



RF Exposure evaluation for mobile devices

Model: **JODY-W263-01A, JODY-W263-00A, JODY-W263-00B, M2-JODY-W263**

FCC ID: **XPYJODYW263**
 IC: **8595A- JODYW263**

Standards
OET Bulletin 65 Edition 97-01 August 1997
FCC 47 CFR §1.1307
FCC 47 CFR §1.1310
RSS-102 Issue 5 – March 2015

Test limits

As specified in Table 1B of 47 CFR 1.1310 – Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure.

Frequency range (MHz)	Power density (mW/cm ²)
300 – 1,500	f/1500
1,500 – 100,000	1.0

Limits specified per RSS-102, Issue 5.

Frequency range (MHz)	Power density (W/m ²)	Power density (mW/cm ²)
300 – 6000	0.02619 $f^{0.6834}$	mW/cm ² = W/m ² * 0.1

Equation OET bulletin 65, page 18, edition 97-01:
$$S = \frac{PG}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$$

Where:

S = power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna = 20cm



Operational Bands	Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain -numeric- (mW/cm ²)	Output Power -conducted- (dBm)	Duty Cycle correction factor	Max. mean output power (dBm)	Output Power -conducted- (mW)	Output Power (EIRP) (mW)	IC Limit (mW/cm ²)	FCC Limit (mW/cm ²)	Power Density value (mW/cm ²)	Margin to FCC Limit (mW/cm ²)	Margin to IC Limit (mW/cm ²)
BLE	2480	2.2	1.6596	4.00	0	4.00	2.51	4.17	0.5469	1.00	0.0008	0.9992	0.5461
Classic BT	2480	2.2	1.6596	11.00	0	11.00	12.59	20.89	0.5469	1.00	0.0042	0.9958	0.5427
WLAN 2.4 GHz	2457	2.5	1.7783	16.00	0	16.00	39.81	70.79	0.5434	1.00	0.0141	0.9859	0.5293
WLAN 5 GHz	5745	4.6	2.8840	16.00	0	16.00	39.81	114.82	0.9710	1.00	0.0228	0.9772	0.9482

Simultaneous Transmission Considerations

The calculation below is used to consider situations in which simultaneous exposure to fields of different frequencies occur. The calculation is performed by the sum of each relative exposure for each equipment according to the following criteria.

$$\sum_{1}^{N} \frac{S_{eqn}}{S_{Limn}} = \frac{S_{eq1}}{S_{Lim1}} + \frac{S_{eq2}}{S_{Lim2}} + \dots + \frac{S_{eqN}}{S_{LimN}} \leq 1$$

Where:

S_{eq} is the power density of the electromagnetic field at a given distance by a specific transmitter and a defined frequency.

S_{lim} is the MPE limit for the frequency being evaluated.



Assessment of Simultaneous transmission for FCC

	Classic BT	WLAN 5 GHz	WLAN 2.4 GHz
(S_{eq} / S_{Lim})	0.0042	0.0228	0.0141
Sum of (S_{eqn} / S_{Limn}) BT + WLAN 2.4 GHz	0.0183		
Sum of (S_{eqn} / S_{Limn}) BT + WLAN 5 GHz	0.027		
Limit	1		
Assessment	passed		

Assessment of Simultaneous transmission for ISED

	Classic BT	WLAN 5 GHz	WLAN 2.4 GHz
(S_{eq} / S_{Lim})	0.0077	0.0235	0.0259
Sum of (S_{eqn} / S_{Limn}) BT + WLAN 2.4 GHz	0.0336		
Sum of (S_{eqn} / S_{Limn}) BT + WLAN 5 GHz	0.0312		
Limit	1		
Assessment	passed		

