UNI-AND BIDIRECTIONAL TRANSIENT VOLTAGE SUPPRESSORS

- HIGH SURGE CAPABILITY : 600 W / 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

CB-417
(Plastic)

DESCRIPTION

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

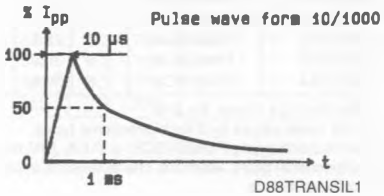
ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
P_p	Peak Pulse Power for 1 ms Exponential Pulse	T_j Initial = 25 °C See note 1	600	W
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	100	A
T_{stg} T_j	Storage and Operating Junction Temperature Range		– 55 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.
V_{FM}	Forward Voltage Drop for Unidirectional Types (I_{FM} = 50 A)		3.5 V max.

Types		I_{RM} @ V_{RM} max.		$V_{(BR)}$* @ I_R (V)				$V_{(CL)}$ @ I_{pp} max. 1 ms expo		$V_{(CL)}$ @ I_{pp} max. 8-20 µs expo		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 P6KE6V8P	P P6KE6V8CP	1000§	5.8	6.45	6.8	7.48	10	10.5	57	13.4	261	5.7	4000
P6KE6V8A	P6KE6V8CA	1000§	5.8	6.45	6.8	7.14	10	10.5	57	13.4	261	5.7	4000
P P6KE7V5P	P P6KE7V5CP	500§	6.4	7.13	7.5	8.25	10	11.3	53	14.5	241	6.1	3700
P6KE7V5A	P6KE7V5CA	500§	6.4	7.13	7.5	7.88	10	11.3	53	14.5	241	6.1	3700
P P6KE8V2P	P6KE8V2CP	200§	7.02	7.79	8.2	9.02	10	12.1	50	15.5	226	6.5	3400
P6KE8V2A	P6KE8V2CA	200§	7.02	7.79	8.2	8.61	10	12.1	50	15.5	226	6.5	3400
P6KE9V1P	P6KE9V1CP	50§	7.78	8.65	9.1	10	1	13.4	45	17.1	205	6.8	3100
P6KE9V1A	P6KE9V1CA	50§	7.78	8.65	9.1	9.55	1	13.4	45	17.1	205	6.8	3100
P6KE10P	P6KE10CP	10§	8.55	9.5	10	11	1	14.5	41	18.6	387	7.3	2800
P6KE10A	P6KE10CA	10§	8.55	9.5	10	10.5	1	14.5	41	18.6	387	7.3	2800
P6KE11P	P6KE11CP	5§	9.4	10.5	11	12.1	1	15.6	38	20.3	355	7.5	2500
P6KE11A	P6KE11CA	5§	9.4	10.5	11	11.6	1	15.6	38	20.3	355	7.5	2500
P P6KE12P	P P6KE12CP	5	10.2	11.4	12	13.2	1	16.7	36	21.7	332	7.8	2300
P6KE12A	P6KE12CA	5	10.2	11.4	12	12.6	1	16.7	36	21.7	332	7.8	2300
P P6KE13P	P P6KE13CP	5	11.1	12.4	13	14.3	1	18.2	33	23.6	305	8.1	2150
P6KE13A	P6KE13CA	5	11.1	12.4	13	13.7	1	18.2	33	23.6	305	8.1	2150
P P6KE15P	P P6KE15CP	5	12.8	14.3	15	16.5	1	21.2	28	27.2	265	8.4	1900
P6KE15A	P6KE15CA	5	12.8	14.3	15	15.8	1	21.2	28	27.2	265	8.4	1900
P6KE16P	P6KE16CP	5	13.6	15.2	16	17.6	1	22.5	27	28.9	249	8.6	1800
P6KE16A	P6KE16CA	5	13.6	15.2	16	16.8	1	22.5	27	28.9	249	8.6	1800
P P6KE18P	P P6KE18CP	5	15.3	17.1	18	19.8	1	25.2	24	32.5	222	8.8	1600
P6KE18A	P6KE18CA	5	15.3	17.1	18	18.9	1	25.2	24	32.5	222	8.8	1600
P P6KE20P	P6KE20CP	5	17.1	19	20	22	1	27.7	22	36.1	199	9.0	1500
P6KE20A	P6KE20CA	5	17.1	19	20	21	1	27.7	22	36.1	199	9.0	1500
P6KE22P	P P6KE22CP	5	18.8	20.9	22	24.2	1	30.6	20	39.3	183	9.2	1350
P6KE22A	P6KE22CA	5	18.8	20.9	22	23.1	1	30.6	20	39.3	183	9.2	1350
P6KE24P	P6KE24CP	5	20.5	22.8	24	26.4	1	33.2	18	42.8	168	9.4	1250
P6KE24A	P6KE24CA	5	20.5	22.8	24	25.2	1	33.2	18	42.8	168	9.4	1250
P P6KE27P	P6KE27CP	5	23.1	25.7	27	29.7	1	37.5	16	48.3	149	9.6	1150
P6KE27A	P6KE27CA	5	23.1	25.7	27	28.4	1	37.5	16	48.3	149	9.6	1150
P P6KE30P	P6KE30CP	5	25.6	28.5	30	33	1	41.5	14.5	53.5	134	9.7	1075
P6KE30A	P6KE30CA	5	25.6	28.5	30	31.5	1	41.5	14.5	53.5	134	9.7	1075
P P6KE33P	P P6KE33CP	5	28.2	31.4	33	36.3	1	45.7	13.1	59	122	9.8	1000
P6KE33A	P6KE33CA	5	28.2	31.4	33	34.7	1	45.7	13.1	59	122	9.8	1000
P P6KE36P	P6KE36CP	5	30.8	34.2	36	39.6	1	49.9	12	64.3	112	9.9	950
P6KE36A	P6KE36CA	5	30.8	34.2	36	37.8	1	49.9	12	64.3	112	9.9	950

