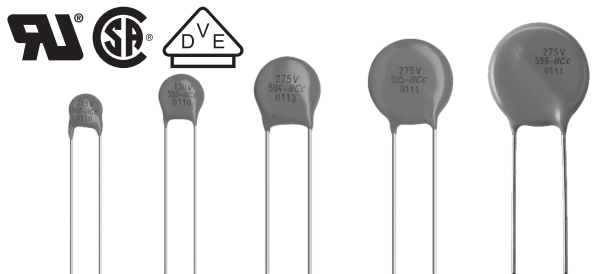


VDR Metal Oxide Varistors Standard



QUICK REFERENCE DATA		
PARAMETER	VALUE	UNIT
Maximum continuous voltage in operating temperature range:		
RMS	14 to 680	V
DC	18 to 895	V
Maximum non-repetitive transient current I_{NRP} (8 x 20 μ s)	100 to 6500	A
Detailed specification	Based on IEC 61051-1 IEC 61051-2 IEC 61051-2-2	
Storage temperature	- 40 to + 125	$^{\circ}$ C
Operating temperature	- 40 to + 85	$^{\circ}$ C

ORDERING INFORMATION

The varistors are available in a number of packaging options:

- Bulk
- On tape on reel
- On tape in ammpack

The basic ordering code for each option is given in tables titled Varistors on Tape on Reel, Varistors on Tape in Ammpack and Varistors in Bulk. To complete the catalog number and to determine the required operating parameters, see Electrical Data and Ordering Information table.

FEATURES

- Zinc oxide disc, epoxy coated
- Straight leads
- Straight leads with flange (2381 592 and 593 series only)
- Kinked leads
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Certified according to UL 1449 edition 3, VDE/IEC 61051-1/2 and CSA



RoHS
COMPLIANT

APPLICATION

- Overvoltage and transient voltage protection

DESCRIPTION

The varistors consist of a disc of low- β ceramic material with two tinned solid copper leads. They are coated with a layer of ochre coloured epoxy, which provides electrical, mechanical and climatic protection. The encapsulation is resistant to all cleaning solvents in accordance with IEC 60068-2-45.

MOUNTING

The varistors are suitable for processing on automatic insertion and cutting and bending equipment.

Varistors with flanged leads provide better positioning on printed-circuit boards (PCB) and more accurate control over component height. This is important for hand mounting and automatic insertion techniques; see outlines of flanged leads drawing.

Typical soldering

235 $^{\circ}$ C, duration: 5 s (Pb-bearing)

245 $^{\circ}$ C, duration: 5 s (lead (Pb)-free)

Resistance to soldering heat

260 $^{\circ}$ C, duration: 10 s max.

MARKING

The varistors are marked with the following information:

- Maximum continuous RMS voltage
- Series number (592, 593, 594, 595 or 596)
- Manufacturers logo
- Date of manufacture (YYWW)

INFLAMMABILITY

The varistors are non-flammable.

The encapsulation is made of flammable resistant epoxy in accordance with UL 94 V-0.

ELECTRICAL DATA AND ORDERING INFORMATION											
MAXIMUM CONTINUOUS VOLTAGE		VOLTAGE ⁽³⁾ at 1 mA	MAXIMUM VOLTAGE at STATED CURRENT		MAXIMUM ENERGY ⁽⁴⁾ (10 x 1000 μ s)	MAXIMUM NON-REP. TRANSIENT CURRENT ⁽⁵⁾ I_{NRP} (8 x 20 μ s)	TYPICAL CAPACITANCE at 1 kHz	T (max.)	E	CATALOG NUMBERS ⁽¹⁾	
RMS ⁽²⁾ (V)	DC (V)	(V)	V (V)	I (A)	(J)	(A)	(pF)	(mm)	(mm)	12NC ⁽⁶⁾	SAP ⁽⁷⁾
14	18	22	48	1.0	0.5	100	1300	4.1	0.7 \pm 0.3	2381 592 x140y	VDRS05A014xyE
			43	2.5	1.7	250	2800	4.1	0.7 \pm 0.3	2381 593 x140y	VDRS07B014xyE
			43	5.0	4.3	500	6000	4.4	0.9 \pm 0.3	2381 594 x140y	VDRS10D014xyE
			43	10.0	5.4	1000	15 000	4.4	0.9 \pm 0.3	2381 595 x140y	VDRS14G014xyE
			43	20.0	8.0	2000	30 000	4.6	1.1 \pm 0.3	2381 596 x140y	VDRS20M014ByE



ELECTRICAL DATA AND ORDERING INFORMATION											
MAXIMUM CONTINUOUS VOLTAGE		VOLTAGE ⁽³⁾ at 1 mA	MAXIMUM VOLTAGE at STATED CURRENT		MAXIMUM ENERGY ⁽⁴⁾ (10 x 1000 µs)	MAXIMUM NON-REP. TRANSIENT CURRENT ⁽⁵⁾ I _{NRP} (8 x 20 µs)	TYPICAL CAPACITANCE at 1 kHz	T (max.)	E	CATALOG NUMBERS ⁽¹⁾	
RMS ⁽²⁾ (V)	DC (V)	(V)	V (V)	I (A)	(J)	(A)	(pF)	(mm)	(mm)	12NC ⁽⁶⁾	SAP ⁽⁷⁾
17	22	27	60	1.0	0.7	100	1050	4.1	0.8 ± 0.3	2381 592 x170y	VDRS05A017xyE
			53	2.5	2.0	250	2000	4.1	0.8 ± 0.3	2381 593 x170y	VDRS07B017xyE
			53	5.0	5.3	500	4000	4.4	1.0 ± 0.3	2381 594 x170y	VDRS10D017xyE
			53	10.0	6.9	1000	10 000	4.4	1.0 ± 0.3	2381 595 x170y	VDRS14G017xyE
			53	20.0	10.0	2000	20 000	4.6	1.2 ± 0.3	2381 596 x170y	VDRS20M017ByE
20	26	33	73	1.0	0.8	100	900	4.1	1.0 ± 0.3	2381 592 x200y	VDRS05A020xyE
			65	2.5	2.5	250	1500	4.1	1.0 ± 0.3	2381 593 x200y	VDRS07B020xyE
			65	5.0	6.5	500	3000	4.4	1.2 ± 0.3	2381 594 x200y	VDRS10D020xyE
			65	10.0	8.8	1000	7500	4.4	1.2 ± 0.3	2381 595 x200y	VDRS14G020xyE
			65	20.0	12.0	2000	15 000	4.8	1.4 ± 0.3	2381 596 x200y	VDRS20M020ByE
25	31	39	86	1.0	0.9	100	500	4.2	1.2 ± 0.3	2381 592 x250y	VDRS05A025xyE
			77	2.5	3.0	250	1350	4.2	1.2 ± 0.3	2381 593 x250y	VDRS07B025xyE
			77	5.0	7.7	500	2600	4.6	1.4 ± 0.3	2381 594 x250y	VDRS10D025xyE
			77	10.0	9.4	1000	6500	4.6	1.4 ± 0.3	2381 595 x250y	VDRS14G025xyE
			77	20.0	14.0	2000	13 000	5.0	1.6 ± 0.3	2381 596 x250y	VDRS20M025ByE
30	38	47	96	1.0	1.1	100	700	4.4	1.4 ± 0.5	2381 592 x300y	VDRS05A030xyE
			93	2.5	3.6	250	1600	4.4	1.4 ± 0.5	2381 593 x300y	VDRS07B030xyE
			93	5.0	9.2	500	2700	4.8	1.6 ± 0.5	2381 594 x300y	VDRS10D030xyE
			90	10.0	12.0	1000	6000	4.8	1.6 ± 0.5	2381 595 x300y	VDRS14G030xyE
			93	20.0	17.0	2000	12 000	5.2	1.8 ± 0.5	2381 596 x300y	VDRS20M030ByE
35	45	56	123	1.0	1.4	100	560	4.8	1.7 ± 0.5	2381 592 x350y	VDRS05A035xyE
			115	2.5	4.4	250	1300	4.8	1.7 ± 0.5	2381 593 x350y	VDRS07B035xyE
			110	5.0	11.0	500	2200	5.2	1.9 ± 0.5	2381 594 x350y	VDRS10D035xyE
			105	10.0	14.0	1000	4800	5.2	1.9 ± 0.5	2381 595 x350y	VDRS14G035xyE
			110	20.0	20.0	2000	9600	5.6	2.1 ± 0.5	2381 596 x350y	VDRS20M035ByE
40	56	68	145	1.0	1.6	100	460	5.1	2.1 ± 0.5	2381 592 x400y	VDRS05A040xyE
			135	2.5	5.2	250	1000	5.1	2.1 ± 0.5	2381 593 x400y	VDRS07B040xyE
			130	5.0	13.0	500	1800	5.5	2.3 ± 0.5	2381 594 x400y	VDRS10D040xyE
			130	10.0	17.0	1000	3800	5.5	2.3 ± 0.5	2381 595 x400y	VDRS14G040xyE
			135	20.0	24.0	2000	7600	5.9	2.5 ± 0.5	2381 596 x400y	VDRS20M040ByE
50	65	82	145	5.0	2.6	400	370	4.1	0.6 ± 0.3	2381 592 x500y	VDRS05C050xyE
			140	10.0	7.0	1200	900	4.1	0.6 ± 0.3	2381 593 x500y	VDRS07H050xyE
			140	25.0	12.0	2500	1500	4.4	0.8 ± 0.3	2381 594 x500y	VDRS10P050xyE
			140	50.0	21.0	4500	3100	4.4	0.8 ± 0.3	2381 595 x500y	VDRS14T050xyE
			165	5.0	2.9	400	290	4.1	0.7 ± 0.3	2381 592 x600y	VDRS05C060xyE
60	85	100	165	10.0	8.3	1200	700	4.1	0.7 ± 0.3	2381 593 x600y	VDRS07H060xyE
			165	25.0	15.0	2500	1200	4.4	0.9 ± 0.3	2381 594 x600y	VDRS10P060xyE
			165	50.0	24.0	4500	2300	4.4	0.9 ± 0.3	2381 595 x600y	VDRS14T060xyE
			165	100.0	56.0	6500	4700	4.5	1.1 ± 0.3	2381 596 x600y	VDRS20W060ByE
			190	5.0	3.4	400	240	4.1	0.9 ± 0.3	2381 592 x750y	VDRS05C075xyE
75	100	120	200	10.0	10.0	1200	530	4.1	0.9 ± 0.3	2381 593 x750y	VDRS07H075xyE
			200	25.0	18.0	2500	1000	4.4	1.1 ± 0.3	2381 594 x750y	VDRS10P075xyE
			200	50.0	29.0	4500	1900	4.4	1.1 ± 0.3	2381 595 x750y	VDRS14T075xyE
			200	100.0	64.0	6500	3900	4.8	1.3 ± 0.3	2381 596 x750y	VDRS20W075ByE
			230	5.0	4.1	400	180	4.2	1.1 ± 0.3	2381 592 x950y	VDRS05C095xyE
95	125	150	250	10.0	13.0	1200	450	4.2	1.1 ± 0.3	2381 593 x950y	VDRS07H095xyE
			250	25.0	22.0	2500	800	4.6	1.3 ± 0.3	2381 594 x950y	VDRS10P095xyE
			250	50.0	37.0	4500	1500	4.6	1.3 ± 0.3	2381 595 x950y	VDRS14T095xyE
			250	100.0	88.0	6500	3000	5.2	1.5 ± 0.3	2381 596 x950y	VDRS20W095ByE

