30V N-channel enhancement mode MOSFET

General Description

The PAN3060C is a 30V N-channel enhancement mode MOSFET which 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. PAN3060C is packaged in PDFN5*6 package.

Features

- V_{DS}(max) =30V
- I_D (max)=60A
- Extremely Low RDS(on):
  Typ.RDS(on) = 3.3 mΩ @V_{GS}=10 V, I_D=30 A
- Good stability and uniformity
- 100% avalanche tested
- Excellent package for good heat dissipation

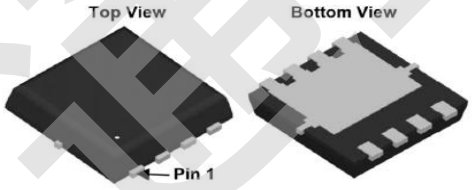
Applications

- Multi-cell Battery protection
- Battery Powered Systems
- UPS
- Portable Power Equipment

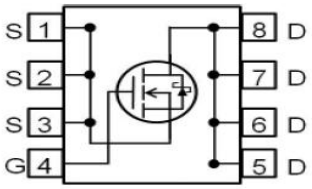
Ordering Information

Device	Package	Pin count	Marking
PAN3060C	PDFN5*6-8L	8	PAN3060C

Pin Configurations



PDFN5*6-8L



Main Parameters

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	30	V
I_D	Drain Current - Continuous (TC= 25°C)	60	A
	- Continuous (TC= 100°C)	42*	A

I_{DM}	Drain Current - Pulsed (Note 1)	240*	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	110	mJ
P_D	Power Dissipation (TC = 25°C)	68	W
	- Derate above 25°C	0.9	W/°C
T_j, T_{stg}	Operating and Storage Temperature Range	-55 to +175	°C

* Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.84	°C/W

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 V, I_D = 250μA	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 30 V, V_{GS} = 0 V			1	μA
I_{GSSF}	Gate Leakage Current, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V			-100	nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold voltage	V_{DS} = V_{GS}, I_D = 250 uA	1	1.5	2.5	V
$R_{DS(On)}$	Drain-Source on-state resistance	V_{GS} = 10 V, I_D = 30 A		3.3	4.2	mΩ
		V_{GS} = 4.5 V, I_D = 24 A		5.0	6.3	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 24 A (Note 3)	20			S
Dynamic Characteristics						
C_{iss}	Input capacitance	V_{DS}=25V, V_{GS}=0V, F=1.0Mhz		1800		pF
C_{oss}	Output capacitance			240		pF
C_{rss}	Reverse transfer capacitance			210		pF
Switching Characteristics						

$t_{d(on)}$	Turn On Delay Time	V_{DD}=15V, I_D=30A, V_{GS}=4.5V, Rg=1.8Ohm (Note 3, 4)		11		ns
t_r	Rising Time			160		ns
$t_{d(off)}$	Turn Off Delay Time			12		ns
t_f	Fall Time			80		ns
Q_g	Total Gate Charge	V_{DD}=15V, I_D=30A, V_{GS}=10V (Note 3, 4)		39		nC
Q_{gs}	Gate-Source Charge			5		nC
Q_{gd}	Gate-Drain Charge			9		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				60	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				240	A
V_{SD}	Diode Forward Voltage	V_{GS}= 0 V, I_S = 30 A			1.2	V
T_{rr}	Reverse recovery time	I_F=60A, di/dt=100A/μS		12		ns
Q_{rr}	Reverse recovery charge			2.5		nC

NOTE:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 0.5 mH, IAS = 35 A, VDD = 15V, Rg = 25 Ω, Starting Tj = 25°C
3. ISD ≤ 40A, di/dt = 100A/us, VDD ≤ BVDSS, Staring Tj =25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Performance Characteristics

