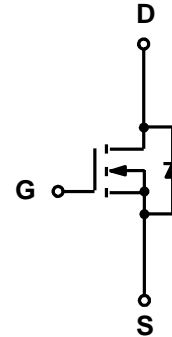


TP70N20

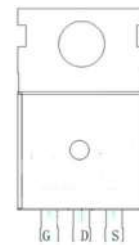
N-Channel Enhancement Mosfet

Features

- 200V,70A
 $R_{DS(ON)} < 27m\Omega @ V_{GS}=10V$ TYP:23 m Ω
- Surface-mounted package
- Advanced Process Technology
- Low QG for Fast Response
- High Repetitive Peak Current Capability for Reliable



TO-220



Marking and pin assignment

Applications

- Short Fall & Rise Times for Fast Switching
- 175°C Operating Junction Temperature for Improved Ruggedness
- Repetitive Avalanche Capability for Robustness and Reliability
- Class-D Audio Amplifier 300W-500W(Half-bridge)

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	200	V
Gate-Source Voltage	V _{GS}	±30	V
Continuous Drain Current	I _D	T _c =25°C	70
		T _c =100°C	48
Pulsed Drain Current	I _{DM}	280	A
Single Pulsed Avalanche Energy (V _{DD} =50V,L=0.5mH) ⁽²⁾	E _{AS}	223	mJ
Drain Power Dissipation	P _D	263	W
Thermal Resistance from Junction to Case	R _{θJC}	0.57	°C/W
Thermal Resistance- Junction to Ambient	R _{θJA}	62.5	°C/W
Junction Temperature	T _J	175	°C
Storage Temperature	T _{STG}	-55~ +175	°C

MOSFET ELECTRICAL CHARACTERISTICS($T_J=25^{\circ}\text{C}$ unless otherwise noted)

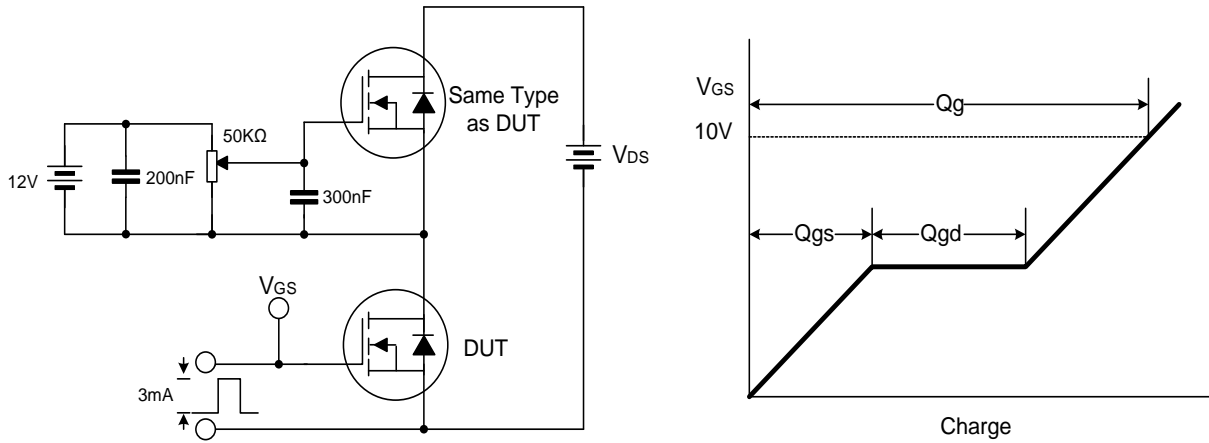
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	200	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 200V, V_{GS} = 0V$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	3.8	5.0	V
Drain-source on-resistance ^(a)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 46A$	-	23	27	m Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$	-	4460	-	pF
Output Capacitance	C_{oss}		-	470	-	
Reverse Transfer Capacitance	C_{rss}		-	160	-	
Gate Resistance	R_g	$V_{GS} = 0V, V_{DS} \text{ Open}, f = 1MHz$		1.1		Ω
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 100V, I_D = 46A, R_G = 2.5\Omega, V_{GS} = 10V$	-	33	-	ns
Turn-on rise time	t_r		-	64	-	
Turn-off delay time	$t_{d(off)}$		-	45	-	
Turn-off fall time	t_f		-	22	-	
Total Gate Charge	Q_g	$V_{DS} = 160V, I_D = 46A, V_{GS} = 10V$	-	84	-	nC
Gate-Source Charge	Q_{gs}		-	36	-	
Gate-Drain Charge	Q_{gd}		-	25	-	
Source-Drain Diode characteristics						
Diode Forward voltage ^(a)	V_{SD}	$T_J = 25^{\circ}\text{C}, V_{GS} = 0V, I_S = 46A$	-	-	1.2	V
Diode Forward current	I_S	$T_C = 25^{\circ}\text{C}$	-	-	70	A
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}\text{C}, I_F = 20A, di/dt = 100A/\mu s$		145		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$T_J = 25^{\circ}\text{C}, I_F = 20A, di/dt = 100A/\mu s$		0.6		nc

