RoHS Available

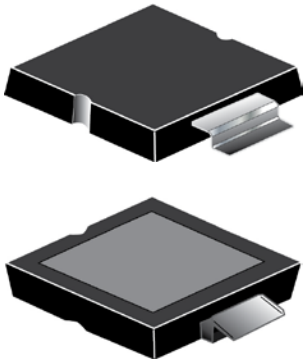
Surface Mount 15,000 Watt Transient Voltage Suppressor

High-Reliability screening available in reference to MIL-PRF-19500

DESCRIPTION

These high power 15 kW rated transient voltage suppressors in a surface mount package are provided with design features to minimize thermal resistance and cumulative heating. Typical applications include lightning and automotive load dump protection. They are particularly effective at meeting the multi-stroke lightning standard RTCA DO-160, section 22 for aircraft design. This efficient low profile package design is offered in standoff voltage selections (V_{WM}) of 7 volts to 200 volts in either unidirectional or bidirectional construction.

Important: For the latest information, visit our website http://www.microsemi.com.



PLAD
(The cathode is the metal base under the body of this device.)

FEATURES

- Available in both unidirectional and bidirectional construction (bidirectional with CA suffix)
- High reliability with wafer fabrication and assembly lot traceability
- All parts surge tested
- Low profile surface mount package
- Optional upscreening is available with various screening and conformance inspection options based on MIL-PRF-19500. Refer to Hirel Non-Hermetic Product Portfolio for more details on the screening options.
- Suppresses transients up to 15,000 W @ 10/1000 µs (see Figure 1)
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS compliant versions are available
- 3σ lot norm screening performed on standby current (I_D)

APPLICATIONS / BENEFITS

- Protection from switching transients and induced RFI
- Protection from ESD, and EFT per IEC 61000-4-2 and IEC 61000-4-4
- Secondary lightning protection per IEC 61000-4-5 with 42 ohms source impedance:
  Class 1,2,3,4,5: MPLAD15KP7.0A to 200CA
- Secondary lightning protection per IEC 61000-4-5 with 12 ohms source impedance:
  Class 1,2,3,4: MPLAD15KP7.0A to 200CA
- Secondary lightning protection per IEC 61000-4-5 with 2 ohms source impedance:
  Class 2,3: MPLAD15KP7.0A to 200CA
  Class 4: MPLAD15KP5.0 to 54CA
- Pin injection protection per RTCA/DO-160F for Waveform 4 (6.4/69 µs at 25 ºC)*:
  Level 4: MPLAD15KP7.0A to 200CA
  Level 5: MPLAD15KP7.0A to 100CA
- Pin injection protection per RTCA/DO-160F for Waveform 5A (40/120 µs at 25 ºC)*:
  Level 4: MPLAD15KP7.0A to 28CA

*See MicroNote 132 for further temperature derating selection.

Also available:

PLAD30KP
(30,000 watts)
MPLAD30KP14A thru MPLAD30KP400CA

MSC – Lawrence
6 Lake Street,
Lawrence, MA 01841
Tel: 1-800-446-1158 or
(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland
Gort Road Business Park,
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Tel: +353 (0) 65 6840044
Fax: +353 (0) 65 6822298

Website:
www.microsemi.com

MAXIMUM RATINGS @ 25 °C unless otherwise specified

Parameters/Test Conditions		Symbol	Value	Unit
Junction and Storage Temperature		T_J and T_{STG}	-55 to +150	ºC/W
Thermal Resistance Junction-to-Ambient (1)		$R_{\Theta JA}$	50	ºC/W
Thermal Resistance Junction-to-Case		$R_{\Theta JC}$	0.7	ºC/W
Peak Pulse Power @ 10/1000 µs (2)		P_{PP}	15,000	W
$t_{clamping}$ (0 volts to $V_{(BR)}$ min)	Unidirectional		<100	ps
	Bidirectional		<5	ns
Forward Clamping Voltage @ 500 Amps (3)		V_{FS}	2.0	V
Forward Surge Current (3)		I_{FSM}	1500	A
Solder Temperature @ 10 s		T_{SP}	260	ºC
Steady-State Power dissipation (5)	T_A = 25 °C	P_D	2.5 (1)	W
	T_C = 100 °C		71 (4)	W

Notes:
1. When mounted on FR4 PC board with recommended mounting pad (see pad layout).
2. Also see Figures 1 and 2. With impulse repetition rate (duty factor) of 0.05% or less.
3. At 8.3 ms half-sine wave (unidirectional devices only).
4. Case temperature controlled on heat sink as specified.
5. See MicroNote 134 for derating P_{PP} when also applying steady-state power.

