

Thyristor/Thyristor (Super MAGN-A-PAK Power Modules), 570 A



Super MAGN-A-PAK

FEATURES

- High current capability
- High surge capability
- Industrial standard package
- 3000 V_{RMS} isolating voltage with non-toxic substrate
- Designed and qualified for industrial level
- UL approved file E78996 
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

TYPICAL APPLICATIONS

- Motor starters
- DC motor controls - AC motor controls
- Uninterruptible power supplies

PRIMARY CHARACTERISTICS

| | |
|-------------|-------------------------------|
| $I_{T(AV)}$ | 570 A |
| Type | Modules - thyristor, standard |
| Package | Super MAGN-A-PAK |

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|---------------|------------------------------------|-------------|----------------------------|
| $I_{T(AV)}$ | $T_C = 74\text{ }^{\circ}\text{C}$ | 570 | A |
| $I_{T(RMS)}$ | $T_C = 74\text{ }^{\circ}\text{C}$ | 895 | |
| I_{TSM} | 50 Hz | 17 800 | |
| | 60 Hz | 18 700 | |
| I^2t | 50 Hz | 1591 | kA ² s |
| | 60 Hz | 1452 | |
| $I^2\sqrt{t}$ | | 15 910 | kA ² \sqrt{s} |
| V_{RRM} | Range | 1800 | V |
| T_{Stg} | Range | -40 to +135 | $^{\circ}\text{C}$ |
| T_J | Range | -40 to +135 | |

ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS

| TYPE NUMBER | VOLTAGE CODE | V_{RRM}/V_{DRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V | V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | I_{RRM}/I_{DRM} MAXIMUM AT $T_J = T_J$ MAXIMUM mA |
|------------------|--------------|--|--|--|
| VS-VSKT570-18PbF | 18 | 1800 | 1900 | 120 |

**ON-STATE CONDUCTION**

| PARAMETER | SYMBOL | TEST CONDITIONS | | | VALUES | UNITS | |
|--|-------------------------------------|--|----------------------------------|---|--------|--------------------|--|
| Maximum average on-state current at case temperature | I _{T(AV)} | 180° conduction, half sine wave | | | 570 | A | |
| | | | | | 74 | °C | |
| Maximum RMS on-state current | I _{T(RMS)} | 180° conduction, half sine wave at T _C = 74 °C | | | 895 | A | |
| Maximum peak, one-cycle, non-repetitive on-state surge current | I _{TSM} , I _{FSM} | t = 10 ms | No voltage reapplied | Sinusoidal half wave, initial T _J = T _J maximum | 17.8 | kA | |
| | | t = 8.3 ms | | | 18.7 | | |
| | | t = 10 ms | 100 % V _{RRM} reapplied | | 15.0 | | |
| | | t = 8.3 ms | | | 15.7 | | |
| Maximum I ² t for fusing | I ² t | t = 10 ms | No voltage reapplied | | 1591 | kA ² s | |
| | | t = 8.3 ms | | | 1452 | | |
| | | t = 10 ms | 100 % V _{RRM} reapplied | | 1125 | | |
| | | t = 8.3 ms | | | 1027 | | |
| Maximum I ² √t for fusing | I ² √t | t = 0.1 ms to 10 ms, no voltage reapplied | | | 15 910 | kA ² √s | |
| Low level value or threshold voltage | V _{T(TO)1} | (16.7 % × π × I _{T(AV)} < I < π × I _{T(AV)}), T _J = T _J maximum | | | 0.864 | V | |
| High level value of threshold voltage | V _{T(TO)2} | (I > π × I _{T(AV)}), T _J = T _J maximum | | | 0.97 | | |
| Low level value on-state slope resistance | r _{t1} | (16.7 % × π × I _{T(AV)} < I < π × I _{T(AV)}), T _J = T _J maximum | | | 0.411 | mΩ | |
| High level value on-state slope resistance | r _{t2} | (I > π × I _{T(AV)}), T _J = T _J maximum | | | 0.362 | | |
| Maximum on-state voltage drop | V _{TM} | I _{pK} = 1500 A, T _J = 25 °C, t _p = 10 ms sine pulse | | | 1.50 | V | |
| Maximum holding current | I _H | T _J = 25 °C, anode supply 12 V resistive load | | | 500 | mA | |
| Maximum latching current | I _L | | | | 1000 | | |

