### Vishay Sprague



Solid-Electrolyte TANTALEX<sup>®</sup> Capacitors, Resin-Coated, Radial-Lead



### PERFORMANCE CHARACTERISTICS

Operating Temperature: - 55 °C to + 85 °C

(to + 125 °C with voltage derating)

Capacitance Tolerance: At 120 Hz, + 25 °C,  $\pm 20$  %,  $\pm 10$  % standard.  $\pm 5$  % available as special Dissipation Factor: At 120 Hz, + 25 °C. Dissipation factor,

**Dissipation Factor:** At 120 Hz, + 25 °C. Dissipation factor, shall not exceed the values listed in the Standard Ratings tables.

#### DC Leakage Current (DCL Max.):

At + 25 °C: Leakage current shall not exceed the values listed in the Standard Ratings tables.

#### FEATURES

### Terminations: Tin/lead (SnPb), 100 % tin (Sn) Economy and high performance are combined in these radial-lead, solid-electrolyte TANTALEX<sup>®</sup> capacitors



RoHS

COMPLIANT

199D

- Rugged, reliable capacitors featuring low leakage current and low dissipation factor
- Six miniature case sizes and five lead styles. All case sizes are available in standard tape and reel packaging per EIA-468
- Standard ratings include replacements for Type 196D capacitors
- Lead (Pb)-free capacitors have "L" in body marking
- Material categorization: For definitions of compliance please see <u>www.vishay.com/doc?99912</u>

#### Note

\* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

#### APPLICATIONS

Suitable for a broad range of consumer, commercial and industrial equipment

**At + 85 °C:** Leakage current shall not exceed 10 times the values listed in the Standard Ratings tables.

**At + 125** °C: Leakage shall not exceed 15 times the values listed in the Standard Ratings tables.

Life Test: Capacitors shall withstand rated DC voltage applied at + 85 °C for 1000 h with a circuit resistance not greater than 3  $\Omega$ .

Following the life test:

- 1. DCL shall not exceed 125 % of the initial requirements
- 2. Dissipation Factor shall meet the initial requirement
- 3. Change in capacitance shall not exceed ± 10 %



AVAILABLE LEAD STYLES AND PACKAGING TYPES PER CASE SIZE											
LEAD STYLE/CASE	1	2	3	4	5	6	7	9	Х	Y	Z
Α		Bulk			Bulk		Bulk	Bulk	Bulk		Bulk
В	Bulk	V1 Reel			V1 Reel B1 Ammo	Bulk V1 Reel B1 Ammo	V1 Reel	el Reel B1 no Ammo	V1 Reel Bi B1 V Ammo A1	Bulk	Ik Reel 1 B1 Ammo A1
С	V1	B1 Ammo					B1 Ammo			V1	
D		A1			A1		A1	A1			
E			Bulk	Bulk/Reel		A1					
F			V1	Ammo							

Revision: 29-Nov-12

1 For technical questions, contact: <u>tantalum@vishav.com</u> Document Number: 40020

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <a href="http://www.vishay.com/doc?91000">www.vishay.com/doc?91000</a>

199D



www.vishay.com

### Vishay Sprague

DIMEN	DIMENSIONS in inches [millimeters]										
LEAD S	STYLE	1, 2,	3, 4	1, 2, 3	2, 4	5,	5, Y		6		
CASE	D max.	P ± 0.024 [0.60]	H max.	L min.	L ± 0.118 [3.0]	P ± 0.03 [0.76]	L ± 0.118 [3.0]	P ± 0.024 [0.60]	H <sub>1</sub> max.	L	
Α	0.173 [4.40]		0.280 [7.11]	0.591 0.748 [15.0] [19.0]					0.378 [9.61]		
В	0.197 [5.00]	0.100	0.300 [7.62]		0.125	0.748		0.398 [10.12]	0.240 ± 0.030		
С	0.217 [5.50]	[2.54]	0.360 [9.14]		0.748	[3.18]	[19.0]	0.200 [5.08]	0.458 [11.64]	[6.1 ± 0.76]	
D	0.236 [6.00]		0.400 [10.16]		[19.0]				0.498 [12.66]		
E	0.339 [8.60]	0.200	0.492 [12.50]			-	-		0.591 [15.00]	1 ± 0.122	
F	0.378 [9.60]	[5.08]	0.650 [16.50]			-	-		0.748 [19.00]	[25.4 ± 3.1]	

DIMENSIONS in inches [millimeters]													
LEAD STYLE	7, 9		7			9		X, Z			x	z	
CASE	D max.	P ± 0.024 [0.60]	H <sub>1</sub> max.	L ± 0.03 [0.76]	P ± 0.024 [0.60]	H <sub>1</sub> max.	L ± 0.03 [0.76]	D max.	H max.	H <sub>1</sub> max.	L ± 0.125	P ± 0.024	P ± 0.024
Α	0.173 [4.40]		0.378 [9.61]			0.398 [10.11]		0.173 [4.40]	0.280 [7.11]	0.340 [8.64]			
В	0.197 [5.00]	0.25	0.398 [10.12]	0.240	0.200	0.418 [10.62] 0.:	0.418 0.62] 0.240 0.478 [6.10] 2.14]	0.197 [5.00]	0.300 [7.62]	0.360 [9.14]	0.750 [19.05]	0.100 [2.54]	0.125 [3.175]
С	0.217 [5.50]	[6.35]	0.458 [11.64]	[6.10]	[5.08]	0.478 [12.14]		0.217 [5.50]	0.360 [9.14]	0.420 [10.67]			
D	0.236 [6.00]		0.498 [12.66]			0.518 [13.16]		0.236 [6.00]	0.400 [10.16]	0.460 [11.68]			

Note

• Lead space measured within 0.05" [1.27 mm] of the body of the capacitor or from the bottom of the crimp.

ORDE	RING INFORMAT	ION						
199D	475	475 X9		Α	1 <sup>(1)</sup>	V1	E3	
MODEL	EL CAPACITANCE CAPACITANCE TOLERANCE		DC VOLTAGE RATING AT + 85 °C I	CASE CODE	LEAD STYLE	PACKAGING	RoHS COMPLIANT	
	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	$X0 = \pm 20 \%$ $X9 = \pm 10 \%$ ** $X5 = \pm 5 \%$ ** Special Order	This is expressed in V. To complete the three-digit block, zeros precede the voltage rating. A decimal point is indicated by an "R" (6R3 = 6.3 V).	See Ratings and Case Codes table.		V1 = Bulk B1 = Tape and reel A1 = Ammo	E3 = 100 % tin termination (RoHS compliant) Blank = Tin/lead termination	

Note

<sup>(1)</sup> See lead styles table.

