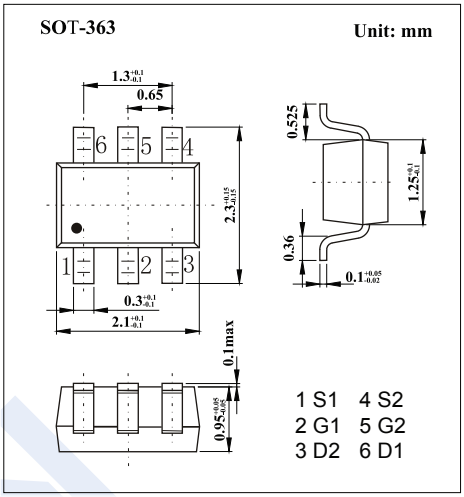
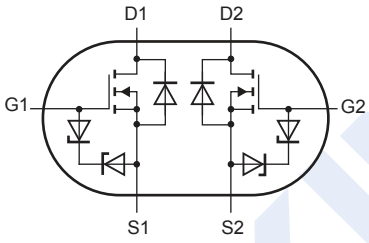
# Dual N-channel Trench MOSFET

# NX3008NBKS




## ■ Features

- $V_{DS\ (V)}$ = 30V
- $I_D$ = 350mA
- $R_{DS(ON)}$ < 1.4Ω @ $V_{GS}$ = 4.5V
- Very fast switching
- Low threshold voltage
- Trench MOSFET technology
- ESD protection up to 2 kV




## ■ Absolute Maximum Ratings ($T_J$ = 25℃, unless otherwise specified)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±8 | |
| Continuous Drain Current (Note 1) | $T_a$ = 25℃ | $I_D$ | 250 | mA |
| | $T_a$ = 100℃ | | 230 | |
| Pulsed Drain Current (Single pulse; tp≤10μs) | | $I_{DM}$ | 1.4 | A |
| Source Current | | $I_S$ | 300 | mA |
| Electrostatic Discharge Voltage HBM (Note 3) | | $V_{ESD}$ | 2000 | V |
| Per Transistor Total Power Dissipation | $T_a$ = 25℃ (Note 2) | $P_{tot}$ | 280 | mW |
| | $T_a$ = 25℃ (Note 1) | | 320 | |
| | $T_{sp}$ = 25℃ | | 990 | |
| Per Device Total Power Dissipation | $T_a$ = 25℃ (Note 2) | | 445 | |
| Per transistor Thermal Resistance. Junction- to-Ambient | (Note 2) | $R_{th(j-a)}$ | 445 | K/W |
| | (Note 1) | | 390 | |
| Thermal Resistance.Junction- to-Solder Point | | $R_{th(j-sp)}$ | 130 | |
| Per DeviceThermal Resistance. Junction- to-Ambient | | $R_{th(j-a)}$ | 300 | |
| Junction Temperature | | $T_J$ | 150 | ℃ |
| Storage Temperature Range | | $T_{stg}$ | -65 to 150 | |

Notes: 1. Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for drain 1 $cm^2$.

2. Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

3. Measured between all pins.

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■ Electrical Characteristics ($T_J$ = 25℃, unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 30 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V, $V_{GS}$=0V | | | 1 | μA |
| | | $V_{DS}$=30V, $V_{GS}$=0V, $T_J$=150℃ | | | 10 | |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±8V | | | ±1 | nA |
| | | $V_{DS}$=0V, $V_{GS}$=±4.5V | | ±10 | | |
| | | $V_{DS}$=0V, $V_{GS}$=±2.5V | | ±1 | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ , $I_D$=250μA | 0.6 | | 1.1 | V |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=350mA | | | 1.4 | Ω |
| | | $V_{GS}$=4.5V, $I_D$=350mA, $T_J$=150℃ | | | 2.5 | |
| | | $V_{GS}$=2.5V, $I_D$=200mA | | | 2.1 | |
| | | $V_{GS}$=1.8V, $I_D$=10mA | | | 2.8 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=10V,$I_D$=350mA | | 310 | | mS |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=15V, f=1MHz | | 34 | 50 | pF |
| Output Capacitance | $C_{oss}$ | | | 6.5 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 2.2 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V, $I_D$=350mA, $V_{GS}$=4.5V | | 0.52 | 0.68 | nC |
| Gate Source Charge | $Q_{gs}$ | | | 0.17 | | |
| Gate Drain Charge | $Q_{gd}$ | | | 0.08 | | |
| Turn-On DelayTime | $t_{d(on)}$ | $V_{DS}$=20V,$R_L$=250Ω $V_{GS}$=4.5V,$R_G$=6Ω | | 15 | 30 | ns |
| Turn-On Rise Time | $t_r$ | | | 11 | | |
| Turn-Off DelayTime | $t_{d(off)}$ | | | 69 | 138 | |
| Turn-Off Fall Time | $t_f$ | | | 19 | | |
| Diode Forward Voltage | $V_{SD}$ | $I_{SD}$=350mA,$V_{GS}$=0V | 0.47 | | 1.2 | V |

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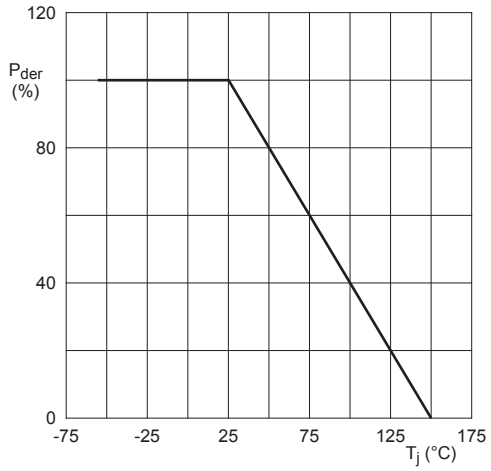
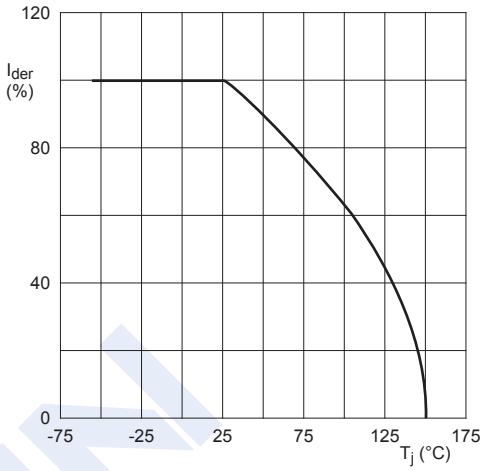
■ Typical Electrical And Thermal Characteristics



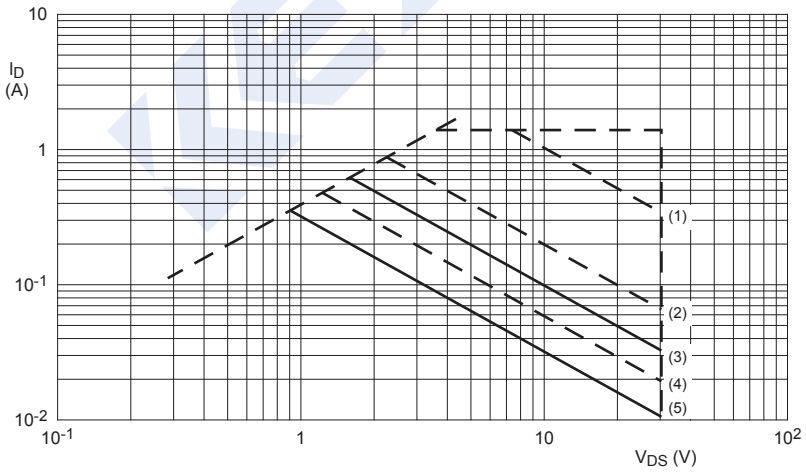

$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\,\%$$

**Fig 1. Normalized total power dissipation as a function of junction temperature**




$$I_{der} = \frac{I_D}{I_{D(25°C)}} \times 100\,\%$$

**Fig 2. Normalized continuous drain current as a function of junction temperature**




$I_{DM}$ is a single pulse

(1) $t_p$ = 1 ms

(2) $t_p$ = 10 ms

(3) DC; $T_{sp}$ = 25 °C

(4) $t_p$ = 100 ms

(5) DC; $T_{amb}$ = 25 °C; 1 $cm^2$ drain mounting pad

**Fig 3. Safe operating area; junction to ambient; continuous and peak drain currents as a function of drain-source voltage**

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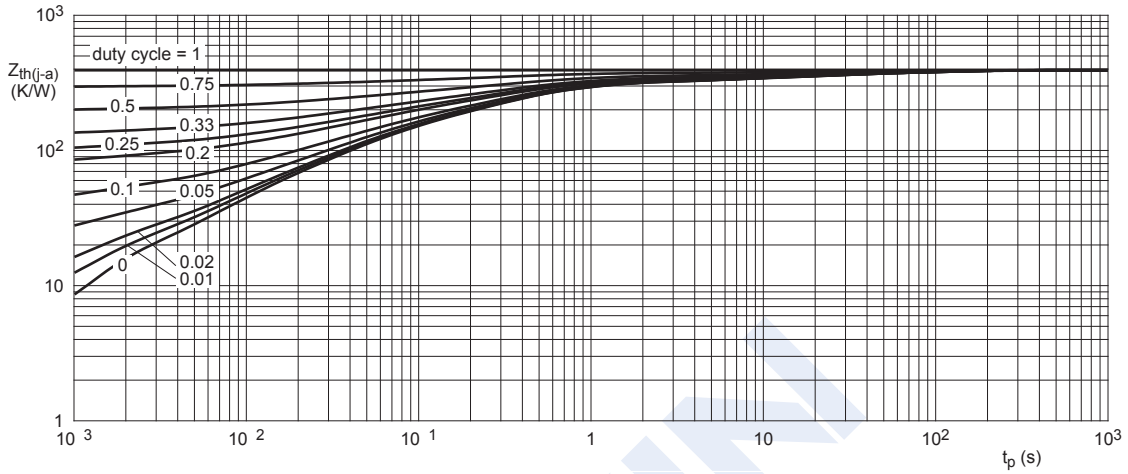
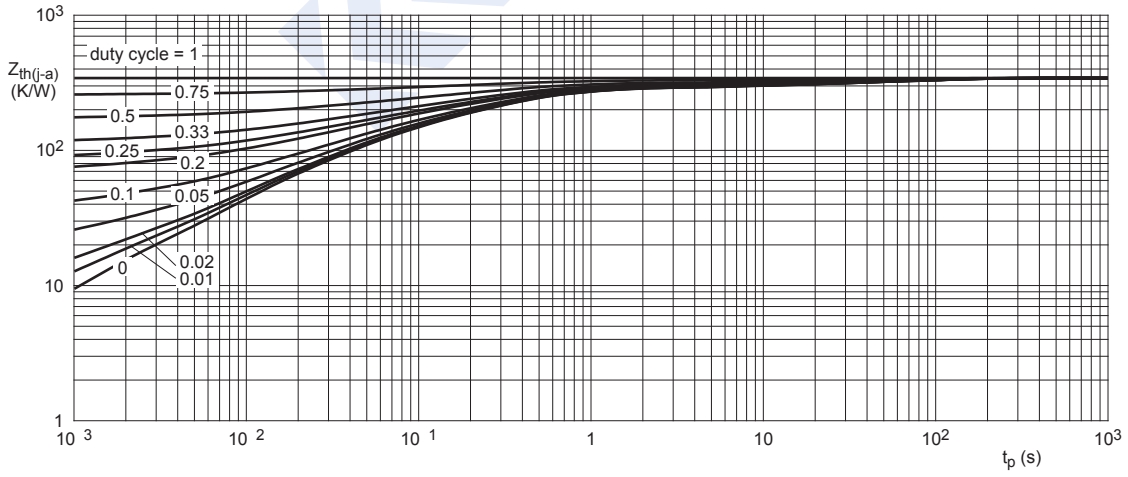



FR4 PCB, standard footprint

**Fig 4. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**




FR4 PCB, mounting pad for drain 1 $cm^2$

**Fig 5. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

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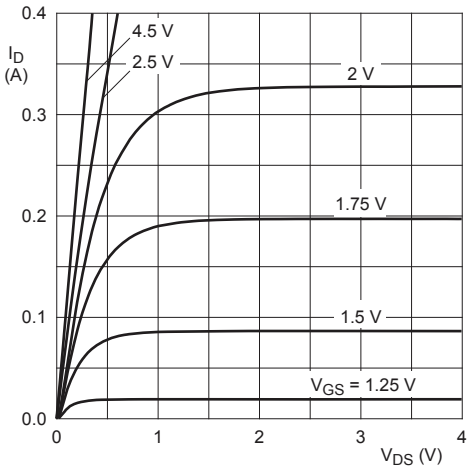
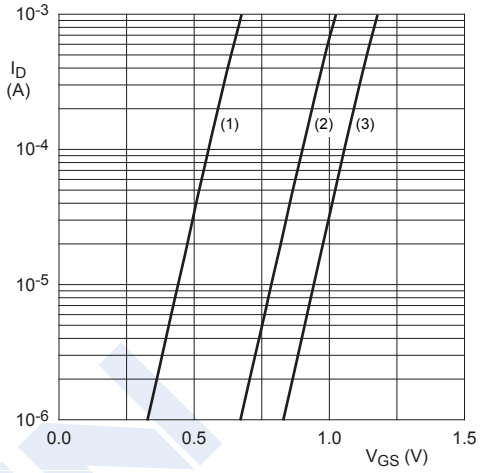


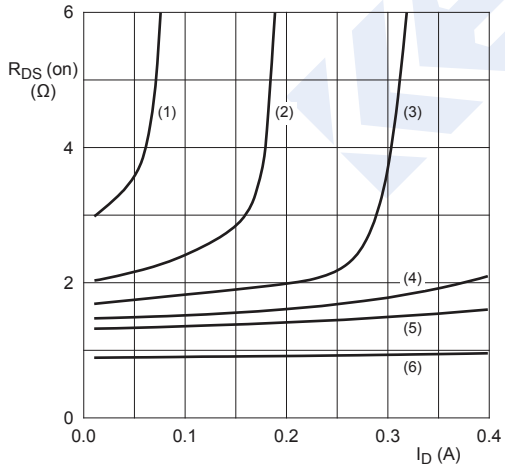

$T_j$ = 25 °C

**Fig 6. Output characteristics: drain current as a function of drain-source voltage; typical values**



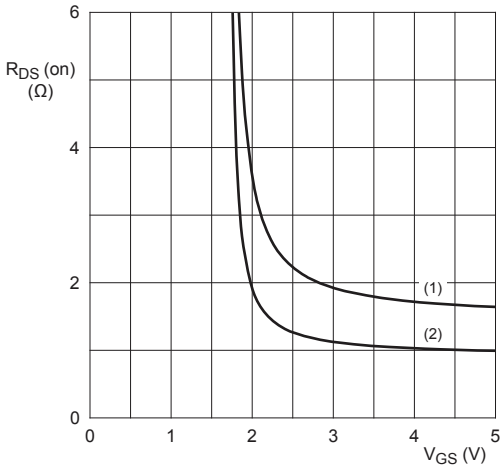

$T_j$ = 25 °C; $V_{DS}$ = 5 V
(1) minimum values
(2) typical values
(3) maximum values

**Fig 7. Sub-threshold drain current as a function of gate-source voltage**




$T_j$ = 25 °C
(1) $V_{GS}$ = 1.5 V
(2) $V_{GS}$ = 1.75 V
(3) $V_{GS}$ = 2.0 V
(4) $V_{GS}$ = 2.25 V
(5) $V_{GS}$ = 2.5 V
(6) $V_{GS}$ = 4.5 V

**Fig 8. Drain-source on-state resistance as a function of drain current; typical values**




$I_D$ = 350 mA
(1) $T_j$ = 150 °C
(2) $T_j$ = 25 °C

**Fig 9. Drain-source on-state resistance as a function of gate-source voltage; typical values**

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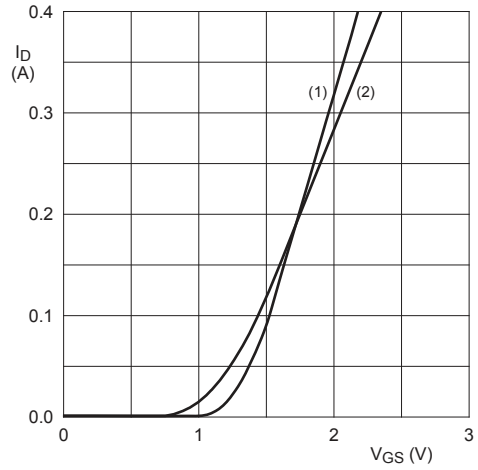
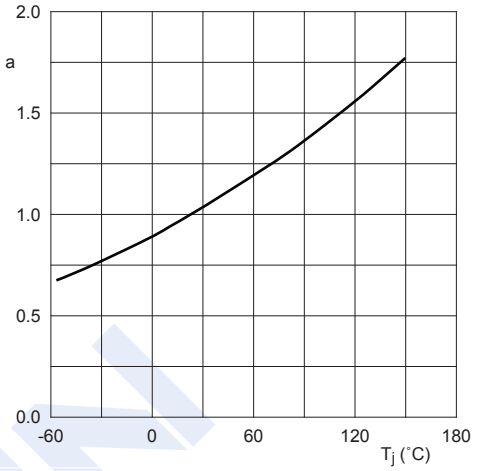



