

## N-Channel Enhancement Mode MOSFET

### 1. Product Information

#### 1.1 Features

- ☒ Advanced trench cell design
- ☒ Super Trench
- ☒ Surface-mounted package

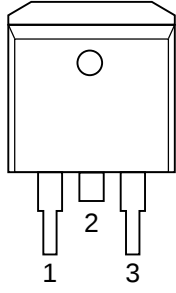
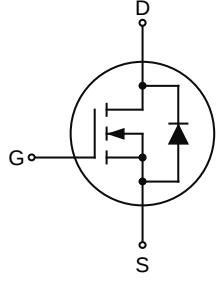
#### 1.2 Applications

- ☒ Motor drivers
- ☒ DC/DC Converter

#### 1.3 Quick reference

- ☒  $BV \geq 40\text{ V}$
- ☒  $P_{tot} \leq 147\text{ W}$
- ☒  $I_D \leq 120\text{ A}$
- ☒  $R_{DS(ON)} \leq 1.8\text{ m}\Omega @V_{GS} = 10\text{ V}$

### 2. Pin Description

| Pin | Description | Simplified Outline                                                                                             | Symbol                                                                                |
|-----|-------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1   | Gate(G)     |  <p>Top View<br/>TO-263</p> |  |
| 2   | Drain(D)    |                                                                                                                |                                                                                       |
| 3   | Source(S)   |                                                                                                                |                                                                                       |

### 3. Limiting Values

| Symbol              | Parameter                                        | Conditions                                   | Min | Max      | Unit                 |
|---------------------|--------------------------------------------------|----------------------------------------------|-----|----------|----------------------|
| $V_{DS}$            | Drain-Source Voltage                             | $T_C=25^{\circ}\text{C}$                     | 40  | -        | V                    |
| $V_{GS}$            | Gate-Source Voltage                              | $T_C=25^{\circ}\text{C}$                     | -   | $\pm 20$ | V                    |
| $I_D^{*,***}$       | Drain Current (DC)                               | $T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$ | -   | 120      | A                    |
| $I_{DM}^{**,***}$   | Drain Current (Pulsed)                           | $T_C=25^{\circ}\text{C}, V_{GS}=10\text{ V}$ | -   | 480      | A                    |
| $P_{tot}^{*}$       | Drain power dissipation                          | $T_C=25^{\circ}\text{C}$                     | -   | 147      | W                    |
| $T_J$               | Junction Temperature                             |                                              | -   | 150      | $^{\circ}\text{C}$   |
| $I_S$               | Continuous-Source Current                        | $T_C=25^{\circ}\text{C}$                     | -   | 120      | A                    |
| $E_{AS}$            | Single Pulsed Avalanche Energy                   | $V_{DD}=40\text{ V}, L=1.0\text{ mH}$        | -   | 1052     | mJ                   |
| $T_J, T_{stg}$      | Operating Junction and Storage Temperature Range |                                              | -55 | 150      | $^{\circ}\text{C}$   |
| $R_{\theta JA}^{*}$ | Thermal Resistance-Junction to Ambient           |                                              | -   | 43       | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}^{*}$ | Thermal Resistance-Junction to Case              |                                              | -   | 0.85     |                      |

Notes:

- \* Surface mounted on minimum footprint pad area.
- \*\* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$
- \*\*\* Maximum current rating is package limited.

### 4. Marking Information

| Product Name | Marking                                                                                                                                                       |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| KJ014N04D    | <div style="display: inline-block; background-color: black; color: white; padding: 2px 5px;">           014N04<br/>YWWXXX         </div> YWWXXX:<br>Date Code |

### 5. Ordering Code

| Product Name | Package | Reel size | Tape width | Quantity (pcs) |
|--------------|---------|-----------|------------|----------------|
| KJ014N04D    | TO-263  | 13"       | 24 mm      | 1000           |

Note: KJ014N04D defines "Green" as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC/JEDEC J-STD-020C)