www.vishay.com

Vishay Sprague

199D OBSOL	199D OBSOLETE VS. CURRENT ORDERING CROSS REFERENCE								
OBSOLETE	NEW	DESCRIPTION							
A1	1V1	0.100 SP, UNEVEN STRAIGHT LL, BULK CASES A - D							
A1	3V1	0.200 SP, UNEVEN STRAIGHT LL, BULK, CASES E, F							
A1	2V1	0.100 SP, EVEN STRAIGHT LL, BULK, CASES A - D							
A6	2B1	0.100 SP, EVEN STRAIGHT LL, REEL POSITIVE LEADER, CASES A - D							
A6	2A1	0.100 SP, EVEN STRAIGHT LL, AMMO, CASES A - D							
A1	4V1	0.200 SP, EVEN STRAIGHT LL, BULK, CASES E, F							
A6	4B1	0.200 SP, EVEN STRAIGHT LL, REEL POSITIVE LEADER, CASES E, F							
A6	4A1	0.200 SP, EVEN STRAIGHT LL, AMMO, CASES E, F							
A2	5V1	0.125 SP, EVEN STRAIGHT LL, BULK, CASES A - D							
A7	5B1	0.125 SP, EVEN STRAIGHT LL, REEL POSITIVE LEADER, CASES A - D							
A7	5A1	0.125 SP, EVEN STRAIGHT LL, AMMO, CASES A - D							
A2	YV1	0.125 SP, UNEVEN STRAIGHT LL, BULK, CASES A - D							
B1	XV1	0.100 SP, HAIRPIN LL, BULK CASES A - D							
B6	XB1	0.100 SP, HAIRPIN LL, REEL POSITIVE LEADER, CASES A - D							
B6	XA1	0.100 SP, HAIRPIN LL, AMMO, CASES A - D							
B2	ZV1	0.125 SP, HAIRPIN LL, BULK, CASES A - D							
B7	ZB1	0.125 SP, HAIRPIN LL, REEL POSITIVE LEADER, CASES A - D							
B7	ZA1	0.125 SP, HAIRPIN LL, AMMO, CASES A - D							
E2	6V1	0.200 SP, HOCKEY STICK LL, BULK, CASES A - F							
E7	6B1	0.200 SP, HOCKEY STICK LL, REEL POSITIVE LEADER, CASES A - F							
E7	6A1	0.200 SP, HOCKEY STICK LL, AMMO, CASES A - F							
E3	7V1	0.250 SP, HOCKEY STICK LL, BULK, CASES A - D							
E8	7B1	0.250 SP, HOCKEY STICK LL, REEL POSITIVE LEADER, CASES A - D							
E8	7A1	0.250 SP, HOCKEY STICK LL, AMMO, CASES A - D							
E4		OBSOLETE							
G2	9V1	0.200 SP, SNAP-IN LL, BULK, CASES A - D							
G7	9B1	0.200 SP, SNAP-IN LL, REEL POSITIVE LEADER, CASES A - D							
G7	9A1	0.200 SP, SNAP-IN LL, AMMO, CASES A - D							

