

N-Channel Enhancement Mode MOSFET

1. Product Information

Features

- Advanced Trench Technology
- Excellent $R_{DS(ON)}$
- Low gate charge

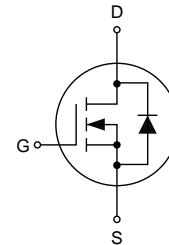
Applications

- Brushless motor
- Load switch
- Uninterruptible power supply

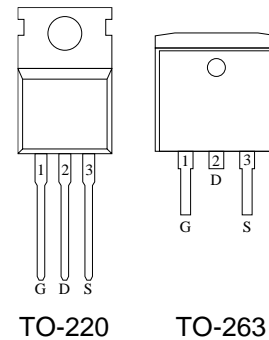
Quick reference

- $V_{DS} = 120\text{ V}$
- $I_D = 120\text{ A}$
- $R_{DS(ON)} \leq 8.5\text{ m}\Omega$ @ $V_{GS} = 10\text{ V}$ (Type: 6.8 m Ω)

Schematic diagram



Pin Assignment



Package Marking and Ordering Information

| Product Name | Package | Marking | Reel size | Tape width | Quantity (pcs) |
|--------------|---------|-----------|-----------|------------|----------------|
| KJ120N12C | TO-220 | KJ120N12C | N/A | N/A | 1000 |
| KJ120N12D | TO-263 | KJ120N12D | 13" | 24 mm | 800 |

2. Absolute Maximum Ratings (T_C=25°C unless otherwise noted)

| Symbol | Parameter | Values | Unit |
|-----------------------------------|---|---------|------|
| V_{DS} | Drain-Source Voltage | 120 | V |
| V_{GS} | Gate-Source Voltage | ±20 | V |
| I_D | Continuous Drain Current, T _A =25°C ¹ | 120 | A |
| | Continuous Drain Current, T _A =70°C ¹ | 70 | A |
| I_{DM} | Pulsed Drain Current ² | 400 | A |
| E_{AS} | Single Pulse Avalanche Energy ³ | 240 | mJ |
| I_{AR} | Single Pulse Avalanche Current | 40 | A |
| P_D | Power Dissipation ⁴ | 140 | W |
| T _J , T _{STG} | Operating Junction and Storage Temperature Range | -55~150 | °C |
| R _{θJA} | Thermal Resistance from Junction to Ambient | 62 | °C/W |
| R _{θJC} | Thermal Resistance from Junction to Case | 0.89 | °C/W |

3. Electrical Characteristics (T_J=25°C, unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|---|--|------|------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0 V, I _D =250 μA | 120 | - | - | V |
| V _{GS(th)} | Gate-Threshold Voltage | V _{DS} =V _{GS} , I _D =250 μA | 2.5 | 3.0 | 3.5 | V |
| I _{GSS} | Gate-Source Leakage Current | V _{DS} =0 V, V _{GS} =±20 V | - | - | ±100 | nA |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =120 V, V _{GS} =0 V | - | - | 1 | μA |
| R _{DS(ON)} | Drain-Source On-Resistance ¹ | V _{GS} =10 V, I _D =20 A | - | 6.8 | 8.5 | mΩ |
| g _{FS} | Forward Transconductance | V _{GS} =5 V, I _D =50 A | - | 130 | - | S |
| C _{iss} | Input Capacitance | V _{DS} =50 V, V _{GS} =0 V, f=1.0 MHz | - | 4282 | - | pF |
| C _{oss} | Output Capacitance | | - | 429 | - | |
| C _{rss} | Reverse Transfer Capacitance | | - | 17 | - | |
| R _g | Gate resistance | | - | 2.5 | - | |
| Q _g | Total Gate Charge | V _{DS} =50 V, V _{GS} =10 V, I _D =20 A | - | 61.7 | - | nC |
| Q _{gs} | Gate-Source Charge | | - | 17.4 | - | |
| Q _{gd} | Gate-Drain Charge | | - | 14.1 | - | |
| t _{d(on)} | Turn-on Delay Time | V _{DD} =50 V, V _{GS} =10 V, I _D =20 A, R _G =5 Ω | - | 20 | - | ns |
| t _r | Turn-on Rise Time | | - | 11 | - | |
| t _{d(off)} | Turn-off Delay Time | | - | 55 | - | |
| t _f | Turn-off Fall Time | | - | 28 | - | |
| V _{SD} | Diode Forward Voltage | V _{GS} =0 V, I _S =6 A | - | - | 1.2 | V |
| I _S | Diode Forward Current | | - | - | 320 | A |
| I _{SM} | Diode Pulse Current | | - | - | 16 | A |
| t _{rr} | Reverse Recovery Time | V _{GS} =50 V, I _S =20 A, dI/dt=100 A/μs | - | 100 | - | ns |
| Q _{rr} | Reverse Recovery Charge | | - | 250 | - | μC |

