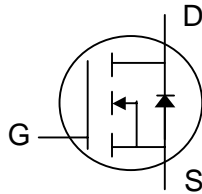


# N-channel Enhancement-mode Power MOSFET

- Low gate-charge
- Simple drive requirement
- Fast switching

 **Pb-free, RoHS compliant.**



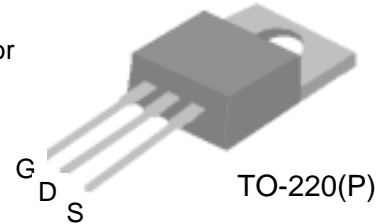
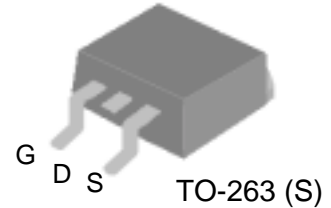
|              |              |
|--------------|--------------|
| $BV_{DSS}$   | 30V          |
| $R_{DS(ON)}$ | 12m $\Omega$ |
| $I_D$        | 45A          |

## DESCRIPTION

The SSM60T03GS is in a TO-263 package, which is widely used for commercial and industrial surface-mount applications. This device is suitable for low-voltage applications such as DC/DC converters.

The through-hole version, the SSM60T03GP in TO-220, is available for vertical-mounting, where a small footprint is required on the board, and/or an external heatsink is to be attached.

These devices are manufactured with an advanced process, permitting operation up to a maximum junction temperature of 175°C.



## ABSOLUTE MAXIMUM RATINGS

| Symbol                        | Parameter                            | Rating     | Units |
|-------------------------------|--------------------------------------|------------|-------|
| $V_{DS}$                      | Drain-Source Voltage                 | 30         | V     |
| $V_{GS}$                      | Gate-Source Voltage                  | $\pm 20$   | V     |
| $I_D @ T_C=25^\circ\text{C}$  | Continuous Drain Current             | 45         | A     |
| $I_D @ T_C=100^\circ\text{C}$ | Continuous Drain Current             | 32         | A     |
| $I_{DM}$                      | Pulsed Drain Current <sup>1</sup>    | 120        | A     |
| $P_D @ T_C=25^\circ\text{C}$  | Total Power Dissipation              | 44         | W     |
|                               | Linear Derating Factor               | 0.352      | W/°C  |
| $T_{STG}$                     | Storage Temperature Range            | -55 to 175 | °C    |
| $T_J$                         | Operating Junction Temperature Range | -55 to 175 | °C    |

## THERMAL DATA

| Symbol          | Parameter                                   | Value | Units |
|-----------------|---|-------|-------|
| $R_{\theta JC}$ | Maximum Thermal Resistance Junction-case    | 3.4   | °C/W  |
| $R_{\theta JA}$ | Maximum Thermal Resistance Junction-ambient | 62    | °C/W  |

