



TEST REPORT

TAS ALGORITHM COMPLIANCE

EUT Description	Wireless Module Installed in Convertible PC
Brand Name	HP
Model Name	HSN-I61C
FCC ID	B94HNI61CKL4
Date of Test Start/End	2024-02-15 / 2024-03-01
Features	LTE, WCDMA, NR

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Test Report identification	231128-05.TR03
Revision Control	Rev. 00 This test report revision replaces any previous test report revision

The test results relate only to the samples tested.

Reviewed by

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1. General conditions, competences and guarantees

- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.

2. Environmental Conditions

- ✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	23.1°C ± 1.2°C
Humidity	31.7% ± 10.4%

3. Test Samples

Sample	ID	Description	Model	Serial	Note
#1	231128-05.S07	Covertible PC with FM350-GL Module Embedded	HSN-I61C	0003770D25	Used for all test cases except Band Validation

4. EUT Features

The herein information is provided by the customer.

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

Brand Name	FM350-GL
Model Name	HSN-I61C
Firmware	11600.0000.00.29.23.12 v1.0.0
Prototype / Production	Production
Host Identification	HSN-I61C

Supported radios

WWAN: The module is a data only DUT. The applicable frequency bands and operating modes are identified in the following table.

Mode	Bands	Supported Tx Mode			
		RMC	HSDPA	HSUPA	DC-HSDPA
WCDMA / HSPA+	FDD II (1850.0 – 1910.0 MHz)	✓	✓	✓	✓
	FDD IV (1710.0 – 1755.0 MHz)	✓	✓	✓	✓
	FDD V (824.0 – 849.0 MHz)	✓	✓	✓	✓

FDD/TDD	Bands	Modulations	Bandwidth					
			1.4	3	5	10	15	20
LTE FDD	Band 2 (1850.0 – 1910.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
	Band 4 (1710.0 – 1755.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
	Band 5 (824.0 – 849.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓		
	Band 7 (2500.0 – 2570.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓
	Band 12 (699.0 – 716.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓		
	Band 13 (777.0 – 787.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 14 (788.0 – 798.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 17 (704.0 – 716.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 25 (1850.0 – 1915.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
	Band 26 (814.0 – 849.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	
	Band 30 (2305.0 – 2315.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 66 (1710.0 – 1780.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
LTE TDD	Band 71 (663.0 – 698.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓
	Band 38 (2570.0 – 2620.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓
	Band 41 (2496.0 – 2690.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓
	Band 48 (3550.0 – 3700.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓

Bands	Modulation	SCS (KHz)	Bandwidth												
			5	10	15	20	25	30	40	50	60	70	80	90	100
N2 FDD (1850.0 – 1910.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N5 FDD (824.0 – 849.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N7 FDD (2500.0 – 2570.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N25 FDD (1850.0 – 1915 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N30 FDD (2305.0 – 2315.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓											
N38 TDD (2570.0 – 2620.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N41 TDD (2496.0 – 2690.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30				✓ ✓			✓ ✓	✓ ✓	✓		✓	✓	✓
N48 TDD (3550.0 – 37000.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓			✓ ✓						
N66 FDD (1710.0 – 1780.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓			✓ ✓						
N71 FDD (663.0 – 698.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N77 TDD (3450.0 – 3550.0 MHz) (3700.0 – 3980.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30		✓ ✓	✓ ✓	✓ ✓			✓ ✓	✓ ✓	✓		✓	✓	✓
N78 TDD** (3700.0 – 3800.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30		✓ ✓	✓ ✓	✓ ✓			✓ ✓	✓ ✓	✓		✓	✓	✓

*FCC limits 5G NR B77 to 3700-3980MHz

** FCC limits 5G NR B78 to 3700-3800MHz

5. Remarks and comments

- 1. The test report is a validation of the FCC TAS algorithm

6. Document Revision History

Revision #	Date	Modified by	Revision Details
Rev.00	2024-03-04	Y.Haddad	First Issue

Annex A. Test Setup Description

A.1 Measurement System

The conducted power measurement test setup is described in the following and illustrated in Figure 1

- The DUT is a Fibocom M2 FM350-GL Cellular Modem installed inside HP model HSN-I61C Convertible PC.
- The control PC is used to configure the call box to send power control test sequences to the FM350-GL
- Uplink signal power is monitored by the spectrum analyzer and recorded by the PC with a time resolution of 25 msec which is substantially less than the power adjustment interval (Avg_SAR_Check_Period) of 0.05 sec used for FM350-GL .
- The values of Avg_SAR_Power are read from the FM350-GL by the PC at each Avg_SAR_Check_Period
- In addition to power results, the time sequence of power control commands and power samples are also recorded by the PC to enable results to be correlated and plotted. Uplink signal from the FM350-GL is fed through a 3 dB power splitter, which delivers an equal amount of signal to the spectrum analyser and the call box. The splitter has high isolation between the spectrum analyser and the call box. Due to different uplink/downlink frequencies and the zero span time-domain measurement used, interference of uplink and downlink signals are avoided.
- Path loss in the power measurement setup from the FM350-GL main antenna port to either the call box or the spectrum analyser is taken into account

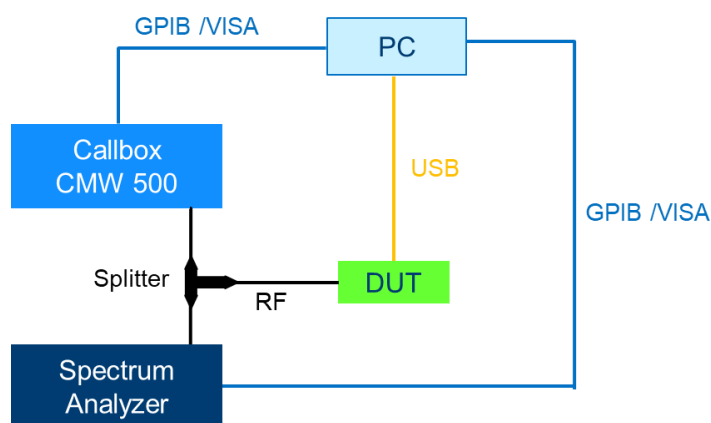


Figure 1 - Test Setup

A.2 Test Equipment List

The Equipments used for the conducted power measurement test setup are listed in Table below.

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
025-005	Communication Tester	CMW500	161493	Rohde & Schwarz	N/A	N/A
265-000	Spectrum Analyzer	FSV30	101318	Rohde & Schwarz	2023-03-29	2025-03-29
455-001	RF Cable	-	-	-	2023-02-23	2024-03-23
455-002	RF Cable	-	-	-	2023-02-23	2024-03-23
455-003	RF Splitter	-	-	-	2023-02-23	2024-03-23

Annex B. Test Results

B.1 Summary of Test Cases

The following table lists the types of TAS algorithm validation tests performed and the corresponding Tables describing the test configurations and validation results.

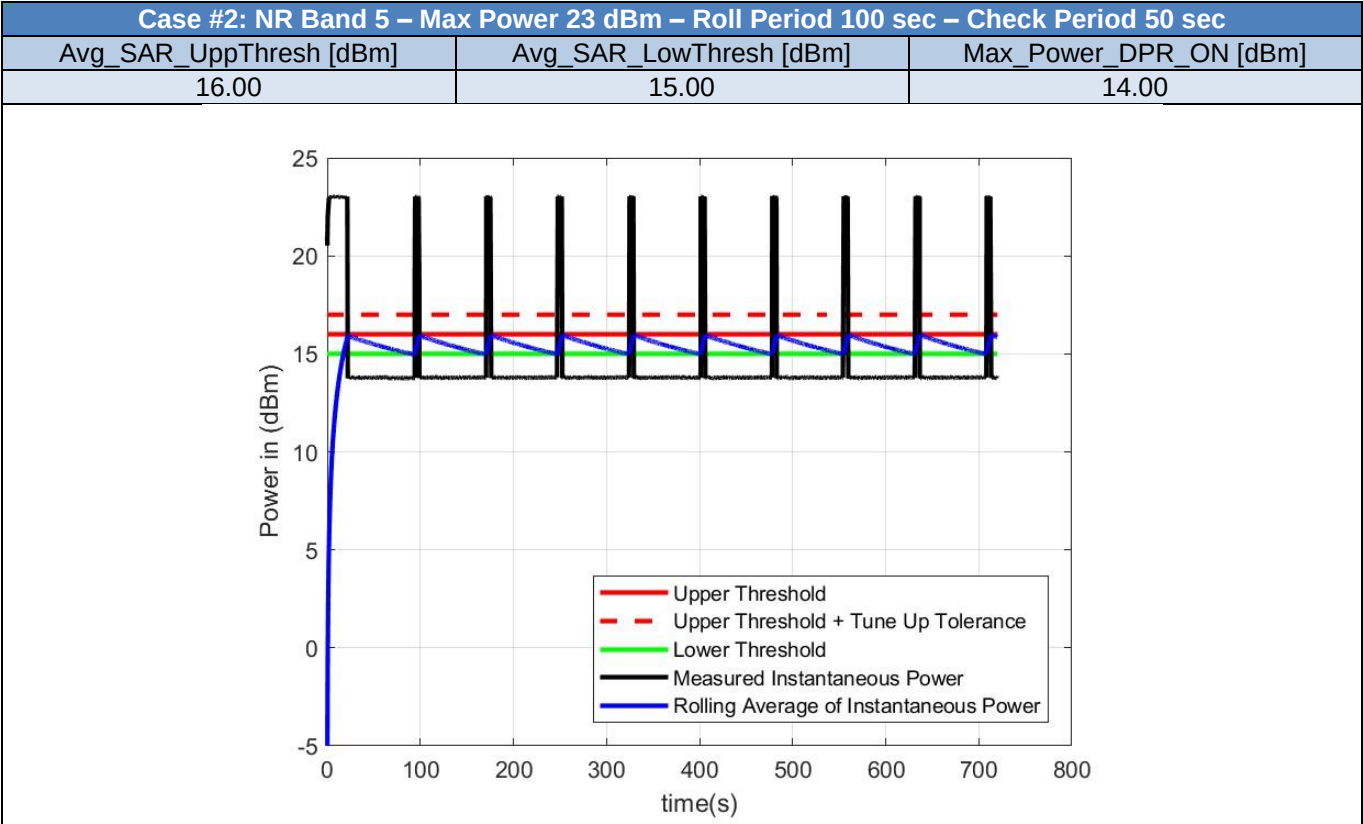
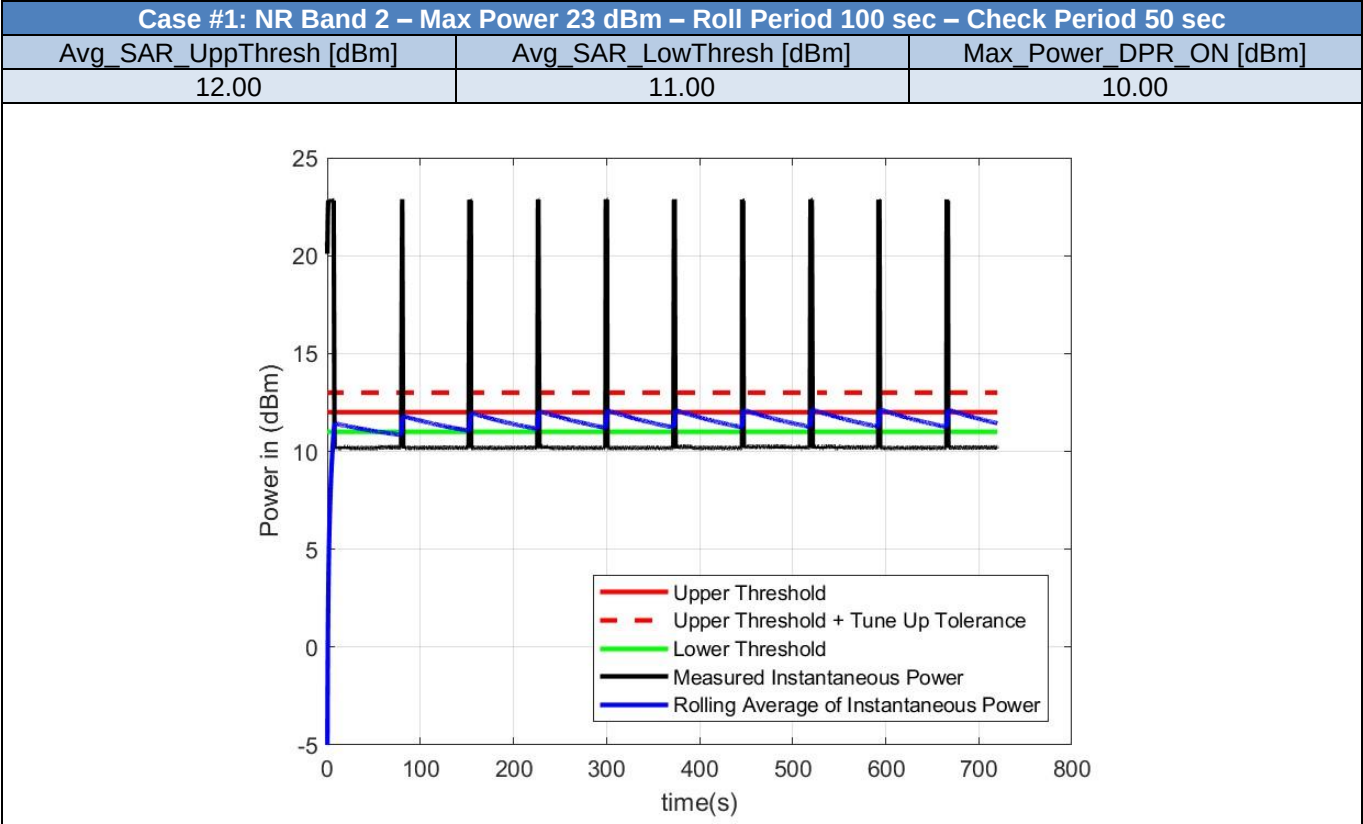
Validation type	RAT	Configurations	Results	Verdict
Bands Validation	NR	Table 1	Section B.2	Pass
Bands Validation	LTE	Table 2	Section B.3	Pass
Bands Validation	WCDMA	Table 3	Section B.4	Pass
Time Varying Test Sequence	NR	Table 4	Section B.5	Pass
Time Varying Test Sequence	LTE	Table 5	Section B.6	Pass
Time Varying Test Sequence	WCDMA	Table 6	Section B.7	Pass
Handover	LTE-LTE	Table 7	Section B.8	Pass
Handover	LTE-WCDMA	Table 8	Section B.9	Pass
Call Drop and Reboot	NR	Table 9	Section B.10	Pass

