

Operation & Installation Manual



Model 4205 Series MMIC Digital Attenuator

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Frederick, Maryland
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SAFETY SUMMARY

DEFINITIONS.

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this manual.



An operating or maintenance procedure, practice, statement, condition, etc., which, if not strictly observed, could result in injury and/or death of personnel. Do not proceed beyond a WARNING symbol until all the indicated conditions have been fully understood and/or met.



An operating or maintenance procedure, practice, statement, condition, etc., which, if not strictly observed, could result in damage or destruction of the equipment or long-term health hazards to personnel. Do not proceed beyond a CAUTION symbol until all the indicated conditions have been fully understood and/or met.

NOTE

An essential operating or maintenance procedure, condition, or statement that must be highlighted.

GENERAL PRECAUTIONS.

The following are general precautions that are not related to any specific procedure and, therefore, do not appear elsewhere in this publication. These are precautions that personnel must understand and apply during various phases of instrument operation or service.



- Potentially lethal voltages are present in this instrument. Serious shock hazards from voltages above 70 volts may exist in any connector, chassis, or circuit board. Observe the following precautions:


- To minimize shock hazard, the instrument chassis must be connected to an electrical ground. Using the supplied three-conductor power cable ensures that the instrument can be firmly connected to the ac power source and electrical ground at a grounded power outlet. If using a 3-2 wire adapter be sure to connect the ground lead to earth ground.
- Use the buddy system any time work involving active high voltage components is required. Turn OFF the power before making/breaking any electrical connection. Regard any exposed connector, terminal board, or circuit board as a possible shock hazard. DO NOT replace any component or module with power applied.
- If test conditions to live equipment are required, ground the test equipment before probing the voltage or signal to be tested.
- Personnel working with or near high voltage should be familiar with modern methods of resuscitation.
- DO NOT wear jewelry (rings, bracelets, metal watches, and/or neck chains) while working on exposed equipment. Be very cautious about using hand tools near exposed backplanes, bus bars, and/or power supply terminals. Use properly insulated tools. When making test connections to the power supply terminals and bus bars, use only insulated probe tips.
- Verify that the instrument is set to match the available line voltage and the correct fuse is installed.
- DO NOT install substitute parts or perform any unauthorized modification to this instrument. Contact API Weinschel to acquire any information on replacement parts or returning the instrument for repair. Unauthorized modification can cause injury to personnel and/or destruction of the instrument.
- Operating personnel must not remove instrument covers. Component replacement or adjustments MUST BE performed by qualified service personnel.
- DO NOT operate the instrument near or in the presence of flammable gases or fumes.

DETAILED PRECAUTIONS.

The following WARNINGS, CAUTIONS and NOTES appear throughout the text of this manual and are repeated here for emphasis.



CAUTION

- All procedures and/or steps identified as  must be followed exactly as written and according to industry accepted ESDS device handling procedures. Failure to comply WILL RESULT in ESDS damage.
- DO NOT use a nylon bristle brush in any solvent as the bristles may dissolve and cause damage to the circuit card or component.
- DO NOT use ultrasonic cleaning on parts or assemblies containing electrical or electronic components.
- DO NOT bend pins of electrical connectors when using fiber-bristle brush.
- Compressed air used for cleaning and/or drying can create airborne particles that may enter the eye. Goggles/faceshields should be worn. DO NOT direct air stream towards self or other personnel. Pressure should be restricted to a maximum of 15 psi to avoid personal injury.
- Under no circumstances should a wire brush, steel wool, or abrasive compound be used on any surface. Using these items will cause extensive damage to the instrument's surface.

NOTE

DO NOT return any instrument or component to Weinschel Corporation without receiving prior factory authorization.

SAFETY SYMBOLS.

The following symbols are used to identify safety hazards found throughout this publication and/or located on the instrument.

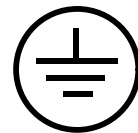
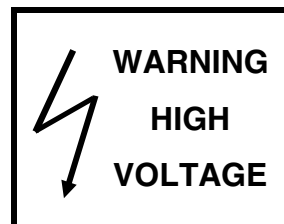


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ICD, ATTENUATOR PROGRAMMABLE, MODEL 4205-63.5	089-4460A
ICD, ATTENUATOR PROGRAMMABLE, MODEL 4205-95.5	089-4465F

1. GENERAL INFORMATION:

1-1 PURPOSE: This manual contains setup and operation information for the API Weinschel Model 4205 Series, MMIC Digital Attenuators.

1-2 SCOPE: This manual is to be used in conjunction with the operation and installation of the Model 4205 Series. The manual also provides a description of the assembly; block diagrams; and general maintenance procedures to maintain the assembly.

1-3 EQUIPMENT DESCRIPTION: API Weinschel Model 4205 series of MMIC Digital Attenuators operates over the 0.2 to 6 GHz frequency range and is in a variety of attenuation ranges up to 95.5 dB in 0.5 dB steps. These units can be controlled using either standard TTL or USB interfaces.



1-4. UNPACKING AND INSPECTION: Upon unpacking the equipment, retain the shipping container and packing material for future shipment for recalibration. Perform the following initial inspection:

- a. Carefully look at the outside of the shipping container for discoloration, stains, charring, or other signs of exposure to excessive heat, moisture, or liquid chemicals. Check for any physical damage to the shipping container such as dents, snags, rips, crushed sections or areas, or similar signs of excessive shock or careless handling.
- b. With the equipment and any accessory package removed from the shipping container, check each item against the packing list or Items Supplied List. If any items are missing, contact the API Weinschel Customer Service Department.
- c. Carefully inspect the equipment looking for dents, deep scratches, damaged or loose connector, or any other signs of physical abuse or careless handling. If damage is found, forward an immediate request to the delivering carrier to perform an inspection and prepare a concealed-damage report. DO NOT destroy any packing material until it has been examined by an agent of the carrier. Concurrently, report the nature and extent of damage to API Weinschel, giving equipment model and serial numbers, so that necessary action can be taken. Under U.S. shipping regulations, damage claims must be collected by the consignee; DO NOT return the equipment to API Weinschel until a claim for damages has been established.

1-5. RESHIPMENT: Use the best packaging materials available to protect the unit during storage or reshipment. When possible, use the original packing container and cushioning material. If the original packing materials are not available, use the following procedure:

- a. Wrap the storage cases in sturdy paper or plastic;
- b. Place the wrapped storage cases in a strong shipping container and place a layer of shock-absorbing material (3/4 inch minimum thickness) around all sides of the unit to provide a firm cushion and to prevent movement inside the container.
- c. If shipping the unit for service, attach a tag to indicate:
 1. model and serial numbers
 2. service required
 3. description of malfunction
 4. return address
 5. authorization to conduct repairs
 6. return authorization number
- d. Thoroughly seal the shipping container and mark it FRAGILE. Ship to:


API Weinschel, Inc.
 Attn: Customer Service Department
 5305 Spectrum Drive
 Frederick, MD 21703-7362
 or to an authorized sales representative.

1-6. STORAGE: Storage of the Model 4205 is possible for extended periods without incurring damage to internal circuitry if the Model 4205 is packaged according to the instructions above. The safe limits for storage environment are as follows:

Temperature: -67° to +167 °F (-55° to +75°C)
Humidity: 5% to 85% (non-condensing)



1-7. RELATED MANUALS: The following manuals contain information that may be used in conjunction with this manual to operate, service, or calibrate this instrument.

<u>Manual</u>	<u>Title</u>
IM-611	Aeroflex USB Control Center Software, P/N 189-164

1-8. ELECTROSTATIC DISCHARGE SENSITIVE: The equipment documented in this manual contains certain Electrostatic Discharge Sensitive (ESDS) components or parts. Therefore, certain procedures/steps are identified by the use of the symbol .  This symbol is used in two ways:



All procedures and/or steps identified as must be followed exactly as written and according to accepted ESDS device handling procedures. Failure to comply **WILL RESULT** in ESDS damage.

- a. When the ESDS symbol is placed between a paragraph number and title  all of that paragraph, including all subparagraphs, is considered ESDS device handling procedure.
- b. When the ESDS symbol is placed between a procedure/step number and the text  , all of that procedure is considered an ESDS device handling procedure.

1-9. ABBREVIATIONS AND ACRONYMS: The following list contains abbreviations used throughout this manual. Abbreviations and acronyms that are not listed conform to MIL-STD-12D.

ESDS	Electrostatic Discharge Sensitive
TBD	To Be Determined

1-10. SAFETY CONSIDERATIONS: The Model 4205 Series and all related documentation must be reviewed for familiarization with safety markings and procedures before any operation and/or service. Refer to the SAFETY SUMMARY located at the beginning of this manual for a summary of safety information and procedures. Following these simple safety precautions will ensure safe operation and service of the unit.

2. SPECIFICATIONS:

2-1. GENERAL SPECIFICATIONS:

Power Requirements	5 VDC @ 50 mA typical								
Environmental	Operating Temperature 0° to +70°C Storage Temperature: -67° to +167 °F (-55° to +75°C) Humidity: 5% to 85% (non-condensing) Altitude: 40,000' (12,192M)								
Parallel TTL	Connector: 10 pin .025 square post header on .1 center. Mates with Amp connector 746285-1 or equivalent (one mating connector included with each unit).								
USB 2.0	Connector: USB, MINI B								
RF Characteristics & Physical Dimensions	Refer to API Weinschel ICD/Specification Drawings: <table><tr><td><u>Model</u></td><td><u>Specification/ICD #</u></td></tr><tr><td>4205-31.5</td><td>089-4451</td></tr><tr><td>4205-63.5</td><td>089-4460</td></tr><tr><td>4205-95.5</td><td>089-4465</td></tr></table>	<u>Model</u>	<u>Specification/ICD #</u>	4205-31.5	089-4451	4205-63.5	089-4460	4205-95.5	089-4465
<u>Model</u>	<u>Specification/ICD #</u>								
4205-31.5	089-4451								
4205-63.5	089-4460								
4205-95.5	089-4465								

2-2. CONFIGURATION MATRIX:

4205

-

XX.5

Basic
Model
Number

Attenuator
dB Value
(refer to chart below)

Example: 4205-95.5

Model Number	Attenuation Cells (dB)	Attenuation Range / Step Size
4305-31.5	0.5, 1, 2, 4, 8 & 16	31.5 in 0.5 dB steps
4305-63.5	0.5, 1, 2, 4, 8, 16 & 32	63.5 in 0.5 dB steps
4305-95.5	0.5, 1, 2, 4, 8, 16, 32 & 32	95.5 in 0.5 dB steps

3. INSTALLATION & OPERATION:

3-1. MOUNTING: Each Digital Attenuator is supplied with 12 mounting holes (4-40 UNC-2B x 4.1 [0.16 Deep]) located on the front, back, top and bottom end of the attenuator. Refer to the appropriate API Weinschel Specification/ICD drawing for mounting hole location.

