Axial Leaded Multilayer Ceramic Capacitors for General Purpose Class 1, Class 2 and Class 3, 50 V_{DC}, 100 V_{DC}, 200 V_{DC}, 500 V_{DC}

FEATURES

- High capacitance with small size
- High reliability
- Axial mounting style
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb e3 RoHS COMPLIANT

APPLICATIONS

- Temperature compensation
- Coupling and decoupling

QUICK REFERENCE DATA										
DESCRIPTION	VALUE									
Ceramic Class	1				2				3	
Ceramic Dielectric	C0G				X7R				Y5V	
Voltage (V_{DC})	50	100	200	500	50	100	200	500	50	100
Min. Capacitance (pF)	10	10	33	33	100	100	100	100	10 000	10 000
Max. Capacitance (pF)	10 000	5600	2200	1000	1 000 000	220 000	47 000	33 000	1 000 000	220 000
Mounting	Axial									

MARKING

Marking indicates capacitance value and tolerance in accordance with “EIA 198” and voltage marks.

OPERATING TEMPERATURE RANGE

C0G, X7R: - 55 °C to + 125 °C

Y5V: - 30 °C to + 85 °C

TEMPERATURE CHARACTERISTICS

Class 1: C0G

Class 2: X7R

Class 3: Y5V

SECTIONAL SPECIFICATIONS

Climatic category (acc. to EN 60058-1)

Class 1 and 2: 55/125/21

Class 3: 30/85/21

APPROVALS

EIA 198

IEC 60384-9

DESIGN

- The capacitors consist of a general purpose MLCC
- The lead wires are 0.5 mm and are made of 100 % tinned copper clad steel wire
- Coating is made of yellow colored flame retardant epoxy resin in accordance with UL 94 V-0

CAPACITANCE RANGE

10 pF to 1 µF

TOLERANCE ON CAPACITANCE

± 5 %, ± 10 %, ± 20 %, + 80 %/- 20 %

RATED VOLTAGE

50 V_{DC}, 100 V_{DC}, 200 V_{DC}, 500 V_{DC}

TEST VOLTAGE

- 50 V_{DC} and 100 V_{DC}: 250 % of rated voltage
- 200 V_{DC}: 150 % of rated voltage + 100 V_{DC}
- 500 V_{DC}: 130 % of rated voltage + 100 V_{DC}

INSULATION RESISTANCE AT 500 V_{DC}

- 50 V_{DC} and 100 V_{DC}: 100 GΩ or 1000 ΩF whichever is less at rated voltage within 2 min of charging
- 200 V_{DC} and 500 V_{DC}: 10 GΩ or 100 ΩF whichever is less at rated voltage within 2 min of charging

DISSIPATION FACTOR

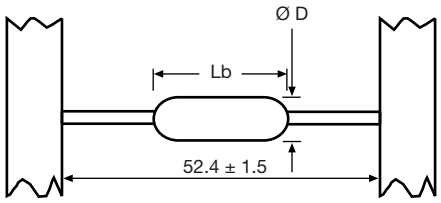
Class 1: 0.1 % max. when C ≥ 30 pF (at 1 MHz; 1 V where C ≤ 1000 pF, and at 1 kHz; 1 V where C > 1000 pF)

For C < 30 pF: DF = 100/(400 + 20 x C)
DF = Disspation factor in %;
C = Capacitance value in pF

Class 2: 2.5 % max. (at 1 kHz; 1 V)

Class 3: 5 % max. (at 1 kHz; 1 V)

DIMENSIONS (in millimeters)



