

DPH1276C868

868 MHz 27dBm Transceiver Modul with LoRa Modulation

Very long Range low Data rate SRD Band Application

GENERAL DESCRIPTION

The DPH1276C868 module is build to be part of a wireless network which is designed for industrial measurement applications. The radio protocol is designed for use in the European area. Controlled via UART interface, it is build for point to point or star network configuration. Its outstanding feature is high link budget, efficient power amplifier, very good blocking immunity, precise clock source and at the same time it is easy to implement.

The intended application of the module is Tracking-Tracing and Meter-Reading. With an unreached performance of up to 174 dB link budget this module can face even very difficult tasks. Using it can significantly reduce development time and cost even for specialists.

APPLICATIONS

- Industrial monitoring and control
- Wireless sensor networks
- Tracking and Tracing
- Meter Reading

KEY PRODUCT FEATURES

- OEM radio module with GFSK and LoRa modulation
- 174 dB maximum link budget
- +27 dBm at <400 mA constant RF output at 3.6V
- Long rang application
- Dimensions 35 x 17 x 3,5 mm
- Software Stack
- Point-to-Point and Point-to-Multipoint operation
- Respects EU R&TTE 1999/5/CE directive
- Connecting via UART

DEVICE OPTIONS

Part	Frequency band	Pin Package
DPH1276C868	868 MHz	Board

Table 1

Table of Contents

1	PIN DESCRIPTION	3
2	ABSOLUT MAXIMUM RATINGS	5
3	OPERATING RANGE	5
4	SPECIFICATIONS	6
4.1	POWER CONSUMPTION SPECIFICATION.....	6
5	RADIO PARAMETER	6
5.1	FREQUENCY RANGE.....	6
5.2	OUTPUT POWER.....	6
5.3	RECEIVER SENSITIVITY GFSK.....	6
5.4	RECEIVER SENSITIVITY LoRa	7
6	RADIO CANNELS	7
6.1	CHANNEL SPACING.....	8
6.2	RECOMMENDED RADIO CANNEL CONFIGURATIONS GFSK	8
6.3	RECOMMENDED RADIO CANNEL CONFIGURATIONS LoRa.....	8
7	MECHANICAL DIMENSIONS	9

