



## Features

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

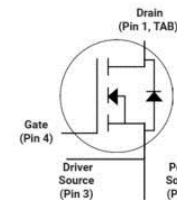
## Applications

- Solar Inverters
- Switch Mode Power Supplies
- Auxiliary power supplies
- Smart meters



TO-263-7L  
Package

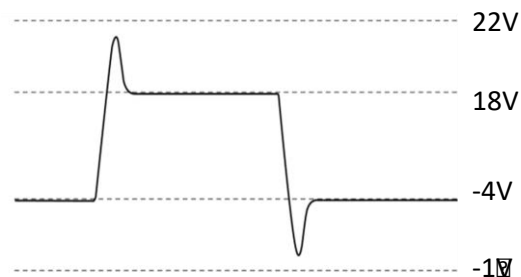
| Ordering Part Number | Package   | Marking |
|----------------------|-----------|---------|
| CMS120N080B          | TO-263-7L | C1200NU |



## Maximum Ratings (T<sub>c</sub> = 25 °C unless otherwise specified)

| Parameter                                                                                  | Symbol                            | Value      | Unit |
|--------------------------------------------------------------------------------------------|-----------------------------------|------------|------|
| Drain-source voltage                                                                       | V <sub>DS</sub>                   | 1200       | V    |
| Continuous drain current<br>T <sub>c</sub> = 25°C<br>T <sub>c</sub> = 100°C                | I <sub>D</sub>                    | 30<br>21   | A    |
| Source current(Body Diode)<br>T <sub>c</sub> = 25°C<br>T <sub>c</sub> = 100°C              | I <sub>S</sub>                    | 30<br>21   | A    |
| Pulsed drain current (T <sub>c</sub> = 25°C, t <sub>p</sub> limited by T <sub>jmax</sub> ) | I <sub>D</sub> pulse              | 80         | A    |
| Avalanche energy, single pulse (L=10mH)                                                    | E <sub>AS</sub>                   | 600        | mJ   |
| Gate-Source voltage                                                                        | V <sub>GS</sub>                   | -4/+18     | V    |
| Gate-Source voltage (dynamic,Absolute maximum values)                                      | V <sub>GSmax</sub>                | -8/+22     | V    |
| Power dissipation (T <sub>c</sub> = 25°C)                                                  | P <sub>tot</sub>                  | 136        | W    |
| Operating junction and storage temperature                                                 | T <sub>J</sub> , T <sub>stg</sub> | -55...+175 | °C   |

- Example of acceptable V<sub>GS</sub> waveform





## Thermal Resistance

| Parameter                                   | Symbol     | Value | Unit |
|---------------------------------------------|------------|-------|------|
| Thermal resistance, junction – case. Max    | $R_{thJC}$ | 1.1   | °C/W |
| Thermal resistance, junction – ambient. Max | $R_{thJA}$ | 40    |      |

