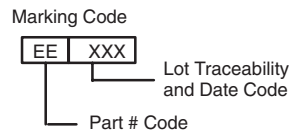
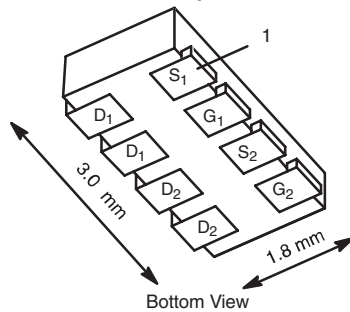


## N- and P-Channel 30 V (D-S) MOSFET

| PRODUCT SUMMARY |                     |                                    |                    |                       |
|-----------------|---------------------|------------------------------------|--------------------|-----------------------|
|                 | V <sub>DS</sub> (V) | R <sub>DS(on)</sub> (Ω)            | I <sub>D</sub> (A) | Q <sub>g</sub> (Typ.) |
| N-Channel       | 30                  | 0.055 at V <sub>GS</sub> = 4.5 V   | 4 <sup>a,g</sup>   | 4.2 nC                |
|                 |                     | 0.090 at V <sub>GS</sub> = 2.5 V   | 4 <sup>a,g</sup>   |                       |
| P-Channel       | - 30                | 0.150 at V <sub>GS</sub> = - 4.5 V | - 3.6 <sup>a</sup> | 2.85 nC               |
|                 |                     | 0.256 at V <sub>GS</sub> = - 2.5 V | - 2.7 <sup>a</sup> |                       |

1206-8 ChipFET®



Ordering Information: Si5511DC-T1-E3 (Lead (Pb)-free)  
Si5511DC-T1-GE3 (Lead (Pb)-free and Halogen-free)

### FEATURES

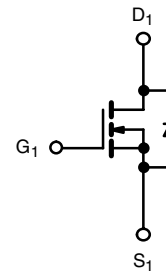
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- Compliant to RoHS Directive 2002/95/EC



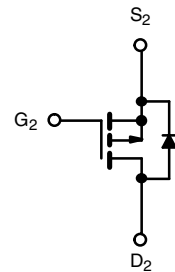
**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available

### APPLICATIONS

- Buck-Boost
- DSC
- Portable Devices



N-Channel MOSFET



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS T<sub>A</sub> = 25 °C, unless otherwise noted

| Parameter                                                    |                        | Symbol                            | N-Channel            | P-Channel             | Unit |
|--------------------------------------------------------------|------------------------|-----------------------------------|----------------------|-----------------------|------|
| Drain-Source Voltage                                         |                        | V <sub>DS</sub>                   | 30                   | - 30                  | V    |
| Gate-Source Voltage                                          |                        | V <sub>GS</sub>                   | ± 12                 |                       |      |
| Continuous Drain Current (T <sub>J</sub> = 150 °C)           | T <sub>C</sub> = 25 °C | I <sub>D</sub>                    | 4 <sup>a, g</sup>    | - 3.6 <sup>a</sup>    | A    |
|                                                              | T <sub>C</sub> = 70 °C |                                   | 4 <sup>a, g</sup>    | - 2.8 <sup>a</sup>    |      |
|                                                              | T <sub>A</sub> = 25 °C |                                   | 4 <sup>a, g</sup>    | - 2.3 <sup>b, c</sup> |      |
|                                                              | T <sub>A</sub> = 70 °C |                                   | 3.9 <sup>a</sup>     | - 1.8 <sup>b, c</sup> |      |
| Pulsed Drain Current                                         |                        | I <sub>DM</sub>                   | 15                   | - 10                  |      |
| Source Drain Current Diode Current                           | T <sub>C</sub> = 25 °C | I <sub>S</sub>                    | 2.6                  | - 2.6                 |      |
|                                                              | T <sub>A</sub> = 25 °C |                                   | 1.7 <sup>b, c</sup>  | - 1.7 <sup>b, c</sup> |      |
| Maximum Power Dissipation                                    | T <sub>C</sub> = 25 °C | P <sub>D</sub>                    | 3.1                  | 2.6                   | W    |
|                                                              | T <sub>C</sub> = 70 °C |                                   | 2.0                  | 1.7                   |      |
|                                                              | T <sub>A</sub> = 25 °C |                                   | 2.1 <sup>b, c</sup>  | 1.3 <sup>b, c</sup>   |      |
|                                                              | T <sub>A</sub> = 70 °C |                                   | 1.33 <sup>b, c</sup> | 0.84 <sup>b, c</sup>  |      |
| Operating Junction and Storage Temperature Range             |                        | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 150          |                       | °C   |
| Soldering Recommendations (Peak Temperature) <sup>d, e</sup> |                        |                                   | 260                  |                       |      |

### THERMAL RESISTANCE RATINGS

| Parameter                                   | Symbol            | N-Channel |      | P-Channel |      | Unit |
|---------------------------------------------|-------------------|-----------|------|-----------|------|------|
|                                             |                   | Typ.      | Max. | Typ.      | Max. |      |
| Maximum Junction-to-Ambient <sup>b, f</sup> | R <sub>thJA</sub> | 50        | 60   | 77        | 95   | °C/W |
| Maximum Junction-to-Foot (Drain)            | R <sub>thJF</sub> | 30        | 40   | 33        | 40   |      |

Notes:

- Based on T<sub>C</sub> = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 5 s.
- See Reliability Manual for profile. The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is 110 °C/W for N-Channel and 130 °C/W for P-Channel.
- Package limited.

