

# AP30P30Q

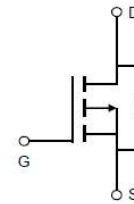
P-Channel Enhancement Mosfet

# AIIPOWER

## DATA SHEET

### Feature

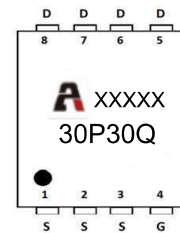
- -30V,-40A  
 $R_{DS(ON)} < 9m\Omega @ V_{GS} = -10V$   
 $R_{DS(ON)} < 13m\Omega @ V_{GS} = -4.5V$
- Trench DMOS Power MOSFET
- Fast Switching
- Exceptional on-resistance and maximum DC current capability



Schematic Diagram

### Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch



Marking and pin Assignment

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
30P30Q	AP30P30Q	PDFN3X3	13 inch	-	5000

### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ 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 ( $T_a = 25^\circ\text{C}$ )	$I_D$	-40	A
Continuous Drain Current ( $T_a = 100^\circ\text{C}$ )	$I_D$	-26	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	-160	A
Singel Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	156	mJ
Power Dissipation	$P_D$	32	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	50	$^\circ\text{C}/\text{W}$
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)

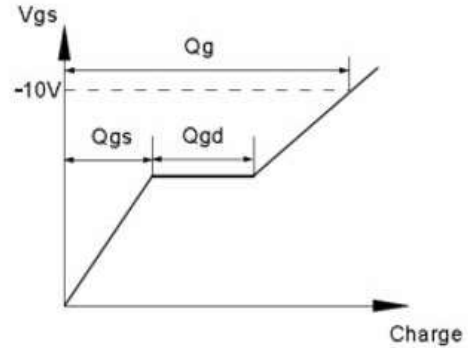
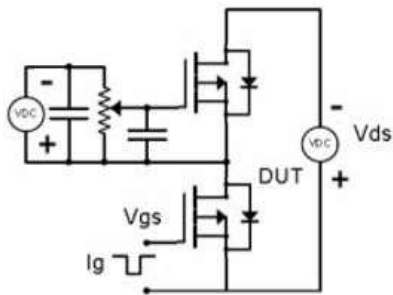
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -30V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage <sup>(3)</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1	-1.6	-2.2	V
Drain-source on-resistance <sup>(3)</sup>	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -20A$	-	7	9	m $\Omega$
		$V_{GS} = -4.5V, I_D = -10A$	-	10	13	
Forward tranconductance <sup>(3)</sup>	$g_{FS}$	$V_{DS} = -5V, I_D = -20A$	20	-	-	S
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$	-	3142	-	pF
Output Capacitance	$C_{oss}$		-	424	-	
Reverse Transfer Capacitance	$C_{rss}$		-	420	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DS} = -15V, I_D = -20A$ $V_{GS} = -10V, R_G = 2.5 \Omega$	-	13	-	ns
Turn-on rise time	$t_r$		-	47	-	
Turn-off delay time	$t_{d(off)}$		-	99	-	
Turn-off fall time	$t_f$		-	22	-	
Total Gate Charge	$Q_g$	$V_{DS} = -15V, I_D = -20A,$ $V_{GS} = -10V$	-	65	-	nC
Gate-Source Charge	$Q_{gs}$		-	9	-	
Gate-Drain Charge	$Q_{gd}$		-	15	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(3)</sup>	$V_{DS}$	$V_{GS} = 0V, I_S = -20A$	-	-	-1.2	V
Diode Forward current <sup>(4)</sup>	$I_S$		-	-	-40	A

