

Calculation and sample for Confirmation

Dear Reviewer,

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

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The RF Exposure level is calculated using the general equation:

$$S = PG / 4\pi R^2$$

the EUT antenna gain is 1.5 dBi

R = 20 cm

$\pi = 3.1416$

GSM mode

Burst Average Power (dBm)								
Band	GSM850				PCS1900			
Channel	128	190	251	Tune up Power tolerant	512	661	810	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	/	1850.2	1880	1909.8	/
GSM Voice (1 uplink),GMSK	32.34	32.01	32.2	31.75± 0.75	28.68	28.40	28.42	28.75±0.75
GPRS Multi-Slot Class 8 (1 uplink),GMSK	31.99	32.33	32.15	31.75± 0.75	28.41	28.38	28.67	28.75±0.75
GPRS Multi-Slot Class 10 (2 uplink) GMSK	31.98	32.05	32.02	31.75± 0.75	28.21	28.20	28.45	28.75±0.75
GPRS Multi-Slot Class 12 (4 uplink) GMSK	29.85	29.78	29.85	29.75± 0.75	27.84	27.96	27.89	27.75±0.75
EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS1	31.87	32.29	32.20	31.75± 0.75	28.36	28.38	28.65	28.75±0.75
EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS1	31.84	32.11	32.06	31.75± 0.75	28.24	28.15	28.45	28.75±0.75
EGPRS Multi-Slot Class 12 (4 uplink) GMSK MCS1	29.90	29.84	29.77	29.75± 0.75	27.86	27.93	27.85	27.75±0.75
EGPRS Multi-Slot Class 8 (1 uplink) 8PSK MCS5	26.36	26.35	26.42	26.75± 0.75	25.02	24.97	24.90	24.75±0.75
EGPRS Multi-Slot Class 10 (2 uplink) 8PSK MCS5	26.13	26.15	26.25	26.75± 0.75	24.72	24.67	24.51	24.75±0.75
EGPRS Multi-Slot Class 12 (4 uplink) 8PSK MCS5	26.00	26.06	25.99	25.75± 0.75	24.01	23.88	23.74	23.75±0.75

Source Based time Average Power (dBm)										
Band	GSM850					PCS1900				
Channel	128	190	251	Time Average factor	Tune up Power tolerant	512	661	810	Time Average factor	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	/	/	1850.2	1880	1909.8	/	/
GSM Voice (1 uplink), GMSK	23.31	22.98	23.17	-9.03	22.75 ± 0.75	19.65	19.37	19.39	-9.03	19.75 ± 0.75
GPRS Multi-Slot Class 8 (1 uplink), GMSK	22.96	23.3	23.12	-9.03	22.75 ± 0.75	19.38	19.35	19.64	-9.03	19.75 ± 0.75
GPRS Multi-Slot Class 10 (2 uplink) GMSK	25.96	26.03	26	-6.02	25.75 ± 0.75	22.19	22.18	22.43	-6.02	22.75 ± 0.75
GPRS Multi-Slot Class 12 (4 uplink) GMSK	26.84	26.77	26.84	-3.01	26.75 ± 0.75	24.83	24.95	24.88	-3.01	24.75 ± 0.75
EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS1	22.84	23.26	23.17	-9.03	22.75 ± 0.75	19.33	19.35	19.62	-9.03	19.75 ± 0.75
EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS1	25.82	26.09	26.04	-6.02	25.75 ± 0.75	22.22	22.13	22.43	-6.02	22.75 ± 0.75
EGPRS Multi-Slot Class 12 (4 uplink) GMSK	26.89	26.83	26.76	-3.01	26.75 ± 0.75	24.85	24.92	24.84	-3.01	24.75 ± 0.75

MCS1										
EGPRS Multi-Slot Class 8 (1 uplink) 8PSK MCS5	17.33	17.32	17.39	-9.03	17.75 ± 0.75	15.99	15.94	15.87	-9.03	15.75 ±0.75
EGPRS Multi-Slot Class 10 (2 uplink) 8PSK MCS5	20.11	20.13	20.23	-6.02	20.75 ± 0.75	18.7	18.65	18.49	-6.02	18.75 ±0.75
EGPRS Multi-Slot Class 12 (4 uplink) 8PSK MCS5	22.99	23.05	22.98	-3.01	22.75 ± 0.75	21	20.87	20.73	-3.01	20.75 ±0.75

The power testing data of WCDMA and LTE derived from Test Report SH16060006W01 and SH16060006W02 and herein omitted,

Solving for S, the power density at 20 cm is

Band	Frequency (MHz)	Max Turn-up Conducted Source Based time Average Power (dBm)	Max Turn-up Conducted Source Based time Average Power (mW)	Gain (dBi)	Numeric	R (cm)	S (mW/cm ²)	Limit (mW/cm ²)
GSM 850	824-849	32.5	1778	1.5	1.4	20	0.50	0.55
GSM 1900	1850-1910	29.5	891	1.5	1.4	20	0.25	1.00
WCDMA B2	1850-1910	23.5	224	1.5	1.4	20	0.06	1.00
WCDMA B4	1710-1755	23.5	224	1.5	1.4	20	0.06	1.00
WCDMA B5	824-849	23.5	224	1.5	1.4	20	0.06	0.55
LTE B2	1850-1910	22.5	178	1.5	1.4	20	0.05	1.00
LTE B4	1710-1755	22.3	170	1.5	1.4	20	0.05	1.00
LTE B5	824-849	23.0	200	1.5	1.4	20	0.06	0.55
LTE B12	698-716	23.0	200	1.5	1.4	20	0.06	0.47
LTE B17	704-716	22.3	170	1.5	1.4	20	0.05	0.47

So, the power density is kept.

Please contact us if you have any additional questions.

Best Regards

Shanghai Skylabs Co., Ltd.

Wu Hongfei