



# FCC WiFi TAS Verification Report

**FCC ID** : A4RGUL82  
**Equipment** : Phone  
**Model Name** : GUL82  
**Applicant** : Google LLC  
1600 Amphitheatre Parkway,  
Mountain View, CA, 94043 USA  
**Standard** : 47CFR Part 2.1093

The product was received on Dec. 20, 2024 and testing was started from Apr. 14, 2025 and completed on Apr. 21, 2025. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. Laboratory, the test report shall not be reproduced except in full.

Approved by: Cona Huang / Deputy Manager

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## History of this test report



## **1. Introduction**

The DUT supports time-averaged SAR (TAS) technology for the WLAN transmitters. This TAS implementation does not monitor actual outpower level, instead it conservatively assumes the WLAN transmitters are operating at the maximum allowable output power for the averaging power calculation. Power levels in different bands with different operating states and power limits are not directly comparable so the TAS algorithm instead tracks the ratio of energy contribution relative to the available energy budget for each transmitter.

This resulting “utilization ratio” for a particular WLAN transmitter can then be added to the utilization ratio for all other WLAN transmitters in the device over the same time-period to derive the total WLAN system utilization ratio. The DUT supports 6GHz. Consistent with FCC guidance on compliance with time averaging exposure limits, the TAS implementation uses the total WLAN utilization ratio over a nominal 30 second time window to manage the transmitter power level and ensure that the DUT does not exceed the average power levels documented in Part1 SAR Report.

To validate the proper functioning of the time-average algorithm of this device, the following test scenarios were performed. These scenarios define the operation of the algorithm in all operational states:

1. SDB traffic mode- 2.4GHz and 5GHz/6GHz transmit simultaneously.
2. Antenna Switching – switching between different antennas on a given channel
3. Plim Switching – switching between different Plims for a given channel.

The data was plotted over time relative to the utilization limit to demonstrate that the utilization ratio never exceeds 100%. The DUT WLAN chipset applies a 1.5 dB uncertainty budget to all power control functions.

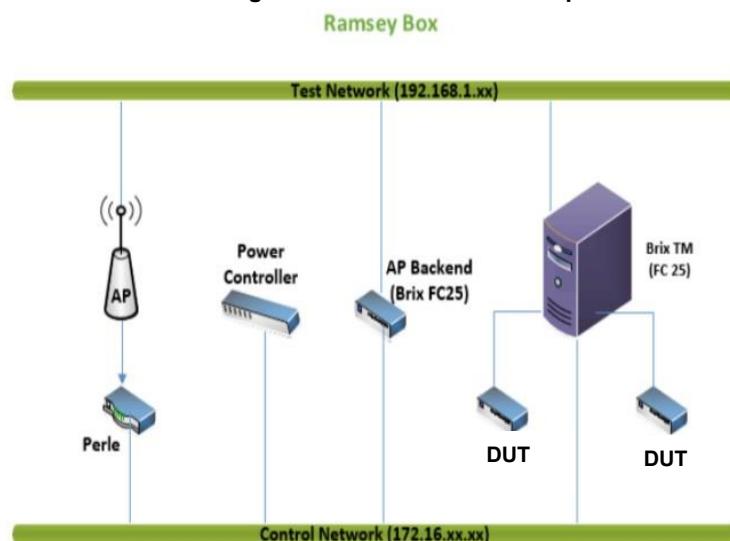
## 2. Test Setup

Set up should include the device under test and access points. It is preferred to have attenuation control to achieve the rssi to a known good level of around -80dBm to -85dBm [ lower rssi to ensure that transmissions are at lower mcs rates. Lower mcs rates transmission increases the possibility of transmitted power limited by SAR\_Limit rather than other regulatory limits.

The power optimization (Pot) setting for both antennas is a 6dB increase from Plim, the instantaneous maximum power is min {Pot, Pmax}, this applies to 2.4GHz, 5GHz and 6GHz. The measurements are performed with a fixed Plim. Please see Plim and Pmax parameters used for testing in the tables below.

Test automation is used to ensure that all WLAN 2.4GHz, 5GHz and 6GHz transmissions are operating at maximum possible duty cycle during the test.

Figure.1 – Validation test setup.





### 3. Validation Summary

#### Parameters used during testing

2.4GHz Parameters used during testing											
Band	Mode	BW	Channel	Power (dBm)							
				Ant 3		Ant 4		Ant 3		Ant 4	
2.4GHz	11g	20M	6	Plimit Index 2	Pmax Index 2	Plimit Index 2	Pmax Index 2	Plimit Index 4	Pmax Index 4	Plimit Index 4	Pmax Index 4
				12.5	18.5	12.5	18.5	15.5	21.5	15.5	21.5
5GHz Parameters used during testing											
Band	Mode	BW	Channel	Power (dBm)							
				Ant 3		Ant 4		Ant 3		Ant 4	
5GHz	11ac	20M	44	Plimit Index 2	Pmax s Index 2	Plimit Index 2	Pmax Index 2	Plimit Index 1	Pmax Index 1	Plimit Index 1	Pmax Index 1
				10.5	16.5	10.5	16.5	15	20	15	20
6GHz Parameters used during testing											
Band	Mode	BW	Channel	Power (dBm)							
				Ant 3		Ant 4		Ant 3		Ant 4	
6GHz	11ax	80M	71	Plimit Index 2	Pmax Index 2	Plimit Index 2	Pmax Index 2	Plimit Index 4	Pmax Index 4	Plimit Index 4	Pmax Index 4
				12.5	18	12.5	18	15.5	19	15.5	19

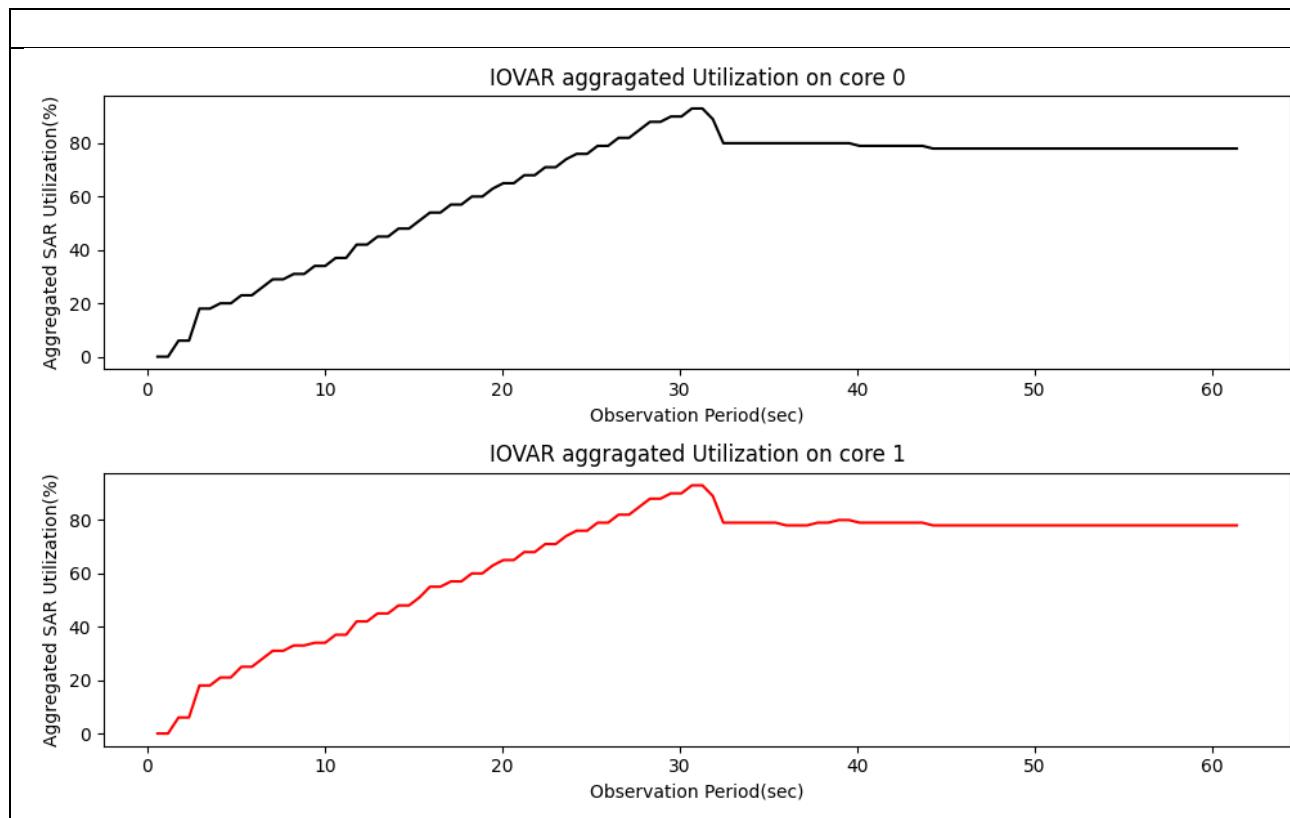
Note: Above power level represents the nominal power plus power tolerance.

