

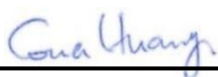
RF Exposure Report

(Part 0: SAR Characterization Evaluation)

FCC ID : A4RGTF7P
Equipment : Phone
Model Name : GTF7P, G3Y12
Applicant : Google LLC
1600 Amphitheatre Parkway,
Mountain View, California, 94043 USA
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

Sporton International Inc. Wensan Laboratory

No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan



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History of this test report

Report No.	Version	Description	Issued Date
FA451607A	01	Initial issue of report	Sep. 25, 2024

1. Introduction

The FCC RF exposure limit is based on time-averaged RF exposure. SAR regulatory specifications are defined over certain measurement duration allowing for time-averaging. The Samsung S.LSI proprietary TAS (Time Average SAR) algorithm has been designed to meet the compliance limits over the required duration, while still allowing dynamic control of transmit power for meeting system performance.

This report shows SAR characterization of sub6GHz. The characterization is achieved by determination of Plimit. In the case of sub6GHz, power is measured by antenna connection port power. Plimit is the power level that corresponds to the exposure design target. Design target is defined as SAR_design target for sub6GHz.

The compliance test under static transmission and simultaneous transmission are performed and summarized in Part 1 report. The validation of TAS algorithm under the dynamic transmission scenarios are conducted are reported in Part 2. Terminologies for this report are listed up in the table below.

Pmax	Maximum Tx power that can be transmitted physically from RFIC for a given RAT
SAR_FCC_limit	SAR limit specified by FCC 1.6 W/kg averaged over 1-gram, for head and body exposure, and 4 W/kg averaged over 10-gram, for extremity exposure
SAR_target	Target SAR level used in TAS algorithm. This SAR value should be less than FCC limit and should be determined after accounting for all uncertainties and other design considerations.
Plimit	The time-averaged RF power that corresponds to SAR_target.
SAR characterization	Characterization of SAR value for all sub6GHz technologies

2. SAR Characterization

SAR characterization must be performed 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 S.LSI TAS feature to control and manage RF exposure for $f < 6$ GHz.

2.1 SAR design target and uncertainty

Accounting for total uncertainty, SAR_design_target should meet the following condition:

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

Wireless technology/ band	Antenna	Duty cycle	Head		Hotspot	Body-worn		Extremity		power tolerance (dB)
			Standalone	Simultaneous	Simultaneous	Standalone	Simultaneous	Standalone	Simultaneous	
			Index 2	Index 3	Index 4	Index 5	Index 6	Index 5	Index 6	
			1g SAR design target (W/Kg)					10g SAR design target (W/Kg)		
GSM850 GSM/GPRS 1TX	0	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 GPRS 2TX	0	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 GPRS 3TX	0	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 GPRS 4TX	0	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 1TX	0	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 2TX	0	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 3TX	0	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 4TX	0	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 GSM/GPRS 1TX	1	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 GPRS 2TX	1	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 GPRS 3TX	1	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 GPRS 4TX	1	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 1TX	1	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 2TX	1	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 3TX	1	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM850 EDGE 4TX	1	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GSM/GPRS 1TX	2	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GPRS 2TX	2	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GPRS 3TX	2	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GPRS 4TX	2	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 1TX	2	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 2TX	2	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 3TX	2	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 4TX	2	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GSM/GPRS 1TX	0	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GPRS 2TX	0	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GPRS 3TX	0	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 GPRS 4TX	0	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 1TX	0	12.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 2TX	0	25.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 3TX	0	37.50%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
GSM1900 EDGE 4TX	0	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00

Wireless technology/ band	Antenna	Duty cycle	Head		Hotspot	Body-worn		Extremity		power tolerance (dB)
			Standalone	Simultaneous	Simultaneous	Standalone	Simultaneous	Standalone	Simultaneous	
			Index 2	Index 3	Index 4	Index 5	Index 6	Index 5	Index 6	
			1g SAR design target (W/Kg)						10g SAR design target (W/Kg)	
WCDMA B2	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
WCDMA B2	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
WCDMA B4	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
WCDMA B4	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
WCDMA B5	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
WCDMA B5	1	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band B2	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band B2	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 7	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 7	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 12/B17	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 12/B17	1	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 26/B5	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 26/B5	1	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 41/B38 PC3	2	63.30%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 41/B38 PC2	2	43.30%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 41/B38 PC3	0	63.30%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 41/B38 PC2	0	43.30%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 66/B4	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
LTE Band 66/B4	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00

