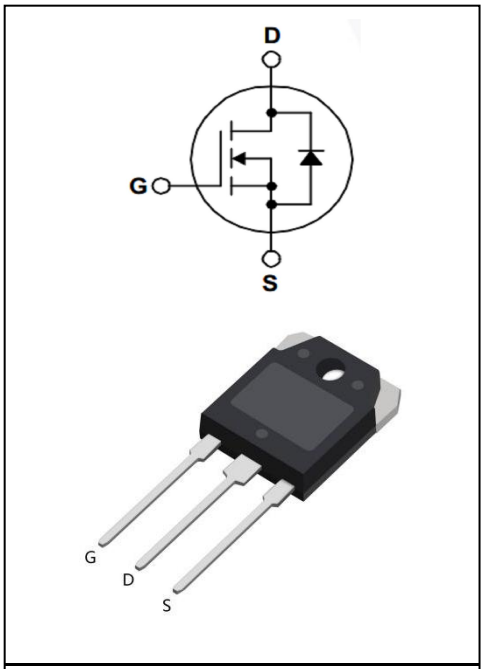
Thunder High Power Products

Silicon N-Channel Planar Power MOSFET

Description

The TH59N25PU utilizes the latest processing techniques to achieve low on-resistance per silicon area. Additional features of this MOSFET are 150℃ operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for PDP driving applications. It can be used in a wide variety of applications.



THUNDER TO-3P

General Features

- V_{DS}=250V,I_D=59A
- Low ON Resistance,$R_{DS(ON)}$ =41mΩ@V_{GS}=10V,I_D=29.5A
- Low reverse transfer capacitance
- Low Qg for fast response
- Short fall & rise times for fast switching
- 100% single pulse avalanche energy Test

Application

- Power switching application
- Digital amplifier
- Adapter and charger

Product Summary

V_{DS}	250V
$R_{DS(on)}$	41mΩ
I_D	59A

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	250	V
Continuous drain current T_C = 25°C (Silicon limit)	I_D	59	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	I_{DM}	236	A
Avalanche energy, single pulse (L=10mH, Rg=25Ω)	E_{AS}	1845	mJ
Gate-Source voltage	V_{GS}	±30	V
Power dissipation (T_C = 25°C)	P_D	417	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	0.30	℃/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}	40	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	250	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	2.0	-	4.0	V	V_{DS}=V_{GS}, I_D=250uA
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	V_{DS}=250V, V_{GS}=0V T_j=25℃
		-	-	10	μA	V_{DS}=200V, V_{GS}=0V T_j=125℃
Gate-source leakage current	I_{GSS}	-	-	±100	nA	V_{GS}=±30V, V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	41	49	mΩ	V_{GS}=10V, I_D=29.5A
Transconductance	g_{fs}	-	45	-	S	V_{DS}=40V, I_D=29.5A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	5230	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Output Capacitance	C_{oss}	-	538	-		
Reverse Transfer Capacitance	C_{rss}	-	8.8	-		
Gate Total Charge	Q_g	-	65	-	nC	V_{GS}=10V, V_{DS}=200V, I_D=59A
Gate-Source charge	Q_{gs}	-	20	-		
Gate-Drain charge	Q_{gd}	-	28	-		
Turn-on delay time	$t_{d(on)}$	-	72	-	ns	V_{DD}=125V, I_D=59A, R_G=25Ω
Rise time	t_r	-	485	-		
Turn-off delay time	$t_{d(off)}$	-	95	-		
Fall time	t_f	-	175	-		
Gate resistance	R_G	-	1	-	Ω	V_{GS}=0V, V_{DS}=0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	-	1.4	V	V_{GS}=0V, I_{DS}=59A
Body Diode Continuous Forward Current	I_S	-	-	59	A	T_C=25°C
Body Diode Reverse Recovery Time	t_{rr}	-	195	-	ns	T_C= 25°C, I_S=59A, di/dt=100A/us
Body Diode Reverse Recovery Charge	Q_{rr}	-	4.5	-	μC	

