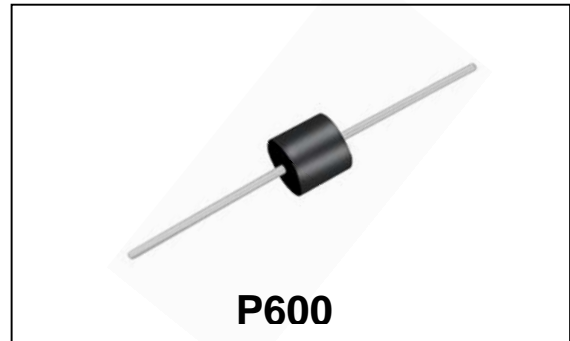


**15000W Transient Voltage Suppressor (TVS) protection device****Main product characteristics**

$V_{WM}$	17V – 280V
$V_{BR(min)}$	19V – 312V
$I_{PP}$	515A – 33A
$V_{CL(MAX)}$	29.3V – 454.5V
$P_{PP}$	15000W

**P600****Description and applications**

This device has the ability to clamp dangerous high voltage, short term transients such as produced by directed or radiated electrostatic discharge phenomena before entering sensitive component regions of a circuit design. Response time of clamping action is virtually instantaneous. As a result, they may also be used effectively for protection from ESD or EFT per IEC61000-4-2 and IEC61000-4-4 or for inductive switching environments and induced RF. They can also be used for protecting other sensitive components from secondary lightning effects per IEC61000-4-5 and class levels defined herein. Microsemi also offers numerous other TVS products to meet higher and lower power demands and special applications.

- RoHS compliant (2002/95/EC), MSL level 1 (J-STD-020)
- Qualified to automotive grade – AEC Q101
- Bi-directional devices are denoted by the suffixes C or CA, electrical characteristics apply in both directions.

**Maximum ratings and characteristics<sup>(1)</sup>**

Symbol	Parameter	Value	Unit
$P_{PPM}$	Peak power dissipation with a 10/1000 $\mu$ s waveform (fig. 1)	Min. 15000	W
$I_{PPM}$	Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(2)</sup>	See next table	A
$P_{M(AV)}$	Steady state power dissipation at $T_L = 75^\circ\text{C}$ , lead lengths 0.375" (9.5mm) <sup>(3)</sup>	8.0	W
$I_{FSM}$	Non repetitive peak forward surge current (8.3ms single half sine wave) <sup>(4)</sup>	400	A
$R_{\theta JL}$	Typical thermal resistance junction to lead	8.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Typical thermal resistance junction to ambient	40	$^\circ\text{C/W}$
$T_{STG}$	Storage temperature	-55 to +175	$^\circ\text{C}$
$T_J$	Junction temperature	-55 to +175	$^\circ\text{C}$

(1) All ratings at 25 $^\circ\text{C}$  unless specified otherwise

(2) Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^\circ\text{C}$  per Fig. 2

(3) Mounted as shown in Fig.5

(4) Measured on 8.3ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

**Microsemi****15KPA17e3 to 15KPA280CAe3****15000W Transient Voltage Suppressor (TVS) protection device****Electrical characteristics<sup>(1)</sup>**

