Confirmation for applies duty factor to scale the measured SAR
Model: E-000110-02, FCC ID: 2A8JK-FIDES-LINK
Host device: L14 (Controller)

December 15, 2023

Product description:

The device is an original Wireless module of 2.4 GHz band.

The Host device is controller for a drone.

Proposal for scaling measured SAR by duty factor:

The wireless module specification is fixed to operate low duty cycle.

Therefore, we propose to scale measured body SAR on the host device by duty factor the base on Section 5.3 of KDB 447498 D04 v01.

Confirmation method of duty factor:

Eject the wireless module from the host device.

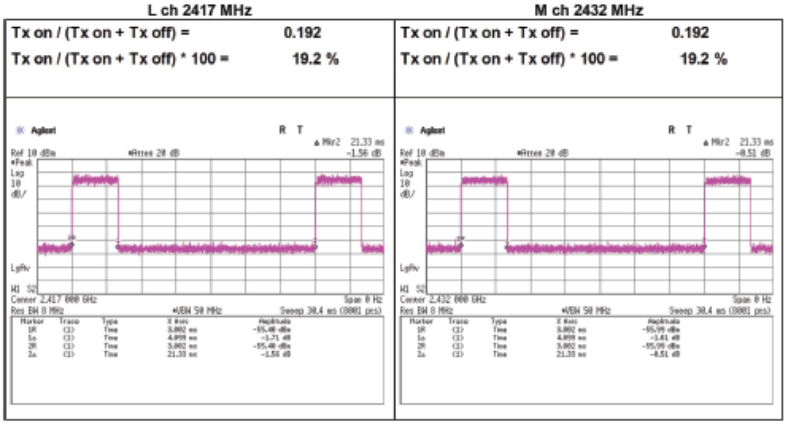
Then the wireless module builds the duty cycle of actual specification with the peripheral and communication devices.

Duty factor of the wireless module is measured by based on the ANSI C63.10:2013 section 11.6.

Duty factor of the wireless module measurement results was 19.2 %.

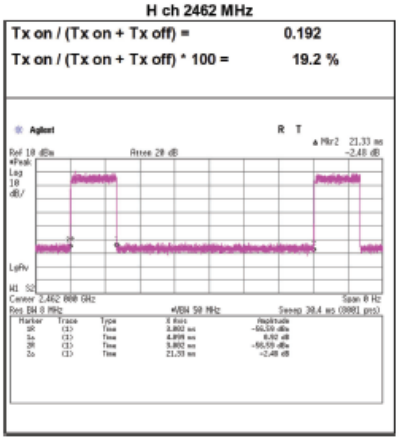
Please confirm the following data and attachment data (Appendix P1 of 4) for the results.

L ch 2417 MHz



M ch 2432 MHz

H ch 2462 MHz



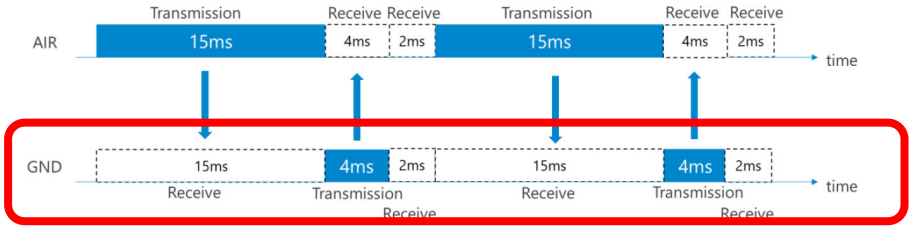
Specification of duty cycle on the wireless module:

Please confirm the following “Tune-up procedure”.

Operation of TDD (Time Division Duplex)

This module is used as a pair of AIR module and GND module. The AIR module and GND module have the same hardware. On the other hand, the firmware is different for the AIR module and GND module. Switching between TDD transmission and reception is performed under firmware control. The switching will be executed at the following timing.

One cycle is 21ms, of which AIR transmits 15ms. GND transmits 4ms. There is a time period of 2ms when both AIR and GND become Receive. This time measures the channel condition.



⇦ Drone side

⇦ Controller side

Duty Factor calculation for controller:

-Transmission time (on time) per 1 cycle: 4ms

-1 cycle: 15 ms + 4 ms + 2 ms = 21 ms

- Duty Factor: Transmission time (on time) per 1 cycle /1cycle time * 100 (%) = 4 ms /21 ms * 100 = 19.048%

Result for scaled SAR measurement value:

The SAR test result is applicable to scale by the measurement and specification duty factor.

