FCC TAS validation – Part 2:

Tests under dynamic transmit power scenarios

The following samples were submitted and identified on behalf of the client as:

EUT Description	Mobile Phone
Model No.	V2446
Applicant	vivo Mobile Communication Co., Ltd. No.1, vivo Road, Chang'an, Dongguan, Guangdong, China
FCC ID	2AUCY-V2446
Date of EUT Receipt	Mar. 24, 2025
Date of Test(s)	Mar. 24, 2025 ~ Mar. 27, 2025
Date of Issue	Apr. 08, 2025

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Signed on behalf of SGS

Clerk / Cindy Chou	PM / Kiki Lin	Approved By / John Yeh
Cindy Chou	Kiki Lin	John Yeh

Date: Apr. 08, 2025

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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2503000270ES	00	Initial creation of document	Apr. 08, 2025	Cindy Chou	

Note:

1. The mark " * " is the revised version of the report due to comments submitted by the certification.

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Contents

1 GENERAL INFORMATION 5
1.1 Test Facility 5
2 Overview 6
3 MediaTek TAS feature Operation Description 7
3.1 Operating Parameters for Algorithm Validation 7
3.2 Overview of TA-SAR Test Proposal 8
4 TA-SAR Test Scenarios and Test Procedures 9
4.1 Test Sequences for All Scenarios 10
4.2 Test Configuration and Procedure for Scenario 1: Range of TA-SAR Parameters via Conducted Power Measurements 15
4.3 Test Configuration and Procedure for Scenario 2: Time-Varying TX Power via Conducted Power Measurements 17
4.4 Test Configuration and Procedure for Scenario 3: Call Disconnection and Re-establishment via Conducted Power Measurements 19
4.5 Test Configuration and Procedure for Scenario 4: Band Handover via Conducted Power Measurements 21
4.6 Test Configuration and Procedure for Scenario 5: Exposure Condition Index (ECI) Change via Conducted Power Measurements 23
4.7 Test Configuration and Procedure for Scenario 6 Antenna Switching via Conducted Power Measurements 24
4.8 Test Configuration and Procedure for Scenario 7: Time Window Switching via Conducted Power Measurements 25
4.9 Test Configuration and Procedure for Scenario 8: SAR Exposure Switching via Conducted Power Measurements 28
4.10 Test Configuration and Procedure for Scenario 2: Time-Varying TX Power via SAR Measurements 31
5 TA-SAR Validation via Conducted Power Measurements 33
5.1 Measurement Setup 33
5.2 Conducted Power Measurement Results for Scenario1: Range of TA-SAR Parameters 40
5.3 Conducted Power Measurement Results for Scenario 2: Time-Varying TX Power 45
5.4 Conducted Power Measurement Results for Scenario 3: Call Disconnection and Re-establishment 82
5.5 Conducted Power Measurement Results for Scenario 4: Band Handover 85
5.6 Conducted Power Measurement Results for Scenario 5: ECI Change 88
5.7 Conducted Power Measurement Results for Scenario 6: Antenna Switching 91
5.8 Conducted Power Measurement Results for Scenario 7: Time Window Switching 94
5.9 Conducted Power Measurement Results for Scenario 8: SAR Exposure Switching 101
6 TA-SAR Validation via SAR Measurements 106
6.1 Measurement Setup 106
6.2 SAR Measurement Results for Scenario 2: Time-Varying TX Power 107

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7 Conclusions 124
Appendix A. cDASY6 System Verification 125
Appendix B. Instruments List 127
Appendix C. SAR SYSTEM VERIFICATION 128
Appendix D. UNCERTAINTY BUDGET 131
8 SAR SYSTEM CHECK RESULTS 133
9 APPENDIXES 137
9.1 SAR_Appendix E Photographs 137
9.2 SAR_Appendix F DAE & Probe Cal. Certificate 137
9.3 SAR_Appendix G Phantom Description & Dipole Cal. Certificate 137
9.4 SAR_Appendix H DIpole Extended Calibration Verification 137

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1 GENERAL INFORMATION

1.1 Test Facility

Laboratory	Test Site Address	Test Site Name	FCC Designation number	IC CAB identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	**1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Road, Neihu District, Taipei City, 11493, Taiwan.**	SAR 2	TW0029	TW3702
		SAR 6		
		SAR 8		
	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 33383, Taiwan	SAR 1	TW0028	
		SAR 4		
	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan	SAR 3	TW0027	
		SAR 7		

Note: Test site name is remarked on a bolded mark as an indication where measurements occurred in specific test site and address.

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2 OVERVIEW

FCC regulation allows time averaged RF power to demonstrate compliance to RF exposure safety limits. Because RF exposure is correlated to transmission power (TX power), e.g., lower RF exposure is correlated to lower TX power, the TX power can be controlled to meet FCC RF exposure limits defined specific absorption rate (SAR) limit for transmit frequencies < 6GHz. For SAR limit, the proposed Time-Averaged Specific Absorption Rate (TA-SAR) algorithm manages TX power to ensure that at all times the time-averaged RF exposure is compliant with the FCC SAR requirement. In the FCC regulation, the averaging window of SAR is 100 seconds for transmit frequencies less than 3GHz, 60 seconds for transmit frequencies between 3GHz and 6GHz.

This document describes the test plan, test procedures, measurement setup, and measurement results for the verification of the proposed TA-SAR/TA-PD algorithm being able to make RF exposure meet FCC requirement.

The equipment under test (EUT) is a mobile phone, it contains supports 2G/3G/4G/5G bands. These modems are enabled with MediaTek TAS feature to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance with the FCC requirement.

This purpose of the Part 2 report is to demonstrate the EUT complies with FCC RF exposure requirement under Tx varying transmission scenarios, thereby validity of MediaTek TAS feature for FCC equipment authorization

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3 MEDIATEK TAS FEATURE OPERATION DESCRIPTION

3.1 Operating Parameters for Algorithm Validation

Mediatek developed the TA-SAR algorithm to control instantaneous TX power for transmit frequencies less than 6GHz, so that the time-averaged RF exposures are less than FCC requirement. TA-SAR algorithm validation has been performed for 2G, 3G, LTE, 5G NR according to cases with different combinations of operating parameters listed in Table 3-1.

Table 3-1 TA-SAR operating parameters

Operating parameters	Description
P_{sub6_limit}	The time-averaged maximum power level limit for different band in sub6.
$P_{LowThresh_offset}$	To calculate $P_{LowThresh.}$ ($P_{LowThresh}$ = P_{sub6_limit} - $P_{LowThresh_offset}$)
$P_{UE_backoff_offset}$	To calculate $P_{UE_backoff.}$ ($P_{UE_backoff}$ = P_{sub6_limit} - $P_{UE_backoff_offset}$)
$P_{UE_max_cust_offset}$	To calculate $P_{UE_max_cust.}$ P_{UE_max} is maximum TX power at which a UE can possibly transmit in sub6. ($P_{UE_max_cust}$ = P_{sub6_limit} - $P_{UE_backoff_offset}$)

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3.2 Overview of TA-SAR Test Proposal

For the completeness of verifying that the proposed TA-SAR algorithm can realize FCC compliance regarding RF exposure, several test scenarios are constructed as below:
Scenario 1: test under different TA-SAR parameters to verify that the TA-SAR algorithm meets compliance requirements with different combinations of operating parameters.
Scenario 2: test under time-varying TX power to verify that the TA-SAR algorithm ensures SAR compliance through dynamic TX power.
Scenario 3: test under call drop and re-establishment conditions to ensure the TA-SAR algorithm control continuity and SAR compliance.
Scenario 4: test under RAT/band handover to ensure the TA-SAR algorithm control continuity and correctness.
Scenario 5: test under different ECIs (Exposure Condition Index) to ensure the TA-SAR algorithm control behaves as expected during ECI switching from one ECI to another. (e.g., head → body worn)
Scenario 6: test under different transmission antennae to ensure the TA-SAR algorithm control works correctly during antenna switching from one antenna to another.
Scenario 7: test under different time windows to ensure the TA-SAR algorithm control functions correctly during time window switching from one time window setting to another. (e.g., time window 100s → 60s)
Scenario 8: test under SAR exposure switching between two active radios (radio#1 only, radio#1+radio#2, and radio#2 only) to ensure the TA-SAR algorithm control continuity and SAR compliance.

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4 TA-SAR TEST SCENARIOS AND TEST PROCEDURES

In order to demonstrate that TA-SAR algorithm performs as expected under various operating scenarios, Table 4-1 lists the test scenarios and expected test sequences to validate TA-SAR algorithm in these scenarios. The test sequences 0, 1, 2 are defined in section 4.1. The details of each test procedures via conducted power and SAR measurements are described in section 4.2~4.9 and section 4.10, respectively.

Table 4-1 Test scenario list of TA-SAR validation

Test scenario		Test sequences #	Description
1	Range of TA-SAR parameters	0	Adjust parameters
2	Time-varying TX power	1 and 2	Test under time-varying
3	Call disconnection and re-establishment	0	Test call drop and re-establishment
4	Band handover	0	Test band change
5	ECI (Exposure Condition Index) change	0	Test under ECI transition (e.g., head → body worn)
6	Antenna switching	0	Change antenna
7	Time window switching	0	Switch frequency bands with larger frequency separation (e.g., time window 100s → 60s)
8	SAR exposure switching	0	Switch RATs when

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4.1 Test Sequences for All Scenarios

Three test sequences having possibly time-varying TX power are predefined for TA-SAR validation:

- Test sequence 0: EUT's TX power is requested to be maximum.
- Test sequence 1: EUT's TX power is requested to be at power less than $P_{LowThresh}$ for 300s, then at maximum power for 200s, and finally at $P_{LowThresh}$ -2dB for the remaining time.
- Test sequence 2: EUT's TX power to vary with time. This sequence is generated relative to measured P_{UE_max}, measured Psub6_limit and calculated $P_{UE_backoff}$ (= measured P_{sub6_limit} in dBm - $P_{UE_backoff_offset}$ in dB) of EUT based on measured P_{sub6_limit}.

- Test sequence is generated based on below parameters of the EUT:
  A. Measured maximum power (P_{UE_max})
  B. Measured Tx_power_at_*SAR_design_limit* (P_{sub6_limit})
  C. Threshold of dynamic power reduction status determination: reserve hysteresis margin for instantaneous power ($P_{LowThresh}$)
  D. *SAR_time_window* (FCC: 100s for f < 3GHz, 60s for 3GHz < f <6GHz)

The test sequence 0, 1, and 2 are illustrated in Figure 4-1, Figure 4-2, and Figure 4-3, respectively. The waveforms of the three test sequences are listed in Table 4-2, Table 4-3, and Table 4-4.

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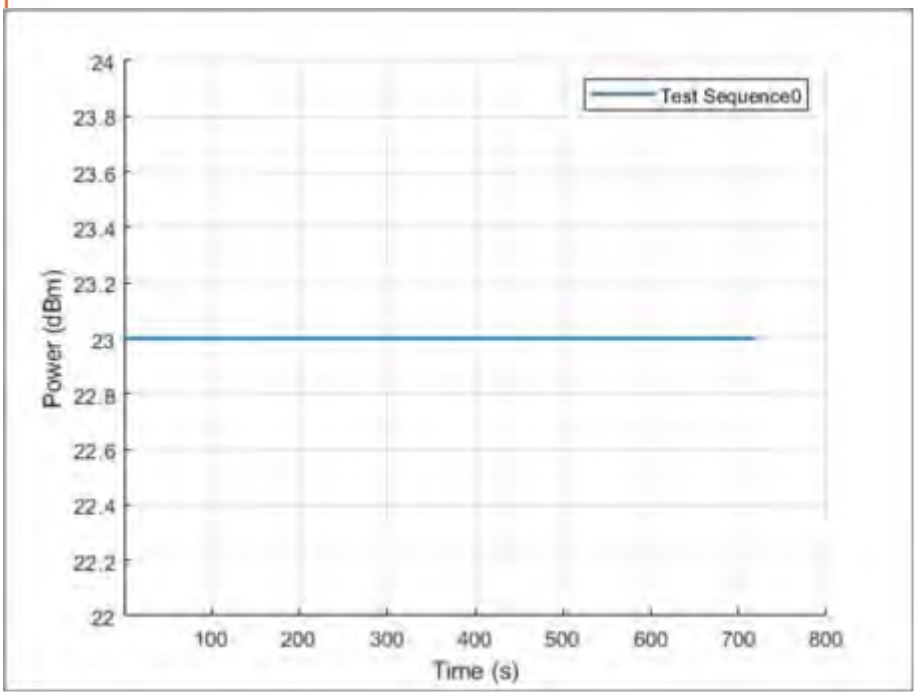

Figure 4-1 Test sequence 0

Table 4-2 Test sequence 0

Time	Duration	Power (dBm)	Note
720	720	23	P_{UE_max}

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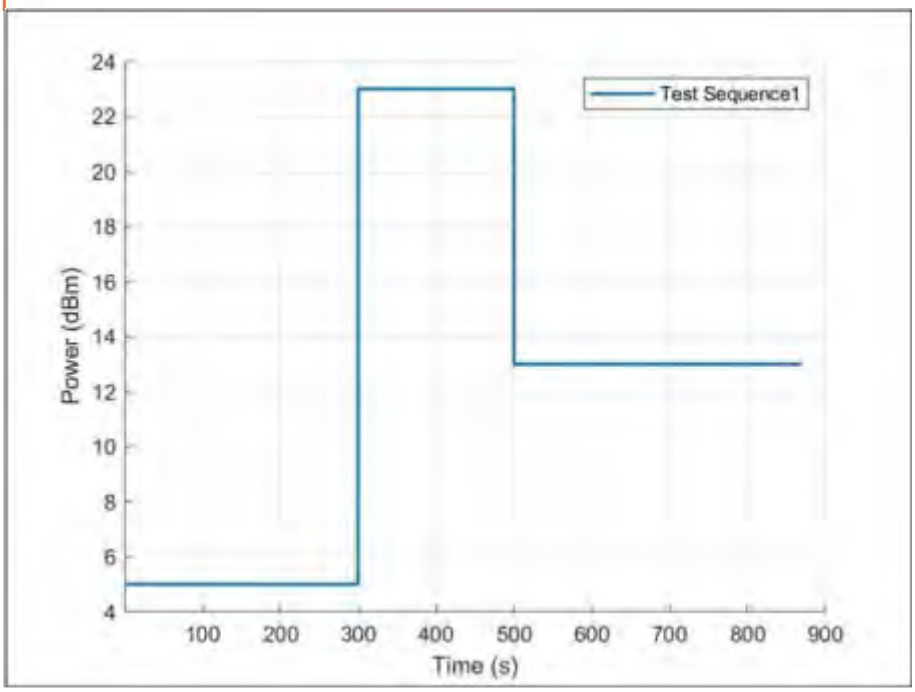

Figure 4-2 Test sequence 1

Table 4-3 Test sequence 1

Time	Duration	Power (dBm)	Note
300	300	5	< $P_{LowThresh}$
500	200	23	P_{UE_max}
870	370	13	$P_{LowThresh}$ - 2dB

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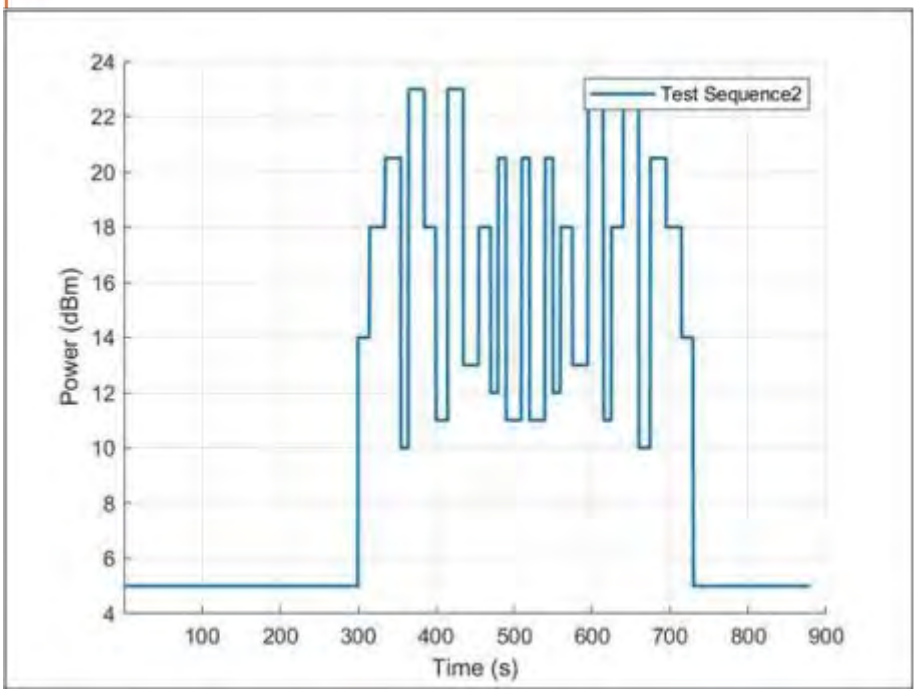

Figure 4-3 Test sequence 2

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Table 4-4 Test sequence 2

Time	Duration	Power (dBm)	Note
300	300	5	< $P_{LowThresh}$
315	15	14	P_{sub6_limit} - 4dB
335	20	18	P_{sub6_limit}
355	20	20.5	(P_{sub6_limit} + P_{UE_max})/2
365	10	10	P_{sub6_limit} - 8dB
385	20	23	P_{UE_max}
400	15	18	P_{sub6_limit}
415	15	11	P_{sub6_limit} - 7dB
435	20	23	P_{UE_max}
455	20	13	P_{sub6_limit} - 5dB
470	15	18	P_{sub6_limit}
480	10	12	P_{sub6_limit} - 6dB
490	10	20.5	(P_{sub6_limit} + P_{UE_max})/2
510	20	11	P_{sub6_limit} - 7dB
520	10	20.5	(P_{sub6_limit} + P_{UE_max})/2
540	20	11	P_{sub6_limit} - 7dB
550	10	20.5	(P_{sub6_limit} + P_{UE_max})/2
560	10	12	P_{sub6_limit} - 6dB
575	15	18	P_{sub6_limit}
595	20	13	P_{sub6_limit} - 5dB
615	20	23	P_{UE_max}
625	10	11	P_{sub6_limit} - 7dB
640	15	18	P_{sub6_limit}
660	20	23	P_{UE_max}
675	15	10	P_{sub6_limit} - 8dB
695	20	20.5	(P_{sub6_limit} + P_{UE_max})/2
715	20	18	P_{sub6_limit}
730	15	14	P_{sub6_limit} - 4dB
870	140	5	< $P_{LowThresh}$

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4.2 Test Configuration and Procedure for Scenario 1: Range of TA-SAR Parameters via Conducted Power Measurements

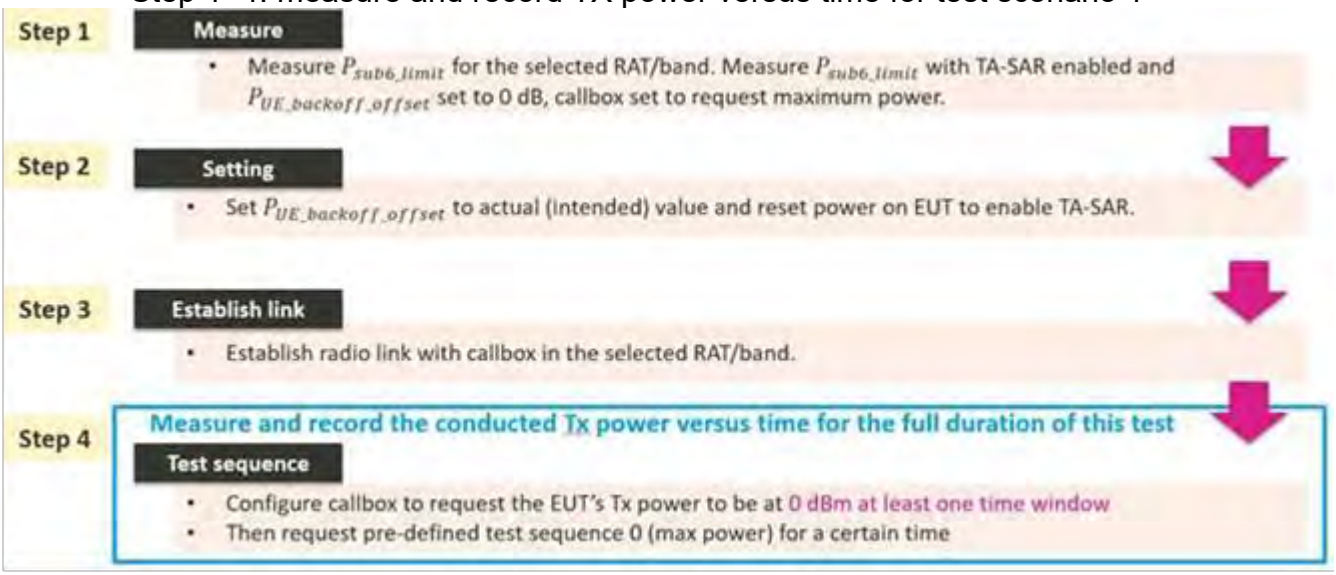
4.2.1 Configuration

This test is performed by changing the parameters ($P_{LowThesdh_offset}$, $P_{UE_back_offset}$, $P_{UE_max_cust_offset}$) for the selected RAT (Radio Access Technologies) and band. Since Mediatek's TA algorithm operation is independent of RATs/bands/channels, any one RAT can be selected for this test and the selected band of the RAT has the least P_{sub6_limit}. In principle, two sets of the parameters are determined for this test (if applicable). If the parameters of the EUT are fixed (without a support of dynamic change), only the set of the default parameters needs to be tested.

4.2.2 Procedure

TX power is measured, recorded, and processed by the following steps:

- Step 1~4: measure and record TX power versus time for test scenario 1



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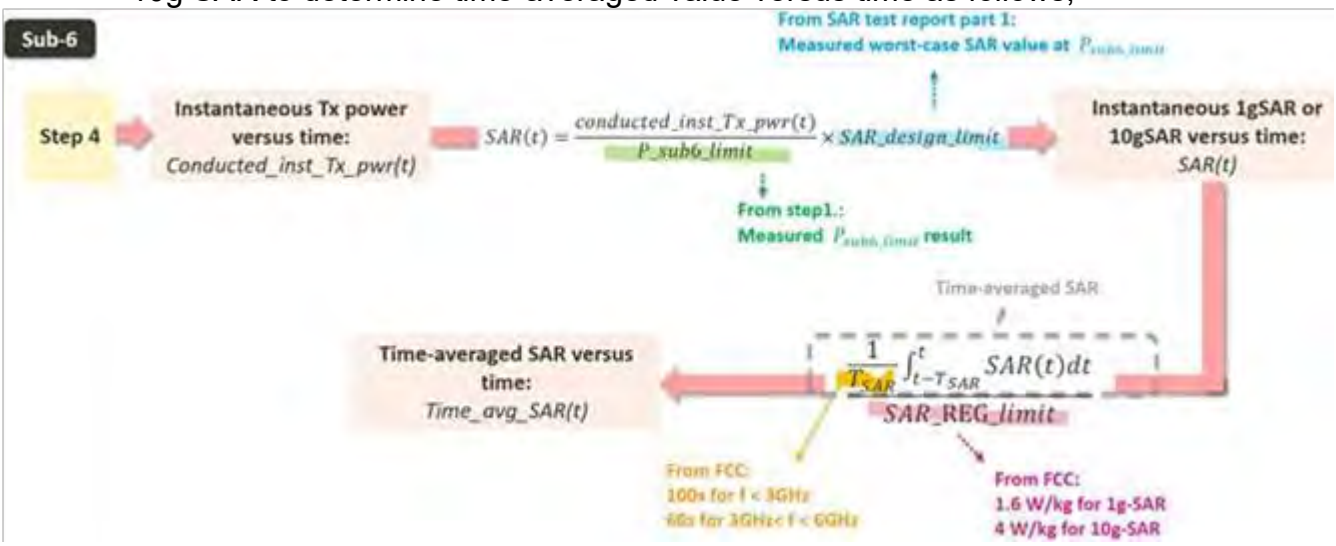
- Step 5: convert the measured conducted TX power into SAR
  Convert the measured conducted TX power from step 4 into 1gSAR or 10gSAR value using the following equation. Perform the running time average to power and 1gSAR or 10g SAR to determine time-averaged value versus time as follows,



- Step 6: plot results
  A. Make one power perspective plot containing
     1. Instantaneous TX power
     2. Requested power
     3. Calculated time-averaged power
     4. Calculated time-averaged power limits
  B. Make one SAR perspective plot containing
     1. Calculated time-averaged 1gSAR or 10gSAR
     2. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)

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4.3 Test Configuration and Procedure for Scenario 2: Time-Varying TX Power via Conducted Power Measurements

4.3.1 Configuration

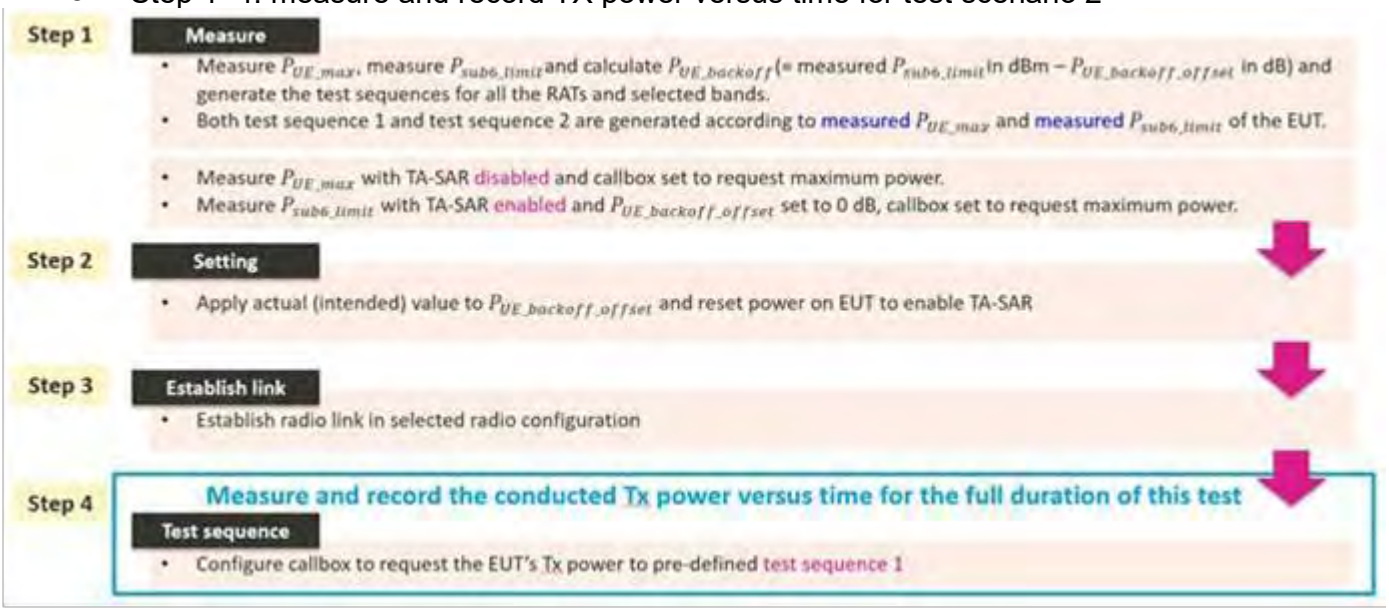
Since Mediatek's TA-SAR feature operation is independent of bands and channels for a given RAT, selecting one band per RAT is sufficient to validate this feature. Two bands per RAT are proposed for this test. The criteria for band selection for each RAT is based on the P_{sub6_limit} values (corresponding to *SAR_design_limit*) and is described as below:

- Select two bands, among the ones whose P_{sub6_limit} values are below P_{UE_max}, which correspond to least and highest P_{sub6_limit} values respectively.
  - Only one band needs to be tested if all the bands have same P_{sub6_limit}.
  - Only one band needs to be tested if only the band has P_{sub6_limit} below P_{UE_max}.
  - If the same least P_{sub6_limit} applies to multiple bands, select the band with the highest measured 1gSAR at P_{sub6_limit}.
  - If P_{sub6_limit} values of all bands are all over P_{UE_max} (i.e., TA-SAR feature is not enabled), there is no need to test this RAT.

4.3.2 Procedure

TX power is measured, recorded, and processed by the following steps:

- Step 1~4: measure and record TX power versus time for test scenario 2



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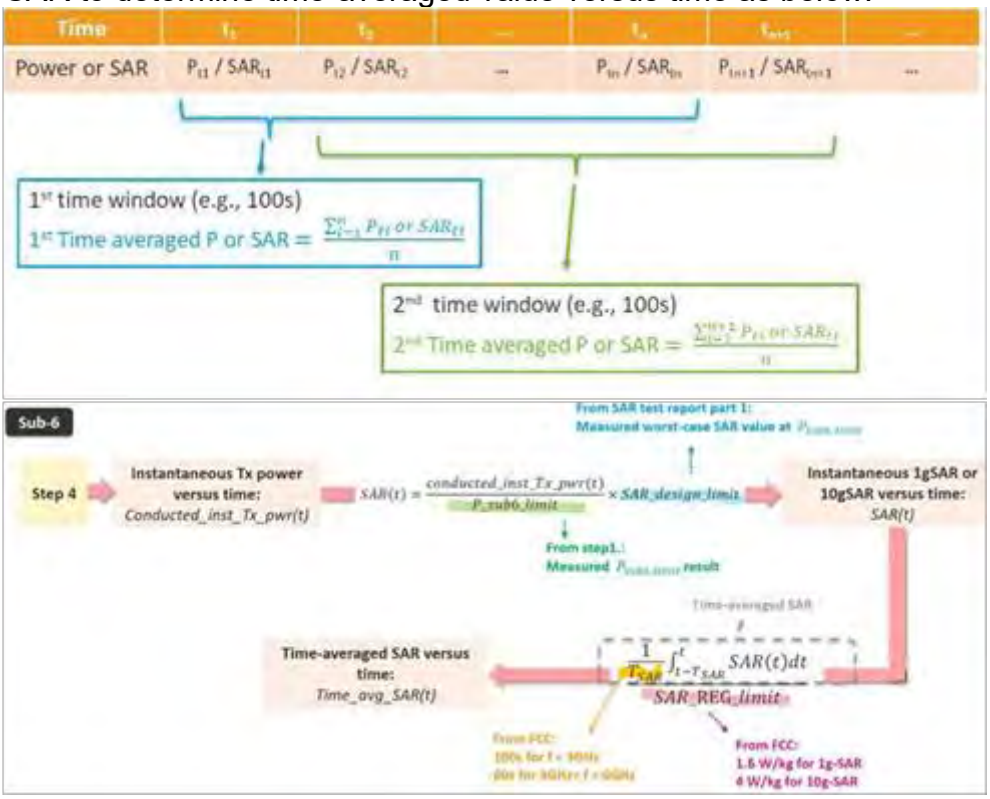
- Step 5: convert the measured conducted TX power into SAR
  Convert the measured conducted TX power from step 4 into 1gSAR or 10gSAR value using the following equation. Perform the running time average to power and 1gSAR or 10g SAR to determine time-averaged value versus time as below:



- Step 6: plot results
  A. Make one power perspective plot containing
     1. Instantaneous TX power
     2. Requested power (test sequence1)
     3. Calculated time-averaged power
     4. Calculated time-averaged power limits
  B. Make one SAR perspective plot containing
     1. Calculated time-averaged 1gSAR or 10gSAR
     2. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)

- Step 7: repeat steps 2~6 for test sequence 2
  Repeat steps 2 ~ 6 for pre-defined test sequence 2 and replace test sequence 1 in step 4 with test sequence 2.
- Step 8: repeat steps 2~7 for different bands

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4.4 Test Configuration and Procedure for Scenario 3: Call Disconnection and Re-establishment via Conducted Power Measurements

4.4.1 Configuration

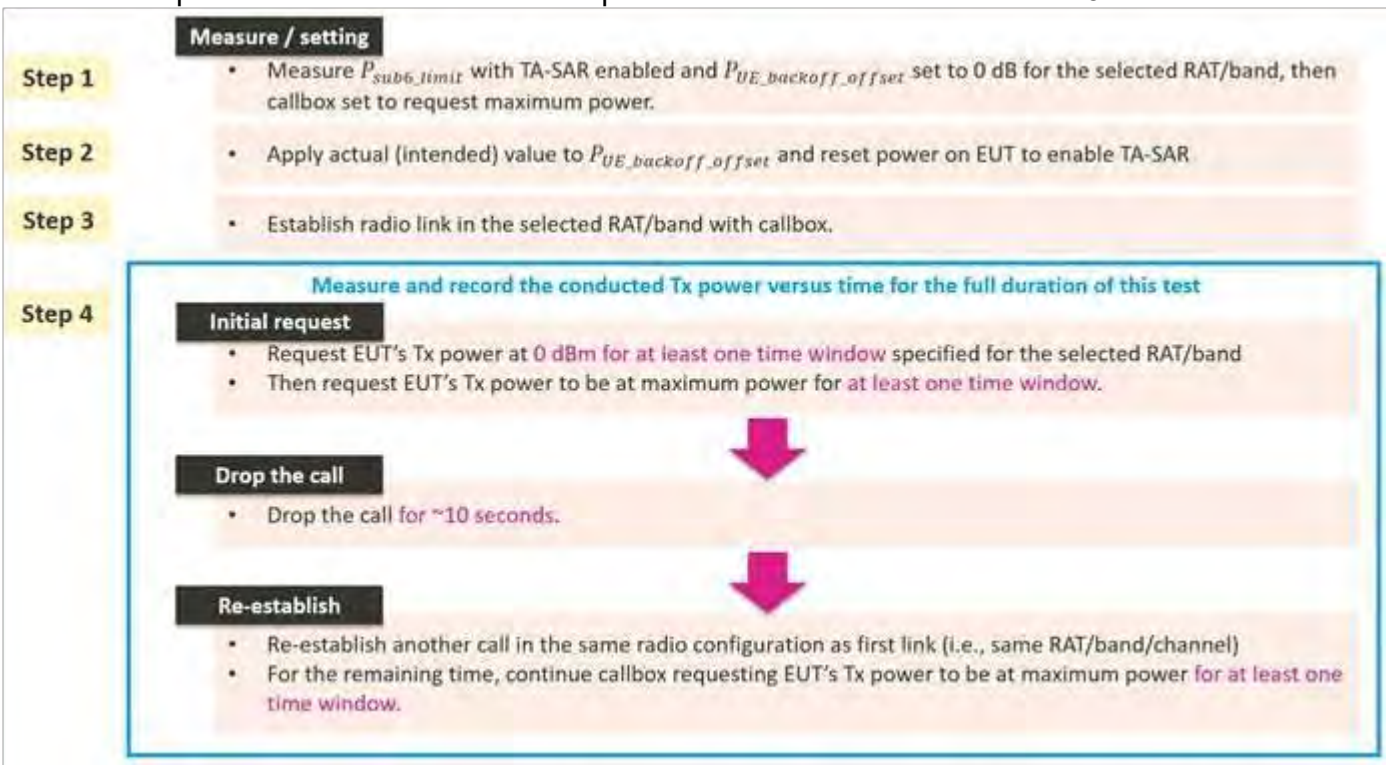
For call disconnection measurement, the criteria of selecting the test configuration is:

- Select the RAT/band with least P_{sub6_limit} among all supported RATs/bands.
- Select the RAT/band having the highest measured 1gSAR at P_{sub6_limit} if multiple RATs/bands having same least P_{sub6_limit}.
- Select the radio configuration in this RAT/band that corresponds to the highest measured 1gSAR at P_{sub6_limit}.

4.4.2 Procedure

TX power is measured, recorded, and processed by the following steps:

- Step 1~4: measure and record TX power versus time for test scenario 3



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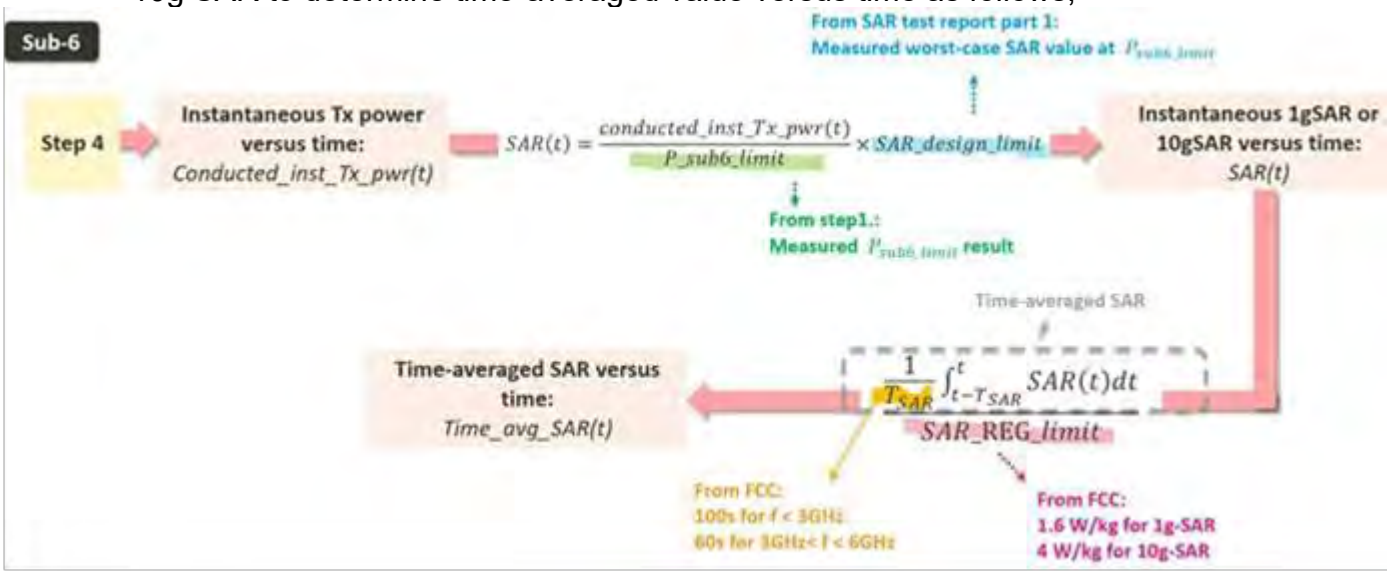
- Step 5: convert the measured conducted TX power into SAR
  Convert the measured conducted TX power from step 4 into 1gSAR or 10gSAR value using the following equation. Perform the running time average to power and 1gSAR or 10g SAR to determine time-averaged value versus time as follows,



- Step 6: plot results
  A. Make one power perspective plot containing
     1. Instantaneous TX power
     2. Requested power
     3. Calculated time-averaged power
     4. Calculated time-averaged power limits
  B. Make one SAR perspective plot containing
     1. Calculated time-averaged 1gSAR or 10gSAR
     2. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)

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4.5 Test Configuration and Procedure for Scenario 4: Band Handover via Conducted Power Measurements

4.5.1 Configuration

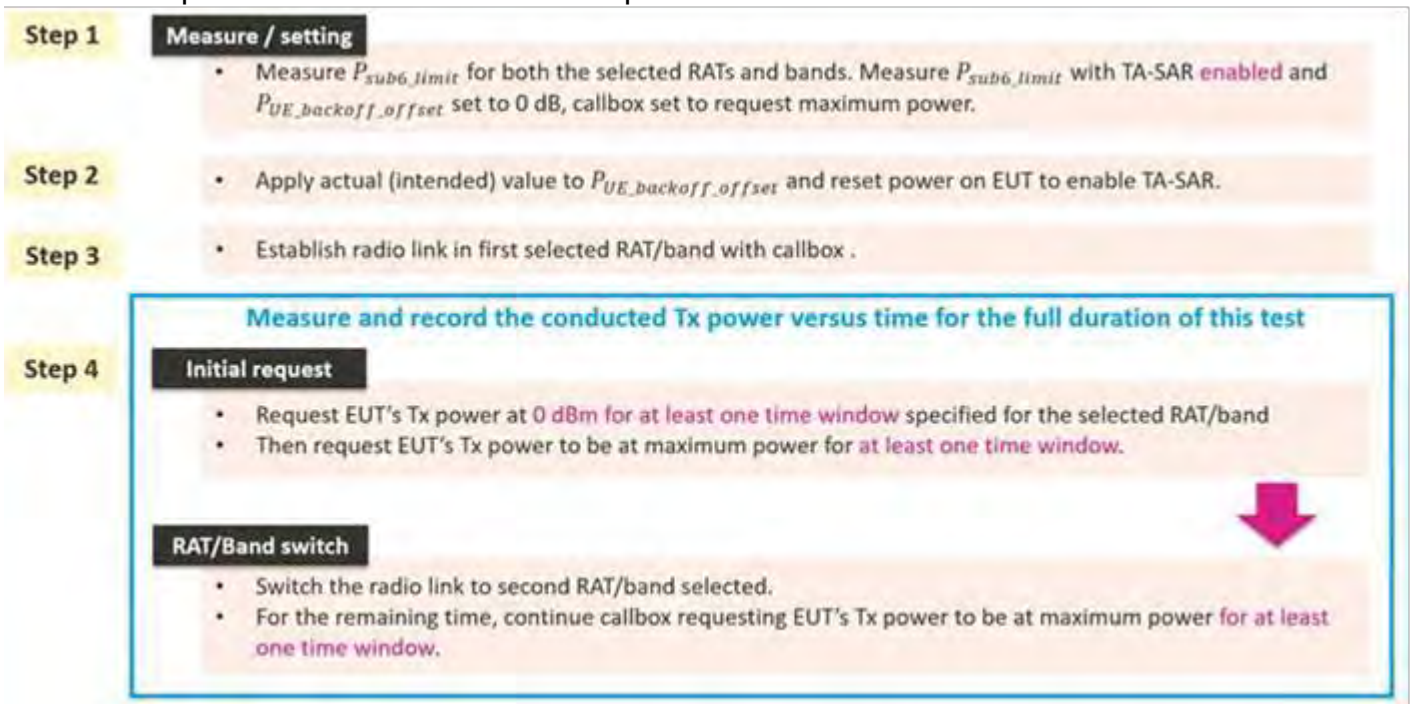
For a given TX antenna, select a RAT/band with the lowest P_{sub6_limit} and the other RAT/band with the highest P_{sub6_limit}. Both of them have P_{sub6_limit} values less than P_{UE_max} if possible.

- Select the RAT/band having the highest measured 1gSAR at P_{sub6_limit} if multiple RATs/bands have the same lowest P_{sub6_limit}.
- Select the RAT/band having the lowest measured 1gSAR at P_{sub6_limit} if multiple RATs/bands have the same highest P_{sub6_limit}.

