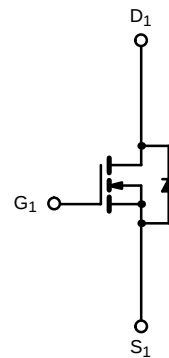
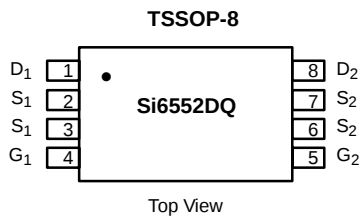




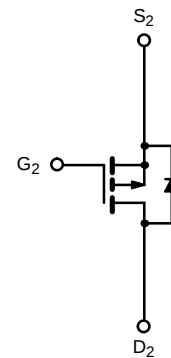
## Dual N- and P-Channel 20-V (D-S) MOSFET

### PRODUCT SUMMARY

|           | $V_{DS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|-----------|--------------|---------------------------|-----------|
| N-Channel | 20           | 0.08 @ $V_{GS} = 4.5$ V   | $\pm 2.8$ |
|           |              | 0.11 @ $V_{GS} = 2.5$ V   | $\pm 2.1$ |
| P-Channel | -12          | 0.1 @ $V_{GS} = -4.5$ V   | $\pm 2.5$ |
|           |              | 0.18 @ $V_{GS} = -2.5$ V  | $\pm 1.9$ |



N-Channel MOSFET



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

| Parameter                                                      |                       | Symbol                            | N-Channel  | P-Channel | Unit |
|----------------------------------------------------------------|-----------------------|-----------------------------------|------------|-----------|------|
| Drain-Source Voltage                                           |                       | V <sub>DS</sub>                   | 20         | -12       | V    |
| Gate-Source Voltage                                            |                       | V <sub>GS</sub>                   | ±8         |           |      |
| Continuous Drain Current (T <sub>J</sub> = 150°C) <sup>a</sup> | T <sub>A</sub> = 25°C | I <sub>D</sub>                    | ± 2.8      | ± 2.5     | A    |
|                                                                | T <sub>A</sub> = 70°C |                                   | ± 2.3      | ± 2.0     |      |
| Pulsed Drain Current                                           |                       | I <sub>DM</sub>                   | ± 20       |           |      |
| Continuous Source Current (Diode Conduction) <sup>a</sup>      |                       | I <sub>S</sub>                    | 1.0        | -1.0      | W    |
| Maximum Power Dissipation <sup>a</sup>                         | T <sub>A</sub> = 25°C | P <sub>D</sub>                    | 1.0        |           |      |
|                                                                | T <sub>A</sub> = 70°C |                                   | 0.64       |           |      |
| Operating Junction and Storage Temperature Range               |                       | T <sub>J</sub> , T <sub>stg</sub> | -55 to 150 |           | °C   |

### THERMAL RESISTANCE RATINGS

| Parameter                                | Symbol     | N- or P-Channel | Unit               |
|------------------------------------------|------------|-----------------|--------------------|
| Maximum Junction-to-Ambient <sup>a</sup> | $R_{thJA}$ | 125             | $^\circ\text{C/W}$ |

