Vishay MLCCs

March 2026

VISHAY

The DNA of tech.™

Molly Olver

Product Marketing MLCCs
Molly.Olver@Vishay.com

MLCC Technology Comparison

Vishay Design Advantage

Vishay

- **Wet sheet process**
  - Thicker layers
  - Higher voltage capability
- **Precious metal electrodes (AgPd)**
  - Higher ESD capability

Competitor

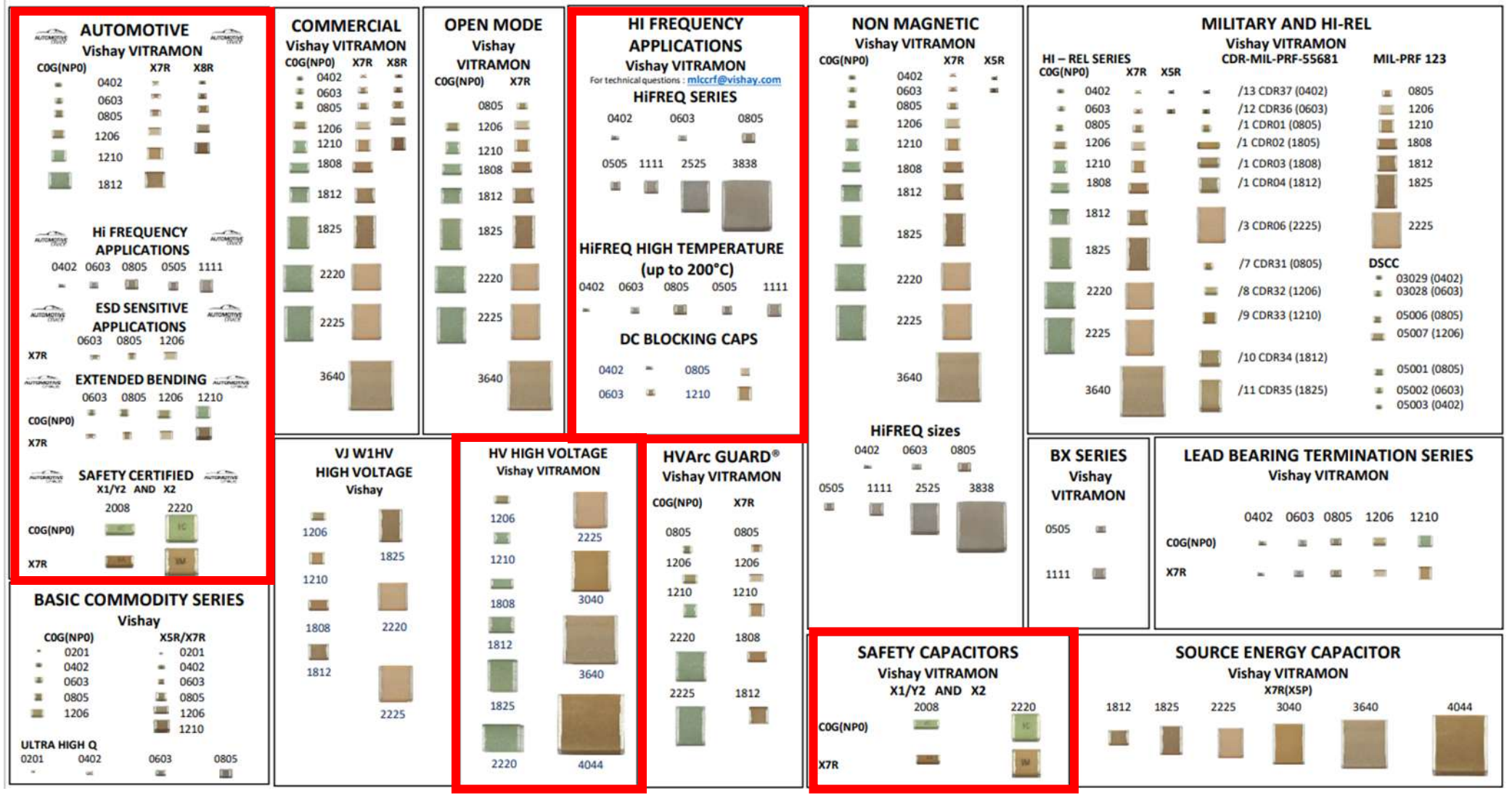
- **Dry sheet process**
  - Thinner layers
  - Higher cap values
- **Base metal electrodes (Ni or Cu)**

- Costs are higher, but performance is better.
- Vishay MLCC products are not for commodity applications.
- Find the applications where Vishay's *technical superiority* is key.