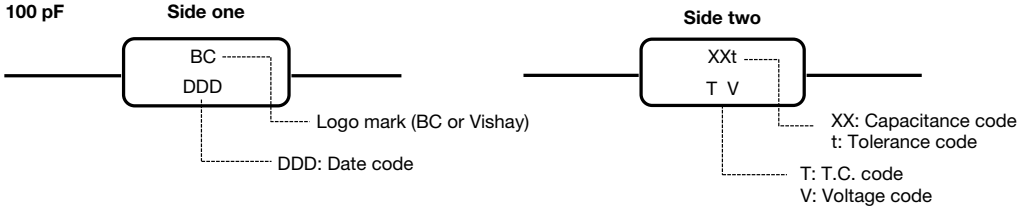
SIZE CODE	$Lb_{MAX.}$	$ØD_{MAX.}$
15	3.8	2.6
20	5.1	3.1

Note

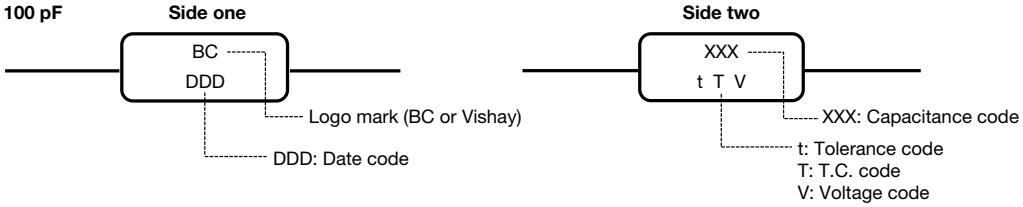
- The leads are matte tinned FeCu wire.

MARKING

CAPACITANCE VALUE < 100 pF



CAPACITANCE VALUE ≥ 100 pF



MARKING CODE DESCRIPTION

DDD	xxx	t	v	T
Date Code	**Capacitance Code**	**Tolerance Code**	**Voltage Code**	**T.C. Code**
The first digit is the year, the last two digits are the week. For example: 109 = 2011, 9th week 217 = 2012, 17th week	Two significant digits followed by one digit for the multiplier as given below. 1 = * 10, 2 = * 100, 3 = * 1000, 4 = * 10 000, 5 = * 100 000	J = ± 5 % K = ± 10 % M = ± 20 % Z = + 80 %/- 20 %	1 = 100 V 2 = 200 V 4 = 500 V 5 = 50 V	A = C0G (NP0) C = X7R Y = Y5V

Note

- The capacitance code indicates actual capacitance in pF when capacitance value < 100 pF.

ORDERING CODE INFORMATION

A	104	K	15	X7R	F	5	TAA
1	2 3 4	5	6 7	8 9 10	11	12	13 14 15
Product Type	**Capacitance (pF)**	**Capacitance Tolerance**	**Size Code**	**TC Code**	**Rated Voltage**	**Lead Diameter**	**Packaging**
A = Axial leaded MLCC	The first two digits are the significant figures of capacitance and the last digit is a multiplier as follows: 0 = * 1 1 = * 10 2 = * 100 3 = * 1000 4 = * 10 000 5 = * 100 000	J = ± 5 % K = ± 10 % M = ± 20 % Z = + 80 %/- 20 %	Please refer to relevant datasheet	Please refer to relevant datasheet	F = 50 V_{DC} H = 100 V_{DC} K = 200 V_{DC} L = 500 V_{DC}	5 = 0.50 mm ± 0.05 mm	TAA = Reel UAA = Ammo

ORDERING CODES

DIELECTRIC C0G				
CAP. (pF)	50 V_{DC}	100 V_{DC}	200 V_{DC}	500 V_{DC}
10	A100#15C0GF5###	A100#15C0GH5###	-	-
12	A120#15C0GF5###	A120#15C0GH5###	-	-
15	A150#15C0GF5###	A150#15C0GH5###	-	-
18	A180#15C0GF5###	A180#15C0GH5###	-	-
22	A220#15C0GF5###	A220#15C0GH5###	-	-
27	A270#15C0GF5###	A270#15C0GH5###	-	-
33	A330#15C0GF5###	A330#15C0GH5###	A330#15C0GK5###	A330#15C0GL5###
39	A390#15C0GF5###	A390#15C0GH5###	A390#15C0GK5###	A390#15C0GL5###
47	A470#15C0GF5###	A470#15C0GH5###	A470#15C0GK5###	A470#15C0GL5###
56	A560#15C0GF5###	A560#15C0GH5###	A560#15C0GK5###	A560#15C0GL5###
68	A680#15C0GF5###	A680#15C0GH5###	A680#15C0GK5###	A680#15C0GL5###
82	A820#15C0GF5###	A820#15C0GH5###	A820#15C0GK5###	A820#15C0GL5###
100	A101#15C0GF5###	A101#15C0GH5###	A101#15C0GK5###	A101#15C0GL5###
120	A121#15C0GF5###	A121#15C0GH5###	A121#15C0GK5###	A121#15C0GL5###
150	A151#15C0GF5###	A151#15C0GH5###	A151#15C0GK5###	A151#15C0GL5###
180	A181#15C0GF5###	A181#15C0GH5###	A181#15C0GK5###	A181#15C0GL5###
220	A221#15C0GF5###	A221#15C0GH5###	A221#15C0GK5###	A221#15C0GL5###
270	A271#15C0GF5###	A271#15C0GH5###	A271#15C0GK5###	A271#15C0GL5###
330	A331#15C0GF5###	A331#15C0GH5###	A331#15C0GK5###	A331#15C0GL5###
390	A391#15C0GF5###	A391#15C0GH5###	A391#15C0GK5###	A391#15C0GL5###
470	A471#15C0GF5###	A471#15C0GH5###	A471#15C0GK5###	A471#20C0GL5###
560	A561#15C0GF5###	A561#15C0GH5###	A561#15C0GK5###	A561#20C0GL5###
680	A681#15C0GF5###	A681#15C0GH5###	A681#15C0GK5###	A681#20C0GL5###
820	A821#15C0GF5###	A821#15C0GH5###	A821#15C0GK5###	A821#20C0GL5###
1000	A102#15C0GF5###	A102#20C0GH5###	A102#20C0GK5###	A102#20C0GL5###
1200	A122#15C0GF5###	A122#20C0GH5###	A122#20C0GK5###	-
1500	A152#15C0GF5###	A152#20C0GH5###	A152#20C0GK5###	-
1800	A182#15C0GF5###	A182#20C0GH5###	A182#20C0GK5###	-
2200	A222#15C0GF5###	A222#20C0GH5###	A222#20C0GK5###	-
2700	A272#20C0GF5###	A272#20C0GH5###	-	-
3300	A332#20C0GF5###	A332#20C0GH5###	-	-
3900	A392#20C0GF5###	A392#20C0GH5###	-	-
4700	A472#20C0GF5###	A472#20C0GH5###	-	-
5600	A562#20C0GF5###	A562#20C0GH5###	-	-
6800	A682#20C0GF5###	-	-	-
8200	A822#20C0GF5###	-	-	-
10 000	A103#20C0GF5###	-	-	-

Notes

- Lead diameter is 0.5 mm
- # 5th digit is capacitance tolerance code: ± 5 % = J; ± 10 % = K
- # 13th, 14th and 15th digits are packaging code: Reel = TAA; Ammo = UAA