SWITCHING

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---------|---|--------|-------|
| Maximum rate of rise of turned-on current | di/dt | $T_J = T_J$ maximum, $I_{TM} = 400\text{ A}$, V_{DRM} applied | 1000 | A/μs |
| Typical delay time | t_d | Gate current 1 A, $di_g/dt = 1\text{ A/μs}$ $V_d = 0.67\% V_{DRM}$, $T_J = 25\text{ °C}$ | 2.0 | μs |
| Typical turn-off time | t_q | $I_{TM} = 750\text{ A}$; $T_J = T_J$ maximum, $di/dt = -60\text{ A/μs}$, $V_R = 50\text{ V}$, $dV/dt = 20\text{ V/μs}$, gate 0 V 100 Ω | 200 | |

BLOCKING

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|--|--------------------|--|--------|-------|
| Maximum critical rate of rise of off-state voltage | dV/dt | $T_J = T_J$ maximum, linear to $V_D = 80\% V_{DRM}$ | 1000 | V/μs |
| RMS insulation voltage | V_{INS} | t = 1 s | 3000 | V |
| Maximum peak reverse and off-state leakage current | I_{RRM}, I_{DRM} | $T_J = T_J$ maximum, rated V_{DRM}/V_{RRM} applied | 120 | mA |

**TRIGGERING**

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|-------------|---|--------|-------|
| Maximum peak gate power | P_{GM} | $T_J = T_J$ maximum, $t_p \leq 5$ ms | 10 | W |
| Maximum peak average gate power | $P_{G(AV)}$ | $T_J = T_J$ maximum, $f = 50$ Hz, $d \% = 50$ | 2.0 | |
| Maximum peak positive gate current | $+I_{GM}$ | $T_J = T_J$ maximum, $t_p \leq 5$ ms | 3.0 | A |
| Maximum peak positive gate voltage | $+V_{GM}$ | | 20 | |
| Maximum peak negative gate voltage | $-V_{GM}$ | | 5.0 | |
| Maximum DC gate current required to trigger | I_{GT} | $T_J = 25$ °C, V_{ak} 12 V | 200 | mA |
| DC gate voltage required to trigger | V_{GT} | | 3.0 | |
| DC gate current not to trigger | I_{GD} | $T_J = T_J$ maximum | 10 | mA |
| DC gate voltage not to trigger | V_{GD} | | 0.25 | |

THERMAL AND MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|--|---|------------------|-------|
| Maximum junction operating temperature range | T_J | | -40 to +135 | °C |
| Maximum storage temperature range | T_{Stg} | | -40 to +135 | |
| Maximum thermal resistance, junction to case per junction | R_{thJC} | DC operation | 0.065 | K/W |
| Maximum thermal resistance, case to heatsink per module | R_{thC-hs} | Mounting surface smooth, flat and greased | 0.02 | |
| Mounting torque ± 10 % | Super MAGN-A-PAK to heatsink busbar to super MAGN-A-PAK | A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound | 6 to 8 | Nm |
| | | | 12 to 15 | |
| Approximate weight | | | 1500 | g |
| Case style | | See dimensions (link at the end of datasheet) | Super MAGN-A-PAK | |

 ΔR_{thJC} CONDUCTION

| CONDUCTION ANGLE | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS | UNITS |
|------------------|-----------------------|------------------------|---------------------|-------|
| 180° | 0.009 | 0.006 | $T_J = T_J$ maximum | K/W |
| 120° | 0.011 | 0.011 | | |
| 90° | 0.014 | 0.015 | | |
| 60° | 0.021 | 0.022 | | |
| 30° | 0.037 | 0.038 | | |

