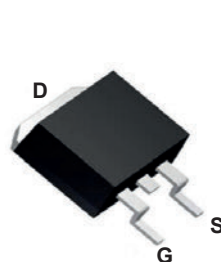
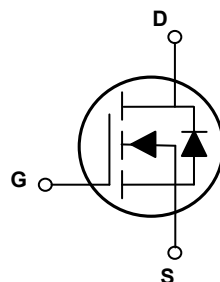


### Main Product Characteristics

|               |                      |
|---------------|----------------------|
| $V_{(BR)DSS}$ | 150V                 |
| $R_{DS(ON)}$  | 5.4m $\Omega$ (Typ.) |
| $I_D$         | 175A                 |



TO-263



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The GSFT7R515 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supplies and a wide variety of other applications.

### Absolute Maximum Ratings ( $T_C=25^{\circ}\text{C}$ unless otherwise specified)

| Parameter  | Symbol          | Max.        | Unit                  |
|--|-----------------|-------------|-----------------------|
| Drain-Source Voltage   | $V_{DS}$        | 150         | V                     |
| Gate-to-Source Voltage   | $V_{GS}$        | $\pm 20$    | V                     |
| Continuous Drain Current, @ Steady-State ( $T_C=25^{\circ}\text{C}$ ) <sup>1</sup> | $I_D$           | 175         | A                     |
| Continuous Drain Current, @ Steady-State ( $T_C=100^{\circ}\text{C}$ )             |                 | 124         | A                     |
| Pulsed Drain Current <sup>2</sup>  | $I_{DM}$        | 690         | A                     |
| Power Dissipation ( $T_A=25^{\circ}\text{C}$ )                                     | $P_D$           | 376         | W                     |
| Linear Derating Factor ( $T_A=25^{\circ}\text{C}$ )                                |                 | 2.5         | W/ $^{\circ}\text{C}$ |
| Single Pulse Avalanche Energy <sup>3</sup>   | $E_{AS}$        | 803         | mJ                    |
| Junction-to-Case   | $R_{\theta JC}$ | 0.4         | $^{\circ}\text{C/W}$  |
| Junction-to-Ambient (PCB Mounted, Steady-State) <sup>4</sup>                       | $R_{\theta JA}$ | 62.5        | $^{\circ}\text{C/W}$  |
| Operating Junction and Storage Temperature Range                                   | $T_J/T_{STG}$   | -55 to +175 | $^{\circ}\text{C}$    |