DIELECTRIC X7R				
CAP. (pF)	50 V_{DC}	100 V_{DC}	200 V_{DC}	500 V_{DC}
100	A101#15X7RF5###	A101#15X7RH5###	A101#15X7RK5###	A101#15X7RL5###
120	A121#15X7RF5###	A121#15X7RH5###	A121#15X7RK5###	A121#15X7RL5###
150	A151#15X7RF5###	A151#15X7RH5###	A151#15X7RK5###	A151#15X7RL5###
180	A181#15X7RF5###	A181#15X7RH5###	A181#15X7RK5###	A181#15X7RL5###
220	A221#15X7RF5###	A221#15X7RH5###	A221#15X7RK5###	A221#15X7RL5###
270	A271#15X7RF5###	A271#15X7RH5###	A271#15X7RK5###	A271#15X7RL5###
330	A331#15X7RF5###	A331#15X7RH5###	A331#15X7RK5###	A331#15X7RL5###
390	A391#15X7RF5###	A391#15X7RH5###	A391#15X7RK5###	A391#15X7RL5###
470	A471#15X7RF5###	A471#15X7RH5###	A471#15X7RK5###	A471#15X7RL5###
560	A561#15X7RF5###	A561#15X7RH5###	A561#15X7RK5###	A561#15X7RL5###
680	A681#15X7RF5###	A681#15X7RH5###	A681#15X7RK5###	A681#15X7RL5###
820	A821#15X7RF5###	A821#15X7RH5###	A821#15X7RK5###	A821#15X7RL5###
1000	A102#15X7RF5###	A102#15X7RH5###	A102#15X7RK5###	A102#15X7RL5###
1200	A122#15X7RF5###	A122#15X7RH5###	A122#15X7RK5###	A122#15X7RL5###
1500	A152#15X7RF5###	A152#15X7RH5###	A152#15X7RK5###	A152#15X7RL5###
1800	A182#15X7RF5###	A182#15X7RH5###	A182#15X7RK5###	A182#15X7RL5###
2200	A222#15X7RF5###	A222#15X7RH5###	A222#15X7RK5###	A222#15X7RL5###
2700	A272#15X7RF5###	A272#15X7RH5###	A272#15X7RK5###	A272#15X7RL5###
3300	A332#15X7RF5###	A332#15X7RH5###	A332#15X7RK5###	A332#20X7RL5###
3900	A392#15X7RF5###	A392#15X7RH5###	A392#15X7RK5###	A392#20X7RL5###
4700	A472#15X7RF5###	A472#15X7RH5###	A472#15X7RK5###	A472#20X7RL5###
5600	A562#15X7RF5###	A562#15X7RH5###	A562#15X7RK5###	A562#20X7RL5###
6800	A682#15X7RF5###	A682#15X7RH5###	A682#15X7RK5###	A682#20X7RL5###
8200	A822#15X7RF5###	A822#15X7RH5###	A822#15X7RK5###	A822#20X7RL5###
10 000	A103#15X7RF5###	A103#15X7RH5###	A103#15X7RK5###	A103#20X7RL5###
12 000	A123#15X7RF5###	A123#15X7RH5###	A123#15X7RK5###	A123#20X7RL5###
15 000	A153#15X7RF5###	A153#15X7RH5###	A153#15X7RK5###	A153#20X7RL5###
18 000	A183#15X7RF5###	A183#15X7RH5###	A183#15X7RK5###	A183#20X7RL5###
22 000	A223#15X7RF5###	A223#15X7RH5###	A223#15X7RK5###	A223#20X7RL5###
27 000	A273#15X7RF5###	A273#20X7RH5###	A273#20X7RK5###	A273#20X7RL5###
33 000	A333#15X7RF5###	A333#20X7RH5###	A333#20X7RK5###	A333#20X7RL5###
39 000	A393#15X7RF5###	A393#20X7RH5###	A393#20X7RK5###	-
47 000	A473#15X7RF5###	A473#20X7RH5###	A473#20X7RK5###	-
56 000	A563#15X7RF5###	A563#20X7RH5###	-	-
68 000	A683#15X7RF5###	A683#20X7RH5###	-	-
82 000	A823#15X7RF5###	A823#20X7RH5###	-	-
100 000	A104#15X7RF5###	A104#20X7RH5###	-	-
150 000	A154#20X7RF5###	A154#20X7RH5###	-	-
220 000	A224#20X7RF5###	A224#20X7RH5###	-	-
330 000	A334#20X7RF5###	-	-	-
470 000	A474#20X7RF5###	-	-	-
560 000	A564#20X7RF5###	-	-	
680 000	A684#20X7RF5###	-	-	-
1 000 000	A105#20X7RF5###	-	-	-

