

2SK3870-01-VB Datasheet

N-Channel 200-V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
200	0.046 at $V_{GS} = 15$ V	50	57
	0.048 at $V_{GS} = 10$ V	46	

FEATURES

- TrenchFET[®] Power MOSFETS
- 175 °C Junction Temperature
- 100 % R_g and UIS Tested

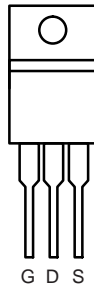


RoHS
COMPLIANT

APPLICATIONS

- Power Supply
- Lighting Systems

TO-220AB



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	200	V
Gate-Source Voltage	V_{GS}	± 25	
Continuous Drain Current ($T_J = 175$ °C)	I_D	$T_C = 25$ °C	50
		$T_C = 100$ °C	30
Pulsed Drain Current	I_{DM}	150	A
Single Pulse Avalanche Current	I_{AS}	20	
Single Pulse Avalanche Energy ^a			
Maximum Power Dissipation ^a	P_D	$T_C = 25$ °C	166 ^b
		$T_A = 25$ °C ^c	3.12
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.75	

Notes:

- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	200			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$			250	
On-State Drain Current ^b	$I_{D(on)}$	$V_{DS} = 5\text{ V}, V_{GS} = 10\text{ V}$	40			A
Drain-Source On-State Resistance ^b	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 3\text{ A}$		0.048		Ω
		$V_{GS} = 10\text{ V}, I_D = 3\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.050		
		$V_{GS} = 10\text{ V}, I_D = 3\text{ A}, T_J = 175\text{ }^\circ\text{C}$		0.070		
		$V_{GS} = 6\text{ V}, I_D = 3\text{ A}$		0.092		
Forward Transconductance ^b	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 3\text{ A}$		35		S
Dynamic^a						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, F = 1\text{ MHz}$		3000		pF
Output Capacitance	C_{oss}			180		
Reverse Transfer Capacitance	C_{rss}			80		
Total Gate Charge ^c	Q_g	$V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 3\text{ A}$		34	51	nC
Gate-Source Charge ^c	Q_{gs}			8		
Gate-Drain Charge ^c	Q_{gd}			12		
Gate Resistance	R_g		0.5		2.9	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 5.2\text{ }\Omega$ $I_D \cong 3\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		15	25	ns
Rise Time ^c	t_r			50	75	
Turn-Off Delay Time ^c	$t_{d(off)}$			30	45	
Fall Time ^c	t_f			60	90	
Source-Drain Diode Ratings and Characteristics ($T_C = 25\text{ }^\circ\text{C}$)						
Pulsed Current	I_{SM}				36	A
Diode Forward Voltage ^b	V_{SD}	$I_F = 3\text{ A}, V_{GS} = 0\text{ V}$		0.9	1.5	V
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 3\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		180	250	ns

Notes:

- a. Guaranteed by design, not subject to production testing.
 b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Output Characteristics