Notes

a. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

**SPECIFICATIONS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)**

| Parameter                                     | Symbol              | Test Condition                                                                                                                                                                                                                                                            |      | Min  | Typ | Max  | Unit |
|-----------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|-----|------|------|
| Static                                        |                     |                                                                                                                                                                                                                                                                           |      |      |     |      |      |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                                                                                                                                                                                               | N-Ch | 0.6  |     |      | V    |
|                                               |                     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA                                                                                                                                                                                                              | P-Ch | -0.6 |     |      |      |
| Gate-Body Leakage                             | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±8 V                                                                                                                                                                                                                             |      |      |     | ±100 | nA   |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>    | V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V                                                                                                                                                                                                                             | N-Ch |      |     | 1    | μA   |
|                                               |                     | V <sub>DS</sub> = -12 V, V <sub>GS</sub> = 0 V                                                                                                                                                                                                                            | P-Ch |      |     | -1   |      |
|                                               |                     | V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70°C                                                                                                                                                                                                      | N-Ch |      |     | 5    |      |
|                                               |                     | V <sub>DS</sub> = -12 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70°C                                                                                                                                                                                                     | P-Ch |      |     | -5   |      |
| On-State Drain Current <sup>a</sup>           | I <sub>D(on)</sub>  | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 4.5 V                                                                                                                                                                                                                            | N-Ch | 10   |     |      | A    |
|                                               |                     | V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -4.5 V                                                                                                                                                                                                                          | P-Ch | -10  |     |      |      |
|                                               |                     | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 2.5 V                                                                                                                                                                                                                            | N-Ch | 4    |     |      |      |
|                                               |                     | V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -2.5 V                                                                                                                                                                                                                          | P-Ch | -4   |     |      |      |
| Drain-Source On-State Resistance <sup>a</sup> | r <sub>DS(on)</sub> | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 2.8 A                                                                                                                                                                                                                           | N-Ch |      |     | 0.08 | Ω    |
|                                               |                     | V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = 2.5 A                                                                                                                                                                                                                          | P-Ch |      |     | 0.1  |      |
|                                               |                     | V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 2.1 A                                                                                                                                                                                                                           | N-Ch |      |     | 0.11 |      |
|                                               |                     | V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = 1.9 A                                                                                                                                                                                                                          | P-Ch |      |     | 0.18 |      |
| Forward Transconductance <sup>a</sup>         | g <sub>fs</sub>     | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 2.8 A                                                                                                                                                                                                                            | N-Ch |      | 12  |      | S    |
|                                               |                     | V <sub>DS</sub> = -9 V, I <sub>D</sub> = -2.5 A                                                                                                                                                                                                                           | P-Ch |      | 7   |      |      |
| Diode Forward Voltage <sup>a</sup>            | V <sub>SD</sub>     | I <sub>S</sub> = 1.0 A, V <sub>GS</sub> = 0 V                                                                                                                                                                                                                             | N-Ch |      |     | 1.2  | V    |
|                                               |                     | I <sub>S</sub> = -1.0 A, V <sub>GS</sub> = 0 V                                                                                                                                                                                                                            | P-Ch |      |     | -1.2 |      |
| Dynamic <sup>b</sup>                          |                     |                                                                                                                                                                                                                                                                           |      |      |     |      |      |
| Total Gate Charge                             | Q <sub>g</sub>      | N-Channel<br>V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 2.8 A<br>P-Channel<br>V <sub>DS</sub> = -6 V, V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -2.5 A                                                                                            | N-Ch |      | 16  | 40   | nC   |
| Gate-Source Charge                            | Q <sub>gs</sub>     |                                                                                                                                                                                                                                                                           | P-Ch |      | 9   | 20   |      |
|                                               |                     |                                                                                                                                                                                                                                                                           | N-Ch |      | 3   |      |      |
| Gate-Drain Charge                             | Q <sub>gd</sub>     |                                                                                                                                                                                                                                                                           | P-Ch |      | 2   |      |      |
|                                               |                     | N-Ch                                                                                                                                                                                                                                                                      |      | 6    |     |      |      |
| Turn-On Delay Time                            | t <sub>d(on)</sub>  | P-Ch                                                                                                                                                                                                                                                                      |      | 3    |     |      |      |
|                                               |                     | N-Channel<br>V <sub>DD</sub> = 10 V, R <sub>L</sub> = 10 Ω<br>I <sub>D</sub> ≅ 1 A, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 6 Ω<br>P-Channel<br>V <sub>DD</sub> = -6 V, R <sub>L</sub> = 6 Ω<br>I <sub>D</sub> ≅ -1 A, V <sub>GEN</sub> = -4.5 V, R <sub>G</sub> = 6 Ω | N-Ch |      | 37  | 60   | ns   |
| P-Ch                                          |                     |                                                                                                                                                                                                                                                                           | 21   | 40   |     |      |      |
| Rise Time                                     | t <sub>r</sub>      |                                                                                                                                                                                                                                                                           | N-Ch |      | 66  | 100  |      |
|                                               |                     |                                                                                                                                                                                                                                                                           | P-Ch |      | 35  | 70   |      |
| Turn-Off Delay Time                           | t <sub>d(off)</sub> | N-Ch                                                                                                                                                                                                                                                                      |      | 56   | 100 |      |      |
|                                               |                     | P-Ch                                                                                                                                                                                                                                                                      |      | 43   | 80  |      |      |
| Fall Time                                     | t <sub>f</sub>      | N-Ch                                                                                                                                                                                                                                                                      |      | 57   | 100 |      |      |
|                                               |                     | P-Ch                                                                                                                                                                                                                                                                      |      | 22   | 40  |      |      |
| Source-Drain Reverse Recovery Time            | t <sub>rr</sub>     | N-Channel—I <sub>F</sub> = 1.0 A, di/dt = 100 A/μs                                                                                                                                                                                                                        | N-Ch |      | 26  | 70   |      |
|                                               |                     | P-Channel—I <sub>F</sub> = -1.0 A, di/dt = 100 A/μs                                                                                                                                                                                                                       | P-Ch |      | 35  | 70   |      |

