

MIMO SAR verification results

Bluetooth (Ant8+15) DS11 Head			
SISO Ant8 Plimit (dBm)	12.9	SISO Ant8 Pmax (dBm)	14.4
SISO Ant15 Plimit (dBm)	15.6	SISO Ant15 Pmax (dBm)	13.9
Ptest (dBm)	12.9	Total uncertainty (dB)	1.5
SAR design target (W/kg)	0.71	Back off	0
Measured MIMO Ptest (dBm)	12.90	Measured MIMO SAR at meas. Ptest (W/kg)	0.409
Reported SAR _{MIMO}	0.578	Calc. SAR	1.541

Bluetooth (Ant8+15) DS14 Hotspot			
SISO Ant8 Plimit (dBm)	19.5	SISO Ant8 Pmax (dBm)	14.4
SISO Ant15 Plimit (dBm)	42.5	SISO Ant15 Pmax (dBm)	13.9
Ptest (dBm)	13.9	Total uncertainty (dB)	1.5
SAR design target (W/kg)	0.71	Back off	0
Measured MIMO Ptest (dBm)	13.90	Measured MIMO SAR at meas. Ptest (W/kg)	0.205
Reported SAR _{MIMO}	0.290	Calc. SAR	0.278

Bluetooth (Ant8+15) DS13 Body-worn			
SISO Ant8 Plimit (dBm)	24.9	SISO Ant8 Pmax (dBm)	14.4
SISO Ant15 Plimit (dBm)	42.5	SISO Ant15 Pmax (dBm)	13.9
Ptest (dBm)	13.9	Total uncertainty (dB)	1.5
SAR design target (W/kg)	0.71	Back off	0
Measured MIMO Ptest (dBm)	13.90	Measured MIMO SAR at meas. Ptest (W/kg)	0.055
Reported SAR _{MIMO}	0.078	Calc. SAR	0.081

MIMO SAR verification results

N7 UL-MIMO (Ant4+6) DSI1- Head

SISO Ant4 Plimit (dBm)	16.0	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	15.5	SISO Ant6 Pmax (dBm)	24.1
Ptest (dBm)	15.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.49	Measured MIMO SAR at meas. Ptest (W/kg)	0.741
Reported SAR _{MIMO}	0.933	Calc.SAR	2.078

N7 UL-MIMO (Ant5+6) DSI1- Head

SISO Ant5 Plimit (dBm)	20.5	SISO Ant5 Pmax (dBm)	25.6
SISO Ant6 Plimit (dBm)	15.5	SISO Ant6 Pmax (dBm)	24.1
Ptest (dBm)	15.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.784
Reported SAR _{MIMO}	0.987	Calc.SAR	1.448

N7 UL-MIMO (Ant4+6) DSI5- Hotspot

SISO Ant4 Plimit (dBm)	16.0	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	15.5	SISO Ant6 Pmax (dBm)	24.1
Ptest (dBm)	15.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.49	Measured MIMO SAR at meas. Ptest (W/kg)	0.184
Reported SAR _{MIMO}	0.232	Calc.SAR	2.078

N7 UL-MIMO (Ant5+6) DSI5- Hotspot

SISO Ant5 Plimit (dBm)	19.5	SISO Ant5 Pmax (dBm)	25.6
SISO Ant6 Plimit (dBm)	15.5	SISO Ant6 Pmax (dBm)	24.1
Ptest (dBm)	15.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.271
Reported SAR _{MIMO}	0.341	Calc.SAR	1.538

N7 UL-MIMO (Ant4+6) DSI4- Body-worn

SISO Ant4 Plimit (dBm)	25.5	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	22.0	SISO Ant6 Pmax (dBm)	24.1
Ptest (dBm)	22.0	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	22.00	Measured MIMO SAR at meas. Ptest (W/kg)	0.761
Reported SAR _{MIMO}	0.958	Calc.SAR	1.585

