

# GW-4SW6-40

## Mechanical Switch 4×SPDT 2.92mm Female

### Applications

- 1-Automated Test and Measurement
- 2-5G and MIMO testing
- 3-Satellite Communications
- 4-Wireless Communication Systems
- 5- Switch Matrixes

### General description

The Gigawave GW-4SW6-40G features four independently controlled electro-mechanical single-pole Six-throw (SP6T) switches, operating from DC to 40 GHz with high isolation and low insertion loss. These absorptive switches are designed with a failsafe, break-before-make configuration and offer a typical lifespan of 2 million switching cycles when operated within the specified conditions.

Housed in a compact and robust metal enclosure, the switch box is equipped with 2.92 mm (f) connectors and front-panel LED indicators for convenient test bench operation. Control is facilitated via USB (communications device class CDC, virtual com port) or Ethernet, enabling direct operation from a PC or remote access over a network. Comprehensive software support is provided, including programming instructions compatible with both Windows and Linux environments.

### Electrical Specifications

Frequency Range	DC-6GHz	6-12.4GHz	12.4-18GHz	18-26.5GHz	26.5-40GHz
VSWR	1.1	1.1	1.2	1.2	1.4
Insertion loss	0.02	0.04	0.05	0.15	0.3
Isolation min	70	60	60	55	50
Switching Time	<15 ms	<15 ms	<15 ms	<15 ms	<15 ms
RF Input Power	40W	30W	25W	15W	5W

DC Voltage	24-28 V
Current consumption when relays are not triggered	30mA
Current consumption during the relay's switching transient	150mA

### Minimum System Requirements

	Requirements
Hardware	Intel i3 (or equivalent) or later
USB	Windows 7 or later; Linux
Ethernet	Windows, Linux or macOS with Ethernet TCP / IP support

### Control Interface

Interface	Supported Protocols
Ethernet Control	TCP / IP
USB Control	Virtual Comp Port at 115200 Baud

### Programming Commands

The primary ASCII/SCPI commands for system control via the Ethernet or USB API are summarized below. For comprehensive details, refer to the programming manual.

Command / Query	Description
*IDN?	Read model name, Serial Number, Software version.
SET,<PORTx>,<Cy>	<p>Set individual port channel,  x parameter [1 - 4]  y parameter [1 -6]  x refers to ports, y refers to channels</p> <p>example command: SET,PORT1,C1</p> <p>Explanation: On Port1 turn on Channel1</p> <p>Note: Hot switching has been implemented, and each port is capable of switching between any channel from C1 to C6 without interruption.</p>

Command / Query	Description
CLR,<PORTx>,<Cy>	<p>Clears individual port channel,  x parameter [1 - 4]  y parameter [1 -6]  x refers to ports, y refers to channels</p> <p>example command: CLR,PORT1,C1</p> <p>Explanation:  Clears Channel1 on Port1</p>

\* All commands must be entered in uppercase letters.

