

SC040N120Y

68 Amps, 1200 Volts N-Channel Sic Power MOSFET

Features

- 68A, 1200V, $R_{DS(ON)MAX}=53m\ \Omega$ @ $V_{GS}=18V/33.3A$
- High Blocking Voltage with low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive

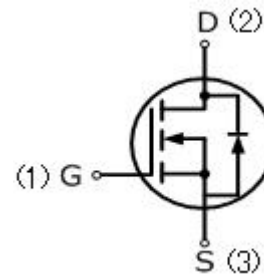
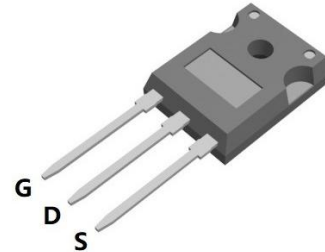
Benefits

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

Applications

- Renewable Energy
- EV Battery Chargers
- High Voltage DC/DC Converters
- Switch Mode Power Supplies

TO-247-3L



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$, unless otherwise noted)

| Parameter | Symbol | Value | UNIT | Test Conditions |
|--|----------------|-------------|------------------|---|
| Drain-Source Voltage | V_{DSmax} | 1200 | V | $V_{GS}=0V, I_{DS}=100\mu A$ |
| Gate-Source Voltage (dynamic) | V_{GSmax} | -8/+22 | | Absolute maximum values |
| Gate-Source Voltage (static) | V_{GSop} | -4/+18 | | Recommended operational values |
| Continuous Drain Current | I_D | 68 | A | $V_{GS}=18V, T_c=25^\circ\text{C}$ |
| | | 49 | | $V_{GS}=18V, T_c=100^\circ\text{C}$ |
| Pulsed Drain Current | $I_{D(pulse)}$ | 100 | A | Pulse width t_p limited by T_{Jmax} |
| Power Dissipation | P_D | 340 | W | $T_c=25^\circ\text{C}, T_J=150^\circ\text{C}$ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 to +175 | $^\circ\text{C}$ | |

Thermal Characteristics

| Parameter | Symbol | SC040N120Y | Units |
|--------------------------|------------|------------|---------------------------|
| Maximum Junction-to-Case | R_{thJC} | 0.44 | $^\circ\text{C}/\text{W}$ |

| Electrical Characteristics ($T_c=25^\circ\text{C}$, unless otherwise noted) | | | | | | |
|--|--------------|--|------|------|-----|------------|
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=100\mu A$ | 1200 | — | — | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=1200V, V_{GS}=0V$ | — | 1 | 100 | μA |
| Gate-Body Leakage Current, Forward | I_{GSSF} | $V_{GS}=22V, V_{DS}=0V$ | — | 10 | 250 | nA |
| Gate-Body Leakage Current, Reverse | I_{GSSR} | $V_{GS}=-8V, V_{DS}=0V$ | — | 10 | 250 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=9.5mA$ | 1.9 | 2.6 | 4.0 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=18V, I_D=33.3A$ | — | 40 | 53 | m Ω |
| | | $V_{GS}=18V, I_D=33.3A, T_J=175^\circ\text{C}$ | — | 65 | — | |
| Input Capacitance | C_{iss} | $V_{DS}=1000V,$ | — | 2070 | — | pF |
| Output Capacitance | C_{oss} | $V_{GS}=0V,$ | — | 112 | — | pF |
| Reverse Transfer Capacitance | C_{rss} | $f=1.0\text{MHz},$ | — | 11 | — | pF |
| Coss Stored Energy | E_{OSS} | $V_{AC}=25mV$ | — | 66 | — | μJ |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}=800V, V_{GS}=-4V/18V,$ $I_D=33A, R_g=2.5\Omega, R_L=20\Omega$ | — | 17 | — | ns |
| Turn-On Rise Time | t_r | | — | 58 | — | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | — | 26 | — | ns |
| Turn-Off Fall Time | t_f | | — | 15 | — | ns |
| Turn-On Switching Energy | E_{ON} | $V_{DS}=800V, V_{GS}=-4V/18V$ | — | 1410 | — | μJ |
| Turn-Off Switching Energy | E_{OFF} | $I_D=33A, R_g=2.5\Omega, L=100\mu H$ | — | 750 | — | μJ |
| Internal Gate Resistance | R_G | $f=1\text{MHz}, V_{AC}=25mV$ | — | 4.9 | — | Ω |
| Total Gate Charge | Q_g | $V_{DS}=800V, I_D=33A,$ $V_{GS}=-4V/18V$ | — | 121 | — | nC |
| Gate-Source Charge | Q_{GS} | | — | 34 | — | |
| Gate-Drain Charge | Q_{gd} | | — | 20 | — | |
| Reverse Diode Characteristics | | | | | | |
| Diode Forward Voltage | V_{SD} | $V_{GS}=-4V, I_{SD}=20A$ | — | 4.5 | — | V |
| | | $V_{GS}=-4V, I_{SD}=20A, T_J=175^\circ\text{C}$ | — | 4.2 | — | |
| Continuous Diode Forward Current | I_S | $T_C=25^\circ\text{C}$ | — | — | 51 | A |
| Reverse Recover Time | t_{rr} | $V_R=800V, I_{SD}=33A$ | — | 38 | — | ns |
| Reverse Recovery Charge | Q_{rr} | | — | 109 | — | nc |
| Peak Reverse Recovery Current | I_{rrm} | | — | 5 | — | A |

