

850V N-Channel Depletion-Mode Power MOSFET

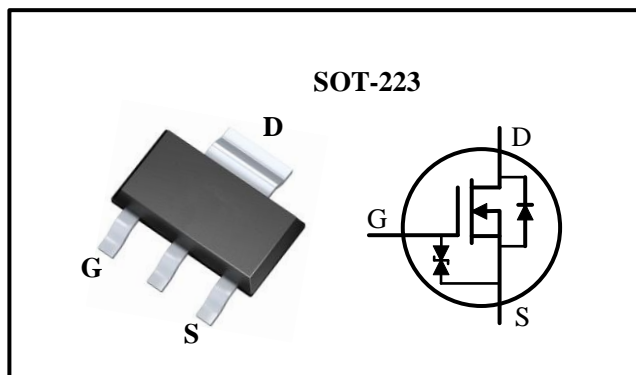
General Features

- Depletion Mode (Normally On)
- ESD Improved Capability
- Fast Switching Speed
- High Breakdown Voltage: 850V
- Proprietary Advanced Planar Technology
- Rugged Polysilicon Gate Cell Structure
- RoHS Compliant
- Halogen-free Available

| BV_{DSX} | $R_{DS(ON)(Typ.)}$ | $I_{DSS(Min.)}$ |
|-------------|--------------------|-----------------|
| 850V | 15Ω | 200mA |

Applications

- Audio Amplifiers
- Start-up Circuits
- Protection Circuits
- Ramp Generators
- Current Regulators
- Active Loads



Ordering Information

| Part Number | Package | Marking | Remark |
|-------------|---------|---------|--------------|
| DMS8515E | SOT-223 | 8515 | Halogen Free |

Absolute Maximum Ratings

$T_A=25^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | DMS8515E | Unit |
|-------------------|---|------------|------|
| V_{DSX} | Drain-to-Source Voltage ^[1] | 850 | V |
| I_D | Continuous Drain Current | 0.2 | A |
| I_{DM} | Pulsed Drain Current ^[2] | 0.8 | |
| P_D | Power Dissipation | 1.5 | W |
| V_{GS} | Gate-to-Source Voltage | ±20 | V |
| T_L | Soldering Temperature Distance of 1.6mm from case for 10 seconds | 300 | °C |
| T_J & T_{STG} | Operating and Storage Temperature Range | -55 to 150 | |

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

| Symbol | Parameter | DMS8515E | Unit |
|-----------------|--------------------------------------|----------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 83 | °C/W |

Electrical Characteristics

OFF Characteristics

 $T_A=25^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|--------------|-----------------------------------|------|------|------|---------------|---|
| BV_{DSX} | Drain-to-Source Breakdown Voltage | 850 | -- | -- | V | $V_{GS}=-10\text{V}$, $I_D=250\mu\text{A}$ |
| $I_{D(OFF)}$ | Drain-to-Source Leakage Current | -- | -- | 10 | μA | $V_{DS}=850\text{V}$, $V_{GS}=-10\text{V}$ |
| I_{GSS} | Gate-to-Source Leakage Current | -- | -- | 20 | μA | $V_{GS}=20\text{V}$, $V_{DS}=0\text{V}$ |
| | | -- | -- | -20 | | $V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$ |

ON Characteristics

 $T_A=25^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|---------------|--------------------------------------|------|------|------|----------|---|
| I_{DSS} | Saturated Drain-to-Source Current | 200 | -- | -- | mA | $V_{GS}=0\text{V}$, $V_{DS}=50\text{V}$ |
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistance | -- | 15 | 30 | Ω | $V_{GS}=0\text{V}$, $I_D=200\text{mA}$ [3] |
| $V_{GS(OFF)}$ | Gate-to-Source Cut-off Voltage | -4.0 | -- | -1.5 | V | $V_{DS}=3\text{V}$, $I_D=8\mu\text{A}$ |
| gfs | Forward Transconductance | -- | 720 | -- | mS | $V_{DS}=20\text{V}$, $I_D=200\text{mA}$ |