Notes:

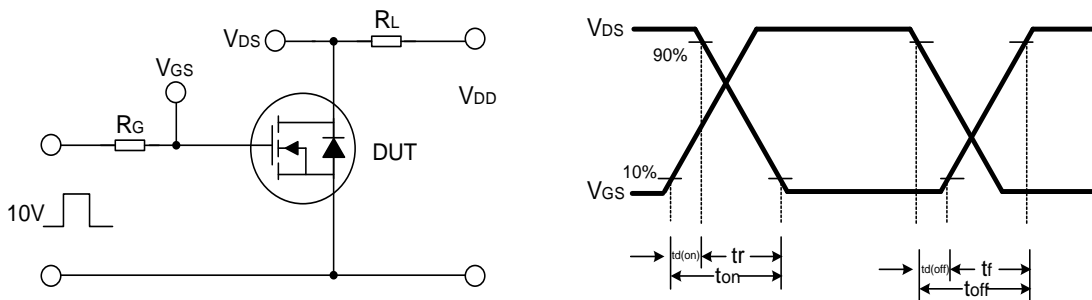
- Pulse width $\leq 300 \mu s$, duty cycle $\leq 2\%$
- Guaranteed by design, not subject to production testing

Test Circuit

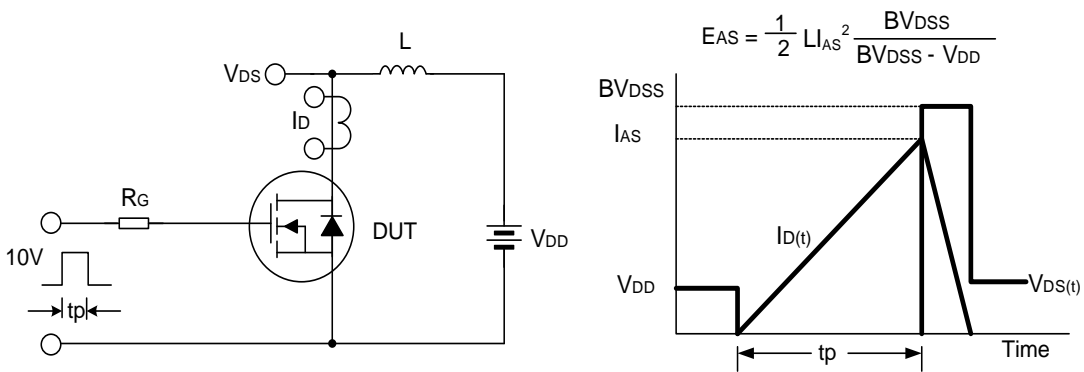
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Typical Characteristics

