

RF EXPOSURE REPORT

(Part 0: SAR Char Evaluation)

Name of Sample: Mobile Cellular Phone
Model of Sample: XT2429-1
Applicant: Motorola Mobility LLC
Issued Date: Mar. 21, 2024



ADR TEST AND CERTIFICATION CENTER
Motorola Mobility LLC, a Lenovo Company

**Add: No. 19, Gao Xin 4th Road Wuhan, People's Republic of
China 430205**

Phone: (86)18702717862

E-mail: lucz1@motorola.com

Name of Client	Motorola Mobility LLC		
Address of Client	222 W, Merchandise Mart Plaza, Chicago IL 60654 USA		
Trademark	Motorola	FCC ID	IHDT56AR4
Applicant No.	RF173570	Sample No.	N/A
Delivering Date	Jan. 28, 2024	Test Date(s)	N/A
Sample Illustration	None		
Standard	FCC 47 CFR Part 2(2.1093)		
Remarks	None		

Editor: Gavin Gao

Gavin Gao

Auditor: Xingwei Zhang

Xingwei Zhang

Approver: Huangsheng Lin

Huangsheng Lin

Matters Needing Attention

- a) The electronic report shall be valid after encryption.
- b) The paper report shall be valid after being stamped with the official seal of the company.
- c) The report is invalid without the signature of the Editor, Auditor and Approver.
- d) The test report is invalid if there is any evidence of erasure and/or falsification.
- e) If there is any dissidence for the test report, please file objection to the lab within 15 days from the date of receiving the test report.
- f) The test report is only responsible for the tested model/sample.
- g) Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the lab.

Revision History

Report No.	Version	Description	Issued Date
24ADRTCC6003A	Rev.01	Initial issue of report	Mar. 21, 2024

Catalogue

Catalogue	4
1. Introduction	5
2. Product Description	6
3. SAR Characterization	8
3.1. SAR Design Target and Uncertainty	8
3.2. SAR Char Table	9

1. Introduction

The RF exposure limit is defined based on time-averaged RF exposure. The product implements Qualcomm Smart Transmit feature which controls the instantaneous transmitting power for WWAN transmitter to ensure the product in compliance with RF exposure limit over a defined time window, for SAR (transmit frequency $\leq 6\text{GHz}$) to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is compliant to the regulation requirement. Smart Transmit cannot operate without SAR characterization at the device level, beforehand.

This report describes the procedures for the SAR char generation, and the parameters obtained from SAR characterization (referred to as SAR char, respectively) will be used as input for Smart Transmit. Both SAR char will be entered via the Embedded File System (EFS) to enable the Smart Transmit GEN2 Feature.

Terminologies in this report:

P_{limit}:

The time-averaged RF power which corresponds to SAR_design_target.

P_{max}:

Maximum target power level

SAR_Design_Target:

The design target for SAR compliance. It should be less than regulatory SAR limit to account for all device design related uncertainty.

SAR char:

P_{limit} for all the technologies/bands for all applicable DSI

2. Product Description

Product Feature & Specification	
Product Name:	Mobile Cellular Phone
Model Name:	XT2429-1
Brand Name:	Motorola
FCC ID:	IHDT56AR4
Device Operating Configurations:	
Modulation Mode:	GSM: GMSK, 8PSK; WCDMA: RMC/AMR 12.2Kbps, HSDPA, HSUPA, DC-HSDPA, HSPA+; LTE: QPSK,16QAM,64QAM,256QAM; 5G NR: CP-OFDM / DFT-s-OFDM, P1/2 BPSK, QPSK,16QAM,64QAM,256QAM; Wi-Fi: DSSS, OFDM; BT: GFSK, $\pi/4$ DQPSK,8DPSK NFC: ASK
Wireless Technology and Frequency Range:	Band: Tx (MHz) GSM850: 824~849 GSM1900: 1850~1910 WCDMA Band II: 1850~1910 WCDMA Band IV: 1710~1755 WCDMA Band V: 824~849 LTE Band 2: 1850~1910 LTE Band 4: 1710~1755 LTE Band 5: 824~849 LTE Band 7: 2500~2570 LTE Band 12: 699~716 LTE Band 13: 777~787 LTE Band 17: 704~716 LTE Band 25: 1850~1915 LTE Band 26: 814~849 LTE Band 38: 2570~2620 LTE Band 41: 2496~2690 LTE Band 42: 3450~3550 LTE Band 66: 1710~1780 5G NR n2: 1850~1910 5G NR n5: 824~849 5G NR n7: 2500~2570 5G NR n26: 814~849 5G NR n38: 2570~2620 5G NR n41: 2496~2690 5G NR n66: 1710~1780 5G NR n78: 3450~3550 Wi-Fi 2.4GHz: 2412~2462 Wi-Fi 5.2GHz: 5180~5240 Wi-Fi 5.3GHz: 5260~5320 Wi-Fi 5.5GHz: 5500~5720

	Wi-Fi 5.8GHz: 5745~5825 Bluetooth: 2402~2480 NFC: 13.56
--	---

3. SAR Characterization

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating at 6 GHz or below. It will then be used as input for Smart Transmit to control and manage RF exposure for $f < 6$ GHz.

