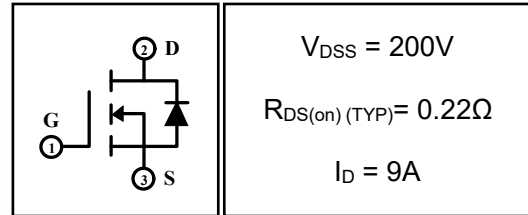


## 9A 200V N-channel Enhancement Mode Power MOSFET

### 1 Description

These N-channel enhanced vdmofets, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. Which accords with the RoHS standard.

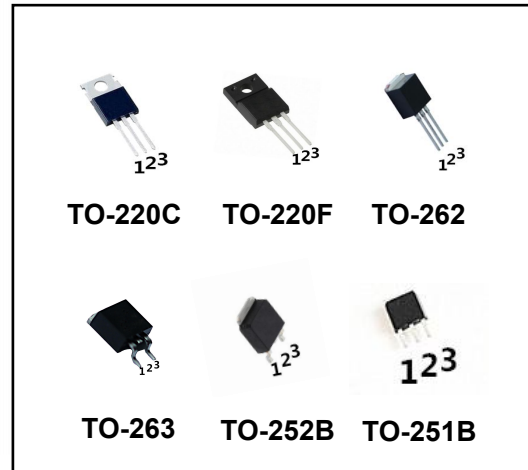


### 2 Features

- Fast switching
- Low on resistance( $R_{dson} \leq 0.30\Omega$ )
- Low gate charge(Typ: 16.5nC)
- Low reverse transfer capacitances(Typ: 25pF)
- 100% single pulse avalanche energy test
- 100%  $\Delta V_{DS}$  test

### 3 Applications

- High efficiency switch mode power supplies.
- Electronic lamp ballasts based on half bridge.
- UPS
- Inverter



### 4 Electrical Characteristics

#### 4.1 Absolute Maximum Rating ( $T_C=25^\circ C$ , unless otherwise noted)

| Parameter                                    | Symbol    | Rating                                |        | Units      |   |
|--|-----------|---------------------------------------|--------|------------|---|
|  |           | 630WI/I630WI/E630WI<br>/B630WI/D630WI | F630WI |            |   |
| Drain-to-Source Voltage                      | $V_{DSS}$ | 200                                   |        | V          |   |
| Gate-to-Source Voltage                       | $V_{GSS}$ | $\pm 30$                              |        | V          |   |
| Continuous Drain Current                     | $I_D$     | $T_C=25^\circ C$                      | 9      | A          |   |
|  |           | $T_C=100^\circ C$                     | 5.7    | A          |   |
| Pulsed Drain Current <sup>(1)</sup>          | $I_{DM}$  | 36                                    |        | A          |   |
| Single Pulse Avalanche Energy <sup>(4)</sup> | $E_{AS}$  | 142                                   |        | mJ         |   |
| Peak Diode Recovery $dv/dt$ <sup>(5)</sup>   | $dv/dt$   | 5                                     |        | V/ns       |   |
| Power Dissipation                            | $P_{tot}$ | $T_a=25^\circ C$                      | 2      | 2          | W |
|  |           | $T_C=25^\circ C$                      | 82     | 38         | W |
| Isolation Voltage                            | $V_{ISO}$ | /                                     | 2500   | V          |   |
| Junction Temperature Range                   | $T_j$     | -55~150                               |        | $^\circ C$ |   |
| Storage Temperature Range                    | $T_{stg}$ | -55~150                               |        | $^\circ C$ |   |
| Maximum Temperature for soldering            | $T_L$     | 300                                   |        | $^\circ C$ |   |

#### 4.2 Thermal Characteristics

| Parameter                                 | Symbol     | Rating                                |        | Unit         |
|---|------------|---------------------------------------|--------|--------------|
|   |            | 630WI/I630WI/E630WI<br>/B630WI/D630WI | F630WI |              |
| Thermal Resistance, Junction to Case-sink | $R_{thJC}$ | 1.52                                  | 3.29   | $^\circ C/W$ |
| Thermal Resistance, Junction to Ambient   | $R_{thJA}$ | 62.5                                  | 62.5   | $^\circ C/W$ |