**ELECTRICAL CHARACTERISTICS (at T<sub>j</sub>=25°C, unless otherwise specified)**

| Symbol                              | Parameter  | Test Conditions  | Min. | Typ. | Max. | Units |
|-------------------------------------|--|--|------|------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                       | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA               | 30   | -    | -    | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>j</sub> | Breakdown Voltage Temperature Coefficient            | Reference to 25°C, I <sub>D</sub> =1mA                   | -    | 0.03 | -    | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup>       | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                | -    | -    | 12   | mΩ    |
|                                     |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A               | -    | -    | 25   | mΩ    |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                               | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA | 1    | -    | 3    | V     |
| g <sub>fs</sub>                     | Forward Transconductance <sup>2</sup>                | V <sub>DS</sub> =10V, I <sub>D</sub> =10A                | -    | 25   | -    | S     |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current (T <sub>j</sub> =25°C)  | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                | -    | -    | 1    | uA    |
|                                     | Drain-Source Leakage Current (T <sub>j</sub> =175°C) | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V                | -    | -    | 250  | uA    |
| I <sub>GSS</sub>                    | Gate-Source Leakage                                  | V <sub>GS</sub> = ±20V                                   | -    | -    | ±100 | nA    |
| Q <sub>g</sub>                      | Total Gate Charge <sup>2</sup>                       | I <sub>D</sub> =20A                                      | -    | 11.6 | 19   | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                                   | V <sub>DS</sub> =24V                                     | -    | 3.9  | -    | nC    |
| Q <sub>gd</sub>                     | Gate-Drain ("Miller") Charge                         | V <sub>GS</sub> =4.5V                                    | -    | 7    | -    | nC    |
| t <sub>d(on)</sub>                  | Turn-on Delay Time <sup>2</sup>                      | V <sub>DS</sub> =15V                                     | -    | 8.8  | -    | ns    |
| t <sub>r</sub>                      | Rise Time  | I <sub>D</sub> =20A                                      | -    | 57.5 | -    | ns    |
| t <sub>d(off)</sub>                 | Turn-off Delay Time                                  | R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =10V               | -    | 18.5 | -    | ns    |
| t <sub>f</sub>                      | Fall Time  | R <sub>D</sub> =0.75Ω                                    | -    | 6.4  | -    | ns    |
| C <sub>iss</sub>                    | Input Capacitance                                    | V <sub>GS</sub> =0V                                      | -    | 1135 | 1816 | pF    |
| C <sub>oss</sub>                    | Output Capacitance                                   | V <sub>DS</sub> =25V                                     | -    | 200  | -    | pF    |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                         | f=1.0MHz   | -    | 135  | -    | pF    |

**Source-Drain Diode**

| Symbol          | Parameter                          | Test Conditions                           | Min. | Typ. | Max. | Units |
|-----------------|------------------------------------|---|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup>    | I <sub>S</sub> =45A, V <sub>GS</sub> =0V  | -    | -    | 1.3  | V     |
| t <sub>rr</sub> | Reverse Recovery Time <sup>2</sup> | I <sub>S</sub> =20A, V <sub>GS</sub> =0V, | -    | 23.3 | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge            | di/dt=100A/μs                             | -    | 16   | -    | nC    |

**Notes:**

- 1.Pulse width limited by safe operating area.
- 2.Pulse width ≤300us, duty cycle ≤2%.

