

# 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



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Trademark	Motorola	FCC ID	IHDT56AR4
Applicant No.	RF173570	Sample No.	N/A
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## Revision History

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

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# 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<sub>limit</sub>:**

The time-averaged RF power which corresponds to SAR<sub>design\_target</sub>.

**P<sub>max</sub>:**

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<sub>limit</sub> for all the technologies/bands for all applicable DSI

## 2. Product Description

Product Feature & Specification	
<b>Product Name:</b>	Mobile Cellular Phone
<b>Model Name:</b>	XT2429-1
<b>Brand Name:</b>	Motorola
<b>FCC ID:</b>	IHDT56AR4
<b>Device Operating Configurations:</b>	
<b>Modulation Mode:</b>	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
<b>Wireless Technology and Frequency Range:</b>	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
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### 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 P<sub>limit</sub> 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 P<sub>limit</sub> is higher than Pmax, then P<sub>limit</sub> 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