

# NRT-8000 OSA - SCPI Commands

*User's Manual*

## Revisions

Version 1	13 July, 2016	Initial revision (2.0.0.125)
Version 2	4 November, 2016	Added new commands (2.0.0.129)  :SENSe:BANDwidth:TAReT :SENSe:BANDwidth:TAReT:LIST :SENSe:BANDwidth:VALue :SENSe:BANDwidth:VALue:LIST
Version 3	29 December, 2016	Added section about possible error codes
Version 4	7 March 2018	Fixed examples about :SENSe:BANDwidth: Added an example using Python + Pyvisa

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## Available Commands

Command	Implementation	Version
*IDN? (Identification)	Implemented	2.0.0.125
:ABORt	Partial	2.0.0.125
:CALCulate:CATegory	Partial	2.0.0.125
:CALCulate:DATA?	Partial	2.0.0.125
:CALCulate:PARAmeter:COMMon:MDIFF	Implemented	2.0.0.125
:CALCulate:PARAmeter[:CATegory]:WDM:DMASk	Implemented	2.0.0.125
:CALCulate:PARAmeter[:CATegory]:WDM:IRANge	Implemented	2.0.0.125
:CALCulate:PARAmeter[:CATegory]:WDM:NARea	Implemented	2.0.0.125
:CALCulate:PARAmeter[:CATegory]:WDM:NBW	Implemented	2.0.0.125
:CALCulate:PARAmeter[:CATegory]:WDM:TH	Implemented	2.0.0.125
:CALCulate[:IMMediate]	Implemented	2.0.0.125
:CALCulate[:IMMediate]:AUTO	Implemented	2.0.0.125
:INITiate:SMODE	Implemented	2.0.0.125
:INITiate[:IMMediate]	Partial	2.0.0.125
:SENSe:AVERage:COUNT	Implemented	2.0.0.125
:SENSe:BANDwidth :BWIDth[:RESolution]	Partial	2.0.0.125
:SENSe:BANDwidth:TARget	Implemented	2.0.0.129
:SENSe:BANDwidth:TARget:LIST	Implemented	2.0.0.129
:SENSe:BANDwidth:VALue	Implemented	2.0.0.129
:SENSe:BANDwidth:VALue:LIST	Implemented	2.0.0.129
:SENSe:CORRection:LEVel:SHIFt	Implemented	2.0.0.125
:SENSe:CORRection:WAVElength:SHIFt	Implemented	2.0.0.125
:SENSe:SWEEp:STEP	Partial	2.0.0.125
:SENSe:WAVElength:CENTer	Implemented	2.0.0.125
:SENSe:WAVElength:SPAN	Implemented	2.0.0.125

:SENSe:WAVeLength:START	Implemented	2.0.0.125
:SENSe:WAVeLength:STOP	Implemented	2.0.0.125
:SYSTem:DATE	Partial	2.0.0.125
:SYSTem:ERRor[:NEXT]?	Partial	2.0.0.125
:SYSTem:ERRor:COUNT?	Implemented	2.0.0.125
:SYSTem:ERRor:ALL?	Implemented	2.0.0.125
:SYSTem:ERRor:CODE:NEXT?	Implemented	2.0.0.125
:SYSTem:ERRor:CODE:ALL?	Implemented	2.0.0.125
:SYSTem:ERRor:CODE:COUNT?	Implemented	2.0.0.125
:TRACe:ACTive	Implemented	2.0.0.125
:TRACe:DELete	Implemented	2.0.0.125
:TRACe:DELete:ALL	Implemented	2.0.0.125
:TRACe[:DATA]:X?	Partial	2.0.0.125
:TRACe[:DATA]:Y?	Partial	2.0.0.125
:UNIT:X	Implemented	2.0.0.125
:DEVice:REFRESH	Implemented	2.0.0.125
:DEVice:LIST	Implemented	2.0.0.125
:DEVice:OPEN	Implemented	2.0.0.125
:DEVice:CLOSE	Implemented	2.0.0.125

# SCPI Commands

## Standard Commands

### **\*IDN? (Identification)**

Function	Queries the instrument type and firmware version
Syntax	*IDN?
Example	*IDN? -> NewRidgeTech,NRT-8000,12345678,2.0.0.125
Explanation	Outputs 4 field data delimited by a comma: <ul style="list-style-type: none"><li>- Field 1: Manufacturer: "NewRidgeTech"</li><li>- Field 2: Model "NRT-8000"</li><li>- Field 3: Serial number (8 hexadecimal characters)</li><li>- Field 4: Software revision</li></ul>
Support	Version 2.0.0.125 This is a sequential command

