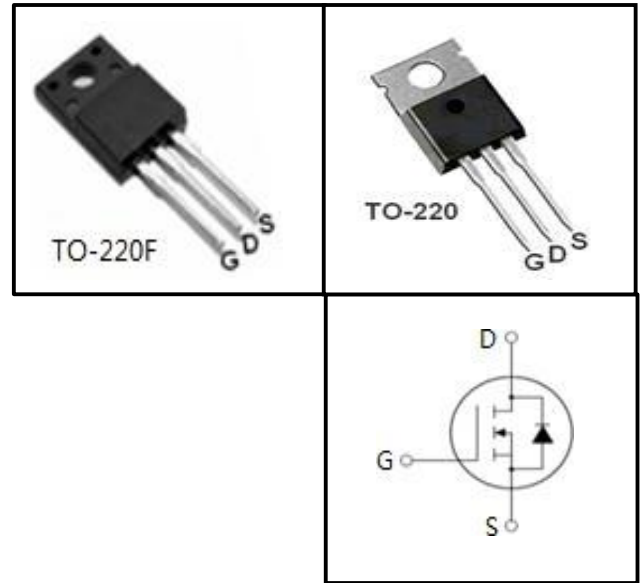


FEATURES

- Proprietary New Planar Technology
- $R_{DS(ON),typ.}=50m\ \Omega @V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

APPLICATIONS

- DC-DC Converters
- DC-AC Inverters for UPS
- SMPS and Motor controls



Device Marking and Package Information

Device	Package	Marking
IRFB38N20D	TO-220F	IRFB38N20D
IRFB38N20D	TO-220	IRFB38N20D

Absolute Maximum Ratings $T_C = 25^\circ C$, unless otherwise noted

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Drain-Source Voltage	V_{DSS}	200		V
Continuous Drain Current	I_D	40		A
Pulsed Drain Current (note1)	I_{DM}	160		A
Gate-Source Voltage	V_{GSS}	± 20		V
Single Pulse Avalanche Energy (note1)	E_{AS}	191		mJ
Avalanche Current (note1)	I_{AS}	31		A
Repetitive Avalanche Energy (note1)	E_{AR}	124		mJ
Power Dissipation ($T_C = 25^\circ C$)	P_D	63.7	104	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	$-55 \sim +150$		$^\circ C$

Thermal Resistance

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Thermal Resistance, Junction-to-Case	R_{thJC}	1.96	1.2	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	60	

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	200	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 200V, V _{GS} = 0V, T _J = 25°C	--	--	1	μA
		V _{DS} = 200V, V _{GS} = 0V, T _J = 125°C	--	--	100	
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	R _{DS(on)}	V _{GS} = 10V, I _D = 20A	--	0.05	0.06	Ω
Forward Transconductance (Note4)	g _{fs}	V _{DS} = 25V, I _D = 20A	--	16	--	S
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz	--	2800	--	pF
Output Capacitance	C _{oss}		--	355	--	
Reverse Transfer Capacitance	C _{rss}		--	101	--	
Total Gate Charge	Q _g	V _{DD} = 160V, I _D = 40A,	--	154		nC
Gate-Source Charge	Q _{gs}		--	13	--	
Gate-Drain Charge	Q _{gd}		--	58	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 160V, I _D = 40A, V _{GS} =15V.R _G = 25Ω	--	46	--	ns
Turn-on Rise Time	t _r		--	54	--	
Turn-off Delay Time	t _{d(off)}		--	360	--	
Turn-off Fall Time	t _f		--	96	--	
Drain-Source Body Diode Characteristics						
Continuous Source Current	I _{SD}	Integral PN-diode in MOSFET	--	--	40	A
Pulsed Source Current	I _{SM}		--	--	160	
Body Forward Voltage	V _{SD}	I _S = 20A, V _{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} = 0V,I _F = 10A, di _F /dt =100A /μs	--	152	--	ns
Reverse Recovery Charge	Q _{rr}		--	1	--	μC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 1\text{mH}$, $V_{DD} = 30V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