Dynamic Characteristics

Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|-----------|-------------------------------|------|-------|------|------|---|
| C_{iss} | Input Capacitance | -- | 393.4 | -- | pF | $V_{GS}=-10\text{V}$ $V_{DS}=50\text{V}$ $f=1.0\text{MHz}$ |
| C_{oss} | Output Capacitance | -- | 20.7 | -- | | |
| C_{rss} | Reverse Transfer Capacitance | -- | 4.1 | -- | | |
| Q_g | Total Gate Charge | -- | 13.6 | -- | nC | $V_{GS}=-10\text{V}\sim 10\text{V}$ $V_{DS}=150\text{V}$ $I_D=200\text{mA}$ |
| Q_{gs} | Gate-to-Source Charge | -- | 4.0 | -- | | |
| Q_{gd} | Gate-to-Drain (Miller) Charge | -- | 3.6 | -- | | |

Resistive Switching Characteristics

Essentially independent of operating temperature

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|--------------|---------------------|------|------|------|------|--|
| $t_{d(on)}$ | Turn-on Delay Time | -- | 18.1 | -- | ns | $V_{GS}=-10\text{V}\sim 0\text{V}$ $V_{DD}=150\text{V}$ $I_D=200\text{mA}$ $R_G=10\Omega$ |
| t_{rise} | Rise Time | -- | 10.5 | -- | | |
| $t_{d(off)}$ | Turn-off Delay Time | -- | 35.6 | -- | | |
| t_{fall} | Fall Time | -- | 94.0 | -- | | |



Source-Drain Diode Characteristics

T_A=25°C unless otherwise specified

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|-----------------|-----------------------|------|------|------|------|---|
| V _{SD} | Diode Forward Voltage | -- | -- | 1.2 | V | I _{SD} =200mA, V _{GS} =-10V |

NOTE:

[1] T_J=+25°C to +150°C.

[2] Repetitive rating, pulse width limited by maximum junction temperature.

[3] Pulse width ≤ 380μs, duty cycle ≤ 2%.