ELECTRICAL DATA AND ORDERING INFORMATION											
MAXIMUM CONTINUOUS VOLTAGE		VOLTAGE at 1 mA ⁽³⁾	MAXIMUM VOLTAGE at STATED CURRENT		MAXIMUM ENERGY ⁽⁴⁾ (10 x 1000 µs)	MAXIMUM NON-REP. TRANSIENT CURRENT ⁽⁵⁾ I _{NRP} (8 x 20 µs)	TYPICAL CAPACITANCE at 1 kHz	T (max.)	E	CATALOG NUMBERS ⁽¹⁾	
RMS ⁽²⁾ (V)	DC (V)	(V)	V (V)	I (A)	(J)	(A)	(pF)	(mm)	(mm)	12NC ⁽⁶⁾	SAP ⁽⁷⁾
130	170	205	310	5.0	5.5	400	130	4.2	1.0 ± 0.3	2381 592 x131y	VDRS05C130xyE
			340	10.0	17.0	1200	320	4.2	1.0 ± 0.3	2381 593 x131y	VDRS07H130xyE
			340	25.0	30.0	2500	580	4.6	1.2 ± 0.3	2381 594 x131y	VDRS10P130xyE
			340	50.0	56.0	4500	1050	4.6	1.2 ± 0.3	2381 595 x131y	VDRS14T130xyE
			340	100.0	114.0	6500	2100	5.3	1.4 ± 0.3	2381 596 x131y	VDRS20W130ByE
140	180	220	350	5.0	6.3	400	120	4.4	1.0 ± 0.3	2381 592 x141y	VDRS05C140xyE
			370	10.0	21.0	1200	290	4.4	1.0 ± 0.3	2381 593 x141y	VDRS07H140xyE
			370	25.0	33.0	2500	540	4.8	1.2 ± 0.3	2381 594 x141y	VDRS10P140xyE
			370	50.0	57.0	4500	950	4.8	1.2 ± 0.3	2381 595 x141y	VDRS14T140xyE
			360	100.0	124.0	6500	1900	5.4	1.5 ± 0.3	2381 596 x141y	VDRS20W140ByE
150	200	240	395	5.0	7.1	400	110	4.4	1.1 ± 0.3	2381 592 x151y	VDRS05C150xyE
			400	10.0	20.0	1200	270	4.4	1.1 ± 0.3	2381 593 x151y	VDRS07H150xyE
			400	25.0	36.0	2500	490	4.8	1.3 ± 0.3	2381 594 x151y	VDRS10P150xyE
			400	50.0	59.0	4500	850	4.8	1.3 ± 0.3	2381 595 x151y	VDRS14T150xyE
			395	100.0	134.0	6500	1700	5.5	1.6 ± 0.3	2381 596 x151y	VDRS20W150ByE
175	225	275	410	5.0	7.3	400	90	4.6	1.3 ± 0.3	2381 592 x171y	VDRS05C175xyE
			455	10.0	23.0	1200	230	4.6	1.3 ± 0.3	2381 593 x171y	VDRS07H175xyE
			455	25.0	41.0	2500	430	5.0	1.5 ± 0.3	2381 594 x171y	VDRS10P175xyE
			455	50.0	67.0	4500	750	5.0	1.5 ± 0.3	2381 595 x171y	VDRS14T175xyE
			455	100.0	158.0	6500	1500	5.7	1.7 ± 0.3	2381 596 x171y	VDRS20W175ByE
230	300	360	560	5.0	10.0	400	70	4.9	1.7 ± 0.8	2381 592 x231y	VDRS05C230xyE
			600	10.0	30.0	1200	170	4.9	1.7 ± 0.8	2381 593 x231y	VDRS07H230xyE
			600	25.0	54.0	2500	320	5.4	1.9 ± 0.8	2381 594 x231y	VDRS10P230xyE
			600	50.0	88.0	4500	540	5.4	1.9 ± 0.8	2381 595 x231y	VDRS14T230xyE
			595	100.0	208.0	6500	1100	6.2	2.2 ± 0.8	2381 596 x231y	VDRS20W230ByE
250	320	390	600	5.0	11.0	400	60	4.9	1.9 ± 0.8	2381 592 x251y	VDRS05C250xyE
			650	10.0	33.0	1200	160	4.9	1.9 ± 0.8	2381 593 x251y	VDRS07H250xyE
			650	25.0	58.0	2500	300	5.4	2.1 ± 0.8	2381 594 x251y	VDRS10P250xyE
			650	50.0	96.0	4500	480	5.4	2.1 ± 0.8	2381 595 x251y	VDRS14T250xyE
			650	100.0	240.0	6500	960	6.4	2.3 ± 0.8	2381 596 x251y	VDRS20W250ByE
275	350	430	695	5.0	12.0	400	55	4.9	2.0 ± 0.8	2381 592 x271y	VDRS05C275xyE
			710	10.0	36.0	1200	140	4.9	2.0 ± 0.8	2381 593 x271y	VDRS07H275xyE
			710	25.0	63.0	2500	270	5.4	2.2 ± 0.8	2381 594 x271y	VDRS10P275xyE
			710	50.0	104.0	4500	440	5.4	2.2 ± 0.8	2381 595 x271y	VDRS14T275xyE
			710	100.0	264.0	6500	900	6.6	2.5 ± 0.8	2381 596 x271y	VDRS20W275ByE
300	385	470	750	5.0	13.0	400	50	5.3	2.2 ± 0.8	2381 592 x301y	VDRS05C300xyE
			800	10.0	40.0	1200	130	5.3	2.2 ± 0.8	2381 593 x301y	VDRS07H300xyE
			800	25.0	71.0	2500	240	5.9	2.4 ± 0.8	2381 594 x301y	VDRS10P300xyE
			800	50.0	117.0	4500	400	5.9	2.4 ± 0.8	2381 595 x301y	VDRS14T300xyE
			775	100.0	280.0	6500	810	6.9	2.7 ± 0.8	2381 596 x301y	VDRS20W300ByE
320	420	510	800	5.0	15.0	400	45	5.5	2.4 ± 0.8	2381 592 x321y	VDRS05C320xyE
			850	10.0	44.0	1200	120	5.5	2.4 ± 0.8	2381 593 x321y	VDRS07H320xyE
			850	25.0	77.0	2500	220	6.2	2.6 ± 0.8	2381 594 x321y	VDRS10P320xyE
			850	50.0	120.0	4500	370	6.2	2.6 ± 0.8	2381 595 x321y	VDRS14T320xyE
			842	100.0	296.0	6500	750	7.1	2.9 ± 0.8	2381 596 x321y	VDRS20W320ByE
350	460	560	940	5.0	19.5	400	42	5.8	2.7 ± 0.8	2381 592 x351y	VDRS05C350xyE
			920	10.0	39.0	1200	110	5.8	2.7 ± 0.8	2381 593 x351y	VDRS07H350xyE
			920	25.0	78.0	2500	200	6.6	2.9 ± 0.8	2381 594 x351y	VDRS10P350xyE
			920	50.0	156.0	4500	325	6.6	2.9 ± 0.8	2381 595 x351y	VDRS14T350xyE
			920	100.0	312.0	6500	660	7.4	3.2 ± 0.8	2381 596 x351y	VDRS20W350ByE



