



UNI-AND BIDIRECTIONAL TRANSIENT VOLTAGE SUPPRESSORS

- HIGH SURGE CAPABILITY :
1.5 kW / 1 ms EXPO
- VERY FAST CLAMPING TIME :
1 ps FOR UNIDIRECTIONAL TYPES
5 ns FOR BIDIRECTIONAL TYPES
- LARGE VOLTAGE RANGE :
5.8 V → 376 V
- ORDER CODE :
TYPE NUMBER FOR UNIDIRECTIONAL TYPES, TYPE NUMBER + SUFFIX C FOR BIDIRECTIONAL TYPES



DESCRIPTION

Transient voltage suppressor diodes especially useful in protecting integrated circuits, MOS, hybrids and other voltage-sensitive semiconductors and components.

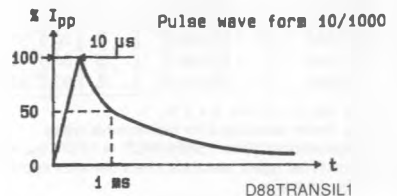
ABSOLUTE RATINGS (limiting values)

Symbol	Parameter	Value	Unit
P_p	Peak Pulse Power for 1 ms Exponential Pulse T_j Initial = 25 °C See note 1	1.5	kW
P	Power Dissipation on Infinite Heatsink $T_{amb} = 75$ °C	5	W
I_{FSM}	Non Repetitive Surge Peak Forward Current for Unidirectional Types T_j Initial = 25 °C $t = 10$ ms	250	A
T_{stg} T_j	Storage and Operating Junction Temperature Range	- 65 to 175 175	°C °C
T_L	Maximum Lead Temperature for Soldering During 10 s at 4 mm from Case	230	°C

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction-leads on Infinite Heatsink for $L_{lead} = 10$ mm	20	°C/W

Note : 1. For surges upper than the maximum values, the diode will present a short-circuit anode-cathode.



ELECTRICAL CHARACTERISTICS (T_j = 25 °C)

Symbol	Parameter	Value	
V _{RM}	Stand-off Voltage	See tables	
V _(BR)	Breakdown Voltage		
V _(CL)	Clamping Voltage		
I _{PP}	Peak Pulse Current		
α _T	Temperature Coefficient of V _(BR)		
C	Capacitance		
t _{clamping}	Clamping Time (0 volt to V _(BR))	Unidirectional Types	1 ps max.
		Bidirectional Types	5 ns max.