3 For technical questions, contact: <u>tantalum@vishay.com</u> Document Number: 40020

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000



Vishay Sprague

			~~	

$\begin{tabular}{ c c c c c c c } \hline CASE CODE & PART NUMBER & MAX. DCL & MAX. DF & MAX. DF & MAX. DCL & MAX. DF & MAX. DCL & MAX. DF & MAX. D$	STANDARD R	ATINGS			
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	CAPACITANCE (μF)	CASE CODE	PART NUMBER	MAX. DCL AT + 25 °C (μΑ)	MAX. DF AT + 25 °C 120 Hz (%)
		3 V <sub>DC</sub> AT	+ 85 °C, SURGE = 3.6 V; 2 V <sub>DC</sub> AT	" + 125 °C, SURGE = 2.4 V	
6.8   A   199058(1)003A(2)(3)   0.5   6     10   A   199016(1)003A(2)(3)   0.5   8     15   A   1990126(1)003A(2)(3)   0.5   8     33   B   1990226(1)003A(2)(3)   0.6   8     33   B   1990236(1)0032(2)(3)   1.0   8     47   C   1990476(1)0032(2)(3)   2.0   8     100   D   199017(1)0032(2)(3)   3.0   10     120   E   1990227(1)0032(2)(3)   5.0   10     220   E   1990237(1)0032(2)(3)   6.0   10     330   E   1990237(1)0032(2)(3)   6.0   10     470   F   1990477(1)0037(2)(3)   6.0   10     680   F   1990477(1)0037(2)(3)   0.5   6     610   B   1990477(1)07047(2)(3)   0.5   6     62   A   1990477(1)07042(3)   0.5   6     63   A   1990167(1)07042(3)   0.5   6     64   A   1990167(1)07042(3)   0.5   6	4.7	А	199D475(1)003A(2)(3)	0.5	6
	6.8	A	199D685(1)003A(2)(3)	0.5	6
15   A   199126(1)0034(2)(3)   0.5   8     22   B   199026(1)0038(2)(3)   1.0   8     33   B   1990276(1)0038(2)(3)   1.0   8     47   C   1990476(1)0032(2)(3)   2.0   8     100   D   199017(1)0032(2)(3)   3.0   10     150   D   199017(1)0032(2)(3)   4.0   10     220   E   199027(1)0032(2)(3)   6.0   10     330   E   199027(1)0032(2)(3)   6.0   10     470   F   1990126(1)0037(2)(3)   8.0   10     680   F   1990126(1)0037(2)(3)   0.5   6     6.3   A   1990126(1)6832(2)(3)   0.5   6     10   B   1990126(1)6832(2)(3)   0.5   6     10   B   1990126(1)6832(2)(3)   2.0   8     115   B   1990126(1)6832(2)(3)   2.0   8     122   C   1990126(1)6832(2)(3)   2.0   8     133   C   1990236(1)683(2)(3)   2.0   8	10	A	199D106(1)003A(2)(3)	0.5	8
22   B   1990226(1)003B(2)(3)   0.6   8     33   B   199026(1)003B(2)(3)   1.0   8     47   C   199026(1)003C(2)(3)   2.0   8     100   D   1990167(1)003C(2)(3)   3.0   10     150   D   1990167(1)003C(2)(3)   3.0   10     220   E   1990227(1)003E(2)(3)   5.0   10     330   E   1990237(1)003E(2)(3)   6.0   10     470   F   1990237(1)003E(2)(3)   8.0   10     680   F   1990237(1)003E(2)(3)   0.5   6     10   B   1990157(1)003E(2)(3)   0.5   6     115   B   1990156(1)683A(2)(3)   0.5   6     12   C   1990226(1)683A(2)(3)   0.5   6    133   C   1990226(1)683A(2)(3)   0.0   8     147   D   1990137(1)683D(2)(3)   1.0   8   8     153   B   1990137(1)683D(2)(3)   5.0   10     164   D   19901367(1)683D(2)(3)   5.0   10	15	A	199D156(1)003A(2)(3)	0.5	8
33     B     1990376(1)003E(2)(3)     1.0     B       47     C     1990476(1)003C(2)(3)     2.0     B       68     C     1990476(1)003C(2)(3)     2.0     B       100     D     199017(1)003C(2)(3)     3.0     10       150     D     1990127(1)003E(2)(3)     5.0     10       200     E     1990227(1)003E(2)(3)     6.0     10       330     E     1990237(1)003E(2)(3)     6.0     10       470     F     199047(1)003E(2)(3)     10.0     10       680     F     199047(1)003E(2)(3)     0.5     6       6.10     B     199047(1)003E(2)(3)     0.5     6       15     B     1990146(1)6832(2)(3)     0.3     8       160     B     1990146(1)6832(2)(3)     2.0     8       17     D     1990236(1)6832(2)(3)     5.0     10       180     1990147(1)6832(2)(3)     5.0     10       1901476(1)6832(2)(3)     5.0     10     10       20 <td>22</td> <td>В</td> <td>199D226(1)003B(2)(3)</td> <td>0.6</td> <td>8</td>	22	В	199D226(1)003B(2)(3)	0.6	8
47   C   1990747(1)003C(2)(3)   1.4   8     68   C   199076(1)003C(2)(3)   3.0   10     150   D   1990157(1)003C(2)(3)   3.0   10     220   E   1990157(1)003C(2)(3)   5.0   10     230   E   1990237(1)003E(2)(3)   6.0   10     470   F   1990247(1)003E(2)(3)   8.0   10     680   F   1990247(1)003E(2)(3)   8.0   10     683   A   1990247(1)003E(2)(3)   0.6   6     6.8   A   1990247(1)003E(2)(3)   0.6   6     6.8   A   1990247(1)003E(2)(3)   0.6   6     7.7   A   1990247(1)67842(2)(3)   0.6   6     15   B   1990156(1)67842(2)(3)   1.3   8     22   C   1990256(1)6782(2)(3)   2.0   8     47   D   1990266(1)6782(2)(3)   2.0   8     160   D   1990266(1)6782(2)(3)   5.0   10     17   D   1990266(1)6782(2)(3)   5.0   10 <td>33</td> <td>В</td> <td>199D336(1)003B(2)(3)</td> <td>1.0</td> <td>8</td>	33	В	199D336(1)003B(2)(3)	1.0	8
68     C     1990167(1)003D(2)(3)     2.0     8       100     D     1990157(1)003D(2)(3)     3.0     10       150     D     199D27(1)003D(2)(3)     4.0     10       220     E     199D27(1)003E(2)(3)     5.0     10       330     E     199D37(1)003E(2)(3)     6.0     10       680     F     199D475(1)003E(2)(3)     10.0     10       6.3     A     199D475(1)003E(2)(3)     0.5     6       6.3     A     199D475(1)6R3A(2)(3)     0.5     6       10     B     199D475(1)6R3A(2)(3)     0.5     6       115     B     199D16(1)6R3B(2)(3)     0.9     8       22     C     199D26(1)6R3D(2)(3)     2.0     8       33     C     199D26(1)6R3D(2)(3)     5.0     10       150     E     199D466(1)6R3D(2)(3)     5.0     10       220     E     199D26(1)6R3D(2)(3)     5.0     10       33     A     199D337(1)6R3E(2)(3)     7.0     10	47	С	199D476(1)003C(2)(3)	1.4	8
	68	С	199D686(1)003C(2)(3)	2.0	8
150     D     199157(1)003E2(%)     4.0     10       220     E     199027(1)003E2(%)     5.0     10       330     E     199037(1)003E2(%)     6.0     10       470     F     199047(1)003E2(%)     8.0     10       680     F     199047(1)003E2(%)     8.0     10       6.3 Vpc AT + 85 °C, SURGE = 8 V; 4 Vpc AT + 125 °C, SURGE = 5 V       4.7     A     1990465(1)6R3A2(%)     0.5     6       6.8     A     199016(1)6R3B2(%)     0.5     6       15     B     199015(1)6R3B2(%)     0.9     8       22     C     1990226(1)6R3C2(%)     1.3     8       33     C     199036(1)6R3C2(%)     2.9     8       68     D     1990466(1)6R3D2(%)     5.0     10       100     D     199017(1)6R3E2(%)     6.0     10       220     E     1990227(1)6R3E2(%)     7.0     10       33     A     199036(1)0102(%)     0.5     6       4.7     A	100	D	199D107(1)003D(2)(3)	3.0	10
