RFoF Products USB API - HID Command Interface Packets

The products have an HID USB interface and communicate with a **64** byte standard packet. The first byte is a command as listed below followed by parameters.
When a reply is expected allow processing time and poll the module for return values which are provided with a **65** byte standard response packet
Typical RFoF programmable series response time is 2ms, for RFoF HF and ODL series it is 8ms, A standard 10ms wait is recommended for all product types.
The first byte of the reply is a USB acknowledgement, followed by an echo of the command that elicited the response and some bytes of data. Echoed command = 0xFF indicates a Command unrecognized Error
The USB command response time depends on the host computer and OS. Typical response times for the LNA OFF->ON are about 1ms, 0.36ms for LNA ON->OFF and for most other commands including attenuation setting.

Command	Hex Code	Product Class	Send Parameters	Return Parameters	Description
RFoF products common commands					
CMD_FWREV	0x10	Prog, Ultra, HF, ODL	none	**Paket[1]=0 Rx or 1 Tx identifier, Packet[5] = size of firmware Revision ibytes, Packet[6-12]ASCII string firmware revision (null terminated), Packet[13] size of PartNumber, Packet[14-30] PartNumber string (null terminated).Packet[31] size of SerialNumber, Packet[32-48] SerialNumber string (null terminated).**	Reads the firmware version string 5 characters null terminated
CMD_RESET	0x22	Prog, Ultra, HF, ODL	none	no return packet	Soft reset
CMD_IDENTIFY	0x35	Prog, Ultra, HF, ODL	none	Packet[1] = Size of S/N field in bytes, Packet[2 to Size of S/N field bytes+1] = Serial Number as a null terminated ASCII string, Packet[Size of S/N field bytes+2] = Size of User given Module Name field in bytes, Packet[Size of S/N field bytes+3 to Size of S/N field in bytes+2 + size of ModuleName field in bytes+1] = Module Name null terminated ASCII string	Light Blue LED for 5 seconds to allow user to identify the module addressed
RFoF Programmable firmware specific Commands					
CMD_RFBIT	0x30	Prog	Packet[1] = bit 1 Rfinjection, bit 7 Measure RF level	empty	Turn on/off RF BIT signal 12MHz, and RF level measurement On= 1 / Off = 0
CMD_MONTIME	0x31	Prog	Packet[1, 2, 3] = MonitorTimer hours, minutes, seconds	empty	Set Monitor Time interval
CMD_RFTIME	0x32	Prog	Packet[1, 2, 3] = RFpilotTimer hours, minutes, seconds	empty	Set RF pilot injection time
CMD_SENSORS	0x34	Prog	none	Packet[1, 2] = High, Low byte OptPwr, Packet[3, 4] = High, Low byte RFPwr, Packet[5, 6] = High, Low byte Temperature, Packet[7.8.9]=MonitorTimer Hours. Minutes, seconds, Packet[10,11] = High,Low byte Optical Power Scale factor, Packet[12,13] = High,Low byte Optical Power Offset, Packet[14,15] = High,Low byte RF Level Scale factor, Packet[16,17] = High,Low byte RF level Offset,Packet[18,19] = High,Low byte Temperature Scale factor, Packet[20,21] = High,Low byte Temperature Offset , **Packet[22-23]= operating control States 1, 2(new), Packet[24]=OpMode the current operating mode (0-Sleep On USB disconnect, 01-Monitor and adjust), Packet[25]=Panel LED state Panel LED state; Red bit 0, Blue bit 1, Green bit 6, Blinking bit 7, Packet[26.27.28]=MonitorTimer Hours. Minutes, seconds.**	Read current sensors redults (Optical Power, RF Level and Temperature)
CMD_RFPWR	0x36	Prog	Packet[1] = OpMode	Packet[1, 2] = High, Low byte RFPwr, Packet[3.4.5]=RFInjectTimer Hours. Minutes, seconds	Read RF power
CMD_OPTALRM	0x38	Prog	Packet[1, 2] = High, Low byte Optical alarm level	empty	Set the optical alarm level
CMD_LNA	0x39	Prog	Packet[1] = LNA state	empty	Set LNA switch ON = 1 / Off = 0
CMD_LASER	0x3A	Prog	Packet[1] = Laser state	empty	Set LASER state ON = 1 / Off = 0
CMD_DCA	0x3B	Prog	Packet[1] = Attenuation	empty	Set DCA Attenuation state (0-63)

