

## Silicon Carbide Power Mosfet

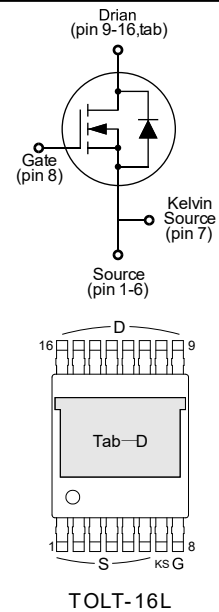
### 1. Product Information

#### Features

- 750V, 11mΩ, 182A, N-Channel SiC MOS
- Low loss, fast switching speeds with low  $R_G$
- Flexible gate voltage range ( $V_{GS}=15V$  to  $18V$ )
- Robust body diode and low  $Q_{rr}$

#### Applications

- EV charger
- Solar inverters
- Switch mode power supplies
- Motor drives
- UPS



#### Package Marking and Ordering Information

| Product Name   | Package  | Marking        | Packing     | Quantity (pcs) |
|----------------|----------|----------------|-------------|----------------|
| KJSC750R011LT1 | TOLT-16L | KJSC750R011LT1 | Tape & Reel | 1200           |

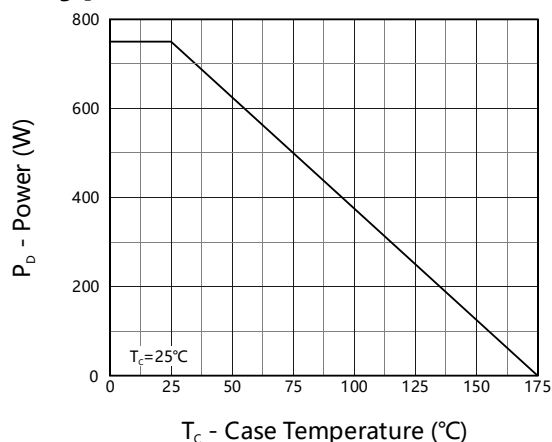
### 2. Absolute Maximum Ratings ( $T_C=25^{\circ}C$ unless otherwise noted)

| Symbol          | Parameter                                                             | Values     | Unit          |
|-----------------|-----------------------------------------------------------------------|------------|---------------|
| $V_{DS}$        | Drain-Source Voltage                                                  | 750        | V             |
| $I_D$           | Continuous Drain Current, $T_C=25^{\circ}C$                           | 182        | A             |
|                 | Continuous Drain Current, $T_C=100^{\circ}C$                          | 125        | A             |
| $I_{DM}$        | Peak Drain Current, Pulse width $t_p$ limited by $T_{Jmax}$           | 546        | A             |
| $V_{GS, max}$   | Gate-Source Voltage (Maximum)                                         | -8/+22     | V             |
| $V_{GS, OP}$    | Gate-Source Voltage (Recommended Operating)                           | -5/+18     | V             |
| $P_D$           | Power Dissipation                                                     | 750        | W             |
| $E_{AS}$        | Single Pulsed Avalanche Energy<br>$V_{DS}=50$ V, $L=5$ mH, $R_G=25$ Ω | 2890       | mJ            |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range                      | -55 to 175 | $^{\circ}C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient                               | 46         | $^{\circ}C/W$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                                  | 0.2        | $^{\circ}C/W$ |

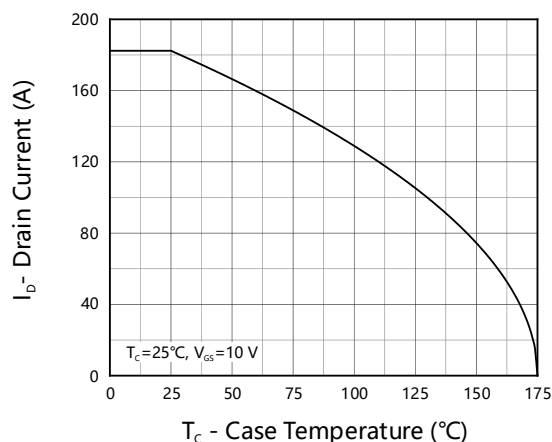
## 3. Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

