



AKT3090G 30V N-channel Enhancement Mode Power MOSFET

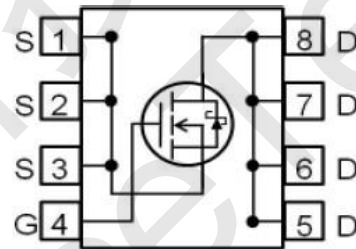
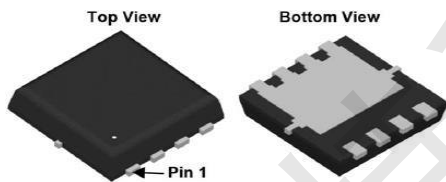
AKT3090G Features

- Extremely Low RDS(on):
Typ. $R_{DS(on)} = 2.3 \text{ m}\Omega @ V_{GS}=10 \text{ V}, I_d=30 \text{ A}$
- Good stability and uniformity
- 100% avalanche tested
- Excellent package for good heat dissipation

AKT3090G General Description

The AKT3090G uses advanced trench technology to provide excellent RDS(ON), low gate charge. This device is suitable for use in UPS, power switching and general purpose applications.

PDFN 5*6 Package



AKT3090G Maximum Ratings ($T_j=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	30	V
I_D	Drain Current - Continuous ($TC=25^\circ\text{C}$)	90	A
	Drain Current - Continuous ($TC=100^\circ\text{C}$)	58*	A
I_{DM}	Drain Current - Pulsed (Note 1)	360*	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	230	mJ
P_D	Power Dissipation ($TC = 25^\circ\text{C}$) - Derate above 25°C	51.63	W
			W/ $^\circ\text{C}$
T_j, T_{stg}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

* Drain current limited by maximum junction temperature

AKT3090G Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.421	$^\circ\text{C}/\text{W}$



AKT3090G 30V N-channel Enhancement Mode Power MOSFET

AKT3090G Electrical Characteristics TC = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 29.5\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
I_{GSS}	Gate Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1.1	1.6	2.1	V
$R_{DS(On)}$	Drain-Source on-state resistance	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		2.3	3.1	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$		4.2	5.8	m Ω
Dynamic Characteristics						
C_{iss}	Input capacitance	$V_{GS}=0\text{ V},$		3300		pF
C_{oss}	Output capacitance	$V_{DS}=15\text{ V},$		480		pF
C_{riss}	Reverse transfer capacitance	$f=1\text{ MHz}$		433		pF
Switching Characteristics						
$t_{d(on)}$	Turn On Delay Time	$V_{DD}=15\text{ V}, I_D=30\text{ A},$ $V_{GS}=10\text{ V}, R_G=30\ \Omega$ (Note 3, 4)		4		ns
t_r	Rising Time			26		ns
$t_{d(off)}$	Turn Off Delay Time			58		ns
t_f	Fall Time			29		ns
Q_g	Total Gate Charge	$V_{DD}=15\text{ V}, I_D=30\text{ A},$		68.5		nC
Q_{gs}	Gate-Source Charge	$V_{GS}=10\text{ V}$		9.6		nC
Q_{gd}	Gate-Drain Charge	(Note 3, 4)		12.4		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				90	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				360	A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 30\text{ A}$			1.2	V
T_{rr}	Reverse recovery time	$I_F=20\text{ A},$ $di_F/dt = 100\text{ A/us}$		20		ns
Q_{rr}	Reverse recovery charge			12		nC

