

Features

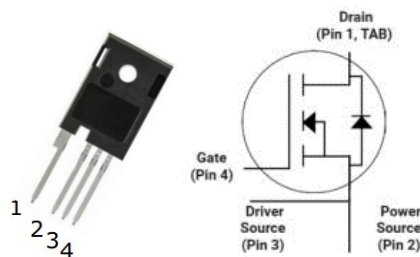
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

Product Summary

| | |
|--------------------|-------|
| V_{DS} | 1200V |
| $R_{DS(on)_{typ}}$ | 320mΩ |
| I_D | 7.6A |

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Package Marking and Ordering Information

| Part # | Marking | Package |
|------------|-----------|----------|
| T1M320120K | 1M320120K | TO-247-4 |

Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|-----------------------|------------|------------------|
| Drain-source voltage | V_{DS} | 1200 | V |
| Continuous drain current $T_C = 25^\circ\text{C}$, $V_{GS} = 18\text{V}$ $T_C = 100^\circ\text{C}$, $V_{GS} = 18\text{V}$ | I_D | 7.6 5.5 | A |
| Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax}) | $I_{D \text{ pulse}}$ | 20 | A |
| Gate-Source voltage | V_{GS} | -4/+18 | V |
| Gate-Source voltage (Absolute maximum values) | V_{GSmax} | -8/+22 | V |
| Power dissipation ($T_C = 25^\circ\text{C}$) | P_{tot} | 60 | W |
| Operating junction and storage temperature | T_j , T_{stg} | -55...+175 | $^\circ\text{C}$ |

- Example of acceptable V_{GS} waveform



Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|------------|-------|------|
| Thermal resistance, junction – case. Max | R_{thJC} | 2.50 | °C/W |
| Thermal resistance, junction – ambient. Max | R_{thJA} | 40 | |

Electrical Characteristic (at $T_j = 25\text{ °C}$, unless otherwise specified)

| Parameter | Symbol | Value | | | Unit | Test Condition |
|-----------|--------|-------|------|------|------|----------------|
| | | min. | typ. | max. | | |

Static Characteristic

| | | | | | | |
|----------------------------------|--------------|------|-----|-----|------------|---|
| Drain-source breakdown voltage | BV_{DSS} | 1200 | - | - | V | $V_{GS}=0V, I_D=100\mu A$ |
| Gate threshold voltage | $V_{GS(th)}$ | 2 | 3.1 | 4 | V | $V_{DS}=V_{GS}, I_D=1mA$ |
| Zero gate voltage drain current | I_{DSS} | - | 1 | 20 | μA | $V_{DS}=1200V, V_{GS}=0V$ $T_C=25\text{ °C}$ |
| | | - | 5 | - | | $T_C=175\text{ °C}$ |
| Gate-source leakage current | I_{GSS} | - | | 100 | nA | $V_{GS}=18V, V_{DS}=0V$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 320 | 450 | m Ω | $V_{GS}=18V, I_D=3.6A,$ $T_j=25\text{ °C}$ |
| | | - | 480 | - | | $T_J=175\text{ °C}$ |
| Transconductance | g_{fs} | - | 3 | - | S | $V_{DS}=20V, I_D=3.6A$ |