Wireless technology/ band	Antenna	Duty cycle	Head		Hotspot	Body-worn		Extremity		power tolerance (dB)
			Standalone	Simultaneous	Simultaneous	Standalone	Simultaneous	Standalone	Simultaneous	
			Index 2	Index 3	Index 4	Index 5	Index 6	Index 5	Index 6	
			1g SAR design target (W/Kg)					10g SAR design target (W/Kg)		
FR1 n2	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n2	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n7	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n7	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n12	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n12	1	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n26/n5	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n26/n5	1	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n41/n38 PC3	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n41 PC2	2	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n41/n38 PC3	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n41 PC2	0	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n66	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n66	0	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n77/n78 PC3	6	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n77/n78 PC2	6	50.00%	0.77	0.66	0.66	0.77	0.66	2.56	2.17	1.10
FR1 n77/n78 PC3	2	100.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n77/n78 PC2	2	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00
FR1 n77/n78 PC2	1	50.00%	0.77	0.66	0.66	0.77	0.66	2.56	2.17	1.10
FR1 n77/n78 PC2	5	50.00%	0.79	0.67	0.67	0.79	0.67	2.62	2.22	1.00

2.2 SAR Characterization – Power Table

1. The Plimit values correspond to SAR_design_target.
2. GSM don't support time average feature of dynamic power varying, the power will be fixed at the static reduce power level at different exposure conditions for RF exposure compliance. For the GSM Plimit power levels in the table correspond to the burst average power levels which don't account for TX duty cycle.
3. UMTS, LTE and 5GNR TDD: Plimit power levels in the table correspond to the time-averaged power levels which accounts for TX duty cycle.
4. Maximum target power, Pmax, is configured in NV settings in EUT to limit maximum transmitting power. This power is converted into peak power in NV settings for TDD schemes.

<P_{limit} for supported technologies and bands (P_{limit} corresponding to SAR design target)>