Co-Location Considerations with Cellular modem SARA-R510M8S as example

FCC

Band	Mode	Duty Cycle (%)	Frequency (MHZ)	Maximum Conducted output power (dBm)	Max Conducted output power (mW)	FCC MPE Limit (mW/cm ²)	Power Density (mW/cm ²)	Separation distance (cm)	Verdict
850	GSM	50%	848.8	33.25	1056.82	0.5659	0.5281	20	Pass
1900	GSM	50%	1909.8	30.2	523.60	1.0000	0.1865	20	Pass
FDD 2	UMTS	100%	1907.6	24.5	281.84	1.0000	0.5055	20	Pass
FDD 4	UMTS	100%	1740.0	24.5	281.84	1.0000	0.2305	20	Pass
FDD 5	UMTS	100%	836.0	24.5	281.84	0.5573	0.5233	20	Pass
eFDD 2	LTE	100%	1908.0	24	251.19	1.0000	0.3637	20	Pass
eFDD 4	LTE	100%	1755.0	24	251.19	1.0000	0.2332	20	Pass
eFDD 5	LTE	100%	826.5	24	251.19	0.5510	0.5114	20	Pass
eFDD 7	LTE	100%	2535.0	24	251.19	1.0000	0.2227	20	Pass
eFDD 13	LTE	100%	782.2	24	251.19	0.5215	0.4851	20	Pass
eFDD 17	LTE	100%	716.0	24	251.19	0.4773	0.4424	20	Pass
eFDD 12	LTE	100%	711.0	24	251.19	0.4740	0.2375	20	Pass
eFDD 30	LTE	100%	2310.0	24	251.19	1.0000	0.0110	20	Pass
eFDD 66	LTE	100%	1770.0	24	251.19	1.0000	0.3773	20	Pass
eTDD 41	LTE	100%	2680.0	24	251.19	1.0000	0.4081	20	Pass
eFDD 25	LTE	100%	1855.0	24	251.19	1.2367	0.3637	20	Pass
eFDD 26	LTE	100%	814.0	24	251.19	0.5427	0.2222	20	Pass



ISED

Band	Mode	Duty Cycle (%)	Frequency (MHZ)	Maximum Conducted output power (dBm)	Max Conducted output power (mW)	FCC MPE Limit (mW/cm ²)	Power Density (mW/cm ²)	Separation distance (cm)	Verdict
850	GSM	50%	848.8	33.25	1056.82	0.2628	0.2359	20	Pass
1900	GSM	50%	1909.8	30.2	523.60	0.4575	0.1865	20	Pass
FDD 2	UMTS	100%	1907.6	24.5	281.84	0.4571	0.4072	20	Pass
FDD 4	UMTS	100%	1740.0	24.5	281.84	0.4293	0.2305	20	Pass
FDD 5	UMTS	100%	836.0	24.5	281.84	0.2601	0.2337	20	Pass
eFDD 2	LTE	100%	1908.0	24	251.19	0.4572	0.3637	20	Pass
eFDD 4	LTE	100%	1755.0	24	251.19	0.4318	0.2332	20	Pass
eFDD 5	LTE	100%	826.5	24	251.19	0.2581	0.2284	20	Pass
eFDD 7	LTE	100%	2535.0	24	251.19	0.5552	0.2227	20	Pass
eFDD 13	LTE	100%	782.2	24	251.19	0.2486	0.2232	20	Pass
eFDD 17	LTE	100%	716.0	24	251.19	0.2340	0.2083	20	Pass
eFDD 12	LTE	100%	711.0	24	251.19	0.2329	0.2083	20	Pass
eFDD 30	LTE	100%	2310.0	24	251.19	0.5210	0.0110	20	Pass
eFDD 66	LTE	100%	1770.0	24	251.19	0.4343	0.3773	20	Pass
eTDD 41	LTE	100%	2680.0	24	251.19	0.5767	0.4081	20	Pass
eFDD 25	LTE	100%	1855.0	24	251.19	0.4485	0.3637	20	Pass
eFDD 26	LTE	100%	814.0	24	251.19	0.2554	0.2222	20	Pass

