報告編號: **RTBEIH-WTW-P21040028**

行動通信電信終端設備技術規範測試報告

產品名稱	通訊模組
申請廠商	中磊電子股份有限公司
製造廠商	中磊電子股份有限公司
廠牌	Sercomm
型號	TPM541M
系列型號	TPM541S, TPM541, TPM541MS
該產品樣品試驗依據之試驗標準	國家通訊傳播委員會 行動通信電信終端設備技術規範【PLMN ALL】 (窄頻終端設備(PLMN11)) 訂定日期：109 年 09 月 25 日
試驗結果	**合格**

填發本檢驗報告之檢驗機構

香港商立德國際商品試驗有限公司桃園分公司　林口實驗室　華亞檢測部
實驗室認可編號：TAF2021
實驗室地址：桃園市龜山區文化里華亞二路 19 號
受理日期：110 年 04 月 02 日
完成日期：110 年 05 月 23 日
發行日期：110 年 06 月 04 日

報告簽署人簽章:

陳志偉

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報告發行紀錄

Issue No.	Description	Date Issued
RTBEIH-WTW-P21040028	Original release	110 年 06 月 04 日

證 明 書

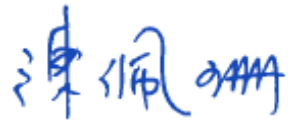
發行日期：110 年 06 月 04 日

產 品 名 稱：	通訊模組
商 標：	Sercomm
型 號：	TPM541M
系 列 型 號：	TPM541S, TPM541, TPM541MS
申 請 者：	中磊電子股份有限公司
量 測 規 範：	行動通信電信終端設備技術規範【PLMN ALL】 (窄頻終端設備(PLMN11)) 訂定日期：109 年 09 月 25 日

香港商立德國際商品試驗有限公司桃園分公司在此證明上述待測設備樣品一組(型號：TPM541M)，收件日期 110 年 04 月 02 日，於 110 年 05 月 17 日至 110 年 05 月 23 日，已在本公司的標準測試場地完成量測。報告中所描述之測試結果和待測設備的架構組合，均根據樣品實際的量測情況作詳實的記錄。

立德桃園分公司依“行動通信電信終端設備技術規範”製作測試結果報告。

特 此 證 明 ！

報告製作者：  ，日 期：110 年 06 月 04 日

陳佩珊/高級專員

審 核 者： ，日 期：110 年 06 月 04 日

陳志偉/高級專案工程師

香港商立德國際商品試驗有限公司桃園分公司
實驗室地址：桃園市龜山區文化里華亞二路 19 號

此份報告不得摘錄複製，除全份複製外，需經實驗室書面同意。

1. 行動通信電信終端設備量測記錄表

申　請　廠　商：中磊電子股份有限公司
製　造　廠　商：中磊電子股份有限公司
申請廠商地址：台北市 115 南港區園區街 3-1 號 8 樓
廠　　牌：Sercomm
產　品　名　稱：通訊模組
型　　號：TPM541M
系　列　型　號：TPM541S, TPM541, TPM541MS
量測單位名稱：香港商立德國際商品試驗有限公司桃園分公司
林口實驗室華亞檢測部
量測單位地址：桃園市龜山區文化里華亞二路 19 號
量測單位認可編號：TAF 2021 (9kHz~40GHz)
認可有效期限：112 年 08 月 06 日
量測單位聯絡電話：03-3183232
量　測　規　範：行動通信電信終端設備技術規範【PLMN ALL】
(窄頻終端設備(PLMN11))
訂定日期：109 年 09 月 25 日

項次	量測項目	規　　範	量測結果判定
1	頻率穩定度	行動通信電信終端設備技術規範 6.2.1.1 章節	合格
2	電磁波能量比吸收率(SAR)	行動通信電信終端設備技術規範 6.6.1.1 章節	不適用(註 1)
3	電波功率密度	行動通信電信終端設備技術規範 6.6.2.1 章節	合格
4	發射功率	行動通信電信終端設備技術規範 6.2.2.1 章節	合格
5	發射頻譜波罩	行動通信電信終端設備技術規範 6.2.2.2 章節	合格
6	傳導帶外輻射發射	行動通信電信終端設備技術規範 6.2.2.3 章節	合格
7	相鄰頻道洩漏功率比(ACLR)	行動通信電信終端設備技術規範 6.2.2.4 章節	合格
8	非資源區塊帶內發射	行動通信電信終端設備技術規範 6.2.2.5 章節	合格
9	災防告警細胞廣播訊息接收功能	行動通信電信終端設備技術規範 6.10 章節	不適用(註 3)

(註 1)：待測物非手持式終端設備故不須測試 SAR。
(註 2)：量測結果之判定不考慮量測不確定度的貢獻。
(註 3)：此待測設備無語音和簡訊功能，故無需執行公眾告警廣播簡訊功能量測。

2. 一般敘述

2.1 待測設備

產 品 名 稱：	通訊模組
型 號：	TPM541M
系 列 型 號：	TPM541S, TPM541, TPM541MS
額 定 電 源：	3.6Vdc from host equipment
頻 帶：	Cat-M1 Band 8: 885-915MHz
工 作 頻 寬：	Cat-M1 Band 8: 1.4 MHz / 3 MHz / 5 MHz / 10 MHz
量 測 功 率： (CLASS 3)	**傳導輸出：** Cat-M1 Band 8: 23.02 dBm **等效輻射：** Cat-M1 Band 8: 22.07 dBm
發 射 模 式：	1 Tx / 1 Rx
天 線 種 類：	見註 1
電 源 線 類 別：	N/A
信 號 線 類 別：	N/A
配 件：	N/A

註 1: 此待測設備搭配測試的天線，其資料如下：

	天線型式	商標	P/N	增益 (dBi)	接頭型式
LTE Band 8	Dipole	WHA YU	C147-510938-A	1.2	SMA Plug Standard

*上述天線的規格資訊由申請者聲明，實驗室不承擔任何責任。

註 2: 待測設備所有型號如下:

Brand	Model	Modem	Embedded GNSS	Embedded MCU
Sercomm	TPM541M	v	v	v
	TPM541	v	v	
	TPM541S	v		
	TPM541MS	v		v

註 3: 此待測設備搭配使用之配件請參閱BV CPS報告編號：BEIH-WTW-P21040028

註 4: IMEI: 355334440005548 為測試時專用的 IMEI 號碼，上市時之 IMEI 請參考 IMEI 保證書之說明。

IMEI Code

此裝置測試中心頻率如下：

LTE Band 8

Bandwidth	頻道	對應頻率 (MHz)	Bandwidth	頻道	對應頻率 (MHz)
1.4 MHz	21507	885.7	3 MHz	21515	886.5
	21650	900.0		21650	900.0
	21793	914.3		21785	913.5
Bandwidth	**頻道**	**對應頻率 (MHz)**	**Bandwidth**	**頻道**	**對應頻率 (MHz)**
5 MHz	21525	887.5	10 MHz	21550	890.0
	21650	900.0		21650	900.0
	21775	912.5		21750	910.0

詳細之規格請參考使用說明書。

量測不確定度

項次	量測項目	擴充不確定度值
1	發射功率 (dB)	+ 0.1659 / - 0.1659
2	頻率容許誤差 (ppm)	+ 0.114 / - 0.114
3	發射頻譜波罩 (dB)	+ 2.428 / - 2.428
4	相鄰頻道洩漏功率比 (dB)	+ 1.961 / - 1.961
5	傳導帶外混附波輻射 (dB)	+ 2.63 / - 2.63

NOTE: The calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k = 2.

2.2 輔助測試之週邊設備描述

此待測設備於受測時無須搭配一般用途之相關設備，故採獨立測試。

3. 發射功率

3.1 適用標準

(1) 有效幅射功率(Effective Radiated Power，ERP)
攜帶式終端設備限制為1瓦特(W)。
移動式終端臺設備限制為 2 瓦特(W)。
(2) 傳導輸出功率限制值
採Class 3者：23毫瓦分貝(dBm）+2.7/-3.2分貝（dB）。
採Class 5者：20毫瓦分貝(dBm）+2.7/-3.2分貝（dB）。

3.2 量測方法

(1) 量測發射功率時，必須使用均方根值等效電壓之儀器量測於任何連續傳輸時段，量測結果須依儀器之反應時間、解析頻寬能力及靈敏度等調整得出正確之發射功率。
(2) 檢測頻道為低、中、高三個頻道，並對最高之工作頻寬，依附表一進行檢測。

附表一、LTE-M1 終端設備發射功率之頻道頻寬測試參數

	下行結構	上行結構		
頻道頻寬	最大發射功率測試不適用	調變方式	資源區塊分配	
			FDD 及 HD-FDD	TDD
5MHz		QPSK	1	1
5MHz		QPSK	(Class 5) 3	(Class 5) 3
10MHz		QPSK	1	1
10MHz		QPSK	(Class 3) 4 (Class 5) 5	(Class 3) 4 (Class 5) 5
15MHz		QPSK	1	1
15MHz		QPSK	6	6
20MHz		QPSK	1	1
20MHz		QPSK	6	6

註：RB offset 設定值及應檢項目之測試方法，參考 3GPP TS 36.521-1 技術標準規定。

3.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 07, 2021	Feb. 06, 2022

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3.4 測試配置

3.5 量測結果

LTE Band 8

BW(MHz)	10							
Test Frequency ID	N_{UL}	Frequency of Uplink [MHz]	Test Configuration Initial of Power				EUT	
			Modulation	RB Size	RB Offset	Narrowband Index	power (dBm)	ERP (dBm)
Low Range	21550	890	QPSK	4	0	0	22.79	21.84
			QPSK	4	2	0	22.17	21.22
Mid Range	21650	900	QPSK	4	0	0	22.71	21.76
			QPSK	4	2	0	22.12	21.17
High Range	21750	910	QPSK	4	0	7	23.02	22.07
			QPSK	4	2	7	22.45	21.50

NOTE:
EIRP = Measured Power + Gain
ERP = EIRP - 2.15

4. 發射頻譜波罩

4.1 適用標準

須符合附表二之頻譜波罩規範值。

附表二、LTE-M1 終端設備頻譜波罩規範值

頻帶頻寬 / Δf_OOB (MHz)	發射限制值(dB)						
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	解析頻寬
±0 to 1	-8.5	-11.5	-13.5	-16.5	-18.5	-19.5	30 kHz
±1 to 2.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
±2.5 to 2.8	-23.5	-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
±2.8 to 5		-8.5	-8.5	-8.5	-8.5	-8.5	1 MHz
±5 to 6		-23.5	-11.5	-11.5	-11.5	-11.5	1 MHz
±6 to 10			-23.5	-11.5	-11.5	-11.5	1 MHz
±10 to 15				-23.5	-11.5	-11.5	1 MHz
±15 to 20					-23.5	-11.5	1 MHz
±20 to 25						-23.5	1 MHz

註：Δf_OOB是發射頻帶外之頻率偏移量 (Δ Frequency of Out-of-band emission)

4.2 量測方法

(1) 頻譜波罩限制值依頻道頻寬及Δf_OOB 而不同，量測時的解析頻寬不小於附表二的設定值。

(2) 檢測頻道採低、中、高三個頻道，並分別對最低、5 MHz、10 MHz 及最高之工作頻寬，依附表三進行檢測。

附表三、LTE-M1 終端設備頻譜波罩之頻道頻寬測試參數

	下行結構	上行結構			
頻道頻寬	頻譜波罩測試不適用	調變方式	資源區塊分配		
			FDD 及 HD-FDD	TDD	窄頻索引(註一)
低頻道、中頻道					
1.4 MHz		QPSK	2	2	0
1.4 MHz		QPSK	5	5	0
1.4 MHz		QPSK	6	6	0
1.4 MHz		16QAM	2	2	0
1.4 MHz		16QAM	5	5	0
3 MHz		QPSK	2	2	0
3 MHz		QPSK	5	5	0
3 MHz		QPSK	6	6	0
3 MHz		16QAM	2	2	0
3 MHz		16QAM	5	5	0
5 MHz		QPSK	6	6	0
5 MHz (註三)		16QAM	1	1	0
5 MHz		16QAM	3	3	0
5 MHz		16QAM	5	5	0
10 MHz (註三)		QPSK	4	4	0
10 MHz		QPSK	6	6	0
10 MHz (註三)		16QAM	3	3	0
10 MHz		16QAM	5	5	0
15 MHz		QPSK	6	6	0
15 MHz		16QAM	5	5	0
高頻道					
1.4 MHz		QPSK	2	2	0
1.4 MHz		QPSK	5	5	0
1.4 MHz		QPSK	6	6	0
1.4 MHz		16QAM	2	2	0
1.4 MHz		16QAM	5	5	0
3 MHz		QPSK	2	2	1
3 MHz		QPSK	5	5	1
3 MHz		QPSK	6	6	1
3 MHz		16QAM	2	2	1
3 MHz		16QAM	5	5	1
5 MHz		QPSK	6	6	3
5 MHz (註三)		16QAM	1	1	3
5 MHz		16QAM	3	3	3
5 MHz		16QAM	5	5	3
10 MHz (註三)		QPSK	4	4	7
10 MHz		QPSK	6	6	7
10 MHz (註三)		16QAM	3	3	7
10 MHz		16QAM	5	5	7
15 MHz		QPSK	6	6	11
15 MHz		16QAM	5	5	11

註：

一、窄頻索引(Narrowband Index)定義參考 3GPP TS 36.211 section 5.2.4 規定。

二、RB offset 設定值及應檢項目之測試方法，參考 3GPP TS 36.521-1 技術標準規定。

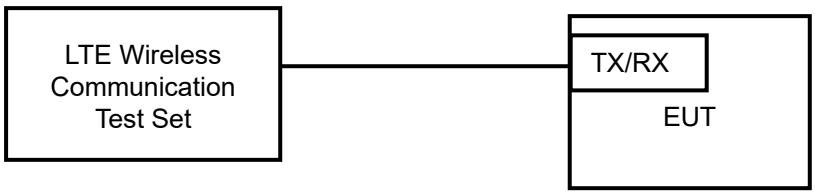
三、僅適用於 Power Class 3 之用戶設備。

4.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 07, 2021	Feb. 06, 2022

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4 測試配置



4.5 量測結果

LTE Band 8

Bandwidth: 1.4 MHz / QPSK (2 RB / 0 RB Offset, Index 0)

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	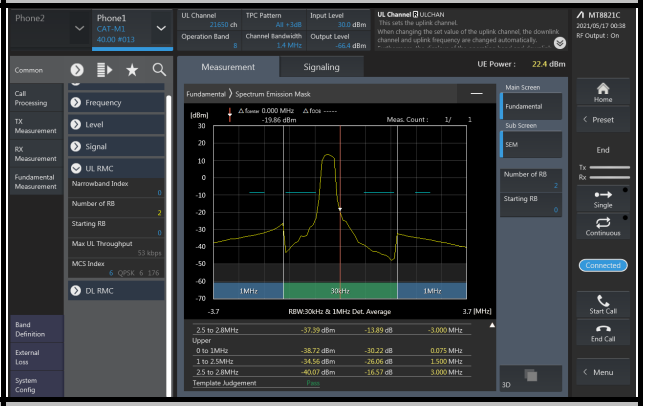
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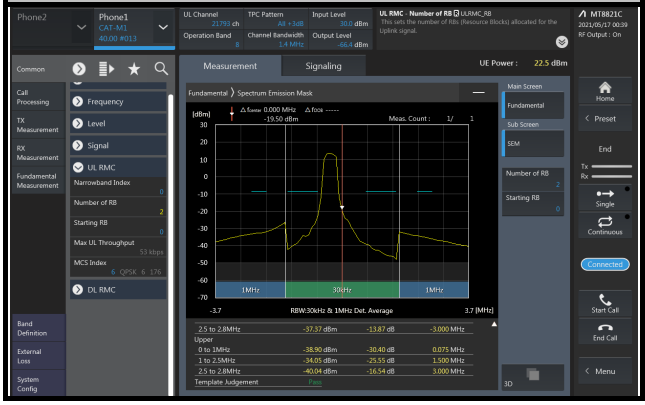
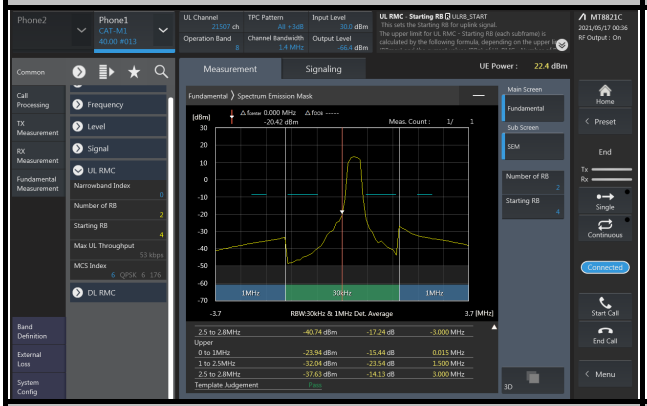
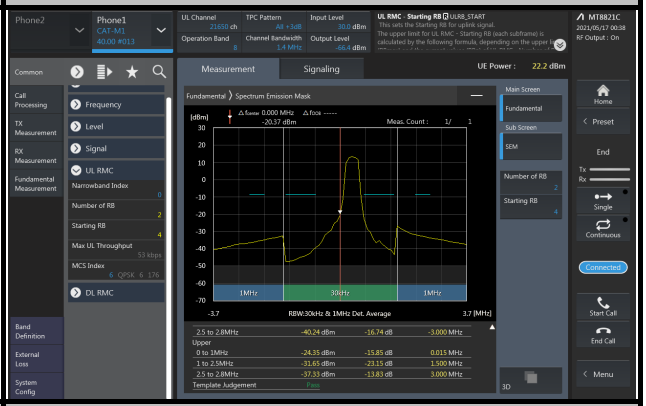
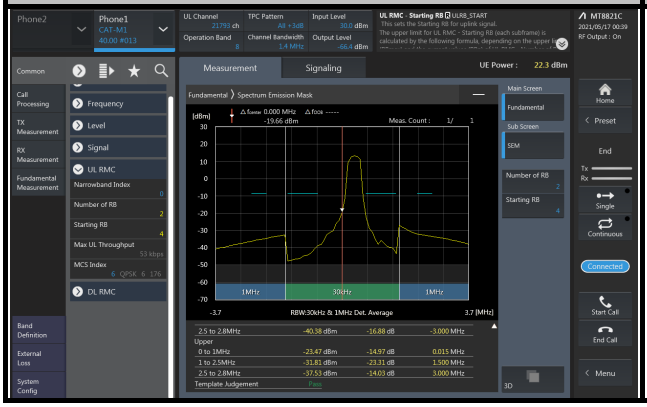
	

Bandwidth: 1.4 MHz / QPSK (2 RB / 4 RB Offset, Index 0)

Ch21507	Ch21650
	
Ch21793	
	

Bandwidth: 1.4 MHz / QPSK (5 RB / 0 RB Offset, Index 0)

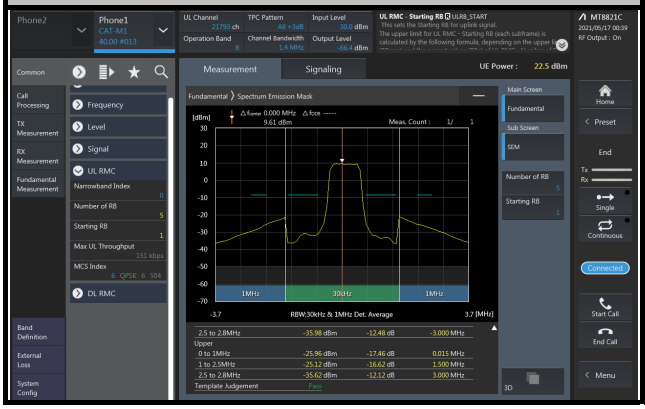
Ch21507	Ch21650
Ch21793	

Bandwidth: 1.4 MHz / QPSK (5 RB / 1 RB Offset, Index 0)

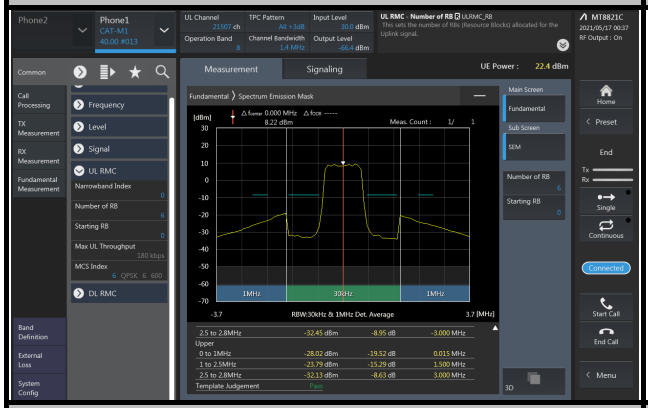
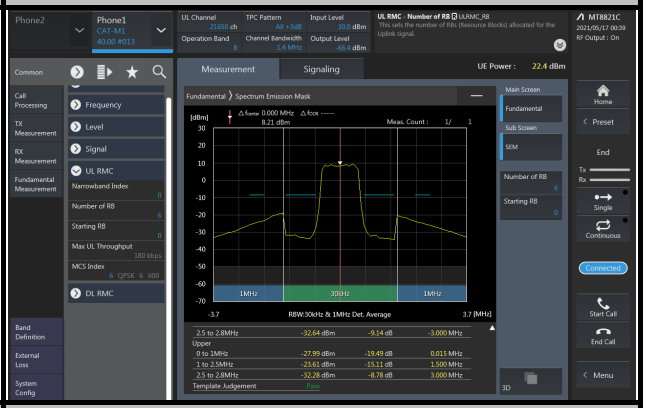
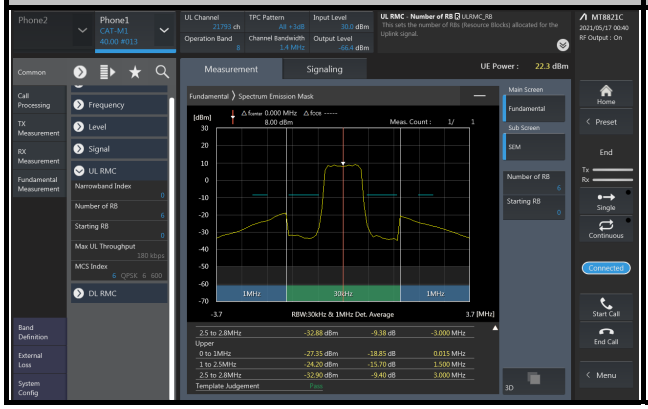
Ch21507

Ch21650

Ch21793

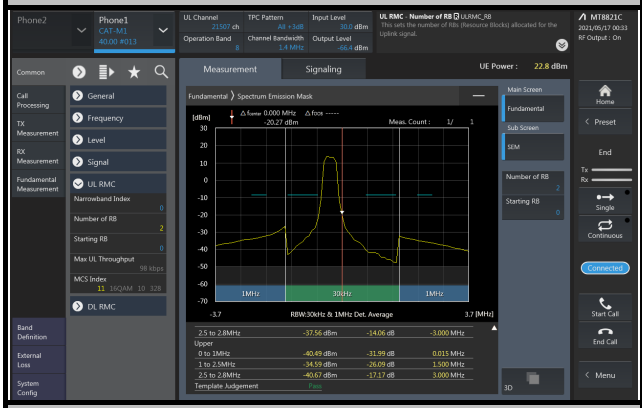


Bandwidth: 1.4 MHz / QPSK (6 RB / 0 RB Offset, Index 0)

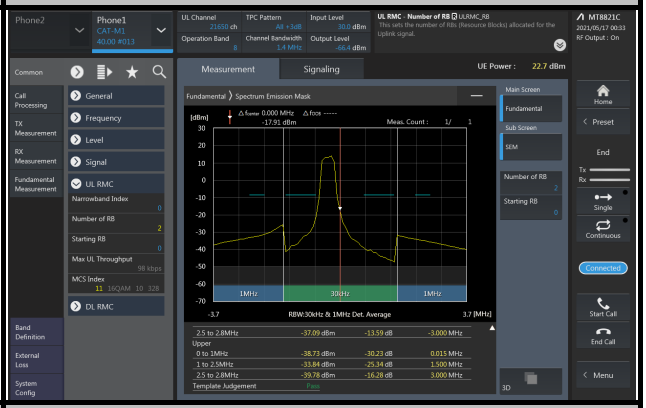
Ch21507	Ch21650
	
Ch21793	
	

Bandwidth: 1.4 MHz / 16QAM (2 RB / 0 RB Offset, Index 0)

