Test Solutions - Programming Manual

Power Sensors

PWR Series Power Sensors
PWR Series Peak & Average Power Sensors

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Trademarks

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1 - Overview

This Programming Manual is intended for customers wishing to create their own interface for Mini-Circuits' USB and Ethernet controlled power sensors. For instructions on using the supplied GUI program, or connecting the PTE hardware, please see the User Guide at:
https://www.minicircuits.com/app/AN48-003.pdf

Mini-Circuits offers support over a variety of operating systems, programming environments and third party applications.

Support for Windows® operating systems is provided through the Microsoft®.NET® and ActiveX® frameworks to allow the user to develop customized control applications. Support for Linux® operating systems is accomplished using the standard libhid and libusb libraries.

Mini-Circuits has experience with a wide variety of environments including (but not limited to):

- Visual Basic®, Visual C#®, Visual C++®
- Delphi®
- Borland C++®
- CVI®
- LabVIEW®
- MATLAB®
- Python®
- Keysight VEE®

The power meter software package includes a GUI program, ActiveX and .NET DLL files, Linux support, project examples for third party software, and detailed user manuals. The latest package is available for download at:
https://www.minicircuits.com/softwaredownload/pm.html

For details on individual models, application notes, GUI installation instructions and user guides please see:
https://www.minicircuits.com/WebStore/PortableTestEquipment.html

Files made available for download from the Mini-Circuits website are subject to Mini-Circuits' terms of use which are available on the website.

2 - Operating in a Windows Environment via USB

When connected by USB, the computer will recognize the power meter as a Human Interface Device (HID). In this mode of operation the DLL file provides the method of control. Alternatively, the “RC” series of power meters can be operated over an Ethernet TCP/IP Network (see Ethernet Control over IP Networks for details).

2.1 - The DLL (Dynamic Link Library) Concept

The Dynamic Link Library concept is Microsoft's implementation of the shared library concept in the Windows environment.

DLLs provide a mechanism for shared code and data, intended to allow a developer to distribute applications without requiring code to be re-linked or recompiled.

Mini-Circuits' CD package provides DLL Objects designed to allow your own software application to interface with the functions of the Mini-Circuits power meter.

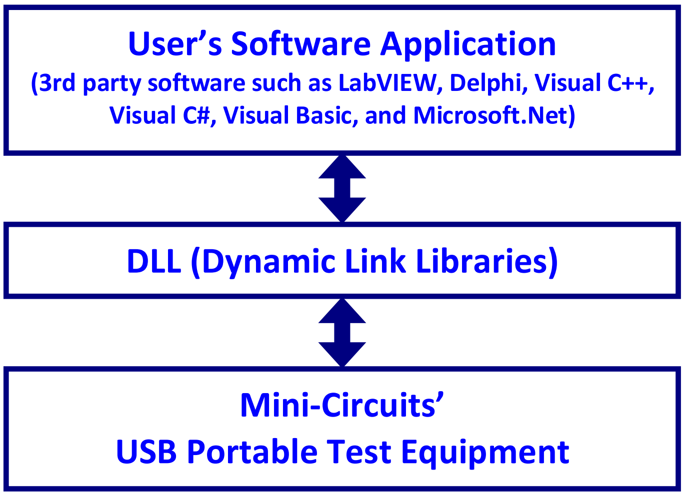


Fig 2.1-a: DLL Interface Concept

The software package provides two DLL files, the choice of which file to use is dictated by the user’s operating system:

1. **ActiveX com object**
   Designed to be used in any programming environment that supports third party ActiveX COM (Component Object Model) compliant applications.
   The ActiveX file should be registered using RegSvr32 (see following sections for details).

2. **Microsoft.NET Class Library**
   A logical unit of functionality that runs under the control of the Microsoft.NET system.

2.1 (a) - ActiveX COM Object

ActiveX COM object DLL files are designed to be used with both 32-bit and 64-bit Windows operating systems. A 32-bit programming environment that is compatible with ActiveX is required. To develop 64-bit applications, the Microsoft.NET Class library should be used instead.

Supported Programming Environments

Mini-Circuits' power meters have been tested in the following programming environments. This is not an exhaustive list and the DLL file is designed to operate in most environments that support ActiveX functionality. Please contact Mini-Circuits for support.

- Visual Studio® 6 (Visual C++ and Visual Basic)
- LabVIEW 8.0 or newer
- MATLAB 7 or newer
- Delphi
- Borland C++
- Agilent VEE
- Python

Installation

1. Copy the DLL file to the correct directory:
   For 32-bit Windows operating systems this is C:\WINDOWS\System32
   For 64-bit Windows operating systems this is C:\WINDOWS\SysWOW64
2. Open the Command Prompt:
   a. For Windows XP® (see *Fig 2.1-b*):
      i. Select "All Programs" and then "Accessories" from the Start Menu
      ii. Click on "Command Prompt" to open
   b. For later versions of the Windows operating system you will need to have Administrator privileges in order to run the Command Prompt in "Elevated" mode (see *Fig 2.1-c* for Windows 7 and Windows 8):
      i. Open the Start Menu/Start Screen and type "Command Prompt"
      ii. Right-click on the shortcut for the Command Prompt
      iii. Select "Run as Administrator"
      iv. You may be prompted to enter the log in details for an Administrator account if the current user does not have Administrator privileges on the local PC
3. Use regsvr32 to register the DLL:
   For 32-bit Windows operating systems type (see Fig 2.1-d):
   `\WINDOWS\System32\Regsvr32 \WINDOWS\System32\mcl_pm.dll`
   For 64-bit Windows operating systems type (see Fig 2.1-e):
   `\WINDOWS\SysWOW64\Regsvr32 \WINDOWS\SysWOW64\mcl_pm.dll`
4. Hit enter to confirm and a message box will appear to advise of successful registration.

Fig 2.1-b: Opening the Command Prompt in Windows XP

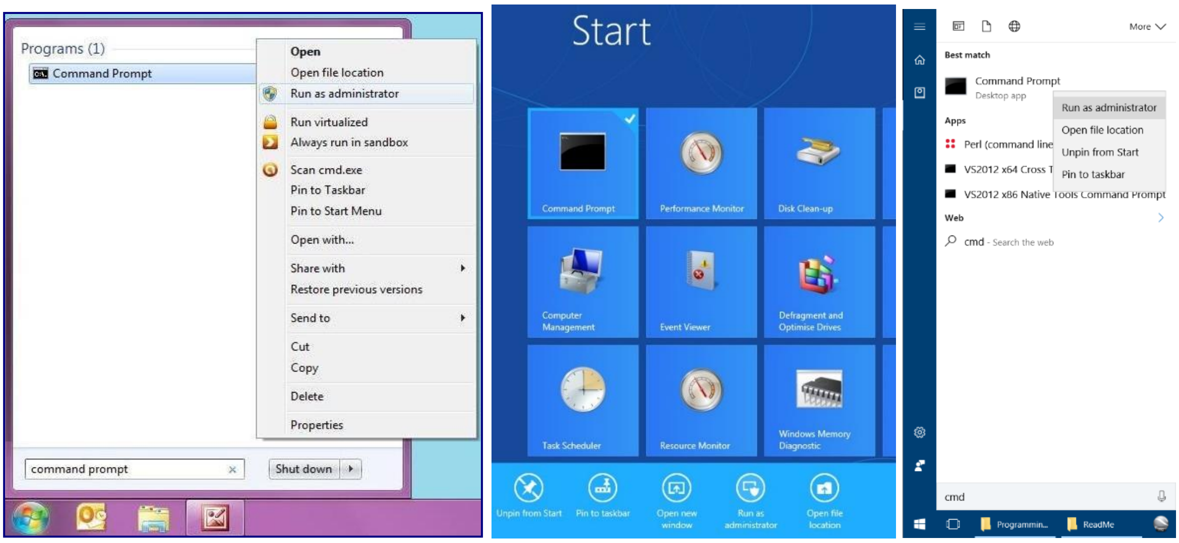


Fig 2.1-c: Opening the Command Prompt in Windows 7 (left), Windows 8 (middle) and Windows 10 (right)

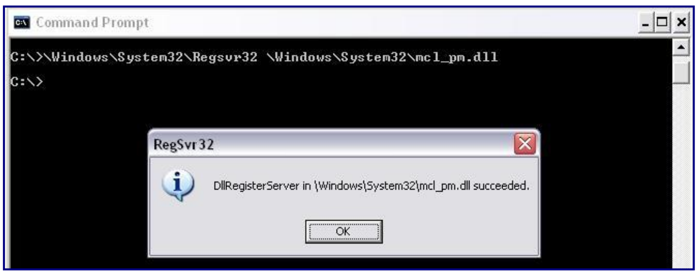


Fig 2.1-d: Registering the DLL in a 32-bit environment

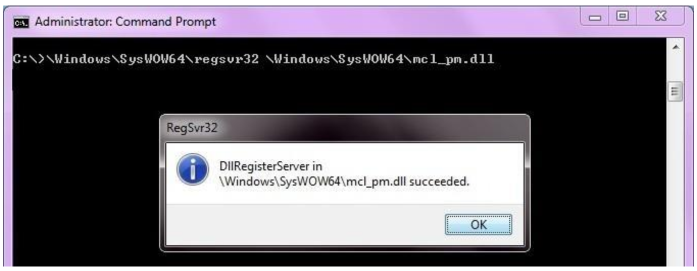


Fig 2.1-e: Registering the DLL in a 64-bit environment

2.1 (b) - Microsoft.NET Class Library

Microsoft.NET class libraries are designed to be used with both 32-bit and 64-bit Windows operating systems. To develop 64-bit applications the user must have both a 64-bit operating system and 64-bit programming environment. However, the Microsoft.NET class library is also compatible with 32-bit programming environments.

Supported Programming Environments

Mini-Circuits' power meters have been tested in the following programming environments. This is not an exhaustive list and the DLL file is designed to operate in most environments that support Microsoft.NET functionality. Please contact Mini-Circuits for support.

- National Instruments CVI
- Microsoft.NET (Visual C++, Visual Basic.NET, Visual C# 2003 or newer)
- LabVIEW 2009 or newer
- MATLAB 2008 or newer
- Delphi
- Borland C++

Installation

1. Copy the DLL file to the correct directory
    a. For 32 bit Windows operating systems this is C:\WINDOWS\System32
    b. For 64 bit Windows operating systems this is C:\WINDOWS\SysWOW64
2. **No registration is required**

2.2 - Referencing the DLL Library

The DLL file should be installed in the host PC's system folders using the steps outlined above. Some programming environments will require the user to set a reference to the relevant DLL file, usually through a built in GUI in the programming environment.

Once this is done, a new instance of the USB power sensor class just needs to be created for each physical sensor to control. The details of this vary greatly between programming environments and languages but Mini-Circuits can provide detailed support on request. The names "MyPTE1" and "MyPTE2" have been assigned to 2 connected power sensors in the examples below.

Example Declarations using the ActiveX DLL

Visual Basic

```
Public MyPTE1 As New mcl_pm.USB_PM
        ' Initialize new power sensor object, assign to MyPTE1
Public MyPTE2 As New mcl_pm.USB_PM
        ' Initialize new power sensor object, assign to MyPTE2
```

Visual C++

```
mcl_pm::USB_PM ^MyPTE1 = gcnew mcl_pm::USB_PM();
        // Initialize new power sensor instance, assign to MyPTE1
mcl_pm::USB_PM ^MyPTE2 = gcnew mcl_pm::USB_PM();
        // Initialize new power sensor instance, assign to MyPTE2
```

Visual C#

```
mcl_pm.USB_PM MyPTE1 = new mcl_pm.USB_PM();
        // Initialize new power sensor instance, assign to MyPTE1
mcl_pm.USB_PM MyPTE2 = new mcl_pm.USB_PM();
        // Initialize new power sensor instance, assign to MyPTE2
```

Matlab

```
MyPTE1 = actxserver('mcl_pm.USB_PM')
        % Initialize new power sensor instance, assign to MyPTE1
MyPTE2 = actxserver('mcl_pm.USB_PM')
        % Initialize new power sensor instance, assign to MyPTE2
```

Example Declarations using the .NET DLL

Visual Basic

```
Public MyPTE1 As New mcl_pm64.usb_pm
        ' Initialize new power sensor object, assign to MyPTE1
Public MyPTE2 As New mcl_pm64.usb_pm
        ' Initialize new power sensor object, assign to MyPTE2
```

Visual C++

```
mcl_pm64::usb_pm ^MyPTE1 = gcnew mcl_pm64::usb_pm();
        // Initialize new power sensor instance, assign to MyPTE1
mcl_pm64::usb_pm ^MyPTE2 = gcnew mcl_pm64::usb_pm();
        // Initialize new power sensor instance, assign to MyPTE2
```

Visual C#

```
mcl_pm64.usb_pm MyPTE1 = new mcl_pm64.usb_pm();
        // Initialize new power sensor instance, assign to MyPTE1
mcl_pm64.usb_pm MyPTE2 = new mcl_pm64.usb_pm();
        // Initialize new power sensor instance, assign to MyPTE2
```

Matlab

```
MCL_PM = NET.addAssembly('C:\Windows\SysWOW64\mcl_pm64.dll')
MyPTE1 = mcl_pm64.usb_pm      % Initialize new sensor instance
MyPTE2 = mcl_pm64.usb_pm      % Initialize new sensor instance
```

2.3 - Summary of DLL Properties/Functions

The following functions and "global" properties are defined in both of the DLL files to allow full control over the power sensor. Please see the following sections for a description of their usage.

2.3 (a) - DLL - Properties

```
a) double Freq
b) short AVG
c) short AvgCount
d) bool Format_mw
e) single OffsetValue
f) short OffsetValue_Enable
```

2.3 (b) - DLL - General Functions

```
a) int Open_Sensor(Optional string SN_Request)                  (ActiveX)
   short Open_Sensor(Optional string SN_Request)                (.NET)
b) void Close_Sensor()
c) string GetSensorModelName()
d) string GetSensorSN()
e) short Get_Available_SN_List(ByRef string SN_List)
f) short GetStatus()
g) short Check_Connection()
h) float GetDeviceTemperature(Optional string
                                       TemperatureFormat)       (ActiveX)
   float GetDeviceTemperature(Optional ByRef string
                                       TemperatureFormat)       (.NET)
i) short GetFirmwareInfo(ByRef short FirmwareID,
               ByRef string FirmwareRev, ByRef short FirmwareNo)
j) short GetFirmwareVer(ByRef short FirmwareVer)
k) string GetUSBDeviceName()
l) string GetUSBDeviceHandle()
m) short Open_AnySensor()
n) void Init_PM()
o) void CloseConnection()
```

2.3 (c) - DLL - Average Power Sensor Measurement Functions

These functions apply to the following Mini-Circuits' power sensor series:

- PWR-xGHS Series (CW average power sensors)
- PWR-xFS Series (fast sampling CW average power sensors)
- PWR-xRMS Series (true RMS power sensors)

```
a) void SetFasterMode(short S_A)                                (ActiveX)
   void SetFasterMode(ByRef short S_A)                          (.NET)
b) void SetRange(short Range)
c) float ReadPower()
d) float ReadImmediatePower()
e) float ReadVoltage()
f) short GetOffsetValues(ByRef int NoOfPoints,
               ByRef double FreqArray(), ByRef single LossArray())
g) int SetOffsetValues(int NoOfPoints, double FreqArray(),
                                  single LossArray())           (ActiveX)
   int SetOffsetValues(int NoOfPoints, ByRef double FreqArray(),
                            ByRef single LossArray())           (.NET)
```

2.3 (d) - DLL - Peak & Average Power Sensor Measurement Functions

These functions apply to Mini-Circuits' PWR-xP Series peak & average power sensor models.

```
a) short PeakPS_SetSampleTime(long ST)
b) long PeakPS_GetSampleTime()
c) short PeakPS_SetTriggerMode(int TM)
d) short PeakPS_GetTriggerMode()
e) float PeakPS_GetAvgPower()
f) float PeakPS_GetPeakPower()
g) short PeakPS_GetPower(int NoOfPoints, float PowerArray(),
                                                float PeakPower)
h) short  Send_SCPI(ByRef string SndSTR, ByRef string RetSTR)
```

2.3 (e) - DLL - Ethernet Configuration Functions

These functions apply to Mini-Circuits' RC power sensor models with an Ethernet interface. The functions provide a means for identifying or configuring the Ethernet settings such as IP address, TCP/IP port and network gateway. They can only be called while the device is connected via the USB interface.

```
a) int GetEthernet_CurrentConfig(ByRef int IP1, int IP2,
                     ByRef int IP3, ByRef int IP4, ByRef int Mask1,
                 ByRef int Mask2, ByRef int Mask3, ByRef int Mask4,
                        ByRef int Gateway1, ByRef int Gateway2,
                        ByRef int Gateway3, ByRef int Gateway4)
b) int GetEthernet_IPAddress(ByRef int b1, ByRef int b2,
                                          ByRef int b3, int b4)
c) int GetEthernet_MACAddress(ByRef int MAC1 , ByRef int MAC2,
                                 ByRef int MAC3, ByRef int MAC4,
                                 ByRef int MAC5, ByRef int MAC6)
d) int GetEthernet_NetworkGateway(ByRef int b1, ByRef int b2,
                                     ByRef int b3, ByRef int b4)
e) int GetEthernet_SubNetMask(ByRef int b1, ByRef int b2,
                                     ByRef int b3, ByRef int b4)
f) int GetEthernet_TCPIPPort(ByRef int port)
g) int GetEthernet_UseDHCP()
h) int GetEthernet_UsePWD()
i) int GetEthernet_PWD(ByRef string  Pwd)
j) int SaveEthernet_IPAddress(int b1, int b2, int b3, int b4)
k) int SaveEthernet_NetworkGateway(int b1, int b2, int b3, int b4)
l) int SaveEthernet_SubnetMask(int b1, int b2, int b3, int b4)
m) int SaveEthernet_TCPIPPort(int port)
n) int SaveEthernet_UseDHCP(int UseDHCP)
o) int SaveEthernet_UsePWD(int UsePwd)
p) int SaveEthernet_PWD(string Pwd)
q) int GetEthernet_EnableEthernet()
r) int SaveEthernet_EnableEthernet(short Enable)
```

2.4 - DLL - Properties

2.4 (a) - Set Compensation Frequency

Property

```
double Freq
```

Description

This property sets the power sensor frequency compensation to the correct frequency in MHz for the expected input signal. This parameter needs to be set in order to achieve the specified power measurement accuracy.