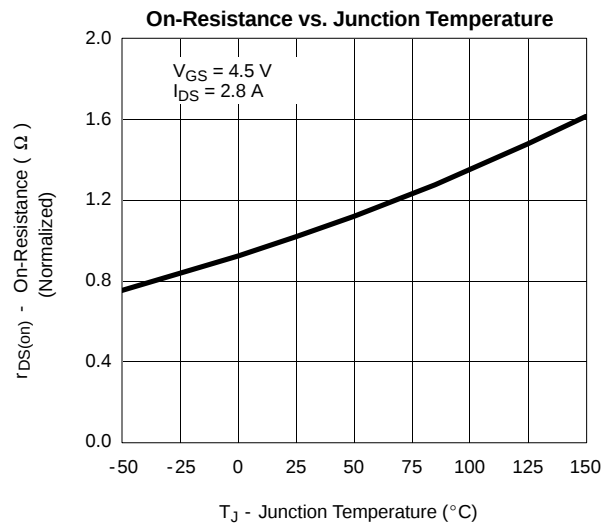
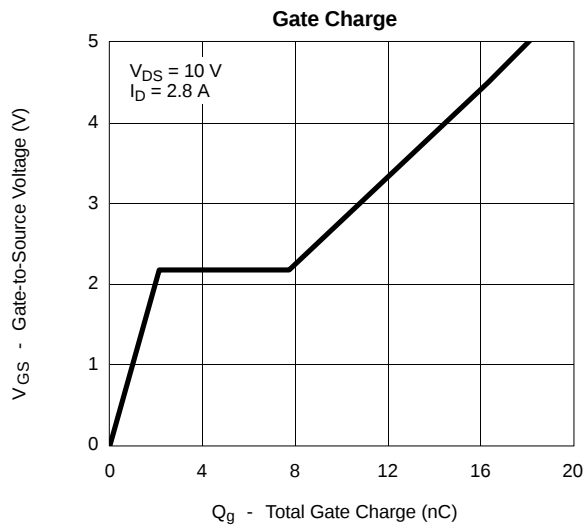
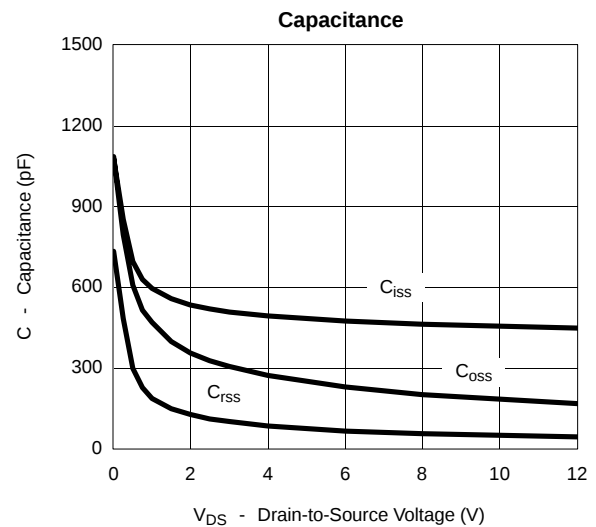
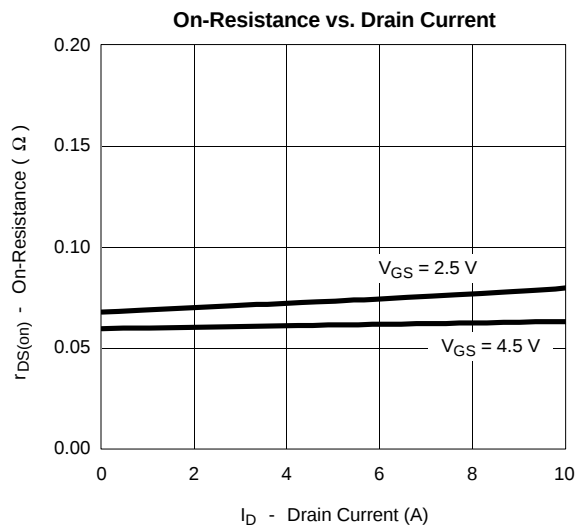
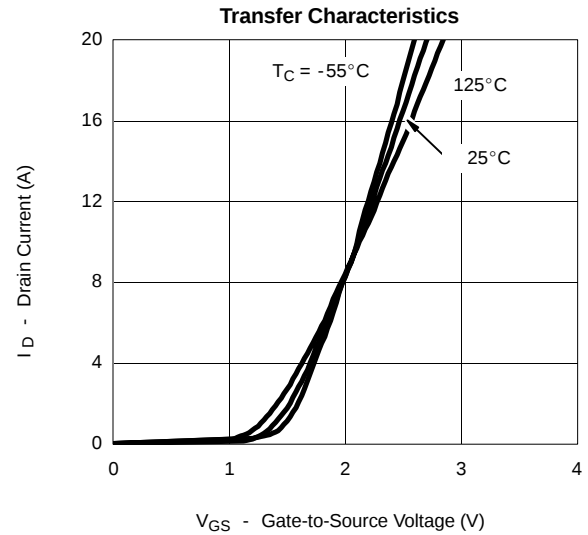
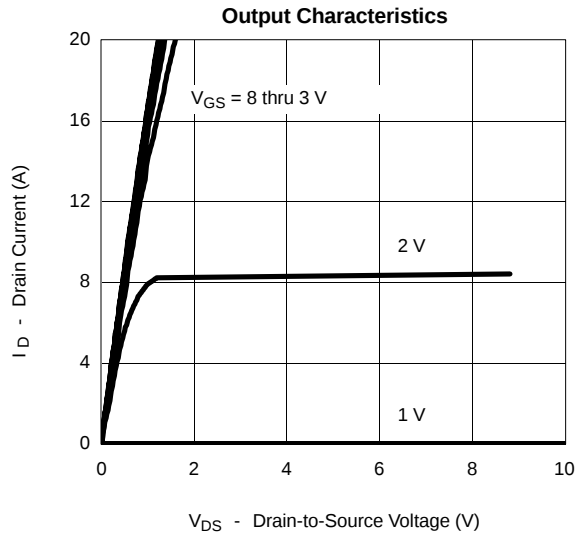
## Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.  
 b. Guaranteed by design, not subject to production testing.



