



## Surface Mount Multilayer Ceramic Chip Capacitor Solutions for High Voltage Applications



### FEATURES

- Excellent reliability and thermal shock performance
- High voltage breakdown compared to standard design
- High reliable serial electrode design
- Protective surface coating may be required to prevent surface arcing
- Wet build process
- Reliable Noble Metal Electrode (NME) system
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

- Input filter capacitors
- Output filter capacitors
- Snubber capacitors reduce MOSFET voltage spikes
- Filtering for switching power supplies
- For lighting and other AC applications please contact: [mlcc@vishay.com](mailto:mlcc@vishay.com)

### ELECTRICAL SPECIFICATIONS

X7R
<p><b>GENERAL SPECIFICATION</b></p> <p><b>Note</b> Electrical characteristics at +25 °C unless otherwise specified</p> <p><b>Operating Temperature:</b> -55 °C to +125 °C</p> <p><b>Capacitance Range:</b> 180 pF to 15 nF</p> <p><b>Voltage Range:</b> 3000 V<sub>DC</sub>, 4000 V<sub>DC</sub>, 5000 V<sub>DC</sub></p> <p><b>Temperature Coefficient of Capacitance (TCC):</b> ± 15 % from -55 °C to +125 °C, with 0 V<sub>DC</sub> applied</p> <p><b>Dissipation Factor (DF):</b> 2.5 % maximum at 1.0 V<sub>RMS</sub> and 1 kHz</p> <p><b>Insulating Resistance:</b> at +25 °C 100 000 MΩ min. or 1000 ΩF whichever is less at +125 °C 10 000 MΩ min. or 100 ΩF whichever is less</p> <p><b>Aging Rate:</b> 1 % maximum per decade</p> <p><b>Dielectric Strength Test:</b> performed per method 103 of EIA 198-2-E Applied test voltages 3000 V<sub>DC</sub>- / 4000 V<sub>DC</sub>- / 5000 V<sub>DC</sub>-rated: min. 120 % of rated voltage</p>

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
X7R	1812	5000	180 pF	3.9 nF
	1825	5000	330 pF	10 nF
	2220	5000	390 pF	10 nF
	2225	5000	470 pF	15 nF

**Note**

- Detail ratings see “Selection Chart”

ORDERING INFORMATION								
HV2220	Y	152	K	X	M	A	T	HV <sup>(2)</sup>
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING <sup>(1)</sup>	MARKING	PACKAGING	PROCESS CODE
1812 1825 2220 2225	Y = X7R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. <b>Examples</b> 152 = 1500 pF	J = ± 5 % K = ± 10 % M = ± 20 %	X = Ni barrier 100 % tin plated matte finish	H = 3000 V V = 4000 V M = 5000 V	A = unmarked	T = 7" reel / plastic tape R = 11 1/4" / 13" reel / plastic tape	HV = high voltage

**Notes**

- (1) DC voltage rating should not be exceeded in application. Other application factors may affect the MLCC performance. Consult for questions: [mlcc@vishay.com](mailto:mlcc@vishay.com)
- (2) Process code with 2 digits has to be added.

ENVIRONMENTAL STATUS			
TERMINATION CODE	TERMINATION DESCRIPTION	RoHS COMPLIANT	VISHAY GREEN
X	Ni barrier 100 % tin plated matte finish	Yes	Yes

DIMENSIONS in inches (millimeters)						
CASE CODE	STYLE	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION PAD (P)	
					MINIMUM	MAXIMUM
1812	HV1812	0.177 ± 0.012 (4.50 ± 0.30)	0.126 ± 0.008 (3.20 ± 0.20)	0.106 (2.70)	0.010 (0.25)	0.030 (0.76)
1825	HV1825	0.177 ± 0.012 (4.50 ± 0.30)	0.252 ± 0.010 (6.40 ± 0.25)	0.106 (2.70)	0.010 (0.25)	0.030 (0.76)
2220	HV2220	0.220 ± 0.010 (5.59 ± 0.25)	0.200 ± 0.010 (5.08 ± 0.25)	0.106 (2.70)	0.010 (0.25)	0.030 (0.76)
2225	HV2225	0.220 ± 0.010 (5.59 ± 0.25)	0.250 ± 0.010 (6.35 ± 0.25)	0.106 (2.70)	0.010 (0.25)	0.030 (0.76)