Notes:

1. Mounted on a 1 inch² FR-4 board with 2 OZ copper.
2. Pulse width ≤ 300 μs, duty cycle ≤ 2%.
3. E_{AS} test condition is V_{DD}=50 V, L=0.3 mH, R_G=25 Ω, Starting T_J=25°C.
4. P_D is limited by 150°C junction temperature.

4. Typical Characteristics

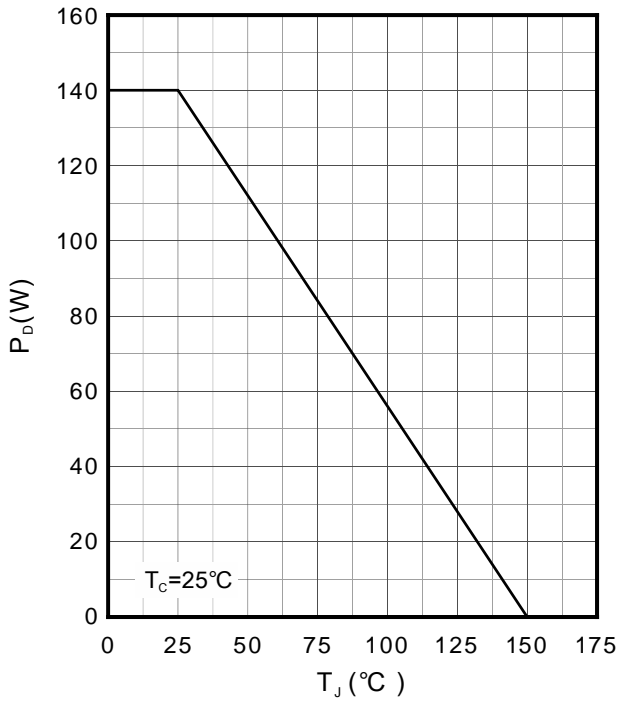


Figure 1. Power Capability

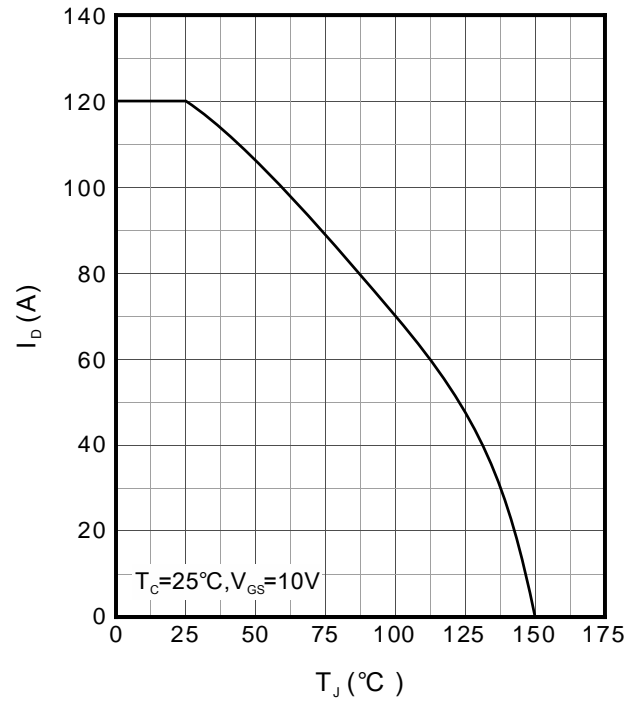


Figure 2. Current Capability

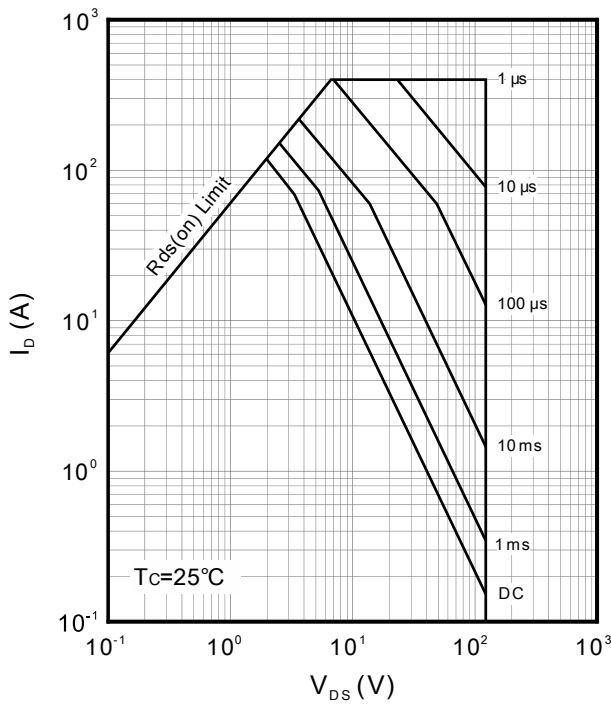


Figure 3. Safe Operating Area

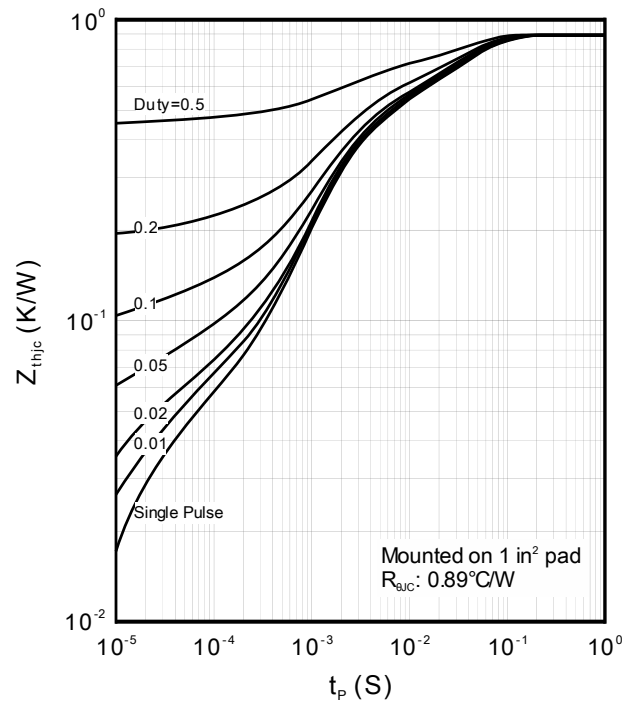


