IRFB38N20DPBF-VB Datasheet
N-Channel 200-V (D-S) MOSFET

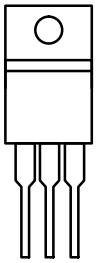
PRODUCT SUMMARY			
$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
200	0.046 at V_{GS} = 15 V	50	57
	0.048 at V_{GS} = 10 V	46	

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

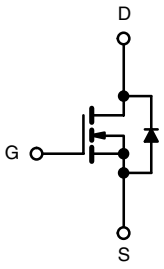
RoHS COMPLIANT

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)	T_C = 25 °C	I_D	50	A
	T_C = 100 °C		30	
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	

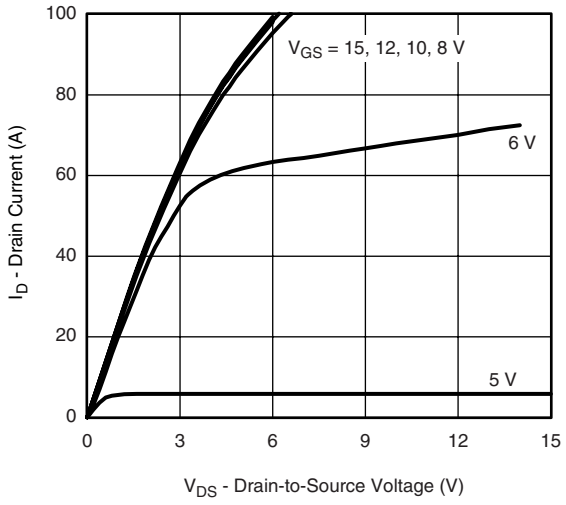
Notes:
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS (T_J = 25 °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

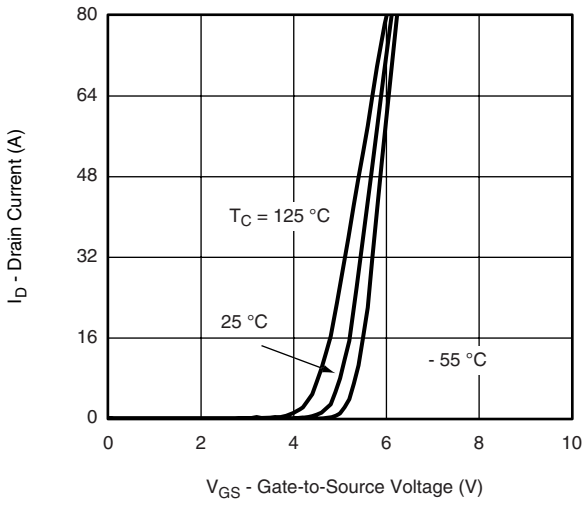
Notes:
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
c. Independent of operating temperature.

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.

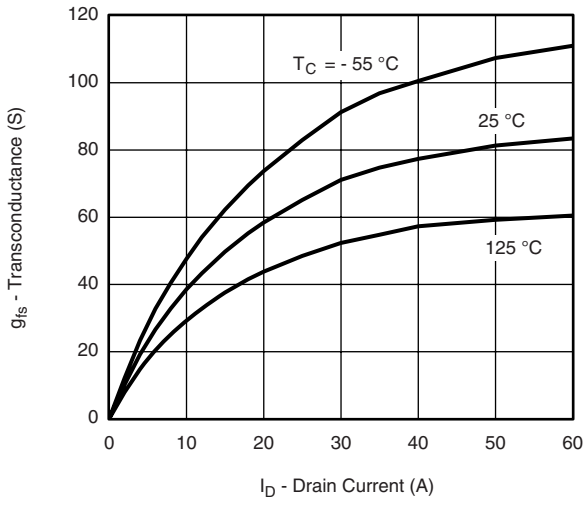
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