DEVICE	BREAKDOWN VOLTAGE <sup>(2)</sup> , V <sub>BR</sub> V <sub>BR</sub> (V) @ I <sub>T</sub> (mA)		TEST CURRENT I <sub>T</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (V)	MAXIMUM STANDBY CURRENT <sup>(4)</sup> I <sub>D</sub> (μA) @ V <sub>WM</sub>	MAXIMUM PEAK PULSE CURRENT <sup>(3)</sup> I <sub>PP</sub> (A)	MAXIMUM CLAMPING VOLTAGE V <sub>C</sub> (V) @ I <sub>PP</sub>	MAXIMUM TEMPERATURE COEFFICIENT OF V <sub>BR</sub> α <sub>VBR</sub> (%/°C)
	Min	Max						
15KPA17e3 / 15KPA17Ce3	18.99	20.89	50	17	5000	515.4	29.3	0.1
<b>15KPA17Ae3 / 15KPA17CAe3</b>	<b>18.99</b>	<b>19.94</b>	<b>50</b>	<b>17</b>	<b>5000</b>	<b>515.4</b>	<b>29.3</b>	<b>0.1</b>
15KPA18e3 / 15KPA18Ce3	20.11	22.12	50	18	5000	488.7	30.9	0.1
<b>15KPA18Ae3 / 15KPA18CAe3</b>	<b>20.11</b>	<b>21.12</b>	<b>50</b>	<b>18</b>	<b>5000</b>	<b>488.7</b>	<b>30.9</b>	<b>0.1</b>
15KPA20e3 / 15KPA20Ce3	22.34	24.57	20	20	1500	440.2	34.3	0.1
<b>15KPA20Ae3 / 15KPA20CAe3</b>	<b>22.34</b>	<b>23.46</b>	<b>20</b>	<b>20</b>	<b>1500</b>	<b>440.2</b>	<b>34.3</b>	<b>0.1</b>
15KPA22e3 / 15KPA22Ce3	24.57	27.03	10	22	500	407.0	37.1	0.1
<b>15KPA22Ae3 / 15KPA22CAe3</b>	<b>24.57</b>	<b>25.80</b>	<b>10</b>	<b>22</b>	<b>500</b>	<b>407.0</b>	<b>37.1</b>	<b>0.1</b>
15KPA24e3 / 15KPA24Ce3	26.81	29.49	5	24	150	371.0	40.7	0.1
<b>15KPA24Ae3 / 15KPA24CAe3</b>	<b>26.81</b>	<b>28.15</b>	<b>5</b>	<b>24</b>	<b>150</b>	<b>371.0</b>	<b>40.7</b>	<b>0.1</b>
15KPA26e3 / 15KPA26Ce3	29.04	31.94	5	26	50	343.2	44.0	0.1
<b>15KPA26Ae3 / 15KPA26CAe3</b>	<b>29.04</b>	<b>30.49</b>	<b>5</b>	<b>26</b>	<b>50</b>	<b>343.2</b>	<b>44.0</b>	<b>0.1</b>
15KPA28e3 / 15KPA28Ce3	31.28	34.41	5	28	25	317.9	47.5	0.1
<b>15KPA28Ae3 / 15KPA28CAe3</b>	<b>31.28</b>	<b>32.84</b>	<b>5</b>	<b>28</b>	<b>25</b>	<b>317.9</b>	<b>47.5</b>	<b>0.1</b>
15KPA30e3 / 15KPA30Ce3	33.51	36.86	5	30	15	297.8	50.7	0.1
<b>15KPA30Ae3 / 15KPA30CAe3</b>	<b>33.51</b>	<b>35.19</b>	<b>5</b>	<b>30</b>	<b>15</b>	<b>297.8</b>	<b>50.7</b>	<b>0.1</b>
15KPA33e3 / 15KPA33Ce3	36.90	40.59	5	33	2	276.1	54.7	0.1
<b>15KPA33Ae3 / 15KPA33CAe3</b>	<b>36.90</b>	<b>38.75</b>	<b>5</b>	<b>33</b>	<b>2</b>	<b>276.1</b>	<b>54.7</b>	<b>0.1</b>
15KPA36e3 / 15KPA36Ce3	40.20	44.22	5	36	2	252.5	59.8	0.1
<b>15KPA36Ae3 / 15KPA36CAe3</b>	<b>40.20</b>	<b>42.21</b>	<b>5</b>	<b>36</b>	<b>2</b>	<b>252.5</b>	<b>59.8</b>	<b>0.1</b>
15KPA40e3 / 15KPA40Ce3	44.70	49.17	5	40	2	229.5	65.8	0.1
<b>15KPA40Ae3 / 15KPA40CAe3</b>	<b>44.70</b>	<b>46.94</b>	<b>5</b>	<b>40</b>	<b>2</b>	<b>229.5</b>	<b>65.8</b>	<b>0.1</b>
15KPA43e3 / 15KPA43Ce3	48.00	52.80	5	43	2	216.3	69.8	0.1
<b>15KPA43Ae3 / 15KPA43CAe3</b>	<b>48.00</b>	<b>50.40</b>	<b>5</b>	<b>43</b>	<b>2</b>	<b>216.3</b>	<b>69.8</b>	<b>0.1</b>
15KPA45e3 / 15KPA45Ce3	50.30	55.33	5	45	2	207.4	72.8	0.1
<b>15KPA45Ae3 / 15KPA45CAe3</b>	<b>50.30</b>	<b>52.82</b>	<b>5</b>	<b>45</b>	<b>2</b>	<b>207.4</b>	<b>72.8</b>	<b>0.1</b>
15KPA48e3 / 15KPA48Ce3	53.60	58.96	5	48	2	194.3	77.7	0.1
<b>15KPA48Ae3 / 15KPA48CAe3</b>	<b>53.60</b>	<b>56.28</b>	<b>5</b>	<b>48</b>	<b>2</b>	<b>194.3</b>	<b>77.7</b>	<b>0.1</b>
15KPA51e3 / 15KPA51Ce3	57.00	62.70	5	51	2	182.1	82.9	0.1
<b>15KPA51Ae3 / 15KPA51CAe3</b>	<b>57.00</b>	<b>59.85</b>	<b>5</b>	<b>51</b>	<b>2</b>	<b>182.1</b>	<b>82.9</b>	<b>0.1</b>

