AN12428

NTAG 5 Application design recommendations to achieve optimal EMI immunity

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Application note
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Document information

Information	Content
Keywords	NTAG 5, Application design recommendations, FCC, CE, EMI
Abstract	Layout design recommendations to get optimal results on EMI, FCC and CE certifications

Revision history

Rev	Date	Description
v.1.0	20200109	Initial released version

1   Abbreviations

Table 1. Abbreviations

Acronym	Description
ALM	Active load modulation
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
NFC	Near field communication
PLM	Passive load modulation
RFID	Radio frequency identification
SRD	Short range devices

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2   Introduction

NXP Semiconductors declares that this device is an FCC Class A unintentional radiator.

Type Classification: SRD, RFID, NFC Transmitter Frequencies: 13.56 MHz ±7 kHz Modulation: 12.71 MHz and 14.41 MHz.

The NTAG 5 customer development kit is an evaluation board to demonstrate the NXP NTAG 5 functionality and used in this document as a reference design.

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3   Passive load modulation mode (PLM)

This design guidelines should be respected for designs with [NTAG 5 switch](#) and [NTAG 5 link](#).

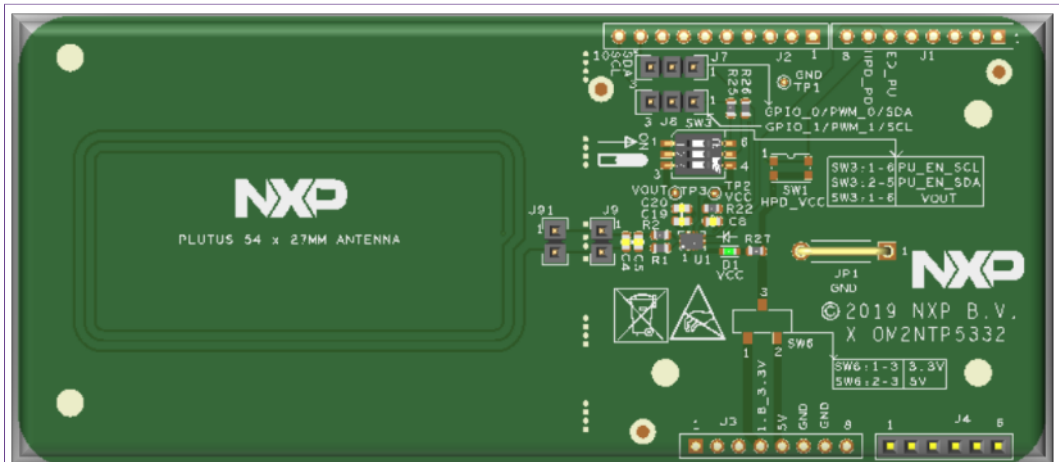Development kit board (OM2NTP5332, part number: 935394937598) top and bottom view.

