

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
Brand Name	POCO
Model No.	2511FPC34G
Applicant	Xiaomi Communications Co., Ltd. #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013
FCC ID	2AFZZFPC34G
Date of EUT Receipt	Oct. 21, 2025
Date of Test(s)	Nov. 11, 2025 ~ Nov. 13, 2025
Date of Issue	Nov. 20, 2025

Approved By /

John Teh

John Yeh

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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Revision History

Report Number	Revision	Description	Issue Date	Revised By	Remark
TESA2510000803EN	00	Initial creation of document	Nov. 20, 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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1 GENERAL INFORMATION

1.1 Test Facility

Laboratory	Test Site Address	Test Site Name	Test Engineer	Project Manager	FCC Designation number/ Registration Number	IC CAB identifier/ Company Number
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/ 150169	TW3702/ 23862
		SAR 6	Chia-Hung Sun	Kiki Lin		
		SAR 8	-	-		
	No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 33383, Taiwan	SAR 1	-	-	TW0028/ 200037	TW3702/ 4620E
		SAR 4	-	-		
	No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan	SAR 3	-	-	TW0027/ 891563	TW3702/ 4620A
		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 exposure to demonstrate compliance to safety limits. Because RF exposure is correlated to transmission power (TX power), the TX power can be controlled to meet FCC RF exposure limits defined as the specific absorption rate (SAR) limit for transmit frequencies < 6GHz and power density (PD) limit for transmit frequencies > 6 GHz. 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 regulation. For PD limit, the proposed Time-Averaged Power Density (TA-PD) algorithm controls TX power to ensure that at all times the time-averaged RF exposure is compliant with the FCC PD requirement. For Wi-Fi and BT 6GHz band, the proposed TA-SAR algorithm and the proposed TA-PD algorithm ensure that at all times the time-averaged RF exposure is compliant with the FCC SAR requirement, PD requirement, and total exposure ratio (TER) limit. In the FCC regulation, the averaging window of SAR is 100 seconds for transmit frequencies less than 3 GHz and 60 seconds for transmit frequencies between 3GHz and 6GHz. As a result, for Wi-Fi and BT 2.4GHz band, the time window is 100 seconds and for Wi-Fi 5/6GHz band, the time window is 60 seconds. For Wi-Fi and BT 6GHz band, the averaging window of PD is 30 seconds.

This document proposes the test plan, test procedures, and measurement setup for the validation of the proposed

- Wi-Fi TA-SAR (time-averaged specific absorption rate) and TA-PD (time-averaged absorbed power density) algorithm,
- Bluetooth (BT) TA-SAR algorithm and TA-PD algorithm,
- Joint Wi-Fi and BT TA-SAR/TA-PD algorithm for Wi-Fi and BT simultaneous transmission with dynamic RF exposure budget allocation.

The measurement results are also provided to show that the requirements defined by FCC can be all met. The scope of the test proposal is for standalone Wi-Fi TA-SAR/TA-PD algorithm, standalone BT TA-SAR/TA-PD algorithm, and joint Wi-Fi and BT TA-SAR/TA-PD algorithm, while the cellular TA-SAR/TA-PD is not within the scope of this test proposal. The joint Wi-Fi and BT TA-SAR/TA-PD algorithm can guarantee that the normalized exposure budgets for Wi-Fi TA-SAR/TA-PD and BT TA-SAR/TA-PD can be determined jointly and dynamically while at the same time guaranteeing that TER is less than or equal to 1.

The rest of the document is organized as follows. The TA-SAR/TA-PD algorithm details are described in chapter 3. The overview of test proposal is given in chapter 4. The test scenarios and test procedures for Wi-Fi TA-SAR conducted power are described in chapter 5. The test scenarios and test procedures for Wi-Fi TA-PD are described in Chapter 6. The test scenarios and test procedures for BT TA-SAR are described in Chapter 7. The test scenarios and test procedures for BT TA-PD are described in Chapter 8. Wi-Fi and BT simultaneous transmission TA-SAR test scenarios and test procedures are described in Chapter 9. For Wi-Fi TA-SAR validation, the measurement setup and results for conducted power are included in Chapter 10, while the SAR measurements are included in Chapter 15. For Wi-Fi TA-PD validation, the measurement setup and results for conducted power are included in Chapter 11, while the PD measurements are included in Chapter 16. For BT TA-SAR validation, the measurement setup and results for conducted power are included in chapter 12, while the SAR measurements are included in Chapter 17. For BT TA-PD validation, the simulation setup and results for conducted power are included in chapter 13, while the

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PD simulation results are included in Chapter 17. For the validation of joint Wi-Fi and BT TA-SAR/TA-PD algorithm for Wi-Fi and BT simultaneous transmission, the measurement setup and results for conducted power are included in Chapter 14. It is concluded in Chapter 19 that the proposed TA-SAR/TA-PD algorithm can dynamically control transmission power to ensure FCC compliance in real-time.

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3 WI-FI AND BT TA-SAR/TA-PD ALGORITHM CONCEPT

Mediatek developed TA-SAR and TA-PD algorithms to control instantaneous TX power for transmit frequencies less and larger than 6GHz respectively, so that the total time-averaged RF exposures (i.e., SAR, PD, and SAR+PD exposure) are less than FCC requirements.

3.1 Algorithm Description

The proposed TA-SAR and TA-PD algorithms use TX power control to accomplish RF exposure compliance for **Wi-Fi and BT** system. The basic concept of both algorithms is the same, if time-averaged TX power approaches a predefined TX power limit which is mapped from SAR or PD limit, the instantaneous TX power will be constrained to ensure that the time-averaged TX power is less than the predefined TX limit at all times. The parameters of the Wi-Fi TA-SAR algorithm are listed in Table 3-1 and the parameters of the Wi-Fi TA-PD algorithm are listed in Table 3-2. The parameters of the BT TA-SAR algorithm are listed in Table 3-3 and the parameters of the BT TA-PD algorithm are listed in Table 3-4.

- The current time-averaged TX power is guaranteed to be lower than the predefined TX power limit P_{SAR_limit} or P_{PD_limit} , which is mapped from SAR or PD limit. As in traditional SAR testing, we measure the power P_{SAR_limit} (mW) and its corresponding maximum 1g or 10g peak spatial-averaged SAR (SAR_REG_limit), similarly, P_{PD_limit} (mW) and its corresponding maximum 4cm² averaged PD (PD_REG_limit). For example, $P_{SAR_limit} = 70.79\text{mW} = 18.5\text{dBm}$ maps to SAR_REG_limit = 1.6W/kg. If device total uncertainty is considered for more conservative assessment, WF_SAR_design_limit (or BT_SAR_design_limit) which is SAR_REG_limit minus the device total uncertainties is used for TX power mapping, similarly, WF_PD_design_limit which is PD_REG_limit minus the device total uncertainties is used for TX power mapping. The TX power limit $P_{WF_SAR_limit}$ (or $P_{BT_SAR_limit}$) is the power mapped from WF_SAR_design_limit (or BT_SAR_design_limit), similarly, the TX power limit $P_{WF_PD_limit}$ is the power mapped from WF_PD_design_limit. For example, if the device total uncertainty is 0.5dB, $P_{WF_SAR_limit} = 63.09\text{mW} = 18\text{dBm}$ maps to WF_SAR_design_limit = 1.43W/kg.
- If the predicted time-averaged TX power tends to be larger than P_{SAR_limit} or P_{PD_limit} , TA-SAR/TA-PD algorithm enables TX constraint to limit instantaneous TX power. The constraint power is dynamically adjusted based on predicted power and duty cycle of the next time period.
- At any time period, TA-SAR algorithm satisfies the following equation:

$$\frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t inst_TX_power(\tau) d\tau \leq P_{SAR_limit}$$

where $inst_TX_power(\tau)$ denotes the instantaneous TX power at time τ and T_{SAR} is the time averaging window defined by FCC for assessing time-averaged SAR. P_{SAR_limit} is the predefined TX power limit which is mapped from SAR exposure limit.

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- At any time period, TA-PD algorithm satisfies the following equation:

$$\frac{1}{T_{PD}} \int_{t-T_{PD}}^t inst_TX_power(\tau) d\tau \leq P_{PD_limit}$$

where $inst_TX_power(\tau)$ denotes the instantaneous TX power at time τ and T_{PD} is the time averaging window defined by FCC for assessing time-averaged PD. P_{PD_limit} is the predefined TX power limit which is mapped from PD exposure limit.

According to “987594 D04 UN6GHZ Pre-Approval Guidance Checklist v02” published on August 7, 2023, for simultaneous transmissions, the corresponding total exposure ratio (TER) for all devices with multiple antennas or multiple transmitters is expressed as:

$$TER = \sum_{k=1}^{N_S} \left[\frac{SAR_k}{SAR_{k,limit}} \right] + \sum_{k=1}^{N_f} \left[\frac{MPE_{field,k}}{MPE_{field,limit}} \right]^2 + \sum_{k=1}^{N_{PD}} \left[\frac{MPE_{PD,k}}{MPE_{PD,limit}} \right]$$

with N_S , N_F , and N_{PD} referring to sources requiring SAR, field-MPE, or PD-MPE, respectively, k referring to measured or estimated values for the source k , and “limit” to the corresponding applicable compliance limit. Simultaneous transmission evaluations and test exemption analyses may use SPLSR per KDB Publication 447458.

Compliance condition for all applicable simultaneous transmission conditions is $TER \leq 1$.

The scope of this document is for Wi-Fi TA-SAR/TA-PD and BT TAR-SAR/TA-PD compliance assessment only, therefore only the values of SAR_k and $MPE_{PD,k}$ related to Wi-Fi and BT in the above equation are considered in our assessment. If other transmitters exist together with Wi-Fi and BT transmitters, it can be requested that $TER(\text{for Wi-Fi and BT only}) \leq a \leq 1$, where a is a fixed budget of the total TER for Wi-Fi TA-SAR/TA-PD and BT TAR-SAR/TA-PD components only. Since only the parameters of Mediatek’s TA-SAR/TA-PD algorithms need to be scaled according to the value a without any change to the Mediatek’s algorithms themselves, the demonstration of Wi-Fi TA-SAR/TA-PD and BT TAR-SAR/TA-PD compliance is provided within the scope of this document with $TER(\text{for Wi-Fi and BT only}) \leq 1$.

The normalized TA-SAR of each 2.4GHz, 5GHz or 6GHz band for Wi-Fi or BT is calculated by the following equations,

$$SAR_{n_WF,normalized} = \frac{SAR_{n_WF,avg}}{SAR_{n_WF,limit}} = \frac{\frac{1}{T_{SAR_{n_WF}}} \int_{t-T_{SAR_{n_WF}}}^t SAR_{n_WF}(\tau) d\tau}{SAR_REG_WF_limit_n}$$

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$$SAR_{n,BT,normalized} = \frac{SAR_{n,BT,avg}}{SAR_{n,BT,limit}} = \frac{\frac{1}{T_{SAR_{n,BT}}} \int_{t-T_{SAR_{n,BT}}}^t SAR_{n,BT}(\tau) d\tau}{SAR_{REG_BT_limit_n}}$$

where $SAR_{n,limit}$ ($SAR_{n_WF,limit}$ or $SAR_{n_BT,limit}$) is the basic restriction limit that is applicable to the n -th transmitter/test frequency.

The notation PD is used interchangeably with MPE_{PD} in this document. The normalized TA-PD of each 6GHz band for Wi-Fi or BT is calculated by the following equations,

$$PD_{m_WF,normalized} = \frac{PD_{m_WF,avg}}{PD_{m_WF,limit}} = \frac{\frac{1}{T_{PD_{m_WF}}} \int_{t-T_{PD_{m_WF}}}^t PD_{m_WF}(\tau) d\tau}{PD_{REG_WF_limit_m}}$$

$$PD_{m_BT,normalized} = \frac{PD_{m_BT,avg}}{PD_{m_BT,limit}} = \frac{\frac{1}{T_{PD_{m_BT}}} \int_{t-T_{PD_{m_BT}}}^t PD_{m_BT}(\tau) d\tau}{PD_{REG_BT_limit_m}}$$

where $PD_{m,limit}$ ($PD_{m_WF,limit}$ or $PD_{m_BT,limit}$) is the reference level limit that is applicable for the m -th transmitter/test frequency.

Since Wi-Fi or BT 6GHz band needs to obey both SAR and PD exposure limits, the maximum of normalized TA-SAR and normalized TA-PD in 6GHz band is adopted in TER calculation within the scope of this document, i.e.,

$$\frac{MPE_{PD,k}}{MPE_{PD,limit}} \text{ is replaced by } \begin{cases} \max \left[\frac{SAR_m}{SAR_{m,limit}}, \frac{PD_m}{PD_{m,limit}} \right], & 6GHz < f_m \leq 10GHz \\ \frac{PD_m}{PD_{m,limit}}, & 10GHz < f_m \end{cases}$$

in the TER formula.

In summary, for simultaneous transmission, the sum of the normalized TA-SAR values in 2.4GHz and 5GHz bands together with the sum of the values of the maximum of normalized TA-SAR and normalized TA-PD in 6GHz band should meet TER requirement, as shown below.

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$$\begin{aligned}
 TER = & \sum_{n_{WF}=1}^{M1} \frac{SAR_{n_{WF},avg}}{SAR_{n_{WF},limit}} (Wi - Fi \text{ 2GHz/5GHz}) + \sum_{n_{BT}=1}^{M2} \frac{SAR_{n_{BT},avg}}{SAR_{n_{BT},limit}} (BT \text{ 2GHz/5GHz}) \\
 & + \sum_{m_{WF}=M1+1}^{N1} \max \left[\frac{SAR_{m_{WF},avg}}{SAR_{m_{WF},limit}}, \frac{PD_{m_{WF},avg}}{PD_{m_{WF},limit}} \right] (Wi - Fi \text{ 6GHz}) \\
 & + \sum_{m_{BT}=M2+1}^{N2} \max \left[\frac{SAR_{m_{BT},avg}}{SAR_{m_{BT},limit}}, \frac{PD_{m_{BT},avg}}{PD_{m_{BT},limit}} \right] (BT \text{ 6GHz}) \leq 1
 \end{aligned}$$

The output power can be converted to SAR or PD by the following equations. In particular, for Wi-Fi SAR,

$$\frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t SAR_{WF}(\tau) d\tau = \frac{\frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t inst_{WF_SAR_TX_power}(\tau) d\tau}{P_{WF_SAR_limit}} \times WF_SAR_design_limit$$

for Wi-Fi PD,

$$\frac{1}{T_{PD}} \int_{t-T_{PD}}^t PD_{WF}(\tau) d\tau = \frac{\frac{1}{T_{PD}} \int_{t-T_{PD}}^t inst_{PD_TX_power}(\tau) d\tau}{P_{WF_PD_limit}} \times WF_PD_design_limit$$

for BT SAR,

$$\frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t SAR_{BT}(\tau) d\tau = \frac{\frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t inst_{BT_SAR_TX_power}(\tau) d\tau}{P_{BT_SAR_limit}} \times BT_SAR_design_limit$$

and for BT PD,

$$\frac{1}{T_{PD}} \int_{t-T_{PD}}^t PD_{BT}(\tau) d\tau = \frac{\frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t inst_{BT_PD_TX_power}(\tau) d\tau}{P_{BT_PD_limit}} \times BT_PD_design_limit$$

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Where $inst_WF_SAR_TX(\tau)$, $inst_WF_PD_TX_power(\tau)$, $inst_BT_SAR_TX_power(\tau)$ and $inst_BT_PD_TX_power(\tau)$ denote the instantaneous TX power at time τ for SAR and PD respectively. T_{SAR} and T_{PD} are the time averaging windows defined by FCC for assessing time-averaged SAR and PD. The meanings of $P_{WF_SAR_limit}$, $WF_SAR_design_limit$, and SAR_REG_limit are described in Table 3-1, the meaning of $P_{WF_PD_limit}$, $WF_PD_design_limit$, and PD_REG_limit are described in Table 3-2, the meanings of $P_{BT_SAR_limit}$, $BT_SAR_design_limit$, and SAR_REG_limit are described in Table 3-3, and the meanings of $P_{BT_PD_limit}$, $BT_PD_design_limit$, and PD_REG_limit are described in Table 3-4.

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3.2 Operating Parameters for Algorithm Validation

Table 3-1 Wi-Fi TA-SAR algorithm parameters

Algorithm parameters	Description
$P_{WF_SAR_limit}$ $(P_{WF_SAR_limit})$	The time-averaged maximum power level limit corresponding to $WF_SAR_design_limit$. - For FCC, SAR_REG_limit: 1.6 W/kg (1g-SAR), 4 W/kg (10g-SAR). $WF_SAR_design_limit$ is SAR_REG_limit minus device total uncertainty for more conservative assessment. $P_{WF_SAR_limit}$ has the unique value for each Wi-Fi band/antenna/exposure condition index.
$P_{WF_SAR_MAX_limit}$ $(P_{WF_SAR_MAX_limit})$	Wi-Fi TA-SAR maximum instantaneous TX power limit, which is less than or equal to maximum TX power $P_{WF_SAR_MAX}$ ($P_{WF_SAR_MAX}$) that can be possibly transmitted in Wi-Fi. The power limit is dynamically adjusted based on Wi-Fi TA-SAR algorithm.

