



**WANSEMI**  
万芯半导体

**WX012DN10LL**

# **N-channel Enhancement Mode Power MOSFET**

**TOLL/100V/±20V/3.0V/200A/2.4mΩ**

**Rev0.6**

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## 100V, 2.4mΩ, 200A, N-channel MOSFET

### 1.Features

- ◆ Excellent R<sub>DS(ON)</sub> and Low Gate Charge
- ◆ 100% UIS Tested
- ◆ 100% ΔV<sub>ds</sub> Tested
- ◆ 100% R<sub>G</sub> Tested
- ◆ 100% DV<sub>DS</sub> Tested
- ◆ Halogen-free; RoHS-compliant

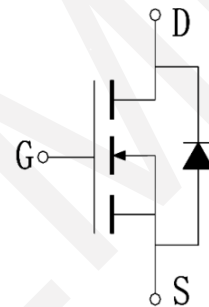
| V <sub>DS</sub> | R <sub>DS(on)</sub> Typ. | I <sub>D</sub> Max. |
|-----------------|--------------------------|---------------------|
| 100V            | 2.4mΩ @10V               | 200A                |

### 2.Applications

- ◆ Load Switch
- ◆ PWM Application
- ◆ Power Management



TOLL  
Pin Description



Schematic Diagram

### 3.Package Marking and Ordering Information

| Part no.    | Package | Marking | PCS/Reel | PCS/CTN. |
|-------------|---------|---------|----------|----------|
| WX012DN10LL | TOLL    | 012N10  | 2,000    | 16,000   |

### 4.Absolute Max Ratings at Ta=25°C (Note1)

| Parameter                       |             | Symbol           | Maximum     | Units |
|---------------------------------|-------------|------------------|-------------|-------|
| Drain to Source Voltage         |             | V <sub>DSS</sub> | 100         | V     |
| Gate to Source Voltage          |             | V <sub>GSS</sub> | ±20         | V     |
| Drain Current (DC)              | T C = 25°C  | I <sub>D</sub>   | 200         | A     |
|                                 | T C = 100°C | I <sub>D</sub>   | 126         | A     |
| Drain Current (Pulse), PW≤300μs |             | I <sub>DM</sub>  | 800         | A     |
| Avalanche Energy, Single Pulsed |             | E <sub>AS</sub>  | 953         | mJ    |
| Total Dissipation               | T C = 25°C  | P <sub>D</sub>   | 313         | W     |
|                                 | T C = 100°C | P <sub>D</sub>   | 125         | W     |
| Junction Temperature            |             | T <sub>j</sub>   | 150         | °C    |
| Storage Temperature             |             | T <sub>stg</sub> | -55 to +150 | °C    |

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**5. Thermal Resistance Ratings (Note 2)**

| Parameter           | Symbol          | Value | Unit                 |
|---------------------|-----------------|-------|----------------------|
| Junction to Ambient | $R_{\theta JA}$ | 66    | $^{\circ}\text{C/W}$ |
| Junction to case    | $R_{\theta JC}$ | 0.4   | $^{\circ}\text{C/W}$ |

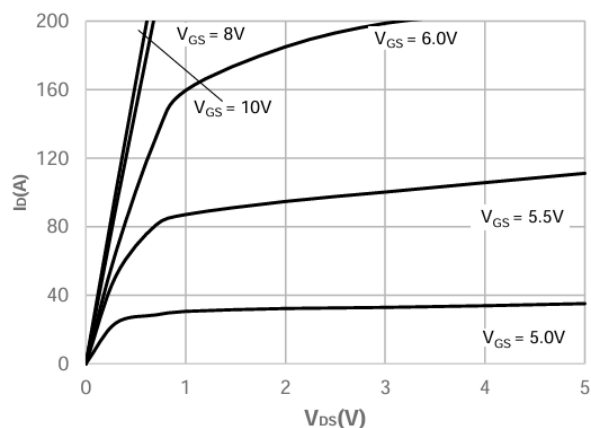
Note 2: When mounted on 1 inch square copper board  $t \leq 10\text{sec}$  The value in any given application depends on the user's specific board design.

