

AP5N80

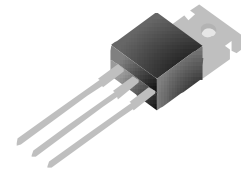
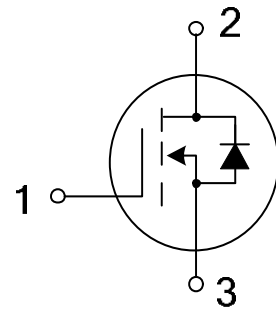
N-Channel Enhancement Mosfet

Features

- 800V,5A
 $R_{DS(ON)} < 2.7 \Omega @ V_{GS}=10V$ TYP:2.0 Ω
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability

Applications

- AC-DC power suppliers,
- DC-DC converters
- H-bridge PWM motor drivers



TO-220

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
5N80	AP5N80	TO-220	-	-	1000

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	800	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ($T_c = 25^\circ\text{C}$)	I_D	5	A
Continuous Drain Current ($T_c = 100^\circ\text{C}$)	I_D	3.2	A
Pulsed Source Current ⁽¹⁾	I_{sm}	20	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	20	A
Single Pulsed Avalanche Energy ⁽²⁾	E_{AS}	323	mJ
Power Dissipation	P_D	146	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.86	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

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

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	800	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 800V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	-	-	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Drain-source on-resistance ⁽³⁾	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2.5A$	-	2.0	2.7	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{MHz}$	-	677.1	-	pF
Output Capacitance	C_{oss}		-	71	-	
Reverse Transfer Capacitance	C_{rss}		-	4.0	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 5A, R_G = 25\Omega$	-	11.9	-	ns
Turn-on rise time	t_r		-	23.1	-	
Turn-off delay time	$t_{d(off)}$		-	25.3	-	
Turn-off fall time	t_f		-	23.1	-	
Total Gate Charge	Q_g	$V_{DS} = 640V, I_D = 5A, V_{GS} = 10V$	-	15.16	-	nC
Gate-Source Charge	Q_{gs}		-	4.27	-	
Gate-Drain Charge	Q_{gd}		-	6.78	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	$T_J = 25^\circ\text{C}, V_{GS} = 0V, I_S = 5A$	-	-	1.4	V
Diode Forward current	I_S	$T_C = 25^\circ\text{C}$	-	-	5.0	A
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 5A, di/dt = 100A/\mu s$		548.7		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$T_J = 25^\circ\text{C}, I_F = 5A, di/dt = 100A/\mu s$		2.95		uc

Notes:

1. $L=30\text{mH}, I_{AS}=4.50\text{A}, V_{DD}=60\text{V}, R_G=25\Omega$, starting $T_J=25^\circ\text{C}$;
2. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;
3. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. On-Region Characteristics