## Instrument-Specific Commands

### **ABORT Sub System Command**

#### **:ABORt**

Function	Stops operations such as measurements and calibration
Syntax	ABORt
Example	ABORt
Explanation	Currently, this command has no impact on anything.
Support	Version 2.0.0.125 This is a sequential command

### **CALCulate Sub System Command**

#### **:CALCuLate:CATEgory**

Function	Set/queries the type of analysis
Syntax	:CALCuLate:CATEgory<wsp>[OSNR WDM 11]
Example	:CALCULATE:CATEGORY OSNR :CALCULATE:CATEGORY? -> 11
Explanation	This command doesn't do the analysis, it just set the category. They may be further analysis possible, therefore this command will make sense.

Support Version 2.0.0.125, partial  
This is a sequential command

#### **:CALCulate:DATA?**

Function Queries the analysis results

Syntax :CALCulate:DATA?

Example :CALCULATE:DATA? ->  
1.000000e+00,1.925091e+02,-2.802505e+01,0.000000e+00,0.000000e+00,-6.137238e+01,3.100294e+01,...

Explanation Queries the analysis results from the last time analysis was executed. If the analysis function has not been executed, a query error occurs. See section "Output Format of Analysis Results" for more informations.

Support Version 2.0.0.125  
This is a sequential command

#### **:CALCulate:PARAMeter:COMMON:MDIFF**

Function Sets/queries the peak bottom difference of channel detection for the WDM analysis function.

Syntax :CALCulate:PARAMeter:COMMON:MDIFF<wsp><NRF>[DB]  
:CALCulate:PARAMeter:COMMON:MDIFF?

Example :CALCULATE:PARAMETER:COMMON:MDIFF 5DB  
:CALCulate:PARAMeter:COMMON:MDIFF? -> 5e+0

Support Version 2.0.0.125  
This is a sequential command

#### **:CALCulate:PARAMeter[:CATegory]:WDM:DMASK**

Function Sets/queries the channel mask threshold level for the WDM analysis function.

Syntax :CALCulate:PARAMeter[:CATegory]:WDM:DMASK<wsp><NRF>[DB]  
:CALCulate:PARAMeter[:CATegory]:WDM:DMASK?

Example :CALCULATE:PARAMETER:WDM:DMASK -30DB  
:CALCULATE:PARAMETER:WDM:DMASK? -> -3.0e+1

Explanation Channels below the display mask level will be skipped  
To turn off the channel mask function, set the parameter to -999

Support Version 2.0.0.125  
This is a sequential command

### **:CALCulate:PARAMeter[:CATegory]:WDM:IRANge**

Function	Sets/queries the Signal Power Integral Range for the WDM analysis function.
Syntax	:CALCulate:PARAMeter[:CATegory]:WDM:IRANge<wsp><NRf>[DB] :CALCulate:PARAMeter[:CATegory]:WDM:IRANge?
Example	:CALCULATE:PARAMETER:WDM:IRANge 1DB :CALCULATE:PARAMETER:WDM:IRANge? -> 1e+0
Support	Version 2.0.0.125 This is a sequential command

### **:CALCulate:PARAMeter[:CATegory]:WDM:NARea**

Function	Sets/queries the Noise Area for the WDM analysis function.
Syntax	:CALCulate:PARAMeter[:CATegory]:WDM:NARea<wsp><NRf>[M] :CALCulate:PARAMeter[:CATegory]:WDM:NARea?
Example	:CALCULATE:PARAMETER:WDM:NAREA 0.80NM
Support	Version 2.0.0.125 This is a sequential command

### **:CALCulate:PARAMeter[:CATegory]:WDM:NBW**

Function	Sets/queries the Noise Bandwidth for the WDM analysis function.
Syntax	:CALCulate:PARAMeter[:CATegory]:WDM:NBW<wsp><NRf>[M] :CALCulate:PARAMeter[:CATegory]:WDM:NBW?
Example	:CALCULATE:PARAMETER:WDM:NBW 0.10NM :CALCULATE:PARAMETER:WDM:NBW? -> 1e-10
Support	Version 2.0.0.125 This is a sequential command