(1) All ratings at 25°C unless specified otherwise

(2) V<sub>BR</sub> measured after I<sub>T</sub> applied for 300μs, I<sub>T</sub>=square wave pulse or equivalent

(3) Surge current waveform per Fig.3 and derated per Fig.2

(4) For bidirectional types with V<sub>WM</sub> of 30 volts and less, the I<sub>D</sub> limit is doubled



# 15KPA17e3 to 15KPA280CAe3

15000W Transient Voltage Suppressor (TVS) protection device

## Electrical characteristics (cont.)

DEVICE	BREAKDOWN VOLTAGE, $V_{BR}$ (V) @ $I_T$ (mA)		TEST CURRENT $I_T$ (mA)	STAND-OFF VOLTAGE $V_{WM}$ (V)	MAXIMUM STANDBY CURRENT $I_D$ ( $\mu$ A) @ $V_{WM}$	MAXIMUM PEAK PULSE CURRENT $I_{PP}$ (A)	MAXIMUM CLAMPING VOLTAGE $V_C$ (V) @ $I_{PP}$	MAXIMUM TEMPERATURE COEFFICIENT OF $V_{BR}$ $\alpha_{VBR}$ (%/°C)
	Min	Max						
15KPA54e3 / 15KPA54Ce3	60.30	66.33	5	54	2	172.2	87.7	0.1
<b>15KPA54Ae3 / 15KPA54CAe3</b>	<b>60.30</b>	<b>63.32</b>	<b>5</b>	<b>54</b>	<b>2</b>	<b>172.2</b>	<b>87.7</b>	<b>0.1</b>
15KPA58e3 / 15KPA58Ce3	64.80	71.28	5	58	2	161.0	93.8	0.1
<b>15KPA58Ae3 / 15KPA58CAe3</b>	<b>64.80</b>	<b>68.04</b>	<b>5</b>	<b>58</b>	<b>2</b>	<b>161.0</b>	<b>93.8</b>	<b>0.1</b>
15KPA60e3 / 15KPA60Ce3	67.00	73.70	5	60	2	155.0	97.4	0.1
<b>15KPA60Ae3 / 15KPA60CAe3</b>	<b>67.00</b>	<b>70.35</b>	<b>5</b>	<b>60</b>	<b>2</b>	<b>155.0</b>	<b>97.4</b>	<b>0.1</b>
15KPA64e3 / 15KPA64Ce3	71.50	78.65	5	64	2	144.9	104.2	0.1
<b>15KPA64Ae3 / 15KPA64CAe3</b>	<b>71.50</b>	<b>75.08</b>	<b>5</b>	<b>64</b>	<b>2</b>	<b>144.9</b>	<b>104.2</b>	<b>0.1</b>
15KPA70e3 / 15KPA70Ce3	78.20	86.02	5	70	2	132.9	113.6	0.1
<b>15KPA70Ae3 / 15KPA70CAe3</b>	<b>78.20</b>	<b>82.11</b>	<b>5</b>	<b>70</b>	<b>2</b>	<b>132.9</b>	<b>113.6</b>	<b>0.1</b>
15KPA75e3 / 15KPA75Ce3	83.80	92.18	5	75	2	123.8	122.0	0.1
<b>15KPA75Ae3 / 15KPA75CAe3</b>	<b>83.80</b>	<b>87.99</b>	<b>5</b>	<b>75</b>	<b>2</b>	<b>123.8</b>	<b>122.0</b>	<b>0.1</b>
15KPA78e3 / 15KPA78Ce3	87.10	95.81	5	78	2	119.7	126.1	0.1
<b>15KPA78Ae3 / 15KPA78CAe3</b>	<b>87.10</b>	<b>91.46</b>	<b>5</b>	<b>78</b>	<b>2</b>	<b>119.7</b>	<b>126.1</b>	<b>0.1</b>
15KPA85e3 / 15KPA85Ce3	94.90	104.39	5	85	2	109.7	137.6	0.1
<b>15KPA85Ae3 / 15KPA85CAe3</b>	<b>94.90</b>	<b>99.65</b>	<b>5</b>	<b>85</b>	<b>2</b>	<b>109.7</b>	<b>137.6</b>	<b>0.1</b>
15KPA90e3 / 15KPA90Ce3	100.50	110.55	5	90	2	103.7	145.6	0.1
<b>15KPA90Ae3 / 15KPA90CAe3</b>	<b>100.50</b>	<b>105.53</b>	<b>5</b>	<b>90</b>	<b>2</b>	<b>103.7</b>	<b>145.6</b>	<b>0.1</b>
15KPA100e3 / 15KPA100Ce3	111.70	122.87	5	100	2	93.6	161.3	0.1
<b>15KPA100Ae3 / 15KPA100CAe3</b>	<b>111.70</b>	<b>117.29</b>	<b>5</b>	<b>100</b>	<b>2</b>	<b>93.6</b>	<b>161.3</b>	<b>0.1</b>
15KPA110e3 / 15KPA110Ce3	122.90	135.19	5	110	2	84.5	178.6	0.1
<b>15KPA110Ae3 / 15KPA110CAe3</b>	<b>122.90</b>	<b>129.05</b>	<b>5</b>	<b>110</b>	<b>2</b>	<b>84.5</b>	<b>178.6</b>	<b>0.1</b>
15KPA120e3 / 15KPA120Ce3	134.00	147.40	5	120	2	78.5	192.3	0.1
<b>15KPA120Ae3 / 15KPA120CAe3</b>	<b>134.00</b>	<b>140.70</b>	<b>5</b>	<b>120</b>	<b>2</b>	<b>78.5</b>	<b>192.3</b>	<b>0.1</b>
15KPA130e3 / 15KPA130Ce3	145.20	159.72	5	130	2	72.5	208.3	0.1
<b>15KPA130Ae3 / 15KPA130CAe3</b>	<b>145.20</b>	<b>152.46</b>	<b>5</b>	<b>130</b>	<b>2</b>	<b>72.5</b>	<b>208.3</b>	<b>0.1</b>
15KPA150e3 / 15KPA150Ce3	167.60	184.36	5	150	2	62.4	241.9	0.1
<b>15KPA150Ae3 / 15KPA150CAe3</b>	<b>167.60</b>	<b>175.98</b>	<b>5</b>	<b>150</b>	<b>2</b>	<b>62.4</b>	<b>241.9</b>	<b>0.1</b>
15KPA160e3 / 15KPA160Ce3	178.70	196.57	5	160	2	58.4	258.6	0.1
<b>15KPA160Ae3 / 15KPA160CAe3</b>	<b>178.70</b>	<b>187.64</b>	<b>5</b>	<b>160</b>	<b>2</b>	<b>58.4</b>	<b>258.6</b>	<b>0.1</b>
15KPA170e3 / 15KPA170Ce3	189.90	208.89	5	170	2	55.4	272.7	0.1
<b>15KPA170Ae3 / 15KPA170CAe3</b>	<b>189.90</b>	<b>199.40</b>	<b>5</b>	<b>170</b>	<b>2</b>	<b>55.4</b>	<b>272.7</b>	<b>0.1</b>
15KPA180e3 / 15KPA180Ce3	201.10	221.21	5	180	2	52.3	288.5	0.1
<b>15KPA180Ae3 / 15KPA180CAe3</b>	<b>201.10</b>	<b>211.16</b>	<b>5</b>	<b>180</b>	<b>2</b>	<b>52.3</b>	<b>288.5</b>	<b>0.1</b>
15KPA200e3 / 15KPA200Ce3	223.40	245.74	5	200	2	47.3	319.1	0.1
<b>15KPA200Ae3 / 15KPA200CAe3</b>	<b>223.40</b>	<b>234.57</b>	<b>5</b>	<b>200</b>	<b>2</b>	<b>47.3</b>	<b>319.1</b>	<b>0.1</b>

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15000W Transient Voltage Suppressor (TVS) protection device

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**Electrical characteristics (cont.)**

DEVICE	BREAKDOWN VOLTAGE, $V_{BR}$ (V) @ $I_T$ (mA)		TEST CURRENT $I_T$ (mA)	STAND-OFF VOLTAGE $V_{WM}$ (V)	MAXIMUM STANDBY CURRENT $I_D$ ( $\mu$ A) @ $V_{WM}$	MAXIMUM PEAK PULSE CURRENT $I_{PP}$ (A)	MAXIMUM CLAMPING VOLTAGE $V_C$ (V) @ $I_{PP}$	MAXIMUM TEMPERATURE COEFFICIENT OF $V_{BR}$ $\alpha_{VBR}$ (%/°C)
	Min	Max						
15KPA220e3 / 15KPA220Ce3	245.70	270.27	5	220	2	35.2	428.6	0.1
<b>15KPA220Ae3 / 15KPA220CAe3</b>	<b>245.70</b>	<b>257.99</b>	<b>5</b>	<b>220</b>	<b>2</b>	<b>35.2</b>	<b>428.6</b>	<b>0.1</b>
15KPA240e3 / 15KPA240Ce3	268.10	294.91	5	240	2	39.3	384.6	0.1
<b>15KPA240Ae3 / 15KPA240CAe3</b>	<b>268.10</b>	<b>281.51</b>	<b>5</b>	<b>240</b>	<b>2</b>	<b>39.3</b>	<b>384.6</b>	<b>0.1</b>
15KPA260e3 / 15KPA260Ce3	290.40	319.44	5	260	2	36.2	416.7	0.1
<b>15KPA260Ae3 / 15KPA260CAe3</b>	<b>290.40</b>	<b>304.92</b>	<b>5</b>	<b>260</b>	<b>2</b>	<b>36.2</b>	<b>416.7</b>	<b>0.1</b>
15KPA280e3 / 15KPA280Ce3	312.80	344.08	5	280	2	33.2	454.5	0.1
<b>15KPA280Ae3 / 15KPA280CAe3</b>	<b>312.80</b>	<b>328.44</b>	<b>5</b>	<b>280</b>	<b>2</b>	<b>33.2</b>	<b>454.5</b>	<b>0.1</b>



