

RF Exposure Evaluation Report

FOR:

Motive Technologies, Inc.

Brand:

Motive Technologies, Inc.

Marketing Name:

Omnicam

Model Number:

OC-1

Product Description:

Is a vehicle camera, designed to be powered by vehicle power (12 or 24 V DC). It is designed to be always on and recording video while the vehicle is on. It will upload small video files to Motive back-end servers via LTE on request.

FCC ID: 2AQM7-OC1 IC: 24516-OC1

Per:

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091), FCC KDB 447498 D01 General RF Exposure Guidance v06 ISED RSS-102 Issue 5

Report number: EMC_KPTRK_040_23001_FCC_ISED_RF_Exposure

DATE: 6/28/2023



A2LA Accredited

IC recognized # 3462B

CETECOM Inc.

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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the equipment (as identified in section 3 of this test report) with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 1.1307, Part 2 (2.1091) and ISED standard RSS-102 issue 5 under worst case conditions (measured or rated RF output power including tune-up tolerance, antenna gain, the distance towards the human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits stipulated by the above given FCC and ISED rule parts based on available specifications for worst-case conditions at a separation distance greater than 20cm to the body.

Company	Description	Model #
Motive Technologies, Inc.	Is a vehicle camera, designed to be powered by vehicle power (12 or 24 V DC). It is designed to be always on and recording video while the vehicle is on. It will upload small video files to Motive back-end servers via LTE on request.	OC-1

Responsible for Testing Laboratory:

Date	Section	Name	Signature
6/28/2023	Compliance	(Director of Regulatory Services)	
		Stoecker, Arndt	

Responsible for the Report:

	Ghanma, Issa					
_	6/28/2023	Compliance	(Deputy Lab Manager)			
	Date	Section	Name	Signature		

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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

CETECOM Inc.
Compliance
411 Dixon Landing Road
Milpitas, CA 95035
USA
+1 (408) 586 6200
+1 (408) 586 6299
Stoecker, Arndt
Quintal, Phillip

2.2 Identification of the Client / Manufacturer

Applicant's Name:	Motive Technologies, Inc.	
Street Address:	55 Hawthorne St., Suite 400	
City/Zip Code	San Francisco, CA 94105	
Country	USA	

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client /	
Manufacturers Address:		
City/Zip Code		
Country		

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3 Equipment under Assessment

Brand:	Motive Technologies, Inc.		
Model No:	OC-1		
Marketing name:	Omnicam		
FCC-ID:	2AQM7-OC1		
IC:	24516-OC1		
HW Version :	1		
SW Version :	0.7.2		
HVIN:	OC-1		
PMN:	Omnicam		
Product Description:	Is a vehicle camera, designed to be powered by vehicle power (12 or 24 V DC). It is designed to be always on and recording video while the vehicle is on. It will upload small video files to Motive back-end servers via LTE on request.		
Frequency Range/number of channels:	 Cellular: UMTS II, IV, V LTE 2, 4, 5, 12, 13 BT LE v5.2 Nominal band: 2400 MHz – 2483.5 MHz Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 Channels WLAN 2.4 GHz 802.11b/g/n Nominal band: 2400 MHz – 2483.5 MHz Center to center: 2412 MHz (ch 1) – 2462 MHz (ch 11), 11 Channels WLAN 5.0 GHz 802.11a/n/ac Nominal band: 5725 MHz – 5850 MHz 802.11a/n-HT20/ac-VHT20 Center to center: 5745 MHz (ch 149) – 5825 MHz (ch 165), 5 Channels 802.11n-HT40/ac-VHT40 Center to center: 5755 MHz (ch 151) – 5795 MHz (ch 159), 2 Channels 802.11ac-VHT80 Center to center: 5775 MHz (ch 155), 1 Channels 		
Radio information:	 ❖ Cellular: Sierra Wireless RC7612 ❖ BT LE/WLAN: Murata LBEE5XV1XZ 		

