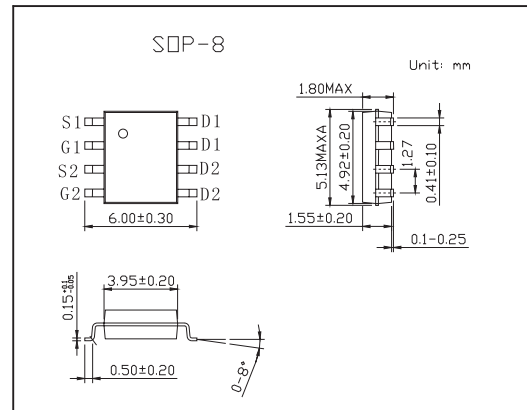
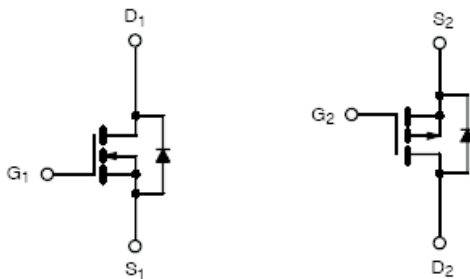


## N- and P-Channel 20-V (D-S) MOSFET

## KI4511DY

## ■ Features

- TrenchFET Power MOSFET

■ Absolute Maximum Ratings  $T_A = 25^\circ\text{C}$ 

| Parameter  | Symbol         | N-Channel                |              | P-Channel |              | Unit             |   |
|--|----------------|--------------------------|--------------|-----------|--------------|------------------|---|
|  |                | 10 sec                   | Steady State | 10 sec    | Steady State |                  |   |
| Drain-Source Voltage   | $V_{DS}$       | 20                       |              | -20       |              | V                |   |
| Gate-Source Voltage  | $V_{GS}$       | $\pm 16$                 |              | $\pm 12$  |              | V                |   |
| Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )* $T_A = 25^\circ\text{C}$ | $I_D$          | 9.6                      | 7.2          | -6.2      | -4.6         | A                |   |
|  |                | $T_A = 70^\circ\text{C}$ | 7.7          | 5.8       | -4.9         | -3.7             | A |
| Pulsed Drain Current   | $I_{DM}$       | 40                       |              | -40       |              | A                |   |
| Continuous Source Current (Diode Conduction)*                                    | $I_S$          | 1.7                      | 0.9          | -1.7      | 0.9          | A                |   |
| Maximum Power Dissipation*   | $P_D$          | $T_A = 25^\circ\text{C}$ | 2            | 1.1       | 2            | 1.1              | W |
|  |                | $T_A = 70^\circ\text{C}$ | 1.3          | 0.7       | 1.3          | 0.7              | W |
| Operating Junction and Storage Temperature Range                                 | $T_J, T_{stg}$ | -55 to 150               |              |           |              | $^\circ\text{C}$ |   |

\*Surface Mounted on FR4 Board;  $t \leq 10$  sec.

■ Thermal Resistance Ratings  $T_A = 25^\circ\text{C}$ 

| Parameter                    | Symbol     | N-Channel       |     | P-Channel |     | Unit |                           |
|------------------------------|------------|-----------------|-----|-----------|-----|------|---------------------------|
|                              |            | Typ             | Max | Typ       | Max |      |                           |
| Maximum Junction-to-Ambient* | $R_{thJA}$ | $t \leq 10$ sec | 50  | 62.5      | 50  | 62.5 | $^\circ\text{C}/\text{W}$ |
|                              |            | Steady State    | 85  | 110       | 90  | 110  |                           |
| Maximum Junction-to-Foot     | $R_{thJc}$ | 30              | 40  | 30        | 35  |      |                           |

\*Surface Mounted on FR4 Board.

