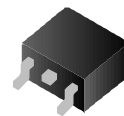
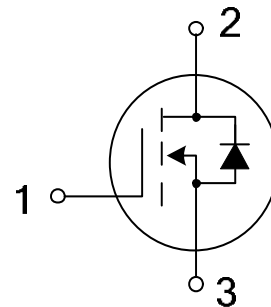


# AP3N80K

## N-Channel Enhancement Mosfet

### Features

- 800V,3A  
 $R_{DS(ON)} < 4.8 \Omega @ V_{GS}=10V$  TYP:3.8  $\Omega$
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability



TO-252

### Applications

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

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
3N80K	AP3N80K	TO-252	-	-	2500

### 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	$V_{GS}$	$\pm 30$	V
Continuous Drain Current ( $T_c = 25^\circ\text{C}$ )	$I_D$	3	A
Continuous Drain Current ( $T_c = 100^\circ\text{C}$ )	$I_D$	1.9	A
Pulsed Source Current <sup>(1)</sup>	$I_{sm}$	12	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	12	A
Single Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	173	mJ
Power Dissipation	$P_D$	80	W
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.56	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	110	$^\circ\text{C/W}$
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
<b>Static Characteristics</b>						
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	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	$\pm 100$	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 <sup>(3)</sup>	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 1.5A$	-	3.8	4.8	$\Omega$
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 25V, V_{GS} = 0V, f = 1.0\text{MHz}$	-	390.3	-	pF
Output Capacitance	$C_{oss}$		-	42.7	-	
Reverse Transfer Capacitance	$C_{rss}$		-	2.0	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 400V, I_D = 3A, R_G = 25\Omega$	-	13.87	-	ns
Turn-on rise time	$t_r$		-	30.53	-	
Turn-off delay time	$t_{d(off)}$		-	22.40	-	
Turn-off fall time	$t_f$		-	18.27	-	
Total Gate Charge	$Q_g$	$V_{DS} = 640V, I_D = 3A, V_{GS} = 10V$	-	9.00	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.46	-	
Gate-Drain Charge	$Q_{gd}$		-	3.74	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage	$V_{SD}$	$T_J = 25^{\circ}\text{C}, V_{GS} = 0V, I_S = 3A$	-	-	1.4	V
Diode Forward current	$I_S$	$T_C = 25^{\circ}\text{C}$	-	-	3.0	A
Body Diode Reverse Recovery Time	$t_{rr}$	$T_J = 25^{\circ}\text{C}, I_F = 3A, di/dt = 100A/\mu s$		190		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$	$T_J = 25^{\circ}\text{C}, I_F = 3A, di/dt = 100A/\mu s$		0.53		$\mu c$

**Notes:**

1.  $L=30\text{mH}, I_{AS}=3.15A, V_{DD}=100V, R_G=25\Omega$ , 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