**SPECIFICATIONS**  $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted

| Parameter                                     | Symbol                               | Test Conditions                                                                            |      | Min.  | Typ. <sup>a</sup> | Max.  | Unit  |  |  |
|-----------------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------|------|-------|-------------------|-------|-------|--|--|
| Static                                        |                                      |                                                                                            |      |       |                   |       |       |  |  |
| Drain-Source Breakdown Voltage                | V <sub>DS</sub>                      | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA                                             | N-Ch | 30    |                   |       | V     |  |  |
|                                               |                                      | V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 250 μA                                           | P-Ch | - 30  |                   |       |       |  |  |
| V <sub>DS</sub> Temperature Coefficient       | ΔV <sub>DS</sub> /T <sub>J</sub>     | I <sub>D</sub> = 250 μA                                                                    | N-Ch |       | 24.2              |       | mV/°C |  |  |
|                                               |                                      | I <sub>D</sub> = - 250 μA                                                                  | P-Ch |       | - 23.1            |       |       |  |  |
| V <sub>GS(th)</sub> Temperature Coefficient   | ΔV <sub>GS(th)</sub> /T <sub>J</sub> | I <sub>D</sub> = 250 μA                                                                    | N-Ch |       | 3.6               |       |       |  |  |
|                                               |                                      | I <sub>D</sub> = - 250 μA                                                                  | P-Ch |       | 2.3               |       |       |  |  |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub>                  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                | N-Ch | 0.7   |                   | 2     | V     |  |  |
|                                               |                                      | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = - 250 μA                              | P-Ch | - 0.7 |                   | - 2   |       |  |  |
| Gate-Body Leakage                             | I <sub>GSS</sub>                     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 12 V                                            | N-Ch |       |                   | 100   | nA    |  |  |
|                                               |                                      |                                                                                            | P-Ch |       |                   | - 100 |       |  |  |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>                     | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V                                              | N-Ch |       |                   | 1     | μA    |  |  |
|                                               |                                      | V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V                                            | P-Ch |       |                   | - 1   |       |  |  |
|                                               |                                      | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C                      | N-Ch |       |                   | 10    |       |  |  |
|                                               |                                      | V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C                    | P-Ch |       |                   | - 10  |       |  |  |
| On-State Drain Current <sup>b</sup>           | I <sub>D(on)</sub>                   | V <sub>DS</sub> ≤ 5 V, V <sub>GS</sub> = 4.5 V                                             | N-Ch | 15    |                   |       | A     |  |  |
|                                               |                                      | V <sub>DS</sub> ≤ - 5 V, V <sub>GS</sub> = - 4.5 V                                         | P-Ch | - 10  |                   |       |       |  |  |
| Drain-Source On-State Resistance <sup>b</sup> | R <sub>DS(on)</sub>                  | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.8 A                                            | N-Ch |       | 0.045             | 0.055 | Ω     |  |  |
|                                               |                                      | V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 2.3 A                                        | P-Ch |       | 0.125             | 0.150 |       |  |  |
|                                               |                                      | V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 3.8 A                                            | N-Ch |       | 0.075             | 0.090 |       |  |  |
|                                               |                                      | V <sub>GS</sub> = - 2.5 V, I <sub>D</sub> = 1.8 A                                          | P-Ch |       | 0.213             | 0.256 |       |  |  |
| Forward Transconductance <sup>b</sup>         | g <sub>fs</sub>                      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 4.8 A                                             | N-Ch |       | 10.8              |       | S     |  |  |
|                                               |                                      | V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 2.3 A                                         | P-Ch |       | 6.56              |       |       |  |  |
| Dynamic <sup>a</sup>                          |                                      |                                                                                            |      |       |                   |       |       |  |  |
| Input Capacitance                             | C <sub>iss</sub>                     | N-Channel<br>V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz                      | N-Ch |       | 435               |       | pF    |  |  |
|                                               |                                      |                                                                                            | P-Ch |       | 260               |       |       |  |  |
| Output Capacitance                            | C <sub>oss</sub>                     | P-Channel<br>V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz                    | N-Ch |       | 65                |       |       |  |  |
|                                               |                                      |                                                                                            | P-Ch |       | 55                |       |       |  |  |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>                     |                                                                                            | N-Ch |       | 30                |       |       |  |  |
|                                               |                                      |                                                                                            | P-Ch |       | 42                |       |       |  |  |
| Total Gate Charge                             | Q <sub>g</sub>                       | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 5 V, I <sub>D</sub> = 4.8 A                      | N-Ch |       | 4.7               | 7.1   | nC    |  |  |
|                                               |                                      | V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 5 V, I <sub>D</sub> = - 3.2 A                | P-Ch |       | 4.1               | 6.2   |       |  |  |
|                                               |                                      | N-Channel<br>V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 4.8 A       | N-Ch |       | 4.2               | 6.3   |       |  |  |
|                                               |                                      |                                                                                            | P-Ch |       | 3.8               | 4.6   |       |  |  |
| Gate-Source Charge                            | Q <sub>gs</sub>                      | P-Channel<br>V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 3.2 A | N-Ch |       | 1.1               |       |       |  |  |
|                                               |                                      |                                                                                            | P-Ch |       | 0.6               |       |       |  |  |
| Gate-Drain Charge                             | Q <sub>gd</sub>                      |                                                                                            | N-Ch |       | 0.9               |       |       |  |  |
|                                               |                                      |                                                                                            | P-Ch |       | 1.85              |       |       |  |  |
| Gate Resistance                               | R <sub>g</sub>                       | f = 1 MHz                                                                                  | N-Ch |       | 2.7               |       | Ω     |  |  |
|                                               |                                      |                                                                                            | P-Ch |       | 7.7               |       |       |  |  |