Fig.1 Power Dissipation Derating Curve

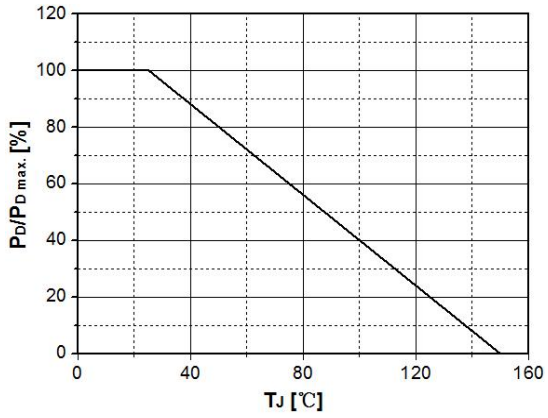


Fig.2 Avalanche Energy Derating Curve vs. Junction Temperature

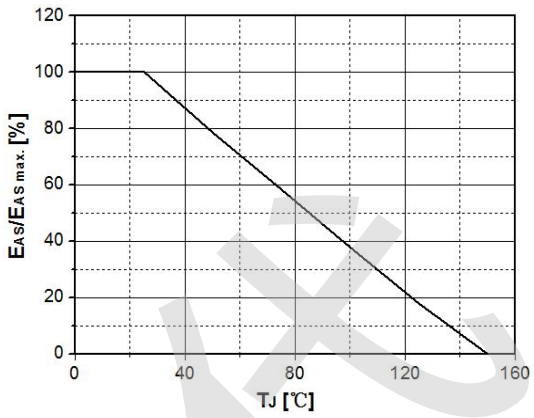


Fig.3 Typical Output Characteristics

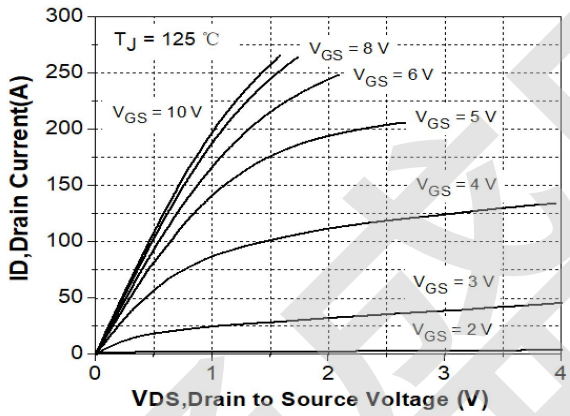


Fig. 4 Transconductance vs. Drain Current