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

| Parameter                        | Symbol              | Value |      |      | Unit | Test Condition                                                                                                  |
|----------------------------------|---------------------|-------|------|------|------|-----------------------------------------------------------------------------------------------------------------|
|                                  |                     | min.  | typ. | max. |      |                                                                                                                 |
| Static Characteristics           |                     |       |      |      |      |                                                                                                                 |
| Drain-source breakdown voltage   | V <sub>DSS</sub>    | 1200  | -    | -    | V    | V <sub>GS</sub> =0V, I <sub>D</sub> =100uA                                                                      |
| Gate threshold voltage           | V <sub>GS(th)</sub> | 2.3   | 2.8  | 3.6  | V    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =5mA                                                          |
| Zero gate voltage drain current  | I <sub>DSS</sub>    | -     | 1    | 10   | μA   | V <sub>DS</sub> =1200V, V <sub>GS</sub> =0V                                                                     |
|                                  |                     | -     | 5    | -    |      | T <sub>C</sub> =25°C                                                                                            |
|                                  |                     | -     | -    | -    |      | T <sub>C</sub> =175°C                                                                                           |
| Gate-source leakage current      | I <sub>GSS</sub>    | -     |      | 100  | nA   | V <sub>GS</sub> =18V, V <sub>DS</sub> =0V                                                                       |
| Drain-source on-state resistance | R <sub>DS(on)</sub> | -     | 75   | 85   | mΩ   | V <sub>GS</sub> =18V, I <sub>D</sub> =20A,                                                                      |
|                                  |                     | -     | 125  | -    |      | T <sub>J</sub> =25°C                                                                                            |
|                                  |                     | -     | -    | -    |      | T <sub>J</sub> =175°C                                                                                           |
| Transconductance                 | g <sub>fs</sub>     | -     | 10   | -    | S    | V <sub>DS</sub> =20V, I <sub>D</sub> =20A                                                                       |
| Dynamic Characteristics          |                     |       |      |      |      |                                                                                                                 |
| Input Capacitance                | C <sub>iss</sub>    | -     | 920  | -    | pF   | V <sub>DS</sub> = 1000V<br>V <sub>GS</sub> = 0V<br>T <sub>J</sub> = 25°C<br>V <sub>AC</sub> = 25mV<br>f = 1MHz  |
| Output Capacitance               | C <sub>oss</sub>    | -     | 57   | -    |      |                                                                                                                 |
| Reverse Transfer Capacitance     | C <sub>rss</sub>    | -     | 3.9  | -    |      |                                                                                                                 |
| Gate Total Charge                | Q <sub>G</sub>      | -     | 40   | -    | nC   | V <sub>DS</sub> = 800V<br>V <sub>GS</sub> = -4/18V<br>I <sub>D</sub> = 20A                                      |
| Gate-Source charge               | Q <sub>gs</sub>     | -     | 7    | -    |      |                                                                                                                 |
| Gate-Drain charge                | Q <sub>gd</sub>     | -     | 19   | -    |      |                                                                                                                 |
| Turn-On Switching Energy         | E <sub>ON</sub>     | -     | 320  | -    | μJ   | V <sub>DD</sub> = 800V<br>V <sub>GS</sub> = -4/+15V<br>I <sub>D</sub> = 20A<br>R <sub>G</sub> = 0Ω<br>L = 120uH |
| Turn-Off Switching Energy        | E <sub>OFF</sub>    | -     | 49   | -    |      |                                                                                                                 |
| Turn-on delay time               | t <sub>d(on)</sub>  | -     | 19   | -    | ns   |                                                                                                                 |
| Rise time                        | t <sub>r</sub>      | -     | 21   | -    |      |                                                                                                                 |
| Turn-off delay time              | t <sub>d(off)</sub> | -     | 15   | -    |      |                                                                                                                 |
| Fall time                        | t <sub>f</sub>      | -     | 17   | -    |      |                                                                                                                 |
| Gate resistance                  | R <sub>G</sub>      | -     | 1.5  | -    | Ω    |                                                                                                                 |



