



The DNA of tech.®

# ***DID YOU KNOW?***

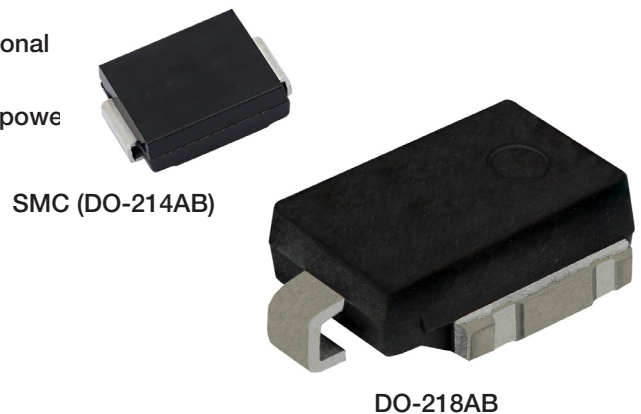
## **INDUSTRY-FIRST SNAPBACK TYPE XClampR® TVS**

### **What Are the Key Features of XClampR® TVS?**

- Designed to protect sensitive electronic equipment against voltage transients induced by inductive load switching and lightning
- With their low clamping voltage, XClampR TVS offer high peak pulse currents in the SMC (DO-214AB) and DO-218AB packages
- For applications with stand-off voltages greater than 24 V - such as 48 V belt starter (BSG) and integrated starter (ISG) generators in mild hybrid electric vehicles (HEV) - the devices can be paired with a standard TVS

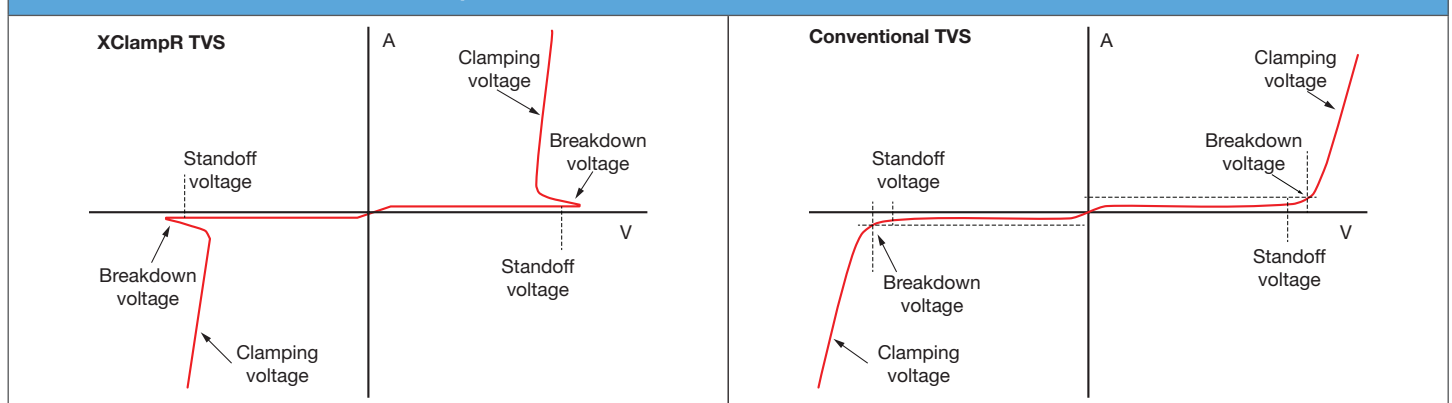
### **What Are the Key Benefits of XClampR TVS?**

- High peak pulse power dissipation
- 180 A at 10/1000  $\mu$ s, equivalent to a 7 kW power rating of conventional TVS, in the SMC (DO-214AB)
- 120 A and 180 A at 10/10 000  $\mu$ s, equivalent to a 4.6 kW and 7 kW power rating of conventional TVS, respectively, in the DO-218AB
- Low clamping voltage
  - Down to 24 V maximum in the SMC (DO-214AB)
  - Down to 26 V maximum in the DO-218AB
- Wide operating temperature range of -55 °C to +175 °C
- Suitable for high reliability applications
  - Available in AEC-Q101 qualified versions
  - Extremely stable breakdown voltage from 26.7 V to 29.5 V over their entire operating temperature range



### **Why Choose XClampR TVS?**

#### **TYPICAL OPERATION CURVE OF XClampR TVS AND CONVENTIONAL TVS**



XClampR TVS are snapback type TVS with an extremely low clamping voltage ratio for suppressing transient voltages to lower clamping voltages than conventional TVS.



