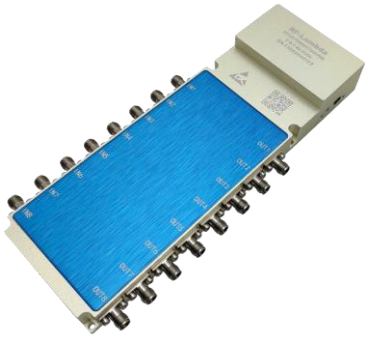
USB / Ethernet 8-Channel Absorptive Digital Control Attenuator 0.1GHz-43.5GHz



Product Description

RFDAT0040G7A8USB is an absorptive USB / Ethernet 8-Channel digital control attenuator with a frequency range of 0.1 to 43.5GHz.

The power input of this attenuator is 27dBm typical. The insertion loss is 14.5 dB with a typical attenuation range of 63.5dB.

The working temperature of this product is between - 40℃ and + 85℃.

Features

- Ultra Wide Band Operation 0.1-43.5GHz
- USB Controlled and Powered
- 0.5dB LSB Steps to 63.5dB

Typical Applications

- Wireless Infrastructure
- Military and Aerospace Applications
- Test Instrumentation
- Radar Systems
- 5G Wireless Communications
- Microwave Radio Systems
- TR Modules
- Research and Development
- Cellular Base Stations

Electrical Specifications (T_A=+25ºC)

Parameter	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range	0.1		1	1		30	30		43.5	GHz
Attenuation Range	57	63.5		57	63.5		54	55		dB
Insertion Loss		7.0	8.5		14.5	16.0		17.5	19.5	dB
Insertion Loss Temperature Coefficient		0.01			0.01			0.01		dB/ °C
Attenuation Flatness: (Referenced to Insertion Loss)		±2.0			±4.0			±5.0		dB
Control Bits			7			7			7	Bit
Control Step Size		0.5			0.5			0.5		dB
Input VSWR (All Atten. States)		2.2	3.0		1.6	2.2		1.6	2.0	: 1
Output VSWR (All Atten. States)		2.2	3.0		1.6	2.2		1.6	2.0	: 1
Input 0.1 dB Compression Point (P0.1dB)		25			25			25		dBm
RF Input Power			27			27			27	dBm
Input IP3		38			38			37		dBm
Bias Current	350Typ.									mA
Power Supply	USB(+5.0V)									
Weight	0.8 Max.									lbs.
Impedance	50									Ohms
Input / Output Connectors	2.92-Female (Input) – 2.92-Female (Output)									
Ext Trigger Input Status(C1) 0 (0-0.8V)	Normal									
Ext Trigger Input Status(C1) 1 (2.8-5V)	protection (Maximum attenuation mode)									
Control Interface	USB2.0 & Ethernet(IPv4) (Control Cable Included)									
Package	Epoxy Sealed (Standard)									
	Hermetically Sealed (Optional)									

RF-LAMBDA USA LLC: www.rflambda.com
Sales: sales@rflambda.com Technical: support@rflambda.com

Environmental Specifications and Test Standards

Parameter	Description
Operational Temperature	-40ºC to +85ºC (Case Temperature)
Storage Temperature	-50ºC to +105ºC
Thermal Shock	-40ºC → +85ºC (5 Cycles / 10 hours)
*Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85ºC for 72 Hours
Shock	1. Weight >20g, 50g half sine wave for 11ms, Speed variation 3.44m/s 2. Weight <=20g, 100g Half sine wave for 6ms, Speed variation 3.75m/s 3. Total 18 times (6 directions, 3 repetitions per direction).
Altitude	Standard: 30,000 Ft (Epoxy Sealed Controlled Environment) Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)
Hermetically Sealed (Optional)	MIL-STD-883 (For Hermetically Sealed Units)

*For vibration testing details please see additional information section.

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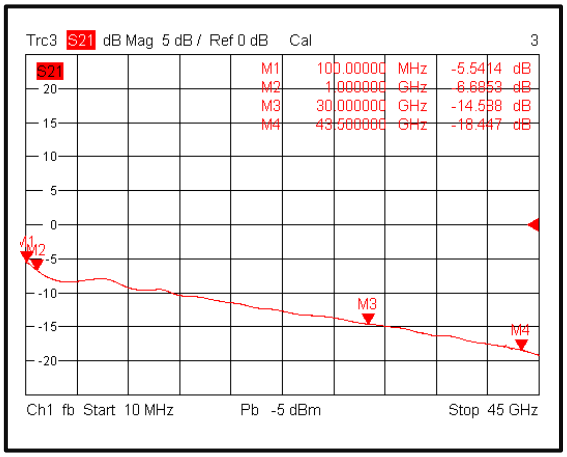
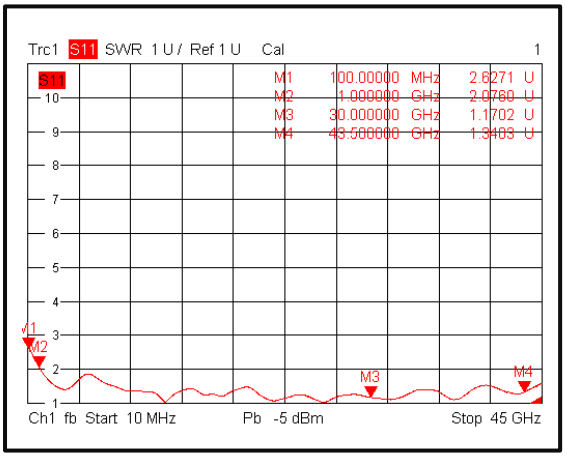
Typical Performance Plots