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

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

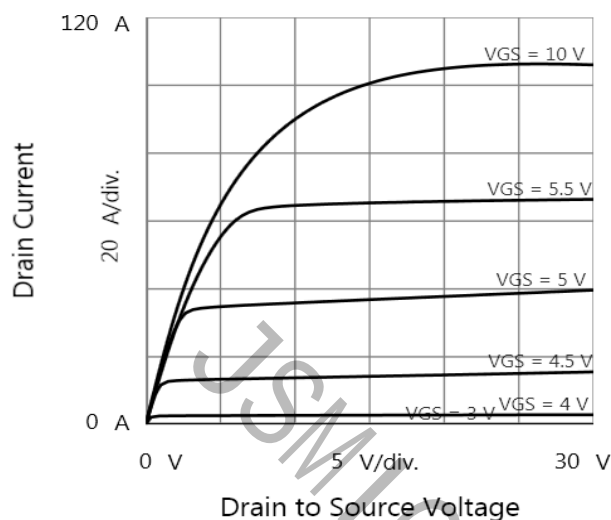


Figure 2. Transfer Characteristics

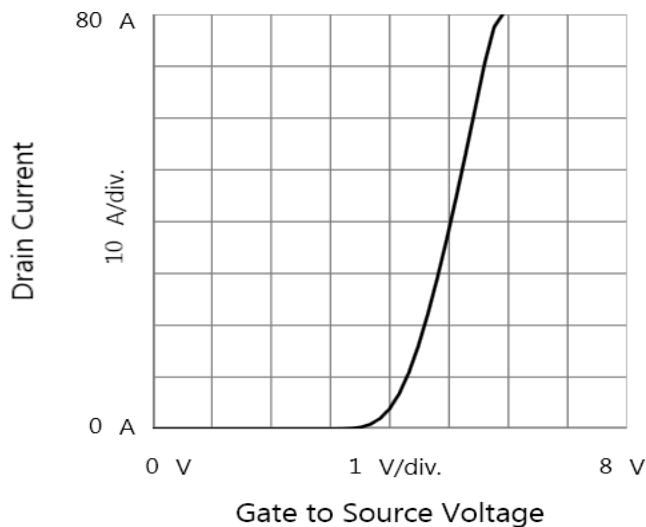


Figure 3. Drain to Source Resistance vs. Drain Current

