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

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| $V_{DS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A)[a] | $Q_g$ (Typ) |
| 30 | 0.024 at $V_{GS}$ = 10 V | 6 | 11 nC |
| | 0.030 at $V_{GS}$ = 4.5 V | 6 | |

## FEATURES

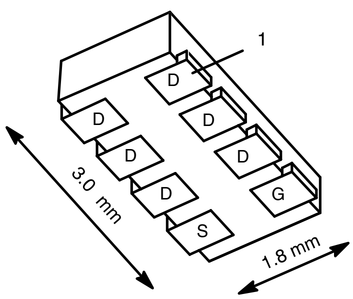
- TrenchFET® Power MOSFET

## APPLICATIONS

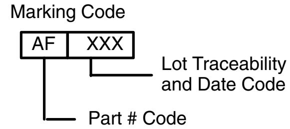
- Load Switch
  – Notebook PC

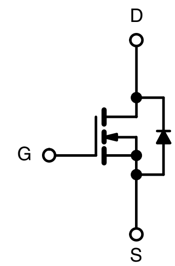
RoHS COMPLIANT

**ChipFET 1206-8**




Bottom View




N-Channel MOSFET

Ordering Information: Si5424DC–T1–E3 (Lead (Pb)–free)

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C UNLESS OTHERWISE NOTED)

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ± 25 | |
| Continuous Drain Current ($T_J$ = 150 °C) | $T_C$ = 25 °C | $I_D$ | 6[a] | A |
| | $T_C$ = 70 °C | | 6[a] | |
| | $T_A$ = 25 °C | | 6[a] | |
| | $T_A$ = 70 °C | | 6[a] | |
| Pulsed Drain Current | | $I_{DM}$ | 40 | |
| Continuous Source-Drain Diode Current | $T_C$ = 25 °C | $I_S$ | 5.2[a] | |
| | $T_A$ = 25 °C | | 2.1[b, c] | |
| Avalanche Current | L = 0.1 mH | $I_{AS}$ | 16 | |
| Single Pulse Avalanche Energy | | $E_{AS}$ | 12.8 | mJ |
| Maximum Power Dissipation | $T_C$ = 25 °C | $P_D$ | 6.25 | W |
| | $T_C$ = 70 °C | | 4.0 | |
| | $T_A$ = 25 °C | | 2.5[b, c] | |
| | $T_A$ = 70 °C | | 1.6[b, c] | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | – 55 to 150 | °C |
| Soldering Recommendations (Peak Temperature)[d, e] | | | 260 | |

## THERMAL RESISTANCE RATINGS

| Parameter | | Symbol | Typical | Maximum | Unit |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient[b, f] | t ≤ 5 sec | $R_{thJA}$ | 40 | 50 | °C/W |
| Maximum Junction-to-Foot (Drain) | Steady State | $R_{thJF}$ | 15 | 20 | |

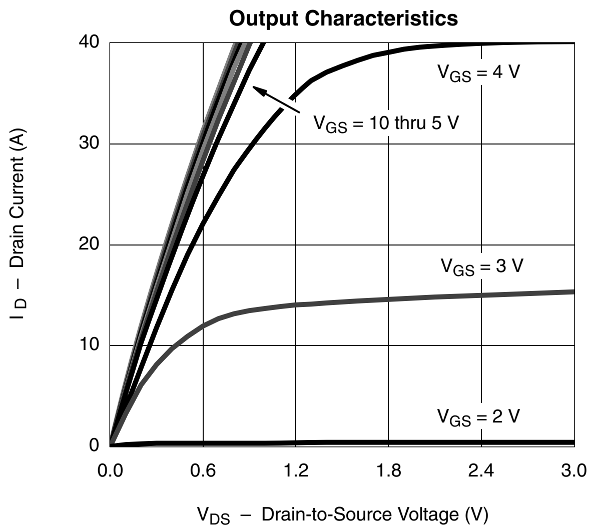
Notes:
a. Package limited.
b. Surface Mounted on 1" x 1" FR4 Board.
c. t = 5 sec.
d. See Solder Profile (http://www.vishay.com/doc?73257). The ChipFET 1206–8 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.
f. Maximum under steady state conditions is 80 °C/W.