**Notes:**

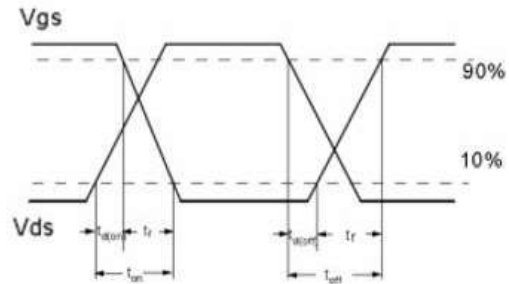
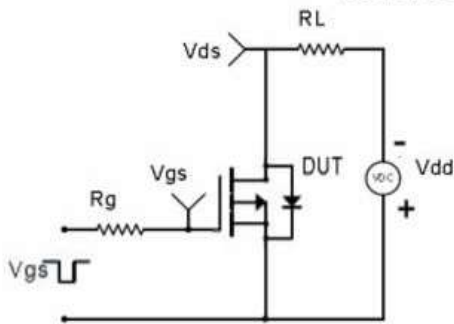
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition:  $T_J = 25^\circ\text{C}, V_{DD} = -15V, R_G = 20 \Omega, L = 0.5mH$
3. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
4. Surface Mounted on FR4 Board,  $t \leq 10 \text{ sec}$

**Test Circuit & Waveform**

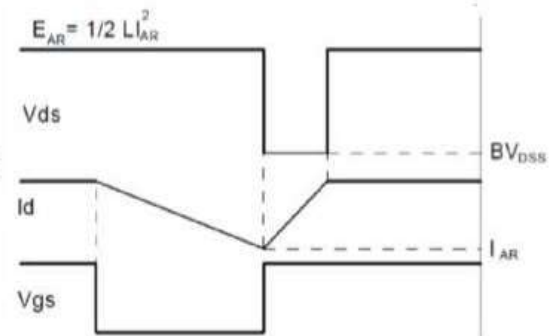
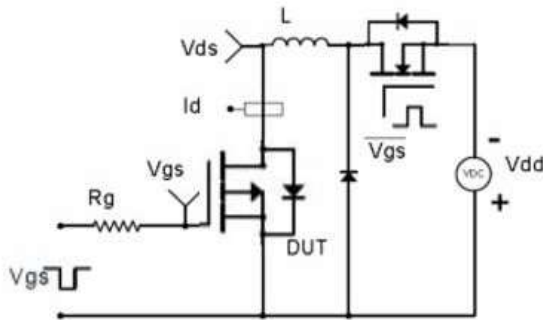
Gate Charge Test Circuit & Waveform



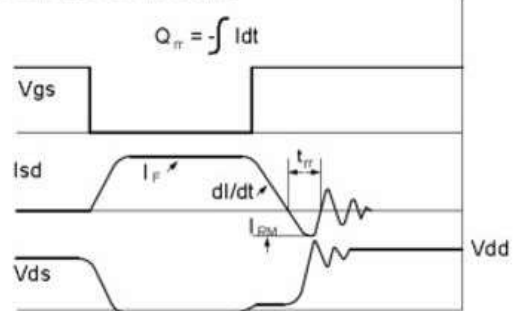
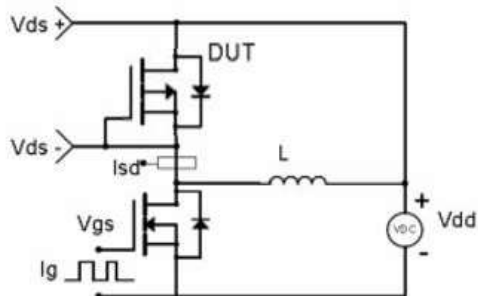
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**Typical Performance Characteristics**

