

## Three Phase Bridge, 160 A (Power Modules)



MTC

### FEATURES

- Blocking voltage up to 1800 V
- High surge capability
- High thermal conductivity package, electrically insulated case
- Excellent power volume ratio
- 3600 V<sub>RMS</sub> isolating voltage
- UL approved file E78996 
- Designed for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### PRIMARY CHARACTERISTICS

|                       |                    |
|-----------------------|--------------------|
| $I_O$                 | 160 A at 118 °C    |
| $V_{RRM}$             | 1600 V to 1800 V   |
| Package               | MTC                |
| Circuit configuration | Three phase bridge |

### DESCRIPTION

A range of extremely compact, encapsulated three phase bridge rectifiers offering efficient and reliable operation. They are intended for use in general purpose and heavy duty applications.

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL        | CHARACTERISTICS | VALUES       | UNITS             |
|---------------|-----------------|--------------|-------------------|
| $I_O^{(1)}$   |                 | 257          | A                 |
|               | $T_C$           | 85           | °C                |
| $I_{FSM}$     | 50 Hz           | 1540         | A                 |
|               | 60 Hz           | 1610         |                   |
| $I^2t$        | 50 Hz           | 11 860       | A <sup>2</sup> s  |
|               | 60 Hz           | 10 825       |                   |
| $I^2\sqrt{t}$ |                 | 118 580      | A <sup>2</sup> √s |
| $V_{RRM}$     | Range           | 1600 to 1800 | V                 |
| $T_{Stg}$     | Range           | -40 to +125  | °C                |
| $T_J$         | Range           | -40 to +150  | °C                |

#### Note

(1) Maximum output current must be limited to 220 A to do not exceed the maximum temperature of terminals

### ELECTRICAL SPECIFICATIONS

#### VOLTAGE RATINGS

| TYPE NUMBER  | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE<br>PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE<br>PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ MAXIMUM<br>AT $T_J$ = MAXIMUM<br>mA |
|--------------|--------------|-------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------|
| VS-161MT...C | 160          | 1600                                                        | 1700                                                            | 12                                            |
|              | 180          | 1800                                                        | 1900                                                            |                                               |

**FORWARD CONDUCTION**

| PARAMETER                                                     | SYMBOL               | TEST CONDITIONS                                                                         |                                  |                                                    | VALUES  | UNITS             |
|---------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------|---------|-------------------|
| Maximum DC output current at case temperature                 | I <sub>O</sub>       | 120° rect. conduction angle                                                             |                                  |                                                    | 160     | A                 |
|                                                               |                      |                                                                                         |                                  |                                                    | 118     | °C                |
| Maximum peak, one-cycle forward, non-repetitive surge current | I <sub>FSM</sub>     | t = 10 ms                                                                               | No voltage reapplied             | Initial<br>T <sub>J</sub> = T <sub>J</sub> maximum | 1540    | A                 |
|                                                               |                      | t = 8.3 ms                                                                              |                                  |                                                    | 1610    |                   |
|                                                               |                      | t = 10 ms                                                                               | 100 % V <sub>RRM</sub> reapplied |                                                    | 1295    |                   |
|                                                               |                      | t = 8.3 ms                                                                              |                                  |                                                    | 1355    |                   |
| Maximum I <sup>2</sup> t for fusing                           | I <sup>2</sup> t     | t = 10 ms                                                                               | No voltage reapplied             |                                                    | 11 860  | A <sup>2</sup> s  |
|                                                               |                      | t = 8.3 ms                                                                              |                                  |                                                    | 10 825  |                   |
|                                                               |                      | t = 10 ms                                                                               | 100 % V <sub>RRM</sub> reapplied |                                                    | 8385    |                   |
|                                                               |                      | t = 8.3 ms                                                                              |                                  |                                                    | 7620    |                   |
| Maximum I <sup>2</sup> √t for fusing                          | I <sup>2</sup> √t    | t = 0.1 ms to 10 ms, no voltage reapplied                                               |                                  |                                                    | 118 580 | A <sup>2</sup> √s |
| Low level value of threshold voltage                          | V <sub>FT(TO)1</sub> | (16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum |                                  |                                                    | 0.81    | V                 |
| High level value of threshold voltage                         | V <sub>FT(TO)2</sub> | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum                                   |                                  |                                                    | 0.98    |                   |
| Low level value of forward slope resistance                   | r <sub>f1</sub>      | 16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> , T <sub>J</sub> maximum   |                                  |                                                    | 3.89    | mΩ                |
| High level of forward slope resistance                        | r <sub>f2</sub>      | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> maximum                                   |                                  |                                                    | 3.68    |                   |
| Maximum forward voltage drop                                  | V <sub>FM</sub>      | I <sub>pk</sub> = 300 A, T <sub>J</sub> = 25 °C, per junction                           |                                  |                                                    | 1.85    | V                 |
| RMS isolation voltage                                         | V <sub>ISOL</sub>    | T <sub>J</sub> = 25 °C, all terminal shorted f = 50 Hz, t = 1 s                         |                                  |                                                    | 3600    |                   |