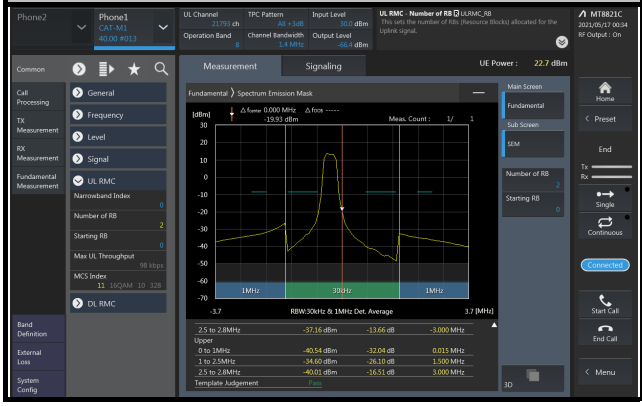
Ch21507



Ch21650

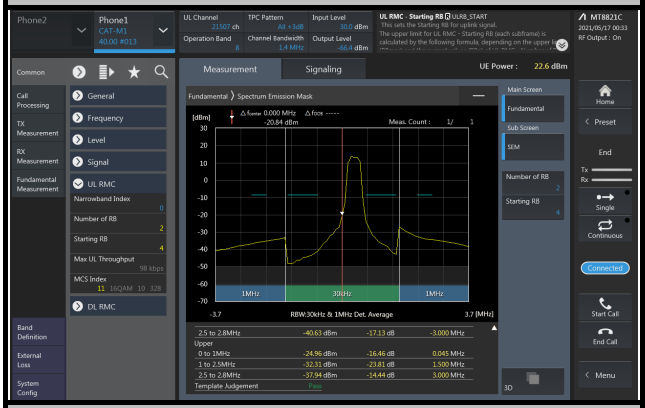


Ch21793

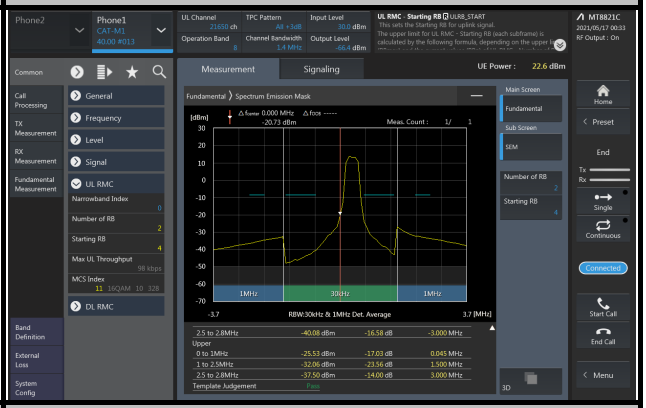


Bandwidth: 1.4 MHz / 16QAM (2 RB / 4 RB Offset, Index 0)

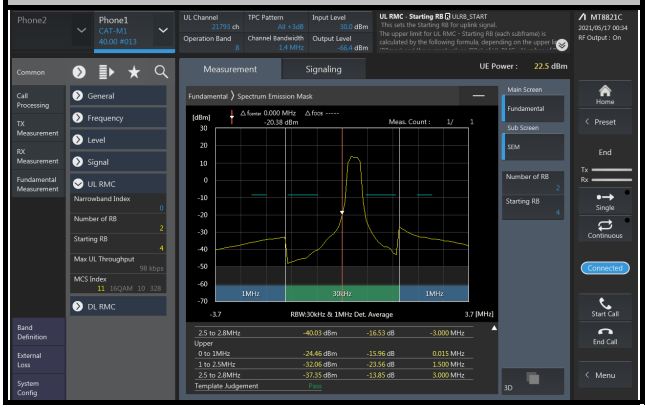
Ch21507



Ch21650

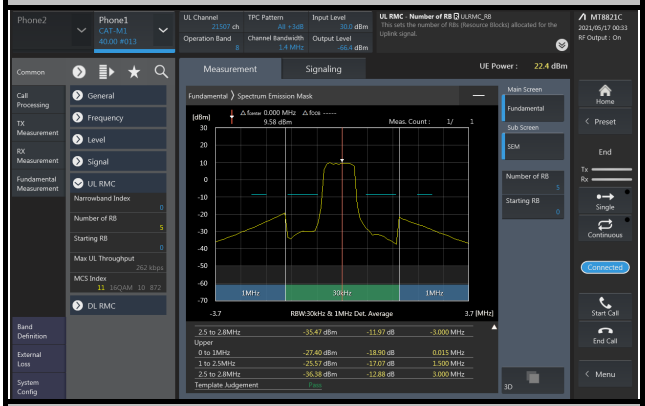


Ch21793

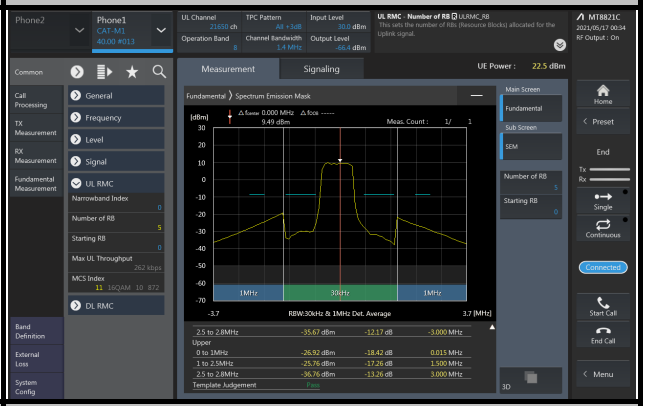


Bandwidth: 1.4 MHz / 16QAM (5 RB / 0 RB Offset, Index 0)

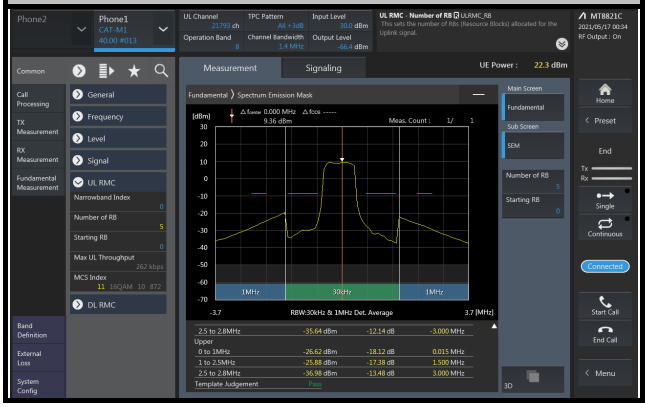
Ch21507



Ch21650

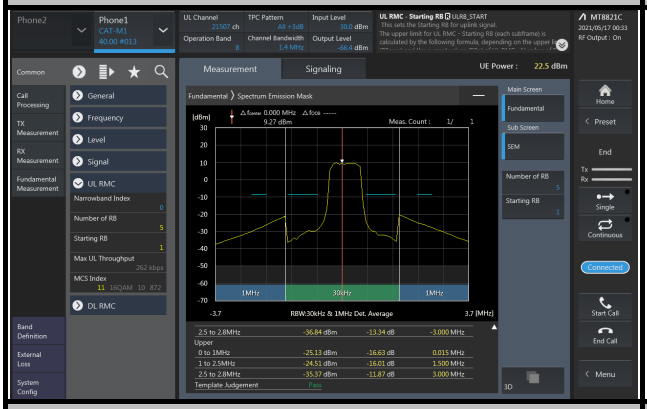


Ch21793

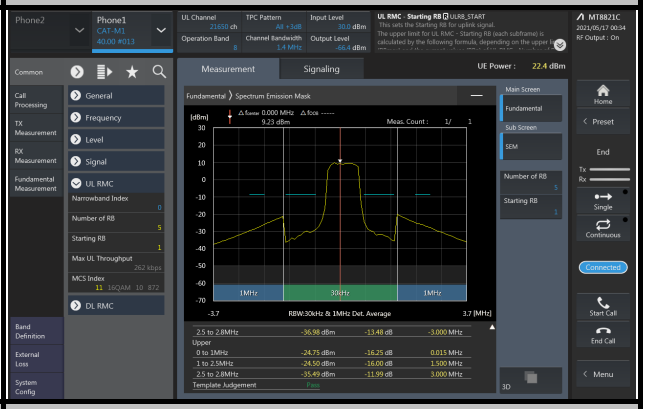


Bandwidth: 1.4 MHz / 16QAM (5 RB / 1 RB Offset, Index 0)

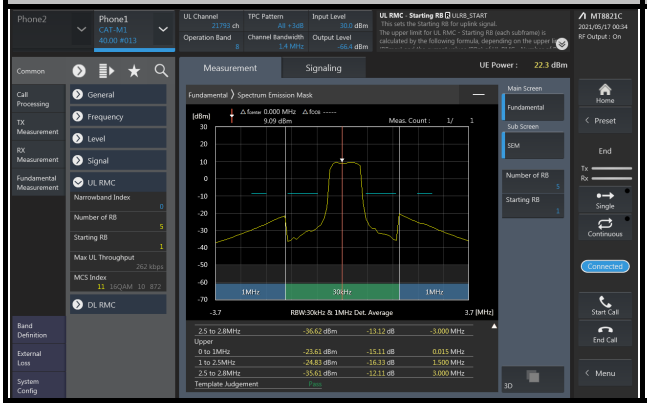
Ch21507



Ch21650



Ch21793



Bandwidth: 5 MHz / QPSK (6 RB / 0 RB Offset, Index 0)

Ch21525	Ch21650

Bandwidth: 5 MHz / QPSK (6 RB / 0 RB Offset, Index 3)

Ch21775

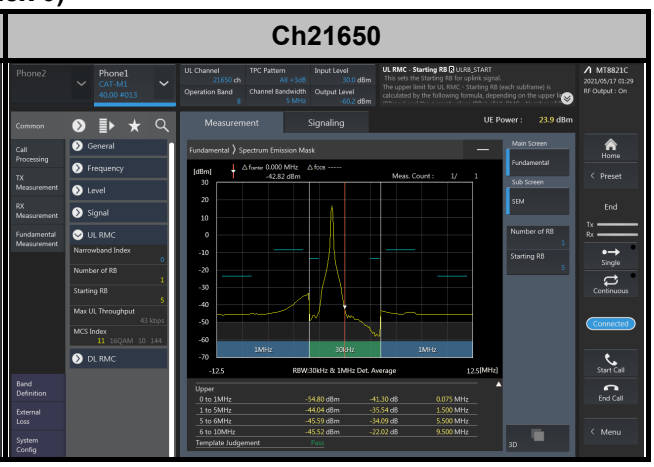
Bandwidth: 5 MHz / 16QAM (1 RB / 0 RB Offset, Index 0)

Ch21525	Ch21650

Bandwidth: 5 MHz / 16QAM (1 RB / 0 RB Offset, Index 3)

Ch21775

Bandwidth: 5 MHz / 16QAM (1 RB / 5 RB Offset, Index 0)

Ch21525	Ch21650
	

Bandwidth: 5 MHz / 16QAM (1 RB / 5 RB Offset, Index 3)

Ch21775

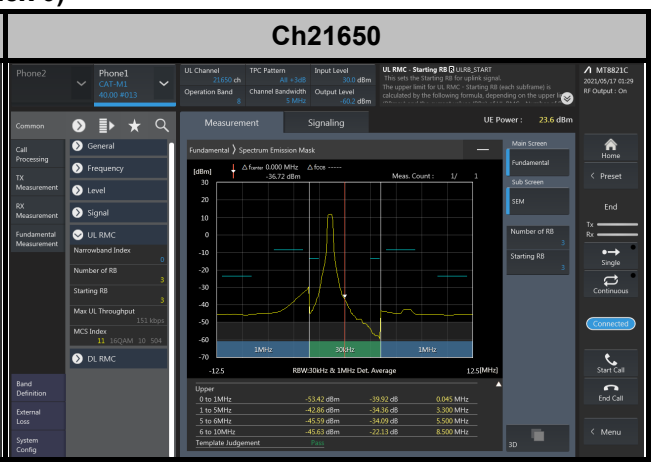
Bandwidth: 5 MHz / 16QAM (3 RB / 0 RB Offset, Index 0)

Ch21525	Ch21650

Bandwidth: 5 MHz / 16QAM (3 RB / 0 RB Offset, Index 3)

Ch21775

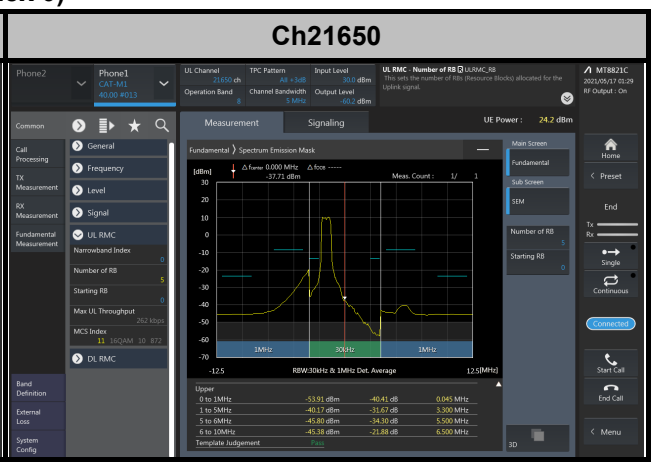
Bandwidth: 5 MHz / 16QAM (3 RB / 3 RB Offset, Index 0)

Ch21525	Ch21650
	

Bandwidth: 5 MHz / 16QAM (3 RB / 3 RB Offset, Index 3)

Ch21775

Bandwidth: 5 MHz / 16QAM (5 RB / 0 RB Offset, Index 0)

Ch21525	Ch21650
	

Bandwidth: 5 MHz / 16QAM (5 RB / 0 RB Offset, Index 3)

Ch21775

Bandwidth: 5 MHz / 16QAM (5 RB / 1 RB Offset, Index 0)

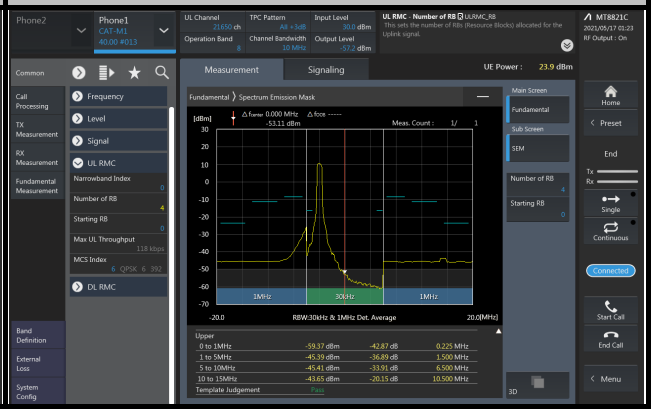
Ch21525

Ch21650

Bandwidth: 5 MHz / 16QAM (5 RB / 1 RB Offset, Index 3)

Ch21775

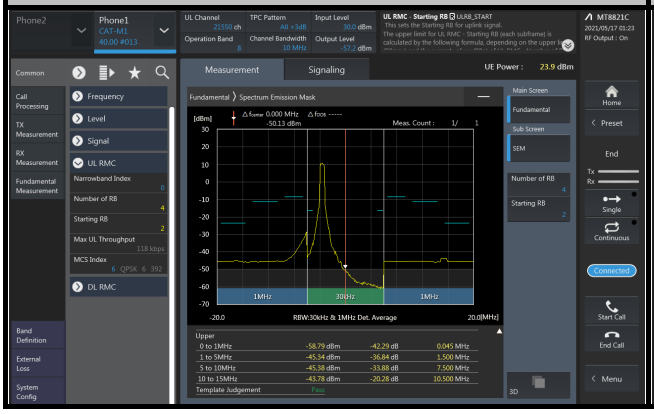
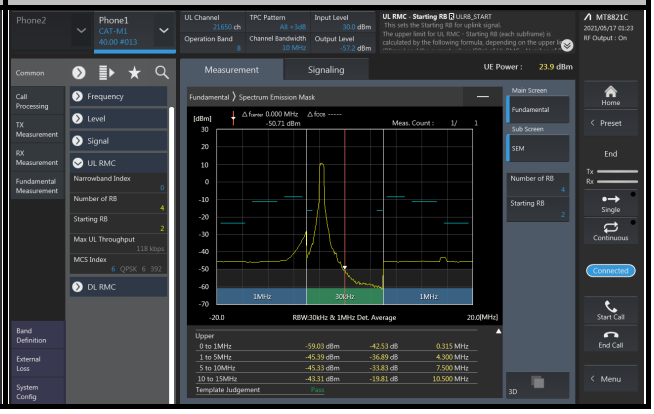
Bandwidth: 10 MHz / QPSK (4 RB / 0 RB Offset, Index 0)

Ch21550	Ch21650
	

Bandwidth: 10 MHz / QPSK (4 RB / 0 RB Offset, Index 7)

Ch21750

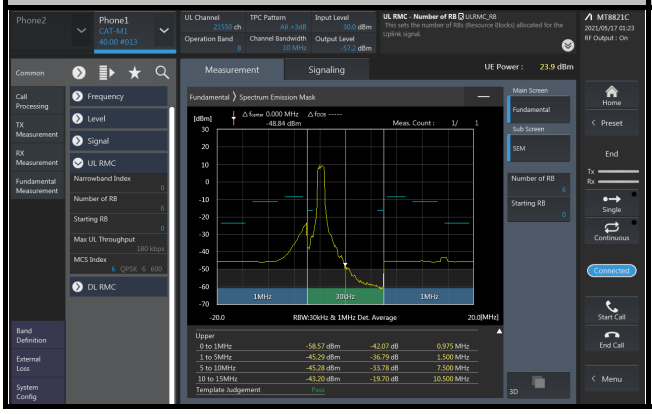
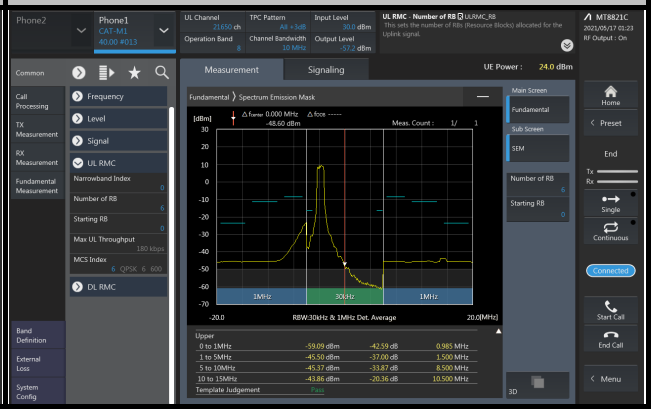
Bandwidth: 10 MHz / QPSK (4 RB / 2 RB Offset, Index 0)

Ch21550	Ch21650
	

Bandwidth: 10 MHz / QPSK (4 RB / 2 RB Offset, Index 7)

Ch21750

Bandwidth: 10 MHz / QPSK (6 RB / 0 RB Offset, Index 0)

Ch21550	Ch21650
	

Bandwidth: 10 MHz / QPSK (6 RB / 0 RB Offset, Index 7)

Ch21750

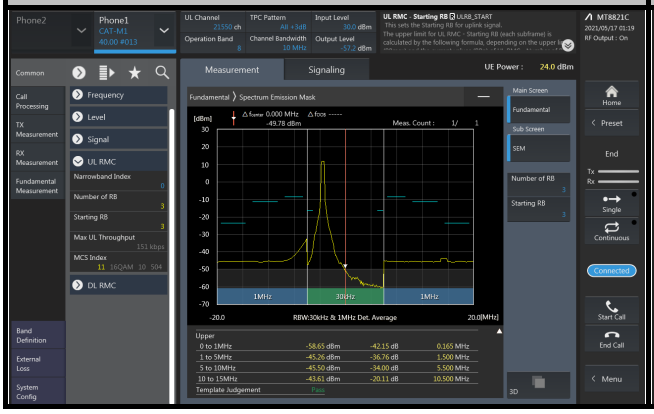
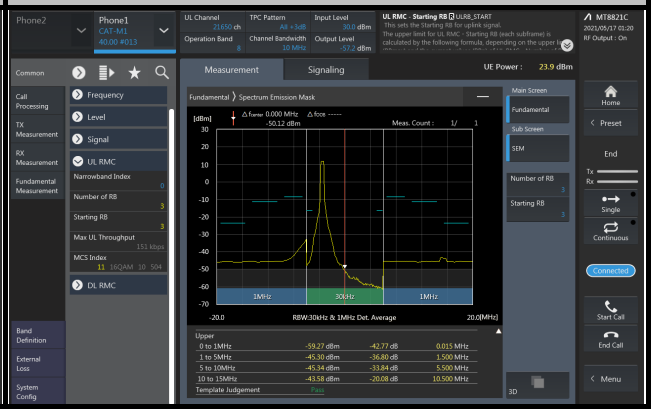
Bandwidth: 10 MHz / 16QAM (3 RB / 0 RB Offset, Index 0)

Ch21550	Ch21650

Bandwidth: 10 MHz / 16QAM (3 RB / 0 RB Offset, Index 7)

Ch21750

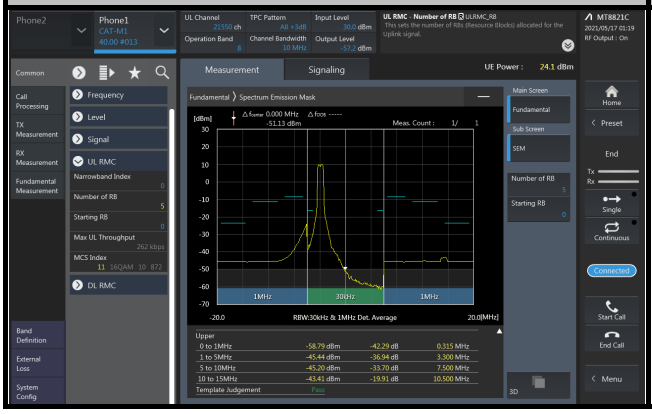
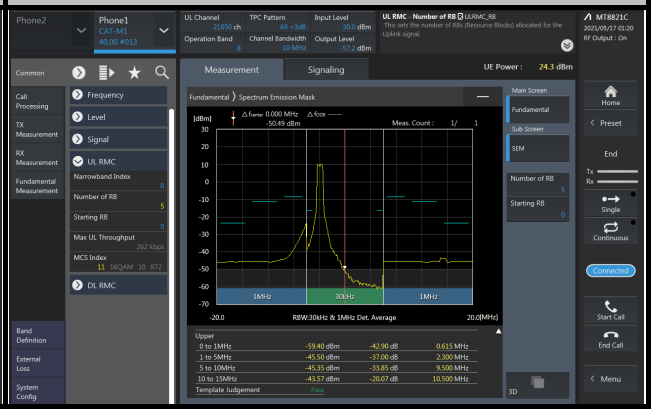
Bandwidth: 10 MHz / 16QAM (3 RB / 3 RB Offset, Index 0)

Ch21550	Ch21650
	

Bandwidth: 10 MHz / 16QAM (3 RB / 3 RB Offset, Index 7)

Ch21750

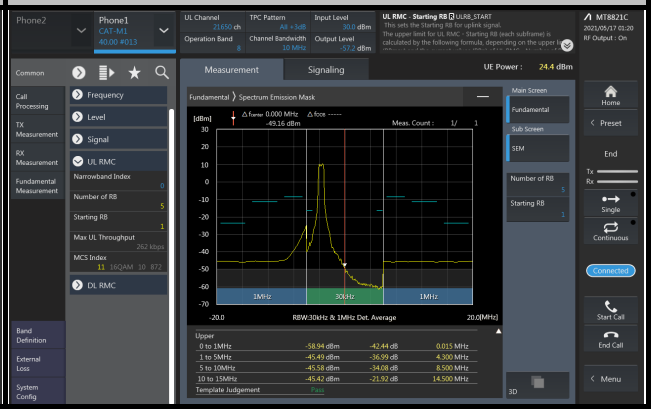
Bandwidth: 10 MHz / 16QAM (5 RB / 0 RB Offset, Index 0)

Ch21550	Ch21650
	

Bandwidth: 10 MHz / 16QAM (5 RB / 0 RB Offset, Index 7)

Ch21750

Bandwidth: 10 MHz / 16QAM (5 RB / 1 RB Offset, Index 0)

Ch21550	Ch21650
	

Bandwidth: 10 MHz / 16QAM (5 RB / 1 RB Offset, Index 7)

Ch21750

5. 傳導帶外輻射發射

5.1 適用標準

須符合下表之規範值。

頻率範圍	最大位準	解析頻寬
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz
30 MHz ≤ f < 1 GHz	-36 dBm	100 kHz
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz

5.2 量測方法

(1) 帶外輻射量測頻率範圍，不包含 6.3.1 點中 Δf_OOB。量測時的解析頻寬不小於附表四的設定值。

(2) 檢測頻道採低、中、高三個頻道，並對最低之工作頻寬，依附表五進行檢測。

附表五、LTE-M1 終端設備帶外輻射之頻道頻寬測試參數

	下行結構	上行結構			
頻道頻寬	帶外輻射測試不適用	調變方式	資源區塊分配		
			FDD 及 HD-FDD	TDD	窄頻索引(註一)
低頻道、中頻道					
1.4 MHz		QPSK	1	1	0
1.4 MHz		QPSK	6	6	0
3 MHz		QPSK	1	1	0
3 MHz		QPSK	6	6	0
5 MHz		QPSK	1	1	0
5 MHz		QPSK	6	6	0
高頻道					
1.4 MHz		QPSK	1	1	0
1.4 MHz		QPSK	6	6	0
3 MHz		QPSK	1	1	1
3 MHz		QPSK	6	6	1
5 MHz		QPSK	1	1	3
5 MHz		QPSK	6	6	3

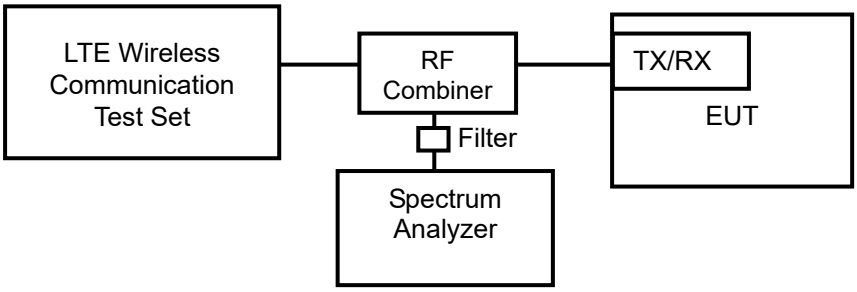
註：窄頻索引(Narrowband Index)定義參考 3GPP TS 36.211,5.2.4 規定。