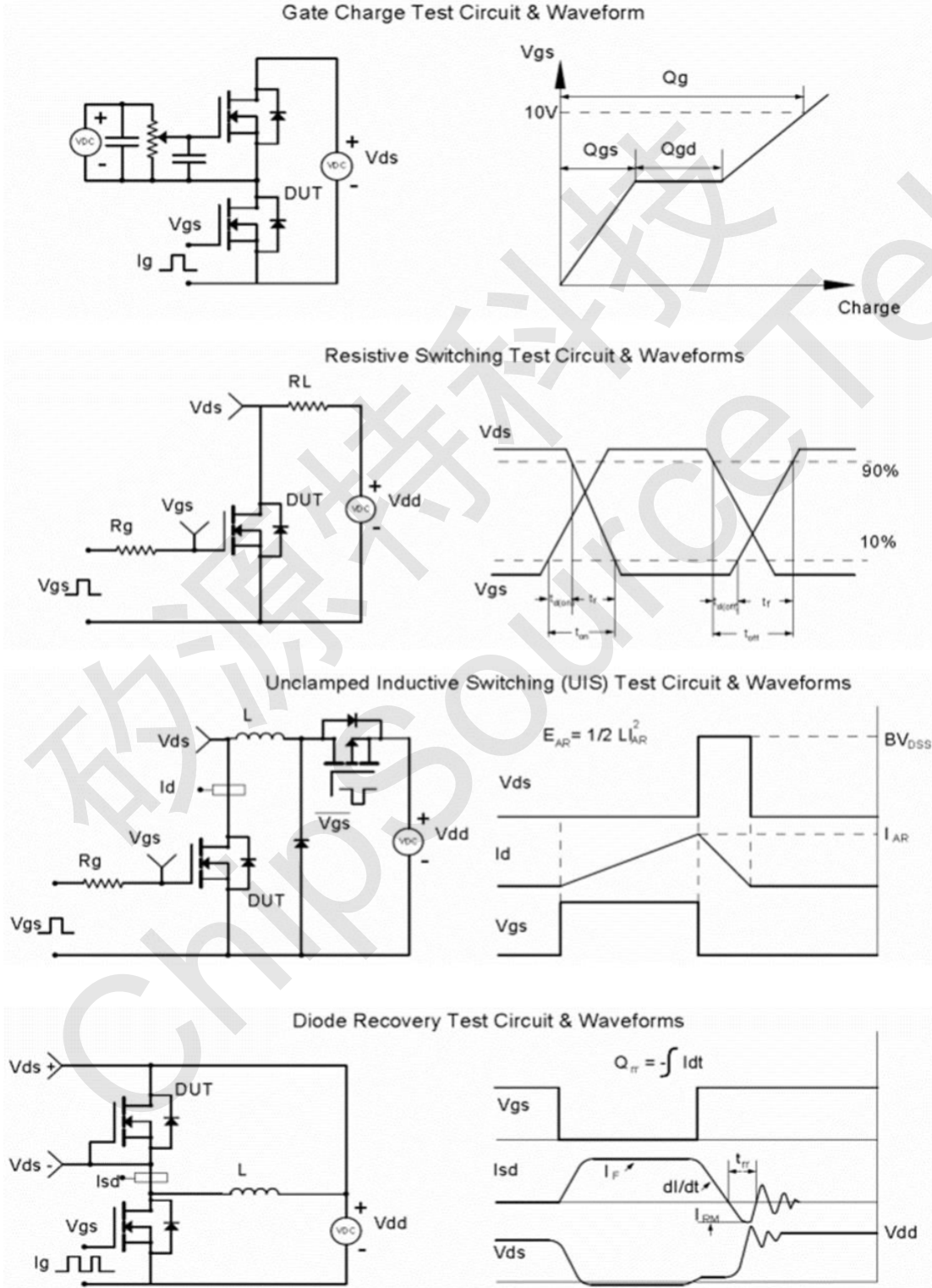
Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 0.5\text{ mH}, V_{DD} = -10\text{ V}, R_G = 25\ \Omega$, Starting $T_j = 25^\circ\text{C}$
3. $I_{SD} \leq -20\text{ A}, di/dt = 100\text{ A/us}, V_{DD} \leq BV_{DSS}$, Starting $T_j = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature



AKT3090G 30V N-channel Enhancement Mode Power MOSFET

AKT3090G Test Circuit & Waveform





AKT3090G 30V N-channel Enhancement Mode Power MOSFET

AKT3090G Typical Performance Characteristics

Fig.1 Power Dissipation Derating Curve

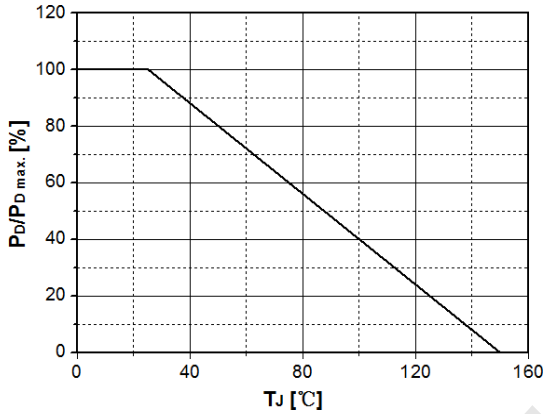


Fig.2 Avalanche Energy Derating Curve vs. Junction Temperature

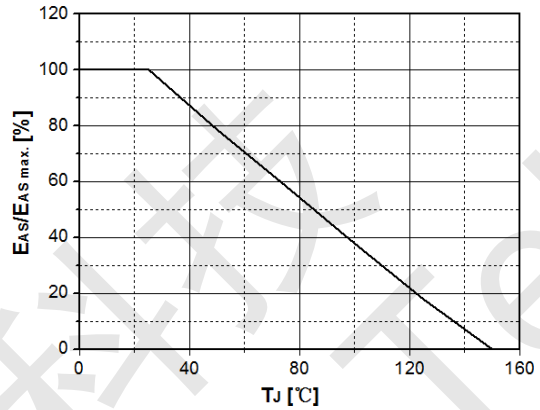


Fig.3 Typical Output Characteristics

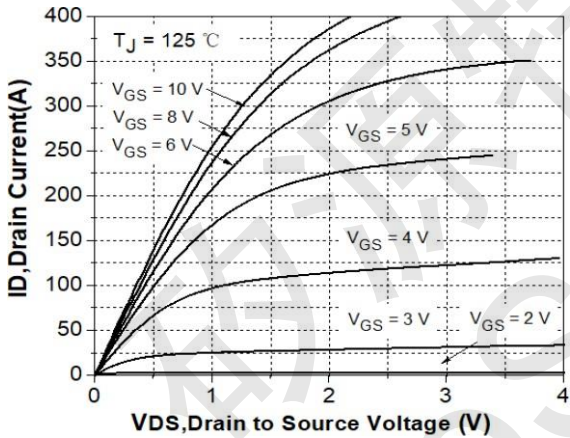


Fig. 4 Transconductance vs. Drain Current

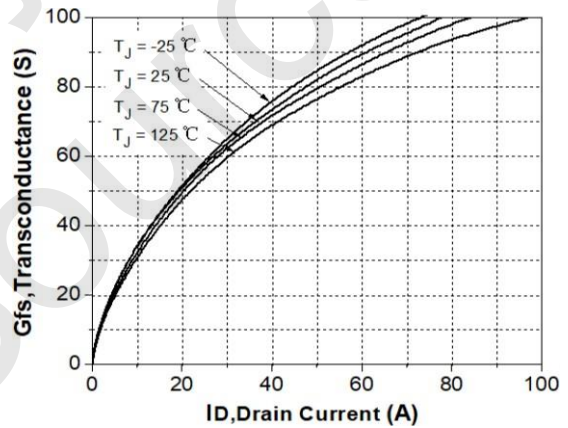


Fig.5 Typical Transfer Characteristics

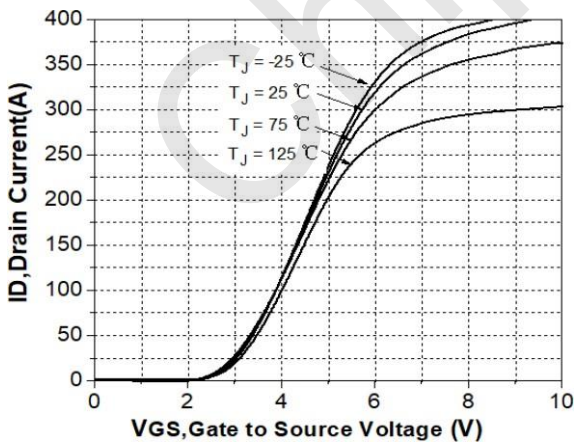
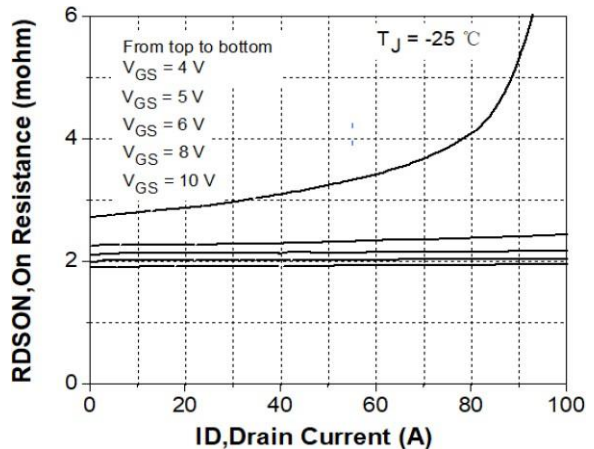