### Body Diode Characteristics

| Parameter                         | Symbol    | Value |       |      | Unit | Test Condition                                                                                 |
|-----------------------------------|-----------|-------|-------|------|------|------------------------------------------------------------------------------------------------|
|                                   |           | min.  | typ.  | max. |      |                                                                                                |
| Body Diode Forward Voltage        | $V_{SD}$  | -     | 4.2   | -    | V    | $V_{GS}=-4V, I_{SD}=10A,$<br>$T_J=25^{\circ}C$                                                 |
|                                   |           | -     | 3.8   | -    |      | $V_{GS}=-4V, I_{SD}=10A,$<br>$T_J=175^{\circ}C$                                                |
| Body Diode Forward Current        | $I_{SD}$  | -     | -     | 30   | A    | $V_{GS}=-4V, T_J=25^{\circ}C$                                                                  |
| Pulsed Body Diode Forward Current | $I_{SDM}$ | -     | -     | 89   |      |                                                                                                |
| Reverse Recovery Time             | $t_{rr}$  | -     | 39.6  | -    | ns   | $V_R = 800V,$<br>$V_{GS} = -4V$<br>$I_D = 20A$<br>$di/dt = 700A/\mu S$<br>$T_J = 25^{\circ}C$  |
| Reverse Recovery Charge           | $Q_{rr}$  | -     | 141.1 | -    | nC   |                                                                                                |
| Reverse Recovery Energy           | $E_{REC}$ | -     | 62.9  | -    | uJ   |                                                                                                |
| Peak Reverse Recovery Current     | $I_{rrm}$ | -     | 6.2   | -    | A    |                                                                                                |
| Charge Time                       | $t_A$     | -     | 9.9   | -    | ns   |                                                                                                |
| DisCharge Time                    | $t_B$     | -     | 29.7  | -    | ns   |                                                                                                |
| Reverse Recovery Time             | $t_{rr}$  | -     | 45.4  | -    | ns   | $V_R = 800V,$<br>$V_{GS} = -4V$<br>$I_D = 20A$<br>$di/dt = 700A/\mu S$<br>$T_J = 175^{\circ}C$ |
| Reverse Recovery Charge           | $Q_{rr}$  | -     | 397   | -    | nC   |                                                                                                |
| Reverse Recovery Energy           | $E_{REC}$ | -     | 180.1 | -    | uJ   |                                                                                                |
| Peak Reverse Recovery Current     | $I_{rrm}$ | -     | 13.8  | -    | A    |                                                                                                |
| Charge Time                       | $t_A$     | -     | 30.8  | -    | ns   |                                                                                                |
| DisCharge Time                    | $t_B$     | -     | 14.9  | -    | ns   |                                                                                                |



## Typical Performance Characteristics

Fig 1. Output Characteristic ( $T_J = -40^\circ\text{C}$ )

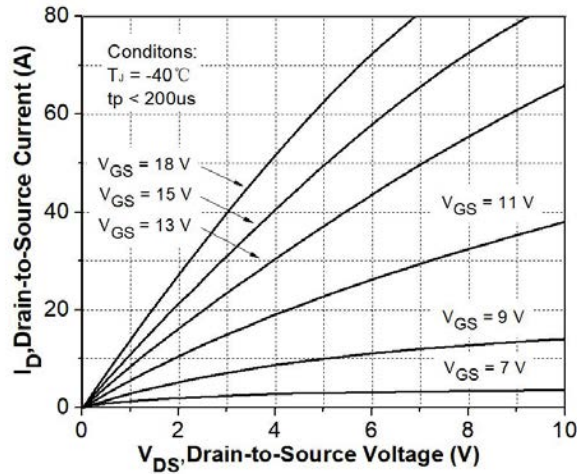


Fig 2. Output Characteristic ( $T_J = 25^\circ\text{C}$ )

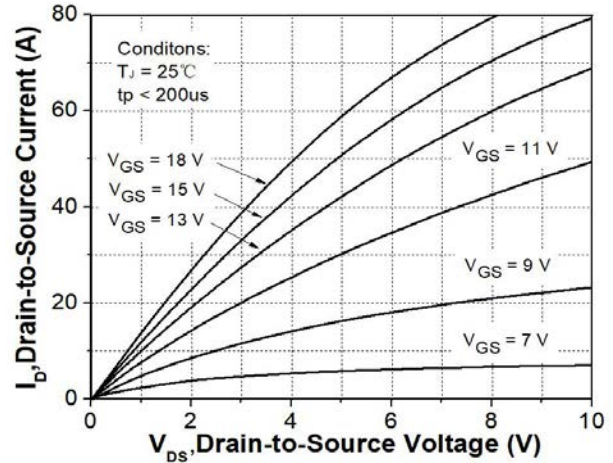


Fig 3. Output Characteristic ( $T_J = 175^\circ\text{C}$ )

