Sony SIRC infrared protocol
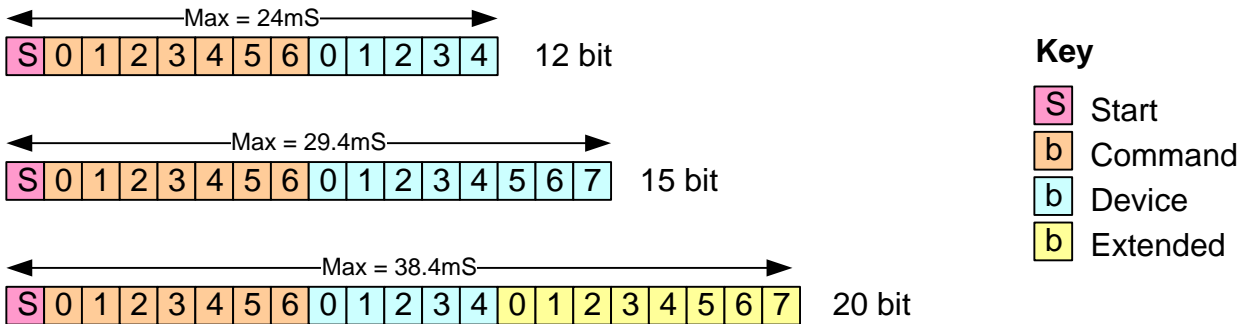
SIRC versions

There are three versions of the protocol; 12, 15 and 20 bit. All three versions have a
Command and Device word, the 20 bit version only has an 8 bit Extended word.
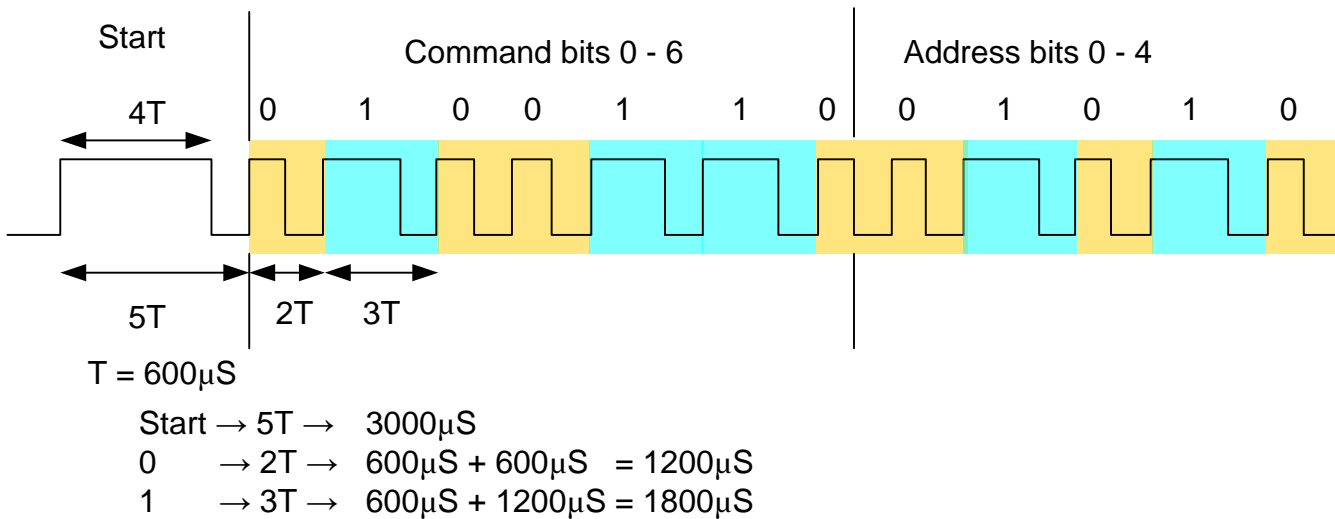Within the bit stream each word is sent LSB first as shown below.

Key

S	Start
b	Command
b	Device
b	Extended

Frame Timing

The frame timing is based on multiples of a 600µS pulse width T.
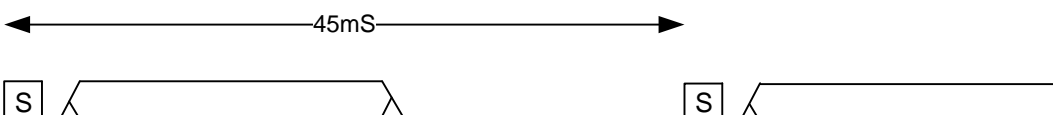Frames begin with a 4T Start mark pulse.
Each bit in the frame is represented by a 1T space followed by either a 1T mark if the bit is a
'0' or 2T mark if the bit is a '1'