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)
- Available in bulk or custom tape-and-reel packaging
- TAPE-AND-REEL: Standard per EIA-481-B (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 1 gram
- See Package Dimensions on last page.

PART NOMENCLATURE

M PLAD 15K P 7.0 CA (e3)

Reliability Level*
M
MA
MX
MXL
*(see Hirel Non-Hermetic Product Portfolio)

Package Designation

P_{PP} Rating (W)

RoHS Compliance
e3 = RoHS compliant
Blank = non-RoHS compliant

Polarity
A = Unidirectional
CA = Bidirectional

Reverse Standoff Voltage

Plastic

SYMBOLS & DEFINITIONS	
Symbol	**Definition**
$I_{(BR)}$	Breakdown Current: The current used for measuring breakdown voltage $V_{(BR)}$.
I_D	Standby Current: The current at the rated standoff voltage V_{WM}.
I_{PP}	Peak Impulse Current: The peak current during the impulse.
$V_{(BR)}$	Breakdown Voltage: The minimum voltage the device will exhibit at a specified current.
V_C	Clamping Voltage: Clamping voltage at I_{PP} (peak pulse current) at the specified pulse conditions (typically shown as maximum value).
V_{WM}	Rated Working Standoff Voltage: The maximum peak voltage that can be applied over the operating temperature range.
$\alpha_{V(BR)}$	Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by change in temperature.

