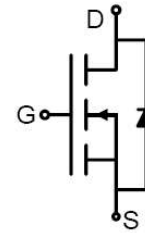


**Feature**

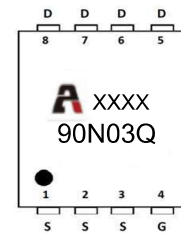
- 30V,90A  
 $R_{DS(ON)} < 4.2m\Omega @ V_{GS}=10V$  TYP:3.6 m $\Omega$   
 $R_{DS(ON)} < 7.0m\Omega @ V_{GS}=4.5V$  TYP:5.2 m $\Omega$
- Advanced Trench Technology
- Lead free product is acquired
- Excellent  $R_{DS(ON)}$  and Low Gate Charge



**Schematic Diagram**

**Application**

- PWM applications
- Load Switch
- Power management



**Marking and pin Assignment**

**Package Marking and Ordering Information**

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
90N03Q	AP90N03Q	PDFN3X3	13 inch	-	5000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a = 25^{\circ}C$ )	$I_D$	90	A
Continuous Drain Current ( $T_a = 100^{\circ}C$ )	$I_D$	53	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	330	A
Singel Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	240	mJ
Power Dissipation	$P_D$	46	W
Thermal Resistance from Junction to Case <sup>(4)</sup>	$R_{\theta JC}$	2.5	$^{\circ}C/W$
Junction Temperature	$T_J$	150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55~ +150	$^{\circ}C$

**MOSFET ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA	30	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V	-	-	±100	nA
Gate threshold voltage <sup>(3)</sup>	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.5	2.5	V
Drain-source on-resistance <sup>(3)</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	3.6	4.2	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	-	5.2	7.0	
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f =1MHz	-	1950	-	pF
Output Capacitance	C <sub>oss</sub>		-	320	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	240	-	
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω	-	13	-	ns
Turn-on rise time	t <sub>r</sub>		-	36	-	
Turn-off delay time	t <sub>d(off)</sub>		-	43	-	
Turn-off fall time	t <sub>f</sub>		-	16	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =30A, V <sub>GS</sub> =10V	-	42	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	3.9	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	14	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	V <sub>DS</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	-	-	1.2	V
Diode Forward current <sup>(4)</sup>	I <sub>S</sub>		-	-	90	A

**Notes:**

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, R<sub>G</sub>=25 Ω, L=0.5mH
3. Pulse Test: pulse width≤300μs, duty cycle≤2%
4. Surface Mounted on FR4 Board, t≤10 sec

