15KP17 thru 15KP280CA, e3

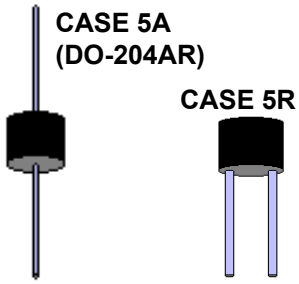
15,000 W TRANSIENT VOLTAGE SUPPRESSOR

Microsemi
SCOTTSDALE DIVISION

DESCRIPTION

These Microsemi 15 kW Transient Voltage Suppressors (TVSs) are designed for applications requiring protection of voltage-sensitive electronic devices that may be damaged by harsh or severe voltage transients including lightning per IEC61000-4-5 and class levels with various source impedances described herein. This series is available in 17 to 280 volt standoff voltages (V_{WM}) in both unidirectional and bi-directional offered in two different package designs for axial and radial configurations. Microsemi also offers numerous other TVS products to meet higher or lower power demands and special applications.

APPEARANCE



IMPORTANT: For the most current data, consult *MICROSEMI's* website: http://www.microsemi.com

FEATURES

- Available in both Unidirectional and Bidirectional construction (Bidirectional with C or CA suffix)
- Available in both axial-leaded and radial packages (include R prefix in part number for radial package option shown in figure as "case 5R," e.g. R15KP17A)
- Selections for 17 to 280 volt standoff voltages (V_{WM})
- Suppresses transients up to 15 kW @ 10/1000 µs and 100 kW @ 8/20 µs (see Figure 1)
- Optional 100% **screening for avionics grade** is available by adding MA prefix to part number for added 100% temperature cycle -55°C to +125°C (10X) as well as surge (3X) and 24 hours HTRB with post test V_Z & I_R (in the operating direction for unidirectional or both directions for bidirectional)
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, and JANTXV are also available by adding MQ, MX, or MV prefixes respectively to part numbers.
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS Compliant devices available by adding "e3" suffix

APPLICATIONS / BENEFITS

- Protection from switching transients and induced RF
- Fast response
- Protection from ESD, and EFT per IEC 61000-4-2 and IEC 61000-4-4
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:
  Class 1,2,3,4: 15KP17A - 15KP280A or CA
  Class 5: 15KP17A - 15KP280A or CA (short distance)
  Class 5: 15KP17A - 15KP110A or CA (long distance)
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
  Class 1 & 2: 15KP17A to 15KP280A or CA
  Class 3: 15KP17A to 15KP240A or CA
  Class 4: 15KP17A to 15KP120A or CA
- Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance:
  Class 2: 15KP17A to 15KP220A or CA
  Class 3: 15KP17A to 15KP110A or CA
  Class 4: 15KP17A to 15KP54A or CA

MAXIMUM RATINGS

- Peak Pulse Power dissipation at 25°C: 15,000 watts at 10/1000 µs (also see Figures 1 and 2)
- Impulse repetition rate (duty factor): 0.05%
- $t_{clamping}$ (0 volts to $V_{(BR)}$ min.): < 100 ps theoretical for unidirectional and < 5 ns for bidirectional
- Operating and Storage temperature: -65°C to +150°C
- Thermal resistance: 20°C/W junction to lead, or 80°C/W junction to ambient when mounted on FR4 PC board with 4 mm^2 copper pads (1oz) and track width 1 mm, length 25 mm
- Steady-State Power dissipation: 6 watts at T_L = 30°C, or 1.56 watts at T_A = 25°C when mounted on FR4 PC board described for thermal resistance
- Forward Surge: 200 Amps 8.3 ms half-sine wave for unidirectional devices only
- Solder temperatures: 260 °C for 10 s (maximum)

MECHANICAL AND PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- FINISH: Tin-Lead or RoHS compliant annealed matte-Tin plating readily solderable per MIL-STD-750, method 2026
- MARKING: Body marked with part number
- POLARITY: Band denotes cathode for the axial-leaded package and a dot denotes cathode terminal for the radial package. Bidirectional not marked for polarity
- WEIGHT: 1.5 grams (approximate)
- TAPE & REEL option: Standard per EIA-296 for axial package (add "TR" suffix to part number)
- See package dimension on last page

