Liability disclaimer

Limiting values

Life support applications

Data sheet status	

Contact details

Main office:

Writing conventions

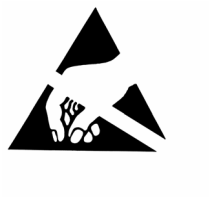
Courier

Courier bold

Revision history

Date	Version	Description

Attention!



NORDIC SEMICONDUCTOR

Contents

1 Introduction

2 Quick reference data

Parameter	Value	Unit
		°

Table 1. nRF905 quick reference data.

3 Block Diagram

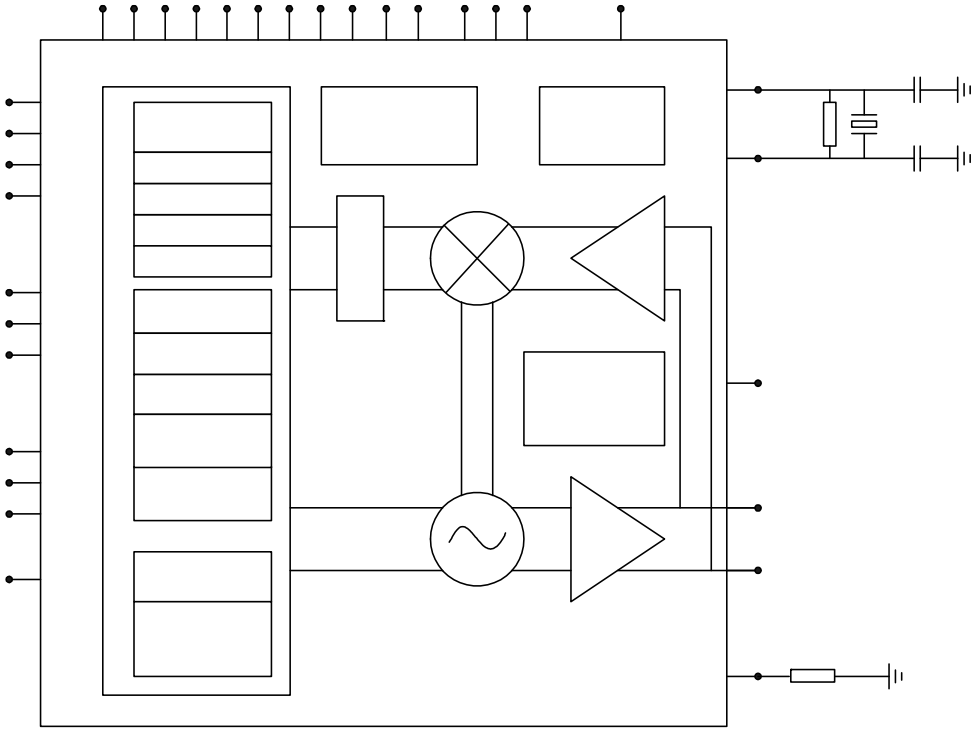


Figure 1. nRF905 with external components.

4 Absolute maximum ratings

Operating conditions	Minimum	Maximum	Units
Supply voltages			
Input voltage			
Output voltage			
Total power dissipation			
°			
Temperatures			
			°
			°
Moisture sensitivity level			
			°

Note:

Table 2. Absolute maximum ratings

5 Electrical Specifications

Symbol	Parameter (condition)	Notes	Min.	Typ.	Max.	Units

Table 3. Operating conditions

Symbol	Parameter (condition)	Notes	Min.	Typ.	Max.	Units

Table 4. Digital input/output

Symbol	Parameter (condition)	Notes	Min.	Typ.	Max.	Units

Table 5. Electrical specifications

Symbol	Parameter (condition)	Notes	Min.	Typ.	Max.	Units
Δ						

Table 6. General RF conditions

Symbol	Parameter (condition)	Notes	Min.	Typ.	Max.	Units

Table 7. Transmitter operation

Symbol	Parameter (condition)	Notes	Min.	Typ.	Max.	Units

Symbol	Parameter (condition)	Notes	Min.	Typ.	Max.	Units

Table 8. Receiver operation

6 Current Consumption

Mode	Crystal freq. (MHz)	Output clock Freq. (MHz)	Typical current

Table 9. nRF905 current consumption

7 Pin information

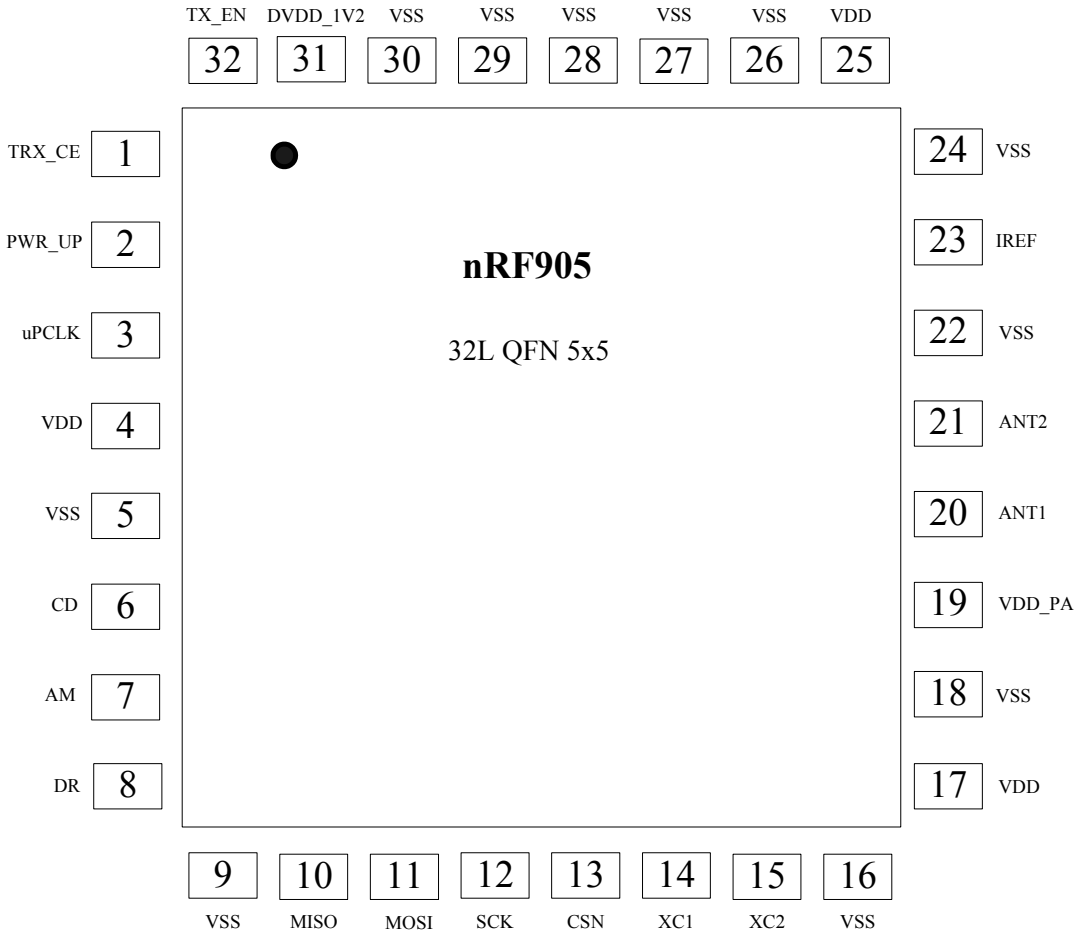


Figure 2. nRF905 pin assignment (top view) for a 32L QFN 5x5 package

Pin	Name	Pin function	Description
	TRX_CE		
	PWR_UP		
	uPCLK		
	VDD		
	VSS		
	CD		
	AM		
	DR		
	VSS		
	MISO		
	MOSI		
	SCK		
	CSN		
	XC1		
	XC2		
	VSS		
	VDD		
	VSS		
	VDD_PA		
	ANT1		
	ANT2		
	VSS		
	IREF		
	VSS		
	VDD		
	VSS		
	VSS		
	VSS		
	VSS		
	VSS		
	DVDD_1V2		
	TX_EN		

Table 10. nRF905 pin function.

8 Modes of Operation

PWR_UP	TRX_CE	TX_EN	Operating Mode

Table 11. nRF905 operational modes.