Dynamic Characteristic

| | | | | | | |
|------------------------------|---------------------|---|------|---|----|---|
| Input Capacitance | C _{iss} | - | 324 | - | pF | V _{DS} = 1000V V _{GS} = 0V T _J = 25°C V _{AC} = 25mV f = 1MHz |
| Output Capacitance | C _{oss} | - | 24 | - | | |
| Reverse Transfer Capacitance | C _{rss} | - | 4 | - | | |
| Gate Total Charge | Q _G | - | 23.5 | - | nC | V _{DS} = 800V V _{GS} = 0/18V I _D = 3.6A I _G = 10mA |
| Gate-Source charge | Q _{gs} | - | 3.2 | - | | |
| Gate-Drain charge | Q _{gd} | - | 14 | - | | |
| Turn-On Switching Energy | E _{ON} | - | 9 | - | μJ | V _{DD} =800V, V _{GS} =-4/18V R _G =5Ω, I _D =3.6A Inductive Load, T _J =25°C |
| Turn-Off Switching Energy | E _{OFF} | - | 140 | - | | |
| Turn-on delay time | t _{d(on)} | - | 10.9 | - | ns | |
| Rise time | t _r | - | 16.2 | - | | |
| Turn-off delay time | t _{d(off)} | - | 11.2 | - | | |
| Fall time | t _f | - | 30.4 | - | | |
| Gate resistance | R _G | - | 5.9 | - | Ω | V _{AC} = 25mV, f=1MHz |

Body Diode Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|------------------------------------|----------|-------|------|------|------|---|
| | | min. | typ. | max. | | |
| Body Diode Forward Voltage | V_{SD} | | 3.6 | | V | $V_{GS} = 0V, I_{SD}=4A,$ $T_J=25^\circ C$ |
| | | | 3.2 | | | $V_{GS} = 0V, I_{SD}=4A,$ $T_J=175^\circ C$ |
| Body Diode Reverse Recovery Time | t_{rr} | - | 12.3 | - | ns | $V_R = 800V, V_{GS} = 0V$ $I_D = 3.6A$ $di/dt = 800A/\mu S$ $T_J = 25^\circ C$ |
| Body Diode Reverse Recovery Charge | Q_{rr} | - | 23.5 | - | nC | |

Typical Performance Characteristics

Fig 1. Output Characteristic ($T_J = -55^{\circ}\text{C}$)

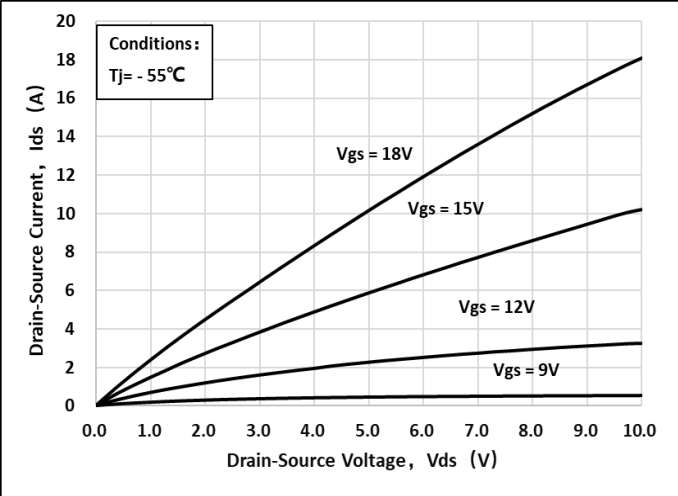


Fig 2. Output Characteristic ($T_J = 25^{\circ}\text{C}$)

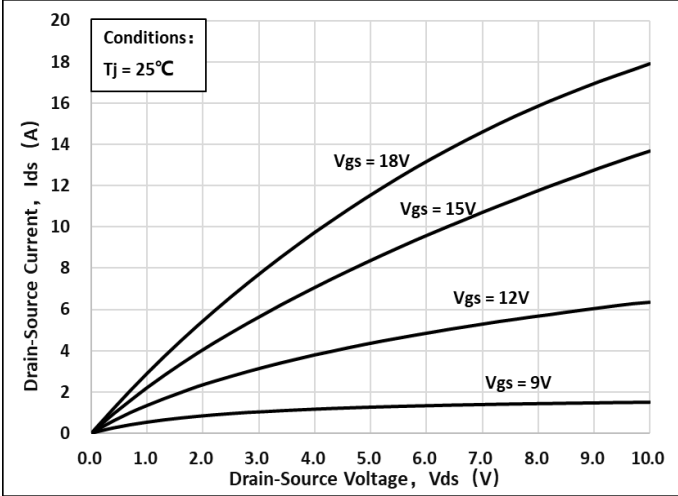


Fig 3. Output Characteristic ($T_J = 175^{\circ}\text{C}$)

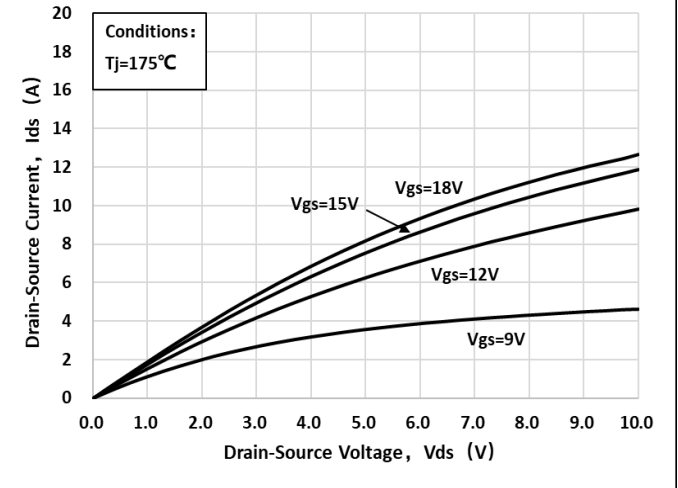


Fig 4: $R_{ds(on)}$ Vs I_{ds} Characteristic

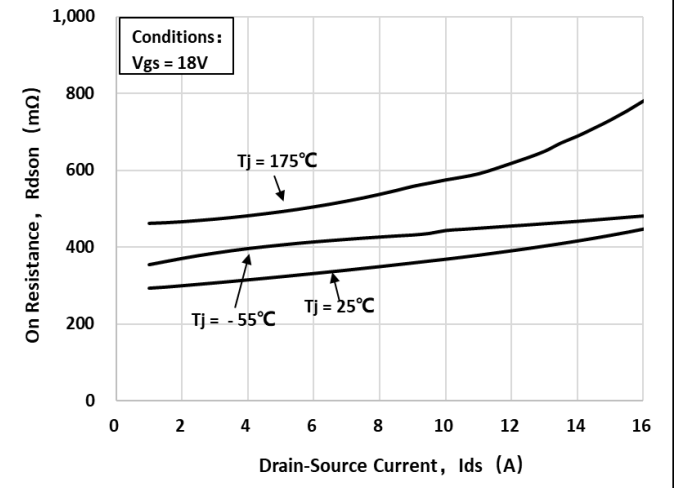


Fig 5: $R_{ds(on)}$ vs. Temperature

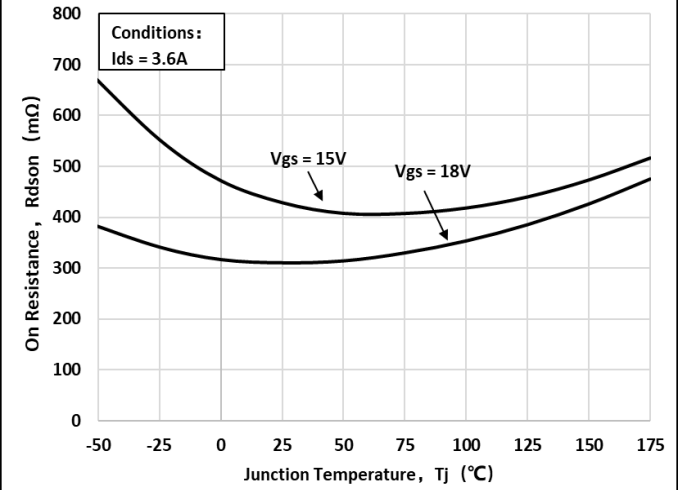


Fig 6: Transfer Characteristic

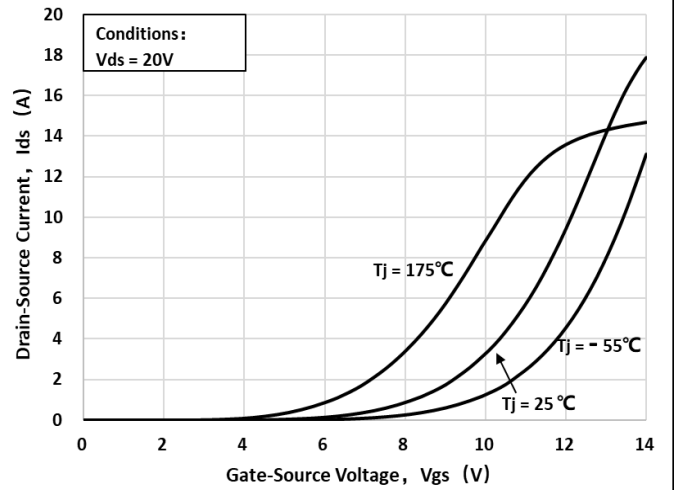


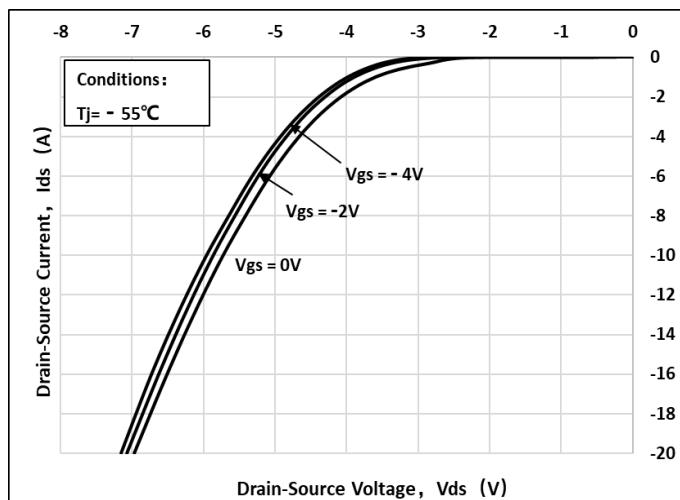
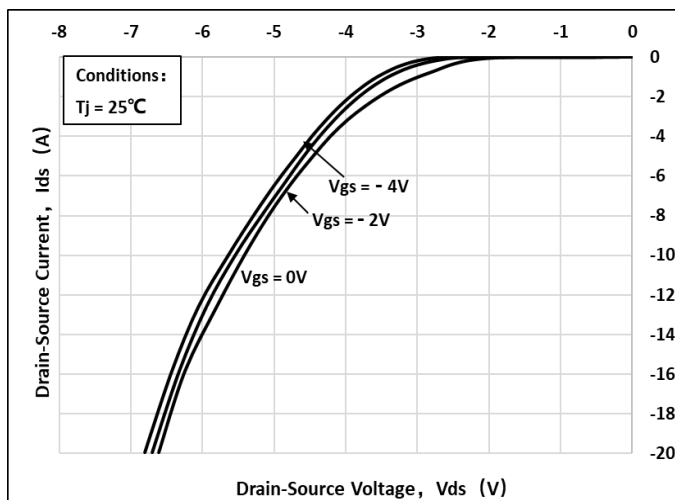
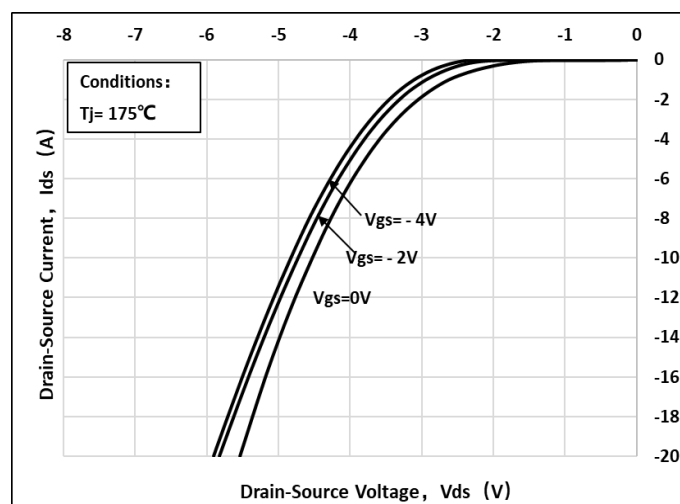
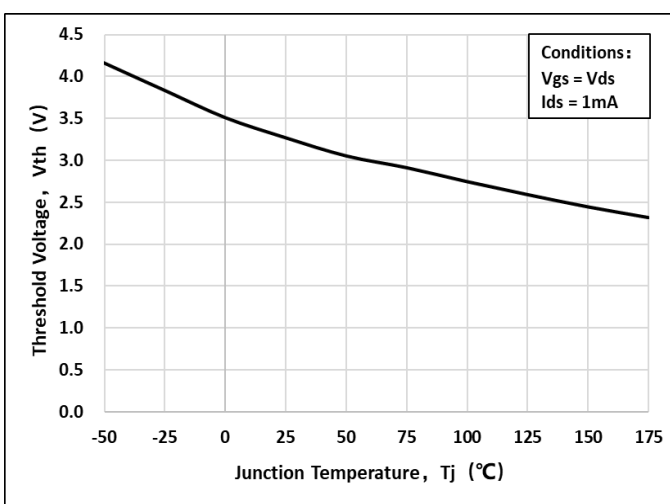
Fig 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)Fig 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)Fig 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)Fig 10: V_{TH} Vs T_J Temperature Characteristic

Fig 11: Gate Charge Characteristics

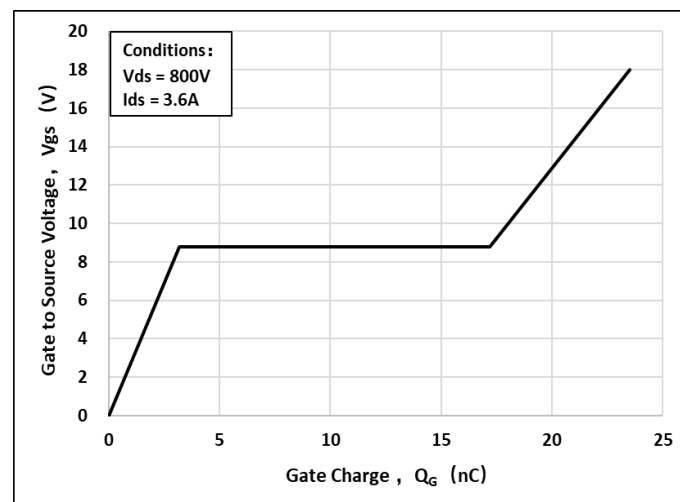
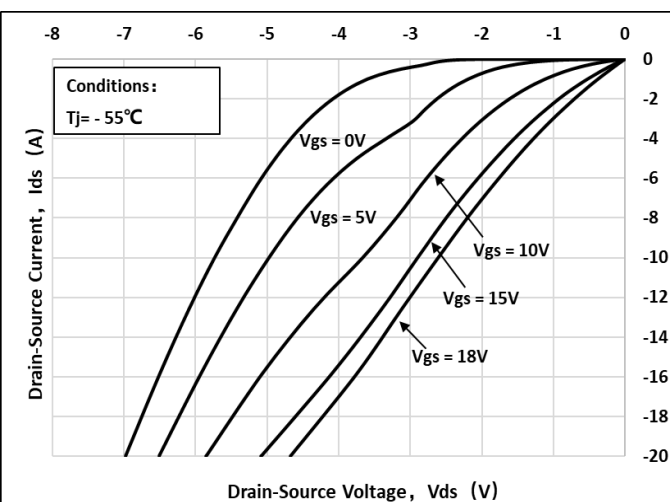
Fig 12: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