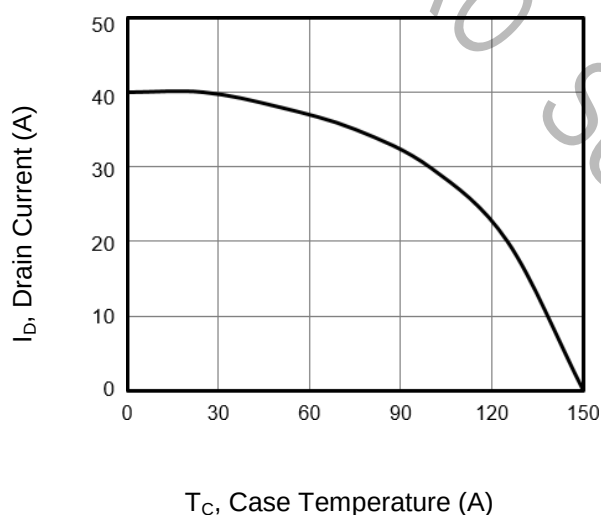


Figure 4. BV_{DSS} Variation vs. Temperature

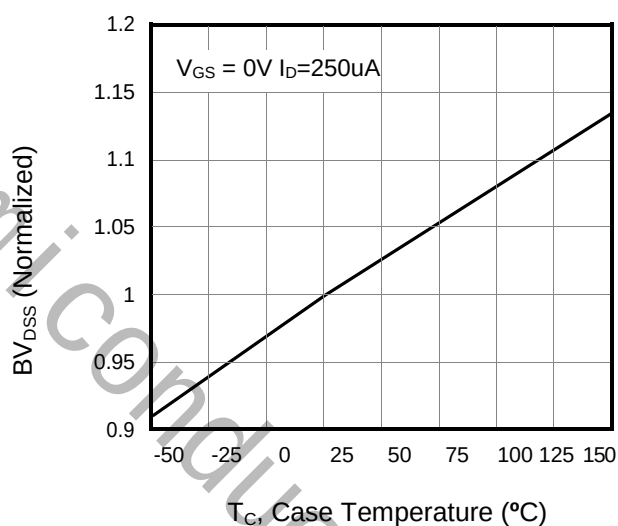


Figure 5. Drain to Source Voltage vs. Gate to Source Voltage

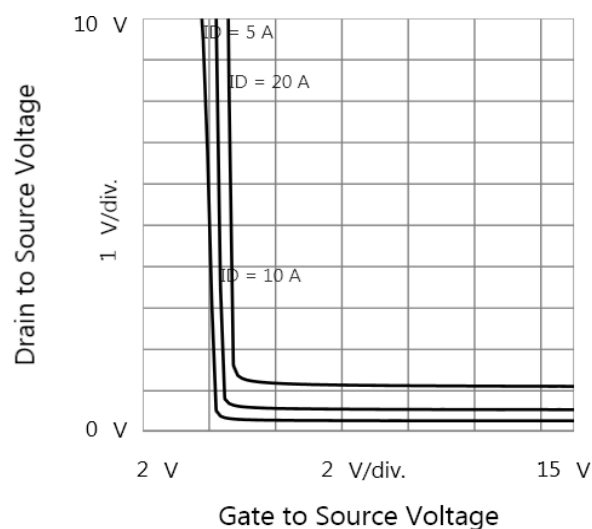
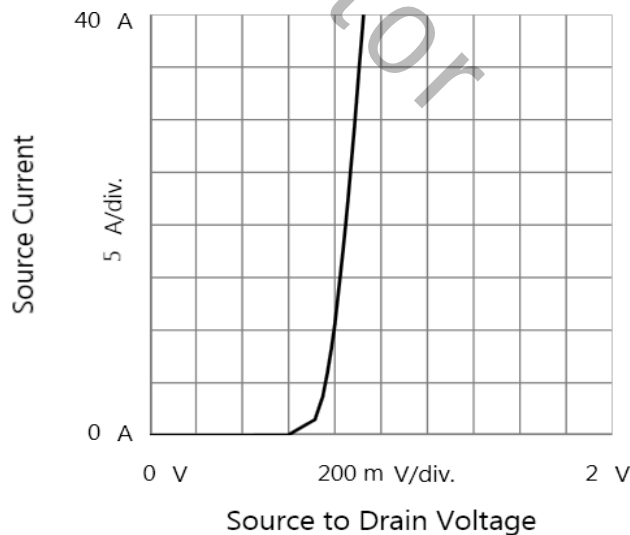