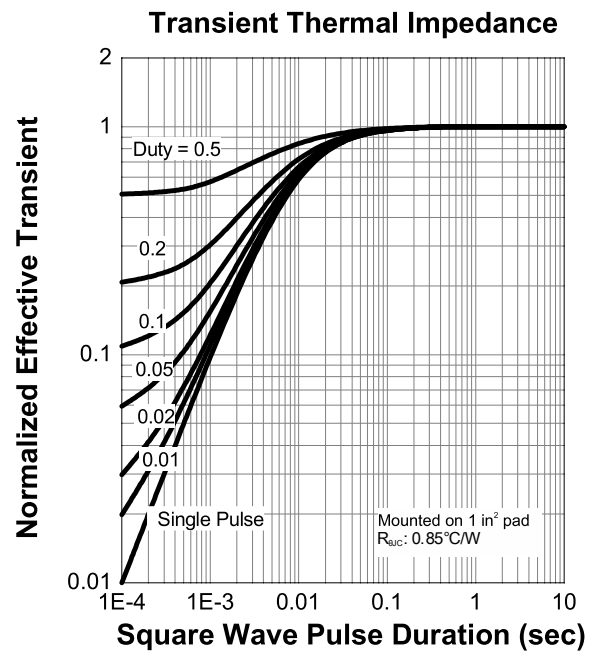
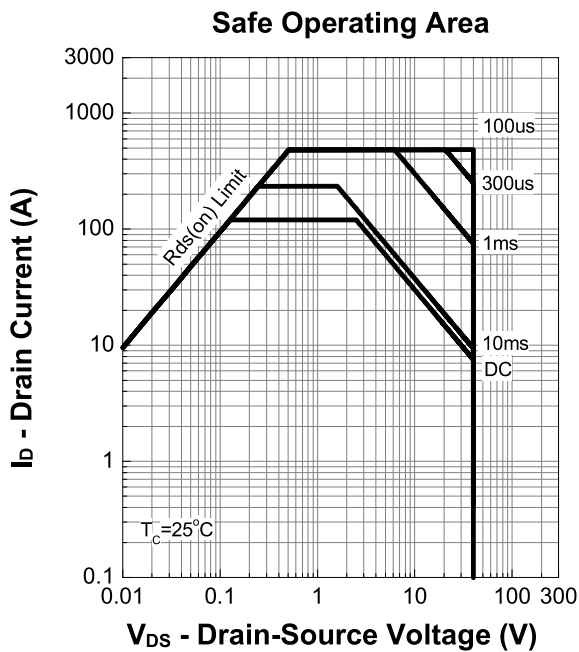
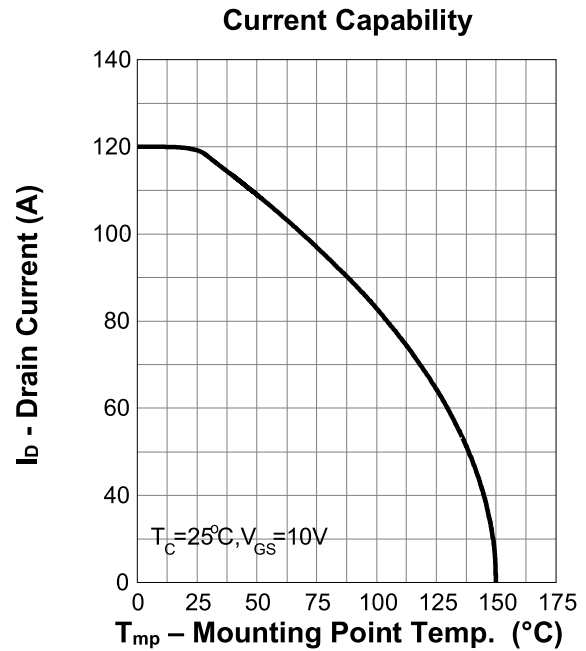
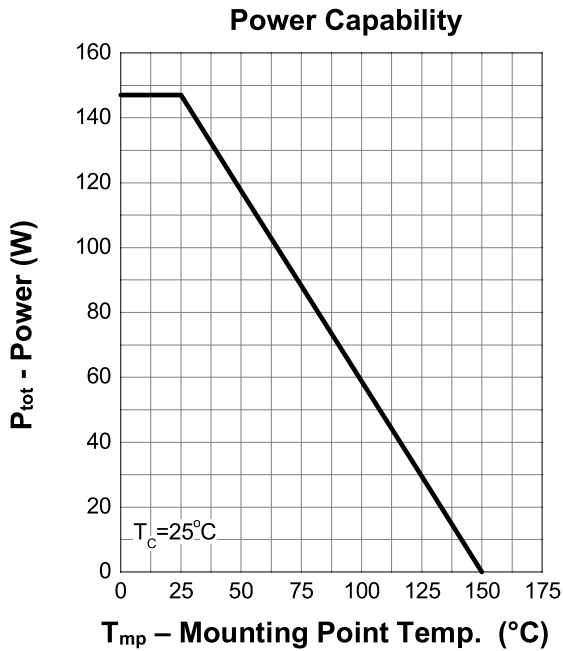
**6. Electrical Characteristics** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

