



LGE3M25120Q

N-Channel SiC Power MOSFET



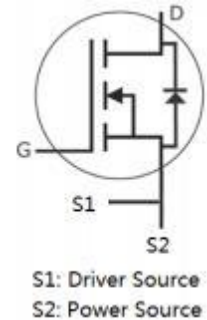
| | | | |
|-------------------|---|------|----|
| V_{DS} | = | 1200 | V |
| $R_{DS(on)}$ | = | 25 | mΩ |
| $I_D@25^{\circ}C$ | = | 90 | A |

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive

Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency



Applications

- Power Supplies
- High Voltage DC/DC Converters
- Motor Drives
- Switch Mode Power Supplies
- Pulsed Power applications

| Part Number | Package |
|-------------|-----------|
| LGE3M25120Q | TO-247-4L |

Maximum Ratings ($T_c=25^{\circ}C$ unless otherwise specified)

| Symbol | Parameter | Value | Unit | Test Conditions | Note |
|----------------|--|-------------|-------------|---|------|
| V_{DSmax} | Drain-Source Voltage | 1200 | V | $V_{GS}=0V, I_D=100\mu A$ | |
| V_{GSmax} | Gate-Source Voltage | -10/+25 | V | Absolute maximum values | |
| V_{GSop} | Gate-Source Voltage | -5/+20 | V | Recommended operational values | |
| I_D | Continuous Drain Current | 90 | A | $V_{GS}=20V, T_c=25^{\circ}C$ | |
| | | 60 | | $V_{GS}=20V, T_c=100^{\circ}C$ | |
| $I_{D(pulse)}$ | Pulsed Drain Current | 200 | A | Pulse width t_p limited by T_{Jmax} | |
| P_D | Power Dissipation | 370 | W | $T_c=25^{\circ}C, T_J=150^{\circ}C$ | |
| T_J, T_{STG} | Operating Junction and Storage Temperature | -55 to +150 | $^{\circ}C$ | | |



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Electrical Characteristics ($T_c=25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions | Note |
|---------------|----------------------------------|------|------|------|------------|---|------------|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | 1200 | / | / | V | $V_{GS}=0V, I_D=100\mu A$ | |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.9 | 2.4 | 4.0 | V | $V_{DS}=V_{GS}, I_D=15mA$ | Fig. 11 |
| | | / | 1.7 | / | | $V_{DS}=V_{GS}, I_D=15mA, T_J=150^\circ\text{C}$ | |
| I_{DSS} | Zero Gate Voltage Drain Current | / | 1 | 100 | μA | $V_{DS}=1200V, V_{GS}=0V$ | |
| I_{GSS+} | Gate-Source Leakage Current | / | 10 | 250 | nA | $V_{DS}=0V, V_{GS}=25V$ | |
| I_{GSS-} | Gate-Source Leakage Current | / | 10 | 250 | nA | $V_{DS}=0V, V_{GS}=-10V$ | |
| $R_{DS(on)}$ | Drain-Source On-State Resistance | / | 25 | 34 | m Ω | $V_{GS}=20V, I_D=50A$ | Fig. 4,5,6 |
| | | / | 43 | / | | $V_{GS}=20V, I_D=50A, T_J=150^\circ\text{C}$ | |
| C_{iss} | Input Capacitance | / | 4200 | / | pF | $V_{GS}=0V$ | Fig. 15,16 |
| C_{oss} | Output Capacitance | / | 250 | / | | $V_{DS}=1000V$ | |
| C_{rss} | Reverse Transfer Capacitance | / | 16 | / | | $f=1MHz$ | |
| E_{oss} | C_{oss} Stored Energy | / | 126 | / | μJ | $V_{AC}=25mV$ | |
| E_{ON} | Turn-On Switching Energy | / | 1.8 | / | mJ | $V_{DS}=800V, V_{GS}=-5V/20V, I_D=50A$ $R_{G(ext)}=2.5\Omega, L=412\mu H$ | |
| E_{OFF} | Turn-Off Switching Energy | / | 0.6 | / | | | |
| $t_{d(on)}$ | Turn-On Delay Time | / | 15 | / | ns | $V_{DS}=800V, V_{GS}=-5V/20V,$ $I_D=50A, R_{G(ext)}=2.5\Omega, R_L=16\Omega$ | |
| t_r | Rise Time | / | 12 | / | | | |
| $t_{d(off)}$ | Turn-Off Delay Time | / | 34 | / | | | |
| t_f | Fall Time | / | 7 | / | | | |
| $R_{G(int)}$ | Internal Gate Resistance | / | 2.1 | / | Ω | $f=1MHz, V_{AC}=25mV$ | |
| Q_{GS} | Gate to Source Charge | / | 54 | / | nC | $V_{DS}=800V$ $V_{GS}=-5V/20V$ $I_D=50A$ | |
| Q_{GD} | Gate to Drain Charge | / | 29 | / | | | |
| Q_G | Total Gate Charge | / | 195 | / | | | |

Reverse Diode Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|-----------|----------------------------------|------|------|------|---|-------------|
| V_{SD} | Diode Forward Voltage | 3.5 | / | V | $V_{GS}=-5V, I_{SD}=25A$ | Fig. 8,9,10 |
| | | 3.3 | / | | $V_{GS}=-5V, I_{SD}=25A, T_J=150^\circ\text{C}$ | |
| I_S | Continuous Diode Forward Current | / | 98 | A | $T_c=25^\circ\text{C}$ | |
| t_{rr} | Reverse Recover Time | 50 | / | ns | $V_R=800V, I_{SD}=50A$ | |
| Q_{rr} | Reverse Recovery Charge | 216 | / | nC | | |
| I_{rrm} | Peak Reverse Recovery Current | 7.2 | / | A | | |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit | Test Conditions | Note |
|-----------------|---|------|------|--------------------|-----------------|------|
| $R_{\theta JC}$ | Thermal Resistance from Junction to Case | 0.25 | / | $^\circ\text{C/W}$ | | |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient | / | 40 | | | |



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Typical Performance

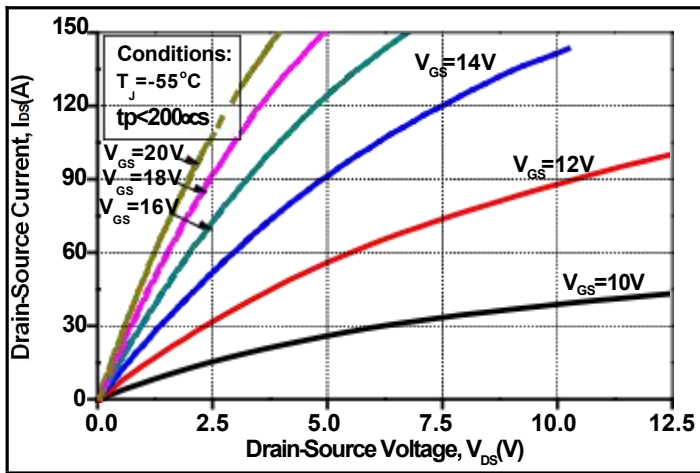


Figure 1. Output Characteristics $T_j = -55^\circ\text{C}$

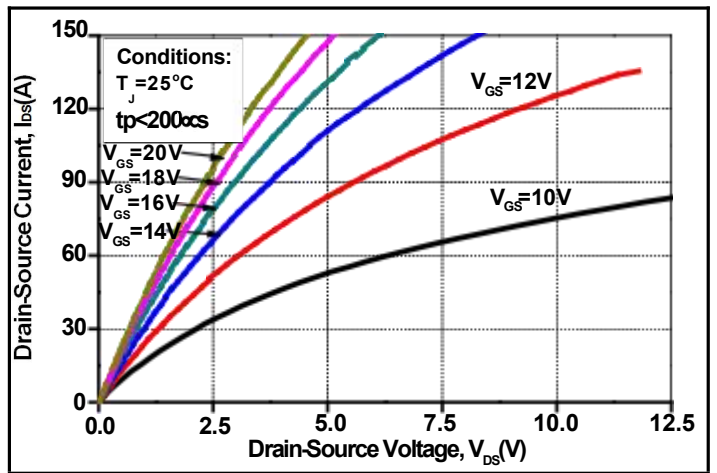


Figure 2. Output Characteristics $T_j = 25^\circ\text{C}$

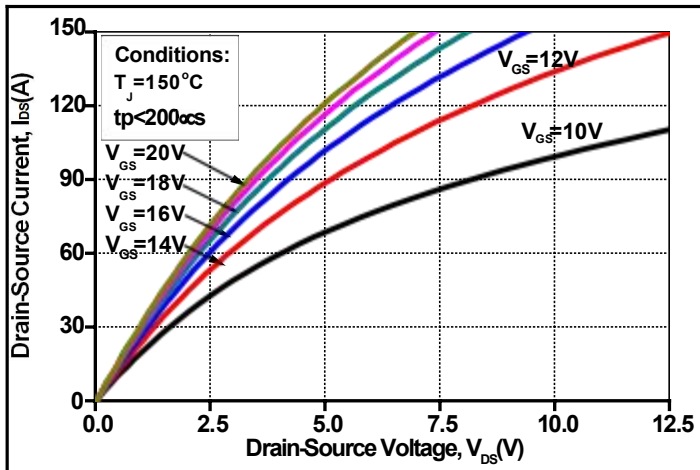


Figure 3. Output Characteristics $T_j = 150^\circ\text{C}$

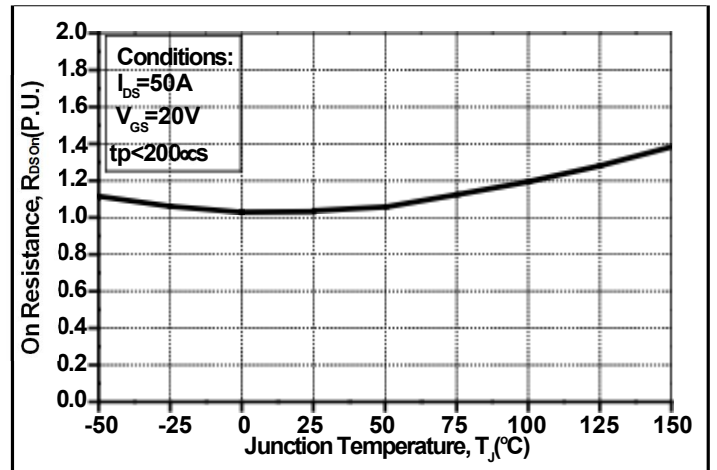


Figure 4. Normalized On-Resistance vs. Temperature

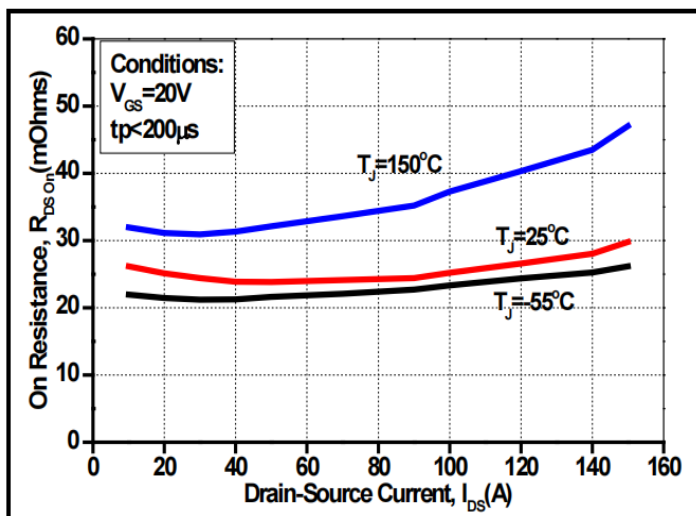


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

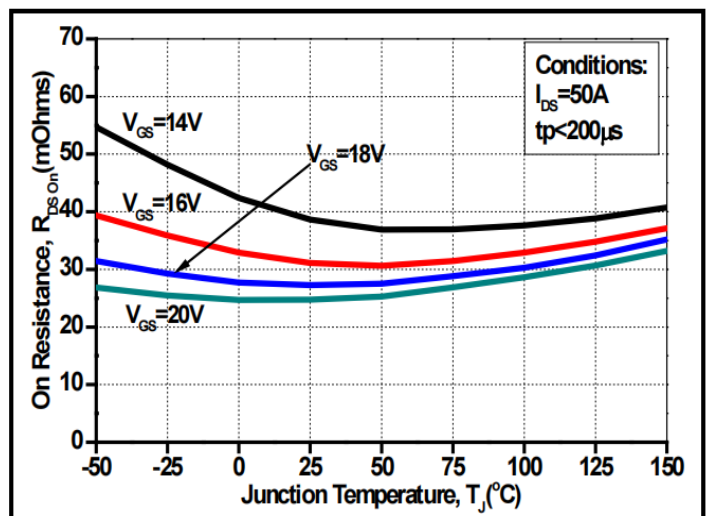


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage



Typical Performance

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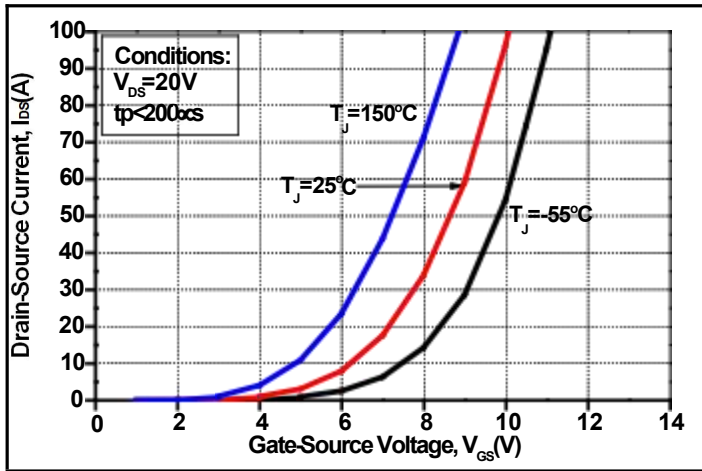


Figure 7. Transfer Characteristic for Various Junction Temperatures

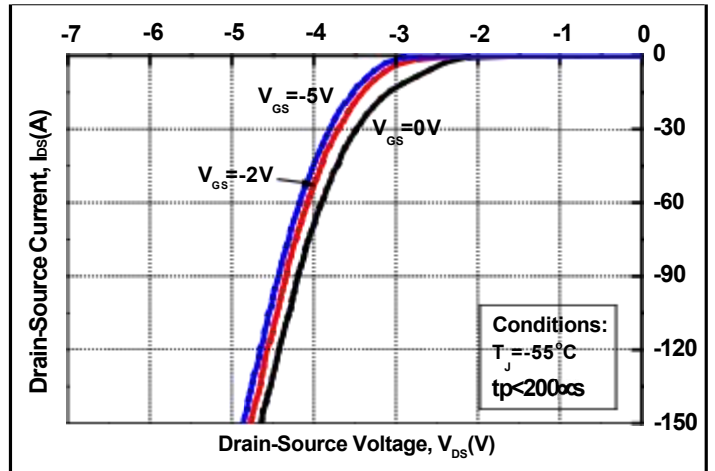


Figure 8. Body Diode Characteristic at -55°C

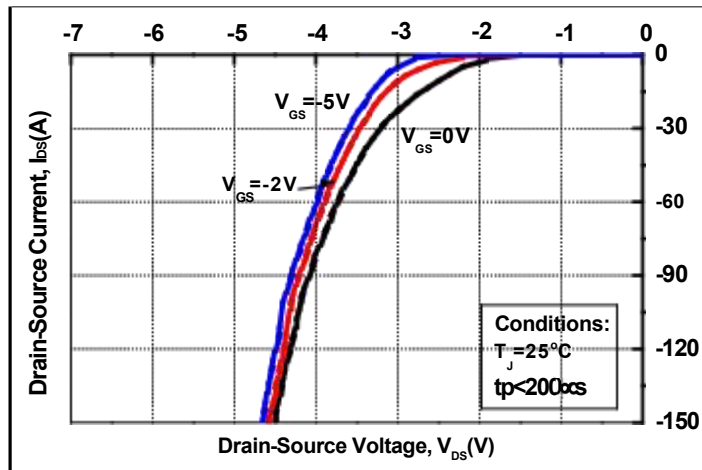


Figure 9. Body Diode Characteristic at 25°C

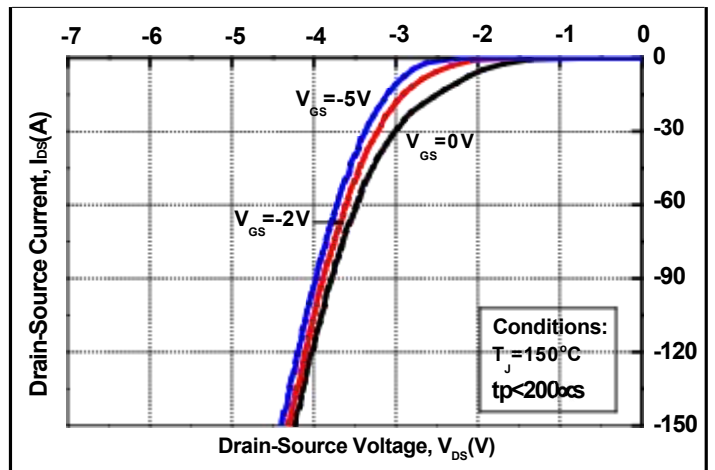


Figure 10. Body Diode Characteristic at 150°C

