# TINO

#### Preamble, mandatory for all Packets

AA	AA	AA	2D	XX	LEN	LEN I	Bytes o	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

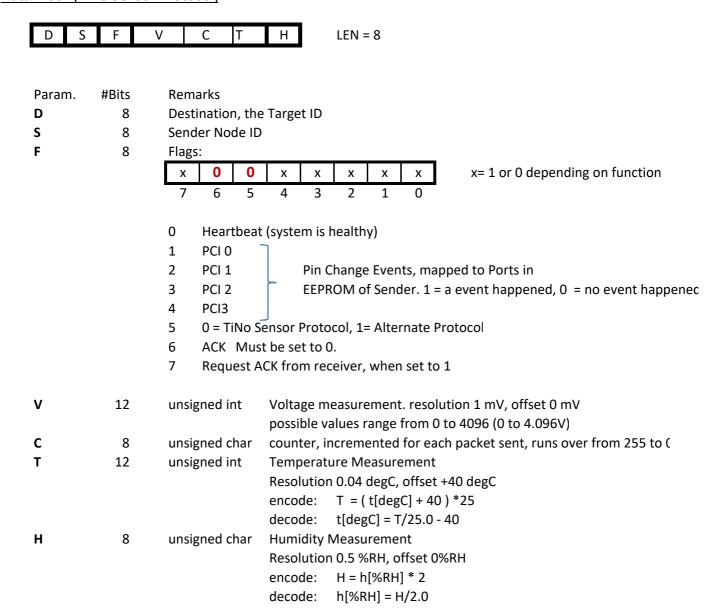
3 Syncword 1. fixed to 2D for compatibility with RFM12B

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)



#### Data Blo

locl	c - Al	ternat	te Pr	otocol (General D	escription)
					TNO
D	S	F	С	Any other data	
0	1	2	3	4LEN	LEN = user defined , must be modulo 4 if encryption is used
					LEN=4 indicates empty data block
ərər	n	#Ritc		Romarks	

x=undefined

0

Param. #Bits Remarks Destination, the Target ID D 8 S 8 Sender Node ID F 8 Flags: 0 Х 1 Χ Χ Χ

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6

0 1 2 user defined Flags. 3 4 5 Must be set to 1 (indicates an alternate Protocol) 6 ACK Must be set to 0. 7 when set to 1, request ACK from receiver

unsigned char incremented for each packet sent, runs over from 255 to C 8

### **Data Block - ACK Packet**

C

note:

D S	F	FEI C RSSI T LEN = 8
Param.	#Bits	Remarks
0 <b>D</b>	8	Destination, the Target ID
1 <b>S</b>	8	Sender Node ID
2 <b>F</b>	8	Flags:
		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 avoid acknoledge of an ack packet Bit 6: must be one to indicate an ACK Bit 5: must be 0, indicates the response to a TiNo Sensor Packet
3 FEI	16	signed int Frequency Error Indicator [ frequency Steps ]  1 Step = 61.03515625 Hz, see Data Sheet of RFM65
5 <b>C</b>	8	unsigned char must be identical to the count of the packet that is acknoledged
6 RSSI	8	unsigned char Received Signal Strength Indicator rssi[dB] = - RSSI / 2.0 Tells the Sender about the channel quality
7 T	8	Temperature Measurement of the receiver's RFM69 resolution: 1 degC/LSB rough temperature indicator, currently not calibrated, can be wrong by several degrees.

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

S

F

C<sub>LSB</sub> 0x03

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D

(for up to 3 Temperature sensors)

T1

T2 C<sub>MSB</sub>

LEN =12

Т

Param.	#Bits	Remarks					
D	8	]					
S	8	see General Description for alternate Packets					
F	8						
$C_{LSB}$	8						
0x04	8	Packet Type Identifier, must be 4					
V	12	unsigned int	Voltage measurement. resolution 1 mV, offset 0 possible values range from 0 to 4096 (0 to 4.096)				
Т	14	unsigned int	Temperature Measurement Tmax =615 degC Resolution 0.04 degC, offset +40 degC encode: T = (t[degC] + 40) *25 decode: t[degC] = T/25.0 - 40	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 <sub>MSB</sub>	6	unsigned int	Counter MSB				