**THERMAL AND MECHANICAL SPECIFICATIONS**

| PARAMETER                                    | SYMBOL      | TEST CONDITIONS                                                                                                                                          | VALUES      | UNITS |
|----------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|
| Maximum junction operating                   | $T_J$       |                                                                                                                                                          | -40 to +150 | °C    |
| Maximum storage temperature                  | $T_{Stg}$   |                                                                                                                                                          | -40 to +125 |       |
| Maximum thermal resistance, junction to case | $R_{thJC}$  | DC operation per module                                                                                                                                  | 0.058       | °C/W  |
|                                              |             | DC operation per junction                                                                                                                                | 0.35        |       |
| Typical thermal resistance, case to heatsink | $R_{thCS}$  | Per module<br>Mounting surface smooth, flat, and greased                                                                                                 | 0.03        |       |
| Mounting torque<br>± 15 %                    | to heatsink | A mounting compound is recommended and the torque should be rechecked after a period of 3 h to allow for the spread of the compound. Lubricated threads. | 5           | Nm    |
|                                              | to terminal |                                                                                                                                                          | 5           |       |
| Approximate weight                           |             |                                                                                                                                                          | 235         | g     |

**ΔR CONDUCTION PER JUNCTION**

| DEVICES             | SINE HALF WAVE CONDUCTION |       |       |       |       | RECTANGULAR WAVE CONDUCTION |       |       |       |       | UNITS |
|---------------------|---------------------------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|-------|-------|
|                     | 180°                      | 120°  | 90°   | 60°   | 30°   | 180°                        | 120°  | 90°   | 60°   | 30°   |       |
| VS-161MT...C Series | 0.054                     | 0.061 | 0.076 | 0.107 | 0.165 | 0.039                       | 0.064 | 0.083 | 0.111 | 0.167 | °C/W  |