* Pulse test $t_p \leq 50$ ms $\delta < 2$ %.
** Divide these values by 2 for bidirectional types.
For bidirectional types P6KE6V8CP → 11CA, IRM 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.		$V_{(BR)}$* (V) @ I_R				$V_{(CL)}$ @ I_{pp} max. 1 ms expo		V_{CL} @ I_{pp} max. 8-20 µs expo		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 P6KE39P	P P6KE39CP	5	33.3	37.1	39	42.9	1	53.9	11.1	69.7	103	10.0	900
P6KE39A	P6KE39CA	5	33.3	37.1	39	41	1	53.9	11.1	69.7	103	10.0	900
P6KE43P	P6KE43CP	5	36.8	40.9	43	47.3	1	59.3	10.1	76.8	94	10.1	850
P6KE43A	P6KE43CA	5	36.8	40.9	43	45.2	1	59.3	10.1	76.8	94	10.1	850
P6KE47P	P P6KE47CP	5	40.2	44.7	47	51.7	1	64.8	9.3	84	86	10.1	800
P6KE47A	P6KE47CA	5	40.2	44.7	47	49.4	1	64.8	9.3	84	86	10.1	800
P P6KE51P	P6KE51CP	5	43.6	48.5	51	56.1	1	70.1	8.6	91	79	10.2	750
P6KE51A	P6KE51CA	5	43.6	48.5	51	53.6	1	70.1	8.6	91	79	10.2	750
P P6KE56P	P6KE56CP	5	47.8	53.2	56	61.6	1	77	7.8	100	72	10.3	700
P6KE56A	P6KE56CA	5	47.8	53.2	56	58.8	1	77	7.8	100	72	10.3	700
P6KE62P	P6KE62CP	5	53	58.9	62	68.2	1	85	7.1	111	65	10.4	650
P6KE62A	P6KE62CA	5	53	58.9	62	65.1	1	85	7.1	111	65	10.4	650
P P6KE68P	P6KE68CP	5	58.1	64.6	68	74.8	1	92	6.5	121	59.5	10.4	625
P6KE68A	P6KE68CA	5	58.1	64.6	68	71.4	1	92	6.5	121	59.5	10.4	625
P6KE75P	P6KE75CP	5	64.1	71.3	75	82.5	1	103	5.8	134	53.5	10.5	575
P6KE75A	P6KE75CA	5	64.1	71.3	75	78.8	1	103	5.8	134	53.5	10.5	575
P P6KE82P	P6KE82CP	5	70.1	77.9	82	90.2	1	113	5.3	146	49	10.5	550
P6KE82A	P6KE82CA	5	70.1	77.9	82	86.1	1	113	5.3	146	49	10.5	550
P6KE91P	P6KE91CP	5	77.8	86.5	91	100	1	125	4.8	162	44.5	10.6	525
P6KE91A	P6KE91CA	5	77.8	86.5	91	95.5	1	125	4.8	162	44.5	10.6	525
P6KE100P	P6KE100CP	5	85.5	95	100	110	1	137	4.4	178	40.5	10.6	500
P6KE100A	P6KE100CA	5	85.5	95	100	105	1	137	4.4	178	40.5	10.6	500
P6KE110P	P6KE110CP	5	94	105	110	121	1	152	3.9	195	37	10.7	470
P6KE110A	P6KE110CA	5	94	105	110	116	1	152	3.9	195	37	10.7	470
