
	DL Number of RB	100
	DL MCS Index	All 28
	UL Number of RB	100
	UL MCS Index	23
SCC	Operation Band	1
	DL Channel	498
	UL Channel	-
	Bandwidth	20 MHz
	Transmission Mode (Antenna Configuration)	Transmission Mode3 (2x2 MIMO (Open Loop))
	DL Number of RB	100
	DL MCS Index	All 28
	UL Number of RB	100
	UL MCS Index	23

5.2.5.1. MT8820C

[Procedure]

The PCC setting is indicated in **red bold [PCC]**, and the SCC setting is indicated in **blue bold [SCC]**.

[MT8820C PCC]

1. **[PCC]** Execute **PRESET** to set default parameter.
2. **[PCC]** Execute **CALLPROC ON** to set **Call Processing** to **On**.
3. **[PCC]** Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Channel Bandwidth** to **20 MHz**.
4. **[PCC]** Execute **DLCHAN 300** to set **Common Parameter - UL Channel and DL Channel** to **18300** and **300**, respectively.
5. **[PCC]** Execute **CHCODING PACKET_DL_CA_PCC** to set **Common Parameter - Channel Coding** to **Packet (DL CA - PCC)**.
6. **[PCC]** Execute **ANTCONFIG OPEN_LOOP** to set **Common Parameter - Antenna Configuration** to **2x2MIMO (Open Loop)**.
7. **[PCC]** Execute **ULRMC_RB 100** to set **Common Parameter - UL RMC - Number of RB** to **100**.
8. **[PCC]** Execute **ULIMCS 23** to set **Common Parameter - UL RMC - MCS Index** to **23**.
9. **[PCC]** Execute **DLRB 100,0** to set **Common Parameter - DL RMC - Number of RB** to **100**, and **DL RMC - Starting RB** to **0**.
10. **[PCC]** Execute **DLIMCS1 28**, **DLIMCS2 28** and **DLIMCS3 28** to set **Common Parameter - DL RMC - MCS Index1/2/3** to **28**.
11. **[PCC]** Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter - SCC1 - Channel Bandwidth** to **20 MHz**.
12. **[PCC]** Execute **DLCHAN_SCC1 498** to set **Common Parameter - SCC1 - DL Channel** to **498**.
13. **[PCC]** Execute **DLRMC_RB_SCC1 100** to set **Common Parameter - SCC1 - DL RMC - Number of RB** to **100**.
14. **[PCC]** Execute **DLIMCS1_SCC1 28**, **DLIMCS2_SCC1 28** and **DLIMCS3_SCC1 28** to set **All of SCC1 - DL RMC - MCS Index1/2/3** to **28**.

Note: The above four procedures are for the SCC setting. Set these parameters to match the MT8820C settings.

MT8820C (PCC)	***MT8820C (SCC)***
Call Processing Parameter - SCC-1 - Channel Bandwidth	Common Parameter - Channel Bandwidth
Call Processing Parameter - SCC-1 - DL Channel	Common Parameter - DL Channel
Call Processing Parameter - SCC-1 - DL RMC Number of RB	Common Parameter - DL RMC - Number of RB
Call Processing Parameter - SCC-1 - DL RMC - MCS Index1/2/3	Common Parameter - DL RMC - MCS Index1/2/3

15. **[PCC]** Execute **SERVERIP 192,168,20,10** to set **Call Processing Parameter - Packet - Server IP Address** to **192.168.20.10**.
16. **[PCC]** Execute **CLIENTIP 192,168,20,11** to set **Client IP Address 1** to **192.168.20.11**.
17. **[PCC]** Execute **CLIENTIP2 192,168,20,12** to set **Client IP Address 2** to **192.168.20.12**.
18. **[PCC]** Execute **DEDEPSACT ON** to set **Dedicated EPS Bearer Activation** to **On**.
19. **[PCC]** Execute **LINKEPSID 5** to set **Linked EPS Bearer Identity** to **5**. (Note 2)
20. **[PCC]** Execute **TFTIPV4 192,168,20,100** to set **TFT Remote IPv4 Address** to 192.168.20.100.
21. **[PCC]** Execute **TPUT_MEAS ON** to set **Throughput Measurement** to **On**.

Note: Set Dedicated EPS Bearer Activation to On when verifying IP Data Transfer with carrier aggregation.

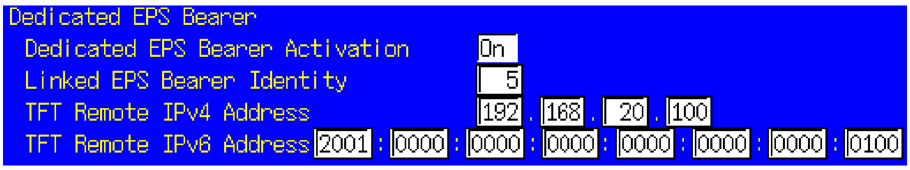


Fig. 5.2.5.1-1 Parameter Setting for Dedicated EPS Bearer

[MT8820C SCC]

22. **[SCC]** Execute **PRESET** to set default parameters.
23. **[SCC]** Execute **CALLPROC OFF** to set **Call Processing** to **Off**.
24. **[SCC]** Execute **BANDWIDTH 20MHZ** to set **Channel Bandwidth** to **20 MHz**.
25. **[SCC]** Execute **DLCHAN 498** to **DL Channel** to **498**.
26. **[SCC]** Execute **CHCODING PACKET_DL_CA_SCC** to set **Channel Coding** to **Packet (DL CA - SCC)**.
27. **[SCC]** Execute **ANTCONFIG OPEN_LOOP** to set **Antenna Configuration** to **2x2MIMO (Open Loop)**.
28. **[SCC]** Execute **DLRB 100,0** to set **DL RMC - Number of RB** to **100**, and **DL RMC - Starting RB** to **0**.
29. **[SCC]** Execute **DLIMCS1 28, DLIMCS2 28** and **DLIMCS3 28** to set **All of DL RMC - MCS Index(x)** to **28**.
30. **[SCC]** Execute **BANDWIDTH_PCC 20MHZ** to set **PCC - Channel Bandwidth** to **20 MHz**.
31. **[SCC]** Execute **ULCHAN_PCC 18300** to set **PCC - UL Channel** to **18300**.
32. **[SCC]** Execute **ULRMCRB_PCC 100** to set **PCC - UL RMC - Number of RB** to **100**.
33. **[SCC]** Execute **ULRB_START_PCC 0** to set **PCC - UL RMC - Starting RB** to **0**.
34. **[SCC]** Execute **ULIMCS_PCC 23** to set **PCC - MCS Index** to **23**.

Note: The above five procedures are necessary to receive the uplink signal at the MT8820C SCC.
Set the same parameters as the MT8820C functioning as PCC.

MT8820C (PCC)	*MT8820C (SCC)*
Common Parameter - Channel Bandwidth	Call Processing Parameter - PCC - Channel Bandwidth
Common Parameter - UL Channel	Call Processing Parameter - PCC - UL Channel
Common Parameter - UL RMC - Number of RB	Call Processing Parameter - PCC - UL RMC Number of RB
Common Parameter - UL RMC - Starting RB	Call Processing Parameter - PCC - UL RMC Starting RB
Common Parameter - UL RMC - MCS Index	Call Processing Parameter - PCC - UL RMC MCS Index

35. **[SCC]** Execute **SERVERIP 192,168,20,10** to set **Server IP Address** to **192.168.20.10**.
36. **[SCC]** Execute **CLIENTIP 192,168,20,11** to set **Client IP Address** to **192.168.20.11**.
37. **[SCC]** Execute **CLIENTIP2 192,168,20,12** to set **Client IP Address 2** to **192.168.20.12**.
38. **[SCC]** Execute **DEDEPSACT ON** to set **Dedicated EPS Bearer Activation** to **On**.
39. **[SCC]** Execute **LINKEPSID 5** to set **Linked EPS Bearer Identity** to **5**. (Note 2)
40. **[SCC]** Execute **TFTIPV4 192.168.20.100** to set **TFT Remote IPv4 Address** to **192.168.20.100**.
41. **[SCC]** Execute **CALLSO** to reset the internal configuration of the MT8820C SCC.

Note 1: Execute this procedure to ensure IP Data communication on the MT8820C SCC.

Note 2: Some UEs may request establishment of the second Default EPS Bearer by conveying a PDN Connectivity Request message after checking the Connected state. To verify IP data communication with this UE and communicate to the second EPS Bearer, execute following procedure instead of step19 and step 38.

19. **[PCC]** Execute **LINKEPSID 6** to set **Linked EPS Bearer Identity** to **6**.
38. **[SCC]** Execute **LINKEPSID 6** to set **Linked EPS Bearer Identity** to **6**.

The Dedicated EPS Bearer will be linked to the second Default EPS Bearer by these settings. The SCC using the dedicated EPS Bearer as the IP data path will communicate with the second Default EPS Bearer's IP address (Call Processing Parameter - Client IP Address2).

[Example of IP Data Path when Linked EPS Bearer Identity Set to 6]
The SCC can communicate with the second EPS Bearer's IP address (Call Processing Parameter - Client IP Address2).

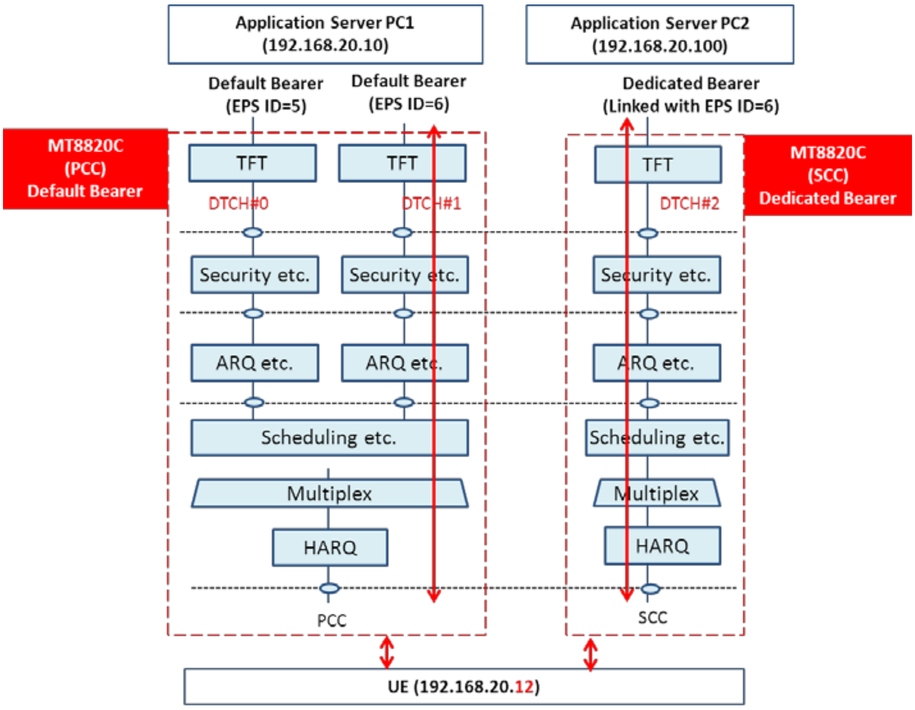


Fig. 5.2.5.1-2 ***IP Data Path (Linked EPS Bearer Identity = 6)***

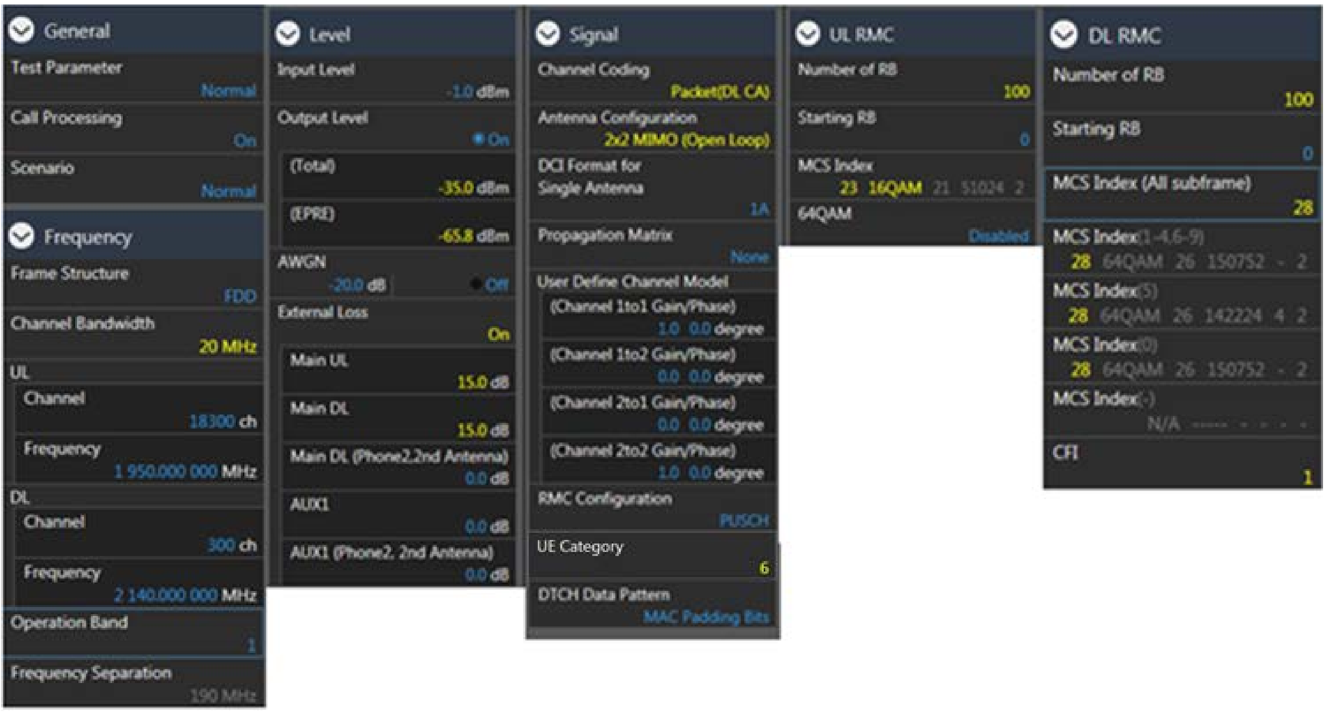
5.2.5.2. MT8821C

[Procedure using GUI]

Set each parameter at Common Parameter (PCC/SCC-1), Call Processing Parameter, and Fundamental Measurement Parameter.

Common Parameter – PCC

1. Execute Preset to set the default parameters.
2. Set **Common Parameter - Call Processing** to **On**.
3. Set **Common Parameter – Frequency - Channel Bandwidth** to **20 MHz**.
4. Set **Common Parameter - Frequency - UL Channel and DL Channel** to **18300** and **300**, respectively.
5. Set **Common Parameter - Signal - Channel Coding** to **Packet (DL CA)**.
6. Set **Common Parameter - Signal - Antenna Configuration** to **2x2MIMO (Open Loop)**.
7. Set **Common Parameter - Level - Output Level(EPRE)** to **–70.0 dBm/15 kHz**.
8. Set **Common Parameter - UL RMC - Number of RB** to **100**.
9. Set **Common Parameter - UL RMC - MCS Index** to **23**.
10. Set **Common Parameter - DL RMC - Number of RB** to **100**, and **Common Parameter - DL RMC - Starting RB** to **0**.
11. Set All of **Common Parameter - DL RMC - MCS Index1/2/3** to **28**.

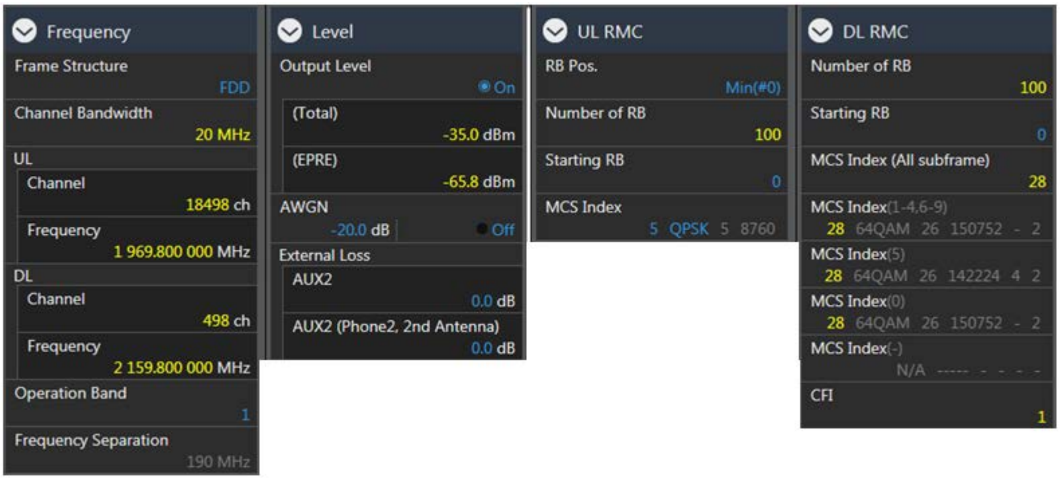


Call Processing Parameter

1. Set **Call Processing Parameter - Carrier Aggregation - Number of DL SCC** to **1**.
2. Set **Call Processing Parameter - Packet - Server IP Address** to **192.168.20.10**.
3. Set **Call Processing Parameter - Packet - Client IP Address 1** to **192.168.20.11**.
4. Set **Call Processing Parameter - Packet - Client IP Address 2** to **192.168.20.12**.
5. Set **Call Processing Parameter - Packet - TFT Remote IPv4 Address** to **192.168.20.100**.

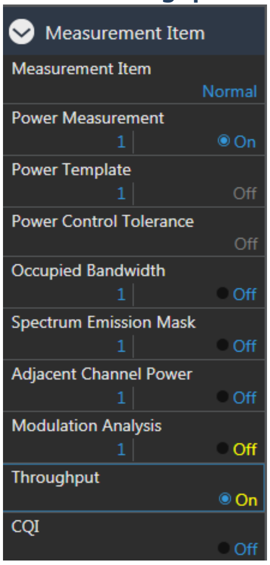
Common Parameter - SCC-1

1. Set **Common Parameter - SCC1 - Channel Bandwidth** to **20 MHz**.
2. Set **Common Parameter - SCC1 - DL Channel** to **498**.
3. Set **Common Parameter - SCC-1 - Output Level(EPRE)** to **–70.0 dBm/15 kHz**.
4. Set **Common Parameter - SCC1 - DL RMC - Number of RB** to **100**, and **Common Parameter - SCC1 - DL RMC - Starting RB** to **0**.
5. Set All of **Common Parameter - SCC1 - DL RMC - MCS Index1/2/3** to **28**.



Fundamental Measurement Parameter

1. Set **Fundamental Measurement Parameter - Throughput Measurement** to **On**.



[Procedure using Remote Commands]

1. Execute **PRESET** to set default parameter.
2. Execute **CALLPROC ON** to set **Common Parameter - Call Processing** to **On**.
3. Execute **BANDWIDTH 20MHZ** to set **Common Parameter – Frequency - Channel Bandwidth** to **20 MHz**.
4. Execute **DLCHAN 300** to set **Common Parameter - Frequency - UL Channel** and **DL Channel** to **18300** and **300**.
5. Execute **CHCODING PACKET_DL_CA_PCC** to set **Common Parameter - Signal - Channel Coding** to **Packet (DL CA)**.
6. Execute **ANTCONFIG OPEN_LOOP** to set **Common Parameter - Signal - Antenna Configuration** to **2x2MIMO (Open Loop)**.
7. Execute **DLSCC 1** to set **Call Processing Parameter - Carrier Aggregation - Number of DL SCC** to **1**.
8. Execute **OLVL_EPRE -70.0** to set **Common Parameter - Level - Output Level(EPRE)** to **–70.0 dBm/15 kHz**.
9. Execute **ULRMC_RB 100** to set **Common Parameter - UL RMC - Number of RB** to **100**.
10. Execute **ULIMCS 23** to set **Common Parameter - UL RMC - MCS Index** to **23**.
11. Execute **DLRB 100,0** to set **Common Parameter - DL RMC - Number of RB** to **100**, and **Common Parameter - DL RMC - Starting RB** to **0**.
12. Execute **DLIMCS1 28**, **DLIMCS2 28** and **DLIMCS3 28** to set All of **Common Parameter - DL RMC - MCS Index1/2/3** to **28**.
13. Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter - SCC1 - Channel Bandwidth** to **20 MHz**.
14. Execute **DLCHAN_SCC1 498** to set **Common Parameter - SCC1 - DL Channel** to **498**.
15. Execute **OLVL_EPRE_SCC1 -70.0** to set **Common Parameter - SCC-1 - Output Level(EPRE)** to **–70.0 dBm/15kHz**.
16. Execute **DLRB_SCC1 100,0** to set **Common Parameter - SCC1 - DL RMC - Number of RB** to **100**, and **Common Parameter - SCC1 - DL RMC - Starting RB** to **0**.
17. Execute **DLIMCS1_SCC1 28**, **DLIMCS2_SCC1 28** and **DLIMCS3_SCC1 28** to set All of **Common Parameter - SCC1 - DL RMC - MCS Index1/2/3** to **28**.

18. Execute **SERVERIP 192,168,20,10** to set **Call Processing Parameter - Packet - Server IP Address** to **192.168.20.10**.
19. Execute **CLIENTIP 192,168,20,11** to set **Call Processing Parameter - Packet - Client IP Address 1** to **192.168.20.11**.
20. Execute **CLIENTIP2 192,168,20,12** to set **Call Processing Parameter - Packet - Client IP Address 2** to **192.168.20.12**.
21. Execute **TFTIPV4 192,168,20,100** to set **Call Processing Parameter - Packet - TFT Remote IPv4 Address** to **192.168.20.100**.
22. Execute **TPUT_MEAS ON** to set **Fundamental Measurement Parameter - Throughput Measurement** to **On**.

5.2.6. Location Registration and Packet Connection

5.2.6.1. MT8820

1. **[SCC]** Execute **LVL OFF** to set **SCell output power** to **off**.
2. **[PCC]** Execute **CALLSO** to clear call processing.
3. **[PCC]** Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
4. Turn on the UE power.
5. **[PCC]** Execute **CALLSTAT?** to confirm the call processing status is 6 (= Connected).
   Repeat Polling query response when the checked status is not 6 (= Connected).
6. **[SCC]** Execute **LVL ON** to set **SCell output power** to **On**.
7. **[PCC]** Execute **TPUT_SAMPLE 2000** to set **the number of Throughput measurement samples** to **2000**.
8. **[PCC]** Execute **SWP** to perform the Throughput measurement.
9. **[PCC]** Execute **TPUT? PER** to read the Throughput measurement result (%).
   If an error occurs, the reception state must to be optimized by changing the RMC setting by referring to Chapter 5.2.5.

5.2.6.2. MT8821

1. Execute **CALLSO** to clear call processing.
2. Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
3. Turn on the UE power.
4. Execute **CALLSTAT?** to confirm the call processing status is 6 (= Connected).
   Repeat Polling query response when the checked status is not 6 (= Connected).
5. Execute **TPUT_SAMPLE 2000** to set **the number of Throughput measurement samples** to **2000**.
6. Execute **SWP** to perform the Throughput measurement.
7. Execute **TPUT? PER** to read the Throughput measurement result (%).
   If an error occurs, the DL transmission condition must be optimized by changing the output level or DL RMC setting of each CC by referring to Chapter 5.2.5.

5.2.7. TCP/UDP Throughput

5.2.7.1. MT8820C

This chapter explains TCP/UDP throughput measurement using the Iperf software for downlink throughput tests. Uplink throughput measurement is supported by switching the application server and client PCs.

1. Open two Command Prompt windows on the Client PC and execute [cd c:¥] to change to the directory containing Iperf.exe. (If the DUT is a smartphone, open the iperf application.)
2. Run the following commands to put the client PC into the wait status.

   TCP: [**iperf -s -i 2 -w 2M -p 50000**]
   UDP: [**iperf -s -u -i 2 -w 2M -p 50000**]

   (If the DUT is smartphone, open the iperf application.)

   TCP: [**-s -i 2 -w 2M -p 50000**]
   UDP: [**-s -u -i 2 -w 2M -p 50000**]

3. Open the Command Prompt window on Application Server 1/2 and execute [cd c:¥] to change to the directory containing Iperf.exe

[Case1: Linked EPS Bearer Identity = 5, Client IP Address = 192.168.20.11]

4. Run the following commands to send data from Application Server 1 and 2.

   TCP: [**iperf -c 192.168.20.11 -w 2M -t 100000 -i 1 -p 50000**]
   UDP: [**iperf -c 192.168.20.11 -b 150M -w 2M -t 100000 -i 1 -p 50000**]

5. The IP data throughput is displayed at the iperf application on the client server.

[Case2: Linked EPS Bearer Identity = 6, Client IPAddress2 = 192.168.20.12]

4. Run the following commands to send data from Application Server 1 and 2.

   TCP: [**iperf -c 192.168.20.12 -w 2M -t 100000 -i 1 -p 50000**]
   UDP: [**iperf -c 192.168.20.12 -b 150M -w 2M -t 100000 -i 1 -p 50000**]

5. The IP data throughput is displayed by the iperf application on the client server.

5.2.7.2. MT8821C

This chapter explains TCP/UDP throughput measurement using the Iperf software for downlink throughput tests. Uplink throughput measurement is supported by switching the application server and client PCs.

1. Open a Command Prompt windows on the Client PC and execute [cd c:¥] to change to the directory containing Iperf.exe. (If the DUT is a smartphone, open the iperf application)
2. Run the following commands to put the client PC into the wait status.