4.5.2 Procedure

TX power is measured, recorded, and processed by the following steps:

- Step 1~4: measure and record TX power versus time for test scenario 4



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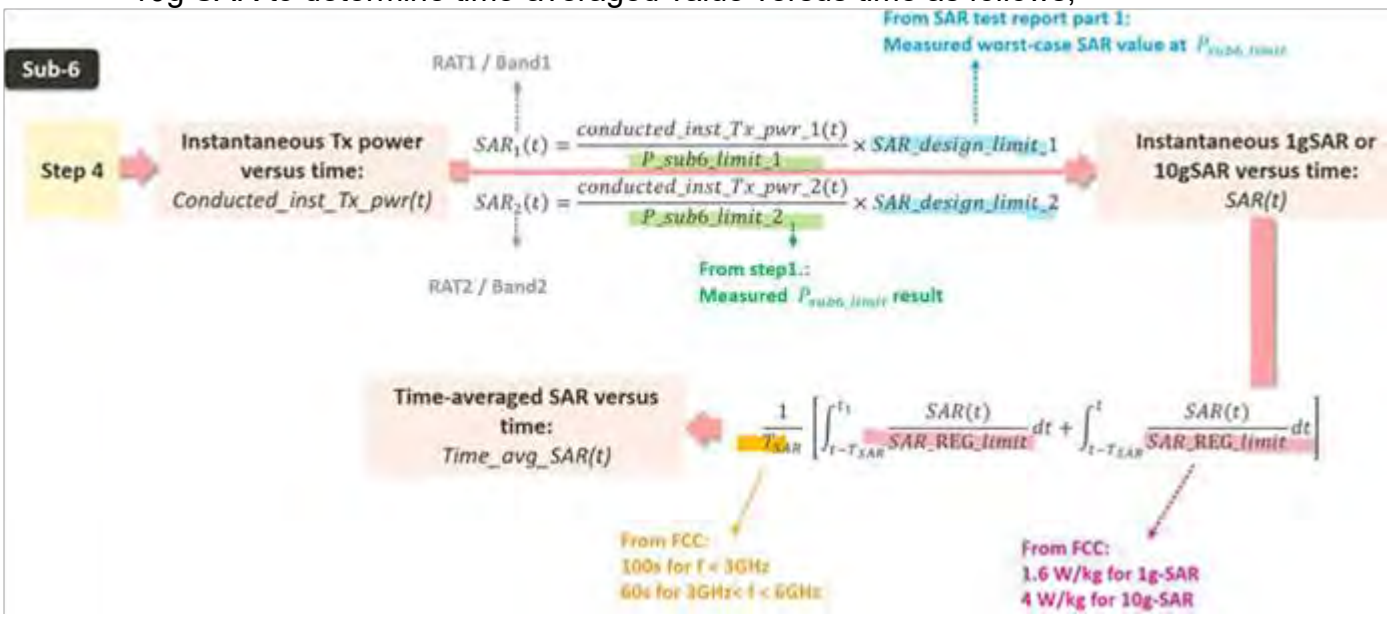
- Step 5: convert the measured conducted TX power into SAR
  Convert the measured conducted TX power from step 4 into 1gSAR or 10gSAR value using the following equation. Perform the running time average to power and 1gSAR or 10g SAR to determine time-averaged value versus time as follows,



- Step 6: plot results
  A. Make one power perspective plot containing
     1. Instantaneous TX power
     2. Requested power
     3. Calculated time-averaged power
     4. Calculated time-averaged power limits
  B. Make one SAR perspective plot containing
     1. Calculated time-averaged 1gSAR or 10gSAR
     2. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)
     3. Normalized time-averaged 1gSAR/1.6 or 10gSAR/4.0

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4.6 Test Configuration and Procedure for Scenario 5: Exposure Condition Index (ECI) Change via Conducted Power Measurements

4.6.1 Configuration

Select any one RAT/band, which has at least two ECIs whose P_{sub6_limit} values are different and are below P_{UE_max}.

4.6.2 Procedure

The test procedure is identical to section 4.5.2 except the following 2 changes:

1. Replace band switch operation with ECI switch.
2. In Step 4, the second ECI switching is arranged after the first one lasts for at least one time window, i.e., switch the second ECI back to the first ECI, and then continue with callbox requesting EUT's Tx power to be at maximum power for at least one time window.

It is noted that the following operations are done as well for this scenario:

- The correct power control is controlled by TA_SAR during ECI switches from one ECI to another.
- The validation criteria are, at all times, the time-averaged 1gSAR or 10gSAR versus time shall not exceed FCC limit of 1.6 W/kg for 1gSAR or 4.0 W/kg for 10gSAR.

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4.7 Test Configuration and Procedure for Scenario 6 Antenna Switching via Conducted Power Measurements

4.7.1 Configuration

Among RATs/bands supporting TX antenna switches, select the RAT/band with the highest P_{sub6_limit} difference between a pair of supported TX antennas.

- Select the RAT/band having the highest measured 1gSAR at P_{sub6_limit} if multiple RATs/bands having the same P_{sub6_limit} difference between the supported TX antennas.
- Antenna selection order o Select the configuration with two antennas having Psub6_limit values less than P_{UE_max}.
  - If the previous configuration does not exist, select the configuration with one antenna having P_{sub6_limit} value less than P_{UE_max}.
  - If the above two cannot be found, select one configuration with the two antennas having the least difference between their P_{sub6_limit} and P_{UE_max} (i.e., P_{sub6_limit} can be greater than P_{UE_max}).

4.7.2 Procedure

The test procedure is identical to section 4.5.2 except the following 2 changes:

1. Replace band switch operation with antenna switch.
2. n Step 4, the second antenna switching is arranged after the first one lasts for at least one time window, i.e., switch the second antenna back to the first antenna, and then continue with callbox requesting EUT's Tx power to be at maximum power for at least one time window.

It is noted that the following operations are done as well for this scenario:

- The correct power control is controlled by TA_SAR during antenna switches from one antenna to another.
- The validation criteria are, at all times, the time-averaged 1gSAR or 10gSAR versus time shall not exceed FCC limit of 1.6 W/kg for 1gSAR or 4.0 W/kg for 10gSAR.

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4.8 Test Configuration and Procedure for Scenario 7: Time Window Switching via Conducted Power Measurements

4.8.1 Configuration

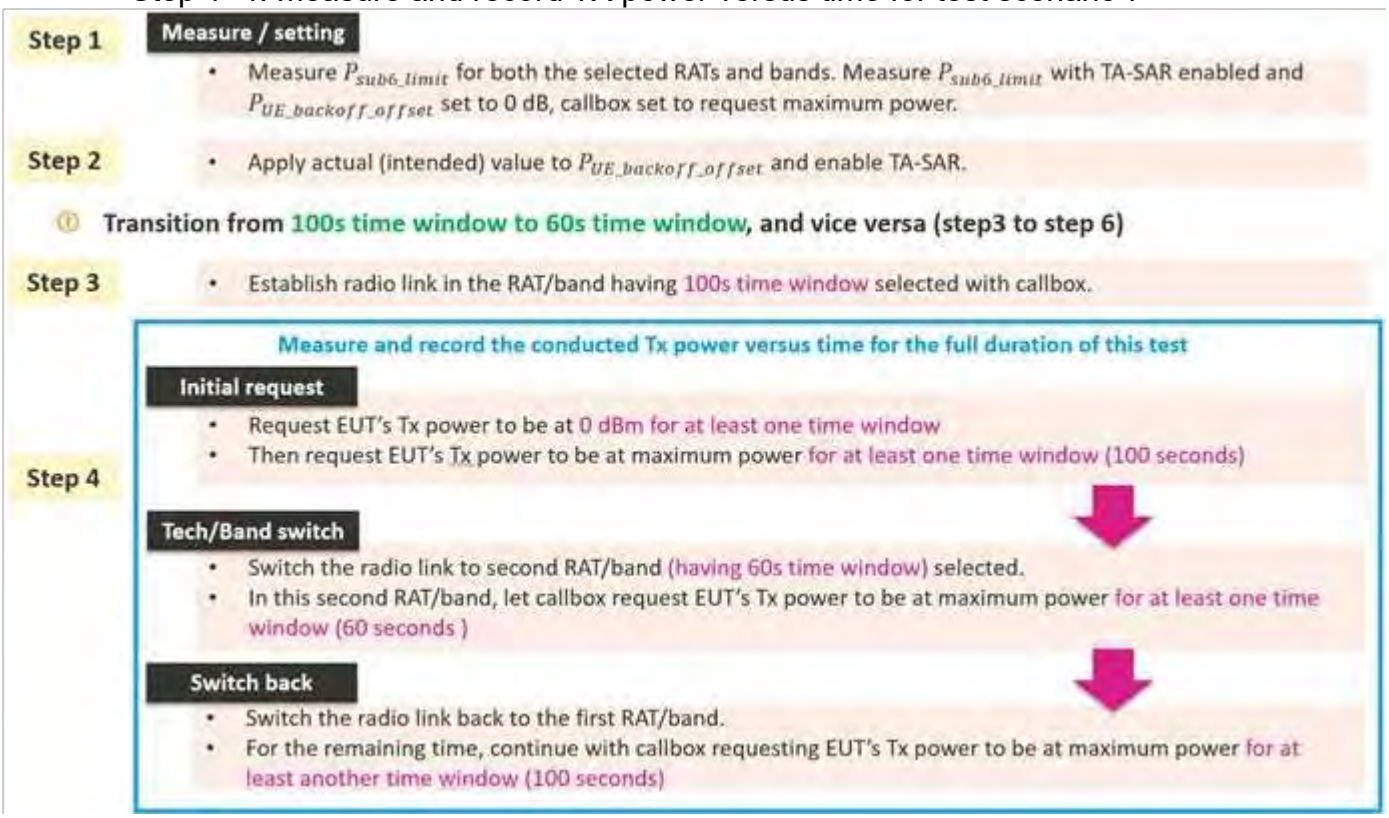
Select one RAT/band with 60-second time averaging window, and the other RAT/band with 100-second time averaging window. Both of them have P_{sub6_limit} values less than P_{UE_max} if possible.

- At least one of the selected RAT/band has its P_{sub6_limit} less than P_{UE_max}.

4.8.2 Procedure

TX power is measured, recorded, and processed by the following steps:

- Step 1~4: measure and record TX power versus time for test scenario 7



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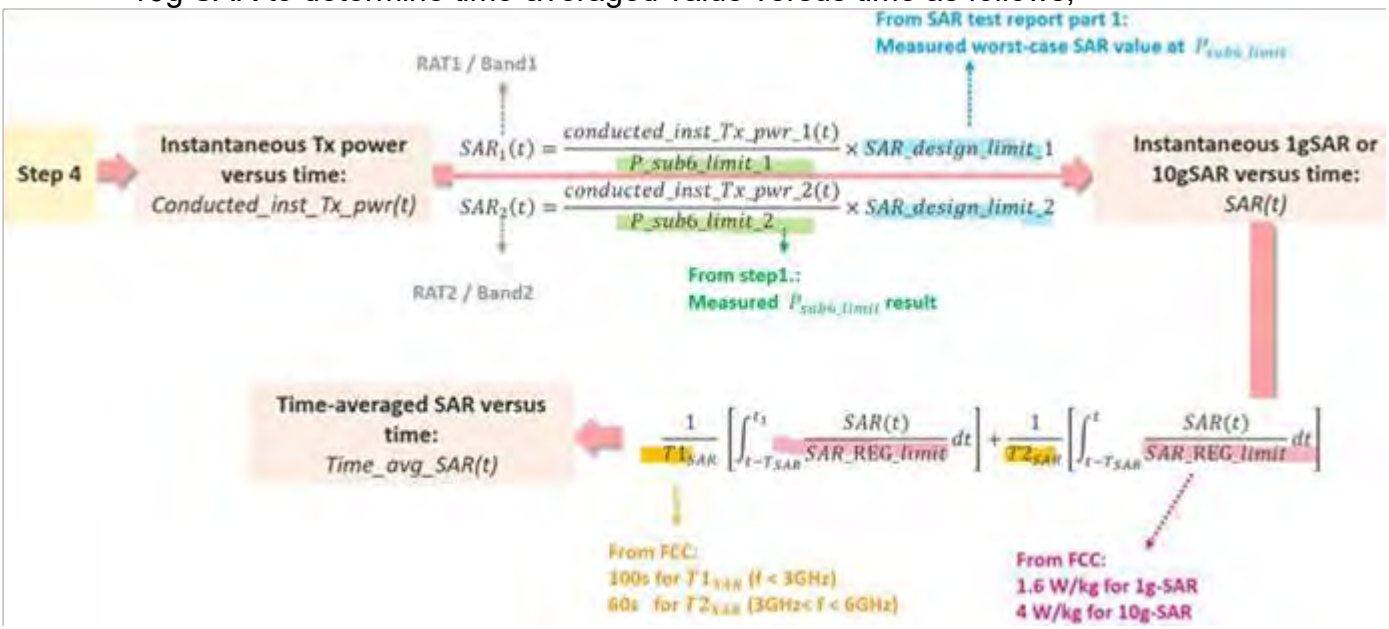
- Step 5: convert the measured conducted TX power into SAR
  Convert the measured conducted TX power from step 4 into 1gSAR or 10gSAR value using the following equation. Perform the running time average to power and 1gSAR or 10g SAR to determine time-averaged value versus time as follows,



- Step 6: plot results
  A. Make one power perspective plot containing
     1. Instantaneous TX power
     2. Requested power
     3. Calculated time-averaged power
     4. Calculated time-averaged power limits
  B. Make one SAR perspective plot containing
     1. Calculated time-averaged 1gSAR or 10gSAR
     2. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)
     3. Normalized time-averaged 1gSAR/1.6 or 10gSAR/4.0

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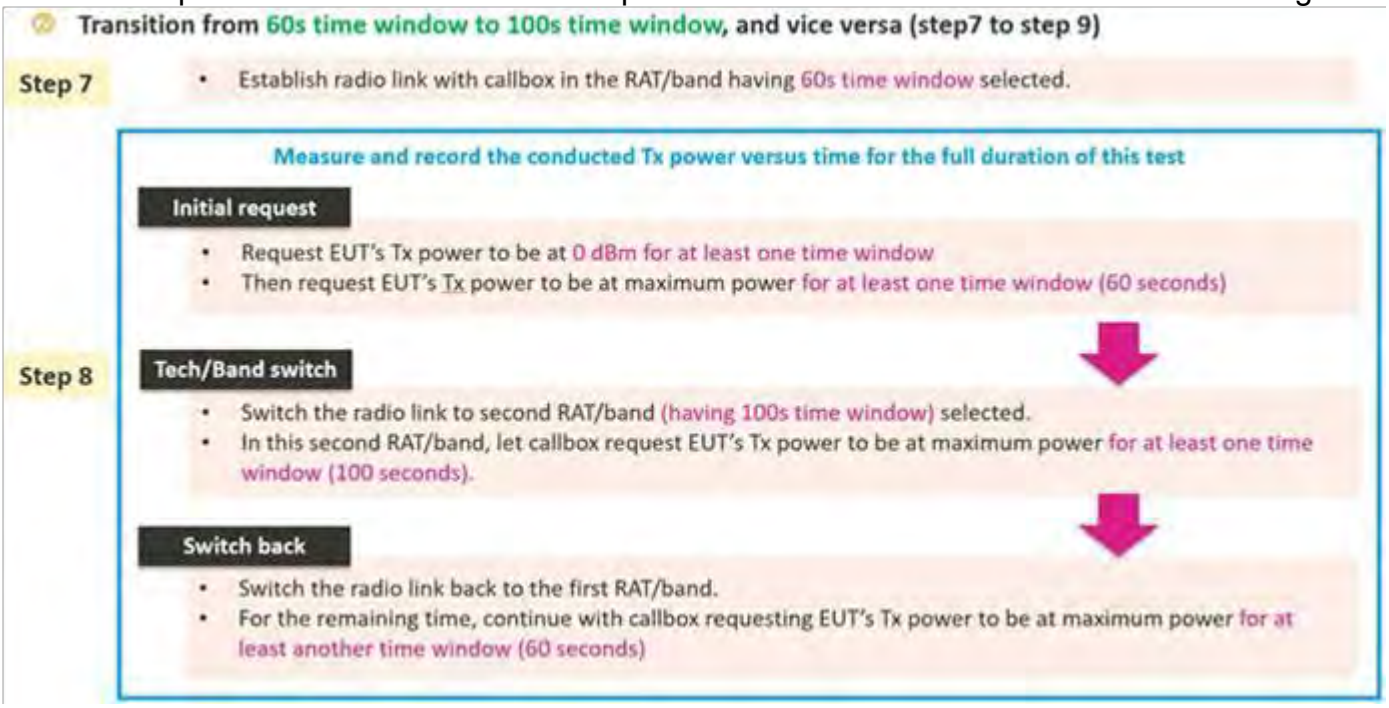
- Step 7~8: measure and record TX power versus time in another time window change



- Step 9: convert the measurement and plot results
  Convert the measured conducted TX power from step 8 into 1gSAR or 10gSAR value using the equation in step 5.
  Repeat step 6 to generate the plots.

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4.9 Test Configuration and Procedure for Scenario 8: SAR Exposure Switching via Conducted Power Measurements

4.9.1 Configuration

If supported, SAR exposure switch with two active radios having the same and different time averaging windows should be covered in this test. Mediatek's TA algorithm operation is independent of the source of SAR exposure (e.g., LTE vs. NR FR1) and ensures total time-averaged RF exposure compliance for SAR exposure among the scenarios of radio 1 only, radio 1 + radio 2, and radio 2 only.

- Select any two < 6GHz RATs/bands that the EUT supports for simultaneous transmission (e.g., LTE+NR FR1).
- The selection order among all supported simultaneous transmission configurations is
  - Select one configuration with P_{sub6_limit} values of radio1 and radio2 less than their corresponding P_{UE_max}, and their Psub6_limit values are different if possible.
  - o If the previous configuration does not exist, at least one radio has its P_{sub6_limit} less than P_{UE_max}.
  - o If above two cannot be found, select one configuration that has P_{sub6_limit} of radio1 and radio2 with the least difference between P_{sub6_limit} and P_{UE_max} (i.e., P_{sub6_limit} can be greater than P_{UE_max}).
- One test with two active radios in any two different time windows is sufficient to cover this scenario.
- One SAR switching is sufficient because the TA algorithm operation is the same.

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4.9.2 Procedure

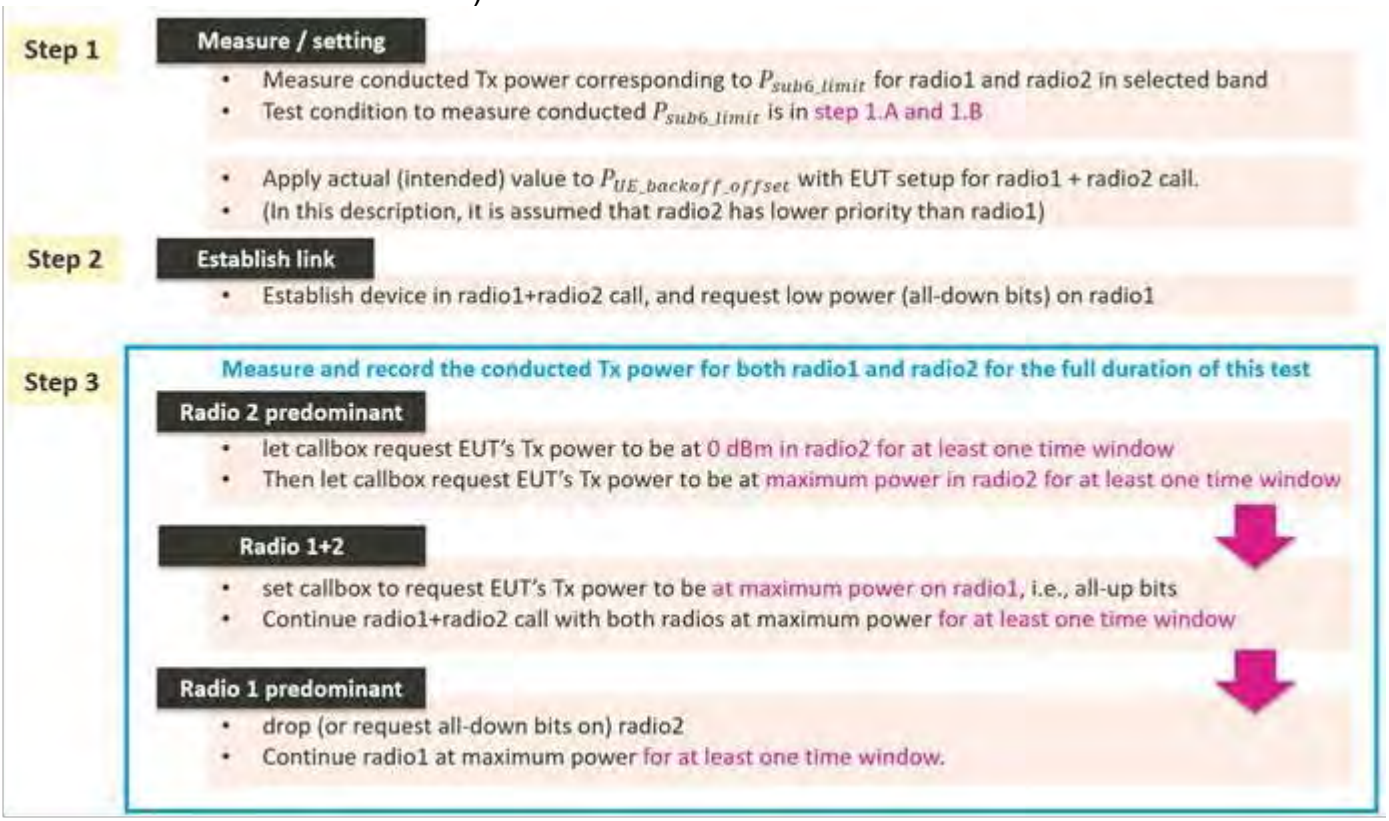
- Step 1~3: measure and record TX power versus time for test scenario 8

A. Measure conducted TX power corresponding to radio1 P_{sub6_limit}

- Establish device in call with the callbox for radio1 band.
- Measure conducted TX power corresponding to radio1 P_{sub6_limit} with TA_SAR enabled and $P_{UE_backoff_offset}$ set to 0 dB, callbox set to request maximum power.

B. measure conducted TX power corresponding to radio2 P_{sub6_limit}

- Repeat above step to measure conducted TX power corresponding to radio2 P_{sub6_limit}.
- If radio2 is dependent on radio1 (for example, non-standalone mode of NR FR1 requiring radio1 LTE as anchor), then establish radio1 + radio2 call with callbox, and request all down bits for radio1 LTE.
- In this scenario, with callbox requesting maximum power from radio2 NR FR1, measured conducted TX power corresponds to radio2 P_{sub6_limit} (as radio1 LTE is at all-down bits)



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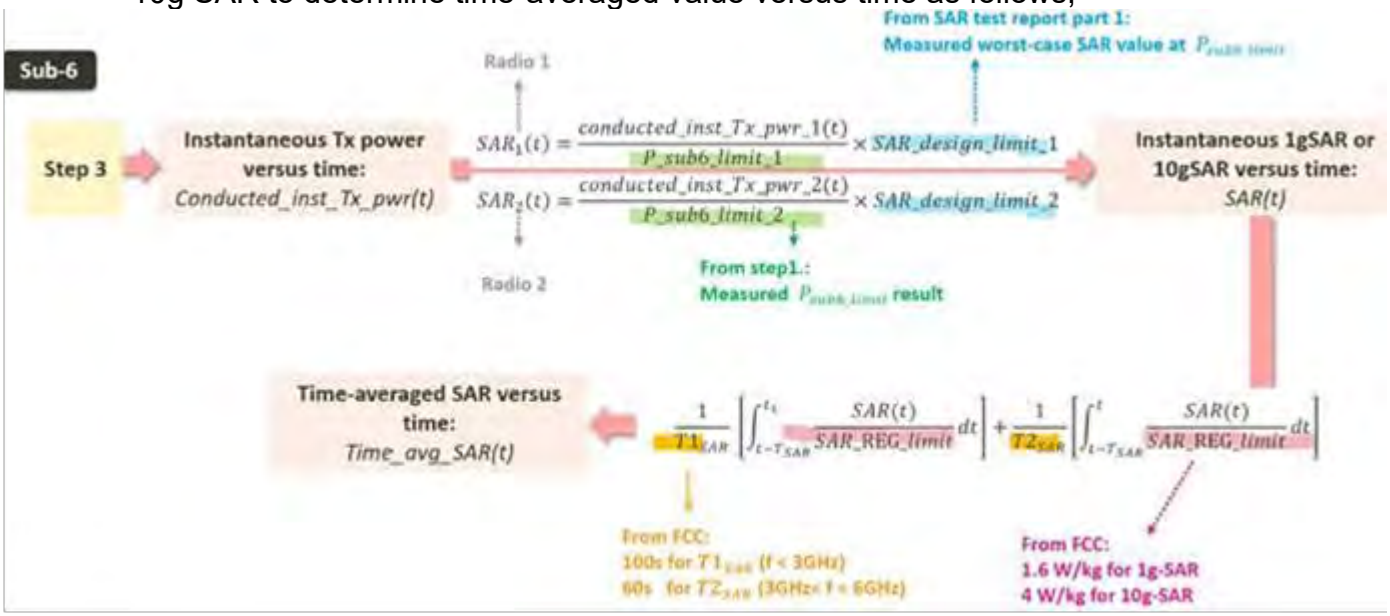
- Step 4: convert the measured conducted TX power into SAR
  Convert the measured conducted TX power from step 3 into 1gSAR or 10gSAR value using the following equation. Perform the running time average to power and 1gSAR or 10g SAR to determine time-averaged value versus time as follows,



- Step 5: plot results
  A. Make one power perspective plot containing
     1. Instantaneous TX power
     2. Requested power
     3. Calculated time-averaged power
     4. Calculated time-averaged power limits
  B. Make one SAR perspective plot containing
     1. Calculated time-averaged 1gSAR or 10gSAR
     2. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)
     3. Normalized time-averaged 1gSAR/1.6 or 10gSAR/4.0

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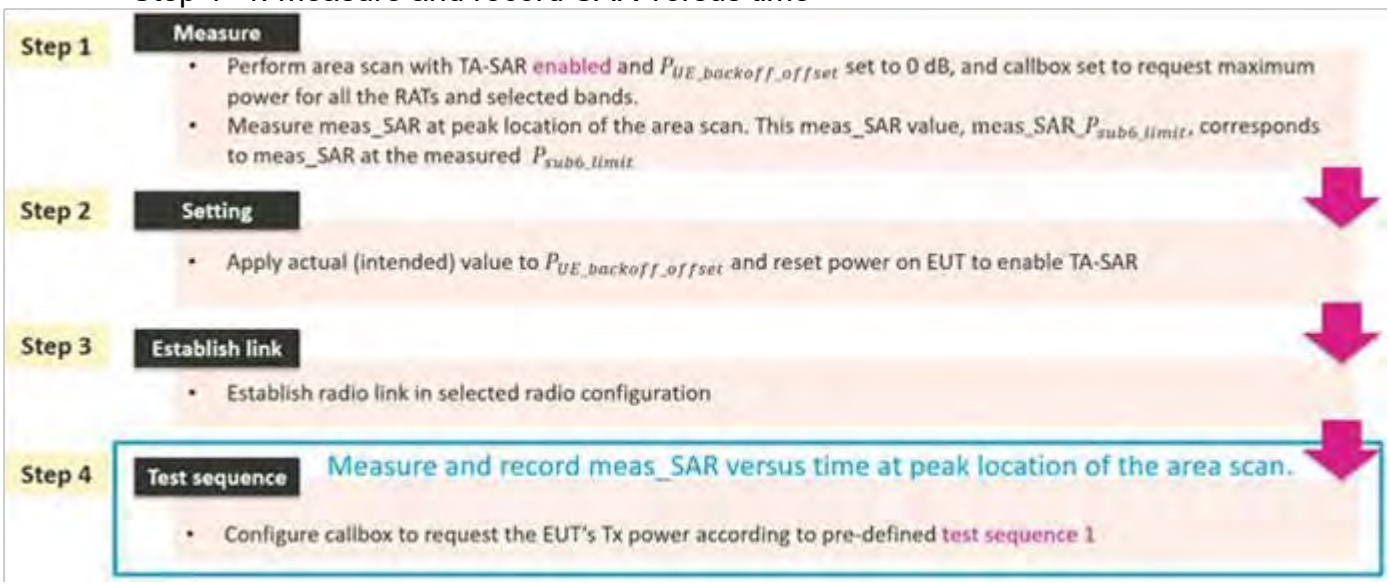
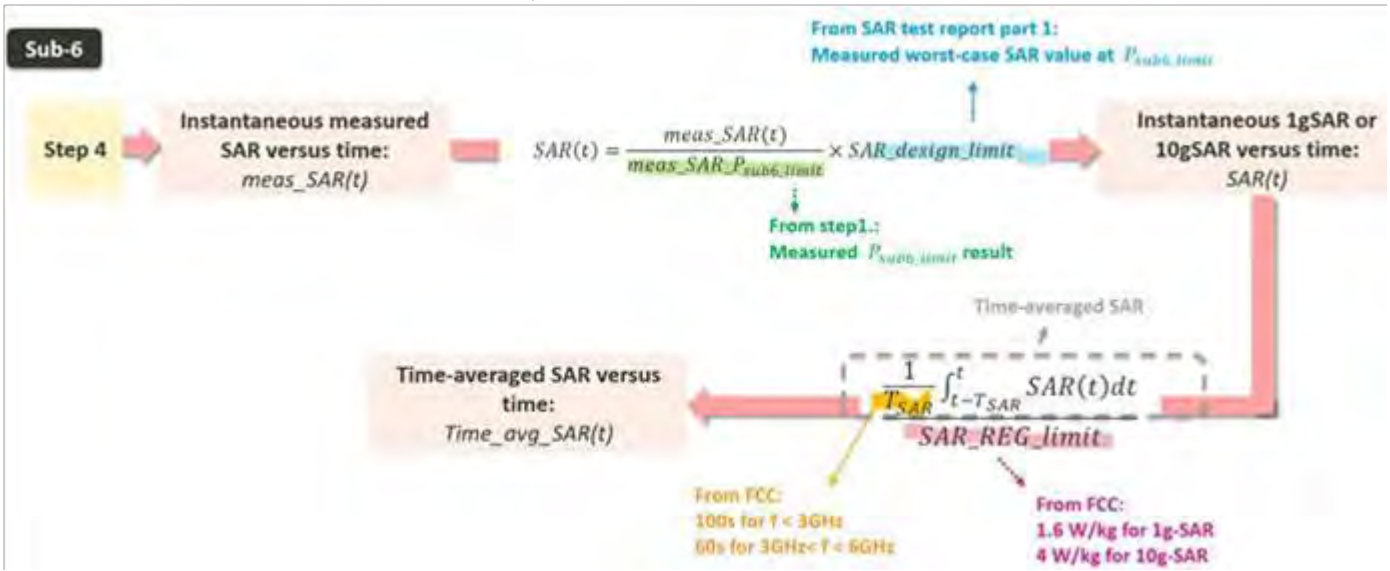
4.10 Test Configuration and Procedure for Scenario 2: Time-Varying TX Power via SAR Measurements

SAR is measured and recorded by the following steps:

- Step 1~4: measure and record SAR versus time



- Step 5: convert the measured SAR into time-averaged SAR
  Convert the instantaneous measured SAR from step 4 into 1gSAR or 10gSAR value. Perform the running time average to 1gSAR or 10g SAR to determine time-averaged value versus time as follows,



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where, *meas_SAR_P*$_{sub6_limit}$ is the value determined in step 1, and *meas_SAR(t)* is the instantaneous measured SAR measured in step 4.

- Step 6: plot results
  A. Calculated time-averaged 1gSAR or 10gSAR
  B. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)

- Step 7: repeat steps 2 ~ 6 for pre-defined test sequence 2

Repeat steps 2 ~ 6 for pre-defined test sequence 2 and replace test sequence 1 in step 4 with test sequence 2.

- Step 8: repeat steps 2 ~ 7 for all the selected bands

The time-averaged SAR versus time shall not exceed FCC limit at all times.

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5 TA-SAR VALIDATION VIA CONDUCTED POWER MEASUREMENTS

5.1 Measurement Setup

5.1.1 Test Bench Introduction

The call boxes KeySight UXM (supporting sub6 NR and LTE) and Rohde & Schwarz CMW500 (supporting LTE, WCDMA, C2K and 2G) are used to validate the proposed TA-SAR mechanism. Figure 5-1 shows the block diagram of the measurement bench, which supports the following test scenarios.

- Test scenario 1: range of TA-SAR parameters
- Test scenario 2: time-varying TX power
- Test scenario 3: call disconnection and re-establishment
- Test scenario 5: ECI change

For these measurements, RF port of the call box is connected to the EUT's antenna port, and the call box establishes a connection link through the test script console tool and the power meter measures the conducted output power of the EUT.

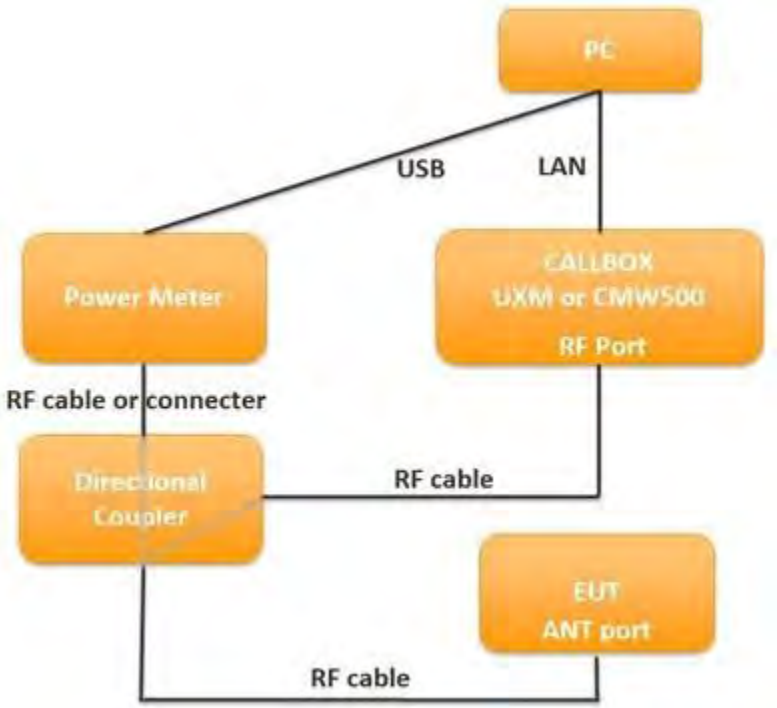

Figure 5-1 TA-SAR conductive power test setup block diagram for scenarios 1/2/3/5

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Figure 5-2 shows the block diagram of the measurement bench, which support test scenario 4 (band handover) and scenario 7 (time window switching). For these measurements, the RF port of the call box is connected with a 1-to-2 power divider, which allows the call box to transmit/receive signals from the two different system configurations set in these two test scenarios. Figure 5-3 shows the setup, which is highly similar to Figure 5-2, to support test scenario 6 (antenna switching); as seen in the figure, two EUT's antenna ports are individually connected with a RF cable.

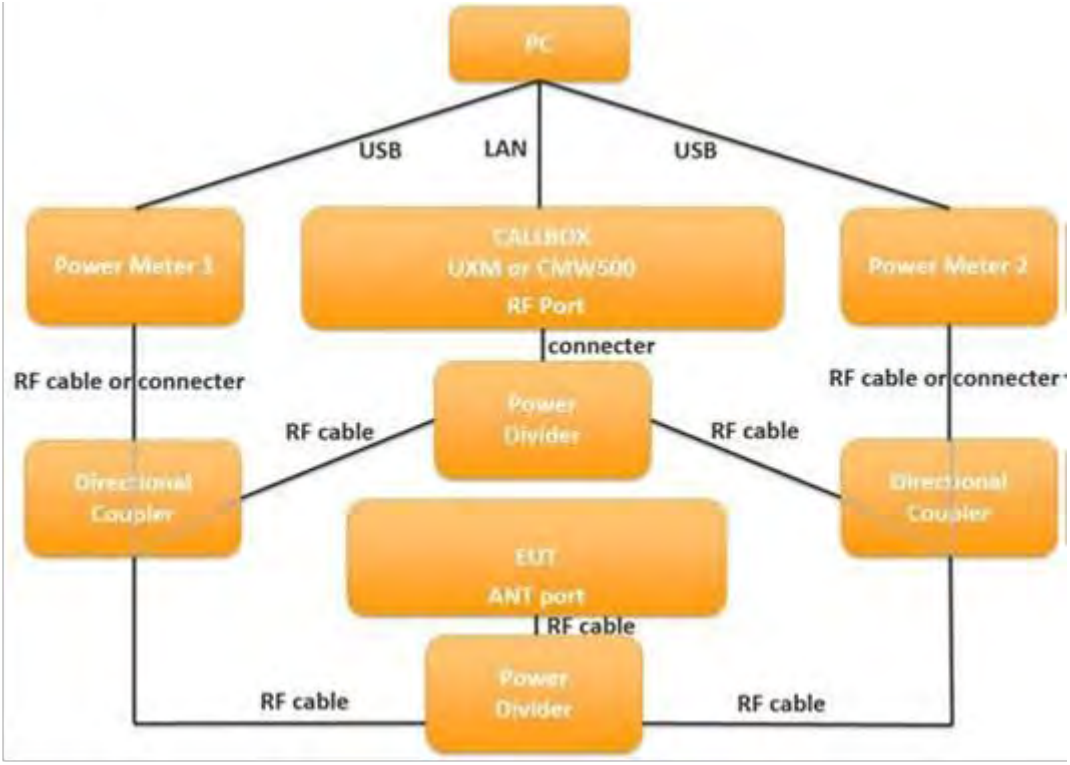

Figure 5-2 TA-SAR conductive power test setup block diagram for scenarios 4 and 7

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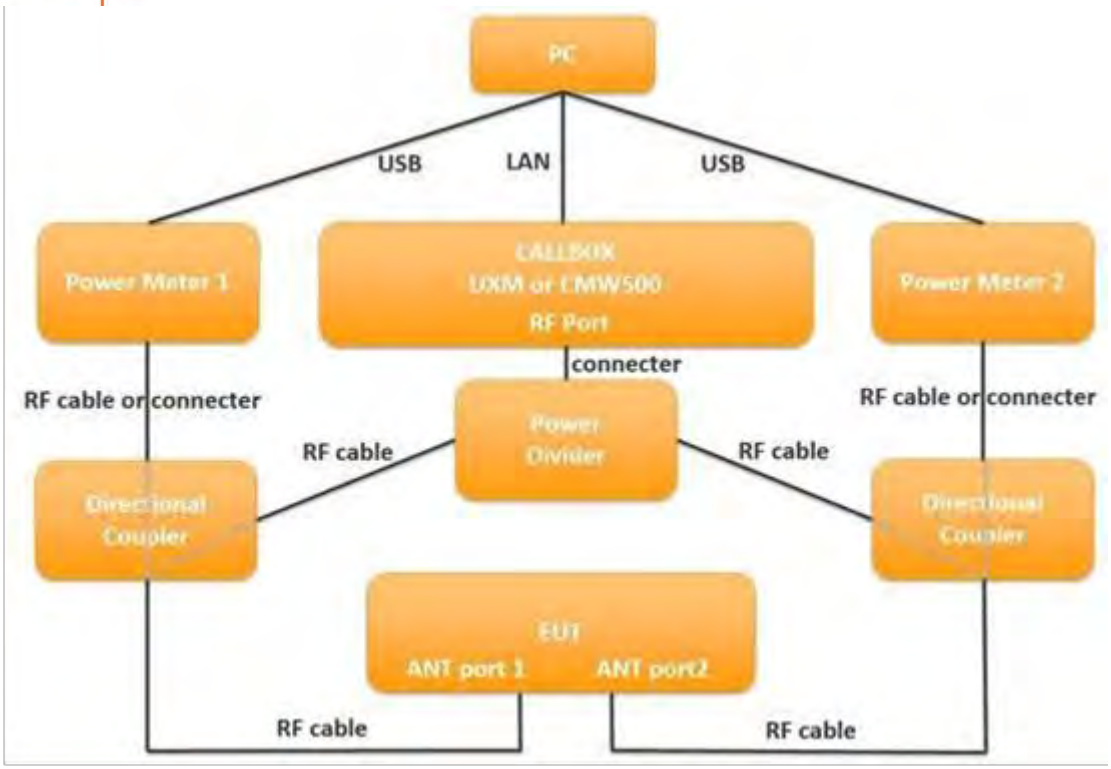

Figure 5-3 TA-SAR conductive power test setup block diagram for scenario 6

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Figure 5-4 shows the setup for test scenario 4 (RAT handover) and scenario 8 (SAR exposure switching). Since two RATs need to be controlled in these two scenarios, RF port of RAT #1 and RF port of RAT #2 of the call box are individually connected to an antenna port of the EUT through a directional coupler. It is noted that each of the two RATs individually transmit signals though one antenna port.

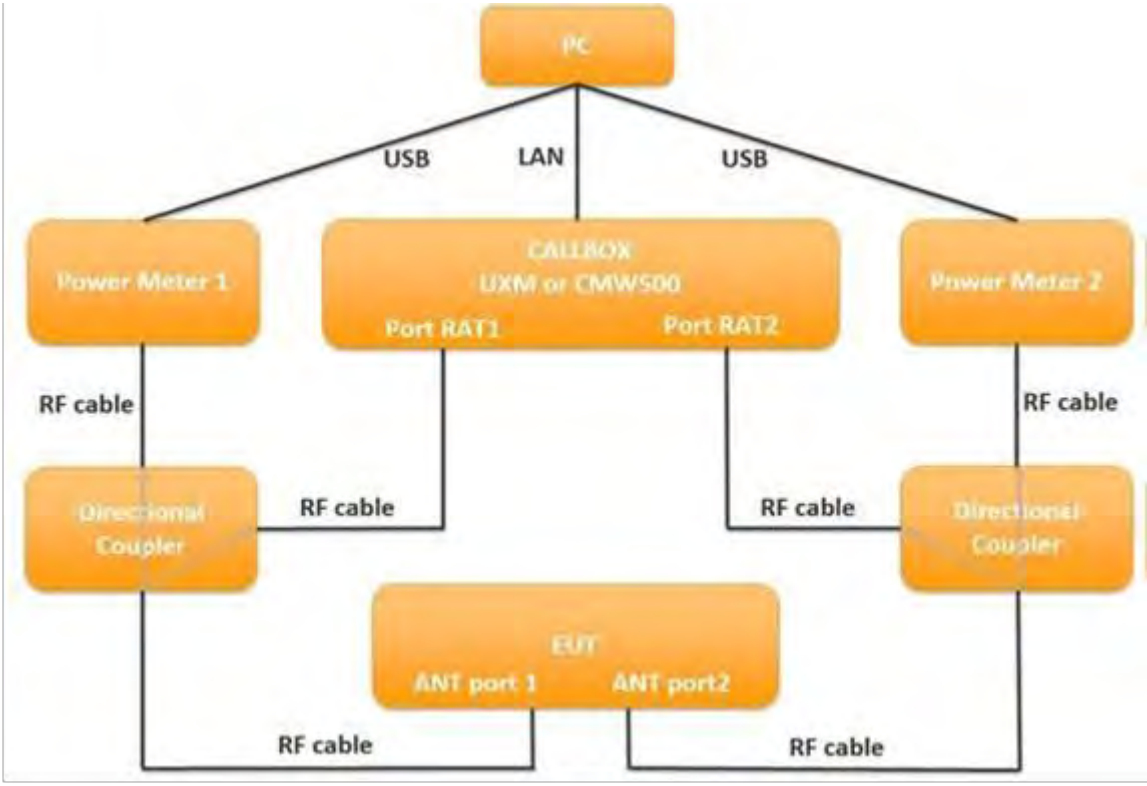

Figure 5-4 TA-SAR conductive power test setup block diagram for scenarios 4/8

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5.1.2 sub6 NR/LTE/3G/2G Power Limit Table and Test Configurations

For the supported bands/channels/antennas of each technology, the measured power limit (P_{sub6_limit}), corresponding to *SAR_design_limit*, is listed in the table 5-1. The *SAR_design_limit* is determined by taking 1-dB device uncertainty into consideration. Please note that for TDD bands with TX duty cycles less than or equal to 100%, the measured power limit corresponds to the burst averaged power level which does not account for TX duty cycle.