| Symbol                             | Parameter                        | Test Conditions                                                                                                      | Min | Type | Max  | Unit |
|------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics             |                                  |                                                                                                                      |     |      |      |      |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0 V, I <sub>D</sub> =250 μA                                                                         | 750 | -    | -    | V    |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =750 V, V <sub>GS</sub> =0 V                                                                         | -   | -    | 100  | μA   |
| I <sub>GSS</sub>                   | Gate-Source Leakage Current      | V <sub>DS</sub> =0 V, V <sub>GS</sub> =-5 to 15 V,                                                                   | -   | -    | ±100 | nA   |
| V <sub>GS(th)</sub>                | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =30 mA                                                             | 1.8 | 2.5  | 3.5  | V    |
| R <sub>DS(ON)</sub>                | Drain-Source On-State Resistance | V <sub>GS</sub> =15 V, I <sub>D</sub> =60 A                                                                          | -   | 10   | 13   | mΩ   |
|                                    |                                  | V <sub>GS</sub> =15 V, I <sub>D</sub> =60 A, T <sub>J</sub> =175°C                                                   | -   | 20   | -    | mΩ   |
|                                    |                                  | V <sub>GS</sub> =18 V, I <sub>D</sub> =60 A                                                                          | -   | 9.8  | 11   | mΩ   |
|                                    |                                  | V <sub>GS</sub> =18 V, I <sub>D</sub> =60 A, T <sub>J</sub> =175°C                                                   | -   | 20   | -    | mΩ   |
| Dynamic Characteristics            |                                  |                                                                                                                      |     |      |      |      |
| C <sub>iss</sub>                   | Input Capacitance                | V <sub>DS</sub> =100 V, V <sub>GS</sub> =0 V,<br>f=1 MHz                                                             | -   | 5550 | -    | pF   |
| C <sub>oss</sub>                   | Output Capacitance               |                                                                                                                      | -   | 710  | -    | pF   |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance     |                                                                                                                      | -   | 50   | -    | pF   |
| E <sub>oss</sub>                   | Coss Stored Energy               |                                                                                                                      | -   | 300  | -    | μJ   |
| R <sub>G</sub>                     | Gate Resistance                  | f=1 MHz                                                                                                              | -   | 1.3  | -    | Ω    |
| Switching Characteristics          |                                  |                                                                                                                      |     |      |      |      |
| Q <sub>g</sub>                     | Total Gate Charge                | V <sub>DS</sub> =400 V, I <sub>D</sub> =60 A,<br>V <sub>GS</sub> =-5/+18 V                                           | -   | 325  | -    | nC   |
| Q <sub>gs</sub>                    | Gate-Source Charge               |                                                                                                                      | -   | 108  | -    | nC   |
| Q <sub>gd</sub>                    | Gate-Drain Charge                |                                                                                                                      | -   | 84   | -    | nC   |
| t <sub>d(on)</sub>                 | Turn-on Delay Time               | V <sub>DS</sub> =400 V,<br>I <sub>D</sub> =60 A,<br>V <sub>GS</sub> =-5/+18 V,<br>R <sub>G</sub> =2.5 Ω,<br>L=200 μH | -   | 62   | -    | ns   |
| t <sub>r</sub>                     | Turn-on Rise Time                |                                                                                                                      | -   | 8    | -    | ns   |
| t <sub>d(off)</sub>                | Turn-off Delay Time              |                                                                                                                      | -   | 72   | -    | ns   |
| t <sub>f</sub>                     | Turn-off Fall Time               |                                                                                                                      | -   | 17   | -    | ns   |
| E <sub>ON</sub>                    | Turn-on Energy                   |                                                                                                                      | -   | 925  | -    | mJ   |
| E <sub>OFF</sub>                   | Turn-off Fall Time Energy        |                                                                                                                      | -   | 1015 | -    | mJ   |
| Source-Drain Diode Characteristics |                                  |                                                                                                                      |     |      |      |      |
| V <sub>SD</sub>                    | Diode Forward Voltage            | V <sub>GS</sub> =-5 V, I <sub>S</sub> =24 A                                                                          | -   | 4    | -    | V    |
| T <sub>rr</sub>                    | Reverse Recovery Time            | V <sub>R</sub> =400 V, I <sub>F</sub> =560 A,<br>di <sub>F</sub> /dt=1000 A/μs                                       | -   | 107  | -    | ns   |
| I <sub>rrm</sub>                   | Peak Reverse Recovery Current    |                                                                                                                      | -   | 45   | -    | A    |
| Q <sub>rr</sub>                    | Reverse Recovery Charge          |                                                                                                                      | -   | 1530 | -    | nC   |