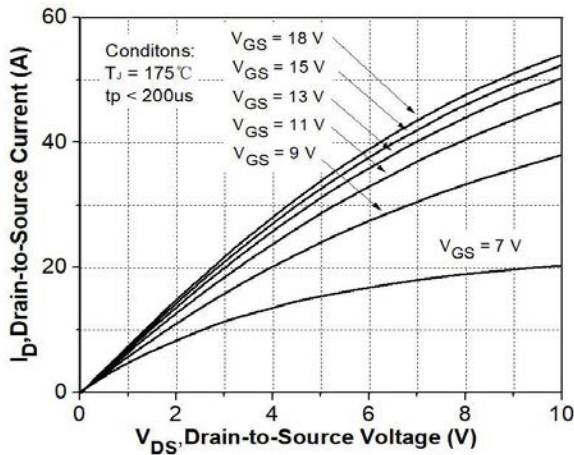


Fig 4:  $R_{DS(on)}$  Vs  $I_{DS}$  Characteristic

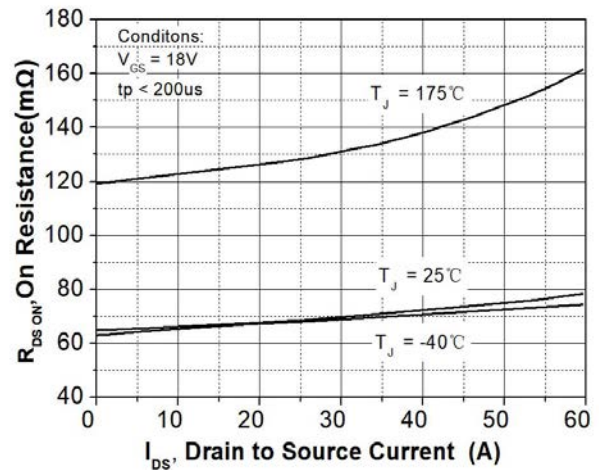


Fig 5:  $R_{DS(on)}$  vs. Temperature

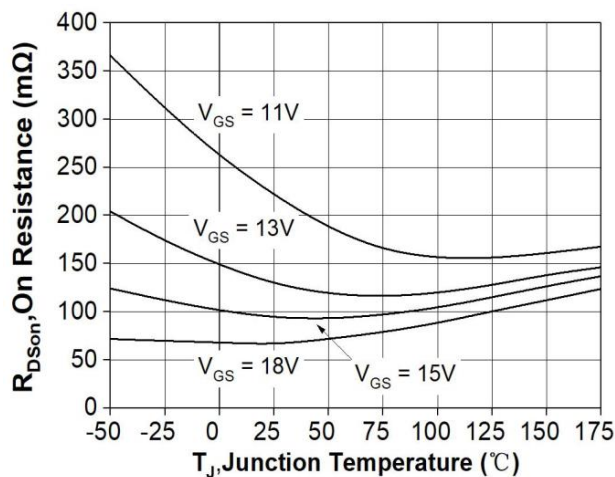


Fig 6: Transfer Characteristic

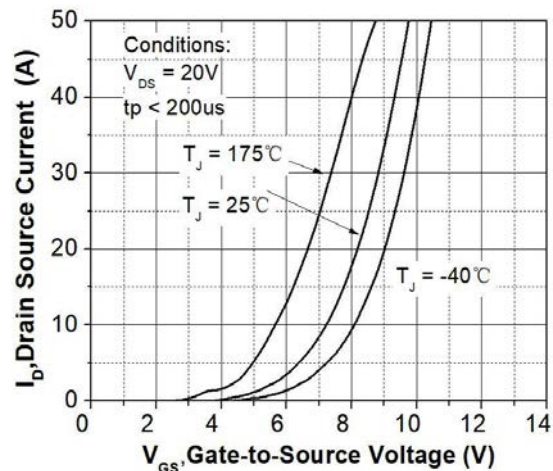






Fig 7: Body-diode Characteristic ( $T_J = -40^\circ\text{C}$ )

