



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

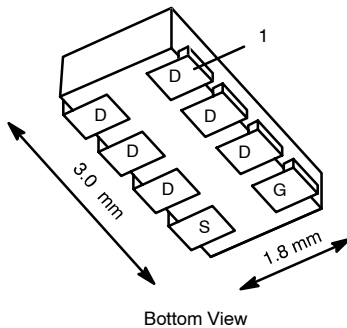
### PRODUCT SUMMARY

| $V_{DS}$ (V) | $r_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|--------------|---------------------------|-----------|
| -20          | 0.045 @ $V_{GS} = -4.5$ V | -6.2      |
|              | 0.060 @ $V_{GS} = -2.5$ V | -5.4      |
|              | 0.082 @ $V_{GS} = -1.8$ V | -4.6      |

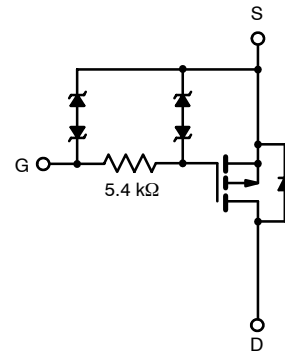
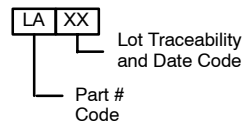


**ESD Protected<sup>b</sup>**  
**5000 V**

1206-8 ChipFET™



Marking Code



P-Channel MOSFET

Ordering Information: Si5461EDC-T1

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

| Parameter                                                             |                            | Symbol         | 5 secs     | Steady State | Unit               |
|-----------------------------------------------------------------------|----------------------------|----------------|------------|--------------|--------------------|
| Drain-Source Voltage                                                  |                            | $V_{DS}$       | -20        |              | V                  |
| Gate-Source Voltage                                                   |                            | $V_{GS}$       | $\pm 12$   |              |                    |
| Continuous Drain Current ( $T_J = 150^{\circ}\text{C}$ ) <sup>a</sup> | $T_A = 25^{\circ}\text{C}$ | $I_D$          | -6.2       | -4.5         | A                  |
|                                                                       | $T_A = 85^{\circ}\text{C}$ |                | -4.5       | -3.2         |                    |
| Pulsed Drain Current                                                  |                            | $I_{DM}$       | -20        |              |                    |
| Continuous Source Current <sup>a</sup>                                |                            | $I_S$          | -2.1       | -1.1         |                    |
| Maximum Power Dissipation <sup>a</sup>                                | $T_A = 25^{\circ}\text{C}$ | $P_D$          | 2.5        | 1.3          | W                  |
|                                                                       | $T_A = 85^{\circ}\text{C}$ |                | 1.3        | 0.7          |                    |
| Operating Junction and Storage Temperature Range                      |                            | $T_J, T_{stg}$ | -55 to 150 |              | $^{\circ}\text{C}$ |
| Soldering Recommendations (Peak Temperature) <sup>c, d</sup>          |                            |                | 260        |              |                    |

### THERMAL RESISTANCE RATINGS

| Parameter                                |                | Symbol     | Typical | Maximum | Unit               |
|------------------------------------------|----------------|------------|---------|---------|--------------------|
| Maximum Junction-to-Ambient <sup>a</sup> | $t \leq 5$ sec | $R_{thJA}$ | 40      | 50      | $^\circ\text{C/W}$ |
|                                          | Steady State   |            | 80      | 95      |                    |
| Maximum Junction-to-Foot (Drain)         | Steady State   | $R_{thJF}$ | 15      | 20      |                    |