   TCP: [**iperf -s -i 2 -w 2M -p 50000**]
   UDP: [**iperf -s -u -i 2 -w 2M -p 50000**]
   (If the DUT is a smartphone, open the iperf application)

   TCP: [**-s -i 2 -w 2M -p 50000**]
   UDP: [**-s -u -i 2 -w 2M -p 50000**]
3. Open the Command Prompt window on Application Server 1 and execute [cd c:¥] to change to the directory containing Iperf.exe
4. Run the following commands to send data from Application Server 1.

   TCP: [**iperf -c 192.168.20.11 -B 192.168.20.10 -w 2M -t 100000 -i 1 -p 50000**]
   UDP: [**iperf -c 192.168.20.11 -B 192.168.20.10 -b 300M -w 2M -t 100000 -i 1 -p 50000**]
5. The IP data throughput is displayed by the iperf application on the client server.

Note: Refer to B.3, adjust the buffer size ("-w" option argument) to match the performance of the Application Server and the data rate.
Change the port number ("-p" option argument) to match the Application Server. The same port number may be used by other applications on the PC.

5.3. IP Data Transfer Test for 3/4DL CA

This feature is supported only by the MT8821C.

For 3DL CA, the IP data transfer with carrier aggregation can be tested by installing the MX882012C−036 LTE FDD DL CA 3CCs IP Data Transfer option (hereafter MX882112C−036 option) in the MT8821C. Furthermore, the installed MX882012C−011 2x2 MIMO DL option (hereafter MX882112C−011 option) supports IP Data Transfer Test at data rates up to 450 Mbps for 3DL CA and 2x2 MIMO.

For 4DL CA, the IP data transfer with carrier aggregation can be tested by installing the MX882012C−046 LTE FDD DL CA 4CCs IP Data Transfer option (hereafter MX882112C−046 option) in the MT8821C. Furthermore, the installed MX882012C−011 2x2 MIMO DL option (hereafter MX882112C−011 option) supports IP Data Transfer Test at data rates up to 600 Mbps for 4DL CA and 2x2 MIMO.

NOTE 1: The MX882012C−006/021/026/031 option must be installed to use the MX882012C−036 option.
NOTE 2: The MX882012C−006/021/026/031/41 option must be installed to use the MX882012C−046 option.
NOTE 3: Testing the DL CA IP Data Transfer requires two application servers and two EPS bearers must be established. The UE should support Multiple PDN Connection.
NOTE 4: Throughput may be unsutaible when test IP Data Transfer Test in TCP/IP bi-direction.In this case, please test Downlink and Uplink separatery.

The DL CA IP Data Transfer Test requires two application servers because this solution uses two LTE HWs in the MT8821C.
Furthermore, two EPS Bearers must be established to perform IP data communication with two IP data streams. The MT8821C will establish the default EPS Bearer as the first EPS Bearer during the Registration procedure, and establishes the second EPS Bearer by performing the Dedicated EPS Bearer Activation after confirming the Connected state.
The following figure shows the Layer−2 structure and an image of the IP data streams.

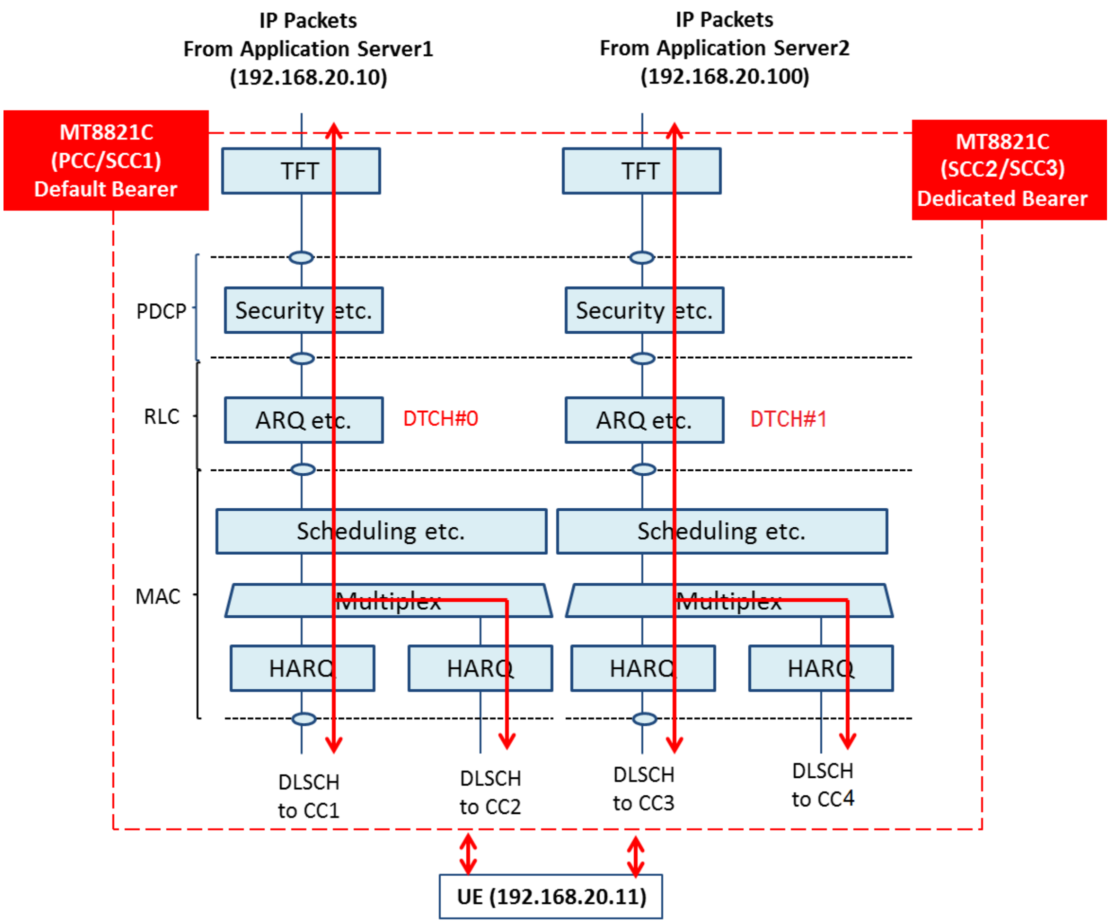


Figure 5.3-1 ***Layer-2 Structure and Image of IP Data Streams***

The MT8821C functioning as PCC communicates with the UE using the IP data path of the Default EPS Bearer. The MT8821C functioning as SCC communicates with the UE using the IP data path of the Dedicated EPS Bearer. The Dedicated EPS Bearer has a TFT Filter allowing transmission of IP packets only when the source address of the IP packet from the application server matches the IP address setting of the TFT filter. (Therefore, the address of the TFT filter must match the IP address of the application server connected to the MT8821C functioning as SCC).
IP peak data rates up to 450 Mbps can be verified by performing IP communication between the UE and two application servers.

The following chapter explains:
- ✓ Connecting MT8821Cs, application servers, and UE
- ✓ Setting application server PC
- ✓ Setting MT8821Cs
- ✓ Verifying IP Data Throughput using iperf

5.3.1. Connection Diagram

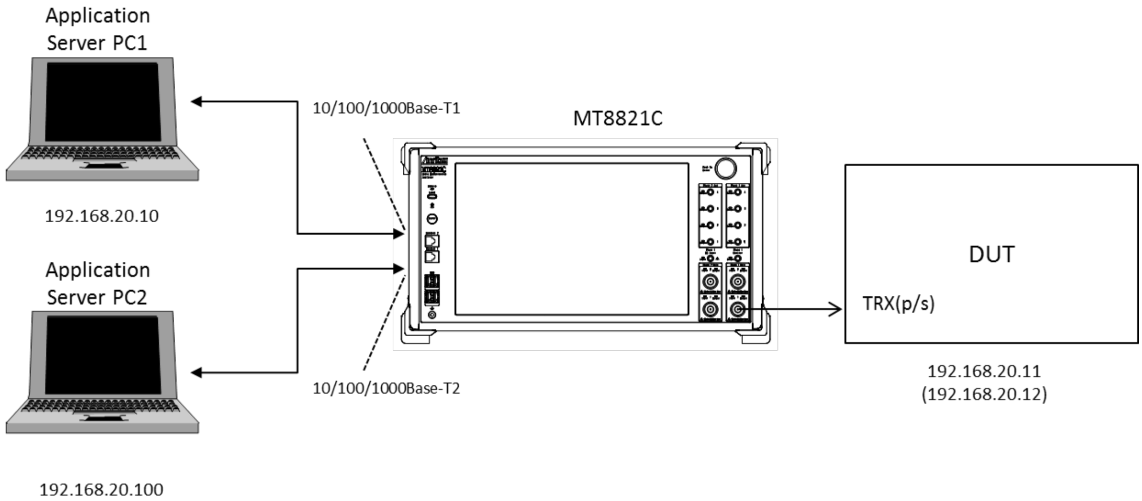


Figure 5.3.1-1 ***Connection Diagram for 3/4DL CA IP Data Transfer (using external servers, antenna configuration set to single)***

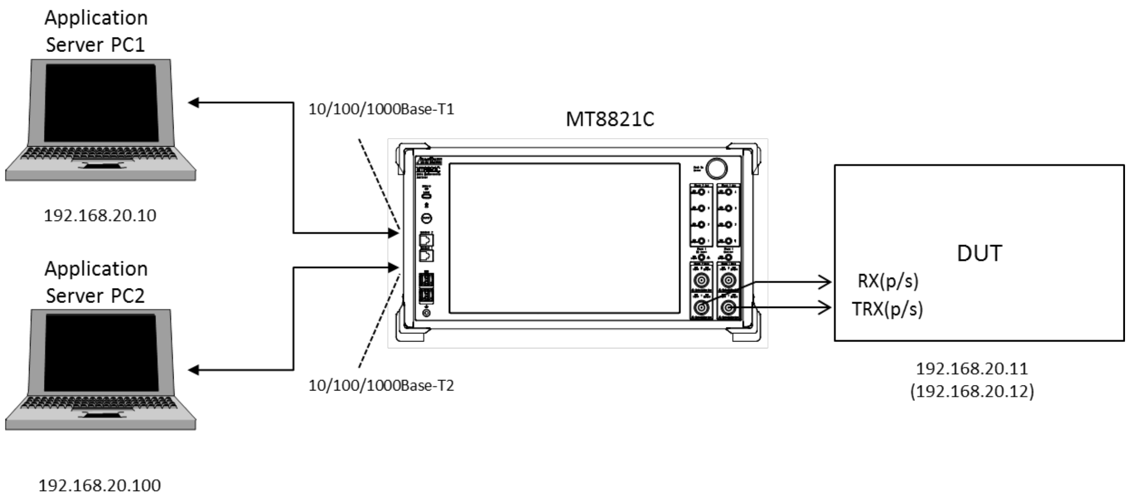


Figure 5.3.1-2 ***Connection Diagram for 3/4DL CA IP Data Transfer (using external servers, antenna configuration set to 2x2 MIMO)***

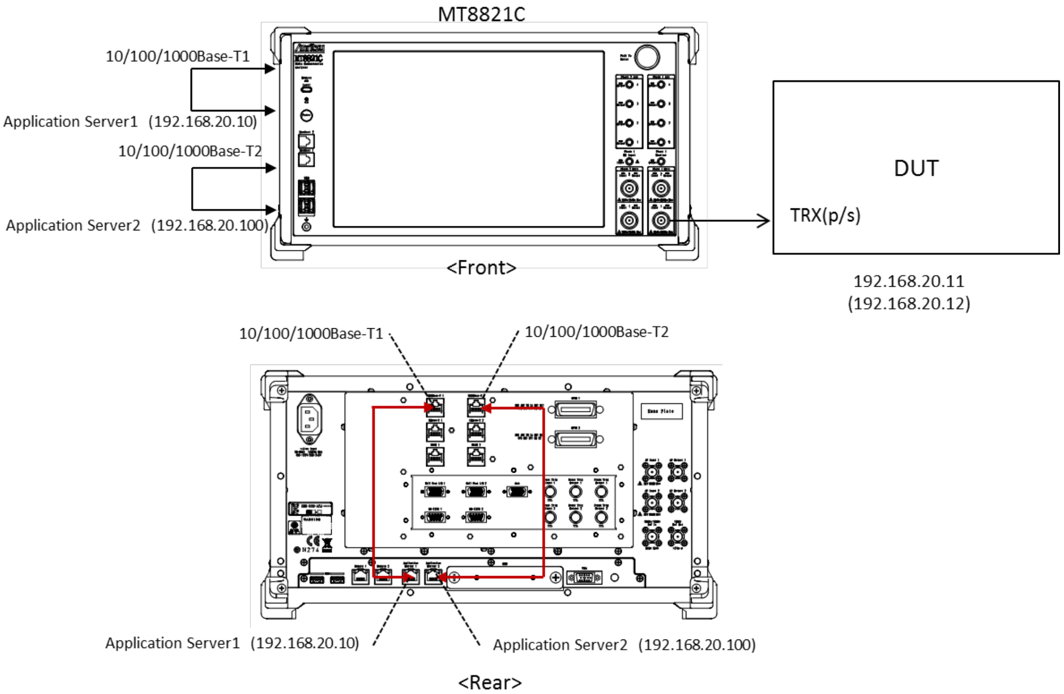


Figure 5.3.1-3 ***Connection Diagram for 3/4DL CA IP Data Transfer (using internal servers, antenna configuration set to single)***

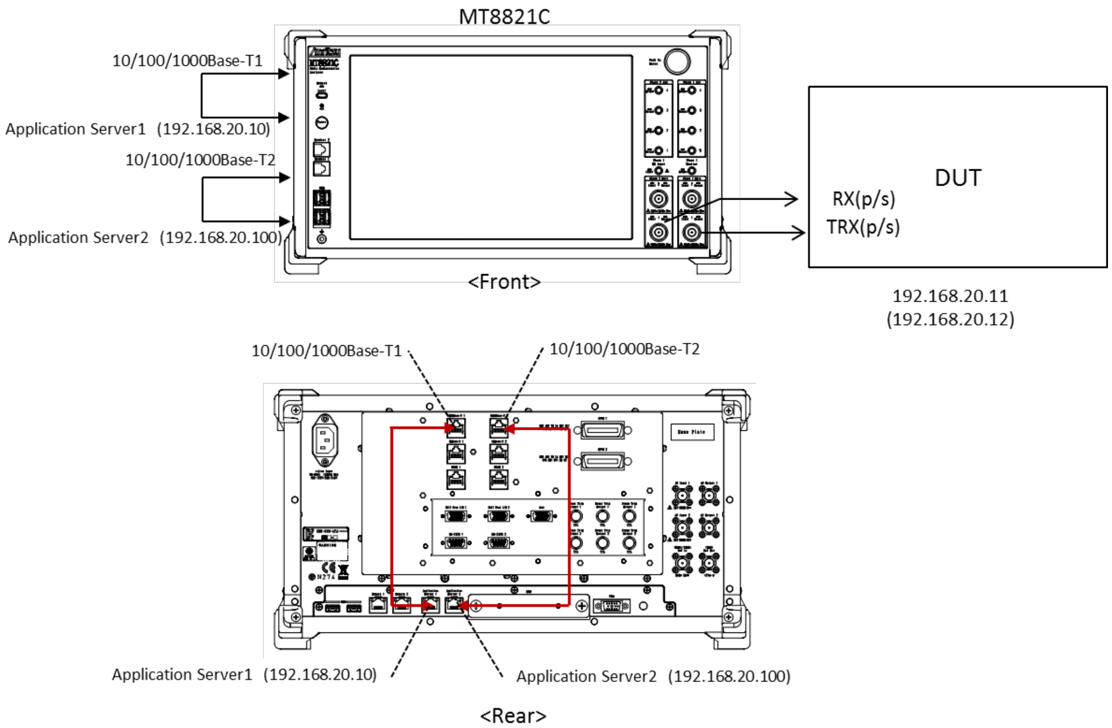


Figure 5.3.1-4 ***Connection Diagram for 3/4DL CA IP Data Transfer (using internal servers, antenna configuration set to 2x2 MIMO)***

<Required Equipment>

- RF cable to connect MT8821C and LTE UE
- Two application server PCs with LAN adapter supporting 1000Base−TX (if using external server)
- Client PC (if DUT is modem type)
- Two Ethernet cables (Crossover cables to connect MT8821C 1000Base−TX1/2 and application server1/2)
- USB cable*2 to connect DUT and client PC (if DUT is modem type)
- UDP/TCP Throughput measurement software (installed in application server and DUT)*1

*1: This test uses the open-source software **Iperf** to measure throughput. It can be downloaded from the Internet. After downloading, copy the execute file (Iperf.exe) to the root of the C: drives in the application server and client PCs.
*2 : USB **3.0** is recommended.

5.3.2. Application Server Connection and Setting

5.3.2.1. Using external Application Server for MT8821C

With the MT8821C powered-down (Off), connect the 1000Base-TX port 1 on the rear panel of the MT8821C to Application Server 1 and the 1000Base-TX port 2 on the rear panel of the MT8821C to Application Server 2.
For the connection diagram, refer to **Figure 5.3.1−1** or **Figure 5.3.1-2** in Chapter 5.3.1.

Use the following address for Application server 2. Otherwise, use the same settings as in Chapter 5.1.2
IP Address: 192.168.20.100
SubnetMask: 255.255.255.0

The MT8821C has two internal network interface cards (hereafter, NIC) and these can be used as the Application Server for IP data verification.
Connect the 1000Base−T1 port on the MT8821C rear panel to Application Server PC1, and connect the 1000Base−T2 port on the MT8821C rear panel to Application Server PC2. For the connection diagram, refer to **Figure 5.3.1-3** or **Figure 5.3.1-4** in Chapter 5.3.1.
Assign the following IP addresses as the initial values for Application Server1/2.

Application Server	***Parameter***	***Setting***
Application Server1	IP Address	192.168.20.10
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.20.1
Application Server2	IP Address	192.168.20.100
	Subnet Mask	255.255.255.0
	Default Gateway	192.168.20.1

Refer to Chapter 5.2.2.3 for the Application Server IP address settings.

5.3.3. Client PC Connection and Setting

The client PC connection and setting depend on the mobile terminal. Set according to the connection method used.

5.3.4. Initial Condition Settings

The following settings are an example of the peak data rate in UE Category 9/11.

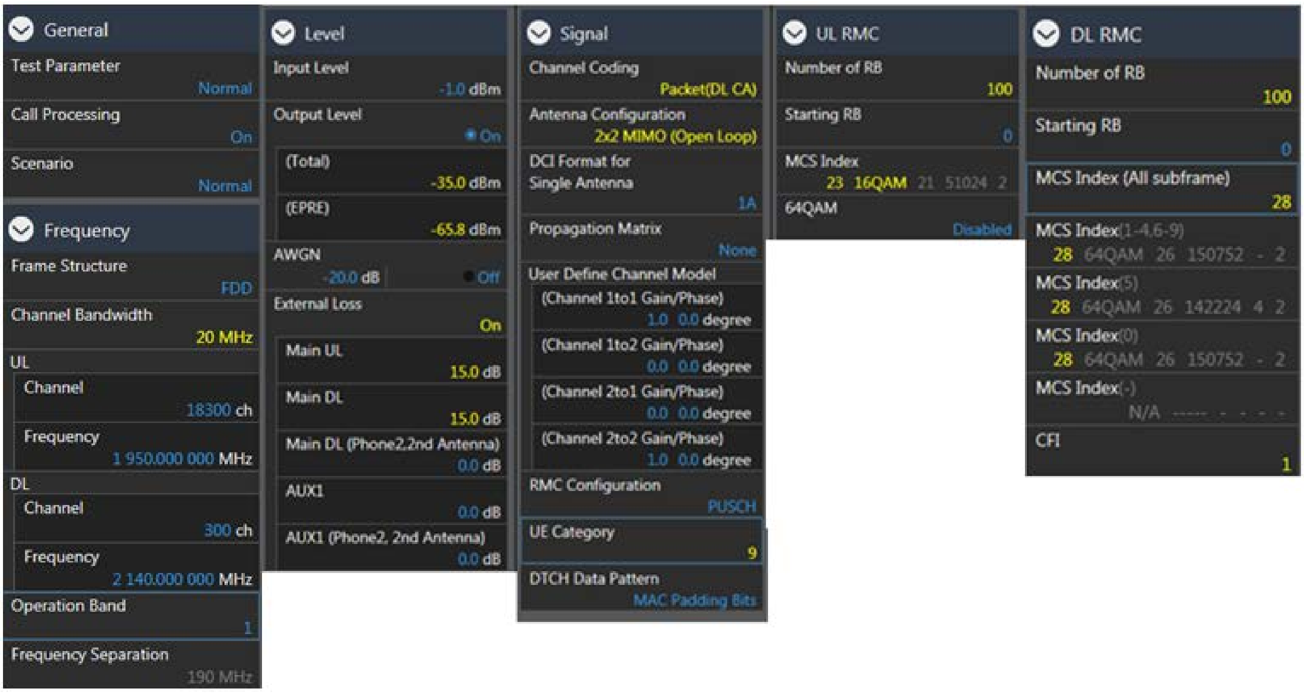
[Example of test conditions]

Serv. Cell	Condition	Value
PCC	Operation Band	1
	DL Channel	300
	UL Channel	18300
	Bandwidth	20 MHz
	Transmission Mode (Antenna Configuration)	Transmission Mode3 (2x2 MIMO (Open Loop))
	UE Category	When 3DL CA : 9 When 4DL CA : 11
	Output Level (Total)	−35.0 dBm
	DL Number of RB	100
	DL MCS Index	All 28
	CFI	1
	UL Number of RB	100
	UL MCS Index	23
SCC−1	Operation Band	1
	DL Channel	498
	UL Channel	-
	Bandwidth	20 MHz
	Output Level (Total)	−35.0 dBm
	DL Number of RB	100
	DL MCS Index	All 28
	CFI	1
SCC−2	Operation Band	3
	DL Channel	1575
	UL Channel	-
	Bandwidth	20 MHz
	Output Level(Total)	−35.0 dBm
	DL Number of RB	100
	DL MCS Index	All 28
	CFI	1
SCC-3	Operation Band	3
	DL Channel	1773
	UL Channel	-
	Bandwidth	20 MHz
	Output Level(Total)	−35.0 dBm
	DL Number of RB	100
	DL MCS Index	All 28
	CFI	1

[Procedure using GUI]
Set each parameter at Common Parameter (PCC/SCC−1/SCC−2), Call Processing Parameter, and Fundamental Measurement Parameter.

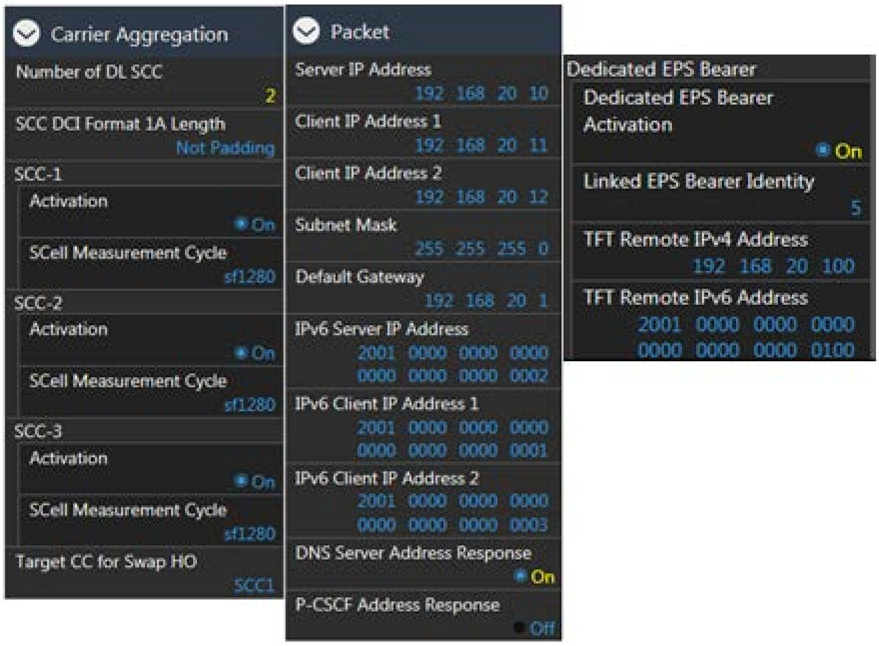
Common Parameter – PCC

1. Execute Preset to set default parameter.
2. Set **Common Parameter – Call Processing** to **On**.
3. Set **Common Parameter – Frequency – Channel Bandwidth** to **20 MHz**.
4. Set **Common Parameter – Frequency – UL Channel and DL Channel** to **18300** and **300**, respectively.
5. Set **Common Parameter – Signal – Channel Coding** to **Packet (DL CA)**.
6. Set **Common Parameter – Signal – Antenna Configuration** to **2x2MIMO (Open Loop)**.
7. Set **Common Parameter – Signal – UE Category** to **9**.
   (When 4DL CA, Set **Common Parameter – Signal - UE Category** to **11**.)
8. Set **Common Parameter – Level – Output Level(Total)** to **−35.0 dBm**.
9. Set **Common Parameter – UL RMC – Number of RB** to **100**.
10. Set **Common Parameter – UL RMC – MCS Index** to **23**.
11. Set **Common Parameter – DL RMC – Number of RB** to **100**, and **Common Parameter – DL RMC – Starting RB** to **0**.
12. Set All of **Common Parameter – DL RMC – MCS Index1/2/3** to **28**.