-
-
-
-

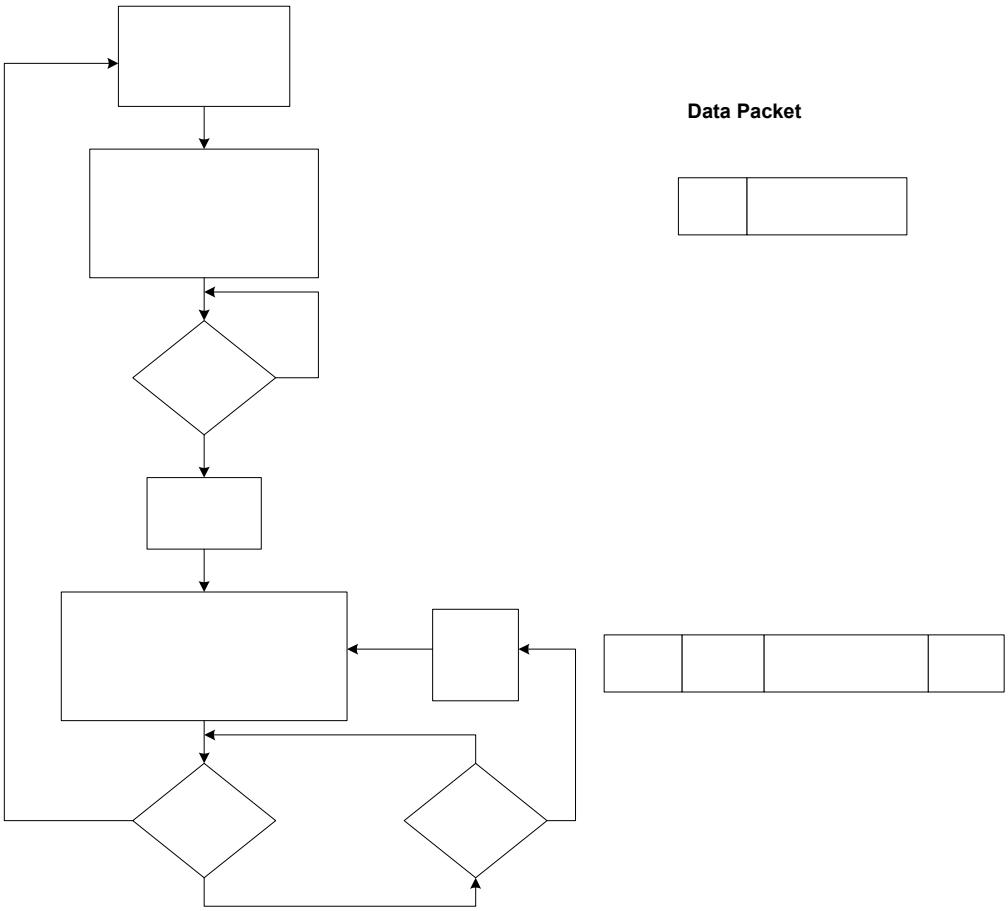


Figure 3. Flowchart ShockBurst transmit of nRF905.

Note:

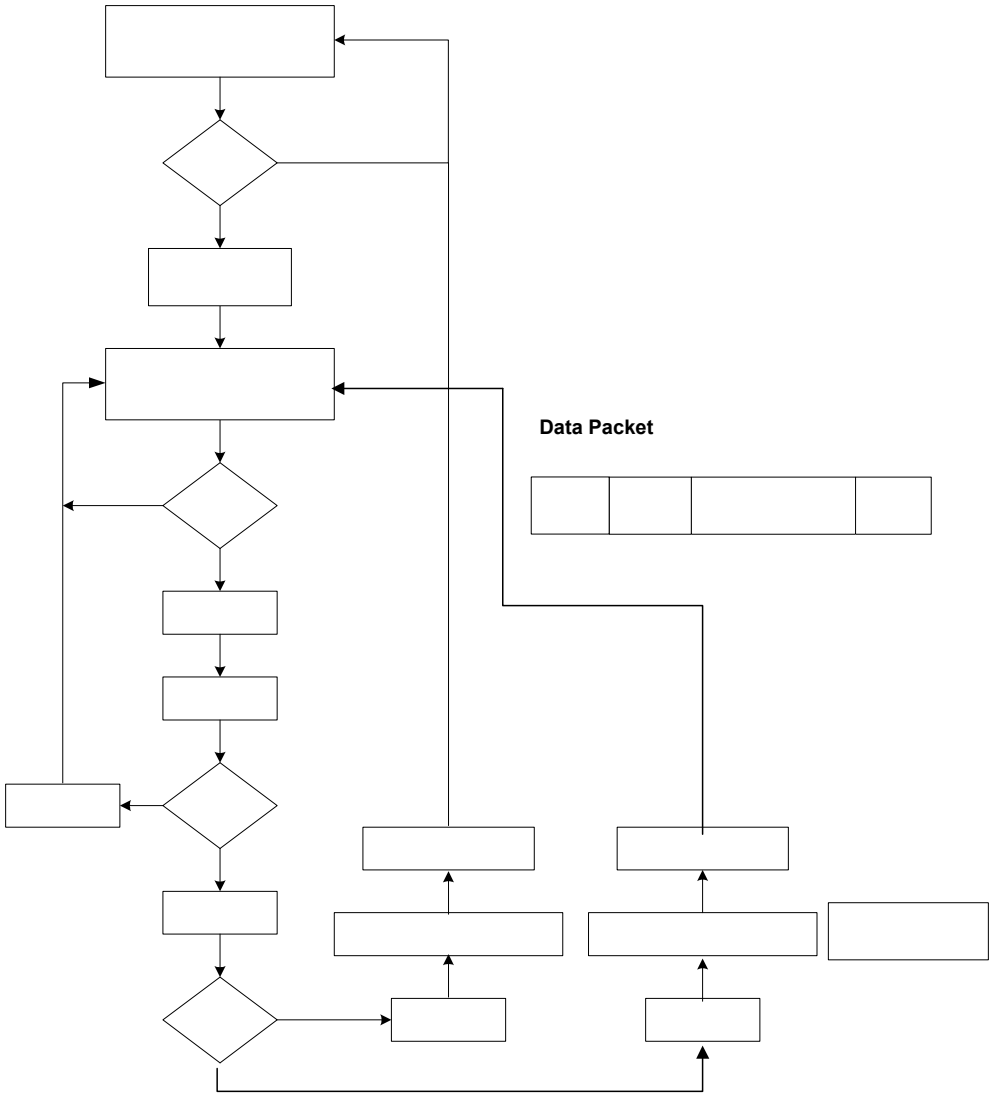


Figure 4. Flowchart ShockBurst receive of nRF905.

9 Device Configuration

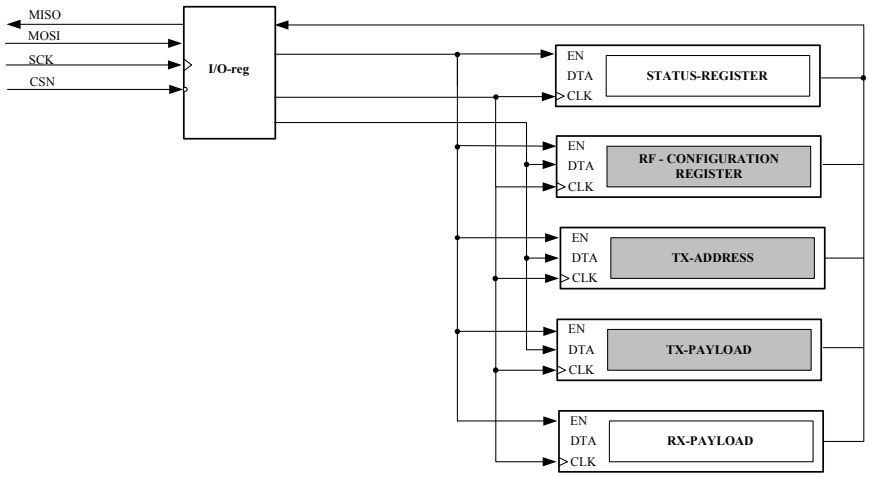


Figure 5. SPI – interface and the five internal registers.

Internal registers	Description

Table 12. Internal registers description

Instruction set for the nRF905 SPI		
Instruction Name	**Instruction Format**	**Operation**

Table 13. Instruction set for the nRF905 SPI.

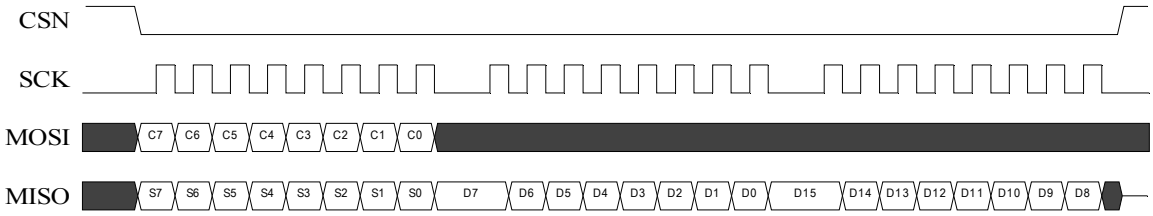


Figure 6. SPI read operation.

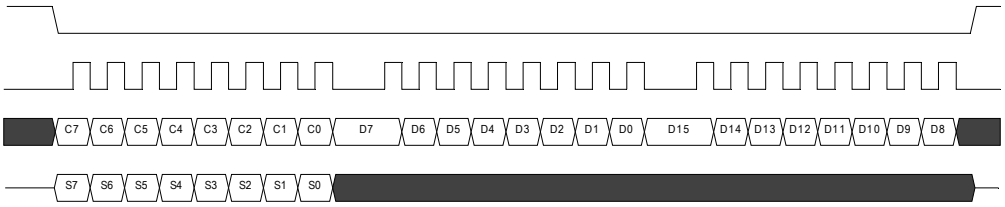


Figure 7. SPI write operation.