#### Notes

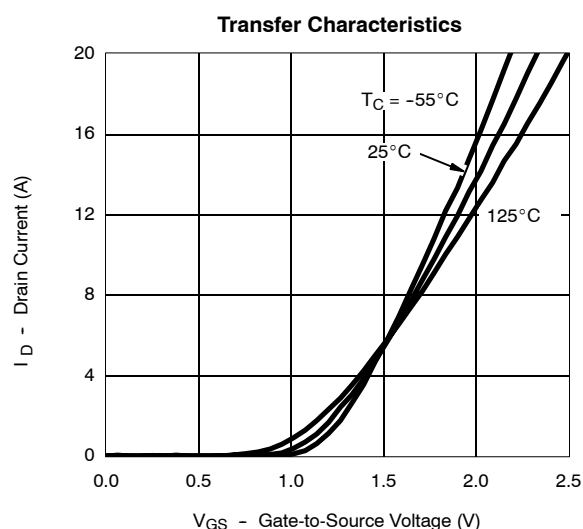
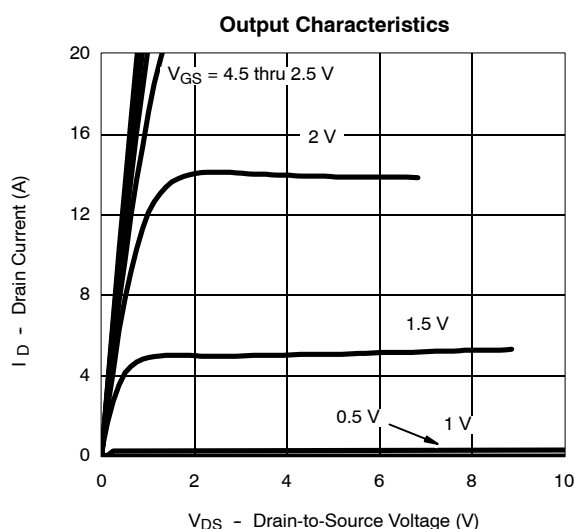
- Surface Mounted on 1" x 1" FR4 Board.
- When using HBM. The MM rating is 300 V.
- See Reliability Manual for profile. The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

**SPECIFICATIONS ( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

| Parameter                                     | Symbol       | Test Condition                                                                                                    | Min   | Typ   | Max       | Unit          |
|-----------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------|-------|-------|-----------|---------------|
| <b>Static</b>                                 |              |                                                                                                                   |       |       |           |               |
| Gate Threshold Voltage                        | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$                                                                        | -0.45 |       |           | V             |
| Gate-Body Leakage                             | $I_{GSS}$    | $V_{DS} = 0\ \text{V}, V_{GS} = \pm 4.5\ \text{V}$                                                                |       |       | $\pm 1.5$ | $\mu\text{A}$ |
| Zero Gate Voltage Drain Current               | $I_{DSS}$    | $V_{DS} = -16\ \text{V}, V_{GS} = 0\ \text{V}$                                                                    |       |       | -1        |               |
|                                               |              | $V_{DS} = -16\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 85^\circ\text{C}$                                            |       |       | -5        |               |
| On-State Drain Current <sup>a</sup>           | $I_{D(on)}$  | $V_{DS} \leq -5\ \text{V}, V_{GS} = -4.5\ \text{V}$                                                               | -20   |       |           | A             |
| Drain-Source On-State Resistance <sup>a</sup> | $r_{DS(on)}$ | $V_{GS} = -4.5\ \text{V}, I_D = -5.0\ \text{A}$                                                                   |       | 0.037 | 0.045     | $\Omega$      |
|                                               |              | $V_{GS} = -2.5\ \text{V}, I_D = -4.0\ \text{A}$                                                                   |       | 0.050 | 0.060     |               |
|                                               |              | $V_{GS} = -1.8\ \text{V}, I_D = -2\ \text{A}$                                                                     |       | 0.066 | 0.082     |               |
| Forward Transconductance <sup>a</sup>         | $g_{fs}$     | $V_{DS} = -5\ \text{V}, I_D = -5.0\ \text{A}$                                                                     |       | 12    |           | S             |
| Diode Forward Voltage <sup>a</sup>            | $V_{SD}$     | $I_S = -1.1\ \text{A}, V_{GS} = 0\ \text{V}$                                                                      |       | -0.7  | -1.2      | V             |
| <b>Dynamic<sup>b</sup></b>                    |              |                                                                                                                   |       |       |           |               |
| Total Gate Charge                             | $Q_g$        | $V_{DS} = -10\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = -5.0\ \text{A}$                                           |       | 12.5  | 20        | nC            |
| Gate-Source Charge                            | $Q_{gs}$     |                                                                                                                   |       | 2.0   |           |               |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                                                                                   |       | 4.0   |           |               |
| Turn-On Delay Time                            | $t_{d(on)}$  | $V_{DD} = -10\ \text{V}, R_L = 10\ \Omega$<br>$I_D \cong -1\ \text{A}, V_{GEN} = -4.5\ \text{V}, R_G = 6\ \Omega$ |       | 2.5   | 3.5       | $\mu\text{S}$ |
| Rise Time                                     | $t_r$        |                                                                                                                   |       | 4.5   | 8.0       |               |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                                                                                   |       | 27    | 40        |               |
| Fall Time                                     | $t_f$        |                                                                                                                   |       | 15    | 25        |               |