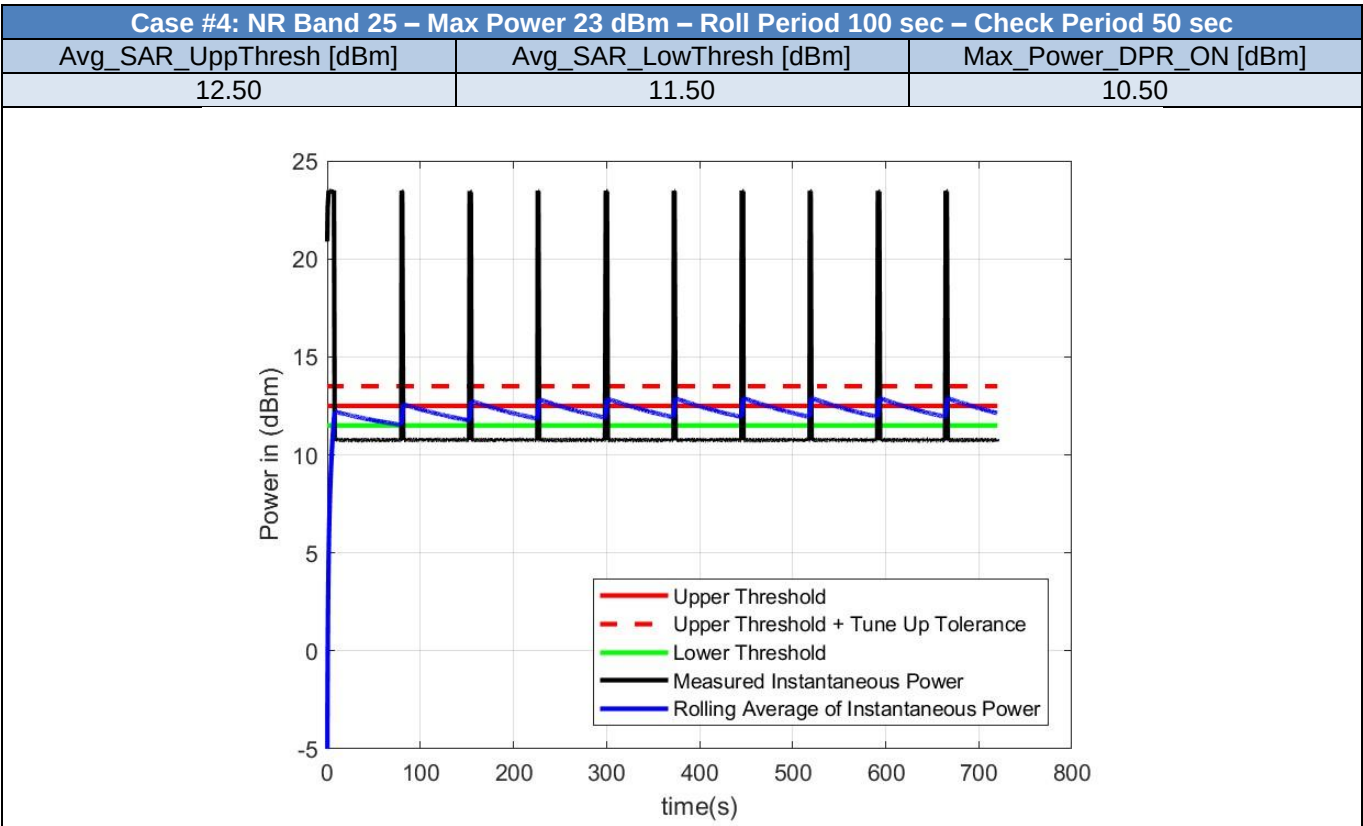
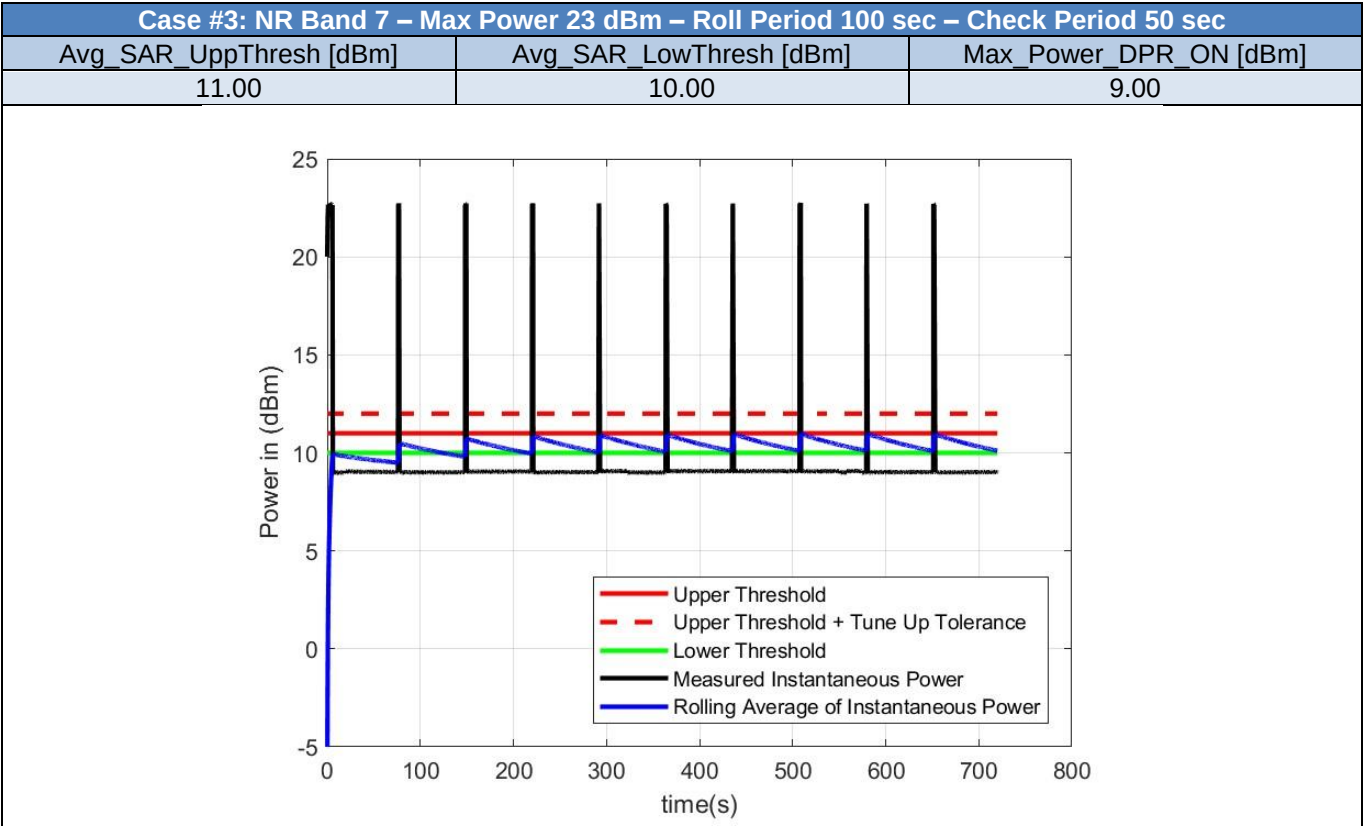
B.2 Bands Validation - NR

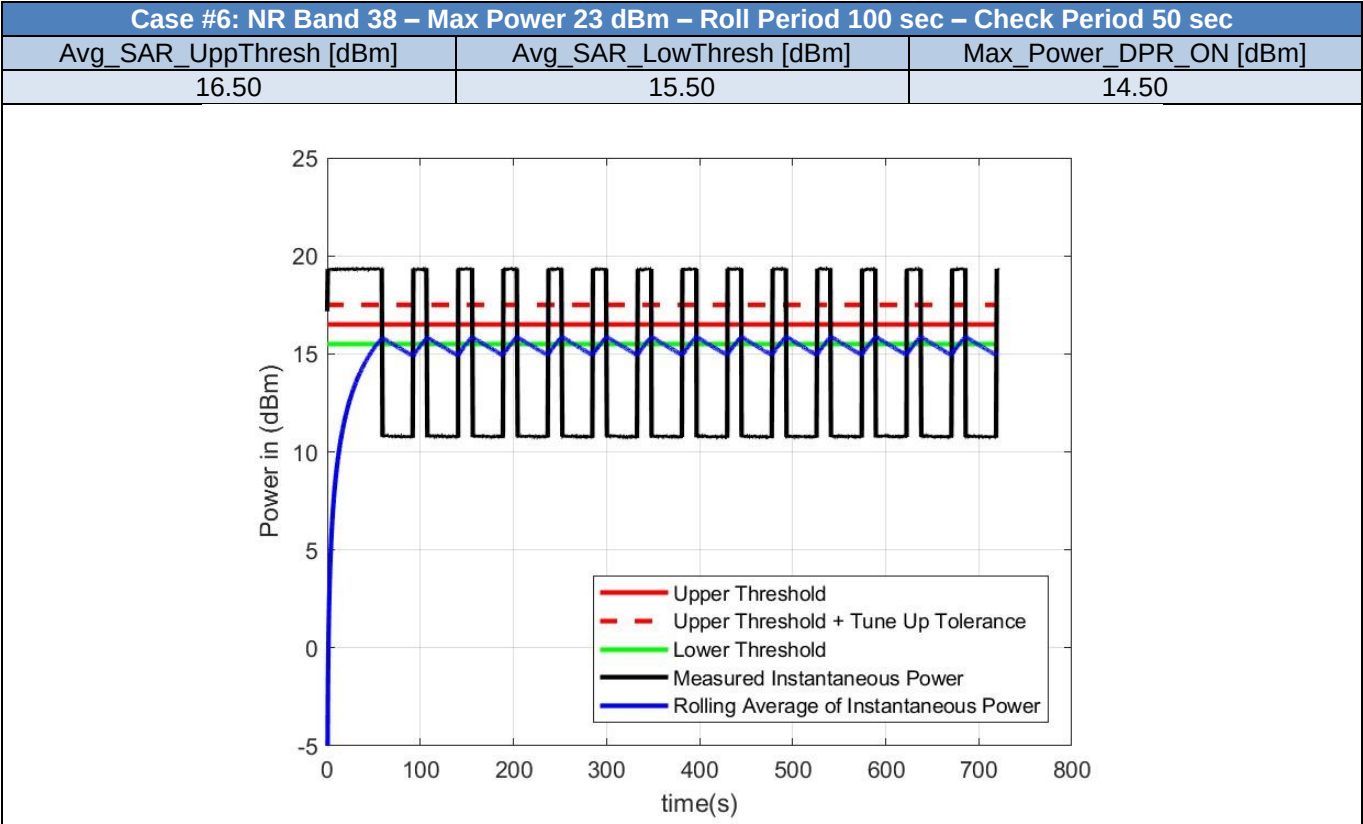
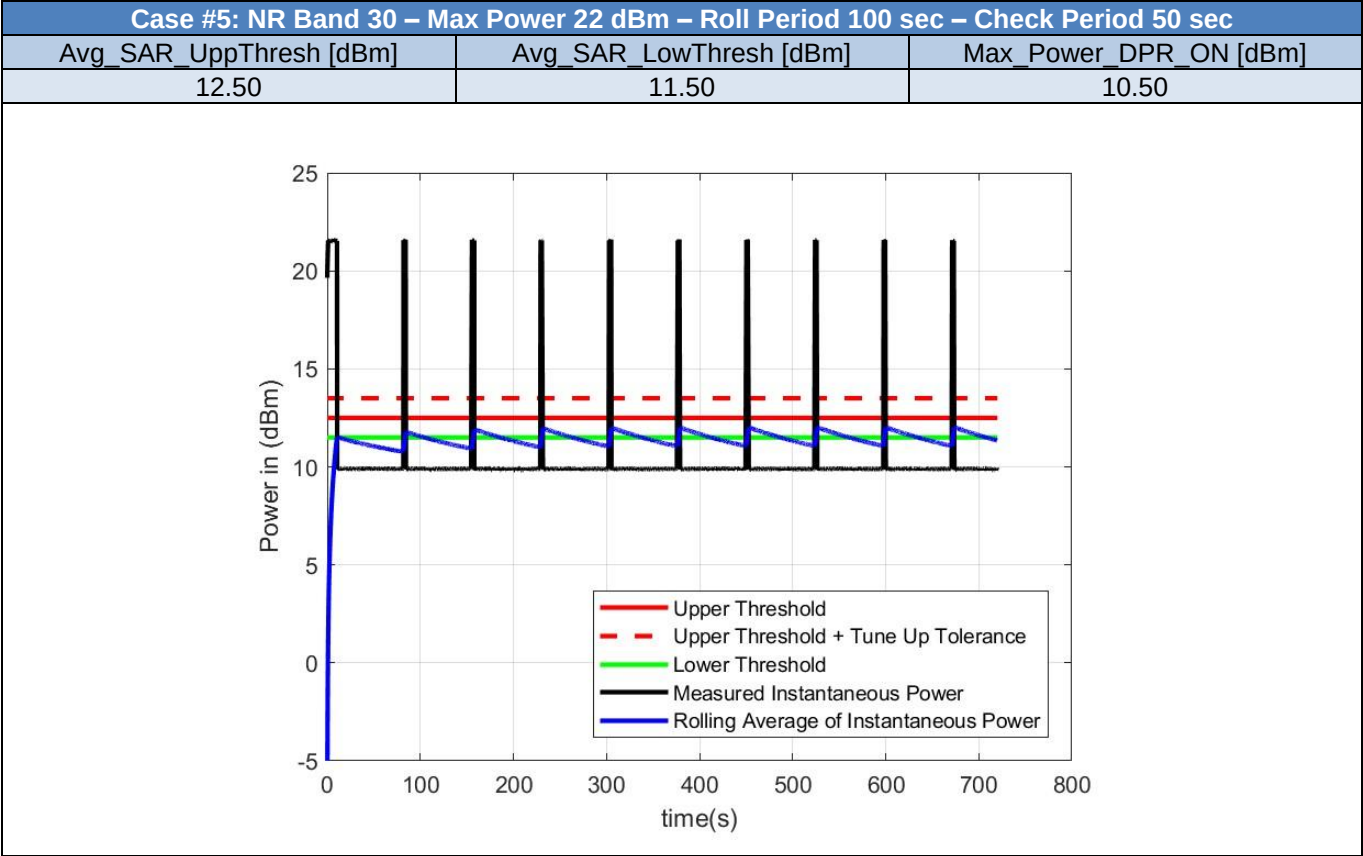
Table 1 - Test Cases for Bands Compliance of NR bands

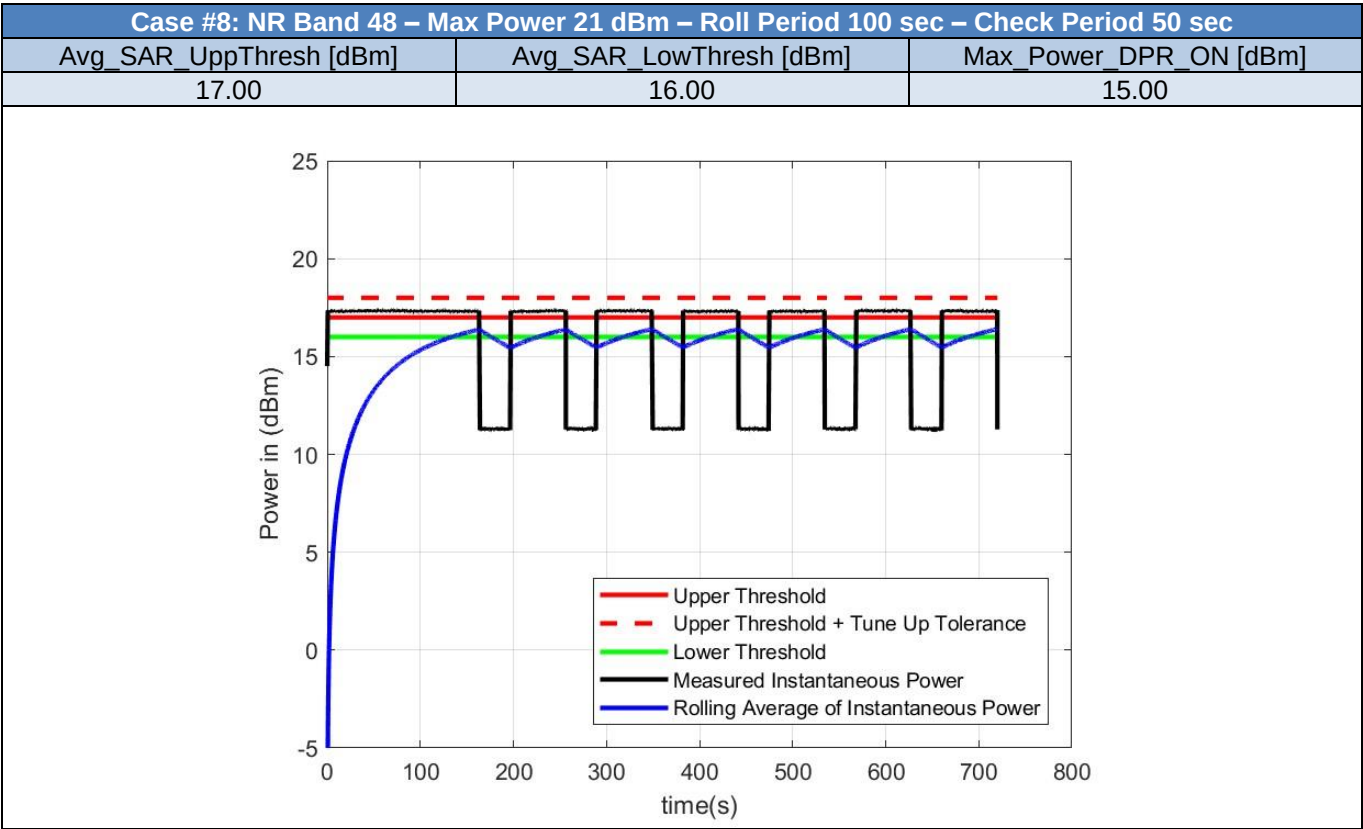
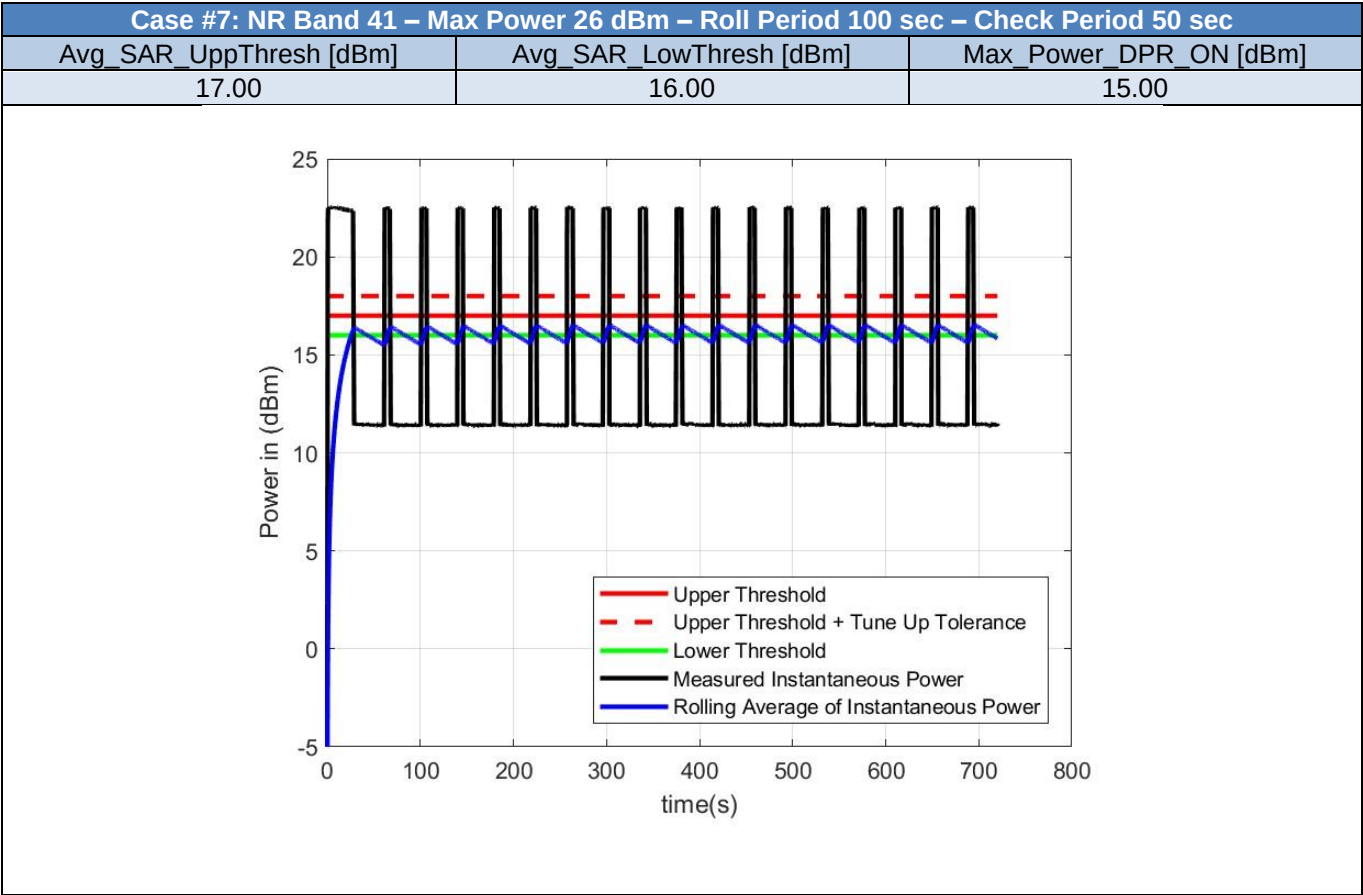
Case	RAT	Band	Max_Power_DPR_OFF_dBm	Roll_Period_s	Check_Period_s	Avg_SAR_UpperThresh_dBm	Avg_SAR_LowerThresh_dBm	Max_Power_DPR_ON_dBm
1	NR	2	23.00	100	50	12.00	11.00	10.00
2	NR	5	23.00	100	50	16.00	15.00	14.00
3	NR	7	23.00	100	50	11.00	10.00	9.00
4	NR	25	23.00	100	50	12.50	11.50	10.50
5	NR	30	22.00	100	50	12.50	11.50	10.50
6	NR	38	23.00	100	50	16.50	15.50	14.50
7	NR	41	26.00	100	50	17.00	16.00	15.00
8	NR	48	21.00	100	50	17.00	16.00	15.00
9	NR	66	23.00	100	50	13.00	12.00	11.00
10	NR	77	23.00	100	50	13.50	12.50	11.50
11	NR	78	26.00	100	50	14.50	13.50	12.50
12	NR	71	23.00	100	50	19.00	18.00	17.00

