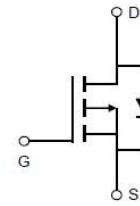


# AP20P30Q

## P-Channel Enhancement Mosfet

### Features

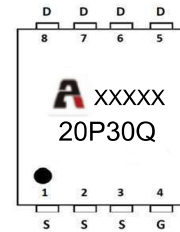
- $V_{DS} = -30V$ ,  $I_D = -35A$   
 $R_{DS(ON)} < 11m\Omega$  @  $V_{GS} = -10V$  (TYP:  $8.6m\Omega$ )  
 $R_{DS(ON)} < 18m\Omega$  @  $V_{GS} = -4.5V$  (TYP:  $13m\Omega$ )
- Advanced Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired



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)
20P30Q	AP20P30Q	PDFN3X3	13 inch	-	5000

## Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units	
V <sub>DSS</sub>	Drain-Source Voltage	-30	V	
V <sub>GSS</sub>	Gate-Source Voltage	±20	V	
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> = 25°C	-35	A
		T <sub>C</sub> = 100°C	-24	A
I <sub>DM</sub>	Pulsed Drain Current <sup>note1</sup>	-78	A	
E <sub>AS</sub>	Single Pulsed Avalanche Energy <sup>note2</sup>	78.8	mJ	
P <sub>D</sub>	Power Dissipation	T <sub>A</sub> = 25°C	21.5	W
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	5.8	°C/W	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C	

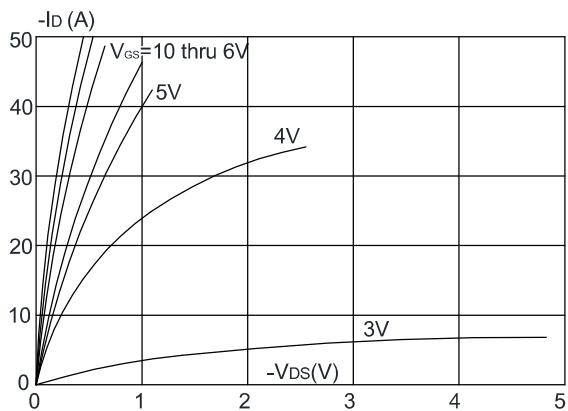
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D = -250\mu A$	-30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -30V, V_{GS} = 0V,$	-	-	-1	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.5	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS} = -10V, I_D = -12A$	-	8.6	11	m $\Omega$
		$V_{GS} = -4.5V, I_D = -8A$	-	13	18	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = -15V, V_{GS} = 0V,$ $f = 1.0MHz$	-	2800	-	pF
$C_{oss}$	Output Capacitance		-	346	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	319	-	pF
$Q_g$	Total Gate Charge	$V_{DS} = -15V, I_D = -20A,$ $V_{GS} = -10V$	-	30	-	nC
$Q_{gs}$	Gate-Source Charge		-	5.3	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	7.6	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = -15V, I_D = -20A,$ $V_{GS} = -10V, R_{GEN} = 2.5\Omega$	-	14	-	ns
$t_r$	Turn-on Rise Time		-	20	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	95	-	ns
$t_f$	Turn-off Fall Time		-	65	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	-10	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-40	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_S = -10A$	-	-0.8	-1.2	V

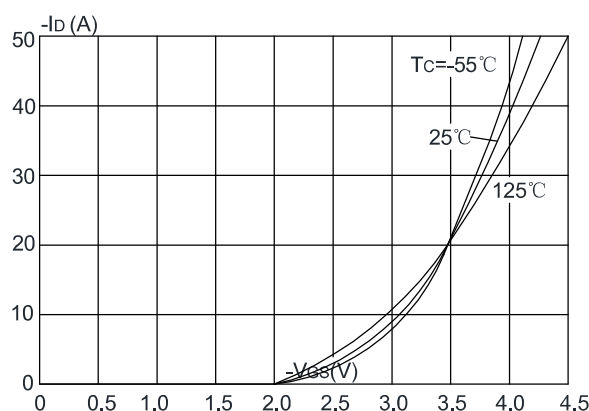
- Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature  
 2. EAS condition:  $T_J = 25^{\circ}\text{C}$ ,  $V_{DD} = -20V$ ,  $V_G = -10V$ ,  $L = 0.5mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = -17A$   
 3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$

**Typical Performance Characteristics**

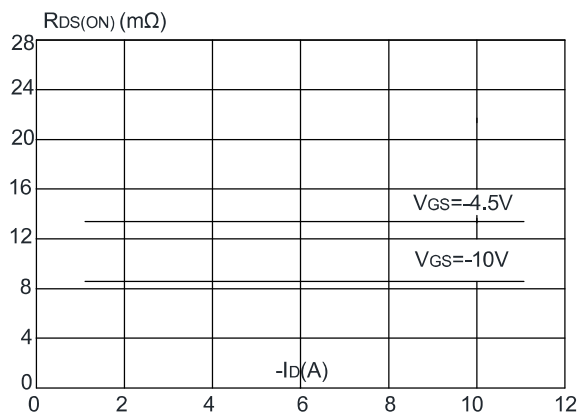
**Figure 1: Output Characteristics**



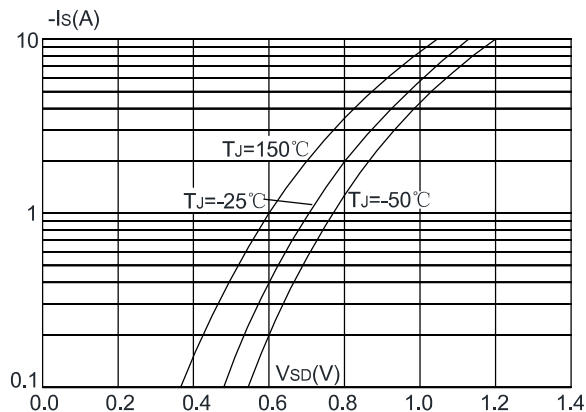
**Figure 2: Typical Transfer Characteristics**



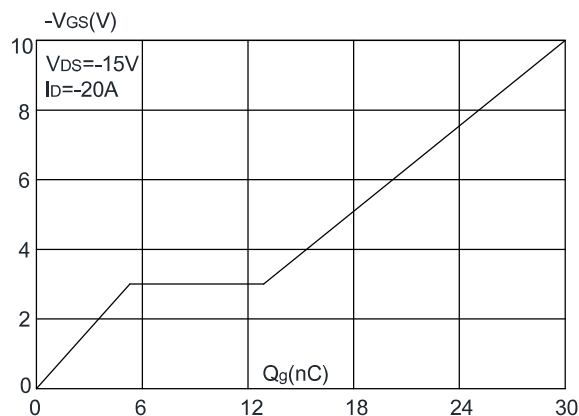
**Figure 3: On-resistance vs. Drain Current**



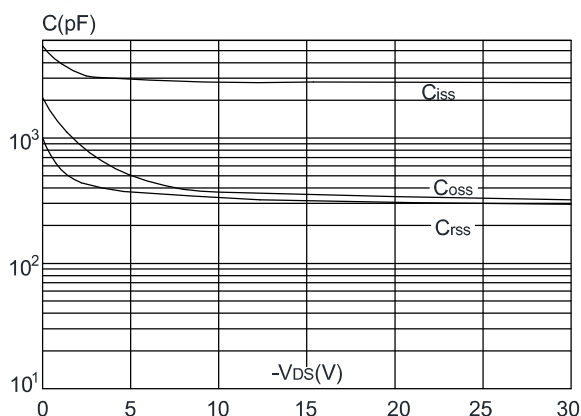
**Figure 4: Body Diode Characteristics**



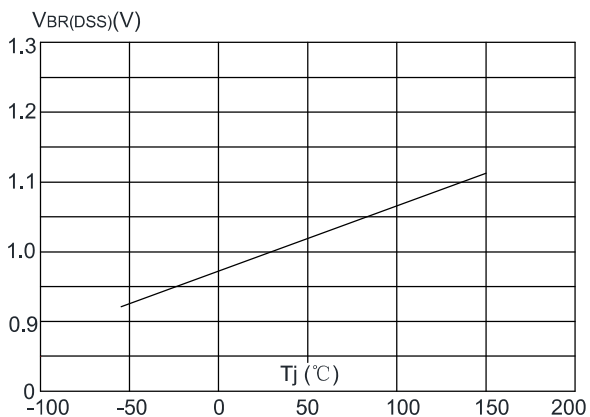
**Figure 5: Gate Charge Characteristics**



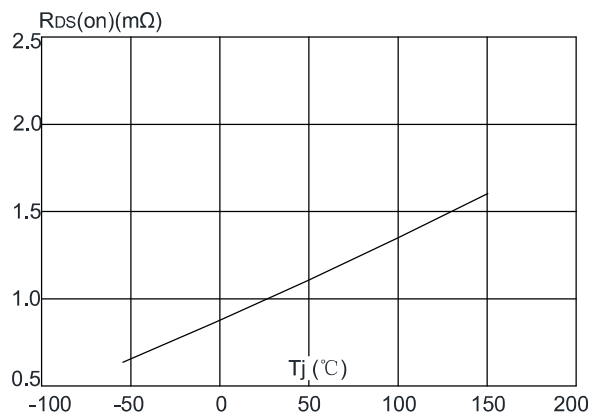
**Figure 6: Capacitance Characteristics**



