SGS-THOMSON MICROELECTRONICS

1.5KE6V8P,A → 440P,A

1.5KE6V8CP,CA → 440CP,CA

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

CB-429
(Plastic)

DESCRIPTION

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

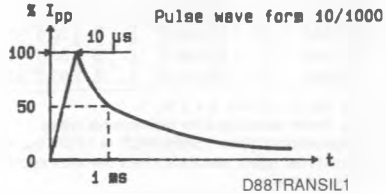
ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
P_p	Peak Pulse Power for 1 ms Exponential Pulse	T_j Initial = 25 °C See note 1	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)				$V_{(CL)}$ @ 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 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 $t_p \leq 50$ ms $\delta < 2$ %.
** 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.		$V_{(BR)}$* (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)
1.5KE39A	1.5KE39CA	5	33.3	37.1	39	41	1	53.9	28	69.7	258	10.0	2400
P 1.5KE43P	1.5KE43CP	5	36.8	40.9	43	47.3	1	59.3	25.3	76.8	234	10.1	2200
1.5KE43A	1.5KE43CA	5	36.8	40.9	43	45.2	1	59.3	25.3	76.8	234	10.1	2200
P 1.5KE47P	P 1.5KE47CP	5	40.2	44.7	47	51.7	1	64.8	23.2	84	214	10.1	2050
1.5KE47A	1.5KE47CA	5	40.2	44.7	47	49.4	1	64.8	23.2	84	214	10.1	2050
P 1.5KE51P	1.5KE51CP	5	43.6	48.5	51	56.1	1	70.1	21.4	91	198	10.2	1950
1.5KE51A	1.5KE51CA	5	43.6	48.5	51	53.6	1	70.1	21.4	91	198	10.2	1950
1.5KE56P	1.5KE56CP	5	47.8	53.2	56	61.6	1	77	19.5	100	180	10.3	1800
1.5KE56A	1.5KE56CA	5	47.8	53.2	56	58.8	1	77	19.5	100	180	10.3	1800
1.5KE62P	1.5KE62CP	5	53	58.9	62	68.2	1	85	17.7	111	162	10.4	1700
1.5KE62A	1.5KE62CA	5	53	58.9	62	65.1	1	85	17.7	111	162	10.4	1700
P 1.5KE68P	P 1.5KE68CP	5	58.1	64.6	68	74.8	1	92	16.3	121	148	10.4	1550
1.5KE68A	1.5KE68CA	5	58.1	64.6	68	71.4	1	92	16.3	121	148	10.4	1550
1.5KE75P	1.5KE75CP	5	64.1	71.3	75	82.5	1	103	14.6	134	134	10.5	1450
1.5KE75A	1.5KE75CA	5	64.1	71.3	75	78.8	1	103	14.6	134	134	10.5	1450
P 1.5KE82P	P 1.5KE82CP	5	70.1	77.9	82	90.2	1	113	13.3	146	123	10.5	1350
1.5KE82A	1.5KE82CA	5	70.1	77.9	82	86.1	1	113	13.3	146	123	10.5	1350
1.5KE91P	1.5KE91CP	5	77.8	86.5	91	100	1	125	12	162	111	10.6	1250
1.5KE91A	1.5KE91CA	5	77.8	86.5	91	95.5	1	125	12	162	111	10.6	1250
1.5KE100P	1.5KE100CP	5	85.5	95	100	110	1	137	11	178	101	10.6	1150
1.5KE100A	1.5KE100CA	5	85.5	95	100	105	1	137	11	178	101	10.6	1150