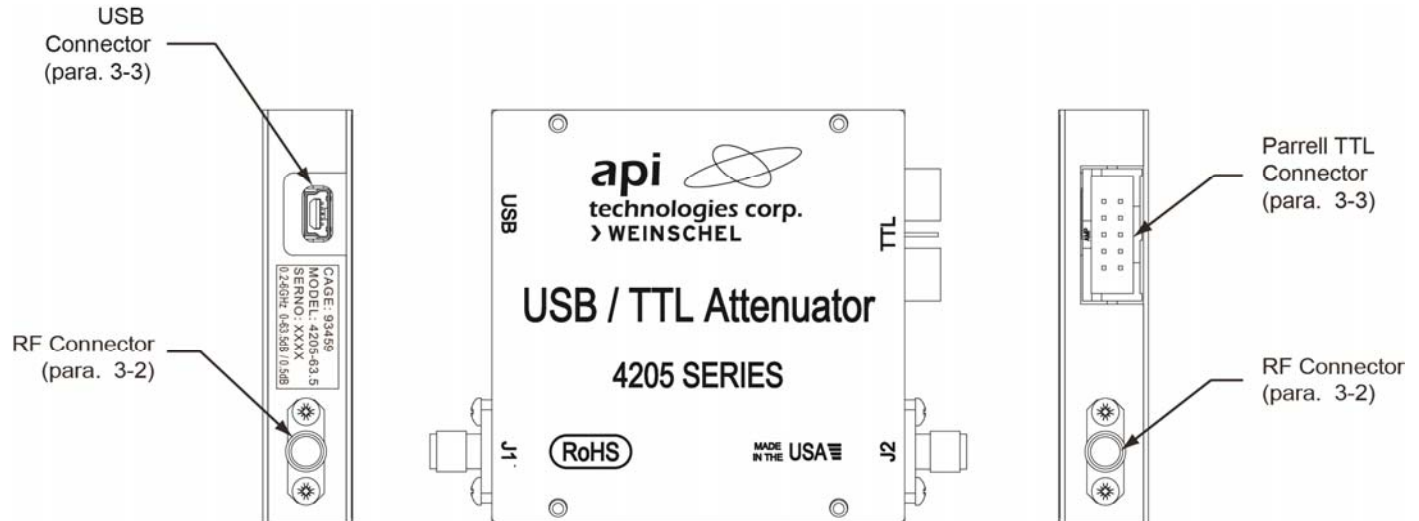


Figure 1. Connector Location



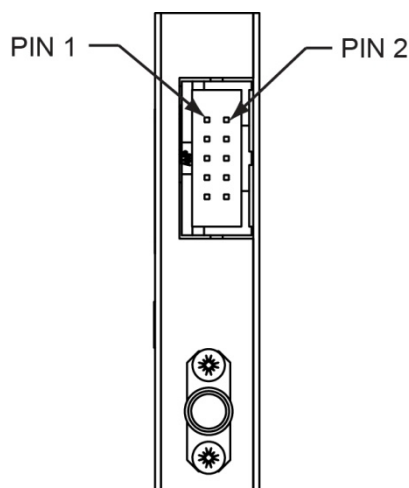
CAUTION

- When applying an RF signal to the RF INPUT connector, DO NOT exceed the maximum allowable power level specifications of the unit.
- Do not over torque the SMA connectors more than 7 inch pounds. Damage may occur.

3-2. RF CONNECTORS & CABLE INSTALLATION: The Model 4205 series contains two SMA female connectors labeled J1 and J2 that mate nondestructively with SMA male connectors per MIL-STD-39012. Care should be taken to prevent strain on the interconnecting cables, since damage here may not always be apparent. Check the attaching RF cables and the SMA connectors for signs of cracked insulation and/or bent or worn pins prior to connection. Tests show that connectors must be clean for accuracy and stability. This requires an inspection and cleaning of each connector immediately before use. When cleaning precautions are observed regularly, connectors can maintain their stability for over several thousand connection cycles. API Weinschel recommends a torque value of 7 to 10 inch pounds when connecting any RF cable to the attenuator's RF connectors.

3-3 CONTROL CONNECTORS: Model 4205 attenuators can be controlled in one of two modes: parallel TTL or USB. The TTL control connector is a standard 10-pin ribbon cable connector that mates with an AMP 746285-1 style connector. The USB connector is a standard 5-pin USB mini B series. NOTE: Only one interface should be connected at a time. DO NOT supply a connection to both control ports simultaneously.

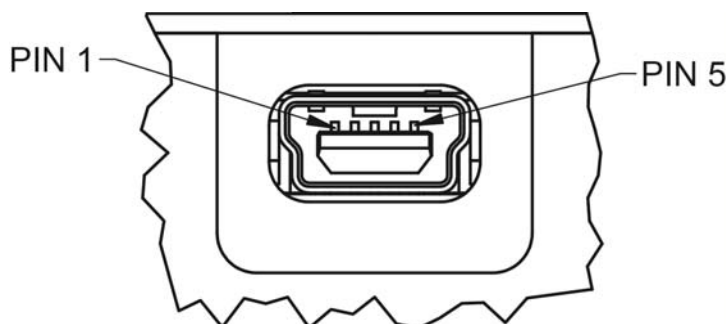
3-3.1. Parallel TTL Connector (J4): In parallel TTL mode up to eight TTL control signals (model dependent) are used to activate or deactivate a particular attenuation cell. A TTL high will enable the attenuation state for the cell, whereas a TTL low will maintain the cell in its zero attenuation state. In addition, there are two DC supply voltage pins which are used to supply power to the unit.



Pin	4205-31.5 Signal	4205-63.5 Signal	4205-95.5 Signal
1	0.5 dB	0.5 dB	0.5 dB
2	1 dB	1 dB	1 dB
3	2 dB	2 dB	2 dB
4	4 dB	4 dB	4 dB
5	8 dB	8 dB	8 dB
6	16 dB	16 dB	16 dB
7	NC	32 dB	32 dB
8	NC	NC	32 dB
9	+5VDC	+5VDC	+5VDC
10	GND	GND	GND

Note: NC pins are Do Not Connect

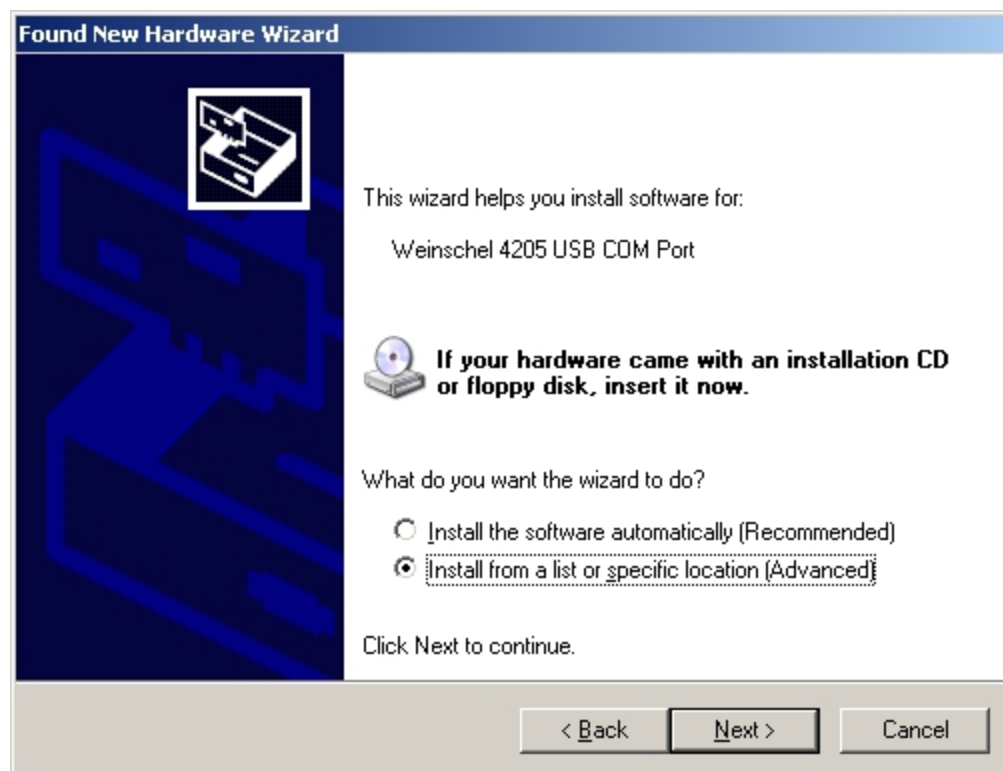
3-3.2. USB Connector (J3): In USB mode the attenuator is controlled and powered via a standard USB 2.0 connection to a USB host. The 4205 operates as a USB CDC device, so it may be controlled via any software that can communicate to a standard COM port. Programming is done via simple ASCII strings to control the device (see the Command section paragraph 3-4).