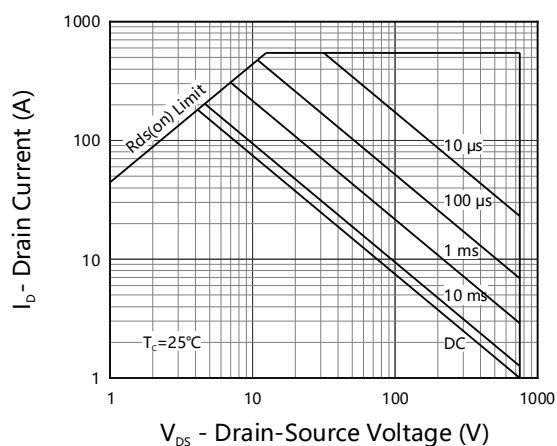
## 4. Typical Characteristics



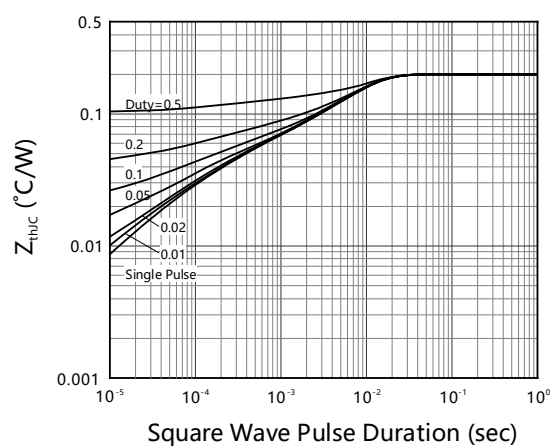
**Fig 1. Power Capability**



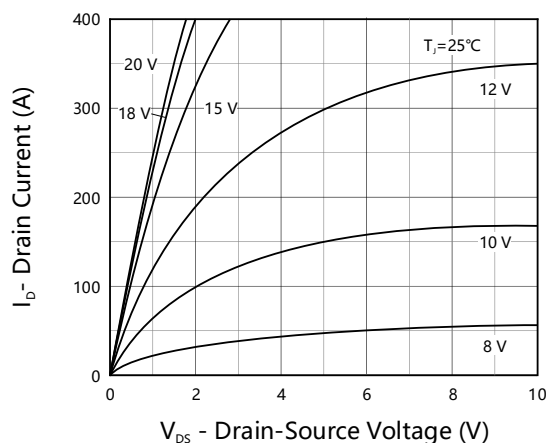
**Fig 2. Current Capability**



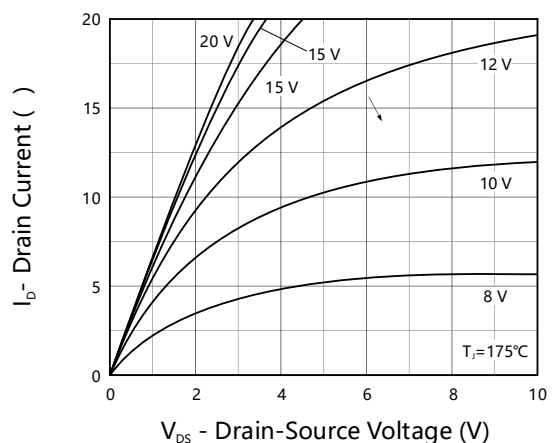
**Fig 3. Safe Operation Area**



**Fig 4. Transient Thermal Impedance**

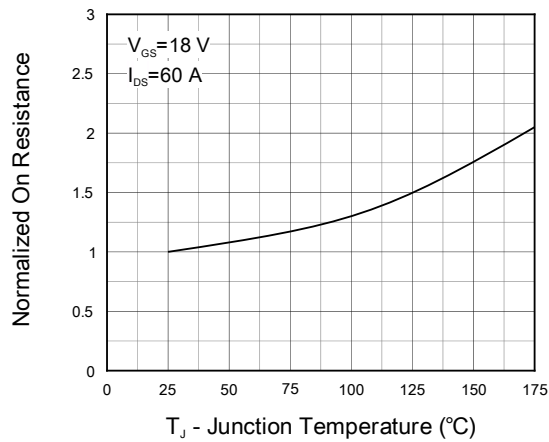


**Fig 5. Output Characteristics,  $T_J=25^{\circ}\text{C}$**

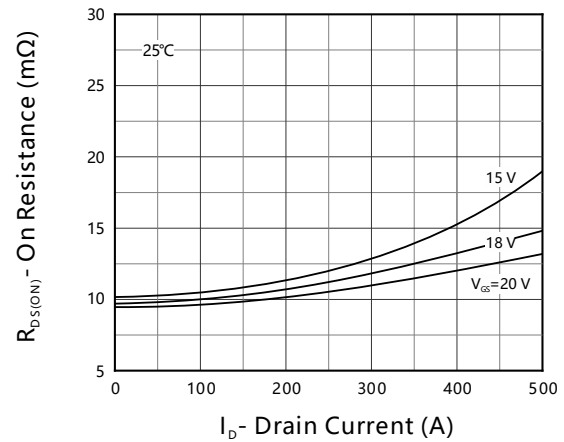


**Fig 6. Output Characteristics,  $T_J=175^{\circ}\text{C}$**

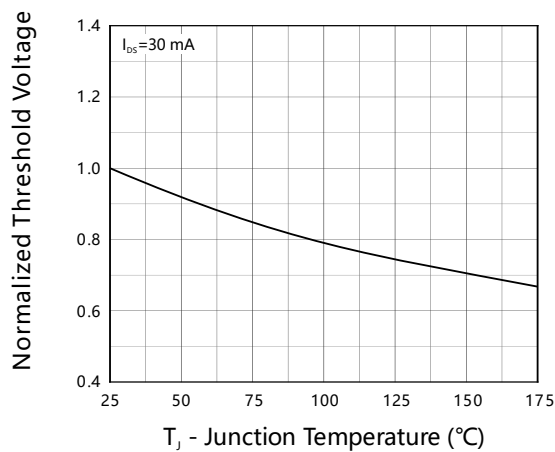
## 4. Typical Characteristics(cont.)