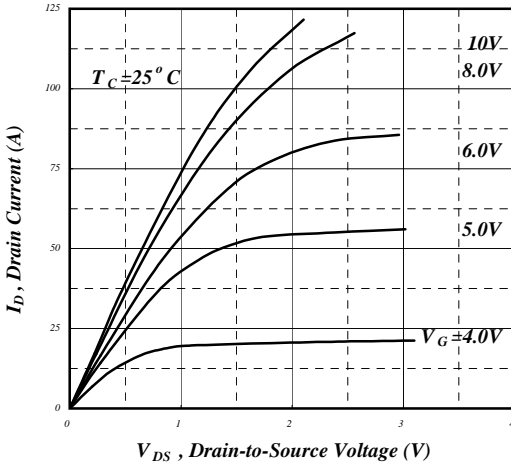


Fig 1. Typical Output Characteristics

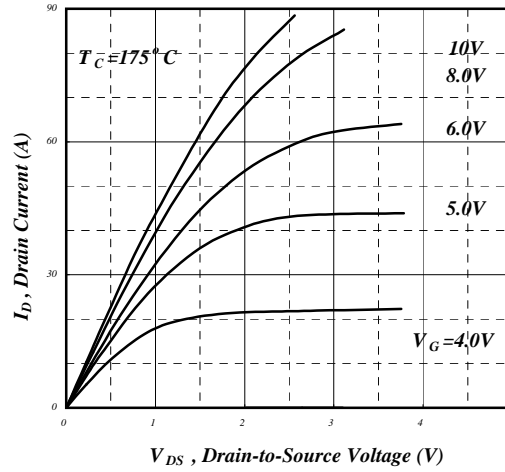


Fig 2. Typical Output Characteristics

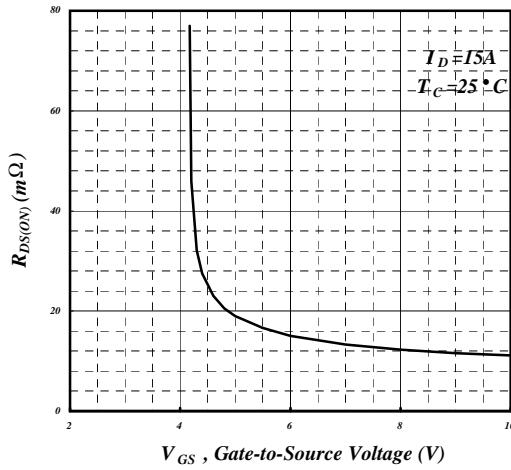


Fig 3. On-Resistance vs. Gate Voltage

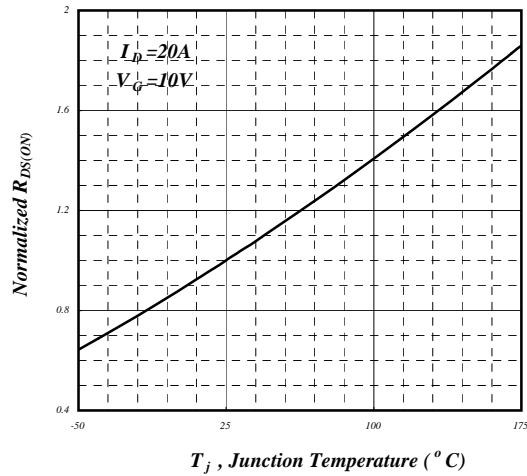


Fig 4. Normalized On-Resistance vs. Junction Temperature

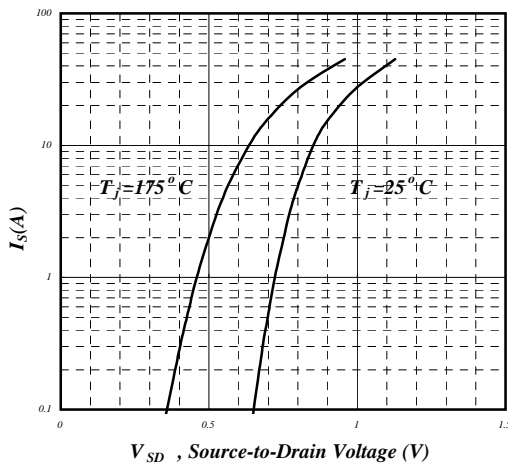


Fig 5. Forward Characteristic of Reverse Diode

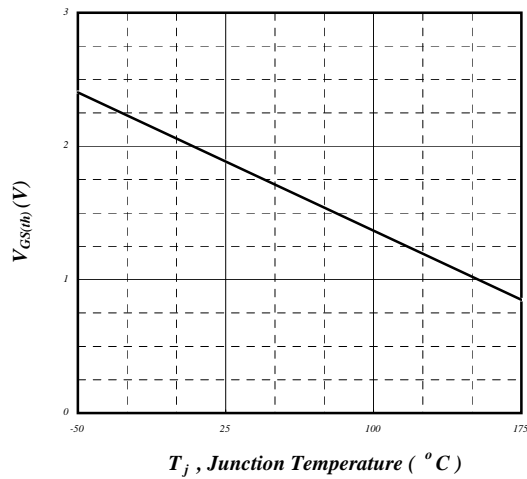


Fig 6. Gate Threshold Voltage vs. Junction Temperature