Figure 6. Body Diode Forward Characteristics



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

Figure 7. Capacitance

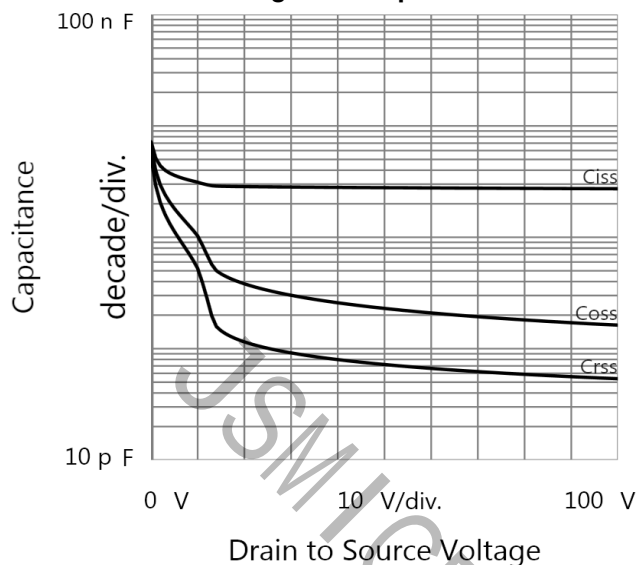
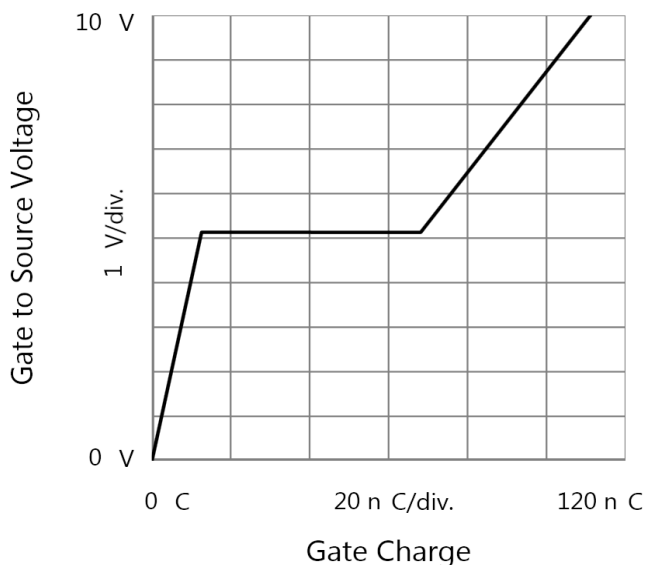
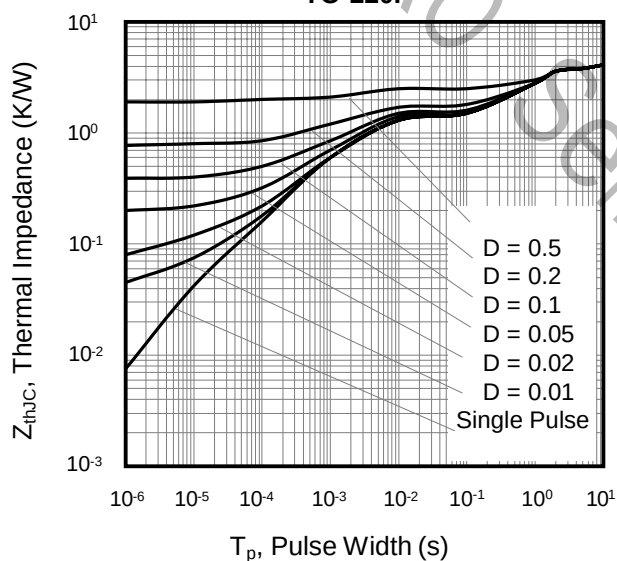