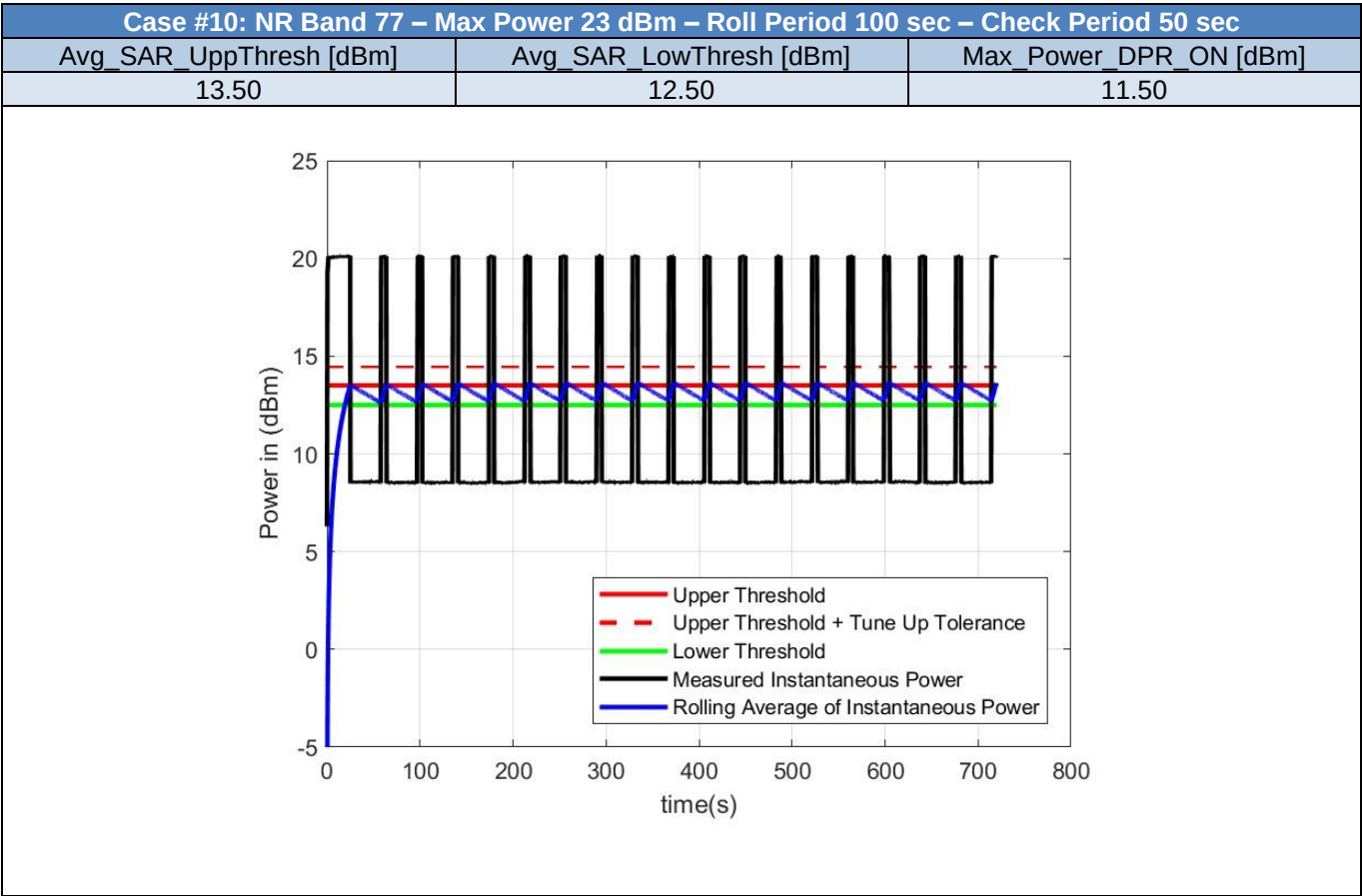
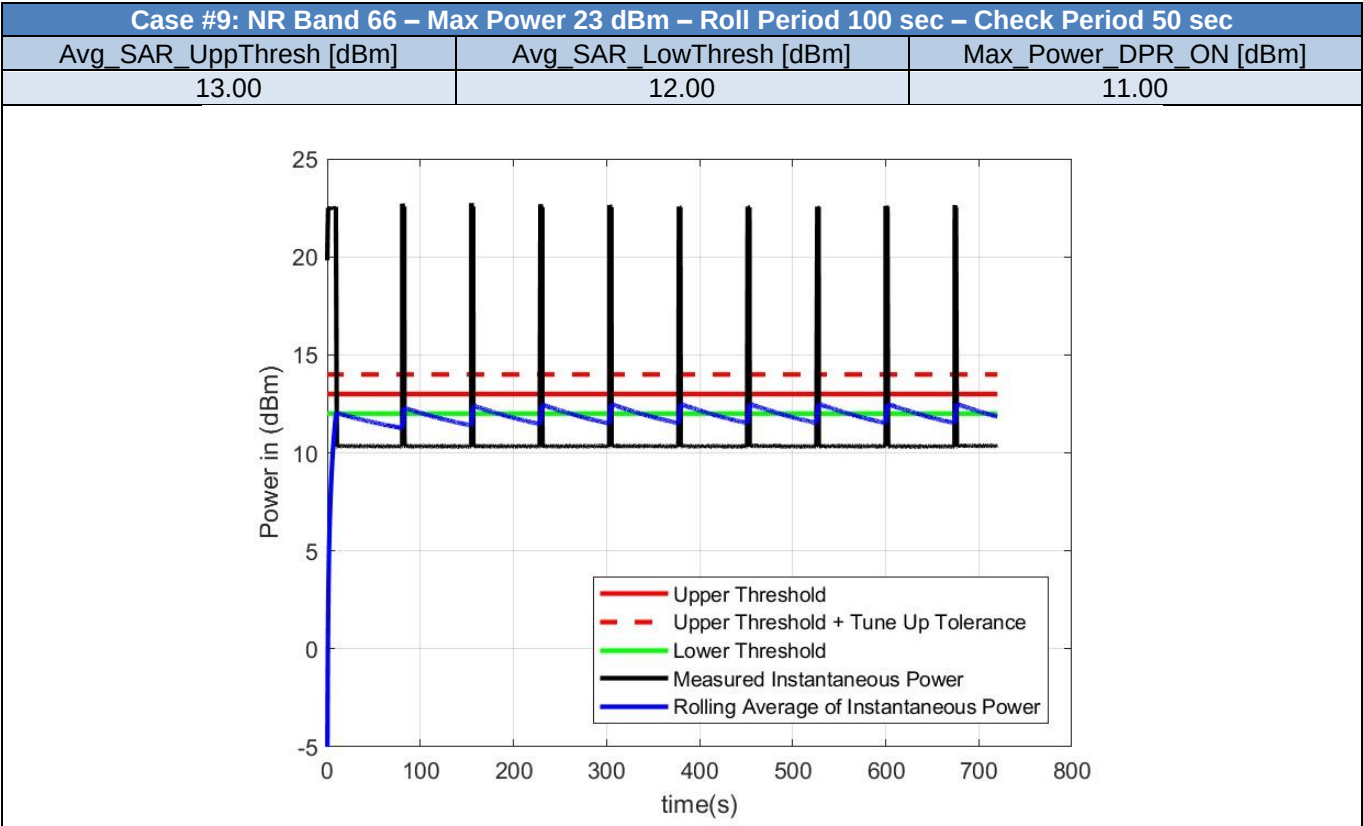
Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.

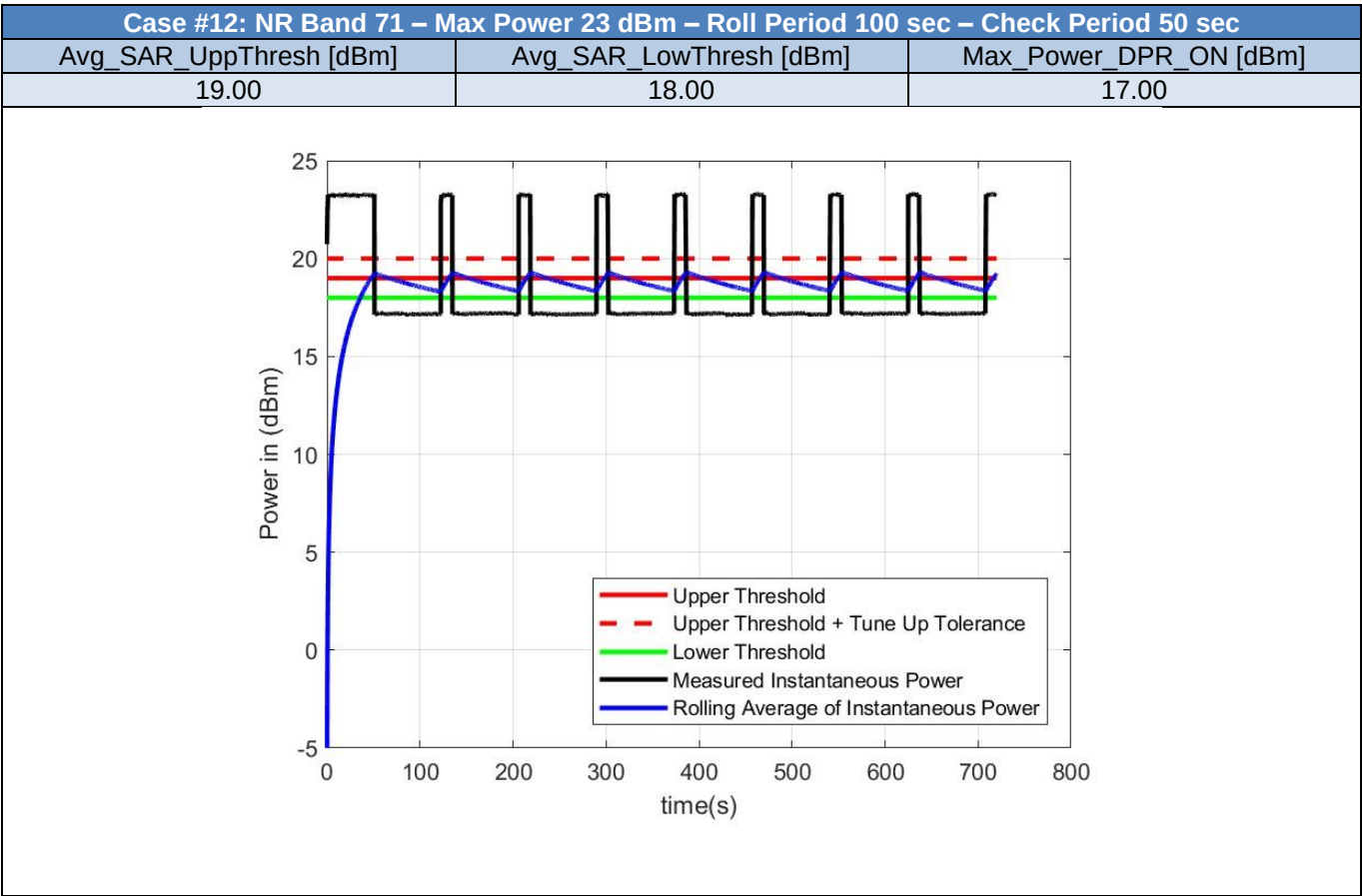
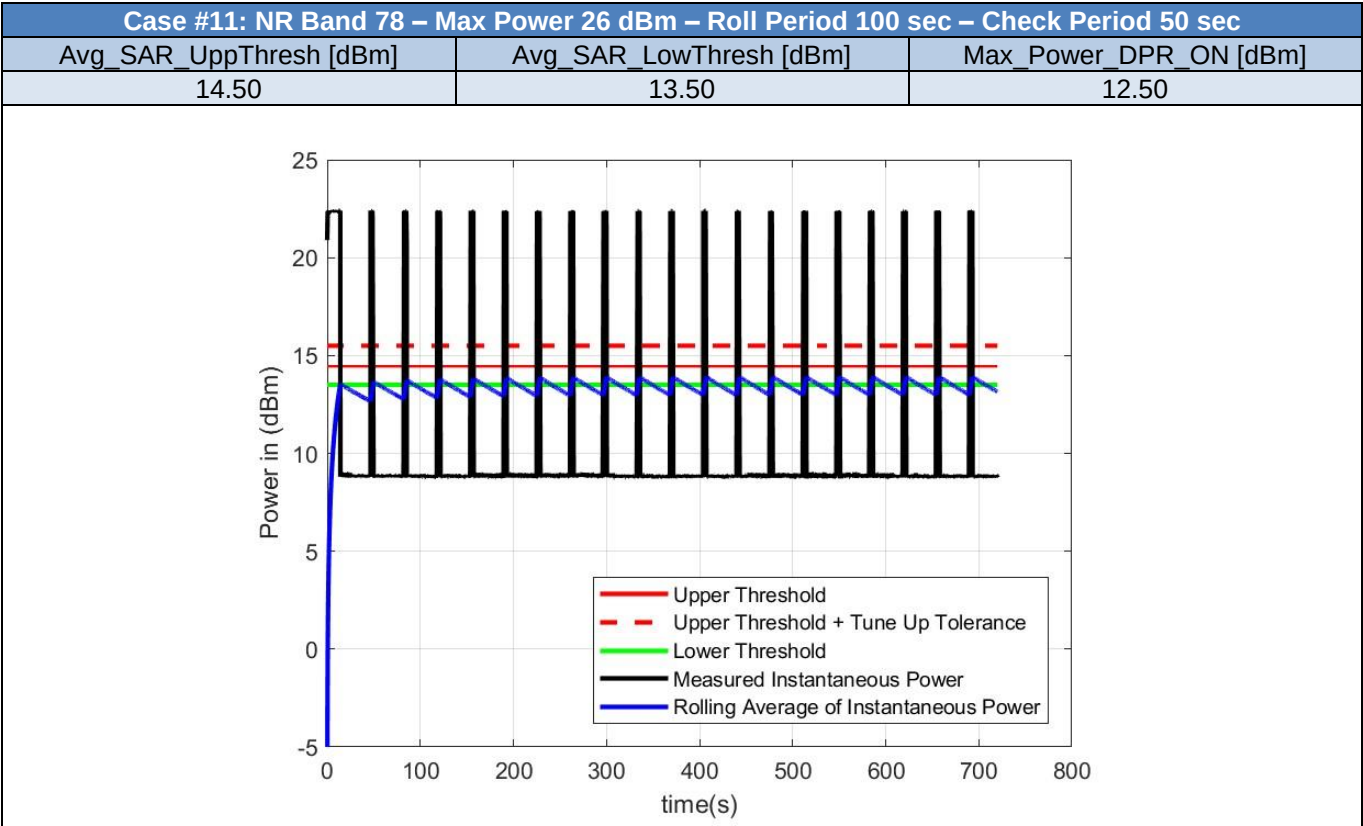