**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

| Parameter                                       | Symbol        | Conditions   | Min. | Typ.  | Max. | Unit       |
|---|---------------|--|------|-------|------|------------|
| <b>On / Off Characteristics</b>                 |               |  |      |       |      |            |
| Drain-to-Source Breakdown Voltage               | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                                      | 150  | -     | -    | V          |
| Drain-to-Source Leakage Current                 | $I_{DSS}$     | $V_{DS}=150V, V_{GS}=0V$                                       | -    | -     | 1    | $\mu A$    |
|   |               | $T_J=125^\circ\text{C}$  | -    | -     | 50   |            |
| Gate-to-Source Forward Leakage                  | $I_{GSS}$     | $V_{GS}=20V$   | -    | -     | 100  | nA         |
|   |               | $V_{GS}=-20V$  | -    | -     | -100 |            |
| Static Drain-to-Source On-Resistance            | $R_{DS(ON)}$  | $V_{GS}=10V, I_D=100A$   | -    | 5.4   | 7.5  | m $\Omega$ |
| Gate Threshold Voltage                          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                                  | 2.1  | 3     | 3.9  | V          |
| <b>Dynamic and Switching Characteristics</b>    |               |  |      |       |      |            |
| Input Capacitance                               | $C_{iss}$     | $V_{GS}=0V, V_{DS}=25V$<br>$F=1\text{MHz}$                     | -    | 5400  | -    | pF         |
| Output Capacitance                              | $C_{oss}$     |  | -    | 3300  | -    |            |
| Reverse Transfer Capacitance                    | $C_{rss}$     |  | -    | 80    | -    |            |
| Total Gate Charge                               | $Q_g$         | $I_D=100A, V_{DS}=120V,$<br>$V_{GS}=10V$                       | -    | 81    | -    | nC         |
| Gate-to-Source Charge                           | $Q_{gs}$      |  | -    | 29    | -    |            |
| Gate-to-Drain ("Miller") Charge                 | $Q_{gd}$      |  | -    | 15    | -    |            |
| Turn-on Delay Time                              | $t_{d(on)}$   | $V_{GS}=10V, V_{DS}=75V,$<br>$I_D=80A, R_{GEN}=2.5\Omega$      | -    | 16.5  | -    | nS         |
| Rise Time                                       | $t_r$         |  | -    | 106.3 | -    |            |
| Turn-Off Delay Time                             | $t_{d(off)}$  |  | -    | 60.6  | -    |            |
| Fall Time                                       | $t_f$         |  | -    | 104.6 | -    |            |
| Gate Resistance                                 | $R_g$         | $F=1\text{MHz}$  | -    | 4.3   | -    | $\Omega$   |
| <b>Source-Drain Ratings and Characteristics</b> |               |  |      |       |      |            |
| Continuous Source Current (Body Diode)          | $I_S$         | MOSFET symbol showing the integral reverse p-n junction diode. | -    | -     | 175  | A          |
| Pulsed Source Current (Body Diode)              | $I_{SM}$      |  | -    | -     | 690  | A          |
| Diode Forward Voltage                           | $V_{SD}$      | $I_S=80A, V_{GS}=0V$   | -    | 1     | 1.2  | V          |
| Reverse Recovery Time                           | $T_{rr}$      | $T_J=25^\circ\text{C}, I_F=80A,$<br>$di/dt=100A/\mu s$         | -    | 110   | -    | nS         |
| Reverse Recovery Charge                         | $Q_{rr}$      |  | -    | 0.36  | -    | $\mu C$    |

Note:

1. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
2. Repetitive rating; pulse width limited by max. junction temperature.
3.  $L=0.3\text{mH}, R_G=25\Omega, V_{DD}=50V, T_J=25^\circ\text{C}$ .
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