Fig. 6 State Resistance vs. Drain Current @-25°C





AKT3090G 30V N-channel Enhancement Mode Power MOSFET

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

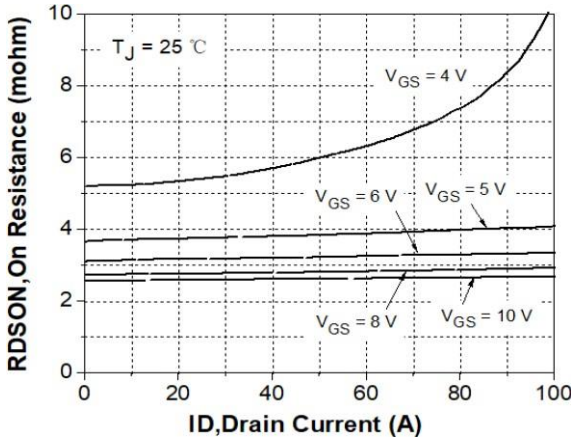


Fig. 8 State Resistance vs. Drain Current @125°C

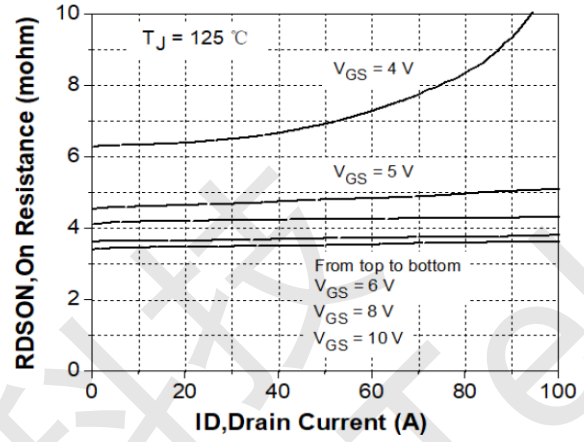


Fig.9 Typical Capacitance vs. Drain Source Voltage

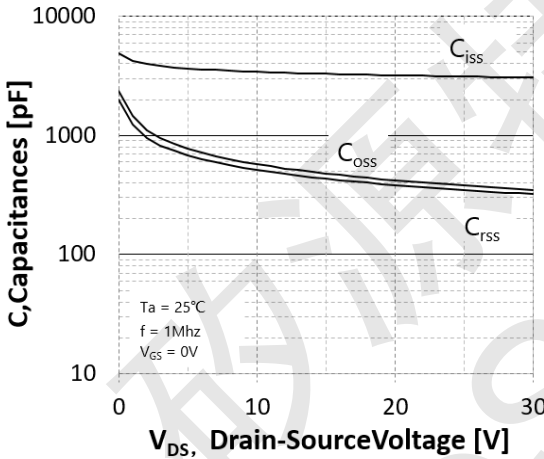


Fig.10 Dynamic Input Characteristics

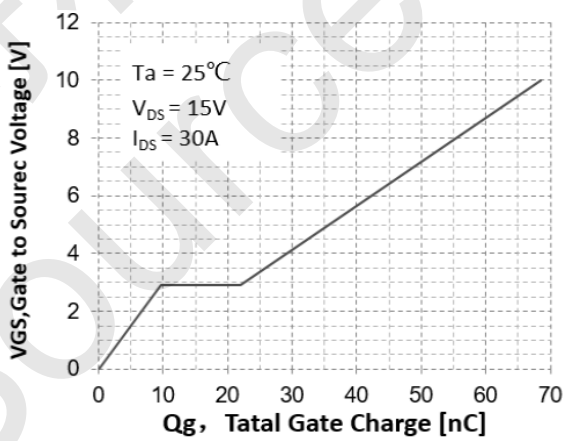