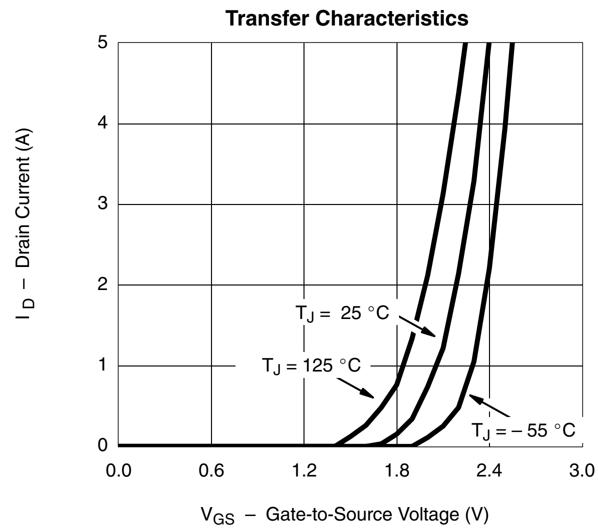
| SPECIFICATIONS ($T_J$ = 25 °C UNLESS OTHERWISE NOTED) | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Condition** | **Min** | **Typ** | **Max** | **Unit** |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 30 | | | V |
| $V_{DS}$ Temperature Coefficient | $\Delta V_{DS}/T_J$ | $I_D$ = 250 µA | | 19.4 | | mV/°C |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | | | – 4.6 | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 1.1 | | 2.3 | V |
| Gate-Source Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ± 25 V | | | ± 100 | ns |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V | | | 1 | µA |
| | | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V, $T_J$ = 55 °C | | | 10 | |
| On-State Drain Current[a] | $I_{D(on)}$ | $V_{DS}$ ≥ 5 V, $V_{GS}$ = 10 V | 40 | | | A |
| Drain-Source On-State Resistance[a] | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 4.8 A | | 0.020 | 0.024 | Ω |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 4.22 A | | 0.024 | 0.030 | |
| Forward Transconductance[a] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 4.8 A | | 17 | | S |
| **Dynamic[b]** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 15 V, $V_{GS}$ = 0 V, f = 1 MHz | | 950 | | pF |
| Output Capacitance | $C_{oss}$ | | | 230 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 180 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_D$ = 4.8 A | | 21 | 32 | nC |
| | | $V_{DS}$ = 15 V, $V_{GS}$ = 4.5 V, $I_D$ = 4.8 A | | 11 | 17 | |
| Gate-Source Charge | $Q_{gs}$ | | | 3.2 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 4.2 | | |
| Gate Resistance | $R_g$ | f = 1 MHz | | 2.2 | | Ω |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 15 V, $R_L$ = 2.63 Ω<br>$I_D$ ≅ 5.7 A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 Ω | | 17 | 26 | ns |
| Rise Time | $t_r$ | | | 75 | 113 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 22 | 33 | |
| Fall Time | $t_f$ | | | 12 | 18 | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 15 V, $R_L$ = 2.5 Ω<br>$I_D$ ≅ 6 A, $V_{GEN}$ = 10 V, $R_g$ = 1 Ω | | 10 | 15 | |
| Rise Time | $t_r$ | | | 38 | 57 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 26 | 40 | |
| Fall Time | $t_f$ | | | 9 | 14 | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Continuous Source-Drain Diode Current | $I_S$ | $T_C$ = 25 °C | | | 6 | A |
| Pulse Diode Forward Current | $I_{SM}$ | | | | 40 | |
| Body Diode Voltage | $V_{SD}$ | $I_S$ = 4.3 A, $V_{GS}$ = 0 V | | 0.8 | 1.2 | V |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$ = 4.3 A, di/dt = 100 A/µs, $T_J$ = 25 °C | | 24 | 36 | ns |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | | 11 | 17 | nC |
| Reverse Recovery Fall Time | $t_a$ | | | 9 | | ns |
| Reverse Recovery Rise Time | $t_b$ | | | 15 | | |