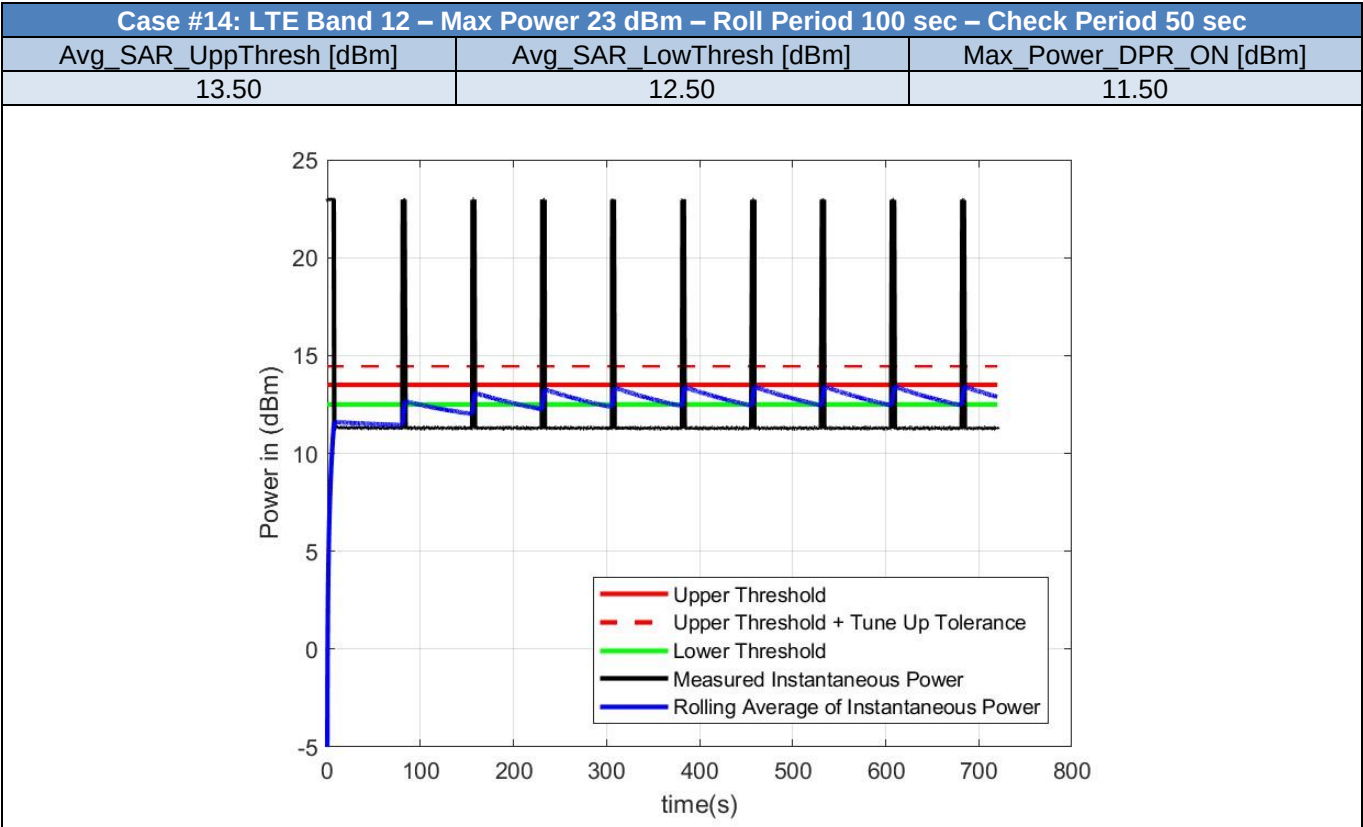
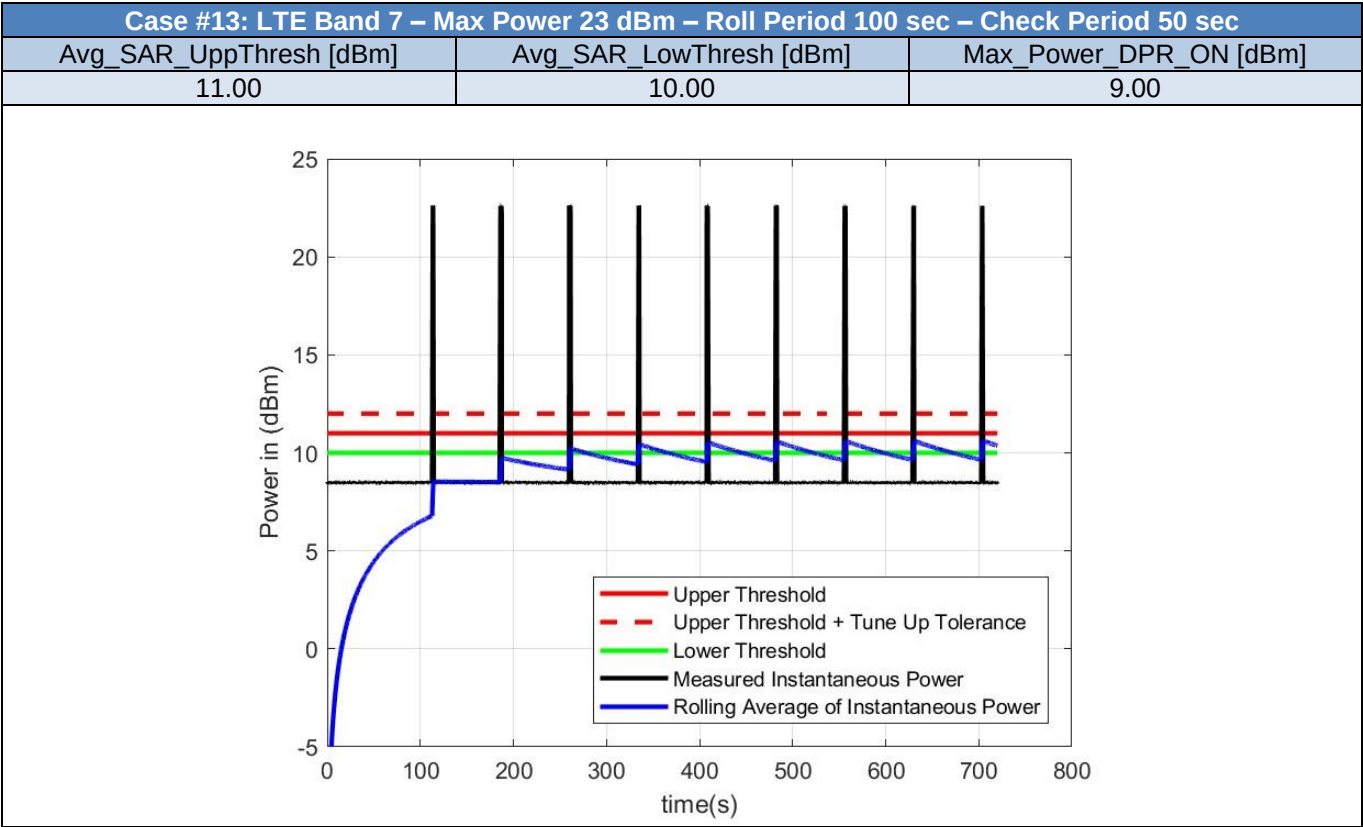


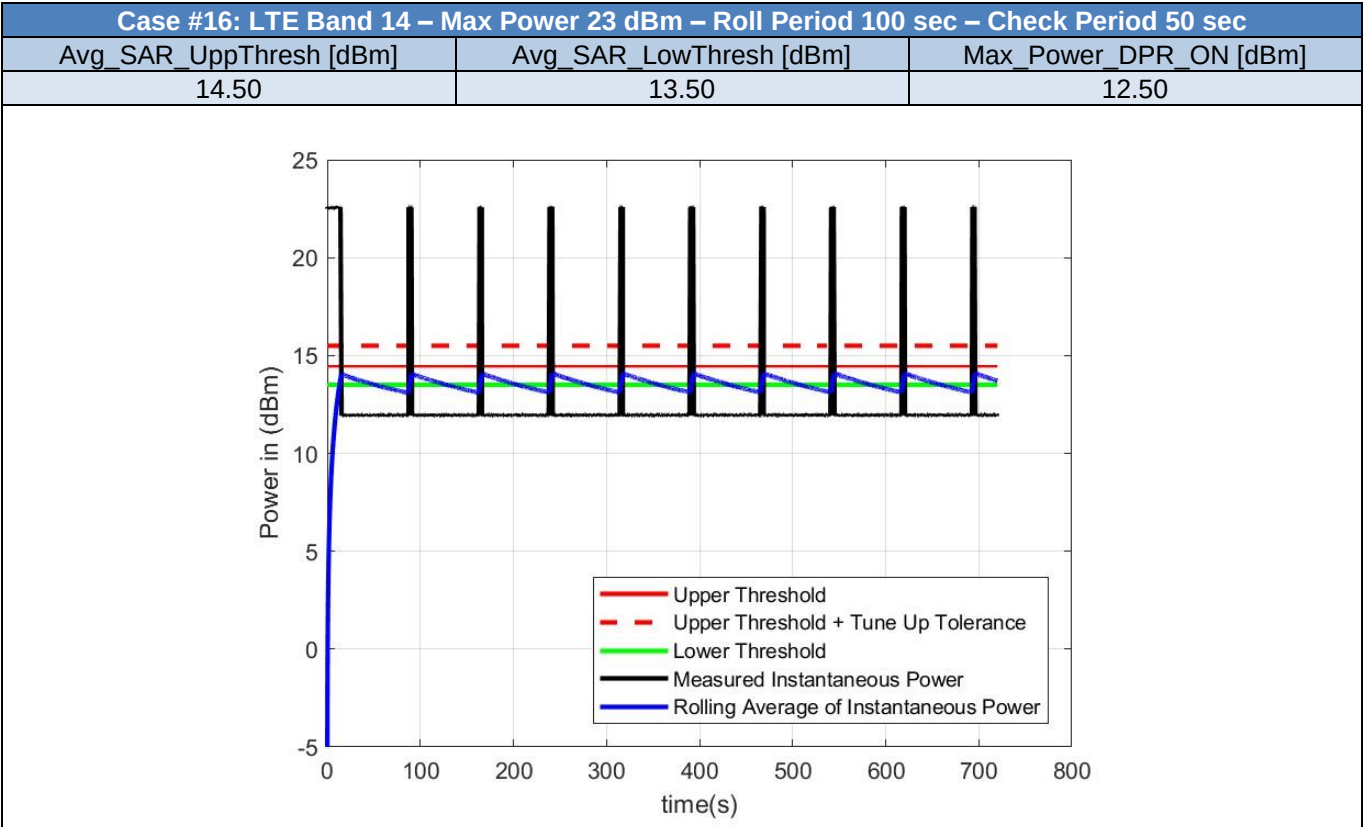
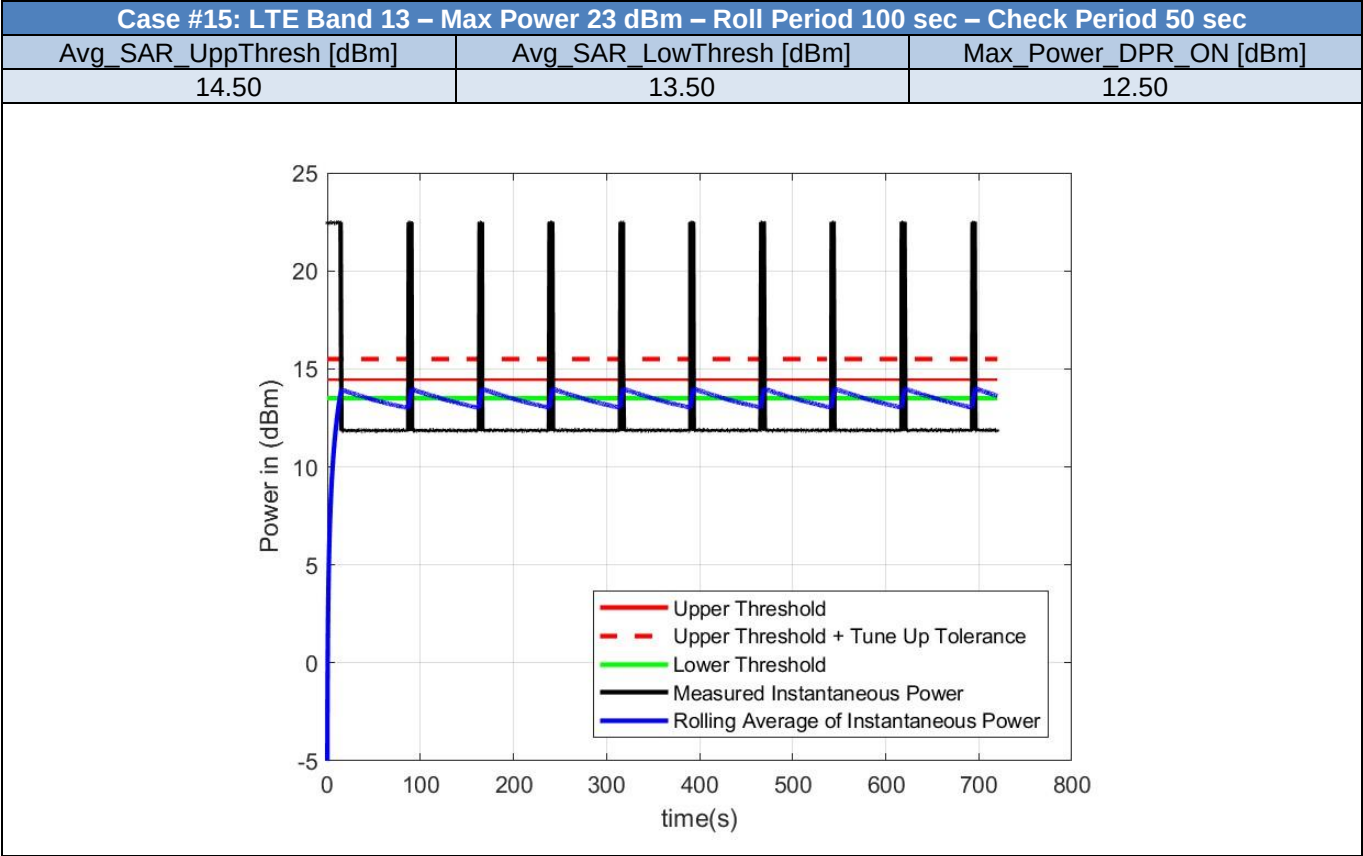