Note: This property will not filter out unwanted signals.

Accepted Values

Data Type	Value	Description
double	Frequency	A frequency within the power sensor's specified range

Examples

Visual Basic
```
MyPTE1.Freq = 1000
```
Visual C++
```
MyPTE1->Freq = 1000;
```
Visual C#
```
MyPTE1.Freq = 1000;
```
Matlab
```
MyPTE1.Freq = 1000
```

2.4 (b) - Set Averaging Mode

Property

```
short AVG
```

Description

This property enables the "averaging" mode of the power sensor so that power readings will be averaged over a number of measurements (defined by the AvgCount property). The default value is 0 (averaging disabled).

Accepted Values

Data Type	Value	Description
short	0	Disable averaging mode
short	1	Enable averaging mode

Examples

Visual Basic
```
MyPTE1.AVG = 1
```
Visual C++
```
MyPTE1->AVG = 1;
```
Visual C#
```
MyPTE1.AVG = 1;
```
Matlab
```
MyPTE1.AVG = 1
```

See Also

Set Average Count

2.4 (c) - Set Average Count

Property

```
short AvgCount
```

Description

This property defines the number of power readings over which to average the measurement when averaging mode is enabled (defined by the AVG property). The default value is 1 (average the reading over 1 measurement).

Accepted Values

Data Type	Value	Description
short	Count	The number of measurements to average (from 1 to 16)

Examples

Visual Basic
```
MyPTE1.AvgCount = 10
```
Visual C++
```
MyPTE1->AvgCount = 10;
```
Visual C#
```
MyPTE1.AvgCount = 10;
```
Matlab
```
MyPTE1.AvgCount = 10
```

See Also

Set Averaging Mode

2.4 (d) - Set Power Format

Property

```
bool Format_mw
```

Description

This property sets the power measurement units to either mW or dBm. The default is power measurements in dBm.

Accepted Values

Data Type	Value	Description
bool	False	Power reading in dBm
bool	True	Power reading in mW

Examples

Visual Basic
```
MyPTE1.Format_mw = TRUE
```
Visual C++
```
MyPTE1->Format_mw = TRUE;
```
Visual C#
```
MyPTE1.Format_mw = TRUE;
```
Matlab
```
MyPTE1.Format_mw = TRUE
```

See Also

Read Power
Read Immediate Power

2.4 (e) - Set Offset Value

Property

```
single OffsetValue
```

Description

This property sets a single offset value to be used for power readings. The power meter offset type must be set to "1" in order to use this (see OffsetValue_Enable).

Accepted Values

Data Type	Value	Description
single	Offset	The power measurement offset in dB

Examples

Visual Basic
```
MyPTE1.OffsetValue_Enable = 1
MyPTE1.OffsetValue = 5.4
' Set a 5.4dB offset to the power readings
```
Visual C++
```
MyPTE1->OffsetValue_Enable = 1;
MyPTE1->OffsetValue = 5.4;
// Set a 5.4dB offset to the power readings
```
Visual C#
```
MyPTE1.OffsetValue_Enable = 1;
MyPTE1.OffsetValue = 5.4;
// Set a 5.4dB offset to the power readings
```
Matlab
```
MyPTE1.OffsetValue_Enable = 1
MyPTE1.OffsetValue = 5.4
% Set a 5.4dB offset to the power readings
```

See Also

Enable Offset

2.4 (f) - Enable Offset

Property

```
short OffsetValue_Enable
```

Description

This property defines whether an offset is used for the power readings. The power sensor can use either a single offset value (set using the Set Offset Value property) or an array of offset values (set by the Set Offset Values function).

Accepted Values

Data Type	Value	Description
short	0	Offset disabled
short	1	Use single value offset (see Set Offset Value)
short	2	Use array of offset values (see Set Offset Values)

Examples

Visual Basic

```
MyPTE1.OffsetValue_Enable = 1
MyPTE1.OffsetValue = 5.4
' Set a 5.4dB offset to the power readings
```

Visual C++

```
MyPTE1->OffsetValue_Enable = 1;
MyPTE1->OffsetValue = 5.4;
// Set a 5.4dB offset to the power readings
```

Visual C#

```
MyPTE1.OffsetValue_Enable = 1;
MyPTE1.OffsetValue = 5.4;
// Set a 5.4dB offset to the power readings
```

Matlab

```
MyPTE1.OffsetValue_Enable = 1
MyPTE1.OffsetValue = 5.4
% Set a 5.4dB offset to the power readings
```

See Also

Set Offset Value
Get Offset Values
Set Offset Values

2.5 - DLL - General Functions

2.5 (a) - Open Power Sensor Connection

ActiveX Declaration (mcl_pm.dll)

```
short Open_Sensor(Optional string SN)
```

.NET Declaration (mcl_pm64.dll)

```
short Open_Sensor(Optional ByRef string SN)
```

Description

This function is called to initialize the connection to a USB power sensor. If multiple sensors are connected to the same computer, then the serial number should be included, otherwise this can be omitted. The connection process can take a few seconds so it is recommended that the connection be made once at the beginning of the routine and left open until the sensor is no longer needed. The sensor should be disconnected on completion of the program using the Close_Sensor function.

Parameters

Data Type	Variable	Description
string	SN	Optional. A string containing the serial number of the USB power sensor. Can be omitted if only one sensor is connected but must be included otherwise.

Return Values

Data Type	Value	Description
short	0	No connection was possible
	1	Connection successfully established
	2	Device already connected
	3	Requested serial number is not available

Examples

Visual Basic
```
Status = MyPTE1.Open_Sensor("1130902001")
```
Visual C++
```
Status = MyPTE1->Open_Sensor("1130902001");
```
Visual C#
```
Status = MyPTE1.Open_Sensor("1130902001");
```
Matlab
```
Status = MyPTE1.Open_Sensor("1130902001")
```

See Also

Close Power Sensor Connection

2.5 (b) - Close Power Sensor Connection

Declaration

```
void Close_Sensor()
```

Description

This function is called to close the connection to the power sensor. It is strongly recommended that this function is used prior to ending the program. Failure to do so may result in a connection problem with the device. Should this occur, shut down the program and unplug the power sensor from the computer, then reconnect the power sensor before attempting to start again.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
None		

Examples

Visual Basic
```
MyPTE1.Close_Sensor()
```
Visual C++
```
MyPTE1->Close_Sensor();
```
Visual C#
```
MyPTE1.Close_Sensor();
```
Matlab
```
MyPTE1.Close_Sensor
```

See Also

Open Power Sensor Connection

2.5 (c) - Read Model Name of Power Sensor

Declaration

```
string GetSensorModelName()
```

Description

This function is called to determine the Mini-Circuits part number of the connected power sensor.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
string	Model	Mini-Circuits model name of the connected sensor

Examples

Visual Basic
```
MsgBox ("The connected sensor is " & MyPTE1.GetSensorModelName)
```
Visual C++
```
MessageBox::Show ("The connected sensor is " + MyPTE1->GetSensorModelName());
```
Visual C#
```
MessageBox.Show ("The connected sensor is " + MyPTE1.GetSensorModelName());
```
Matlab
```
ModelName = MyPTE1.GetSensorModelName
h = msgbox('The connected sensor is ', ModelName)
```

See Also

Read Serial Number of Power Sensor

2.5 (d) - Read Serial Number of Power Sensor

Declaration

```
string GetSensorSN()
```

Description

This function is called to determine the serial number of the connected power sensor.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
string	SN	Serial number of the connected sensor

Examples

Visual Basic

```
MsgBox ("The connected sensor is " & MyPTE1.GetSensorSN)
```

Visual C++

```
MessageBox::Show ("The connected sensor is " + MyPTE1->GetSensorSN());
```

Visual C#

```
MessageBox.Show ("The connected sensor is " + MyPTE1.GetSensorSN());
```

Matlab

```
SN = MyPTE1.GetSensorSN
h = msgbox('The connected sensor is ', SN)
```

See Also

Read Model Name of Power Sensor

2.5 (e) - Get List of Connected Serial Numbers

Declaration

```
short Get_Available_SN_List(ByRef string SN_List)
```

Description

This function takes a user defined variable and updates it with a list of serial numbers for all available (currently connected) power sensors.

Parameters

Data Type	Variable	Description
string	SN_List	Required. string variable which the function will update with a list of all available serial numbers, separated by a single space character, for example "11508280079 11508280080 11508280081".

Return Values

Data Type	Value	Description
short	0	Command failed
short	>1	Command completed successfully

Examples

Visual Basic

```
If MyPTE1.Get_Available_SN_List(SN_List) > 0 Then
        array_SN() = Split(SN_List, " ")
                ' Split the list into an array of serial numbers
        For i As Integer = 0 To array_SN.Length - 1
                ' Loop through the array and use each serial number
        Next
End If
```

Visual C++

```
if (MyPTE1 ->Get_Available_SN_List(SN_List) > 0)
{
        // split the List into array of SN's
}
```

Visual C#

```
if (MyPTE1.Get_Available_SN_List(ref(SN_List)) > 0)
{
        // split the List into array of SN's
}
```

Matlab

```
[status, SN_List]= MyPTE1.Get_Available_SN_List(SN_List)
if status > 0
        % split the List into array of SN's
end
```

See Also

Read Serial Number of Power Sensor
Open Power Sensor Connection

2.5 (f) - Get Status

Declaration

```
short GetStatus()
```

Description

This function checks whether the USB connection to the power sensor is still active.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
short	0	No connection
short	1	USB connection to power sensor is active

Examples

Visual Basic

```
Status = MyPTE1.Get_Status
```

Visual C++

```
Status= MyPTE1->Get_Status();
```

Visual C#

```
Status= MyPTE1.Get_Status();
```

Matlab

```
Status= MyPTE1.Get_Status
```

See Also

Read Power

2.5 (g) - Check Connection

Declaration

```
short Check_Connection()
```

Description

This function checks whether the USB connection to the power sensor is still active.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
short	0	No connection
short	1	USB connection to power sensor is active

Examples

Visual Basic

```
Status = MyPTE1.Check_Connection
```

Visual C++

```
Status= MyPTE1->Check_Connection();
```

Visual C#

```
Status= MyPTE1.Check_Connection();
```

Matlab

```
Status= MyPTE1.Check_Connection
```

See Also

Read Power

2.5 (h) - Get Temperature of Power Sensor

ActiveX Declaration (mcl_pm.dll)

```
float GetDeviceTemperature(Optional string TemperatureFormat)
```

.NET Declaration (mcl_pm64.dll)

```
float GetDeviceTemperature(Optional ByRef string TemperatureFormat)
```

Description

This function returns the internal temperature of the power sensor in degrees Celsius (default) or Fahrenheit.

Parameters

Data Type	Variable	Description
string	Temperature _Format	Optional. string (not case sensitive) to set the temperature measurement units: F - Set temperature units to Fahrenheit C- Set temperature units to Celsius (default)

Return Values

Data Type	Value	Description
float	Temperature	The device internal temperature in degrees Celsius

Examples

Visual Basic
```
MsgBox ("Temperature is " & MyPTE1.GetDeviceTemperature)
```
Visual C++
```
MessageBox::Show ("Temperature is " + MyPTE1->GetDeviceTemperature());
```
Visual C#
```
MessageBox.Show ("Temperature is " + MyPTE1.GetDeviceTemperature());
```
Matlab
```
h = msgbox ("Temperature is " & MyPTE1.GetDeviceTemperature)
```

See Also

Read Power
Read Immediate Power

2.5 (i) - Get Firmware

Declaration

```
short GetFirmwareInfo(ByRef short FirmwareID,
                          ByRef string FirmwareRev, ByRef short FirmwareNo)
```

Description

This function returns a numeric value which indicates the internal firmware version of the power sensor.

Parameters

Data Type	Variable	Description
short	FirmwareID	Required. User defined variable for factory use only.
string	FirmwareRev	Required. User defined variable which will be updated with the current firmware version, for example “B3”.
short	FirmwareNo	Required. User defined variable for factory use only.

Return Values

Data Type	Value	Description
short	0	Command failed
short	1	Command completed successfully

Examples

Visual Basic

```
If MyPTE1.GetFirmwareInfo(fID, fRev, fNo) > 0 Then
        MsgBox ("Firmware version is " & fRev)
End If
```

Visual C++

```
if (MyPTE1->GetFirmwareInfo(fID, fRev, fNo) > 0 )
{
        MessageBox::Show("Firmware version is " + fRev);
}
```

Visual C#

```
if (MyPTE1.GetFirmwareInfo(ref(fID, fRev, fNo)) > 0 )
{
        MessageBox.Show("Firmware version is " + fRev);
}
```

Matlab

```
[status, fID, fRev, fNo]=MyPTE1.GetFirmwareInfo(fID, fRev, fNo)
if status > 0
        h = msgbox('Firmware version is ', fRev)
end
```

2.5 (j) - Get Firmware Version (Antiquated)

Declaration

```
short GetFirmwareVer(ByRef short FirmwareVer)
```

Description

This function is antiquated, GetFirmwareInfo should be used instead. GetFirmwareVer returns a numeric value which indicates the internal firmware version of the power sensor.

Parameters

Data Type	Variable	Description
short	FirmwareVer	Required. User defined variable which will be updated with the firmware version number

Return Values

Data Type	Value	Description
short	0	Command failed
short	1	Command completed successfully

Examples

Visual Basic

```
status = MyPTE1.GetFirmwareVer(FirmwareVer)
```

Visual C++

```
status = MyPTE1->GetFirmwareVer(FirmwareVer);
```

Visual C#

```
status = MyPTE1.GetFirmwareVer(FirmwareVer);
```

Matlab

```
status = MyPTE1.GetFirmwareVer(FirmwareVer)
```

See Also

Get Firmware

2.5 (k) - Get USB Device Name

Declaration

```
string GetUSBDeviceName()
```

Description

This function is for advanced users to identify the USB device name of the sensor for direct communication.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
string	DeviceName	Device name of the sensor head

Examples

Visual Basic
```
UsbName = MyPTE1.GetUSBDeviceName
```
Visual C++
```
UsbName = MyPTE1->GetUSBDeviceName();
```
Visual C#
```
UsbName = MyPTE1.GetUSBDeviceName();
```
Matlab
```
UsbName = MyPTE1.GetUSBDeviceName
```

See Also

Get USB Device Handle

2.5 (l) - Get USB Device Handle

Declaration

```
string GetUSBDeviceHandle()
```

Description

This function is for advanced users to identify the handle to the USB sensor for direct communication.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
string	HandleToUSB	USB handle of the power sensor head

Examples

Visual Basic
```
UsbHandle = MyPTE1.GetUSBDeviceHandle
```
Visual C++
```
UsbHandle = MyPTE1->GetUSBDeviceHandle();
```
Visual C#
```
UsbHandle = MyPTE1.GetUSBDeviceHandle();
```
Matlab
```
UsbHandle = MyPTE1.GetUSBDeviceHandle
```

See Also

Get USB Device Name

2.5 (m) - Open Any Power Sensor (Antiquated)

Declaration

```
short Open_AnySensor()
```

Description

This function is included for compatibility with early models, Open_Sensor is the recommended method to connect to a power sensor.