SAR measurement results (2.4 GHz band)

Test setup					Mode & Frequency			Duty cycle		Power correction			SAR results [W/kg] (Max.value of multi-peak)								SAR plot # in Appx. 2	Setup photo# in Appx. 1-3	Memo (*c)
No.	Test position	Antenna position (degree) (*2)	Gap [mm]	Source power	Mode	[MHz]	CH	Duty cycle [%]	Duty scaled factor	Max. tune-up limit [dBm]	Measured conducted [dBm]	Power scaled (tune-up) factor	Measured SAR	ΔSAR [%]	ΔSAR corrected	Tx occupancy rate (*1)	Reported SAR (*b)	SAR type	Limit				
					Mark with "■" is the initial CH.																		
1	Top	90 deg.	0	Battery		2417	2	100	1.00	19	17.82	1.31	2.96	+	n/a (*a)	19.2 %	0.744	1g	1.6	1-1	P1	-
2	Top	90 deg.	0	Battery		2432	5	100	1.00	19	17.97	1.27	2.99	+	n/a (*a)	19.2 %	0.729	1g	1.6	-	P1	-
3	Top	90 deg.	0	Battery		2462*	11	100	1.00	19	18.76	1.06	3.18	+	n/a (*a)	19.2 %	0.647	1g	1.6	-	P1	-
4	Back1	0 deg.	0	Battery		2417	2	100	1.00	19	17.82	1.31	2.50	+	n/a (*a)	19.2 %	0.629	1g	1.6	-	P2	-
5	Back1	0 deg.	0	Battery		2432	5	100	1.00	19	17.97	1.27	2.74	+	n/a (*a)	19.2 %	0.668	1g	1.6	-	P2	-
6	Back1	0 deg.	0	Battery	OFDM	2462*	11	100	1.00	19	18.76	1.06	2.56	+	n/a (*a)	19.2 %	0.521	1g	1.6	-	P2	-
7	Back2	0 deg.	0	Battery		2432	11	100	1.00	19	17.97	1.27	2.60	+	n/a (*a)	19.2 %	0.634	1g	1.6	-	P3	-
8	Front	0 deg.	0	Battery		2462*	11	100	1.00	19	18.76	1.06	0.082	+	n/a (*a)	19.2 %	0.017	1g	1.6	-	P4	-
9	Right	90 deg.	0	Battery		2462*	11	100	1.00	19	18.76	1.06	0.103	+	n/a (*a)	19.2 %	0.021	1g	1.6	-	P5	-
10	Bottom	90 deg.	0	Battery		2462*	11	100	1.00	19	18.76	1.06	n/a	+	n/a (*a)	19.2 %	n/a	1g	1.6	-	-	Exempt, See 4.2
11	Left	90 deg.	0	Battery		2462*	11	100	1.00	19	18.76	1.06	n/a	+	n/a (*a)	19.2 %	n/a	1g	1.6	-	-	Exempt, See 4.2

T.Imamura

Toyokazu Imamura

Leader

UL Japan, Inc.

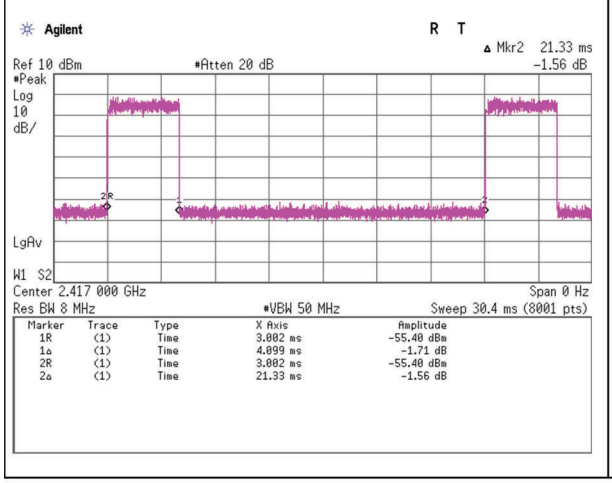
Burst rate confirmation

Test place	Shonan EMC Lab. No.2 Shielded Room
Date	December 7, 2023
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Yohsuke Matsuzawa
Mode	Tx