SELECTION CHART													
DIELECTRIC		X7R											
STYLE		HV1812 <sup>(1)</sup>			HV1825 <sup>(1)</sup>			HV2220 <sup>(1)</sup>			HV2225 <sup>(1)</sup>		
EIA CODE		1812			1825			2220			2225		
VOLTAGE (V <sub>DC</sub> )		3000	4000	5000	3000	4000	5000	3000	4000	5000	3000	4000	5000
VOLTAGE CODE		H	V	M	H	V	M	H	V	M	H	V	M
CAP. CODE	CAP.												
101	100 pF												
121	120 pF												
151	150 pF												
181	180 pF			•									
221	220 pF		•	•									
271	270 pF		•	•									
331	330 pF		•	•		•	•						
391	390 pF		•	•		•	•			•			
471	470 pF		•	•		•	•		•	•			•
561	560 pF	•	•	•		•	•		•	•			•
681	680 pF	•	•	•		•	•		•	•		•	•
821	820 pF	•	•	•		•	•		•	•		•	•
102	1.0 nF	•	•			•	•		•	•		•	•
122	1.2 nF	•	•		•	•	•	•	•	•		•	•
152	1.5 nF	•	•		•	•	•	•	•	•		•	•
182	1.8 nF	•			•	•	•	•	•	•	•	•	•
222	2.2 nF	•			•	•		•	•		•	•	•
272	2.7 nF	•			•	•		•	•		•	•	•
332	3.3 nF	•			•	•		•	•		•	•	•
392	3.9 nF	•			•			•			•	•	
472	4.7 nF				•			•			•	•	
562	5.6 nF				•			•			•	•	
682	6.8 nF				•			•			•		
822	8.2 nF				•			•			•		
103	10 nF				•			•			•		
123	12 nF										•		
153	15 nF										•		
183	18 nF												

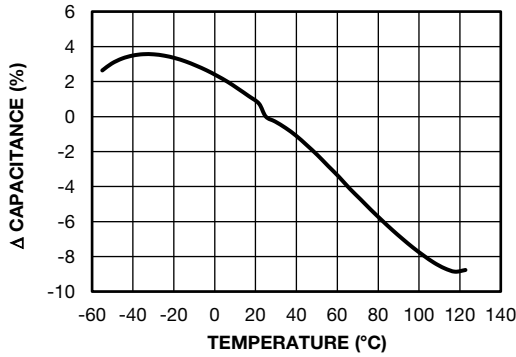
**Note**

<sup>(1)</sup> See soldering recommendations within this data book, or visit: [www.vishay.com/doc?45034](http://www.vishay.com/doc?45034)