### **:CALCulate:PARAMeter[:CATegory]:WDM:TH**

Function	Sets/queries the Threshold for the WDM analysis function.
Syntax	:CALCulate:PARAMeter[:CATegory]:WDM:TH<wsp><NRf>[DB] :CALCulate:PARAMeter[:CATegory]:WDM:TH?
Example	:CALCULATE:PARAMETER:WDM:TH 20DB :CALCULATE:PARAMETER:WDM:TH? -> 2.0e+1
Support	Version 2.0.0.125 This is a sequential command



### **:CALCulate[:IMMEDIATE]**

Function	Execute analysis. Queries the result of whether analysis has been performed.
Syntax	:CALCulate
Example	:CALCULATE:IMMEDIATE
Explanation	Analysis is performed according to the latest analysis settings As version 2.0.0.125, both with and without IMMEDIATE suffix command are executed sequentially. The user is advised to use :IMMEDIATE as if later a background operation is implemented, it will be trigger just by :CALCulate
Support	Version 2.0.0.125 This is a sequential command

### **:CALCulate[:IMMEDIATE]:AUTO**

Function	Sets/queries the automatic analysis function.
Syntax	:CALCulate[:IMMEDIATE]:AUTO<wsp>OFF ON 0 1
Example	:CALCULATE:IMMEDIATE:AUTO ON :CALCULATE:IMMEDIATE:AUTO? -> 1
Explanation	If the parameter is activated, it will automatically do a analysis after a sweep.
Support	Version 2.0.0.125 This is a sequential command

## **INITiate Sub System Command**

### **:INITiate:SMODE**

Function	Sets/queries the sweep mode.
Syntax	:INITiate:SMODE<wsp><sweep mode> :INITiate:SMODE? <sweep mode> = SINGLE = SINGLE sweep mode (1) REPEAT = REPEAT sweep mode (2) AUTO = AUTO sweep mode (3)
Example	:INITiate:SMODE SINGLE :INITiate:SMODE? -> 1
Explanation	This command is not yet used.
Support	Version 2.0.0.125

This is a sequential command

#### **:INITiate[:IMMediate]**

Function	Make a sweep/scan
Syntax	:INITiate[:IMMediate]
Example	:INITIATE:IMMEDIATE
Explanation	As version 2.0.0.125, both with and without IMMEDIATE suffix command are executed sequentially. The user is advised to use :IMMEDIATE as if later a background operation is implemented, it will be trigger just by :INITiate
Support	Version 2.0.0.125 This is a sequential command

### **SENSe Sub System Command**

#### **:SENSe:AVERage:COUNT**

Function	Sets/queries the number of times averaging for each measured point.
Syntax	:SENSe:AVERage:COUNT<wsp><integer> :SENSe:AVERage:COUNT?
Example	:SENSE:AVERAGE:COUNT 3 :SENSE:AVERAGE:COUNT? -> 3
Support	Version 2.0.0.125 This is a sequential command

#### **:SENSe:BANDwidth[:RESolution]**

Function	Sets/queries the measurement resolution
Syntax	:SENSe:BANDwidth:RESolution<wsp><NRf>[Hz] :SENSe:BANDwidth:RESolution?
Example	:SENSE:BANDwidth:RESolution 20GHz :SENSE:BANDwidth? -> 20E+9
Support	Version 2.0.0.125 This is a sequential command.

#### **:SENSe:BANDwidth:TARget**

Function	Sets/queries the current bandwidth target to use with the current device.
Syntax	:SENSe:BANDwidth:TARget<wsp><target name>

`:SENSe:BANDwidth:TARget?`

Example `:SENSe:BANDwidth:TARget Standard OSA`  
`:SENSe:BANDwidth:TARget? -> Standard OSA`

Support Version 2.0.0.129  
This is a sequential command.

#### **`:SENSe:BANDwidth:TARget:LIST`**

Function List the available bandwidth targets on the current device, separated by a comma.  
WARNING: it require you to be connected first to the device.

Syntax `:SENSe:BANDwidth:TARget:LIST?`

Example `:SENSe:BANDwidth:TARget:LIST?`  
`Standard OSA,Gaussian / Wavelength [nm],Gaussian / Frequency [GHz]`

Support Version 2.0.0.129  
This is a sequential command.