N7 UL-MIMO (Ant5+6) DSI4- Body-worn

SISO Ant5 Plimit (dBm)	19.5	SISO Ant5 Pmax (dBm)	25.6
SISO Ant6 Plimit (dBm)	22.0	SISO Ant6 Pmax (dBm)	24.1
Ptest (dBm)	19.5	Total uncertainty (dB)	1.5
SAR design target (W/kg)	0.78	Back off	0
Measured MIMO Ptest (dBm)	19.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.214
Reported SAR _{MIMO}	0.302	Calc.SAR	1.721

N38 UL-MIMO (Ant4+6) DS11- Head

SISO Ant4 Plimit (dBm)	17.5	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	14.5	SISO Ant6 Pmax (dBm)	24.3
Ptest (dBm)	14.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	14.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.801
Reported SAR _{MIMO}	1.008	Calc SAR	1.644

N38 UL-MIMO (Ant5+6) DS11- Head

SISO Ant5 Plimit (dBm)	20.0	SISO Ant5 Pmax (dBm)	25.5
SISO Ant6 Plimit (dBm)	14.5	SISO Ant6 Pmax (dBm)	24.3
Ptest (dBm)	14.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	14.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.646
Reported SAR _{MIMO}	0.813	Calc SAR	1.404

N38 UL-MIMO (Ant4+6) DS15- Hotspot

SISO Ant4 Plimit (dBm)	17.5	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	14.5	SISO Ant6 Pmax (dBm)	24.3
Ptest (dBm)	14.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	14.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.222
Reported SAR _{MIMO}	0.279	Calc SAR	1.644

N38 UL-MIMO (Ant5+6) DS15- Hotspot

SISO Ant5 Plimit (dBm)	18.5	SISO Ant5 Pmax (dBm)	25.5
SISO Ant6 Plimit (dBm)	14.5	SISO Ant6 Pmax (dBm)	24.3
Ptest (dBm)	14.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	14.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.211
Reported SAR _{MIMO}	0.266	Calc SAR	1.531

N38 UL-MIMO (Ant4+6) DS14- Body-worn

SISO Ant4 Plimit (dBm)	25.5	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	20.5	SISO Ant6 Pmax (dBm)	24.3
Ptest (dBm)	20.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	20.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.430
Reported SAR _{MIMO}	0.541	Calc SAR	1.442

N38 UL-MIMO (Ant5+6) DS14- Body-worn

SISO Ant5 Plimit (dBm)	18.5	SISO Ant5 Pmax (dBm)	25.5
SISO Ant6 Plimit (dBm)	20.5	SISO Ant6 Pmax (dBm)	24.3
Ptest (dBm)	18.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	18.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.191
Reported SAR _{MIMO}	0.240	Calc SAR	1.786

N41 UL-MIMO (Ant4+6) DS11- Head

SISO Ant4 Plimit (dBm)	16.5	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	15.0	SISO Ant6 Pmax (dBm)	24.2
Ptest (dBm)	15.0	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.00	Measured MIMO SAR at meas. Ptest (W/kg)	0.837
Reported SAR _{MIMO}	1.054	Calc SAR	1.871

N41 UL-MIMO (Ant5+6) DS11- Head

SISO Ant5 Plimit (dBm)	20.0	SISO Ant5 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	15.0	SISO Ant6 Pmax (dBm)	24.2
Ptest (dBm)	15.0	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.00	Measured MIMO SAR at meas. Ptest (W/kg)	0.692
Reported SAR _{MIMO}	0.859	Calc SAR	1.442

N41 UL-MIMO (Ant4+6) DS15- Hotspot

SISO Ant4 Plimit (dBm)	16.5	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	15.0	SISO Ant6 Pmax (dBm)	24.2
Ptest (dBm)	15.0	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.00	Measured MIMO SAR at meas. Ptest (W/kg)	0.230
Reported SAR _{MIMO}	0.290	Calc SAR	1.871