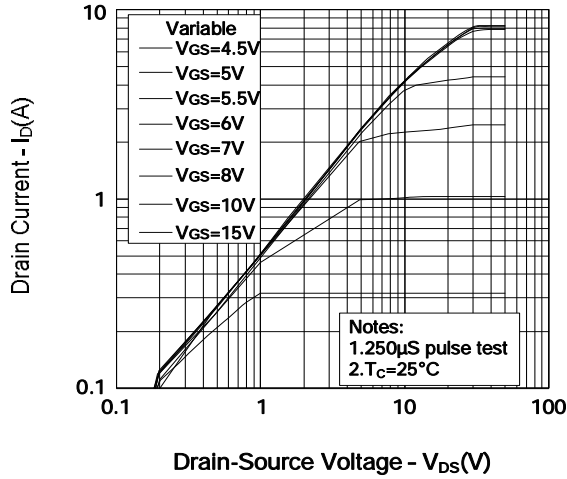


Figure 2. Transfer Characteristics

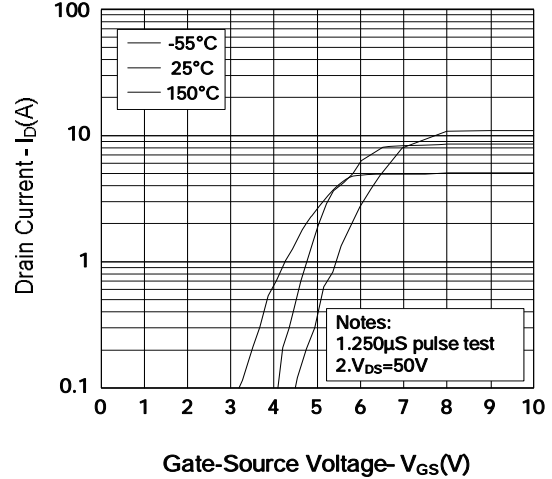


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

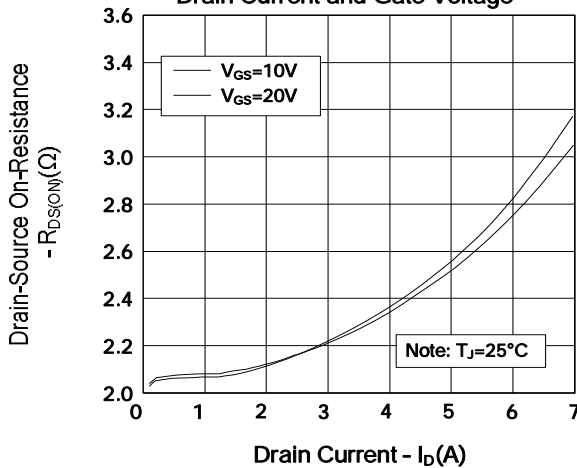


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

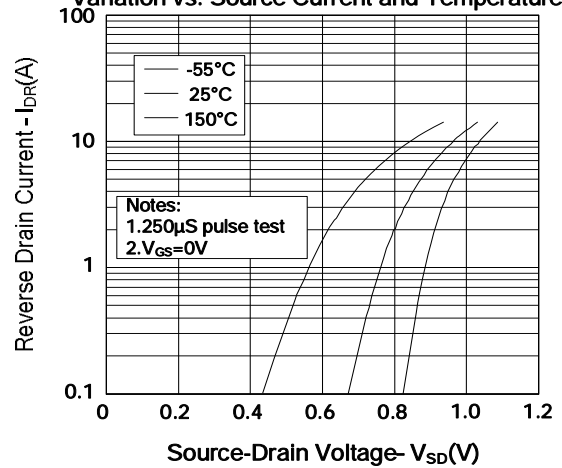


Figure 5. Capacitance Characteristics

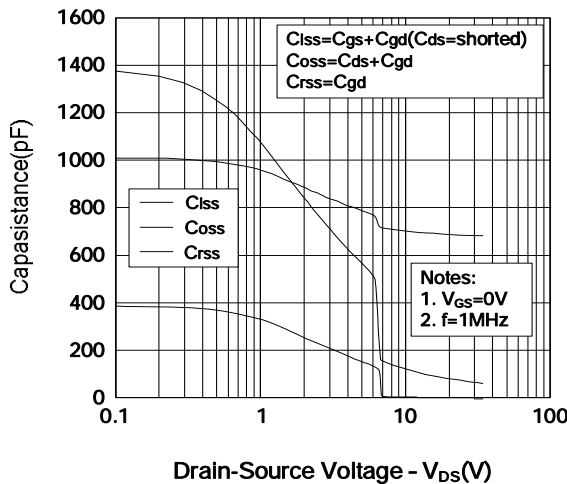
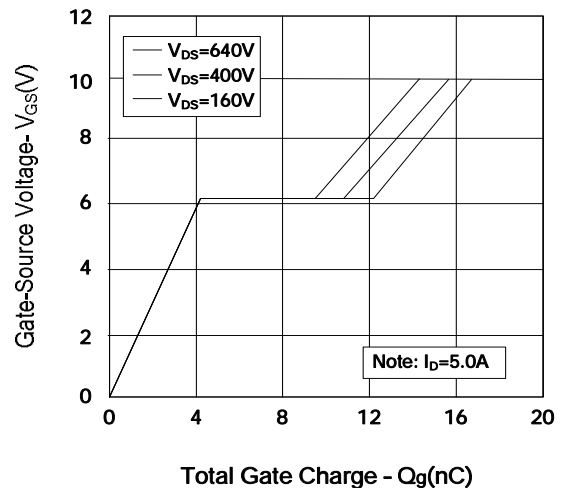


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS (continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