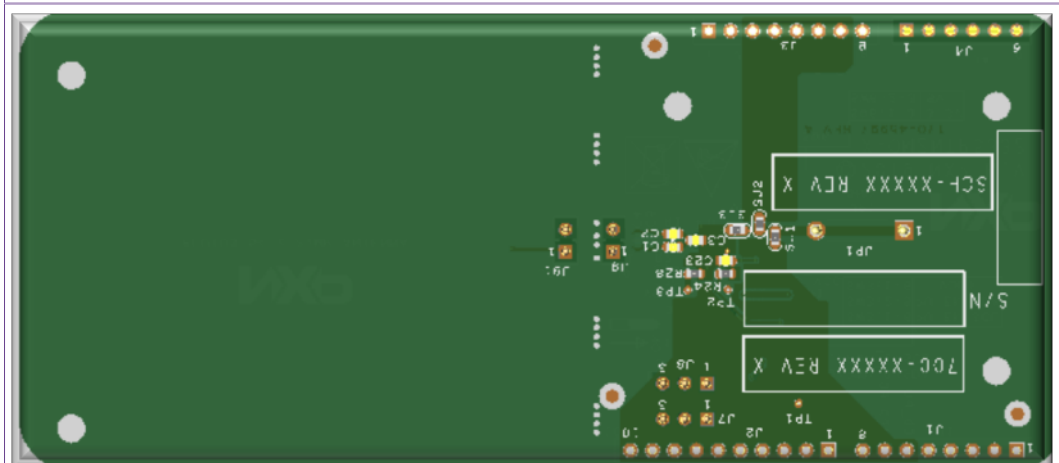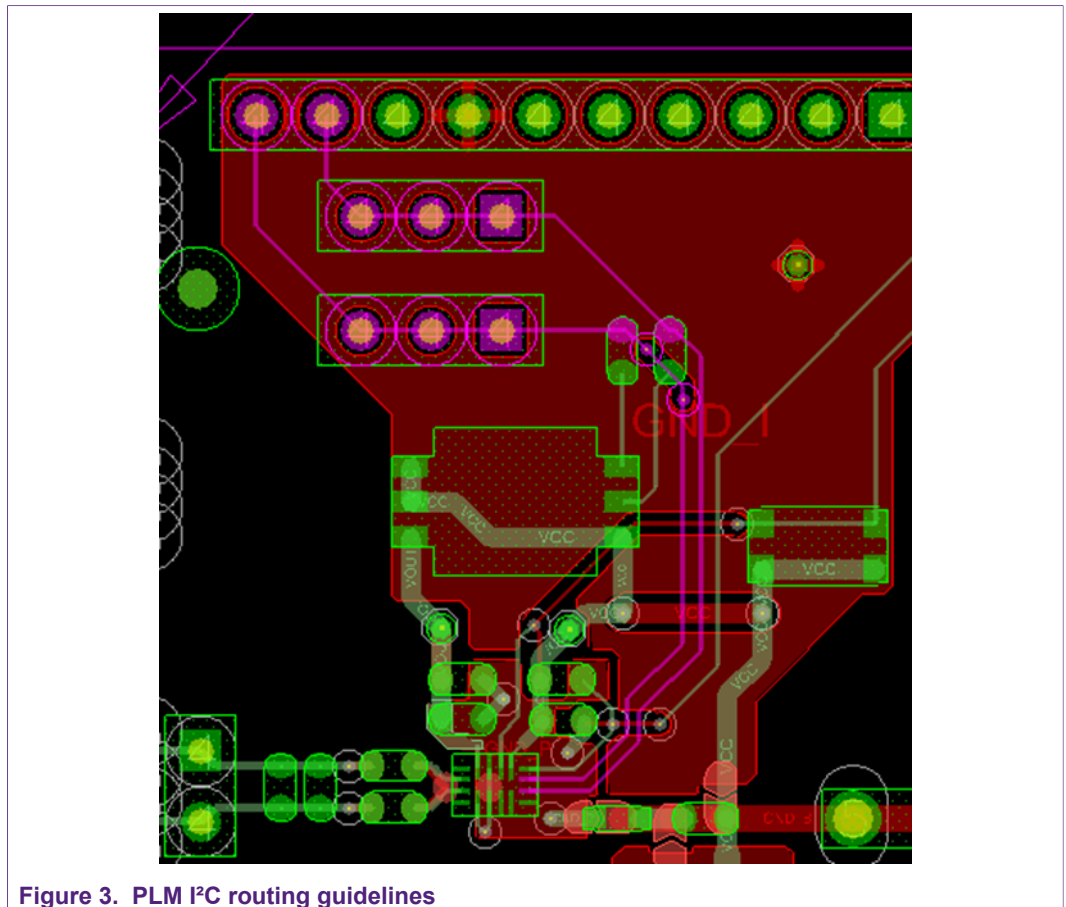**Figure 1. PLM development kit TOP view**

Figure 2. PLM development kit BOTTOM view

3.1 I²C routing

1. SDA and SCL signals shall be routed equally
2. Due to crossing of I²C signals, one of the signals shall be routed on opposite Layer, as short as possible

Figure 3. PLM I²C routing guidelines

3.2 RF routing

1. Place matching network components as close as to NTAG 5 IC
2. Keep as less VIAs as possible for RF lines

3.3 Power routing

1. LA & LB are source of noise. Sensitive signals should be routed as far away from power nets as possible
2. Decoupling capacitors shall be placed as close as to NTAG 5 IC
3. Pour copper instead of traces for power nets shall be used. If pouring copper is not possible, then route traces with wider trace of 30 mils (762 µm)
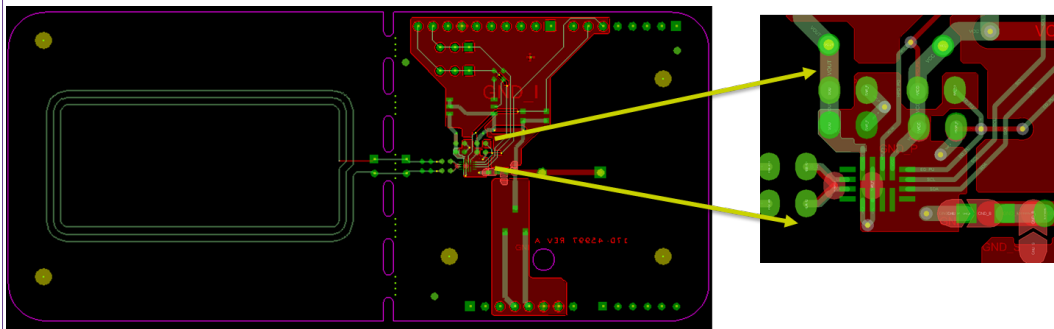
Figure 4. PLM power routing guideline

4   Active load modulation mode (ALM)

These design guidelines should be respected for designs with NTAG 5 boost.

