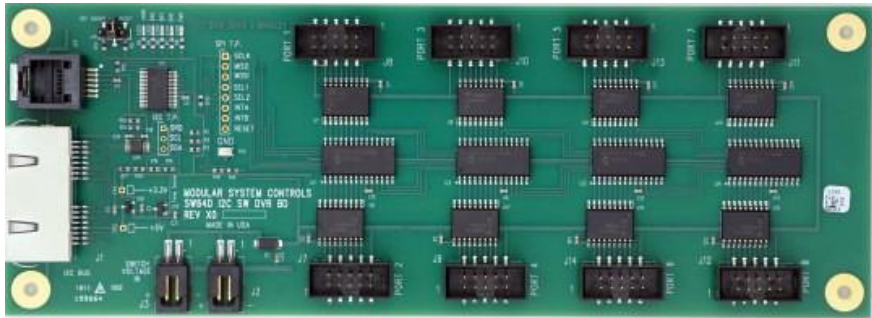


# SW64D

## 64 Channel Switch Driver Board Direct Drive for RF Switch Coils and other devices



### Description

The SW64D board is a component of the Modular Control System. The board provides direct control of RF switches, relays, lamps, fans and other high current, high voltage devices. Multiple SW64D boards may be combined with other boards and the MSC02 controller board to build large or small custom control systems with no NRE. The boards are controlled by the industry standard I<sup>2</sup>C bus and are interconnected with standard Ethernet cables. The board is configured by the controller board.

The SW64D is a “smart board”, its on-board processor handles the control of the attached devices, off-loading the main controller board. The board is pre-programmed with the parameters of the devices so when the controller needs to change a setting such as a RF switch position, all it needs to send to the board is the switch number and the new position.

One example is the control of a multi-position latching switch with a common reset line, the SW64D processor would first pulse the reset coil for the programmed time, then pulse the proper coil to set the desired position. As the required pulse timing is typically 10-20 milliseconds for

### Features:

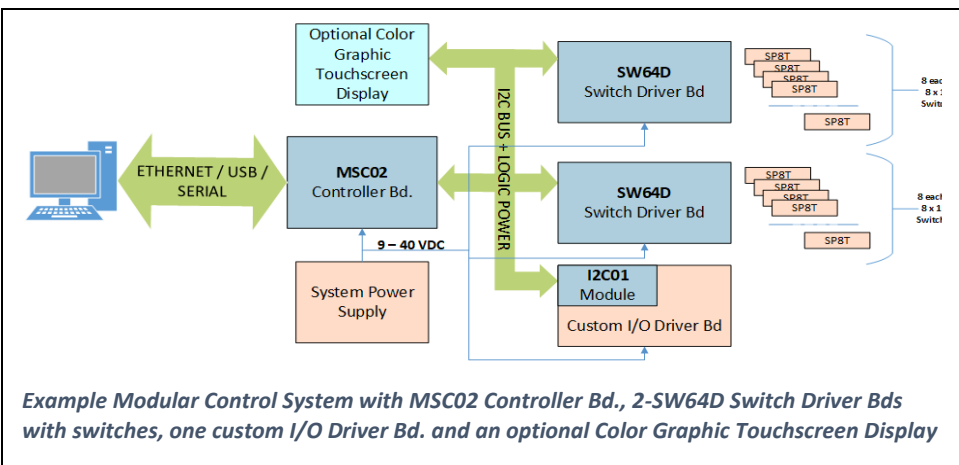
- Plug and Play RF switch control – No NRE
- Compatible with the Modular Control System
- On board processor offloads main controller board
- 64 channels in 8 ports
- 50V, 500 mA, low side drivers
- Suppression diodes for inductive loads
- Contact actuation counters for each channel
- Controls latching and non-latching switches and relays
- Supports many standard RF switches
- Supports step attenuators
- I<sup>2</sup>C bus control using standard Ethernet cables
- Multiple boards can be controlled by one controller bd.
- Switch power distribution
- Reverse voltage protection
- Monitors temperature and supply voltages
- Minimal chassis wiring

### Applications:

- Test & Measurement
- Communication Systems
- Instrumentation
- Radio/Antenna matrix control
- Naval & other marine systems

### Device Control:

- RF switch matrixes
- Attenuators
- Relays
- Lamps & LEDs
- Fans
- Mechanical devices



*Example Modular Control System with MSC02 Controller Bd., 2-SW64D Switch Driver Bds with switches, one custom I/O Driver Bd. and an optional Color Graphic Touchscreen Display*

## Modular System Controls

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each coil, once the command is sent to the SW64D, the controller board is free to continue to the next switch or device without having to wait for the pulse timing to complete. If a path in a matrix switch is being set, this will allow the action to be processed in parallel. The SW64D board can also process multiple switch commands in parallel as the command structure allows the controller board to send a list of switch position commands.

