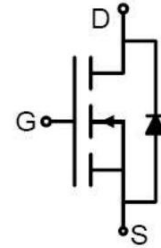


## Features

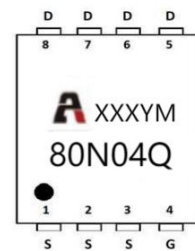
- 40V,40A  
 $R_{DS(on)} < 7.5m\Omega @ V_{GS}=10V$  TYP: 5.7m $\Omega$   
 $R_{DS(on)} < 12m\Omega @ V_{GS}=4.5V$  TYP: 8m $\Omega$
- Advanced Trench Technology
- Lead free product is acquired
- Excellent  $R_{DS(on)}$  and Low Gate Charge

## Applications

- PWM applications
- Load Switch
- Power management



Schematic Diagram



Marking and pin Assignment

## Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
80N04Q	AP80N04Q	PDFN3X3	-	-	5000

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_c=25^\circ\text{C}$ ) <sup>(1)</sup>	$I_D$	40	A
Continuous Drain Current ( $T_c=100^\circ\text{C}$ )	$I_D$	27	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	160	A
Drain Power Dissipation	$P_D$	21	W
Single Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	81	mJ
Thermal Resistance from Junction to Case	$R_{\theta JC}$	6	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	-55~ +150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ\text{C}$

### Notes:

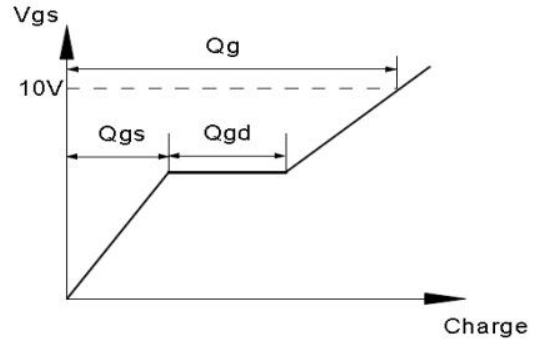
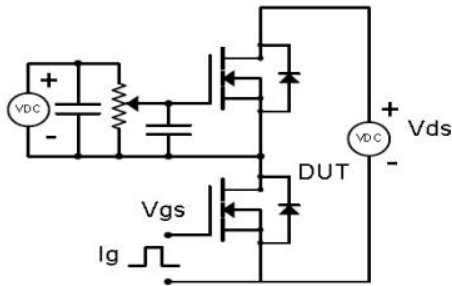
- 1) Repetitive Rating: pulse width limited by maximum junction temperature
- 2) EAS condition :  $T_J=25^\circ\text{C}$ ,  $V_{DD}=20\text{V}$ ,  $V_G=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$ ,  $I_{AS}=18\text{A}$

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

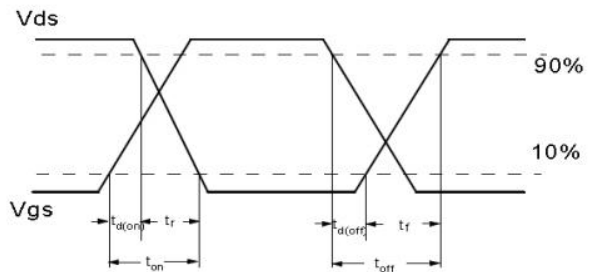
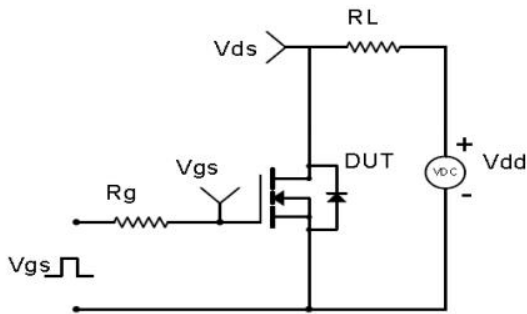
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 40V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.5	2.5	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 30A$	-	5.7	7.5	m $\Omega$
		$V_{GS} = 4.5V, I_D = 20A$	-	8	12	
Forward transconductance	$R_g$	$V_{GS} = 0V, V_{DS} = 0V, f = 1.0MHz$	-	2.4	-	$\Omega$
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$	-	2400	-	pF
Output Capacitance	$C_{oss}$		-	187	-	
Reverse Transfer Capacitance	$C_{rss}$		-	167	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 20V, I_D = 30A, R_L = 1\Omega$ $V_{GS} = 10V, R_G = 3\Omega$	-	13	-	ns
Turn-on rise time	$t_r$		-	12	-	
Turn-off delay time	$t_{d(off)}$		-	38	-	
Turn-off fall time	$t_f$		-	9	-	
Total Gate Charge	$Q_g$	$V_{DS} = 20V, I_D = 30A,$ $V_{GS} = 10V$	-	37	-	nC
Gate-Source Charge	$Q_{gs}$		-	6	-	
Gate-Drain Charge	$Q_{gd}$		-	7	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage	$V_{SD}$	$T_J = 25^{\circ}\text{C}, V_{GS} = 0V, I_S = 10A$	-	0.8	1.2	V
Diode Forward current	$I_S$	$T_C = 25^{\circ}\text{C}$	-	-	40	A