Relative exposure for Secondary Transmitter for FCC

OP-Mode	Mode	Output Power (mW)	Frequency (MHZ)	S _{eq} (mW/cm ²)	S _{lin} (mW/cm ²)	$\frac{S_{eq}}{S_{lin}}$	Verdict
850	GSM	1056.8175	848.8	0.5281	0.5659	0.9332895	Pass
1900	GSM	523.6004	1909.8	0.1865	1.0000	0.1865351	Pass
FDD 2	UMTS	281.8383	1907.6	0.5055	1.0000	0.5055458	Pass
FDD 4	UMTS	281.8383	1740.0	0.2305	1.0000	0.2305316	Pass
FDD 5	UMTS	281.8383	836.0	0.5233	0.5573	0.9388917	Pass
eFDD 2	LTE	251.1886	1908.0	0.3637	1.0000	0.3637144	Pass
eFDD 4	LTE	251.1886	1755.0	0.2332	1.0000	0.2332011	Pass
eFDD 5	LTE	251.1886	826.5	0.5114	0.5510	0.9280661	Pass
eFDD 7	LTE	251.1886	2535.0	0.2227	1.0000	0.2227053	Pass
eFDD 13	LTE	251.1886	782.2	0.4851	0.5215	0.9303166	Pass
eFDD 17	LTE	251.1886	716.0	0.4424	0.4773	0.9268939	Pass
eFDD 12	LTE	251.1886	711.0	0.2375	0.4740	0.501132	Pass
eFDD 30	LTE	251.1886	2310.0	0.0110	1.0000	0.0109825	Pass
eFDD 66	LTE	251.1886	1770.0	0.3773	1.0000	0.377338	Pass
eTDD 41	LTE	251.1886	2680.0	0.4081	1.0000	0.4080943	Pass
eFDD 25	LTE	251.1886	1855.0	0.3637	1.2367	0.2941087	Pass
eFDD 26	LTE	251.1886	814.0	0.2222	0.5427	0.4094467	Pass



Relative exposure for Primary Transmitter for ISED

OP-Mode	Mode	Output Power (mW)	Frequency (MHZ)	S_{eq} (mW/cm ²)	S_{lin} (mW/cm ²)	$\frac{S_{eq}}{S_{lin}}$	Verdict
850	GSM	1056.8175	848.8	0.2359	0.2628	0.8975309	Pass
1900	GSM	523.6004	1909.8	0.1865	0.4575	0.4077537	Pass
FDD 2	UMTS	281.8383	1907.6	0.4072	0.4571	0.8907175	Pass
FDD 4	UMTS	281.8383	1740.0	0.2305	0.4293	0.5370363	Pass
FDD 5	UMTS	281.8383	836.0	0.2337	0.2601	0.8985852	Pass
eFDD 2	LTE	251.1886	1908.0	0.3637	0.4572	0.7955688	Pass
eFDD 4	LTE	251.1886	1755.0	0.2332	0.4318	0.5400774	Pass
eFDD 5	LTE	251.1886	826.5	0.2284	0.2581	0.8850162	Pass
eFDD 7	LTE	251.1886	2535.0	0.2227	0.5552	0.4011589	Pass
eFDD 13	LTE	251.1886	782.2	0.2232	0.2486	0.8980601	Pass
eFDD 17	LTE	251.1886	716.0	0.2083	0.2340	0.8903227	Pass
eFDD 12	LTE	251.1886	711.0	0.2083	0.2329	0.8945968	Pass
eFDD 30	LTE	251.1886	2310.0	0.0110	0.5210	0.0210801	Pass
eFDD 66	LTE	251.1886	1770.0	0.3773	0.4343	0.8688205	Pass
eTDD 41	LTE	251.1886	2680.0	0.4081	0.5767	0.7076813	Pass
eFDD 25	LTE	251.1886	1855.0	0.3637	0.4485	0.8110335	Pass
eFDD 26	LTE	251.1886	814.0	0.2222	0.2554	0.8699099	Pass



