



Maximum Permissible Exposure Report

1. Product Information

Product name	IPTV Set-Top Box
Test Model	SML-5045W6
Power supply	Input: 12V $\overline{\sim}$ 1.5A Output: USB 5V $\overline{\sim}$ 1A For Adapter Input: 100-240V~, 50/60Hz, 0.4A For Adapter Output: 12V $\overline{\sim}$ 1.5A
Hardware Version	JUW7.820.00293831 V2
Software Version	4.22.1
5G WLAN	
Frequency Range	5260MHz~5320MHz, 5500MHz~5700MHz
Channel Number	4 Channels for 20MHz bandwidth(5260MHz-5320MHz) 11 Channels for 20MHz bandwidth(5500MHz-5700MHz) 2 channels for 40MHz bandwidth(5270MHz~5310MHz) 5 Channels for 40MHz bandwidth(5510MHz-5670MHz) 1 channels for 80MHz bandwidth(5290MHz) 2 Channels for 80MHz bandwidth(5530MHz, 5610MHz)
Modulation Type	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ax: OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	5260MHz~5320MHz: Antenna 0: Internal Antenna, 2.48dBi (max.) Antenna 1: Internal Antenna, 1.5dBi (max.) 5500MHz~5700MHz: Antenna 0: Internal Antenna, 0.74dBi (max.) Antenna 1: Internal Antenna, 1.6dBi (max.)
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Devices



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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.



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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

Internal Antenna can only use antennas certificated as follows provided by manufacturer;

Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Internal Antenna 0	5260MHz~5320MH	2.48	WIFI Antenna
	5500MHz~5700MHz	0.74	
Internal Antenna 1	5260MHz~5320MH	1.5	WIFI Antenna
	5500MHz~5700MHz	1.6	



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6. Conducted Power and Manufacturing Tolerance

[5.3G WLAN]

Mode	Channel	Frequency (MHz)	Ant 0 Max Conducted Power(dBm)	Ant 1 Max Conducted Power(dBm)	Target (dBm)	Tolerance ±(dB)
IEEE 802.11a	52	5260	8.42	7.52	8.0	1.0
	60	5300	7.92	8.63	8.0	1.0
	64	5320	8.83	8.1	8.0	1.0

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)	Target (dBm)	Tolerance ±(dB)
IEEE 802.11n HT20 MIMO	52	5260	11.57	11.0	1.0
	60	5300	11.49	11.0	1.0
	64	5320	11.81	11.0	1.0
IEEE 802.11n HT40 MIMO	54	5270	11.62	11.0	1.0
	62	5310	11.96	11.0	1.0
IEEE 802.11ac VHT20 MIMO	52	5260	11.21	11.0	1.0
	60	5300	11.73	11.0	1.0
	64	5320	11.19	11.0	1.0
IEEE 802.11ac VHT40 MIMO	54	5270	11.53	11.0	1.0
	62	5310	10.99	11.0	1.0
IEEE 802.11ac VHT80 MIMO	58	5290	11.20	11.0	1.0
IEEE 802.11ax HEW20 MIMO	52	5260	11.29	11.0	1.0
	60	5300	11.28	11.0	1.0
	64	5320	11.70	11.0	1.0
IEEE 802.11ax HEW40 MIMO	54	5270	10.89	11.0	1.0
	62	5310	11.32	11.0	1.0
IEEE 802.11ax HEW80 MIMO	58	5290	11.71	11.0	1.0



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Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)	Target (dBm)	Tolerance ±(dB)
802.11ax OFDMA(26 Tone)-MIMO	52	5260	12.02	12	1.0
	60	5300	12.09	12	1.0
	64	5320	11.97	11	1.0
	54	5270	12.15	12	1.0
	62	5310	12.16	12	1.0
	58	5290	12.23	12	1.0
802.11ax OFDMA(52 Tone)-MIMO	52	5260	12.08	12	1.0
	60	5300	12.33	12	1.0
	64	5320	11.98	11	1.0
	54	5270	12.11	12	1.0
	62	5310	12.01	12	1.0
	58	5290	12.11	12	1.0
802.11ax OFDMA(106 Tone)-MIMO	52	5260	11.94	11	1.0
	60	5300	11.85	11	1.0
	64	5320	11.84	11	1.0
	54	5270	11.48	11	1.0
	62	5310	11.98	11	1.0
	58	5290	11.74	11	1.0
802.11ax OFDMA(242 Tone)-MIMO	52	5260	11.48	11	1.0
	60	5300	11.78	11	1.0
	64	5320	11.92	11	1.0
	54	5270	11.24	11	1.0
	62	5310	11.74	11	1.0
	58	5290	11.39	11	1.0
802.11ax OFDMA(484 Tone)-MIMO	54	5270	11.60	11	1.0
	62	5310	12.05	12	1.0
	58	5290	11.29	11	1.0
802.11ax OFDMA(996 Tone)-MIMO	58	5290	12.02	12	1.0