## KI4511DY

■ Electrical Characteristics  $T_J = 25^\circ\text{C}$ 

| Parameter                          | Symbol       | Testconditions   | Min  | Typ  | Max    | Unit      |               |
|------------------------------------|--------------|--|------|------|--------|-----------|---------------|
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$                                       | N-Ch | 0.6  |        | 1.8       | V             |
|                                    |              | $V_{DS} = V_{GS}, I_D = -250 \mu\text{A}$                                      | P-Ch | -0.6 |        | 1.4       |               |
| Gate Body Leakage                  | $I_{GSS}$    | $V_{DS} = 0\text{V}, V_{GS} = \pm 16\text{V}$                                  | N-Ch |      |        | $\pm 100$ | nA            |
|                                    |              | $V_{DS} = 0\text{V}, V_{GS} = \pm 12\text{V}$                                  | P-Ch |      |        | $\pm 100$ |               |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$                                      | N-Ch |      |        | 1         | $\mu\text{A}$ |
|                                    |              | $V_{DS} = -16\text{V}, V_{GS} = 0\text{V}$                                     | P-Ch |      |        | -1        |               |
|                                    |              | $V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, T_J = 55^\circ\text{C}$              | N-Ch |      |        | 5         |               |
|                                    |              | $V_{DS} = -16\text{V}, V_{GS} = 0\text{V}, T_J = 55^\circ\text{C}$             | P-Ch |      |        | -5        |               |
| On State Drain Currenta            | $I_{D(on)}$  | $V_{DS} = 5\text{V}, V_{GS} = 10\text{V}$                                      | N-Ch | 40   |        |           | A             |
|                                    |              | $V_{DS} = -5\text{V}, V_{GS} = -4.5\text{V}$                                   | P-Ch | -40  |        |           |               |
| Drain Source On State Resistance*  | $r_{DS(on)}$ | $V_{GS} = 10\text{V}, I_D = 9.6\text{A}$                                       | N-Ch |      | 0.0115 | 0.0145    | $\Omega$      |
|                                    |              | $V_{GS} = -4.5\text{V}, I_D = -6.2\text{A}$                                    | P-Ch |      | 0.022  | 0.033     |               |
|                                    |              | $V_{GS} = 4.5\text{V}, I_D = 8.6\text{A}$                                      | N-Ch |      | 0.0135 | 0.017     |               |
|                                    |              | $V_{GS} = -2.5\text{V}, I_D = -5\text{A}$                                      | P-Ch |      | 0.035  | 0.050     |               |
| Forward Transconductance*          | $g_{fs}$     | $V_{DS} = 15\text{V}, I_D = 9.6\text{A}$                                       | N-Ch |      | 33     |           | S             |
|                                    |              | $V_{DS} = -15\text{V}, I_D = -6.2\text{A}$                                     | P-Ch |      | 17     |           |               |
| Diode Forward Voltage*             | $V_{SD}$     | $I_S = 1.7\text{A}, V_{GS} = 0\text{V}$  | N-Ch |      | 0.8    | 1.2       | V             |
|                                    |              | $I_S = -1.7\text{A}, V_{GS} = 0\text{V}$                                       | P-Ch |      | ?0.8   | -1.2      |               |
| Total Gate Charge                  | $Q_g$        | N-Channel<br>$V_{DS} = 10\text{V}, V_{GS} = 4.5\text{V}, I_D = 9.6\text{A}$    | N-Ch |      | 11.5   | 18        | nC            |
| Gate Source Charge                 | $Q_{gs}$     | P-Channel<br>$V_{DS} = -10\text{V}, V_{GS} = -4.5\text{V}, I_D = -6.2\text{A}$ | N-Ch |      | 3.7    |           |               |
|                                    |              |  | P-Ch |      | 4.1    |           |               |
| Gate Drain Charge                  | $Q_{gd}$     |  | N-Ch |      | 3.3    |           |               |
|                                    |              |  | P-Ch |      | 4.3    |           |               |
| Turn On Time                       | $t_{d(on)}$  | N Channel<br>$V_{DD} = 10\text{V}, R_L = 10\Omega$                             | N-Ch |      | 12     | 20        | ns            |
| Rise Time                          | $t_r$        | $I_D = 1\text{A}, V_{GEN} = 10\text{V}, R_g = 6\Omega$                         | P-Ch |      | 25     | 40        |               |
|                                    |              |  | N-Ch |      | 12     | 20        |               |
| Turn Off Delay Time                | $t_{d(off)}$ | P-Channel<br>$V_{DD} = -10\text{V}, R_L = 10\Omega$                            | N-Ch |      | 55     | 85        |               |
|                                    |              |  | P-Ch |      | 70     | 105       |               |
| Fall Time                          | $t_f$        | $I_D = -1\text{A}, V_{GEN} = -4.5\text{V}, R_g = 6\Omega$                      | N-Ch |      | 15     | 25        |               |
|                                    |              |  | P-Ch |      | 50     | 75        |               |
| Source-Drain Reverse Recovery Time | $t_{rr}$     | $I_F = 1.7\text{A}, di/dt = 100\text{A}/\mu\text{s}$                           | N-Ch |      | 50     | 100       |               |
|                                    |              | $I_F = -1.7\text{A}, di/dt = 100\text{A}/\mu\text{s}$                          | P-Ch |      | 40     | 80        |               |

\* Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .