

General Description

The WSK40200 use advanced SGT MOSFET technology to provide low $R_{DS(ON)}$, low gate charge, fast switching, and excellent avalanche characteristics.

This device is specially designed to get better ruggedness and suitable to use in Synchronous-rectification applications.

Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery
- Invertors
- Synchronous-rectification applications

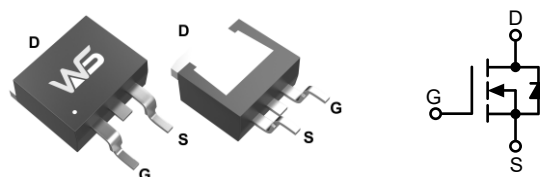
Product Summary

| BV_{DSS} | $R_{DS(ON)}$ | I_D |
|------------|---------------|-------|
| 40V | 1.5m Ω | 200A |

Applications

- Consumer electronic power supply
- Motor control
- Synchronous rectification
- Isolated DC
- Synchronous-rectification applications

TO-263-2L Pin Configuration



Absolute Maximum Ratings ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|--------------------|
| V_{DS} | Drain-Source Voltage | 40 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | |
| I_D | Continuous Drain Current ¹ | 200 | A |
| I_{DP} | Pulsed Drain Current ² | 390 | |
| E_{AS} | Single Pulse Avalanche Energy ⁴ | 300 | mJ |
| P_D | Power Dissipation ³ | 140 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^{\circ}\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | |

Thermal Data

| Symbol | Parameter | Rating | Units |
|-----------------|--|--------|----------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ⁵ | 62 | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case | 0.89 | |

Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|--------------|-----------------------------------|--|------|------|-----------|------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V$, $I_D=250\mu A$ | 40 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10V$, $I_D=55A$ | --- | 1.5 | 2.0 | m Ω |
| | | $V_{GS}=4.5V$, $I_D=55A$ | --- | 2.5 | 3.0 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}$, $I_D=250\mu A$ | 1.3 | 1.7 | 2.5 | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=40V$, $V_{GS}=0V$ | --- | --- | 1.0 | μA |
| I_{GSS} | Gate-Body Leakage Current | $V_{GS}=\pm 20V$, $V_{DS}=0V$ | --- | --- | ± 100 | nA |
| Q_g | Total Gate Charge | $V_{DS}=20V$, $V_{GS}=10V$, $I_D=20A$ | --- | 96.8 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 14.5 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 18.4 | --- | |
| $T_{d(on)}$ | Turn-on Delay Time | $V_{DS}=20V$, $V_{GS}=10V$, $R_G=2\Omega$, $I_D=20A$ | --- | 26.6 | --- | ns |
| T_r | Rise Time | | --- | 9.3 | --- | |
| $T_{d(off)}$ | Turn-off Delay Time | | --- | 96 | --- | |
| T_f | Fall Time | | --- | 39.3 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=20V$, $V_{GS}=0V$, $f=100\text{KHz}$ | --- | 6587 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 2537 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 178 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|----------|---------------------------|--------------------------------|------|-------|------|-------|
| I_S | Continuous Source Current | $V_G=V_D=0V$, Force Current | --- | --- | 130 | A |
| I_{SP} | Pulsed Source Current | | --- | --- | 390 | |
| V_{SD} | Diode Forward Voltage | $V_{GS}=0V$, $I_S=20A$ | --- | --- | 1.3 | V |
| t_{rr} | Reverse Recovery Time | $I_S=20A$, $di/dt=100A/\mu s$ | --- | 205 | --- | ns |
| Q_{rr} | Reverse Recovery Charge | | --- | 557.4 | --- | nC |

Note:

1. Calculated continuous current based on maximum allowable junction temperature.
2. Repetitive rating: pulse width limited by max. junction temperature.
3. P_D is based on max. junction temperature, using junction-case thermal resistance.
4. $V_{DD}=30V$, $R_G=6\Omega$, $L=0.3mH$, starting $T_J=25^{\circ}\text{C}$.
5. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$.