1.5KE110P	P 1.5KE110CP	5	94	105	110	121	1	152	9.9	195	92	10.7	1050
1.5KE110A	1.5KE110CA	5	94	105	110	116	1	152	9.9	195	92	10.7	1050
1.5KE120P	1.5KE120CP	5	102	114	120	132	1	165	9.1	212	85	10.7	1000
1.5KE120A	1.5KE120CA	5	102	114	120	126	1	165	9.1	212	85	10.7	1000
1.5KE130P	P 1.5KE130CP	5	111	124	130	143	1	179	8.4	230	78	10.7	950
1.5KE130A	1.5KE130CA	5	111	124	130	137	1	179	8.4	230	78	10.7	950
1.5KE150P	1.5KE150CP	5	128	143	150	165	1	207	7.2	265	68	10.8	850
1.5KE150A	1.5KE150CA	5	128	143	150	158	1	207	7.2	265	68	10.8	850
1.5KE160P	1.5KE160CP	5	136	152	160	176	1	219	6.8	282	64	10.8	800
1.5KE160A	1.5KE160CA	5	136	152	160	168	1	219	6.8	282	64	10.8	800
P 1.5KE170P	1.5KE170CP	5	145	161	170	187	1	234	6.4	301	60	10.8	750
1.5KE170A	1.5KE170CA	5	145	161	170	179	1	234	6.4	301	60	10.8	750
P 1.5KE180P	P 1.5KE180CP	5	154	171	180	198	1	246	6.1	317	57	10.8	725
1.5KE180A	1.5KE180CA	5	154	171	180	189	1	246	6.1	317	57	10.8	725
P 1.5KE200P	P 1.5KE200CP	5	171	190	200	220	1	274	5.5	353	51	10.8	675
1.5KE200A	1.5KE200CA	5	171	190	200	210	1	274	5.5	353	51	10.8	675
1.5KE220P	P 1.5KE220CP	5	188	209	220	242	1	328	4.6	388	46.5	10.8	625
1.5KE220A	1.5KE220CA	5	188	209	220	231	1	328	4.6	388	46.5	10.8	625
P 1.5KE250P	P 1.5KE250CP	5	213	237	250	275	1	344	5.0	442	47	11	560
1.5KE250A	1.5KE250CA	5	213	237	250	263	1	344	5.0	442	47	11	560
1.5KE280P	1.5KE280CP	5	239	266	280	308	1	384	5.0	494	47	11	520
1.5KE280A	1.5KE280CA	5	239	266	280	294	1	384	5.0	494	47	11	520
P 1.5KE300P	P 1.5KE300CP	5	256	285	300	330	1	414	5.0	529	47	11	500
1.5KE300A	1.5KE300CA	5	256	285	300	315	1	414	5.0	529	47	11	500
1.5KE320P	1.5KE320CP	5	273	304	320	352	1	438	4.5	564	42	11	460
1.5KE320A	1.5KE320CA	5	273	304	320	336	1	438	4.5	564	42	11	460
P 1.5KE350P	P 1.5KE350CP	5	299	332	350	385	1	482	4.0	618	37	11	430
1.5KE350A	1.5KE350CA	5	299	332	350	368	1	482	4.0	618	37	11	430
P 1.5KE400P	P 1.5KE400CP	5	342	380	400	440	1	548	4.0	706	37	11	390
1.5KE400A	1.5KE400CA	5	342	380	400	420	1	548	4.0	706	37	11	390
P 1.5KE440P	P 1.5KE440CP	5	376	418	440	484	1	603	3.5	776	33	11	360
1.5KE440A	1.5KE440CA	5	376	418	440	462	1	603	3.5	776	33	11	360