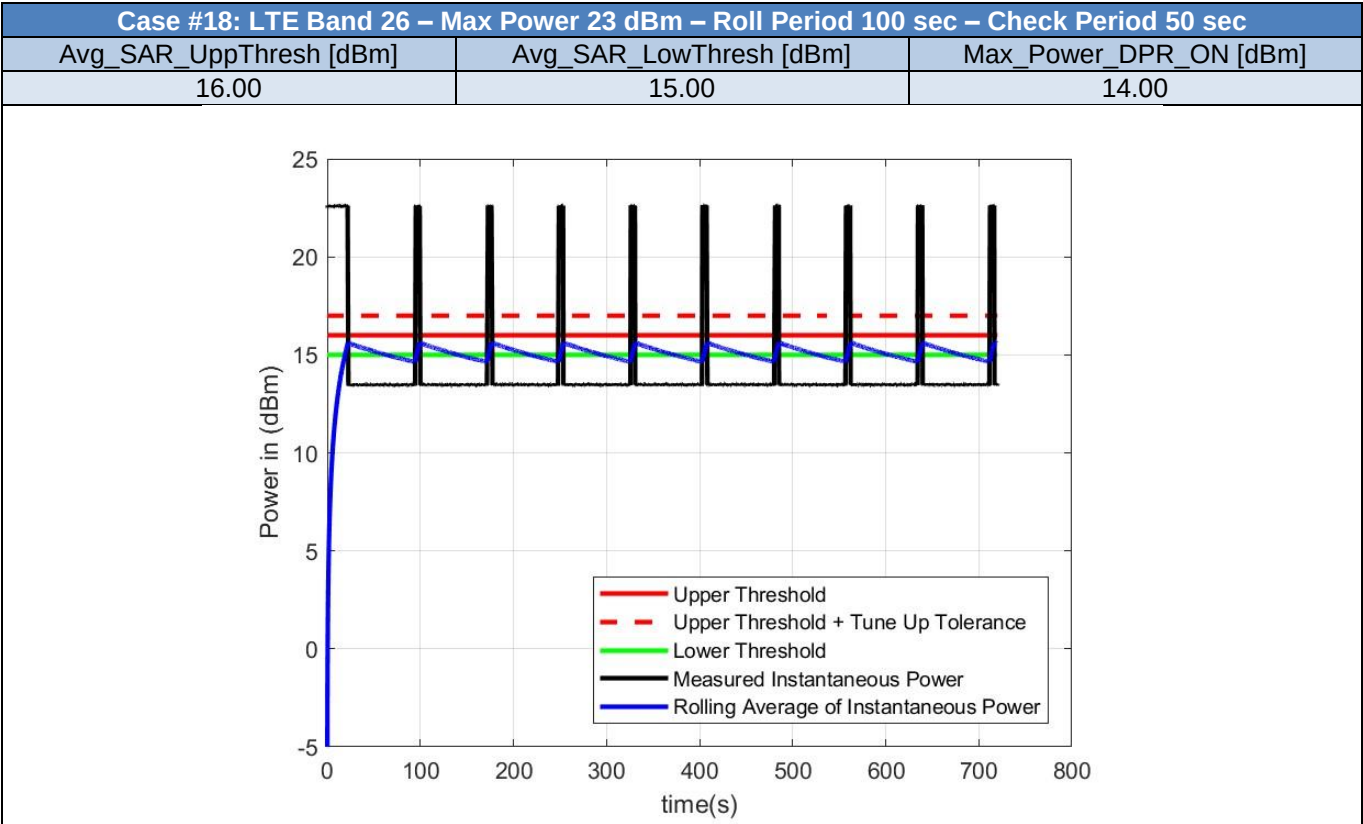
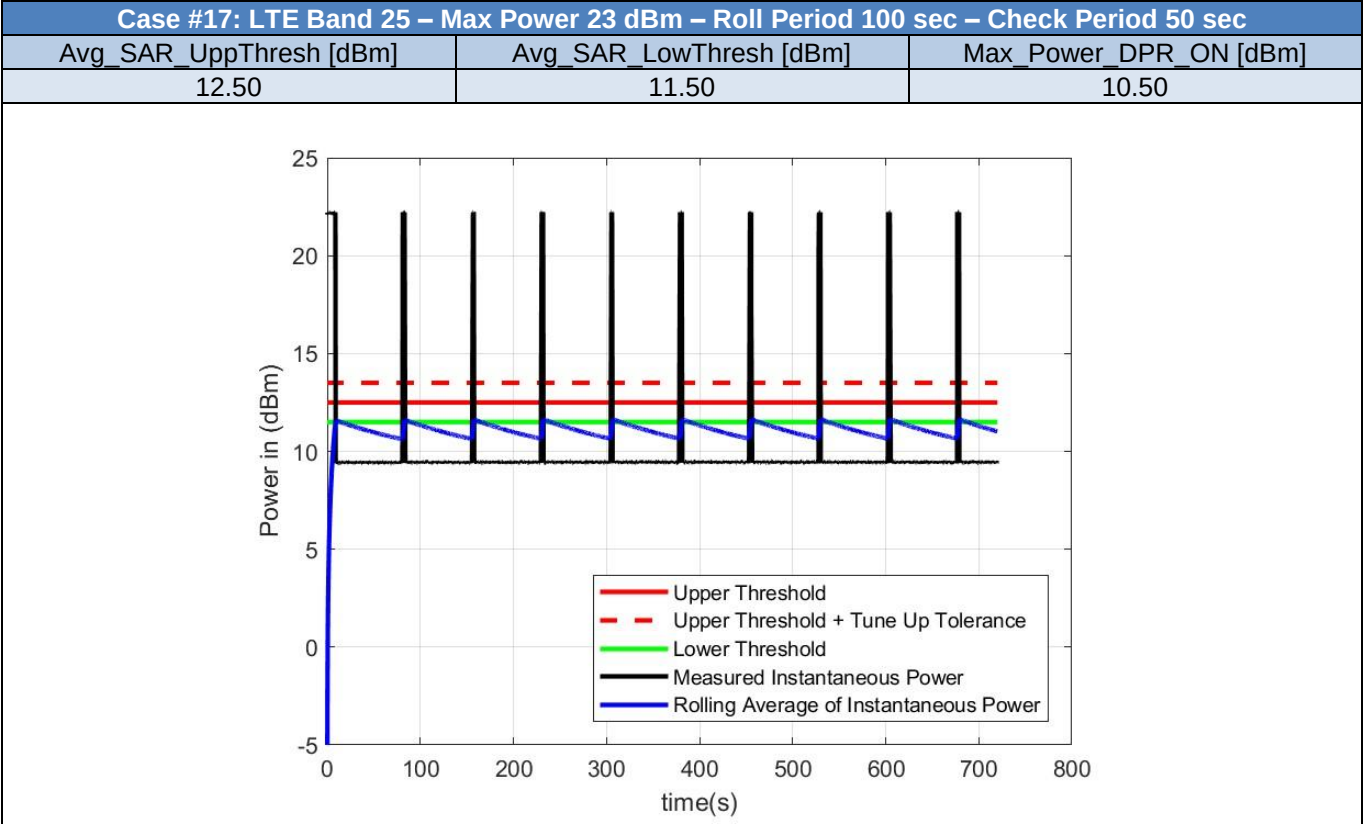
B.3 Bands Validation - LTE*Table 2 - Test Cases for Bands Compliance of LTE bands*

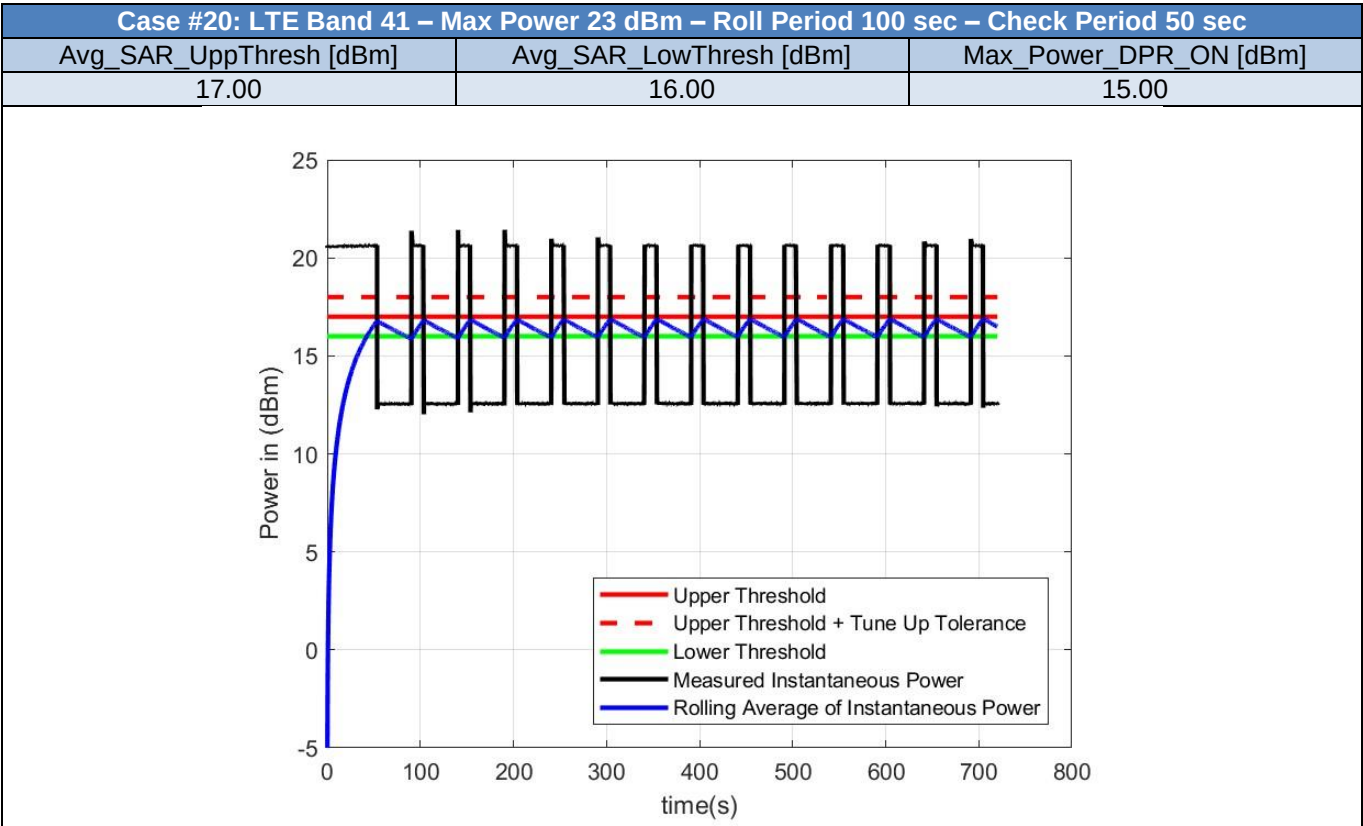
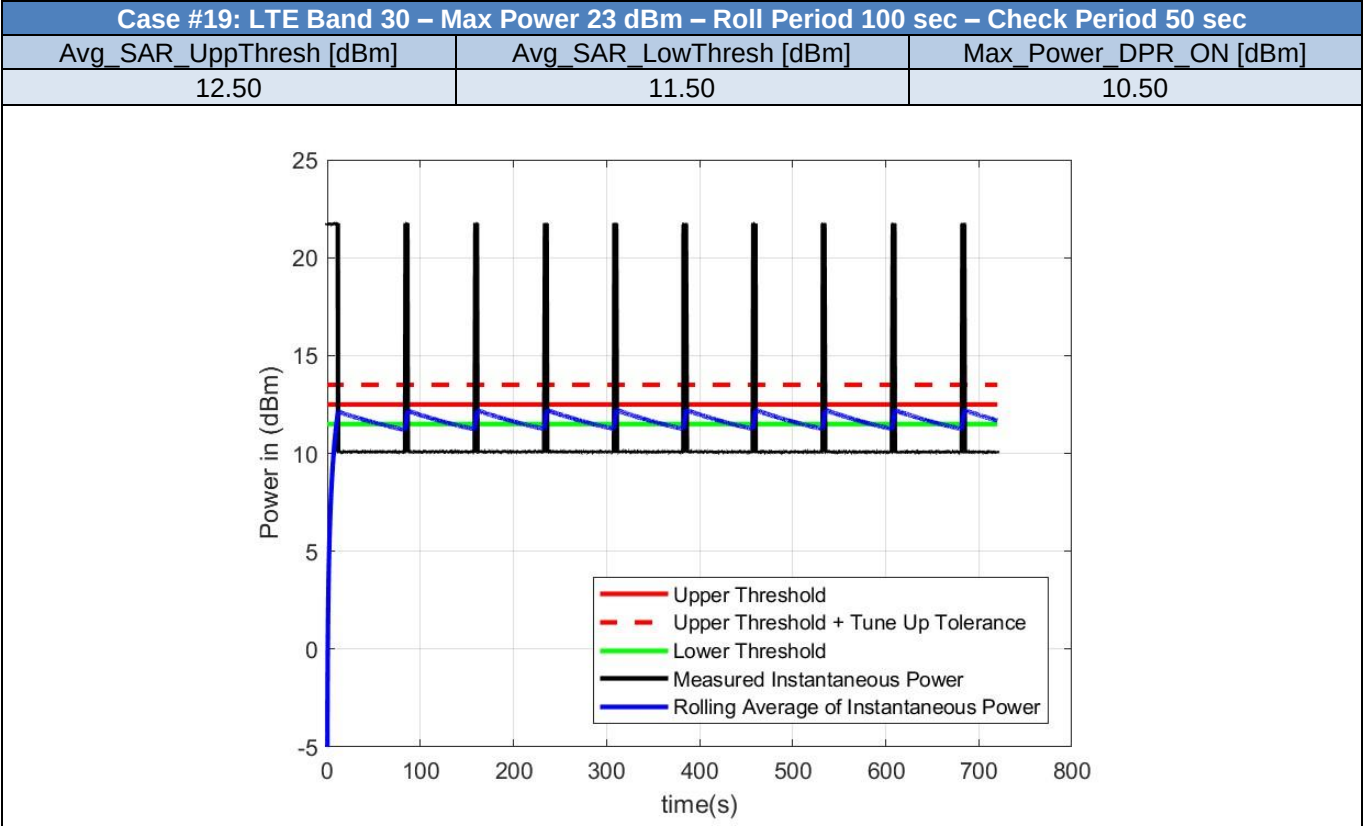
Case	RAT	Band	Max_Power_DPR_OFF_dBm	Roll_Period_s	Check_Period_s	Avg_SAR_UpperThresh_dBm	Avg_SAR_LowerThresh_dBm	Max_Power_DPR_ON_dBm
13	LTE	7	23.00	100	50	11.00	10.00	9.00
14	LTE	12	23.00	100	50	13.50	12.50	11.50
15	LTE	13	23.00	100	50	14.50	13.50	12.50
16	LTE	14	23.00	100	50	14.50	13.50	12.50
17	LTE	25	23.00	100	50	12.50	11.50	10.50
18	LTE	26	23.00	100	50	16.00	15.00	14.00
19	LTE	30	23.00	100	50	12.50	11.50	10.50
20	LTE	41	23.00	100	50	17.00	16.00	15.00
21	LTE	48	21.00	100	50	17.00	16.00	15.00
22	LTE	66	23.00	100	50	13.00	12.00	11.00
23	LTE	71	23.00	100	50	19.00	18.00	17.00

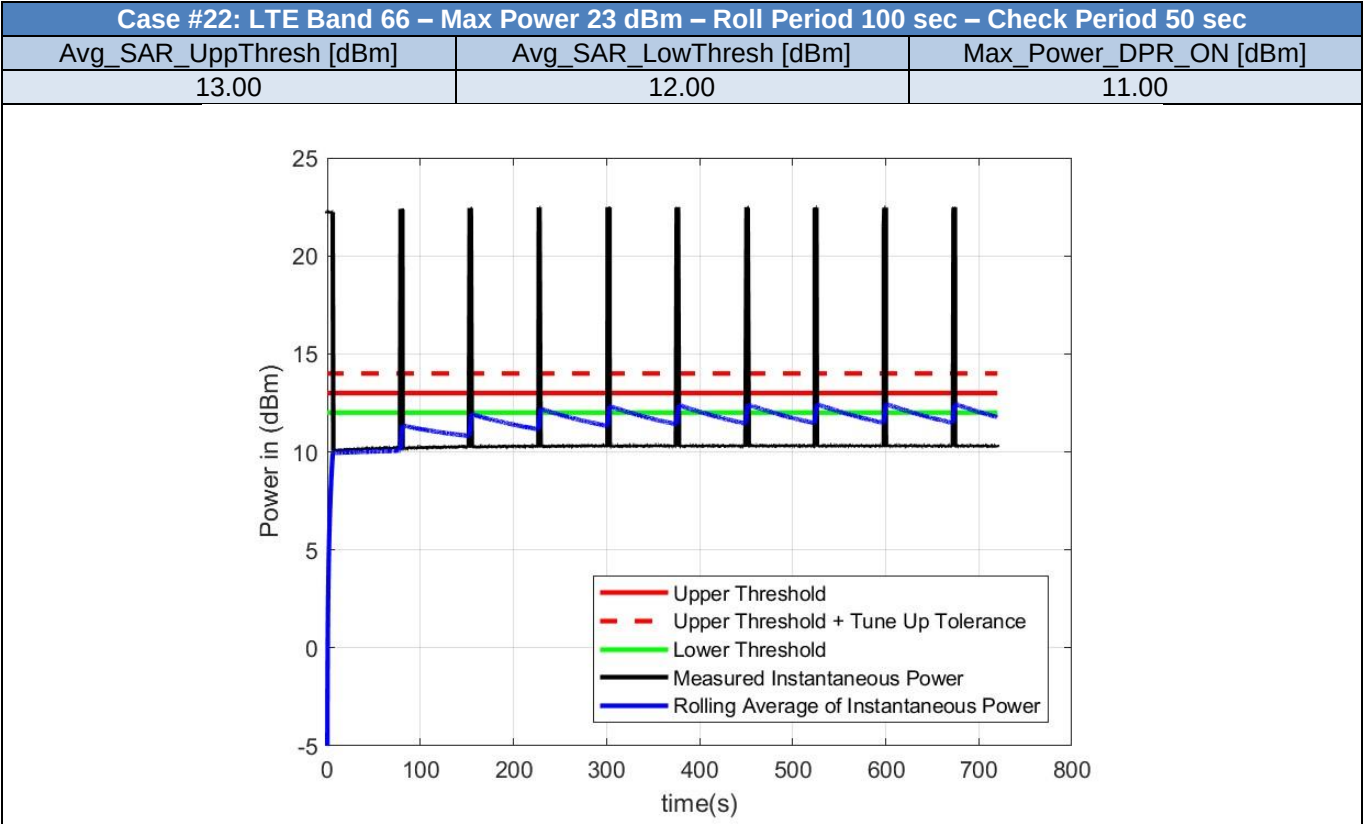
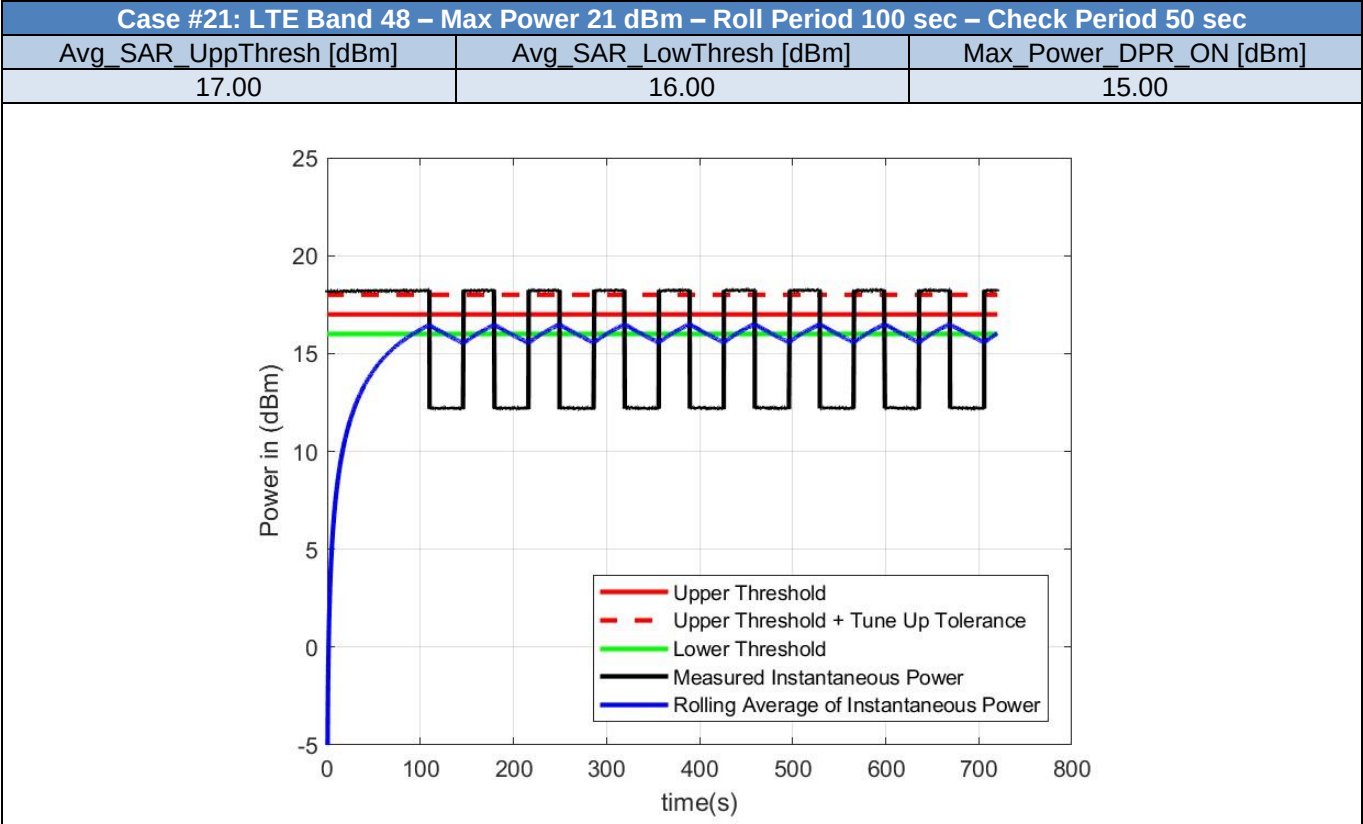
Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.

