

## N-Channel Enhancement Mode MOSFET

### Features

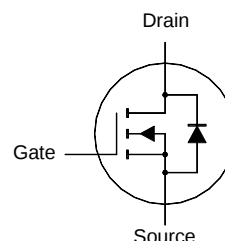
- AEC-Q101 Qualified, high reliability
- Robust design
- Very low on-resistance  $R_{DS(on)}$
- N-channel - Enhancement mode
- Halogen and Antimony Free(HAF),RoHS compliant

### Applications

- Motor Drive
- Power Supply
- Industrial Automation
- Battery Operated Tools
- Battery Protection
- Load Switch



TOLL-8L  
1.Gate(G)  
2.3.4.5.6.7.8 Source(S)  
9.Drain(D)



### Key Parameters

| Parameter        | Value                        | Unit      |
|------------------|------------------------------|-----------|
| $BV_{DSS}$       | 100                          | V         |
| $R_{DS(ON)}$ Max | 1.5 @ $V_{GS} = 10\text{ V}$ | $m\Omega$ |
|                  | 2.4 @ $V_{GS} = 6\text{ V}$  |           |
| $Q_g$ typ        | 173 @ $V_{GS} = 10\text{ V}$ | nC        |

### Absolute Maximum Ratings(at $T_a = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                                                                   | Symbol         | Min  | Max        | Unit             |
|-----------------------------------------------------------------------------|----------------|------|------------|------------------|
| Drain-Source Voltage                                                        | $V_{DS}$       | 100  |            | V                |
| Gate-Source Voltage                                                         | $V_{GS}$       |      | $\pm 20$   | V                |
| Drain Current<br>$T_c = 25^\circ\text{C}$<br>$T_c = 100^\circ\text{C}$      | $I_D$          |      | 324<br>230 | A                |
| Drain Current, Pulsed <sup>2)</sup>                                         | $I_{DM}$       |      | 1200       | A                |
| Single Pulse Avalanche Energy<br>$V_{DD} = 50\text{ V}$ , $L = 1\text{ mH}$ | $E_{AS}$       |      | 2738       | mJ               |
| Power Dissipation<br>$T_c = 25^\circ\text{C}$                               | $P_{tot}$      |      | 375        | W                |
| Operating Junction and Storage Temperature Range                            | $T_J, T_{stg}$ | - 55 | 175        | $^\circ\text{C}$ |

### Thermal Characteristics

| Parameter                                                 | Symbol          | Max. | Unit               |
|-----------------------------------------------------------|-----------------|------|--------------------|
| Thermal Resistance from Junction to Case                  | $R_{\theta JC}$ | 0.4  | $^\circ\text{C/W}$ |
| Thermal Resistance from Junction to Ambient <sup>1)</sup> | $R_{\theta JA}$ | 45   | $^\circ\text{C/W}$ |

