| RELEASE | DATE | RELEASED BY | CHECKED BY | APPROVED BY | CHANGE LOG |
|---|---|---|---|---|---|
| 0.1 | 13/01/2025 | I.Cappato | | | First emission. |
| 0.2 | 13/01/2025 | V.Carollo | | | Added Gain and fields. |
| | | | | | |

# 1. Summary

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# 2. Antenna specification

- 2 rounds, width = 0,4mm, spacing = 0,3mm.
- Thickness: 0,0356mm

- Dimensions: 40 x 32 mm

# 3. PCB specification

Mechanical characteristics:

Misc characteristics:

- Flammability class: UL94-V0
- TG: 135 °C
- UL-Requirement: YES
- UL logo on silkscreen: YES, on top side
- Manufacturer on silkscreen: YES, on top side
- Data code on silkscreen: YES, on top side
- Batch code: YES, on top side
- Silkscreen on Pads and holes: NO, Not allowed
- Silkscreen on non-exposed copper is acceptable: YES
- Request for complete RoHS compliant build: YES

# 4. Gain

- Maximum theorical antenna gain is: **G < 1.76 dBi**

# 5. Electromagnetic characteristics

This NFC Reader/Writer PCB, operates at 13,56 MHz. The core of this is CR95HF-VMD5T with these electrical characteristics on the antenna interface:

**Table 34. Reader characteristics**

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $f_C$ | Frequency of operating field (carrier frequency) | 13.553 | 13.56 | 13. 567 | MHz |
| MI Carrier | Carrier modulation index(1) ISO/IEC 14443-A | | | 100 | % |
| | ISO/IEC 14443-B | 8 | | 14 | |
| | ISO/IEC 18092 | 8 | | 14 | |
| | ISO/IEC 15693 (10% modulation)(2) | 10 | | 30 | |
| | ISO/IEC 15693 (100% modulation) | 80 | | 100 | |
| **Transmitter specifications (VPS_TX = 2.7 to 3.3 V)** | | | | | |
| | $Z_{OUT}$ differential impedance between TX1 and TX2(1) | | 27 | | Ω |
| | Output power for 3V operation on pin VPS_TX (1)(2) | | 55 | | mW |

**Table 31. Power consumption characteristics (VPS_TX from 2.7 to 3.3 V)**

| Symbol | Parameter | Condition | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $I_{CC}$ RF ($V_{PS_TX}$) RF Field ON | Supply current in RF Field (Reader mode) (1) | $T_A$ = 25°C | 70 | 100 | mA |
| $I_{CC}$ RF ($V_{PS_TX}$) RF Field OFF | Supply current in RF Field (Ready mode) (2) | $T_A$ = 25°C | | 200 | µA |
| $I_{CC}$ RF ($V_{PS_TX}$) Tag Detect | Peak(3) current during Burst detection | $T_A$ = 25°C | 70 | 100 | mA |

1. Parameter measured using recommended output matching network. (Z load is 27 Ω and 0°).
2. This consumption can be reduced to approximately 2 µA (typ.) by setting a control bit (bit HF2RF) to '1' using command 090468010710. In this case, Reader mode is not available.
   To re-enable Reader mode, reset the HF2RF bit to '0' using the command 090468010700 or execute a new PROTOCOLSELECT command.
3. The maximum differential input voltage between pins RX1 and RX2 (VRx1-Rx2) has a peak-peak of 18 V.