**4.3 Electrical Characteristics** ( $T_C=25^\circ\text{C}$ , unless otherwise noted)

| Parameter                                 | Symbol       | Test Condition  | Value |      |           | Units         |
|---|--------------|---|-------|------|-----------|---------------|
|   |              |   | Min   | Typ  | Max       |               |
| <b>Off Characteristics</b>                |              |   |       |      |           |               |
| Drain-to-Source Breakdown Voltage         | $BV_{DSS}$   | $I_D=250\mu\text{A}, V_{GS}=0\text{V}$  | 200   | --   | --        | V             |
| Drain-to-Source Leakage Current           | $I_{DSS}$    | $V_{DS}=200\text{V}, V_{GS}=0\text{V}, T_C=25^\circ\text{C}$                                  | --    | --   | 10        | $\mu\text{A}$ |
|   |              | $V_{DS}=160\text{V}, V_{GS}=0\text{V}, T_C=125^\circ\text{C}$                                 | --    | --   | 100       | $\mu\text{A}$ |
| Gate-to-Source Leakage Current            | $I_{GSS}$    | $V_{GS}=\pm 30\text{V}$   | --    | --   | $\pm 100$ | nA            |
| <b>On Characteristics</b>                 |              |   |       |      |           |               |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu\text{A}$   | 2     | --   | 4         | V             |
| Drain-to-Source on-state Resistance       | $R_{DS(on)}$ | $V_{GS}=10\text{V}, I_D=4.5\text{A}$  | --    | 0.22 | 0.3       | $\Omega$      |
| Forward Transfer Conductance              | $g_{fs}$     | $V_{DS}=10\text{V}, I_D=4.5\text{A}$  | --    | 8.2  | --        | S             |
| <b>Dynamic Characteristics</b>            |              |   |       |      |           |               |
| Input Capacitance                         | $C_{iss}$    | $V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1.0\text{MHz}$  | --    | 565  | --        | pF            |
| Output Capacitance                        | $C_{oss}$    |   | --    | 86   | --        |               |
| Reverse Transfer Capacitance              | $C_{rss}$    |   | --    | 25   | --        |               |
| <b>Switching Characteristics</b>          |              |   |       |      |           |               |
| Turn-on Delay Time                        | $t_{d(on)}$  | $I_D=5.4\text{A},$<br>$V_{DD}=100\text{V},$<br>$V_{GS}=10\text{V},$<br>$R_G=3.5\Omega$        | --    | 8.1  | --        | nS            |
| Turn-on Rise Time                         | $t_r$        |   | --    | 62   | --        |               |
| Turn-off Delay Time                       | $t_{d(off)}$ |   | --    | 27   | --        |               |
| Turn-off Fall Time                        | $t_f$        |   | --    | 32   | --        |               |
| Total Gate Charge                         | $Q_g$        | $I_D=5.4\text{A}, V_{DD}=160\text{V}, V_{GS}=10\text{V}$                                      | --    | 16.5 | --        | nC            |
| Gate-to-Source Charge                     | $Q_{gs}$     |   | --    | 2.4  | --        |               |
| Gate-to-Drain("Miller") Charge            | $Q_{gd}$     |   | --    | 3.9  | --        |               |
| <b>Drain-Source Diode Characteristics</b> |              |   |       |      |           |               |
| Diode Forward Voltage <sup>(3)</sup>      | $V_{FSD}$    | $V_{GS}=0\text{V}, I_S=9\text{A}$   | --    | --   | 1.5       | V             |
| Diode Forward Current                     | $I_S$        |   | --    | --   | 9         | A             |
| Reverse Recovery Time <sup>(3)</sup>      | $t_{rr}$     | $T_J=25^\circ\text{C}, I_F=9\text{A},$<br>$di_F/dt=100\text{A}/\mu\text{s}, V_{GS}=0\text{V}$ | --    | 120  | --        | nS            |
| Reverse Recovery Charge <sup>(3)</sup>    | $Q_{rr}$     |   | --    | 542  | --        | nC            |

**Notes:**

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board,  $t \leq 10\text{sec}$ .
- 3: Pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- 4:  $L=10\text{mH}, I_D=5.4\text{A}, V_{DD}=50\text{V}, V_{GATE}=200\text{V}, \text{Start } T_J=25^\circ\text{C}$ .
- 5:  $I_{SD}=9\text{A}, di/dt \leq 100\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}, \text{Start } T_J=25^\circ\text{C}$ .

