



DECLARATION OF COMPLIANCE: MPE ASSESSMENT

<p>Motorola Solutions, Inc. EME Test Laboratory Motorola Solutions Malaysia Sdn Bhd Plot 2A, Medan Bayan Lepas, Mukim 12 SWD 11900 Bayan Lepas Penang, Malaysia.</p>	<p>Date of Report: 09/01/2023 Report Revision: A</p>
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<p>Responsible Engineer: Report Author: Assessment Date(s) DUT Description: Nominal power output: Max. Power output: Tx Frequency Bands: Model(s) Certified: Classification: Applicant Name: Applicant Address: FCC ID: FCC Test Firm Registration Number:</p>	<p>Saw Sun Hock Saw Sun Hock 08/25/2023 BARRETT 4050 HF SDR TRANSCEIVER 150 W, 125 W, 30 W, 10 W 180 W, 150 W, 36 W, 12 W 1.5-30 MHz 4050ip, 4050se Occupational / Controlled Environment Motorola Solutions Inc. 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322 OW4-4050IP 823256</p>
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Based on the information and the testing results provided herein, the undersigned certifies that when used as stated in the operating instructions supplied, said product complies with the national and international reference standards and guidelines listed in section 2.0 of this report (no deviation from standard methods). This report shall not be reproduced without written approval from an officially designated representative of the Motorola Solutions Inc. EME Laboratory.

I attest to the accuracy of the data and assume full responsibility for the completeness of these measurements.

This reporting format is consistent with the suggested guidelines of the TIA TSB-159 April 2006

The results and statements contained in this report pertain only to the device(s) evaluated herein.

Tey Pei Loo (Approved Signatory)
Approval Date: 09/01/2023

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Report Revision History

Date	Revision	Comments
09/01/2023	A	Initial release

1.0 Introduction

This report contains calculated Maximum Permissible Exposure (MPE) results for product models 4050ip and 405se.

2.0 Referenced Standards and Guidelines

This product is designed to comply with the following applicable national and international standards and guidelines.

- United States Federal Communications Commission, Code of Federal Regulations; Rule Part 47CFR § 1.1307, § 1.1310, § 2.1091 (d) and § 2.1093 for RF Exposure, where applicable.
- Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields”, OET Bulletin 65 (Edition 97-01), FCC, Washington, D.C.: August 1997.
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1999
- American National Standards Institute (ANSI) / Institute of Electrical and Electronics Engineers (IEEE) C95. 1-1992. Specific to FCC rules and regulations.
- Institute of Electrical and Electronics Engineers (IEEE) C95.3-2002
- Ministry of Health (Canada) Safety Code 6 (2015), Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz
- RSS-102 (Issue 5) – Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

- FCC KDB – 865664 D02 RF Exposure Reporting v01r02

3.0 Power Density Limits

Table 1 – Occupational / Controlled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65	ICNIRP	IEEE C95.1 1992/1999	IEEE C95.1 2005	RSS-102 Issue 5 2015
	mW/cm ²	W/m ²	mW/cm ²	W/m ²	W/m ²
10 – 20					10.0
20 – 48					$44.72 / f^{0.5}$
30 – 300	1.0				
48 – 100					6.455
10 – 400		10.0			
100 – 300			1.0	10.0	
100 – 6,000					$0.6455 f^{0.5}$
300 – 1,500	f/300				
300 – 3,000			f/300	f/30	
400 – 2,000		f/40			
1,500 – 15,000					
1,500 – 100,000	5.0				
2,000 – 300,000		50.0			
3,000 – 300,000			10.0	100.0	
6,000 – 15,000					50.0
15000 – 150,000					50.0
150000 – 300,000					$3.33 \times 10^{-4} f$