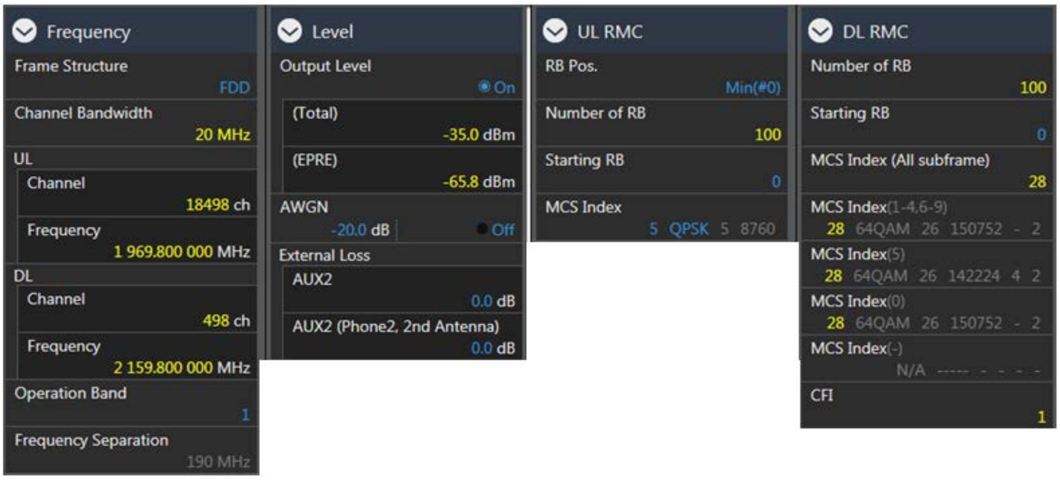
Call Processing Parameter

1. Set **Call Processing Parameter** – **Carrier Aggregation** – **Number of DL SCC** to **2**.
   (When 4DL CA, Set **Call Processing Parameter** – **Carrier Aggregation** – **Number of DL SCC** to **3**.)
2. Set **Call Processing Parameter** – **Packet** – **Server IP Address** to **192.168.20.10**.
3. Set **Call Processing Parameter** – **Packet** – **Client IP Address 1** to **192.168.20.11**.
4. Set **Call Processing Parameter** – **Packet** – **Client IP Address 2** to **192.168.20.12**.
5. Set **Call Processing Parameter** – **Packet** – **TFT Remote IPv4 Address** to **192.168.20.100**.



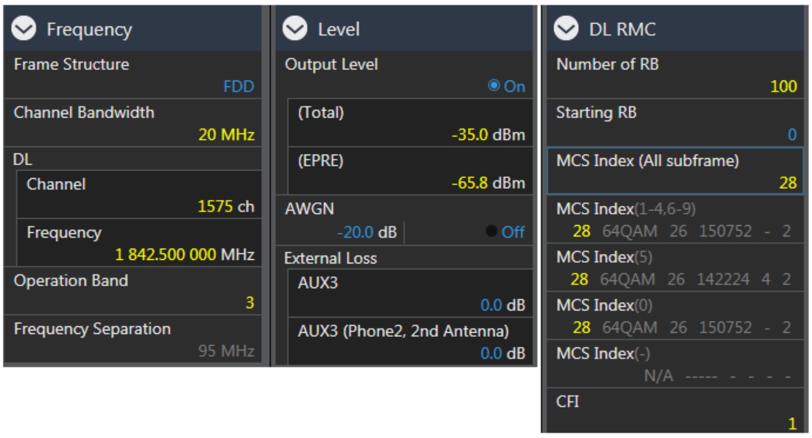
Common Parameter - SCC-1

1. Set **Common Parameter** – **SCC1 - Channel Bandwidth** to **20 MHz**.
2. Set **Common Parameter** – **SCC1 - DL Channel** to **498**.
3. Set **Common Parameter** – **SCC-1 - Output Level(Total)** to **–35.0 dBm**.
4. Set **Common Parameter** – **SCC1 - DL RMC - Number of RB** to **100**, and **Common Parameter** – **SCC1** – **DL RMC** – **Starting RB** to **0**.
5. Set All of **Common Parameter** – **SCC1** – **DL RMC** – **MCS Index1/2/3** to **28**.



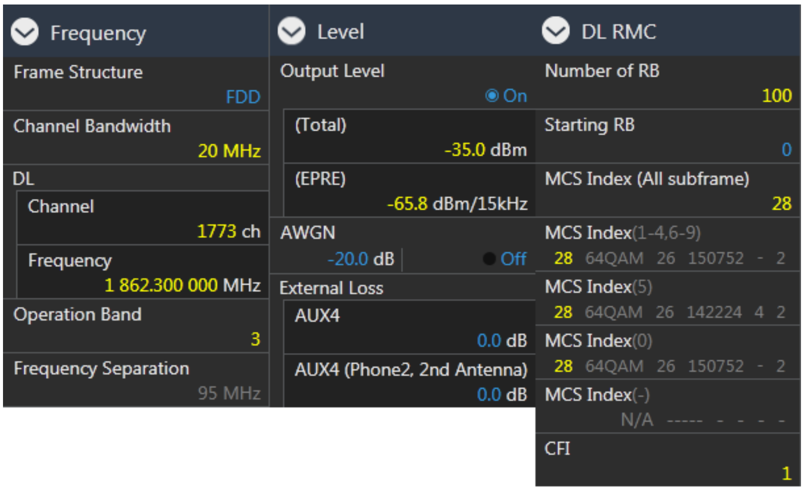
Common Parameter – SCC-2

1. Set **Common Parameter – SCC2 – Channel Bandwidth** to **20 MHz**.
2. Set **Common Parameter – SCC2 – DL Channel** to **1575**.
3. Set **Common Parameter – SCC2 – Output Level(Total)** to **-35.0 dBm**.
4. Set **Common Parameter – SCC2 – DL RMC - Number of RB** to **100**, and **Common Parameter – SCC2 – DL RMC – Starting RB** to **0**.
5. Set All of **Common Parameter – SCC2 – DL RMC – MCS Index1/2/3** to **28**.



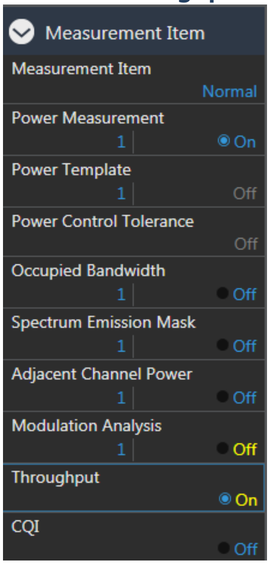
Common Parameter – SCC-3

1. Set **Common Parameter – SCC3 – Channel Bandwidth** to **20 MHz**.
2. Set **Common Parameter – SCC3 – DL Channel** to **1773**.
3. Set **Common Parameter – SCC3 – Output Level(Total)** to **-35.0 dBm**.
4. Set **Common Parameter – SCC3 – DL RMC – Number of RB** to **100**, and **Common Parameter – SCC3 – DL RMC – Starting RB** to **0**.
5. Set All of **Common Parameter – SCC3 – DL RMC – MCS Index1/2/3** to **28**.



Fundamental Measurement Parameter

1. Set **Fundamental Measurement Parameter** – **Throughput Measurement** to **On**.



[Procedure using remote commands]

1. Execute **PRESET** to set default parameter.
2. Execute **CALLPROC ON** to set **Common Parameter** – **Call Processing** to **On**.
3. Execute **CHCODING PACKET_DL_CA_PCC** to set **Common Parameter** – **Signal** – **Channel Coding** to **Packet (DL CA)**.
4. Execute **ANTCONFIG OPEN_LOOP** to set **Common Parameter** – **Signal** – **Antenna Configuration** to **2x2MIMO (Open Loop)**.
5. Execute **UECAT CAT9** set **Common Parameter** – **Signal** – **UE Category** to **9**.
   (When 4DL CA, Execute **UECAT CAT11** set **Common Parameter** – **Signal** – **UE Category** to **11**.)
6. Execute **DLSCC 2** to set **Call Processing Parameter** – **Carrier Aggregation** – **Number of DL SCC** to **2**.
   (When 4DL CA, Execute **DLSCC 3** to set **Call Processing Parameter** – **Carrier Aggregation** – **Number of DL SCC** to **3**.)
7. Execute **BANDWIDTH 20MHZ** to set **Common Parameter** – **Frequency** – **Channel Bandwidth** to **20 MHz**.
8. Execute **DLCHAN 300** to set **Common Parameter - Frequency** – **UL Channel and DL Channel** to **18300** and **300**, respectively.
9. Execute **OLVL_EPRE -70.0** to set **Common Parameter** – **Level** – **Output Level(EPRE)** to –**70.0 dBm/15 kHz**.
10. Execute **ULRMC_RB 100** to set **Common Parameter** – **UL RMC** – **Number of RB** to **100**.
11. Execute **ULIMCS 23** to set **Common Parameter** – **UL RMC** – **MCS Index** to **23**.
12. Execute **DLRB 100,0** to set **Common Parameter** – **DL RMC** – **Number of RB** to **100**, and **Common Parameter** – **DL RMC** – **Starting RB** to **0.**

13. Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter** – **SCC1** – **Channel Bandwidth** to **20 MHz**.
14. Execute **DLIMCS1 28**, **DLIMCS2 28** and **DLIMCS3 28** to set All of **Common Parameter** – **DL RMC** – **MCS Index1/2/3** to **28**.
15. Execute **DLCHAN_SCC1 498** to set **Common Parameter** – **SCC1** – **DL Channel** to **498**.
16. Execute **OLVL_EPRE_SCC1 -70.0** to set **Common Parameter** – **SCC-1** – **Output Level(EPRE)** to **–70.0 dBm/15 kHz**.
17. Execute **DLRB_SCC1 100,0** to set **Common Parameter** – **SCC1** – **DL RMC - Number of RB** to **100**, and **Common Parameter** – **SCC1** – **DL RMC** – **Starting RB** to **0**.
18. Execute **DLIMCS1_SCC1 28**, **DLIMCS2_SCC1 28** and **DLIMCS3_SCC1 28** to set All of **Common Parameter** – **SCC1** – **DL RMC** – **MCS Index1/2/3** to **28**.
19. Execute **BANDWIDTH_SCC2 20MHZ** to set **Common Parameter** – **SCC2** – **Channel Bandwidth** to **20 MHz**.
20. Execute **DLCHAN_SCC2 1575** to set **Common Parameter** – **SCC2** – **DL Channel** to **1575**.
21. Execute **OLVL_EPRE_SCC2 -70.0** to set **Common Parameter** – **SCC-2** – **Output Level(EPRE)** to **–70.0 dBm/15 kHz**.
22. Execute **DLRB_SCC2 100,0** to set **Common Parameter** – **SCC2** – **DL RMC - Number of RB** to 100, and **Common Parameter** – **SCC2** – **DL RMC** – **Starting RB** to **0**.

23. Execute **DLIMCS1_SCC2 28**, **DLIMCS2_SCC2 28** and **DLIMCS3_SCC2 28** to set All of **Common Parameter - SCC2** – **DL RMC** – **MCS Index1/2/3** to **28**.

When 4DL CA, execute 24 to 28

24. Execute **BANDWIDTH_SCC3 20MHZ** to set **Common Parameter** – **SCC3** – **Channel Bandwidth** to **20 MHz**.
25. Execute **DLCHAN_SCC3 1773** to set **Common Parameter** – **SCC3** – **DL Channel** to **1575**.
26. Execute **OLVL_EPRE_SCC3 -70.0** to set **Common Parameter** – **SCC3** – **Output Level(EPRE)** to **–70.0 dBm/15 kHz**.
27. Execute **DLRB_SCC3 100,0** to set **Common Parameter** – **SCC3** – **DL RMC - Number of RB** to 100, and **Common Parameter** – **SCC3** – **DL RMC** – **Starting RB** to **0**.

28. Execute **DLIMCS1_SCC2 28**, **DLIMCS2_SCC2 28** and **DLIMCS3_SCC2 28** to set All of **Common Parameter - SCC2** – **DL RMC** – **MCS Index1/2/3** to **28**.

29. Execute **SERVERIP 192,168,20,10** to set **Call Processing Parameter - Packet - Server IP Address** to **192.168.20.10**.
30. Execute **CLIENTIP 192,168,20,11** to set **Call Processing Parameter - Packet - Client IP Address 1** to **192.168.20.11**.
31. Execute **CLIENTIP2 192,168,20,12** to set **Call Processing Parameter - Packet - Client IP Address 2** to **192.168.20.12**.
32. Execute **DEDEPSACT ON** to set **Call Processing Parameter - Packet - Dedicated EPS Bearer Activation** to **On**.

33. Execute **LINKEPSID 5** to set **Call Processing Parameter - Packet - Linked EPS Bearer Identity** to **5**. (NOTE 1)
34. Execute **TFTIPV4 192,168,20,100** to set **Call Processing Parameter - Packet - TFT Remote IPv4 Address** to **192.168.20.100**.
35. Execute **TPUT_MEAS ON** to set **Fundamental Measurement Parameter - Throughput Measurement** to **On**.

NOTE 1:

Some UEs may request establishment of the second Default EPS Bearer by sending a PDN Connectivity Request message after confirming the Connected state. To verify IP data communication with this UE and communicate with the second EPS Bearer, execute following procedure instead of procedure No. 33.

33. Execute **LINKEPSID 6** to set **Call Processing Parameter - Packet - Linked EPS Bearer Identity** to **6**.

The Dedicated EPS Bearer will be linked to the second Default EPS Bearer by this setting. The SCC using the Dedicated EPS Bearer as the IP data path will communicate with the second Default EPS Bearer IP address (Call Processing Parameter - Client IP Address2).

[Example of IP Data Path when Linked EPS Bearer Identity set to 6]

SCC can communicate with the second EPS Bearer IP address (Call Processing Parameter - Client IP Address2).

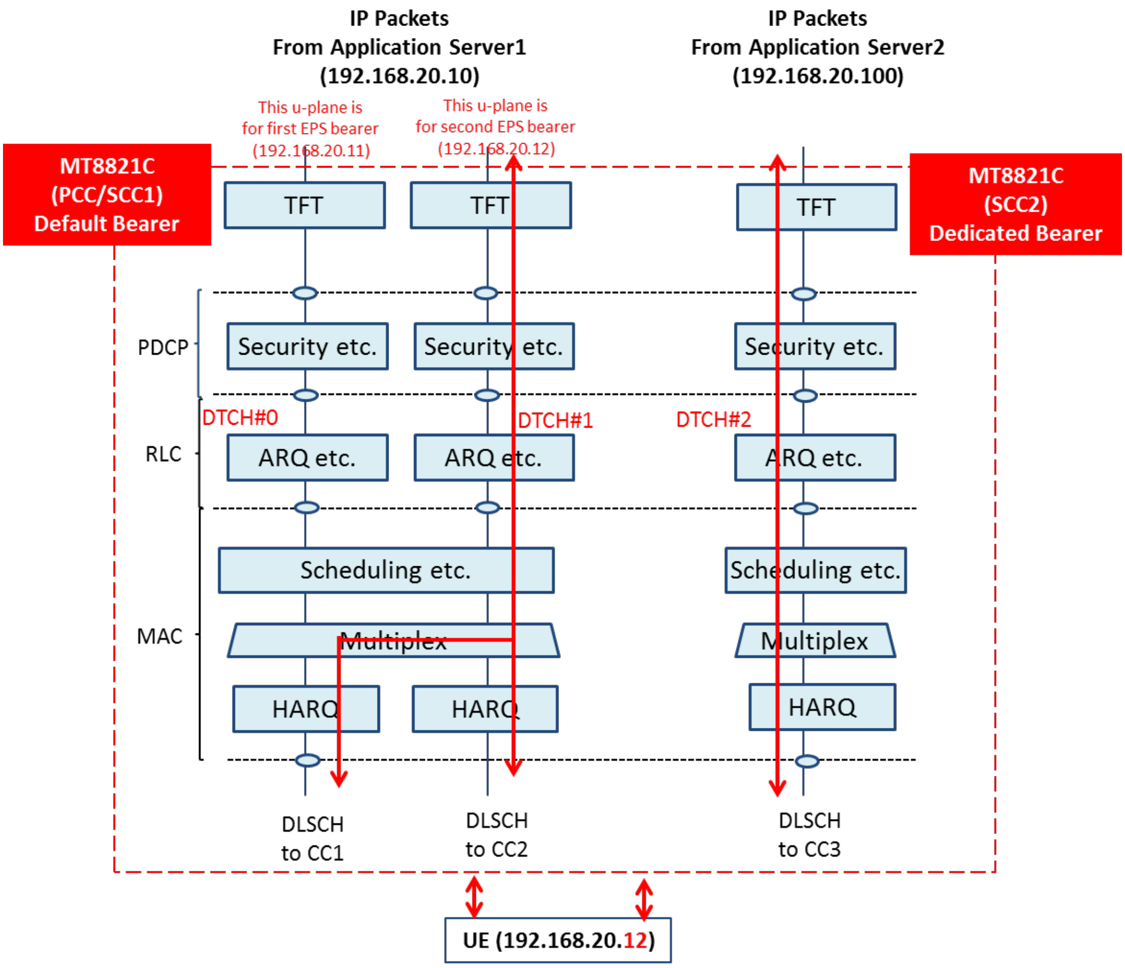


Figure 5.3.4-1 ***IP Data Path (Linked EPS Bearer Identity = 6)***

5.3.5. Location Registration and Packet Connection

1. Execute **CALLSO** to clear call processing.
2. Execute **CALLSTAT?** to confirm the call processing status is 1 (= Idle).
3. Turn on the UE power.
4. Execute **CALLSTAT?** to confirm the call processing status is 6 (= Connected).
   Repeat Polling query response when the checked status is not 6 (= Connected).
5. Execute **TPUT_SAMPLE 2000** to set **the number of Throughput measurement samples** to **2000**.
6. Execute **SWP** to perform the Throughput measurement.
7. Execute **TPUT? PER** to read the Throughput measurement result (%).
   At an error, the DL transmission condition must be optimized by changing the output level or RMC setting of each CC by referring to Chapter 5.3.4.

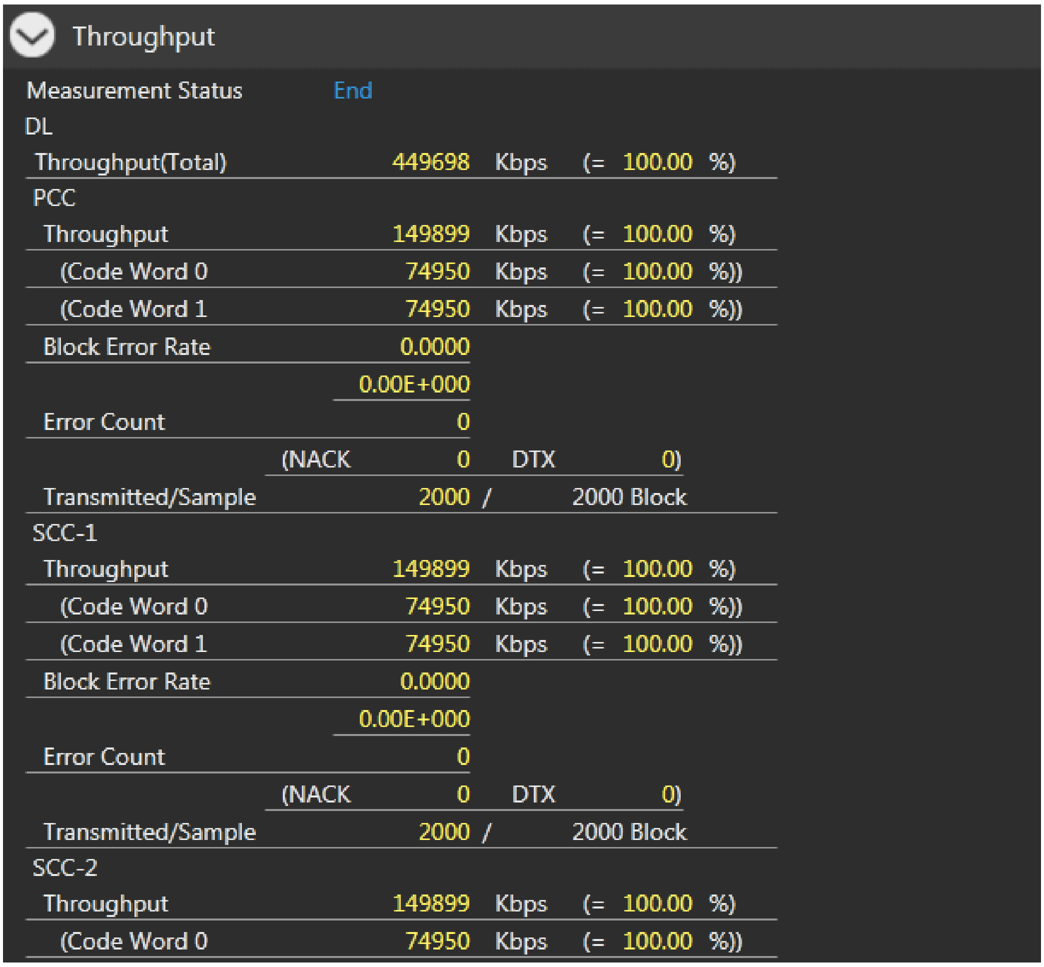


Fig. 10.6-1 Throughput Measurement Result Screen of DL CA (Fundamental Measurement)

5.3.6. TCP/UDP Throughput

This chapter explains TCP/UDP throughput measurement using the Iperf software for downlink throughput tests. Uplink throughput measurement is supported by switching the application server and client PCs.

1. Open two Command Prompt windows on the Client PC and execute [cd c:¥] to change to the directory containing Iperf.exe. (If the DUT is a smartphone type, open the iperf application)
2. Run the following command to put the client PC into the wait status.

   TCP: [**iperf -s -w 2M -i 1 -p 50000**]
   UDP: [**iperf -s -u -w 2M -i 1 -p 50000**]

   (If the DUT is a smartphone, open the iperf application)

   TCP: [**-s -w 2M -i 1 -p 50000**]
   UDP: [**-s -u -w 2M -i 1 -p 50000**]

3. Open the Command Prompt window on Application Server 1/2 and execute [cd c:¥] to change to the directory containing Iperf.exe.

[Case1:Linked EPS Bearer Identity = 5, Client IP Address = 192.168.20.11]

4. Run the following commands to send data from Application Server 1 and 2.

TCP from Application Server1: [**iperf -c 192.168.20.11 -B 192.168.20.10 -w 2M -t 100000 -i 1 -p 50000**]
TCP from Application Server2: [**iperf -c 192.168.20.11 -B 192.168.20.100 -w 2M -t 100000 -i 1 -p 50000**]

UDP from Application Server1: [**iperf -c 192.168.20.11 -B 192.168.20.10 -b 300M -w 2M -t 100000 -i 1 -p 50000**]
UDP from Application Server2: [**iperf -c 192.168.20.11 -B 192.168.20.100 -b 300M -w 2M -t 100000 -i 1 -p 50000**]

[Case2:Linked EPS Bearer Identity = 6, Client IPAddress2 = 192.168.20.12]

4. Run the following commands to send data from Application Server 1 and 2.

TCP from Application Server1: [**iperf -c 192.168.20.12 -B 192.168.20.10 -w 2M -t 100000 -i 1 -p 50000**]
TCP from Application Server2: [**iperf -c 192.168.20.12 -B 192.168.20.100 -w 2M -t 100000 -i 1 -p 50000**]

UDP from Application Server1: [**iperf -c 192.168.20.12 -B 192.168.20.10 -b 300M -w 2M -t 100000 -i 1 -p 50000**]
UDP from Application Server2: [**iperf -c 192.168.20.12 -B 192.168.20.100 -b 300M -w 2M -t 100000 -i 1 -p 50000**]

5. The IP data throughput is displayed by the iperf application on the client server.

Note: Refer to B.3, adjust the buffer size ("-w" option argument) to match the performance of the Application Server and the data rate.
Change the port number ("-p" option argument) to match the Application Server. The same port number may be used by other applications on the PC.

5.4. IP Data Application

This chapter describes ping execution and TCP/UDP throughput verification using Iperf in MT8821C's LTE measurement software.

5.4.1. ping

Described in the procedure below is the ping execution sequence for an IPv4 Packet-connected UE.
The ping command is as follows.
ping 192.168.20.11 -w 1000 -l 50000 -S 192.168.20.10

1. Perform IPv4 connection procedure in chapter 5.1.5 and 5.1.6 to establish UE Packet connection.
2. Execute **PINGDSTIP S1,192,168,20,11** to set **PING - Destination IPv4 Address** of server 1 to **192.168.20.11.**
3. Execute **PINGIP S1,IPV4** to set **PING - IP Type** of server 1 to **IPv4.**
4. Execute **PINGW S1,1000** to set **PING - Interval** of server 1 to **1000**.
5. Execute **PINGL S1,32** to set **PING - Buffer Size** of server 1 to **32byte**.
6. Execute **RSLTAREA IPDATATAB** to open **IP Data tab**.
7. Execute **PINGSINGLS S1** to execute ping.
8. Confirm the result of the ping on the screen.

NOTE:

- ***Use Application Server1,2 IP address described in chapter 5.3.2.2 as the server address where the ping is sent. The server address is specified by the "-s" option in the ping command.***

5.4.2. iperf

Described in the procedure below is the TCP/UDP throughput verification sequence using iperf for an IPv4 Packet-connected UE.