Types		I _{RM} @ V _{RM} max.		V _(BR) * @			I _R	V _(CL) @ I _{PP} max.		V _(CL) @ I _{PP} max.		α _T max.	C** typ. V _R =0 f=1 MHz
Unidirectional	Bidirectional	(μA)	(V)	min.	nom.	max.	(mA)	(V)	(A)	(V)	(A)	(10 ⁻⁴ /°C)	(pF)
P 1.5KE6V8P	P 1.5KE6V8CP	1000§	5.8	6.45	6.8	7.48	10	10.5	143	13.4	746	5.7	9500
1.5KE6V8A	1.5KE6V8CA	1000§	5.8	6.45	6.8	7.14	10	10.5	143	13.4	746	5.7	9500
P 1.5KE7V5P	1.5KE7V5CP	500§	6.4	7.13	7.5	8.25	10	11.3	132	14.5	690	6.1	8500
1.5KE7V5A	1.5KE7V5CA	500§	6.4	7.13	7.5	7.88	10	11.3	132	14.5	690	6.1	8500
1.5KE8V2P	1.5KE8V2CP	200§	7.02	7.79	8.2	9.02	10	12.1	124	15.5	645	6.5	8000
1.5KE8V2A	1.5KE8V2CA	200§	7.02	7.79	8.2	8.61	10	12.1	124	15.5	645	6.5	8000
1.5KE9V1P	1.5KE9V1CP	50§	7.78	8.65	9.1	10	1	13.4	112	17.1	585	6.8	7500
1.5KE9V1A	1.5KE9V1CA	50§	7.78	8.65	9.1	9.55	1	13.4	112	17.1	585	6.8	7500
P 1.5KE10P	1.5KE10CP	10§	8.55	9.5	10	11	1	14.5	103	18.6	968	7.3	7000
1.5KE10A	1.5KE10CA	10§	8.55	9.5	10	10.5	1	14.5	103	18.6	968	7.3	7000
1.5KE11P	1.5KE11CP	5§	9.4	10.5	11	12.1	1	15.6	96	20.3	887	7.5	6400
1.5KE11A	1.5KE11CA	5§	9.4	10.5	11	11.6	1	15.6	96	20.3	887	7.5	6400
P 1.5KE12P	P 1.5KE12CP	5	10.2	11.4	12	13.2	1	16.7	90	21.7	829	7.8	6000
1.5KE12A	1.5KE12CA	5	10.2	11.4	12	12.6	1	16.7	90	21.7	829	7.8	6000
P 1.5KE13P	1.5KE13CP	5	11.1	12.4	13	14.3	1	18.2	82	23.6	763	8.1	5500
1.5KE13A	1.5KE13CA	5	11.1	12.4	13	13.7	1	18.2	82	23.6	763	8.1	5500
1.5KE15P	1.5KE15CP	5	12.8	14.3	15	16.5	1	21.2	71	27.2	662	8.4	5000
1.5KE15A	1.5KE15CA	5	12.8	14.3	15	15.8	1	21.2	71	27.2	662	8.4	5000
P 1.5KE16P	1.5KE16CP	5	13.6	15.2	16	17.6	1	22.5	67	28.9	623	8.6	4700
1.5KE16A	1.5KE16CA	5	13.6	15.2	16	16.8	1	22.5	67	28.9	623	8.6	4700
P 1.5KE18P	P 1.5KE18CP	5	15.3	17.1	18	19.8	1	25.2	59.5	32.5	554	8.8	4300
1.5KE18A	1.5KE18CA	5	15.3	17.1	18	18.9	1	25.2	59.5	32.5	554	8.8	4300
P 1.5KE20P	P 1.5KE20CP	5	17.1	19	20	22	1	27.7	54	36.1	498	9.0	4000
1.5KE20A	1.5KE20CA	5	17.1	19	20	21	1	27.7	54	36.1	498	9.0	4000
P 1.5KE22P	1.5KE22CP	5	18.8	20.9	22	24.2	1	30.6	49	39.3	458	9.2	3700
1.5KE22A	1.5KE22CA	5	18.8	20.9	22	23.1	1	30.6	49	39.3	458	9.2	3700
1.5KE24P	1.5KE24CP	5	20.5	22.8	24	26.4	1	33.2	45	42.8	421	9.4	3500
1.5KE24A	1.5KE24CA	5	20.5	22.8	24	25.2	1	33.2	45	42.8	421	9.4	3500
P 1.5KE27P	1.5KE27CP	5	23.1	25.7	27	29.7	1	37.5	40	48.3	373	9.6	3200
1.5KE27A	1.5KE27CA	5	23.1	25.7	27	28.4	1	37.5	40	48.3	373	9.6	3200
P 1.5KE30P	P 1.5KE30CP	5	25.6	28.5	30	33	1	41.5	36	53.5	336	9.7	2900
1.5KE30A	1.5KE30CA	5	25.6	28.5	30	31.5	1	41.5	36	53.5	336	9.7	2900
P 1.5KE33P	P 1.5KE33CP	5	28.2	31.4	33	36.3	1	45.7	33	59	305	9.8	2700
1.5KE33A	1.5KE33CA	5	28.2	31.4	33	34.7	1	45.7	33	59	305	9.8	2700
P 1.5KE36P	P 1.5KE36CP	5	30.8	34.2	36	39.6	1	49.9	30	64.3	280	9.9	2500
1.5KE36A	1.5KE36CA	5	30.8	34.2	36	37.8	1	49.9	30	64.3	280	9.9	2500
P 1.5KE39P	P 1.5KE39CP	5	33.3	37.1	39	42.9	1	53.9	28	69.7	258	10.0	2400

* Pulse test t_p < 50 ms δ < 2 %.

