

### Product Summary

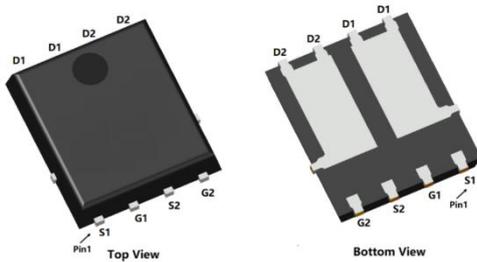
| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| 40V           | 13mΩ@10V        | 30A   |
|               | 20mΩ@4.5V       |       |

### Feature

- Trench Power MV MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Epoxy Meets UL 94 V-0 Flammability Rating
- Suffix "-Q1" for AEC-Q101

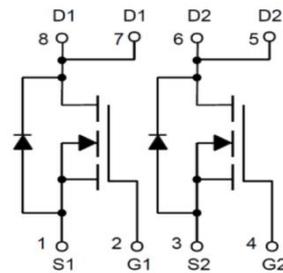
### Application

- Power switching application
- Uninterruptible power supply
- DC-DC converter



PDFN5\*6-8L

### Circuit diagram



### Marking



### Absolute maximum ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter  | Symbol                    | Value      | Unit                      |
|--|---------------------------|------------|---------------------------|
| Drain-Source Voltage   | $V_{DS}$                  | 40         | V                         |
| Gate-Source Voltage  | $V_{GS}$                  | $\pm 20$   | V                         |
| Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )        | $I_D$                     | 30         | A                         |
| Drain Current-Continuous ( $T_C = 100^\circ\text{C}$ )       | $I_D (100^\circ\text{C})$ | 19         | A                         |
| Pulsed Drain Current <sup>1)</sup>                           | $I_{DM}$                  | 120        | A                         |
| Power Dissipation ( $T_C = 25^\circ\text{C}$ ) <sup>3)</sup> | $P_D$                     | 35         | W                         |
| Thermal Resistance Junction to Case                          | $R_{\theta JC}$           | 3.5        | $^\circ\text{C}/\text{W}$ |
| Single pulse avalanche energy <sup>2)</sup>                  | $E_{AS}$                  | 42         | mJ                        |
| Operating Junction Temperature                               | $T_J$                     | -55 ~ +150 | $^\circ\text{C}$          |
| Storage Temperature  | $T_{STG}$                 | -55 ~ +150 | $^\circ\text{C}$          |

### Electrical characteristics ( $T_J=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                   | Symbol        | Test Condition   | Min. | Typ. | Max.      | Unit          |
|---|---------------|--|------|------|-----------|---------------|
| <b>Static Characteristics</b>               |               |  |      |      |           |               |
| Drain-source breakdown voltage              | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu\text{A}$                          | 40   |      |           | V             |
| Zero gate voltage drain current             | $I_{DSS}$     | $V_{DS} = 40V, V_{GS} = 0V$                                  |      |      | 1         | $\mu\text{A}$ |
| Gate-body leakage current                   | $I_{GSS}$     | $V_{GS} = \pm 20V, V_{DS} = 0V$                              |      |      | $\pm 100$ | nA            |
| Gate threshold voltage                      | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$                      | 1.0  | 1.5  | 2.5       | V             |
| Drain-source on-resistance                  | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 20A$                                    |      | 10   | 13        | m $\Omega$    |
|   |               | $V_{GS} = 4.5V, I_D = 10A$                                   |      | 14   | 20        |               |
| <b>Dynamic characteristics<sup>4)</sup></b> |               |  |      |      |           |               |
| Input Capacitance                           | $C_{iss}$     | $V_{DS} = 20V, V_{GS} = 0V, f = 1\text{MHz}$                 |      | 970  |           | pF            |
| Output Capacitance                          | $C_{oss}$     |  |      | 100  |           |               |
| Reverse Transfer Capacitance                | $C_{rss}$     |  |      | 90   |           |               |
| Total Gate Charge                           | $Q_g$         | $V_{DS} = 20V, V_{GS} = 10V, I_D = 20A$                      |      | 22   |           | nC            |
| Gate-Source Charge                          | $Q_{gs}$      |  |      | 3    |           |               |
| Gate-Drain Charge                           | $Q_{gd}$      |  |      | 6    |           |               |
| Turn-on delay time                          | $t_{d(on)}$   | $V_{DD} = 20V, V_{GS} = 10V, I_D = 20A, R_{GEN} = 2.2\Omega$ |      | 7    |           | nS            |
| Turn-on rise time                           | $t_r$         |  |      | 73   |           |               |
| Turn-off delay time                         | $t_{d(off)}$  |  |      | 19   |           |               |
| Turn-off fall time                          | $t_f$         |  |      | 10   |           |               |
| <b>Source-Drain Diode characteristics</b>   |               |  |      |      |           |               |
| Diode Forward Current                       | $I_S$         |  |      |      | 30        | A             |
| Diode Forward voltage                       | $V_{SD}$      | $V_{GS} = 0V, I_S = 20A$                                     |      |      | 1.2       | V             |
| Reverse Recovery Time                       | $t_{rr}$      | $I_F = 20A, di/dt = 100A/\mu\text{s}$                        |      | 12   |           | nS            |
| Reverse Recovery Charge                     | $Q_{rr}$      |  |      | 10   |           | nC            |