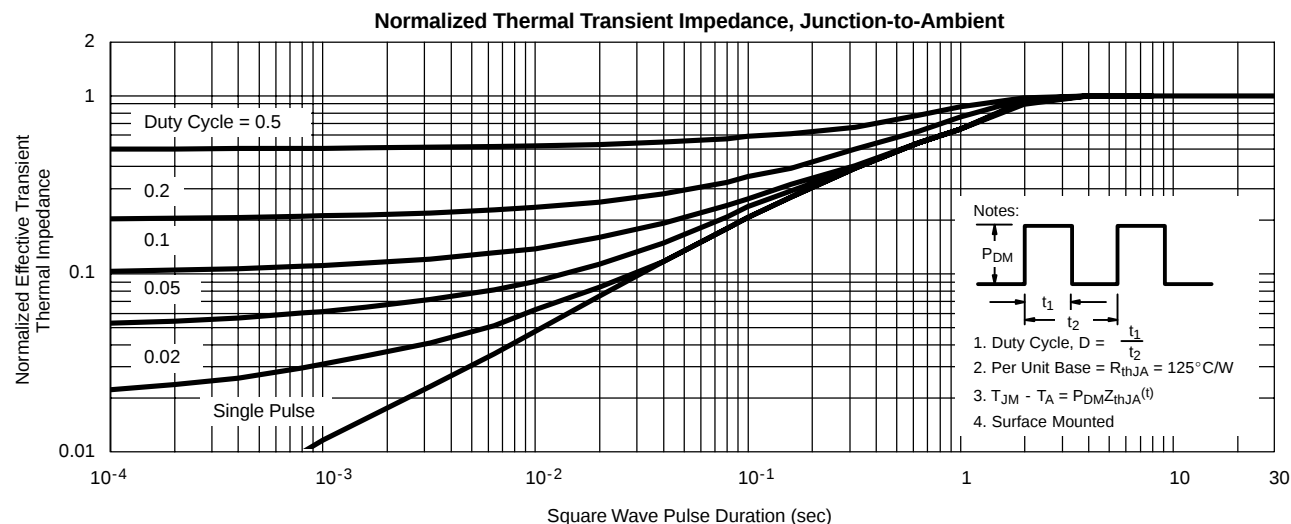
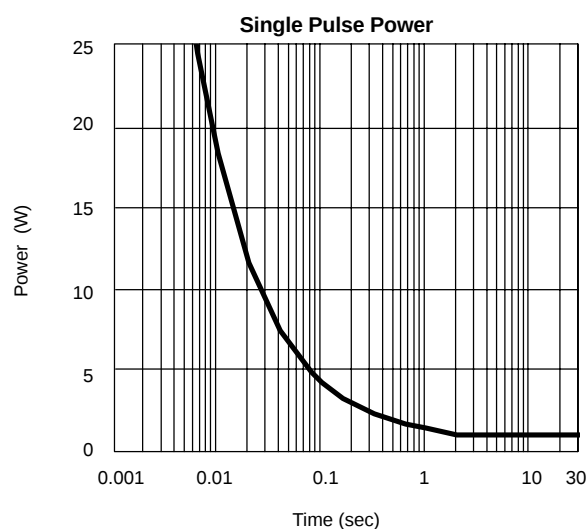
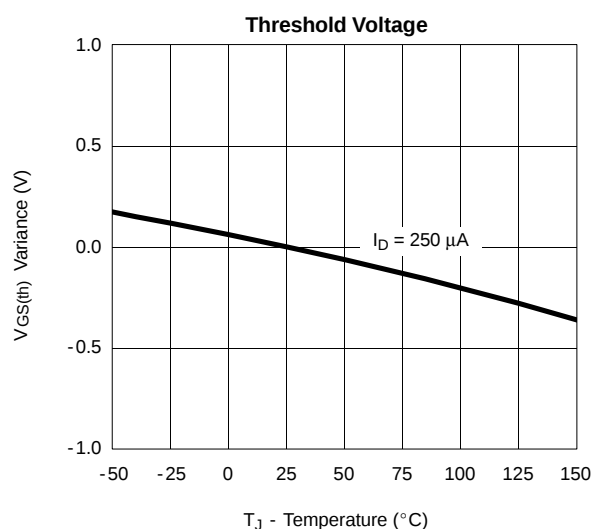
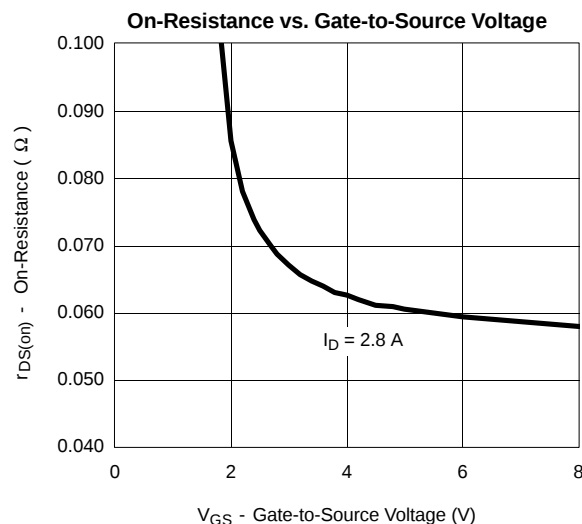
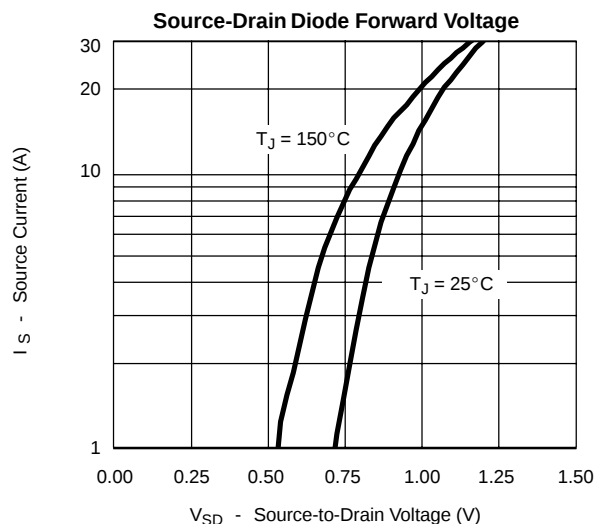
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

