

SiC Mosfet

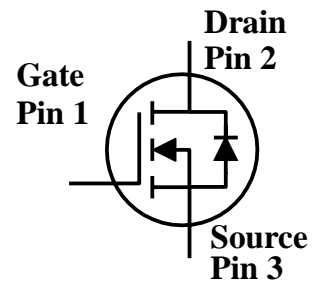
Features:

- High Voltage, Low On-State Resistance
- High Speed, Low Parasitic Capacitance
- High Operating Junction Temperature
- Fast Recovery Body Diode

Applications:

- Photovoltaic Inverter
- UPS Power Supply
- Motor Drive
- High-Voltage DC/DC Converters
- Switching Power Supply

Package:



| | |
|--------------|----------|
| Product Code | Package |
| SL42N120A | TO-247-3 |

Maximum Ratings (T_c=25°C, unless otherwise specified)

| Symbol | Parameter description | Typical value | Unit | Testing conditions | Note |
|------------------|--------------------------------------|---------------|------|---|-----------|
| V _{DS} | Drain-Source Voltage | 1200 | V | V _{GS} =0V, I _D =100μA | |
| V _{GS} | Gate-Source Voltage | -5 to 20 | V | The device is recommended working within the voltage range listed above. | |
| I _D | Maximum Drain-Source Current | 42 | A | V _{GS} =20V, T _c =25°C | Figure 21 |
| | | 31 | A | V _{GS} =20V, T _c =100°C | |
| I _{DM} | Maximum Pulse Drain-Source Current | 70 | A | It depends on the safe operating area (SOA) of the device. | Figure 24 |
| P _{TOT} | Maximum Power Dissipation | 300 | W | T _c =25°C | Figure 22 |
| T _{stg} | Storage Temperature Range | -55 to 175 | °C | | |
| T _j | Operating Junction Temperature Range | -55 to 175 | °C | | |
| T _L | Soldering Temperature | 260 | °C | Wave Soldering is done on the lead, 1.6mm away from the package housing, and it lasts for no more than 10 seconds | |

Thermal-Resistance Property

| Symbol | Parameter description | Typical value | Unit | Note |
|---------------------|-------------------------------------|---------------|------|-----------|
| R _{θ(j-c)} | junction-to-case thermal resistance | 0.5 | °C/W | Figure 23 |

Electrical Property (TC = 25°C, unless otherwise specified)

| Symbol | Parameter description | Code Value | | | Unit | Testing conditions | Note |
|---------------------|-----------------------------------|------------|---------|------|------|--|----------------------|
| | | MIN | Typical | MAX | | | |
| I _{DSS} | Drain Leakage At Shutdown | | 5 | 100 | μA | V _{DS} =1200V, V _{GS} =0V | |
| I _{GSS} | Gate Induced Drain Leakage | | | ±100 | nA | V _{DS} =0V, V _{GS} =-5~20V | |
| V _{TH} | Threshold Voltage | | 3.6 | | V | V _{GS} =V _{DS} , I _D =3.8mA | Figure 8, 9 |
| | | | 2.7 | | | V _{GS} =V _{DS} , I _D =3.8mA @ T _C =175°C | |
| R _{ON} | On-State Resistance | | 80 | 100 | mΩ | V _{GS} =20V, I _D =10A @ T _J =25°C | Figure 4, 5, 6, 7 |
| | | | 130 | | mΩ | V _{GS} =20V, I _D =10A @ T _J =175°C | |
| C _{iss} | Input Capacitance | | 1680 | | pF | V _{DS} =800V, V _{GS} =0V, f=1MHz, V _{AC} =25mV | Figure 16 |
| C _{oss} | Output Capacitance | | 69 | | pF | | |
| C _{rss} | Reverse Transfer Capacitance | | 6.7 | | pF | | Figure 17 |
| E _{oss} | Output Capacitance Storage Energy | | 27 | | μJ | | |
| E _{AS} | single pulse avalanche energy | | 0.75 | | J | I _D =20A, V _{DD} =50V, L=2mH | |
| Q _g | Total Gate Charge | | 76 | | nC | V _{DS} =800V, I _D =20A, V _{GS} =-5 to 20V | Figure 18 |
| Q _{gs} | Gate-Source Charge | | 29 | | nC | | |
| Q _{gd} | Gate-Drain Charge | | 34 | | nC | | |
| R _g | Gate Input Resistance | | 4.2 | | Ω | f=1MHz | |
| E _{ON} | Turn-on Energy | | 337 | | μJ | V _{DS} =800V, I _D =20A, V _{GS} =-3.5 to 20V, R _{G(ext)} =2.0Ω, L=290μH | Figure 19, 20 |
| E _{OFF} | Turn-off Energy | | 44 | | μJ | | |
| t _{d(on)} | Turn-on Delay Time | | 22 | | ns | | |
| t _r | Rise Time | | 17 | | | | |
| t _{d(off)} | Turn-off Delay Time | | 17 | | | | |
| t _f | Fall Time | | 12 | | | | |

