**NIKO-SEM**

# N-Channel Enhancement Mode Field Effect Transistor

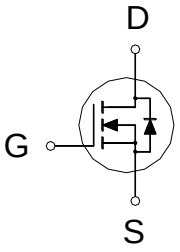
**PG7A10BK**

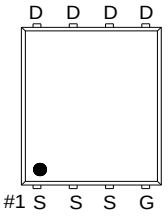
**PDFN 5x6P**

**Halogen-Free & Lead-Free**

## PRODUCT SUMMARY

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 100V | 6.7mΩ | 79A |




G. GATE
D. DRAIN
S. SOURCE

RoHS Compliant

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C Unless Otherwise Noted)

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $T_C$ = 25 °C | $I_D$ | 79 | A |
| | $T_C$ = 100 °C | | 56 | |
| Pulsed Drain Current[1] | | $I_{DM}$ | 150 | |
| Continuous Drain Current | $T_A$ = 25 °C | $I_D$ | 18 | |
| | $T_A$ = 70 °C | | 15 | |
| Avalanche Current | | $I_{AS}$ | 13.9 | |
| Avalanche Energy | L = 1mH | $E_{AS}$ | 96.6 | mJ |
| Power Dissipation | $T_C$ = 25 °C | $P_D$ | 100 | W |
| | $T_C$ = 100 °C | | 50 | |
| Power Dissipation[3] | $T_A$ = 25 °C | $P_D$ | 5.1 | W |
| | $T_A$ = 70 °C | | 3.6 | |
| Operating Junction & Storage Temperature Range | | $T_j$, $T_{stg}$ | -55 to 175 | °C |

## THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE | | SYMBOL | TYPICAL | MAXIMUM | UNITS |
|---|---|---|---|---|---|
| Junction-to-Ambient[2] | t ≦10s | $R_{\theta JA}$ | | 29 | °C / W |
| Junction-to-Ambient[2] | Steady-State | $R_{\theta JA}$ | | 54 | |
| Junction-to-Case | Steady-State | $R_{\theta JC}$ | | 1.5 | |

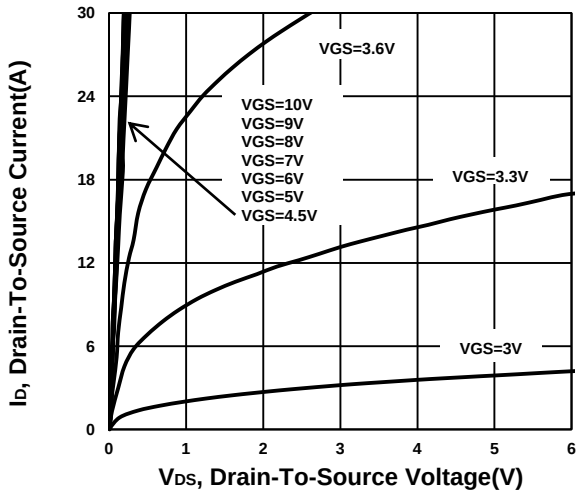
[1]Pulse width limited by maximum junction temperature.
[2]The value of $R_{\theta JA}$ is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°C.
[3]The Power dissipation is based on $R_{\theta JA}$ t ≦10s value.

