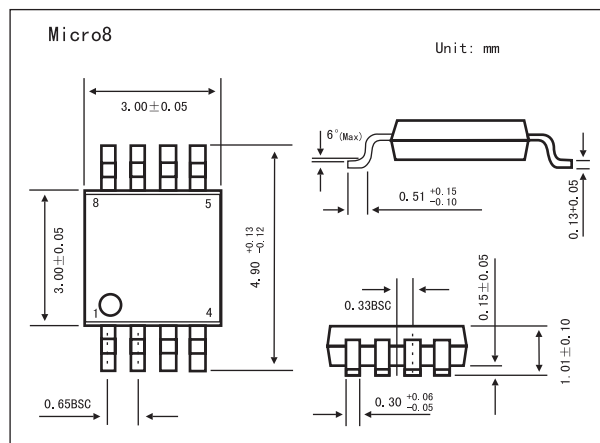
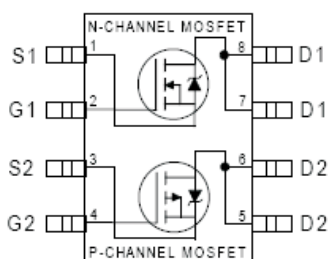


HEXFET<sup>®</sup> Power MOSFET

## KRF7509

## ■ Features

- Generation V Technology
- Ultra Low On-Resistance
- Dual N and P Channel MOSFET
- Very Small SOIC Package
- Low Profile (<1.1mm)
- Available in Tape & Reel
- Fast Switching

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

| Parameter                                                              | Symbol                            | N-Channel    | P-Channel | Unit  |
|------------------------------------------------------------------------|-----------------------------------|--------------|-----------|-------|
| Drain-Source Voltage                                                   | V <sub>DS</sub>                   | 30           | -30       | V     |
| Continuous Drain Current, V <sub>GS</sub> @ 10V @ T <sub>a</sub> = 25℃ | I <sub>D</sub>                    | 2.7          | -2        | A     |
| Continuous Drain Current, V <sub>GS</sub> @ 10V @ T <sub>a</sub> = 70℃ | I <sub>D</sub>                    | 2.1          | -1.6      |       |
| Pulsed Drain Current *1                                                | I <sub>DM</sub>                   | 21           | -16       |       |
| Power Dissipation @T <sub>a</sub> = 25℃                                | P <sub>D</sub>                    | 1.25         |           | W     |
| Power Dissipation @T <sub>a</sub> = 70℃                                |                                   | 0.8          |           |       |
| Linear Derating Factor                                                 |                                   | 10           |           | m W/℃ |
| Gate-to-Source Voltage                                                 | V <sub>GS</sub>                   | ±20          |           | V     |
| Gate-to-Source Voltage Single Pulse tp<10 μ S                          | V <sub>GSM</sub>                  | 30           |           |       |
| Peak Diode Recovery dv/dt *2                                           | dv/dt                             | 5.0          |           | V/ns  |
| Junction and Storage Temperature Range                                 | T <sub>J</sub> , T <sub>STG</sub> | -55 to + 150 |           | ℃     |
| Maximum Junction-to-Ambient *3                                         | R θ JA                            | 100          |           | ℃/W   |

\*1 Repetitive rating; pulse width limited by max. junction temperature.

\*2 N-Channel  $I_{SD} \leq 1.7\text{A}$ ,  $di/dt \leq 120\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$

P-Channel  $I_{SD} \leq -1.2\text{A}$ ,  $di/dt \leq 160\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 150^\circ\text{C}$

\*3 Surface mounted on FR-4 board,  $t \leq 10\text{sec}$ .

