

## -200V N-Channel MOSFET

### FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



### Device Marking and Package Information

Device	Package	Marking
MP11P20	TO-220	MP11P20

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

Parameter	Symbol	Value				Unit
		TO-220F	TO-220	TO-247	TO-3P	
Drain-Source Voltage ( $V_{GS} = 0V$ )	$V_{DSS}$	-200				V
Continuous Drain Current	$I_D$	-11				A
Pulsed Drain Current (note1)	$I_{DM}$	-44				A
Gate-Source Voltage	$V_{GSS}$	$\pm 20$				V
Single Pulse Avalanche Energy (note2)	$E_{AS}$	165				mJ
Avalanche Current (note1)	$I_{AS}$	-11				A
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	78				mJ
Linear Derating Factor		0.6				W/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150				$^\circ\text{C}$

### Thermal Resistance

Parameter	Symbol	Value				Unit
		TO-220F	TO-220	TO-247	TO-3P	
Thermal Resistance, Junction-to-Case	$R_{thJC}$	1.6		1.2		K/W
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	50		48		

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	-200	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -200V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	5	$\mu A$
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 120$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-2	--	-4	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -6.6A$	--	0.34	0.42	$\Omega$
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $V_{DS} = -25V,$ $f = 1.0\text{MHz}$	--	1200	---	pF
Output Capacitance	$C_{oss}$		--	370	--	
Reverse Transfer Capacitance	$C_{rss}$		--	81	--	
Total Gate Charge	$Q_g$	$V_{DD} = -100V,$ $I_D = -13.5A,$ $V_{GS} = -10V$	--	52	68	nC
Gate-Source Charge	$Q_{gs}$		--	9	--	
Gate-Drain Charge	$Q_{gd}$		--	25	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -160V, I_D = -13.5A,$ $R_G = 25 \Omega$	--	28	56	ns
Turn-on Rise Time	$t_r$		--	74	148	
Turn-off Delay Time	$t_{d(off)}$		--	260	520	
Turn-off Fall Time	$t_f$		--	120	240	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	-11	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	-44	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = -11A, V_{GS} = 0V$	--	--	-5	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = -11A,$ $di_F/dt = 100A/\mu s$	--	250	300	ns
Reverse Recovery Charge	$Q_{rr}$		--	2.9	3.6	$\mu C$

**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $I_{AS} = -11A, V_{DD} = 25V, R_G = 25 \Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s, \text{Duty Cycle } \leq 1\%$