220   E   199D227(1)003E(2)(3)   5.0   10     470   F   199D477(1)003F(2)(3)   6.0   10     680   F   199D67(1)003F(2)(3)   10.0   10     6.3 V <sub>DC</sub> AT + 85 °C, SURGE = 8 V; 4 V <sub>DC</sub> AT + 125 °C, SURGE = 5 V     4.7   A   199D475(1)0678(2)(3)   0.5   6     6.8   A   199D475(1)0678(2)(3)   0.5   6     10   B   199D166(1)6783E(2)(3)   0.5   6     110   B   199D166(1)6783E(2)(3)   0.9   8     22   C   199D236(1)6783C(2)(3)   1.3   8     33   C   199D36(1)6783C(2)(3)   2.0   8     66   D   199D167(1)6782(2)(3)   4.0   8     100   D   199D167(1)6782(2)(3)   5.0   10     100   D   199D167(1)6782(2)(3)   6.0   10     220   E   199D237(1)67872(2)(3)   6.0   10     33   A   199D237(1)67872(2)(3)   0.5   6     6.8   B   199D167(1)6782(2)(3)   0.5   6	150	D	199D157(1)003D(2)(3)	4.0	10
330   E   199D37(1)035(2)(3)   6.0   10     660   F   199D67(1)037(2)(3)   10.0   10     6.80   F   199D68(1)003(2)(3)   10.0   10     6.81   A   199D68(1)063A(2)(3)   0.5   6     6.8   A   199D68(1)063A(2)(3)   0.5   6     15   B   199D156(1)663B(2)(3)   0.6   8     22   C   199D36(1)663C(2)(3)   2.9   8     33   C   199D36(1)663C(2)(3)   2.0   8     47   D   199D36(1)663C(2)(3)   2.0   8     68   D   199D36(1)663C(2)(3)   2.0   8     100   D   199D36(1)663C(2)(3)   2.0   8     100   D   199D47(1)663C(2)(3)   2.0   8     100   D   199D47(1)663C(2)(3)   3.0   10     220   E   199D157(1)663C(2)(3)   7.0   10     3.3   A   199D23(1)063C(2)   0.5   6     4.7   A   199D36(1)0102(2)   0.5   6	220	E	199D227(1)003E(2)(3)	5.0	10
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	330	E	199D337(1)003E(2)(3)	6.0	10
680     F     199D687(1)003F(2)(3)     10.0     10       6.3 V <sub>Dc</sub> AT + 85 °C, SURGE = 5 V       4.7     A     199D475(1)6F3A(2)(3)     0.5     6       6.8     A     199D685(1)6F3A(2)(3)     0.5     6       10     B     139D165(1)6F3A(2)(3)     0.5     6       15     B     139D156(1)6F3B2(2)(3)     0.6     8       22     C     139D252(1)6F3C2(2)(3)     1.3     8       33     C     139D252(1)6F3C2(2)(3)     2.0     8       47     D     139D267(1)6F3C2(2)(3)     2.0     8       68     D     199D268(1)6F3C2(2)(3)     5.0     10       150     E     199D157(1)6F3C2(2)(3)     5.0     10       220     E     199D237(1)6F3E(2)(3)     8.0     10       330     F     199D337(1)6F3F(2)(3)     0.5     6       4.7     A     199D475(1)0102(2)(3)     0.5     6       4.7     A     199D475(1)0102(2)(3)     1.5     8       2.2	470	F	199D477(1)003F(2)(3)	8.0	10
	680	F	199D687(1)003F(2)(3)	10.0	10
4.7   A   199D475(1)6R3A(2)(3)   0.5   6     6.8   A   199D156(1)6R3B(2)(3)   0.6   8     10   B   199D156(1)6R3B(2)(3)   0.9   8     22   C   139D126(1)6R3C(2)(3)   2.0   8     33   C   199D236(1)6R3C(2)(3)   2.9   8     47   D   199D266(1)6R3C(2)(3)   2.0   8     68   D   199D266(1)6R3C(2)(3)   4.0   8     100   D   199D157(1)6R3C(2)(3)   5.0   10     150   E   199D157(1)6R3E(2)(3)   6.0   10     220   E   199D237(1)6R3F(2)(3)   8.0   10 <b>10 V<sub>Dc</sub> AT + 85 °C, SURGE = 13 V; 7 V<sub>Dc</sub> AT + 125 °C, SURGE = 9 V</b> 3.3   A   199D335(1)010A(2)(3)   0.5   6     6   6     10   B   199D156(1)0102(2)(3)   0.5   6     15   C   199D235(1)010A(2)(3)   3.0   8     22   C   199D247(1)0102(2)(3)   3.0   8     33   D   199D235(1)010		6.3 V <sub>DC</sub>	AT + 85 °C, SURGE = 8 V; 4 V <sub>DC</sub> A	T + 125 °C, SURGE = 5 V	
6.8     A     1990685(1)6R3A(2)(3)     0.5     6       10     B     199016(1)6R3B(2)(3)     0.6     8       15     B     199016(1)6R3B(2)(3)     0.9     8       33     C     199026(1)6R3C(2)(3)     2.0     8       47     D     199026(1)6R3C(2)(3)     2.0     8       68     D     199026(1)6R3D(2)(3)     2.0     8       100     D     199027(1)6R3D(2)(3)     4.0     8       101     D     199017(1)6R3D(2)(3)     6.0     10       220     E     199027(1)6R3E(2)(3)     8.0     10       330     F     199033(1)010A(2)(3)     0.5     6       4.7     A     199027(1)010(2)(3)     0.5     6       4.8     B     1990136(1)010(2)(3)     0.5     6       4.7     A     1990226(1)010(2)(3)     1.0     8       15     C     1990156(1)010(2)(3)     1.0     8       15     C     1990157(1)010(2)(3)     3.0     8	4.7	A	199D475(1)6R3A(2)(3)	0.5	6
10     B     1990106(1)6R32(2)(3)     0.6     8       15     B     1990126(1)6R32(2)(3)     0.9     8       22     C     1990236(1)6R3C(2)(3)     2.0     8       33     C     1990236(1)6R3C(2)(3)     2.0     8       47     D     199026(1)6R3C(2)(3)     2.9     8       68     D     199026(1)6R3C(2)(3)     5.0     10       150     E     199017(1)6R3D(2)(3)     5.0     10       220     E     1990237(1)6R3F(2)(3)     8.0     10       330     F     1990337(1)6R3F(2)(3)     6.5     6       4.7     A     1990335(1)0104/2)(3)     0.5     6       4.7     A     1990335(1)0104/2)(3)     0.5     6       10     B     199016(1)0108/2)(3)     1.0     8       15     C     1990156(1)0108/2)(3)     1.0     8       16     D     199016(1)0108/2)(3)     3.0     8       33     D     1990336(1)0100/2)(3)     3.0     8	6.8	A	199D685(1)6R3A(2)(3)	0.5	6
15     B     199D156(1)6R3B(2)(3)     0.9     8       22     C     199D236(1)6R3C(2)(3)     1.3     8       33     C     199D36(1)6R3C(2)(3)     2.0     8       47     D     199D476(1)6R3D(2)(3)     2.9     8       68     D     199D666(1)6R3D(2)(3)     4.0     8       100     D     199D107(1)6R3E(2)(3)     6.0     10       220     E     199D237(1)6R3E(2)(3)     8.0     10       330     F     199D337(1)6R3F(2)(3)     8.0     10       333     A     199D337(1)6R3F(2)(3)     0.5     6       4.7     A     199D337(1)6R3F(2)(3)     0.5     6       4.7     A     199D337(1)010A(2)(3)     0.5     6       10     B     199D3475(1)010A(2)(3)     0.5     6       4.7     A     199D3475(1)010A(2)(3)     1.5     8       22     C     199D16(1)10102(2)(3)     1.0     8       33     D     199D336(1)10102(2)(3)     3.0     8	10	В	199D106(1)6R3B(2)(3)	0.6	8