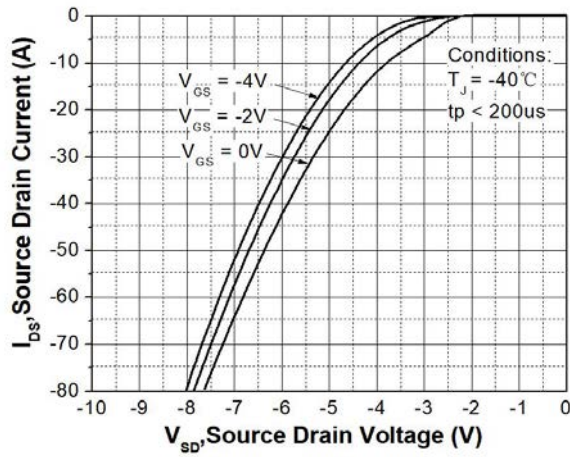


Fig 8: Body-diode Characteristic ( $T_J = 25^\circ\text{C}$ )

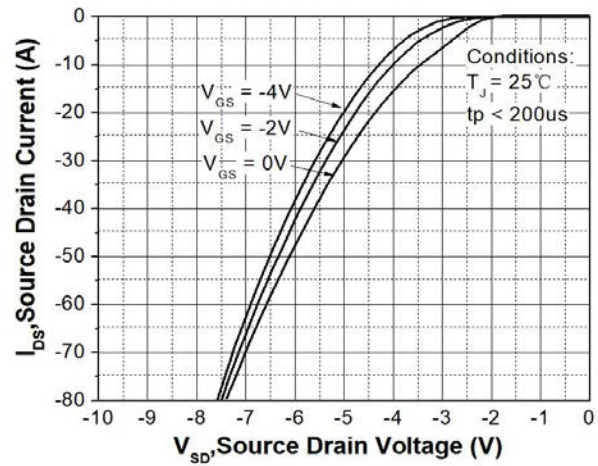


Fig 9: Body-diode Characteristic ( $T_J = 175^\circ\text{C}$ )