This function initializes the connection to a USB power sensor. If multiple sensors are connected to the same computer, it is not possible to determine which sensor will be initialized. The connection process can take a few milliseconds so it is recommended that the connection be made once at the beginning of the routine and left open until the sensor is no longer needed. The sensor should be disconnected on completion of the program using the Close_Sensor function.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
short	0	No connection was possible
	1	Connection successfully established

See Also

Open Power Sensor Connection

2.5 (n) - Open Any Power Sensor (Antiquated)

Declaration

```
void Init_PM()
```

Description

This function is included for compatibility with early models, Open_Sensor is the recommended method to connect to a power sensor.

This function initializes the connection to a USB power sensor. If multiple sensors are connected to the same computer, it is not possible to determine which sensor will be initialized. The connection process can take a few milliseconds so it is recommended that the connection be made once at the beginning of the routine and left open until the sensor is no longer needed. The sensor should be disconnected on completion of the program using the Close_Sensor function.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
None		

See Also

Open Power Sensor Connection

2.5 (o) - Close Power Sensor Connection (Antiquated)

Declaration

```
void CloseConnection()
```

Description

This function is included for compatibility with early models, Close_Sensor is the recommended method to disconnect from a power sensor.

This function is called to close the connection to the power sensor.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
None		

See Also

Close Power Sensor Connection

2.6 - DLL - Average Power Sensor Measurement Functions

These functions apply to the following Mini-Circuits' power sensor series:

- PWR-xGHS Series (CW average power sensors)
- PWR-xFS Series (fast sampling CW average power sensors)
- PWR-xRMS Series (true RMS power sensors)

2.6 (a) - Set Measurement Mode

ActiveX Declaration (mcl_pm.dll)

```
void SetFasterMode(short S_A)
```

.NET Declaration (mcl_pm64.dll)

```
void SetFasterMode(ByRef short S_A)
```

Description

This function sets the measurement mode of the power sensor between "low noise" and "fast sampling" modes. Additionally, "fastest sampling" mode is also available for PWR-8FS. The specifications for these modes are defined in the individual model datasheets. The default is "low noise" mode. This function does not apply to PWR-6G (now discontinued).

Parameters

Data Type	Variable	Description
short	S_A	Reference to a user defined variable which determines the noise/sampling modes. The options are: 0 = Low noise mode 1 = Fast sampling mode 2 = Fastest sampling mode (only available for PWR-8FS)

Return Values

Data Type	Value	Description
None		

Examples

Visual Basic
```
MyPTE1.SetFasterMode(S_A)
```
Visual C++
```
MyPTE1->SetFasterMode(S_A);
```
Visual C#
```
MyPTE1.SetFasterMode(S_A);
```
Matlab
```
MyPTE1.SetFasterMode(S_A)
```

See Also

Set Power Range

2.6 (b) - Set Power Range

Declaration

```
void SetRange(short Range)
```

Description

This function optimizes the power sensor measurement for the expected input power range. It is recommended that the sensor be left in the default “Auto” mode.

Parameters

Data Type	Variable	Description
short	Range	Reference to a user defined variable which determines the input power range. The options are: 0 = Auto 1 = Low power 2 = High power

Return Values

Data Type	Value	Description
None		

Examples

Visual Basic

```
MyPTE1.SetRange(Range)
```

Visual C++

```
MyPTE1->SetRange(Range);
```

Visual C#

```
MyPTE1.SetRange(Range);
```

Matlab

```
MyPTE1.SetRange(Range)
```

See Also

Set Faster Mode

2.6 (c) - Read Power

Declaration

```
float ReadPower()
```

Description

This function returns the sensor power measurement. The default units are dBm but this can be set to mW using the Format_mw property.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
float	Power	The power reading in either mW or dBm. Note: a power value below -900 dBm indicates that the input signal level is below the sensor's useable range.

Examples

Visual Basic
```
Pwr = MyPTE1.ReadPower
```
Visual C++
```
Pwr = MyPTE1->ReadPower();
```
Visual C#
```
Pwr = MyPTE1.ReadPower();
```
Matlab
```
Pwr = MyPTE1.ReadPower
```

See Also

Set Power Format
Read Immediate Power

2.6 (d) - Read Immediate Power

Declaration

```
float ReadImmediatePower()
```

Description

This function returns the sensor power measurement with a faster response but reduced accuracy compared to ReadPower. This function does not measure the temperature in the same process so temperature compensation is based on the last recorded reading (taken when the ReadPower or GetDeviceTemperature functions were last called). For greatest accuracy, ReadPower should be used. The default units are dBm but this can be set to mW using the Format_mw property.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
float	Power	Current power measurement

Examples

Visual Basic
```
Pwr = MyPTE1.ReadImmediatePower
```
Visual C++
```
Pwr = MyPTE1->ReadImmediatePower();
```
Visual C#
```
Pwr = MyPTE1.ReadImmediatePower();
```
Matlab
```
Pwr = MyPTE1.ReadImmediatePower
```

See Also

Set Power Format
Read Immediate Power

2.6 (e) - Read Voltage

Declaration

```
float ReadVoltage()
```

Description

This function returns the raw voltage detected at the power sensor head. There is no calibration for temperature or frequency.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
float	Voltage	Voltage detected at the sensor head

Examples

Visual Basic
```
Voltage = MyPTE1.ReadVoltage
```
Visual C++
```
Voltage = MyPTE1->ReadVoltage();
```
Visual C#
```
Voltage = MyPTE1.ReadVoltage();
```
Matlab
```
Voltage = MyPTE1.ReadVoltage
```

See Also

Read Power
Read Immediate Power

2.6 (f) - Get Offset Values

Declaration

```
short GetOffsetValues(ByRef int NoOfPoints, ByRef double FreqArray(),
                                            ByRef single LossArray())
```

Description

This function returns the values used in the offset array when the power meter has been set to operate in “array offset” mode (see Enable Offset).

Parameters

Data Type	Variable	Description
int	NoOfPoints	Variable, passed by reference, to be updated with the number of points in the list of offset values
double	FreqArray	Array, passed by reference, to be updated with the list of frequency values (MHz) specified for the offset
float	LossArray	Array, passed by reference, to be updated with the list of loss values (dB) specified for the offset

Return Values

Data Type	Value	Description
short	0	Command failed
short	1	Command completed successfully

Examples

Visual Basic

```
MyPTE1.GetOffsetValues(pts, freq, loss)
For i=0 To pts - 1
        MsgBox (i & ": " & freq(i) & "MHz, " & loss(i) & "dB")
Next
```

Visual C++

```
MyPTE1->GetOffsetValues(pts, freq, loss);
for (i = 0; i < pts; i++) {
        MessageBox::Show(i + ": " + freq[i] + "MHz, " + loss[i] + "dB");
}
```

Visual C#

```
MyPTE1.GetOffsetValues(ref(pts, freq, loss));
for (i = 0; i < pts; i++) {
        MessageBox.Show(i + ": " + freq[i] + "MHz, " + loss[i] + "dB");
}
```

Matlab

```
[status, pts, freq, loss]=MyPTE1.GetOffsetValues(pts, freq, loss)
maxi=pts-1
for i=0:maxi
        h = msgbox([i,': ',freq(i),'MHz ',loss(i),'dB'])
end
```

See Also

Enable Offset
Set Offset Values

2.6 (g) - Set Offset Values

ActiveX Declaration (mcl_pm.dll)

```
short SetOffsetValues(int NoOfPoints, double FreqArray(),
                                               _ single LossArray())
```

.NET Declaration (mcl_pm64.dll)

```
short SetOffsetValues(int NoOfPoints, ByRef double FreqArray(),
                                          ByRef single LossArray())
```

Description

This function sets the array of offset values to be used for power measurements. The power sensor must be set to operate in "array offset" mode (see Enable Offset).

Parameters

Data Type	Variable	Description
int	NoOfPoints	Required. The number of offset points to be defined in the array.
double	FreqArray	Required. Array of size "NoOfPoints" containing the frequency (MHz) values of the respective offset points.
float	LossArray	Required. Array of size "NoOfPoints" containing the loss 9dB) values of the respective offset points.

Return Values

Data Type	Value	Description
short	0	Command failed
short	1	Command completed successfully

Examples

Visual Basic
```
Dim pts As Integer = 4
Dim freq(1000, 2000, 3000, 4000) As double
Dim loss(0, 0.5, 1, 1.5) As float
MyPTE1.SetOffsetValues(pts, freq, loss)
' Set 4 offset values:
' 0dB @ 1000MHz; 0.5dB @ 2000MHz; 1dB @ 3000MHz; 1.5dB @ 4000MHz
```

Visual C++
```
int pts = 4;
double freq [pts] = {1000, 2000, 3000, 4000};
float loss [pts] = {0, 0.5, 1, 1.5};
MyPTE1->SetOffsetValues(pts, freq, loss);
// Set 4 offset values:
// 0dB @ 1000MHz; 0.5dB @ 2000MHz; 1dB @ 3000MHz; 1.5dB @ 4000MHz
```

Visual C#
```
int pts = 4;
double[] freq = {1000, 2000, 3000, 4000};
float[] loss = {0, 0.5, 1, 1.5};
MyPTE1->SetOffsetValues(pts, freq, loss);
// Set 4 offset values:
// 0dB @ 1000MHz; 0.5dB @ 2000MHz; 1dB @ 3000MHz; 1.5dB @ 4000MHz
```

Matlab
```
pts=4
freq=[1000,2000,3000,4000]
loss=[0,0.5,1,1.5]
[status]=MyPTE1.SetOffsetValues(pts, freq, loss)
% Set 4 offset values:
% 0dB @ 1000MHz; 0.5dB @ 2000MHz; 1dB @ 3000MHz; 1.5dB @ 4000MHz
```

See Also

Enable Offset
Get Offset Values

2.7 - DLL - Peak & Average Power Sensor Measurement Functions

These functions apply to Mini-Circuits' PWR-xP Series peak & average power sensor models.

2.7 (a) - Set Sample Time

Declaration

```
short PeakPS_SetSampleTime(long ST)
```

Description

Sets the sample time to be captured by the power sensor measurements, from 10 µs to 1 s.

Parameters

Data Type	Variable	Description
long	ST	Sample time (µs) to be captured by the power sensor, from 10 to 1,000,000 µs

Return Values

Value	Description
0	Command failed
1	Command completed successfully

Examples

Visual Basic
```
status = MyPTE1.PeakPS_SetSampleTime(100)
```
Visual C++
```
status = MyPTE1->PeakPS_SetSampleTime(100);
```
Visual C#
```
status = MyPTE1.PeakPS_SetSampleTime(100);
```
Matlab
```
status = MyPTE1.PeakPS_SetSampleTime(100)
```

See Also

Get Sample Time

2.7 (b) - Get Sample Time

Declaration

```
long PeakPS_GetSampleTime()
```

Description

Returns the sample time to be captured by the power sensor measurements, from 10 µs to 1 s.

Return Values

Variable	Description
ST	Sample time (µs) to be captured by the power sensor, from 10 to 1,000,000 µs

Examples

Visual Basic
```
time = MyPTE1.PeakPS_GetSampleTime()
```
Visual C++
```
time = MyPTE1->PeakPS_GetSampleTime();
```
Visual C#
```
time = MyPTE1.PeakPS_GetSampleTime();
```
Matlab
```
time = MyPTE1.PeakPS_GetSampleTime()
```

See Also

Set Sample Time

2.7 (c) - Set Trigger Mode

Declaration

```
short PeakPS_SetTriggerMode(int TM)
```

Description

Sets the event which triggers the start of the power sensor's sample period.

Parameters

Variable	Value	Description
TM	0	Trigger not in use: Power sampling will start on request
	1	Internal trigger in use: Power sampling will start on the rising edge of the first pulse detected at the RF input
	2	External trigger in use: Power sampling will start when an external trigger input signal is detected

Return Values

Value	Description
0	Command failed
1	Command completed successfully

Examples

Visual Basic
```
status = MyPTE1.PeakPS_SetTriggerMode(1)
```
Visual C++
```
status = MyPTE1->PeakPS_SetTriggerMode(1);
```
Visual C#
```
status = MyPTE1.PeakPS_SetTriggerMode(1);
```
Matlab
```
status = MyPTE1.PeakPS_SetTriggerMode(1)
```

See Also

Get Trigger Mode

2.7 (d) - Get Trigger Mode

Declaration

```
short PeakPS_GetTriggerMode()
```

Description

Indicates the event which triggers the start of the power sensor's sample period.

Return Values

Value	Description
0	Trigger not in use: Power sampling will start on request
1	Internal trigger in use: Power sampling will start on the rising edge of the first pulse detected at the RF input
2	External trigger in use: Power sampling will start when an external trigger input signal is detected

Examples

Visual Basic
```
mode = MyPTE1.PeakPS_GetTriggerMode()
```
Visual C++
```
mode = MyPTE1->PeakPS_GetTriggerMode();
```
Visual C#
```
mode = MyPTE1.PeakPS_GetTriggerMode();
```
Matlab
```
mode = MyPTE1.PeakPS_GetTriggerMode()
```

See Also

Set Trigger Mode

2.7 (e) - Read Average Power

Declaration

```
float PeakPS_GetAvgPower()
```

Description

Returns the average power measurement in dBm for the complete sample period of the sensor. The compensation frequency must be set prior to reading power in order to achieve the specified accuracy.

Return Values

Value	Description
Power	Average power of the sampled signal

Examples

Visual Basic
```
Pwr = MyPTE1.PeakPS_GetAvgPower
```
Visual C++
```
Pwr = MyPTE1->PeakPS_GetAvgPower();
```
Visual C#
```
Pwr = MyPTE1.PeakPS_GetAvgPower();
```
Matlab
```
Pwr = MyPTE1.PeakPS_GetAvgPower
```

See Also

Set Compensation Frequency
Read Peak Power
Read Peak & Average Power Array

2.7 (f) - Read Peak Power

Declaration

```
float PeakPS_GetPeakPower()
```

Description

Returns the peak power measurement in dBm for the complete sample period of the sensor. The compensation frequency must be set prior to reading power in order to achieve the specified accuracy.

Return Values

Value	Description
Power	Peak power of the sampled signal

Examples

Visual Basic

```
Pwr = MyPTE1.PeakPS_GetPeakPower
```

Visual C++

```
Pwr = MyPTE1->PeakPS_GetPeakPower();
```

Visual C#

```
Pwr = MyPTE1.PeakPS_GetPeakPower();
```

Matlab

```
Pwr = MyPTE1.PeakPS_GetPeakPower
```

See Also

Set Compensation Frequency
Read Average Power
Read Peak & Average Power Array

2.7 (g) - Read Peak & Average Power Array

Declaration

```
short PeakPS_GetPower(ByRef int NoOfPoints, ByRef float PowerArray(),
                                                  ByRef float PeakPower)
```

Description

Captures a series of power measurements over the sensor's sample time to enable statistical analysis of the sampled signal. The number of discrete measurements taken is variable but approximately equally spaced in the time domain so that the number of measurements / total sample time = approximate time per measurement. The series of power measurements is returned as an array

Parameters

Variable	Description
NoOfPoints	Integer variable, passed by reference, to be updated by the sensor with the number of power measurements taken (the array size of PowerArray)
PowerArray()	Float array, passed by reference, to be updated by the sensor with the array of discrete power measurements (dBm), equally spaced over the sensor's sample time
PeakPower	Float variable, passed by reference, to be updated with the peak power (dBm) detected during the sensor's sample time

Return Values

Value	Description
Power	Peak power of the sampled signal

Examples

Visual Basic

```
Pwr = MyPTE1.PeakPS_GetPower(NoOfPoints, PowerArray(), PeakPower)
```

Visual C++

```
Pwr = MyPTE1->PeakPS_GetPower(NoOfPoints, PowerArray(), PeakPower);
```

Visual C#

```
Pwr = MyPTE1.PeakPS_GetPower(NoOfPoints, PowerArray(), PeakPower);
```

Matlab

```
[Pwr, NoOfPoints, PowerArray(), PeakPower] =
                    PTE1.PeakPS_GetPower(NoOfPoints, PowerArray(), PeakPower)
```

See Also

Set Compensation Frequency
Read Average Power
Read Peak Power

2.7 (h) - Send SCPI Command

Declaration

```
Short Send_SCPI(String SndSTR, ByRef String RetSTR)
```

Description

Sends a SCPI (Standard Commands for Programmable Instruments) command to the power sensor and collects the response. This function can be used to configure the peak power sensor using the ASCII / SCPI text commands detailed in SCPI - Peak & Average Power Sensor Measurement Functions.