**Test Circuit**

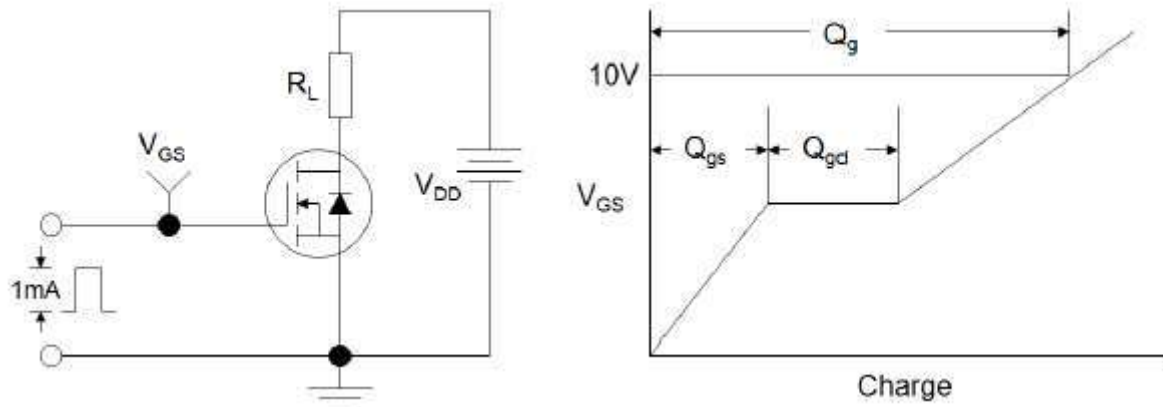


Figure1:Gate Charge Test Circuit & Waveform

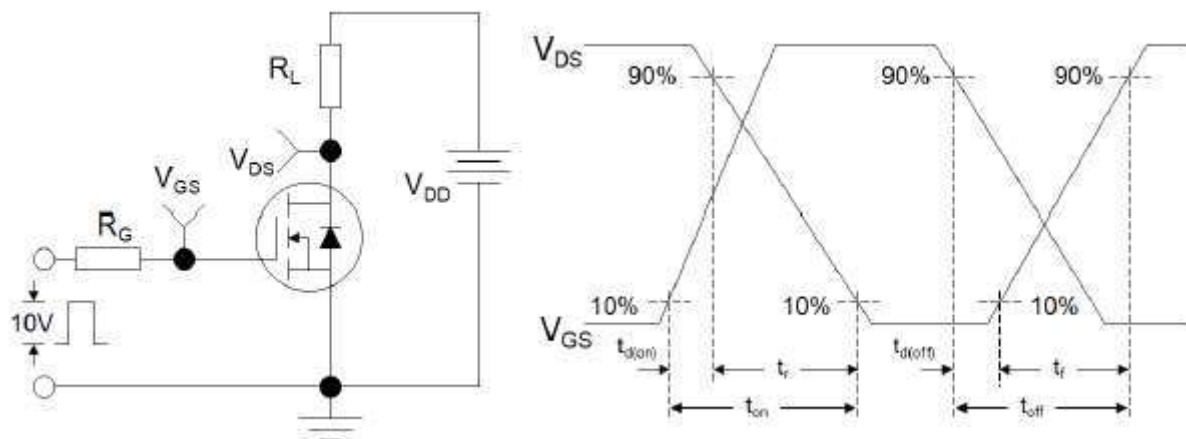


Figure 2: Resistive Switching Test Circuit & Waveforms

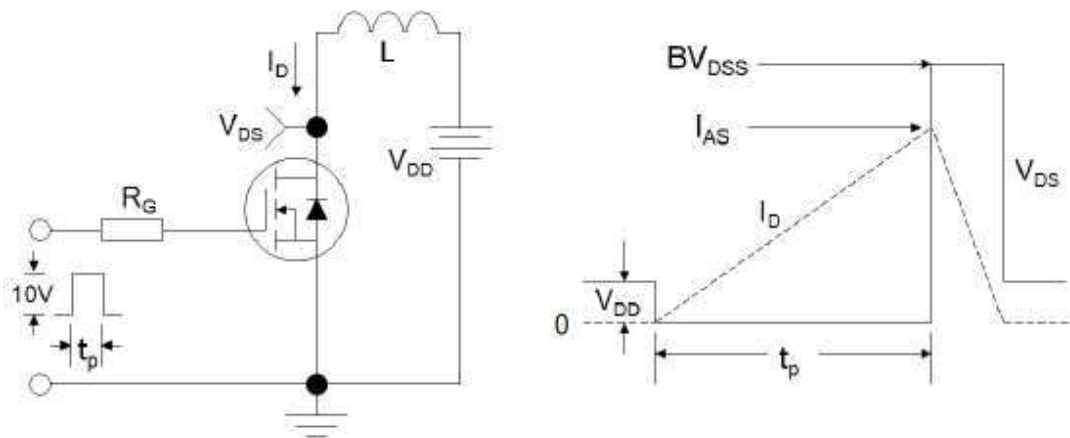
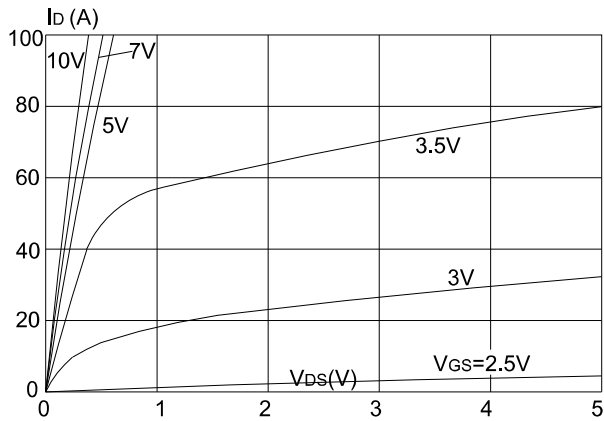


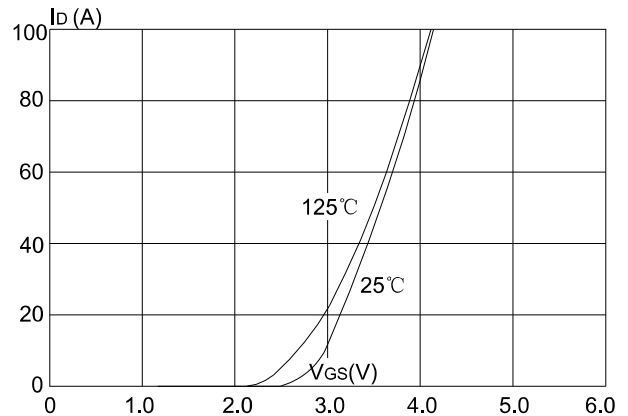
Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

