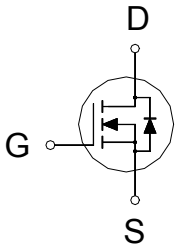
**NIKO-SEM**

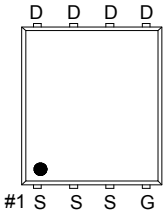
# N-Channel Enhancement Mode Field Effect Transistor

**P0703BK-A**
**PDFN 5x6P**
**Halogen-Free & Lead-Free**

## PRODUCT SUMMARY

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | $I_D$ |
|---|---|---|
| 30V | 7.2mΩ | 30A |




RoHS Compliant

G. GATE
D. DRAIN
S. SOURCE

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

| PARAMETERS/TEST CONDITIONS | | SYMBOL | LIMITS | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $T_C$ = 25 °C (Package Limited) | $I_D$ | 30 | A |
| | $T_C$ = 25 °C (Silicon Limited) | | 71 | |
| | $T_C$ = 100 °C | | 45 | |
| Pulsed Drain Current[1] | | $I_{DM}$ | 150 | |
| Continuous Drain Current | $T_A$ = 25 °C | $I_D$ | 14 | |
| | $T_A$ = 70 °C | | 11 | |
| Avalanche Current | | $I_{AS}$ | 36 | |
| Avalanche Energy | L = 0.1mH | $E_{AS}$ | 65 | mJ |
| Power Dissipation | $T_C$ = 25 °C | $P_D$ | 62.5 | W |
| | $T_C$ = 100 °C | | 25 | |
| Power Dissipation | $T_A$ = 25 °C | $P_D$ | 2.5 | W |
| | $T_A$ = 70 °C | | 1.6 | |
| Operating Junction & Storage Temperature Range | | $T_j$, $T_{stg}$ | -55 to 150 | °C |

## THERMAL RESISTANCE RATINGS

| THERMAL RESISTANCE | | SYMBOL | TYPICAL | MAXIMUM | UNITS |
|---|---|---|---|---|---|
| Junction-to-Ambient | Steady-State | $R_{\theta JA}$ | | 50 | °C / W |
| Junction-to-Case | Steady-State | $R_{\theta JC}$ | | 2 | |

[1]Pulse width limited by maximum junction temperature.

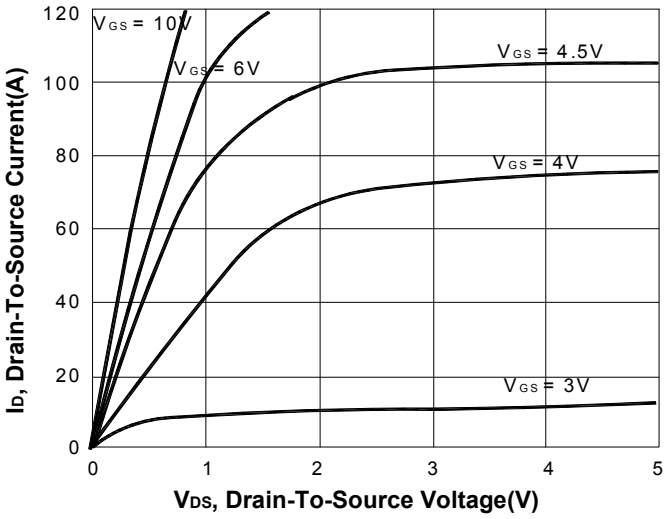
## ELECTRICAL CHARACTERISTICS ($T_J$ = 25 °C, Unless Otherwise Noted)

| PARAMETER | SYMBOL | TEST CONDITIONS | LIMITS | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 30 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1.2 | 1.7 | 3.0 | |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | | | ±100 | nA |