22   C   199D226(1)6R3C(2)(3)   1.3   8     33   C   199D36(1)6R3D(2)(3)   2.0   8     47   D   199D476(1)6R3D(2)(3)   2.9   8     68   D   199D157(1)6R3D(2)(3)   5.0   10     150   E   199D157(1)6R3E(2)(3)   6.0   10     220   E   199D237(1)6R3E(2)(3)   7.0   10     330   F   199D337(1)0R3E(2)(3)   0.5   6     4.7   A   199D335(1)010A(2)(3)   0.5   6     4.7   A   199D475(1)010A(2)(3)   0.5   6     5.8   B   199D476(1)010A(2)(3)   0.5   6     10   B   199D166(1)010A(2)(3)   1.0   8     15   C   199D156(1)010C(2)(3)   1.0   8     15   C   199D156(1)010C(2)(3)   3.0   8     33   D   199D39(1)010D(2)(3)   3.0   8     39   D   199D39(1)010D(2)(3)   4.0   8     68   D   199D247(1)010E(2)(3)   7.0   10	15	В	199D156(1)6R3B(2)(3)	0.9	8
33     C     199D386(1)6R3C(2)(3)     2.0     8       47     D     199D367(1)6R3D(2)(3)     2.9     8       68     D     199D686(1)6R3D(2)(3)     4.0     8       100     D     199D107(1)6R3D(2)(3)     5.0     10       150     E     199D127(1)6R3E(2)(3)     6.0     10       220     E     199D237(1)6R3E(2)(3)     8.0     10       330     F     199D337(1)6R3F2(2)(3)     0.5     6       4.7     A     199D337(1)6R3F2(2)(3)     0.5     6       5.3     A     199D337(1)6R3F2(2)(3)     0.5     6       6.8     B     199D476(1)01042(3)     0.5     6       10     B     199D476(1)01042(3)     1.5     8       22     C     199D246(1)01042(3)     1.0     8       33     D     199D393(1)01042(3)     3.0     8       347     D     199D246(1)01042(3)     3.0     8       39     D     199D393(1)01002(3)     5.0     8	22	С	199D226(1)6R3C(2)(3)	1.3	8
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	33	С	199D336(1)6R3C(2)(3)	2.0	8
68     D     199D866(1)6R3D(2)(3)     4.0     8       100     D     199D107(1)6R3D(2)(3)     5.0     10       150     E     199D127(1)6R3E(2)(3)     6.0     10       220     E     199D237(1)6R3E(2)(3)     7.0     10       330     F     199D337(1)6R3E(2)(3)     8.0     10       10 Vpc AT + 85 °C, SURGE = 13 V; 7 Vpc AT + 125 °C, SURGE = 9 V       3.3     A     199D335(1)010A(2)(3)     0.5     6       4.7     A     199D355(1)010A(2)(3)     0.5     6       6.8     B     199D666(1)010B(2)(3)     1.0     8       15     C     199D156(1)010C(2)(3)     1.5     8       22     C     199D236(1)010D(2)(3)     3.0     8       33     D     199D336(1)010D(2)(3)     3.0     8       39     D     199D336(1)010D(2)(3)     3.0     8       47     D     199D476(1)010D(2)(3)     4.0     8       160     E     199D137(1)010E(2)(3)     5.0     8	47	D	199D476(1)6R3D(2)(3)	2.9	8
	68	D	199D686(1)6R3D(2)(3)	4.0	8
150E199157(1)6R3E(2)(3)6.010220E1991227(1)6R3E(2)(3)7.010330F1991337(1)6R3F(2)(3)8.010IO $V_{DC}$ AT + 85 °C, SURGE = 13 V; 7 $V_{DC}$ AT + 125 °C, SURGE = 9 V3.3A1991235(1)010A(2)(3)0.564.7A1991245(1)010A(2)(3)0.566.8B1990455(1)010A(2)(3)1.0815C199156(1)010C(2)(3)1.0822C1990156(1)010C(2)(3)2.0833D1990336(1)010D(2)(3)3.0839D1990336(1)010D(2)(3)3.0839D1990336(1)010D(2)(3)3.0847D1990476(1)010D(2)(3)4.0868D1990686(1)010D(2)(3)5.08100E1990157(1)010E(2)(3)7.010220F1990127(1)010E(2)(3)7.010220F1990226(1)016A(2)(3)0.563.3A1990235(1)016A(2)(3)0.563.3A1990235(1)016A(2)(3)0.564.7B1990245(1)016A(2)(3)0.565.3A1990245(1)016A(2)(3)0.566.8B1990245(1)016A(2)(3)1.0615C1990126(1)016C(2)(3)1.5815C1990126(1)016C(2)(3)2.4822D1990236(1)016B(2)(3)	100	D	199D107(1)6R3D(2)(3)	5.0	10
220     E     199D337(1)6R3F(2)(3)     7.0     10       330     F     199D337(1)6R3F(2)(3)     8.0     10       0 $V_{Dc}$ AT + 85 °C, SURGE = 13 V; 7 $V_{Dc}$ AT + 125 °C, SURGE = 9 V       3.3     A     199D335(1)010A(2)(3)     0.5     6       4.7     A     199D475(1)010A(2)(3)     0.5     6       10     B     199D166(1)010B(2)(3)     1.0     8       15     C     199D156(1)010C(2)(3)     1.0     8       22     C     199D236(1)010D(2)(3)     3.0     8       33     D     199D336(1)010D(2)(3)     3.0     8       347     D     199D247(0)10D(2)(3)     4.0     8       68     D     199D476(1)010D(2)(3)     5.0     8       100     E     199D167(1)010E(2)(3)     6.0     10       16 V <sub>Dc</sub> AT + 85 °C, SURGE = 20 V; 10 V <sub>Dc</sub> AT + 125 °C, SURGE = 12 V       16 V <sub>Dc</sub> AT + 85 °C, SURGE = 20 V; 10 V <sub>Dc</sub> AT + 125 °C, SURGE = 12 V       16 V <sub>Dc</sub> AT + 85 °C, SURGE = 20 V; 10 V <sub>Dc</sub> AT + 125 °C, SURGE = 12 V       16 V <sub>Dc</sub> AT + 85 °C, SURGE = 20	150	E	199D157(1)6R3E(2)(3)	6.0	10
330     F     199033 (1)6H3/(2)(3)     8.0     10       10 V <sub>DC</sub> AT + 85 °C, SURGE = 13 V; 7 V <sub>DC</sub> AT + 125 °C, SURGE = 9 V       3.3     A     1990335(1)010A(2)(3)     0.5     6       4.7     A     199D475(1)010A(2)(3)     0.5     6       6.8     B     199D685(1)010B(2)(3)     1.0     8       10     B     199D166(1)010C(2)(3)     1.0     8       15     C     199D126(1)010C(2)(3)     2.0     8       33     D     199D336(1)010D(2)(3)     3.0     8       33     D     199D336(1)010D(2)(3)     3.0     8       347     D     199D476(1)010D(2)(3)     4.0     8       68     D     199D686(1)010D(2)(3)     5.0     8       100     E     199D157(1)010E(2)(3)     6.0     10       150     E     199D157(1)010E(2)(3)     8.0     10        F     199D125(1)016A(2)(3)     0.5     6       3.3     A     199D335(1)016A(2)(3)     0.5     6	220	E	199D227(1)6R3E(2)(3)	7.0	10
10 $V_{Dc} AI + 85 °C, SURGE = 3 V$ 3.3     A     199D335(1)010A(2)(3)     0.5     6       4.7     A     199D475(1)010A(2)(3)     0.5     6       6.8     B     199D665(1)010E(2)(3)     0.6     6       10     B     199D166(1)010E(2)(3)     1.0     8       15     C     199D156(1)010C(2)(3)     1.5     8       22     C     199D238(1)010D(2)(3)     3.0     8       33     D     199D338(1)010D(2)(3)     3.0     8       39     D     199D39(1)010D(2)(3)     3.0     8       47     D     199D476(1)010D(2)(3)     4.0     8       68     D     199D157(1)010E(2)(3)     6.0     10       150     E     199D157(1)010E(2)(3)     7.0     10       220     F     199D225(1)016A(2)(3)     0.5     6       3.3     A     199D235(1)016A(2)(3)     0.5     6       4.7     B     199D475(1)016E(2)(3)     1.0     6       5.3     A <td>330</td> <td><u>+</u></td> <td>199D337(1)6R3F(2)(3)</td> <td>8.0</td> <td>10</td>	330	<u>+</u>	199D337(1)6R3F(2)(3)	8.0	10