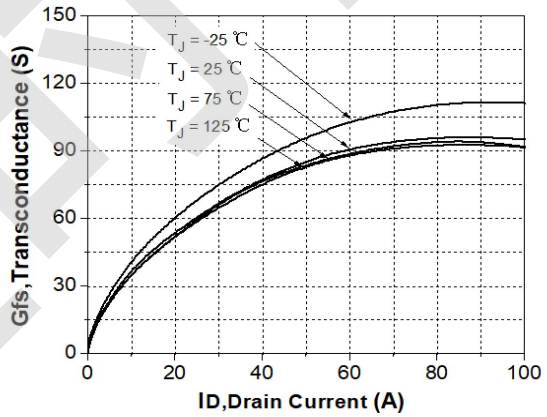


Fig.5 Typical Transfer Characteristics

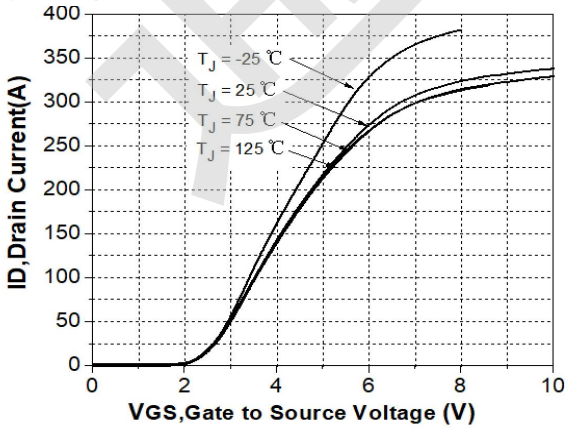


Fig. 6 State Resistance vs. Drain Current @-25℃

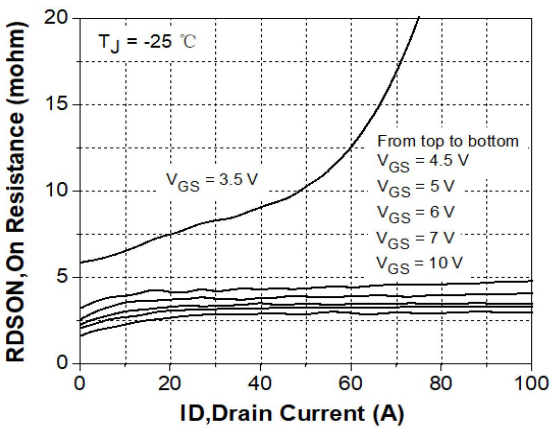


Fig.7 State Resistance vs. Drain Current @25℃

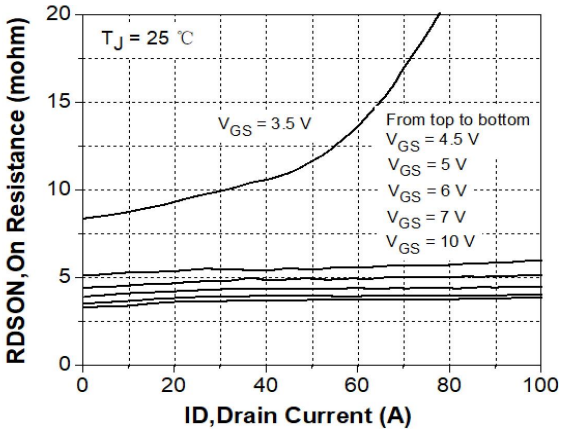