Fig.1 Power Dissipation Derating Curve

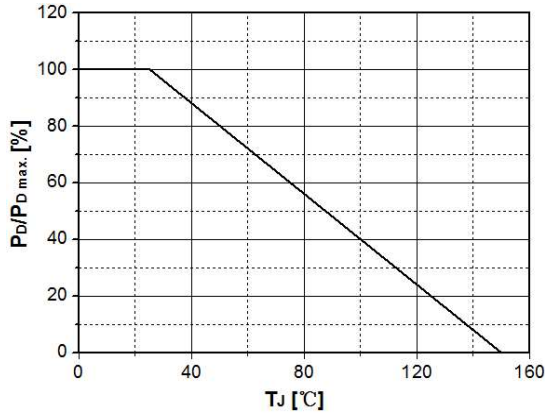


Fig.2 Avalanche Energy Derating Curve vs. Junction Temperature

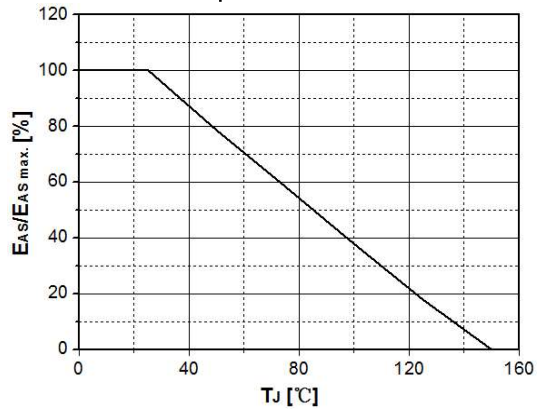


Fig.3 Typical Output Characteristics

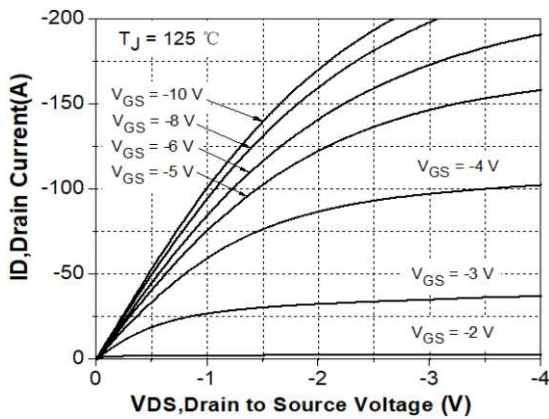


Fig. 4 Transconductance vs. Drain Current

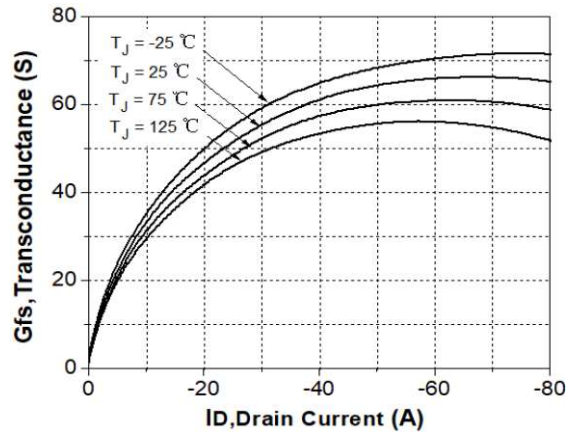