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O UMTS: 23 dBm ± 1dB Power class 3 ○ LTE: 23 dBm ± 1dB Power class 3 ◆ TLE (Measured) 4.89 dBm ◆ WLAN 0 2.4 GHz (Measured) ○ 802.11b: 17.79 dBm ○ 802.11b: 20.4 dBm ○ 802.11b: 18.03 dBm ○ 802.11b: 18.03 dBm ○ 802.11b: 18.03 dBm ○ 802.11b: 18.03 dBm ○ 802.11a: 16.02 dBm ○ 802.11a: VHTD: 18.75 dBm ○ 802.11a: VHTO: 15.74 dBm ○ 802.11a: VHTO: 15.75 dBm ○ VHLAN 0 VHTO: 1						
LTE: 23 dBm ± 1dB Power class 3 B TLE (Measured) 4.89 dBm WLAN 0.2.4 GHz (Measured) 802.11b: 17.79 dBm 802.11b: 27.79 dBm 802.11b: 25.06 dBm WLAN 1.2.4 GHz (Measured) 802.11b: 27.04 dBm 802.11b: 27.04 dBm 802.11b: 27.04 dBm 802.11b: 27.04 dBm WLAN 1.10.13 (Measured) 802.11a: 16.03 dBm WLAN 1.10.113 (Measured) 802.11a: 16.		❖ Cellular				
WILAN 0 2.4 GHz (Measured) • WILAN 0 2.4 GHz (Measured) • 802.11b: 17.79 dBm • 802.11b: 17.79 dBm • 802.11b: 20.4 dBm • WILAN 0 U-NII-3 (Measured) 802.11a: 16.03 dBm • WILAN MIMO U-NII-3 (Calculated total power) • 802.11a-17d: 16.95 dBm • 802.11a-17d: 16.95 dBm • 802.11a-VHT40: 16.76 d						
WLAN 0 2.4 GHz (Measured) 602.11s: 17.79 dBm 802.11g: 25.06 dBm WLAN 1 2.4 GHz (Measured) 802.11s: 20.4 dBm 802.11s: 25.23 dBm WLAN MIMO 2.4 GHz (Measured) 802.11a: 16.03 dBm WLAN 0 U-NII-3 (Measured) 802.11a: 16.02 dBm WLAN 1 U-NII-3 (Measured) 802.11a: 16.02 dBm WLAN MIMO U-NII-3 (Gaculated total power) 802.11a-WT40: 18.76 dBm 802.11a-WT720: 18.75 dBm 802.11a-WT740: 16.76 dBm 802.11a-WT740: 15.74 dBm Power Supply/ Rated Operating Voltage Range: 12 or 24 V DC Operating Temperature Range: T min: 40 °C / T Nom: 20 °C / T max: +60 °C LTE Main T Type: Monopole Antenna T TyrRx Max Gain National Max Gain T Type: Inverted-F Antenna R x only Max Gain National Max Gain 2.4 2.48 GHz: 1.7 dBi LEWUAN 0 Type: Inverted-F Antenna TyrRx Max Gain 2.4 2.48 GHz: 1.7 dBi 5.0 –6.0 GHz: 4.4 dBi BLE-WUAN 1 Type: Inverted-F Antenna TyrRx TyrRx Max Gain						
Second Process Sec		,				
Nax. Output Power:		· · · · · · · · · · · · · · · · · · ·				
WILAN 1 2.4 GHz (Measured)						
Max. Output Power: 0						
Max. Output Power:		· · · · · · · · · · · · · · · · · · ·				
WILAN MIMO 2.4 GHz (Measured) 802.11n-HT20: 27.59 dBm WILAN U-NII-3 (Measured) 802.11a: 16.03 dBm WILAN U-NII-3 (Measured) 802.11a: 16.02 dBm WILAN MIMO U-NII-3 (Calculated total power) 802.11n-HT20: 18.77 dBm 802.11ac-VHT20: 18.75 dBm 802.11ac-VHT40: 16.76 dBm 802.11ac-VHT40: 16.76 dBm 802.11ac-VHT40: 15.74 dBm Power Supply/ Rated Operating Voltage Range: 12 or 24 V DC Operating Temperature Range: T min: 40 °C / T Nom: 20 °C / T max: +60 °C * LTE Main Type: Monopole Antenna 17/Rx Max Gain 17/10 - 2155 MHz: 5.3 dBi LTE Diversity Type: Inverted-F Antenna Rx only Max Gain 17/10 - 2170 MHz: -1.1 dBi Antenna Information as declared: BLE/MLAN 0 O Type: Inverted-F Antenna Ty/Rx Max Gain 2.4 - 2.48 GHz: 1.7 dBi 5.0 - 6.0 GHz: 4.4 dBi 5.0 - 6.0 GHz: 4.4 dBi 6 BLE/MLAN 1 Type: Inverted-F Antenna 7 Tx/Rx Max Gain 2.4 - 2.48 GHz: 0.8 dBi 5.0 - 6.0 GHz: 5.6 dBi 3 Sample Revision: Pro						
