

General Description

The WSR150N04 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications.

Product Summary

| BVDSS | RDSON | ID |
|-------|-------|------|
| 40V | 4mΩ | 150A |

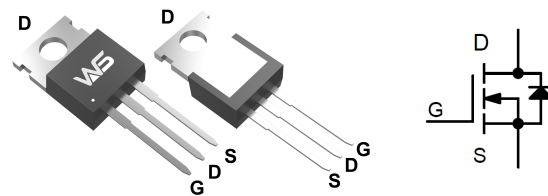
Features

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

- Load switch
- Battery protection
- Uninterruptible power supply

TO-220AB Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---------------------------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | 40 | V |
| V _{GS} | Gate-Source Voltage | ±20 | V |
| I _D @T _C =25°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 150 | A |
| I _D @T _C =100°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 98 | A |
| I _{DM} | Pulsed Drain Current ² | 600 | A |
| EAS | Single Pulse Avalanche Energy ³ | 350 | mJ |
| P _D @T _C =25°C | Total Power Dissipation ⁴ | 180 | W |
| T _J T _{STG} | Operating Junction Temperature Range | -55 to 150 | °C |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R _{θJA} | Thermal Resistance Junction-Ambient ¹ | --- | 50 | °C/W |
| R _{θJC} | Thermal Resistance Junction-Case ¹ | --- | 0.7 | °C/W |

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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--|--|------|-------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 40 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.057 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =30A | --- | 3 | 4 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 2.0 | 3.0 | 4.0 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -5.68 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =40V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =40V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =15A | --- | 40 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 0.8 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =20V, V _{GS} =10V, I _D =30A | --- | 80 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 17 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 21 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DS} =20V, V _{GS} =10V, I _D =30A, R _g =1Ω. | --- | 21 | --- | ns |
| T _r | Rise Time | | --- | 32 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 71 | --- | |
| T _f | Fall Time | | --- | 40 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =20V, V _{GS} =0V, f=1MHz | --- | 4950 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 530 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 321 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I _S | Continuous Source Current ^{1,6} | V _G =V _D =0V, Force Current | --- | --- | 150 | A |
| I _{SM} | Pulsed Source Current ^{2,6} | | --- | --- | 600 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =30A, T _J =25°C | --- | --- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | IF=20A, di/dt=100A/μs, T _J =25°C | --- | 27 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 47 | --- | nC |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: T_J=25°C, V_{DD}=20V, V_G=10V, L=0.5mH, R_g=25Ω