Typical Performance Characteristics

Fig 1: Output Characteristics

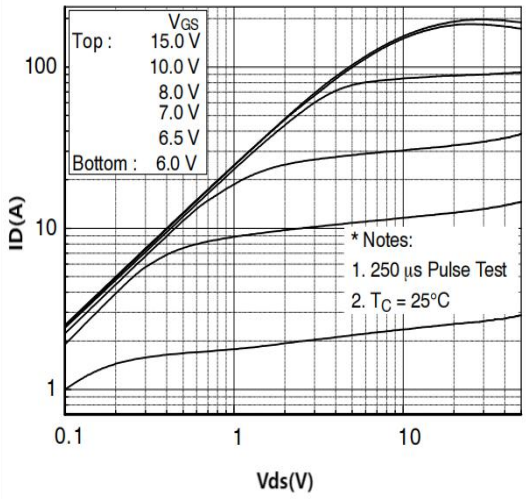


Fig 2: Transfer Characteristics

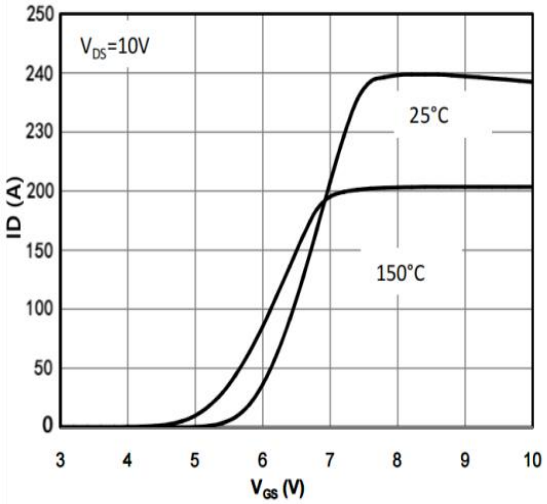


Fig 3: Rds(on) vs Drain Current and Gate Voltage

