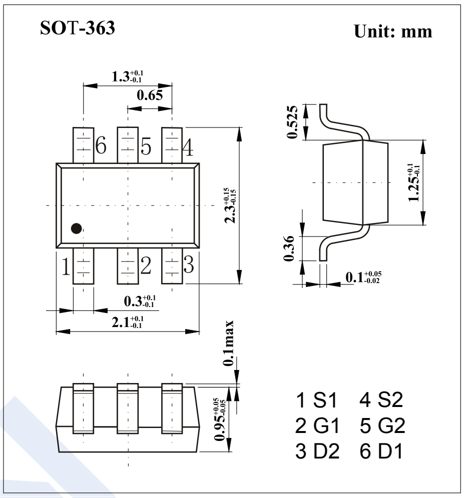
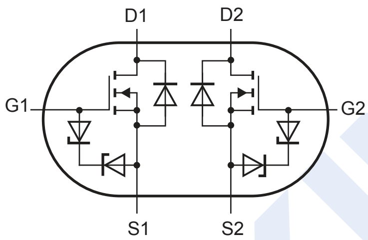
Dual N-channel Trench MOSFET

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.

Dual N-channel Trench MOSFET

NX3008NBKS

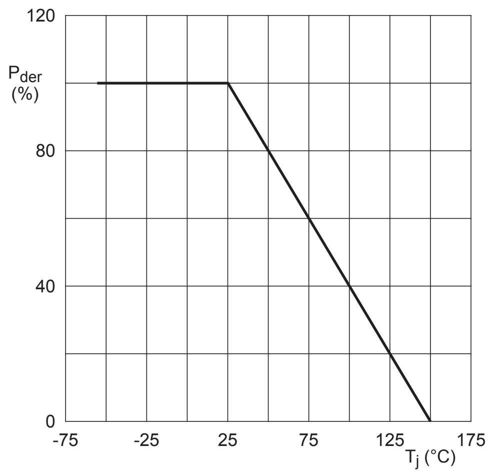
■ Electrical Characteristics (T_J = 25℃, unless otherwise specified)

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	
		V_{DS}=0V, V_{GS}=±4.5V		±10		nA
		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

Dual N-channel Trench MOSFET

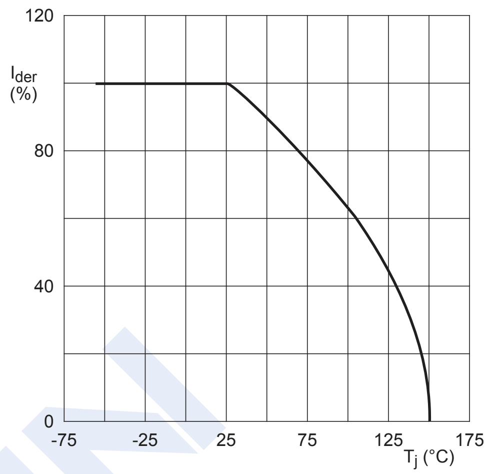
NX3008NBKS

■ Typical Electrical And Thermal Characteristics



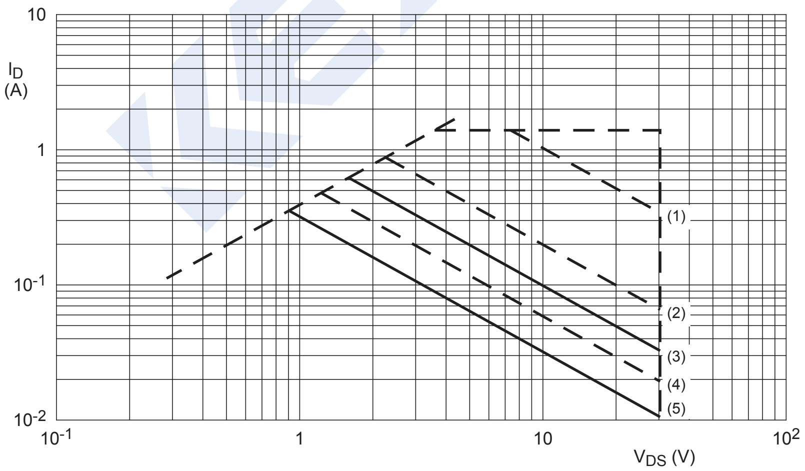
$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\,\%$$