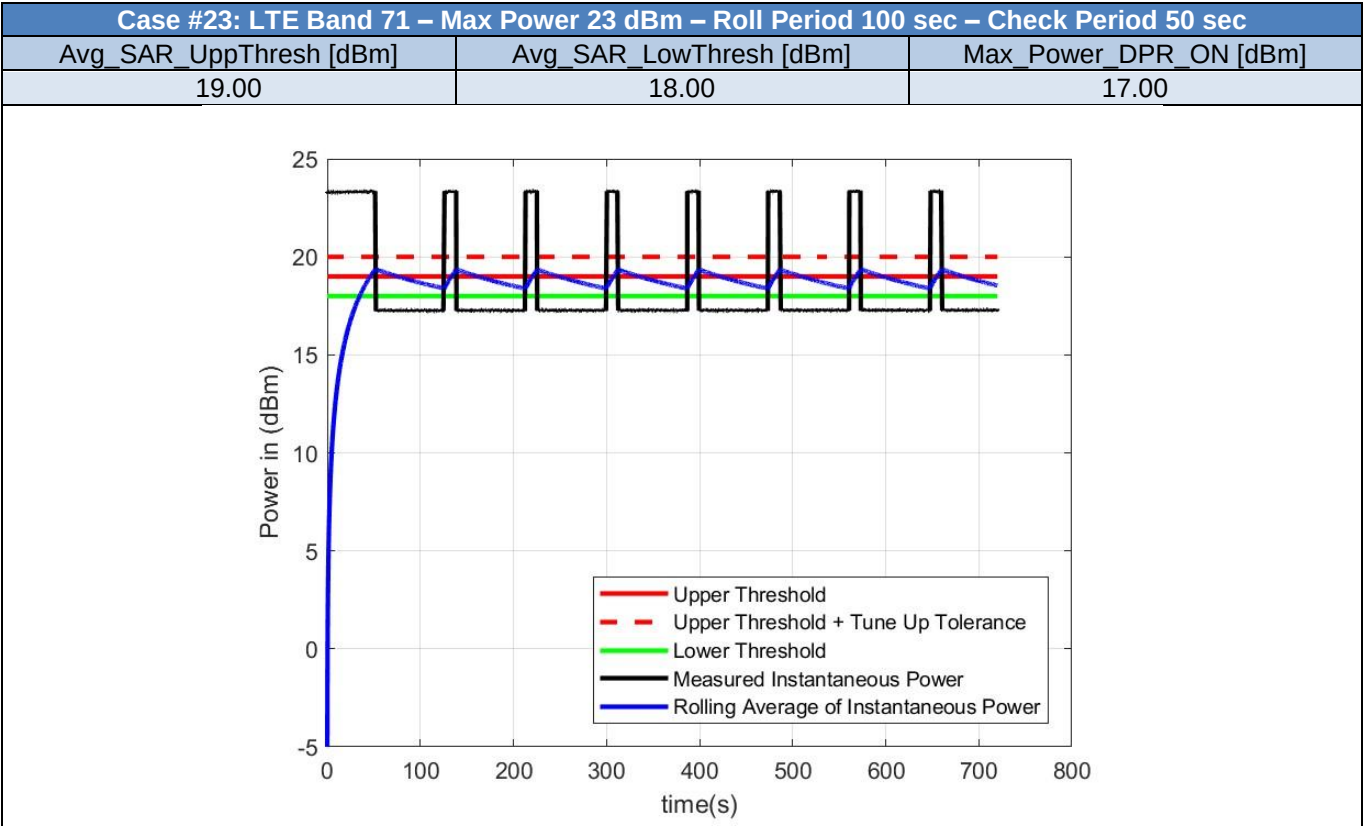










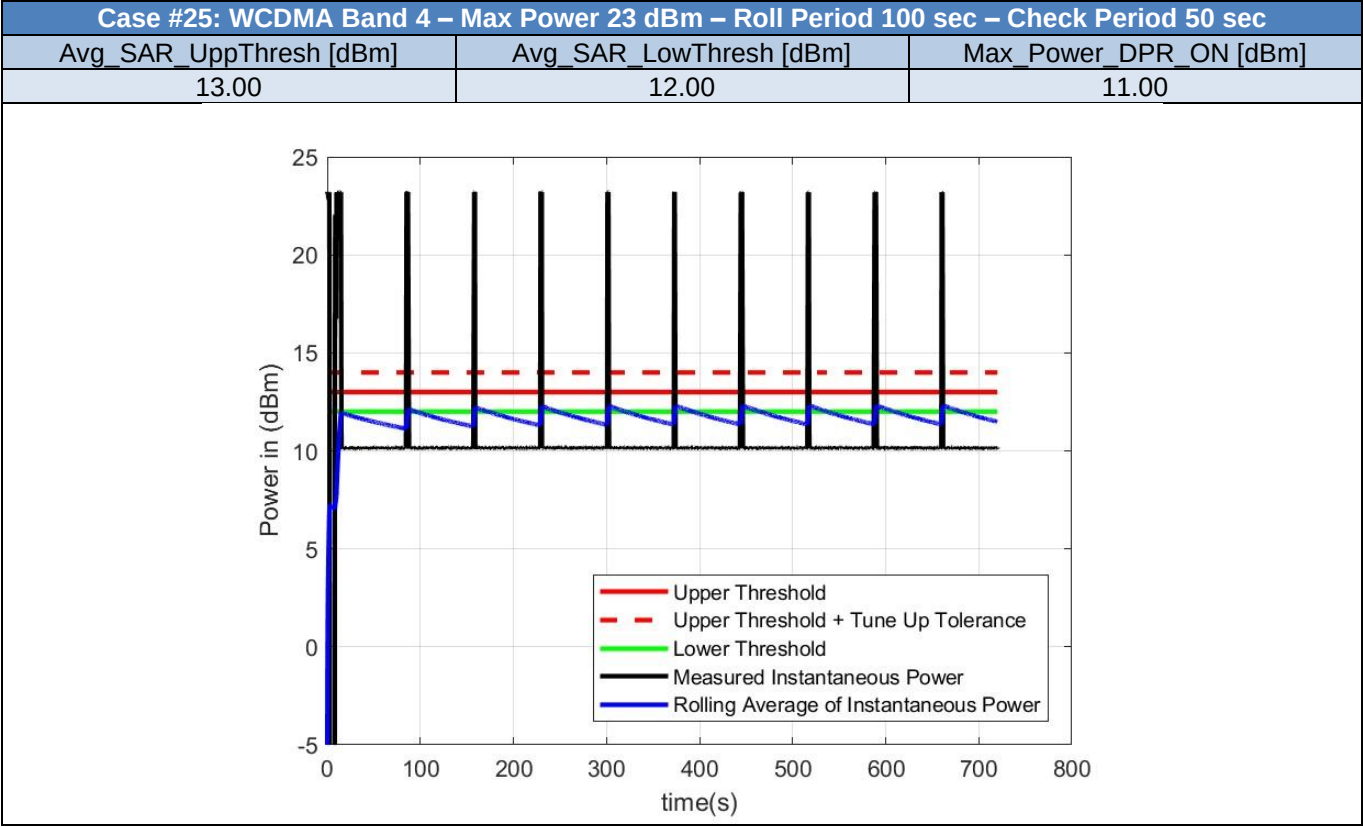
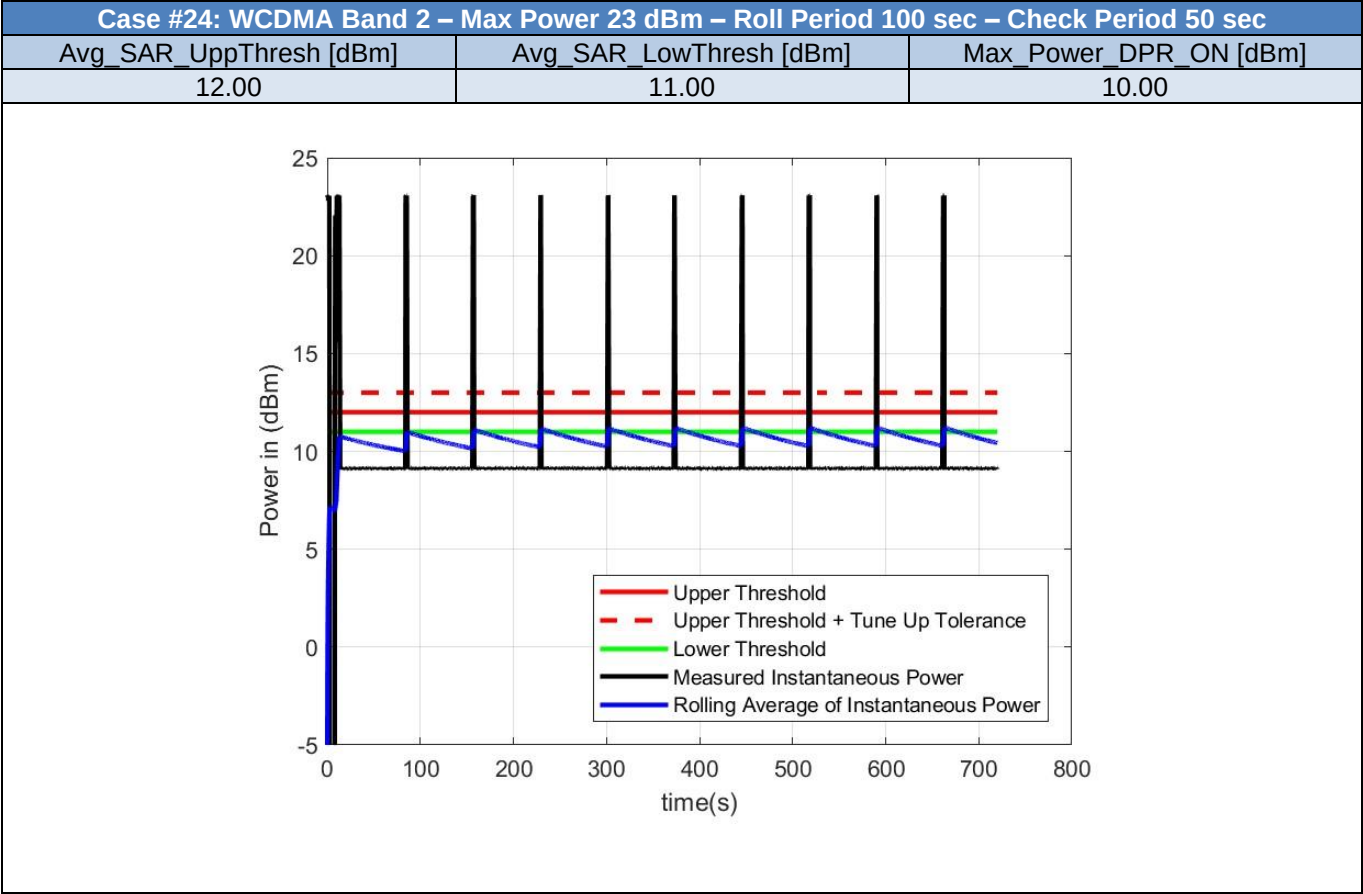


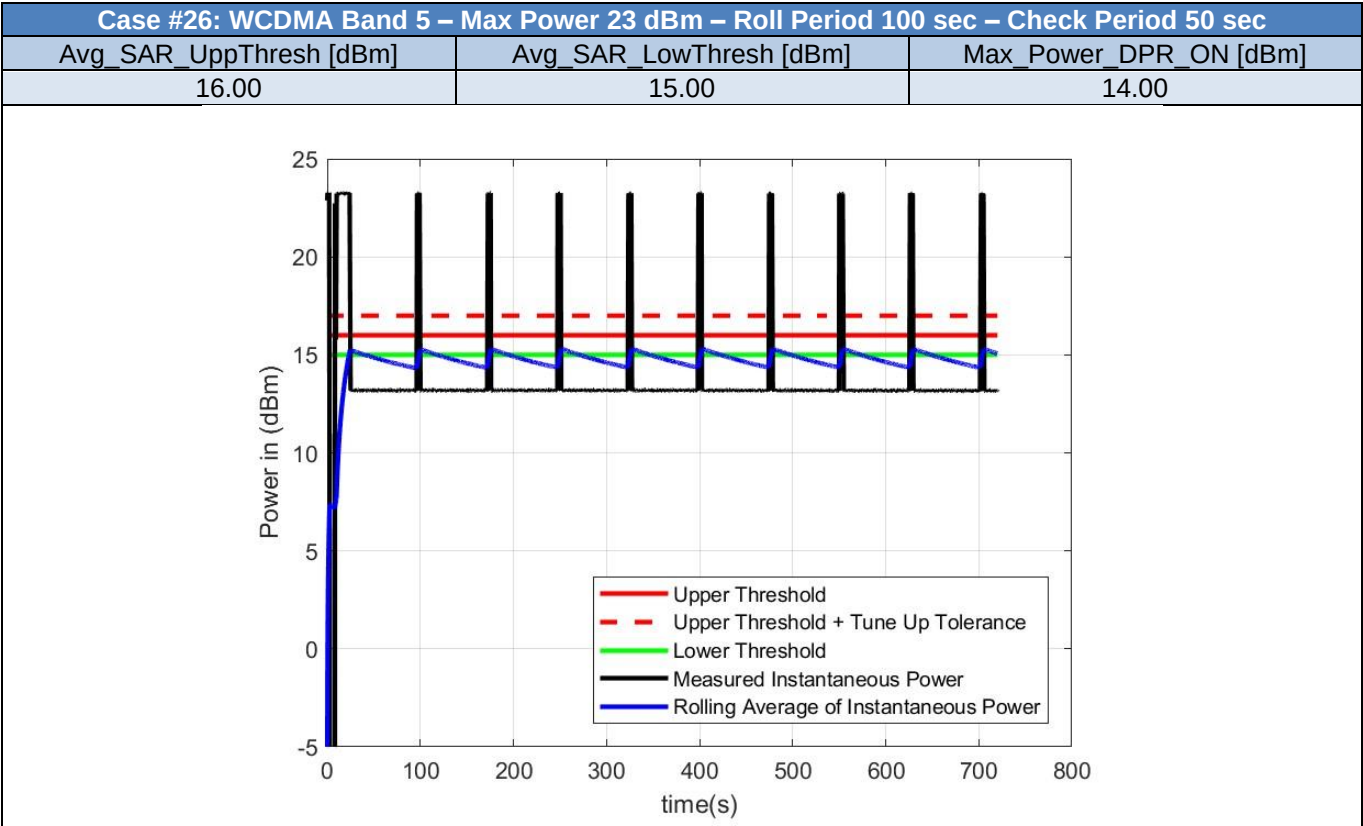
B.4 Bands Validation - WCDMA

Table 3 - Test Cases for Bands Compliance of WCDMA bands

Case	RAT	Band	Max_Power_ DPR_OFF_d Bm	Roll_Period_ s	Check_Perio d_s	Avg_SAR_Up pThresh_dB m	Avg_SAR_Lo wThresh_dB m	Max_Power_ DPR_ON_dB m
24	WCDMA	2	23.00	100	50	12.00	11.00	10.00
25	WCDMA	4	23.00	100	50	13.00	12.00	11.00
26	WCDMA	5	23.00	100	50	16.00	15.00	14.00

Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.