**6. Electrical Characteristics at  $T_a=25^{\circ}\text{C}$  (Note 2)**

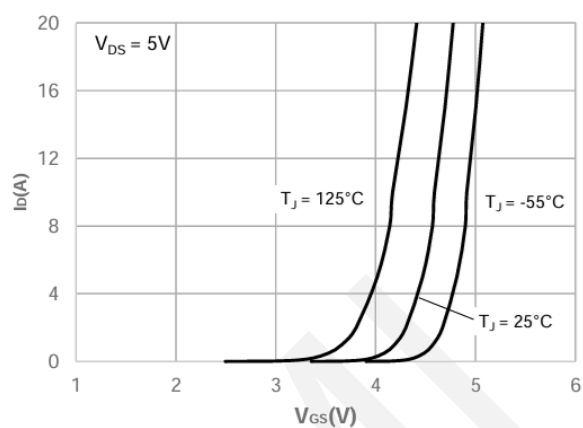
| Parameter                                  | Symbol        | Test Conditions  | Min. | Typ. | Max.      | Units            |
|--|---------------|--|------|------|-----------|------------------|
| Drain to Source Breakdown Voltage          | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$  | 100  | -    | -         | V                |
| Zero-Gate Voltage Drain Current            | $I_{DSS}$     | $V_{DS} = 100\text{V}$ , $V_{GS} = 0\text{V}$  | -    | -    | 1         | $\mu\text{A}$    |
| Gate to Source Leakage Current             | $I_{GSS}$     | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$   | -    | -    | $\pm 100$ | nA               |
| Gate Threshold Voltage                     | $V_{GS(th)}$  | $V_{DS}=V_{GS}$ , $I_{DS}=250\mu\text{A}$  | 2.0  | 3.0  | 4.0       | V                |
| Static Drain to Source On-State Resistance | $R_{DS(on)}$  | $I_D = 20\text{A}$ , $V_{GS} = 10\text{V}$   | -    | 2.4  | 3.3       | $\text{m}\Omega$ |
| Input Capacitance                          | $C_{iss}$     | $V_{GS}=0\text{V}$ ,<br>$V_{DS}=50\text{V}$ ,<br>Frequency=1.0MHz                              | -    | 6984 | -         | pF               |
| Output Capacitance                         | $C_{oss}$     |  | -    | 1210 | -         | pF               |
| Reverse Transfer Capacitance               | $C_{rss}$     |  | -    | 50   | -         | pF               |
| Turn-on Delay Time                         | $t_{d(on)}$   | $V_{DS} = 50\text{V}$ , $I_D = 20\text{A}$<br>$V_{GS} = 10\text{V}$ ,<br>$R_{GEN} = 6.2\Omega$ | -    | 30   | -         | ns               |
| Rise Time                                  | $t_r$         |  | -    | 57   | -         | ns               |
| Turn-off Delay Time                        | $t_{d(off)}$  |  | -    | 98   | -         | ns               |
| Fall Time                                  | $t_f$         |  | -    | 66   | -         | ns               |
| Total Gate Charge                          | $Q_g$         | $V_{DS} = 50\text{V}$ ,<br>$V_{GS} = 10\text{V}$ ,<br>$I_D = 20\text{A}$                       | -    | 115  | -         | nC               |
|  | $Q_{gs}$      |  | -    | 36   | -         | nC               |
|  | $Q_{gd}$      |  | -    | 31   | -         | nC               |
| Diode Forward Voltage                      | $V_{FSD}$     | $I_S = 20\text{A}$ , $V_{GS} = 0$  | 0.4  | -    | 1.2       | V                |

Note 2: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

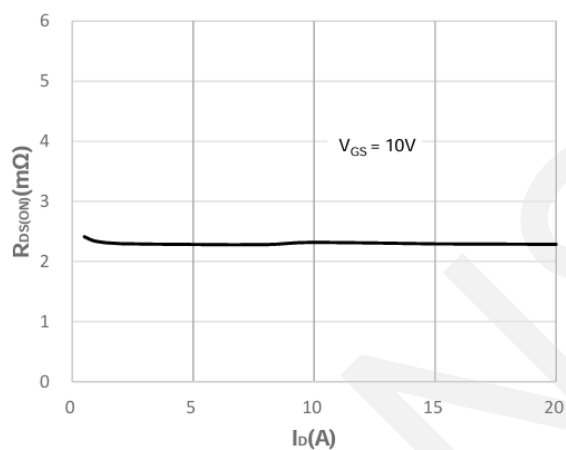
## 7. Typical electrical and thermal characteristics



