Microsemi
SCOTTSDALE DIVISION

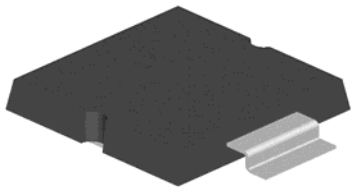
PLAD15KP5.0 thru PLAD15KP400CA, e3

15,000 W SURFACE MOUNT TRANSIENT VOLTAGE SUPPRESSOR

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 classes with various source impedances described herein. This series is available in 5.0 to 400 volt standoff voltages (V_{WM}) in both unidirectional and bidirectional offered in one surface mount device. Microsemi also offers numerous other TVS products to meet higher and 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)
- Low profile surface mount
- Available in tape-and-reel or waffle pack
- Selections for 5.0 to 400 volts standoff voltages (V_{WM})
- Suppresses transients up to 15,000 watts @ 10/1000 µs (see Figure 1)
- Fast response
- 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
- 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: PLAD15KP5.0A to 400A or CA
  Class 5: PLAD15KP5.0A to 400A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
  Class 1,2,3,4: PLAD15KP5.0A to 400A or CA
- Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance:
  Class 2,3: PLAD15KP5.0A to 400A or CA
  Class 4: PLAD15KP5.0 to 54A or CA
- Pin injection protection per RTCA/DO-160D for Waveform 4 (6.4/69 µs):
  Level 4: PLAD15KP5.0A to 400A or CA
  Level 5: PLAD15KP5.0A to 100A or CA
- Pin injection protection per RTCA/DO-160D for Waveform 5A (40/120 µs):
  Level 4: PLAD15KP5.0A to 28A or CA

MAXIMUM RATINGS

- Operating and Storage temperature: -55°C to +150°C
- 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
- Thermal resistance: 0.2 C/W junction to case or 50°C/W junction to ambient when mounted on FR4 PC board with recommended mounting pad (see last page)
- Steady-State Power dissipation: 50 watts at T_C = 100°C with good heat sink, or 2.5 watts at T_A = 25°C if mounted on FR4 PC board as described for thermal resistance
- Forward Surge Voltage: 3.5 V maximum @ 500 Amps 8.3 ms half-sine wave (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
- TERMINALS: Tin-Lead or RoHS Compliant annealed matte-Tin plating readily solderable per MIL-STD-750, method 2026
- MARKING: Body marked with part number
- POLARITY: For unidirectional devices, the cathode is on the metal backside (package bottom)
- WEIGHT: 1 gram (approximate)
- TAPE & Reel: Standard per EIA-481-B (add "TR" suffix to part number)
- See package dimensions on last page

