

## Dual N-Channel 30 V (D-S) MOSFET

### PRODUCT SUMMARY

|           | V <sub>DS</sub> (V) | R <sub>DS(on)</sub> (Ω)           | I <sub>D</sub> (A) <sup>a</sup> | Q <sub>g</sub> (Typ.) |
|-----------|---------------------|-----------------------------------|---------------------------------|-----------------------|
| Channel 1 | 30                  | 0.0153 at V <sub>GS</sub> = 10 V  | 8 <sup>e</sup>                  | 8.4                   |
|           |                     | 0.0184 at V <sub>GS</sub> = 4.5 V | 8 <sup>e</sup>                  |                       |
| Channel 2 | 30                  | 0.0280 at V <sub>GS</sub> = 10 V  | 8                               | 3.6                   |
|           |                     | 0.0340 at V <sub>GS</sub> = 4.5 V | 7.1                             |                       |

### FEATURES

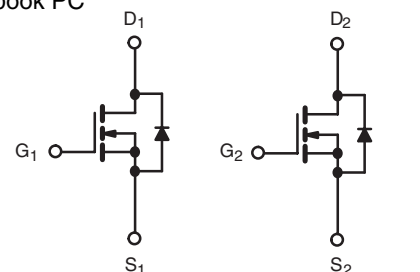
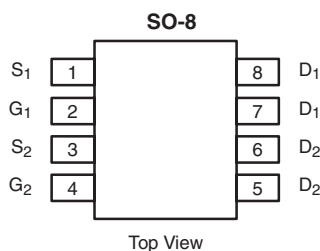
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET<sup>®</sup> Power MOSFET
- 100 % R<sub>g</sub> Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



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

### APPLICATIONS

- DC/DC for Notebook PC



Ordering Information: Si4276DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

| Parameter                                          | Symbol                            | Channel 1            | Channel 2           | Unit |
|----------------------------------------------------|-----------------------------------|----------------------|---------------------|------|
| Drain-Source Voltage                               | V <sub>DS</sub>                   | 30                   |                     | V    |
| Gate-Source Voltage                                | V <sub>GS</sub>                   | ± 20                 |                     |      |
| Continuous Drain Current (T <sub>J</sub> = 150 °C) | I <sub>D</sub>                    | 8 <sup>e</sup>       | 8                   | A    |
|                                                    |                                   | 8 <sup>e</sup>       | 6.4                 |      |
|                                                    |                                   | 8 <sup>b, c, e</sup> | 6.8 <sup>b, c</sup> |      |
|                                                    |                                   | 7.6 <sup>b, c</sup>  | 5.5 <sup>b, c</sup> |      |
| Pulsed Drain Current (10 μs Pulse Width)           | I <sub>DM</sub>                   | 50                   | 30                  |      |
| Source-Drain Current Diode Current                 | I <sub>S</sub>                    | 3.0                  | 2.3                 |      |
|                                                    |                                   | 1.7 <sup>b, c</sup>  | 1.7 <sup>b, c</sup> |      |
| Single Pulse Avalanche Current                     | I <sub>AS</sub>                   | 20                   | 10                  | mJ   |
| Avalanche Energy                                   | E <sub>AS</sub>                   | 20                   | 5                   |      |
| Maximum Power Dissipation                          | P <sub>D</sub>                    | 3.6                  | 2.8                 | W    |
|                                                    |                                   | 2.3                  | 1.8                 |      |
|                                                    |                                   | 2.1 <sup>b, c</sup>  | 2.0 <sup>b, c</sup> |      |
|                                                    |                                   | 1.3 <sup>b, c</sup>  | 1.3 <sup>b, c</sup> |      |
| Operating Junction and Storage Temperature Range   | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 150          |                     | °C   |

### THERMAL RESISTANCE RATINGS

| Parameter                                   | Symbol            | Channel 1 |         | Channel 2 |         | Unit |
|---------------------------------------------|-------------------|-----------|---------|-----------|---------|------|
|                                             |                   | Typical   | Maximum | Typical   | Maximum |      |
| Maximum Junction-to-Ambient <sup>b, d</sup> | R <sub>thJA</sub> | 47        | 60      | 58        | 62.5    | °C/W |
| Maximum Junction-to-Foot (Drain)            | R <sub>thJF</sub> | 30        | 35      | 38        | 45      |      |

Notes:

- Based on T<sub>C</sub> = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under steady state conditions is 107 °C/W (Ch 1) and 110 °C/W (Ch 2).
- 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                                                                                                                                   | Ch 1                                                                   | 30              |                   |        | V     |    |
|                                               |                                      | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA                                                                                                                                   | Ch 2                                                                   | 30              |                   |        |       |    |
| V <sub>DS</sub> Temperature Coefficient       | ΔV <sub>DS</sub> /T <sub>J</sub>     | I <sub>D</sub> = 250 μA                                                                                                                                                          | Ch 1                                                                   |                 | 29                |        | mV/°C |    |
|                                               |                                      | I <sub>D</sub> = 250 μA                                                                                                                                                          | Ch 2                                                                   |                 | 30                |        |       |    |
| V <sub>GS(th)</sub> Temperature Coefficient   | ΔV <sub>GS(th)</sub> /T <sub>J</sub> | I <sub>D</sub> = 250 μA                                                                                                                                                          | Ch 1                                                                   |                 | - 5.2             |        |       |    |
|                                               |                                      | I <sub>D</sub> = 250 μA                                                                                                                                                          | Ch 2                                                                   |                 | - 4.4             |        |       |    |
| Gate Threshold Voltage                        | V <sub>GS(th)</sub>                  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                                                                                                      | Ch 1                                                                   | 1.2             |                   | 2.5    | V     |    |
|                                               |                                      | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA                                                                                                                      | Ch 2                                                                   | 1.2             |                   | 2.5    |       |    |
| Gate-Body Leakage                             | I <sub>GSS</sub>                     | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V                                                                                                                                  | Ch 1                                                                   |                 |                   | 100    | nA    |    |
|                                               |                                      |                                                                                                                                                                                  | Ch 2                                                                   |                 |                   | 100    |       |    |
| Zero Gate Voltage Drain Current               | I <sub>DSS</sub>                     | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V                                                                                                                                    | Ch 1                                                                   |                 |                   | 1      | μA    |    |
|                                               |                                      | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V                                                                                                                                    | Ch 2                                                                   |                 |                   | 1      |       |    |
|                                               |                                      | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C                                                                                                            | Ch 1                                                                   |                 |                   | 10     |       |    |
|                                               |                                      | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C                                                                                                            | Ch 2                                                                   |                 |                   | 10     |       |    |
| On-State Drain Current <sup>b</sup>           | I <sub>D(on)</sub>                   | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V                                                                                                                                    | Ch 1                                                                   | 10              |                   |        | A     |    |
|                                               |                                      | V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V                                                                                                                                    | Ch 2                                                                   | 10              |                   |        |       |    |
| Drain-Source On-State Resistance <sup>b</sup> | R <sub>DS(on)</sub>                  | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 9.5 A                                                                                                                                   | Ch 1                                                                   |                 | 0.0127            | 0.0153 | Ω     |    |
|                                               |                                      | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 6.8 A                                                                                                                                   | Ch 2                                                                   |                 | 0.0230            | 0.0280 |       |    |
|                                               |                                      | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 8.7 A                                                                                                                                  | Ch 1                                                                   |                 | 0.0146            | 0.0184 |       |    |
|                                               |                                      | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 6.1 A                                                                                                                                  | Ch 2                                                                   |                 | 0.0280            | 0.0340 |       |    |
| Forward Transconductance <sup>b</sup>         | g <sub>fs</sub>                      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 9.5 A                                                                                                                                   | Ch 1                                                                   |                 | 43                |        | S     |    |
|                                               |                                      | V <sub>DS</sub> = 15 V, I <sub>D</sub> = 6.8 A                                                                                                                                   | Ch 2                                                                   |                 | 17                |        |       |    |
| Dynamic <sup>a</sup>                          |                                      |                                                                                                                                                                                  |                                                                        |                 |                   |        |       |    |
| Input Capacitance                             | C <sub>iss</sub>                     | Channel 1<br>V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz<br><br>Channel 2<br>V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz                               | Ch 1                                                                   |                 | 1000              |        | pF    |    |
| Output Capacitance                            | C <sub>oss</sub>                     |                                                                                                                                                                                  | Ch 2                                                                   |                 | 366               |        |       |    |
|                                               |                                      |                                                                                                                                                                                  | Ch 1                                                                   |                 | 215               |        |       |    |
| Reverse Transfer Capacitance                  | C <sub>rss</sub>                     |                                                                                                                                                                                  | Ch 2                                                                   |                 | 82                |        |       |    |
|                                               |                                      | Ch 1                                                                                                                                                                             |                                                                        | 85              |                   |        |       |    |
| Total Gate Charge                             | Q <sub>g</sub>                       | Channel 1<br>V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 9.5 A<br><br>Channel 2<br>V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 6.8 A | Ch 2                                                                   |                 | 45                |        | nC    |    |
|                                               |                                      |                                                                                                                                                                                  | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 9.5 A | Ch 1            |                   | 17.2   |       | 26 |
|                                               |                                      |                                                                                                                                                                                  | V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 6.8 A | Ch 2            |                   | 7.3    |       | 15 |
|                                               |                                      |                                                                                                                                                                                  | Ch 1                                                                   |                 | 8.4               | 17     |       |    |
|                                               |                                      |                                                                                                                                                                                  | Ch 2                                                                   |                 | 3.6               | 8      |       |    |
|                                               |                                      |                                                                                                                                                                                  | Gate-Source Charge                                                     | Q <sub>gs</sub> | Ch 1              |        |       | 3  |
| Ch 2                                          |                                      | 1.1                                                                                                                                                                              |                                                                        |                 |                   |        |       |    |
| Gate-Drain Charge                             | Q <sub>gd</sub>                      |                                                                                                                                                                                  | Ch 1                                                                   |                 | 2.6               |        |       |    |
|                                               |                                      |                                                                                                                                                                                  | Ch 2                                                                   |                 | 1.3               |        |       |    |
| Gate Resistance                               | R <sub>g</sub>                       | f = 1 MHz                                                                                                                                                                        | Ch 1                                                                   | 0.6             | 3.1               | 6.2    | Ω     |    |
|                                               |                                      |                                                                                                                                                                                  | Ch 2                                                                   | 0.5             | 2.6               | 5.2    |       |    |