Development kit board (OM2NTA5332, 935394976598) top and bottom view.

4.1   I²C routing

The same recommendations apply for ALM mode as described in chapter [Section 3.1].
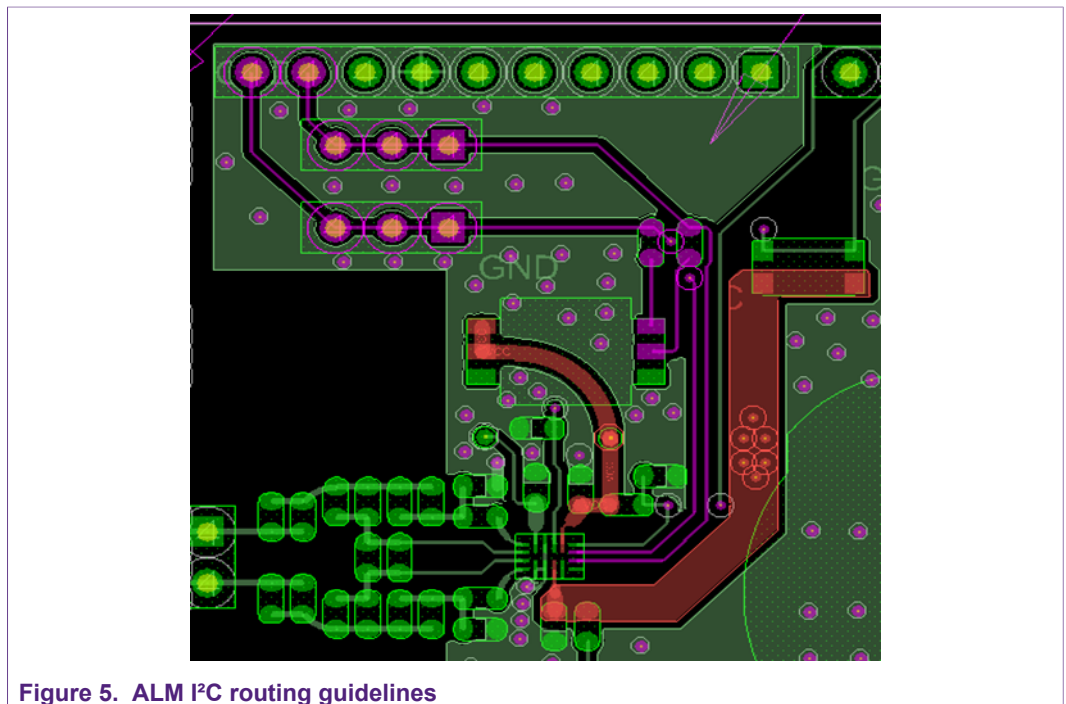

Figure 5. ALM I²C routing guidelines

4.2   Power routing

The same recommendations apply for ALM mode as described in chapter [Section 3.3].

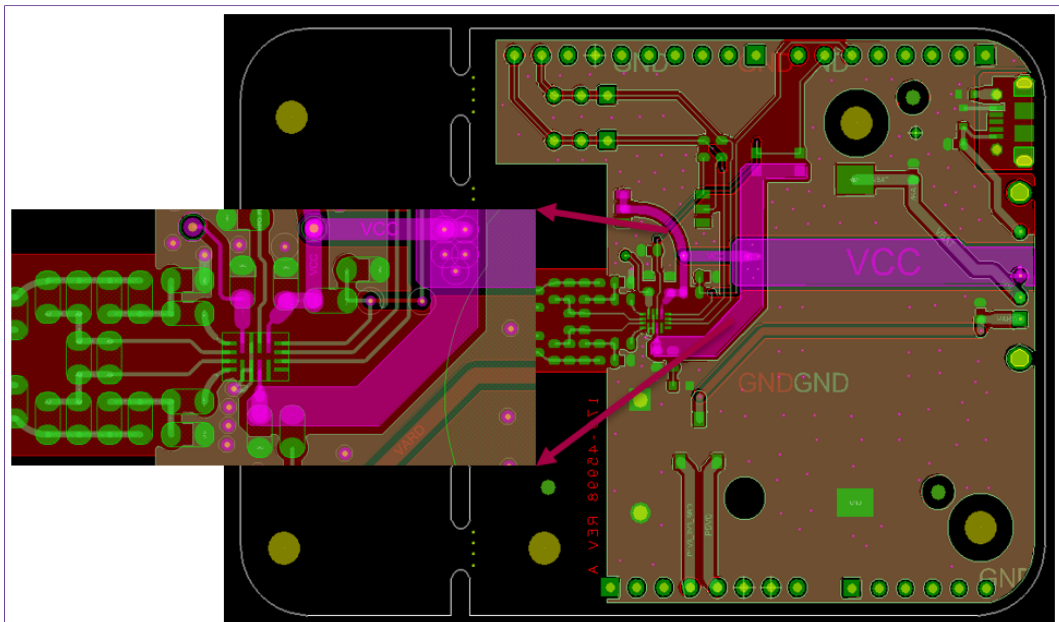In addition consider LA_TX, LB_TX to follow the same recommendation as LA, LB.