WILAN 0 U-NII-3 (Measured) 802.11a: 16.03 dBm WILAN 1 U-NII-3 (Measured) 802.11a: 16.02 dBm WILAN 1 U-NII-3 (Calculated total power) 802.11n-HT40: 16.95 dBm 802.11n-HT40: 16.95 dBm 802.11ac-VHT40: 16.76 dBm 802.11ac-VHT80: 15.74 dBm Power Supply/ Rated Operating Voltage Range: 12 or 24 V DC Operating Temperature Range: T min: -40 °C / T Nom: 20 °C / T max: +60 °C LTE Main 1 Type: Monopole Antenna 17/Rx Max Gain 17/10 - 2155 MHz: 5.3 dBi LTE Diversity Type: Inverted-F Antenna Rx only Max Gain 17/10 - 2170 MHz: -1.1 dBi Antenna Information as declared: 4 BLE/WLAN 0 Type: Inverted-F Antenna Tx/Rx Max Gain 2 4 - 2.48 GHz: 1.7 dBi 5.0 - 6.0 GHz: 4.4 dBi 5.0 - 6.0 GHz: 4.4 dBi BLE/WLAN 1 Type: Inverted-F Antenna Tx/Rx Max Gain 2 4 - 2.48 GHz: 0.8 dBi 5.0 - 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82 mm tall x 82 mm wide x 67 mm deep	Max. Output Power:					
♦ WLAN 1 U-NII-3 (Measured) 802.11a: 16.02 dBm ♦ WLAN MIMO U-NII-3 (Calculated total power) • 802.11n-HT20: 18.75 dBm • 802.11ac-VHT20: 18.75 dBm • 802.11ac-VHT20: 18.75 dBm • 802.11ac-VHT20: 18.75 dBm • 802.11ac-VHT30: 15.74 dBm Power Supply/ Rated Operating Voltage Range: 12 or 24 V DC T min: -40 °C / T Nom: 20 °C / T max: +60 °C ♦ LTE Main 1 ype: Monopole Antenna • TX/Rx Max Gain • 704 - 894 MHz: 4.6 dBi 1 710 - 2155 MHz: 5.3 dBi • LTE Diversity Type: Inverted-F Antenna • Rx only Max Gain • 1710 - 2170 MHz: -1.1 dBi Antenna Information as declared: ♦ BLEMUAN 0 • Type: Inverted-F Antenna Tx/Rx • Max Gain 2.4 - 2.48 GHz: 1.7 dBi • 5.0 - 6.0 GHz: 4.4 dBi 5.0 - 6.0 GHz: 4.4 dBi • Type: Inverted-F Antenna Tx/Rx • Max Gain 2.4 - 2.48 GHz: 0.8 dBi • 5.0 - 6.0 GHz: 5.6 dBi Sample Revision: Production Unit; Pre-Production Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep		· · · · · · · · · · · · · · · · · · ·				
♦ WLAN MIMO U-NII-3 (Calculated total power) ○ 802.11n-HT20: 18.77 dBm ○ 802.11n-HT20: 18.77 dBm ○ 802.11n-HT20: 18.75 dBm ○ 802.11ac-VHT20: 18.75 dBm ○ 802.11ac-VHT20: 16.76 dBm ○ 7ye: Monopole Antenna ○ 7yRx ○ Max Gain ○ 170 - 2155 MHz: 4.6 dBi ○ 170 - 2155 MHz: 5.3 dBi ○ 170 - 2170 MHz: -1.1 dBi ◆ BLE/WLAN 0 ○ 17ye: Inverted-F Antenna ○ 17yRx ○ Max Gain ○ 17ye: Inverted-F Antenna ○ 17yRx ○ Max Gain ○ 17yRx ○ Max Gain ○ 17yRx ○ 17ye: Inverted-F Antenna ○ 17yRx		· · ·				
0 802.11n-HT20: 18.77 dBm 0 802.11n-HT40: 16.95 dBm 802.11ac-VHT40: 16.76 dBm 802.11ac-VHT80: 15.74 d						
0 802.11n-HT40: 16.95 dBm 0 802.11ac-VHT20: 18.75 dBm 802.11ac-VHT40: 16.76 dBm 802.11ac-VHT40: 16.76 dBm 802.11ac-VHT80: 15.74 dBm		· · ·				
0						
S802.11ac-VHT40: 16.76 dBm 802.11ac-VHT80: 15.74 dBm						
S02.11ac-VHT80: 15.74 dBm						
Power Supply/ Rated Operating Voltage Range: Operating Temperature Range: T min: -40 °C / T Nom: 20 °C / T max: +60 °C LTE Main Type: Monopole Antenna TyrRx Max Gain Tot - 894 MHz: 4.6 dBi Tr10 - 2155 MHz: 5.3 dBi LTE Diversity Max Gain Rx only Max Gain Trype: Inverted-F Antenna Rx only Max Gain Type: Inverted-F Antenna Tx/Rx Max Gain Type: Inverted-F Antenna Tx/Rx Max Gain Type: Inverted-F Antenna Tx/Rx Max Gain TyrRx Max Gain TyrRx Max Gain L2 4-2.48 GHz: 1.7 dBi Type: Inverted-F Antenna Tx/Rx Max Gain L2 4-2.48 GHz: 1.7 dBi Max Gain L2 4-2.48 GHz: 0.8 dBi Max Gain Product dimensions [mm]: Product dimensions [mm]:						
T min: -40 °C / T Nom: 20 °C / T max: +60 °C		o 802.11ac-VHT80: 15.74 dBm				
T min: -40 °C / T Nom: 20 °C / T max: +60 °C		12 or 24 V DC				