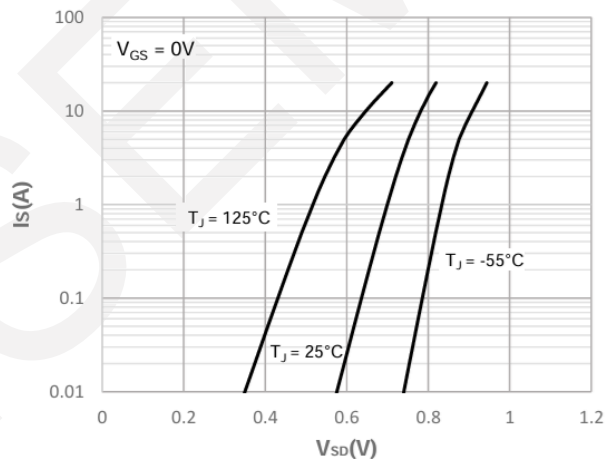
**Saturation Characteristics**



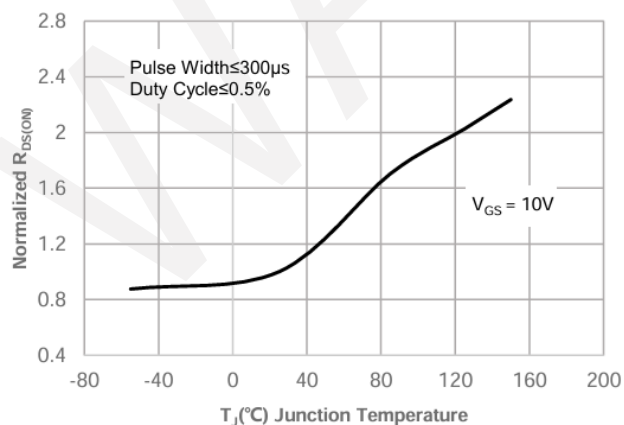
**Transfer Characteristics**



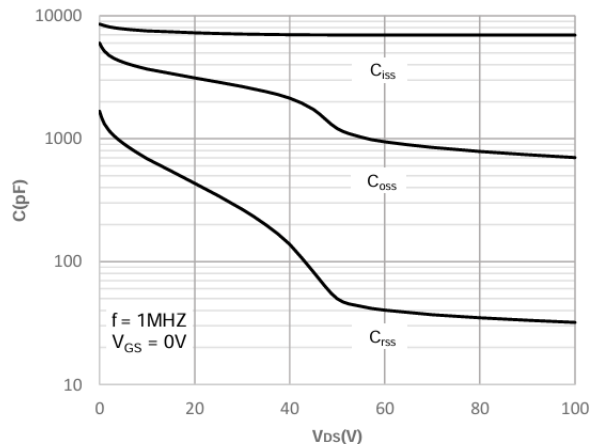
**$R_{DS(on)}$  vs. Drain Current**



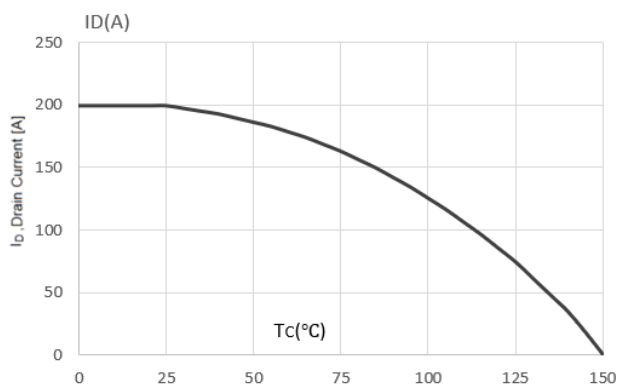
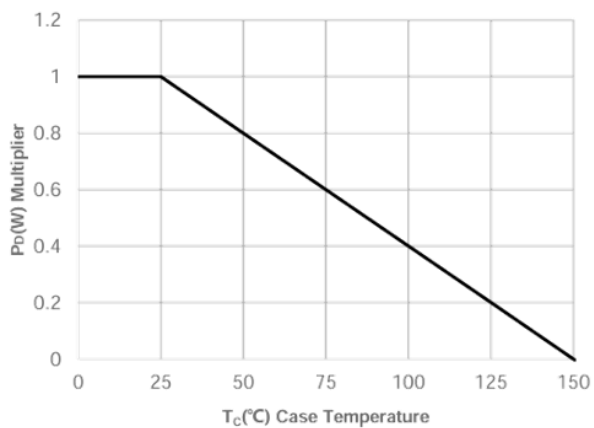
**Body-Diode Characteristics**