Table 3-2 Wi-Fi TA-PD algorithm parameters

Algorithm parameters	Description
$P_{WF_PD_limit}$ $(P_{WF_PD_limit})$	The time-averaged maximum power level limit corresponding to $WF_PD_design_limit$. - For FCC, PD_REG_limit: 10 W/m² (4cm² PD). $WF_PD_design_limit$ is PD_REG_limit minus device total uncertainty for more conservative assessment. $P_{WF_PD_limit}$ has the unique value for each Wi-Fi band/antenna/exposure condition index.
$P_{WF_PD_MAX_limit}$ $(P_{WF_PD_MAX_limit})$	Wi-Fi TA-PD maximum instantaneous PD TX power limit, which is less than or equal to maximum TX power $P_{WF_PD_MAX}$ ($P_{WF_PD_MAX}$) that can be possibly transmitted in Wi-Fi. The power limit is dynamically adjusted based on Wi-Fi TA-PD algorithm.

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Table 3-3 BT TA-SAR algorithm parameters

Algorithm parameters	Description
$P_{BT_SAR_limit}$ $(P_{BT_SAR_limit})$	The time-averaged maximum power level limit corresponding to BT_SAR_design_limit. - For FCC, SAR_REG_limit: 1.6 W/kg (1g-SAR), 4 W/kg (10g-SAR). - BT_SAR_design_limit is SAR_REG_limit minus device total uncertainty for more conservative assessment. - P_BT_SAR_limit has the unique value for each BT antenna/exposure condition index.
$P_{BT_SAR_MAX_limit}$ $(P_{BT_SAR_MAX_limit})$	BT TA-SAR maximum instantaneous SAR TX power limit, which is less than or equal to maximum TX power $P_{BT_SAR_MAX}$ ($P_{BT_SAR_MAX}$) that can be possibly transmitted in BT. The power limit is dynamically adjusted based on BT TA-SAR algorithm.

Table 3-4 BT TA-PD algorithm parameters

Algorithm parameters	Description
$P_{BT_PD_limit}$ $(P_{BT_PD_limit})$	The time-averaged maximum power level limit corresponding to BT_PD_design_limit. - For FCC, PD_REG_limit: 10 W/m² (4cm² PD). - BT_PD_design_limit is PD_REG_limit minus device total uncertainty for more conservative assessment. - P_BT_PD_limit has the unique value for each BT band/antenna/exposure condition index.
$P_{BT_PD_MAX_limit}$ $(P_{BT_PD_MAX_limit})$	BT TA-PD maximum instantaneous PD TX power limit, which is less than or equal to maximum TX power $P_{BT_PD_MAX}$ ($P_{BT_PD_MAX}$) that can be possibly transmitted in BT. The power limit is dynamically adjusted based on BT TA-PD algorithm.

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4 OVERVIEW OF WI-FI AND BT TA-SAR/TA-PD TEST PROPOSAL

For the completeness of verifying that the proposed TA-SAR/TA-PD algorithm can realize FCC compliance regarding RF exposure, several test scenarios for Wi-Fi system are constructed as below:

- **Wi-Fi test scenario 1:** Test TX mode change between normal mode and sleep mode to verify algorithm and SAR compliance.
- **Wi-Fi test scenario 2:** Test band handover to ensure algorithm control continuity and correctness.
- **Wi-Fi test scenario 3:** Test different transmission antennas to ensure algorithm control works correctly during antenna switch from one antenna to another.
- **Wi-Fi test scenario 4:** Test different ECI (Exposure Condition Index) to ensure algorithm control behaves as expected during ECI switch from one ECI to another. (ex., head→body worn)
- **Wi-Fi test scenario 5:** Test TER under 2.4GHz band and 6GHz band simultaneous transmission. Since both SAR and PD are required in Wi-Fi 6GHz band, the maximum of normalized TA-SAR and normalized TA-PD in 6GHz band should be used in TER calculation. The proposed algorithm can ensure TA-SAR/TA-PD control correctness and prove the normalized total RF exposure is less than or equal to 1 (FCC requirement).

Table 4-1 shows the test scenario list for Wi-Fi TA-SAR/TA-PD validation. For Wi-Fi TA-SAR 2.4GHz and 5GHz bands validation, scenarios 1 to 4 are proposed to demonstrate FCC compliance. For Wi-Fi 7 MLO SAR and PD switch, scenario 5 is proposed. For Wi-Fi TA-PD 6GHz band validation, scenario 1 is proposed.

Table 4-1 BT TA-PD algorithm parameters

Test scenario		Description	Wi-Fi TA-SAR 2.4/5GHz	Wi-Fi TA-SAR 6GHz	Wi-Fi TA-PD 6GHz
1	TX mode change between normal mode and sleep mode	Test normal mode and sleep mode switch	✓	✓	✓
2	Band handover	Test 2.4G/5GHz bandchange	✓		
3	Antenna switching	Change antenna index	✓		
4	ECI (Exposure Condition Index) change	Test under ECI transition (e.g., head→body worn)	✓		
5	Simultaneous SAR and PD	TER of 2.4GHz TA-SAR and 6GHz TA-SAR/TA-PD	✓	✓	✓

Note: This device does not support the 6 GHz band. Therefore, Item 5 does not need to be tested.

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For BT TA-SAR/TA-PD validation, the following test scenario is constructed.

- **BT test scenario 1:** BT TX transmits maximum power with varying duty.

Table 4-2 shows the test scenario list for BT TA-SAR/TA-PD validation.

Table 4-2 Test scenario list for BT TA-SAR/TA-PD validation

Test scenario		Description	BT TA-SAR 2.4/5GHz	BT TA- SAR 6GHz	BT TA- PD 6GHz
1	TX with varying duty	BT TX transmits maximum power with varying duty	✓	✓	✓

Note: This device does not support BT TAS. Therefore, This Item does not need to be tested.

Wi-Fi and BT simultaneous transmission test scenario is constructed as below:

- **Wi-Fi and BT simultaneous transmission test scenario 1:** Wi-Fi and BT are assigned dynamic RF exposure budget individually with the sum of the total exposure budget ≤ 1 . Wi-Fi TA-SAR algorithm and BT TA-SAR algorithm operate interactively. Wi-Fi and BT are requested to transmit at individual maximum power levels. This scenario tests that the proposed TA-SAR algorithms can ensure compliance during Wi-Fi and BT simultaneous transmission.

Table 4-3 shows the test scenario list for the TA-SAR validation under Wi-Fi and BT simultaneous transmission.

Table 4-3 Test scenario list for BT TA-SAR/TA-PD validation

Test scenario		Description	Wi-Fi TA-SAR 5GHz	BT TA-SAR 2.4GHz
1	Wi-Fi and BT simultaneous TX	Wi-Fi and BT both transmit under max power requests	✓	✓

For the chipsets that will be used by Mediatek's customers, there are two(2) or three(3) antennas for different products. For ease of discussion, definitions of operational bands are as follows

- G-band: 2.4GHz band,
- A-band: one of the 5GHz band or 6GHz band.

Each antenna allows G-band transmission, A-band transmission, or simultaneous G-band + A-band transmission. For two-antenna chipsets, the maximum supported features are dual band dual concurrent (DBDC) G-band + A-band, in which case, there can be two spatial streams in G-band (out of two antennas) and two spatial streams in A-band (out of two antennas) simultaneously. For three-antenna chipsets, the maximum supported features are tri-bands, namely, 1 G-band + 2 A-bands, in which case, there can be two spatial streams in G-band (out of two antennas), two spatial streams in one A-band (out of two antennas), and one spatial stream in another A-band (out of one antenna) simultaneously.

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Wi-Fi operational conditions and antenna configurations are summarized in the following two tables, in which SISO means single-input single output and MIMO means multiple-input multiple output.

The table 4-4 summarizes all applicable Wi-Fi operational conditions for two-antenna chipsets, where representative antenna states are shown. For example, in G-band SISO, the table shows that Ant0 is active in G-band and Ant1 is off, while it can also be true that Ant0 is off and Ant1 is active in G-band.

Table 4-4 Wi-Fi operational conditions and antenna configurations

Operational conditions	Ant0	Ant1
G-band SISO	G-band	Off
G-band MIMO	G-band	G-band
A-band SISO	A-band	Off
A-band MIMO	A-band	A-band
G-band SISO + A-band SISO	G-band	A-band
G-band SISO + A-band MIMO	G-band + A-band	A-band
G-band MIMO + A-band SISO	G-band + A-band	G-band
G-band MIMO + A-band MIMO	G-band + A-band	G-band + A-band

The table 4-5 summarizes all applicable Wi-Fi operational conditions for three-antenna chipsets. The Ant2 is active only under tri-band transmission.

Table 4-5 Wi-Fi operational conditions and antenna configurations

Operational conditions	Ant0	Ant1	Ant2
G-band SISO	G-band	off	Off
G-band MIMO	G-band	G-band	Off
A-band SISO	A-band	off	Off
A-band MIMO	A-band	A-band	Off
G-band SISO + A-band SISO	G-band	A-band	Off
G-band SISO + A-band MIMO	G-band + A-band	A-band	Off
G-band MIMO + A-band SISO	G-band + A-band	G-band	Off
G-band MIMO + A-band MIMO	G-band + A-band	G-band + A-band	Off
G-band SISO + A-band SISO + another A-band SISO	G-band	A-band	Another A-band
G-band SISO + A-band MIMO + another A-band SISO	G-band + A-band	A-band	Another A-band
G-band MIMO + A-band SISO + another A-band SISO	G-band + A-band	G-band	Another A-band
G-band MIMO + A-band MIMO + another A-band SISO	G-band + A-band	G-band + A-band	Another A-band

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Regarding Wi-Fi + BT operations, the following options are available.

1. ANT0: Wi-Fi G-band + BT G-band (Wi-Fi and BT must be time-division multiplexed)
2. ANT0: Wi-Fi A-band + BT G-band
3. ANT1: Wi-Fi G-band + BT G-band (Wi-Fi and BT must be time-division multiplexed)
4. ANT1: Wi-Fi A-band + BT G-band

From the RF exposure perspective, (ANT0: Wi-Fi A-band + BT G-band) is worse than (ANT0: Wi-Fi G-band + BT G-band), similarly, (ANT1: Wi-Fi A-band + BT G-band) is worse than (ANT1: Wi-Fi G-band + BT G-band).

For each applicable operation condition, the algorithm parameters, such as $P_{WF_SAR_limit}$, time averaging window size, etc., can be adjusted accordingly to guarantee RF regulatory compliance. All applicable operation conditions have been considered in algorithm design and proposed test scenarios.

For Wi-Fi TA-SAR validation, description of the conducted power measurement test procedures is included in Sections 5.2~5.6, and description of the SAR measurement test procedures is included in Section 5.7. For Wi-Fi TA-PD validation, description of the conducted power measurement test procedures is included in Section 6.2, and description of the PD measurement test procedures is included in Section 6.3. For BT TA-SAR validation, description of the conducted power measurement test procedures is included in Section 7.2, and description of the SAR measurement test procedures is included in Section 7.3. For BT TA-PD validation, description of the conducted power measurement test procedures is included in Section 8.2, and description of the PD measurement test procedures is included in Section 8.3. For Wi-Fi and BT simultaneous transmission TA-SAR validation, description of the conducted power measurement test procedures is included in Section 9.2.

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5 WI-FI TA-SAR TEST SCENARIOS AND TEST PROCEDURES

In order to demonstrate that Wi-Fi TA-SAR algorithm performs as expected under various operating scenarios, Table 5-1 lists the test scenarios and test sequences to validate Wi-Fi TA-SAR algorithm. The test sequences are defined in Section 5.1. The details of each test procedures via conducted power and SAR measurements are described in Sections 5.2~5.6 and Section 5.7, respectively.

Table 5-1 Wi-Fi TA-SAR test scenario and test sequence list

Test scenario		Test sequence	Description	Device requirement
1	TX mode change between normal mode and sleep mode	Defined in Section 5.1	Test normal mode and sleep mode switch	
2	Band handover	Defined in Section 5.1	Test 2.4GHz/5GHz band change	Supports DBDC
3	Antenna switching	Defined in Section 5.1	Change antenna index	
4	ECI (Exposure Condition Index) change	Defined in Section 5.1	Test under ECI transition (e.g., head→body worn)	
5	Simultaneous SAR and PD	Defined in Section 5.1	TER of 2.4GHz TA-SAR and 6GHz TA-SAR/TA-PD	Supports WiFi DBDC or MLO

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5.1 Wi-Fi TA-SAR Test Sequences

The test sequence is predefined for Wi-Fi TA-SAR:

- **Wi-Fi TA-SAR test sequence:** Wi-Fi is requested to transmit static and maximum power with high duty cycle.

The test sequence is illustrated in Figure 5-1. The waveform of the test sequence is listed in Table 5-2.

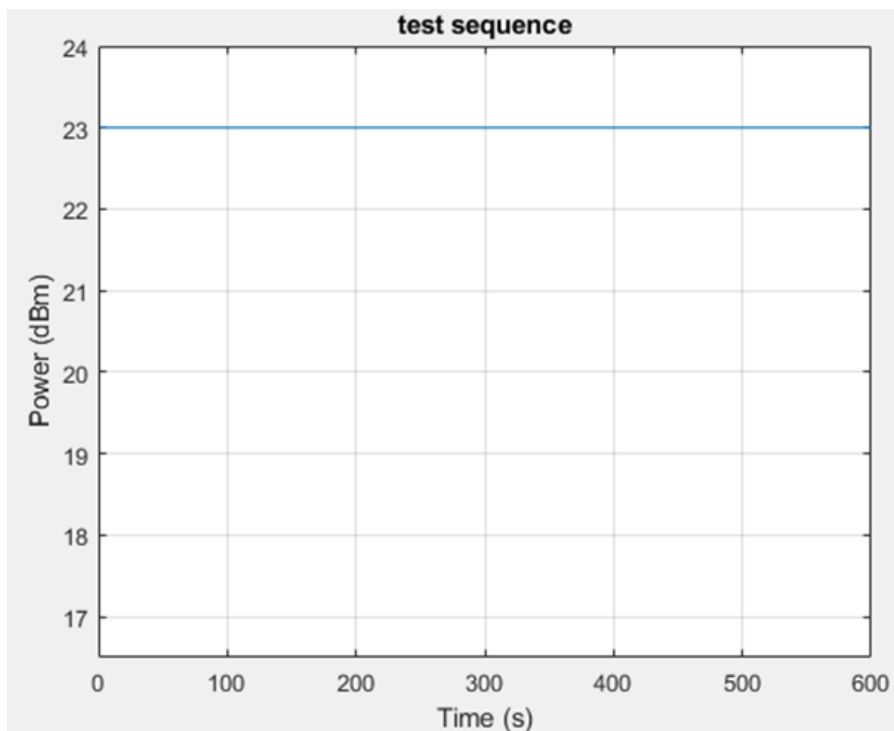


Figure 5-1 Wi-Fi TA-SAR test sequence

Table 5-2 Wi-Fi TA-SAR test sequence

Time (s)	Duration (s)	Power (dBm)	Note
0	600	23	Wi-Fi TX maximum power (P _{WF SAR MAX})

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5.2 Test Configuration and Procedure for Wi-Fi TA-SAR Test Scenario 1: TX Mode Change between Normal Mode and Sleep Mode via Conducted Power Measurements

5.2.1 Configuration

The scenario tests Wi-Fi TX mode switching from normal throughput mode to sleep mode. Since Mediatek's TA-SAR feature operation is independent of bands and channels, selecting one band is sufficient to validate this feature. The criteria for band selection are based on the $P_{WF_SAR_limit}$ values (corresponding to $WF_SAR_design_limit$) and are described as below:

- Select one band/channel with least $P_{WF_SAR_limit}$ among all supported bands and the $P_{WF_SAR_limit}$ value is below $P_{WF_SAR_MAX}$.
 - Only one band/channel needs to be tested if all the bands have the same $P_{WF_SAR_limit}$.
 - Only one band/channel needs to be tested if only one band has $P_{WF_SAR_limit}$ below $P_{WF_SAR_MAX}$.
 - If the same least $P_{WF_SAR_limit}$ applies to multiple bands, select the band with the highest measured 1gSAR at $P_{WF_SAR_limit}$.
 - If $P_{WF_SAR_limit}$ values of all bands are over $P_{WF_SAR_MAX}$, there is no need to test these bands.

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5.2.2 Procedure

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

- Steps 1~4: Measure and record TX power versus time for test scenario 1.
 - Step 1: Start $P_{WF_SAR_limit}$ calibration mode and measure $P_{WF_SAR_limit}$ for the selected band.
 - Step 2: Establish radio link with AP in the selected band and enable TA-SAR.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
 - Step 4: Wi-Fi TX switches modes.
Initial Wi-Fi normal mode: Configure pre-defined TX power sequence to DUT for selected band and then DUT transmits packets after 400s.
Switch to Wi-Fi sleep mode: Wi-Fi switches to sleep mode about 10s and no packets are transmitted.
Wi-Fi wakes up to normal mode: Wi-Fi wakes up from sleep mode and DUT re-transmits packets for at least the specified time duration.
- 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.

Instantaneous 1gSAR or 10gSAR versus time: $SAR(\tau)$

$$SAR(\tau) = \frac{conducted_inst_SAR_TX_power(\tau)}{P_{WF_SAR_limit}} \times WF_SAR_design_limit$$

where $P_{WF_SAR_limit}$ is measured from step 1 and $WF_SAR_design_limit$ is measured worst case SAR value at $P_{WF_SAR_limit}$.

Time average SAR versus time: $Time_avg_SAR(t)$

$$Time_avg_SAR(t) = \frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t SAR(\tau) d\tau$$

- Step 6: Plot results
 - A. Make one power perspective plot containing
 1. Instantaneous TX power
 2. Requested power (test sequence)
 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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5.3 Test Configuration and Procedure for Wi-Fi TA-SAR Test Scenario 2: Band Handover via Conducted Power Measurements

5.3.1 Configuration

The scenario tests Wi-Fi 2.4GHz and 5GHz band handover and DBDC mode. The test configuration switches from Wi-Fi 2.4GHz band to Wi-Fi 5GHz band and then switches to 2.4GHz/5GHz DBDC mode.