Wireless technology/ band (No Accounting duty cycle)	Antenna	Duty cycle	Maximum Power Condition	Head		Hotspot	Body-worn/Extremity		P Max Burst average power (dBm)
				Standalone	Simultaneous	Simultaneous	Standalone	Simultaneous	
			Index 1	Index 2	Index 3	Index 4	Index 5	Index 6	
			P limit						
			Burst average power (dBm)						
GSM850 GSM/GPRS 1TX	0	12.50%	32.50	37.50	33.80	34.20	35.30	34.20	32.50
GSM850 GPRS 2TX	0	25.00%	31.50	34.50	30.80	31.20	32.30	31.20	31.50
GSM850 GPRS 3TX	0	37.50%	30.50	32.70	29.00	29.40	30.50	29.40	30.50
GSM850 GPRS 4TX	0	50.00%	29.00	31.50	27.80	28.20	29.30	28.20	29.00
GSM850 EDGE 1TX	0	12.50%	27.00	37.50	33.80	34.20	35.30	34.20	27.00
GSM850 EDGE 2TX	0	25.00%	26.50	34.50	30.80	31.20	32.30	31.20	26.50
GSM850 EDGE 3TX	0	37.50%	26.50	32.70	29.00	29.40	30.50	29.40	26.50
GSM850 EDGE 4TX	0	50.00%	24.50	31.50	27.80	28.20	29.30	28.20	24.50
GSM850 GSM/GPRS 1TX	1	12.50%	32.00	30.00	27.90	31.20	34.30	31.20	32.00
GSM850 GPRS 2TX	1	25.00%	31.50	27.00	24.90	28.20	31.30	28.20	31.50
GSM850 GPRS 3TX	1	37.50%	29.50	25.20	23.10	26.40	29.50	26.40	29.50
GSM850 GPRS 4TX	1	50.00%	27.00	24.00	21.90	25.20	28.30	25.20	27.00
GSM850 EDGE 1TX	1	12.50%	26.50	30.00	27.90	31.20	34.30	31.20	26.50
GSM850 EDGE 2TX	1	25.00%	26.00	27.00	24.90	28.20	31.30	28.20	26.00
GSM850 EDGE 3TX	1	37.50%	26.00	25.20	23.10	26.40	29.50	26.40	26.00
GSM850 EDGE 4TX	1	50.00%	23.00	24.00	21.90	25.20	28.30	25.20	23.00
GSM1900 GSM/GPRS 1TX	2	12.50%	29.50	36.10	35.40	30.80	30.80	30.80	29.50
GSM1900 GPRS 2TX	2	25.00%	28.50	33.10	32.40	27.80	27.80	27.80	28.50
GSM1900 GPRS 3TX	2	37.50%	28.00	31.30	30.60	26.00	26.00	26.00	28.00
GSM1900 GPRS 4TX	2	50.00%	27.00	30.10	29.40	24.80	24.80	24.80	27.00
GSM1900 EDGE 1TX	2	12.50%	25.00	36.10	35.40	30.80	30.80	30.80	25.00
GSM1900 EDGE 2TX	2	25.00%	24.00	33.10	32.40	27.80	27.80	27.80	24.00
GSM1900 EDGE 3TX	2	37.50%	24.00	31.30	30.60	26.00	26.00	26.00	24.00
GSM1900 EDGE 4TX	2	50.00%	23.00	30.10	29.40	24.80	24.80	24.80	23.00
GSM1900 GSM/GPRS 1TX	0	12.50%	29.00	35.70	35.00	30.50	32.30	30.50	29.00
GSM1900 GPRS 2TX	0	25.00%	28.50	32.70	32.00	27.50	29.30	27.50	28.50
GSM1900 GPRS 3TX	0	37.50%	27.50	30.90	30.20	25.70	27.50	25.70	27.50
GSM1900 GPRS 4TX	0	50.00%	26.50	29.70	29.00	24.50	26.30	24.50	26.50
GSM1900 EDGE 1TX	0	12.50%	25.00	35.70	35.00	30.50	32.30	30.50	25.00
GSM1900 EDGE 2TX	0	25.00%	23.50	32.70	32.00	27.50	29.30	27.50	23.50
GSM1900 EDGE 3TX	0	37.50%	23.50	30.90	30.20	25.70	27.50	25.70	23.50
GSM1900 EDGE 4TX	0	50.00%	22.50	29.70	29.00	24.50	26.30	24.50	22.50

<P_{limit} for supported technologies and bands (P_{limit} corresponding to SAR design target)>

Wireless technology/ band (Accounting duty cycle)	Antenna	Duty cycle	Maximum Power Condition	Head		Hotspot	Body-worn/Extremity		P Max Time-average power (dBm)
				Standalone	Simultaneous	Simultaneous	Standalone	Simultaneous	
			Index 1	Index 2	Index 3	Index 4	Index 5	Index 6	
			P limit						
Time-average power (dBm)									
WCDMA B2	2	100.00%	24.00	25.70	23.50	20.70	20.70	20.70	24.00
WCDMA B2	0	100.00%	23.50	26.60	25.90	22.10	22.80	22.10	23.50
WCDMA B4	2	100.00%	24.70	25.80	23.70	21.40	21.40	21.40	24.70
WCDMA B4	0	100.00%	24.20	27.40	26.70	23.30	24.00	23.30	24.20
WCDMA B5	0	100.00%	24.00	28.30	24.00	24.50	25.90	24.50	24.00
WCDMA B5	1	100.00%	23.50	20.60	18.50	21.50	25.00	21.50	23.50
LTE Band 2	2	100.00%	24.00	26.00	23.90	20.90	20.90	20.90	24.00
LTE Band 2	0	100.00%	23.50	26.00	25.30	21.00	22.50	21.00	23.50
LTE Band 7	2	100.00%	24.70	24.70	22.70	20.30	20.60	20.60	24.70
LTE Band 7	0	100.00%	24.20	26.30	23.90	20.00	22.60	20.00	24.20
LTE Band 12/B17	0	100.00%	24.70	30.80	30.10	24.70	25.40	24.70	24.70
LTE Band 12/B17	1	100.00%	24.20	21.40	20.00	24.10	27.50	24.10	24.20
LTE Band 26/B5	0	100.00%	24.70	28.30	24.40	24.50	25.80	25.10	24.70
LTE Band 26/B5	1	100.00%	24.20	20.40	18.30	21.70	25.40	21.70	24.20
LTE Band 41/B38 PC3	2	63.30%	22.70	24.10	22.00	20.30	20.70	20.70	22.70
LTE Band 41/B38 PC2	2	43.30%	22.90	24.10	22.00	20.30	20.70	20.70	22.90
LTE Band 41/B38 PC3	0	63.30%	22.20	28.30	27.60	20.60	23.50	20.60	22.20
LTE Band 41/B38 PC2	0	43.30%	22.40	28.30	27.60	20.60	23.50	20.60	22.40
LTE Band 66/B4	2	100.00%	24.70	26.40	24.30	21.10	21.10	21.10	24.70
LTE Band 66/B4	0	100.00%	24.20	26.90	26.20	22.70	23.70	22.70	24.20