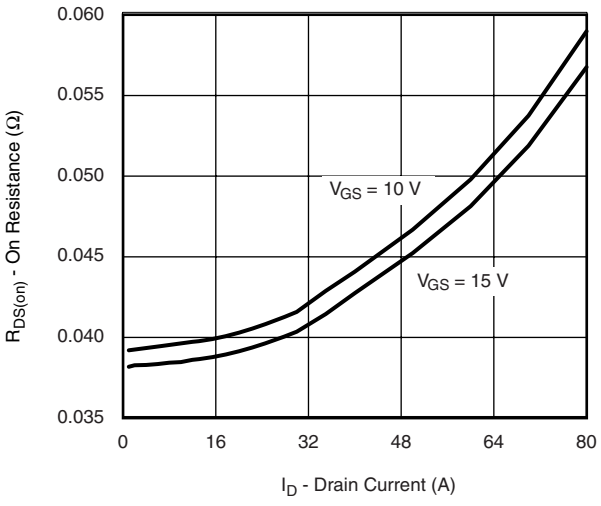
Output Characteristics



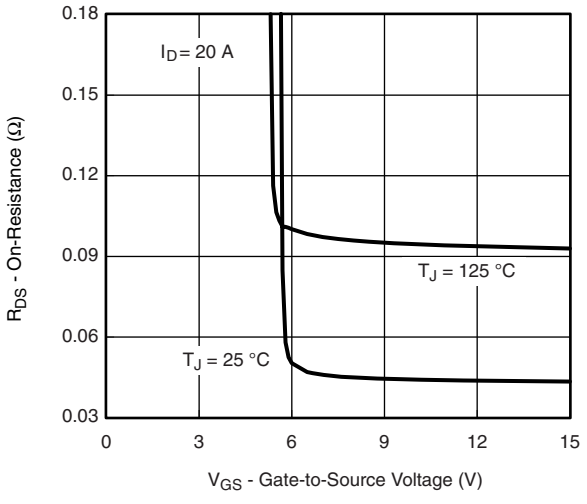
Transfer Characteristics



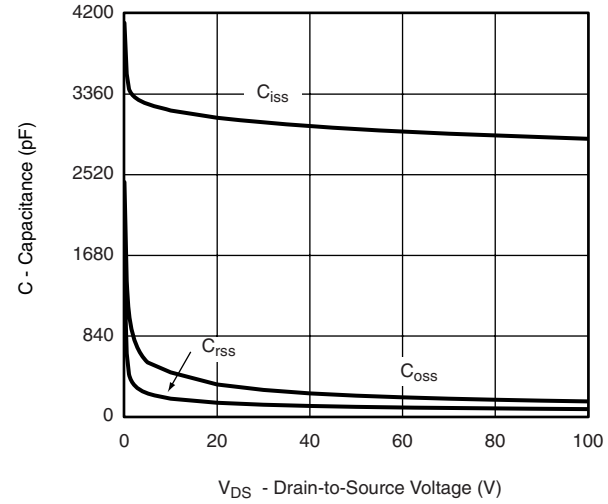
Transconductance



On-Resistance vs. Drain Current

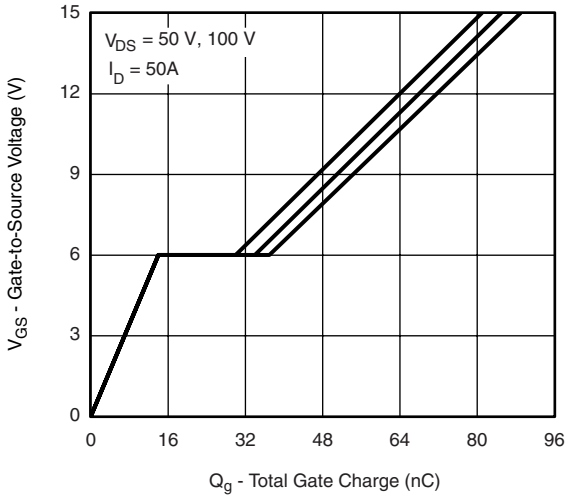


On-Resistance vs. Gate-to-Source Voltage

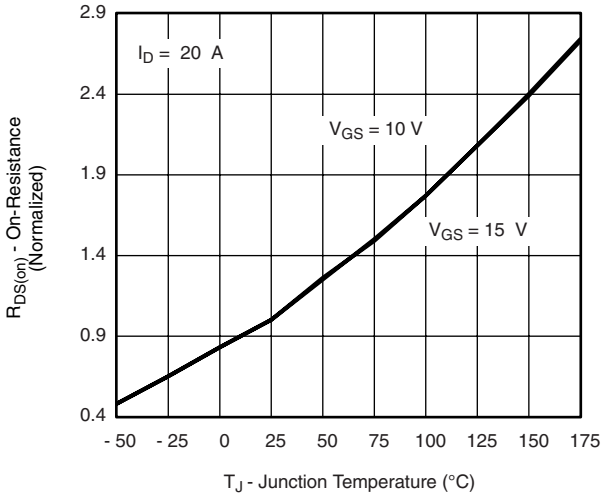


Capacitance

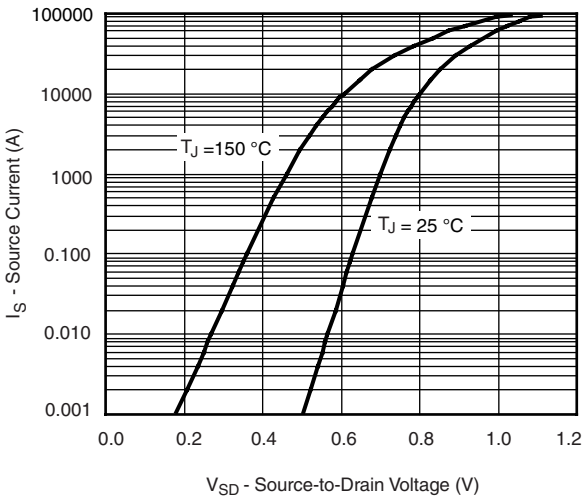
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