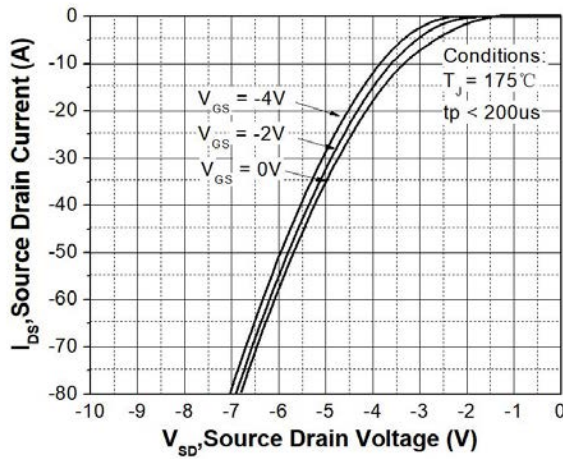


Fig 10:  $V_{TH}$  Vs  $T_J$  Temperature Characteristic

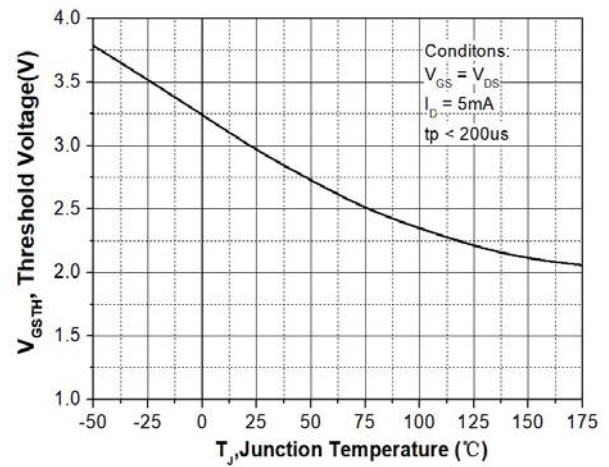


Fig 11: Gate Charge Characteristics

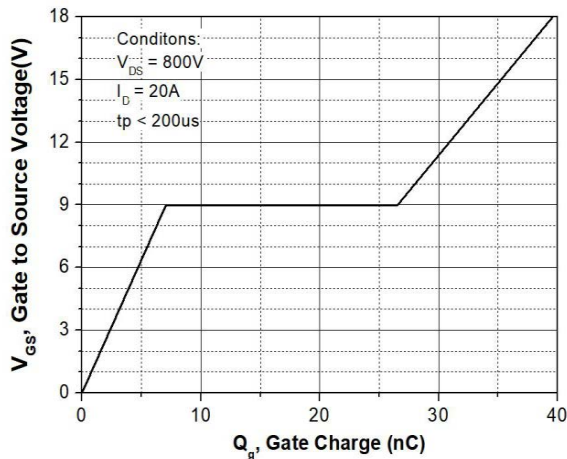


Fig 12: 3rd Quadrant Characteristic ( $T_J = -40^\circ\text{C}$ )

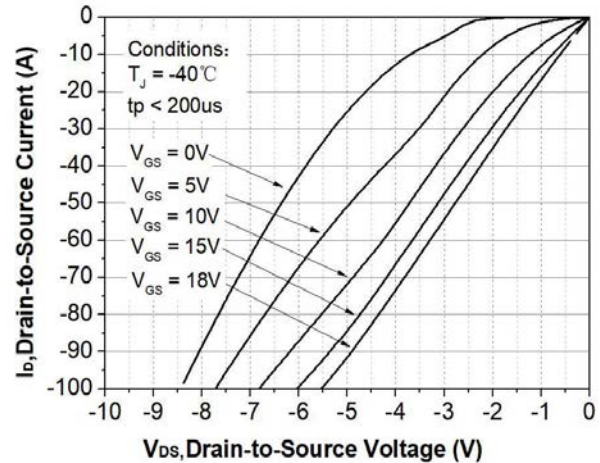




Fig 13: 3rd Quadrant Characteristic( $T_J=25^\circ\text{C}$ )

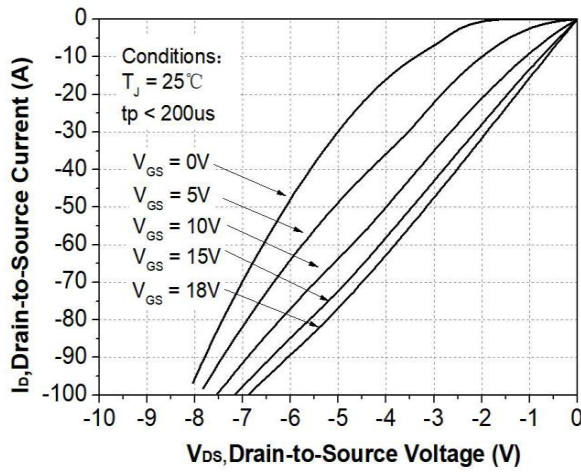


Fig 14: 3rd Quadrant Characteristic( $T_J=175^\circ\text{C}$ )