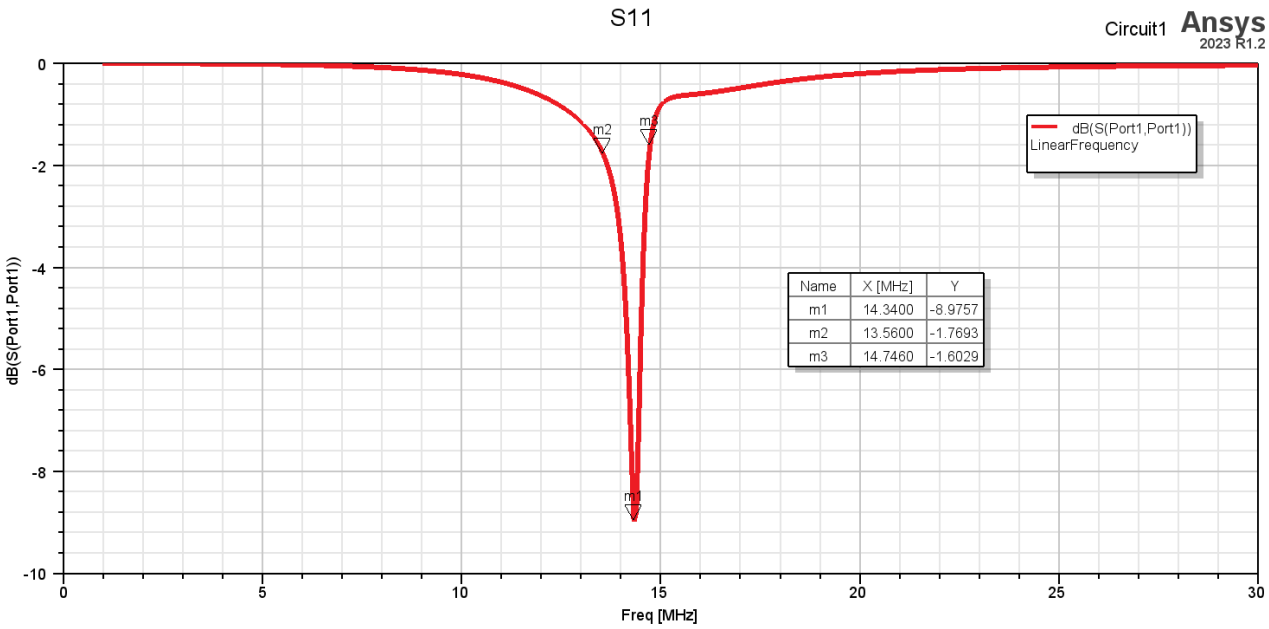
The sysem have USB-Serial UART TTL bridge and RF Transceiver, no Microcontroller on board. The RF settings coming via USB Cable and translate in serial to control CR95 ic.

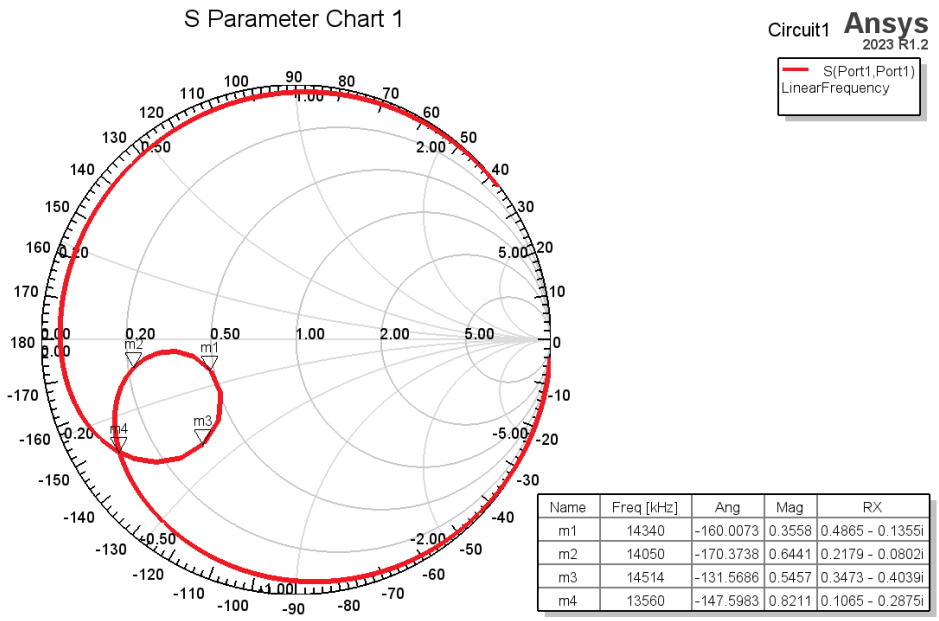
These are reported in design to maximize performance in better way, and the results are below.
Bottom and TOP layer PCB Antenna In Ansys HFSS:

The complete system simulated is:

At the Transceiver termils the S11 response istuned for NFC bheavior:

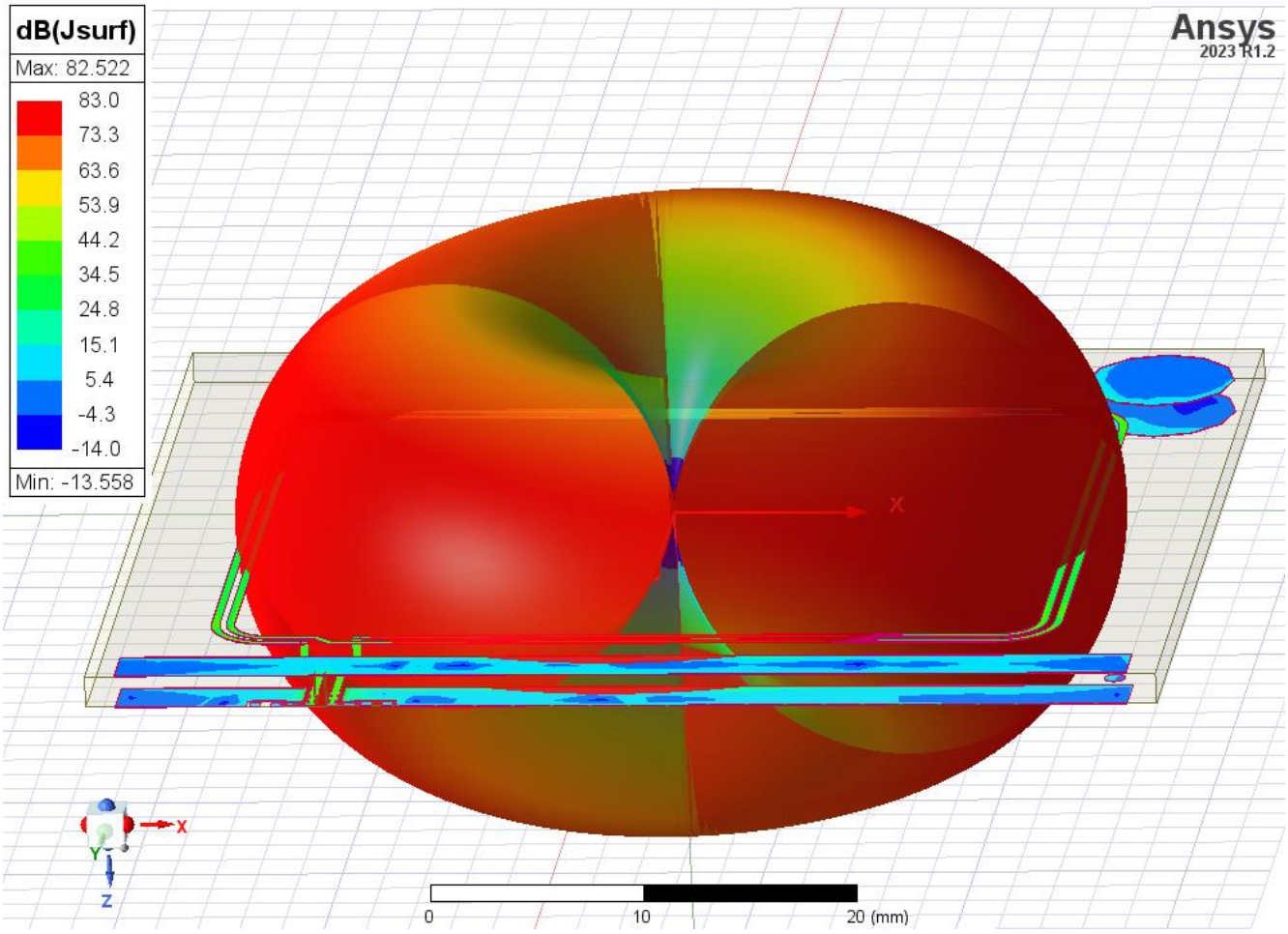
Where the port impedance is 27 ohm.