**ELECTRICAL CHARACTERISTICS ($T_J$ = 25 °C, Unless Otherwise Noted)**

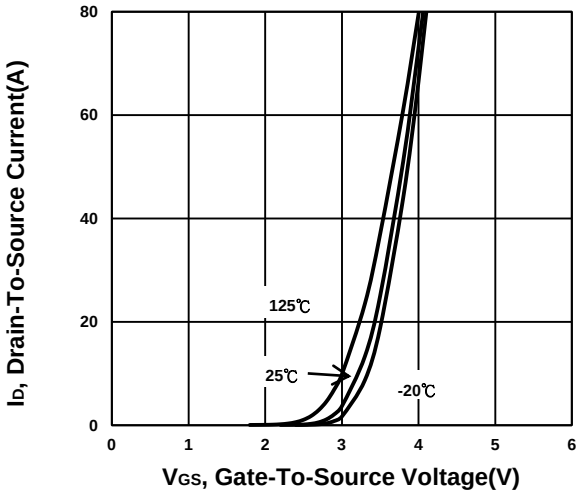
| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS MIN | LIMITS TYP | LIMITS MAX | UNIT |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 100 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1.4 | 1.9 | 3 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ =100V, $V_{GS}$ = 0V | | | 1 | μA |
| | | $V_{DS}$ = 100V, $V_{GS}$ = 0V, $T_J$ = 55 °C | | | 10 | μA |
| Drain-Source On-State Resistance[1] | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 14A | | 5.2 | 6.7 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 10A | | 7.1 | 10.2 | mΩ |
| Forward Transconductance[1] | $g_{fs}$ | $V_{DS}$ = 5V, $I_D$ = 14A | | 60 | | S |
| **DYNAMIC** | | | | | | |
| Input Capacitance[3] | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 50V, f = 1MHz | 2282 | 3261 | 4239 | pF |
| Output Capacitance[3] | $C_{oss}$ | | 199 | 285 | 370 | pF |
| Reverse Transfer Capacitance[3] | $C_{rss}$ | | 4.9 | 14 | 23 | pF |
| Gate Resistance[3] | $R_g$ | $V_{GS}$ = 0V, $V_{DS}$ = 0V, f = 1MHz | 0.9 | 1.7 | 2.6 | Ω |
| Total Gate Charge[2,3] | $Q_g$ VGS = 10V | $V_{DS}$ = 50V , $V_{GS}$ = 10V, $I_D$ = 14A | 41 | 59 | 78 | nC |
| | $Q_g$ $V_{GS}$ = 4.5V | | 22 | 32 | 42 | nC |
| Gate-Source Charge[2,3] | $Q_{gs}$ | | 7 | 10 | 13 | nC |
| Gate-Drain Charge[2,3] | $Q_{gd}$ | | 7.5 | 15 | 22.5 | nC |
| Turn-On Delay Time[2,3] | $t_{d(on)}$ | $V_{DS}$ = 50V , $I_D$ ≅ 14A, $V_{GS}$ = 10V, $R_{GEN}$ =6Ω | | 19 | | nS |
| Rise Time[2,3] | $t_r$ | | | 51 | | nS |
| Turn-Off Delay Time[2,3] | $t_{d(off)}$ | | | 79 | | nS |
| Fall Time[2,3] | $t_f$ | | | 87 | | nS |
| **SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_J$ = 25 °C)** | | | | | | |
| Continuous Current | $I_S$ | | | | 79 | A |
| Forward Voltage[1] | $V_{SD}$ | $I_F$ = 14A, $V_{GS}$ = 0V | | | 1.2 | V |
| Reverse Recovery Time[3] | $t_{rr}$ | $I_F$ = 14A, $dI_F/dt$ = 100A / μS | 19 | 38 | 57 | nS |
| Reverse Recovery Charge[3] | $Q_{rr}$ | | 26 | 52 | 78 | nC |

[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.
[3]Guaranteed by design, not subject to production testing

