

# SQP3205T

## 55V 110A N-Channel Trench MOSFET

### Features

- Advanced Trench Technology
- Typical on-Resistance:  
 $R_{DS(on)}=3.3m\Omega$  @ $V_{GS}=10V$ ,  $I_D=55A$   
 $R_{DS(on)}=3.5m\Omega$  @ $V_{GS}=10V$ ,  $I_D=75A$
- Rated Avalanche Energy
- RoHS Compliant

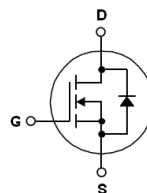
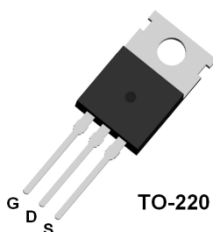
### Applications

- Switched Mode Power Supplies
- UPS

### Description

The SQP3205T is an N-Channel enhancement mode power MOSFET and based on advanced trench technology, it has extremely low static on-resistance and high avalanche energy strength. This device provide excellent switching performance for switched mode power supplies, UPS.

### Package Type & Internal Circuit



### Absolute Maximum Ratings @ $T_C=25^{\circ}C$ unless otherwise noted

| Symbol    | Parameter                            |                    | Ratings  | Unit           |
|-----------|--------------------------------------|--------------------|----------|----------------|
| $V_{DSS}$ | Drain to Source Voltage              |                    | 55       | V              |
| $V_{GSS}$ | Gate to Source Voltage               |                    | $\pm 25$ | V              |
| $I_D$     | Drain Current                        | $T_C=25^{\circ}C$  | 150      | A              |
|           |                                      | $T_C=100^{\circ}C$ | 110      | A              |
| $I_{DM}$  | Pulsed Drain Current                 | (Note1)            | 450      | A              |
| $P_D$     | Maximum Power Dissipation            | $T_C=25^{\circ}C$  | 210      | W              |
|           | Derate above $25^{\circ}C$           |                    | 1.1      | W/ $^{\circ}C$ |
| $E_{AS}$  | Single Pulsed Avalanche Energy       | (Note 2)           | 1200     | mJ             |
| $T_J$     | Operating Junction Temperature Range |                    | -55~+150 | $^{\circ}C$    |
| $T_{STG}$ | Storage Temperature Range            |                    | -55~+150 | $^{\circ}C$    |

### Thermal Characteristics

| Symbol        | Parameter                               | Ratings | Unit          |
|---------------|-----------------------------------------|---------|---------------|
| $R_{th(J-C)}$ | Thermal Resistance, Junction to case    | 0.6     | $^{\circ}C/W$ |
| $R_{th(J-A)}$ | Thermal Resistance, Junction to Ambient | 62      | $^{\circ}C/W$ |

## Electrical Characteristics @T<sub>C</sub>=25 °C unless otherwise noted

| Symbol              | Parameter                         | Conditions                                               | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|----------------------------------------------------------|------|------|------|------|
| BV <sub>DSS</sub>   | Drain to Source Breakdown Voltage | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA               | 55   | -    | -    | V    |
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 2    | 3    | 4    | V    |
| R <sub>DS(on)</sub> | Static Drain-Source On-Resistance | V <sub>GS</sub> =10V, I <sub>D</sub> =55A                | -    | 3.3  | 5    | mΩ   |
|                     |                                   | V <sub>GS</sub> =10V, I <sub>D</sub> =75A                | -    | 3.5  | -    | mΩ   |
| I <sub>DSS</sub>    | Zero Gate Voltage Drain Current   | V <sub>DS</sub> =V <sub>DSS</sub> , V <sub>GS</sub> =0V  | -    | -    | 10   | uA   |
| I <sub>GSS</sub>    | Gate to Source Leakage Current    | V <sub>GS</sub> =V <sub>GSS</sub> , V <sub>DS</sub> =0V  | -    | -    | ±100 | nA   |

## D-S Diode Characteristics and Maximum Rating @T<sub>C</sub>=25 °C unless otherwise noted

| Symbol          | Parameter                                     | Conditions                                | Min. | Typ. | Max. | Unit |
|-----------------|-----------------------------------------------|-------------------------------------------|------|------|------|------|
| I <sub>S</sub>  | Maximum Drain to Source Diode Forward Current |                                           | -    | -    | 110  | A    |
| V <sub>SD</sub> | Drain-Source Diode Forward Voltage            | V <sub>GS</sub> =0V, I <sub>S</sub> =110A | -    | 0.95 | 1.5  | V    |
|                 |                                               | V <sub>GS</sub> =0V, I <sub>S</sub> =150A | -    | 1.0  | -    | V    |
| t <sub>rr</sub> | Reverse Recovery Time                         | V <sub>GS</sub> =0V, I <sub>S</sub> =55A, | -    | 85   | -    | ns   |
| Q <sub>rr</sub> | Reverse Recovery Charge                       | di/dt=-100A/us                            | -    | 175  | -    | nC   |

