RoHS Available

15,000 Watt Transient Voltage Suppressor (TVS) Protection Device

Screening in reference to MIL-PRF-19500 available

DESCRIPTION

This Transient Voltage Suppressor series of M15KP22A – M15KP280CA offers an extended voltage range and also provides a variety of high reliability, uni- and bi-directional options as well. RoHS compliant versions are also available. These devices have the ability to clamp dangerous high voltage transients such as secondary effects of lightning strikes, providing circuit protection to several class levels in the IEC61000-4-5 specification. Clamping time is virtually instantaneous. It also provides protection from transients caused by inductive load dumps, RFI, and ESD, providing protection to IEC61000-4-2 and -4-4.

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

Case 5A (DO-204AR) Package

FEATURES

- Available in both unidirectional and bidirectional configurations
- 3σ lot norm screening performed on standby current I_D
- 100% surge tested devices
- Suppresses transients up to 15 kW @ 10/1000 μs and 100 kW @ 8/20 μs (see Figure 1)
- Various screenings in reference to MIL-PRF-19500 are available. Refer to Hirel Non-Hermetic Product Portfolio for more details on the screening options.
  (See part nomenclature for all options.)
- High reliability controlled devices have wafer fabrication and assembly lot traceability
- Moisture classification is level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS compliant versions are available

APPLICATIONS / BENEFITS

- Selections from 22 to 280 volts stand-off voltage (V_{WM})
- Economical TVS series for thru-hole mounting
- Protection from switching transients & induced RFI
- Fast sub-nanosecond response (unidirectional)
- Compliant to IEC 61000-4-2 and IEC 61000-4-4 for ESD and EFT protection respectively
- Secondary lightning protection per IEC61000-4-5 with 42 ohms source impedance:
  - Class 1, 2, 3, 4: M15KP22A to M15KP280CA
  - Class 5: M15KP22A to M15KP280CA (short distance)
  - Class 5: 1M5KP22A to M15KP110CA (long distance)
- Secondary lightning protection per IEC61000-4-5 with 12 ohms source impedance:
  - Class 1 & 2: M15KP22A to M15KP280CA
  - Class 3: M15KP22A to M15KP240CA
  - Class 4: M15KP22A to M15KP120CA
- Secondary lightning protection per IEC61000-4-5 with 2 ohms source impedance:
  - Class 2: M15KP22A to M15KP220CA
  - Class 3: M15KP22A to M15KP110CA
  - Class 4: M15KP22A to M15KP54CA

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MAXIMUM RATINGS @ 25 ºC unless otherwise noted

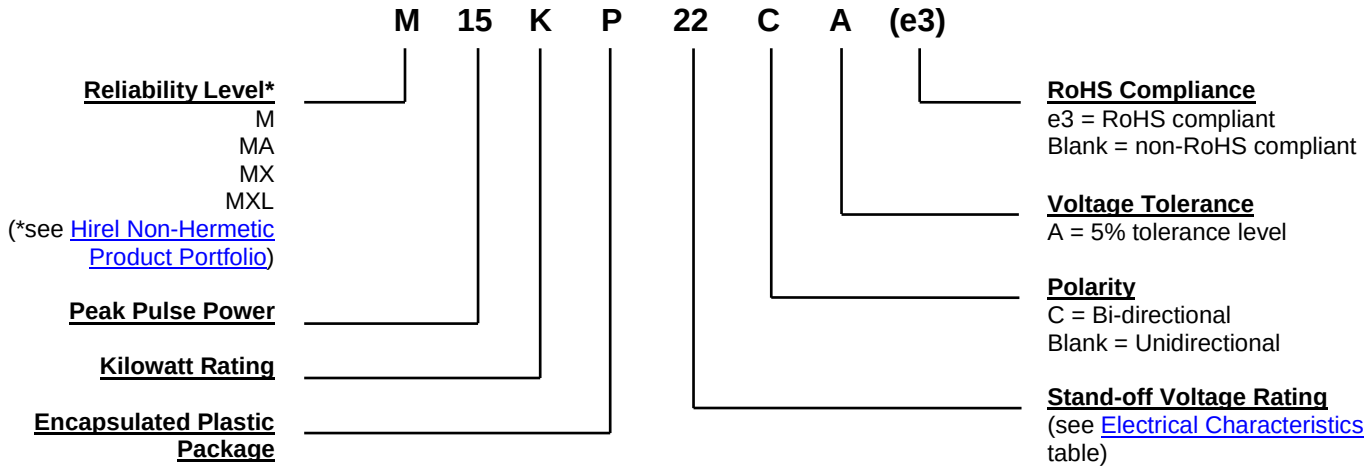
Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +150	°C
Thermal Resistance, Junction to Lead @ 3/8 inch (10 mm) lead length from body	$R_{\Theta JL}$	20	°C/W
Thermal Resistance, Junction to Ambient (1)	$R_{\Theta JA}$	80	°C/W
Peak Pulse Power Dissipation (2) 10/1000us	P_{PP}	15,000	W
Steady-State Power Dissipation @ T_L = 30 ºC 3/8 inch (10 mm) from body	P_D	6 1.56 (1)	W
$T_{clamping}$ (0 volts to $V_{(BR)}$ min, theoretical) Unidirectional Bidirectional		< 100 < 5	ps ns
Surge Peak Forward Current (3)	I_{FSM}	200	A
Solder Temperature @ 10 s		260	°C

Notes: 1. When mounted on FR4 PC board with 4 mm^2 copper pads (1 oz) and track width 1 mm, length 25 mm.
2. With impulse repetition rate (duty factor) of 0.01 % or less (also Figures 1 and 2).
3. At 8.3 ms half-sine wave for unidirectional devices only.

MECHANICAL and PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0.
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating. Solderable per MIL-STD-750, method 2026.
- MARKING: Part number.
- POLARITY: Cathode indicated by band. No cathode band on bidirectional devices.
- TAPE & REEL option: Standard per EIA-296 (add "TR" suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 1.4 grams.
- See Package Dimensions on last page.

PART NOMENCLATURE



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SYMBOLS & DEFINITIONS	
Symbol	**Definition**
$\alpha_{V(BR)}$	Temperature Coefficient of Breakdown Voltage: The change in breakdown voltage divided by the change in temperature that caused it expressed in %/°C or mV/°C.
$I_{(BR)}$	Breakdown Current: The current used for measuring Breakdown Voltage $V_{(BR)}$.
I_D	Standby Current: The current through the device at rated stand-off voltage.
I_{FSM}	Surge Peak Forward Current: The forward current including all nonrepetitive transient currents but excluding all repetitive transients (ref JESD282-B).
I_{PP}	Peak Impulse Current: The maximum rated random recurring peak impulse current or nonrepetitive peak impulse current that may be applied to a device. A random recurring or nonrepetitive transient current is usually due to an external cause, and it is assumed that its effect will have completely disappeared before the next transient arrives.
P_{PP}	Peak Pulse Power. The rated random recurring peak impulse power or rated nonrepetitive peak impulse power. The impulse power is the maximum-rated value of the product of I_{PP} and V_C.
$V_{(BR)}$	Breakdown Voltage: The voltage across the device at a specified current $I_{(BR)}$ in the breakdown region.
V_C	Clamping Voltage: The voltage across the device in a region of low differential resistance during the application of an impulse current (I_{PP}) for a specified waveform.
V_{WM}	Working Standoff Voltage: The maximum-rated value of dc or repetitive peak positive cathode-to-anode voltage that may be continuously applied over the standard operating temperature.

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ELECTRICAL CHARACTERISTICS @ 25 ºC