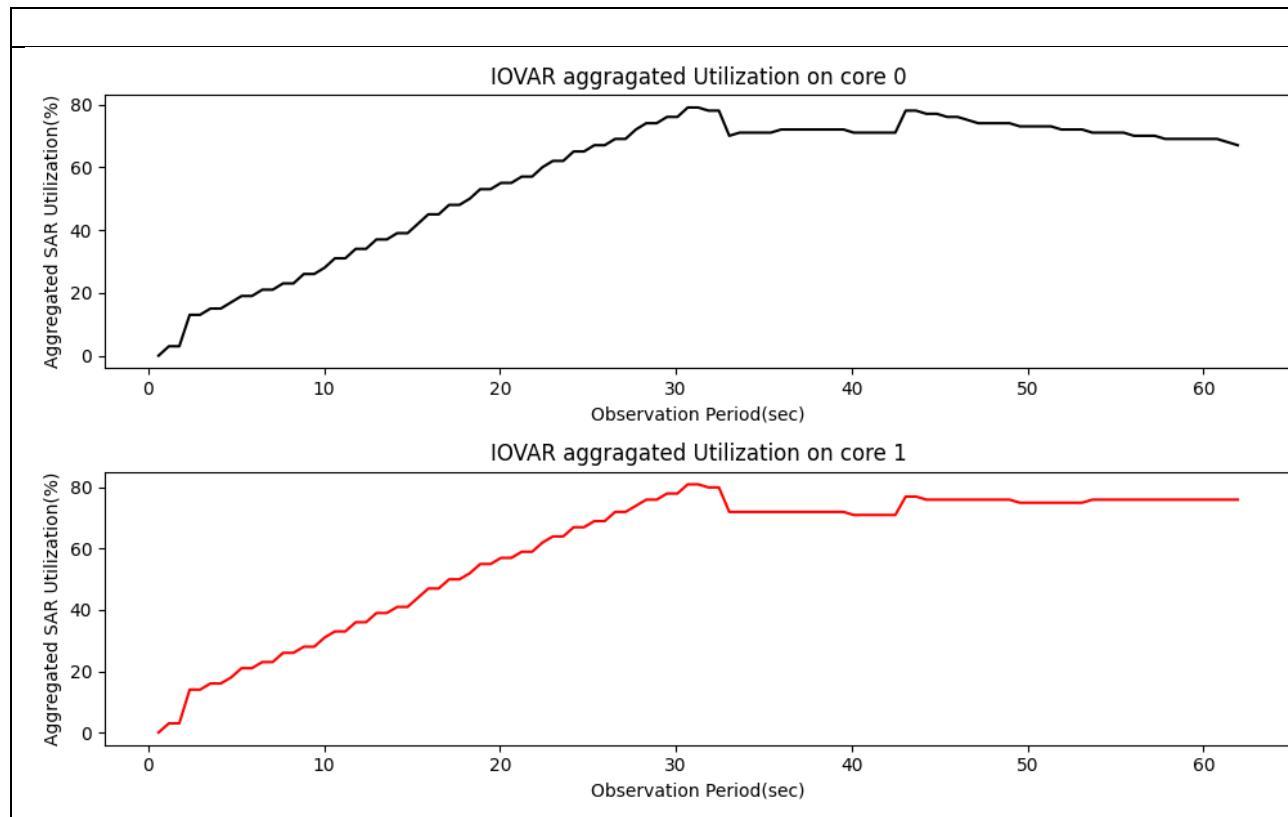
#### Test case and results

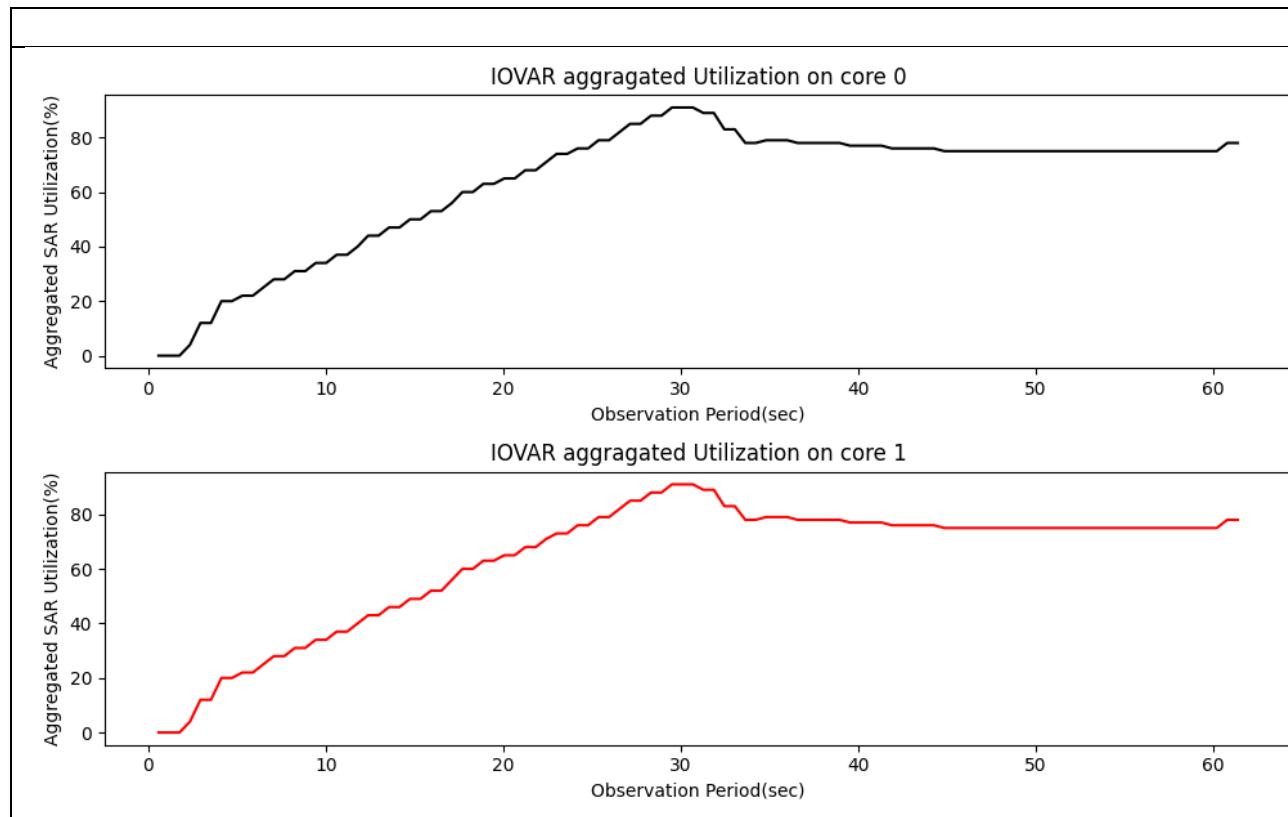
FCC	Test case	Test item	Power index	Reported/measured	Ant	Observation period(s)	Limit	Pass/Fail	Notes	
SDB	1a	2.4G and 5G	Index 2	Reported data	Ant 3,4	60s	100%	Pass	Ant3 and Ant 4 transmit simultaneously	
	1b	2.4G and 5G +BT	Index 2	Reported data	Ant 3,4	60s	100%	Pass		
	2a	2.4G and 6G	Index 2	Reported data	Ant 3,4	60s	100%	Pass		
	2b	2.4G and 6G +BT	Index 2	Reported data	Ant 3,4	60s	100%	Pass		
Non-SDB	Ant switch	3a	2.4G	Index 2	Reported data	Ant 3 to Ant 4	120s	100%	Pass	Antenna switching at 60s from Ant 3 to Ant 4 for a given channel
		3b	2.4GHz+BT	Index 2	Reported data	Ant 3 to Ant 4	120s	100%	Pass	
		4a	5G	Index 2	Reported data	Ant 3 to Ant 4	120s	100%	Pass	
		4b	5G+BT	Index 2	Reported data	Ant 3 to Ant 4	120s	100%	Pass	
		5a	6G	Index 2	Reported data	Ant 3 to Ant 4	120s	100%	Pass	
		5b	6G+BT	Index 2	Reported data	Ant 3 to Ant 4	120s	100%	Pass	
	SAR limit switch	6a	2.4G	Index 4 to Index 2	Reported data	Ant 3	120s	100%	Pass	SAR_Limit switching at 60s based upon changing of SAR_States of the hos
		6b	2.4G+BT	Index 4 to Index 2	Reported data	Ant 3	120s	100%	Pass	
		7a	5G	Index 1 to Index 2	Reported data	Ant 3	120s	100%	Pass	
		7b	5G+BT	Index 1 to Index 2	Reported data	Ant 3	120s	100%	Pass	
		8a	6G	Index 4 to Index 2	Reported data	Ant 3	120s	100%	Pass	
		8b	6G+BT	Index 4 to Index 2	Reported data	Ant 3	120s	100%	Pass	