Portfolio Overview, Focus Products

Vishay MLCC

Vishay MLCC Product Portfolio



VISHAY

The DNA of tech.™

MLCCs Focus Products

Safety Capacitors

- Development focus
- Applications
  - EV OBC
  - Charging stations
  - Solar / wind power
  - Anything with a plug

High Frequency

- Simulation tools and kits
- Non-magnetic terminations
- Applications
  - MRI / body coils
  - RF / plasma generators
  - Tactical radios

High Voltage

- Open mode and polymer terminations for board flex
- Serial electrode design in HV series
- Applications
  - Power supplies
  - Air purification
  - DC/DC converters

Automotive Electrification

- Automotive versions of focus products
- Applications
  - BMS
  - Traction inverters
  - E-compressors
  - DC/DC converters
  - V2X communication

Safety Capacitors

Industrial and Automotive

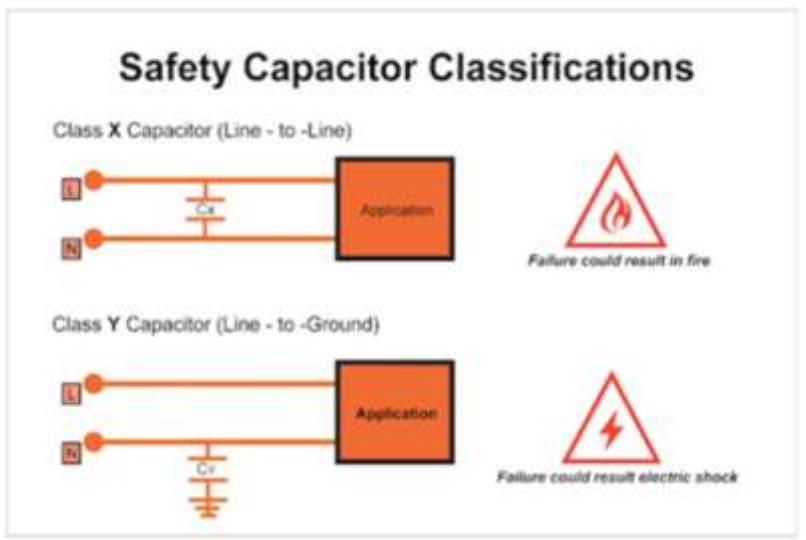
VISHAY

The DNA of tech.™

Safety Capacitor Basics

IEC-60384-14

X and Y classifications



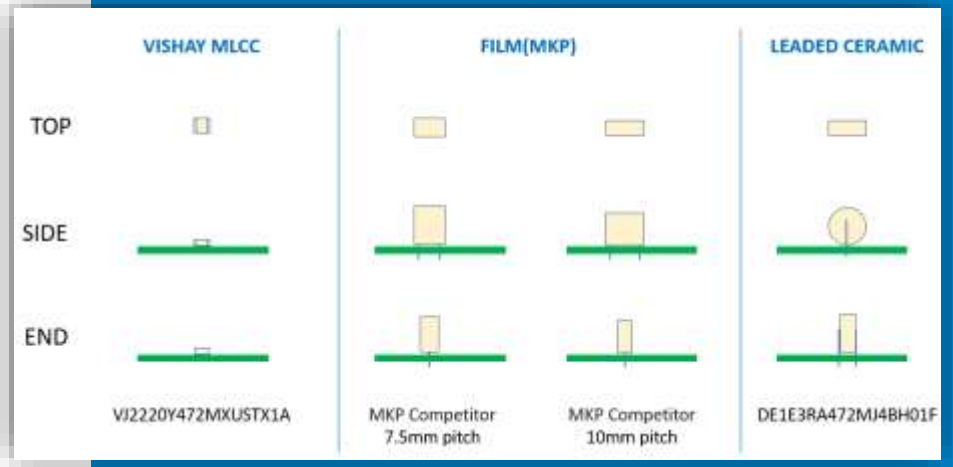
Y class requirements

Subclass	Peak Impulse	Creepage	
		130 V ≤ UR ≤ 250V	250 V ≤ UR ≤ 500V
Y1	8 kV	8 mm	10 mm
Y2	5 kV	4 mm	5 mm