P6KE120P	P6KE120CP	5	102	114	120	132	1	165	3.6	212	34	10.7	450
P6KE120A	P6KE120CA	5	102	114	120	126	1	165	3.6	212	34	10.7	450
P P6KE130P	P6KE130CP	5	111	124	130	143	1	179	3.4	230	31.5	10.7	420
P6KE130A	P6KE130CA	5	111	124	130	137	1	179	3.4	230	31.5	10.7	420
P6KE150P	P6KE150CP	5	128	143	150	165	1	207	2.9	265	27.2	10.8	400
P6KE150A	P6KE150CA	5	128	143	150	158	1	207	2.9	265	27.2	10.8	400
P6KE160P	P P6KE160CP	5	136	152	160	176	1	219	2.7	282	25.5	10.8	380
P6KE160A	P6KE160CA	5	136	152	160	168	1	219	2.7	282	25.5	10.8	380
P6KE170P	P6KE170CP	5	145	161	170	187	1	234	2.6	301	24	10.8	370
P6KE170A	P6KE170CA	5	145	161	170	179	1	234	2.6	301	24	10.8	370
P P6KE180P	P6KE180CP	5	154	171	180	198	1	246	2.4	317	22.7	10.8	360
P6KE180A	P6KE180CA	5	154	171	180	189	1	246	2.4	317	22.7	10.8	360
P P6KE200P	P6KE200CP	5	171	190	200	220	1	274	2.2	353	20.4	10.8	350
P6KE200A	P6KE200CA	5	171	190	200	210	1	274	2.2	353	20.4	10.8	350
P6KE220P	P6KE220CP	5	188	209	220	242	1	301	2	388	18.6	10.8	330
P6KE220A	P6KE220CA	5	188	209	220	231	1	301	2	388	18.6	10.8	330
P P6KE250P	P6KE250CP	5	213	237	250	275	1	344	2	442	19	11	310
P6KE250A	P6KE250CA	5	213	237	250	263	1	344	2	442	19	11	310
P6KE280P	P6KE280CP	5	239	266	280	308	1	384	2	494	18	11	300
P6KE280A	P6KE280CA	5	239	266	280	294	1	384	2	494	18	11	300
P6KE300P	P6KE300CP	5	256	285	300	330	1	414	1.6	529	14	11	290
P6KE300A	P6KE300CA	5	256	285	300	315	1	414	1.6	529	14	11	290
P6KE320P	P6KE320CP	5	273	304	320	352	1	438	1.6	564	14	11	280
P6KE320A	P6KE320CA	5	273	304	320	336	1	438	1.6	564	14	11	280
P6KE350P	P6KE350CP	5	299	332	350	385	1	482	1.6	618	14	11	270
P6KE350A	P6KE350CA	5	299	332	350	368	1	482	1.6	618	14	11	270
P P6KE400P	P P6KE400CP	5	342	380	400	440	1	548	1.3	706	11	11	360
P6KE400A	P6KE400CA	5	342	380	400	420	1	548	1.3	706	11	11	360
P P6KE440P	P6KE440CP	5	376	418	440	484	1	603	1.3	776	11	11	350
P6KE440A	P6KE440CA	5	376	418	440	462	1	603	1.3	776	11	11	350