## KRF7509

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

| Parameter                              | Symbol            | Testconditons                               |           | Min                              | Typ   | Max   | Unit |
|----------------------------------------|-------------------|---------------------------------------------|-----------|----------------------------------|-------|-------|------|
| Drain-to-Source Breakdown Voltage      | V(BR)DSS          | VGS = 0V, ID = 250 μ A                      | N-Ch      | 30                               |       |       | V    |
|                                        |                   | VGS = 0V, ID = -250 μ A                     | P-Ch      | -30                              |       |       |      |
| Breakdown Voltage Temp. Coefficient    | ΔV(BR)DSS/<br>ΔTJ | ID = 1mA,Reference to 25℃                   | N-Ch      |                                  | 0.059 |       | V/℃  |
|                                        |                   | ID = -1mA,Reference to 25℃                  | P-Ch      |                                  | 0.039 |       |      |
| Static Drain-to-Source On-Resistance   | RDS(on)           | VGS =10V, ID = 1.7A*1                       | N-Ch      |                                  | 0.09  | 0.110 | Ω    |
|                                        |                   | VGS = 4.5V, ID = 0.85A*1                    |           |                                  | 0.14  | 0.175 |      |
| Static Drain-to-Source On-Resistance   | RDS(on)           | VGS = -10V, ID = -1.2A*1                    | P-Ch      |                                  | 0.17  | 0.20  |      |
|                                        |                   | VGS = -4.5V, ID = -0.6A*1                   |           |                                  | 0.30  | 0.40  |      |
| Gate Threshold Voltage                 | VGS(th)           | VDS = VGS, ID = 250 μ A                     | N-Ch      | 1.0                              |       |       | V    |
|                                        |                   | VDS = VGS, ID = -250 μ A                    | P-Ch      | -1.0                             |       |       |      |
| Forward Transconductance               | gfs               | VDS = 10V, ID = 0.85A*1                     | N-Ch      | 1.9                              |       |       | S    |
|                                        |                   | VDS = -10V, ID = -0.6A*1                    | P-Ch      | 0.92                             |       |       |      |
| Drain-to-Source Leakage Current        | IDSS              | VDS = 24V, VGS = 0V                         | N-Ch      |                                  |       |       | μ A  |
|                                        |                   | VDS = -24V, VGS = 0V                        | P-Ch      |                                  |       | 1.0   |      |
|                                        |                   | VDS = 24V, VGS = 0V, TJ = 125℃              | N-Ch      |                                  |       | -1.0  |      |
|                                        |                   | VDS = -24V, VGS = 0V, TJ = 125℃             | P-Ch      |                                  |       | 25    |      |
| Gate-to-Source Forward Leakage         | IGSS              | VGS = ±20V                                  | N-Ch      |                                  |       | -25   |      |
|                                        |                   |                                             | P-Ch      |                                  |       | ±100  |      |
| Total Gate Charge                      | Qg                | N-Channel<br>ID = 1.7A,VDS = 24V,VGS =10V   | N-Ch      |                                  | 7.8   | 12    | nC   |
| Gate-to-Source Charge                  | Qgs               |                                             | P-Channel | P-Ch                             |       | 7.5   |      |
|                                        |                   | Gate-to-Drain ("Miller") Charge             | Qgd       | ID = -1.2A,VDS = -24V,VGS = -10V | N-Ch  |       |      |
| P-Ch                                   |                   |                                             |           |                                  | 1.3   | 1.9   |      |
| Turn-On Delay Time                     | td(on)            | N-Channel<br>VDD = 15V,ID = 1.7A,RG = 6.1 Ω | N-Ch      |                                  | 4.7   |       | ns   |
|                                        |                   |                                             | P-Ch      |                                  | 9.7   |       |      |
| Rise Time                              | tr                | RD=8.7 Ω<br>P-Channel                       | N-Ch      |                                  | 10    |       |      |
|                                        |                   |                                             | P-Ch      |                                  | 12    |       |      |
| Turn-Off Delay Time                    | td(off)           | VDD = -15V,ID = -1.2A,RG = 6.2 Ω<br>RD=12 Ω | N-Ch      |                                  | 12    |       |      |
|                                        |                   |                                             | P-Ch      |                                  | 19    |       |      |
| Fall Time                              | tf                |                                             | N-Ch      |                                  | 5.3   |       |      |
|                                        |                   |                                             | P-Ch      |                                  | 9.3   |       |      |
| Input Capacitance                      | Ciss              | N-Channel<br>VGS = 0V,VDS = 25V,f = 1.0MHz  | N-Ch      |                                  | 210   |       | pF   |
|                                        |                   |                                             | P-Ch      |                                  | 180   |       |      |
| Output Capacitance                     | Coss              | P-Channel                                   | N-Ch      |                                  | 80    |       |      |
|                                        |                   |                                             | P-Ch      |                                  | 87    |       |      |
| Reverse Transfer Capacitance           | Crss              | VGS = 0V,VDS = -25V,f = 1.0MHz              | N-Ch      |                                  | 32    |       |      |
|                                        |                   |                                             | P-Ch      |                                  | 42    |       |      |
| Continuous Source Current （Body Diode） | IS                |                                             | N-Ch      |                                  |       | 1.25  | A    |
| Pulsed Source Current （Body Diode）*2   | ISM               |                                             | P-Ch      |                                  |       | -1.25 |      |
|                                        |                   |                                             | N-Ch      |                                  |       | 21    |      |
|                                        |                   |                                             | P-Ch      |                                  |       | -16   |      |

**KRF7509**■ Electrical Characteristics  $T_J = 25^\circ\text{C}$ 

| Parameter               | Symbol   | Testconditions                                                                            |      | Min | Typ | Max  | Unit |
|-------------------------|----------|-------------------------------------------------------------------------------------------|------|-----|-----|------|------|
| Diode Forward Voltage   | $V_{SD}$ | $T_J = 25^\circ\text{C}$ , $I_S = 1.7\text{A}$ , $V_{GS} = 0\text{V}^{*1}$                | N-Ch |     |     | 1.2  | V    |
|                         |          | $T_J = 25^\circ\text{C}$ , $I_S = -1.8\text{A}$ , $V_{GS} = 0\text{V}^{*1}$               | P-Ch |     |     | -1.2 |      |
| Reverse Recovery Time   | $t_{rr}$ | N-Channel                                                                                 | N-Ch |     | 40  | 60   | ns   |
|                         |          | $T_J = 25^\circ\text{C}$ , $I_F = 1.7\text{A}$ , $di/dt = 100\text{A}/\mu\text{s}^{*1}$   | P-Ch |     | 30  | 45   |      |
| Reverse Recovery Charge | $Q_{rr}$ | P-Channel                                                                                 | N-Ch |     | 48  | 72   | nC   |
|                         |          | $T_J = 25^\circ\text{C}$ , $I_F = -1.2\text{A}$ , $di/dt = -100\text{A}/\mu\text{s}^{*1}$ | P-Ch |     | 37  | 55   |      |

\*1 Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

\*2 Repetitive rating; pulse width limited by max. junction temperature.