** Divide these values by 2 for bidirectional types.

§ For bidirectional types 1.5KE6V8CP → 11CA, I_{RM} must be double that specified for unidirectional types.

For bidirectional types, electrical characteristics apply in both directions.

P : Preferred device.

Types		I _{RM} @ V _{RM} max.		Ψ _(BR) * @ (V)			I _R	V _(CL) @ I _{pp} max.	V _(CL) @ I _{pp} max.	α _T max.	C** typ V _R =0 f=1 MHz		
Unidirectional	Bidirectional	(μA)	(V)	min.	nom.	max.	(mA)	(V)	(A)	(V)	(A)	(10 ⁻⁴ /°C)	(pF)
							1 ms expo	8-20 μs expo					
	1.5KE39A		33.3	37.1	39	41	1	53.9	28	69.7	258	10.0	2400
P	1.5KE43P		36.8	40.9	43	47.3	1	59.3	25.3	76.8	234	10.1	2200
	1.5KE43A		36.8	40.9	43	45.2	1	59.3	25.3	76.8	234	10.1	2200
P	1.5KE47P	P	40.2	44.7	47	51.7	1	64.8	23.2	84	214	10.1	2050
	1.5KE47A		40.2	44.7	47	49.4	1	64.8	23.2	84	214	10.1	2050
P	1.5KE51P		43.6	48.5	51	56.1	1	70.1	21.4	91	198	10.2	1950
	1.5KE51A		43.6	48.5	51	53.6	1	70.1	21.4	91	198	10.2	1950
	1.5KE56P		47.8	53.2	56	61.6	1	77	19.5	100	180	10.3	1800
	1.5KE56A		47.8	53.2	56	58.8	1	77	19.5	100	180	10.3	1800
	1.5KE62P		53	58.9	62	68.2	1	85	17.7	111	162	10.4	1700
	1.5KE62A		53	58.9	62	65.1	1	85	17.7	111	162	10.4	1700
P	1.5KE68P	P	58.1	64.6	68	74.8	1	92	16.3	121	148	10.4	1550
	1.5KE68A		58.1	64.6	68	71.4	1	92	16.3	121	148	10.4	1550
	1.5KE75P		64.1	71.3	75	82.5	1	103	14.6	134	134	10.5	1450
	1.5KE75A		64.1	71.3	75	78.8	1	103	14.6	134	134	10.5	1450
P	1.5KE82P	P	70.1	77.9	82	90.2	1	113	13.3	146	123	10.5	1350
	1.5KE82A		70.1	77.9	82	86.1	1	113	13.3	146	123	10.5	1350
	1.5KE91P		77.8	86.5	91	100	1	125	12	162	111	10.6	1250
	1.5KE91A		77.8	86.5	91	95.5	1	125	12	162	111	10.6	1250
	1.5KE100P		85.5	95	100	110	1	137	11	178	101	10.6	1150
	1.5KE100A		85.5	95	100	105	1	137	11	178	101	10.6	1150
	1.5KE110P	P	94	105	110	121	1	152	9.9	195	92	10.7	1050
	1.5KE110A		94	105	110	116	1	152	9.9	195	92	10.7	1050
	1.5KE120P		102	114	120	132	1	165	9.1	212	85	10.7	1000
	1.5KE120A		102	114	120	126	1	165	9.1	212	85	10.7	1000
	1.5KE130P	P	111	124	130	143	1	179	8.4	230	78	10.7	950
	1.5KE130A		111	124	130	137	1	179	8.4	230	78	10.7	950
	1.5KE150P		128	143	150	165	1	207	7.2	265	68	10.8	850
	1.5KE150A		128	143	150	158	1	207	7.2	265	68	10.8	850
	1.5KE160P		136	152	160	176	1	219	6.8	282	64	10.8	800
	1.5KE160A		136	152	160	168	1	219	6.8	282	64	10.8	800
P	1.5KE170P		145	161	170	187	1	234	6.4	301	60	10.8	750
	1.5KE170A		145	161	170	179	1	234	6.4	301	60	10.8	750
P	1.5KE180P	P	154	171	180	198	1	246	6.1	317	57	10.8	725
	1.5KE180A		154	171	180	189	1	246	6.1	317	57	10.8	725
P	1.5KE200P	P	171	190	200	220	1	274	5.5	353	51	10.8	675
	1.5KE200A		171	190	200	210	1	274	5.5	353	51	10.8	675
	1.5KE220P	P	188	209	220	242	1	328	4.6	388	46.5	10.8	625
	1.5KE220A		188	209	220	231	1	328	4.6	388	46.5	10.8	625
P	1.5KE250P	P	213	237	250	275	1	344	5.0	442	47	11	560
	1.5KE250A		213	237	250	263	1	344	5.0	442	47	11	560
	1.5KE280P		239	266	280	308	1	384	5.0	494	47	11	520
	1.5KE280A		239	266	280	294	1	384	5.0	494	47	11	520
P	1.5KE300P	P	256	285	300	330	1	414	5.0	529	47	11	500
	1.5KE300A		256	285	300	315	1	414	5.0	529	47	11	500
	1.5KE320P		273	304	320	352	1	438	4.5	564	42	11	460
	1.5KE320A		273	304	320	336	1	438	4.5	564	42	11	460
P	1.5KE350P	P	299	332	350	385	1	482	4.0	618	37	11	430
	1.5KE350A		299	332	350	368	1	482	4.0	618	37	11	430
P	1.5KE400P	P	342	380	400	440	1	548	4.0	706	37	11	390
	1.5KE400A		342	380	400	420	1	548	4.0	706	37	11	390
P	1.5KE440P	P	376	418	440	484	1	603	3.5	776	33	11	360
	1.5KE440A		376	418	440	462	1	603	3.5	776	33	11	360