MLCCs Size Advantage

Safety Capacitors Footprint Comparison

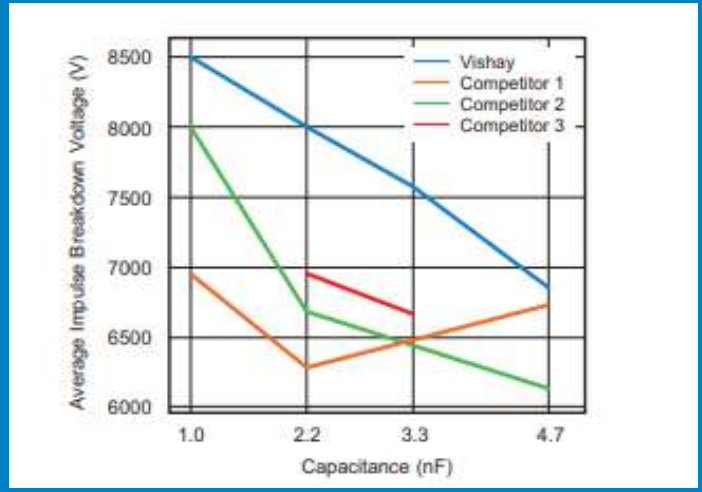
- Compared to both film and leaded, ceramic MLCCs have:
  - Reduced area
  - Reduced height
  - SMD mounting to reduce assembly costs

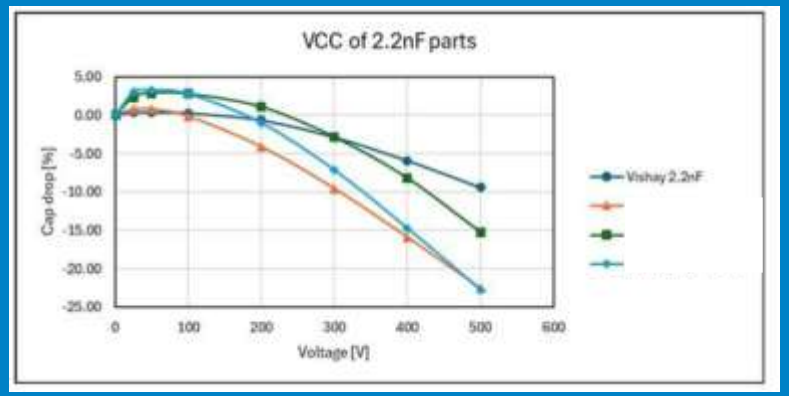


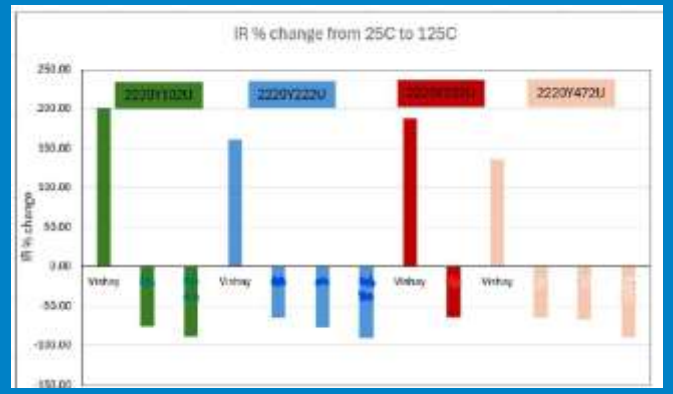
Vishay Safety Cap Benchmarking

Advantages of Vishay v. Competing X1 / Y2 MLCCs

- Average pulse breakdown exceeds all competitors
  - Far exceeds requirement of 5 kV.
- Superior VCC performance
  - More capacitance is preserved at high voltages; decreased stress in surge event.
- Increase of IR with temperature
  - High voltage pulses cause an increase in the temperature of X7R dielectric and a decrease in the IR of competitors, causing earlier failures
- ***Beyond the specification and Above the competition***







Safety Capacitors

Value Proposition

Where to Hunt

- Industrial / Commercial Applications
  - EV charging infrastructure
  - Data centers
  - Solar / wind inverters
  - Specialty lighting
- Automotive Applications
  - OBC
  - BMS
  - E-turbo
  - DC/DC converters
- Target competitor: Knowles, Murata

How to Engage Customers

Door opener questions and positioning..