5.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Analyzer Agilent	N9030B	MY57140953	Jul. 02, 2020	Jul. 01, 2021
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 07, 2021	Feb. 06, 2022

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

5.4 測試配置



5.5 量測結果

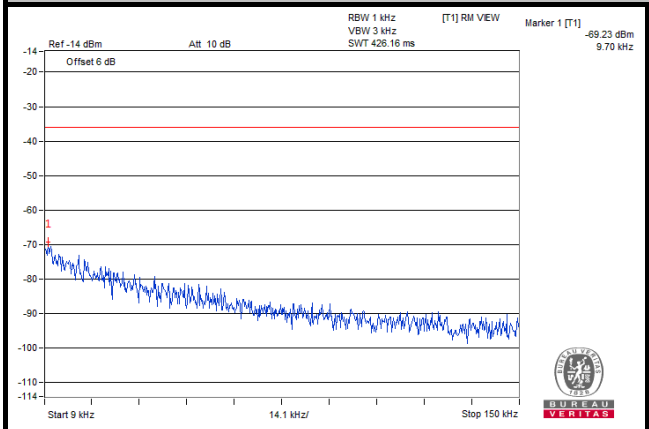
LTE Band 8

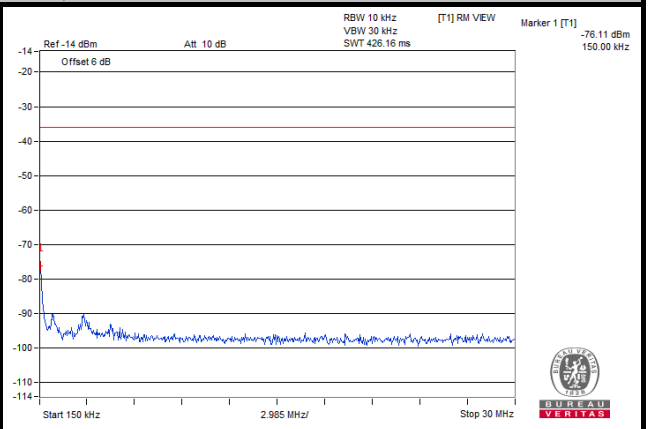
Bandwidth: 1.4 MHz

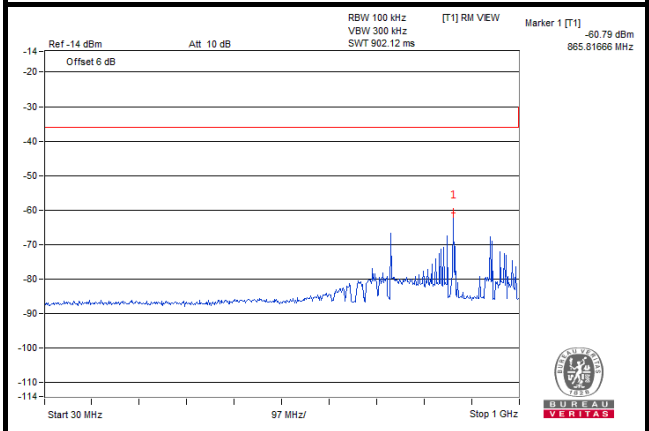
Modulation	Channel	RB	Frequency Range (MHz)	Measurement Value	Limit	Pass / Fail
QPSK	21507	1#0 Index 0	0.009 to 0.15	-69.23	-36	Pass
			0.15 to 30	-76.11	-36	Pass
			30 to 1000	-60.79	-36	Pass
			1000 to 12750	-69.98	-30	Pass
		1#5 Index 0	0.009 to 0.15	-71.79	-36	Pass
			0.15 to 30	-76.82	-36	Pass
			30 to 1000	-50.89	-36	Pass
			1000 to 12750	-67.88	-30	Pass
		6#0 Index 0	0.009 to 0.15	-68.47	-36	Pass
			0.15 to 30	-76.34	-36	Pass
			30 to 1000	-54.96	-36	Pass
			1000 to 12750	-69.71	-30	Pass
	21650	1#0 Index 0	0.009 to 0.15	-71.49	-36	Pass
			0.15 to 30	-77.37	-36	Pass
			30 to 1000	-48.18	-36	Pass
			1000 to 12750	-67.26	-30	Pass
		1#5 Index 0	0.009 to 0.15	-69.17	-36	Pass
			0.15 to 30	-76.56	-36	Pass
			30 to 1000	-47.73	-36	Pass
			1000 to 12750	-69.89	-30	Pass
		6#0 Index 0	0.009 to 0.15	-70.89	-36	Pass
			0.15 to 30	-76.98	-36	Pass
			30 to 1000	-48.38	-36	Pass
			1000 to 12750	-69.89	-30	Pass
	21793	1#0 Index 0	0.009 to 0.15	-69.59	-36	Pass
			0.15 to 30	-76.49	-36	Pass
			30 to 1000	-51.84	-36	Pass
			1000 to 12750	-70.16	-30	Pass
		1#5 Index 0	0.009 to 0.15	-71.03	-36	Pass
			0.15 to 30	-77.85	-36	Pass
			30 to 1000	-52.91	-36	Pass
			1000 to 12750	-68.66	-30	Pass
		6#0 Index 0	0.009 to 0.15	-69.49	-36	Pass
			0.15 to 30	-75.91	-36	Pass
			30 to 1000	-52.98	-36	Pass
			1000 to 12750	-67.44	-30	Pass

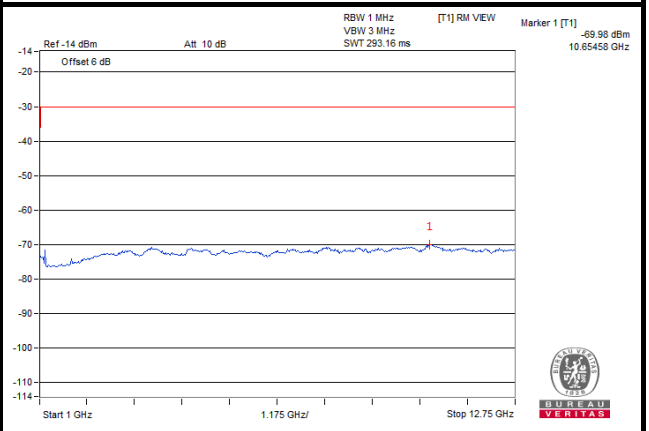
Ch 21507

1 RB / 0 RB Offset, Index 0

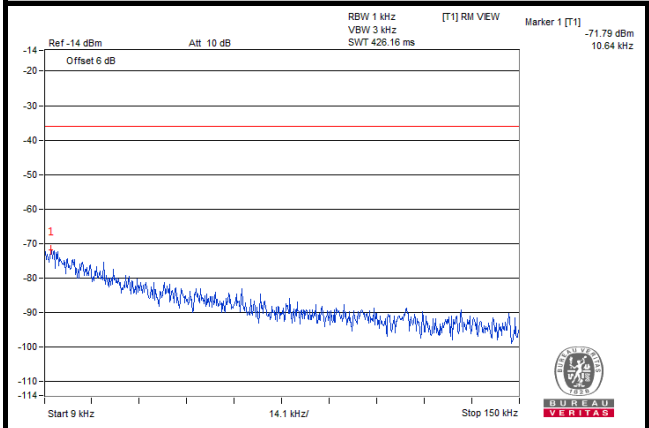


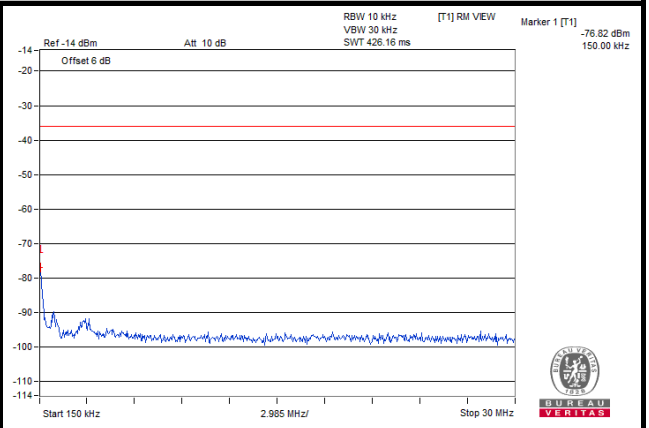


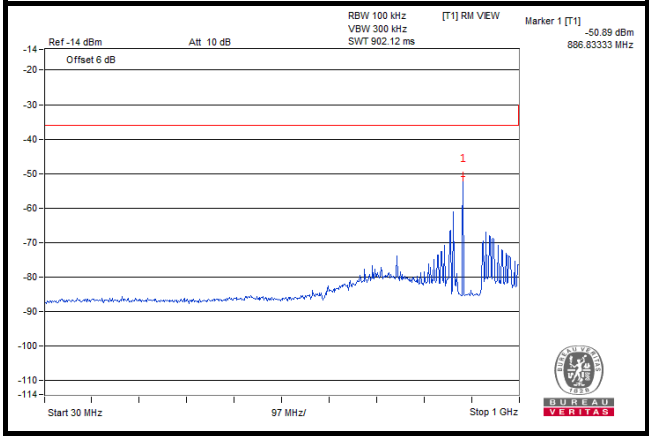


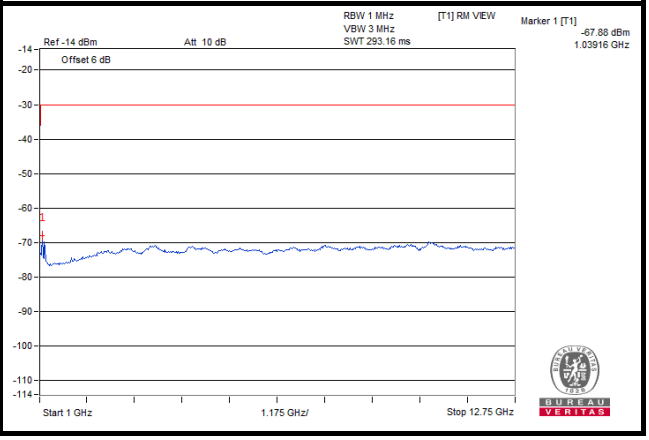


1 RB / 5 RB Offset, Index 0









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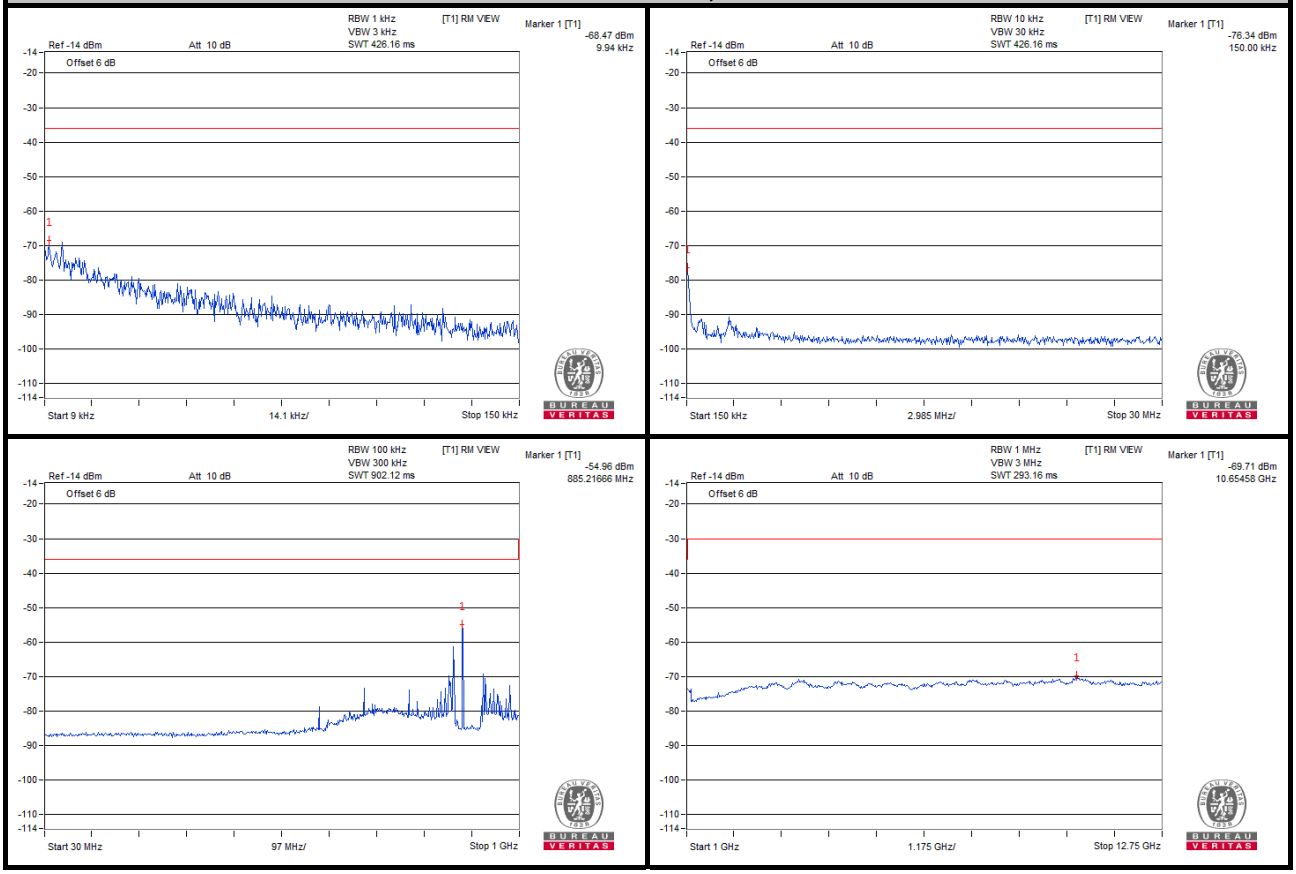

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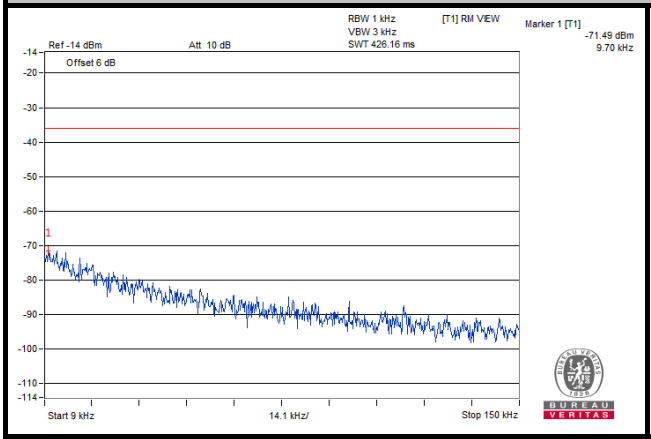

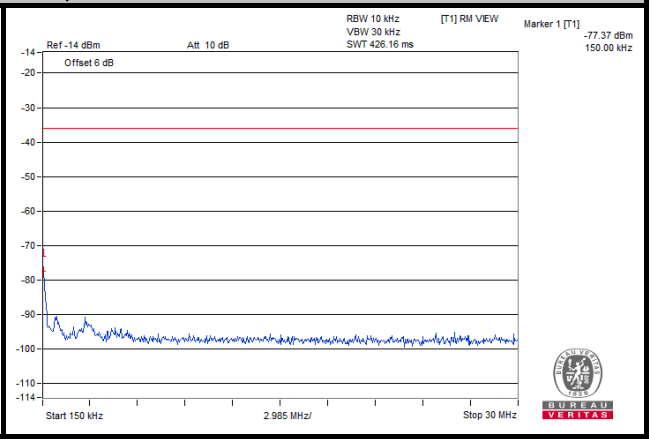

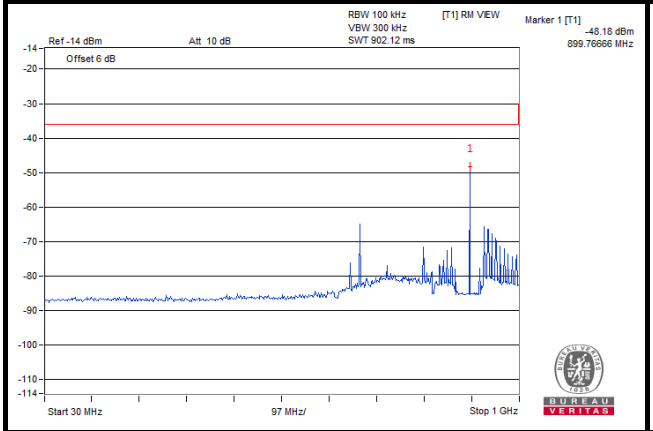

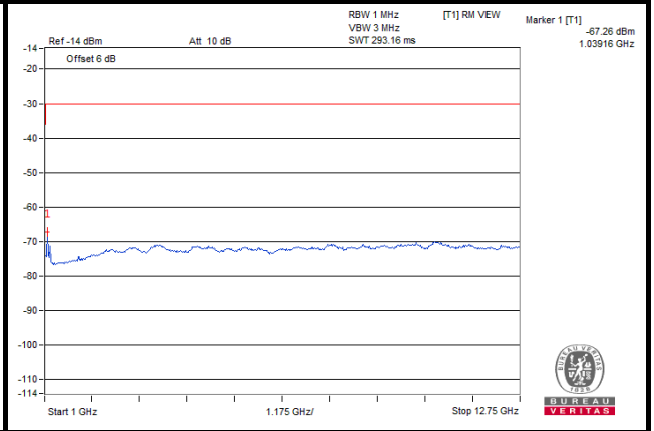

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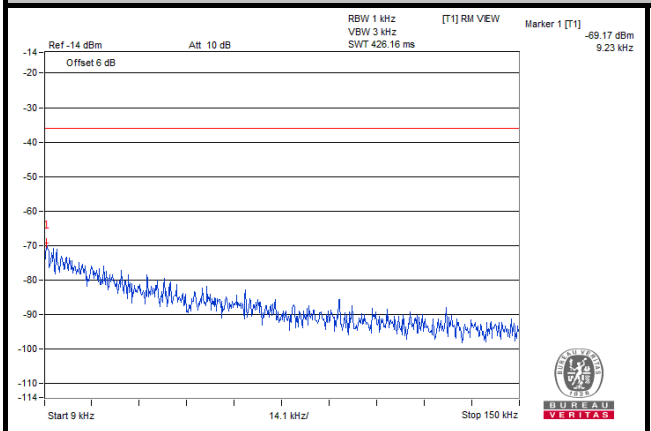
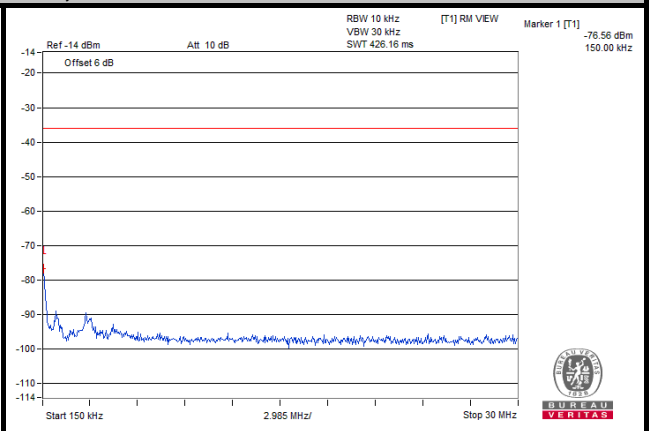
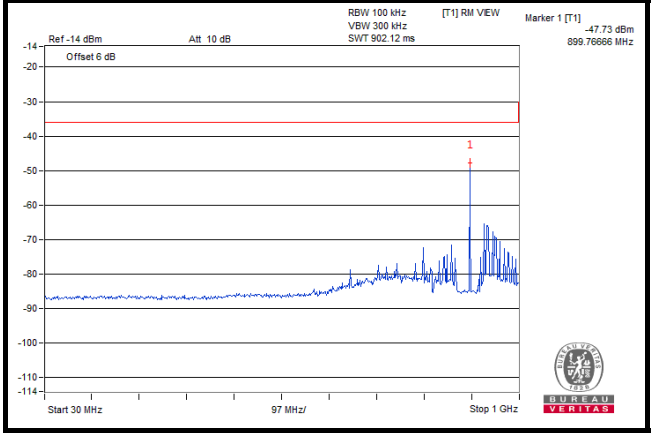
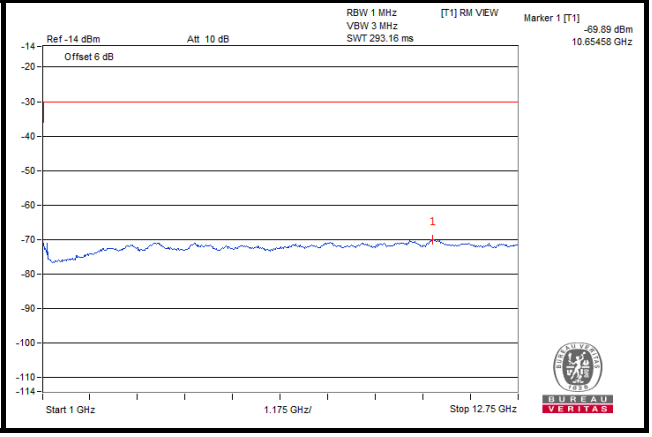
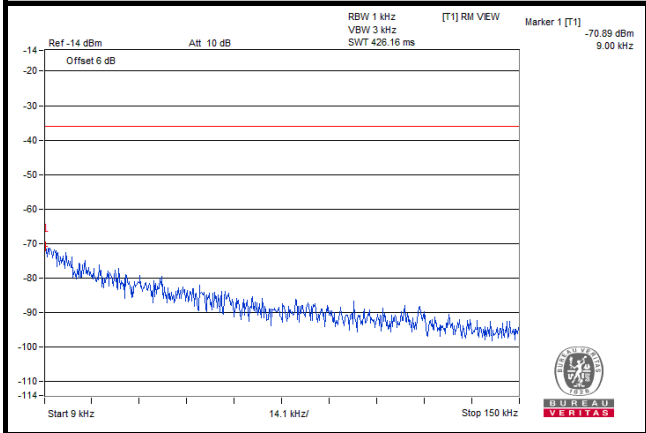


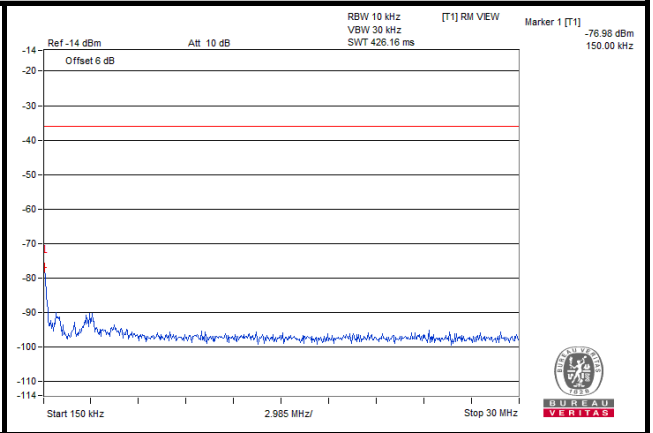


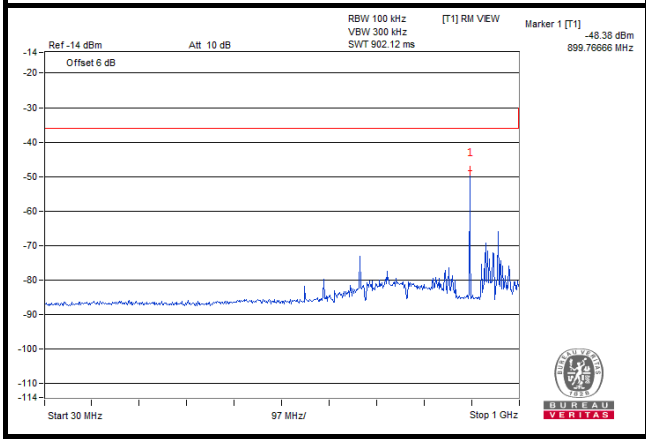


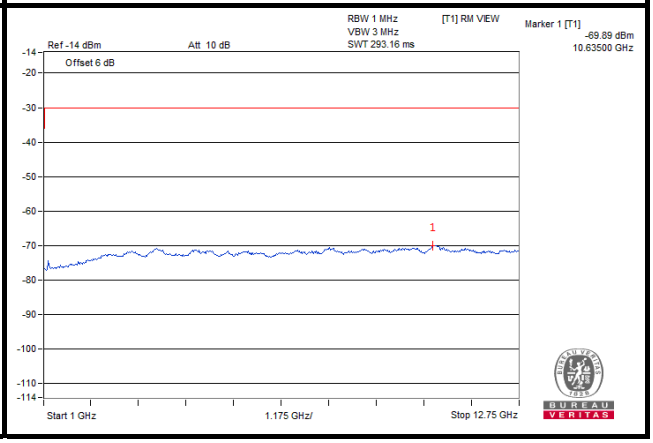


6 RB / 0 RB Offset, Index 0









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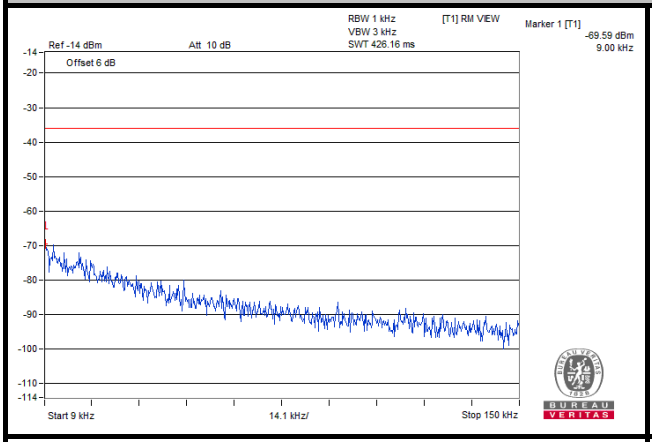
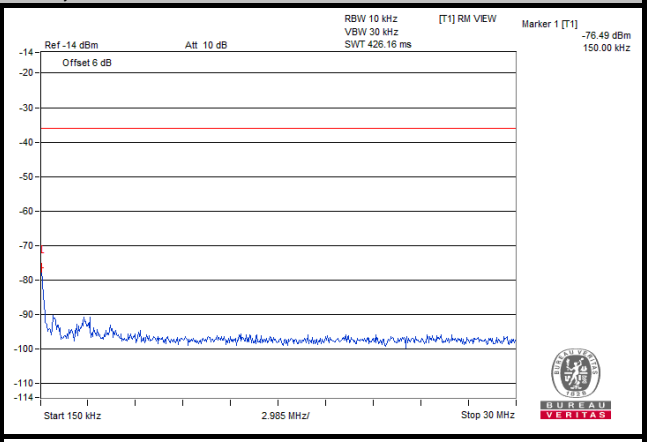
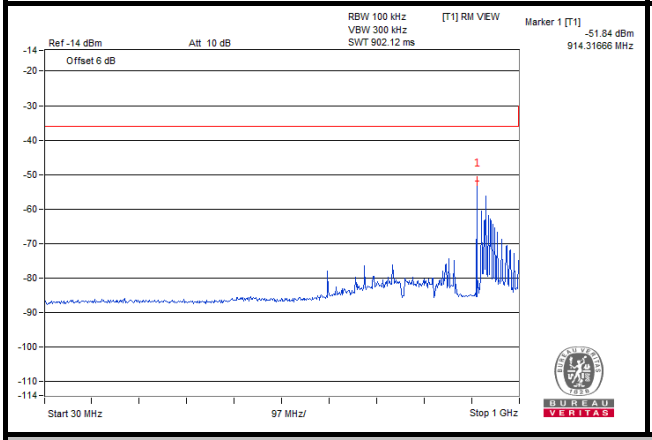
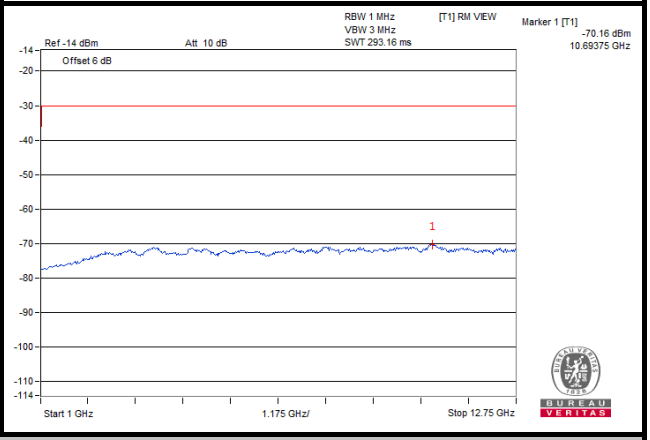
1 RB / 0 RB Offset, Index 0