* Pulse test t_p ≤ 50 ms δ < 2%.

** Divide these values by 2 for bidirectional types

For bidirectional types, electrical characteristics apply in both directions.

P : Preferred device

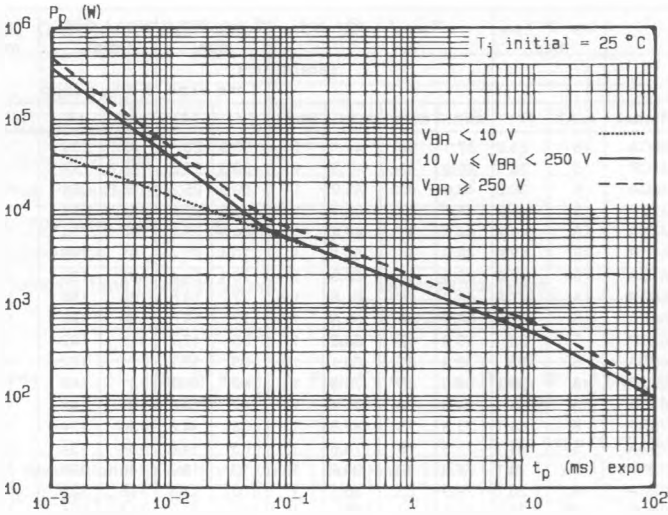


Fig.1 - Peak pulse power versus exponential pulse duration.