Typical Characteristics

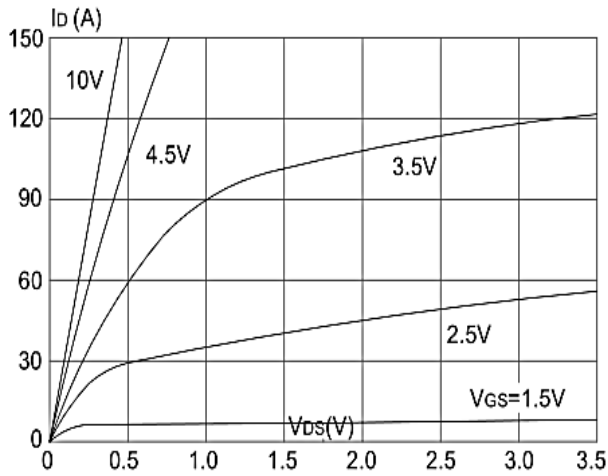


Figure 1: Output Characteristics

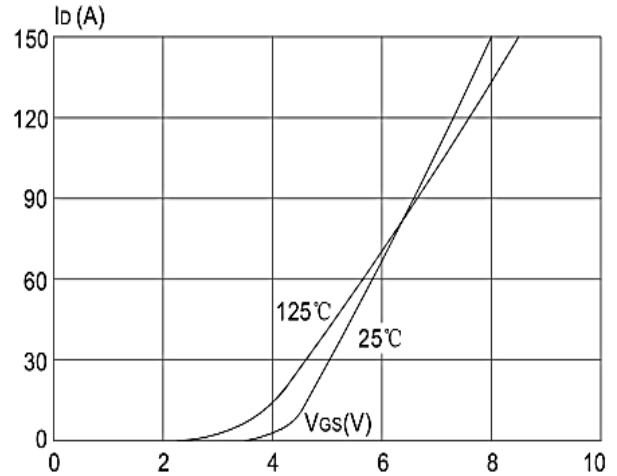


Figure 2: Typical Transfer Characteristics

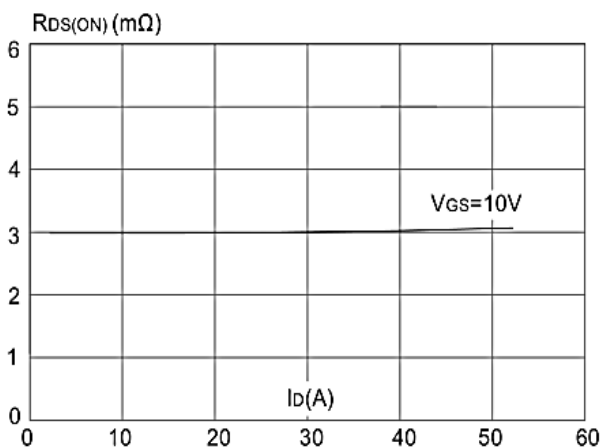


Figure 3: On-resistance vs. Drain Current

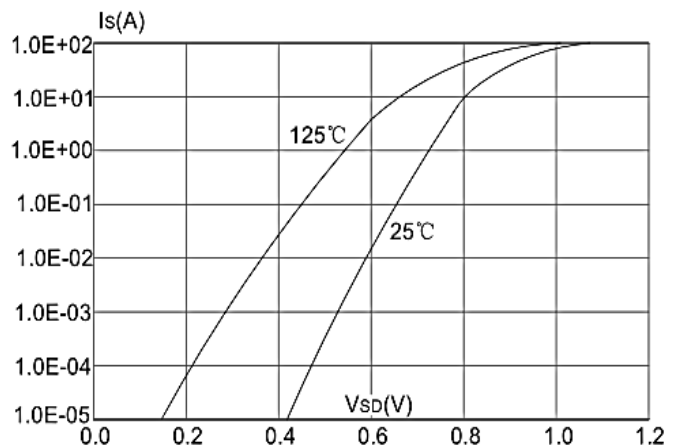


Figure 4: Body Diode Characteristics

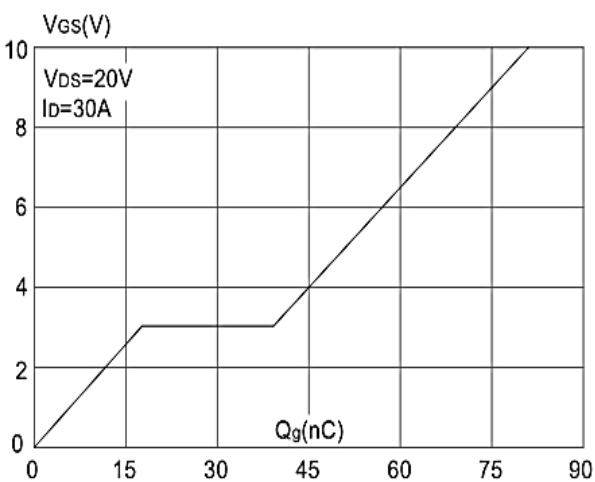


Figure 5: Gate Charge Characteristics

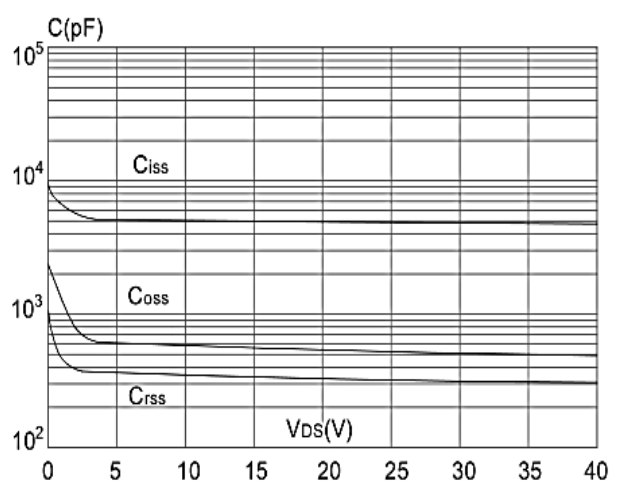


Figure 6: Capacitance Characteristics