Figure 1. Output Characteristics

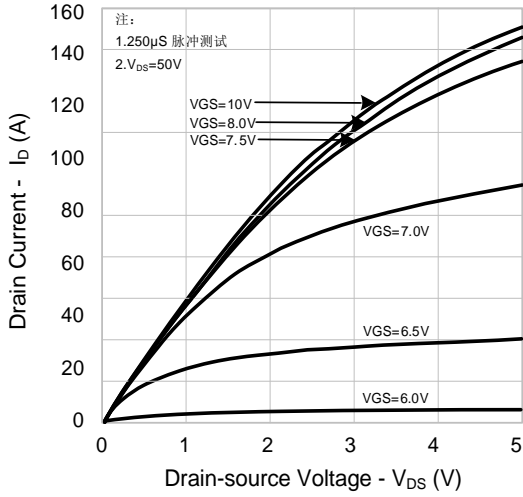


Figure 2. Transfer Characteristics

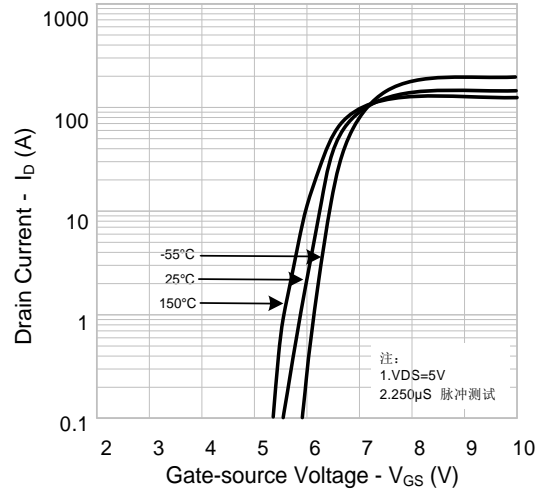


Figure 3. On-resistance vs. Drain Current

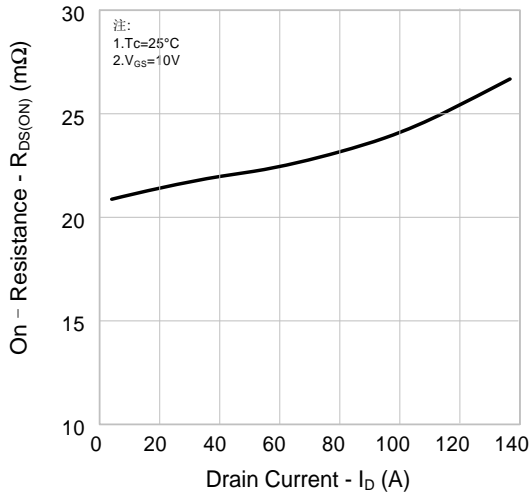


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

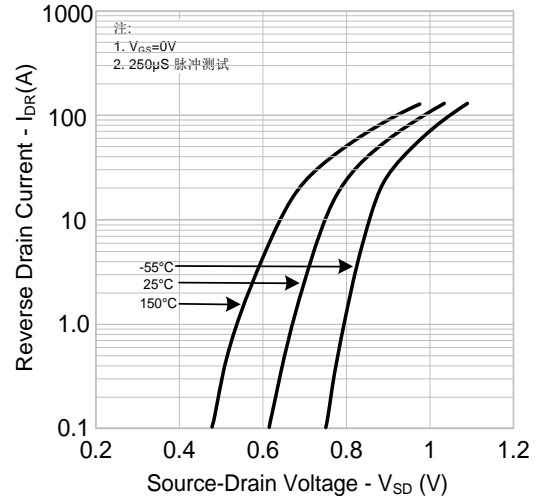


Figure 5. Capacitance Characteristics

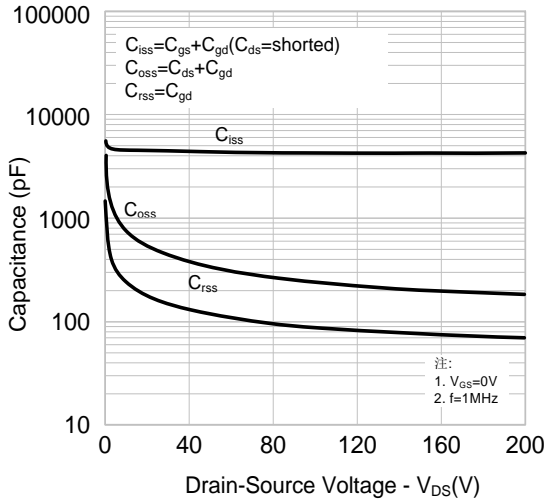