* 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

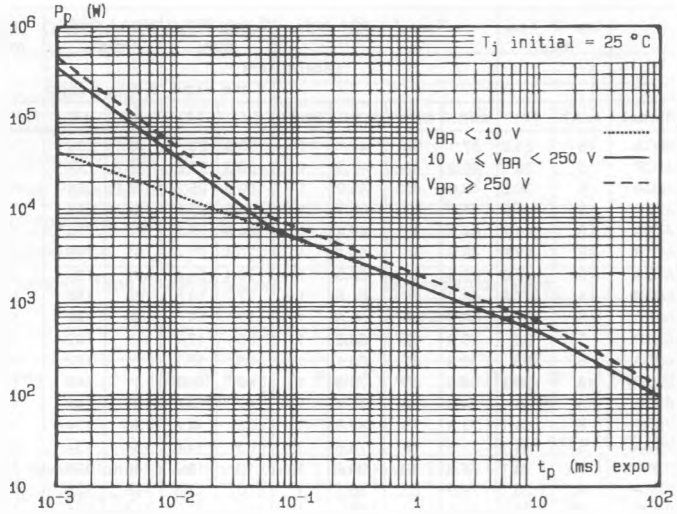


Fig.1 - Peak pulse power versus exponential pulse duration.

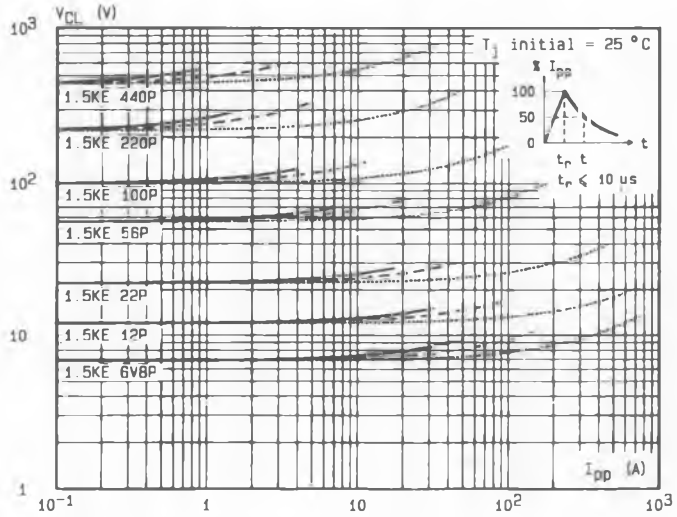


Fig.2 - Clamping voltage versus peak pulse current.
exponential waveform t = 20 µs ·····
t = 1 ms – – –
t = 10 ms ——

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.

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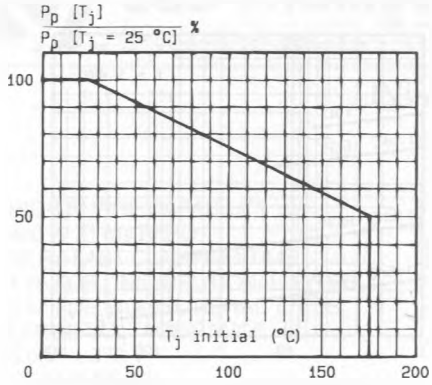


Fig.3 - Allowable power dissipation versus junction temperature.

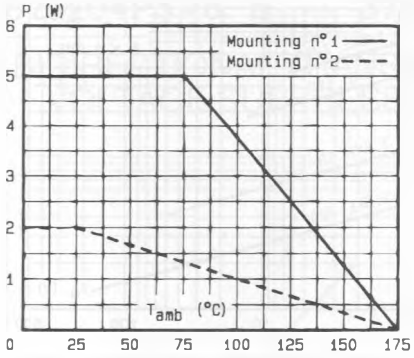


Fig.4 - Power dissipation versus ambient temperature.

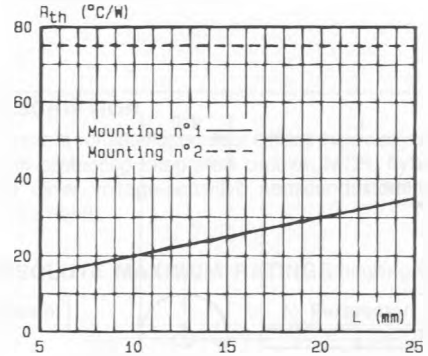
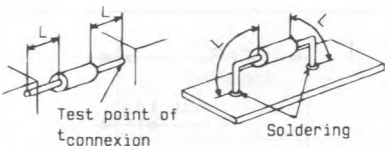


Fig.5 - Thermal resistance versus lead length.