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ELECTRICAL CHARACTERISTICS

MICROSEMI PART NUMBER (Note 2)	REVERSE STAND-OFF VOLTAGE V_{WM} (Note 1)	MINIMUM BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$		MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP}	MAXIMUM STANDBY CURRENT I_D @ V_{WM}	MAXIMUM PEAK PULSE CURRENT I_{PP} (FIG. 2)	MAXIMUM VOLTAGE TEMPERATURE VARIATION $\alpha_{V(BR)}$
	VOLTS	VOLTS	mA	VOLTS	µA	A	mV/ °C
15KP17	17	18.9	50	32.3	5000	464	19
15KP17A	17	18.9	50	29.3	5000	512	17
15KP18	18	20.0	50	34.2	5000	439	20
15KP18A	18	20.0	50	30.9	5000	485	18
15KP20	20	22.2	20	37.9	1500	396	24
15KP20A	20	22.2	20	34.3	1500	437	21
15KP22	22	24.4	10	41.1	500	365	27
15KP22A	22	24.4	10	37.1	500	404	24
15KP24	24	26.7	5	45.0	150	333	30
15KP24A	24	26.7	5	40.7	150	369	27
15KP26	26	28.9	5	48.7	50	308	32
15KP26A	26	28.9	5	44.0	50	341	29
15KP28	28	31.1	5	52.4	25	286	35
15KP28A	28	31.1	5	47.5	25	316	31
15KP30	30	33.3	5	56.2	15	267	27
15KP30A	30	33.3	5	50.7	15	296	34
15KP33	33	36.7	5	60.6	10	248	42
15KP33A	33	36.7	5	54.8	10	274	38
15KP36	36	40.0	5	66.0	10	227	46
15KP36A	36	40.0	5	59.7	10	251	41
15KP40	40	44.4	5	72.8	10	206	51
15KP40A	40	44.4	5	65.8	10	228	46
15KP43	43	47.8	5	77.1	10	195	55
15KP43A	43	47.8	5	69.7	10	215	50
15KP45	45	50.0	5	80.7	10	186	57
15KP45A	45	50.0	5	73.0	10	205	52
15KP48	48	53.3	5	85.9	10	175	62
15KP48A	48	53.3	5	77.7	10	193	56
15KP51	51	56.7	5	91.5	10	164	66
15KP51A	51	56.7	5	82.8	10	181	60
15KP54	54	60.0	5	96.8	10	155	70
15KP54A	54	60.0	5	87.5	10	171	63
15KP58	58	64.4	5	104.0	10	144	76
15KP58A	58	64.4	5	94.0	10	160	68
15KP60	60	66.7	5	107.0	10	140	78
15KP60A	60	66.7	5	97.3	10	154	71
15KP64	64	71.1	5	115	10	130	84
15KP64A	64	71.1	5	104	10	144	76
15KP70	70	77.8	5	126	10	119	92
15KP70A	70	77.8	5	114	10	132	83
15KP75	75	83.3	5	135	10	111	100
15KP75A	75	83.3	5	122	10	123	89
15KP78	78	86.7	5	140	10	107	104
15KP78A	78	86.7	5	126	10	119	93
15KP85	85	94.4	5	152	10	99	113
15KP85A	85	94.4	5	137	10	109	102
15KP90	90	100	5	160	10	94	120
15KP90A	90	100	5	146	10	103	109
15KP100	100	111	5	179	10	84	134
15KP100A	100	111	5	162	10	93	121
15KP110	110	122	5	196	10	77	147
15KP110A	110	122	5	178	10	84	133
15KP120	120	133	5	214	10	70	161
15KP120A	120	133	5	193	10	78	145
15KP130	130	144	5	231	10	65	174
15KP130A	130	144	5	209	10	72	157
15KP150	150	167	5	268	10	56	202
15KP150A	150	167	5	243	10	62	183
15KP160	160	178	5	287	10	52	216
15KP160A	160	178	5	259	10	58	195

MICROSEMI PART NUMBER (Note 2)	REVERSE STAND-OFF VOLTAGE V_{WM} (Note 1)	MINIMUM BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$		MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP}	MAXIMUM STANDBY CURRENT I_D @ V_{WM}	MAXIMUM PEAK PULSE CURRENT I_{PP} (FIG. 2)	MAXIMUM VOLTAGE TEMPERATURE VARIATION $\alpha_{V(BR)}$
	VOLTS	VOLTS	mA	VOLTS	µA	A	mV/ °C
15KP170	170	189	5	304	10	49	229
15KP170A	170	189	5	275	10	55	207
15KP180	180	200	5	321	10	47	242
15KP180A	180	200	5	291	10	52	219
15KP200	200	222	5	356	10	42	269
15KP200A	200	222	5	322	10	47	243
15KP220	220	245	5	393	10	38	297
15KP220A	220	245	5	356	10	42	269
15KP240	240	267	5	428	10	35	324
15KP240A	240	267	5	388	10	39	293
15KP260	260	289	5	464	10	32	352
15KP260A	260	289	5	419	10	36	317
15KP280	280	311	5	500	10	30	378
15KP280A	280	311	5	452	10	33	342

NOTE 1: Transient Voltage Suppressors are normally selected with reverse "Standoff Voltage" V_{WM} which should be equal to or greater than the dc or continuous peak operating voltage level.
NOTE 2: For bidirectional construction, indicate a C or CA suffix after the part number.