RATING AND CHARACTERISTIC CURVES

Figure.1 Output Characteristics $T_j=25^\circ\text{C}$

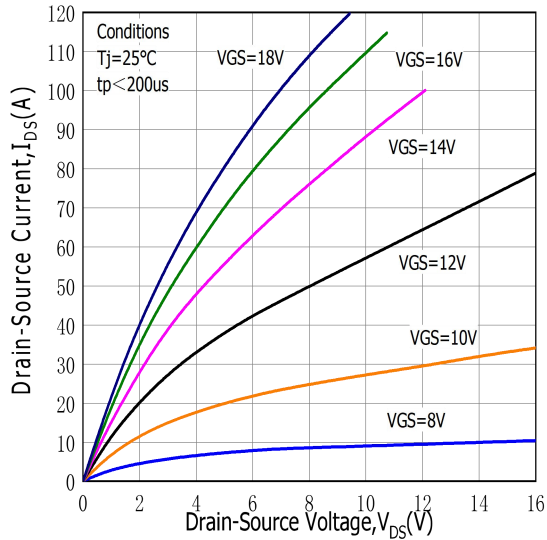


Figure.2 Output Characteristics $T_j=175^\circ\text{C}$

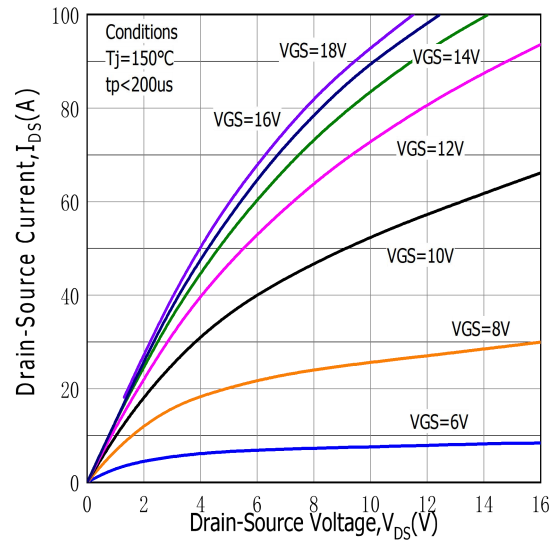


Figure.3 On-Resistance vs. Temperature

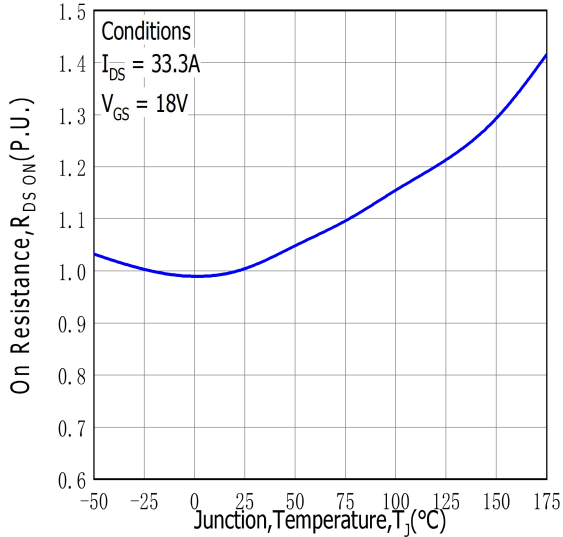


