

FSL23N20D-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	0.038 at $V_{GS} = 15$ V	45	57
	0.043 at $V_{GS} = 10$ V	40	

FEATURES

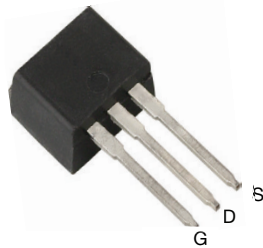
- Trench Power MOSFETS
- 175 °C Junction Temperature
- 100 % R_g and UIS Tested


RoHS
 COMPLIANT

APPLICATIONS

- Power Supply
- Lighting Systems

TO-262



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)	$T_C = 25$ °C	I_D	45	A
	$T_C = 100$ °C		26	
Pulsed Drain Current		I_{DM}	150	
Single Pulse Avalanche Current	$L = 0.1$ mH	I_{AS}	20	
Single Pulse Avalanche Energy ^a		E_{AS}	20	mJ
Maximum Power Dissipation ^a	$T_C = 25$ °C	P_D	166 ^b	W
	$T_A = 25$ °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:

a. Duty cycle ≤ 1 %.

b. See SOA curve for voltage derating.

c. When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

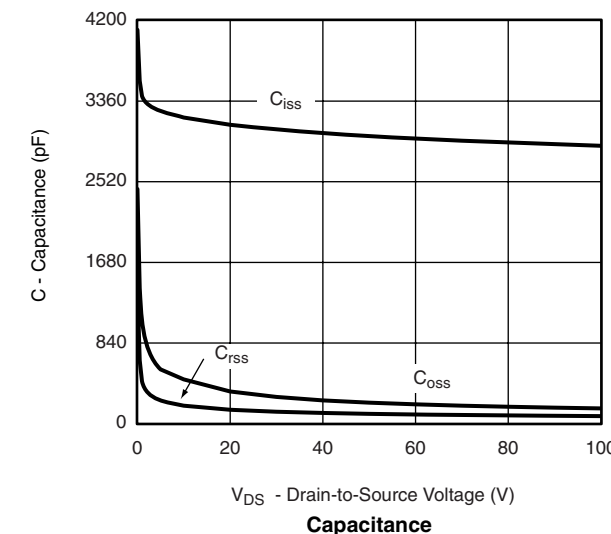
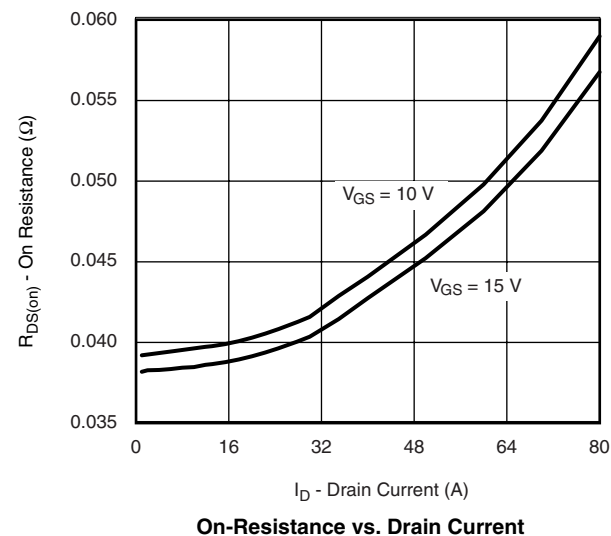
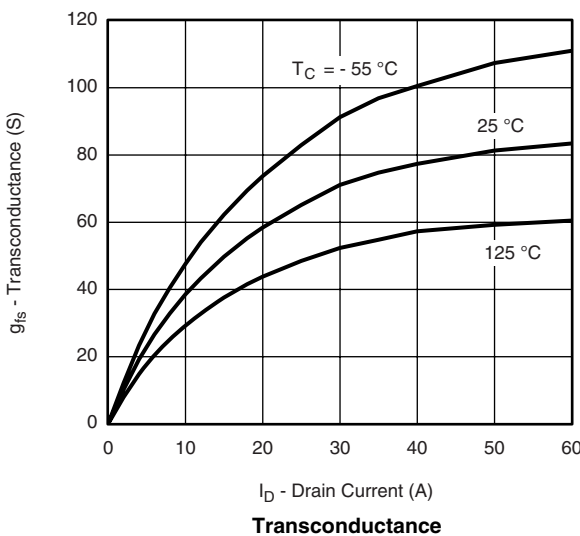
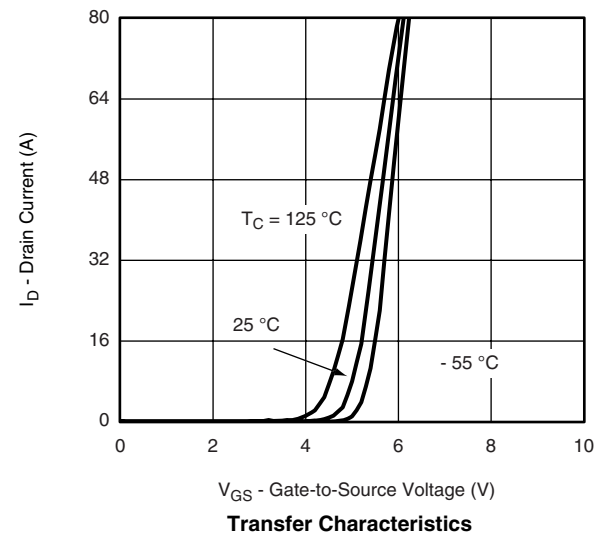
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	200			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5		4.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 25\text{ V}$			± 300	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}, T_J = 100\text{ }^{\circ}\text{C}$			25	
		$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^{\circ}\text{C}$			250	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	40			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.038		Ω