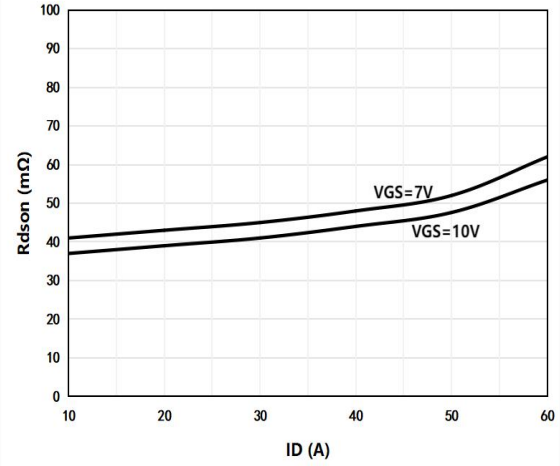


Fig 4: Rds(on) vs Gate Voltage

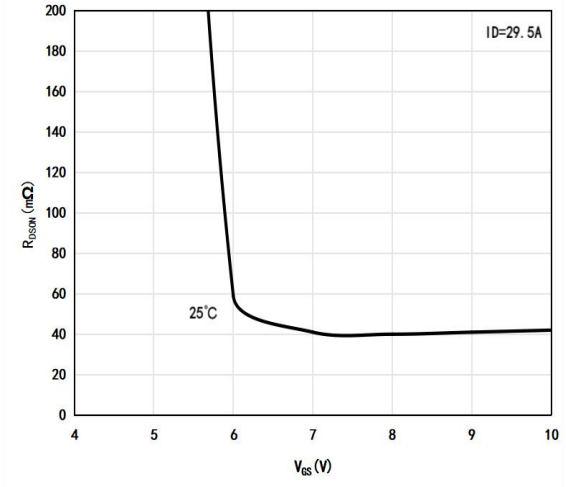


Fig 5: Rds(on) vs. Temperature

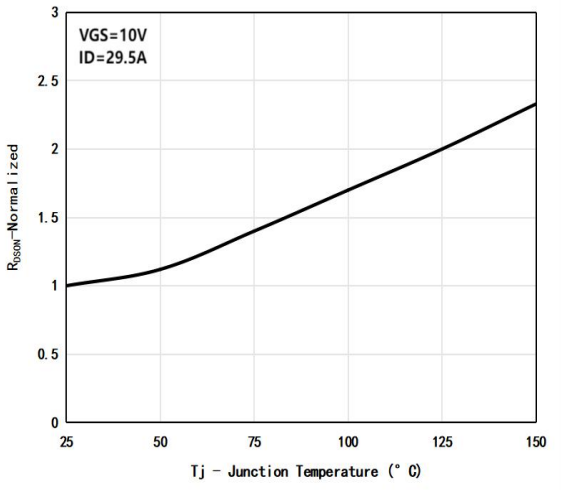


Fig 6: Capacitance Characteristics

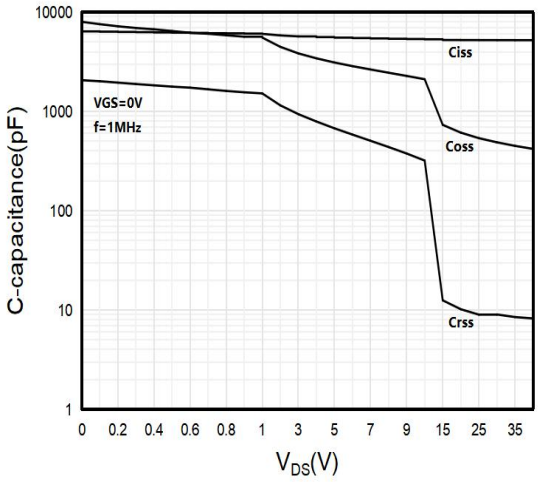