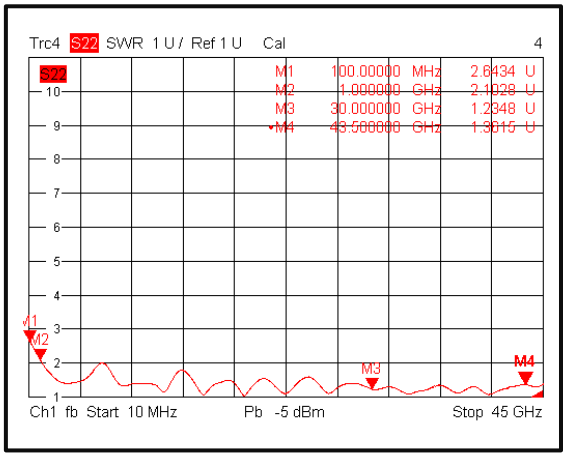
Insertion Loss @+25ºC



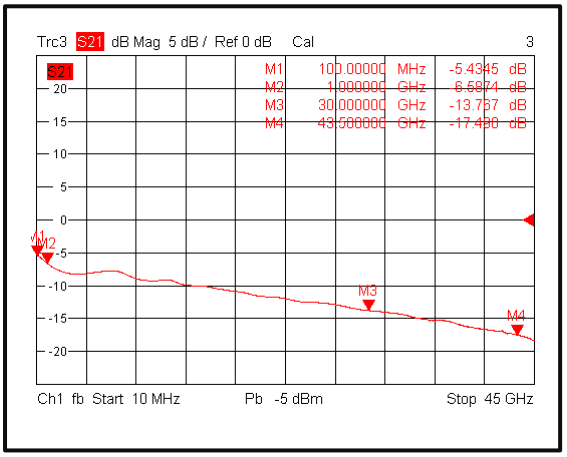
Input VSWR @+25ºC



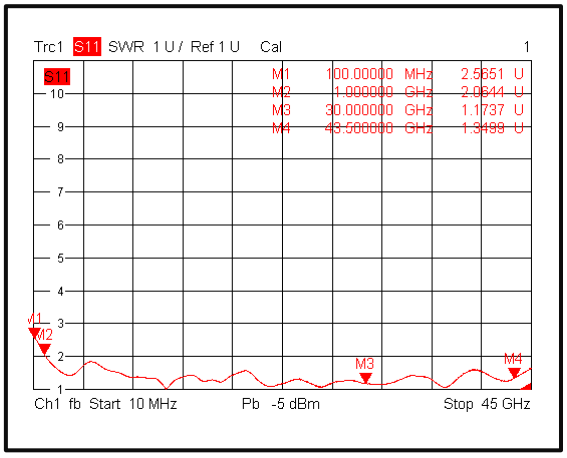
Output VSWR @+25ºC



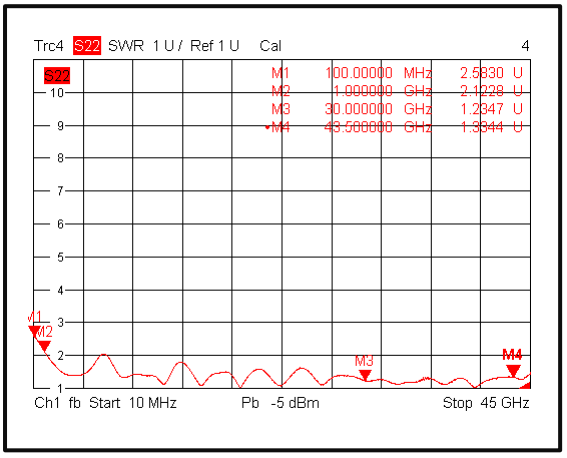
Insertion Loss @-40ºC



Input VSWR @-40ºC

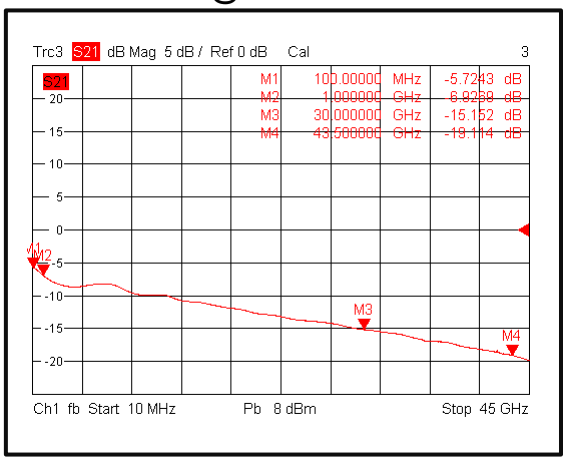


Output VSWR @-40ºC

