

## P-Channel 60 V (D-S) MOSFET

### PRODUCT SUMMARY

| V <sub>DS</sub> (V) | R <sub>DS(on)</sub> (mΩ)(Typ)   | I <sub>D</sub> (A) |
|---------------------|---------------------------------|--------------------|
| - 60                | 70 at V <sub>GS</sub> = - 10 V  | - 35               |
|                     | 85 at V <sub>GS</sub> = - 4.5 V | - 25               |

### FEATURES

- DT-Trench Power MOSFET
- 100 % R<sub>g</sub> and UIS Tested

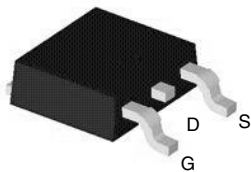


**RoHS**  
COMPLIANT

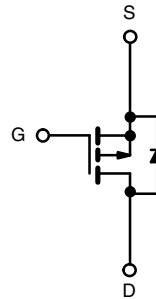
### APPLICATIONS

- Load Switch

TO-252 Pin Configuration



Top View



P-Channel MOSFET

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

| Parameter  | Symbol                            | Limit                   | Unit             |
|--|-----------------------------------|-------------------------|------------------|
| Drain-Source Voltage                               | V <sub>DS</sub>                   | - 60                    | V                |
| Gate-Source Voltage                                | V <sub>GS</sub>                   | ± 20                    |                  |
| Continuous Drain Current (T <sub>J</sub> = 150 °C) | I <sub>D</sub>                    | T <sub>C</sub> = 25 °C  | - 35             |
|  |                                   | T <sub>C</sub> = 100 °C | - 26             |
| Pulsed Drain Current                               | I <sub>DM</sub>                   | - 125                   | A                |
| Avalanche Current                                  | I <sub>AS</sub>                   | - 30                    |                  |
| Single Pulse Avalanche Energy <sup>a</sup>         | E <sub>AS</sub>                   | 116                     | mJ               |
| Power Dissipation                                  | P <sub>D</sub>                    | T <sub>C</sub> = 25 °C  | 133 <sup>c</sup> |
|  |                                   | T <sub>A</sub> = 25 °C  | 2.9 <sup>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            | Typical      | Maximum | Unit |
|----------------------------------|-------------------|--------------|---------|------|
| Junction-to-Ambient <sup>b</sup> | R <sub>thJA</sub> | t ≤ 10 s     | 10      | 15   |
|                                  |                   | Steady State | 30      | 45   |
| Junction-to-Case                 | R <sub>thJC</sub> | 0.7          | 1.1     | °C/W |

Notes:

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

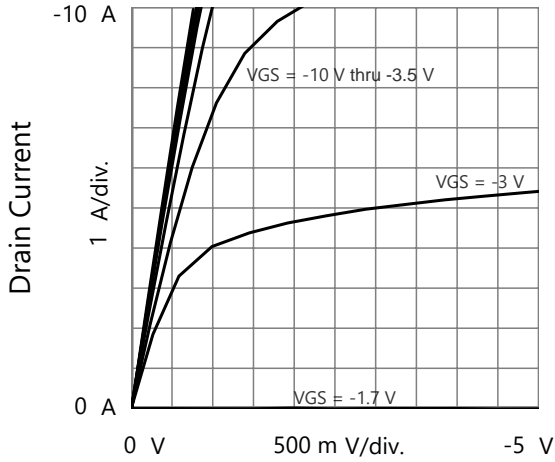
| <b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)       |              |  |      |       |           |                  |
|--|--------------|--|------|-------|-----------|------------------|
| Parameter  | Symbol       | Test Conditions  | Min. | Typ.  | Max.      | Unit             |
| <b>Static</b>  |              |  |      |       |           |                  |
| Drain-Source Breakdown Voltage   | $V_{DS}$     | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$   | - 60 |       |           | V                |
| Gate Threshold Voltage   | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$   | - 1  |       | - 3       |                  |
| Gate-Body Leakage  | $I_{GSS}$    | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$  |      |       | $\pm 100$ | nA               |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | $V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$   |      |       | - 1       | $\mu\text{A}$    |
|  |              | $V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$  |      |       | - 50      |                  |
|  |              | $V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$  |      |       | - 100     |                  |
| On-State Drain Current <sup>a</sup>  | $I_{D(on)}$  | $V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$  | - 35 |       |           | A                |
| Drain-Source On-State Resistance <sup>a</sup>  | $R_{DS(on)}$ | $V_{GS} = -10\text{ V}, I_D = -10\text{ A}$  |      | 70    | 85        | $\text{m}\Omega$ |
|  |              | $V_{GS} = -10\text{ V}, I_D = -10\text{ A}, T_J = 125\text{ }^\circ\text{C}$   |      |       | 96        |                  |
|  |              | $V_{GS} = -10\text{ V}, I_D = -10\text{ A}, T_J = 150\text{ }^\circ\text{C}$   |      |       | 115       |                  |
|  |              | $V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$  |      | 85    | 105       |                  |
| Forward Transconductance <sup>a</sup>  | $g_{fs}$     | $V_{DS} = -5\text{ V}, I_D = -10\text{ A}$   |      | 15    |           | S                |
| <b>Dynamic<sup>b</sup></b>   |              |  |      |       |           |                  |
| Input Capacitance  | $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = -30\text{ V}, f = 1\text{ MHz}$   |      | 860   |           | $\text{pF}$      |
| Output Capacitance   | $C_{oss}$    |  |      | 51    |           |                  |
| Reverse Transfer Capacitance   | $C_{rss}$    |  |      | 40    |           |                  |
| Total Gate Charge <sup>c</sup>   | $Q_g$        | $V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$   |      | 25    |           | $\text{nC}$      |
| Gate-Source Charge <sup>c</sup>  | $Q_{gs}$     |  |      | 14    |           |                  |
| Gate-Drain Charge <sup>c</sup>   | $Q_{gd}$     |  |      | 12    |           |                  |
| Gate Resistance  | $R_g$        | $f = 1\text{ MHz}$   |      | 19    |           | $\Omega$         |
| Turn-On Delay Time <sup>c</sup>  | $t_{d(on)}$  | $V_{DD} = -30\text{ V}, R_L = 0.6\text{ }\Omega$<br>$I_D \equiv -10\text{ A}, V_{GEN} = -10\text{ V}, R_G = 6\text{ }\Omega$ |      | 11    |           | ns               |
| Rise Time <sup>c</sup>   | $t_r$        |  |      | 17    |           |                  |
| Turn-Off Delay Time <sup>c</sup>   | $t_{d(off)}$ |  |      | 33    |           |                  |
| Fall Time <sup>c</sup>   | $t_f$        |  |      | 15    |           |                  |
| <b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25\text{ }^\circ\text{C}^b$ |              |  |      |       |           |                  |
| Continuous Current   | $I_S$        |  |      |       | - 35      | A                |
| Pulsed Current   | $I_{SM}$     |  |      |       | - 125     |                  |
| Forward Voltage <sup>a</sup>   | $V_{SD}$     | $I_F = -30\text{ A}, V_{GS} = 0\text{ V}$  |      | - 0.7 | - 1.5     | V                |
| Reverse Recovery Time  | $t_{rr}$     | $I_F = -10\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$   |      | 26    |           | ns               |

**Notes:**

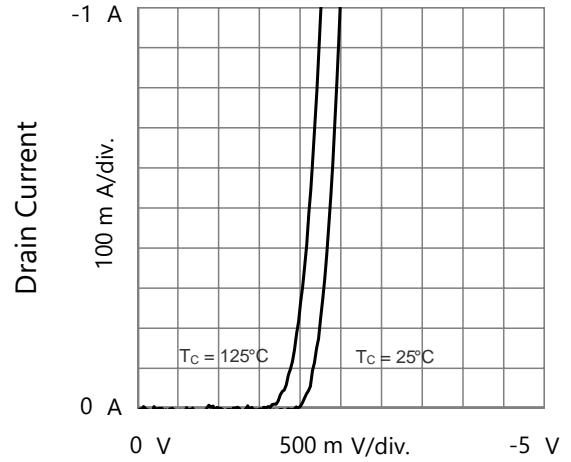
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