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

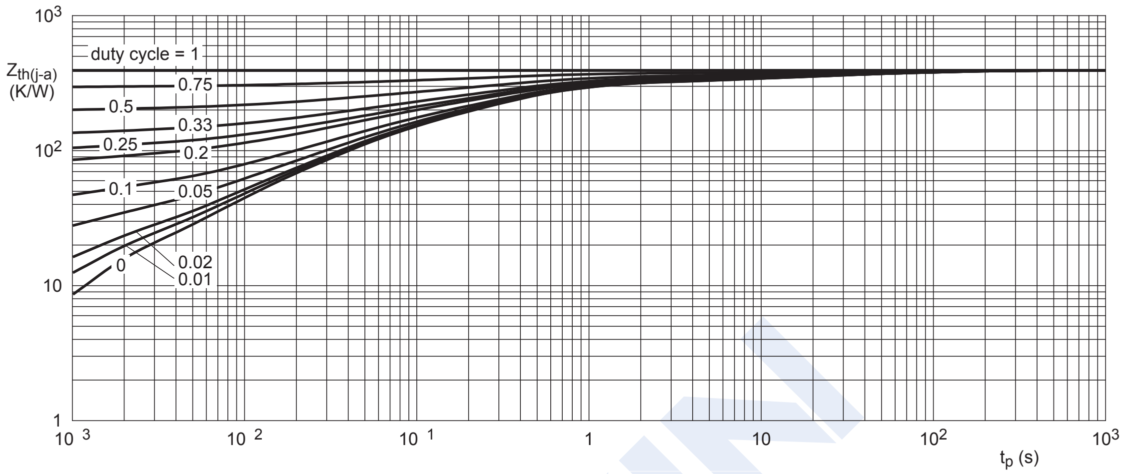


I_{DM} is a single pulse
(1) t_p = 1 ms
(2) t_p = 10 ms
(3) DC; T_{sp} = 25 °C
(4) t_p = 100 ms
(5) DC; T_{amb} = 25 °C; 1 cm^2 drain mounting pad