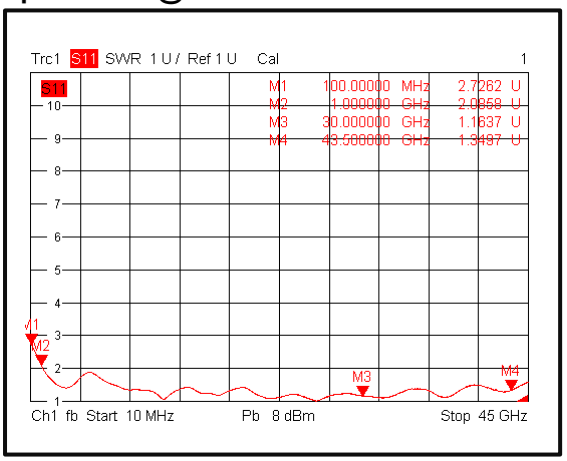


Typical Performance Plots

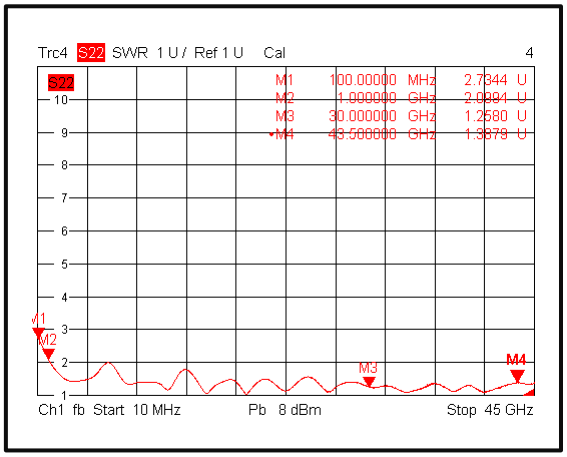
Insertion Loss @+85ºC



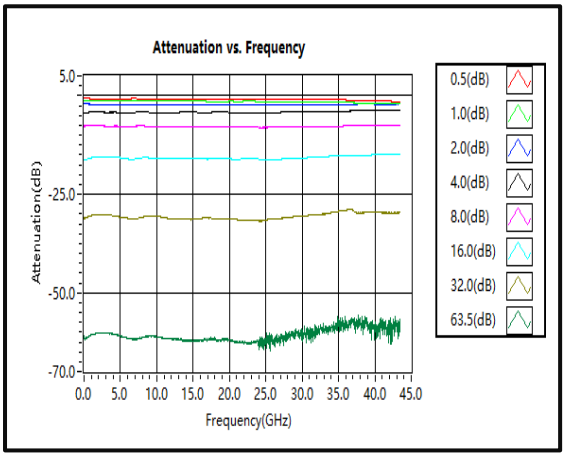
Input VSWR @+85ºC



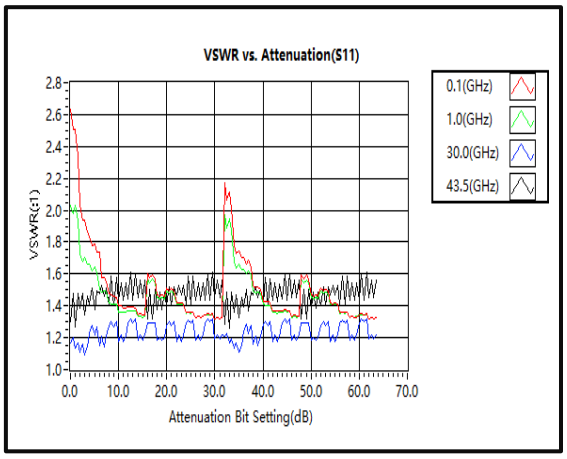
Output VSWR @+85ºC



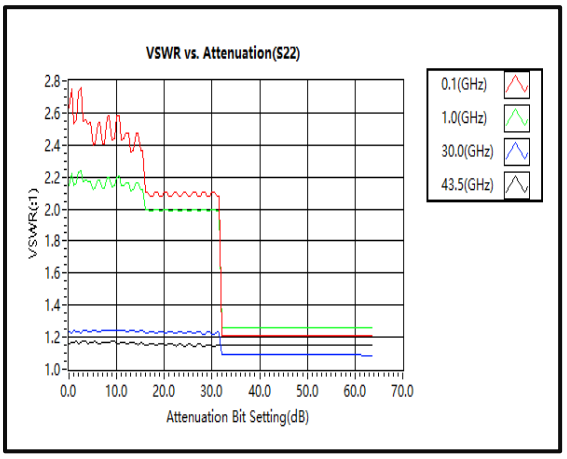
Attenuation vs. Frequency



VSWR vs. Attenuation (S11)