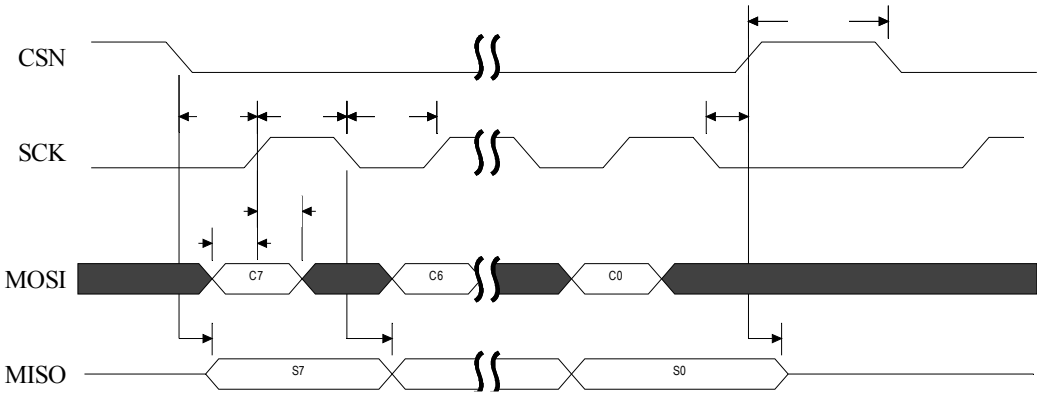


Figure 8. SPI NOP timing diagram.

PARAMETER	SYMBOL	MIN	MAX	UNITS

Table 14. SPI timing parameters (C_{load} = 10pF)

Parameter	Bitwidth	Description
CH_NO		
HFREQ_PLL		
PA_PWR		
RX_RED_PWR		
AUTO_RETRAN		
RX_AFW		
TX_AFW		
RX_PW		
TX_PW		
RX_ADDRESS		
UP_CLK_FREQ		
UP_CLK_EN		

Parameter	Bitwidth	Description
XOF		
CRC_EN		
CRC_ MODE		

Table 15. Configuration register description

RF-CONFIG_REGISTER (R/W)		
Byte #	**Content bit[7:0], MSB = bit[7]**	**Init value**

Table 16. RF config register

TX_PAYLOAD (R/W)		
Byte #	**Content bit[7:0], MSB = bit[7]**	**Init value**

Table 17. TX payload register

TX_ADDRESS (R/W)		
Byte #	**Content bit[7:0], MSB = bit[7]**	**Init value**

Table 18.TX address register

RX_PAYLOAD (R)		
Byte #	**Content bit[7:0], MSB = bit[7]**	**Init value**

Table 19. RX payload register

STATUS_REGISTER (R)		
Byte #	**Content bit[7:0], MSB = bit[7]**	**Init value**

Table 20. Status register

10 Important Timing Data

nRF905 timing	Max.
→	
→	
→	
→	
→	

Table 21. Switching times for nRF905.