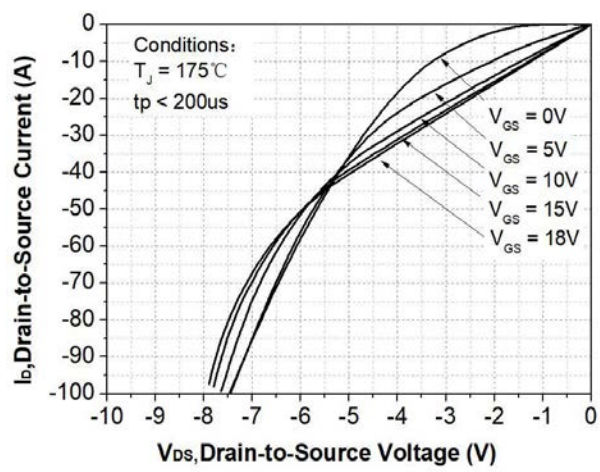


Fig 15: Capacitance Characteristic

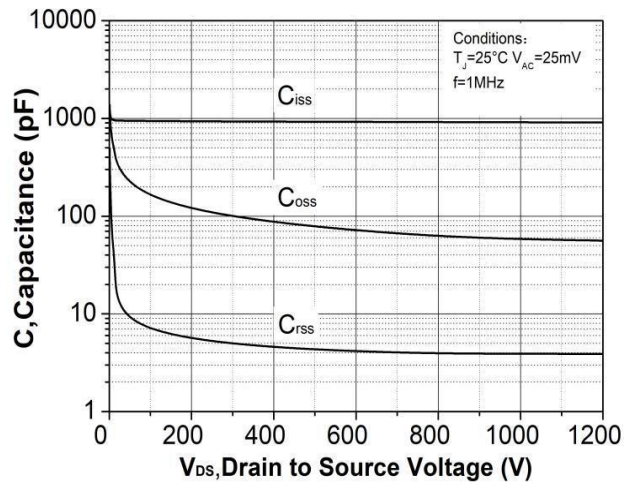


Fig 16: Safe Operating Area

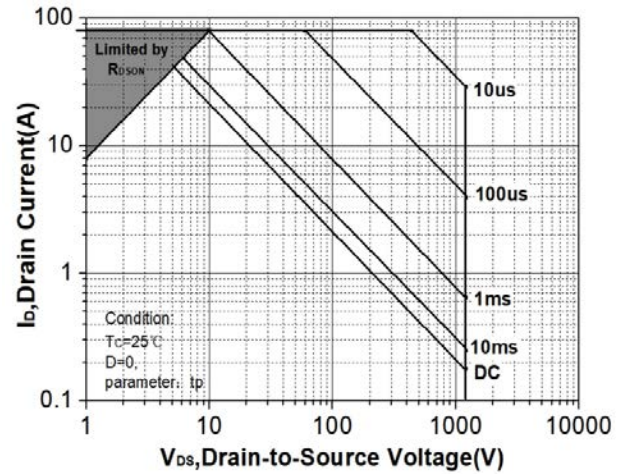
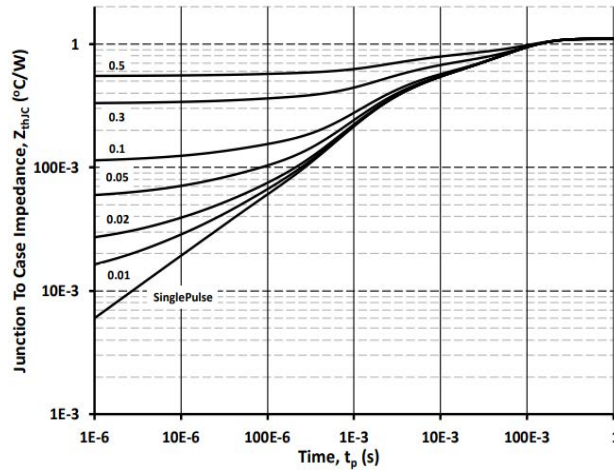