Fig.5 Typical Transfer Characteristics

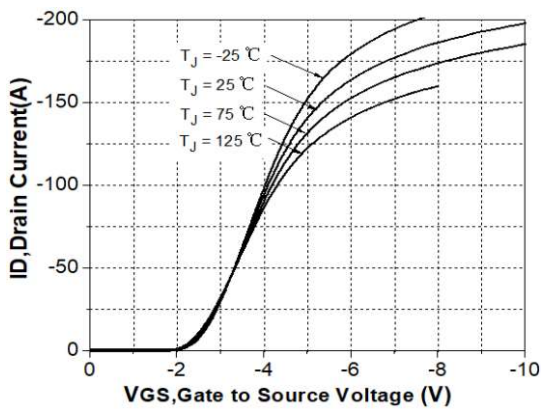


Fig. 6 State Resistance vs. Drain Current @-25°C

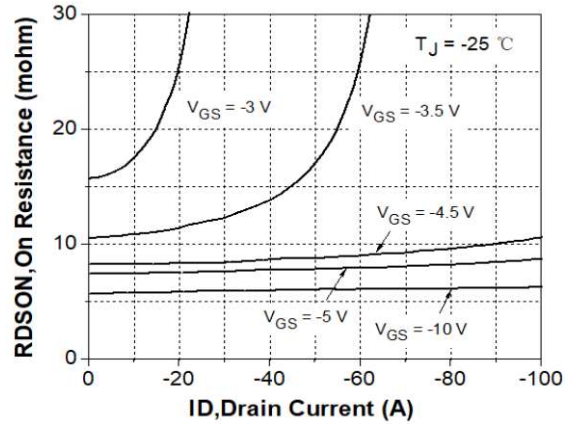


Fig.7 State Resistance vs. Drain Current @25°C

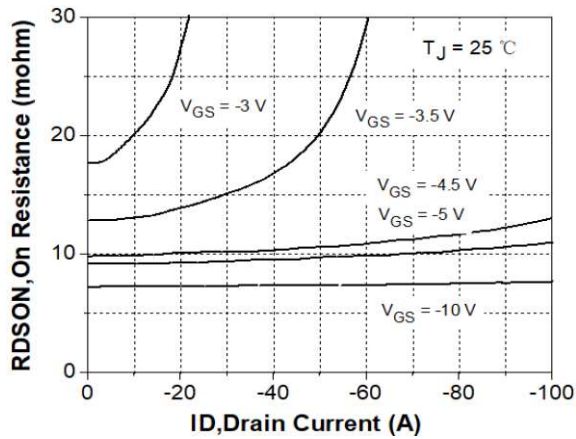


Fig. 8 State Resistance vs. Drain Current @125°C

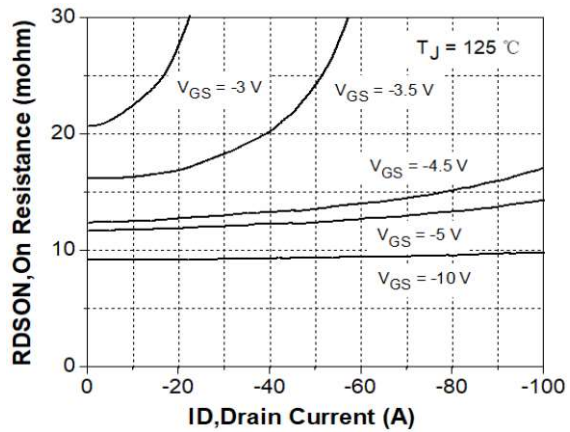


Fig.9 Typical Capacitance vs. Drain Source Voltage