Parameters

Data Type	Variable	Description
String	SndSTR	The SCPI command / query to send
String	RetSTR	String variable which will be updated with the power sensor's response to the command / query

Return Values

Data Type	Value	Description
Short	0	Command failed
	1	Command completed successfully

Examples

Visual Basic
```
Status = MyPTE1.Send_SCPI("MN?", RetStr)
               ' Send SCPI command to return the model name
```
Visual C++
```
Status = MyPTE1->Send_SCPI("MN?", RetStr);
               // Send SCPI command to return the model name
```
Visual C#
```
Status = MyPTE1.Send_SCPI("MN?", RetStr);
               // Send SCPI command to return the model name
```
Matlab
```
[Status, RetStr] = MyPTE1.Send_SCPI("MN?", RetStr)
               % Send SCPI command to return the model name
```

See Also

SCPI - Peak & Average Power Sensor Measurement Functions

2.8 - DLL - Ethernet Configuration Functions

These functions apply to Mini-Circuits' RC power sensor models with an Ethernet interface. The functions provide a means for identifying or configuring the Ethernet settings such as IP address, TCP/IP port and network gateway. They can only be called while the device is connected via the USB interface.

2.8 (a) - Get Ethernet Configuration

Declaration

```
int GetEthernet_CurrentConfig(ByRef int IP1, ByRef int IP2,
                              ByRef int IP3, ByRef int IP4,
                              ByRef int Mask1, ByRef int Mask2,
                              ByRef int Mask3, ByRef int Mask4,
                              ByRef int Gateway1, ByRef int Gateway2,
                              ByRef int Gateway3, ByRef int Gateway4)
```

Description

Returns the current IP configuration of the connected power sensor in a series of user defined variables. The settings checked are IP address, subnet mask and network gateway.

Parameters

Data Type	Variable	Description
int	IP1	Required. Integer variable which will be updated with the first (highest order) octet of the IP address.
int	IP2	Required. Integer variable which will be updated with the second octet of the IP address.
int	IP2	Required. Integer variable which will be updated with the third octet of the IP address.
int	IP4	Required. Integer variable which will be updated with the last (lowest order) octet of the IP address.
int	Mask1	Required. Integer variable which will be updated with the first (highest order) octet of the subnet mask.
int	Mask2	Required. Integer variable which will be updated with the second octet of the subnet mask.
int	Mask3	Required. Integer variable which will be updated with the third octet of the subnet mask.
int	Mask4	Required. Integer variable which will be updated with the last (lowest order) octet of the subnet mask.
int	Gateway1	Required. Integer variable which will be updated with the first (highest order) octet of the subnet mask.
int	Gateway2	Required. Integer variable which will be updated with the second octet of the network gateway.
int	Gateway3	Required. Integer variable which will be updated with the third octet of the network gateway.
int	Gateway4	Required. Integer variable which will be updated with the last (lowest order) octet of the network gateway.

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic

```
If MyPTE1.GetEthernet_CurrentConfig(IP1, IP2, IP3, IP4, M1, M2, M3, M4,
                                    _ GW1, GW2, GW3, GW4) > 0 Then

        MsgBox ("IP address: " & IP1 & "." & IP2 & "." & IP3 & "." & IP4)
        MsgBox ("Subnet Mask: " & M1 & "." & M2 & "." & M3 & "." & M4)
        MsgBox ("Gateway: " & GW1 & "." & GW2 & "." & GW3 & "." & GW4)

End If
```

Visual C++

```
if (MyPTE1->GetEthernet_CurrentConfig(IP1, IP2, IP3, IP4, M1, M2, M3, M4,
                                      _ GW1, GW2, GW3, GW4) > 0)
{
        MessageBox::Show("IP address: " + IP1 + "." + IP2 + "." + IP3 + "."
                                                                    _ + IP4);
        MessageBox::Show("Subnet Mask: " + M1 + "." + M2 + "." + M3+ "." +
                                                                    _ M4);
        MessageBox::Show("Gateway: " + GW1 + "." + GW2 + "." + GW3 + "." +
                                                                    _ GW4);

}
```

Visual C#

```
if (MyPTE1.GetEthernet_CurrentConfig(IP1, IP2, IP3, IP4, M1, M2, M3, M4,
                                     _ GW1, GW2, GW3, GW4) > 0)
{
        MessageBox.Show("IP address: " + IP1 + "." + IP2 + "." + IP3 + "."
                                                                    _ + IP4);
        MessageBox.Show("Subnet Mask: " + M1 + "." + M2 + "." + M3+ "." +
                                                                    _ M4);
        MessageBox.Show("Gateway: " + GW1 + "." + GW2 + "." + GW3 + "." +
                                                                    _ GW4);

}
```

Matlab

```
[status, IP1, IP2, IP3, IP4, M1, M2, M3, M4, GW1, GW2, GW3, GW4] =
MyPTE1.GetEthernet_CurrentConfig(IP1, IP2, IP3, IP4, M1, M2, M3, M4, GW1,
GW2, GW3, GW4)
if status > 0
        h = msgbox ("IP address: ", IP1, ".", IP2, ".", IP3, ".", IP4)
        h = msgbox ("Subnet Mask: ", M1, "." & M2, "." & M3, ".", M4)
        h = msgbox ("Gateway: ", GW1, ".", GW2, ".", GW3, ".", GW4)

end
```

See Also

Get MAC Address
Get TCP/IP Port

2.8 (b) - Get IP Address

Declaration

```
int GetEthernet_IPAddress(ByRef int b1, ByRef int b2, ByRef int b3,
                                                        ByRef int b4)
```

Description

This function returns the current IP address of the connected power sensor in a series of user defined variables (one per octet).

Parameters

Data Type	Variable	Description
int	IP1	Required. Integer variable which will be updated with the first (highest order) octet of the IP address (for example "192" for the IP address "192.168.1.0").
int	IP2	Required. Integer variable which will be updated with the second octet of the IP address (for example "168" for the IP address "192.168.1.0").
int	IP2	Required. Integer variable which will be updated with the third octet of the IP address (for example "1" for the IP address "192.168.1.0").
int	IP4	Required. Integer variable which will be updated with the last (lowest order) octet of the IP address (for example "0" for the IP address "192.168.1.0").

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
If MyPTE1.GetEthernet_CurrentConfig(IP1, IP2, IP3, IP4) > 0 Then
        MsgBox ("IP address: " & IP1 & "." & IP2 & "." & IP3 & "." & IP4)
End If
```
Visual C++
```
if (MyPTE1->GetEthernet_CurrentConfig(IP1, IP2, IP3, IP4) > 0)
{
        MessageBox::Show("IP address: " + IP1 + "." + IP2 + "." + IP3 + "."
                                                                   _ + IP4);
}
```
Visual C#
```
if (MyPTE1.GetEthernet_CurrentConfig(IP1, IP2, IP3, IP4) > 0)
{
        MessageBox.Show("IP address: " + IP1 + "." + IP2 + "." + IP3 + "."
                                                                   _ + IP4);
}
```
Matlab
```
[status, IP1, IP2, IP3, IP4] = MyPTE1.GetEthernet_CurrentConfig(IP1, IP2,
IP3, IP4)
if status > 0
        h = msgbox ("IP address: ", IP1, ".", IP2, ".", IP3, ".", IP4)
end
```

See Also

Get Ethernet Configuration
Get TCP/IP Port
Save IP Address
Save TCP/IP Port

2.8 (c) - Get MAC Address

Declaration

```
int GetEthernet_MACAddress(ByRef int MAC1, ByRef int MAC2,
        ByRef int MAC3, ByRef int MAC4, ByRef int MAC5, ByRef int MAC6)
```

Description

This function returns the MAC (media access control) address, the physical address, of the connected power sensor as a series of decimal values (one for each of the 6 numeric groups).

Parameters

Data Type	Variable	Description
int	MAC1	Required. Integer variable which will be updated with the decimal value of the first numeric group of the MAC address. For example: MAC address =11:47:165:103:137:171 MAC1=11
int	MAC2	Required. Integer variable which will be updated with the decimal value of the second numeric group of the MAC address. For example: MAC address =11:47:165:103:137:171 MAC2=47
int	MAC3	Required. Integer variable which will be updated with the decimal value of the third numeric group of the MAC address. For example: MAC address =11:47:165:103:137:171 MAC3=165
int	MAC4	Required. Integer variable which will be updated with the decimal value of the fourth numeric group of the MAC address. For example: MAC address =11:47:165:103:137:171 MAC4=103
int	MAC5	Required. Integer variable which will be updated with the decimal value of the fifth numeric group of the MAC address. For example: MAC address =11:47:165:103:137:171 MAC5=137
int	MAC6	Required. Integer variable which will be updated with the decimal value of the last numeric group of the MAC address. For example: MAC address =11:47:165:103:137:171 MAC6=171

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
If MyPTE1.GetEthernet_MACAddess(M1, M2, M3, M4, M5, M6) > 0 Then
    MsgBox ("MAC address: " & M1 & ":" & M2 & ":" & M3 & ":" & M4 & ":"
                                                      _ & M5 & ":" & M6)
End If
```
Visual C++
```
if (MyPTE1->GetEthernet_MACAddess(M1, M2, M3, M4, M5, M6) > 0)
{
    MessageBox::Show("MAC address: " + M1 + "." + M2 + "." + M3 + "."
                                  _ + M4 + "." + M5 + "." + M6);
}
```
Visual C#
```
if (MyPTE1.GetEthernet_MACAddess(M1, M2, M3, M4, M5, M6) > 0)
{
    MessageBox.Show("MAC address: " + M1 + "." + M2 + "." + M3 + "."
                                  _ + M4 + "." + M5 + "." + M6);
    }
```
Matlab
```
[status, M1, M2, M3, M4, M5, M6] = MyPTE1.GetEthernet_MACAddess(M1, M2, M3,
M4, M5, M6)
if status > 0
    h = msgbox ("MAC address: ", M1, ".", M2, ".", M3, ".", M4, ".", M5,
                                                              ".", M6)
end
```

See Also

Get Ethernet Configuration

2.8 (d) - Get Network Gateway

Declaration

```
int GetEthernet_NetworkGateway(ByRef int b1, ByRef int b2,
                               ByRef int b3, ByRef int b4)
```

Description

This function returns the IP address of the network gateway to which the power sensor is currently connected. A series of user defined variables are passed to the function to be updated with the IP address (one per octet).

Parameters

Data Type	Variable	Description
int	IP1	Required. Integer variable which will be updated with the first (highest order) octet of the IP address (for example “192” for the IP address “192.168.1.0”).
int	IP2	Required. Integer variable which will be updated with the second octet of the IP address (for example “168” for the IP address “192.168.1.0”).
int	IP2	Required. Integer variable which will be updated with the third octet of the IP address (for example “1” for the IP address “192.168.1.0”).
int	IP4	Required. Integer variable which will be updated with the last (lowest order) octet of the IP address (for example “0” for the IP address “192.168.1.0”).

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic

```
If MyPTE1.GetEthernet_NetworkGateway(IP1, IP2, IP3, IP4) > 0 Then
        MsgBox ("Gateway: " & IP1 & "." & IP2 & "." & IP3 & "." & IP4)
End If
```

Visual C++

```
if (MyPTE1->GetEthernet_NetworkGateway(IP1, IP2, IP3, IP4) > 0)
{
        MessageBox::Show("Gateway: " + IP1 + "." + IP2 + "." + IP3 + "."
                                                                 _ + IP4);
}
```

Visual C#

```
if (MyPTE1.GetEthernet_NetworkGateway(IP1, IP2, IP3, IP4) > 0)
{
        MessageBox.Show("Gateway: " + IP1 + "." + IP2 + "." + IP3 + "."
                                                                 _ + IP4);
}
```

Matlab

```
[status, IP1, IP2, IP3, IP4] = MyPTE1.GetEthernet_NetworkGateway(IP1, IP2,
IP3, IP4)
        if status > 0
        h = msgbox ("Gateway: ", IP1, ".", IP2, ".", IP3, ".", IP4)
end
```

See Also

Get Ethernet Configuration
Save Network Gateway

2.8 (e) - Get Subnet Mask

Declaration

```
int GetEthernet_SubNetMask(ByRef int b1, ByRef int b2, ByRef int b3,
                                                    ByRef int b4)
```

Description

This function returns the subnet mask used by the network gateway to which the power sensor is currently connected. A series of user defined variables are passed to the function to be updated with the subnet mask (one per octet).

Parameters

Data Type	Variable	Description
int	b1	Required. Integer variable which will be updated with the first (highest order) octet of the subnet mask (for example "255" for the subnet mask "255.255.255.0").
int	b2	Required. Integer variable which will be updated with the second octet of the subnet mask (for example "255" for the subnet mask "255.255.255.0").
int	b2	Required. Integer variable which will be updated with the third octet of the subnet mask (for example "255" for the subnet mask "255.255.255.0").
int	b4	Required. Integer variable which will be updated with the last (lowest order) octet of the subnet mask (for example "0" for the subnet mask "255.255.255.0").

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
If MyPTE1.GetEthernet_SubNetMask(b1, b2, b3, b4) > 0 Then
        MsgBox ("Subnet mask: " & b1 & "." & b2 & "." & b3 & "." & b4)
End If
```
Visual C++
```
if (MyPTE1->GetEthernet_SubNetMask(b1, b2, b3, b4) > 0)
{
        MessageBox::Show("Subnet mask: " + b1 + "." + b2 + "." + b3 + "."
                                                                 _ + b4);
}
```
Visual C#
```
if (MyPTE1.GetEthernet_SubNetMask(b1, b2, b3, b4) > 0)
{
        MessageBox.Show("Subnet mask: " + b1 + "." + b2 + "." + b3 + "."
                                                                 _ + b4);
}
```
Matlab
```
[status, b1, b2, b3, b4] = MyPTE1.GetEthernet_SubNetMask(b1, b2, b3, b4)
if status > 0
        h = msgbox ("Subnet mask: ", b1, ".", b2, ".", b3, ".", b4)
end
```

See Also

Get Ethernet Configuration
Save Subnet Mask

2.8 (f) - Get TCP/IP Port

Declaration

```
int GetEthernet_TCPIPPort(ByRef int port)
```

Description

This function returns the TCP/IP port used by the power sensor for HTTP communication. The default is port 80.

Note: Port 23 is reserved for Telnet communication and cannot be set as the HTTP port.

Parameters

Data Type	Variable	Description
int	port	Required. Integer variable which will be updated with the TCP/IP port.

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic

```
If MyPTE1.GetEthernet_SubNetMask(port) > 0 Then
    MsgBox ("Port: " & port)
End If
```

Visual C++

```
if (MyPTE1->GetEthernet_SubNetMask(port) > 0)
{
    MessageBox::Show("Port: " + port);
}
```

Visual C#

```
if (MyPTE1.GetEthernet_SubNetMask(port) > 0)
{
    MessageBox.Show("Port: " + port);
}
```

Matlab

```
[status, port] = MyPTE1.GetEthernet_SubNetMask(port)
if status > 0
    h = msgbox ("Port: ", port)
end
```

See Also

Get Ethernet Configuration
Save TCP/IP Port

2.8 (g) - Get DHCP Status

Declaration

```
int GetEthernet_UseDHCP()
```

Description

This function indicates whether the power sensor is using DHCP (dynamic host control protocol), in which case the IP configuration is derived from a network server; or user defined “static” IP settings.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
int	0	DHCP not in use (IP settings are static and manually configured)
int	1	DHCP in use (IP settings are assigned automatically by the network)

Example

Visual Basic
```
DHCPstatus = MyPTE1.GetEthernet_UseDHCP()
```
Visual C++
```
DHCPstatus = MyPTE1->GetEthernet_UseDHCP();
```
Visual C#
```
DHCPstatus = MyPTE1.GetEthernet_UseDHCP();
```
Matlab
```
DHCPstatus = MyPTE1.GetEthernet_UseDHCP
```

See Also

Get Ethernet Configuration
Use DHCP

2.8 (h) - Get Password Status

Declaration

```
int GetEthernet_UsePWD()
```

Description

This function indicates whether the power sensor is currently configured to require a password for HTTP/Telnet communication.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
int	0	Password not required
int	1	Password required

Example

Visual Basic
```
PWDstatus = MyPTE1.GetEthernet_UsePWD()
```
Visual C++
```
PWDstatus = MyPTE1->GetEthernet_UsePWD();
```
Visual C#
```
PWDstatus = MyPTE1.GetEthernet_UsePWD();
```
Matlab
```
PWDstatus = MyPTE1.GetEthernet_UsePWD
```

See Also

Get Password
Use Password
Set Password

2.8 (i) - Get Password

Declaration

```
int GetEthernet_PWD(ByRef string Pwd)
```

Description

This function returns the current password used by the power sensor for HTTP/Telnet communication. The password will be returned even if the device is not currently configured to require a password.

Parameters

Data Type	Variable	Description
string	Pwd	Required. string variable which will be updated with the password.

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
If MyPTE1.GetEthernet_PWD(pwd) > 0 Then
        MsgBox ("Password: " & pwd)
End If
```
Visual C++
```
if (MyPTE1->GetEthernet_PWD(pwd) > 0)
{
        MessageBox::Show("Password: " + pwd);
}
```
Visual C#
```
if (MyPTE1.GetEthernet_PWD(pwd) > 0)
{
        MessageBox.Show("Password: " + pwd);
}
```
Matlab
```
[status, pwd] = MyPTE1.GetEthernet_PWD(pwd)
if status > 0
        h = msgbox ("Password: ", pwd)
end
```

See Also

Get Password Status
Use Password
Set Password

2.8 (j) - Save IP Address

Declaration

```
int SaveEthernet_IPAddress(int b1, int b2, int b3, int b4)
```

Description

This function sets a static IP address to be used by the connected power sensor.

