Packet Descriptions:

Ping

Header	A	[data]	…													
Header	a	[data]	…													

Ping provides a simple confirmation of device operation and communication. Responds with a copy of the data sent.

Version

Header	B															
Header	b	local_addr	device_type	major_ver	minor_ver											

Version responds with the current software version number.

local_addr = RDB device address – MPPTs have an address between 0x60 and 0x6E.
device_type = RDB device type – MPPTs return type ‘A’
major_ver = Major version number
minor_ver = Minor version number

Shutup

Header	C															
Header	c															

Shutup stops all scheduled RDB transmission.

Schedule Read

Header	E	pkt_time	pkt_dest													
Header	e	pkt_time	pkt_dest													

Schedule defines the interval and destination for sending scheduled ‘I’ packets.

pkt_time = Time interval (1 second steps) between sending ‘I’ packets.
pkt_dest = RDB destination address for sending scheduled ‘I’ packets.

Info

Header	I															
Header	i	Vin_H	Vin_L	Iin_H	Iin_L	Vout_H	Vout_L	Iout_H	Iout_L	heatsink_T	OVP_H	OVP_L	name_H	name_L		

Info sends the primary set of data obtained from/about the tracker.

Vin_H_{0-3}:L = Input (array) voltage, 12-bit value, **Volts**; conversion equation: $Vin = \frac{Vin\_H * 256 + Vin\_L}{20}$

Iin_H_{0-3}:L = Input (array) current, 12-bit value, **Amps**; conversion equation: $Iin = \frac{Iin\_H * 256 + Iin\_L}{1000}$

Vout_H_{0-3}:L = Output (battery) voltage, 12-bit value, **Volts**; conversion equation: $Vout = \frac{Vout\_H * 256 + Vout\_L}{20}$

Iout_H_{0-3}:L = Output (battery) current, 12-bit value, **Amps**; conversion equation: $Iout = \frac{Iout\_H * 256 + Iout\_L}{1000}$

heatsink_T = Main heatsink temperature, **°C**; conversion equation: $T = \frac{heatsink\_T}{2}$

OVP_H_{0-3}:L = Output (battery) maximum output voltage lid, 12-bit value, **Volts**; conversion equation: $Vout = \frac{Vout\_H * 256 + Vout\_L}{27.3}$

calib_in = Input telemetry calibration value
calib_out = Output telemetry calibration value

Array Characterization

Header	J	type	start_V	end_V												
Header	j	pkt_num	total_pkts	read_1_H	read_1_M	read_1_L	read_2_H	read_2_M	read_2_L	read_3_H	read_3_M	read_3_L	read_4_H	read_4_M	read_4_L	valid

Array Characterization commands instruct the MPPT to produce an I-V characteristic curve.

type = Type of array characterization to be done
0x00 - Sweep of 24 readings from 130V – 30V in 4 V increments

pkt_num = Serial number of the packet in the transfer, between 0 and total_pkts

total_pkts = Total number of packets to be sent for the array characterization

read_*X*_H:L_{4-7} = Array voltage for reading *X*, **Volts**; conversion equation: $Vin = \frac{read\_X\_L_{4-7} * 256 + read\_X\_H}{20}$

read_*X*_M:L_{0-3} = Array current for reading *X*, **Amps**; conversion equation: $Iin = \frac{read\_X\_L_{0-3} * 256 + read\_X\_L}{1000}$

valid = Number of valid readings contained in this packet

Configuration

Header	L	OVP_set_H	OVP_set_L													
Header	l	OVP_H	OVP_L													

Configuration allows the user to set the overvoltage limit on the output and the tracking mode. Note that setting the desired overvoltage limit to zero will also set the disable line on the PWM to prevent accidental pulses from ever occuring, effectively providing a software shutdown of the MPPT.

OVP_set_$H_{0\text{-}3}$:L = Requested overvoltage setting, **Volts**; conversion equation: $V_{OVP} = \frac{OVP\_set\_H_{0-3} * 256 + OVP\_set\_L}{27.3}$

OVP_$H_{0\text{-}3}$:L = Actual overvoltage setting of the tracker, **Volts**; conversion equation: $V_{OVP} = \frac{OVP\_H_{0-3} * 256 + OVP\_L}{27.3}$

Calibration

Header	N	calib_in_s	calib_out_s													
Header	n	calib_in	calib_out	retries	rom_0	rom_1	rom_2	rom_3	rom_4	rom_5	rom_6	rom_crc				

Calibration interacts with the non-volatile name information stored in each tracker and allows them to be compensated for inaccuracies in the input and output voltage and current telemetry sensors.

calib_in_s = Requested value to set the input calibration byte to. If this value is 0x00, the name is not changed, but simply read back.
calib_out_s = Requested value to set the output calibration byte to. If calib_in_s is 0x00, this value is ignored

calib_in$_{0\text{-}3}$ = Calibration value for input current.
calib_in$_{4\text{-}7}$ = Calibration value for input voltage.
calib_out$_{0\text{-}3}$ = Calibration value for output current.
calib_out$_{4\text{-}7}$ = Calibration value for output voltage.

Calibration Value	Percent Adjustment		Calibration Value	Percent Adjustment
0	*RESERVED*		8	0.00%
1	-5.47%		9	+0.78%
2	-4.69%		10	+1.56%
3	-3.91%		11	+2.34%
4	-3.13%		12	+3.13%
5	-2.34%		13	+3.91%
6	-1.56%		14	+4.69%
7	-0.78%		15	+5.47%

retries = A value representing how many attempts were made to write a new name into the nonvolatile memory.
rom_0:6 = The 7-byte address from the ROM on the DS1820 on each tracker
rom_crc = The CRC of the 7-byte ROM address

Query

Header	Q	addr														
Header	q	addr	value													

Query allows any byte in memory to be dumped over the RDB bus.

addr = The requested memory address to be examined.
value = The current value stored in *addr*

Reset

Header	R	type														

Reset allows the tracker to be reset to varying degrees

type = Specifies action to be taken with turn signals
0x00: Software reset by re-initializing all registers and restarting the program
0x01: Hardware reset by shutting down the PIC and allowing the watchdog to reset the MPPT.
'T': Reinitialize tracking routines and find a new initial power point voltage approximation

Manual Tracking

Header	V	mode	PPV_H	PPV_L												
Header	v	mode	PPV_H	PPV_L												

Manual Tracking allows the user to select the desired array voltage to be maintained.

mode = MPPT operating mode
0x00: Manual tracking at a fixed voltage set by the user
0x01: Normal automatic tracking, beginning at the power point voltage being used before manual mode was initiated.

PPV_$H_{0\text{-}3}$:L = Desired input (array) voltage, 12-bit value, **Volts**; conversion equation: $Vin = \frac{PPV\_H * 256 + PPV\_L}{20}$

Performance Metrics

Header	X															
Header	x	tps	trkfreq	Pout_H	Pout_L	PPV_H	PPV_L	OVP_H	OVP_L							

Manual Tracking allows the user to select the desired array voltage to be maintained.

tps = Actual number of tracking events per second being achieved
trkfreq = Number of clock ticks between tracking events

PPV_$H_{0\text{-}3}$:L = Desired input (array) voltage, 12-bit value, **Volts**; conversion equation: $Vin = \frac{PPV\_H * 256 + PPV\_L}{20}$

OVP_$H_{0\text{-}3}$:L = Actual overvoltage setting of the tracker, **Volts**; conversion equation: $V_{OVP} = \frac{OVP\_H_{0-3} * 256 + OVP\_L}{27.3}$