preliminary

1 PIN DESCRIPTION

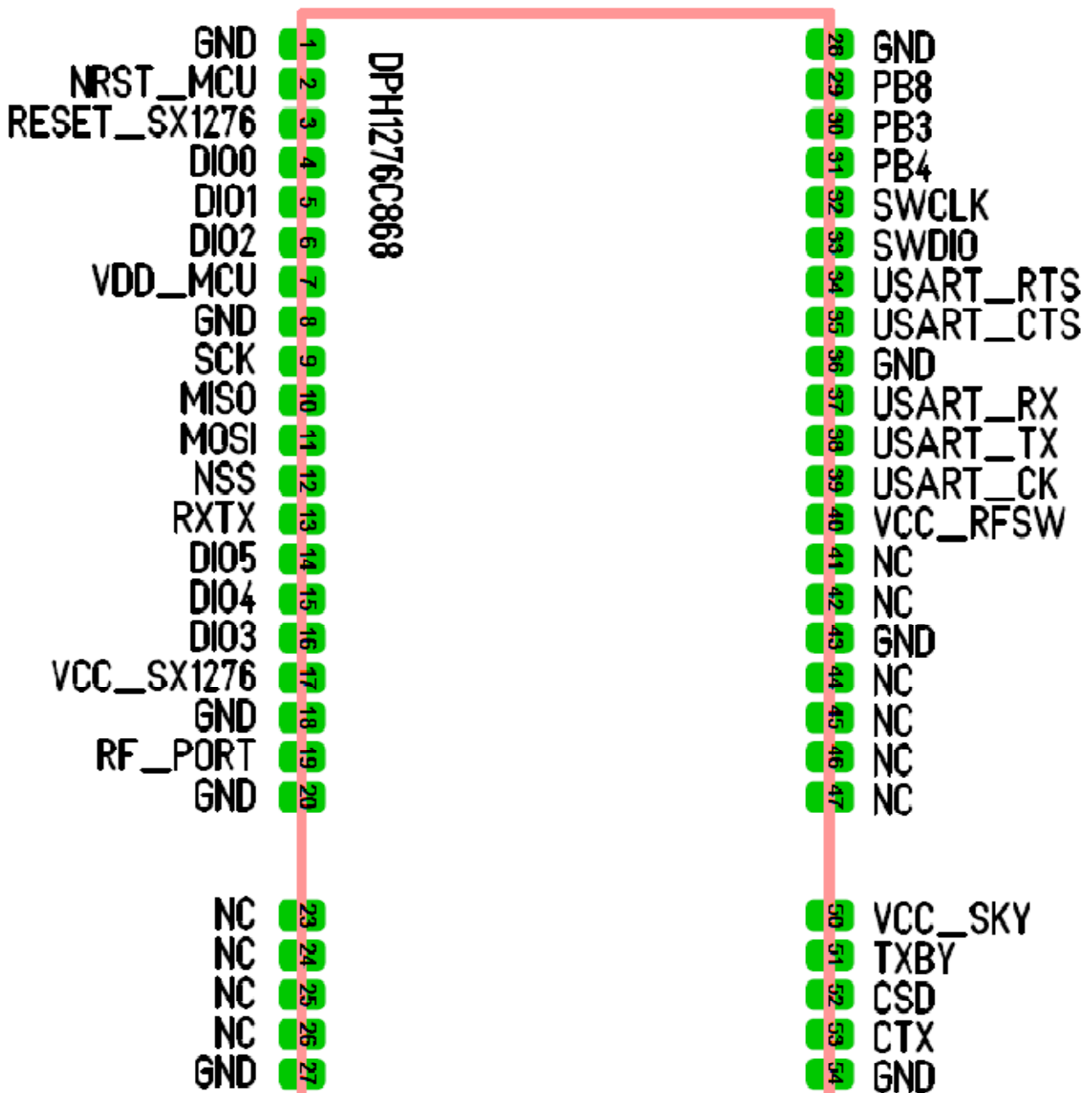


Figure 1: Pin description

Top View

PIN	NAME	I/O	DESCRIPTION
1	GND	SUPPLY	Ground
2	NRST_MCU	IN	Reset trigger input
3	RESET_SX1276		Keep floating internal use only
4	DIO0		Keep floating internal use only
5	DIO1		Keep floating internal use only
6	DIO2		Keep floating internal use only
7	VDD_MCU	SUPPLY	Voltage supply for microcontroller
8	GND	SUPPLY	Ground
9	SCK		Keep floating internal use only
10	MISO		Keep floating internal use only
11	MOSI		Keep floating internal use only
12	NSS		Keep floating internal use only
13	RXTX		Keep floating internal use only
14	DIO5		Keep floating internal use only
15	DIO4		Keep floating internal use only
16	DIO3		Keep floating internal use only
17	VCC_SX1276	SUPPLY	Voltage supply for SX1276
18	GND	SUPPLY	Ground
19	RF_PORT	IN/OUT	RF input / output
20	GND	SUPPLY	Ground
21			
22			
23	NC		Keep floating not connected
24	NC		Keep floating not connected
25	NC		Keep floating not connected
26	NC		Keep floating not connected
27	GND	SUPPLY	Ground
28	GND	SUPPLY	Ground
29	PB8	IN/OUT	General purpose input / output
30	PB3	IN/OUT	General purpose input / output
31	PB4	IN/OUT	General purpose input / output
32	SWCLK		Debugger / keep floating
33	SWDIO		Debugger / keep floating
34	USART_RTS		Keep floating
35	USART_CTS		Keep floating
36	GND	SUPPLY	Ground
37	USART_TX	OUT	UART output
38	USART_RX	IN	UART input
39	USART_CK		Keep floating
40	VCC_RFSW		Keep floating internal use only
41	NC		Keep floating not connected
42	NC		Keep floating not connected
43	GND	SUPPLY	Ground
44	NC		Keep floating not connected
45	NC		Keep floating not connected
46	NC		Keep floating not connected
47	NC		Keep floating not connected
48			
49			
50	VCC_SKY	SUPPLY	Voltage supply for power amplifier / buffer capacitor
51	CTX		Keep floating internal use only
52	CSD_L		Keep floating internal use only
53	CBYP_L		Keep floating internal use only
54	GND	SUPPLY	Ground

