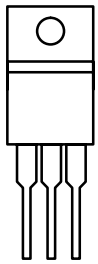
# N-Channel 30-V (D-S), 150°C MOSFET, Logic Level

## Product Summary

| $V_{(BR)DSS}$ (V) | $r_{DS(on)}$ (Ω) | $I_D$ (A) |
|---|---|---|
| 30 | 0.01 | 60 |

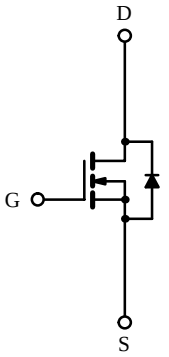
**TO-220AB**



G D S

DRAIN connected to TAB

Top View




N-Channel MOSFET

## Absolute Maximum Ratings ($T_C$ = 25°C Unless Otherwise Noted)

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current | $T_C$ = 25°C | $I_D$ | 60 | A |
| | $T_C$ = 100°C | | 51 | |
| Pulsed Drain Current | | $I_{DM}$ | 240 | |
| Avalanche Current | | $I_{AR}$ | 60 | |
| Avalanche Energy | L = 0.1 mH | $E_{AS}$ | 180 | mJ |
| Repetitive Avalanche Energy[a] | L = 0.05 mH | $E_{AR}$ | 90 | |
| Power Dissipation | $T_C$ = 25°C | $P_D$ | 105 | W |
| | $T_C$ = 100°C | | 42 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | –55 to 150 | °C |
| Lead Temperature ($^1/_{16}$" from case for 10 sec.) | | $T_L$ | 300 | |

## Thermal Resistance Ratings

| Parameter | Symbol | Typical | Maximum | Unit |
|---|---|---|---|---|
| Junction-to-Ambient | $R_{thJA}$ | | 80 | °C/W |
| Junction-to-Case | $R_{thJC}$ | | 1.2 | |
| Case-to-Sink | $R_{thCS}$ | 1.0 | | |

Notes:
a. Duty cycle ≤ 1%

Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70280.
A SPICE Model data sheet is available for this product (FaxBack document #70525).

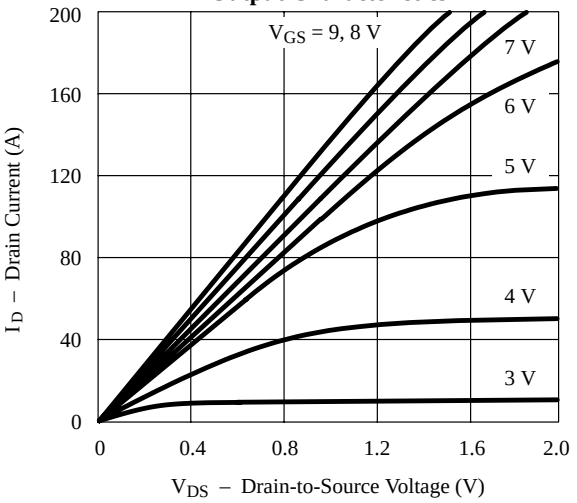
## Specifications ($T_J$ = 25°C Unless Otherwise Noted)