#### **`:SENSe:BANDwidth:VALue`**

Function Sets/queries the current bandwidth value to use with the current device.  
WARNING: the value can be either a string or a number, depending the target.  
WARNING: the value can be set only after setting the target.

Syntax `:SENSe:BANDwidth:VALue<wsp><value name>`  
`:SENSe:BANDwidth:VALue?`

Example `:SENSe:BANDwidth:TARget "Standard OSA"`  
`:SENSe:BANDwidth:VALue "4 GHz"`  
`:SENSe:BANDwidth:VALue? -> "4 GHz"`

`:SENSe:BANDwidth:TARget "Gaussian / Wavelength [nm]"`  
`:SENSe:BANDwidth:VALue 0.2`  
`:SENSe:BANDwidth:VALue? -> 0.2`

Support Version 2.0.0.129  
This is a sequential command.

#### **`:SENSe:BANDwidth:VALue:LIST`**

Function List all the availables values for the current target, separated by a comma.

Syntax `:SENSe:BANDwidth:VALue:LIST?`

Example `:SENSe:BANDwidth:TARget "Standard OSA"`

**:SENSE:BANDwidth:VALue:LIST?**  
4 GHz,20 GHz,40 GHz,100 GHz,200 GHz

Support Version 2.0.0.129  
This is a sequential command.

#### **:SENSe:CORRection:LEVel:SHIFt**

Function Sets/queries the offset value for the level  
Syntax **:SENSe:CORRection:LEVel:SHIFt**<wsp><NRf>[DB]  
**:SENSe:CORRection:LEVel:SHIFt?**  
Example **:SENSE:CORRection:LEVel:SHIFt 0.2DB**  
**:SENSE:CORRection:LEVel:SHIFt? 0.2**  
Support Version 2.0.0.125  
This is a sequential command.

#### **:SENSe:CORRection:WAVeLength:SHIFt**

Function List all the available values for the current target, separated by a comma.  
Syntax **:SENSe:CORRection:WAVeLength:SHIFt**<wsp><NRf>[M]  
**:SENSe:CORRection:WAVeLength:SHIFt?**  
Example **:SENSE:CORRection:WAVeLength:SHIFt 1NM**  
**:SENSE:CORRection:WAVeLength:SHIFt? -> 1E-9**  
Support Version 2.0.0.125  
This is a sequential command.

#### **:SENSe:WAVeLength:CENTer**

Function Sets/queries the measurement condition center wavelength  
Syntax **:SENSe:WAVeLength:CENTer**<wsp><NRf>[M|HZ]  
**:SENSe:WAVeLength:CENTer?**  
Example **:SENSe:WAVeLength:CENTer 1550NM**  
**:SENSe:WAVeLength:CENTer? 0.0000015**  
Support Version 2.0.0.125  
This is a sequential command.

#### **:SENSe:WAVeLength:SPAN**

Function Sets/queries the measurement condition span wavelength  
Syntax **:SENSe:WAVeLength:SPAN**<wsp><NRf>[M|HZ]  
**:SENSe:WAVeLength:SPAN?**  
Example **:SENSe:WAVeLength:SPAN 20NM**

**:SENSe:WAVeLength:CENTer?** -> 2E-8

Support Version 2.0.0.125  
This is a sequential command.

#### **:SENSe:WAVeLength:START**

Function Sets/queries the measurement condition start wavelength

Syntax **:SENSe:WAVeLength:START**<wsp><NRf>[M|HZ]  
**:SENSe:WAVeLength:START?**

Example **:SENSe:WAVeLength:START** 1540NM  
**:SENSe:WAVeLength:START?** 0.000001540

Support Version 2.0.0.125  
This is a sequential command.

#### **:SENSe:WAVeLength:STOP**

Function Sets/queries the measurement condition stop wavelength

Syntax **:SENSe:WAVeLength:STOP**<wsp><NRf>[M|HZ]  
**:SENSe:WAVeLength:STOP?**

Example **:SENSe:WAVeLength:STOP** 1560NM  
**:SENSe:WAVeLength:STOP?** -> 0.000001560

Support Version 2.0.0.125  
This is a sequential command.

### **SYStem Sub System Command**

#### **:SYSTem:DATE**

Function Get the current date with format YEAR,DAY,MONTH

Syntax **:SYSTem:DATE?**

Example **:SYSTem:DATE?** -> 2016,4,11

Support Version 2.0.0.125  
This is a sequential command.