Fig. 8 State Resistance vs. Drain Current @75℃

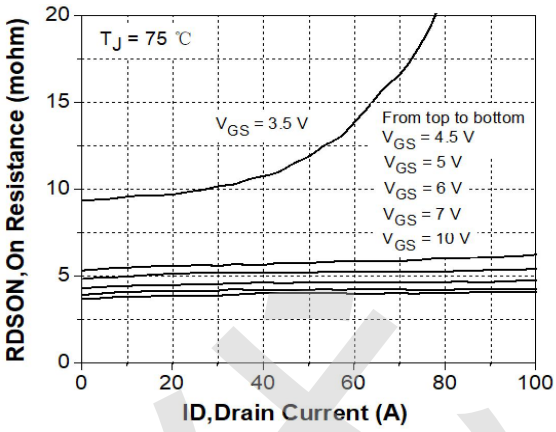


Fig.9 State Resistance vs. Drain Current @125℃

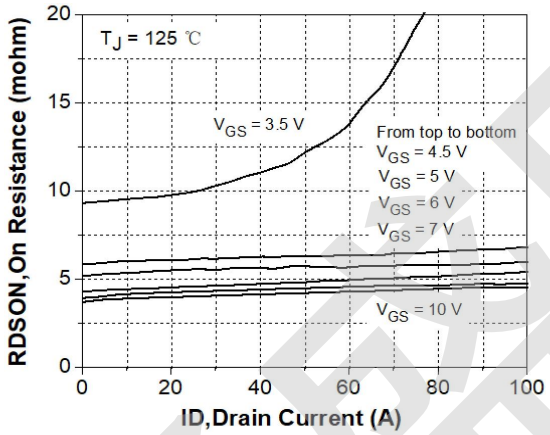


Fig.10 Gate Charge Characteristics

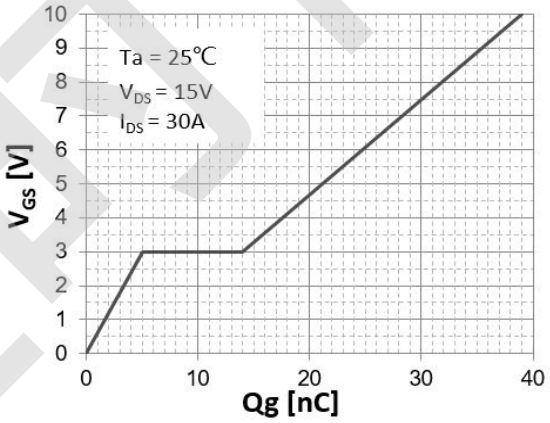


Fig.11 Breakdown Voltage vs. Junction Temperature