3.3   A   199D35(1)01042(2)(3)   0.5   6     4.77   A   199D475(1)01042(2)(3)   0.5   6     6.8   B   199D685(1)010B(2)(3)   0.6   6     10   B   199D166(1)010B(2)(3)   1.0   8     15   C   199D126(1)010C(2)(3)   2.0   8     33   D   199D336(1)010D(2)(3)   3.0   8     33   D   199D336(1)010D(2)(3)   3.0   8     33   D   199D339(1)010D(2)(3)   3.0   8     39   D   199D339(1)010D(2)(3)   4.0   8     68   D   199D466(1)010D(2)(3)   5.0   8     100   E   199D17(1)010E(2)(3)   6.0   10     150   E   199D127(1)010F(2)(3)   8.0   10     220   F   199D227(1)010F(2)(3)   8.0   10     16 Vpc AT + 85 °C, SURGE = 20 V; 10 Vpc AT + 125 °C, SURGE = 12 V     2.2   A   199D25(1)016A(2)(3)   0.5   6     3.3   A   199D25(1)016B(2)(3)   0.5   6     4.		10 V <sub>DC</sub> A	$1 + 85 °C, SURGE = 13 V; / V_{DC} A$	1 + 125 °C, SURGE = 9 V	2
4.7   A   199D47(5(1)0104(2)(3)   0.5   6     6.8   B   199D106(1)010B(2)(3)   0.6   6     10   B   199D106(1)010B(2)(3)   1.0   8     15   C   199D126(1)010C(2)(3)   1.5   8     22   C   199D236(1)010C(2)(3)   3.0   8     33   D   199D336(1)010D(2)(3)   3.9   8     47   D   199D476(1)010D(2)(3)   4.0   8     68   D   199D466(1)010D(2)(3)   5.0   8     100   E   199D107(1)010E(2)(3)   6.0   10     155   E   199D127(1)010E(2)(3)   7.0   10     220   F   199D227(1)010F(2)(3)   8.0   10     16 Vpc AT + 85 °C, SURGE = 20 V; 10 Vpc AT + 125 °C, SURGE = 12 V     2.2   A   199D25(1)016A(2)(3)   0.5   6     3.3   A   199D25(1)016A(2)(3)   0.5   6     4.7   B   199D475(1)016B(2)(3)   0.7   6     6.8   B   199D265(1)016B(2)(3)   1.0   6	3.3	A	199D335(1)010A(2)(3)	0.5	6
6.8     B     199D83(1)010B(2)(3)     0.6     6       10     B     199D16(1)010B(2)(3)     1.0     8       15     C     199D156(1)010C(2)(3)     2.0     8       22     C     199D236(1)010C(2)(3)     3.0     8       33     D     199D336(1)010D(2)(3)     3.0     8       39     D     199D336(1)010D(2)(3)     4.0     8       68     D     199D476(1)010D(2)(3)     6.0     10       150     E     199D157(1)010E(2)(3)     6.0     10       150     E     199D157(1)010E(2)(3)     6.0     10       150     E     199D157(1)010E(2)(3)     7.0     10       220     F     199D227(1)010F(2)(3)     0.5     6       3.3     A     199D235(1)016A(2)(3)     0.5     6       3.3     A     199D235(1)016A(2)(3)     0.5     6       4.7     B     199D475(1)016B(2)(3)     0.7     6       6.8     B     199D26(1)016C(2)(3)     1.0     6	4.7	A	199D475(1)010A(2)(3)	0.5	6
10B199D106(1)010B(2)(3)1.0815C199D156(1)010C(2)(3)1.5822C199D226(1)010C(2)(3)3.0833D199D336(1)010D(2)(3)3.0839D199D339(1)010D(2)(3)3.9847D199D476(1)010D(2)(3)4.0868D199D686(1)010D(2)(3)5.08100E199D157(1)010E(2)(3)6.010150E199D157(1)010E(2)(3)7.010220F199D227(1)010F(2)(3)8.010 <b>16 V<sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V<sub>DC</sub> AT + 125 °C, SURGE = 12 V</b> 2.2A199D225(1)016A(2)(3)0.564.7B199D245(1)016B(2)(3)0.564.7B199D475(1)016B(2)(3)0.766.8B199D475(1)016B(2)(3)1.0610C199D16(1)016C(2)(3)1.5815C199D156(1)016D(2)(3)3.5833D199D336(1)016D(2)(3)3.5833D199D336(1)016D(2)(3)4.0847E199D476(1)016E(2)(3)5.0868E199D686(1)016E(2)(3)6.0868E199D468(1)016E(2)(3)6.08100F199D17(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)7.010	6.8	В	199D685(1)010B(2)(3)	0.6	6
15C199D156(1)010C(2)(3)1.5822C199D226(1)010C(2)(3)2.0833D199D336(1)010D(2)(3)3.0839D199D339(1)010D(2)(3)3.9847D199D476(1)010D(2)(3)4.0868D199D686(1)010D(2)(3)5.08100E199D177(1)010E(2)(3)6.010150E199D157(1)010E(2)(3)7.010220F199D227(1)010F(2)(3)8.010T6 Vpc AT + 85 °C, SURGE = 20 V; 10 Vpc AT + 125 °C, SURGE = 12 V2.2A199D225(1)016A(2)(3)0.563.3A199D235(1)016A(2)(3)0.564.7B199D475(1)016B(2)(3)0.766.8B199D685(1)016B(2)(3)1.0610C199D166(1)016C(2)(3)1.5815C199D156(1)016C(2)(3)3.5833D199D336(1)016D(2)(3)3.5833D199D336(1)016D(2)(3)4.0847E199D476(1)016E(2)(3)5.0833D199D336(1)016D(2)(3)4.0847E199D476(1)016E(2)(3)5.0868E199D686(1)016E(2)(3)6.0869F199D167(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)8.0 <td>10</td> <td>В</td> <td>199D106(1)010B(2)(3)</td> <td>1.0</td> <td>8</td>	10	В	199D106(1)010B(2)(3)	1.0	8
22C199D226(1)010C(2)(3)2.0833D199D336(1)0100(2)(3)3.0839D199D336(1)0100(2)(3)3.9847D199D476(1)0100(2)(3)4.0868D199D686(1)0100(2)(3)5.08100E199D17(1)010E(2)(3)6.010150E199D157(1)010E(2)(3)7.01020F199D227(1)010F(2)(3)8.010I6 V <sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V <sub>DC</sub> AT + 125 °C, SURGE = 12 V2.2A199D25(1)016A(2)(3)0.563.3A199D335(1)016A(2)(3)0.564.7B199D475(1)016B(2)(3)0.566.8B199D685(1)016B(2)(3)1.0610C199D106(1)016C(2)(3)1.5822D199D126(1)016C(2)(3)3.5833D199D336(1)016D(2)(3)4.08477E199D476(1)016C(2)(3)5.0868E199D686(1)016D(2)(3)5.0868E199D476(1)016E(2)(3)6.08100F199D107(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)8.010	15	C	199D156(1)010C(2)(3)	1.5	8
33D199D336(1)010D(2)(3)3.0839D199D339(1)010D(2)(3)3.9847D199D476(1)010D(2)(3)4.0868D199D686(1)010D(2)(3)5.08100E199D107(1)010E(2)(3)6.010150E199D157(1)010E(2)(3)7.010220F199D227(1)010F(2)(3)8.010I6 V <sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V <sub>DC</sub> AT + 125 °C, SURGE = 12 V2.2A199D225(1)016A(2)(3)0.563.3A199D335(1)016A(2)(3)0.564.7B199D475(1)016B(2)(3)0.766.8B199D685(1)016B(2)(3)1.0610C199D106(1)016C(2)(3)1.5815C199D156(1)016C(2)(3)3.5833D199D336(1)016D(2)(3)3.5833D199D36(1)016D(2)(3)4.0847E199D476(1)016E(2)(3)5.0868E199D686(1)016E(2)(3)5.0868E199D686(1)016E(2)(3)6.08100F199D157(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)7.010	22		199D226(1)010C(2)(3)	2.0	8
39     D     199D39(1)0102/(3)     3.9     8       47     D     199D476(1)01002/(3)     4.0     8       68     D     199D686(1)01002/(3)     5.0     8       100     E     199D107(1)010E(2)(3)     6.0     10       150     E     199D157(1)010E(2)(3)     8.0     10       220     F     199D227(1)010F(2)(3)     8.0     10       16 V <sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V <sub>DC</sub> AT + 125 °C, SURGE = 12 V       2.2     A     199D225(1)016A(2)(3)     0.5     6       3.3     A     199D235(1)016A(2)(3)     0.5     6       4.7     B     199D475(1)016B(2)(3)     0.7     6       6.8     B     199D485(1)016B(2)(3)     1.0     6       10     C     199D106(1)016C(2)(3)     1.5     8       15     C     199D126(1)016D(2)(3)     3.5     8       33     D     199D236(1)016D(2)(3)     3.5     8       33     D     199D136(1)016D(2)(3)     5.0     8  <	33	D	199D336(1)010D(2)(3)	3.0	8