		$V_{GS} = 15\text{ V}, I_D = 20\text{ A}$		0.043		
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 100\text{ }^{\circ}\text{C}$		0.088		
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$		0.120		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	25			S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		3100		pF
Output Capacitance	C_{oss}			300		
Reverse Transfer Capacitance	C_{rss}			135		
Total Gate Charge ^c	Q_g	$V_{DS} = 100\text{ V}, V_{GS} = 15\text{ V}, I_D = 50\text{ A}$		85	127	nC
		$V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		57	85	
Gate-Source Charge ^c	Q_{gs}			14		
Gate-Drain Charge ^c	Q_{gd}			20		
Gate Resistance	R_g	$f = 1\text{ MHz}$		1.2	1.8	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 2\text{ }\Omega$ $I_D \approx 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		16	25	ns
Rise Time ^c	t_r			170	260	
Turn-Off Delay Time ^c	$t_{d(off)}$			27	42	
Fall Time ^c	t_f			9	18	
Source-Drain Diode Ratings and Characteristics ^c $T_C = 25\text{ }^{\circ}\text{C}$						
Continuous Current	I_S				36	A
Pulsed Current	I_{SM}				80	
Forward Voltage ^a	V_{SD}	$I_F = 20\text{ A}, V_{GS} = 0\text{ V}$		0.86	1.5	V
Reverse Recovery Time	t_{rr}	$I_F = 40\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		116	175	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			9	14	A
Reverse Recovery Charge	Q_{rr}			0.53	0.8	μC
Reverse Recovery Fall Time	t_a			84		nS
Reverse Recovery Rise Time	t_b			32		

Notes:

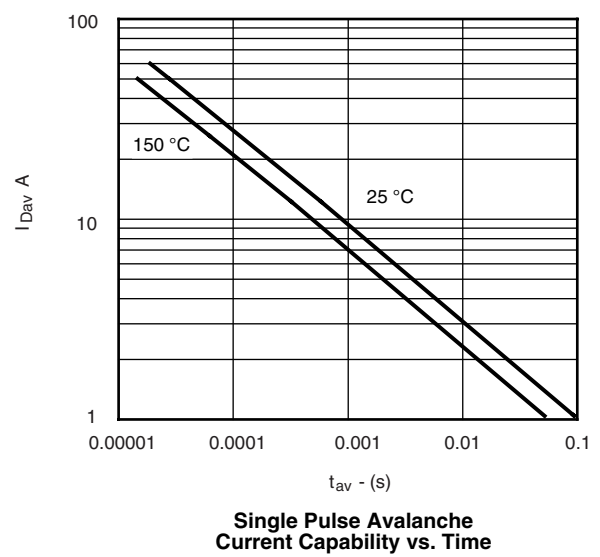
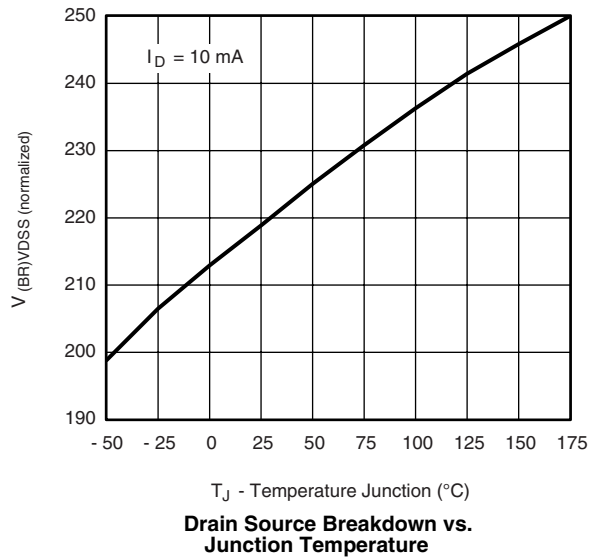
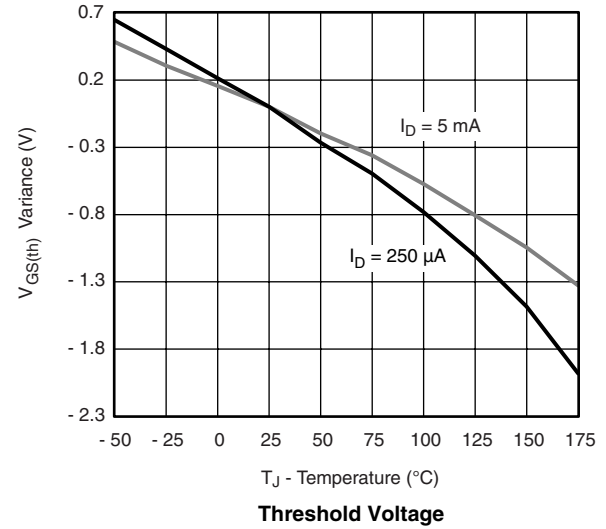
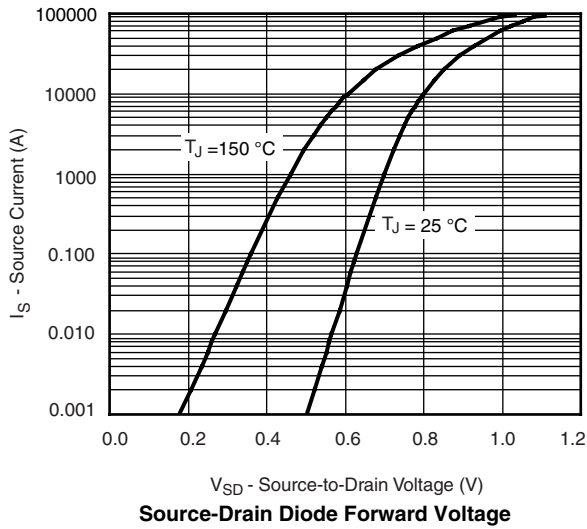
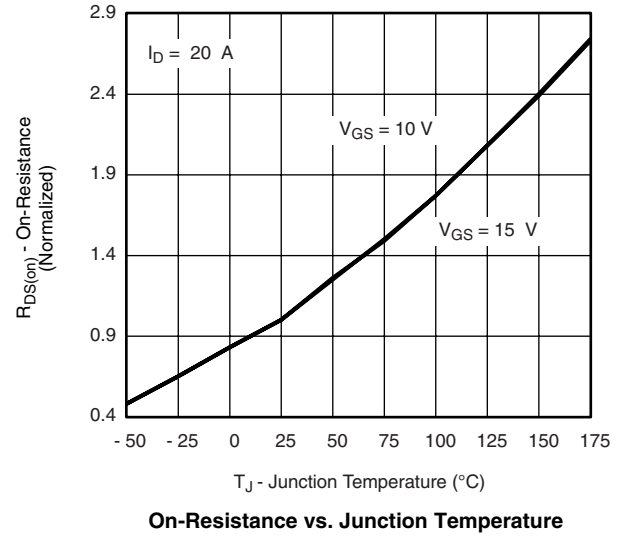
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

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.