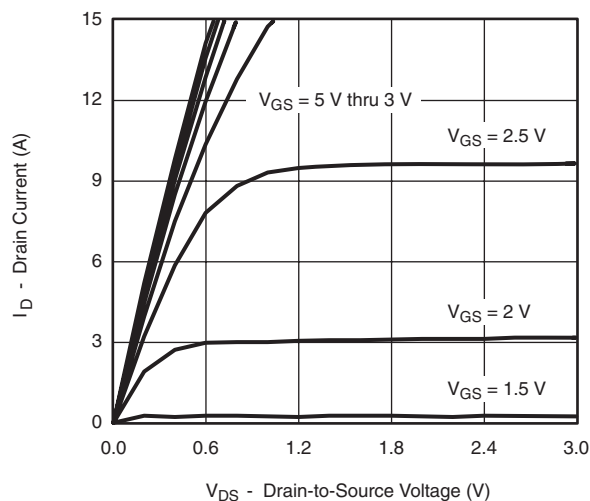
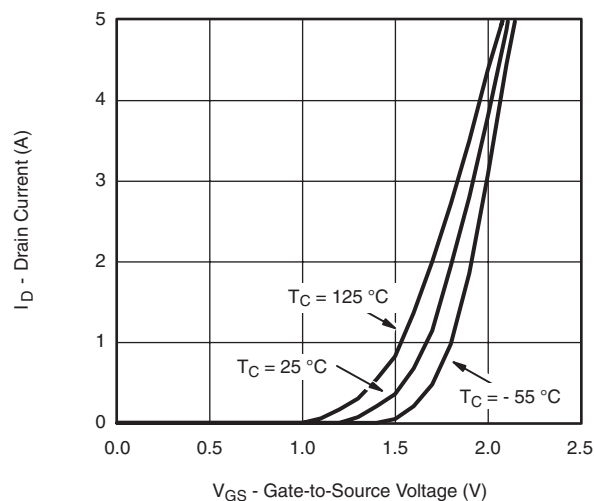
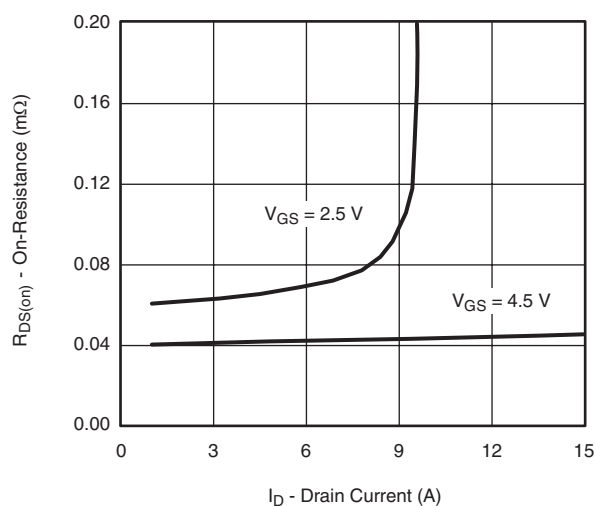
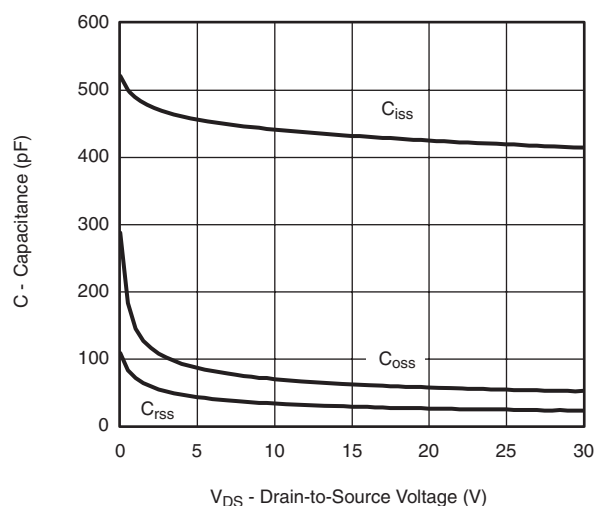
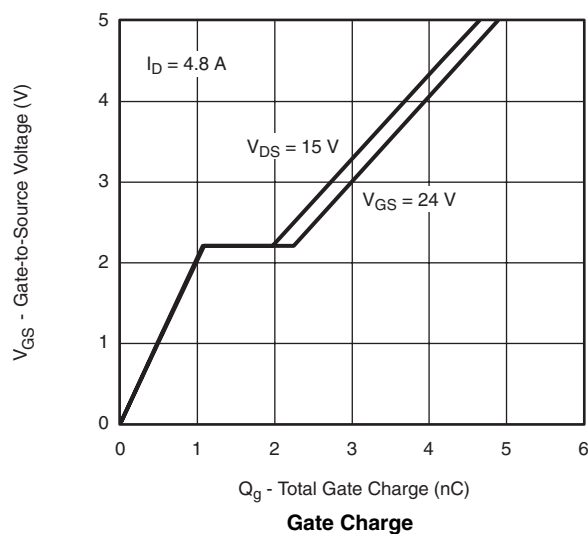
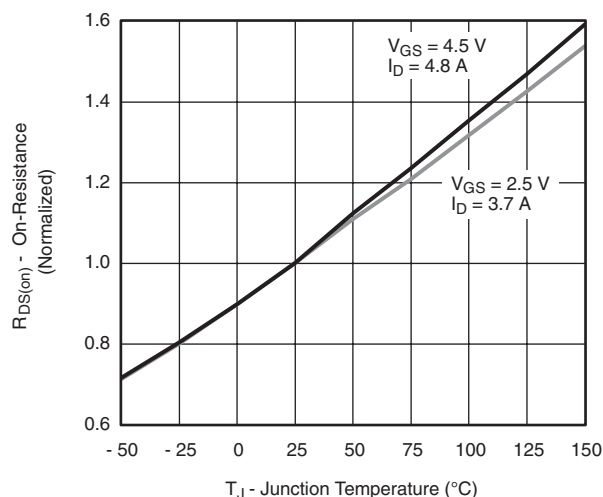
| SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted |                     |                                                                                                                                               |      |      |                   |       |      |
|---------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------|------|-------------------|-------|------|
| Parameter                                                     | Symbol              | Test Conditions                                                                                                                               |      | Min. | Typ. <sup>a</sup> | Max.  | Unit |
| Dynamic <sup>a</sup>                                          |                     |                                                                                                                                               |      |      |                   |       |      |
| Turn-On Delay Time                                            | t <sub>d(on)</sub>  | N-Channel<br>V <sub>DD</sub> = 15 V, R <sub>L</sub> = 3.95 Ω<br>I <sub>D</sub> ≅ 3.8 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω        | N-Ch |      | 9                 | 12    | ns   |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 15                | 23    |      |
| Rise Time                                                     | t <sub>r</sub>      |                                                                                                                                               | N-Ch |      | 45                | 68    |      |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 78                | 117   |      |
| Turn-Off Delay Time                                           | t <sub>d(off)</sub> | P-Channel<br>V <sub>DD</sub> = - 15 V, R <sub>L</sub> = 18.1 Ω<br>I <sub>D</sub> ≅ - 1.86 A, V <sub>GEN</sub> = - 4.5 V, R <sub>g</sub> = 1 Ω | N-Ch |      | 48                | 72    |      |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 33                | 50    |      |
| Fall Time                                                     | t <sub>f</sub>      |                                                                                                                                               | N-Ch |      | 28                | 42    |      |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 65                | 98    |      |
| Drain-Source Body Diode Characteristics                       |                     |                                                                                                                                               |      |      |                   |       |      |
| Continuous Source-Drain Diode Current                         | I <sub>S</sub>      | T <sub>C</sub> = 25 °C                                                                                                                        | N-Ch |      |                   | 2.6   | A    |
|                                                               |                     |                                                                                                                                               | P-Ch |      |                   | - 2.6 |      |
| Pulse Diode Forward Current <sup>a</sup>                      | I <sub>SM</sub>     |                                                                                                                                               | N-Ch |      |                   | 15    |      |
|                                                               |                     |                                                                                                                                               | P-Ch |      |                   | - 10  |      |
| Body Diode Voltage                                            | V <sub>SD</sub>     | I <sub>S</sub> = 2.4 A, V <sub>GS</sub> = 0 V                                                                                                 | N-Ch |      | 0.8               | 1.2   | V    |
|                                                               |                     | I <sub>S</sub> = - 1.5 A, V <sub>GS</sub> = 0 V                                                                                               | P-Ch |      | - 0.8             | - 1.2 |      |
| Body Diode Reverse Recovery Time                              | t <sub>rr</sub>     | N-Channel<br>I <sub>F</sub> = 2.4 A, dl/dt = 100 A/μs, T <sub>J</sub> = 25 °C                                                                 | N-Ch |      | 11.6              | 18    | ns   |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 19.8              | 30    |      |
| Body Diode Reverse Recovery Charge                            | Q <sub>rr</sub>     |                                                                                                                                               | N-Ch |      | 6.1               | 9.2   | nC   |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 17.5              | 27    |      |
| Reverse Recovery Fall Time                                    | t <sub>a</sub>      | P-Channel<br>I <sub>F</sub> = - 1.5 A, dl/dt = - 100 A/μs, T <sub>J</sub> = 25 °C                                                             | N-Ch |      | 8.4               |       | ns   |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 17.2              |       |      |
| Reverse Recovery Rise Time                                    | t <sub>b</sub>      |                                                                                                                                               | N-Ch |      | 3.2               |       |      |
|                                                               |                     |                                                                                                                                               | P-Ch |      | 2.6               |       |      |