Electrical Property (T_c=25°C, unless otherwise specified)

| Symbol | Parameter description | Code Value | | | Unit | Testing conditions | Note |
|------------------|---------------------------------|------------|---------|-----|------|---|-------------------|
| | | MIN | Typical | MAX | | | |
| V _{SD} | Forward Voltage | | 4.7 | | V | I _{SD} =10A, V _{GS} =0V | Figure 10, 11, 12 |
| | | | 4.2 | | V | I _{SD} =10A, V _{GS} =0V, T _J =175°C | |
| t _{rr} | Reverse Recovery Time | | 40 | | ns | V _{GS} =0V, I _{SD} =20A, V _R =800V, di/dt=1100A/us, R _{G(ext)} =11.0Ω | |
| Q _{rr} | Reverse Recovery Charge | | 57 | | nC | | |
| I _{RRM} | Peak Repetitive Reverse Current | | 4.7 | | A | | |

Typical Characteristic Curves:

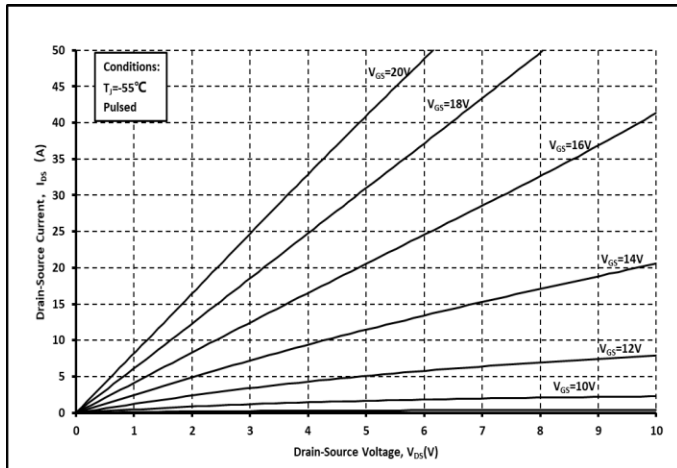


Figure. 1 Output @ $T_j = -55^\circ\text{C}$

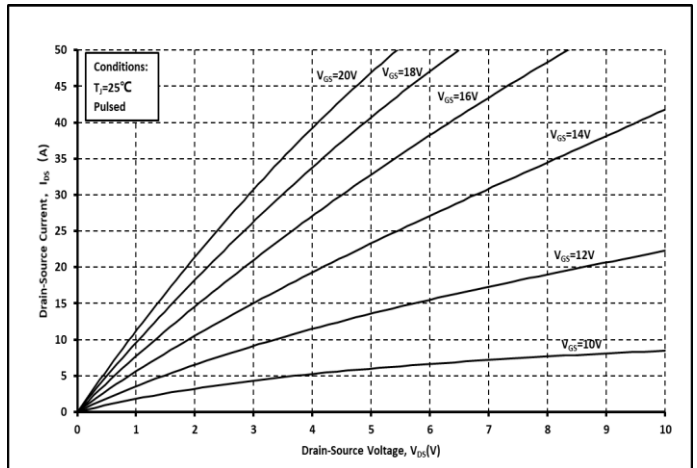


Figure. 2 Output @ $T_j = 25^\circ\text{C}$

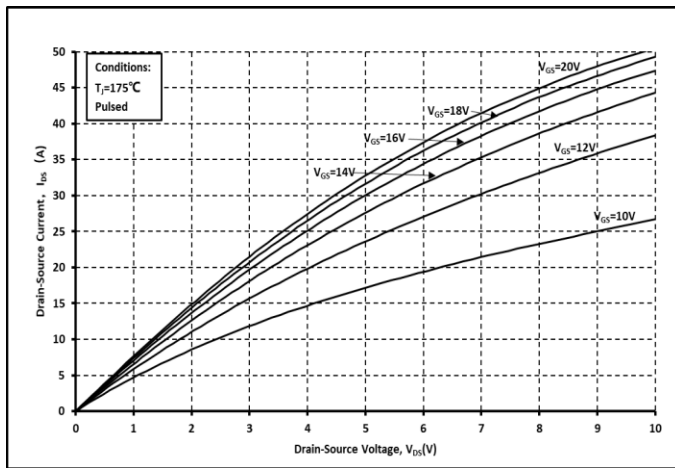


