

## P-Channel 20-V (D-S) MOSFET

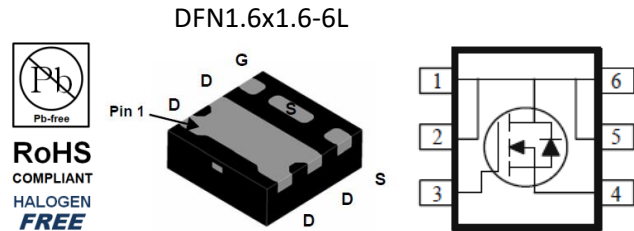
### Key Features:

- Low  $r_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed

### Typical Applications:

- Load Switches
- DC/DC Conversion
- Motor Drives

| PRODUCT SUMMARY |                            |           |
|-----------------|----------------------------|-----------|
| $V_{DS}$ (V)    | $r_{DS(on)}$ (m $\Omega$ ) | $I_D$ (A) |
| -20             | 56 @ $V_{GS} = -4.5V$      | -5.0      |
|                 | 80 @ $V_{GS} = -2.5V$      | -4.2      |
|                 | 130 @ $V_{GS} = -1.8V$     | -3.3      |



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED) |                          |                |            |                  |
|-----------------------------------------------------------------------------|--------------------------|----------------|------------|------------------|
| Parameter                                                                   |                          | Symbol         | Limit      | Units            |
| Drain-Source Voltage                                                        |                          | $V_{DS}$       | -20        | V                |
| Gate-Source Voltage                                                         |                          | $V_{GS}$       | $\pm 8$    |                  |
| Continuous Drain Current <sup>a</sup>                                       | $T_A = 25^\circ\text{C}$ | $I_D$          | -5.0       | A                |
|                                                                             | $T_A = 70^\circ\text{C}$ |                | -4.5       |                  |
| Pulsed Drain Current <sup>b</sup>                                           |                          | $I_{DM}$       | -20        |                  |
| Continuous Source Current (Diode Conduction) <sup>a</sup>                   |                          | $I_S$          | -2.5       | A                |
| Power Dissipation <sup>a</sup>                                              | $T_A = 25^\circ\text{C}$ | $P_D$          | 2.1        | W                |
|                                                                             | $T_A = 70^\circ\text{C}$ |                | 1.7        |                  |
| Operating Junction and Storage Temperature Range                            |                          | $T_J, T_{stg}$ | -55 to 150 | $^\circ\text{C}$ |

| THERMAL RESISTANCE RATINGS               |                         |                 |         |                    |
|------------------------------------------|-------------------------|-----------------|---------|--------------------|
| Parameter                                |                         | Symbol          | Maximum | Units              |
| Maximum Junction-to-Ambient <sup>a</sup> | $t \leq 10 \text{ sec}$ | $R_{\theta JA}$ | 62.5    | $^\circ\text{C/W}$ |
|                                          | Steady State            |                 | 110     |                    |