**N-CHANNEL**



**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

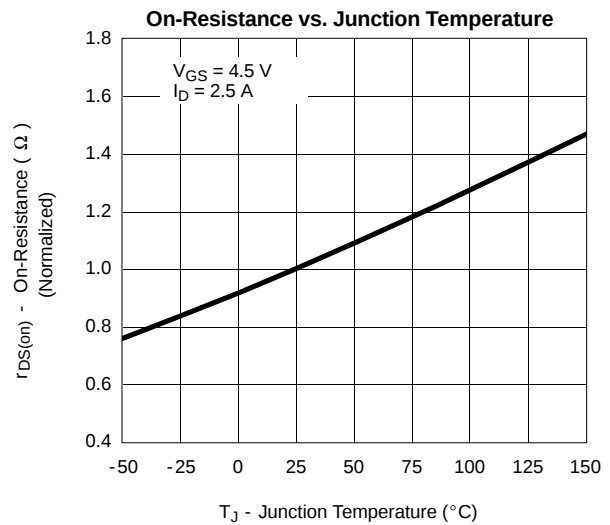
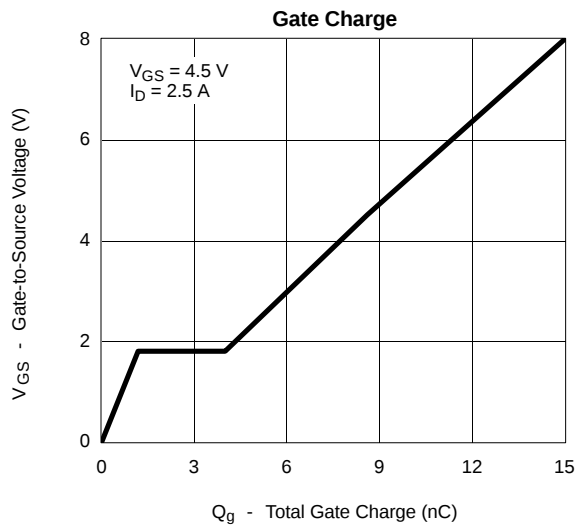
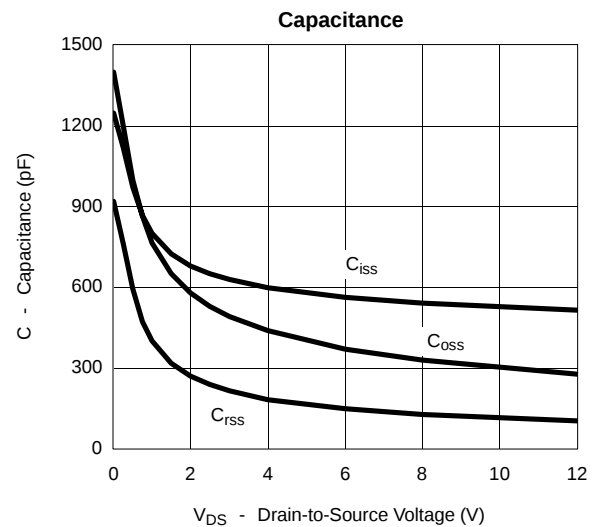
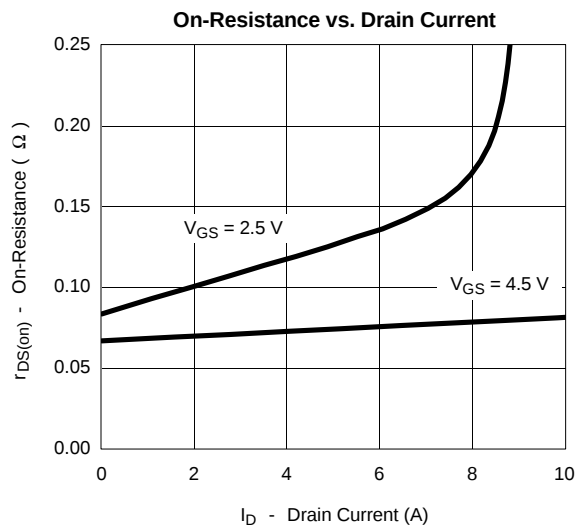
