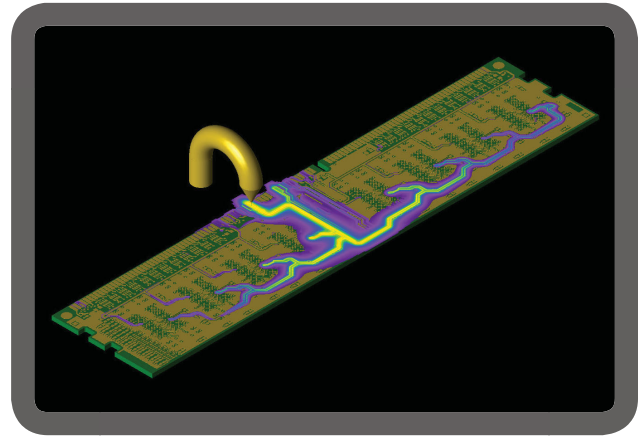# ESD Testing Simulation in XFdtd®

Predict Locations at Risk of Suffering Dielectric Breakdown

XFdtd® Electromagnetic Simulation Software simulates electrostatic discharge (ESD) testing, enabling engineers to identify potential locations of dielectric breakdown and components at risk of damage in their device designs. For less obvious damage this pre-prototype insight is especially valuable, as it minimizes the chance of undetected weaknesses and reveals areas of concern prior to hardware testing.
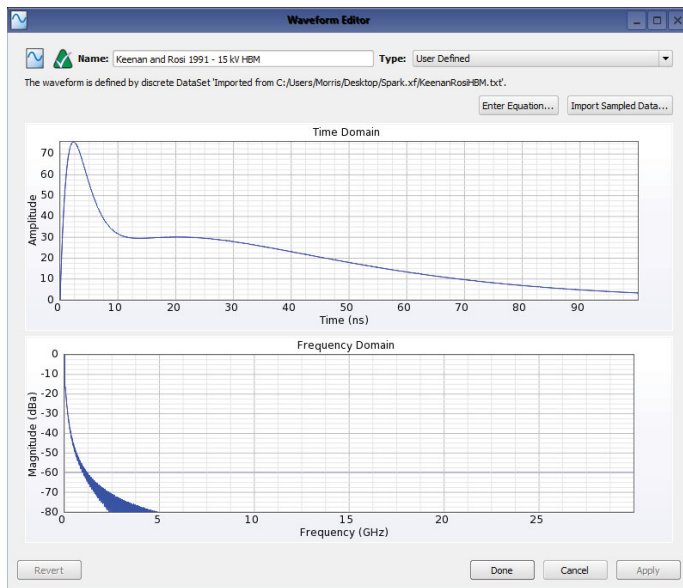

ESD testing of electric fields in XF.

## XF's ESD Simulation Features:

User Defined Waveforms
Import ESD waveforms defined by various testing standards and use them to create ESD current sources in your XF project.
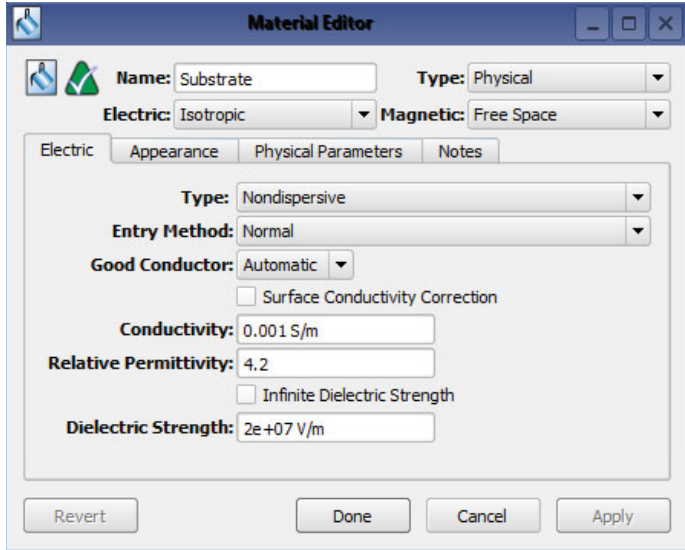
Dielectric Breakdown Sensor
This sensor monitors cell edges for electric fields exceeding the dielectric strength of their constituent material and records where breakdown is likely.