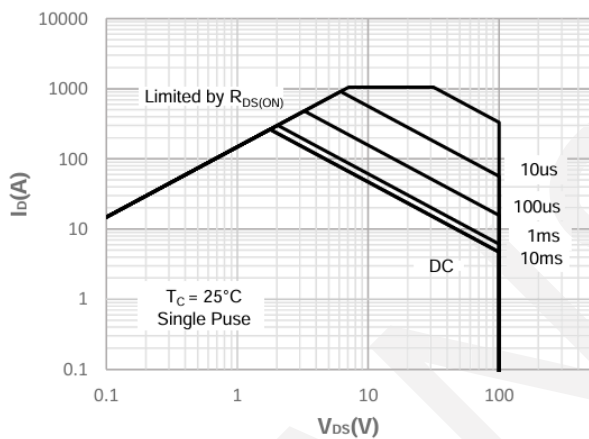
**Normalized on Resistance vs. Junction Temperature**



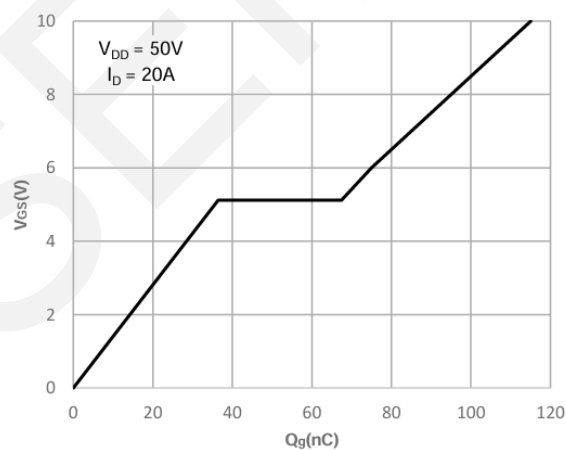
**Capacitance Characteristics**



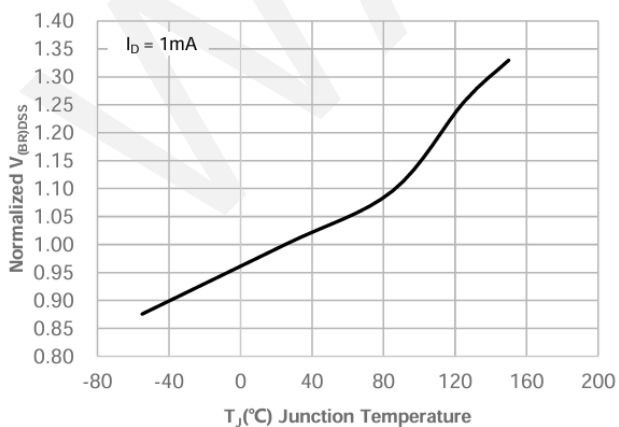
Current De-rating



Power De-rating

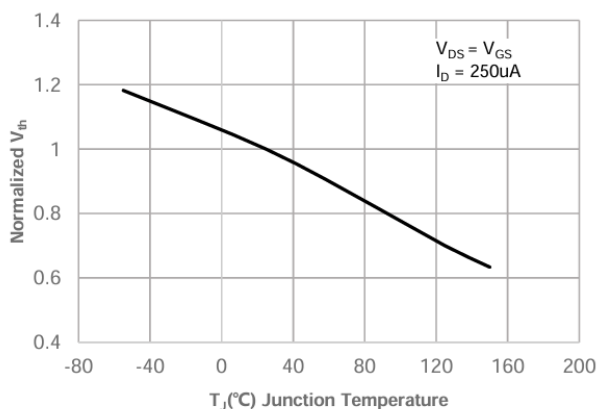