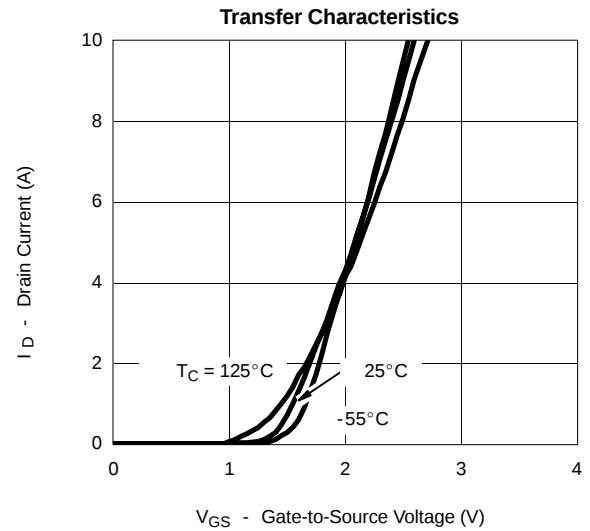
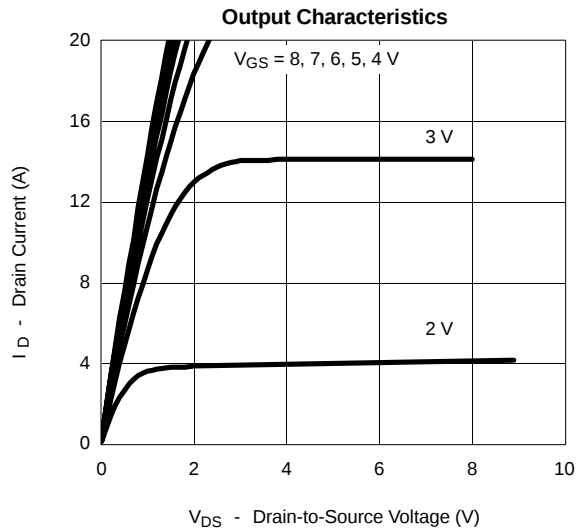
**N-CHANNEL**





**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

**P-CHANNEL**



**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

**P-CHANNEL**