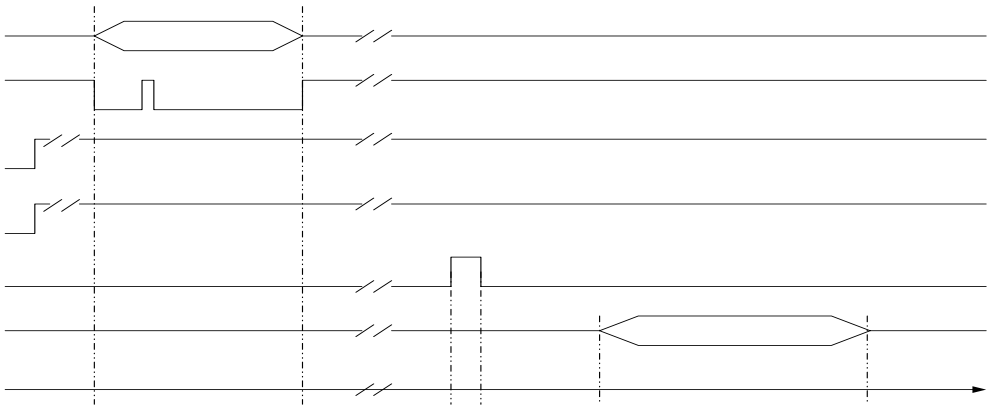


Figure 9. Timing diagram for standby to transmit

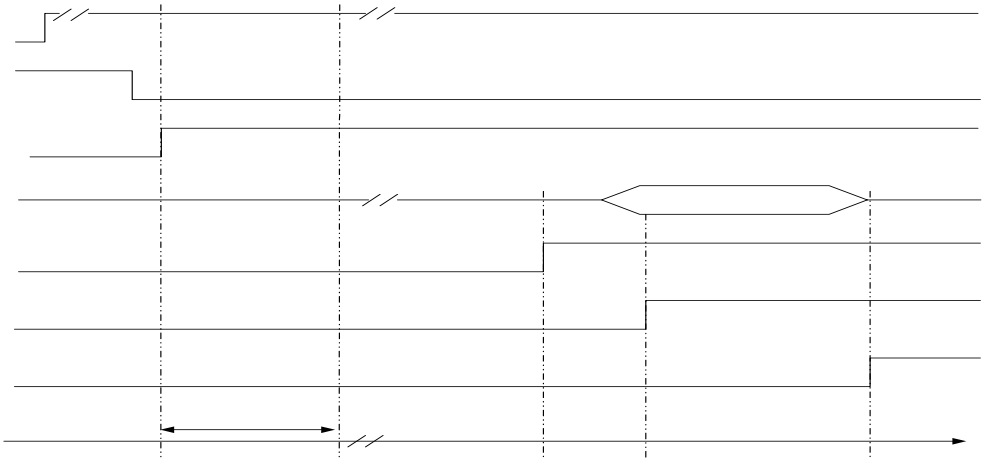


Figure 10. Timing diagram for standby to receiving

$$TOA = t_{startup} + t_{preamble} + \frac{N_{address} + N_{payload} + N_{CRC}}{BR}$$

11 Peripheral RF Information

Frequency	C_L	ESR	C_{0max}	Tolerance @ 868/915 MHz	Tolerance @ 433 MHz
		Ω		±	±
		Ω		±	±
		Ω		±	±
		Ω		±	±
		Ω		±	±

Table 22. Crystal specification of nRF905

$$C_L = \frac{C_1' \cdot C_2'}{C_1' + C_2'}, \quad where\ C_1' = C_1 + C_{PCB1} + C_{I1}\ and\ C_2' = C_2 + C_{PCB2} + C_{I2}$$

Ω

Ω

Ω

Power setting	RF output power	DC current consumption
		Ω

Table 23. RF output power setting for the nRF905

±

$$f_{OP} = (422.4 + (CH\_NO/10)) \cdot (1 + HFREQ\_PLL)\ MHz$$

Operating frequency	HFREQ_PLL	CH_NO

Table 24. Examples of real operating frequencies

12 nRF905 features

±

13 Mechanical specifications

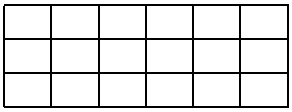
NOTES :

1. DIMENSIONING AND TOLERANCING CONFORME TO ASME Y14.5M – 1994.
2. ALL DIMENSIONS ARE IN MILLIMETERS, θ IS IN DEGREES.
3. N IS THE TOTAL NUMBER OF TERMINALS.
4. DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30mm FROM TERMINAL TIP. IF THE TERMINAL HAS THE OPTIONAL RADIUS ON THE OTHER END OF THE TERMINAL, THE DIMENSION b SHOULD NOT BE MEASURED IN THAT RADIUS AREA.
5. ND AND NE REFER TO THE NUMBER OF TERMINALS ON EACH D AND E SIDE RESPECTIVELY.
6. MAX. PACKAGE WARPAGE IS 0.05 mm.
7. MAXIMUM ALLOWABLE BURRS IS 0.076 mm IN ALL DIRECTIONS.
8. PIN #1 ID ON TOP WILL BE LASER MARKED.
9. SLUG AS WELL AS THE TERMINALS.

Package		A	A1	A3	b	D	E	e	J	K	L	N	ND	NE	θ

Figure 11. nRF905 package outline

14 Ordering information



14.1.1 Abbreviations

Abbreviation	Definition

Table 25. Abbreviations

14.2.1 RF silicon

Ordering code	Package	Container	MOQ[a]

