RF Exposure Report

(Part 0: SAR Char Evaluation)

FCC ID	**: UZ7TC58BE**
Equipment	**: Touch Computer**
Brand Name	**: Zebra**
Model Name	**: TC58BE**
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
FA4111108	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 sto ensure the product in compliance with FCC RF exposure limit over a defined time window, for SAR (transmit frequency ≤ 6GHz) 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 operat without SAR characterization at the device level, beforehand.

This report describes the procedures for the SAR char and the parameters obtained from SAR characterization (reffered 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

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 power density limit to account for all device design related uncertainties.
SAR char	P_{limit} for all the technologies/bands for all applicable DSI

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 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

Band	Antenna	Device Uncetainty (dB)	Duty cycle	Head WiFi off 1g SAR design target DSI2	Head WiFi on 1g SAR design target DSI2	Hotspot Body WiFi on 1g SAR design target DSI1 / DSI3	Body WiFi off 1g SAR design target DSI1	Extremity 10g SAR design target DSI1
GSM850(4 Tx slots)**	1	1	50.00%	0.953	0.635	0.635	0.953	2.54
GSM1900(4 Tx slots)**	1	1	50.00%	0.953	0.635	0.635	0.953	2.54
WCDMA II	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
WCDMA IV	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
WCDMA V	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B2/25	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B2/25	5	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B4/66	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B4/66	5	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B5/26	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B7	5	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B12/B17	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
LTE B41/38(PC3)**	5	1	63.30%	0.953	0.635	0.635	0.953	2.54
LTE B41 (PC2)**	5	1	43.30%					2.54
LTE B42**	8	1	63.30%	0.953	0.635	0.635	0.953	2.54
LTE B71	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
n7	5	1	100.00%	0.953	0.635	0.635	0.953	2.54
n12	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
n2/n25	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
n2/n25	5	1	100.00%	0.953	0.635	0.635	0.953	2.54
n5/n26	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
n66	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
n66	5	1	100.00%	0.953	0.635	0.635	0.953	2.54
n71	1	1	100.00%	0.953	0.635	0.635	0.953	2.54
n38/n41**	5	1	100.00%	0.953	0.635	0.635	0.953	2.54
n41_HPUE**	5	1	50.00%					
n41**	2	1	100.00%	0.953	0.635	0.635	0.953	2.54
n41**	3	1	100.00%	0.953	0.635	0.635	0.953	2.54
n41**	4	1	100.00%	0.953	0.635	0.635	0.953	2.54
n77/78_Part 27O / 27Q PC3	8	1	100.00%	0.953	0.635	0.635	0.953	2.54
n77/78_Part 27O / 27Q PC2	8	1	50.00%					
n77/78_Part 27O / 27Q PC3	9	1	100.00%	0.953	0.635	0.635	0.953	2.54
n77/78_PC3 SRS	4	1	100.00%	0.953	0.635	0.635	0.953	2.54
n77/78_PC3 SRS	3	1	100.00%	0.953	0.635	0.635	0.953	2.54

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

$$SAR\_design\_target < SAR_{regulatory\_limit} \times 10^{\frac{-total\ uncertainty}{10}}$$

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 Pmax + 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	Device Uncetainty (dB)	Duty cycle	Head (Wlan Off)	Body Worn / Extremity (Wlan Off)	Free Space Mode (Wlan Off)	Hotspot (Wlan On)	Head (Wlan On)	Body Worn / Extremity (Wlan On)	Pmax*
				(DSI:2)	(DSI:1)	(DSI:0)	(DSI:3)	(DSI2)	DSI1	
GSM850(4 Tx slots)**	1	1	50.00%	30.9	27	27	29.5			27
GSM1900(4 Tx slots)**	1	1	50.00%	23.7	23.8	25	20.7	1.8		25
WCDMA II	1	1	100.00%	26.6	23.9	24.2	22.6			24.2
WCDMA IV	1	1	100.00%	25.5	24	24.2	20.7	1.8	1.8	24.2
WCDMA V	1	1	100.00%	29	26.7	24.2	25			24.2
LTE B2/25	1	1	100.00%	26.7	23.4	24.2	22.1		0.9	24.2
LTE B2/25	5	1	100.00%	31.8	23.4	24.2	22.3			24.2
LTE B4/66	1	1	100.00%	25.4	23.3	24.2	20.7	1.7	1.7	24.2
LTE B4/66	5	1	100.00%	30.3	23.5	24.2	22.6			24.2
LTE B5/26	1	1	100.00%	29	27.8	24.2	26.3			24.2
LTE B7	5	1	100.00%	38	21.5	24.2	22.9			24.2
LTE B12/B17	1	1	100.00%	31.2	28	24.2	27			24.2
LTE B41/38(PC3)**	5	1	63.30%	40.3	21.5	24.2	20.4			22.2
LTE B41 (PC2)**	5	1	43.30%							22.4
LTE B42**	8	1	63.30%	26.3	22.2	22.2	24.2			22.2
LTE B71	1	1	100.00%	31.5	27.3	24.2	26.9			24.2
n7	5	1	100.00%	36.7	22.6	24.2	23.3			24.2
n12	1	1	100.00%	30.7	27.9	24.2	26.9			24.2
n2/n25	1	1	100.00%	26.6	24.2	24.2	22.8		1.7	24.2
n2/n25	5	1	100.00%	32.1	23.2	24.2	21.9			24.2
n5/n26	1	1	100.00%	29	28.4	24.2	26.6			24.2
n66	1	1	100.00%	26.1	23	24.2	20.6		1.7	24.2
n66	5	1	100.00%	29.3	23.3	24.2	22.6			24.2
n71	1	1	100.00%	31.3	27.6	24.2	26.9			24.2
n38/n41**	5	1	100.00%	36.3	26.9	24.2	23.1			24.2
n41_HPUE**	5	1	50.00%							23.0
n41**	2	1	100.00%	26	24.8	21	23.4			21.0
n41**	3	1	100.00%	21	24	21	22.2	1.8		21.0
n41**	4	1	100.00%	26	27.2	21	27.4			21.0
n77/78_Part 27O / 27Q PC3	8	1	100.00%	22.6	21.9	26	20.5	1.8		24.2
n77/78_Part 27O / 27Q PC2	8	1	50.00%							23.0
n77/78_Part 27O / 27Q PC3	9	1	100.00%	25.5	19.8	21	16.9		2.9	21.0
n77/78_PC3 SRS	4	1	100.00%	24	21.2	21	18.5		2.7	21.0
n77/78_PC3 SRS	3	1	100.00%	23	21.8	21	19.3			21.0