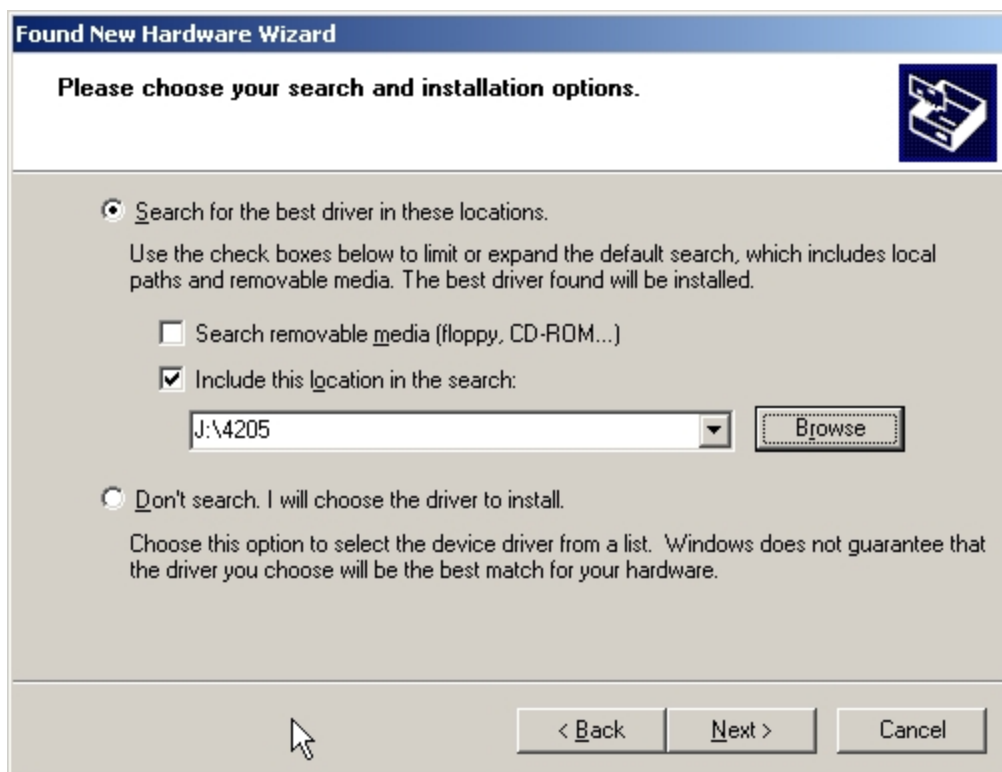
For ease of use, the 4205 has two modes of operation: console and raw mode. Console mode provides a simple command-line based interface that can be used in conjunction with any standard terminal emulator program. Console mode sends command prompts ('>'), echoes received characters, issues error messages, and supports the backspace key for simple editing, while raw mode is more suitable for programming. By default, the unit is shipped with Console mode enabled, but this operation can be change by the user (see the CONSOLE command for more details).

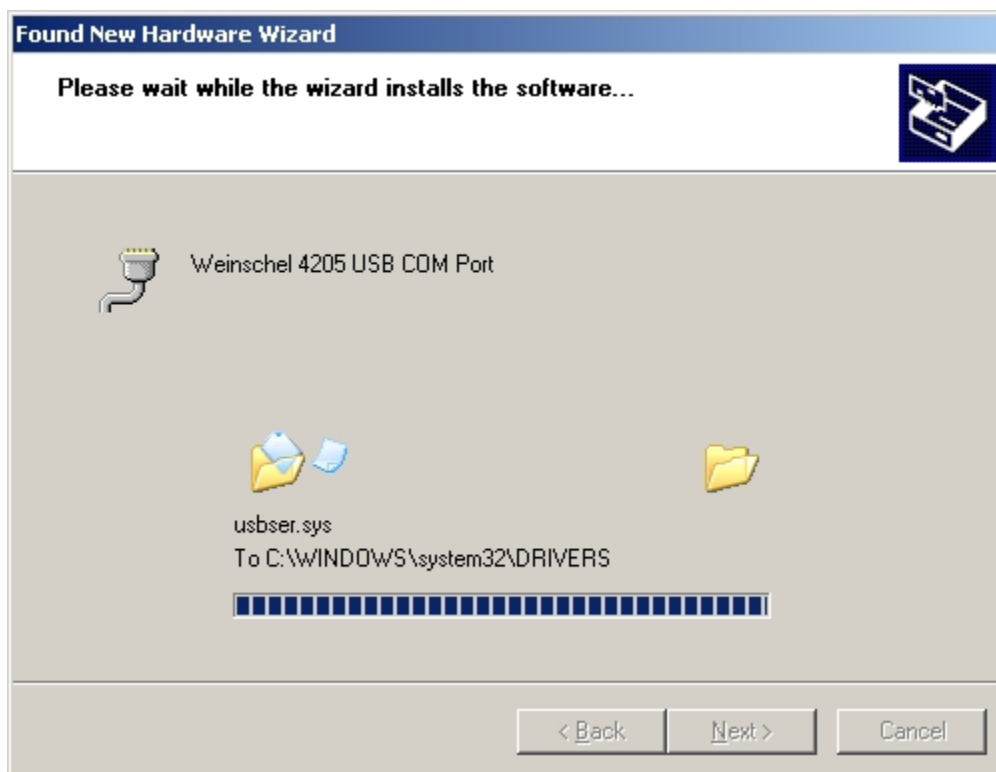
3-4. USB DRIVER INSTALLATION: When you connect the 4205 to the USB for the first time, you should be presented with the New Hardware Wizard.

Follow the steps shown below to install the USB CDC .inf file. (NOTE: A copy of the INF information is included in paragraph 3-6 of this document. If you do not have an electronic copy, you can create one using Notepad. Copy and paste the information into Notepad and save it as a plain text file with the name AW4205_CDC.INF)

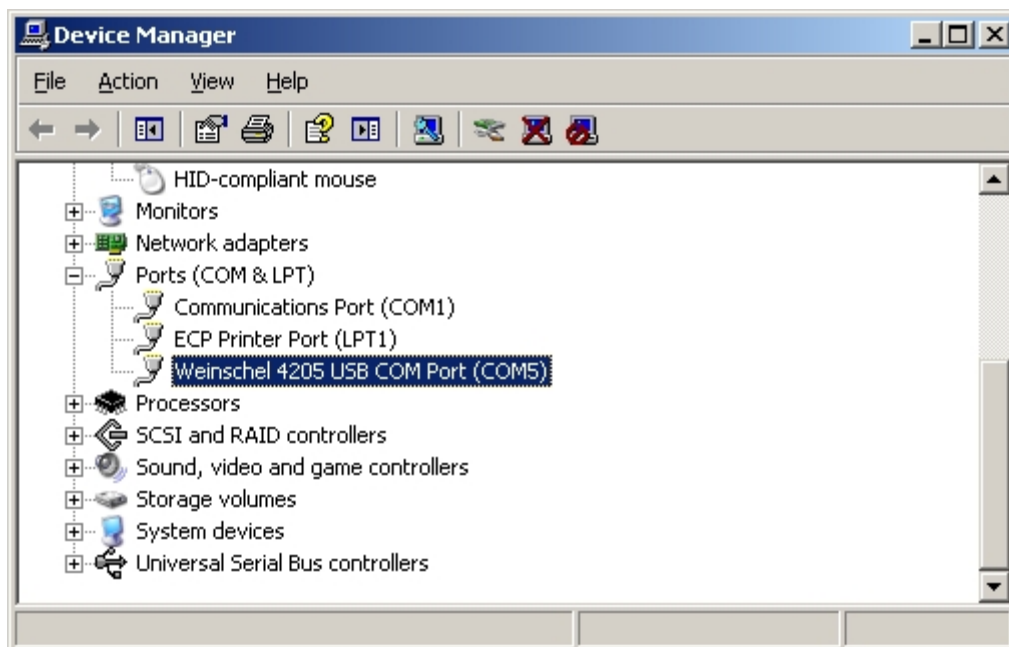


Navigate to the drive/folder containing the AW4205_CDC.INF file, and select 'Next'

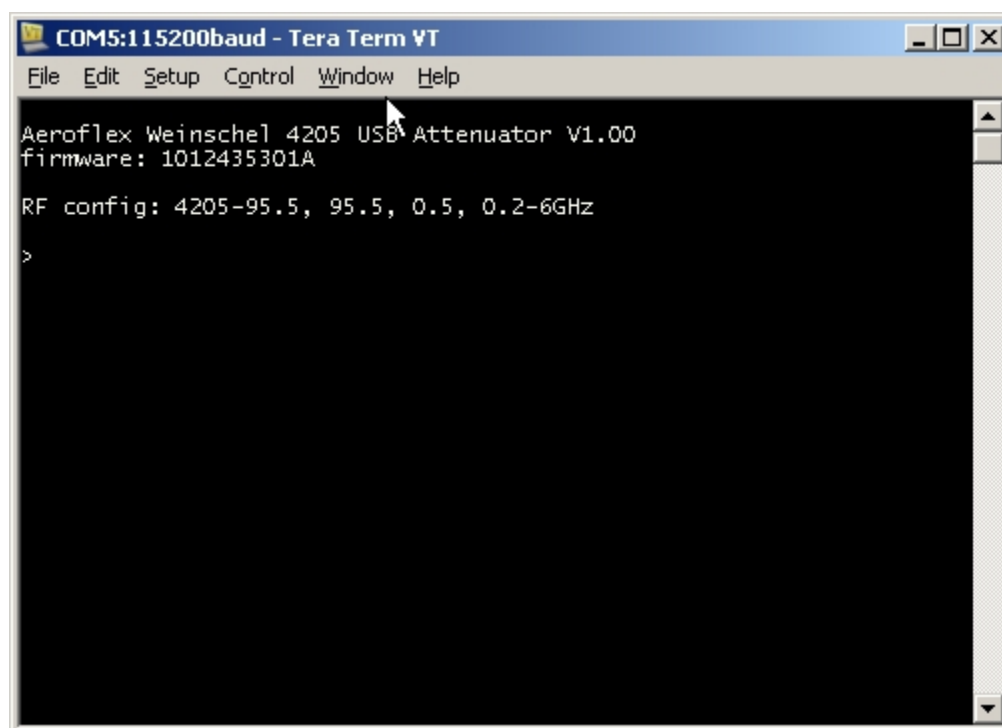




To verify that the driver has installed properly, view the Ports section in Device Manager. You should see the 4205 listed as a USB COM port. Note the assigned COM port number.



Using a terminal emulator, open a connection to the COM port shown above. The default COM port settings should be acceptable, as these are unused by the 4205. If the 4205 is in Console mode (the default), you should see the signon message.



The COM port numbers are assigned by Windows based on the device USB VID, PID, and Serial Number. The 4205 uses different USB PID codes for each of the three models as shown below:

Model	USB PID
4205-31.5	106F
4205-63.5	106E
4205-95.5	106D

By default, the attenuators are all shipped with the USB serial number set to '000000'. If you are using a single attenuator of a given model, you can ignore this setting. If you wish to use multiple attenuators of the same type, you can change the serial number to a unique setting so that each attenuator is assigned a different COM port. This can be done through the Console using the IDN command, which allows the user to change the serial number/ID to any 6-character setting. As the units are serialized at the factory on the product label, you may wish to use this number for easy identification.

To assign a new serial number to the attenuator, connect the unit as normal. It is recommended to do this with only a single attenuator connected to the USB to avoid any confusion. Note the serial number located on the product label (ie 100), and send the command 'IDN *serialno*', replacing *serialno* with the actual desired string. Unplug and reattach the attenuator's USB connection. You will have to reinstall the driver (this time you can let Windows install it automatically), after which it should be re-enumerated with a different COM port number.

3-5. COMMAND OPERATION: Commands are comprised of text-based ASCII strings. The command parser is case-insensitive, so either upper or lower case characters are acceptable. Command parameters may be separated with either an ASCII SPACE char (0x20) or an ASCII COMMA char (0x2E), but the separator character used must be the same within an individual command string. Additional SPACE characters are ignored. Input program messages may be terminated using either an ASCII CR character (0x0D) or an ASCII LF character (0x0A). Command message strings are limited to 64 characters total, including the terminator. Multiple commands can be included in one message by separating the individual commands with an ASCII SEMICOLON character ';' (0x3B), up to the 64 character message limit. Typically, Response messages sent from the device are terminated using both a CR (0x0D) and LF (0x0A) to terminate the message. The output terminator sequence may be changed using the RMT command. A list of supported commands can be seen by typing 'HELP' at the Console prompt.

The command structure/operation is similar to that used in IEEE 488.2, and includes some of the 488.2 Common Commands such as *IDN?, *RST, *CLS, and *OPC?, in addition to device specific commands. In 488.2, programming commands take one of two forms: a Program message or a Query message. Program messages are used to send commands to the device, while Query messages are used to elicit a response. Query commands are those that contain a '?' character. In general, the device does not generate any response to a program message unless the message contains a valid Query command. (Note that this does not apply when operating in Console mode, or when using some commands such as HELP which are designed to provide the user general information). You can use this feature to provide a method to synchronize command execution with the controller by appending a Query to the desired command, and waiting for the response. For example, sending "*CLS;*OPC?" will place a "1" in the output queue when the *CLS command has been executed. Query commands that return multiple values will have the values separated by an ASCII COMMA character (0x2E). If multiple Query commands are included in the same message, the individual query responses will be separated with an ASCII SEMICOLON character (0x3B).

An Error Queue is provided that logs the results of command/execution errors in a FIFO fashion. The queue entries can be read using the ERR? command, which returns both an error code and a descriptive text message, such as

101, "invalid command"

When the queue is empty, ERR? returns the message **0, "no error"**. The queue can be emptied by repeatedly

sending ERR? until all entries are read from the queue, or via sending the *CLS message.

Unless otherwise specified, commands revert to their default setting at system reset/poweron, with the exception of the system setup and configuration commands which store their setting in non-volatile memory (NVM).

3-5.1. Command Reference: In the command descriptions that follow, argument types are described using the following additional conventions to indicate the relative size of the parameter:

- byte - used to indicate an 8-bit unsigned integer
- word - used to indicate a 16-bit unsigned integer
- int8 - 8-bit integer
- int16 - 16-bit integer
- int32 - 32-bit integer
- string - character data, including the max number of characters allowable. (ie string8 has a max of 8 chars)

Numeric arguments default to decimal (base 10) notation, but may optionally be provided in hex if appropriate by using a "0x" prefix (ie 0x0a = 10)

Required command keywords are shown in CAPITAL letters, and arguments are shown in *italics*. Square brackets '[' may be used to indicate an optional parameter, for example [*selec*]. Optional parameters, if not supplied by the user, assume the default setting specified in the text.

3-5.2 Application Specific Commands: Attenuation value settings are specified in dB, with up to 1 digit of precision after the decimal point for attenuators that support step sizes of < 1dB. When specifying integral dB values, usage of the decimal point format is strictly option (ie '10' is the same as '10.0'). The attenuation setting must be a multiple of the attenuators intrinsic step size or the command will generate an error. For example, an attenuator that has a stepsize of 0.5 dB will accept settings of 0.5, but will generate an error if set to 0.3. For responses, attenuation values will be formatted to the base precision of the attenuator.

Attenuation switching speed requirements are built into the command execution time and are always enforced such that if you execute a command sequence such as "ATTN 10;*OPC?" the response will not be sent until the attenuator has been programmed and has changed state. The attenuator can be switched at the maximum rate that commands are executed, which is typically in the 1-2ms range.

ATTN

Function: set attenuator

Syntax: ATTN *setting*

Argument(s): *setting* attenuator setting, in dB. *setting*=0-max attenuation value, or MAX

Remarks: This command sets the RF attenuator to the dB value provided by *setting*. If *setting* is MAX, then the maximum dB value for that attenuator will be used.

Return Value: none

Example(s):

```
ATTN 10           // sets attn to 10 dB
ATTN MAX          // sets attn to max (95.5dB)
ATTN 15.5         // sets attn to 15.5 dB
```

ATTN?

Function: read attenuator setting

Syntax: ATTN?

Argument(s): none

Remarks: This command returns the current setting of the attenuator

Return Value: attenuator setting, in dB

Example(s):

```
ATTN 10           // sets attn to 10 dB
ATTN?             // read attn setting
10.0              // returns attn setting (10 dB)
```

STEPSIZE**Function:** set attenuator stepsize**Syntax:** STEPSIZE *setting***Argument(s):** *setting* attenuator stepsize, in dB. *Setting*=0-max attenuation value**Remarks:** This command sets the attenuation stepsize. This command can be used with the INCR, DECR, and FADE commands to change the step value. Specifying a *setting* of 0 sets the stepsize to the intrinsic step value for the attenuator, in effect removing any previous STEPSIZE command.**Return Value:** none**Example(s):**

```

STEPSIZE 10          // sets attn stepsize to 10dB
STEPSIZE 0           // sets the stepsize back to native value (ie 0.5dB)

```

STEPSIZE?**Function:** read attenuator stepsize setting**Syntax:** STEPSIZE?**Argument(s):** none**Remarks:** This command returns the current stepsize**Return Value:** attenuator setting, in dB**Example(s):**

```

STEPSIZE 10          // sets attn stepsize to 10dB
STEPSIZE?            // read attn stepsize setting
10.0                 // returns attn stepsize (10dB)

```

INCR**Function:** increment attenuator setting**Syntax:** INCR**Argument(s):** none**Remarks:** This command increments the current setting of the attenuator by the STEPSIZE setting.**Return Value:** none**Example(s):**

```

ATTN 5               // sets attn to 5dB
STEPSIZE 10          // sets attn stepsize to 10dB
INCR                  // increments attn by current stepsize (5dB + 10dB = 15dB)

```

DECR**Function:** decrement attenuator setting**Syntax:** DECR**Argument(s):** none**Remarks:** This command decrements the current setting of the attenuator by the STEPSIZE setting.**Return Value:** none**Example(s):**

```

ATTN 15              // sets attn to 15dB
STEPSIZE 10          // sets attn stepsize to 10dB
DECR                  // decrements attn by current stepsize (15dB - 10dB = 5dB)

```


FADE**FADE?****Function:** fade attenuation value over time**Syntax:** FADE *start_db end_db interval*
FADE? *start_db end_db interval***Argument(s):** *start_db* initial attenuation setting
end_db final attenuation setting
interval dwell time per increment, in msec (max=10000)**Remarks:** This command ramps the attenuation value at a user specified rate. The *start_db* and *end_db* values can be any settings valid for the attenuator, and the attenuation will ramp up or down as required. The attenuation value will step according to the current STEPSIZE setting. Attenuation values are changed at the rate specified by *interval*, which is in units of msec. Note that no other commands can be executed until the fade operation is completed. The query form of the command (FADE?) will return the current attenuation values as the steps are executed.**Return Value:** none**Example(s):**

```

STEPSIZE 1.0           // set stepsize to 1 dB
FADE 10.0 85.0 500     // fade from 10dB to 85dB in STEPSIZE increments at a rate of 500ms
STEPSIZE 0             // set stepsize to default (0.5dB)
FADE? 90 0 1000        // fade from 90dB to 0dB in 0.5dB steps at a rate of 1000ms (1sec)
90.0                   // values are sent as the attenuation changes
89.5
....
0.0

```

RFCONFIG?**Function:** displays current RF configuration**Syntax:** RFCONFIG?**Argument(s):** none**Remarks:** This command displays the current attenuator configuration, including the model, max attn, default stepsize, and frequency range**Example(s):**

```

RFCONFIG?
4205-95.5, 95.5, 0.5, 0.2-6GHz

```

3-5.3. 488.2 COMMON COMMANDS:***CLS**

Function: clears the error status
Syntax: *CLS
Argument(s): none
Remarks: This function is used to clear the Error Queue
Return Value: none
Example(s):
 *CLS

***IDN?**

Function: Reads the system identification information
Syntax: *IDN?
Argument(s): none
Remarks: This function is used to read the system identification info, which is a string consisting of the following data: manufacturer, model, serial number, and firmware version.
Return Value: *idstr* string id info
Example(s):
 *IDN?
 Aeroflex Weinschel, 4205, 002, V1.00

***OPC?**

Function: Operation complete query
Syntax: *OPC?
Argument(s): none
Remarks: This function loads a '1' into the output queue when the Program Message Unit is executed. It's primary use is to provide an indication of command completion by including the command as the last one in a series of commands. It can be useful to synchronize operation and to prevent input buffer overflow.
Return Value: 1 integer constant command completed
Example(s):
 CMD1 1; CMD2 2; *OPC?
 1 // sends a '1' response when the three commands have been parsed and executed

***ESR?**

Function: Event Status Register query
Syntax: *ESR?
Argument(s): none
Remarks: This function reads the 488.2 Event Status Register. Reading the register also clears it.
Return Value: *int8* integer status register
Example(s):
 *ESR?
 32 // indicates a Command Error

***RST**

Function: Performs a device application level reset.
Syntax: *RST
Argument(s): none
Remarks: This function is used to reset the device application settings.
Return Value: none
Example(s):
 *RST

TST?*Function:** Self-test query**Syntax:** *TST?**Argument(s):** none**Remarks:** This function performs an internal self-test. Upon completion, the results of the test are loaded into the output queue.**Return Value:** *testresults* integer '0' indicates test passed. Non-zero indicates test failed.**Example(s):**

```
*TST?  
0 // returns a '0' when the test completes successfully.
```

ERR?**Function:** Read the Error Queue**Syntax:** ERR?**Argument(s):** none**Remarks:** This function returns the last entry in the error status queue, and a string description of the error code. Repeating the command will return the next entry, until the error queue is empty and returns a zero. The error queue may be cleared via the *CLS command. Note that when using the command-line interface the Error Queue contents are automatically displayed after each command prior to issuing the CLI prompt.**Return Value:** error number, "error description"**Example(s):**

```
ERR?  
101, "invalid command"  
ERR?  
0, "no error"
```

3-5.4. Setup and Configuration Commands

RMT

Function: sets the Response Message Terminator end of string character(s)

Syntax: RMT *val*

Argument(s): *val* word, eos characters

Remarks: This function sets the output Response Message Terminator (RMT) sequences. The *val* parameter specifies the character sequence used, and can specify up to two characters, typically as a hex word high byte-low byte pair. Common definitions for the terminators include the ASCII CR (0x0D) and LF (0x0A) characters. A single character may be specified either by using 0 for the high byte, such as 0x000D, or by only specifying a single character (ie 0x0D). On output the characters are sent low byte then high byte, unless it is specified as 0. Note that the CONSOLE mode will always use a fixed CRLF (0x0A0D) sequence. This value is stored in non-volatile memory (NVM), and does not take effect until the next system restart event.

Return Value: none

Example(s):

```
RMT 0x0A0D    // set output sequence as CR-LF
RMT 0x0D      // set output sequence as a single CR character
```

CONSOLE

Function: Console mode enable

Syntax: CONSOLE *mode*

Argument(s): *mode* OFF, ON, ENABLE, or DISABLE

OFF	turns console mode off (and updates NVM setting)
ON	turns console mode on (and updates NVM setting)
ENABLE	enables console mode
DISABLE	disables console mode

Remarks: This function enables/disables the console mode command-line interface and optionally updates the nvm setting. Setting *mode* parameter OFF or ON updates the NVM default setting, while modes ENABLE and DISABLE do not.

Return Value: none

Example(s):

```
CONSOLE ON      // turns on the console and updates nvm setting
CONSOLE ENABLE  // turns on console for this session only
CONSOLE DISABLE // turns off console for this session only
```

IDN

Function: Identification serial number setup

Syntax: IDN *serno*

Argument(s): *serno* 6-character string

Remarks: This command sets the serial number parameter returned by the *IDN? Command, and also used as the USB serial number. Alpha-numeric values are allowed, up to a max of 6 characters. The value is saved in NVM.

Return Value: none

Example(s):

```
IDN 001
```

3-6. AW4205_CDC.INF INSTALLATION FILE

; Windows USB CDC ACM Setup File
 ; Based on INF template which was:
 ; Copyright (c) 2000 Microsoft Corporation
 ; Copyright (C) 2004 Microchip Technology Inc.

[Version]
 Signature="\$Windows NT\$"
 Class=Ports
 ClassGuid={4D36E978-E325-11CE-BFC1-08002BE10318}
 Provider=%MFG%
 LayoutFile=layout.inf
 DriverVer=01/07/2007,5.1.2800.0

[Manufacturer]
 %MFG%=DeviceList, NTx86, NTia64, NTamd64

[DestinationDirs]
 DefaultDestDir=12

 ; Vendor and Product ID Definitions

 ; Note: One INF file can be used for multiple devices with different
 ; VID and PIDs. For each supported device, append
 ; ",USB\VID_XXXX&PID_YYYY" to the end of the line.

[SourceDisksFiles]
 [SourceDisksNames]

[DeviceList.NTx86]
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106D ; 4205-95.5
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106E ; 4205-63.5
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106F ; 4205-31.5

[DeviceList.NTia64]
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106D ; 4205-95.5
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106E ; 4205-63.5
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106F ; 4205-31.5

[DeviceList.NTamd64]
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106D ; 4205-95.5
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106E ; 4205-63.5
 %DESCRIPTION%=DriverInstall, USB\VID_25EA&PID_106F ; 4205-31.5

 ; 32 bit section for Windows 2000/2003/XP/Vista

[DriverInstall.NTx86]
 include=mdmcpq.inf
 CopyFiles=DriverCopyFiles

AddReg=DriverInstall.NTx86.AddReg

[DriverInstall.NTx86]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles
AddReg=DriverInstall.NTx86.AddReg

[DriverCopyFiles]
usbser.sys,,,0x20

[DriverInstall.NTx86.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,usbser.sys
HKR,,EnumPropPages32,, "MsPorts.dll,SerialPortPropPageProvider"

[DriverInstall.NTx86.Services]
AddService=usbser, 0x00000002, DriverService

; 64 bit section for Intel Itanium based systems

[DriverInstall.NTia64]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles
AddReg=DriverInstall.NTia64.AddReg

[DriverInstall.NTia64]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles
AddReg=DriverInstall.NTia64.AddReg

[DriverCopyFiles]
usbser.sys,,,0x20

[DriverInstall.NTia64.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,usbser.sys
HKR,,EnumPropPages32,, "MsPorts.dll,SerialPortPropPageProvider"

[DriverInstall.NTia64.Services]
AddService=usbser, 0x00000002, DriverService

; 64 bit section for AMD64 and Intel EM64T based systems

[DriverInstall.NTamd64]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles
AddReg=DriverInstall.NTamd64.AddReg

[DriverInstall.NTamd64]
include=mdmcpq.inf
CopyFiles=DriverCopyFiles

AddReg=DriverInstall.NTamd64.AddReg

[DriverCopyFiles]
usbser.sys,,,0x20

[DriverInstall.NTamd64.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,usbser.sys
HKR,,EnumPropPages32,,"MsPorts.dll,SerialPortPropPageProvider"

[DriverInstall.NTamd64.Services]
AddService=usbser, 0x00000002, DriverService

;-
;
;-

[DriverService]
DisplayName=%SERVICE%
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\usbser.sys

;-
; String Definitions
;-

[Strings]
MFG="AeroflexWeinschel"
DESCRIPTION="Weinschel 4205 USB COM Port"
SERVICE="USB RS232 Emulation Driver"

4. CONTACTING API WEINSCHEL, INC.:

In the event of a malfunction, contact API Weinschel. An apparent malfunction of an instrument or component may be diagnosed over the phone by first contacting the Customer Service Department at API Weinschel. DO NOT send the instrument or component back to the factory without prior authorization. When it is necessary to return an item, state the symptoms, catalog and type number of the instrument or component, and date of original purchase. Also write the Company name and your name and phone number on a card and tape the card to the item returned. Page provides further information regarding preparation of a unit for reshipment. Contact API Weinschel Customer Service Department as follows:

Via mail: API Weinschel, Inc.
5305 Spectrum Drive
Frederick, MD 21703-7362
U.S.A.

Via Telefax: 301-846-9116

Via Phone: Call TOLL FREE 800-638-2048
Toll call # 301-846-9222

Via Website: www.aeroflex.com/weinschel

Via e-mail: weinschel-sales@aeroflex.com

5. API WEINSCHEL INC. WARRANTY:

PRODUCTS - API Weinschel, Inc. warrants each product it manufactures to be free from defects in material and workmanship under normal use and service anywhere in the world. API Weinschel only obligation under this Warranty is to repair or replace, at its plant, any product or part thereof that is returned with transportation charges prepaid to API Weinschel by the original purchaser within ONE YEAR from the date of shipment.

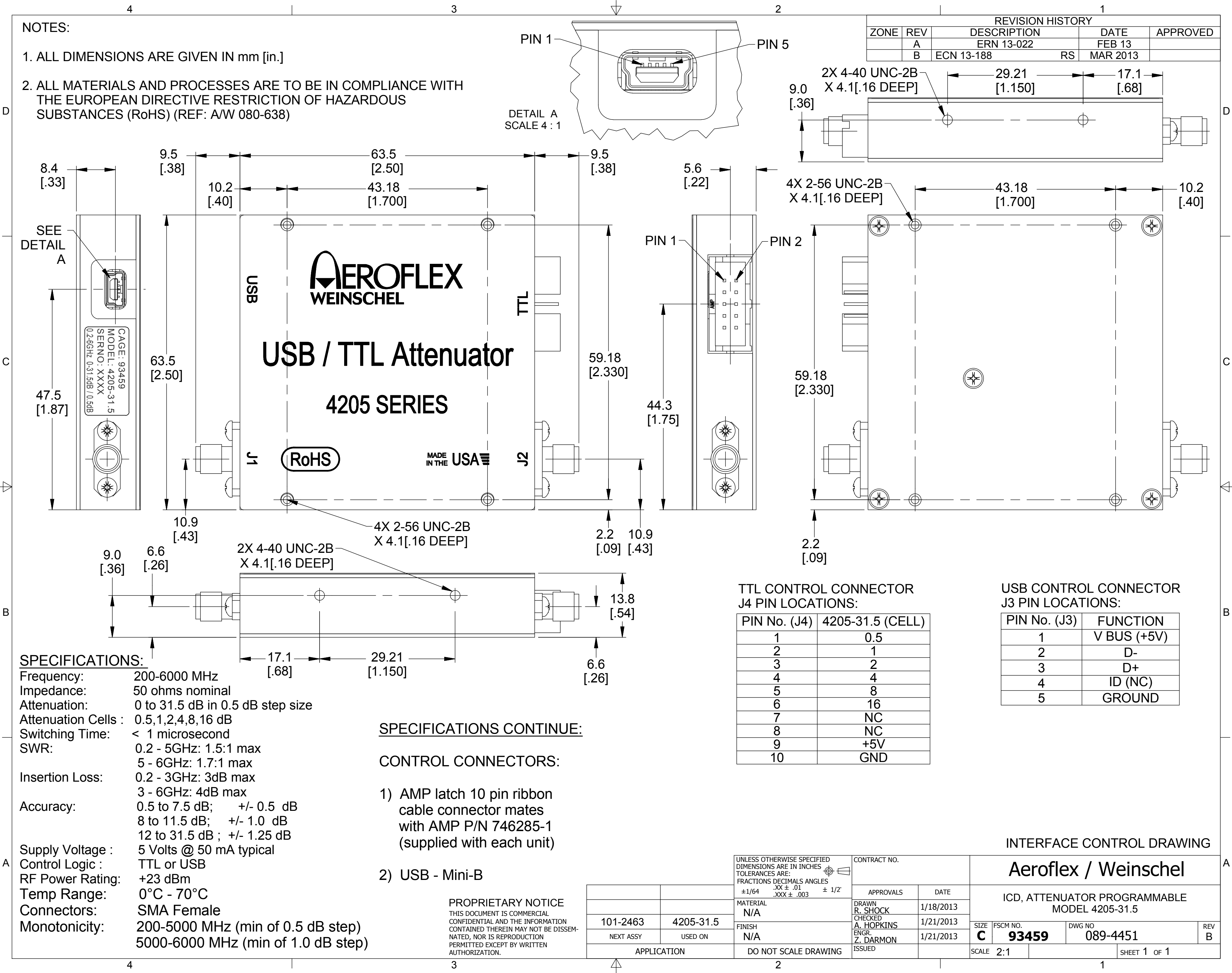
The foregoing Warranty does not apply in API Weinschel sole opinion to products that have been subject to improper or inadequate maintenance, unauthorized modifications, misuse, or operation outside the environmental specifications for the product.