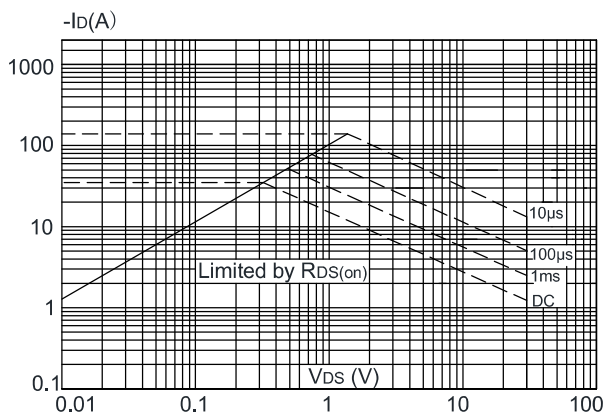
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



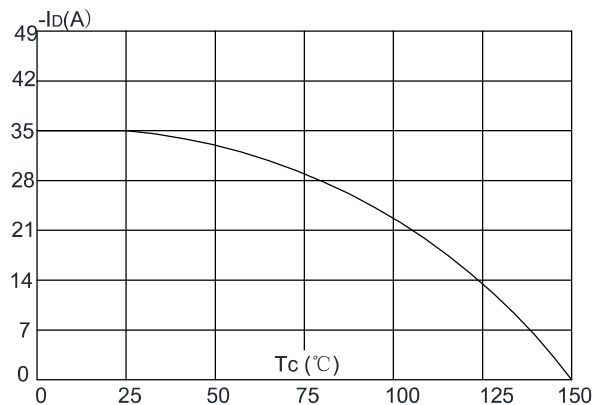
**Figure 8:** Normalized on Resistance vs. Junction Temperature



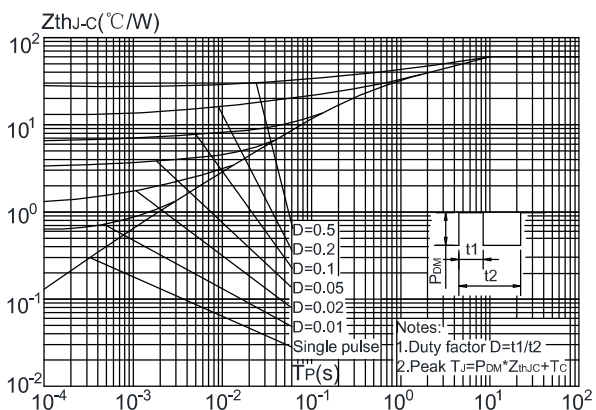
**Figure 9:** Maximum Safe Operating Area



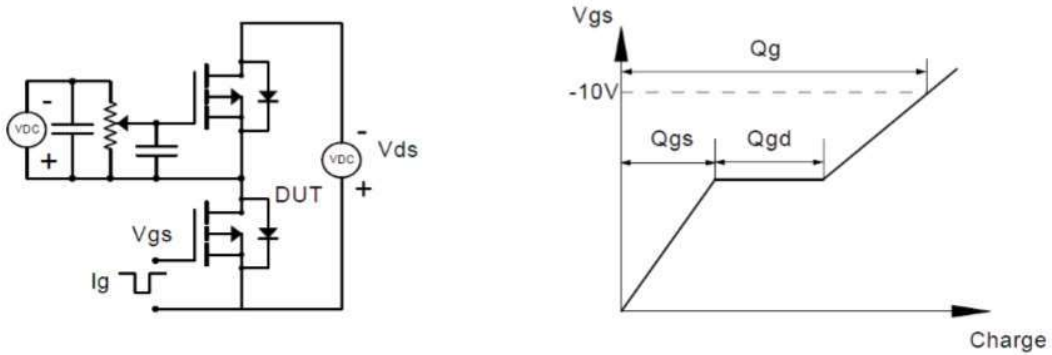
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



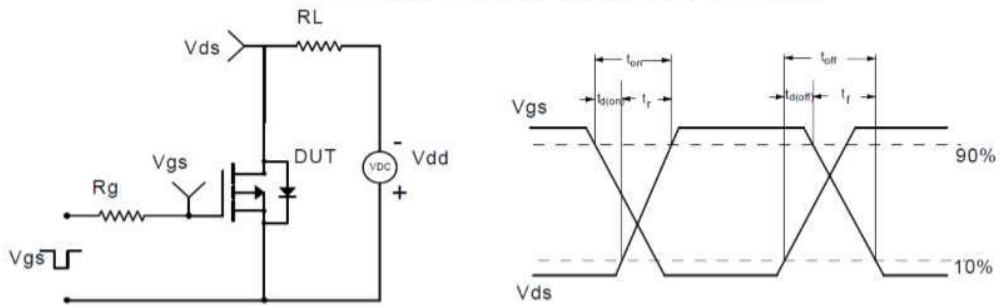
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