Table 2

ELECTRICAL CHARACTERISTICS

2 ABSOLUT MAXIMUM RATINGS

Description	Min	Max	Unit
Supply voltage	0.5	3.8	V
Storage temperature	-55	+115	°C
RF Input Level	-	0	dBm

Table 3

3 OPERATING RANGE

Description	Min	Max	Unit
Supply voltage	2.1	3.6	V
Operating temperature	-20	+75	°C
RF Input Level	-	0	dBm
RF Output Level	-8.5	+27	dBm
Soldering temperature (max 15 sec)		260	°C

Table 4



CAUTION: ESD sensitive device.
Precaution should be taken when handling the device in order to prevent permanent damage



Life Support Policy and Use in Safety Critical Applications

ANYLINK PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF ANYLINK PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE UNDERTAKEN SOLELY AT THE CUSTOMER'S OWN RISK.

4 SPECIFICATIONS

4.1 POWER CONSUMPTION SPECIFICATION

Symbol	Description	Conditions	Min	Typ	Max	Unit
IDDSL	Supply current in Sleep mode		-	Tbc.	x	µA
IDDR	Supply current in Receive mode		13		17	mA
IDDT	Supply current in Transmit mode			380	400	mA

Table 5

5 RADIO PARAMETER

5.1 FREQUENCY RANGE

The Modul is build and tested to work within the certified frequency Band from 869.4 MHz to 869.65 MHz

Symbol	Description	Conditions	Min	Typ	Max	Unit
FOP	Operation Frequency	related to SAW spec.	868	869.525	870	MHz

Table 6

5.2 OUTPUT POWER

While using the power amplifier for 27 dBm no output power configuration is possible. In bypass mode the output power can be configured from min -5dBm to max 13 dBm in 1 dB steps.

Symbol	Description	Conditions	Min	Typ	Max	Unit
TXP	Transmitter power	Power step size 1 dB for -5 dBm to 13dBm and 27 in PA on Configuration	-5		27	dBm

Table 7

5.3 RECEIVER SENSITIVITY GFSK

Receiver Sensitivity test were performed with dividend receiver bandwidth (RxBw) (Single Side Bandwidth)

Symbol	Modulation	Frequency Deviation	Bitrate	RxBw	Min	Typ	Max	Unit
RFS_1_2	GFSK	5 kHz	1200 bps(bit per second)	10 kHz		-121		dBm
RFS_2_4	GFSK	5 kHz	2400 bps	10 kHz		Tbd.		dBm
RFS_4_8	GFSK	5 kHz	4800 bps	10 kHz		-117		dBm
RFS_9_6	GFSK	10 kHz	9600 bps	25 kHz		Tbd.		dBm
RFS_19_2	GFSK	20 kHz	19200 bps	25 kHz		Tbd.		dBm
RFS_38_4	GFSK	20 kHz	38400 bps	50 kHz		-107		dBm

Table 8

WIRELESS PRODUCTS

5.4 RECEIVER SENSITIVITY LoRa

All values are calculated with the "LoRa Modem Calculator Tool" for Semtech and 2 dB insertion attenuation from the SAW Filter. Use the Semtech Tool for you individual calculation. The table should be used as referent only. Spreading Factor 6, 7, 8, 9, 10, 11 and 12 can be used with the Modul, but only factors for 6 and 12 are shown in this Table as an example.