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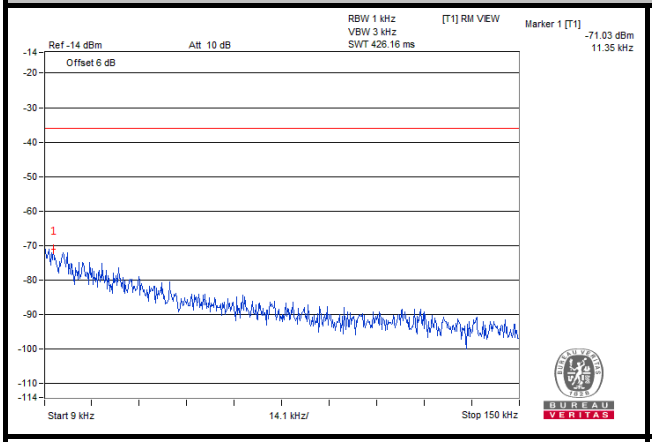

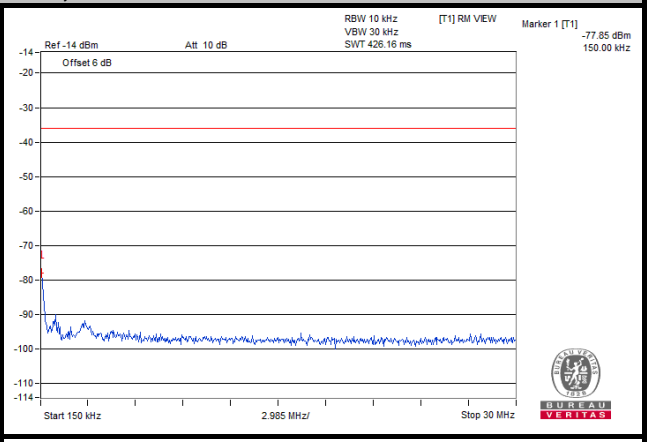

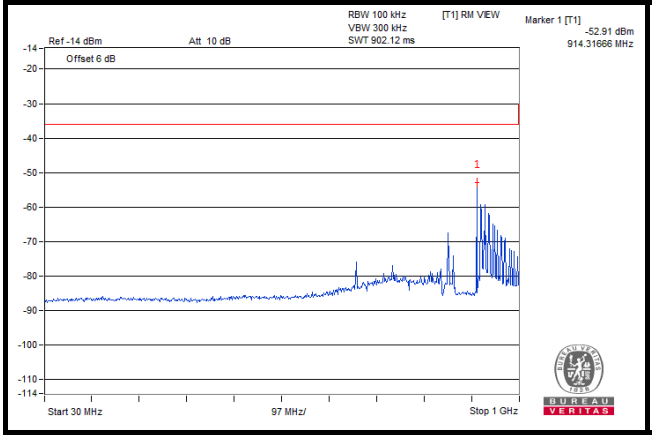

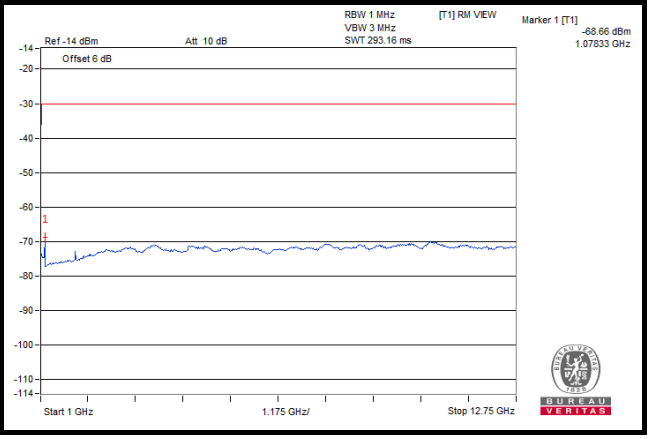

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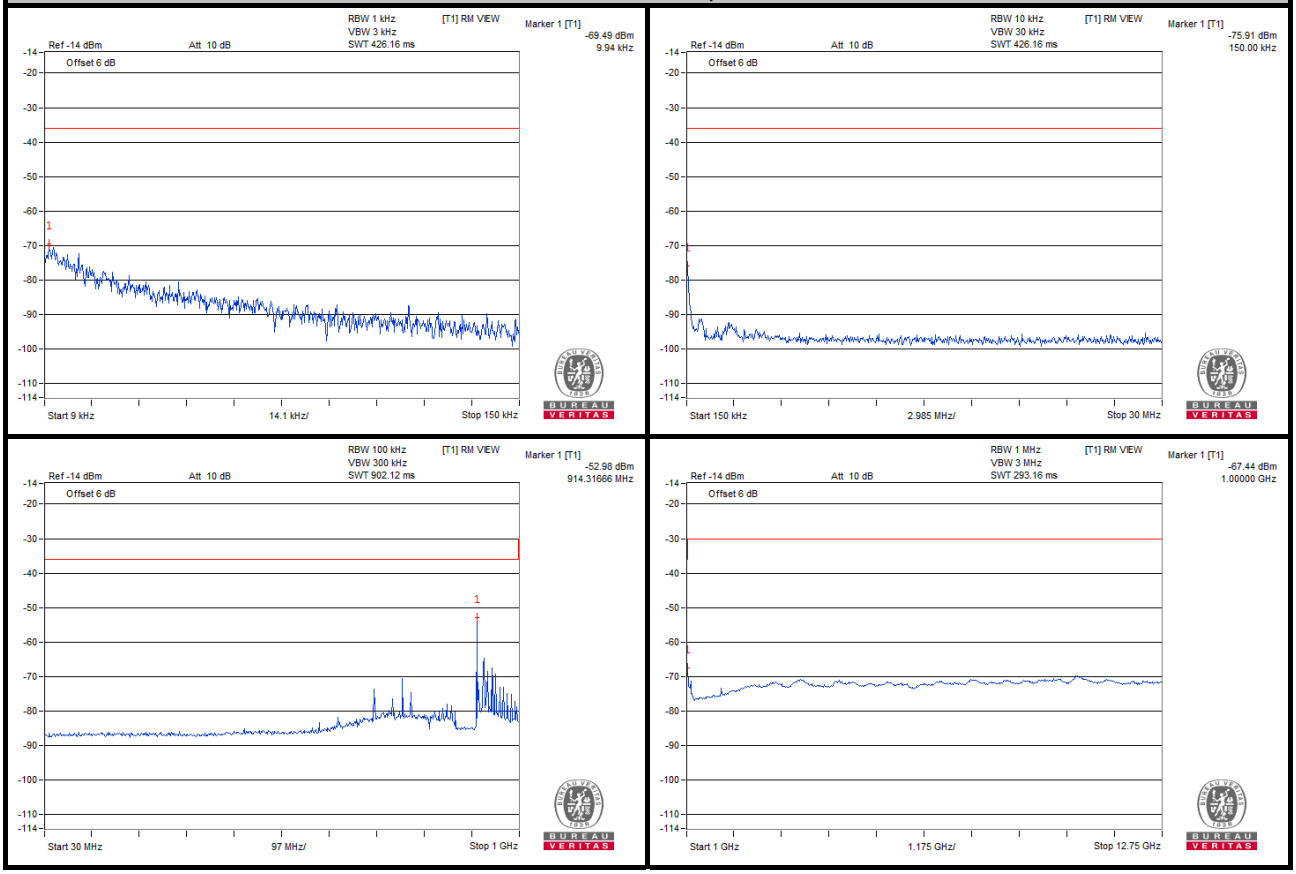


6. 相鄰頻道洩漏功率比(ACLR)

6.1 適用標準

應符合附表六之相鄰頻道洩漏功率比規範值。

附表六、LTE-M1 終端設備相鄰頻道洩漏功率比規範值

	頻道頻寬					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
E-UTRA 相鄰頻道洩漏功率限制值	29.2 dB					
相鄰頻道偏移	±1.4 MHz	±3 MHz	±5 MHz	±10 MHz	±15 MHz	±20 MHz
頻道量測頻寬	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

	UTRA					
	頻道頻寬					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
UTRA 相鄰頻道洩漏功率限制值 1	32.2 dB					
相鄰頻道中心頻率偏移 (MHz)	$0.7+BW_{UTRA}/2$ / $-0.7-BW_{UTRA}/2$	$1.5+BW_{UTRA}/2$ / $-1.5-BW_{UTRA}/2$	$2.5+BW_{UTRA}/2$ / $-2.5-BW_{UTRA}/2$	$5+BW_{UTRA}/2$ / $-5-BW_{UTRA}/2$	$7.5+BW_{UTRA}/2$ / $-7.5-BW_{UTRA}/2$	$10+BW_{UTRA}/2$ / $-10-BW_{UTRA}/2$
UTRA 相鄰頻道洩漏功率限制值 2			35.2 dB			
相鄰頻道中心頻率偏移 (MHz)			$2.5+3*BW_{UTRA}/2$ / $-2.5-3*BW_{UTRA}/2$	$5+3*BW_{UTRA}/2$ / $-5-3*BW_{UTRA}/2$	$7.5+3*BW_{UTRA}/2$ / $-7.5-3*BW_{UTRA}/2$	$10+3*BW_{UTRA}/2$ / $-10-3*BW_{UTRA}/2$
E-UTRA 頻道測量頻寬	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz
UTRA 5 MHz 頻道測量頻寬 (註一)	3.84 MHz					
UTRA 1.6 MHz 頻道測量頻寬(註二)	1.28 MHz					

註：

一、適用於在配對頻譜中與UTRA FDD 共存之E-UTRA FDD。

二、適用於在非配對頻譜中與UTRA TDD 共存之E-UTRA TDD。

三、UTRA FDD 之 BW_{UTRA} 為 5 MHz，UTRA TDD 之 BW_{UTRA} 為 1.6 MHz。

6.2 量測方法

(1) 測量檢測頻道與其相鄰通道之平均功率，計算相鄰頻道洩漏功率比。測量時，頻道之量測頻寬依附表六規定。

(2) 檢測頻道採低、中、高三個頻道，並分別對最低、5 MHz、10 MHz 及最高之工作頻寬，依附表七進行檢測。

附表七、LTE-M1 終端設備相鄰頻道洩漏功率比之頻道頻寬測試參數

	下行結構		上行結構		
頻道頻寬	調變方式	相鄰頻道洩漏功率比測試不適用	調變方式	資源區塊分配	
				FDD 及 HD-FDD	窄頻索引(註一)
低頻道、中頻道					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	0
7	3MHz		QPSK	5	0
8	3MHz		QPSK	6	0
9	3MHz		16QAM	2	0
10	3MHz		16QAM	5	0
11	5MHz		QPSK	6	0
12 (註二)	5MHz		16QAM	1	0
13	5MHz		16QAM	3	0
14	5MHz		16QAM	5	0
15 (註二)	10MHz		QPSK	4	0
16	10MHz		QPSK	6	0
17 (註二)	10MHz		16QAM	3	0
18	10MHz		16QAM	5	0
19	15MHz		QPSK	6	0
20	15MHz		16QAM	5	0
21	20MHz		16QAM	5	0
低頻道、中頻道					
1	1.4MHz		QPSK	2	0
2	1.4MHz		QPSK	5	0
3	1.4MHz		QPSK	6	0
4	1.4MHz		16QAM	2	0
5	1.4MHz		16QAM	5	0
6	3MHz		QPSK	2	1
7	3MHz		QPSK	5	1
8	3MHz		QPSK	6	1
9	3MHz		16QAM	2	1
10	3MHz		16QAM	5	1
11	5MHz		QPSK	6	3
12 (註二)	5MHz		16QAM	1	3
13	5MHz		16QAM	3	3
14	5MHz		16QAM	5	3
15 (註二)	10MHz		QPSK	4	7
16	10MHz		QPSK	6	7
17 (註二)	10MHz		16QAM	3	7
18	10MHz		16QAM	5	7
19	15MHz		QPSK	6	11
20	15MHz		16QAM	5	11
21	20MHz		16QAM	5	15

註：

一、窄頻索引(Narrowband Index)定義參考3GPP TS 36.211,5.2.4 規定。

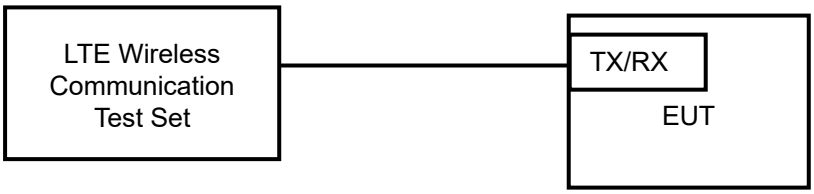
二、僅適用於Power Class 3 之用戶設備。

6.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 07, 2021	Feb. 06, 2022

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

6.4 測試配置



6.5 量測結果

LTE Band 8

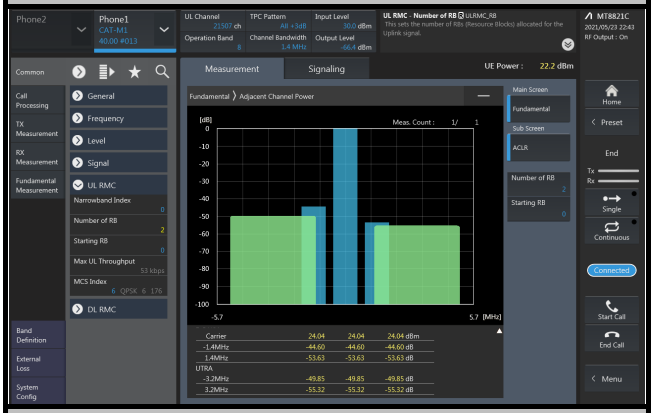
BW (MHz): 1.4									
N_{UL}	Test Configuration Intial of Power				ACLR (dB)		Limit (dB)		
	Modulation	RB Size	RB Offset	Narrowband Index	E-UTRA	UTRA1	E-UTRA	UTRA1	Pass / Fail
21507	QPSK	2	0	0	-44.60	-49.85	-29.2	-32.2	Pass
	QPSK	2	4	0	-45.62	-50.18			Pass
	QPSK	5	0	0	-41.50	-43.23			Pass
	QPSK	5	1	0	-42.17	-44.45			Pass
	QPSK	6	0	0	-41.54	-42.34			Pass
	16QAM	2	0	0	-44.42	-49.93			Pass
	16QAM	2	4	0	-45.78	-50.41			Pass
	16QAM	5	0	0	-40.32	-42.90			Pass
	16QAM	5	1	0	-41.41	-43.74			Pass
21650	QPSK	2	0	0	-44.74	-49.55			Pass
	QPSK	2	4	0	-45.60	-50.02			Pass
	QPSK	5	0	0	-41.71	-43.17			Pass
	QPSK	5	1	0	-42.19	-44.43			Pass
	QPSK	6	0	0	-41.65	-42.20			Pass
	16QAM	2	0	0	-44.35	-49.78			Pass
	16QAM	2	4	0	-45.66	-50.08			Pass
	16QAM	5	0	0	-40.49	-42.95			Pass
	16QAM	5	1	0	-41.24	-43.69			Pass
21793	QPSK	2	0	0	-44.80	-49.54			Pass
	QPSK	2	4	0	-45.66	-49.95			Pass
	QPSK	5	0	0	-41.37	-43.14			Pass
	QPSK	5	1	0	-42.09	-44.50			Pass
	QPSK	6	0	0	-41.43	-42.09			Pass
	16QAM	2	0	0	-44.47	-49.64			Pass
	16QAM	2	4	0	-45.73	-50.01			Pass
	16QAM	5	0	0	-40.20	-42.88			Pass
	16QAM	5	1	0	-40.99	-43.83			Pass

BW (MHz): 5											
N_{UL}	Test Configuration Intial of Power				ACLR (dB)			Limit (dB)			
	Modulation	RB Size	RB Offset	Narrowband Index	E-UTRA	UTRA1	UTRA 2	E-UTRA	UTRA1	UTRA 2	Pass / Fail
21525	QPSK	6	0	0	-41.74	-43.32	-73.44	-29.2	-32.2	-35.2	Pass
	16QAM	1	0	0	-50.78	-52.93	-73.38				Pass
	16QAM	1	5	0	-54.79	-56.16	-73.41				Pass
	16QAM	3	0	0	-43.95	-47.46	-73.58				Pass
	16QAM	3	3	0	-50.34	-52.99	-73.53				Pass
	16QAM	5	0	0	-41.03	-43.73	-73.62				Pass
	16QAM	5	1	0	-42.75	-45.49	-73.58				Pass
21650	QPSK	6	0	0	-41.57	-43.13	-73.46				Pass
	16QAM	1	0	0	-51.33	-53.51	-73.43				Pass
	16QAM	1	5	0	-54.83	-56.22	-73.45				Pass
	16QAM	3	0	0	-44.07	-47.65	-73.47				Pass
	16QAM	3	3	0	-50.42	-53.02	-73.51				Pass
	16QAM	5	0	0	-41.10	-43.78	-73.72				Pass
	16QAM	5	1	0	-42.68	-45.34	-73.88				Pass
21775	QPSK	6	0	3	-42.37	-44.34	-73.39				Pass
	16QAM	1	0	3	-53.69	-55.18	-73.34				Pass
	16QAM	1	5	3	-50.90	-52.67	-73.11				Pass
	16QAM	3	0	3	-49.99	-52.40	-73.49				Pass
	16QAM	3	3	3	-45.06	-48.13	-73.31				Pass
	16QAM	5	0	3	-43.87	-46.56	-73.63				Pass
	16QAM	5	1	3	-42.07	-44.89	-73.56				Pass

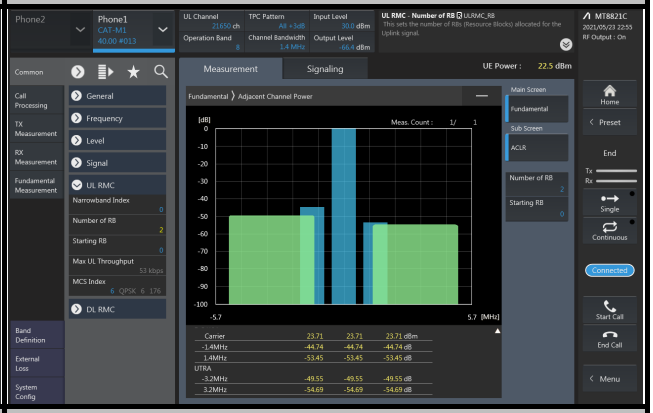
BW (MHz): 10											
N_{UL}	Test Configuration Intial of Power				ACLR (dB)			Limit (dB)			
	Modulation	RB Size	RB Offset	Narrowband Index	E-UTRA	UTRA1	UTRA 2	E-UTRA	UTRA1	UTRA 2	Pass / Fail
21550	QPSK	4	0	0	-48.61	-49.03	-73.59	-29.2	-32.2	-35.2	Pass
	QPSK	4	2	0	-51.65	-51.99	-73.61				Pass
	QPSK	6	0	0	-46.01	-46.11	-73.58				Pass
	16QAM	3	0	0	-51.46	-51.68	-73.73				Pass
	16QAM	3	3	0	-55.68	-55.87	-73.63				Pass
	16QAM	5	0	0	-47.28	-47.63	-73.72				Pass
	16QAM	5	1	0	-48.55	-49.04	-73.62				Pass
21650	QPSK	4	0	0	-48.59	-49.09	-73.47				Pass
	QPSK	4	2	0	-51.73	-52.04	-73.49				Pass
	QPSK	6	0	0	-45.92	-46.01	-73.56				Pass
	16QAM	3	0	0	-51.50	-51.78	-73.79				Pass
	16QAM	3	3	0	-55.51	-55.70	-73.70				Pass
	16QAM	5	0	0	-46.97	-47.35	-73.72				Pass
	16QAM	5	1	0	-48.49	-48.97	-73.70				Pass
21750	QPSK	4	0	7	-52.30	-52.54	-73.46				Pass
	QPSK	4	2	7	-49.36	-49.83	-73.45				Pass
	QPSK	6	0	7	-47.26	-47.31	-73.64				Pass
	16QAM	3	0	7	-54.79	-55.01	-73.54				Pass
	16QAM	3	3	7	-51.25	-51.60	-73.58				Pass
	16QAM	5	0	7	-48.91	-49.27	-73.84				Pass
	16QAM	5	1	7	-47.94	-48.24	-73.71				Pass

Bandwidth: 1.4 MHz / QPSK (2 RB / 0 RB Offset, Index 0)

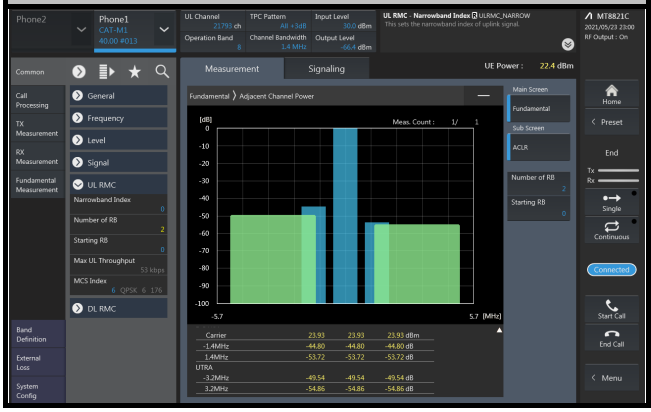
Ch21507



Ch21650

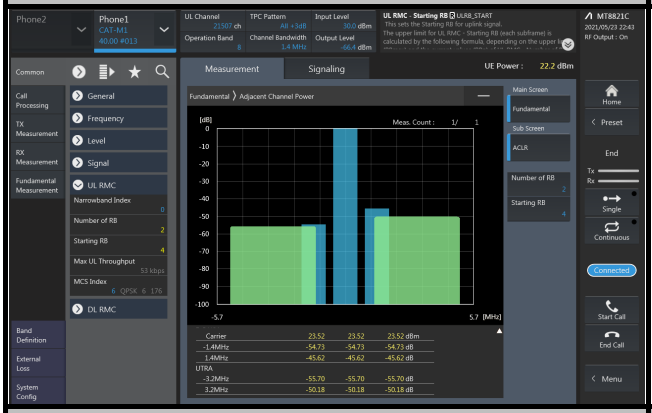


Ch21793

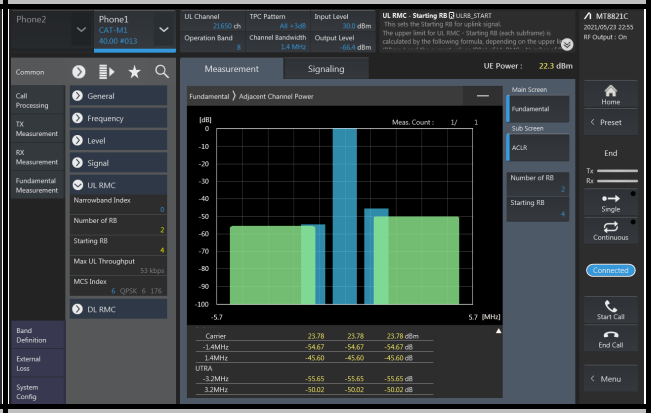


Bandwidth: 1.4 MHz / QPSK (2 RB / 4 RB Offset, Index 0)