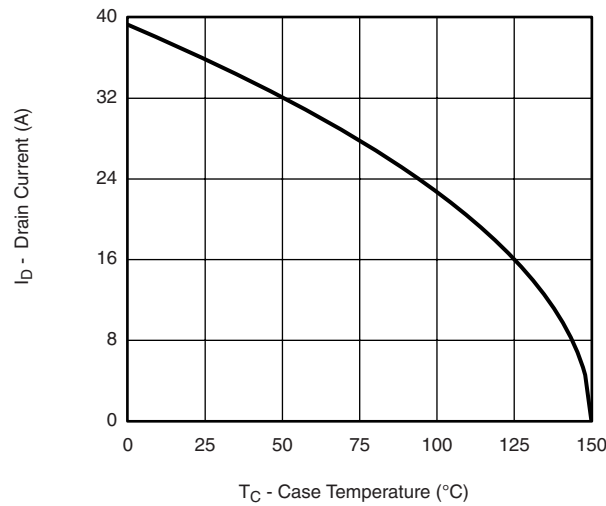
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



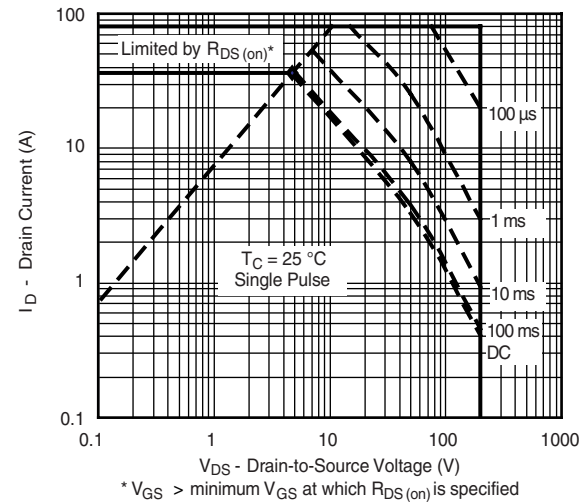
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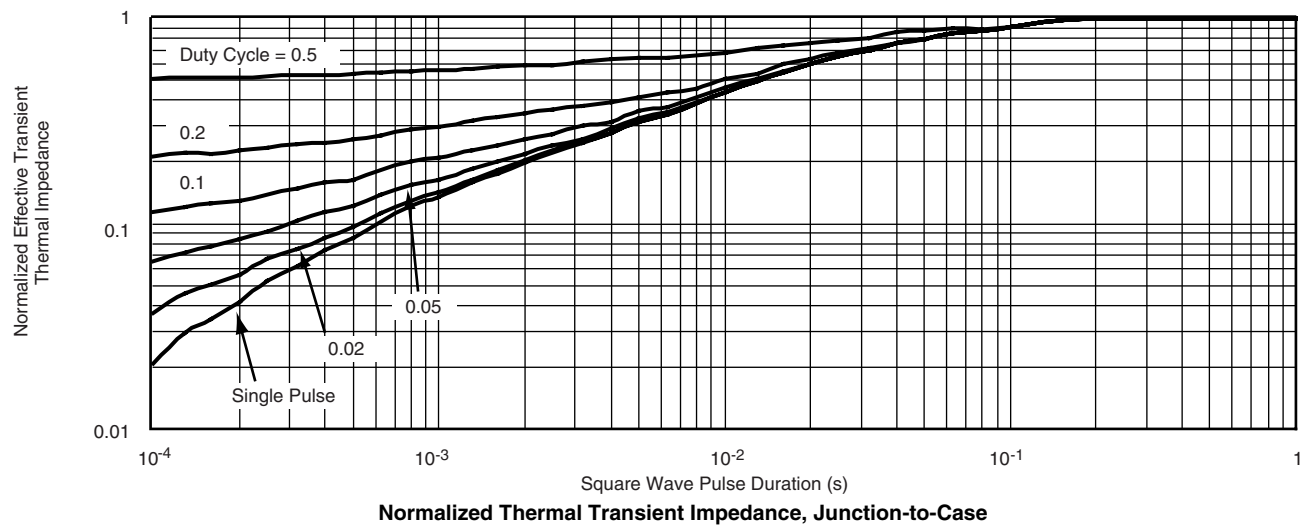
THERMAL RATINGS