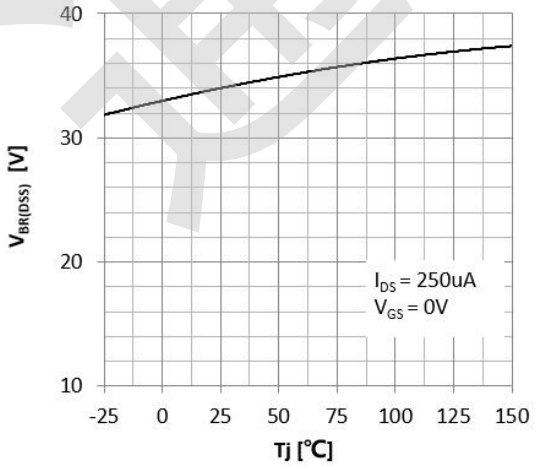


Fig. 12 Gate Threshold Voltage vs. Junction Temperature

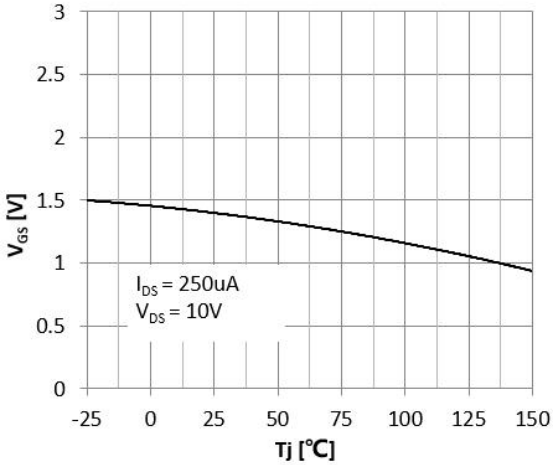


Fig.13 Safe Operating Area

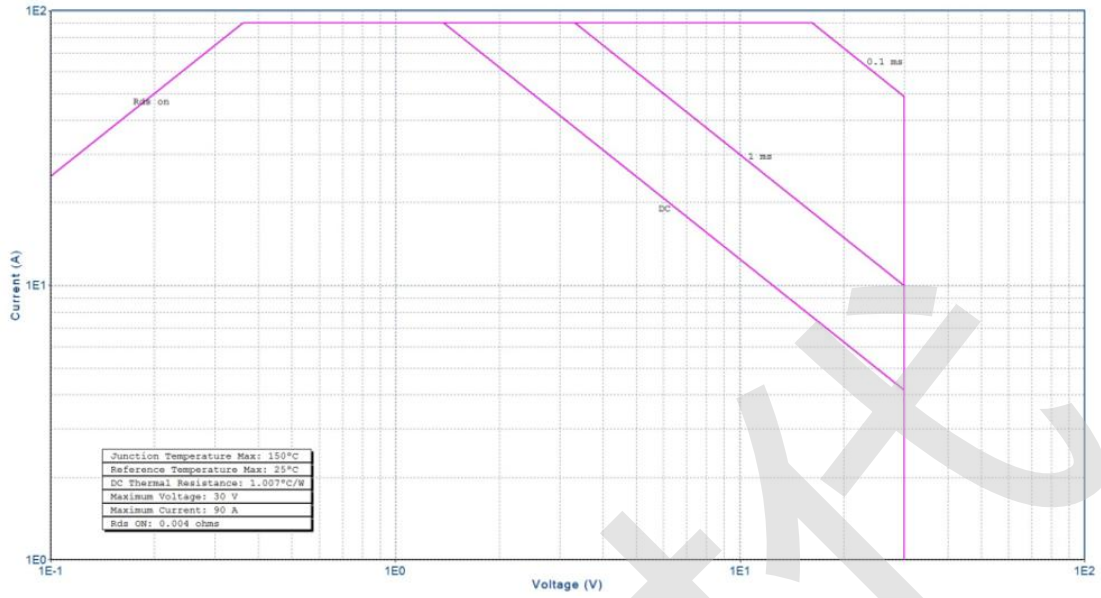
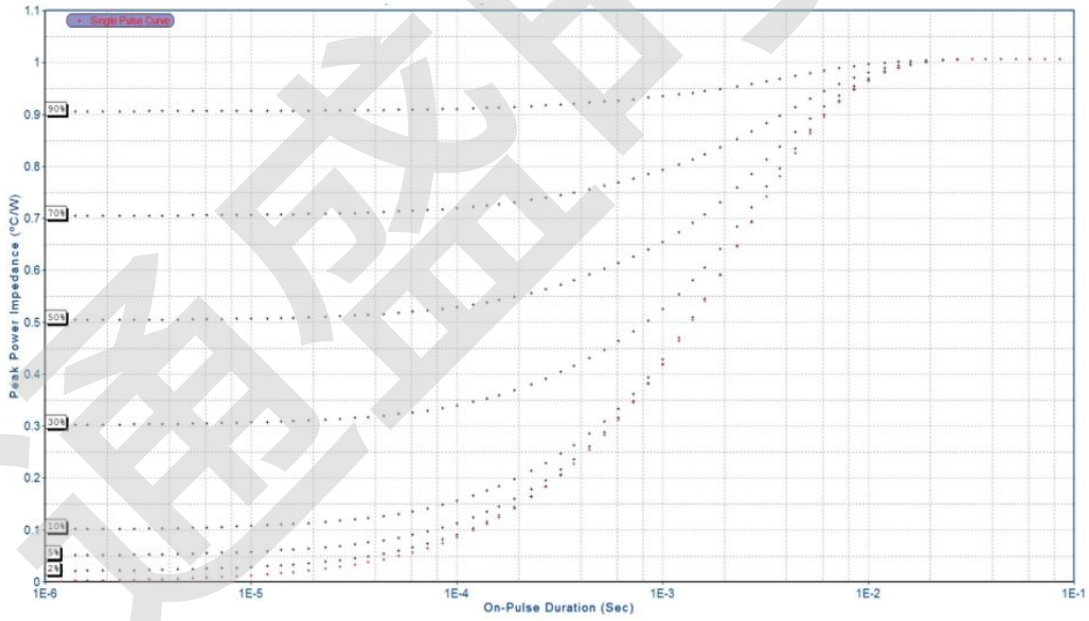
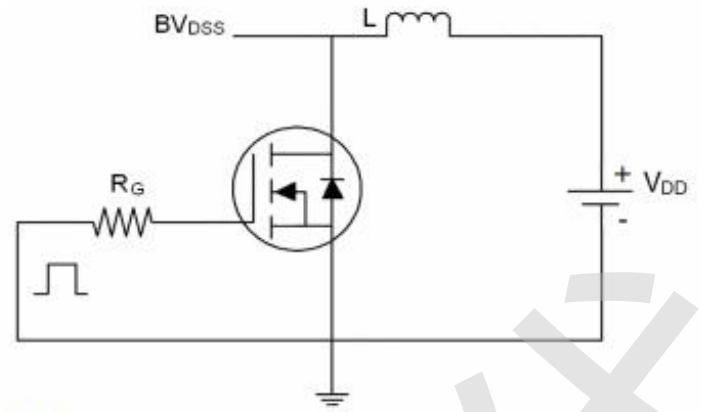


