

Part 0_BLADE_801_GEN1_RF Exposure Report

1. Product Description	2
2. SAR Characterization	3

1. Product Description

Product Name	PAYPAD_801_GEN1
Model Name	BLADE_801_GEN1
Operated Band	GSM850: 824 MHz ~ 849 MHz GSM1900: 1850 MHz ~ 1910 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz WCDMA Band XIX: 830 MHz ~ 845 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 19: 830 MHz ~ 845 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 40: 2300 MHz ~ 2400 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n41: 2496 MHz ~ 2690 MHz 5G NR n66: 1710 MHz ~ 1780 MHz 5G NR n71: 663 MHz ~ 698 MHz 5G NR n77: 3300 MHz ~ 4200 MHz Bluetooth: 2402 MHz ~ 2480 MHz 802.11b/g/n/ac/ax: 2412 MHz ~ 2462 MHz 802.11a/ac/n/ax: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5720 MHz; 5745 MHz ~ 5825 MHz 802.11a/ax: 5925 MHz ~ 6425 MHz; 6425 MHz ~ 6525 MHz;

	6525 MHz ~ 6875 MHz; 6875 MHz ~ 7125 MHz NFC: 13.56 MHz
--	--

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 char generation

The design target for SAR compliance (1gSAR compliance for FCC), denoted as ***SAR_design_target***, must be specified before generating SAR char.

SAR char determines the power level the device meets the ***SAR_design_target*** for each radio configuration and usage case supported. For SAR char generation, the SAR measurement should be performed in a static Tx power transmission mode, i.e., FTM mode at maximum power, or with callbox requesting maximum power and Smart Transmit disabled.

To generate SAR char for a smartphone:

1. Specify ***SAR_design_target***: The ***SAR_design_target*** shall be less than regulatory SAR limit (i.e., 1gSAR limit for FCC) after accounting for all device design related uncertainties.
2. Measure conducted power and SAR for each Tx antenna and supported technology/band. For a given technology/band, if the device supports multiple modulations (for example, QPSK, 16-QAM and 64-QAM in the case of LTE), then measurement on one modulation is sufficient for SAR char generation. For each supported band, SAR is evaluated at low, mid, high channels and the highest SAR among the three channels is chosen for the respective band.
3. Based on 1gSAR values obtained in Step 2, see Figure 2-2 to derive the worst-case 1gSAR for each DSI (i.e., DSI = "yes") and for all Tx antenna and supported technology/band.
4. Determine the Tx power level at which the corresponding worst-case 1gSAR is equal to ***SAR_design_target*** for each DSI and for all Tx antenna and supported technology/band.
5. FCC has specified 1gSAR and 10gSAR for different RF exposure scenarios. In this case, ***SAR_design_target*** is defined for 1gSAR first, and then calculate the Tx power level at which the corresponding worst-case 10gSAR is equal to the design target for 10gSAR compliance, ***SAR_design_target_extremity***, as follows:
 - a. Derive ***SAR_design_target_extremity*** for hand exposure scenario using

$$SAR_design_target_extremity = \frac{SAR_design_target}{1gSAR\ limit} \times 10gSAR\ limit$$

- b. Determine the Tx power level that corresponds to ***SAR_design_target_extremity*** for all Tx antenna and supported technologies/bands, denoted as ***Tx_power_at_SAR_design_target_extremity***
6. Generate SAR char and tabulate ***Tx_power_at_SAR_design_target*** versus DSI for each Tx antenna and for all supported technologies/bands.

2.2 SAR design target and uncertainty

For this EUT, the TxAGC uncertainty for sub6 radio is 1.0dB (k=2). Device-to-device uncertainty is 1.2dB (k=2). Total uncertainty can then be determined (see Table 3-4).