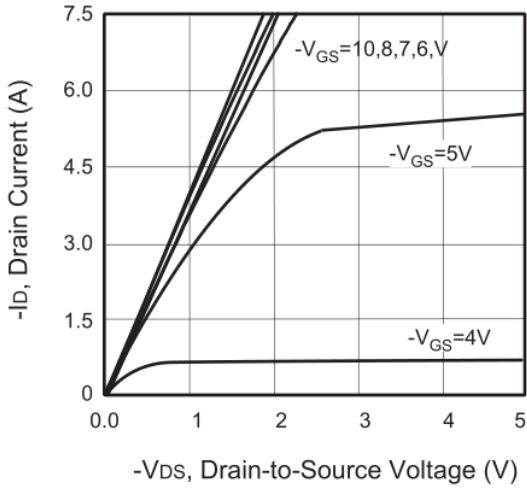


Figure 1. Output Characteristics

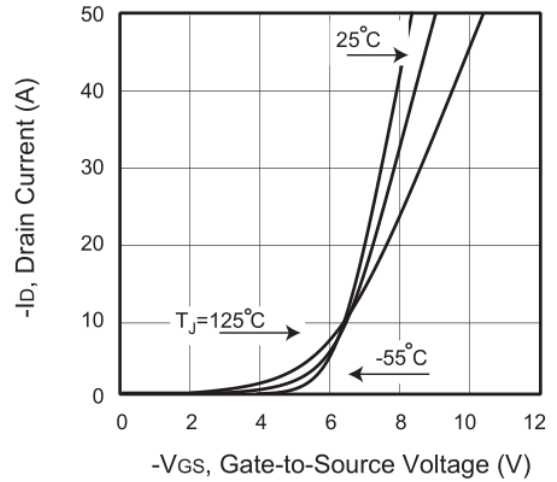


Figure 2. Transfer Characteristics

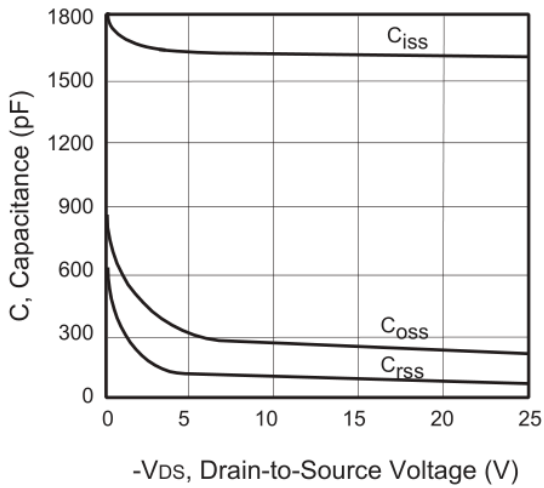


Figure 3. Capacitance

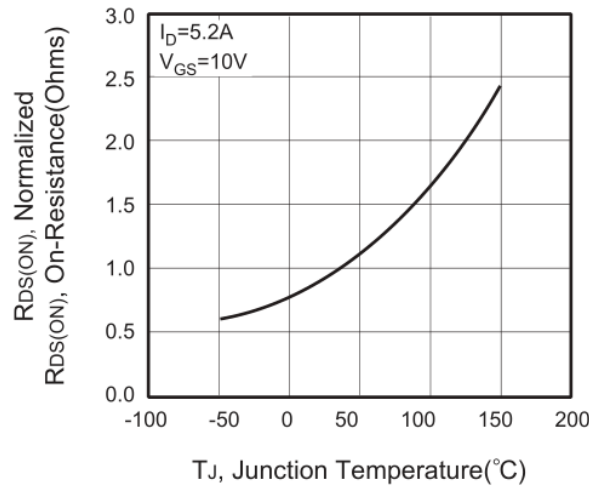


Figure 4. On-Resistance Variation with Temperature

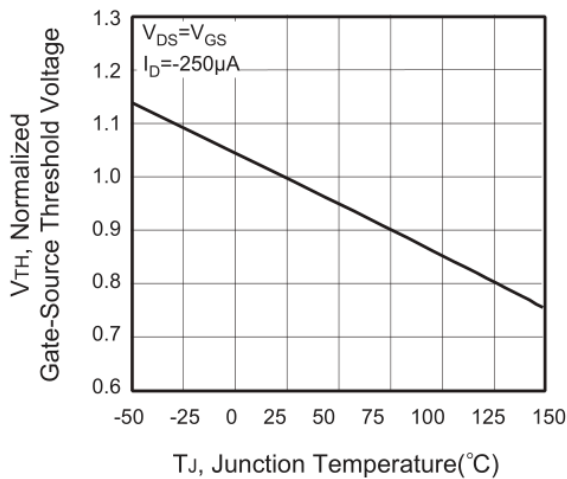


Figure 5. Gate Threshold Variation with Temperature

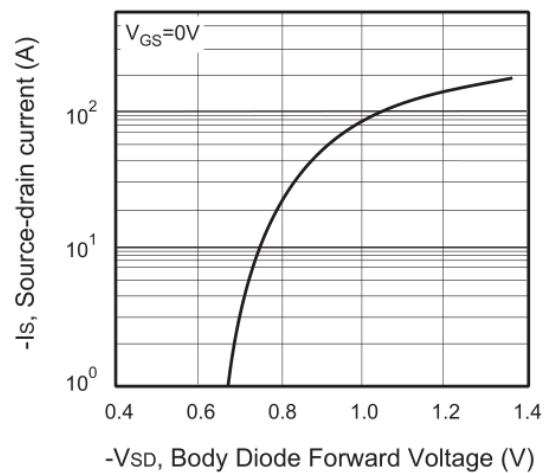