1)Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$

2)Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

3)Limited by bonding wire

**Characteristics at T<sub>a</sub> = 25°C unless otherwise specified**

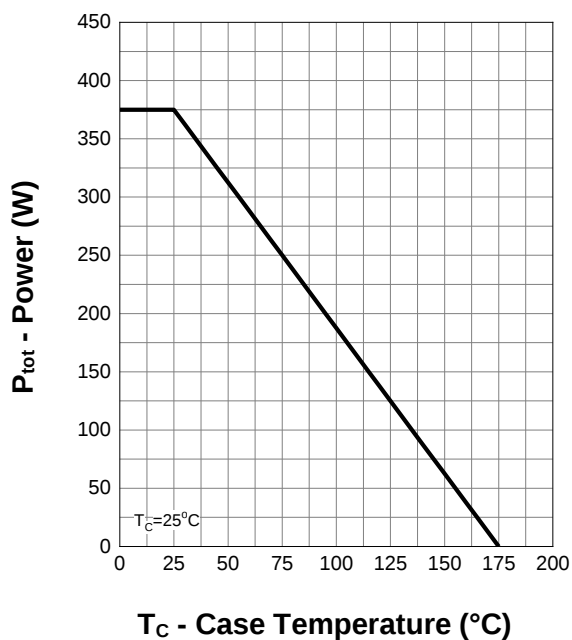
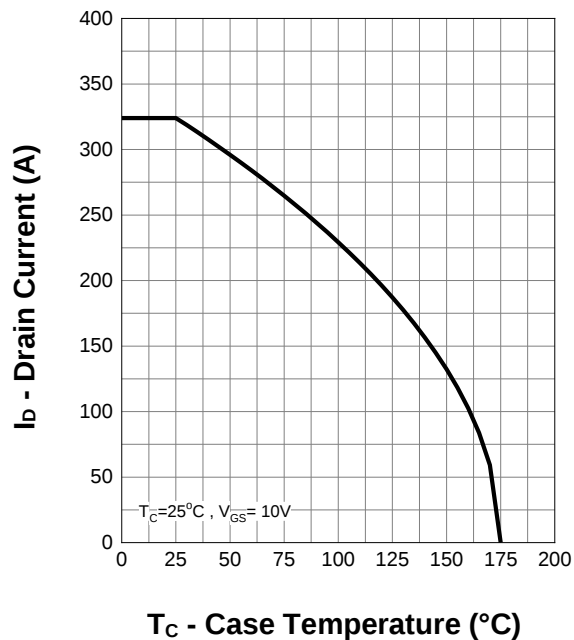
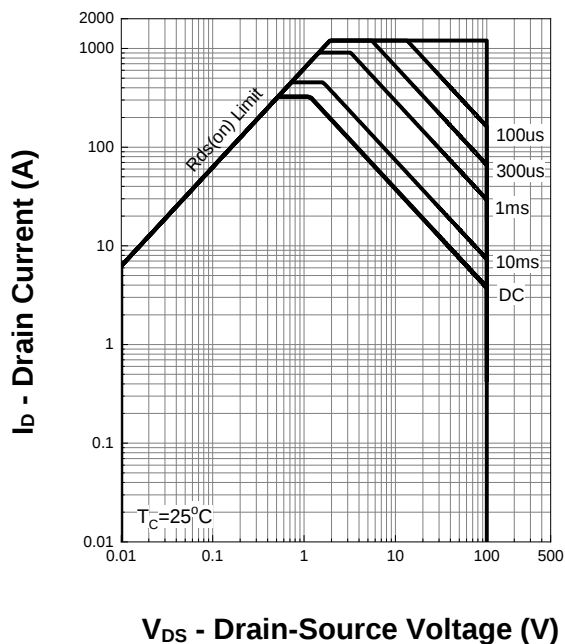
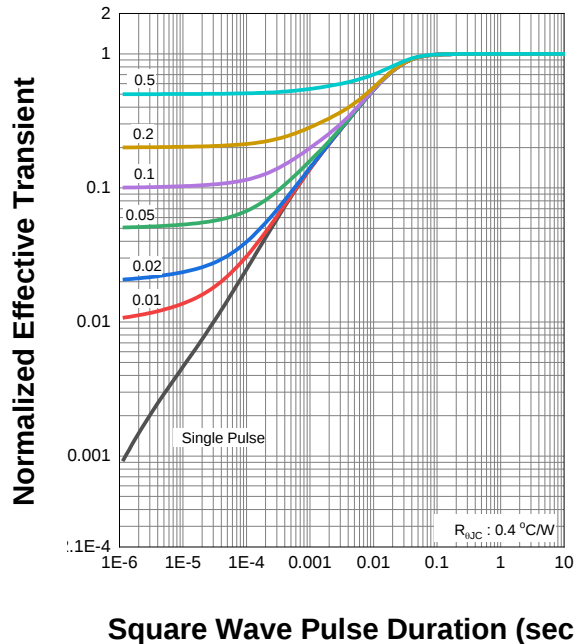
| Parameter                                                                                                                                               | Symbol              | Min.   | Typ.       | Max.       | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------|------------|------------|------|
| <b>STATIC PARAMETERS</b>                                                                                                                                |                     |        |            |            |      |
| Drain-Source Breakdown Voltage<br>at I <sub>D</sub> = 250 μA                                                                                            | BV <sub>DSS</sub>   | 100    | -          | -          | V    |
| Drain-Source Leakage Current<br>at V <sub>DS</sub> = 80 V                                                                                               | I <sub>DSS</sub>    | -      | -          | 1          | μA   |
| Gate Leakage Current<br>at V <sub>GS</sub> = ± 20 V                                                                                                     | I <sub>GSS</sub>    | -      | -          | ± 100      | nA   |
| Gate-Source Threshold Voltage<br>at V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA                                                        | V <sub>GS(th)</sub> | 2      | -          | 4          | V    |
| Drain-Source On-State Resistance <sup>1)</sup><br>at V <sub>GS</sub> = 10 V, I <sub>DS</sub> = 50 A<br>at V <sub>GS</sub> = 6 V, I <sub>DS</sub> = 30 A | R <sub>DS(on)</sub> | -<br>- | 1.3<br>1.8 | 1.5<br>2.4 | mΩ   |
| <b>DYNAMIC PARAMETERS <sup>2)</sup></b>                                                                                                                 |                     |        |            |            |      |
| Input Capacitance<br>at V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 50 V, f = 1 MHz                                                                        | C <sub>iss</sub>    | -      | 9790       | -          | pF   |
| Output Capacitance<br>at V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 50 V, f = 1 MHz                                                                       | C <sub>oss</sub>    | -      | 1700       | -          | pF   |
