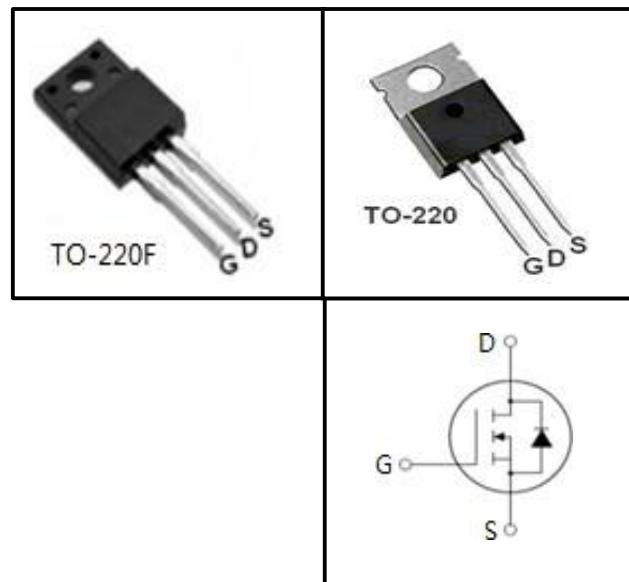


FEATURES

- Proprietary New Planar Technology
- RDS(ON),typ.=50m Ω @VGS=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
JSM50N20	TO-220F	JSM50N20
JSM50N20	TO-220	JSM50N20

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

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Drain-Source Voltage	V_{DSS}	200		V
Continuous Drain Current	I_D	50		A
Pulsed Drain Current (note1)	I_{DM}	160		A
Gate-Source Voltage	V_{GSS}	± 20		V
Single Pulse Avalanche Energy (note1)	E_{AS}	194		mJ
Avalanche Current (note1)	I_{AS}	31		A
Repetitive Avalanche Energy (note1)	E_{AR}	124		mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	63.7	104	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	$-55\text{--}+150$		$^\circ\text{C}$

Thermal Resistance

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

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

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_D = 250\mu\text{A}$	200	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{DS}} = 200\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 25^\circ\text{C}$	--	--	1	μA
		$V_{\text{DS}} = 200\text{V}, V_{\text{GS}} = 0\text{V}, T_J = 125^\circ\text{C}$	--	--	100	
Gate-Source Leakage	I_{GSS}	$V_{\text{GS}} = \pm 20\text{V}, V_{\text{DS}} = 0\text{V}$	--	--	± 100	nA
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = 250\mu\text{A}$	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10\text{V}, I_D = 20\text{A}$	--	0.05	0.06	Ω
Forward Transconductance (Note4)	g_{fs}	$V_{\text{DS}} = 25\text{V}, I_D = 20\text{A}$	--	16	--	S
Dynamic						
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0\text{V}, V_{\text{DS}} = 25\text{V}, f = 1.0\text{MHz}$	--	2800	--	pF
Output Capacitance	C_{oss}		--	355	--	
Reverse Transfer Capacitance	C_{rss}		--	101	--	
Total Gate Charge	Q_g	$V_{\text{DD}} = 160\text{V}, I_D = 40\text{A},$	--	154	--	nC
Gate-Source Charge	Q_{gs}		--	13	--	
Gate-Drain Charge	Q_{gd}		--	58	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 160\text{V}, I_D = 40\text{A}, V_{\text{GS}} = 15\text{V}, R_G = 25\Omega$	--	46	--	ns
Turn-on Rise Time	t_r		--	54	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	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}	$I_S = 20\text{A}, V_{\text{GS}} = 0\text{V}$	--	--	1.4	V
Reverse Recovery Time	t_{rr}	$V_{\text{GS}} = 0\text{V}, I_F = 10\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	--	152	--	ns
Reverse Recovery Charge	Q_{rr}		--	1	--	μC

Notes:

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

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

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

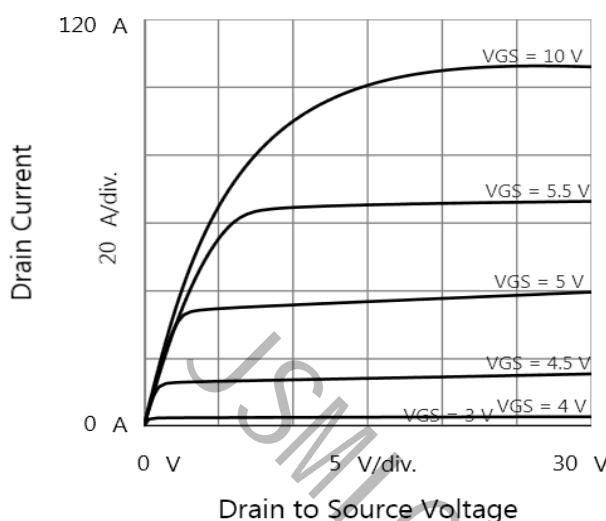


Figure 2. Transfer Characteristics

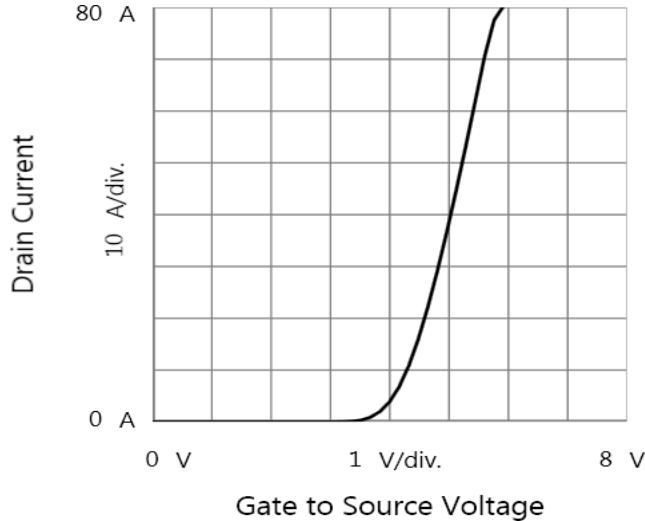


Figure 3. Drain to Source Resistance vs. Drain Current

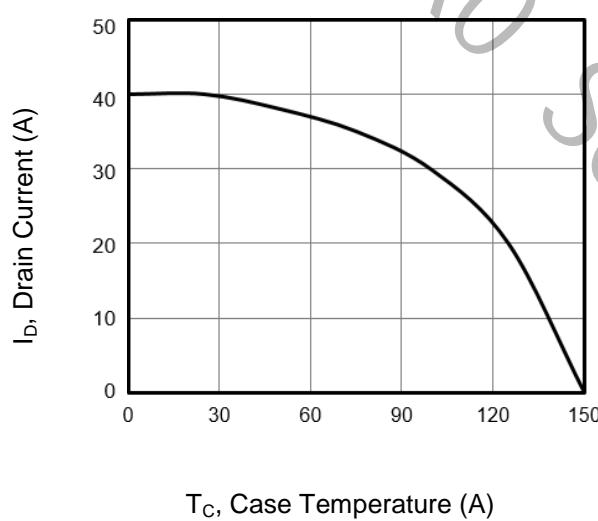


Figure 4. BV_{DSS} Variation vs. Temperature

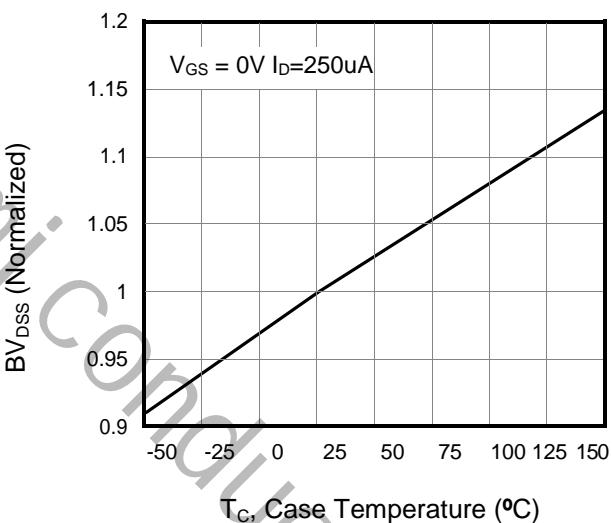


Figure 5. Drain to Source Voltage vs. Gate to Source Voltage

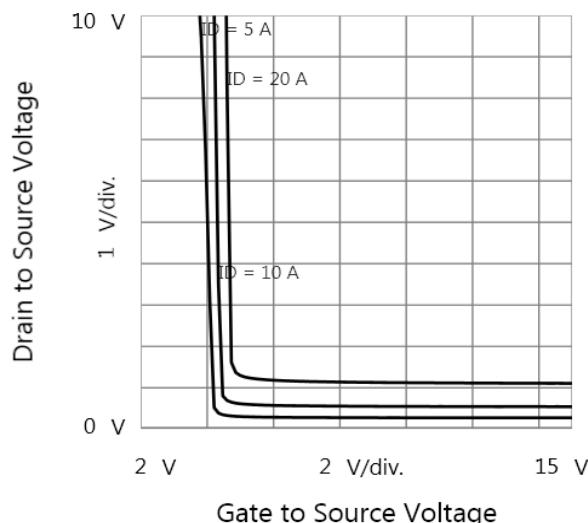
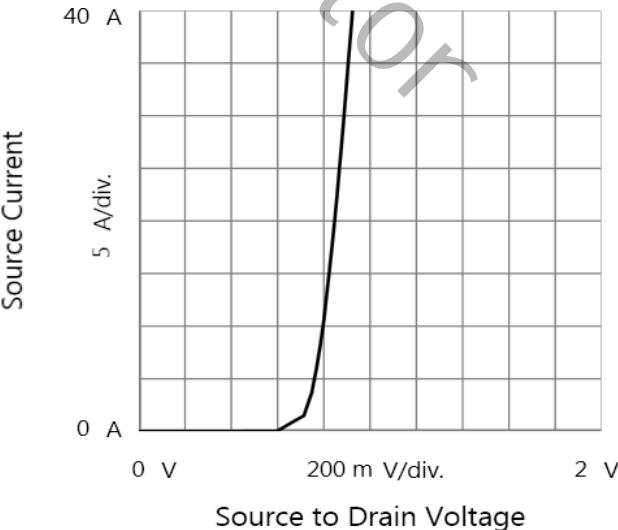