<When UDP>
The iperf command is as follows.
Server1 : iperf -c 192.168.20.11 -B 192.168.20.10 –b 300M –p 50000 –w 2M –l 1000 –t 100 –i 1
Server2 : iperf -c 192.168.20.11 -B 192.168.20.100 –b 300M –p 50000 –w 2M –l 1000 –t 100 –i 1

1. Perform IPv4 connection procedure in chapter 5.3.4 and 5.3.5 to establish UE Packet connection.
2. Execute **IPFMODE S1,CLIENT** to set **Iperf - Iperf Mode** of server 1 to **Client**.
3. Execute **IPFIP S1,IPV4** to set **Iperf - IP Type** of server 1 to **IPv4**.
4. Execute **IPFPRTCL S1,UDP** to set **Iperf - IP Protocol** of server 1 to **UDP**.
5. Execute **IPFDSTIP S1,192,168,20,11** to set **Iperf - Destination IPv4 Address** of server 1 to **192.168.20.11**.
6. Execute **IPFB S1,300** to set **Iperf - Bandwidth** of server 1 to **300**.
7. Execute **IPFB_UNIT S1,MBITS** to set **Iperf - Bandwidth Unit** of server 1 to **Mbits/sec**.
8. Execute **IPFP S1,50000** to set **Iperf - Port Number** of server 1 to **50000**.
9. Execute **IPFW S1,2** to set **Iperf - Window Size** of server 1 to **2**.
10. Execute **IPFW S1,MBYTES** to set **Iperf - Window Size Unit** of server 1 to **Mbytes**.
11. Execute **IPFL S1,1000** to set **Iperf - Frame Length** of server 1 to **1000**.
12. Execute **IPFT S1,100** to set **Iperf - Time** of server 1 to **100.**
13. Repeat steps 2 to 12 with argument S1 replaced by S2 to configure Server2 settings.
14. Execure **RSLTAREA IPDATATAB** to open **IP Data tab**.
15. Start iperf in the DUT then execute the following command.
    When DUT is PC : iperf -s -u -w 2M -i 1 -p 50000
    When DUT is Smartphone : -s -u -w 2M -i 1 -p 50000
16. Execute **IPERFSINGLS BOTH** to start UDP transmission by **iperf**.
17. Confirm the throughput result of the iperf on the DUT.

<When TCP>
The iperf command is as follows.
Server1 : iperf -c 192.168.20.11 -B 192.168.20.10 –p 50000 –w 2M –l 1000 –t 100 –i 1
Server2 : iperf -c 192.168.20.11 -B 192.168.20.100 –p 50000 –w 2M –l 1000 –t 100 –i 1

1. Perform IPv4 connection procedure in chapter 5.3.4 and 5.3.5 to establish UE Packet connection.
2. Execute **IPFMODE S1,CLIENT** to set **Iperf - Iperf Mode** of server 1 to **Client.**
3. Execute **IPFIP S1,IPV4** to set **Iperf - IP Type** of server 1 to **IPv4**.
4. Execute **IPFPRTCL S1,TCP** to set **Iperf - IP Protocol** of server 1 to **TCP**.

5. Execute **IPFDSTIP S1,192,168,20,11** to set **Iperf - Destination IPv4 Address** of server 1 to **192.168.20.11**.
6. Execute **IPFP S1,50000** to set **Iperf - Port Number** of server 1 to **50000**.
7. Execute **IPFW S1,2** to set **Iperf - Window Size** of server 1 to **2**.
8. Execute **IPFW S1,MBYTES** to set **Iperf - Window Size Unit** of server 1 to **Mbytes**.
9. Execute **IPFL S1,1000** to set **Iperf - Frame Length** of server 1 to **1000**.
10. Execute **IPFT S1,100** to set **Iperf - Time** of server 1 to **100**.
11. Repeat steps 2 to 10 with argument S1 replaced by S2 to configure Server2 settings.
12. Execute **RSLTAREA IPDATATAB** to open **IP Data tab**.

13. Start iperf in the DUT then execute the following command.
    When DUT is PC : iperf -s -w 2M -i 1 -p 50000
    When DUT is Smartphone : -s -w 2M -i 1 -p 50000
14. Execute **IPERFSINGLS BOTH** to start TCP transmission by **iperf**.
15. Confirm the throughput result of the iperf on the DUT.

NOTE:

- ***Use Application Server1,2 IP address described in chapter 5.3.2.2 as the server address where the data is sent. The server address is specified by the "-B" option in the iperf command.***

6. RRM

The following test procedure can be used by both the MT8820C and MT8821C.

6.1. 1Port CS Fallback/Redirection

This chapter describes CS Fallback/Redirection to Inter-RAT at 1 Port.
Using CS Fallback/Redirection after completion of all measurements in LTE can shorten the switching time to Inter-RAT.

The required options for CS Fallback/Redirection are shown below. Refer to Chapter 1.1.

LTE	Inter-RAT			
	W-CDMA	TD-SCDMA	GSM	CDMA2000/1xEV-DO
FDD	MX882012C-016	-	MX882012C-016	MX882012C-017
TDD	MX882013C-016	MX882013C-018	MX882013C-016 or 018	MX882013C-017

6.1.1. CS Fallback to W-CDMA/Redirection to W-CDMA

This chapter describes an example where the LTE cell executes CS fallback to W-CDMA DL Channel 10700.

1. Execute **STDSEL WCDMA** to change the system to W-CDMA.
2. Execute **PRESET_3GPP** to perform W-CDMA initialization.
3. Execute **DLCHAN 10700** to set the **Common Parameter - Downlink Channel** to 10700.
4. Execute **INTEGRITY ON** to set **Call Processing Parameter - Integrity Protection** to ON.
5. Execute **REGMODE CS** to set **Call Processing Parameter - Registration Mode** to CS.
6. Execute **CONMODE CSFB** to set **Call Processing Parameter - Connection Mode** to CS Fallback.
7. Execute **LAC 0001** to set **Call Processing Parameter - LAC** to 0001.

8. Execute **STDSEL LTE** to change the system to LTE.
9. Execute **PRESET** to perform LTE initialization.
10. Execute **IRAT CSFB_WCDMA** to set the destination at CS Fallback execution to **W-CDMA**.
11. Execute **IRATW_CH 10700** to set **Call Processing Parameter - Inter-RAT Mobility - W-CDMA - DL Channel** to the same value as the above W-CDMA Downlink Channels setting.
12. Execute **IRAT_STDCNG ON** to set automatic switching when CS Fallback is executed to change **Standard**
13. Perform the LTE connection. (→2.1.2, 2.1.3, 2.1.4)
14. Execute **CSFB** to set either **CS Fallback or Redirection** to **W-CDMA**.
15. Execute **CALLSTAT?** to query the call processing status is 7 (= Loop Mode 1).
    (If not 7 (= Loop Mode 1), repeat step 15.)

For Redirection, the changes to the above procedure are shown below.

10. Execute **IRAT REDIRECT_WCDMA** to set the destination when Redirection is executed to **W-CDMA**.

15. Execute **CALLSTAT?** to query the call processing status is 2 (= Idle (Regist)).
    (If not 2 (= Idle (Regist)), repeat step 15.)

NOTE:

- ***W-CDMA LAC must be fixed to "0001".***
- ***To perform CS Fallback/Redirection to W-CDMA at 1 Port, version 22.23 or later of the W-CDMA software is required.***

6.1.2. CS Fallback to TD-SCDMA/Redirection to TD-SCDMA

This chapter describes an example where the LTE cell executes CS fallback to TD-SCDMA DL Channel 10054.

1. Execute **STDSEL TDSCDMA** to change the system to **TD-SCDMA**.
2. Execute **PRESET** to perform TD-SCDMA initialization.
3. Execute **CHAN 10054** to set **Common Parameter - Channel** to **10054**.
4. Execute **INTEGRITY ON** to set **Call Processing Parameter - Integrity Protection** to **ON**.
5. Execute **REGMODE CS** to set **Call Processing Parameter - Registration Mode** to **CS**.
6. Execute **LAC 0001** to set **Call Processing Parameter - LAC** to **0001**.

7. Execute **STDSEL LTE** to change the system to **LTE**.
8. Execute **PRESET** to perform LTE initialization.
9. Execute **IRAT CSFB_TDSCDMA** to set the destination at CS Fallback execution to **TD-SCDMA**.
10. Execute **IRATW_CH 10054** to set **Call Processing Parameter - Inter-RAT Mobility - W-CDMA - DL Channel** to the same value as the above TD-SCDMA Channels setting.
11. Execute **IRAT_STDCNG ON** to set automatic switching when CS Fallback is executed to change **Standard**.
12. Perform the LTE connection. (→2.1.2, 2.1.3, 2.1.4)
13. Execute **CSFB** to set **CS Fallback or Redirection** to **TD-SCDMA**.
14. Execute **CALLSTAT?** to query the call processing status is 7 (= Loop Mode 1).
    (If not 7 (= Loop Mode 1), repeat step 14.)

For Redirection, the changes to the above procedure are shown below.

9. Execute **IRAT REDIRECT_TDSCDMA** to set the destination when Redirection is executed to **TD-SCDMA**.

14. Execute **CALLSTAT?** to query the call processing status is 2 (=Idle (Regist)).
    (If not 2 (= Idle(Regist)), repeat step 14.)

NOTE:

- ***TD-SCDMA LAC must be fixed to "0001"***
- ***To perform CS Fallback/Redirection to TD-SCDMA at 1 Port, version 22.25 or later of the TSCDMA software is required.***

6.1.3. CS Fallback to GSM/Redirection to GSM

This chapter describes an example where the LTE Cell executes CS fallback to GSM CCH Channel 1.

1. Execute **STDSEL GSM** to change the system to **GSM**.
2. Execute **PRESET** to perform GSM initialization processing.
3. Execute **SYSCMB DCS1800** to set **Call Processing Parameter - System Combination** to **DCS1800**.
4. Execute **CTRLCH 1** to set **Call Processing Parameter - CCH Channel** to **1**.
5. Execute **CHAN 1** to set **Call Processing Parameter - TCH Channel** to **1**.
6. Execute **STDSEL LTE** to change the system to **LTE**.
7. Execute **PRESET** to perform LTE initialization processing.
8. Execute **IRAT CSFB_GSM** to set the destination at CS Fallback execution to **GSM**.
9. Execute **IRATG_BI DCS1800** to set **Call Processing Parameter - Inter-RAT Mobility - GSM - Band Indicator** to **DCS1800**.
10. Execute **IRATG_CH 1** to set the same values as the above GSM Channels settings.
11. Execute **IRAT_STDCNG ON** to set automatic switching when CS Fallback is executed to change **Standard**.
12. Perform the LTE connection. (→2.1.2, 2.1.3, 2.1.4)
13. Execute **CSFB** to set CS Fallback to **GSM**.
14. Execute **CALLSTAT?** to query the call processing status is 6 (= Termination).
    (If not 6 (= Termination), repeat step 14.)
15. The UE responds to the Network call origination.

For Redirection, the changes to the above procedure are shown below.

8. Execute **IRAT REDIRECT_GSM** to set the destination when Redirection is executed to **GSM**.

14. Execute **CALLSTAT?** to query the call processing status is 1 (= Idle (Regist)).
    (If not 1 (= Idle (Regist)), repeat step 14.)

NOTE:

- ***To perform CS Fallback/Redirection to GSM at 1 Port, version 22.18 or later of the GSM software is required.***

6.1.4. CS Fallback to CDMA2000/Redirection to CDMA2000

This chapter describes an example where the LTE cell executes CS fallback to CDMA2000 Band Class is 0 and the channel is 283.

1. Execute **STDSEL CDMA2K** to switch the system to **CDMA2000**.
2. Execute **PRESET** to perform CDMA2000 initialization.
3. Execute **PRESET** to perform CDMA2000 initialization.
4. Execute **CHAN 283,1X** to set **Channel** to **283**.
5. Execute **STDSEL LTE** to switch the system to **LTE**.
6. Execute **PRESET** to perform LTE initialization.
7. Execute **PREREGIST 1XRTT** to set **Call Processing Parameter - Pre-Registration** to **1xRTT** for execution to **CDMA2000-1xRTT**.
8. Execute **IRAT CSFB_CDMA2000** to set the destination at CS Fallback execution to **CDMA2000**.
9. Execute **IRATC BC 0** to set **Call Processing Parameter - Inter-RAT Mobility - CDMA2000 - bandclass** to the same values as the above CDMA2000 Band class settings.
10. Execute **IRATC CH 283** to set **Call Processing Parameter - Inter-RAT Mobility - CDMA2000 - Channel** to the same values as the above CDMA2000 Channel settings.
11. Execute **IRAT_STDCNG ON** to set automatic switching when CS Fallback is executed to change **Standard**.
12. Perform LTE connection. (→2.1.2, 2.1.3, 2.1.4)
13. Execute **CSFB** to set CS Fallback or Redirection to **CDMA2000**.
14. Execute **CALLSTAT?** to query the call processing status is 6 (= Connected/Conversation).
    (If not 6 (= Connected/Conversation), repeat step 14.)

For Redirection, the changes to the above procedure are shown below.

8. Execute **IRAT REDIRECT _CDMA2000** to set the destination at CS Fallback execution to **CDMA2000**.

14. Execute **CALLSTAT?** to query the call processing status is 1(= Idle (Regist)).
    (If not 1 (= Idle (Regist)), repeat step 14.)

NOTE:

- ***To perform CS Fallback/Redirection to CDMA2000 at 1 Port, version v22.24 or later of the CDMA2000 software version is required.***

6.1.5. Redirection to 1xEV-DO

This chapter describes an example of redirection where 1xEV-DO Band Class is 0 and Channel is 283.

1. Execute **STDSEL CDMA2K** to switch the system to **CDMA200**0.
2. Execute **PRESET** to perform CDMA2000 initialization.
3. Execute **C2KSTD EV** to set to **1xEV-DO**.
4. Execute **BANDCLASS 0,EV** to set the Band class to **0**.
5. Execute **CHAN 283,EV** to set **Channel** to **283**.
6. Execute **STDSEL LTE** to change the system to **LTE**.
7. Execute **PRESET** to perform LTE initialization.
8. Execute **IRAT REDIRECT_EVDO** to set the destination at Redirection execution to **1xEV-DO**.
9. Execute **IRATC BC 0** to set the same values as the above CDMA2000 Band class settings.
10. Execute **IRATC CH 283** to set the same values as the above CDMA2000 Channel settings.
11. Execute **IRAT_STDCNG ON** to set automatic switching when CS Fallback is executed to change **Standard**.
12. Perform LTE connection. (→2.1.2, 2.1.3, 2.1.4)
13. Execute **CSFB** to set Redirection to **1xEV-DO**.
14. Execute **CALLSTAT?** to query the call processing status is 2 (= Idle (Session Opened)).
    (If not 2 (= Idle (Session Opened)), repeat step 14.)

NOTE:

- ***To perform Redirection to 1xEV-DO at 1 Port, version 22.24 or later of the CDMA2000 software is required.***

6.2. Cell Reselection

This chapter outlines cell reselection and explains the operation procedure.

After completing location registration to a cell, the UE searches for the cell with stronger Rx sensitivity than that of the registered cell based on the criteria of cell reselection. When a cell fulfills the cell reselection criteria, the UE executes reselection to that cell.

6.2.1. Cell Selection Criterion

Srxlev and Squal are used for evaluation of cell selection and reselection and the following criteria must be fulfilled for each standard.

6.2.1.1. E-UTRAN Case

Srxlev > 0 AND Squal > 0

Srxlev = $Q_{rxlevmeas}$ - ($Q_{rxlevmin}$ + $Q_{rxlevminoffset}$) - Pcompensation

Squal = $Q_{qualmeas}$ - ($Q_{qualmin}$ + $Q_{qualminoffset}$)

Srxlev	Cell selection RX level value (dB)
Squal	Cell selection quality value (dB)
$Q_{rxlevmeas}$	Measured cell RX level value (RSRP)
$Q_{qualmeas}$	Measured cell quality value (RSRQ)
$Q_{rxlevmin}$	Minimum required RX level in cell (dBm)
$Q_{qualmin}$	Minimum required quality level in cell (dB)
$Q_{rxlevminoffset}$	Offset to signalled $Q_{rxlevmin}$ taken into account in Srxlev evaluation as result of periodic search for higher-priority PLMN while camped normally in VPLMN.
$Q_{qualminoffset}$	Offset to signalled $Q_{qualmin}$ taken into account in Squal evaluation as result of periodic search for higher-priority PLMN while camped normally in VPLMN.
Pcompensation	max(P_{EMAX} - $P_{PowerClass}$, 0) (dB)
P_{EMAX}	Maximum TX power level UE may use when transmitting on uplink in cell (dBm) defined as P_{EMAX} in [TS 36.101].
$P_{PowerClass}$	Maximum RF output power of UE (dBm) according to UE power class as defined in [TS 36.101].

Since the MT8821C does not transmit Q_{qualm}in of *SystemInformationBlockType1,* the UE applies the value of negative infinity for $Q_{qualmin}$. Therefore Squal > 0 is always satisfied.

- Refer to the Inter-RAT Cell Reselection criteria (6.2.3) for comparison with the MT8821C settings.
- These criteria are defined in 3GPP TS36.304 5.2.3.2.

6.2.1.2. UTRAN Case

for FDD cells: Srxlev > 0 AND Squal > 0

for TDD cells: Srxlev > 0

Srxlev = $Q_{rxlevmeas}$ - ($Q_{rxlevmin}$ + $Q_{rxlevminoffset}$) - Pcompensation

Squal = $Q_{qualmeas}$ - ($Q_{qualmin}$ + $Q_{qualminoffset}$)

Squal	Cell Selection quality value (dB) Applicable only to FDD cells
Srxlev	Cell Selection RX level value (dB)
$Q_{qualmeas}$	Measured cell quality value. Quality of received signal expressed in CPICH Ec/N0 (dB) for FDD cells. CPICH Ec/N0 is averaged. Applicable only to FDD cells.
$Q_{rxlevmeas}$	Measured cell RX level value. This is received signal, CPICH RSCP for FDD cells (dBm) and P-CCPCH RSCP for TDD cells (dBm).
Qqualmin	Minimum required quality level in cell (dB). Applicable only to FDD cells.
QqualminOffset	Offset to signalled Qqualmin taken into account in Squal evaluation as result of periodic search for higher-priority PLMN while camped normally in VPLMN.
Qrxlevmin	Minimum required RX level in cell (dBm).
QrxlevminOffset	Offset to signalled Qrxlevmin taken into account in Srxlev evaluation as result of periodic search for higher-priority PLMN while camped normally in VPLMN.
Pcompensation	max(UE_TXPWR_MAX_RACH - P_MAX, 0) (dB)
UE_TXPWR_MAX_RACH	Maximum TX power level UE may use when accessing cell on RACH (read in system information) (dBm).
P_MAX	Maximum RF output power of UE (dBm).

- Refer to the Inter-RAT Cell Reselection criteria (6.2.3) for comparison with the MT8821C settings.
- These criteria are defined in 3GPP TS25.304 5.2.3.1.

6.2.1.3. GSM Case

C1 > 0

C1 = A - Pcompensation

C1	Path loss criterion parameter (dB)
A	RLA_C - RXLEV_ACCESS_MIN
RLA_C	Running average of received signal level
RXLEV_ACCESS_MIN	Minimum received signal level at MS required for access to system (dBm).
Pcompensation	Max MS_TXPWR_MAX_CCH - P, 0) (dB)
MS_TXPWR_MAX_CCH	Maximum TX power level MS may use when accessing system until otherwise commanded.
P	Maximum RF output power of MS.

- Refer to the Inter-RAT Cell Reselection criteria (6.2.3) for comparison with the MT8821C settings.
- These criteria are defined in 3GPP TS45.008 6.4.

6.2.2. Measurement Rules for Cell Reselection

After completing location registration to a cell, the UE evaluates non-serving cells in preparation for executing cell reselection. The following criteria must be unsatisfied to perform evaluation. If the following criteria are satisfied, whether or not to perform evaluation depends on the UE.

・Intra-frequency Cell Reselection

Srxlev > $S_{IntraSearchP}$ AND Squal > $S_{IntraSearchQ}$

・Inter frequency and Inter-RAT Cell Reselection

Srxlev > $S_{nonIntraSearchP}$ AND Squal > $S_{nonIntraSearchQ}$

Inter-frequency is evaluated with these criteria because the MT8821C LTE cell priorities are all the same. Inter-RAT is also evaluated with these criteria because the LTE cell reselection priority is set to the highest.

Since the MT8821C does not transmit $S_{IntraSearchQ}$ /$S_{nonIntraSearchQ}$ of *SystemInformationBlockType3*, the UE applies the value of 0 dB for $S_{IntraSearchQ}$/$S_{nonIntraSearchQ}$. Consequently, Squal > $S_{IntraSearchQ}$ and Squal > $S_{nonIntraSearchQ}$ are fulfilled as described in Chapter 6.2.1. When *SystemInformationBlockType3* does not include $S_{IntraSearchP}$/$S_{nonIntraSearchP}$ (s-IntraSearch = Off, s-NonIntraSearch = Off), the UE applies the value of infinity for $S_{IntraSearchP}$/$S_{nonIntraSearchP}$. Therefore the evaluation result is Srxlev < $S_{IntraSearchP}$, Srxlev < $S_{nonIntraSearchP}$ and the neighbour cell evaluation criteria are fulfilled.

- Refer to the Cell Reselection Operation Procedure (6.2.5) for how to set $S_{IntraSearchP}$.
- These criteria are defined in 3GPP TS36.304 5.2.4.2.
- Refer to 3GPP TS36.331 for each message element of *SystemInformationBlockType.*

6.2.3. Inter-RAT Cell Reselection Criteria

When the criteria in Chapter 6.2.2 are fulfilled, the UE performs evaluation to execute cell reselection.
Since the MT8821C does not transmit $Thresh_{Serving, LowQ}$ of *SystemInformationBlockType3*, the UE performs cell reselection when Srxlev for each serving cell and neighbour cell fulfils the following criteria.

Srxlev(serving cell) < $Thresh_{Serving, LowP}$ AND Srxlev(neighbour cell) > $Thresh_{X, LowP}$

Variable	Parameter			
	E-UTRAN	UTRAN	GSM	1xEV-DO
Srxlev, C1	---	---	---	*4
$Q_{rxlevmeas}$, RLA_C	Output Level (EPRE)	Output Level	Output Level	Output Level (Fwd.)
$Q_{rxlevmin}$, RXLEV_ACCESS_MIN	Qrxlevmin (SIB1) *1	–119 dB (fixed)	–115 dB (fixed)	---
$Q_{rxlevminoffset}$	Not sent*2	Not sent*2	---	---
Pcompensation	---	---	---	---
Maximum TX Power Level	p-Max	33 dBm (fixed)	0 dBm (fixed)	---
Maximum RF Output Power	23 dBm*3	23 dBm*3	23 dBm*3	---

*1: Setting x 2 = actual value (dB)
*2: UE applies the value of 0 dB
*3: Power Class 3 value
*4: Calculated by formula (-FLOOR(-2 x 10 x log10 Ec/Io) in units of 0.5 dB) defined in 3GPP TS36.304 5.2.4.5.

- Refer to the Cell Reselection Operation Procedure (6.2.5) for how to set $Thresh_{X, LowP}$ and $Thresh_{X, LowP}$.
- These criteria are defined in 3GPP TS36.304 5.2.4.5 E-UTRAN Inter-frequency and inter-RAT Cell Reselection criteria.
- Refer to 3GPP TS36.331 for each message element of *SystemInformationBlockType.*

6.2.4. Intra-Frequency and Equal Inter-Frequency Cell Reselection Criteria

When the criteria in Chapter 6.2.2 are fulfilled, the UE ranks cells to perform cell reselection. When the ranking R_n of the following neighbour cell is greater than the ranking Rs of the serving cell, the UE performs cell reselection.

$R_s = Q_{meas,s} + Q_{Hyst}$

$R_n = Q_{meas,n} + Q_{offset}$

Q_{meas}	RSRP measurement quantity used at cell reselection.
Qoffset	For intra-frequency: Equals to $Qoffset_{s,n}$, if $Qoffset_{s,n}$ is valid, otherwise this equals to zero. For inter-frequency: Equals to $Qoffset_{s,n}$ plus $Qoffset_{frequency}$, if $Qoffset_{s,n}$ is valid, otherwise this equals to $Qoffset_{frequency}$.

The MT8821C sets Q_{Hyst} of *SystemInformationBlockType3* to dB0. For inter-frequency, only $Qoffset_{frequency}$ is used because the MT8821C does not transmit $Q_{offsets,n}$.

- The Q_{meas} setting procedure is the same as $Q_{rxlevmeas}$ described in 6.2.3 Inter-RAT Cell Reselection Criteria.
- Refer to 6.2.5 Cell Reselection Operation Procedure for how to set Q_{offset}.
- These criteria are defined in 3GPP TS36.304 5.2.4.6.

6.2.5. Cell ReselectionProcedure

To perform cell reselection, follow the procedure below. LTE (serving cell) operations are in blue and neighbor cell operations are in red.