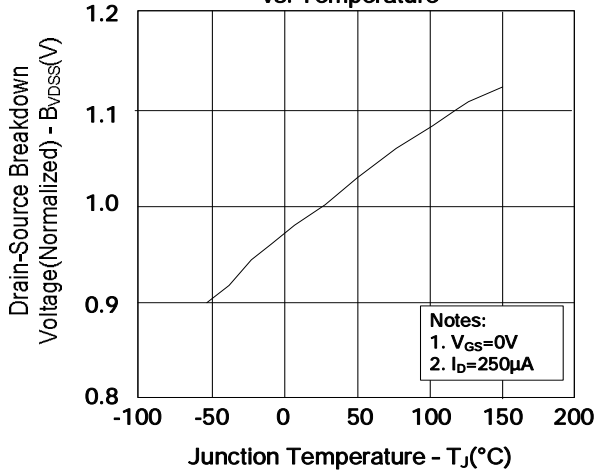


Figure 8. On-resistance Variation vs. Temperature

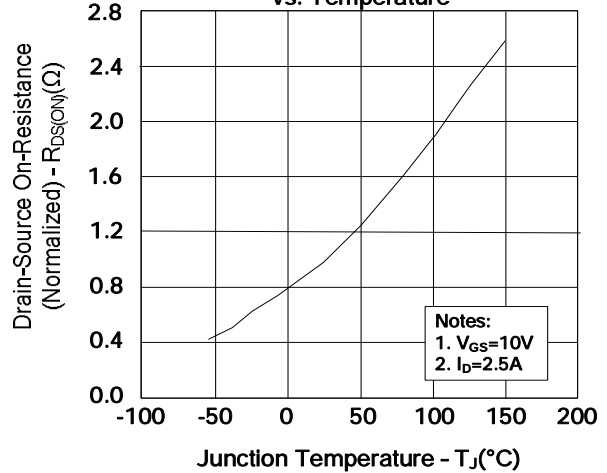


Figure 9-1. Max. Safe Operating Area(SFF5N80)

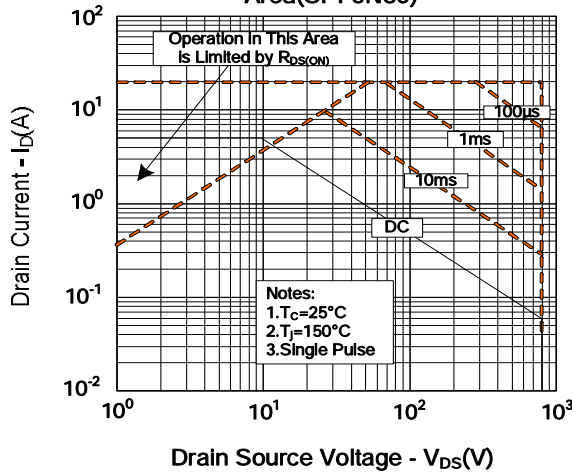


Figure 9-2. Max. Safe Operating Area(SFP5N80)

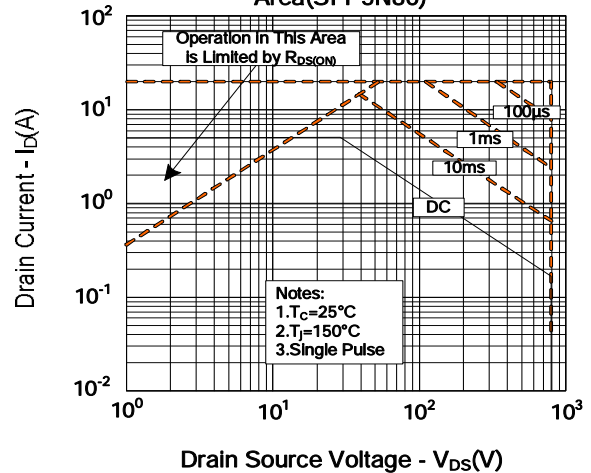
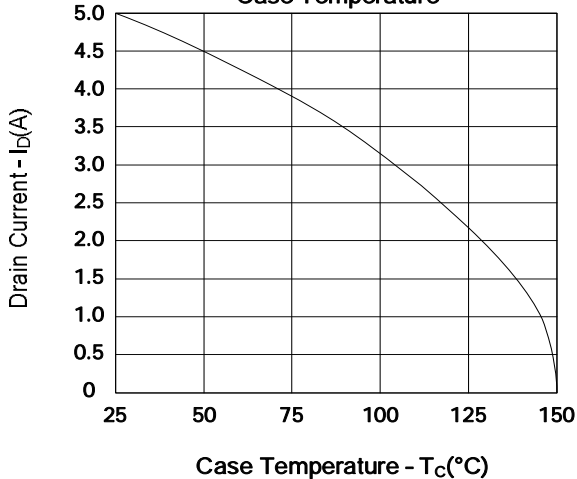
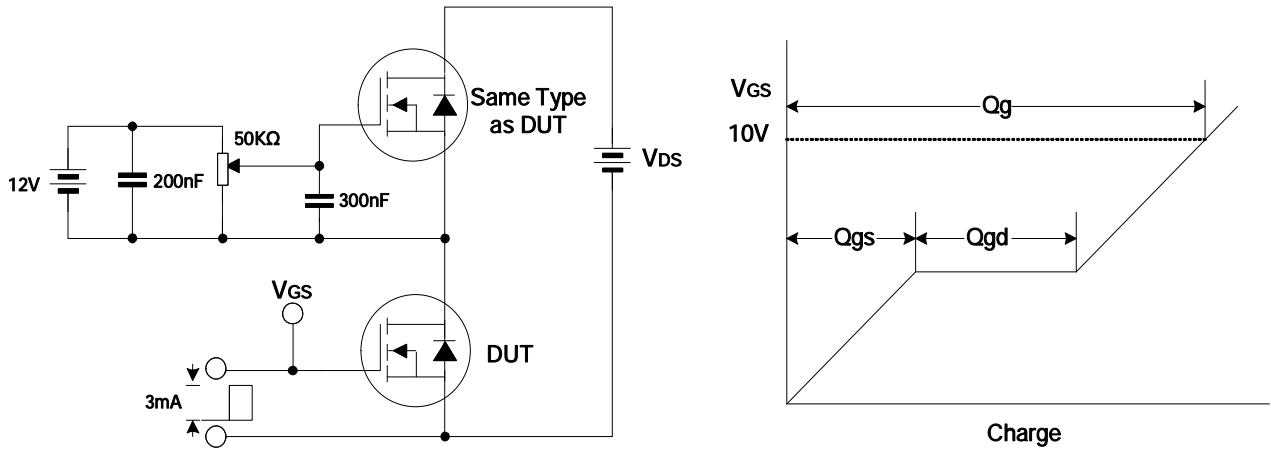