- Do you need high impulse handling?
- Is your current supplier's product not able to meet your needs?
- Are you moving from through-hole to SMD?
- Do you need to reduce board space?

How to Win

- Vishay beats the competition in:
  - Impulse breakdown
  - VCC
  - Insulation resistance
- Voltage-proof test

High Voltage

HV, OMD, ArcGuard, W1HV

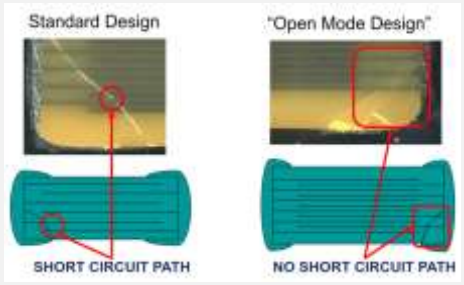
VISHAY

The DNA of tech.™

High Voltage MLCCs (≥500V)

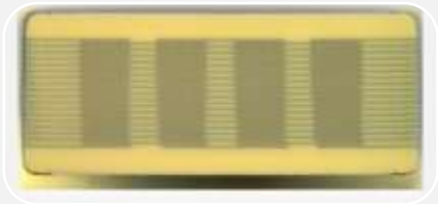
Open Mode

- Reduces risk of shorts or leakage from board flex
- For applications with temperature cycling (outdoors)



HV Series
HV...HV

- Improved voltage handling
- Voltages to 8KV



Automotive
GA..31G

- Extended voltage offering to 3 KV

- Increased efficiency
- Reduced charging time
- Longer range
- Increased acceleration

High Voltage

Value Proposition

Where to Hunt

- High voltage power supplies
- Air purification
- Voltage multipliers
- OBC
- BMS
- E-turbo

- Competitors: Knowles, Kemet

How to Engage Customers

Door opener questions and positioning..

- Do you need voltages above 500 V?
- Is your product used in an environment with temperature extremes (outdoor)?

How to Win

Vishay's Advantages

- AEC-Q200 qualification

- Voltage up to 8 kV

High Frequency

Hi Freq, Hi Freq HT, GA..34M, Blocking Cap, DSCC

VISHAY

The DNA of tech.™

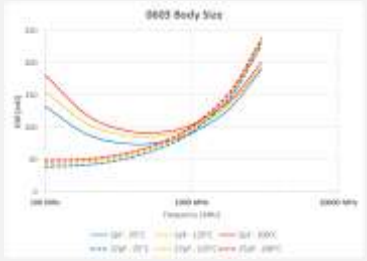
High Frequency MLCCs

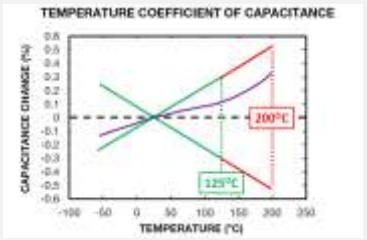
Hi Freq
VJ....D.....

- Tight tolerances
- Voltages as high as 7.2kV

HiFreq HT
VJ...D...HT

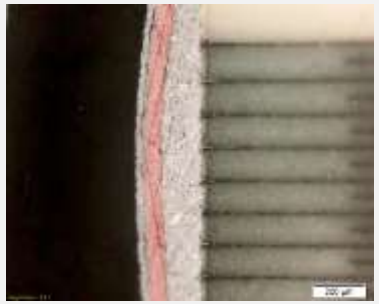
- Operation up to 200°C





Non-Magnetic
VJ...D...C.....