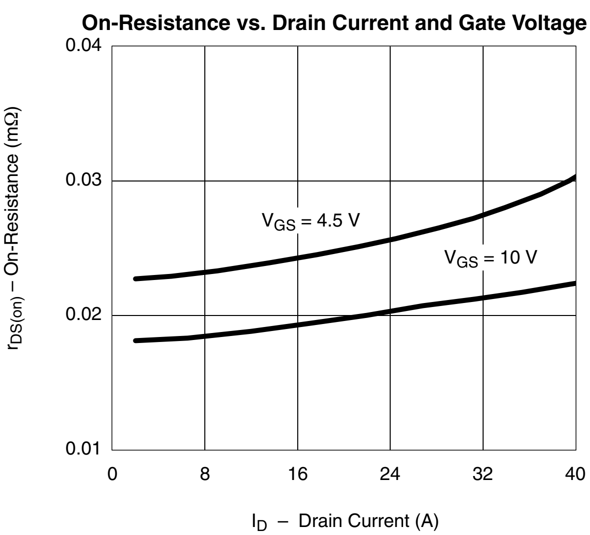
Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

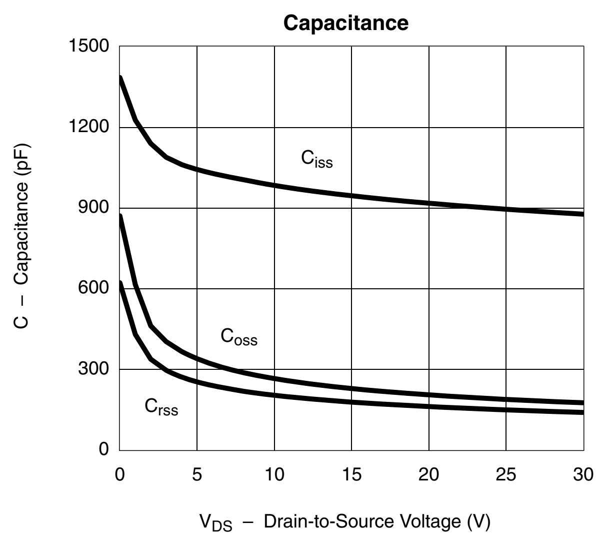
*Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

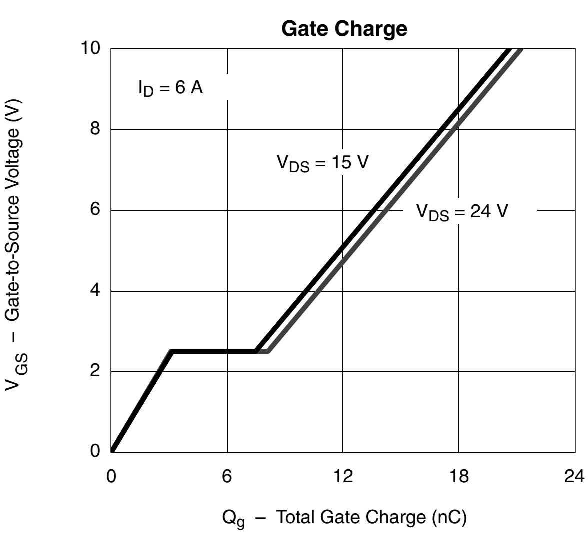
## TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