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ELECTRICAL CHARACTERISTICS

MICROSEMI PART NUMBER (Note 2)	REVERSE STAND-OFF VOLTAGE V_{WM} (Note 1)	BREAKDOWN VOLTAGE $V_{(BR)}$		MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP}	MAXIMUM STANDBY CURRENT I_D @ V_{WM}	MAXIMUM PEAK PULSE CURRENT I_{PP} (FIG. 3)	MAXIMUM TEMPERATURE COEFFICIENT OF $V_{(BR)}$ $\alpha_{V(BR)}$
	VOLTS	$V_{(BR)}$ @ VOLTS	$I_{(BR)}$ mA	VOLTS	µA	A	mV/ °C
PLAD15KP5.0	5.0	6.40 – 7.30	150	9.6	15000	1620	4.0
PLAD15KP5.0A	5.0	6.40 – 7.00	150	9.2	15000	1629	4.0
PLAD15KP6.0	6.0	6.67 – 8.15	150	11.4	15000	1317	4.0
PLAD15KP6.0A	6.0	6.67 – 7.37	150	10.3	15000	1455	4.0
PLAD15KP6.5	6.5	7.22 – 8.82	150	12.3	6000	1221	4.0
PLAD15KP6.5A	6.5	7.22 – 7.98	150	11.2	6000	1341	4.0
PLAD15KP7.0	7.0	7.78 – 9.51	150	13.3	3000	1134	5.0
PLAD15KP7.0A	7.0	7.78 – 8.60	150	12.0	3000	1251	5.0
PLAD15KP7.5	7.5	8.33 – 10.2	5	14.3	750	1350	6.0
PLAD15KP7.5A	7.5	8.33 – 9.21	5	12.9	750	1164	6.0
PLAD15KP8.0	8.0	8.89 – 10.9	5	15.0	450	999	6.0
PLAD15KP8.0A	8.0	8.89 – 9.83	5	13.6	450	1101	6.0
PLAD15KP8.5	8.5	9.44 – 11.5	5	15.9	150	942	7.0
PLAD15KP8.5A	8.5	9.44 – 10.4	5	14.4	150	1041	7.0
PLAD15KP9.0	9.0	10.0 – 12.2	5	16.9	120	885	8.0
PLAD15KP9.0A	9.0	10.0 – 11.1	5	15.4	60	975	8.0
PLAD15KP10	10	11.1 – 13.6	5	18.8	45	798	9.0
PLAD15KP10A	10	11.1 – 12.3	5	17.0	45	882	9.0
PLAD15KP11	11	12.2 – 14.9	5	20.1	10	747	10
PLAD15KP11A	11	12.2 – 13.5	5	18.2	10	822	10
PLAD15KP12	12	13.3 – 16.3	5	22.0	10	681	11
PLAD15KP12A	12	13.3 – 14.7	5	19.9	10	753	11
PLAD15KP13	13	14.4 – 17.6	5	23.8	10	630	12
PLAD15KP13A	13	14.4 – 15.9	5	21.5	10	696	12
PLAD15KP14	14	15.6 – 19.1	5	25.8	10	582	13
PLAD15KP14A	14	15.6 – 17.2	5	23.2	10	645	13
PLAD15KP15	15	16.7 – 20.4	5	26.9	10	564	15
PLAD15KP15A	15	16.7 – 18.5	5	24.4	10	318	15
PLAD15KP16	16	17.8 – 21.8	5	28.8	10	528	18
PLAD15KP16A	16	17.8 – 19.7	5	26.0	10	576	16
PLAD15KP17	17	18.9 – 23.1	5	30.5	10	492	19
PLAD15KP17A	17	18.9 – 20.9	5	27.6	10	543	18
PLAD15KP18	18	20.0 – 24.4	5	32.2	10	465	20
PLAD15KP18A	18	20.0 – 22.1	5	29.2	10	516	19
PLAD15KP20	20	22.2 – 27.1	5	35.8	10	417	24
PLAD15KP20A	20	22.2 – 24.5	5	32.4	10	462	22
PLAD15KP22	22	24.4 – 29.8	5	39.4	10	381	27
PLAD15KP22A	22	24.4 – 26.9	5	35.5	10	423	24
PLAD15KP24	24	26.7 – 32.6	5	43.0	10	348	30
PLAD15KP24A	24	26.7 – 29.5	5	38.9	10	384	27
PLAD15KP26	26	28.9 – 35.3	5	46.6	10	321	33
PLAD15KP26A	26	28.9 – 31.9	5	42.1	10	357	29
PLAD15KP28	28	31.1 – 38.0	5	50.1	10	297	34
PLAD15KP28A	28	31.1 – 34.4	5	45.5	10	330	30
PLAD15KP30	30	33.3 – 40.7	5	53.5	10	279	38
PLAD15KP30A	30	33.3 – 36.8	5	48.4	10	309	35
PLAD15KP33	33	36.7 – 44.9	5	59.0	10	255	41
PLAD15KP33A	33	36.7 – 40.6	5	53.3	10	282	38
PLAD15KP36	36	40.0 – 48.9	5	64.3	10	234	45
PLAD15KP36A	36	40.0 – 44.2	5	58.1	10	258	40
PLAD15KP40	40	44.4 – 54.3	5	71.4	10	210	50
PLAD15KP40A	40	44.4 – 49.1	5	64.5	10	234	45
PLAD15KP43	43	47.8 – 58.4	5	76.7	10	195	54
PLAD15KP43A	43	47.8 – 52.8	5	69.4	10	216	49
PLAD15KP45	45	50.0 – 61.1	5	80.3	10	186	57
PLAD15KP45A	45	50.0 – 55.3	5	72.7	10	207	51
PLAD15KP48	48	53.3 – 65.1	5	85.5	10	174	62
PLAD15KP48A	48	53.3 – 58.9	5	77.4	10	195	55
PLAD15KP51	51	56.7 – 69.3	5	91.1	10	165	65
PLAD15KP51A	51	56.7 – 62.7	5	82.4	10	183	60