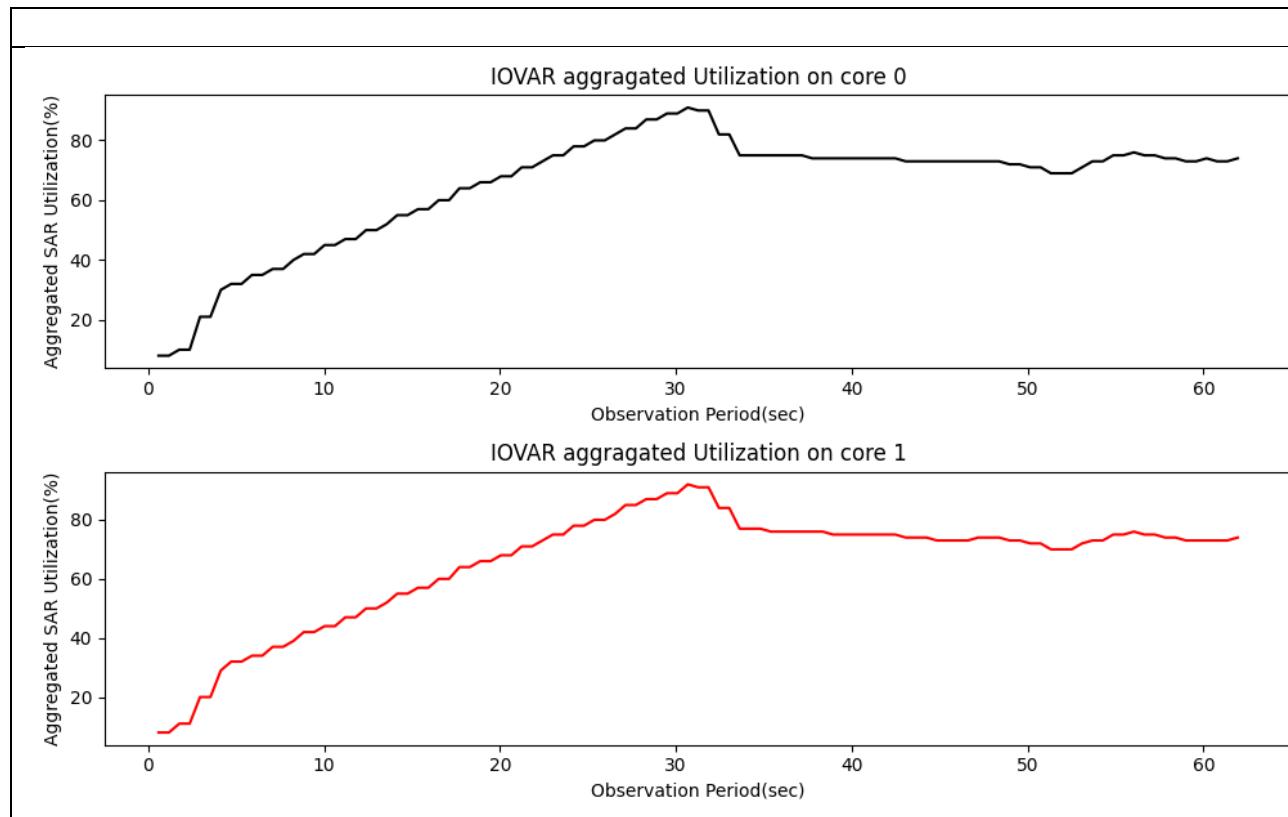
#### 4. Test Result

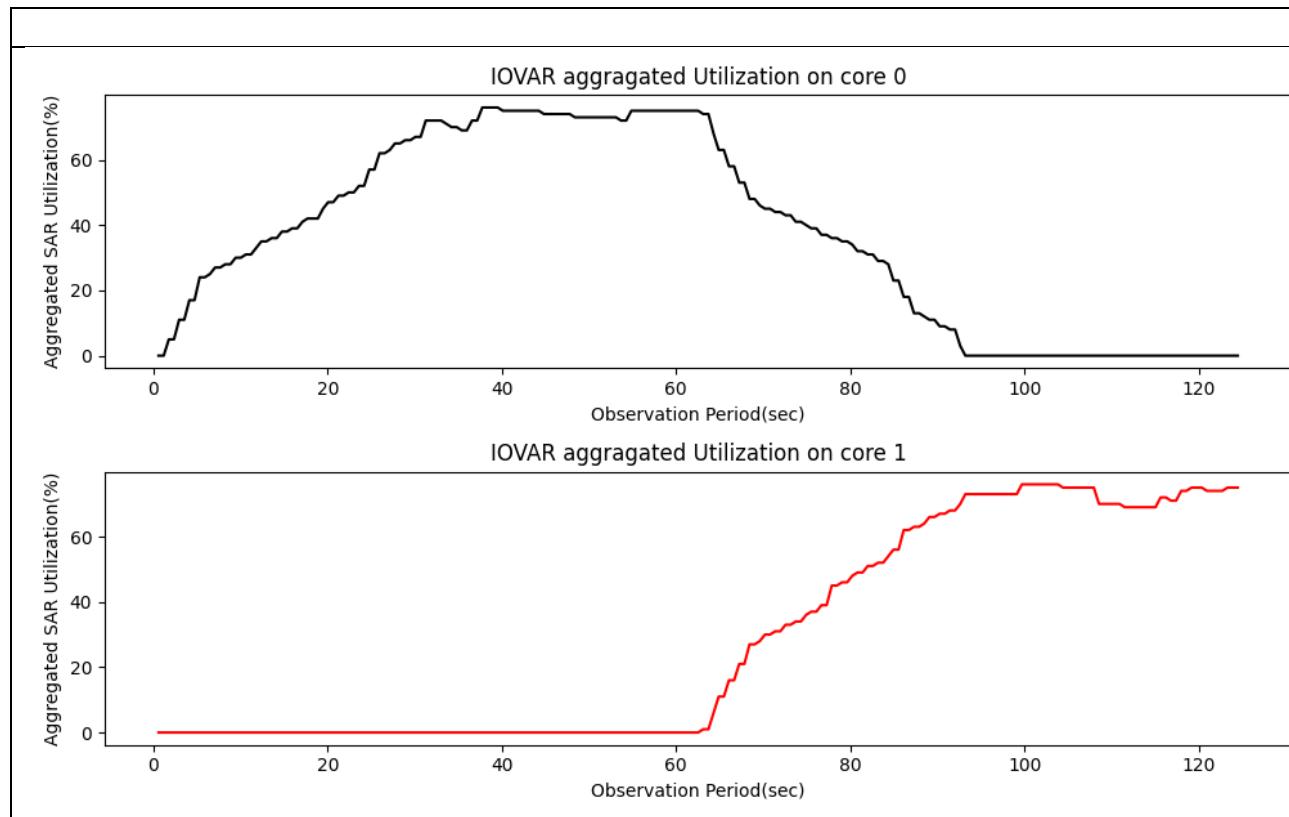
**Test Case 1a: SDB - Reported Aggregated SAR Utilization over observation window - Softap in 5Ghz and sta connection in 2.4Ghz**