Typical Characteristics

Figure 1. Maximum Power Dissipation vs. Case Temperature

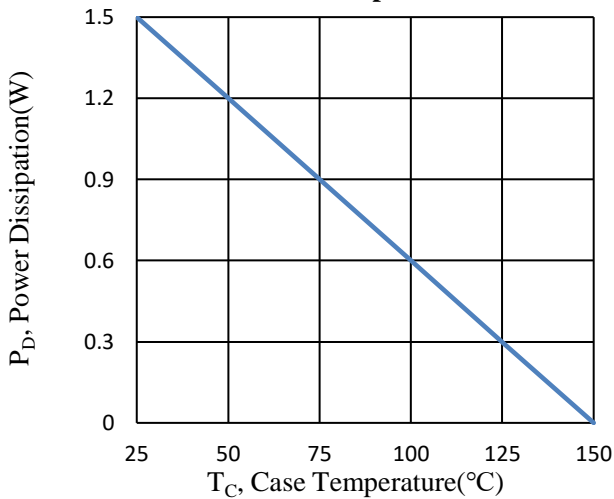


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

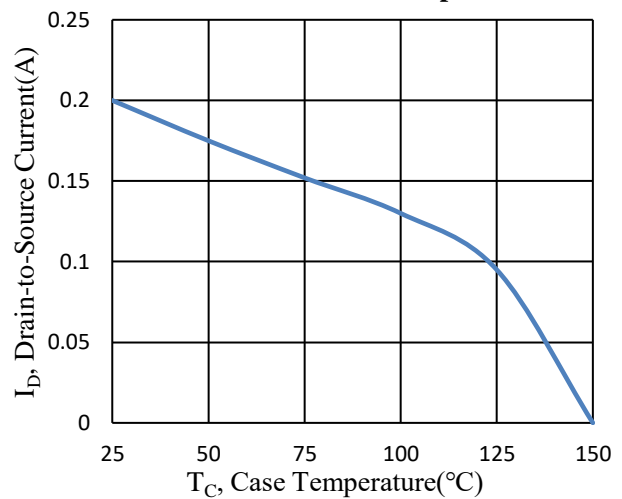


Figure 3. Typical Output Characteristics

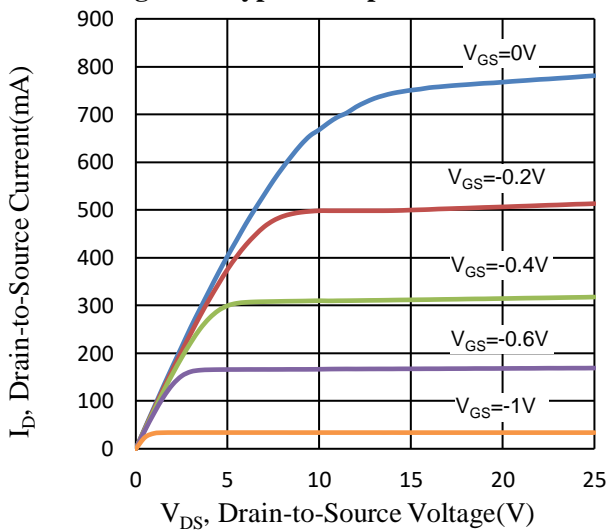


Figure 4. Typical Transfer Characteristics

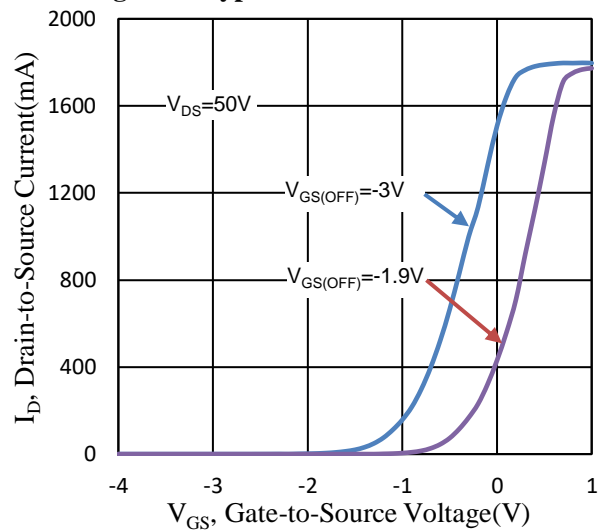