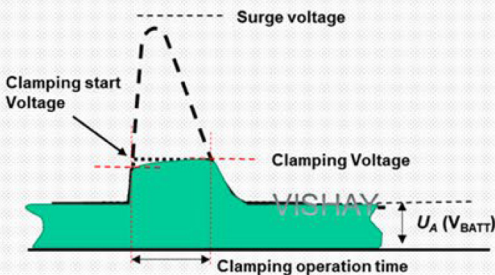
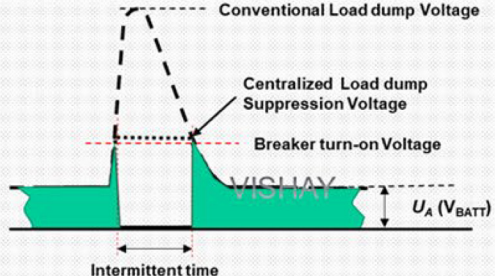
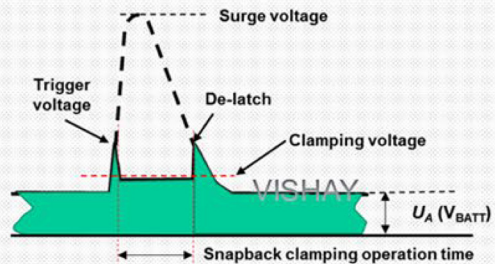
The DNA of tech.®