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Command	Hex Code	Product Class	Send Parameters	Return Parameters	Description
CMD_OPARAM	0x3F	Prog	none	Packet[1] = operating control states (see below), Packet[2] = OpMode current operating mode (00=Sleep on USB disconnect, 01=Monitor and Adjust), Packet[3] = Attenuation state (0=63), Packet[4, 5, 6] = MonitorTimer hours, minutes, seconds, Packet[7, 8, 9] = RFpilotTimer hours, minutes, seconds, Packet[10, 11] = High, Low byte DFB bias setting, Packet[12, 13] = High, Low byte Optical power alarm setting, Packet[14, 15] = High, Low byte RF Alarm setting (optional)	Read the operating parameters. DFB Bias, Optical Power level and RF power levels are reported in binary by two bytes used to form a 10-bit short value. The translation into mA, mW and dBm uses a scale and offset parameters stored internally in the module
			The Operating control states is a byte with the following bit values:	bit 0 = LNAon bit 1 = RFpilotOn bit 2 = LaserOn bit 7 = MeasureRFlevel (Other bits are for internal use only)	

RFoF Ultra firmware specific commands

CMD_SETUP	0x50	Ultra	Packet[1] = Module configuration and set state bits bit 0 = configuration bits, read only bit 1 = configuration bits, read only bit 2 = configuration bits, read only bit 4 = bTECon bit 5 = bSetLaserOn (Laser is scheduled to bit 6 = bRFampOn bit 7 = status bits, read only bit 8 = status bits, read only	Packet[1] = Module status bits bit 0 = Laser Is configured (If 1 it is a Tx module) bit 1 = RF amplifier is configured bit 2 = DCA is configured (Not implemented yet) bit 3 = RF amplifier is on bit 4 = TEC On bit 5 = Set Laser On (schedule to On pending TEC tempe bit 6 = TEC is at Target Temperature bit 7 = Laser Is On	 module configuration bit, read only module configuration bit, read only module configuration bit, read only module setup bit module setup bit module setup bit module status bit, read only module status bit, read only
CMD_SENSORS	0x34	Ultra	none	Packet[0] = Status byte (See CMD_SETUP) Packet[1] = cLEDstate code Packet[2, 3] = High, low byte TEC target Temperature Packet[4, 5] = High, low byte Module Temperature Packet[6,7] = High, low byte Measured Laser Temperature Packet[8, 9] = High, low byte Measured Optical Power Packet[10, 11] = High, low byte Measured Laser Current	
CMD_OPARAM	0x3F	Ultra	none	Packet[0] = TEC target Temperature Packet[1, 2] = High, low Laser Current Packet[3, 4] = High, low Optical Power Alarm Level Packet[5, 6] = High, low Scale Laser Bias Packet[7, 8] = High, low Offset Laser Bias Packet[9, 10] = High, low ScaleI Laser Current Sense Packet[11, 12] = High, low Offset Laser Current Sense Packet[13, 14] = High, low Scale Module Temperature Packet[15, 16] = High, low Offset Module Temperature Packet[17, 18] = High, low Scale Laser Temperature Packet[19, 20] = High, low Offset Laser Temperature Packet[21, 22] = High, low Scale Optical Power Packet[23, 24] = High, low Offset Optical Power Packet[25] = Scale TEC target Temperature Packet[26] = Offset TEC target Temperature	 Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor Conversion factor
CMD_DCA	0x3B	Ultra	Packet[1] = Attenuation	none	Set Attenuation 6bit 0.5dB step (Not implemented yet)