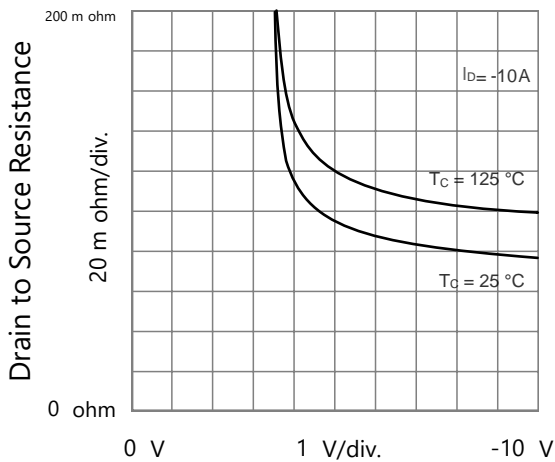
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



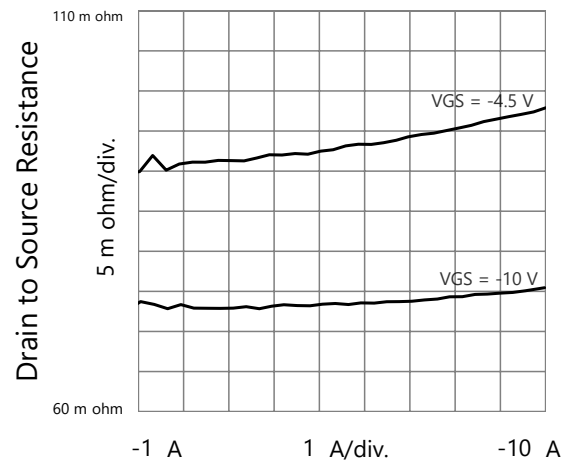
Drain to Source Voltage  
Output Characteristics



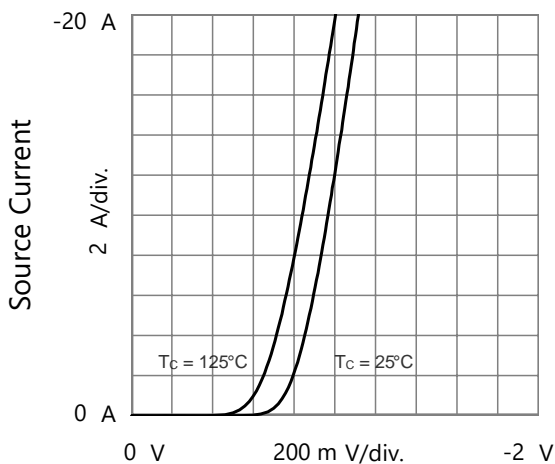
Gate to Source Voltage  
Transfer Characteristics



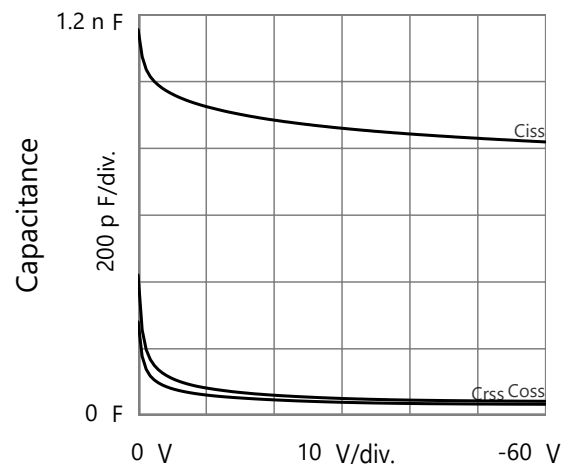
Gate to Source Voltage  
Drain to Source Resistance vs. Gate to Source Voltage