MICROSEMI PART NUMBER (Note 2)	REVERSE STAND-OFF VOLTAGE V_{WM} (Note 1)	BREAKDOWN VOLTAGE $V_{(BR)}$		MAXIMUM CLAMPING VOLTAGE V_C @ I_{PP}	MAXIMUM STANDBY CURRENT I_D @ V_{WM}	MAXIMUM PEAK PULSE CURRENT I_{PP} (FIG. 3)	MAXIMUM TEMPERATURE COEFFICIENT OF $V_{(BR)}$
	VOLTS	$V_{(BR)}$ VOLTS @	$I_{(BR)}$ mA	VOLTS	µA	A	$\alpha_{V(BR)}$ mV/ °C
PLAD15KP54	54	60.0 – 73.3	5	96.3	10	156	70
PLAD15KP54A	54	60.0 – 66.3	5	87.1	10	171	64
PLAD15KP58	58	64.4 – 78.7	5	103.0	10	147	77
PLAD15KP58A	58	64.4 – 71.2	5	93.6	10	159	69
PLAD15KP60	60	66.7 – 81.5	5	107.0	10	141	79
PLAD15KP60A	60	66.7 – 73.7	5	96.8	10	156	70
PLAD15KP64	64	71.1 – 86.9	5	114.0	10	132	85
PLAD15KP64A	64	71.1 – 78.6	5	103.0	10	147	75
PLAD15KP70	70	77.8 – 95.1	5	125	10	120	93
PLAD15KP70A	70	77.8 – 86.0	5	113	10	132	84
PLAD15KP75	75	83.3 – 102.0	5	134	10	111	100
PLAD15KP75A	75	83.3 – 92.1	5	121	10	123	90
PLAD15KP78	78	86.7 – 106.0	5	139	10	108	104
PLAD15KP78A	78	86.7 – 95.8	5	126	10	120	94
PLAD15KP85	85	94.4 – 115.0	5	151	10	99	113
PLAD15KP85A	85	94.4 – 104.0	5	137	10	108	102
PLAD15KP90	90	100 – 122	5	160	10	93	120
PLAD15KP90A	90	100 – 111	5	146	10	102	109
PLAD15KP100	100	111 – 136	5	179	10	84	134
PLAD15KP100A	100	111 – 123	5	162	10	93	122
PLAD15KP110	110	122 – 149	5	196	10	78	147
PLAD15KP110A	110	122 – 135	5	177	10	84	132
PLAD15KP120	120	133 – 163	5	214	10	70	161
PLAD15KP120A	120	133 – 147	5	193	10	78	145
PLAD15KP130	130	144 – 176	5	231	10	65	174
PLAD15KP130A	130	144 – 159	5	209	10	71	157
PLAD15KP150	150	167 – 204	5	268	10	56	202
PLAD15KP150A	150	167 – 185	5	243	10	62	183
PLAD15KP160	160	178 – 218	5	287	10	52	216
PLAD15KP160A	160	178 – 197	5	259	10	58	195
PLAD15KP170	170	189 – 231	5	304	10	49	229
PLAD15KP170A	170	189 – 209	5	275	10	55	207
PLAD15KP180	180	200 – 244	5	321	10	47	242
PLAD15KP180A	180	200 – 221	5	291	10	52	219
PLAD15KP200	200	222 – 271	5	356	10	42	269
PLAD15KP200A	200	222 – 245	5	322	10	47	243
PLAD15KP220	220	245 – 299	5	293	10	38	297
PLAD15KP220A	220	245 – 271	5	356	10	42	269
PLAD15KP250	250	278 – 308	5	403	10	37	306
PLAD15KP260A	260	289 – 320	5	419	10	35.5	318
PLAD15KP280A	280	311 – 345	5	451	10	33	344
PLAD15KP300A	300	333 – 369	5	483	10	31	368
PLAD15KP350A	350	389 – 431	5	564	10	26.5	430
PLAD15KP400A	400	444 - 492	5	644	10	23	490