ELECTRICAL CHARACTERISTICS @ 25 ºC unless otherwise stated

MICROSEMI PART NUMBER		REVERSE STANDOFF 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 $\alpha_{V(BR)}$
Unidirectional	**Bidirectional**	**Volts**	**Volts**	**mA**	**Volts**	**µA**	**A**	**mV/ ºC**
MPLAD15KP7.0A	MPLAD15KP7.0CA	7.0	7.78 – 8.60	150	12.0	3000	1251*	5.0
MPLAD15KP7.5A	MPLAD15KP7.5CA	7.5	8.33 – 9.21	5	12.9	750	1164*	6.0
MPLAD15KP8.0A	MPLAD15KP8.0CA	8.0	8.89 – 9.83	5	13.6	450	1101*	6.0
MPLAD15KP8.5A	MPLAD15KP8.5CA	8.5	9.44 – 10.4	5	14.4	150	1041*	7.0
MPLAD15KP9.0A	MPLAD15KP9.0CA	9.0	10.0 – 11.1	5	15.4	60	975	8.0
MPLAD15KP10A	MPLAD15KP10CA	10	11.1 – 12.3	5	17.0	45	882	9.0
MPLAD15KP11A	MPLAD15KP11CA	11	12.2 – 13.5	5	18.2	10	822	10
MPLAD15KP12A	MPLAD15KP12CA	12	13.3 – 14.7	5	19.9	10	753	11
MPLAD15KP13A	MPLAD15KP13CA	13	14.4 – 15.9	5	21.5	10	696	12
MPLAD15KP14A	MPLAD15KP14CA	14	15.6 – 17.2	5	23.2	10	645	13
MPLAD15KP15A	**MPLAD15KP15CA**	15	16.7 – 18.5	5	24.4	10	618	15
MPLAD15KP16A	MPLAD15KP16CA	16	17.8 – 19.7	5	26.0	10	576	16
MPLAD15KP17A	MPLAD15KP17CA	17	18.9 – 20.9	5	27.6	10	543	18
MPLAD15KP18A	MPLAD15KP18CA	18	20.0 – 22.1	5	29.2	10	516	19
MPLAD15KP20A	MPLAD15KP20CA	20	22.2 – 24.5	5	32.4	10	462	22
MPLAD15KP22A	MPLAD15KP22CA	22	24.4 – 26.9	5	35.5	10	423	24
MPLAD15KP24A	MPLAD15KP24CA	24	26.7 – 29.5	5	38.9	10	384	27
MPLAD15KP26A	**MPLAD15KP26CA**	26	28.9 – 31.9	5	42.1	10	357	29
MPLAD15KP28A	MPLAD15KP28CA	28	31.1 – 34.4	5	45.5	10	330	30
MPLAD15KP30A	MPLAD15KP30CA	30	33.3 – 36.8	5	48.4	10	309	35
MPLAD15KP33A	**MPLAD15KP33CA**	33	36.7 – 40.6	5	53.3	10	282	38
MPLAD15KP36A	MPLAD15KP36CA	36	40.0 – 44.2	5	58.1	10	258	40
MPLAD15KP40A	MPLAD15KP40CA	40	44.4 – 49.1	5	64.5	10	234	45
MPLAD15KP43A	MPLAD15KP43CA	43	47.8 – 52.8	5	69.4	10	216	49
MPLAD15KP45A	MPLAD15KP45CA	45	50.0 – 55.3	5	72.7	10	207	51
MPLAD15KP48A	MPLAD15KP48CA	48	53.3 – 58.9	5	77.4	10	195	55
MPLAD15KP51A	MPLAD15KP51CA	51	56.7 – 62.7	5	82.4	10	183	60
MPLAD15KP54A	MPLAD15KP54CA	54	60.0 – 66.3	5	87.1	10	171	64
MPLAD15KP58A	**MPLAD15KP58CA**	58	64.4 – 71.2	5	93.6	10	159	69
MPLAD15KP60A	**MPLAD15KP60CA**	60	66.7 – 73.7	5	96.8	10	156	70
MPLAD15KP64A	MPLAD15KP64CA	64	71.1 – 78.6	5	103	10	147	75
MPLAD15KP70A	MPLAD15KP70CA	70	77.8 – 86.0	5	113	10	132	84
MPLAD15KP75A	**MPLAD15KP75CA**	75	83.3 – 92.1	5	121	10	123	90
MPLAD15KP78A	MPLAD15KP78CA	78	86.7 – 95.8	5	126	10	120	94
MPLAD15KP85A	**MPLAD15KP85CA**	85	94.4 – 104.0	5	137	10	108	102
MPLAD15KP90A	MPLAD15KP90CA	90	100 – 111	5	146	10	102	109
MPLAD15KP100A	MPLAD15KP100CA	100	111 – 123	5	162	10	93	122
MPLAD15KP110A	MPLAD15KP110CA	110	122 – 135	5	177	10	84	132
MPLAD15KP120A	MPLAD15KP120CA	120	133 – 147	5	193	10	78	145
MPLAD15KP130A	MPLAD15KP130CA	130	144 – 159	5	209	10	71	157
MPLAD15KP150A	MPLAD15KP150CA	150	167 – 185	5	243	10	62	183
MPLAD15KP160A	**MPLAD15KP160CA**	160	178 – 197	5	259	10	58	195
MPLAD15KP170A	MPLAD15KP170CA	170	189 – 209	5	275	10	55	207
MPLAD15KP180A	MPLAD15KP180CA	180	200 – 221	5	291	10	52	219
MPLAD15KP200A	MPLAD15KP200CA	200	222 – 245	5	322	10	47	243

NOTE 1: Transient Voltage Suppressors are normally selected with reverse standoff voltage V_{WM}, which should be equal to or greater than the peak operating voltage.

NOTE 2: Items listed in bold above are available ex-stock or with a short lead-time.