★ LTE Main ○ Type: Monopole Antenna ○ Tx/Rx ○ Max Gain • 704 – 894 MHz: 4.6 dBi • 1710 – 2155 MHz: 5.3 dBi ★ LTE Diversity ○ Type: Inverted-F Antenna ○ Rx only ○ Max Gain • 1710 – 2170 MHz: -1.1 dBi ★ BLE/WLAN 0 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain • 2.4 - 2.48 GHz: 1.7 dBi • 5.0 – 6.0 GHz: 4.4 dBi ★ BLE/WLAN 1 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain • 2.4 - 2.48 GHz: 0.8 dBi • 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Production Unit; Pre-Production Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
o Type: Monopole Antenna o Tx/Rx o Max Gain ■ 704 – 894 MHz: 4.6 dBi ■ 1710 – 2155 MHz: 5.3 dBi LTE Diversity o Type: Inverted-F Antenna o Rx only o Max Gain ■ 1710 – 2170 MHz: -1.1 dBi Antenna Information as declared: Product dimensions [mm]: Product dimensions [mm]: Product dimensions [mm]: Product dimensions [mm]: Max Gain ■ 2.4 - 2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi Product dimensions [mm]:	Operating Temperature Range:					
O Tx/Rx O Max Gain ■ 704 – 894 MHz: 4.6 dBi ■ 1710 – 2155 MHz: 5.3 dBi LTE Diversity O Type: Inverted-F Antenna O Rx only O Max Gain ■ 1710 – 2170 MHz: -1.1 dBi Antenna Information as declared: BLE/WLAN 0 O Type: Inverted-F Antenna O Tx/Rx O Max Gain ■ 2.4 - 2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi BLE/WLAN 1 O Type: Inverted-F Antenna O Tx/Rx O Max Gain ■ 2.4 - 2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep		❖ LTE Main				
O Max Gain ■ 704 – 894 MHz: 4.6 dBi ■ 1710 – 2155 MHz: 5.3 dBi LTE Diversity O Type: Inverted-F Antenna O Rx only O Max Gain ■ 1710 – 2170 MHz: -1.1 dBi Antenna Information as declared: BLE/WLAN 0 O Type: Inverted-F Antenna O Tx/Rx O Max Gain ■ 2.4 -2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi BLE/WLAN 1 O Type: Inverted-F Antenna O Tx/Rx O Max Gain ■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
■ 704 – 894 MHz: 4.6 dBi ■ 1710 – 2155 MHz: 5.3 dBi LTE Diversity ○ Type: Inverted-F Antenna ○ Rx only ○ Max Gain ■ 1710 – 2170 MHz: -1.1 dBi Antenna Information as declared: BLE/WLAN 0 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain ■ 2.4 -2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi BLE/WLAN 1 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain ■ 2.4 -2.48 GHz: 0.8 dBi ■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep		o Tx/Rx				
■ 1710 – 2155 MHz: 5.3 dBi LTE Diversity Type: Inverted-F Antenna Rx only Max Gain 1710 – 2170 MHz: -1.1 dBi BLE/WLAN 0 Type: Inverted-F Antenna Tx/Rx Max Gain 2.4 -2.48 GHz: 1.7 dBi 5.0 – 6.0 GHz: 4.4 dBi BLE/WLAN 1 Type: Inverted-F Antenna Tx/Rx Max Gain 2.4 -2.48 GHz: 1.7 dBi 5.0 – 6.0 GHz: 4.4 dBi Max Gain Product dimensions [mm]: Product dimensions [mm]:						
★ LTE Diversity ○ Type: Inverted-F Antenna ○ Rx only ○ Max Gain ■ 1710 – 2170 MHz: -1.1 dBi ★ BLE/WLAN 0 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain ■ 2.4 -2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi ★ BLE/WLAN 1 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain ■ 7x/Rx ○ Max Gain ■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
Type: Inverted-F Antenna Rx only Max Gain 1710 − 2170 MHz: -1.1 dBi BLE/WLAN 0 Type: Inverted-F Antenna Tx/Rx Max Gain 2.4 -2.48 GHz: 1.7 dBi 5.0 − 6.0 GHz: 4.4 dBi BLE/WLAN 1 Type: Inverted-F Antenna Tx/Rx Max Gain 2.4 -2.48 GHz: 1.7 dBi 5.0 − 6.0 GHz: 4.8 dBi Max Gain Type: Inverted-F Antenna Tx/Rx Max Gain Type: Inverted-F Antenna Tx/Rx Max Gain Tx/Rx Max Gain 2.4 -2.48 GHz: 0.8 dBi 5.0 − 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