Note

- Table shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC

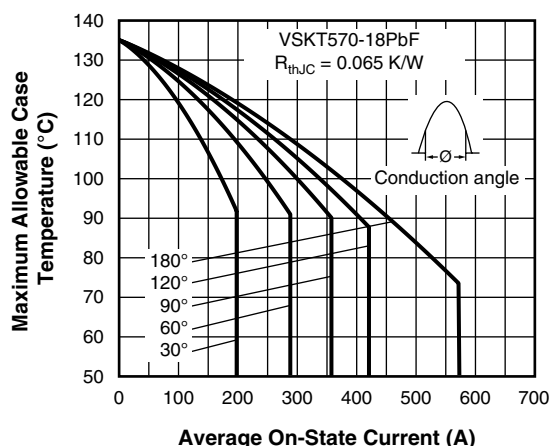


Fig. 1 - Current Ratings Characteristics

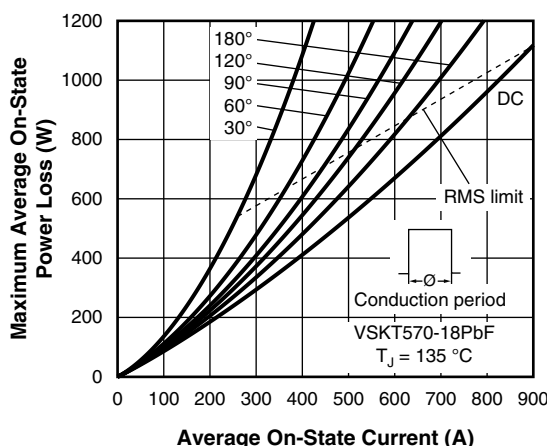


Fig. 4 - On-State Power Loss Characteristics

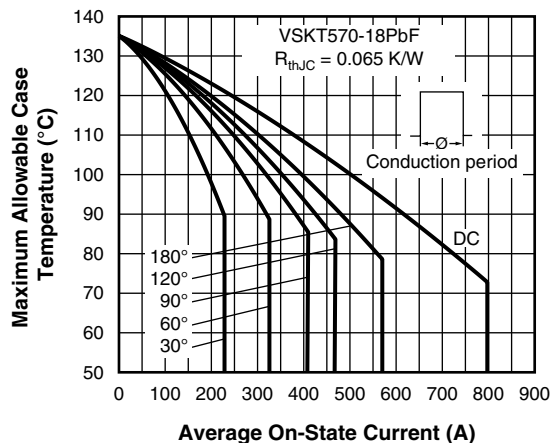


Fig. 2 - Current Ratings Characteristics

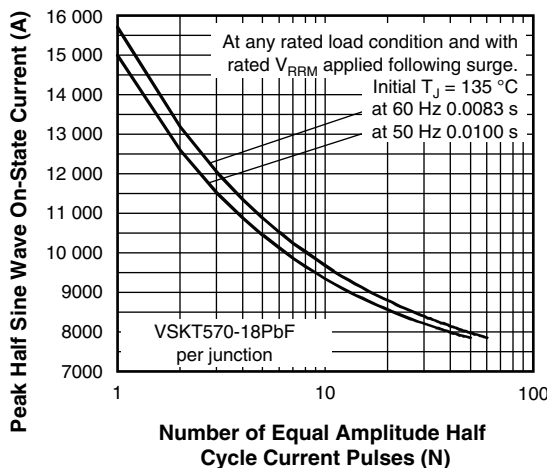


Fig. 5 - Maximum Non-Repetitive Surge Current

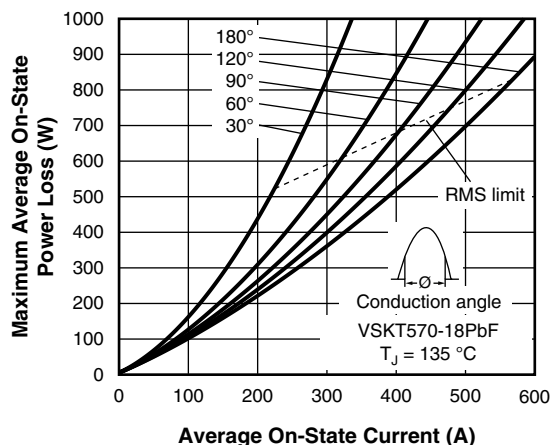