Fig 7. Gate Charge Characteristics

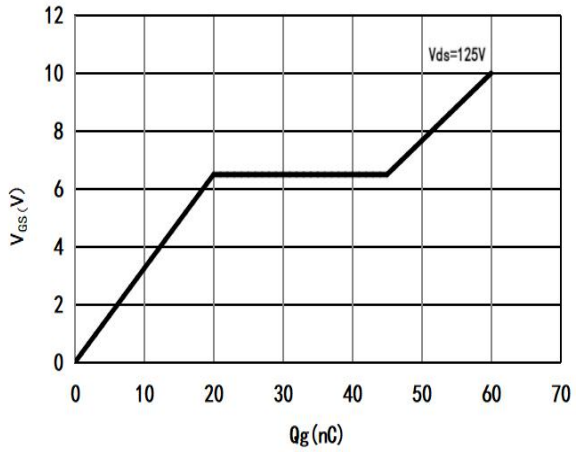


Fig 8: Body-diode Forward Characteristics

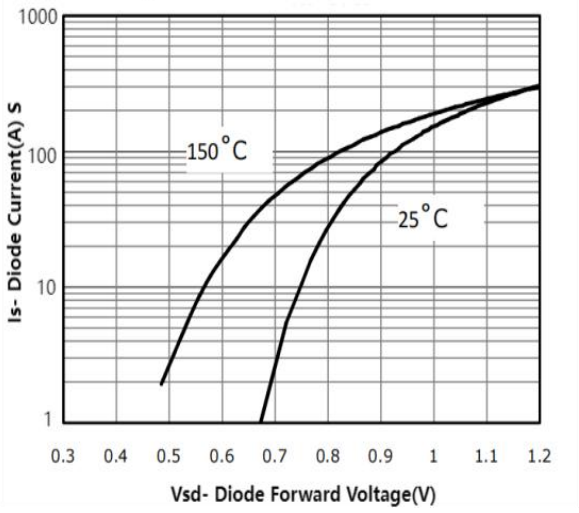


Fig 9. Power Dissipation vs. Temperature

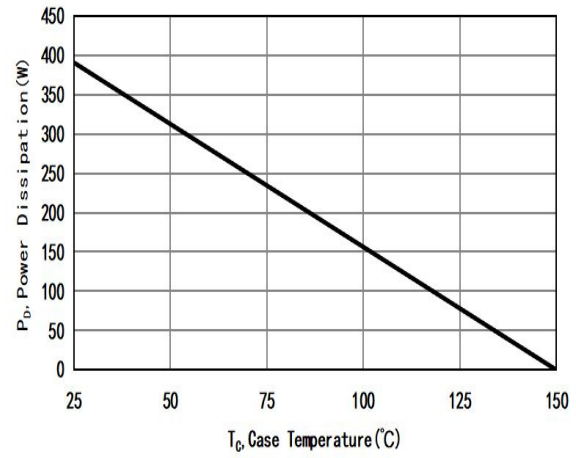