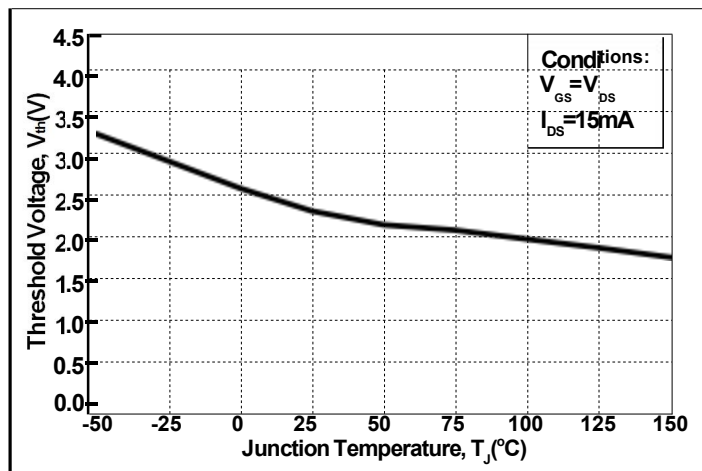


Figure 11. Threshold Voltage vs. Temperature

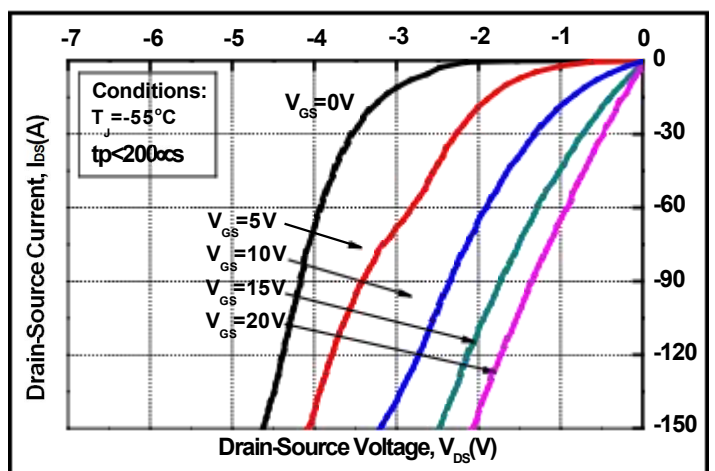


Figure 12. 3rd Quadrant Characteristic at -55°C



Typical Performance

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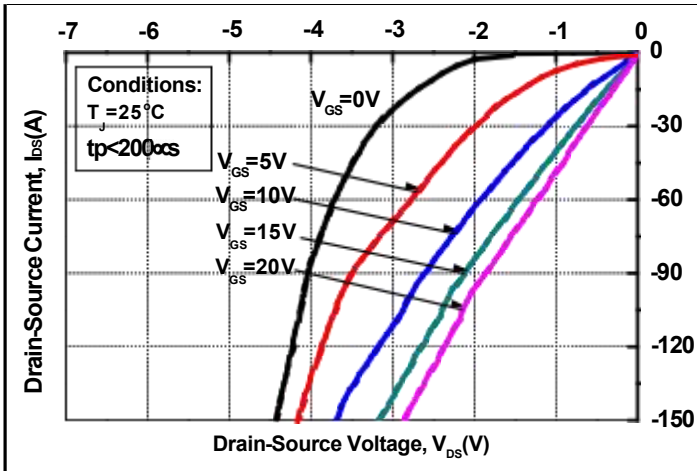


Figure 13. 3rd Quadrant Characteristic at 25°C

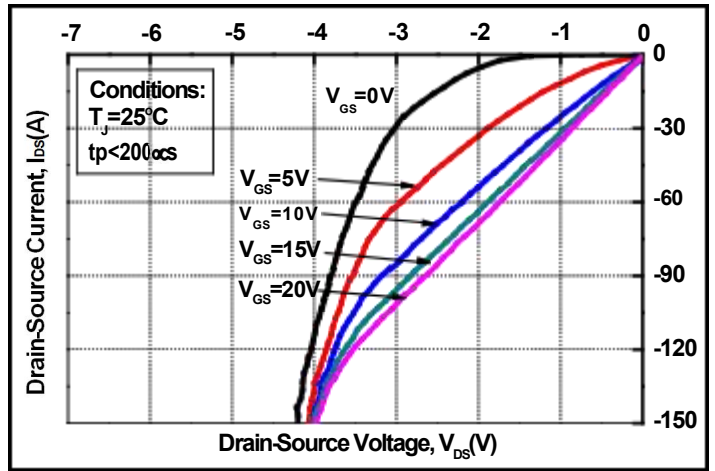


Figure 14. 3rd Quadrant Characteristic at 150°C

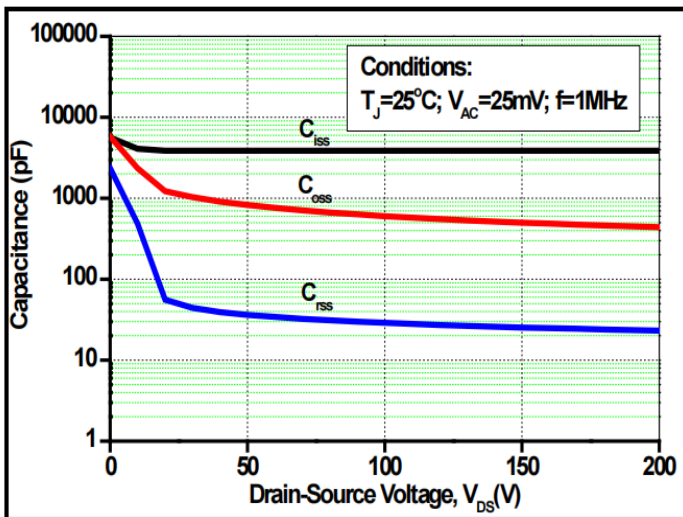


Figure 15. Capacitances vs. Drain-Source Voltage (0 - 200V)

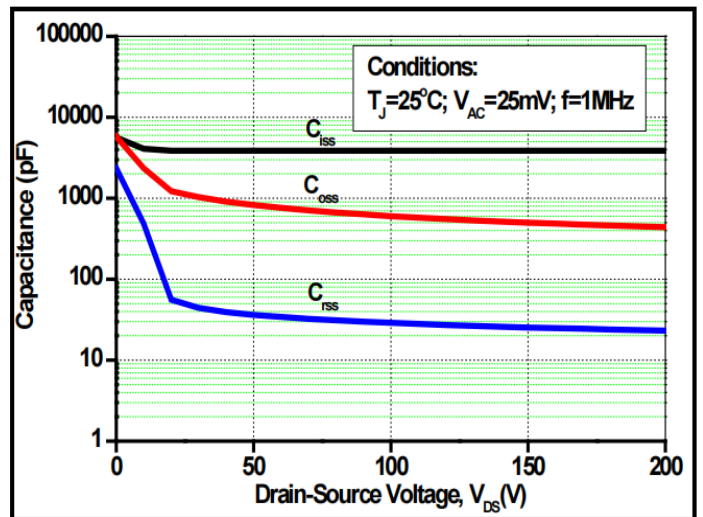


Figure 16. Capacitances vs. Drain-Source Voltage (0 - 1000V)