N41 UL-MIMO (Ant5+6) DS15- Hotspot

SISO Ant5 Plimit (dBm)	18.5	SISO Ant5 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	15.0	SISO Ant6 Pmax (dBm)	24.2
Ptest (dBm)	15.0	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	15.00	Measured MIMO SAR at meas. Ptest (W/kg)	0.213
Reported SAR _{MIMO}	0.268	Calc SAR	1.585

N41 UL-MIMO (Ant4+6) DS14- Body-worn

SISO Ant4 Plimit (dBm)	25.5	SISO Ant4 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	20.5	SISO Ant6 Pmax (dBm)	24.2
Ptest (dBm)	20.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	20.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.772
Reported SAR _{MIMO}	0.972	Calc SAR	1.442

N41 UL-MIMO (Ant5+6) DS14- Body-worn

SISO Ant5 Plimit (dBm)	18.5	SISO Ant5 Pmax (dBm)	25.7
SISO Ant6 Plimit (dBm)	20.5	SISO Ant6 Pmax (dBm)	24.2
Ptest (dBm)	18.5	Total uncertainty (dB)	1.0
SAR design target (W/kg)	0.87	Back off	0
Measured MIMO Ptest (dBm)	18.50	Measured MIMO SAR at meas. Ptest (W/kg)	0.178
Reported SAR _{MIMO}	0.224	Calc SAR	1.786

Appendix H
MIMO SAR Test results

Head SAR Test																		
Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth					1Mbps	Left Cheek	0mm	Ant 8+15(8)	Standalone	78	2480	11.95	13.50	1.429	-0.17	0.409	0.629
	Bluetooth					1Mbps	Left Titled	0mm	Ant 8+15(15)	Full power	0	2402	15.29	17.00	1.483	0.04	0.396	0.635
Other PA	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 4+6(4)	DSI 1	507000	2535	16.04	16.20	1.038	-0.04	0.741	0.769
	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 4+6(6)	DSI 1	507000	2535	15.49	16.10	1.151	0.01	0.741	0.853
Other PA	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Left Cheek	0mm	Ant 5+6(5)	DSI 1	507000	2535	20.72	21.10	1.091	-0.01	0.438	0.478
	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Right Cheek	0mm	Ant 5+6(6)	DSI 1	507000	2535	15.49	16.10	1.151	-0.08	0.764	0.902
Other PA	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 4+6(4)	DSI 1	519000	2595	17.37	17.70	1.079	-0.18	0.801	0.864
	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 4+6(6)	DSI 1	519000	2595	14.58	15.80	1.324	0.1	0.801	1.061
Other PA	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 5+6(5)	DSI 1	519000	2595	20.06	21.00	1.242	0.08	0.310	0.385
	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 5+6(6)	DSI 1	519000	2595	14.58	15.80	1.324	-0.17	0.646	0.856
Other PA	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 4+6(4)	DSI 1	518598	2592.99	16.56	16.70	1.033	0.14	0.837	0.864
	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 4+6(6)	DSI 1	518598	2592.99	14.86	15.70	1.213	-0.01	0.837	1.016
Other PA	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Cheek	0mm	Ant 5+6(5)	DSI 1	518598	2592.99	19.82	20.70	1.225	0.18	0.354	0.434
	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Cheek	0mm	Ant 5+6(6)	DSI 1	518598	2592.99	14.86	15.70	1.213	0.14	0.682	0.828

