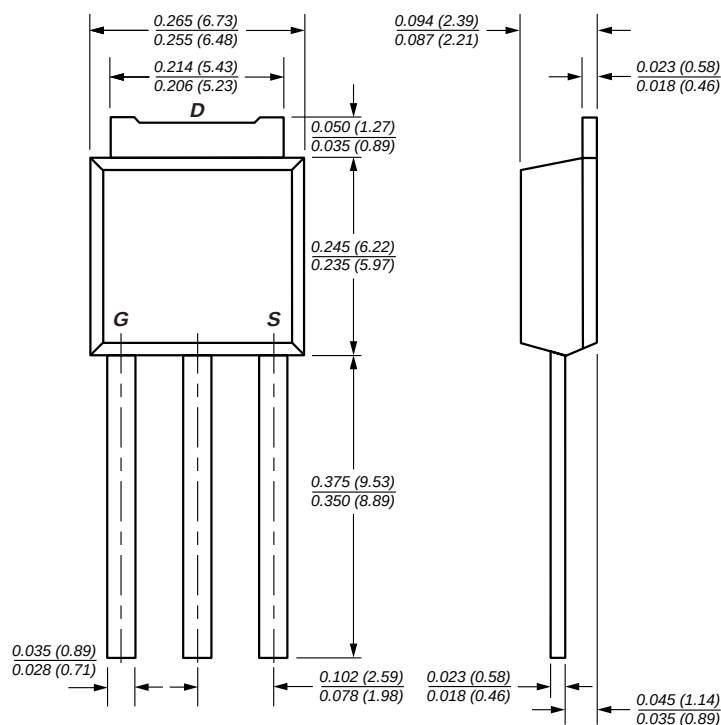
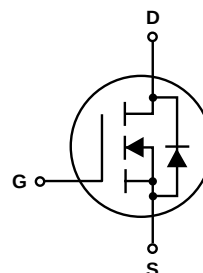


## N-Channel Enhancement-Mode MOSFET

 $V_{DS}$  30V  
 $R_{DS(ON)}$  16.5m $\Omega$   
 $I_D$  38A

TO-251 (IPAK)

TRENCH  
GENFET™

## Features

- Advanced Trench Process Technology
- High Density Cell Design for Ultra Low On-Resistance
- Specially Designed for Low Voltage DC/DC Converters
- Fast Switching for High Efficiency
- Low Gate Charge

## Mechanical Data

**Case:** JEDEC TO-251 molded plastic body**Terminals:** Solder plated, solderable per MIL-STD-750, Method 2026**High temperature soldering guaranteed:**  
250°C/10 seconds at terminals**Weight:** 0.011oz., 0.4gMaximum Ratings and Thermal Characteristics ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

| Parameter                                             | Symbol          | Limit      | Unit               |
|-------------------------------------------------------|-----------------|------------|--------------------|
| Drain-Source Voltage                                  | $V_{DS}$        | 30         | V                  |
| Gate-Source Voltage                                   | $V_{GS}$        | $\pm 20$   |                    |
| Continuous Drain Current<br>$T_J = 150^\circ\text{C}$ | $I_D$           | 38         | A                  |
| $T_C = 25^\circ\text{C}$<br>$T_C = 70^\circ\text{C}$  |                 | 30         |                    |
| Pulsed Drain Current <sup>(1)</sup>                   | $I_{DM}$        | 80         |                    |
| Power Dissipation<br>$T_J = 150^\circ\text{C}$        | $P_D$           | 38         | W                  |
| $T_C = 25^\circ\text{C}$<br>$T_C = 70^\circ\text{C}$  |                 | 24         |                    |
| $T_A = 25^\circ\text{C}$ <sup>(2)</sup>               |                 | 2.5        |                    |
| Operating Junction and Storage Temperature Range      | $T_J, T_{stg}$  | -55 to 150 | $^\circ\text{C}$   |
| Junction-to-Case Thermal Resistance                   | $R_{\theta JC}$ | 3.3        | $^\circ\text{C/W}$ |
| Junction-to-Ambient Thermal Resistance <sup>(2)</sup> | $R_{\theta JA}$ | 50         | $^\circ\text{C/W}$ |

**Notes:** (1) Pulse width limited by maximum junction temperature(2) Surface mounted on a 1in<sup>2</sup> 2 oz.. Cu PCB (FR-4 material)