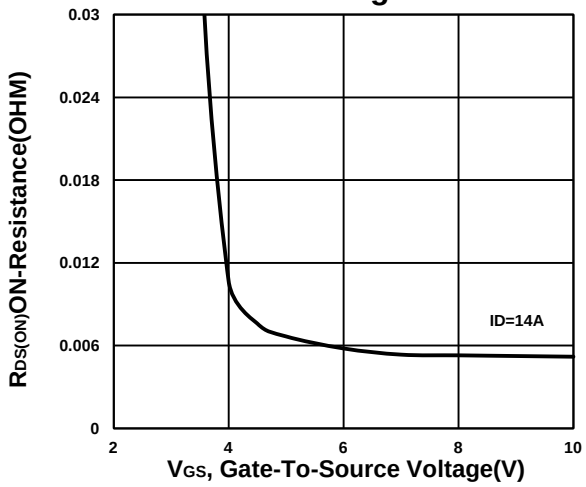
## Output Characteristics



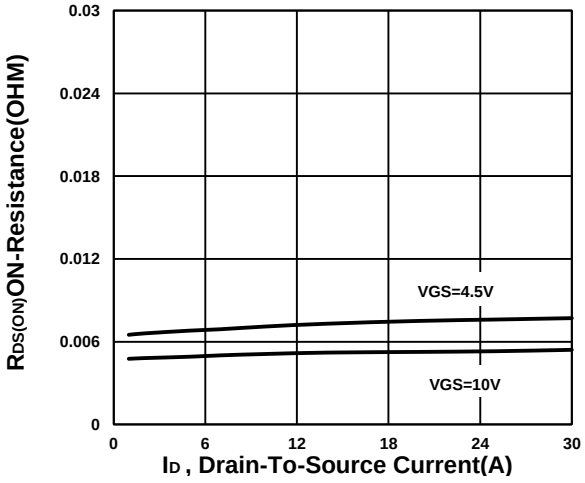

## Transfer Characteristics



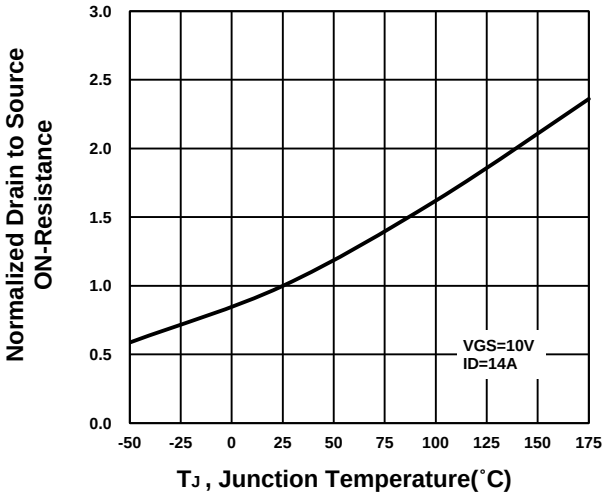

## On-Resistance VS Gate-To-Source Voltage



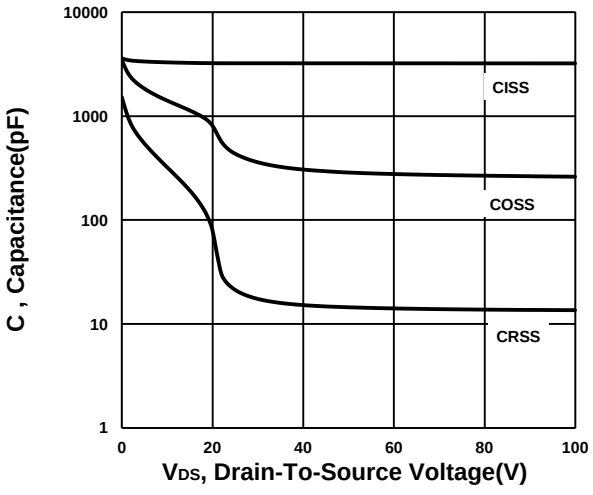

## On-Resistance VS Drain Current



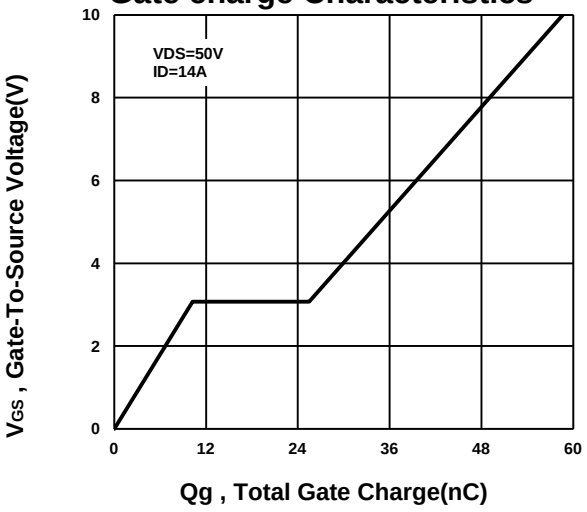