T = 600µS

Start → 5T →   3000µS
0   → 2T →   600µS + 600µS   = 1200µS
1   → 3T →   600µS + 1200µS = 1800µS

Repeat rate

Frames are repeated at an interval of 45mS
Sony remotes tested all appear to repeat each frame a minimum of 3 times

Note:
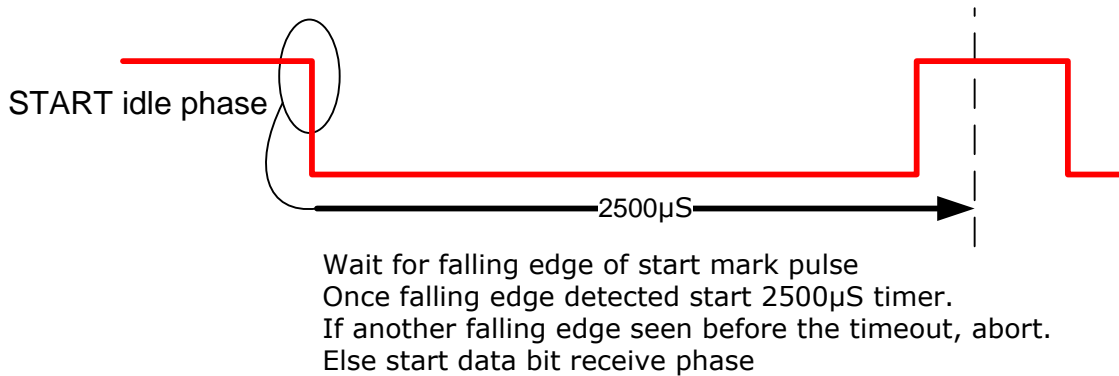*The output from the TSOP4838 IR receiver IC is active low so we need to invert the level seen on the I/O input pin when receiving data.*

START idle phase

2500µS

Wait for falling edge of start mark pulse
Once falling edge detected start 2500µS timer.
If another falling edge seen before the timeout, abort.
Else start data bit receive phase

DATA BIT receive phase

Data is transmitted LSB first so it is assembled LSB to MSB. Since it is sent as a 7 bit command, followed by 5 bit device id, the code must split the 12 received bits into two groups of 7 and 5 bits.

Wait for falling edge:
- If edge detected start 900µS timer
- If no edge within 1200µS abort receive

900µS   900µS   900µS

x x x x x x x x x x x 0   x x x x x x x x x x 1 0   x x x x x x x x x 0 1 0
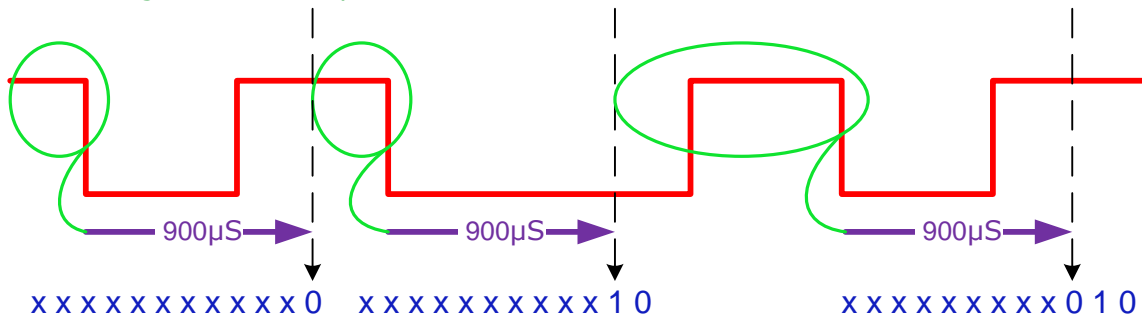
- Wait for 900µS then sample input.
- If falling edge detected before time out abort receive

The data bit receive code loops until all 12 bits have been received.

Because SIRC also supports 15 and 20 bit transmission, after 12 bits have been received, the code 'listens' for more falling edges over a 10mS period. Any falling edges seen during this hold down period will cause the receiver code to abort since it indicates either 15/20 bit SIRC or spurious reception.

SIRC Receiver Flowchart

http://picprojects.org.uk/

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START

Idle Wait Falling edge? — NO

YES

Start 2500 µS timer

Falling edge? — YES / NO

Timer out? — NO

YES

Set number of bits to receive (7+5) 12 bit sirc

Start 1200 µS timer

Timer out? — YES / NO

Falling edge? — NO

YES

Start 900 µS timer

Falling edge? — YES / NO

Timer out? — NO

YES

Test IR receiver output and shift value to received data

Bit counter --

Bit count ==0 — NO

YES

Start 10mS timer

Falling edge? — YES / NO

Timer out? — NO

YES

Data Ready

ERROR
Unexpected timeout or falling edge detected.

Abort receive and restart