#### **:SYSTem:ERRor[ :NEXT]?**

Function Queries a error in the error queue and deletes it from the queue.  
If you use **:NEXT**, the error will stay in the queue.

Syntax **:SYSTem:ERRor[ :NEXT]?**

Example **:SYSTem:ERRor?** -> -109,"Missing parameter"

Support Version 2.0.0.125  
This is a sequential command.

#### **:SYSTem:ERRor:COUnT?**

Function Return the number of error in the queue

Syntax :SYSTem:ERRor:COUnT?

Example :SYSTem:ERRor:COUnT? -> 3

Support Version 2.0.0.125  
This is a sequential command.

#### **:SYSTem:ERRor:ALL?**

Function Return all the errors code + message in the queue separated by a comma

Syntax :SYSTem:ERRor:ALL?

Example :SYSTem:ERRor:ALL? -> -101,"Invalid character",-109,"Missing parameter"

Support Version 2.0.0.125  
This is a sequential command.

#### **:SYSTem:ERRor:CODE[:NEXT]?**

Function Queries a error code in the error queue and deletes it from the queue.  
If you use :NEXT, the error will stay in the queue.

Syntax :SYSTem:ERRor[:NEXT]?

Example :SYSTem:ERRor? -> -109

Support Version 2.0.0.125  
This is a sequential command.

#### **:SYSTem:ERRor:CODE:ALL?**

Function Return all the errors code then message in the queue separated by a comma

Syntax :SYSTem:ERRor[:NEXT]?

Example :SYSTem:ERRor? -> -109,-101

Support Version 2.0.0.125  
This is a sequential command.

## TRACe Sub System Commands

### **:TRACe:ACTive**

Function        Sets/queries the active trace

Syntax         :TRACe:ACTive<wsp><trace name>  
                  :TRACe:ACTive?

Example        :TRACe:ACTive TRA  
                  :TRACe:ACTive? -> TRA

Support        Version 2.0.0.125  
                  This is a sequential command.

### **:TRACe:DELeTe**

Function        Delete a specific trace

Syntax         :TRACe:DELeTe<wsp><trace name>

Example        :TRACe:DELeTe TRA

Support        Version 2.0.0.125  
                  This is a sequential command.

### **:TRACe:DELeTe:ALL**

Function        Delete all traces

Syntax         :TRACe:DELeTe:ALL

Example        :TRACe:DELeTe:ALL

Support        Version 2.0.0.125  
                  This is a sequential command.

### **:TRACe[:DATA]:X**

Function        Queries the X values of a trace, separated by a comma

Syntax         :TRACe:X?<wsp><trace name>

Example        :TRACe:X? TRA -> 1540,1540.5,1541...

Support        Version 2.0.0.125  
                  This is a sequential command.

### **:TRACe[:DATA]:Y**

Function        Queries the Y values of a trace, separated by a comma

Syntax         :TRACe:Y?<wsp><trace name>

Example        :TRACe:Y? TRA -> -6.3215, -8.1654, -16.35651...

Support           Version 2.0.0.125  
                  This is a sequential command.

## UNIT Sub System Command

### **:UNIT:X**

Function          Sets/queries the units for the X axis  
Syntax            :UNIT:X<wsp>WAVElength|FREQuency|0|1  
                  :UNIT:X?  
Example           :UNIT:X FREQUENCY  
                  :UNIT:X? -> 1  
Support           Version 2.0.0.125  
                  This is a sequential command.

## Multi-Instrument Commands

### **:DEVIce:REFRESH**

Function          Activate NRT-8000 scanning on local computer and local network  
Syntax            :DEVIce:REFRESH  
Support           Version 2.0.0.125  
                  This is a sequential command.

### **:DEVIce:LIST**

Function          Queries the devices find by refresh, separated by a comma  
Syntax            :DEVIce:LIST?  
Example           :DEVIce:LIST? ->  
                  network:demo;linuxusbserial:/sys/bus/usb-serial/devices/ttyU  
                  SB0  
Support           Version 2.0.0.125  
                  This is a sequential command.

### **:DEVIce:OPEN**

Function          Open a specific device  
Syntax            :DEVIce:OPEN<wsp><device name>  
Example           :DEVIce:OPEN network:demo  
Support           Version 2.0.0.125



This is a sequential command.