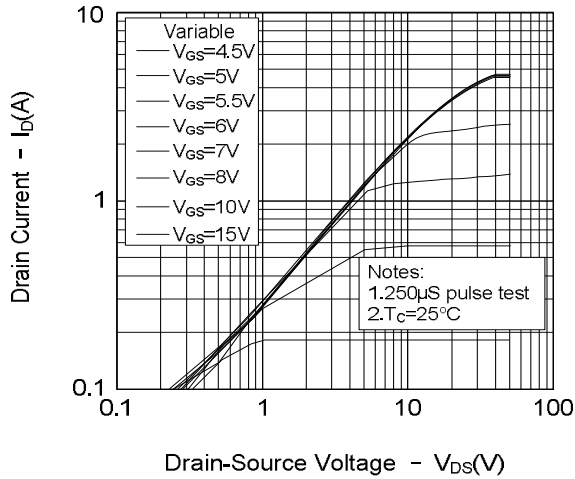


Figure 2. Transfer Characteristics

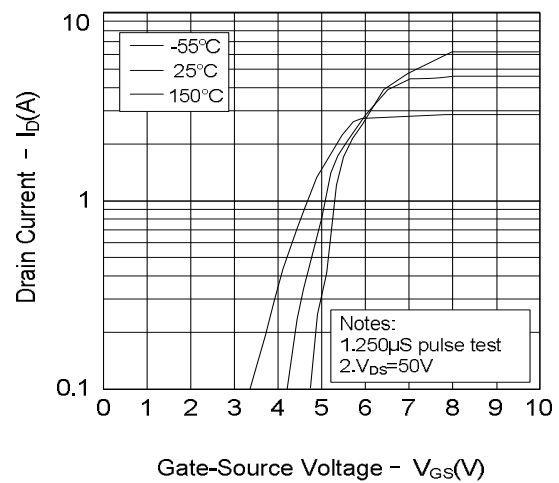


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

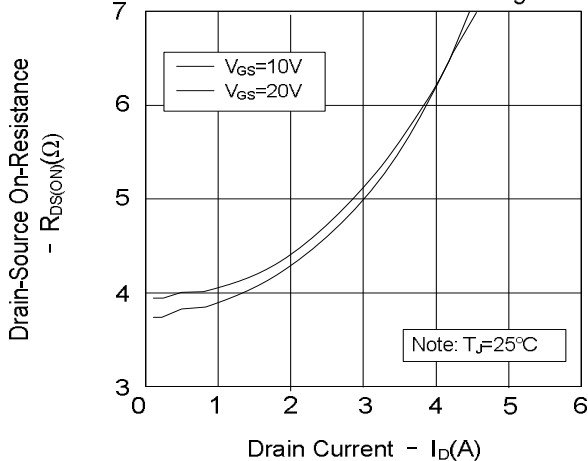


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

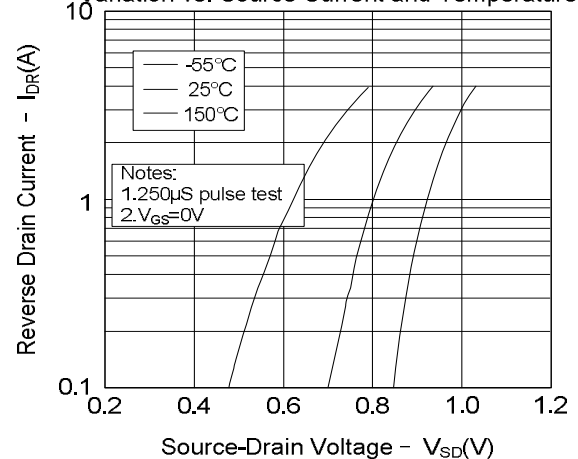


Figure 5. Capacitance Characteristics

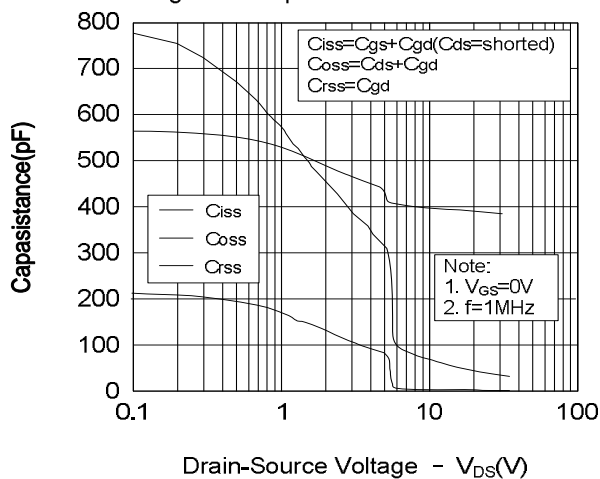
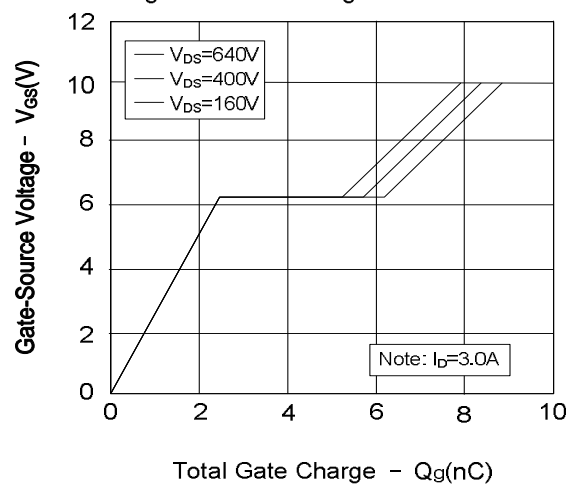