Maximum Safe Operating Area

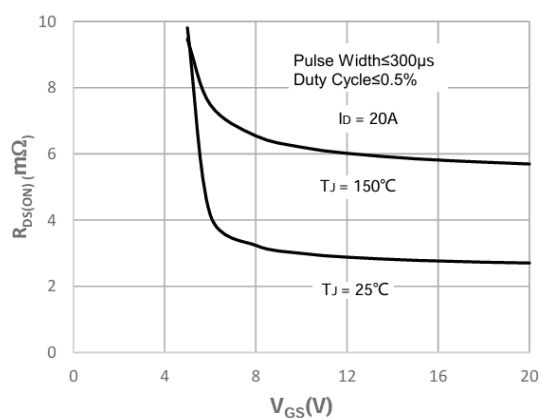


Normalized Breakdown voltage vs. Junction Temperature

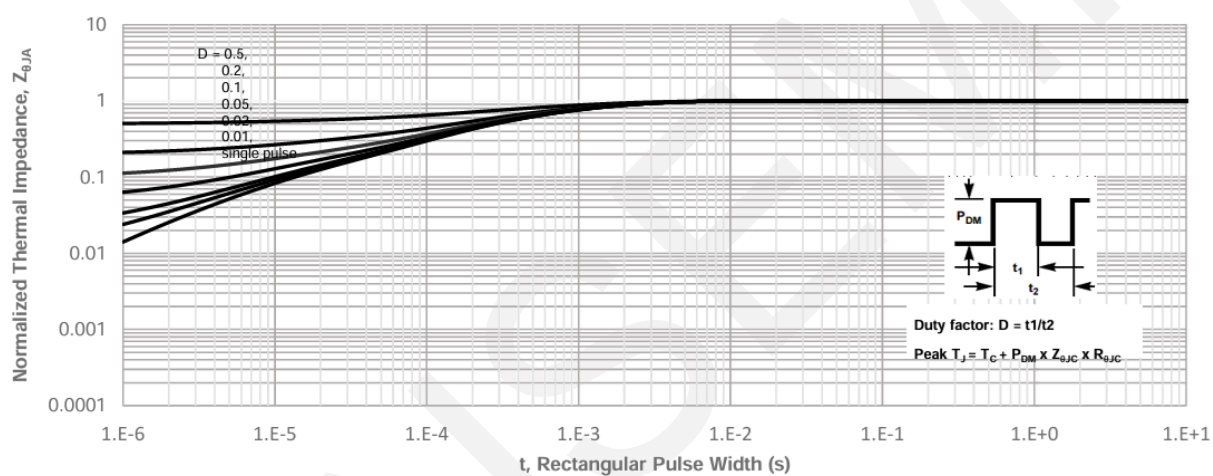
Gate Charge Characteristics



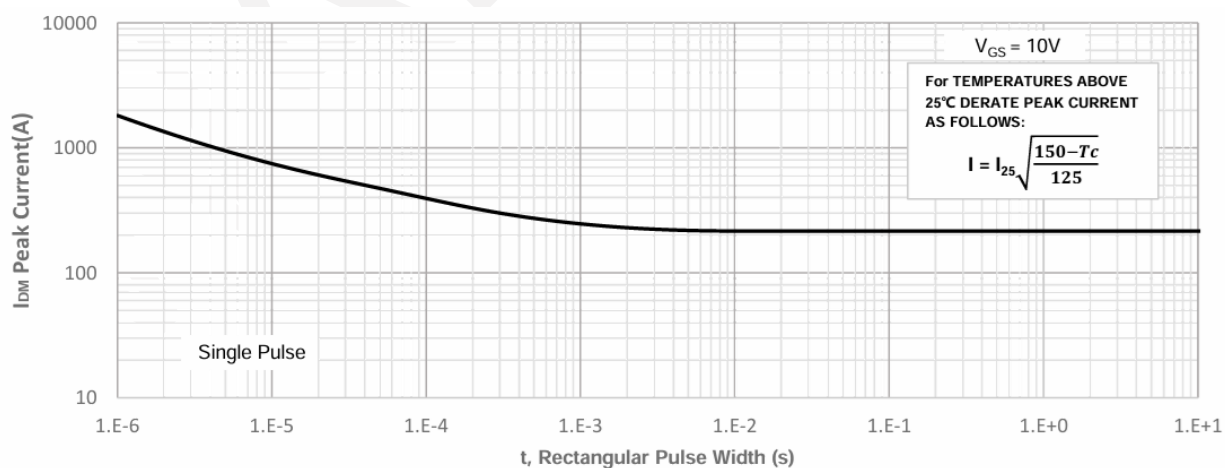
Normalized Threshold Voltage vs. Junction Temperature