Notes

- Lead diameter is 0.5 mm
- # 5th digit is capacitance tolerance code: ± 10 % = K; ± 20 % = M
- # 13th, 14th and 15th digits are packaging code: Reel = TAA; Ammo = UAA

DIELECTRIC Y5V		
CAP. (pF)	50 V_{DC}	100 V_{DC}
10 000	A103Z15Y5VF5###	A103Z15Y5VH5###
15 000	A153Z15Y5VF5###	A153Z15Y5VH5###
22 000	A223Z15Y5VF5###	A223Z15Y5VH5###
33 000	A333Z15Y5VF5###	A333Z15Y5VH5###
47 000	A473Z15Y5VF5###	A473Z15Y5VH5###
68 000	A683Z15Y5VF5###	A683Z15Y5VH5###
100 000	A104Z15Y5VF5###	A104Z15Y5VH5###
150 000	A154Z15Y5VF5###	A154Z20Y5VH5###
220 000	A224Z15Y5VF5###	A224Z20Y5VH5###
330 000	A334Z20Y5VF5###	-
470 000	A474Z20Y5VF5###	-
680 000	A684Z20Y5VF5###	-
1 000 000	A105Z20Y5VF5###	-

Notes

- Lead diameter is 0.5 mm
- Tolerance is + 80 %/- 20 %
- # 13th, 14th and 15th digits are packaging code: Reel = TAA; Ammo = UAA

TAPING AND PACKAGING

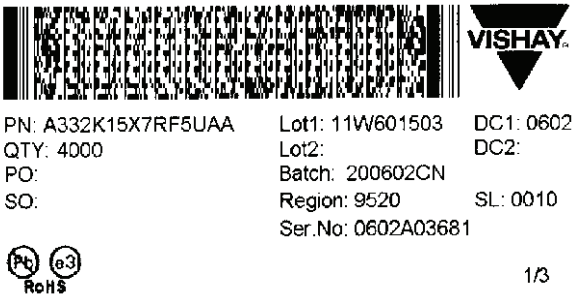
LABELLING

Each reel is provided with a label showing the following details:

Manufacturer, A style, capacitance, tolerance, batch number, quantity of components, rated voltage, dielectric.

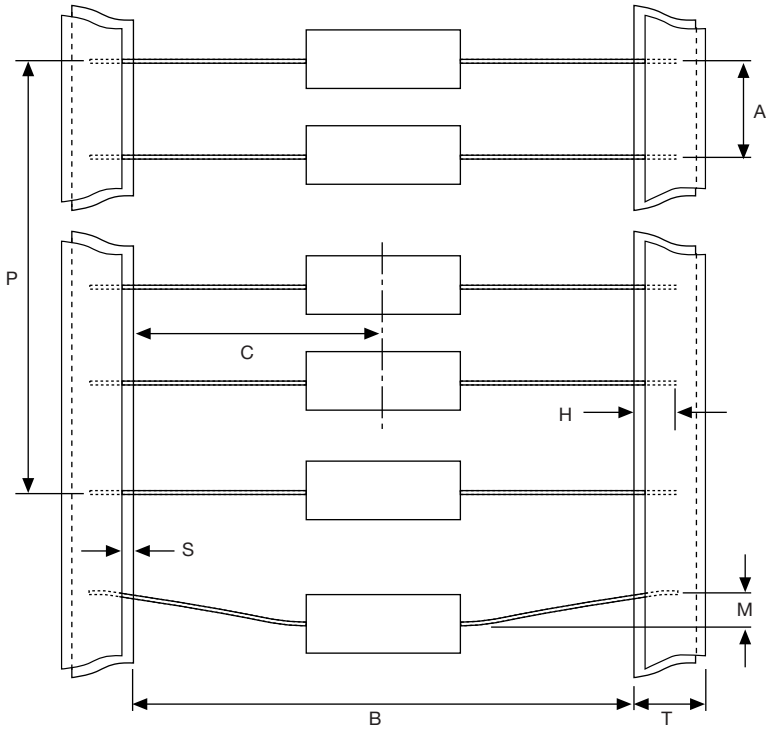
On special request other designations can be shown.

