

# MAXIMUM PERMISSIBLE EXPOSURE (MPE) EVALUATION

**Product:** Ultimaker B.V.: Material Station

**Date:** 21 November 2022

---

Applicant : Ultimaker B.V.

Evaluated by : R. Brett

Date : 21-11-2022

Signature :

A handwritten signature in blue ink, appearing to be 'R. Brett', is written over the signature line.

## Table of contents

<b>1</b>	<b>Applicable regulation</b> .....	<b>3</b>
1.1	Reference documents .....	3
<b>2</b>	<b>Evaluation</b> .....	<b>4</b>
<b>3</b>	<b>Assessment result</b> .....	<b>4</b>

# 1 Applicable regulation

The applicable regulation: FCC Code of Federal Regulations, Title 47 (Telecommunications).

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.



**Figure 1:** Photo of the EUT

According to §1.1307(b)(1) Requirements:

With respect to the limits on human exposure to RF provided in § 1.1310 of Chapter I, the requirements of §1.1307(b)(1)(B) were chosen to for determination of the radiofrequency sources .

§1.1307(b)(1)(B):

Prepare an evaluation of the human exposure to RF radiation pursuant to § 1.1310 and include in the application a statement confirming compliance with the limits in § 1.1310

## 1.1 Reference documents

Ref [1]: DEKRA RF Test report No. NIE: 61376RRF.002; Material manager machine (2019-09-12)

Ref [2]: ANSI C63: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

## 2 Evaluation

### Mobile device:

As defined in § 2.1091(b) of chapter I, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimetres is normally maintained between the RF source's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location while transmitting. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal desktop computer, are considered to be mobile devices if they meet the 20-centimeter separation requirement.

The UM 3D printers and Material Stations are considered to be mobile devices.

Table 1 (ii): Limits for General Population Exposure (MPE)

### Evaluation

The RF exposure is calculated according to §1.1310 and §2.1093 RF

Table 1 (ii): Limits for General Population Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equipment power density

Compliance is with respect to field strength or power density limits in Table 1 of §1.1310

The Electric Field Strength limit (V/m) specified in Table 1 for 13.56MHz =  $824/f = 60.77\text{V/m}$

The output RF of the RFID transmitter was set to its maximum transmission power during the measurements in Ref [1].

According to Ref [1] the maximum field strength (dBμV/m) measured at 3 m distance is 65.96dBμV/m.

According to paragraph 6.4.4.2 of Ref [2]. Using the Maximum field strength extrapolated from 3m to 20cm = 153dBμV/m, equivalent to 44.67V/m

This is below the General Population Exposure (MPE) limit of 60.77V/m at 13.56MHz.

## 3 Assessment result

The Maximum field strength derived from [1] extrapolated from 3m to 20cm is below the General Population Exposure (MPE) limit of 60.77V/m at 13.56MHz.