RDS(ON) vs. VGS

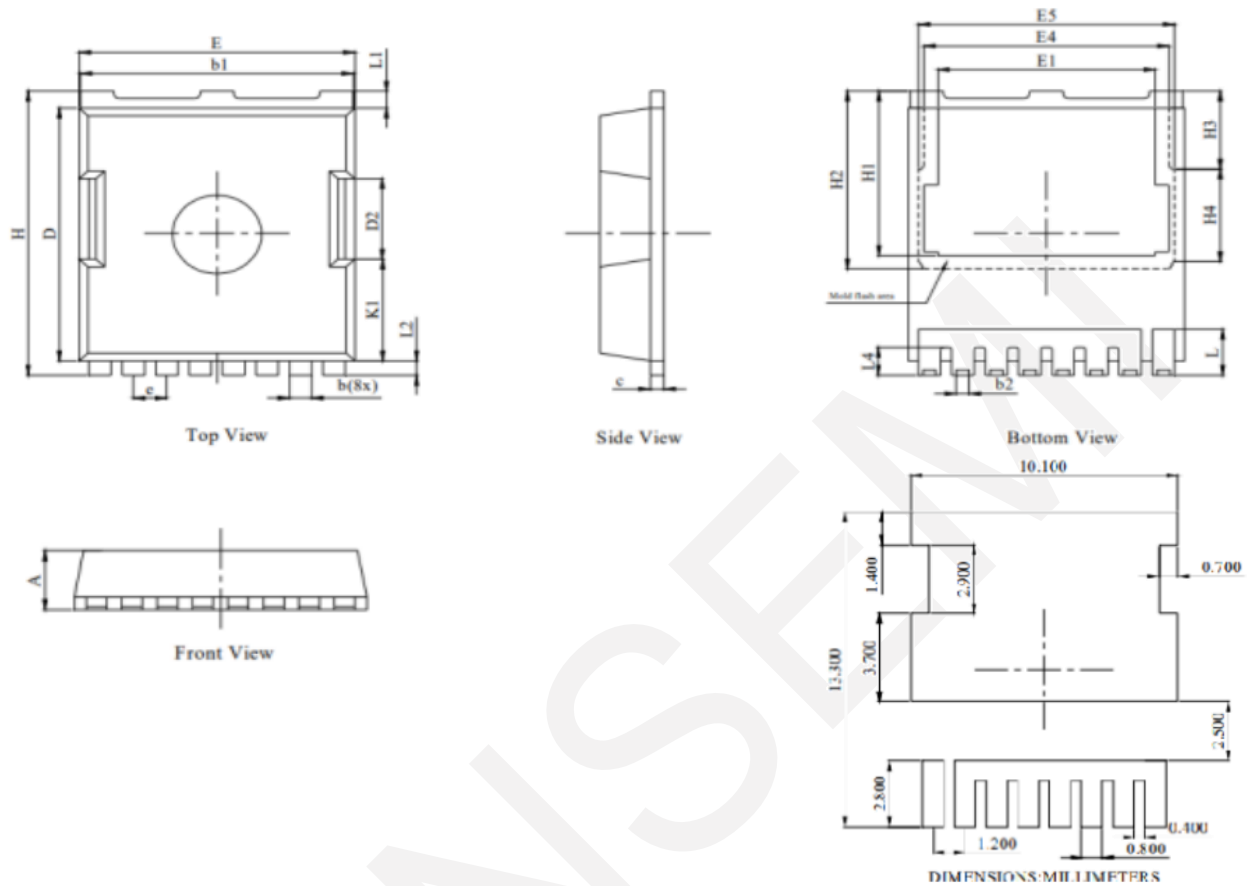


Normalized Maximum Transient Thermal Impedance



Peak Current Capacity

## 8.Package Dimensions



| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN        | NOM   | MAX   |
| A    | 2.20       | 2.30  | 2.50  |
| b    | 0.70       | 0.80  | 0.90  |
| b1   | 9.70       | 9.80  | 9.90  |
| b2   | 0.42       | 0.46  | 0.50  |
| C    | 0.40       | 0.50  | 0.65  |
| D    | 10.28      | 10.38 | 10.58 |
| D2   | 3.30       |       |       |
| E    | 9.70       | 9.90  | 10.10 |
| E1   | 7.80       |       |       |
| E4   | 8.80       |       |       |
| E5   | 9.20       |       |       |
| e    | 1.20(BSC)  |       |       |
| H    | 11.48      | 11.68 | 11.88 |
| H1   | 6.55       | 6.75  | 6.85  |
| H2   | 7.30       |       |       |
| H3   | 3.20       |       |       |
| H4   | 3.80       |       |       |
| K1   | 4.18       |       |       |
| L    | 1.70       | 1.90  | 2.10  |
| L1   | 0.70       |       |       |
| L2   | 0.60       |       |       |
| L4   | 1.00       | 1.15  | 1.30  |

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