> ***NOTE 1:*** **Perform initial condition setting (2.1.2) and external loss setting for each standard before performing cell reselection.**

> ***NOTE 2:*** **TS36.521-3 specifies the margin for cell reselection criteria as at least 6 dB.**

6.2.5.1. Inter-RAT(TD-SCDMA) Cell Reselection: TD-SCDMA is lower priority.

1. **[TD-SCDMA]** Execute **CHAN 10054** to set **Common Parameter - Channel** to **10054**.
2. **[TD-SCDMA]** Execute **LVL OFF** to set **Common Parameter - Output Level** to **Off**.
3. **[LTE]** Execute **OLVL_EPRE -50.0** to set **Common Parameter - Output Level (EPRE)** to **–50.0 (dBm/15 kHz)**.
4. **[LTE]** Execute **QRXLEVMIN_SIB1 -70** to set **Call Processing Parameter - Qrxlevmin (SIB1)** to **–70 (–140 dB)**.
5. **[LTE]** Execute **SNONINTRA -1** to set **Call Processing Parameter - s-NonIntraSearch** to **Off (∞ dB).**
6. **[LTE]** Execute **THSERVLOW 30** to set **Call Processing Parameter - threshServingLow** to **30 (60 dB).**
7. **[LTE]** Execute **NCATDSDLUARFCN 1,10054** to set the leftmost **Inter RAT (TD-SCDMA) Cell - threshX-Low** to **10054**.
8. **[LTE]** Execute **NCATDSTXLOW 0** to set **Call Processing Parameter - Inter RAT (TD-SCDMA) Cell - threshX-Low** to **0 (0 dB).**
9. **[LTE]** Turn on the UE power and perform location registration (2.1.3).
10. **[TD-SCDMA]** Execute **LVL ON** to set **Common Parameter - Output Level** to **On**.
11. **[TD-SCDMA]** Execute **OLVL -30.0** to set **Common Parameter - Output Level** to **–30.0 dBm**.
12. **[LTE]** Execute **OLVL_EPRE -75.0** to set **Common Parameter - Output Level (EPRE)** to **–75.0 (dBm/15 kHz)**, and wait a few seconds.
13. **[TD-SCDMA]** Execute **CALLSTATIC?** and check that the call processing static status is 2 (= Idle(Regist)).

6.2.5.2. Inter-RAT(W-CDMA) Cell Reselection: W-CDMA is lower priority.

1. **[W-CDMA]** Execute **PRESET_3GPP** to initialize to the value based on 3GPP.
2. **[W-CDMA]** Execute **DLCHAN 10700** to set **DL Channel** to **10700**.
3. **[W-CDMA]** Execute **INTEGRITY ON** to set **Integrity Protection** to **On**.
4. **[W-CDMA]** Execute **REGMODE COMBINED** to **set Registration Mode** to **Combined**.
5. **[W-SCDMA]** Execute **LVL OFF** to set **Output Level** to **Off**.
6. **[LTE]** Execute **OLVL_EPRE -50.0** to set **Output Level (EPRE)** to **–50.0 (dBm/15 kHz)**.
7. **[LTE]** Execute **QRXLEVMIN_SIB1 -70** to set **Qrxlevmin (SIB1)** to **–70 (–140 dB)**.
8. **[LTE]** Execute **SNONINTRA -1** to set **s-NonIntraSearch** to **Off (∞ dB)**.
9. **[LTE]** Execute **THSERVLOW 30** to set **threshServingLow** to **30 (60 dB)**.
10. **[LTE]** Execute **NCAWCDMADLUARFCN 1,10700** to set **the leftmost Inter RAT (W-CDMA) Cell - UARFCN** to **10700**.
11. **[LTE]** Execute **NCAWCDMATXLOW 0** to set **Inter RAT (W-CDMA) Cell - threshX-Low to 0 (0 dB)**.
12. **[LTE]** Turn on the UE power and perform location registration (2.1.3).
13. **[W-CDMA]** Execute **LVL ON** to set **Output Level** to **On**.
14. **[W-CDMA]** Execute **OLVL -30.0** to set **Output Level** to **–30.0 dBm**.
15. **[LTE]** Execute **OLVL_EPRE -75.0** to set **Output Level (EPRE)** to **–75.0 (dBm/15 kHz)** and wait a few seconds.
16. **[W-CDMA]** Execute **CALLSTAT?** and check that the call processing static status is 2(= Idle (Regist)).

6.2.5.3. Inter-RAT(GSM) Cell Reselection: GSM is lower priority.

1. **[GSM]** Execute **SYSCMB DCS1800** to set **System Combination** to **GSM/DCS1800**.
2. **[GSM]** Execute **CTRLCH 1** to set **CCH Channel** to **1**.
3. **[GSM]** Execute **LVL OFF** to set **Output Level** to **Off**.
4. **[LTE]** Execute **OLVL_EPRE -50.0** to set **Output Level (EPRE)** to **–50.0 (dBm/15 kHz)**.
5. **[LTE]** Execute **QRXLEVMIN_SIB1 -70** to set **Qrxlevmin (SIB1)** to **–70 (–140 dB)**.
6. **[LTE]** Execute **SNONINTRA -1** to set **s-NonIntraSearch** to **Off (∞ dB)**.
7. **[LTE]** Execute **THSERVLOW 30** to set **threshServingLow** to **30 (60 dB)**.
8. **[LTE]** Execute **NCABCCHARFCN 1,1,DCS1800** to set **the leftmost Inter RAT (GSM) Cell - BCCH-ARFCN and Band** to **1** and **DCS,** respectively.
9. **[LTE]** Execute **NCAGSMTXLOW 0** to set **Inter RAT (GSM) Cell - threshX-Low** to **0 (0 dB)**.
10. **[LTE]** Turn on the UE perform and perform location registration (2.1.3).
11. **[GSM]** Execute **LVL ON** to set **Output Level** to **On**.
12. **[GSM]** Execute **OLVL -30.0** to set **Output Level** to **–30.0 dBm**.
13. **[LTE]** Execute **OLVL_EPRE -75.0** to set **Output Level (EPRE)** to **–75.0 (dBm/15 kHz)** and wait a few seconds.
14. **[GSM]** Execute **CALLSTAT?** and check that the call processing static status is 2(= Idle (Regist)).

6.2.5.4. Inter-RAT(1xEV-DO) Cell Reselection: 1xEV-DO is lower priority.

1. **[1xEV-DO]** Execute **C2KSTD EV** to set **Standard to 1xEV-DO**.
2. **[1xEV-DO]** Execute **BANDCLASS 1** to set **Band Class** to **1**.
3. **[1xEV-DO]** Execute **CHAN 375** to set **Channel** to **375**.
4. **[1xEV-DO]** Execute **LVL OFF** to set **Output Level** to **Off**.
5. **[LTE]** Execute **OLVL_EPRE -50.0** to set **Output Level (EPRE)** to **–50.0 (dBm/15 kHz)**.
6. **[LTE]** Execute **QRXLEVMIN_SIB1 -70** to set **Qrxlevmin (SIB1)** to **–70 (–140 dB)**.
7. **[LTE]** Execute **SNONINTRA -1** to set **s-NonIntraSearch** to **Off (∞ dB)**.
8. **[LTE]** Execute **THSERVLOW 30** to set **threshServingLow** to **30 (60 dB)**.
9. **[LTE]** Execute **NCAEVDOARFCN 1,375** to set the **leftmost Inter RAT (1xEV-DO) Cell - ARFCN** to **375**.
10. **[LTE]** Execute **NCAEVDOBAND BC1** to set **Inter RAT (1xEV-DO) Cell - Band Class** to **bc1**.
11. **[LTE]** Execute **NCAEVDOTXLOW 2** to set **Inter RAT (1xEV-DO) Cell - threshX-Low** to **2 (–1.0 dB)**.
12. **[LTE]** Turn on the UE power and perform location registration (2.1.3).
13. **[1xEV-DO]** Execute **LVL ON** to set **Output Level** to **On**.
14. **[1xEV-DO]** Execute **CALLSTATIC?** and check that the call processing static status is 2(= Idle (Regist)).

6.2.5.5. Inter-Frequency Cell Reselection: Inter-Frequency has same priority.

1. **[InterFreq]** Execute **DLCHAN 0** to set **DL Channel** to **0**.
2. **[InterFreq]** Execute **TAC 000A** to set **TAC** to **000A**.
3. **[InterFreq]** Execute **LVL OFF** to set **Output Level** to **Off**.
4. **[LTE]** Execute **OLVL_EPRE -50.0** to set **Output Level (EPRE)** to **–50.0 (dBm/15 kHz)**.
5. **[LTE]** Execute **QRXLEVMIN_SIB1 -70** to set **Qrxlevmin (SIB1)** to **–70 (–140 dB)**.
6. **[LTE]** Execute **SNONINTRA -1** to set **s-NonIntraSearch** to **Off (∞ dB)**.
7. **[LTE]** Execute **NCAINTERFREQ 1,0** to set the **leftmost Inter Frequency Cell - DL Channel** to **0**.
8. **[LTE]** Execute **NCAINTERQOFFSET 0dB** to set **Inter Frequency Cell - q-OffsetFreq** to **0 dB**.
9. **[LTE]** Execute **NCAINTERQOFFSETCELL 1,-4dB** to set the **leftmost Inter Frequency Cell - q-OffsetCell** to **–4 dB**.
10. **[LTE]** Execute **NCAINTERCELLID 1,0** to set the **leftmost Inter Frequency Cell - Cell ID** to **0**.
11. **[LTE]** Turn on the UE power and perform location registration (2.1.3).
12. **[InterFreq]** Execute **LVL ON** to set **Output Level** to **On**.
13. **[InterFreq]** Execute **OLVL_EPRE -60.0** to set **Output Level (EPRE)** to **–60.0 (dBm/15 kHz)**.
14. **[LTE]** Execute **OLVL_EPRE -75.0** to set **Output Level (EPRE)** to **–75.0 (dBm/15 kHz)** and wait a few seconds.
15. **[InterFreq]** Execute **CALLSTAT?** and check that the call processing static status is 2(= Idle(Regist)).

6.2.5.6. Intra-Frequency Cell Reselection

1. **[IntraFreq]** Execute **CELLID 100** to set **Cell ID** to **100**.
2. **[IntraFreq]** Execute **TAC 000A** to set **TAC** to **000A**.
3. **[IntraFreq]** Execute **LVL OFF** to set **Output Level** to **Off**.
4. **[LTE]** Execute **OLVL_EPRE -50.0** to set **Output Level (EPRE)** to **–50.0 (dBm/15 kHz)**.
5. **[LTE]** Execute **QRXLEVMIN_SIB1 -70** to set **Qrxlevmin (SIB1)** to **–70 (–140 dB)**.
6. **[LTE]** Execute **SINTRA -1** to set **s-IntraSearch** to **Off (∞ dB)**.
7. **[LTE]** Execute **NCAINTRAFREQ 1,100** to set the **leftmost Intra Frequency Cell - Cell ID** to **100**.
8. **[LTE]** Execute **NCAINTRAQOFFSET 0** to set **Intra Frequency Cell - q-OffsetCell** to **0 dB**.
9. **[LTE]** Turn on the UE power and perform location registration (2.1.3).
10. **[IntraFreq]** Execute **LVL ON** to set **Output Level** to **On**.
11. **[IntraFreq]** Execute **OLVL_EPRE -60.0** to set **Output Level (EPRE)** to **–60.0 (dBm/15 kHz)**.
12. **[LTE]** Execute **OLVL_EPRE -70.0** to set **Output Level (EPRE)** to **–70.0 (dBm/15 kHz)** and wait a few seconds.
13. **[IntraFreq]** Execute **CALLSTAT?** and check that the call processing static status is 2(= Idle (Regist)).

6.3. Measurement Report

This chapter describes the Measurement Report.
This function can verify the Inter-RAT measurement function and receiver characteristics for neighboring cells, such as E-UTRA inter-frequency/intra-frequency, Inter-RAT UTRA FDD/TDD, GSM, CDMA2000 in RRC_CONNECTED state.

6.3.1. Initial Condition Setting

In this and following chapters, the initial settings are 480 ms for Measurement Report - Interval, and Periodical for Measurement Report - Trigger Type. Changes can be made if necessary.

1. Execute **MEASREP_INTVAL 480** to send UE Report every 480 ms.
2. Execute **MEASREP_TRG PERIODICAL** to set **Measurement Report - Trigger Type** to **Periodical**.

6.3.2. Measurement Report Procedure

6.3.2.1. Measurement Report for LTE

This chapter describes the UE Report for the Serving Cell (LTE).

1. Execute **CALLRFR** to initialize the UE Report value.
2. Execute **NEIGHCELLMEAS OFF** to set **Neighbour Cell Measurement** to **OFF**.
3. Connect in Test Mode. (→2.3)
4. Execute **MEASREP ON** to request UE Report.
5. Execute **RSRP? FLAG** and check if the Response is 1 to receive the UE Report.
6. Execute **RSRP?** to read the RSRP value.
7. To read again, return to Step 4 and continue.

For a one-time UE Report, the changes to the procedure are shown below.
These changes can be applied to the following procedures.

5. Execute **MEASREP OFF.**
6. Execute **MEASREP_ONCE** to request UE report only once.

6.3.2.2. Measurement Report for Intra-Frequency

This chapter describes the UE Report for LTE and Intra-Frequency. In the example, the Cell ID for Intra-Frequency is set to 100 and TAC is set to 000A. A UE Report for the Neighbour Cell requires signal input to the UE. Signal Input is also required for the following procedures.

1. **[LTE]** Execute **CALLRFR** to initialize the UE Report value.
2. **[LTE]** Execute **NCAINTRAFREQ 1,100** to set **leftmost Intra Frequency Cell - Cell ID** to **100**.
3. **[LTE]** Execute **NEIGHCELLMEAS INTRAFREQ** to set **Neighbour Cell Measurement** to **Intra Frequency**.
4. **[IntraFreq]** Execute **CELLID 100** to set **Cell ID** to **100**.
5. **[IntraFreq]** Execute **TAC 000A** to set **TAC** to **000A**.
6. **[LTE]** Connect in the Test Mode. (→2.3)
7. **[LTE]** Execute **MEASREP ON** to request UE Report.
8. **[LTE]** Execute **MREP_LTE? FLAG** and check if the Response is 1 to receive the UE Report for Intra-Frequency.
9. **[LTE]** Execute **MREP_LTE?** to read the Cell ID, RSRP, and RSRQ values.
10. To read again, return to Step 8 and continue.

6.3.2.3. Measurement Report for Inter-Frequency

This chapter describes the UE Report of LTE and Inter-Frequency. In the example, the DL Channel for Inter-Frequency is set to 2525, Cell ID is set to 100 and TAC is set to 000A.

1. **[LTE]** Execute **CALLRFR** to initialize the UE Report value.
2. **[LTE]** Execute **NCAINTERFREQ 1,2525** to set **leftmost Inter Frequency Cell - DL Channel** to **2525**.
3. **[LTE]** Execute **NCAINTERCELLID 1,100** to set **leftmost Inter Frequency Cell - Cell ID** to **100**.
4. **[LTE]** Execute **NEIGHCELLMEAS INTERFREQ** to set **Neighbour Cell Measurement** to **Inter Frequency**.
5. **[InterFreq]** Execute **CELLID** to set **Cell ID** to **100**.
6. **[InterFreq]** Execute **TAC 0000A** to set **TAC** to **000A**.
7. **[LTE]** Connect on Test Mode. (→2.3)
8. **[LTE]** Execute **MEASREP ON** to request the UE Report.
9. **[LTE]** Execute **MREP_LTE?** FLAG and check if the Response is 1 to receive the UE Report for Inter-Frequency.
10. **[LTE]** Execute **MREP_LTE?** to read the Cell ID, RSRP, and RSRQ values.
11. To read again, return to Step 10 and continue.

6.3.2.4. Measurement Report for W-CDMA

This chapter describes the UE Report for LTE and W-CDMA. In the example, the DL Channel for W-CDMA is set to 10700 and Primary Scrambling Code is set to to 100.

1. **[LTE]** Execute **CALLRFR** to initialize the UE Report value.
2. **[LTE]** Execute **NCAWCDMADLUARFCN 1,10700** to set **leftmost Inter RAT(W-CDMA) Cell - UARFCN** to **10700**.
3. **[LTE]** Execute **NCAWCDMACELLID 100** to set **Inter RAT(W-CDMA) Cell - Cell ID** to **100**.
4. **[LTE]** Execute **NEIGHCELLMEAS WCDMA** to set **Neighbour Cell Measurement** to **W-CDMA**.
5. **[W-CDMA]** Execute **DLCHAN 10700** to set **DL Channel** to **10700**.
6. **[W-CDMA]** Execute **PRISCRCODE 100** to set **Primary Scrambling Code** to **100**.
7. **[LTE]** Connect on Test Mode. (→2.3)
8. **[LTE]** Execute **MEASREP ON** to request the UE Report.
9. **[LTE]** Execute **MREP_WCDMA? FLAG** and check if the Response is 1 to receive the UE Report for W-CDMA.
10. **[LTE]** Execute **MREP_WCDMA?** to read the Cell ID, and RSCP values.
11. To read again, return to Step 10 and continue.

6.3.2.5. Measurement Report for TD-SCDMA

This chapter describes the UE Report of LTE and TD-SCDMA. In the example, the Channel in TD-SCDMA is set to 10054 and Scrambling Code ID is set to 0.

1. **[LTE]** Execute **CALLRFR** to initialize the UE Report value.
2. **[LTE]** Execute **NCATDSDLUARFCN 1,10054** to set **leftmost Inter RAT(TD-SCDMA) Cell - UARFCN** to **10054**.
3. **[LTE]** Execute **NCATDSCELLID 0** to set **Inter RAT(TD-SCDMA) Cell - Cell ID** to **0**.
4. **[LTE]** Execute **NEIGHCELLMEAS TDSCDMA** to set **Neighbour Cell Measurement** to **TD-SCDMA**.
5. **[TD-SCDMA]** Execute **CHAN 10054** to set **Channel** to **10054**.
6. **[TD-SCDMA]** Execute **SCRCODEID 0** to set **Scrambling Code ID** to **0**.
7. **[LTE]** Connect on Test Mode. (→2.3)
8. **[LTE]** Execute **MEASREP ON** to request the UE Report.
9. **[LTE]** Execute **MREP_TDSCDMA? FLAG** and check if the Response is 1 to receive the UE Report for TD-SCDMA.
10. **[LTE]** Execute **MREP_TDSCDMA?** to read the Cell ID, and RSCP values.
11. To read again, return to Step 10 and continue.

6.3.2.6. Measurement Report for GSM

This chapter describes the UE Report of LTE and GSM. In the example, the CCH Channel in GSM is set to 1 and System Combination is set to GSM/DCS1800.

1. **[LTE]** Execute **CALLRFR** to initialize the UE Report value.
2. **[LTE]** Execute **NCABCCHARFCN 1,1,DCS1800** to set **leftmost Inter RAT(GSM) Cell - BCCH-ARFCN** and **Band** to **1** and **DCS1800**, respectively.
3. **[LTE]** Execute **NEIGHCELLMEAS GSM** to set **Neighbour Cell Measurement** to **GSM**.
4. **[GSM]** Execute **SYSCMB DCS1800** to set **System Combination** to **GSM/DCS1800**.
5. **[GSM]** Execute **CTRLCH 1** to set **CCH Channel** to **1**.
6. **[LTE]** Connect on Test Mode. (→2.3)
7. **[LTE]** Execute **MEASREP ON** to request the UE Report.
8. **[LTE]** Execute **MREP_GSM? FLAG** and check if the Response is 1 to receive the UE Report for GSM.
9. **[LTE]** Execute **MREP_GSM?** to read the ARFCN, NCC, BCC, and RxLev values.
10. **[LTE]** Execute **MREP_GSM_BAND?** to read the Band value.
11. To read again, return to Step 9 and continue.

6.3.2.7. Measurement Report for 1xEV-DO

This chapter describes the UE Report for LTE and 1xEV-DO. In the example, the Channel in 1xEV-DO is set to 300, Band Class is set to 1 and Pilot PN Off is set to 0.

1. **[LTE]** Execute **CALLRFR** to initialize the UE Report value.
2. **[LTE]** Execute **NCAEVDOARFCN 1,300** to set **leftmost Inter RAT(1xEV-DO) Cell - ARFCN** to **300**.
3. **[LTE]** Execute **NCAEVDOBAND BC1** to set **Inter RAT(1xEV-DO) Cell - Band Class** to **bc1**.
4. **[LTE]** Execute **NCAEVDOCELLID 0** to set **Inter RAT(1xEV-DO) Cell - Cell ID** to **0**.
5. **[LTE]** Execute **NEIGHCELLMEAS EVDO** to set **Neighbour Cell Measurement** to **1xEV-DO**.
6. **[1xEV-DO]** Execute **BANDCLASS 1** to set **Band Class** to **1**.
7. **[1xEV-DO]** Execute **CHAN 300** to set **Channel** to **300**.
8. **[1xEV-DO]** Execute **PNOFFS 0** to set **Pilot PN Offset** to **0**.
9. **[LTE]** Connect on Test Mode. (→2.3)
10. **[LTE]** Execute **MEASREP ON** to request the UE Report.
11. **[LTE]** Execute **MREP_EVDO? FLAG** and check if the Response is 1 to receive the UE Report for 1xEV-DO.
12. **[LTE]** Execute **MREP_EVDO?** to read the Cell ID and PilotStrength.
13. To read again, return to Step 12 and continue.

6.3.2.8. Measurement Report for CA

This chapter describes the UE Report for CA. In the example, the initial condition is set (→2.2.3) and the UE Report is requested when SCC Activation is Off and On.

1. Execute **CALLRFR** to initialize the UE Report value.
2. Execute **MEASCYCLE_SCC1 SF1280** to set **SCell Measurement Cycle of SCC-1** to **sf1280**.
3. Execute **ACT_SCC1 OFF** to set **SCC-1 Activation** to **OFF**.
4. Connect in the Test Mode. (→2.2.5)
5. Execute **MEASREP ON** to request UE Report.
6. Execute **RSRP_SCC1? FLAG** and check if the Response is 1 to receive the UE Report for SCC-1.
7. Execute **RSRP_SCC1?** to read the SCC-1 RSRP value.
8. To read again, return to Step 7 and continue.
9. Execute **MEASREP OFF** to switch OFF transition for the UE Report.
10. Execute **CALLRFR** to initialize the UE Report value.
11. Execute **ACT_SCC1 ON** to set **SCC-1 Activation** to **ON**.
12. Execute **MEASREP ON** to request the UE Report.
13. Execute **RSRP_SCC1? FLAG** and check if the Response is 1 to receive the UE Report for SCC-1.
14. Execute **RSRP_SCC1?** to read the RSRP value for SCC-1.
15. To read again, return to Step 14 and continue.

7. LTE VoLTE Echoback Test (MT8821C Only)

The following test procedures can be used for the MT8821C only.

7.1. LTE VoLTE Echoback Test

The VoLTE Echoback between the internal IMS server of the MT8821C and the UE can be tested by installing the MX882164C LTE VoLTE Echoback option in the MT8821C.

NOTES:

- ***The VoLTE Connection Test can be performed even without the MX882112C/13C-006 IP Data Transfer Option License.***

The following test procedure is based on hands-on operation. Refer to the LTE measurement software operation manual for the basic operation and remote commands.

7.1.1. Connection Diagram

7.1.1.1. Connection Diagram for IP Data Verification using MT8821C

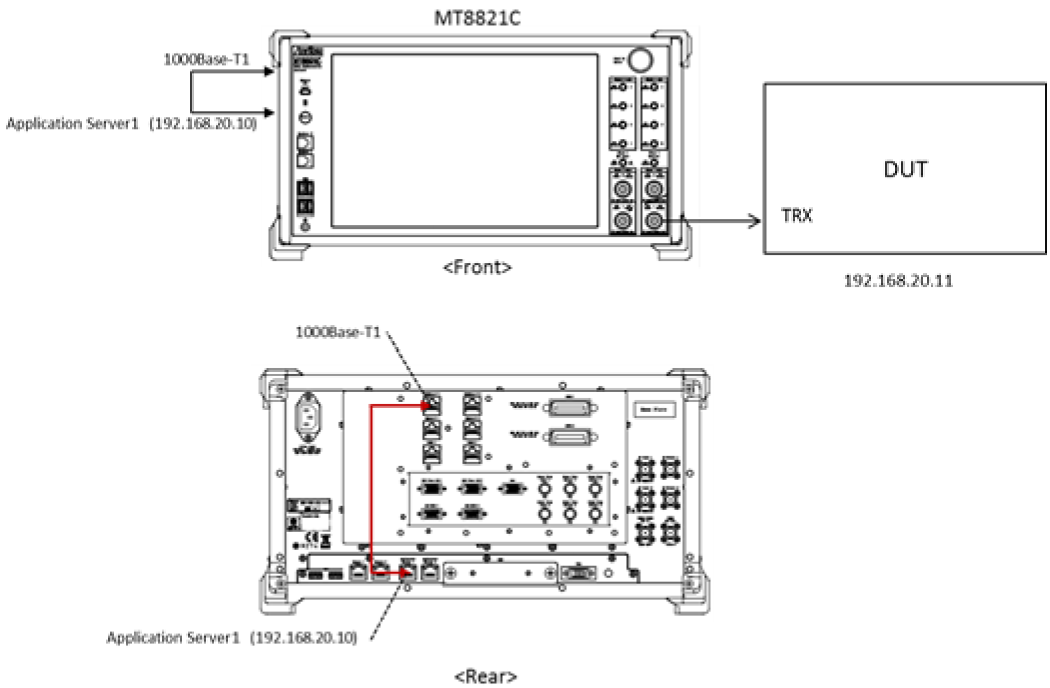


Figure 7.1.1-1 ***Connection Diagram for LTE VoLTE Echoback Test (MT8821C, using internal IMS server)***

<Required Equipment>

- LTE mobile terminal supporting VoLTE connection
- RF cable to connect MT8821C and LTE mobile terminal
- Crossover cable to connect MT8821C and application server

* Windows is a registered trademark of Microsoft Corporation in the USA and other countries.

7.1.2. Application Server Connection and Setting

With the MT8821C powered−down (OFF), use a crossover Ethernet cable to connect the 1000Base−TX port to the Application Server1 on the back panel of the MT8821C. Set TCP/IP of the internal Application Server1. When performing VoLTE call tests using Phone2, use an Ethernet cable to connect the 1000Base-T2 port to the Application Server2. Then set TCP/IP of Application Server2.