| Parameter | Symbol | Test Condition | Min | Typ[a] | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 30 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 1 mA | 0.8 | | 3.0 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | ±500 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 24 V, $V_{GS}$ = 0 V | | | 25 | µA |
| | | $V_{DS}$ = 24 V, $V_{GS}$ = 0 V, $T_J$ = 125°C | | | 250 | |
| On-State Drain Current[b] | $I_{D(on)}$ | $V_{DS}$ = 10 V, $V_{GS}$ = 10 V | 60 | | | A |
| Drain-Source On-State Resistance[b] | $r_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 30 A | | 0.007 | 0.010 | Ω |
| | | $V_{GS}$ = 5 V, $I_D$ = 30 A | | 0.010 | 0.015 | |
| | | $V_{GS}$ = 10 V, $I_D$ = 30 A, $T_J$ = 125°C | | 0.009 | 0.014 | |
| Forward Transconductance[b] | $g_{fs}$ | $V_{DS}$ = 15 V, $I_D$ = 30 A | | 45 | | S |
| **Dynamic** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 2600 | | pF |
| Output Capacitance | $C_{oss}$ | | | 1500 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 750 | | |
| Total Gate Charge[c] | $Q_g$ | $V_{DS}$ = 15 V, $V_{GS}$ = 10 V, $I_D$ = 60 A | | 100 | 120 | nC |
| Gate-Source Charge[c] | $Q_{gs}$ | | | 10 | 15 | |
| Gate-Drain Charge[c] | $Q_{gd}$ | | | 45 | 75 | |
| Turn-On Delay Time[c] | $t_{d(on)}$ | $V_{DD}$ = 30 V, $R_L$ = 1 Ω<br>$I_D$ ≃ 30 A, $V_{GEN}$ = 10 V, $R_G$ = 2.5 Ω | | 14 | 30 | ns |
| Rise Time[c] | $t_r$ | | | 25 | 50 | |
| Turn-Off Delay Time[c] | $t_{d(off)}$ | | | 65 | 100 | |
| Fall Time[c] | $t_f$ | | | 45 | 80 | |
| **Source-Drain Diode Ratings and Characteristics ($T_C$ = 25°C)** | | | | | | |
| Continuous Current | $I_S$ | | | | 60 | A |
| Pulsed Current | $I_{SM}$ | | | | 240 | |
| Forward Voltage[b] | $V_{SD}$ | $I_F$ = 60 A, $V_{GS}$ = 0 V | | | 1.6 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 60 A, $dI_F/dt$ = 100 A/µs | | 160 | | ns |
| Peak Reverse Recovery Current | $I_{RM(REC)}$ | | | 13 | | A |
| Reverse Recovery Charge | $Q_{rr}$ | | | 1.0 | | µC |

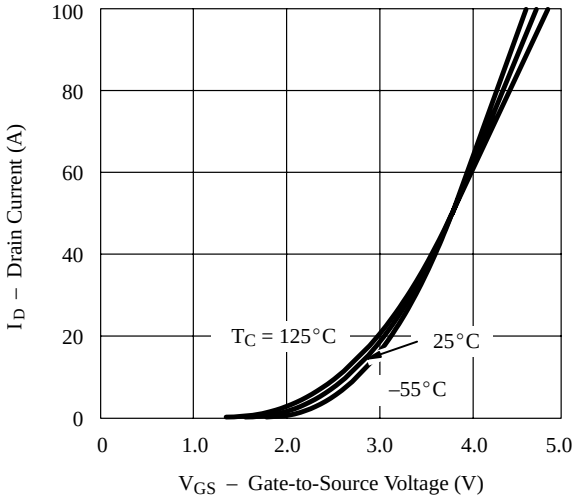
Notes:
a. For design aid only; not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
c. Independent of operating temperature.