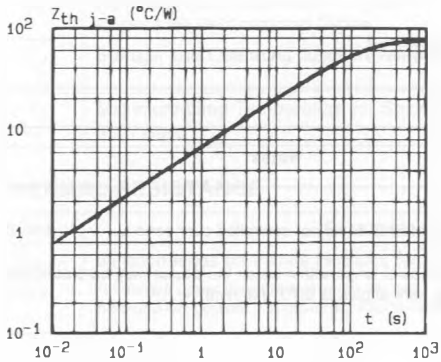


Fig.6 - Transient thermal impedance junction-ambient for mounting n°2 versus pulse duration (L = 10 mm).

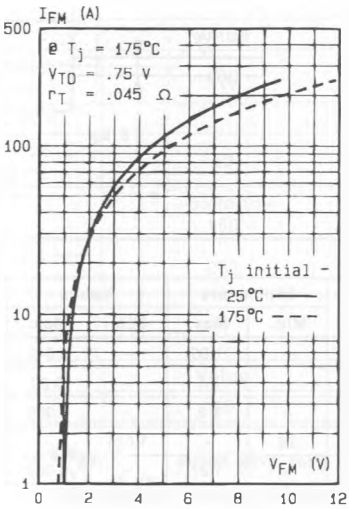


Fig.7 - Peak forward current versus peak forward voltage drop (typical values for unidirectional types).

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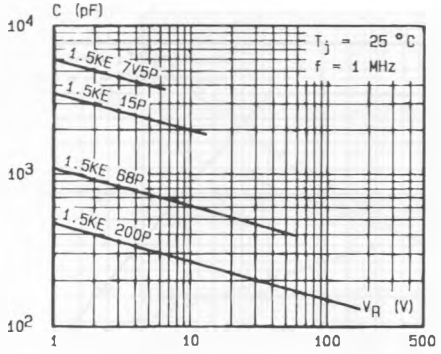

Fig.8a - Capacitance versus reverse applied voltage for unidirectional types (typical values).

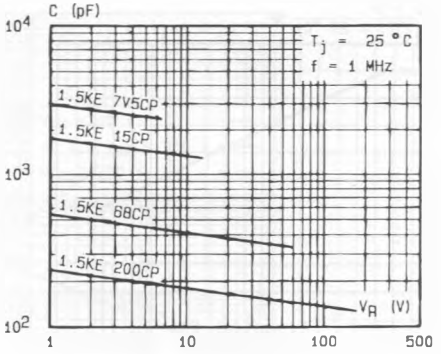

Fig.8b - Capacitance versus reverse applied voltage for bidirectional types (typical values).

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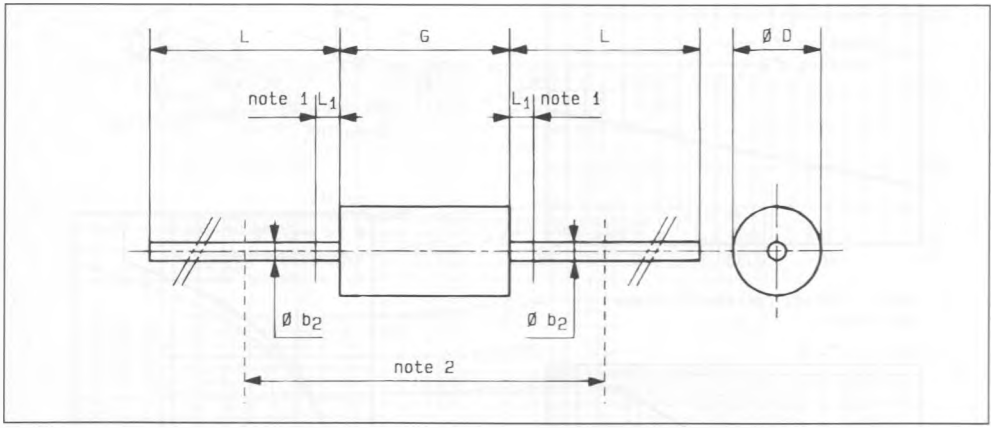
PACKAGE MECHANICAL DATA

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. 2 - The minimum axial lengh within which the device may be placed with its leads bent at right angles is 0.70" (18 mm).
Ø D	–	5.1	–	0.20	
G	–	9.8	–	0.386	
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