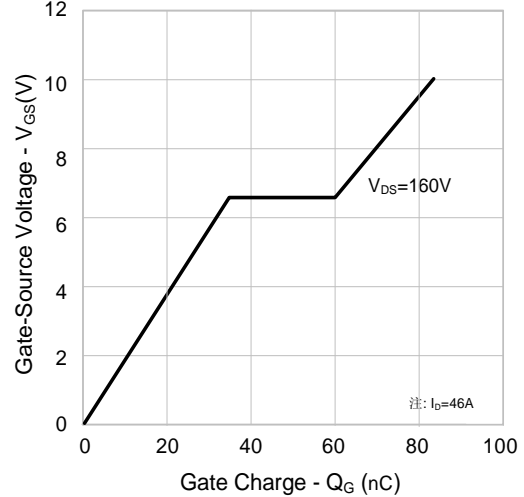


Figure 6. Gate Charge



Typical Characteristics

Figure 7. Breakdown Voltage vs. Temperature Characteristics

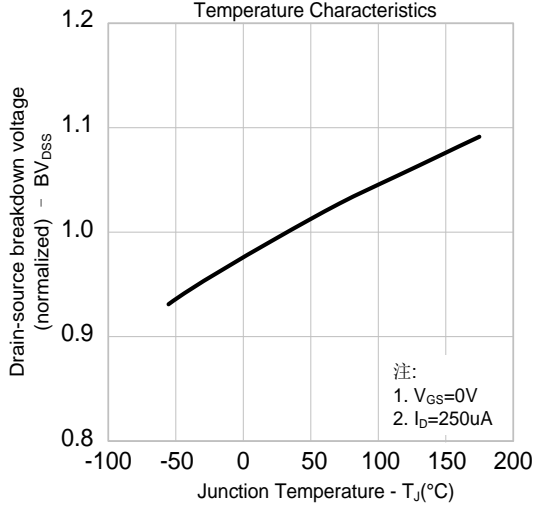


Figure 8. On-resistance vs. Temperature Characteristics

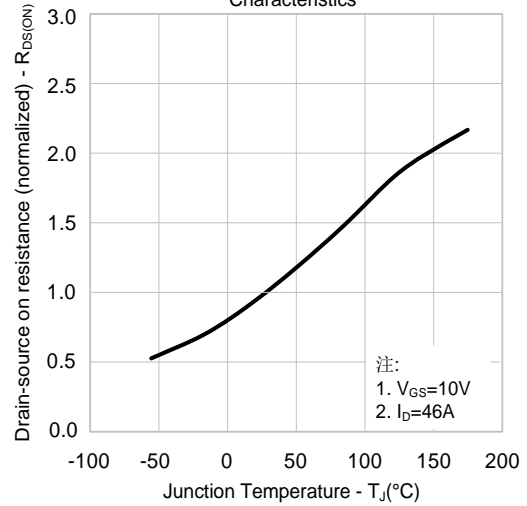
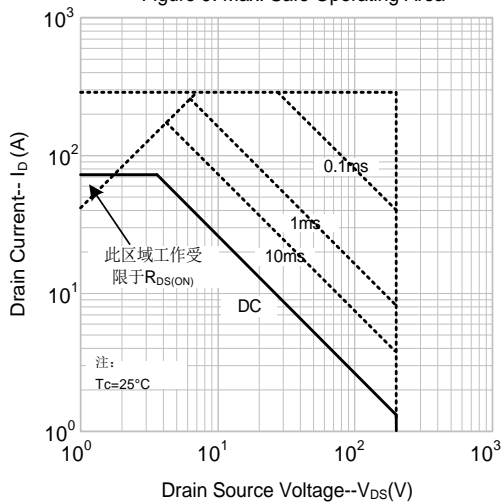


Figure 9. Max. Safe Operating Area



TO220 Package Information