L ch 2417 MHz

Tx on / (Tx on + Tx off) = 0.192

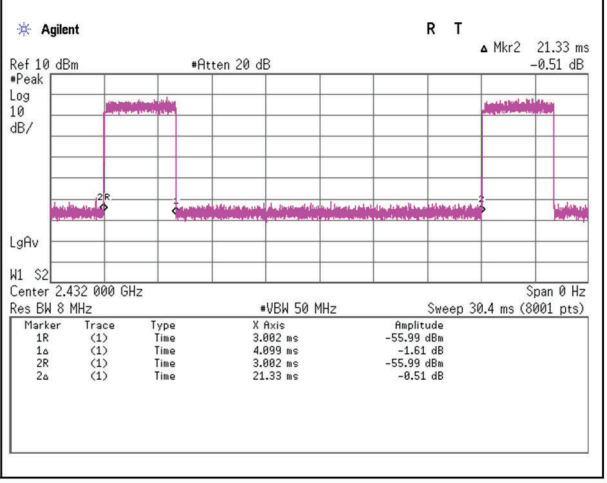
Tx on / (Tx on + Tx off) * 100 = 19.2 %



M ch 2432 MHz

Tx on / (Tx on + Tx off) = 0.192

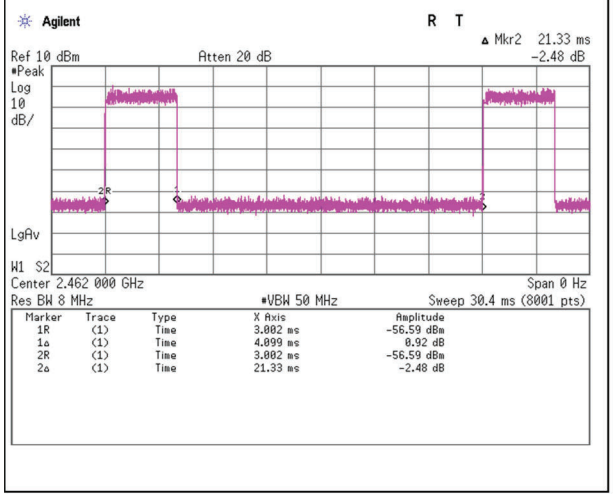
Tx on / (Tx on + Tx off) * 100 = 19.2 %



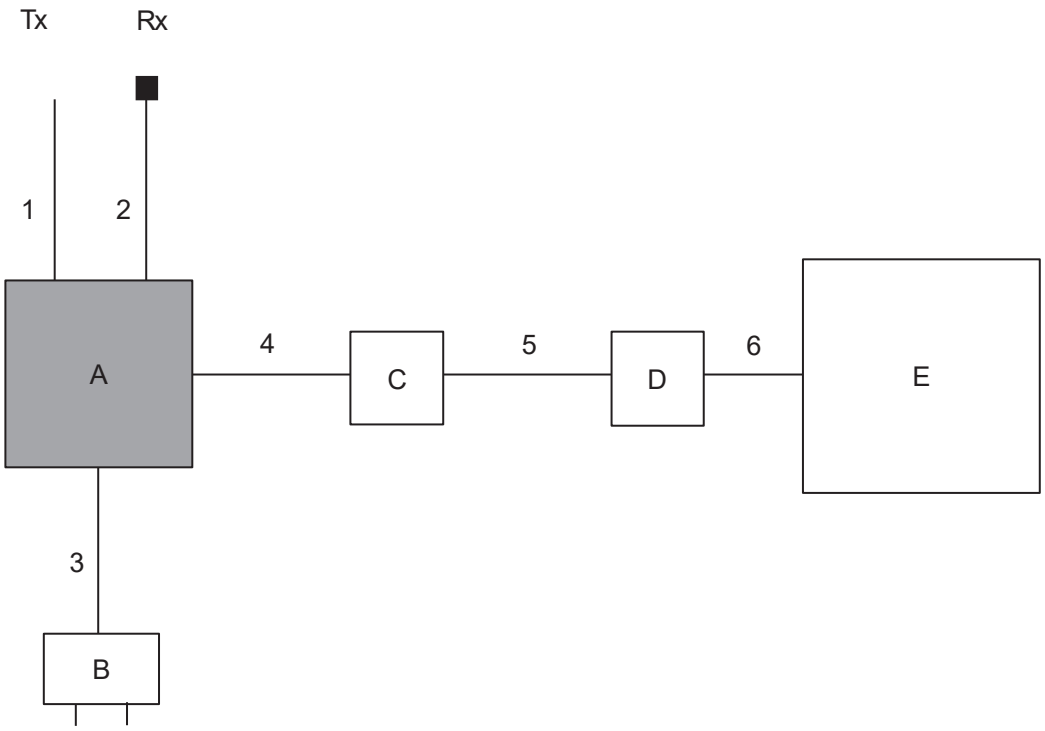
H ch 2462 MHz

Tx on / (Tx on + Tx off) = 0.192

Tx on / (Tx on + Tx off) * 100 = 19.2 %



Configuration and Peripherals



AC 100 V / 50 Hz

* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Falcon 3.0 GND	E-000110-02	GND-PC63003388	ACSL Ltd.	EUT FCC ID: 2A8JK-FIDES-LINK
B	AC Adapter	SMM30-12-RV-C	203400555	CUI INC.	-
C	USB-Serial	-	-	ACSL Ltd.	-
D	USB-USB	A8355	-	ANKER	-
E	PC	80Y7	PF0TT9RY	LENOVO	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	RF (Tx)	0.2	Shielded	Shielded	-
2	RF (Rx)	0.2	Shielded	Shielded	-
3	DC	1.55	Unshielded	Unshielded	-
4	Serial	0.1	Unshielded	Unshielded	-
5	USB	1.7	Shielded	Shielded	-
6	USB	0.2	Shielded	Shielded	-

Test Instruments

Radio test equipment

Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
AT	145040	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	2023/03/02	12
AT	145793	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997819	2023/05/26	12
AT	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2023/03/01	12
AT	154591	Attenuator	Weinschel Corp.	54A-10	81595	2023/04/12	12
AT	160496	Attenuator	Weinschel Corp.	54A-20	87636	2022/12/02	12
AT	191839	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2023/08/01	12
AT	207277	Measuring	ASKUL	-	-	-	-

*Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.
Test Item:
AT: Antenna terminal conducted test