## System Architecture

The Modular Control System consists of a MSC02 Modular System Controller Board and as many driver boards as needed. The system control is via I<sup>2</sup>C serial buses using standard Ethernet cables. All boards have two parallel I<sup>2</sup>C connectors so they can be “daisy chained” on the bus. Other types of boards can also be included in the system as well as a front panel color touch screen.

System configuration, switch types and other device parameters are pre-programmed in the MSC02 controller board’s EEPROM using simple SCPI commands and can be loaded using batch files.

## SW64 Configuration

The SW64D boards are configured by the MSC02 controller board over the I2C bus when the system is assembled. The SW64D stores its configuration in its own EEPROM so it is ready at power on.

SW64D boards can be configured to control up to 64 switches or relays with a separate command for each one. Each I/O port can be configured to control switches with up to 8 positions or multiple switches or relays in any mix up to 8 control lines. For example, a port could control two 4-position switches, two 3-position switches with two SPDT switches or one 8-position switch. Switches larger than 8-positions can be controlled using multiple ports.

The SW64D can also be configured to control step attenuators. The attenuation value for each control line is programmed and the attenuator can be set by just specifying the total attenuation value. This also allows the attenuator to be calibrated to match actual values if desired.

The control ports can also be set as 8-bit values in decimal or hexadecimal to control lamps or other devices.

The SW64D has service request capability and can notify the controller of specific events such as operation complete to validate that all commands have been executed or in case of a system error such as a power supply voltage out of range or an over temperature event.

The board temperature and supply voltages are monitored and reported to the controller on command.

The SW64D contains counters which can be enabled to count the number cycles for each switch pole or relay to provide a warning when the device reaches a pre-determined number of cycles. In a production test environment, this will allow the devices to be replaced when their maximum cycles specification is reached.

## Supported Devices

The standard SW64D firmware supports the following devices with low side coil drive requirements, please consult the factory if additional device support is needed.

### RF Switches

- 1 to 8 poles non-latching
- 1 to 8 poles latching
- 1 to 7 poles latching w/reset

### Step Attenuators

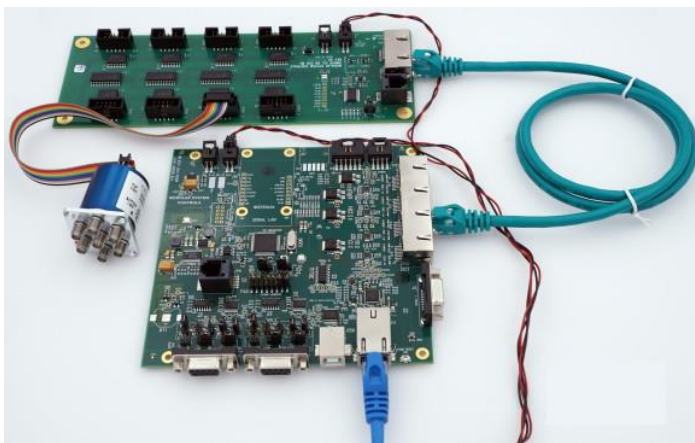
- 1 to 8 sections non-latching
- 1 to 4 sections latching (2 lines per section)

### Relays

- Non-latching (1 coil)
- Latching (2 coils)

### Other Devices

- Single line on/off
- Multiple lines, decimal or binary encoding



### MSC02 & SW64D Modular Control System

This is a minimal off-the-shelf solution which can be expanded by adding additional SW64D or other boards. Shown is a MSC02 Controller Board connected to a SW64D Switch Driver board and Ethernet with one 6-pole RF switch.

# SW64D Driver Board Specifications

## I/O Ports

### Ports

Number of ports 8

### Port signals

Drivers 8

Load Voltage Out 1

Ground 1

### Driver Rating

Voltage 50V DC max

Current 500 mA max

Suppression Diodes Yes

### Connector Type

Industry standard polarized shrouded header with male pins compatible with standard ribbon cable connectors or crimp pin cable connectors.

Pins 10

Rows 2

Pins spacing 0.1"

Row spacing 0.1"

I/O CONNECTIONS J7 - J14	
PIN	FUNCTION
1	Driver 1
2	Driver 2
3	Driver 3
4	Driver 4
5	Driver 5
6	Driver 6
7	Driver 7
8	Driver 8
9	Ground
10	Switch Voltage

## Measurements

Board temperature -10 to 60 C

Supply voltages: Switch Voltage, 5V, 3.3V

## I<sup>2</sup>C Interface

The I<sup>2</sup>C bus signals are fully buffered at a 5V level and include a service request line.

### Connector type

RJ45 (2) shielded, wired in parallel to allow daisy chaining the bus

### I<sup>2</sup>C Signals

SCL Twisted pair

SDA Twisted pair

INT (SRQ) Twisted pair

+5V DC 2-wires

### I<sup>2</sup>C Modes

I<sup>2</sup>C mode Slave

Address Mode 7-bit

Addresses 112 (programmable)

Default address 64

## Power Requirements

### Logic Power

5V @ < 5 mA Supplied by the MSC02 Controller Bd.

### Switch Voltage

+6 to +40 VDC Switch Supply

POWER CONNECTIONS J2 & J3	
PIN	FUNCTION
1	Switch Voltage
2	Ground

## Configuration and Control

Configuration and Control is via the MSC02 Controller Bd. using standard SCPI commands. Once configured, the setup is stored in the SW64D's micro controller's EEPROM.

### Configuration:

- Switch & relay settings
- I/O port setup
- Attenuator step settings

### Control Commands:

- Switch/Relay control
- Attenuator control
- I/O port control

## Physical

### Size, L x W x H

8.3 x 3.0 x 0.64 inches

### Temperature

Operation -10C to +50C

Storage -40C to +85C

Humidity 0-90% RH non-condensing

### Connectors

I<sup>2</sup>C (2) RJ45

Power Inputs (2) Molex 0015912025

I/O connectors (8) CNC Tech 3020-10-0300-00

Programming (1) RJ14

### LED Indicators

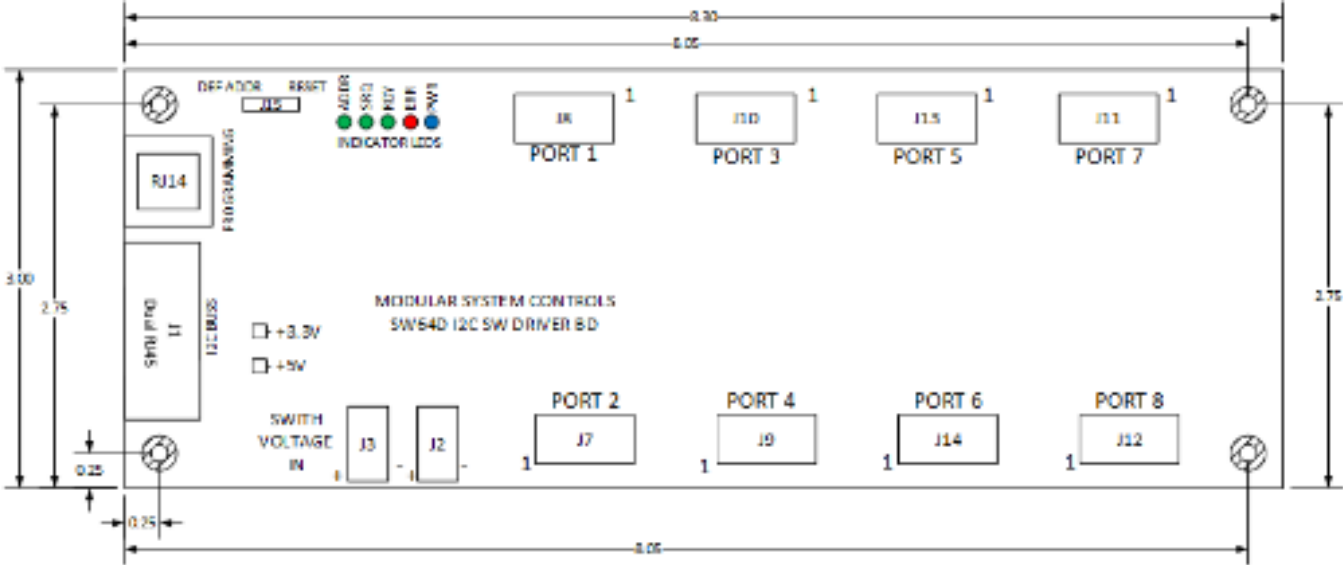
PWR, ERR, RDY, SRQ, ADDR

## Certifications

Our assembly facility is ISO 9001 and ISO 13485 certified.

All boards are RoHS certified.

### SW64D Installation Drawing



**Notes:**

- 1. Mounting hole pads are isolated from circuit ground and connected to J1 shell. It is recommended that the user connect the power supply ground to the chassis as appropriate.
- 2. Dimensions are in inches.
- 3. Do not scale drawing.