## On-Resistance VS Temperature



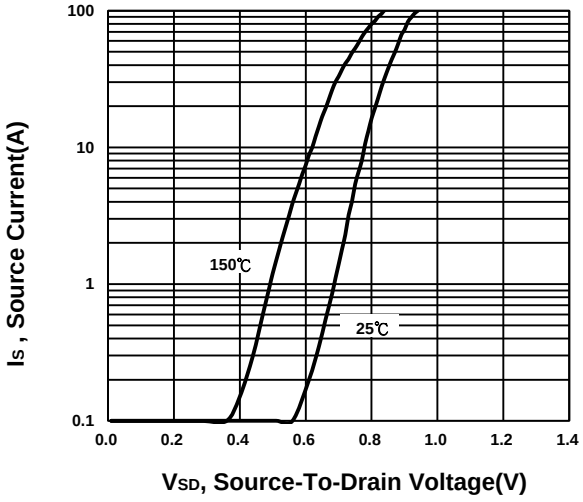

## Capacitance Characteristic



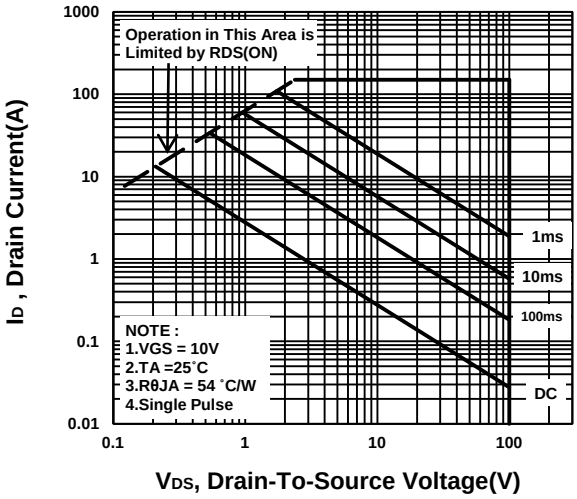
## Gate charge Characteristics



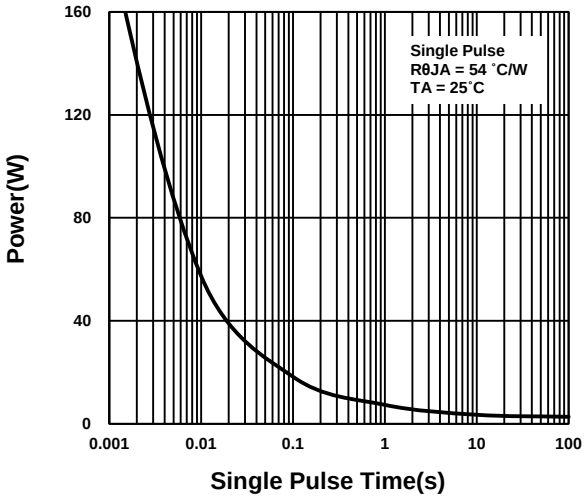

## Source-Drain Diode Forward Voltage



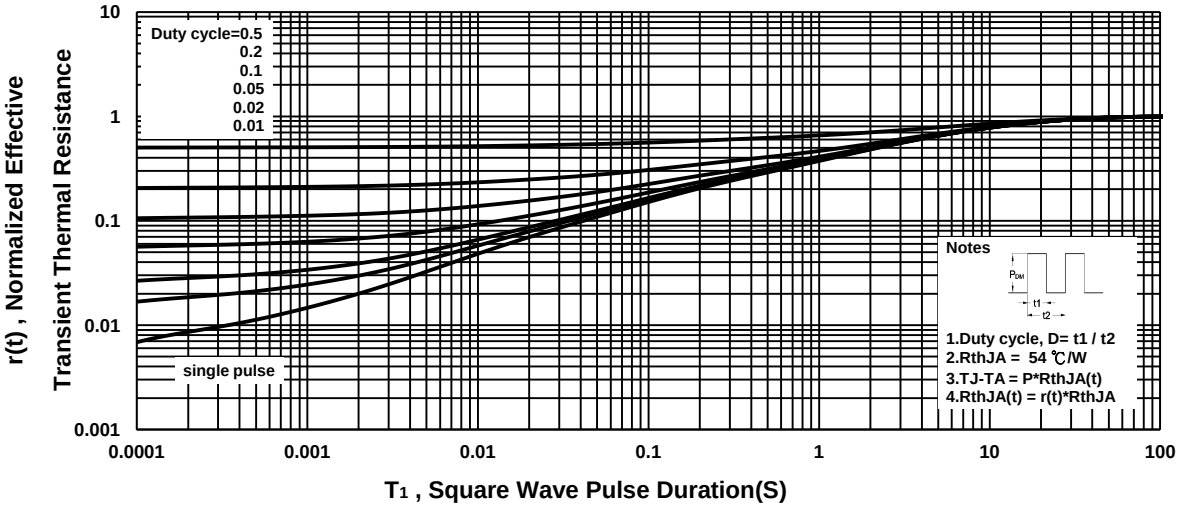

## Safe Operating Area




## Single Pulse Maximum Power Dissipation




## Transient