15000W Transient Voltage Suppressor (TVS) protection device

Fig. 1 - Peak Pulse Power Rating Curve

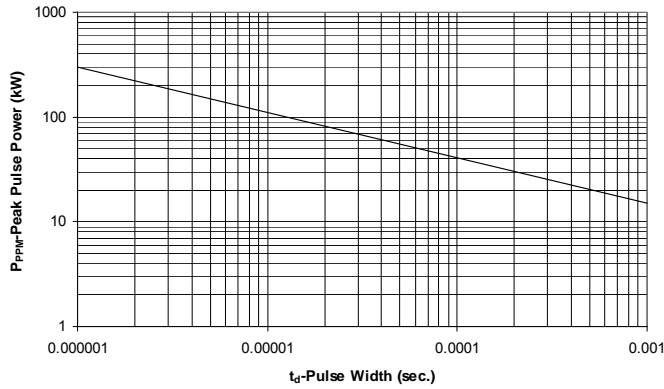


Fig. 2 - Pulse Derating Curve

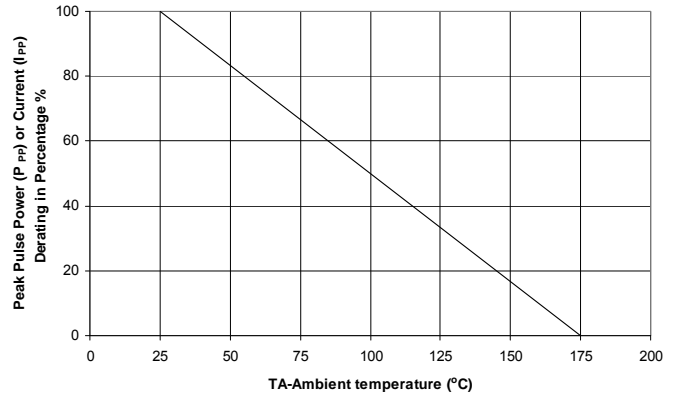


Fig. 3 - Test Pulse Waverform

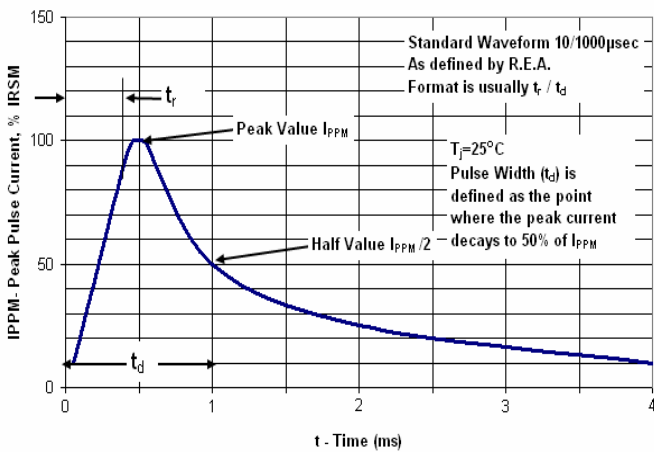


Fig. 4 - Typical Junction capacitance

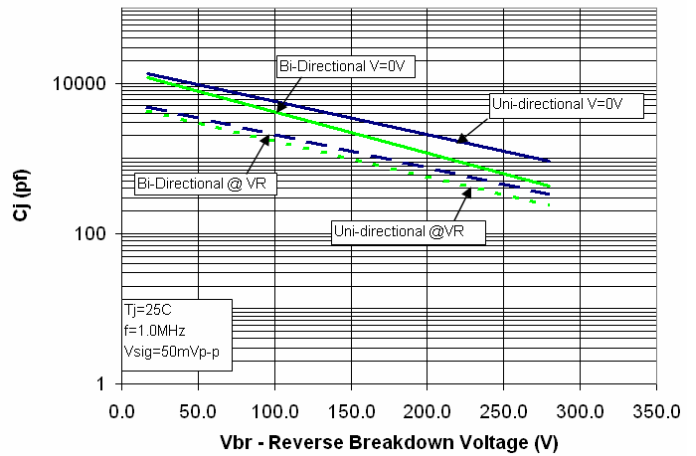


Fig. 5 - Steady State Power Derating Curve

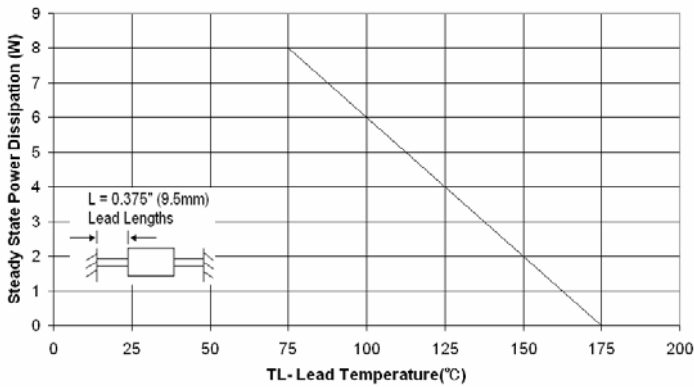
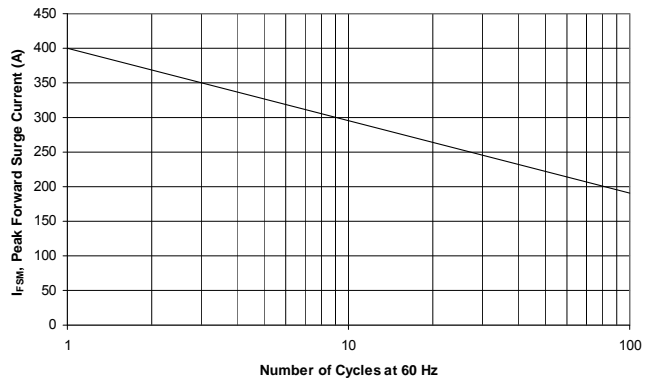


Fig. 6 - Maximum Non-repetitive Forward Surge Current





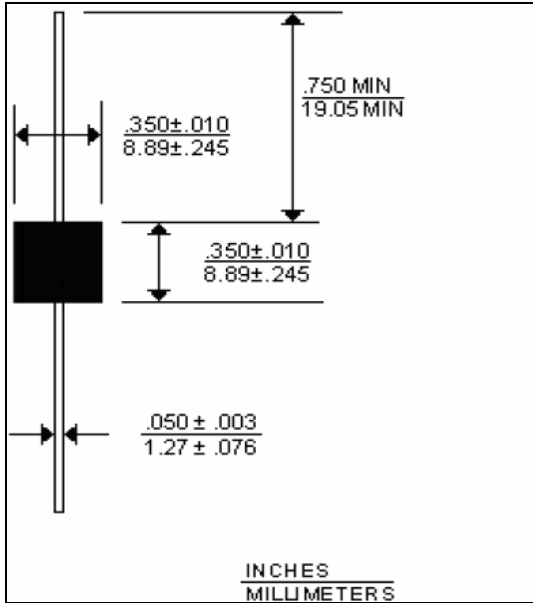
**Microsemi**

# 15KPA17e3 to 15KPA280CAe3

15000W Transient Voltage Suppressor (TVS) protection device

## Mechanical Characteristics

### Physical dimensions



### Package materials & information

**Case** : Epoxy meets UL94V-0  
**Electrode finish** : Matte Sn plating - fully RoHS compliant  
**Terminals** : solderable per MIL-STD-750, Method 2026  
**Marking code** :

**MSC-YYWW**  
**15KPAxxQZ**

**YYWW** = Date code  
**xx** = Breakdown voltage,  $V_{BR}$   
**Q** = "C" if bi-directional or blank if uni-directional  
**Z** = "A" if  $V_{BR}$  has 5% tolerance or blank if  $V_{BR}$  has 10% tolerance

**POLARITY** : For unidirectional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation.

## Ordering information

Product order code	Package	Weight	Base qty	Delivery mode
<b>15KPAxxYZe3/TR13</b>  For example : 15KPA17CAe3/TR13 or 15KPA36Ae3/TR13	P600	0.07oz. 2.5g	800	Tape and reel (13 inch)

Commercial Business Unit  
 Microsemi Corporation

Microsemi Commercial Offshore de Macau Limitada  
 Avenida Doutor Mario Soares  
 Bank of China Building, 18/F, Unit D  
 Macau SAR

Please refer to [www.microsemi.com](http://www.microsemi.com) for the terms and conditions of purchase