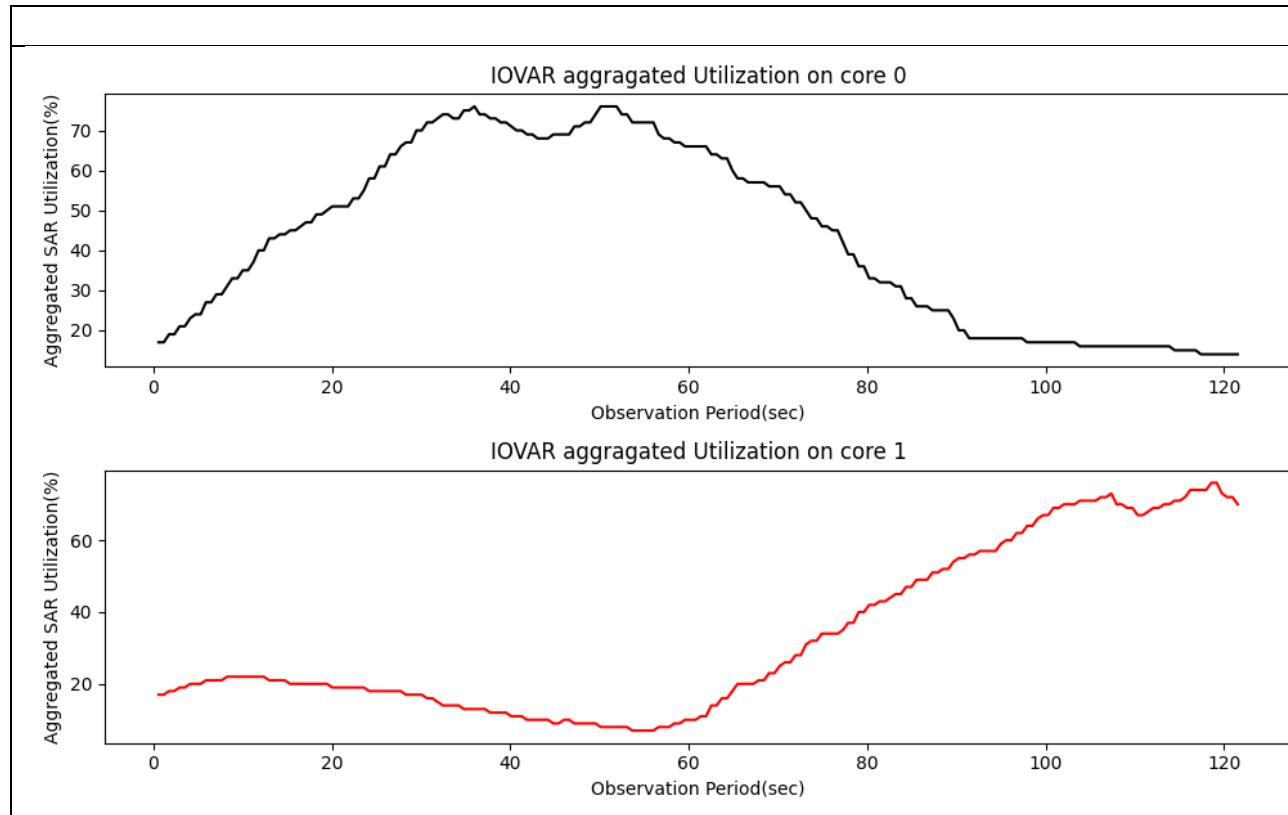


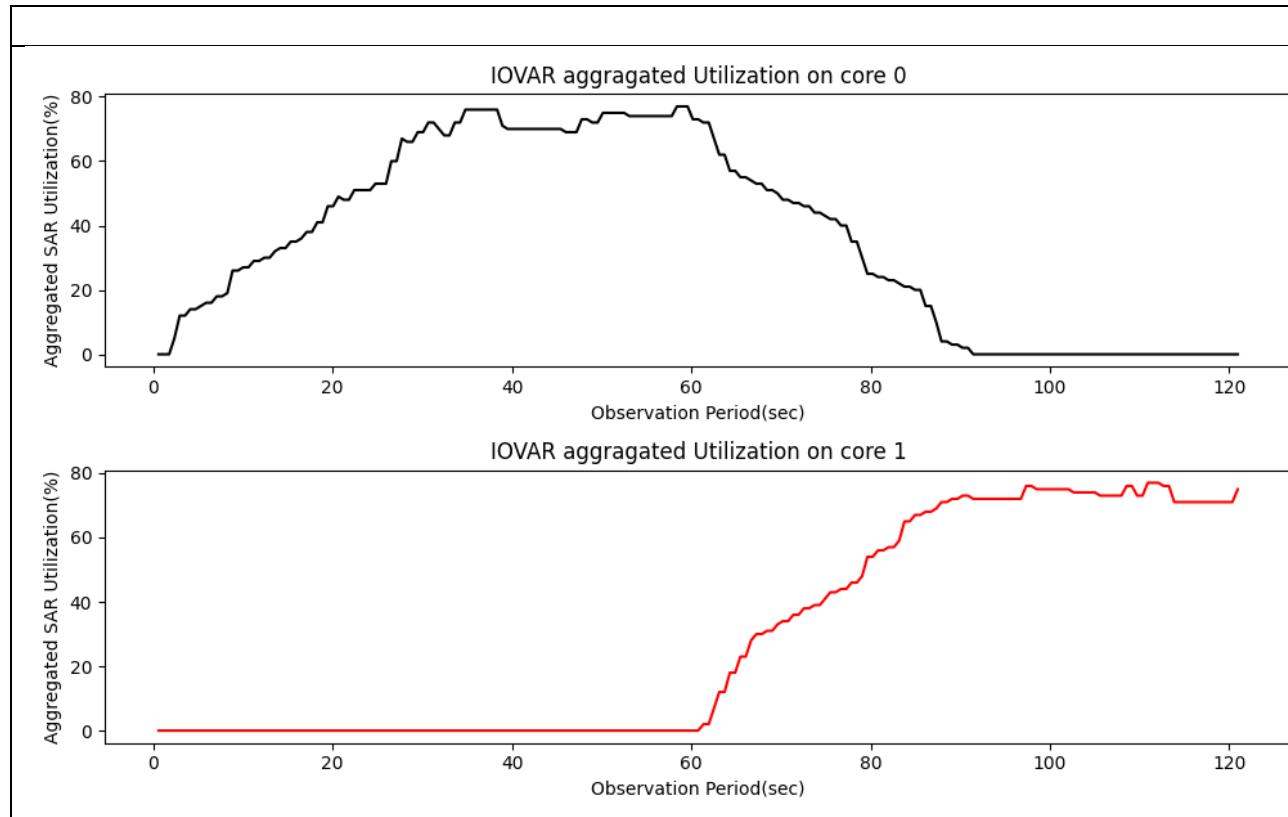
**Test Case 1b: SDB - SDB - Reported Aggregated SAR Utilization over observation window - Softap in 5Ghz and sta connection in 2.4Ghz + BT Traffic**