**5 Typical characteristics diagrams**

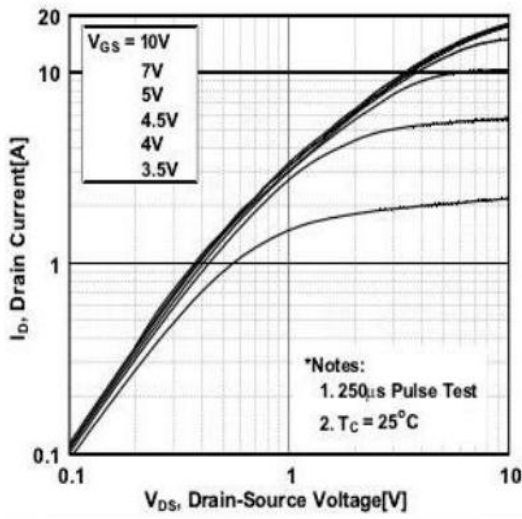


图 1 输出特性曲线,  $T_C=25^\circ\text{C}$

Fig1 Typical Output Characteristics,  $T_C=25^\circ\text{C}$

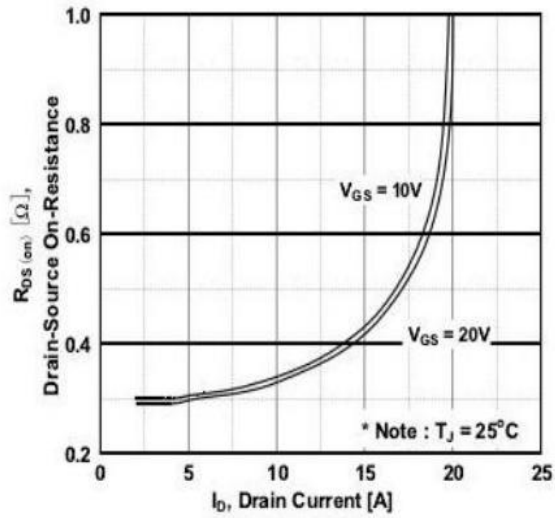


图 2 导通电阻与漏极电流和栅极电压曲线

Fig2 On-Resistance Vs.Drain Current and Gate Voltage

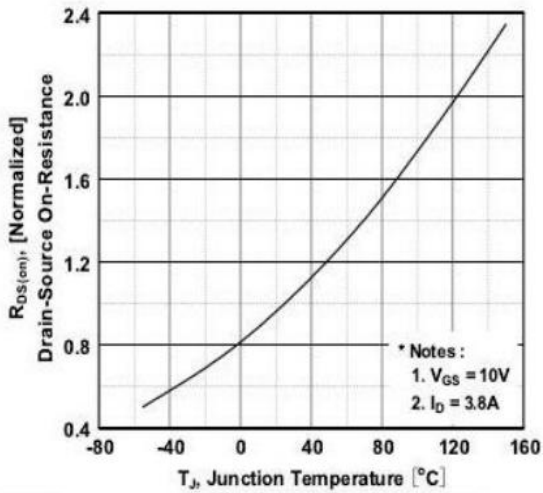


图 3 导通电阻与温度曲线

Fig3 Normalized On-Resistance Vs.Temperature

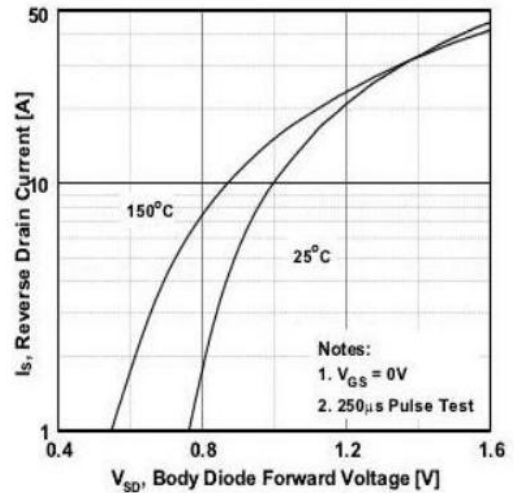
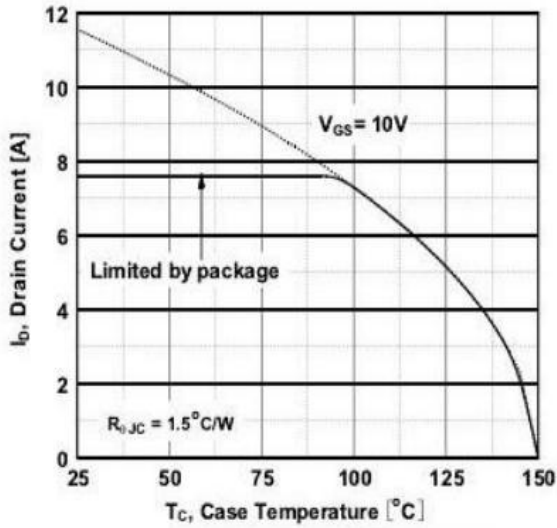


图 4 二极管正向电压曲线

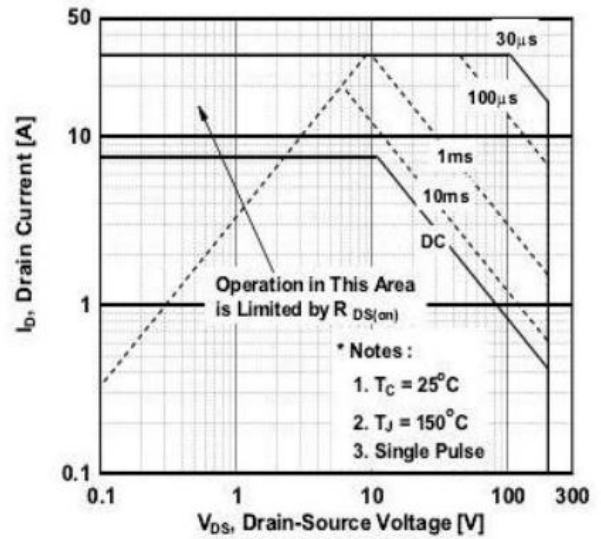
Fig4 Typical Source-Drain Diode Forward Voltage

