



1601 North A.W. Grimes Blvd., Suite B
 Round Rock, TX 78665
 e-mail: info@ptitest.com
 (512) 244-3371 Fax: (512) 244-1846

1.0 Maximum Permissible Exposure Evaluation (Supplements the test report.)

The measured power is considered for the intended use of the device and resulting RF exposure to the user.

1.2 Criteria

Section Reference	Date
447498 D01 General RF Exposure Guidance v06 // RSS-102 Issue 5	21 Oct 2021

1.3 Procedure

Using measurement of peak power and considering the intended application, determine the permissible exposure level, applicability of exclusion, or whether additional exposure tests (SAR) are indicated. When applicable justify conclusion for selected exposure level and separation distance.

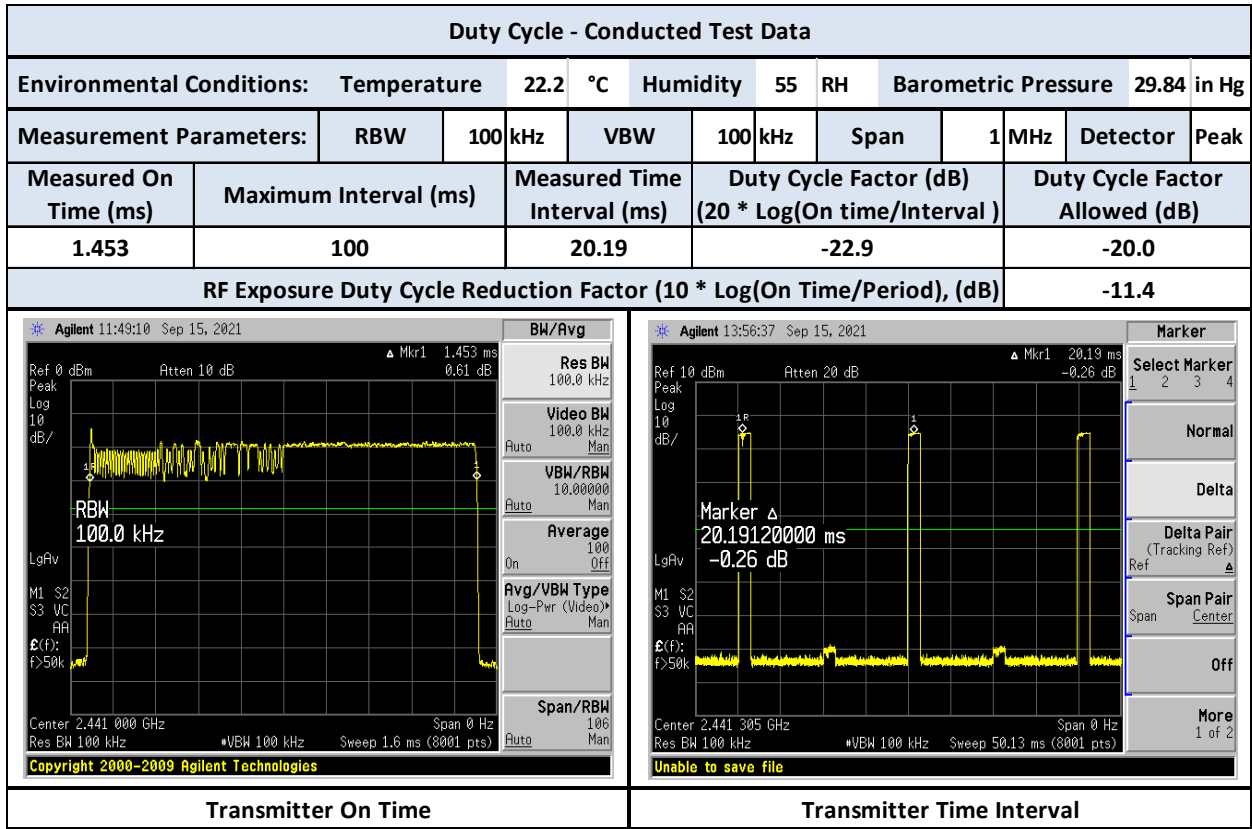
This radio module is used inside equipment control interfaces. These interfaces can either be mounted to industrial equipment or held by an operator. Units that are held by an operator are typically equipped with several controls in the form of switches, push buttons, or joysticks. The antennas used in these devices are mounted away from the user, resulting in a minimum distance of 20mm from any surface typically contacted by the operator during normal use.

Duty Cycle Correction Factor Measurement:

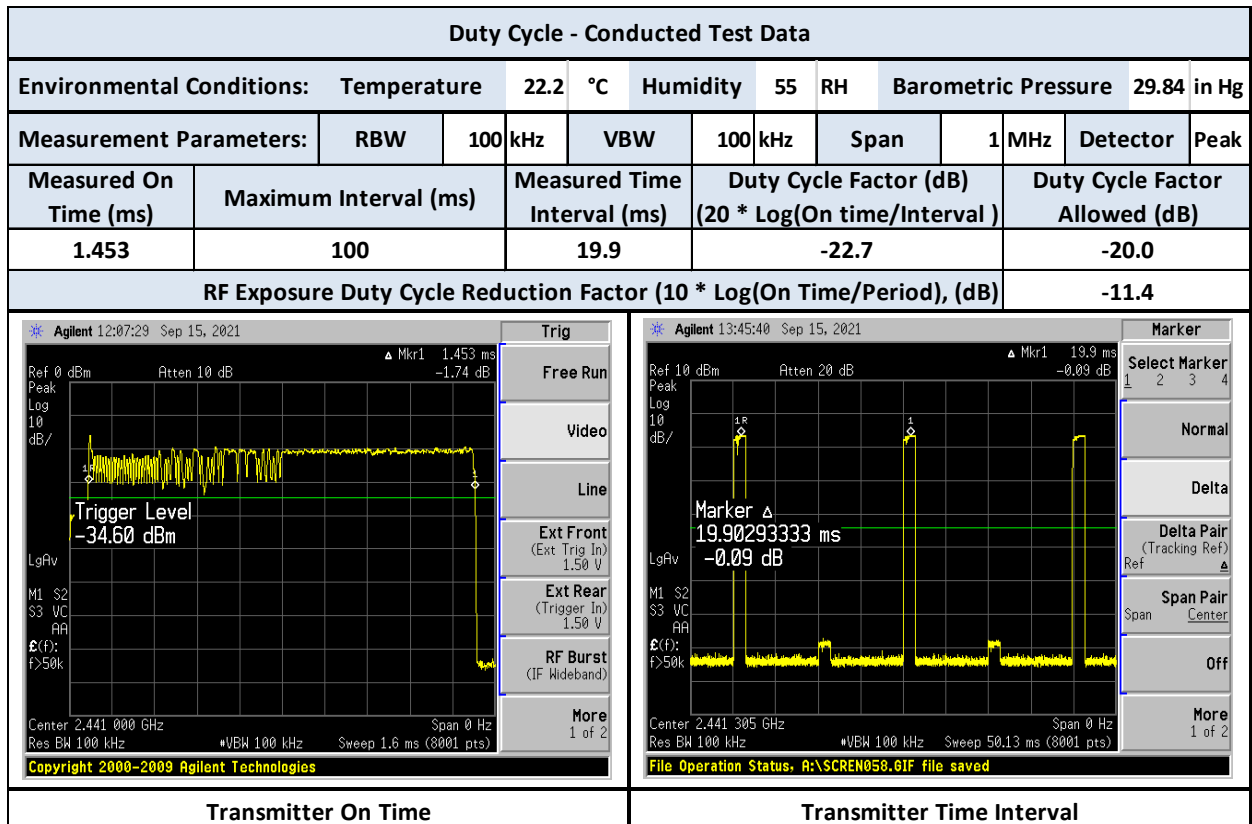
Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

Continuous packet transmission mode was used for the duty cycle measurement, which would represent a worst-case operating scenario. Duty Cycle measurement was performed on 15 Sep, 2021.

The radio contains two independent transmit chains which output identical signals during normal operation. Duty cycle measurements are presented for both antenna ports. Total output power is the summation of both antenna port A and antenna port B peak power.



Duty Cycle, Antenna Port 'A'



Duty Cycle, Antenna Port 'B'

1.4 Power to Exposure Calculation

For 2.4 GHz radio power is determined by conducted measurement. Safe exposure distance was calculated for the allowed maximum uncontrolled public exposure limit.

Measured Conducted Peak Power dBm (Port A + Port B)	Source Duty Cycle Factor dB	Antenna Gain dBi	Calculated EIRP dBm	EIRP In Linear Terms mW
18.5	-11.4	3.0	10.1	10.23

1.5 SAR Exemption Calculation – FCC

Applicable requirement: KDB 447498 Clause 4.3.1 Section 1

Calculated power (max power including tune up tolerance = 10.23 mW):

$$[(10.23 \text{ mW})/(20 \text{ mm})] \cdot [\sqrt{2.4 \text{ (GHz)}}] = 0.79$$

$$0.79 \leq 6.0 \text{ (Limb exposure)}$$

$$0.79 \leq 3.0 \text{ (Non-Limb exposure)}$$

1.6 SAR Exemption Calculation – IC

Applying Table 1 of clause 2.5.1 applying 2cm (or 20mm) spacing column and row 2450 MHz. The exemption limit is 30 mW.

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

$$10.23 \text{ mW} < 30 \text{ mW}$$

1.7 Conclusion

The exposure limit is satisfied.

Signed:



Larry Finn