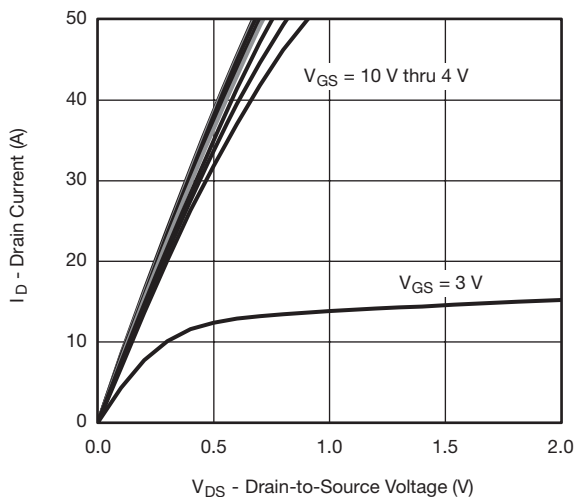
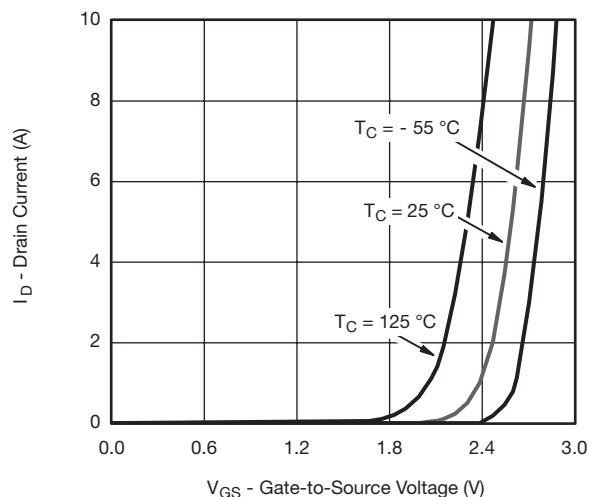
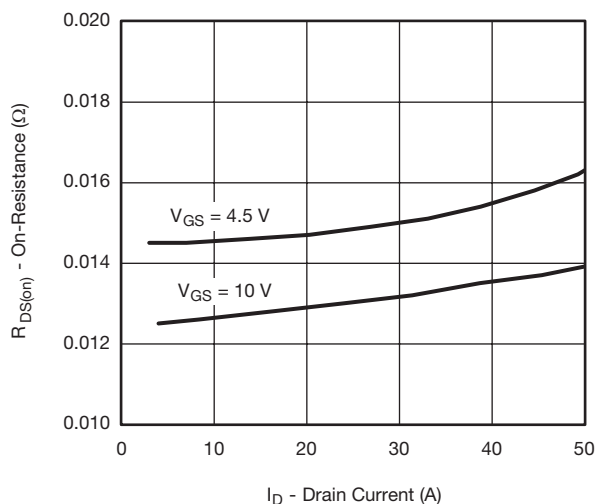
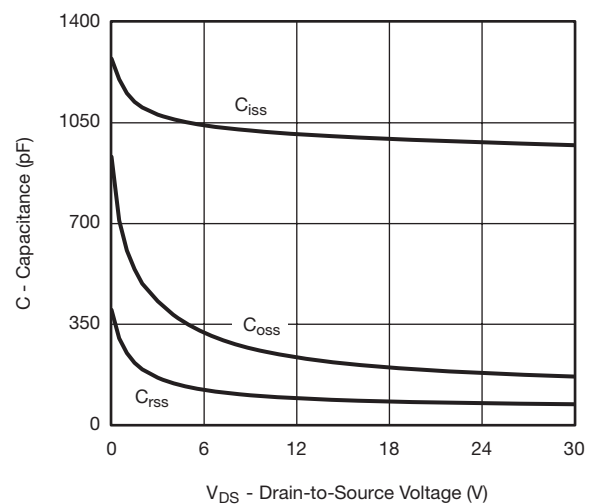
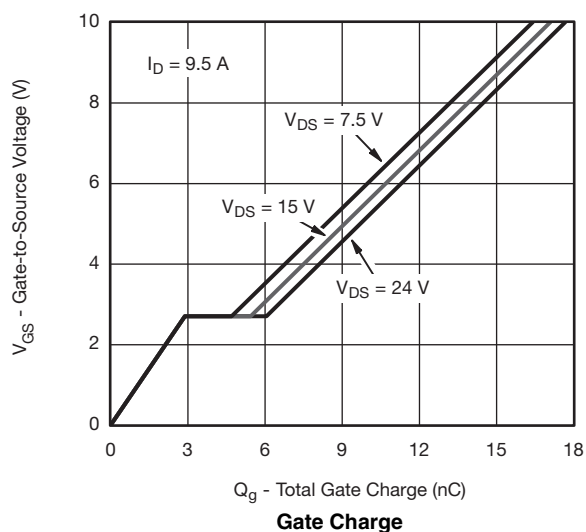
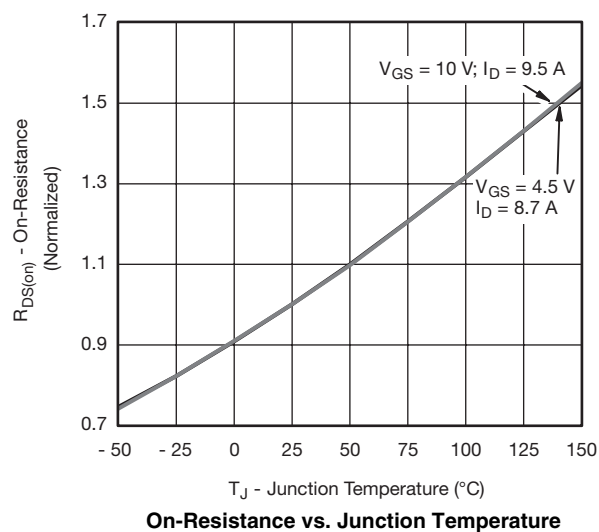
| SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted |                     |                                                                                                                                       |                                                                               |      |                   |      |      |    |
|---------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------|-------------------|------|------|----|
| Parameter                                                     | Symbol              | Test Conditions                                                                                                                       |                                                                               | Min. | Typ. <sup>a</sup> | Max. | Unit |    |
| Dynamic <sup>a</sup>                                          |                     |                                                                                                                                       |                                                                               |      |                   |      |      |    |
| Turn-On Delay Time                                            | t <sub>d(on)</sub>  | Channel 1<br>V <sub>DD</sub> = 15 V, R <sub>L</sub> = 2 Ω<br>I <sub>D</sub> ≅ 7.6 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω    | Ch 1                                                                          |      | 8                 | 16   | ns   |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 4                 | 8    |      |    |
| Rise Time                                                     | t <sub>r</sub>      |                                                                                                                                       | Ch 1                                                                          |      | 10                | 20   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 8                 | 16   |      |    |
| Turn-Off DelayTime                                            | t <sub>d(off)</sub> | Channel 2<br>V <sub>DD</sub> = 15 V, R <sub>L</sub> = 2.7 Ω<br>I <sub>D</sub> = 5.5 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 1 Ω  | Ch 1                                                                          |      | 20                | 30   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 11                | 20   |      |    |
| Fall Time                                                     | t <sub>f</sub>      |                                                                                                                                       | Ch 1                                                                          |      | 7                 | 14   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 7                 | 14   |      |    |
| Turn-On Delay Time                                            | t <sub>d(on)</sub>  | Channel 1<br>V <sub>DD</sub> = 15 V, R <sub>L</sub> = 2 Ω<br>I <sub>D</sub> ≅ 7.6 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω   | Ch 1                                                                          |      | 14                | 21   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 8                 | 16   |      |    |
| Rise Time                                                     | t <sub>r</sub>      |                                                                                                                                       | Ch 1                                                                          |      | 11                | 20   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 10                | 20   |      |    |
| Turn-Off Delay Time                                           | t <sub>d(off)</sub> | Channel 2<br>V <sub>DD</sub> = 15 V, R <sub>L</sub> = 2.7 Ω<br>I <sub>D</sub> ≅ 5.5 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω | Ch 1                                                                          |      | 18                | 27   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 10                | 20   |      |    |
| Fall Time                                                     | t <sub>f</sub>      |                                                                                                                                       | Ch 1                                                                          |      | 7                 | 14   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 7                 | 14   |      |    |
| Drain-Source Body Diode Characteristics                       |                     |                                                                                                                                       |                                                                               |      |                   |      |      |    |
| Continous Source-Drain Diode Current                          | I <sub>S</sub>      | T <sub>C</sub> = 25 °C                                                                                                                | Ch 1                                                                          |      |                   | 3    | A    |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      |                   | 2.3  |      |    |
| Pulse Diode Forward Current <sup>a</sup>                      | I <sub>SM</sub>     |                                                                                                                                       | Ch 1                                                                          |      |                   | 50   |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      |                   | 30   |      |    |
| Body Diode Voltage                                            | V <sub>SD</sub>     | I <sub>S</sub> = 7.6 A                                                                                                                | Ch 1                                                                          |      | 0.82              | 1.2  | V    |    |
|                                                               |                     | I <sub>S</sub> = 5.5 A                                                                                                                | Ch 2                                                                          |      | 0.85              | 1.2  |      |    |
| Body Diode Reverse Recovery Time                              | t <sub>rr</sub>     |                                                                                                                                       | Ch 1                                                                          |      | 20                | 30   | ns   |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 13                | 20   |      |    |
| Body Diode Reverse Recovery Charge                            | Q <sub>rr</sub>     |                                                                                                                                       | Channel 1<br>I <sub>F</sub> = 7.7 A, dI/dt = 100 A/μs, T <sub>J</sub> = 25 °C | Ch 1 |                   | 12   | 20   | nC |
|                                                               |                     |                                                                                                                                       |                                                                               | Ch 2 |                   | 6    | 12   |    |
| Reverse Recovery Fall Time                                    | t <sub>a</sub>      | Channel 2<br>I <sub>F</sub> = 5.5 A, dI/dt = 100 A/μs, T <sub>J</sub> = 25 °C                                                         | Ch 1                                                                          |      | 11                |      | ns   |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 7                 |      |      |    |
| Reverse Recovery Rise Time                                    | t <sub>b</sub>      |                                                                                                                                       | Ch 1                                                                          |      | 9                 |      |      |    |
|                                                               |                     |                                                                                                                                       | Ch 2                                                                          |      | 6                 |      |      |    |