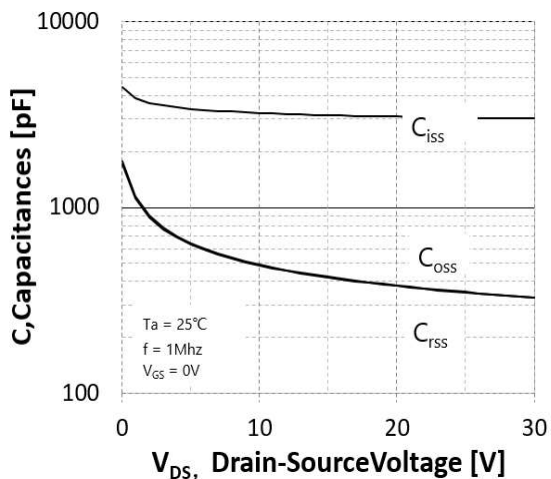


Fig.10 Dynamic Input Characteristics

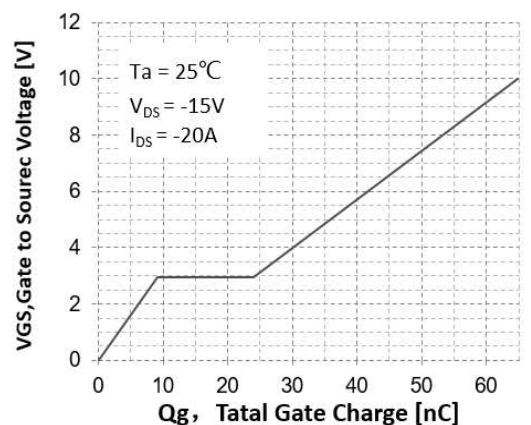


Fig.11 Breakdown Voltage vs. Junction Temperature

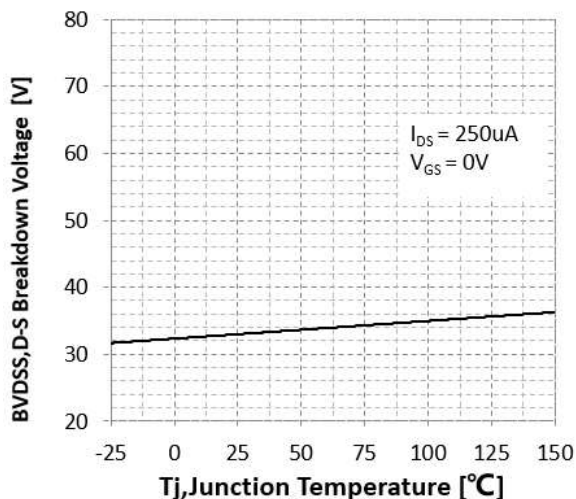


Fig. 12 Gate Threshold Voltage vs. Junction Temperature

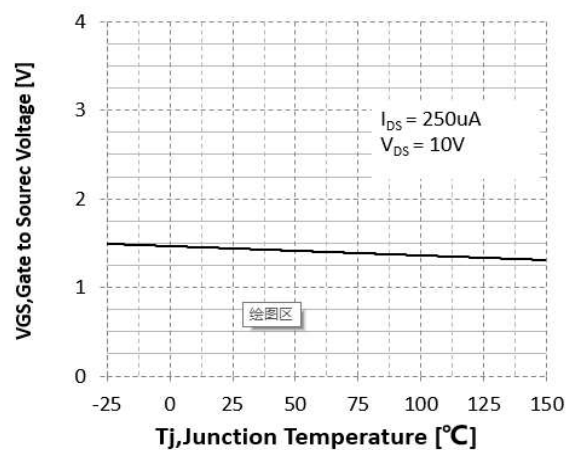




Fig.13 On-Resistance Variation vs. Junction Temperature