Fig. 14 Transient Thermal Response Curve

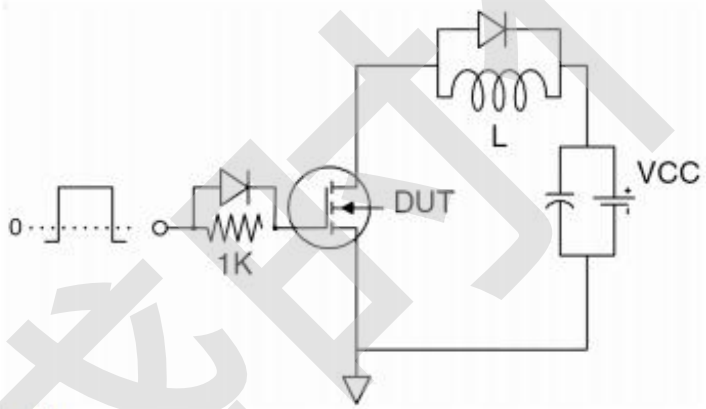


Test Circuit

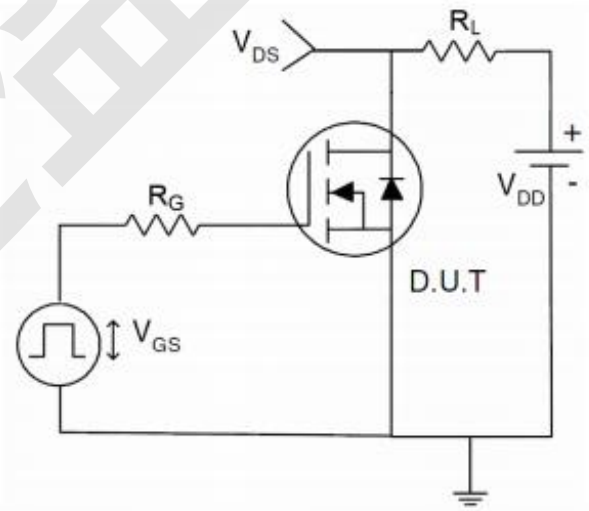
1) E_{AS} Test Circuits



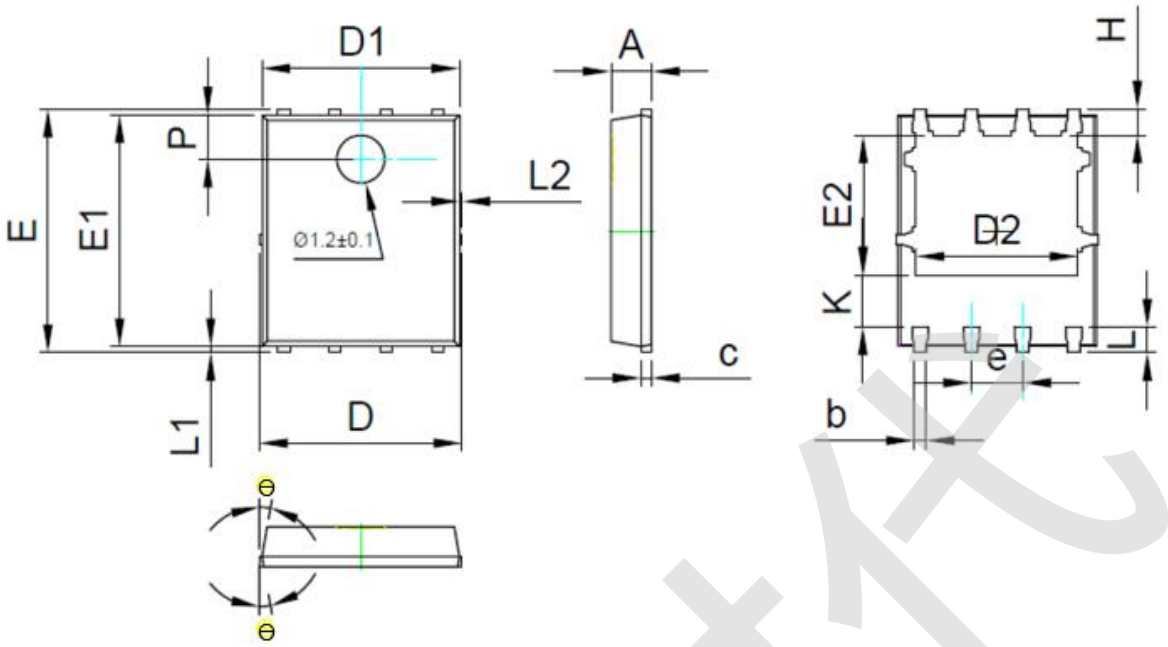
2) Gate Charge Test Circuit:



3) Switch Time Test Circuit:



Package Dimensions(PDFN5*6-8L)



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