* Surge Testing is performed to 1000Amps due to Equipment limitations

GRAPHS

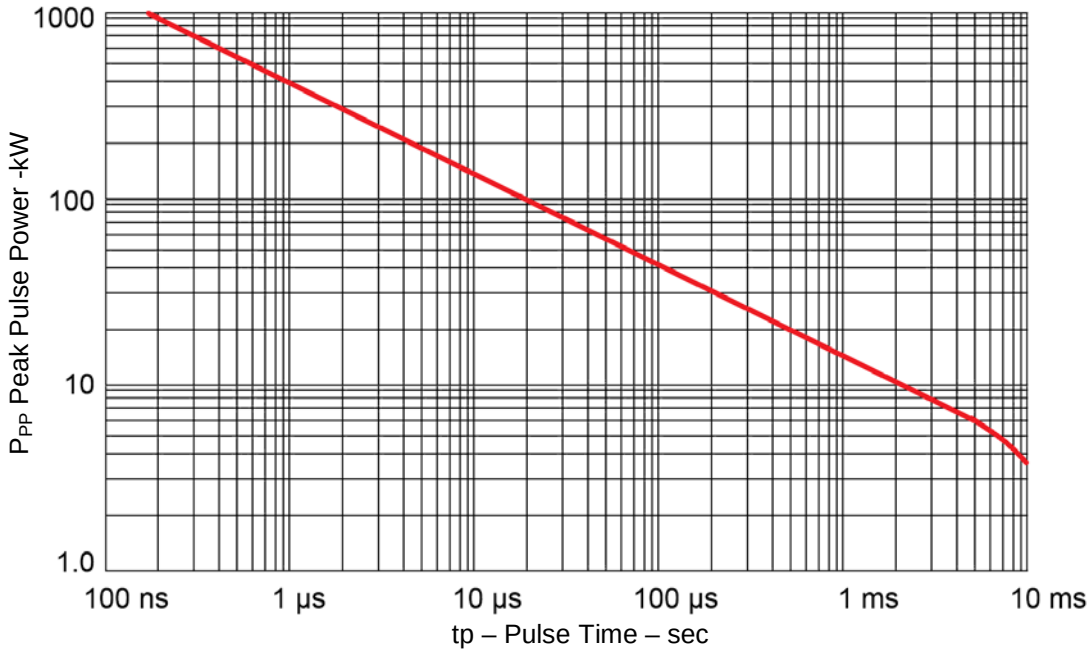
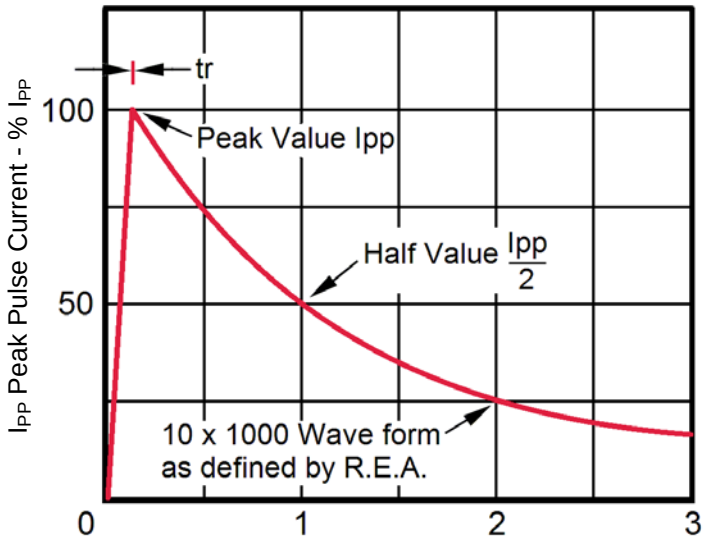


FIGURE 1
Peak Pulse Power vs. Pulse Time
(to 50% of exponentially decaying pulse)



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

Figure 2
Pulse Waveform

GRAPHS (continued)