7.1.2.1. IPv4

TCP/IP Setting for Application Server1 (Phone1) or Application Server2 (Phone2).

1. Open the **Control Panel – Network and Sharing Center – Change adapter setting**, and double−click the Application Server1.

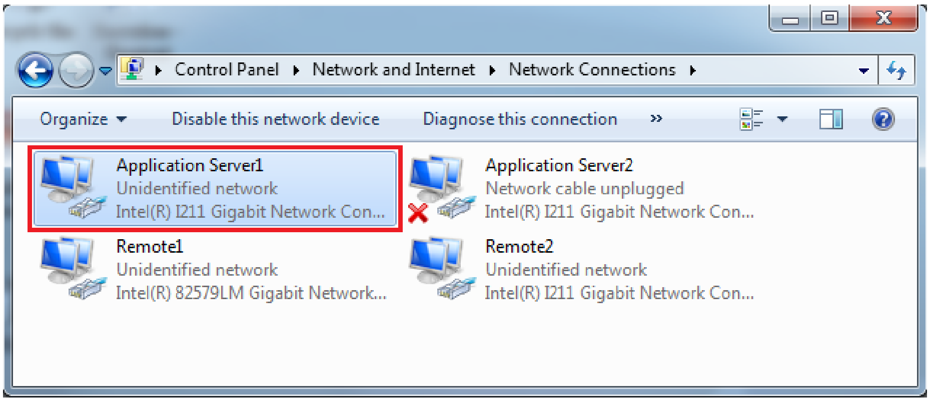


Figure 7.1.2.1-1 Change Adapter Setting Window (MT8821C)

2. Double−click Properties of the Application Server1 or Application Server2 Status window, and double−click Internet Protocol (TCP/IPv4) to open the Internet Protocol (TCP/IP) Properties window.

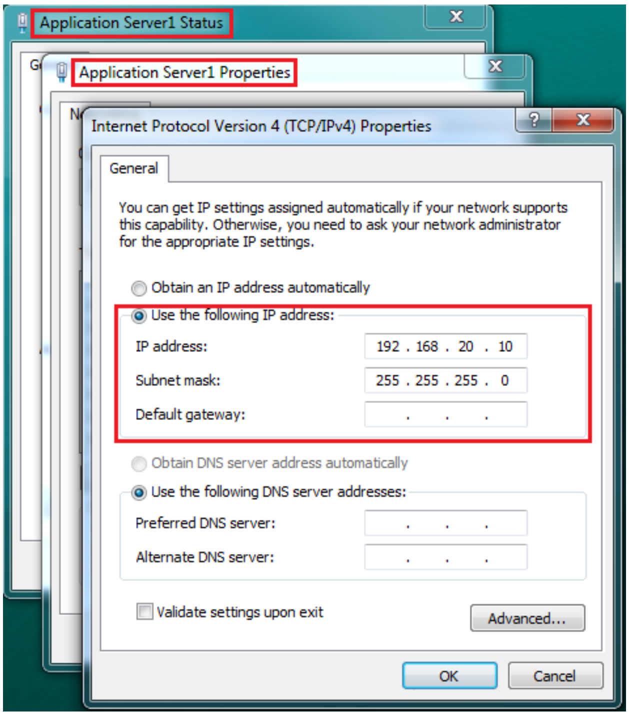


Figure 7.1.2.2-2 *Internet Protocol (TCP/IPv4) Properties Window (MT8821C)*

3. Choose **Use the following IP address** and set **IP address** and **Subnet mask** as follows:
   IP address: 192.168.20.10
   Subnet mask: 255.255.255.0

The settings above are for Phone1. When using Phone2, please use the IP address and subnet mask specified below.

IP address: 192.168.21.10
Subnet mask: 255.255.255.0

NOTE: ***For Phone1 and/or Phone2, set the same Application Server IP addresses in Call Processing→ Packet→[Server IP Address] parameter. Set Phone1 [Server IP Address] to Application Server1 IP address and set Phone2 [Server IP Address] to Application Server2 IP address.***

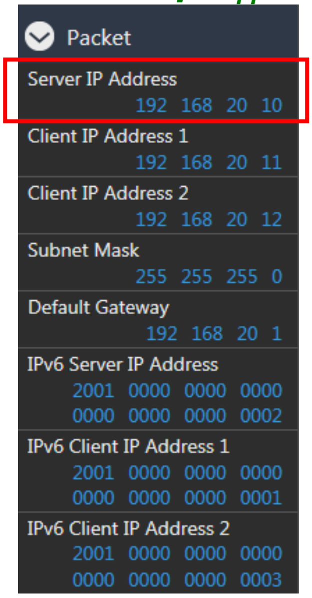


Figure 7.1.2.3-–3 ***Server IPv4 Address Setting Screen (MT8821C)***

4. Click **Advanced...** to open the **Advanced TCP/IP Settings** window.

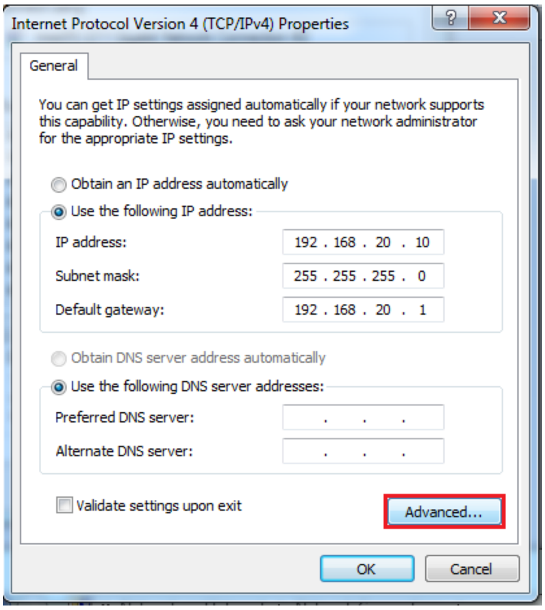


Figure 7.1.2.4-4 ***Internet Protocol (TCP/IPv4) Properties Window (MT8821C)***

5. Click **Add...** to open the TCP/IP Address window.

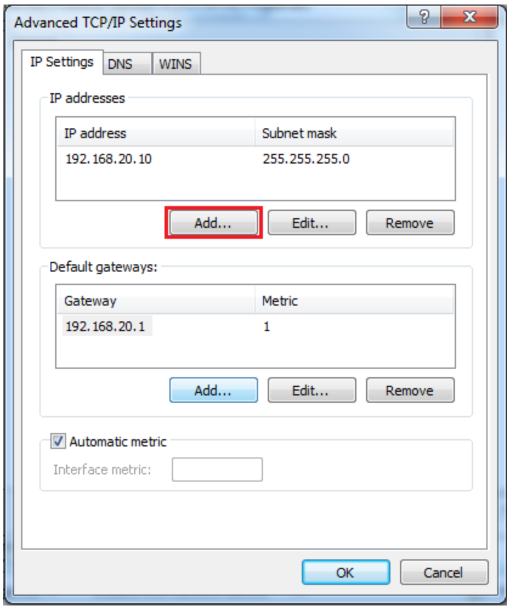
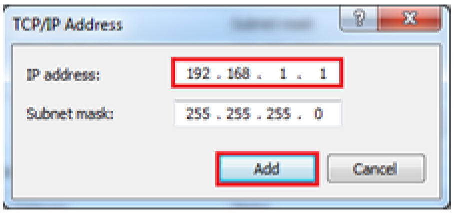


Figure 7.1.2.5-5 ***Advanced TCP/IP Settings Window (MT8821C)***

6. Click **Add...** to open the **TCP/IP Address** window.

7. Set **IP address** and **Subnet mask** as follows:
   IP address: 192.168.1.1
   Subnet mask: 255.255.255.0
   The settings above are for Phone1. When using Phone2, please use the IP address and subnet mask specified below.



   IP address: 192.168.2.1
   Subnet mask: 255.255.255.0

Figure 7.1.2.6-6 ***TCP/IPv4 Address Window (MT8821C)***

NOTE: For Phone1 and/or Phone2, set the same Advanced Setting IP addresses in Call Processing→IMS Service→[IMS Server IPv4 Address] parameter. Set Phone1 [IMS Server IPv4 Address] to Application Server1 Advanced Setting IP address and set Phone2 [IMS Server IPv4 Address] to Application Server2 Advanced Setting IP address.

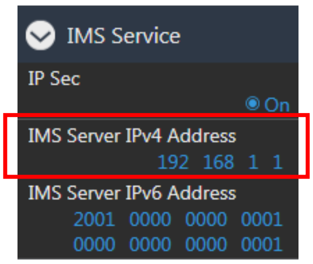


Figure 7.1.2.7-7 **IMS** ***Server IPv4 Address Setting Screen (MT8821C)***

8. Click **OK** to close the **TCP/IPv4 Address** window.
9. Click **OK** twice to close the **Internet Protocol (TCP/IP) Properties** window.
10. Click **Close** close the **Application Server1 Status** window.

IPv6

TCP/IP Setting for Application Server1 (Phone1) or Application Server2 (Phone2).

1. Open the **Control Panel – Network and Sharing Center – Change adapter setting**, and double-click the Application Server1 or Application Server2.

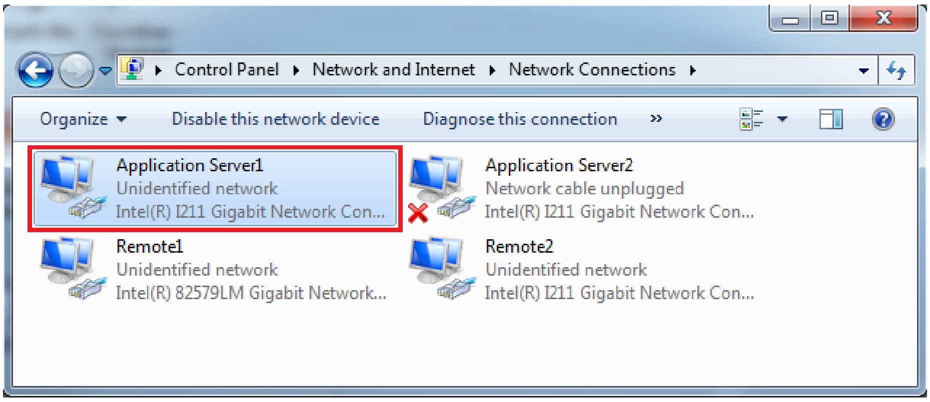


Figure 7.1.2.2-1 Change Adapter Setting Window (MT8821C)

2. Double-click **Properties** of the **Application Server1** or **Application Server2 Status** window, and double-click **Internet Protocol (TCP/IPv6)** to open the **Internet Protocol (TCP/IP) Properties** window.

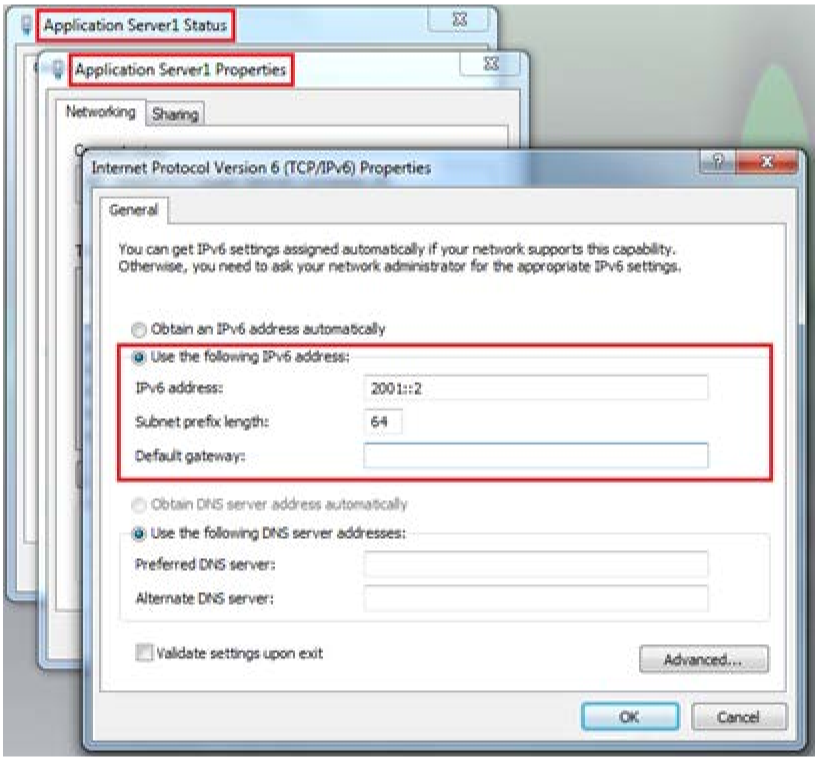


Figure 7.1.2.2-2 *Internet Protocol (TCP/IPv6) Properties Window (MT8821C)*

3. Choose **Use the following IPv6 address** and set **IP address** and **Subnet mask** as follows:
   IPv6 address: 2001::2
   Subnet prefix length: 64

The settings above are for Phone1. When using Phone2, please use the IP address and subnet prefix length specified below.

IP address: 2001:0:0:2::2
Subnet prefix length: 64

NOTES:

- ***Places with contiguous 0s in the IPv6 Server IP Address captured at Index No IP Address of step 4 'netsh int ipv6 set' are abbreviated as::. For example IPv6 Server IP Address 2001:0000:0000:0000:0000:0000:0000:0002 displayed in the following screen is abbreviated to 2001::2.***
- ***For Phone1 and/or Phone2, set the same IPv6 addresses in Call Processing→Packet→[IPv6 Server IP Address] parameter. Set Phone1 [IPv6 Server IP Address] to Application Server1 IPv6 address and set Phone2 [IPv6 Server IP Address] to Application Server2 IPv6 address.***

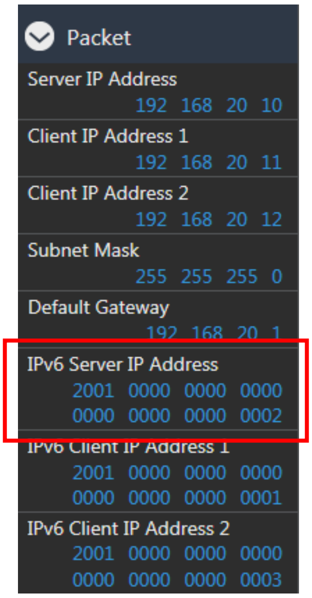


Figure 7.1.2.2-3 ***Server IPv6 Address Setting Screen (MT8821C)***

4. Click **Advanced...** to open the **Advanced TCP/IP Settings** window.

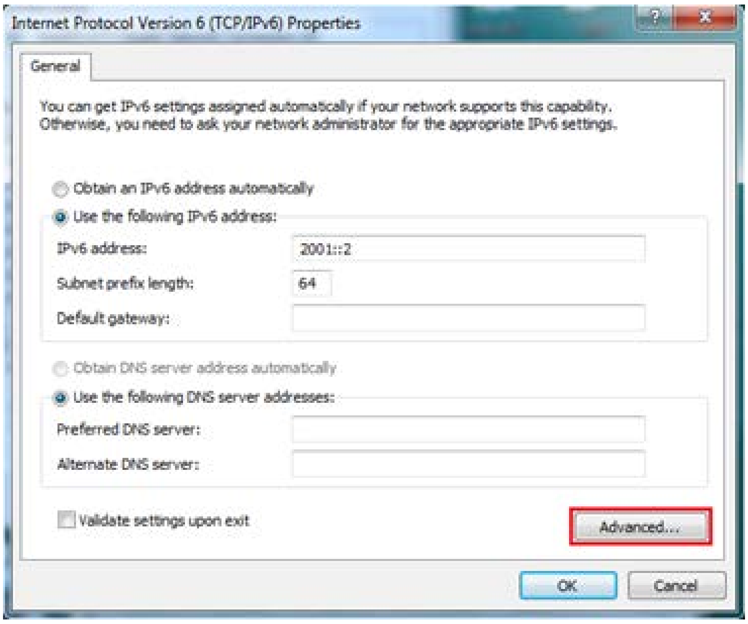


Figure 7.1.2.2-4 ***Internet Protocol (TCP/IPv6) Properties Window (MT8821C)***

5. Click **Add...** to open the **TCP/IP Address** window.

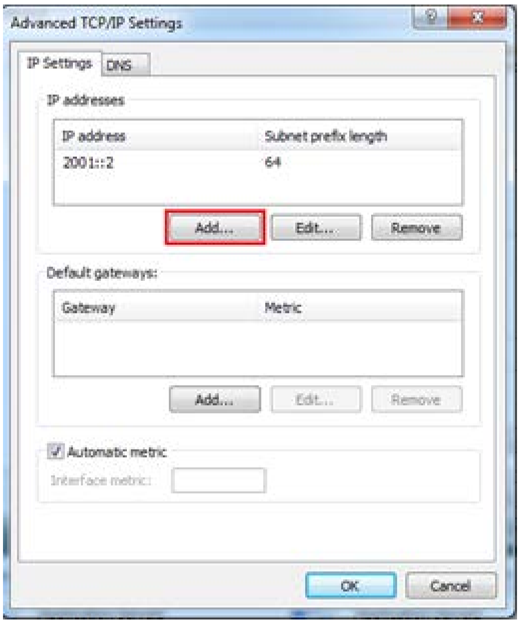


Figure 7.1.2.2-5 ***Advanced TCP/IP Settings Window (MT8821C)***

6. Click **Add...** to open the **TCP/IP Address** window.

7. Set **IP address** and **Subnet mask** as follows:
   IPv6 address: 2001:0:0:1::1
   Subnet prefix length: 64

   The settings above are for Phone1. When using Phone2, please use the IP address and subnet prefix length specified below.
   IP address: 2001:0:0:3::1
   Subnet prefix length: 64

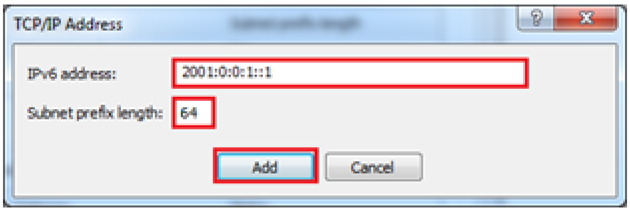
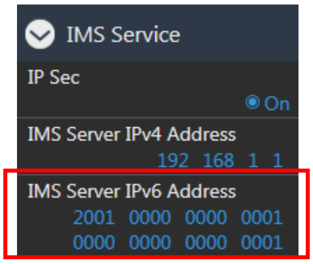


Figure 7.1.2.2-6 ***TCP/IPv6 Address Window (MT8821C)***

NOTE: For Phone1 and/or Phone2, set the same Advanced Setting IPv6 addresses in Call Processing→



IMS Service→[IMS Server IPv6 Address] parameter. Set Phone1 [IMS Server IPv6 Address] to Application Server1 Advanced Setting IPv6 address and set Phone2 [IMS Server IPv6 Address] to Application Server2 Advanced Setting IPv6 address.

Figure 7.1.2.2-7 IMS ***Server IPv6 Address Setting Screen (MT8821C)***

8. Click **OK** to close the **TCP/IPv6 Address** window.
9. Click **OK** twice to close the **Internet Protocol (TCP/IP) Properties** window.
10. Click **Close** to close the **Application Server1 Status** window.

11. Reboot the MT8821C.
12. Select and load the LTE measurement software to Phone1.

7.1.3. Initial Condition Setting

The following shows how to set-up the test condition for VoLTE Echoback .

1. Execute **Preset** to Initialize.
2. Set **UL Channel** to 18300.

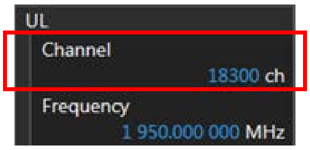


Figure 7.1.3-1 ***UL Channel Setting at Common Parameter Screen (MT8821C)***

3. Set **Channel Coding** to **Packet.**

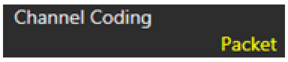


Figure 7.1.3-2 ***Channel Coding Setting at Common Parameter Screen (MT8821C)***

NOTE: If the MX882112C/13C-006 IP Data Transfer option is not installed, set Channel Coding to RMC and Set Test Mode to Off at the Call Processing Parameter screen.

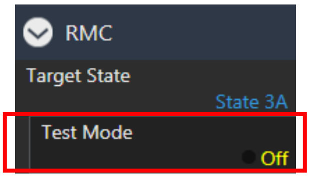


Figure 7.1.3-3 ***Test Mode Setting at Call Processing Parameter Screen (MT8821C)***

4. Set a **UE Category**.

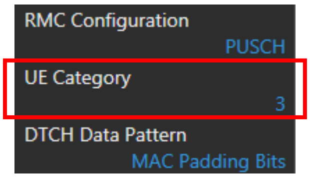


Figure 7.1.3-4 ***UE Category Setting at Common Parameter Screen (MT8821C)***

5. Set **SIM Model Number** to match the IMS Authentication Parameter with the SIM in use.
   NOTE: When using a SIM with a model number that is not included in the available SIM Model Numbers , the settings for Authentication Algorithm, Authentication Key K, AMF, OPc must be set accordingly.

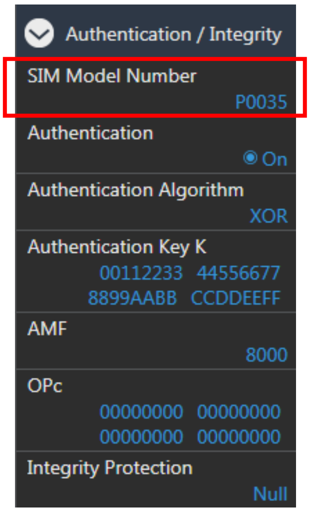


Figure 7.1.3-5 ***SIM Model Number Setting at Call Processing Parameter Screen (MT8821C)***

6. Set **Service Type** to **VoLTE (Voice)**.

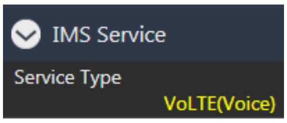


Figure 7.1.3-6 Service Type Setting *at Call Processing Parameter Screen (MT8821C)*

7. Set **VoLTE APN.** (→7.1.4)
NOTE : When [ims] or [IMS] is included in the UE's VoLTE APN character string, VoLTE APN setting is unnecessary. Otherwise, when [ims] or [IMS] is not included, please set the VoLTE APN according to section 7.1.4.

8. Set **VoLTE Codec Rate** to **23.85kbps (WB).**

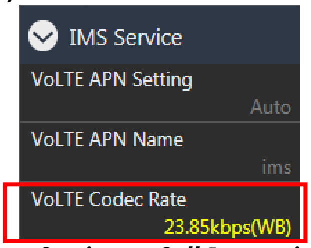


Figure 7.1.3-7 VoLTE Codec Rate Setting at Call Processing Parameter Screen (MT8821C)

9.
10. Set **IMS Authentication** to match the **IMS Authentication Parameter** with the SIM in use.

NOTE: For cases where the Call Processing Parameter - Authentication/Integrity - SIM Model Number is set to a value other than [User], the IMS Authentication Authentication Algorithm, Authentication Key K, and OPc will be set automatically. However, these parameters must be set manually for the SIM Model Number set to User, or when each Call Processing Parameter - Authentication/Integrity setting does not match the required setting.

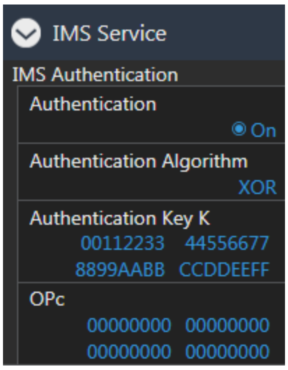


Figure 7.1.3-8 *IMS Authentication at Call Processing Parameter Screen (MT8821C)*

11. Set **IMS Client IPv4 Address** to 192.168.1.2.
NOTE: The IP address above is for Phone1. When using Phone2, please set the IP address to 192.168.2.2.

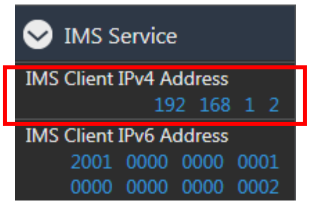
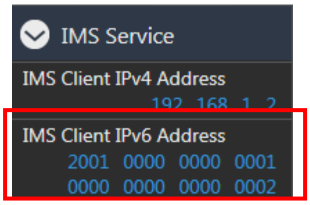


Figure 7.1.3-9 IMS Client IPv4 *Address Setting at Call Processing Parameter Screen (MT8821C)*

12. Set **IMS Client IPv6 Address** to **2001:0000:0000:0001:0000:0000：0000：0002**.
NOTE: The IPv6 address above is for Phone1. When using Phone2, please set the IPv6 address to



2001:0000:0000:0003:0000:0000:0000:0002.

Figure 7.1.3-10 IMS Client IPv6 ***Address Setting at Call Processing Parameter Screen (MT8821C)***

7.1.4. VoLTE APN Setting

VoLTE APN setting for establishing IMS/SIP Communication Bearer.
When [ims] or [IMS] is not included in the UE's VoLTE APN character string, please set the APN according to the example below. Any APN name can be set by using the command VOLTEAPNNAME "" with alphanumeric characters as the input. Note that APN can only be set by remote command.

1. Execute **VOLTEAPNSET USERDEFINE** to set **Call Processing Parameter – IMS Service – VoLTE APN Setting** to **User Define**.
2. Execute **VOLTEAPNNAME "abc"** to set **Call Processing Parameter – IMS Service – VoLTE APN Name** to **abc**.
   NOTE : When VoLTE APN Setting is set to Auto, VoLTE APN Name setting is not used, and IMS/SIP Communication Bearer is established using the UE's VoLTE APN Setting with [ims] or [IMS] included in the character string.