<P_{limit} for supported technologies and bands (P_{limit} corresponding to SAR design target)>

Wireless technology/ band (Accounting duty cycle)	Antenna	Duty cycle	Maximum Power Condition	Head		Hotspot	Body-worn/Extremity		P Max Time-average power (dBm)
				Standalone	Simultaneous	Simultaneous	Standalone	Simultaneous	
			Index 1	Index 2	Index 3	Index 4	Index 5	Index 6	
			P limit						
			Time-average power (dBm)						
FR1 n2	2	100.00%	24.00	26.10	23.90	20.80	21.50	20.80	24.00
FR1 n2	0	100.00%	23.50	25.90	25.20	21.00	22.70	21.00	23.50
FR1 n7	2	100.00%	24.70	24.40	22.90	20.30	21.00	20.30	24.70
FR1 n7	0	100.00%	24.20	26.30	23.80	19.60	22.60	19.60	24.20
FR1 n12	0	100.00%	24.70	29.60	28.90	24.90	25.60	24.90	24.70
FR1 n12	1	100.00%	24.20	21.10	19.50	27.30	28.00	27.30	24.20
FR1 n26/n5	0	100.00%	24.70	29.00	24.50	24.70	25.40	24.70	24.70
FR1 n26/n5	1	100.00%	24.20	20.50	18.80	22.10	25.60	22.10	24.20
FR1 n41/n38 PC3	2	100.00%	24.70	24.50	22.50	20.60	20.70	20.70	24.70
FR1 n41 PC2	2	50.00%	23.50	24.50	22.50	20.60	20.70	20.70	23.50
FR1 n41/n38 PC3	0	100.00%	24.20	27.40	26.70	20.90	23.40	20.90	24.20
FR1 n41 PC2	0	50.00%	23.00	27.40	26.70	20.90	23.40	20.90	23.00
FR1 n66	2	100.00%	24.70	26.70	24.50	21.50	21.50	21.50	24.70
FR1 n66	0	100.00%	24.20	26.90	26.20	22.00	23.80	22.00	24.20
FR1 n77/n78 PC3	6	100.00%	24.70	26.20	23.30	19.80	19.80	19.80	24.70
FR1 n77/n78 PC2	6	50.00%	23.20	26.20	23.30	19.80	19.80	19.80	23.20
FR1 n77/n78 PC3	2	100.00%	24.20	24.10	22.00	18.50	20.00	20.00	24.20
FR1 n77/n78 PC2	2	50.00%	22.70	24.10	22.00	18.50	20.00	20.00	22.70
FR1 n77/n78 PC2	1	50.00%	22.00	14.30	12.70	18.50	21.40	18.50	22.00
FR1 n77/n78 PC2	5	50.00%	22.00	14.20	13.50	18.50	21.50	18.50	22.00