SPI Mode Programming

v0.91 Preliminary
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SPI Mode on the rapidFIRE module enables the use of the module in race environments, where central management is required. It also enables the use of several receiver stations in 'satellite' configurations for out of LOS flight.

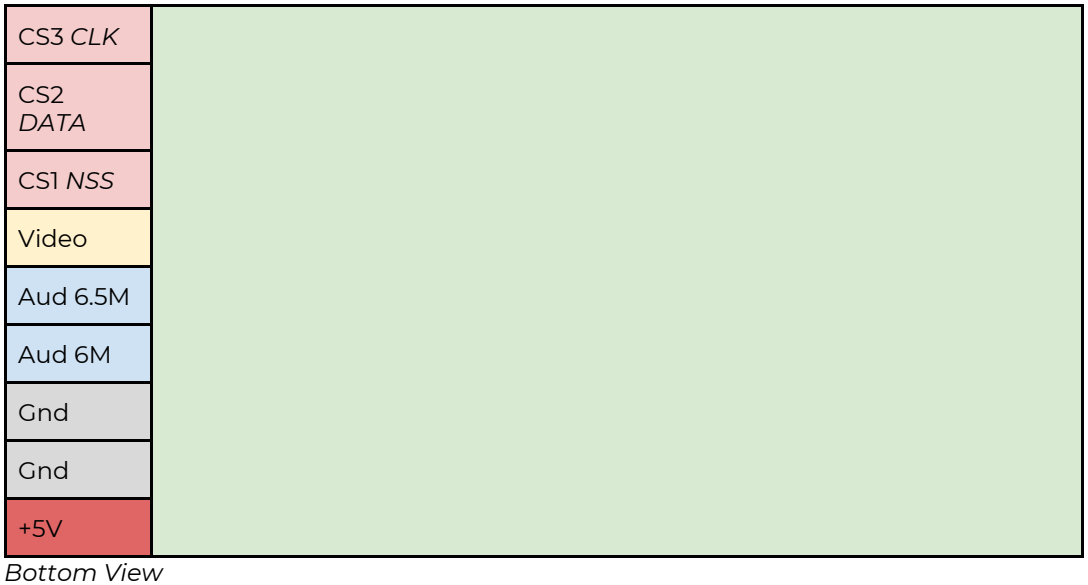
Versions 1.2.5 of the rapidFIRE firmware and later support this mode.

This mode enables the following:

- Setting band/channel and frequency
- Change modes
- Query real-time RSSI
- Enable/disable OSD overlay
- etc.

The CS1, CS2, CS3 pins are used as the SPI interface. These are normally used as a 3-bit binary interface to communicate the goggle selected channel to the module.

The SPI interface is configured so that the module is the slave (allowing several modules to be connected to the same bus), with CPOL = 0, CPHA = 0, MSB first.
The speed should be limited to a clock rate of about 80kHz.



Bottom View

To enable SPI mode, set CS1, CS2, CS3 high, and then within 100-400ms set them all low.

SPI Protocol

Command Header

cmd	dir	len	csum	data*0*		data*n*

Where Csum is computed as the 8-bit checksum of all header bytes, Cmd, Dir, Len, and all (optional) data bytes.

Query Header

len	csum	data*0*		data*n*

Where Csum is computed as the 8-bit checksum of Len, and all data bytes.

SPI Commands

The following commands are currently supported by the SPI Mode:

F - Firmware Version, Query

Query the firmware version of the two processors in the rapidFIRE module.

Cmd 'F' 0x46	Dir '?' 0x3f	Len 0x00	Csum 0x85

Len 0x06	Csum *csum*	X	Y	Z	x	y	z

Where:
X.Y.Z is the rapidFIRE OLED firmware version.
X.y.a is the rapidFIRE core firmware version.

V - Voltage, Query

Query the rapidFIRE input voltage (should be approx. 5.0V).

Cmd 'V' 0x56	Dir '?' 0x3f	Len 0x00	Csum 0x95

Len 0x02	Csum *csum*	mV lsb	mV msb

R - RSSI, Query

Query the rapidFIRE RSSI values.

Cmd	Dir	Len	Csum
‘R’ 0x52	‘?’ 0x3f	0x00	0x91

Len	Csum	Raw rx1	Raw rx1	Raw rx2	Raw rx2	Scaled rx1	Scaled rx1	Scaled rx2	Scaled rx2
0x08	*csum*	lsb	msb	lsb	msb	lsb	msb	lsb	msb

S - Sound Buzzer, Action

Make a short sound on the rapidFIRE built-in buzzer.

Cmd	Dir	Len	Csum
‘S’ 0x53	‘>’ 0x3e	0x00	0x91

T - Set OSD User-Text, Command

Set the OSD user text string, max. 25 characters.

Cmd	Dir	Len	Csum	Data 0	Data 1	Data 2	Data 3	Data4
‘T’ 0x54	‘=’ 0x3d	0x05	0x8a	‘H’ 0x48	‘e’ 0x65	‘l’ 0x6c	‘l’ 0x6c	‘o’ 0x6f

O - Set OSD Mode, Command

Set the OSD user text string, max. 25 characters.

Cmd	Dir	Len	Csum	OSDMode
‘O’ 0x4f	‘=’ 0x0d	0x01	0x63	0x06

OSDMode
0 - Off
1 - Default
2 - LockOnly
3 - UserText
4 - RSSIBars
5 - LockAndStandard
6 - RSSIBarsLite
7 - Internal use
8 - Internal use
9- Unique ID
10 - Long Range

M - Set Rx Module, Command

Set the rx module mode. Allows selecting either of the receivers for a non-diversity mode, or both of them for full rapidFIRE diversity.

Cmd 'M' 0x4d	Dir '=' 0x3d	Len 0x01	Csum 0x8b	RxMode 0x00

RxMode
0x00 - Both
0x01 - Upper
0x02 - Lower

C - Set Channel, Command

Set the receiver channel.

Cmd 'C' 0x43	Dir '=' 0x3d	Len 0x01	Csum 0x82	Channel 0x01

Channel range 0x01..0x08

B - Set Band, Command

Set the receiver band.

Cmd 'B' 0x42	Dir '=' 0x3d	Len 0x01	Csum 0x81	Band 0x01

Band
0x01 - ImmersionRC/FatShark
0x02 - RaceBand
0x03 - Boscam E
0x04 - Boscam B
0x05 - Boscam A
0x06 - LowRace
0x07 - Band X

D - Set RapidFIRE Mode, Command

Set the receiver mode.

Cmd	Dir	Len	Csum	Mode
‘D’ 0x44	‘=’ 0x3d	0x01	0x82	0x00

Band
0x00 - RapidFIRE #1
0x01 - RapidFIRE #2
0x02 - Legacy