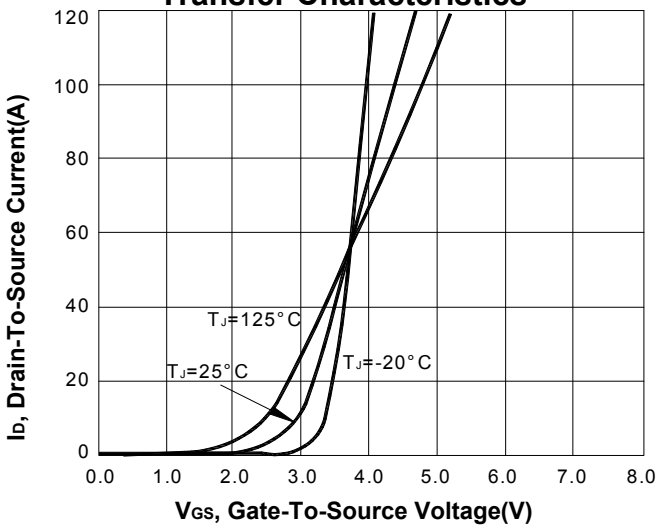
| | | | | | | |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 24V, $V_{GS}$ = 0V | | | 1 | μA |
| | | $V_{DS}$ = 20V, $V_{GS}$ = 0V, $T_J$ = 55 °C | | | 10 | |
| Drain-Source On-State Resistance[1] | $R_{DS(ON)}$ | $V_{GS}$ = 4.5V, $I_D$ = 15A | | 9.5 | 11.5 | mΩ |
| | | $V_{GS}$ = 10V, $I_D$ = 20A | | 5.7 | 7.2 | |
| Forward Transconductance[1] | $g_{fs}$ | $V_{DS}$ = 15V, $I_D$ = 17A | | 57 | | S |
| **DYNAMIC** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 15V, f = 1MHz | | 1150 | | pF |
| Output Capacitance | $C_{oss}$ | | | 270 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 170 | | |
| Gate Resistance | $R_g$ | $V_{GS}$ = 0V, $V_{DS}$ = 0V, f = 1MHz | | 1.4 | | Ω |
| Total Gate Charge[2] | $Q_g$ $V_{GS}$ = 10V | $V_{DS}$ = 0.5$V_{(BR)DSS}$, $V_{GS}$ = 10V, $I_D$ = 20A | | 25 | | nC |
| | $Q_g$ $V_{GS}$ = 4.5V | | | 11 | | |
| Gate-Source Charge[2] | $Q_{gs}$ | | | 4.5 | | |
| Gate-Drain Charge[2] | $Q_{gd}$ | | | 7 | | |
| Turn-On Delay Time[2] | $t_{d(on)}$ | $V_{DS}$ = 15V , $I_D$ ≅ 20A, $V_{GS}$ = 10V, $R_{GEN}$ =6Ω | | 17.5 | | nS |
| Rise Time[2] | $t_r$ | | | 10 | | |
| Turn-Off Delay Time[2] | $t_{d(off)}$ | | | 36 | | |
| Fall Time[2] | $t_f$ | | | 11 | | |
| **SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS ($T_J$ = 25 °C)** | | | | | | |
| Continuous Current | $I_S$ | | | | 30 | A |
| Forward Voltage[1] | $V_{SD}$ | $I_F$ = 20A, $V_{GS}$ = 0V | | | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 20A, $dI_F/dt$ = 100A / μS | | 30 | 55 | nS |

[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.