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

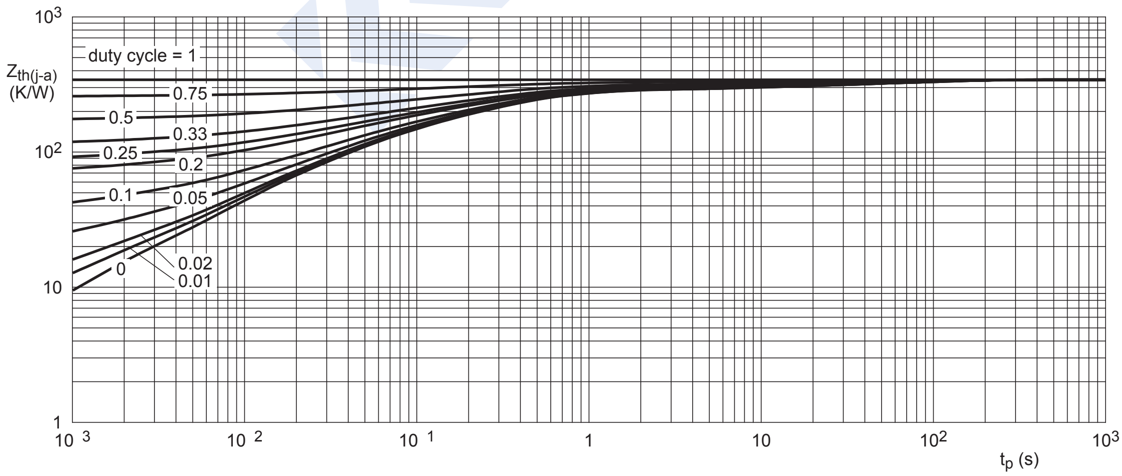
Dual N-channel Trench MOSFET

NX3008NBKS



FR4 PCB, standard footprint

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

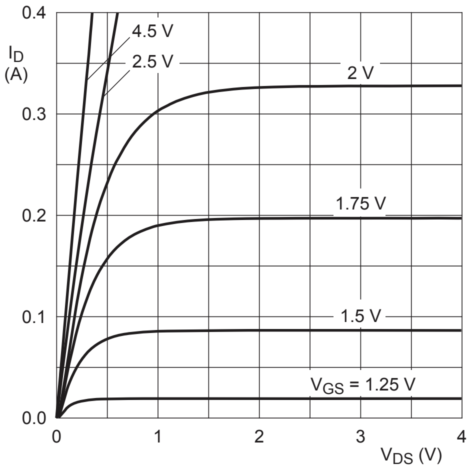


FR4 PCB, mounting pad for drain 1 cm^2

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

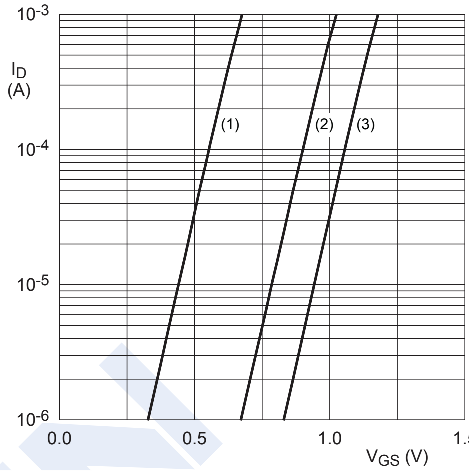
Dual N-channel Trench MOSFET

NX3008NBKS



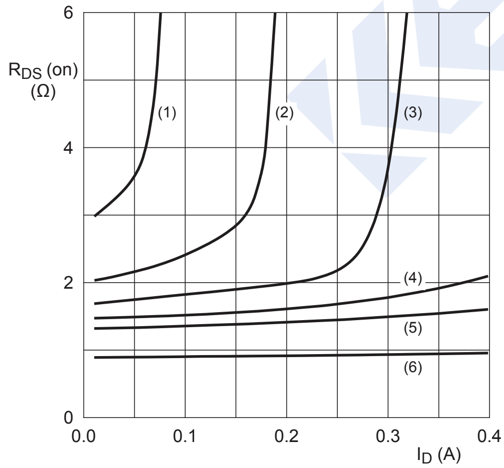
T_j = 25 °C

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



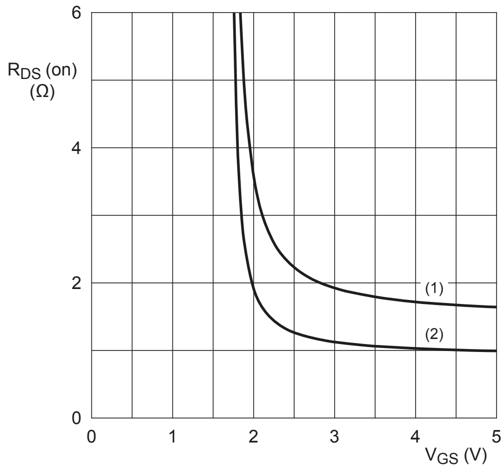
T_j = 25 °C; V_{DS} = 5 V
(1) minimum values
(2) typical values
(3) maximum values