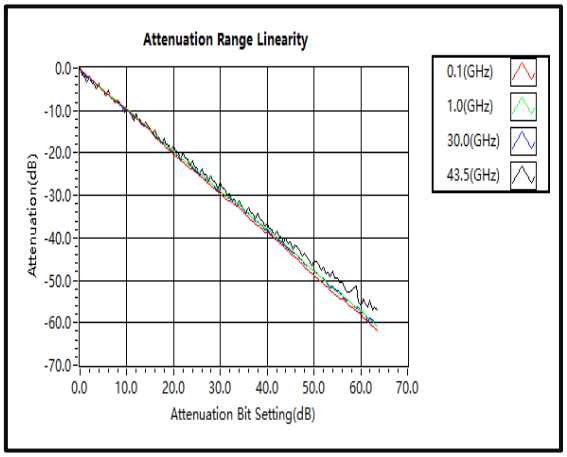


VSWR vs. Attenuation (S22)

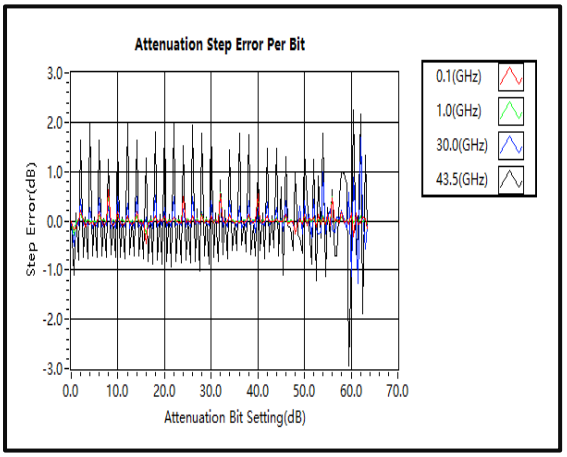


Typical Performance Plots

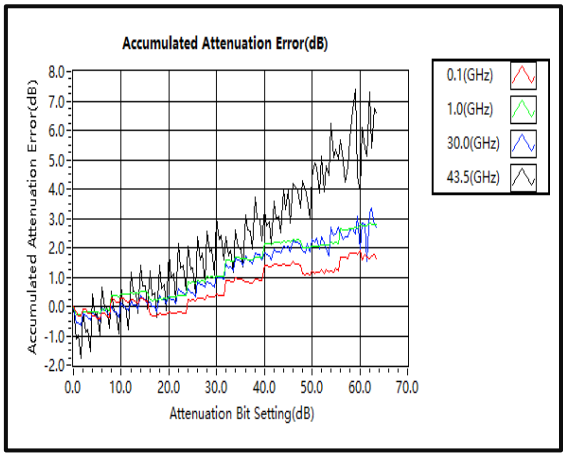
Attenuation Range Linearity



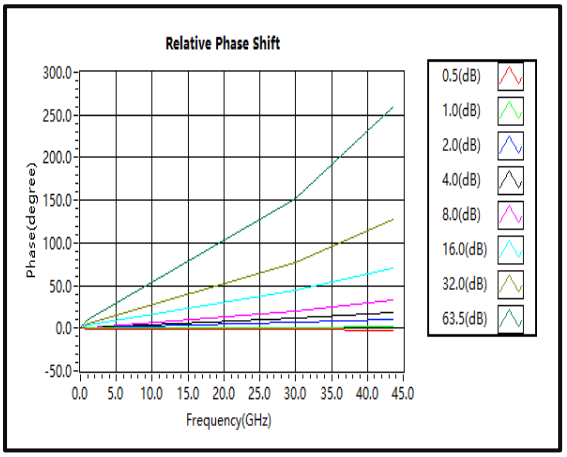
Attenuation Step Error Per Bit (dB)



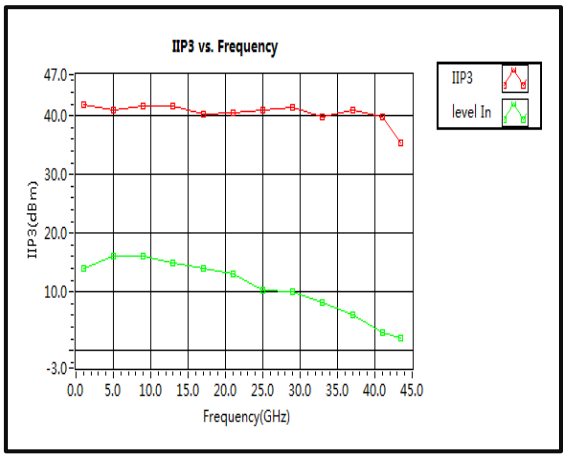
Accumulated Attenuation Error (dB)