Simultaneous exposure of Primary and Secondary transmitter installed in generic host device for FCC						
Primary Band	Primary Mode	All Transmitters	Frequency (MHZ)	Maximum S_{eq} / S_{lin}	Maximum $S_{pri} / S_{lim_pri} + S_{sec} / S_{lin_sec}$	Compliance Maximum $(S_{pri} / S_{lim_pri} + S_{sec} / S_{lin_sec}) < 1$
850	GSM	Bluetooth	2480	0.0042	0.9603	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	848.8	0.9333		
1900	GSM	Bluetooth	2480	0.0042	0.2136	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	1909.8	0.1865		
FDD 2	UMTS	Bluetooth	2480	0.0042	0.5326	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	1907.6	0.5055		
FDD 4	UMTS	Bluetooth	2480	0.0042	0.2576	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	1740.0	0.2305		
FDD 5	UMTS	Bluetooth	2480	0.0042	0.9659	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	836.0	0.9389		
eFDD 2	LTE	Bluetooth	2480	0.0042	0.3908	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	1908.0	0.3637		
eFDD 4	LTE	Bluetooth	2480	0.0042	0.2602	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	1755.0	0.2332		
eFDD 5	LTE	Bluetooth	2480	0.0042	0.9551	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	826.5	0.9281		
eFDD 7	LTE	Bluetooth	2480	0.0042	0.2497	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	2535.0	0.2227		
eFDD 13	LTE	Bluetooth	2480	0.0042	0.9574	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	782.2	0.9303		
eFDD 17	LTE	Bluetooth	2480	0.0042	0.9539	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	716.0	0.9269		
eFDD 12	LTE	Bluetooth	2480	0.0042	0.5282	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	711.0	0.5011		
eFDD 30	LTE	Bluetooth	2480	0.0042	0.0380	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	2310.0	0.0110		
eFDD 66	LTE	Bluetooth	2480	0.0042	0.4044	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	1770.0	0.3773		
eTDD 41	LTE	Bluetooth	2480	0.0042	0.4351	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	2680.0	0.4081		
eFDD 25	LTE	Bluetooth	2480	0.0042	0.3212	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	1855.0	0.2941		
eFDD 26	LTE	Bluetooth	2480	0.0042	0.4365	Compliant
		Wlan	5745	0.0228		
		SARA-R510M8S	814.0	0.4094		



Simultaneous exposure of Primary and Secondary transmitter installed in generic host device for ISED

Primary Band	Primary Mode	Transmitter	Frequency (MHZ)	Maximum S_{eq} / S_{Lin}	Maximum $S_{pri} / S_{lim_pri} + S_{sec} / S_{lin_sec}$	Compliance Maximum $(S_{pri} / S_{lim_pri}) + (S_{sec} / S_{lin_sec}) < 1$
850	GSM	Bluetooth	2480	0.0078	0.9475	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	848.8	0.8975		
1900	GSM	Bluetooth	2480	0.0078	0.4577	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	1909.8	0.4078		
FDD 2	UMTS	Bluetooth	2480	0.0078	0.9407	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	1907.6	0.8907		
FDD 4	UMTS	Bluetooth	2480	0.0078	0.5870	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	1740	0.5370		
FDD 5	UMTS	Bluetooth	2480	0.0078	0.9486	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	836	0.8986		
eFDD 2	LTE	Bluetooth	2480	0.0078	0.8456	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	1908	0.7956		
eFDD 4	LTE	Bluetooth	2480	0.0078	0.5901	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	1755	0.5401		
eFDD 5	LTE	Bluetooth	2480	0.0078	0.9350	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	826.5	0.8850		
eFDD 7	LTE	Bluetooth	2480	0.0078	0.4511	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	2535	0.4012		
eFDD 13	LTE	Bluetooth	2480	0.0078	0.9480	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	782.19	0.8981		
eFDD 17	LTE	Bluetooth	2480	0.0078	0.9403	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	716	0.8903		
eFDD 12	LTE	Bluetooth	2480	0.0078	0.9446	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	711	0.8946		
eFDD 30	LTE	Bluetooth	2480	0.0078	0.0711	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	2310	0.0211		
eFDD 66	LTE	Bluetooth	2480	0.0078	0.9188	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	1770	0.8688		
eTDD 41	LTE	Bluetooth	2480	0.0078	0.7577	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	2680	0.7077		
eFDD 25	LTE	Bluetooth	2480	0.0078	0.8610	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	1855	0.8110		
eFDD 26	LTE	Bluetooth	2480	0.0078	0.9199	Compliant
		Wlan	5745	0.0422		
		SARA-R510M8S	814	0.8699		



OP-Mode	dBi (For FCC)	dBi (For Industry Canada)
850	4.0	0.5
1900	2.5	2.5
FDD 2	9.6	8.6
FDD 4	6.1	6.1
FDD 5	9.7	6.2
eFDD 2	8.6	8.6
eFDD 4	6.7	6.7
eFDD 5	10.1	6.6
eFDD 7	6.5	6.5
eFDD 13	9.9	6.5
eFDD 17	9.5	6.2
eFDD 12	6.8	6.2
eFDD 30	-6.6	-6.6
eFDD 66	8.8	8.8
eTDD 41	9.1	9.1
eFDD 25	8.6	8.6
eFDD 26	6.5	6.5

Yours sincerely,

A handwritten signature in blue ink that reads 'Imad Hjije'.

Imad Hjije