

Maximum Permissible Exposure Report

1. Product Information

FCC ID:	2AWTASD-C9
Product name	Stackable multifunction charging station
Test Model	SD-C9
Hardware Version	4C2
Software Version	M1.0.7R
Power supply	Input: 100-240V~, 50/60Hz, 1.5A Max Output: 5V $\overline{\text{---}}$ 2A Max (per. layer) Max. Total Output: 80W
Operation frequency	2.412-2.462GHz for 2.4G WIFI
Channel Number	11 channels for 20MHz bandwidth (2412~2462MHz)
Channel Spacing	5MHz
Antenna Description	PCB Antenna 1.5 dBi
Support Band	<input checked="" type="checkbox"/> GSM 850 (U.S.-Band) <input checked="" type="checkbox"/> PCS 1900 (U.S.-Band)
Release Version	R99
GPRS Class	Class 12
EGPRS Class	Class 12
Type Of Modulation	GMSK for GSM/GPRS; 8PSK for EGPRS
Antenna Description	Internal Antenna 0 dBi (max.) For GSM 850; 1.5dBi (max.) For PCS 1900.
Support Band	<input checked="" type="checkbox"/> E-UTRA Band 2(U.S.-Band) <input checked="" type="checkbox"/> E-UTRA Band 4(U.S.-Band) <input checked="" type="checkbox"/> E-UTRA Band 5(U.S.-Band) <input checked="" type="checkbox"/> E-UTRA Band 12(U.S.-Band) <input checked="" type="checkbox"/> E-UTRA Band 13(U.S.-Band) <input checked="" type="checkbox"/> E-UTRA Band 14(U.S.-Band) <input checked="" type="checkbox"/> E-UTRA Band 66(U.S.-Band) <input checked="" type="checkbox"/> E-UTRA Band 71(U.S.-Band)
	Internal Antenna 1.5dBi (max.) For E-UTRA Band 2; 1.5dBi (max.) For E-UTRA Band 4; 0dBi (max.) For E-UTRA Band 5; 1.5dBi (max.) For E-UTRA Band 12; 1.5dBi (max.) For E-UTRA Band 13; 1.5dBi (max.) For E-UTRA Band 14; 1.5dBi (max.) For E-UTRA Band 66; 1.5dBi (max.) For E-UTRA Band 71.
LTE Release Version	R8
Type Of Modulation	QPSK/16QAM
Antenna Description	Internal Antenna; 1.5dBi (max.)
Power Class	Class 3
Extreme temp. Tolerance	0°C to +50°C
Extreme vol. Limits	108VAC to 132VAC (nominal: 120VAC)
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3.1 Refer Evaluation Method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices

3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
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

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

F=frequency in MHz

*=Plane-wave equivalent power density

4. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where: S=power density

P=power input to 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

5. Antenna Information

SD-C9 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Antenna	PCB Antenna	2400 MHz –5850 MHz	1.5 dBi	WiFi Antenna
Antenna	Internal Antenna	1850~1910 MHz	1.5 dBi	GSM/ LTE Antenna
Antenna	Internal Antenna	1710~1755 MHz	1.5 dBi	LTE Antenna
Antenna	Internal Antenna	824~849 MHz	0 dBi	GSM/LTE Antenna
Antenna	Internal Antenna	669~716 MHz	1.5 dBi	LTE Antenna
Antenna	Internal Antenna	777~787 MHz	1.5 dBi	LTE Antenna
Antenna	Internal Antenna	788~798 MHz	1.5 dBi	LTE Antenna
Antenna	Internal Antenna	1710~1780 MHz	1.5 dBi	LTE Antenna
Antenna	Internal Antenna	663~698 MHz	1.5 dBi	LTE Antenna

6. Conducted Power

[2.4GWIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
IEEE 802.11b	1	2412	16.50
	6	2437	15.76
	11	2462	15.98
IEEE 802.11g	1	2412	15.25
	6	2437	15.75
	11	2462	15.16
IEEE 802.11n HT20	1	2412	12.41
	6	2437	12.61
	11	2462	12.97

[GSM Max Average Power]