SYMBOLS & DEFINITIONS

Symbol	Definition	Symbol	Definition
V_{WM}	Working Peak (Standoff) Voltage	I_{PP}	Peak Pulse Current
P_{PP}	Peak Pulse Power	V_C	Clamping Voltage
$V_{(BR)}$	Breakdown Voltage	$I_{(BR)}$	Breakdown Current for $V_{(BR)}$
I_D	Standby Current		

GRAPHS

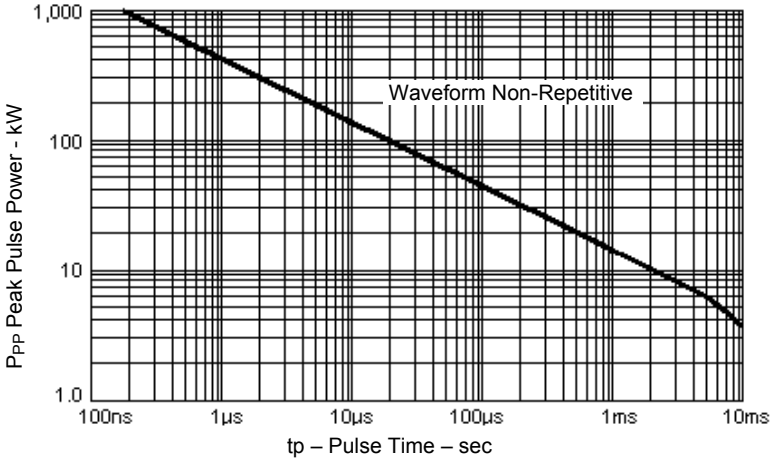
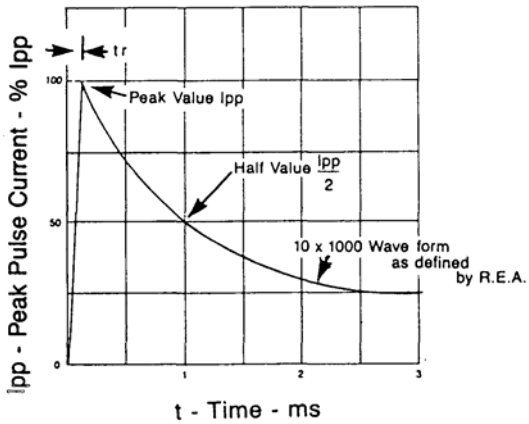


FIGURE 1
Peak Pulse Power vs. Pulse Time to 50% of Exponentially Decaying Pulse



Test waveform parameters:
tr=10 µs, tp=1000 µs
FIGURE 2
Pulse Waveform

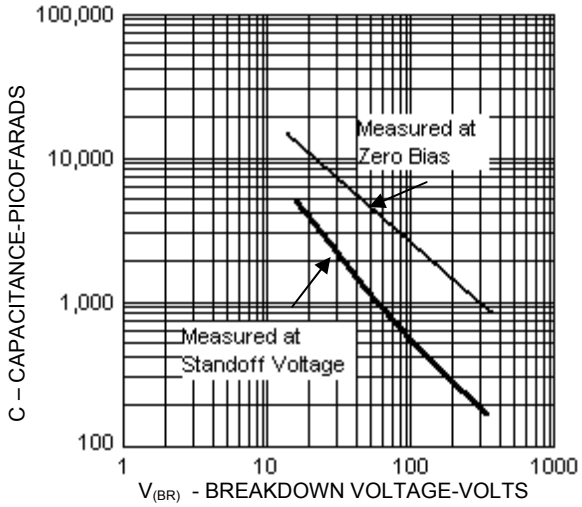
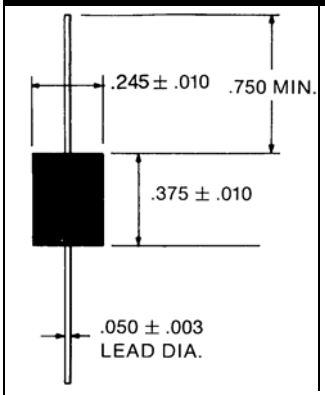


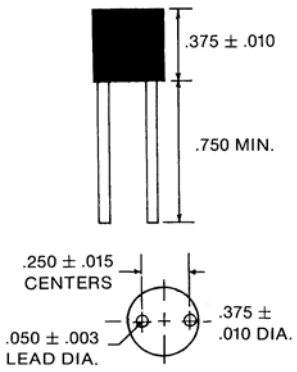
FIGURE 3
Typical Capacitance vs. Breakdown Voltage

NOTE: For Bidirectional Construction, indicate a C or CA suffix after part number. Capacitance will be one-half that shown in Figure 3.

PACKAGE DIMENSIONS



CASE 5A



CASE 5R

NOTE: Dimensions are in inches.

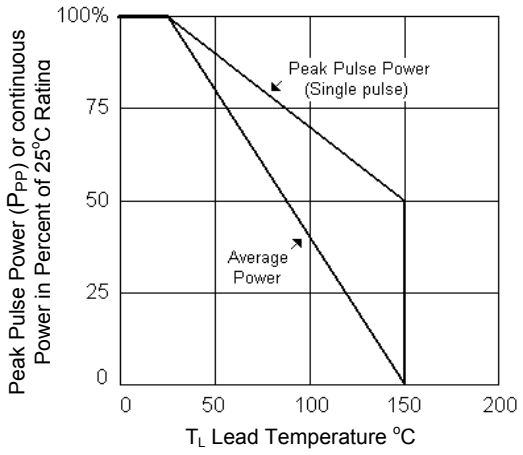


FIGURE 4 Derating Curve