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Table 5-1 Summary table of power limit (Psub6_limit) for all supported RAT

RAT	Band	Mode	Duty cycle	Channel	Frequency (MHz)	ANT	SPLSR	P_sub6_Limit (dBm) (average)				Pmax (dBm) (average)	P_sub6_Limit (dBm) (burst)				Pmax (dBm) (burst)	SAR_design_limit for P_sub6_limt_setting (W/kg)			
							Group	ECI2 (Head)	ECI4 (Body Worn Sensor off)	ECI5 (Limbs Sensor on)	ECI10 (Hotspot)		ECI2 (Head)	ECI4 (Body Worn Sensor off)	ECI5 (Limbs Sensor on)	ECI10 (Hotspot)		ECI2 (Head)	ECI4 (Body Worn Sensor off)	ECI5 (Limbs Sensor on)	ECI10 (Hotspot)
2G	GSM850 1TX	TDD	12.5%	190	836.6	13	0	21.5	23.5	23.5	23.5	23.5	30.5	32.5	32.5	32.5	32.5	0.90	0.90	2.65	0.70
	GSM850 2TX	TDD	25.0%	190	836.6	13	0	21.0	24.5	24.5	24.5	24.5	27.0	30.5	30.5	30.5	30.5	0.90	0.90	2.65	0.70
	GSM850 2TX	TDD	25.0%	190	836.6	31	0	24.5	24.5	24.5	24.5	24.5	30.5	30.5	30.5	30.5	30.5	0.90	0.90	2.65	0.70
	GSM1900 2TX	TDD	25.0%	661	1880	13	0	17.5	22.0	20.0	18.0	22.0	23.5	28.0	26.0	24.0	28.0	0.90	0.90	2.65	0.70
	GSM1900 2TX	TDD	25.0%	661	1880	31	0	22.0	20.0	20.0	20.0	22.0	28.0	26.0	26.0	26.0	28.0	0.90	0.90	2.65	0.70
3G WCDMA	B2	FDD	100.0%	9400	1880	13	0	16.5	23.5	20.5	18.5	23.5	16.5	23.5	20.5	18.5	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	9400	1880	31	0	23.5	21.0	21.0	21.0	23.5	23.5	21.0	21.0	21.0	23.5	0.90	0.90	2.65	0.70
	B4	FDD	100.0%	1413	1732.6	13	0	18.0	23.5	20.5	18.5	23.5	18.0	23.5	20.5	18.5	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	1413	1732.6	31	0	23.5	21.0	21.0	21.0	23.5	23.5	21.0	21.0	21.0	23.5	0.90	0.90	2.65	0.70
	B5	FDD	100.0%	4183	836.6	13	0	22.5	24.0	24.0	24.0	24.0	22.5	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	4183	836.6	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
4G LTE	LTE_B2	FDD	100.0%	18900	1880	13	0	16.8	23.8	20.8	18.8	23.8	16.8	23.8	20.8	18.8	23.8	0.90	0.90	2.65	0.70
		FDD	100.0%	18900	1880	31	0	23.8	21.3	21.3	21.3	23.8	23.8	21.3	21.3	21.3	23.8	0.90	0.90	2.65	0.70
		FDD	100.0%	18900	1880	11	0	23.0	23.5	23.0	22.5	23.5	23.0	23.5	23.0	22.5	23.5	0.90	0.90	2.65	0.70
	LTE_B4	FDD	100.0%	20175	1732.5	13	0	18.3	23.8	20.8	19.3	23.8	18.3	23.8	20.8	19.3	23.8	0.90	0.90	2.65	0.70
		FDD	100.0%	20175	1732.5	31	0	23.8	21.3	21.3	21.3	23.8	23.8	21.3	21.3	21.3	23.8	0.90	0.90	2.65	0.70
		FDD	100.0%	20175	1732.5	11	0	21.5	23.5	20.5	18.5	23.5	21.5	23.5	20.5	18.5	23.5	0.90	0.90	2.65	0.70
	LTE_B5	FDD	100.0%	20525	836.5	13	0	22.5	24.0	24.0	24.0	24.0	22.5	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	20525	836.5	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
	LTE_B7	FDD	100.0%	21100	2535	13	0	17.5	23.5	18.5	17.0	23.5	17.5	23.5	18.5	17.0	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	21100	2535	31	0	23.5	21.5	21.5	21.5	23.5	23.5	21.5	21.5	21.5	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	21100	2535	11	0	19.0	23.5	19.0	16.5	23.5	19.0	23.5	19.0	16.5	23.5	0.90	0.90	2.65	0.70
	LTE_B12	FDD	100.0%	23095	707.5	13	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	23095	707.5	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
	LTE_B13	FDD	100.0%	23230	782	13	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	23230	782	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
	LTE_B17	FDD	100.0%	23790	710	13	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	23790	710	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
	LTE_B26	FDD	100.0%	26865	831.5	13	0	22.5	24.0	24.0	24.0	24.0	22.5	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	26865	831.5	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
	LTE_B38	TDD	63.3%	38000	2595	13	0	16.5	22.0	18.5	16.5	22.0	18.5	24.0	20.5	18.5	24.0	0.90	0.90	2.65	0.70
		TDD	63.3%	38000	2595	31	0	22.0	22.0	22.0	22.0	22.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		TDD	63.3%	38000	2595	11	0	18.5	22.0	19.0	16.5	22.0	20.5	24.0	21.0	18.5	24.0	0.90	0.90	2.65	0.70
	LTE_B41	TDD	63.3%	40620	2593	13	0	16.5	22.0	18.5	16.5	22.0	18.5	24.0	20.5	18.5	24.0	0.90	0.90	2.65	0.70
		TDD	63.3%	40620	2593	31	0	22.0	22.0	22.0	22.0	22.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		TDD	63.3%	40620	2593	11	0	18.5	22.0	19.0	16.5	22.0	20.5	24.0	21.0	18.5	24.0	0.90	0.90	2.65	0.70
	LTE_B66	FDD	100.0%	66886	2155	13	0	18.3	23.8	20.8	19.3	23.8	18.3	23.8	20.8	19.3	23.8	0.90	0.90	2.65	0.70
		FDD	100.0%	66886	2155	31	0	23.8	21.3	21.3	21.3	23.8	23.8	21.3	21.3	21.3	23.8	0.90	0.90	2.65	0.70
		FDD	100.0%	66886	2155	11	0	21.5	23.5	20.5	18.5	23.5	21.5	23.5	20.5	18.5	23.5	0.90	0.90	2.65	0.70
5G FR1 NR SA	NR5G_N2	FDD	100.0%	376000	1880	13	0	16.5	23.5	20.5	18.0	23.5	16.5	23.5	20.5	18.0	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	376000	1880	31	0	23.5	20.5	20.5	20.5	23.5	23.5	20.5	20.5	20.5	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	376000	1880	11	0	23.5	23.5	23.0	22.5	23.5	23.5	23.5	23.0	22.5	23.5	0.90	0.90	2.65	0.70
	NR5G_N5	FDD	100.0%	167300	836.5	13	0	21.0	24.0	24.0	24.0	24.0	21.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	167300	836.5	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
	NR5G_N7	FDD	100.0%	507000	2535	13	0	17.0	23.5	18.5	17.0	23.5	17.0	23.5	18.5	17.0	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	507000	2535	31	0	23.5	21.5	21.5	21.5	23.5	23.5	21.5	21.5	21.5	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	507000	2535	11	0	18.5	23.5	18.0	15.5	23.5	18.5	23.5	18.0	15.5	23.5	0.90	0.90	2.65	0.70
	NR5G_N26	FDD	100.0%	166300	831.5	13	0	21.0	24.0	24.0	24.0	24.0	21.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
		FDD	100.0%	166300	831.5	31	0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.90	0.90	2.65	0.70
	NR5G_N38	TDD	100.0%	519000	2595	13	0	17.0	23.5	18.5	16.5	23.5	17.0	23.5	18.5	16.5	23.5	0.90	0.90	2.65	0.70
		TDD	100.0%	519000	2595	31	0	23.5	21.5	21.5	21.5	23.5	23.5	21.5	21.5	21.5	23.5	0.90	0.90	2.65	0.70
		TDD	100.0%	519000	2595	11	0	18.0	22.5	18.0	16.0	23.5	18.0	22.5	18.0	16.0	23.5	0.90	0.90	2.65	0.70
	NR5G_N41 PC2	TDD	100.0%	518598	2593	13	0	17.0	25.0	19.5	17.5	25.0	17.0	25.0	19.5	17.5	25.0	0.90	0.90	2.65	0.70
		TDD	100.0%	518598	2593	31	0	25.0	22.5	22.5	22.5	25.0	25.0	22.5	22.5	22.5	25.0	0.90	0.90	2.65	0.70
		TDD	100.0%	518598	2593	11	0	19.5	25.0	19.5	17.0	25.0	19.5	25.0	19.5	17.0	25.0	0.90	0.90	2.65	0.70
	NR5G_N41 PC3	TDD	100.0%	518598	2593	13	0	17.0	24.0	19.5	17.0	24.0	17.0	24.0	19.5	17.0	24.0	0.90	0.90	2.65	0.70
		TDD	100.0%	518598	2593	31	0	24.0	22.5	22.5	22.5	24.0	24.0	22.5	22.5	22.5	24.0	0.90	0.90	2.65	0.70
		TDD	100.0%	518598	2593	11	0	19.5	24.0	19.5	17.0	24.0	19.5	24.0	19.5	17.0	24.0	0.90	0.90	2.65	0.70
	NR5G_N66	FDD	100.0%	349000	1745	13	0	18.0	23.5	20.5	19.0	23.5	18.0	23.5	20.5	19.0	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	349000	1745	31	0	23.5	21.0	21.0	21.0	23.5	23.5	21.0	21.0	21.0	23.5	0.90	0.90	2.65	0.70
		FDD	100.0%	349000	1745	11	0	21.5	23.5	20.0	18.0	23.5	21.5	23.5	20.0	18.0	23.5	0.90	0.90	2.65	0.70
	NR5G_N77	TDD	100.0%	650000	3750	11	0	20.0	23.0	17.5	15.5	23.0	20.0	23.0	17.5	15.5	23.0	0.90	0.90	2.65	0.70
		TDD	100.0%	650000	3750	12	0	17.5	19.5	19.5	17.5	23.0	17.5	19.5	19.5	17.5	23.0	0.90	0.90	2.65	0.70
		TDD	100.0%	650000	3750	23	0	18.0	19.0	19.0	18.0	20.0	18.0	19.0	19.0	18.0	20.0	0.90	0.90	2.65	0.70
		TDD	100.0%	650000	3750	21	0	15.0	19.5	19.5	17.5	20.0	15.0	19.5	19.5	17.5	20.0	0.90	0.90	2.65	0.70
	NR5G_N78 PC2	TDD	100.0%	636666	3550	11	0	20.0	23.0	18.0	16.5	25.5	20.0	23.0	18.0	16.5	25.5	0.90	0.90	2.65	0.70
		TDD	100.0%	636666	3550	12	0	17.5	20.0	20.0	18.0	25.5	17.5	20.0	20.0	18.0	25.5	0.90	0.90	2.65	0.70
		TDD	100.0%	636666	3550	23	0	18.5	22.0	22.0	20.0	22.5	18.5	22.0	22.0	20.0	22.5	0.90	0.90	2.65	0.70
		TDD	100.0%	636666	3550	21	0	15.5	21.0	21.0	19.0	22.5	15.5	21.0	21.0	19.0	22.5	0.90	0.90	2.65	0.70
	NR5G_N78 PC3	TDD	100.0%	636666	3550	11	0	20.0	23.0	18.0	16.5	23.0	20.0	23.0	18.0	16.5	23.0	0.90	0.90	2.65	0.70
		TDD	100.0%	636666	3550	12	0	17.5	18.5	18.5	18.0	23.0	17.5	18.5	18.5	18.0	23.0	0.90	0.90	2.65	0.70
		TDD	100.0%	636666	3550	23	0	18.5	20.0	20.0	20.0	20.0	18.5	20.0	20.0	20.0	20.0	0.90	0.90	2.65	0.70
		TDD	100.0%	636666	3550	21	0	15.5	19.5	19.5	18.5	20.0	15.5	19.5	19.5	18.5	20.0	0.90	0.90	2.65	0.70

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
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Table 5-2 summarizes the test configurations of all RATs, and the corresponding worst-case measured SAR for each RAT under the power limit.

Table 5-2 Test configurations of radio technologies and worst-case measured SAR

Test Case	Test Scenario	Test Tech	Test band	Test Sequence	BW (MHz)	Modulation	duty cycle	RB size	RB offset	Test Position	Gap (mm)	ANT	ANT Index	ANT state (TX/RX)	ECI	UL Channel	UL Freq (MHz)	DL Channel	DL Freq (MHz)	Part 1, SAR@Plimit 1-g or 10-g SAR (W/kg)	SAR reg.	Plimit, frame-averaged	Pmax, frame-averaged	min power duration	duration 1	drop call	duration 2	duration 3
0	1. Range of TA-SAR parameters	FR1	n77	0	100	QPSK(DFT-s-OFDM)	100.00%	1	1	N/A	0	21	2	4/1	2	650000	3750	650000	3750	0.631	1.6	14.25	19.31	300	570			
1		FR1	n7	0	50	QPSK(DFT-s-OFDM)	100.00%	1	135	N/A	10	11	1	2/2	10	507000	2535	529000	2645	0.268	1.6	14.71	22.68	300	570			
2	2. Time-varying TX power	2G	GPRS 8S0 1TX	1	N/A	GMSK	12.50%	N/A	N/A	Right tilted	0	13	3	0/0	2	190	836.6	190	836.6	0.432	1.6	21.33	23.25	150	720			
3		2G	GPRS 1900 2TX	1	N/A	GMSK	25.00%	N/A	N/A	Right tilted	0	13	3	0/0	2	661	1880	661	1880	0.729	1.6	17.32	21.85	150	720			
4		WCDMA	B5	1	N/A	RMC	100.00%	N/A	N/A	Right cheek	0	13	3	0/0	2	4182	836.4	4407	881.4	0.606	1.6	21.83	23.56	150	720			
5		WCDMA	B2	1	N/A	RMC	100.00%	N/A	N/A	Right tilted	0	13	3	0/0	2	9400	1880	9800	1960	0.659	1.6	15.96	22.92	150	720			
6		LTE	B26	1	15	QPSK	100.00%	1	74	Right cheek	0	13	3	0/0	2	26765	821.5	8765	866.5	0.709	1.6	21.13	22.17	150	720			
7		LTE	B41	1	20	QPSK	63.30%	1	99	Right tilted	0	13	3	0/0	2	41490	2680	41490	2680	0.705	1.6	15.79	21.36	150	720			
8		FR1	n78 PC2	1	100	QPSK(DFT-s-OFDM)	100.00%	1	137	Back Side	15	11	1	0/1	4	650000	3750	650000	3750	0.289	1.6	22.51	23.42	150	720			
9		FR1	n77	1	100	QPSK(DFT-s-OFDM)	100.00%	1	1	Left cheek	0	21	2	4/1	2	650000	3750	650000	3750	0.631	1.6	14.25	19.31	150	720			
10		2G	GPRS 8S0 1TX	2	N/A	GMSK	12.50%	N/A	N/A	Right tilted	0	13	3	0/0	2	190	836.6	190	836.6	0.432	1.6	21.33	23.25	150	720			
11		2G	GPRS 1900 2TX	2	N/A	GMSK	25.00%	N/A	N/A	Right tilted	0	13	3	0/0	2	661	1880	661	1880	0.729	1.6	17.32	21.85	150	720			
12		WCDMA	B5	2	N/A	RMC	100.00%	N/A	N/A	Right cheek	0	13	3	0/0	2	4182	836.4	4407	881.4	0.606	1.6	21.83	23.56	150	720			
13		WCDMA	B2	2	N/A	RMC	100.00%	N/A	N/A	Right tilted	0	13	3	0/0	2	9400	1880	9800	1960	0.659	1.6	15.96	22.92	150	720			
14		LTE	B26	2	15	QPSK	100.00%	1	74	Right cheek	0	13	3	0/0	2	26765	821.5	8765	866.5	0.709	1.6	21.13	22.17	150	720			
15		LTE	B41	2	20	QPSK	63.30%	1	99	Right tilted	0	13	3	0/0	2	41490	2680	41490	2680	0.705	1.6	15.79	21.36	150	720			
16		FR1	n78 PC2	2	100	QPSK(DFT-s-OFDM)	100.00%	1	137	Back Side	15	11	1	0/1	4	650000	3750	650000	3750	0.289	1.6	22.51	23.42	150	720			
17		FR1	n77	2	100	QPSK(DFT-s-OFDM)	100.00%	1	1	Left cheek	0	21	2	4/1	2	650000	3750	650000	3750	0.631	1.6	14.25	19.31	150	720			
18	3. Call disconnection and re-establishment	FR1	n77	0	100	QPSK(DFT-s-OFDM)	100.00%	1	1	N/A	0	21	2	4/1	2	650000	3750	650000	3750	0.631	1.6	14.25	19.31	300	200	10	200	
19	4. band handover	WCDMA	B5	0	N/A	RMC	100.00%	N/A	N/A	N/A	0	13	3	0/0	2	4182	836.4			0.606	1.6	21.83	23.56	300	200		200	
		LTE	B41		20	QPSK	63.30%	1	99			13	3	0/0		41490	2680	41490	2680	0.705		15.79	21.36					
20	5. Change in operating state	FR1	n77	0	100	QPSK(DFT-s-OFDM)	100.00%	1	1	N/A	0	21	2	4/1	2	650000	3750	650000	3750	0.631	1.6	14.25	19.31	300	200		200	200
										N/A	10				10			650000	3750	0.252		16.78						
21	6. Antenna switching	FR1	n77	0	100	QPSK(DFT-s-OFDM)	100.00%	1	1	N/A	0	21	2	4/1	2	650000	3750	650000	3750	0.631	1.6	14.25	19.31	300	200		200	200
												11	1	0/1		650000	3750	650000	3750	0.442		19.13	20.12					
22	7. Time window switching	FR1	n77	0	100	QPSK(DFT-s-OFDM)	100.00%	1	1	N/A	0	21	2	4/1	2	650000	3750	650000	3750	0.631	1.6	14.25	19.31	300	120		200	120
		FR1	n7		50	QPSK(DFT-s-OFDM)	100.00%	135	67			13	3	0/0		505000	2525	529000	2645	0.547		16.53	22.81					
23		FR1	n7	0	50	QPSK(DFT-s-OFDM)	100.00%	135	67	N/A	0	13	3	0/0	2	505000	2525	529000	2645	0.547	1.6	16.53	22.81	300	200		120	200
		FR1	n77		100	QPSK(DFT-s-OFDM)	100.00%	1	1			21	2	4/1		650000	3750	650000	3750	0.631		14.25	19.31					
24	8. SAR exposure switching (ENDC)	LTE	B2	0	20	QPSK	100.00%	50	25	N/A	0	13	3	0/0	2	19100	1900	11000	1980	0.788	1.6	16.12	23.25	300	200		200	200
		FR1	n7		50	QPSK(DFT-s-OFDM)	100.00%	1	135			11	1	2/2		507000	2535	529000	2645	0.552		17.79	22.89					
25	8. SAR exposure switching (ENDC)	LTE	B7	0	20	QPSK	100.00%	1	0	N/A	0	13	3	0/0	2	20850	2510	2850	2630	0.812	1.6	16.61	22.58	300	200		200	200
		FR1	n77		100	QPSK(DFT-s-OFDM)	100.00%	1	1			21	2	4/1		650000	3750	650000	3750	0.631		14.25	19.31					

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5.2 Conducted Power Measurement Results for Scenario1: Range of TA-SAR Parameters

In this scenario, two TA-SAR parameters are swept to validate Mediatek's TA-SAR algorithm. The parameter sets are summarized in Table 5-3, and the test procedure follows section 4.2.2. The measurement setup is shown in Figure 5-2. The high-level summary of the final validation results are also listed in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement for all test cases. The following section will demonstrate case-by-case to show how Mediatek's TA-SAR algorithm behaves for different parameters.

Table 5-3 TA-SAR parameters setting for scenario 1

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
0	FR1	n77	0	2	20.00	15.00	14.50	12.00	20.00	Pass
1	FR1	n7	0	10	23.50	15.50	15.00	12.50	23.50	Pass

These test cases are for 5G NR and are conducted under NR band n77 with ECI = 2 and NR band n7 with ECI = 10. The corresponding detailed test procedure is described in 4.2.2. For the figure set of each case, the first figure demonstrates the EUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). The second figure illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in section 4.2.2. For all test cases, the time-averaged SAR does not exceed the FCC limit.

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- Case 0 in table 5-3

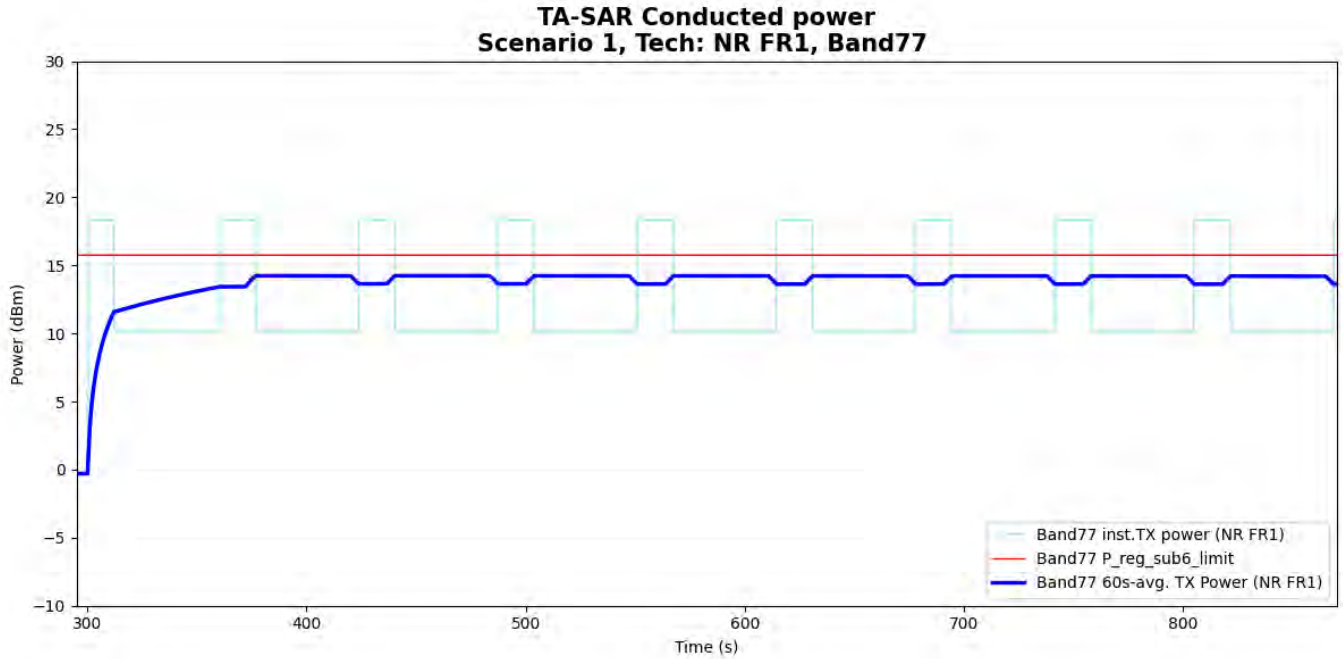

Figure 5-5 Time-averaged conducted TX power over time for case 0

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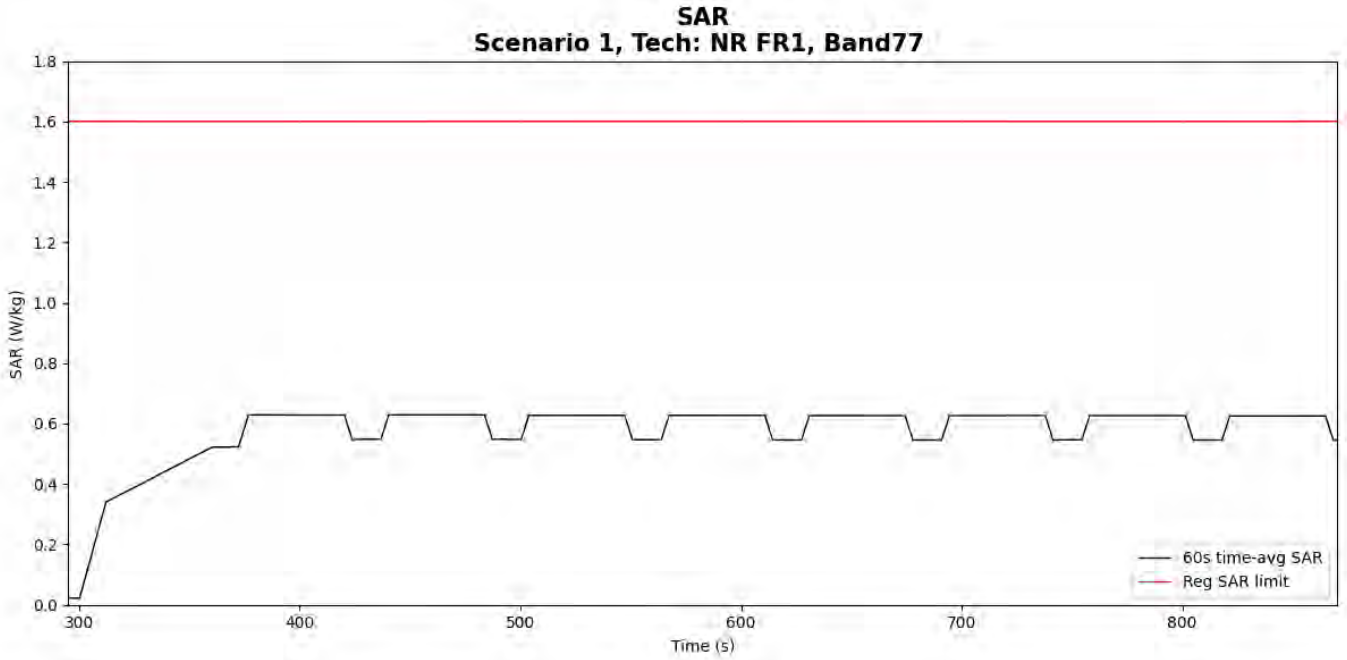

Figure 5-6 Time-averaged SAR for case 0

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.629 W/kg
Validation result: pass	

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- Case 1 in table 5-3

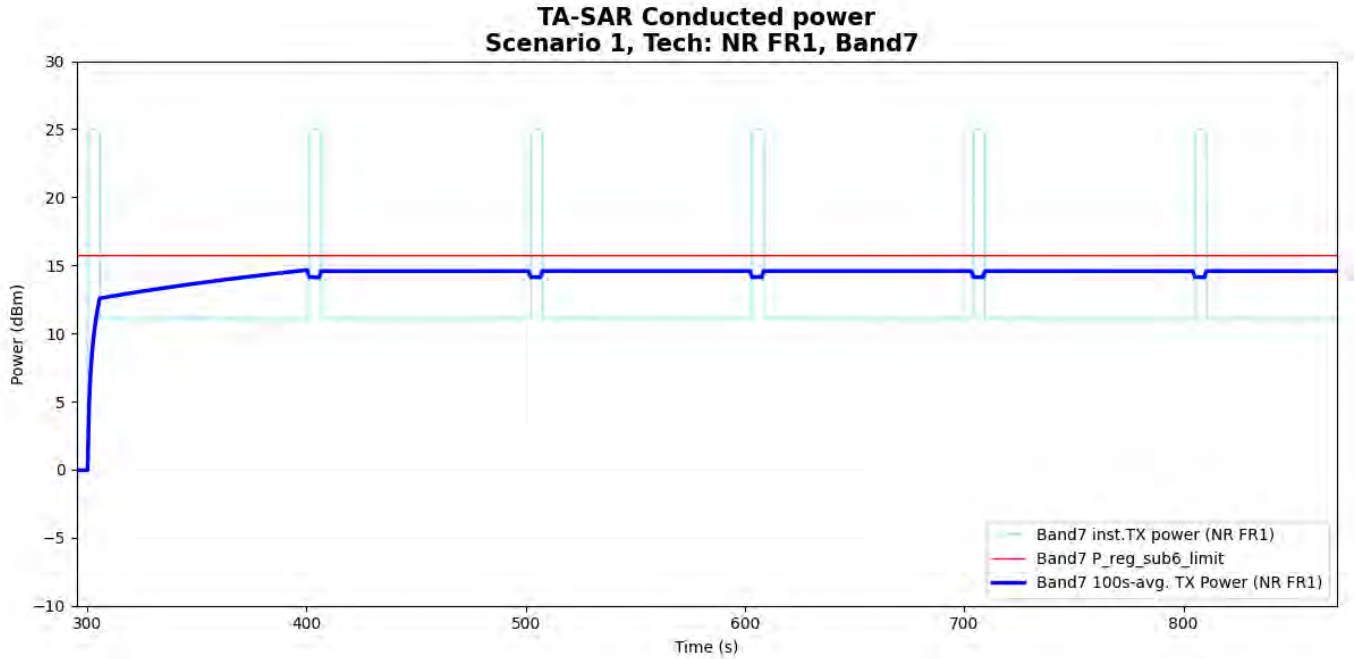

Figure 5-7 Time-averaged conducted TX power over time for case 1

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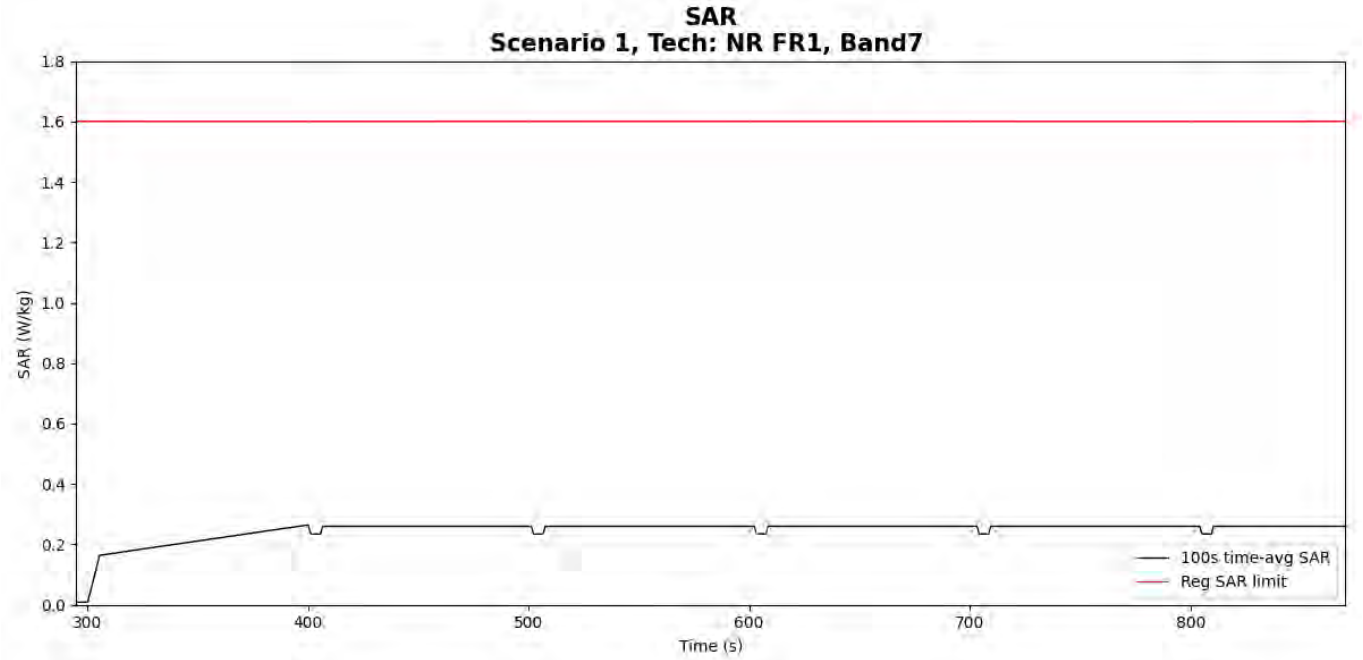

Figure 5-8 Time-averaged SAR for case 1

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.265 W/kg
Validation result: pass	

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5.3 Conducted Power Measurement Results for Scenario 2: Time-Varying TX Power

In this scenario, Mediatek's TA-SAR algorithm is tested under more dynamic power test sequences. The test sequence #1 is shown in section 4.1 and test sequence #2 is tabulated in table 4.4. All of the test cases for this scenario are relegated in Table 5-4, and the test procedure follows section 4.3.2. The measurement setup is shown in Figure 5-2. The high-level summary of the final validation results are also listed in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement for all test cases. The following sections will demonstrate case-by-case to show how Mediatek's TA-SAR algorithm behaves for each RAT.

Table 5-4 TA-SAR parameters setting for scenario 1

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
2	2G	GPRS 850 1TX	1	2	32.50	30.50	30.00	27.50	32.50	Pass
3	2G	GPRS 1900 2TX	1	2	28.00	23.50	23.00	20.50	28.00	Pass
4	WCDMA	B5	1	2	24.00	22.50	22.00	19.50	24.00	Pass
5	WCDMA	B2	1	2	23.50	16.50	16.00	13.50	23.50	Pass
6	LTE	B26	1	2	24.00	22.50	22.00	19.50	24.00	Pass
7	LTE	B41	1	2	24.00	18.50	18.00	15.50	24.00	Pass
8	FR1	N78_PC2	1	4	25.50	23.00	22.50	20.00	25.50	Pass
9	FR1	n77	1	2	20.00	15.00	14.50	12.00	20.00	Pass
10	2G	GPRS 850 1TX	2	2	32.50	30.50	30.50	30.50	30.50	Pass
11	2G	GPRS 1900 2TX	2	2	28.00	23.50	23.50	23.50	23.50	Pass
12	WCDMA	B5	2	2	24.00	22.50	22.50	22.50	22.50	Pass
13	WCDMA	B2	2	2	23.50	16.50	16.50	16.50	16.50	Pass
14	LTE	B26	2	2	24.00	22.50	23.00	23.00	23.00	Pass
15	LTE	B41	2	2	24.00	18.50	18.50	18.50	18.50	Pass
16	FR1	N78_PC2	2	4	25.50	23.00	23.00	23.00	23.00	Pass
17	FR1	n77	2	2	20.00	15.00	15.00	15.00	15.00	Pass

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5.3.1 Measurement results for NR

These test cases are for sub6 NR and is conducted under NR bands n2 with ECI = 2 and n12 with ECI = 3. The corresponding detailed test procedure is described in 4.3.2. For the figure set of each case, the first figure demonstrates the EUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). The second figure illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in section 4.3.2. For all test cases, the time-averaged SAR does not exceed the FCC limit.

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- Case 8 in table 5-4: NR n78_PC2 result for test sequence 1

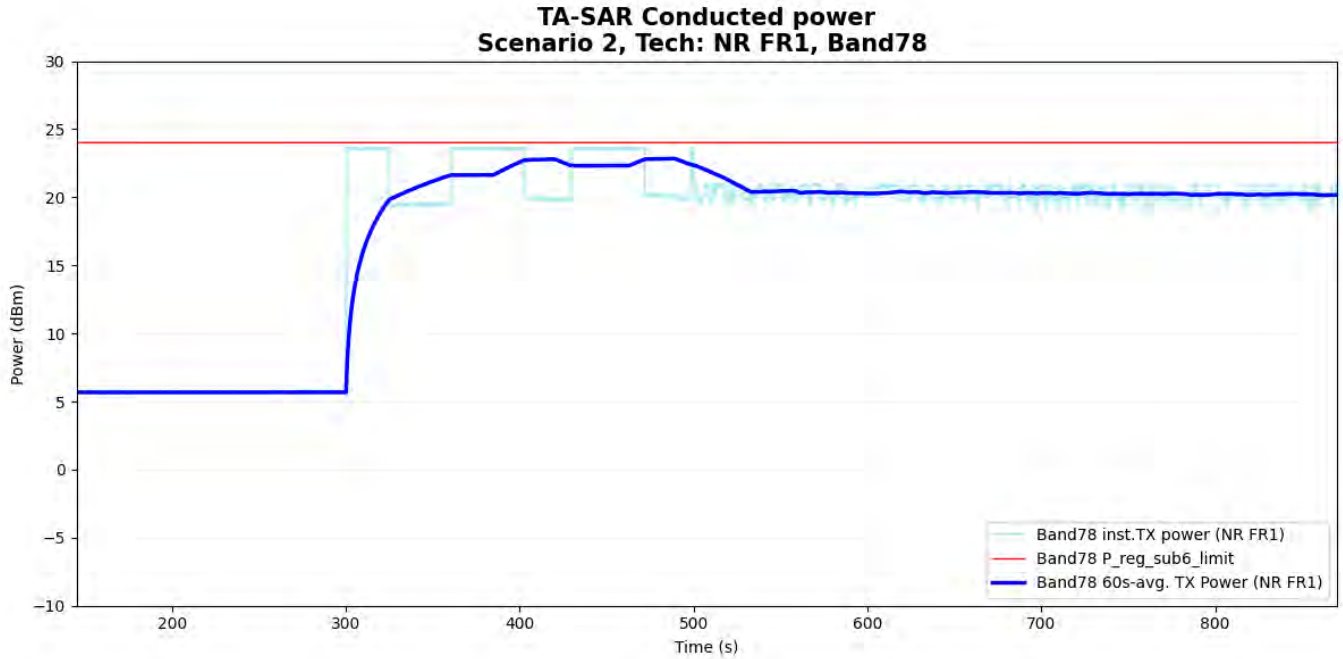

Figure 5-9 Time-averaged conducted TX power over time for case 8 (sub6 NR n78_PC2)

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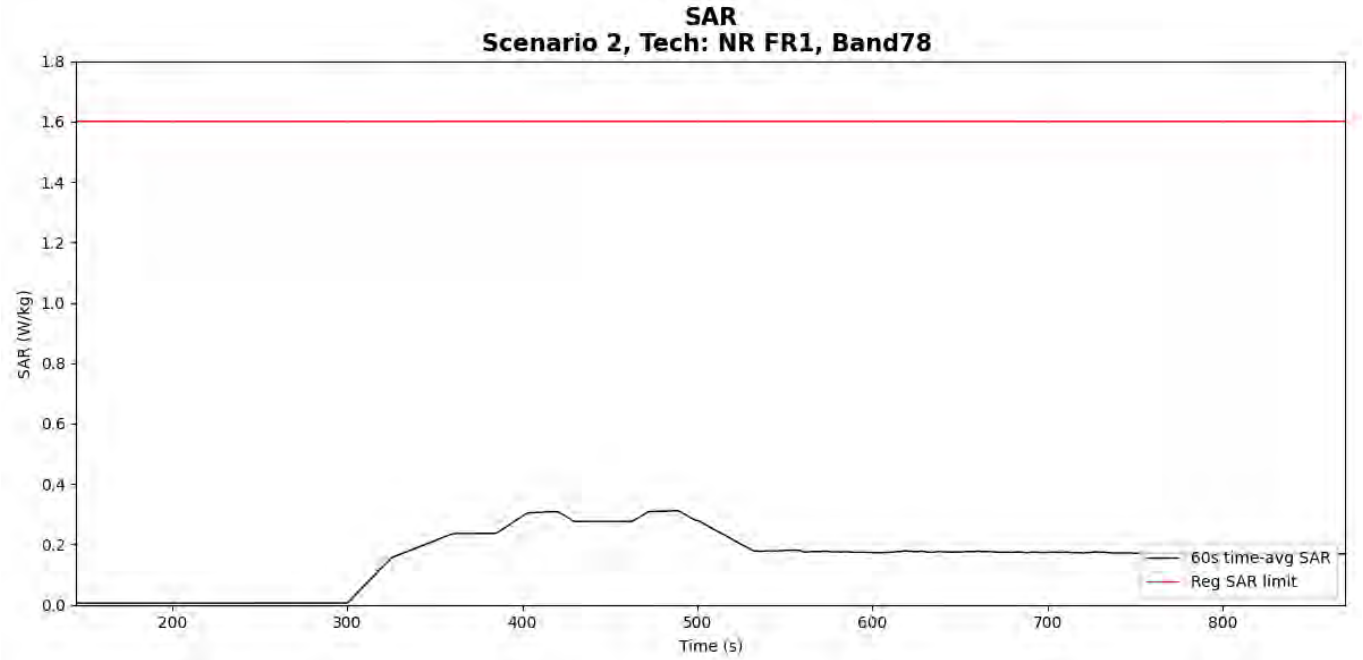

Figure 5-10 Time-averaged SAR for case 8 (sub6 NR n78_PC2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.312 W/kg
Validation result: pass	

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- Case 9 in table 5-4: NR n77 result for test sequence 1

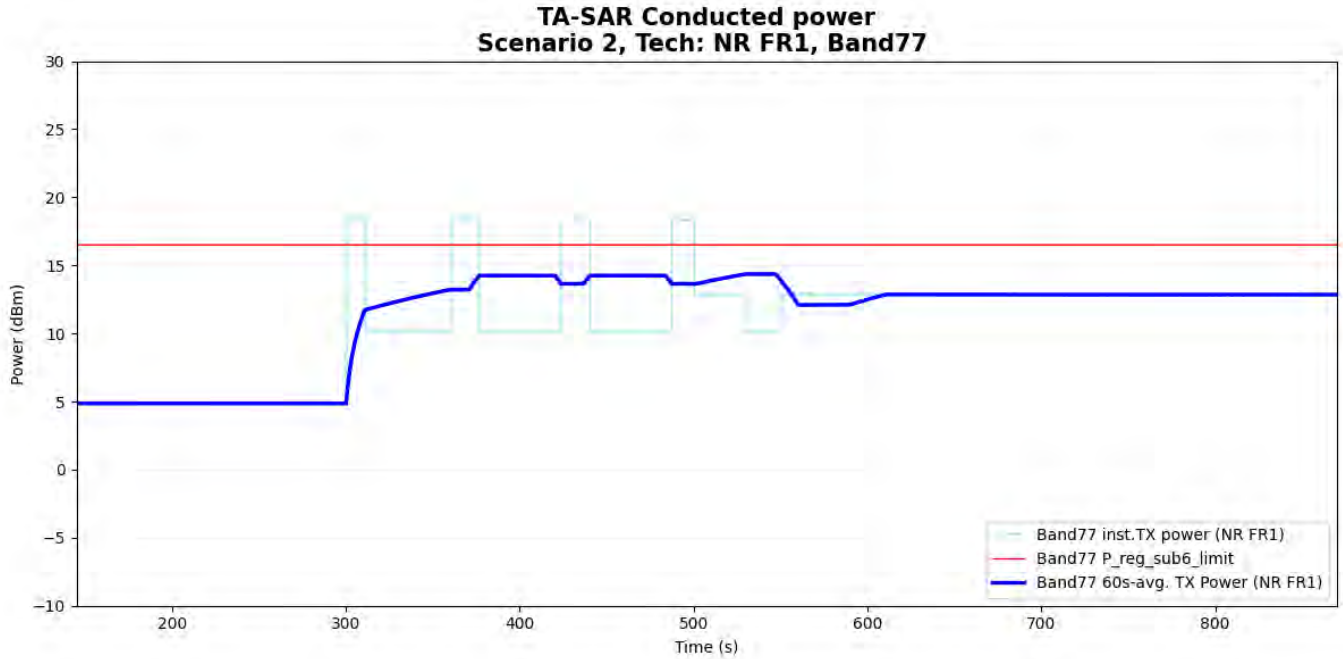

Figure 5-11 Time-averaged conducted TX power over time for case 9 (sub6 NR n77)