Fig 13: 3rd Quadrant Characteristic(T_J=25°C)

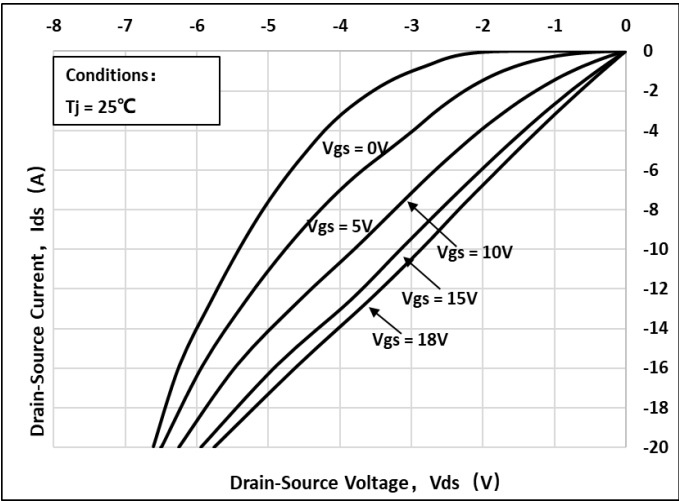


Fig 14: 3rd Quadrant Characteristic(T_J=175°C)