PART NUMBER	REVERSE STAND-OFF VOLTAGE V_{WM} (Note 1)	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 TEMPERATURE COEFFICIENT OF $V_{(BR)}$ $\alpha_{V(BR)}$
	V	V	mA	V	µA	A	mV/ºC
M15KP22A	22	24.4	10	37.1	500	404	24
M15KP24A	24	26.7	5	40.7	150	369	27
M15KP26A	26	28.9	5	44.0	50	341	29
M15KP28A	28	31.1	5	47.5	25	316	31
M15KP30A	30	33.3	5	50.7	15	296	34
M15KP33A	33	36.7	5	54.8	10	274	38
M15KP36A	36	40.0	5	59.7	10	251	41
M15KP40A	40	44.4	5	65.8	10	228	46
M15KP43A	43	47.8	5	69.7	10	215	50
M15KP45A	45	50.0	5	73.0	10	205	52
M15KP48A	48	53.3	5	77.7	10	193	56
M15KP51A	51	56.7	5	82.8	10	181	60
M15KP54A	54	60.0	5	87.5	10	171	63
M15KP58A	58	64.4	5	94.0	10	160	68
M15KP60A	60	66.7	5	97.3	10	154	71
M15KP64A	64	71.1	5	104	10	144	76
M15KP70A	70	77.8	5	114	10	132	83
M15KP75A	75	83.3	5	122	10	123	89
M15KP78A	78	86.7	5	126	10	119	93
M15KP85A	85	94.4	5	137	10	109	102
M15KP90A	90	100	5	146	10	103	109
M15KP100A	100	111	5	162	10	93	121
M15KP110A	110	122	5	178	10	84	133
M15KP120A	120	133	5	193	10	78	145
M15KP130A	130	144	5	209	10	72	157
M15KP150A	150	167	5	243	10	62	183
M15KP160A	160	178	5	259	10	58	195
M15KP170A	170	189	5	275	10	55	207
M15KP180A	180	200	5	291	10	52	219
M15KP200A	200	222	5	322	10	47	243
M15KP220A	220	245	5	356	10	42	269
M15KP240A	240	267	5	388	10	39	293
M15KP260A	260	289	5	419	10	36	317
M15KP280A	280	311	5	452	10	33	342

** Consult factory for availability of the 17 and 18 Volt devices on a special order basis.

NOTES:

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.

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GRAPHS

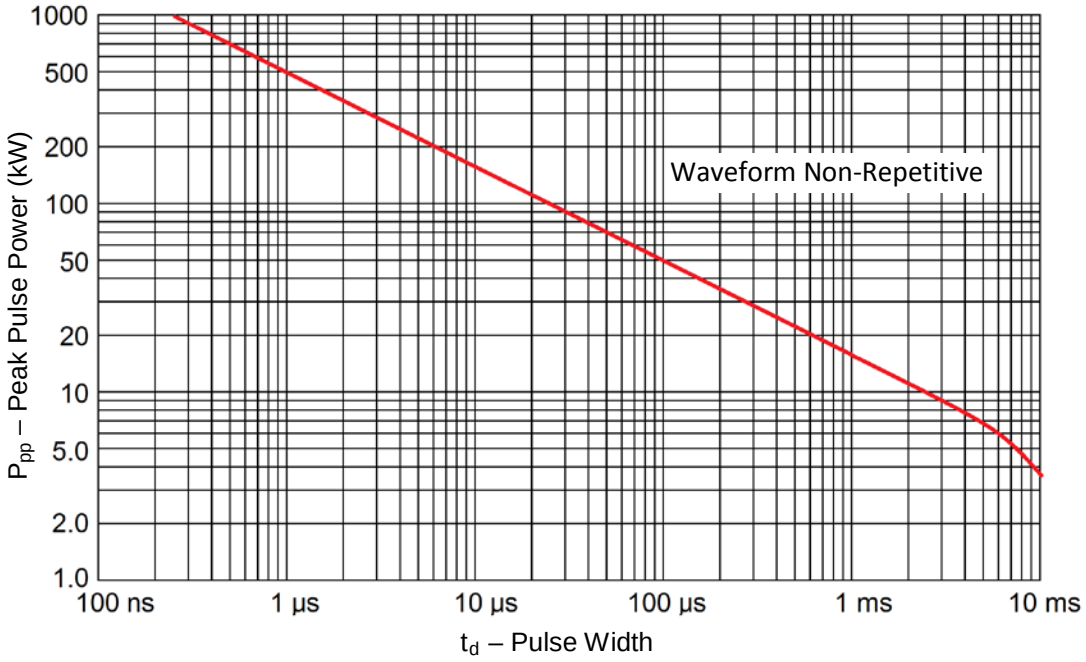
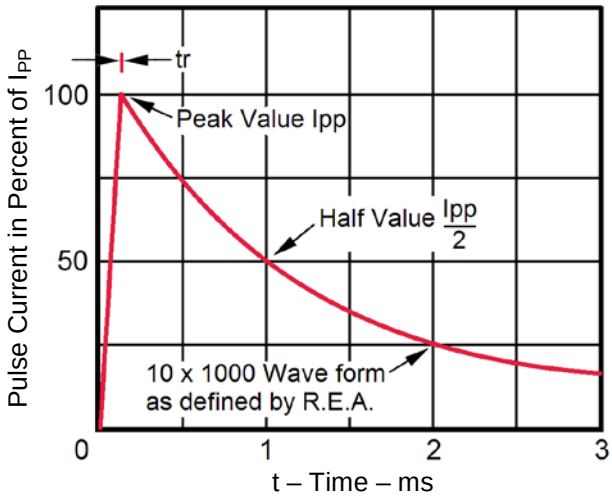