**Typical Performance Characteristics**

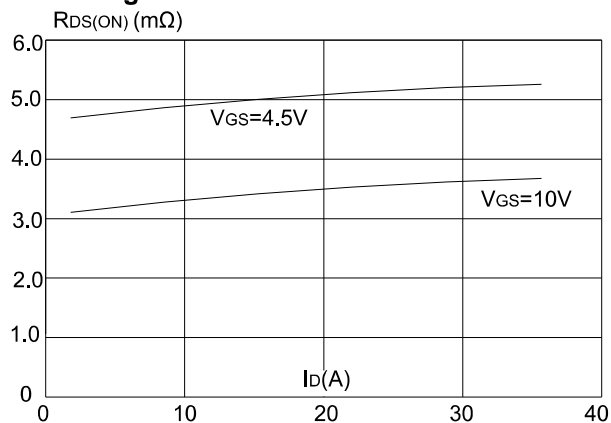
**Figure 1: Output Characteristics**



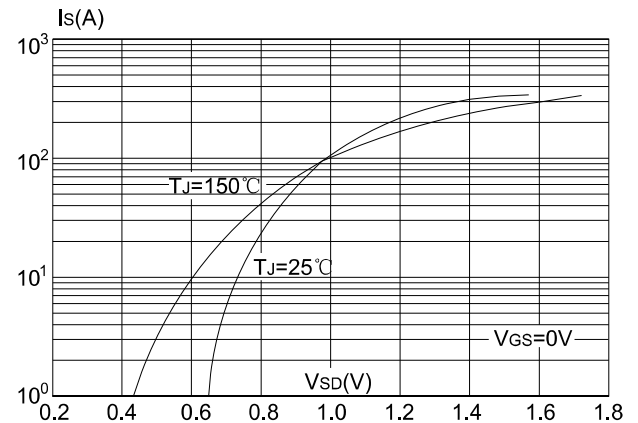
**Figure 2: Typical Transfer Characteristics**



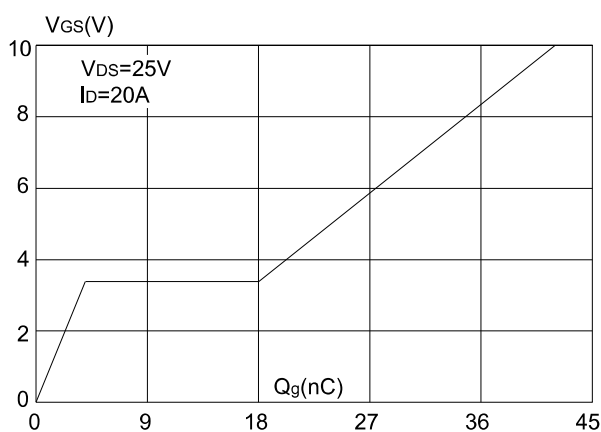
**Figure 3: On-resistance vs. Drain Current**



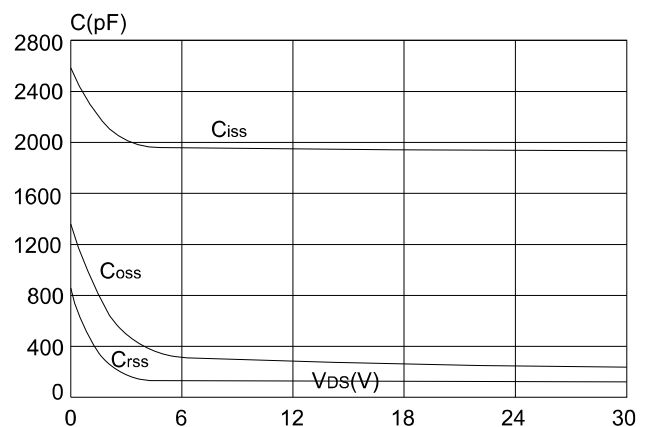
**Figure 4: Body Diode Characteristics**



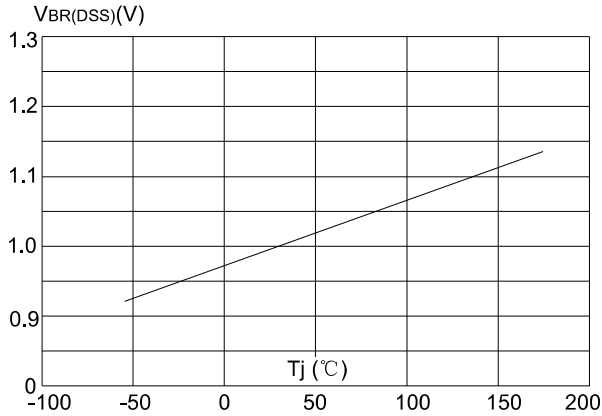
**Figure 5: Gate Charge Characteristics**