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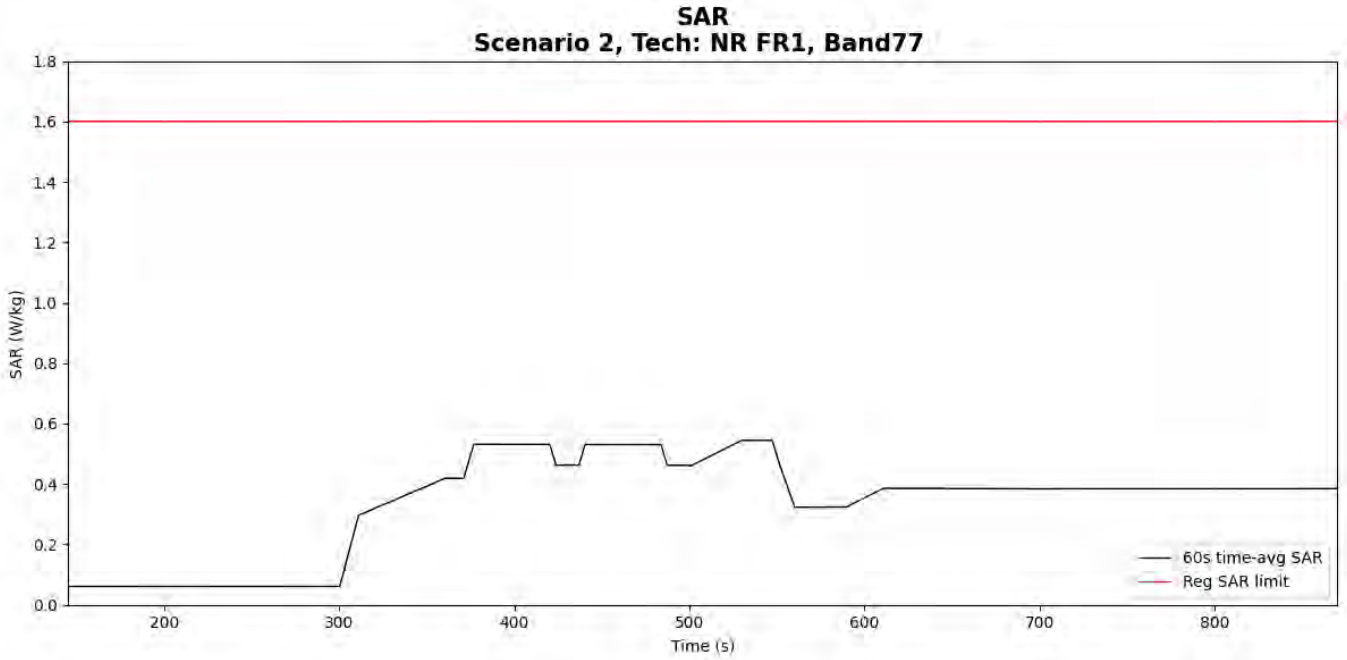

Figure 5-12 Time-averaged SAR for case 9 (sub6 NR n77)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.544 W/kg
Validation result: pass	

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- Case 16 in table 5-4: NR n78_PC2 result for test sequence 2

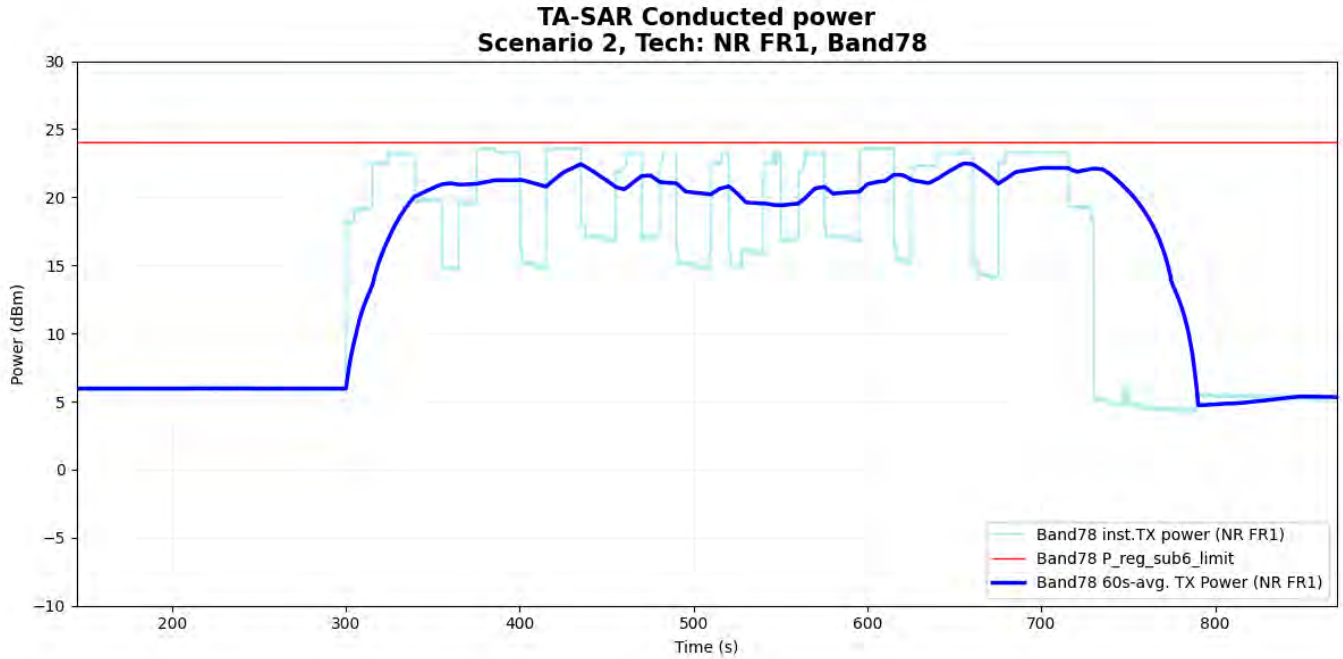

Figure 5-13 Time-averaged conducted TX power over time for case 16 (sub6 NR n78_PC2)

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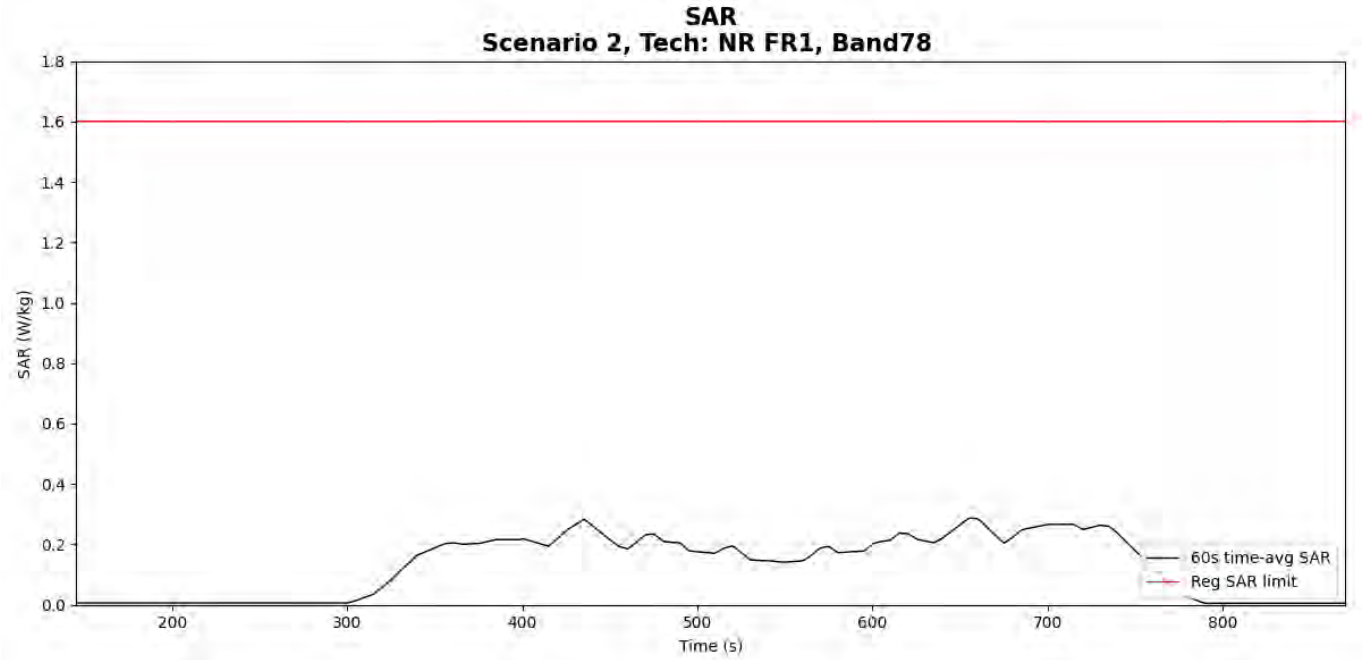

Figure 5-14 Time-averaged SAR for case 16 (sub6 NR n78_PC2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.287 W/kg
Validation result: pass	

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- Case 17 in table 5-4: NR n77 result for test sequence 2

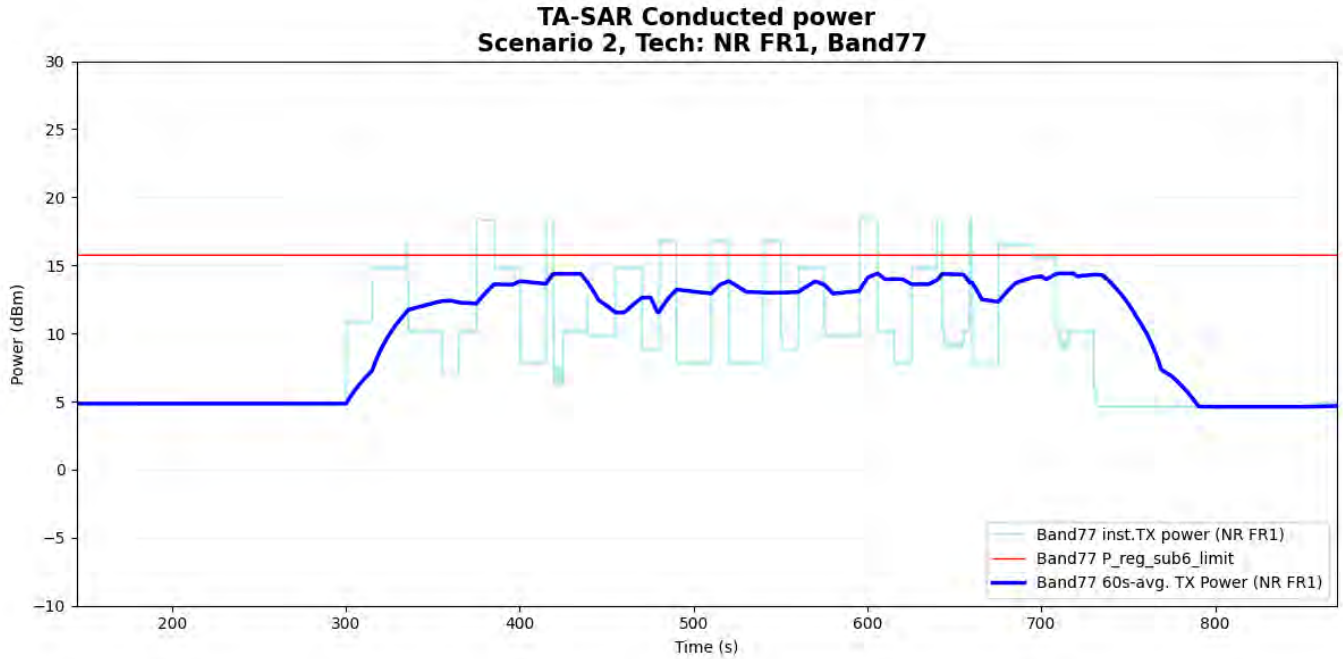

Figure 5-15 Time-averaged conducted TX power over time for case 17 (sub6 NR n77)

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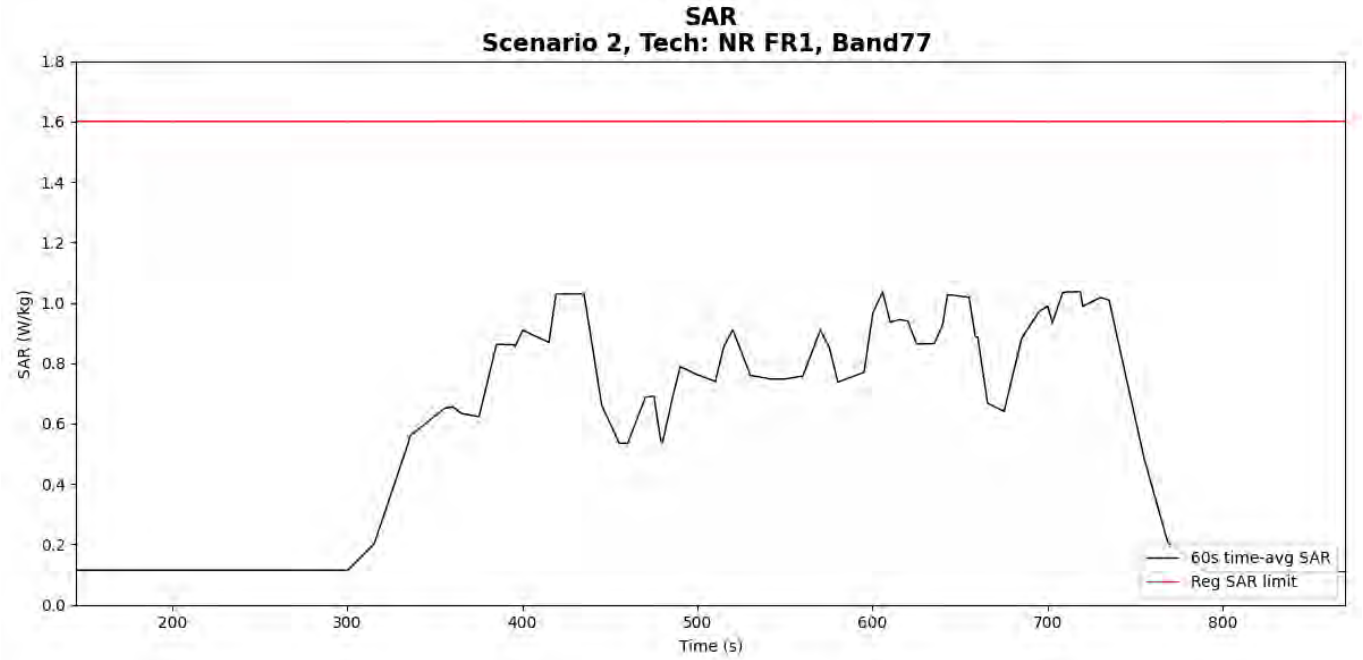

Figure 5-16 Time-averaged SAR for case 17 (sub6 NR n77)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	1.037 W/kg
Validation result: pass	

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5.3.2 Measurement results for LTE

These test cases are for 4G LTE and are conducted under LTE bands B7 with ECI = 2 and B12 with 3. The corresponding detailed test procedure is described in 4.3.2. For the figure set of each case, the first figure demonstrates the EUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). The second figure illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in section 4.3.2. For all test cases, the time-averaged SAR does not exceed the FCC limit.

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- Case 6 in table 5-4: LTE B26 result for test sequence 1

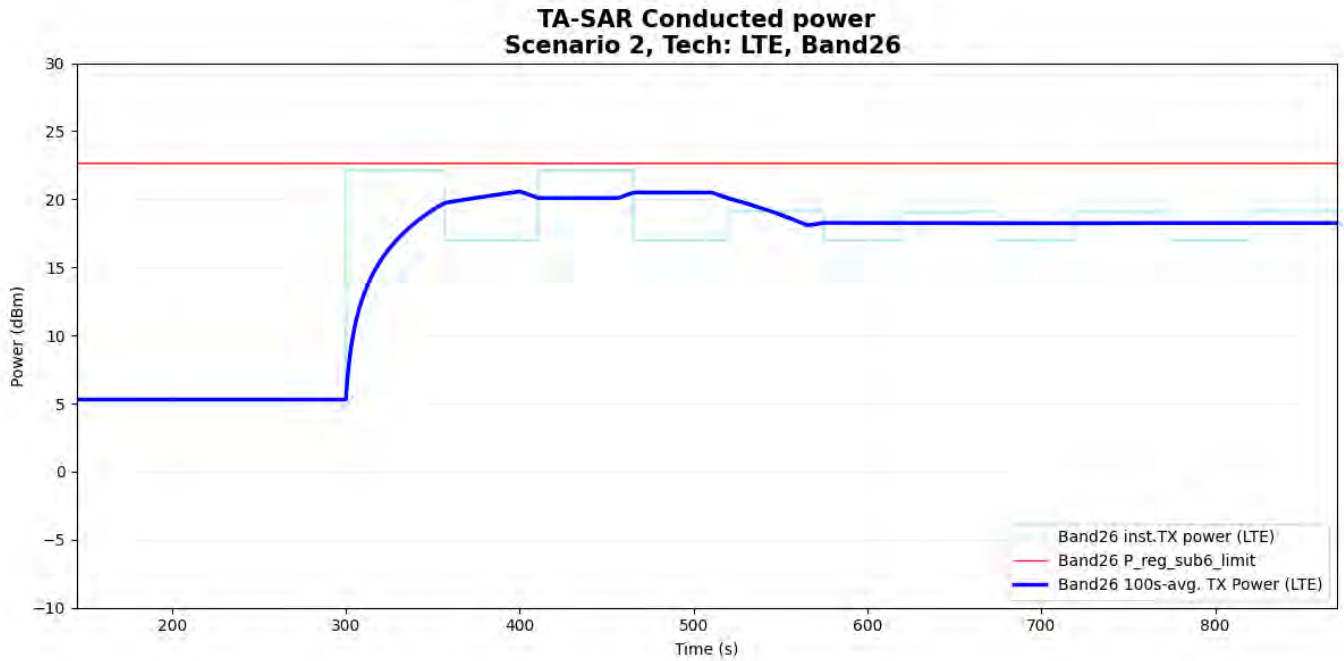

Figure 5-17 Time-averaged conducted TX power over time for case 6 (LTE B26)

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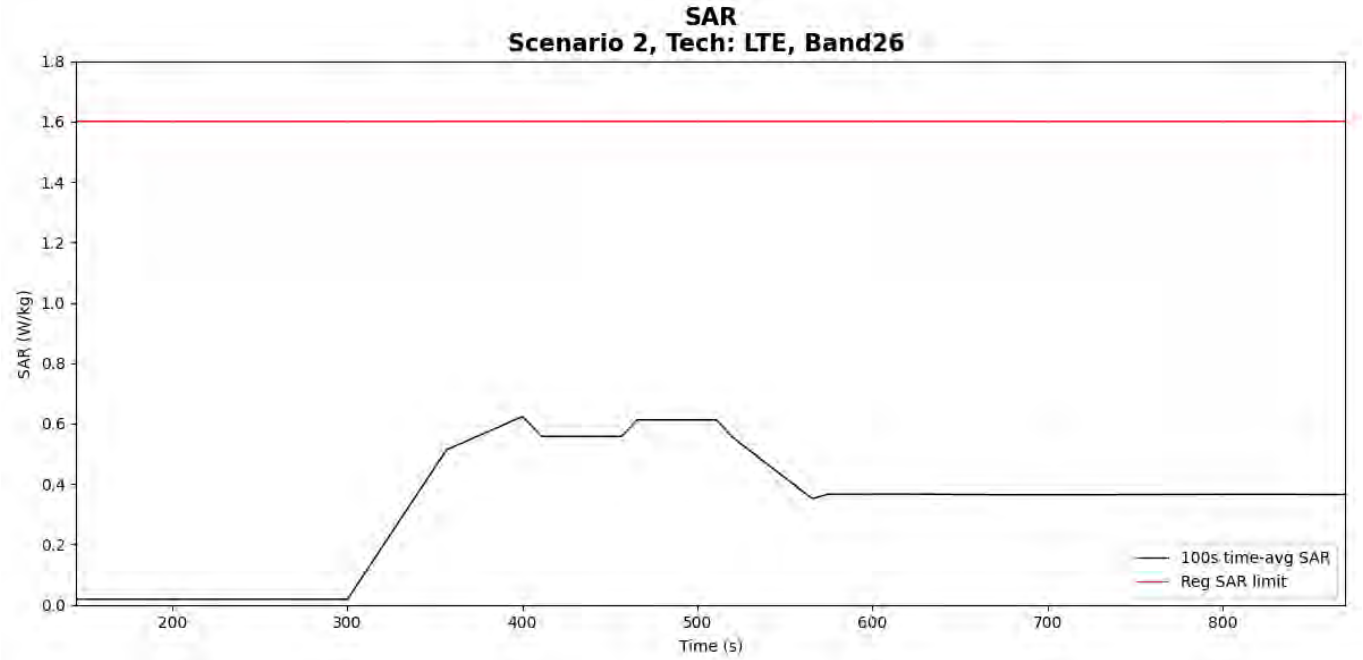

Figure 5-18 Time-averaged SAR for case 6 (LTE B26)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.623 W/kg
Validation result: pass	

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- Case 7 in table 5-4: LTE B41 result for test sequence 1

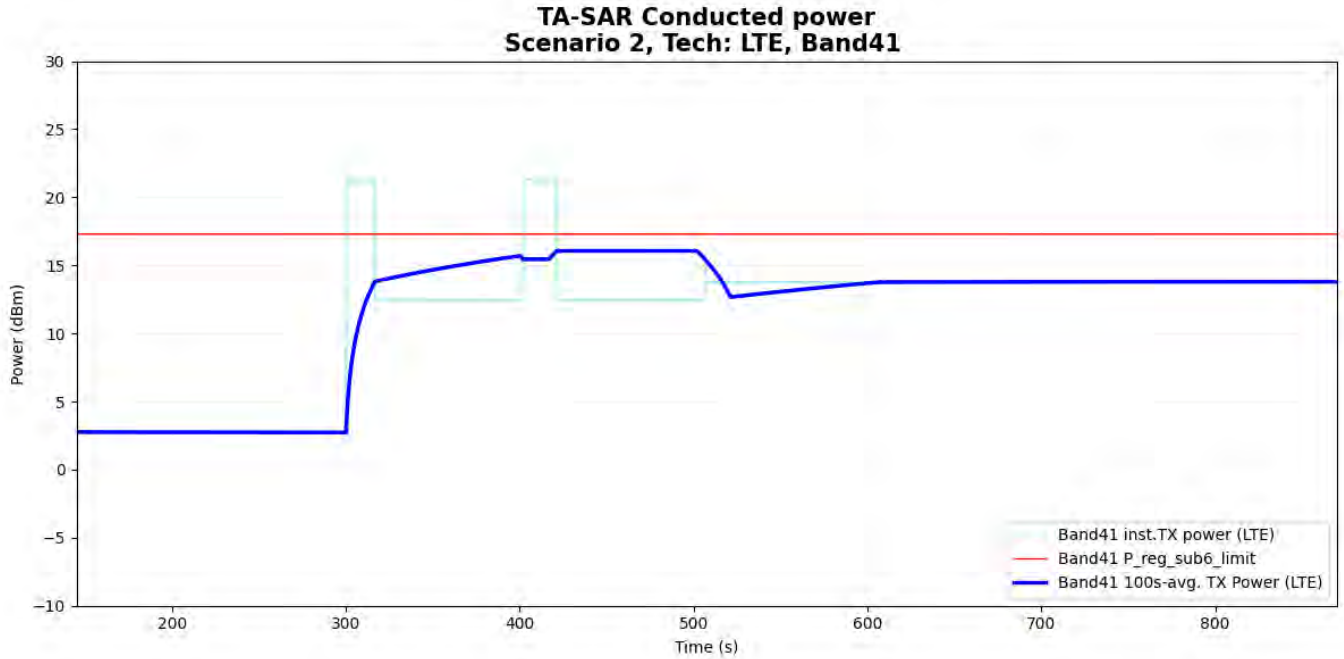

Figure 5-19 Time-averaged conducted TX power over time for case 7 (LTE B41)

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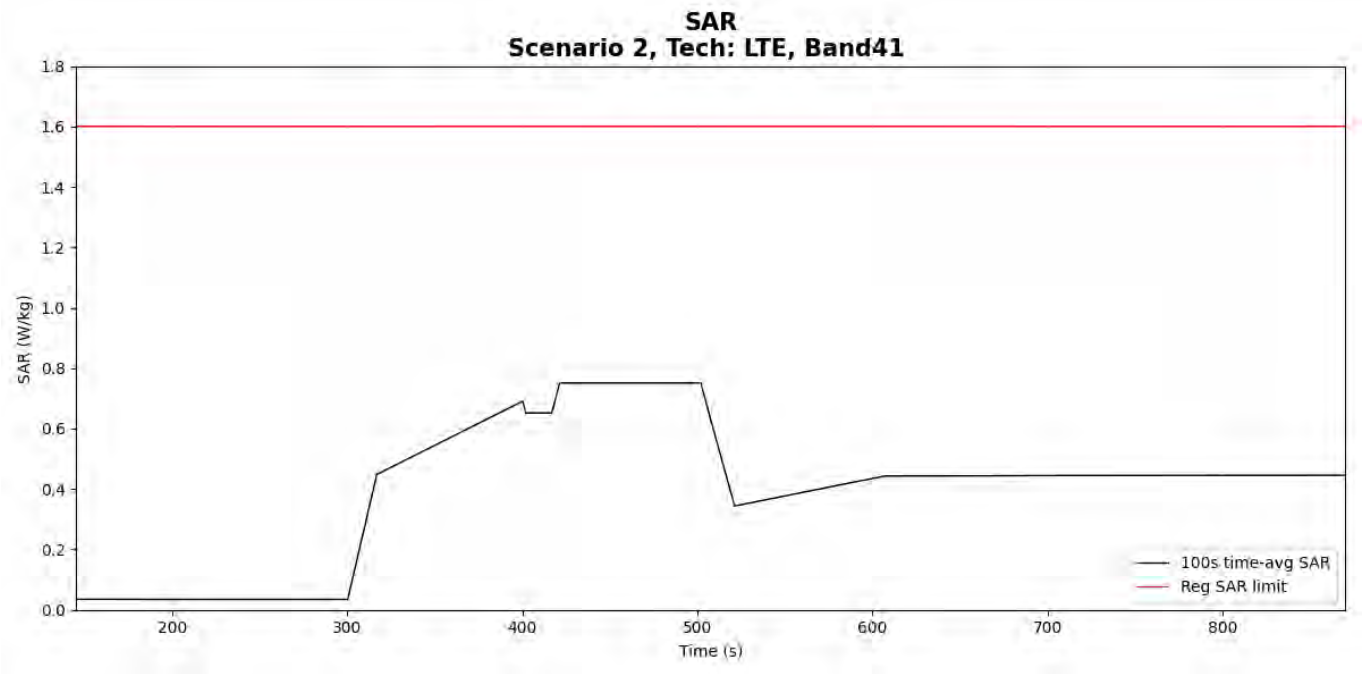

Figure 5-20 Time-averaged SAR for case 7 (LTE B41)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.751 W/kg
Validation result: pass	

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- Case 14 in table 5-4: LTE B26 result for test sequence 2

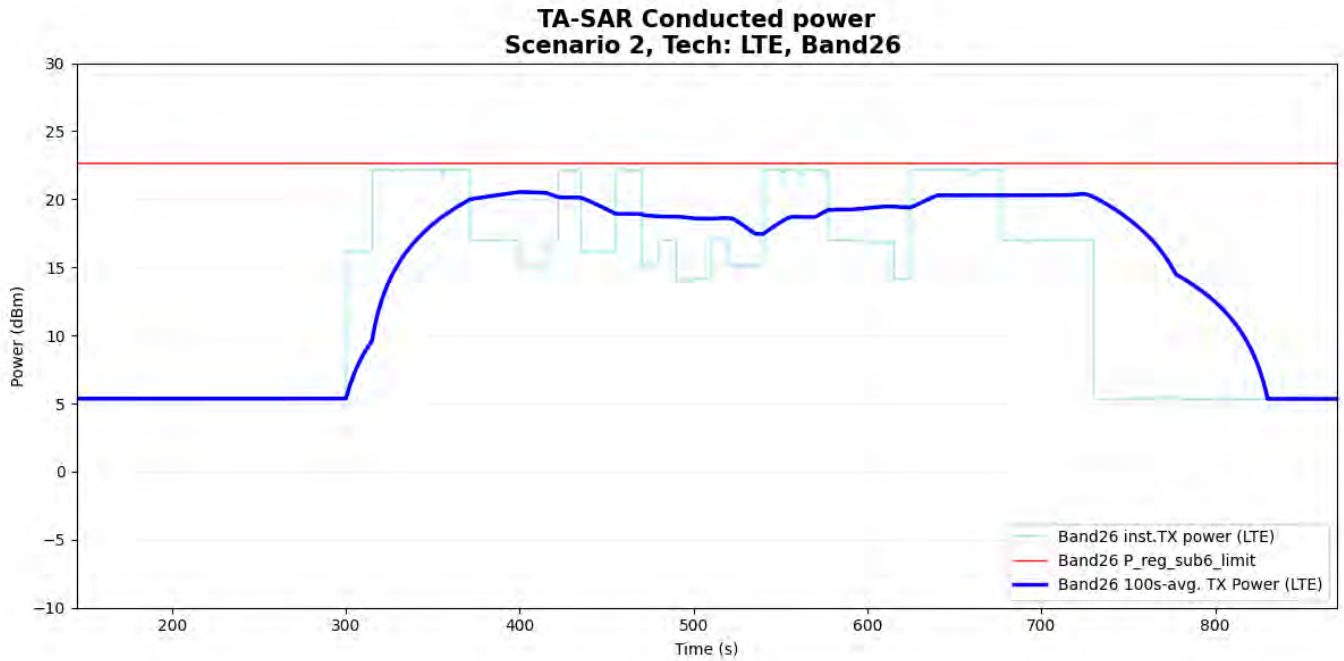

Figure 5-21 Time-averaged conducted TX power over time for case 14 (LTE B26)

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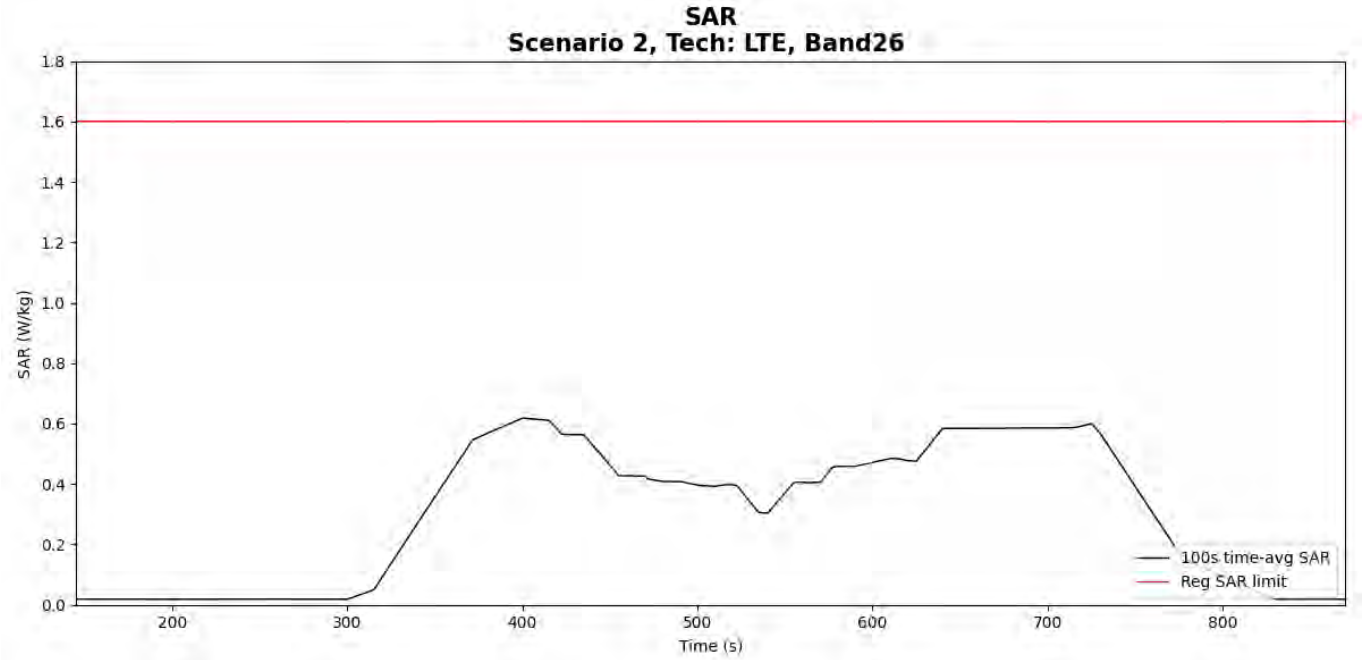

Figure 5-22 Time-averaged SAR for case 14 (LTE B26)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.618 W/kg
Validation result: pass	

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- Case 15 in table 5-4: LTE B41 result for test sequence 2

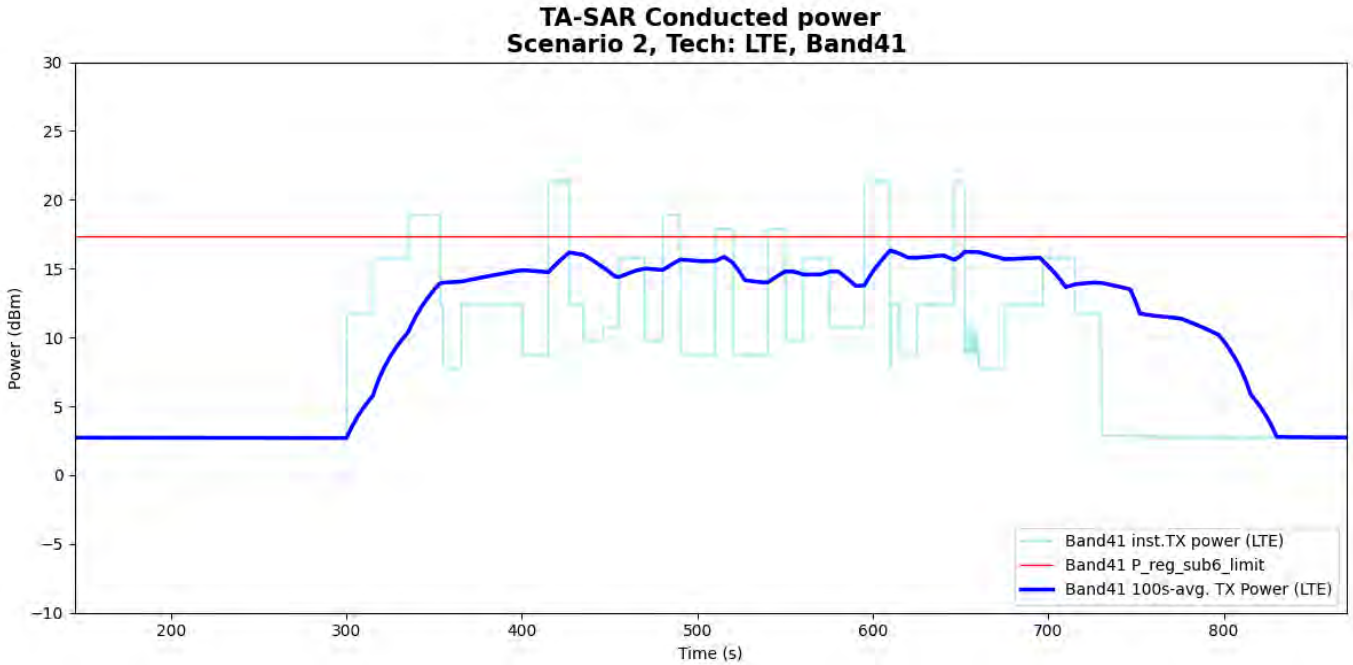

Figure 5-23 Time-averaged conducted TX power over time for case 15 (LTE B41)

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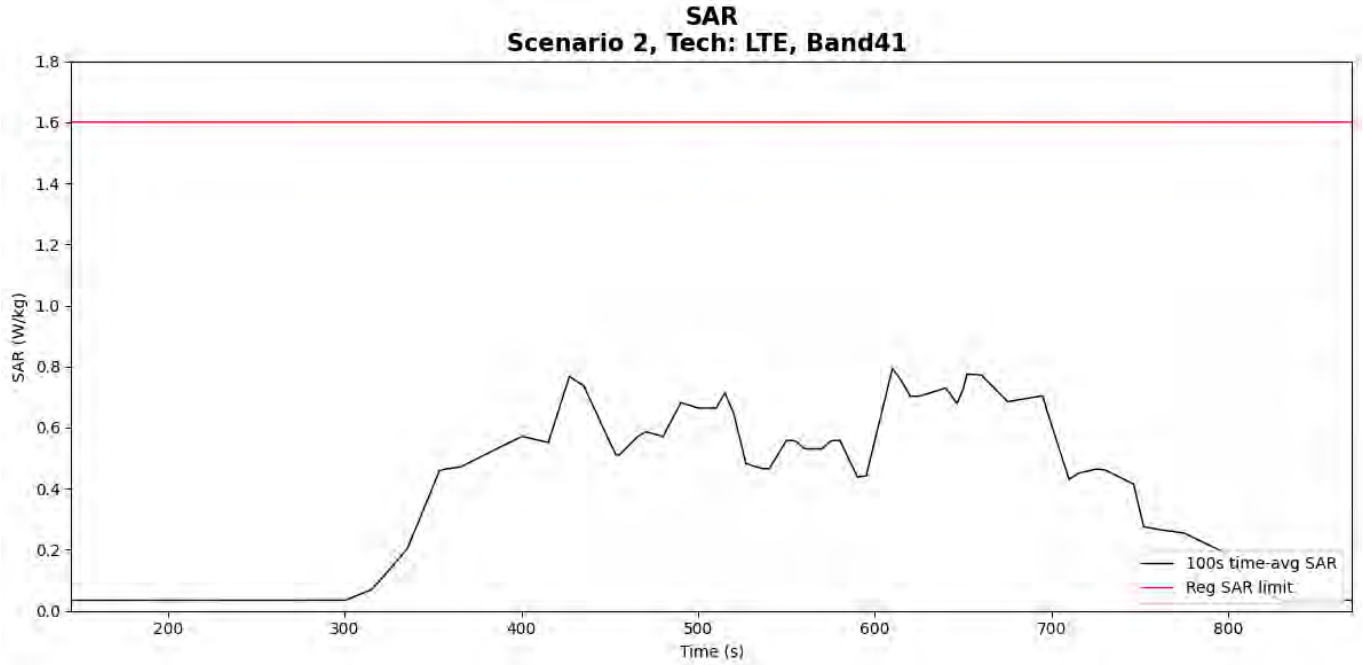

Figure 5-24 Time-averaged SAR for case 15 (LTE B41)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.793 W/kg
Validation result: pass	

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5.3.3 Measurement results for WCDMA

These test cases are for 3G WCDMA and are conducted under WCDMA bands B4 and B2 with ECI = 2. The corresponding detailed test procedure is described in 4.3.2. For the figure set of each case, the first figure demonstrates the EUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). The second figure illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in section 4.3.2. For all test cases, the time-averaged SAR does not exceed the FCC limit.