o Rx only o Max Gain ■ 1710 – 2170 MHz: -1.1 dBi Antenna Information as declared: BLE/WLAN 0 o Type: Inverted-F Antenna o Tx/Rx o Max Gain ■ 2.4 - 2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi BLE/WLAN 1 o Type: Inverted-F Antenna o Tx/Rx o Max Gain ■ 2.4 - 2.48 GHz: 0.8 dBi ■ 2.4 - 2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
Max Gain ■ 1710 – 2170 MHz: -1.1 dBi Interpretation as declared: Max Gain □ Type: Inverted-F Antenna □ Tx/Rx □ Max Gain ■ 2.4 - 2.48 GHz: 1.7 dBi □ 5.0 – 6.0 GHz: 4.4 dBi BLE/WLAN 1 □ Type: Inverted-F Antenna □ Tx/Rx □ Max Gain □ 2.4 - 2.48 GHz: 0.8 dBi □ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
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Antenna Information as declared:						
Type: Inverted-F Antenna Tx/Rx Max Gain 2.4 - 2.48 GHz: 1.7 dBi 5.0 - 6.0 GHz: 4.4 dBi BLE/WLAN 1 Type: Inverted-F Antenna Tx/Rx Max Gain Tx/Rx Max Gain 2.4 - 2.48 GHz: 0.8 dBi 5.0 - 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
O Tx/Rx O Max Gain ■ 2.4 -2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi Substituting BLE/WLAN 1 O Type: Inverted-F Antenna O Tx/Rx O Max Gain ■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep	Antenna Information as declared:					
 Max Gain 2.4 -2.48 GHz: 1.7 dBi 5.0 - 6.0 GHz: 4.4 dBi ♦ BLE/WLAN 1 Type: Inverted-F Antenna Tx/Rx Max Gain 2.4 -2.48 GHz: 0.8 dBi 5.0 - 6.0 GHz: 5.6 dBi Sample Revision: Production Unit; Pre-Production Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep 						
■ 2.4 -2.48 GHz: 1.7 dBi ■ 5.0 – 6.0 GHz: 4.4 dBi SELE/WLAN 1 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain ■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: Product dimensions [mm]:						
■ 5.0 – 6.0 GHz: 4.4 dBi BLE/WLAN 1 Type: Inverted-F Antenna Tx/Rx Max Gain 2.4 -2.48 GHz: 0.8 dBi 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: Product dimensions [mm]:						
BLE/WLAN 1 ○ Type: Inverted-F Antenna ○ Tx/Rx ○ Max Gain ■ 2.4 - 2.48 GHz: 0.8 dBi ■ 5.0 - 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
o Type: Inverted-F Antenna o Tx/Rx o Max Gain ■ 2.4 - 2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
o Tx/Rx o Max Gain ■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: Product dimensions [mm]: Product dimensions [mm]:						
Max Gain ■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision: Product dimensions [mm]: Product dimensions [mm]: Product dimensions [mm]:						
■ 2.4 -2.48 GHz: 0.8 dBi ■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision:						
■ 5.0 – 6.0 GHz: 5.6 dBi Sample Revision:						
Sample Revision: □ Production Unit; ☑ Pre-Production Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep						
	Sample Revision: Production Unit; Pre-Production					
	Product dimensions [mm]:	Product dimensions [mm]: 82mm tall x 82mm wide x 67mm deep				
ן ויסנס. דווס ווווסודומנוסדו סו נווס בס ד סףסטווסמנוסדוס ווו נוום נמטום מטטים וס טוטיוטפט טיי נוום טוסוון לאססטנ נוום סטסטוווסט דויוופמסטופט טו	Note: The information of the EUT specifications in the table above is provided by the client except the specified (Measured or					
calculated) output power.						