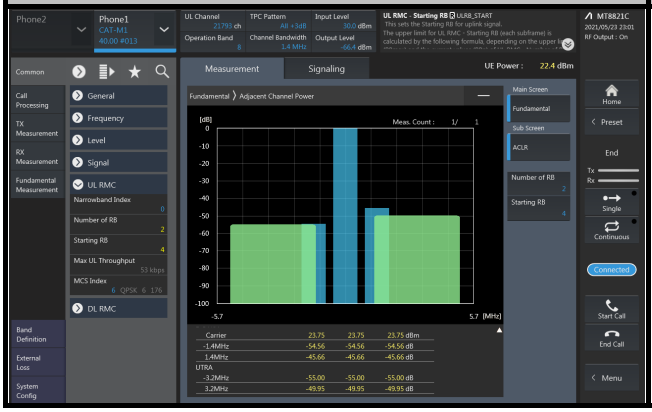
Ch21507



Ch21650

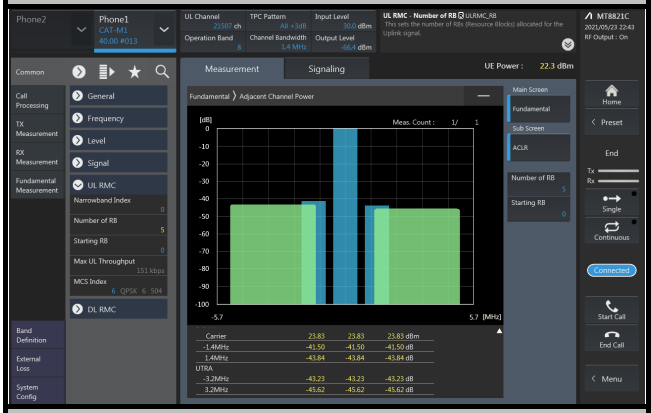


Ch21793

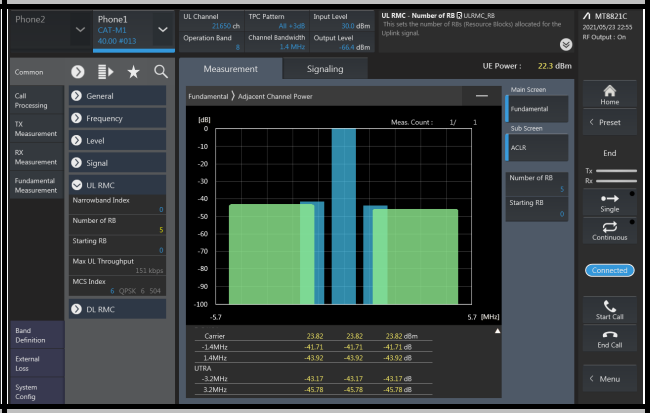


Bandwidth: 1.4 MHz / QPSK (5 RB / 0 RB Offset, Index 0)

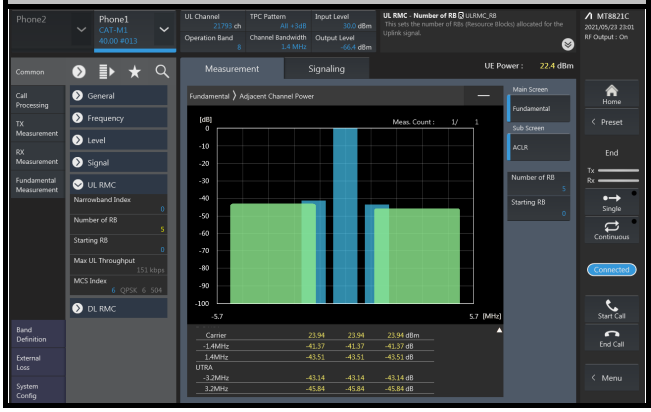
Ch21507



Ch21650

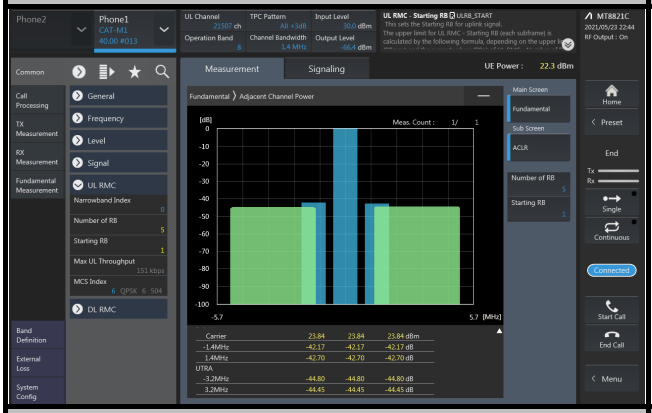


Ch21793

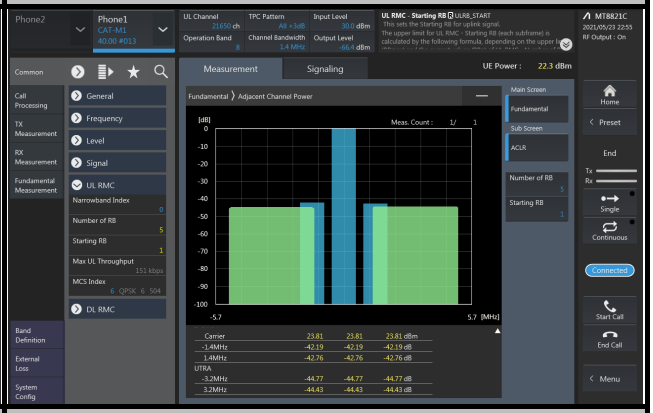


Bandwidth: 1.4 MHz / QPSK (5 RB / 1 RB Offset, Index 0)

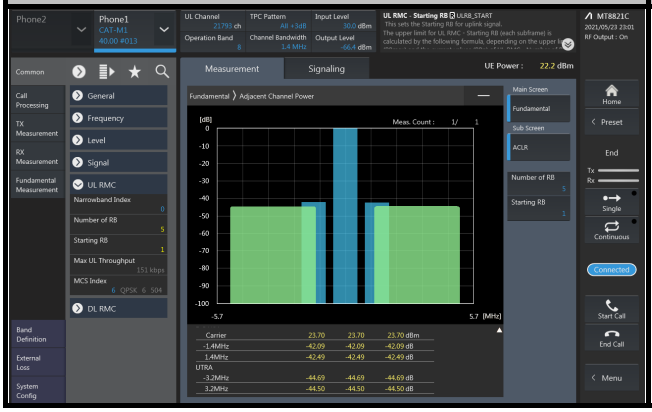
Ch21507



Ch21650

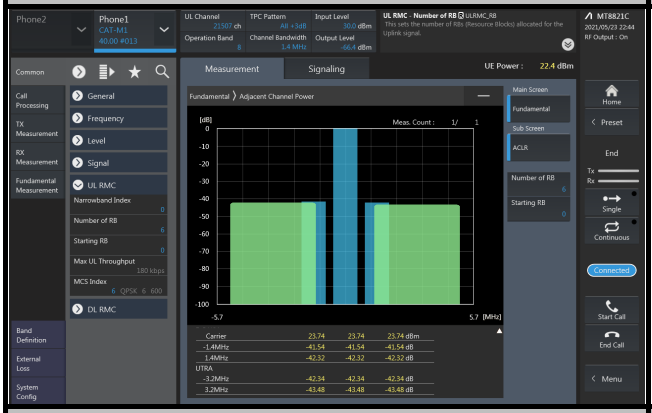


Ch21793

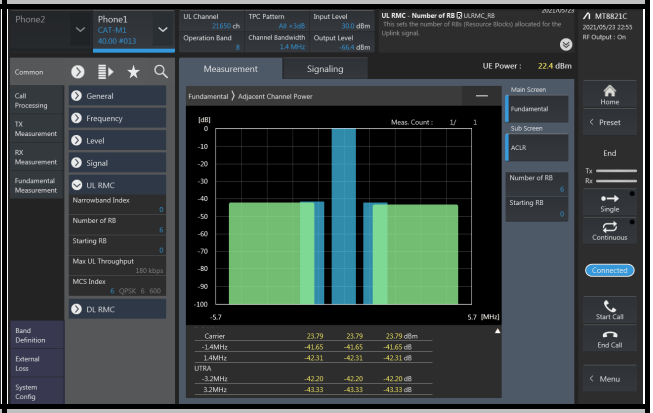


Bandwidth: 1.4 MHz / QPSK (6 RB / 0 RB Offset, Index 0)

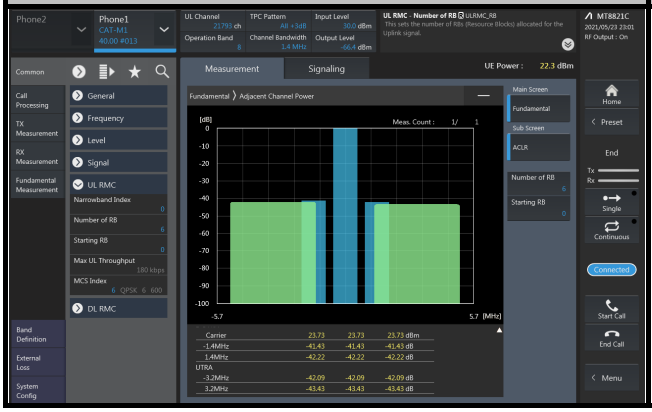
Ch21507



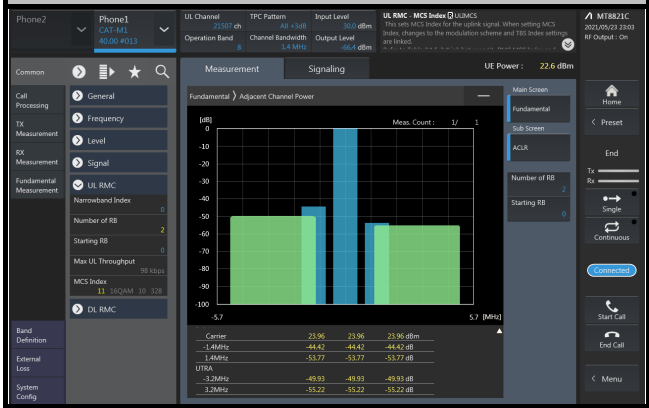
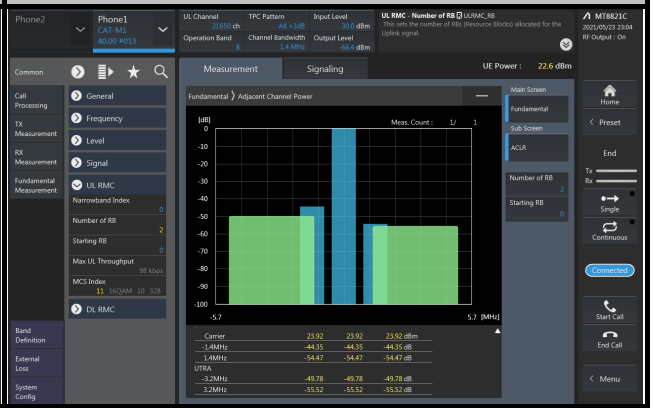
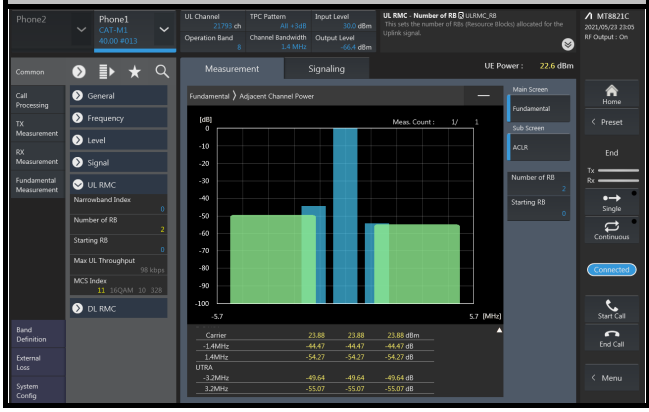
Ch21650



Ch21793

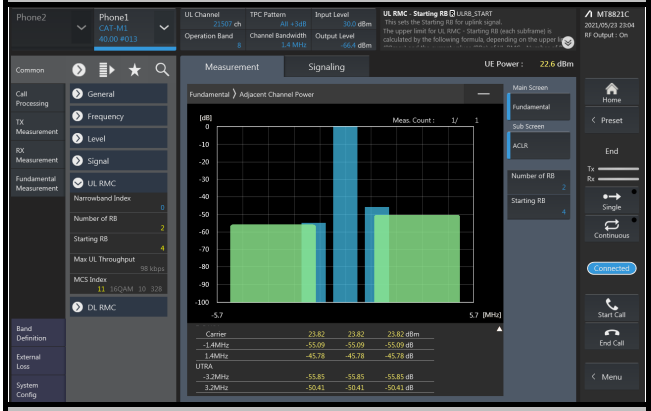


Bandwidth: 1.4 MHz / 16QAM (2 RB / 0 RB Offset, Index 0)

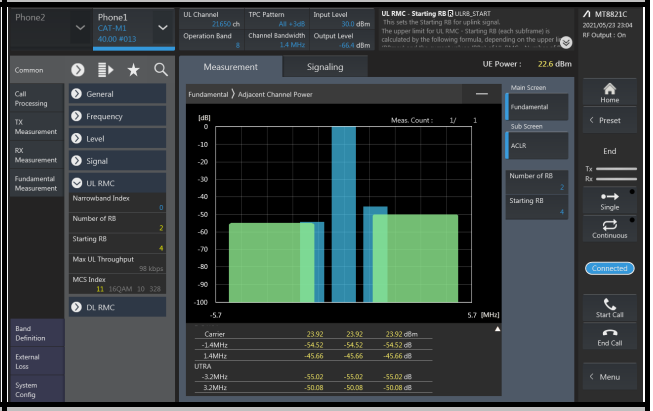
Ch21507	Ch21650
	
Ch21793	
	

Bandwidth: 1.4 MHz / 16QAM (2 RB / 4 RB Offset, Index 0)

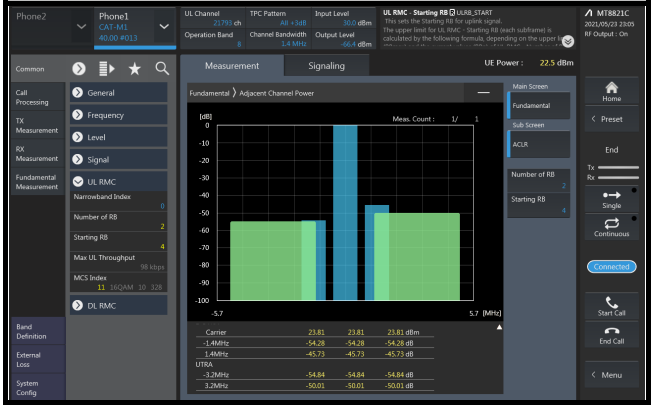
Ch21507



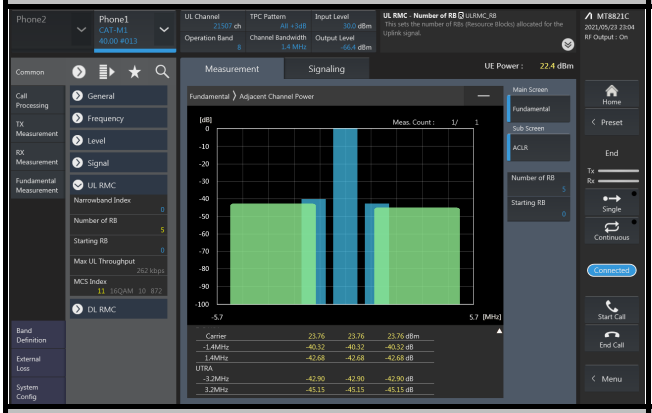
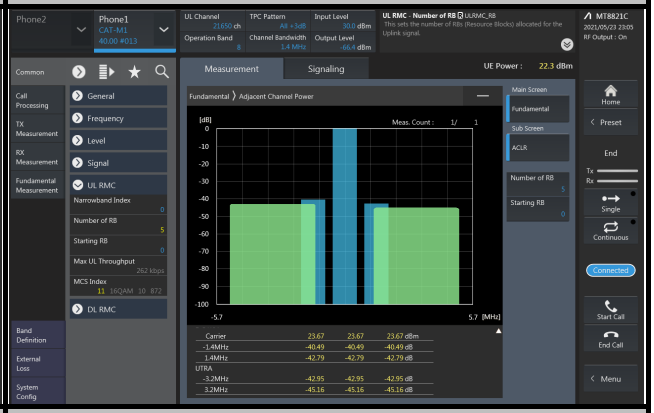
Ch21650



Ch21793



Bandwidth: 1.4 MHz / 16QAM (5 RB / 0 RB Offset, Index 0)

Ch21507	Ch21650
	
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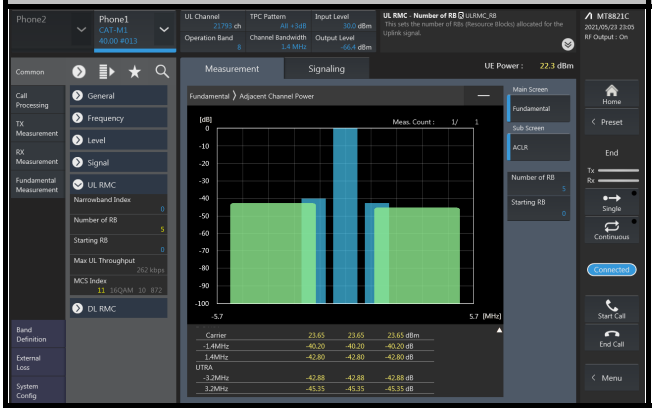
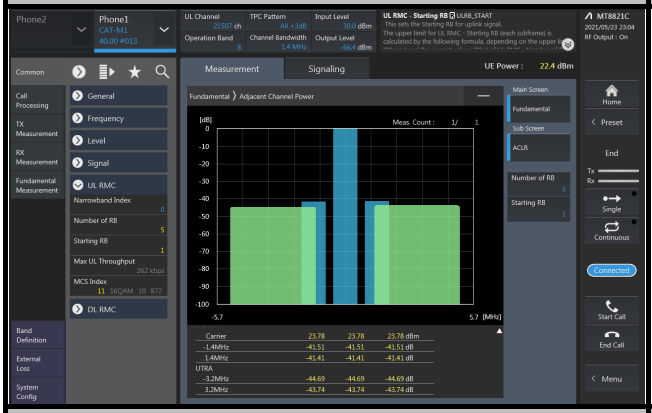
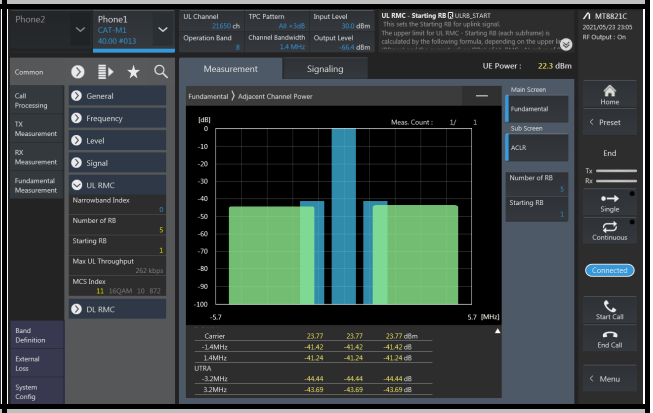
	

Bandwidth: 1.4 MHz / 16QAM (5 RB / 1 RB Offset, Index 0)

Ch21507	Ch21650
	
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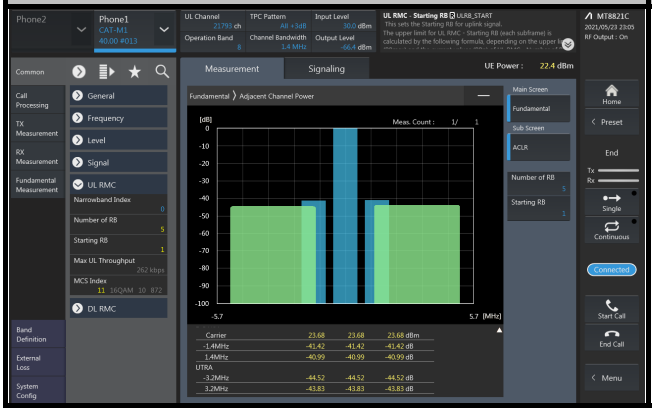
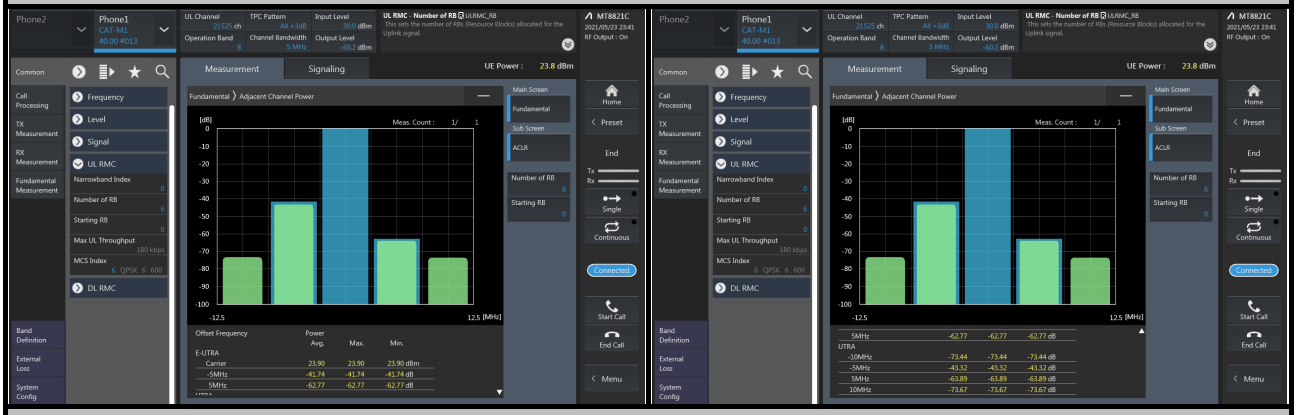
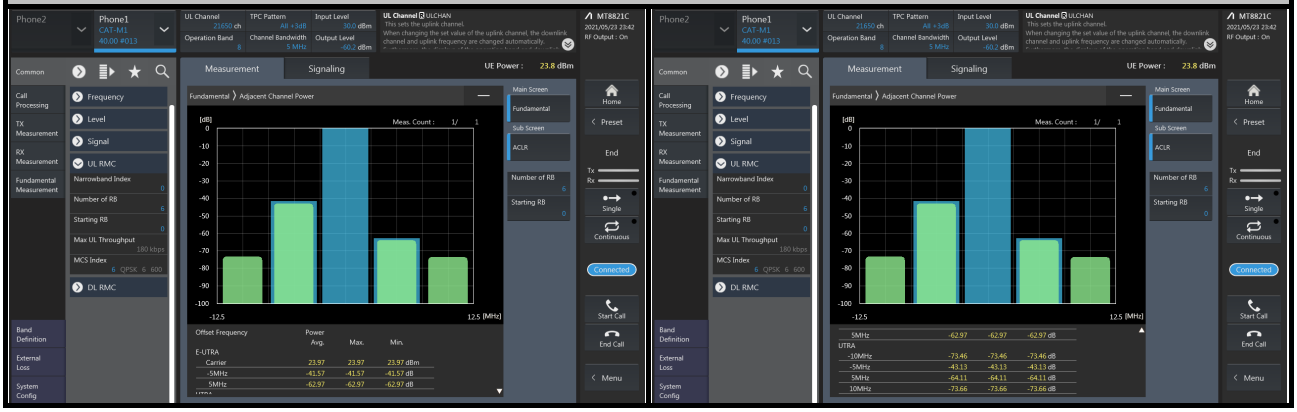
	

Bandwidth: 5 MHz / QPSK (6 RB / 0 RB Offset, Index 0)