ELECTRICAL DATA AND ORDERING INFORMATION											
MAXIMUM CONTINUOUS VOLTAGE		VOLTAGE (3) at 1 mA	MAXIMUM VOLTAGE at STATED CURRENT		MAXIMUM ENERGY (4) (10 x 1000 µs)	MAXIMUM NON-REP. TRANSIENT CURRENT (5) I _{NRP} (8 x 20 µs)	TYPICAL CAPACITANCE at 1 kHz	T (max.)	E	CATALOG NUMBERS (1)	
RMS (2) (V)	DC (V)	(V)	V (V)	I (A)	(J)	(A)	(pF)	(mm)	(mm)	12NC (6)	SAP (7)
385	505	620	1000	5.0	18.0	400	40	6.0	3.0 ± 0.8	2381 592 x381y	VDRS05C385xyE
			1025	10.0	51.0	1200	95	6.0	3.0 ± 0.8	2381 593 x381y	VDRS07H385xyE
			1025	25.0	67.0	2500	180	6.6	3.2 ± 0.8	2381 594 x381y	VDRS10P385xyE
			1025	50.0	110.0	4500	280	6.6	3.2 ± 0.8	2381 595 x381y	VDRS14T385xyE
			1025	100.0	328.0	6500	570	7.7	3.5 ± 0.8	2381 596 x381y	VDRS20W385ByE
420	560	680	1100	5.0	20.0	400	35	6.1	3.2 ± 0.8	2381 592 x421y	VDRS05C420xyE
			1120	10.0	56.0	1200	85	6.1	3.2 ± 0.8	2381 593 x421y	VDRS07H420xyE
			1120	25.0	73.0	2500	165	6.6	3.4 ± 0.8	2381 594 x421y	VDRS10P420xyE
			1120	50.0	120.0	4500	250	6.6	3.4 ± 0.8	2381 595 x421y	VDRS14T420xyE
			1120	100.0	344.0	6500	510	8.1	3.7 ± 0.8	2381 596 x421y	VDRS20W420ByE
460	615	750	1200	5.0	21.0	400	30	6.4	3.6 ± 0.8	2381 592 x461y	VDRS05C460xyE
			1240	10.0	63.0	1200	75	6.4	3.6 ± 0.8	2381 593 x461y	VDRS07H460xyE
			1240	25.0	82.0	2500	150	6.8	3.8 ± 0.8	2381 594 x461y	VDRS10P460xyE
			1240	50.0	135.0	4500	225	6.8	3.8 ± 0.8	2381 595 x461y	VDRS14T460xyE
			1240	100.0	360.0	6500	460	8.5	4.1 ± 0.8	2381 596 x461y	VDRS20W460ByE
510	670	820	1355	25.0	89.0	2500	135	7.2	4.1 ± 0.8	2381 594 x511y	VDRS10P510xyE
			1355	50.0	145.0	4500	220	7.2	4.1 ± 0.8	2381 595 x511y	VDRS14T510xyE
			1355	100.0	376.0	6500	450	8.9	4.4 ± 0.8	2381 596 x511y	VDRS20W510ByE
550	745	910	1500	25.0	98.0	2500	120	7.9	4.5 ± 0.8	2381 594 x551y	VDRS10P550xyE
			1500	50.0	160.0	4500	180	7.9	4.5 ± 0.8	2381 595 x551y	VDRS14T550xyE
			1500	100.0	408.0	6500	370	9.5	4.9 ± 0.8	2381 596 x551y	VDRS20W550ByE
625	825	1000	1650	100.0	448.0	6500	320	10.1	5.3 ± 0.8	2381 596 x621y	VDRS20W625ByE
680	895	1100	1815	100.0	496.0	6500	270	10.6	5.8 ± 0.8	2381 596 x681y	VDRS20W680ByE

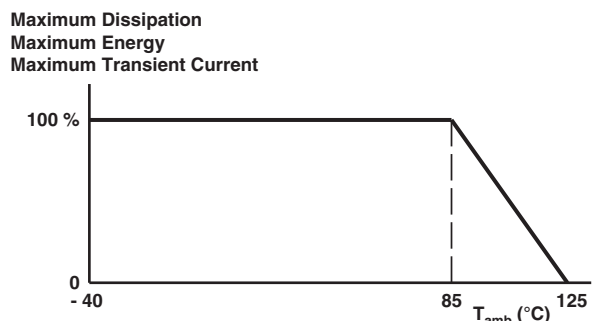
Notes

- (1) The products are certified according to (c)UL (E332800), VDE (40002622) and CSA (219883)
- (2) The sinusoidal voltage is assumed as the normal operating condition. If a non-sinusoidal voltage is present, type selection should be based on multiplying the peak voltage by a factor of 0.707.
- (3) The voltage measured at 1 mA meets the requirements of IEC 61051.
The tolerance on the voltage at 1 mA is ± 10 %.
- (4) High energy surges are generally of longer duration. The maximum energy for one pulse of 10 x 1000 µs is given as a reference for longer duration pulses. This pulse can be characterised by peak current (I_p) and pulse width t₂ (virtual time of half I_p value, following IEC 60060-2, section 6). If V_p is the clamping voltage corresponding to I_p, the energy absorbed in the varistor is determined by the formula:
E = K x V_p x I_p x t₂
where:
a) K is dependent on the value of t₂ when the value of t₁ is between 8 µs and 10 µs; see Peak Current as a Function of Pulse Width drawing.
- (5) A current wave of 8 x 20 µs is used as a standard for pulse current and clamping voltage ratings. The maximum non-repetitive transient current is given for one pulse applied during the life of the component.
- (6) For composition of the 12NC part number replace "x" and "y" by figures from the sections "Varistors in Bulk", "Varistors on Tape in Ammpack" and "Varistors on Tape on Reel".
- (7) For composition of the SAP part number:
Replace "x" by B for bulk type
T for tape and reel
A for tape and ammpack
Replace "y" by S for straight leads
F for straight leads with flange (bulk only)
G for straight leads with flange and H₀ = 16 mm (tape and reel/ammo)
H for straight leads with flange and H₀ = 18.25 mm (tape and reel/ammo)
K for kinked leads (bulk only)
L for kinked leads with H₀ = 16 mm (tape and reel/ammo)
M for kinked leads with H₀ = 18.25 mm (tape and reel/ammo)

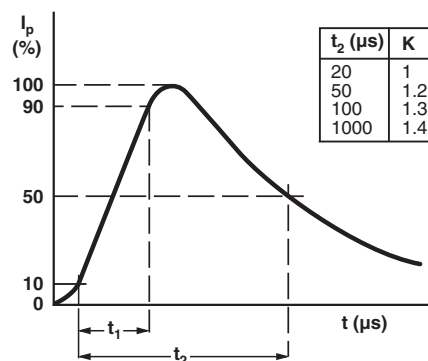
ELECTRICAL CHARACTERISTICS

ELECTRICAL DATA		
PARAMETER	VALUE	UNIT
Maximum continuous voltage:		
RMS	14 to 680	V
DC	18 to 895	V
Maximum non-repetitive transient current (I_{NRP}) (8 x 20 μ s):		
2381 592/VDRS05.....E	100 or 400	A
2381 593/VDRS07.....E	250 or 1200	A
2381 594/VDRS10.....E	500 or 2500	A
2381 595/VDRS14.....E	1000 or 4500	A
2381 596/VDRS20.....E	2000 or 6500	A
Thermal resistance:		
2381 592/VDRS05.....E	\approx 80	K/W
2381 593/VDRS07.....E	\approx 70	K/W
2381 594/VDRS10.....E	\approx 60	K/W
2381 595/VDRS14.....E	\approx 50	K/W
2381 596/VDRS20.....E	\approx 40	K/W
Maximum dissipation:		
2381 592/VDRS05.....E	100	mW
2381 593/VDRS07.....E	250	mW
2381 594/VDRS10.....E	400	mW
2381 595/VDRS14.....E	600	mW
2381 596/VDRS20.....E	1000	mW
Temperature coefficient of voltage at 1 mA maximum	\pm 0.05	%/K
Voltage proof between interconnected leads and case	2500	V
Storage temperature	- 40 to + 125	$^{\circ}$ C
Operating temperature	- 40 to + 85	$^{\circ}$ C

DERATING CURVE



PEAK CURRENT AS A FUNCTION OF PULSE WIDTH



COMPONENT DIMENSIONS (BULK TYPE) in millimeters AND CATALOG NUMBERS

D MAX.	A MAX.	A ₀ MAX.	L MIN.	T ⁽¹⁾ MAX.	E ⁽¹⁾	d	F	CATALOG NUMBER
7.0	9.0	11.0	24.0	6.5	0.7 to 3.6	0.6 \pm 0.05	5 \pm 1.0	2381 592/VDRS05.....E
9.0	11.0	13.0	24.0	6.5	0.7 to 3.6	0.6 \pm 0.05	5 \pm 1.0	2381 593/VDRS07.....E
13.5	15.5	18.0	17.0	8	0.9 to 4.5	0.8 \pm 0.05	7.5 \pm 1.0	2381 594/VDRS10.....E
17.0	19.0	23.0	16.0	8	0.9 to 4.5	0.8 \pm 0.05	7.5 \pm 1.0	2381 595/VDRS14.....E
23.0	25.0	28.0	24.0	10	1.1 to 5.8	1.0 \pm 0.05	10 \pm 1.0	2381 596/VDRS20.....E