Figure. 3 Output @ $T_j = 175^\circ\text{C}$

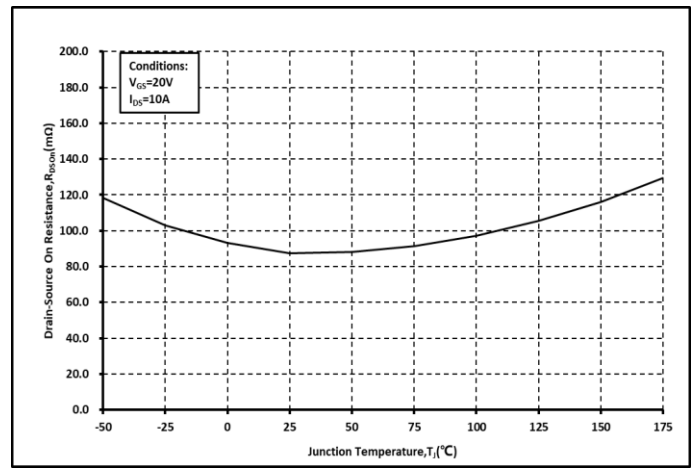


Figure. 4 Ron VS Temperature

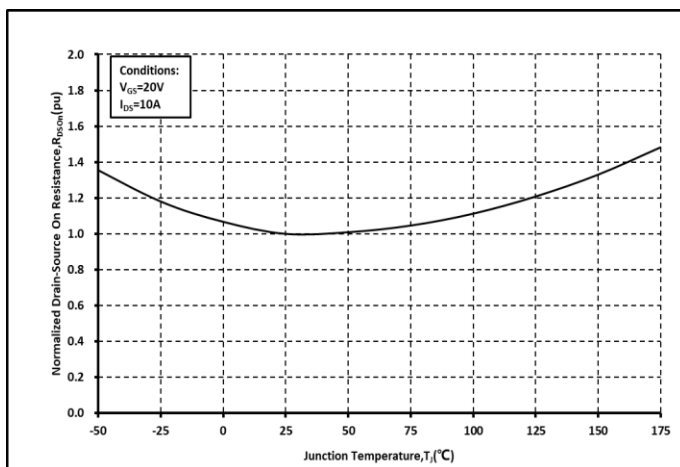


Figure. 5 Normalized Ron VS Temperature

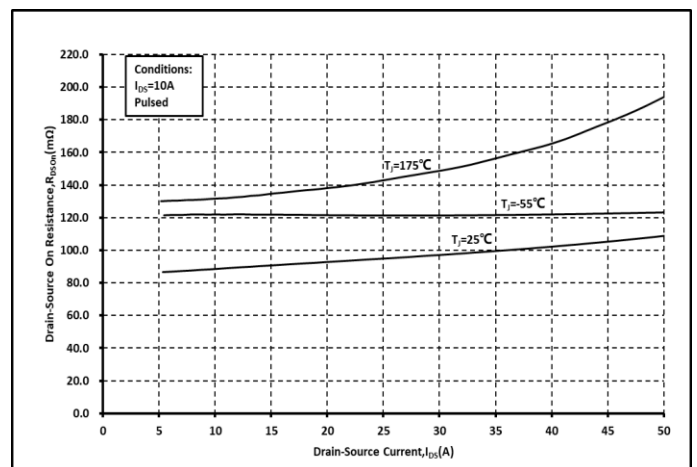


Figure. 6 Ron VS I_{DS} at Different Temperatures

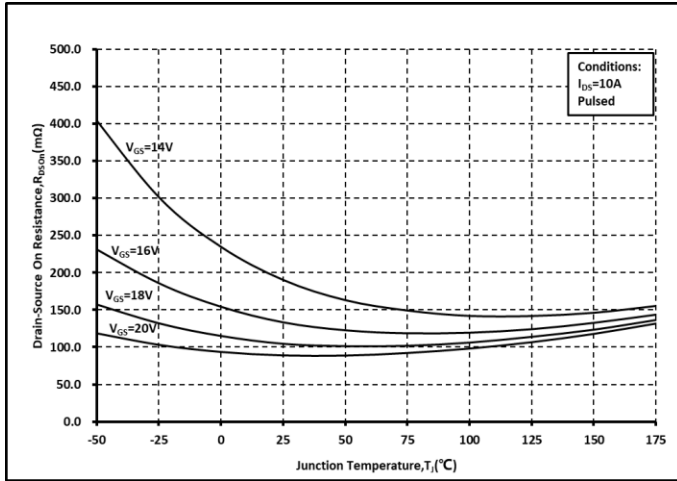


Figure. 7 Ron VS Temperature at Different VGS

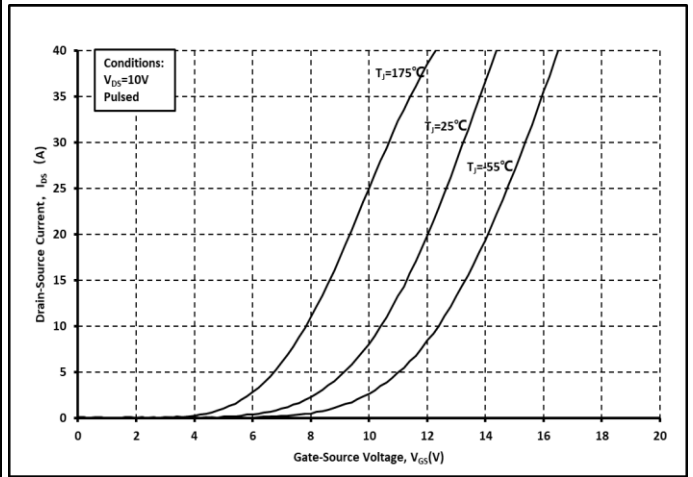


Figure. 8 Transfer Property at Different Temperatures