Notes:

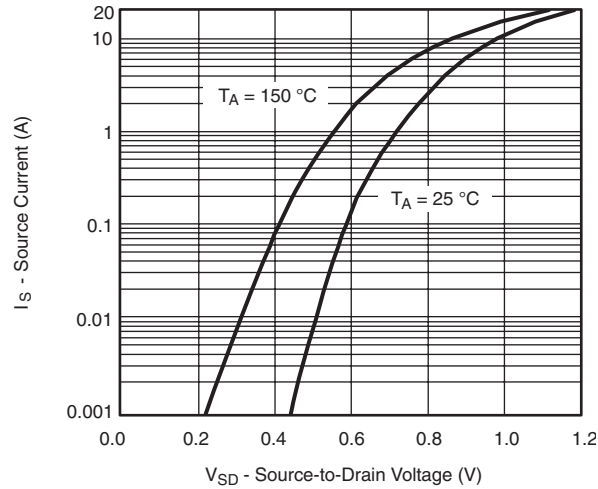
a. Guaranteed by design, not subject to production testing.

b. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\text{ }\%$ .

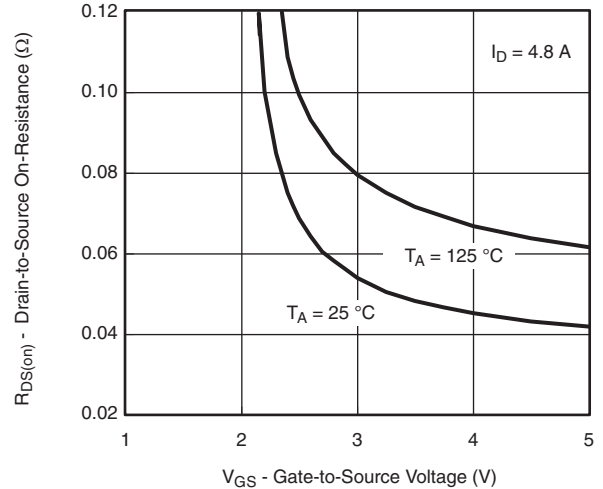
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current and Gate Voltage****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

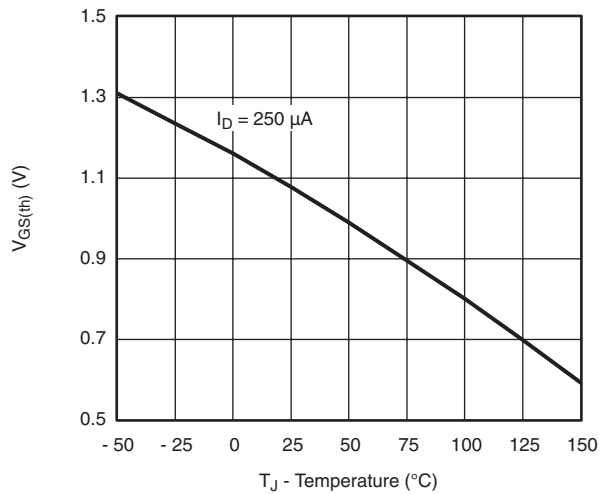
## N-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



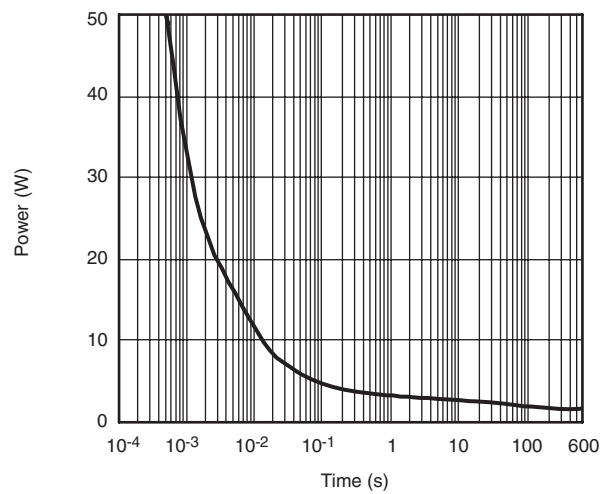
Source-Drain Diode Forward Voltage



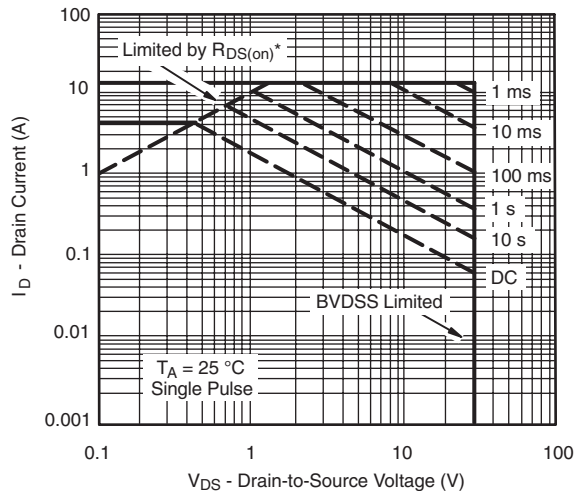
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