## Switching Characteristics @T<sub>C</sub>=25 °C unless otherwise noted

| Symbol              | Parameter                    | Conditions                                                                     | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|--------------------------------------------------------------------------------|------|------|------|------|
| t <sub>d(on)</sub>  | Turn-on Delay Time           | I <sub>D</sub> =55A,<br>V <sub>DD</sub> =28V,<br>R <sub>G</sub> =5Ω (Note 3)   | -    | 17   | -    | ns   |
| t <sub>r</sub>      | Turn-on Rise Time            |                                                                                | -    | 110  | -    | ns   |
| t <sub>d(off)</sub> | Turn-off Delay Time          |                                                                                | -    | 54   | -    | ns   |
| t <sub>f</sub>      | Turn-off Fall Time           |                                                                                | -    | 70   | -    | ns   |
| C <sub>iss</sub>    | Input Capacitance            | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V,<br>f=1.0MHz                         | -    | 3100 | 4320 | pF   |
| C <sub>oss</sub>    | Output Capacitance           |                                                                                | -    | 720  | 1730 | pF   |
| C <sub>rss</sub>    | Reverse Transfer Capacitance |                                                                                | -    | 205  | 350  | pF   |
| Q <sub>g</sub>      | Total Gate Charge            | I <sub>D</sub> =110A,<br>V <sub>DD</sub> =44V<br>V <sub>GS</sub> =10V (Note 3) | -    | 115  | -    | nC   |
| Q <sub>gs</sub>     | Gate to Emitter Charge       |                                                                                | -    | 27   | -    | nC   |
| Q <sub>gd</sub>     | Gate to Collector Charge     |                                                                                | -    | 35   | -    | nC   |

### Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. V<sub>DD</sub>=50V, L=500uH, V<sub>G</sub>=10V, I<sub>AS</sub>=70A
3. Essentially independent of operating temperature typical characteristics