Figure 5. Typical Transfer Characteristics

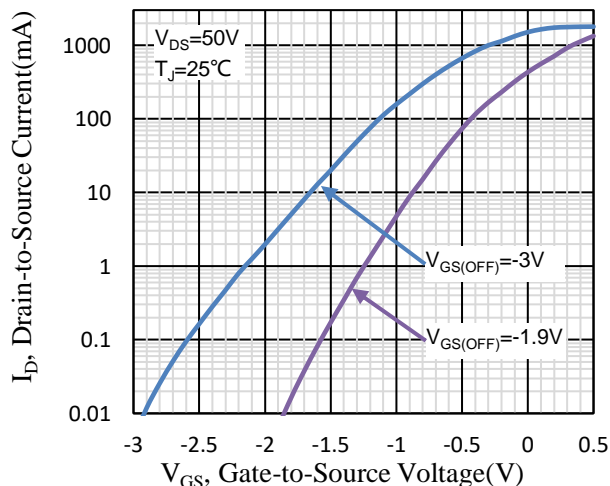


Figure 6. Typical Capacitance vs. Drain-to-Source Voltage

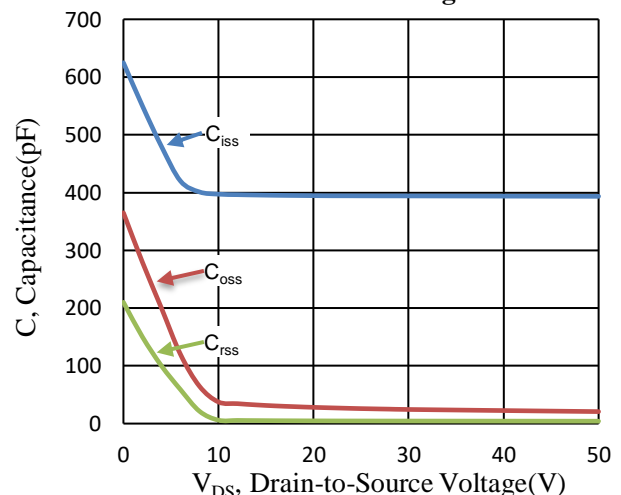


Figure 7. Typical Gate Charge vs. Gate-to-Source Voltage

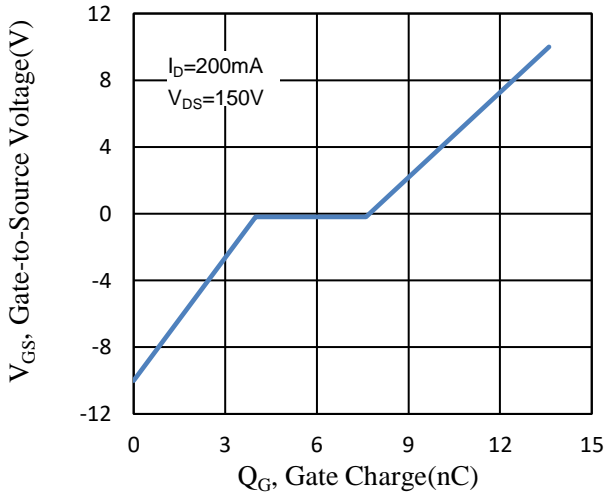


Figure 8. Normalized On-Resistance vs. Junction Temperature

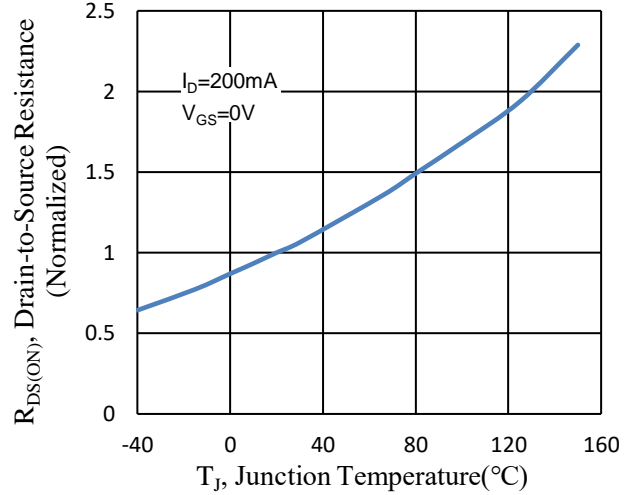


