

FCC RF Exposure Evaluation

1. Product Information

FCC ID	: 2AV6W-TAB-F1063-2
EUT	: Drive
Test Model	: TAB-F1063-2
Additional Model No.	: F1063
Model declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Power Supply	: DC 7.6V by Rechargeable Li-Polymer Battery(3250mAh) Recharged by DC 12V/3A adapter
Hardware version	: A116J
Software version	: Windows 10

Bluetooth

Frequency Range	: 2402MHz-2480MHz
Bluetooth Version	: V4.2
Bluetooth Channel Number	: 79 channels for Bluetooth V4.2 (BT Classics) 40 channels for Bluetooth V4.2 (BT LE)
Bluetooth Channel Spacing	: 1MHz for Bluetooth V4.2 (BT Classics) 2MHz for Bluetooth V4.2 (BT LE)
Bluetooth Modulation Type	: GFSK, $\pi/4$ -DQPSK, 8DPSK for Bluetooth V4.2 (BT Classics) GFSK for Bluetooth V4.2 (BT LE)

2.4G WLAN

Frequency Range	: 2412 – 2462 MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Channel Spacing	: 5MHz
Modulation Type	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)

WIFI(5.2G Band)

Frequency Range	: 5180 – 5240 MHz
Channel Number	: 4 channels for 20MHz bandwidth (5180-5240MHz) 2 channels for 40MHz bandwidth (5190~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	: IEEE 802.11a/n/ac: OFDM (64QAM, 16QAM, QPSK, BPSK)

WIFI(5.8G Band)

Frequency Range	: 5745 – 5825 MHz
	5 channels for 20MHz bandwidth (5745-5825MHz)
Channel Number	: 2 channels for 40MHz bandwidth (5755~5795MHz)
	1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	: IEEE 802.11a/n/ac: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: PIFA Antenna(ANT 0), used for WIFI TX/RX, 3dBi(Max.) for 2.4G Band, 5dBi(Max.) for 5G Band; PIFA Antenna(ANT 1), used for WIFI/Bluetooth TX/RX, 3dBi(Max.) for 2.4G Band, 5dBi(Max.) for 5G Band
Exposure category	: General population/uncontrolled environment
EUT Type	: Production Unit
Device Type	: Portable Device

2. Evaluation method and Limit

According to KDB447498 D01 General RF Exposure Guidance v06 Section 4.3.1 Standalone SAR test exclusion considerations: “Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.22 The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc.23 “

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [f (\text{GHz})] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where:}$$

- f (GHz) is the RF channel transmit frequency in GHz
 - Power and distance are rounded to the nearest mW and mm before calculation
 - The result is rounded to one decimal place for comparison
 - 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below
- The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

3. 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 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 2.1093](#): Radiofrequency radiation exposure evaluation: portable devices

4. Conducted Power Results

[BT Max Conducted Power]

Mode	Channel	Frequency(MHz)	Maximum Peak Output Power [dBm]
GFSK	0	2402	4.981
	39	2441	4.971
	78	2480	5.597
$\pi/4$ DQPSK	0	2402	4.007
	39	2441	3.898
	78	2480	5.050
8DPSK	0	2402	4.044
	19	2440	4.391
	39	2480	4.863
BT LE	0	2402	-4.823
	19	2440	-3.881
	39	2480	-4.981

[2.4GWLAN Max Conducted Power]

Mode	Channel	Frequency(MHz)	Max Peak Conducted Power (dBm)		
			ANT0	ANT1	ANT0+ANT1
IEEE 802.11b	1	2412	6.80	7.01	/
	6	2437	7.83	7.26	/
	11	2462	7.65	8.54	/
IEEE 802.11g	1	2412	8.42	7.35	/
	6	2437	7.97	8.14	/
	11	2462	8.07	7.39	/
IEEE 802.11n HT20	1	2412	6.22	6.17	9.21
	6	2437	6.64	6.28	9.47
	11	2462	6.50	6.36	9.44
IEEE 802.11n HT40	3	2422	6.23	6.49	9.37
	6	2437	6.17	6.31	9.25
	9	2452	6.43	6.41	9.43

[5.2GWLAN Max Conducted Power]

Mode	Channel	Frequency(MHz)	Max Average Conducted Power(dBm)		
			ANT0	ANT1	ANT0+ANT1
IEEE 802.11a	36	5180	6.65	6.41	/
	40	5200	6.33	6.81	/
	48	5240	6.85	6.43	/
IEEE 802.11n HT20	36	5180	4.70	4.51	7.62
	40	5200	4.40	4.54	7.48
	48	5240	4.65	4.50	7.59
IEEE 802.11n HT40	38	5190	4.30	4.94	7.64
	46	5230	4.59	4.35	7.48
IEEE 802.11ac VHT20	36	5180	4.41	4.90	7.67
	40	5200	4.99	4.46	7.74
	48	5240	4.96	4.88	7.93
IEEE 802.11ac VHT40	38	5190	4.63	4.44	7.55
	46	5230	4.87	4.80	7.85
IEEE 802.11ac VHT80	42	5210	4.48	4.59	7.55