**Test Circuit & Waveform**

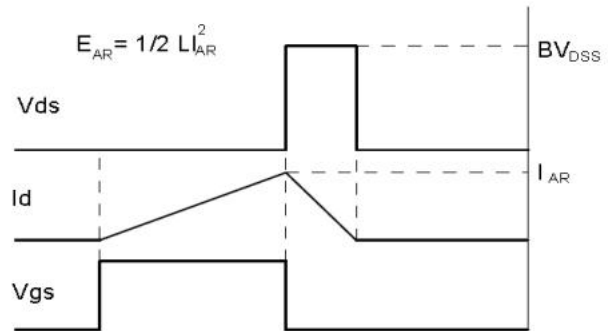
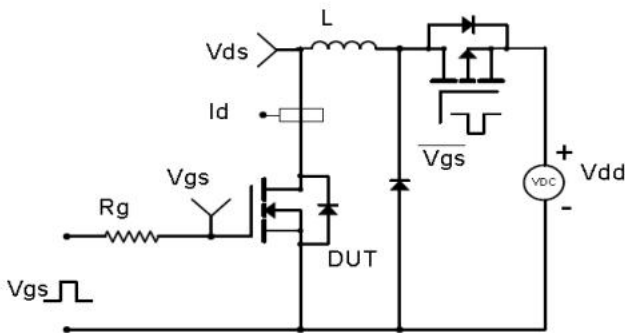
Gate Charge Test Circuit & Waveform



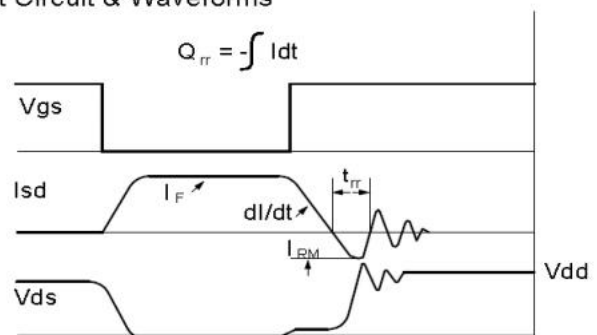
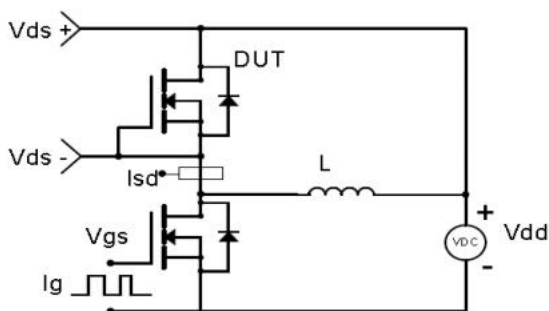
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