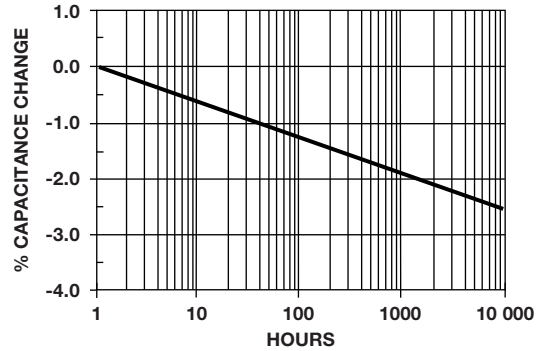


X7R DIELECTRIC - TYPICAL PARAMETERS

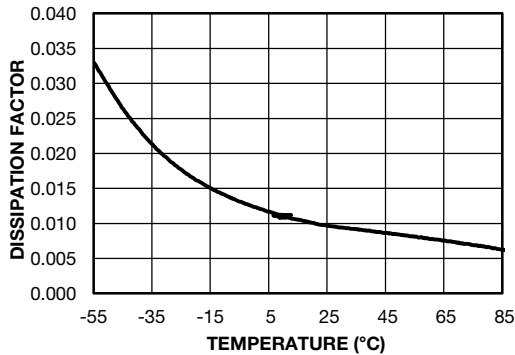
TEMPERATURE COEFFICIENT OF CAPACITANCE



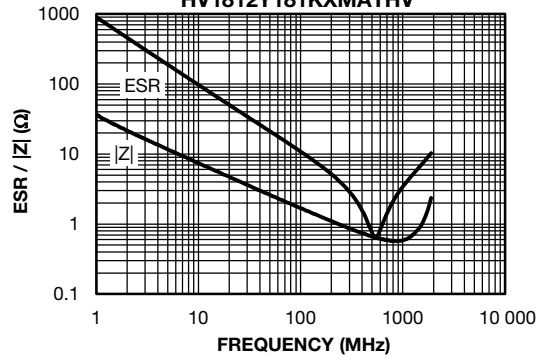
AGING RATE



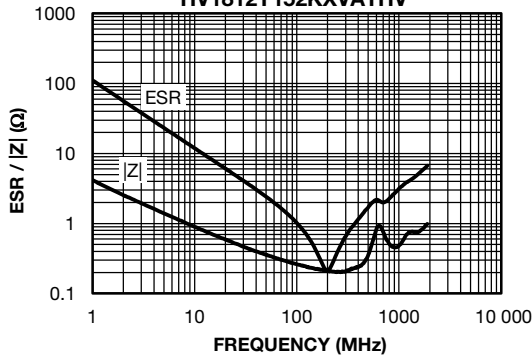
DISSIPATION FACTOR VS. TEMPERATURE



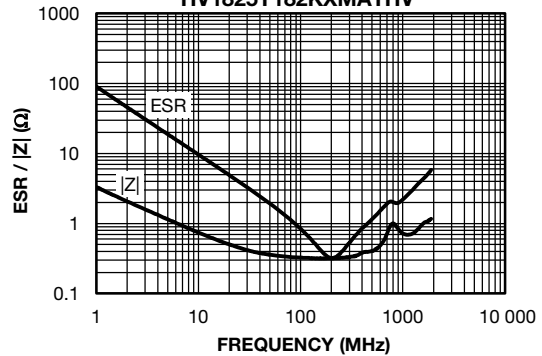
IMPEDANCE / ESR VS. FREQUENCY  
HV1812Y181KXMATHV



IMPEDANCE / ESR VS. FREQUENCY  
HV1812Y152KXVATHV

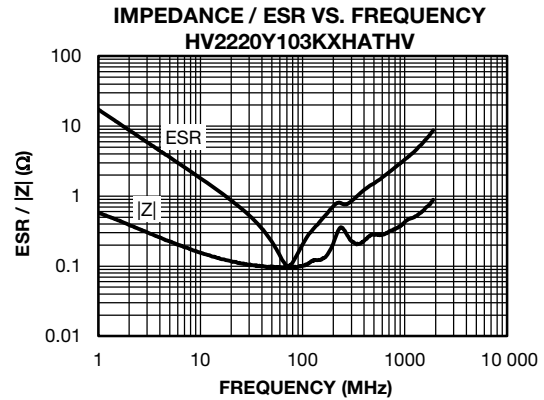
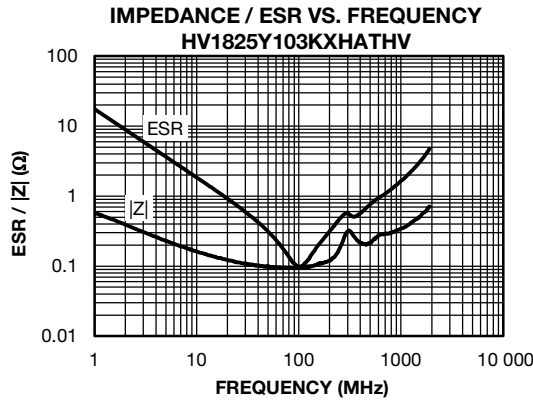


IMPEDANCE / ESR VS. FREQUENCY  
HV1825Y182KXMATHV





## X7R DIELECTRIC - TYPICAL PARAMETERS



## STANDARD PACKAGING QUANTITIES (1)

CASE CODE	TAPE SIZE	7" REEL QUANTITIES PACKAGING CODE "T"	11 1/4" AND 13" REEL QUANTITIES PACKAGING CODE "R"
1812	12 mm	1000	4000
1825	12 mm	1000	4000
2220	12 mm	1000	4000
2225	12 mm	500	4000

### Note

(1) Reference: EIA standard RS 481 - "Taping of Surface Mount Components for Automatic Placement"

## STORAGE AND HANDLING CONDITIONS

- (1) Store the components at 5 °C to 40 °C ambient temperature and ≤ 70 % relative humidity conditions.
- (2) The product is recommended to be used within a time-frame of 2 years after shipment.  
Check solderability in case extended shelf life beyond the expiry date is needed.

### Precautions:

- a. Do not store products in an environment containing corrosive elements, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. This may cause corrosion or oxidation of the terminations, which can easily lead to poor soldering.
- b. Store products on the shelf and avoid exposure to moisture or dust.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.



## 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.**



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.