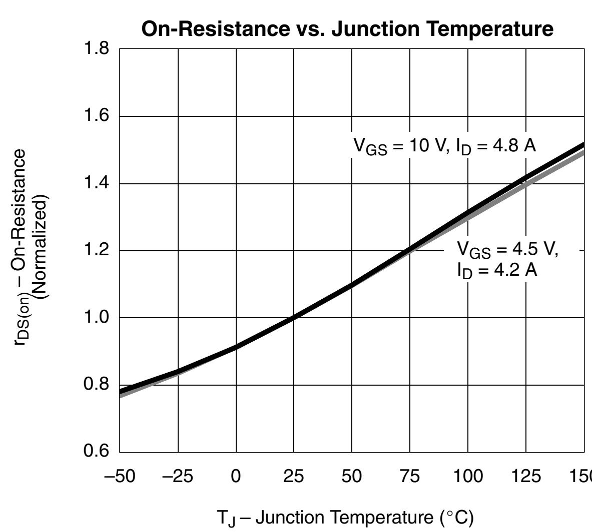


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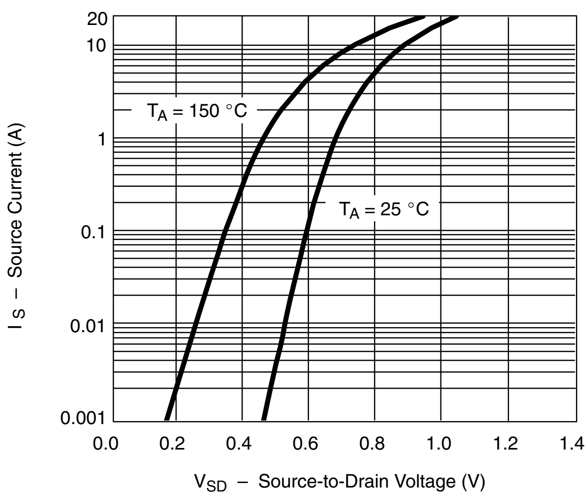
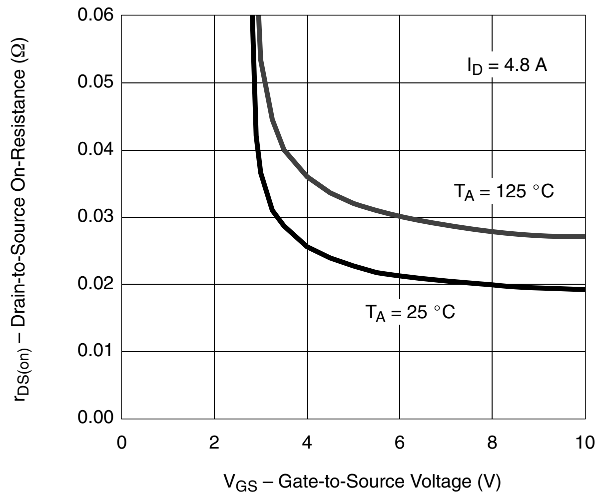
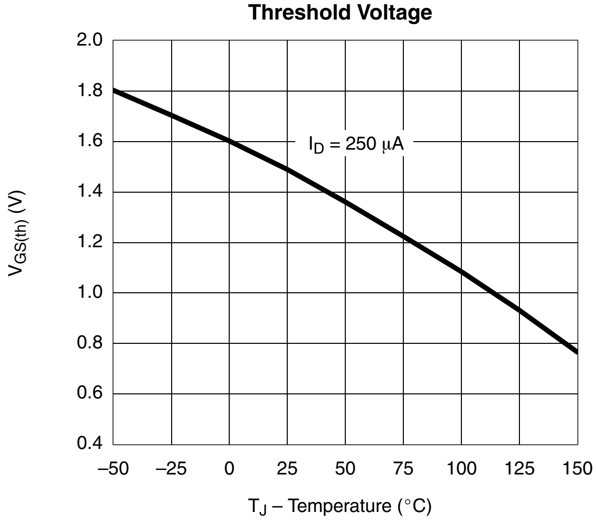
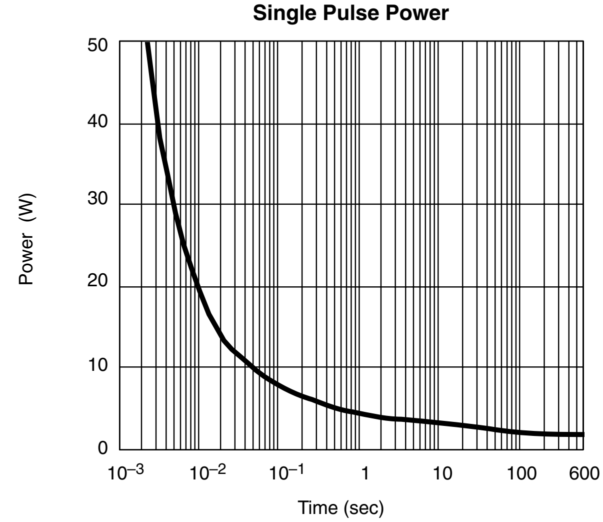
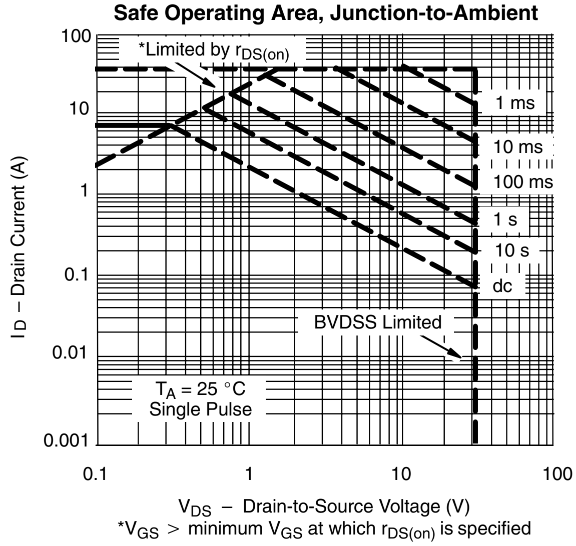