Fig.11 Breakdown Voltage vs. Junction Temperature

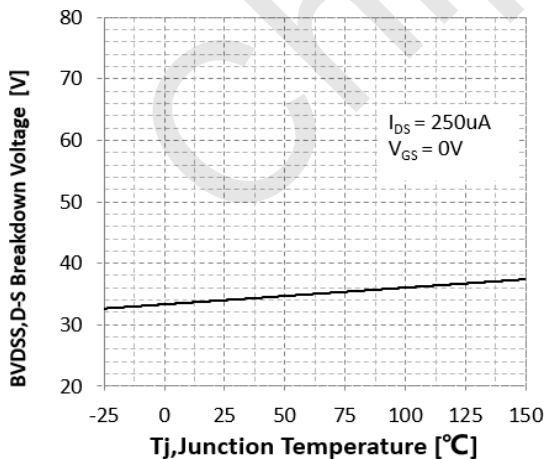
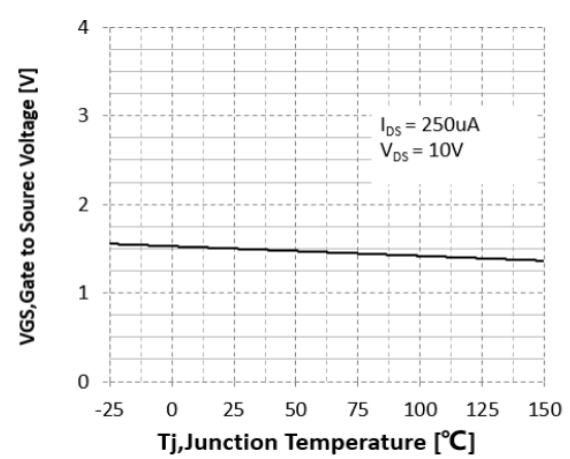


Fig. 12 Gate Threshold Voltage vs. Junction Temperature





AKT3090G 30V N-channel Enhancement Mode Power MOSFET

Fig.13 On-Resistance Variation vs. Junction Temperature

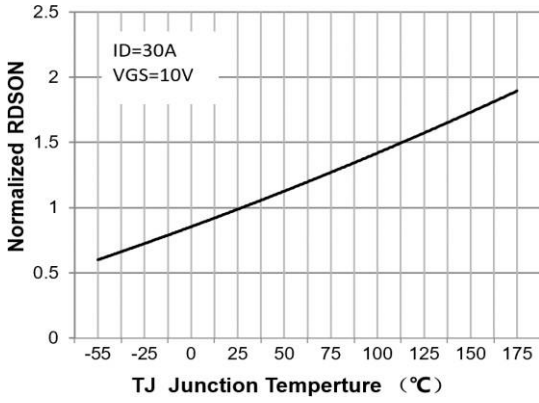


Fig.14 Maximum Drain Current vs. Case Temperature

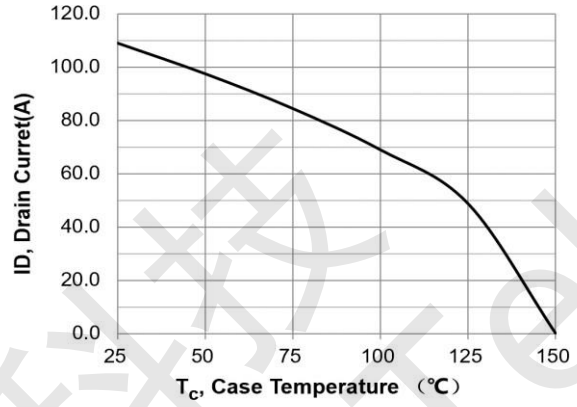
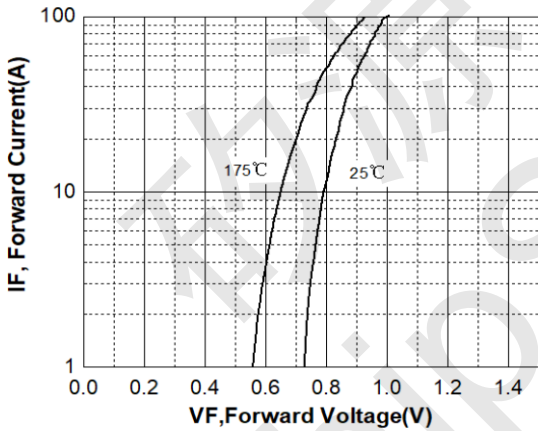