Transfer Characteristics



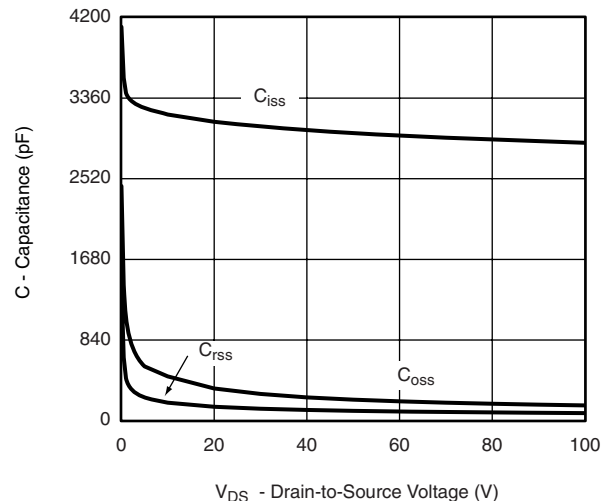
Transconductance



On-Resistance vs. Drain Current

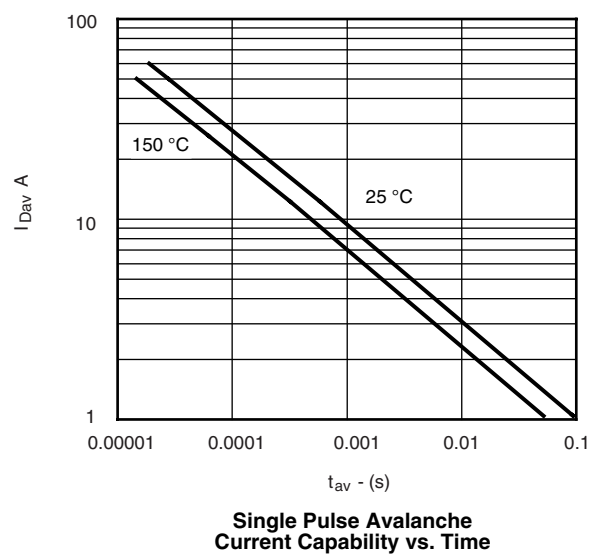
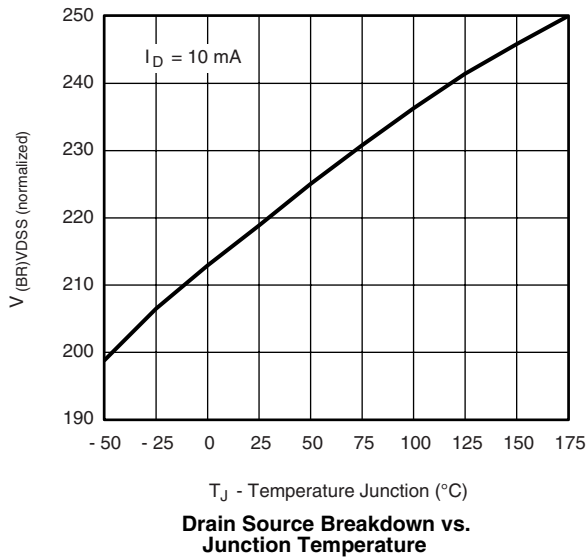
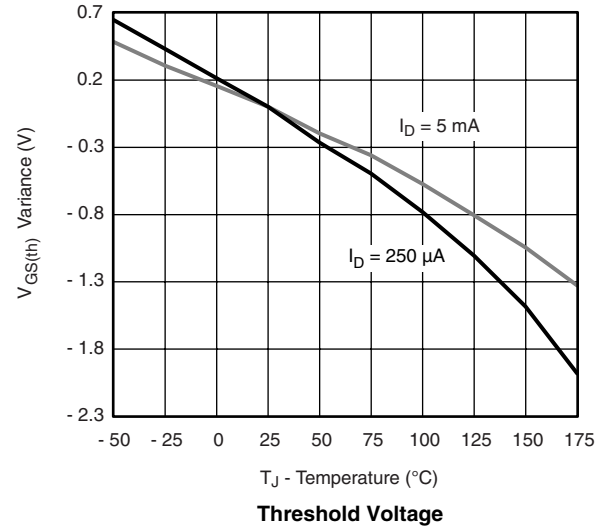
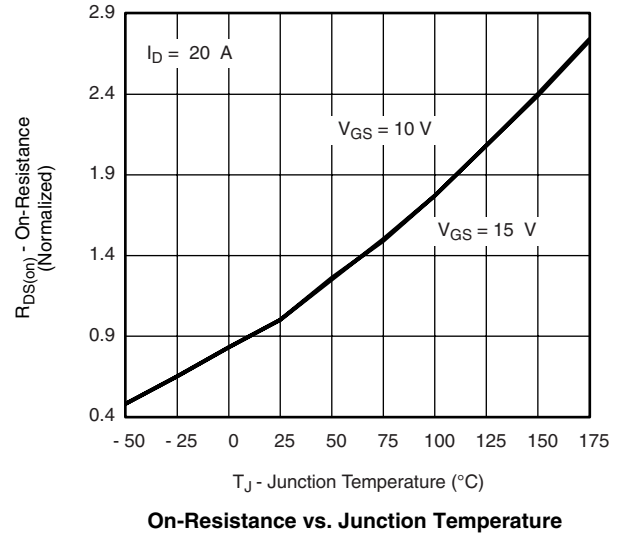
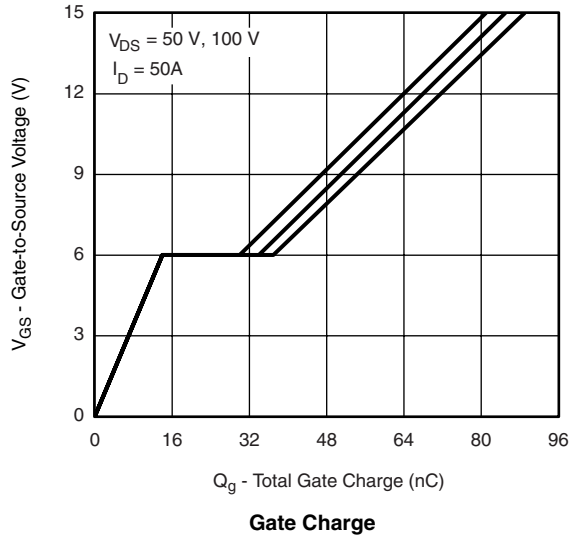


On-Resistance vs. Gate-to-Source Voltage



Capacitance

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



THERMAL RATINGS



Maximum Drain Current vs. Case Temperature



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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