For example:



PACKAGING QUANTITIES AND BOX DIMENSIONS			
PACKAGING	SIZE CODE	SMALLEST PACKAGING QUANTITY (SPQ)	BOX DIMENSIONS L x W x H (mm)
Tape on reel	15, 20	7000	370 x 370 x 90
Ammopack	15, 20	4000	265 x 85 x 95

CAPACITORS ON BANDOLIER FOR DIPPED AXIAL



PARAMETER	SYMBOL	DIMENSIONS	
		mm	INCH
Inside tape spacing	B (1)	52.4 ± 1.5	2.062 ± 0.059
Center to tape spacing	C	± 0.8	± 0.031
Cumulative pitch, 6 consecutive components	P	± 1.5	± 0.059
Components pitch	A	5.0 ± 0.5	0.197 ± 0.015
Lead bend	M	< 1.2	< 0.047
Exposed adhesive	S	< 0.51	> 0.020
Tape width	T	6.35	0.250
Lead sandwich	H	> 3.96	> 0.156

Note

(1) Inside tape spacing 26.0 mm + 1.51 mm/- 0.0 mm is available on request

REEL DATA

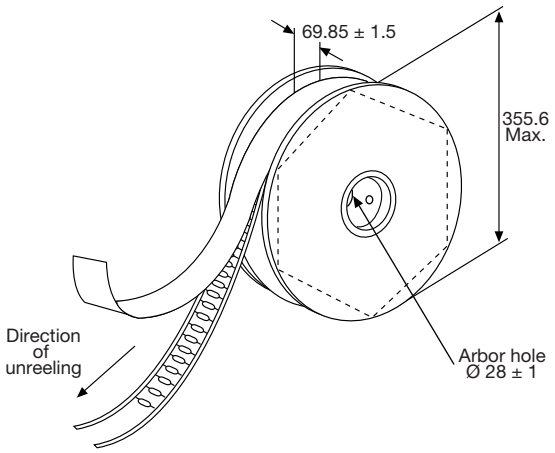
A maximum of 0.5 % of the total number of capacitors per reel may be missing.

A maximum of 1 consecutive vacant positions is followed by 6 consecutive components.

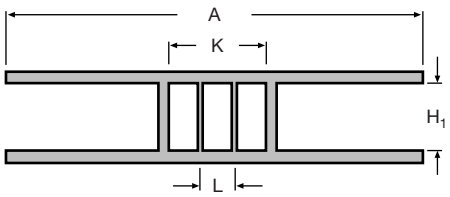
Tape begins and ends with a minimum of 4 empty positions (180 mm tape).

Maximum of 5 splicers per reel.

REEL



REEL DIMENSIONS



REEL SIZE		(mm)
A	Outer diameter	355.6 max.
L	Hole diameter	28 ± 1
K	Core diameter	90
H_1	Internal width	69.9 ± 1.5

AMMOPACK DATA

A maximum of 0.5 % of the total number of capacitors per reel may be missing.

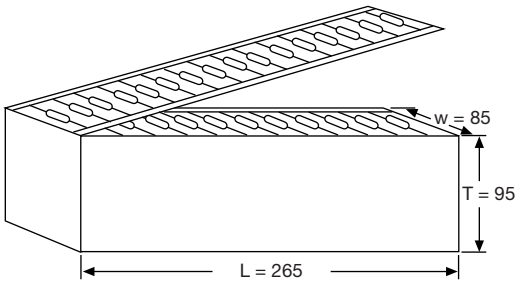
A maximum of 1 consecutive vacant positions is followed by 6 consecutive components.

Tape begins and ends with a minimum of 4 empty positions (180 mm tape).

Maximum of 5 splicers per reel.

The cumulative pitch tolerance over 20 consecutive units is not to exceed ± 1.0 mm.

AMMOPACK



RELATED DOCUMENTS

General Information	www.vishay.com/doc?45163

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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

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.