Fig 10. On-Resistance Variation vs. Temperature

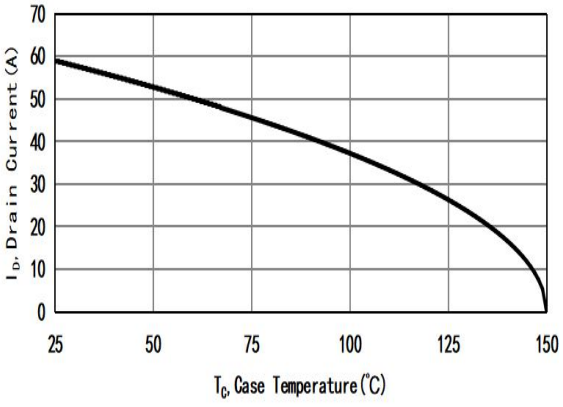


Fig 11: Safe Operating Area

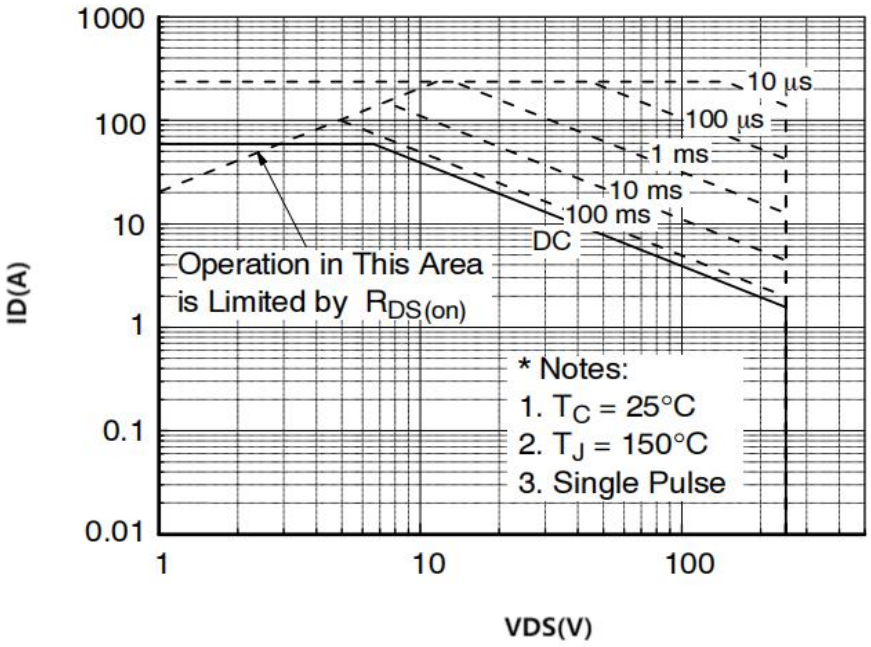
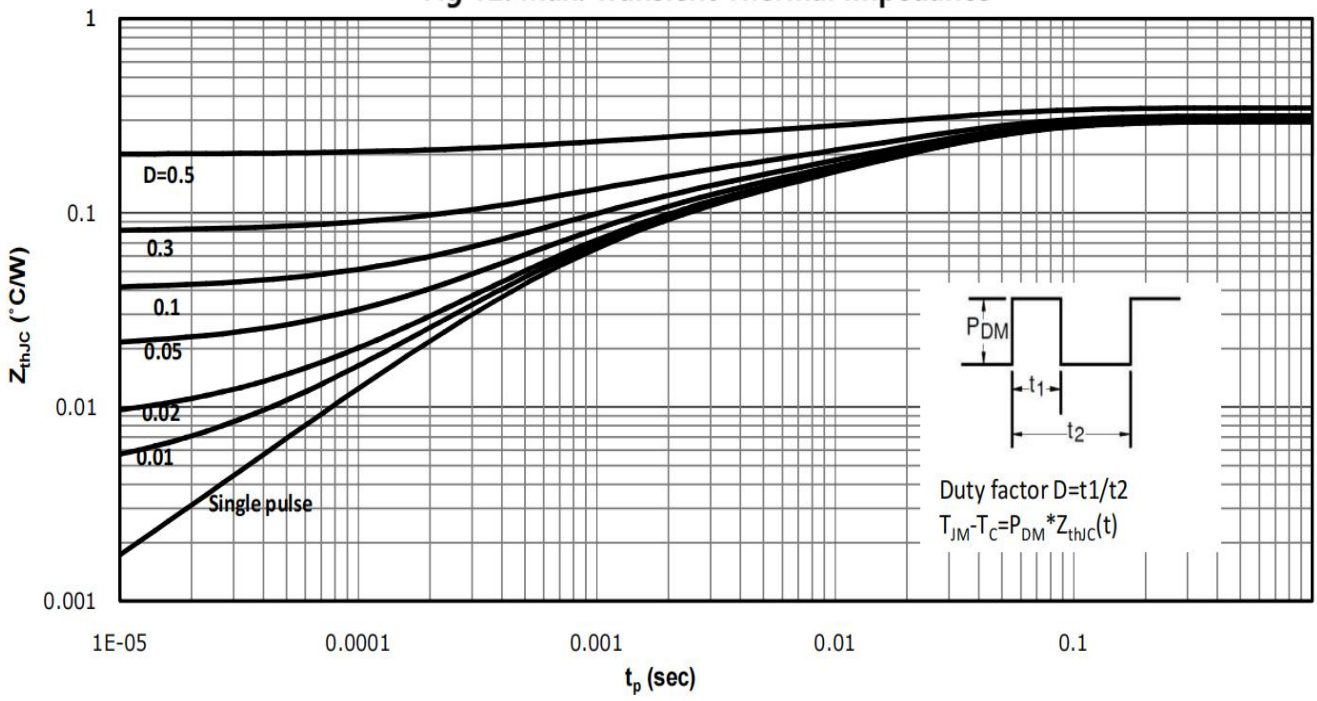
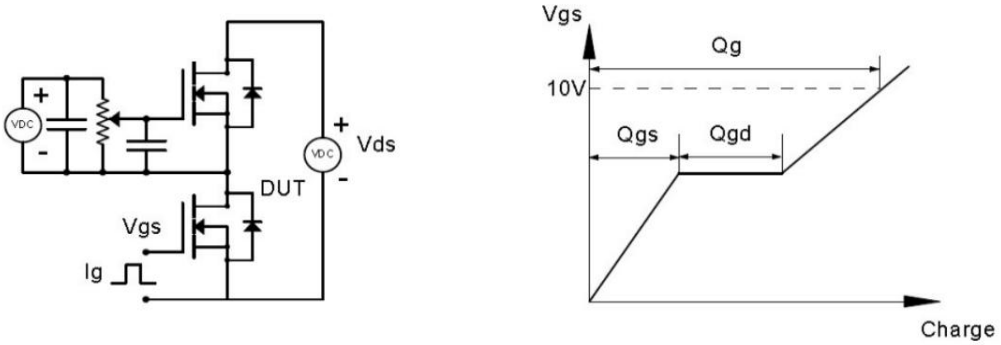