Drain Current  
Drain to Source Resistance vs. Drain Current

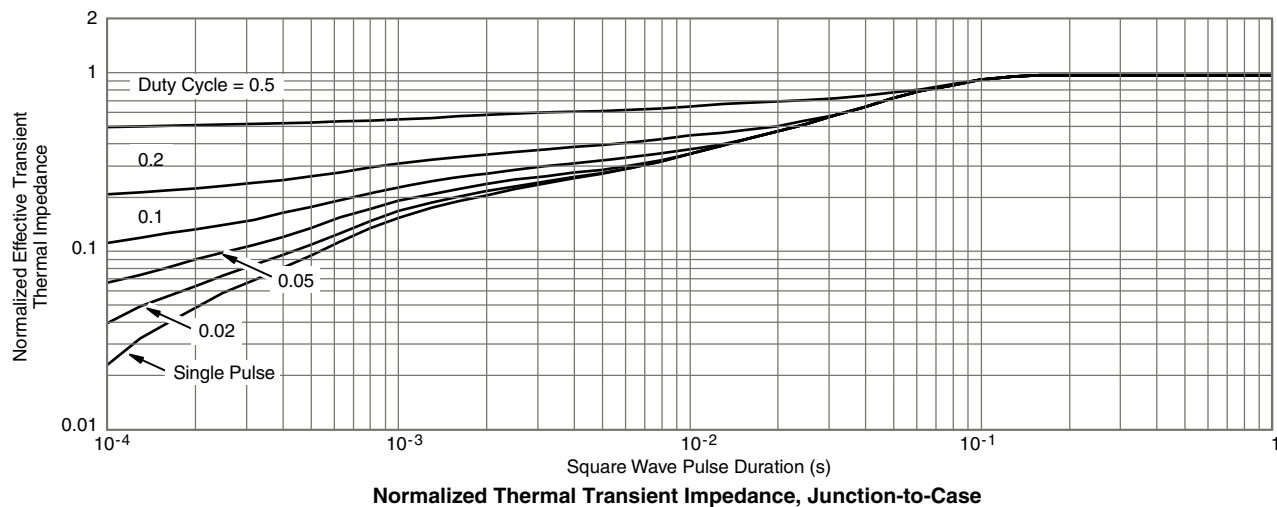
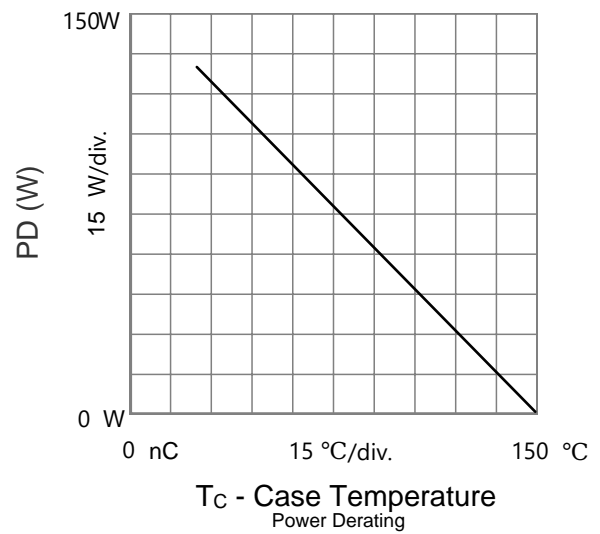
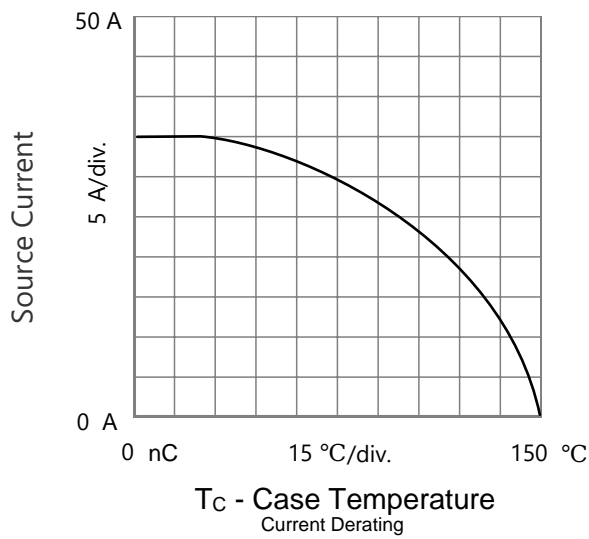
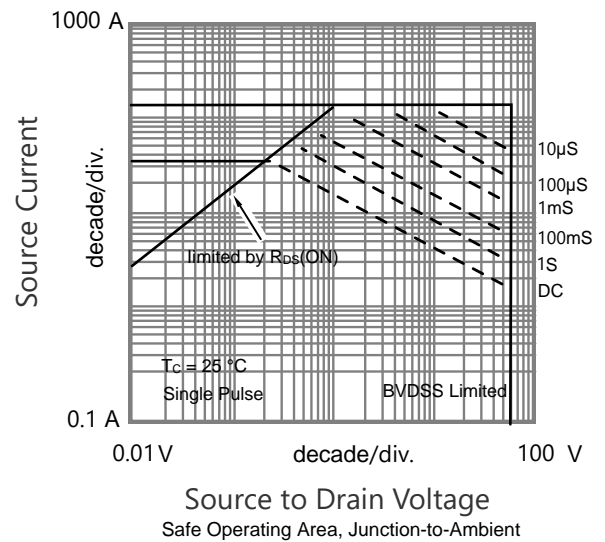
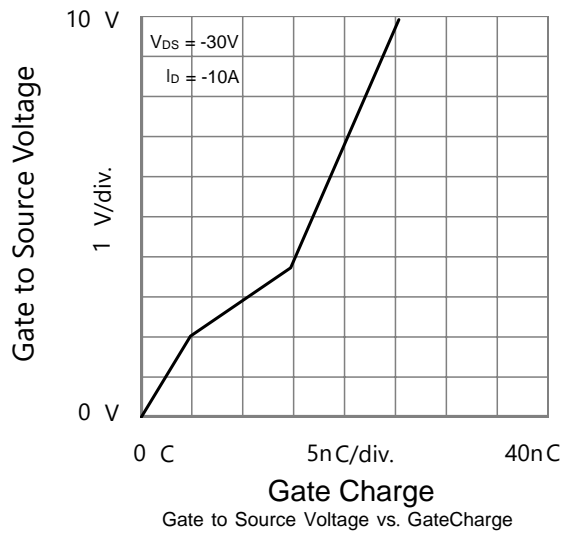