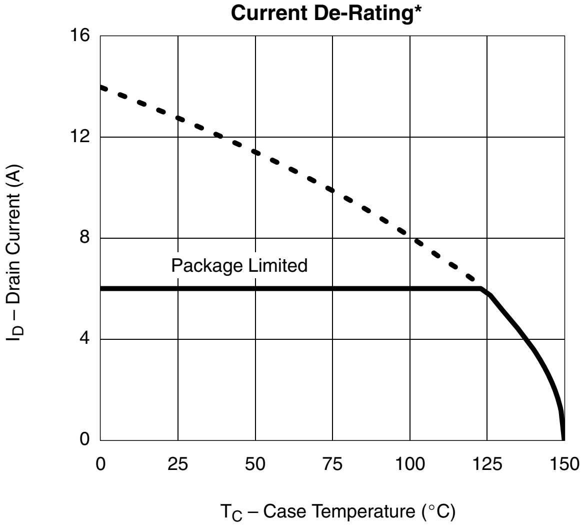



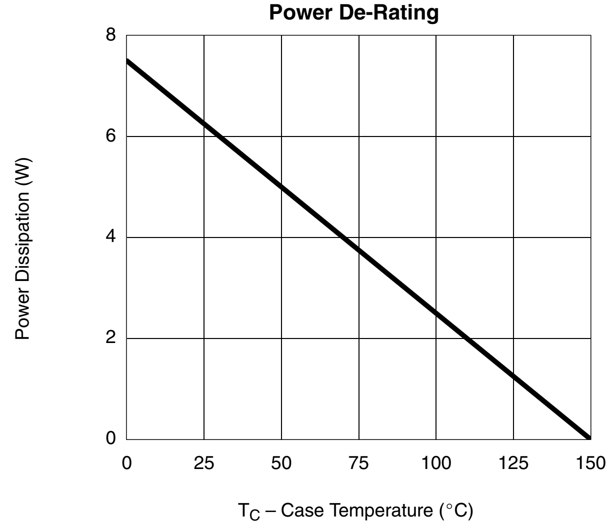



## TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

**Current De-Rating***

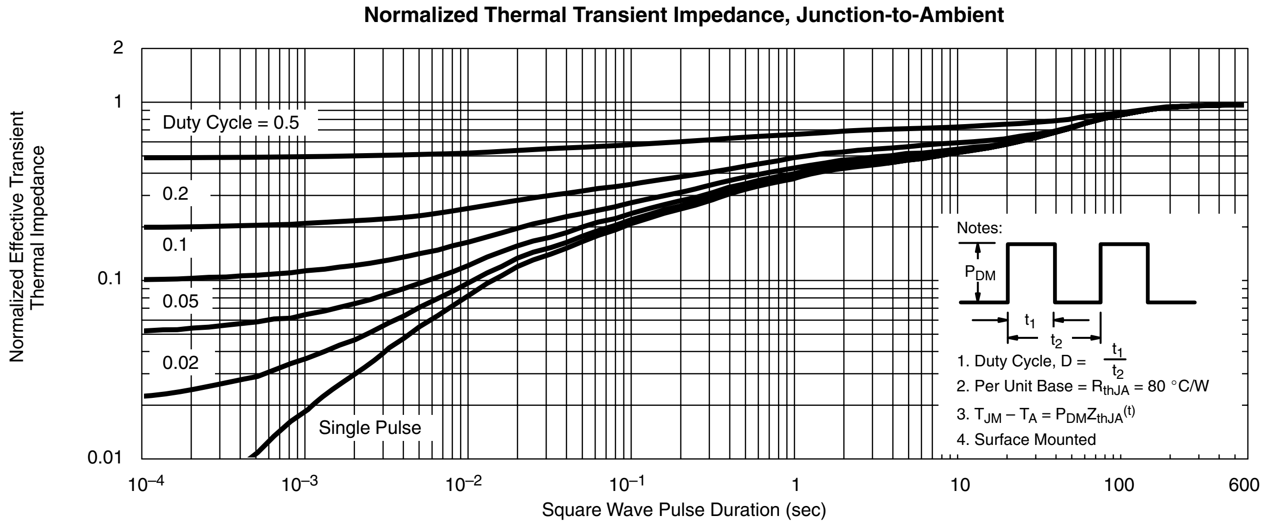