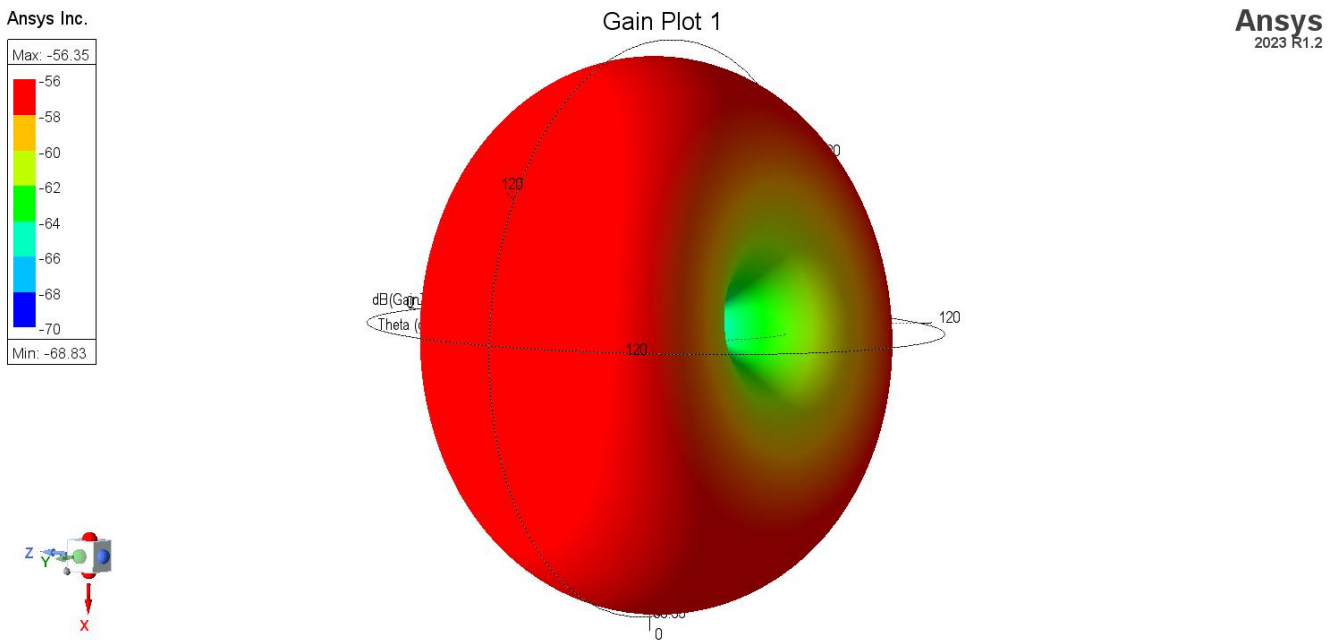


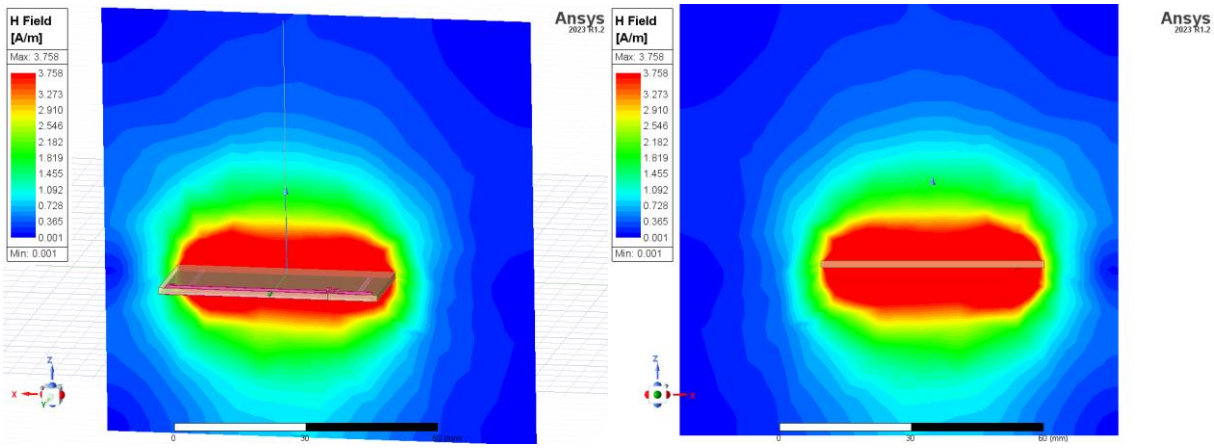
The Surface curent density or current distribution calculated is show below