$V_{DS} > I_D \times R_{DSon}$

(1) $T_j$ = 25 °C

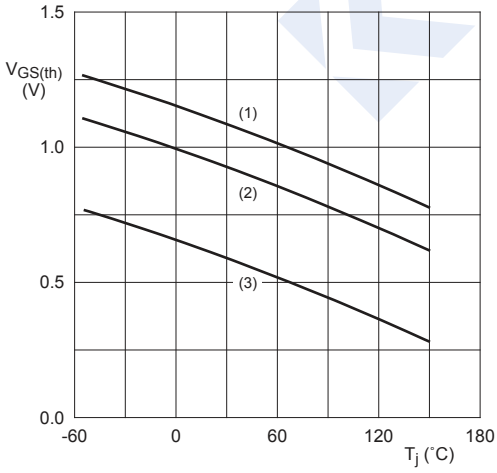
(2) $T_j$ = 150 °C

**Fig 10. Transfer characteristics: drain current as a function of gate-source voltage; typical values**




$$a = \frac{R_{DSon}}{R_{DSon(25°C)}}$$

**Fig 11. Normalized drain-source on-state resistance as a function of junction temperature; typical values**



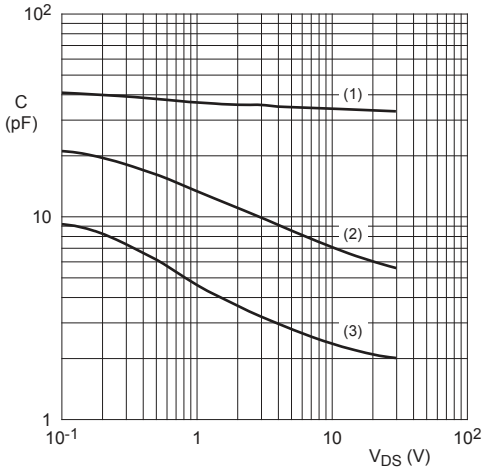

$I_D$ = 0.25 mA; $V_{DS} = V_{GS}$

(1) maximum values

(2) typical values

(3) minimum values

**Fig 12. Gate-source threshold voltage as a function of junction temperature**




f = 1 MHz; $V_{GS}$ = 0 V

(1)$C_{iss}$

(2)$C_{oss}$

(3)$C_{rss}$

**Fig 13. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values**

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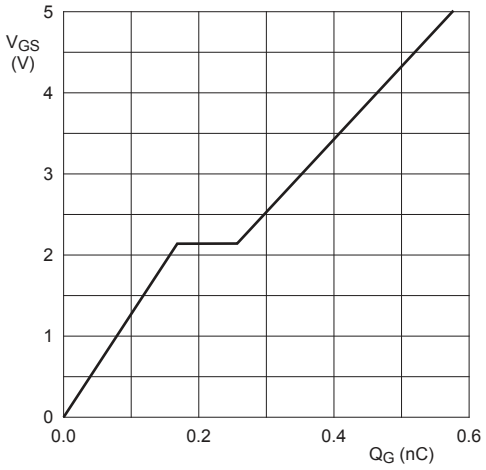



$I_D$ = 350 mA; $V_{DS}$ = 15 V; $T_{amb}$ = 25 °C

**Fig 14. Gate-source voltage as a function of gate charge; typical values**

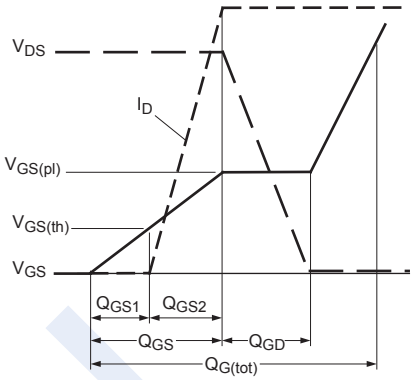
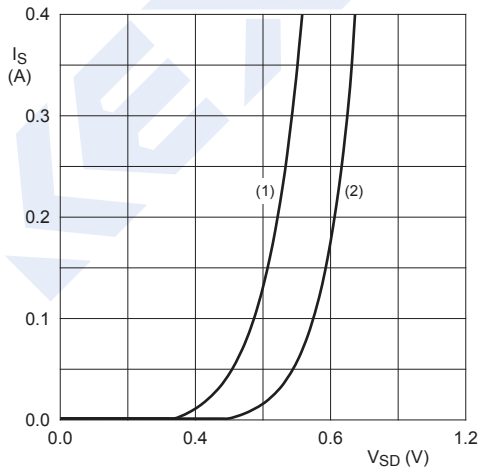



**Fig 15. Gate charge waveform definitions**




$V_{GS}$ = 0 V

(1) $T_j$ = 150 °C

(2) $T_j$ = 25 °C

**Fig 16. Source current as a function of source-drain voltage; typical values**