## Notes

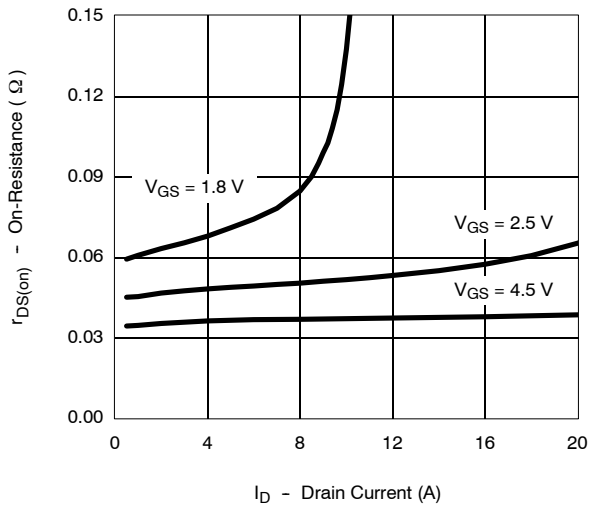
- a. Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

**TYPICAL CHARACTERISTICS ( $25^\circ\text{C}$  UNLESS NOTED)**


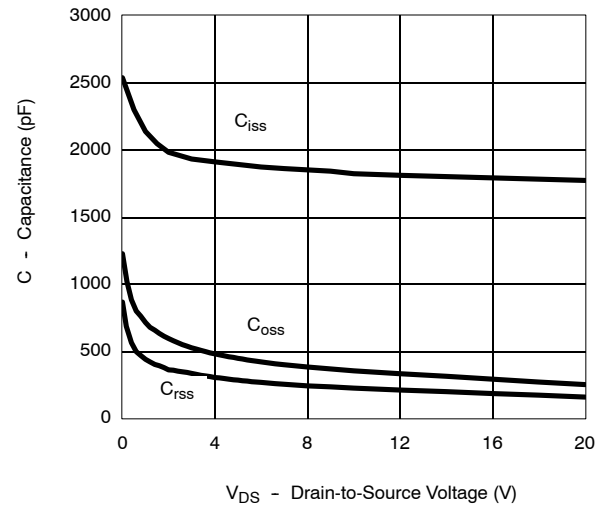


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

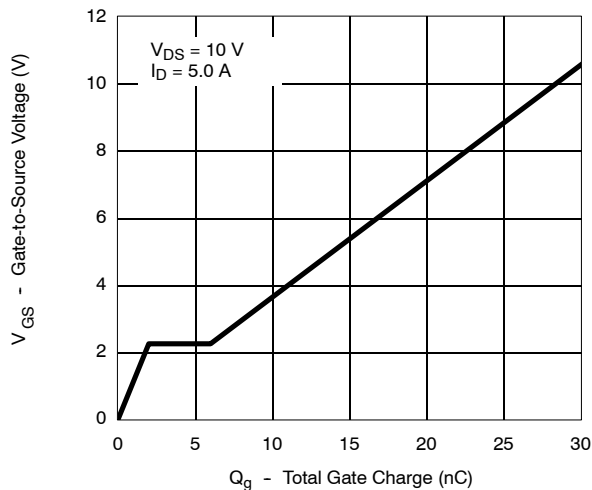
**On-Resistance vs. Drain Current**



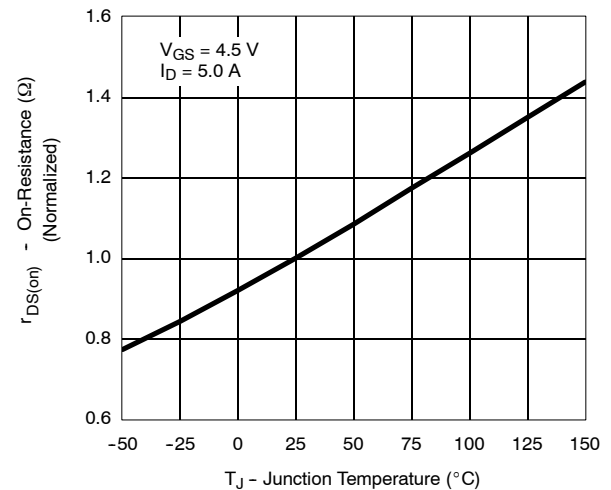
**Capacitance**



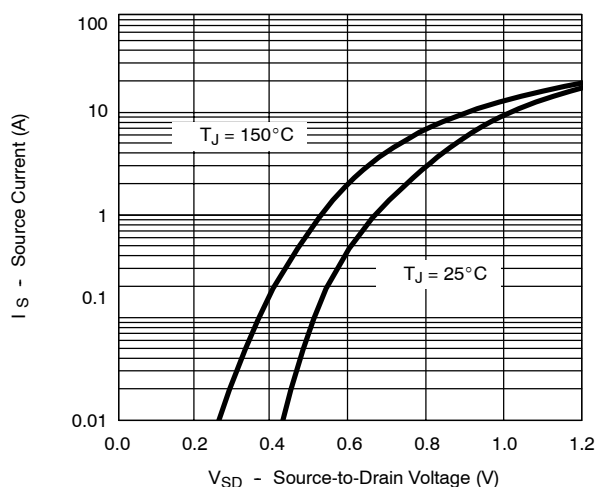
**Gate Charge**



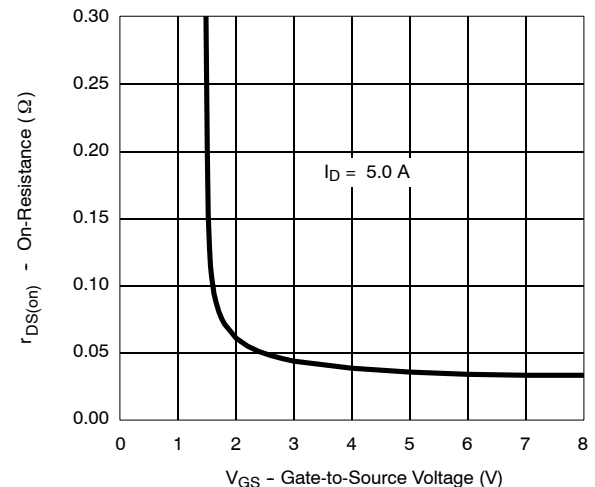
**On-Resistance vs. Junction Temperature**