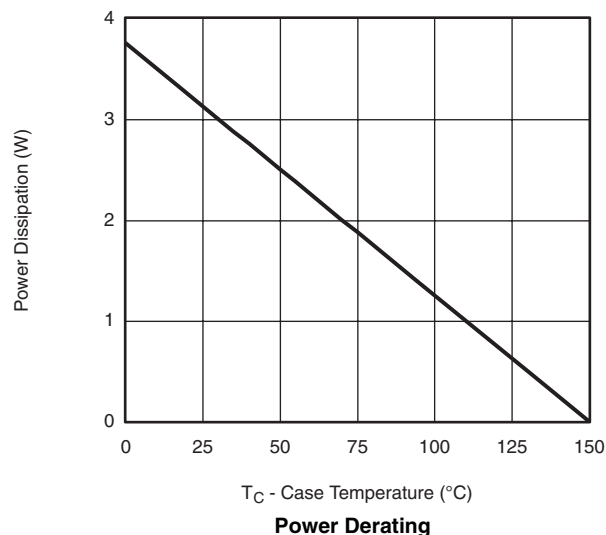
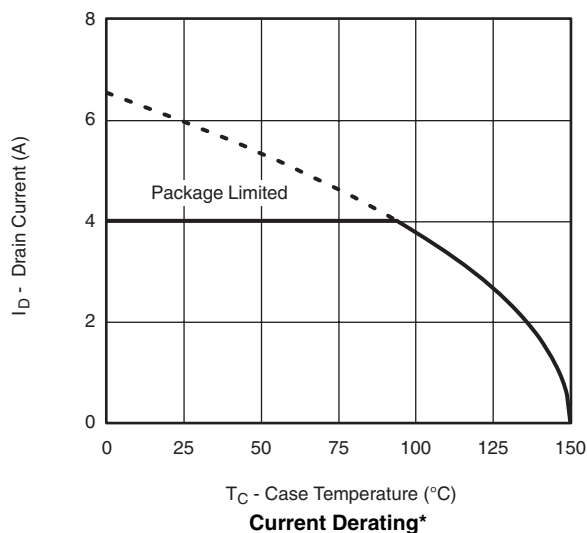


Single Pulse Power



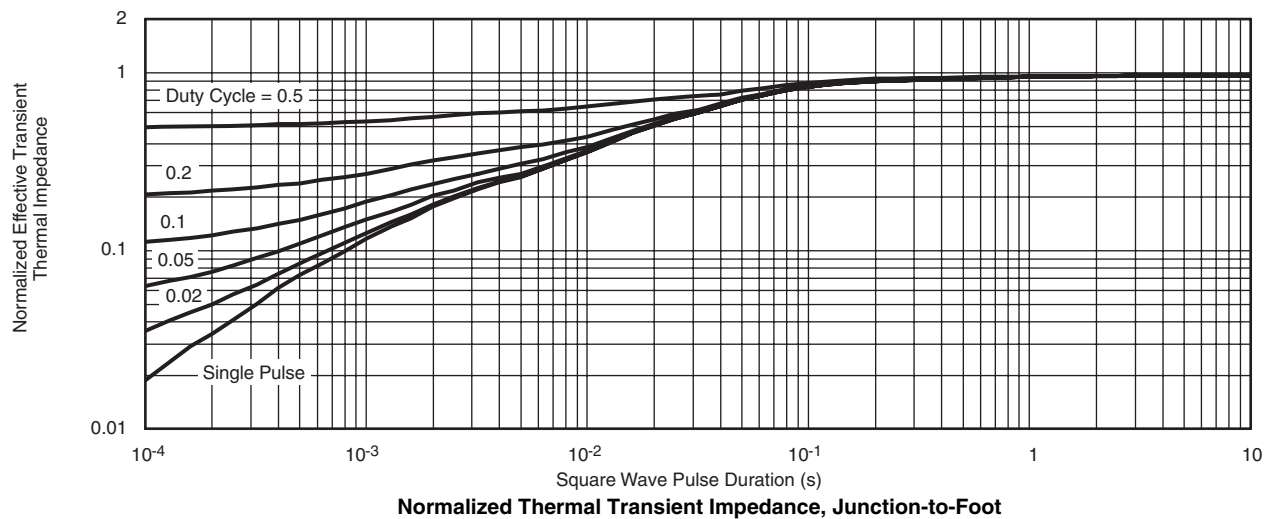
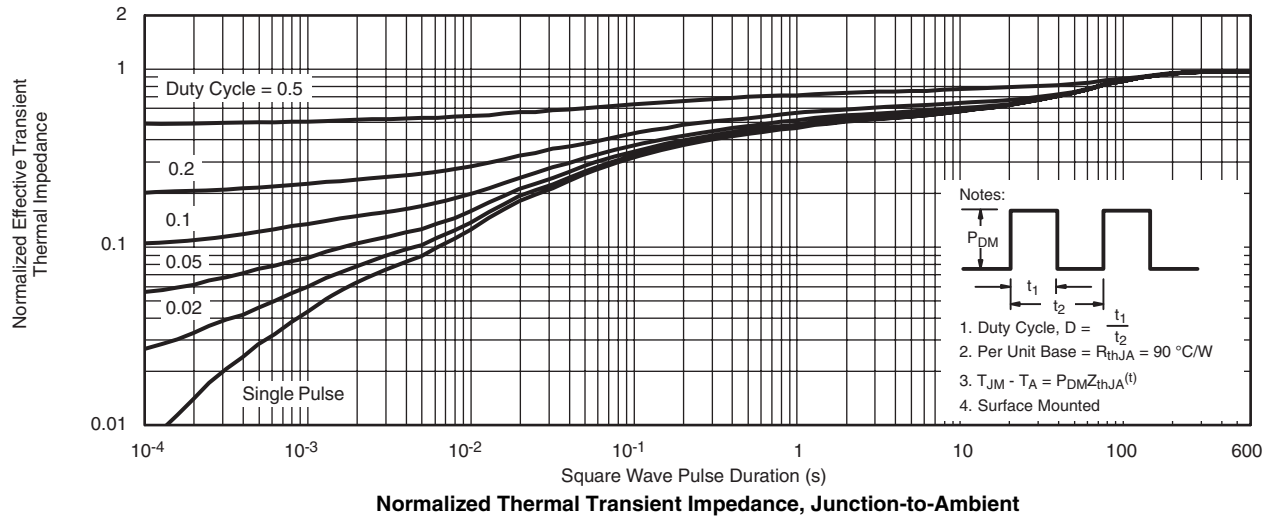
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