# Typical Characteristics (25°C Unless Otherwise Noted)

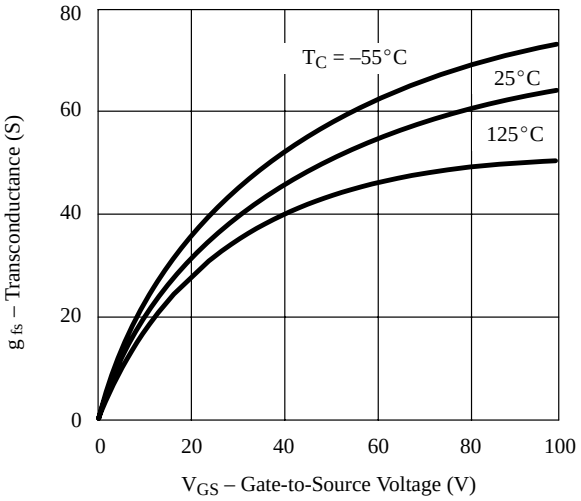
**Output Characteristics**



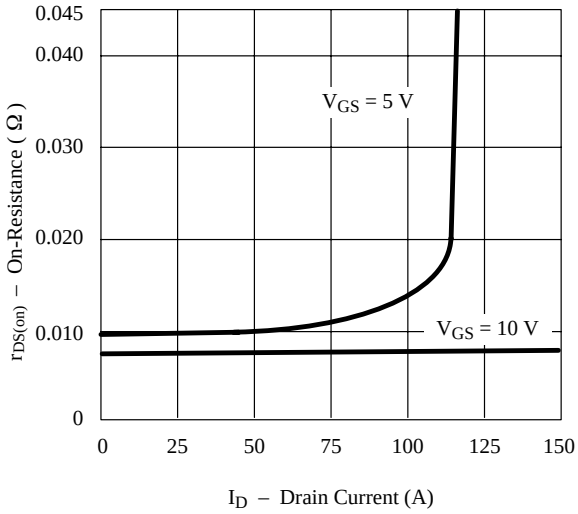

**Transfer Characteristics**



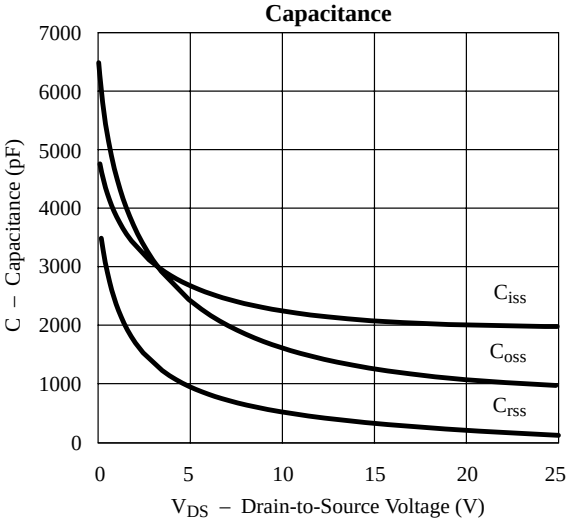

**Transconductance**



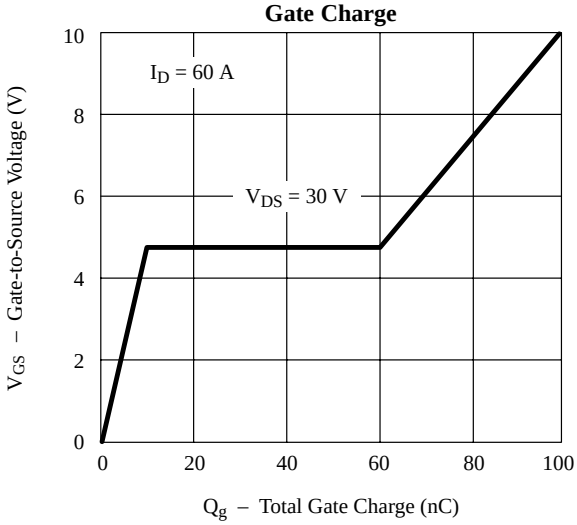

**On-Resistance vs. Drain Current**




**Capacitance**

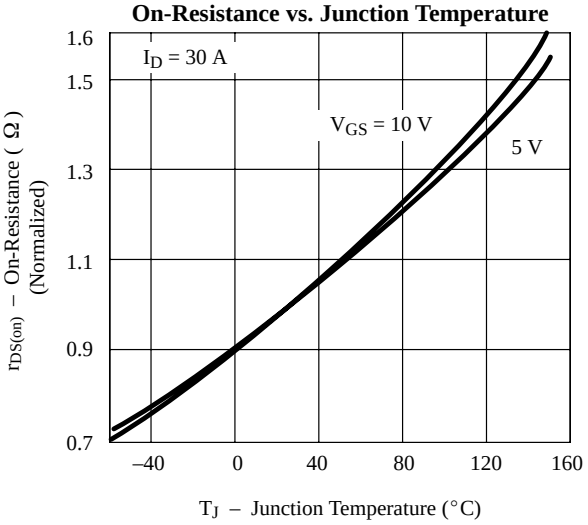



**Gate Charge**

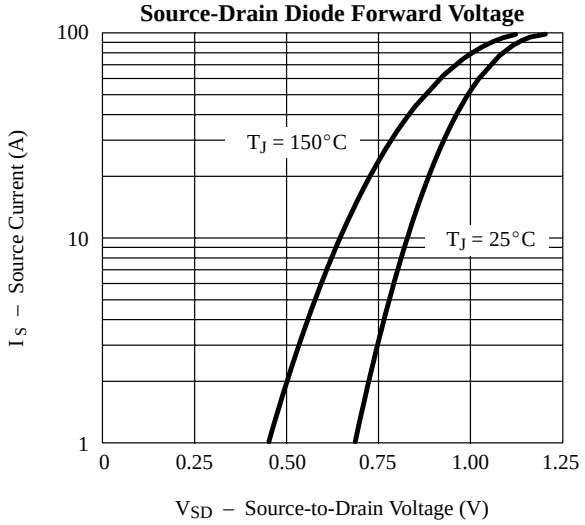