Figure.4 On-Resistance vs. Drain Current for Various Temperatures

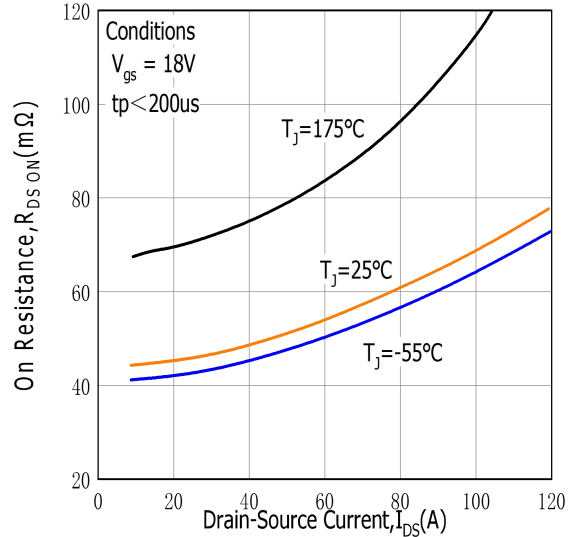


Figure.5 On-Resistance vs. Temperature for Various Gate Voltage

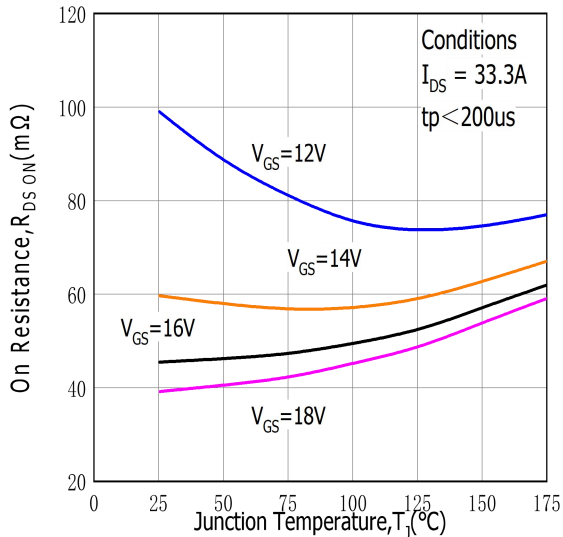


Figure.6 Transfer Characteristic for Various Junction Temperatures

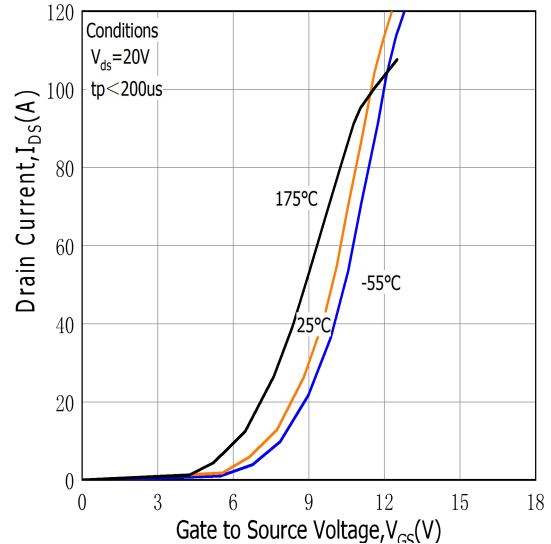


Figure.7 Body Diode Characteristic at 25°C