Ch21525



Ch21650

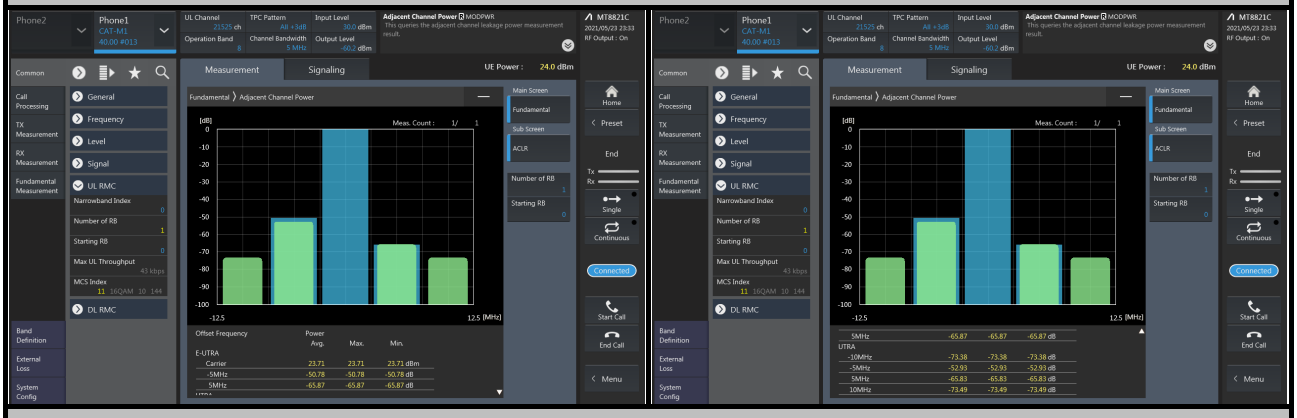


Bandwidth: 5 MHz / QPSK (6 RB / 0 RB Offset, Index 3)

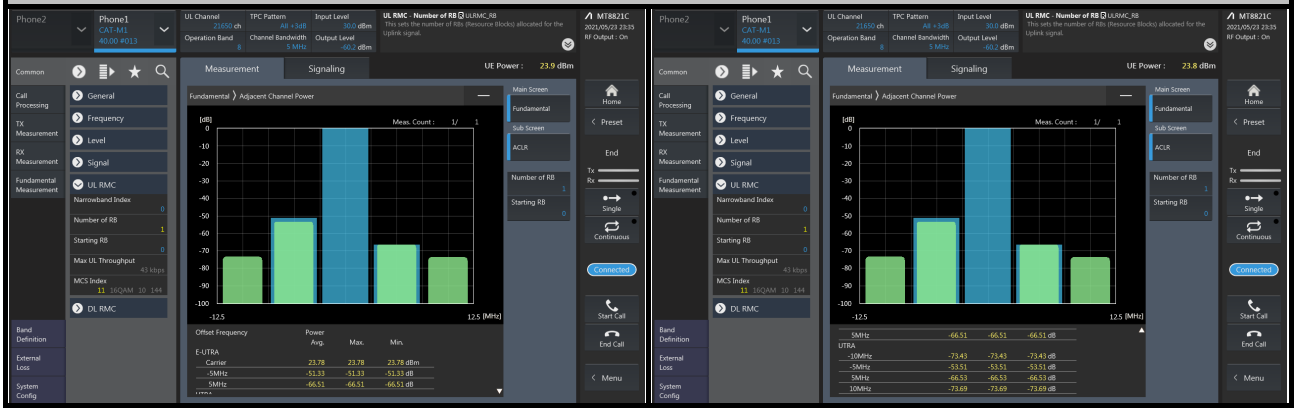
Ch21775

Bandwidth: 5 MHz / 16QAM (1 RB / 0 RB Offset, Index 0)

Ch21525



Ch21650

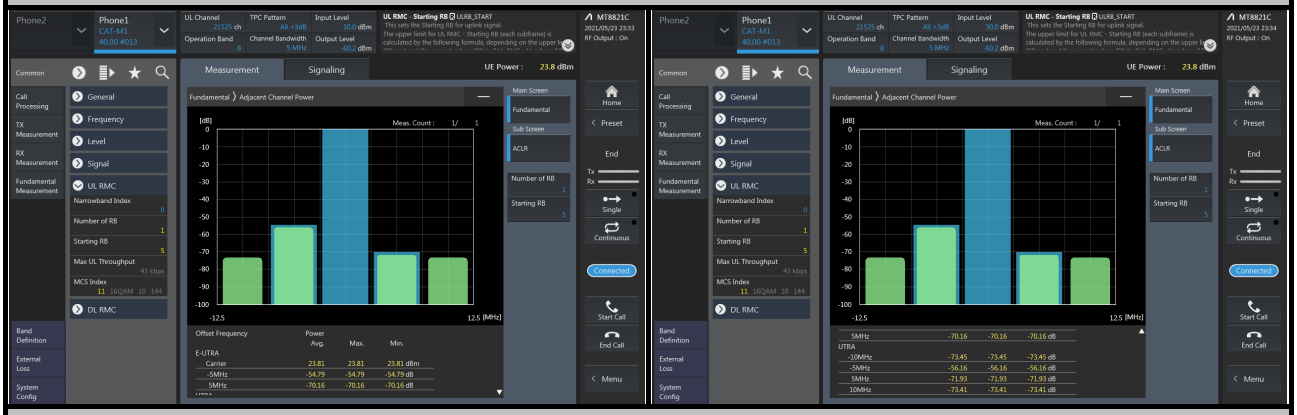


Bandwidth: 5 MHz / 16QAM (1 RB / 0 RB Offset, Index 3)

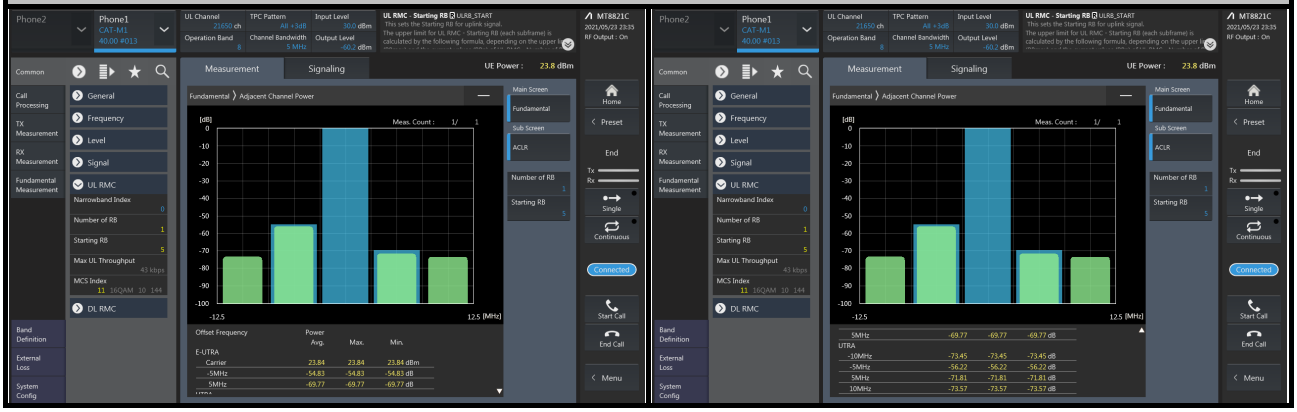
Ch21775

Bandwidth: 5 MHz / 16QAM (1 RB / 5 RB Offset, Index 0)

Ch21525



Ch21650

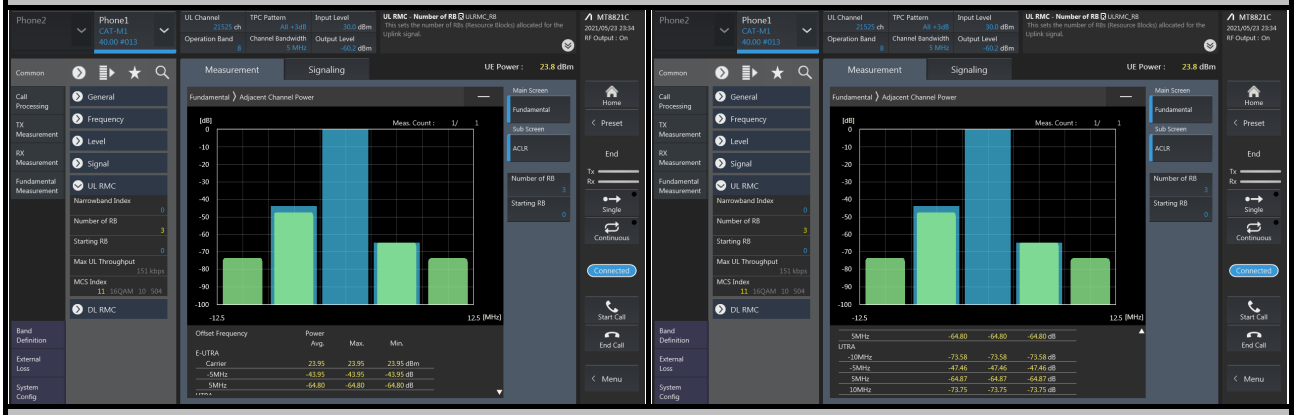


Bandwidth: 5 MHz / 16QAM (1 RB / 5 RB Offset, Index 3)

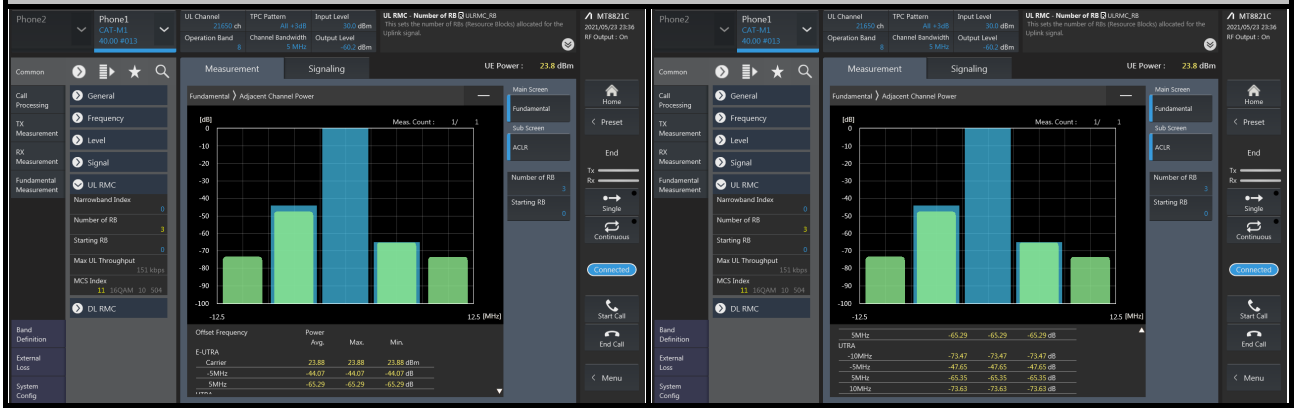
Ch21775

Bandwidth: 5 MHz / 16QAM (3 RB / 0 RB Offset, Index 0)

Ch21525



Ch21650

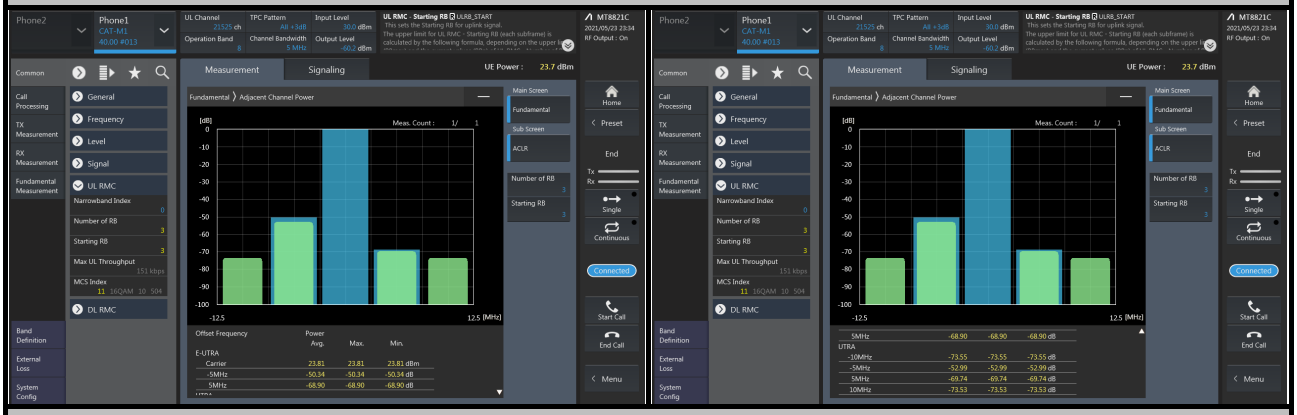


Bandwidth: 5 MHz / 16QAM (3 RB / 0 RB Offset, Index 3)

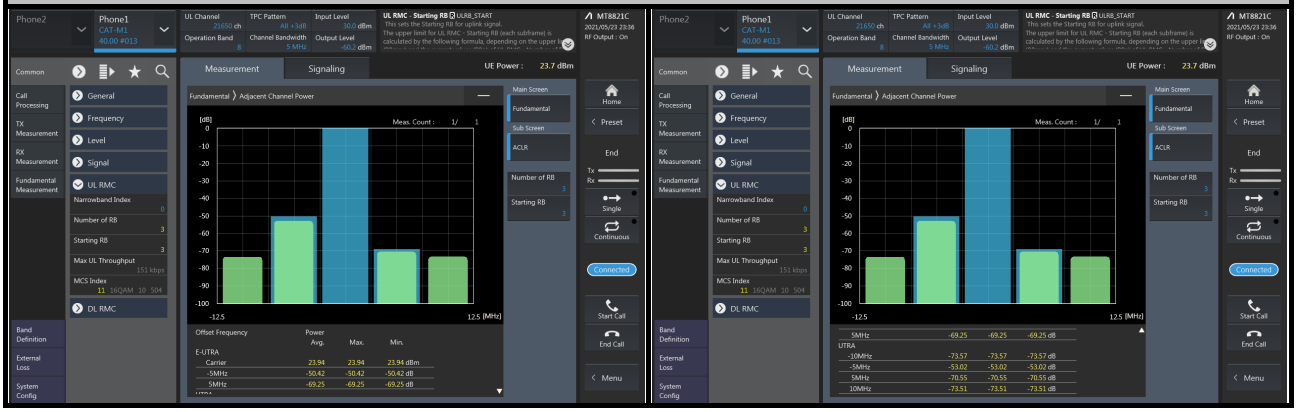
Ch21775

Bandwidth: 5 MHz / 16QAM (3 RB / 3 RB Offset, Index 0)

Ch21525



Ch21650

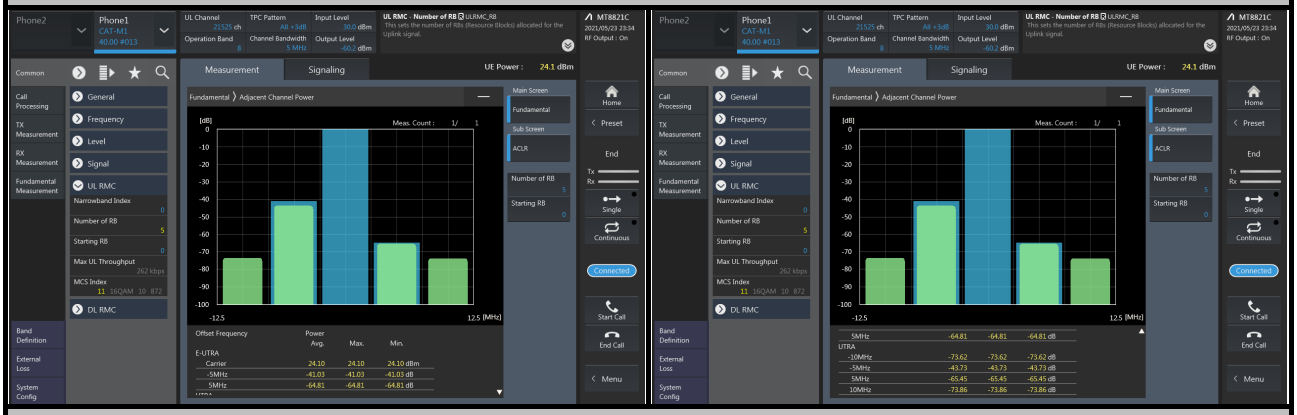


Bandwidth: 5 MHz / 16QAM (3 RB / 3 RB Offset, Index 3)

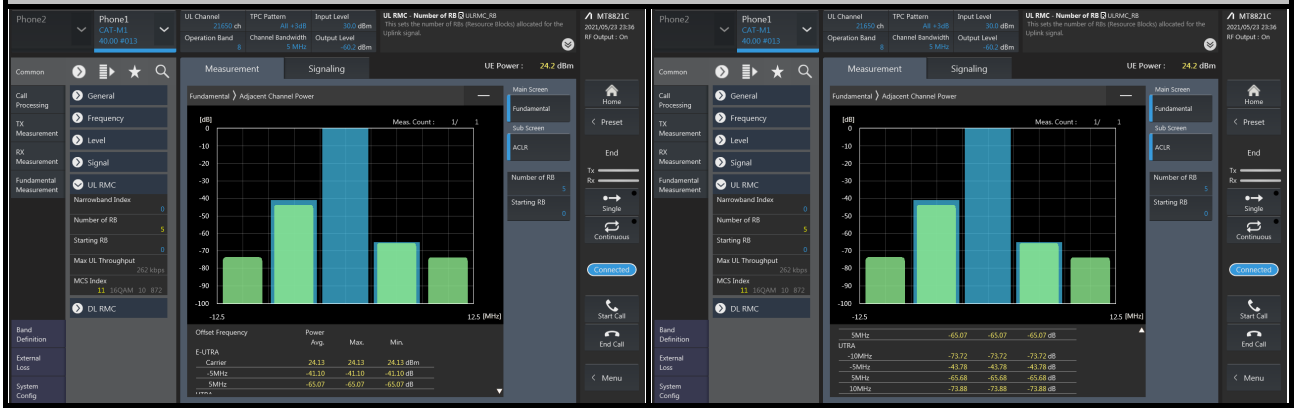
Ch21775

Bandwidth: 5 MHz / 16QAM (5 RB / 0 RB Offset, Index 0)

Ch21525



Ch21650

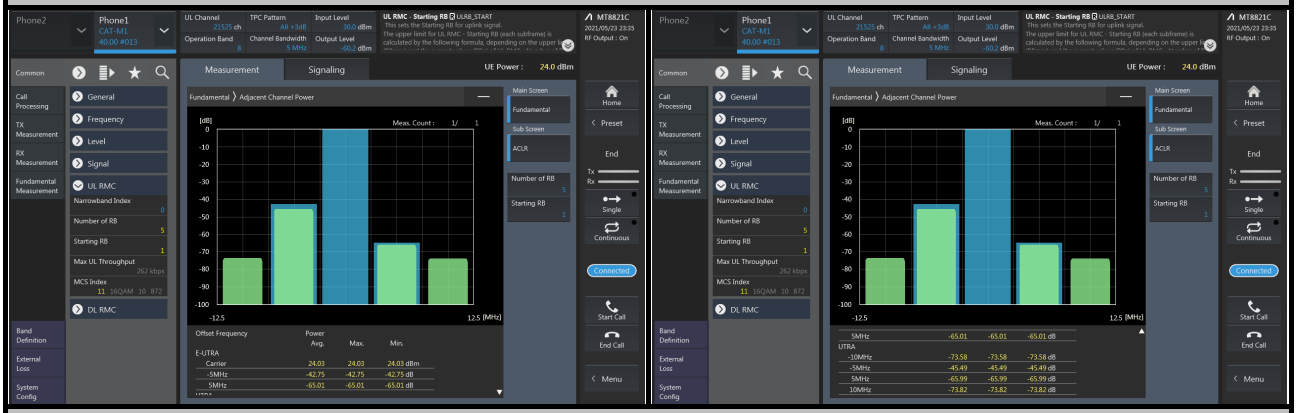


Bandwidth: 5 MHz / 16QAM (5 RB / 0 RB Offset, Index 3)

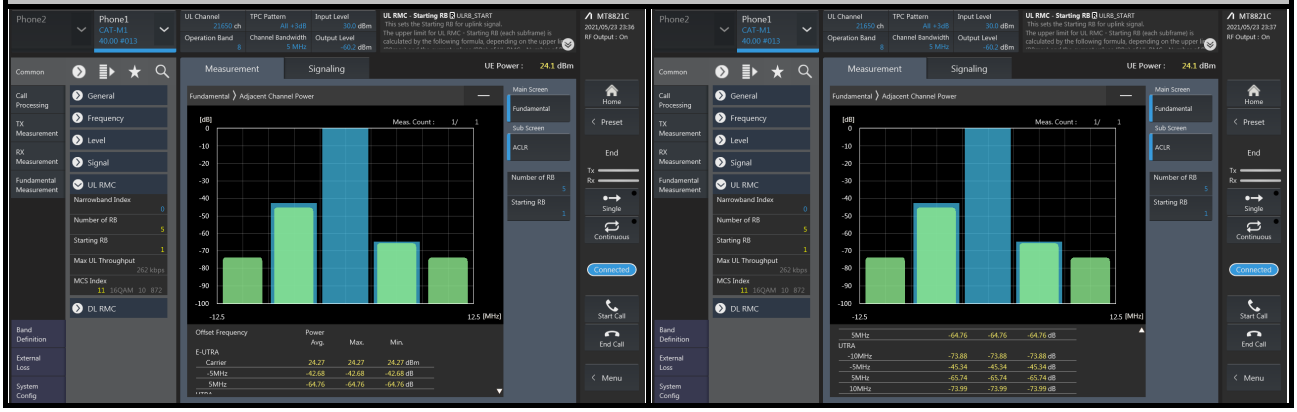
Ch21775

Bandwidth: 5 MHz / 16QAM (5 RB / 1 RB Offset, Index 0)

Ch21525



Ch21650

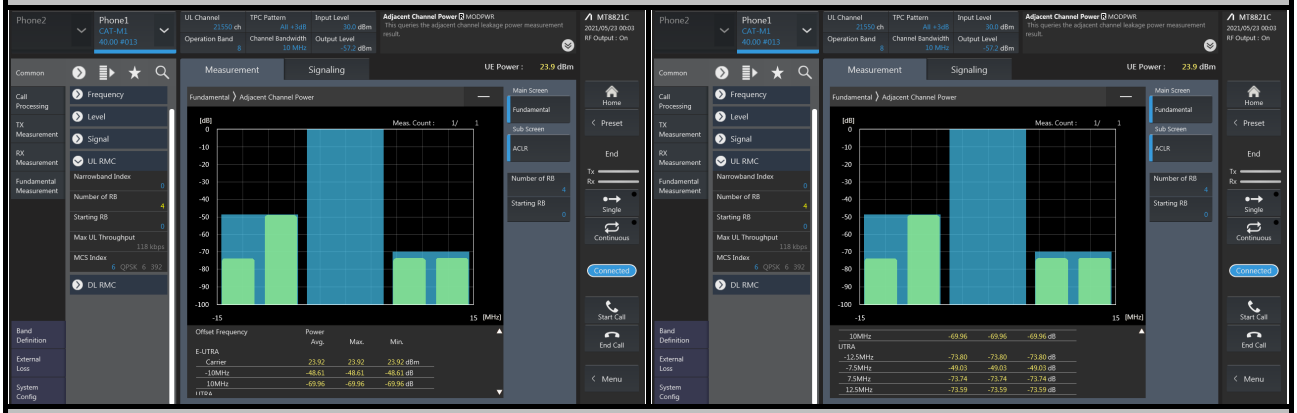


Bandwidth: 5 MHz / 16QAM (5 RB / 1 RB Offset, Index 3)

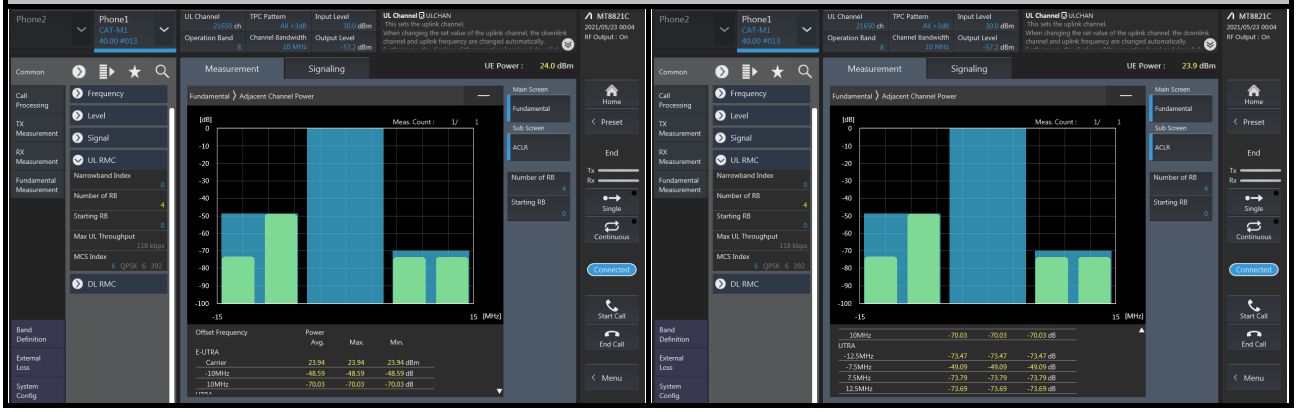
Ch21775

Bandwidth: 10 MHz / QPSK (4 RB / 0 RB Offset, Index 0)