| Reverse Transfer Capacitance<br>at V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 50 V, f = 1 MHz                                                             | C <sub>rss</sub>    | -      | 104        | -          | pF   |
| Gate charge total <sup>2)</sup><br>at V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A                                             | Q <sub>g</sub>      | -      | 173        | --         | nC   |
| Gate to Source Charge<br>at V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A                                                       | Q <sub>gs</sub>     | -      | 50         | -          | nC   |
| Gate to Drain Charge<br>at V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A                                                        | Q <sub>gd</sub>     | -      | 45         | -          | nC   |
| Turn-On Delay Time<br>at V <sub>DS</sub> = 50 V, V <sub>GEN</sub> = 10 V, I <sub>DS</sub> = 50 A, R <sub>g</sub> = 3.9 Ω, R <sub>L</sub> =1Ω            | t <sub>d(on)</sub>  | -      | 29         | -          | ns   |
| Turn-On Rise Time<br>at V <sub>DS</sub> = 50 V, V <sub>GEN</sub> = 10 V, I <sub>DS</sub> = 50 A, R <sub>g</sub> = 3.9 Ω, R <sub>L</sub> =1Ω             | t <sub>r</sub>      | -      | 96         | -          | ns   |
| Turn-Off Delay Time<br>at V <sub>DS</sub> = 50 V, V <sub>GEN</sub> = 10 V, I <sub>DS</sub> = 50 A, R <sub>g</sub> = 3.9 Ω, R <sub>L</sub> =1Ω           | t <sub>d(off)</sub> | -      | 108        | -          | ns   |
| Turn-Off Fall Time<br>at V <sub>DS</sub> = 50 V, V <sub>GEN</sub> = 10 V, I <sub>DS</sub> = 50 A, R <sub>g</sub> = 3.9 Ω, R <sub>L</sub> =1Ω            | t <sub>f</sub>      | -      | 96         | -          | ns   |
| <b>Body-Diode PARAMETERS</b>                                                                                                                            |                     |        |            |            |      |
| Drain-Source Diode Forward Voltage <sup>1)</sup><br>at I <sub>SD</sub> = 50 A, V <sub>GS</sub> = 0 V                                                    | V <sub>SD</sub>     | -      | -          | 1.3        | V    |
| Body Diode Reverse Recovery Time<br>at I <sub>DS</sub> = 50 A, di <sub>SD</sub> /dt = 100 A / μs                                                        | t <sub>rr</sub>     | -      | 117        | -          | ns   |
| Body Diode Reverse Recovery Charge<br>at I <sub>DS</sub> = 50 A, di <sub>SD</sub> /dt = 100 A / μs                                                      | Q <sub>rr</sub>     | -      | 273        | -          | nC   |