Notes:

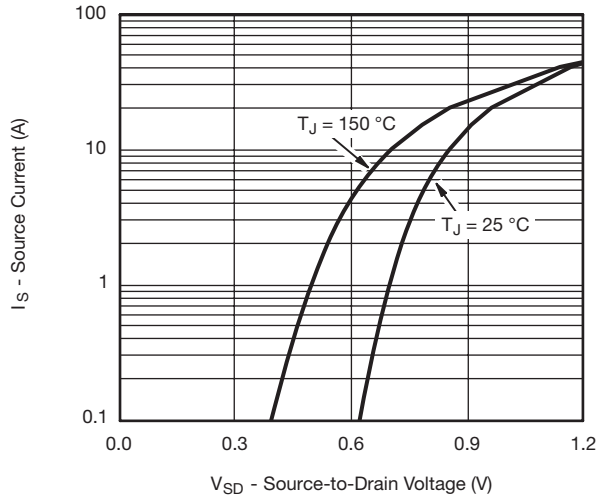
a. Guaranteed by design, not subject to production testing.

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

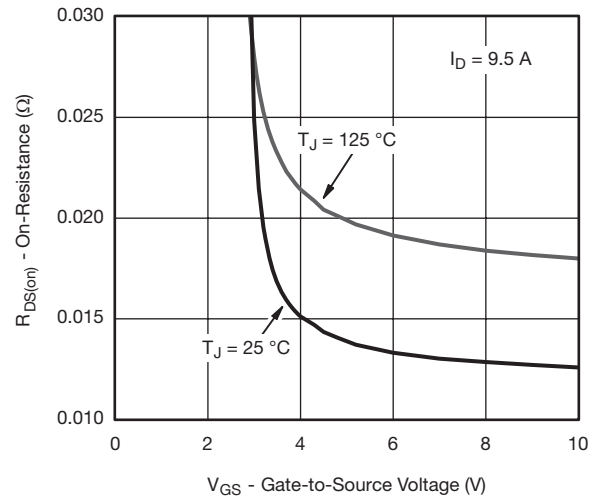
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**CHANNEL-1 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

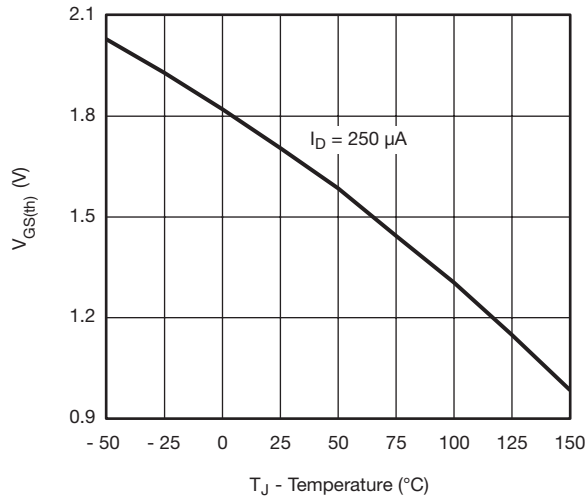
## CHANNEL-1 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



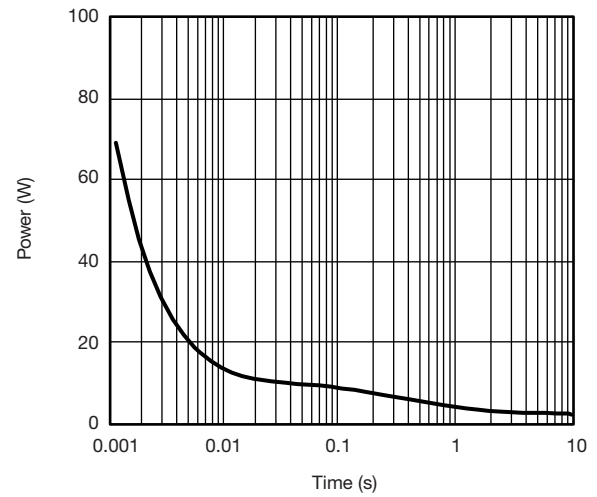
Source-Drain Diode Forward Voltage



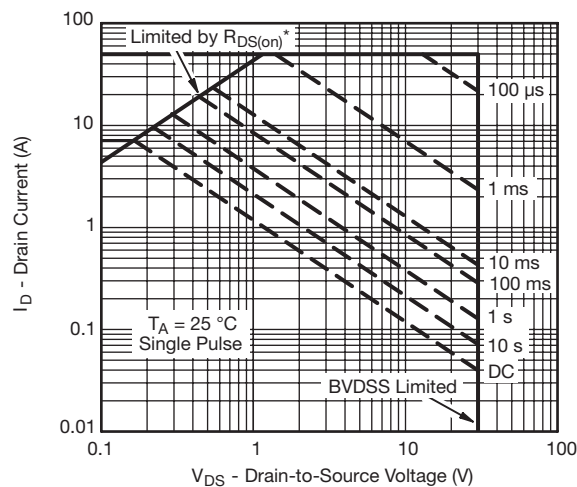
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