**Note**

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

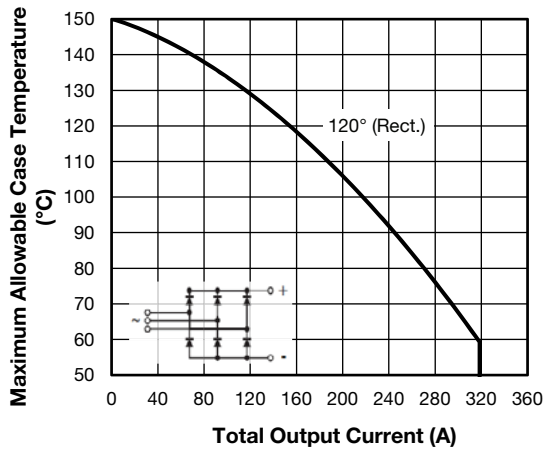


Fig. 1 - Current Ratings Characteristics

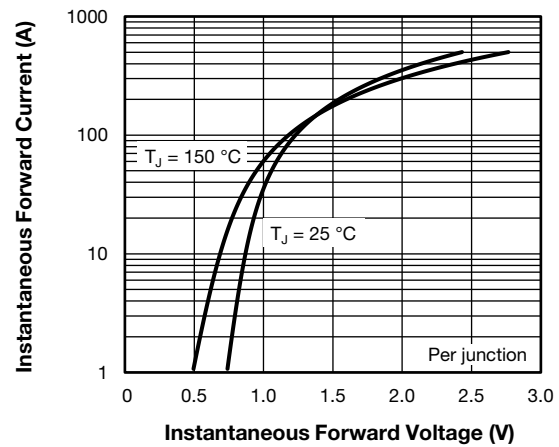


Fig. 2 - Forward Voltage Drop Characteristics

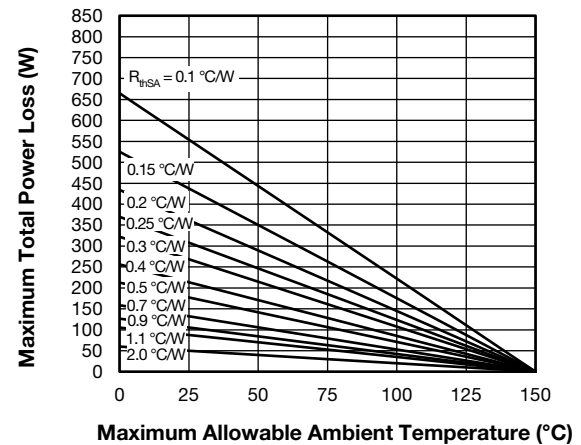
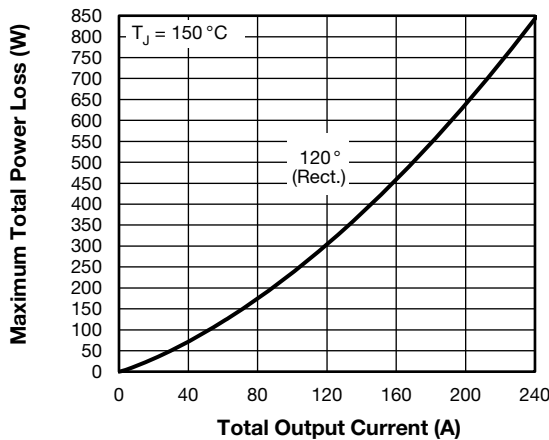