Note: this could subsequently be overwritten automatically if DHCP is enabled (see Use DHCP).

Parameters

Data Type	Variable	Description
int	IP1	Required. First (highest order) octet of the IP address to set (for example "192" for the IP address "192.168.1.0").
int	IP2	Required. Second octet of the IP address to set (for example "168" for the IP address "192.168.1.0").
int	IP2	Required. Third octet of the IP address to set (for example "1" for the IP address "192.168.1.0").
int	IP4	Required. Last (lowest order) octet of the IP address to set (for example "0" for the IP address "192.168.1.0").

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
status = MyPTE1.SaveEthernet_IPAddress(192, 168, 1, 0)
```
Visual C++
```
status = MyPTE1->SaveEthernet_IPAddress(192, 168, 1, 0);
```
Visual C#
```
status = MyPTE1.SaveEthernet_IPAddress(192, 168, 1, 0);
```
Matlab
```
status = MyPTE1.SaveEthernet_IPAddress(192, 168, 1, 0)
```

See Also

Get Ethernet Configuration
Get IP Address

2.8 (k) - Save Network Gateway

Declaration

```
int SaveEthernet_NetworkGateway(int b1, int b2, int b3, int b4)
```

Description

This function sets the IP address of the network gateway to which the power sensor should connect.

Note: this could subsequently be overwritten automatically if DHCP is enabled (see Use DHCP).

Parameters

Data Type	Variable	Description
int	IP1	Required. First (highest order) octet of the network gateway IP address (for example "192" for the IP address "192.168.1.0").
int	IP2	Required. Second octet of the network gateway IP address (for example "168" for the IP address "192.168.1.0").
int	IP2	Required. Third octet of the network gateway IP address (for example "1" for the IP address "192.168.1.0").
int	IP4	Required. Last (lowest order) octet of the network gateway IP address (for example "0" for the IP address "192.168.1.0").

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
status = MyPTE1.SaveEthernet_NetworkGateway(192, 168, 1, 0)
```
Visual C++
```
status = MyPTE1->SaveEthernet_NetworkGateway(192, 168, 1, 0);
```
Visual C#
```
status = MyPTE1.SaveEthernet_NetworkGateway(192, 168, 1, 0);
```
Matlab
```
status = MyPTE1.SaveEthernet_NetworkGateway(192, 168, 1, 0)
```

See Also

Get Ethernet Configuration
Get Network Gateway

2.8 (l) - Save Subnet Mask

Declaration

```
int SaveEthernet_SubnetMask(int b1, int b2, int b3, int b4)
```

Description

This function sets the subnet mask of the network to which the power sensor should connect.

Note: this could subsequently be overwritten automatically if DHCP is enabled (see Use DHCP).

Parameters

Data Type	Variable	Description
int	IP1	Required. First (highest order) octet of the subnet mask (for example “255” for the subnet mask “255.255.255.0”).
int	IP2	Required. Second octet of the subnet mask (for example “255” for the subnet mask “255.255.255.0”).
int	IP2	Required. Third octet of the subnet mask (for example “255” for the subnet mask “255.255.255.0”).
int	IP4	Required. Last (lowest order) octet of the subnet mask (for example “0” for the subnet mask “255.255.255.0”).

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic

```
status = MyPTE1.SaveEthernet_SubnetMask(255, 255, 255, 0)
```

Visual C++

```
status = MyPTE1->SaveEthernet_SubnetMask(255, 255, 255, 0);
```

Visual C#

```
status = MyPTE1.SaveEthernet_SubnetMask(255, 255, 255, 0);
```

Matlab

```
status = MyPTE1.SaveEthernet_SubnetMask(255, 255, 255, 0)
```

See Also

Get Ethernet Configuration
Get Subnet Mask

2.8 (m) - Save TCP/IP Port

Declaration

```
int SaveEthernet_TCPIPPort(int port)
```

Description

This function sets the TCP/IP port used by the power sensor for HTTP communication. The default is port 80.

Note: Port 23 is reserved for Telnet communication and cannot be set as the HTTP port.

Parameters

Data Type	Variable	Description
int	port	Required. Numeric value of the TCP/IP port.

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
status = MyPTE1.SaveEthernet_TCPIPPort(70)
```
Visual C++
```
status = MyPTE1->SaveEthernet_TCPIPPort(70);
```
Visual C#
```
status = MyPTE1.SaveEthernet_TCPIPPort(70);
```
Matlab
```
status = MyPTE1.SaveEthernet_TCPIPPort(70)
```

See Also

Get TCP/IP Port

2.8 (n) - Use DHCP

Declaration

```
int SaveEthernet_UseDHCP(int UseDHCP)
```

Description

This function enables or disables DHCP (dynamic host control protocol). When enabled the IP configuration of the power sensor is assigned automatically by the network server; when disabled the user defined “static” IP settings apply.

Parameters

Data Type	Variable	Description
int	UseDHCP	Required. Integer value to set the DHCP mode: 0 - DHCP disabled (static IP settings used) 1 - DHCP enabled (IP setting assigned by network)

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
status = MyPTE1.SaveEthernet_UseDHCP(1)
```
Visual C++
```
status = MyPTE1->SaveEthernet_UseDHCP(1);
```
Visual C#
```
status = MyPTE1.SaveEthernet_UseDHCP(1);
```
Matlab
```
status = MyPTE1.SaveEthernet_UseDHCP(1)
```

See Also

Get DHCP Status

2.8 (o) - Use Password

Declaration

```
int SaveEthernet_UsePWD(int UsePwd)
```

Description

This function enables or disables the password requirement for HTTP/Telnet communication with the power sensor.

Parameters

Data Type	Variable	Description
int	UseDHCP	Required. Integer value to set the password mode: 0 – Password not required 1 – Password required

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
status = MyPTE1.SaveEthernet_UsePWD(1)
```
Visual C++
```
status = MyPTE1->SaveEthernet_UsePWD(1);
```
Visual C#
```
status = MyPTE1.SaveEthernet_UsePWD(1);
```
Matlab
```
status = MyPTE1.SaveEthernet_UsePWD(1)
```

See Also

Get Password Status
Get Password
Set Password

2.8 (p) - Set Password

Declaration

```
int SaveEthernet_PWD(string Pwd)
```

Description

This function sets the password used by the power sensor for HTTP/Telnet communication. The password will not affect power sensor operation unless Use Password is also enabled.

Parameters

Data Type	Variable	Description
string	Pwd	Required. The password to set (20 characters maximum).

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
status = MyPTE1.SaveEthernet_PWD("123")
```
Visual C++
```
status = MyPTE1->SaveEthernet_PWD("123");
```
Visual C#
```
status = MyPTE1.SaveEthernet_PWD("123");
```
Matlab
```
status = MyPTE1.SaveEthernet_PWD("123")
```

See Also

Get Password Status
Get Password
Use Password

2.8 (q) - Get Ethernet Status

Declaration

```
int GetEthernet_EnableEthernet()
```

Description

Indicates whether Ethernet communication is enabled or disabled. Disabling Ethernet control is recommended when not needed, in order to reduce current consumption.

Parameters

Data Type	Variable	Description
None		

Return Values

Data Type	Value	Description
int	0	Ethernet control is disabled
int	1	Ethernet control is enabled

Example

Visual Basic
```
status = MyPTE1.GetEthernet_EnableEthernet()
```
Visual C++
```
status = MyPTE1->GetEthernet_EnableEthernet();
```
Visual C#
```
status = MyPTE1.GetEthernet_EnableEthernet();
```
Matlab
```
status = MyPTE1.GetEthernet_EnableEthernet
```

See Also

Enable / Disable Ethernet

2.8 (r) - Enable / Disable Ethernet

Declaration

```
int SaveEthernet_EnableEthernet(short Enable)
```

Description

Enable or disable Ethernet communication. Disabling Ethernet control is recommended when not needed, in order to reduce current consumption.

Parameters

Data Type	Variable	Description
short	Enable	Required. Integer value to enable / disable Ethernet control: 0 – Ethernet control disabled 1 – Ethernet control enabled

Return Values

Data Type	Value	Description
int	0	Command failed
int	1	Command completed successfully

Example

Visual Basic
```
status = MyPTE1.SaveEthernet_EnableEthernet(1)
```
Visual C++
```
status = MyPTE1->SaveEthernet_EnableEthernet(1);
```
Visual C#
```
status = MyPTE1.SaveEthernet_EnableEthernet(1);
```
Matlab
```
status = MyPTE1.SaveEthernet_EnableEthernet(1)
```

See Also

Get Ethernet Status

3 - Operating in a Linux Environment via USB

When connected by USB, the computer will recognize the power meter as a Human Interface Device (HID). In this mode of operation the following USB interrupt codes can be used. Alternatively, the device can be operated over an Ethernet TCP/IP Network (see Ethernet Control over IP Networks for details).

To open a connection to the power sensor, the Vendor ID and Product ID are required:

- Mini-Circuits Vendor ID: 0x20CE
- Power Sensor Product ID: 0x11

Communication with the power sensor is carried out by way of USB Interrupt. The transmitted and received buffer sizes are 64 Bytes each:

- Transmit Array = [Byte 0][Byte1][Byte2]…[Byte 63]
- Returned Array = [Byte 0][Byte1][Byte2]…[Byte 63]

In most cases, the full 64 byte buffer size is not needed so any unused bytes become “don’t care” bytes; they can take on any value without affecting the operation of the power sensor.

Worked examples can be found in the Programming Examples & Troubleshooting Guide, downloadable from the Mini-Circuits website. The examples use the libhid and libusb libraries to interface with the programmable attenuator as a USB HID (Human Interface Device).

3.1 - Interrupts - General Functions

#	Description	Command Code (Byte 0)
a	Get Device Model Name	104
b	Get Device Serial Number	105
c	Set Measurement Mode	15
d	Read Power	102
e	Get Internal Temperature	103
f	Get Firmware	99
g	Send SCPI Command	42 or 121

3.1 (a) - Get Device Model Name

Description

Returns the full Mini-Circuits part number of the connected power sensor.

Transmit Array

Byte	Data	Description
0	104	Interrupt code for Get Device Model Name
1- 63	Not significant	"Don't care" bytes, can be any value

Returned Array

Byte	Data	Description
0	104	Interrupt code for Get Device Model Name
1 to (n-1)	Model Name	Series of bytes containing the ASCII code for each character in the model name
n	0	Zero value byte to indicate the end of the model name
(n+1) to 63	Not significant	"Don't care" bytes, can be any value

Example

The following array would be returned for Mini-Circuits' PWR-8FS power sensor. See Appendix A for conversions between decimal, binary and ASCII characters.

Byte	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Description	Code	Char 1	Char 2	Char 3	Char 4	Char 5
Value	104	80	87	82	45	56
ASCII Character	N/A	P	W	R	-	8

Byte	Byte 6	Byte 7	Byte 8
Description	Char 6	Char 7	End Marker
Value	70	83	0
ASCII Character	F	S	N/A

See Also

Get Device Serial Number

3.1 (b) - Get Device Serial Number

Description

Returns the serial number of the connected power sensor.

Transmit Array

Byte	Data	Description
0	105	Interrupt code for Get Device Serial Number
1- 63	Not significant	"Don't care" bytes, can be any value

Returned Array

Byte	Data	Description
0	105	Interrupt code for Get Device Serial Number
1 to (n-1)	Serial Number	Series of bytes containing the ASCII code for each character in the serial number
n	0	Zero value byte to indicate the end of the serial number
(n+1) to 63	Not significant	"Don't care" bytes, can be any value

Example

The following example indicates that the current power sensor has serial number 1100040023. See Appendix A for conversions between decimal, binary and ASCII characters.

Byte	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Description	Code	Char 1	Char 2	Char 3	Char 4	Char 5
Value	105	49	49	48	48	48
ASCII Character	N/A	1	1	0	0	0

Byte	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Description	Char 6	Char 7	Char 8	Char 9	Char 10	End Marker
Value	52	48	48	50	51	0
ASCII Character	4	0	0	2	3	N/A

See Also

Get Device Model Name

3.1 (c) - Set Measurement Mode

Description

Sets the measurement mode of the power sensor between "low noise" and "fast sampling" modes; the default is "low noise" mode. Additionally, "fastest sampling" mode is also available for PWR-8FS. See the individual model datasheets for specifications.

This function does not apply to PWR-6G (now discontinued).

Transmit Array

Byte	Data	Description
0	15	Interrupt code for Set Measurement Mode
1	Mode	Integer value to set the required mode: 0 = Low noise mode 1 = Fast sampling mode 2 = Fastest sampling mode (PWR-8FS only)
2- 63	Not significant	“Don’t care” bytes, can be any value

Returned Array

Byte	Data	Description
0	15	Interrupt code for Set Measurement Mode
1 to 63	Not significant	“Don’t care” bytes, can be any value

Example

Byte	Data	Description
0	15	Interrupt code for Set Measurement Mode
1	1	Set power sensor to "fast sampling" mode
2- 63	Not significant	“Don’t care” bytes, can be any value

3.1 (d) - Read Power

Description

Returns the sensor power measurement based on a user specified compensation frequency.

The power value (in dBm) is represented in BYTE1 to BYTE6 of the returned array as a series of ASCII character codes in the format “+00.00”.

Transmit Array

Byte	Data	Description
0	102	Interrupt code for Read Power
1	Frequency_1	The compensation frequency to be used for the power reading, split over 2 bytes: Frequency_1 = INT (FREQUENCY / 256)
2	Frequency_2	The compensation frequency to be used for the power reading, split over 2 bytes: Frequency_2 = FREQUENCY - (Frequency_1 * 256)
3	Freq_Units	ASCII character code representing the units for the compensation frequency, the 2 options are: 75 = ASCII code for "K" (frequency units are KHz) 77 = ASCII code for "M" (frequency units are MHz)
4- 63	Not significant	“Don’t care” bytes, can be any value

Returned Array

Byte	Data	Description
0	102	Interrupt code for Read Power
1	Power_1	ASCII character code for the first character of the power reading
2	Power_2	ASCII character code for the second character of the power reading
3	Power_3	ASCII character code for the third character of the power reading
4	Power_4	ASCII character code for the fourth character of the power reading
5	Power_5	ASCII character code for the fifth character of the power reading
6	Power_6	ASCII character code for the sixth character of the power reading
7 to 63	Not significant	“Don’t care” bytes, can be any value

Example

The following transmit array would be sent to read the power for an expected signal at 1250 MHz:

Byte	Data	Description
0	102	Interrupt code for Read Power
1	4	Frequency_1 = INT (1250 / 256)
2	226	Frequency_2 = 1250 - (4 * 256)
3	77	ASCII code for "M" (frequency units are MHz)
4- 63	Not significant	“Don’t care” bytes, can be any value

The following array would be returned to indicate a power reading of -10.65dBm:

Byte	Data	Description
0	102	Interrupt code for Read Power
1	45	ASCII character code for "-"
2	49	ASCII character code for "1"
3	48	ASCII character code for "0"
4	46	ASCII character code for "."
5	54	ASCII character code for "6"
6	53	ASCII character code for "5"
7 to 63	Not significant	“Don’t care” bytes, can be any value

3.1 (e) - Get Internal Temperature

Description

This function returns the internal temperature of the power sensor in degrees Celsius, to two decimal places.