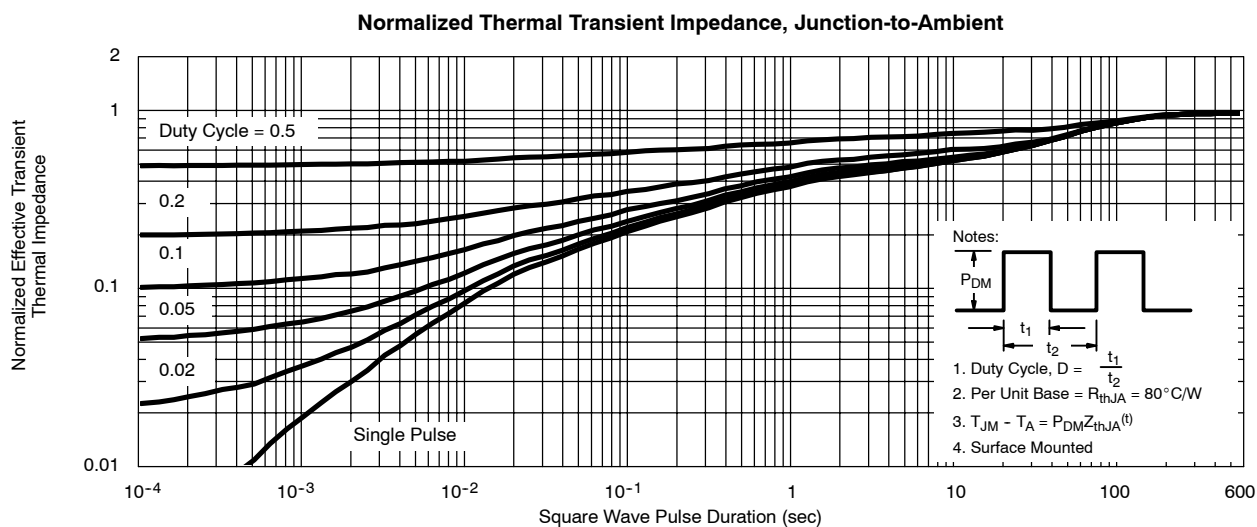
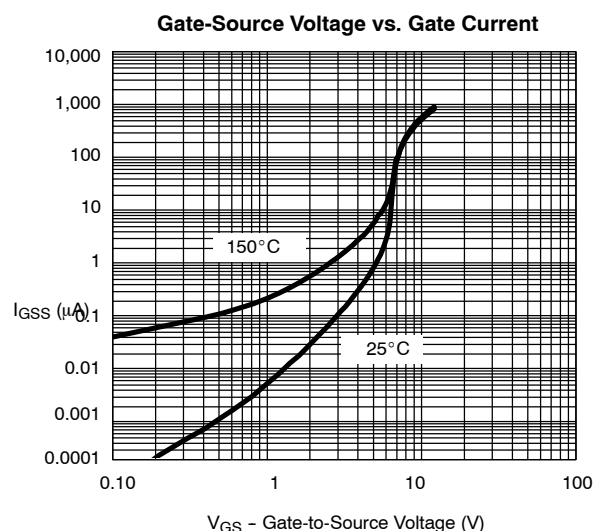
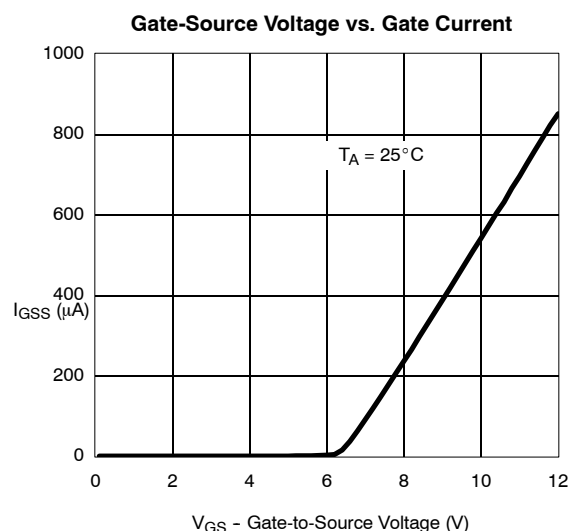
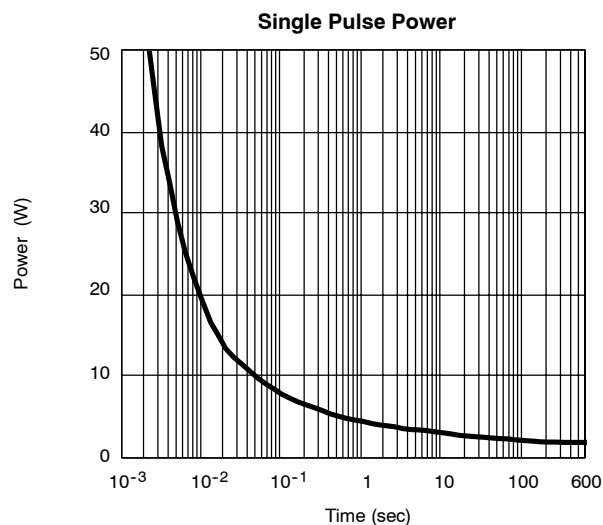
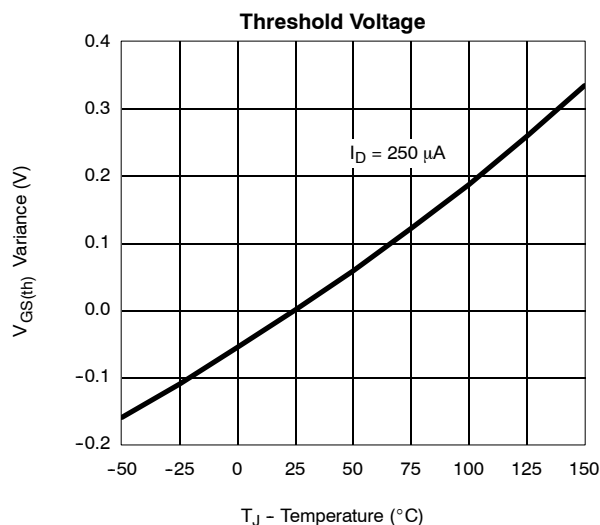


**Source-Drain Diode Forward Voltage**



**On-Resistance vs. Gate-to-Source Voltage**



**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**




**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