**:DEVIce:CLOSE**

Function        Close the current connected device

Syntax         :DEVIce:CLOSE

Support        Version 2.0.0.125

This is a sequential command.

# List of possible error code

## Standard SCPI

### -100 BLOCK: COMMAND ERRORS

command\_error = -100  
invalid\_character = -101  
syntax\_error = -102  
invalid\_separator = -103  
data\_type\_error = -104  
get\_not\_allowed = -105  
parameter\_not\_allowed = -108  
missing\_parameter = -109  
command\_header\_error = -110  
header\_separator\_error = -111  
program\_mnemonic\_too\_long = -112  
undefined\_header = -113  
header\_suffix\_out\_of\_range = -114  
unexpected\_number\_of\_parameters = -115  
numeric\_data\_error = -120  
invalid\_character\_in\_number = -121  
exponent\_too\_large = -123  
too\_many\_digits = -124  
numeric\_data\_not\_allowed = -128  
suffix\_error = -130  
invalid\_suffix = -131  
suffix\_too\_long = -134  
suffix\_not\_allowed = -138  
character\_data\_error = -140  
invalid\_character\_data = -141  
character\_data\_too\_long = -144  
character\_data\_not\_allowed = -148  
string\_data\_error = -150  
invalid\_string\_data = -151  
string\_data\_not\_allowed = -158  
block\_data\_error = -160  
invalid\_block\_data = -161  
block\_data\_not\_allowed = -168  
expression\_error = -170  
invalid\_expression = -171  
expression\_not\_allowed = -178  
macro\_error\_180 = -180  
invalid\_outside\_macro\_definition = -181  
invalid\_inside\_macro\_definition = -183  
macro\_parameter\_error = -184

## **-200 BLOCK: EXECUTION ERRORS**

execution\_error = -200  
data\_out\_of\_range = -222  
too\_much\_data = -223  
illegal\_parameter\_value = -224  
out\_of\_memory = -225  
macro\_error\_270 = -270  
macro\_execution\_error = -272  
illegal\_macro\_label = -273  
macro\_recursion\_error = -276  
macro\_redefinition\_not\_allowed = -277

## **-300 BLOCK: DEVICE-SPECIFIC ERRORS**

system\_error = -310  
too\_many\_errors = -350

## **-400 BLOCK: QUERY ERRORS**

query\_error = -400  
query\_interrupted = -410  
query\_terminated = -420  
query\_deadlocked = -430  
query\_terminated\_after\_indefinite\_response = -440

## **OTHERS**

user\_request\_event = -600  
request\_control\_event = -700  
operation\_complete = -800

## **Specific NRT-8000 OSA**

device\_not\_connected = -900  
device\_missing\_filter = -901  
device\_no\_matching\_resolution\_bandwidth = -902  
device\_no\_matching\_bandwidth\_target = -903  
device\_no\_matching\_bandwidth\_value = -904  
device\_no\_value\_list\_for\_this\_target = -905

## Examples

### Overview of a scan and OSNR

```
:SENSE:BANDWIDTH:RESOLUTION 4G
:CALCULATE:AUTO ON
:CALCULATE:CATEGORY WDM
:CALCULATE:PARAMETER:COMMON:MDIFF 5DB
:CALCULATE:PARAMETER:WDM:MDIFF 5DB
:CALCULATE:PARAMETER:WDM:DMASK -30DB
:CALCULATE:PARAMETER:WDM:TH 20DB
:CALCULATE:PARAMETER:WDM:IRANGE 10
:CALCULATE:PARAMETER:WDM:NAREA 3MM
:CALCULATE:PARAMETER:WDM:NBW 0.1NM
:INITIATE
:TRACE:X? TRA
:TRACE:Y? TRA
:CALCULATE:DATA?
```

Please note that there is 2 MDIFF command, the COMMON:MDIFF is for version 125, the WDM:MDIFF is for version > 125.