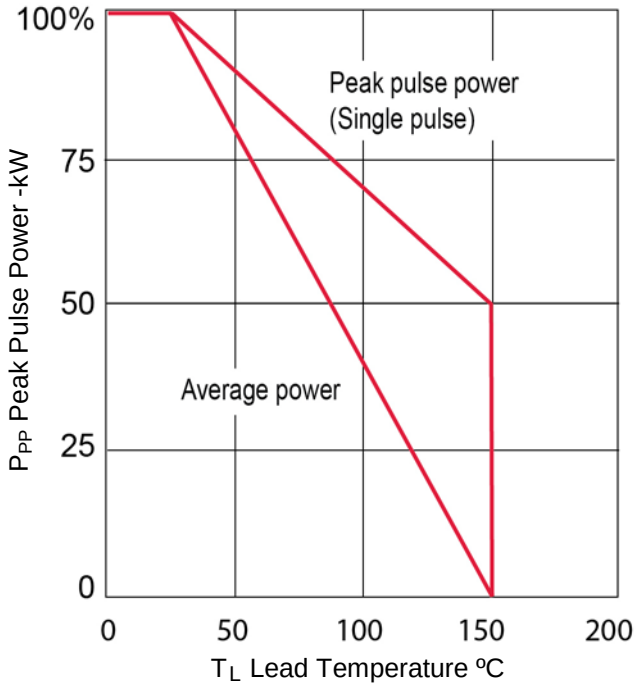
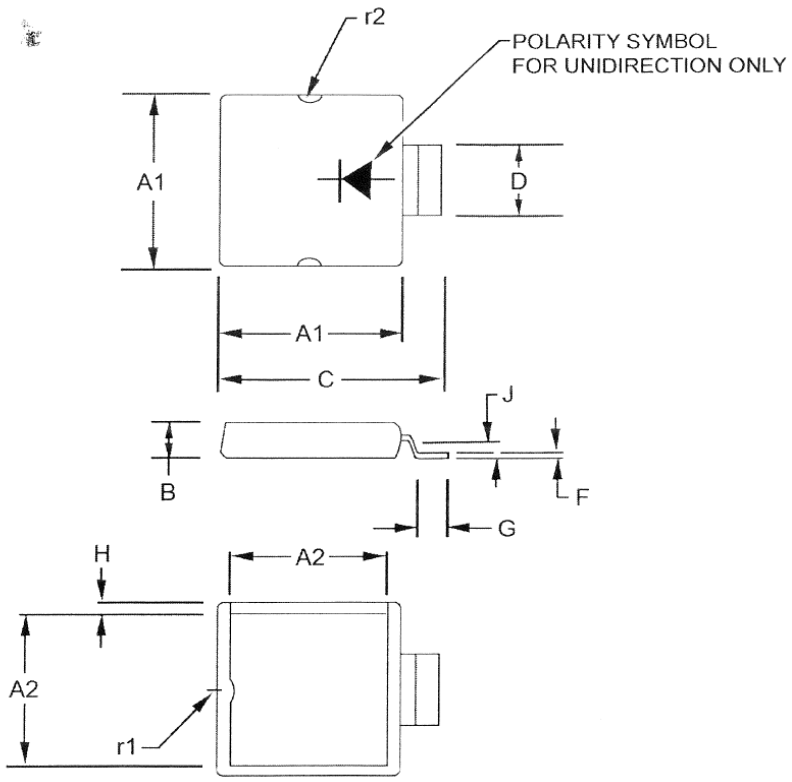


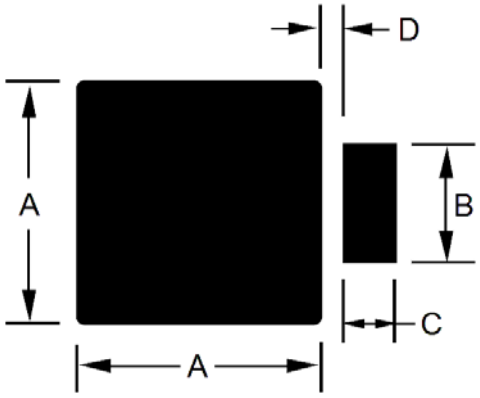
FIGURE 3
Derating Curve

PACKAGE DIMENSIONS



Ref.	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
A1	0.485	0.495	12.32	12.57
A2	0.445	0.455	11.30	11.56
B	0.145	0.155	3.68	3.94
C	0.585	0.595	14.86	15.11
D	0.200	0.210	5.08	5.33
F	0.008	0.013	0.20	0.33
G	0.055	0.065	1.40	1.65
H	0.015	0.025	0.38	0.64
J	0.062 TYP.		1.57 TYP.	
r1	0.030 TYP.		0.76 TYP.	
r2	0.045 TYP.		1.14 TYP.	

PAD LAYOUT



Ref.	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
A	0.465	0.475	11.81	12.07
B	0.225	0.235	5.72	5.97
C	0.095	0.105	2.41	2.67
D	0.04	0.05	1.02	1.27