Table 2 – General Population / Uncontrolled Exposure Limits

Frequency Range (MHz)	FCC OET Bulletin 65	ICNIRP	IEEE C95.1 1992/1999	IEEE C95.1 2005	RSS-102 Issue 5 2015
	mW/cm ²	W/m ²	mW/cm ²	W/m ²	W/m ²
10 – 20					2.0
20 – 48					$8.944 / f^{0.5}$
30 – 300	0.2				
48 – 300					1.291
10 – 400		2.0			
100 – 300			0.2		
100 – 400				2.0	
300 – 1,500	$f/1,500$				
300 – 6000					$0.02619 f^{0.6834}$
400 – 2,000		$f/200$		$f/200$	
300 – 15,000			$f/1,500$		
1,500 – 15,000					
1,500 – 100,000	1.0				
2,000 – 100,000				10.0	
2,000 – 300,000		10.0			
6,000 – 15,000					10.0
15,000 – 150,000					10.0
150,000 – 300,000					$6.67 \times 10^{-5} f$

4.0 FCC MPE Assessment

This report calculates the minimum separation distance from a fixed antenna, connected to the subject mobile radio operated at an fixed location and vehicle, ensuring that the power density limits listed is not exceeded.

MPE calculation was used to determine the RF exposure for transmitter due to maximum power. . According to FCC’s OET Bulletin 65 Edition 97-01 Section 2, calculations can be made to predict RF field strength and power density levels around typical RF sources. Equation (1) below was used to show compliance for this device and generally accurate in far-field of an antenna.

$$S = \frac{P_t G}{4 \pi d^2} F \quad \text{Equation (1)}$$

Equation (1) account for the maximum duty cycle of the signal, and the factor, F, to provide a conservative power density prediction.

Where:

S = power density

P_t = maximum output power scaled by the maximum duty cycle of the signal

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

d = distance from antenna

F = Enhancement factor [1 or 2.56 for predicting ground-level field strength]

Table 3

Antenna Type	Peak Envelope Power (W)	Time-Averaged Power Factor (%)	Tx Frequency (MHz)	Antenna Gain (dBi)	Cable Loss, L (dB)	Dist., d (cm)	⁽⁴⁾ Enhance Factor, F	Max Calc. MPE (mW/cm ²)	MPE Spec Limit (mW/cm ²)	
									FCC	% of FCC Spec Limit
Automatic tuned and whip	180	50	30.0	0.00	0.00	310	2.56	0.191	0.20	95.4
Magnetic Loop	180	50	30.0	1.50	0.00	360	2.56	0.200	0.20	99.9
Multi-wire Broadband	180	50	30.0	5.00	0.00	540	2.56	0.199	0.20	99.4
Log-Periodic	180	50	30.0	13.00	0.00	1360	2.56	0.198	0.20	98.9
Automatic tuned and whip	150	50	30.0	0.00	0.00	280	2.56	0.195	0.20	97.4
Magnetic Loop	150	50	30.0	1.50	0.00	330	2.56	0.198	0.20	99.1
Multi-wire Broadband	150	50	30.0	5.00	0.00	500	2.56	0.193	0.20	96.6
Log-Periodic	150	50	30.0	13.00	0.00	1240	2.56	0.198	0.20	99.1
Automatic tuned and whip	36	50	30.0	0.00	0.00	140	2.56	0.187	0.20	93.5
Magnetic Loop	36	50	30.0	1.50	0.00	170	2.56	0.179	0.20	89.6
Multi-wire Broadband	36	50	30.0	5.00	0.00	250	2.56	0.186	0.20	92.8
Log-Periodic	36	50	30.0	13.00	0.00	610	2.56	0.197	0.20	98.3
Automatic tuned and whip	12	50	30.0	0.00	0.00	80	2.56	0.191	0.20	95.5
Magnetic Loop	12	50	30.0	1.50	0.00	100	2.56	0.173	0.20	86.3
Multi-wire Broadband	12	50	30.0	5.00	0.00	140	2.56	0.197	0.20	98.6
Log-Periodic	12	50	30.0	13.00	0.00	350	2.56	0.199	0.20	99.5

Note: Peak Envelope Power figures used in the calculation include a 20% tune-up margin from nominal power.

5.0 Conclusion

The MPE assessment presented in this report concludes that model 4050ip and 4050se when transmitting at a minimum separation distance of 13.60 m from nearby persons is compliant to FCC General Population /Uncontrolled Environment RF exposure limits.