APPLICATION NOTE

ATA5577 Performance Test with Various Antenna Coil Q-factors

ATA5577

Description

In contrast to other transponder types, the ATA5577 enables the operation of high Q-antennas without interference to the gap detection in write mode.

This is possible as the ATA5577 executes an active damping of the Analog Front End (AFE) during write operation.

Based on an ISO card antenna shape as shown in the Figure 1-1, the investigation identify whether the R/W performance can be improved by using antenna coils with higher Q-factors than the typically used values (Q = 5 to 20).

1. Measured Read/Write Performance Basing on ATAK2270 RFID Base Station

Settings used:

Mode:	Basic, no AFE-option
Coding:	Manchester
Data rate:	RF/32
ID code length:	128 bits
Signature:	Sequence Terminator
R/W Timing:	Default

Figure 1-1. Coil Outer Size 68 mm × 40 mm

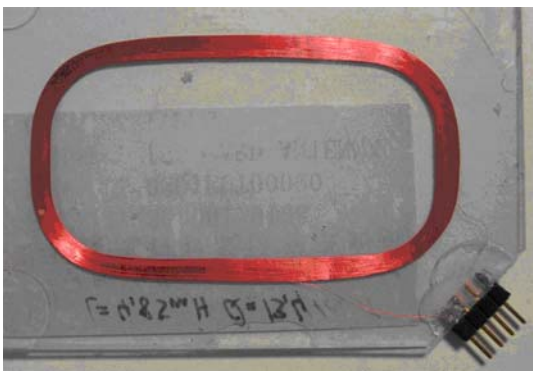

Table 1-1. Target Coil Inductance for M1330 Chip Version (330pF ±3% on Chip)
L = 4.90mH at 125kHz

Coil Model No.	Inductance	Q-factor	Read Distance	Write Distance
0	4.86mH	13.4	19cm	17cm
1	5.12mH	34.2	21cm	22cm
2	5.04mH	55	22cm	28cm
3	5.14mH	82	21cm	31cm

Table 1-2. Target Coil Inductance for M1250 Chip Version (250pF ±3% on Chip)
L = 6.48mH at 125kHz

Coil Model No.	Inductance	Q-factor	Read Distance	Write Distance
4	6.4mH	13.7	19cm	22cm
5	6.6mH	38.8	20cm	29cm
6	6.6mH	63	21cm	30cm
7	6.5mH	75	20cm	30cm

2. Conclusion

The higher Q-factor of the antenna coils show an enlarged read and write distance for both target inductance values. Obviously the lower impedance of the high Q antenna coils leads to a gaining of the tag supply and hence also to a better write performance.

Moreover, the tests indicate, that the read performance drops again if a maximum Q-value is exceeded.

According these measurements, the ATA5577 allows antenna coil Q-factors up to about Q = 50. However, the suggestion is independent of the feasibility and economy of coil manufacturing. Common production limits of ISO card antenna coils have Q-factors up to 40.

Remark:

A further improvement of the read-distance could be achieved for most applications by using an optimal setting of the AFE register.

Therefore, configure the AFE- Option register via block3, page1 as follows:

- Clamp voltage = high (9V)
- Modulation voltage = low (1V)

3. Revision History

Please note that the following page numbers referred to in this section refer to the specific revision mentioned, not to this document.

Revision No.	History
9133B-RFID-07/15	• Put document in the latest template

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