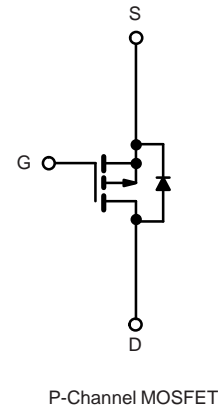
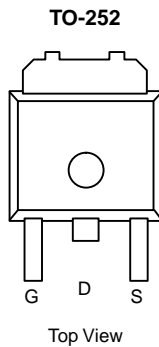


P-Channel 60V (D-S) MOSFET

| PRODUCT SUMMARY | | |
|---------------------|------------------------------------|---------------------------------|
| V _{DS} (V) | R _{DS(on)} (Ω) | I _D (A) ^a |
| -60 | 0.0055 at V _{GS} = - 10 V | - 75 |
| | 0.008 at V _{GS} = - 4.5 V | - 70 |

FEATURES

- Compliant to RoHS Directive 2002/95/EC



| ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted) | | | |
|---------------------------------------------------------------------------|----------------------------------------------|-------------------------|-------------------|
| Parameter | Symbol | Limit | Unit |
| Gate-Source Voltage | V _{GS} | ± 20 | V |
| Continuous Drain Current (T _J = 175 °C) | I _D | T _C = 25 °C | - 75 ^a |
| | | T _C = 125 °C | - 65 |
| Pulsed Drain Current | I _{DM} | - 225 | A |
| Avalanche Current | I _{AR} | - 60 | |
| Repetitive Avalanche Energy ^b | L = 0.1 mH | E _{AR} | 180 |
| Power Dissipation | T _C = 25 °C (TO-220AB and TO-263) | P _D | 187 ^d |
| | T _A = 25 °C (TO-263) ^c | | 3.75 |
| Operating Junction and Storage Temperature Range | T _J , T _{stg} | - 55 to 175 | °C |

| THERMAL RESISTANCE RATINGS | | | |
|----------------------------|-------------------|---------------------------------|------|
| Parameter | Symbol | Limit | Unit |
| Junction-to-Ambient | R _{thJA} | PCB Mount (TO-263) ^c | 40 |
| | | Free Air (TO-220AB) | 62.5 |
| Junction-to-Case | R _{thJC} | 0.8 | °C/W |

Notes:

- Package limited.
- Duty cycle ≤ 1 %.
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.

* Pb containing terminations are not RoHS compliant, exemptions may apply.

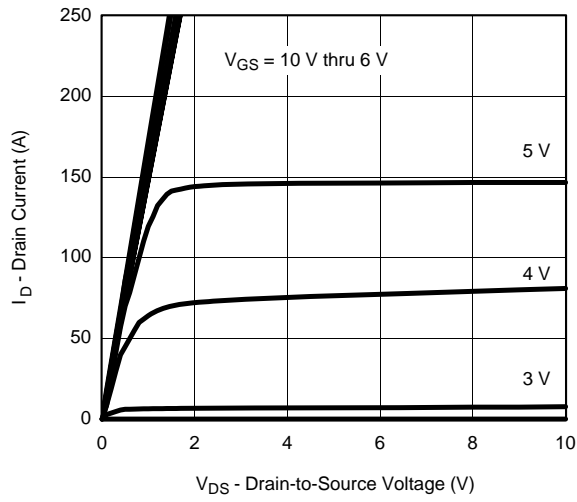
| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|--------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------|------|--------|-----------|---------------|
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | -30 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | -1 | | -3 | |
| Gate-Body Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$ | | | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$ | | | -1 | μA |
| | | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | | | -50 | |
| | | $V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | | | -250 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$ | -120 | | | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -30\text{ A}$ | | 0.0055 | | Ω |
| | | $V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | | 0.010 | | |
| | | $V_{GS} = -10\text{ V}, I_D = -30\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | | 0.013 | | |
| | | $V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$ | | 0.008 | | |
| Forward Transconductance ^a | g_{fs} | $V_{DS} = -15\text{ V}, I_D = -75\text{ A}$ | 20 | | | S |
| Dynamic^b | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$ | | 9000 | | μF |
| Output Capacitance | C_{oss} | | | 1565 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 715 | | |
| Total Gate Charge ^c | Q_g | $V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -75\text{ A}$ | | 160 | 240 | nC |
| Gate-Source Charge ^c | Q_{gs} | | | 32 | | |
| Gate-Drain Charge ^c | Q_{gd} | | | 30 | | |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = -15\text{ V}, R_L = 0.2\text{ }\Omega$ $I_D \equiv -75\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\text{ }\Omega$ | | 25 | 40 | ns |
| Rise Time ^c | t_r | | | 225 | 360 | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | | 150 | 240 | |
| Fall Time ^c | t_f | | | 210 | 340 | |
| Source-Drain Diode Ratings and Characteristics^b ($T_C = 25\text{ }^\circ\text{C}$) | | | | | | |
| Continuous Current | I_S | | | | -80 | A |
| Pulsed Current | I_{SM} | | | | -240 | |
| Forward Voltage ^a | V_{SD} | $I_F = -75\text{ A}, V_{GS} = 0\text{ V}$ | | -1.2 | -1.5 | V |
| Reverse Recovery Time | t_{rr} | $I_F = -75\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ | | 55 | 100 | ns |
| Peak Reverse Recovery Current | $I_{RM(REC)}$ | | | 2.5 | 5 | A |
| Reverse Recovery Charge | Q_{rr} | | | 0.07 | 0.25 | μC |