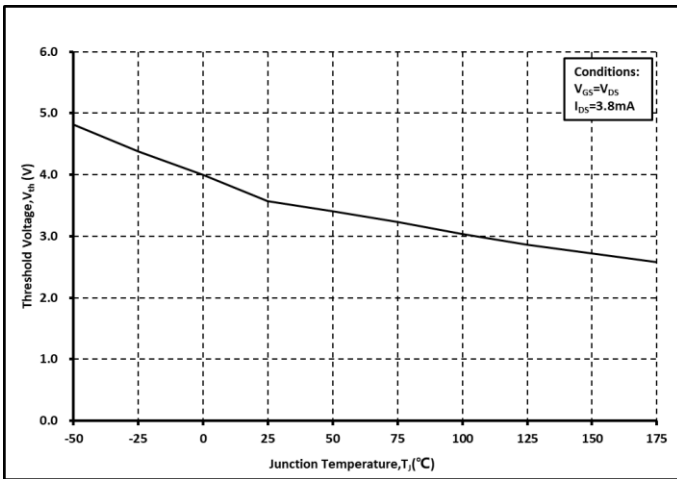


Figure. 9 Threshold Voltage Change With Temperature

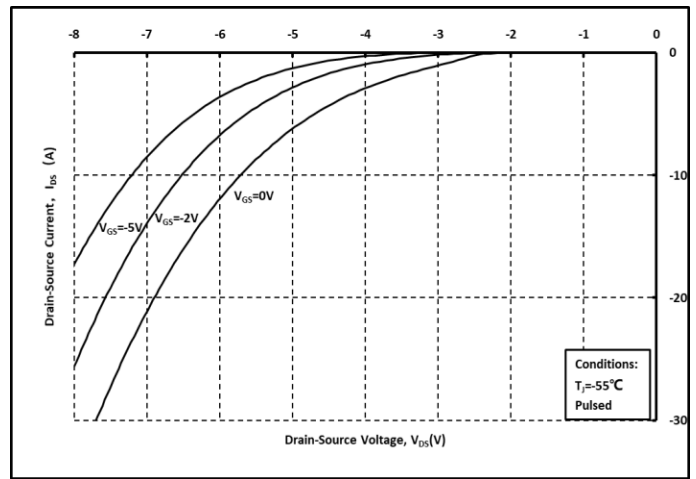


Figure. 10 Body Diode On-State @ TJ = -55°C

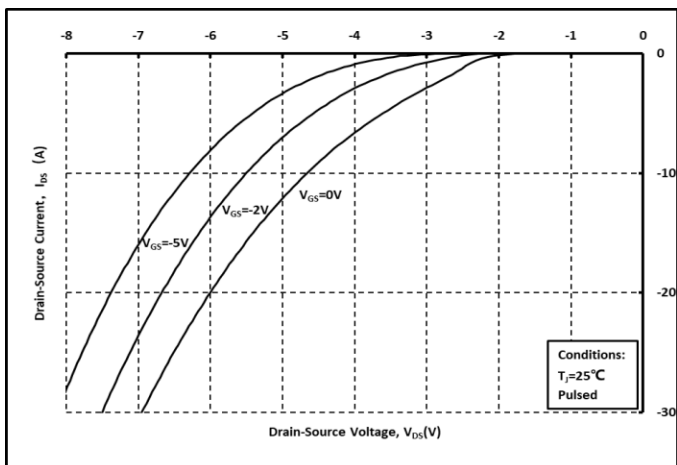


Figure. 11 Body Diode On-State @ TJ=25°C

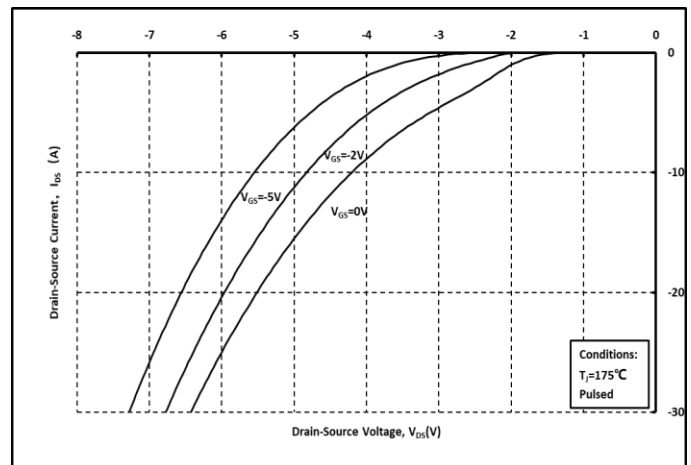


Figure. 12 Body Diode On-State @ TJ=175°C

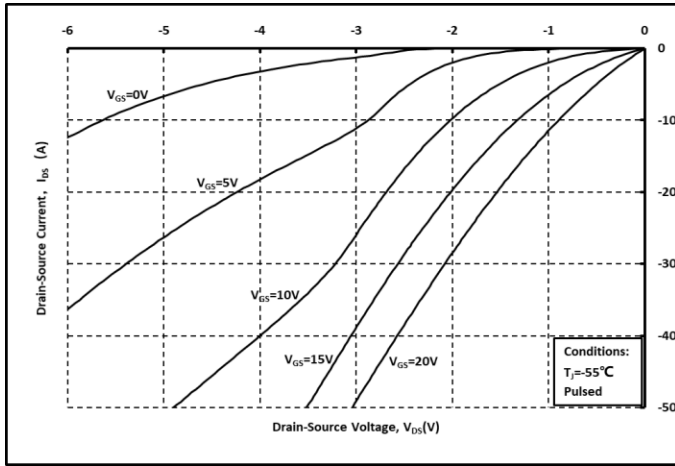


Figure. 13 Quadrant III @ $T_J = -55^\circ\text{C}$

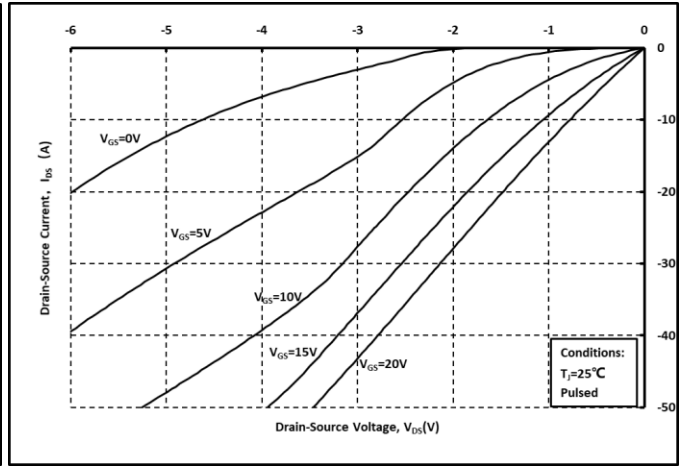