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- Case 4 in table 5-4: WCDMA B5 result for test sequence 1

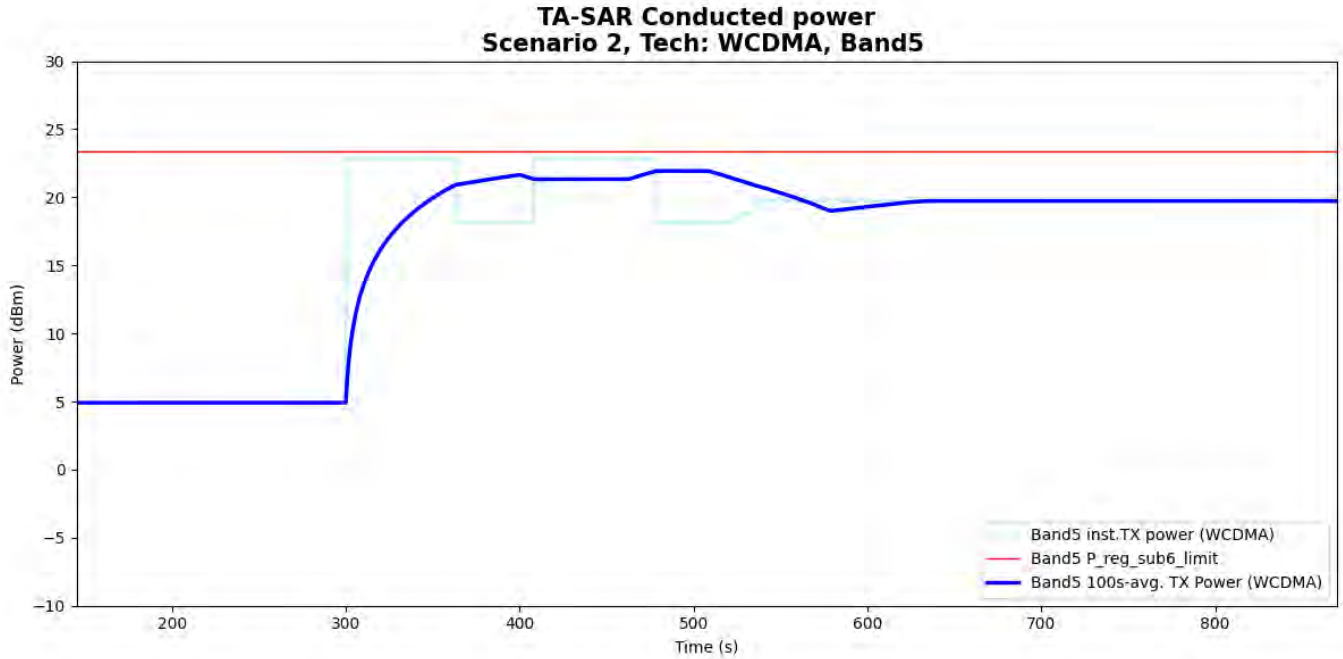

Figure 5-25 Time-averaged conducted TX power over time for case 4 (WCDMA B5)

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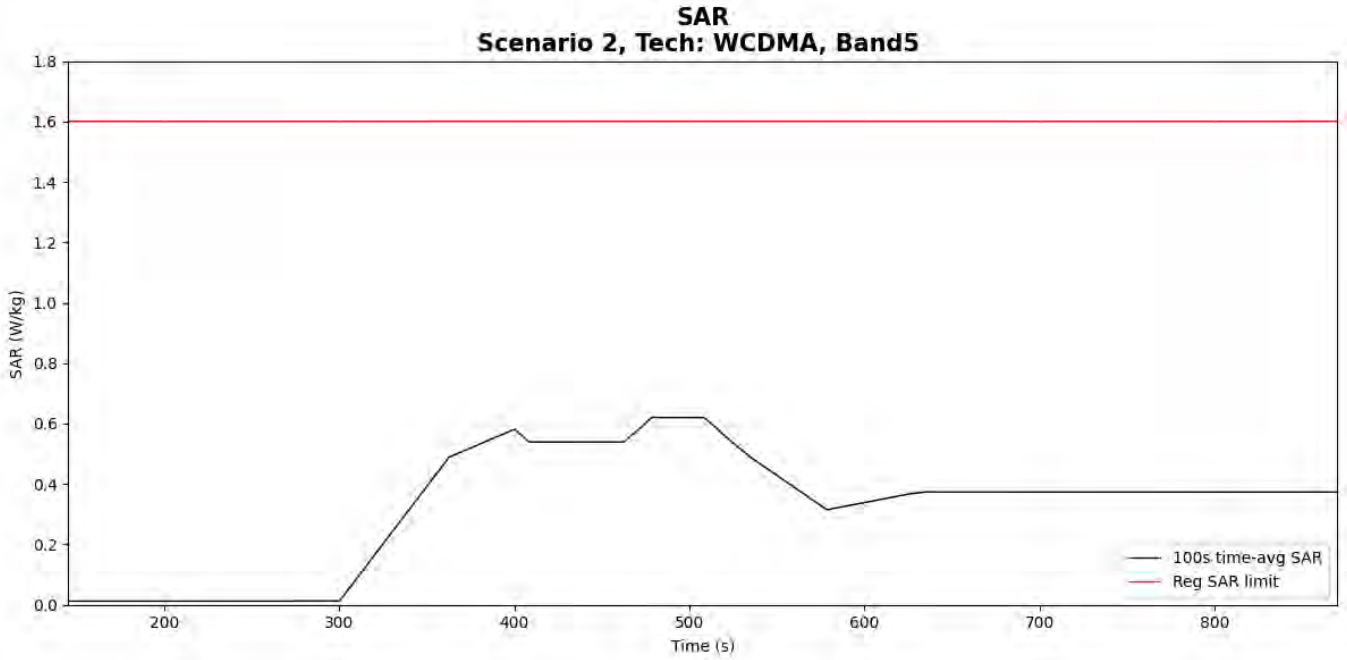

Figure 5-26 Time-averaged SAR for case 4 (WCDMA B5)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.620 W/kg
Validation result: pass	

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- Case 5 in table 5-4: WCDMA B2 result for test sequence 1

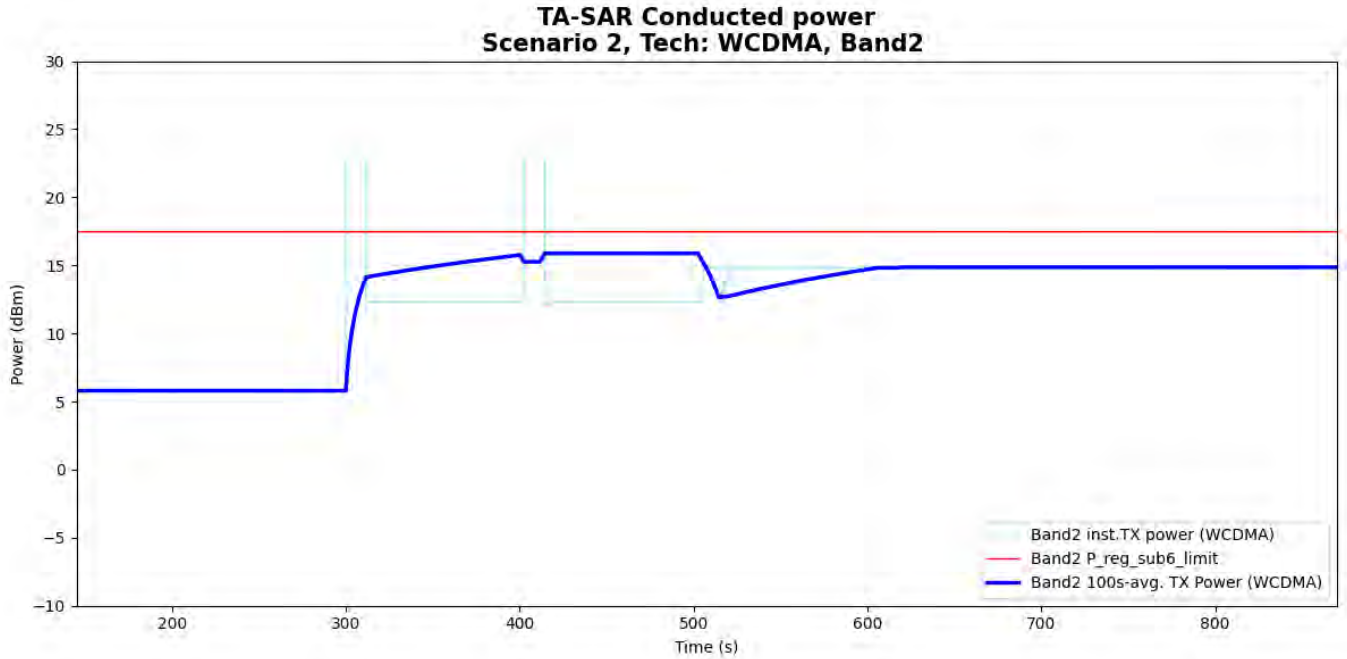

Figure 5-27 Time-averaged conducted TX power over time for case 5 (WCDMA B2)

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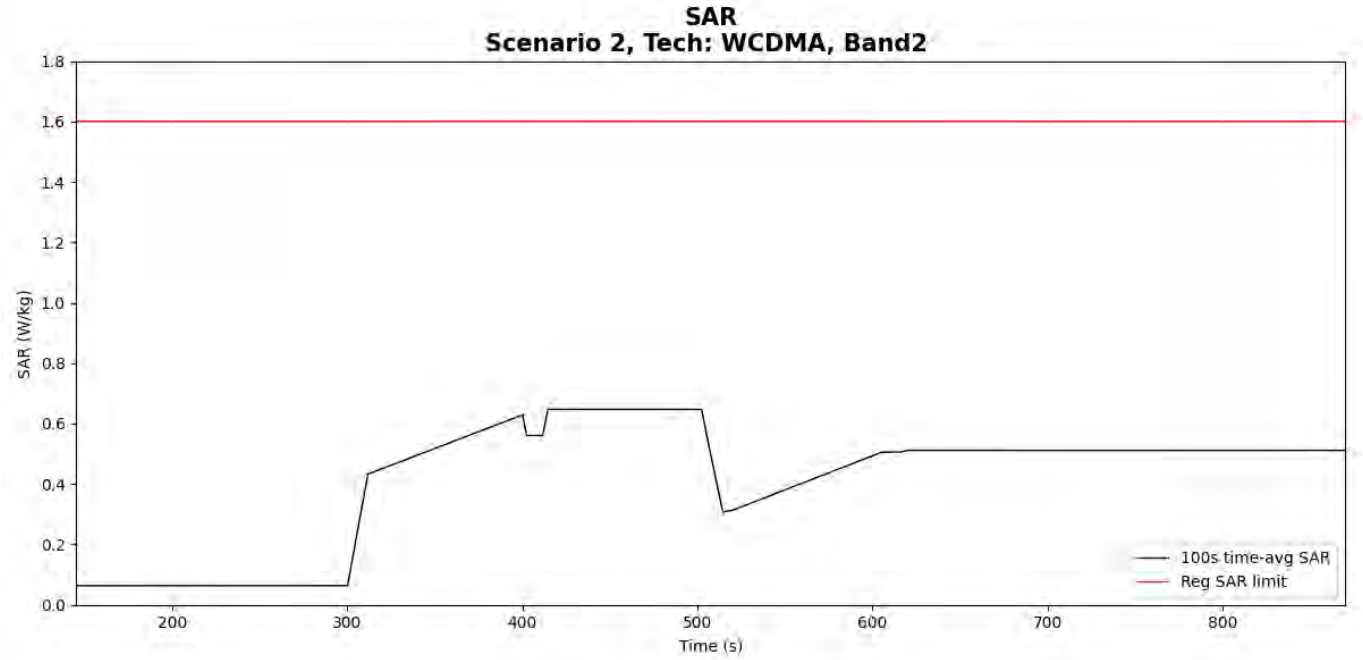

Figure 5-28 Time-averaged SAR for case 5 (WCDMA B2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.647 W/kg
Validation result: pass	

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- Case 12 in table 5-4: WCDMA B5 result for test sequence 2

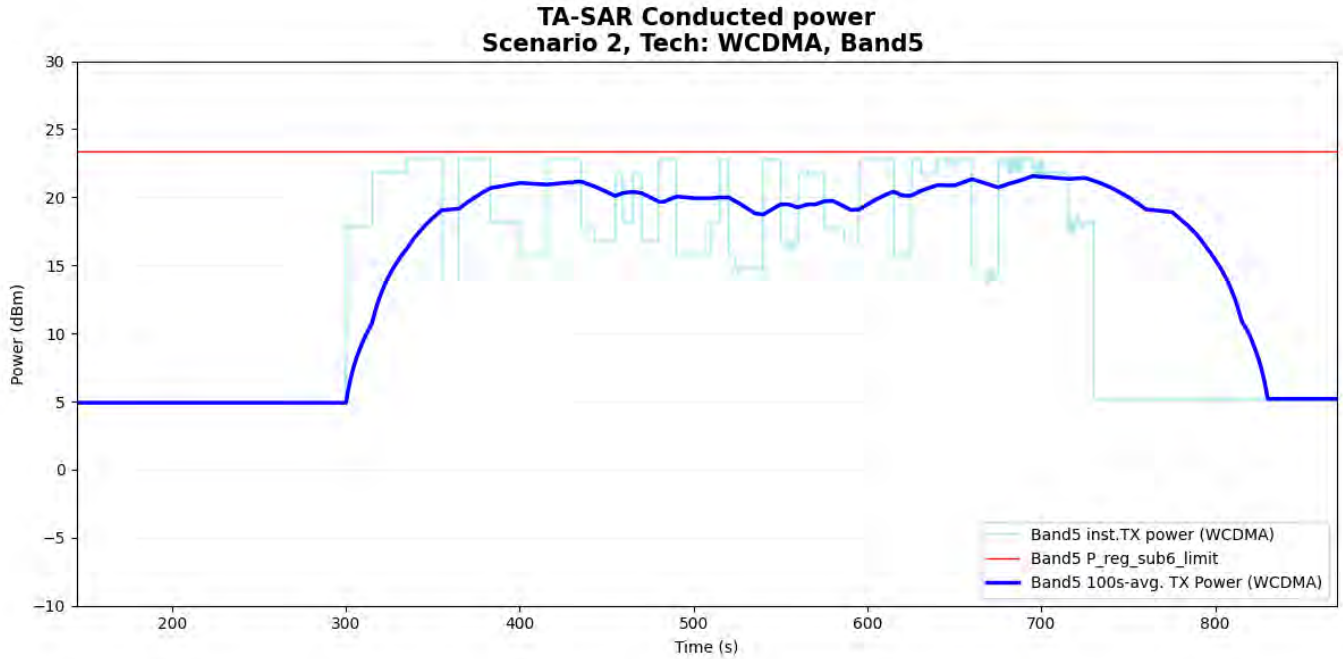

Figure 5-29 Time-averaged conducted TX power over time for case 12 (WCDMA B5)

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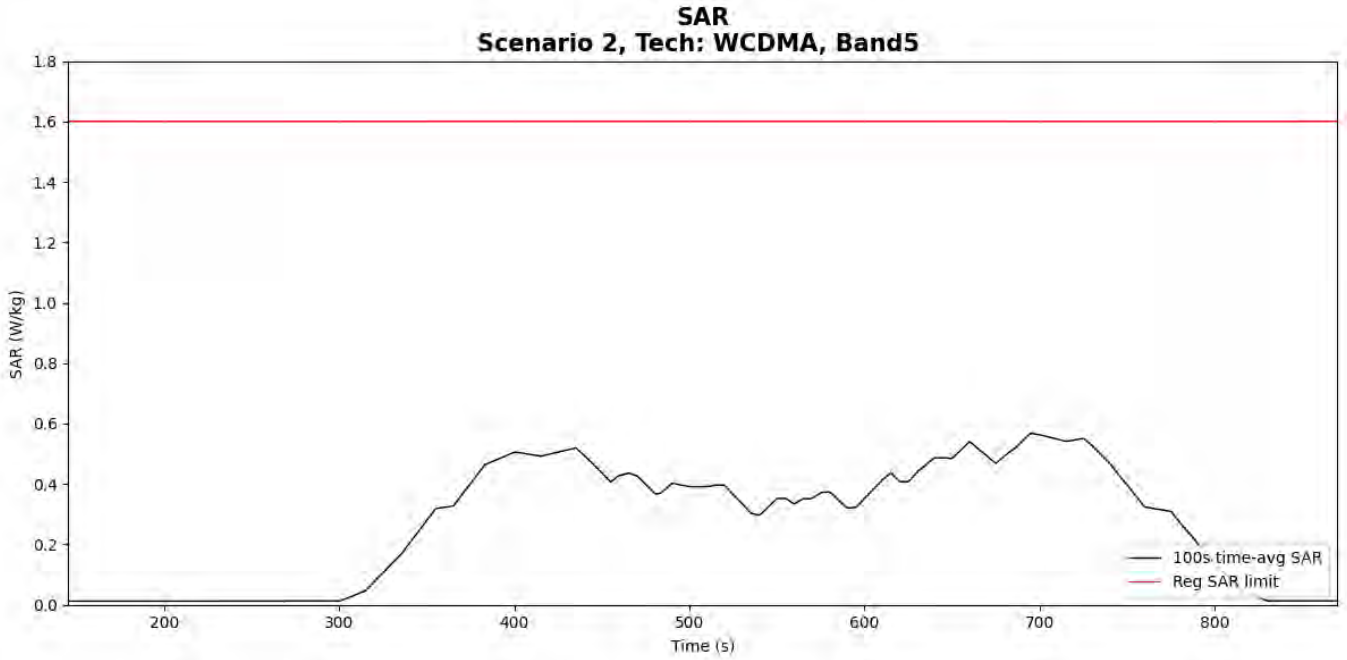

Figure 5-30 Time-averaged SAR for case 12 (WCDMA B5)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.569 W/kg
Validation result: pass	

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- Case 13 in table 5-4: WCDMA B2 result for test sequence 2

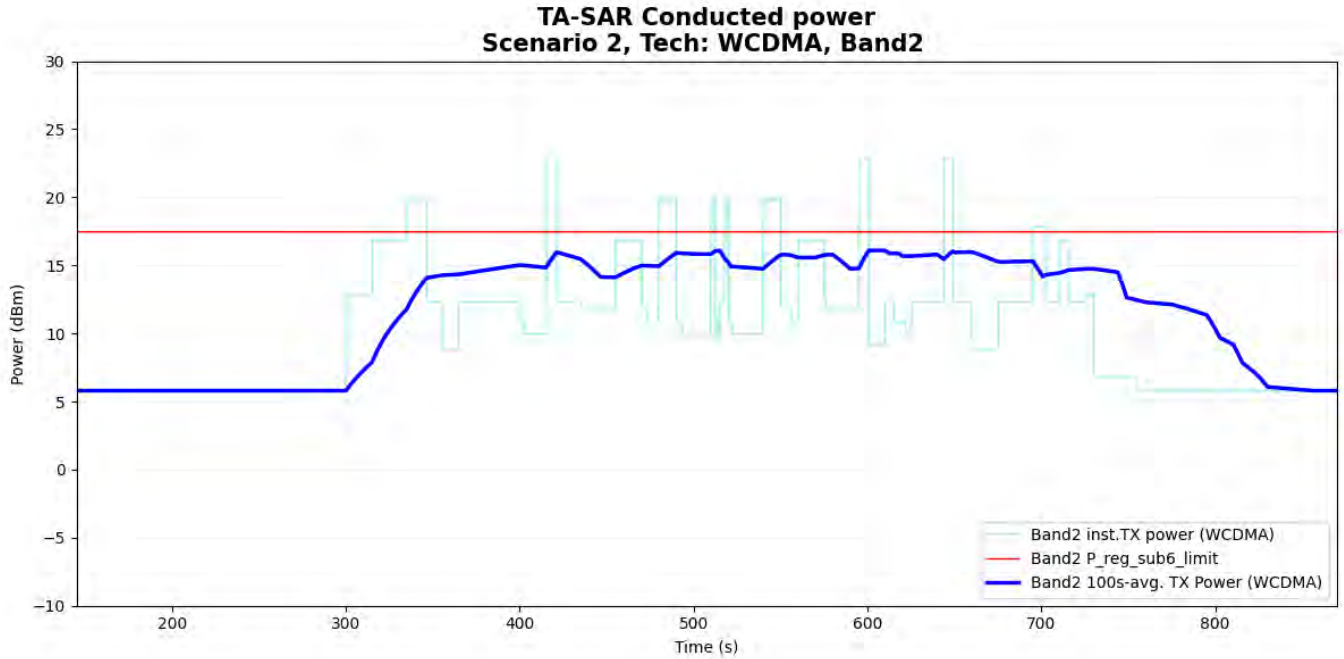

Figure 5-31 Time-averaged conducted TX power over time for case 13 (WCDMA B2)

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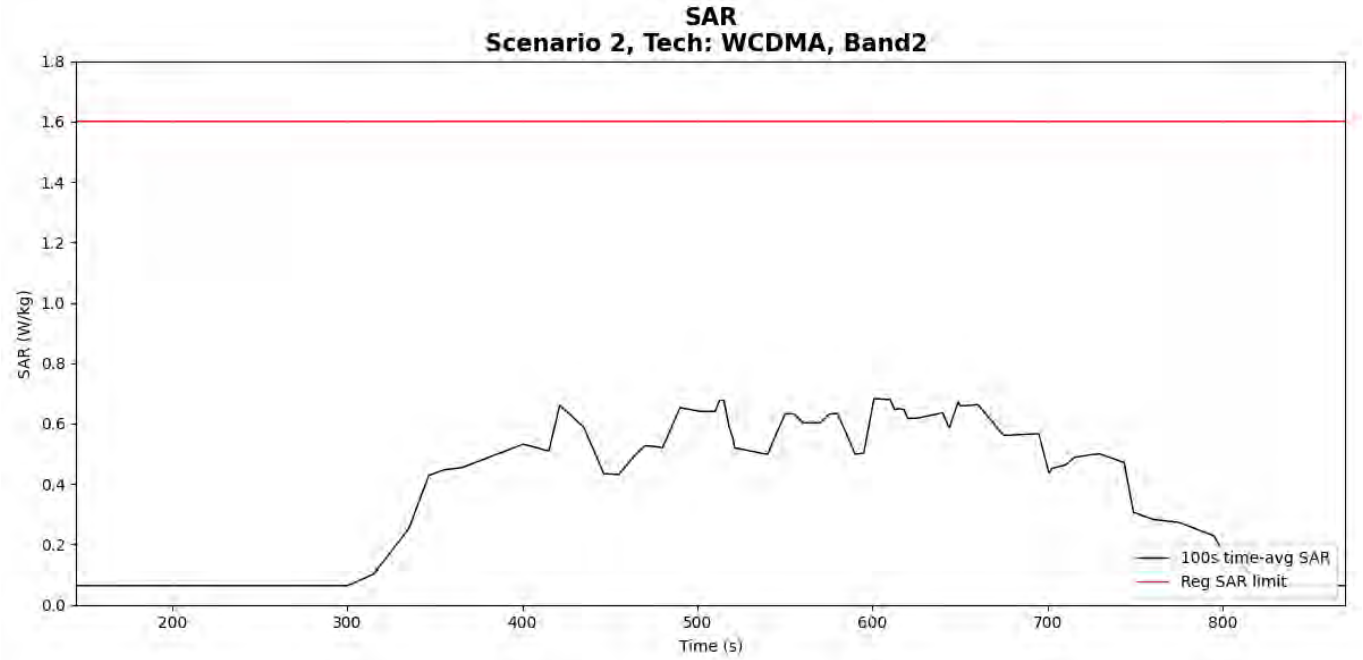

Figure 5-32 Time-averaged SAR for case 13 (WCDMA B2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.682 W/kg
Validation result: pass	

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5.3.4 Measurement results for 2G

These test cases are for 2G and are conducted under 2G band GPRS 850 4Tx and 1900 with ECI = 2. The corresponding detailed test procedure is described in 4.3.2. For the figure set of each case, the first figure demonstrates the EUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). The second figure illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in section 4.3.2.

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- Case 2 in table 5-4: 2G GPRS 850 1TX result for test sequence 1

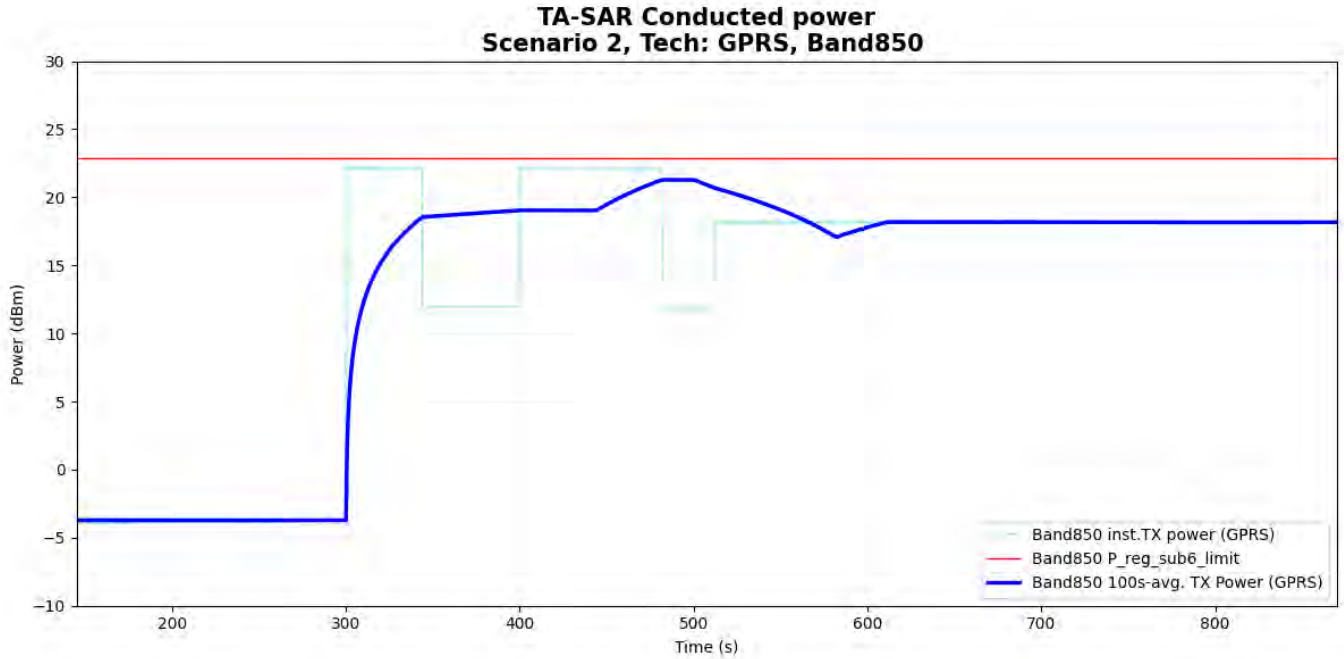

Figure 5-33 Time-averaged conducted TX power over time for case 2 (2G GPRS 850 1TX)

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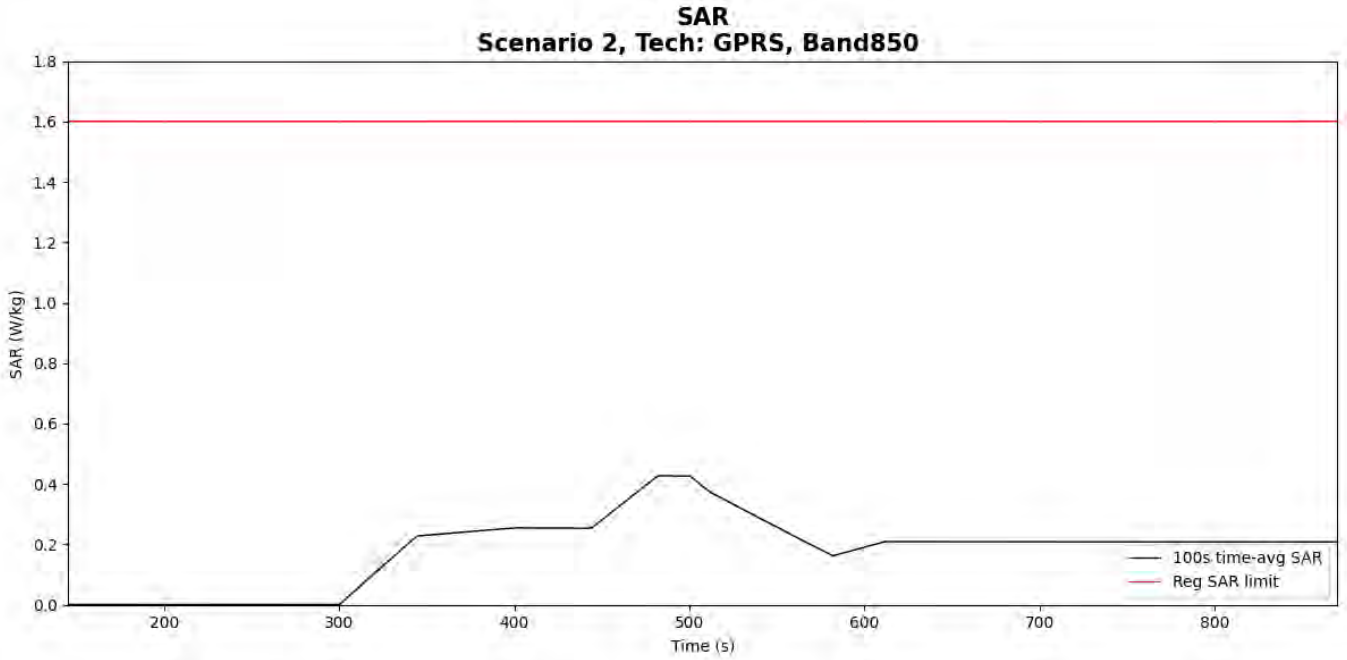

Figure 5-34 Time-averaged SAR for case 2 (2G GPRS 850 1TX)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.427 W/kg
Validation result: pass	

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- Case 3 in table 5-4: 2G GPRS 1900 2TX result for test sequence 1

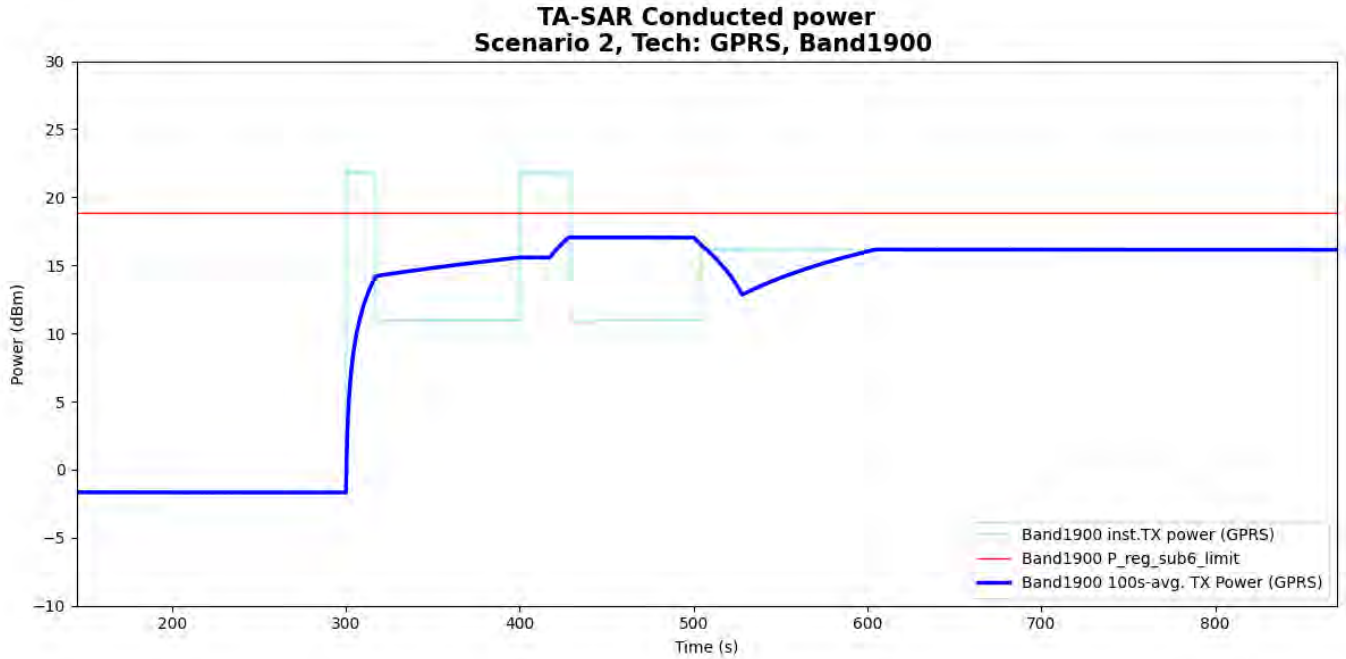

Figure 5-35 Time-averaged conducted TX power over time for case 3 (2G GPRS 1900 2TX)

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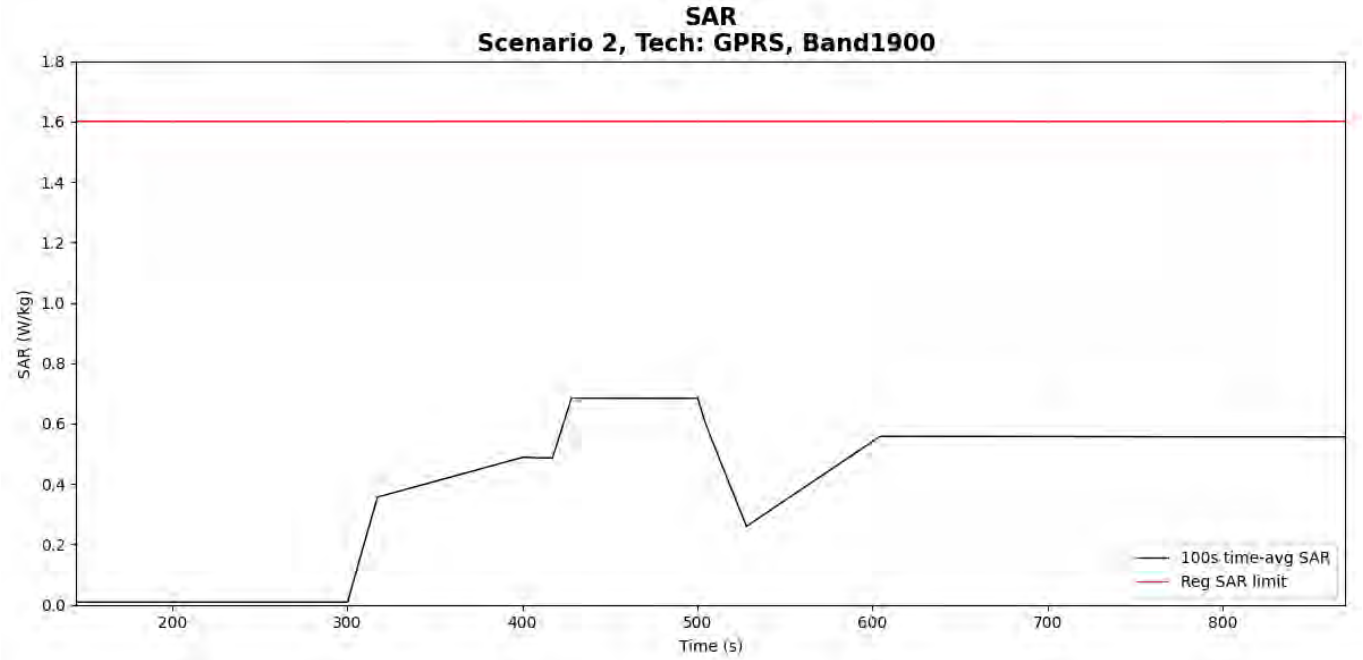

Figure 5-36 Time-averaged SAR for case 3 (2G GPRS 1900 2TX)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.684 W/kg
Validation result: pass	

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- Case 10 in table 5-4: 2G GPRS 850 1TX result for test sequence 2

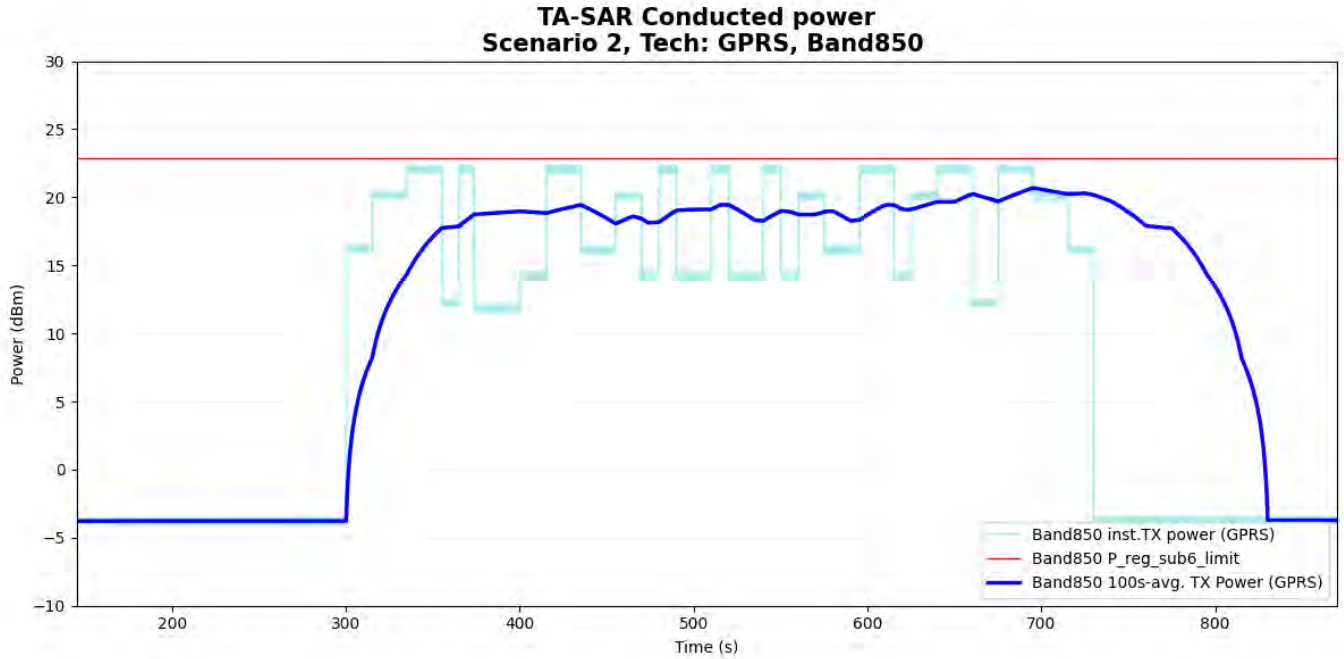

Figure 5-37 Time-averaged conducted TX power over time for case 10 (2G GPRS 850 1TX)

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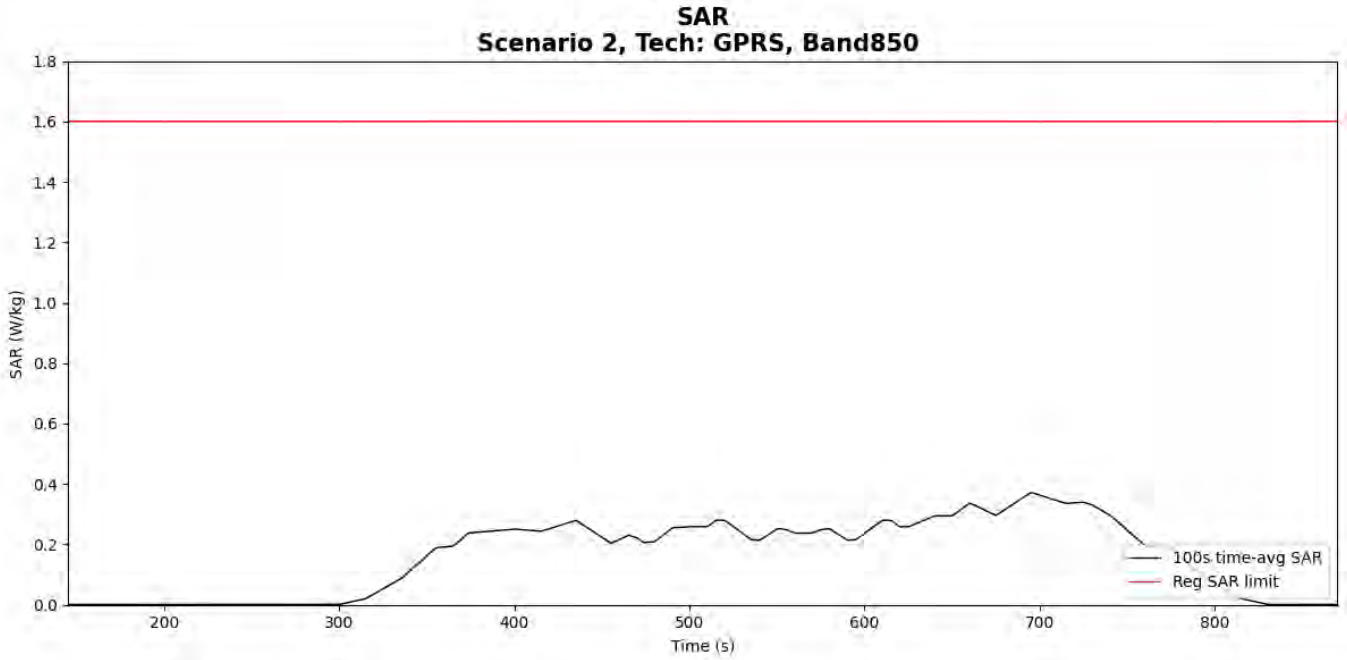

Figure 5-38 Time-averaged SAR for case 10 (2G GPRS 850 1TX)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.372 W/kg
Validation result: pass	

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- Case 11 in table 5-4: 2G GPRS 1900 1Tx result for test sequence 2

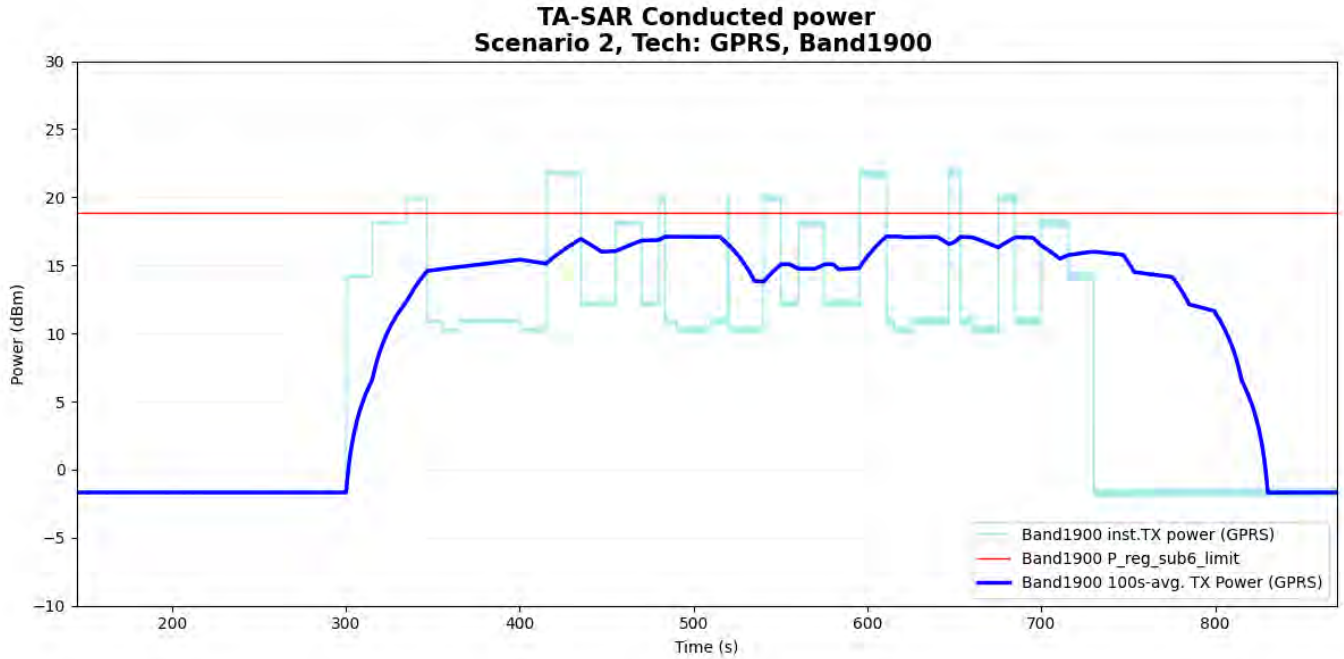

Figure 5-39 Time-averaged conducted TX power over time for case 11 (2G GPRS 1900 2Tx)

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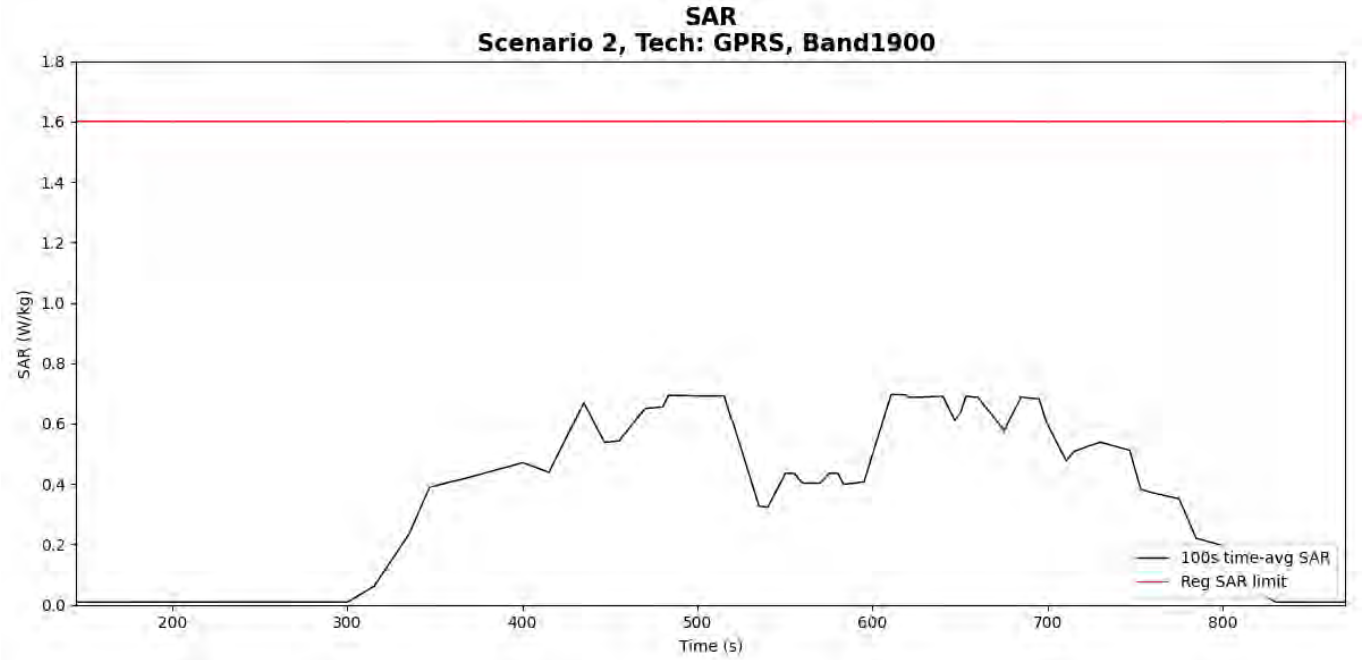

Figure 5-40 Time-averaged SAR for case 11 (2G GPRS 1900 2Tx)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.696 W/kg
Validation result: pass	

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5.4 Conducted Power Measurement Results for Scenario 3: Call Disconnection and Re-establishment

In this scenario, the test power sequence #0 (i.e., maximum TX power is requested by a call box for each RAT) is used, and the call drop is manually configured for a pre-defined period and then the call is re-established to continue data transmission. The test case for this scenario is relegated in Table 5-5, and the test procedure follows section 4.4.2. The measurement setup is shown in Figure 5-2. The high-level summary of the final validation results is also listed in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement. The following section will demonstrate how Mediatek's TA-SAR algorithm behaves.

Table 5-5 TA-SAR parameters setting for scenario 3

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
18	FR1	n77	0	2	20.00	15.00	15.00	15.00	15.00	Pass

This test is for 5G NR and is conducted under NR band n77 with ECI = 2. The corresponding detailed test procedure is described in 4.4.2. Figure 5-42 demonstrates the EUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). Figure 5-43 illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in section 4.4.2. As seen in this figure, the time-averaged SAR does not exceed the FCC limit.

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- Case 18 in table 5-5: call drop happens at the time instance of 500 seconds.