Figure 6. Gate Charge Characteristics



TYPICAL CHARACTERISTICS

Figure 7. Breakdown Voltage Variation vs. Temperature

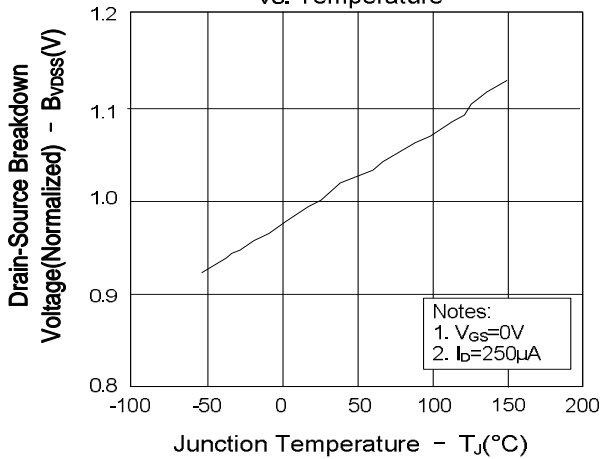


Figure 8. On-resistance Variation vs. Temperature

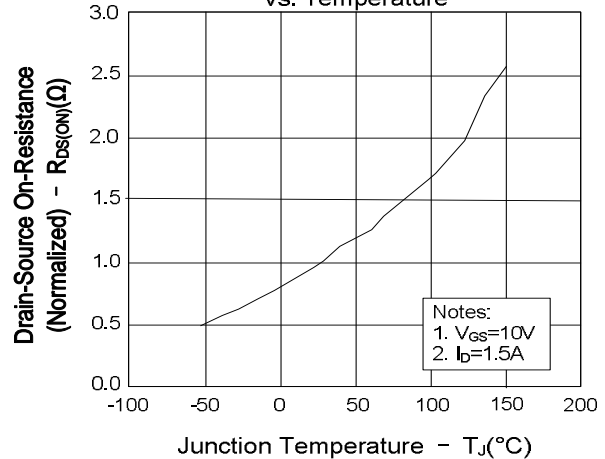


Figure 9-1. Max. Safe Operating Area(SFM/D3N80)

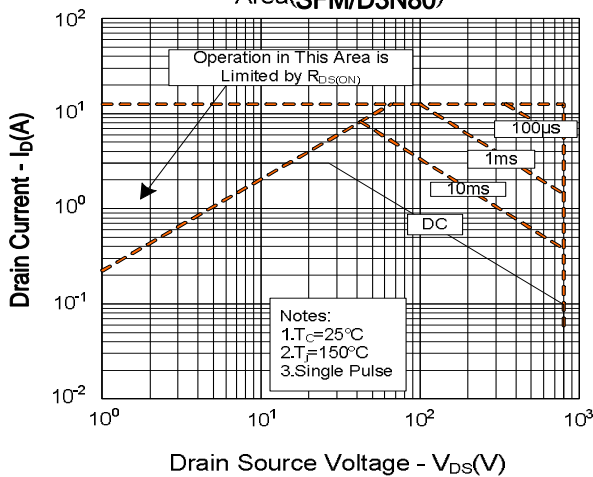


Figure 9-2. Max. Safe Operating Area(SFU3N80)

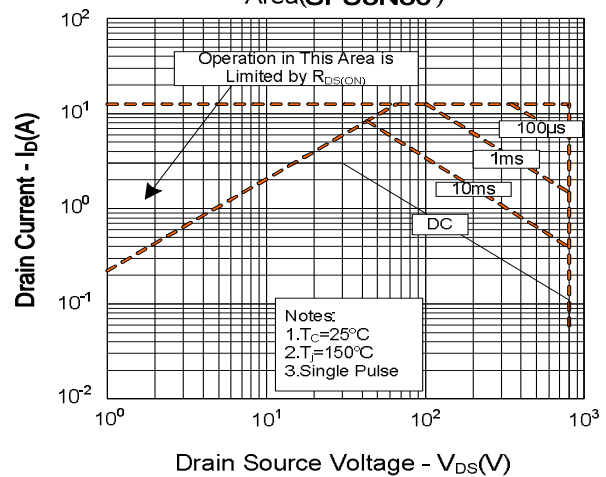


Figure 9-3. Max. Safe Operating Area (SFF3N80)