Figure. 14 Quadrant III @ $T_J = 25^\circ\text{C}$

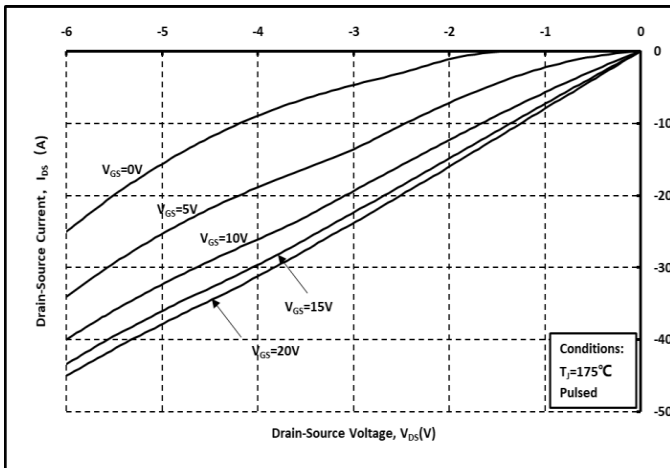


Figure. 15 Quadrant III @ $T_J = 175^\circ\text{C}$

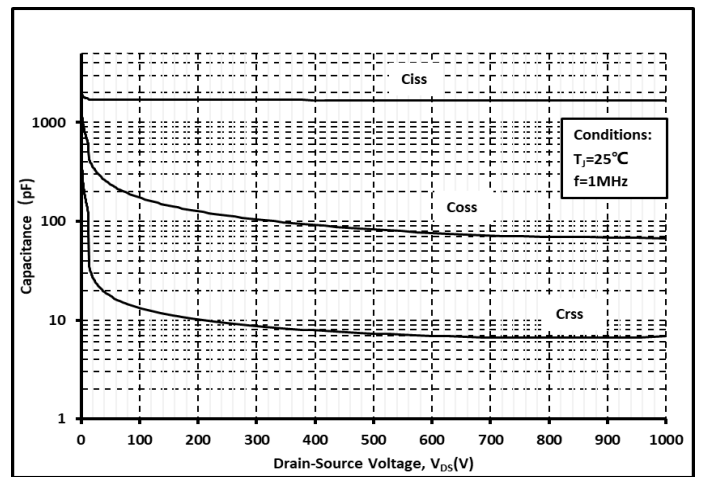
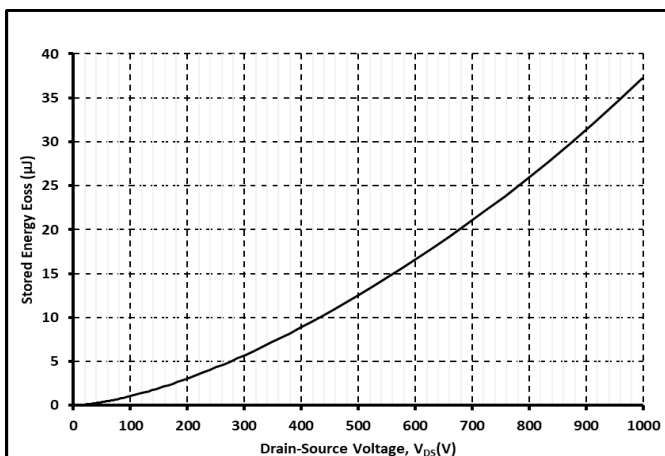


Figure. 16 Capacitances VS V_{DS}



Output capacitor stored energy curve

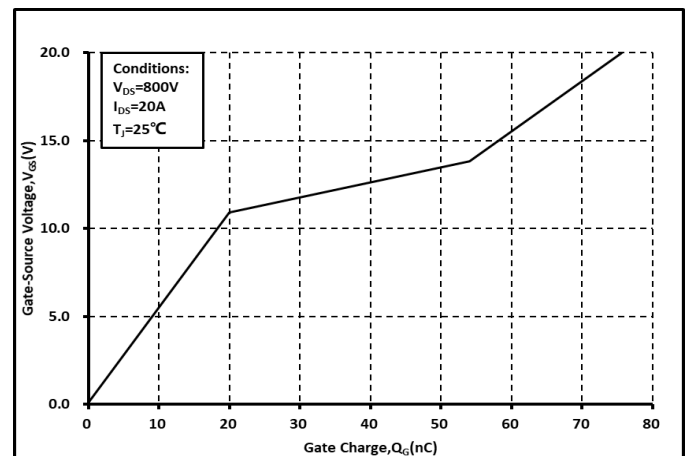


Figure. 1 Gate charge characteristic curve

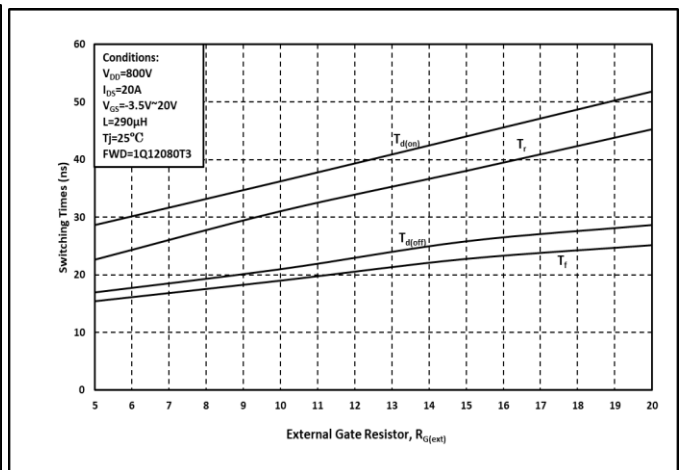
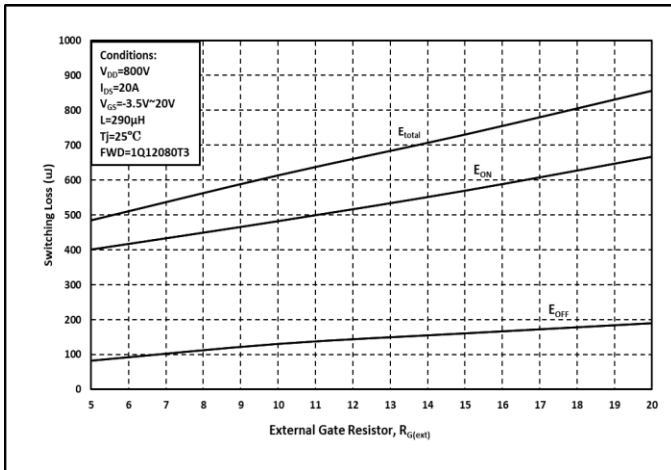