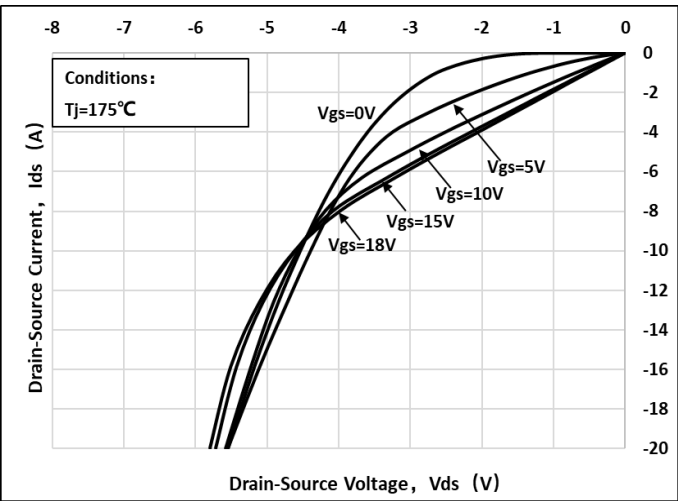


Fig 15: Capacitance Characteristic

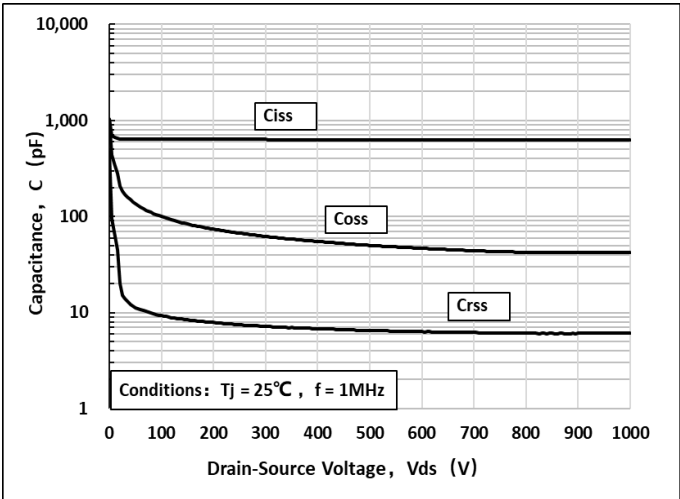


Fig 16: Safe Operating Area

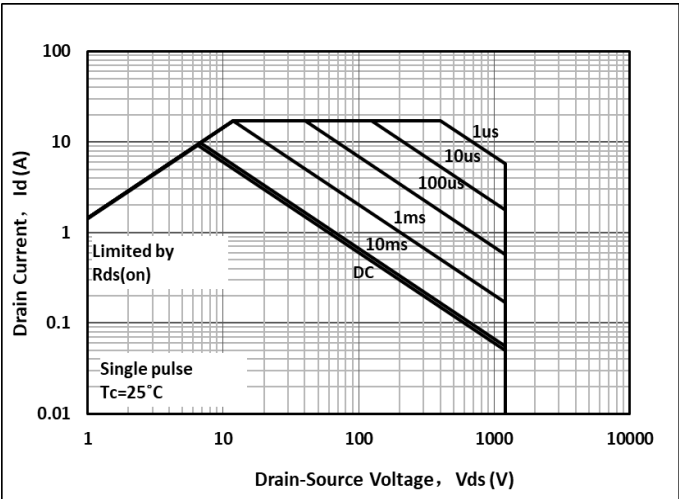
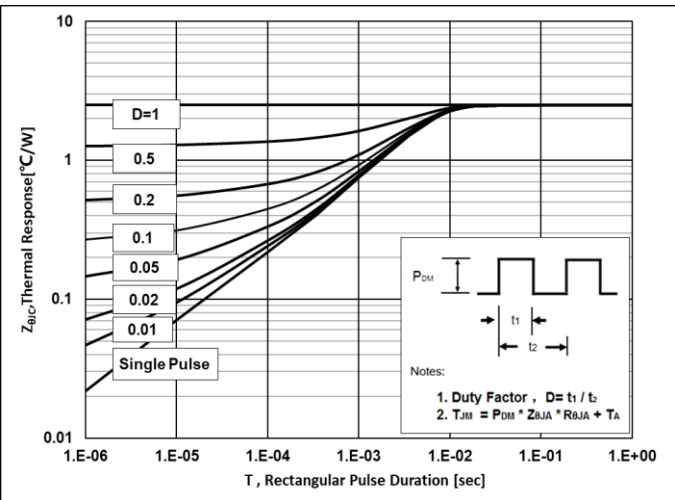


Fig 17: Transient Thermal Impedance



Test Circuit & Waveform

Figure A. Definition of switching times

Figure B. Dynamic test circuit

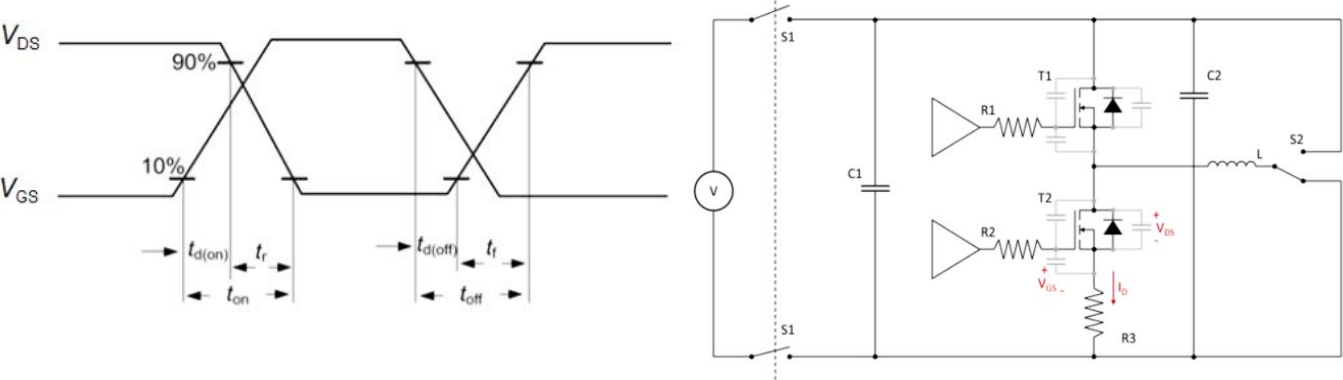


Figure C. Definition of body diodeswitching characteristics

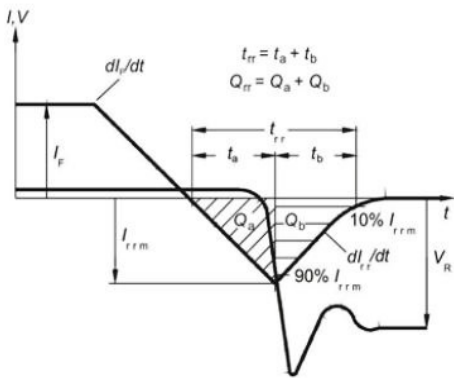
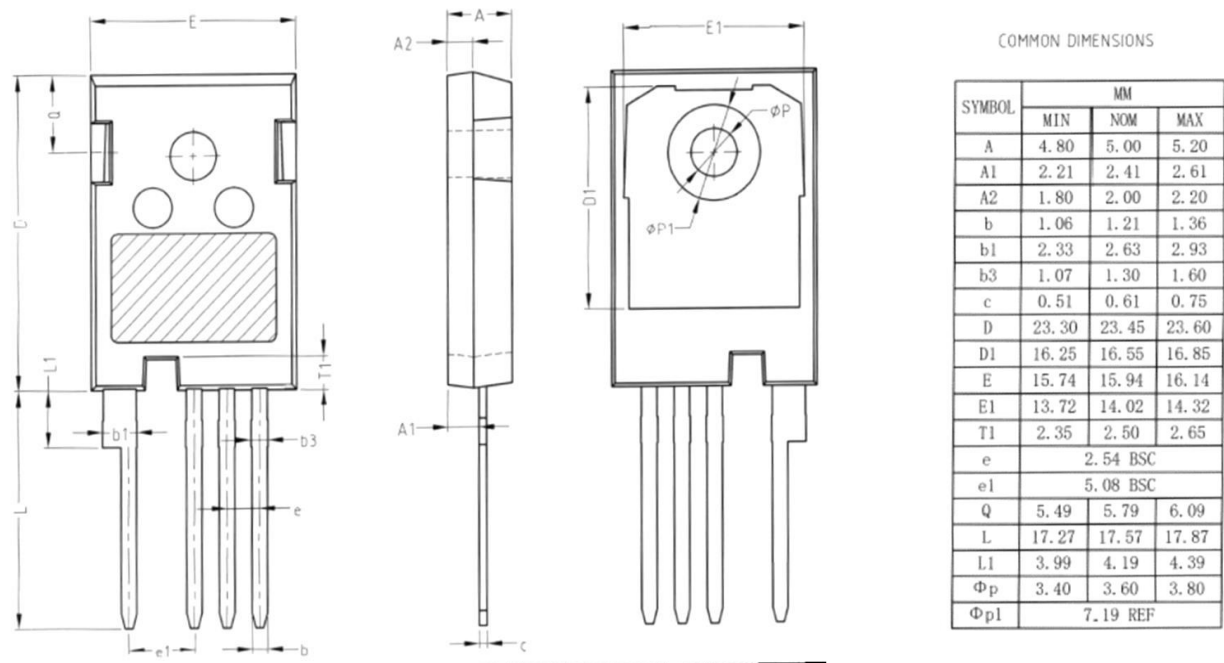



Figure C. Definition of diode switching characteristics

Package Outline:



Contact Information

TANI website: <http://www.tanisemi.com> Email: tani@tanisemi.com
For additional information, please contact your local Sales Representative.

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