### Scan without OSNR

```
:SENSE:BANDWIDTH:RESOLUTION 4G
:CALCULATE:AUTO OFF
:INITIATE
:TRACE:X? TRA
:TRACE:Y? TRA
```

### Scanning without \*STB, \*ESR or \*OPC

```
# setup the bandwidth / parameters are before
# then clear any previous error before a scan
:SYSTEM:ERROR:ALL?
# do a scan
:INITIATE
# see if there is an error on the previous scan
:SYSTEM:ERROR:COUNT?
# if no error (0) then continue, otherwise go into error
# then ask for trace data
:TRACE:X? TRA
:TRACE:Y? TRA
:CALCULATE:DATA?
```

## Overview of a scan and OSNR (documented)

```
# (M) = meter (DB) = decibel (HZ) = hertz
# First line = set a setting / do an action
# Second command line (if exist): query the current value
```

```
# Identification
# NewRidgeTech,<model>,<serial hash>,<software version>
*IDN?
```

```
# Resolution bandwidth
:SENSE:BANDWIDTH:RESOLUTION 4G
:SENSE:BANDWIDTH?
```

```
# Do a trace
:INITIATE
```

```
# Get X Data (M)
:TRACE:X? TRA
```

```
# Get Y Data (DB)
:TRACE:Y? TRA
```

```
# -----
# CALCULATION
# All the settings can be set one at the start of the commands.
```

```
# Set the calculate category to WDM (same as OSNR/11)
:CALCULATE:CATEGORY WDM
:CALCULATE:CATEGORY?
```

```
# Do the calculation automatically when a scan is done
:CALCULATE:AUTO 1
:CALCULATE:AUTO?
```

```
# Peak search: Mode diff (DB) (version == 125)
:CALCULATE:PARAMETER:COMMON:MDIFF 5DB
:CALCULATE:PARAMETER:COMMON:MDIFF?
```

```
# Peak search: Mode diff (DB) (version > 125)
:CALCULATE:PARAMETER:WDM:MDIFF 5DB
:CALCULATE:PARAMETER:WDM:MDIFF?
```

```
# Peak search: Display Mask (DB)
```

```

:CALCULATE:PARAMETER:WDM:DMASK -30DB
:CALCULATE:PARAMETER:WDM:DMASK?

# Peak search: Threshold (DB)
:CALCULATE:PARAMETER:WDM:TH 20DB
:CALCULATE:PARAMETER:WDM:TH?

# OSNR: Signal Power Integral Range (GHZ)
:CALCULATE:PARAMETER:WDM:IRANGE 10
:CALCULATE:PARAMETER:WDM:IRANGE?

# OSNR: Noise Area (M) (! not HZ)
:CALCULATE:PARAMETER:WDM:NAREA 3MM
:CALCULATE:PARAMETER:WDM:NAREA?

# OSNR: Noise Bandwidth (M)
:CALCULATE:PARAMETER:WDM:NBW 0.1NM
:CALCULATE:PARAMETER:WDM:NBW?

# Do the calculation
:CALCULATE

# Get the data in the WDM format
# <channel number>,<peak wavelength>,<peak power>,<theta>,<theta>,<noise>,<osnr>
# data is repeated on the line joined with comma
:CALCULATE:DATA?

# -----
# BROKEN COMMANDS FOR NOW
# Shift X (M) (BROKEN)
:SENSE:CORRECTION:WAVELENGTH:SHIFT 5NM
:SENSE:CORRECTION:WAVELENGTH:SHIFT?

# Shift Y (DB) (BROKEN)
:SENSE:CORRECTION:LEVEL:SHIFT 1DB
:SENSE:CORRECTION:LEVEL:SHIFT?

```

## List and connect to a specific device

```

:DEVICE:REFRESH
# (then, do a loop until you see the device you wanted too)
:DEVICE:LIST?
network:demo;linuxusbserial:/sys/bus/usb-serial/devices/ttyUSB0
:DEVICE:OPEN network:demo

```

```
# ...
:DEVICE:CLOSE
:DEVICE:OPEN linuxusbserial:/sys/bus/usb-serial/devices/ttyUSB0
# ...
:DEVICE:CLOSE
```

## Using Python + Pyvisa

Requirements: <https://pyvisa.readthedocs.io/en/stable/>

You need to first start the NRT-8000 SCPI Server and select the device, then Start the server.

```
import visa
rm = visa.ResourceManager()
nrt = rm.open_resource("TCPIP::127.0.0.1::5025::SOCKET",
read_termination="\r\n")
nrt.write(":SENSE:BANDWIDTH:RESOLUTION 4G")
nrt.write(":CALCULATE:AUTO OFF")
nrt.write(":INITIATE")
xs = nrt.query_ascii_values(":TRACE:X? TRA")
ys = nrt.query_ascii_values(":TRACE:Y? TRA")

# => xs and ys will be a numpy array containing the values.
```