## Electrical Characteristics (T<sub>J</sub> = 25°C unless otherwise noted)

| Parameter                                       | Symbol              | Test Condition                                                      | Min | Typ  | Max  | Unit |
|-------------------------------------------------|---------------------|---------------------------------------------------------------------|-----|------|------|------|
| <b>Static</b>                                   |                     |                                                                     |     |      |      |      |
| Drain-Source Breakdown Voltage                  | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                        | 30  | –    | –    | V    |
| Gate Threshold Voltage                          | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA          | 0.8 | –    | 2.5  | V    |
| Gate-Body Leakage                               | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                        | –   | –    | ±100 | nA   |
| Zero Gate Voltage Drain Current                 | I <sub>DSS</sub>    | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V                         | –   | –    | 1    | μA   |
|                                                 |                     | V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C | –   | –    | 10   |      |
| On-State Drain Current <sup>(1)</sup>           | I <sub>D(on)</sub>  | V <sub>DS</sub> ≥ 5V, V <sub>GS</sub> = 10V                         | 80  | –    | –    | A    |
| Drain-Source On-State Resistance <sup>(1)</sup> | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 19A                         | –   | 12.5 | 16.5 | mΩ   |
|                                                 |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 15A                        | –   | 19   | 25   |      |
| Forward Transconductance <sup>(1)</sup>         | g <sub>fs</sub>     | V <sub>DS</sub> = 5V, I <sub>D</sub> = 19A                          | –   | 25   | –    | S    |

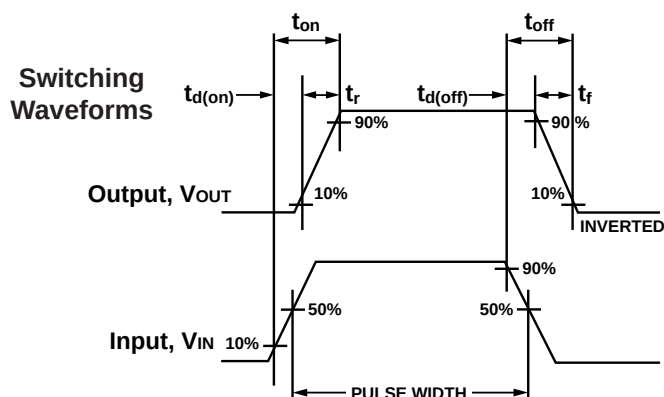
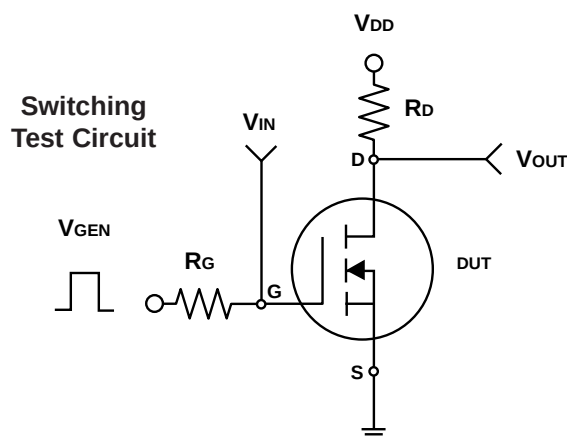
## Dynamic

|                              |                     |                                                                                           |   |      |    |    |
|------------------------------|---------------------|-------------------------------------------------------------------------------------------|---|------|----|----|
| Total Gate Charge            | Q <sub>g</sub>      | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 5V, I <sub>D</sub> = 19A                         | – | 11   | 14 | nC |
|                              |                     | V <sub>DS</sub> = 15V, I <sub>D</sub> = 19A<br>V <sub>GS</sub> = 10V                      | – | 22   | 28 |    |
| Gate-Source Charge           | Q <sub>gs</sub>     |                                                                                           | – | 3.4  | –  |    |
| Gate-Drain Charge            | Q <sub>gd</sub>     | V <sub>DD</sub> = 15V, I <sub>D</sub> = 1A<br>V <sub>GEN</sub> = 10V, R <sub>G</sub> = 6Ω | – | 3.4  | –  | ns |
| Turn-On Delay Time           | t <sub>d(on)</sub>  |                                                                                           | – | 10   | 18 |    |
| Turn-On Rise Time            | t <sub>r</sub>      |                                                                                           | – | 14   | 25 |    |
| Turn-Off Delay Time          | t <sub>d(off)</sub> |                                                                                           | – | 38   | 60 |    |
| Turn-Off Fall Time           | t <sub>f</sub>      |                                                                                           | – | 6    | 10 |    |
| Input Capacitance            | C <sub>iss</sub>    | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                 | – | 1173 | –  | pF |
| Output Capacitance           | C <sub>oss</sub>    |                                                                                           | – | 199  | –  |    |
| Reverse Transfer Capacitance | C <sub>rss</sub>    |                                                                                           | – | 112  | –  |    |