3.1. SAR Design Target and Uncertainty

SAR Design Target:

FCC SAR	Measure Distance	Measured SAR(W/kg)	
		WWAN 2/3/4/5G Bottom Antenna	WWAN 2/3/4/5G Top Antenna
Head (1g)	touch&tilt 15deg	1.03	0.71
Body-Worn (1g)	5mm	1.03	0.71
Hotspot (1g)	5mm	1.03	0.50
Extremity (10g)	0mm	2.55	1.98

Uncertainty:

Item	Uncertainty dB (k=2)
Total uncertainty	1.5

To account for total uncertainty, SAR_design_target should be determined as:

$$SAR_{design_target} < SAR_{regulatory_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

Antenna:

Antenna Group 1	Ant2 & Ant4 & Ant5 & Ant6 & Ant7 & Ant8
Antenna Group 0	Ant0 & Ant1 & Ant11

3.2. SAR Char Table

SAR char must be generated to cover all radio configurations and usage scenarios that the wireless device supports for operating at 6 GHz or below. It will then be used as input for Smart Transmit to control and manage RF exposure for $f < 6$ GHz.

<Plimit for supported technologies and bands (Plimit in EFS file)>

Band	Antenna	Head DSI 2	Body- Worn DSI 3	Extremity DSI 6	Hotspot DSI 7	Sensor off DSI 4	Pmax
GSM 850(GPRS 1Tx slot)	ANT0	26.50	26.50	26.50	26.50	23.00	23.00
GSM 1900(GPRS 2Tx slot)	ANT1	25.00	21.50	25.00	21.50	21.00	21.00
WCDMA II	ANT1	44.50	21.00	22.50	20.00	23.00	23.00
WCDMA IV	ANT1	44.50	21.00	23.50	19.50	23.00	23.00
WCDMA V	ANT0	44.70	44.70	44.70	44.70	23.00	23.00
LTE Band 12(B17)	ANT0	44.70	44.70	44.70	44.70	23.00	23.00
LTE Band 12(B17)	ANT4	23.70	44.70	44.70	24.20	22.00	22.00
LTE Band 13	ANT0	44.70	44.70	44.70	44.70	23.00	23.00
LTE Band 13	ANT4	23.70	44.70	44.70	23.20	21.00	21.00
LTE Band 28	ANT0	44.70	44.70	44.70	44.70	23.00	23.00
LTE Band 28	ANT4	23.70	44.70	44.70	44.70	21.50	21.50
LTE Band 26(B5)	ANT0	44.70	44.70	44.70	44.70	23.00	23.00
LTE Band 26(B5)	ANT4	23.70	44.70	44.70	44.70	20.50	20.50
LTE Band 66(B4)	ANT1	44.50	20.50	22.50	20.50	23.00	23.00
LTE Band 66(B4)	ANT4	21.00	20.00	23.00	17.50	20.50	20.50
LTE Band 25(B2)	ANT1	44.50	20.50	22.50	20.50	22.50	22.50
LTE Band 25(B2)	ANT4	17.00	17.50	19.00	16.00	21.50	21.50
LTE Band 7	ANT1	44.00	21.00	22.00	19.50	23.00	23.00
LTE Band 7	ANT4	18.00	19.00	20.00	16.00	23.00	23.00
LTE Band41(B38)	ANT1	42.00	21.50	42.00	20.00	21.00	21.00
LTE Band41(B38)	ANT4	17.00	19.00	20.00	16.50	20.00	20.00
LTE Band42	ANT2	16.00	15.50	19.00	12.50	21.00	21.00
FR1 N2	ANT1	44.50	19.50	22.50	20.00	23.00	23.00
FR1 N2	ANT4	18.00	19.00	19.00	17.00	23.00	23.00
FR1 N7	ANT1	44.00	20.50	21.00	19.50	22.00	22.00
FR1 N7	ANT4	18.50	18.50	19.50	15.50	23.00	23.00
FR1 N26	ANT0	44.70	44.70	44.70	44.70	22.00	22.00
FR1 N26	ANT4	23.70	44.70	44.70	44.70	21.50	21.50
FR1 N5	ANT0	44.70	22.00	44.70	44.70	23.00	23.00
FR1 N5	ANT4	24.00	24.70	24.70	24.70	23.00	23.00
FR1 N41(N38)	ANT1	44.00	21.50	22.50	20.00	23.00	23.00
FR1 N66	ANT1	44.50	21.00	23.00	19.50	23.00	23.00
FR1 N66	ANT4	20.00	18.50	21.00	16.00	23.00	23.00
FR1 N78 Part27Q	ANT2	17.00	17.00	19.00	12.50	22.50	22.50
FR1 N78 Part27Q	ANT5	44.00	44.00	44.00	44.00	15.50	15.50

FR1 N78 Part27Q	ANT7	44.00	44.00	44.00	44.00	16.00	16.00
FR1 N78 Part27Q	ANT11	44.00	22.50	44.00	19.00	22.00	22.00

Note:

- 1) Pmax is used for RF tune up procedure. The maximum allowed output power is equal to Pmax + 1.0 dB device uncertainty.
- 2) All Plimit power levels entered in the Table correspond to average power levels after accounting for duty cycle in the case TDD modulation schemes (for e.g., GSM & LTE TDD & NR TDD).
- 3) If DSI Plimit is higher than Pmax, then Plimit is operate as Pmax.
- 4) The following table is duty cycle and factor used for calculating time average power.

GSM&FDD&TDD	Duty cycle	Time average calculation factor(dB)
GSM 1TX	12.50%	-9.0
GSM 2TX	25%	-6.0
GSM 3TX	37.50%	-4.3
GSM 4TX	50%	-3.0
LTE FDD	100%	0.0
LTE TDD	63.30%	-2.0
NR FDD/TDD	100%	0.0