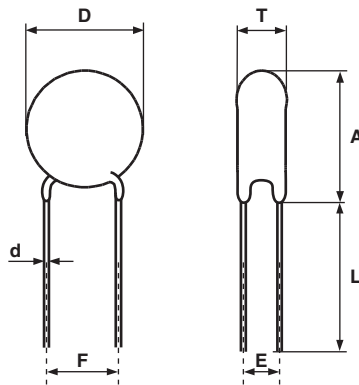
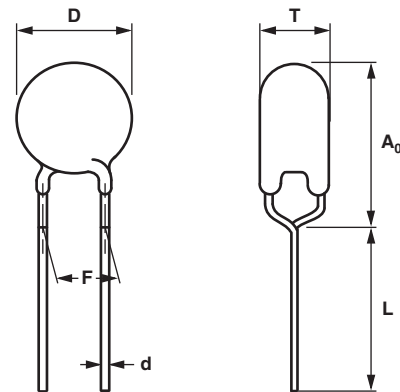
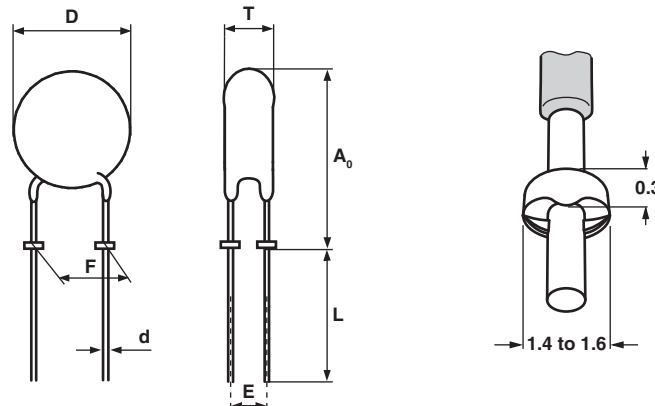
Note

⁽¹⁾ T_{max} . and E values per size and voltage level can be found back in the Electrical Data table

VARISTORS IN BULK					
TYPE	2381 592 Ø 5 mm 14 V to 460 V	2381 593 Ø 7 mm 14 V to 460 V	2381 594 Ø 10 mm 14 V to 550 V	2381 595 Ø 14 mm 14 V to 550 V	2381 596 Ø 20 mm 14 V to 680 V
Straight leads; see outline of components with straight leads drawing ⁽¹⁾	5...6	5...6	5...6	5...6	5...6
Straight leads with flange; see outline of components with flanged leads drawing	7...6	7...6	-	-	-
Kinked leads; see outline of components with kinked leads drawing	6...6	6...6	6...6	6...6	6...6
Packaging quantities					
14 V to 95 V	250	250	250	100	50
130 V to 385 V	250	250	250	100	50
420 V to 460 V	250	250	200	100	50
485 V to max. V	-	250	150	100	50

Note
⁽¹⁾ Outline of the Ø 20 mm differs from the other dimensions

DIMENSIONS in millimeters: See Component Dimensions and Electrical Data table

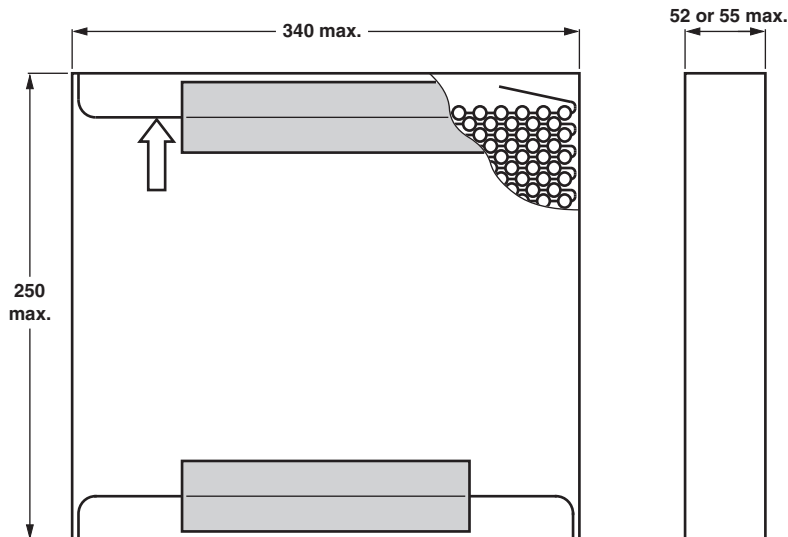
OUTLINE of Component with Straight Leads

OUTLINE of Component with Kinked Leads

OUTLINE of Component with Flanged Leads


VARISTORS ON TAPE IN AMMOPACK				
TYPE	2381 592 Ø 5 mm 14 V to 460 V	2381 593 Ø 7 mm 14 V to 460 V	2381 594 Ø 10 mm 14 V to 550 V	2381 595 Ø 14 mm 14 V to 550 V
Straight leads				
H = 18 mm	-	-	0...7	0...7
H = 20 mm	0...7	0...7	-	-
See drawing: Taped version with straight leads				
Straight leads with flange				
H ₀ = 16 mm	1...7	1...7	-	-
H ₀ = 18.25 mm	2...7	2...7	-	-
See drawing: Taped version with flanged leads				
Kinked leads				
H ₀ = 18.25 mm	3...7	3...7	3...7	3...7
H ₀ = 16 mm	8...7	8...7	8...7	8...7
See drawing: Taped version with kinked leads				
Packaging quantities				
14 V to 210 V	1500 ⁽¹⁾	1500 ⁽¹⁾	500	500
230 V to max. V	1000	1000	500	500

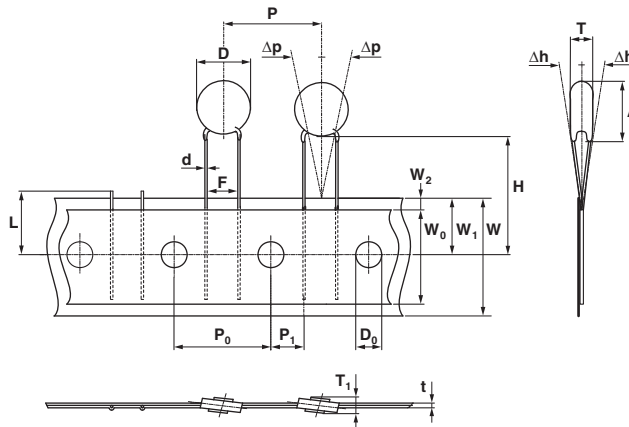
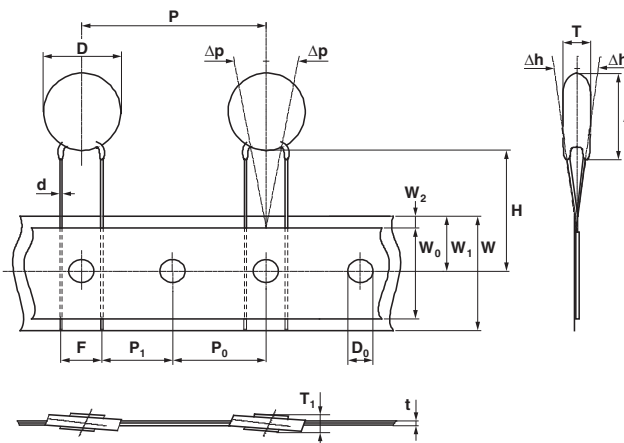
Note

⁽¹⁾ Except for 35 V and 40 V = 1000 pieces

DIMENSIONS OF AMMOPACK in millimeters

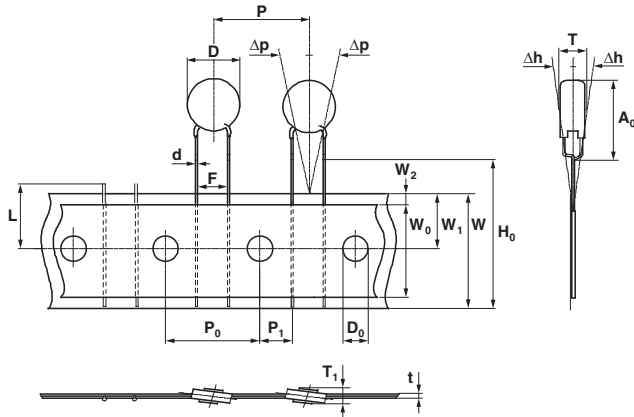


VARISTORS ON TAPE AND REEL				
TYPE	2381 592 Ø 5 mm 14 V to 460 V	2381 593 Ø 7 mm 14 V to 460 V	2381 594 Ø 10 mm 14 V to 550 V	2381 595 Ø 14 mm 14 V to 550 V
Straight leads H = 18 mm H = 20 mm See drawing: Taped version with straight leads	- 0...6	- 0...6	0...6 -	0...6 -
Straight leads with flange H ₀ = 16 mm H ₀ = 18.25 mm See drawing: Taped version with flanged leads	1...6 2...6	1...6 2...6	- -	- -
Kinked leads H ₀ = 18.25 mm H ₀ = 16 mm See drawing: Taped version with kinked leads	3...6 8...6	3...6 8...6	3...6 8...6	3...6 8...6
Packaging quantities				
14 V to 250 V	1500	1500	1000	750
275 V to 300 V	1500	1500	750	750
320 V to 350 V	1000	1000	500	500
385 V to max. V	1000	1000	500	500

PACKAGING
TAPED VERSION WITH STRAIGHT LEADS (only for 2381 592/VDRS05.....E and 2381 593...../VDRS07.....E)