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4 RF Exposure Limits and FCC and ISED Basic Rules

4.1 FCC

4.1.1 § 2.1091(c)(1)

Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for mobile devices with single RF sources having either more than an available maximum time-averaged power of 1 mW or more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), whichever is greater. For mobile devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 of this chapter is necessary if the ERP of the device is greater than ERP20cm in the formula below. If the ERP of a single RF source at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP) in comparison with the following formula only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

$$P_{th}(\text{mW}) = ERP_{20\;cm}\;(\text{mW}) = \begin{cases} 2040f & 0.3\;\text{GHz} \le f < 1.5\;\text{GHz} \\ \\ 3060 & 1.5\;\text{GHz} \le f \le 6\;\text{GHz} \end{cases}$$

4.1.2 § 2.1091(c)(2)

For multiple mobile or portable RF sources within a device operating in the same time averaging period, routine environmental evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

4.1.3 § 1.1307(b)(3)(ii)(B)

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \le 1$$

4.2 ISED RSS 102

4.2.1 Clause 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10-2 \text{ } f0.6834 \text{ W}$ (adjusted for tune-up tolerance), where f is in MHz;

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5 Evaluations

5.1 FCC RF Exposure (Standalone)

Radio	Technology / Band	Frequency	Power	Gain	ERP	FCC 2.1091(c)(1)	ERP <threshold< th=""></threshold<>
Radio	recimology / Bund	[GHz]	[mW]	[dBi]	[mW]	Pth[mW] = ERP20cm	LINI VIIIICOIIOIU
	UMTS II	1852.4	251.2	5.30	518.80	3060.00	Exempt
	UMTS IV	1712.4	251.2	5.30	518.80	3060.00	Exempt
	UMTS V	826.4	251.2	4.60	441.57	1685.86	Exempt
Cellular	LTE 2	1855.0	251.2	5.30	518.80	3060.00	Exempt
Cellulai	LTE 4	1715.0	251.2	5.30	518.80	3060.00	Exempt
	LTE 5	829.0	251.2	4.60	441.57	1691.16	Exempt
	LTE 12	704.0	251.2	4.60	441.57	1436.16	Exempt
	LTE 13	779.5	251.2	4.60	441.57	1590.18	Exempt
BT	LE	2402.0	3.1	1.70	2.78	3060.00	Exempt
	802.11 b Ant 0	2412.0	60.1	1.70	54.20	3060.00	Exempt
	802.11 b Ant 1	2412.0	109.6	0.80	80.35	3060.00	Exempt
	802.11 g Ant 0	2412.0	320.6	1.70	289.07	3060.00	Exempt
	802.11 g Ant 1	2412.0	333.4	0.80	244.34	3060.00	Exempt