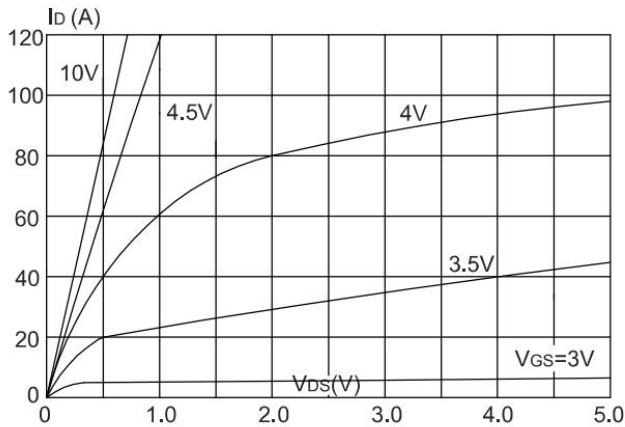


Diode Recovery Test Circuit & Waveforms

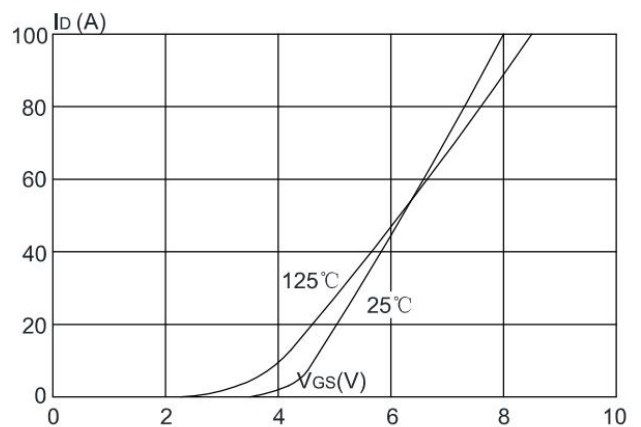


## Typical Characteristics

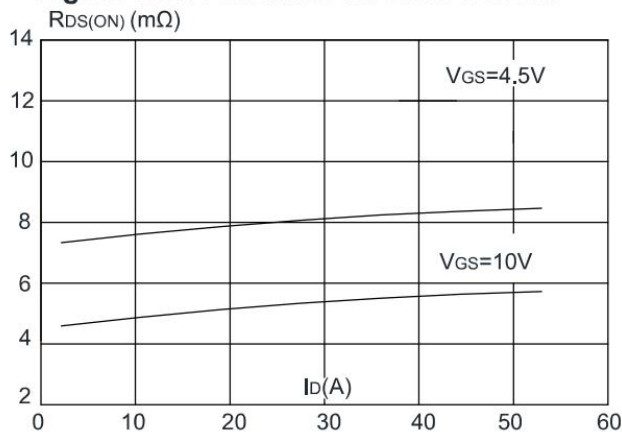
**Figure 1: Output Characteristics**



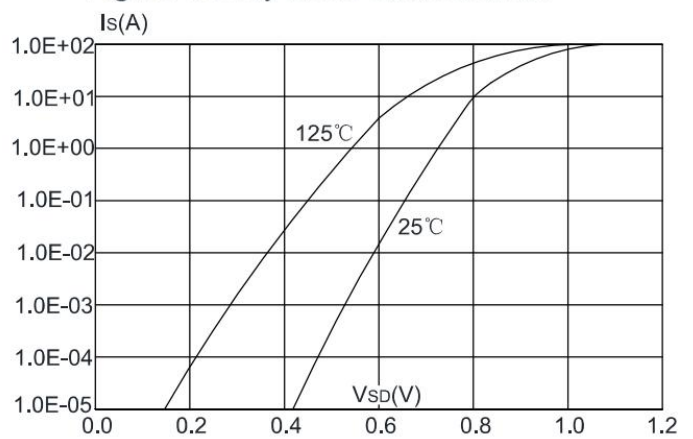
**Figure 2: Typical Transfer Characteristics**



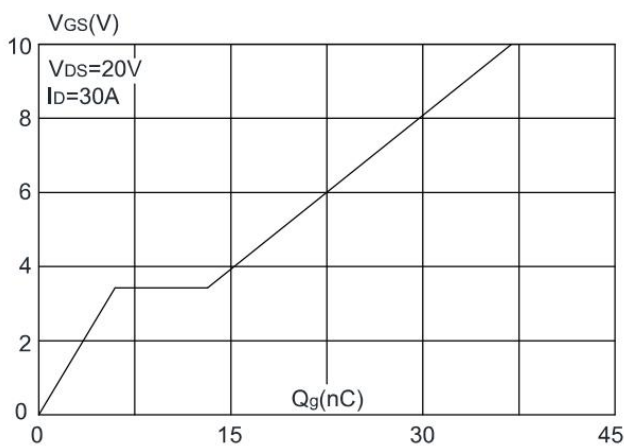
**Figure 3: On-resistance vs. Drain Current**