**5 Typical characteristics diagrams(continues)**



**图 5 最大漏极电流与壳温曲线**

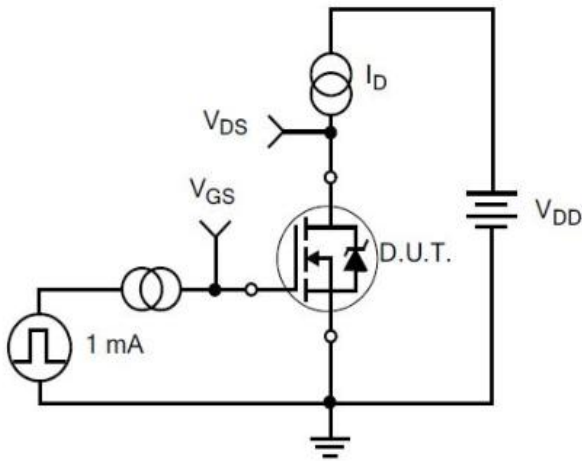
**Fig5 Maximum Drain Current Vs.Case Temperature**



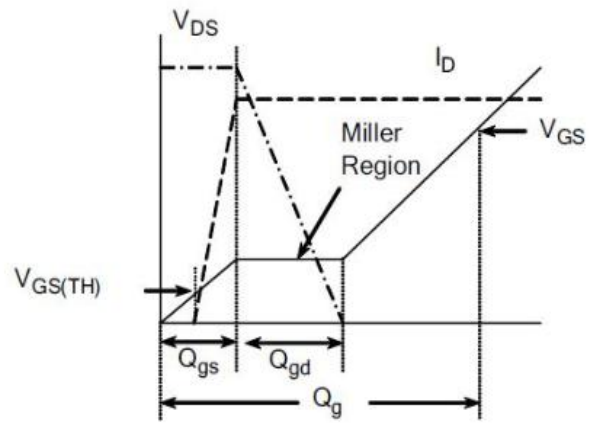
**图 6 最大安全工作区曲线**

**Fig6 Maximum Safe Operating Area**

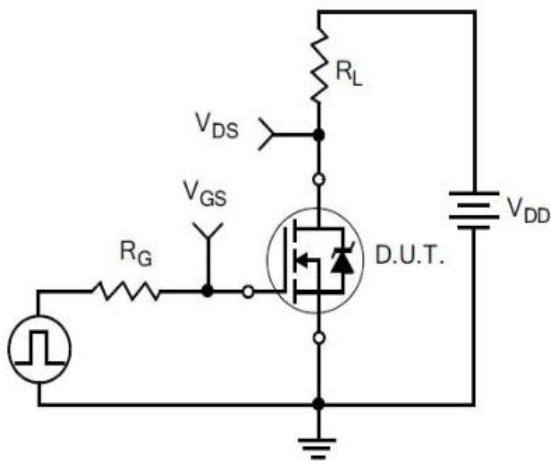
**6 Typical Test Circuit and Waveform**



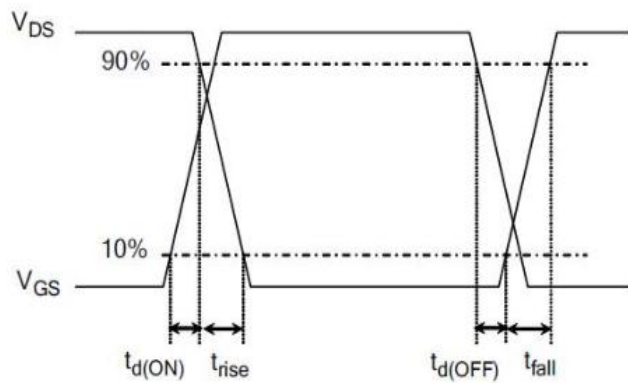
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