- Copper layer replaces Ni in termination



Qualified Products

- AEC-Q200

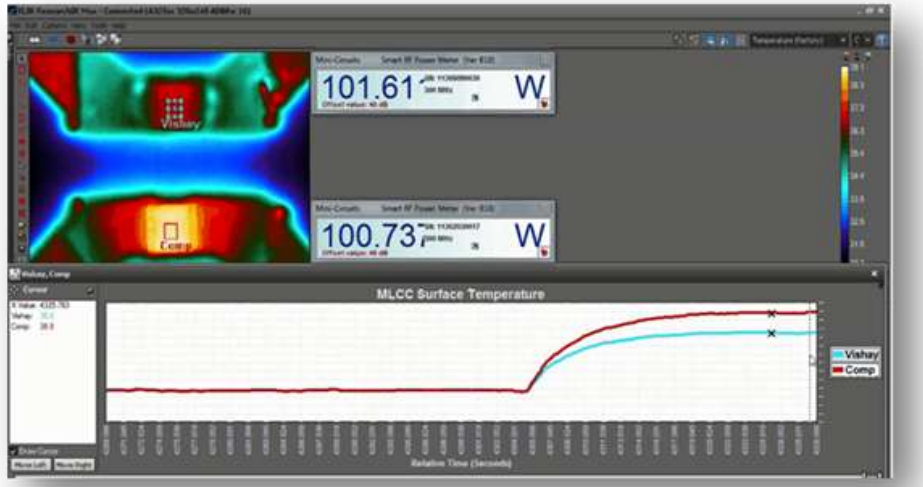
- DSCC

Vishay MLCC Benchmark Test

Continuous Wave Power Test Summary

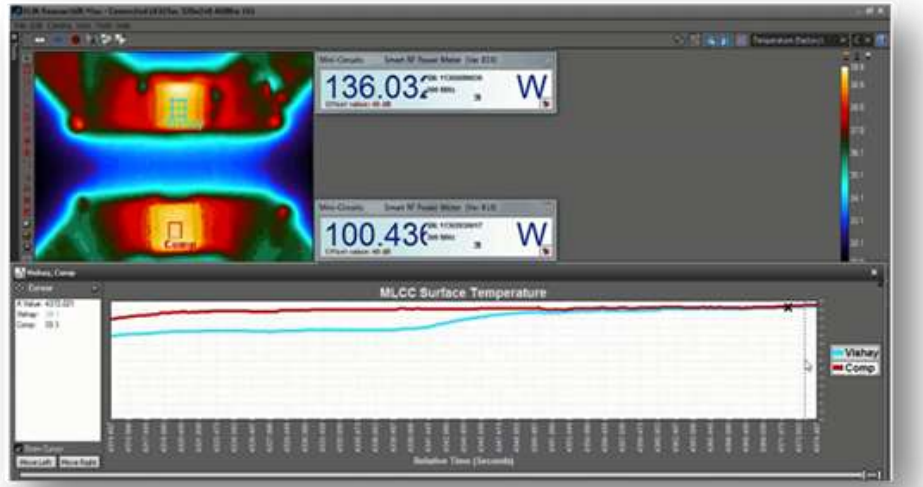
When the *same power* is applied:

- Vishay parts **ran cooler**
- Vishay parts have lower ESR
- Lower ESR results in less heating due to losses



When both parts are driven to the *same temperature*:

- Vishay part can handle 35% **more power** than the competitor



High Frequency

Value Proposition

Where to Hunt

- Military / municipal tactical radios
- MRI and body coils
- Baggage screening
- NMR industrial equipment
- Medical telemetry
- RF generators
- V2X communication
- Smart traffic

- Competitors: Kyocera, PPI

How to Engage Customers

Door opener questions and positioning..

- Does your application operate at frequencies above 100 MHz?
- Is your operational temperature above 125°C
- Do you need a combination of high frequency and high voltage?
- Is your application sensitive to disruptions in the magnetic field?
- Do you need lead-bearing terminations?
- Do you need simulation data or design kits?

How to Win

Vishay's Advantages

- Non-magnetic terminations
- High temperature operation
- AEC-Q200 qualification
- Military / DSSC qualfication

