

60V N-Channel Power MOSFET

DESCRIPTION :

- Excellent $R_{DS(ON)}$
- Low Gate Charge
- 100% UIS Tested, 100% ΔV_{ds} Tested
- Pb-Free Lead Plating
- RoHS compliant
- Halogen Free

| | |
|--------------------------------|---------------|
| V_{DSS} | 60V |
| $I_D @ V_{GS}=10V$ | 58A |
| $R_{DS(ON)_Typ.} @ V_{GS}=10V$ | 8.3m Ω |



TO-220AB

TYPICAL APPLICATIONS :

- Power Management
- Load Switch
- PWM Application

MAXIMUM RATINGS (at $T_C = 25^\circ C$, unless otherwise specified)

| Characteristic | Condition | Symbol | Value | Unit |
|---|---------------------------------------|----------------|---------------|------------|
| Drain-Source Voltage | | V_{DS} | 60 | V |
| Gate-Source Voltage | | V_{GS} | ± 20 | V |
| Continuous Drain Current | $T_C=25^\circ C$ $T_C=100^\circ C$ | I_D | 58 41 | A |
| Pulsed Drain Current ⁽¹⁾ | | I_{DM} | Refer to Fig4 | A |
| Single Pulsed Avalanche Energy ⁽²⁾ | | E_{AS} | 124 | mJ |
| Power dissipation | $T_C=25^\circ C$ $T_C=100^\circ C$ | P_D | 215 86 | W |
| Junction & Storage temperature Range | | T_J, T_{STG} | -55~+150 | $^\circ C$ |

Notes : 1. Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature.

2. E_{AS} condition: Starting $T_J=25^\circ C$, $V_{DD}=30V$, $V_G=10V$, $R_G=25\Omega$, $L=0.5mH$, $I_{AS}=22.26A$, $V_{DD}=0V$ during time in avalanche.

THERMAL CHARACTERISTICS

| Characteristic | Condition | Symbol | Value | Unit |
|---------------------|---|------------------------------------|-----------|--------------|
| Thermal resistance, | Junction to Ambient Junction to Case | $R_{\theta JA}$ $R_{\theta JC}$ | 68 0.6 | $^\circ C/W$ |

ELECTRICAL CHARACTERISTICS (at $T_J = 25\text{ }^\circ\text{C}$, unless otherwise specified)

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---------------|------|------|-----------|------------|
| Drain-Source Breakdown Voltage VGS = 0V, ID = 250uA | $V_{(BR)DSS}$ | 60 | | | V |
| Zero Gate Voltage Drain Current VDS = 60 V, VGS = 0 V | I_{DSS} | | | 1 | uA |
| Gate-Source Leakage Current VGS = ± 20 V, VDS = 0V | I_{GSS} | | | ± 100 | nA |
| Gate-Source threshold voltage VDS = VGS, ID = 250uA | $V_{GS(th)}$ | 1.1 | 1.6 | 2.0 | V |
| Drain-Source On-State Resistance VGS = 10V, ID = 30A | $R_{DS(on)}$ | | 8.3 | 10.8 | m Ω |
| Input capacitance f=1MHz, VDS=30 V, VGS=0 V | C_{iss} | | 4032 | | pF |
| Output capacitance f=1MHz, VDS=30 V, VGS=0 V | C_{oss} | | 186 | | pF |
| Reverse transfer capacitance f=1MHz, VDS=30 V, VGS=0 V | C_{rss} | | 152 | | pF |
| Gate Resistance f=1MHz | R_g | | 2.0 | | Ω |
| Total Gate Charge VDS= 30V, ID= 30A, VGS= 0 to 10V | Q_G | | 77 | | nC |
| Gate to Source Charge VDS= 30V, ID= 30A, VGS= 0 to 10V | Q_{GS} | | 14 | | nC |
| Gate to Drain Charge VDS= 30V, ID= 30A, VGS= 0 to 10V | Q_{GD} | | 14 | | nC |
| Turn-on delay time VDD=30 V, VGS= 10V, ID= 30A, RGEN=3 Ω | $t_{d(ON)}$ | | 10 | | ns |
| Rise time VDD=30 V, VGS= 10V, ID= 30A, RGEN=3 Ω | t_r | | 27 | | ns |
| Turn-off delay time VDD=30 V, VGS= 10V, ID= 30A, RGEN=3 Ω | $t_{d(OFF)}$ | | 61 | | ns |
| Fall time VDD=30 V, VGS= 10V, ID= 30A, RGEN=3 Ω | t_f | | 16 | | ns |

Body Diode

ELECTRICAL CHARACTERISTICS (at $T_J = 25\text{ }^\circ\text{C}$, unless otherwise specified)

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|----------|------|------|------|------|
| Diode Forward Voltage $V_{GS} = 0V, I_S = 30A$ | V_{SD} | | | 1.2 | V |
| Maximum Continuous Body Diode Forward Current | I_S | | | 58 | A |
| Maximum Pulsed Body Diode Forward Current | I_{SM} | | | 232 | A |
| Revers Recovery Time $I_F = 30A, di/dt = 100A/\mu s$ | T_{rr} | | 25 | | ns |
| Revers Recovery Charge $I_F = 30A, di/dt = 100A/\mu s$ | Q_{rr} | | 29 | | nC |

Typical Performance Characteristics

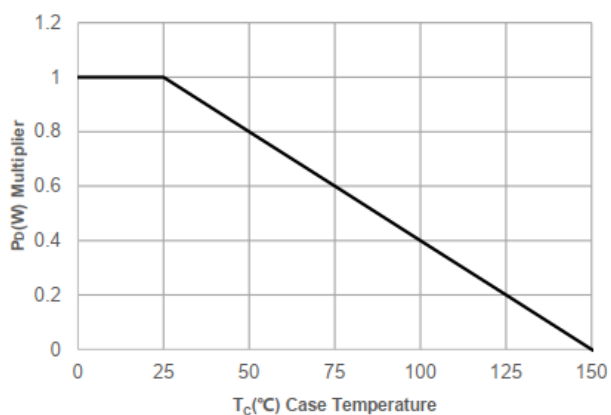


Figure 1. Power De-rating

