Garage door opener using a RFM69/SX1231

Signal : 433.945MHz

Bitlength / SamplesPerSignal : 700
Bits / Symbol : 1

As binary

```
10010110010110010110011 [Pause: 25118 samples]
10110010110010110010110010110010110011 [Pause: 25110
samples]
… repeat n samples
```

As hex

```
965964 [Pause: 25118 samples]
b2cb2cb2c8 [Pause: 25110 samples]
… repeat n samples
```

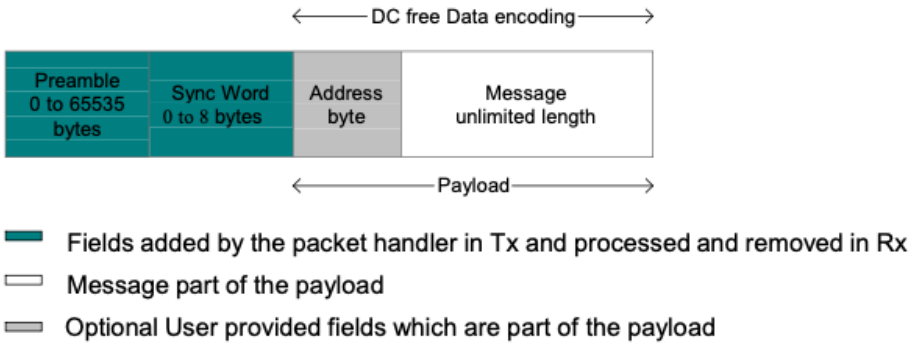
Python library flow

```
_send(self, toAddress buff, requestACK)
    _sendFrame(self, toAddress, buff, requestACK,
sendACK)
        --> spi.xfer2([REG_FIFO | 0x80, len(buf)
+3,toAddress,address,ack]+buff)
```

Unlimited length packet format is selected when bit *PacketFormat* is set to 0 and *PayloadLength* is set to 0.

An unlimited length packet shown in is made up of the following fields:

- Preamble (1010...).
- Sync word (Network ID).
- Optional Address byte (Node ID).
- Message data
- Optional 2-bytes CRC checksum (Tx only)



Scanning for pulses...

```
$ rtl_433 -A
Guessing modulation: Pulse Width Modulation with sync/
delimiter
Attempting demodulation... short_width: 708, long_width:
1416, reset_limit: 1448, sync_width: 396
Use a flex decoder with -X
'n=name,m=OOK_PWM,s=708,l=1416,r=1448,g=0,t=0,y=396'
```

Generic decoder fine tuning...

```
% rtl_433 -A -X
'n=NiceGarage,m=OOK_PWM,short=675,long=1385,reset=16680,
bits=13'

Detected OOK package 2022-06-04 11:13:53
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
time      : 2022-06-04 11:13:53
model     : NiceGarage   count     : 1
num_rows  : 1             rows      :
len       : 13            data      : aaa8
codes     : {13}aaa8
Analyzing pulses...
Total count:   13,  width: 26.42 ms       ( 6605 S)
Pulse width distribution:
 [ 0] count:    7,  width:  692 us [688;708] ( 173 S)
 [ 1] count:    6,  width: 1400 us [1396;1404]   ( 350
S)
Gap width distribution:
```

```
 [ 0] count:    6,  width:  736 us [736;740] ( 184 S)
 [ 1] count:    6,  width: 1456 us [1452;1460]   ( 364
S)
Pulse period distribution:
 [ 0] count:    6,  width: 1428 us [1424;1444]   ( 357
S)
 [ 1] count:    6,  width: 2856 us [2852;2864]   ( 714
S)
Pulse timing distribution:
 [ 0] count:   13,  width:  712 us [688;740] ( 178 S)
 [ 1] count:   12,  width: 1428 us [1396;1460]   ( 357
S)
 [ 2] count:    1,  width: 14044 us [14044;14044]
(3511 S)
Level estimates [high, low]:   2281,     12
RSSI: -8.6 dB SNR: 22.8 dB Noise: -31.4 dB
Frequency offsets [F1, F2]:    9398,      0  (+35.9
kHz, +0.0 kHz)
view at https://triq.org/pdv/
#AAB10302C8059036B4809180918091809180918091809180918255
```

Reflected...

```
% rtl_433 -A -X
'n=NiceGarage,m=OOK_PWM,short=708,long=1424,sync=736,res
et=1600,bits=13,reflect'
model     : NiceGarage   count     : 1
num_rows  : 1             rows      :
len       : 13           data      : 5515
codes     : {13}5515
```

Inverted...

```
% rtl_433 -A -X
'n=NiceGarage,m=OOK_PWM,short=708,long=1424,sync=736,res
et=1600,bits=13,invert'
model     : NiceGarage   count     : 1
num_rows  : 1             rows      :
len       : 13           data      : 5550
codes     : {13}5550
```

Flipped code bit switch ...(temporarily)

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - -
time      : 2022-06-04 10:42:39
model     : name         count     : 1
num_rows  : 1             rows      :
len       : 13           data      : eaa8
codes     : {13}eaa8
```

```
- - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - -
time      : 2022-06-04 10:42:39
model     : name          count     : 1
num_rows  : 1              rows      :
len       : 13            data      : eaa8
codes     : {13}eaa8

- - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - -
time      : 2022-06-04 10:42:39
model     : name          count     : 1
num_rows  : 1              rows      :
len       : 13            data      : eaa8
codes     : {13}eaa8
```

https://triq.org/pdv/

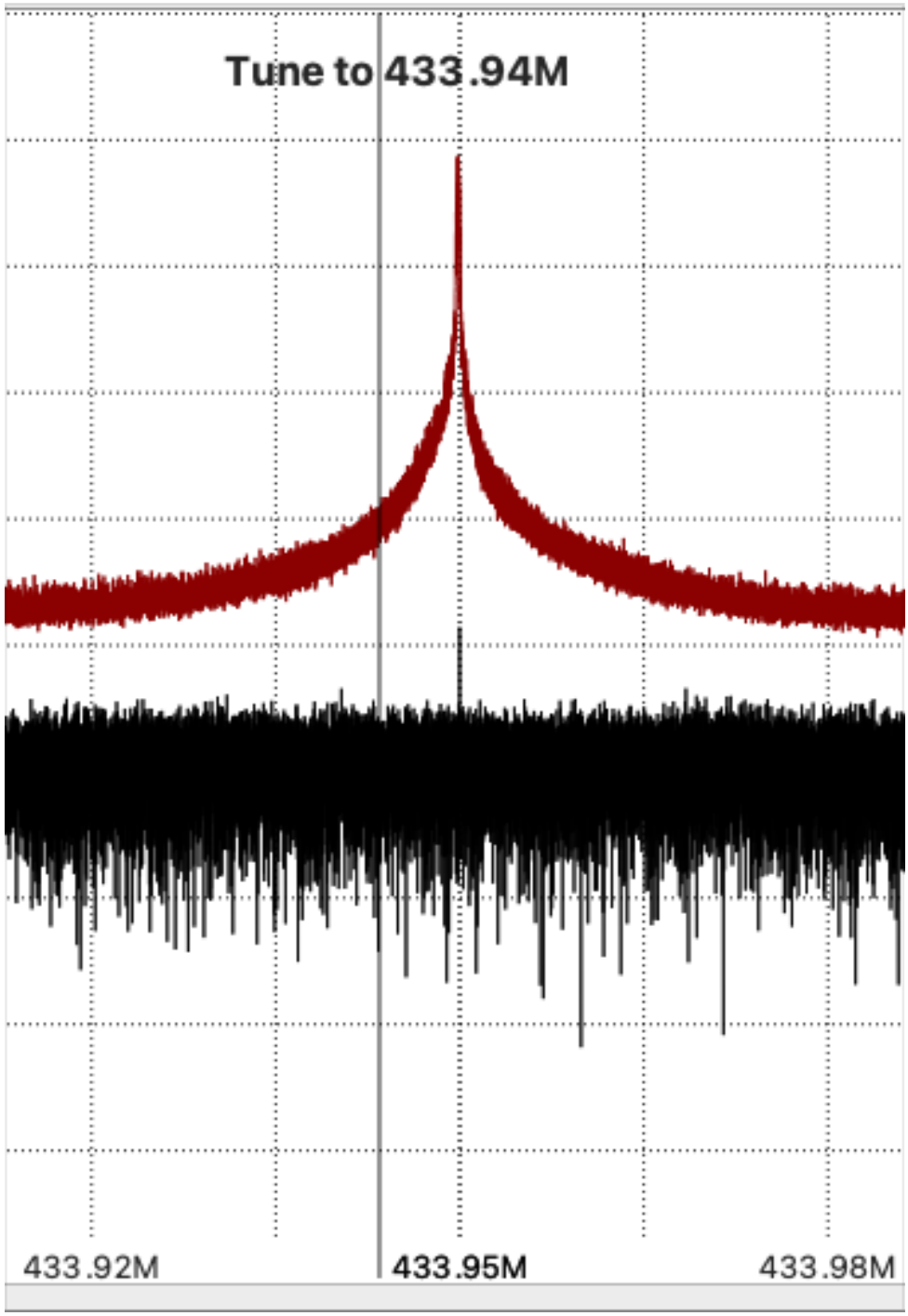
Pulses	97× 674.8 ±6.0 µs	83× 1385.3 ±5.5 µs	
Gaps	83× 752.1 ±5.0 µs	83× 1467.0 ±6.5 µs	13× 13880.2 ±20.0 µs
Periods	83× 1427.1 ±6.0 µs	83× 2852.3 ±10.0 µs	13× 14554.3 ±20.5 µs
Timings	180× 710.5 ±45.0 µs	166× 1426.2 ±48.0 µs	14× 13881.0 ±20.0 µs

DC bias (Pulse/Gap skew): -50.5%
Guessing modulation: **Pulse Width Modulation with multiple packets**
modulation: **PWM** short: **674.8** long: **1385.3** sync: **-** gap: **1770.0** reset: **16681.2**
RfRaw (rx):
AAB1033333F6BF36398091809180918091809182809180918091809180
91828091809180918091809180918280918091809180918091828091809
18091809180918091828091809180918091809182809180918091809180
91809182809180918091809180918091828091809180918091809182809
180918091809180918091828091809180918091809180918280918091809180
91809180918280918091809180918091809182809180918091809180918
255
Bits: **{336} AA A0 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 / AA A8 /**

RFM69HW connected to Pi Zero 2

Python interface code : https://github.com/jgillula/rpi-rfm69
Docs : https://rpi-rfm69.readthedocs.io/en/latest/api.html

Channel filter :
433.940 - **433.946 -** 433.954 therefore 14kHz channel bandwidth.



FSK MODE
I see 3 bytes of preamble (either 0xAA or 0x55)