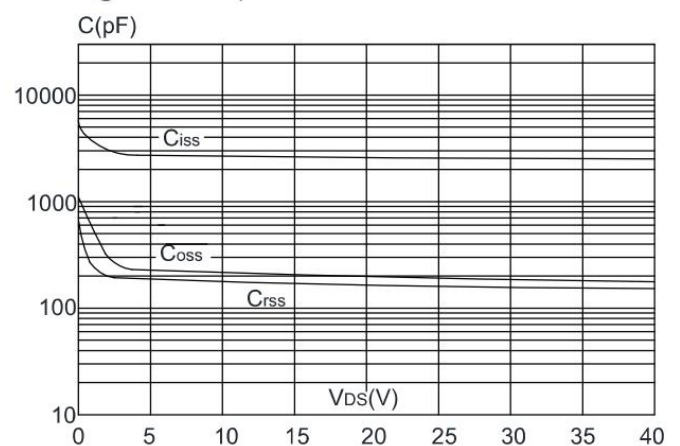
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

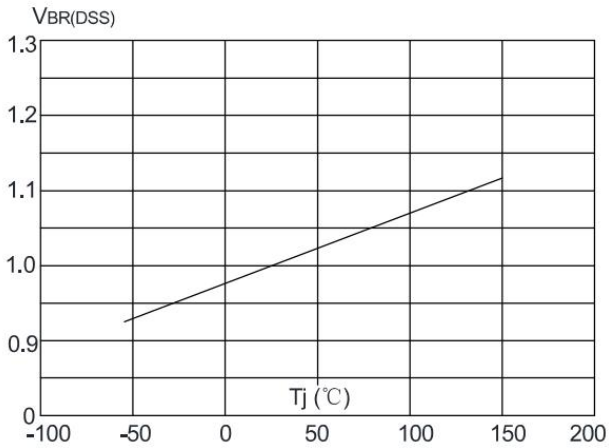


**Figure 6: Capacitance Characteristics**

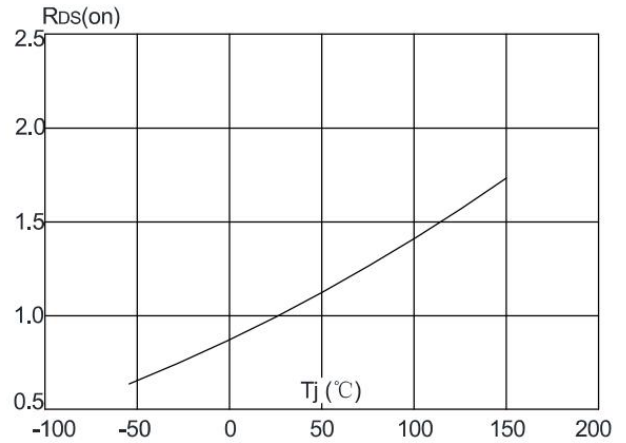


## Typical Characteristics

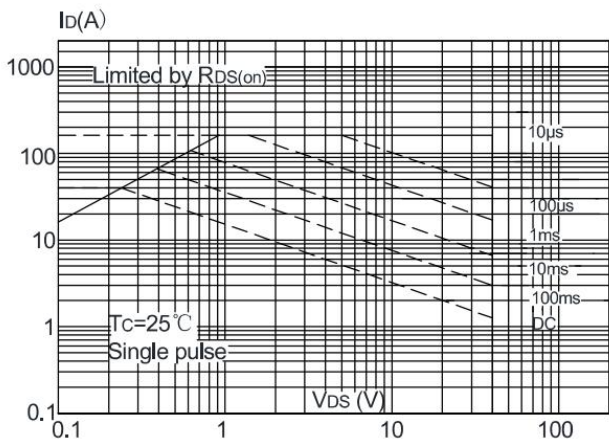
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



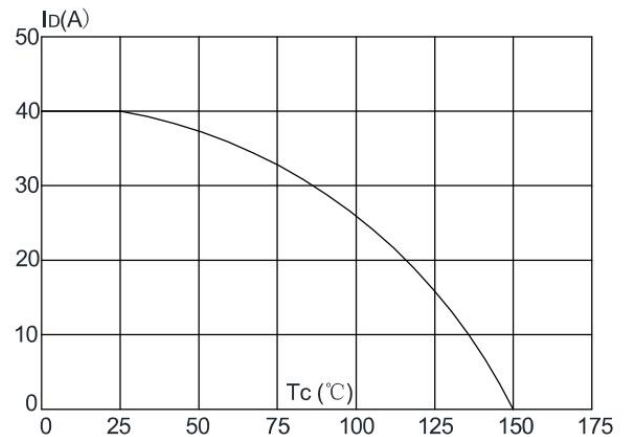
**Figure 8:** Normalized on Resistance vs. Junction Temperature