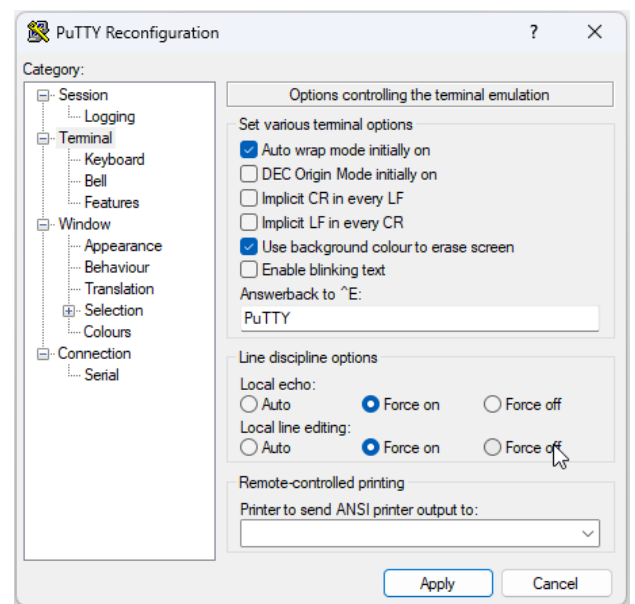
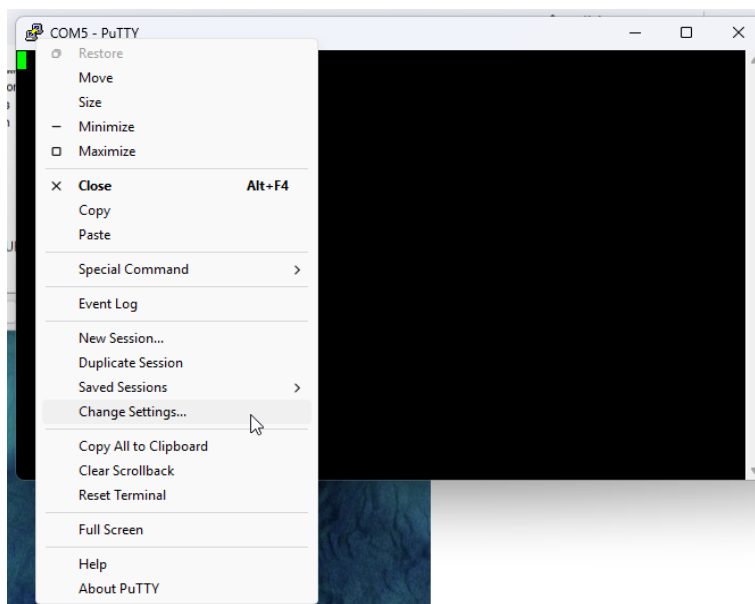
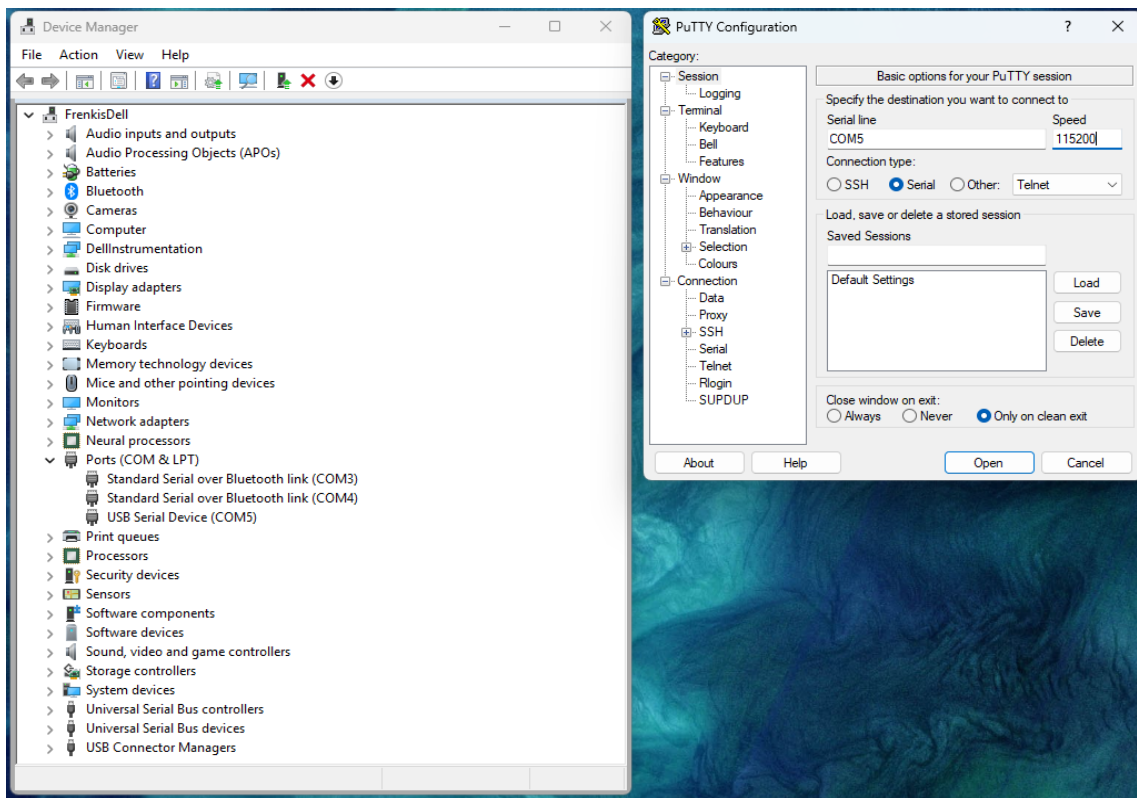
## Operational Guide for Connecting the RF Switch in Windows

- 1.Connect a DC 24V power supply to the designated connector.
- 2.Connect the device to an available USB port on the computer.
- 3.Check the Device Manager for newly detected USB ports.
- 4.Open PuTTY.
- 5.Explore available commands.