- For Wi-Fi 2.4GHz band, select the channel with least $P_{WF_SAR_limit}$ value and below $P_{WF_SAR_MAX}$. If the same least $P_{WF_SAR_limit}$ applies to multiple bands, select the channel with the highest measured 1gSAR at $P_{WF_SAR_limit}$.
- For Wi-Fi 5GHz band, select the channel with least $P_{WF_SAR_limit}$ value and below $P_{WF_SAR_MAX}$. If the same least $P_{WF_SAR_limit}$ applies to multiple bands, select the channel with the highest measured 1gSAR at $P_{WF_SAR_limit}$.

5.3.2 Procedure

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

- Steps 1~4: Measure and record TX power versus time for test scenario 2.
 - Step 1: Start $P_{WF_SAR_limit}$ calibration mode and measure $P_{WF_SAR_limit}$ for both the selected bands/channels. (2.4GHz and 5GHz)
 - Step 2: Establish radio link with AP in the selected band and enable TA-SAR.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
 - Step 4: Wi-Fi TX switches bands.
Initial 2.4GHz band connection: Configure pre-defined TX power sequence to DUT for 2.4GHz band and then DUT transmits packets for 400s.
Band switch to 5GHz band connection: Wi-Fi switches to the 5GHz band for 400s.
Dual band mode (DBDC) connection: Wi-Fi connects to 2.4GHz and 5GHz bands simultaneously for 400s.

- 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 10gSAR to determine time-averaged value versus time as follows.

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Instantaneous 1gSAR or 10gSAR versus time: $SAR_1(\tau)$ (band1), $SAR_2(\tau)$ (band2)

$$SAR_1(\tau) = \frac{conducted_inst_SAR_TX_power_1(\tau)}{P_{WF_SAR_limit_1}} \times WF_SAR_design_limit_1$$

$$SAR_2(\tau) = \frac{conducted_inst_SAR_TX_power_2(\tau)}{P_{WF_SAR_limit_2}} \times WF_SAR_design_limit_2$$

where $P_{WF_SAR_limit_1}$ and $P_{WF_SAR_limit_2}$ are measured from step 1, $WF_SAR_design_limit_1$ and $WF_SAR_design_limit_2$ are measured worst case SAR values at $P_{WF_SAR_limit_1}$ and $P_{WF_SAR_limit_2}$, respectively.

Time average SAR versus time: $Time_avg_SAR(t)$

$$Time_avg_SAR(t) = \frac{1}{T_{SAR}} \left[\frac{\int_{t-T_{SAR}}^t SAR_1(\tau) d\tau}{WF_SAR_REG_limit_1} + \frac{\int_{t-T_{SAR}}^t SAR_2(\tau) d\tau}{WF_SAR_REG_limit_2} \right]$$

- 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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5.4 Test Configuration and Procedure for Wi-Fi TA-SAR Test Scenario 3: Antenna Switching via Conducted Power Measurements

5.4.1 Configuration

Wi-Fi first selects an antenna to transmit packets then switches to another antenna within the same band. For any band supporting multiple TX antennas, select the one with the highest difference in $P_{WF_SAR_limit}$ among all supported antennas.

- Select the band having the highest measured 1gSAR at $P_{WF_SAR_limit}$ if multiple bands have the same $P_{WF_SAR_limit}$ among supported antennas.
- Antenna selection order
 - Select the configuration with two antennas having $P_{WF_SAR_limit}$ values less than $P_{WF_SAR_MAX}$.
 - If the previous configuration does not exist, select the configuration with one antenna having $P_{WF_SAR_limit}$ value less than $P_{WF_SAR_MAX}$.
 - If the above two cannot be found, select one configuration with the two antennas having the least difference between their $P_{WF_SAR_limit}$ and $P_{WF_SAR_MAX}$.

5.4.2 Procedure

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

- Steps 1~4: Measure and record TX power versus time for test scenario 3.
 - Step 1: Start $P_{WF_SAR_limit}$ calibration mode and measure $P_{WF_SAR_limit}$ for both the selected antennas.
 - Step 2: Establish radio link with AP in the selected band and enable TA-SAR.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
 - Step 4: Wi-Fi TX switches antennas.
Connect to one selected antenna: Configure pre-defined TX power sequence to DUT for selected band and selected antenna and then DUT transmits packets for 400s.
Switch to another antenna: Wi-Fi TX switches to another selected antenna and DUT transmits packets for 400s.
- Step 5: Convert the measured conducted TX power into SAR based on the formulas for scenario 1.
- 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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It is noted that the following operations are done as well for this scenario:

- The correct power control is realized by TA-SAR algorithm when antenna switches from one 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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5.5 Test Configuration and Procedure for Wi-Fi TA-SAR Test Scenario 4: Exposure Condition Index (ECI) Change via Conducted Power Measurements

5.5.1 Configuration

The scenario tests the time-averaged TX power is less than the predefined TX limit at all times when exposure condition index changes which means $P_{WF_SAR_limit}$ changes in the test. This scenario selects any one band having two different $P_{WF_SAR_limit}$ values less than $P_{WF_SAR_MAX}$ in the two ECI groups. One test is sufficient as the feature operation is independent of technology and band.

5.5.2 Procedure

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

- Steps 1~4: Measure and record TX power versus time for test scenario 4.
 - Step 1: Start $P_{WF_SAR_limit}$ calibration mode and measure $P_{WF_SAR_limit}$ for the selected band/channel.
 - Step 2: Establish radio link with AP in the selected band and enable TA-SAR.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
 - Step 4: Wi-Fi TX ECI changes.
Connect to selected band with initial $P_{WF_SAR_limit}$ in one ECI group index: Configure pre-defined TX power sequence to DUT for selected band and then DUT transmits packets for 400s.
Change $P_{WF_SAR_limit}$ value to another ECI group index: Set the command to change $P_{WF_SAR_limit}$ for 400s
- Step 5: Convert the measured conducted TX power into SAR based on the formulas for scenario 1.
- 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

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

- The correct power control is controlled by TA_SAR when ECI switches from one 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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5.6 Test Configuration and Procedure for Wi-Fi TA-SAR Test Scenario 5: Simultaneous SAR and PD via Conducted Power Measurements

5.6.1 Configuration

The scenario is to test TER (total exposure ratio) under 2.4GHz band and 6GHz band simultaneous transmission. Since Wi-Fi 6GHz band needs to obey both SAR and PD exposure limits, the maximum of normalized TA-SAR and normalized TA-PD in 6GHz band should be used in TER calculation. The proposed algorithms can ensure TA-SAR/TA-PD control correctness by demonstrating that TER is less than or equal to 1 (FCC requirement).

- Select one channel of Wi-Fi 2.4GHz band with measured $P_{WF_SAR_limit}$ less than $P_{WF_SAR_MAX}$ and select one channel of Wi-Fi 6GHz band with measured $P_{WF_SAR_limit}$ less than $P_{WF_SAR_MAX}$ and with measured $P_{WF_PD_limit}$ less than $P_{WF_PD_MAX}$.

5.6.2 Procedure

- Steps 1~4: Measure and record TX power versus time for test scenario 5.
 - Step 1: Start $P_{WF_SAR_limit}$ and $P_{WF_PD_limit}$ calibration mode, measure $P_{WF_SAR_limit}$ for the selected 2.4GHz band, and measure $P_{WF_SAR_limit}$ and $P_{WF_PD_limit}$ for the selected 6GHz band channel.
 - Step 2: Establish link with AP for the selected band and enable TA-SAR and TA-PD.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
 - Step 4: Wi-Fi transmits packets at 2.4GHz band and 6GHz band.
- Step 5: Convert the measured conducted TX power into SAR, PD and calculate TER

For TA-SAR of each 2.4GHz, 5GHz, or 6GHz band

$$SAR_{n,normalized} = \frac{SAR_{n,avg}}{SAR_{n,limit}} = \frac{\frac{1}{T_{SAR_n}} \int_{t-T_{SAR_n}}^t SAR_n(\tau) d\tau}{SAR_REG_limit_n}$$

For TA-PD of each band at 6GHz band

$$PD_{m,normalized} = \frac{PD_{m,avg}}{PD_{m,limit}} = \frac{\frac{1}{T_{APD_m}} \int_{t-T_{APD_m}}^t PD_m(\tau) d\tau}{PD_REG_limit_m}$$

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Instantaneous 1gSAR or 10gSAR versus time: $SAR(\tau)$, $PD(\tau)$

$$SAR(\tau) = \frac{conducted_inst_SAR_TX_power(\tau)}{P_{WF_SAR_limit}} \times WF_SAR_design_limit$$

$$PD(\tau) = \frac{conducted_inst_PD_TX_power(\tau)}{P_{WF_PD_limit}} \times WF_PD_design_limit$$

where $P_{WF_SAR_limit}$ is measured from step 1 and $WF_SAR_design_limit$ is measured worst case SAR value at $P_{WF_SAR_limit}$, $P_{WF_PD_limit}$ is measured from step 1 and $WF_PD_design_limit$ is measured worst case PD value at $P_{WF_PD_limit}$.

For simultaneous transmission, the sum of the normalized TA-SAR values in 2.4GHz and 5GHz bands together with the sum of the values of the maximum of normalized TA-SAR and normalized TA-PD in 6GHz band should meet TER requirement, as shown below.

$$TER = \sum_{n=1}^M \frac{SAR_{n,avg}}{SAR_{n,limit}} (2GHz/5GHz) + \sum_{m=M+1}^N \max \left[\frac{SAR_{m,avg}}{SAR_{m,limit}}, \frac{PD_{m,avg}}{PD_{m,limit}} \right] (6GHz) \leq 1$$

- 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/PD perspective plot containing
 1. Calculated normalized time-averaged 1gSAR or 10gSAR for 2.4GHz band
 2. Calculated maximum of normalized time-averaged SAR (1gSAR or 10gSAR) and normalized time-averaged PD for 6GHz band
 3. Total Exposure Ratio (TER)
 4. FCC TER limit of 1

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5.7 Test Configuration and Procedure for Wi-Fi TA-SAR Test Scenario 1: TX Mode Change between Normal Mode and Sleep Mode via SAR Measurements

5.7.1 Configuration

The test procedures in the previous sections (Sections 5.2 ~ 5.6) mainly focus on measuring conducted TX power, in this section test via SAR measurement is performed. The validation can be provided by performing one test scenario from the previous section.

In this test via SAR measurement, the test configuration of test scenario 1 in Section 5.2.1 is used.

5.7.2 Procedure

SAR is measured and recorded by the following steps:

- Steps 1~3: Measure and record TA-SAR versus time for test scenario 1.
 - Step 1: Start $meas_SAR_P_{WF_SAR_limit}$ calibration mode for the selected band/channel. Measure $meas_SAR$ at peak location of the area scan where $meas_SAR_P_{WF_SAR_limit}$ corresponds to this $meas_SAR$ value at $P_{WF_SAR_limit}$.
 - Step 2: Establish radio link with AP in the selected band and enable TA-SAR.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure instantaneous SAR versus time.
- Step 4: Convert the measured SAR into time-averaged SAR.

Convert the instantaneous measured SAR from step 3 into 1gSAR or 10gSAR value. Perform the running time average to 1gSAR or 10g SAR to determine the time-averaged value versus time by the following equations.

Instantaneous 1gSAR or 10g SAR versus time: $SAR(\tau)$

$$SAR(\tau) = \frac{meas_SAR(\tau)}{meas_SAR_P_{WF_SAR_limit}} \times WF_SAR_design_limit$$

where $meas_SAR_P_{WF_SAR_limit}$ is measured from step 1, $meas_SAR(t)$ is the instantaneous SAR measured in step 3, and $WF_SAR_design_limit$ is the measured worse-case SAR value at $P_{WF_SAR_limit}$.

$$Time_avg_SAR(t) = \frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t SAR(\tau) d\tau$$

- Step 5: Plot results
 - A. Calculated time-averaged 1gSAR or 10g SAR
 - B. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)

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6 WI-FI TA-PD TEST SCENARIOS AND TEST PROCEDURES

In order to demonstrate that TA-PD algorithm performs as expected under various operating scenarios, Table 6-1 lists the test scenarios and test sequences to validate TA-PD algorithm. The details of test procedures via conducted power and PD measurements are described in section 6.2 and 6.3

Table 6-1 Test scenario and test sequence list for Wi-Fi TA-PD validation

Test scenario		Test sequence	Description	Device requirement
1	TX mode change between normal mode and sleep mode	Defined in Section 6.1	Test normal mode and sleep mode switch	Supports 6GHz band

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6.1 Wi-Fi TA-PD Test Sequences

The test sequence is predefined for Wi-Fi TA-PD:

- **Wi-Fi TA-PD test sequence:** Wi-Fi TX is requested to transmit static and maximum power with high duty.

The test sequence is illustrated in Figure 6-1. The waveform of the test sequence is listed in Table 6-2.

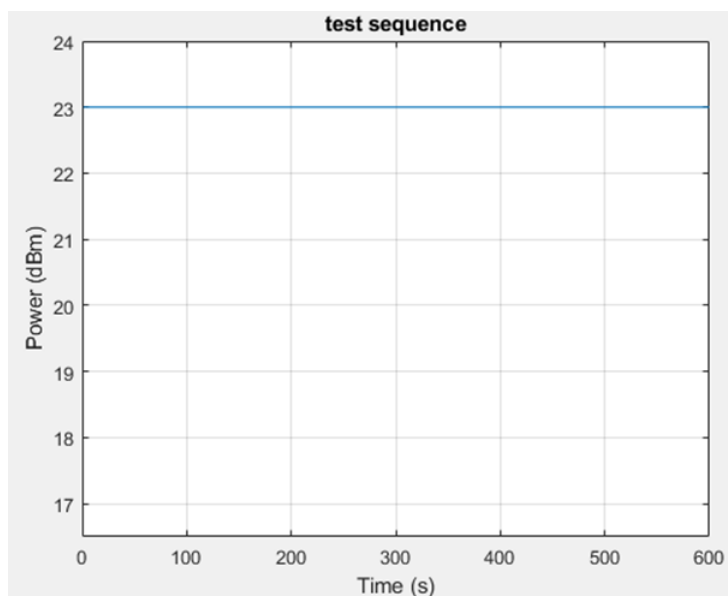


Figure 6-1 Wi-Fi TA-PD test sequence

Table 6-2 Wi-Fi TA-PD test sequence

Time (s)	Duration (s)	Power (dBm)	Note
0	600	23	Wi-Fi TX maximum power (P_WF_PD_MAX)

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6.2 Test Configuration and Procedure for Wi-Fi TA-PD Test Scenario 1: TX Mode Change between Normal Mode and Sleep Mode via Conducted Power Measurements

6.2.1 Configuration

The scenario tests Wi-Fi TX mode switching from normal throughput mode to sleep mode. Since Mediatek's TA-PD feature operation is independent of bands and channels, selecting one band is sufficient to validate this feature. The criteria for band selection are based on the $P_{WF_PD_limit}$ values (corresponding to $WF_PD_design_limit$) and are described as below:

- Select one band with least $P_{WF_PD_limit}$ among the ones whose $P_{WF_PD_limit}$ values are below $P_{WF_PD_MAX}$.
 - Only one band needs to be tested if all the bands have same $P_{WF_PD_limit}$.
 - Only one band needs to be tested if only one band has $P_{WF_PD_limit}$ below $P_{WF_PD_MAX}$.
 - If the same least $P_{WF_PD_limit}$ applies to multiple bands, select the band with the highest measured PD at $P_{WF_PD_limit}$.
 - If $P_{WF_PD_limit}$ values of all bands are over $P_{WF_PD_MAX}$, there is no need to test these bands.

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6.2.2 Procedure

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

- Steps 1~4: Measure and record TX power versus time for test scenario 1.
 - Step 1: Start $P_{WF_PD_limit}$ calibration mode and measure $P_{WF_PD_limit}$ for the selected band.
 - Step 2: Establish radio link with AP in the selected band and enable TA-PD.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
 - Step 4: Wi-Fi TX switches modes.

Initial Wi-Fi normal mode: Configure pre-defined TX power sequence to DUT for selected band and then DUT transmits packets after 400s.

Switch to Wi-Fi sleep mode: Wi-Fi switches to sleep mode about 10s and no packets are transmitted.

Wi-Fi wakes up to normal mode: Wi-Fi wakes up from sleep mode and DUT re-transmits packets for at least the specified time duration.
- Step 5: Convert the measured conducted TX power into PD.

Convert the measured conducted TX power from Step 4 into spatial-averaged PD value using the following equation. Perform the running time average to power and spatial-averaged PD value to determine time-averaged value versus time as follows.

Instantaneous PD versus time: $PD(\tau)$

$$PD(\tau) = \frac{\text{conducted_inst_PD_TX_power}(\tau)}{P_{WF_PD_limit}} \times WF_PD_design_limit$$

where $P_{WF_PD_limit}$ is measured from step 1 and $WF_PD_design_limit$ is measured worst case PD value at $P_{WF_PD_limit}$.

Time average PD versus time: $Time_avg_PD(t)$

$$Time_avg_PD(t) = \frac{1}{T_{PD}} \int_{t-T_{PD}}^t PD(\tau) d\tau$$

- 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 PD
 2. FCC limit of $10W/m^2$ (PD)

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6.3 Test Configuration and Procedure for Wi-Fi TA-PD Test Scenario 1: TX Mode Change between Normal Mode and Sleep Mode via PD Measurements

6.3.1 Configuration

The test procedure in the previous section (Section 6.2) mainly focuses on measuring conducted TX power, in this section test via PD measurement is performed. The validation can be provided by performing test scenario 1.