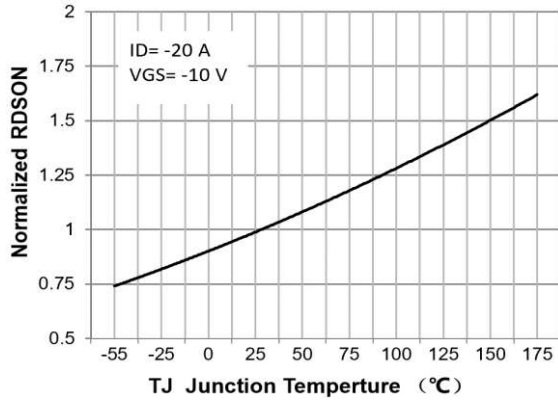


Fig.14 Maximum Drain Current vs. Case Temperature

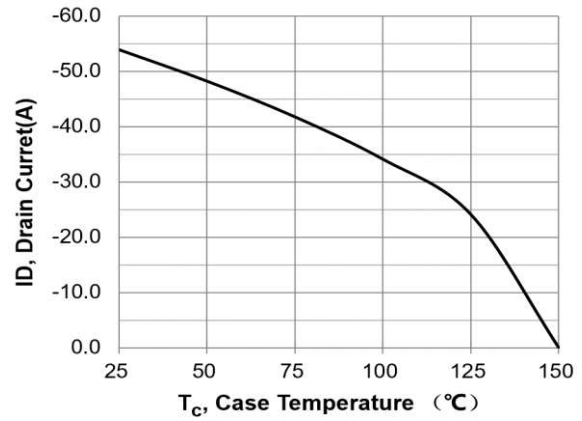


Fig.15 Body Diode Forward Voltage Vs Reverse Drain Current

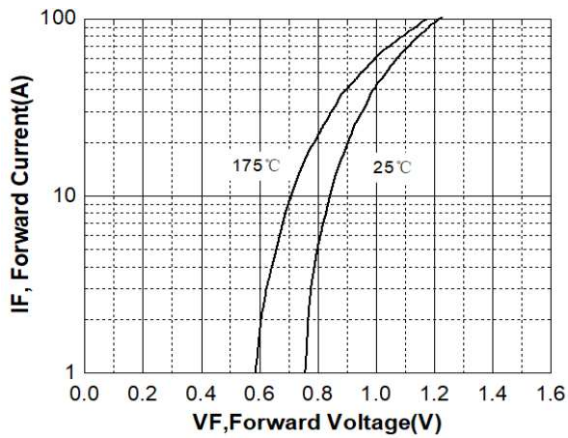


Fig.16 Safe Operating Area

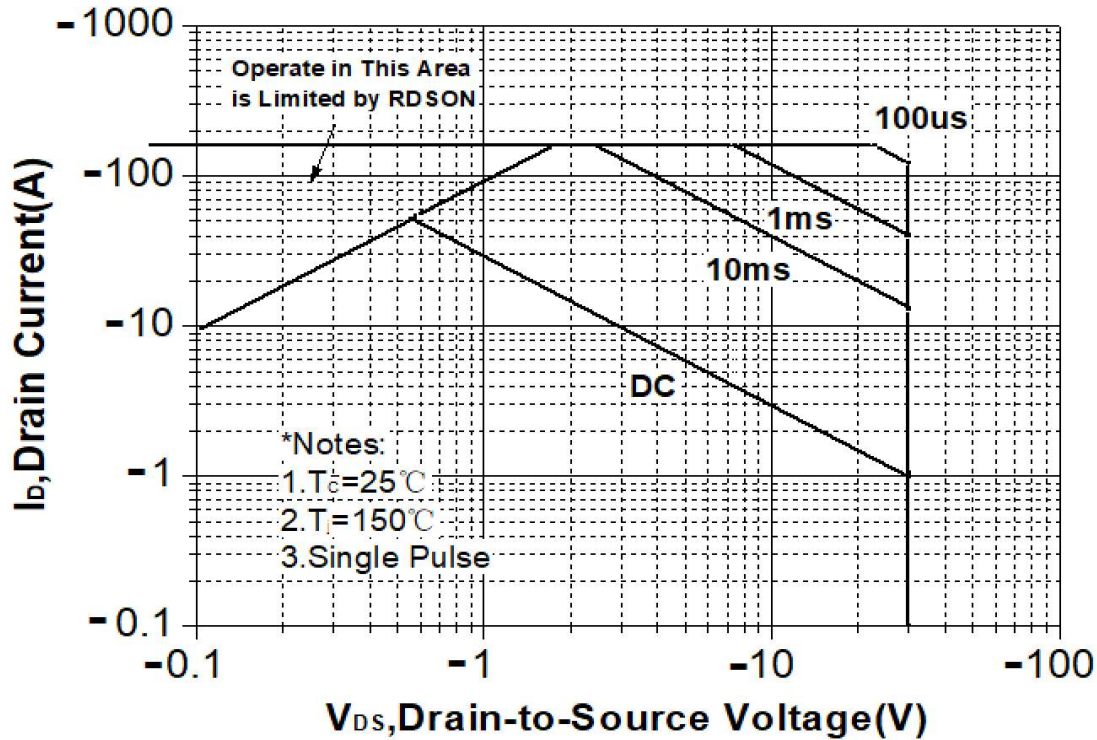
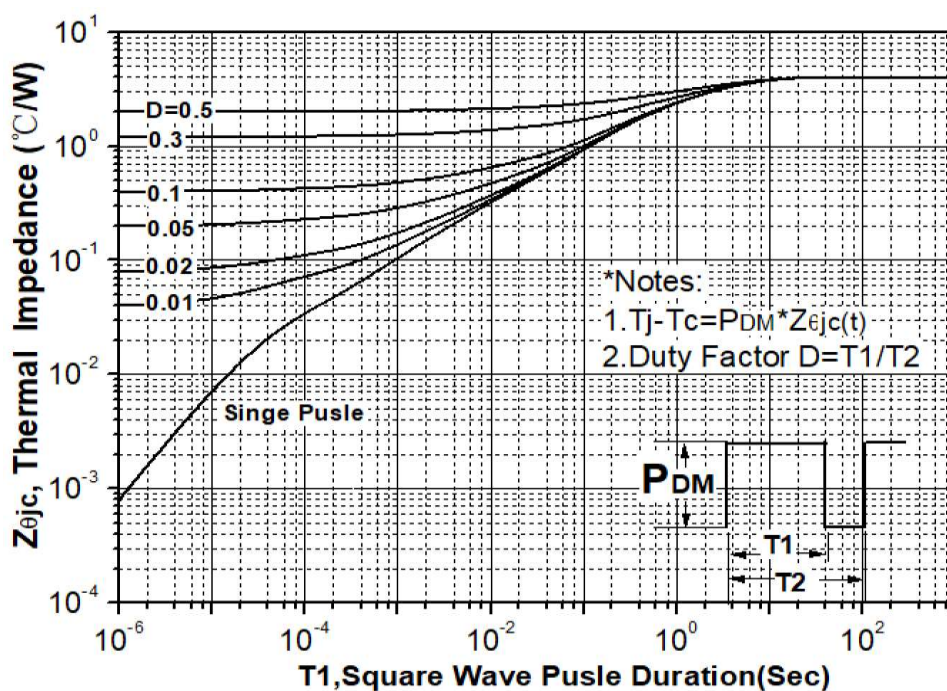