TAPED VERSION WITH STRAIGHT LEADS (only for 2381 594/VDRS10.....E and 2381 595/VDRS14.....E)


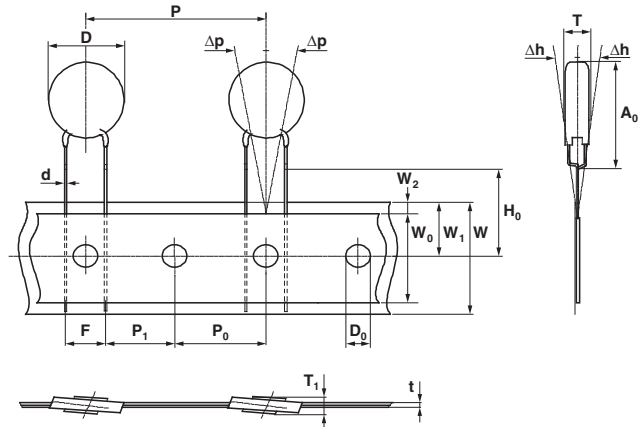
TAPED VERSION WITH KINKED LEADS

(only for 2381 592/VDRS05.....E and 2381 593/VDRS07.....E)



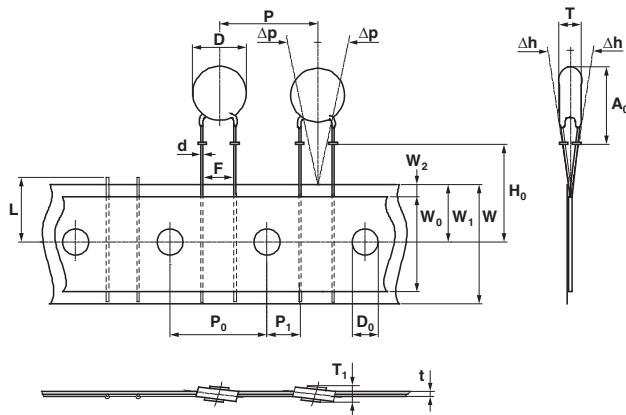
TAPED VERSION WITH KINKED LEADS

(only for 2381 594/VDRS10.....E and 2381 595/VDRS14.....E)



TAPED VERSION WITH FLANGED LEADS

(only for 2381 592/VDRS05.....E and 2381 593/VDRS07.....E)



TAPING DATA (based on IEC 60286-2)					
SYMBOL	PARAMETER	DIMENSIONS/TOLERANCE			
		592	593	594	595
A	Mounting height	9.0 max.	11.0 max.	15.5 max.	19.0 max.
A ₀	Mounting height	11.0 max.	13.0 max.	18.0 max.	23.0 max.
D	Body diameter	7.0 max.	9.0 max.	13.5 max.	17.0 max.
d	Lead wire diameter	0.6 ± 0.05		0.8 ± 0.05	
F	Lead to lead distance ⁽¹⁾	5.0 + 0.8/- 0.2		7.5 ± 0.8	
H	Distance component to tape center ⁽²⁾	20.0 + 2.0/- 0.0		18.0 + 2.0/- 0.0	
H ₀	Lead wire clinch height	16.0 or 18.25 ± 0.5			
P	Pitch of components on tape	12.7 ± 1.0		25.4 ± 1.0	
T	Total thickness	See Electrical Data table			

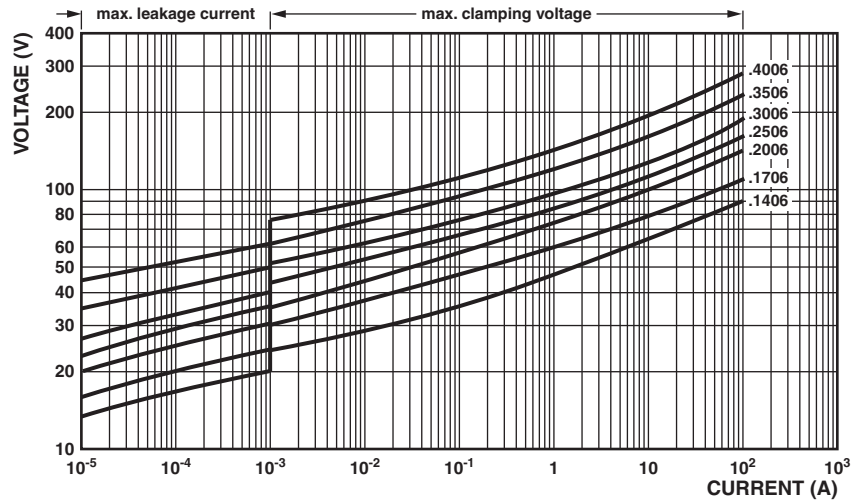
Notes

- (1) Guaranteed between component and tape
- (2) For 2381 595 0511y and 2381 595 0551y: H = 20 mm ± 1 mm

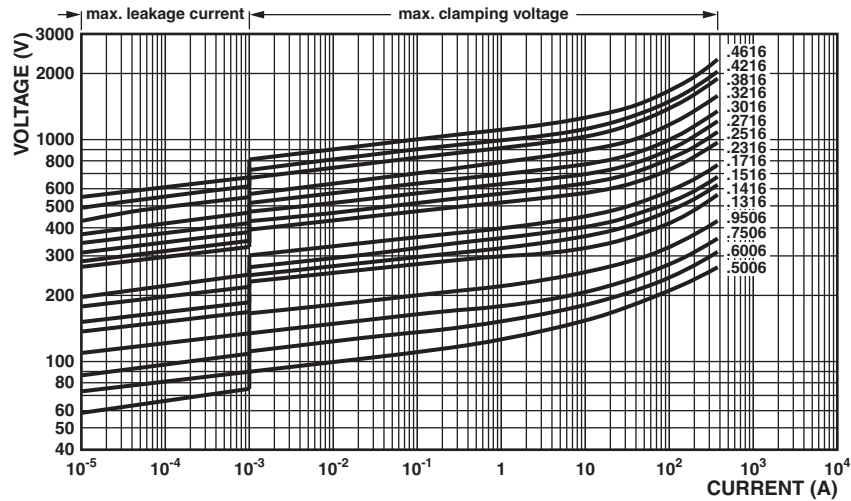


V/I CHARACTERISTICS

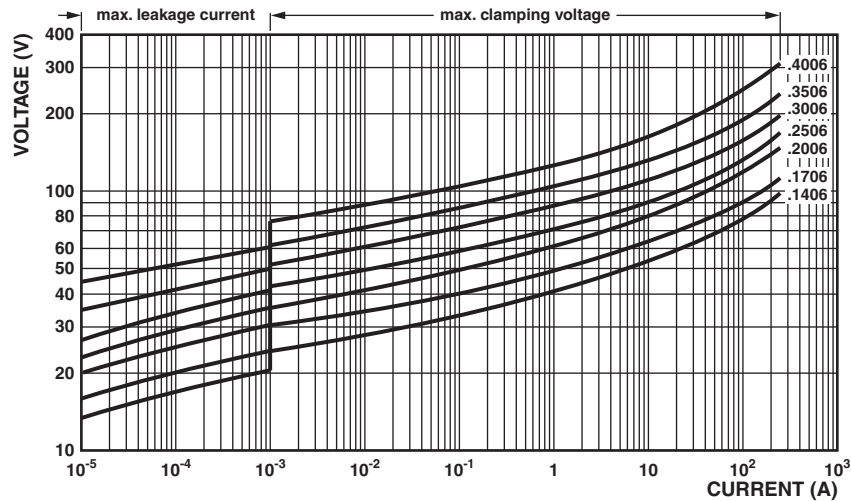
14 V_{RMS} to 40 V_{RMS}; 2381 592VDRS05.....E