6.3.2 Procedure

PD is measured and recorded by the following steps:

- Steps 1~3: Measure and record TA-PD versus time for test scenario 1.
 - Step 1: Start $meas_PD_P_{WF_PD_limit}$ calibration mode for the selected band/channel. Measure $meas_PD$ at peak location of the area scan and the $meas_PD_P_{WF_PD_limit}$ corresponds to this $meas_PD$ value at $P_{WF_PD_limit}$.
 - Step 2: Establish radio link with AP in the selected band and enable TA-PD.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure PD versus time.
- Step 4: Convert the measured PD into time-averaged PD.

Convert the instantaneous measured PD from step 3 into spatial-averaged PD value. Perform the running time average to spatial-averaged PD value to determine. time-averaged value versus time by following equations.

Instantaneous PD versus time: $PD(\tau)$

$$PD(\tau) = \frac{meas_PD(\tau)}{meas_PD_P_{WF_PD_limit}} \times WF_PD_design_limit$$

where $meas_SAR_P_{WF_PD_limit}$ is measured from step 1, $meas_PD(\tau)$ is the instantaneous measured PD measured in step 3, and $WF_PD_design_limit$ is the measured worse-case PD value at $P_{WF_PD_limit}$.

$$Time_avg_PD(\tau) = \frac{1}{T_{PD}} \int_{t-T_{PD}}^t PD(\tau) d\tau$$

- Step 5: Plot results
 - A. Calculated time-averaged PD
 - B. FCC limit of $10W/m^2$ (PD)

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7 BT TA-SAR TEST SCENARIOS AND TEST PROCEDURES

In order to demonstrate that BT TA-SAR algorithm performs as expected under various operating scenarios, Table 7-1 lists the test scenarios and test sequences to validate TA-SAR algorithm. The test sequences are defined in Section 7.1. The details of test procedures via conducted power and SAR measurements are described in Section 7.2 and Section 7.3.

Table 7-1 Test scenario and test sequence list for BT TA-SAR validation

Test scenario		Test sequence	Description
1	TX with varying duty	Defined in Section 6.1	BT TX transmits maximum power with varying duty

7.1 BT TA-SAR Test Sequences

The test sequence is predefined for BT TA-SAR:

- **BT TA-SAR test sequence:** BT TX is requested to transmit static and maximum power with varying duty cycles.

The maximum power of the test sequence is listed in Table 7-2. The duty cycles of the test sequence are illustrated in Figure 7-1, while the power of the test sequence under maximum power with the given varying duty cycles is illustrated in Figure 7-2.

Table 7-2 Test sequence

Start Time (s)	Duration (s)	Power (dBm)	Note
0	1000	18	BT TX maximum power (P_BT_SAR_MAX)

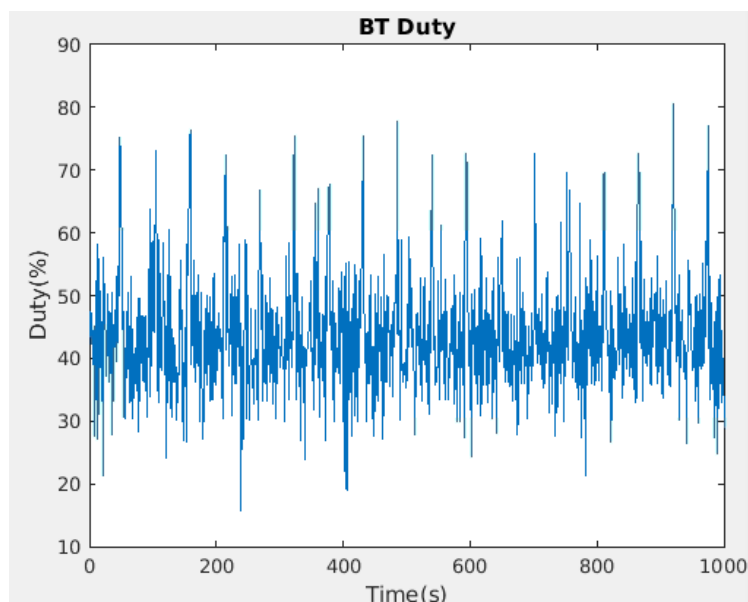


Figure 7-1 The duty cycles of BT TA-SAR test sequence

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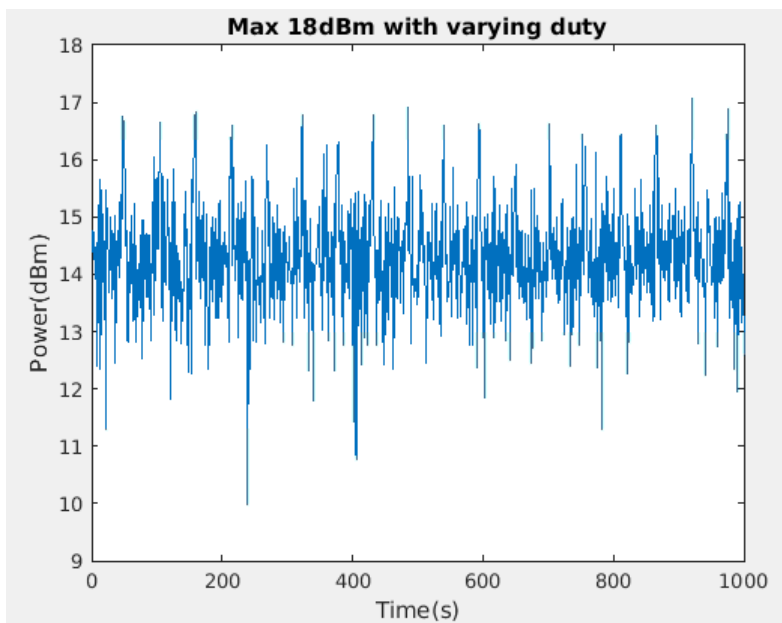


Figure 7-2 The actual power of BT TA-SAR test sequence corresponding to max power with varying duty cycles shown in Figure 7-1

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7.2 Test Configuration and Procedure for BT TA-SAR Test Scenario 1: TX with Varying Duty via Conducted Power Measurements

7.2.1 Configuration

The scenario tests BT TX with varying duty at 2.4GHz band. For the varying BT duty defined in the test sequence, select the $P_{BT_SAR_limit}$ value which is lower than the average BT TX power ($P_{BT_SAR_MAX}$ with duty pattern) of the test sequence. If the $P_{BT_SAR_limit}$ value is larger than the average BT TX power of the test sequence, a scaling ratio which is less than 1 can be defined and used to scale down the $P_{BT_SAR_limit}$ to test BT TA-SAR algorithm.

7.2.2 Procedure

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

- Steps 1~3: Measure and record TX power versus time for test scenario 1.
 - Step 1: Start $P_{BT_SAR_limit}$ calibration mode and measure $P_{BT_SAR_limit}$ for the selected band.
 - Step 2: Establish radio link with AP in the selected band and enable TA-SAR.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
- 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.

Instantaneous 1gSAR or 10gSAR versus time: $SAR(\tau)$

$$SAR(\tau) = \frac{\text{conducted_inst_SAR_TX_power}(\tau)}{P_{BT_SAR_limit}} \times BT_SAR_design_limit$$

where $P_{BT_SAR_limit}$ is measured from step 1 and SAR_design_limit is measured worst case SAR value at $P_{BT_SAR_limit}$.

Time average SAR versus time: $Time_avg_SAR(t)$

$$Time_avg_SAR(t) = \frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t SAR(\tau) d\tau$$

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- Step 5: Plot results
 - A. Make one power perspective plot containing
 1. Instantaneous TX power
 2. Requested power (test sequence)
 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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7.3 Test Configuration and Procedure for BT TA-SAR Test Scenario 1: TX with Varying Duty via SAR Measurements

7.3.1 Configuration

The test procedure in the previous section (Section 7.2) mainly focuses on measuring conducted TX power, in this section test via SAR measurements is performed. The validation can be provided by performing test scenario 1.

7.3.2 Procedure

SAR is measured and recorded by the following steps:

- Steps 1~3: Measure and record TA-SAR versus time for test scenario 1.
 - Step 1: Start $meas_SAR_P_{BT_SAR_limit}$ calibration mode for the selected band/channel. Measure $meas_SAR$ at peak location of the area scan where $meas_SAR_P_{BT_SAR_limit}$ corresponds to this $meas_SAR$ value at $P_{BT_SAR_limit}$.
 - Step 2: Establish radio link with AP in the selected band and enable TA-SAR.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure instantaneous SAR versus time.
- Step 4: Convert the measured SAR into time-averaged SAR.

Convert the instantaneous measured SAR from step 3 into 1gSAR or 10gSAR value. Perform the running time average to 1gSAR or 10g SAR to determine the time-averaged value versus time by the following equations.

Instantaneous 1gSAR or 10gSAR versus time: $SAR(\tau)$

$$SAR(\tau) = \frac{meas_SAR(\tau)}{meas_SAR_P_{BT_SAR_limit}} \times BT_SAR_design_limit$$

where $meas_SAR_P_{BT_SAR_limit}$ is measured from step1, $meas_SAR(\tau)$ is the instantaneous measured SAR measured in step 3, and $BT_SAR_design_limit$ is measured worse-case SAR value at $P_{BT_SAR_limit}$.

$$Time_avg_SAR(t) = \frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t SAR(\tau) d\tau$$

- Step 5: Plot results
 - A. Calculated time-averaged 1gSAR or 10gSAR
 - B. FCC limit of 1.6 W/kg (1gSAR) or 4.0 W/kg (10gSAR)

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8 BT TA-PD TEST SCENARIOS AND TEST PROCEDURES

MediaTek's chip may support 6GHz band BT transmission. In order to demonstrate that BT TA-PD algorithm performs as expected under various operating scenarios, Table 8-1 lists the test scenarios and test sequences to validate TA-PD algorithm. The test sequences are defined in Section 8.1. The details of test procedures via conducted power and PD measurements are described in Section 8.2 and Section 8.3.

Table 8-1 Test scenario and test sequence list for BT TA-PD validation

Test scenario		Test sequence	Description
1	TX with varying duty	Defined in Section 7.1	BT TX transmits maximum power with varying duty

8.1 BT TA-PD Test Sequences

The test sequence is predefined for BT TA-PD:

- **BT TA-PD test sequence:** BT TX is requested to transmit static and maximum power with varying duty.

The maximum power of the test sequence is listed in Table 8-2. The duty cycles of the test sequence are illustrated in Figure 8-1, while the power of the test sequence under maximum power with the given varying duty cycles is illustrated in Figure 8-2.

Table 8-2 BT TA-PD test sequence

Start Time (s)	Duration (s)	Power (dBm)	Note
0	1000	18	BT TX maximum power (P _{BT PD MAX})

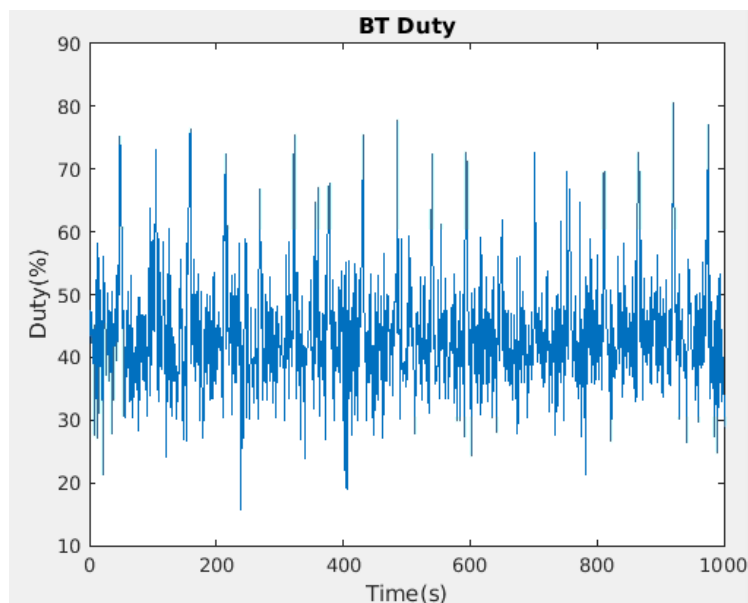


Figure 8-1 The duty cycles of BT TA-PD test sequence

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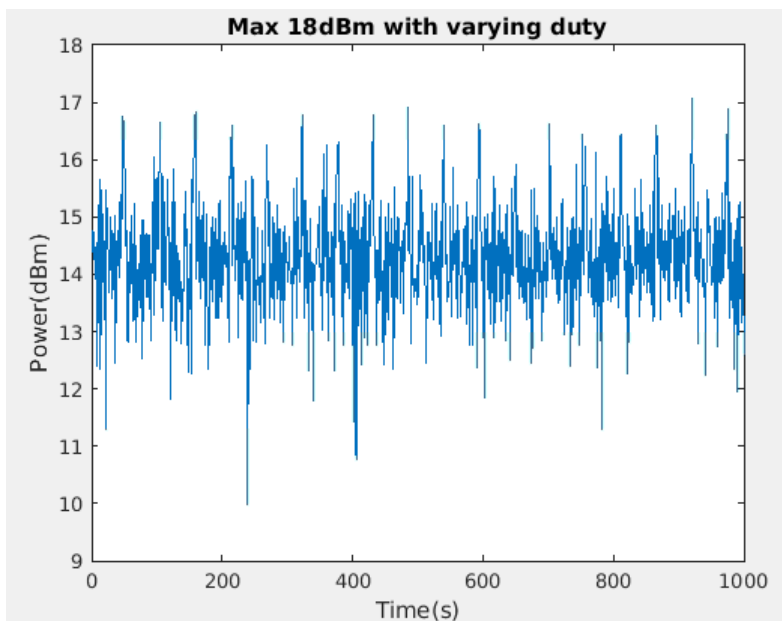


Figure 8-2 The actual power of BT TA-PD test sequence corresponding to max power with varying duty cycles shown in Figure 8-1

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8.2 Test Configuration and Procedure for BT TA-PD Test Scenario 1: TX with Varying Duty via Conducted Power Measurements

8.2.1 Configuration

The scenario tests BT TX with varying duty at 6GHz band. For the varying BT duty defined in the test sequence, select the $P_{BT_PD_limit}$ value which is lower than the average BT TX power ($P_{BT_PD_MAX}$ with duty pattern) of the test sequence. If the $P_{BT_PD_limit}$ value is larger than the average BT TX power of the test sequence, a scaling ratio which is less than 1 can be defined and used to scale down the $P_{BT_PD_limit}$ to test BT TA-PD algorithm.

8.2.2 Procedure

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

- Steps 1~3: Measure and record TX power versus time for test scenario 1.
 - Step 1: Start $P_{BT_PD_limit}$ calibration mode and measure $P_{BT_PD_limit}$ for the selected band.
 - Step 2: Establish radio link with AP in the selected band and enable TA-PD.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure TX power versus time.
- Step 4: Convert the measured conducted TX power into PD.

Convert the measured conducted TX power from Step 4 into spatial-averaged PD value using the following equation. Perform the running time average to power and spatial-averaged PD value to determine time- averaged value versus time as follows.

Instantaneous PD versus time: $PD(\tau)$

$$PD(\tau) = \frac{\text{conducted_inst_PD_TX_power}(\tau)}{P_{BT_PD_limit}} \times BT_PD_design_limit$$

where $P_{BT_PD_limit}$ is measured from step 1 and $BT_PD_design_limit$ is measured worst case PD value at $P_{BT_PD_limit}$.

Time average PD versus time: $Time_avg_PD(t)$

$$Time_avg_PD(t) = \frac{1}{T_{PD}} \int_{t-T_{PD}}^t PD(\tau) d\tau$$

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- 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
 - 3. Calculated time-averaged PD
 - 4. FCC limit of $10\text{W}/\text{m}^2$ (PD)

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8.3 Test Configuration and Procedure for BT TA-PD Test Scenario 1: TX with Varying Duty via PD Measurements

8.3.1 Configuration

The test procedure in the previous section (Section 8.2) mainly focuses on measuring conducted TX power, in this section test via PD measurement is performed. The validation can be provided by performing test scenario 1.

8.3.2 Procedure

PD is measured and recorded by the following steps:

- Steps 1~3: measure and record TA-PD versus time for test scenario 1.
 - Step 1: Start meas_PD_P_{BT_PD_limit} calibration mode for the selected band/channel. Measure meas_PD at peak location of the area scan and the meas_PD_P_{BT_PD_limit} corresponds to this meas_PD value at P_{BT_PD_limit}.
 - Step 2: Establish radio link with AP in the selected band and enable TA-PD.
 - Step 3: Configure pre-defined TX power sequence to DUT and measure instantaneous PD versus time.
- Step 4: Convert the measured PD into time-averaged PD.

Convert the instantaneous measured PD from step 3 into spatial-averaged PD value. Perform the running time average to spatial-averaged PD value to determine time-averaged value versus time by following equations.

Instantaneous PD versus time: $PD(\tau)$

$$PD(\tau) = \frac{meas_PD(\tau)}{meas_PD_P_{BT_PD_limit}} \times BT_PD_design_limit$$

where meas_SAR_P_{BT_PD_limit} is measured from step 1, meas_PD(τ) is the instantaneous measured PD measured in step 3, and BT_PD_design_limit is the measured worse-case PD value at P_{BT_PD_limit}.

$$Time_avg_PD(\tau) = \frac{1}{T_{PD}} \int_{t-T_{PD}}^t PD(\tau) d\tau$$

- Step 5: Plot results
 - A. Calculated time-averaged PD
 - B. FCC limit of 10W/m² (PD)

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9 WI-FI AND BT SIMULTANEOUS TRANSMISSION TA-SAR TEST SCENARIOS AND TEST PROCEDURES

In order to demonstrate that Wi-Fi and BT simultaneous transmission TA-SAR algorithms perform as expected under various operating scenarios, Table 9-1 lists the test scenarios and test sequences to validate Wi-Fi and BT simultaneous transmission TA-SAR algorithms.

The purpose of system level Wi-Fi and BT simultaneous transmission is to demonstrate the compliance continuity in the following scenarios:

1. Across Wi-Fi and BT technology switch
2. Total exposure ratio of Wi-Fi and BT simultaneous transmission

Table 9-1 Test scenario and test sequence list for Wi-Fi and BT simultaneous transmission TA-SAR validation

Test scenario		Test sequence	Description
1	Wi-Fi and BT Simultaneous TX	Wi-Fi test sequence 1 defined in Section 5.1 and BT test sequence 1 defined in Section 7.1	Wi-Fi and BT both transmit under max power requests

9.1 Wi-Fi and BT simultaneous transmission TA-SAR Test Sequences

To validate Wi-Fi and BT simultaneous transmission TA-SAR algorithms, both Wi-Fi test sequence 1 defined in Section 5.1 and BT test sequence 1 defined in Section 7.1 are used.

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9.2 Test Configuration and Procedure for Wi-Fi and BT Simultaneous Transmission

Test Scenario 1: Wi-Fi and BT Simultaneous TX via Conducted Power Measurements

9.2.1 Configuration

The test flow of the system level compliance test is shown in figure 9-1. The test contains 4 sections and 3 transitions: Start with Wi-Fi and BT simultaneous transmission (Section A), drop off BT radio and transition to Wi-Fi only transmission (Section B), then transition to Wi-Fi and BT simultaneous transmission (Section C), and finally transition to BT only transmission (Section D).



Figure 9-1 Wi-Fi and BT simultaneous transmission scenario

The configuration contains both Wi-Fi configuration and BT configuration.

- For Wi-Fi, select one channel of Wi-Fi 2.4GHz/5GHz band with measured $P_{WF_SAR_limit}$ less than $P_{WF_SAR_MAX}$. Pre-allocate a TER budget x , to obtain the Wi-Fi budgeted limit $x \cdot P_{WF_SAR_limit}$.
- For BT, select one channel of BT 2.4GHz/5GHz band with measured $P_{BT_SAR_limit}$ value lower than the average BT TX power ($P_{BT_SAR_MAX}$ with duty pattern) of the test sequence. Pre-allocate a TER budget y , to obtain the BT budgeted limit $y \cdot P_{BT_SAR_limit}$.
- The dynamic exposure budget allocation mechanism assigns different budgets for Wi-Fi and BT based on each radio power and duty requirement, which means x and y are varying over time.
- The constraint on the TER budgets is $x + y \leq 1$.

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9.2.2 Procedure

For Wi-Fi and BT, TX power is measured, recorded, and processed by the following steps:

- Steps 1~4: Measure and record TX power versus time.
 - Step 1: Start $P_{WF_SAR_limit}$ and $P_{WF_BT_limit}$ calibration mode, measure $P_{WF_SAR_limit}$ and $P_{WF_BT_limit}$ for the selected band.
 - Step 2: Establish link with AP for the selected band and enable TA-SAR and TA-BT.
 - Step 3: Configure pre-defined TX power sequences of Wi-Fi and BT to DUT and measure TX power versus time.
 - Step 4: Set DUT to the Wi-Fi and BT test scenario as depicted in Figure 9-1.
 - ◆ Section A: Connect with Wi-Fi and BT to have simultaneous transmission. Request Wi-Fi and BT to transmit at maximum power and maximum duty for at least 200s.
 - ◆ Section B: Drop BT connection and request Wi-Fi only to transmit at maximum power and maximum duty for at least 100s.
 - ◆ Section C: Request Wi-Fi and BT to transmit at maximum power and maximum duty for at least 200s.
 - ◆ Section D: Drop Wi-Fi connection and request BT only to transmit at maximum power and maximum duty.
- Step 5: Convert the measured Wi-Fi conducted TX power into SAR based on the formulas for Wi-Fi test scenario 1 and convert the measured BT conducted TX power into SAR based on the formulas for BT test scenario 1.
- Step 6: Plot results
 - A. Make one power perspective plot containing
 1. Wi-Fi instantaneous TX power
 2. Wi-Fi calculated time-averaged power
 3. Wi-Fi budgeted power limit $x \cdot P_{WF_SAR_limit}$
 - B. Make one BT power perspective plot containing
 1. BT instantaneous TX power
 2. BT calculated time-averaged power
 3. BT budgeted power limit $y \cdot P_{BT_SAR_limit}$
 - C. Make one SAR perspective plot containing
 1. Normalized Wi-Fi 1g SAR or 10g SAR
 2. Normalized BT 1g SAR or 10g SAR
 3. Normalized total time-averaged 1g SAR or 10g SAR over time
 4. Normalized FCC limit of 1.6 W/kg (1g SAR) or 4.0 W/kg (10g SAR)

The validation criteria are

1. At all times, Wi-Fi time-averaged power is below $x \cdot P_{WF_SAR_limit}$ and BT time-averaged power is below $y \cdot P_{BT_SAR_limit}$; or
2. At all times, the time-averaged total 1g SAR or 10g SAR versus time shall not exceed FCC limit of 1.6 W/kg for 1g SAR or 4.0 W/kg for 10g SAR.

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10 WI-FI TA-SAR VALIDATION VIA CONDUCTED POWER MEASUREMENTS

For conducted power measurements, TA-SAR algorithm is implemented in firmware in a phone and a notebook. The exact measurement setup diagrams for Android DUT and Windows DUT are shown in Section 10.1.

10.1 Measurement Setup

The general measurement setup for Android DUT is shown in Figure 10-1. There is a control PC which controls DUT and peer devices that act as soft-AP or STA. The WLAN traffic is established between peer devices and DUT, e.g., an engineering model of smart phone. The traffic from DUT TX is UDP and controlled by control PC. For Windows DUT, the general measurement setup is shown in Figure 10-2. Different from Android DUT, the TA-SAR control program is executed in Windows DUT.

The test sequence and scenarios are controlled by PC command. The transmitter power is measured with spectrum analyzers. There are two peer devices and two spectrum analyzers to support test scenarios with multiple operation frequencies. Furthermore, the moving average of each measured power is calculated to ensure the conductive time-averaging power is always below the power limit threshold.

The test measurement setup for test scenarios 1 and 4 is illustrated in Figure 10-3 and Figure 10-4. The test measurement setup for test scenarios 2 and 5 is illustrated in Figure 10-5 and Figure 10-6. The test measurement setup for test scenario 3 is illustrated in Figure 10-7 and Figure 10-8. Note that for test scenario 3, an RF attenuator is added to the conductive path to provide proper attenuation from DUT to AP and DUT to spectrum analyzer.

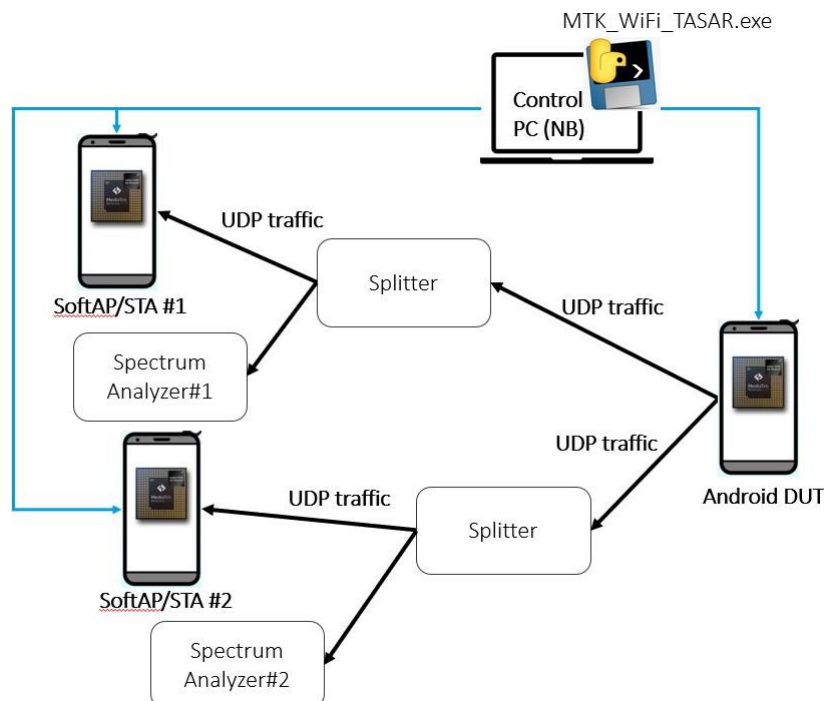


Figure 10-1 General setup for Wi-Fi TA-SAR conducted power measurement for Android DUT

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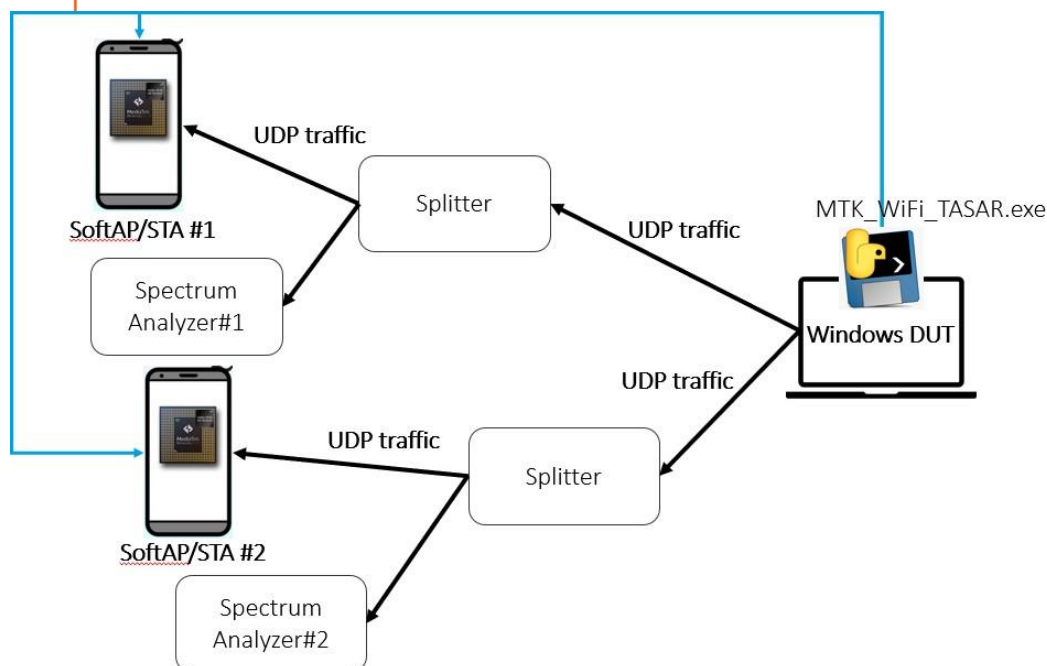


Figure 10-2 General setup for Wi-Fi TA-SAR conducted power measurement for Windows DUT

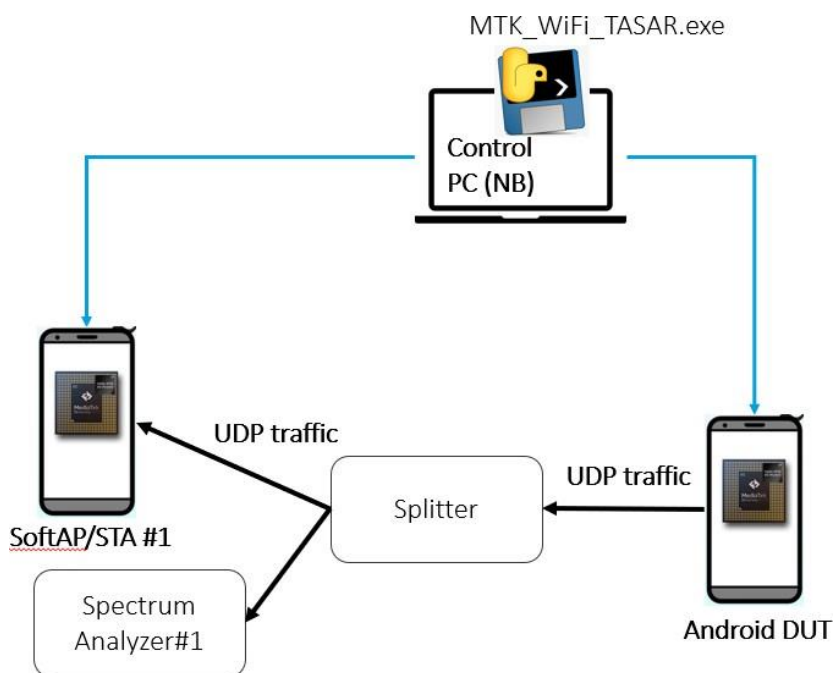


Figure 10-3 Wi-Fi TA-SAR conducted power test setup for test scenarios 1 and 4 with Windows DUT

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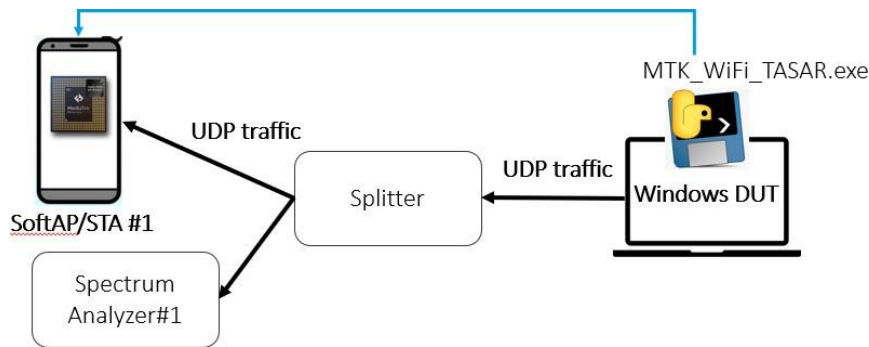


Figure 10-4 Wi-Fi TA-SAR conducted power test setup for test scenarios 1 and 4 with Windows DUT

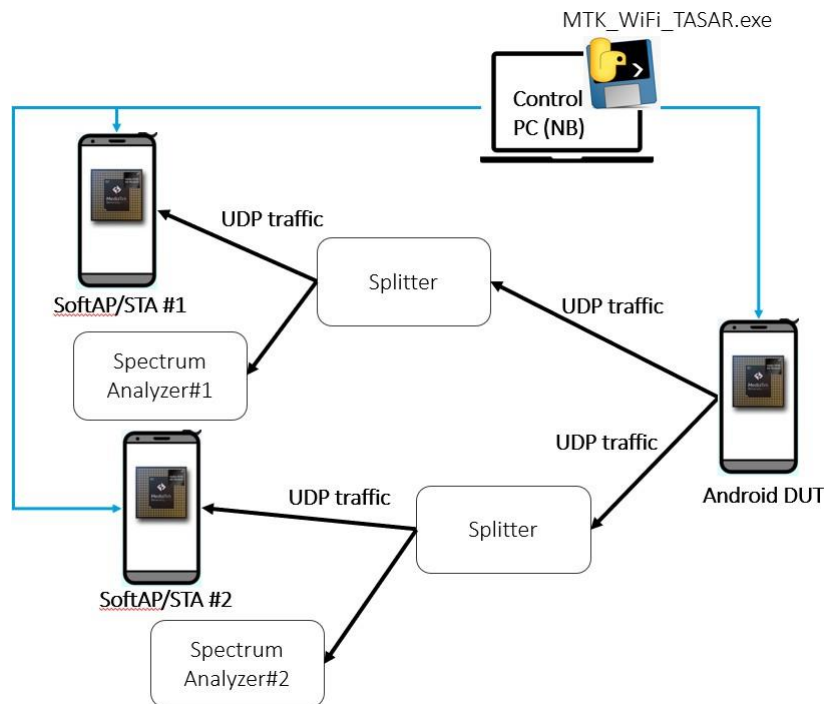


Figure 10-5 Wi-Fi TA-SAR conducted power test setup for test scenarios 2 and 5 with Android DUT

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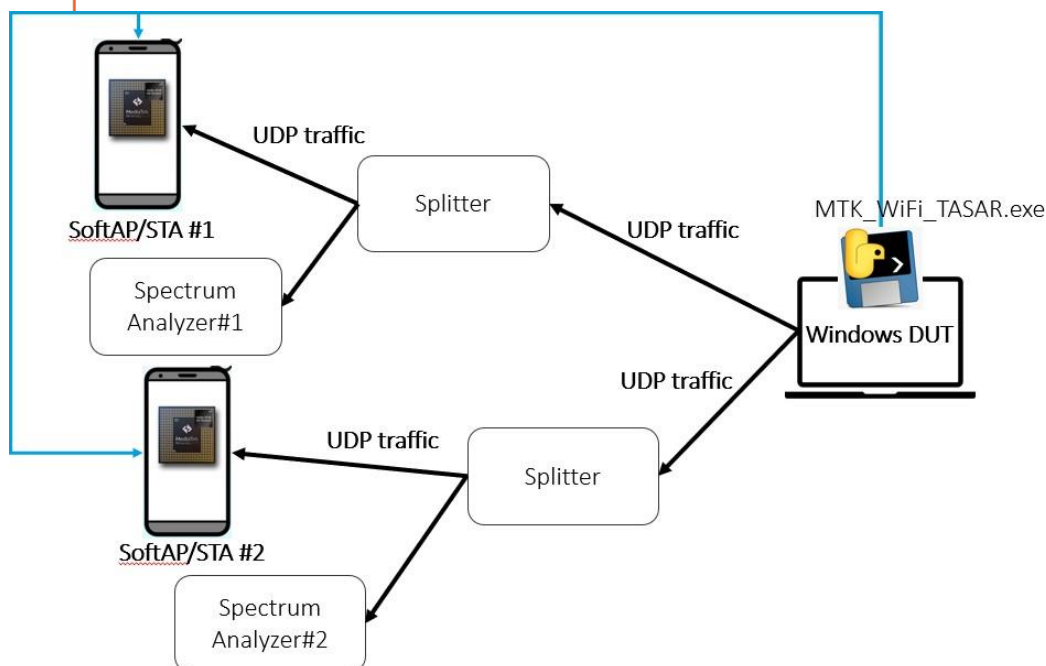