| Symbol                                   | Parameter                        | Conditions                                                                                                             | Min | Typ  | Max  | Unit |
|------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------|-----|------|------|------|
| Static Characteristics                   |                                  |                                                                                                                        |     |      |      |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0 V, I <sub>DS</sub> =250 μA                                                                          | 40  | -    | -    | V    |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250 μA                                                             | 2.0 | -    | 4.0  | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Source Current | V <sub>DS</sub> =32 V, V <sub>GS</sub> =0 V                                                                            | -   | -    | 1    | μA   |
|                                          |                                  | T <sub>J</sub> =85°C                                                                                                   | -   | -    | 30   | μA   |
| I <sub>GSS</sub>                         | Gate Leakage Current             | V <sub>GS</sub> =±20 V, V <sub>DS</sub> =0 V                                                                           | -   | -    | ±100 | nA   |
| R <sub>DS(ON)</sub> <sup>a</sup>         | Drain-Source On-State Resistance | V <sub>GS</sub> =10 V, I <sub>DS</sub> =20 A                                                                           | -   | 1.6  | 1.8  | mΩ   |
| Diode Characteristics                    |                                  |                                                                                                                        |     |      |      |      |
| V <sub>SD</sub> <sup>a</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =20 A, V <sub>GS</sub> =0 V                                                                            | -   | -    | 1.3  | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>SD</sub> =20 A,<br>dI <sub>SD</sub> /dt=100 A/μs                                                                | -   | 68   | -    | ns   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                                        | -   | 92   | -    | nC   |
| Dynamic Characteristics <sup>b</sup>     |                                  |                                                                                                                        |     |      |      |      |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0 V, V <sub>DS</sub> =20 V,<br>Frequency=1 MHz                                                        | -   | 4925 | -    | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                                        | -   | 1655 | -    |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                                        | -   | 122  | -    |      |
| t <sub>d(on)</sub>                       | Turn-on Delay Time               | V <sub>DS</sub> =20 V, V <sub>GEN</sub> =10 V,<br>R <sub>G</sub> =4.5 Ω, R <sub>L</sub> =1 Ω,<br>I <sub>DS</sub> =20 A | -   | 16   | -    | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                        | -   | 48   | -    |      |
| t <sub>d(off)</sub>                      | Turn-off Delay Time              |                                                                                                                        | -   | 75   | -    |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                        | -   | 42   | -    |      |
| Gate Charge Characteristics <sup>b</sup> |                                  |                                                                                                                        |     |      |      |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =20 V, V <sub>GS</sub> =10 V,<br>I <sub>DS</sub> =20 A                                                 | -   | 81   | -    | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                        | -   | 18   | -    |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                        | -   | 15   | -    |      |