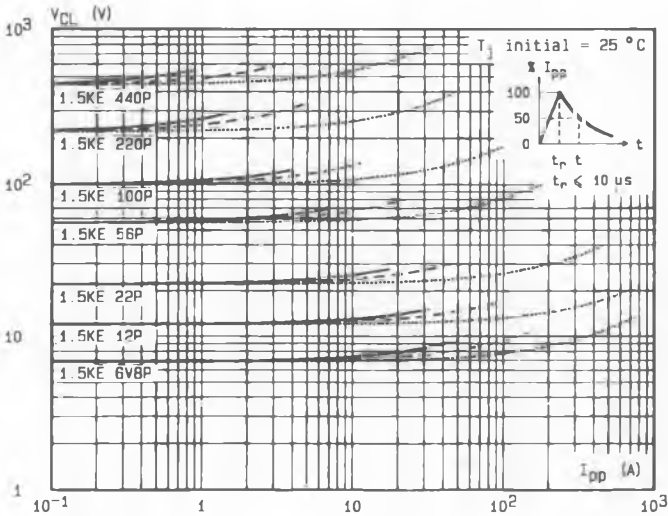


Fig.2 - Clamping voltage versus peak pulse current.
 exponential waveform $t = 20$ μ s
 $t = 1$ ms ---
 $t = 10$ ms —

Note : The curves of the figure 2 are specified for a junction temperature of 25 °C before surge. The given results may be extrapolated for other junction temperatures by using the following formula : $\Delta V_{(BR)} = K T (V_{(BR)}) \times [T_j - 25] \times V_{(BR)}$
 For intermediate voltages, extrapolate the given results.

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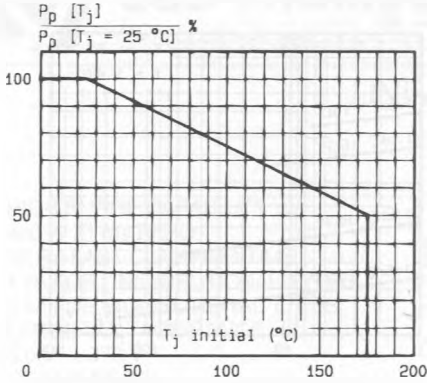


Fig.3 - Allowable power dissipation versus junction temperature.

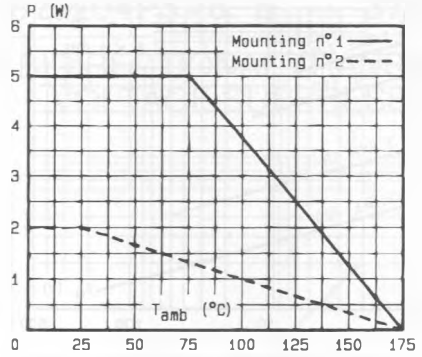


Fig.4 - Power dissipation versus ambient temperature.

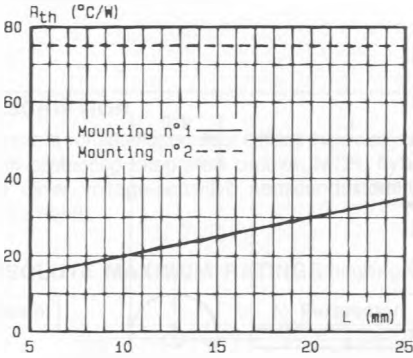


Fig.5 - Thermal resistance versus lead length.

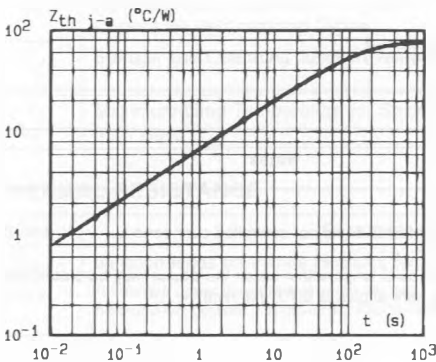
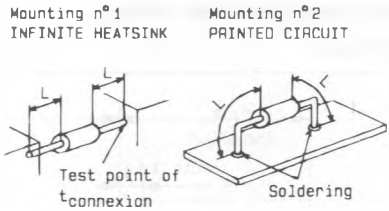


Fig.6 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

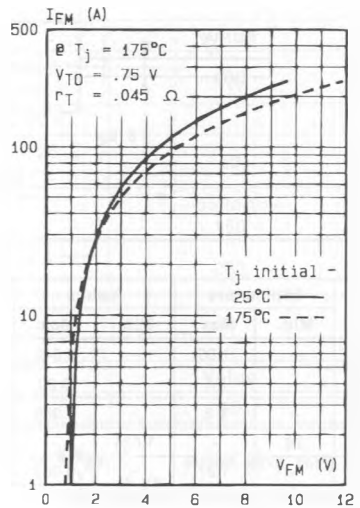


Fig.7 - Peak forward current versus peak forward voltage drop (typical values for unidirectional types).