* Pulse test $t_p \leq 50$ ms $\delta < 2$ %.

** Divide these values by 2 for bidirectional types.

For bidirectional types, electrical characteristics apply in both directions.

P : Preferred device.

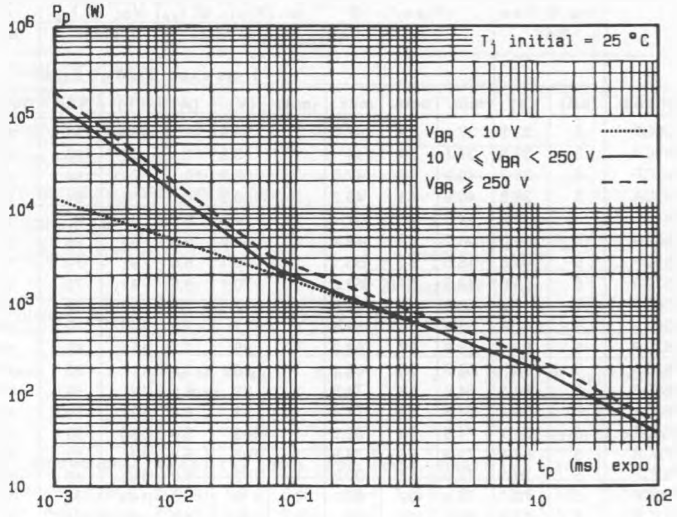


Fig.1 - Peak pulse power versus exponential pulse duration.

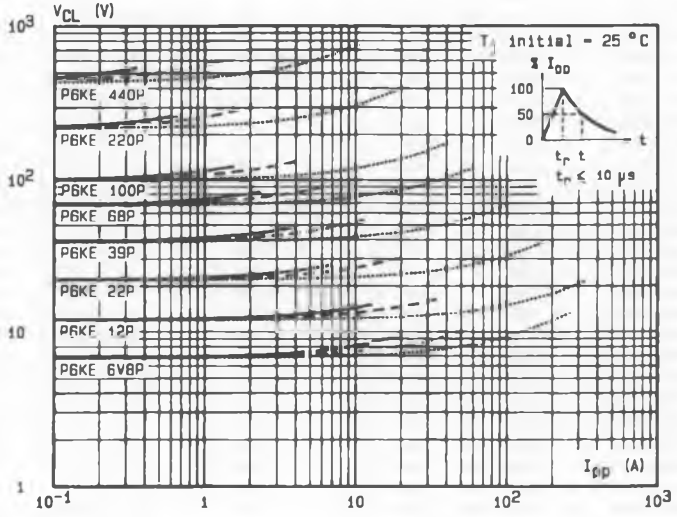


Fig.2 - Clamping voltage versus peak pulse current.
exponential waveform t = 20 µs ·····
t = 1 ms – – –
t = 10 ms ——

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 : $\Delta V_{(BR)} = \alpha_{T(V(BR))} \times [T_j - 25] \times V_{(BR)}$
For intermediate voltages, extrapolate the given results.

D88P6KEP4

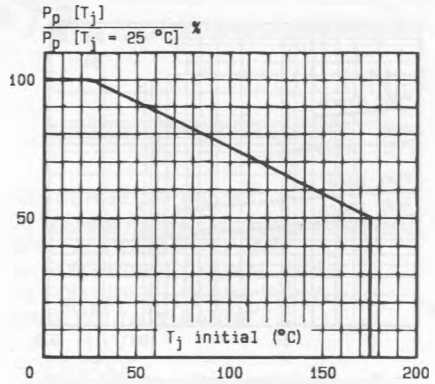


Fig.3 - Allowable power dissipation versus junction temperature.

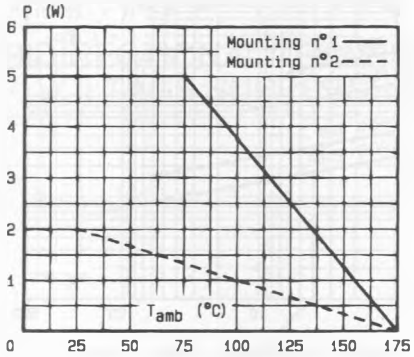


Fig.4 - Power dissipation versus ambient temperature.

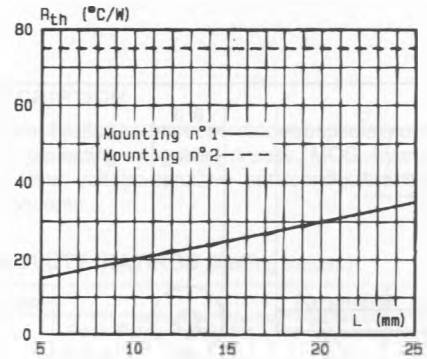
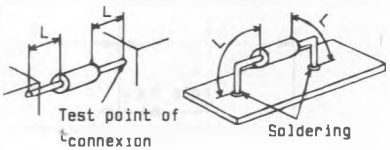


Fig.5 - Thermal resistance versus lead length.



