The TiNo Radio Data Protocol

V3.0.2



Preamble, mandatory for all Packets

AA	AA	AA	2D	XX	LEN	N LEN Bytes of Data			Preamble is required by RFM69
0	1	2	3	4	5	6	7		mode of operation

Byte Remarks

0,1,2 Preamble for frequency Sync

- 3 Syncword 1. fixed to 2D for compatibility with RFM12B
- 4 Syncword 2. Network ID, defined by user, set to D2 for compatibility with RFM12E
- 5 LEN = length of Data block

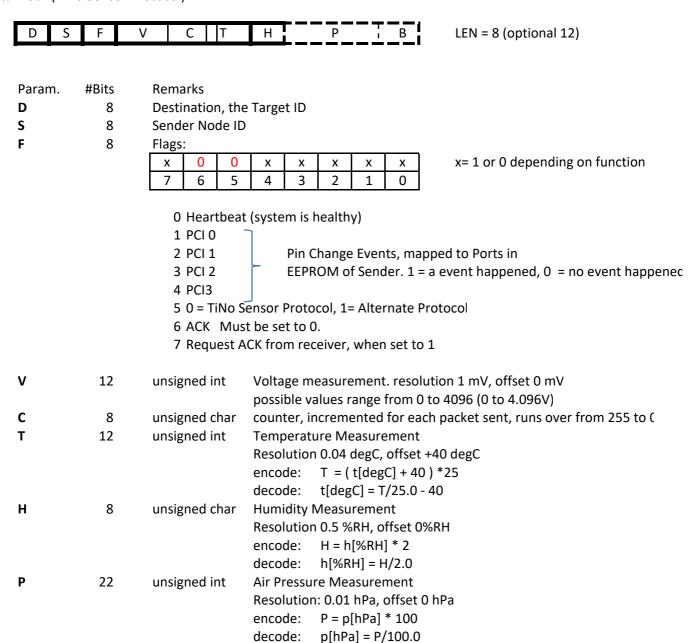
6...6+LEN Data Block

Data Block (TiNo Sensor Protocol)

В

10

unsigned int



analog Value, for example Brightness Measurement

<u>Data Block - Alternate Protocol (General Description)</u>

D	S	F	С	Any c	ther	data						I
0	1	2	3	4LE	•			LEN =	= user	defin	ed , m	nust be modulo 4 if encryption is u
				1	Ī							y data block
Parar	n.	#Bits		Rema	arks							,
D		8		Desti	natio	n, the	Targe	t ID				
S				Destination, the Target ID Sender Node ID								
F		8		Flags	:							
				Х	0	1	Х	Х	Х	Х	Х	x=undefined
				7	6	5	4	3	2	1	0	
				•	Ū	J	·	J	_	_	Ū	
				0	٦							
				1								
2 user defined Flags.												
	3											
				4								
5 Must be set to 1 (indicates an alternate Protocol)									e Protocol)			
				6			be se	-				•
7 when set to 1, request ACK from receiver									ver			
	-,,,,,,											

unsigned char incremented for each packet sent, runs over from 255 to C

Data Block - ACK Packet

8

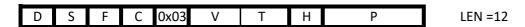
C

note:

D	S	F	FEI	С	RSSI	Т			LEN =	= 8		
							-					
Paran	n.	#Bits	Rema	arks								
0 D		8	Dest	Destination, the Target ID								
1 S		8	Send	Sender Node ID								
2 F		8	Flags	Flags:								
			0	0 1 0 x x x x x x x=undefined								
			7	6	5	4	3	2	1	0	•	
			Bit 7	must	be 0	to avo	oid acl	knole	dge of	an ac	k packet	
			Bit 6	Bit 6: must be one to indicate an ACK								
			Bit 5	Bit 5: must be 0, indicates the response to a TiNo Sensor Packet								
3 FEI		16	signe	d int		Frequ	uency	Error	Indica	ator [frequency Steps]	
						1 Ste	p = 61	L.0351	L5625	Hz, se	ee Data Sheet of RFM69	
5 C		8	unsig	gned char must be identical to the count of the packet that is								
						ackn	oledge	ed				
6 RSSI		8	unsig	gned c	har	Received Signal Strength Indicator						
						rssi[c	IB] = -	RSSI	/ 2.0			
						Tells	the S	ender	abou	t the c	channel quality	
7 T		8	Tem	perati	ire M	Measurement of the receiver's RFM69						
			resol	resolution: 1 degC/LSB								
			roug	rough temperature indicator, currently not calibrated, can be wrong by								
			seve	ral de	grees	es.						

FEI, RSSI and Temperature Values of the receiver are currently unused





Param.	#Bits	Remarks
D S F C	8 8 8	see General Description for alternate Packets
0x03	8	Packet Type Identifier, must be 3
V	12	unsigned int Voltage measurement. resolution 1 mV, offset 0 mV possible values range from 0 to 4096 (0 to 4.096V)
Т	12	unsigned int Temperature Measurement Resolution 0.04 degC, offset +40 degC encode: T = (t[degC] + 40) *25 decode: t[degC] = T/25.0 - 40
Н	8	unsigned char Humidity Measurement Resolution 0.5 %RH, offset 0%RH encode: H = h[%RH] * 2 decode: h[%RH] = H/2.0
P	24	unsigned int Pressure measurement Resolution: 0.01 hPa, offset 0 hPa encode: P=p[hPa] * 100 decode: p[hPa] = P/100.0

Alternate Packet Type 4

F C_{LSB} 0x03

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D

(for up to 3 Temperature sensors)

T1

T2 C_{MSB}

LEN =12

Т

Param.	#Bits	Remarks								
D	8	7								
S	8	see Gene	eral Description for alternate Pack	ets						
F	8									
C_{LSB}	8	J								
0x04	8	Packet Type Id	Packet Type Identifier, must be 4							
V	12	unsigned int	Voltage measurement. resoluti possible values range from 0 to							
Т	14	unsigned int	Temperature Measurement Resolution 0.04 degC, offset +4 encode: T = (t[degC] + 40) decode: t[degC] = T/25.0 - 40	*25	Tmin= -40 degC					
T1	12	unsigned int	Temperature Measurement	Tmax = 123.8 degC	Tmin = -40 degC					
T2	12	unsigned int	Temperature Measurement	Tmax = 123.8 degC	Tmin = -40 degC					
C _{MSB}	6	unsigned int	Counter MSB							

Alternate Packet Type 5

S

D

C_{LSB} 0x05

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Т

Н

T2

humidity sensor and additional temperature reading (DS18B20 or MAX31865)

В

LEN =12

Param.	#Bits	Remarks								
D	8]								
S	8	see Gener	al Description for alternate Packets							
F	8									
С	8									
0x05	8	Packet Type Ide	Packet Type Identifier, must be 5							
V	12	unsigned int	Voltage measurement. resolution 1 mV, offset 0 mV							
			possible values range from 0 to 4096 (0 to 4.096V)							
T	12	unsigned int	Temperature Measurement Tmax =615 degC	Tmin= -40 degC						
			Resolution 0.04 degC, offset +40 degC							
			encode: $T = (t[degC] + 40) *25$							
			decode: $t[degC] = T/25.0 - 40$							
Н	8	unsigned char	Humidity Measurement							
			Resolution 0.5 %RH, offset 0%RH							
			encode: H = h[%RH] * 2							
			decode: $h[\%RH] = H/2.0$							
T1	14	unsigned int	Temperature Measurement Tmax = 615.32 degC	Tmin = -40 degC						
В	10	unsigned int	Analog Reading i.e. Brightness values: 0 - 1023	_						