Figure 4. Max. Transient Thermal Impedance

4. Typical Characteristics (cont.)

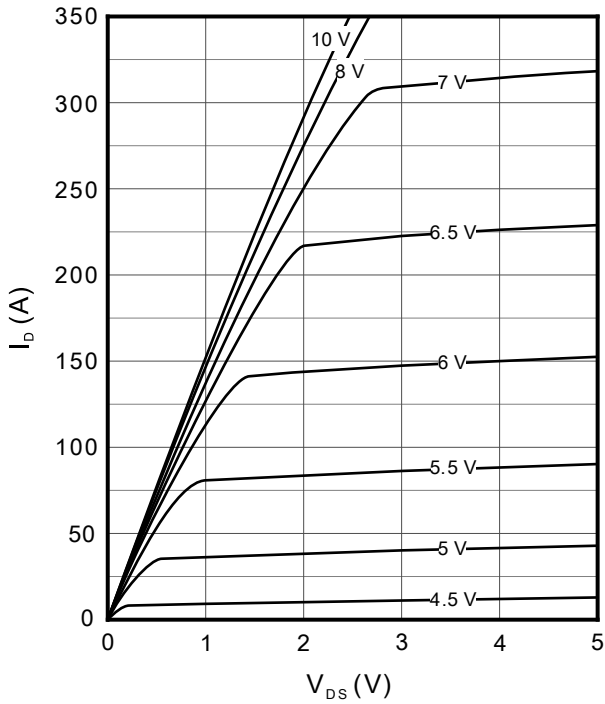


Figure 5. Output Characteristics

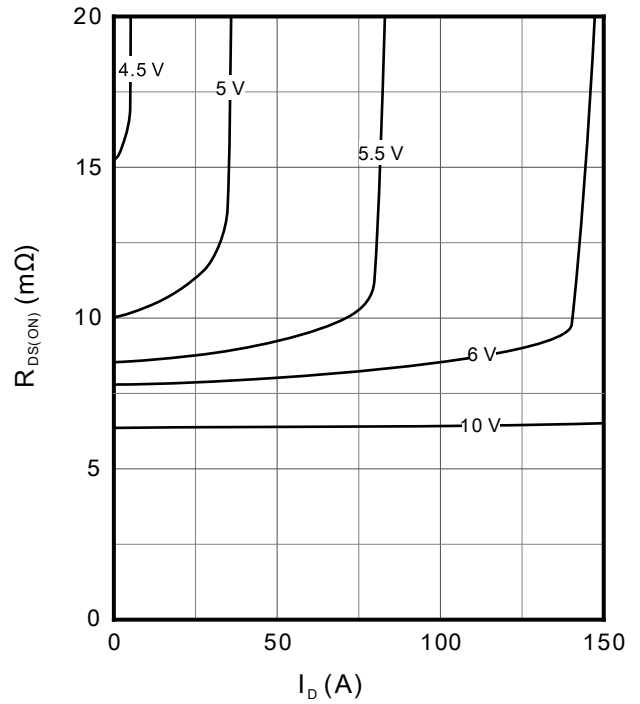


Figure 6. Typical Drain-Source On Resistance