Notes:

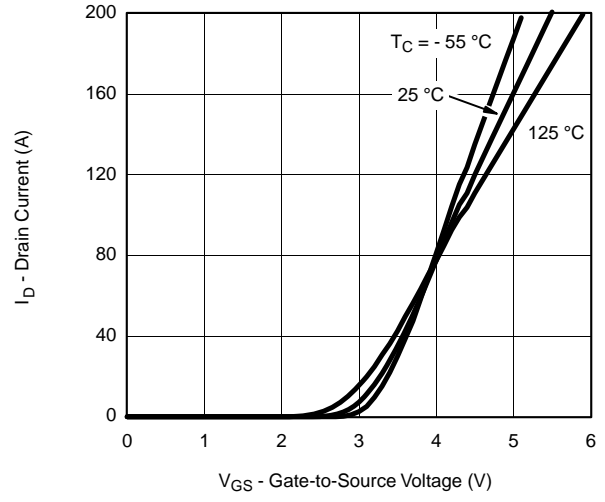
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

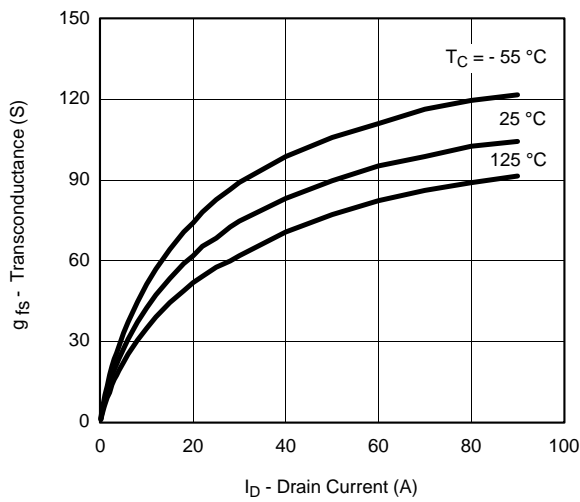
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