Figure 10-6 Wi-Fi TA-SAR conducted power test setup for test scenarios 2 and 5 with Windows DUT

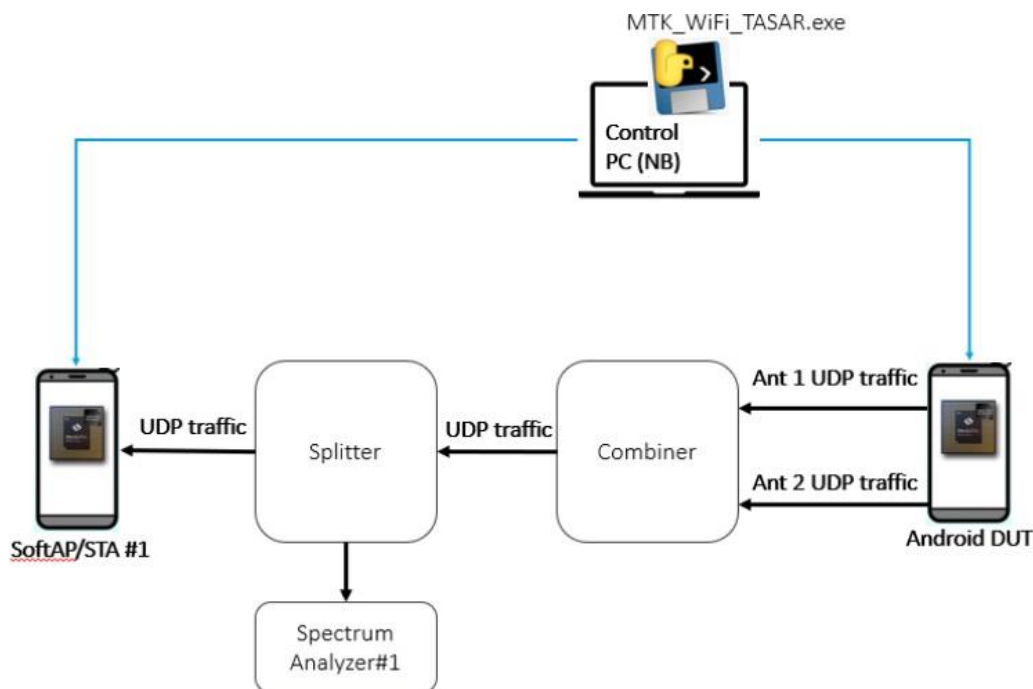


Figure 10-7 Wi-Fi TA-SAR conducted power test setup for test scenario 3 with Android DUT

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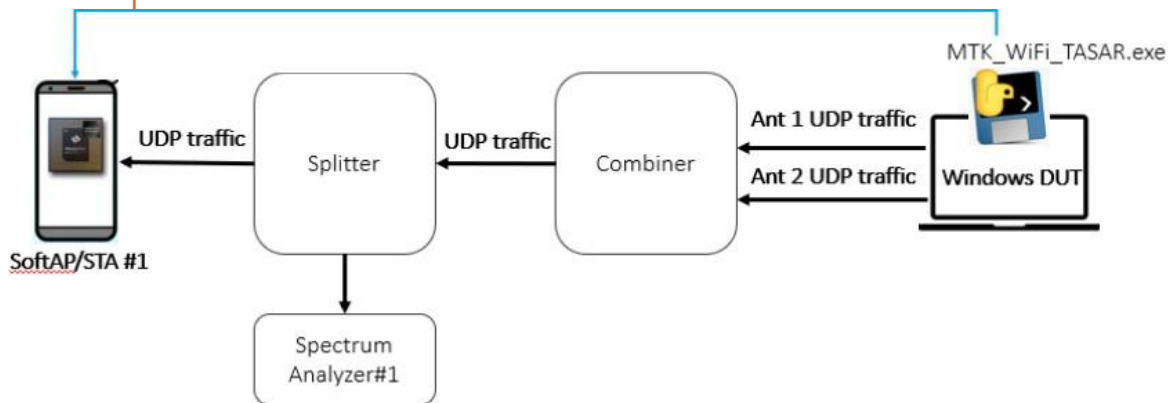


Figure 10-8 Wi-Fi TA-SAR conducted power test setup for test scenario 3 with Windows DUT

Spectral analyzer utilizing zero-span mode is used for monitoring the time-domain conductive power of the DUT. This spectral analyzer may be replaced by a power probe or other time-domain power logging instrument as well. The detailed setup of the spectral analyzer is shown as follow:

Center frequency: = WLAN channel frequency
 Span: Zero span
 RBW: Spectral analyzer's maximum capability (8MHz for Keysight PXA N9030A)
 VBW: =RBW
 Sweep Time: 1400s
 Sweep Point: =10 times of sweep time + 1 = 14001
 Detector mode: RMS
 Trace mode: Single hold (clear write)

Since the WLAN data bandwidth (ex. 20MHz) is larger than the max resolution bandwidth of spectral analyzer, a power correlation method is essential to determine the actual conductive channel power (per data bandwidth occupied) from the readout of the spectral analyzer (in terms of power density dBm/RBW).

The correlation term that accounts for the conductive power to spectral analyzer readout and RF cable loss is obtained with the following steps:

1. Setup the TA-SAR conductive measurement as shown in Figure 10-1 to Figure 10-4.
2. Configure DUT to MTK engineering mode and set DUT to continuous packet TX mode (duty cycle $\geq 98\%$) with TX information such as WLAN channel, rate, and TX power.
3. Determine the power correlation term as

$$Corr. = DUT\ TX\ power - measured\ power\ of\ the\ spectral\ analyzer$$

The readout of the spectral analyzer is thus correlated to the actual conductive channel power at the DUT output port by arithmetically adding *Corr.* to the raw data in mW domain.

In control PC, an executable file named MTK_WiFi_TASAR.exe controls the test of TA-SAR/TA-PD according to different test scenarios. It controls the connections between DUT and peer devices, controls test sequence according to the selected test scenario, starts the UDP traffic

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from DUT, and pulls the logs from DUT.

Logs	2022/7/18 上午 12:28
_bz2.pyd	2022/6/4 下午 11:39
_decimal.pyd	2022/6/4 下午 11:39
_hashlib.pyd	2022/6/4 下午 11:39
_lzma.pyd	2022/6/4 下午 11:39
_socket.pyd	2022/6/4 下午 11:39
base_library.zip	2022/7/18 上午 12:28
libcrypto-1_1.dll	2022/6/4 下午 11:39
MTK_WiFi_TASAR.exe	2022/7/18 上午 12:28
python310.dll	2022/6/4 下午 11:39
select.pyd	2022/6/4 下午 11:39
unicodedata.pyd	2022/6/4 下午 11:39
VCRUNTIME140.dll	2022/6/4 下午 11:39

Figure 10-9 Control scripts executed in control PC

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10.2 Conducted Power Measurement Results for Wi-Fi TA-SAR Test Scenario 1: TX Mode Change between Normal Mode and Sleep Mode

This test is the conducted power measurement for Wi-Fi 2.4GHz band TX mode change. The detailed setting is listed in Table 10-1. Figure 10-10 demonstrates the DUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit for test scenario 1-1.

Table 10-1 TA-SAR parameters setting for test scenario 1-1

Test band	$P_{WF_SAR_MAX}$	$P_{WF_SAR_limit}$
2.4GHz	19.00 dBm	14.00 dBm

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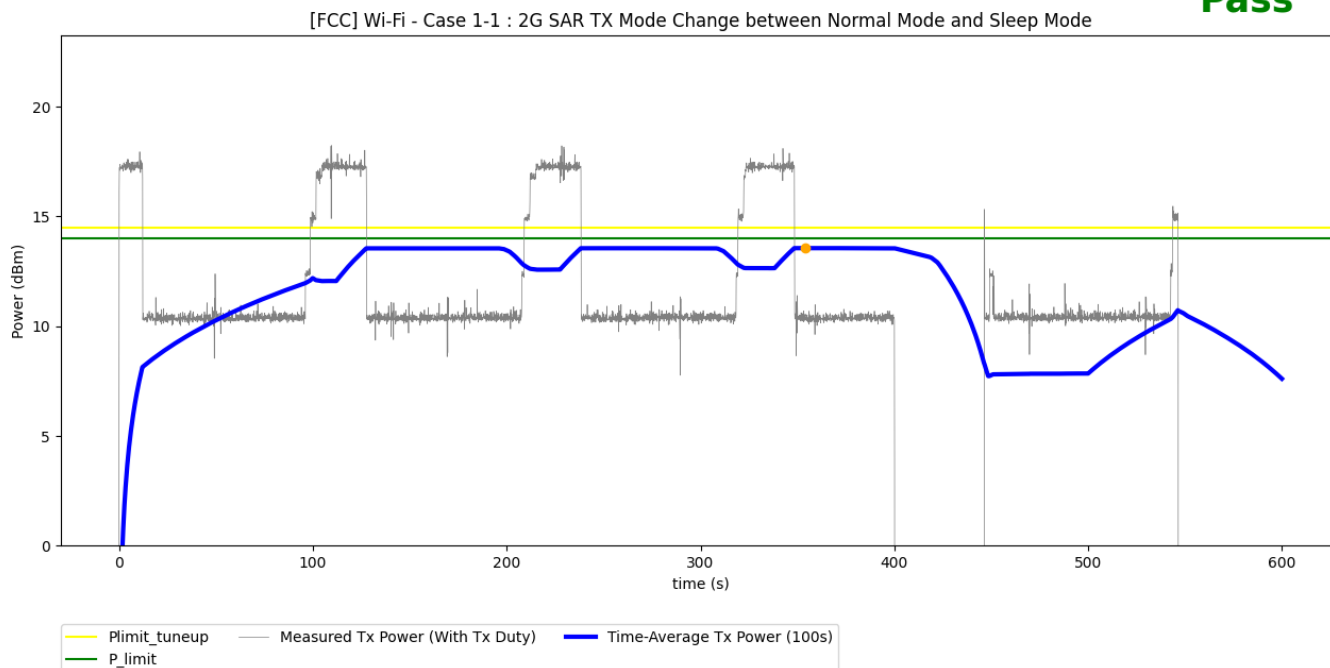
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**Figure 10-10 Time-averaged conducted TX power over time for Wi-Fi TA-SAR test scenario 1-1**

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10.3 Conducted Power Measurement Results for Wi-Fi TA-SAR Test Scenario 2: Band Handover

This test is the conducted power measurement for Wi-Fi 2.4GHz/5GHz band handover. The detailed setting is listed in Table 10-2. Figure 10-10 demonstrates the DUT's instantaneous conducted TX power, the time- averaged conducted TX power behavior over time, and the power limit. Figure 10-11 illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in Section 5.3.2. As seen in this figure, the normalized time-averaged SAR does not exceed the FCC limit.

Table 10-2 TA-SAR parameters setting for test scenario 2

Test band	Switch time	$P_{WF_SAR_MAX}$	$P_{WF_SAR_limit}$
2.4GHz	0~400s	19.00 dBm	14.00 dBm
5GHz	400s~800s	19.00 dBm	14.50 dBm

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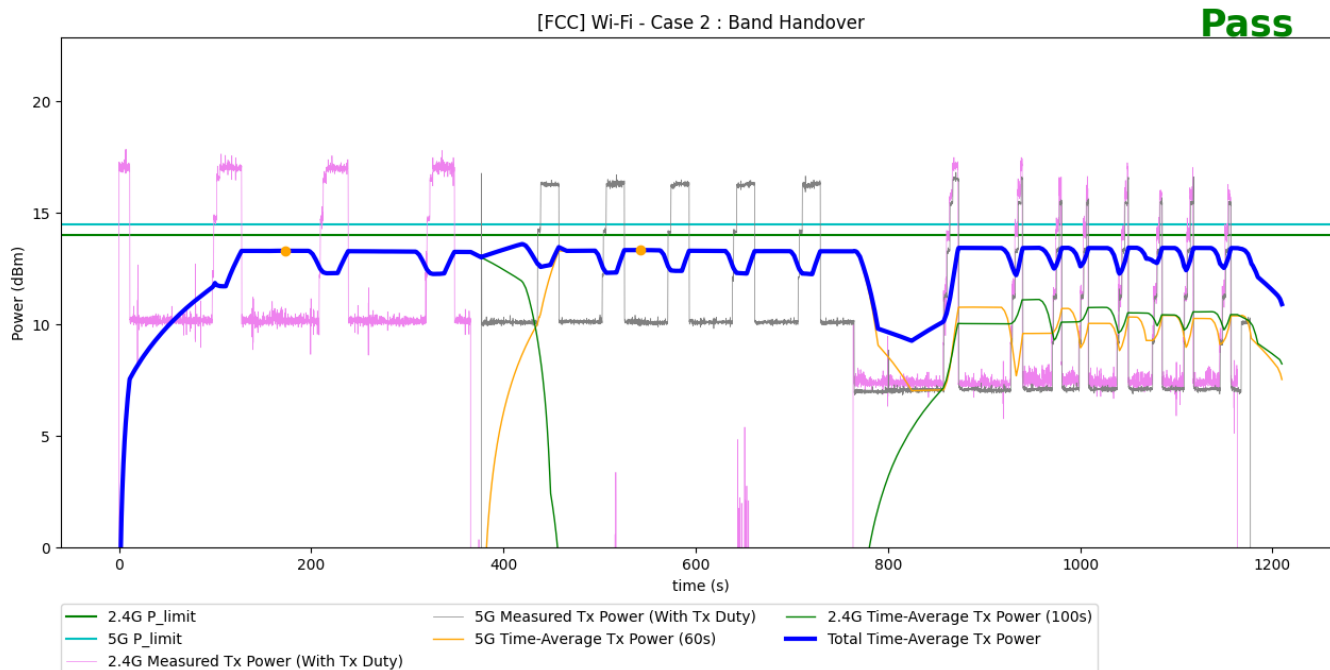


Figure 10-11 Time-averaged conducted TX power over time for Wi-Fi TA-SAR test scenario 2

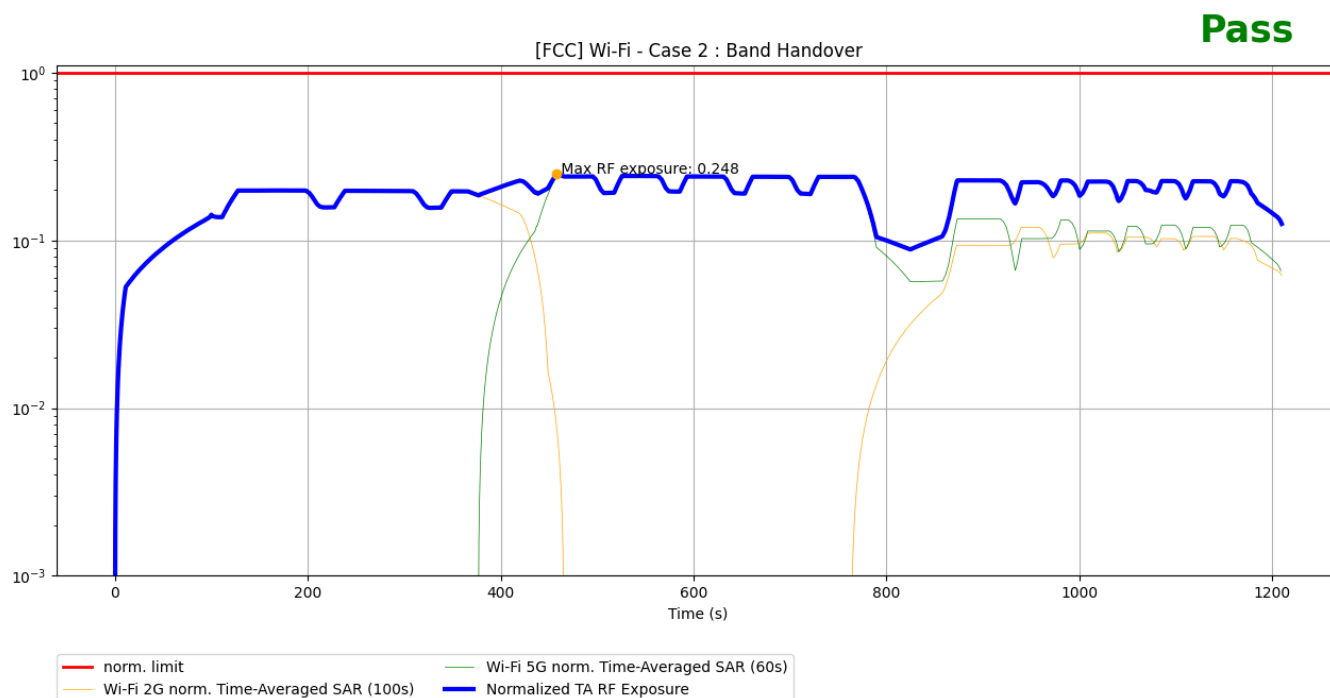


Figure 10-12 Normalized time-averaged SAR over time for Wi-Fi TA-SAR test scenario 2

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10.4 Conducted Power Measurement Results for Wi-Fi TA-SAR Test Scenario 3: Antenna Switching

This test is the conducted power measurement for Wi-Fi antenna switching. The detailed setting is listed in Table 10-3. Figure 10-13 demonstrates the DUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit. Figure 10-14 illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in Section 5.4.2. As seen in this figure, the normalized time-averaged SAR does not exceed the FCC limit.