Transmit Array

Byte	Data	Description
0	103	Interrupt code for Get Internal Temperature
1-63	Not significant	“Don’t care” bytes, can be any value

Returned Array

Byte	Data	Description
0	103	Interrupt code for Get Internal Temperature
1	Temp_1	ASCII character code for the first character of the temperature reading
2	Temp_2	ASCII character code for the second character of the temperature reading
3	Temp_3	ASCII character code for the third character of the temperature reading
4	Temp_4	ASCII character code for the fourth character of the temperature reading
5	Temp_5	ASCII character code for the fifth character of the temperature reading
6	Temp_6	ASCII character code for the sixth character of the temperature reading
7-63	Not significant	“Don’t care” bytes, can be any value

Example

The below returned array would indicate a temperature of +28.43°C:

Byte	Data	Description
0	103	Interrupt code for Get Internal Temperature
1	43	ASCII character code for "+"
2	50	ASCII character code for "2"
3	56	ASCII character code for "8"
4	46	ASCII character code for "."
5	52	ASCII character code for "4"
6	51	ASCII character code for "3"
7 to 63	Not significant	“Don’t care” bytes, can be any value

3.1 (f) - Get Firmware

Description

Returns the internal firmware version of the power sensor.

Transmit Array

Byte	Data	Description
0	99	Interrupt code for Get Firmware
1- 63	Not significant	"Don't care" bytes, can be any value

Returned Array

Byte	Data	Description
0	99	Interrupt code for Get Firmware
1	Reserved	Internal code for factory use only
2	Reserved	Internal code for factory use only
3	Reserved	Internal code for factory use only
4	Reserved	Internal code for factory use only
5	Firmware Letter	ASCII code for the first character in the firmware revision identifier
6	Firmware Number	ASCII code for the second character in the firmware revision identifier
7-63	Not significant	"Don't care" bytes, could be any value

Example

The following returned array indicates that the power sensor has firmware version C3:

Byte	Data	Description
0	99	Interrupt code for Get Firmware
1	55	Internal code for factory use only
2	52	Internal code for factory use only
3	83	Internal code for factory use only
4	87	Internal code for factory use only
5	67	ASCII code for the letter "C"
6	51	ASCII code for the number 3
7-63	Not significant	"Don't care" bytes, could be any value

3.1 (g) - Send SCPI Command

Description

Sends a SCPI command to the power sensor and collects the returned acknowledgement. SCPI (Standard Commands for Programmable Instruments) is a common method for communicating with and controlling instrumentation products.

Transmit Array

Byte	Data	Description
0	42 or 121	Interrupt code for Send SCPI Command
1	SCPI_Length	The length (number of ASCII characters) of the SCPI string to send
2 to 63	SCPI Transmit String	The SCPI command to be sent represented as a series of ASCII character codes, one character code per byte

Returned Array

Byte	Data	Description
0	42 or 121	Interrupt code for Send SCPI Command
1	SCPI_Length	The length (number of ASCII characters) of the SCPI command sent in the transmit array
2 to 7	Transmit_Array	Bytes 2 to 7 of the transmit array repeated
8 to (n-1)	SCPI Return String	The SCPI return string, one character per byte, represented as ASCII character codes
n	0	Zero value byte to indicate the end of the SCPI return string
(n+1) to 63	Not significant	"Don't care" bytes, could be any value

Example (Get Model Name)

The SCPI command to request the model name is `:MN?` (see Get Model Name)

The ASCII character codes representing the 4 characters in this command should be sent in bytes 2 to 5 of the transmit array as follows:

Byte	Data	Description
0	42	Interrupt code for Send SCPI Command
1	4	Length of the SCPI command (four ASCII characters)
2	49	ASCII character code for :
3	77	ASCII character code for M
4	78	ASCII character code for N
5	63	ASCII character code for ?

See Also

SCPI Functions

3.2 - Interrupts - Ethernet Configuration Functions (RC Models Only)

	Description	Command Code	
		Byte 0	Byte 1
a	Set Static IP Address	250	201
b	Set Static Subnet Mask	250	202
c	Set Static Network Gateway	250	203
d	Set HTTP Port	250	204
e	Use Password	250	205
f	Set Password	250	206
g	Use DHCP	250	207
h	Get Static IP Address	251	201
i	Get Static Subnet Mask	251	202
j	Get Static Network Gateway	251	203
k	Get HTTP Port	251	204
l	Get Password Status	251	205
m	Get Password	251	206
n	Get DHCP Status	251	207
o	Get Dynamic Ethernet Configuration	253	
p	Get MAC Address	252	
q	Enable / Disable Ethernet	250	208
r	Reset Ethernet Configuration	101	101

3.2 (a) - Set Static IP Address

Description

Sets the static IP address to be used when DHCP (dynamic host control protocol) is disabled.

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	201	Interrupt code for Set IP Address
2	IP_Byte0	First byte of IP address
3	IP_Byte1	Second byte of IP address
4	IP_Byte2	Third byte of IP address
5	IP_Byte3	Fourth byte of IP address
6 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 - 63	Not significant	Any value

Example

To set the static IP address to 192.168.100.100, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	201	Interrupt code for Set IP Address
2	192	First byte of IP address
3	168	Second byte of IP address
4	100	Third byte of IP address
5	100	Fourth byte of IP address

See Also

Use DHCP
Get Static IP Address
Reset Ethernet Configuration

3.2 (b) - Set Static Subnet Mask

Description

Sets the static subnet mask to be used when DHCP (dynamic host control protocol) is disabled.

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	202	Interrupt code for Set Subnet Mask
2	IP_Byte0	First byte of subnet mask
3	IP_Byte1	Second byte of subnet mask
4	IP_Byte2	Third byte of subnet mask
5	IP_Byte3	Fourth byte of subnet mask
6 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 - 63	Not significant	Any value

Example

To set the static subnet mask to 255.255.255.0, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	202	Interrupt code for Set Subnet Mask
2	255	First byte of subnet mask
3	255	Second byte of subnet mask
4	255	Third byte of subnet mask
5	0	Fourth byte of subnet mask

See Also

Use DHCP
Get Static Subnet Mask
Reset Ethernet Configuration

3.2 (c) - Set Static Network Gateway

Description

Sets the network gateway IP address to be used when DHCP (dynamic host control protocol) is disabled.

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	203	Interrupt code for Set Network Gateway
2	IP_Byte0	First byte of network gateway IP address
3	IP_Byte1	Second byte of network gateway IP address
4	IP_Byte2	Third byte of network gateway IP address
5	IP_Byte3	Fourth byte of network gateway IP address
6 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 - 63	Not significant	Any value

Example

To set the static IP address to 192.168.100.0, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	203	Interrupt code for Set Network Gateway
2	192	First byte of IP address
3	168	Second byte of IP address
4	100	Third byte of IP address
5	0	Fourth byte of IP address

See Also

Use DHCP
Get Static Network Gateway
Reset Ethernet Configuration

3.2 (d) - Set HTTP Port

Description

Sets the port to be used for HTTP communication (default is port 80).

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	204	Interrupt code for Set HTTP Port
2	Port_Byte0	First byte (MSB) of HTTP port value: Port_Byte0 = INTEGER (Port / 256)
3	Port_Byte1	Second byte (LSB) of HTTP port value: Port_byte1 = Port - (Port_Byte0 * 256)
4 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 - 63	Not significant	Any value

Example

To set the HTTP port to 8080, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	204	Interrupt code for Set HTTP Port
2	31	Port_Byte0 = INTEGER (8080 / 256)
3	144	Port_byte1 = 8080 - (31 * 256)

See Also

Get HTTP Port
Reset Ethernet Configuration

3.2 (e) - Use Password

Description

Enables or disables the requirement to password protect the HTTP / Telnet communication.

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	205	Interrupt code for Use Password
2	PW_Mode	0 = password not required (default) 1 = password required
3 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 - 63	Not significant	Any value

Example

To enable the password requirement for Ethernet communication, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	205	Interrupt code for Use Password
2	1	Enable password requirement

See Also

Set Password
Get Password Status
Get Password
Reset Ethernet Configuration

3.2 (f) - Set Password

Description

Sets the password to be used for Ethernet communication (when password security is enabled, maximum 20 characters.

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	206	Interrupt code for Set Password
2	PW_Length	Length (number of characters) of the password
3 to n	PW_Char	Series of ASCII character codes (1 per byte) for the Ethernet password
n + 1 to 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 to 63	Not significant	Any value

Example

To set the password to *Pass_123*, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	206	Interrupt code for Set Password
2	8	Length of password (8 characters)
3	80	ASCII character code for P
4	97	ASCII character code for a
5	115	ASCII character code for s
6	115	ASCII character code for s
7	95	ASCII character code for _
8	49	ASCII character code for 1
9	50	ASCII character code for 2
10	51	ASCII character code for 3

See Also

Use Password
Get Password Status
Get Password
Reset Ethernet Configuration

3.2 (g) - Use DHCP

Description

Enables or disables DHCP (dynamic host control protocol). With DHCP enabled, the attenuators Ethernet / IP configuration is assigned by the network and any user defined static IP settings are ignored. With DHCP disabled, the user defined static IP settings are used.

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	207	Interrupt code for Use DHCP
2	DHCP_Mode	0 = DCHP disabled (static IP settings in use) 1 = DHCP enabled (default - dynamic IP in use)
3 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 - 63	Not significant	Any value

Example

To enable DHCP for Ethernet communication, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	207	Interrupt code for Use DHCP
2	1	Enable DHCP

See Also

Use DHCP
Get DHCP Status
Get Dynamic Ethernet Configuration
Reset Ethernet Configuration

3.2 (h) - Get Static IP Address

Description

Gets the static IP address (configured by the user) to be used when DHCP (dynamic host control protocol) is disabled.

Transmit Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	201	Interrupt code for Get IP Address
2 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	IP_Byte0	First byte of IP address
2	IP_Byte1	Second byte of IP address
3	IP_Byte2	Third byte of IP address
4	IP_Byte3	Fourth byte of IP address
5 - 63	Not significant	Any value

Example

The following returned array would indicate that a static IP address of 192.168.100.100 has been configured:

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	192	First byte of IP address
2	168	Second byte of IP address
3	100	Third byte of IP address
4	100	Fourth byte of IP address

See Also

Use DHCP
Set Static IP Address

3.2 (i) - Get Static Subnet Mask

Description

Gets the subnet mask (configured by the user) to be used when DHCP (dynamic host control protocol) is disabled.

Transmit Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	202	Interrupt code for Get Subnet Mask
2 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	IP_Byte0	First byte of subnet mask
2	IP_Byte1	Second byte of subnet mask
3	IP_Byte2	Third byte of subnet mask
4	IP_Byte3	Fourth byte of subnet mask
5 - 63	Not significant	Any value

Example

The following returned array would indicate that a subnet mask of 255.255.255.0 has been configured:

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	255	First byte of subnet mask
2	255	Second byte of subnet mask
3	255	Third byte of subnet mask
4	0	Fourth byte of subnet mask

See Also

Use DHCP
Set Static Subnet Mask

3.2 (j) - Get Static Network Gateway

Description

Gets the static IP address (configured by the user) of the network gateway to be used when DHCP (dynamic host control protocol) is disabled.

Transmit Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	203	Interrupt code for Get Network Gateway
2 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	IP_Byte0	First byte of IP address
2	IP_Byte1	Second byte of IP address
3	IP_Byte2	Third byte of IP address
4	IP_Byte3	Fourth byte of IP address
5 - 63	Not significant	Any value

Example

The following returned array would indicate that a network gateway IP address of 192.168.100.0 has been configured:

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	192	First byte of IP address
2	168	Second byte of IP address
3	100	Third byte of IP address
4	0	Fourth byte of IP address

See Also

Use DHCP
Set Static Network Gateway

3.2 (k) - Get HTTP Port

Description

Gets the port to be used for HTTP communication (default is port 80).

Transmit Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	204	Interrupt code for Get HTTP Port
2 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	Port_Byte0	First byte (MSB) of HTTP port value:
2	Port_Byte1	Second byte (LSB) of HTTP port value: Port = (Port_Byte0 * 256) + Port_Byte1
3 - 63	Not significant	Any value

Example

The following returned array would indicate that the HTTP port has been configured as 8080:

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	31	
2	144	Port = (31 * 256) + 144 = 8080

See Also

Set HTTP Port

3.2 (l) - Get Password Status

Description

Checks whether the attenuators has been configured to require a password for HTTP / Telnet communication.

Transmit Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	205	Interrupt code for Get Password Status
2 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	251	Interrupt code for Set Ethernet Configuration
1	PW_Mode	0 = password not required (default) 1 = password required
2 - 63	Not significant	Any value

Example

The following returned array indicates that password protection is enabled:

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	1	Password protection enabled

See Also

Use Password
Set Password
Get Password

3.2 (m) - Get Password

Description

Gets the password to be used for Ethernet communication (when password security is enabled, maximum 20 characters.

Transmit Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	206	Interrupt code for Get Password
2 to 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	PW_Length	Length (number of characters) of the password
2 to n	PW_Char	Series of ASCII character codes (1 per byte) for the Ethernet password
n to 63	Not significant	Any value

Example

The following returned array indicated that the password has been set to *Pass_123*:

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	8	Length of password (8 characters)
2	80	ASCII character code for P
3	97	ASCII character code for a
4	115	ASCII character code for s
5	115	ASCII character code for s
6	95	ASCII character code for _
7	49	ASCII character code for 1
8	50	ASCII character code for 2
9	51	ASCII character code for 3

See Also

Use Password
Set Password
Get Password Status

3.2 (n) - Get DHCP Status

Description

Checks whether DHCP (dynamic host control protocol) is enabled or disabled. With DHCP enabled, the attenuators Ethernet / IP configuration is assigned by the network and any user defined static IP settings are ignored. With DHCP disabled, the user defined static IP settings are used.

Transmit Array

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	207	Interrupt code for Get DHCP Status
2 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	251	Interrupt code for Set Ethernet Configuration
1	DCHP_Mode	0 = DCHP disabled (static IP settings in use) 1 = DHCP enabled (default - dynamic IP in use)
2 - 63	Not significant	Any value

Example

The following returned array indicates that DHCP is enabled:

Byte	Data	Description
0	251	Interrupt code for Get Ethernet Configuration
1	1	DHCP enabled

See Also

Use DHCP
Get Dynamic Ethernet Configuration

3.2 (o) - Get Dynamic Ethernet Configuration

Description

Returns the IP address, subnet mask and default gateway currently used by the device. If DHCP is enabled then these values are assigned by the network DHCP server. If DHCP is disabled then these values are the static configuration defined by the user.

Transmit Array

Byte	Data	Description
0	253	Interrupt code for Get Dynamic Ethernet Configuration
1 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	253	Interrupt code for Get Dynamic Ethernet Configuration
1	IP_Byte0	First byte of IP address
2	IP_Byte1	Second byte of IP address
3	IP_Byte2	Third byte of IP address
4	IP_Byte3	Fourth byte of IP address
5	SM_Byte0	First byte of subnet mask
6	SM_Byte1	Second byte of subnet mask
7	SM_Byte2	Third byte of subnet mask
8	SM_Byte3	Fourth byte of subnet mask
9	NG_Byte0	First byte of network gateway IP address
10	NG_Byte1	Second byte of network gateway IP address
11	NG_Byte2	Third byte of network gateway IP address
12	NG_Byte3	Fourth byte of network gateway IP address
13 - 63	Not significant	Any value

Example

The following returned array would indicate the below Ethernet configuration is active:

- IP Address: 192.168.100.100
- Subnet Mask: 255.255.255.0
- Network Gateway: 192.168.100.0

Byte	Data	Description
0	253	Interrupt code for Get Dynamic Ethernet Configuration
1	192	First byte of IP address
2	168	Second byte of IP address
3	100	Third byte of IP address
4	100	Fourth byte of IP address
5	255	First byte of subnet mask
6	255	Second byte of subnet mask
7	255	Third byte of subnet mask
8	0	Fourth byte of subnet mask
9	192	First byte of network gateway IP address
10	168	Second byte of network gateway IP address
11	100	Third byte of network gateway IP address
12	0	Fourth byte of network gateway IP address

See Also

Use DHCP
Get DHCP Status

3.2 (p) - Get MAC Address

Description

Returns the MAC address of the device.

Transmit Array

Byte	Data	Description
0	252	Interrupt code for Get MAC Address
1 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	252	Interrupt code for Get MAC Address
1	MAC_Byte0	First byte of MAC address
2	MAC_Byte1	Second byte of MAC address
3	MAC_Byte2	Third byte of MAC address
4	MAC_Byte3	Fourth byte of MAC address
5	MAC_Byte4	Fifth byte of MAC address
6	MAC_Byte5	Sixth byte of MAC address
7 - 63	Not significant	Any value

Example

The following returned array would indicate a MAC address (in decimal notation) of 11:47:165:103:137:171:

Byte	Data	Description
0	252	Interrupt code for Get MAC Address
1	11	First byte of MAC address
2	47	Second byte of MAC address
3	165	Third byte of MAC address
4	103	Fourth byte of MAC address
5	137	Fifth byte of MAC address
6	171	Sixth byte of MAC address

See Also

Get Dynamic Ethernet Configuration

3.2 (q) - Enable / Disable Ethernet

Description

Enable or disable Ethernet communication. Disabling Ethernet control is recommended when not needed, in order to reduce current consumption.