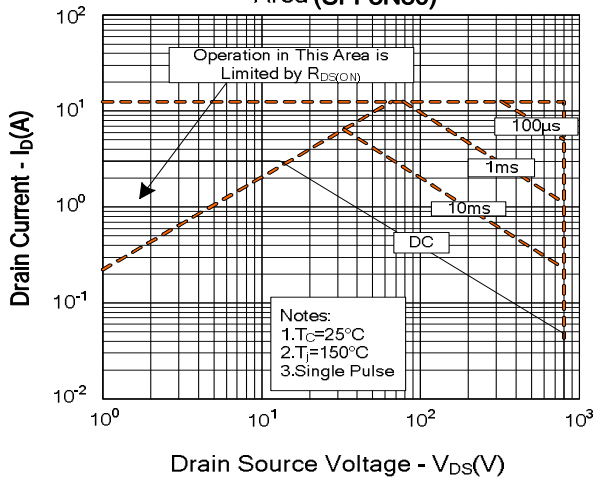
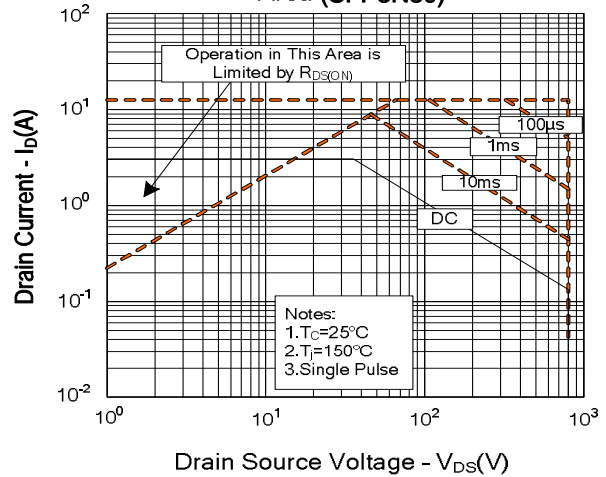
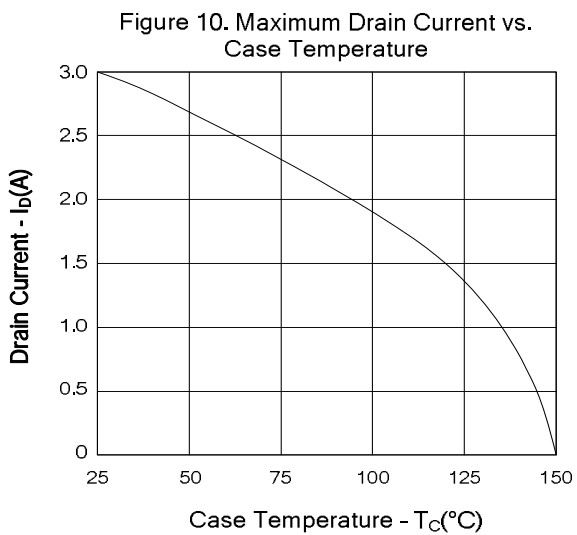


Figure 9-4. Max. Safe Operating Area (SFP3N80)