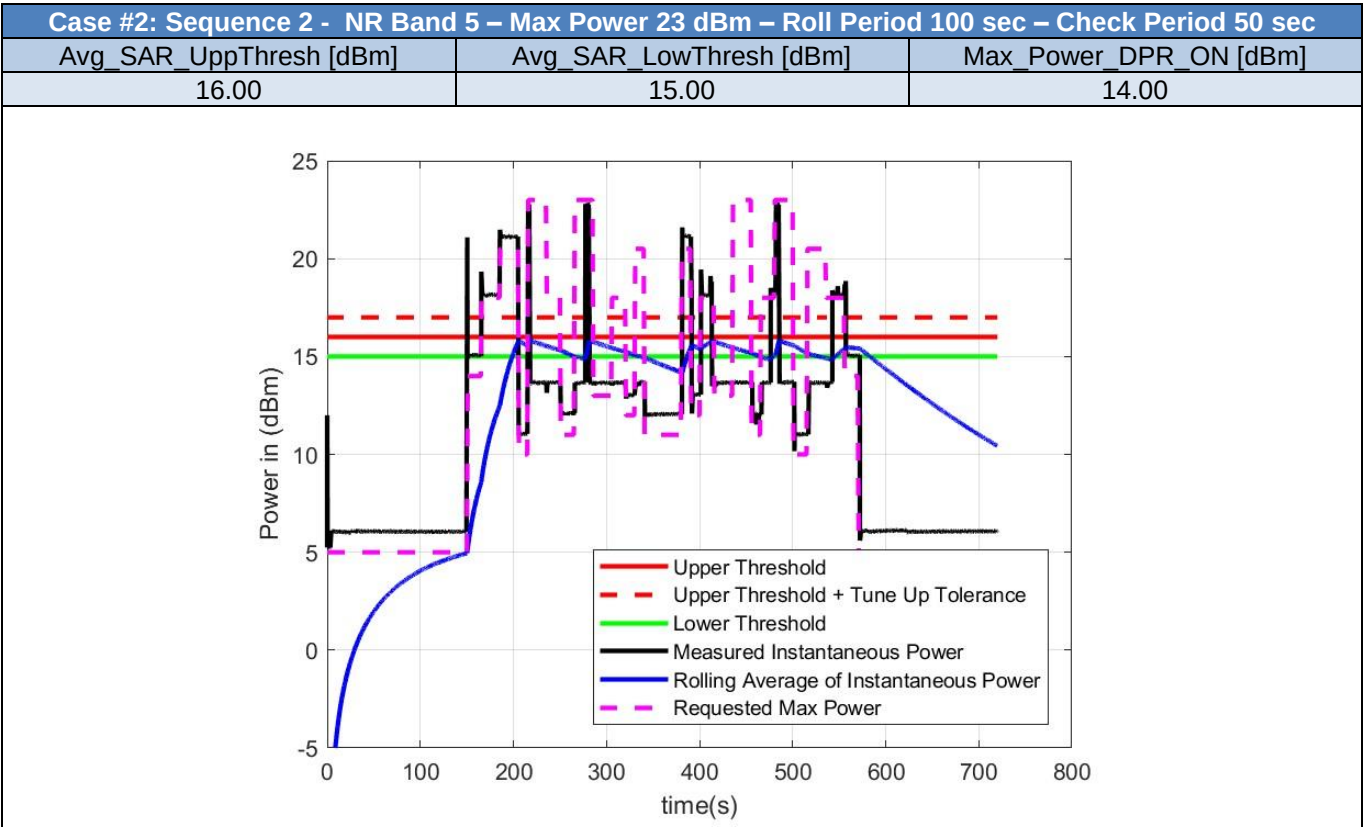
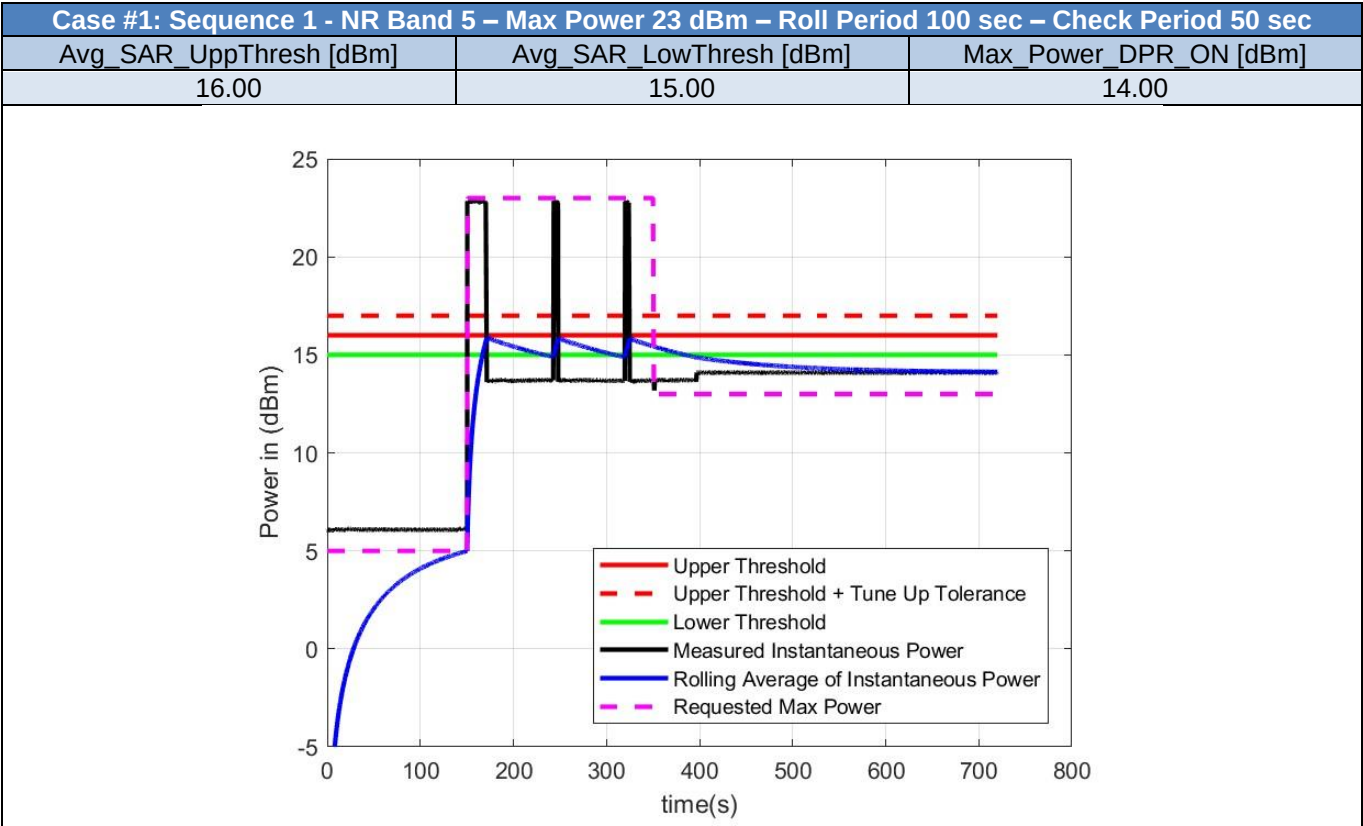


B.5 Time Varying Test Sequence - NR

Table 4 - Test Cases for Time Varying Test Sequence of NR bands

Case	RAT	Band	Max_Power_DPR_OFF	Roll_Period	Check_Period	Avg_SAR_UpThresh	Avg_SAR_LoThresh	Max_Power_DPR_ON
1	NR	5	23.00	100	50	16.00	15.00	14.00
2	NR	5	23.00	100	50	16.00	15.00	14.00

Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.

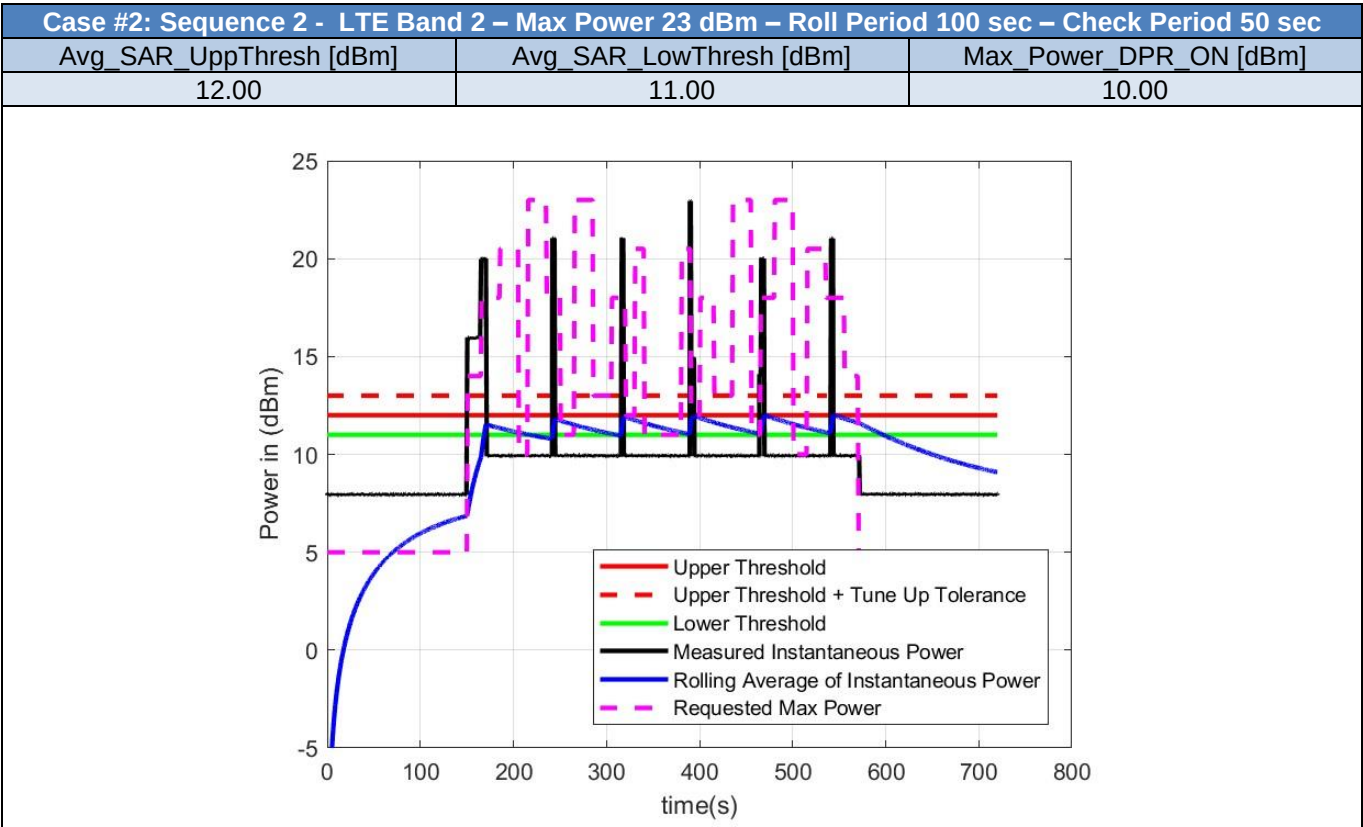
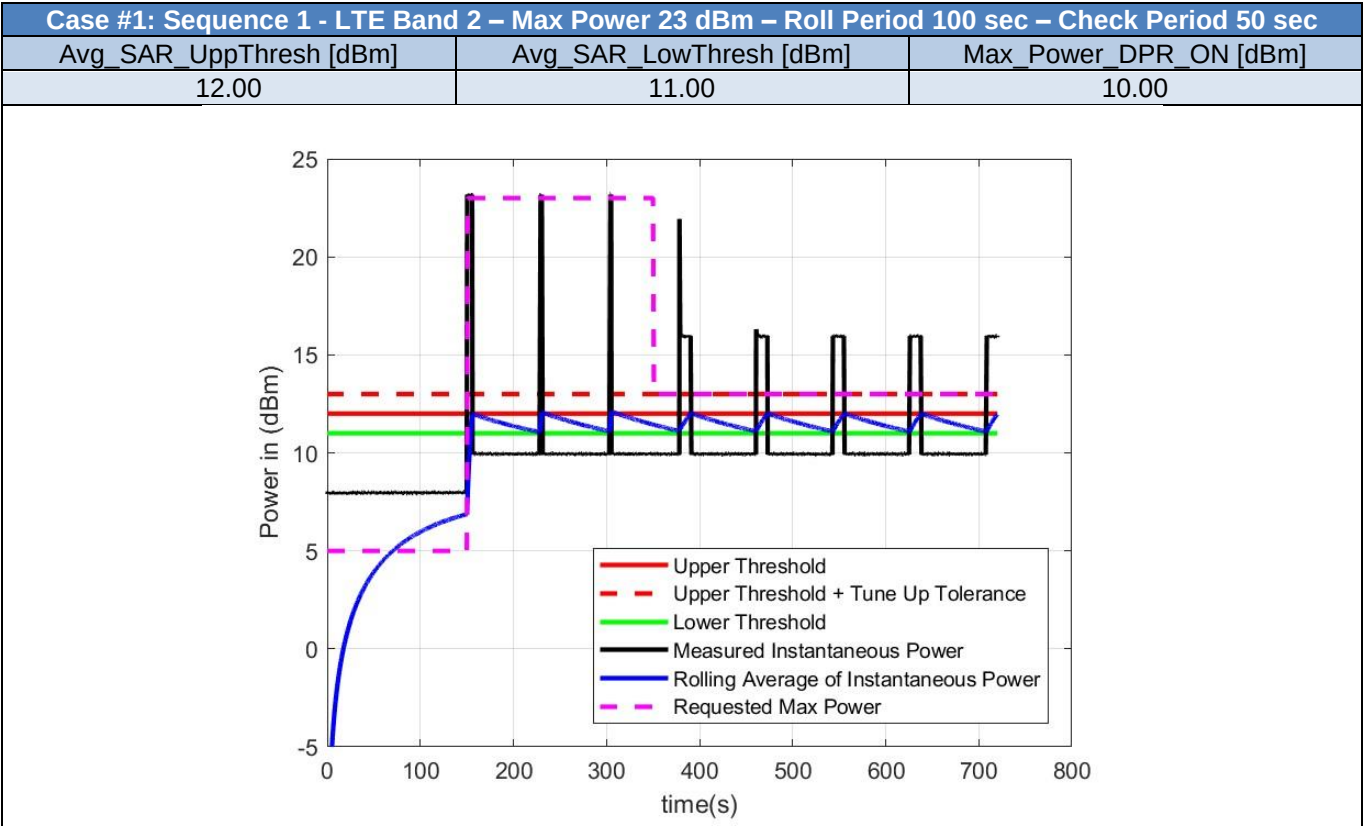


B.6 Time Varying Test Sequence - LTE

Table 5 - Test Cases for Time Varying Test Sequence of LTE bands

Case	RAT	Band	Max_Power_DPR_OFF	Roll_Period	Check_Period	Avg_SAR_UpperThresh	Avg_SAR_LowerThresh	Max_Power_DPR_ON
1	LTE	2	23.00	100	50	12.00	11.00	10.00
2	LTE	2	23.00	100	50	12.00	11.00	10.00

Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.



B.7 Time Varying Test Sequence - WCDMA

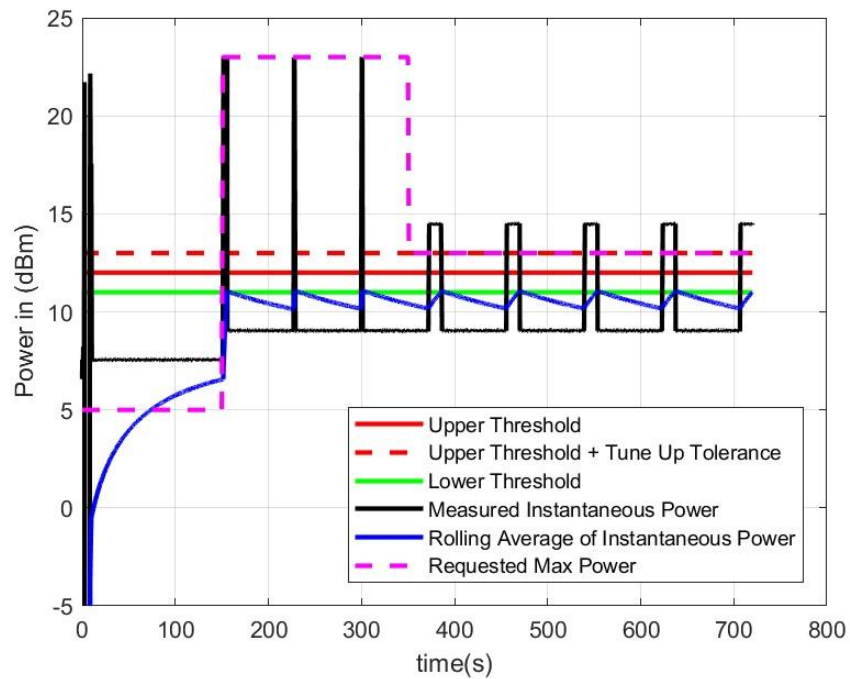
Table 6 - Test Cases for Time Varying Test Sequence of WCDMA bands

Case	RAT	Band	Max_Power_DPR_OFF	Roll_Period	Check_Period	Avg_SAR_UpperThresh	Avg_SAR_LowerThresh	Max_Power_DPR_ON
1	WCDMA	2	23.00	100	50	12.00	11.00	10.00
2	WCDMA	2	23.00	100	50	12.00	11.00	10.00

Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.