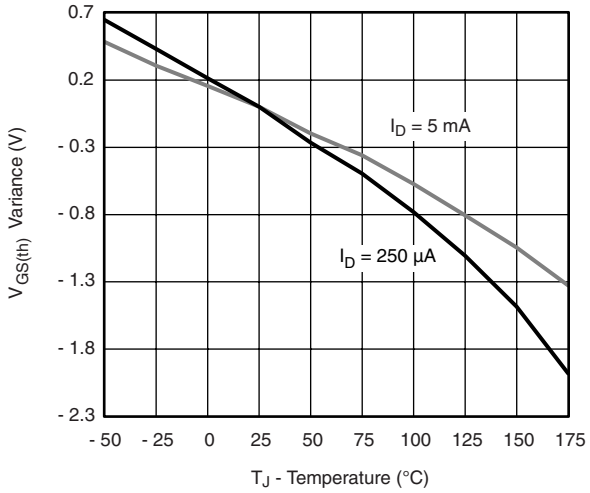
Gate Charge



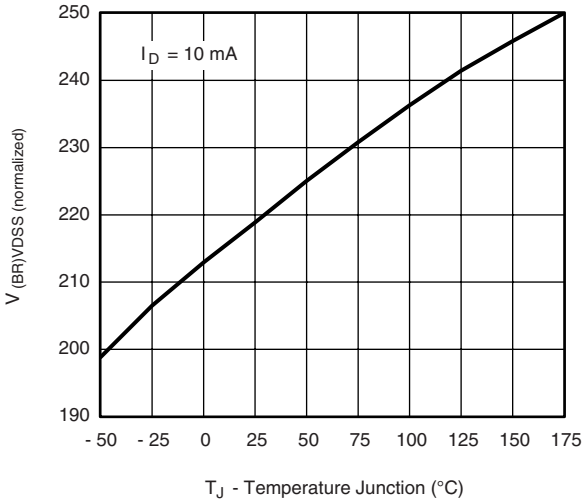
On-Resistance vs. Junction Temperature



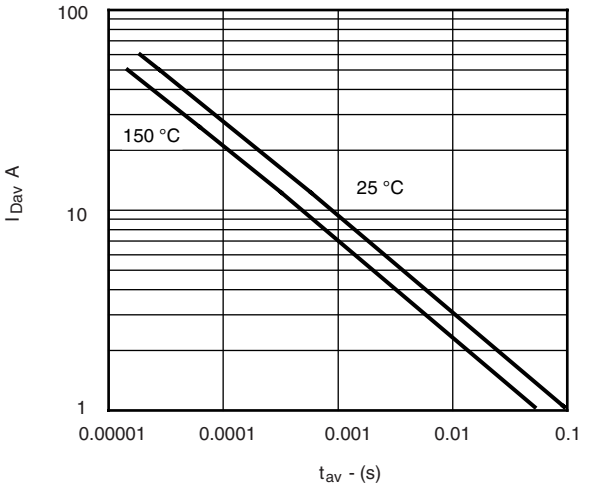
Source-Drain Diode Forward Voltage



Threshold Voltage

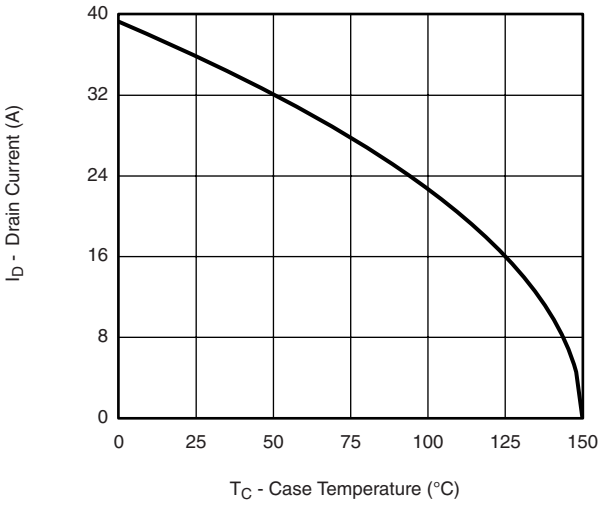


Drain Source Breakdown vs. Junction Temperature