Transmit Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	208	Interrupt code for Enable / Disable Ethernet
2	Mode	0 = Ethernet disabled 1 = Ethernet enabled
3 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1 - 63	Not significant	Any value

Example

To enable Ethernet control, the transmit array is:

Byte	Data	Description
0	250	Interrupt code for Set Ethernet Configuration
1	208	Interrupt code for Enable / Disable Ethernet
2	1	Enable Ethernet control

3.2 (r) - Reset Ethernet Configuration

Description

Forces the device to reset and adopt the latest Ethernet configuration. Must be sent after any changes are made to the configuration.

Transmit Array

Byte	Data	Description
0	101	Reset Ethernet configuration sequence
1	101	Reset Ethernet configuration sequence
2	102	Reset Ethernet configuration sequence
3	103	Reset Ethernet configuration sequence
4 - 63	Not significant	Any value

Returned Array

Byte	Data	Description
0	101	Confirmation of reset Ethernet configuration sequence
1 - 63	Not significant	Any value

4 - Ethernet Control over IP Networks

The Mini-Circuits RC series of power sensors have a RJ45 connector for remote control over Ethernet TCP/IP networks. HTTP (Get/Post commands) and Telnet communication are supported. UDP transmission is also supported for discovering available power sensors on the network.

The device can be configured manually with a static IP address or automatically by the network using DHCP (Dynamic Host Control Protocol):

- Dynamic IP (factory default setting)
    - Subnet Mask, Network Gateway and local IP Address are assigned by the network server on each connection
    - The only user controllable parameters are:
        - TCP/IP Port for HTTP communication (the default is port 80)
        - Password (up to 20 characters; default is no password)
- Static IP
    - All parameters must be specified by the user:
        - IP Address (must be a legal and unique address on the local network)
        - Subnet Mask (subnet mask of the local network)
        - Network gateway (the IP address of the network gateway/router)
        - TCP/IP Port for HTTP communication (the default is port 80)
        - Password (up to 20 characters; default is no password)

Notes:
1. The TCP/IP port must be included in every HTTP command to the power sensor unless the default port 80 is used
2. The password must be included in every HTTP command to the power sensor if password security is enabled
3. Port 23 is reserved for Telnet communication
4. The device draws DC power through the USB type B connector; this can be connected to a computer or the AC mains adapter

4.1 - Configuring Ethernet Settings via USB

The sensor must be connected via the USB interface in order to configure the Ethernet settings. Following initial configuration, the device can be controlled via the Ethernet interface with no further need for a USB connection. The API DLL provides the functionality for configuring the Ethernet settings over a USB connection (see DLL Functions for Ethernet Configuration for full details).

4.2 - Ethernet Communication Methodology

Communication over Ethernet is accomplished using HTTP (Get/Post commands) or Telnet to send SCPI commands. The HTTP and Telnet protocols are both commonly supported and simple to implement in most programming languages. Any Internet browser can be used as a console/tester for HTTP control by typing the commands/queries directly into the address bar. The SCPI commands that can be sent to Mini-Circuits RC power sensor series are detailed in the SCPI Command Set for Ethernet Control section.

4.2 (a) - Setting Power Sensor Properties Using HTTP and SCPI

The basic format of the HTTP command to set the power sensor is:

http://ADDRESS:PORT/PWD;COMMAND

Where
- http:// is required
- ADDRESS = IP address (required)
- PORT = TCP/IP port (can be omitted if port 80 is used)
- PWD = Password (can be omitted if password security is not enabled)
- COMMAND = Command to send to the power sensor

Example 1:

http://192.168.100.100:800/PWD=123;:FREQ:1000

Explanation:
- The power sensor has IP address 192.168.100.100 and uses port 800
- Password security is enabled and set to “123”
- The command is to set the compensation frequency to 1000MHz (see below for the full explanation of all commands/queries)

Example 2:

http://10.10.10.10/:TEMP:FORMAT:F

Explanation:
- The power sensor has IP address 10.10.10.10 and uses the default port 80
- Password security is disabled
- The command is to set the temperature format to Fahrenheit (see below for the full explanation of all commands/queries)

4.2 (b) - Querying Power Sensor Properties Using HTTP and SCPI

The basic format of the HTTP command to query the power sensor is:

http://ADDRESS:PORT/PWD;QUERY?

Where

- http:// is required
- ADDRESS = IP address (required)
- PORT = TCP/IP port (can be omitted if port 80 is used)
- PWD = Password (can be omitted if password is security is not enabled)
- QUERY? = Query to send to the power sensor

Example 1:

http://192.168.100.100:800/PWD=123;:MN?

Explanation:

- The power sensor has IP address 192.168.100.100 and uses port 800
- Password security is enabled and set to “123”
- The query is to return the model name of the power sensor (see below for the full explanation of all commands/queries)

Example 2:

http://10.10.10.10/:POWER?

Explanation:

- The power sensor has IP address 10.10.10.10 and uses the default port 80
- Password security is disabled
- The query is to return the current power reading (see below for the full explanation of all commands/queries)

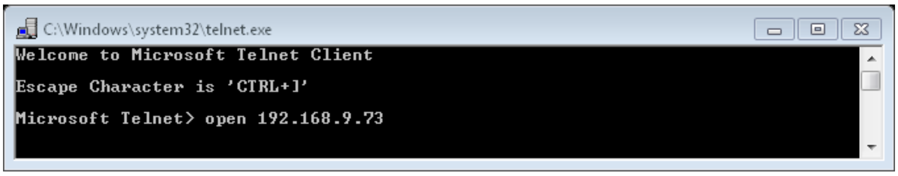
The device will return the result of the query as a string of ASCII characters.

4.2 (c) - Communication Using Telnet and SCPI

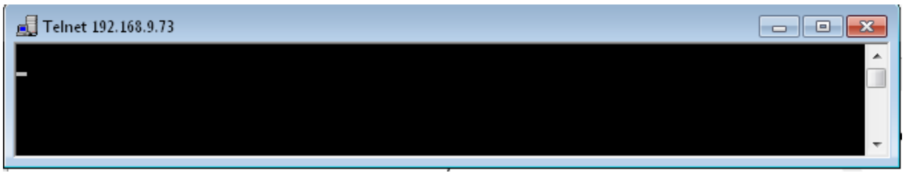
Communication with the device is started by creating a Telnet connection to the power sensor IP address. On successful connection the “line feed” character will be returned. If the power sensor has a password enabled then this must be sent as the first command after connection.

The full list of all SCPI commands and queries is detailed in the following sections. A basic example of the Telnet communication structure using the Windows Telnet Client is summarized below:

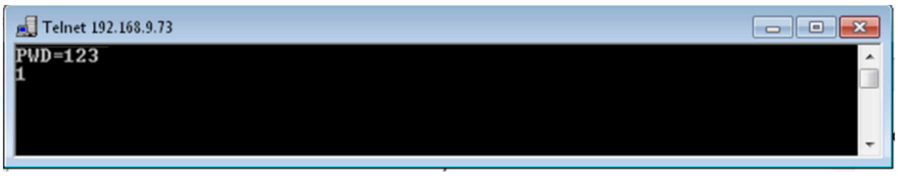
1) Set up Telnet connection to an power sensor with IP address 192.168.9.73



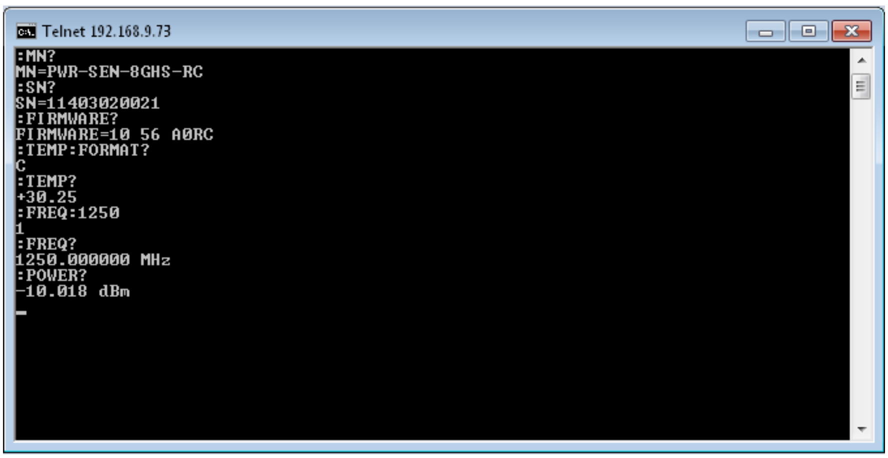
2) The “line feed” character is returned indicating the connection was successful:



3) The password (if enabled) must be sent as the first command; a return value of 1 indicates success:



4) Any number of commands and queries can be sent as needed:



4.3 - Device Discovery Using UDP

In addition to HTTP and Telnet, the RC series of Ethernet controlled power sensors also provide limited support of the UDP protocol for the purpose of “device discovery.” This allows a user to request the IP address and configuration of all Mini-Circuits power sensors connected on the network; full control of those units is then accomplished using HTTP or Telnet, as detailed previously.

Alternatively, the IP configuration can be identified or changed by connecting the power sensor with the USB interface (see Configuring Ethernet Settings).

Note: UDP is a simple transmission protocol that provides no method for error correction or guarantee of receipt.

UDP Ports

Mini-Circuits’ power sensors are configured to listen on UDP port 4950 and answer on UDP port 4951. Communication on these ports must be allowed through the computer’s firewall in order to use UDP for device discovery. If the sensor’s IP address is already known it is not necessary to use UDP.

Transmission

The command MCL_POWERSENSOR? should be broadcast to the local network using UDP protocol on port 4950.

Receipt

All Mini-Circuits power sensors that receive the request will respond with the following information (each field separated by CrLf) on port 4951:

- Model Name
- Serial Number
- IP Address/Port
- Subnet Mask
- Network Gateway
- MAC Address

Example

Sent Data:

MCL_POWERSENSOR?

Received Data:

Model Name: PWR-8GHS-RC
Serial Number: 11402120001
IP Address=192.168.9.101 Port: 80
Subnet Mask=255.255.0.0
Network Gateway=192.168.9.0
Mac Address=D0-73-7F-82-D8-01

Model Name: PWR-8GHS-RC
Serial Number: 11402120002
IP Address=192.168.9.102 Port: 80
Subnet Mask=255.255.0.0
Network Gateway=192.168.9.0
Mac Address=D0-73-7F-82-D8-02

Model Name: PWR-8GHS-RC
Serial Number: 11402120003
IP Address=192.168.9.103 Port: 80
Subnet Mask=255.255.0.0
Network Gateway=192.168.9.0
Mac Address=D0-73-7F-82-D8-03

5 - SCPI Command Summary

5.1 - Using SCPI Commands

This section details the control functions applicable to Mini-Circuits' RC series of Ethernet enabled power sensors, using SCPI communication. SCPI (Standard Commands for Programmable Instruments) is a common method for controlling instrumentation products.

The SCPI commands are sent as an ASCII text string (up to 63 characters) in the below format:

```
:COMMAND:[value]:[suffix]
```

Where:

COMMAND	= the command/query to send
[value]	= the value (if applicable) to set
[suffix]	= the units (if applicable) that apply to the value

Commands can be sent in upper or lower case and the return value will be an ASCII text string. If an unrecognized command/query is received the sensor will return:

```
-99 Unrecognized Command. Model=[ModelName] SN=[SerialNumber]
```

These functions can be called using HTTP get/post commands or Telnet over a TCP/IP network when the device is connected via the Ethernet RJ45 port (see Ethernet Control over IP Networks).

5.2 - SCPI - General Functions

These functions apply to all PWR Series power sensor models.

	Description	Command/Query
a	Get Model Name	:MN?
b	Get Serial Number	:SN?
c	Get Firmware	:FIRMWARE?
d	Get Temperature Units	:TEMP:FORMAT?
e	Set Temperature Units	:TEMP:FORMAT:[units]
f	Get Internal Temperature	:TEMP?

5.2 (a) - Get Model Name

Description

Returns the full Mini-Circuits part number of the power sensor.

Command Syntax

:MN?

Return string

MN=[model]

Variable	Description
[model]	Full model name of the ZTM-X system (for example, "ZTM-999")

Examples

string to Send	string Returned
:MN?	MN=PWR-8GHS-RC

HTTP Implementation: http://10.10.10.10/:MN?

See Also

Get Serial Number

5.2 (b) - Get Serial Number

Description

Returns the serial number of the power sensor.

Command Syntax

```
:SN?
```

Return string

```
SN=[serial]
```

Variable	Description
[serial]	Serial number of the power sensor (for example, “11401010001”)

Examples

string to Send	string Returned
:SN?	SN=11401010001

HTTP Implementation: `http://10.10.10.10/:SN?`

See Also

Get Model Name

5.2 (c) - Get Firmware

Description

Returns the firmware version of the power sensor.

Command Syntax

`:FIRMWARE?`

Return string

`FIRMWARE=[firmware]`

Variable	Description
[firmware]	Firmware version name (for example, “A1”)

Examples

string to Send	string Returned
:FIRMWARE?	FIRMWARE=A1

HTTP Implementation: http://10.10.10.10/:FIRMWARE?

5.2 (d) - Get Temperature Units

Description

Returns the units to be used by the power sensor's internal temperature sensor, either degrees Celsius or Fahrenheit.

Command Syntax

`:TEMP:FORMAT?`

Return string

`[units]`

Variable	Value	Description
[units]	F	Temperature measurements in degrees Fahrenheit
	C	Temperature measurements in degrees Celsius

Examples

string to Send	string Returned
:TEMP:FORMAT?	C

HTTP Implementation: http://10.10.10.10/:TEMP:FORMAT?

See Also

Set Temperature Units
Get Internal Temperature

5.2 (e) - Set Temperature Units

Description

Sets the units to be used by the power sensor's internal temperature sensor, either degrees Celsius or Fahrenheit.

Command Syntax

`:TEMP:FORMAT:[units]`

Variable	Value	Description
[units]	F	Set temperature measurements to degrees Fahrenheit
	C	Set temperature measurements to degrees Celsius

Return string

`[status]`

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:TEMP:FORMAT:F	1
:TEMP:FORMAT:C	1

HTTP Implementation: `http://10.10.10.10/:TEMP:FORMAT:C`

See Also

Get Temperature Units
Get Internal Temperature

5.2 (f) - Get Internal Temperature

Description

Returns the internal temperature of the power sensor in degrees Celsius or Fahrenheit, as defined by the user.

Command Syntax

`:TEMP?`

Return string

`[temperature]`

Variable	Description
[temperature]	The temperature returned from the specified sensor

Examples

string to Send	string Returned
:TEMP?	+25.50

HTTP Implementation: http://10.10.10.10/:TEMP?

See Also

Get Temperature Units
Set Temperature Units

5.3 - SCPI - Average Power Sensor Measurement Functions

These functions apply to the following Mini-Circuits' power sensor series:

- PWR-xGHS Series (CW average power sensors)
- PWR-xFS Series (fast sampling CW average power sensors)
- PWR-xRMS Series (true RMS power sensors)

	Description	Command/Query
a	Get Measurement Mode	:MODE?
b	Set Measurement Mode	:MODE:[speed]
c	Get Averaging Mode	:AVG:STATE?
d	Set Averaging Mode	:AVG:STATE:[mode]
e	Get Average Count	:AVG:COUNT?
f	Set Average Count	:AVG:COUNT:[count]
g	Get Compensation Frequency	:FREQ?
h	Set Compensation Frequency	:FREQ:[freq]
i	Read Average Power	:POWER?
j	Read Voltage	:VOLTAGE?

5.3 (a) - Get Measurement Mode

Description

Returns an integer indicating the measurement mode of the power sensor; "low noise", "fast sampling" or “fastest sampling”. The specifications for these modes are defined in the individual model datasheets. The default is "low noise" mode.

Command Syntax

:MODE?

Return string

[speed]

Variable	Value	Description
[speed]	0	Low noise mode
	1	Fast sampling mode
	2	Fastest sampling mode

Examples

string to Send	string Returned
:MODE?	1

HTTP Implementation: http://10.10.10.10/:MODE?

See Also

Set Measurement Mode

5.3 (b) - Set Measurement Mode

Description

Sets the measurement mode of the power sensor between "low noise", "fast sampling" and “fastest sampling” modes. The specifications for these modes are defined in the individual model datasheets. The default is "low noise" mode.

Command Syntax

`:MODE:[speed]`

Variable	Value	Description
[speed]	0	Low noise mode
	1	Fast sampling mode
	2	Fastest sampling mode

Return string

`[status]`

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:MODE:0	1
:MODE:1	1
:MODE:2	1

HTTP Implementation: http://10.10.10.10/:MODE:1

See Also

Get Measurement Mode

5.3 (c) - Get Averaging Mode

Description

Indicates whether "averaging" mode is currently enable for the power sensor. The default is averaging disabled.