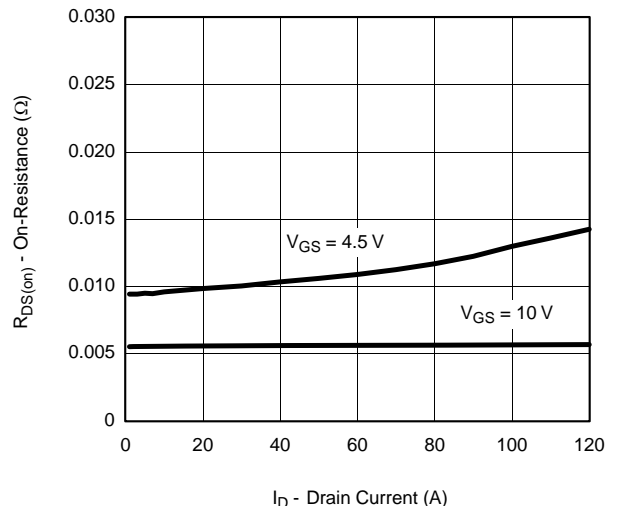
Output Characteristics



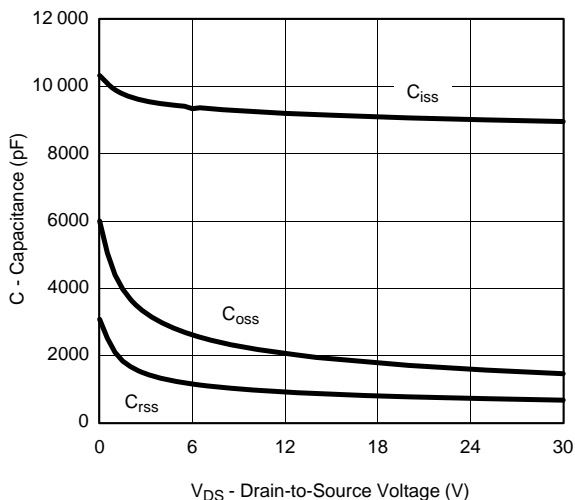
Transfer Characteristics



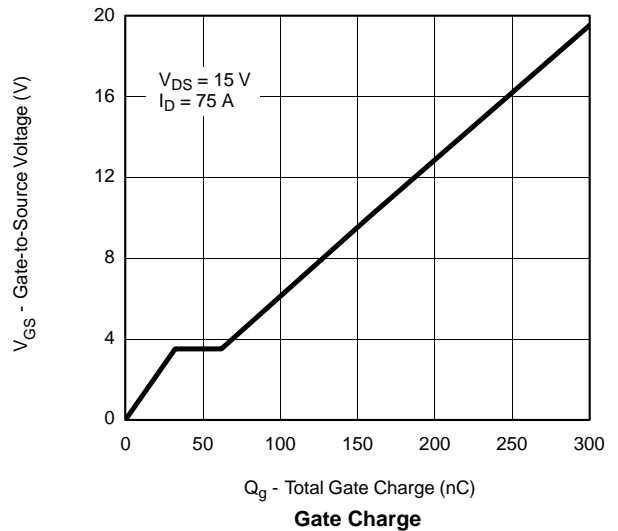
Transconductance



On-Resistance vs. Drain Current



Capacitance

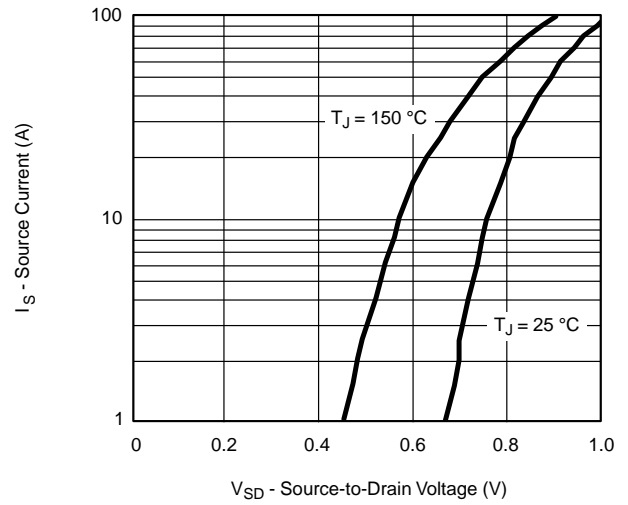


Gate Charge

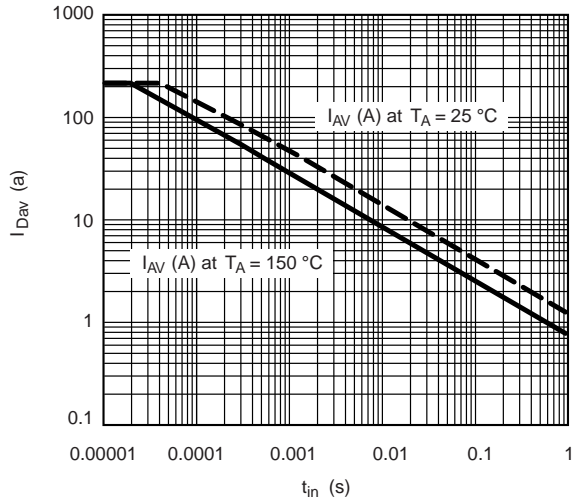
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



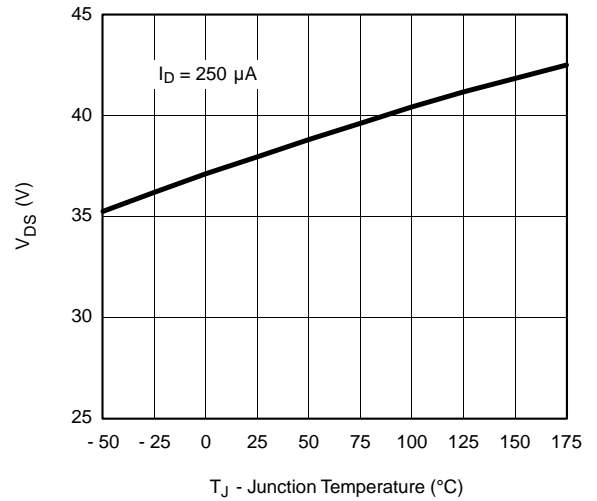
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



Avalanche Current vs. Time

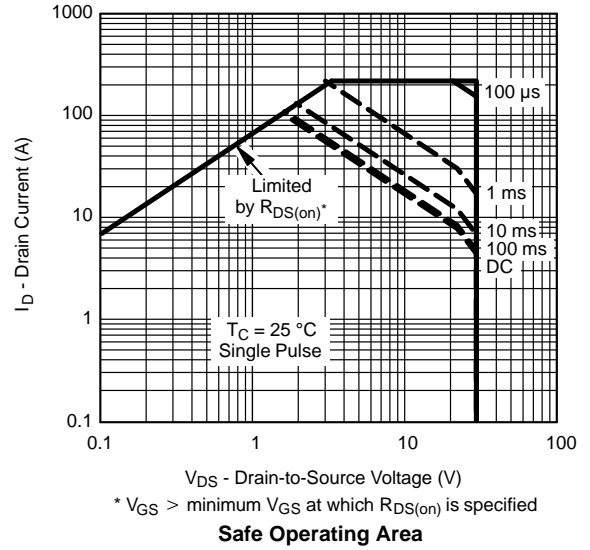


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS

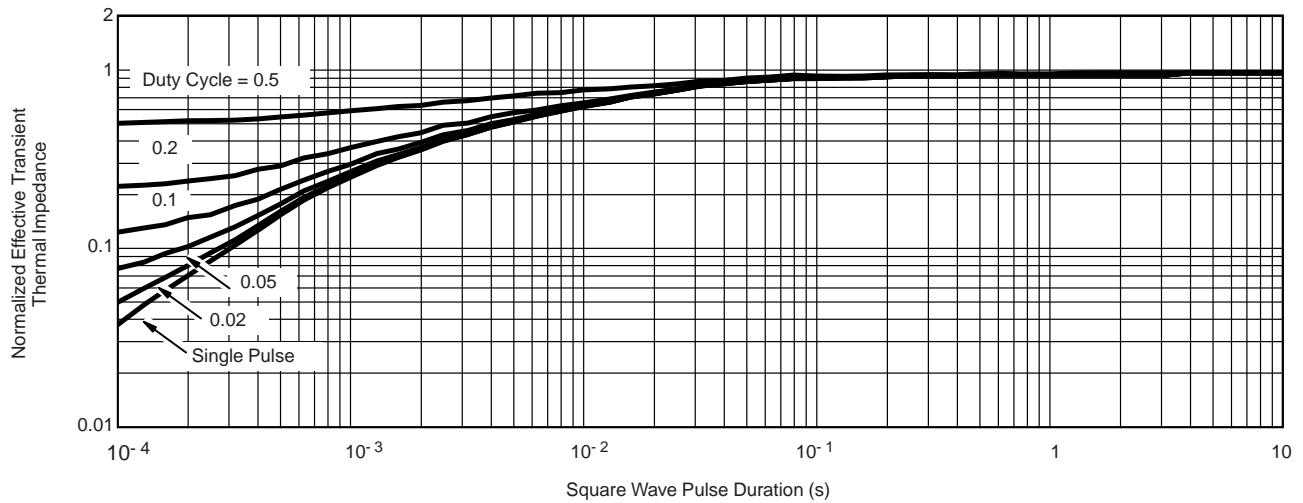


Maximum Avalanche and Drain Current vs. Case Temperature



V_{DS} - Drain-to-Source Voltage (V)

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



Normalized Thermal Transient Impedance, Junction-to-Case

TO-252AA CASE OUTLINE

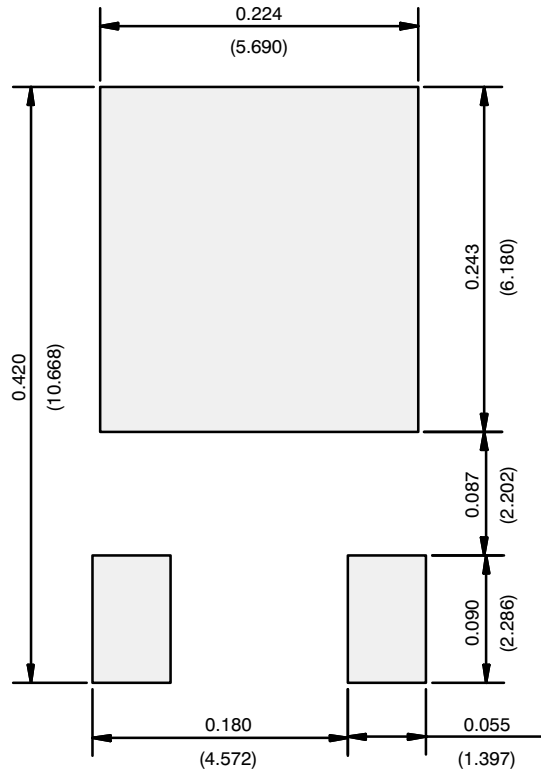


| DIM. | MILLIMETERS | | INCHES | |
|----------------------------------------------|-------------|-------|-----------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 2.18 | 2.38 | 0.086 | 0.094 |
| A1 | - | 0.127 | - | 0.005 |
| b | 0.64 | 0.88 | 0.025 | 0.035 |
| b2 | 0.76 | 1.14 | 0.030 | 0.045 |
| b3 | 4.95 | 5.46 | 0.195 | 0.215 |
| C | 0.46 | 0.61 | 0.018 | 0.024 |
| C2 | 0.46 | 0.89 | 0.018 | 0.035 |
| D | 5.97 | 6.22 | 0.235 | 0.245 |
| D1 | 5.21 | - | 0.205 | - |
| E | 6.35 | 6.73 | 0.250 | 0.265 |
| E1 | 4.32 | - | 0.170 | - |
| H | 9.40 | 10.41 | 0.370 | 0.410 |
| e | 2.28 BSC | | 0.090 BSC | |
| e1 | 4.56 BSC | | 0.180 BSC | |
| L | 1.40 | 1.78 | 0.055 | 0.070 |
| L3 | 0.89 | 1.27 | 0.035 | 0.050 |
| L4 | - | 1.02 | - | 0.040 |
| L5 | 1.14 | 1.52 | 0.045 | 0.060 |
| ECN: X12-0247-Rev. M, 24-Dec-12 DWG: 5347 | | | | |

Note

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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