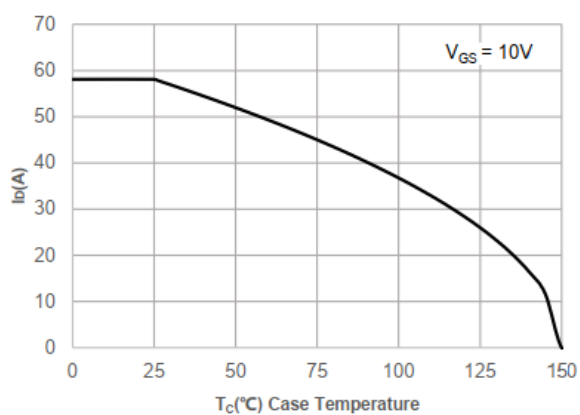


Figure 2. Current De-rating

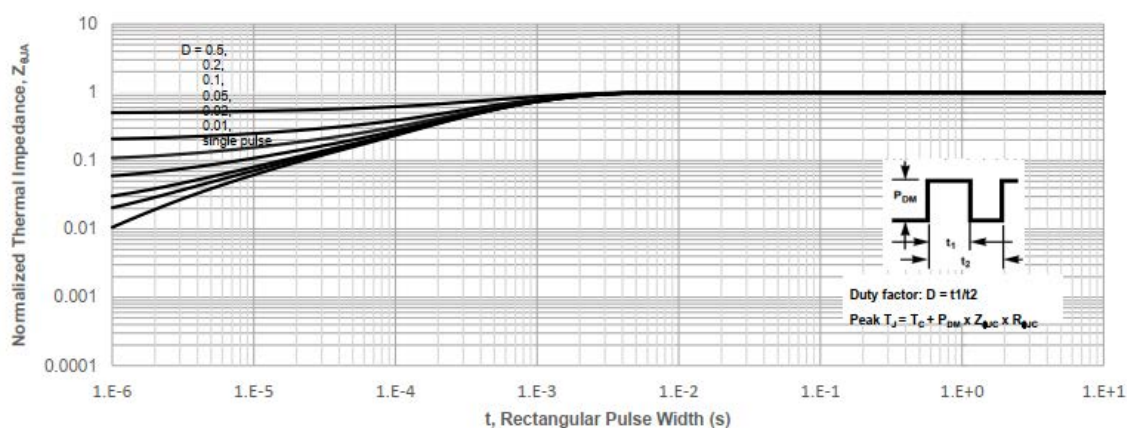


Figure 3. Normalized Maximum Transient Thermal Impedance

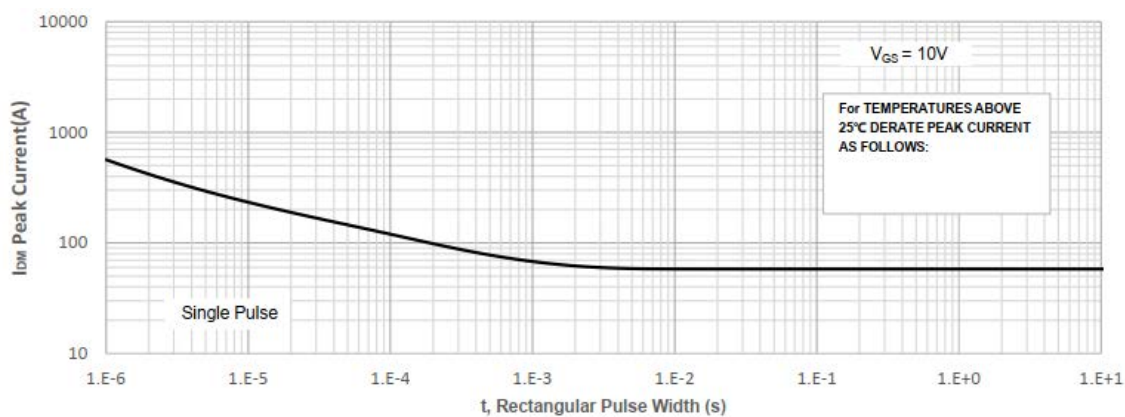


Figure 4. Peak Current Capacity

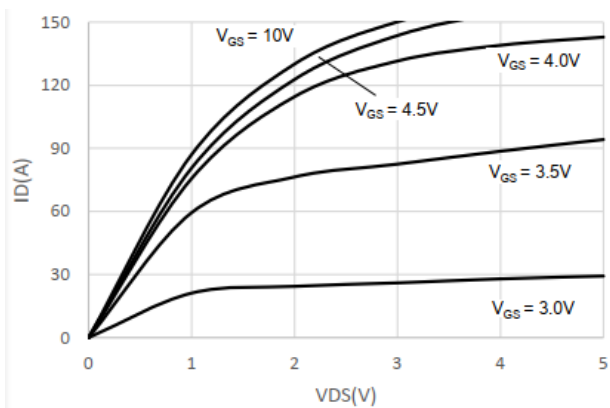


Figure 5. Output Characteristics

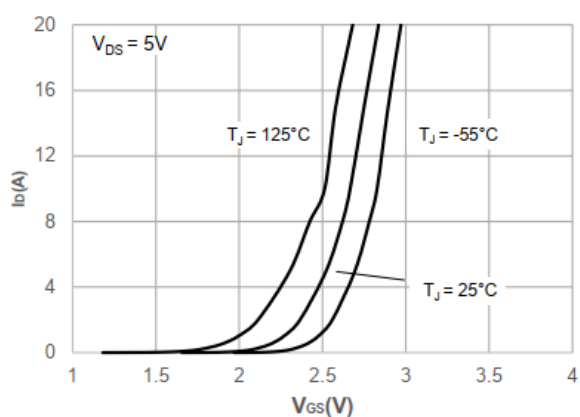


Figure 6. Typical Transfer Characteristics

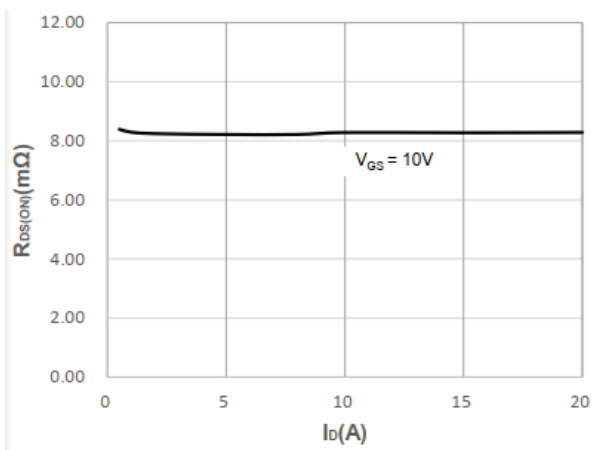


Figure 7. On-resistance vs. Drain Current

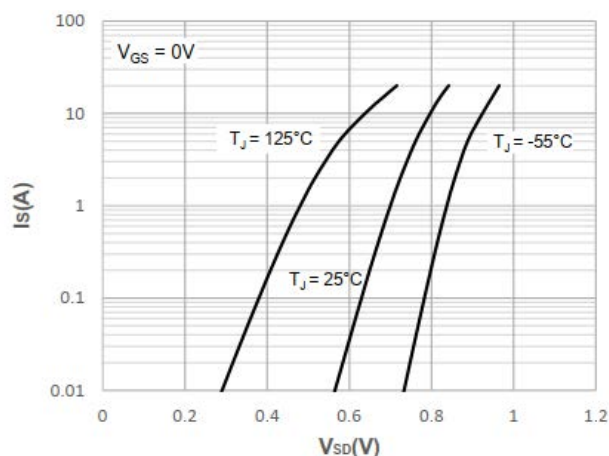


Figure 8. Body Diode Characteristics

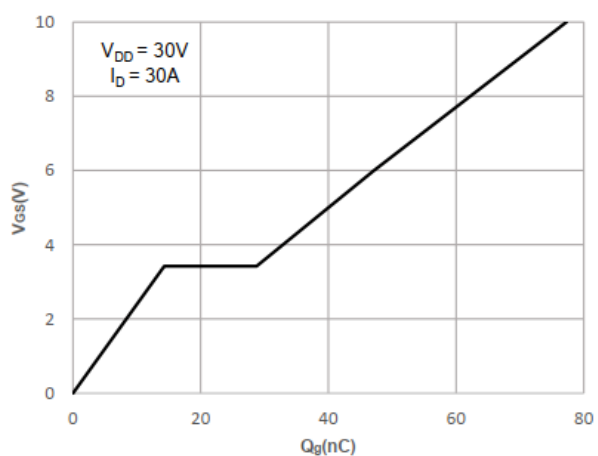


Figure 9. Gate Charge Characteristics

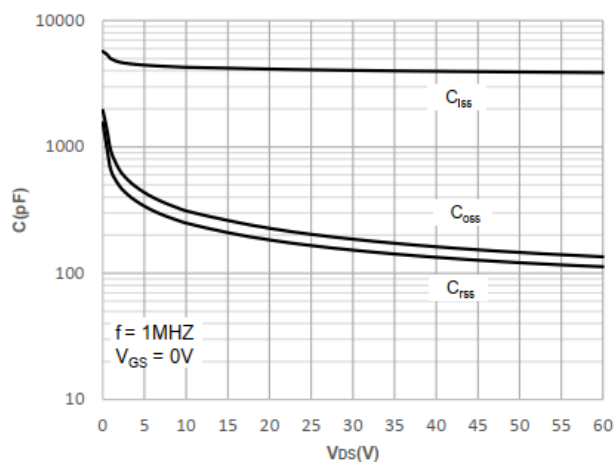


Figure 10. Capacitance Characteristics

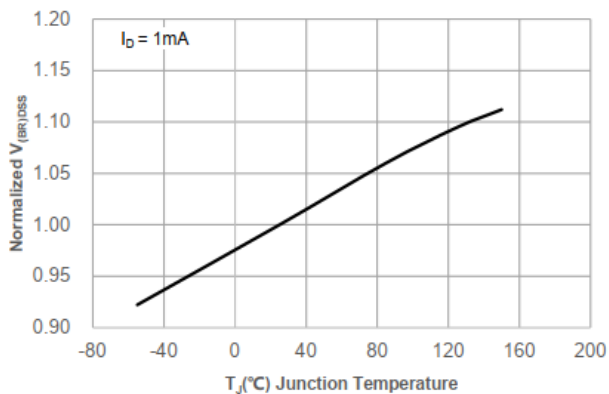


Figure 11. Normalized Breakdown voltage vs. Junction Temperature

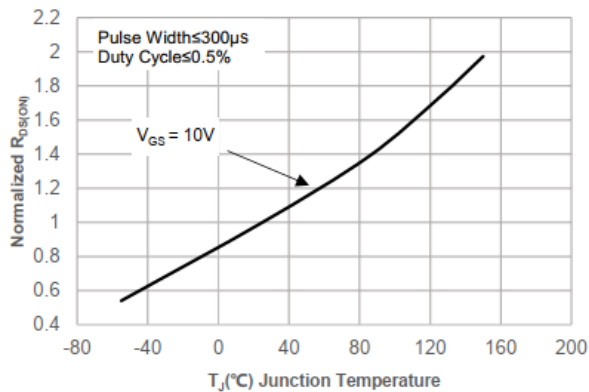


Figure 12. Normalized on Resistance vs. Junction Temperature

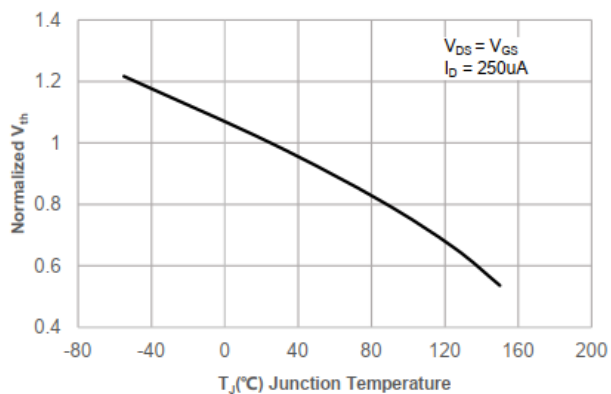


Figure 13. Normalized Threshold Voltage vs. Junction Temperature

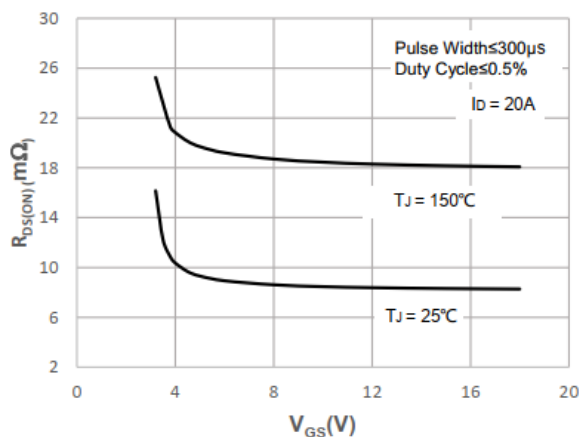


Figure 14. RDS(ON) vs. VGS

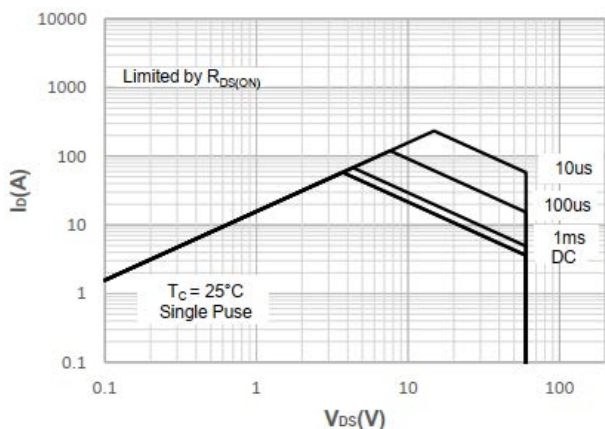
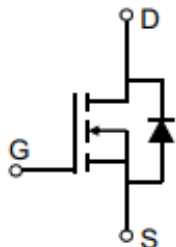
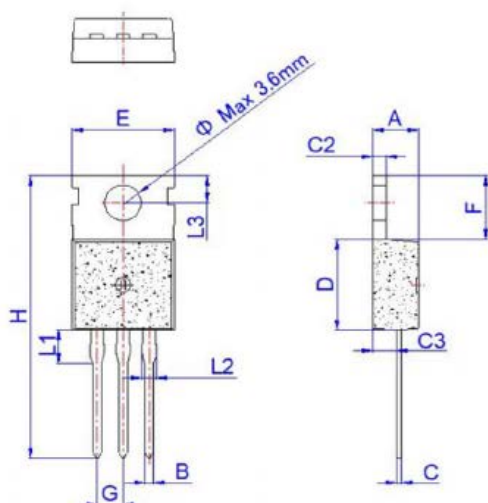


Figure 15. Maximum Safe Operating Area

- Circuit diagram



- Package outlines : Dimensions in (mm)



| Ref. | Dimensions | | | | | |
|------|-------------|------|------|--------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| B | 0.70 | | 0.90 | 0.028 | | 0.035 |
| C | 0.45 | | 0.60 | 0.018 | | 0.024 |
| C2 | 1.23 | | 1.32 | 0.048 | | 0.052 |
| C3 | 2.20 | | 2.60 | 0.087 | | 0.102 |
| D | 8.90 | | 9.90 | 0.350 | | 0.390 |
| E | 9.90 | | 10.3 | 0.390 | | 0.406 |
| F | 6.30 | | 6.90 | 0.248 | | 0.272 |
| G | | 2.54 | | | 0.1 | |
| H | 28.0 | | 29.8 | 1.102 | | 1.173 |
| L1 | | 3.39 | | | 0.133 | |
| L2 | 1.14 | | 1.70 | 0.045 | | 0.067 |
| L3 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| Φ | | 3.6 | | | 0.142 | |

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