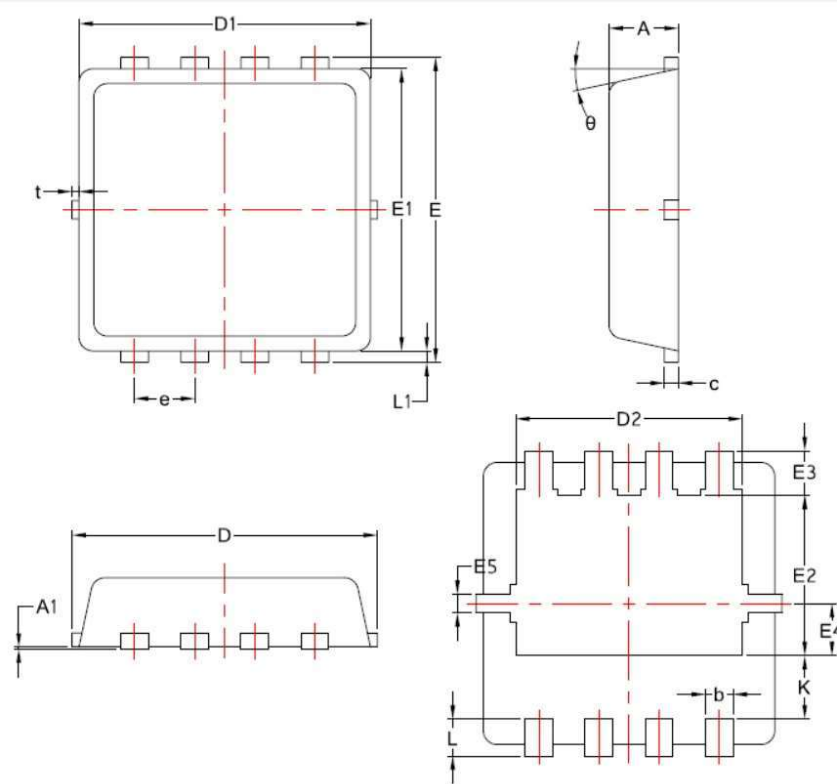
Fig. 17 Transient Thermal Response Curve



# AP30P30Q

P-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
$\theta$	10°	12°	14°