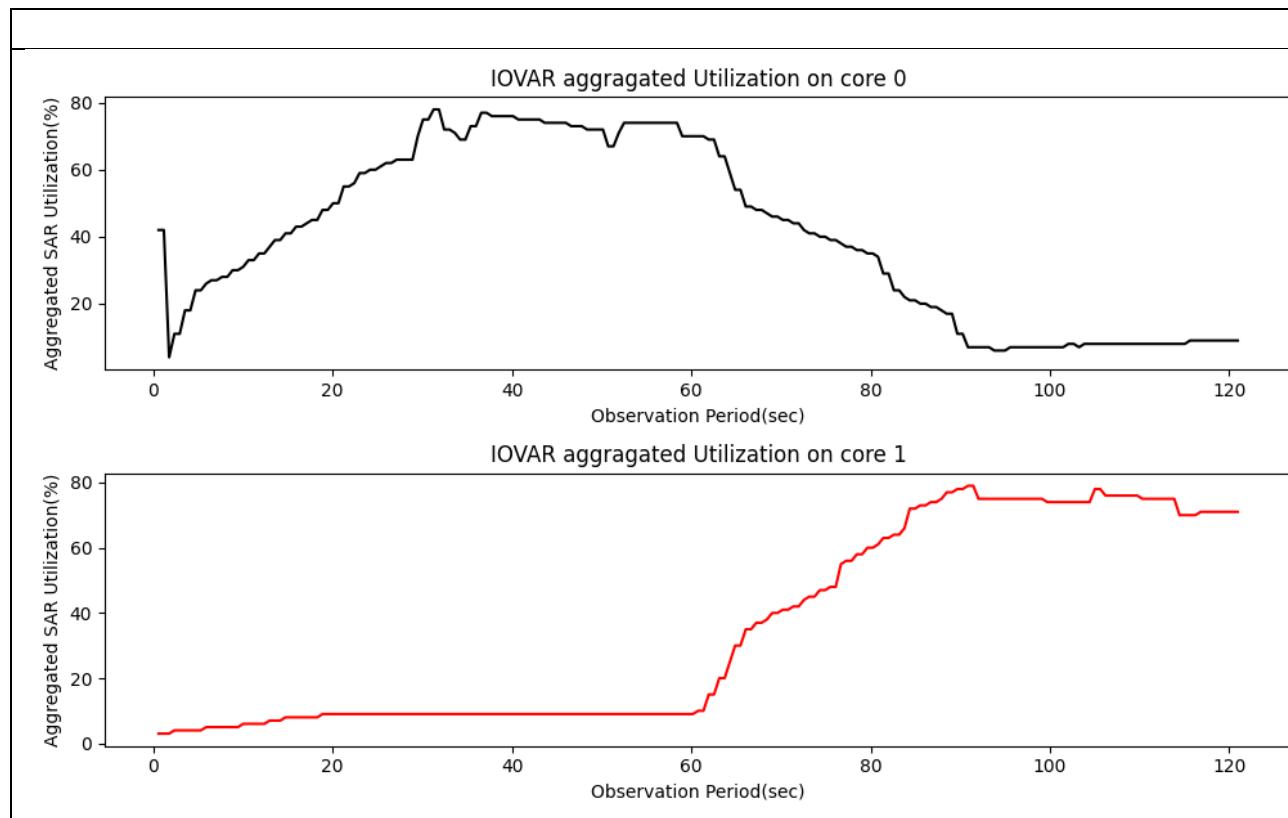
**Test Case 2a: SDB - Aggregated SAR Utilization over observation window Softap in 2.4Ghz and sta connection in 6Ghz**

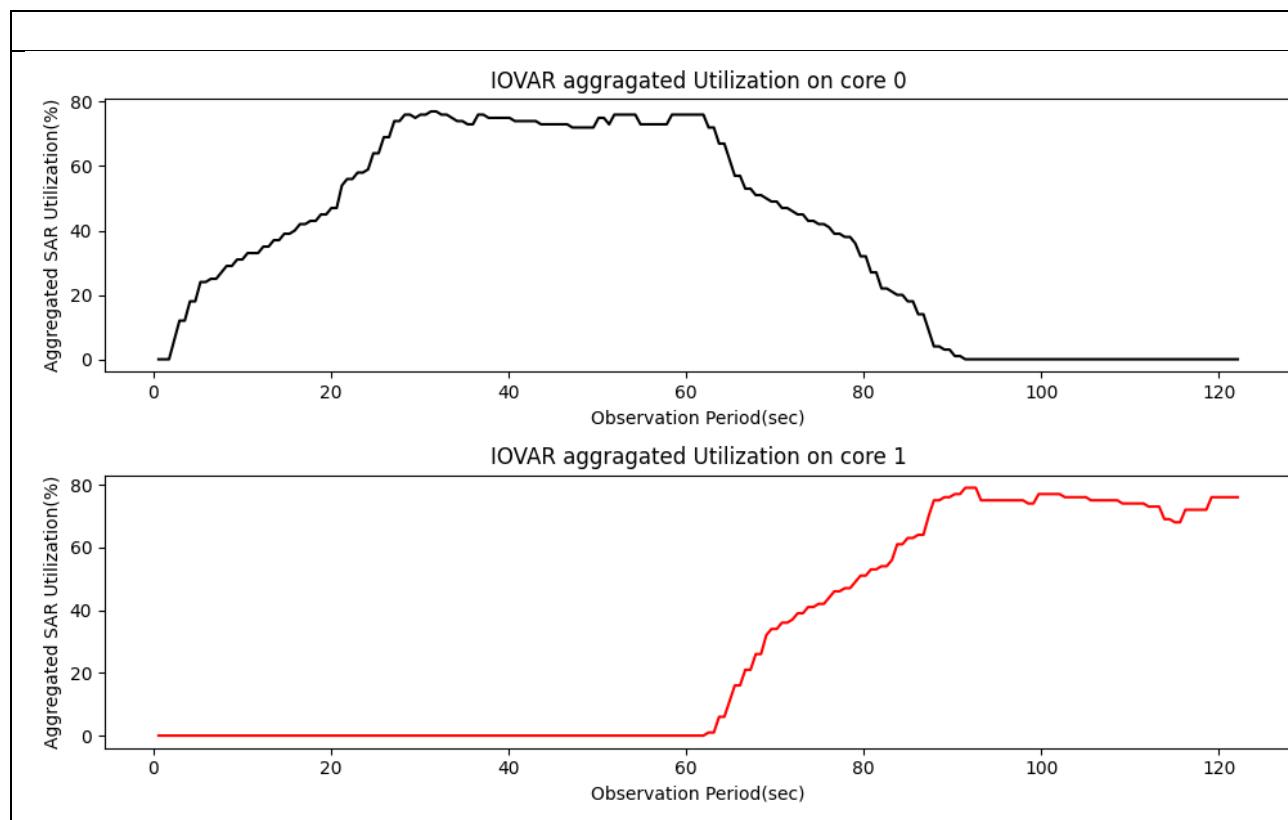
**Test Case 2b: SDB - Aggregated SAR Utilization over observation window Softap in 2.4Ghz and sta connection in 6Ghz + BT Traffic**