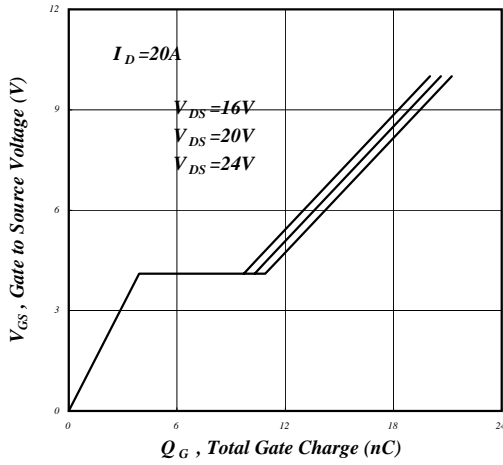


Fig 7. Gate Charge Characteristics

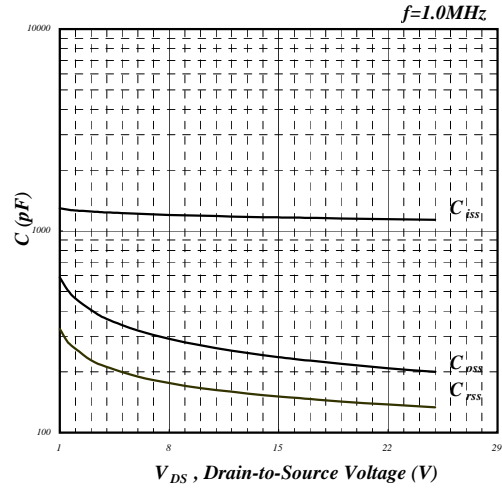


Fig 8. Typical Capacitance Characteristics

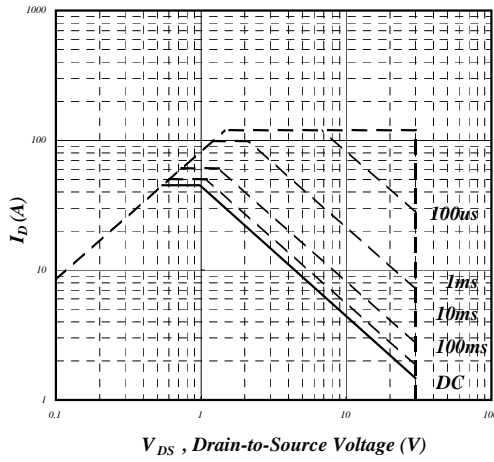


Fig 9. Maximum Safe Operating Area

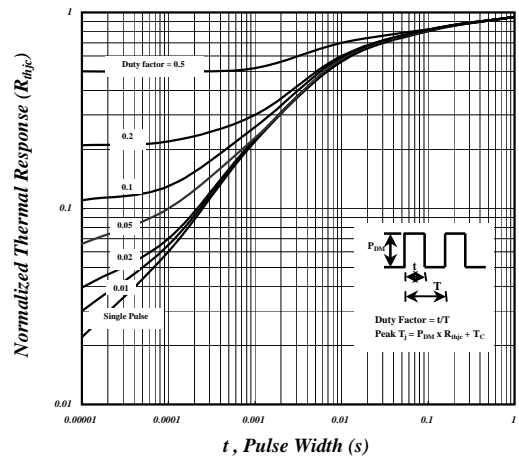


Fig 10. Effective Transient Thermal Impedance

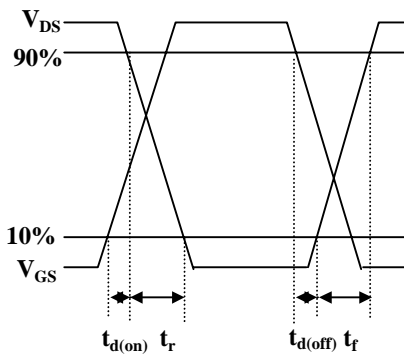


Fig 11. Switching Time Waveform

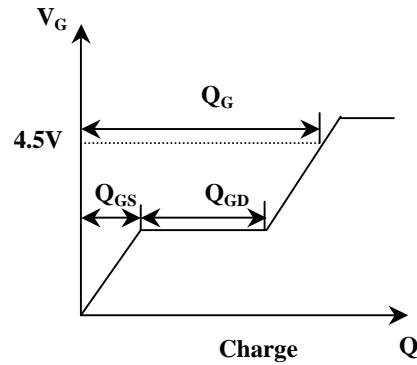


Fig 12. Gate Charge Waveform

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