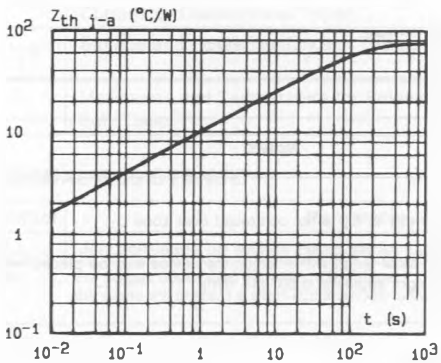


Fig.6 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

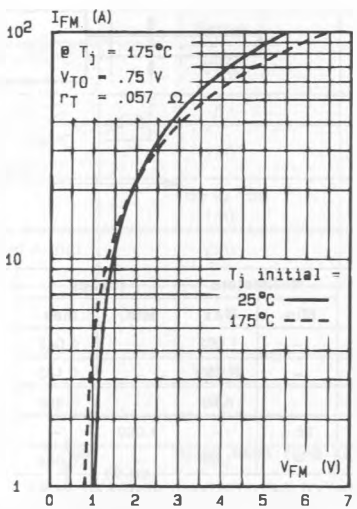


Fig.7 - Peak forward current versus peak forward voltage drop (typical values for unidirectional types).

D88P6KEP5

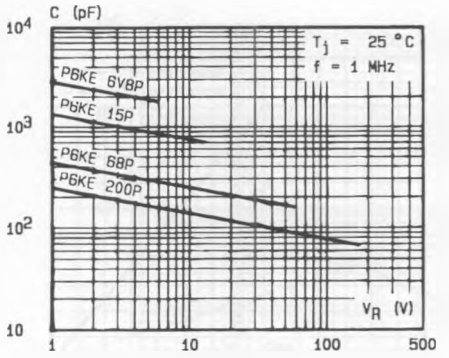


Fig.8a - Capacitance versus reverse applied voltage for unidirectional types (typical values).

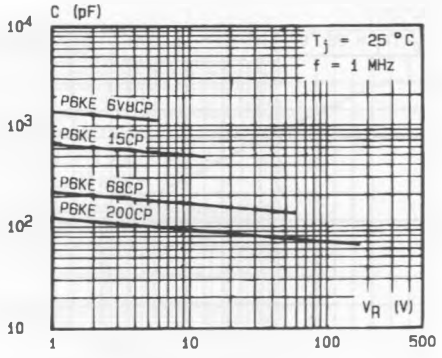
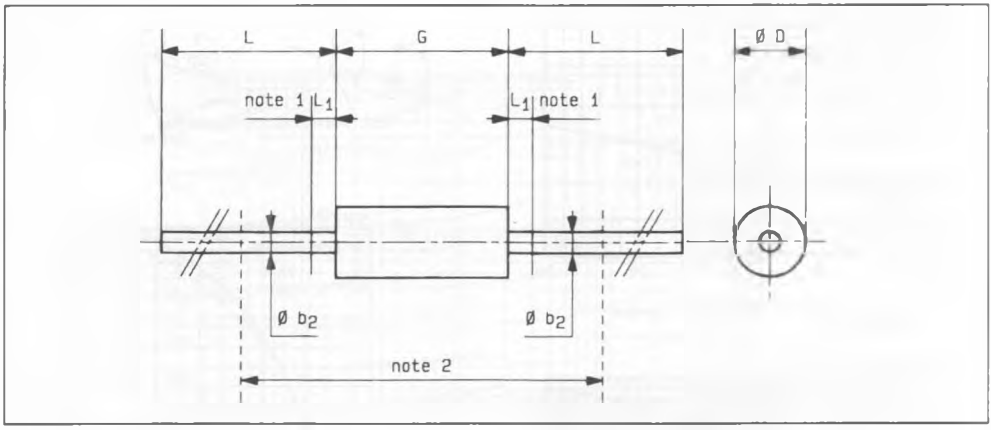


Fig.8b - Capacitance versus reverse applied voltage for bidirectional types (typical values).

D88P6KEP6

PACKAGE MECHANICAL DATA

CB-417 Plastic



Ref.	Millimeters		Inches		Notes
	Min.	Max.	Min.	Max.	
Ø b_2	–	1.092	–	0.043	1 - The lead diameter Ø b_2 is not controlled over zone L_1. 2 - The minimum axial lengh within which the device may be placed with its leads bent at right angles is 0.59" (15 mm).
Ø D	–	3.683	–	0.145	
G	–	8.89	–	0.350	
L	25.4	–	1.000	–	
L_1	–	1.25	–	0.049	

Cooling method : by convection (method A).
Marking : type number ; white band indicates cathode for unidirectional types.
Weight : 0.6 g.