# ***DID YOU KNOW?***

## **INDUSTRY-FIRST SNAPBACK TYPE**

### **XClampR® TVS**

#### Overvoltage Protection Types

<p><b>Clamping protection</b></p>  <p>The diagram shows a surge voltage (dashed line) and a clamping voltage (solid line). The clamping operation time is indicated. The clamping start voltage is marked. The clamping voltage is labeled as <math>U_A (V_{BATT})</math>.</p>	<table><tr><th>Circuit Type</th><th>ABD TVS, Zener, MOV</th></tr><tr><td>Advantage</td><td><ul style="list-style-type: none"><li>• No electrical short</li><li>• Accurate voltage protection control</li></ul></td></tr><tr><td>Disadvantage</td><td><ul style="list-style-type: none"><li>• High power derating device required</li></ul></td></tr></table>	Circuit Type	ABD TVS, Zener, MOV	Advantage	<ul style="list-style-type: none"><li>• No electrical short</li><li>• Accurate voltage protection control</li></ul>	Disadvantage	<ul style="list-style-type: none"><li>• High power derating device required</li></ul>
Circuit Type	ABD TVS, Zener, MOV						
Advantage	<ul style="list-style-type: none"><li>• No electrical short</li><li>• Accurate voltage protection control</li></ul>						
Disadvantage	<ul style="list-style-type: none"><li>• High power derating device required</li></ul>						
<p><b>CROW-BAR protection</b></p>  <p>The diagram shows a conventional load dump voltage (dashed line) and a centralized load dump suppression voltage (solid line). The breaker turn-on voltage is marked. The intermittent time is indicated. The clamping voltage is labeled as <math>U_A (V_{BATT})</math>.</p>	<table><tr><th>Circuit Type</th><th>Gas Discharge Tube Type Surge Arrestor, Thyristor, Load Switch</th></tr><tr><td>Advantage</td><td><ul style="list-style-type: none"><li>• No electrical short (load switch type)</li><li>• Simple and small device required (GDT, thyristor)</li></ul></td></tr><tr><td>Disadvantage</td><td><ul style="list-style-type: none"><li>• Intermittence time</li><li>• Fuse blowout (thyristor type)</li><li>• Circuit reset</li><li>• Big capacitor and polarity protection diode required for power backup (load switch)</li></ul></td></tr></table>	Circuit Type	Gas Discharge Tube Type Surge Arrestor, Thyristor, Load Switch	Advantage	<ul style="list-style-type: none"><li>• No electrical short (load switch type)</li><li>• Simple and small device required (GDT, thyristor)</li></ul>	Disadvantage	<ul style="list-style-type: none"><li>• Intermittence time</li><li>• Fuse blowout (thyristor type)</li><li>• Circuit reset</li><li>• Big capacitor and polarity protection diode required for power backup (load switch)</li></ul>
Circuit Type	Gas Discharge Tube Type Surge Arrestor, Thyristor, Load Switch						
Advantage	<ul style="list-style-type: none"><li>• No electrical short (load switch type)</li><li>• Simple and small device required (GDT, thyristor)</li></ul>						
Disadvantage	<ul style="list-style-type: none"><li>• Intermittence time</li><li>• Fuse blowout (thyristor type)</li><li>• Circuit reset</li><li>• Big capacitor and polarity protection diode required for power backup (load switch)</li></ul>						
<p><b>Snapback protection</b></p>  <p>The diagram shows a surge voltage (dashed line) and a clamping voltage (solid line). The trigger voltage is marked. The de-latch voltage is marked. The snapback clamping operation time is indicated. The clamping voltage is labeled as <math>U_A (V_{BATT})</math>.</p>	<table><tr><th>Circuit Type</th><th>ABD TVS, Zener, MOV</th></tr><tr><td>Advantage</td><td><ul style="list-style-type: none"><li>• No electrical short</li><li>• No intermittent time</li><li>• Accurate voltage protection control</li></ul></td></tr><tr><td>Disadvantage</td><td><ul style="list-style-type: none"><li>• None</li></ul></td></tr></table>	Circuit Type	ABD TVS, Zener, MOV	Advantage	<ul style="list-style-type: none"><li>• No electrical short</li><li>• No intermittent time</li><li>• Accurate voltage protection control</li></ul>	Disadvantage	<ul style="list-style-type: none"><li>• None</li></ul>
Circuit Type	ABD TVS, Zener, MOV						
Advantage	<ul style="list-style-type: none"><li>• No electrical short</li><li>• No intermittent time</li><li>• Accurate voltage protection control</li></ul>						
Disadvantage	<ul style="list-style-type: none"><li>• None</li></ul>						



The DNA of tech.®

# ***DID YOU KNOW?***

## **INDUSTRY-FIRST SNAPBACK TYPE**

### **XClampR® TVS**

#### **The Key Specifications**

<b>XClampR® TRANSIENT VOLTAGE SUPPRESSORS</b>			
<b>PART NUMBER</b>	<b><u>XLD5A24CA</u></b>	<b><u>XLD8A24CA</u></b>	<b><u>XMC7K24CA</u></b>
<b>Maximum working stand-off voltage</b>	24 V	24 V	24 V
<b>Breakdown voltage</b>	26.7 V to 29.5 V	26.7 V to 29.5 V	26.7 V to 29.5 V
<b>Maximum clamping voltage</b>	26 V	26 V	24 V
<b>Peak pulse power (10/1000 µs)</b>	7700 W <sup>(1)</sup>	11 000 W <sup>(1)</sup>	7000 W <sup>(1)</sup>
<b>Peak pulse current (10/1000 µs)</b>	200 A	300 A	180 A
<b>Peak pulse power (10/10 000 µs)</b>	4600 W <sup>(1)</sup>	7000 W <sup>(1)</sup>	1100 W <sup>(1)</sup>
<b>Peak pulse current (10/10 000 µs)</b>	120 A	180 A	30 A
<b>Maximum reverse leakage current</b>	1.0 µA	1.0 µA	1.0 µA
<b>Maximum operating junction temperature</b>	175 °C	175 °C	175 °C
<b>Polarity</b>	Bidirectional	Bidirectional	Bidirectional
<b>Package</b>	DO-218AB	DO-218AB	SMC (DO-214AB)

Note

(1) Equivalent IPPM with conventional TVS