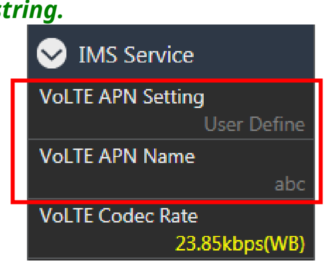


Figure 7.1.4-1 VoLTE APNSetting at Call Processing Parameter Screen (MT8821C)

7.1.5. Registration and IMS Registration

Perform UE Location Registration, Packet connection and IMS Registration.

1. Connect the UE to the MT8821C.
2. Select the Signaling screen of the MT8821C.
3. Switch on the UE.
4. Wait for packet communication from the mobile terminal to be established.
   The MT8821C call processing status changes from Idle→Registration→Connected.
5. The MT8821C IMS status changes from IMS Off→IMS Idle within 10 seconds.

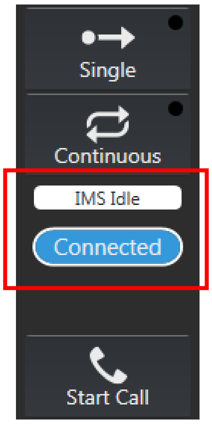


Figure 7.1.5-1 Call Processing and IMS Status *Screen (MT8821C)*

NOTE: When the call processing status has returned to Idle due to unexpected call disconnection (e.g. End Call key press or Call drop from UE), press the VoLTE End Call key twice to return the IMS status to Off. Then, please restart the UE.

7.1.6. Echoback Test

After IMS Registration, perform VoLTE Echoback on the packet connection.

1. Set **VoLTE Test Mode** to **Echo**.

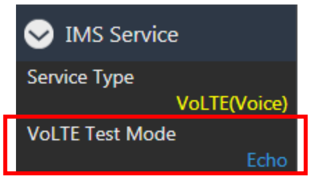


Figure 7.1.6-1 VoLTE Test Mode *Setting at Call Processing Parameter Screen (MT8821C)*

2. Wait for **IMS Registration** to be completed in 7.1.4.
3. Make a voice call to a random phone number from the UE.

   NOTE 1: The ***MT8821C does not support emergency call numbers like 911, 110, 119 etc.***
4. The MT8821C IMS status changes from IMS Idle→IMS Calling→IMS Connected.
5. Talk into the microphone, the echoback voice can be heard from the UE speaker.
6. End the call from the UE. (Or press **VoLTE End Call** key in the lower-right corner of the MT8821C Signaling screen.)
7. The MT8821C IMS status changes from IMS Connected→IMS Idle.
8. Press **VoLTE Start Call** in the lower-right corner of the MT8821C Signaling screen.
9. The MT8821C IMS status changes from IMS Idle→IMS Ringing, then after answering the phone, the status changes from IMS Ringing→IMS Connected.
10. Talk into the microphone: the echoback voice can be heard from the UE speaker.
11. Press **VoLTE End Call** in the lower-right corner of the MT8821C Signaling screen. (Or end the call from the UE.)
12. The MT8821C IMS status changes from IMS Connected→IMS Idle.

    NOTE 2: When the call processing status has returned to Idle due to unexpected call disconnection (e.g. End Call key press or Call drop from UE), press the VoLTE End Call key twice to return the IMS status to Off. Then, please restart the UE.

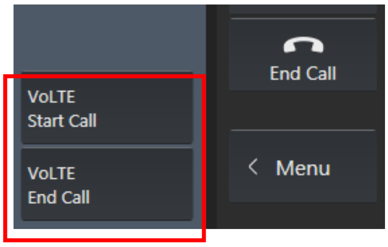


Figure 7.1.6-2 VoLTE Start Call and VoLTE End Call Key *at Signaling Screen (MT8821C)*

7.1.7. Downlink Fixed Data Test

After IMS Registration, perform VoLTE Echoback on the packet connection.

1. Set **VoLTE Test Mode** to **Downlink Fixed Data**.

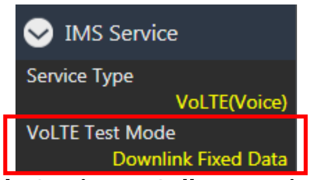


Figure 7.1.7-1 VoLTE Test Mode *Setting at Call Processing Parameter Screen (MT8821C)*

2. Wait for IMS Registration to be completed in 7.1.4.
3. Make a voice call to a random phone number from the UE.
   NOTE 1: The MT8821C does not support emergency call numbers like 911, 110, 119 etc.
4. The MT8821C IMS status changes from IMS Idle→IMS Calling→IMS Connected.
5. Whether talking or not into the microphone, a tone signal can be heard from the UE speaker.
6. End the call from the UE. (Or press **VoLTE End Call** in the lower-right corner of the MT8821C Signaling screen.)
7. The MT8821C IMS status changes from IMS Connected→IMS Idle.
8. Press **VoLTE Start Call** in the lower-right corner of the MT8821C Signaling screen.
9. The MT8821C IMS status changes from IMS Idle→IMS Ringing, then after answering the phone, the status changes from IMS Ringing→IMS Connected.
10. Whether talking or not into the microphone, a tone signal can be heard from the UE speaker.
11. Press **VoLTE End Call** in the lower-right corner of the MT8821C Signaling screen. (Or end the call from the UE.)
12. The MT8821C IMS status changes from IMS Connected→IMS Idle.
    NOTE 2: When the call processing status has returned to Idle due to unexpected call disconnection (e.g. End Call key press or Call drop from UE), please press the [VoLTE End Call] key twice to return the IMS status to Off. Then, please restart the UE.

7.1.8. Downlink SID Data Test

After IMS Registration, perform VoLTE Echoback on the packet connection.

1. Set **VoLTE Test Mode** to **SID**.

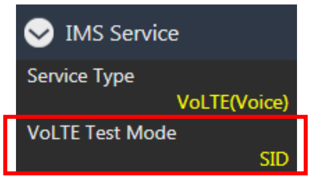


Figure 7.1.8-1 VoLTE Test Mode ***Setting at Call Processing Parameter Screen (MT8821C)***

2. Wait for IMS Registration to be completed in 7.1.4.
3. Make a voice call to a random phone number from the UE.
   NOTE 1: The MT8821C does not support emergency call numbers like 911, 110, 119 etc.
4. The MT8821C IMS status changes from IMS Idle→IMS Calling→IMS Connected.
5. Whether talking or not into the microphone, no voice can be heard from the UE speaker.
6. End the call from the UE. (Or press **VoLTE End Call** in the lower-right corner of MT8821C Signaling screen.)
7. The MT8821C IMS status changes from IMS Connected→IMS Idle.
8. Press **VoLTE Start Call** in the lower-right corner of the MT8821C Signaling screen.
9. The MT8821C IMS status changes from IMS Idle→IMS Ringing, then after answering the phone, the status changes from IMS Ringing→IMS Connected.
10. Whether talking or not into the microphone, no voice can be heard from the UE speaker.
11. Press **VoLTE End Call** in the lower-right corner of the MT8821C Signaling screen. (Or end the call from the UE.)
12. The MT8821C IMS status changes from IMS Connected→IMS Idle.
    NOTE 2: When the call processing status has returned to Idle due to unexpected call disconnection (e.g. End Call key press or Call drop from UE), please press the VoLTE End Call key twice to return the IMS status to Off. Then, restart the UE.

8. SMS Test (Only MT8821C)

8.1. MT8821C → UE SMS send

This is an example of sending an SMS from the MT8821C to the UE. Input alphanumeric characters at SENDSMS_USER “”. The character limit is 160 max.
The connection to the UE is the same procedure as described in 2.1.1 Connection Diagram to 2.1.4 Test Mode Connection and Disconnection.

8.1.1. Send SMS

1. Execute **CALLSTATIC?** to confirm the call processing stationary status is 6 (Connected).
2. Execute **SENDSMS_USER “Hello world”** to send an SMS from MT8821C to the UE.
3. Confirm that the UE successfully received the SMS “Hello world”

8.2. UE → MT8821C SMS receive

This is an example of receiving an SMS sent from the UE to the MT8821C. The MT8821C receives the SMS from the UE, and the user confirms the message from the query result.
The connection to the UE uses the same procedure as described in 2.1.1 Connection Diagram to 2.1.4 Test Mode Connection and Disconnection.

8.2.1. Receive SMS

1. Execute **SMS_MSG? FLAG** to confirm the SMS reception flag is 0 (unreceived).
2. Send the SMS message “Hello world” from the UE.
3. Execute **SMS_MSG? FLAG** to confirm the SMS reception flag is 1 (received).
4. Execute **SMS_MSG?** to confirm the query result is “Hello world”.

8.2.2. Clear SMS

1. To clear the received SMS, execute **SMSCLR**.
2. Execute **SMS_MSG? FLAG** to confirm the SMS reception flag is 0 (unreceived).
3. Execute **SMS_MSG?** to confirm the query fesult is “-” (Initial value).
4. The SMS reception test can be continued by following the procedure described in 8.2.1.

9. 4x4 MIMO (MT8821C Only)

FDD/TDD 4x2 MIMO (TM3) and 4x4 MIMO (TM3/TM9) throughput measurement capability is enabled when options MX882112C/13C-021 are installed. In addition, the following features can be tested by installing the other options listed in the table below.

Feature	Required Option MX8821							
	12C				13C			
	006	021	022	026	006	021	022	026
FDD non CA(RMC)	---	---	---	---	---	---	---	---
TDD non CA(RMC)	---	---	---	---	---	---	---	---
FDD non CA(Packet)	√	---	---	---	---	---	---	---
TDD non CA(Packet)	---	---	---	---	√	---	---	---
FDD DL 2CA(RMC)	---	√	---	---	---	---	---	---
TDD DL 2CA(RMC)	---	---	---	---	---	√	---	---
FDD DL 2CA(Packet)	√	√	---	√	---	---	---	---
TDD DL 2CA(Packet)	---	---	---	---	√	√	---	√
FDD UL 2CA(RMC)	---	√	√	---	---	---	---	---
TDD UL 2CA(RMC)	---	---	---	---	---	√	√	---
Joint CA(RMC)*1,*2	---	√	---	---	---	√	---	---

*1: HARQ re-transmission is not supported.
*2: For PCell TDD, only Uplink Downlink Configuration 1 is supported.

9.1. LTE non CA

9.1.1. Connection Diagram

For the table below, Input/Output and UL/DL Antenna Port connections are shown in Figure 9.1.1-1.

UL/DL	Antenna	Port
DL	1	Phone1 - AUX1
	2	Phone2 - AUX1
	3	Phone1 - AUX3
	4	Phone2 - AUX3
UL	1	Phone1 - Main1

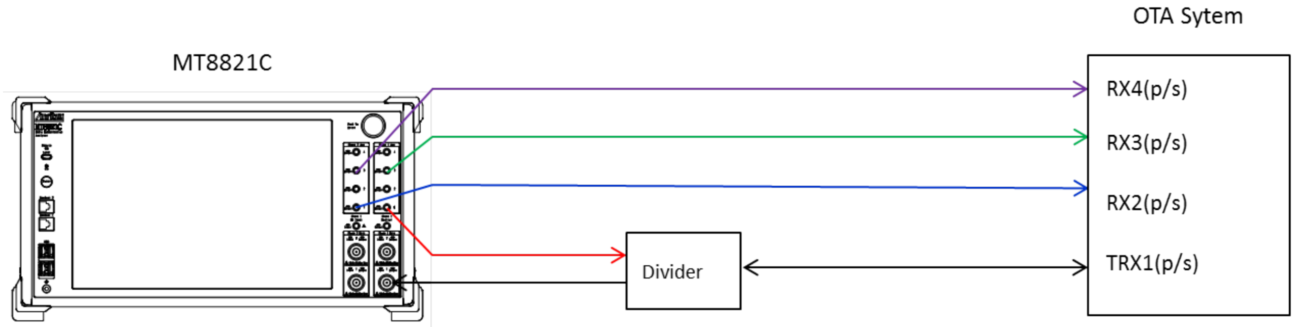


Figure 9.1.1-1 Connection diagram for *single cell using AUX ports*

For the table below, Input/Output and UL/DL Antenna Port connections are shown in Figure 9.1.1-2.

UL/DL	Antenna	Port
DL	1	Phone1 - Main1
	2	Phone2 – Main1
	3	Phone1 - AUX3
	4	Phone2 - AUX3
UL	1	Phone1 - Main1

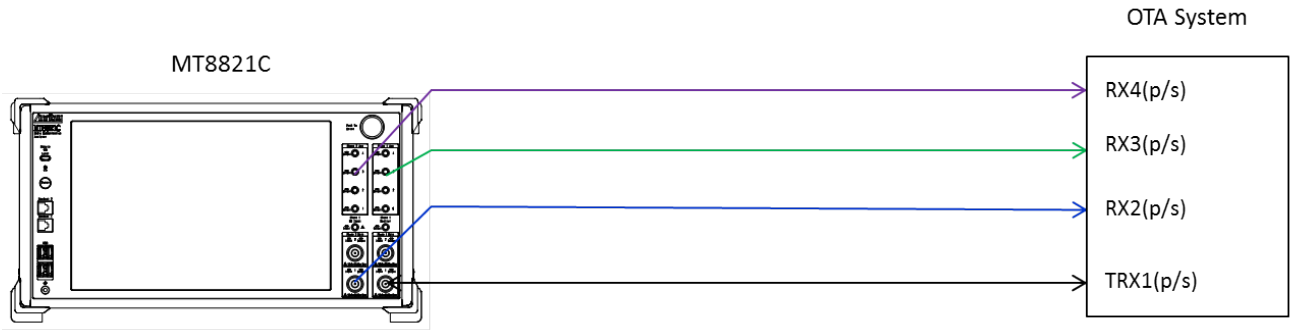


Figure 9.1.1-3 Connection diagram for single cell using AUX and Main ports

9.1.2. Initial Condition Setting

Initial settings must be configured before measurement. In this sample sequence, connection diagram in figure 9.1.2-1, DL Channel 300, 20MHz Channel Bandwidth and 4x4 MIMO (TM3) Antenna Configuration are set.
The settings detailed in this section are assumed to be already configured in the succeeding sections.

1. Execute **PRESET** to initialize parameters.
2. Execute **CALLPROC ON** to set **Call Processing** to **On**.
3. Execute **DLCHAN 300** to set **Common Parameter - UL Channel** and **DL Channel** to **18300** and **300** respectively.
4. Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Channel Bandwidth** to **20MHz**.
5. Execute **ANTCONFIG 4X4_TM3** to set **Common Parameter - Antenna Configuration** to **4x4MIMO(TM3)**.
6. Execute **TXOUT 1,AUX** to set Phone1 **TX1** to **AUX1**.
7. Execute **TXOUT 3,AUX** to set Phone1 **TX3** to **AUX3**.
8. Execute **TXOUT_P2 1,AUX** to set Phone2 **TX1** to **AUX1**.
9. Execute **TXOUT_P2 3,AUX** to set Phone2 **TX3** to **AUX3**.
10. Execute **UECAT CAT5** to set **Call Processing Parameter – UE Cateogry** to **5**.

Note1 :
After execution of Step 5, it takes about 30 seconds for the internal settings to switch. Please set the Time Out period for Query Commands to be greater than 30 seconds.

Note2 :
In Step 10, please set the UE Category that matches the UE Capability.

9.2. 2DL CA without UL CA

9.2.1. Connection Diagram

For the tables below, Input/Output and UL/DL Antenna Port connections are shown in Figure 9.2.1-1.

PCC			SCC1		
UL/DL	Antenna	InOut	UL/DL	Antenna	InOut
DL	1	Phone1 - AUX1	DL	1	Phone1 – AUX2
	2	Phone2 - AUX1		2	Phone2 – AUX2
	3	Phone1 - AUX3		3	Phone1 – AUX4
	4	Phone2 - AUX3		4	Phone2 – AUX4
UL	1	Phone1 - Main1	UL	---	---

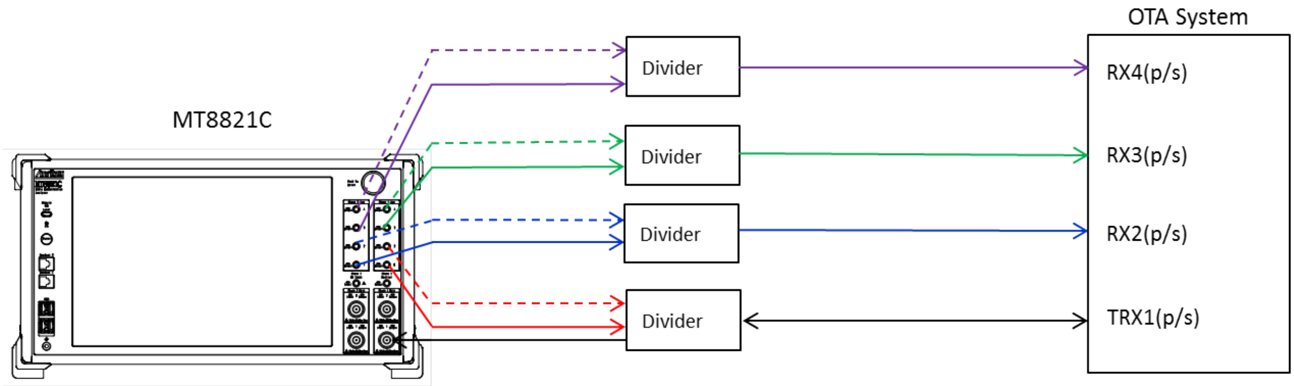


図 9.2.1-1　**Connection diagram for 2DL CA without UL CA using AUX ports**

For the tables below, Input/Output and UL/DL Antenna Port connections are shown in Figure 9.2.1-2.

PCC			SCC1		
UL/DL	Antenna	InOut	UL/DL	Antenna	InOut
DL	1	Phone1 - Main1	DL	1	Phone1 – Main1
	2	Phone2 - Main1		2	Phone2 – Main1
	3	Phone1 - AUX3		3	Phone1 – AUX4
	4	Phone2 - AUX3		4	Phone2 – AUX4
UL	1	Phone1 - Main1	UL	---	---

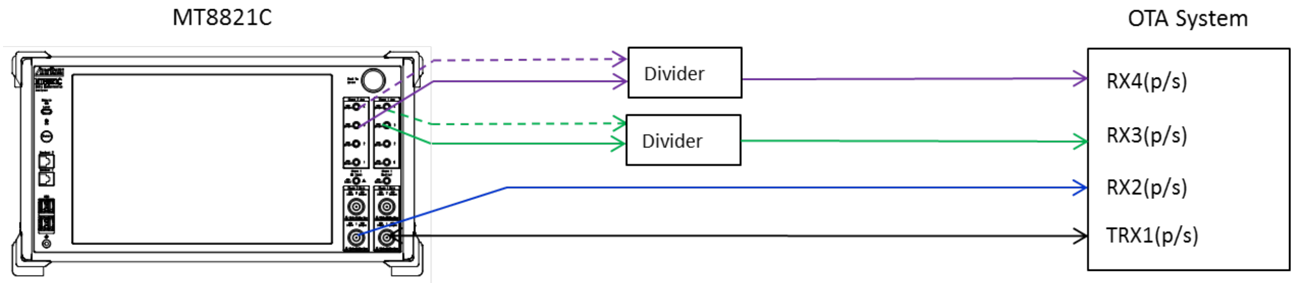


図 9.2.1-2　**Connection diagram for 2DL CA without UL CA using AUX and Main ports**

9.2.2. Initial Condition Setting

Initial settings must be configured before measurement. In this sample sequence, connection diagram in figure 9.2.2-1, PCC DL Channel 300, SCC1 DL Channel 1575, 20MHz PCC/SCC1 Channel Bandwidth and 4x4 MIMO (TM3) Antenna Configuration are set.
The settings detailed in this section are assumed to be already configured in the succeeding sections.

1. Execute **PRESET** to initialize parameters.
2. Execute **CHCODING RMC_DL_CA_PCC** to set **Common Parameter - Channel Coding** to **RMC(DL CA)**.
3. Execute **DLSCC 1** to set **Call Processing Parameter - Number of DL SCC** to **1**.
4. Execute **CALLPROC ON** to set **Call Processing** to **On**.
5. Execute **DLCHAN 300** to set **Common Parameter - UL Channel** and **DL Channel** to **18300** and **300** respectively.
6. Execute **DLCHAN_SCC1 1575** to set **Common Parameter - SCC-1 - DL Channel** to **1575**.
7. Execute **BANDWIDTH 20MHZ** to set **Common Parameter - Channel Bandwidth** to **20MHz**.
8. Execute **BANDWIDTH_SCC1 20MHZ** to set **Common Parameter - SCC-1 - Channel Bandwidth** to **20MHz**.
9. Execute **ANTCONFIG 4X4_TM3** to set **Common Parameter - Antenna Configuration** to **4x4MIMO(TM3)**.
10. Execute **TXOUT 1,AUX** to set Phone1 **TX1** to **AUX1**.
11. Execute **TXOUT 2,AUX** to set Phone1 **TX2** to **AUX2**.
12. Execute **TXOUT 3,AUX** to set Phone1 **TX3** to **AUX3**.
13. Execute **TXOUT 4,AUX** to set Phone1 **TX4** to **AUX4**.
14. Execute **TXOUT_P2 1,AUX** to set Phone2 **TX1** to **AUX1**.
15. Execute **TXOUT_P2 2,AUX** to set Phone2 **TX2** to **AUX2**.
16. Execute **TXOUT_P2 3,AUX** to set Phone2 **TX3** to **AUX3**.
17. Execute **TXOUT_P2 4,AUX** to set Phone2 **TX4** to **AUX4**.
18. Execute **UECAT CAT11** to set **Call Processing Parameter – UE Cateogry** to **11**.

Note :
After execution of Step 9, it takes about 30 seconds for the internal settings to switch. Please set the Time Out period for Query Commands to be greater than 30 seconds.

9.3. IP Data Transfer

Excluding the UE connection diagram, non CA and CA can be tested using the same procedure as chapter 5.1 and 5.3.