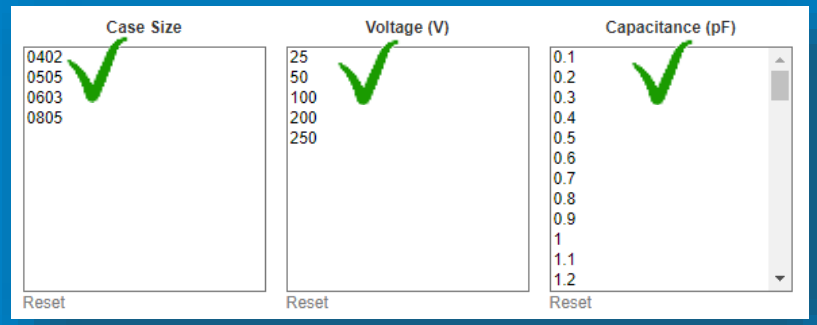
Design Resources and Selling Tools

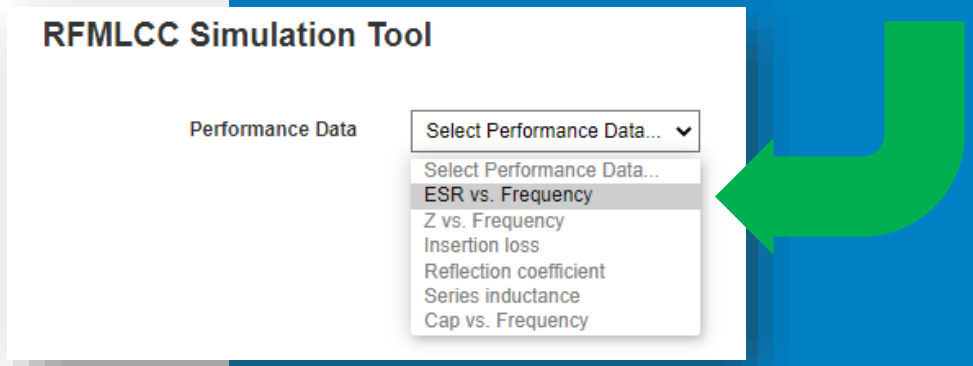
Design Resources

RFMLCC Simulation Tool | Vishay

- Circuit simulation can shorten the design cycle time
- Select: case size, voltage, capacitance
- Results:
  - ESR vs frequency
  - Z vs frequency
  - Insertion loss
  - Reflection coefficient (S11 or S22)
  - Series inductance
  - Cap vs frequency