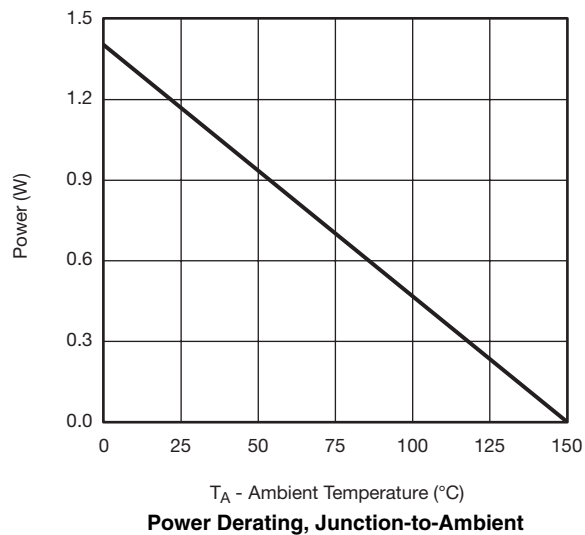
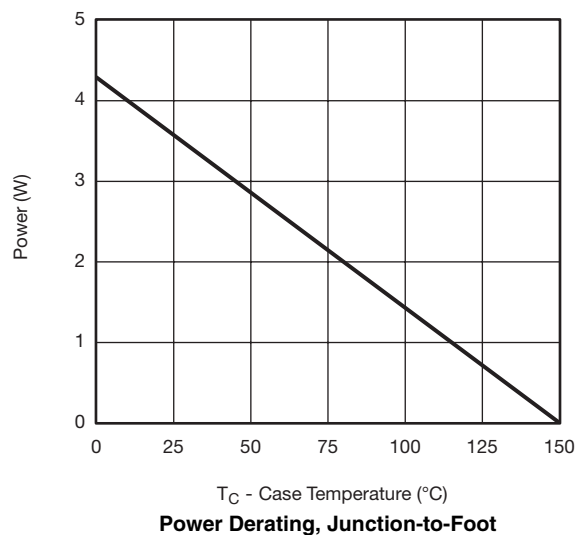
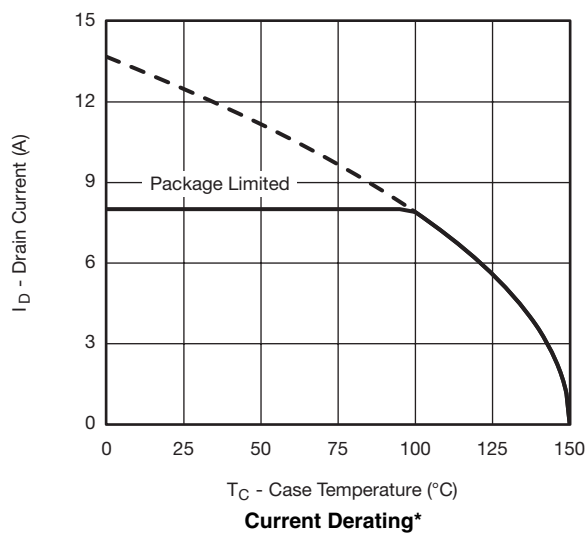


Single Pulse Power, Junction-to-Ambient



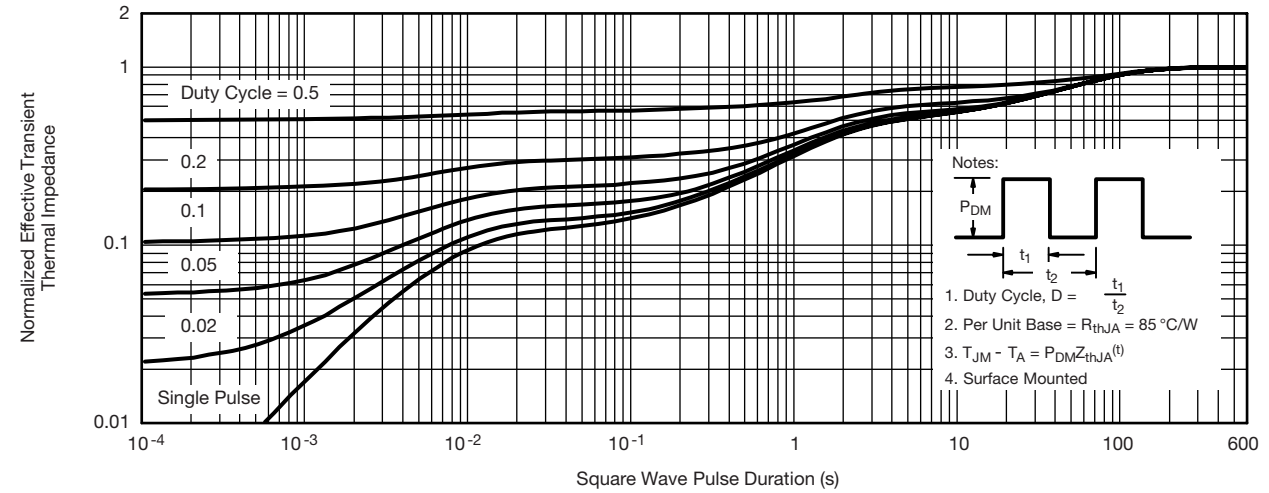
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area, Junction-to-Ambient

