

FS38N20D-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

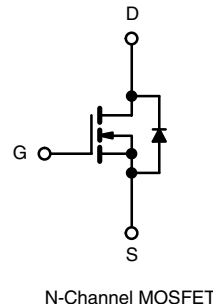
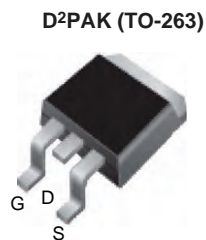
- Trench Power MOSFETS
- 175 °C Junction Temperature
- 100 % R_g and UIS Tested



RoHS
COMPLIANT

APPLICATIONS

- Power Supply
- Lighting Systems



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	45	A
		26	
Pulsed Drain Current	I_{DM}	150	
Single Pulse Avalanche Current	I_{AS}	20	
Single Pulse Avalanche Energy ^a	E_{AS}	20	mJ
Maximum Power Dissipation ^a	P_D	166 ^b	W
		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 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. ^a	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	200			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2		4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V			1	μA
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 125 °C			50	
		V _{DS} = 200 V, V _{GS} = 0 V, T _J = 175 °C			250	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	40			A
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 3 A		0.048		Ω
		V _{GS} = 10 V, I _D = 3 A, T _J = 125 °C		0.050		
		V _{GS} = 10 V, I _D = 3 A, T _J = 175 °C		0.070		
		V _{GS} = 6 V, I _D = 3 A		0.092		
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 3 A		35		S
Dynamic ^a						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, F = 1 MHz		3000		pF
Output Capacitance	C _{oss}			180		
Reverse Transfer Capacitance	C _{rss}			80		
Total Gate Charge ^c	Q _g	V _{DS} = 100 V, V _{GS} = 10 V, I _D = 3 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 V, R _L = 5.2 Ω I _D ≅ 3 A, V _{GEN} = 10 V, R _g = 2.5 Ω		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 °C)						
Pulsed Current	I _{SM}				36	A
Diode Forward Voltage ^b	V _{SD}	I _F = 3 A, V _{GS} = 0 V		0.9	1.5	V
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 3 A, dI/dt = 100 A/μs		180	250	ns

Notes:

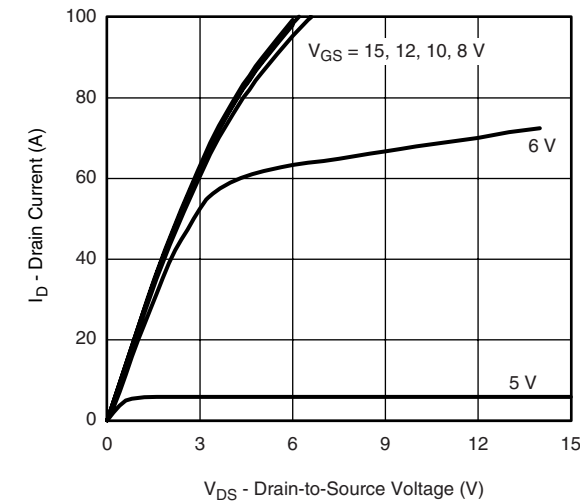
a. Guaranteed by design, not subject to production testing.

b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

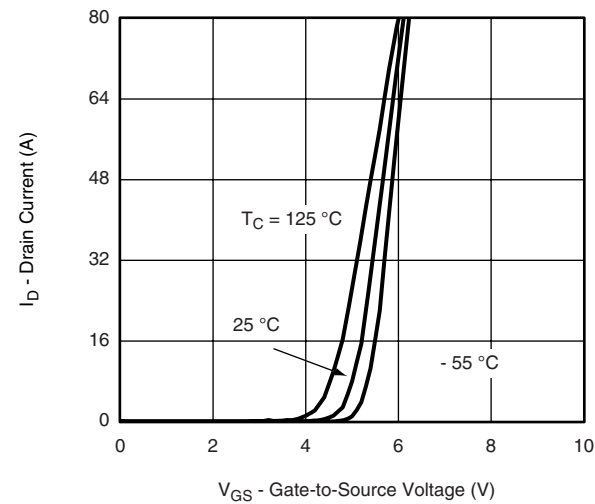
c. Independent of operating temperature.

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.