### Notes

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

## Electrical Characteristics

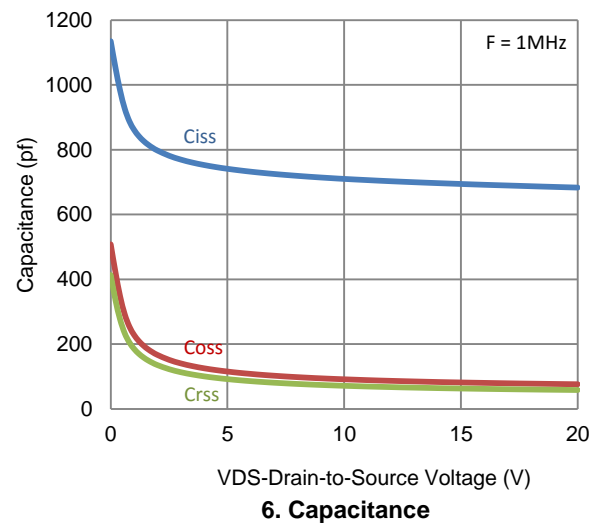
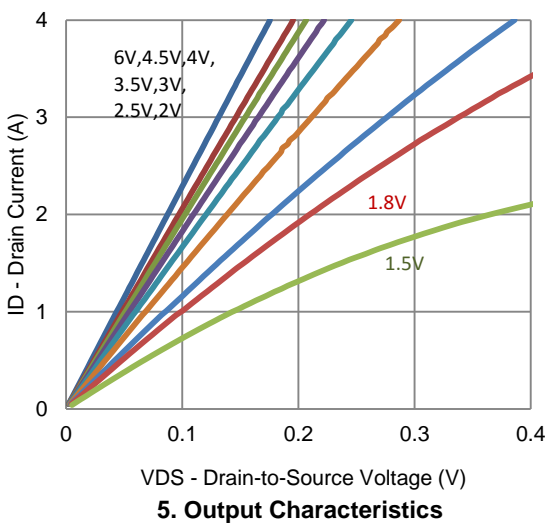
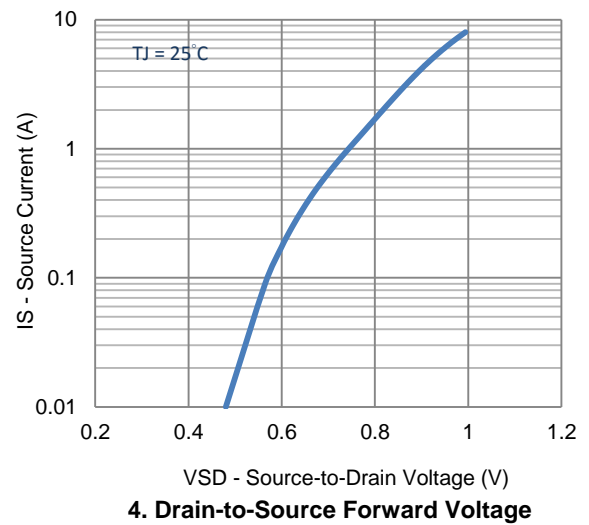
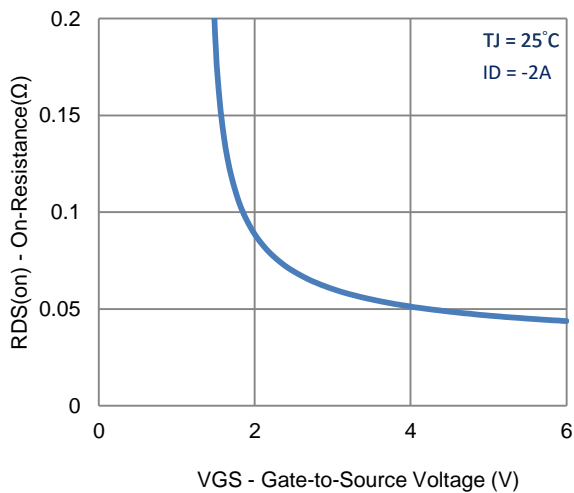
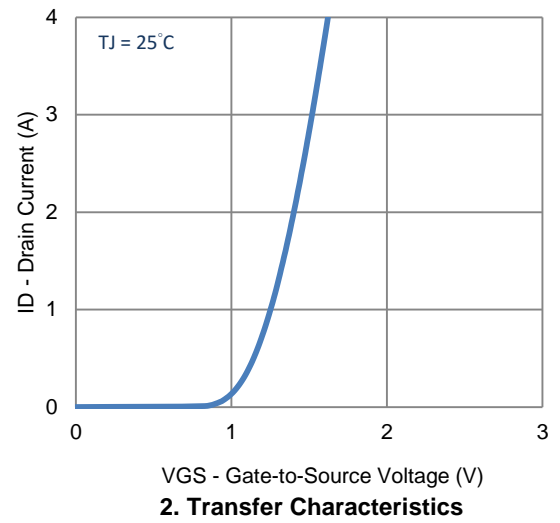
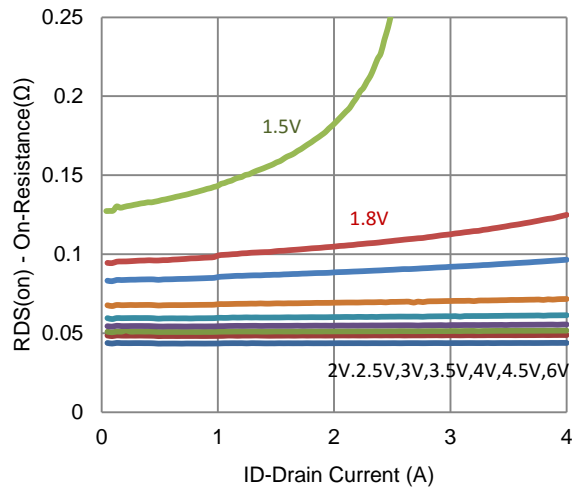
| Parameter                               | Symbol       | Test Conditions                                                                              | Min  | Typ   | Max       | Unit       |
|-----------------------------------------|--------------|----------------------------------------------------------------------------------------------|------|-------|-----------|------------|
| <b>Static</b>                           |              |                                                                                              |      |       |           |            |
| Gate-Source Threshold Voltage           | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250 \mu A$                                                          | -0.4 |       |           | V          |
| Gate-Body Leakage                       | $I_{GSS}$    | $V_{DS} = 0 V, V_{GS} = \pm 8 V$                                                             |      |       | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | $V_{DS} = -16 V, V_{GS} = 0 V$                                                               |      |       | -1        | $\mu A$    |
|                                         |              | $V_{DS} = -16 V, V_{GS} = 0 V, T_J = 55^\circ C$                                             |      |       | -10       |            |
| On-State Drain Current <sup>a</sup>     | $I_{D(on)}$  | $V_{DS} = -5 V, V_{GS} = -4.5 V$                                                             | -7.5 |       |           | A          |
| Drain-Source On-Resistance <sup>a</sup> | $r_{DS(on)}$ | $V_{GS} = -4.5 V, I_D = -4 A$                                                                |      |       | 56        | m $\Omega$ |
|                                         |              | $V_{GS} = -2.5 V, I_D = -3.2 A$                                                              |      |       | 80        |            |
|                                         |              | $V_{GS} = -1.8 V, I_D = -2.6 A$                                                              |      |       | 130       |            |
| Forward Transconductance <sup>a</sup>   | $g_{fs}$     | $V_{DS} = -15 V, I_D = -4 A$                                                                 |      | 10    |           | S          |
| Diode Forward Voltage <sup>a</sup>      | $V_{SD}$     | $I_S = -1.3 A, V_{GS} = 0 V$                                                                 |      | -0.77 |           | V          |
| <b>Dynamic <sup>b</sup></b>             |              |                                                                                              |      |       |           |            |
| Total Gate Charge                       | $Q_g$        | $V_{DS} = -10 V, V_{GS} = -4.5 V,$<br>$I_D = -2 A$                                           |      | 12    |           | nC         |
| Gate-Source Charge                      | $Q_{gs}$     |                                                                                              |      | 1.7   |           |            |
| Gate-Drain Charge                       | $Q_{gd}$     |                                                                                              |      | 2.6   |           |            |
| Turn-On Delay Time                      | $t_{d(on)}$  | $V_{DS} = -10 V, R_L = 5 \Omega,$<br>$I_D = -2 A,$<br>$V_{GEN} = -4.5 V, R_{GEN} = 6 \Omega$ |      | 10    |           | ns         |
| Rise Time                               | $t_r$        |                                                                                              |      | 13    |           |            |
| Turn-Off Delay Time                     | $t_{d(off)}$ |                                                                                              |      | 50    |           |            |
| Fall Time                               | $t_f$        |                                                                                              |      | 20    |           |            |
| Input Capacitance                       | $C_{iss}$    | $V_{DS} = -15 V, V_{GS} = 0 V, f = 1 \text{ Mhz}$                                            |      | 694   |           | pF         |
| Output Capacitance                      | $C_{oss}$    |                                                                                              |      | 82    |           |            |
| Reverse Transfer Capacitance            | $C_{rss}$    |                                                                                              |      | 63    |           |            |