Table 26. nRF905 RF silicon options

14.2.2 Development tools

Type Number	Description	Version

Table 27. nRF905 solution options

15 Application Examples

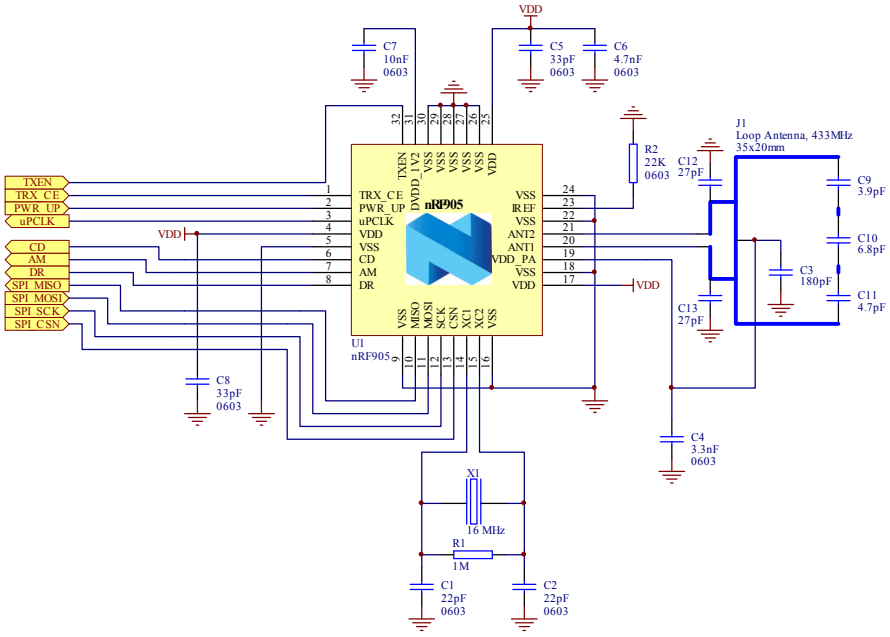


Figure 12. nRF905 Application schematic, differential connection to a loop antenna (433MHz)

Component	Description	Size	Value	Tol.	Units
				±	
				±	
				±	
				±	
				±	
				±	
				±	
				±	
				±	
				±	
				±	Ω
				±	Ω
				±	

Table 28. Recommended external components, differential connection to a loop antenna (433MHz)

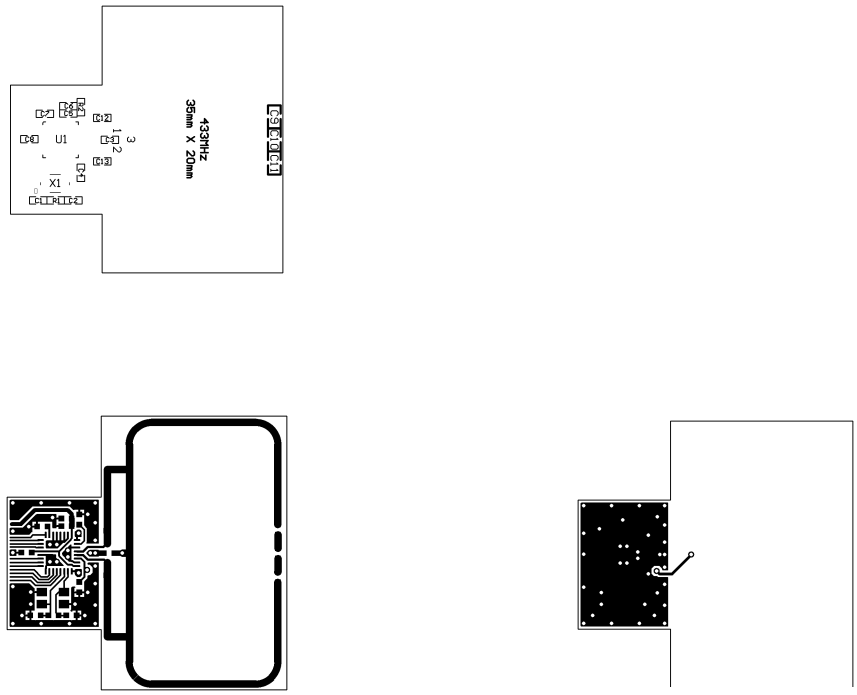


Figure 13. PCB layout example for nRF905, differential connection to a loop antenna