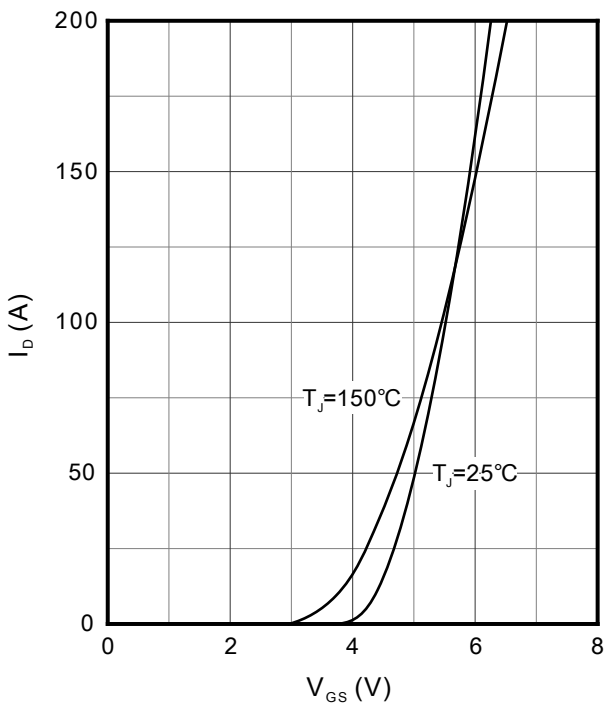


Figure 7. Transfer Characteristics

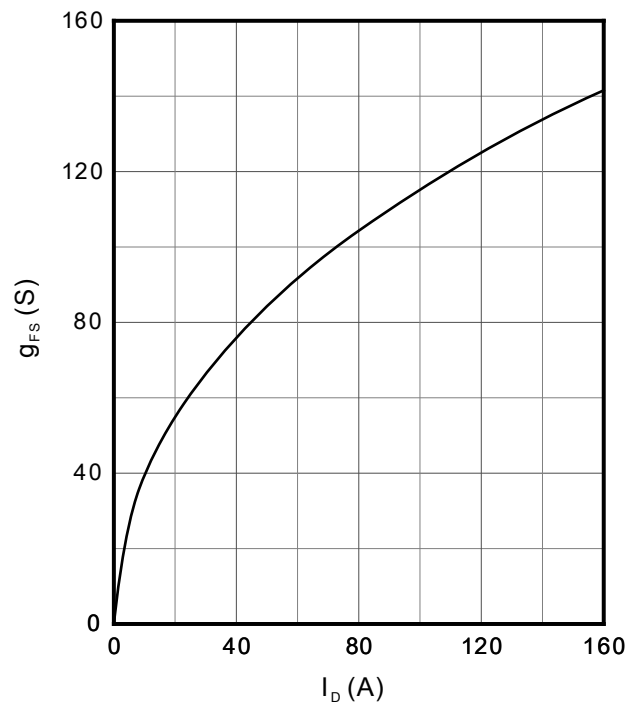


Figure 8. Forward Transconductance

4. Typical Characteristics (cont.)

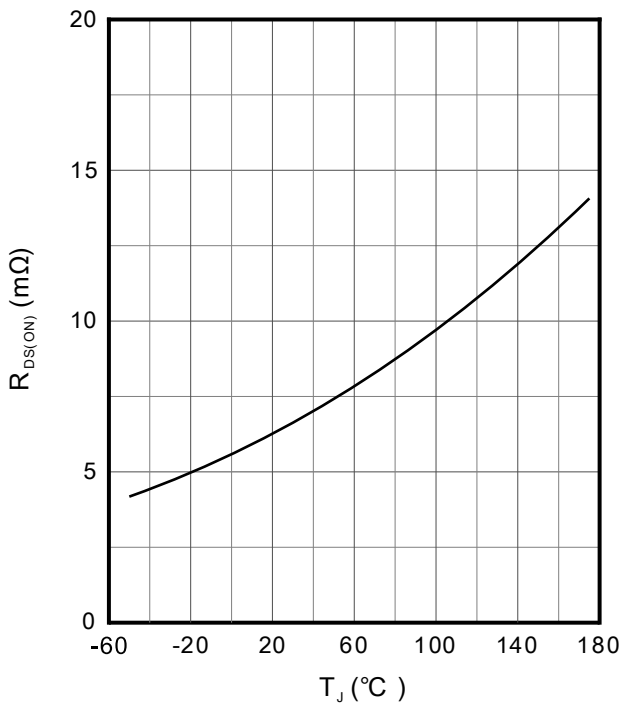