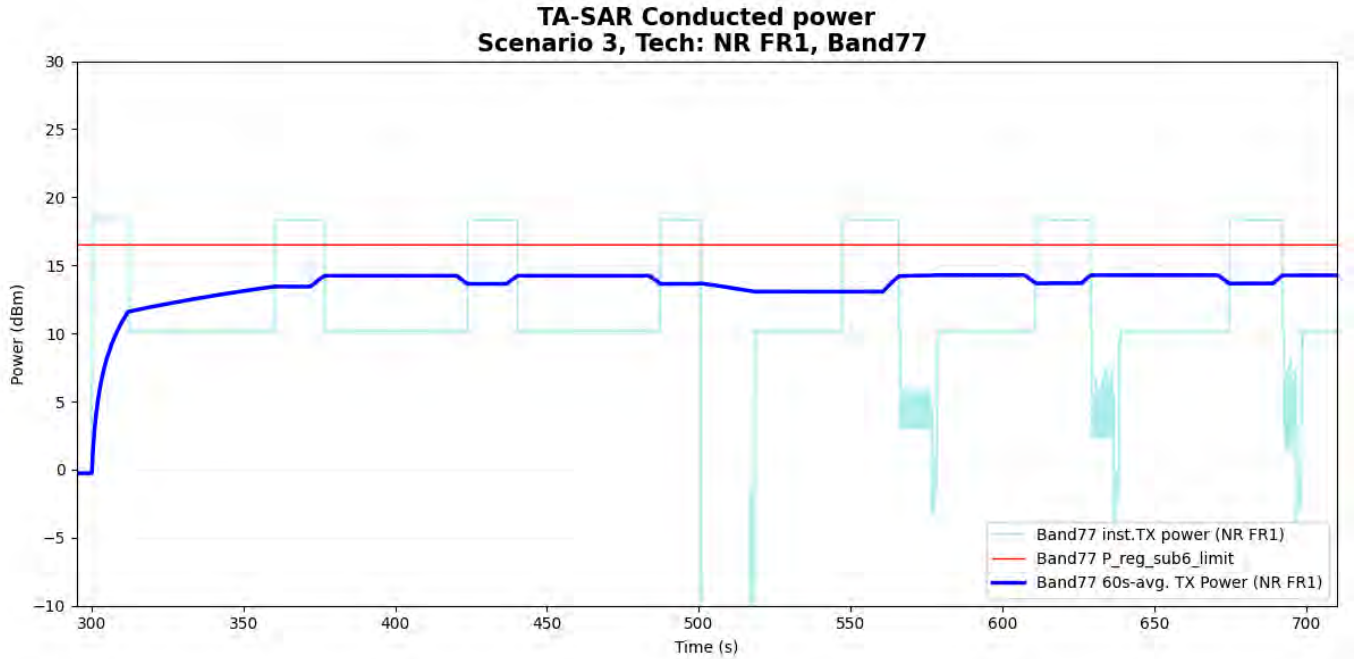

Figure 5-41 Time-averaged conducted TX power over time for case 18 (sub6 NR n77)

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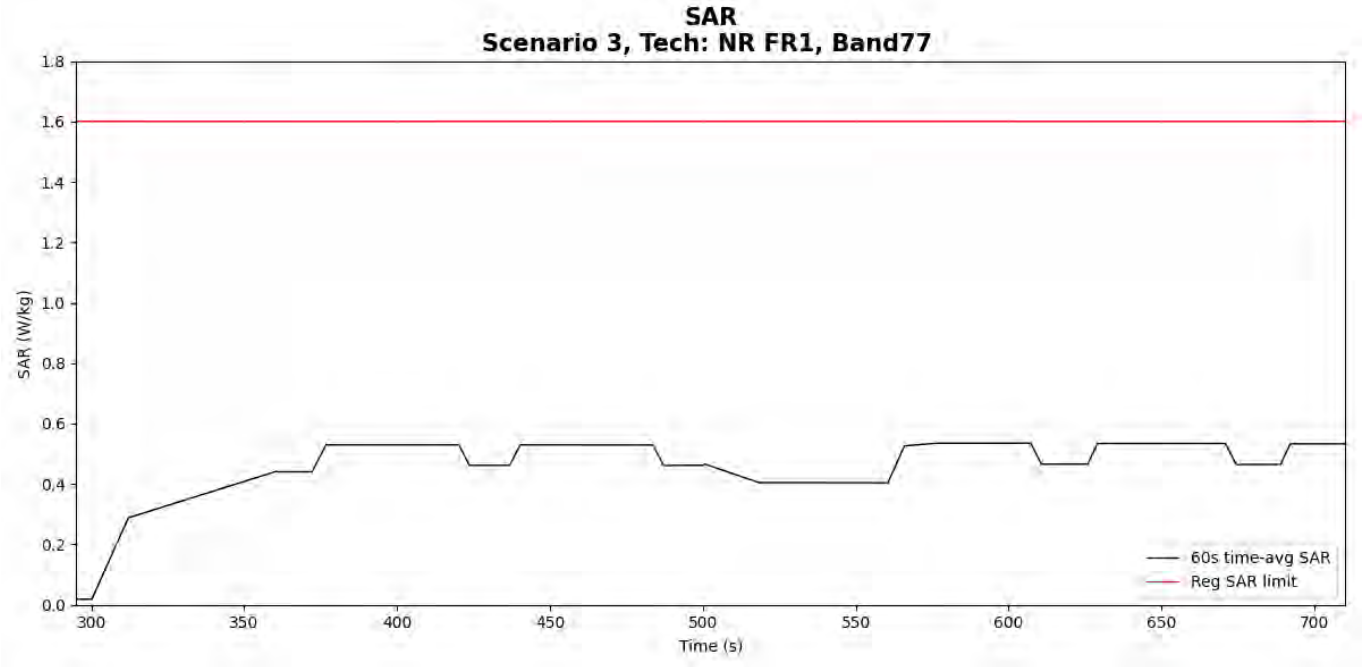

Figure 5-42 Time-averaged SAR for case 18 (sub6 NR n77)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.535 W/kg
Validation result: pass	

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5.5 Conducted Power Measurement Results for Scenario 4: Band Handover

In this scenario, the test power sequence #0 (i.e., maximum TX power is requested by a call box for each RAT) is used, and band (and RAT) handover is manually configured at a specific time instance. The test case widely cover handover scenarios between two RATs. The test case for this scenario is relegated in Table 5-6, and the test procedure follows section 4.5.2. The measurement setup is shown in Figure 5-3 (band handover) and Figure 5-5 (RAT handover). The high-level summary of the final validation results is also listed in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement. The following section will demonstrate how Mediatek's TA-SAR algorithm behaves.

Table 5-6 TA-SAR parameters setting for scenario 4

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
19	WCDMA	B5	0	2	24.00	22.50	22.50	22.50	22.50	Pass
	LTE	B41	0	2	24.00	18.50	18.50	18.50	18.50	

This test aims to validate the TA-SAR algorithm with a handover from WCDMA band B5 to LTE band B41 and ECI = 2. The corresponding detailed test procedure is described in 4.5.2. The first figure demonstrates the EUT's instantaneous conducted TX power and the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). The handover is configured at the time instance of 500 seconds. It is observed in the figure that the time-averaged TX power of the individual RAT is below its own P_{sub6_limit}. The second figure illustrates the corresponding time-averaged normalized SAR over time converted from the TX time-averaged power by using the equation listed in section 4.5.2. The figure shows that the time-averaged normalized SAR does not exceed the normalized FCC limit of 1.

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- Case 19 in table 5-6: band handover happens at the time instance of 500 seconds.

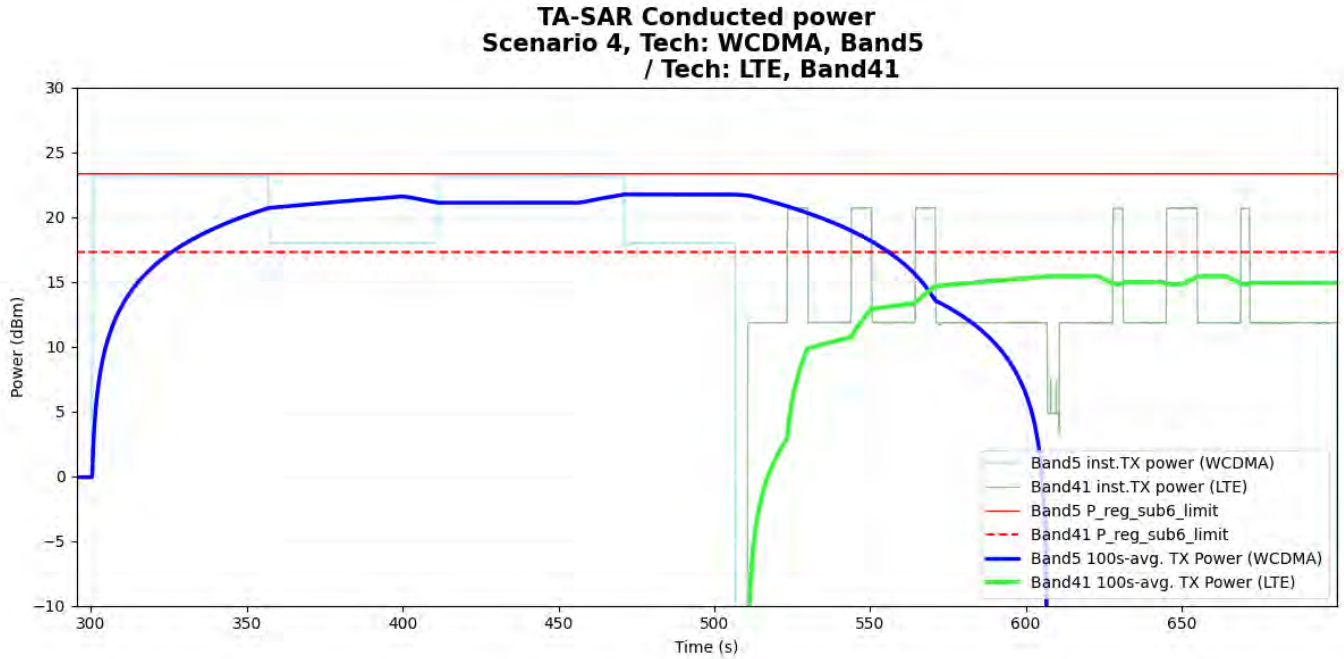

Figure 5-43 Time-averaged conducted TX power over time for case 19 (WCDMA B5, LTE B41)

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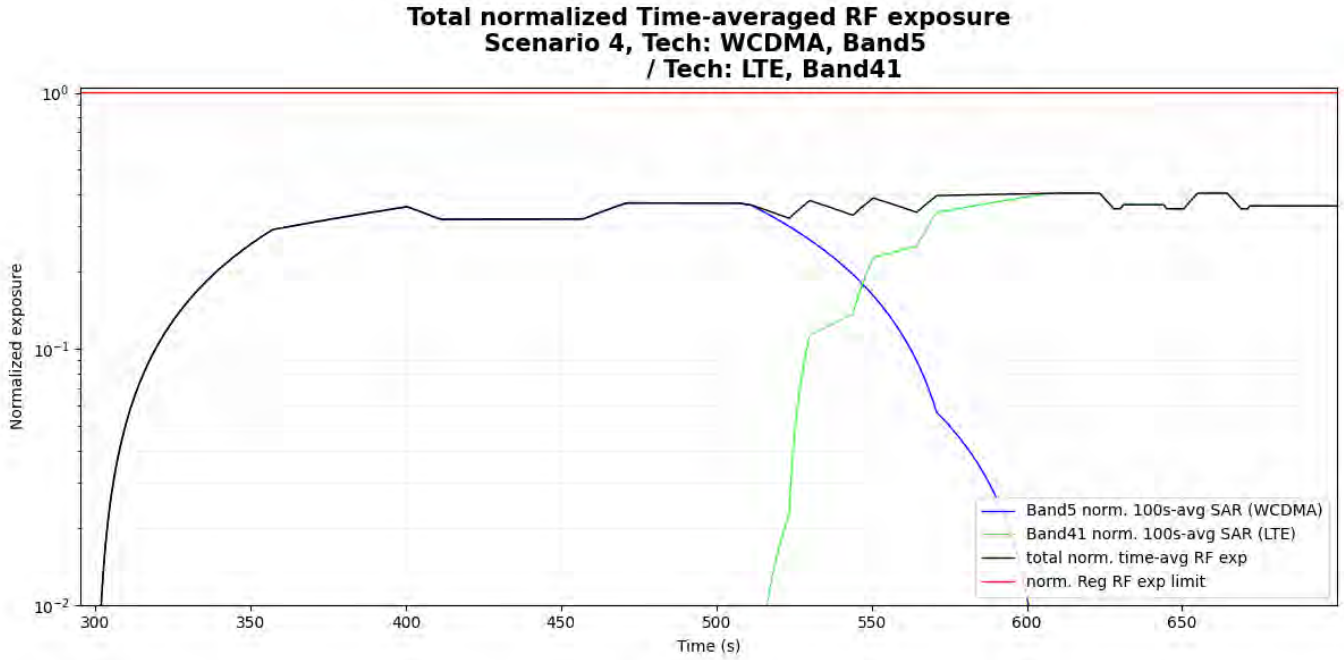

Figure 5-44 Normalized time-averaged SAR for case 19 (WCDMA B5, LTE B41)

FCC limit of total RF exposure (normalized)	1.0
Max total normalized time-averaged RF exposure	0.405
Validation result: pass	

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5.6 Conducted Power Measurement Results for Scenario 5: ECI Change

In this scenario, the test power sequence #0 (i.e., maximum TX power is requested by a call box for each RAT) is used, and ECI change at the EUT side is manually configured at a specific time instance. The test case cover ECI switching scenario between two ECIs. The test case for this scenario is relegated in Table 5-7, and the test procedure follows section 4.6.2. The measurement setup is shown in Figure 5-2. The high-level summary of the final validation results is also listed in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement. The following section will demonstrate how Mediatek's TA-SAR algorithm behaves.

Table 5-7 TA-SAR parameters setting for scenario 5

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
20	FR1	n77	0	2	20.00	15.00	15.00	15.00	15.00	Pass
				10	20.00	17.50	17.00	14.50	20.00	

This test aims to validate the TA-SAR algorithm with ECI change from NR band n77 with ECI = 2 to ECI = 10. The corresponding detailed test procedure is described in 4.6.2. The first figure demonstrates the EUT's instantaneous conducted TX power and the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = *Psub6_limit* + 1dB device uncertainty). During the test period, there are two ECI change events configured individually at the time instances 500 seconds and 700 seconds. The 1st change is from ECI = 2 to ECI = 10 and the 2nd change is from ECI = 10 back to ECI = 2. It is observed in the figure that the time-averaged TX power of the individual RAT is below its own Psub6_limit. The second figure illustrates the corresponding time-averaged normalized SAR over time converted from the TX time-averaged power by using the equation listed in section 4.6.2. The figure shows that the time-averaged normalized SAR does not exceed the normalized FCC limit of 1.

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- Case 20 in table 5-7: two ECI changes happen at the time instances of 500 and 700 seconds, respectively.

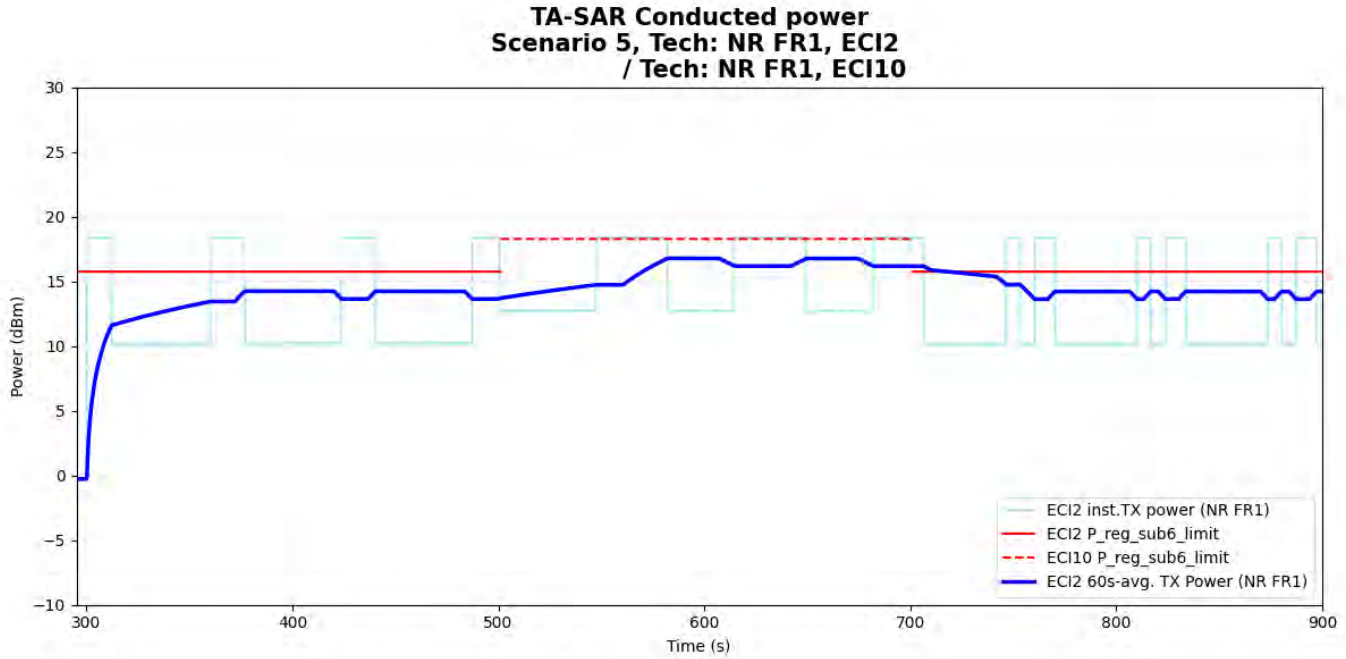

Figure 5-45 Time-averaged conducted TX power over time for case 20 (sub6 NR n77)

NOTE : The inst. TX power should be compared with P_reg_sub6_limit of the corresponding configuration, then transformed and averaged in SAR perspective to check compliance. Therefore, even though the time-averaged TX power seems to exceed P_reg_sub6_limit after configuration changed (from 500s to 530s), the time-averaged SAR pass regulation as a matter of fact.

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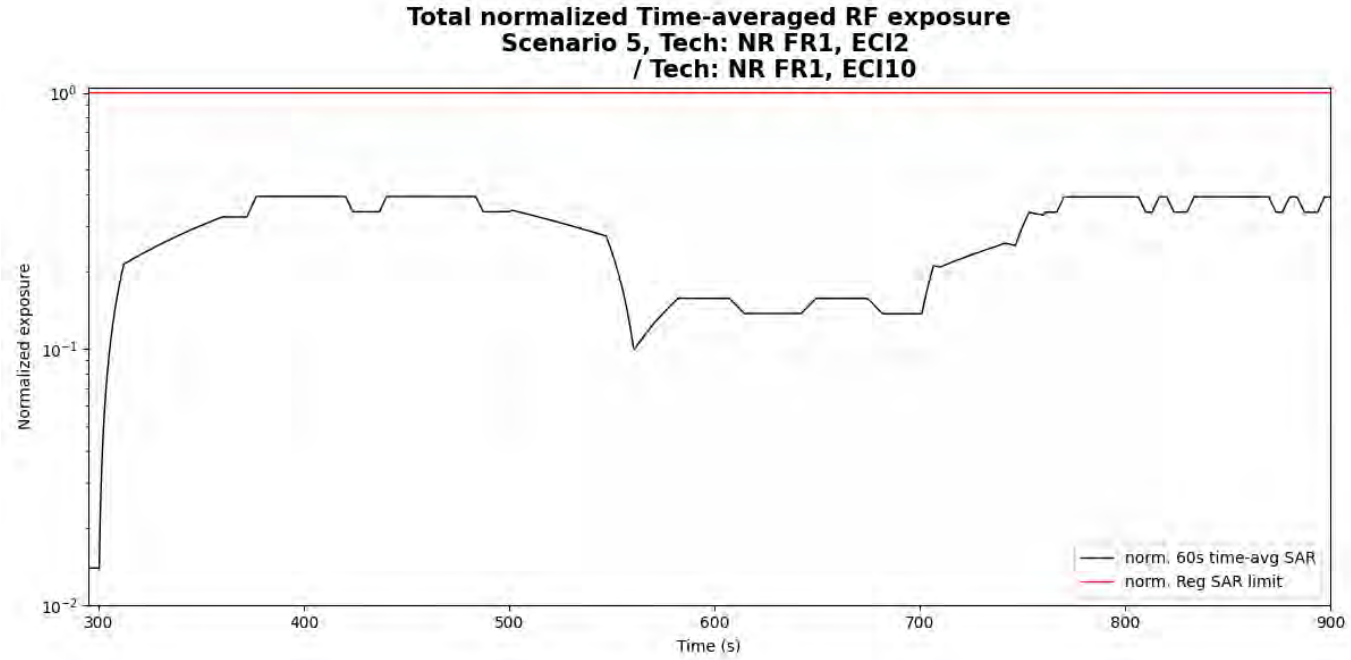

Figure 5-46 Normalized time-averaged SAR for case 20 (sub6 NR n77)

FCC limit of total RF exposure (normalized)	1.0
Max total normalized time-averaged RF exposure	0.394
Validation result: pass	

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5.7 Conducted Power Measurement Results for Scenario 6: Antenna Switching

In this scenario, the test power sequence #0 (i.e., maximum TX power is requested by a call box for each RAT) is used, and antenna change at the EUT side is manually configured at a specific time instance. The test case for this scenario is relegated in Table 5-8, and the test procedure follows section 4.7.2. The measurement setup is shown in Figure 5-2. The high-level summary of the final validation results is also listed in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement. The following sections will demonstrate how Mediatek's TA-SAR algorithm behaves.

Table 5-8 TA-SAR parameters setting for scenario 6

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
21	FR1	n77	0	2	20.00	15.00	15.00	15.00	15.00	Pass
					23.00	20.00	19.50	17.00	23.00	

This test aims to validate the TA-SAR algorithm with antenna change during the test period for NR band n77 with ECI = 2. The corresponding detailed test procedure is described in 4.7.2. The first figure demonstrates the EUT's instantaneous conducted TX power and the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). During the test period, there are two antenna change events configured individually at the time instances 500 seconds and 700 seconds. The 1st change is from ANT 21 to ANT 11 and the 2nd change is from ANT 11 back to ANT 21. It is observed in the figure that the time-averaged TX power during the transition of the change is maintained below the power limitation. The second figure illustrates the corresponding time-averaged normalized SAR over time converted from the TX time-averaged power by using the equation listed in section 4.7.2. The figure shows that the time-averaged normalized SAR does not exceed the normalized FCC limit of 1.

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- Case 21 in table 5-8: ANT switching happens at the time instances of 500 and 700 seconds .

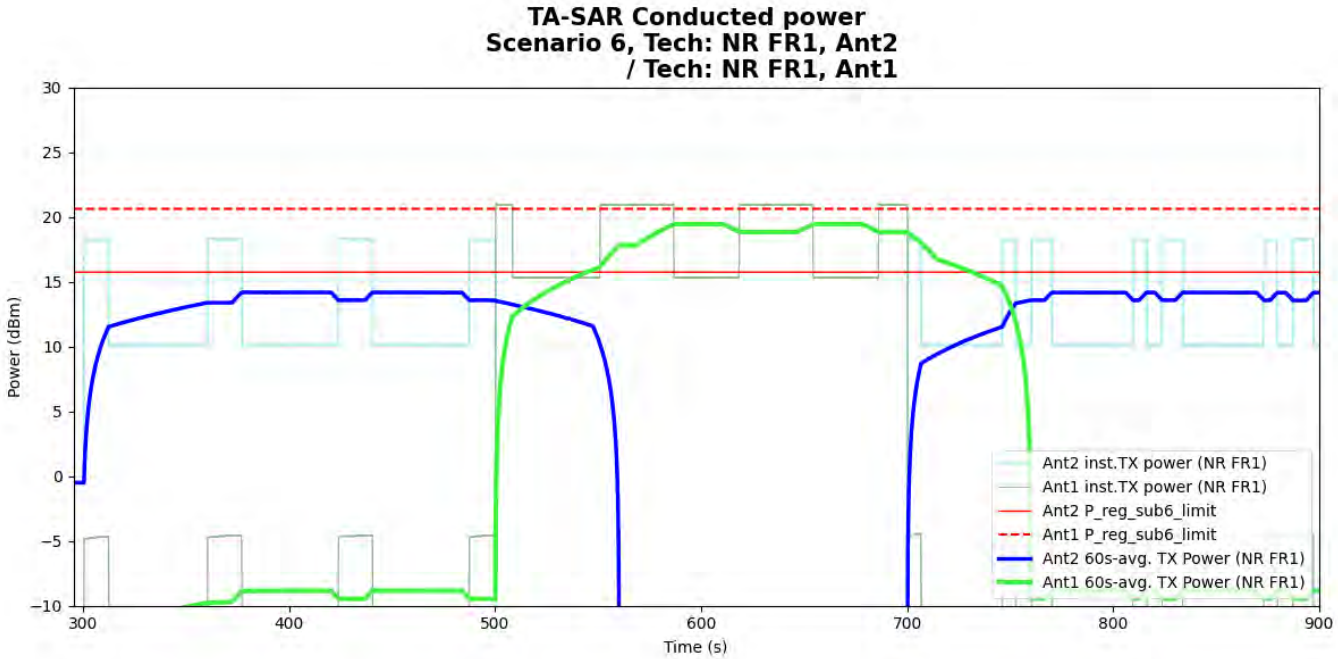

Figure 5-47 Time-averaged conducted TX power over time for case 21 (sub6 NR n77)

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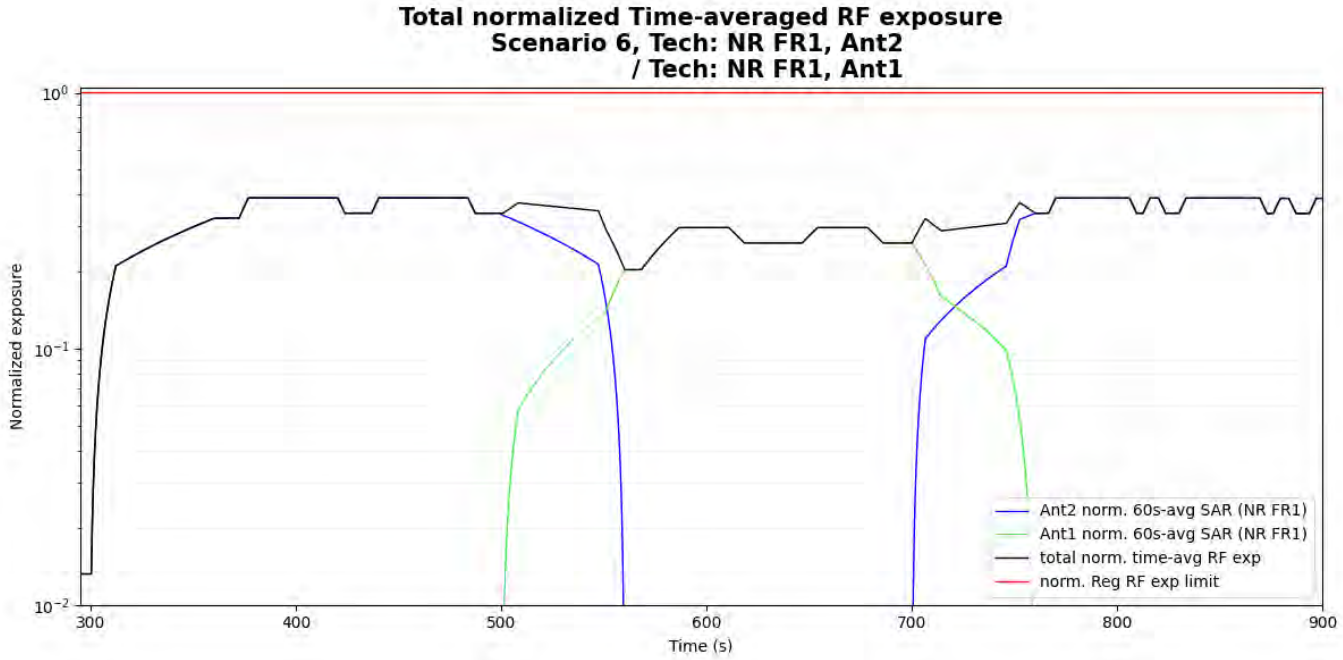

Figure 5-48 Normalized time-averaged SAR for case 21 (sub6 NR n77)

FCC limit of total RF exposure (normalized)	1.0
Max total normalized time-averaged RF exposure	0.389
Validation result: pass	

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5.8 Conducted Power Measurement Results for Scenario 7: Time Window Switching

In this scenario, the test power sequence #0 (i.e., maximum TX power is requested by a call box for each RAT) is used, and band handover events within a RAT are manually configured at specific time instances. This scenario aims to validate the correctness of the TA-SAR algorithm with existence of moving average time window change. The two test cases for this scenario are relegated in Table 5-9, and the test procedure follows section 4.8.2. The measurement setup is shown in Figure 5-3. The high-level summary of the final validation results are also listed in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement for all the cases. The following sections will demonstrate how Mediatek's TA-SAR algorithm behaves.

Table 5-9 TA-SAR parameters setting for scenario 7

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
22	FR1	n77	0	2	22.00	20.00	15.00	15.00	15.00	Pass
	FR1	n7			20.50	23.50	17.00	16.50	14.00	
23	FR1	n7	0	2	20.50	23.50	17.00	16.50	14.00	Pass
	FR1	n77			22.00	20.00	15.00	15.00	15.00	

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5.8.1 Measurement results for test case 21

This test case is conducted for NR band n77 and n7 with ECI =2. The corresponding detailed test procedure is described in 4.8.2. During the test period, there are two band handover events configured individually at the time instances 500 seconds and 620 seconds. The 1st handover is from n77 to n7 and the 2nd handover is from n7 back to n77. The first figure demonstrates the EUT's instantaneous conducted TX power and the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = *Psub6_limit* + 1dB device uncertainty). It is observed in the figure that the time-averaged TX power during the transitions of the band changes is maintained below the power limitation. The second figure illustrates the corresponding time-averaged normalized SAR over time converted from the TX time-averaged power by using the equation listed in section 4.8.2. The figure shows that the time-averaged normalized SAR does not exceed the normalized FCC limit of 1.

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- Case 22 in table 5-9: band handover happens at the time instances of 500 and 620 seconds.

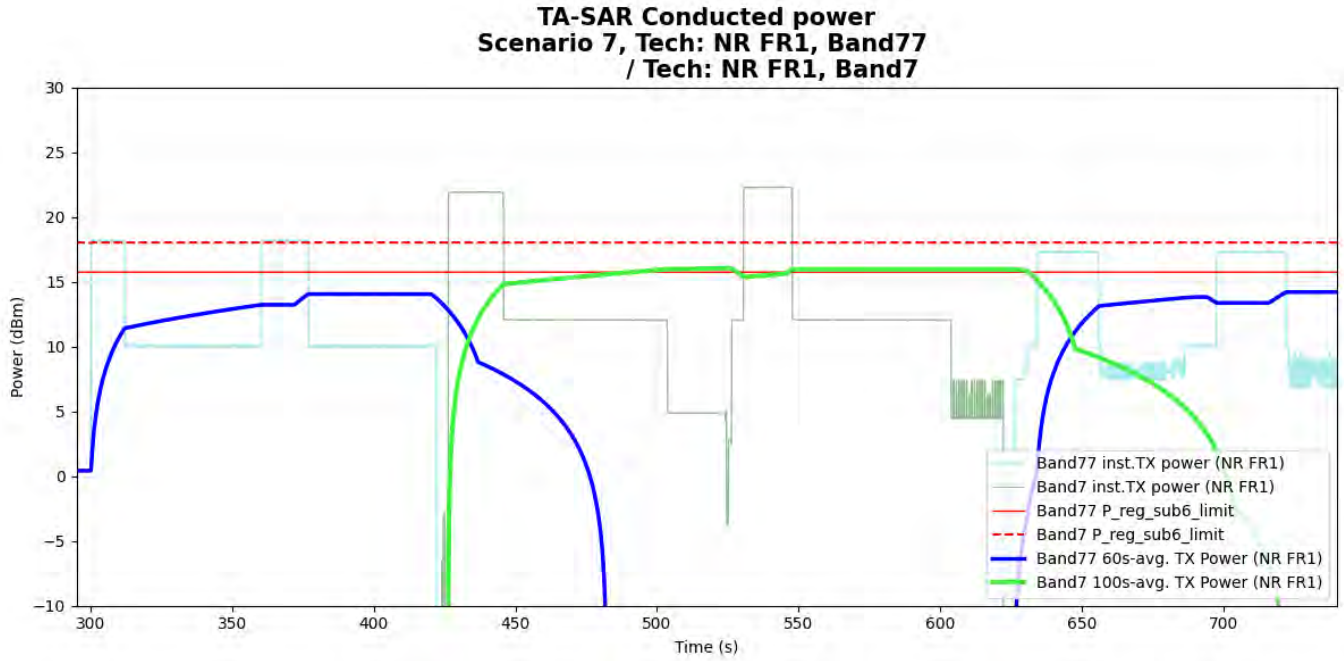

Figure 5-49 Time-averaged conducted TX power over time for case 22 (sub6 NR n77 and n7)

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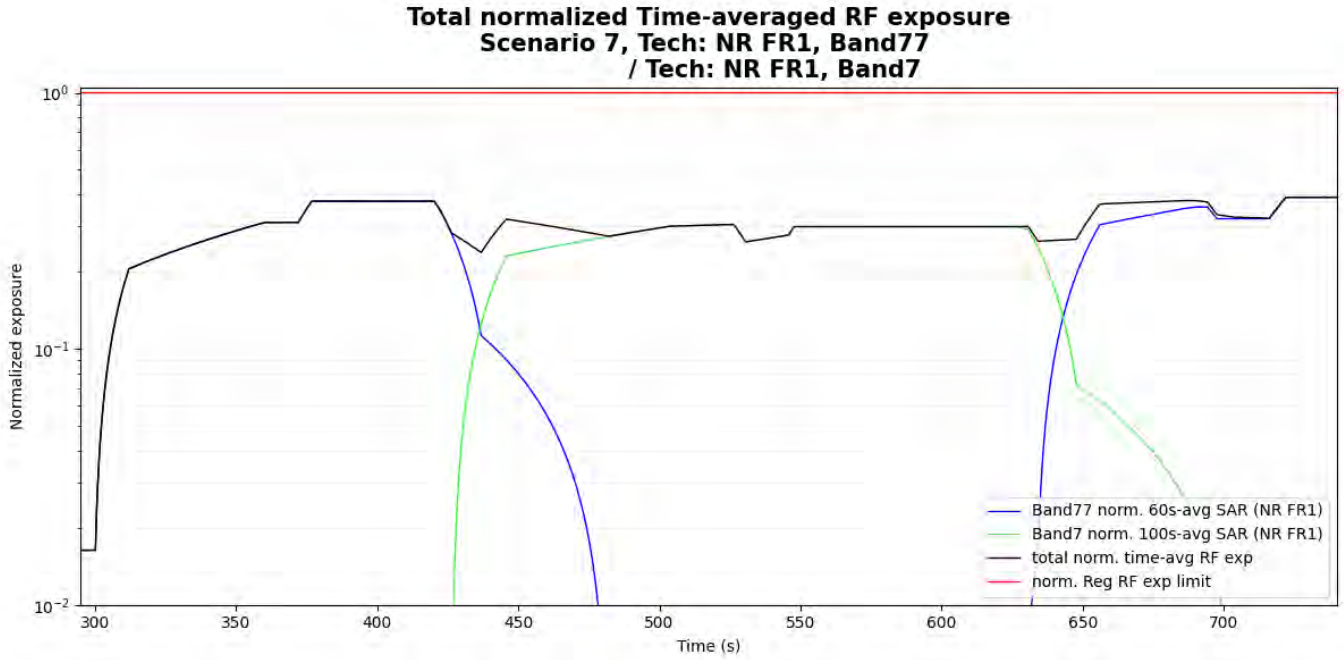

Figure 5-50 Normalized time-averaged SAR for case 22 (sub6 NR n77 and n7)

FCC limit of total RF exposure (normalized)	1.0
Max total normalized time-averaged RF exposure	0.230
Validation result: pass	

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5.8.2 Measurement results for test case 23

This test case is conducted for NR band n7 and n77 with ECI =2. The corresponding detailed test procedure is described in 4.8.2. During the test period, there are two band handover events configured individually at the time instances 500 seconds and 620 seconds. The 1st handover is from n7 to n77 and the 2nd handover is from n77 back to n7. The first figure demonstrates the EUT's instantaneous conducted TX power and the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = *Psub6_limit* + 1dB device uncertainty). It is observed in the figure that the time-averaged TX power during the transitions of the band changes is maintained below the power limitation. The second figure illustrates the corresponding time-averaged normalized SAR over time converted from the TX time-averaged power by using the equation listed in section 4.8.2. The figure shows that the time-averaged normalized SAR does not exceed the normalized FCC limit of 1.

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- Case 23 in table 5-9: band handover happens at the time instances of 420 and 620 seconds.

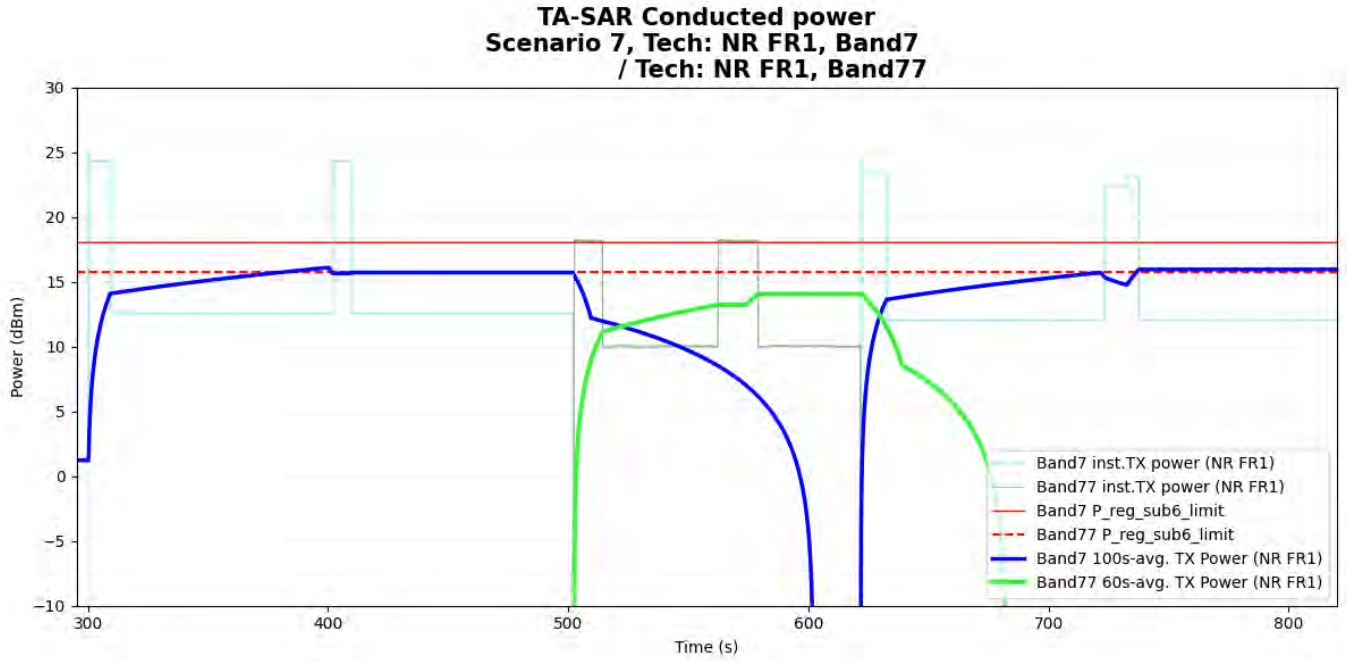

Figure 5-51 Time-averaged conducted TX power over time for case 23 (sub6 NR n7 and n77)

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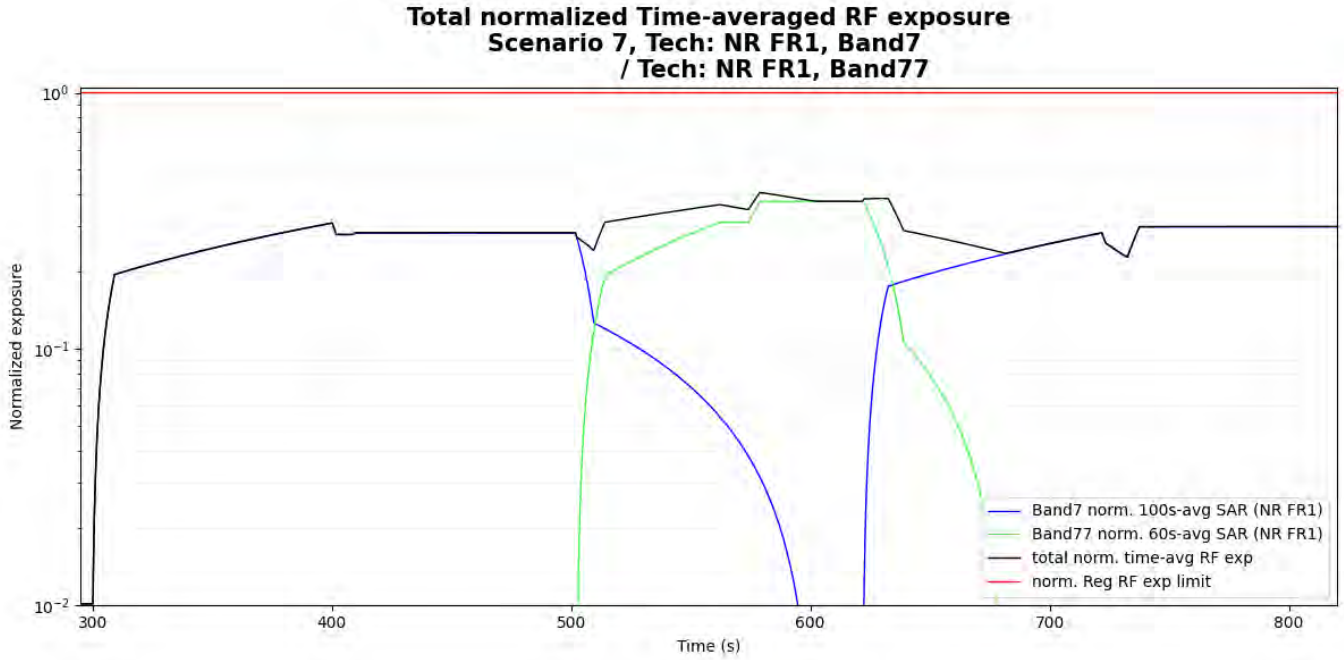

Figure 5-52 Normalized time-averaged SAR for case 23 (sub6 NR n7 and n77)

FCC limit of total RF exposure (normalized)	1.0
Max total normalized time-averaged RF exposure	0.408
Validation result: pass	

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5.9 Conducted Power Measurement Results for Scenario 8: SAR Exposure Switching

In this scenario, the test power sequence #0 (i.e., maximum TX power is requested by a call box for each RAT) is used, and LTE and sub6 NR are turned on at the same time for a pre-defined period during the test. This scenario aims to validate whether the TA-SAR algorithm is able to maintain TER below the FCC limit when the two radios change TX power dynamically. The experiment parameters are summarized in Table 5-10, and the test procedure follows section 4.9.2. The measurement setup is shown in Figure 5-5.

Table 5-10 TA-SAR parameters setting for scenario 8

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
24	LTE	B2	0	2	23.80	16.80	16.30	13.80	23.80	Pass
	FR1	n7	0	2	23.50	18.50	18.00	15.50	23.50	
25	LTE	B7	0	2	23.50	18.50	18.50	18.50	18.50	Pass
	FR1	n77	0	2	20.00	15.00	15.00	15.00	15.00	

During the test period,

- Time = 300s~500s: NR sub6-only scenario.
- Time = 500s~700s: LTE+ NR sub6 scenario.
- Time = 700s~900s: LTE-only scenario.

The first figure demonstrates the EUT's instantaneous conducted TX power and the time-averaged conducted TX power behavior over time, and the power limit (P_reg_sub6_limit = P_{sub6_limit} + 1dB device uncertainty). It is observed in the figure that the time-averaged TX power in all time periods is maintained below the power limitation. The second figure illustrates the corresponding time-averaged normalized SAR over time converted from the TX time-averaged power by using the equation listed in section 4.9.2. The figure shows that the time-averaged normalized SAR does not exceed the normalized FCC limit of 1.