Symbol	Modulation	Bandwith Config	Sprading Faktor	Bitrate (bps)	Min	Typ	Max	Unit
RLS_7_8	LoRa	7.8 kHz	SF = 6	585			-130	dBm
			SF = 12	18			-147	
RLS_10_2	LoRa	10.4 kHz	SF = 6	780			129	dBm
			SF = 12	24			-145	
RLS_15_6	LoRa	15.6 kHz	SF = 6	1170			-127	dBm
			SF = 12	36			-144	
RLS_20_8	LoRa	20.8 kHz	SF = 6	1560			-125	dBm
			SF = 12	48			-142	
RLS_31_8	LoRa	31.8 kHz	SF = 6	2343			-123	dBm
			SF = 12	73			-141	
RLS_41_7	LoRa	41.7 kHz	SF = 6	3127			121	dBm
			SF = 12	97			-139	
RLS_62_5	LoRa	62.5 kHz	SF = 6	4687			-119	dBm
			SF = 12	146			-138	
RLS_125	LoRa	125 kHz	SF = 6	9375			-117	dBm
			SF = 12	292			-135	

Table 9

6 RADIO CANNELS

The table shows all relevant bands from the EN-Norm 300-220 specified for 27dBm / 500mW.

Band	Frequency Bands/frequencies	Applications	Maximum radiated power, e.r.p. / power spectral density	Channel spacing	Spectrum access and mitigation requirement (e.g. Duty cycle or LBT + AFA)
B1	868,400 MHz to 868,65 MHz	Alarms	500 mW	25 kHz The whole stated frequency band may be used as 1 wideband channel for high speed data Transmission	1 %
B1	868,400 MHz to 868,65 MHz	Non-specific use	500 mW	≥25 kHz The whole stated frequency band may be used as 1 wideband channel for high speed data Transmission	10 % or LBT + AFA (see note 3)

Table 10

All "NOTE's" are related to EN300220 V2.4.1 (2012-01) document.

WIRELESS PRODUCTS

6.1 CHANNEL SPACING

Symbol	Description	Conditions	Min	Typ	Max	Unit
CSF	Spacing of GFSK Cannel		10		250	kHz
CSL	Spacing of LoRa Cannel		7.8		125	kHz

Table 11

6.2 RECOMMENDED RADIO CANNEL CONFIGURATIONS GFSK

All GFSK radio channel configurations are compliant to European legal requirements at 27 dBm output power.

Band	Mod.	Frequency (Hz)			Bitrate Bps.	Frequency Deveation (kHz)	RxBw (kHz)
		Min	Center	Max			
B1	GFSK		869.525.000		38400	20	50
B2	GFSK	869.475.000		869.575.000	19200	10	25
B3	GFSK	869.475.000		869.575.000	9600	10	25
B4	GFSK	869.450.000		969.600.000	4800	5	10
B5	GFSK	869.450.000		969.600.000	2400	5	10
B6	GFSK	869.450.000		969.600.000	1200	5	10

Table 12

6.3 RECOMMENDED RADIO CANNEL CONFIGURATIONS LoRa

All LoRa radio channel configurations are compliant to European legal requirements at 27 dBm output power.

Band	Mod.	Center Frequency (Hz)			Bandwith Config (kHz)	Spreading Faktor
		Min	Center	Max		
L1	LoRa	869.450.000		869.600.000	7.8	6-12
L2	LoRa	869.450.000		869.600.000	10.4	6-12
L3	LoRa	869.450.000		869.600.000	15.6	6-12
L4	LoRa	869.450.000		869.600.000	20.8	6-12
L5	LoRa	869.450.000		869.600.000	31.8	6-12
L6	LoRa	869.475.000		869.575.000	41.7	6-12
L7	LoRa	869.475.000		869.575.000	62.5	6-12
L8	LoRa		869.525.000		125	6-12

Table 13

7 MECHANICAL DIMENSIONS

The following drawing shows the physical footprint and dimensions of the DPH1276C868 module.