## Notes

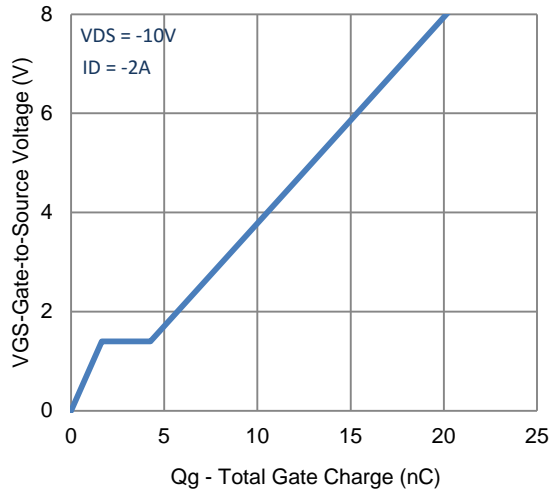
- a. Pulse test:  $PW \leq 300 \mu s$  duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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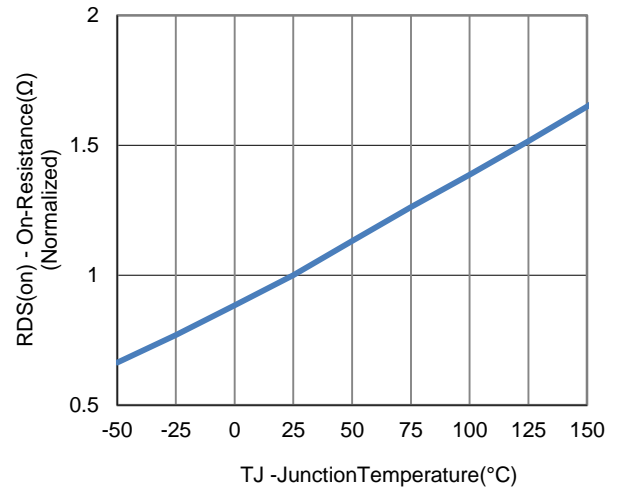
## Typical Electrical Characteristics