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- Case 24 in table 5-10.

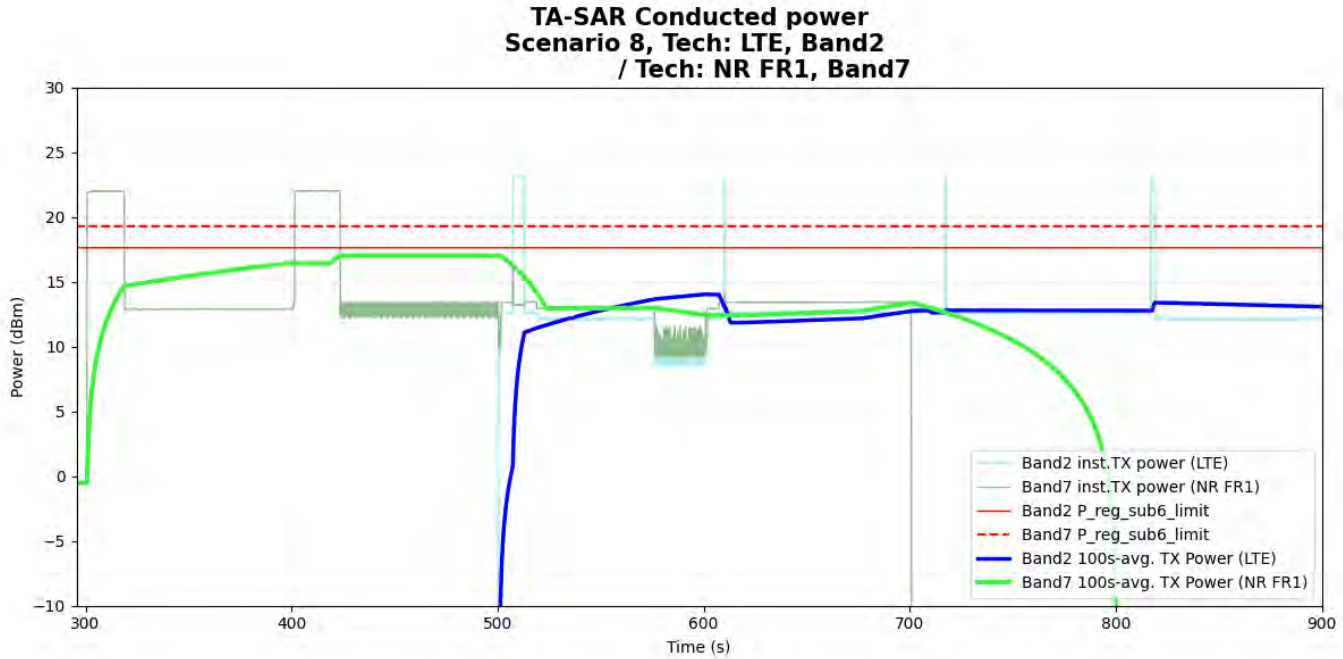

Figure 5-53 Time-averaged conducted TX power over time for case 24 (LTE B2, sub6 NR n7)

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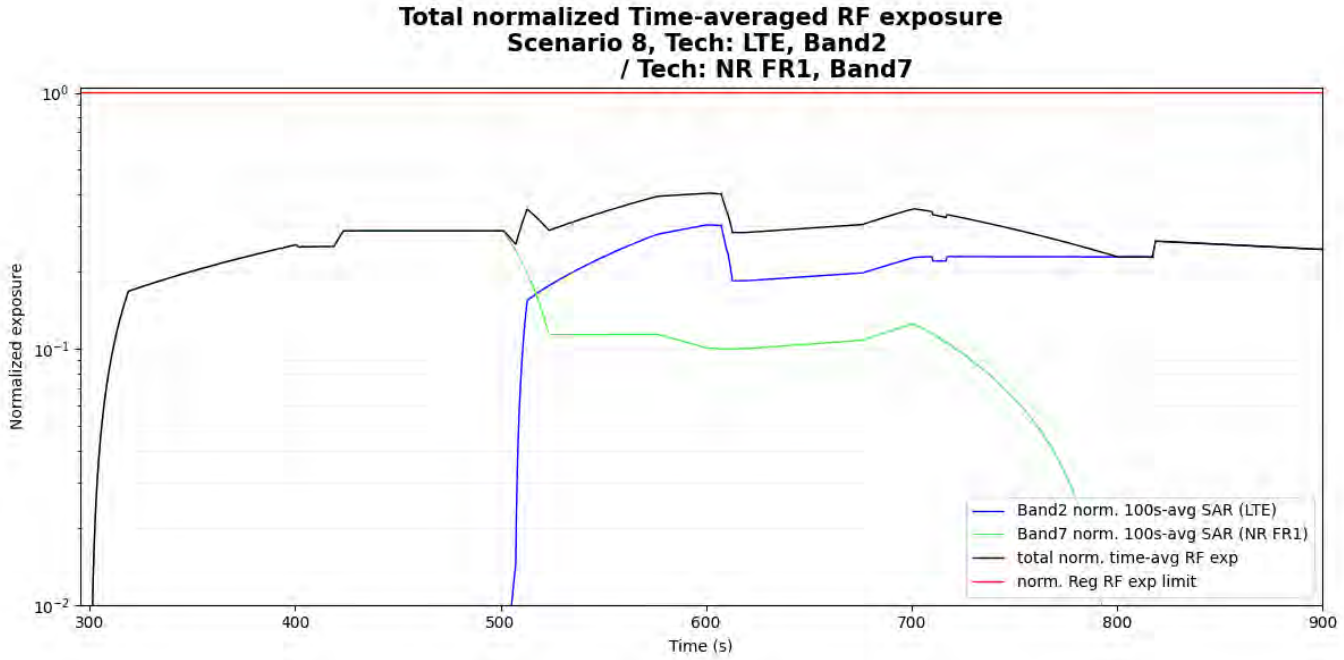

Figure 5-54 Normalized time-averaged SAR for case 24 (LTE B2, sub6 NR n7)

FCC limit of total RF exposure (normalized)	1.0
Max total normalized time-averaged RF exposure	0.405
Validation result: pass	

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- Case 25 in table 5-10.

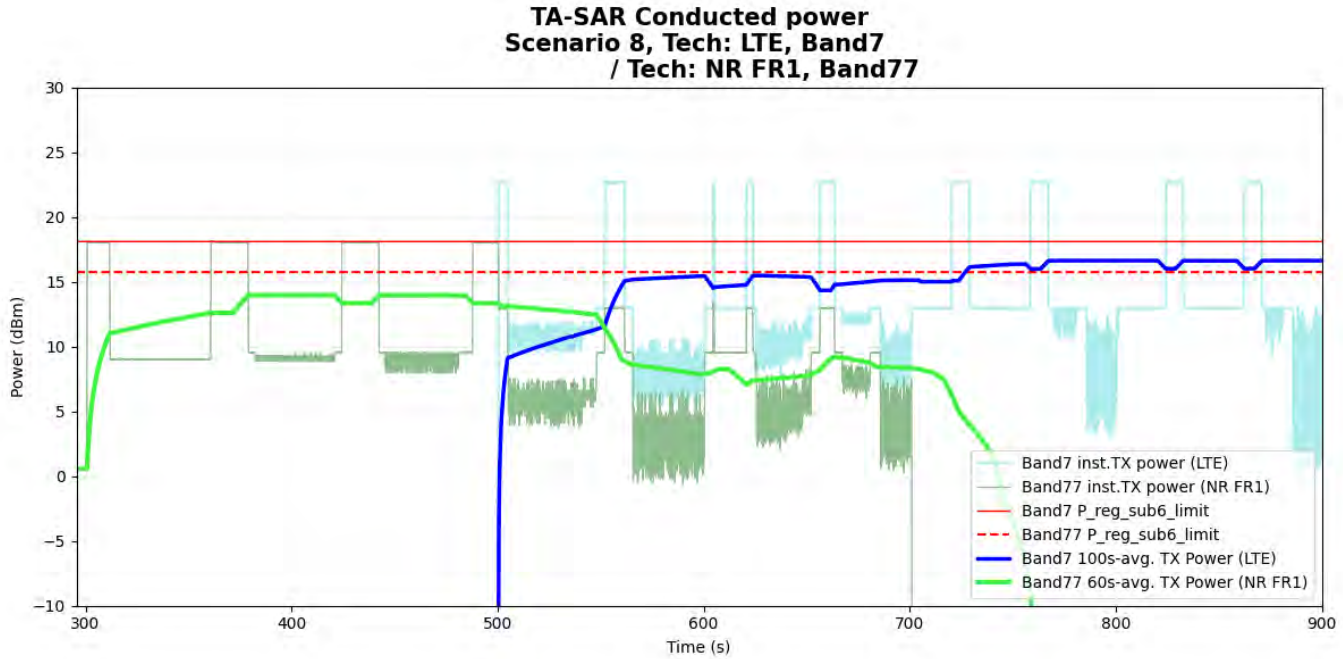

Figure 5-55 Time-averaged conducted TX power over time for case 25 (LTE B7, sub6 NR n77)

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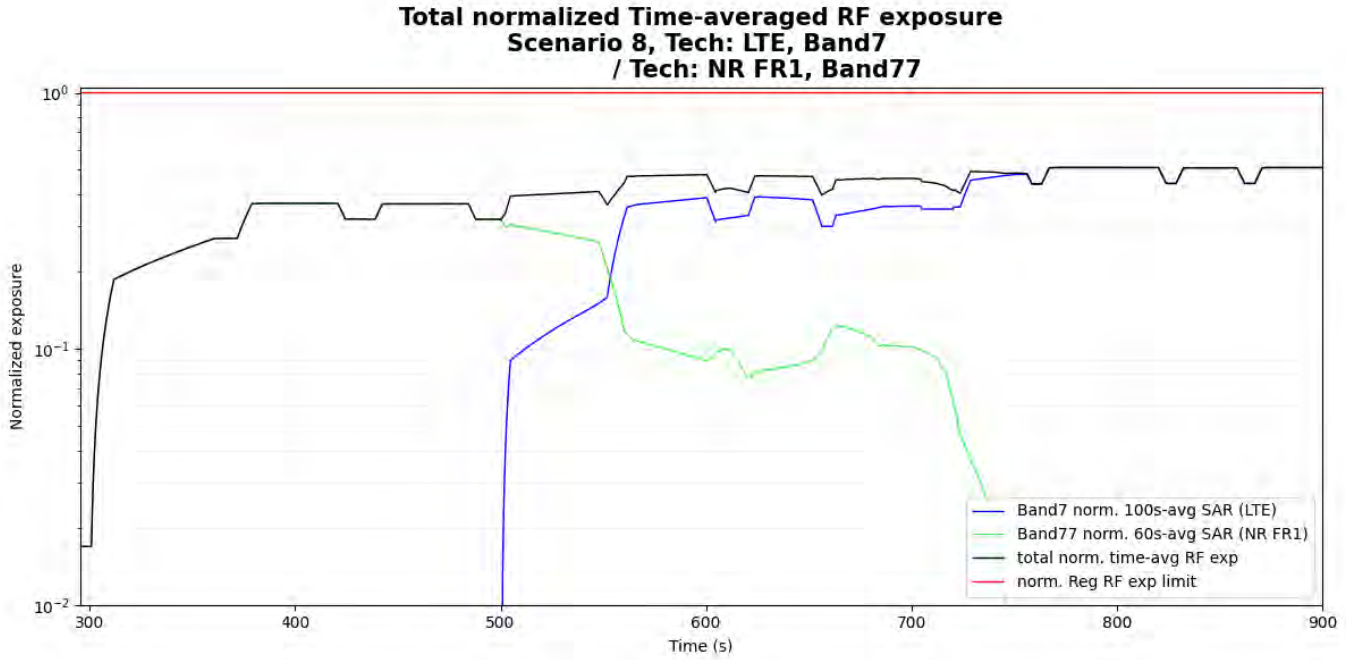

Figure 5-56 Normalized time-averaged SAR for case 25 (LTE B7, sub6 NR n77)

FCC limit of total RF exposure (normalized)	1.0
Max total normalized time-averaged RF exposure	0.510
Validation result: pass	

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6 TA-SAR VALIDATION VIA SAR MEASUREMENTS

6.1 Measurement Setup

The measurement setup is similar to normal fixed power SAR measurement. The difference in SAR measurement setup for time averaging feature validation is that the call box operates under the close loop power control mode and is connected to the PC, so that the PC can control the call box based on the test sequence to configure EUT's TX target power. The same test procedure used in conducted power setup for time-varying TX power measurement is also used in this section for time-averaging SAR measurements. Since the SAR chamber is an uncontrolled environment, the path loss between call box antenna and the EUT are well calibrated. The test setup is illustrated in Figure 6-1.

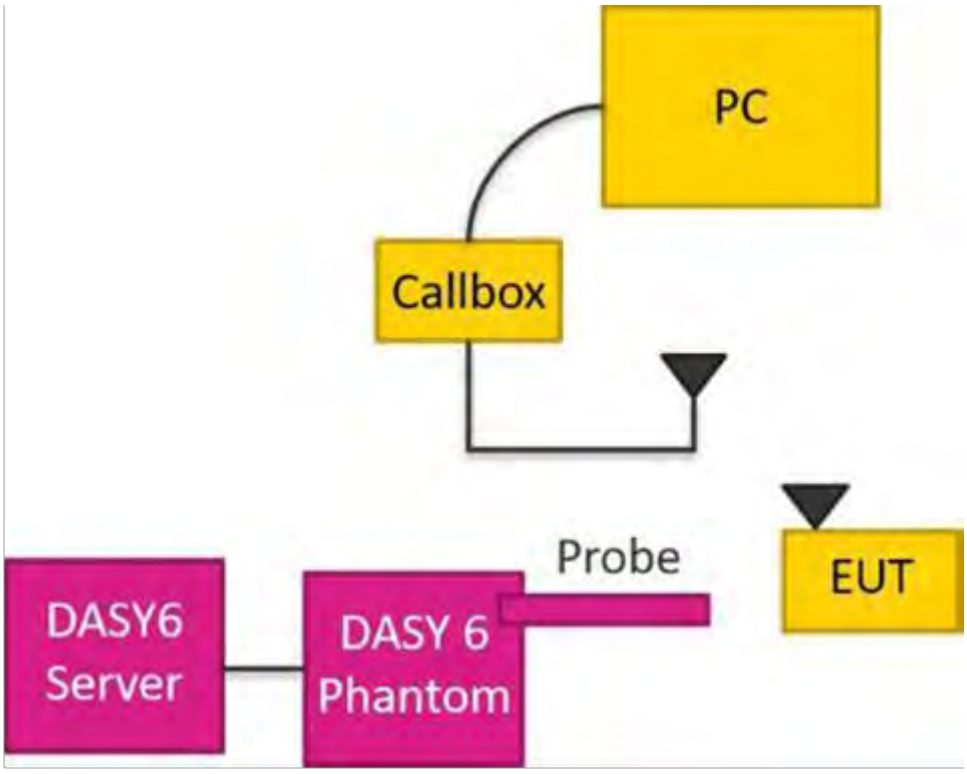

Figure 6-1 TA-SAR wireless test environment

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6.2 SAR Measurement Results for Scenario 2: Time-Varying TX Power

In this scenario, Mediatek's TA-SAR algorithm is tested under more dynamic power test sequences. The test sequence #1 is shown in section 4.1 and test sequence #2 is tabulated in table 4.4. All of the test cases for this scenario are relegated in Table 6-1, and the test procedure follows section 4.10.2. The measurement setup is shown in Figure 6-1, 6-2(a) and 6-2(b). All of the measurements are conduct by using DASY6. The high-level summary of the final validation results is given in the last column of the table, which concludes that Mediatek's TA-SAR algorithm can maintain the time-averaged SAR is always below the FCC requirement for all test cases. The following sections will demonstrate case-by-case to show how Mediatek's TA-SAR algorithm behaves for each RAT.

Table 6-1 Operating parameters for different TA-SAR parameters setting

Test case	RAT	Test band	Test seq.	ECI	Max power (dBm)	P_{sub6_limit} (dBm)	$P_{LowThresh}$ (dBm)	$P_{UE_backoff}$ (dBm)	$P_{UE_max_cust}$ (dBm)	Pass /Fail SAR limit
2	2G	GPRS 850 1TX	1	2	32.50	30.50	30.00	27.50	32.50	Pass
3	2G	GPRS 1900 2TX	1	2	28.00	23.50	23.00	20.50	28.00	Pass
4	WCDMA	B5	1	2	24.00	22.50	22.00	19.50	24.00	Pass
5	WCDMA	B2	1	2	23.50	16.50	16.00	13.50	23.50	Pass
6	LTE	B26	1	2	24.00	22.50	22.00	19.50	24.00	Pass
7	LTE	B41	1	2	24.00	18.50	18.00	15.50	24.00	Pass
8	FR1	N78_PC2	1	4	25.50	23.00	22.50	20.00	25.50	Pass
9	FR1	n77	1	2	20.00	15.00	14.50	12.00	20.00	Pass
10	2G	GPRS 850 1TX	2	2	32.50	30.50	30.50	30.50	30.50	Pass
11	2G	GPRS 1900 2TX	2	2	28.00	23.50	23.50	23.50	23.50	Pass
12	WCDMA	B5	2	2	24.00	22.50	22.50	22.50	22.50	Pass
13	WCDMA	B2	2	2	23.50	16.50	16.50	16.50	16.50	Pass
14	LTE	B26	2	2	24.00	22.50	23.00	23.00	23.00	Pass
15	LTE	B41	2	2	24.00	18.50	18.50	18.50	18.50	Pass
16	FR1	N78_PC2	2	4	25.50	23.00	23.00	23.00	23.00	Pass
17	FR1	n77	2	2	20.00	15.00	15.00	15.00	15.00	Pass

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6.2.1 SAR Measurement results for NR

- Case 8 in table 6-1: NR n78_PC2 result for test sequence 1

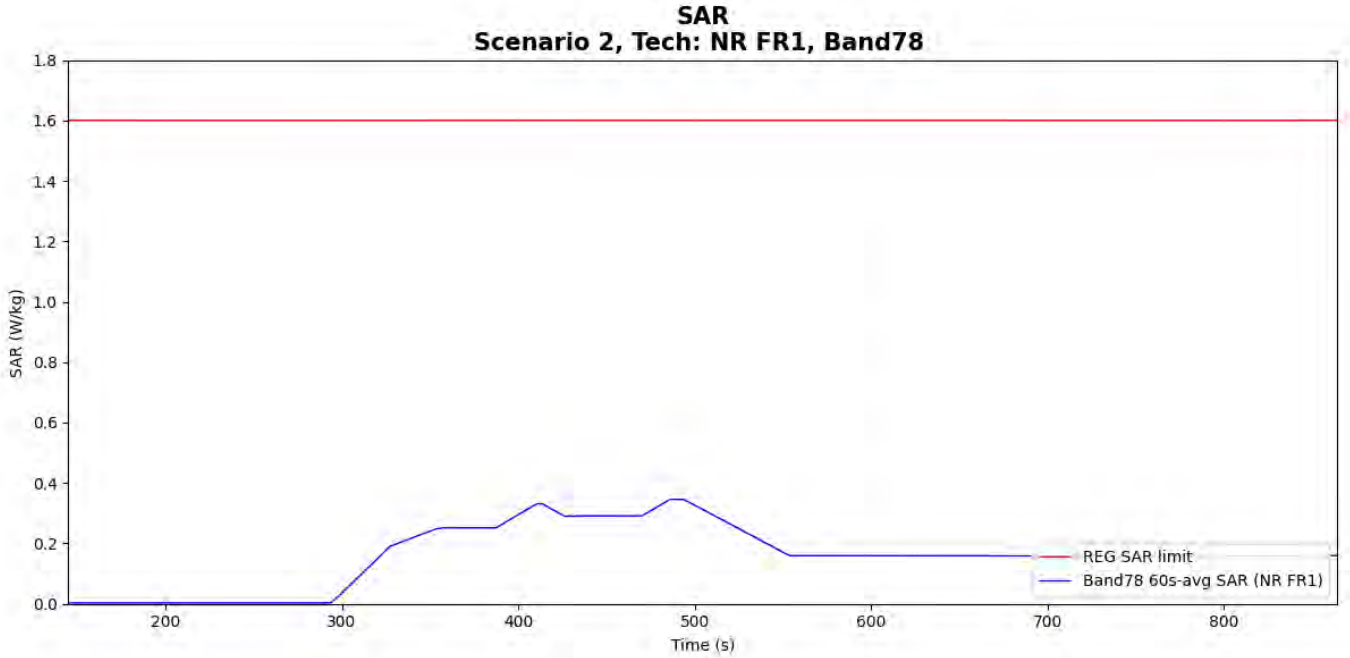

Figure 6-2 Time-averaged SAR for case 8 in table 6-1 (sub6 NR n78_PC2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.346 W/kg
Validation result: pass	

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- Case 9 in table 6-1: NR n77 result for test sequence 1

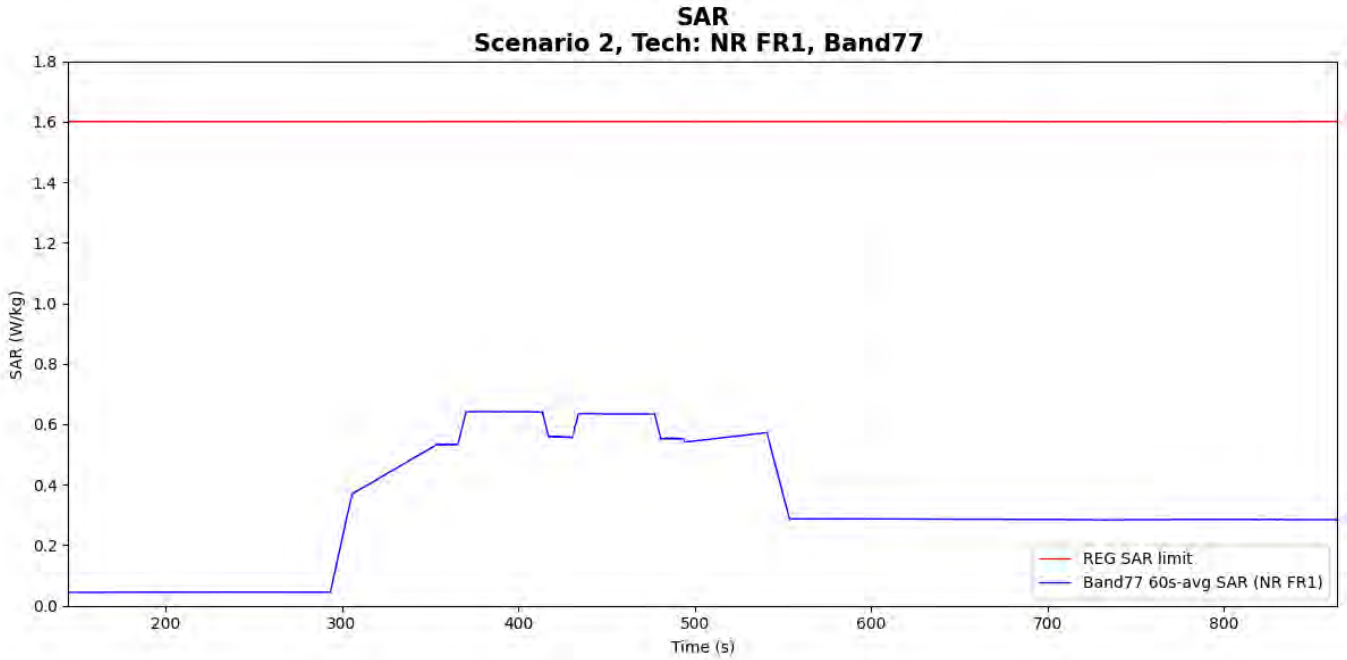

Figure 6-3 Time-averaged SAR for case 9 in table 6-1 (sub6 NR n77)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.642 W/kg
Validation result: pass	

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- Case 16 in table 6-1: NR n78_PC2 result for test sequence 2

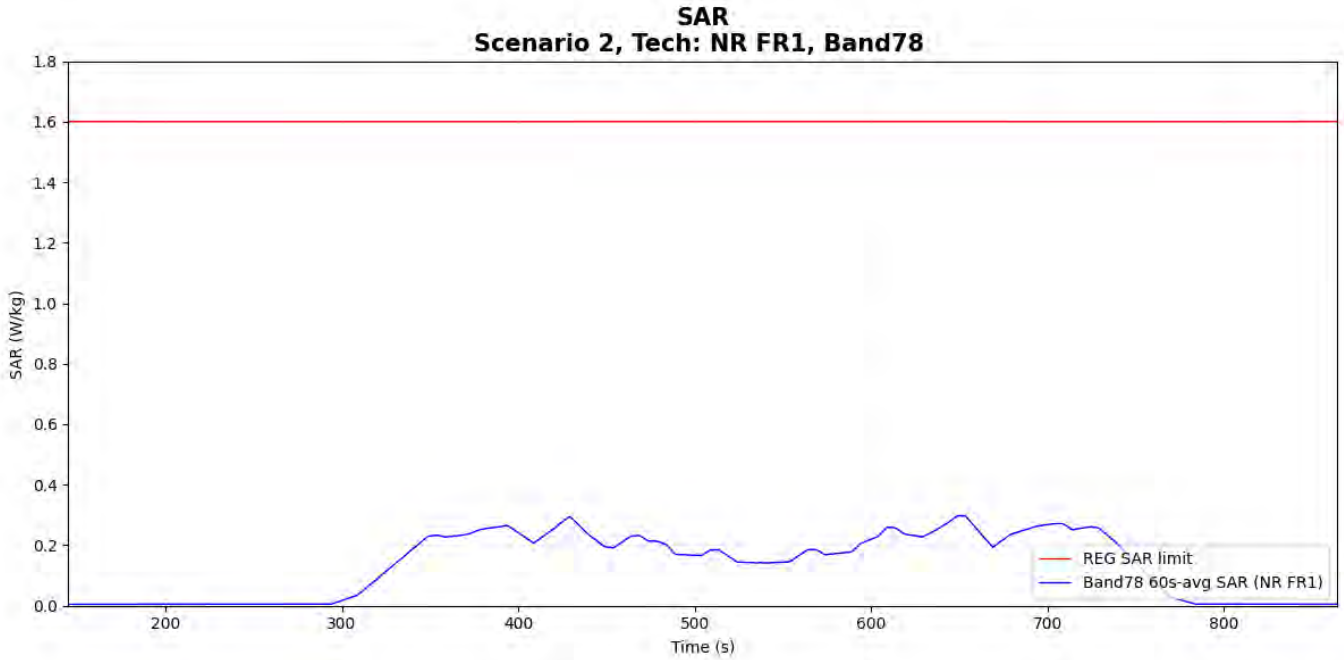

Figure 6-4 Time-averaged SAR for case 16 in table 6-1 (sub6 NR n78_PC2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.298 W/kg
Validation result: pass	

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- Case 17 in table 6-1: NR n77 result for test sequence 2

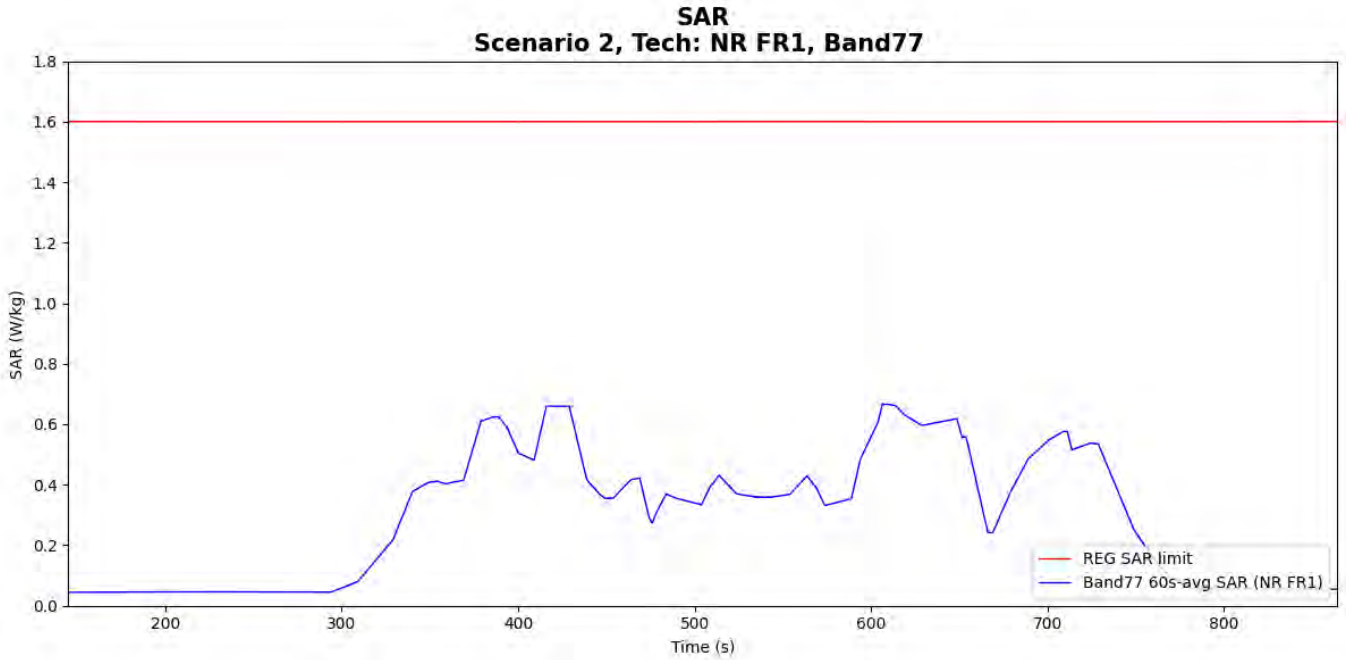

Figure 6-5 Time-averaged SAR for case 17 in table 6-1 (sub6 NR n77)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.666 W/kg
Validation result: pass	

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6.2.2 SAR Measurement results for LTE

- Case 6 in table 6-1: LTE B26 result for test sequence 1

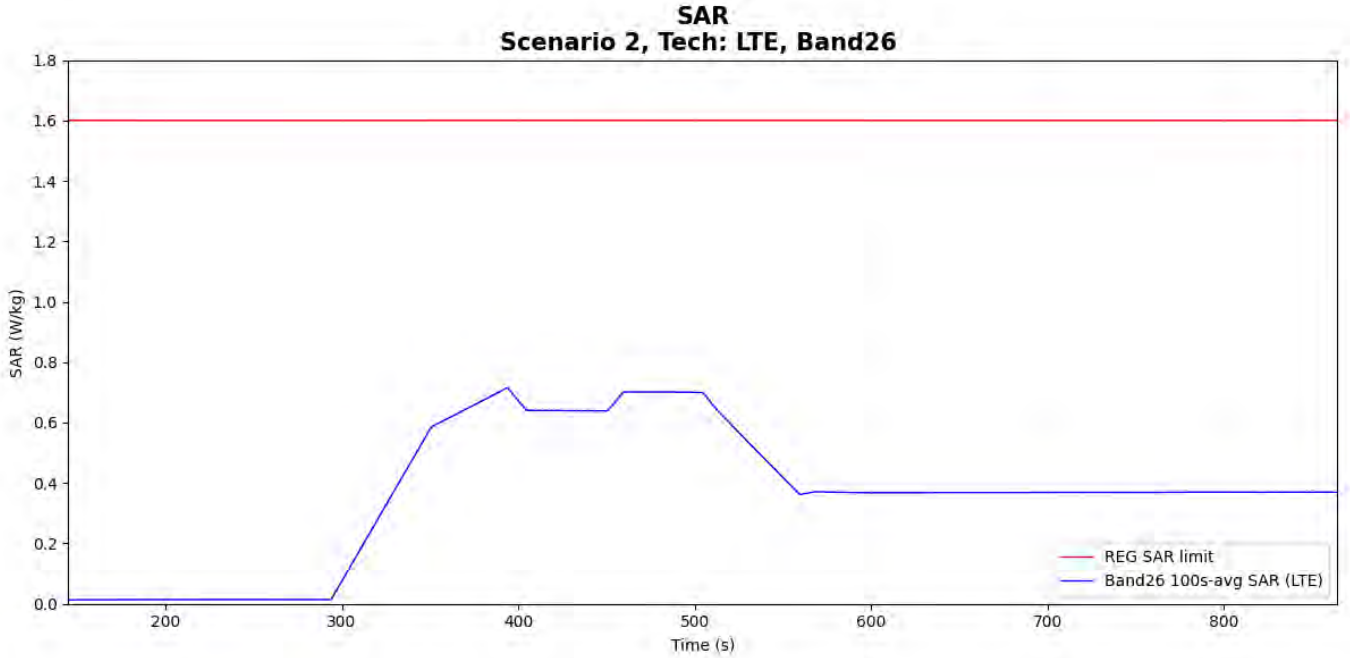

Figure 6-6 Time-averaged SAR for case 6 in table 6-1 (LTE B26)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.715 W/kg
Validation result: pass	

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- Case 7 in table 6-1: LTE B41 result for test sequence 1

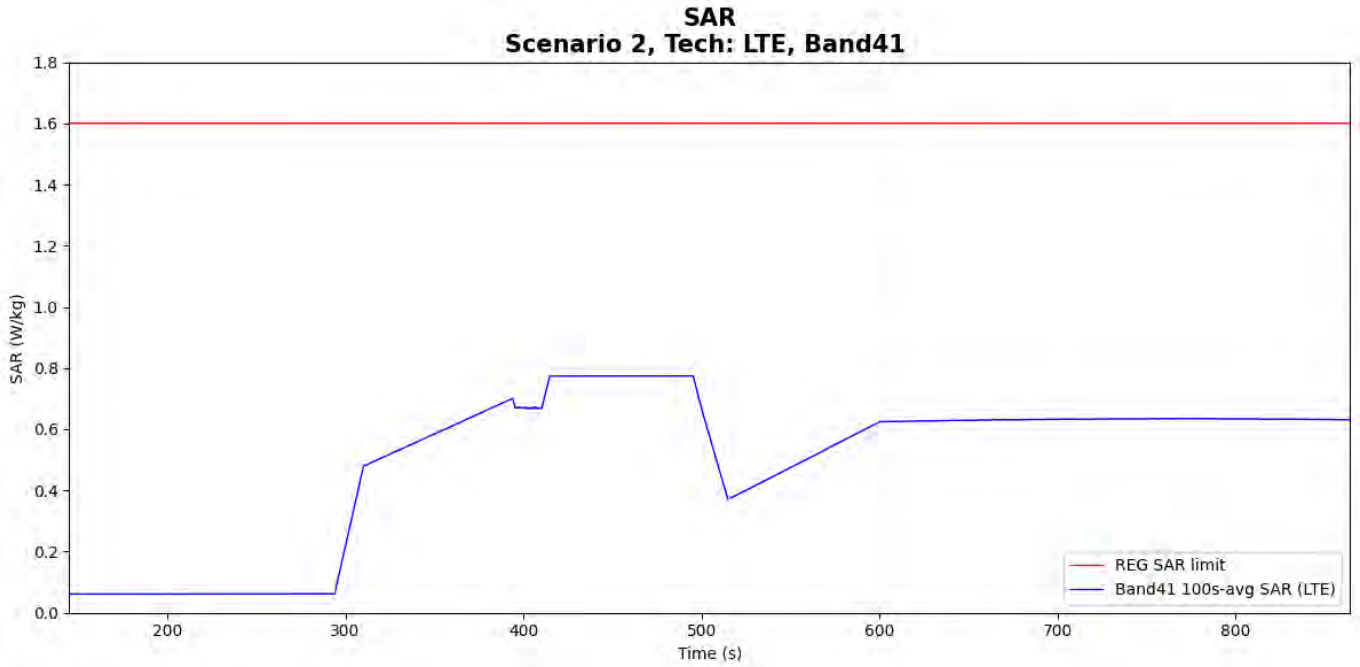

Figure 6-7 Time-averaged SAR for case 7 in table 6-1 (LTE B41)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.774 W/kg
Validation result: pass	

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- Case 14 in table 6-1: LTE B26 result for test sequence 2

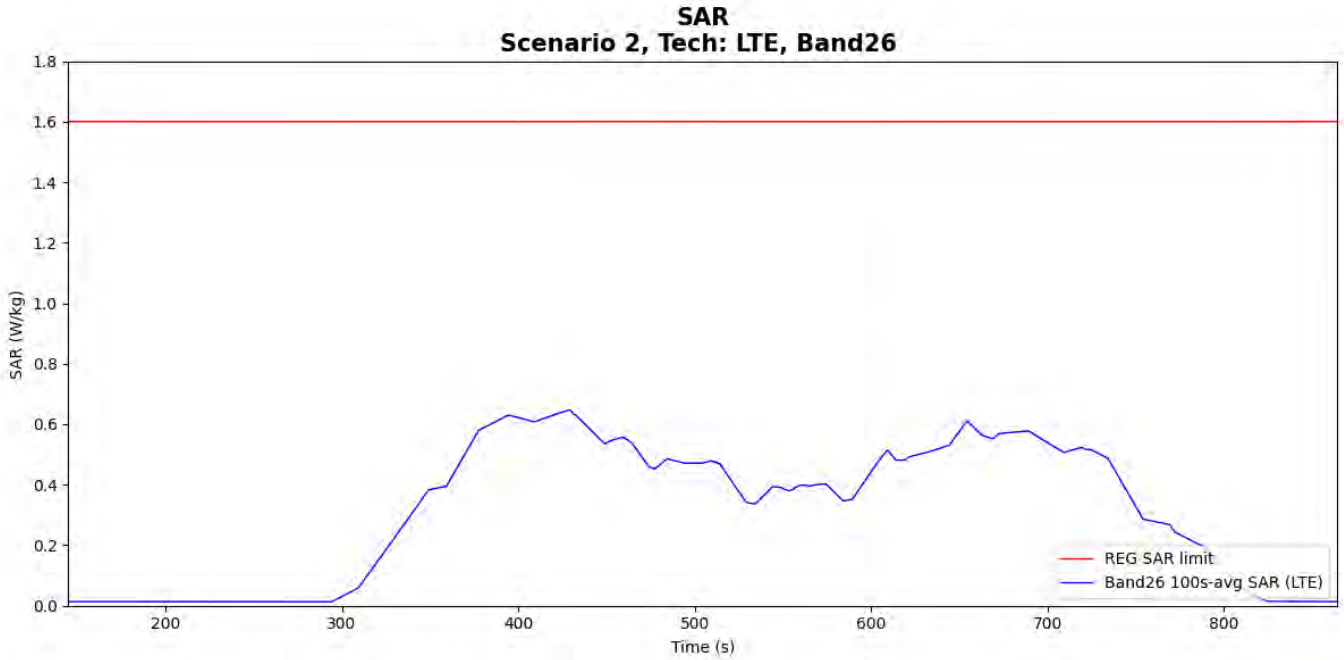

Figure 6-8 Time-averaged SAR for case 14 in table 6-1 (LTE B26)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.648 W/kg
Validation result: pass	

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- Case 15 in table 6-1: LTE B41 result for test sequence 2

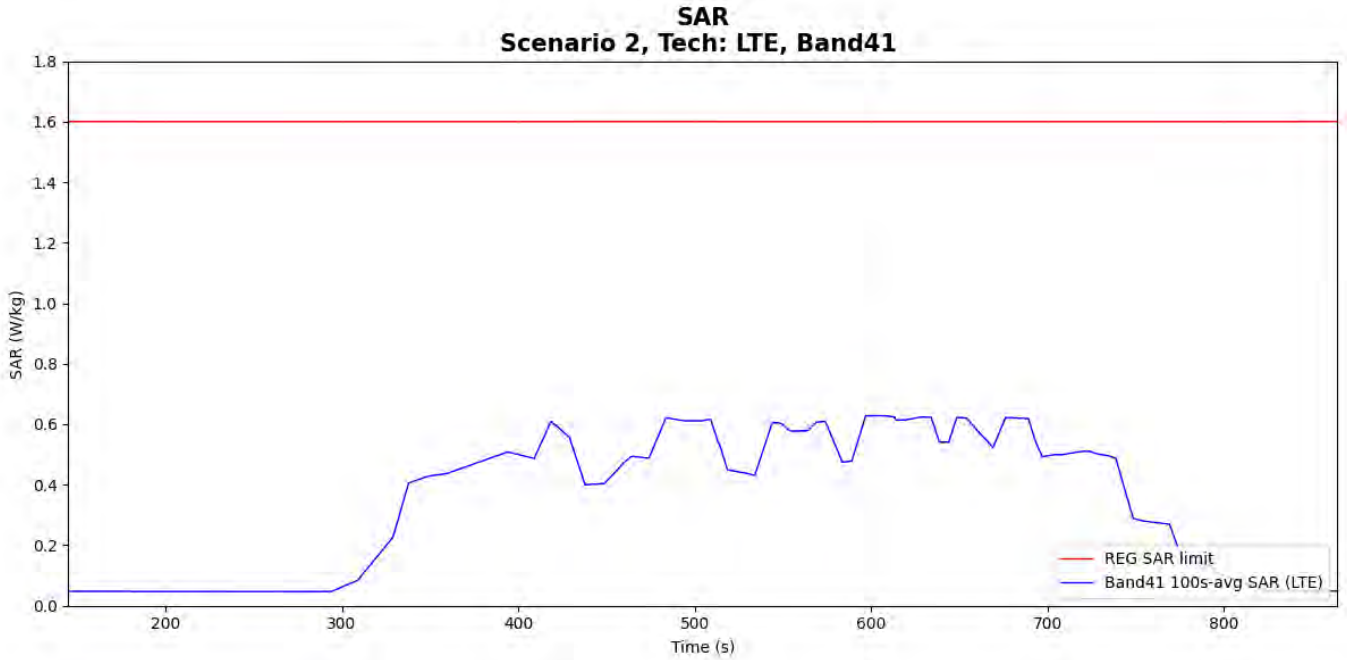

Figure 6-9 Time-averaged SAR for case 15 in table 6-1 (LTE B41)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.628 W/kg
Validation result: pass	

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6.2.3 SAR Measurement results for 3G WCDMA

- Case 4 in table 6-1: WCDMA B5 result for test sequence 1

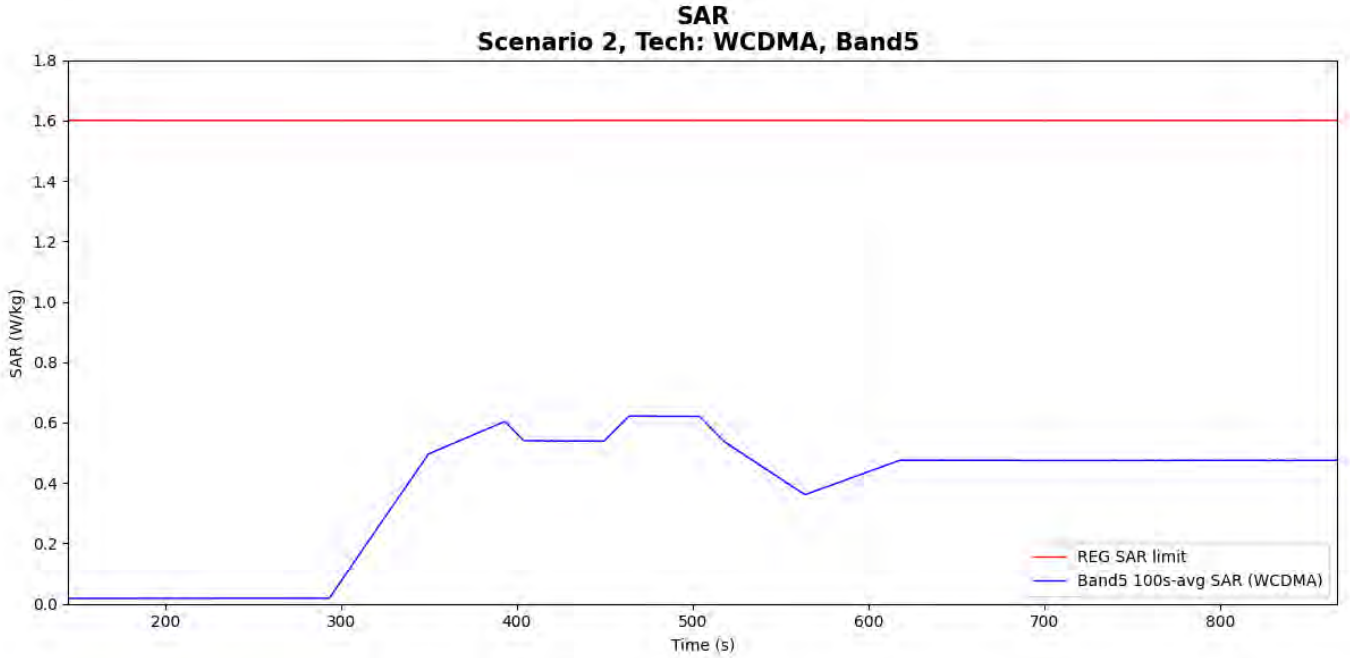

Figure 6-10 Time-averaged SAR for case 4 in table 6-1 (WCDMA B5)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.621 W/kg
Validation result: pass	