Test Mode	Channel	Frequency (MHz)	Max Average Power (dBm)
PCS 1900	Low	1850.2	29.70
	Middle	1880.0	29.70
	High	1909.8	29.66
GSM 850	Low	824.2	32.66
	Middle	836.6	32.71
	High	848.8	32.68

[LTE Max Average Power]

Test Mode		Channel	Max Average Power (dBm)
LTE	Band 2	LCH	23.86
		MCH	23.45
		HCH	23.58
	Band 4	LCH	22.98
		MCH	23.55
		HCH	23.61
	Band 5	LCH	23.81
		MCH	24.16
		HCH	24.19
	Band 12	LCH	23.83
		MCH	24.07
		HCH	24.80
	Band 13	LCH	23.84
		MCH	23.81
		HCH	23.77
	Band 14	LCH	23.52
		MCH	23.93
		HCH	23.74
	Band 66	LCH	23.97
		MCH	23.97
		HCH	24.00
	Band 71	LCH	23.98
		MCH	24.00
		HCH	23.99

7. Measurement Results

2.4GWIFI

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	15.0	15.0
Tolerance \pm (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12.0	12.0	12.0
Tolerance \pm (dB)	1.0	1.0	1.0

[GSMMax Average Power]

Test Mode	Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
PCS1900	LCH	29.70	29.0±1.0
	MCH	29.70	29.0±1.0
	HCH	29.66	29.0±1.0
GSM850	LCH	32.66	32.0±1.0
	MCH	32.71	32.0±1.0
	HCH	32.68	32.0±1.0

<LTE Max Average Power>

Test Mode	Channel	Max Average Power (dBm)	ANT Max. Tune Up Power (dBm)
LTE	Band 2	LCH	23.86
		MCH	23.45
		HCH	23.58
	Band 4	LCH	22.98
		MCH	23.55
		HCH	23.61
	Band 5	LCH	23.81
		MCH	24.16
		HCH	24.19
	Band 12	LCH	23.83
		MCH	24.07
		HCH	24.80
	Band 13	LCH	23.84
		MCH	23.81
		HCH	23.77
	Band 14	LCH	23.52
		MCH	23.93
		HCH	23.74
	Band 66	LCH	23.97
		MCH	23.97
		HCH	24.00
	Band 71	LCH	23.98
		MCH	24.00
		HCH	23.99

8. Evaluation Results

8.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

2.4GWIFI

Band/Mode	RF output power		Antenna Gain (dBi)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW			
IEEE 802.11b	17.0	50.1187	1.5	0.0141	1.0000
IEEE 802.11g	16.0	39.8107	1.5	0.0112	1.0000
IEEE 802.11n HT20	13.0	19.9526	1.5	0.0056	1.0000

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GSM 850	33.0	1995.2623	0.0	1.0000	0.3969	0.55
PCS1900	30.0	1000.0000	1.5	1.4125	0.2810	1.0
LTE Band 2	24.0	251.1886	1.5	1.4125	0.0706	1.0
LTE Band 4	24.0	251.1886	1.5	1.4125	0.0706	1.0
LTE Band 5	25.0	251.1886	0.0	1.0000	0.0500	0.55
LTE Band 12	25.5	316.2278	1.5	1.4125	0.0889	0.47
LTE Band 13	25.0	316.2278	1.5	1.4125	0.0889	0.52
LTE Band 14	24.0	251.1886	1.5	1.4125	0.0706	0.53
LTE Band 66	24.0	251.1886	1.5	1.4125	0.0706	1.0
LTE Band 71	24.0	251.1886	1.5	1.4125	0.0706	0.44

Remark:

1. Output power including turn-up tolerance;
2. Output power is burst average power;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. MPE values = $PG/4\pi R^2$

8.2 Simultaneous Transmission MPE

The sample support one WIFI Antenna and another one GSM & LTE transmit antenna, so need consider simultaneous transmission;

Simultaneous transmission MPE

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Σ of MPE ratios ≤ 1.0

Mode	Σ MPE max ratios	Limit	Results
WIFI + GSM	0.736	1.0	Pass
WIFI + LTE	0.175	1.0	Pass

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----THE END OF REPORT-----