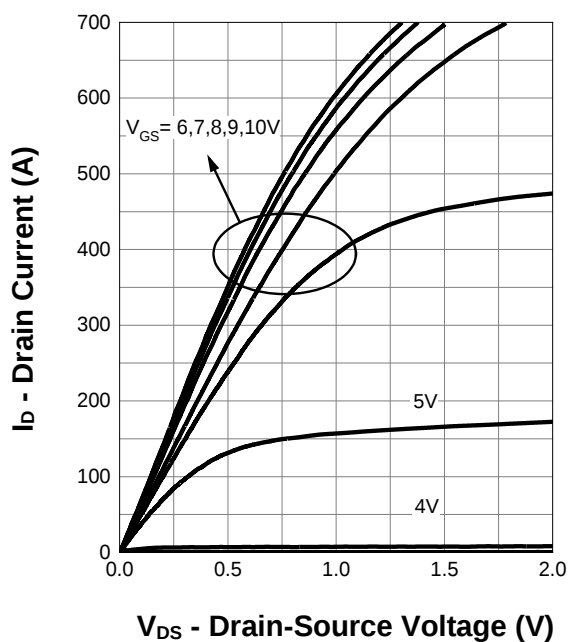
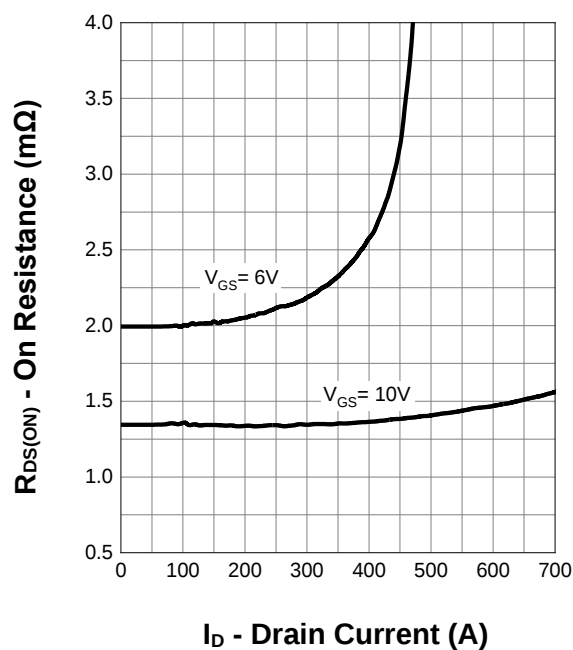
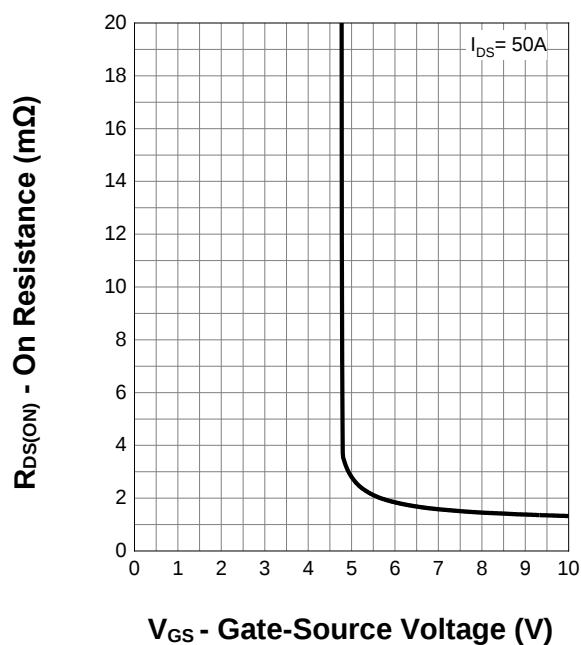
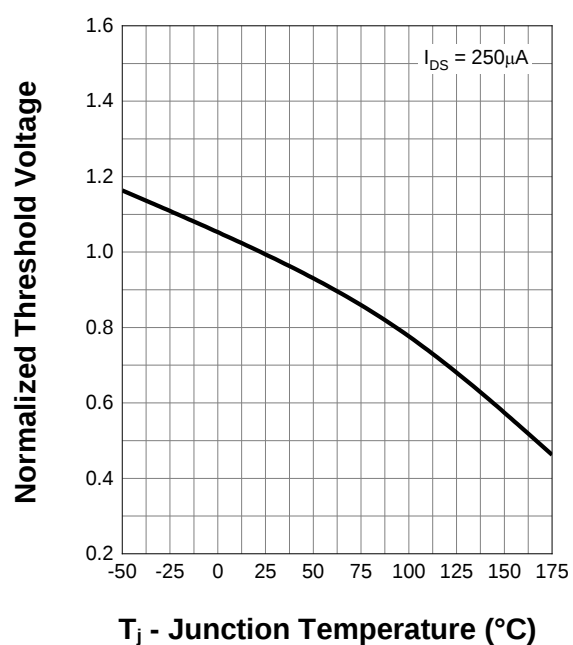
Notes:

1) Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%

2) Guaranteed by design, not subject to production testing

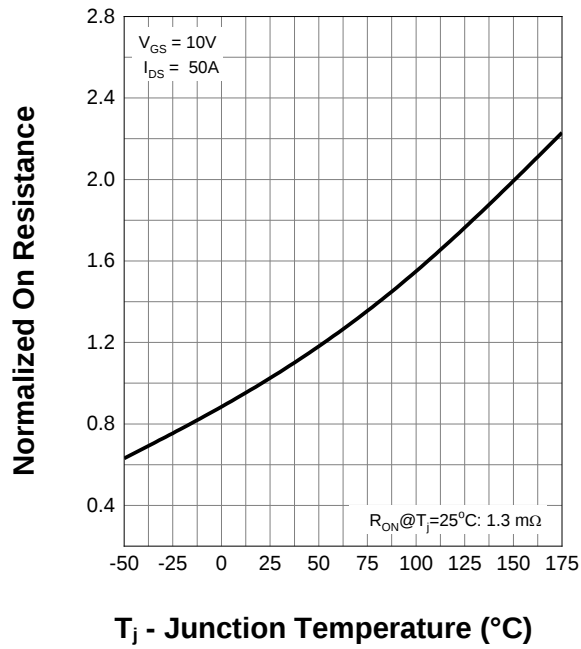
## Typical Characteristics

**Power Capability**

**Current Capability**

**Safe Operating Area**

**Transient Thermal Impedance**


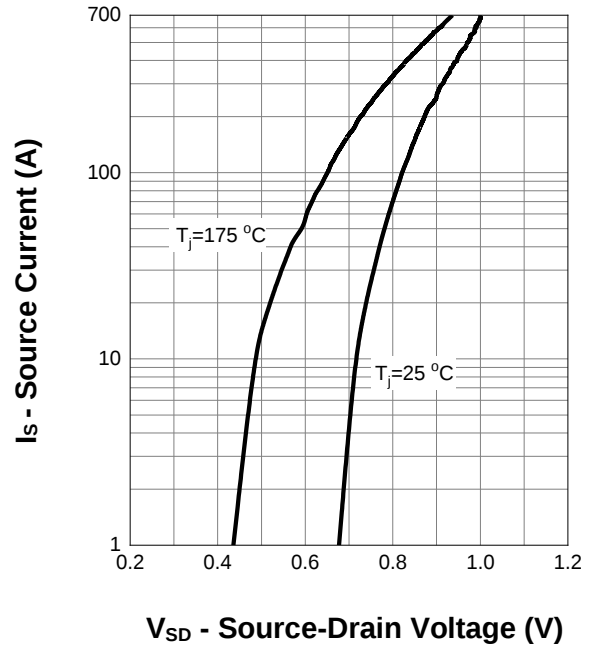
**Typical Characteristics (cont.)**
**Output Characteristics**

**On Resistance**

**Transfer Characteristics**

**Normalized Threshold Voltage**


# Typical Characteristics (cont.)

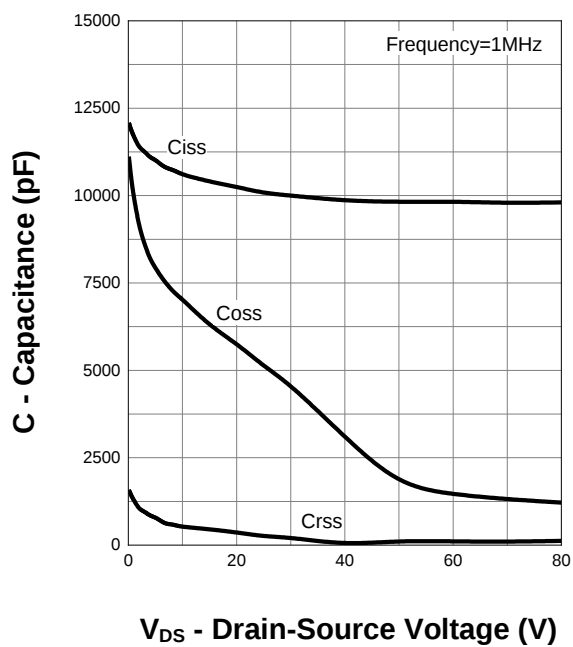
## Normalized On Resistance



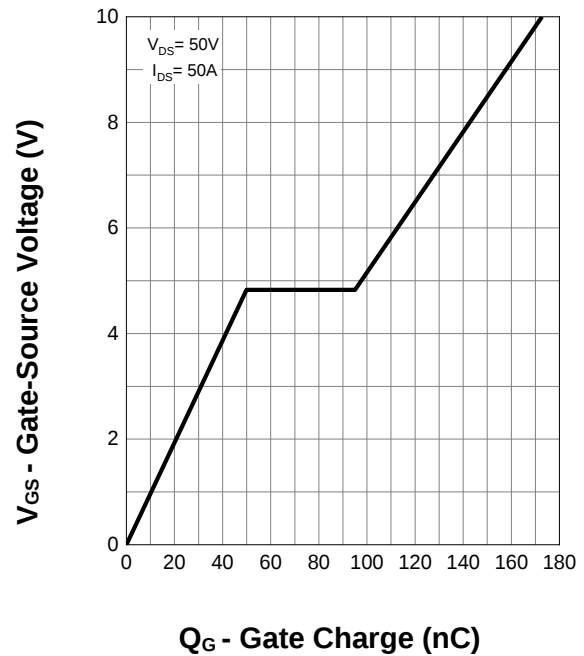
## Diode Forward Current



## Capacitance

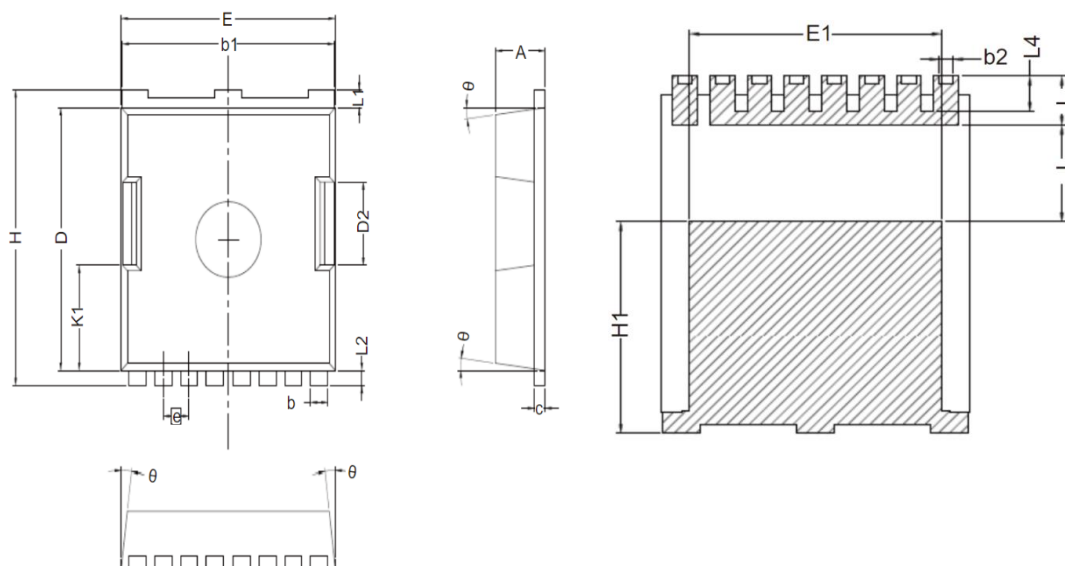


## Gate Charge



## Package Dimensions

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| UNIT | A   | b   | b 1 | b 2  | c    | D     | D2   | E     | E1   | e    |
|------|-----|-----|-----|------|------|-------|------|-------|------|------|
| mm   | 2.2 | 0.9 | 9.7 | 0.42 | 0.42 | 10.28 | 3.10 | 9.70  | 7.90 | 1.20 |
|      | 2.4 | 0.9 | 9.9 | 0.50 | 0.60 | 10.58 | 3.50 | 10.10 | 8.30 | BSC  |

| H     | H1   | J    | K1   | L    | L1   | L2   | L4   | θ   |
|-------|------|------|------|------|------|------|------|-----|
| 11.48 | 6.75 | 3.00 | 3.98 | 1.40 | 0.60 | 0.50 | 1.00 | 4°  |
| 11.88 | 7.15 | 3.30 | 4.38 | 1.80 | 0.80 | 0.70 | 1.30 | 10° |

## Packing information

| Package | Tape Width<br>(mm) | Pitch |        | Reel Size |       | Per Reel Packing Quantity |
|---------|--------------------|-------|--------|-----------|-------|---------------------------|
|         |                    | mm    | inch   | mm        | inch  |                           |
| TOLL-8L | 24                 | 4     | 0.1575 | 330       | 12.99 | 2000                      |

## Marking information

" DG10N015LSA " = Part No.

"YWW " = Date Code Marking

" Y " = Last digit of year (ex: 2 = 2022)

" WW " = Week Code (ex: 24 = the 24th week of the year)

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