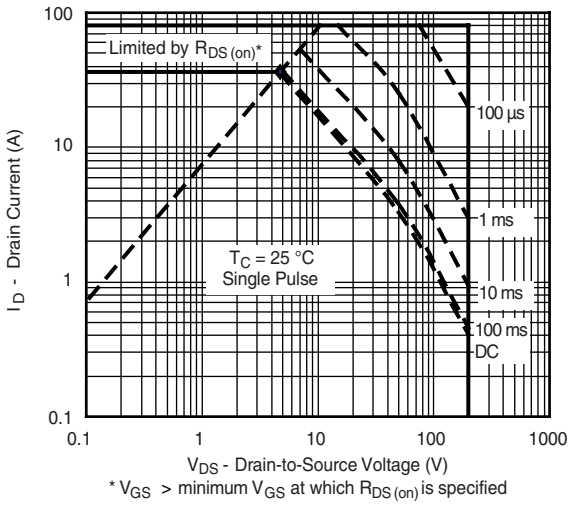


Single Pulse Avalanche Current Capability vs. Time

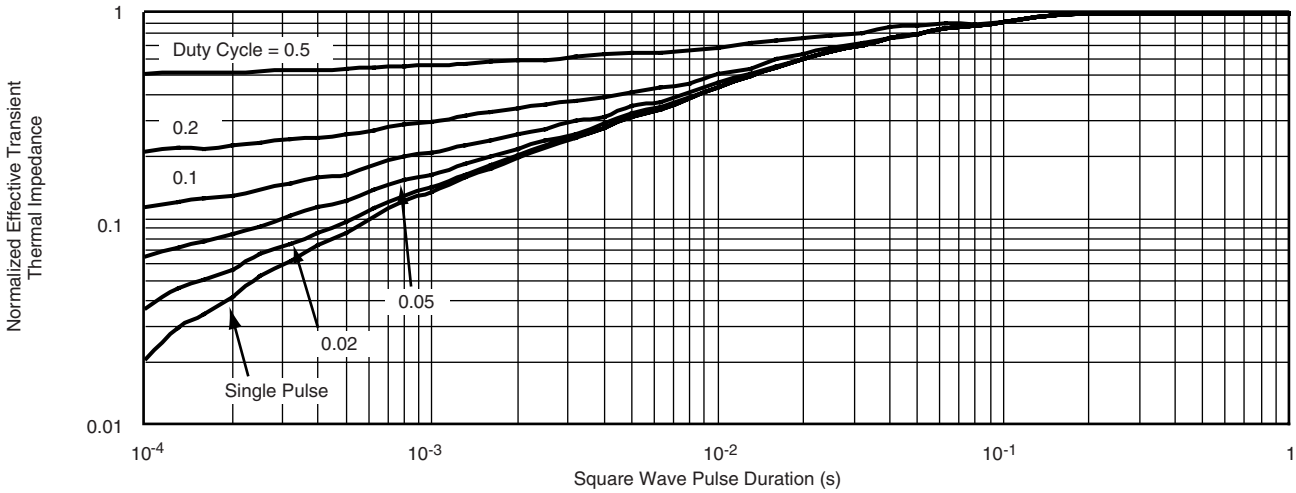
THERMAL RATINGS



Maximum Drain Curent vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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