Ch21550



Ch21650

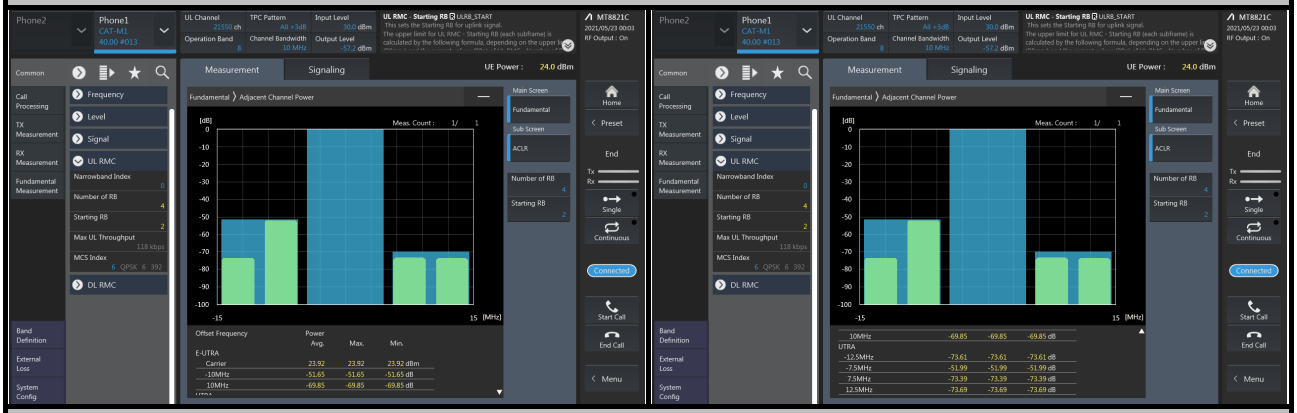


Bandwidth: 10 MHz / QPSK (4 RB / 0 RB Offset, Index 7)

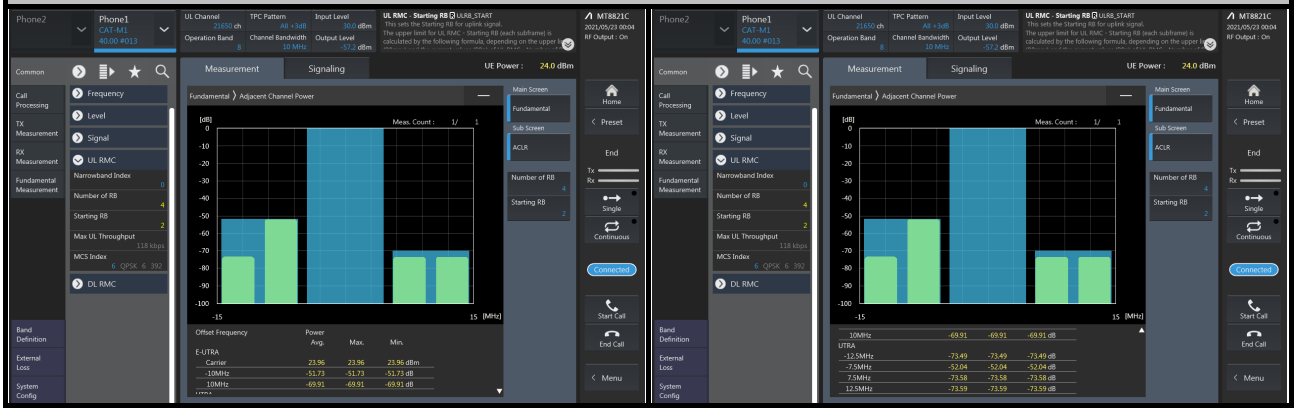
Ch21750

Bandwidth: 10 MHz / QPSK (4 RB / 2 RB Offset, Index 0)

Ch21550



Ch21650

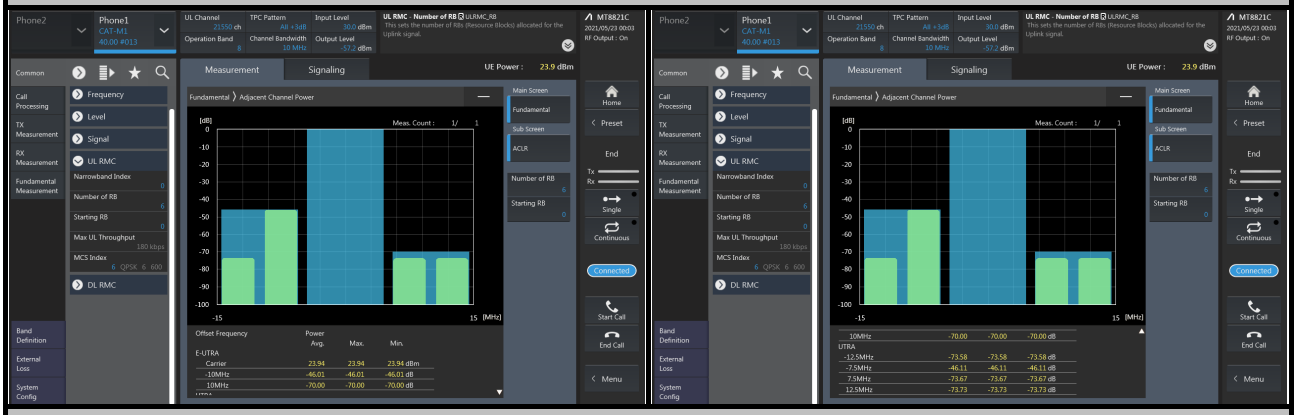


Bandwidth: 10 MHz / QPSK (4 RB / 2 RB Offset, Index 7)

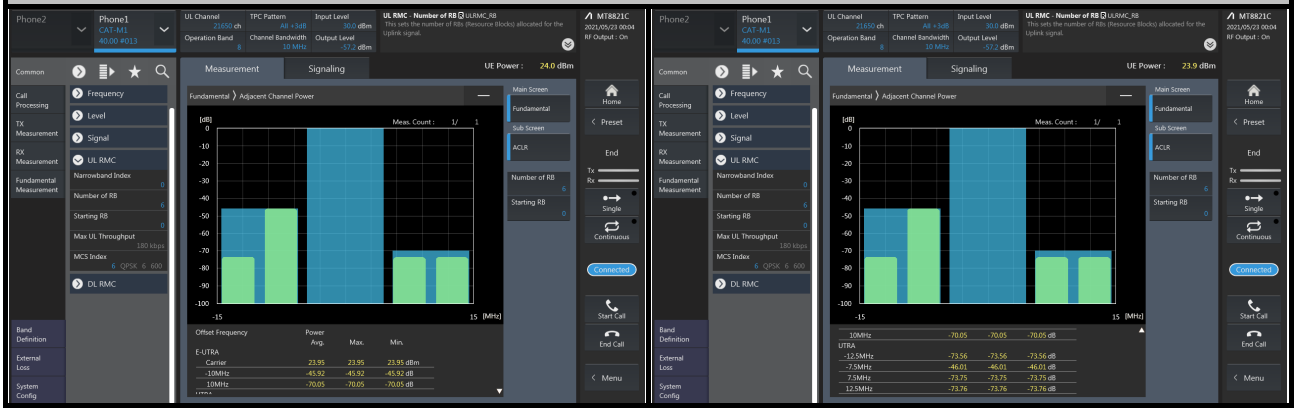
Ch21750

Bandwidth: 10 MHz / QPSK (6 RB / 0 RB Offset, Index 0)

Ch21550



Ch21650

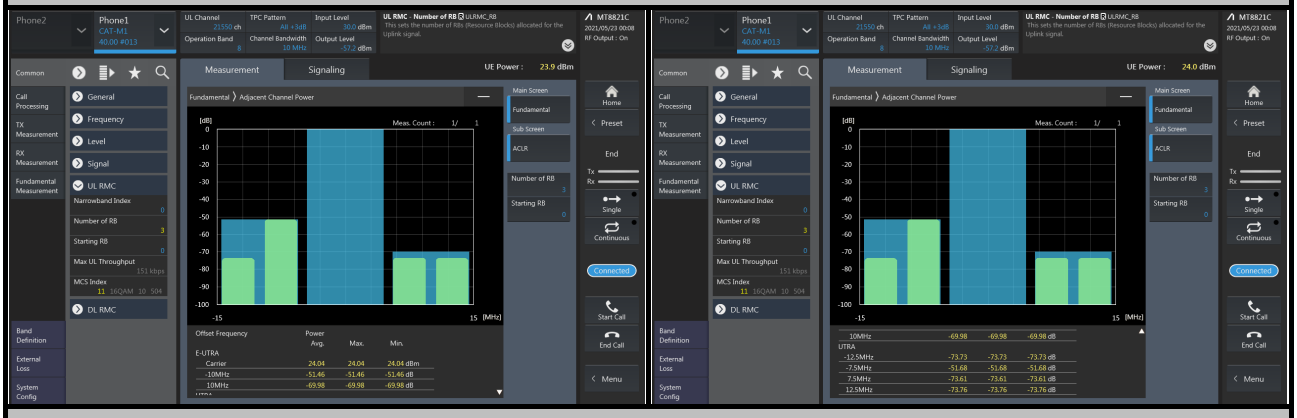


Bandwidth: 10 MHz / QPSK (6 RB / 0 RB Offset, Index 7)

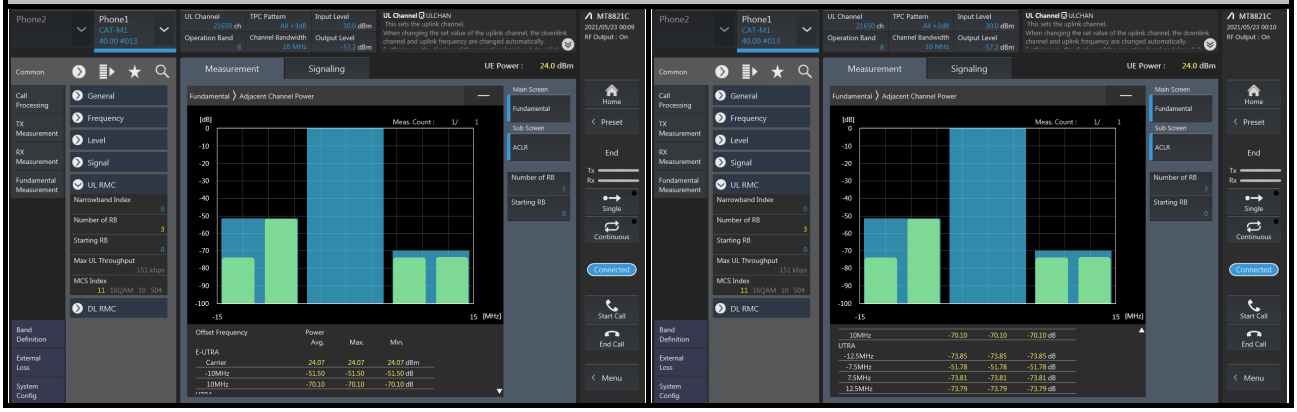
Ch21750

Bandwidth: 10 MHz / 16QAM (3 RB / 0 RB Offset, Index 0)

Ch21550



Ch21650

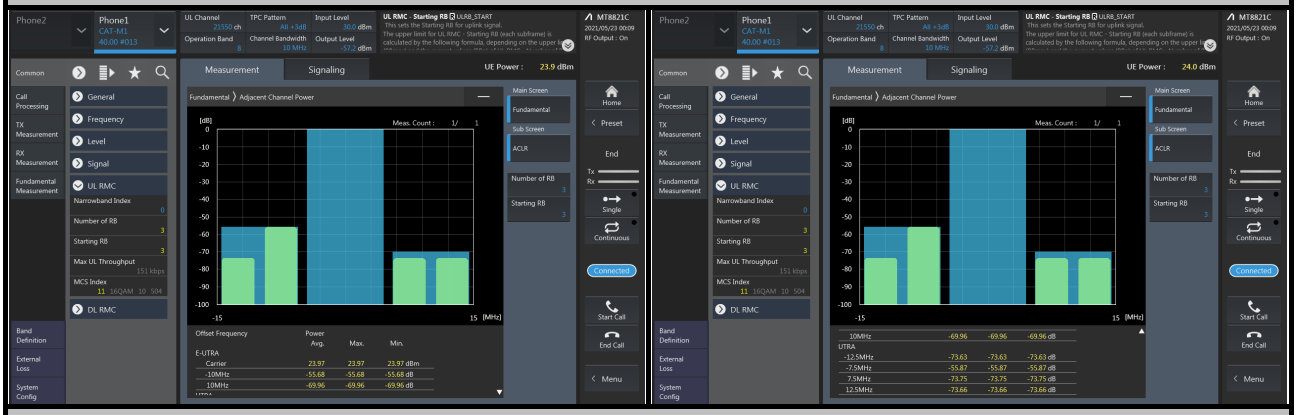


Bandwidth: 10 MHz / 16QAM (3 RB / 0 RB Offset, Index 7)

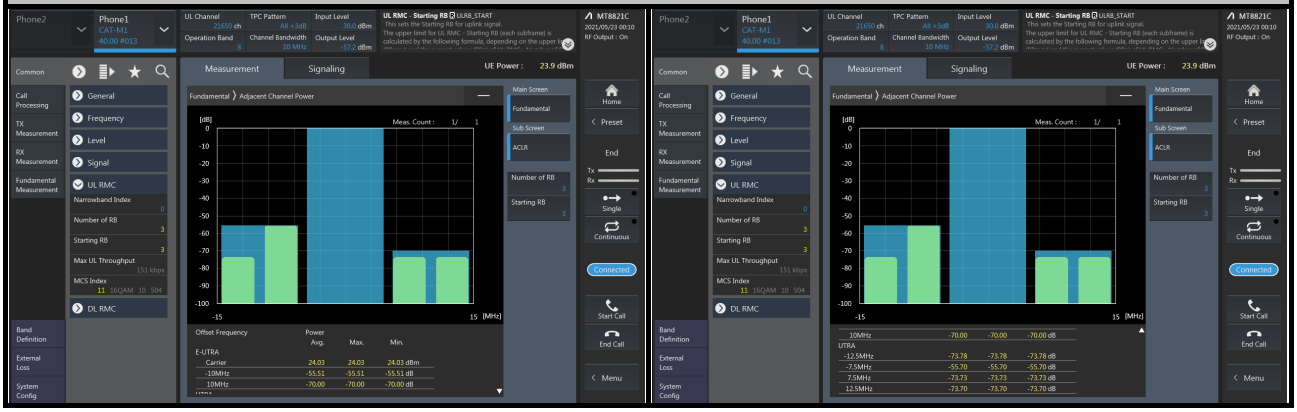
Ch21750

Bandwidth: 10 MHz / 16QAM (3 RB / 3 RB Offset, Index 0)

Ch21550



Ch21650

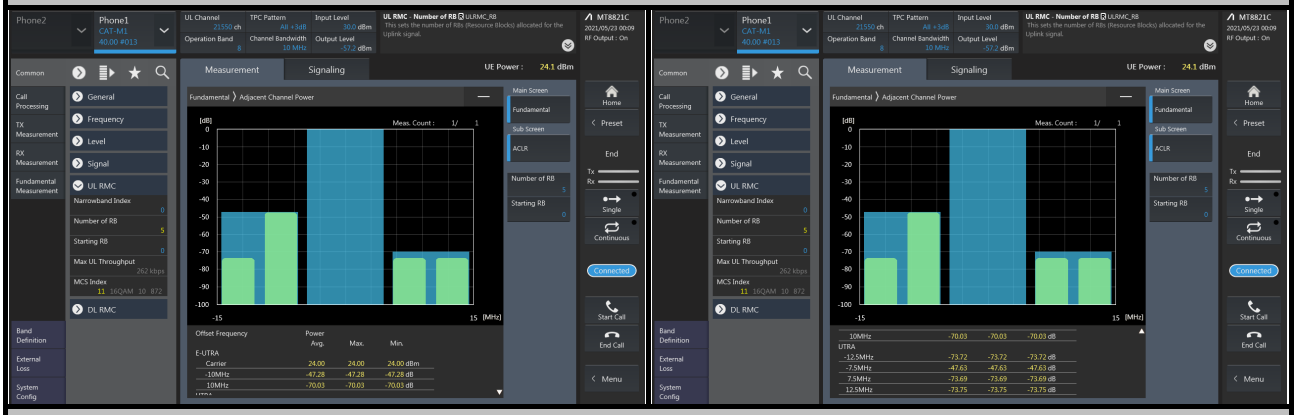


Bandwidth: 10 MHz / 16QAM (3 RB / 3 RB Offset, Index 7)

Ch21750

Bandwidth: 10 MHz / 16QAM (5 RB / 0 RB Offset, Index 0)

Ch21550



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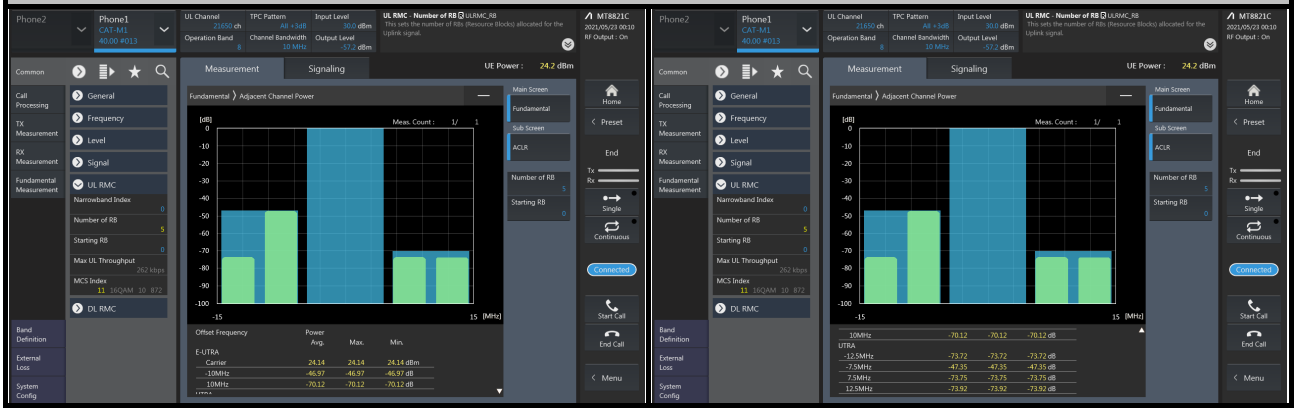
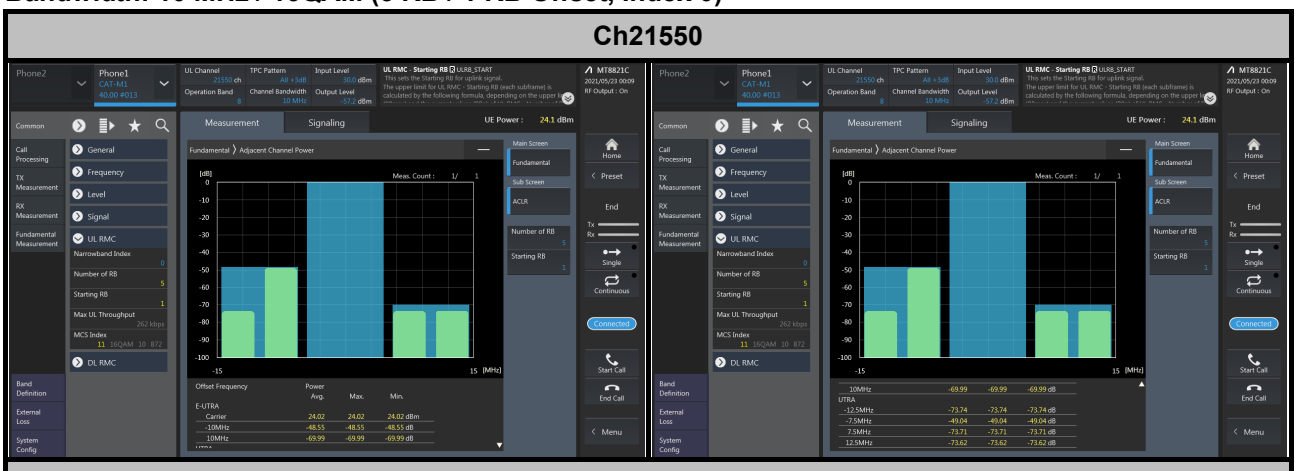


Bandwidth: 10 MHz / 16QAM (5 RB / 0 RB Offset, Index 7)

Ch21750

Bandwidth: 10 MHz / 16QAM (5 RB / 1 RB Offset, Index 0)

Ch21550



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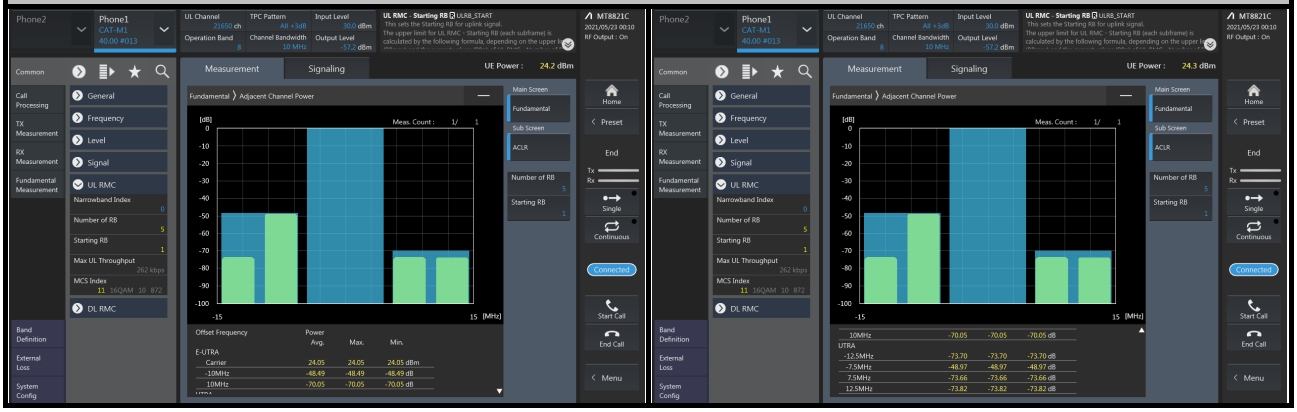


Bandwidth: 10 MHz / 16QAM (5 RB / 1 RB Offset, Index 7)

Ch21750

7. 非資源區塊帶內發射

7.1 適用標準

應符合附表八之非資源區塊帶內發射規範值。

附表八、LTE-M1 終端設備未分配資源區塊帶內幅射規範值

參數描述	單位	未分配資源區塊帶內幅射規範值		適用頻率
一般	dB	max{−25−10・$\log_{10}$（N_{RB}/L_{CRB}），20・$\log_{10}$EVM−3−5・（｜Δ_{RB}｜−1）/ L_{CRB}，＋0.8-57dBm/180kHz-P_{RB}}		所有未分配的頻率
IQ 鏡像	dB	-27.2	鏡像頻率當載波中心頻率＜1 GHz 且輸出功率＞10 dBm	鏡像頻率
		-24.2	鏡像頻率當載波中心頻率＜1 GHz 且輸出功率≦10 dBm	
		-24.2	鏡像頻率當載波中心頻率≧1 GHz	
載波洩漏	dB	-27.2	輸出功率＞10 dBm 且載波中心頻率＜1 GHz	鏡像頻率
		-24.2	輸出功率＞10 dBm 且載波中心頻率≧1 GHz	
		-24.2	0 dBm≦輸出功率≦10 dBm	
		-19.2	-30 dBm≦輸出功率≦0 dBm	
		-9.2	-40 dBm≦輸出功率＜-30 dBm	

註：
一、RB offset 設定值及應檢項目之測試方法，參考3GPP TS 36.521-1 技術標準規定。
二、附表八參數定義參考 3GPP TS 36.521-1, Table 6.5.2.3EA.5-1。

7.2 量測方法

對5 MHz之工作頻寬，依附表九進行檢測。

附表九、LTE-M1 終端設備未分配資源區塊帶內幅射之頻道頻寬測試參數

	下行結構				上行結構			
PUSCH								
頻道頻寬	未分配資源區塊帶內幅射不適用				調變方式	資源區塊分配		
						FDD 及 HD-FDD	TDD	窄頻索引 (註)
5 MHz					QPSK	1	1	0
PUCCH								
頻道頻寬	調變方式	資源區塊分配			FDD：PUCCH format=Format 1a TDD：PUCCH format=Format 1a/1b			
		FDD	TDD	窄頻索引				
5 MHz	QPSK	4@0	4@0	0				

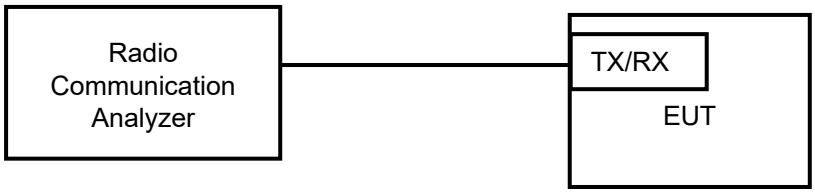
註：窄頻索引(Narrowband Index)定義參考 3GPP TS 36.211,5.2.4 規定。

7.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 07, 2021	Feb. 06, 2022

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.4 測試配置

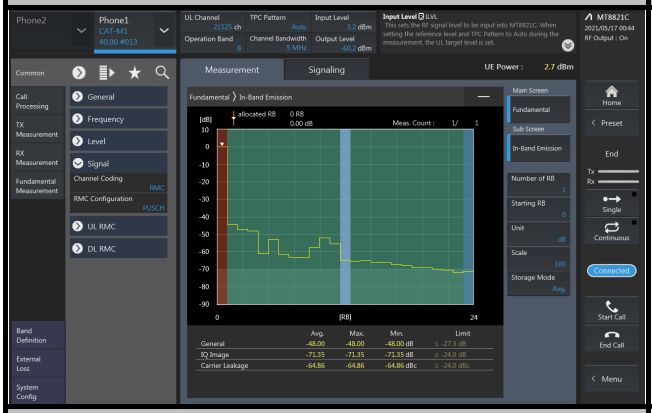
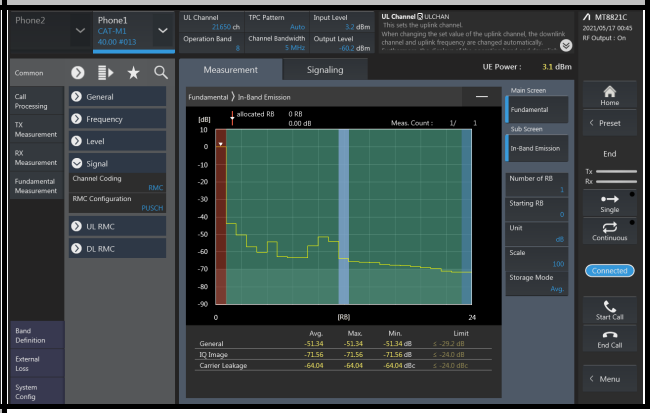