Fig.15 Body Diode Forward Voltage Vs Reverse Drain Current





AKT3090G 30V N-channel Enhancement Mode Power MOSFET

Fig.16 Safe Operating Area

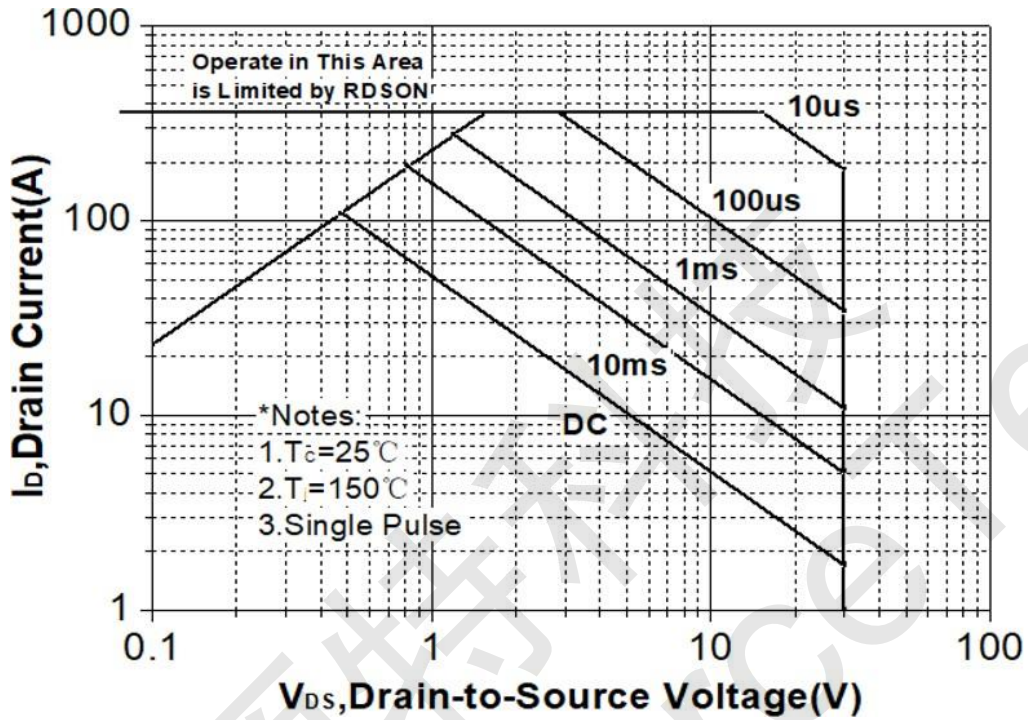
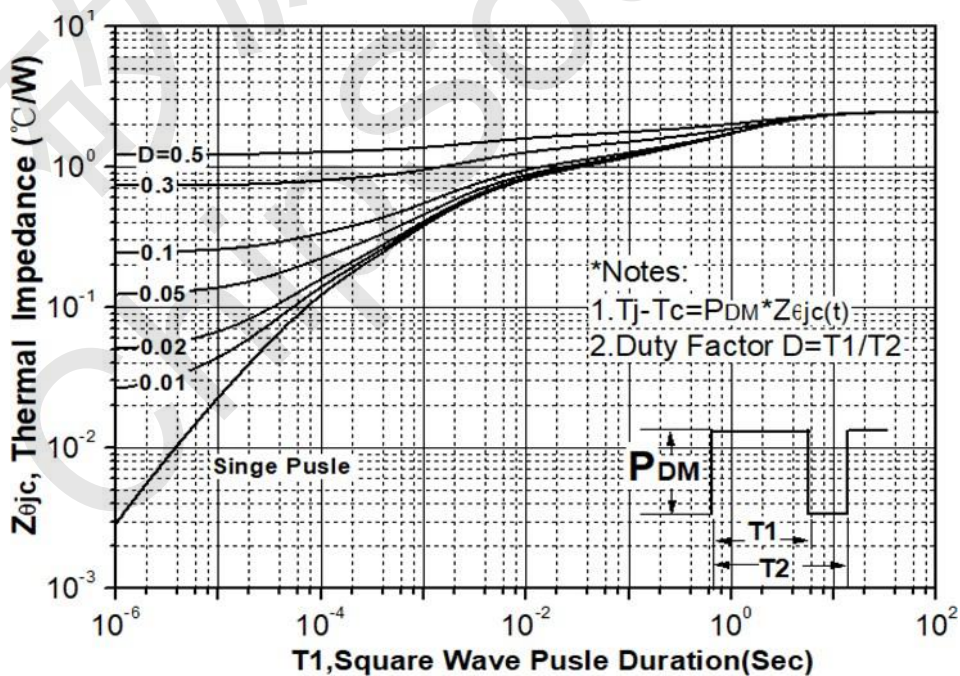


