



RF Exposure Report

(Part 0: SAR Char Evaluation)

FCC ID : UZ7TC58AE
Equipment : Touch Computer
Brand Name : Zebra
Model Name : TC58AE
Applicant : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Standard : FCC 47 CFR Part 2 (2.1093)

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., 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

Report No.	Version	Description	Issued Date
FA411111A	01	Initial issue of report	May 10, 2024

1. Introduction

The FCC 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 FCC 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. Cannot operate without SAR characterization at the device level, beforehand.

This report describes the procedures for the SAR char 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 Feature.

Terminologies in this report

Plimit	The time-averaged RF power which corresponds to SAR_design_target.
Pmax	Maximum target power level
SAR_design_target:	The design target for SAR compliance. It should be less than regulatory power density limit to account for all device design related uncertainties.
SAR char	Plimit for all the technologies/bands for all applicable DSI

Test Lab Information

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Test Firm Registration Number for FCC	553509
FCC Designation No.	TW1190
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2. 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 $f < 6\text{GHz}$.

2.1 SAR design target and uncertainty

<SAR design target and uncertainty>

The detail SAR design target relate to each exposure conditions pls refer to operation description

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

Band	Antenna	Duty cycle	WLAN OFF			WLAN ON		
			Head	Body-worn / Product Specific	Free Space Mode	Hotspot	Head	Body-worn / Product Specific
			(DSI:2)	(DSI:1)	(DSI:0)	(DSI:3)	(DSI2)	DSI1
WCDMA II	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
WCDMA IV	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
WCDMA V	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B2/25	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B2/25	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B4/66	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B4/66	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B5/26	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B7	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B12/B17	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B13	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B14	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B30	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B41/38(PC3)	5	63.30%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B41 (PC2)	5	43.30%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B48	8	63.30%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B48	9	63.30%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
LTE B71	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n7	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n12	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n13	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n14	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n2/n25	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n2/n25	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n5/n26	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n30	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n66	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n66	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n71	1	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n38/n41	5	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n41_HPUE	5	50.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n41	2	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n41	3	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n41	4	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n48	8	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n48	9	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_Part 270/27Q PC3	8	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_Part 270/27Q PC2	8	50.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_Part 96 PC3	8	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_Part 270/27Q PC3	9	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_Part 270/27Q PC2	9	50.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_Part 96	9	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_PC3 SRS	4	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224
n77/78_PC3 SRS	3	100.00%	0.935	0.953/2.54	2.54	0.635	0.635	0.635/2.224

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

2.2 SAR Char Table

<P_{limit} for supported technologies and bands (P_{limit} in EFS file)>

*P_{max} is used for RF tune up procedure. The maximum allowed output power is equal to P_{max} + 1dB uncertainty.

**All P_{limit} 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).

The max allowed output power is the P_{limit} + 1dB device uncertainty, and if P_{limit} is higher than P_{max}, the device output power will be P_{max} instead.

Band	Antenna	Duty Cycle	P _{max} *	WLAN OFF (P limit)			WLAN ON (P limit)		
				Head	Body-worn / Product Specific	Free Space Mode	Hotspot	Head	Body- worn/ Product Specific
				(DSI:2)	(DSI:1)	(DSI:0)	(DSI:3)	(DSI2)	DSI1
WCDMA II	1	100.00%	24.2	26.6	23.9	24.2	22.6		
WCDMA IV	1	100.00%	24.2	25.5	24	24.2	20.7	1.8	1.8
WCDMA V	1	100.00%	24.2	29	26.7	24.2	25		
LTE B2/25	1	100.00%	24.2	26.7	23.4	24.2	22.1		0.9
LTE B2/25	5	100.00%	24.2	31.8	23.4	24.2	22.3		
LTE B4/66	1	100.00%	24.2	25.4	23.3	24.2	20.7	1.7	1.7
LTE B4/66	5	100.00%	24.2	30.3	23.5	24.2	22.6		
LTE B5/26	1	100.00%	24.2	29	27.8	24.2	26.3		
LTE B7	5	100.00%	24.2	38	21.5	24.2	22.9		
LTE B12/B17	1	100.00%	24.2	31.2	28	24.2	27		
LTE B13	1	100.00%	24.2	29.7	28	24.2	26.2		
LTE B14	1	100.00%	24.2	30.2	28	24.2	26.4		
LTE B30	5	100.00%	24.2	30.2	23.4	24.2	23.4		
LTE B41/38(PC3)**	5	63.30%	22.2	40.3	21.5	24.2	20.4		
LTE B41 (PC2)**	5	43.30%	22.4						
LTE B48**	8	63.30%	21.0	23.8	22.5	23	21.3		
LTE B48**	9	63.30%	21.0	27.7	23.1	23	20.2		
LTE B71	1	100.00%	24.2	31.5	27.3	24.2	26.9		
n7	5	100.00%	24.2	36.7	22.6	24.2	23.3		
n12	1	100.00%	24.2	30.7	27.9	24.2	26.9		
n13	1	100.00%	24.2	29.7	28.2	24.2	26.6		
n14	1	100.00%	24.2	29.6	27.7	24.2	25.9		
n2/n25	1	100.00%	24.2	26.6	24.2	24.2	22.8		1.7
n2/n25	5	100.00%	24.2	32.1	23.2	24.2	21.9		
n5/n26	1	100.00%	24.2	29	28.4	24.2	26.6		
n30	5	100.00%	24.2	28	23.2	24.2	23.2		
n66	1	100.00%	24.2	26.1	23	24.2	20.6		1.7
n66	5	100.00%	24.2	29.3	23.3	24.2	22.6		
n71	1	100.00%	24.2	31.3	27.6	24.2	26.9		
n38/n41**	5	100.00%	24.2	36.3	26.9	24.2	23.1		
n41_HPUE**	5	50.00%	23.0						
n41**	2	100.00%	21.0	26	24.8	21	23.4		
n41**	3	100.00%	21.0	21	24	21	22.2	1.8	
n41**	4	100.00%	21.0	26	27.2	21	27.4		
n48	8	100.00%	23.0	27.3	23.3	23	21.8		
n48	9	100.00%	23.0	25.2	23.2	23	21.7		
n77/78_Part 270 / 27Q PC3	8	100.00%	24.2	22.6	21.9	26	20.5	1.8	
n77/78_Part 270 / 27Q PC2	8	50.00%	23.0						
n77/78_Part 96 PC3	8	100.00%	21.0						
n77/78_Part 270 / 27Q PC3	9	100.00%	21.0	25.5	19.8	21	16.9		2.9
n77/78_Part 96 PC3	9	100.00%	21.0						
n77/78_PC3 SRS	4	100.00%	21.0	24	21.2	21	18.5		2.7
n77/78_PC3 SRS	3	100.00%	21.0	23	21.8	21	19.3		