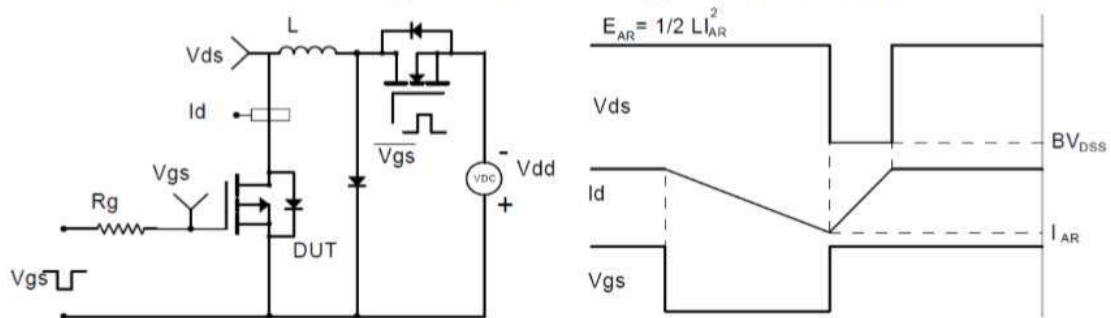
Gate Charge Test Circuit & Waveform



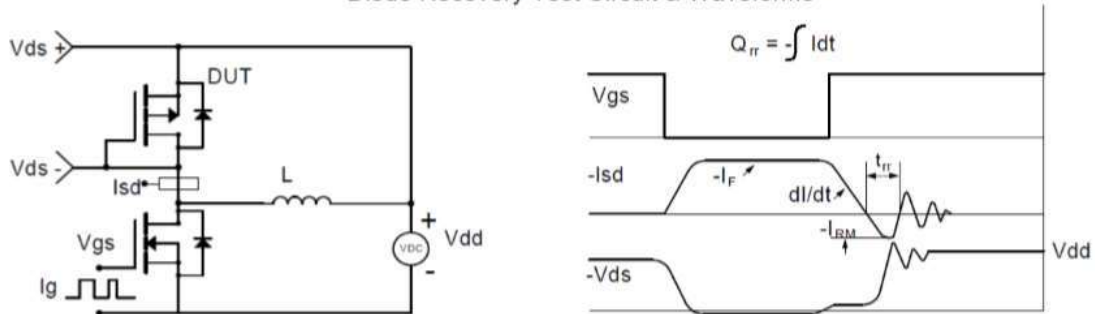
Resistive Switching Test Circuit & Waveforms



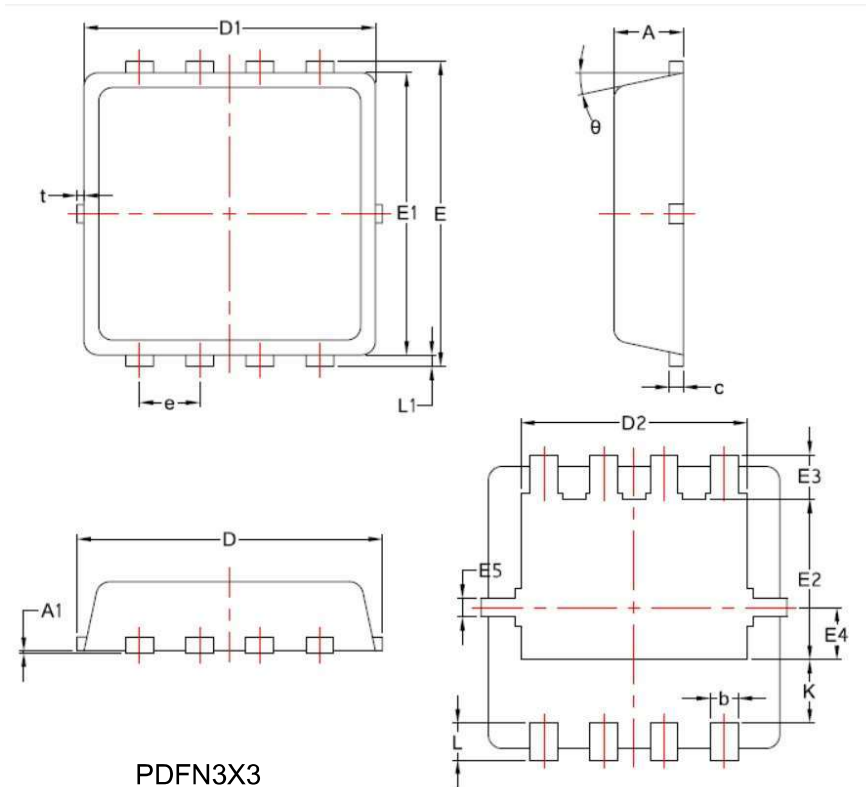
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**Package Mechanical Data**



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
$\theta$	10°	12°	14°