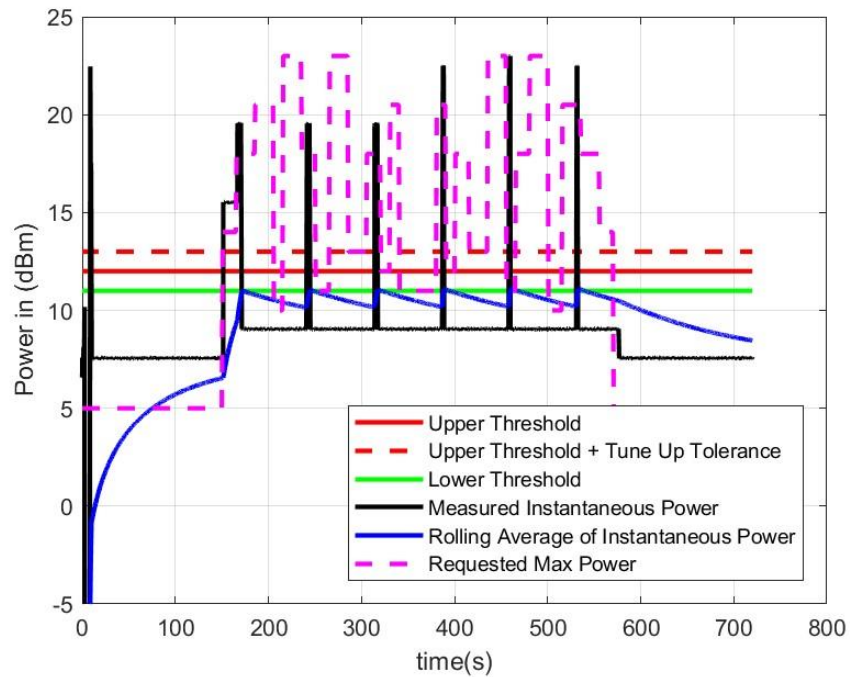
Case #1: Sequence 1 - WCDMA Band 2 – Max Power 23 dBm – Roll Period 100 sec – Check Period 50 sec

Avg_SAR_UppThresh [dBm]	Avg_SAR_LowThresh [dBm]	Max_Power_DPR_ON [dBm]
12.00	11.00	10.00



Case #2: Sequence 2 - WCDMA Band 2 – Max Power 23 dBm – Roll Period 100 sec – Check Period 50 sec

Avg_SAR_UppThresh [dBm]	Avg_SAR_LowThresh [dBm]	Max_Power_DPR_ON [dBm]
12.00	11.00	10.00

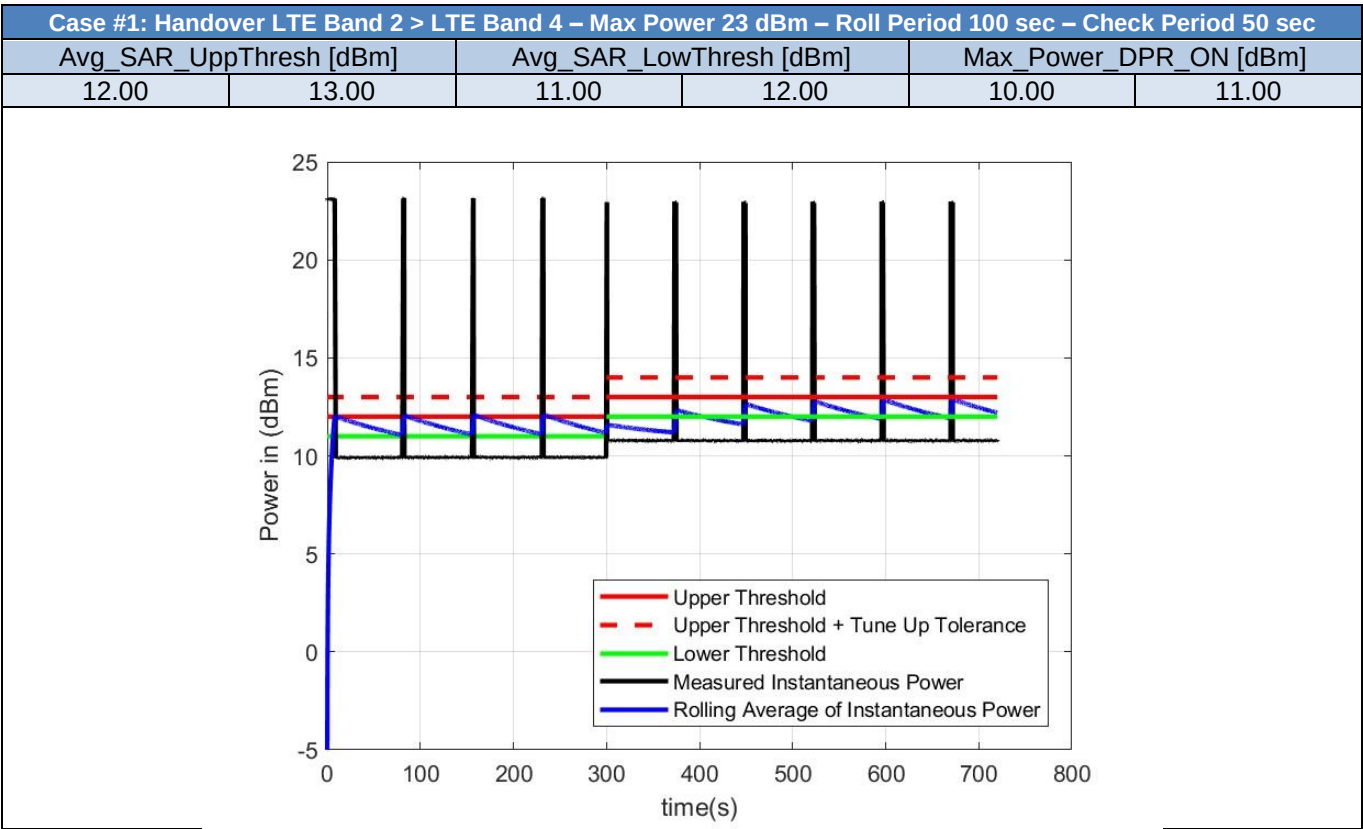


B.8 Handover - LTE-LTE

Table 7 - Test Cases for Handover of LTE-LTE bands

Case	RAT	Band	Max_Power_DPR_OFF_dBm	Roll_Period_s	Check_Period_s	Avg_SAR_UppThresh_dBm	Avg_SAR_LowThresh_dBm	Max_Power_DPR_ON_dBm
1	LTE	2	23.00	100	50	12.00	11.00	10.00
	LTE	4	23.00	100	50	13.00	12.00	11.00

Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.

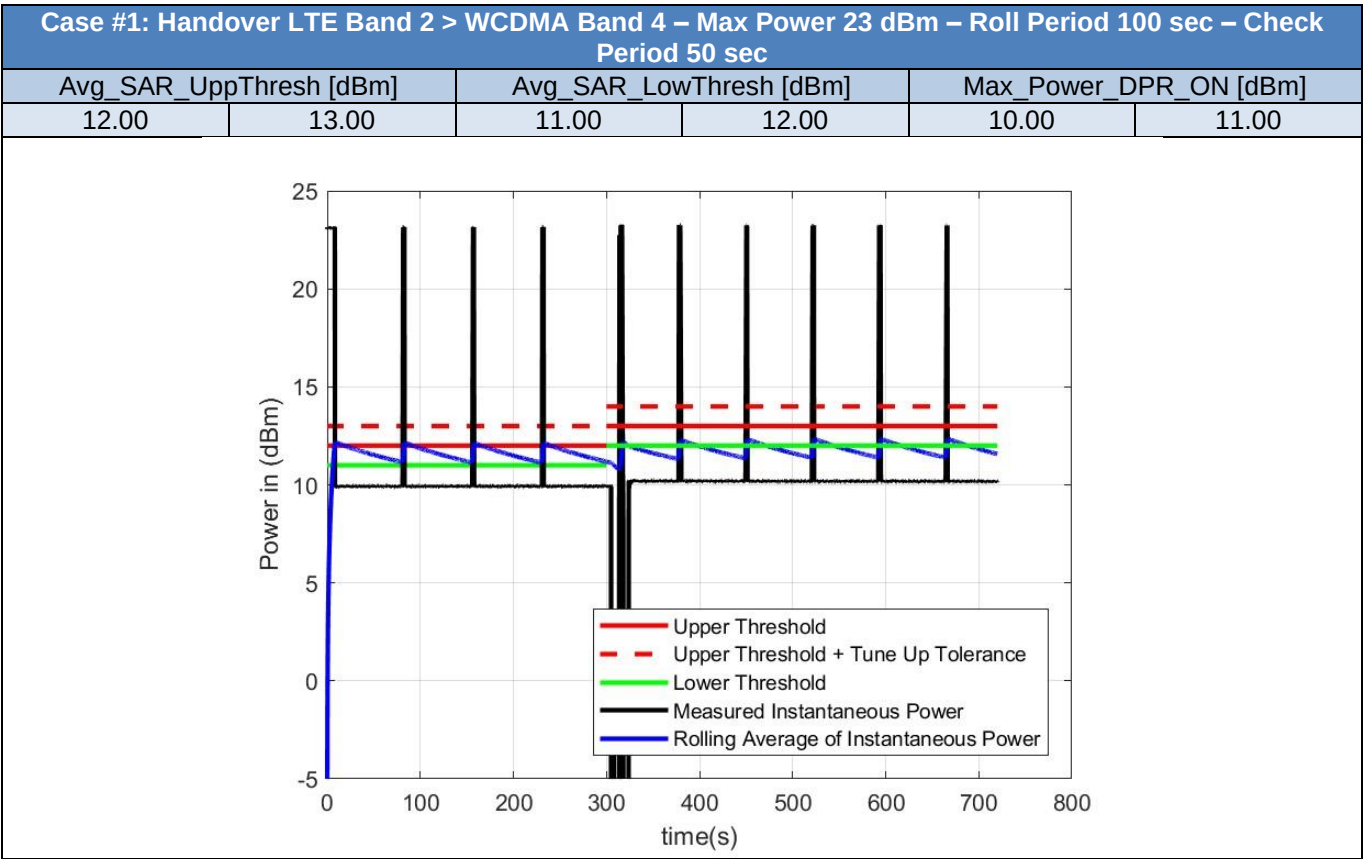


B.9 Handover - LTE-WCDMA

Table 8 - Test Cases for Handover of LTE-WCDMA bands

Case	RAT	Band	Max_Power_DPR_OFF_dBm	Roll_Period_s	Check_Period_s	Avg_SAR_UppThresh_dBm	Avg_SAR_LowThresh_dBm	Max_Power_DPR_ON_dBm
1	LTE	2	23.00	100	50	12.00	11.00	10.00
	WCDMA	4	23.00	100	50	13.00	12.00	11.00

Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.

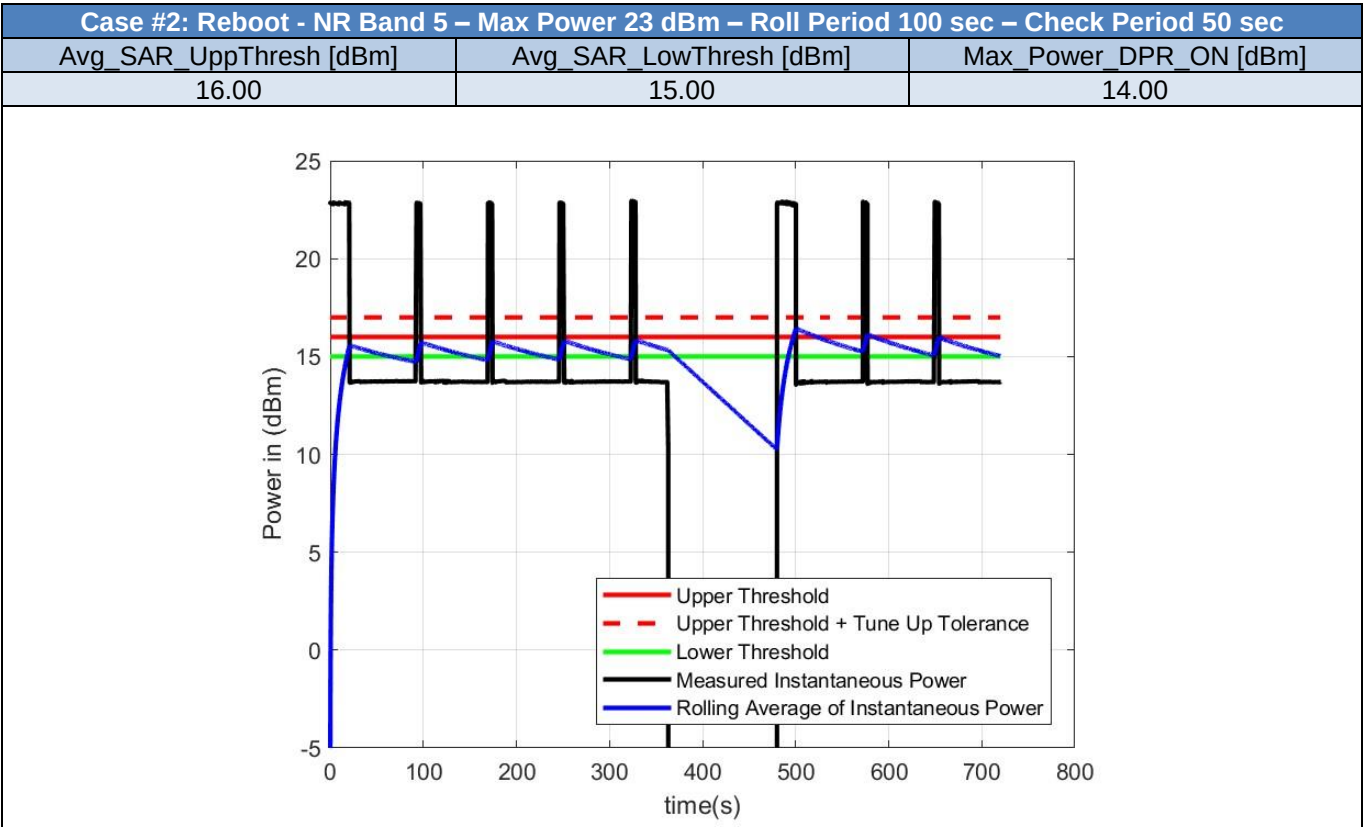
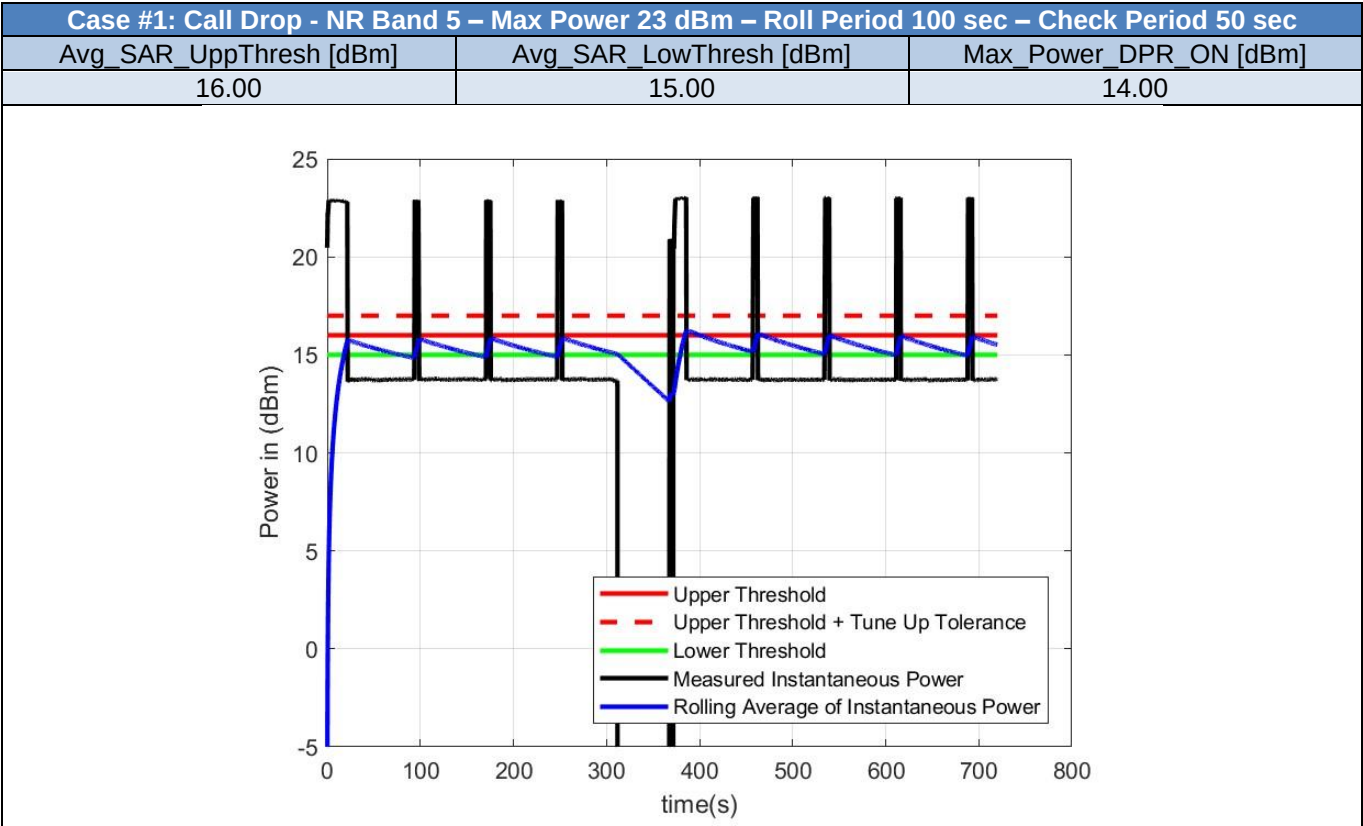


B.10 Call Drop and Reboot - NR

Table 9 - Test Cases for Call Drop and Reboot of NR bands

Case	RAT	Band	Max_Power_DPR_OFF	Roll_Period	Check_Period	Avg_SAR_Up_pThresh	Avg_SAR_LowThresh	Max_Power_DPR_ON
1	NR	5	23.00	100	50	16.00	15.00	14.00
2	NR	5	23.00	100	50	16.00	15.00	14.00

Note: The Average power is calculated using the measured instantaneous power and compared to the UpperThreshold Plus Tune-Up Tolerance. This is applied for all the test cases in this report.



End of the report

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