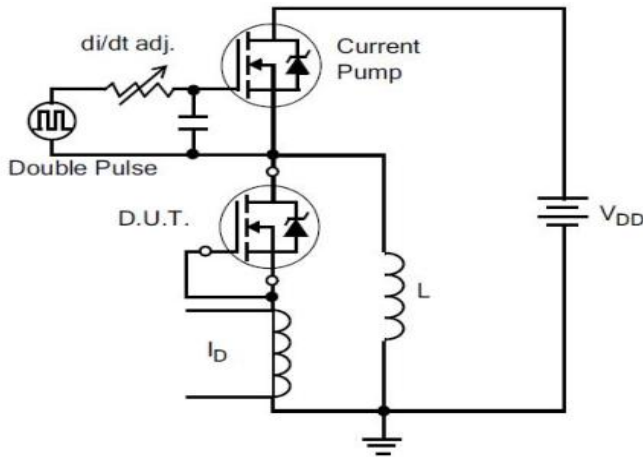


3) Resistive Switching Test Circuit

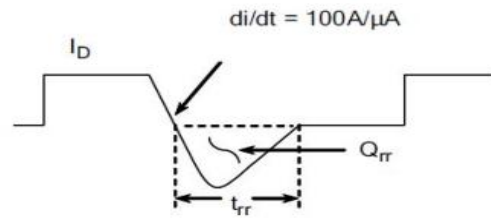


4) Resistive Switching Waveforms

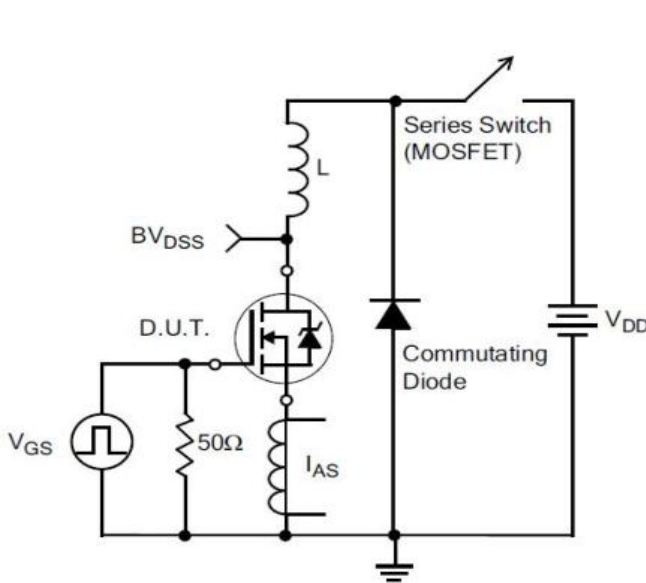
**6 Typical Test Circuit and Waveform(continues)**



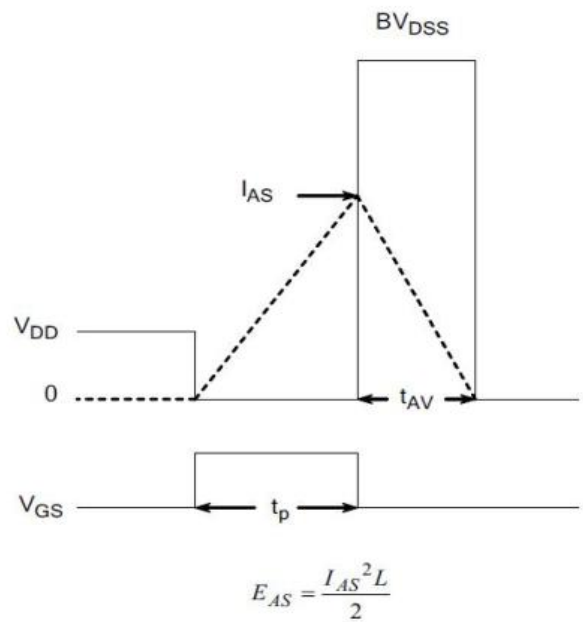
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