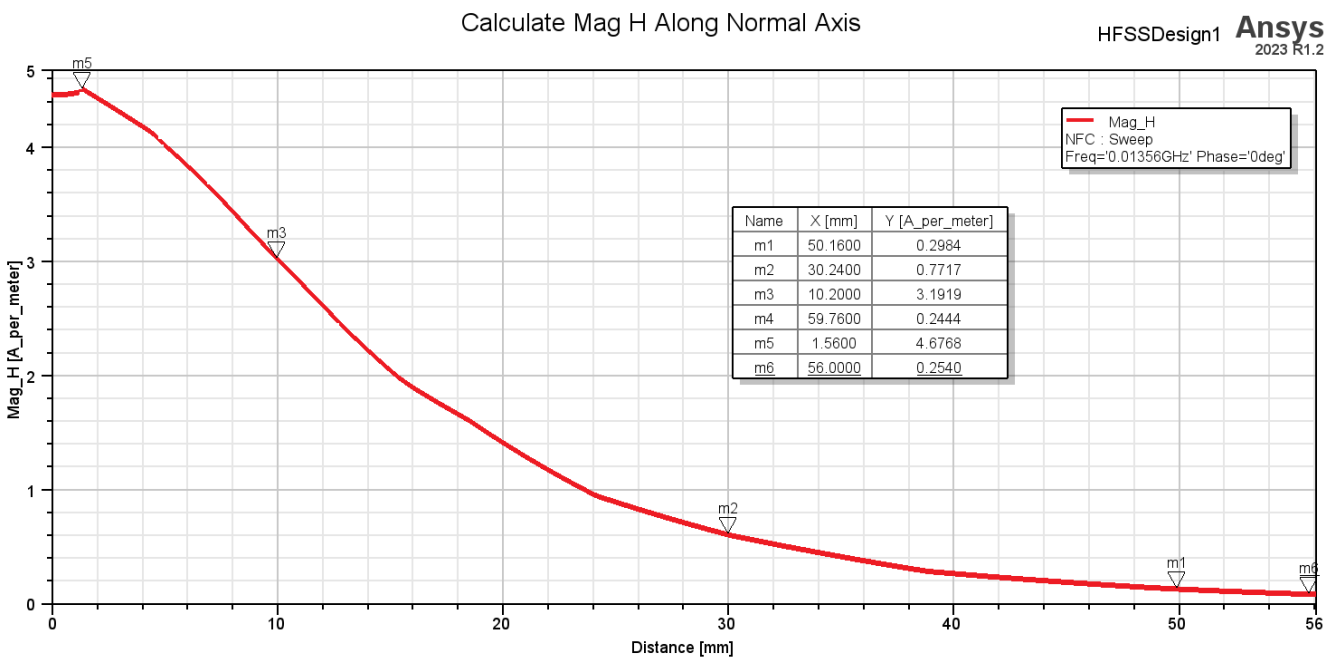
Far Field Shape same as expected Manetic loop dipole



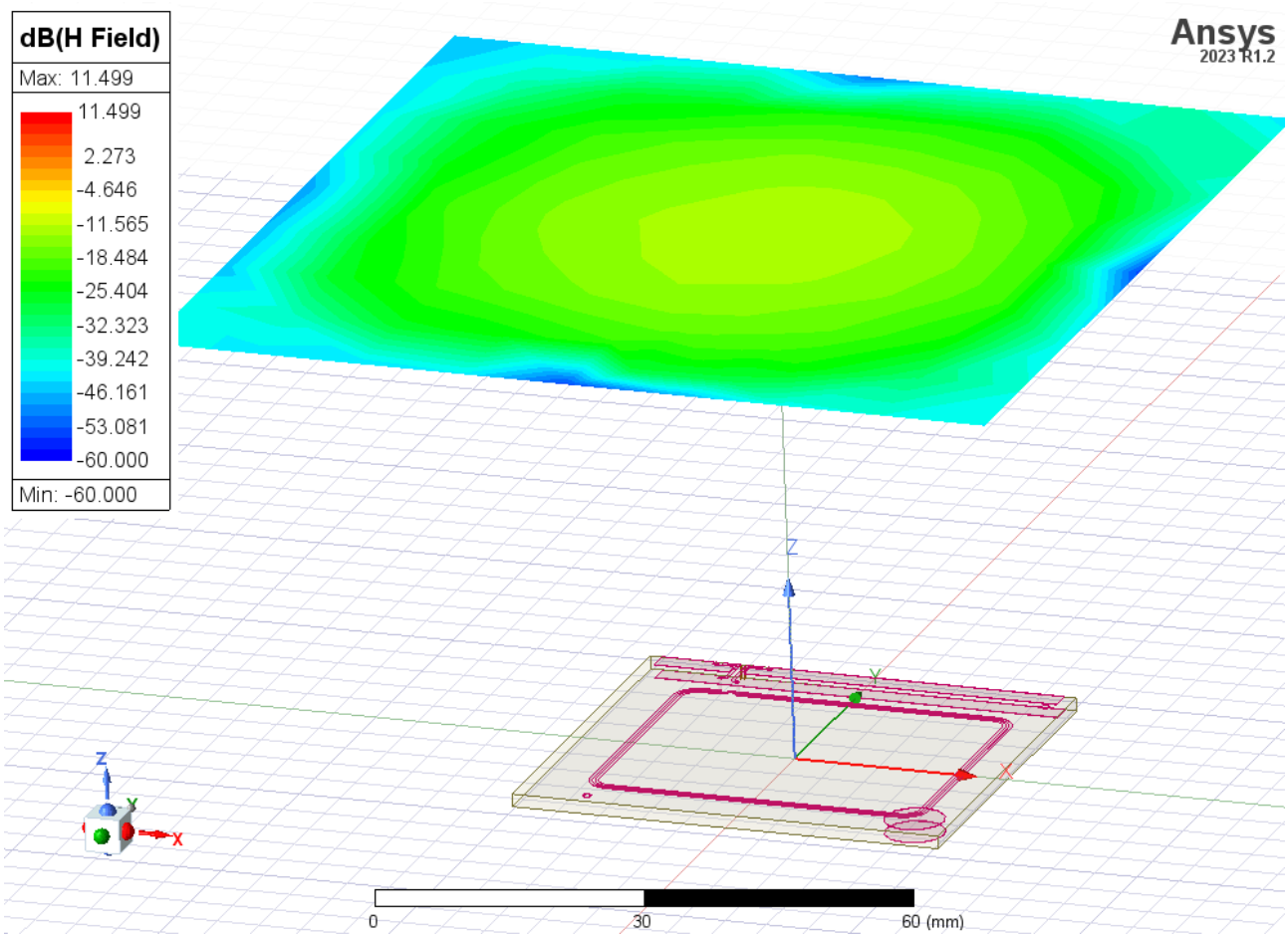
The most important for certification is H field measured along "normal" axis of antenna, and it is characterized below