FIGURE 1
Peak Pulse Power Rating Curve



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

FIGURE 2
Pulse Waveform for 10/1000 µs Exponential Surge

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GRAPHS (continued)

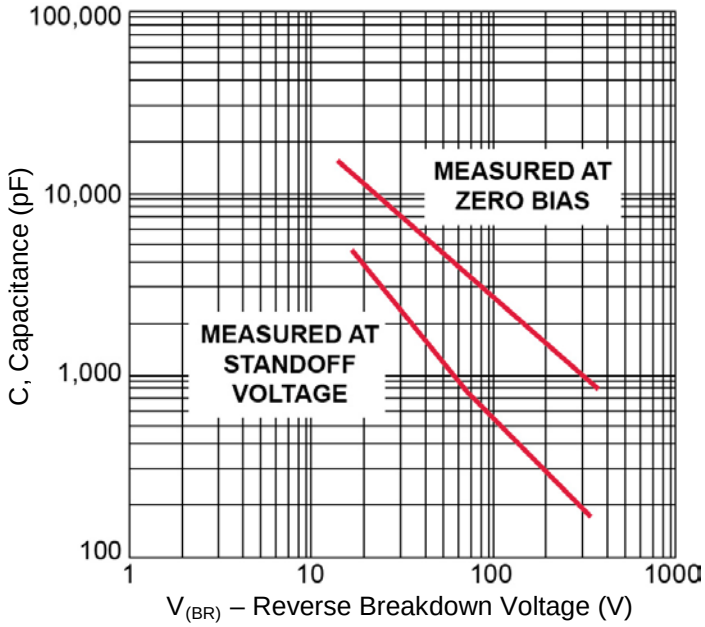

FIGURE 3
Typical Junction Capacitance

NOTE: For bidirectional construction, capacitance will be one-half that shown.

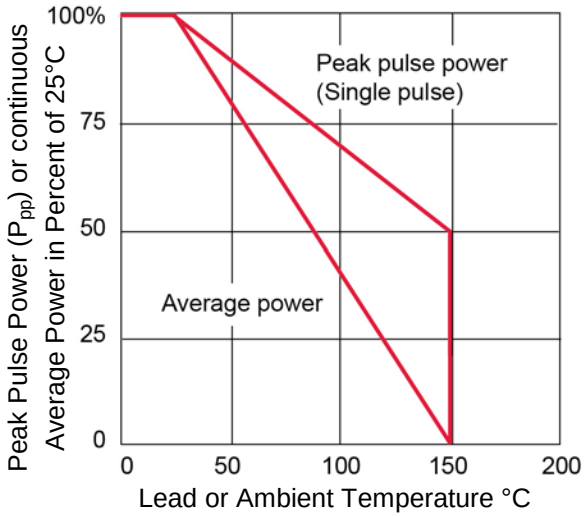

FIGURE 4
Derating Curve

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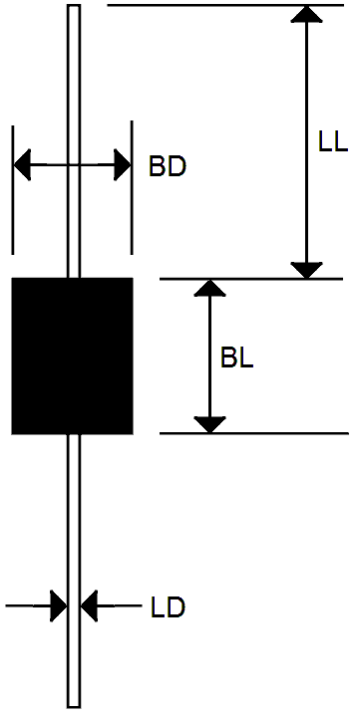
PACKAGE DIMENSIONS



Dim	Dimensions			
	Inch		Millimeters	
	Min	Max	Min	Max
LL	0.750	-	19.05	-
BL	0.365	0.385	9.27	9.78
BD	0.235	0.255	5.97	6.48
LD	0.047	0.053	1.194	1.346

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