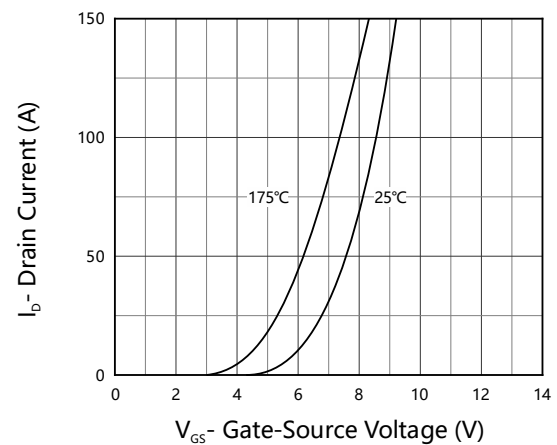
**Fig 7. Normalized On Resistance**



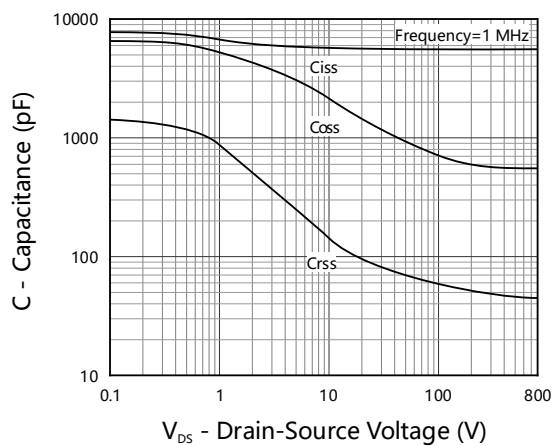
**Fig 8. On Resistance vs.  $I_D$**



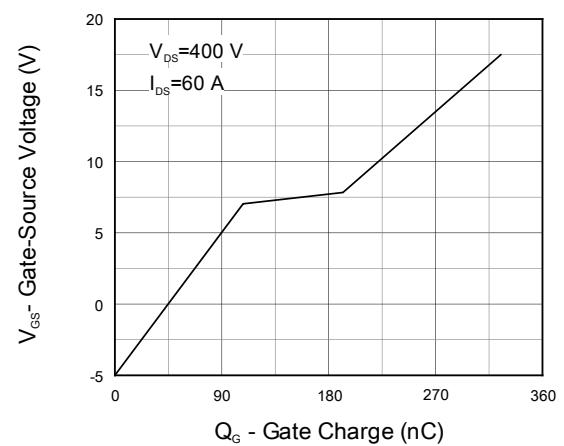
**Fig 9. Normalized Threshold Voltage**



**Fig 10. Diode Forward Current**



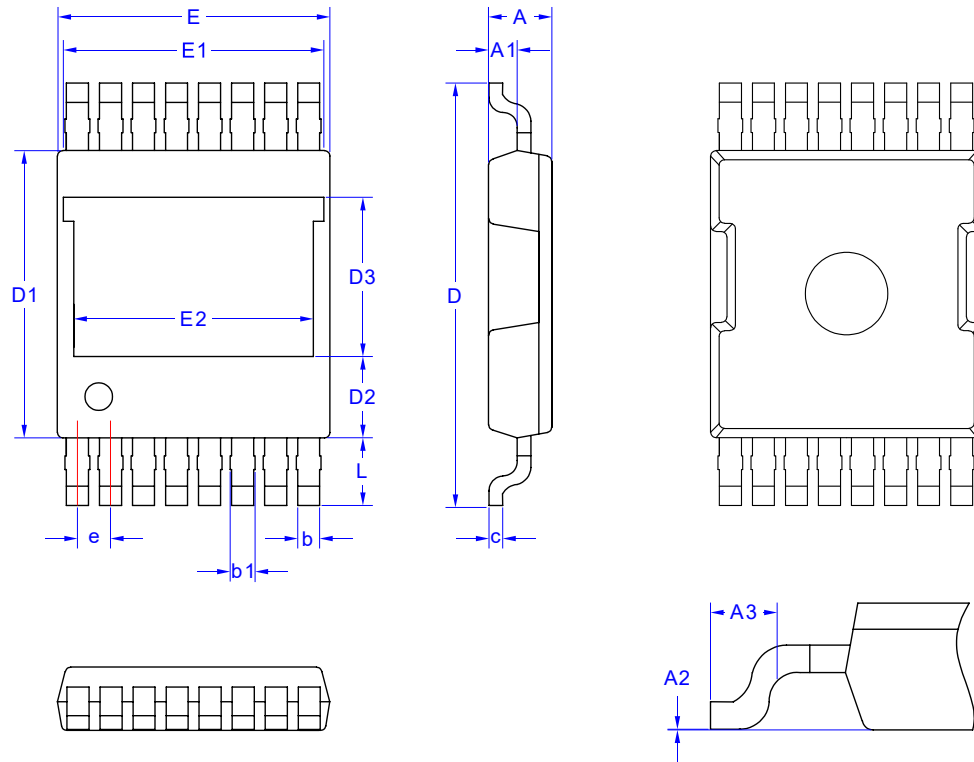
**Fig 11. Capacitance**



**Fig 12. Gate Charge**

## 5. Package Mechanical Data

### TOLT-16L Package



| Symbol | Dimensions in Millimeters |       |       |
|--------|---------------------------|-------|-------|
|        | MIN                       | NOM   | MAX   |
| A      | 2.20                      | 2.30  | 2.40  |
| A1     | 0.99                      | 1.04  | 1.09  |
| A2     | 0.00                      | 0.08  | 0.16  |
| A3     | 1.50 REF                  |       |       |
| b      | 0.70                      | 0.75  | 0.80  |
| b1     | 0.65                      | 0.70  | 0.75  |
| c      | 0.45                      | 0.50  | 0.55  |
| D      | 14.50                     | 15.00 | 15.50 |

| Symbol | Dimensions in Millimeters |       |       |
|--------|---------------------------|-------|-------|
|        | MIN                       | NOM   | MAX   |
| D1     | 9.60                      | 10.10 | 10.60 |
| D2     | 2.30                      | 2.80  | 3.30  |
| D3     | 5.77 REF                  |       |       |
| E      | 9.40                      | 9.90  | 10.40 |
| E1     | 9.46 REF                  |       |       |
| E2     | 8.70 REF                  |       |       |
| e      | 1.15                      | 1.20  | 1.25  |
| L      | 2.40                      | 2.45  | 2.50  |