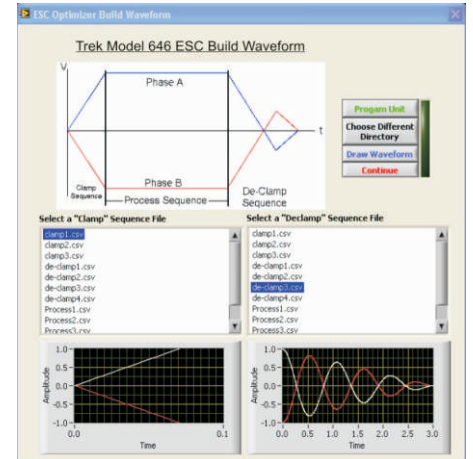


# Model 646

## Electrostatic Chuck Supply



Trek's Model 646 software-driven Electrostatic Chuck Supply offers an array of features that provide significant benefits while accommodating a variety of demanding applications. Model 646 incorporates Trek technology which has demonstrated increases in efficiency and throughput equal to three times that of other supplies. Additionally, the Model 646 virtually eliminates sticky wafer and wafer popping issues, thus ensuring better control over particle contamination.

The lockable front panel interface of this amplifier/supply optimizes many processes by enabling the operator to control parameters such as over-current, wafer-present and wafer-clamped thresholds, clamp voltage, offset voltage and internal or external amplitude/offset control.

The dynamic features of the Model 646 also enable electrostatic chuck profiles to be uploaded to the unit via a user-friendly software interface. The profiles, which are stored internally using non-volatile memory, are used to effectively chuck and de-chuck the wafer. Both Coulombic and Johnson-Rahbek electrostatic chuck technologies are supported.

The Model 646 includes in-process-adjustable amplitude/offset and output-control versatility. The output can be controlled by the back panel I/O, serial computer command (USB, RS232 or optional Ethernet) or by the controls on the front panel.

Given the versatility of Model 646 and its dial-in performance, the unit can be used in multiple unique tools/processes, thus eliminating the need to specify a new supply for each unique tool/process in a facility.

- **User Configurable for Custom Clamp and Declamp Sequences and Wave Shapes**
- **Virtually Eliminates Sticky Wafer or Wafer Popping Issues**
- **Increases Throughput**
- **Reduces Backside (He) Errors**
- **Lockable Front Panel Control Interface**
- **Wafer Detection Includes No Wafer, Wafer Present, Wafer Clamped**
- **±3 kV Bipolar or Unipolar Operation**
- **10 mA Peak Current**
- **Coulombic or Johnson-Rahbek Operation**



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# Model 646 Electrostatic Chuck Supply

## Output

### Simultaneous High-Voltage Outputs

The unit features 2 simultaneous high-voltage outputs (output Phase A and output Phase B) which are equal in magnitude and opposite in polarity relative to an offset voltage.

### Output Phasing

#### Output Voltage A (Reference Phase)

0 to  $\pm 3$  kV.

#### Output Voltage B

0 to  $\pm 3$  kV.

Phase B = (-1) x Phase A.

#### Offset Voltage

Each DC output voltage (Phase A and Phase B) is ramped up and down with symmetrical rise and fall times, or they can be programmed with the user's custom clamping and declamping waveforms. The clamping process is initiated in response to the Clamp On/Off control. The polarity of each output reverses to the opposite polarity after each Clamp On/Off cycle. This feature can be disabled through the program.

### Output Waveshape

Each DC output voltage (Phase A and Phase B) is ramped up and down with symmetrical rise and fall times, or can be programmed with the user's custom clamping and declamping waveforms.

### Output Voltage Range

0 to  $\pm 3$  kV DC, maximum.

### Output Current Range

0 to  $\pm 6.5$  mA DC with a peak capability of 10 mA.

## Input

### Setting the High Voltage Amplitude

The high voltage magnitude can be controlled either externally or internally to the unit.

### Setting the Offset Voltage

The offset voltage can be controlled either externally or internally to the unit.

## Features

### Clamped Wafer Detection Feature

To indicate wafer clamping events, the capacitive currents generated

## Features (cont)

by a low voltage sine wave, superimposed on the Phase A and Phase B outputs, are monitored but can be disabled through the program. The super imposed waveform is used to indicate a no wafer, wafer present, or wafer clamped capacitance state; thresholds are set by the program.

### Capacitive Load Select

The clamped capacitance state range can be selected by the program for 0 to 10, 20 or 30nF (phase to phase), depending on the system and electrostatic clamp physical configurations.

### Interlock Connector

Connections are provided to support an Interlock safety configuration. In the event that the interlock is open, the high voltage generation circuits are shut down.

### Interface

#### 15-Pin connector

Provides connections for a remote device to control and monitor the operation of the Model 646.

#### USB

#### RS-232

#### Ethernet (optional)

#### Front Panel

### Digital Display

A 40x2 LCD character display shows various system functions such as Set Voltage, Output Voltage, Capacitance Monitor, and more.

### Output Voltage Monitors (back panel connector)

#### Scale Factor

1 V/300 V.

#### DC Accuracy

Better than 0.5% of full scale.

#### Offset Voltage

Less than 10 mV.

#### Output Noise

Less than 50 mV rms.

### Output Current Monitors

#### Scale Factor

1 V/1  $\mu$ A.

#### DC Accuracy

$\pm 0.1$   $\mu$ A.

#### Output Noise

Less than 50 mV rms

## General

### Power ON/OFF

A two-position rocker switch.

### Power Requirements

24V DC, 2.0 Amps.

### Operating Conditions

#### Temperature

0 °C to 35 °C.

#### Relative Humidity

To 85%, noncondensing.

### Dimensions

1U Rack mount enclosure.

#### Height

3.47" (88.1mm).

#### Width

17.0" (431.8mm).

#### Depth

20.9" (531.9mm).

#### Panel Width

19.0" (482.6mm).

### Weight

11.0 lbs. (5.0 kg).

### High-Voltage Output Connector

TYCO (AMP) 3 Pin LGH series.

### Ground Receptacle

Ground stud.

### DC Input Receptacle

2.0mm locking DC Jack. The center contact is positive and the shell is negative. (Receptacle mates with a Switchcraft S761K plug.)

### Interface Connector

15-pin "D" ITT cannon.

### Serial Connector

9-pin "D" ITT cannon.

### USB Connector

Standard type A.

### Accessories Supplied

Operator's manual, fuse, line cord and DC plug (Switchcraft S761K). Optional cable assembly available.

### Optional Accessories

24 VDC universal input power supply.

**A  $\pm 2$  kV model is also available:  
Trek Model 645**

All specifications are subject to change.  
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