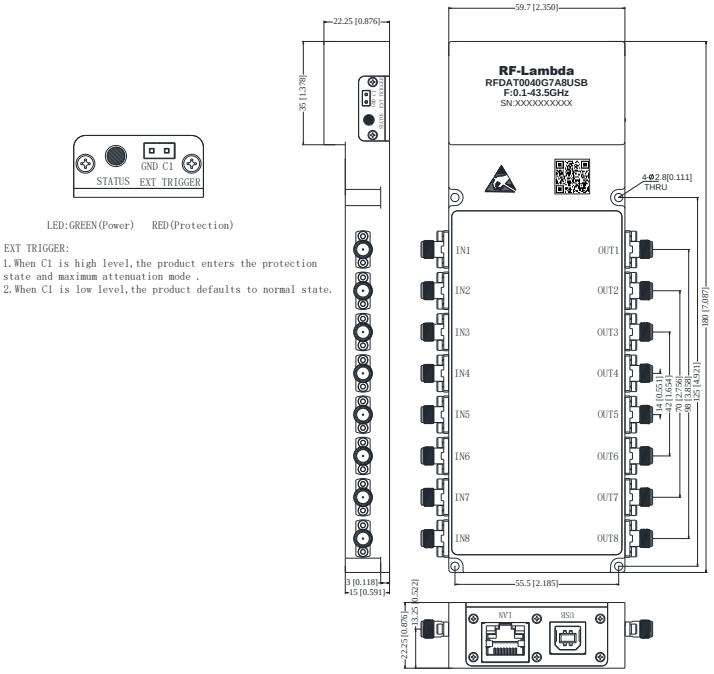
Relative Phase Shift

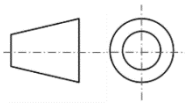


IIP3



Outline Drawing





Notes:
1. Package Material: Aluminum
2. Finish: Nickel Plated
3. All dimensions are in millimeters [inches].
4. Housing Tolerances±0.5 [0.02]unless otherwise specified
5. Standard torque wrench must be used to secure RF connectors.

Packing List

ID	Description	QTY
1	Fig a. USB/Ethernet Control RF Attenuator	1
2	Fig b. USB2.0 Cable (5 feet / 1.5 meter)	1
3	Fig c. Network Cable （6 feet / 2 meter）	1
4	Fig d. Dupont Line (0.2 feet / 0.65 meter）	1

Fig b.

Fig c.

Fig d.

Control Content Description

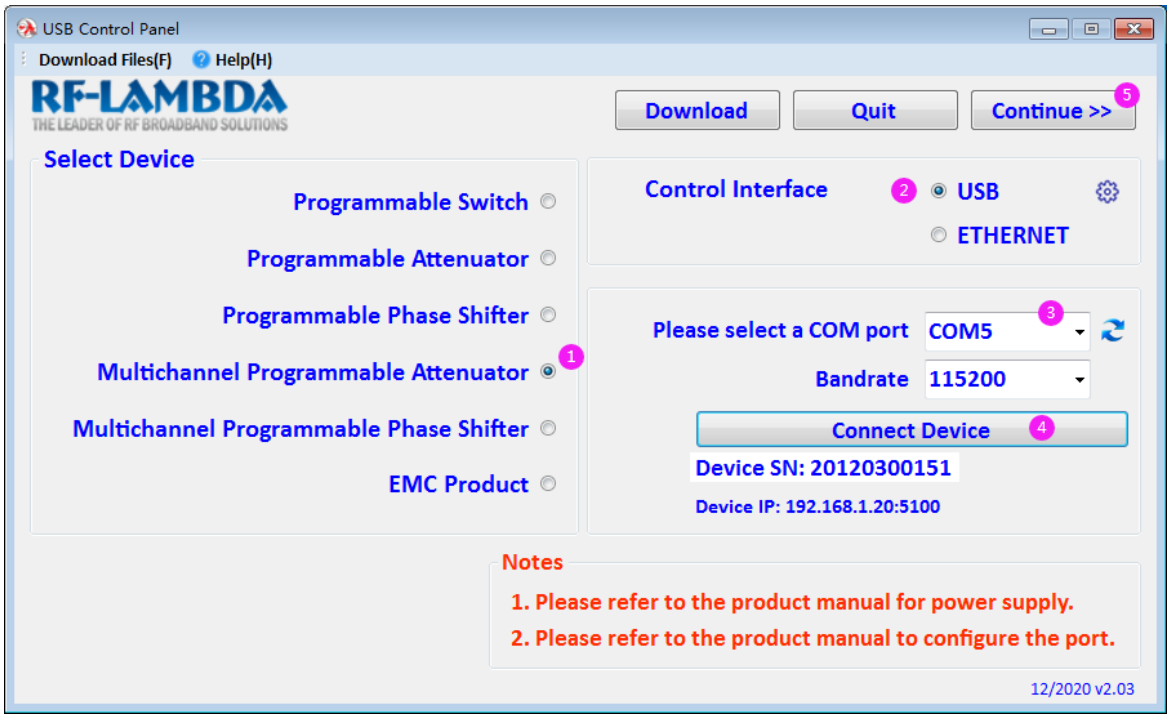
Format Requirement	USB (virtual serial port) Configuration	LAN Interface	Range of Parameters
a.All commands must end with a semicolon. b.All commands are case insensitive. c.Comma is used to separate multiple parameters in commands. d.All commands are suitable for USB(virtual serial port) and LAN interface.	Baud Rate :115200 Data bits : 8 Parity : None Stop bits : 1 Flow Type :None	IP address and Port. Default:192.168.1.225:5100; use 'USB Control panel.exe' to update.	x(Step): 1～2^n ,n is control bits.