50 V_{RMS} to 460 V_{RMS}; 2381 592VDRS05.....E



14 V_{RMS} to 40 V_{RMS}; 2381 593VDRS07.....E

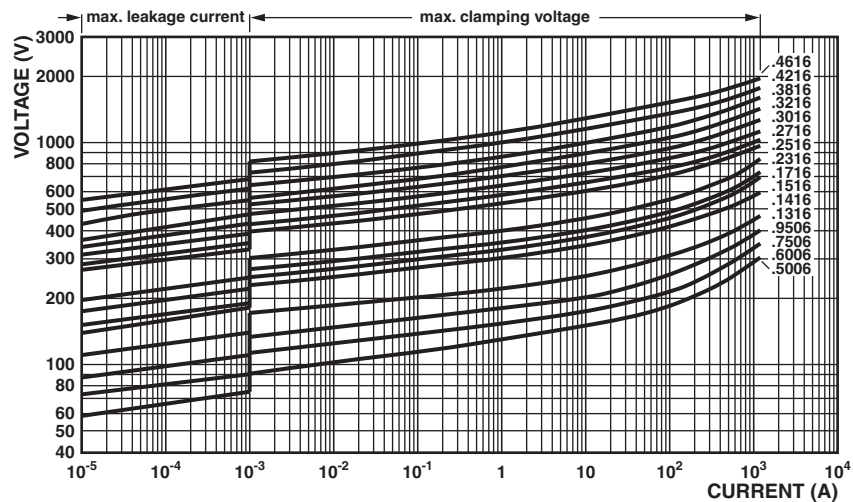


2381 59./VDRS.....E

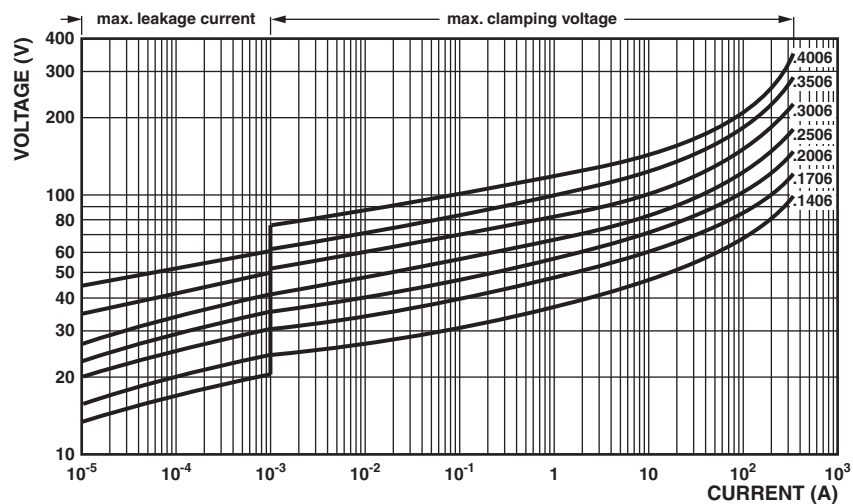


Vishay BCcomponents VDR Metal Oxide Varistors Standard

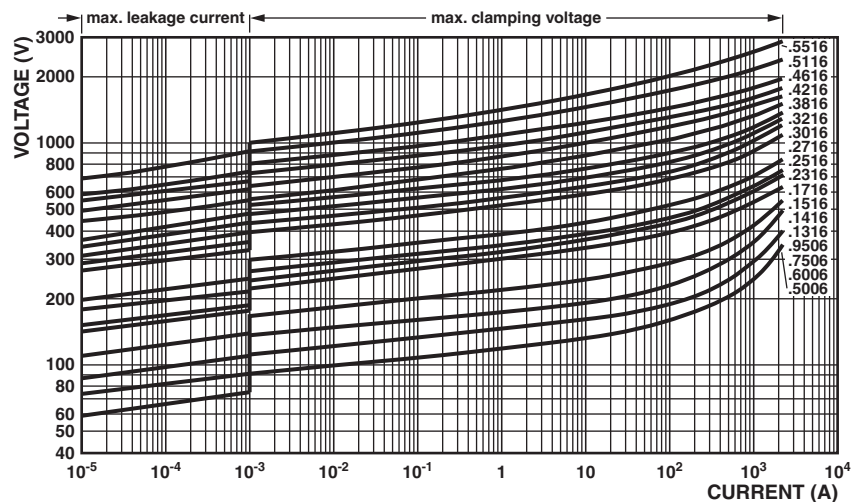
50 V_{RMS} to 460 V_{RMS}; 2381 593/VDRS07.....E



14 V_{RMS} to 40 V_{RMS}; 2381 594/VDRS10.....E

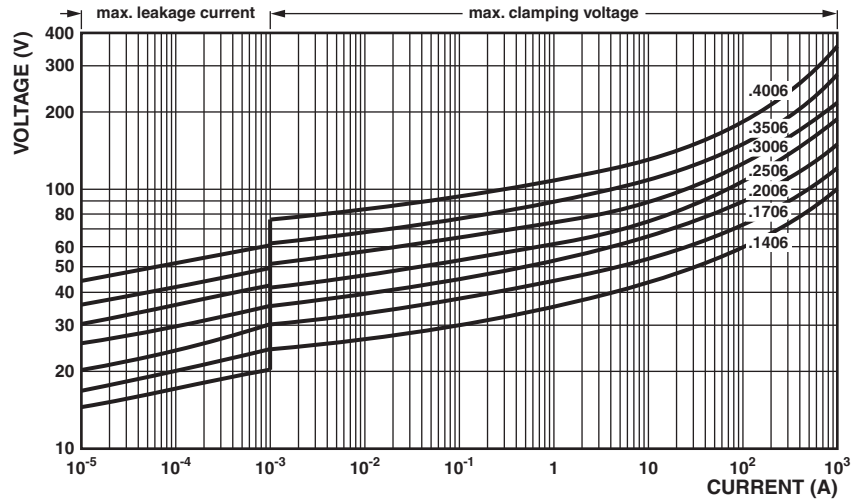


50 V_{RMS} to 550 V_{RMS}; 2381 594/VDRS10.....E

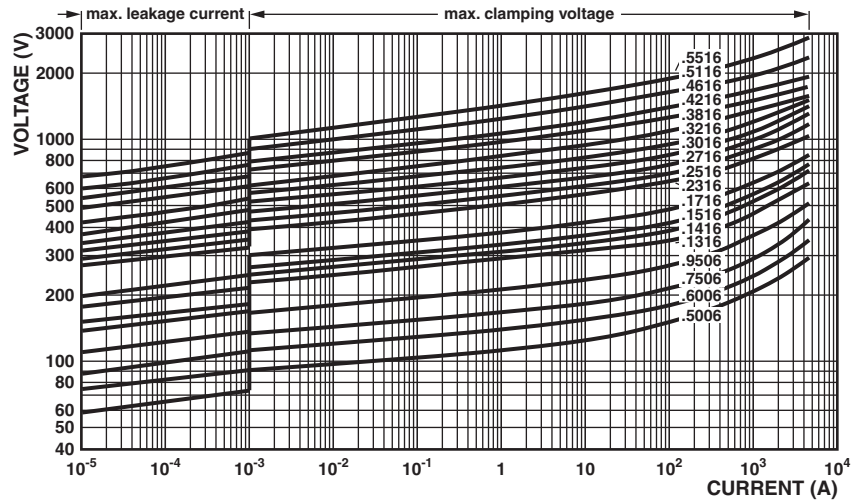




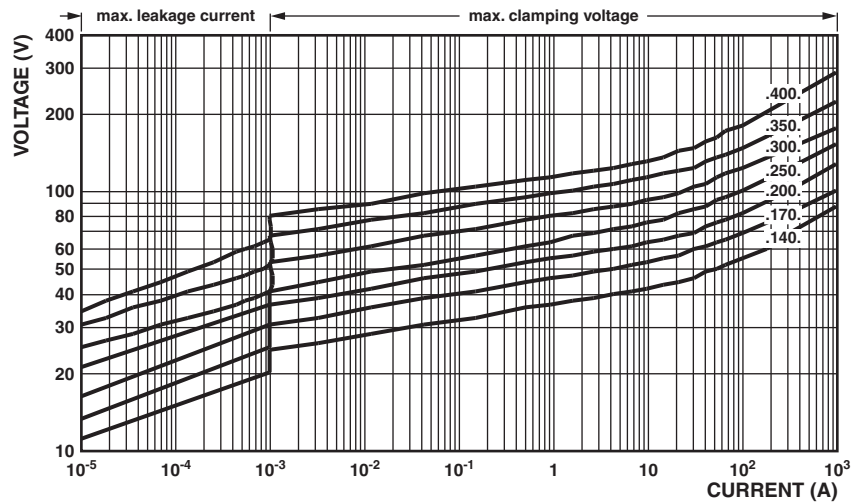
14 V_{RMS} to 40 V_{RMS}; 2381 595VDRS14....E



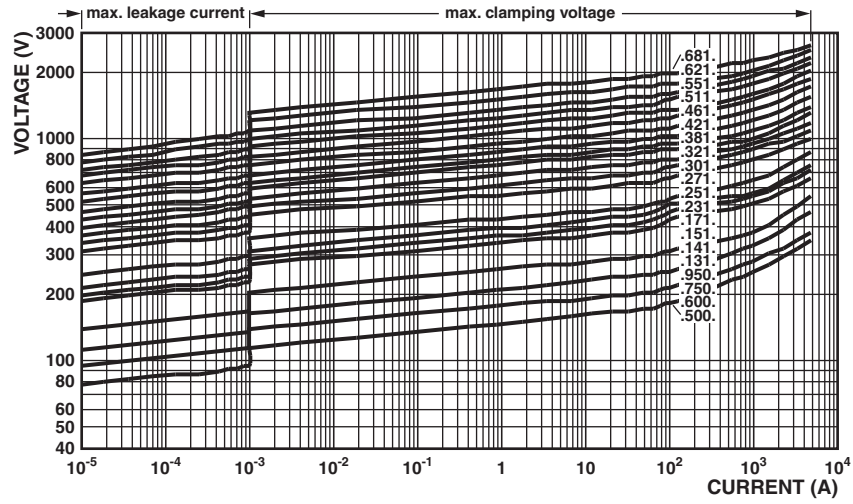
50 V_{RMS} to 550 V_{RMS}; 2381 595VDRS14....E



14 V_{RMS} to 40 V_{RMS}; 2381 596VDRS20....E

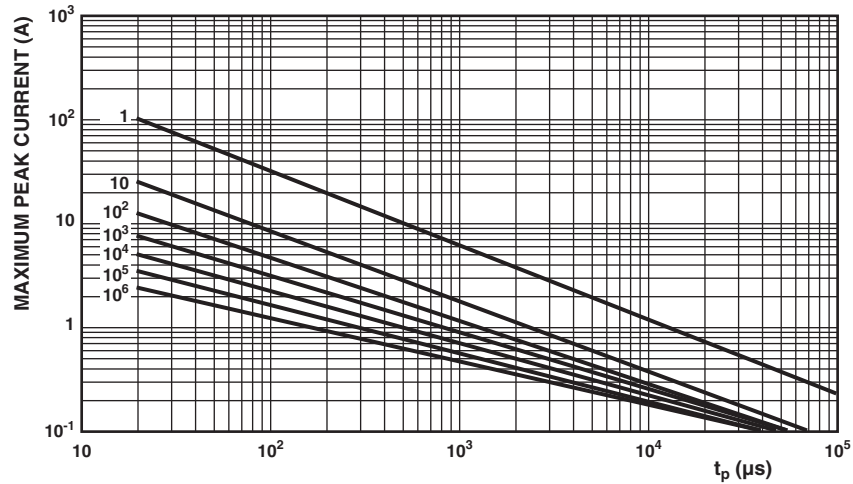


50 V_{RMS} to 680 V_{RMS}; 2381 596/VDRS20.....E

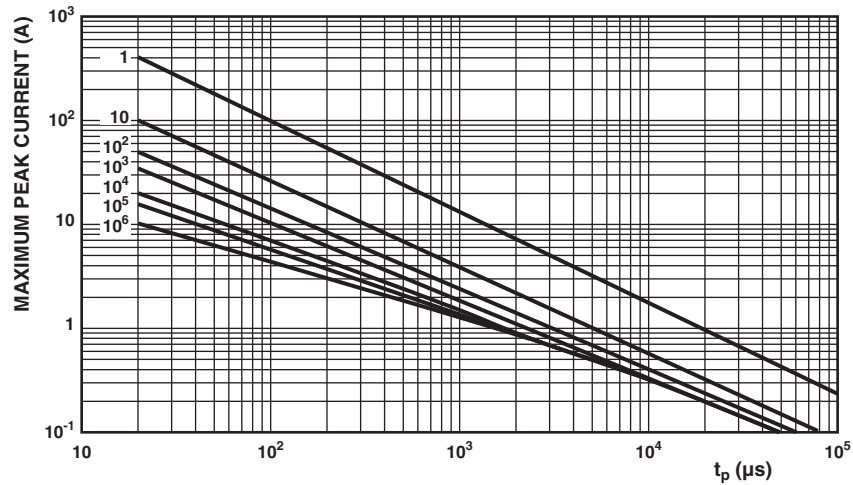


MAXIMUM APPLICABLE TRANSIENT CURRENT AS A FUNCTION OF PULSE DURATION

14 V_{RMS} to 40 V_{RMS}; 2381 592/VDRS05.....E

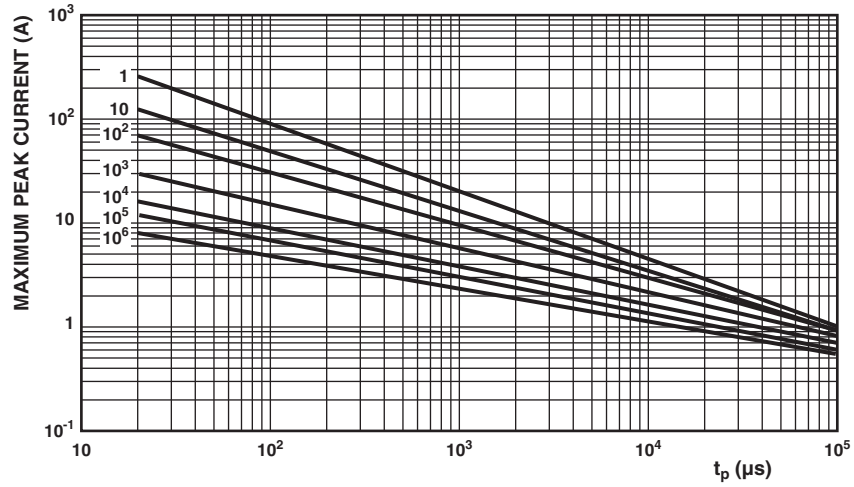


50 V_{RMS} to 460 V_{RMS}; 2381 592/VDRS05.....E

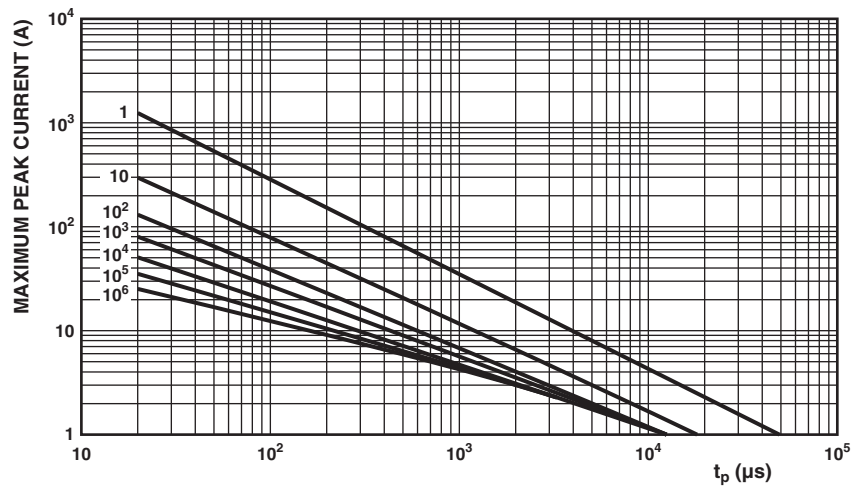




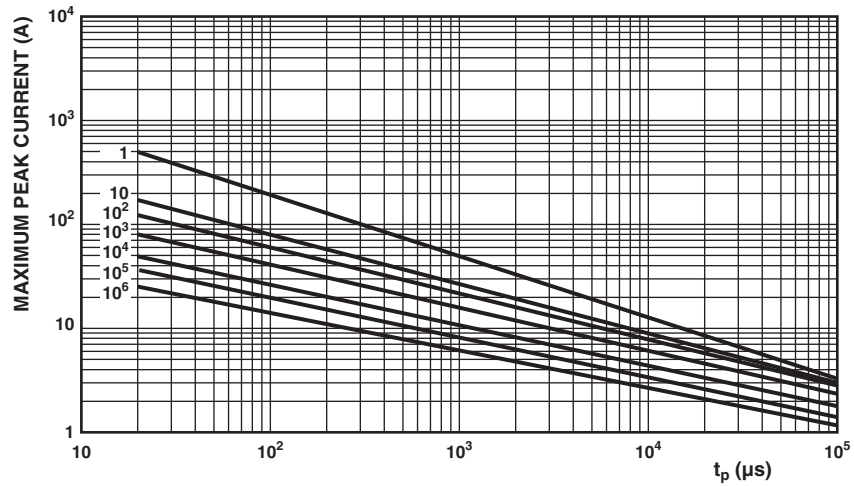
14 V_{RMS} to 40 V_{RMS}; 2381 593VDRS07.....E