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[5.5G WLAN]

Mode	Channel	Frequency (MHz)	Ant 0 Max Conducted Power(dBm)	Ant 1 Max Conducted Power(dBm)	Target (dBm)	Tolerance $\pm$ (dB)
IEEE 802.11a	100	5500	7.3	6.93	7.0	1.0
	116	5580	7.71	7.26	7.0	1.0
	140	5700	7.24	7.73	7.0	1.0

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)	Target (dBm)	Tolerance $\pm$ (dB)
IEEE 802.11n HT20 MIMO	100	5500	10.13	10	1.0
	116	5580	10.43	10	1.0
	140	5700	10.42	10	1.0
IEEE 802.11n HT40 MIMO	102	5510	10.02	10	1.0
	110	5550	10.23	10	1.0
	134	5670	10.31	10	1.0
IEEE 802.11ac VHT20 MIMO	100	5500	10.09	10	1.0
	116	5580	10.41	10	1.0
	140	5700	10.91	10	1.0
IEEE 802.11ac VHT40 MIMO	102	5510	9.85	10	1.0
	110	5550	10.26	10	1.0
	134	5670	10.42	10	1.0
IEEE 802.11ac VHT80 MIMO	106	5530	10.68	10	1.0
IEEE 802.11ax HEW20 MIMO	100	5500	10.36	10	1.0
	116	5580	10.52	10	1.0
	140	5700	11.28	10	1.0
IEEE 802.11ax HEW40 MIMO	102	5510	10.64	11	1.0
	110	5550	10.97	10	1.0
	134	5670	10.40	10	1.0
IEEE 802.11ax HEW20 MIMO	106	5530	10.12	10	1.0



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Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)	Target (dBm)	Tolerance ±(dB)
802.11ax OFDMA(26 Tone)-MIMO	100	5500	9.73	9	1.0
	116	5580	8.83	8	1.0
	140	5700	6.73	6	1.0
	102	5510	9.96	9	1.0
	110	5550	9.39	9	1.0
	134	5670	7.40	7	1.0
	106	5530	9.84	9	1.0
	122	5610	9.03	9	1.0
802.11ax OFDMA(52 Tone)-MIMO	100	5500	9.58	9	1.0
	116	5580	8.70	8	1.0
	140	5700	6.48	6	1.0
	102	5510	9.76	9	1.0
	110	5550	9.17	9	1.0
	134	5670	7.15	7	1.0
	106	5530	9.68	9	1.0
	122	5610	8.87	8	1.0
802.11ax OFDMA(106 Tone)-MIMO	100	5500	9.49	9	1.0
	116	5580	8.67	8	1.0
	140	5700	6.42	6	1.0
	102	5510	9.44	9	1.0
	110	5550	8.89	8	1.0
	134	5670	6.97	6	1.0
	106	5530	9.32	9	1.0
	122	5610	8.56	8	1.0
802.11ax OFDMA(242 Tone)-MIMO	100	5500	9.33	9	1.0
	116	5580	8.60	8	1.0
	140	5700	6.01	6	1.0
	102	5510	8.93	8	1.0
	110	5550	8.57	8	1.0
	134	5670	6.36	6	1.0
	106	5530	8.85	8	1.0
	122	5610	8.14	8	1.0
802.11ax OFDMA(484 Tone)-MIMO	102	5510	9.19	9	1.0
	110	5550	8.95	8	1.0
	134	5670	6.64	6	1.0
	106	5530	8.65	8	1.0
	122	5610	8.19	8	1.0
802.11ax OFDMA(996 Tone)-MIMO	106	5530	9.01	9	1.0
	122	5610	8.74	8	1.0



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7. Measurement Results

7.1 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.