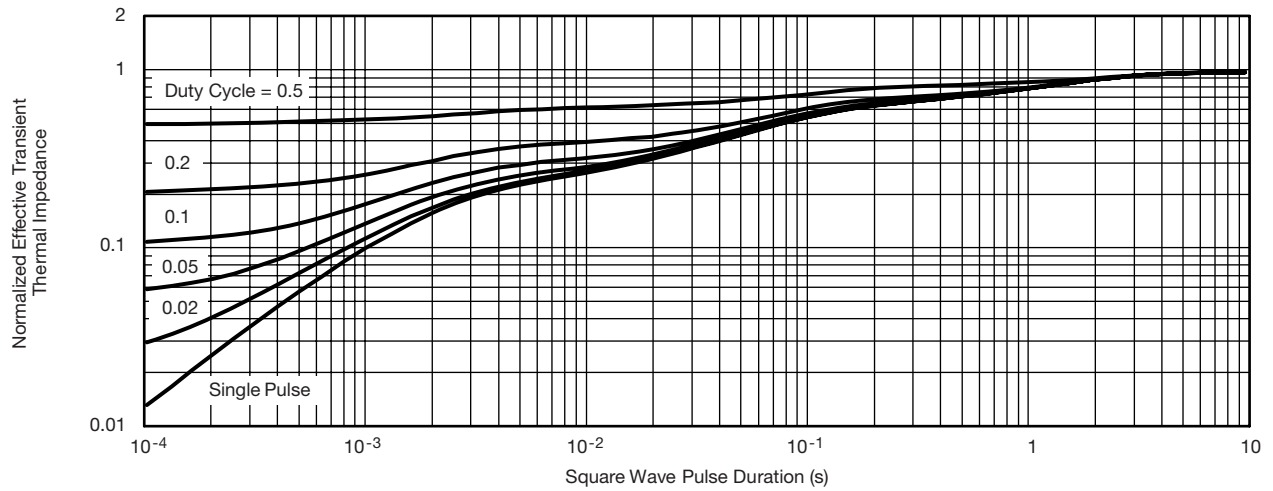
**CHANNEL-1 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

\* 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.

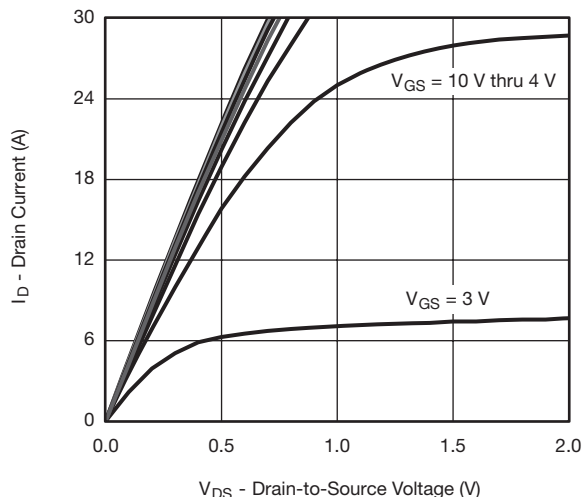
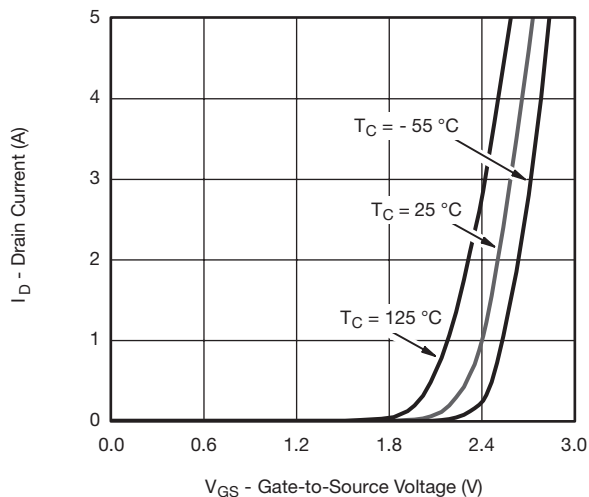
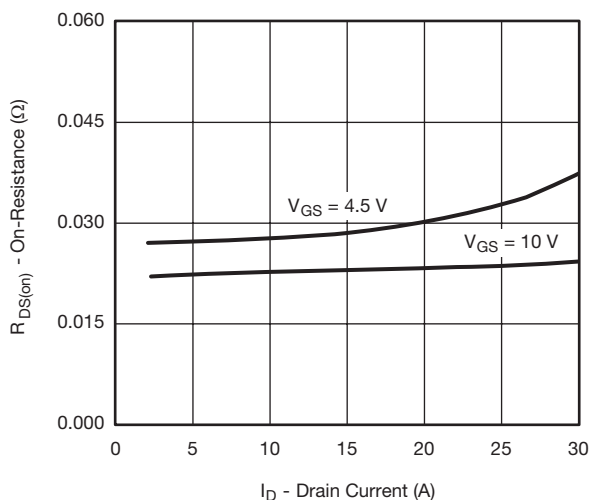
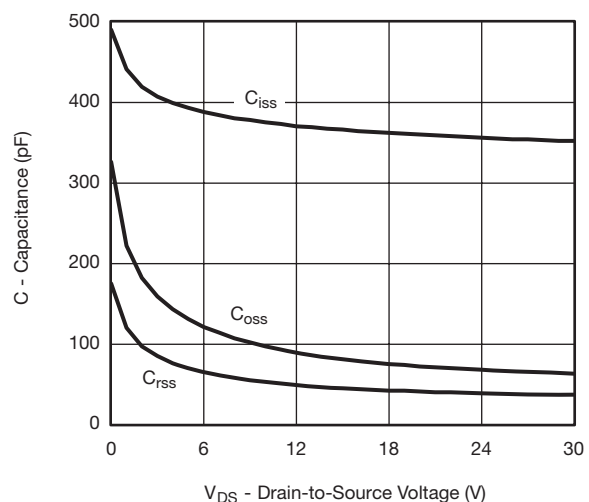
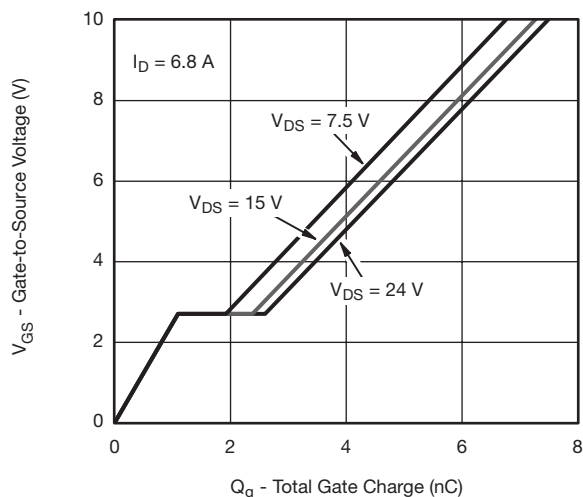
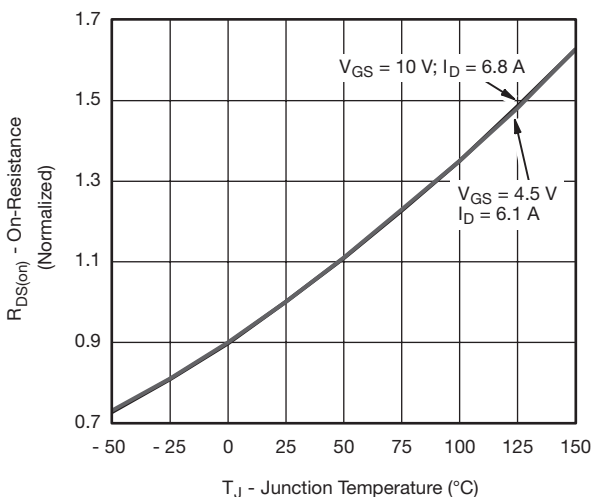
**CHANNEL-1 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