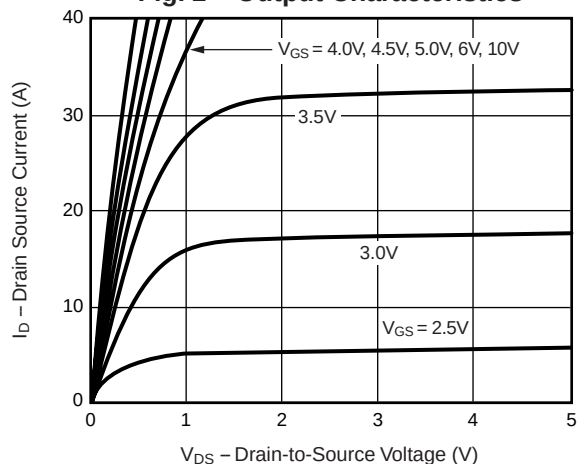
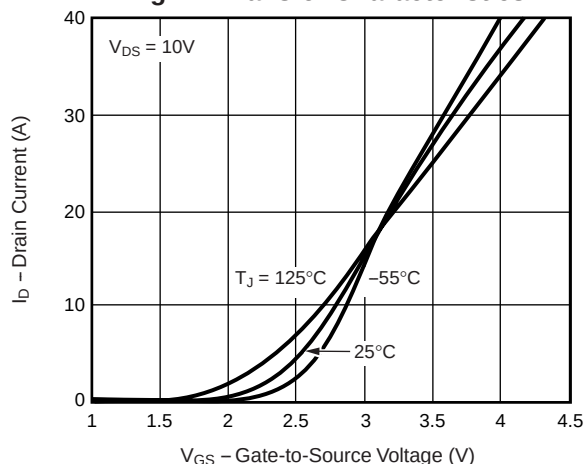
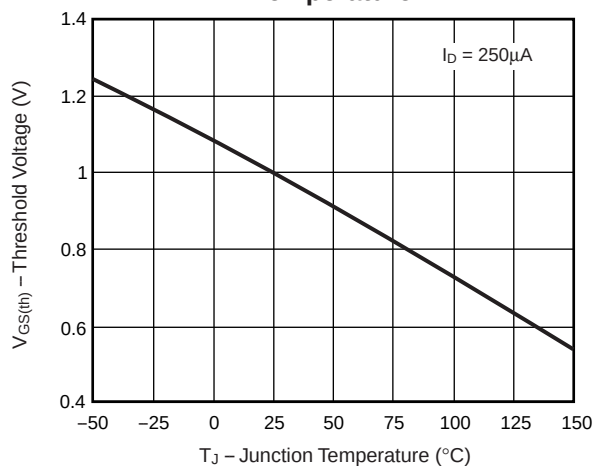
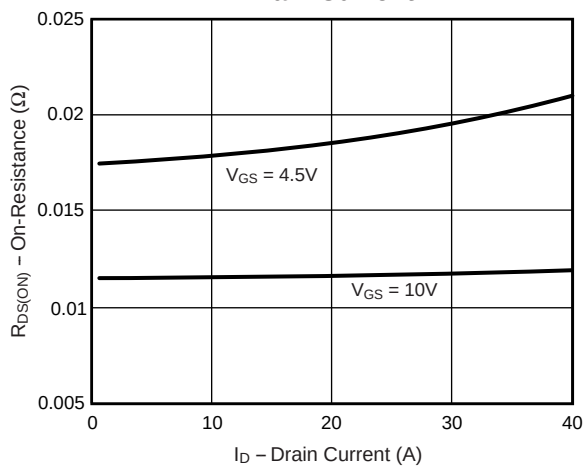
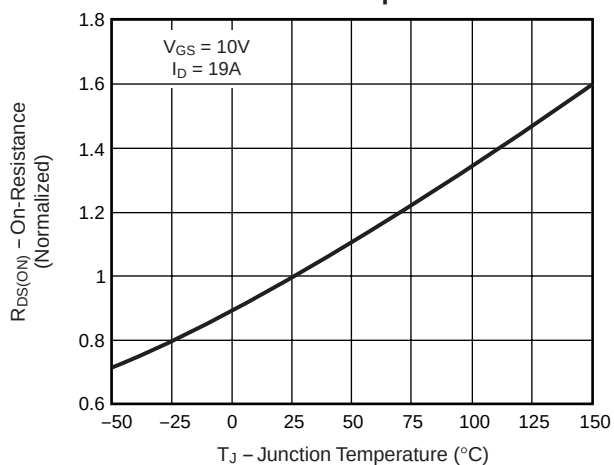
## Source-Drain Diode

|                                              |                 |                                            |   |     |     |   |
|----------------------------------------------|-----------------|--------------------------------------------|---|-----|-----|---|
| Diode Forward Voltage <sup>(1)</sup>         | V <sub>SD</sub> | I <sub>S</sub> = 19A, V <sub>GS</sub> = 0V | – | 0.9 | 1.2 | V |
| Continuous Source Current (Diode Conduction) | I <sub>S</sub>  | –                                          | – | –   | 30  | A |

Notes: (1) Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%

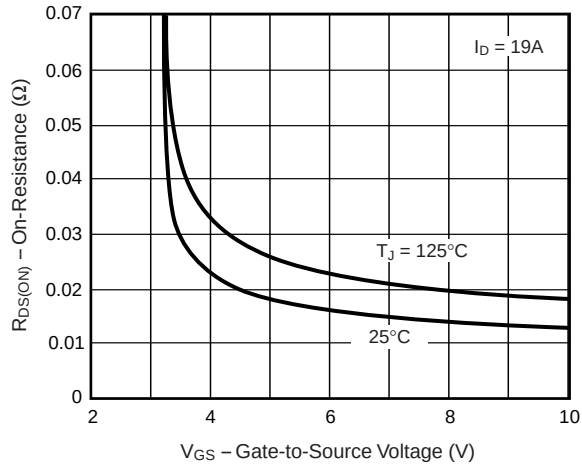


## Ratings and Characteristic Curves ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

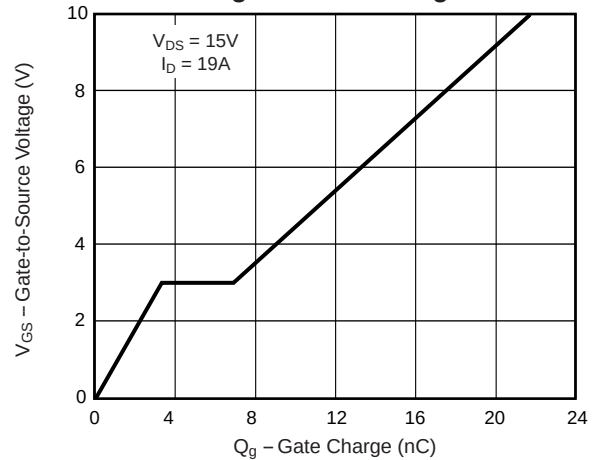
**Fig. 1 – Output Characteristics**

**Fig. 2 – Transfer Characteristics**

**Fig. 3 – Threshold Voltage vs. Temperature**

**Fig. 4 – On-Resistance vs. Drain Current**

**Fig. 5 – On-Resistance vs. Junction Temperature**


# Ratings and Characteristic Curves ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

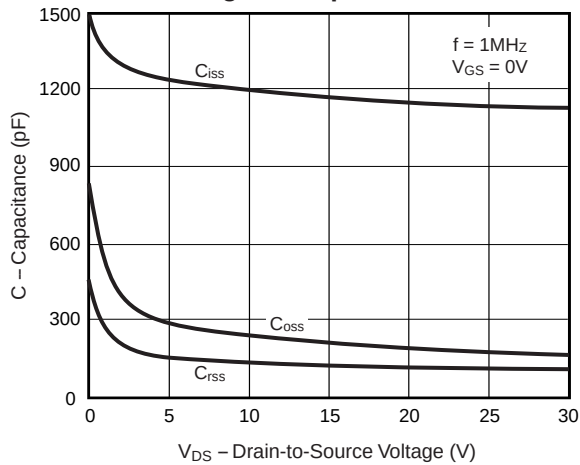
**Fig. 6 – On-Resistance vs.  
Gate-to-Source Voltage**



**Fig. 7 – Gate Charge**



**Fig. 8 – Capacitance**



**Fig. 9 – Source-Drain Diode  
Forward Voltage**