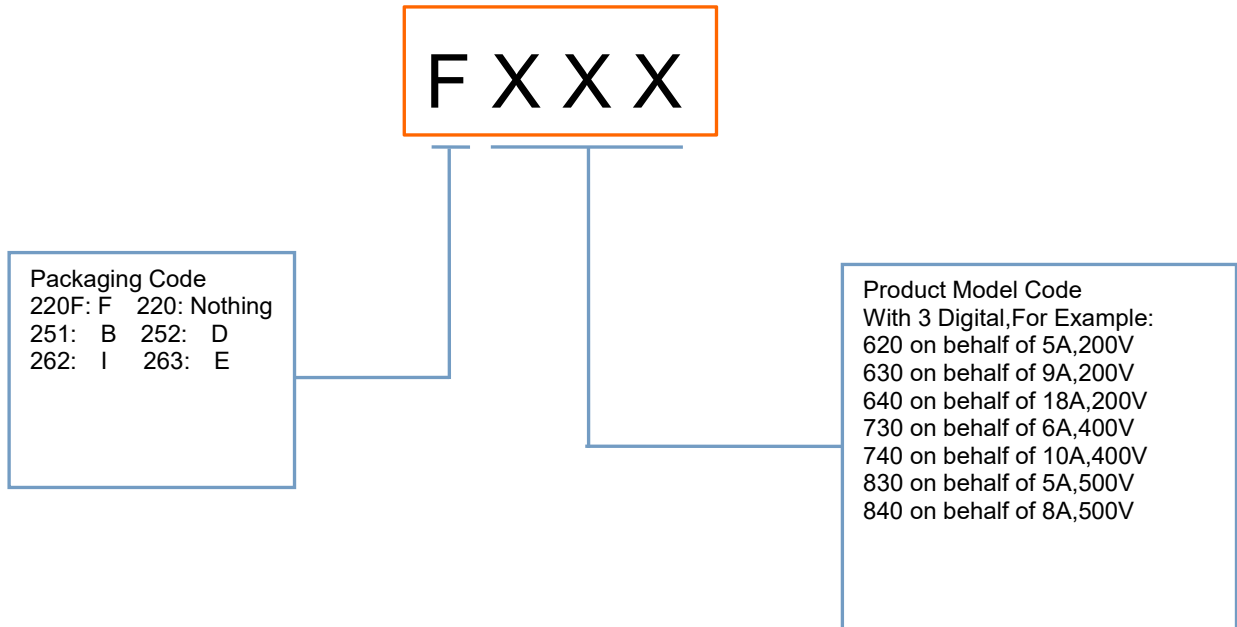


7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

## 7 Product Names Rules

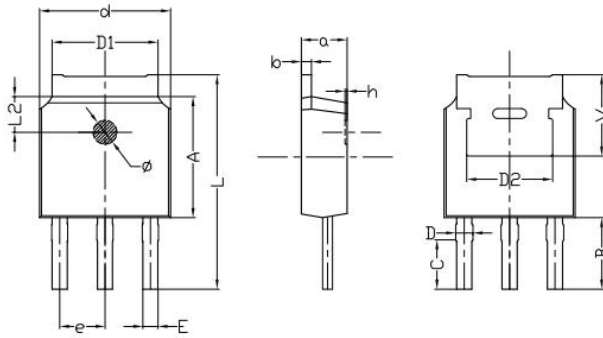


## 8 Product Specifications and Packaging Models

| Product Model | Package Type | Mark Name | Identification Code | RoHS    | Package     | Quantity |
|---------------|--------------|-----------|---------------------|---------|-------------|----------|
| 630WI         | TO-220       | 630       | WI                  | Pb-free | Tube        | 1000/box |
| F630WI        | TO-220F      | F630      | WI                  | Pb-free | Tube        | 1000/box |
| B630WI        | TO-251       | B630      | WI                  | Pb-free | Tube        | 3000/box |
| D630WI        | TO-252       | D630      | WI                  | Pb-free | Tape & Reel | 2500/box |
| I630WI        | TO-262       | I630      | WI                  | Pb-free | Tube        | 1000/box |
| E630WI        | TO-263       | E630      | WI                  | Pb-free | Tape & Reel | 800/box  |

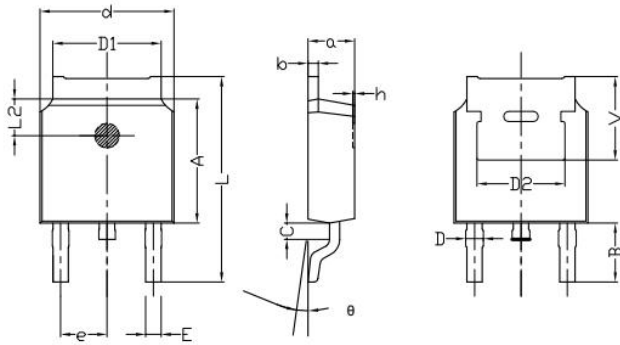
**9 Dimensions**

TO-251B PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |        |
|--------|---------------------------|-------|----------------------|--------|
|        | min.                      | max.  | min.                 | max.   |
| a      | 2.20                      | 2.40  | 0.087                | 0.0946 |
| b      | 0.46                      | 0.58  | 0.018                | 0.023  |
| C      | 2.45                      | 2.65  | 0.097                | 0.104  |
| D      | 0.80                      | 0.90  | 0.032                | 0.035  |
| d      | 6.30                      | 6.70  | 0.248                | 0.264  |
| D1     | 5.00                      | 5.50  | 0.197                | 0.217  |
| D2     | TYP 4.83                  |       | TYP 0.190            |        |
| A      | 5.80                      | 6.20  | 0.228                | 0.244  |
| e      | 2.19                      | 2.39  | 0.086                | 0.094  |
| L      | 10.40                     | 11.00 | 0.4098               | 0.4334 |
| B      | 3.50                      | 3.70  | 0.1379               | 0.1458 |
| L2     | 1.5                       | 1.8   | 0.059                | 0.071  |
| Φ      | 1.10                      | 1.30  | 0.0433               | 0.0512 |
| h      | 0.00                      | 0.30  | 0.000                | 0.012  |
| V      | 5.25                      | 5.85  | 0.207                | 0.230  |
| E      | 0.60                      | 0.80  | 0.0236               | 0.0315 |