Thermal Response Curve



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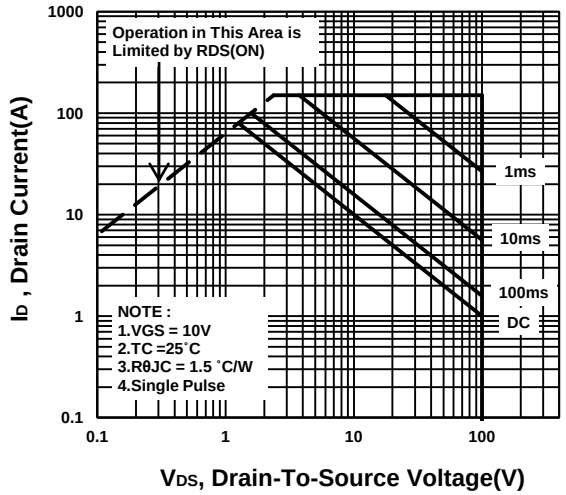


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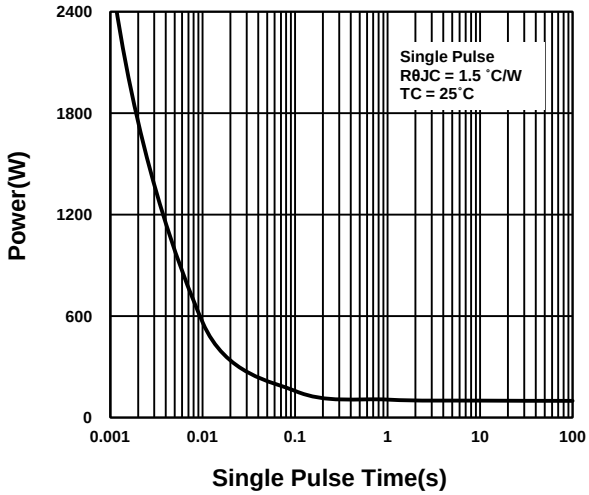


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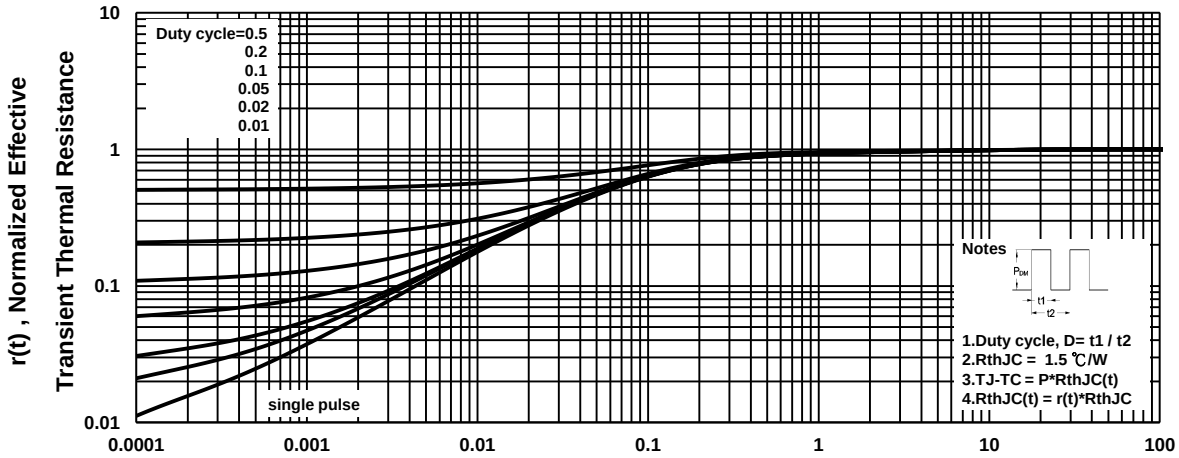

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