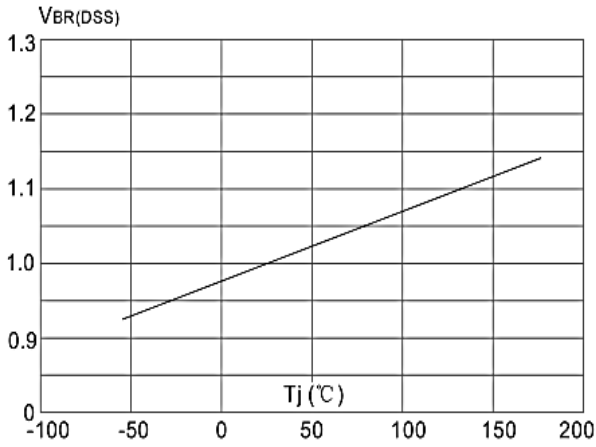


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

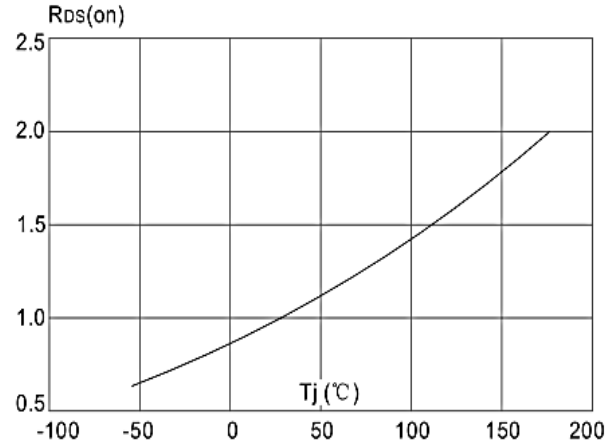


Figure 8: Normalized on Resistance vs. Junction Temperature

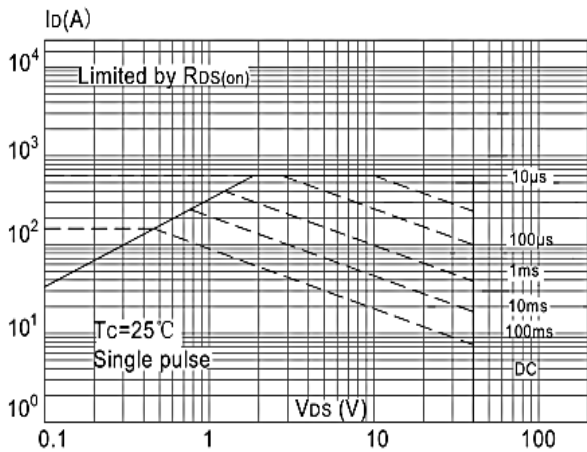


Figure 9: Maximum Safe Operating Area

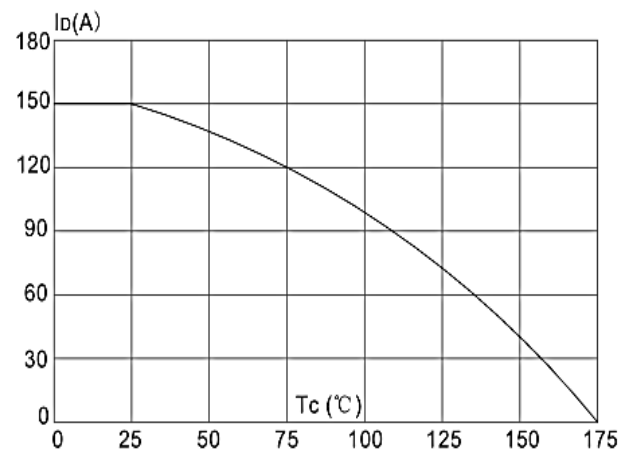


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

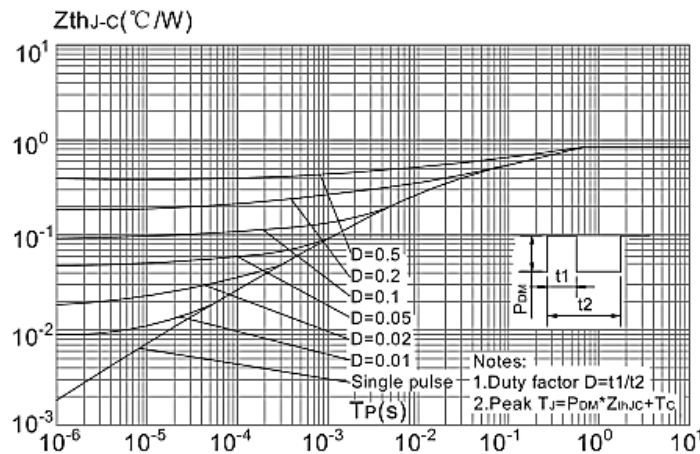


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien



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