Table 10-3 TA-SAR parameters setting for test scenario 3

Test band	Antenna	Switch time	$P_{WF_SAR_MAX}$	$P_{WF_SAR_limit}$
2.4GHz	12	0~400s	19.00 dBm	14.00 dBm
2.4GHz	10	400s~800s	19.00 dBm	14.00 dBm

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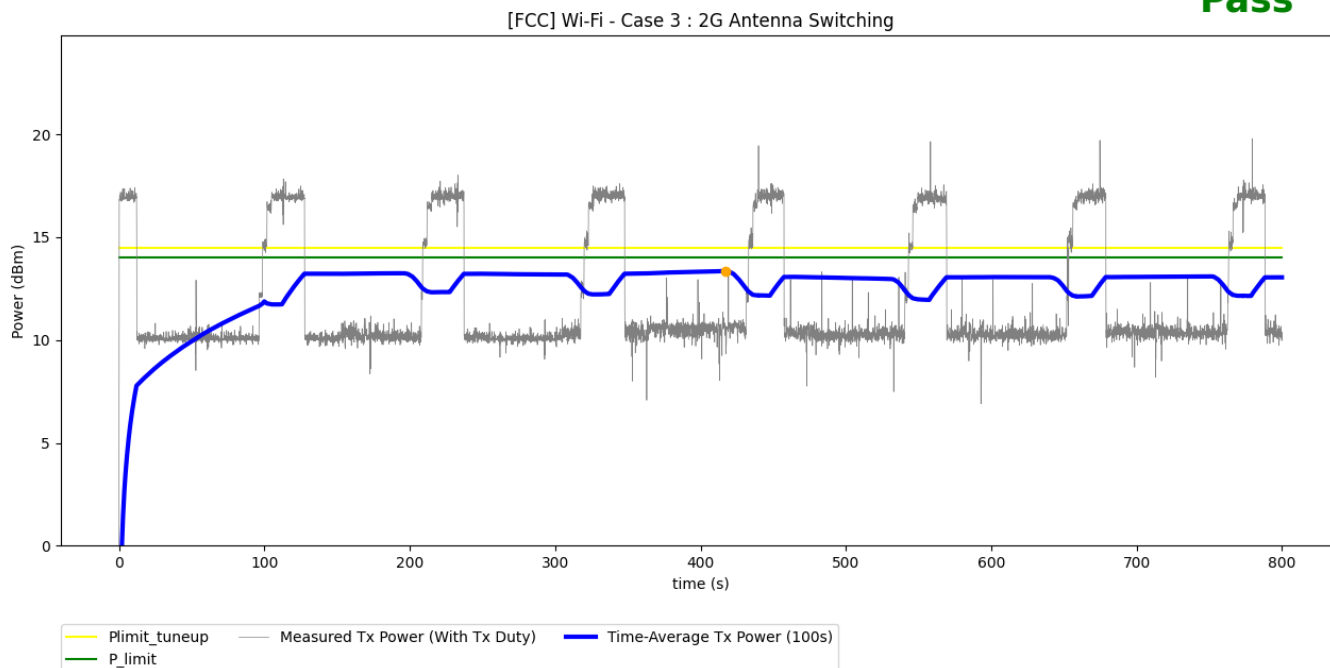


Figure 10-13 Time-averaged conducted TX power over time for Wi-Fi TA-SAR test scenario 3

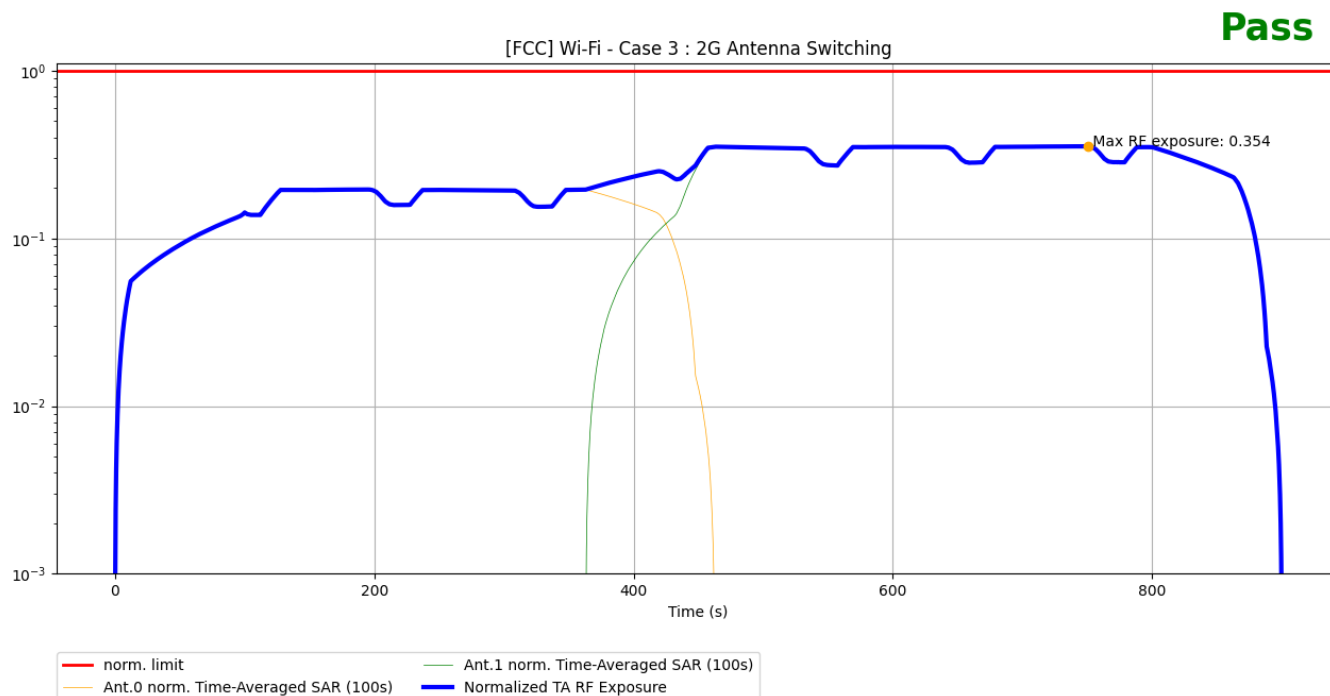


Figure 10-14 Normalized time-averaged SAR over time for Wi-Fi TA-SAR test scenario 3

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10.5 Conducted Power Measurement Results for Wi-Fi TA-SAR Test Scenario 4: ECI Change

This test is the conducted power measurement for Wi-Fi ECI change. The detailed setting is listed in Table 10-4. Figure 10-15 demonstrates the DUT's instantaneous conducted TX power, the time-averaged conducted TX power behavior over time, and the power limit. Figure 10-16 illustrates the corresponding time-averaged SAR over time converted from the TX time-averaged power by using the equation listed in Section 5.5.2. As seen in this figure, the normalized time-averaged SAR does not exceed the FCC limit.

Table 10-4 TA-SAR parameters setting for test scenario 4

Test band	Switch time	ECI	$P_{WF_SAR_MAX}$	$P_{WF_SAR_limit}$
2.4GHz	0~400s	2	19.00 dBm	14.00 dBm
2.4GHz	400s~800s	2*	19.00 dBm	12.00 dBm

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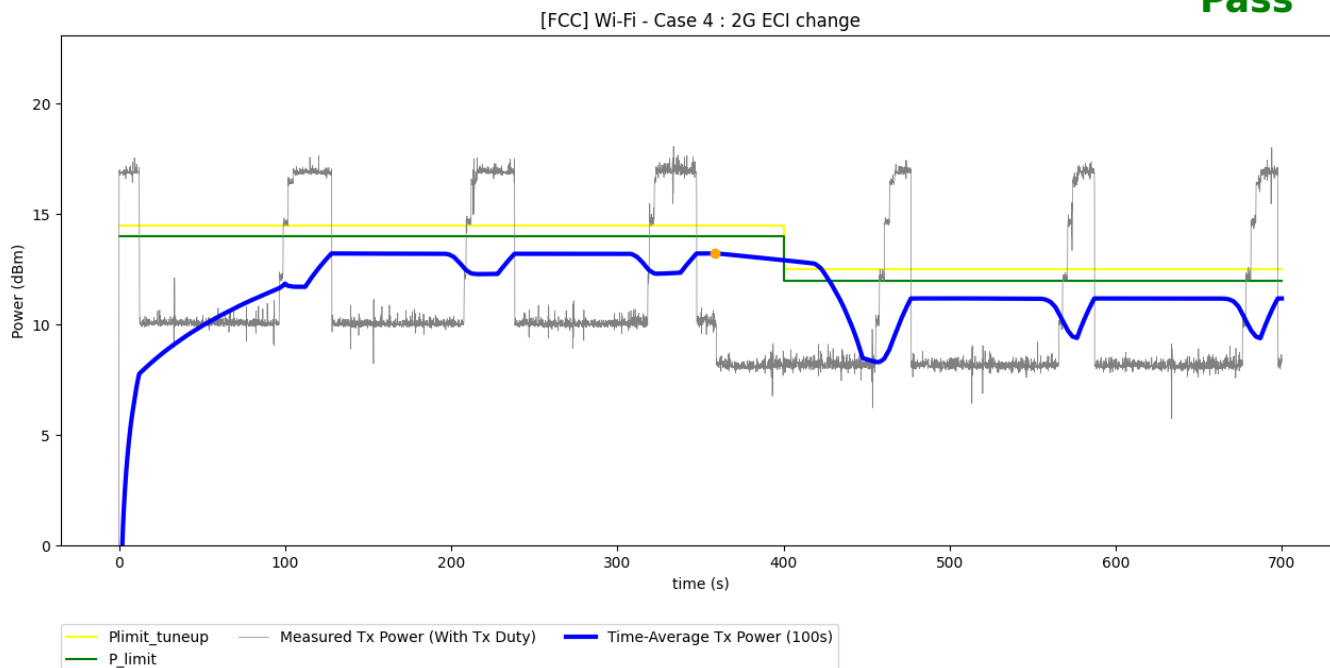


Figure 10-15 Time-averaged conducted TX power over time for Wi-Fi TA-SAR test scenario 4

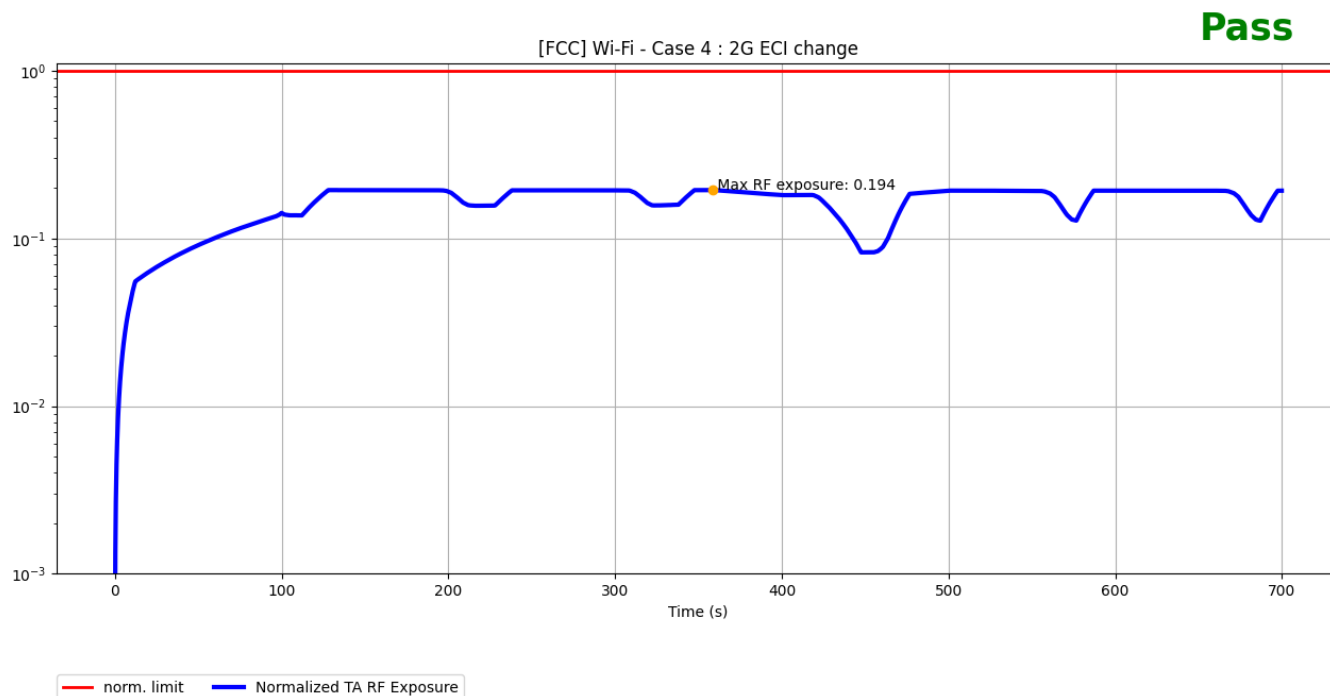


Figure 10-16 Time-averaged SAR over time for Wi-Fi TA-SAR test scenario 4

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NOTE: The instantaneous TX power should be compared with P_WF_SAR_limit of the corresponding configuration, i.e., 14 dBm for ECI 2 and 12dBm for ECI 2*, then transformed and averaged in SAR perspective to check compliance. Therefore, even though the time-averaged TX power seems to exceed P_WF_SAR_limit after ECI changes at 400s, the time-averaged SAR meets regulation as a matter of fact.

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11 WI-FI TA-SAR VALIDATION VIA SAR MEASUREMENTS

For SAR measurements, TA-SAR algorithm is implemented in firmware in a phone and a notebook.

11.1 Measurement Setup

The lab SAR measurement setup photos are shown in Figure 14-1, 14-2 and 14-3.



Figure 11-1 DASY6 TA-SAR test environment of DUT, AP and PC

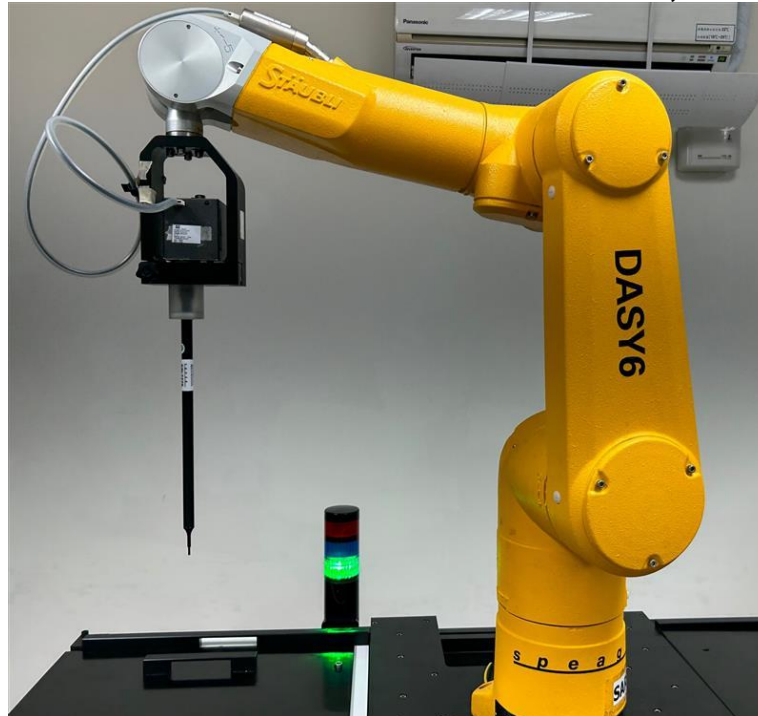


Figure 11-2 DASY6 TA-SAR test environment

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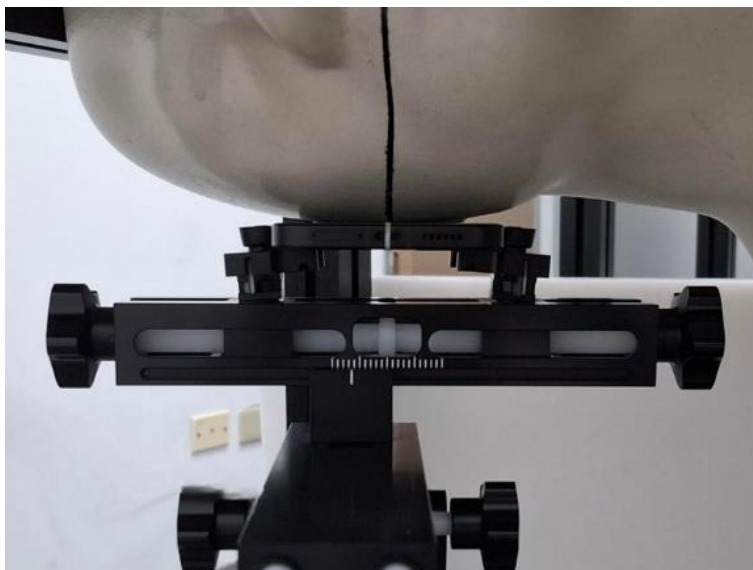


Figure 11-3 DASY6 TA-SAR test environment of DUT

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11.2 SAR Measurement Results for Wi-Fi TA-SAR Test Scenario 1: TX Mode Change between Normal Mode and Sleep Mode

Mediatek's TA-SAR algorithm is tested in SGS (an FCC certified lab) by using DASY6. The detailed setting is listed in Table 15-1. Figure 15-1 demonstrates test scenario 1-1 of 2.4GHz band TA- SAR measurement result.