Hotspot SAR Test																		
Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dbm)	Tune-Up Limit (dbm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth					1Mbps	Right Side	10mm	Ant 8+15(8)	Full power	78	2480	16.03	17.50	1.403	0.16	0.205	0.309
	Bluetooth					1Mbps	Top Side	10mm	Ant 8+15(15)	Full power	0	2402	15.29	17.00	1.463	-0.1	0.155	0.249
Other PA	FR1 n7	50M	QPSK	1	1	DFT-SCS-19KHz	Top Side	10mm	Ant 4+6(4)	DSI 5	507000	2535	16.04	16.20	1.038	-0.04	0.184	0.191
	FR1 n7	50M	QPSK	1	1	DFT-SCS-19KHz	Left Side	10mm	Ant 4+6(6)	DSI 5	507000	2535	15.49	16.10	1.151	0.05	0.174	0.200
Other PA	FR1 n7	50M	QPSK	1	1	DFT-SCS-19KHz	Right Side	10mm	Ant 5+6(5)	DSI 5	507000	2535	19.71	20.10	1.094	-0.04	0.230	0.252
	FR1 n7	50M	QPSK	1	1	DFT-SCS-19KHz	Left Side	10mm	Ant 5+6(6)	DSI 5	507000	2535	15.49	16.10	1.151	0.01	0.271	0.312
Other PA	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Top Side	10mm	Ant 4+6(4)	DSI 5	519000	2595	17.37	17.70	1.079	-0.07	0.222	0.240
	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 4+6(6)	DSI 5	519000	2595	14.58	15.80	1.324	0.01	0.185	0.245
Other PA	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Right Side	10mm	Ant 5+6(5)	DSI 5	519000	2595	18.59	19.50	1.233	-0.04	0.180	0.222
	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 5+6(6)	DSI 5	519000	2595	14.58	15.80	1.324	0.01	0.211	0.279
Other PA	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Top Side	10mm	Ant 4+6(4)	DSI 5	518598	2592.99	16.56	16.70	1.033	-0.07	0.230	0.238
	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 4+6(6)	DSI 5	518598	2592.99	14.86	15.70	1.213	-0.01	0.209	0.254
Other PA	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Right Side	10mm	Ant 5+6(5)	DSI 5	518598	2592.99	18.35	19.20	1.216	-0.07	0.212	0.258
	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Left Side	10mm	Ant 5+6(6)	DSI 5	518598	2592.99	14.86	15.70	1.213	0.05	0.213	0.258

Body Worn SAR Test																		
Pilot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth					1Mbps	Front	15mm	Ant 8+15(8)	Full power	78	2480	16.03	17.50	1.403	0.03	0.055	0.083
	Bluetooth					1Mbps	Front	15mm	Ant 8+15(15)	Full power	0	2402	15.29	17.00	1.483	0.18	0.001	0.002
Other PA	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Back	15mm	Ant 4+6(4)	DSI 4	507000	2535	25.50	25.70	1.047	-0.04	0.761	0.797
	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Back	15mm	Ant 4+6(6)	DSI 4	507000	2535	21.76	22.60	1.213	0.05	0.761	0.923
Other PA	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Back	15mm	Ant 5+6(5)	DSI 4	507000	2535	19.63	20.10	1.114	0.01	0.214	0.236
	FR1 n7	50M	QPSK	1	1	DFT-SCS-15KHz	Back	15mm	Ant 5+6(6)	DSI 4	507000	2535	21.76	22.60	1.213	0.07	0.214	0.260
Other PA	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 4+6(4)	DSI 4	519000	2595	25.31	25.70	1.094	-0.07	0.430	0.470
	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 4+6(6)	DSI 4	519000	2595	20.50	21.80	1.349	0.05	0.430	0.580
Other PA	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 5+6(5)	DSI 4	519000	2595	18.49	19.50	1.262	-0.04	0.191	0.241
	FR1 n38	40M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 5+6(6)	DSI 4	519000	2595	20.50	21.80	1.349	0.07	0.191	0.258
Other PA	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 4+6(4)	DSI 4	518598	2592.99	25.41	25.70	1.069	0.02	0.772	0.825
	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 4+6(6)	DSI 4	518598	2592.99	20.70	21.70	1.259	-0.04	0.772	0.972
Other PA	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 5+6(5)	DSI 4	518598	2592.99	18.32	19.20	1.225	-0.04	0.178	0.218
	FR1 n41	100M	QPSK	1	1	DFT-SCS-30KHz	Back	15mm	Ant 5+6(6)	DSI 4	518598	2592.99	20.70	21.70	1.259	0.01	0.178	0.224