Figure 6. ALM power routing guidelines

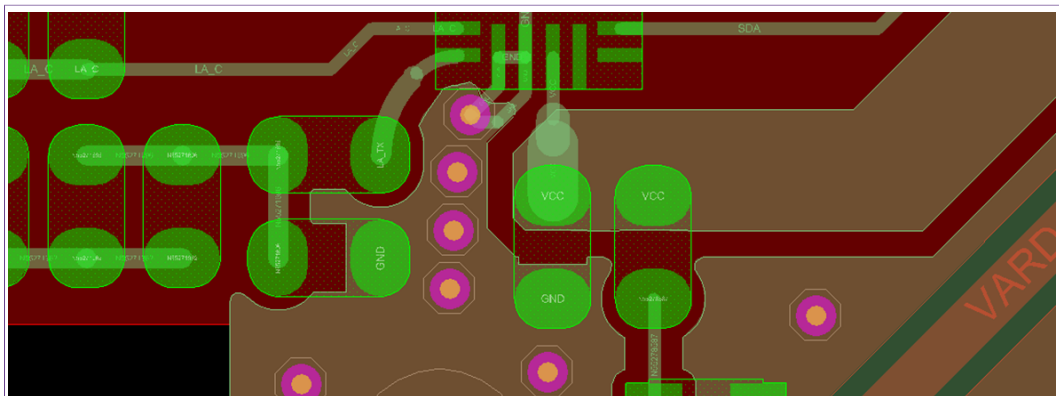No VIAs stich on GND Copper plane (Near U1 Pin 1&2).

Figure 7. ALM power routing guideline 2

4.3 RF routing

The same recommendations apply for ALM mode as described in chapter [Section 3.2].

In addition also consider:

• Fill GND Copper on bottom layer beneath matching circuitry
• No copper thieving in any layer, especially not in antenna part
• RF lines shall be vias-less

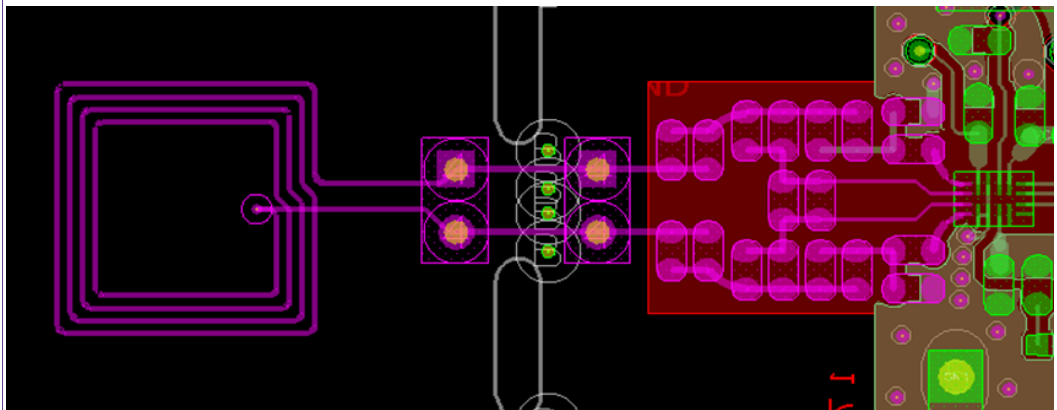**Figure 8. ALM RF routing guideline**

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5 References

[1] NTP5210 - NTAG 5 switch, NFC Forum-compliant PWM and GPIO bridge, doc.no. 5477xx
https://www.nxp.com/docs/en/data-sheet/NTP5210.pdf

[2] NTP53x2 - NTAG 5 link, NFC Forum-compliant I^{2}C bridge, doc.no. 5476xx
https://www.nxp.com/docs/en/data-sheet/NTP53x2.pdf

[3] NTA5332 - NTAG 5 boost, NFC Forum-compliant I^{2}C bridge for tiny devices, doc.no. 5475xx
https://www.nxp.com/docs/en/data-sheet/NTA5332.pdf

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