Figure 9. On-State resistance

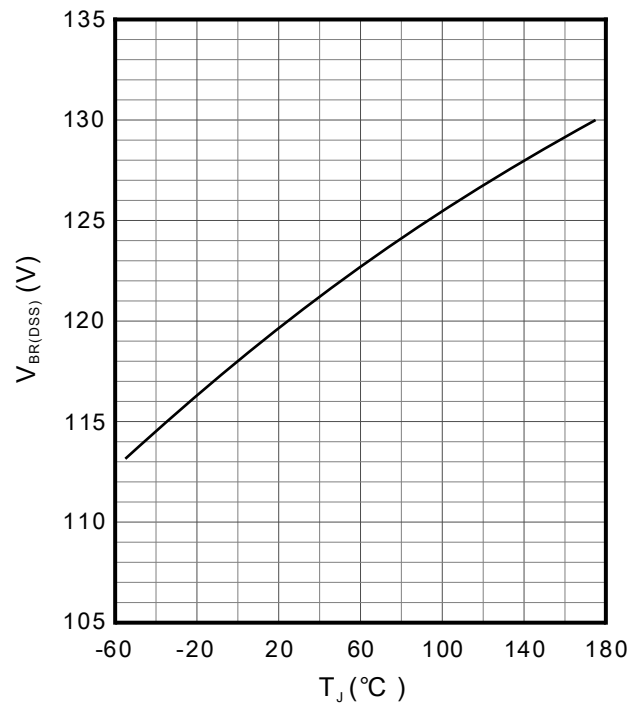


Figure 10. Breakdown Voltage

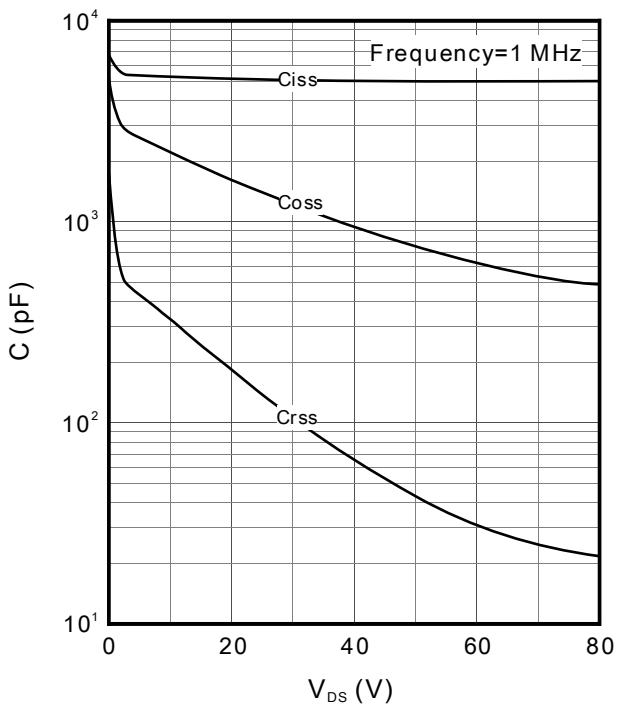


Figure 11. Typ. Capacitances

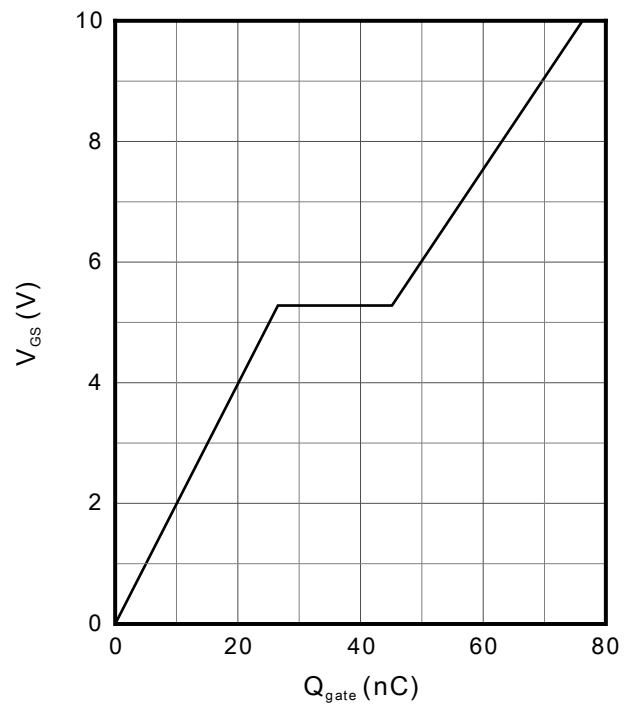
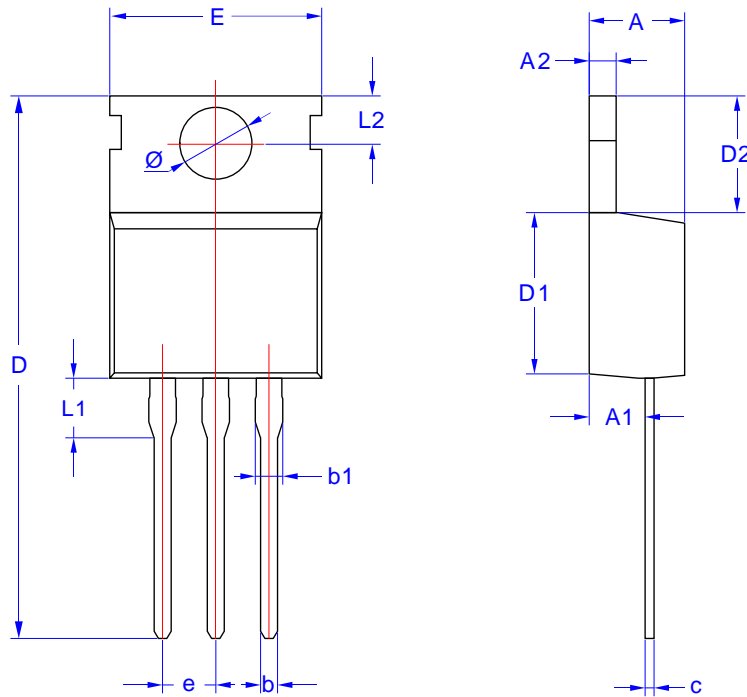