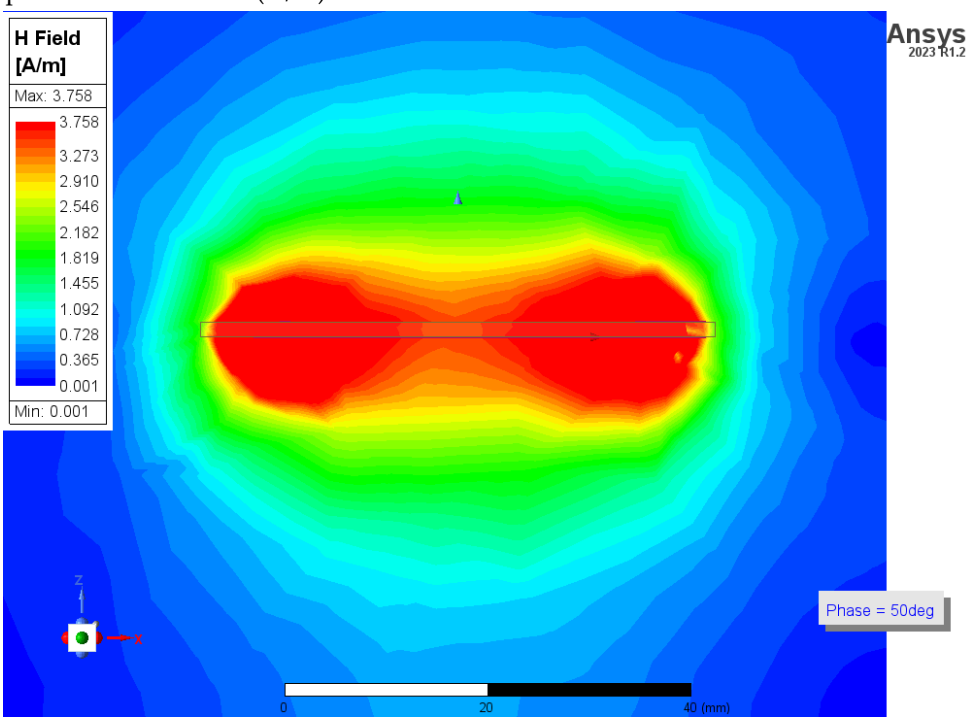



| Name | X [mm] | Y [A_per_meter] |
|---|---|---|
| m1 | 50.1600 | 0.2984 |
| m2 | 30.2400 | 0.7717 |
| m3 | 10.2000 | 3.1919 |
| m4 | 59.7600 | 0.2444 |
| m5 | 1.5600 | 4.6768 |
| m6 | 56.0000 | 0.2540 |

The H field finger print (dB) at 60 mm is < 0.3 A/m




ZX vertical plane H field section (A/m)