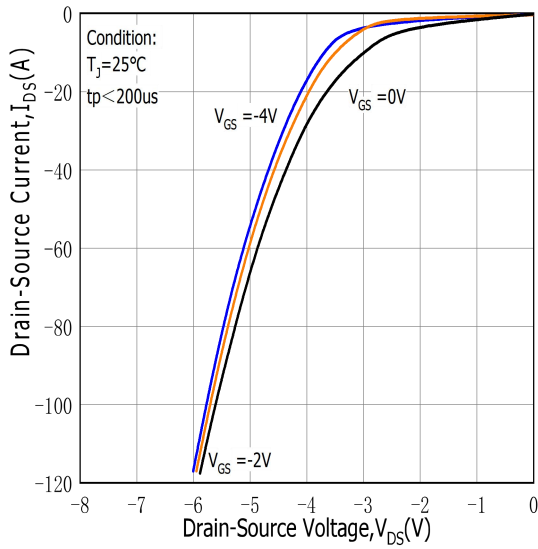


Figure.8 Body Diode Characteristic at 175°C

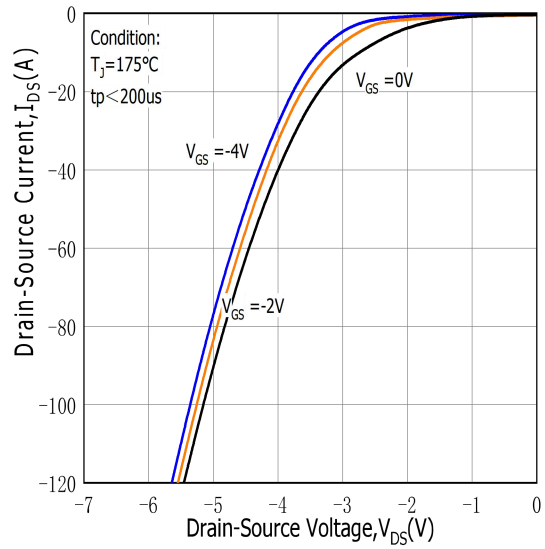


Figure.9 Threshold Voltage vs. Temperature

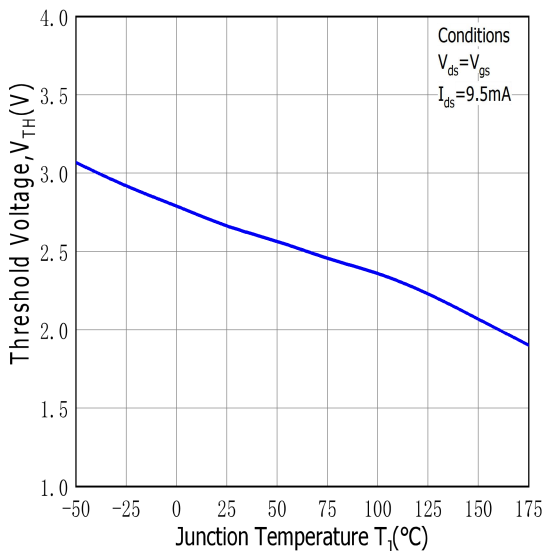


Figure.10 Gate Charge Characteristics

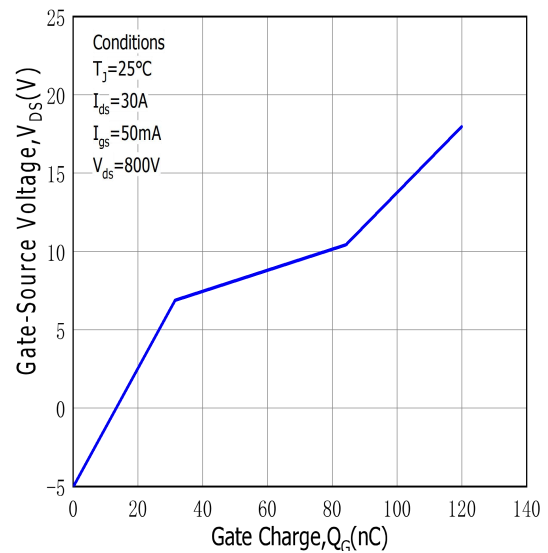


Figure.11 3rd Quadrant Characteristic at 25°C