## Typical Performance Characteristics

Fig. 1. Typical on-Resistance Characteristics

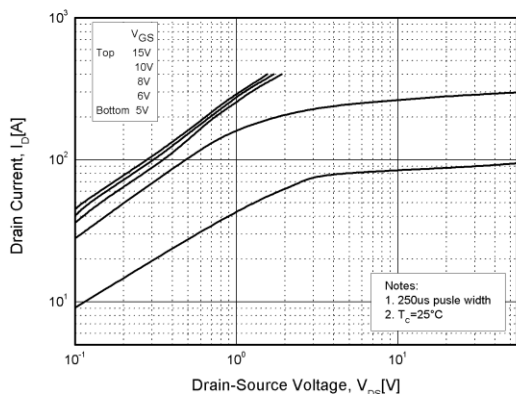


Fig. 2. Typical Transfer Characteristics

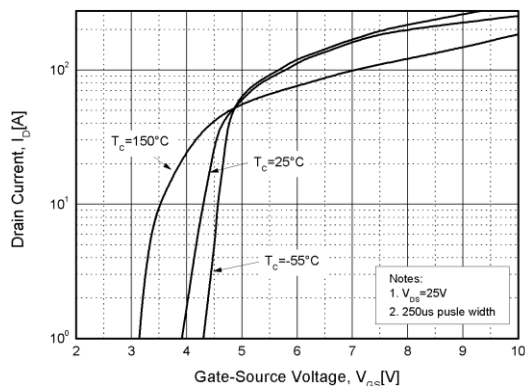


Fig. 3. Static on-Resistance vs.  $I_D$

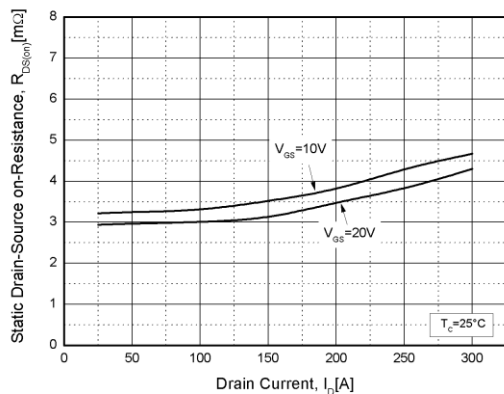


Fig. 4. Body Diode Forward Voltage vs.  $I_{DR}$

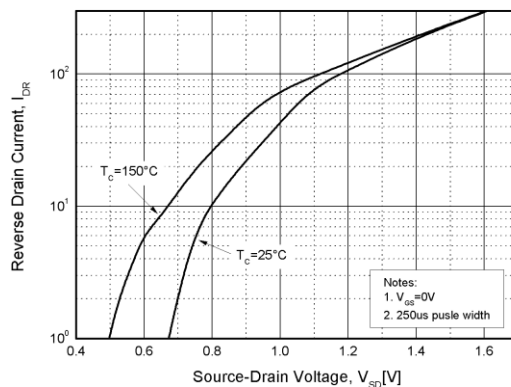


Fig. 5. Capacitance Characteristics

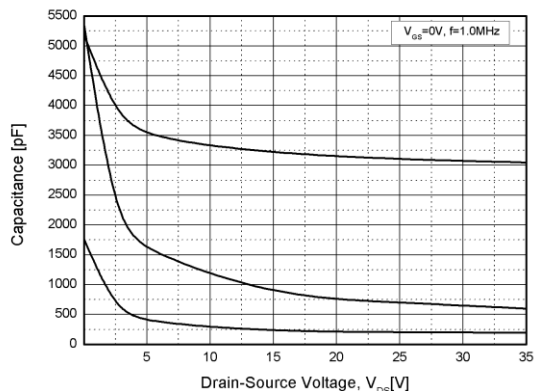
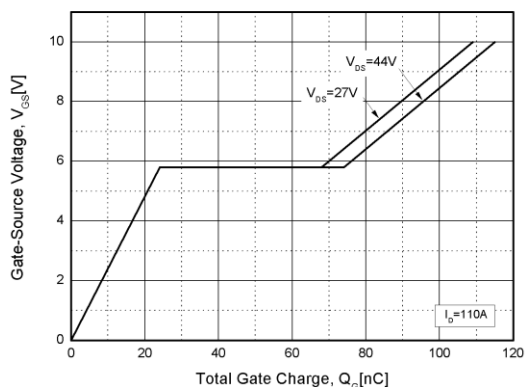


Fig. 6. Gate Charge Characteristics



# Typical Performance Characteristics

Fig. 7. Breakdown Voltage vs. Temperature

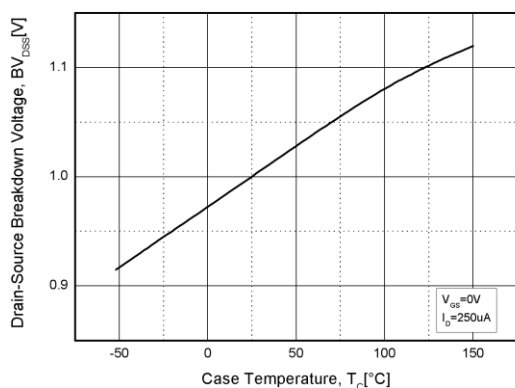


Fig. 8. Static on-Resistance vs. Temperature

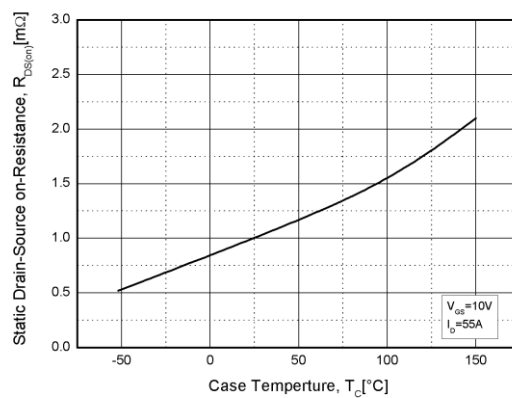


Fig. 9. Maximum Safe Operating Area

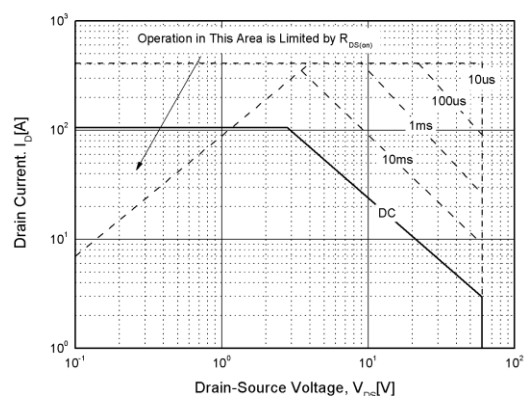


Fig. 10. Maximum Drain Current vs. Temperature

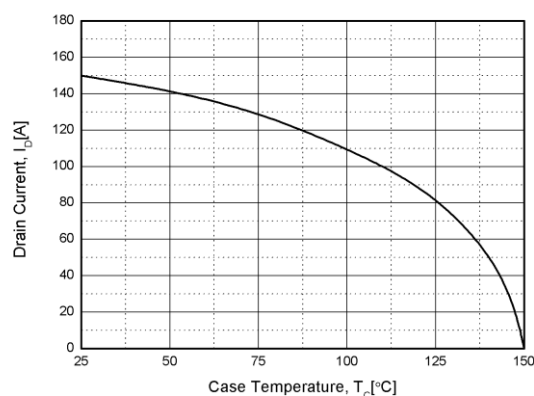
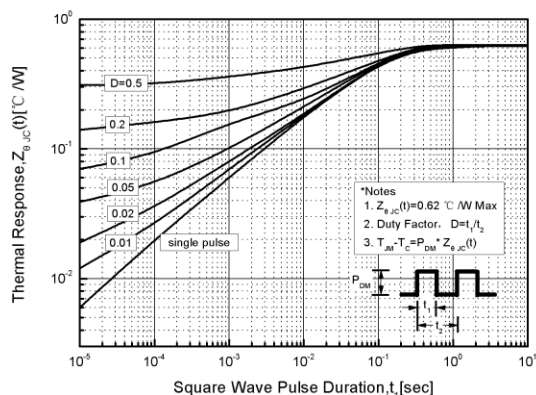


Fig. 11. Transient Thermal Response Curve



# Package Dimensions

## TO-220

(Dimensions in Millimeters)