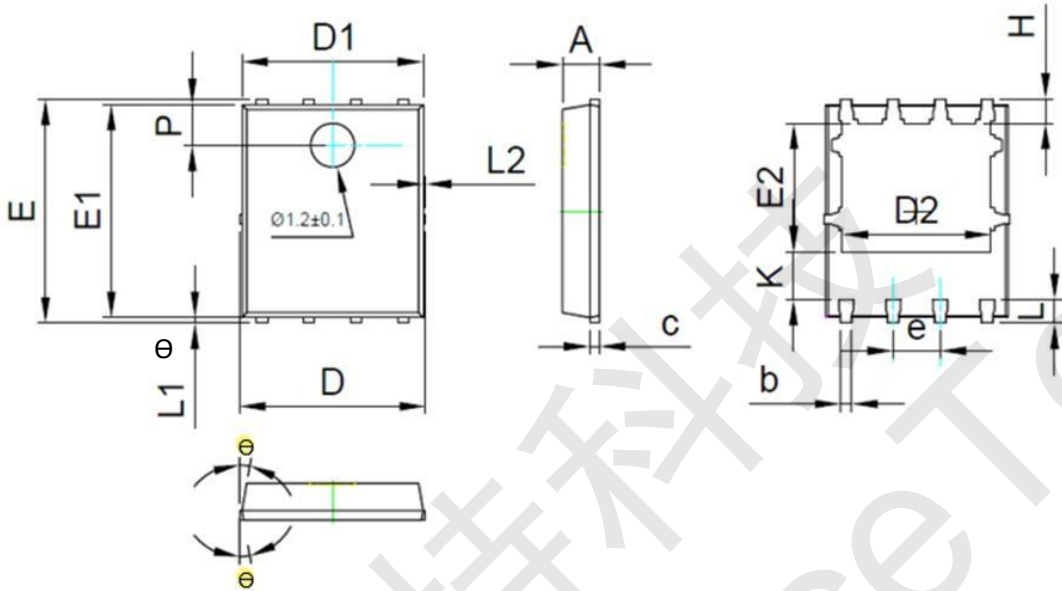
Fig. 17 Transient Thermal Response Curve





AKT3090G 30V N-channel Enhancement Mode Power MOSFET

AKT3090G Package Dimensions : PDFN 5*6 PACKAGE



COMMON DIMENSIONS
(UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.35	0.40	0.45
c	0.21	0.25	0.34
D	-	-	5.1
D1	4.85	4.90	4.95
D2	3.96	4.01	4.06
e	1.27 BSC		
E	5.95	6.00	6.05
E1	5.70	5.75	5.80
E2	3.425	3.475	3.525
H	0.60	0.65	0.70
K	1.29	-	-
L	0.60	0.65	0.70
L1	0.05	0.15	0.25
L2	-	-	0.12
θ	8°	10°	12°
P	1.05	1.10	1.15