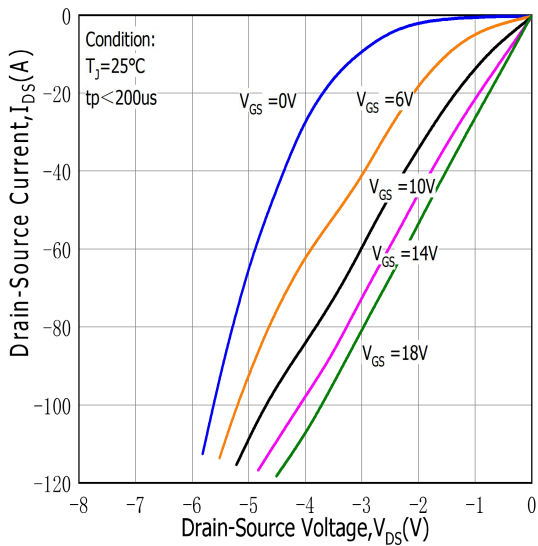


Figure.12 3rd Quadrant Characteristic at 175°C

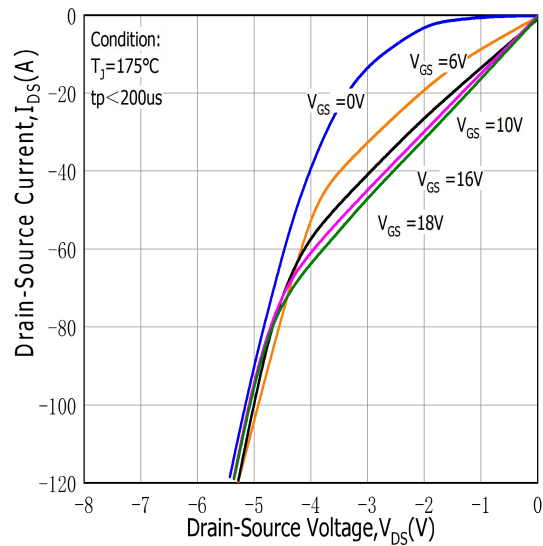


Figure.13 Capacitances vs. Drain-Source Voltage(0-200V)

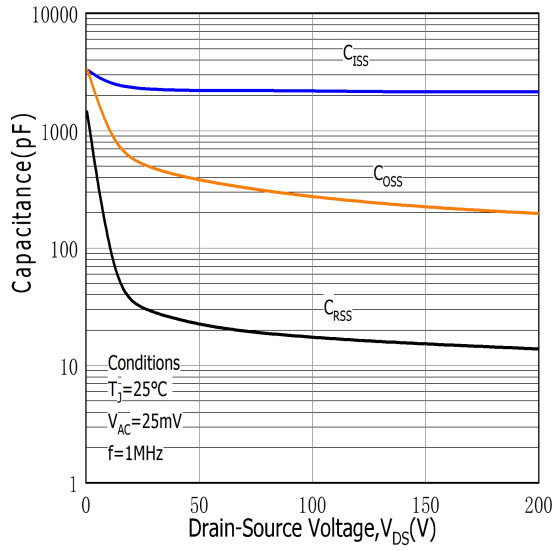
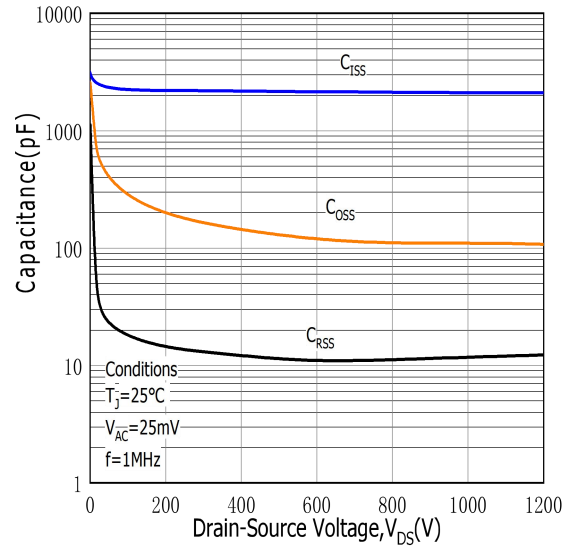
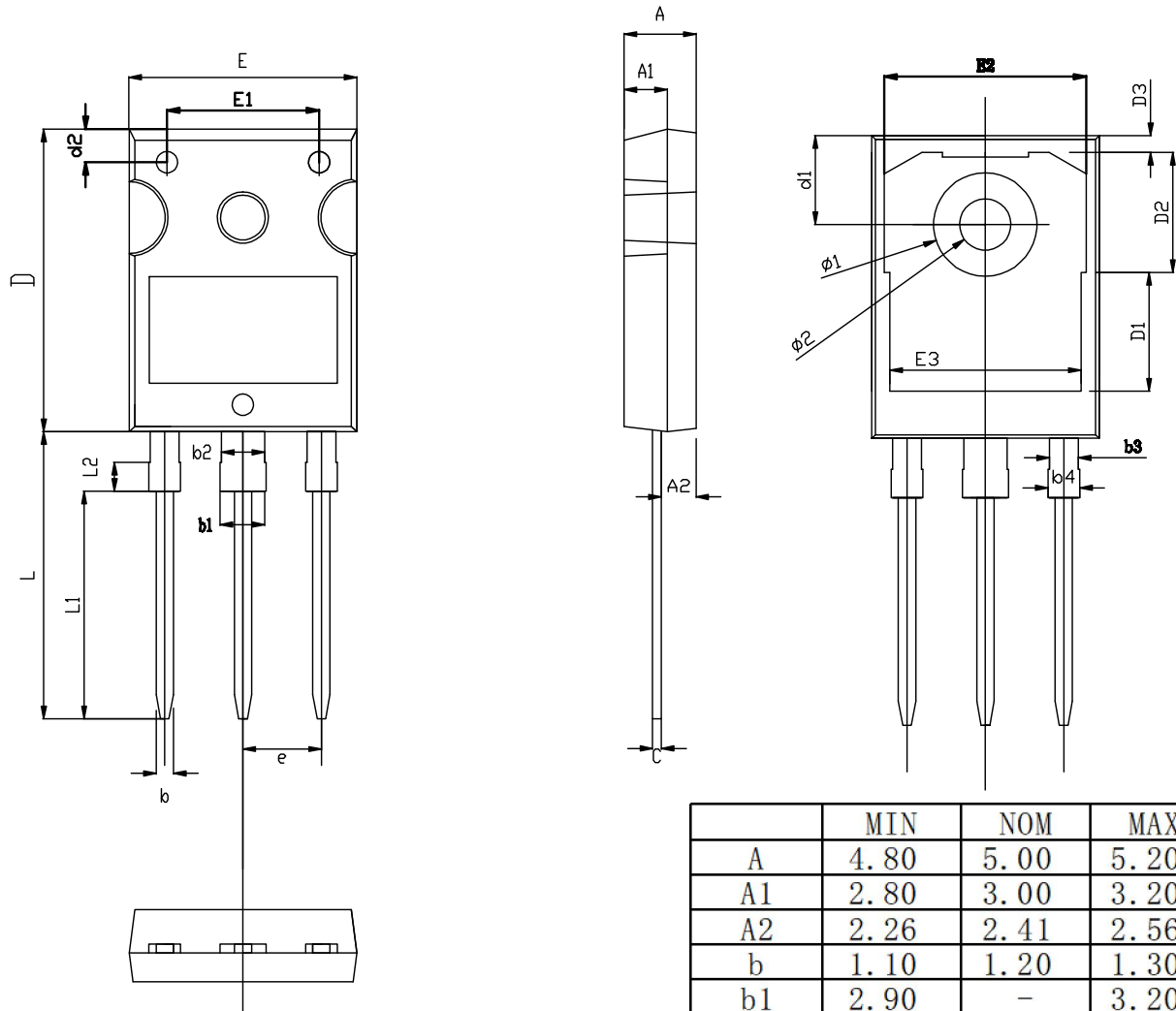