Annex A: ARB Waveform List

A.1. ARB Waveform Installer Version: Q007

Package1: LTE DL 10 MHz

No.	Pattern Name	Channel Bandwidth	UL Number of RB	UL Start RB	UL Modulation	DL Number of RB	DL Start RB	DL Modulation	Power Control	Frame Structure
0	UL R50 S0 QPSK UP	10	50	0	QPSK	50	0	QPSK	All up	FDD
1	UL R12 S0 QPSK UP	10	12	0	QPSK	50	0	QPSK	All up	FDD
2	UL R12 S38 QPSK UP	10	12	38	QPSK	50	0	QPSK	All up	FDD
3	UL R50 S0 16QAM UP	10	50	0	16QAM	50	0	QPSK	All up	FDD
4	UL R12 S38 16QAM UP	10	12	38	16QAM	50	0	QPSK	All up	FDD
5	UL R12 S0 16QAM UP	10	12	0	16QAM	50	0	QPSK	All up	FDD
6	UL R20 S0 QPSK UP	10	20	0	QPSK	50	0	QPSK	All up	FDD
7	void	-	-	-	-	-	-	-	-	-
8	void	-	-	-	-	-	-	-	-	-
9	void	-	-	-	-	-	-	-	-	-
10	void	-	-	-	-	-	-	-	-	-
11	void	-	-	-	-	-	-	-	-	-
12	TDD UL R50 S0 QPSK UP	10	50	0	QPSK	50	0	QPSK	All up	TDD
13	TDD UL R12 S0 QPSK UP	10	12	0	QPSK	50	0	QPSK	All up	TDD
14	TDD UL R12 S38 QPSK UP	10	12	38	QPSK	50	0	QPSK	All up	TDD
15	TDD UL R50 S0 16QAM UP	10	50	0	16QAM	50	0	QPSK	All up	TDD
16	TDD UL R12 S38 16QAM UP	10	12	38	16QAM	50	0	QPSK	All up	TDD
17	TDD UL R12 S0 16QAM UP	10	12	0	16QAM	50	0	QPSK	All up	TDD
18	TDD UL R20 S0 QPSK UP	10	20	0	QPSK	50	0	QPSK	All up	TDD
19	void	-	-	-	-	-	-	-	-	-
20	void	-	-	-	-	-	-	-	-	-
21	void	-	-	-	-	-	-	-	-	-
22	void	-	-	-	-	-	-	-	-	-
23	void	-	-	-	-	-	-	-	-	-

Note1: TDD Uplink Downlink Configuration = 1, Special Subframe Configuration = 4
Note2: C-RNTI = AAAA (hex)

A.2. ARB Waveform Installer Version: Q008

Package1: LTE DL QPSK 1.4 to 20 MHz

No.	Pattern Name	Channel Bandwidth	UL Number of RB	UL Start RB	UL Modulation	DL Number of RB	DL Start RB	DL Modulation	Power Control	Frame Structure
0	FDD 1.4MHz QPSK	1.4	6	0	QPSK	6	0	QPSK	All up	FDD
1	FDD 3MHz QPSK	3	15	0	QPSK	15	0	QPSK	All up	FDD
2	FDD 5MHz QPSK	5	25	0	QPSK	25	0	QPSK	All up	FDD
3	FDD 10MHz QPSK	10	50	0	QPSK	50	0	QPSK	All up	FDD
4	FDD 15MHz QPSK	15	75	0	QPSK	75	0	QPSK	All up	FDD
5	FDD 20MHz QPSK	20	100	0	QPSK	100	0	QPSK	All up	FDD
6	void	-	-	-	-	-	-	-	-	-
7	void	-	-	-	-	-	-	-	-	-
8	void	-	-	-	-	-	-	-	-	-
9	void	-	-	-	-	-	-	-	-	-
10	void	-	-	-	-	-	-	-	-	-
11	void	-	-	-	-	-	-	-	-	-
12	TDD 1.4MHz QPSK	1.4	6	0	QPSK	6	0	QPSK	All up	TDD
13	TDD 3MHz QPSK	3	15	0	QPSK	15	0	QPSK	All up	TDD
14	TDD 5MHz QPSK	5	25	0	QPSK	25	0	QPSK	All up	TDD
15	TDD 10MHz QPSK	10	50	0	QPSK	50	0	QPSK	All up	TDD
16	TDD 15MHz QPSK	15	75	0	QPSK	75	0	QPSK	All up	TDD
17	TDD 20MHz QPSK	20	100	0	QPSK	100	0	QPSK	All up	TDD
18	void	-	-	-	-	-	-	-	-	-
19	void	-	-	-	-	-	-	-	-	-
20	void	-	-	-	-	-	-	-	-	-
21	void	-	-	-	-	-	-	-	-	-
22	void	-	-	-	-	-	-	-	-	-
23	void	-	-	-	-	-	-	-	-	-

Note1: C-RNTI = AAAA (hex)

Package2: LTE DL 64QAM 1.4 to 20 MHz

No.	Pattern Name	Channel Bandwidth	UL Number of RB	UL Start RB	UL Modulation	DL Number of RB	DL Start RB	DL Modulation	Power Control	Frame Structure
0	FDD 1.4MHz 64QAM	1.4	6	0	QPSK	6	0	64QAM	All up	FDD
1	FDD 3MHz 64QAM	3	15	0	QPSK	15	0	64QAM	All up	FDD
2	FDD 5MHz 64QAM	5	25	0	QPSK	25	0	64QAM	All up	FDD
3	FDD 10MHz 64QAM	10	50	0	QPSK	50	0	64QAM	All up	FDD
4	FDD 15MHz 64QAM	15	75	0	QPSK	75	0	64QAM	All up	FDD
5	FDD 20MHz 64QAM	20	100	0	QPSK	100	0	64QAM	All up	FDD
6	void	-	-	-	-	-	-	-	-	-
7	void	-	-	-	-	-	-	-	-	-
8	void	-	-	-	-	-	-	-	-	-
9	void	-	-	-	-	-	-	-	-	-
10	void	-	-	-	-	-	-	-	-	-
11	void	-	-	-	-	-	-	-	-	-
12	TDD 1.4MHz 64QAM	1.4	6	0	QPSK	6	0	64QAM	All up	TDD
13	TDD 3MHz 64QAM	3	15	0	QPSK	15	0	64QAM	All up	TDD
14	TDD 5MHz 64QAM	5	25	0	QPSK	25	0	64QAM	All up	TDD
15	TDD 10MHz 64QAM	10	50	0	QPSK	50	0	64QAM	All up	TDD
16	TDD 15MHz 64QAM	15	75	0	QPSK	75	0	64QAM	All up	TDD
17	TDD 20MHz 64QAM	20	100	0	QPSK	100	0	64QAM	All up	TDD
18	void	-	-	-	-	-	-	-	-	-
19	void	-	-	-	-	-	-	-	-	-
20	void	-	-	-	-	-	-	-	-	-
21	void	-	-	-	-	-	-	-	-	-
22	void	-	-	-	-	-	-	-	-	-
23	void	-	-	-	-	-	-	-	-	-

Note1: TDD Uplink Downlink Configuration = 1, Special Subframe Configuration = 4
Note2: C-RNTI = AAAA (hex)

Annex B: Informative

B.1. UE DL-SCH RX

It is important to consider the following settings when the UE is receiving using DL-SCH from the BTS (MT8821C).

- ✓ UE Category
- ✓ Code Rate

B.1.1. UE Category

TS36.306 defines the DL-SCH Rx performance as shown in the table below for each UE Category.

Table 4.1-1: Downlink physical layer parameter values set by the field *ue-Category*

UE Category	Maximum number of DL-SCH transport block bits received within a TTI	Maximum number of bits of a DL-SCH transport block received within a TTI	Total number of soft channel bits	Maximum number of supported layers for spatial multiplexing in DL
Category 1	10296	10296	250368	1
Category 2	51024	51024	1237248	2
Category 3	102048	75376	1237248	2
Category 4	150752	75376	1827072	2
Category 5	299552	149776	3667200	4

The blue encircled part in the above table indicates the maximum bit count per one DL-SCH (one Codeword) that the UE can receive in one TTI (one Subframe). For UE Category 3, if the DL-SCH Transport Block Size (TBS) for one DL-SCH exceeds 75376 bits, the UE cannot receive DL-SCH normally.
In addition, the red encircled part in the above table indicates the maximum bit count for the DL-SCH (total of two Codewords for Transmission Mode3 and Transmission Mode4) that the UE can receive in one TTI (one Subframe). For UE Category 3, if the DL-SCH Transport Block Size (TBS) for one DL-SCH exceeds 102048 bits, the UE cannot receive DL-SCH normally.
The TBS of the DL-SCH sent by the MT8821C is determined by the Common Parameter Antenna Configuration, the DL RMC Number RB and the DL RMC MCS Index (0) to (3), so it is necessary to perform setting by considering the above-described UE category Rx restrictions.
For example, for UE Category 3 with a Channel Bandwidth of 20 MHz and a 2x2 MIMO (Open Loop) or 2x2 MIMO (Closed Loop Multi Layer) Antenna Configuration, as shown in Fig. 1, at DL RMC, the UE can receive DL-SCH normally because the TBS is 102048 bits and does not exceed the "Maximum number of DL-SCH transport block bits received within a TTI" shown in the above table.

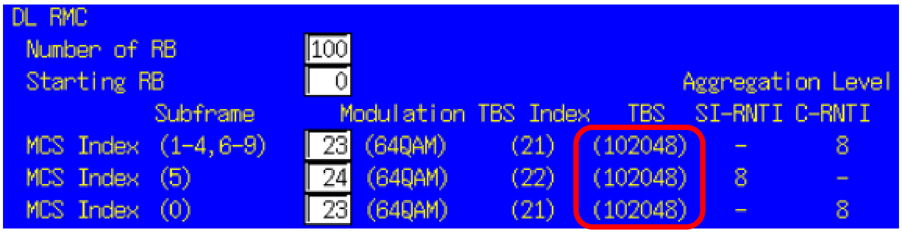


Fig. B.1.1-1. MCS Index Setting for DL RMC and TBS Value (when UE can decode)

On the other hand, at the DL RMC setting shown in Fig. 2, since TBS is larger than 102048 and exceeds the Rx restriction described in "Maximum number of DL-SCH transport block bits received within a TTI" above, the UE cannot decode DL-SCK and returns an error (NACK).

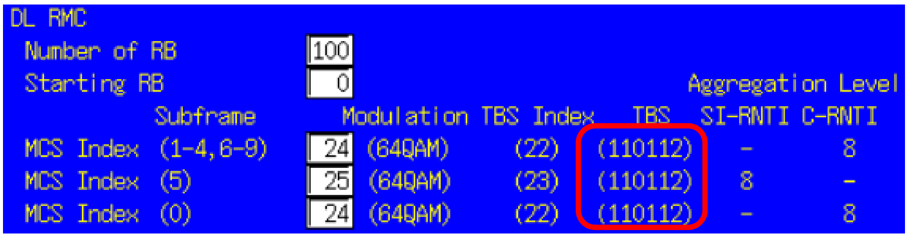


Fig. B.1.1-2. MCS Index Setting for DL RMC and TBS Value (when UE cannot decode)

B.1.2. Code Rate

The LTE using data Tx channel (PDSCH-DLSCH) performs channel encode processing and adds the error correction coding required at decoding by the UE before mapping to the Physical Channel and sending.

Since error correction encoding can be added as the ratio (Code Rate) between the Information Bit count (number of CRC bits added to TBS), which is the size of the user data, and the Physical Channel Bit count with PDSCH per Subframe becomes smaller, the Rx data error correction performance increases.

The above described ratio (Code Rate) is defined below.
Code Rate = Information Bit count/Physical Channel Bit count

The 3GPP TS 36.213 7.1.7 Modulation order and transport block size determination notes that "The UE may skip decoding a transport block in an initial transmission if the effective channel Code Rate is higher than 0.930, where the effective channel code rate is defined as the number of downlink information bits (including CRC bits) divided by the number of physical channel bits on PDSCH". As a result, when the DL-SCH Code Rate sent from the BTS exceeds 0.93, the UE cannot decode DL-SCH and returns an error (NACK).

- Example: When Channel Coding = RMC and Antenna Config. = 2x2 MIMO (OpenLoop)

Tables B.1.2-1 and B.1.2-2 below show the MCS Index value and Code Rate at Full RB Mapping for each bandwidth.
Table B.1.2-1 shows the value for Subframe #0 and Table 4 for Subframe #1-4, and #6-9.
Depending on the MCS Index setting, sometimes the UE may be unable to decode DL-SCH if the Code Rate exceeds 0.930. Subframe #0 can be decoded by a smaller MCS Index than other subframes.
As shown in Fig. B.1.2-1, there are non-PDSCH Physical Channels PBCH, PSS, and SSS in Subframe #0, so the PDSCH region is smaller than other subframes.

Table B.1.2-1. Relationship between Subframe#0 MCS Index Value and Code Rate

Bandwidth	CFI	RB	Physical Channel Bits	MCS Index	TBS	Information Bits	Code Rate	Can UE Decode?
1.4	4	6	960	4	816	840	0.875	Yes
				5	1008	1032	1.075	No
3	3	15	16920	23	14960	15032	0.8884	Yes
				24	15984	16056	0.9489	No
5	3	25	31560	25	28224	28344	0.8981	Yes
				26	30528	30648	0.9711	No
10	2	50	75360	27	63408	63672	0.8449	Yes
				28	73392	73680	0.9777	No
15	2	75	115560	27	93776	94160	0.8148	Yes
				28	110112	110544	0.9566	No
20	2	100	155760	27	127552	128056	0.8221	Yes
				28	150752	151352	0.9717	No

✓ The UE can decode DL-SCH at the MCS Index where the Code Rate is 0.930.

Table B.1.2-2. Relationship between Subframe#1-4, 6-9 MCS Index Value and Code Rate

Bandwidth	CFI	RB	Physical Channel Bits	MCS Index	TBS	Information Bits	Code Rate	Can UE Decode?
1.4	4	6	7776	25	6992	7040	0.9053	Yes
				26	7248	7296	0.9383	No
3	3	15	21600	27	19056	19152	0.8867	Yes
				28	22128	22224	1.0289	No
5	3	25	36000	27	31680	31824	0.884	Yes
				28	36672	36816	1.0227	No
10	2	50	79200	27	63408	63672	0.8039	Yes
				28	73392	73680	0.9303	No
15	2	75	118800	27	93776	94160	0.7926	Yes
				28	110112	110544	0.9305	No
20	2	100	158400	27	127552	128056	0.8084	Yes
				28	150752	151352	0.9555	No

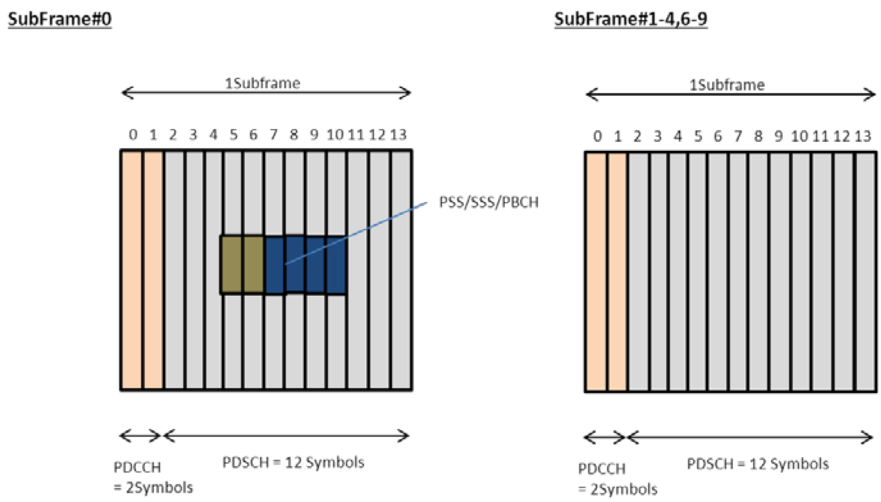


Fig. B.1.2-1. Physical Channel Mapping for Each Subframe

B.1.3. Error Free Setting

For the UE to receive DL-SCH with high TBS, the CFI must be made smaller. As a result, the Symbol count used in PDSCH increases and since the number of Physical Channel bits becomes larger, the Code Rate increases. Consequently decoding is possible even when the MCS Index is high.

✓ Common Parameter - CFI Setting

(Example at 20 MHz: The CFI setting range varies with the Channel Bandwidth. Refer to the MX88201xC LTE Measurement Software operation manual.)

✓ Code Rate

By making the CFI smaller, the Symbol count used in PDSCH increases and since the number of Physical Channel bits increases, the Code Rate increases and the UE can decode DL-SCH even when the MCS Index is high and the Code Rate exceeds 0.930.

However, care is required when making settings in the small region, because the Code Rate may rise above 0.930 where sufficient Physical Channel Bits cannot be secured.

Subframe#0

Bandwidth	CFI	RB	Physical Channel Bits	MCS Index	TBS	Information Bits	Code Rate	Can UE Decode?
1.4	4	6	960	4	816	840	0.875	Yes
3	2	15	19080	25	17008	17080	0.8952	Yes
5	2	25	35160	27	31680	31824	0.9051	Yes
10	1	50	82560	28	73392	73680	0.8924	Yes
15	1	75	126360	28	110112	110544	0.8748	Yes
20	1	100	170160	28	150752	151352	0.8895	Yes

Subframe#1-4, 6-9

Bandwidth	CFI	RB	Physical Channel Bits	MCS Index	TBS	Information Bits	Code Rate	Can UE decode?
1.4	4	6	7776	25	6992	7040	0.9053	Yes
3	2	15	23760	27	19056	19152	0.8061	Yes
5	2	25	39600	28	36672	36816	0.9297	Yes
10	1	50	86400	28	73392	73680	0.8528	Yes
15	1	75	129600	28	110112	110544	0.853	Yes
20	1	100	172800	23	102048	102456	0.5929	Yes

B.2. Carrier Leakage Frequency

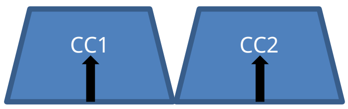
This chapter explains the carrier leakage frequency setting for MT8821C intra-band contiguous component carrier (CC) measurement.

To remove the effects of carrier leakage and correctly measure Transmit Modulation for CA (EVM, Carrier Leakage and In-band Emissions) as specified in 3GPP TS36.521-1 6.5.2A, the carrier leakage position must be first configured accordingly before performing intra-band contiguous CC measurements. This is done by setting the ***TX Measurement*** - ***Carrier Leakage Frequency*** parameter.

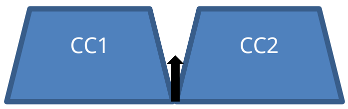
B.2.1. Transmitter LO Configuration

For LTE Uplink CA transmission, different UE transmitter RF reference architectures are described in 3GPP TR36.807 Figure 6.1-1. The UE transmitter may either employ a single-LO or a two-LO architecture.

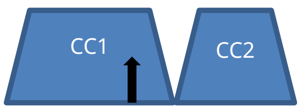
The carrier leakage position varies, depending on the UE transmitter architecture and channel bandwidth configuration of each CC. The figure below shows three possible carrier leakage positions for intra-band contiguous CC transmission.



(a) Two-LO Architecture, Non-equal or Equal UL CC Channel BW



(b) Single-LO Architecture, Equal UL CC Channel BW



(c) Single-LO Architecture, Non-equal UL CC Channel BW

Fig. B.2.1-1. Possible Carrier Leakage Positions

Figure B.2.1-1 (a) shows the carrier leakage for the two-LO architecture where the carrier leakage is at the center of each CC. Figure B.2.1-1 (b) and (c) shows the possible carrier leakage positions for the single-LO architecture wherein the carrier leakage is on the center of the Aggregated Transmission Bandwidth Configuration. For the case of equal bandwidth configuration (b), the carrier leakage falls in between the two CC's. However, in the case of non-equal bandwidth configuration (c), the carrier leakage falls at the CC with the wider channel bandwidth.

B.2.2. TX Measurement Parameter

The user can set the Carrier Leakage Position using the GUI by configuring ***Carrier Leakage Frequency*** under *TX Measurement Parameters* as shown in Figure B.2.2-1.

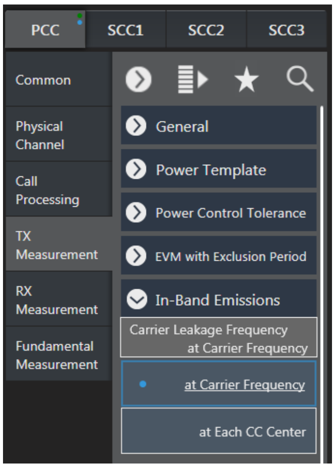


Fig. B.2.2-1. TX Measurement Parameter – Carrier Leakage Frequency Setting

The following Remote Command can also be used to configure Carrier Leakage Frequency.

Command	**Argument**	**Response**
IBEM_CLFR	clf	-----
IBEM_CLFR?	-----	clf

clf: Carrier Leakage Frequency Position

CFR at Carrier Frequency
Carrier Leakage is at the center frequency of the Aggregated Transmission Bandwidth

CCC at Each CC Center
Carrier Leakage is at the center frequency of each CC

For the case in Figure B.2.1-1 (a), the setting should be ***at Each CC Center*** (or send remote command “**IBEM_CLFR CCC”**).
For the cases in Figure B.2.1-1 (b) and (c), the setting should be ***at Carrier Frequency*** (or send remote command “**IBEM_CLFR CFR”**).

It is important to note that the *Carrier Leakage Frequency Parameter* is applicable only to intra-band contiguous CC measurements. For non-contiguous measurements, the carrier leakage position is always set to ***at Each CC Center*** (at the center frequency of each CC).

Additionally, when the ***Carrier Leakage Frequency*** parameter is set to ***at Carrier Frequency***, there will be cases, depending on bandwidth configuration, wherein PCC is allocated (SCC-1 is not allocated) but the carrier leakage is at the SCC-1 band (i.e. PCC Channel BW < SCC-1 Channel BW). When configured as such, even if the carrier leakage is at the SCC-1 band, carrier leakage is still measured at PCC and the result is obtained by the remote command ***CARRLEAK? MAX, PCC*** (or ***CARRLEAK? MAX***).
Conversely, for the case wherein SCC-1 is allocated (PCC is not allocated) but the carrier leakage is at the PCC band, carrier leakage is still measured at SCC-1 and the result is obtained by the remote command ***CARRLEAK? MAX, SCC1***. This is in accordance with 3GPP TS36.521-1 6.5.2A.2 which states that carrier leakage is measured on the carrier with RBs allocated.

B.3. About Optimization of the TCP Throughput using iperf

To obtain the best effort result in bidirectional communication like TCP, the window size from RTT(Round Trip Time) must be optimized.

To determine the TCP/IP window size, clarify RTT using PING (although the result is not accurate).
The RTT depends on the your test environment, so the RTT must be checked for each test environments.
The TCP/IP window size optimization method is described below.

B.3.1. Setting of TCP Window Size

1. Put the UE into the Connected state. Refer to Chapter 5.
2. Execute the PING command using the default setting (ex. ping 192.168.20.11 -S 192.168.20.10) multiple times
   Then check the RTT(Average)

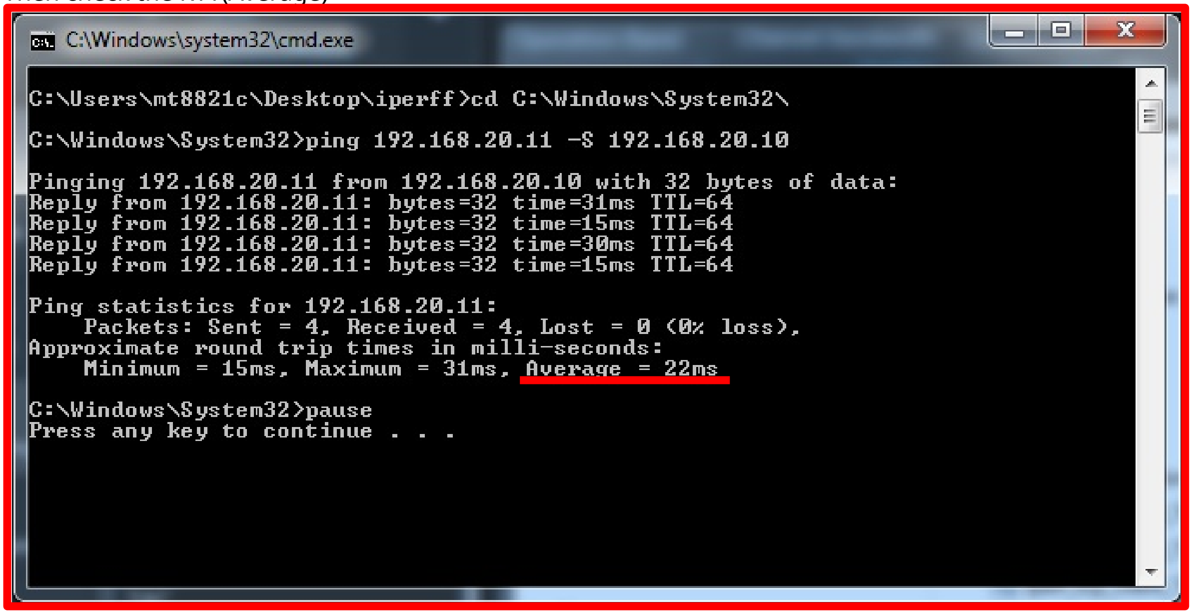


Figure B.3.1-1 Average of RTT(from Ping)

3. Choose the slowest average time from the results in No.2
4. Calculate the TCP window size to be used for the TCP/IP test of iperf using the following equation

   *(Desired throughput for 1 IP stream(bps) / 8) x average time(s) = **TCP window size(bytes)***

   Example:
   2CA 300Mbps / 8 x 0.022s = **825kbyte**

   3CA(Default Bearer) 300Mbps / 8 x 0.022s = **825kbyte**
   (Dedicated Bearer) 150Mbps / 8 x 0.022s = **412.5kbyte**
5. Set the -w argument at the result in No.4 when running iperf(Client side)

   Example:
   2CA iperf -c -192.168.20.11 -B 192.168.20.10 -**w 825k** -i 1

   3CA(Default Bearer) iperf -c -192.168.20.11 -B 192.168.20.10 -**w 825k** -i 1
   (Dedicated Bearer) iperf -c -192.168.20.11 -B 192.168.20.100 -**w412k** -i 1
6. Adjust the TCP window size(if neccesary)
   ・Throughput is lower than desired throughput
   Expand TCP window size in steps of 10k
   Example:
   iperf -c -192.168.20.11 -B 192.168.20.10 -***w 975k*** -i -> iperf -c -192.168.20.11 -B 192.168.20.10 -***w 985k*** -i 1

・Throughput is unstable(This situation, TCP window size too large)
Reduce TCP window size in steps of 10k
Example:
iperf -c -192.168.20.11 -B 192.168.20.10 -***w 975k*** -i -> iperf -c -192.168.20.11 -B 192.168.20.10 -***w 965k*** -i 1

B.4. Setting for DL 256QAM Maximum Throughput Rate

The settings and procedure for throughput measurement when DL 256QAM is enabled are described below. This procedure is required, because settings may be changed unintentionally by parameter linkage.

1. Execute **PRESET** to perform initialization.
2. Execute **ANTCONFIG OPEN_LOOP** to set **Common Parameter** - **Signal** - **Antenna Configuration** to **2x2MIMO(Open Loop)**.
3. Execute **DLCHAN 300** to set **Common Parameter - Frequency** - **UL Channel and DL Channel** to **18300** and **300**.
4. Execute **BANDWIDTH 20MHZ** to set **Common Parameter** - **Frequency** - **Channel Bandwidth** to **20MHz**.
5. Execute **UECAT CAT11** to set **Common Parameter** - **Signal** - **UE Category** to **11**.
6. Execute **DLRMC_256QAM ENABLED** to set **Common Parameter** - **DL RMC** - **256QAM** to **Enabled**.
   And, **Common Parameter** - **Signal** - **DCI Format** is set to **1** by parameter linkage.
7. Execute **DLIMCS 27** to set **Common Parameter** - **DL RMC** - **MCS Index 1/2/3** to **27**.
8. Execute **CFI 1** to set **Common Parameter** - **DL RMC** - **CFI** to **1**.
9. Turn on the UE power.
10. Execute **CALLSTAT?** to confirm the call processing status is 2 (= Idle (Regist)).
    Repeat step 10 when the checked status is not 2 (= Idle (Regist)).
11. Execute **CALLSA** to ensure the call processing status is “Connected“.
12. Execute **CALLSTAT?** to confirm the call processing status is 6 (= Connected).
13. Execute **TPUT_MEAS ON** to set **Throughput Measurement** to **ON**.
14. Execute **SWP** to perform measurement.
15. Execute **TPUT?** to confirm the throughput measurement result.

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Printed on Recycled Paper

Printed in Japan 公知 2016-6 MG No. MT8820C/21C-E-F-6-(6.00)