Figure. 19 Switching Energy VS Gate Resistance $R_{G(\text{est})}$ Figure. 20 Switching Time VS Gate Resistance $R_{G(\text{est})}$

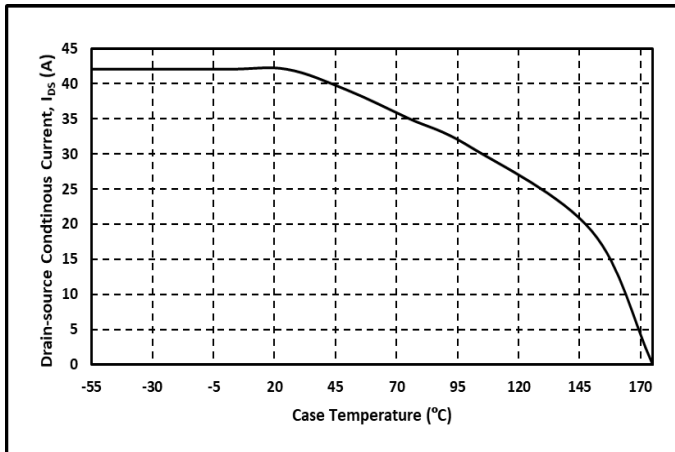


Figure. 21 Drain Current VS Temperature

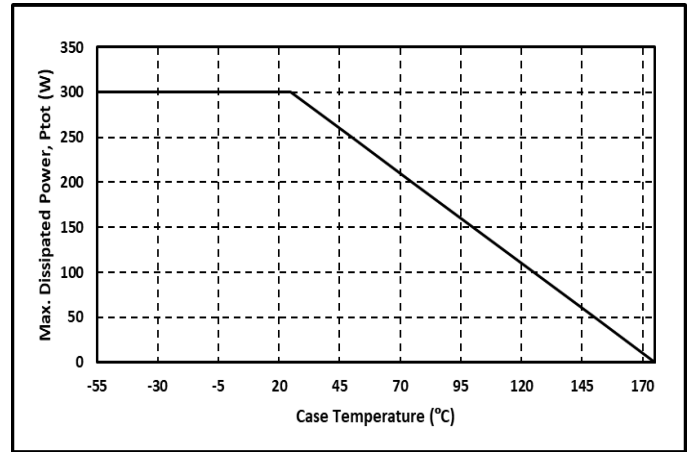


Figure. 22 Maximum Power Derating VS Temperature

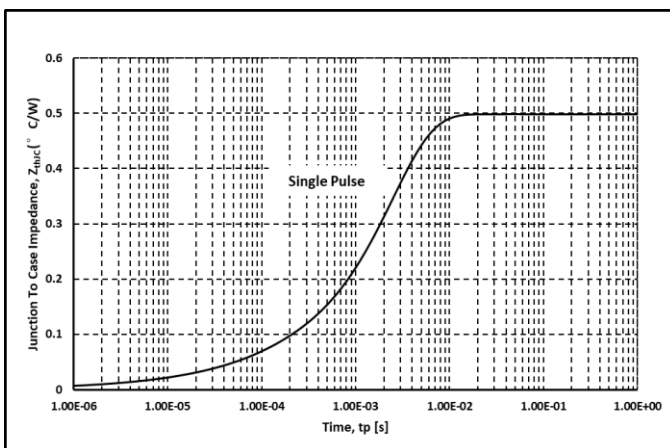


Figure. 23 Thermal Resistance

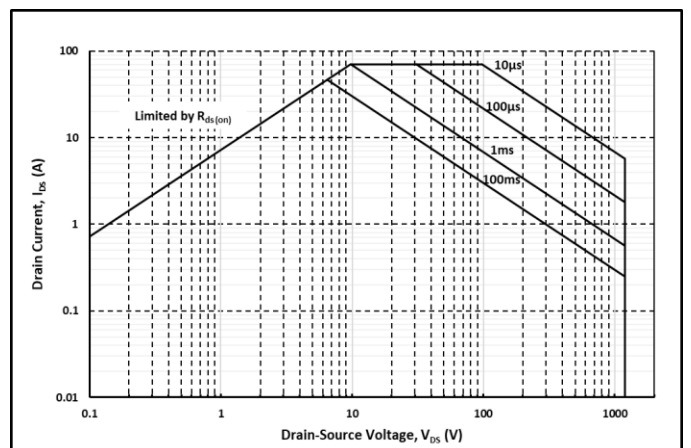
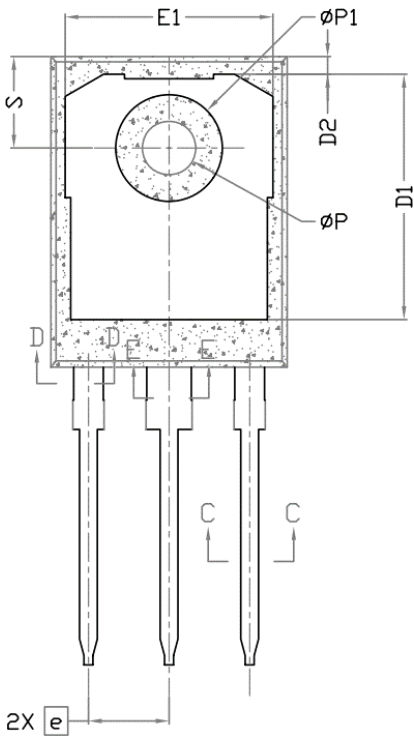
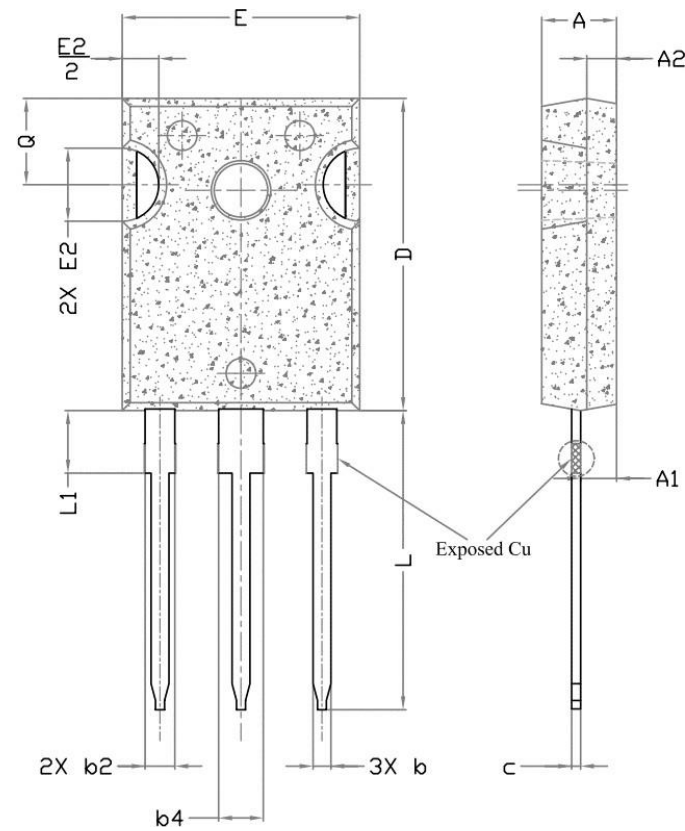
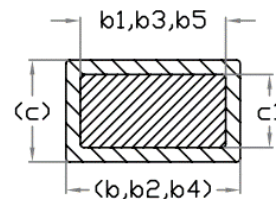


Figure. 24 The Safe Operating Area

Package Specification



| SYMBOL | DIMENSIONS | | | NOTES |
|--------|------------|-------|-------|-------|
| | MIN. | NOM. | MAX. | |
| A | 4.83 | 5.02 | 5.21 | |
| A1 | 2.29 | 2.41 | 2.55 | |
| A2 | 1.50 | 2.00 | 2.49 | |
| b | 1.12 | 1.20 | 1.33 | |