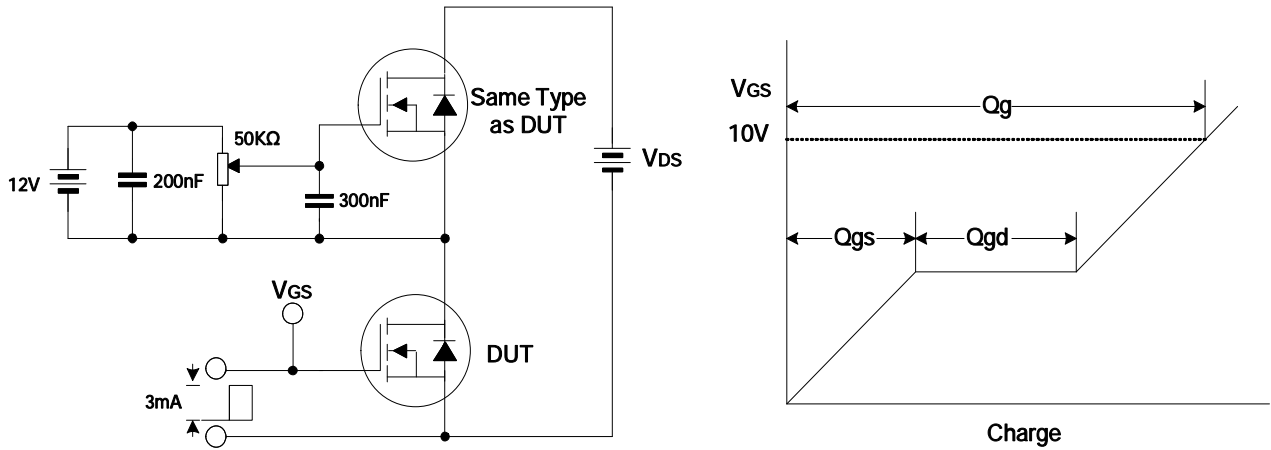


TYPICAL CHARACTERISTICS

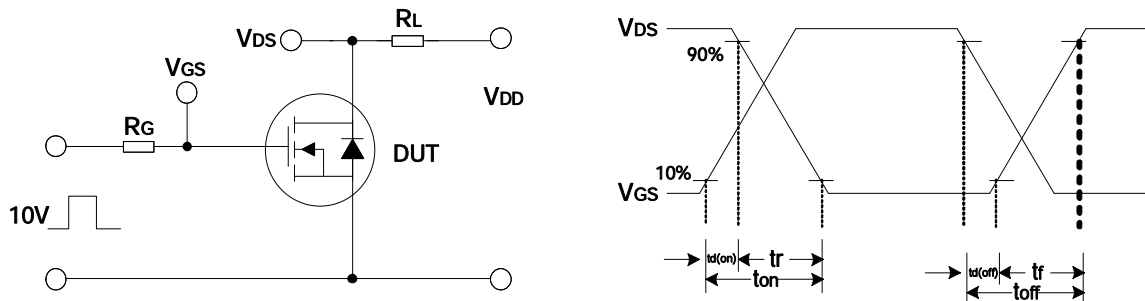


TYPICAL TEST CIRCUIT

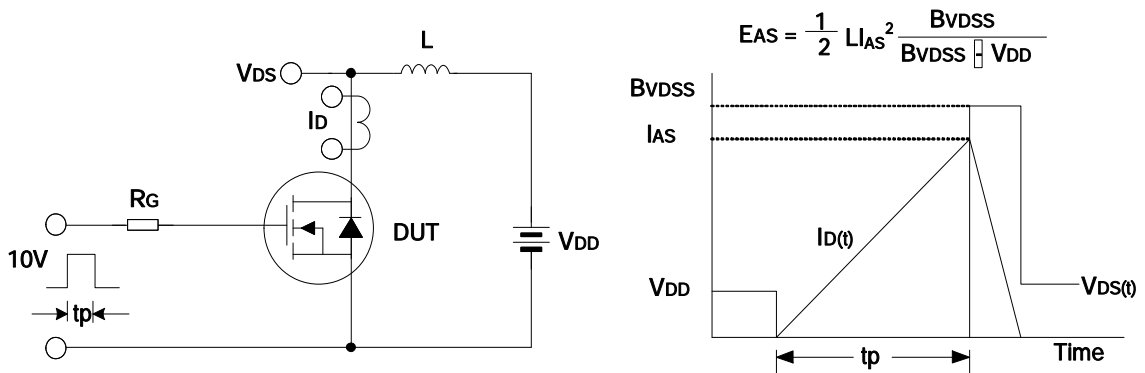
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



PACKAGE OUTLINE(continued)