[5.8GWLAN Max Conducted Power]

Mode	Channel	Frequency(MHz)	Max Average Conducted Power(dBm)		
			ANT0	ANT1	ANT0+ANT1
IEEE 802.11a	149	5745	5.33	5.61	/
	157	5785	5.44	5.13	/
	165	5825	5.45	5.30	/
IEEE 802.11n HT20	149	5745	4.33	4.02	7.19
	157	5785	4.30	4.15	7.24
	165	5825	4.35	4.27	7.32
IEEE 802.11n HT40	151	5755	4.28	4.38	7.34
	159	5795	4.46	4.16	7.32
IEEE 802.11ac VHT20	149	5745	4.41	4.10	7.27
	157	5785	4.29	4.26	7.29
	165	5825	4.26	4.18	7.23
IEEE 802.11ac VHT40	151	5755	4.13	4.44	7.30
	159	5795	4.17	4.32	7.26
IEEE 802.11ac VHT80	155	5775	4.40	4.19	7.31

5. Manufacturing tolerance

GFSK (Peak)						
Channel	Channel 0		Channel 39		Channel 78	
Target (dBm)	4.0		4.0		5.0	
Tolerance ±(dB)	1.0		1.0		1.0	
π/4DQPSK (Peak)						
Channel	Channel 0		Channel 39		Channel 78	
Target (dBm)	4.0		3.0		5.0	
Tolerance ±(dB)	1.0		1.0		1.0	
8DPSK (Peak)						
Channel	Channel 0		Channel 39		Channel 78	
Target (dBm)	4.0		4.0		4.0	
Tolerance ±(dB)	1.0		1.0		1.0	
BT-LE (Peak)						
Channel	Channel 0		Channel 19		Channel 39	
Target (dBm)	-4.0		-3.0		-4.0	
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11b(Peak)						
Channel	Channel 1		Channel 6		Channel 11	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	6.0	6.5	7.0	6.5	7.0	8.0
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11g(Peak)						
Channel	Channel 1		Channel 6		Channel 11	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	7.5	6.5	7.0	7.5	7.5	6.5
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11n HT20(Peak)						
Channel	Channel 1		Channel 6		Channel 11	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	5.5	5.5	6.0	5.5	6.0	5.5
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11n HT40(Peak)						
Channel	Channel 3		Channel 6		Channel 9	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	5.5	5.5	5.5	5.5	5.5	5.5
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11a(5.2G) (Average)						
Channel	Channel 36		Channel 40		Channel 48	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	6.0	5.5	5.5	6.0	6.0	5.5
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11 N20 (5.2G) (Average)						
Channel	Channel 36		Channel 40		Channel 48	

	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	4.0	4.0	4.0	4.0	4.0	4.0
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11 N40 (5.2G) (Average)						
Channel	Channel 38		Channel 46		/	
	ANT0	ANT1	ANT0	ANT1		
Target (dBm)	4.0	4.0	4.0	4.0	/	
Tolerance ±(dB)	1.0		1.0		/	
IEEE 802.11 ac20 (5.2G) (Average)						
Channel	Channel 36		Channel 40		Channel 48	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	4.0	4.0	4.0	4.0	4.0	4.0
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11ac40 (5.2G) (Average)						
Channel	Channel 38		Channel 46		/	
	ANT0	ANT1	ANT0	ANT1		
Target (dBm)	4.0	4.0	4.0	4.0	/	
Tolerance ±(dB)	1.0		1.0		/	
IEEE 802.11ac80 (5.2G) (Average)						
Channel	Channel 42		/		/	
	ANT0	ANT1				
Target (dBm)	4.0	4.0	/		/	
Tolerance ±(dB)	1.0		/		/	
IEEE 802.11a(5.8) (Average)						
Channel	Channel 149		Channel 157		Channel 165	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	4.5	5.0	4.5	4.5	4.5	4.5
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11 N20 (5.8) (Average)						
Channel	Channel 149		Channel 157		Channel 165	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	3.5	3.5	3.5	3.5	3.5	3.5
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11 N40 (5.8) (Average)						
Channel	Channel 151		Channel 159		/	
	ANT0	ANT1	ANT0	ANT1		
Target (dBm)	3.5	3.5	3.5	3.5	/	
Tolerance ±(dB)	1.0		1.0		/	
IEEE 802.11 ac20 (5.8) (Average)						
Channel	Channel 149		Channel 157		Channel 165	
	ANT0	ANT1	ANT0	ANT1	ANT0	ANT1
Target (dBm)	3.5	3.5	3.5	3.5	3.5	3.5
Tolerance ±(dB)	1.0		1.0		1.0	
IEEE 802.11ac40 (5.8) (Average)						
Channel	Channel 151		Channel 159		/	

	ANT0	ANT1	ANT0	ANT1	
Target (dBm)	3.5	3.5	3.5	3.5	/
Tolerance ±(dB)	1.0		1.0		/
IEEE 802.11ac80 (5.8) (Average)					
Channel	Channel 155		/		/
	ANT0	ANT1			
Target (dBm)	3.5	3.5	/		/
Tolerance ±(dB)	1.0		/		/