**Test Case 3a: Non-SDB –Aggregated 2.4GHz SAR Utilization over observation window (Antenna switching)**

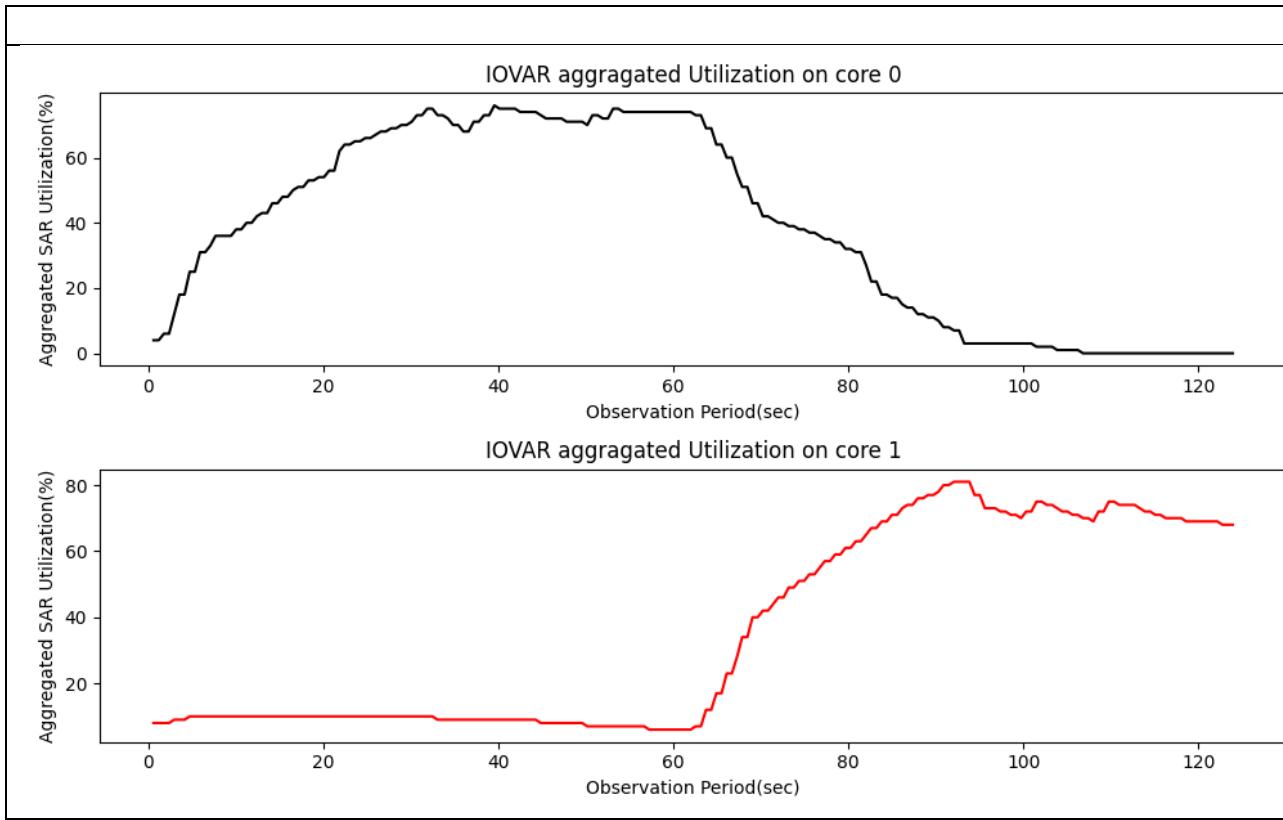
**Test Case 3b: Non-SDB –Aggregated 2.4GHz SAR Utilization over observation window + BT Traffic**

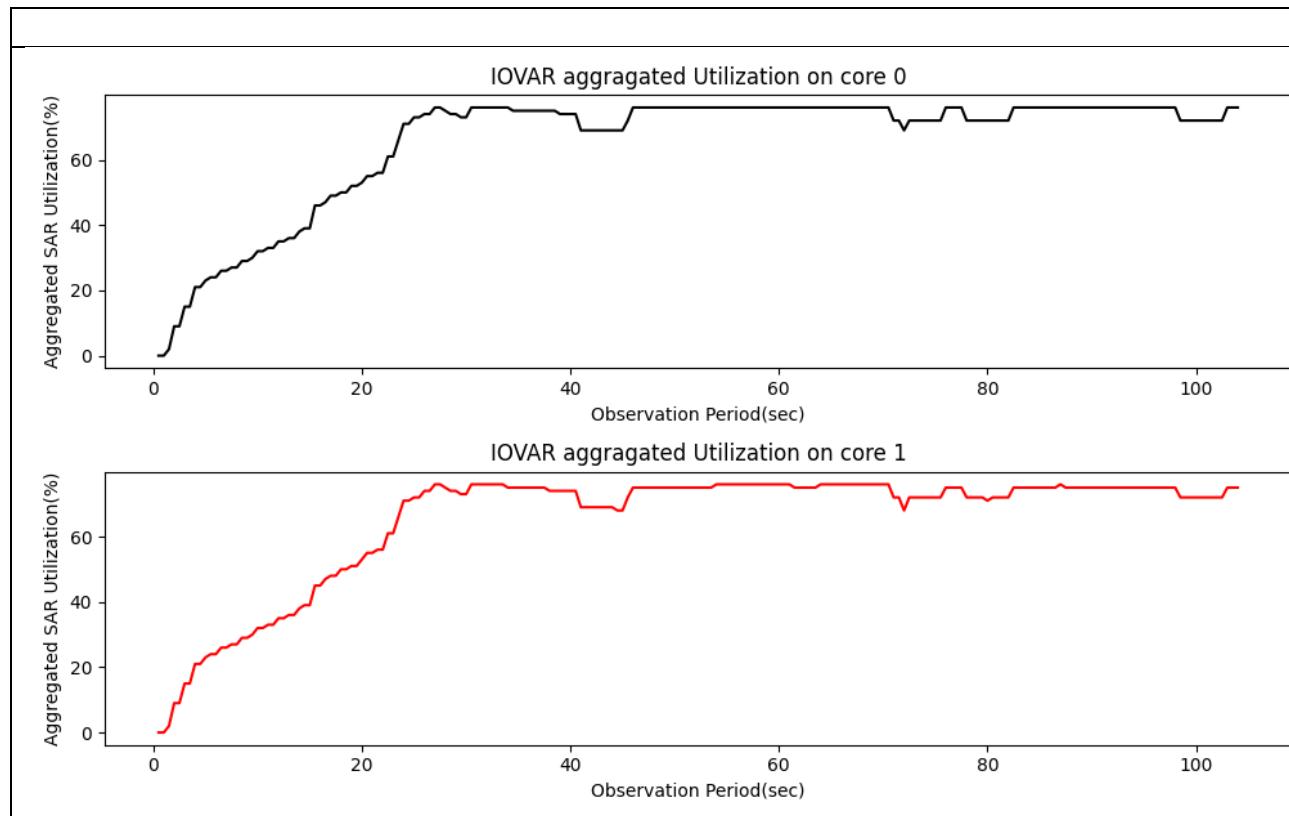
**Test Case 4a: Non-SDB –Aggregated 5GHz SAR Utilization over observation window**

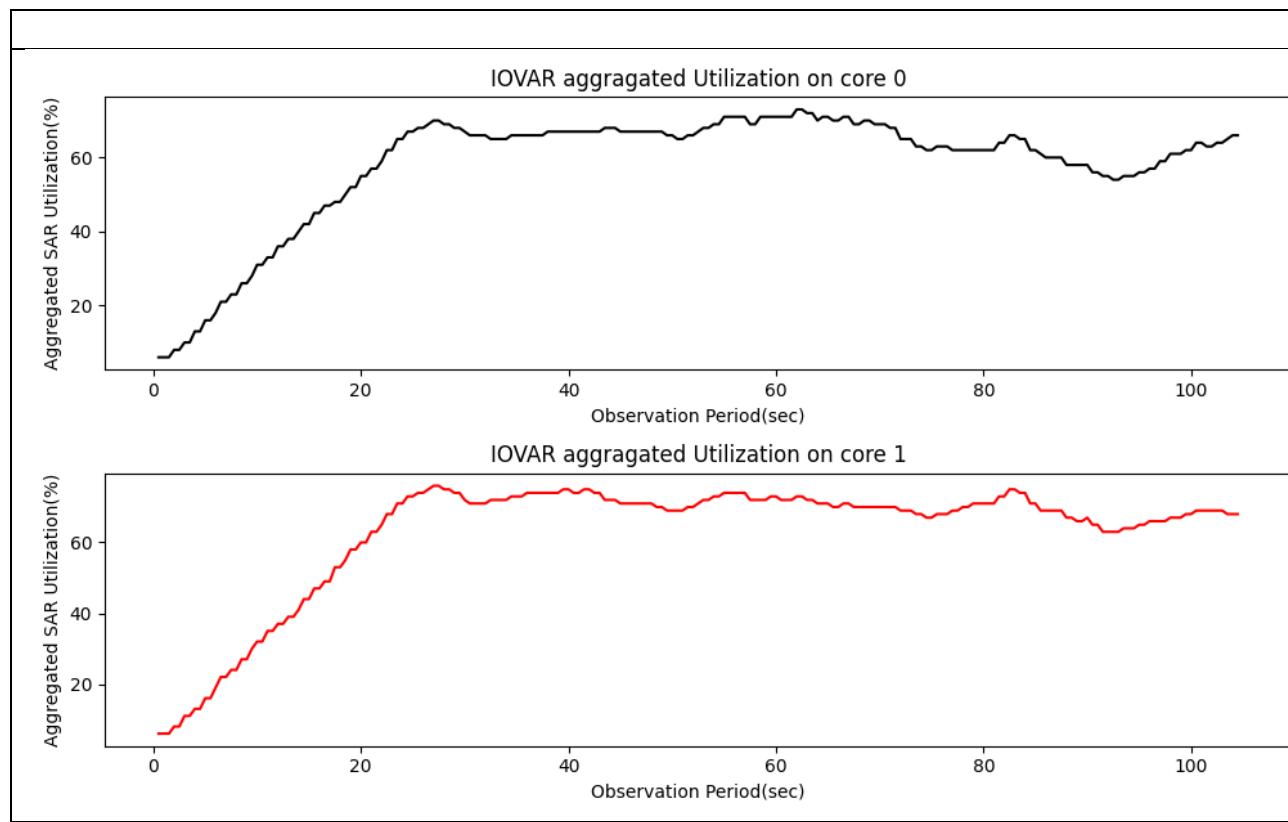
**Test Case 4b: Non-SDB –Aggregated 5GHz SAR Utilization over observation window**