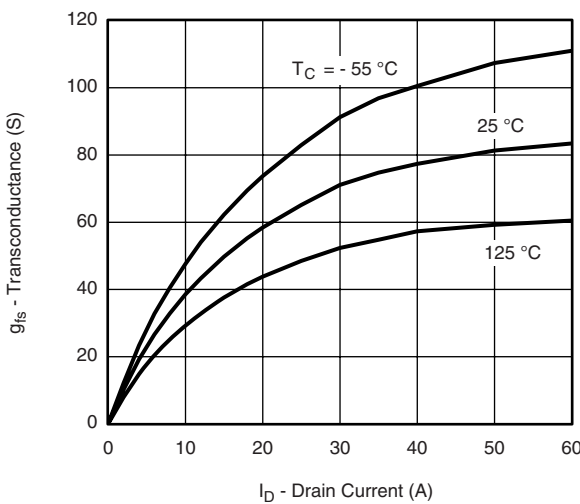
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



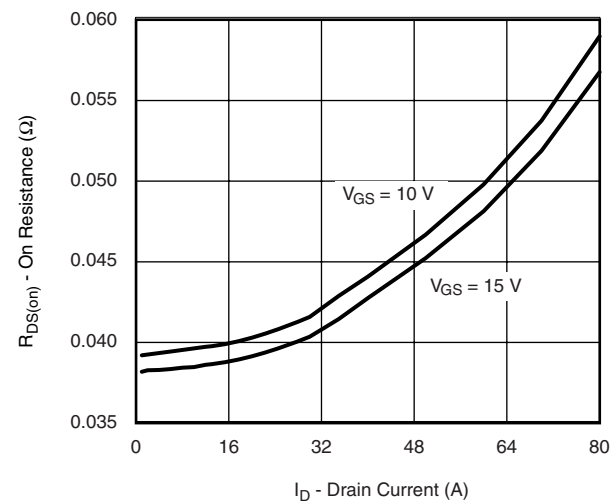
Output Characteristics



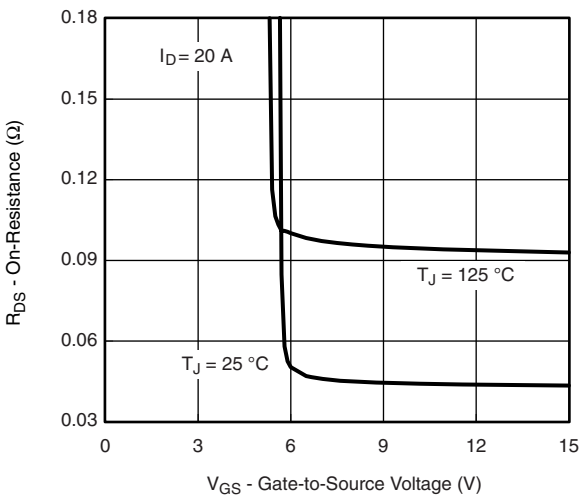
Transfer Characteristics



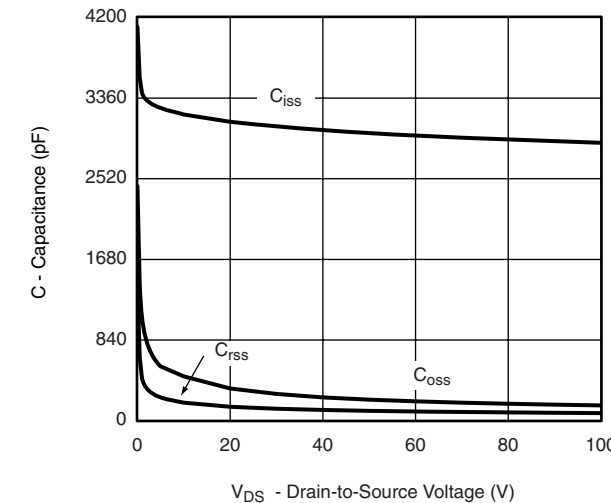
Transconductance



On-Resistance vs. Drain Current

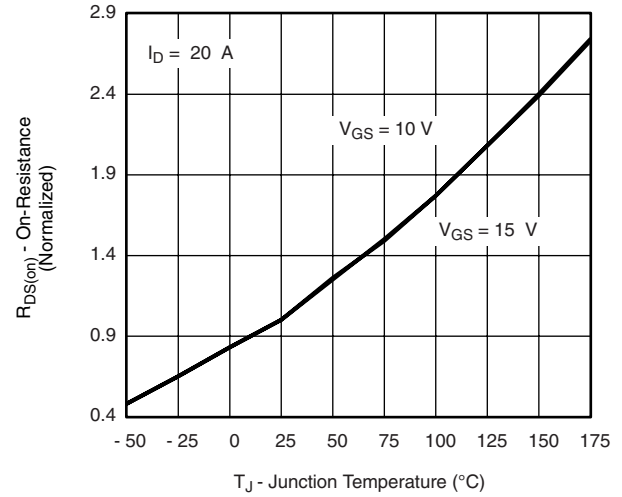
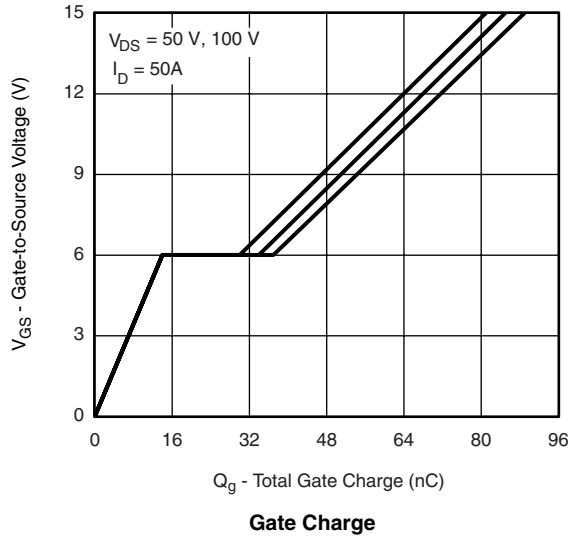