Figure 6. Body Diode Forward Characteristics



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

Figure 7. Capacitance

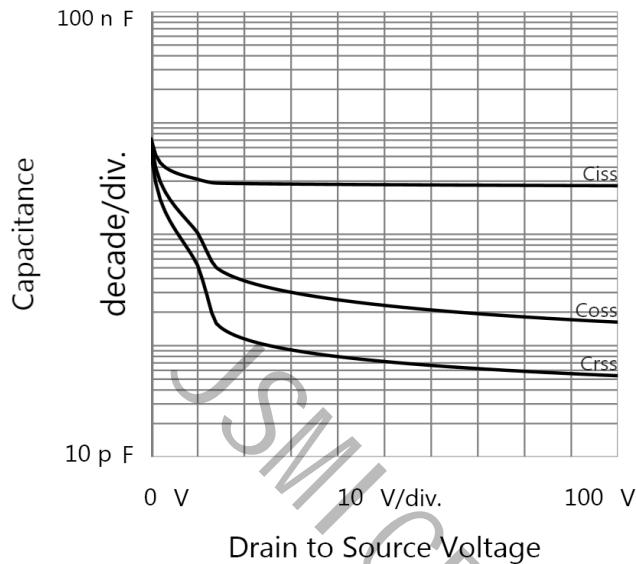
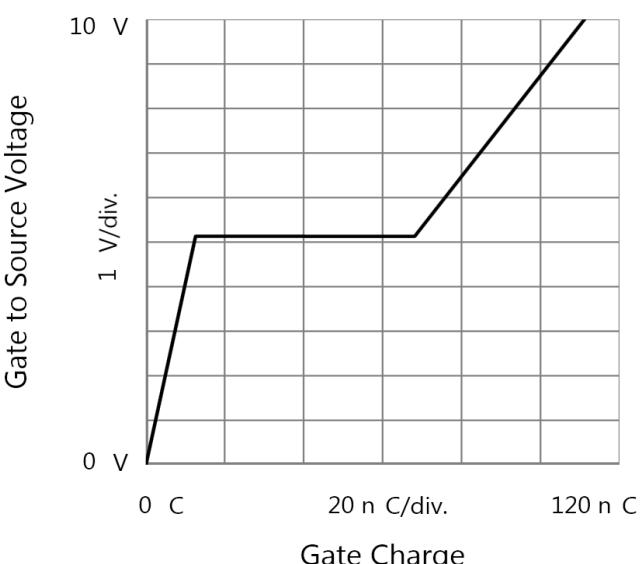
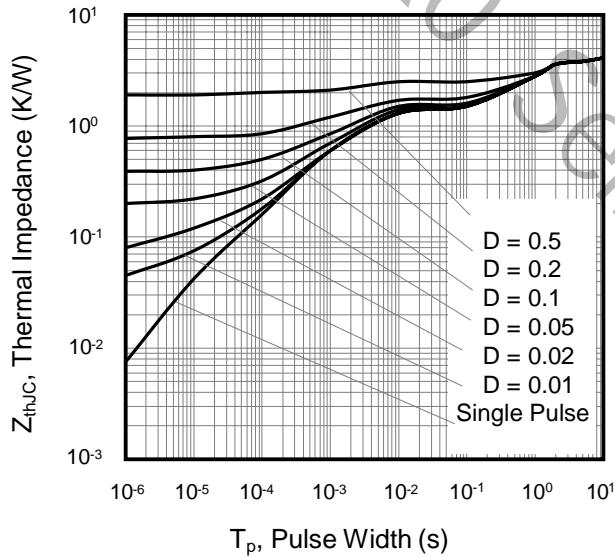