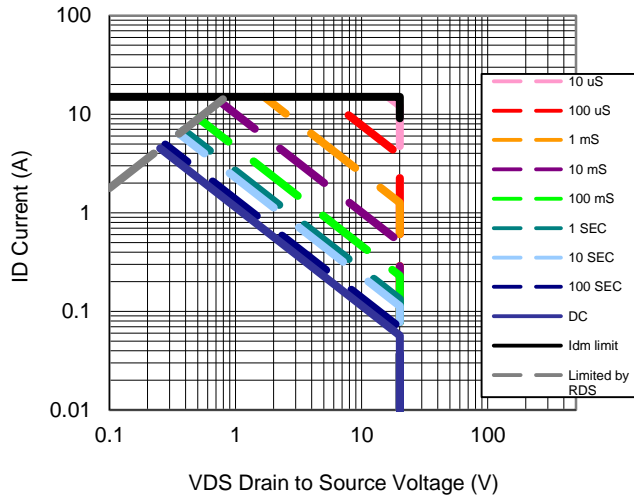
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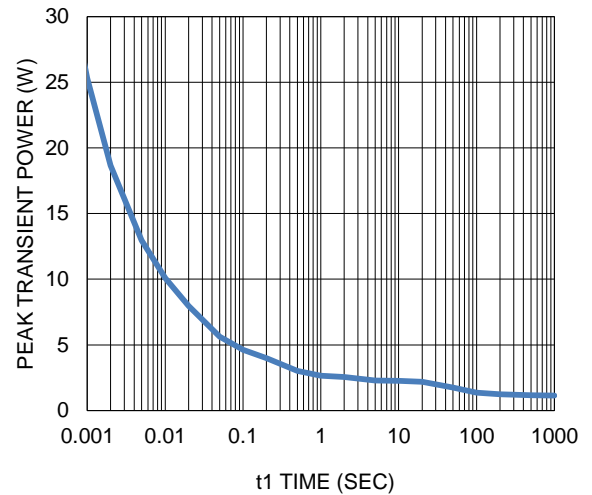
7. Gate Charge



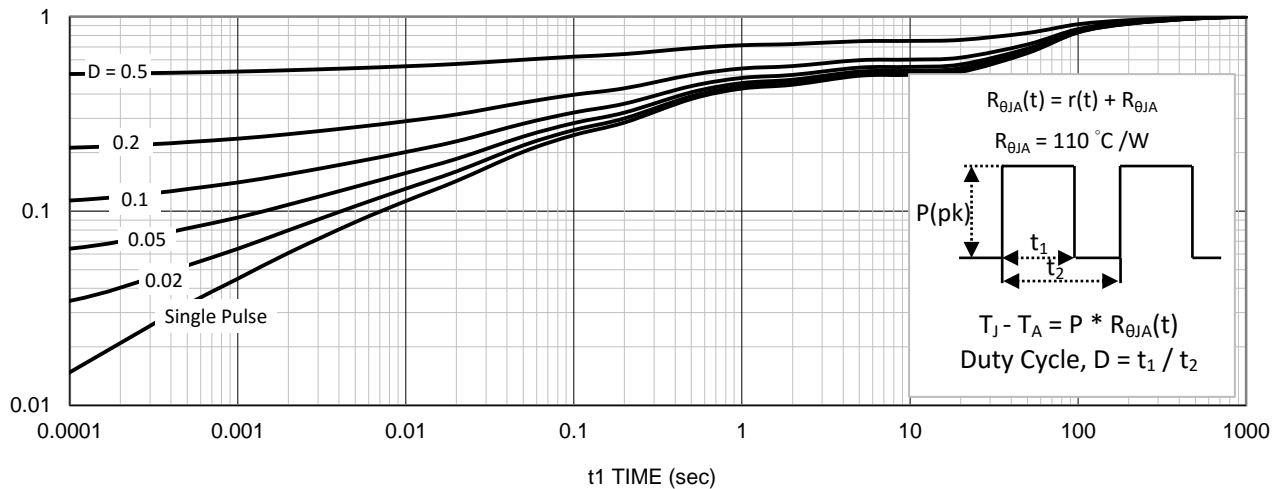
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