TO-252B PACKAGE OUTLINE DIMENSIONS

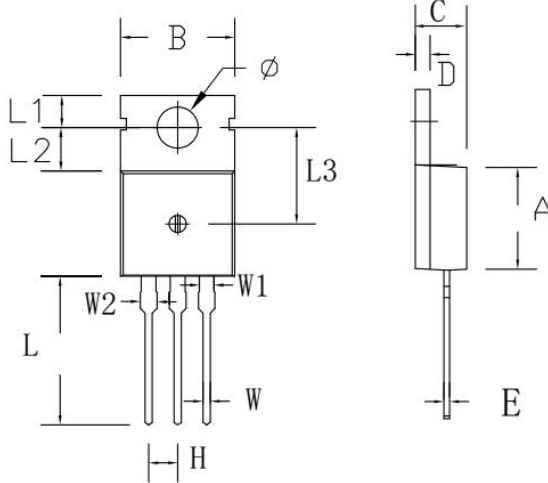


| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | min.                      | max.  | min.                 | max.  |
| a      | 2.20                      | 2.40  | 0.087                | 0.095 |
| b      | 0.46                      | 0.58  | 0.018                | 0.023 |
| c      | 0.70                      | 0.90  | 0.028                | 0.035 |
| D      | 0.80                      | 1.00  | 0.032                | 0.039 |
| d      | 6.30                      | 6.70  | 0.248                | 0.264 |
| D1     | 5.00                      | 5.50  | 0.197                | 0.217 |
| D2     | TYP 4.83                  |       | TYP 0.190            |       |
| A      | 5.80                      | 6.20  | 0.228                | 0.244 |
| e      | 2.19                      | 2.39  | 0.086                | 0.094 |
| L      | 9.40                      | 10.40 | 0.370                | 0.409 |
| B      | 2.6                       | 3.2   | 0.102                | 0.126 |
| L2     | 1.5                       | 1.8   | 0.059                | 0.071 |
| θ      | 0                         | 8     | 0                    | 8     |
| h      | 0                         | 0.3   | 0                    | 0.012 |
| V      | 5.25                      | 5.85  | 0.207                | 0.230 |
| E      | 0.6                       | 0.8   | 0.024                | 0.032 |



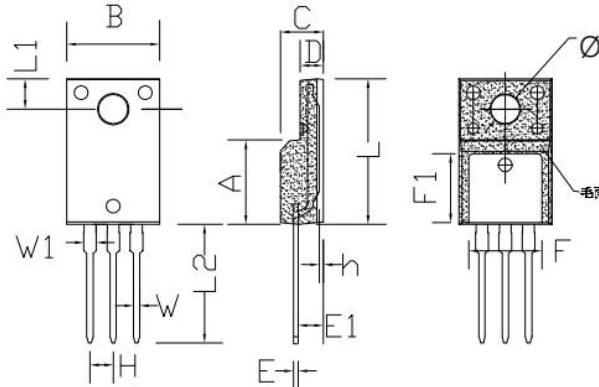
**9 Dimensions(continues)**

TO-220C PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | min.                      | max.  | min.                 | max.  |
| A      | 8.80                      | 9.30  | 0.346                | 0.366 |
| B      | 9.70                      | 10.30 | 0.382                | 0.406 |
| C      | 4.25                      | 4.75  | 0.167                | 0.187 |
| D      | 1.20                      | 1.45  | 0.047                | 0.057 |
| E      | 0.40                      | 0.60  | 0.016                | 0.024 |
| H      | 2.54 TYP                  |       | 0.100 TYP            |       |
| W      | 0.60                      | 0.95  | 0.024                | 0.037 |
| W1     | 1.05                      | 1.45  | 0.041                | 0.057 |
| W2     | 1.20                      | 1.60  | 0.047                | 0.063 |
| L      | 12.60                     | 13.40 | 0.496                | 0.528 |
| L1     | 2.45                      | 2.95  | 0.096                | 0.116 |
| L2     | 3.45                      | 3.95  | 0.136                | 0.156 |
| L3     | 8.15                      | 8.65  | 0.321                | 0.341 |
| Φ      | 3.50                      | 3.90  | 0.138                | 0.154 |