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- Case 5 in table 6-1: WCDMA B2 result for test sequence 1

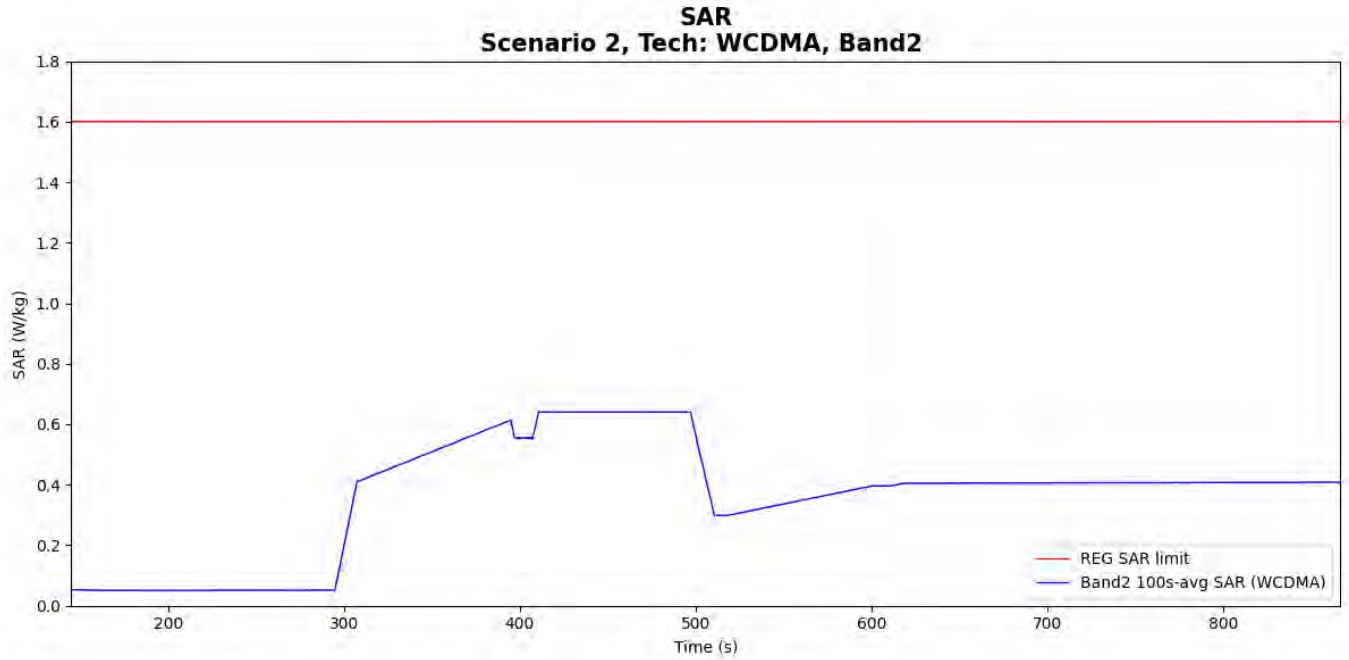

Figure 6-11 Time-averaged SAR for case 5 in table 6-1 (WCDMA B2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.641 W/kg
Validation result: pass	

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- Case 12 in table 6-1: WCDMA B5 result for test sequence 2

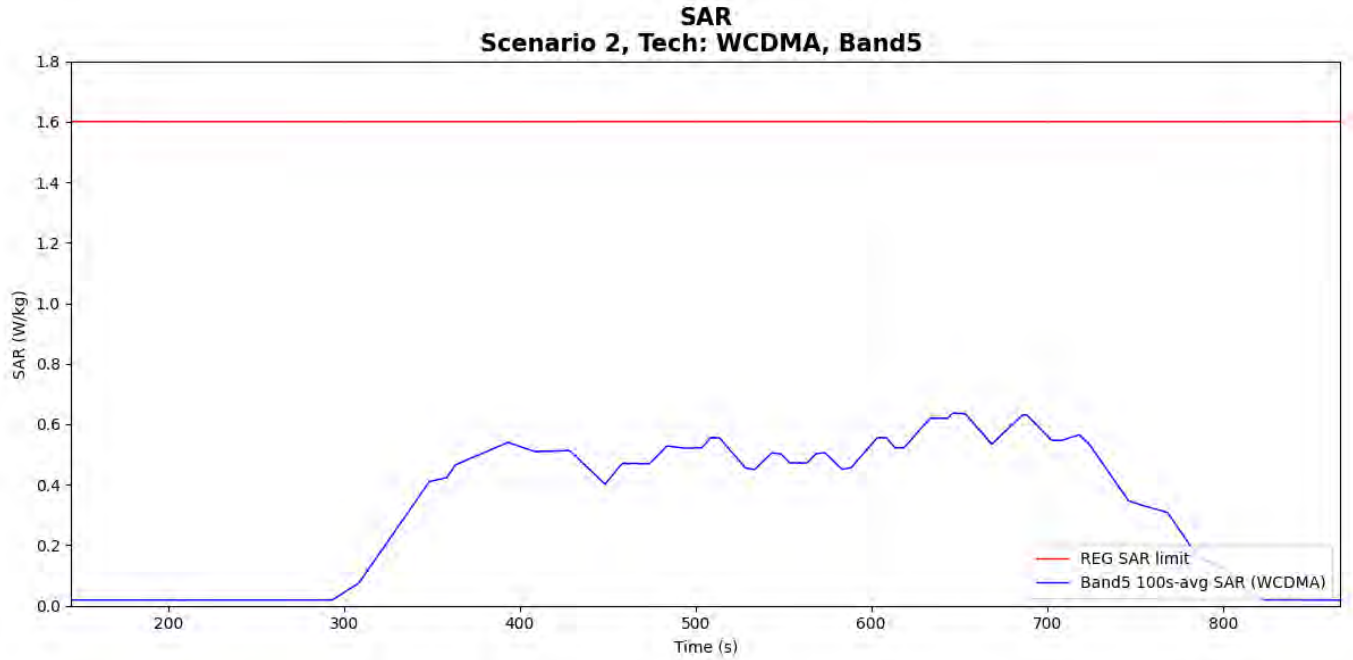

Figure 6-12 Time-averaged SAR for case 12 in table 6-1 (WCDMA B5)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.637 W/kg
Validation result: pass	

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- Case 13 in table 6-1: WCDMA B2 result for test sequence 2

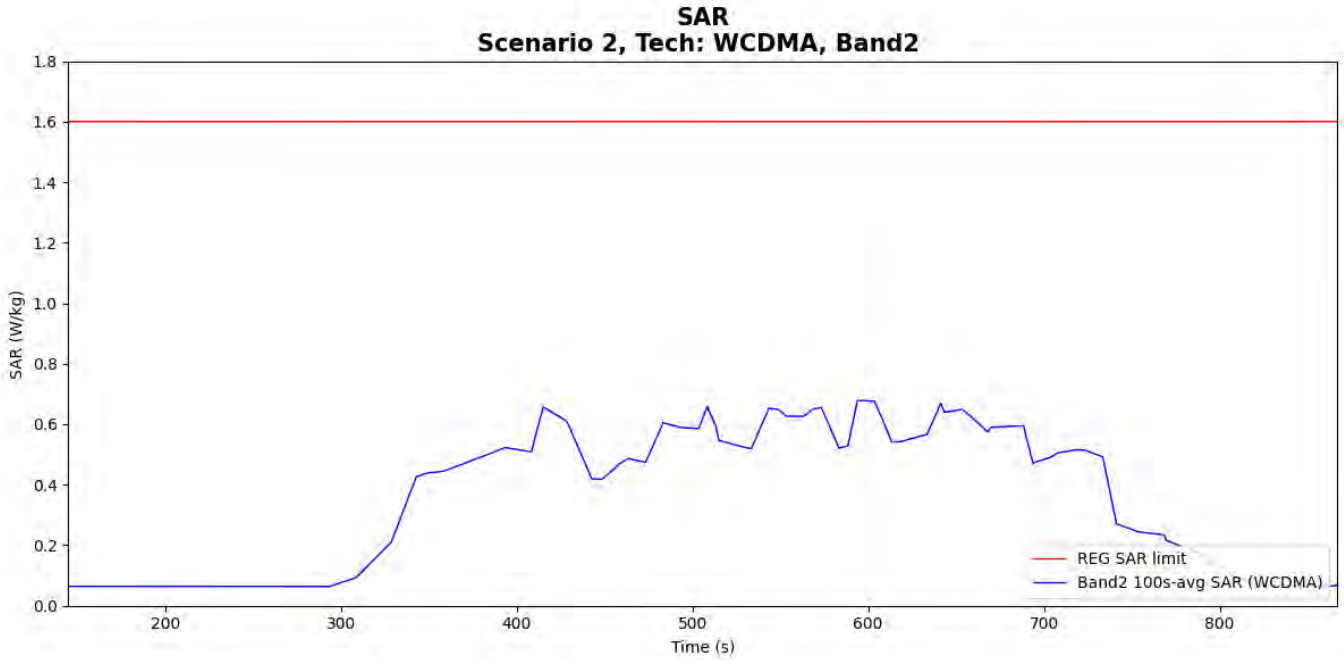

Figure 6-13 Time-averaged SAR for case 13 in table 6-1 (WCDMA B2)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.679 W/kg
Validation result: pass	

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6.2.4 SAR Measurement results for 2G

- Case 2 in table 6-1: 2G GPRS 850 1TX result for test sequence 1

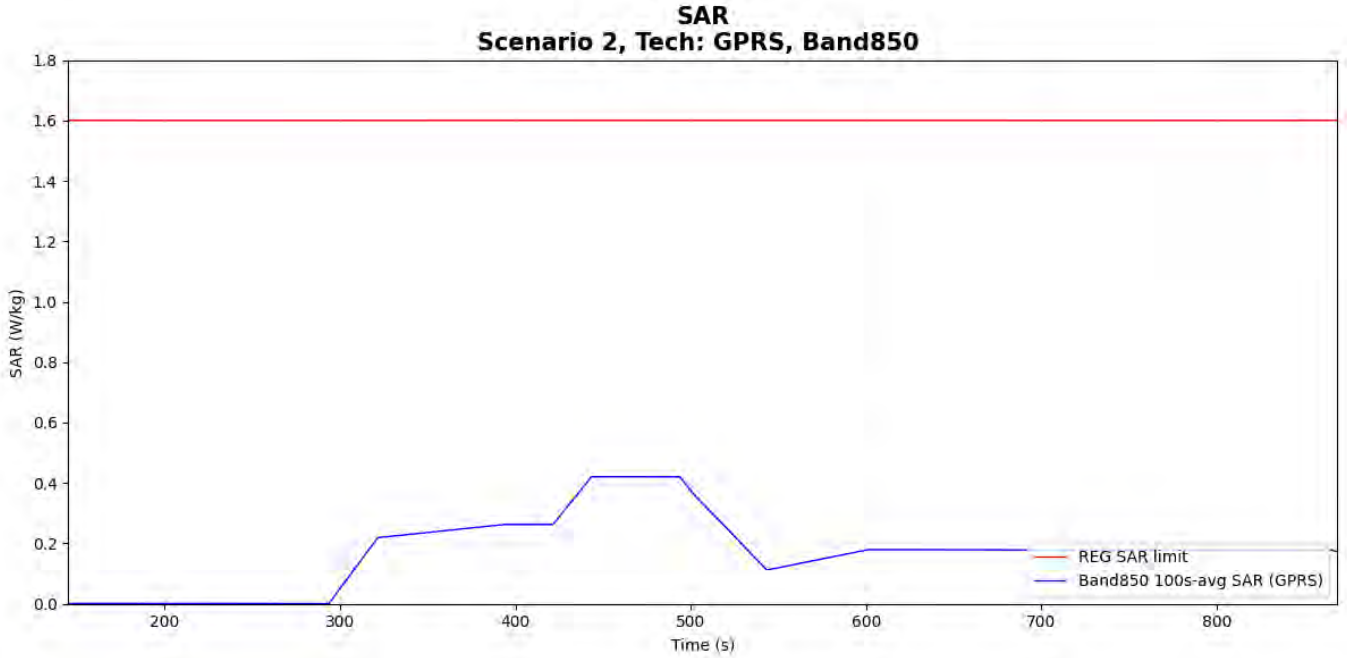

Figure 6-14 Time-averaged SAR for case 2 in table 6-1 (2G GPRS 850 1TX)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.421 W/kg
Validation result: pass	

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- Case 3 in table 6-1: 2G GPRS 1900 2TX result for test sequence 1

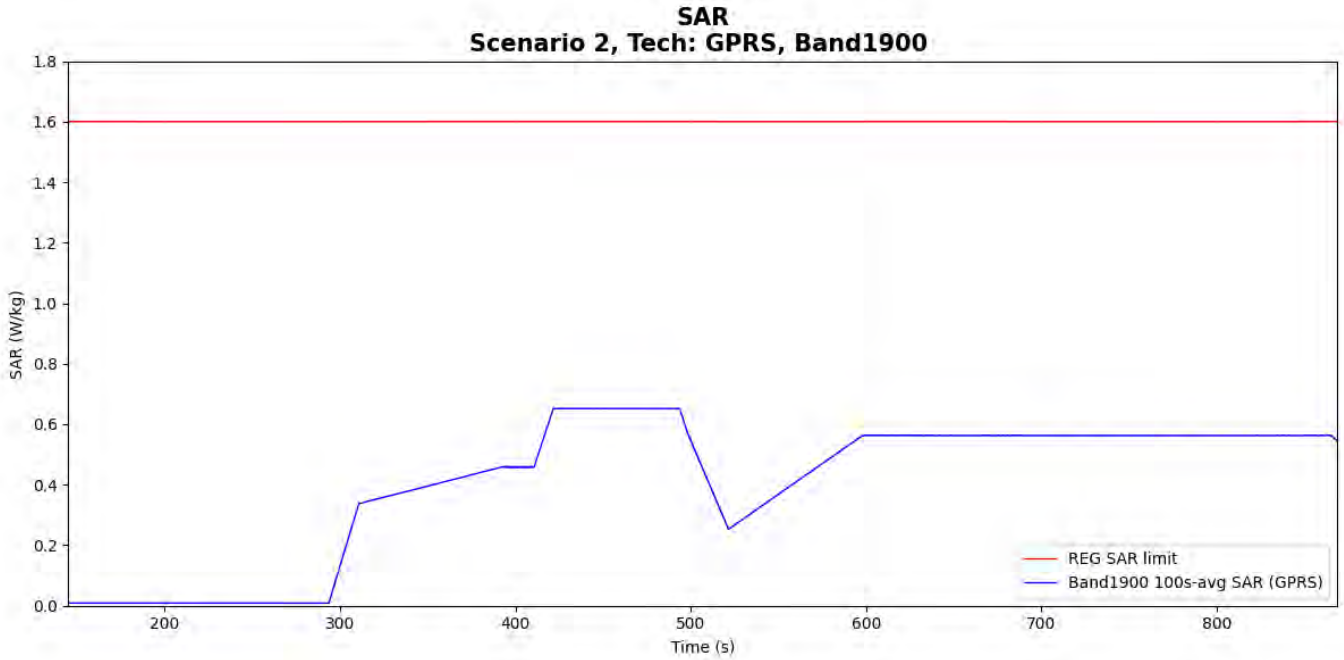

Figure 6-15 Time-averaged SAR for case 3 in table 6-1 (2G GPRS 1900 2TX)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.652 W/kg
Validation result: pass	

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- Case 10 in table 6-1: 2G GPRS 850 1TX result for test sequence 2

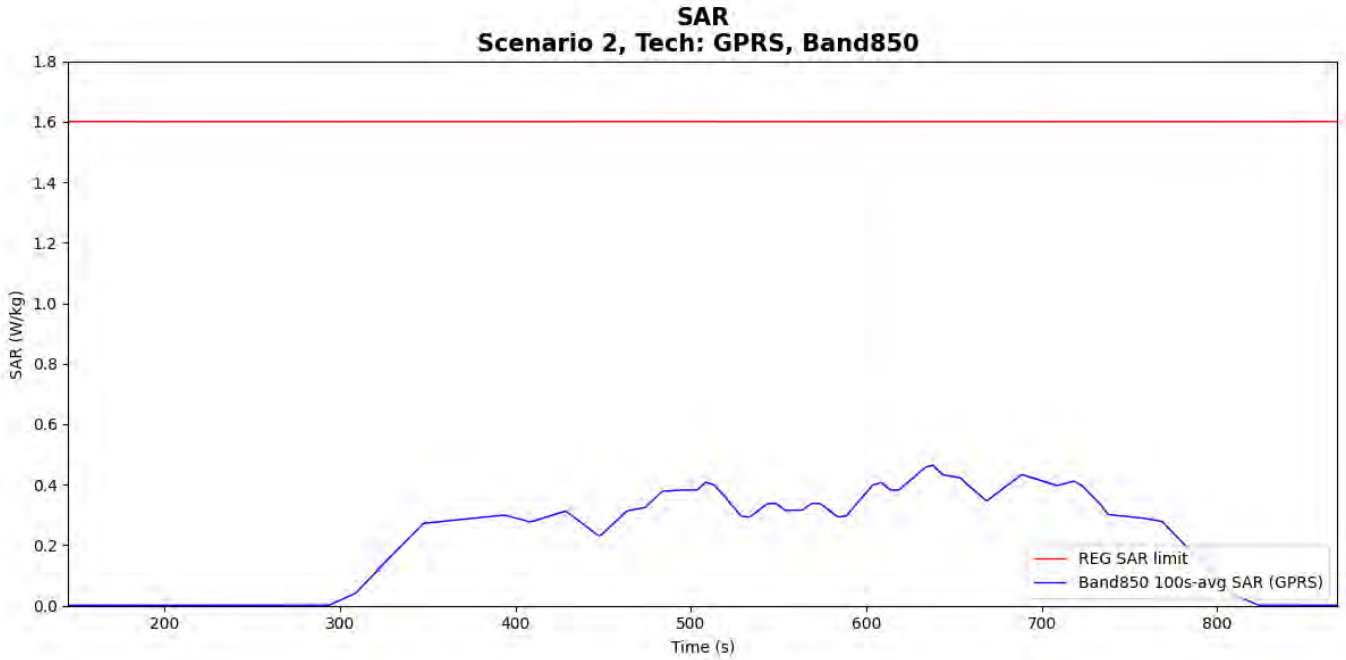

Figure 6-16 Time-averaged SAR for case 10 in table 6-1 (2G GPRS 850 1TX)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.465 W/kg
Validation result: pass	

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- Case 11 in table 6-1: 2G GPRS 1900 2TX result for test sequence 2

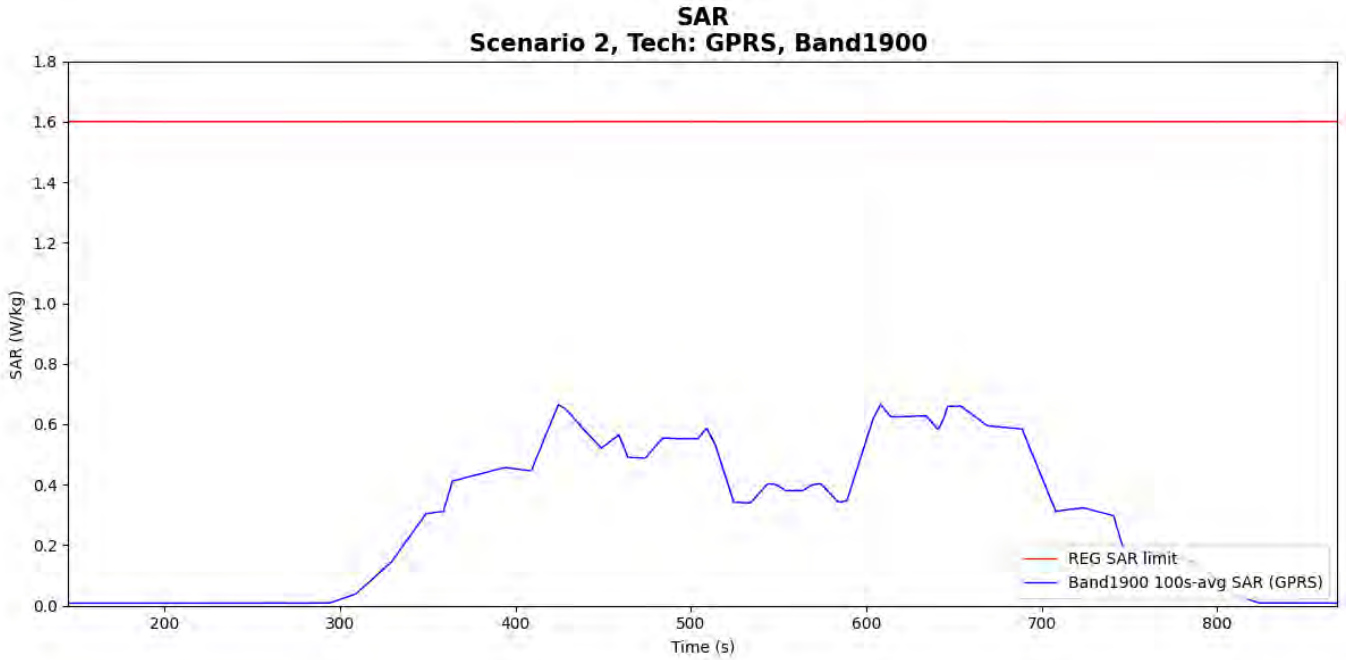

Figure 6-17 Time-averaged SAR for case 11 in table 6-1 (2G GPRS 1900 2TX)

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.665 W/kg
Validation result: pass	

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7 CONCLUSIONS

This document proposes TA-SAR test scenarios and procedures, and further proves Mediatek's TA-SAR algorithms can meet the FCC SAR regulations with the proposed test scenarios and procedures. As shown in Chapters 6, Mediatek's TA-SAR algorithms are able to maintain SAR over time below the FCC regulatory limits (based on the agreed TX-power-to-SAR translation). Furthermore, the near-field measurements are also done in an FCC certified lab to further validate the proposed test methodologies, and the results shown demonstrate that Mediatek's TA-SAR algorithms really can maintain SAR over time below the FCC regulatory limits under the proposed test procedures. Based on the provided measurement evidences, it is concluded that Mediatek's TA-SAR algorithms can be tested by using the proposed test methodology for FCC compliance.

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APPENDIX A. CDASY6 SYSTEM VERIFICATION

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835/1900/2600/3700 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Tip diameter: 2.5 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

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Phantom

Model	Twin SAM
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.
Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm

DEVICE HOLDER

Construction	In combination with the Twin SAM Phantom V4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).	 Device Holder

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APPENDIX B. INSTRUMENTS LIST

Equipment List					
Manufacturer	**Device**	**Type**	**Serial number**	**Date of last calibration**	**Date of next calibration**
SPEAG	Data acquisition Electronics	DAE4	856	Apr/22/2024	Apr/21/2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	7466	Jan/28/2025	Jan/27/2026
SPEAG	System Validation Dipole	D835V2	4d063	Sep/16/2024	Sep/15/2025
SPEAG	System Validation Dipole	D1900V2	5d173	Apr/25/2024	Apr/24/2025
SPEAG	System Validation Dipole	D2600V2	1014	Aug/21/2024	Aug/20/2027
SPEAG	System Validation Dipole	D3700V2	1057	Nov/21/2024	Nov/20/2025
SPEAG	Dielectric Assessment Kit	DAK-3.5	1342	May/21/2024	May/20/2025
Agilent	Network Analyzer	E5071C	MY46107530	May/03/2024	May/02/2025
Keysight	Economy calibration kit	85032E	MY61410221	May/29/2024	May/28/2025
R&S	MXG Analog Signal Generator	SMB100A03	182996	Mar/29/2024	Mar/28/2025
Agilent	Dual-directional coupler	772D	MY46151258	Sep/30/2024	Sep/29/2025
Agilent	Dual-directional coupler	778D	MY46151242	Sep/03/2024	Sep/02/2025
EMCI	Amplifier	EMC 074225P	980155	Calibration not required	Calibration not required
Keysight	Power meter	E4417A	MY51410006	Mar/27/2024	Mar/26/2025
Narda	High Power Directional Coupler	4216-10	2672	Nov/15/2024	Nov/14/2025
Narda	High Power Directional Coupler	4216-10	2673	Oct/30/2024	Oct/29/2025
R&S	Power Sensor	NRP18S	109065	Aug/28/2024	Aug/27/2025
R&S	Power Sensor	NRP18S	109066	Oct/28/2024	Oct/27/2025
SPEAG	Software	DASY 52 V52.10.4	N/A	Calibration not required	Calibration not required
SPEAG	Software	DASY 6 V16.0.0.116	N/A	Calibration not required	Calibration not required
SPEAG	Phantom	SAM	N/A	Calibration not required	Calibration not required
R&S	Radio Communication Test	CMW 500	125470	May/17/2024	May/16/2025
Keysight	UXM 5G Wireless Test Platform	E7515B	MY59321566	Feb/12/2025	Feb/11/2026
TECPEL	Digital thermometer	DTM-303A	TP131515	May/23/2024	May/22/2025

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APPENDIX C. SAR SYSTEM VERIFICATION

Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with homogeneous tissue simulating liquid. For head SAR testing, the liquid height from the ear rint (ERP) of the phantom to the liquid top surface is larger than 15cm. For body SAR testing, the liquid height fromeference po the center of the flat phantom to the liquid top surface is larger than 15cm.

Tissue Simulant Liquid measurement

The dielectric properties for this Head-simulant fluid were measured by using the SPEAG Dielectric Assessment Kit (DAK-3.5)
All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The measured conductivity and permittivity are all within ± 5% of the target values.

Measurement results of Tissue Simulant Liquid

Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ	Limit	Measurement Date
821.5	41.564	0.898	41.229	0.872	-0.80%	-2.94%	± 5%	Mar. 27, 2025
835	41.500	0.900	41.198	0.883	-0.73%	-1.89%	± 5%	Mar. 27, 2025
836.4	41.500	0.902	41.008	0.892	-1.19%	-1.11%	± 5%	Mar. 27, 2025
836.6	41.500	0.902	40.993	0.893	-1.22%	-0.97%	± 5%	Mar. 27, 2025
1745	40.105	1.367	39.935	1.339	-0.42%	-2.07%	± 5%	Mar. 27, 2025
1750	40.100	1.370	39.846	1.348	-0.63%	-1.61%	± 5%	Mar. 27, 2025
1880	40.000	1.400	39.796	1.368	-0.51%	-2.29%	± 5%	Mar. 27, 2025
1900	40.000	1.400	39.730	1.379	-0.68%	-1.50%	± 5%	Mar. 27, 2025
2510	39.120	1.864	39.073	1.831	-0.12%	-1.77%	± 5%	Mar. 27, 2025
2525	39.100	1.880	39.027	1.847	-0.19%	-1.76%	± 5%	Mar. 27, 2025
2535	39.087	1.891	38.902	1.860	-0.47%	-1.62%	± 5%	Mar. 27, 2025
2600	39.000	1.960	38.625	1.918	-0.96%	-2.14%	± 5%	Mar. 27, 2025
2680	38.900	2.048	38.600	2.022	-0.77%	-1.27%	± 5%	Mar. 27, 2025
3700	37.700	3.118	37.393	3.103	-0.81%	-0.48%	± 5%	Mar. 27, 2025
3750	37.650	3.170	37.342	3.122	-0.82%	-1.51%	± 5%	Mar. 27, 2025

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The composition of the tissue simulating liquid:

Simulating Liquids for 600 MHz -10 GHz, Manufactured by SPEAG:

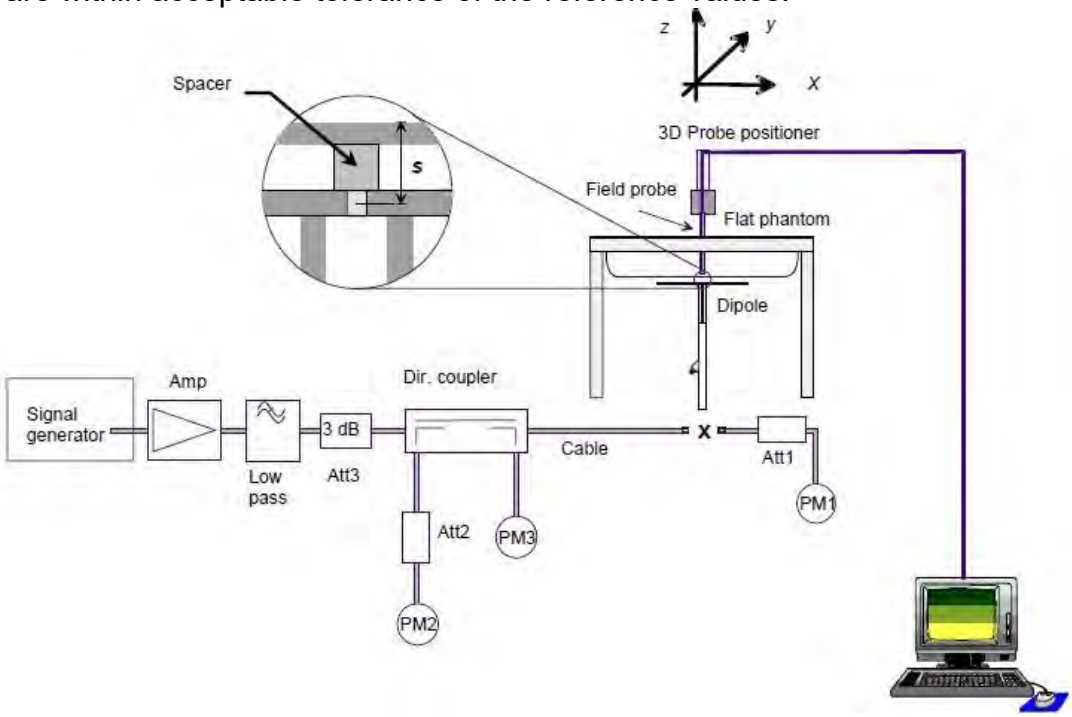
Broad-band head tissue simulating liquids	SPEAG Product	Frequency range (MHz)	Main Ingredients
	HBBL600-10000V6	600 - 10000	Water, Oil

System check

The microwave circuit arrangement for system check is sketched in below. The daily system accuracy verification occurs within the flat section of the SAM phantom and ELI phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values.

The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed with SAR values normalized to 1W forward power delivered to the dipole.

During the tests, the liquid depth from the center of the flat phantom to the liquid top surface was 15 cm above in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



The block diagram of system check

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System check results

Validation Kit	S/N	Frequency (MHz)	1W Target 1g-SAR (W/kg)	pin=250mW Measured 1g-SAR (W/kg)	Normalized to 1W 1g-SAR (W/kg)	Deviation (%)	Limit	Measurement Date
D835V2	4d063	835	9.4	2.36	9.44	0.43	± 10%	Mar.27,2025
D1900V2	5d173	1900	39.9	9.71	38.84	-2.66	± 10%	Mar.27,2025
D2600V2	1014	2600	54.8	14.2	56.8	3.65	± 10%	Mar.27,2025
Validation Kit	S/N	Frequency (MHz)	1W Target 1g-SAR (W/kg)	pin=100mW Measured 1g-SAR (W/kg)	Normalized to 1W 1g-SAR (W/kg)	Deviation (%)	Limit	Measurement Date
D3700V2	1057	3700	67.5	6.95	69.5	2.96	± 10%	Mar.27,2025

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APPENDIX D. UNCERTAINTY BUDGET

Measurement Uncertainty evaluation template for DUT SAR test (3-6G)

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability Distributio	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.63%	N	1	1	0.64	0.43	1.04%	0.70%	M
Liquid Conductivity (mea.)	1.51%	N	1	1	0.6	0.49	0.91%	0.74%	M
Combined standard uncertainty		RSS					11.80%	11.75%	
Expant uncertainty (95% confidence interval), K=2							23.59%	23.50%	

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Measurement Uncertainty evaluation template for DUT SAR test (0.3-3G)

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability Distributio	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.00%	N	1	1	1	1	6.00%	6.00%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.22%	N	1	1	0.64	0.43	0.78%	0.52%	M
Liquid Conductivity (mea.)	2.94%	N	1	1	0.6	0.49	1.76%	1.44%	M
Combined standard uncertainty		RSS					11.58%	11.51%	
Expant uncertainty (95% confidence interval), K=2							23.16%	23.02%	

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8 SAR SYSTEM CHECK RESULTS

Date: 2025/3/27

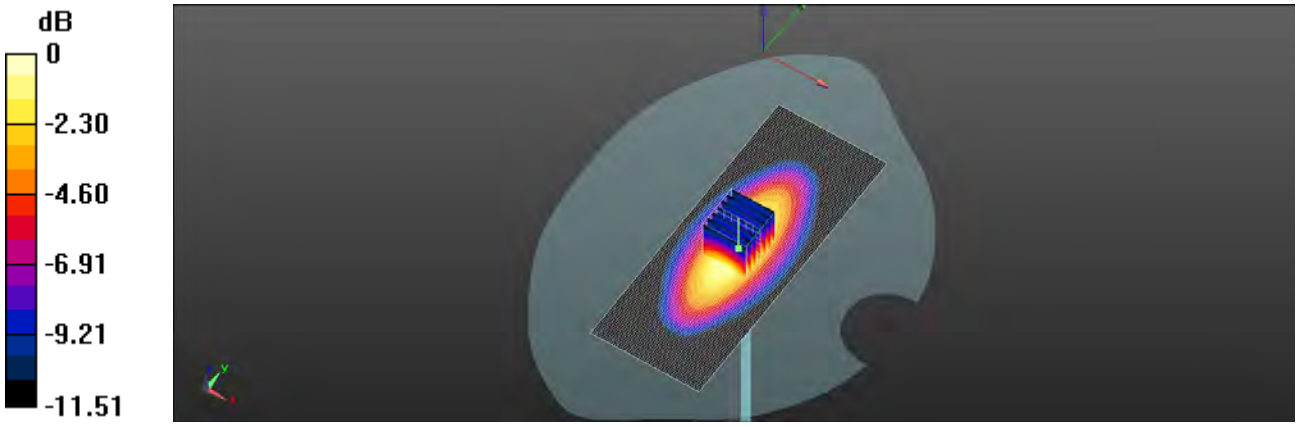
Report No. :TESA2503000270ES
Dipole 835 MHz_SN:4d063
Communication System: CW; Frequency: 835 MHz; Duty cycle= 1:1
Medium parameters used: f = 835 MHz; σ = 0.883 S/m; εr = 41.198; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(9.84, 9.27, 9.23) @ 835 MHz; Calibrated: 2025/1/28
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2024/4/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (51x131x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 2.94 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.67 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.90 W/kg
SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.42 W/kg
Smallest distance from peaks to all points 3 dB below = 14 mm
Ratio of SAR at M2 to SAR at M1 = 61.3%
Maximum value of SAR (measured) = 3.17 W/kg



0 dB = 3.17 W/kg = 5.01 dBW/kg

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Date: 2025/3/27

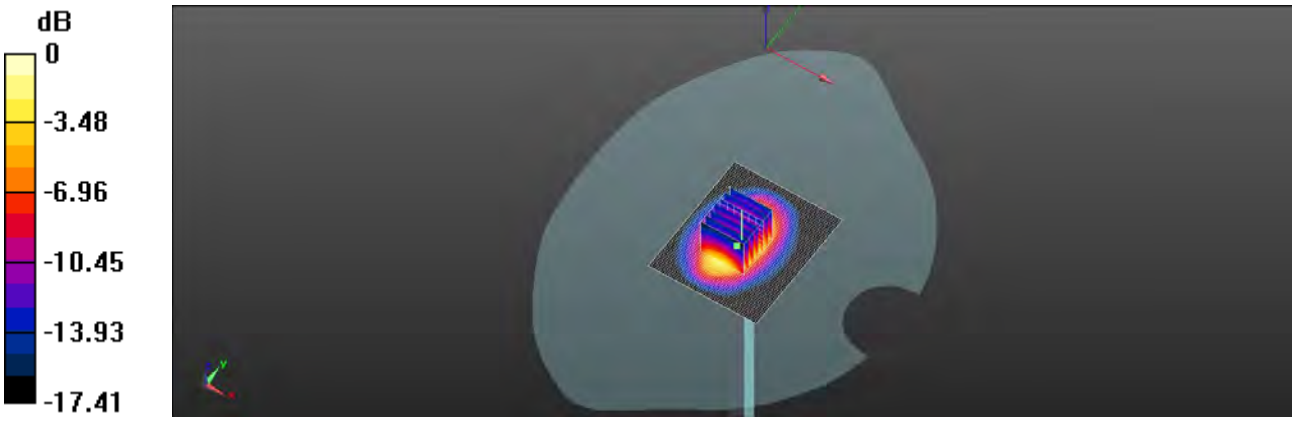
Report No. :TESA2503000270ES
Dipole 1900 MHz_SN:5d173
Communication System: CW; Frequency: 1900 MHz; Duty cycle= 1:1
Medium parameters used: f = 1900 MHz; σ = 1.379 S/m; εr = 39.73; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(8.09, 7.62, 7.59) @ 1900 MHz; Calibrated: 2025/1/28
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2024/4/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (51x61x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 14.4 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.6 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.4 W/kg
Smallest distance from peaks to all points 3 dB below = 10.4 mm
Ratio of SAR at M2 to SAR at M1 = 55.8%
Maximum value of SAR (measured) = 13.7 W/kg



0 dB = 13.7 W/kg = 11.37 dBW/kg

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Date: 2025/3/27

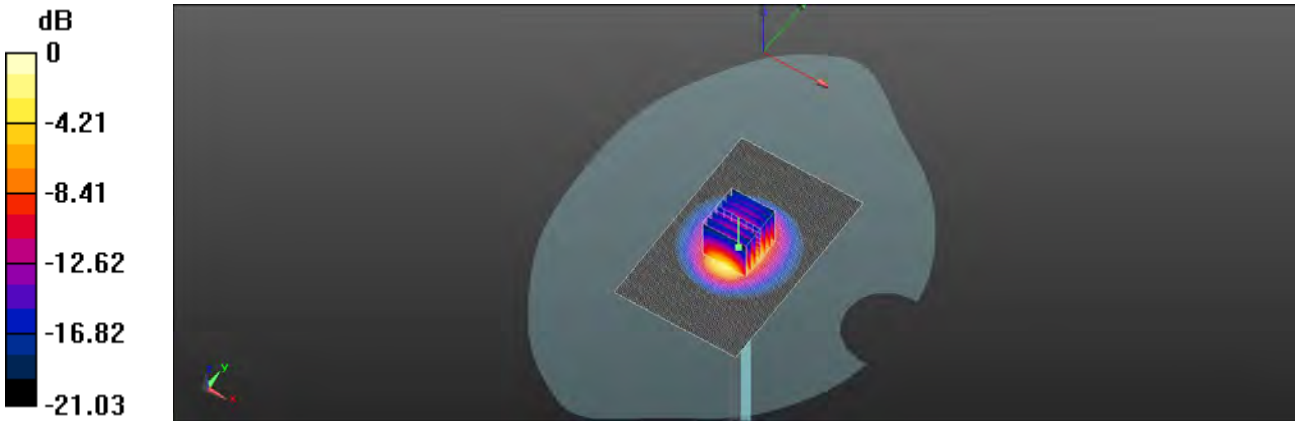
Report No. :TESA2503000270ES
Dipole 2600 MHz_SN:1014
Communication System: CW; Frequency: 2600 MHz; Duty cycle= 1:1
Medium parameters used: f = 2600 MHz; σ = 1.918 S/m; εr = 38.625; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(7.22, 6.8, 6.78) @ 2600 MHz; Calibrated: 2025/1/28
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2024/4/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (71x111x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 21.2 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.2 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 26.5 W/kg
SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.53 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 51.2%
Maximum value of SAR (measured) = 20.1 W/kg



0 dB = 20.1 W/kg = 13.03 dBW/kg

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Date: 2025/3/27

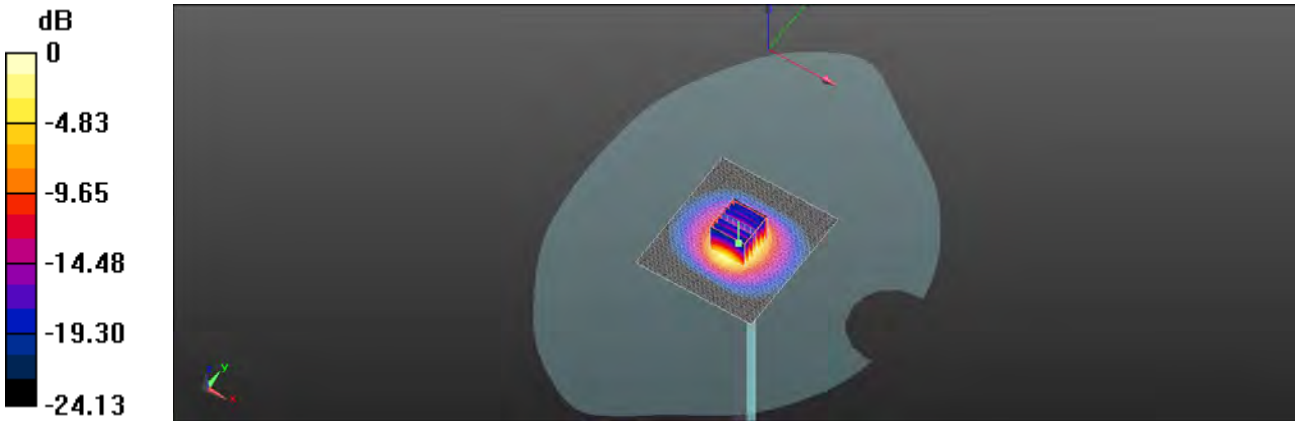
Report No. :TESA2503000270ES
Dipole 3700 MHz_SN:1057
Communication System: CW; Frequency: 3700 MHz; Duty cycle= 1:1
Medium parameters used: f = 3700 MHz; σ = 3.103 S/m; εr = 37.393; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 22.4°C; Liquid temperature: 22.2°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7466; ConvF(6.73, 6.34, 6.31) @ 3700 MHz; Calibrated: 2025/1/28
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2024/4/22
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (81x91x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 13.4 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 67.98 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 19.2 W/kg
SAR(1 g) = 6.95 W/kg; SAR(10 g) = 2.51 W/kg
Smallest distance from peaks to all points 3 dB below = 8.6 mm
Ratio of SAR at M2 to SAR at M1 = 67.3%
Maximum value of SAR (measured) = 12.8 W/kg



0 dB = 12.8 W/kg = 11.07 dBW/kg

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9 APPENDIXES

Refer to separated files for the following appendixes.

9.1 SAR_Appendix E Photographs

9.2 SAR_Appendix F DAE & Probe Cal. Certificate

9.3 SAR_Appendix G Phantom Description & Dipole Cal. Certificate

9.4 SAR_Appendix H DIpole Extended Calibration Verification

- End of report -

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