

DATASHEET

N-Channel Enhancement Mode Power MOSFET

Description

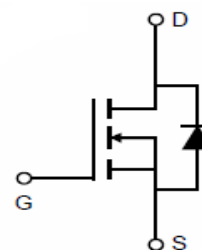
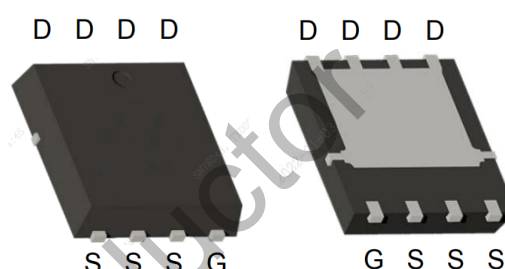
This Power MOSFET is produced using advanced Trench technology.

This devices provide an excellent gate charge and $R_{DS(on)}$, which leads to extremely communication and conduction losses. So it is very suitable for AC/DC power conversion, load switch and industrial power applications.

Features

- $V_{DS}=20V$, $I_D=90A$
- $R_{DS(on)}$ Typ= $2.8m\Omega$ @ $V_{GS}=4.5V$
- $R_{DS(on)}$ Typ= $4m\Omega$ @ $V_{GS}=2.5V$
- Low FOM $R_{DS(on)} \times Q_{gd}$
- 100% avalanche tested
- Easy to use/drive
- RoHS compliant

PDFN5*6-8L



Schematic diagram

Applications

- Power Management
- PWM Application
- Load Switch

100% UIS TESTED!

100% ΔV_{ds} TESTED!



Package Marking and Ordering Information

Device	Marking	Package	Packing	Reel size	Reel (pcs)	Per Carton (pcs)
90N02		PDFN5*6	Reel	13inch	5000	50000

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Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-source Voltage		V_{DS}	20	V
Gate-source Voltage		V_{GS}	± 12	V
Continuous Drain Current ⁽¹⁾	$T_C=25^{\circ}\text{C}$	I_D	90	A
	$T_C=100^{\circ}\text{C}$		59	
Pulsed Drain Current($T_C=25^{\circ}\text{C}$, T_p Limited By T_{jmax}) ⁽²⁾		I_{DM}	360	A
Maximum Power Dissipation($T_C=25^{\circ}\text{C}$)		P_D	81	W
Avalanche energy , single Pulse($L=0.5\text{mH}$) ⁽¹⁾		E_{AS}	110	mJ
Operating Junction And Storage Temperature		T_j, T_{stg}	-55 To 150	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	$^{\circ}\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Resistance

Parameter	Symbol	Max	Unit
Junction-to-Case	$R_{\theta JC}$	1.85	$^{\circ}\text{C/W}$

Notes:

- 1) Limited by maximum junction temperature.
- 2) Repetitive Rating: Pulse width limited by maximum junction temperature.

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Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Off Characteristic						
Drain-source breakdown voltage	BV_{DSS}	20	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=20V, V_{GS}=0V, T_J=25^{\circ}C$
		-	-	10	μA	$V_{DS}=16V, V_{GS}=0V, T_J=125^{\circ}C$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 12V, V_{DS}=0V$
On Characteristics						
Gate threshold voltage	$V_{GS(th)}$	0.4	0.7	1.1	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Drain-source on-state resistance	$R_{DS(on)}$	-	2.8	4	m Ω	$V_{GS}=4.5V, I_D=30A$
Drain-source on-state resistance	$R_{DS(on)}$	-	4	5	m Ω	$V_{GS}=2.5V, I_D=20A$
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	3200	-	PF	$V_{GS}=0V, V_{DS}=15V, f=1.0MHz$
Output Capacitance	C_{oss}	-	460	-		
Reverse Transfer Capacitance	C_{rss}	-	445	-		
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	-	9.7	-	nS	$V_{DS} = 15V, V_{GS} = 4.5V$ $R_G = 1.8\Omega, I_D = 17A$
Turn-on Rise time	t_r	-	37	-		
Turn-off delay time	$t_{d(off)}$	-	63	-		
Turn-off Fall time	t_f	-	52	-		
Gate Total Charge	Q_G	-	48	-	nC	$V_{GS}=4.5V, V_{DS}=15V,$ $I_D=17A$
Gate-Source Charge	Q_{gs}	-	3.6	-		
Gate-Drain Charge	Q_{gd}	-	19	-		
Drain-Source Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	-	-	1.2	V	$V_{GS}=0V, I_{SD}=30A, T_J = 25^{\circ}C$
Body Diode Forward Current	I_S	-	-	90	A	-
Body Diode Reverse Recovery Time	T_{rr}	-	23	-	ns	$T_J=25^{\circ}C, I_{SD}=30A, V_{GS}=0V,$ $d_i/d_t=100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	10	-	nC	

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N-Channel Typical Characteristics

