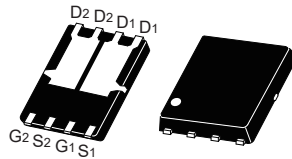


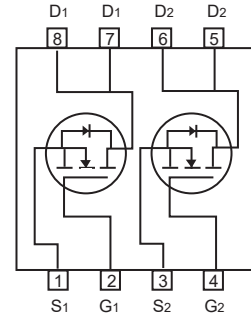
## P-Channel Enhancement Mode Field Effect Transistor

### FEATURES

- -30V, -53A,  $R_{DS(ON)} = 9\text{ m}\Omega$  @ $V_{GS} = -10\text{V}$ .  
 $R_{DS(ON)} = 12\text{m}\Omega$  @ $V_{GS} = -4.5\text{V}$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handling capability.
- RoHS compliant.
- Surface mount Package.



P-PAK 5X6



### ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ unless otherwise noted

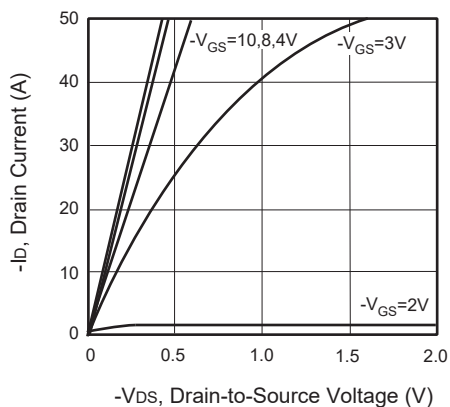
| Parameter                             | Symbol                   | Limit      | Units            |
|---------------------------------------|--------------------------|------------|------------------|
| Drain-Source Voltage                  | $V_{DS}$                 | -30        | V                |
| Gate-Source Voltage                   | $V_{GS}$                 | $\pm 20$   | V                |
| Drain Current-Continuous              | $I_D @ R_{\theta JA}$    | -13        | A                |
| Drain Current-Continuous              | $I_D @ R_{\theta JC}$    | -53        | A                |
| Drain Current-Pulsed <sup>a</sup>     | $I_{DM} @ R_{\theta JA}$ | -52        | A                |
| Drain Current-Pulsed <sup>a</sup>     | $I_{DM} @ R_{\theta JC}$ | -212       | A                |
| Maximum Power Dissipation             | $P_D$                    | 50         | W                |
| Operating and Store Temperature Range | $T_J, T_{stg}$           | -55 to 150 | $^\circ\text{C}$ |

### Thermal Characteristics

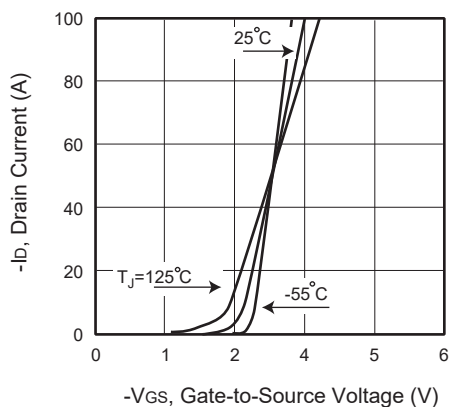
| Parameter  | Symbol          | Limit | Units              |
|--|-----------------|-------|--------------------|
| Thermal Resistance, Junction-to-Case                 | $R_{\theta JC}$ | 2.5   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient <sup>b</sup> | $R_{\theta JA}$ | 40    | $^\circ\text{C/W}$ |

## Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

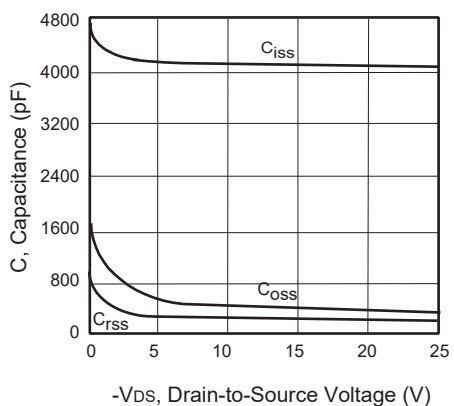
| Parameter  | Symbol       | Test Condition   | Min | Typ  | Max  | Units     |
|--|--------------|--|-----|------|------|-----------|
| <b>Off Characteristics</b>   |              |  |     |      |      |           |
| Drain-Source Breakdown Voltage   | $BV_{DSS}$   | $V_{GS} = 0V, I_D = -250\mu A$                                     | -30 |      |      | V         |
| Zero Gate Voltage Drain Current  | $I_{DSS}$    | $V_{DS} = -30V, V_{GS} = 0V$                                       |     |      | -1   | $\mu A$   |
| Gate Body Leakage Current, Forward   | $I_{GSSF}$   | $V_{GS} = 20V, V_{DS} = 0V$  |     |      | 100  | nA        |
| Gate Body Leakage Current, Reverse   | $I_{GSSR}$   | $V_{GS} = -20V, V_{DS} = 0V$                                       |     |      | -100 | nA        |
| <b>On Characteristics <sup>c</sup></b>   |              |  |     |      |      |           |
| Gate Threshold Voltage   | $V_{GS(th)}$ | $V_{GS} = V_{DS}, I_D = -250\mu A$                                 | -1  |      | -3   | V         |
| Static Drain-Source  | $R_{DS(on)}$ | $V_{GS} = -10V, I_D = -13A$  |     | 7.2  | 9    | $m\Omega$ |
| On-Resistance  |              | $V_{GS} = -4.5V, I_D = -10A$                                       |     | 8.5  | 12   | $m\Omega$ |
| <b>Dynamic Characteristics <sup>d</sup></b>  |              |  |     |      |      |           |
| Input Capacitance  | $C_{iss}$    | $V_{DS} = -15V, V_{GS} = 0V,$<br>$f = 1.0\text{ MHz}$              |     | 4165 |      | pF        |
| Output Capacitance   | $C_{oss}$    |  |     | 475  |      | pF        |
| Reverse Transfer Capacitance   | $C_{rss}$    |  |     | 365  |      | pF        |
| <b>Switching Characteristics <sup>d</sup></b>  |              |  |     |      |      |           |
| Turn-On Delay Time   | $t_{d(on)}$  | $V_{DD} = -15V, I_D = -15A,$<br>$V_{GS} = -10V, R_{GEN} = 6\Omega$ |     | 18   |      | ns        |
| Turn-On Rise Time  | $t_r$        |  |     | 13   |      | ns        |
| Turn-Off Delay Time  | $t_{d(off)}$ |  |     | 122  |      | ns        |
| Turn-Off Fall Time   | $t_f$        |  |     | 48   |      | ns        |
| Total Gate Charge  | $Q_g$        | $V_{DS} = -15V, I_D = -13A,$<br>$V_{GS} = -5V$                     |     | 44   |      | nC        |
| Gate-Source Charge   | $Q_{gs}$     |  |     | 9    |      | nC        |
| Gate-Drain Charge  | $Q_{gd}$     |  |     | 13   |      | nC        |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b>  |              |  |     |      |      |           |
| Drain-Source Diode Forward Current <sup>b</sup>  | $I_S$        |  |     |      | -45  | A         |
| Drain-Source Diode Forward Voltage <sup>c</sup>  | $V_{SD}$     | $V_{GS} = 0V, I_S = -13A$  |     |      | -1.1 | V         |
| <b>Notes :</b><br>a.Repetitive Rating : Pulse width limited by maximum junction temperature.<br>b.Surface Mounted on FR4 Board, $t \leq 10$ sec.<br>c.Pulse Test : Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 2\%$ .<br>d.Guaranteed by design, not subject to production testing. |              |  |     |      |      |           |



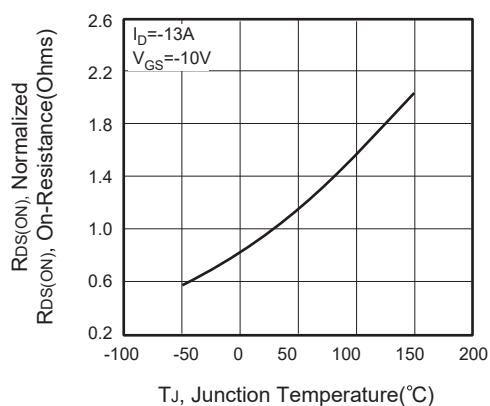
**Figure 1. Output Characteristics**



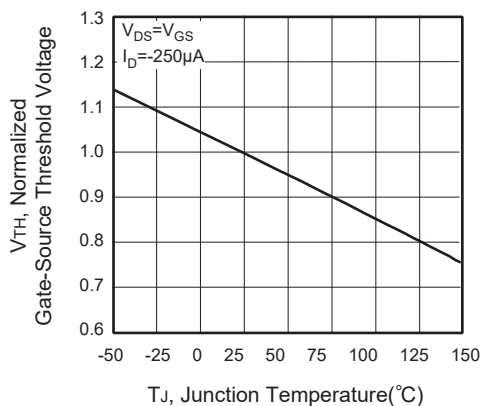
**Figure 2. Transfer Characteristics**



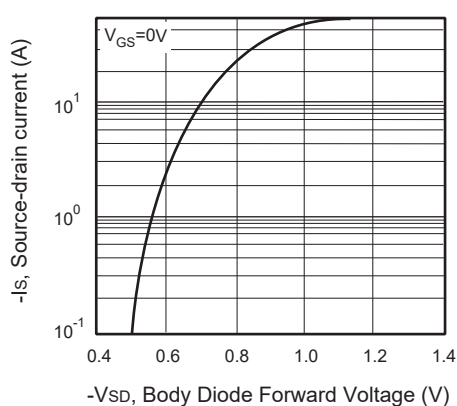
**Figure 3. Capacitance**



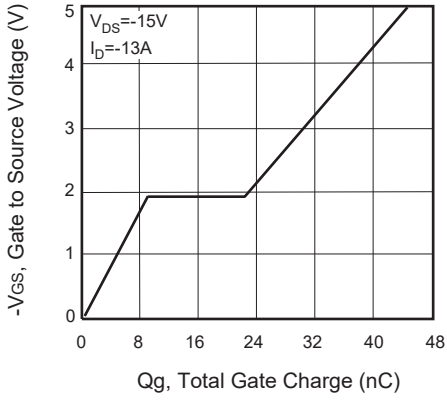
**Figure 4. On-Resistance Variation with Temperature**