Source to Drain Voltage  
Body Diode Forward Characteristics

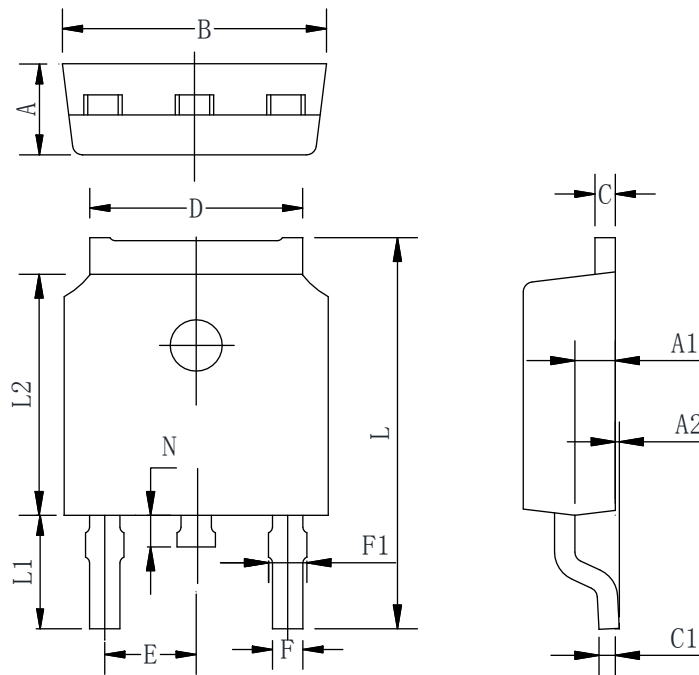


Drain to Source Voltage  
Capacitances

**TYPICAL CHARACTERISTICS**



**TO-252-2L PACKAGE OUTLINE**



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

| Symbol | Min       | Typ  | Max   |
|--------|-----------|------|-------|
| A      | 2.10      | 2.30 | 2.50  |
| A1     | 0.88      | 1.01 | 1.16  |
| A2     | 0.00      | 0.15 | 0.28  |
| B      | 6.40      | 6.60 | 6.80  |
| C      | 0.42      | 0.50 | 0.63  |
| C1     | 0.42      | 0.50 | 0.63  |
| D      | 5.08      | 5.32 | 5.65  |
| E      | 2.286 TYP |      |       |
| F      | 0.63      | 0.76 | 0.89  |
| F1     | 0.64      | 0.86 | 1.08  |
| L      | 9.30      | 9.90 | 10.80 |
| L1     | 2.4       | 2.8  | 3.6   |
| L2     | 5.90      | 6.10 | 6.55  |
| N      | 0.57      | 0.80 | 1.05  |

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