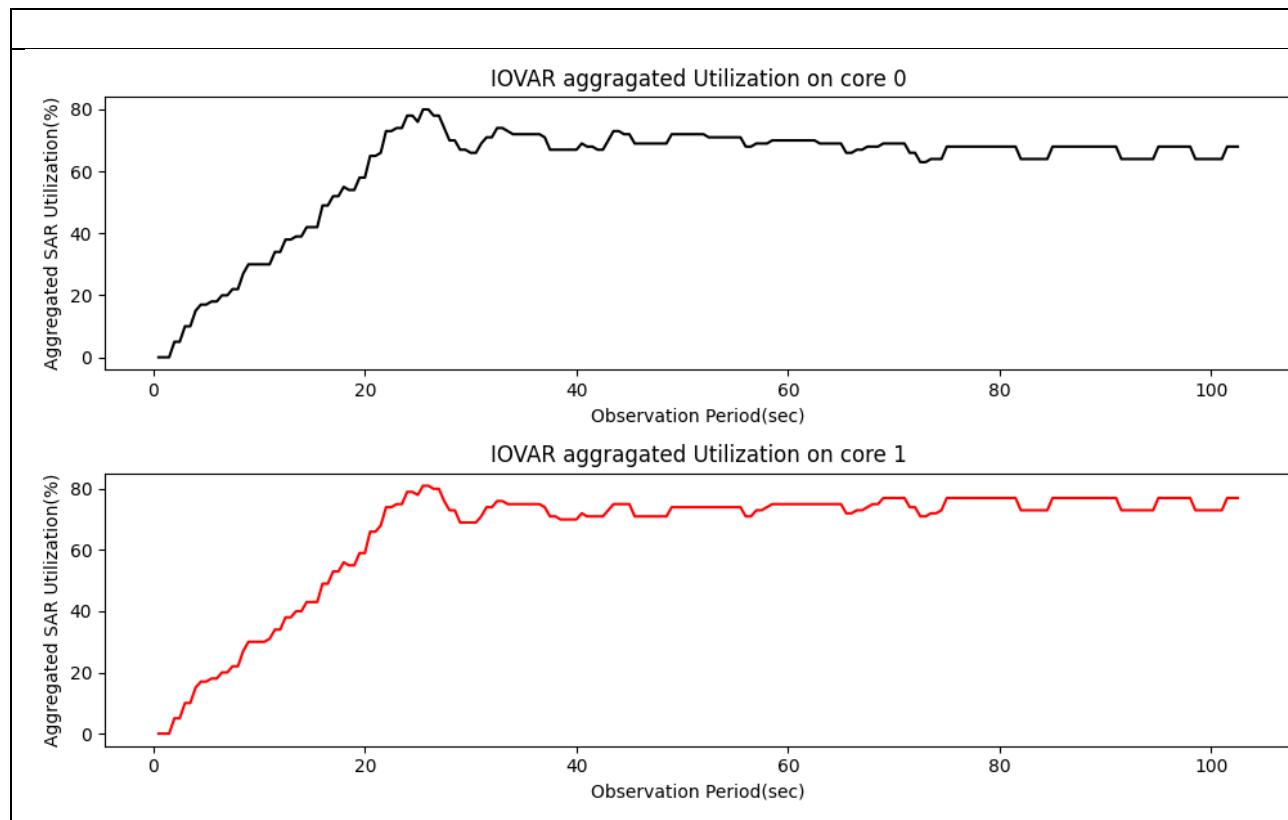
**Test Case 5a: Non-SDB –Aggregated 6GHz SAR Utilization over observation window**

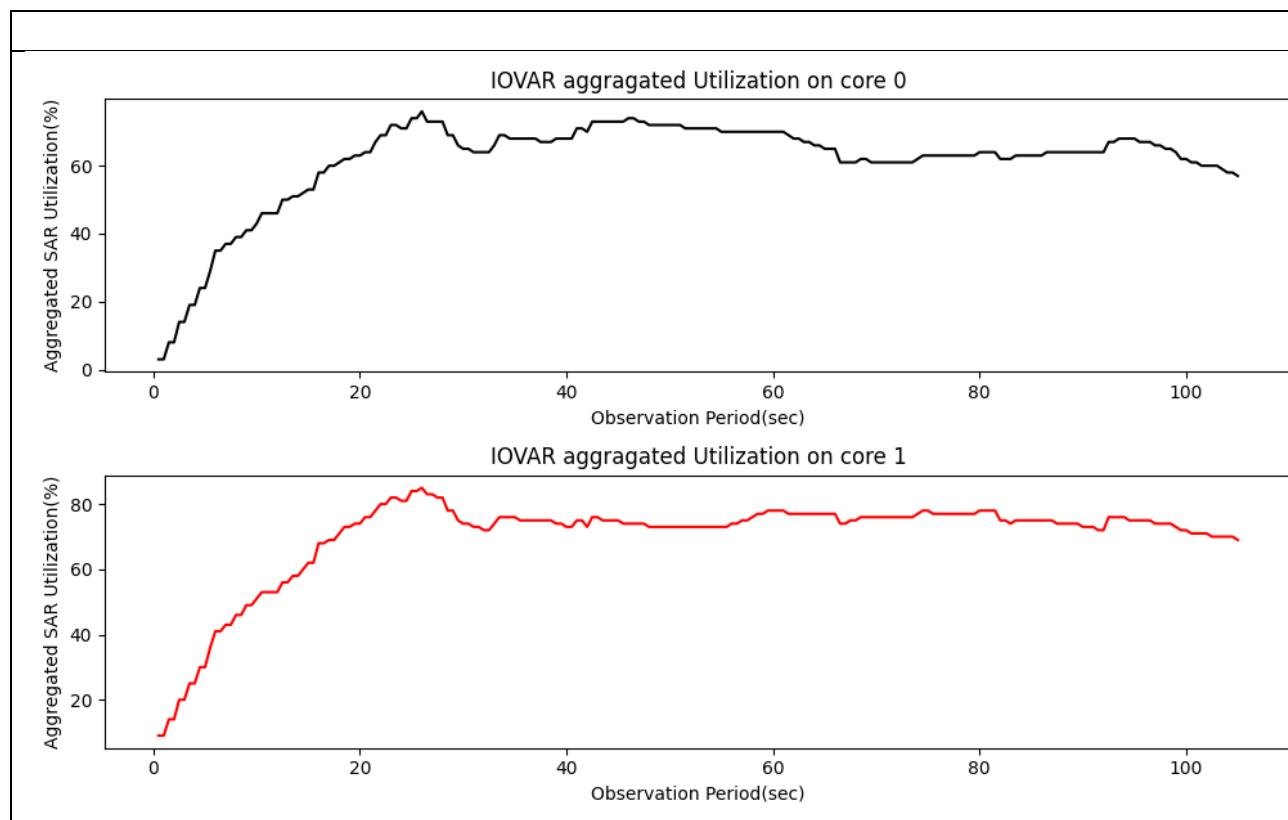
## Test Case 5b: Non-SDB –Aggregated 6GHz SAR Utilization over observation window