Figure 8. Gate Charge



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



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

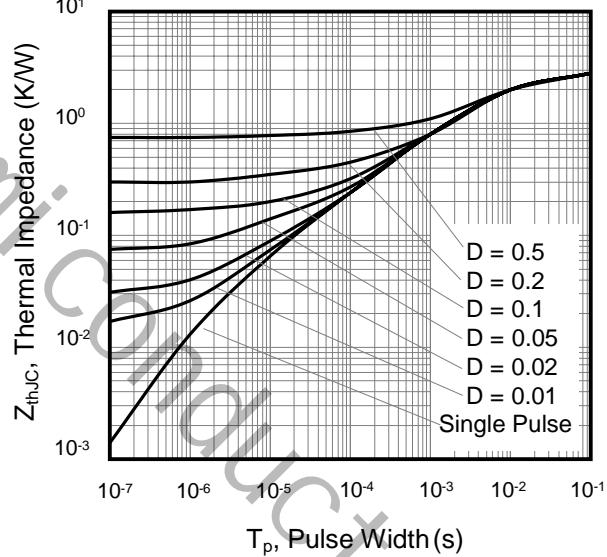
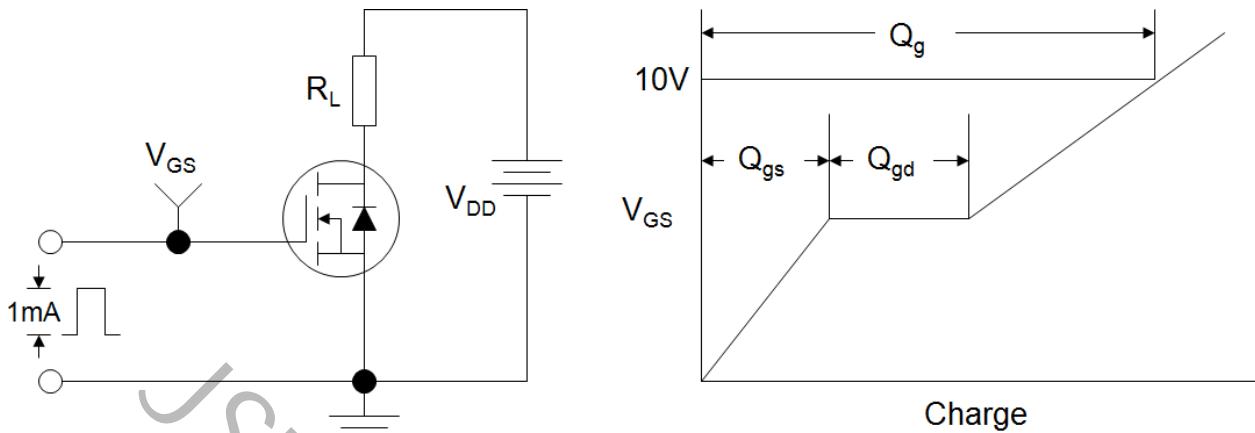
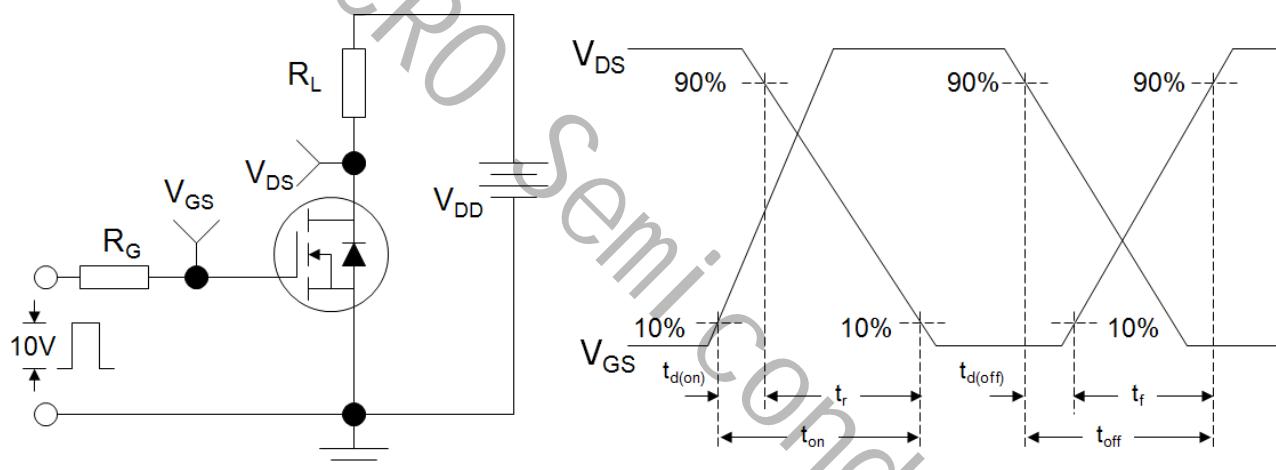


Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform