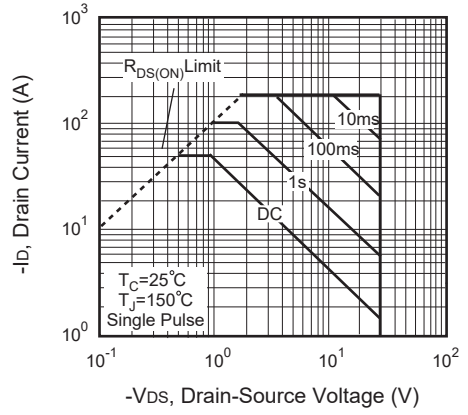
**Figure 5. Gate Threshold Variation with Temperature**



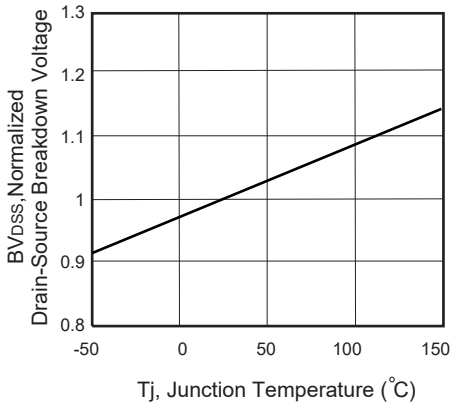
**Figure 6. Body Diode Forward Voltage Variation with Source Current**



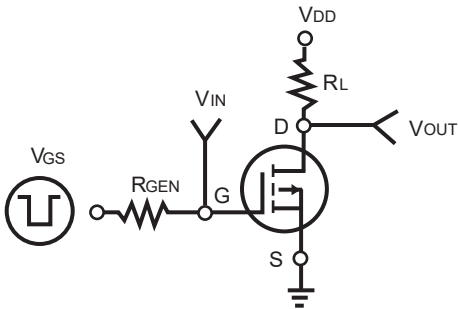
**Figure 7. Gate Charge**



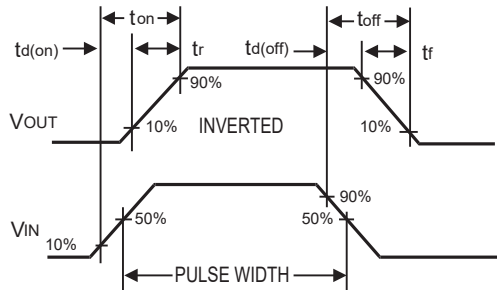
**Figure 8. Maximum Safe Operating Area**



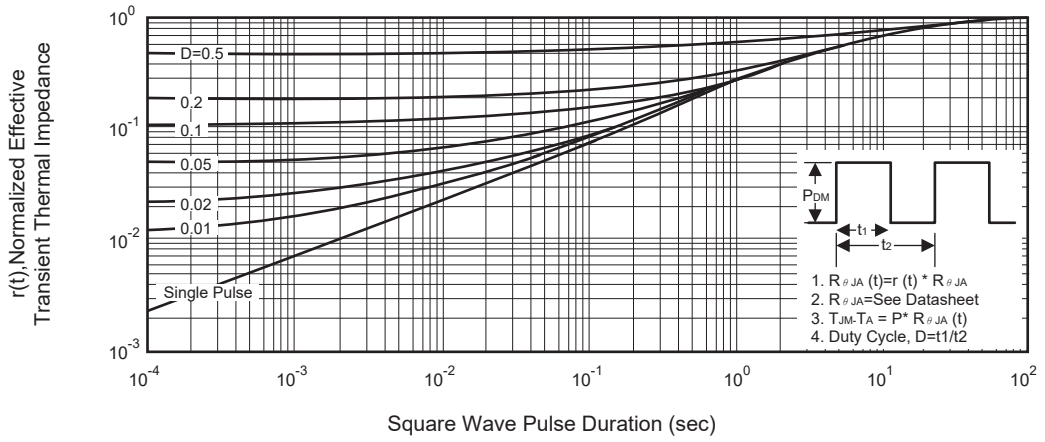
**Figure 9. Breakdown Voltage Variation VS Temperature**



**Figure 10. Switching Test Circuit**



**Figure 11. Switching Waveforms**



**Figure 12. Normalized Thermal Transient Impedance Curve**