Model Number: A2846
Date: 7/24/2023

Revision History for report number 14523758-S1V4

Rev.	Date	Revisions	Revised By
V1	7/5/2023	Initial Issue	--
V2	7/7/2023	Section 9.3: Updated max output power table Section 9.6: Updated max output power table Section 9.8: Updated max output power tables Section 10.38: Updated table Appendix G: Updated max output power tables	Coltyce Sanders
V3	7/10/2023	Section 9.11: Updated max output power table	Devin Chang
V4	7/24/2023	Appendix H: Updated measured cellular power	Dave Weaver

POWER REDUCTION VERIFICATION

This device supports manufacturer's proprietary power reduction mechanism called, 'Detect mode' for the cellular, Wi-Fi and Bluetooth transmitters. There are additional power reduction mechanisms for the Wi-Fi and Bluetooth transmitters based on the operating state of the cellular and (for Bluetooth) Wi-Fi transmitters. Details of these mechanisms can be found in the Operational Description**.**

The verification plan consists of measuring the power levels of the cellular, Bluetooth and Wi-Fi transmitters under different operating conditions related to the power reduction mechanisms.

A. Verification of Body Detect mechanism was performed for the following test cases for cellular, Wi-Fi and Bluetooth transmitters.

- In-hand or on knee
- On a stationary object (placed on a table)

B. Verification of power reduction levels for Wi-Fi was performed with cellular transmitter on and off.

C. Verification of power reduction levels for Bluetooth and Wi-Fi was performed with different combinations of cellular transmitter on and off and Wi-Fi transmitter on and off.

For testing purposes the device was loaded with a power table[1] for each transmitter that had different power settings for each of the operating states. The target / expected power level and measured power levels are detailed in the following tables and clearly show that mechanisms operate as expected.

RLAN: Based on the utilization ratio, a power control algorithm will allow the active WLAN to increase power until the utilization ratio approaches the limit. The algorithm will then disable the power increase until the utilization ratio decreases. A predictive power control feature further ensures regulatory compliance by disabling all transmitters if there are any scenarios where aggregate maximum WLAN transmissions over the next 1-second interval could cause the utilization ratio to exceed the regulatory limit.

Smart Tx: This device incorporates the Smart Transmit (SmartTX) SAR averaging algorithm provided by Qualcomm for cellular technologies. SmartTX controls the Tx power of the cellular-based wireless device in real-time to maintain the time-averaged Tx power, and in turn, time-averaged RF exposure, below the predefined time-averaged power limit characterized for each technology and band. Smart TX was disabled during testing to ensure stable power readings so that any change in output power can be attributed to the body detect mechanism.

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Table 1 –Body detect validation for cellular

Air Transport	Band	Target Power		Measured Power		
		Pmax	**Mode B (Body)**	**Stationary**	**In Hand**	**On Knee**
GSM	1900 (2Slots)	31.0	24.8	31.0	24.5	24.5
WCDMA	B4	25.7	18.6	25.0	18.0	18.0
	B2	25.7	19.1	24.9	18.8	18.8
LTE FDD	B25	25.7	19.1	24.8	18.5	18.5
	B30	25.7	22.6	24.9	22.0	22.0
	B7	25.7	20.3	25.1	19.8	19.8
LTE TDD	B41	25.7	22.6	25.0	21.2	21.2
	B48	24.9	21.0	23.9	20.4	20.4
All measured values were within the expected tolerances of the target / expected power levels programmed into the power table for the head versus body states. Mechanism of body detect was verified.						

[1] The power tables used for the mechanism validation may not match the production power tables detailed in the main SAR report because production power levels are not established at the time these measurements were made.

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Table 2 –Body detect and Cellular State validation for Wi-Fi

Body detect	Head (device stationary on table)		Body (device in hand)	
Cellular State	ON	OFF	ON	OFF
2.4 GHz 11n HT20 Ch6 SISO	E: 15.25 M: 15.1	E: 19.75 M: 19.7	E: 17.25 M: 17.0	E: 20.5 M: 20.3
5.0 GHz 802.11n HT20 Ch40 SISO Ant6	E: 14.5 M: 14.4	E: 20 M: 19.8	E: 15.75 M: 15.5	E: 20 M: 19.6
All measured power values (M) were within the expected tolerances of the target / expected power levels (E) programmed into the power table for the head versus body and cellular on/off states. Mechanism of body detect and cellular state was verified				

Table 3 –Body detect and Cellular State validation for Bluetooth

Body detect	Head (device on table)				Body (device in hand)			
Cellular State	ON		OFF		ON		OFF	
5GHz Wi-Fi state	ON	OFF	ON	OFF	ON	OFF	ON	OFF
Expected power condition	Plow mode A BT Table P_1	PHigh mode A BT Table P_3	PHigh mode A BT Table P_5	$P_{Standalone}$ BT Table P_7	Plow mode B BT Table P_2	PHigh mode B BT Table P_4	PHigh mode B BT Table P_6	$P_{Standalone}$ BT Table P_8
Power (dBm)	E: 8.0 M:7.8	E: 13.75 M:13.6	E: 13.75 M:13.5	E: 18.25 M:18.0	E: 8.75 M:8.6	E: 14.5 M:14.1	E: 14.5 M:14.2	E:19.0 M:18.9
Bluetooth transmitter set for channel 39 in EDR mode. All measured power values (M) were within the expected tolerances of the target / expected power levels (E) programmed into the power table for the head versus body, cellular on/off and Wi-Fi on/off states. Mechanism of body detect and cellular state and Wi-Fi state was verified								

[2] The power tables used for the mechanism validation may not match the production power tables detailed in the main SAR report because production power levels are not established at the time these measurements were made.