5012A RS232 Port Communication Format and Protocol

The 5012A RS232 port communicates at full speed compatible with RS232 specification versions 1.0 and 1.1.

Important: The connection sequence is critical power must be applied to the 5012A sensor before an active RS232 connection is made. The 'Status LED' will blink if the sequencing is correct. The 'Status LED' will stay hard on if the sequencing is not correct.

Power data is returned for the most part as floating point, ready to display values. Measurement type and power units are returned as enumerated values.

- Burst power
- Sensor temperature
- Forward power
- Reflected power point
- Peak power
- Filter value
- Measurement type
- Power units
- CCDF
- Crest factor
- Duty cycle

Note: burst power and CCDF data are exclusive as a result of hardware limitation.

1. After power up initialization the 5012A sends an *'!'* (exclamation) sign on character without any query to the indicating that it has powered up properly and is ready to receive commands.

The following is the communications sequence that must be followed to obtain power data readings from the 5012A. All RS232 host commands begin with an upper case character identifier followed by a data string with most terminated with a line feed carriage return with the exception of the interrogation command '*I*' and the serial number command '*S*'.

2. The RS232 host sends an *'I'* command to the 5012A. The 5012A will respond with its interrogation string detailing its model number and software version number followed by a runtime string. This command must be repeated until a valid command string is returned by the 5012A.

    - *5012,06MAR2007,VX.XX\r\n*
    - *rs232\r\n*

3. The RS232 host sends an *'F\r\n'* command to the 5012A to check that the calibration flag is set indicating that the 5012A is calibrated. The returned string contains the 5012A calibration status.
    a. Calibration status
        - Calibrated 0x06
        - Not calibrated 0x15

    Example: for a calibrated 5012A: *FACK ,\r\n*
    for an uncalibrated 5012A: *FNAK,\r\n*

4. Next the RS232 host sends a configuration command *'G,a,b,c,d,e,\r\n'* to the 5012A. The string sent is comma separated containing the following fields.
    a. Enumerated measurement type displayed
        - e_measNone = 0,
        - e_measAvg = 1,
        - e_measPeak = 2,
        - e_measBurst = 3,
        - e_measCrest = 4,
        - e_measCcdf = 5,
        - e_measAvgPeak = 6,
        - e_measAvgApm = 7
    b. Offset value in dB – floating point
    c. Filter value – floating point
        - 4.5 kHz – 4.5e+03
        - 400 kHz – 4.0e+02
        - Full(10000 kHz) – 1.0e+04
    d. Enumerated power units
        - e_unitNone = 0,
        - e_unitdb = 1,
        - e_unitRho = 2,
        - e_unitVSWR = 3,
        - e_unitR = 4,
        - e_unitRL = 5,
        - e_unitdbm = 6,
        - e_unituW = 7,
        - e_unitmW = 8,
        - e_unitW = 9,
        - e_unitKW = 10,
        - e_unitAutoW = 11,
        - e_unitMhz = 12,
        - e_unitKhz = 13,
    e. CCDF limit set - floating point

    Example: *G,02,2.00000e+00,4.50000e+03,0A,5.00000e+01 \r\n*

    a. Enumerated measurement type displayed
        - e_measPeak = 2,

b. Offset value in dB – 2dB
c. Filter value – floating point
   - 4.5 kHz – 4.5e+03
d. Enumerated power units
   - e_unitKW = 10,
e. CCDF limit set - 50 watts

5. The 5012A will respond with an echo of the command sent and the full scale power in watts formatted as a floating point value followed by an ACK if the configuration is accepted or a 0 followed by a NAK.
   Example:
   - *G,1.50000e+02,ACK\r\n*
   - *G,0.0,NAK\r\n*

The command sequence detailed above must be executed properly to completion before the 5012A can enter the data transmission mode.

6. Next the RS232 sends a *'D\r\n'* command to the 5012A. The 5012A will enter the data transmission mode where it continuously and asynchronously sends updated power data to the RS232 at an internal 5012A rate of about 300 ms.

   a. Burst power – floating point
   b. Sensor temperature – floating point
   c. Forward power – floating point
   d. Reflected power – floating point
   e. Peak power – floating point
   f. Current filter value – floating point
   g. Measurement type – character
   h. Power units – character
   i. CCDF factor – floating point
   j. Crest factor –floating point
   k. Duty cycle – floating point

Example: *D,1.50000e+02,2.50000e+01,7.50000e+01,8.00000e+00,1.75000e+02, 4.50000e+03,0x09,0x01, 0.000e+00, 1.34000e+00,9.30000e+01,ACK\r\n*

   a. Burst power – 150
   b. Sensor temperature – 25
   c. Forward power – 75
   d. Reflected power – 8
   e. Peak power – 175
   f. Current filter value – 4.5 kHz
   g. Power units – watts
   h. Measurement type – average

i. CCDF factor – 0
j. Crest factor – 1.34
k. Duty cycle – 93

7. A *'Z\r\n'* will command the 5012A to perform a zero calibration. The 5012A will responds with the following string giving the result of the calibration after the command echo.
    a. Enumerated calibration result
        - Pass= 0
        - Fail=1
        - Over=2

    Example successful calibration: '*Z0x00ACK\r\n'*
    Example unsuccessful calibration: '*Z0x01ACK\r\n'*

    Note: the calibration process takes about 60 seconds to complete and must be done with no RF power applied. The 'Over' calibration result is used to query the user to check for no RF power applied.

Additional commands; these commands are not used with the 5000EX, they are documented her for the completeness.

8. The RS232 host can query the 5012A for its serial number by sending '*S*'. The 5012A responds with the serial number.
    Example for serial number 1234: *S,1234\r\n*

9. The *'U\r\n'* command will, if the 5012A is streaming readings, stop the data stream and place the 5012A in the master slave communications mode after the 5012A sends the following response. This command is primarily used to stop the data stream before a zero calibration command is issued.
    Example: *'send status\r\n'*

10. A '*T\r\n'* command to the 5012A. The 5012A will send a single data set.

    a. Burst power – floating point
    b. Sensor temperature – floating point
    c. Forward power – floating point
    d. Reflected power – floating point
    e. Peak power – floating point
    f. Current filter value – floating point
    g. Measurement type – character
    h. Power units – character
    i. CCDF factor – floating point
    j. Crest factor –floating point
    k. Duty cycle – floating point

Example: *T,1.50000e+02,2.50000e+01,7.50000e+01,8.00000e+00,1.75000e+02, 4.50000e+03,0x09,0x01, 0.000e+00, 1.34000e+00,9.30000e+01,ACK\r\n*

a. Burst power – 150
b. Sensor temperature – 25
c. Forward power – 75
d. Reflected power – 8
e. Peak power – 175
f. Current filter value – 4.5 kHz
g. Power units – watts
h. Measurement type – average
i. CCDF factor – 0
j. Crest factor – 1.34
k. Duty cycle – 93