47D199D476(1)010D(2)(3)4.0568D199D686(1)010D(2)(3)5.08100E199D107(1)010E(2)(3)6.010150E199D157(1)010E(2)(3)7.010220F199D227(1)010F(2)(3)8.010 <b>16 V<sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V<sub>DC</sub> AT + 125 °C, SURGE = 12 V</b> 2.2A199D225(1)016A(2)(3)0.563.3A199D335(1)016A(2)(3)0.564.7B199D475(1)016B(2)(3)0.766.8B199D685(1)016B(2)(3)1.0610C199D106(1)016C(2)(3)1.5815C199D156(1)016D(2)(3)3.5833D199D226(1)016D(2)(3)3.5833D199D336(1)016D(2)(3)5.0847E199D476(1)016E(2)(3)5.0847E199D476(1)016E(2)(3)6.08100F199D107(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)8.010	39	D	199D339(1)010D(2)(3)	3.9	0
06D $199D686(1)010E(2)(3)$ $3.0$ $8$ $100$ E $199D107(1)010E(2)(3)$ $6.0$ $10$ $150$ E $199D157(1)010E(2)(3)$ $7.0$ $10$ $220$ F $199D227(1)010F(2)(3)$ $8.0$ $10$ <b>16 V<sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V<sub>DC</sub> AT + 125 °C, SURGE = 12 V</b> 2.2A $199D225(1)016A(2)(3)$ $0.5$ $6$ $4.7$ B $199D475(1)016B(2)(3)$ $0.5$ $6$ $4.7$ B $199D475(1)016B(2)(3)$ $0.7$ $6$ $6.8$ B $199D475(1)016B(2)(3)$ $1.0$ $6$ $10$ C $199D106(1)016C(2)(3)$ $1.5$ $8$ $15$ C $199D156(1)016C(2)(3)$ $2.4$ $8$ $22$ D $199D226(1)016D(2)(3)$ $3.5$ $8$ $33$ D $199D336(1)016D(2)(3)$ $4.0$ $8$ $47$ E $199D476(1)016E(2)(3)$ $5.0$ $8$ $68$ E $199D476(1)016E(2)(3)$ $6.0$ $8$ $100$ F $199D107(1)016F(2)(3)$ $7.0$ $10$ $150$ F $199D157(1)016F(2)(3)$ $8.0$ $10$	47	D	199D470(1)010D(2)(3)	4.0	0
100E199D157(1)010E(2)(3)6.010150E199D157(1)010E(2)(3)7.010220F199D227(1)010F(2)(3)8.010 <b>16 V<sub>DC</sub> AT + 85 °C, SURGE = 20 V; 10 V<sub>DC</sub> AT + 125 °C, SURGE = 12 V</b> 2.2A199D235(1)016A(2)(3)0.563.3A199D335(1)016A(2)(3)0.564.7B199D475(1)016B(2)(3)0.766.8B199D685(1)016B(2)(3)1.0610C199D106(1)016C(2)(3)1.5815C199D156(1)016C(2)(3)2.4822D199D226(1)016D(2)(3)3.5833D199D336(1)016D(2)(3)4.08477E199D476(1)016E(2)(3)5.0868E199D686(1)016E(2)(3)6.08100F199D107(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)8.010	100		1990000(1)0100(2)(3)	5.0	8
130L139D137(1)010E(2)(3)1.010220F199D227(1)010F(2)(3)8.01016 $V_{DC}$ AT + 85 °C, SURGE = 20 V; 10 $V_{DC}$ AT + 125 °C, SURGE = 12 V2.2A199D225(1)016A(2)(3)0.563.3A199D335(1)016A(2)(3)0.564.7B199D475(1)016B(2)(3)0.766.8B199D685(1)016B(2)(3)1.0610C199D166(1)016C(2)(3)1.5815C199D156(1)016C(2)(3)2.4822D199D226(1)016D(2)(3)3.5833D199D336(1)016D(2)(3)4.0847E199D476(1)016E(2)(3)5.0868E199D686(1)016E(2)(3)6.08100F199D107(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)8.010	150	E	199D107(1)010E(2)(3)	7.0	10
100000000000000000000000000000000000	220	F	199D227(1)010E(2)(3)	8.0	10
2.2   A   199D225(1)016A(2)(3)   0.5   6     3.3   A   199D335(1)016A(2)(3)   0.5   6     4.7   B   199D475(1)016B(2)(3)   0.7   6     6.8   B   199D106(1)016C(2)(3)   1.0   6     10   C   199D106(1)016C(2)(3)   1.5   8     15   C   199D156(1)016C(2)(3)   2.4   8     22   D   199D226(1)016D(2)(3)   3.5   8     33   D   199D336(1)016D(2)(3)   4.0   8     47   E   199D476(1)016E(2)(3)   5.0   8     68   E   199D686(1)016E(2)(3)   6.0   8     100   F   199D107(1)016F(2)(3)   7.0   10     150   F   199D157(1)016F(2)(3)   8.0   10		16 Vpc AT	+ 85 °C. SURGE = 20 V: 10 Vpc A	T + 125 °C. SURGE = 12 V	
3.3A $199D335(1)016A(2)(3)$ $0.5$ 6 $4.7$ B $199D475(1)016B(2)(3)$ $0.7$ 6 $6.8$ B $199D685(1)016B(2)(3)$ $1.0$ 6 $10$ C $199D106(1)016C(2)(3)$ $1.5$ 8 $15$ C $199D156(1)016C(2)(3)$ $2.4$ 8 $22$ D $199D226(1)016D(2)(3)$ $3.5$ 8 $33$ D $199D336(1)016D(2)(3)$ $4.0$ 8 $47$ E $199D476(1)016E(2)(3)$ $5.0$ 8 $68$ E $199D686(1)016E(2)(3)$ $6.0$ 8 $100$ F $199D107(1)016F(2)(3)$ $7.0$ $10$ $150$ F $199D157(1)016F(2)(3)$ $8.0$ $10$	2.2	A	199D225(1)016A(2)(3)	0.5	6
4.7B $199D475(1)016B(2)(3)$ $0.7$ $6$ $6.8$ B $199D685(1)016B(2)(3)$ $1.0$ $6$ $10$ C $199D106(1)016C(2)(3)$ $1.5$ $8$ $15$ C $199D156(1)016C(2)(3)$ $2.4$ $8$ $22$ D $199D226(1)016D(2)(3)$ $3.5$ $8$ $33$ D $199D336(1)016D(2)(3)$ $4.0$ $8$ $47$ E $199D476(1)016E(2)(3)$ $5.0$ $8$ $68$ E $199D686(1)016E(2)(3)$ $6.0$ $8$ $100$ F $199D107(1)016F(2)(3)$ $7.0$ $10$ $150$ F $199D157(1)016F(2)(3)$ $8.0$ $10$	3.3	А	199D335(1)016A(2)(3)	0.5	6
6.8B $199D685(1)016B(2)(3)$ $1.0$ $6$ $10$ C $199D106(1)016C(2)(3)$ $1.5$ $8$ $15$ C $199D156(1)016C(2)(3)$ $2.4$ $8$ $22$ D $199D226(1)016D(2)(3)$ $3.5$ $8$ $33$ D $199D336(1)016D(2)(3)$ $4.0$ $8$ $47$ E $199D476(1)016E(2)(3)$ $5.0$ $8$ $68$ E $199D686(1)016E(2)(3)$ $6.0$ $8$ $100$ F $199D107(1)016F(2)(3)$ $7.0$ $10$ $150$ F $199D157(1)016F(2)(3)$ $8.0$ $10$	4.7	В	199D475(1)016B(2)(3)	0.7	6
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	6.8	В	199D685(1)016B(2)(3)	1.0	6
15     C     199D156(1)016C(2)(3)     2.4     8       22     D     199D226(1)016D(2)(3)     3.5     8       33     D     199D336(1)016D(2)(3)     4.0     8       47     E     199D476(1)016E(2)(3)     5.0     8       68     E     199D686(1)016E(2)(3)     6.0     8       100     F     199D107(1)016F(2)(3)     7.0     10       150     F     199D157(1)016F(2)(3)     8.0     10	10	С	199D106(1)016C(2)(3)	1.5	8
22     D     199D226(1)016D(2)(3)     3.5     8       33     D     199D336(1)016D(2)(3)     4.0     8       47     E     199D476(1)016E(2)(3)     5.0     8       68     E     199D686(1)016E(2)(3)     6.0     8       100     F     199D107(1)016F(2)(3)     7.0     10       150     F     199D157(1)016F(2)(3)     8.0     10	15	С	199D156(1)016C(2)(3)	2.4	8
33     D     199D336(1)016D(2)(3)     4.0     8       47     E     199D476(1)016E(2)(3)     5.0     8       68     E     199D686(1)016E(2)(3)     6.0     8       100     F     199D107(1)016F(2)(3)     7.0     10       150     F     199D157(1)016F(2)(3)     8.0     10	22	D	199D226(1)016D(2)(3)	3.5	8
47     E     199D476(1)016E(2)(3)     5.0     8       68     E     199D686(1)016E(2)(3)     6.0     8       100     F     199D107(1)016F(2)(3)     7.0     10       150     F     199D157(1)016F(2)(3)     8.0     10	33	D	199D336(1)016D(2)(3)	4.0	8
68     E     199D686(1)016E(2)(3)     6.0     8       100     F     199D107(1)016F(2)(3)     7.0     10       150     F     199D157(1)016F(2)(3)     8.0     10	47	E	199D476(1)016E(2)(3)	5.0	8
100F199D107(1)016F(2)(3)7.010150F199D157(1)016F(2)(3)8.010	68	E	199D686(1)016E(2)(3)	6.0	8
150 F 199D157(1)016F(2)(3) 8.0 10	100	F	199D107(1)016F(2)(3)	7.0	10
	150	F	199D157(1)016F(2)(3)	8.0	10