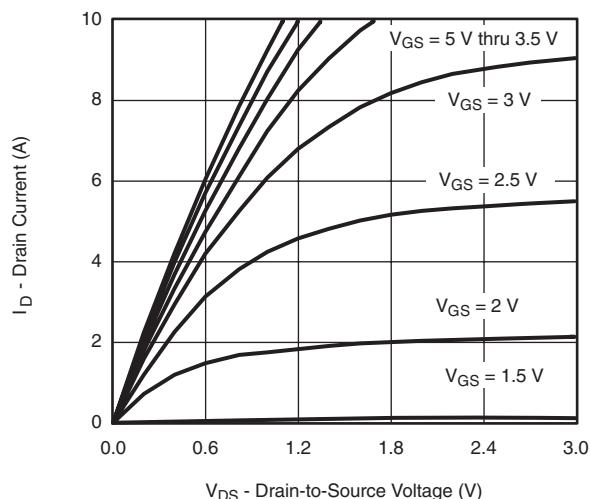
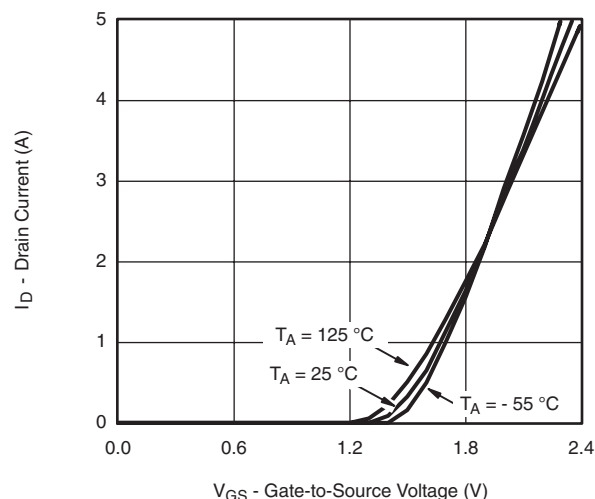
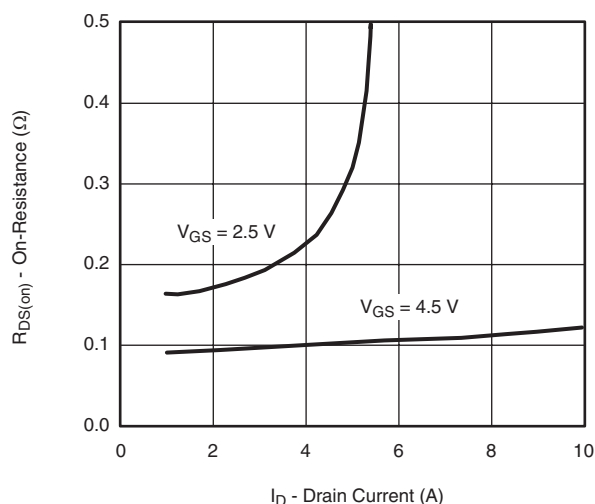
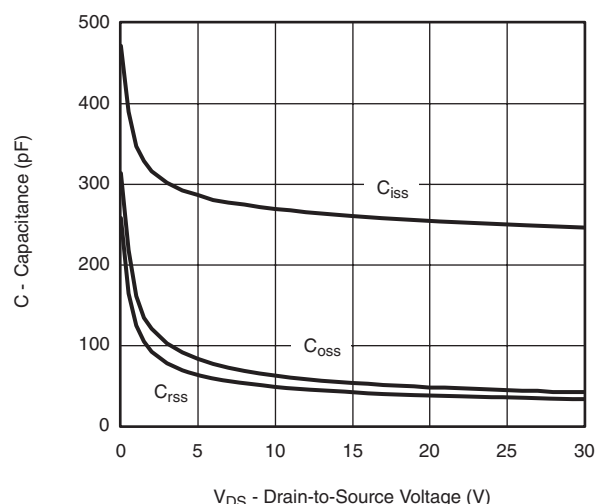
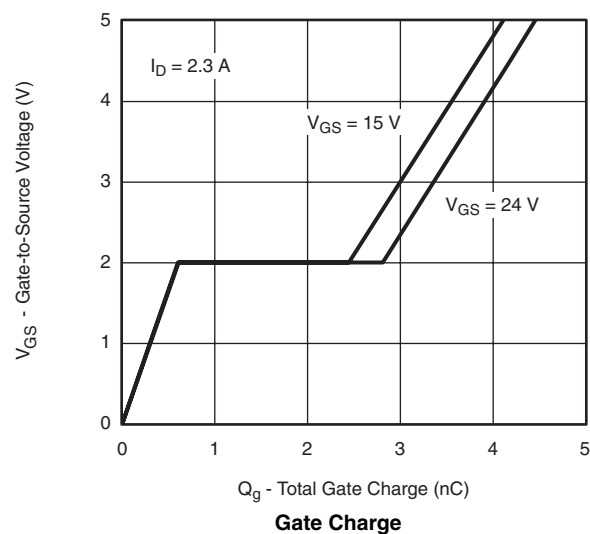
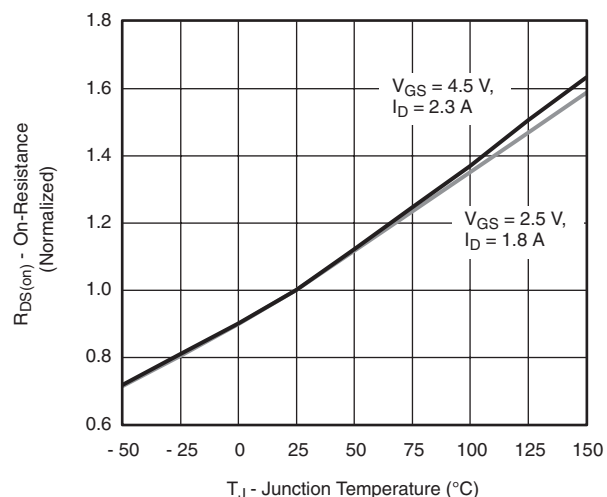
Safe Operating Area, Junction-to-Ambient