15 kV HBM waveform in XF.
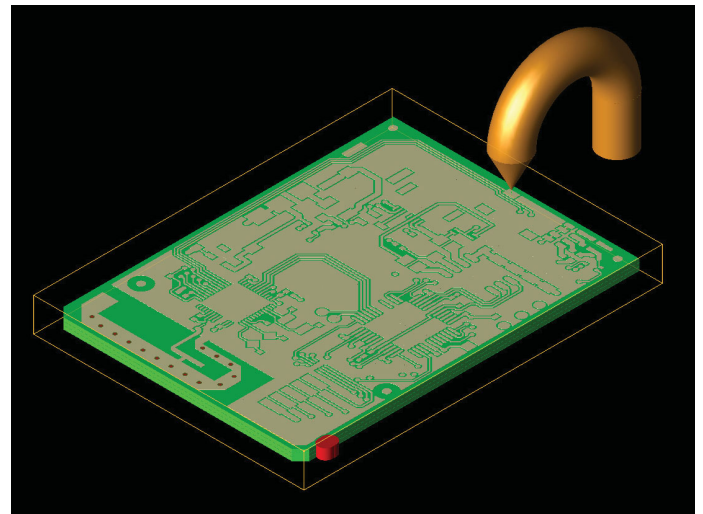
Define a bounding box in order to limit the volume that is monitored by the sensor and achieve computational savings.

REMCOM®

XFdtd®

Dielectric Strength Material Parameter

Dielectric strength is the maximum electric field a material can withstand before losing its insulating properties and can be defined for electric materials using XF's Material Editor. XF monitors transient field values during time-stepping and checks for potential dielectric breakdown.

Enter a material's dielectric strength in XF's Material Editor.

Dielectric Breakdown Ratio Result

Cell edges which exceeded their dielectric strength during a simulation can be examined with the Dielectric Breakdown Sensor and Dielectric Breakdown Ratio result type from XF's results browser. The cell with the highest dielectric breakdown ratio can be easily located using a convenient "zoom to maximum" button.
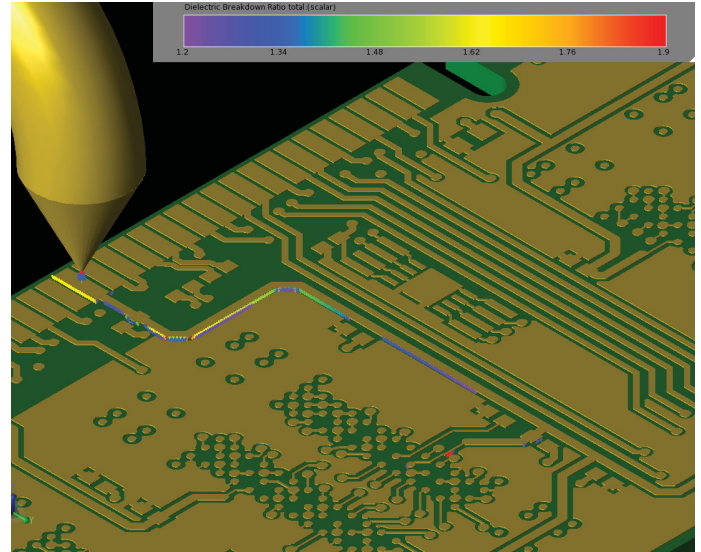
Zooming in to locate cells with the highest Dielectric Breakdown Ratio.

Rated Voltage and Current Input Parameters

XF monitors specific electronic components that are taxed beyond their rated voltage and current input parameters, which can be obtained from the components' data sheets. Post-simulation results identify those components that are subject to permanent damage due to unsafe limits.

Max Component Voltages and Currents Results for:
Project Name: Remote
Simulation: HBM Test (Coarse Staircase, Reduced Dielectric Strength)
Run Number: 1

Component Name	Max Voltage	Rated Voltage	Max Current	Rated Current
C1	17.7892 V	16 V	0.170955 A	--
C2	2.55162 V	16 V	0.0439905 A	--
C3	9.12234 V	16 V	0.154973 A	--
ESD Feed	392.368 V	--	5.34214 A	--
L1	1.42421 V	--	0.572944 A	0.44 A
L2	0.9173 V	--	0.268556 A	0.44 A
L3	1.08432 V	--	0.134515 A	0.44 A
R1	20.1895 V	30 V	0.40379 A	--
R2	64.1534 V	30 V	1.28307 A	--
R3	278.358 V	30 V	5.56717 A	--

XF's Max Component Voltages and Currents Results.

Learn more about XF's ESD Testing features at
www.remcom.com/xfdtd-dielectric-breakdown-prediction

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