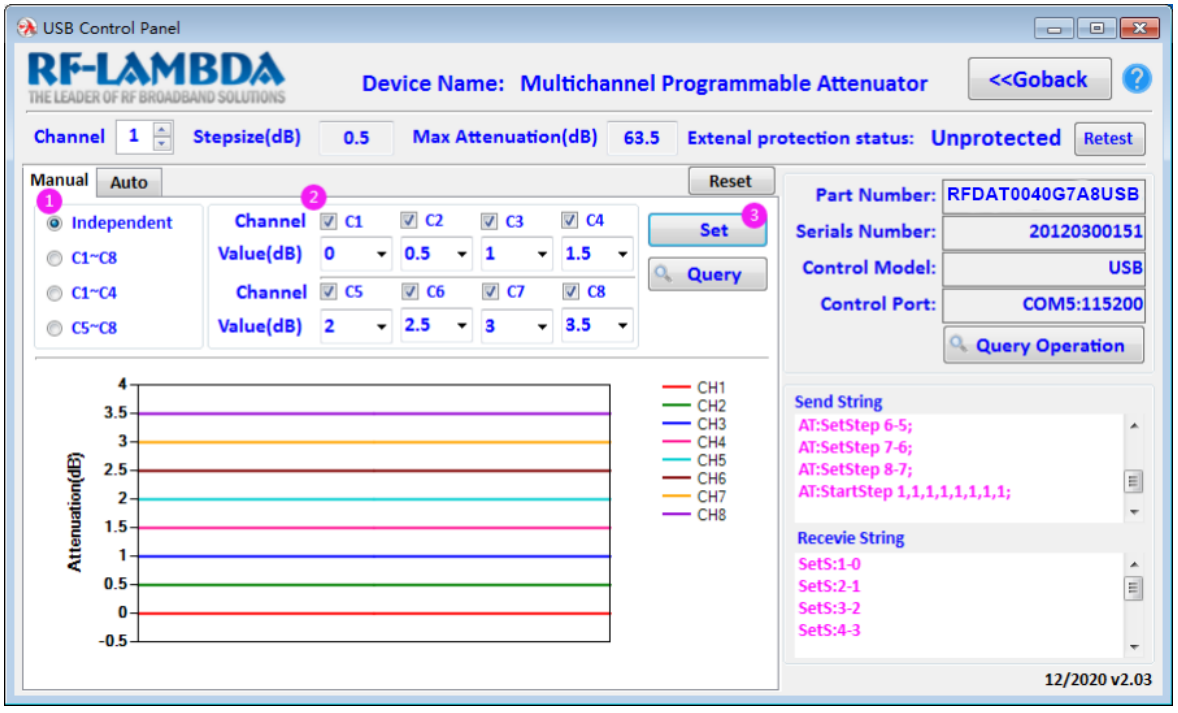
Command Specification

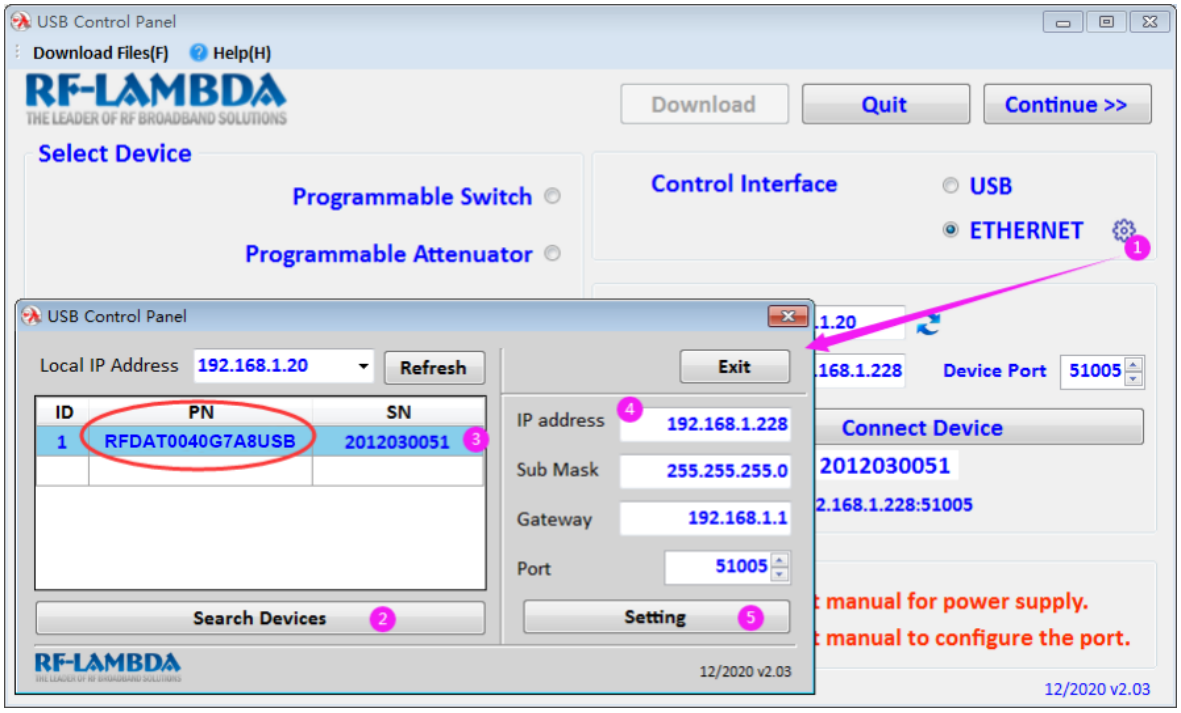
ID	Order	Description	Return	Example
1	*IDN?;	Query product information	Product PN ,SN, Manufacturer ,version	*IDN?;
2	Reset;	Reset the product	/	Reset;
3	GetMAC?;	Query the device MAC address	MAC address	GetMAC?;
4	SetBaudrate x;	Set the Baud rate (x=0,9600; x=1,115200)	Baud:badurate	SetBaudrate 1;
5	AT:SetStep x-y;	Set the attenuation step y of channel x.	SetS:x-y	AT:SetStep 2-5;
6	AT:StartStep z1,z2,...,z8;	Execute the current settings for all channels.	StartS: …	AT:StartStep 0,1,0,1,1,0,0,0;
7	AT:SetLoop x-y-z-s-t-n;	Set the looping parameters for channel x.	SetL:x-y-z-s-t-n	AT:SetLoop 2-1-16-2-0.1-100;
8	AT:StartLoop x1,x2,...,x8;	Execute the loop settings for all channels.	StartL:…	AT:StartLoop 0,1,0,1,1,0,0,0;