On-Resistance vs. Gate-to-Source Voltage

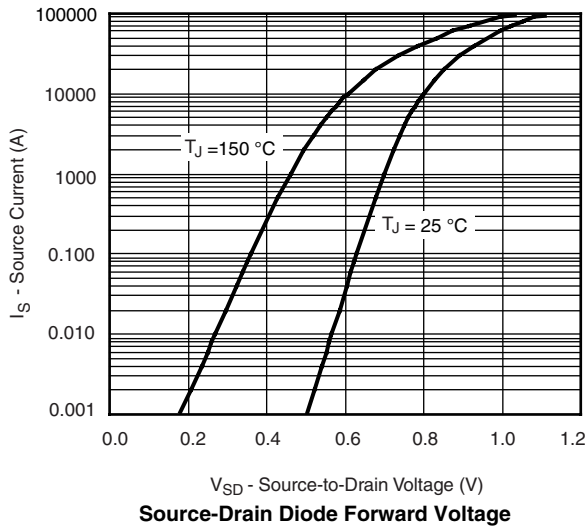


Capacitance

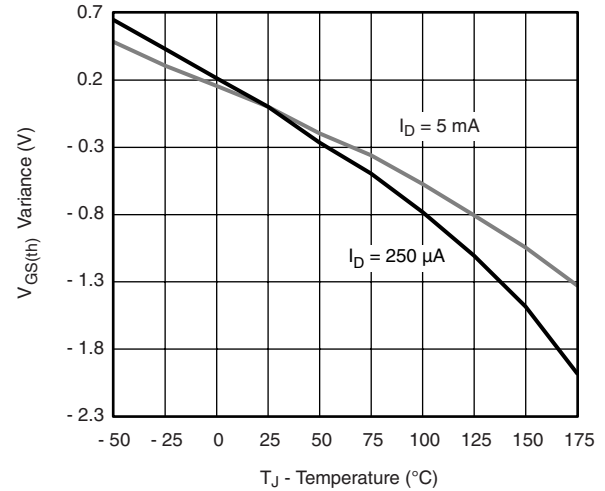
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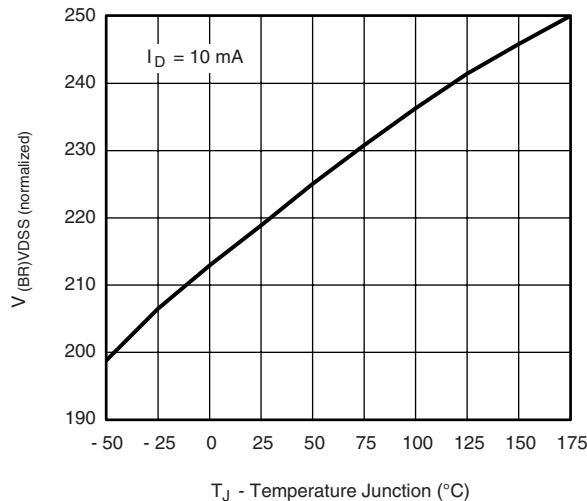
On-Resistance vs. Junction Temperature