	802.11 n-HT20 MIMO	2412.0	574.1	1.27	468.81	3060.00	Exempt
14/1 4 8 1	802.11 a Ant 0	5745.0	40.1	4.40	67.27	3060.00	Exempt
WLAN	802.11 a Ant 1	5745.0	40.0	5.60	88.51	3060.00	Exempt
	802.11 n-HT20 MIMO	5745.0	75.3	5.04	146.55	3060.00	Exempt
	802.11 ac-VHT20 MIMO	5745.0	75.0	5.04	145.88	3060.00	Exempt
	802.11 n-HT40 MIMO	5755.0	49.5	5.04	96.27	3060.00	Exempt
	802.11 ac-VHT20 MIMO	5755.0	47.4	5.04	92.17	3060.00	Exempt
	802.11 ac-VHT80 MIMO	5775.0	37.5	5.04	72.98	3060.00	Exempt

5.2 ISED RF Exposure (Standalone)

Radio	Technology / Band	Frequency [GHz]	Power [W]	Gain [dBi]	E.I.R.P	Exemption limit for Routine Evaluation [w]	E.I.R.P <threshold< th=""></threshold<>
	UMTS II	1852.4	0.251	5.30	0.851	2.2	Exempt
	UMTS IV	1712.4	0.251	5.30	0.851	2.12	Exempt
	UMTS V	826.4	0.251	4.60	0.724	1.29	Exempt
Cellular	LTE 2	1855.0	0.251	5.30	0.851	2.24	Exempt Exempt Exempt Exempt
Cellulai	LTE 4	1715.0	0.251	5.30	0.851	2.13	
	LTE 5	829.0	0.251	4.60	0.724	1.29	Exempt
	LTE 12	704.0	0.251	4.60	0.724	1.16	Exempt
	LTE 13	779.5	0.251	4.60	0.724	1.24	Exempt
BT	LE	2402.0	0.003	1.70	0.005	2.68	Exempt
	802.11 b Ant 0	2412.0	0.060	1.70	0.089	2.68	Exempt
	802.11 b Ant 1	2412.0	0.110	0.80	0.132	2.68	Exempt
	802.11 g Ant 0	2412.0	0.321	1.70	0.474	2.68	Exempt
	802.11 g Ant 1	2412.0	0.333	0.80	0.401	2.68	Exempt
	802.11 n-HT20 MIMO	2412.0	0.574	1.27	0.769	2.68	Exempt
WLAN	802.11 a Ant 0	5745.0	0.040	4.40	0.110	4.86	Exempt
VVLAIN	802.11 a Ant 1	5745.0	0.040	5.60	0.145	4.86	Exempt
	802.11 n-HT20 MIMO	5745.0	0.075	5.04	0.240	4.86	Exempt
	802.11 ac-VHT20 MIMO	5745.0	0.075	5.04	0.239	4.86	Exempt
	802.11 n-HT40 MIMO	5755.0	0.049	5.04	0.158	4.86	Exempt
	802.11 ac-VHT20 MIMO	5755.0	0.047	5.04	0.151	4.86	Exempt
	802.11 ac-VHT80 MIMO	5775.0	0.038	5.04	0.120	4.87	Exempt

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5.3 Multiple RF sources

The worst case of simultaneous transmission is LTE 12 + BT LE + WLAN 802.11 n-HT20 MIMO (2.4 GHz): $(251.2/1436.16) + (3.1/3060) + (574.1/3060) = 0.496 \le 1$

The sum of the fractional contributions to the applicable thresholds is less than or equal to 1, hence the multiple RF sources are exempt

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6 Revision History

Date	Report Name	Changes to report	Prepared by
6/28/2023	EMC_KPTRK_040_23001_FCC_ISED_RF_Exposure	Initial Version	Ghanma, Issa

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