## UART Communication Example

Upon connecting the USB cable to the development PC and powering the device, it will be recognized as a USB Serial Device (COM5: in your system could be any number 1,2,..) in the system. You can now start PuTTY or any other serial terminal program.

In the Session category, select the Serial radio button and enter COM5 into the Serial Line field. Set the Speed to 115200. After entering the necessary information, click Open to launch the terminal window. Once the new terminal window is open, you will need to configure the terminal settings. Right-click on the two computers icon in the upper-right corner of the terminal window to access the terminal settings. By selecting the Change Settings option, we can modify the Line Discipline settings by enabling the radio buttons for Local Echo: Force On and Local Line Editing: Force On.



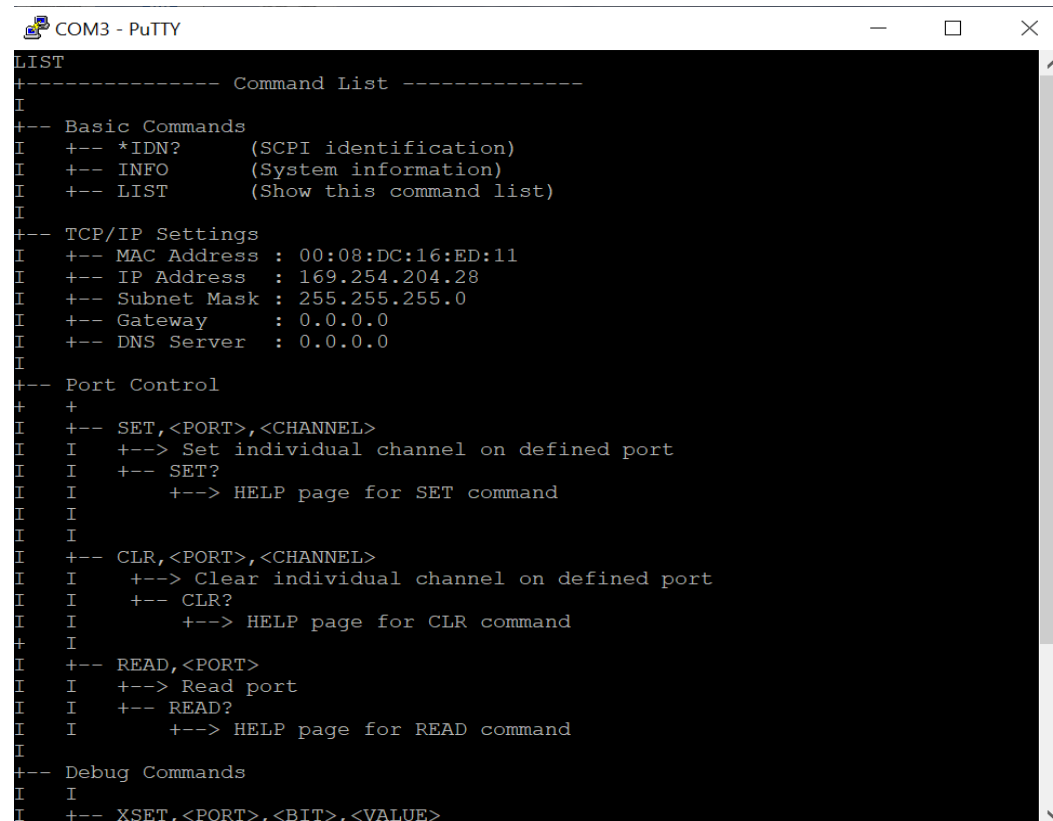
After adjusting these options, click Apply to confirm the changes. The terminal is now ready for use.

Send SCPI command \*IDN?



```
COM3 - PuTTY
*IDN?
Gigawave Systems, LLC. , Model Name: GW-4SW6-40G, Serial No:00001, SW:0.1
```

Send SCPI command LIST



```
COM3 - PuTTY
LIST
+----- Command List -----
I
+-- Basic Commands
I +-- *IDN?      (SCPI identification)
I +-- INFO      (System information)
I +-- LIST      (Show this command list)
I
+-- TCP/IP Settings
I +-- MAC Address : 00:08:DC:16:ED:11
I +-- IP Address  : 169.254.204.28
I +-- Subnet Mask : 255.255.255.0
I +-- Gateway     : 0.0.0.0
I +-- DNS Server  : 0.0.0.0
I
+-- Port Control
I +
I +-- SET,<PORT>,<CHANNEL>
I I +--> Set individual channel on defined port
I I +-- SET?
I I +--> HELP page for SET command
I I
I I
I +-- CLR,<PORT>,<CHANNEL>
I I +--> Clear individual channel on defined port
I I +-- CLR?
I I +--> HELP page for CLR command
I I
I +-- READ,<PORT>
I I +--> Read port
I I +-- READ?
I I +--> HELP page for READ command
I
+-- Debug Commands
I I
I +-- XSET,<PORT>,<BIT>,<VALUE>
```