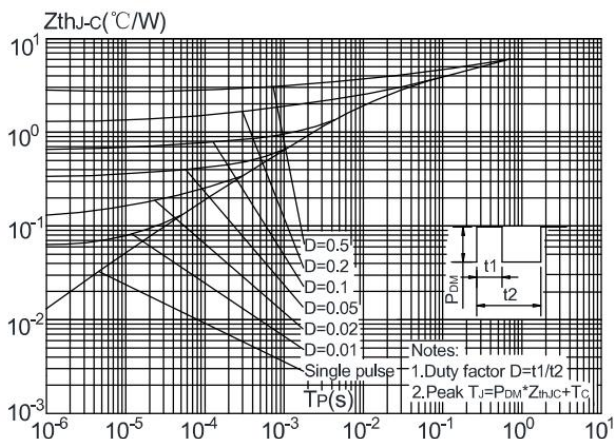
**Figure 9:** Maximum Safe Operating Area



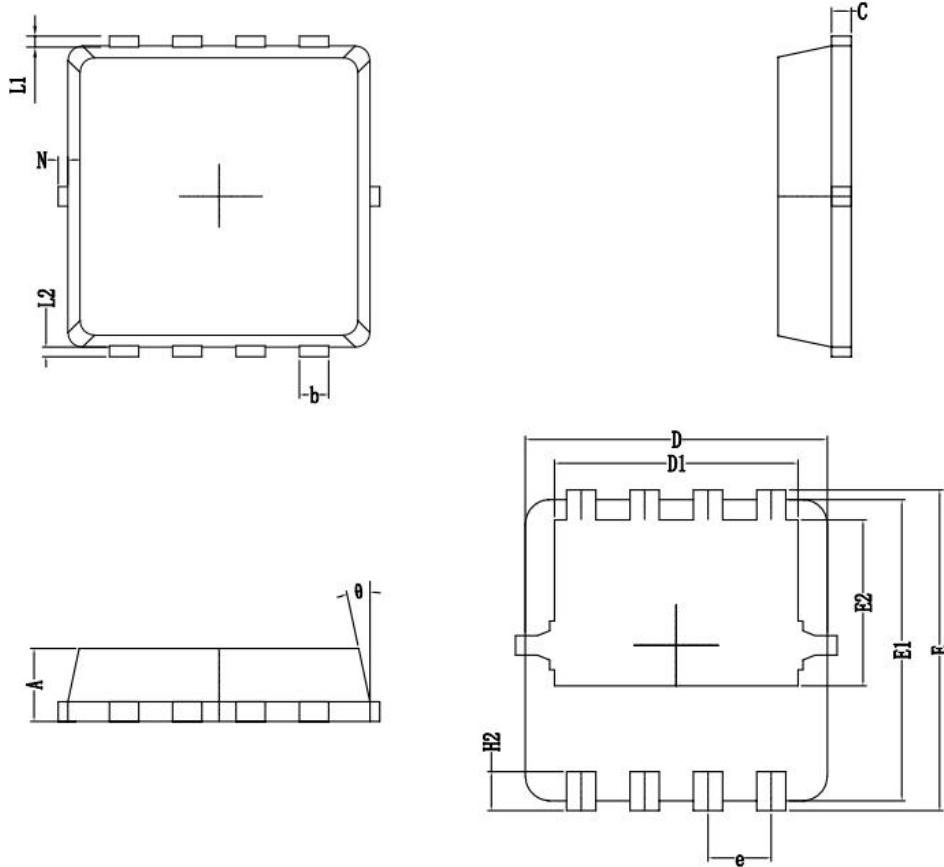
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



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



**PDFN3X3 Package Information**



Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.70	0.80	0.90
b	0.25	0.30	0.35
C	0.14	0.15	0.16
D	3.00	3.10	3.20
L1/L2	0.10 REF.		
D1	2.35	2.50	2.60
N	0	-	0.10
E	3.20	3.30	3.40
E1	3.00	3.10	3.20
E2	1.72	1.82	1.92
e	0.65 BSC.		
θ	11°	12°	13°
H2	0.30	0.40	0.50

## Revision History

Revision	Release	Remark
V1.2	2024/11/11	Update 4.5V RDSON

## Disclaimer

The information given in this document describes the independent performance of the product, but similar performance is not guaranteed under other working conditions, and cannot be guaranteed when installed with other products or equipment. To achieve the required performance of the product in actual scenarios, the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings, operating conditions, or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which requires high reliability. Customers using or selling these products for use in medical, life-saving, or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements, the information described or contained herein may be changed without prior notice.