[5.3G WLAN Ant0]

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	9.0	7.9433	2.48	1.7701	0.0028	1.0000

[5.3G WLAN Ant1]

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	9.0	7.9433	1.5	1.4125	0.0022	1.0000

[5.3G WLAN MIMO]

Band/Mode	RF output power		Directional Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11n HT20	11.0	12.5893	2.48	1.7701	0.0044	1.0000
IEEE 802.11n HT40	11.0	12.5893	2.48	1.7701	0.0044	1.0000
IEEE 802.11ac VHT20	11.0	12.5893	2.48	1.7701	0.0044	1.0000
IEEE 802.11ac VHT40	11.0	12.5893	2.48	1.7701	0.0044	1.0000
IEEE 802.11ac VHT80	11.0	12.5893	2.48	1.7701	0.0044	1.0000
IEEE 802.11ax HEW20	11.0	12.5893	2.48	1.7701	0.0044	1.0000
IEEE 802.11ax HEW40	11.0	12.5893	2.48	1.7701	0.0044	1.0000
IEEE 802.11ax HEW80	11.0	12.5893	2.48	1.7701	0.0044	1.0000



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**[5.3G WLAN MIMO]**

Band/Mode	RF output power		Directional Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
802.11ax OFDMA(26 Tone)-MIMO	13	19.9526	2.48	1.7701	0.0070	1.0000
802.11ax OFDMA(52 Tone)-MIMO	13	19.9526	2.48	1.7701	0.0070	1.0000
802.11ax OFDMA(106 Tone)-MIMO	12	15.8489	2.48	1.7701	0.0056	1.0000
802.11ax OFDMA(242 Tone)-MIMO	12	15.8489	2.48	1.7701	0.0056	1.0000
802.11ax OFDMA(484 Tone)-MIMO	13	19.9526	2.48	1.7701	0.0070	1.0000
802.11ax OFDMA(996 Tone)-MIMO	13	19.9526	2.48	1.7701	0.0070	1.0000

[5.5G WLAN Ant0]

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	8.0	6.3096	0.74	1.1858	0.0015	1.0000

[5.5G WLAN Ant1]

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	8.0	6.3096	1.6	1.4454	0.0018	1.0000

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5.5G WLAN MIMO]

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11n HT20	10.0	10.0000	1.6	1.4454	0.0029	1.0000
IEEE 802.11n HT40	10.0	10.0000	1.6	1.4454	0.0029	1.0000
IEEE 802.11ac VHT20	10.0	10.0000	1.6	1.4454	0.0029	1.0000
IEEE 802.11ac VHT40	10.0	10.0000	1.6	1.4454	0.0029	1.0000
IEEE 802.11ac VHT80	10.0	10.0000	1.6	1.4454	0.0029	1.0000
IEEE 802.11ax HEW20	10.0	10.0000	1.6	1.4454	0.0029	1.0000
IEEE 802.11ax HEW40	11.0	12.5893	1.6	1.4454	0.0036	1.0000
IEEE 802.11ax HEW80	10.0	10.0000	1.6	1.4454	0.0029	1.0000

[5.5G WLAN MIMO]

Band/Mode	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
802.11ax OFDMA(26 Tone)-MIMO	10	10.0000	1.6	1.4454	0.0029	1.0000
802.11ax OFDMA(52 Tone)-MIMO	10	10.0000	1.6	1.4454	0.0029	1.0000
802.11ax OFDMA(106 Tone)-MIMO	10	10.0000	1.6	1.4454	0.0029	1.0000
802.11ax OFDMA(242 Tone)-MIMO	10	10.0000	1.6	1.4454	0.0029	1.0000
802.11ax OFDMA(484 Tone)-MIMO	10	10.0000	1.6	1.4454	0.0029	1.0000
802.11ax OFDMA(996 Tone)-MIMO	10	10.0000	1.6	1.4454	0.0029	1.0000



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7.2 Simultaneous Transmission MPE

The EUT equipped with one 5.3G WIFI/5.5GWIFI antenna and one 5.3G WIFI/5.5GWIFI antenna. so need consider simultaneous transmission;

Simultaneous transmission MPE

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

$\sum \sum$ of MPE ratios ≤ 1.0

mode	5.3GWIFI MPE ratios	5.5GWIF MPE ratios	$\sum$ MPE ratios	Limit	Results
5.3GWIFI+5.5GWIFI	0.0070	0.0036	0.0106	1.0	Pass

Remark: only the result of the worst case was recorded in the report.

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. 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-----



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