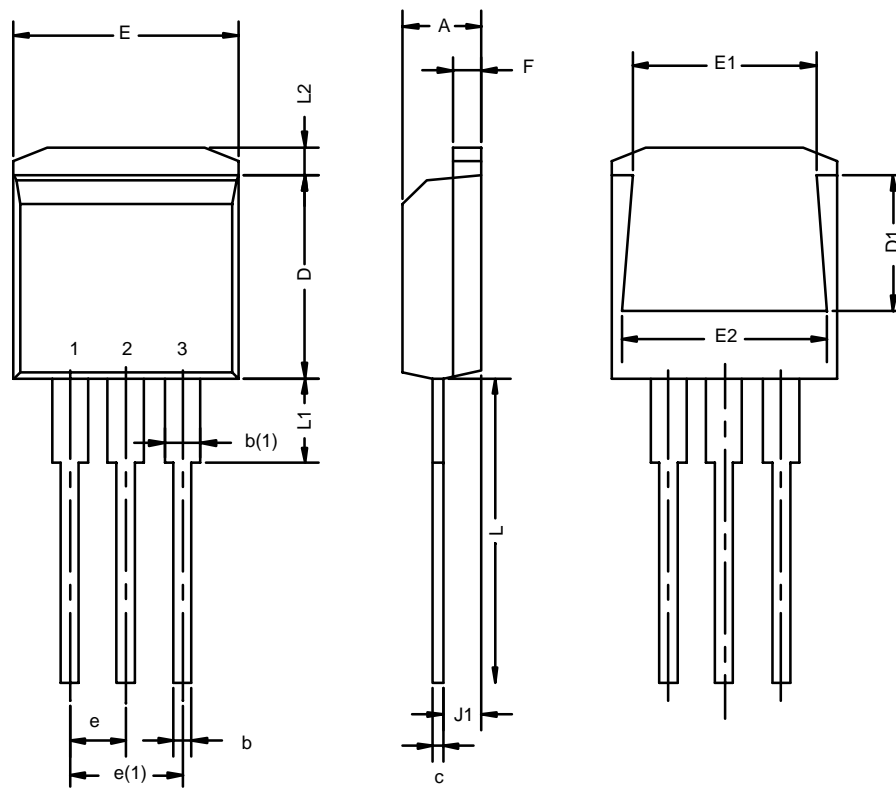
Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-262: 3-LEAD

Dim	MILLIMETERS*		INCHES	
	Min	Max	Min	Max
A	4.32	4.70	0.170	0.185
b	0.64	1.00	0.025	0.039
b(1)	1.14	1.40	0.045	0.055
c	0.36	0.50	0.014	0.020
D	8.64	9.65	0.340	0.380
D1	5.59	6.10	0.220	0.240
e	2.41	2.67	0.095	0.105
e(1)	4.95	5.33	0.195	0.210
E	10.03	10.41	0.395	0.410
E1	7.87	8.64	0.310	0.340
E2	9.02	9.53	0.355	0.375
F	1.14	1.40	0.045	0.055
J1	2.41	2.79	0.095	0.110
L	13.08	14.22	0.515	0.560
L1	-	3.81	-	0.150
L2	1.02	1.40	0.040	0.055

ECN: T-02234—Rev. C, 14-Oct-02
 DWG: 5855

*Use millimeters as the primary measurement

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