To initiate communication with the device, input the command \*IDN? into the terminal and press the Enter key. If the device is correctly connected and configured, it will return an identification string confirming its presence. To retrieve comprehensive device information, use the INFO command.

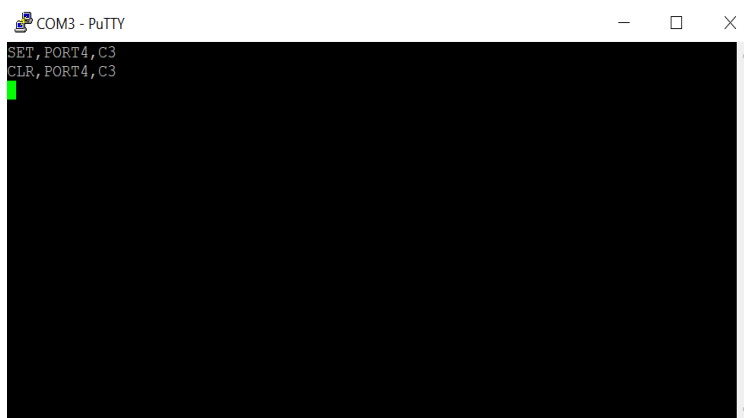
Each command for managing ports includes an integrated help page. For instance, the SET command is utilized to activate a specific channel on a designated port. To close the switch on Channel 3 of Port 4, enter SET,PORT4,C3. Upon submitting the command by pressing the Enter key, the device will execute the instruction, closing the RF path associated with Channel 3 on Port 4.

To deactivate the selected path, use the command CLR,PORT4,C3. After confirming the command, the device will disconnect the specified path on the associated port.

```

+-----+
SET?
+--- SET Command Help -----+
I Sets individual port channel
I Usage: SET,<PORT>,<CHANNEL>
+-----+
I
+--- <PORT>
I +--- PORT1      (Port 1 Control)
I +--- PORT2      (Port 2 Control)
I +--- PORT3      (Port 3 Control)
I +--- PORT4      (Port 4 Control)
I
+--- <CHANNEL>
I +--- Channel list
I I +--- SET_C1   (Set Channel 1)
I I +--- SET_C2   (Set Channel 2)
I I +--- SET_C3   (Set Channel 3)
I I +--- SET_C4   (Set Channel 4)
I I +--- SET_C5   (Set Channel 5)
I I +--- SET_C6   (Set Channel 6)
+-----+

```



## Switch Control Logic

Switch Command	Switch State				Front Panel LED						
	Port1	Port2	Port3	Port4	1	2	3	4	5	6	PORT LED
<u>SET,PORT1,C1</u>	PORT1 Channel1 active				ON						
<u>SET,PORT2,C2</u>	PORT2 Channel2 active					ON					
<u>SET,PORT3,C4</u>	PORT3 Channel4 active							ON			
<u>SET,PORT4,C6</u>	PORT4 Channel5 active									ON	
	No active channel on port										

## Extended Command List

Command	Command Group	Description
*IDN?	System	System identification command
INFO		System info command
LIST		Command list
IP	Network Settings	Set IP address
SBMSK		Set Subnet Mask
GT		Set Gateway
DNS		Set DNS server
SET,<PORTx>,<Cy>	System Control	Set individual port channel
SET?		Set command help page
CLR,<PORTx>,<Cy>		Clears individual port channel
CLR?		Clear command help page
READ,<PORTx>		Read selected port
READ?		Read command help page

Gigawave offers a complete software and support package, available for free download, which includes a user guide, Windows GUI, example programs in various programming languages (LabVIEW, Python), an API programming manual, and sample implementations (refer to the last page for the download link). A comprehensive range of software control options is provided.

1. GUI for Windows – A user-friendly software interface enabling control via Ethernet and or USB.
2. Programming and Automation via Ethernet
3. Provides a comprehensive set of control commands that can be transmitted through supported protocol, ensuring seamless integration into most modern programming environments.
4. Programming and Automation via USB/CDC
5. Provides same functionality as Ethernet but only over USB CDC
6. USB (Communication Device Class) is a standard USB device class that enables communication between a host computer (e.g., a PC) and a USB device (e.g., a microcontroller) via a virtual serial port.

