Maximum Permissible Exposure

Ceridian HCM Model: DFTouch (WR) FCC ID: 2AC2N-DFTOUCHWR IC: 12286A-DFTOUCHWR

Purpose

The purpose of this test is to ensure that the RF energy intentionally transmitted, in terms of power density emitted from the EUT at a stated operating distance does not exceed the limits listed below as defined in the applicable test standard, as calculated based upon readings obtained during testing. This helps protect human exposure to excessive RF fields.

Limit(s) and Method

The limits, as defined in FCC 1.1310 Table 1 (B) limits for general public exposure was applied. The limit for the frequency range of 1.34 MHz to 30 MHz is $180/f^2$ mW/cm^2, and the limit for the frequency range of 1.5 GHz to 100 GHz is 1.0 mW/ cm^2. The limit for the frequency range of 0.3 MHz to 1.34 MHz is 100 mW/cm^2.

Limits are not defined for frequencies < 0.3MHz, however the output power of the 125 kHz transmitter is low. The limit for MPE at 300 kHz is applied to determine compliance.

Therefore, the limits for this device are as follows:

MPE Limits	
Frequency	**Limit**
125 kHz	100 mW/cm^2
13.56 MHz	0.97 mW/cm^2
2.4GHz	1.0 mW/cm^2

The distance used for calculations was 20cm, as this is the minimum distance an operator will be from the EUT during normal operation.

Prediction methods from OET Bulletin 65, Edition 97-01 are applied.
SAR test exclusion for simultaneous transmissions from FCC KDB447498 is applied.

Results

The EUT passed the requirements. The worst case calculated power density was 0.0134 mW/cm^2. This is under the 1.0 mW/cm^2 requirement.

Calculations for 15.247 device

$P_d = (P*G)/(4*pi*R^2)$
Where:
P = Power input into the antenna = 66mW as per grant for RYK-WUBR170GNM module.
G = Power gain of antenna = 0.1 dBi = 1.02 (numeric) as per test report.
R = 20cm
$P_d = (66 \text{ mW} * 1.02) / (4 * pi * 20^2 \text{ cm}^2)$
$P_d = 0.0134 \text{ mW/cm}^2$

Calculations for 15.209 devices

13.56 MHz Device

P_d = (EIRP / (4*pi*R^2)
Where:
EIRP = Equivalent Isotropic Radiated Power = E(dBuV) – 95.2
E(dBuV) = 51.1 dBuV as per *Radiated Emissions - 15.209 - Table 4*.
EIRP = 51.1 dBuV – 95.2 = -44.1 dBm = 0.000039 mW
R = 20cm

P_d = (0.000039 mW) / (4 * pi * 20^2 cm^2)
P_d = 0.000000007 mW/cm^2

125 kHz Device

P_d = (EIRP / (4*pi*R^2)
Where:
EIRP = Equivalent Isotropic Radiated Power = E(dBuV) – 95.2
E(dBuV) = 79.1 dBuV as per *Radiated Emissions - 15.209 - Table 4*.
EIRP = 79.1 dBuV – 95.2 = -16.1 dBm = 0.02455 mW
R = 20cm

P_d = (0.02455 mW) / (4 * pi * 20^2 cm^2)
P_d = 0.000004884 mW/cm^2

Calculations for simultaneous transmission device

As per FCC KDB447498 7.2:

> *Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0.*

MPE ratio = Ratio of power density to MPE limit, at the test frequency = P_d / (MPE limit)

MPE ratio for 15.247 device = 0.0134 mW/cm^2 / 1.0 mW/cm^2 = 0.0134
MPE ratio for 15.209 device (*13.56 MHz device*) = 0.000000007 mW/cm^2 / 0.97 mW/cm^2 = 0.000000007
MPE ratio for 15.209 device (*125 kHz device*) = 0.000004884 mW/cm^2 / 100 mW/cm^2 = 0.000000049

0.0134 + 0.000000007 + 0.000000049 = 0.013400056 < 1.0

MPE test exclusion applies for simultaneous transmission.