Figure 12. Typ. Gate Charge

5. Package Mechanical Data

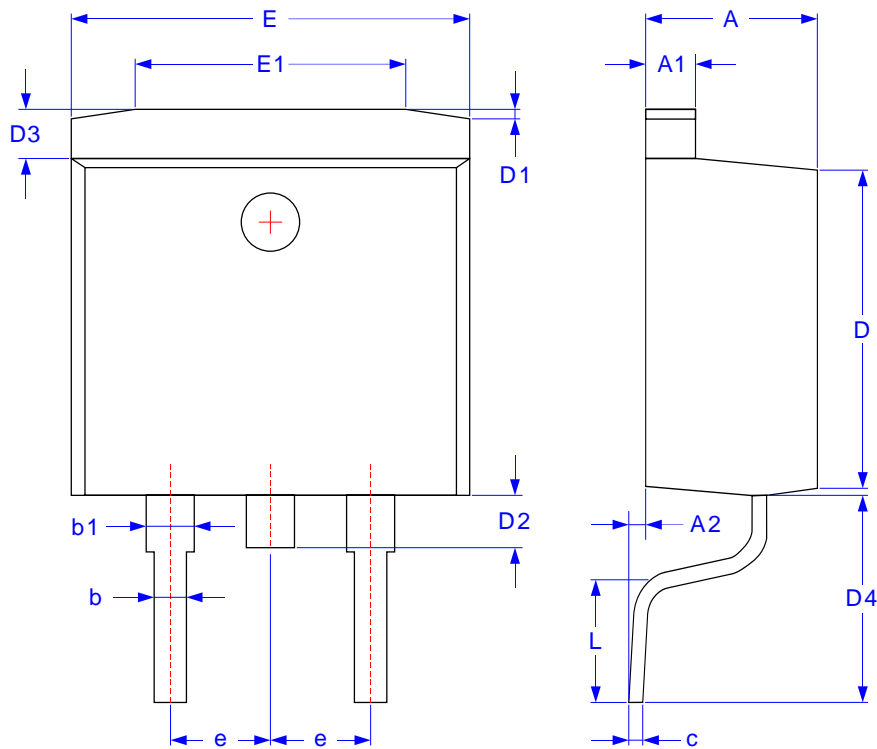
TO-220 Package



| Symbol | Dimensions in Millimeters | |
|--------|---------------------------|-------|
| | MIN | MAX |
| A | 4.24 | 4.70 |
| A1 | 2.20 | 3.00 |
| A2 | 1.15 | 1.40 |
| b | 0.70 | 0.95 |
| b1 | 1.14 | 1.70 |
| c | 0.40 | 0.60 |
| D | 28.0 | 29.8 |
| D1 | 8.80 | 9.90 |
| D2 | 6.25 | 6.90 |
| E | 9.70 | 10.50 |
| L1 | 3.80 | |
| L2 | 2.40 | 3.00 |
| e | 2.54 BSC | |
| Φ | 3.60 | |

5. Package Mechanical Data

TO-263 Package



| Symbol | Dimensions in Millimeters | |
|--------|---------------------------|-------|
| | MIN | MAX |
| A | 4.30 | 4.70 |
| A1 | 1.25 | 1.35 |
| A2 | 0.02 | 0.23 |
| b | 0.70 | 0.90 |
| b1 | 1.17 | 1.37 |
| c | 0.45 | 0.55 |
| D | 9.00 | 9.20 |
| D1 | 0.50 | 1.00 |
| D2 | 1.40 | 1.60 |
| D3 | 1.10 | 1.40 |
| D4 | 4.60 | 5.00 |
| E | 9.80 | 10.20 |
| E1 | 6.10 | 6.70 |
| e | TYP 2.54 | |
| L | 2.20 | 2.80 |