# Typical Characteristics (25°C Unless Otherwise Noted)

**On-Resistance vs. Junction Temperature**

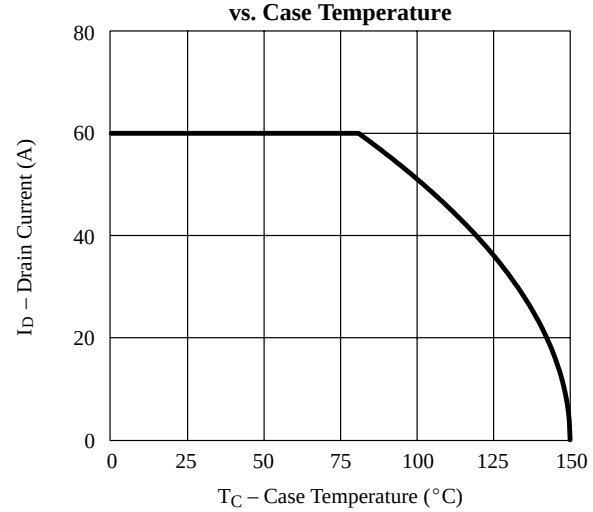



**Source-Drain Diode Forward Voltage**

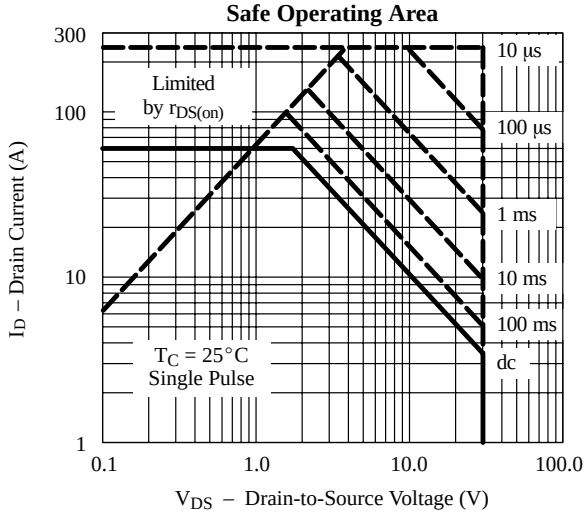



# Thermal Ratings

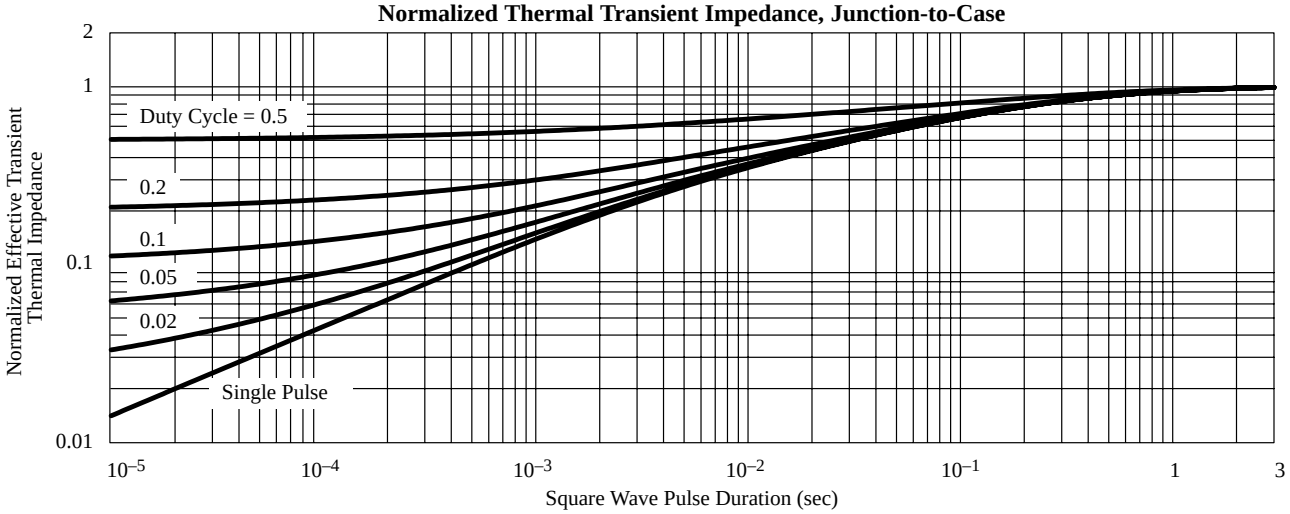
**Maximum Avalanche and Drain Current vs. Case Temperature**




**Safe Operating Area**




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



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