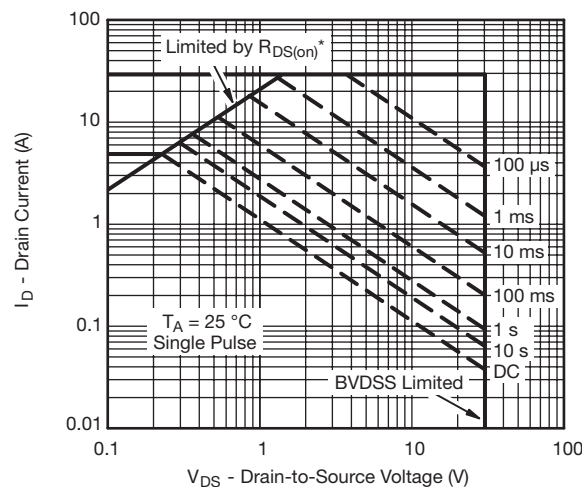
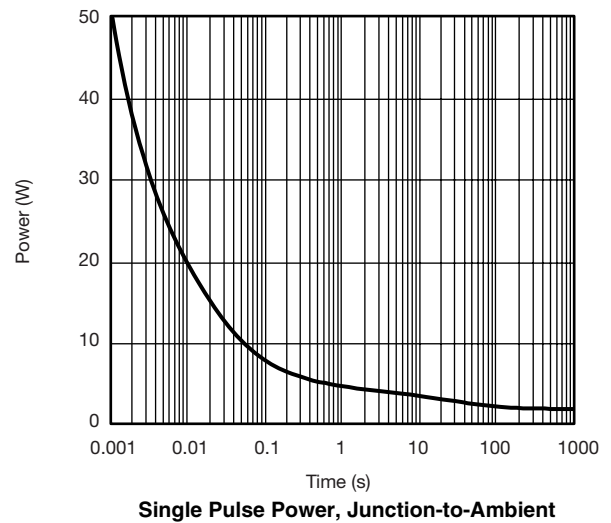
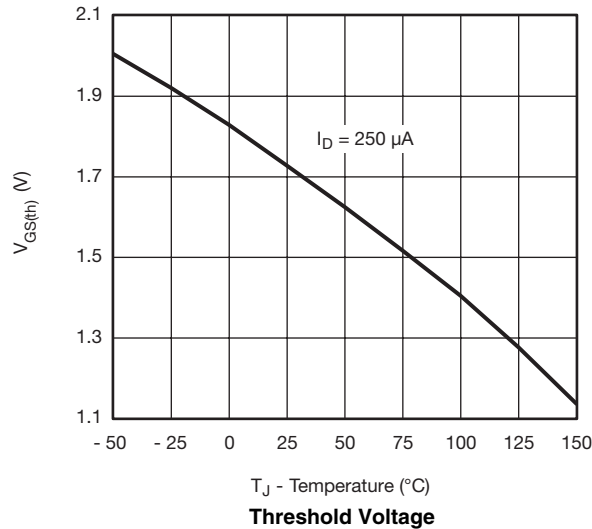
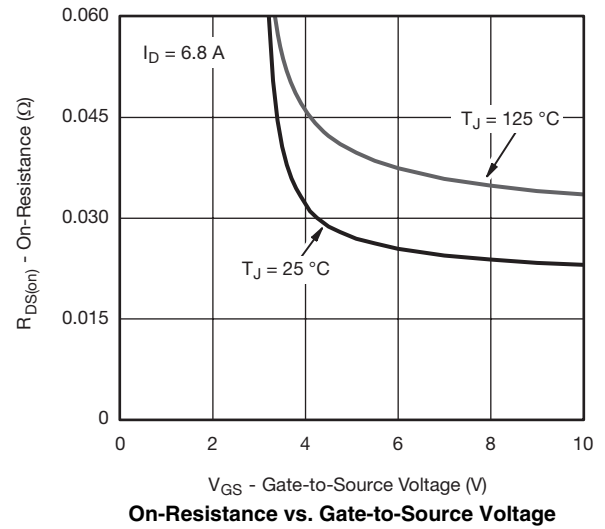
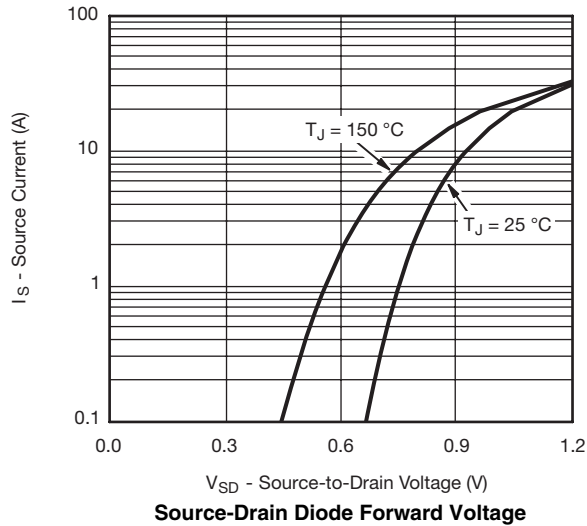
**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

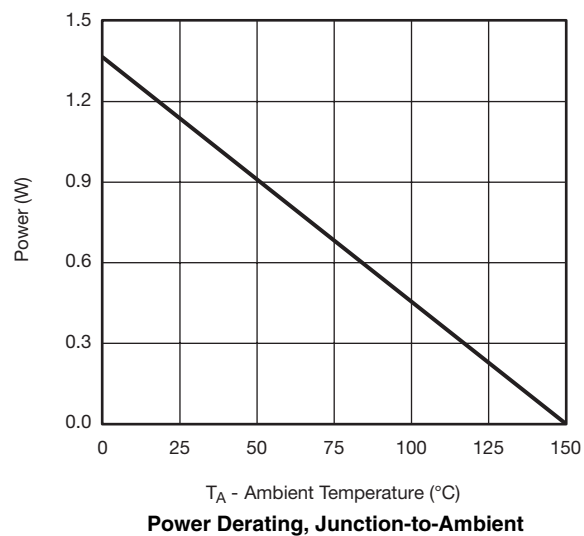
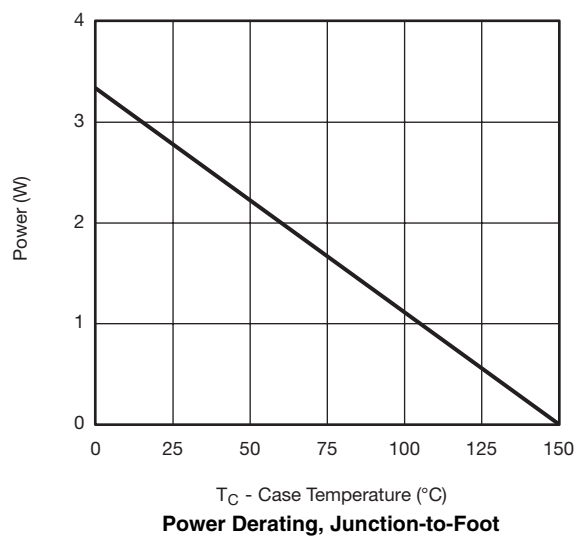
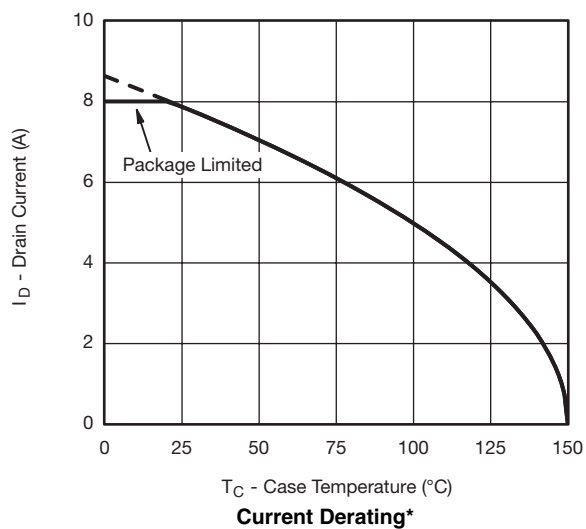
**CHANNEL-2 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

## CHANNEL-2 TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



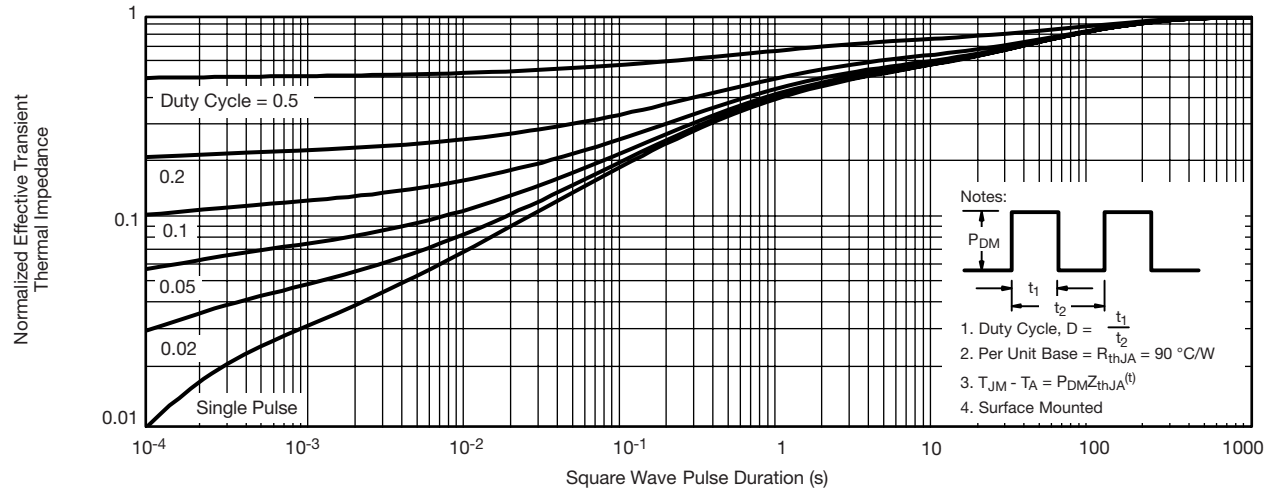
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area, Junction-to-Ambient**

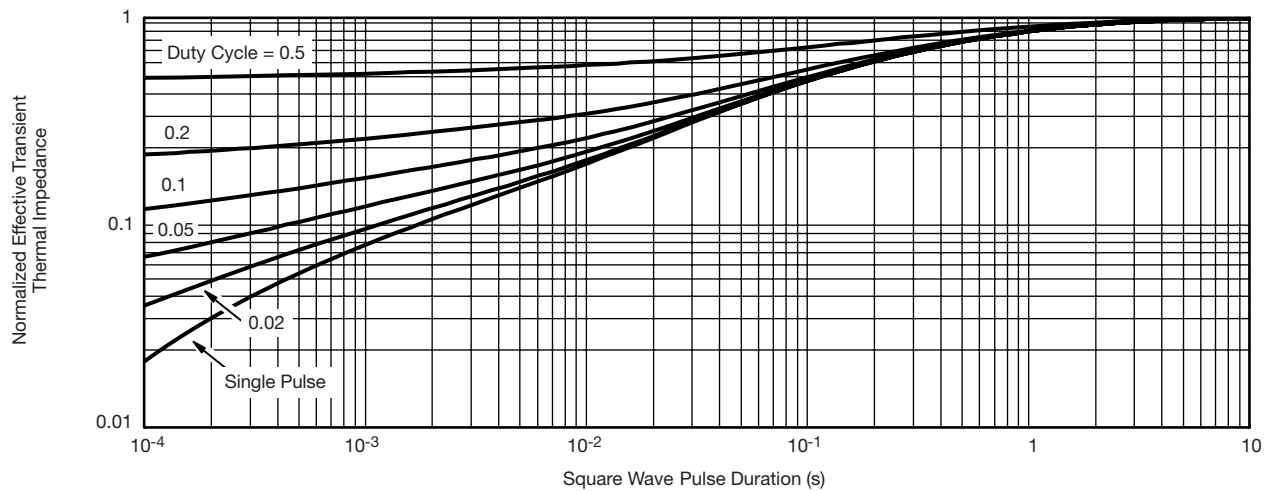
**CHANNEL-2 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

\* 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.

**CHANNEL-2 TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

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