50 V_{RMS} to 460 V_{RMS}; 2381 593VDRS07.....E



14 V_{RMS} to 40 V_{RMS}; 2381 594VDRS10.....E

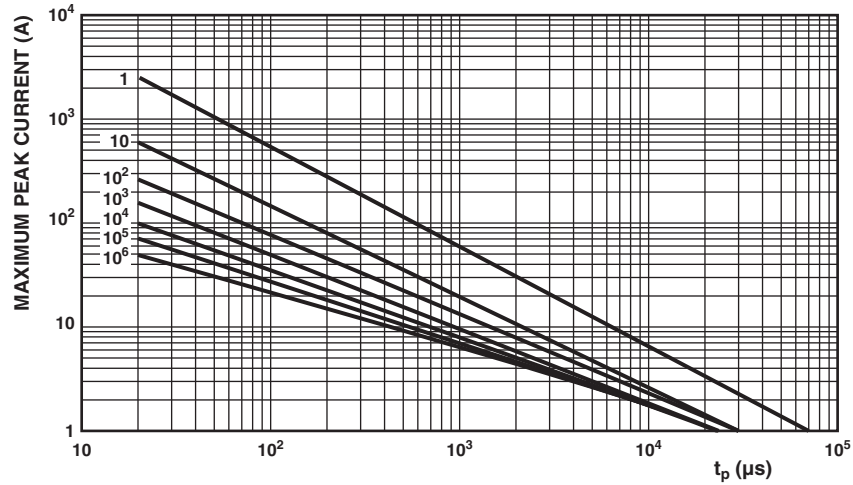


2381 59./VDRS.....E

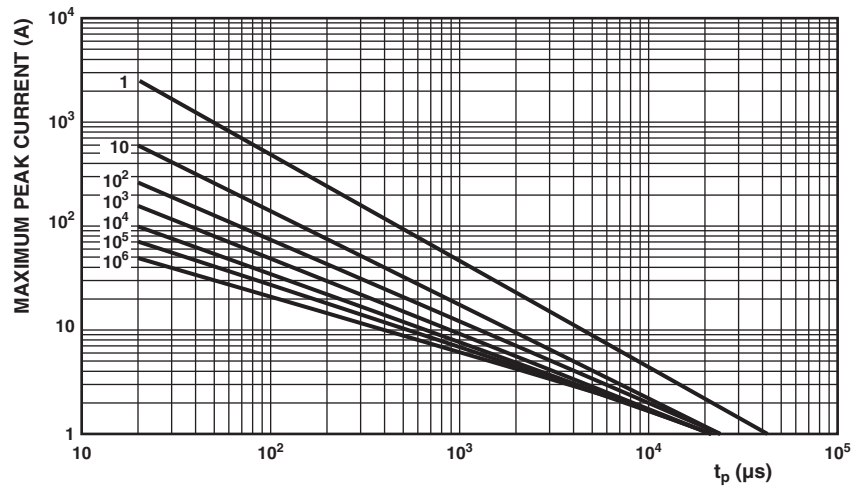


Vishay BCcomponents VDR Metal Oxide Varistors Standard

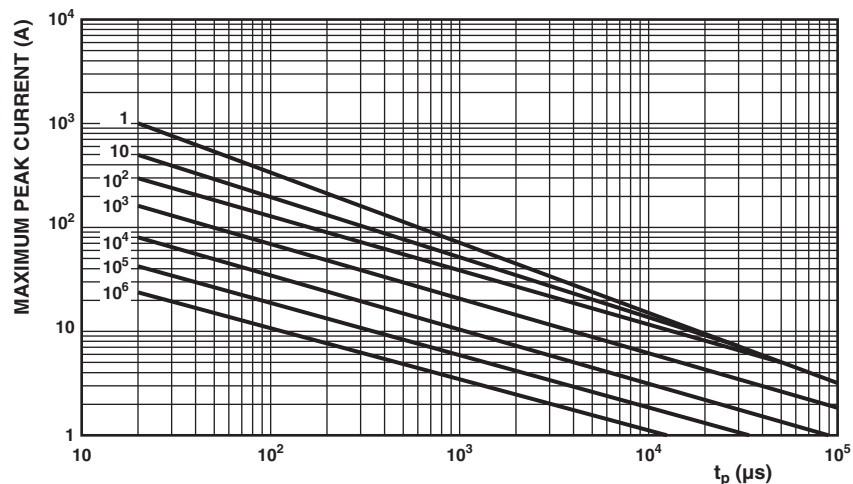
50 V_{RMS} to 320 V_{RMS} ; 2381 594/VDRS10.....E



385 V_{RMS} to 550 V_{RMS} ; 2381 594/VDRS10.....E

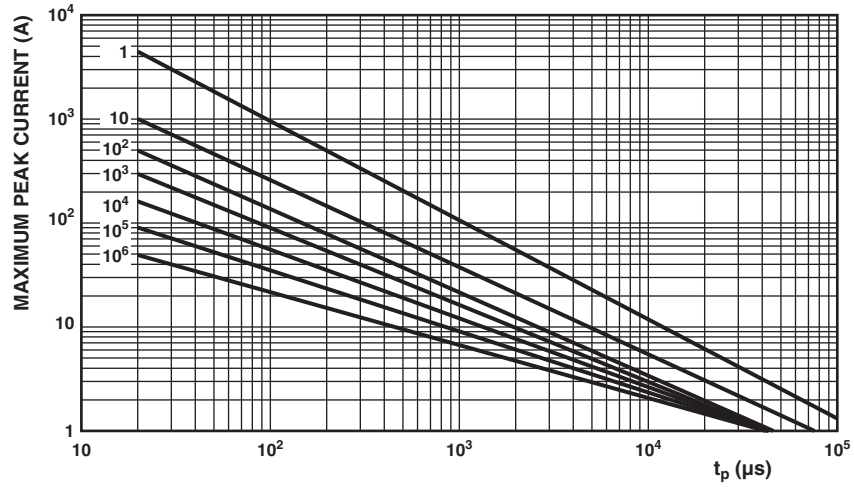


14 V_{RMS} to 40 V_{RMS} ; 2381 595/VDRS14.....E

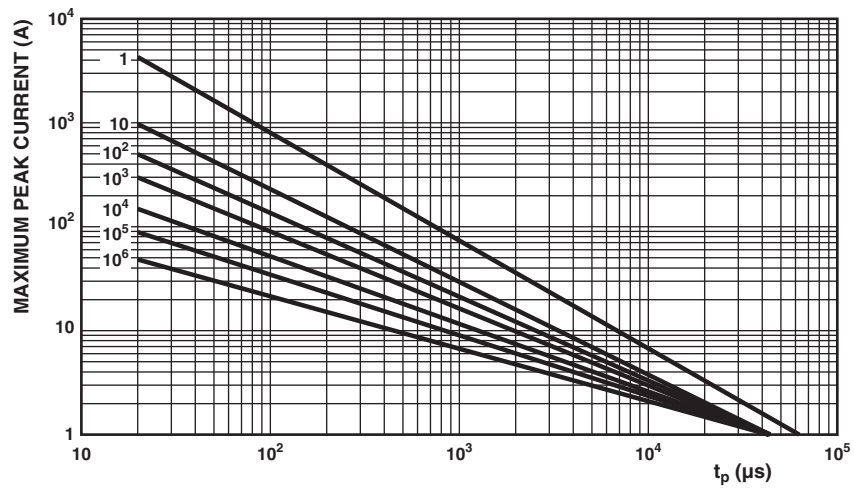




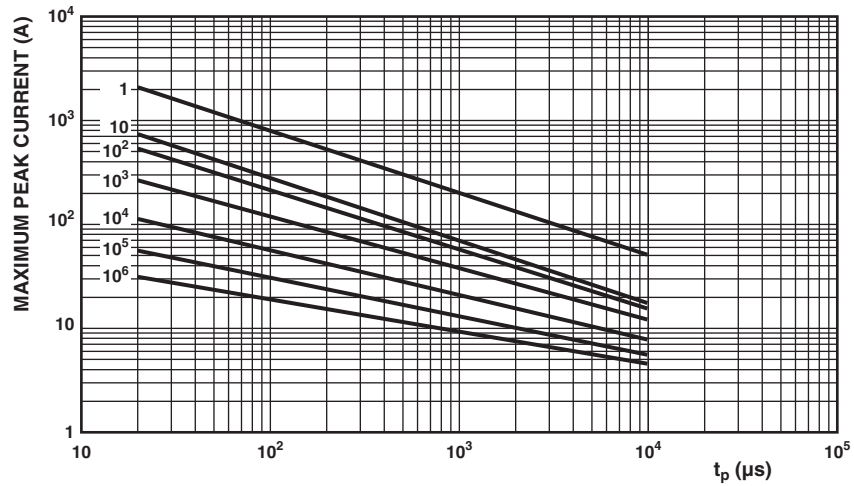
50 V_{RMS} to 320 V_{RMS}; 2381 595VDRS14.....E



385 V_{RMS} to 550 V_{RMS}; 2381 595VDRS14.....E



14 V_{RMS} to 40 V_{RMS}; 2381 596VDRS20.....E

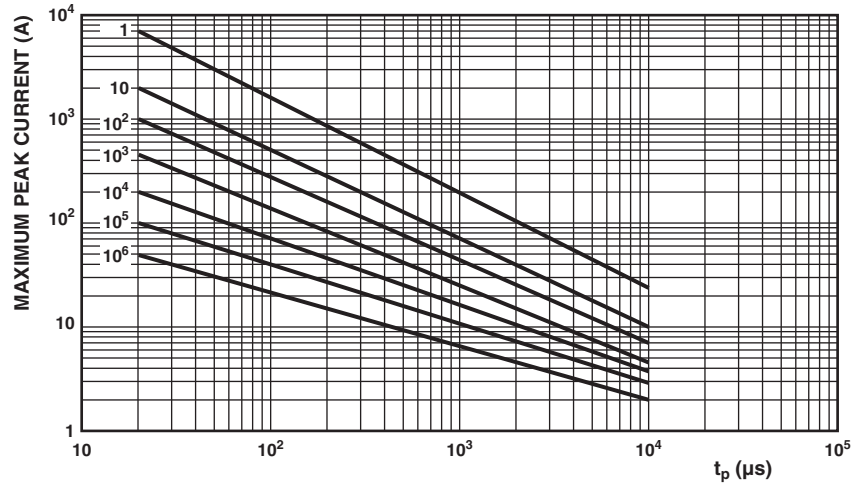


2381 59.VDRS.....E

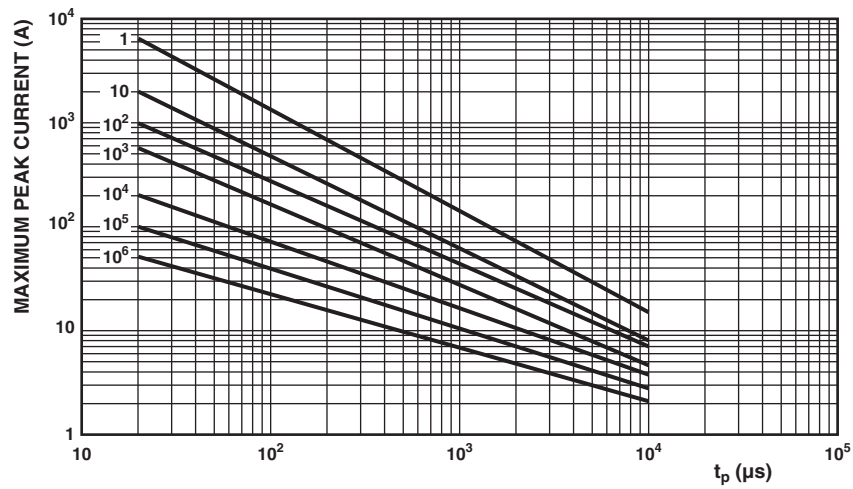


Vishay BCcomponents VDR Metal Oxide Varistors Standard

60 V_{RMS} to 300 V_{RMS}; 2381 596VDRS20.....E



320 V_{RMS} to 680 V_{RMS}; 2381 596VDRS20.....E





Disclaimer

All product specifications and data are subject to change without notice.

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 herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

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.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.