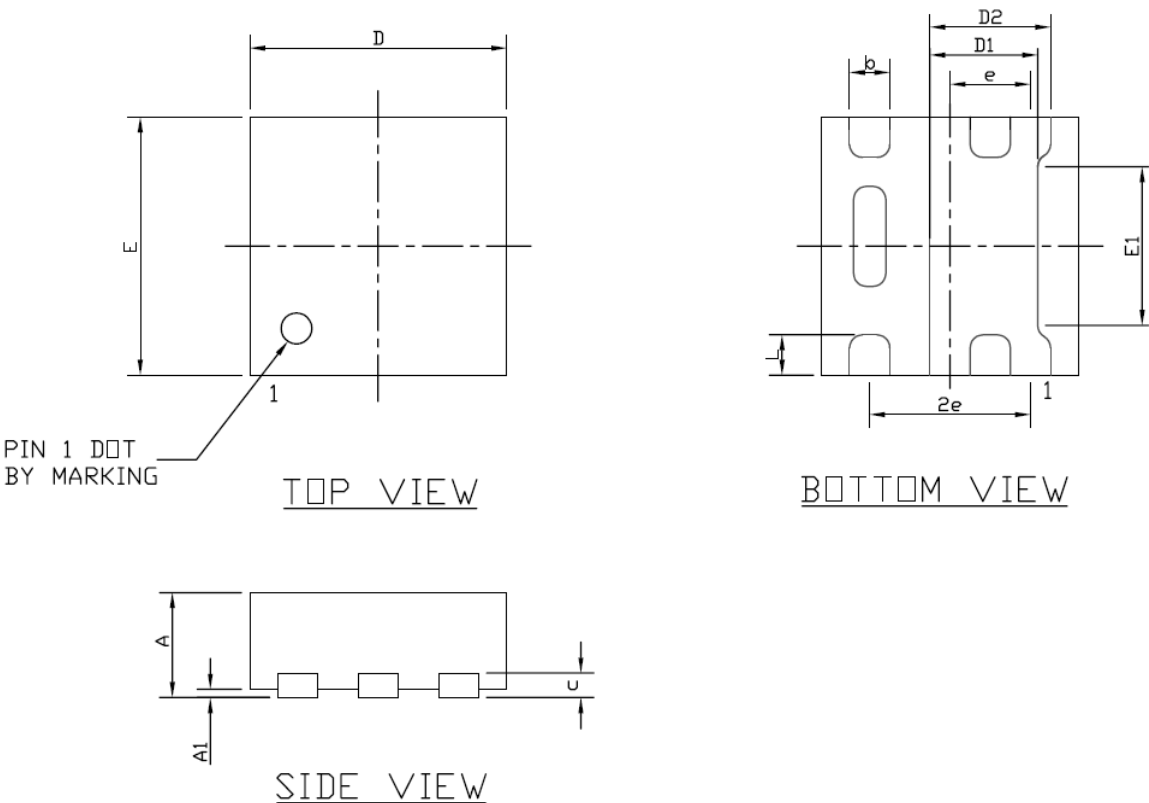


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



| SYMBOLS | DIMENSIONS IN MILLIMETERS |      |      | DIMENSIONS IN INCHES |       |       |
|---------|---------------------------|------|------|----------------------|-------|-------|
|         | MIN                       | NOM  | MAX  | MIN                  | NOM   | MAX   |
| A       | 0.50                      | 0.55 | 0.60 | 0.020                | 0.022 | 0.024 |
| A1      | 0.00                      | ---  | 0.05 | 0.000                | ---   | 0.002 |
| b       | 0.22                      | 0.25 | 0.28 | 0.009                | 0.010 | 0.011 |
| c       | 0.152 Ref.                |      |      | 0.006 Ref.           |       |       |
| D       | 1.55                      | 1.60 | 1.65 | 0.061                | 0.063 | 0.065 |
| D1      | 0.67 TYP                  |      |      | 0.026 TYP            |       |       |
| D2      | 0.75 TYP                  |      |      | 0.030 TYP            |       |       |
| E       | 1.55                      | 1.60 | 1.65 | 0.061                | 0.063 | 0.065 |
| E1      | 0.98 TYP                  |      |      | 0.039 TYP            |       |       |
| e       | 0.50 BSC                  |      |      | 0.020 BSC            |       |       |
| L       | 0.20                      | 0.25 | 0.30 | 0.008                | 0.010 | 0.012 |