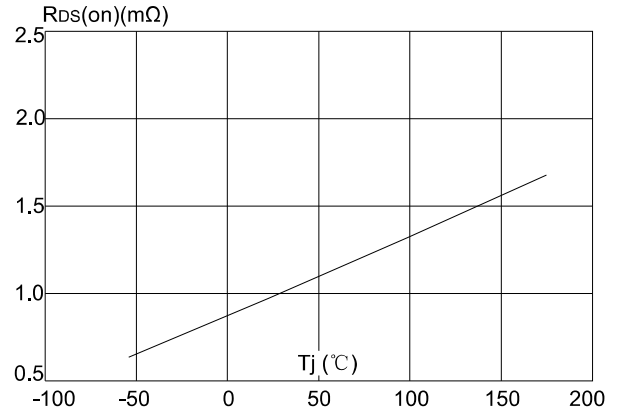
**Figure 6: Capacitance Characteristics**



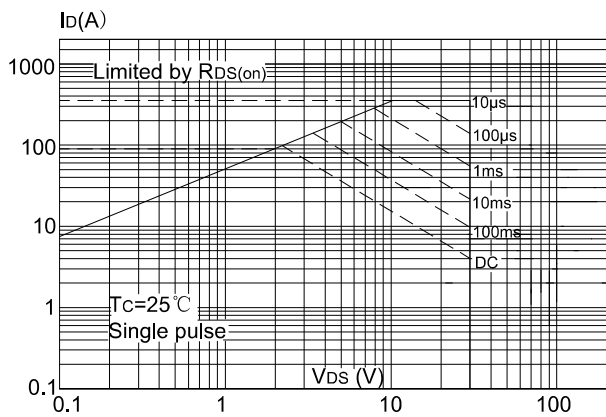
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



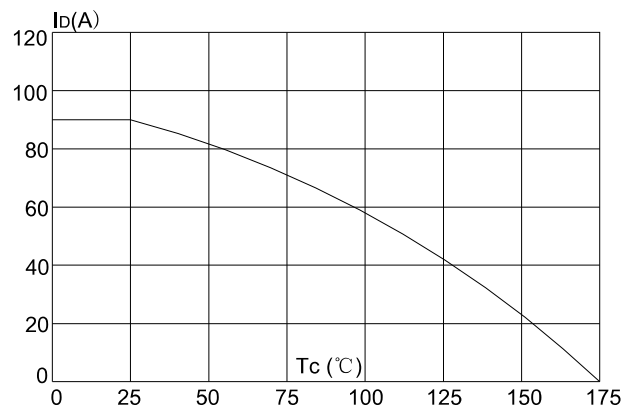
**Figure 8:** Normalized on Resistance vs. Junction Temperature



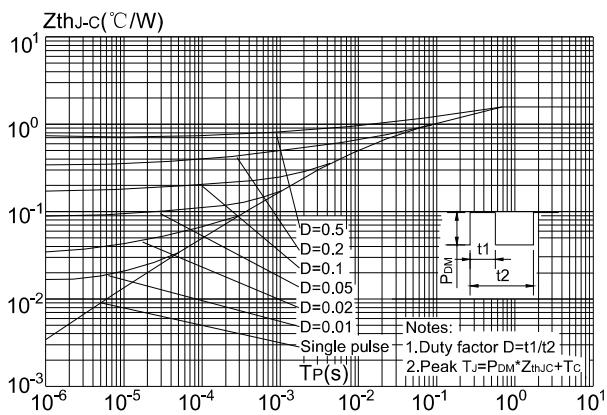
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

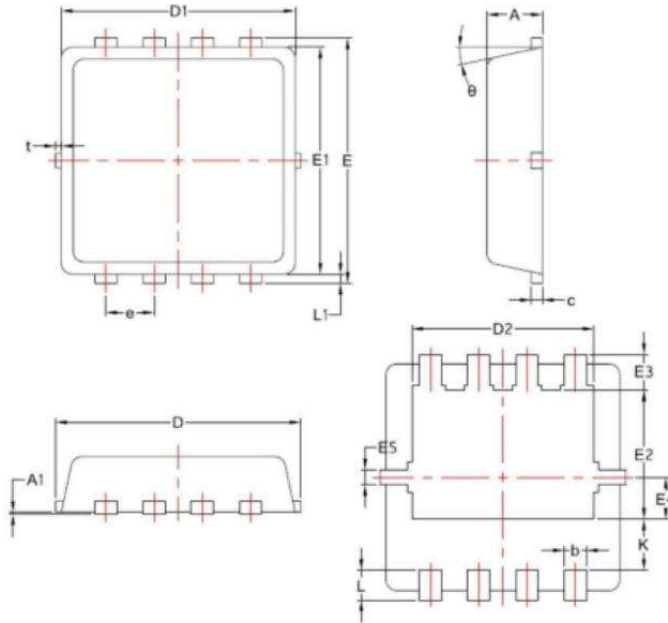


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



**AP90N03Q**  
N-Channel Enhancement Mosfet

**PDFN3X3 Package Information**



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
θ	10°	12°	14°