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

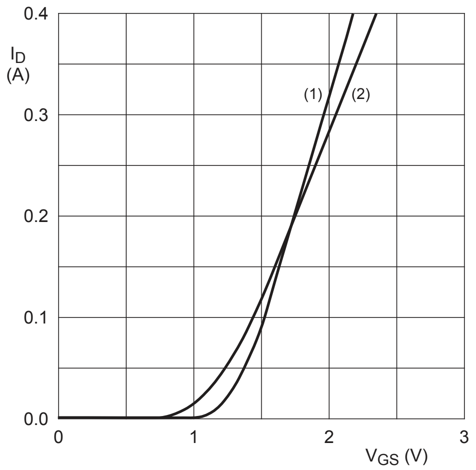


I_D = 350 mA
(1) T_j = 150 °C
(2) T_j = 25 °C

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

Dual N-channel Trench MOSFET

NX3008NBKS

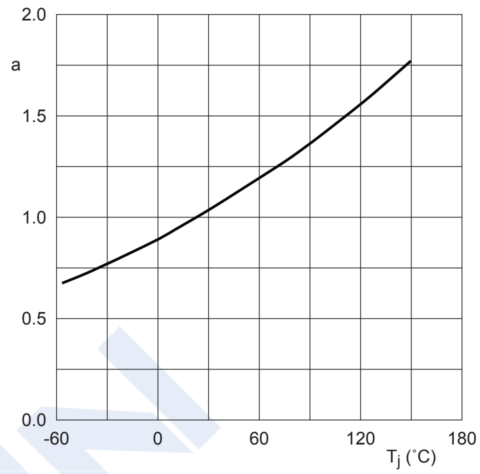


$V_{DS} > I_D \times R_{DSon}$

(1) T_j = 25 °C

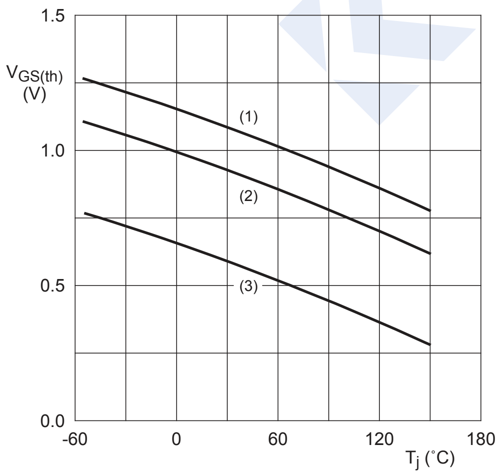
(2) T_j = 150 °C

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



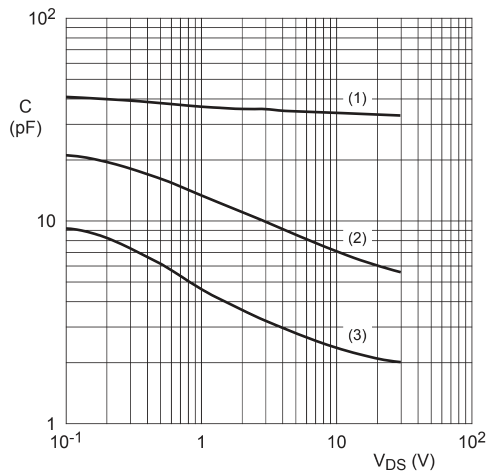
I_D = 0.25 mA; $V_{DS} = V_{GS}$

(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}

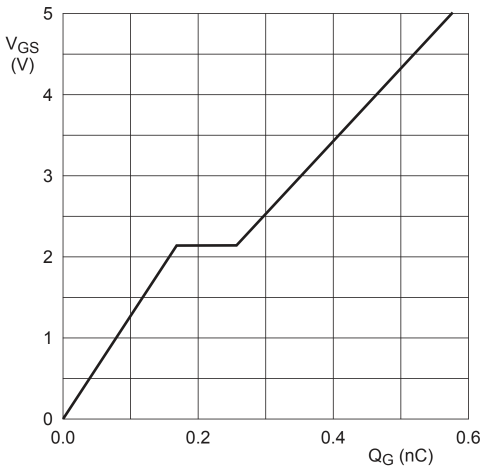
(2)C_{oss}

(3)C_{rss}

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

Dual N-channel Trench MOSFET

NX3008NBKS



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

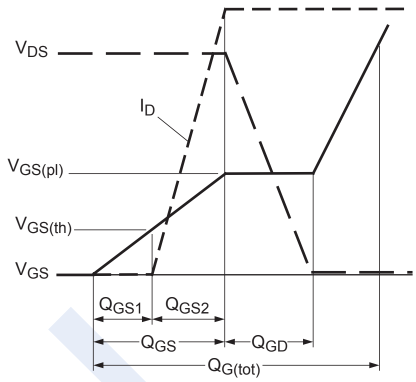
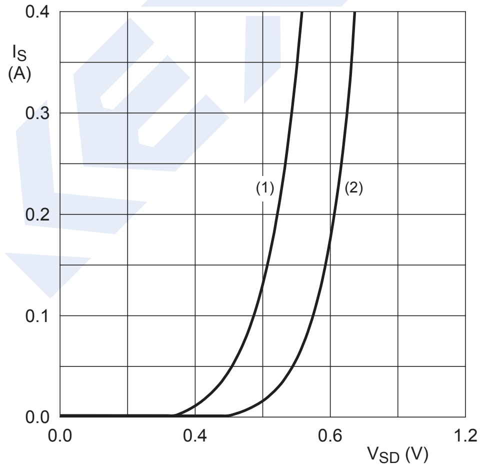


Fig 15. Gate charge waveform definitions



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