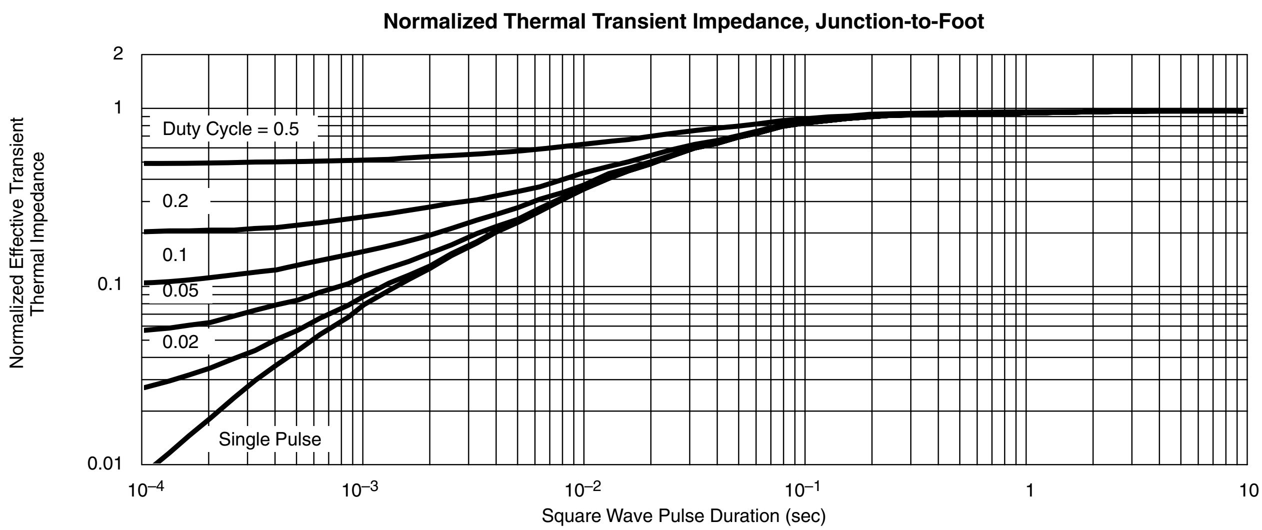

**Power De-Rating**




*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.

## TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

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