Fig. 3 - Total Power Loss Characteristics

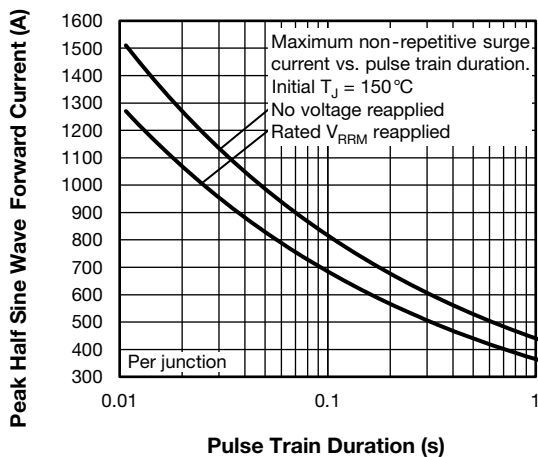


Fig. 4 - Maximum Non-Repetitive Surge Current

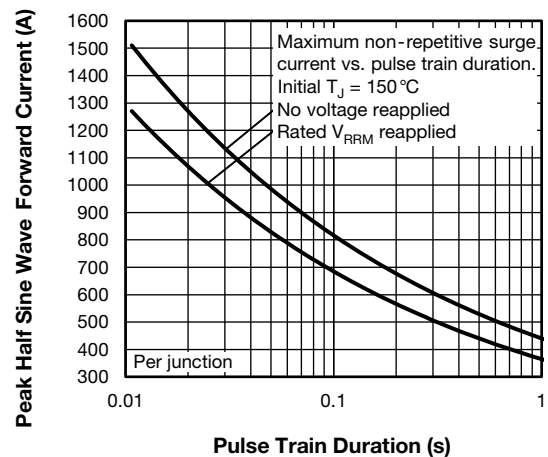
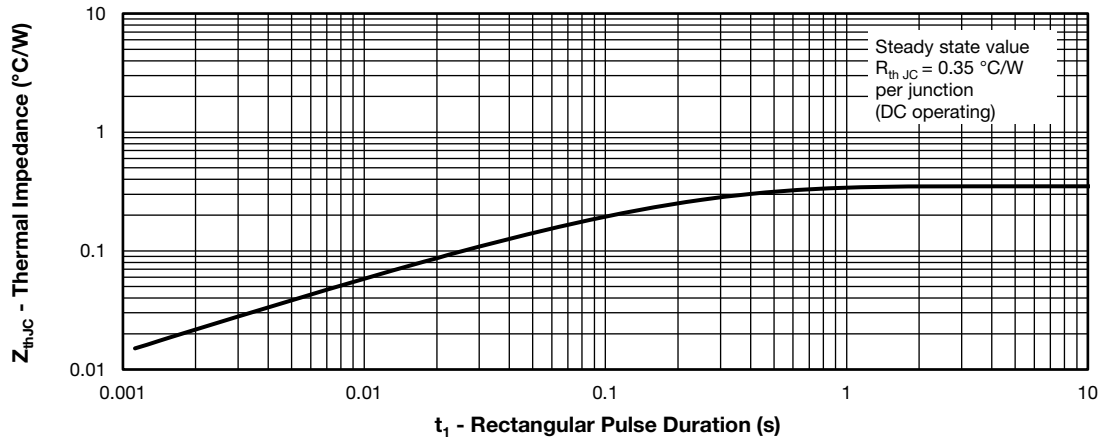


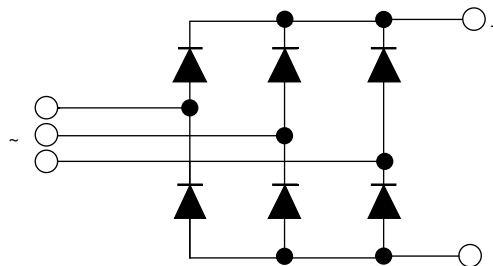
Fig. 5 - Maximum Non-Repetitive Surge Current


Fig. 6 - Thermal Impedance  $Z_{thJC}$  Characteristic

## ORDERING INFORMATION TABLE

| Device code | VS-                                                         | 16 | 1 | MT | 160 | C |
|-------------|-------------------------------------------------------------|----|---|----|-----|---|
|             | ①                                                           | ②  | ③ | ④  | ⑤   |   |
| ①           | - Vishay Semiconductors product                             |    |   |    |     |   |
| ②           | - Current rating code: 16 = 160 A (average)                 |    |   |    |     |   |
| ③           | - Circuit configuration (three phase diodes bridge)         |    |   |    |     |   |
| ④           | - Package indicator                                         |    |   |    |     |   |
| ⑤           | - Voltage code x 10 = $V_{RRM}$ (see Voltage Ratings table) |    |   |    |     |   |