Command	Hex Code	Product Class	Send Parameters	Return Parameters	Description
RFoF HSFDR and ODL firmware specific commands					
These products have many optional features which may not exist in a given product. Only features that are installed can be controlled. Commands related to uninstalled features would be ignored.					
CMD_SETUP	0x50	HF	Packet[1,2] = High, Low bytes of Module **set state** bits bit 0 = bTECon bit 1 = bLaserOn bit 2 = bRFampOn bit 3 = bLEDblueOn bit 4 = bUcont1on bit 5 = bUcont2on / RFbypassOn bit 6 = bUcont3on bit 7 = bSW1on bit 8 = bSW2on bit 9 = bSW3on bit 10 = bSW4on/bDatt0 for 6bit - option bit 11 = bDatt0 bit 12 = bDatt1 bit 13 = bDatt2 bit 14 = bDatt3 bit 15 = bDatt4	Packet[1, 2] = High, Low bytes of Module **status** bits bit 0 = TECon bit 1 = SetLaserOn bit 2 = RFampOn bit 3 = TECatTarget bit 4 = LaserIsOn bit 5 = LaserOpticalFault bit 6 = TxOpticalFault bit 7 = RxOpticalFault bit 8 = Ucont1on bit 9 = Ucont2on bit 10 = Ucont3on bit 11 = SW1on bit 12 = SW2on bit 13 = SW3on bit 14 = SW4on bit 15 = unused Packet[3,4] = High, Low bytes TEC target Temp Packet[5,6] = High, Low bytes Measured Laser Temp Packet[7.8] = High, Low bytes Laser Current Setting Packet[9.10] = High, Low bytes Measured Laser Current	Sets the Module states Laser is scheduled to turn On after Operating Temp is reached Indicates that the TEC reached the target temperature Indicates theat the Laser is turned on
CMD_SENSORS	0x34	HF	none	Packet[1, 2] = High, Low bytes of Module **status** bits bit 0 = TECon bit 1 = SetLaserOn (laser is scheduled to On after Op. Temp reached) bit 2 = RFampOn bit 3 = TECatTarget bit 4 = LaserIsOn bit 5 = LaserOpticalFault bit 6 = TxOpticalFault bit 7 = RxOpticalFault bit 8 = Ucont1on bit 9 = Ucont2on bit 10 = Ucont3on bit 11 = SW1on bit 12 = SW2on bit 13 = SW3on bit 14 = SW4on bit 15 = unused Packet[3,4] = High, low Calculated TEC target temp Packet[5,6] = High, low Module Temperature Packet[7,8] = High, low Measured Laser Temperature Packet[9.10] = High, low Measured laser optical power Packet[11,12] = High, low Measured Tx output optical power Packet[13,14] = High, low Measured Rx output optical power Packet[15,16] = High, low Measured laser current Packet[17] = ODL LCD visibility bits [0, 1] Contrast, [2,3] backlight Packet[18, 19, 20] = 24bit High, Low ODL delay state Packet[21] = DCA state	Get measured parameters of the module

Command	Hex Code	Product Class	Send Parameters	Return Parameters	Description
				Packet[0] = TEC target temperature	Get operating parameters of the module
				Packet[1, 2] = High, low Laser current	Get operating parameters of the module
				Packet[3, 4] = High, low MZM bias voltage	Get operating parameters of the module
				Packet[5, 6] = High, low Optical Power Alarm level	Get operating parameters of the module
				Packet[7, 8] = High, low iScaleLaserBias	Conversion factor
				Packet[9, 10] = High, low iOffsetLaserBias	Conversion factor
				Packet[11, 12] = High, low iScaleIlaserSense	Conversion factor
				Packet[13, 14] = High, low iOffsetIlaserSense	Conversion factor
				Packet[15, 16] = High, low iScaleTemp	Conversion factor
CMD_OPARAM	0x3F	HF	none	Packet[17, 18] = High, low iOffsetTemp	Conversion factor
				Packet[19, 20] = High, low iScaleLaserTemp	Conversion factor
				Packet[21, 22] = High, low iOffsetLaserTemp	Conversion factor
				Packet[23, 24] = High, low iScaleRxOptPwr	Conversion factor
				Packet[25, 26] = High, low iOffsetRxOptPwr	Conversion factor
				Packet[27, 28] = High, low iScaleTxOptPwr	Conversion factor
				Packet[29, 30] = High, low iOffsetTxOptPwr	Conversion factor
				Packet[31, 32] = High, low iScaleMZMbias	Conversion factor
				Packet[33, 34] = High, low iOffsetTxOptPwr	Conversion factor
				Packet[35] = cScaleTECtargetTemp;	Conversion factor
				Packet[36] = cOffsetTECtargetTemp;	Conversion factor
CMD_DCA	0x3B	HF	Packet[1] = High, Low bytes DCA state	empty	Sets optional Digital Attenuator state
CMD_ODL	0x57	HF, ODL	Packet[1,2,3, 4] = High, Low bytes ODL state	empty	Sets ODL delay state, byte 1 reserved for Delay pattern, ODL delay is specified lower 24bits.

Sensor conversion expressions:

Temperature = ((double) temperature2b - TempOffset) * (-TempScale) / 1024
RFlevel = ((double) RFlevelOffset - RFpwr2b) * RFlevelScale / 1024
OpticalPower = ((double) OptPower2b - OptPwrOffset) * OptPwrScale / 1024

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