Fig 17: Transient Thermal Impedance





## Test Circuit Schematic

Figure A. Definition of switching times

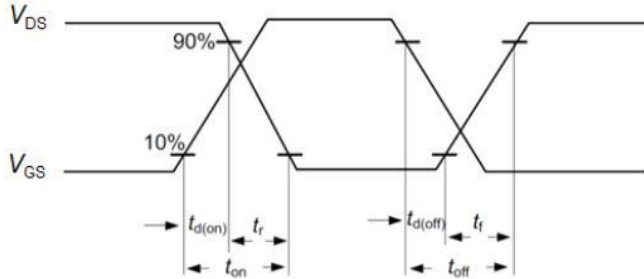


Figure B. Dynamic test circuit

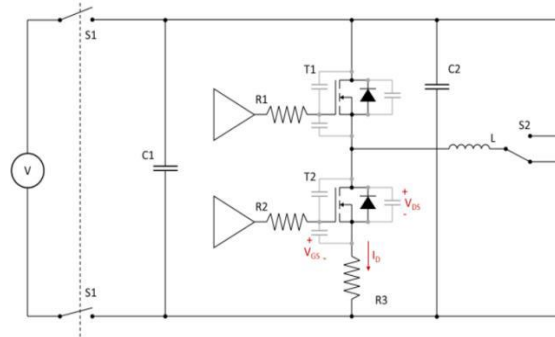


Figure C. Definition of body diodeswitching characteristics

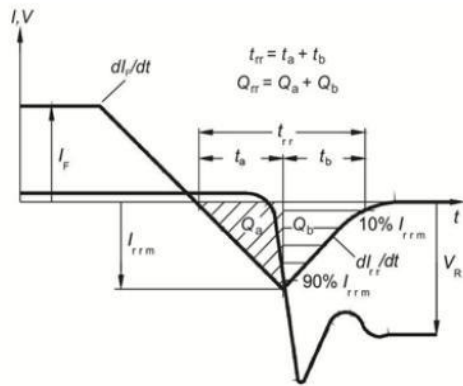
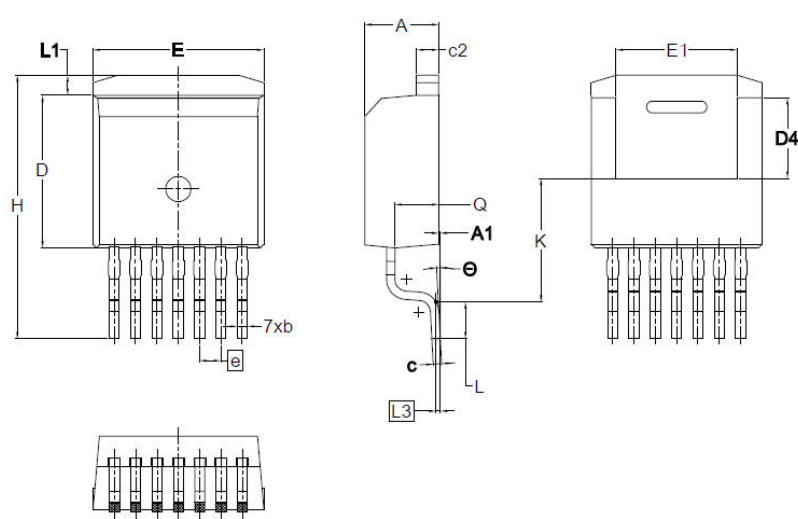


Figure C. Definition of diode switching characteristics



Package Dimensions

Package TO-263-7L



| SYMBOL   | DIMENSIONS |       |       |
|----------|------------|-------|-------|
|          | MIN.       | NOM.  | MAX.  |
| A        | 4.30       | 4.40  | 4.50  |
| A1       | 0.00       | 0.10  | 0.25  |
| b        | 0.50       | 0.60  | 0.70  |
| c        | 0.45       | 0.50  | 0.60  |
| c2       | 1.20       | 1.30  | 1.40  |
| D        | 8.93       | 9.08  | 9.23  |
| D4       | 4.65       | 4.80  | 4.95  |
| E        | 10.08      | 10.18 | 10.28 |
| E1       | 6.82       | 7.22  | 7.62  |
| e        | 1.27 BSC   |       |       |
| H        | 15.00      | 15.70 | 16.00 |
| K        | 7.30       |       |       |
| L        | 1.90       | 2.20  | 2.50  |
| L1       | 1.00       | 1.20  | 1.40  |
| L3       | 0.25 BSC   |       |       |
| Q        | 2.45       | 2.60  | 2.75  |
| $\theta$ | 0°         | 3°    | 7°    |





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