## CIRCUIT CONFIGURATION



## LINKS TO RELATED DOCUMENTS

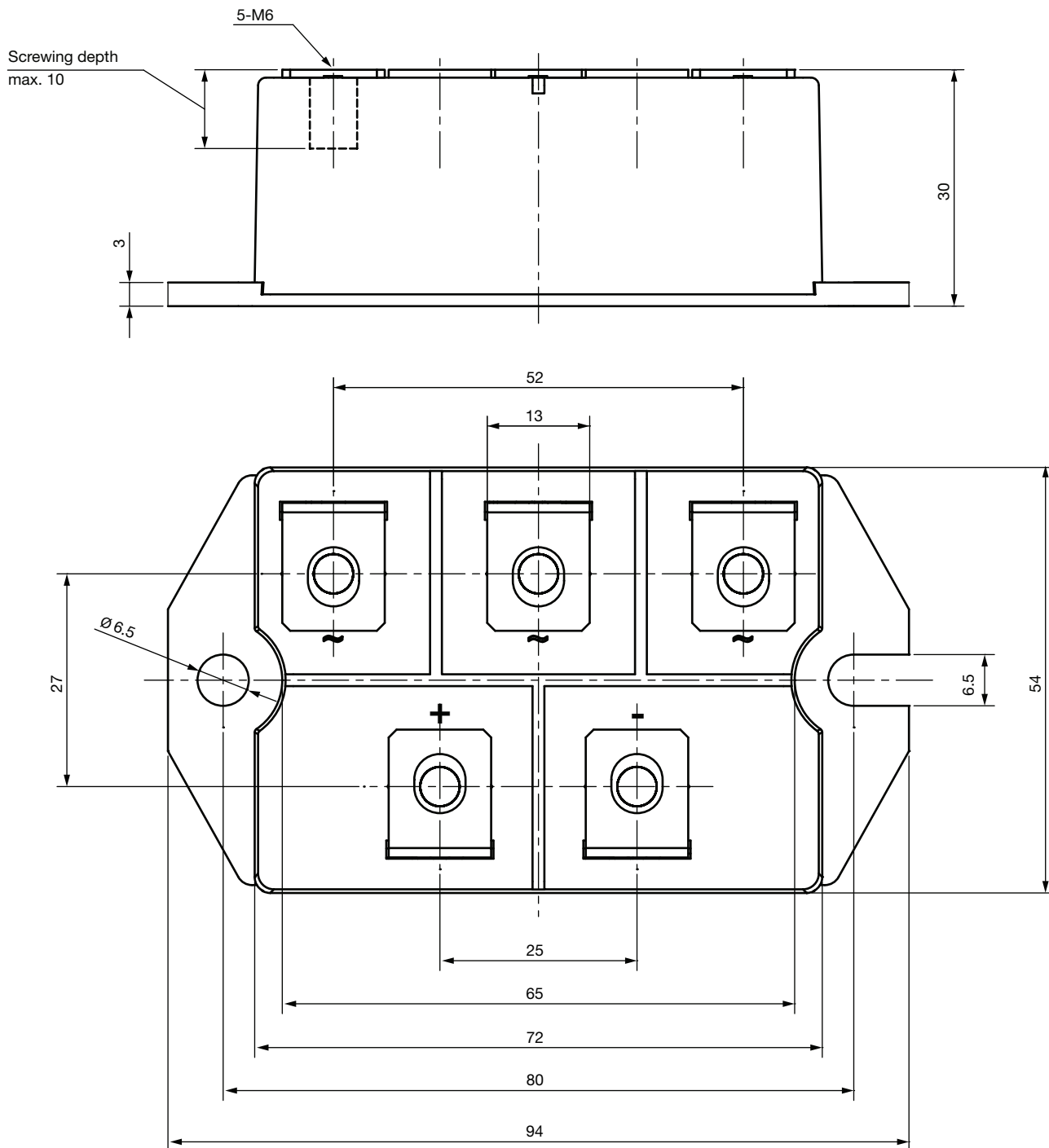
Dimensions

[www.vishay.com/doc?96003](http://www.vishay.com/doc?96003)



## MTC

**DIMENSIONS** in millimeters





## Disclaimer

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