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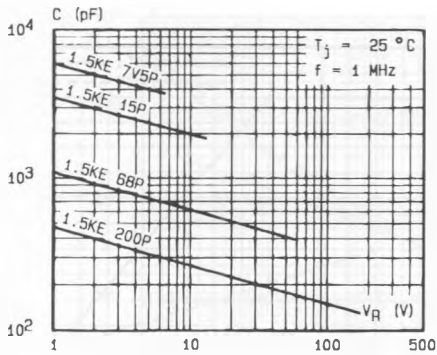


Fig.8a - Capacitance versus reverse applied voltage for unidirectional types (typical values).

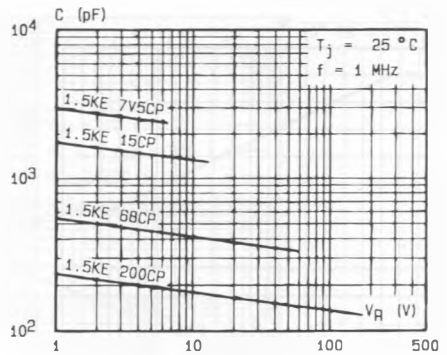
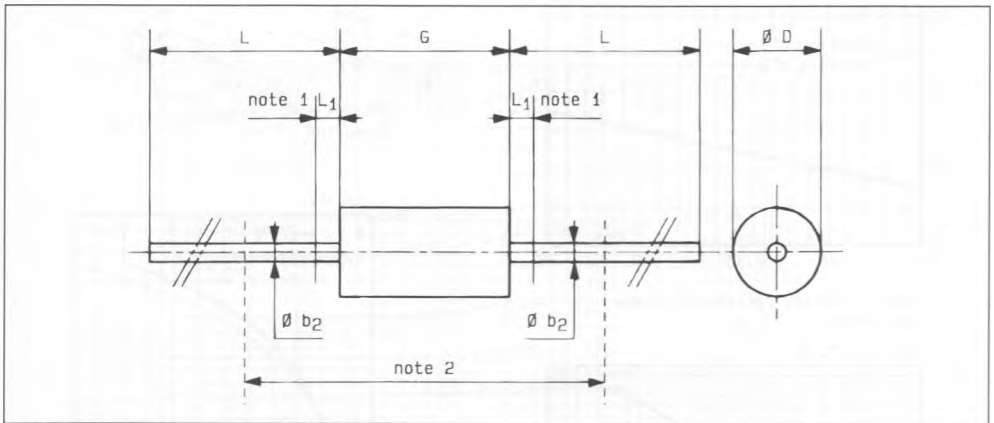


Fig.8b - Capacitance versus reverse applied voltage for bidirectional types (typical values).

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PACKAGE MECHANICAL DATA

CB-429 Plastic



Ref.	Millimeters		Inches		Notes
	Min.	Max.	Min.	Max.	
Ø b ₂	-	1.06	-	0.042	1 - The lead diameter Ø b ₂ is not controlled over zone L ₁ .
Ø D	-	5.1	-	0.20	
G	-	9.8	-	0.386	2 - The minimum axial length within which the device may be placed with its leads bent at right angles is 0.70" (18 mm)
L	26	-	1.024	-	
L ₁	-	1.27	-	0.050	

Cooling method : by convection (method A).

Marking : type number ; white band indicates cathode for unidirectional types.

Weight : 0.9 g