| b1 | 1.12 | 1.20 | 1.28 | |
| b2 | 1.91 | 2.00 | 2.39 | 6 |
| b3 | 1.91 | 2.00 | 2.34 | |
| b4 | 2.87 | 3.00 | 3.22 | 6, 8 |
| b5 | 2.87 | 3.00 | 3.18 | |
| c | 0.55 | 0.60 | 0.69 | 6 |
| c1 | 0.55 | 0.60 | 0.65 | |
| D | 20.80 | 20.95 | 21.10 | 4 |
| D1 | 16.25 | 16.55 | 17.65 | 5 |
| D2 | 0.51 | 1.19 | 1.35 | |
| E | 15.75 | 15.94 | 16.13 | 4 |
| E1 | 13.46 | 14.02 | 14.16 | 5 |
| E2 | 4.32 | 4.91 | 5.49 | 3 |
| e | 5.44BSC | | | |
| L | 19.81 | 20.07 | 20.32 | |
| L1 | 4.10 | 4.19 | 4.40 | 6 |
| ØP | 3.56 | 3.61 | 3.65 | 7 |
| ØP1 | 7.19REF. | | | |
| Q | 5.39 | 5.79 | 6.20 | |
| S | 6.04 | 6.17 | 6.30 | |



Section C--C, D--D, E--E

Description:

1. Standard Reference: JEDEC TO247, Variation AD
2. Unit: Mm
3. There shall be slots in it, and the shape can be round.
4. Mould overflowing is excluded from D and E.