Notes:

- 1) Repetitive rating; pulse width limited by max. junction temperature.
- 2)  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 40V$ ,  $V_G = 10V$ ,  $R_G = 25\Omega$ ,  $L = 0.5\text{mH}$ ,  $I_{AS} = 13A$ .
- 3)  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.
- 4) Guaranteed by design, not subject to production testing.

## Typical Characteristics

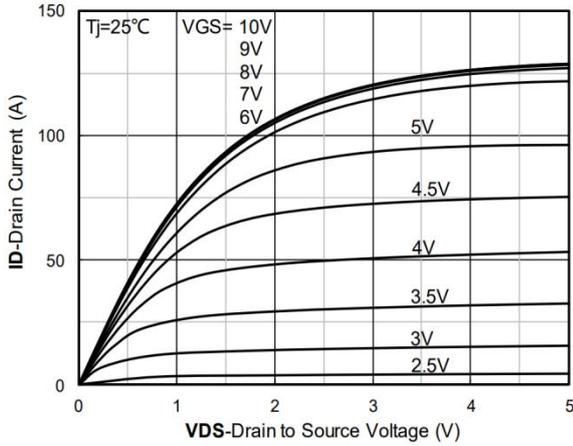


Figure 1. Output Characteristics

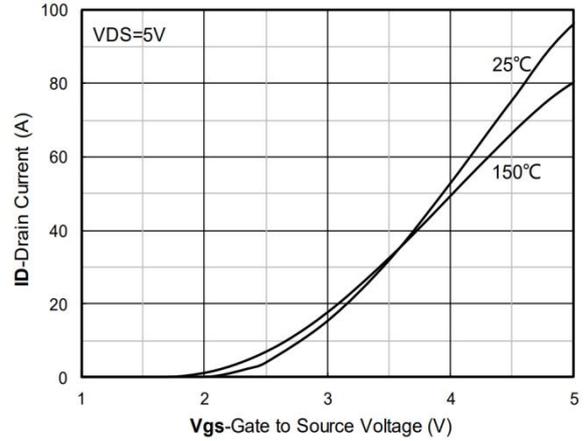


Figure 2. Transfer Characteristics

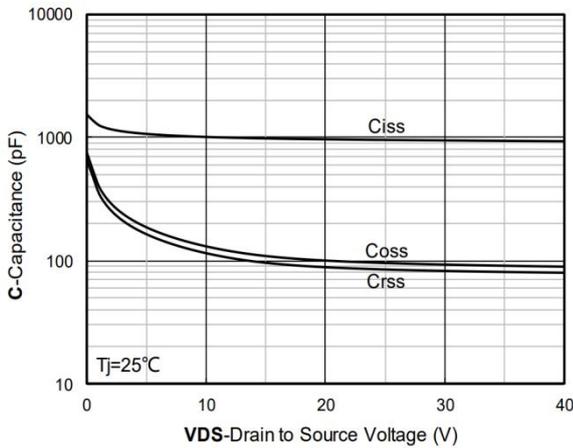


Figure 3. Capacitance Characteristics

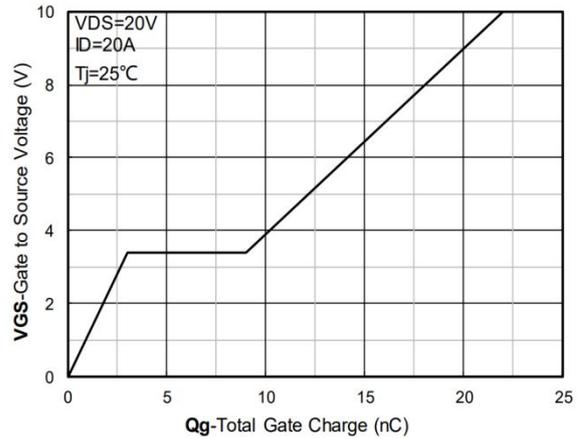


Figure 4. Gate Charge

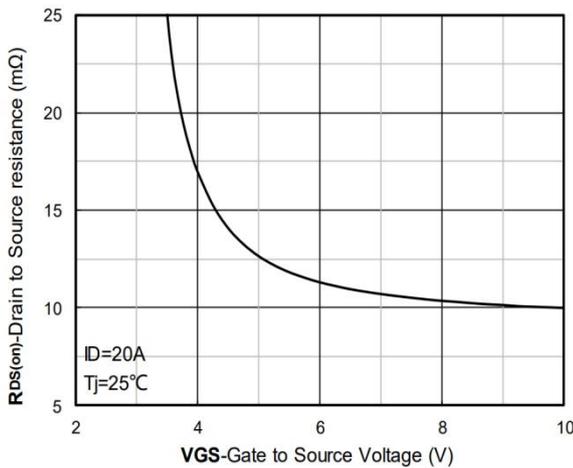