## Operational Guide for Connecting the RF Switch in Linux

This guide provides instructions for connecting and controlling the RF switch in a Linux environment via LAN or USB interfaces.

### 1. LAN Connection

To establish a connection via LAN, locate the IP address of the RF switch, which is indicated on a label affixed to the back of the device housing. Use the default IP address to connect to the switch using the `telnet` command for control.

```
:~$ ping 169.254.204.28
PING 169.254.204.28 (169.254.204.28) 56(84) bytes of data:
64 bytes from 169.254.204.28: icmp_seq=1 ttl=128 time=0.426 ms
64 bytes from 169.254.204.28: icmp_seq=2 ttl=128 time=0.485 ms
64 bytes from 169.254.204.28: icmp_seq=3 ttl=128 time=0.490 ms
64 bytes from 169.254.204.28: icmp_seq=4 ttl=128 time=0.309 ms
64 bytes from 169.254.204.28: icmp_seq=5 ttl=128 time=0.180 ms
64 bytes from 169.254.204.28: icmp_seq=6 ttl=128 time=0.205 ms
64 bytes from 169.254.204.28: icmp_seq=7 ttl=128 time=0.496 ms
64 bytes from 169.254.204.28: icmp_seq=8 ttl=128 time=0.433 ms
64 bytes from 169.254.204.28: icmp_seq=9 ttl=128 time=0.458 ms
^
```

- Identify the IP address on the device label.
- Open a terminal and enter the command:  
telnet <IP\_ADDRESS>
- Follow the on-screen prompts to control the switch.
- Device uses TCP port 3333

```
:~$ telnet 169.254.204.28 3333
Trying 169.254.204.28...
Connected to 169.254.204.28.
Escape character is '^]'.
SET,PORT1,C1
LIST
+----- Command List -----
I
+-- Basic Commands
I +-- *IDN?      (SCPI identification)
I +-- INFO      (System information)
I +-- LIST      (Show this command list)
I
+-- TCP/IP Settings
I +-- MAC Address : 00:08:DC:16:ED:11
I +-- IP Address  : 169.254.204.28
I +-- Subnet Mask : 255.255.255.0
I +-- Gateway     : 0.0.0.0
I +-- DNS Server  : 0.0.0.0
I
+-- Port Control
+ +
I +-- SET,<PORT>,<CHANNEL>
I I +--> Set individual channel on defined port
I I +-- SET?
I I +--> HELP page for SET command
I I
I +-- CLR,<PORT>,<CHANNEL>
I I +--> Clear individual channel on defined port
I I +-- CLR?
I I +--> HELP page for CLR command
+ I
I +-- READ,<PORT>
```



## 2. USB Connection

For USB connectivity, a serial terminal emulator such as `picocom` or `minicom` is required. This guide uses `picocom` as an example.

- Install `picocom` by executing the following command in the terminal:

```
sudo apt install picocom
```

- Connect the RF switch to the computer via a USB cable.

- Open a terminal and initiate the connection with the following command:

```
picocom /dev/ttyACM0 -b 115200 --echo
```

- Use the terminal interface to send commands and control the switch.

**\*\*Note:\*\*** Ensure the USB device is recognized as `/dev/ttyACM0`.

If a different port is assigned, replace `/dev/ttyACM0` with the appropriate device path.

```
~$ picocom /dev/ttyACM0 -b 115200 --echo
picocom v3.1

port is      : /dev/ttyACM0
flowcontrol  : none
baudrate is  : 115200
parity is    : none
databits are : 8
stopbits are : 1
escape is    : C-a
local echo is : yes
noinit is    : no
noreset is   : no
hangup is    : no
nolock is    : no
send_cmd is  : SZ -vv
receive_cmd is : rz -vv -E
imap is      :
omap is      :
emap is      : crcrlf,delbs,
logfile is   : none
initstring   : none
exit_after is : not set
exit is      : no

Type [C-a] [C-h] to see available commands
Terminal ready
SET,PORT4,C2
SET,PORT4,C3
```

## Mechanical Specifications

Material : Aluminium

Finish: Paint

Weight : 25 gram

Dimensions: 47mm × 33mm × 11mm

Connector: 2.92 mm Female

Operation Temperature: -40°C to 85°C