Figure 10. Maximum Drain Current vs. Case Temperature

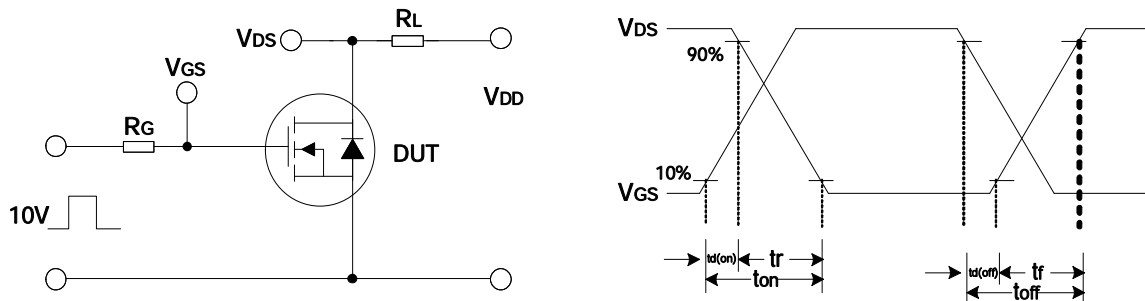


TYPICAL TEST CIRCUIT

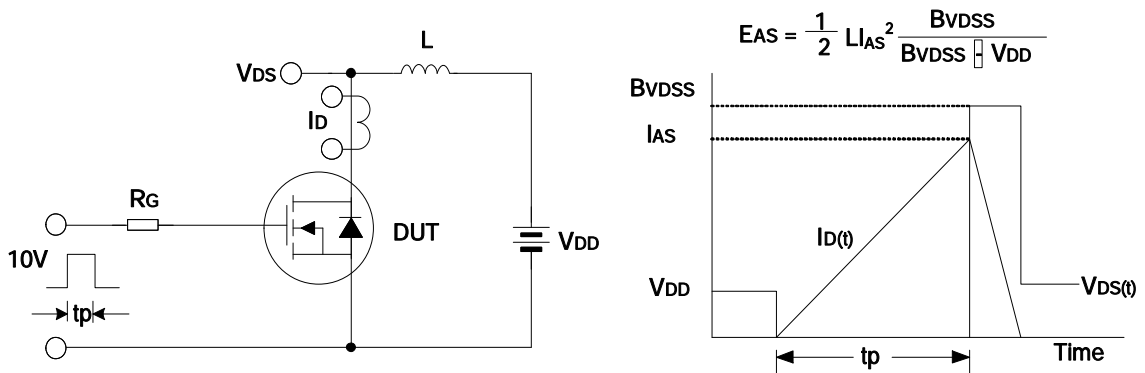
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



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PACKAGE OUTLINE(continued)

