

Pulsed Electro-Acoustic Systems

Box Elder Innovations, LLC

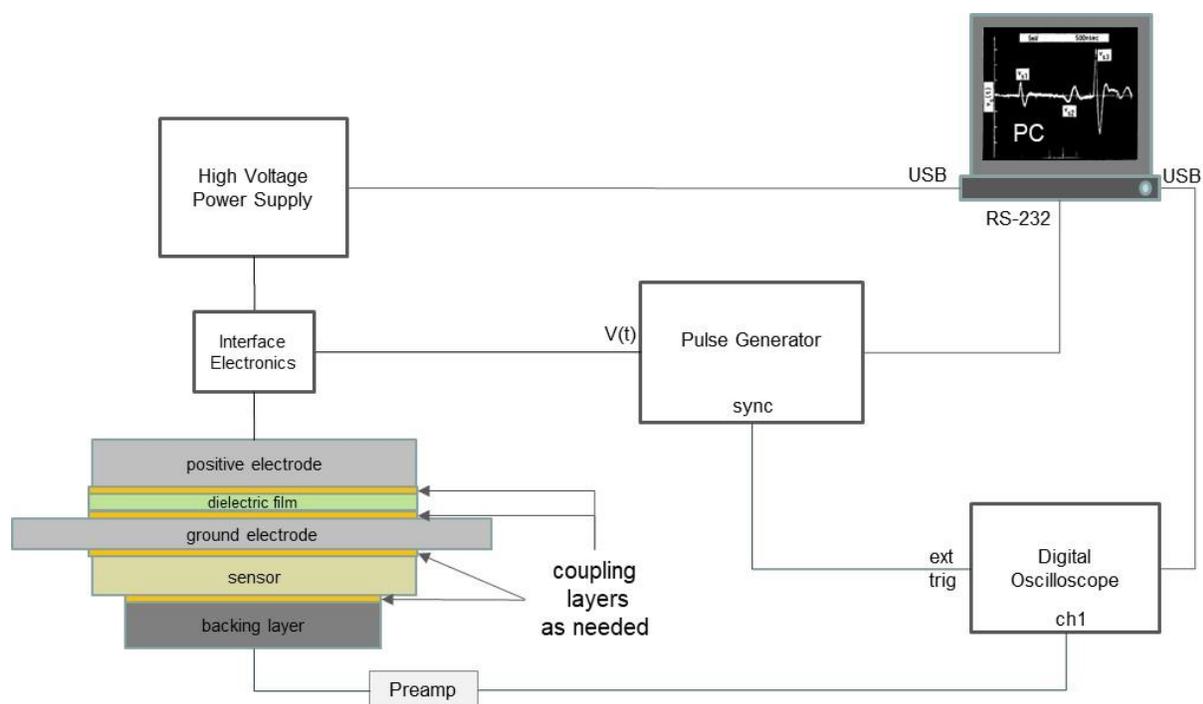
From 2709 Mule Ranch Circle
Corinne, Utah 84307

FOR MORE INFORMATION GO TO:

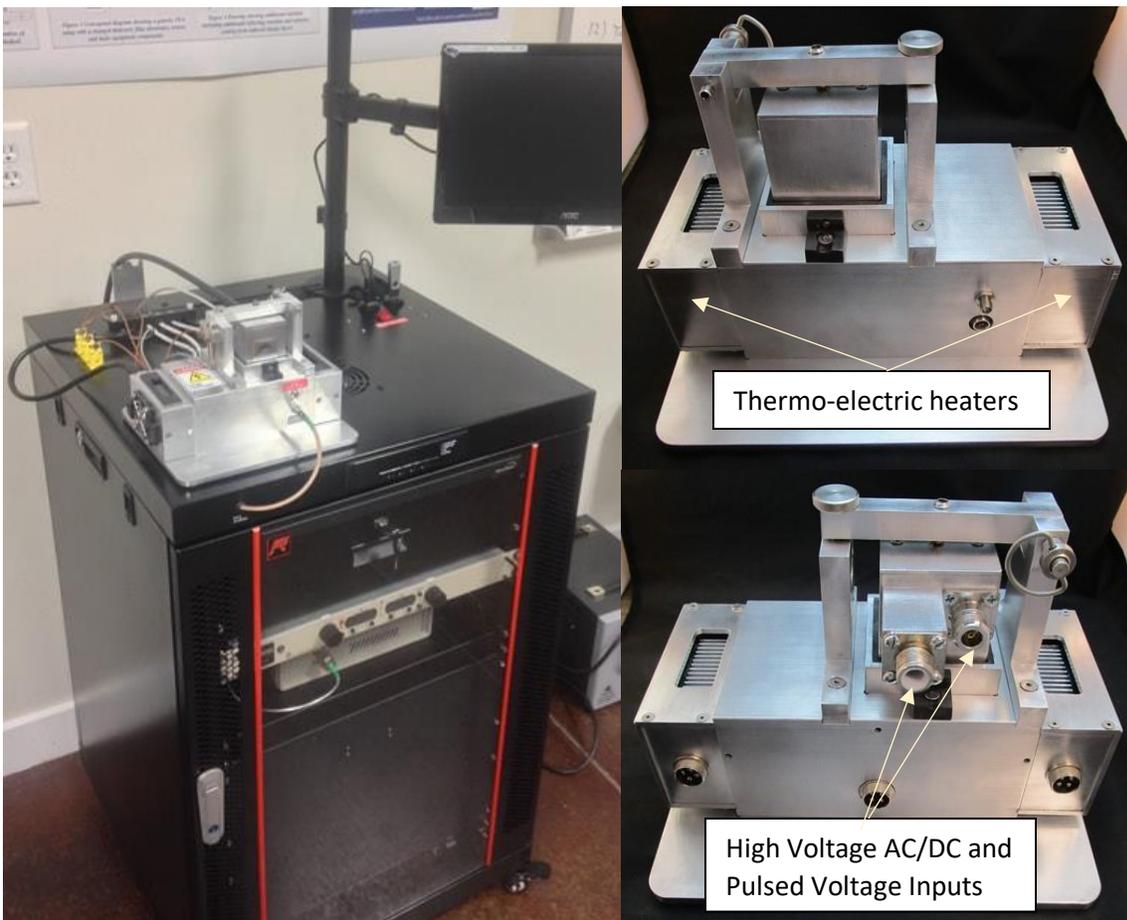
www.boxelderinnovations.com

The Box Elder Innovations' PEA system is a laboratory-based measurement system that provides a means to perform controlled studies on charge build-up and migration behavior in dielectric materials. Results from these studies are essential in understanding existing materials and supporting development of advanced materials that will help mitigate problems caused by charge build -up and dielectric break-down.

PEA systems are designed to measure charge distributions embedded in thin dielectric films. The method is based on applying a pulsed electric field across the dielectric film that creates a force on embedded free charge which, in turn, creates an ultrasonic wave that is detected by a piezoelectric sensor. The sensor converts the mechanical energy to an electrical signal representing the ultrasonic waveform. This waveform is digitized and analyzed to obtain location and quantity of embedded charge.



BEI is the only manufacturer of PEA systems in the United States and whose business model is to build customized systems based on customer needs and requirements. Our systems are designed for testing dielectric films in ambient temperature and pressure conditions and, optionally, at elevated temperature up to 60 deg C. Also, high voltage DC, and optional high voltage AC can be applied across the sample to simulate external electric fields as seen by dielectric films in various environments for studying field-affected charge migration behavior. All system functions are computer controlled.



Applications include spacecraft charging and high voltage power transmission lines. A known cause for satellite failure is charge build-up in dielectric films, used for thermal and electrical insulation in spacecraft, caused by electrons in the solar wind. This build-up can lead to electrostatic discharge events that can damage satellite components. Also, charge build up in high voltage DC power

transmission cable insulators can reduce service life of these components in the electrical power grid.

Data acquisition and data processing software packages with user-friendly interfaces are included with each PEA system. Installation, setup, and training are provided as required by the customer.

Software Specifications	Description
Data Acquisition	<ul style="list-style-type: none"> • Digital Oscilloscope Setup <ul style="list-style-type: none"> • Vertical and horizontal ranges • Data acquisition rate up to 2.5 GS/s
Controlled Measurements	<ul style="list-style-type: none"> • Free run: run continuously • Timed test settings <ul style="list-style-type: none"> • Number of waveforms per hour • Number of hours • Temperature • HVDC voltage • AC voltage and frequency (optional)
Cursor Controls	<ul style="list-style-type: none"> • Time, amplitude, distance measurements • Windowing
Voltage Sources	<ul style="list-style-type: none"> • High Voltage DC power supply <ul style="list-style-type: none"> • Set and monitor voltage and current • High Voltage AC power supply (optional) <ul style="list-style-type: none"> • Monitor voltage and current • On/off control • Pulse generator <ul style="list-style-type: none"> • Pulse width • Pulse amplitude • Rep rate
Environmental Conditions	<ul style="list-style-type: none"> • PEA test fixture temperature control (optional)
Signal Processing	<ul style="list-style-type: none"> • Gaussian band pass filter • Split spectrum processing • Waveform averaging • Windowing
Charge Distribution Calculation	<ul style="list-style-type: none"> • Deconvolution and calibration of waveform to obtain charge distribution • Electric and potential field calculations

Hardware Specifications	Description
Spatial resolution	<ul style="list-style-type: none"> • > 6 microns
Maximum waveform acquisition rate	<ul style="list-style-type: none"> • One waveform per second
Dielectric sample size	<ul style="list-style-type: none"> • 50 microns to 2 mm (2 to 80 mils) thick • 5.4 cm (2.125 in) diameter
High voltage DC power supply	<ul style="list-style-type: none"> • 0 to 20 kV
High voltage AC power supply (optional)	<ul style="list-style-type: none"> • -10 kV to + 10kV AC • 0 to 10 kV DC offset with DC+max AC < or = 10 kV or > or = -10 kV • 0 to 1kHz
Pulse generator	<ul style="list-style-type: none"> • 0.2 nsec rise time • 0.5 nsec to 5.0 nsec pulse width • 1000 V to 2000 V amplitude • Rep rate <= 10k
Preamp	<ul style="list-style-type: none"> • 40 dB
DAQ resolution	<ul style="list-style-type: none"> • 8 bit or 12 bit
Sample rate	<ul style="list-style-type: none"> • Up to 5 GS/sec
Temperature control of PEA test Fixture (optional)	<ul style="list-style-type: none"> • 22 deg C to 60 deg C