**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

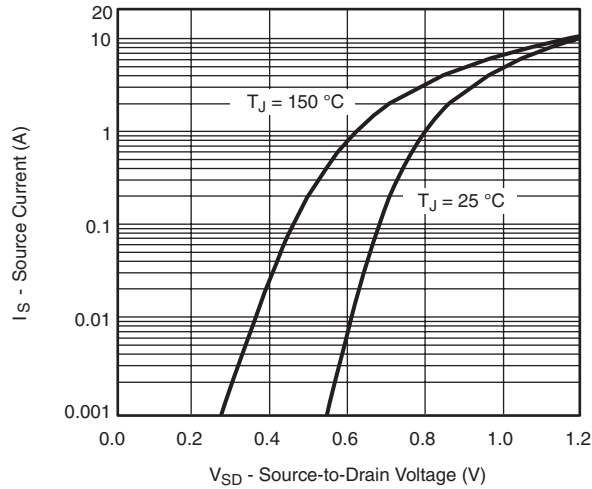
\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

**N-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

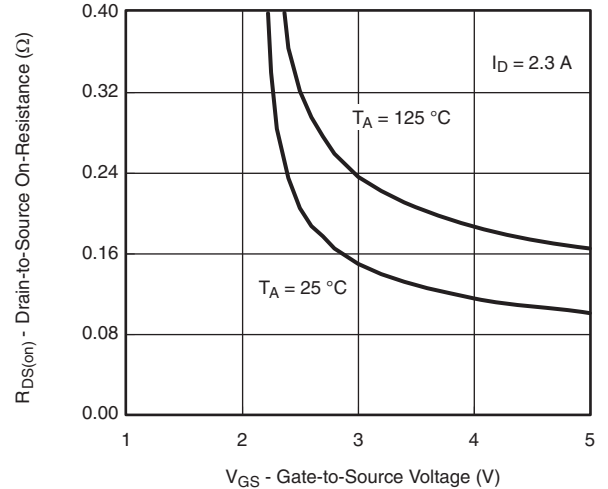


**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current and Gate Voltage****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

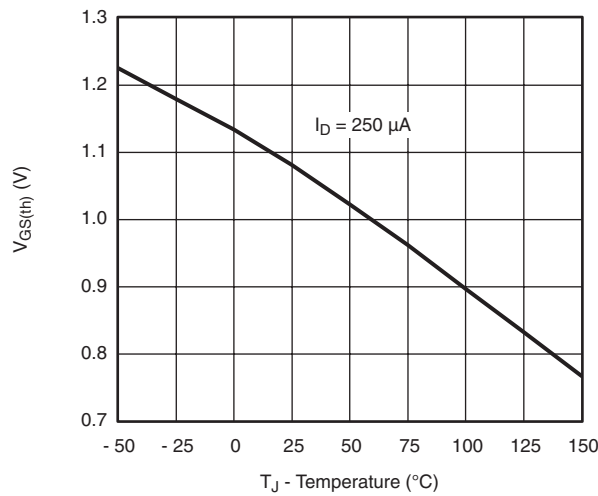
## P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



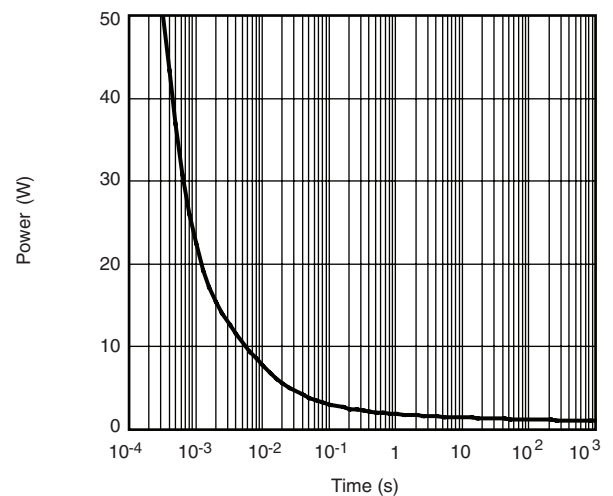
Source-Drain Diode Forward Voltage



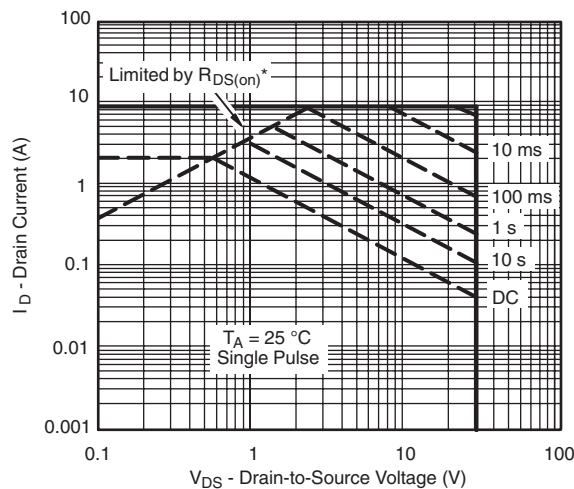
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

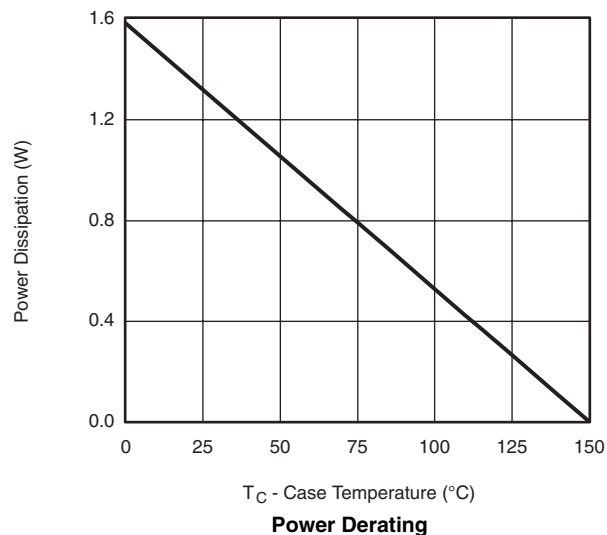
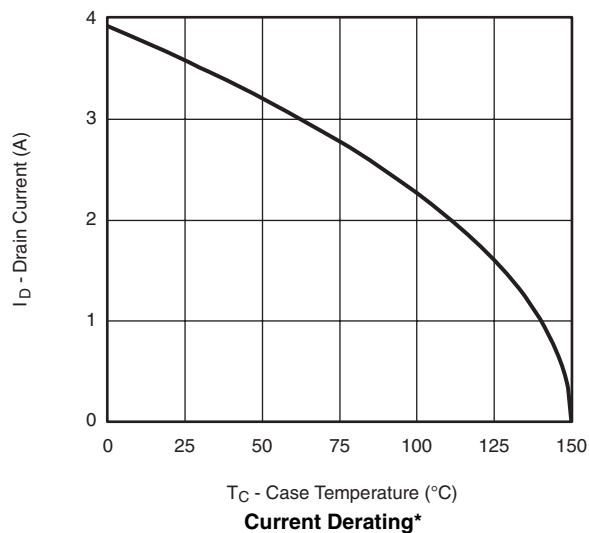


Single Pulse Power



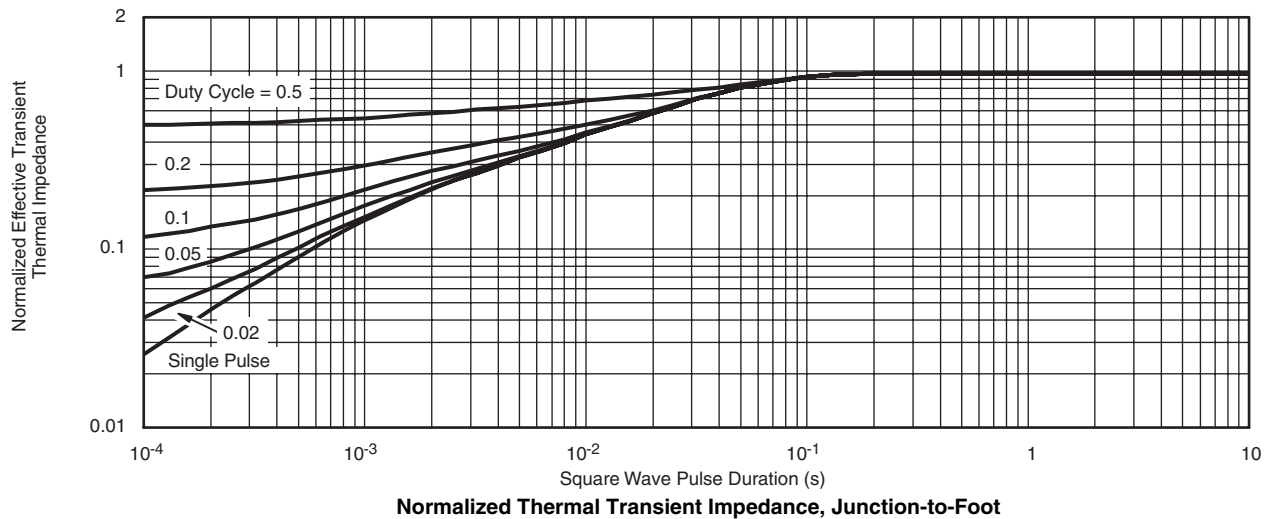
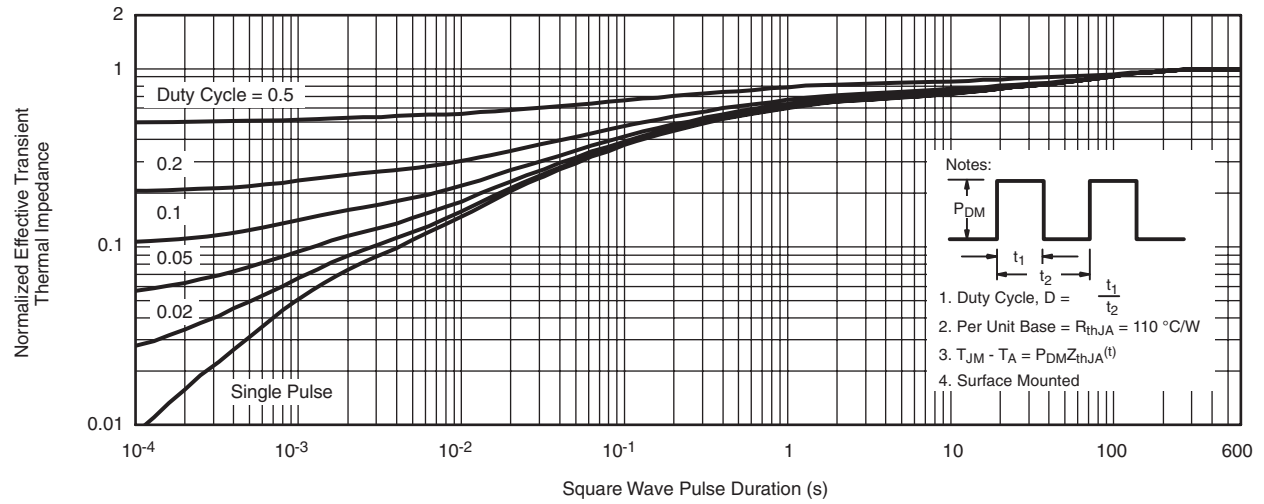
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area, Junction-to-Case

**P-CHANNEL TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

## P-CHANNEL TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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