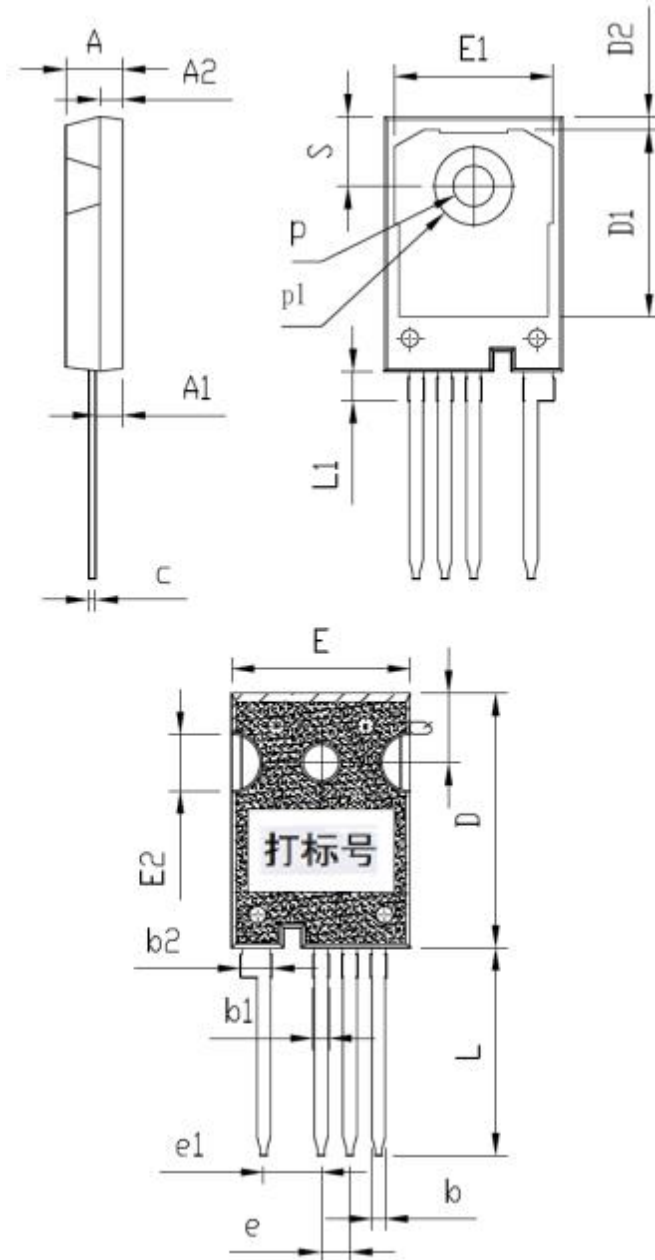
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Package Dimensions

Package TO-247-4L



| SYMBOLS | DIMENSIONS IN MILLIMETERS | | |
|---------|---------------------------|-------|-----|
| | MIN | NOM | MAX |
| A | | 5.00 | |
| A1 | | 2.40 | |
| A2 | | 2.00 | |
| b | | 1.20 | |
| b1 | | 1.30 | |
| b2 | | 2.65 | |
| c | | 0.6 | |
| D | | 22.54 | |
| D1 | | 16.50 | |
| D2 | | 1.17 | |
| e | | 2.54 | |
| e1 | | 5.08 | |
| E | | 15.80 | |
| E1 | | 14.00 | |
| E2 | | 5.00 | |
| L | | 18.38 | |
| L1 | | 2.58 | |
| p | | 3.60 | |
| p1 | | 6.80 | |
| Q | | 6.15 | |
| S | | 6.15 | |