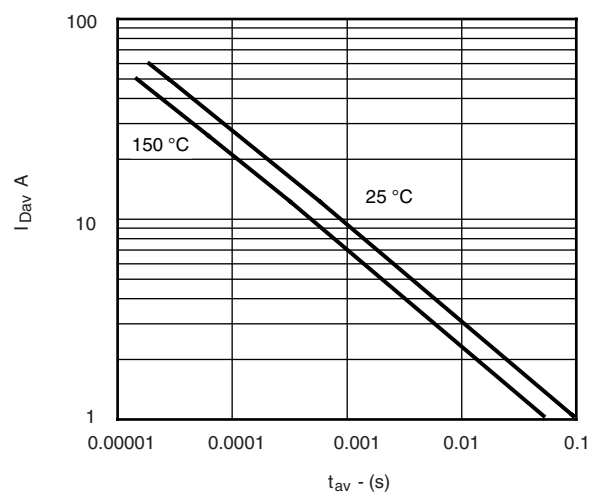
Source-Drain Diode Forward Voltage



Threshold Voltage

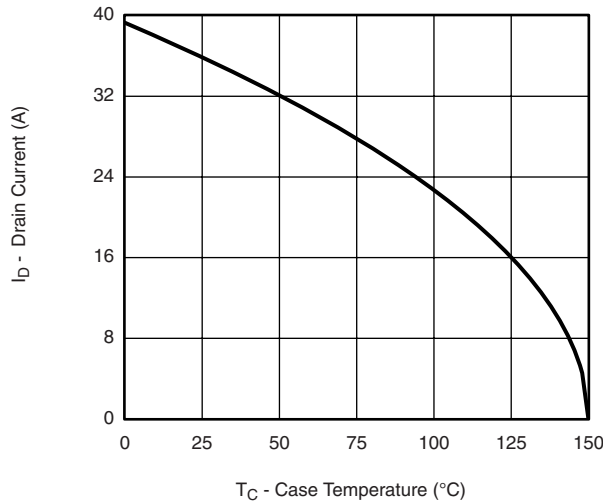


Drain Source Breakdown vs. Junction Temperature

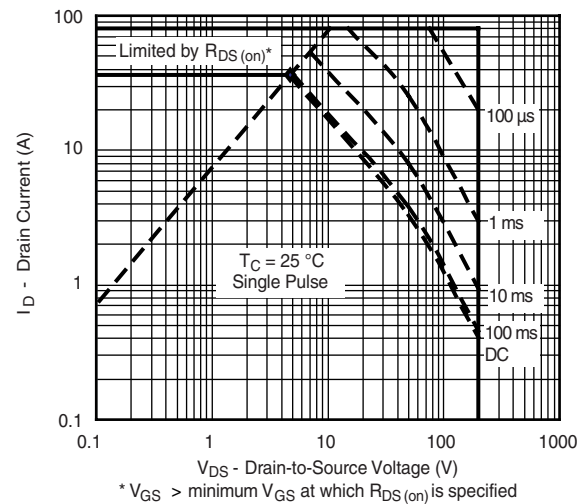


Single Pulse Avalanche Current Capability vs. Time

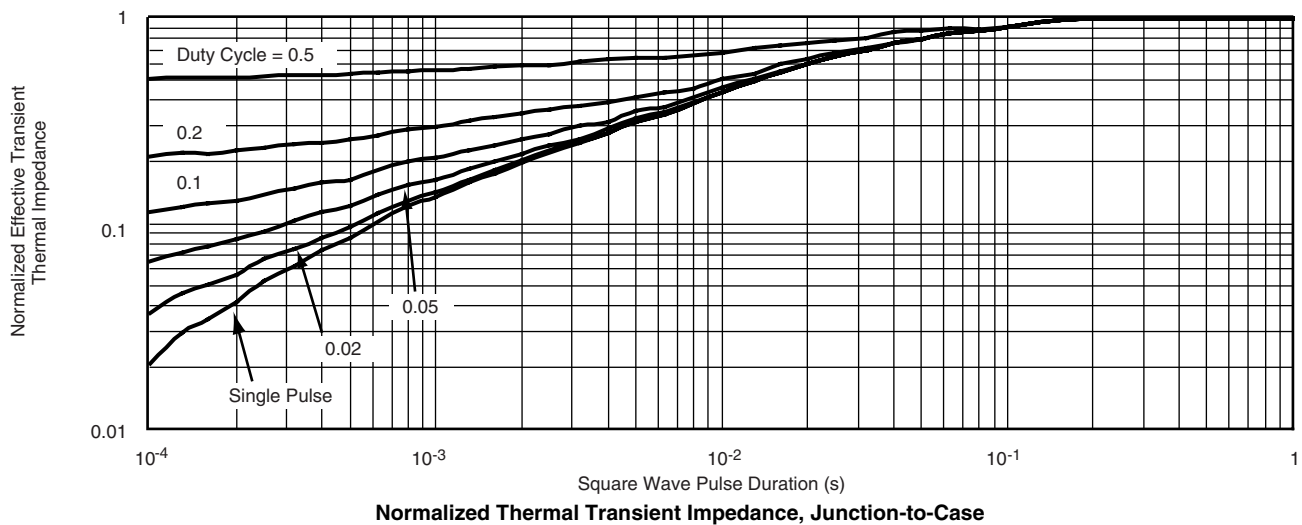
THERMAL RATINGS



Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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