NOTE 1: Transient Voltage Suppressors are normally selected with reverse "Stand Off 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		

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GRAPHS

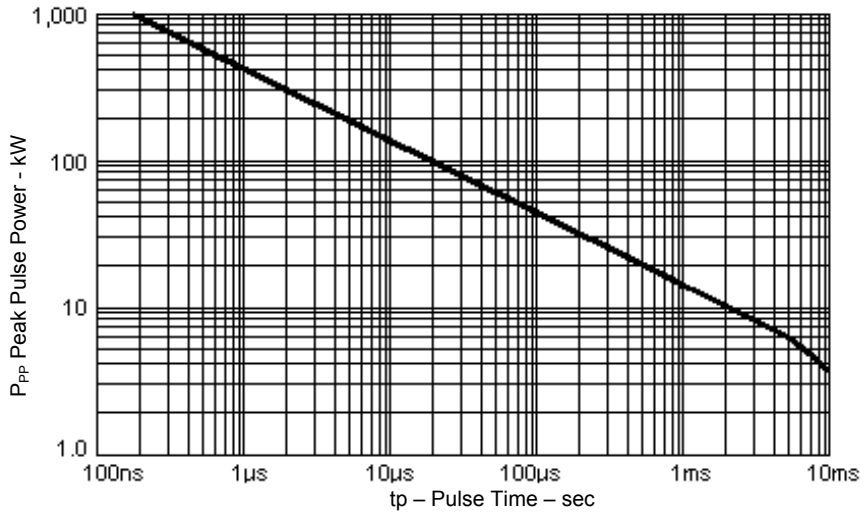
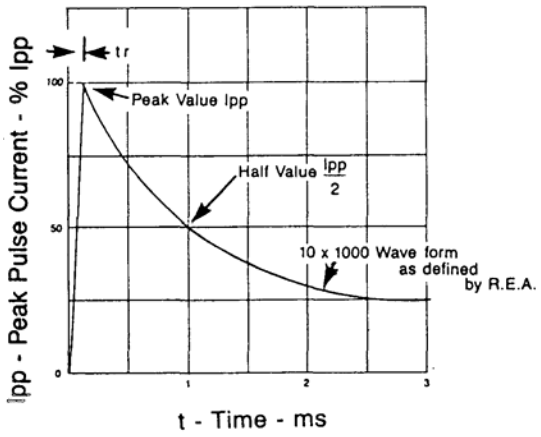