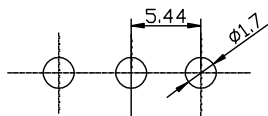
Figure.14 Capacitances vs. Drain-Source Voltage(0-1200V)



TO-247-3L PACKAGE OUTLINE



RECOMMENDED LAND PATTERN



UNIT: mm

| | MIN | NOM | MAX |
|----------|-------|-------|-------|
| A | 4.80 | 5.00 | 5.20 |
| A1 | 2.80 | 3.00 | 3.20 |
| A2 | 2.26 | 2.41 | 2.56 |
| b | 1.10 | 1.20 | 1.30 |
| b1 | 2.90 | - | 3.20 |
| b2 | 2.90 | 3.00 | 3.10 |
| b3 | 1.90 | 2.00 | 2.10 |
| b4 | 2.00 | - | 2.20 |
| c | 0.50 | 0.60 | 0.70 |
| D | 20.80 | 21.00 | 21.20 |
| D1 | | 8.23 | |
| D2 | | 8.32 | |
| D3 | | 1.17 | |
| d1 | 6.00 | 6.15 | 6.30 |
| d2 | 2.20 | 2.30 | 2.40 |
| E | 15.60 | 15.80 | 16.00 |
| E1 | | 10.50 | |
| E2 | | 14.02 | |
| E3 | | 13.50 | |
| e | 5.34 | 5.44 | 5.54 |
| L | 19.72 | 19.92 | 20.12 |
| L1 | | 15.79 | |
| L2 | | 1.98 | |
| $\phi 1$ | 7.10 | 7.19 | 7.30 |
| $\phi 2$ | 3.50 | 3.60 | 3.70 |