Table 2.2-1 uncertainty budget

Item	Uncertainty dB (k = 2)
Sub6 radio TxAGC	1.0
Device to device variation	1.2
Total uncertainty	1.49

Table 2.2-1 uncertainty budge

To account for total uncertainty, SAR_design_target should be determined as

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

The SAR design target is determined as Table 2.2-2:

SAR regulary limit (W/kg)	Total uncertainty (dB)	SAR design target (w/kg)
1.2	1	0.95

Table 2.2-2 SAR design target

Per FCC, KDB Publication 447498 D01v06, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance, For simultaneous transmission. the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR

Referring to the initial FCC submission, the worst-case reported SAR for each antenna/technology/bandDS1 is summarized in Table

2.3 Worst case reported SAR

Frequency Bands		Highest SAR Summary		
		Body (Gap 0mm)	APD	Scaled PD
		1g SAR (W/kg)	Body (mW/cm ²)	4cm ² psPD (mW/cm ²)
GSM	GSM 850	0.890	N/A	N/A
	GSM 1900	1.102	N/A	N/A
WCDMA	Band II	1.184	N/A	N/A
	Band IV	1.186	N/A	N/A
	Band V	0.933	N/A	N/A
	Band XIX	0.925	N/A	N/A
LTE	Band 2	0.72	N/A	N/A
	Band 5	0.787	N/A	N/A
	Band 7	1.136	N/A	N/A
	Band 12/17	0.746	N/A	N/A
	Band 13	0.513	N/A	N/A
	Band 19	0.870	N/A	N/A
	Band 25	1.176	N/A	N/A
	Band 26	1.014	N/A	N/A
	Band 38	1.179	N/A	N/A
	Band 40	1.017	N/A	N/A
	Band 41	0.996	N/A	N/A
	Band 48	1.166	N/A	N/A
	Band 66/4	0.756	N/A	N/A
	Band 71	0.618	N/A	N/A
5G NR	n2	0.745	N/A	N/A
	n5	0.757	N/A	N/A
	n41	0.700	N/A	N/A
	n66	0.735	N/A	N/A
	n71	0.685	N/A	N/A
	n77	0.789	N/A	N/A
WLAN	2.4GHz WLAN	1.096	N/A	N/A
	5GHz WLAN	1.186	N/A	N/A
	6GHz WLAN	1.340	0.768	0.583
2.4GHz	Bluetooth	0.115	N/A	N/A
Highest Simultaneous Transmission 1g SAR (W/kg)		1.509	Limit (W/kg): 1.6	

2.4 SAR characterization

Bands	Antenna	1TX	1TX	1TX	1TX	Pmax (dBm)
		DSI=0	DSI=1	DSI=2	DSI=3	
GSM 850	0	24.92	23.92	24.92	23.92	28
GSM 1900	0	N/A	15.92	N/A	13.92	25
WCDMA II	0	N/A	15	N/A	13	24
WCDMA IV	0	N/A	13	N/A	11	24
WCDMA V	0	23	N/A	23	22	24
WCDMA XIX	0	23	N/A	23	22	24
LTE Band 2	0	N/A	11	N/A	11	25
	2	N/A	15	N/A	16	25
LTE Band 4	0	N/A	11	N/A	11	25
LTE Band 5	0	24	22	24	22	25
LTE Band 7	0	N/A	14	N/A	12	24
LTE Band 12	0	23	22	23	22	24
LTE Band 13	0	23	N/A	23	N/A	24
LTE Band 17	0	23	22	23	22	24
LTE Band 19	0	23	N/A	23	21	24
LTE Band 25	0	N/A	15	N/A	13	24
LTE Band 26	0	23	N/A	23	22	24
LTE Band 38	2	N/A	16.41	N/A	13.41	24
LTE Band 40	2	N/A	15.41	N/A	13.41	24
LTE Band 41	2	N/A	13.41	N/A	12.41	24
LTE Band 48	1	N/A	15.41	N/A	13.41	24
LTE Band 66	0	N/A	11	N/A	11	25
	2	N/A	15.5	N/A	16.5	25
LTE Band 71	0	23	N/A	23	N/A	24
n2	2	N/A	15.5	N/A	15.5	25
n5	0	N/A	20.5	20.5	20.5	25
n41 (PC2)	2	N/A	11	N/A	11	27
n41 (PC3)	2	N/A	10	N/A	10	24.5
n66	2	N/A	15	N/A	15	25
n71	0	N/A	N/A	N/A	N/A	24
n77(PC2)	1	N/A	9	N/A	9	27
n77(PC3)	1	N/A	9	N/A	9	24.5