Note .

Part number definitions:

(1) For capacitance tolerance:  $X0 = \pm 20$  %,  $X9 = \pm 10$  % or X5 = 5 %

(2) To specify Lead Style/Spacing/Packaging insert the last three characters in the part number. Use the appropriate code shown in the Current Ordering Cross Reference table and explained in the Ordering Information and Lead Styles table.

(3) E3 = RoHS compliant 100 % tin leads. Blank or no suffix = Standard tin/lead termination.

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

199D



www.vishay.com

Vishay Sprague

STANDARD R	ATINGS			
			MAX. DCL	MAX. DF
(uF)	CASE CODE	PART NUMBER	AT + 25 °C	AT + 25 °C
()** /			(μA)	120 Hz (%)
	20 V <sub>DC</sub> A1	Γ + 85 °C, SURGE = 26 V; 13 V <sub>DC</sub> A	AT + 125 °C, SURGE = 16 V	
3.3	В	199D335(1)020B(2)(3)	0.8	6
4.7	В	199D475(1)020B(2)(3)	1.0	6
6.8	C	199D685(1)020C(2)(3)	1.5	6
10	С	199D106(1)020C(2)(3)	2.0	8
15	D	199D156(1)020D(2)(3)	2.5	8
22	D	199D226(1)020D(2)(3)	3.0	8
33	E	199D336(1)020E(2)(3)	4.0	8
47	E	199D476(1)020E(2)(3)	5.0	8
100	г с	199D000(1)020F(2)(3)	0.0	0
100	 25 V ^1	199D107(1)020F(2)(3)	7.0 XT + 125 °C SUBGE - 21 V	10
1.0		1 + 05 C, SONGE = 55 V, 17 V <sub>DC</sub> F	0.5	Λ
1.0	Δ	199D155(1)025A(2)(3)	0.5	4
2.2	A	199D225(1)025A(2)(3)	0.5	6
3.3	В	199D335(1)025B(2)(3)	0.8	6
4.7	B	199D475(1)025B(2)(3)	1.0	6
6.8	Ċ	199D685(1)025C(2)(3)	1.5	6
10	Č	199D106(1)025C(2)(3)	2.5	8
15	D	199D156(1)025D(2)(3)	3.0	8
22	D	199D226(1)025D(2)(3)	4.0	8
33	Е	199D336(1)025E(2)(3)	5.0	8
47	E	199D476(1)025E(2)(3)	6.0	8
68	F	199D686(1)025F(2)(3)	7.0	8
	35 V <sub>DC</sub> A1	Γ + 85 °C, SURGE = 46 V; 23 V <sub>DC</sub> A	AT + 125 °C, SURGE = 28 V	
0.10	A	199D104(1)035A(2)(3)	0.5	4
0.15	A	199D154(1)035A(2)(3)	0.5	4
0.22	A	199D224(1)035A(2)(3)	0.5	4
0.33	A	199D334(1)035A(2)(3)	0.5	4
0.47	A	199D474(1)035A(2)(3)	0.5	4
0.68	A	199D684(1)035A(2)(3)	0.5	4
1.0	A	199D105(1)035A(2)(3)	0.5	4
1.0	R	100D185(1)035B(2)(3)	0.5	0
2.0	B	100D225(1)035B(2)(3)	0.7	6
2.2	B	199D225(1)035B(2)(3)	1.0	6
47	C	199D475(1)035C(2)(3)	1.0	6
6.8	D D	199D685(1)035D(2)(3)	2.3	6
10	D	199D106(1)035D(2)(3)	3.5	8
15	Ē	199D156(1)035E(2)(3)	4.0	8
22	Ē	199D226(1)035E(2)(3)	5.0	8
33	F	199D336(1)035F(2)(3)	6.0	8
47	F	199D476(1)035F(2)(3)	7.0	8
	50 V <sub>DC</sub> A	Γ + 85 °C, SURGE = 65 V; 33 V <sub>DC</sub> A	AT + 125 °C, SURGE = 40 V	
0.10	А	199D104(1)050A(2)(3)	0.5	4
0.15	A	199D154(1)050A(2)(3)	0.5	4
0.22	A	199D224(1)050A(2)(3)	0.5	4
0.33	A	199D334(1)050A(2)(3)	0.5	4
0.47	A	199D474(1)050A(2)(3)	0.5	4
0.68	A	199D684(1)050A(2)(3)	0.5	4
1.0	В	199D105(1)050B(2)(3)	0.5	4
1.5	C	199D155(1)050C(2)(3)	0.7	6
2.2	C	199D225(1)050C(2)(3)	1.1	6
3.3 1 7	U	199D333(1)050D(2)(3)	1.0	р С
4./		199D473(1)050D(2)(3)	2.U 2.0	р С
0.0	F	199D003(1)030F(2)(3)	3.0	D D
15	F	199D156(1)050F(2)(3)	4.0 5 0	о 8
22	F	199D226(1)050F(2)(3)	6.0	8

Note •

Part number definitions:

(1) For capacitance tolerance:  $X0 = \pm 20$  %,  $X9 = \pm 10$  % or X5 = 5 % (2) To specify Lead Style/Spacing/Packaging insert the last three characters in the part number. Use the appropriate code shown in the Current Ordering Cross Reference table and explained in the Ordering Information and Lead Styles table. (3) E3 = RoHS compliant 100 % tin leads. Blank or no suffix = Standard tin/lead termination.

www.vishay.com

199D Vishay Sprague

STANDARD REEL	PACKAGING SPECII	FICATIONS PER EIA	-468 in inches [millime	ters]		
	0.111 M/ 0.0354 + 0.030 - 0.020 [8.99 + 0.762 - 0.508] ADHESIVE TAPE CARRIER TAPE SE TA	B [3.0] AX.	DNFIGURATION 6.7 EAD CONFIGURATION 2, 4, 5 LEAD CONFIGURATION X 1.270 [32.26] MAX. $0.630 \pm 0.020$ [16.0 ± 0.508] IETER .012 305]	, Z 0.020 1.508]		
CASE CODE	OBSOLETE	LEAD STYLE	LEAD SPACING	LL MIN. (BULK)		
A, B, C, D	A1, A6	1V1 (Bulk), 2B1 (T and R)	1V1 (Bulk),     0.100 + 0.024/- 0.016       2B1 (T and R)     [2.54 + 0.60/- 0.40]			
A, B, C, D	A, B, C, D     B1, B6     XV1 (Bulk), XB1 (T and R)     0.100 + 0.024/- 0.016 [2.54 + 0.60/- 0.40]     0.187 [4.7]					
A, B, C, D, E, F	E2, E7	6V1 (Bulk), 6B1 (T and R)	0.200 + 0.024/- 0.016 [5.08 + 0.06/- 0.40]	0.187 [4.7]		

Note

• Lead space measured within 0.05" [1.27 mm] of the body of the capacitor, or from the bottom of the crimp. Lead Style "A" may be supplied with 0.59" [15 mm] anode lead and 0.47" [12 mm] cathode lead.

**Tape and Reel Packaging:** Type 199D radial-leaded tantalum capacitors, all lead styles exept 1, 3 and Y are available taped and reeled per EIA-468.

CASE CODE	Α	В	С	D	E	F	
Quantity per box bulk	1000 500		1(	00			
Quantity per box ammopack	2500	2000	1500	1000	500		
Quantity per reel		10	50	00			



Vishay

## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

# **Material Category Policy**

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.

# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for vishay manufacturer:

Other Similar products are found below :

M39006/22-0577H Y00892K49000BR13L VSKT250-16PBF M8340109M6801GGD03 NTCALUG01A103F291L ITU1341SM3 VS-MBRB1545CTPBF 1KAB100E 1KAB20E IH10EB600K12 CP0005150R0JE1490 562R5GAD47RR S472M69Z5UR84K0R MKP1848C65090JY5L CRCW1210360RFKEA VSMF4720-GS08 TSOP34438SS1V CRCW04024021FRT7 001789X CRCW08054K00FKTA LVR10R0200FE03 CRCW12063K30FKEAHP 009923A CRCW2010331JR02 CRCW25128K06FKEG CS6600552K000B8768 CSC07A0110K0GPA M34C156K100BZSS M39003/01-2289 M39003/01-2784 M39006/25-0133 M39006/25-0228 M64W101KB40 M64Z501KB40 CW001R5000JS73 CW0055R000JE12 CW0056K800JB12 CW0106K000JE73 672D826H075EK5C CWR06JC105KC CWR06NC475JC MAL219699001E3 MCRL007035R00JHB00 92MT80KPBF PTF56100K00QYEK PTN0805H1502BBTR1K RCWL1210R130JNEA RH005220R0FE02 RH005330R0FC02 RH010R0500FC02