Figure 5. On-Resistance vs Gate to Source Voltage

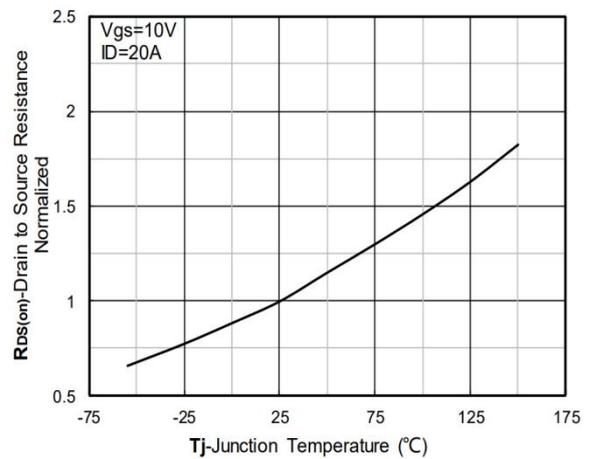


Figure 6. Normalized On-Resistance

## Typical Characteristics

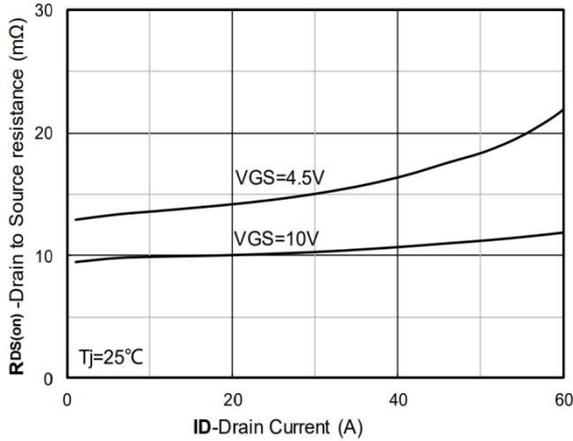


Figure 7. RDS(on) VS Drain Current

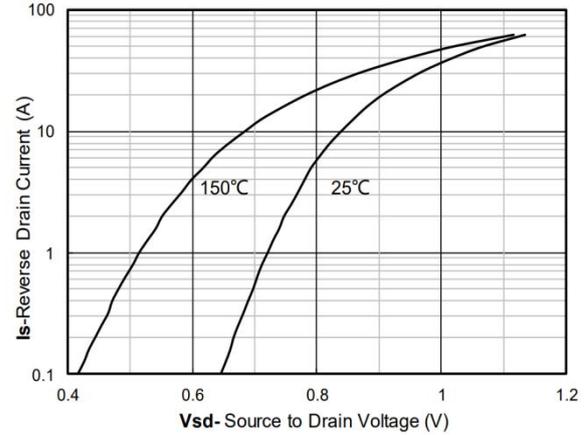


Figure 8. Forward characteristics of reverse diode

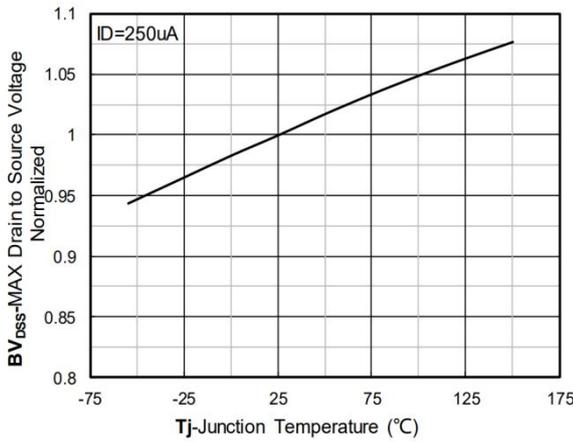


Figure 9. Normalized breakdown voltage

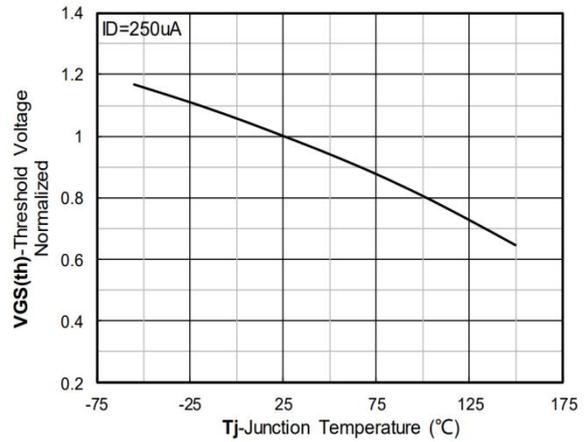


Figure 10. Normalized Threshold voltage

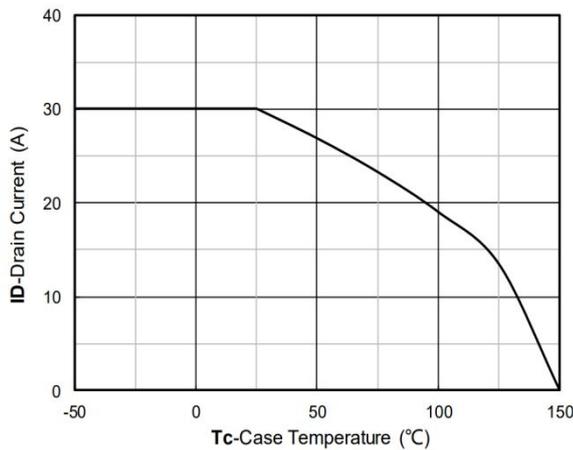


Figure 11. Current dissipation

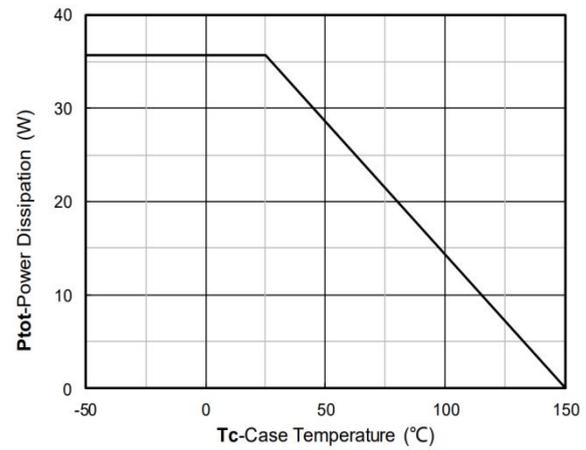


Figure 12. Power dissipation

## Typical Characteristics

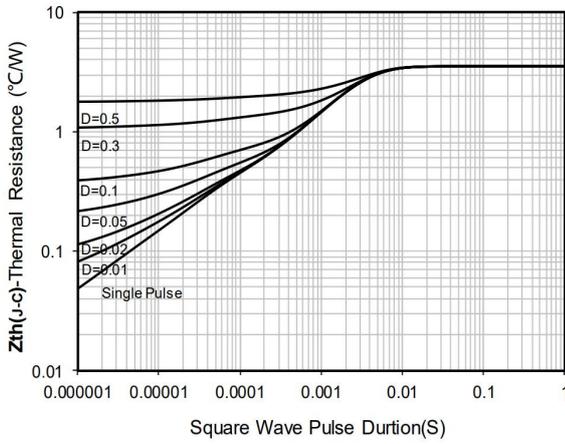