Typical Characteristics

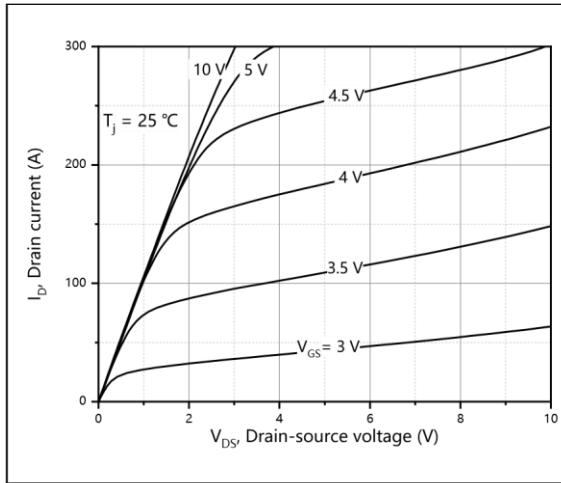


Figure 1, Typ. output characteristics

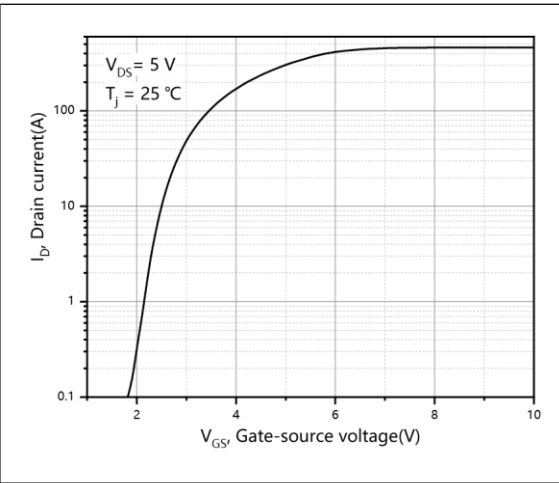


Figure 2, Typ. transfer characteristics

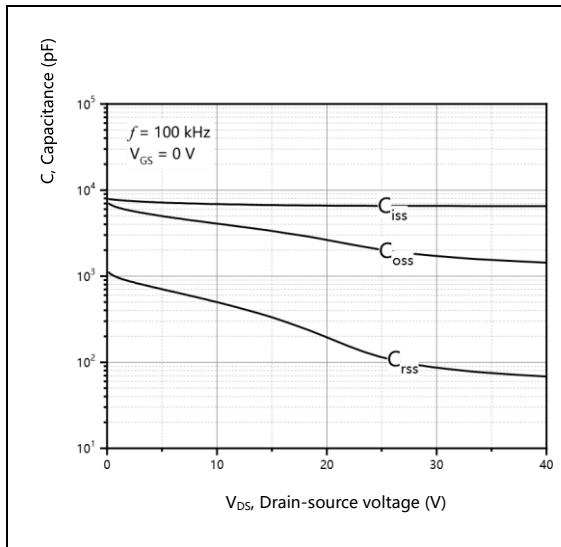


Figure 3, Typ. capacitances

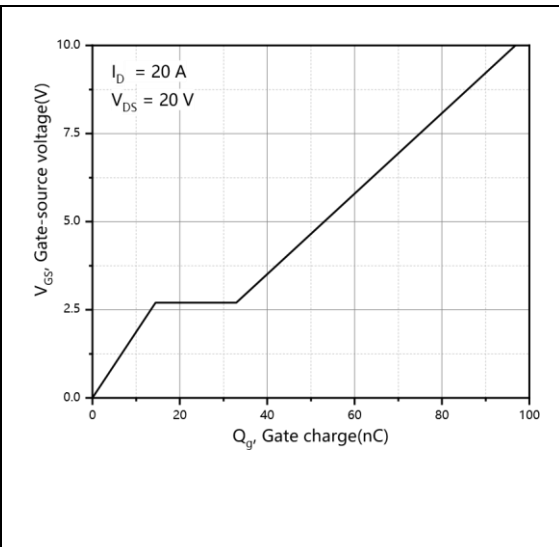


Figure 4, Typ. gate charge

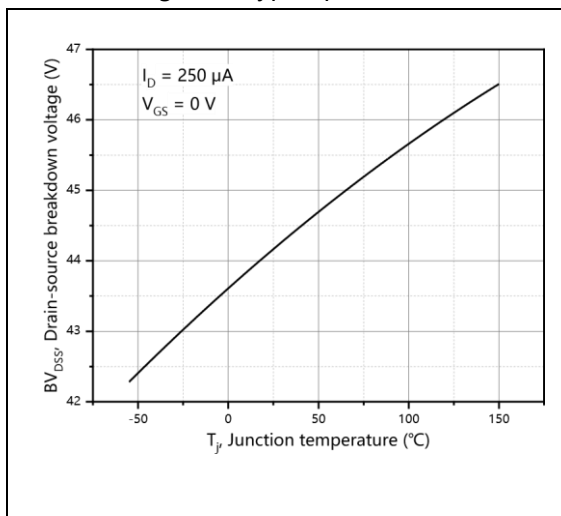


Figure 5, Drain-source breakdown voltage

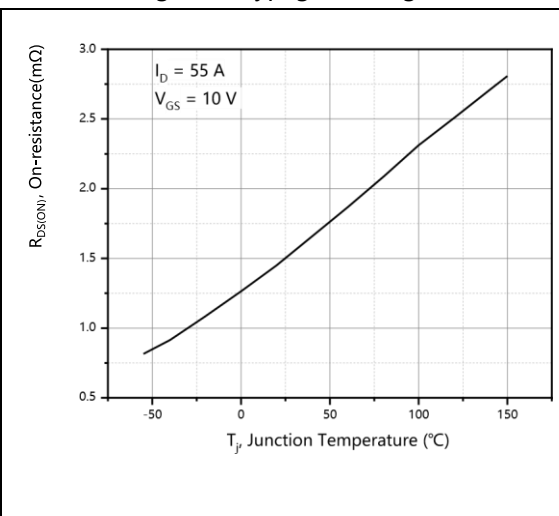


Figure 6, Drain-source on-state resistance

Typical Characteristics (Cont.)