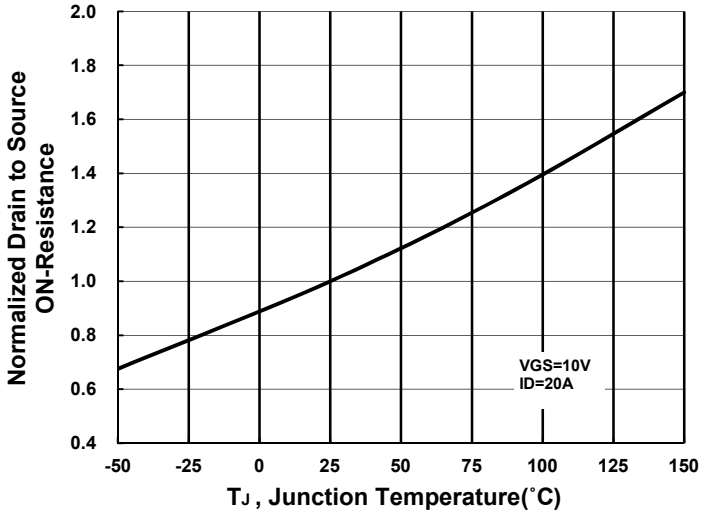
## Output Characteristics



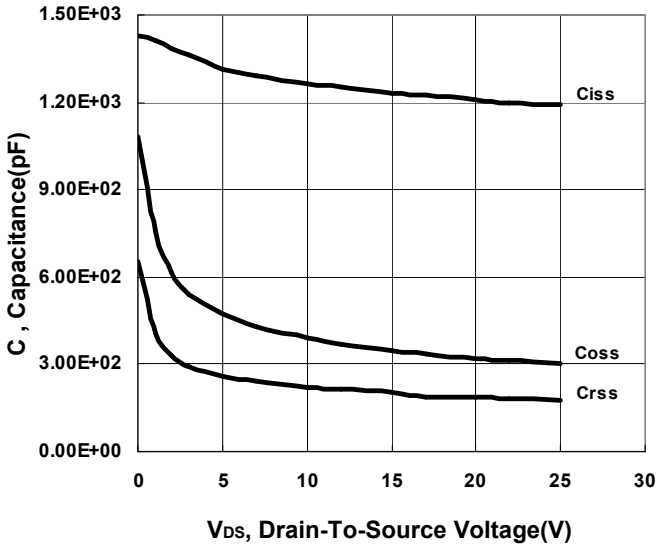

## Transfer Characteristics



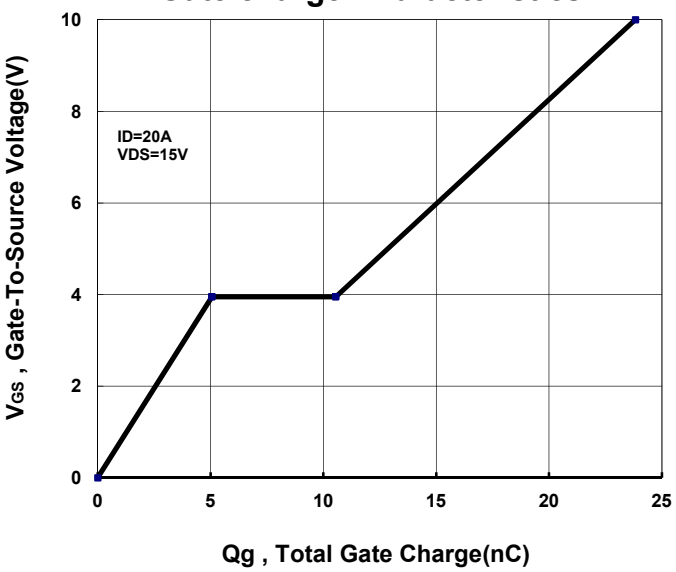

## On-Resistance VS Temperature



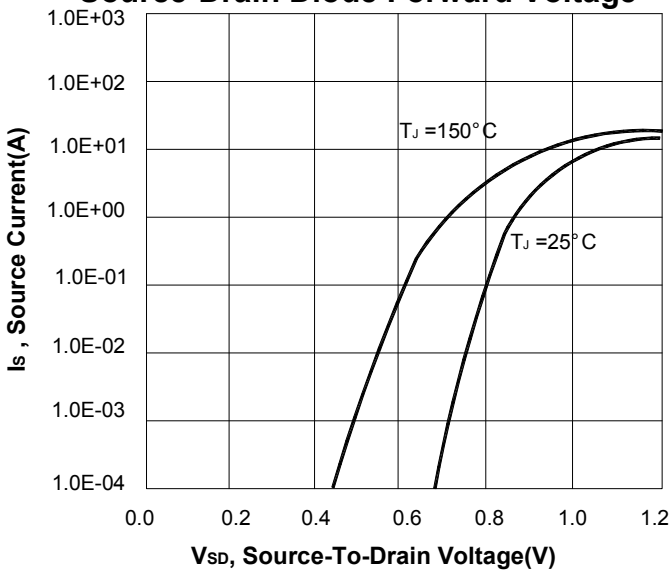

## Capacitance Characteristic



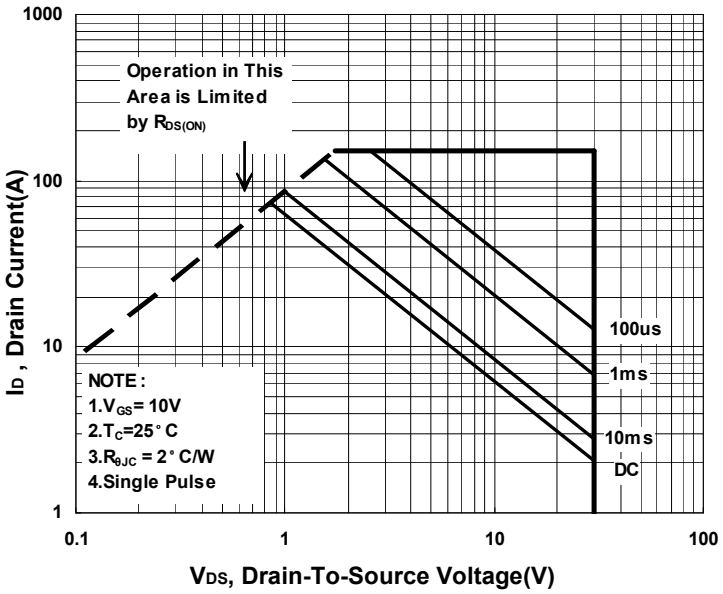

## Gate charge Characteristics



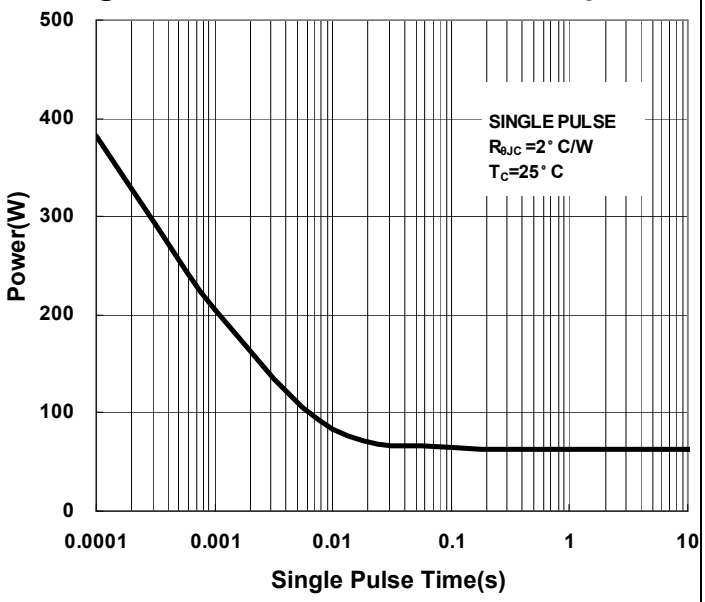

## Source-Drain Diode Forward Voltage



## Safe Operating Area




## Single Pulse Maximum Power Dissipation




## Transient Thermal Response Curve