Download data for use



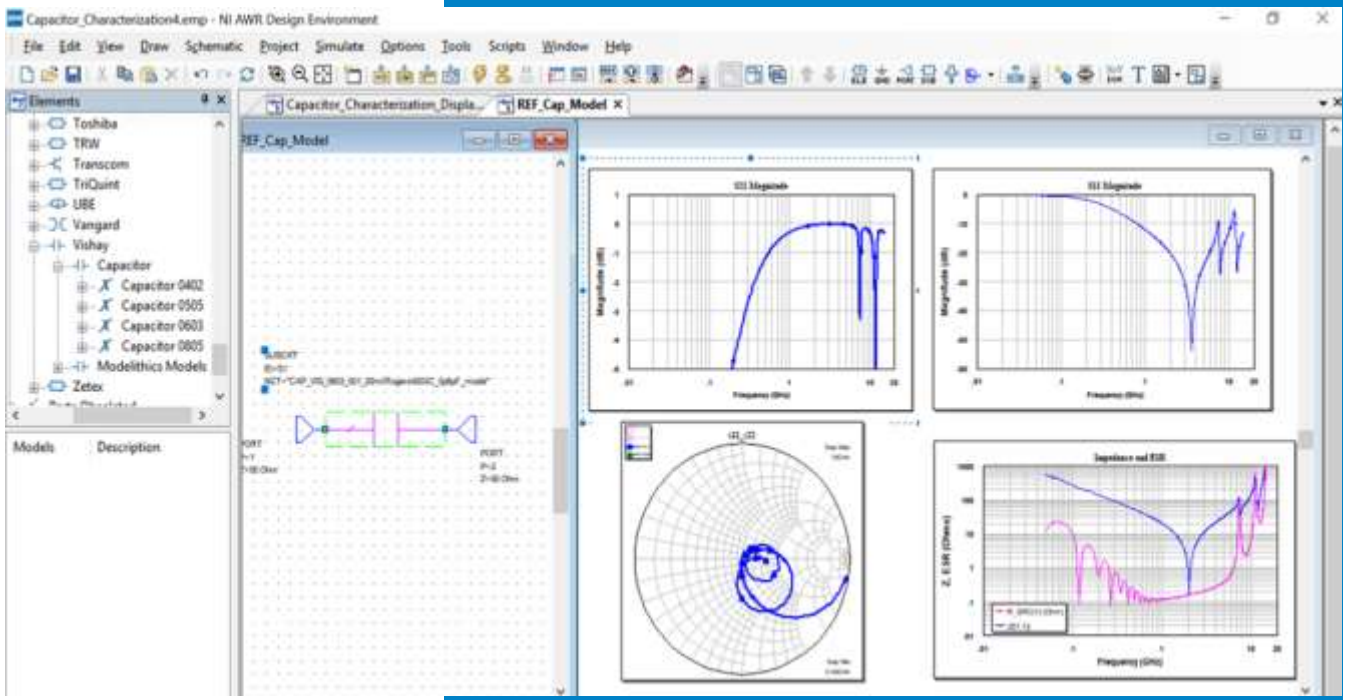


VISHAY
The DNA of tech.™

Design Resources

Vishay MLCC RF Circuit Models

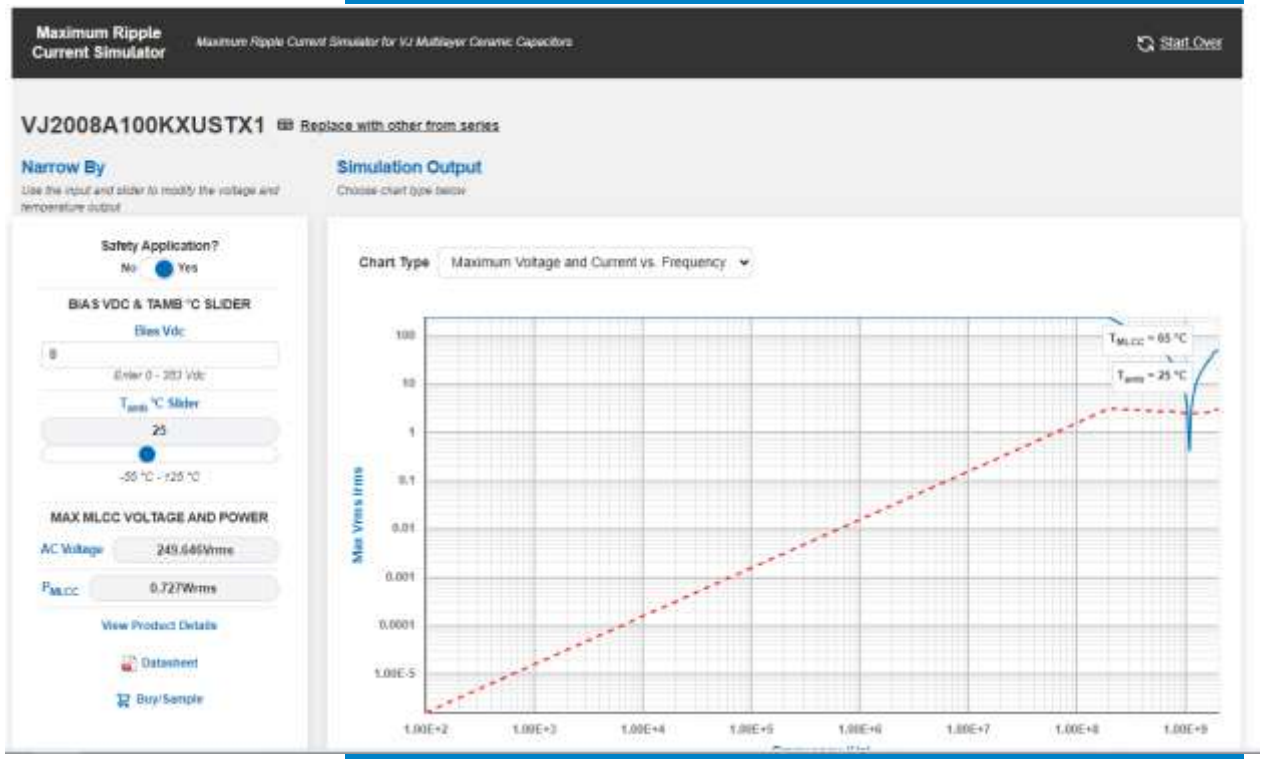
- S2p files can be downloaded from Vishay web site.
- This allows simulation using packages such as Keysight ADS, Cadence AWR and Keysight Genesys



Design Resources

Maximum Ripple Current Simulator | Vishay

- Circuit simulation can shorten the design cycle time
- Select: case size, capacitance
- Specify: Bias V_{DC} and ambient temp
- Results:
  - Maximum voltage and current vs. frequency
  - Impedance, ESR vs. frequency
  - Percent power vs ambient temperature



Design Resources

Engineering Kits

1

High Frequency

- HiFreq and HiFreq HT
- 0402, 0603, 0505, and 1111 sizes

2

Touch N Tune

- Cap mounted on stick for ease of use
- 0505 and 0603 sizes

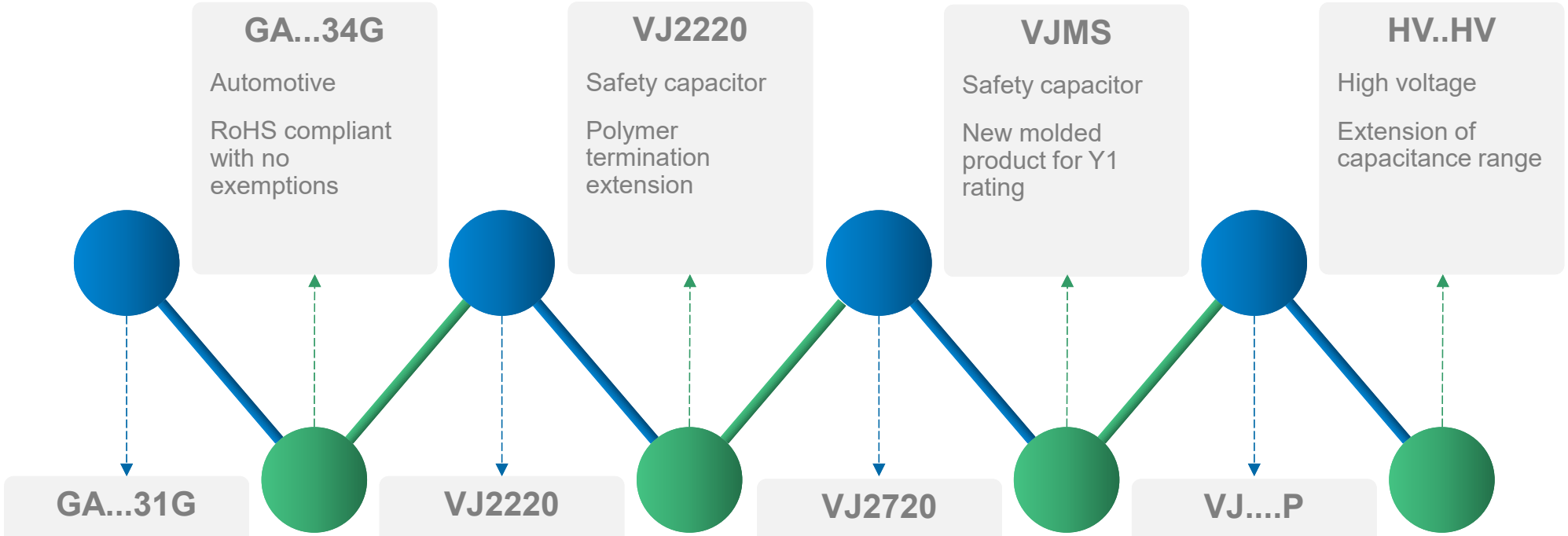
3

Safety Capacitors

- Industrial and automotive versions
- 2008 and 2220 sizes
- Commonly used values

Product Development Roadmap

The DNA of tech™.



GA...34G

Automotive

RoHS compliant with no exemptions

VJ2220

Safety capacitor

Polymer termination extension

VJMS

Safety capacitor

New molded product for Y1 rating

HV..HV

High voltage

Extension of capacitance range

GA...31G

Automotive

Extension of voltage ranges and capacitance values.

VJ2220

Safety capacitor

New offering with 305 Vac

VJ2720

Safety capacitor

New offering with 315 Vac and expanded value range

VJ....P

High Frequency

New porcelain dielectric

Call to Action

- Focus on specialty applications.
- Vishay MLCCs has a focus on growing product offering for ***safety capacitors*** and ***extending our voltage ranges***.
- Benchmarking vs customers show technical advantages.
- Sample kits and simulation models available.
- Leverage Israeli manufacturing sites for those looking to move from China +1.

Capacitor Business Segment

Aligning for Profitable Growth

VISHAY

The DNA of tech.™

VISHAY

The DNA of tech.™

BUILT TO WIN

VISHAY EVERY DAY

AMERICAS SALES CONFERENCE