Table 11-1 TA-SAR parameters setting for test scenario 1-1

Test band	$P_{WF_SAR_MAX}$	$P_{WF_SAR_limit}$
2.4GHz	19.00 dBm	14.00 dBm

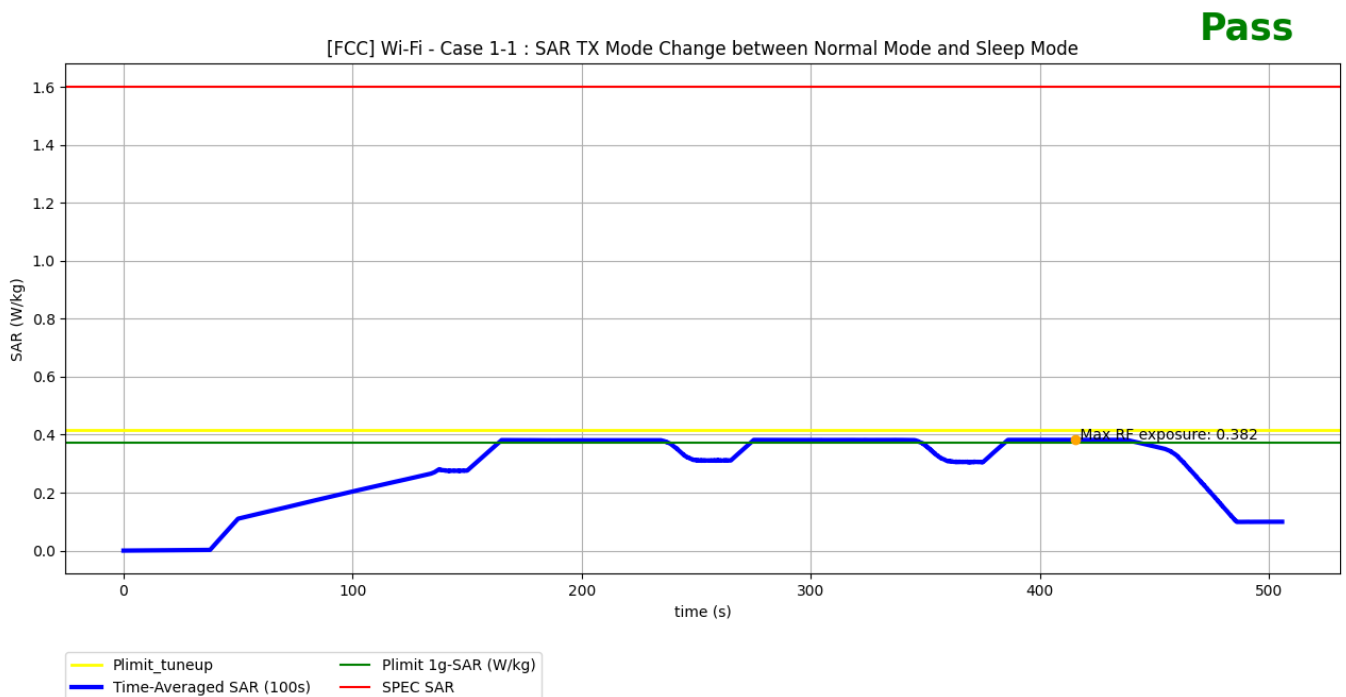


Figure 11-4 Time-averaged SAR measurement for Wi-Fi TA-SAR test scenario 1-1

FCC 1gSAR limit	1.6 W/kg
Max 100s-time averaged 1gSAR	0.382 W/kg
Validation result: pass	

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12 CONCLUSIONS

This document proposes Wi-Fi/BT TA-SAR/TA-PD test scenarios and procedures for Mediatek's Wi-Fi/BT TA-SAR/TA-PD algorithms. The conducted power measurement results in Chapter 10 show that Mediatek's Wi-Fi TA-SAR/TA-PD algorithms can maintain SAR over time below the FCC regulatory limits. Furthermore, the near-field measurements are also done in a certified lab (i.e., SGS) to further validate Mediatek's Wi-Fi/BT TA-SAR algorithms. The SAR measurement results in Chapter 11 over time below the FCC regulatory limits. It is concluded that Mediatek's Wi-Fi TA-SAR/TA-PD algorithms can be validated for FCC compliance by the proposed test methodology.

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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 2450/5850 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 (SAM)

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	1751	Mar/27/2025	Mar/26/2026
SPEAG	Dosimetric E-Field Probe	EX3DV4	7712	Mar/24/2025	Mar/23/2026
SPEAG	System Validation Dipole	D2450V2	727	Apr/15/2025	Apr/14/2026
SPEAG	System Validation Dipole	D5GHzV2	1349	Mar/19/2024	Mar/18/2027
SPEAG	Dielectric Assessment Kit	DAKS-3.5	1053	Feb/17/2025	Feb/16/2026
R&S	FSV Signal Analyzer	FSV3013	101742	May/19/2025	May/18/2026
R&S	MXG Analog Signal Generator	SMB100A03	182012	Aug/09/2025	Aug/08/2026
Keysight	EXA Signal Analyzer	N9010B	MY63440390	Feb/13/2025	Feb/12/2026
Keysight	EXA Signal Analyzer	N9010B	MY59071573	Jun/03/2025	Jun/02/2026
Agilent	Dual-directional coupler	772D	MY46151258	Oct/08/2025	Oct/07/2026
Agilent	Dual-directional coupler	778D	MY46151242	Sep/09/2025	Sep/08/2026
EMCI	Amplifier	EMC 2830P	980156	Calibration not required	Calibration not required
R&S	Power Sensor	NRP18S	101973	Feb/21/2025	Feb/20/2026
R&S	Power Sensor	NRP18S	109065	Sep/05/2025	Sep/04/2026
R&S	Power Meter	NRX	105651	Nov/11/2024	Nov/10/2025
SPEAG	Software	DASY 6 V16.0.2.136	N/A	Calibration not required	Calibration not required
SPEAG	Software	DASY 52 V52.10.4	N/A	Calibration not required	Calibration not required
SPEAG	Phantom	SAM	N/A	Calibration not required	Calibration not required
TECPEL	Digital thermometer	DTM-303A	TP190085	Dec/30/2024	Dec/29/2025

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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 from reference point to 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 (DAKS-3.5)

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The measured conductivity and permittivity are all within $\pm 5\%$ of the target values.

Measurement results of Tissue Simulant Liquid

Measured Frequency (MHz)	Target Dielectric Constant, ϵ_r	Target Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ_r	Measured Conductivity, σ (S/m)	% dev ϵ_r	% dev σ	Limit	Measurement Date
2442	39.214	1.793	37.984	1.742	-3.14%	-2.84%	$\pm 5\%$	Nov. 02, 2025
2450	39.200	1.800	37.979	1.744	-3.11%	-3.11%	$\pm 5\%$	
5825	35.275	5.296	35.123	5.245	-0.43%	-0.96%	$\pm 5\%$	
5850	35.250	5.323	34.948	5.291	-0.86%	-0.60%	$\pm 5\%$	

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The composition of the tissue simulating liquid:

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

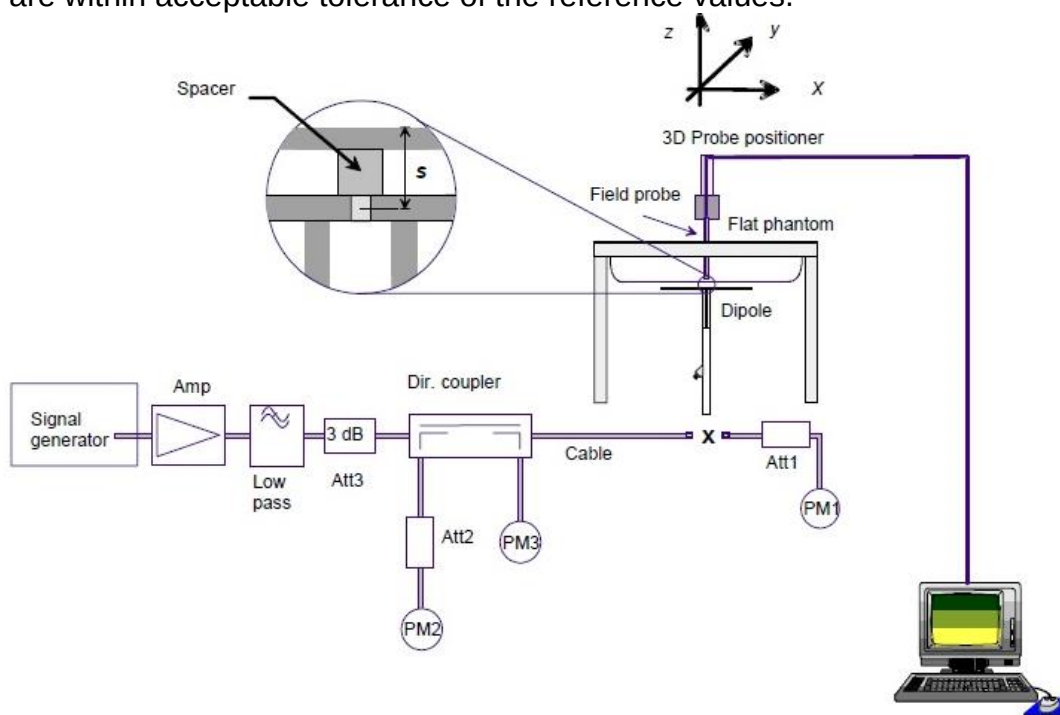
Broad-band head tissue simulating liquids	SPEAG Product	Frequency range (MHz)	Main Ingredients
	HBBL600-10000V6	600 - 10000	Water, Oil

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
D2450V2	727	2450	52.6	13	52	-1.14	± 10%	Nov.02,2025

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
D5GHzV2	1349	5850	79.9	8.14	81.4	1.88	± 10%	Nov.02,2025

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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%	∞
<i>Isotropy, Axial</i>	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
<i>Isotropy, Hemispherical</i>	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.)	0.86%	N	1	1	0.64	0.43	0.55%	0.37%	M
Liquid Conductivity (mea.)	0.96%	N	1	1	0.6	0.49	0.58%	0.47%	M
Combined standard uncertainty		RSS					11.74%	11.72%	
Expan uncertainty (95% confidence interval), K=2							23.49%	23.44%	

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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 Distribution	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%	∞
<i>Isotropy, Axial</i>	3.50%	R	$\sqrt{3}$	1.732	1	1	2.02%	2.02%	∞
<i>Isotropy, Hemispherical</i>	9.60%	R	$\sqrt{3}$	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	$\sqrt{3}$	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	$\sqrt{3}$	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	$\sqrt{3}$	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	$\sqrt{3}$	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	$\sqrt{3}$	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	$\sqrt{3}$	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	$\sqrt{3}$	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	$\sqrt{3}$	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	$\sqrt{3}$	1.732	1	1	1.73%	1.73%	∞
Probe positioner	0.40%	R	$\sqrt{3}$	1.732	1	1	0.23%	0.23%	∞
Mechanical restrictions									
Probe Positioning with respect to phantom shell	2.90%	R	$\sqrt{3}$	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	$\sqrt{3}$	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	$\sqrt{3}$	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	$\sqrt{3}$	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	$\sqrt{3}$	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	3.14%	N	1	1	0.64	0.43	2.01%	1.35%	M
Liquid Conductivity (mea.)	3.11%	N	1	1	0.6	0.49	1.87%	1.52%	M
Combined standard uncertainty		RSS					11.74%	11.59%	
Expart uncertainty (95% confidence interval), K=2							23.48%	23.18%	

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13 SAR SYSTEM CHECK RESULTS

Date: 2025/11/2

Report No. :TESA2510000778EN

Dipole 2450 MHz_SN:727

Communication System: CW; Frequency: 2450 MHz; Duty cycle= 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.744$ S/m; $\epsilon_r = 37.979$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Ambient temperature: 22.3°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7712; ConvF(7.78, 7.32, 7.26) @ 2450 MHz; Calibrated: 2025/3/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1751; Calibrated: 2025/3/27
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x61x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 21.8 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.7 V/m; Power Drift = 0.13 dB

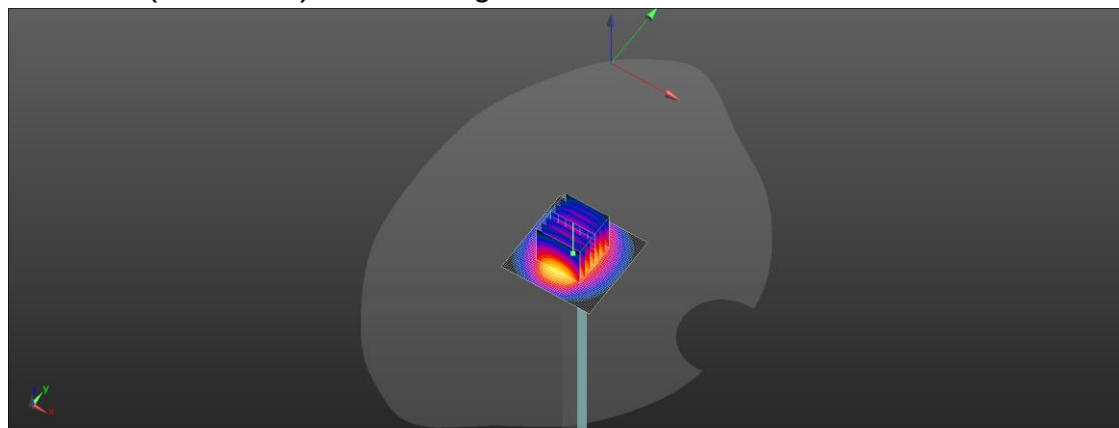
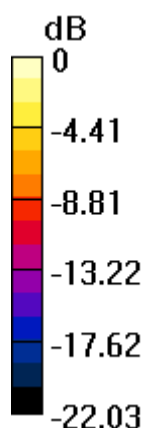
Peak SAR (extrapolated) = 25.0 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.19 W/kg

Smallest distance from peaks to all points 3 dB below = 9.2 mm

Ratio of SAR at M2 to SAR at M1 = 52.1%

Maximum value of SAR (measured) = 20.9 W/kg



0 dB = 20.9 W/kg = 13.20 dBW/kg

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Date: 2025/11/2

Report No. :TESA2510000778EN

Dipole 5850 MHz_SN:1349

Communication System: CW; Frequency: 5850 MHz; Duty cycle= 1:1

Medium parameters used: $f = 5850 \text{ MHz}$; $\sigma = 5.291 \text{ S/m}$; $\epsilon_r = 34.948$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Ambient temperature: 21.6°C; Liquid temperature: 21.3°C

DASY5 Configuration:

- Probe: EX3DV4 - SN7712; ConvF(5.63, 5.3, 5.26) @ 5850 MHz; Calibrated: 2025/3/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1751; Calibrated: 2025/3/27
- Phantom: SAM
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Area Scan (61x61x1): Interpolated grid: $dx=10 \text{ mm}$, $dy=10 \text{ mm}$

Maximum value of SAR (interpolated) = 22.2 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Reference Value = 50.26 V/m; Power Drift = 0.04 dB

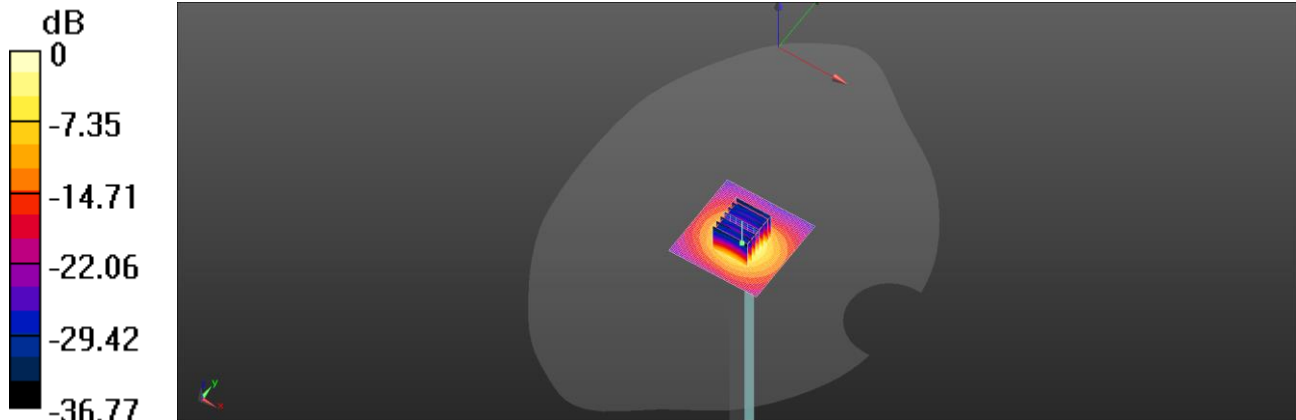
Peak SAR (extrapolated) = 42.7 W/kg

SAR(1 g) = 8.18 W/kg; SAR(10 g) = 2.27 W/kg

Smallest distance from peaks to all points 3 dB below = 7.5 mm

Ratio of SAR at M2 to SAR at M1 = 45.9%

Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

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14 APPENDIXES

Refer to separated files for the following appendixes.

14.1 SAR_Appendix E Photographs

14.2 SAR_Appendix F DAE & Probe Cal. Certificate

14.3 SAR_Appendix G Phantom Description & Dipole Cal. Certificate

14.4 SAR_Appendix H Dipole Extended Calibration Verification

- End of report -

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