FIGURE 1
Peak Pulse Power vs. Pulse Time to 50% of Exponentially Decaying Pulse



Test waveform parameters: tr=10 µs, tp=1000 µs

FIGURE 2
Pulse Waveform

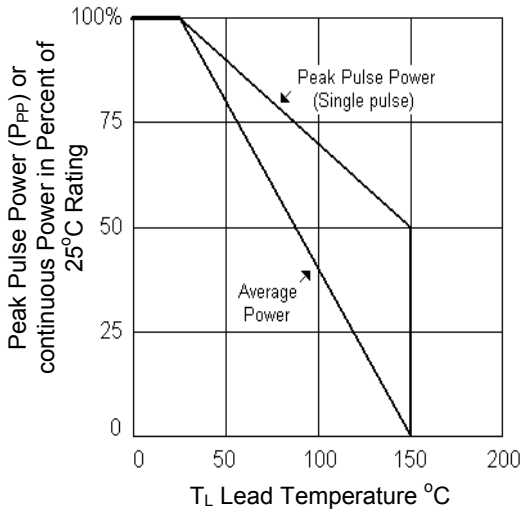
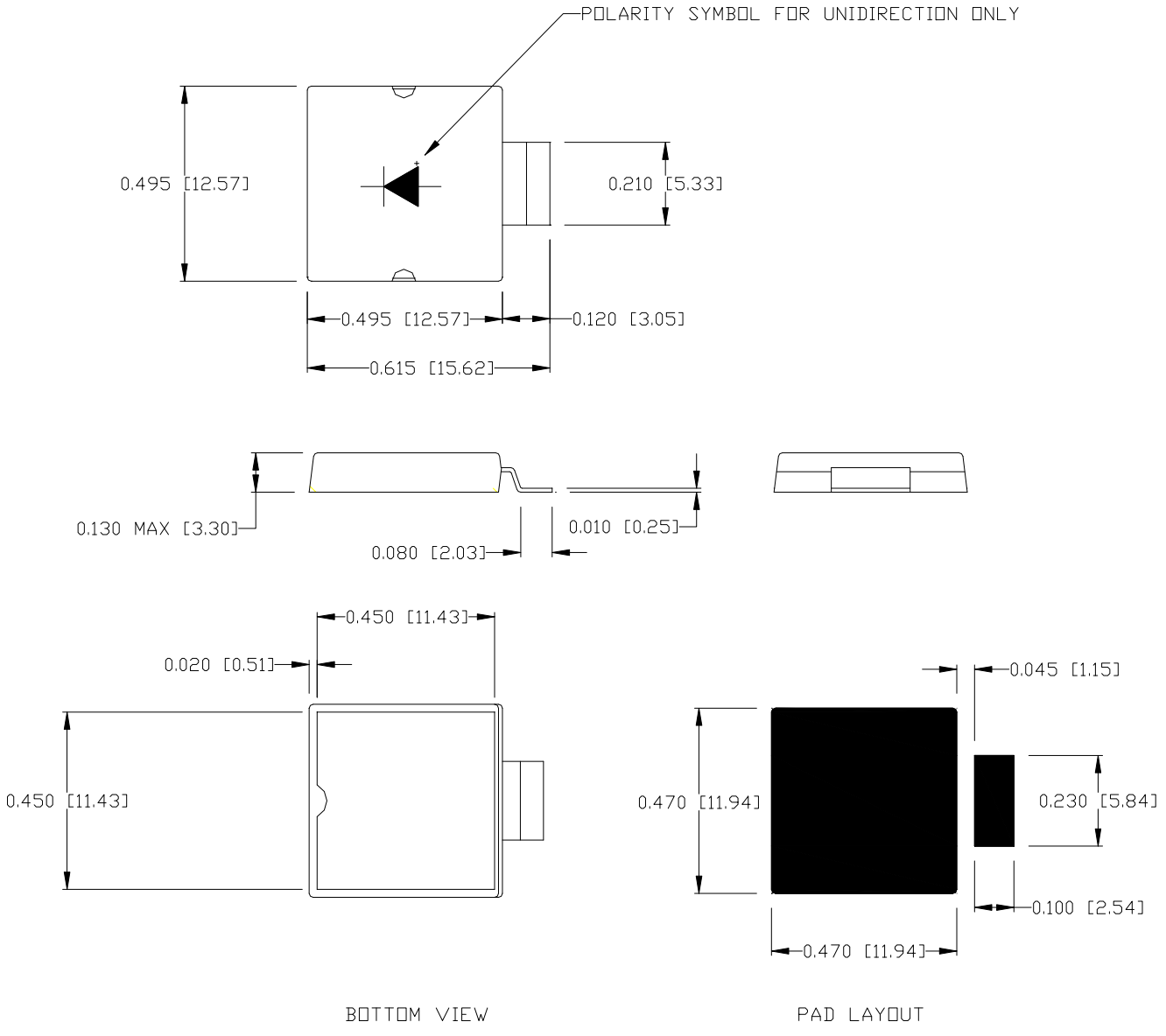


FIGURE 3
Derating Curve

PACKAGE AND MOUNTING PAD DIMENSIONS Inches [mm]



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