Ω

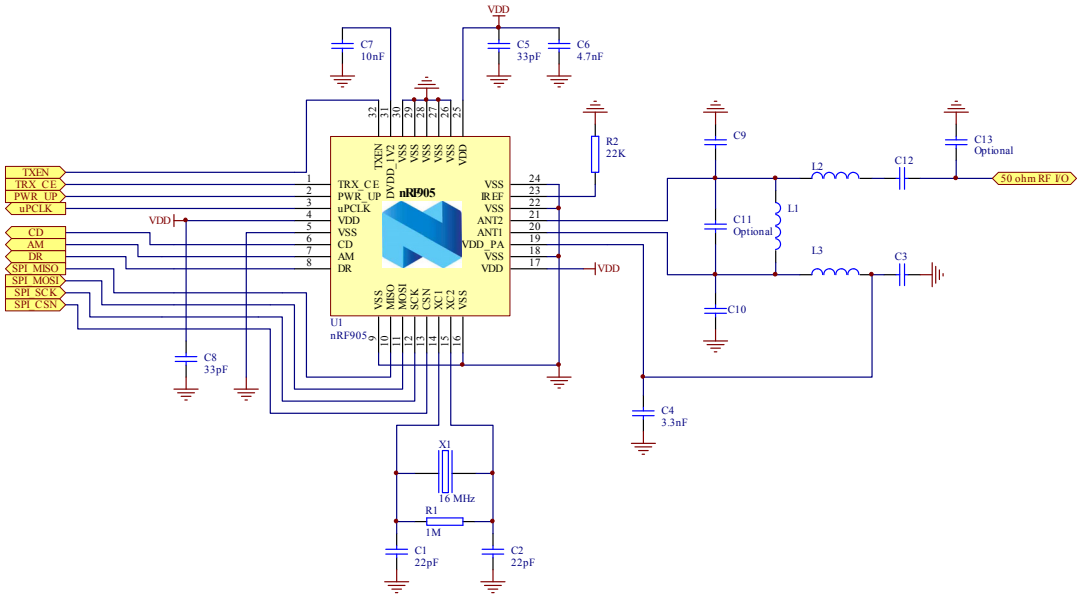


Figure 14. 433 MHz operating nRF905 application schematic, single ended connection to 50Ω antenna by using a differential to single ended matching network

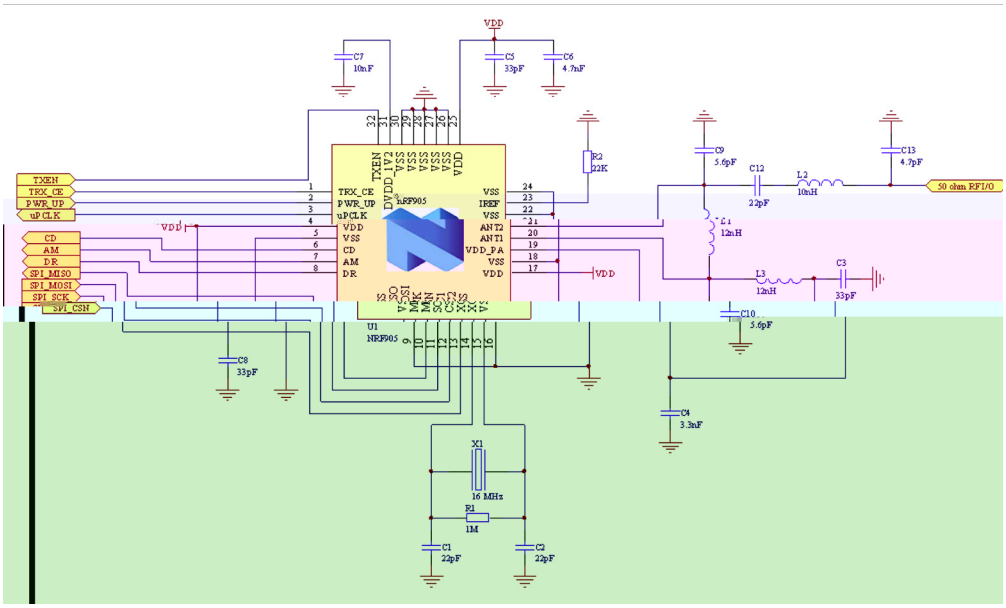


Figure 15. 868-915 MHz operating nRF905 application schematic, single ended connection to 50Ω antenna by using a differntial to single ended matching network

Component	Description	Size	Value	Tol.	Units
				±	
				±	
				±	
				±	
				±	
				±	
				±	
				±	
				± ± ±	
				± ± ±	
				± ± ±	
				±	
				± ± ±	

Component	Description	Size	Value	Tol.	Units
				± ± ±	
				±	Ω
				±	Ω
				± ± ±	

Table 29. Recommended external components, single ended connection to 50Ω antenna

Ω

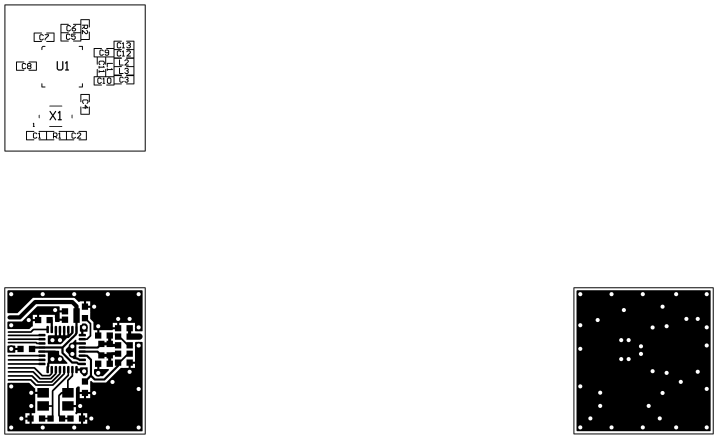


Figure 16. PCB layout example for 433 MHz operation on nRF905, single ended connection to 50Ω antenna by using a differential to single ended matching network

Figure 17. PCB layout example for 868-915 MHz operation on nRF905, single ended connection to 50Ω antenna by using a differential to single ended matching network

16 Glossary of terms

Term	Description

Table 30. Glossary of terms.