7.5 量測結果

LTE Band 8

PUSCH

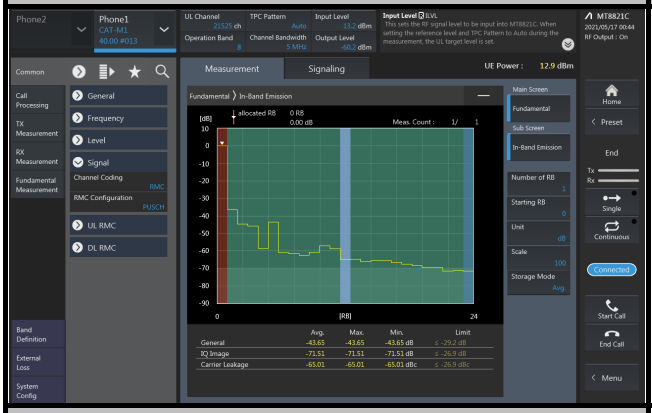
Bandwidth: 5 MHz / QPSK (1@0, Index 0) / 3.2 dBm

Ch21525	Ch21650
	

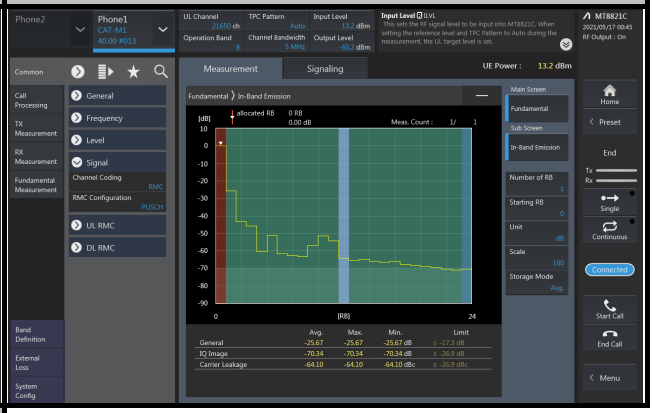
Ch21775

Bandwidth: 5 MHz / QPSK (1@0, Index 0) / 13.2 dBm

Ch21525



Ch21650



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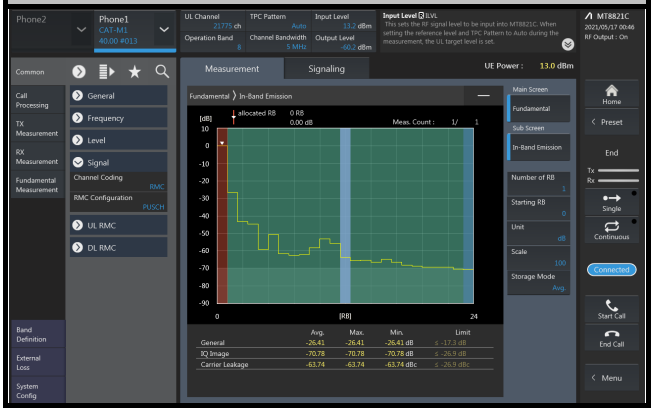
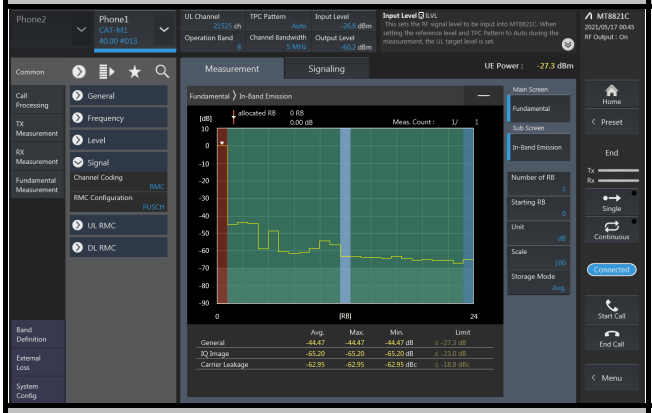
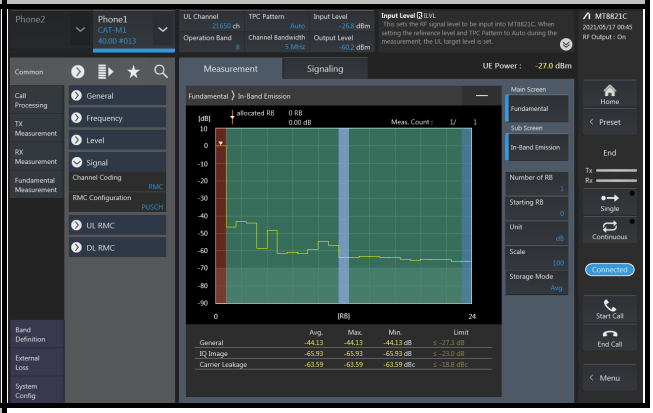


Bandwidth: 5 MHz / QPSK (1@0, Index 0) / -26.8 dBm

Ch21525



Ch21650



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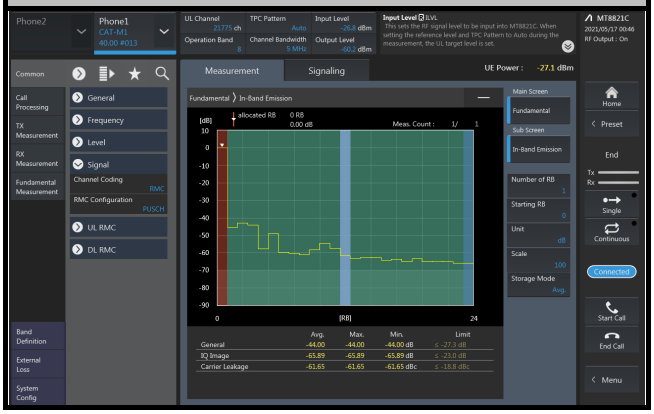
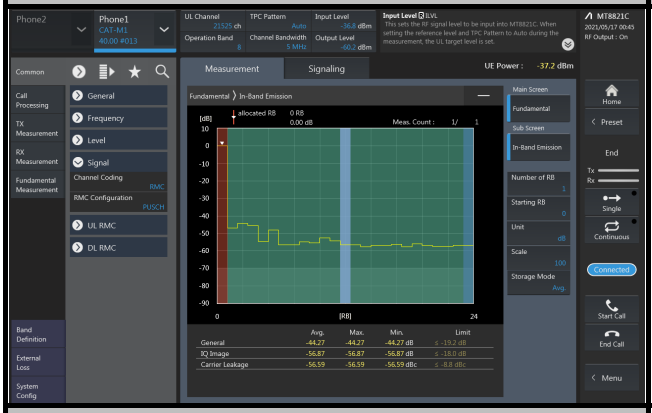
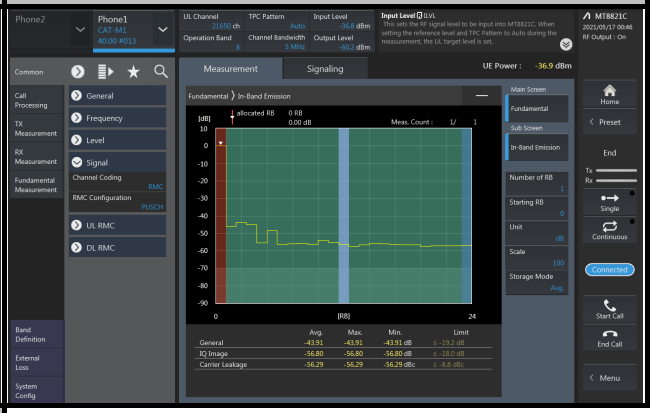


Bandwidth: 5 MHz / QPSK (1@0, Index 0) / -36.8 dBm

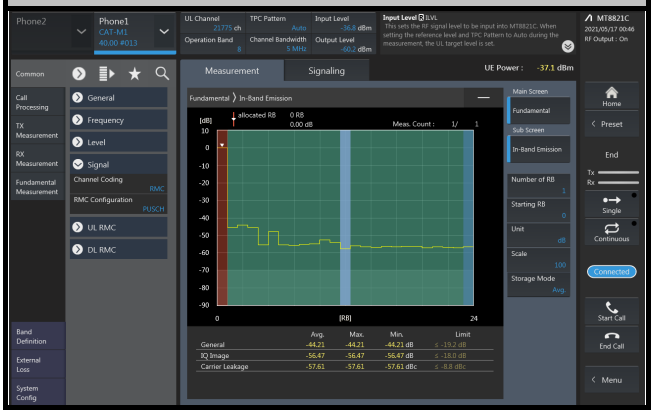
Ch21525



Ch21650



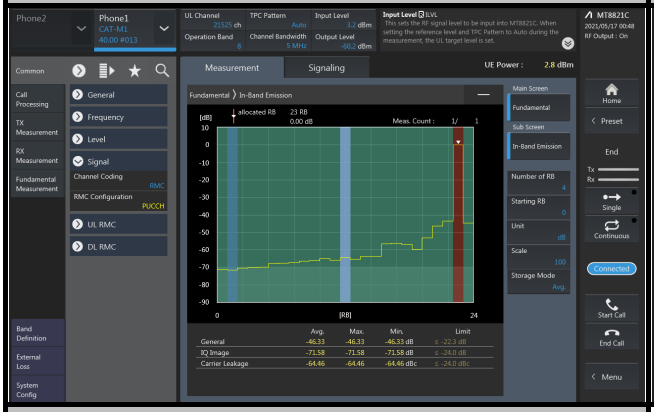
Ch21775



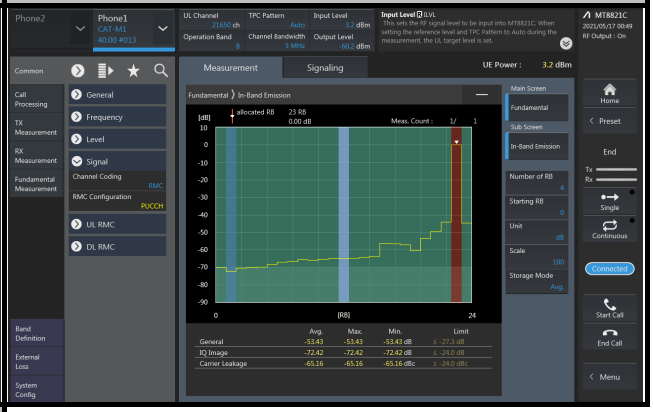
PUCCH

Bandwidth: 5 MHz / QPSK (4@0, Index 0) / 3.2 dBm

Ch21525



Ch21650



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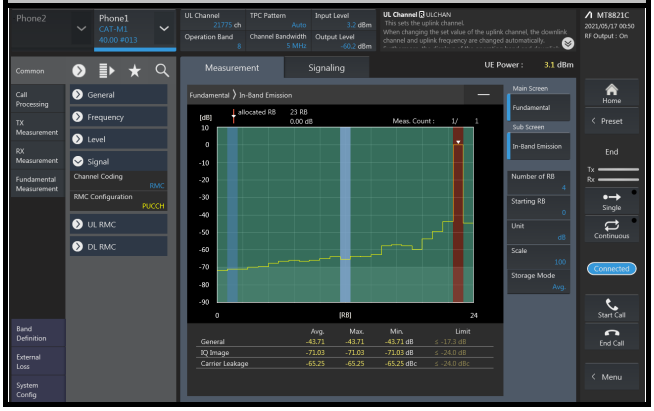
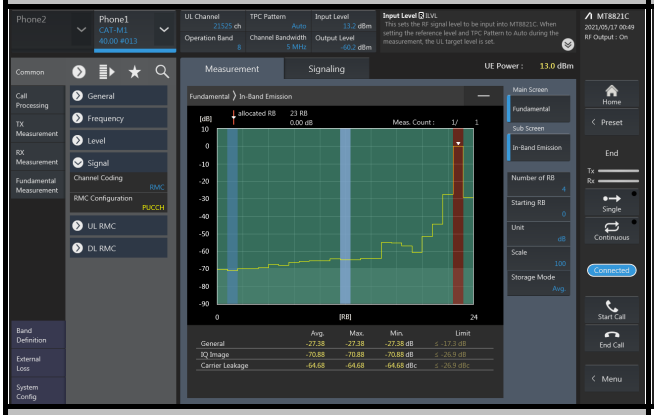


Bandwidth: 5 MHz / QPSK (4@0, Index 0) / 13.2 dBm

Ch21525



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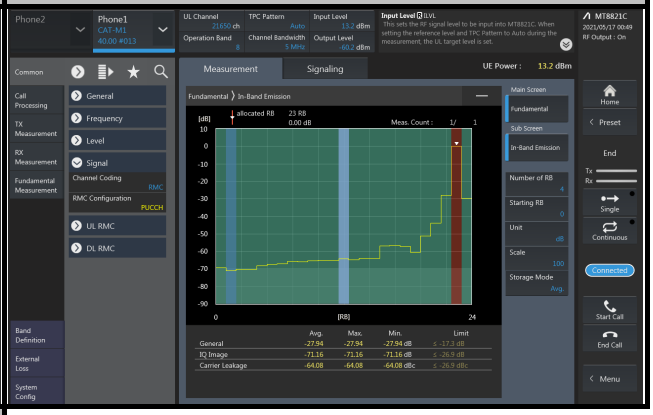

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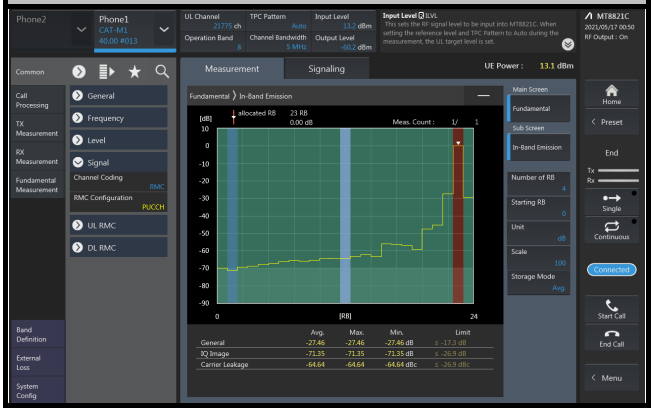
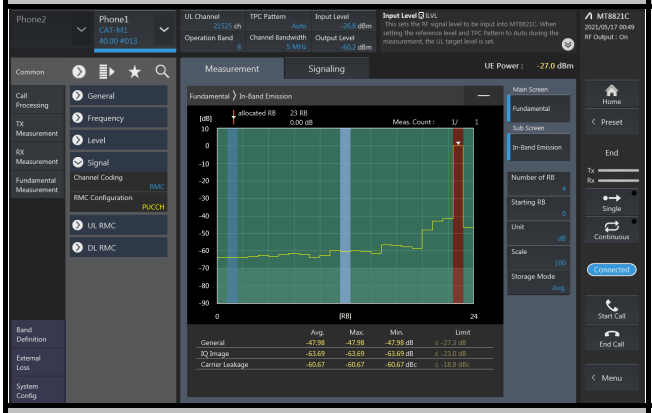


Bandwidth: 5 MHz / QPSK (4@0, Index 0) / -26.8 dBm

Ch21525



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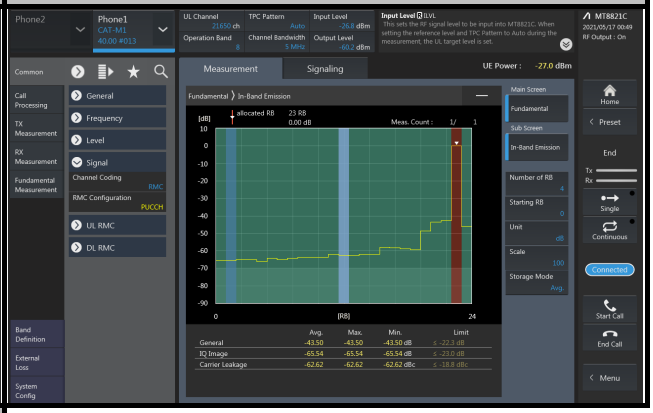

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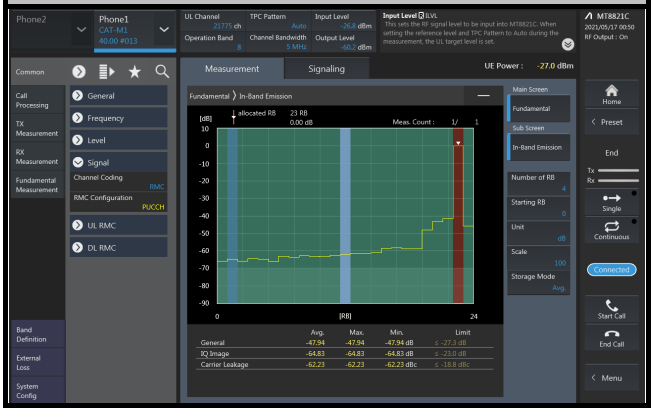
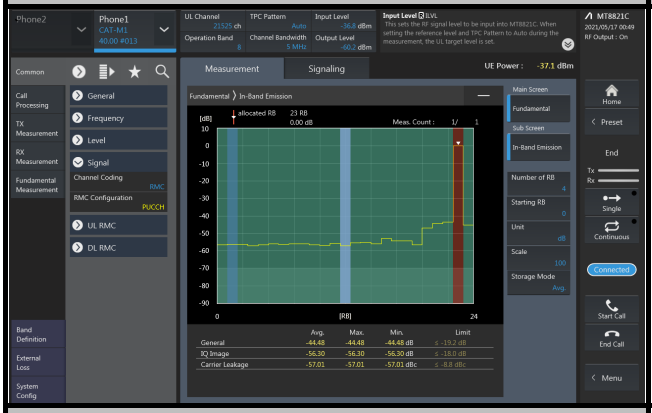


Bandwidth: 5 MHz / QPSK (4@0, Index 0) / -36.8 dBm

Ch21525



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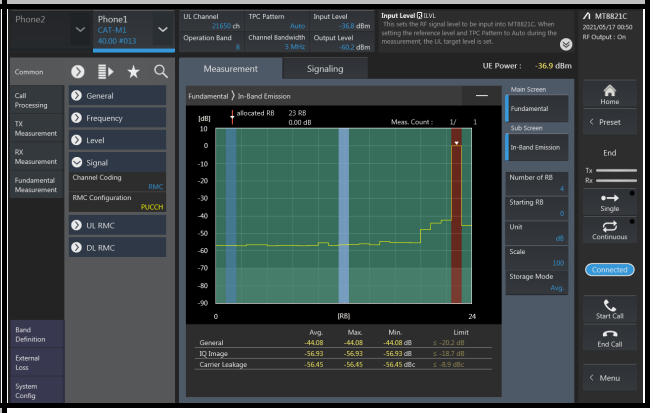

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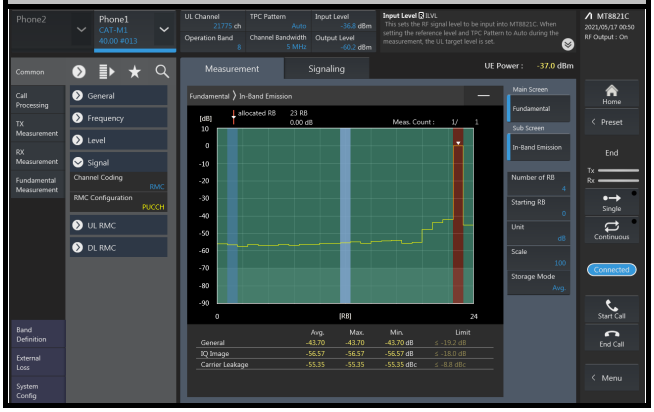


8. 頻率穩定度

8.1 適用標準

依 PLMN ALL 第 5 點測試環境條件，終端設備於常態環境常態電壓、低極端溫度低極端電壓、低極端溫度高極端電壓、高極端溫度低極端電壓、高極端溫度高極端電壓等五種測試環境下，分別進行頻率量測，經 0/2/5/10 分鐘量測結果，頻率應維持在頻道之主波頻率 0.1ppm 以內。

8.2 量測方法

(1) 將未供電之受測物置於環境溫櫃中，由 DC Power Supply 供電。若可行，則將天線連接至受測物之天線輸出接頭。

(2) 關閉受測物且置之於環境溫櫃中，設定至適用規範指定之最高溫度。對正常持續操作之裝置，當置於溫櫃中時可使受測物運作。

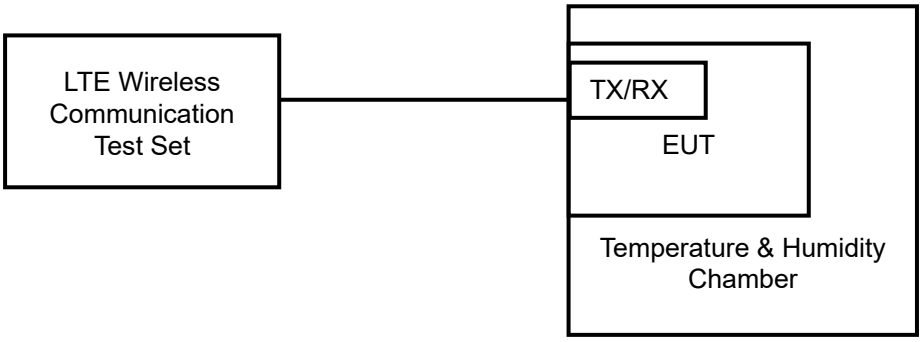
(3) 使溫櫃之溫度有足夠時間達到穩定，當溫櫃內維持在一定溫度時，啟動受測物，並於開始時、以及啟動後第 2 分鐘、第 5 分鐘與第 10 分鐘測量受測物之操作頻率，共作四次測量。在進行此測量之前須確定使溫櫃到達穩定。

8.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Radio Communication Analyzer ANRITSU	MT8821C	6261786083	Jun. 19, 2020	Jun. 18, 2021
Temperature & Humidity Chamber 巨孚儀器工業股份有限公司	H-120-40-CP-AR	MAA1306-019	Sep. 09, 2020	Sep. 08, 2021
DC power supply Keysight	U8002A	MY56330015	NA	NA
Digital Multimeter FLUKE	87-III	70360742	Jun. 23, 2020	Jun. 22, 2021

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

8.4 測試配置



8.5 量測結果

製造商聲明待測物關機電壓為 2.0Vdc，經測試後，確認待測物電壓低於 2.0Vdc 後即自動關機。

LTE Band 8

900 MHz

Frequency Error vs. Voltage					
TEMP. (℃)	Power Supply (Vdc)	Frequency (MHz)			
		0 Minute	2 Minute	5 Minute	10 Minute
		Drift (ppm)	Drift (ppm)	Drift (ppm)	Drift (ppm)
25	3.96	0.043	0.049	0.054	0.055
-10	4.68	0.039	0.049	0.042	0.040
	3.24	0.040	0.025	0.038	0.028
55	4.68	-0.028	-0.028	-0.015	-0.002
	3.24	-0.037	-0.042	-0.050	-0.041

註：製造商聲明待測物內部 DC 輸入端標稱電壓為 3.6Vdc，低極限操作電壓為 3.0Vdc，高極限操作電壓為 4.3Vdc，此待測物為模組使用較嚴格的調節式鉛酸電池來評估，故頻率穩定度檢測值如上表所示，確認待測物於極限電壓範圍內仍可使用通訊頻率。

9. 電波功率密度

9.1 適用標準

1. 本項測試適用於移動式行動臺設備。
2. 電波功率密度最大值：

(a) 700 MHz 頻段為 0.35 毫瓦特/平方公分(mW/cm²)；
(b) 900 MHz 頻段為 0.45 mW/cm²；
(c) 1800 MHz 頻段為 0.9 mW/cm²；
(d) 2100 MHz、2500 MHz 與 2600 MHz 頻段為 1.0 mW/cm^2。

量測距離為 20 公分，或以設備廠商宣告設備天線與附近人體可活動範圍之距離。

9.2 評估方法

1. 以 3.5 節所測得的最大傳導輸出功率值再加上待測物天線的增益值(Gain)帶入下面公式換算出待測物所輻射的功率密度。
2. Pd = (Pout*G) / (4*pi*r^2)

   where

   Pd = power density in mW/cm^2

   Pout = output power to antenna in mW

   G = gain of antenna in linear scale

   pi = 3.1416

   r = distance between observation point and center of the radiator in cm

9.3 評估結果

Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Pass / Fail
900 MHz 頻段	23.02	1.2	20	0.053	0.45	Pass

10. 檢測實驗室基本資料

立德國際商品試驗有限公司桃園分公司提供產業界最佳的檢測以及諮詢服務。
本公司為 ISO/IEC 17025 認可實驗室。

如您有任何問題或建議，請與下列實驗室聯絡：

林口 EMC / RF 實驗室 ：
Tel: 886-2-26052180
Fax: 886-2-26051924

新竹 EMC / RF 及通訊實驗室 ：
Tel: 886-3-6668565
Fax: 886-3-6668323

華亞 EMC / RF / Safety 實驗室:
Tel: 886-3-3183232
Fax: 886-3-3270892

Email:service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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