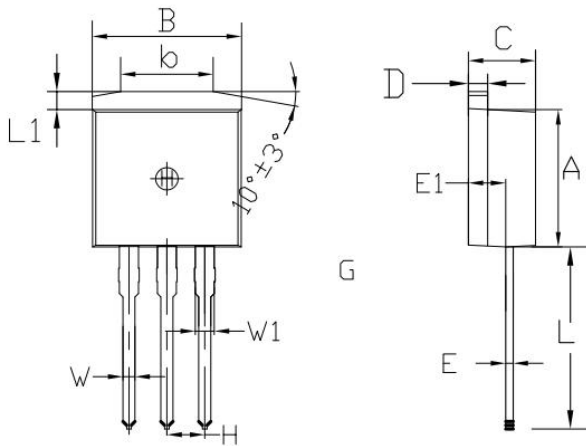
TO-220F PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | min.                      | max.  | min.                 | max.  |
| A      | 8.80                      | 9.30  | 0.346                | 0.366 |
| B      | 10.00                     | 10.50 | 0.394                | 0.413 |
| C      | 4.30                      | 4.90  | 0.169                | 0.193 |
| D      | 2.30                      | 2.70  | 0.091                | 0.106 |
| L      | 15.55                     | 16.15 | 0.612                | 0.636 |
| h      | 0.40                      | 0.60  | 0.016                | 0.024 |
| L1     | 3.15                      | 3.55  | 0.124                | 0.140 |
| L2     | 12.65                     | 13.35 | 0.498                | 0.526 |
| W      | 0.70                      | 0.90  | 0.028                | 0.035 |
| W1     | 1.15                      | 1.55  | 0.045                | 0.061 |
| H      | 2.54 TYP                  |       | 0.100 TYP            |       |
| E      | 0.48                      | 0.53  | 0.019                | 0.021 |
| Φ      | 2.90                      | 3.40  | 0.114                | 0.134 |
| E1     | 2.40                      | 2.90  | 0.094                | 0.114 |
| F      | 7.75                      | 8.25  | 0.305                | 0.325 |
| F1     | 7.35                      | 7.85  | 0.289                | 0.309 |

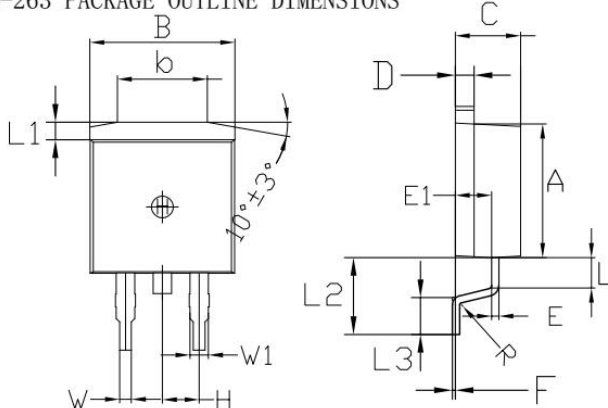
**9 Dimensions(continues)**

TO-262 PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |        |
|--------|---------------------------|-------|----------------------|--------|
|        | min.                      | max.  | min.                 | max.   |
| A      | 8.80                      | 9.30  | 0.346                | 0.366  |
| B      | 9.70                      | 10.30 | 0.382                | 0.406  |
| C      | 4.25                      | 4.75  | 0.167                | 0.187  |
| D      | 1.20                      | 1.45  | 0.047                | 0.057  |
| E      | 0.40                      | 0.60  | 0.016                | 0.024  |
| L      | 12.25                     | 13.75 | 0.482                | 0.541  |
| L1     | 1.15                      | 1.45  | 0.045                | 0.057  |
| E1     | 2.4                       | 2.6   | 0.0945               | 0.1024 |
| W      | 0.80                      | 0.82  | 0.0315               | 0.034  |
| W1     | 1.20                      | 1.30  | 0.047                | 0.051  |
| H      | 2.54 TYP                  |       | 0.200 TYP            |        |
| b      | 5.50                      | 6.50  | 0.216                | 0.256  |

TO-263 PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |        |
|--------|---------------------------|-------|----------------------|--------|
|        | min.                      | max.  | min.                 | max.   |
| A      | 8.80                      | 9.30  | 0.346                | 0.366  |
| B      | 9.70                      | 10.30 | 0.382                | 0.406  |
| C      | 4.25                      | 4.75  | 0.167                | 0.187  |
| D      | 1.20                      | 1.45  | 0.047                | 0.057  |
| E      | 0.40                      | 0.60  | 0.016                | 0.024  |
| L      | 1.90                      | 2.30  | 0.075                | 0.091  |
| L1     | 1.15                      | 1.45  | 0.045                | 0.057  |
| R      | 0.24                      | 0.26  | 0.0095               | 0.0102 |
| W      | 0.80                      | 0.82  | 0.0315               | 0.0323 |
| W1     | 1.20                      | 1.30  | 0.047                | 0.051  |
| H      | 2.54 TYP                  |       | 0.200 TYP            |        |
| b      | 5.50                      | 6.50  | 0.216                | 0.256  |
| E1     | 2.4                       | 2.6   | 0.0946               | 0.1024 |
| L2     | 5.20                      | 5.80  | 0.205                | 0.228  |
| L3     | 2.20                      | 3.20  | 0.087                | 0.126  |
| F      | 0.03                      | 0.23  | 0.0012               | 0.0091 |

## 10 Attentions

- Jiangsu Donghai Semiconductor Technology CO.,LTD. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of Donghai products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

## 11 Appendix

Revision history:

| Date       | REV. | Description | Page |
|------------|------|-------------|------|
| 2017.03.14 | 1.0  | Original    |      |

单击下面可查看定价，库存，交付和生命周期等信息

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