Fig 12: Max. Transient Thermal Impedance

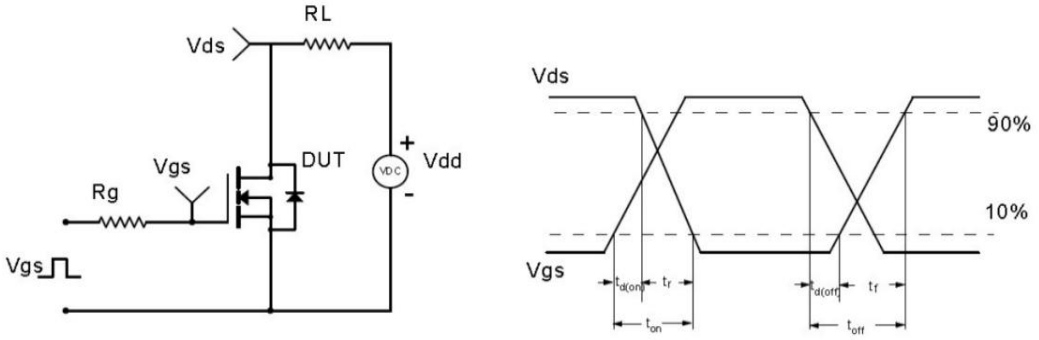


Test Circuit & Waveform

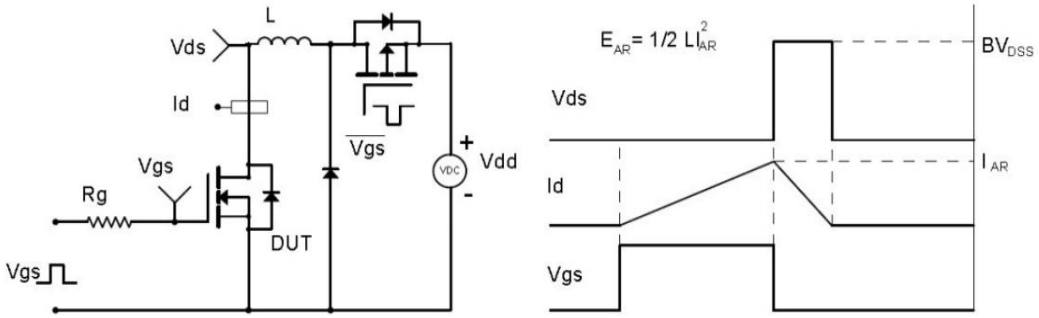
Gate Charge Test Circuit & Waveform



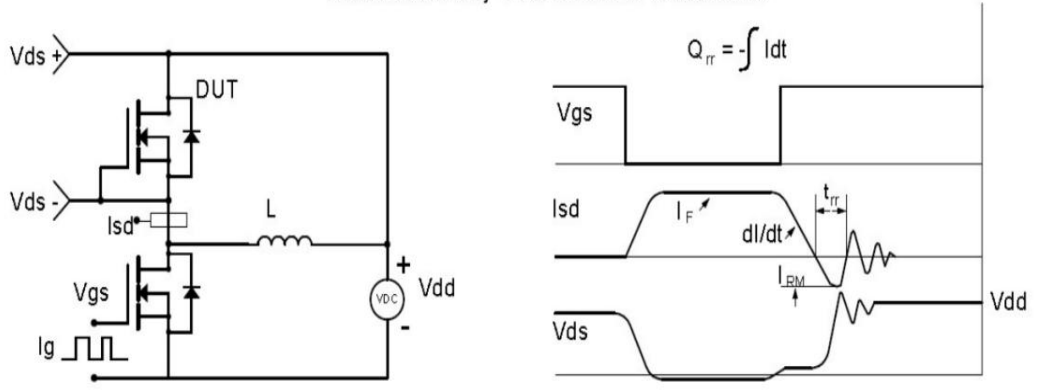
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

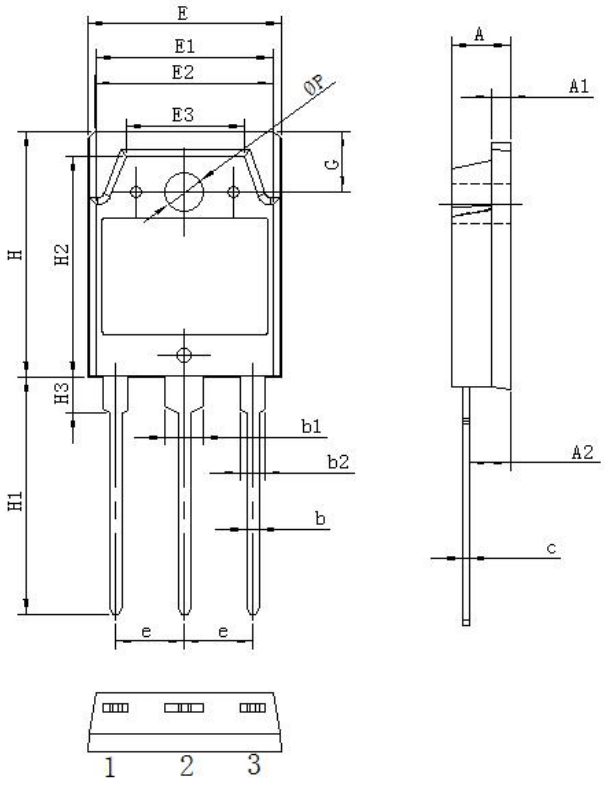


Diode Recovery Test Circuit & Waveforms



Package Information

TO-3P PACKAGE



Symbol	单位 mm		
	Min	Nom	Max
A	4.60	4.80	5.00
A1	1.3	1.5	1.7
A2	1.20	1.40	1.60
b	0.80	1.0	1.20
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c	0.50	0.60	0.70
e	5.25	5.45	5.65
E	15.2	15.6	16.0
E1	13.2	13.4	13.6
E2	13.1	13.3	13.5
E3	9.1	9.3	9.5
H	19.8	20.0	20.2
H1	20.1	20.3	20.5
H2	18.5	18.7	18.9
H3	3.2	3.5	3.8
G	4.8	5.0	5.2
ΦP	3.00	3.20	3.40

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