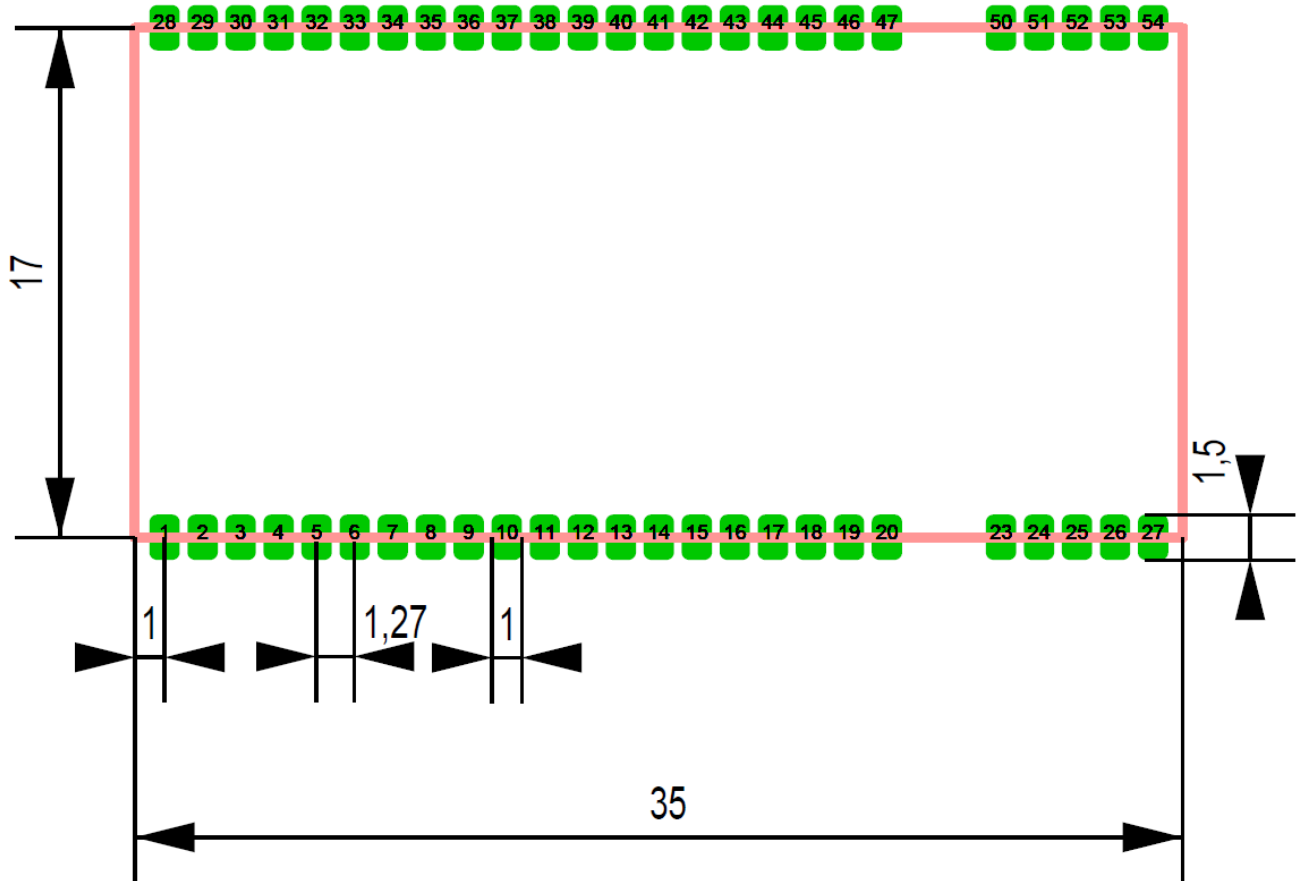


Figure 2: Top view of mechanical dimensions

© Anylink 2015

All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent or other industrial or intellectual property rights. Anylink assumes no responsibility or liability whatsoever for any failure or unexpected operation resulting from misuse, neglect improper installation, repair or improper handling or unusual physical or electrical stress including, but not limited to, exposure to parameters beyond the specified maximum ratings or operation outside the specified range.

ANYLINK PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF ANYLINK PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE UNDERTAKEN SOLELY AT THE CUSTOMER'S OWN RISK. Should a customer purchase or use Anylink products for any such unauthorized application, the customer shall indemnify and hold Anylink and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs damages and attorney fees which could arise.

Version	Create Date:	Creator	Changes
0.1	01.02.2016	Holler	Create new Datasheet

Table 14

Contact Information:

Anylink Systems AG

 Ringlerstrasse 19
 85057 Ingolstadt
 Germany

 Phone (+49) 841-881-1200
 Fax: (+49) 841-881-1201