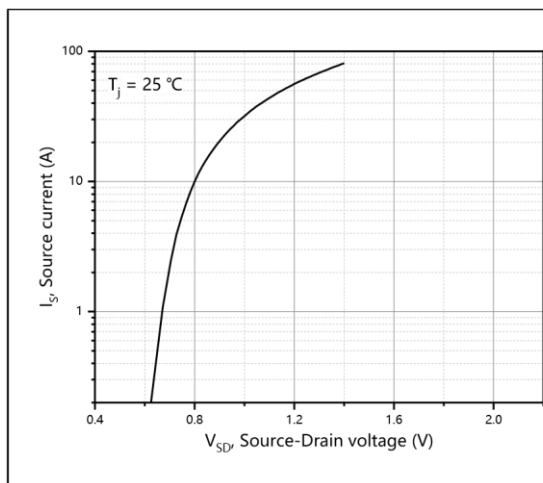


Figure 7, Forward characteristic of body diode

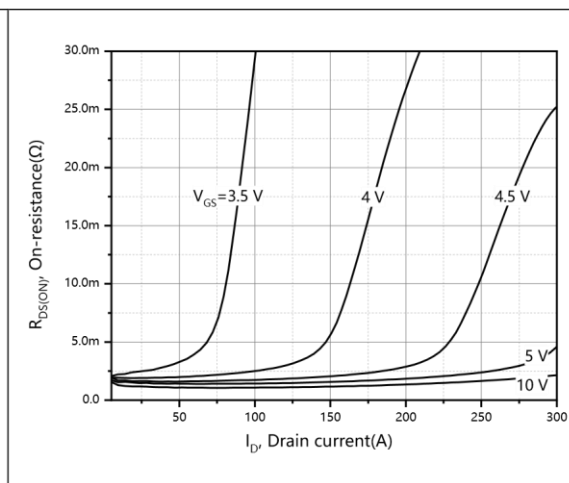


Figure 8, Drain-source on-state resistance

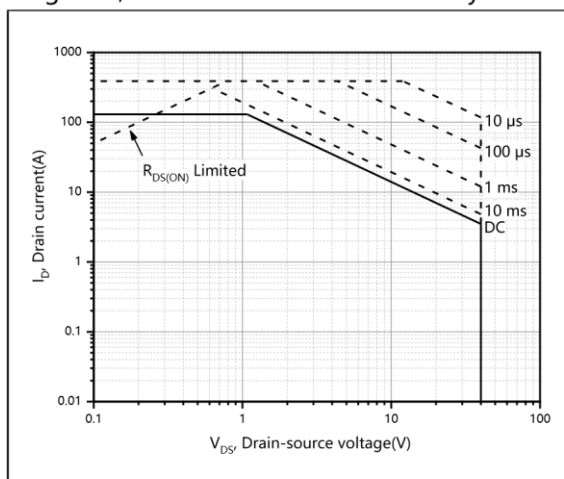
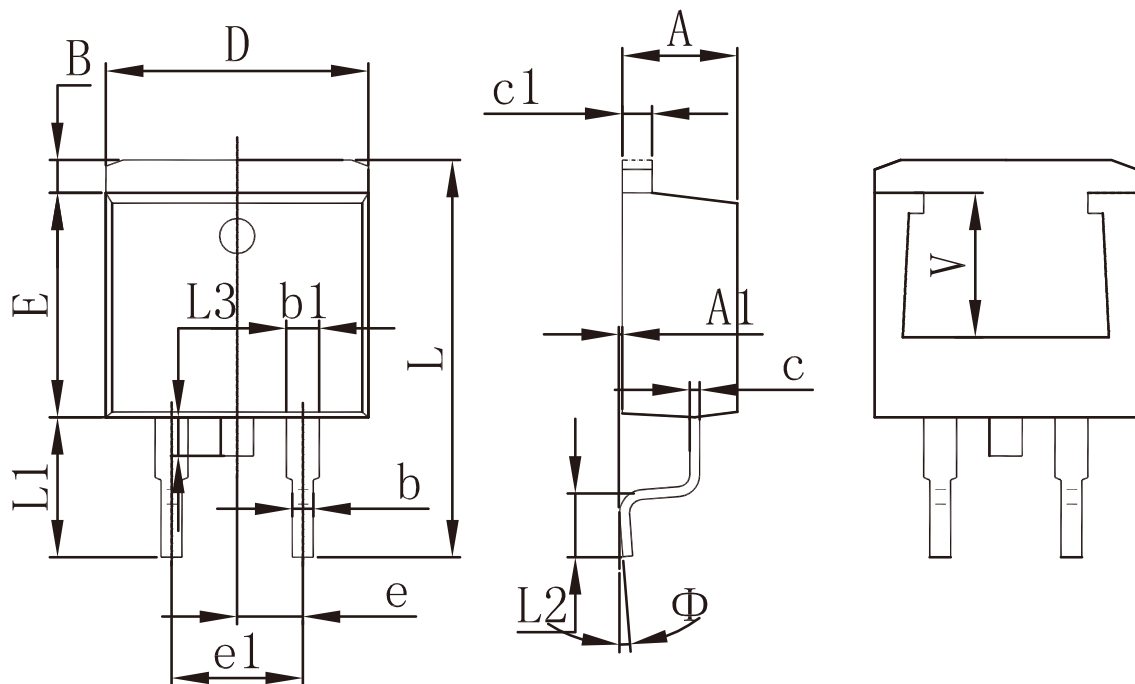


Figure 9, Safe operation area $T_C=25\text{ }^{\circ}\text{C}$

Packaging information


| SYMBOL | MILLIMETERS | | INCHES | |
|--------|-------------|--------|------------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 4.470 | 4.670 | 0.176 | 0.184 |
| A1 | 0.000 | 0.150 | 0.000 | 0.006 |
| B | 1.120 | 1.420 | 0.044 | 0.056 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.310 | 0.530 | 0.012 | 0.021 |
| c1 | 1.170 | 1.370 | 0.046 | 0.054 |
| D | 10.010 | 10.310 | 0.394 | 0.406 |
| E | 8.500 | 8.900 | 0.335 | 0.350 |
| e | 2.540 TYP. | | 0.100 TYP. | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| L | 14.940 | 15.500 | 0.588 | 0.610 |
| L1 | 4.950 | 5.450 | 0.195 | 0.215 |
| L2 | 2.340 | 2.740 | 0.092 | 0.108 |
| L3 | 1.300 | 1.700 | 0.051 | 0.067 |
| Φ | 0° | 8° | 0° | 8° |
| V | 5.600 REF. | | 0.220 REF. | |

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