Figure 8. Gate Charge



**Figure 9. Transient Thermal Impedance
TO-220F**



**Figure 10. Transient Thermal Impedance
TO-220**

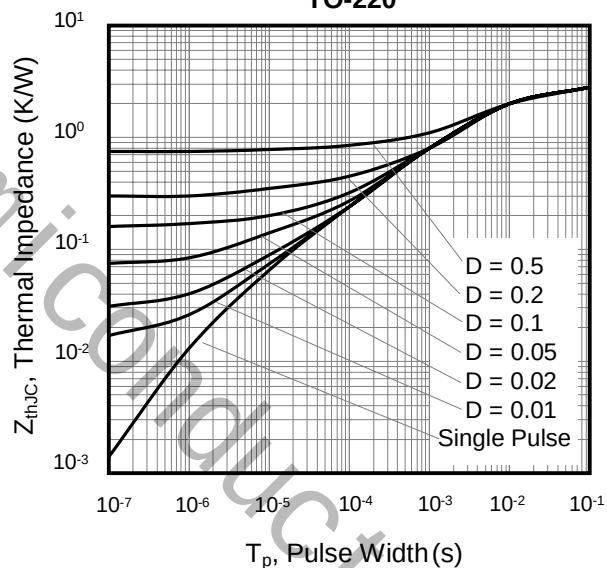


Figure A: Gate Charge Test Circuit and Waveform

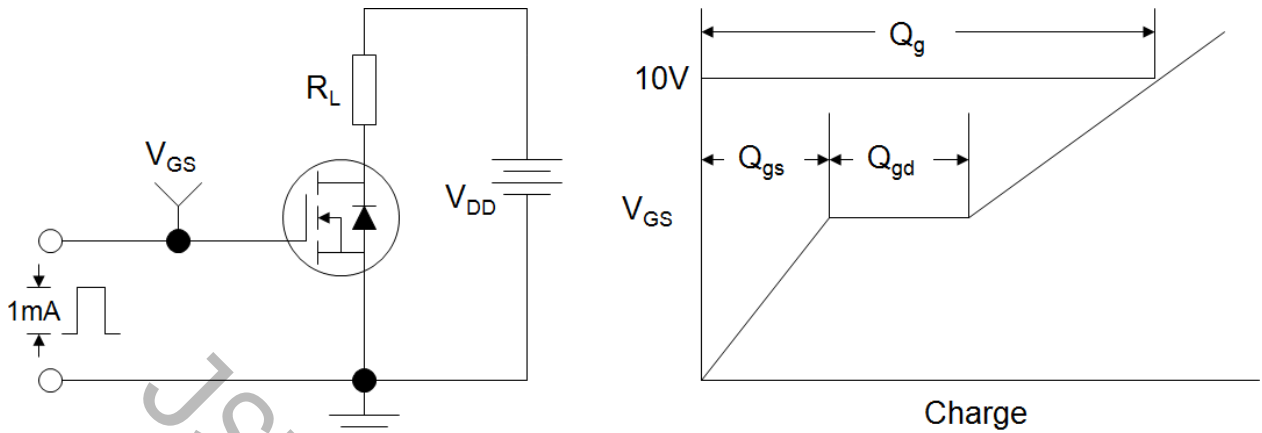


Figure B: Resistive Switching Test Circuit and Waveform

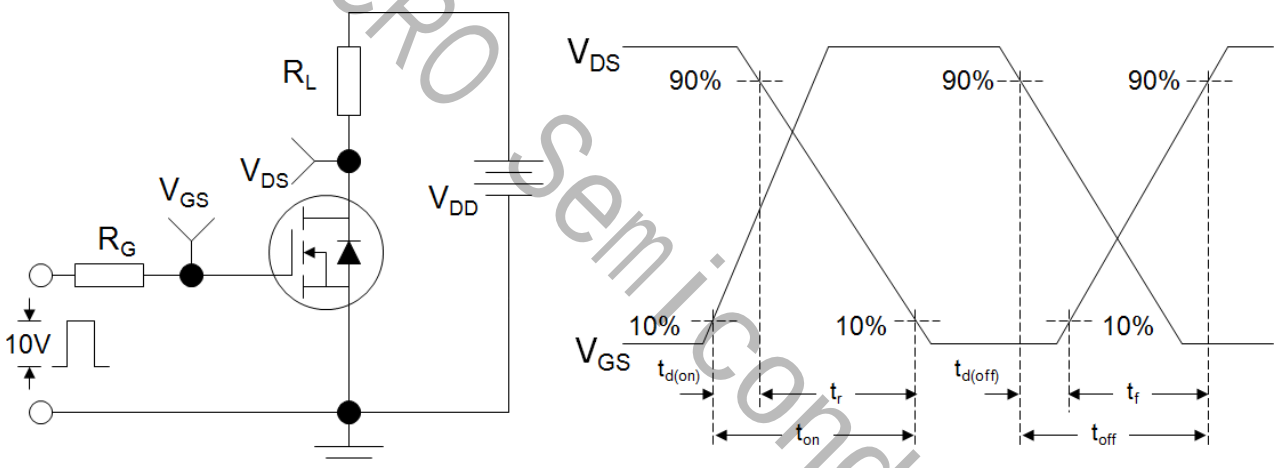


Figure C: Unclamped Inductive Switching Test Circuit and Waveform