Fig. 3 - On-State Power Loss Characteristics

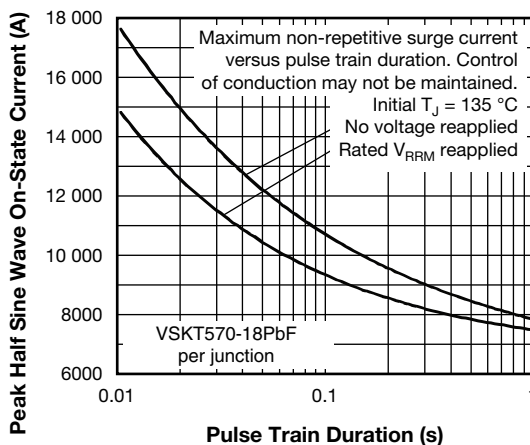


Fig. 6 - Maximum Non-Repetitive Surge Current

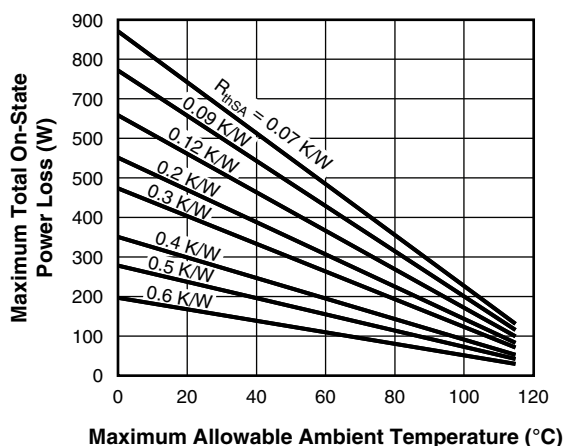
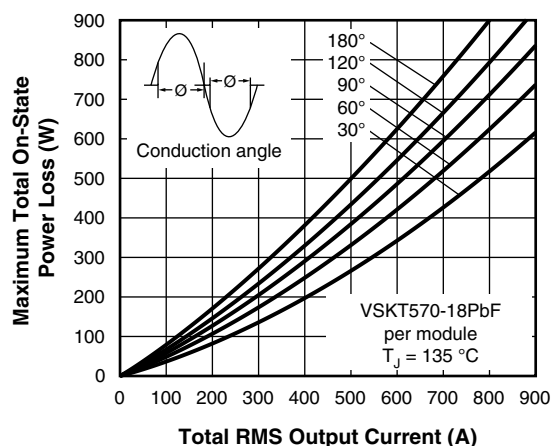


Fig. 7 - On-State Power Loss Characteristics

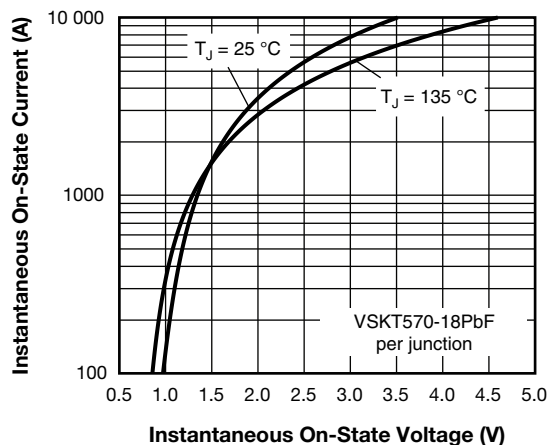


Fig. 8 - On-State Voltage Drop Characteristics

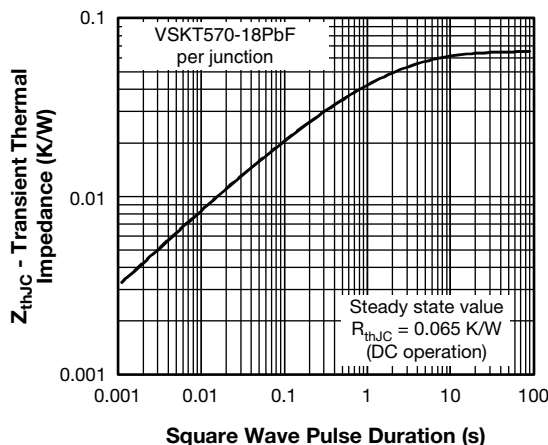
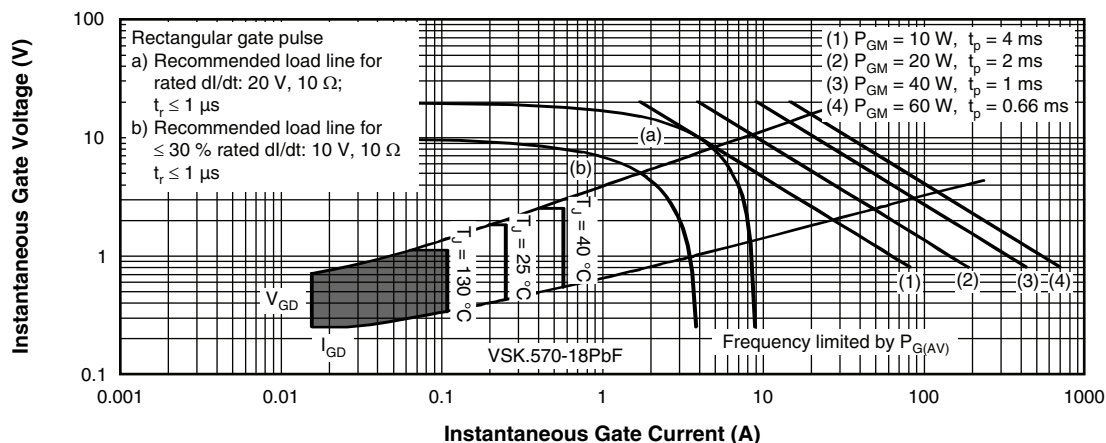