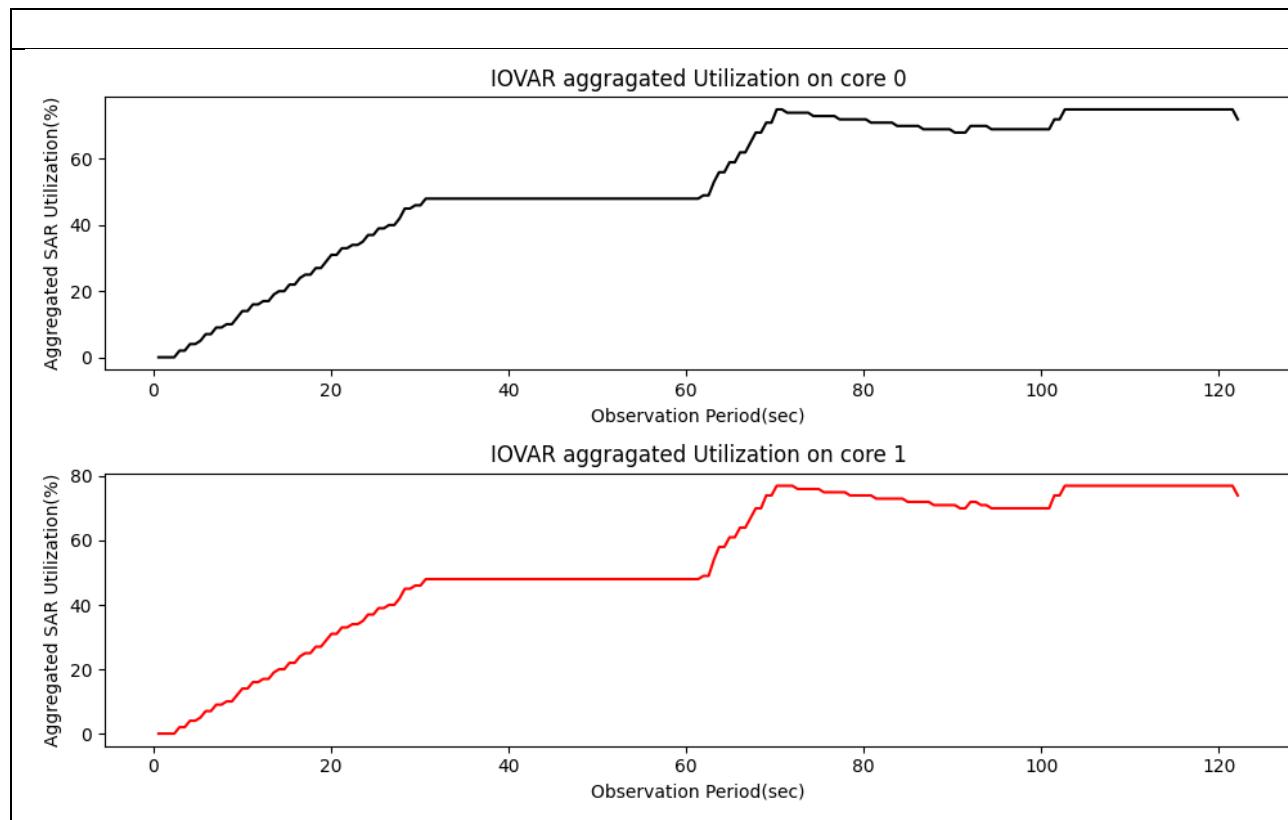


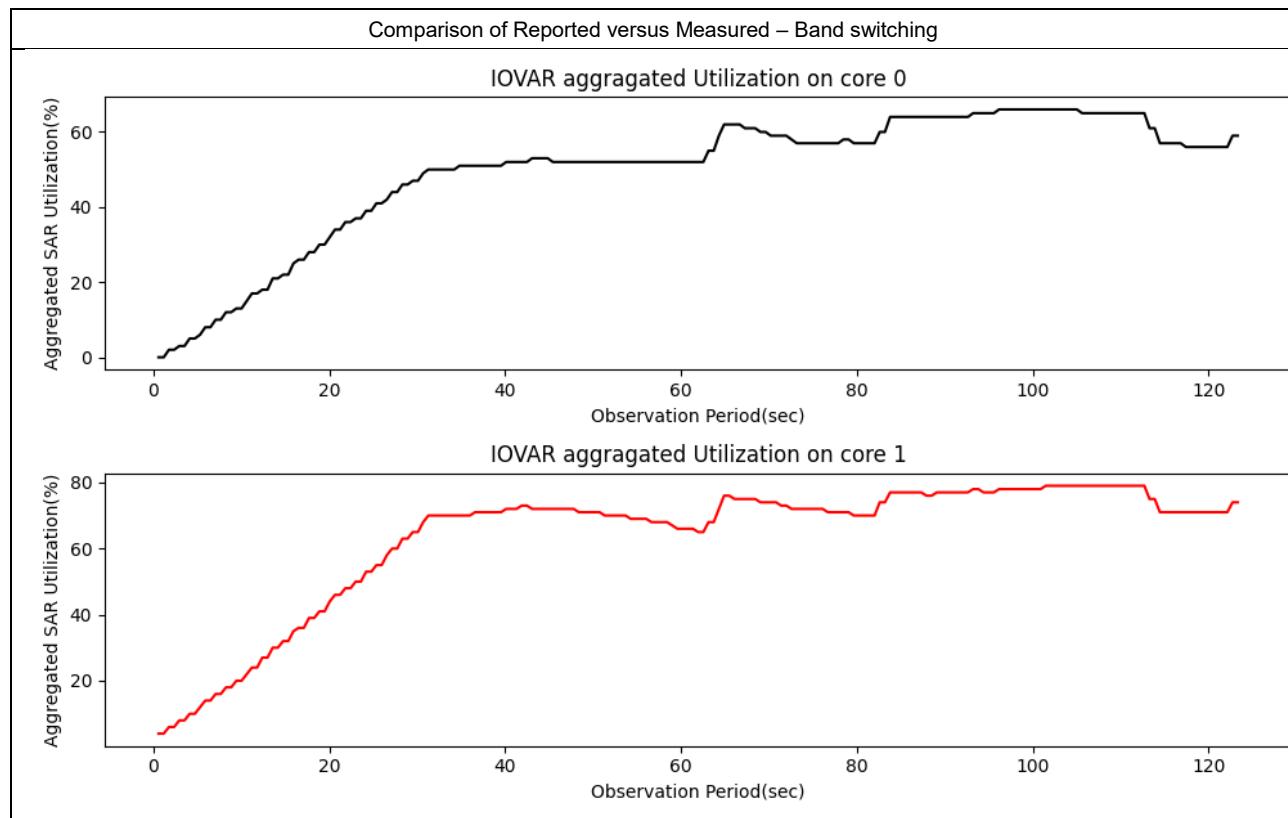
**Test Case 6a: Non-SDB –Aggregated 2.4GHz SAR Utilization over observation window**

**Test Case 6b: Non-SDB –Aggregated 2.4GHz SAR Utilization over observation window**

**Test Case 7a: Non-SDB –Aggregated 5GHz SAR Utilization over observation window**

**Test Case 7b: Non-SDB –Aggregated 5GHz SAR Utilization over observation window**

**Test Case 8a: Non-SDB –Aggregated 6GHz SAR Utilization over observation window**

**Test Case 8b: Non-SDB –Aggregated 6GHz SAR Utilization over observation window**



## 5. Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
Boonton	Power Sensor	RTP4018-S1	12965	Oct. 22, 2024	Oct. 21, 2025
Boonton	Power Sensor	RTP4018-S1	12966	Oct. 22, 2024	Oct. 21, 2025
Boonton	Power Sensor	RTP4018-S1	12967	Oct. 22, 2024	Oct. 21, 2025
Boonton	Power Sensor	RTP4018-S1	12969	Oct. 22, 2024	Oct. 21, 2025
Testo	Hygro meter	608-H1	45196600	Oct. 28, 2024	Oct. 27, 2025
ATM	Dual Directional Coupler	C122H-10	P610410z-02	CBT*	
Woken	Attenuator	WK0602-XX	N/A	CBT*	
Mini-Circuits	Diplexer	ZDSS-2R5G5G-S+	N/A	CBT*	
Netgear	Wireless router	RS300	7MM2485WA030D	NA	
Netgear	Wireless router	RAX200	69G6187LA00B1	NA	

**Remark:**

\*CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, coupler, diplexer were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.