## Typical Electrical and Thermal Characteristic Curves

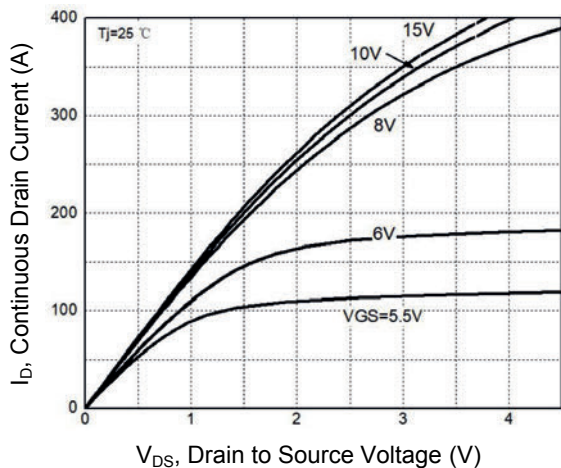


Figure 1. Typical Output Characteristics

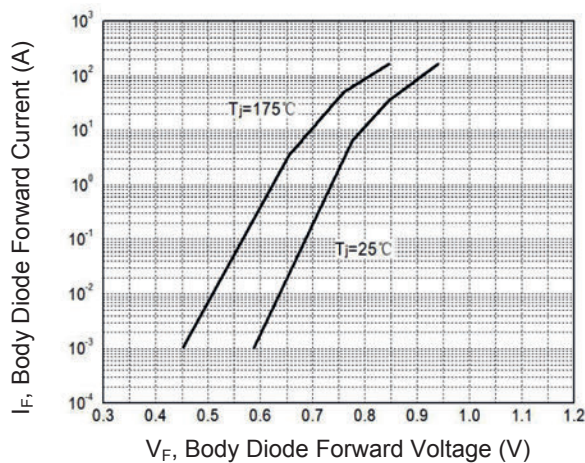


Figure 2. Body Diode Characteristics

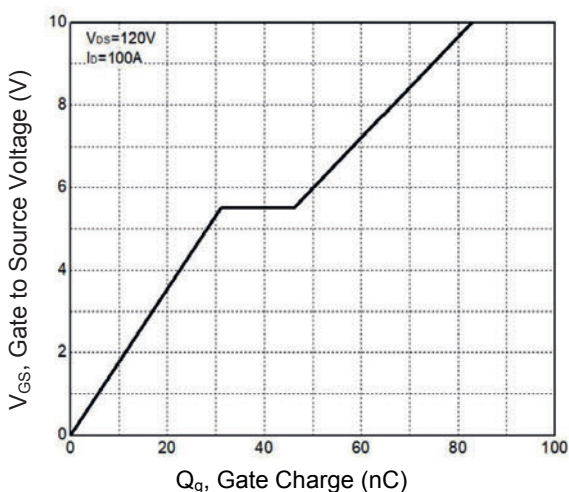


Figure 3. Gate Charge

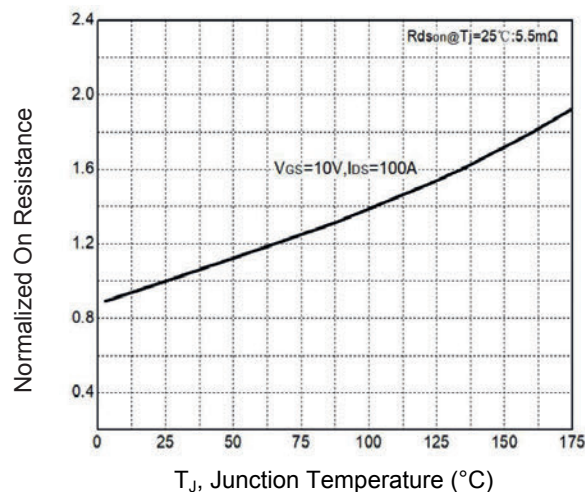


Figure 4. Normalized On-Resistance Vs.  $T_J$

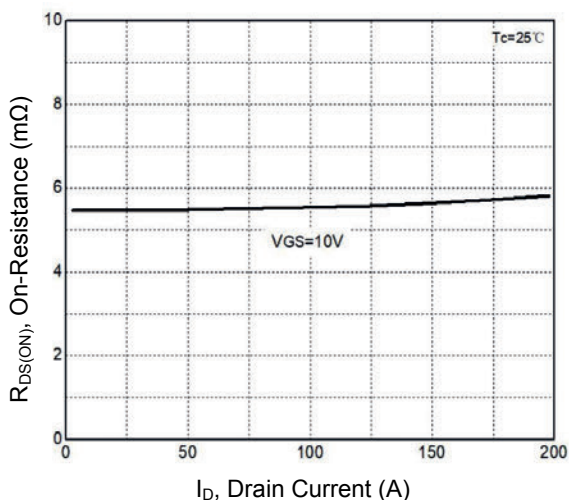


Figure 5. Drain-Source On-Resistance

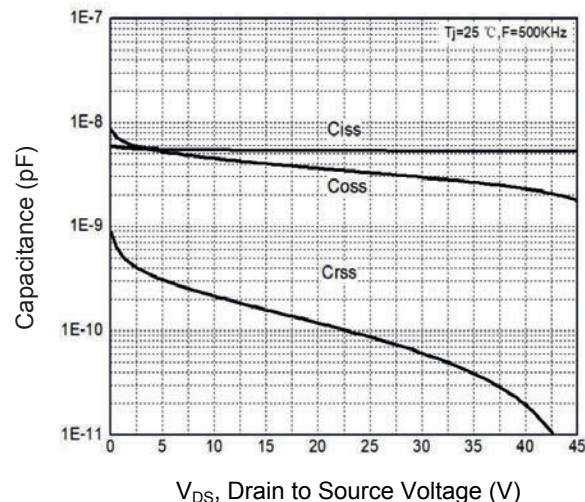
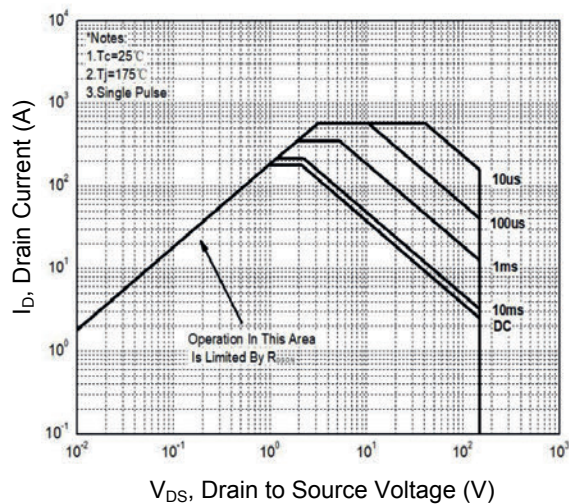
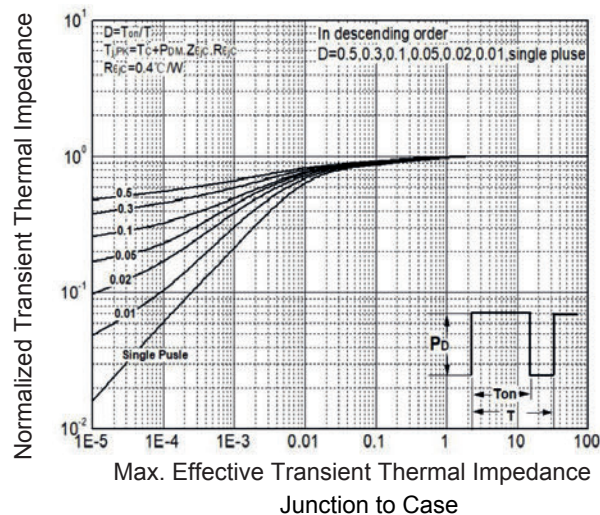


Figure 6. Typical Capacitance Characteristics

### Typical Electrical and Thermal Characteristic Curves

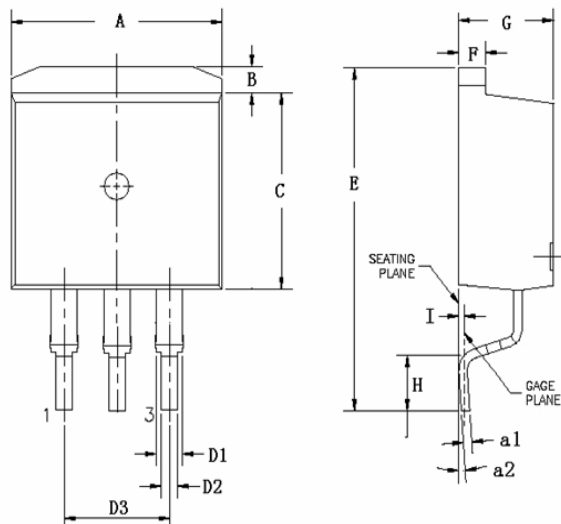


**Figure 7. Safe Operation Area**



**Figure 8. Thermal Transient Impedance**

**Package Outline Dimensions TO-263(D2PAK)**



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 9.66                      | 10.28 | 0.380                | 0.405 |
| B      | 1.02                      | 1.32  | 0.040                | 0.052 |
| C      | 8.59                      | 9.40  | 0.339                | 0.370 |
| D1     | 1.14                      | 1.40  | 0.045                | 0.055 |
| D2     | 0.70                      | 0.90  | 0.028                | 0.037 |
| D3     | 5.08 TYP.                 |       | 0.200 TYP.           |       |
| E      | 15.09                     | 15.39 | 0.594                | 0.606 |
| F      | 1.15                      | 1.40  | 0.045                | 0.055 |
| I      | 0.25 TYP.                 |       | 0.010 TYP.           |       |
| G      | 4.30                      | 4.70  | 0.169                | 0.185 |
| H      | 2.29                      | 2.79  | 0.090                | 0.110 |
| K      | 1.30                      | 1.60  | 0.051                | 0.063 |
| a1     | 0.45                      | 0.65  | 0.018                | 0.026 |
| a2     | 0°                        | 8°    | 0°                   | 8°    |