Fig. 9 - Thermal Impedance Z_{thJC} Characteristics


Fig. 10 - Gate Characteristics



ORDERING INFORMATION TABLE

| Device code | VS-VS | KT | 570 | - | 18 | PbF |
|-------------|-------------------------------------|----|-----|---|----|-----|
| | 1 | 2 | 3 | | 4 | 5 |
| 1 | - Vishay Semiconductors product | | | | | |
| 2 | - Circuit configuration (see below) | | | | | |
| 3 | - Current rating | | | | | |
| 4 | - Voltage code x 100 = V_{RRM} | | | | | |
| 5 | - Lead (Pb)-free | | | | | |

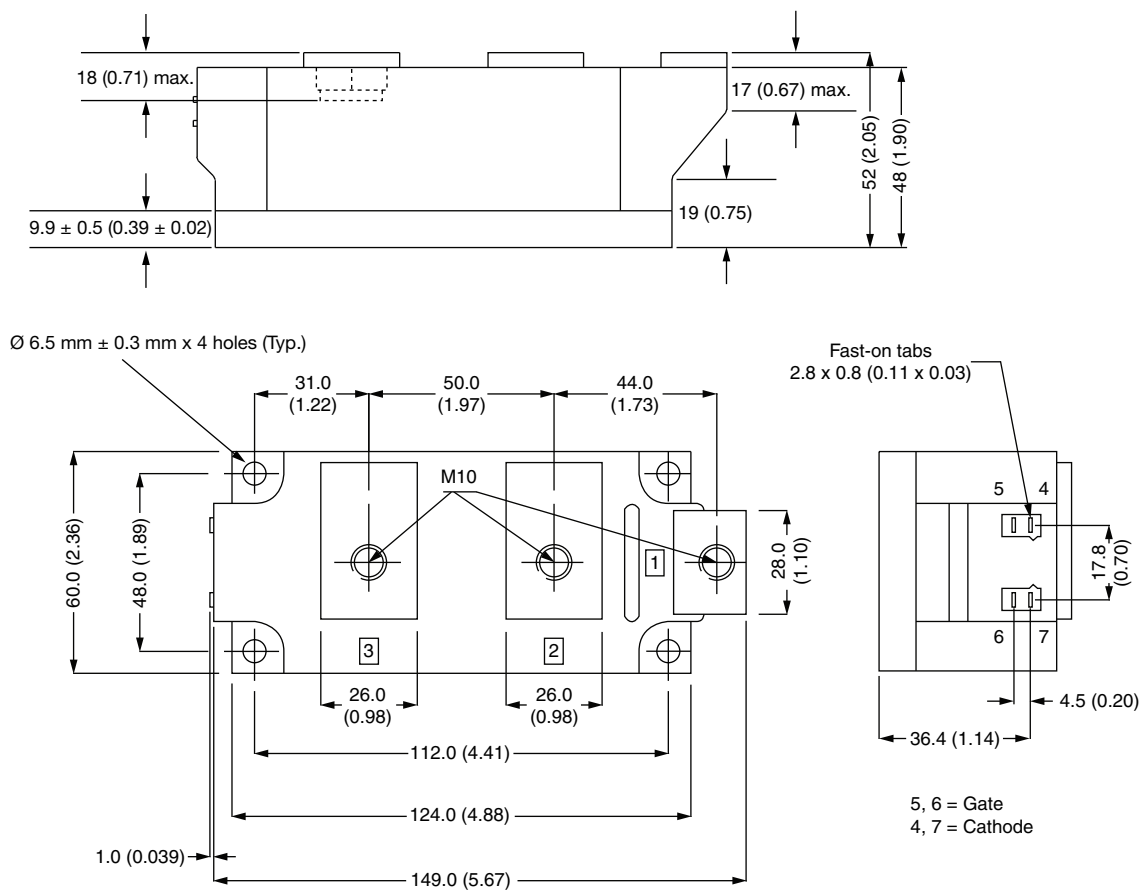
| CIRCUIT CONFIGURATION | | |
|--------------------------|----------------------------|-----------------|
| CIRCUIT DESCRIPTION | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING |
| Two SCRs doubler circuit | KT | |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95283 |



Super MAGN-A-PAK Thyristor/Diode

DIMENSIONS in millimeters (inches)





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.