Figure 6. Body Diode Forward Voltage Variation with Source Current

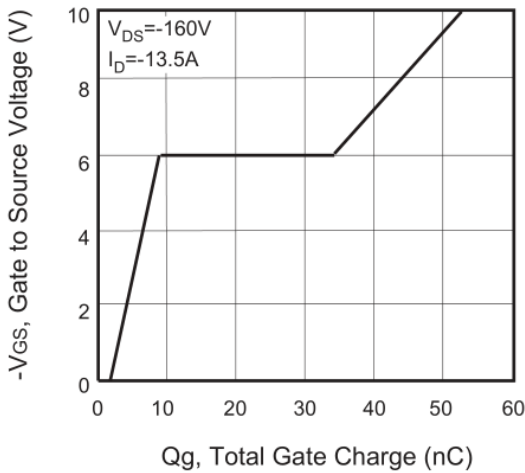


Figure 7. Gate Charge

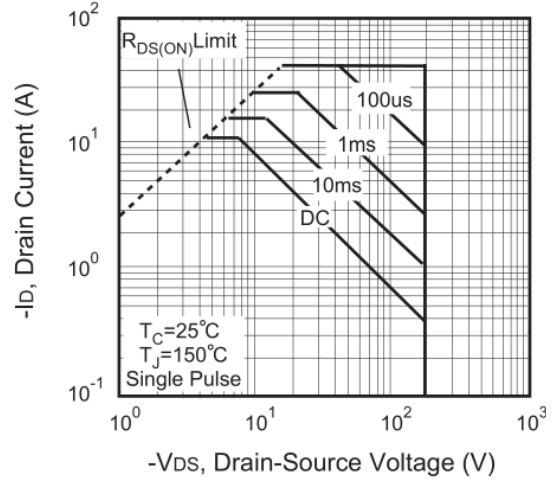


Figure 8. Maximum Safe Operating Area

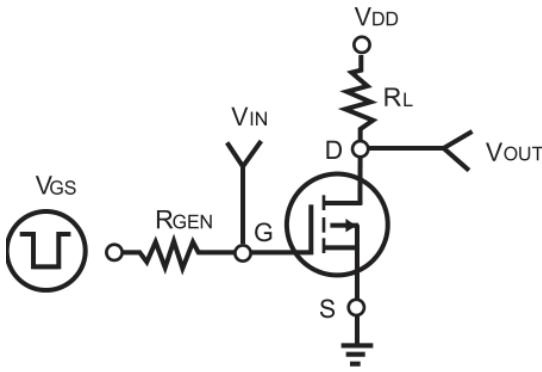


Figure 9. Switching Test Circuit

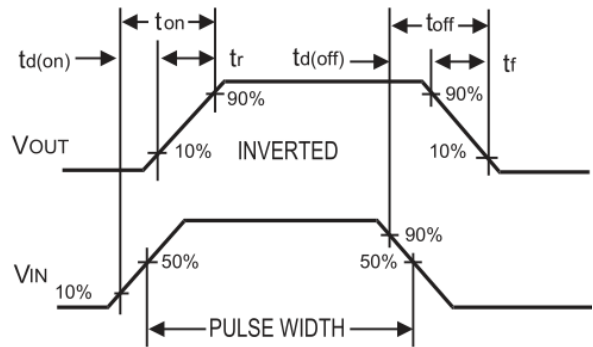


Figure 10. Switching Waveforms

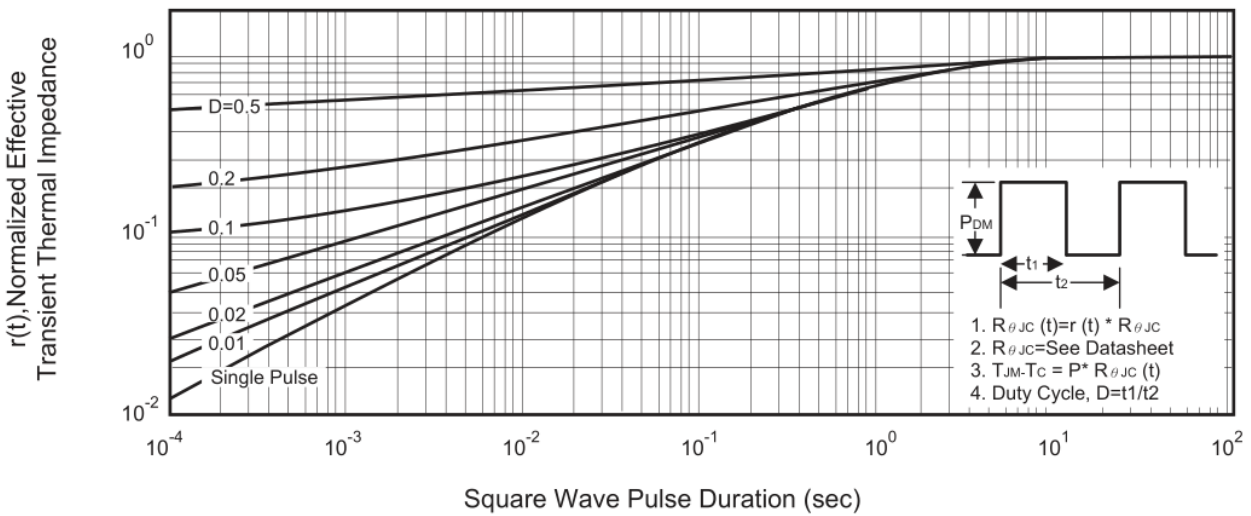


Figure 11. Normalized Thermal Transient Impedance Curve