SOFTWARE PRODUCTS- API Weinschel, Inc. software products are supplied without representation or Warranty of any kind. API Weinschel, therefore, assume no responsibility and will not accept liability (consequential or otherwise) arising from the use of program materials, disk, or tape.

The Warranty period is controlled by the Warranty document furnished with each product and begins on the date of shipment. All Warranty returns must be authorized by API Weinschel prior to their return.

API Weinschel's Quality System Certified to:

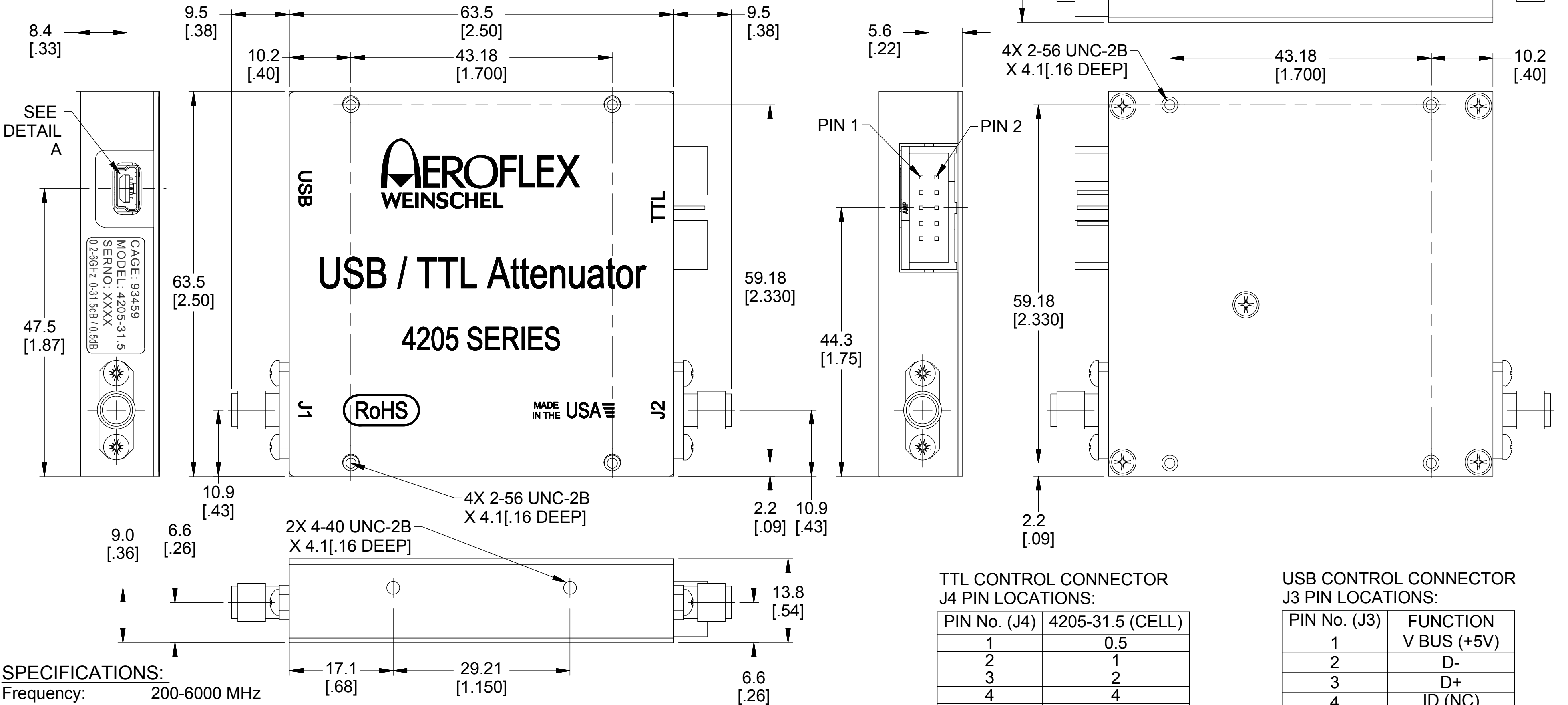




NOTES:

1. ALL DIMENSIONS ARE GIVEN IN mm [in.]
2. ALL MATERIALS AND PROCESSES ARE TO BE IN COMPLIANCE WITH THE EUROPEAN DIRECTIVE RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS) (REF: A/W 080-638)

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ERN 13-022	FEB 13	
	B	ECN 13-188	RS MAR 2013	



SPECIFICATIONS:

Frequency: 200-6000 MHz
Impedance: 50 ohms nominal
Attenuation: 0 to 31.5 dB in 0.5 dB step size
Attenuation Cells : 0.5,1,2,4,8,16 dB
Switching Time: < 1 microsecond
SWR: 0.2 - 5GHz: 1.5:1 max
5 - 6GHz: 1.7:1 max
Insertion Loss: 0.2 - 3GHz: 3dB max
3 - 6GHz: 4dB max
Accuracy: 0.5 to 7.5 dB; +/- 0.5 dB
8 to 11.5 dB; +/- 1.0 dB
12 to 31.5 dB ; +/- 1.25 dB
Supply Voltage : 5 Volts @ 50 mA typical
Control Logic : TTL or USB
RF Power Rating: +23 dBm
Temp Range: 0°C - 70°C
Connectors: SMA Female
Monotonicity: 200-5000 MHz (min of 0.5 dB step)
5000-6000 MHz (min of 1.0 dB step)

SPECIFICATIONS CONTINUE:

CONTROL CONNECTORS:

- 1) AMP latch 10 pin ribbon cable connector mates with AMP P/N 746285-1 (supplied with each unit)
- 2) USB - Mini-B

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AUTHORIZATION.

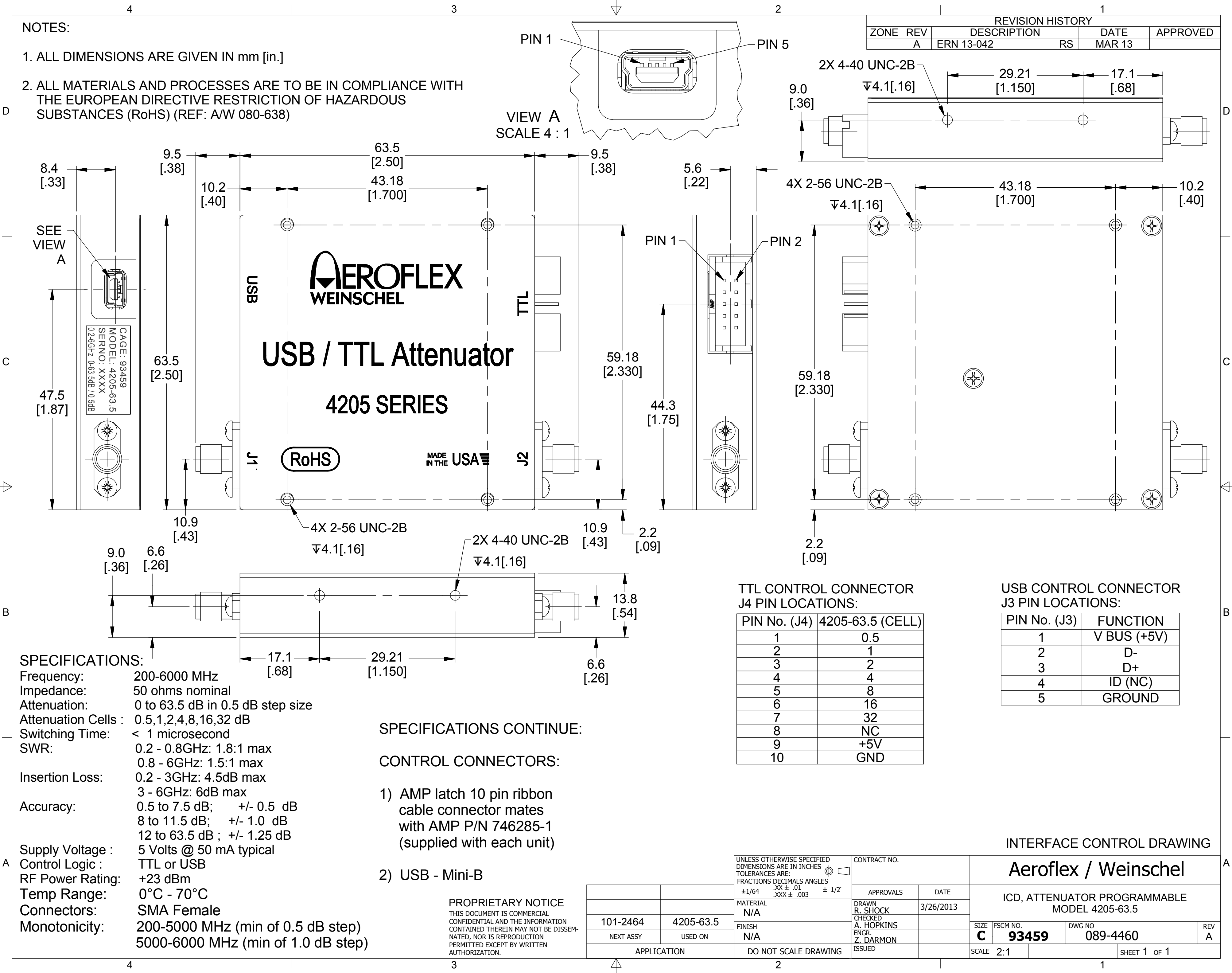
TTL CONTROL CONNECTOR
J4 PIN LOCATIONS:

PIN No. (J4)	4205-31.5 (CELL)
1	0.5
2	1
3	2
4	4
5	8
6	16
7	NC
8	NC
9	+5V
10	GND

USB CONTROL CONNECTOR
J3 PIN LOCATIONS:

PIN No. (J3)	FUNCTION
1	V BUS (+5V)
2	D-
3	D+
4	ID (NC)
5	GROUND

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ±1/64 .XX ± .01 ± 1/2° MATERIAL N/A FINISH N/A		CONTRACT NO.		INTERFACE CONTROL DRAWING			
101-2463		4205-31.5		APPROVALS		DATE	
NEXT ASSY		USED ON		DRAWN R. SHOCK		1/18/2013	
APPLICATION		DO NOT SCALE DRAWING		CHECKED A. HOPKINS		1/21/2013	
				ENGR. Z. DARMON		1/21/2013	
				ISSUED			
				SCALE 2:1		SHEET 1 OF 1	

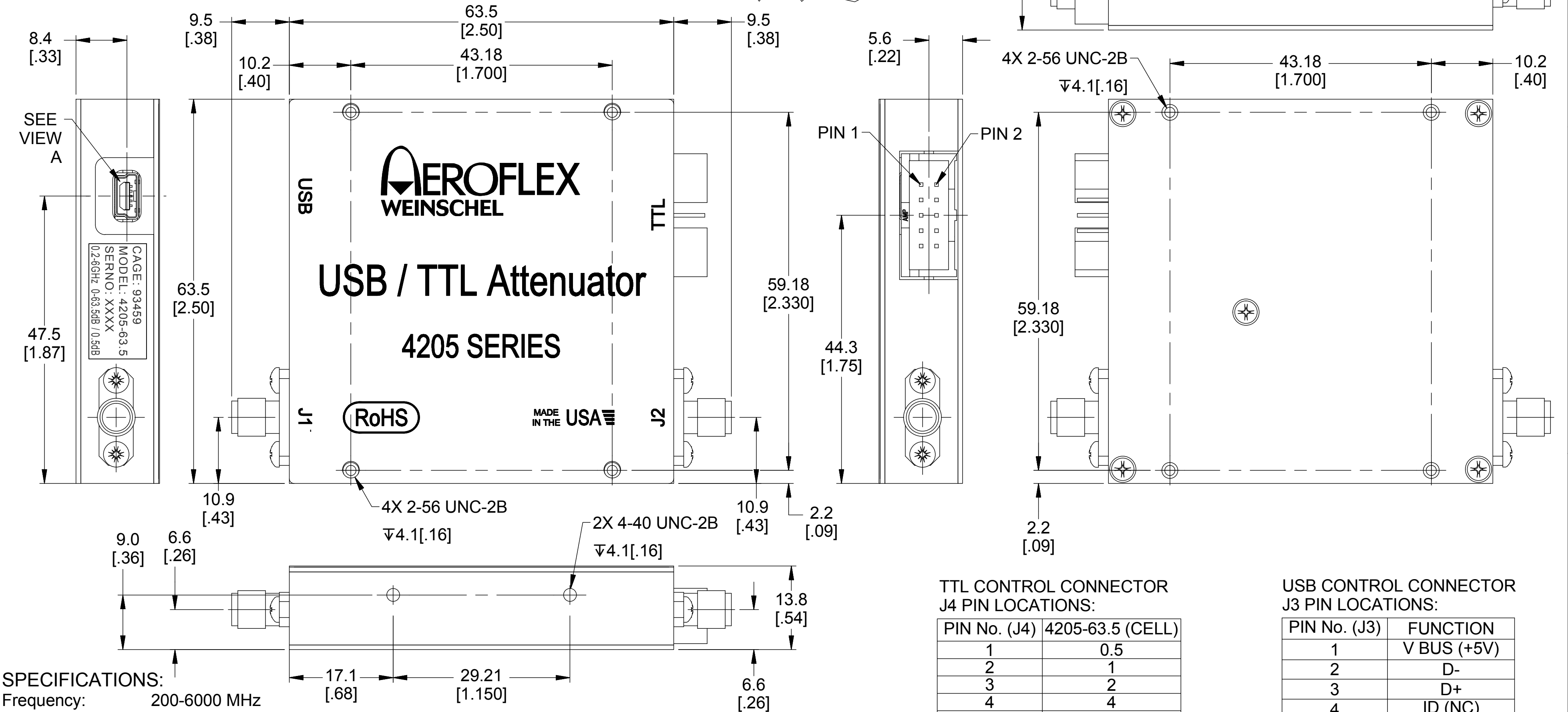


NOTES:

1. ALL DIMENSIONS ARE GIVEN IN mm [in.]
2. ALL MATERIALS AND PROCESSES ARE TO BE IN COMPLIANCE WITH THE EUROPEAN DIRECTIVE RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS) (REF: A/W 080-638)

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ERN 13-042 RS	MAR 13	

VIEW A
SCALE 4 : 1



SPECIFICATIONS:

Frequency: 200-6000 MHz
Impedance: 50 ohms nominal
Attenuation: 0 to 63.5 dB in 0.5 dB step size
Attenuation Cells : 0.5,1,2,4,8,16,32 dB
Switching Time: < 1 microsecond
SWR: 0.2 - 0.8GHz: 1.8:1 max
0.8 - 6GHz: 1.5:1 max
Insertion Loss: 0.2 - 3GHz: 4.5dB max
3 - 6GHz: 6dB max
Accuracy: 0.5 to 7.5 dB; +/- 0.5 dB
8 to 11.5 dB; +/- 1.0 dB
12 to 63.5 dB ; +/- 1.25 dB
Supply Voltage : 5 Volts @ 50 mA typical
Control Logic : TTL or USB
RF Power Rating: +23 dBm
Temp Range: 0°C - 70°C
Connectors: SMA Female
Monotonicity: 200-5000 MHz (min of 0.5 dB step)
5000-6000 MHz (min of 1.0 dB step)

SPECIFICATIONS CONTINUE:

CONTROL CONNECTORS:

- 1) AMP latch 10 pin ribbon cable connector mates with AMP P/N 746285-1 (supplied with each unit)
- 2) USB - Mini-B

TTL CONTROL CONNECTOR
J4 PIN LOCATIONS:

PIN No. (J4)	4205-63.5 (CELL)
1	0.5
2	1
3	2
4	4
5	8
6	16
7	32
8	NC
9	+5V
10	GND

USB CONTROL CONNECTOR
J3 PIN LOCATIONS:

PIN No. (J3)	FUNCTION
1	V BUS (+5V)
2	D-
3	D+
4	ID (NC)
5	GROUND

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101-2464	4205-63.5
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ±1/64 .XX ± .01 ± 1/2° XXX ± .003	
MATERIAL N/A	FINISH N/A
DO NOT SCALE DRAWING	

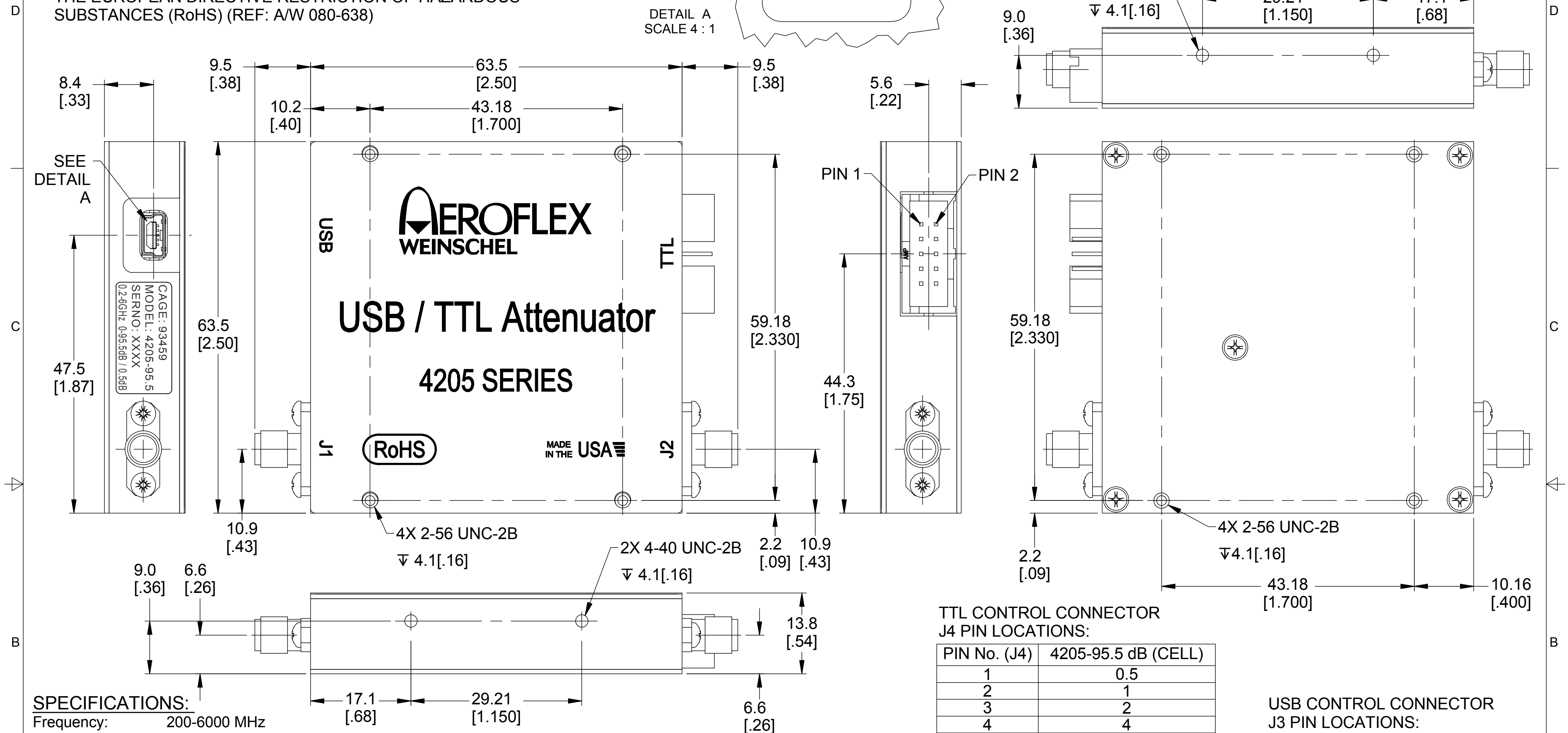
CONTRACT NO.	
APPROVALS	DATE
DRAWN R. SHOCK	3/26/2013
CHECKED A. HOPKINS	
ENGR. Z. DARMON	
ISSUED	