6. Evaluation Results

ANT0

Band/Mode	f (GHz)	Antenna Distance (mm)	RF output power		SAR Test Exclusion Threshold	SAR Test Exclusion
			dBm	mW		
GFSK	2.480	5	6.0	3.9811	1.2539 < 3.0	Yes
$\pi/4$ DQPSK	2.480	5	6.0	3.9811	1.2539 < 3.0	Yes
8DPSK	2.480	5	5.0	3.1623	0.9960 < 3.0	Yes
BT LE	2.480	5	-2.0	0.6310	0.1987 < 3.0	Yes
IEEE 802.11b	2.462	5	8.0	6.3096	1.9800 < 3.0	Yes
IEEE 802.11g	2.462	5	8.5	7.0795	2.2216 < 3.0	Yes
IEEE 802.11n HT20	2.462	5	7.0	5.0119	1.5728 < 3.0	Yes
IEEE 802.11n HT40	2.452	5	6.5	4.4668	1.3989 < 3.0	Yes
IEEE 802.11a (5.2G)	5.24	5	7.0	5.0119	2.2945 < 3.0	Yes
IEEE 802.11n20 (5.2G)	5.24	5	5.0	3.1623	1.4478 < 3.0	Yes
IEEE 802.11n40 (5.2G)	5.23	5	5.0	3.1623	1.4464 < 3.0	Yes
IEEE 802.11ac20 (5.2G)	5.24	5	5.0	3.1623	1.4478 < 3.0	Yes
IEEE 802.11ac40 (5.2G)	5.23	5	5.0	3.1623	1.4464 < 3.0	Yes
IEEE 802.11ac80 (5.2G)	5.21	5	5.0	3.1623	1.4436 < 3.0	Yes
IEEE 802.11a (5.8G)	5.825	5	5.5	3.5481	1.7127 < 3.0	Yes
IEEE 802.11n20 (5.8G)	5.825	5	4.5	2.8184	1.3604 < 3.0	Yes
IEEE 802.11n40 (5.8G)	5.795	5	4.5	2.8184	1.3569 < 3.0	Yes
IEEE 802.11ac20 (5.8G)	5.825	5	4.5	2.8184	1.3604 < 3.0	Yes
IEEE 802.11ac40 (5.8G)	5.795	5	4.5	2.8184	1.3569 < 3.0	Yes
IEEE 802.11ac80 (5.8G)	5.775	5	4.5	2.8184	1.3546 < 3.0	Yes

ANT1

Band/Mode	f (GHz)	Antenna Distance (mm)	RF output power		SAR Test Exclusion Threshold	SAR Test Exclusion
			dBm	mW		
IEEE 802.11b	2.462	5	9.0	7.9433	2.4927 < 3.0	Yes
IEEE 802.11g	2.462	5	8.5	7.0795	2.2216 < 3.0	Yes
IEEE 802.11n HT20	2.462	5	6.5	4.4668	1.4018 < 3.0	Yes
IEEE 802.11n HT40	2.452	5	6.5	4.4668	1.3989 < 3.0	Yes
IEEE 802.11a (5.2G)	5.24	5	7.0	5.0119	2.2945 < 3.0	Yes
IEEE 802.11n20 (5.2G)	5.24	5	5.0	3.1623	1.4478 < 3.0	Yes
IEEE 802.11n40 (5.2G)	5.23	5	5.0	3.1623	1.4464 < 3.0	Yes
IEEE 802.11ac20 (5.2G)	5.24	5	5.0	3.1623	1.4478 < 3.0	Yes
IEEE 802.11ac40 (5.2G)	5.23	5	5.0	3.1623	1.4464 < 3.0	Yes
IEEE 802.11ac80 (5.2G)	5.21	5	5.0	3.1623	1.4436 < 3.0	Yes
IEEE 802.11a (5.8G)	5.825	5	6.0	3.9811	1.9217 < 3.0	Yes
IEEE 802.11n20 (5.8G)	5.825	5	4.5	2.8184	1.3604 < 3.0	Yes

IEEE 802.11n40 (5.8G)	5.795	5	4.5	2.8184	1.3569 < 3.0	Yes
IEEE 802.11ac20 (5.8G)	5.825	5	4.5	2.8184	1.3604 < 3.0	Yes
IEEE 802.11ac40 (5.8G)	5.795	5	4.5	2.8184	1.3569 < 3.0	Yes
IEEE 802.11ac80 (5.8G)	5.775	5	4.5	2.8184	1.3546 < 3.0	Yes

Remark:

1. Output power including tune up tolerance;
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to f) in section 4.1 is applied to determine SAR test exclusion.

Simultaneous Transmission for SAR Exclusion

The sample support one Bluetooth/WLAN modular with two same antenna and support MIMO technology, need consider simultaneous transmission;

Σ of (the highest measured or estimated $SAR_{Antenna0} + SAR_{Antenna1}$)/1.6 = (0.2097+0.1869)/1.6 = 0.2 < 1.0;

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

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