9	AT:StopLoop x1,x2,...,x8;	Stop the cycle of all channels.	StopL:…	AT:StopLoop 0,1,0,1,1,0,0,0;
10	AT:GetProtection Status?;	Query the external protection status. Protect:1--Protected. Protect:0--Unprotected.	Protect:1	AT:GetProtectionStatus?;
11	AT:GetBits x?;	Query the control bits of channel x.	Control Bits	AT:GetBits 1?;
12	AT:GetStepsize x?;	Query the step size of channel x.	Stepsize	AT:GetStepsize 1?;
13	AT:GetStep x?;	Query the current step of channel x.	Current step	AT:GetStep 1?;
14	AT:GetLoop x?;	Query the current loop settings for channel x.	Current settings	AT:GetLoop 1?;
15	AT:GetStatus x?;	Query the status of channel x. Return 0 or 1, and 1 means fixed attenuation, 0 means loop mode.	Status	AT:GetStatus 1?;

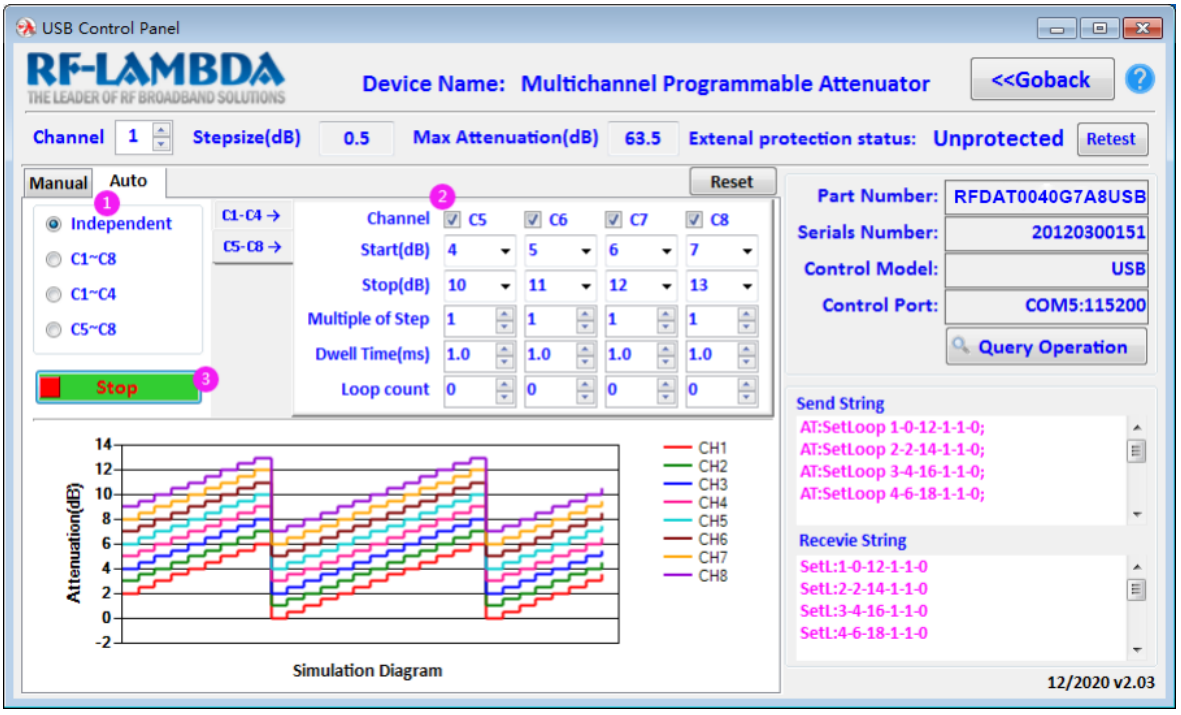
Error Code Query

ID	Return	Description
1	E1	Missing semicolon
2	E2	Incorrect command
3	E3	Missing space character
4	E4	Out of range parameters