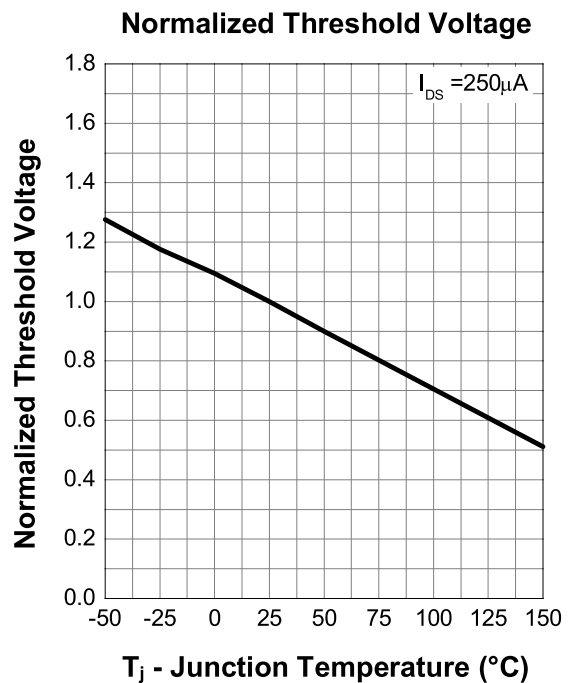
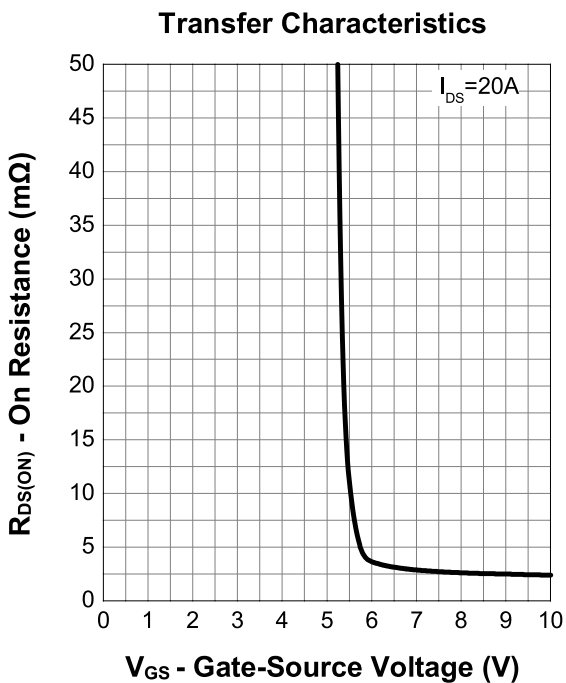
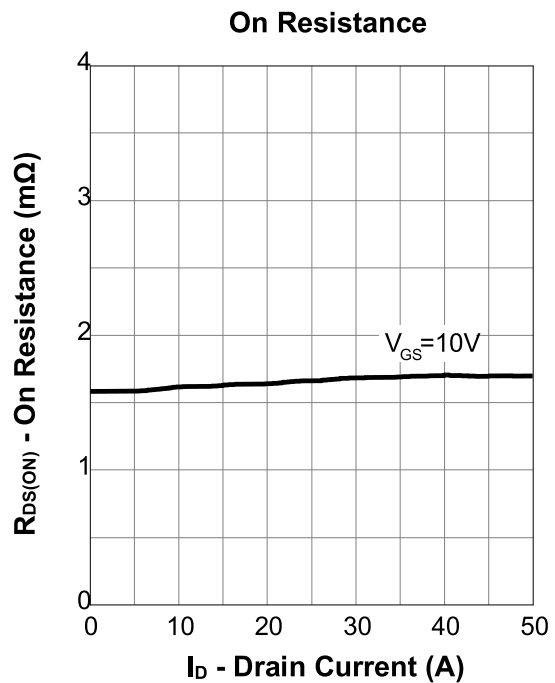
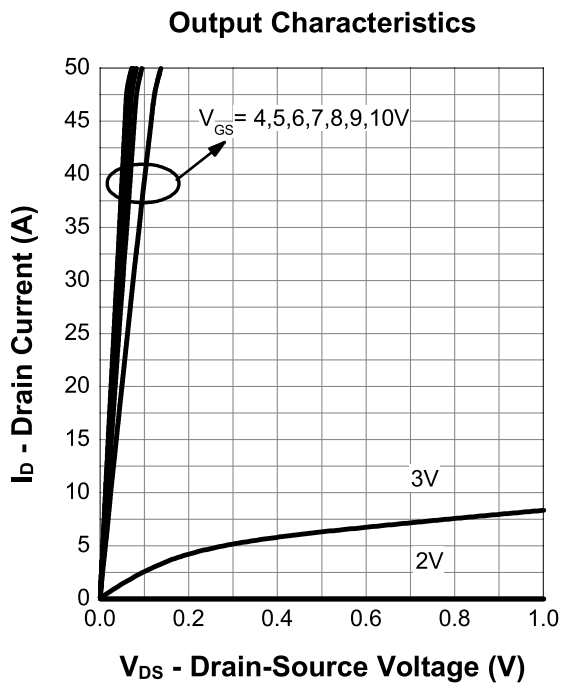
Notes:

- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

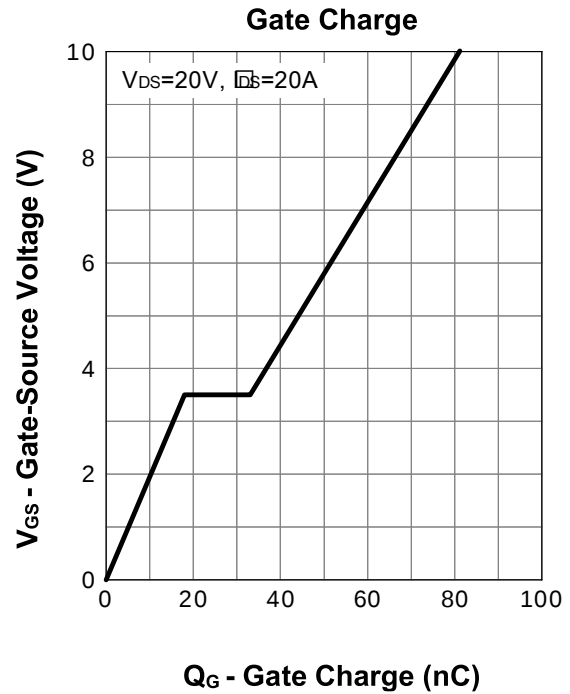
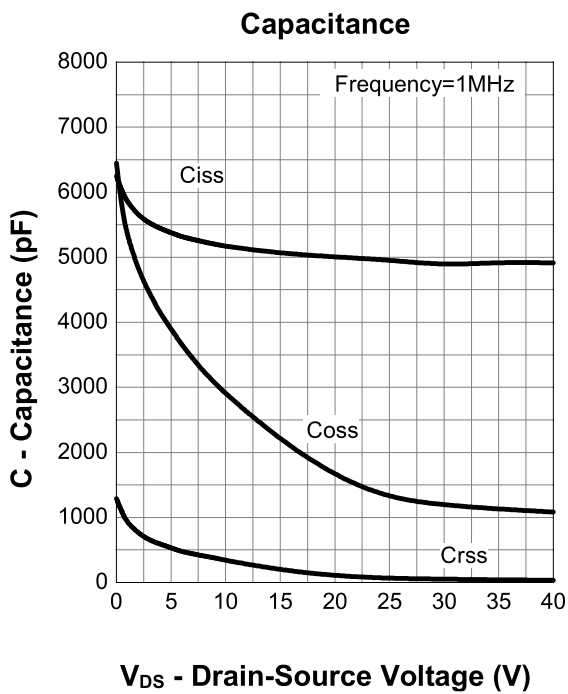
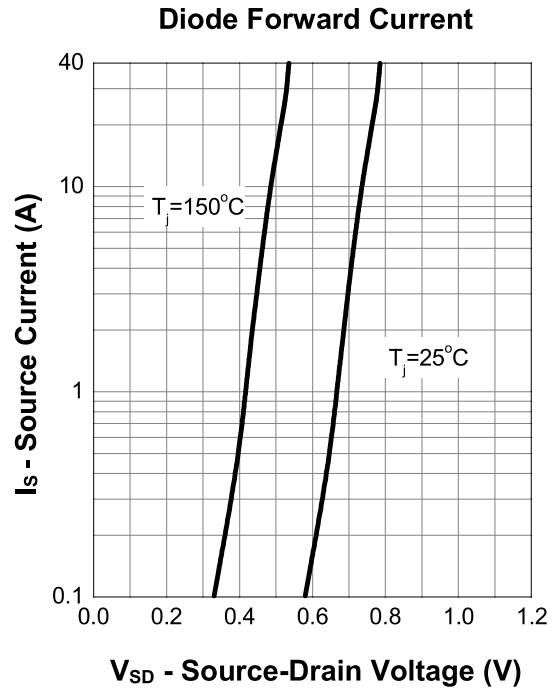
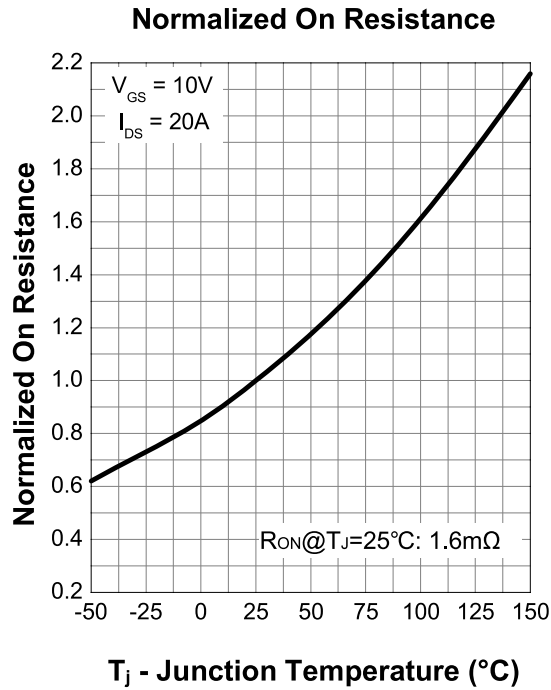
## 7. Typical Characteristics



## 7. Typical Characteristics (cont.)

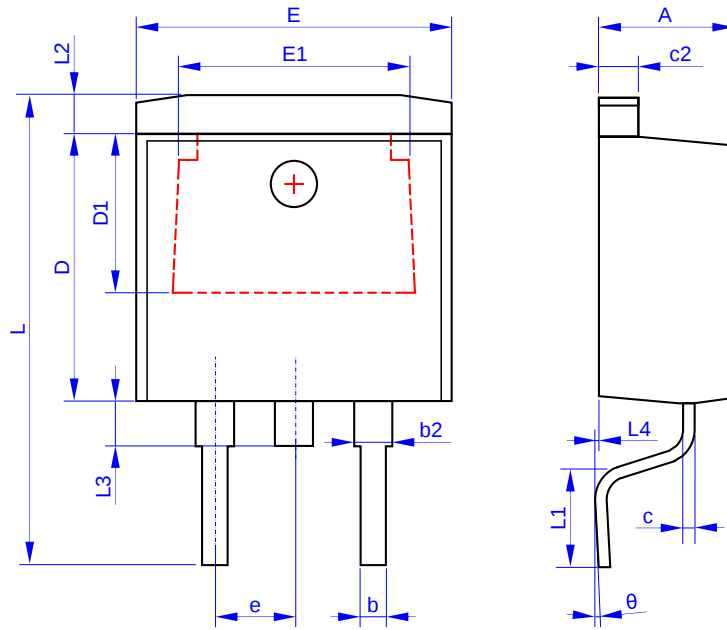


## 7. Typical Characteristics (cont.)



## 8. Package Dimensions

### TO-263 Package



| Symbol | Dimensions In Millimeters |       |
|--------|---------------------------|-------|
|        | MIN                       | MAX   |
| A      | 4.40                      | 4.80  |
| b      | 0.76                      | 1.00  |
| L4     | 0.00                      | 0.25  |
| C      | 0.36                      | 0.50  |
| L3     | 1.50 REF                  |       |
| L1     | 2.29                      | 2.79  |
| E      | 9.80                      | 10.40 |
| E1     | 7.40 REF                  |       |
| c2     | 1.25                      | 1.45  |
| b2     | 1.17                      | 1.47  |
| D      | 8.60                      | 9.00  |
| D1     | 5.10 REF                  |       |
| e      | 2.54 REF                  |       |
| L      | 14.60                     | 15.80 |
| θ      | 0° ± 3°                   |       |
| L2     | 1.27 REF                  |       |