INTERFACE CONTROL DRAWING			
Aeroflex / Weinschel			
ICD, ATTENUATOR PROGRAMMABLE MODEL 4205-63.5			
SIZE C	FSCM NO. 93459	DWG NO. 089-4460	REV A
SCALE 2:1		SHEET 1 OF 1	

NOTES:

1. ALL DIMENSIONS ARE GIVEN IN mm [in.]
2. ALL MATERIALS AND PROCESSES ARE TO BE IN COMPLIANCE WITH THE EUROPEAN DIRECTIVE RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS) (REF: A/W 080-638)

REVISION HISTORY					
ZONE	REV	DESCRIPTION		DATE	APPROVED
	D	ECN 12-230	VB.	10/12	Z. DARMON
	E	ECN 12-310	VB.	12/12	R.SINNO
	F	ECN 13-188	RS	MAR 2013	



SPECIFICATIONS:

Frequency: 200-6000 MHz
Impedance: 50 ohms nominal
Attenuation: 0 to 95.5 dB in 0.5 dB step size
Attenuation Cells : 0.5;1;2;4;8;16;32 & 32 dB
Switching Time: < 1 microsecond
SWR: 0.2-0.8 GHz: 2:1 max
0.8-5 GHz: 1.6:1 max
5-6 GHz: 1.9:1 max
Insertion Loss: 0.2-3 GHz: 6.5 dB max
3-6 GHz: 8 dB max
Accuracy: 0.5 to 7.5 dB; +/- 0.5 dB
8 to 11.5 dB; +/- 1.0 dB
12 to 85.5 dB ; +/- 1.25 dB or 4%
86 to 95.5 dB ; 5 %
Supply Voltage : 5 Volts @ 50 mA typical
Control Logic : TTL or USB
RF Power Rating: +23 dBm
Temperature Range: 0°C - 70°C
Connectors: SMA Female
Monotonicity: 200-5000 MHz (min of 0.5 dB step)
5000-6000 MHz (min of 1.0 dB step)

SPECIFICATIONS CONTINUE:

CONTROL CONNECTORS:

- 1) AMP latch 10 pin ribbon cable connector mates with AMP P/N 746285-1 (supplied with each unit)
- 2) USB - Mini-B

TTL CONTROL CONNECTOR
J4 PIN LOCATIONS:

PIN No. (J4)	4205-95.5 dB (CELL)
1	0.5
2	1
3	2
4	4
5	8
6	16
7	32
8	32
9	+5V
10	GND

USB CONTROL CONNECTOR
J3 PIN LOCATIONS:

PIN No. (J3)	FUNCTION
1	V BUS (+5V)
2	D-
3	D+
4	ID (NC)
5	GROUND

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101-2424	4205-95.5
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ±1/64 .XX ± .01 ± 1/2° .XXX ± .003	
MATERIAL N/A	FINISH N/A
DO NOT SCALE DRAWING	

CONTRACT NO.	
APPROVALS	DATE
DRAWN V. BETSIS	5/15/2012
CHECKED A. HOPKINS	7/16/2012
ENGR. Z. DARMON	7/17/2012
ISSUED	

INTERFACE CONTROL DRAWING

Aeroflex / Weinschel

ICD, ATTENUATOR PROGRAMMABLE
MODEL 4205-95.5

SIZE C	FSCM NO. 93459	DWG NO 089-4365	REV F
SCALE 2:1		SHEET 1 OF 1	

APPENDIX A

CARE AND HANDLING OF MICROWAVE COAXIAL CABLE ASSEMBLIES

A-1 CARE AND HANDLING OF ASSEMBLIES.

To ensure accurate measurements and optimal performance of Weinschel products, the microwave coaxial cable assemblies used in system and test setups must be properly used and maintained. Proper connections, routine inspection of all cables, and cleaning of the connectors are extremely important procedures which can prolong the longevity and accuracy of equipment.

A-2 CABLE INSPECTION.

Routinely check external cables for signs of cracked insulation, dents, twists, flattening, signs of jacket abrasion, or other signs of abuse. Wrinkles in the jacket indicate that the minimum bend radius has been exceeded. Most often, this occurs near the marker tubes and connectors.

Also inspect the connector interfaces for the following:

- Bent pins (male).
- Bent or missing tines (female).
- Worn or chipped plating.
- Damaged or displaced dielectric inserts.
- Thread damage.
- Folded or mushroomed outer interface rims.
- Mushroomed pin shoulders (male) or tine ends (female).
- Score lines on pins and outer interface rims visible to the unaided eye.
- Recessed or protruding pins.

It is advisable to clean the connectors prior to inspection to make subtle damage more apparent. If any of the above is noted, replace the assembly before its further use results in equipment damage. Also inspect the mating connectors for similar damage.

Inspect the connector interface for signs of debris. Debris may be in the form of:

- Plating chips or other metal particles.
- Dust or dirt.
- Oily films.
- Other miscellaneous foreign particles.

If signs of debris are present, clean the connector interface as directed in Paragraph A-6.

A-3 MAKING INITIAL CONNECTIONS.

Exercise caution when mating cables. Poor connections lead to poor system performance. They can also damage not only the cable assembly, but more significantly, front or rear panel connectors on the equipment itself which may be more difficult to repair.

A-3.1 ALIGNING CONNECTORS. Align the center lines of two connectors before actual mating. Male retaining nuts contain a small amount of necessary play which may make it possible to mate the threads without the pins being properly aligned. Pin misalignment can damage pins and dielectric inserts.

A-3.2 MATING CONNECTORS. Gently mate the connectors by hand, taking care not to force the coupling nut at the slightest resistance. It is often possible to feel whether or not the pins are mated. If the coupling nut is difficult to turn, either the pins are not mated, the coupling nut is cross-threaded, or one of the connectors has been damaged by excess torque.

Never hold a male connector coupling nut stationary while screwing a female connector into it. This rotation can erode the plating and damage both the outer interface rim as well as the pin. If the pins become locked, serious damage can result to both the equipment and the cable assembly.

A-4 ENSURING PROPER CONNECTOR TORQUE.

A-4.1 OVERTORQUING. Once connectors have been properly mated, apply only the proper amount of torque. Overtorquing damages both connectors involved. Also, a connector which has been damaged by overtorquing, in turn, damages every connector to which it is subsequently mated. It usually leads to poor system performance as well. Overtorque can cause:

- Bent pins.
- Recessed or protruding pins.
- Recessed or protruding dielectrics.
- Chipped plating.
- Damaged coupling threads.
- Coupling nut retaining ring damage.
- Mushroomed outer interface shells.
- Mushroomed pin shoulders.

A-4.2 HEX-NUT TYPES. To mate a connector of the hex-nut type, always use a torque wrench set to the correct torque value. Tighten the connector slowly until the wrench snaps. Tightening too quickly can cause the wrench to exceed its set limit. Do not snap the wrench more than once as this also causes overtorque.

A-4.3 KNURLED NUTS. Tighten connectors with knurled nuts by hand. If this does not provide sufficient tightness use a hex-nut connector and torque wrench instead. Never use pliers to tighten a connector. Table A-1 recommends torque specifications for the various types of connectors.

Table A-1. Recommended Torque Values

Connector	Recommended Torque
GPC-7 (7mm) w/hex nut	14 in/lbs \pm 1 in/lbs
Type N w/hex nut	14 in/lbs \pm 1 in/lbs
SMA, 2.92mm, 3.5mm 2.4mm, WPM, WPM-3 WPM-4	7.5 in/lbs \pm 0.5 in/lbs
Type N & TNC (knurled)	Hand-tight
BNC (knurled)	Hand-tight

A-5 PROPER CABLE HANDLING.

Never exceed the minimum bend radius specified for a cable. Guard against tight bends at the end of connector strain relief tubing, or at the ends of marker tubing where they may be less noticeable. Although cable bend may seem slight, the actual radius of the bend at the point of angular departure may be far smaller than the acceptable radius.

Never pinch, crush or drop objects on cable assemblies. Also, do not drag a cable over sharp edges as this will pinch it and cause it to exceed the minimum bend radius.

Never use a cable assembly to pull a piece of equipment. Cables and connectors are not designed to support or move equipment.

A-5.1 SECURING CABLES. Use toothed, rubber-lined "P-clamps" to hold cables in place. If it is necessary to use tie-wraps, use the widest possible wrap and the lowest setting on the gun to ensure the minimum pressure on the cable.

A-5.2 STORING CABLES. When storing cables, minimize cable "set" by coiling them in large diameters (1 or 2 feet). Unroll the cable properly when it is ready to be used; do not pull the loops out hastily. Similarly, re-roll them when storing them away again.

A-6 CLEANING CONNECTOR INTERFACES.

Use the following guidelines in cleaning connector interfaces:

- a. Do not use chlorinated solvents including common tap water. These solvents are extremely penetrating and sometimes ruin otherwise good devices and assemblies.
- b. Moisten a cotton swab with isopropyl alcohol. Roll the swab on a paper towel to remove excess.
- c. Use the moistened cotton swab to wipe away debris. Do not try to dissolve the debris by overwetting the swab.
- d. Repeat the cleaning process using additional swabs as necessary. If metallic particles are embedded in the dielectric, use an eyeglass and a sharp pick in an attempt to dislodge them. Swab again.
- e. When satisfied that the interfaces are clean, blow them dry with dry compressed air, or preferably dry nitrogen (pressurized spray cans work well). Do not use breath.
- f. Clean the mating connectors. These may be the source of the debris.

Model 4205 Series (IM-612) Revision Record

REVISION	DATE	DESCRIPTION	APPLICABLE SERIAL NUMBERS
A	3-28-2013	ERN 13-043: Initial Issue includes API Weinschel ECNs 12-230, 12-310, 13-022 & 13-188.	All Units
B	11-24-2015	ECN 15-319: Company Name and Logo change to API Weinschel.	All unit built after 11-24-15