USB Control Panel
Download Files(F)
Help(H)
RF-LAMBDA
THE LEADER OF RF BROADBAND SOLUTIONS
Download
Quit
Continue >>
5
Select Device
Programmable Switch
Programmable Attenuator
Programmable Phase Shifter
Multichannel Programmable Attenuator
1
Multichannel Programmable Phase Shifter
EMC Product
Control Interface
2
USB
ETHERNET
Please select a COM port
COM5
3
Bandrate
115200
Connect Device
4
Device SN: 20120300151
Device IP: 192.168.1.20:5100
Notes
1. Please refer to the product manual for power supply.
2. Please refer to the product manual to configure the port.
12/2020 v2.03


USB Control Panel
RF-LAMBDA
THE LEADER OF RF BROADBAND SOLUTIONS
Device Name: Multichannel Programmable Attenuator
<<Goback
Channel 1
Stepsize(dB) 0.5
Max Attenuation(dB) 63.5
Extenal protection status: Unprotected
Retest
Manual
Auto
Reset
1
Independent
C1~C8
C1~C4
C5~C8
2
Channel C1 C2 C3 C4
Value(dB) 0 0.5 1 1.5
Channel C5 C6 C7 C8
Value(dB) 2 2.5 3 3.5
Set
3
Query
Part Number: RFDAT0040G7A8USB
Serials Number: 20120300151
Control Model: USB
Control Port: COM5:115200
Query Operation
Attenuation(dB)
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
CH1
CH2
CH3
CH4
CH5
CH6
CH7
CH8
Send String
AT:SetStep 6-5;
AT:SetStep 7-6;
AT:SetStep 8-7;
AT:StartStep 1,1,1,1,1,1,1,1;
Recevie String
SetS:1-0
SetS:2-1
SetS:3-2
SetS:4-3
12/2020 v2.03


USB Control Panel
Download Files(F)
Help(H)
RF-LAMBDA
THE LEADER OF RF BROADBAND SOLUTIONS
Download
Quit
Continue >>
Select Device
Programmable Switch
Programmable Attenuator
Control Interface
USB
ETHERNET
1
USB Control Panel
Local IP Address
192.168.1.20
Refresh
Exit
ID
PN
SN
1
RFDAT0040G7A8USB
2012030051
3
IP address
4
192.168.1.228
Sub Mask
255.255.255.0
Gateway
192.168.1.1
Port
51005
Search Devices
2
Setting
5
12/2020 v2.03
Device Port
51005
Connect Device
2012030051
manual for power supply.
manual to configure the port.
12/2020 v2.03


USB Control Panel
RF-LAMBDA
THE LEADER OF RF BROADBAND SOLUTIONS
Device Name: Multichannel Programmable Attenuator
<<Goback
Channel
1
Stepsize(dB)
0.5
Max Attenuation(dB)
63.5
Extenal protection status:
Unprotected
Retest
Manual
Auto
Reset
1
Independent
C1~C8
C1~C4
C5~C8
C1-C4 →
C5-C8 →
Channel
C5
C6
C7
C8
2
Start(dB)
Stop(dB)
Multiple of Step
Dwell Time(ms)
Loop count
Stop
3
Part Number:
RFDAT0040G7A8USB
Serials Number:
20120300151
Control Model:
USB
Control Port:
COM5:115200
Query Operation
Send String
AT:SetLoop 1-0-12-1-1-0;
AT:SetLoop 2-2-14-1-1-0;
AT:SetLoop 3-4-16-1-1-0;
AT:SetLoop 4-6-18-1-1-0;
Recevie String
SetL:1-0-12-1-1-0
SetL:2-2-14-1-1-0
SetL:3-4-16-1-1-0
SetL:4-6-18-1-1-0
Attenuation(dB)
14
12
10
8
6
4
2
0
-2
CH1
CH2
CH3
CH4
CH5
CH6
CH7
CH8
Simulation Diagram
12/2020 v2.03

Additional Information

Documentation	Webpage
ESD Policy	https://rflambda.com/pdf/rflambda_esd_control.pdf
Connector Torque Specifications	https://www.rflambda.com/pdf/Torque_Specifications.pdf
Random Vibration Test Standard	https://www.rflambda.com/pdf/rflambda_random_vibration_MIL-STD-202G.pdf

Ordering Information

Part Number	Modification	Description
RFDAT0040G7A8USB	Standard	0.1GHz-43.5GHz Digital Control Attenuator

RF-LAMBDA USA LLC: www.rflambda.com
Sales: sales@rflambda.com Technical: support@rflambda.com