Command Syntax

:AVG:STATE?

Return string

[mode]

Variable	Value	Description
[mode]	0	Averaging mode disabled
	1	Averaging mode enabled

Examples

string to Send	string Returned
:AVG:STATE?	1

HTTP Implementation: http://10.10.10.10/:AVG:STATE?

See Also

Set Averaging Mode
Get Average Count
Set Average Count

5.3 (d) - Set Averaging Mode

Description

Enables or disables the power sensor “averaging” mode.

Command Syntax

:AVG:STATE:[mode]

Variable	Value	Description
[mode]	0	Averaging mode disabled
	1	Averaging mode enabled

Return string

[status]

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:AVG:STATE:1	1

HTTP Implementation: http://10.10.10.10/:AVG:STATE:1

See Also

Get Averaging Mode
Get Average Count
Set Average Count

5.3 (e) - Get Average Count

Description

Returns the number of power readings (from 1 to 32) over which the measurement will be averaged when averaging mode is enabled.

Command Syntax

`:AVG:COUNT?`

Return string

`[count]`

Variable	Description
[count]	The number of power readings over which to average the measurement

Examples

string to Send	string Returned
:AVG:COUNT?	3

HTTP Implementation: `http://10.10.10.10/:AVG:COUNT?`

See Also

Get Averaging Mode
Set Averaging Mode
Set Average Count

5.3 (f) - Set Average Count

Description

Sets the number of power readings (from 1 to 32) over which to average the measurement when averaging mode is enabled. The default value is 1 (average the reading over 1 measurement).

Command Syntax

`:AVG:COUNT:[count]`

Variable	Description
[count]	The number of readings over which to average the power reading, from 1 to 32

Return string

`[status]`

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:AVG:COUNT:10	1

HTTP Implementation: `http://10.10.10.10/:AVG:COUNT:10`

See Also

Get Averaging Mode
Set Averaging Mode
Get Average Count

5.3 (g) - Get Compensation Frequency

Description

Returns the frequency currently in use for calibrating the input power measurements.

Command Syntax

:FREQ?

Return string

[freq]

Variable	Description
[freq]	The current compensation frequency in MHz

Examples

string to Send	string Returned
:FREQ?	2500.000000 MHz

HTTP Implementation: http://10.10.10.10/:FREQ?

See Also

Set Compensation Frequency
Read Power

5.3 (h) - Set Compensation Frequency

Description

Sets the compensation frequency for calibrating input power measurements. This parameter must be set to ensure measurement accuracy.

Note: This property will not filter out unwanted signals.

Command Syntax

:FREQ:[freq]

Variable	Description
[freq]	The current compensation frequency in MHz

Return string

[status]

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:FREQ:2500	1

HTTP Implementation: http://10.10.10.10/:FREQ:2500

See Also

Get Compensation Frequency
Read Power

5.3 (i) - Read Average Power

Description

Returns the input power measurement in dBm. The compensation frequency should be set prior to reading power in order to achieve the specified accuracy.

Command Syntax

:POWER?

Return string

[power]

Variable	Description
[power]	Input power measurement in dBm. Note: a power value of -99.000 dBm indicates that the input signal level is below the sensor's useable range.

Examples

string to Send	string Returned
:POWER?	-22.050 dBm

HTTP Implementation: http://10.10.10.10/:POWER?

See Also

Set Compensation Frequency
Read Voltage

5.3 (j) - Read Voltage

Description

Returns the raw voltage detected at the power sensor head. There is no calibration for temperature or frequency.

Command Syntax

:VOLTAGE?

Return string

[volts]

Variable	Description
[volts]	Input voltage reading in mV.

Examples

string to Send	string Returned
:VOLTAGE?	0.000105 Volt

HTTP Implementation: http://10.10.10.10/:VOLTAGE?

See Also

Read Power

5.4 - SCPI - Peak & Average Power Sensor Measurement Functions

These functions apply to Mini-Circuits' PWR-xP Series peak & average power sensor models.

	Description	Command/Query
a	Get Trigger Mode	:TRIGGER:MODE?
b	Set Trigger Mode	:TRIGGER:MODE:[type]
c	Get External Trigger Type	:TRIGGER:EXTERNAL:[type]?
d	Set External Trigger Type	:TRIGGER:EXTERNAL:[type]
e	Get Trigger Delay	:TRIGGER:DELAY?
f	Set Trigger Delay	:TRIGGER:DELAY:[time]
g	Get Trigger Output Mode	:EXTOUT:SELECT?
h	Set Trigger Output Mode	:EXTOUT:SELECT:[type]
i	Get Sample Time	:SAMPLETIME?
j	Set Sample Time	:SAMPLETIME:[time]
k	Get Compensation Frequency	:FREQ?
l	Set Compensation Frequency	:FREQ:[freq]
m	Read Peak & Average Power	:POWER?
n	Read Initial Power Array	:POWER_ARRAY?
o	Read Subsequent Power Arrays	:POWER_ARRAY_EP[package]?

5.4 (a) - Get Trigger Mode

Description

Indicates the event which triggers the start of the power sensor's sample period.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:TRIGGER:MODE?

Return string

[type]

Variable	Value	Description
[type]	FREE	Trigger not in use: Power sampling will start on request
	INTERNAL	Internal trigger in use: Power sampling will start on the rising edge of the first pulse detected at the RF input
	EXTERNAL	External trigger in use: Power sampling will start when an external trigger input signal is detected (see Get External Trigger Type)

Examples

string to Send	string Returned
:TRIGGER:MODE?	FREE
:TRIGGER:MODE?	INTERNAL
:TRIGGER:MODE?	EXTERNAL

HTTP Implementation: http://10.10.10.10/:TRIGGER:MODE?

See Also

Set Trigger Mode
Get External Trigger Type
Set External Trigger Type

5.4 (b) - Set Trigger Mode

Description

Sets the event which triggers the start of the power sensor's sample period.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:TRIGGER:MODE:[type]

Variable	Value	Description
[type]	FREE	Trigger not in use: Power sampling will start on request
	INTERNAL	Internal trigger in use: Power sampling will start on the rising edge of the first pulse detected at the RF input
	EXTERNAL	External trigger in use: Power sampling will start when an external trigger input signal is detected (see Set External Trigger Type)

Return string

[status]

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:TRIGGER:MODE:FREE	1
:TRIGGER:MODE:INTERNAL	1
:TRIGGER:MODE:EXTERNAL	1

HTTP Implementation: http://10.10.10.10/:TRIGGER:MODE:FREE

See Also

Get Trigger Mode
Get External Trigger Type
Set External Trigger Type

5.4 (c) - Get External Trigger Type

Description

Indicates whether power sampling will start on the rising or falling edge of an external trigger input signal when the power sensor is operating in external trigger mode.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:TRIGGER:EXTERNAL:[type]?

Variable	Value	Description
[type]	ONFALL	Query whether power sampling is to start on the falling edge of an external trigger input signal
	ONRISE	Query whether power sampling is to start on the rising edge of an external trigger input signal

Return string

[status]

Variable	Value	Description
[status]	0	The queried mode is not active
	1	The queried mode is active

Examples

string to Send	string Returned
:TRIGGER:EXTERNAL:ONFALL?	0
:TRIGGER:EXTERNAL:ONRISE?	1

HTTP Implementation: http://10.10.10.10/:TRIGGER:EXTERNAL:ONFALL?

See Also

Get Trigger Mode
Set Trigger Mode
Set External Trigger Type

5.4 (d) - Set External Trigger Type

Description

Sets whether power sampling will start on the rising or falling edge of an external trigger input signal when the power sensor is operating in external trigger mode.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

`:TRIGGER:EXTERNAL:[type]`

Variable	Value	Description
[type]	ONFALL	Power sampling will start on the falling edge of an external trigger input signal
	ONRISE	Power sampling will start on the rising edge of an external trigger input signal

Return string

`[status]`

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:TRIGGER:EXTERNAL:ONFALL	1
:TRIGGER:EXTERNAL:ONRISE	1

HTTP Implementation: http://10.10.10.10/:TRIGGER:EXTERNAL:ONFALL

See Also

Get Trigger Mode
Set Trigger Mode
Get External Trigger Type

5.4 (e) - Get Trigger Delay

Description

Indicates the delay to be applied between detection of an trigger signal and the start of power sampling.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:TRIGGER:DELAY?

Return string

[time]

Variable	Description
[time]	The delay time in microseconds (μS) to be applied between detection of an external trigger input signal and the start of power sampling

Examples

string to Send	string Returned
:TRIGGER:DELAY?	100

HTTP Implementation: http://10.10.10.10/:TRIGGER:DELAY?

See Also

Set Trigger Delay

5.4 (f) - Set Trigger Delay

Description

Sets the delay to be applied between detection of a trigger signal and the start of power sampling.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:TRIGGER:DELAY:[time]

Variable	Description
[time]	The delay time in microseconds (µS) to be applied between detection of an external trigger input signal and the start of power sampling

Return string

[status]

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:TRIGGER:DELAY:0	1
:TRIGGER:DELAY:100	1

HTTP Implementation: http://10.10.10.10/:TRIGGER:DELAY:0

See Also

Get Trigger Delay

5.4 (g) - Get Trigger Output Mode

Description

Indicates whether the trigger output port is to be used as a TTL trigger signal (corresponding to the start of the sample period) or a video output (corresponding to the modulation of the RF input).

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:EXTOUT:SELECT?

Return string

[mode]

Variable	Value	Description
[mode]	TRIG	Trigger output port will provide a TTL signal at the start of the sampling period
	VIDEO	Trigger output port will provide a video signal corresponding to the modulation of the RF input

Examples

string to Send	string Returned
:EXTOUT:SELECT?	TRIG
: EXTOUT:SELECT?	VIDEO

HTTP Implementation: http://10.10.10.10/:EXTOUT:TRIGGER?

See Also

Set Trigger Output Mode

5.4 (h) - Set Trigger Output Mode

Description

Sets whether the trigger output port is to be used as a TTL trigger signal (corresponding to the start of the sample period) or a video output (corresponding to the modulation of the RF input).

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:EXTOUT:SELECT:[mode]

Variable	Value	Description
[mode]	TRIG	Trigger output port will provide a TTL signal at the start of the sampling period
	VIDEO	Trigger output port will provide a video signal corresponding to the modulation of the RF input

Return string

[status]

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:EXTOUT:SELECT:TRIG	1
:EXTOUT:SELECT:VIDEO	1

HTTP Implementation: http://10.10.10.10/:EXTOUT:SELECT:TRIG

See Also

Get Trigger Output Mode

5.4 (i) - Get Sample Time

Description

Indicates the sample time to be captured by the power sensor measurements, from 10 µs to 1 s.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:SAMPLETIME?

Return string

[time]

Variable	Description
[time]	The sample time in microseconds (µS) to be captured by the power sensor

Examples

string to Send	string Returned
SAMPLETIME?	10

HTTP Implementation: http://10.10.10.10/:SAMPLETIME?

See Also

Set Sample Time

5.4 (j) - Set Sample Time

Description

Sets the sample time to be captured by the power sensor measurements, from 10 µs to 1 s.

Applies To

PWR-xP Series - Peak & average power sensors

Command Syntax

:SAMPLETIME:[time]

Variable	Description
[time]	The sample time in microseconds (µS) to be captured by the power sensor

Return string

[status]

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:SAMPLETIME:10	1
:SAMPLETIME:1000000	1

HTTP Implementation: http://10.10.10.10/:SAMPLETIME:10

See Also

Get Sample Time

5.4 (k) - Get Compensation Frequency

Description

Indicates the frequency currently set for calibrating the input power measurements.

Command Syntax

```
:FREQ?
```

Return string

```
[freq]
```

Variable	Description
[freq]	The current compensation frequency in MHz

Examples

string to Send	string Returned
:FREQ?	2500.000000 MHz

HTTP Implementation: http://10.10.10.10/:FREQ?

See Also

Set Compensation Frequency
Read Peak & Average Power

5.4 (l) - Set Compensation Frequency

Description

Sets the compensation frequency for calibrating input power measurements. This parameter must be set to ensure measurement accuracy.

Note: This property will not filter out unwanted signals.

Command Syntax

:FREQ:[freq]

Variable	Description
[freq]	The current compensation frequency in MHz

Return string

[status]

Variable	Value	Description
[status]	0	Command failed
	1	Command completed successfully

Examples

string to Send	string Returned
:FREQ:2500	1

HTTP Implementation: http://10.10.10.10/:FREQ:2500

See Also

Get Compensation Frequency
Read Peak & Average Power

5.4 (m) - Read Peak & Average Power

Description

Returns the peak and average power measurement in dBm (separated by a space character) for the complete sample period of the sensor. The compensation frequency must be set prior to reading power in order to achieve the specified accuracy.

Command Syntax

```
:POWER?
```

Return string

```
[peak] [avg]
```

Variable	Description
[peak]	Peak power measured in dBm over the full sample period
[avg]	Average power measurement in dBm over the full sample period

Examples

string to Send	string Returned
:POWER?	-2.050 -25.250

HTTP Implementation: http://10.10.10.10/:POWER?

See Also

Get Compensation Frequency
Set Compensation Frequency
Read Power Array

5.4 (n) - Read Initial Power Array - Ethernet Control Only

Description

Initiates the power measurement process and stores a series of discrete measurements, grouped in packages of 160 measurements, within the sensor. This initial query returns the number of packages (p), the total number of measurements (m) and the first 160 measured values. The compensation frequency must be set prior to reading power in order to achieve the specified accuracy.

The number of discrete measurements taken is variable but approximately equally spaced in the time domain so that the number of measurements / total sample time = approximate time per measurement.

If p is greater than 1 (ie: more than 160 discrete measurement values were stored) then the Read Subsequent Power Arrays query should be used to iteratively return each subsequent package of 160 measurement values.

Once all packages have been obtained, the full array of discrete power measurement values can be used for calculated analysis of the measured input signal, including pulse width, crest factor, rise / fall time and duty cycle for example.

Command Syntax

:POWER_ARRAY?

Return string

[p] [m] [val$_0$] [val$_1$] [val$_2$] …[val$_{159}$]

Variable	Description
[p]	The total number of packages (including this initial package) that the power measurement data has been split over
[m]	The total number of discrete measurements, contained in all p packages
val$_n$	The absolute power measurement (dBm) for this discrete reading, multiplied by 100 to give an integer value

Examples

The power measurement is split over 5 packages, containing 804 discrete values and the first 160 values are -60.25 dBm, -60.00 dBm, -60.50 dBm… -60.25 dBm:

string to Send	string Returned
:POWER_ARRAY?	5 804 -6025 -6000 -6050 … -6025

HTTP Implementation: http://10.10.10.10/:POWER_ARRAY?

See Also

Set Compensation Frequency
Read Peak & Average Power
Read Subsequent Power Arrays

5.4 (o) - Read Subsequent Power Arrays - Ethernet Control Only

Description

Follows on from Read Initial Power Array which initiates the power measurement process and stores a series of discrete measurements, grouped in packages of 160 measurements, within the sensor. The initial query returns the number of packages (p), the total number of measurements (m) and the first 160 measured values.

If p is greater than 1 (ie: more than 160 discrete measurement values were stored) then this Read Subsequent Power Arrays query should be used to iteratively return each subsequent package of 160 measurement values.

Once all packages have been obtained, the full array of discrete power measurement values can be used for calculated analysis of the measured input signal, including pulse width, crest factor, rise / fall time and duty cycle for example.

Command Syntax

:POWER_ARRAY_EP[n]?

Variable	Description
[n]	The package index from 1 to m. The total number of packets (m) and the initial package (with index 0) is returned by the Read Initial Power Array query.

Return string

[val_0] [val_1] [val_2] …[val_159]

Variable	Description
[val_n]	The absolute power measurement (dBm) for this discrete reading, multiplied by 100 to give an integer value

Examples

Read Initial Power Array indicated that the power measurement is split over 5 packages, containing 804 discrete values, and returned the first 160 values (package 0). The remaining 4 packages of data must therefore be requested. Packages 1 to 3 contain 160 data points each and the final package contains the final 4 data points.

string to Send	string Returned
:POWER_ARRAY?	5 804 -6025 -6000 -5975 … -5025
:POWER_ARRAY_EP1?	-5050 -5075 -5075 … -6000
:POWER_ARRAY_EP2?	-6025 -6000 -5975 … -5025
:POWER_ARRAY_EP3?	-5050 -5075 -5075 … -6000
:POWER_ARRAY_EP4?	-6025 -6050 -6075 -6075

See Also

Read Peak & Average Power
Read Initial Power Array