Figure 9. Gate-to-Source Cut-off Voltage vs. Junction Temperature

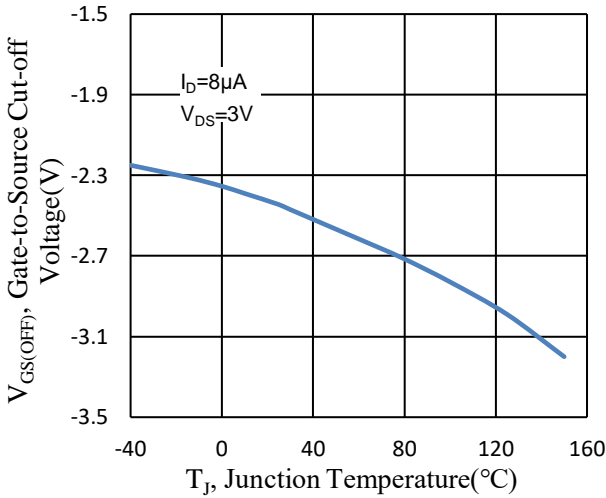


Figure 10. Drain-to-Source Breakdown Voltage vs. Junction Temperature

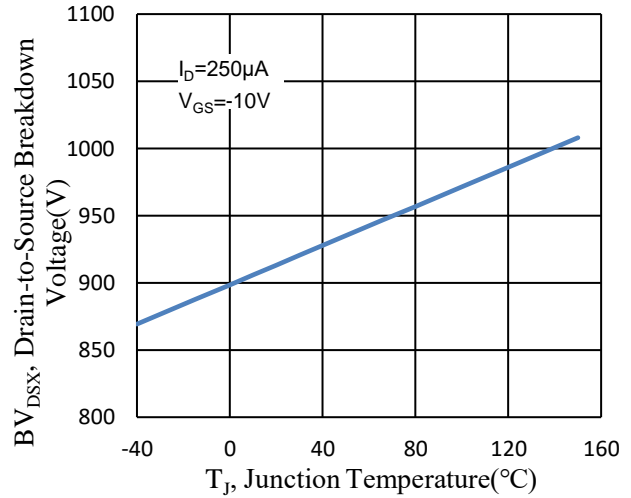
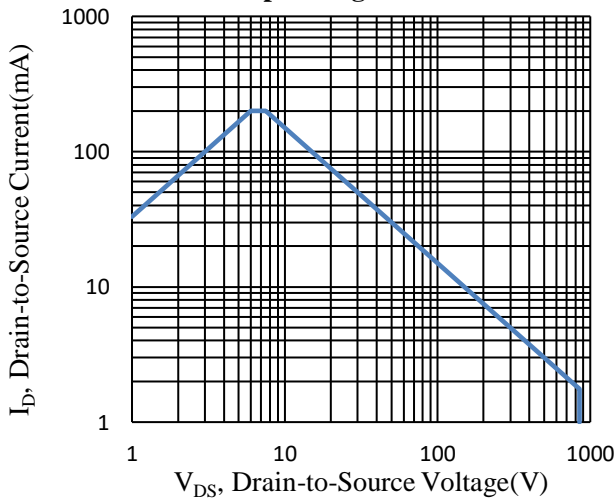
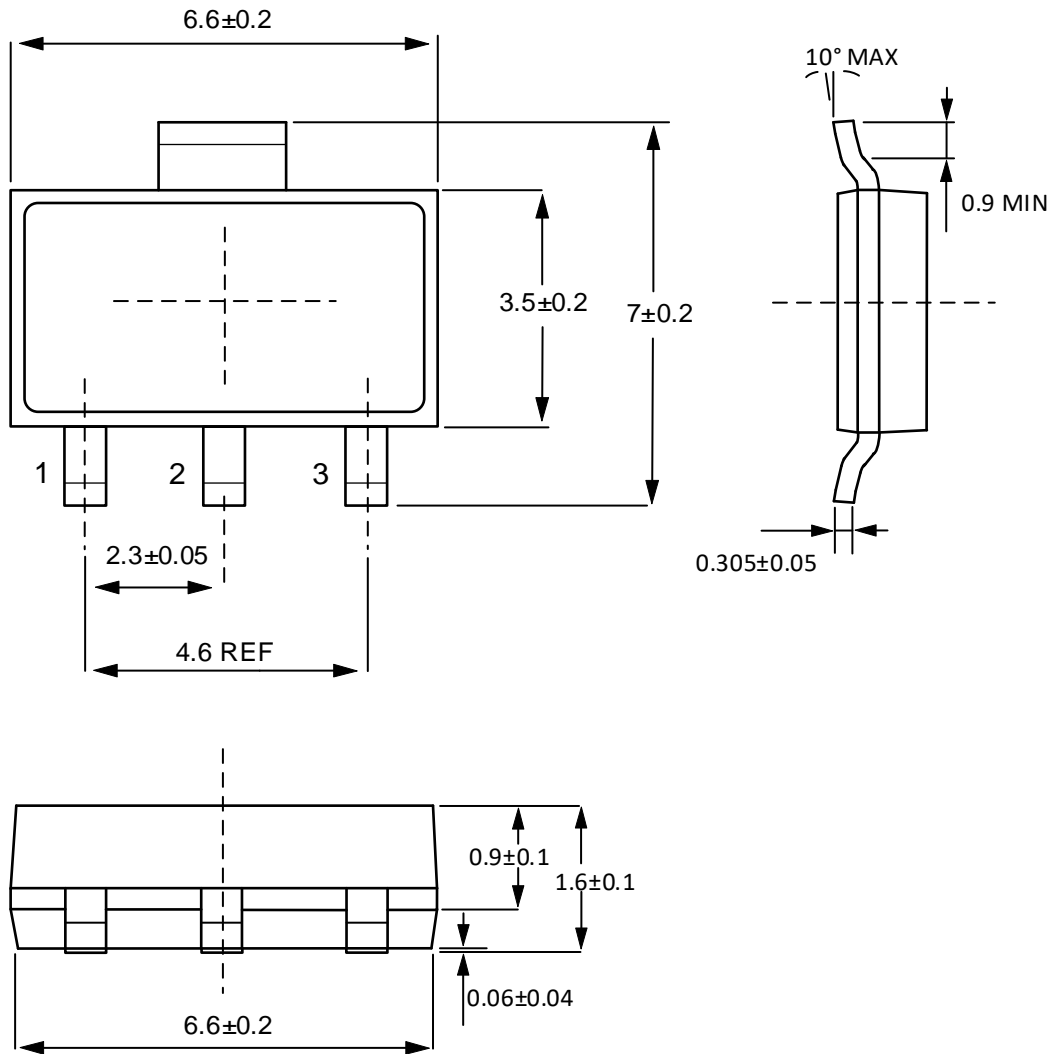


Figure 11. Maximum Forward Safe Operating Area



Package Dimensions

SOT-223





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