Figure 13. Maximum Transient Thermal Impedance

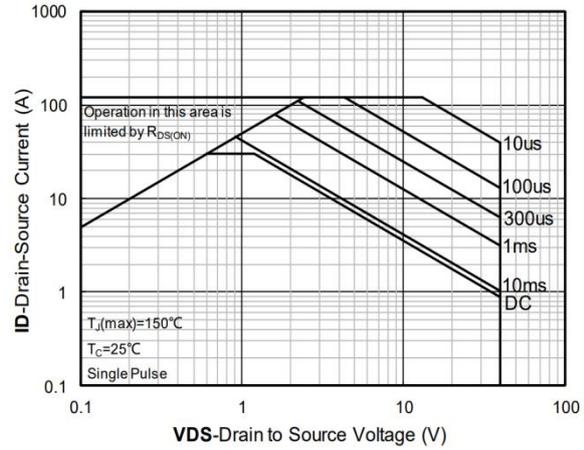
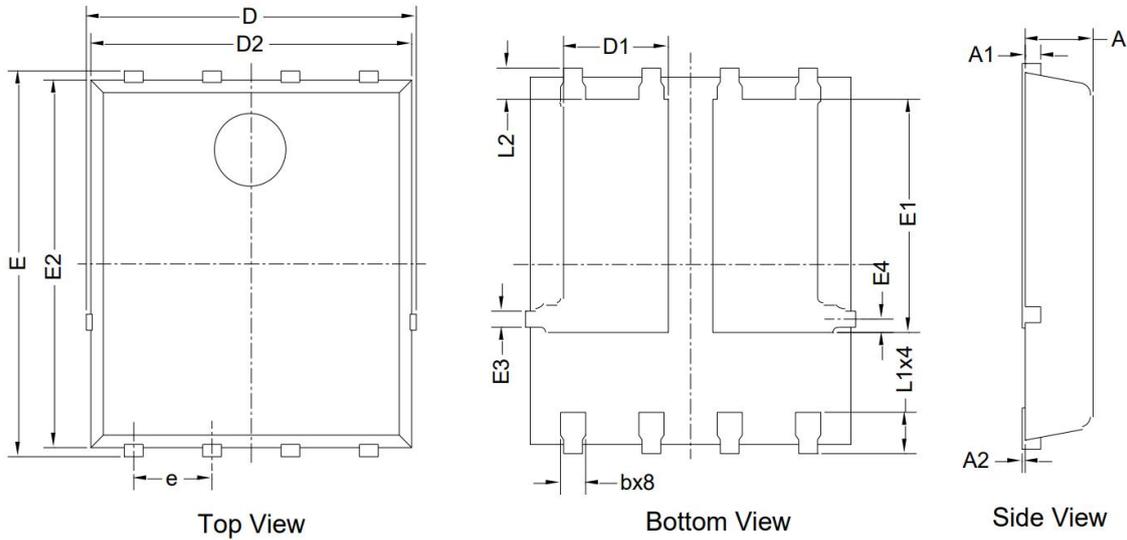


Figure 14. Safe Operation Area

### PDFN5\*6-8L Package Information



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| D      | 5.150                     | 5.550 | 0.203                | 0.219 |
| E      | 5.950                     | 6.350 | 0.234                | 0.250 |
| A      | 1.000                     | 1.200 | 0.039                | 0.047 |
| A1     | 0.254 BSC                 |       | 0.010 BSC            |       |
| A2     | 0.000                     | 0.100 | 0.000                | 0.004 |
| D1     | 1.500                     | 1.900 | 0.059                | 0.075 |
| E1     | 3.520                     | 3.920 | 0.139                | 0.154 |
| D2     | 5.000                     | 5.400 | 0.197                | 0.213 |
| E2     | 5.660                     | 6.060 | 0.223                | 0.239 |
| E3     | 0.254 REF                 |       | 0.010 REF            |       |
| E4     | 0.210 REF                 |       | 0.008 REF            |       |
| L1     | 0.560                     | 0.760 | 0.022                | 0.030 |
| L2     | 0.500 BSC                 |       | 0.020 BSC            |       |
| b      | 0.310                     | 0.510 | 0.012                | 0.020 |
| e      | 1.270 BSC                 |       | 0.050 BSC            |       |