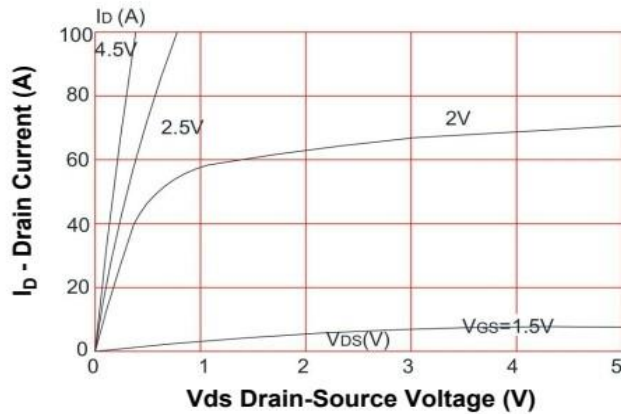


Figure 1. On-Region Characteristics

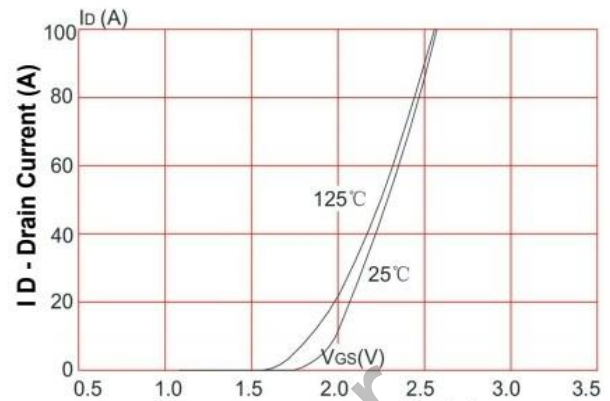


Figure 2. Transfer Characteristics

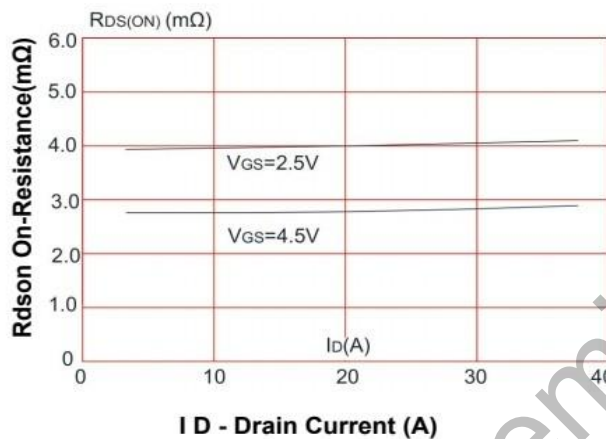


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

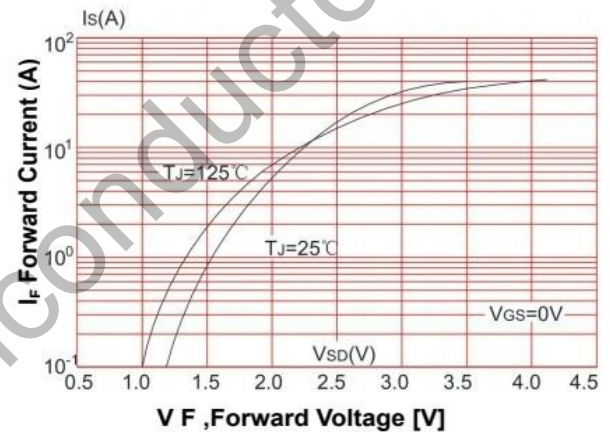


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

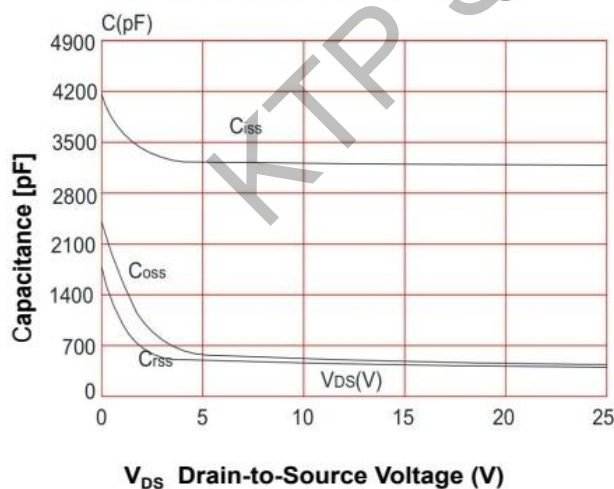


Figure 5. Capacitance Characteristics

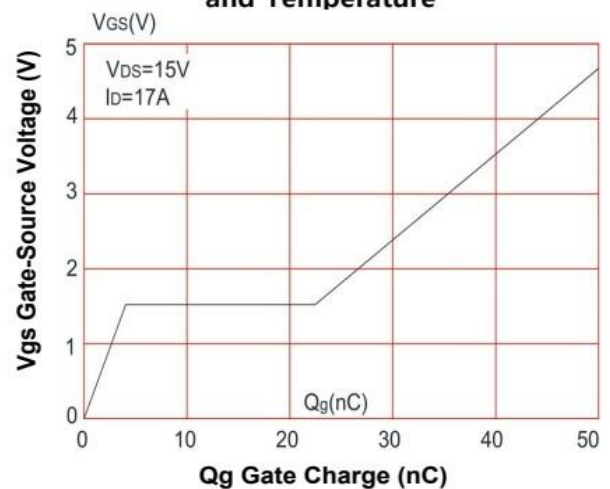
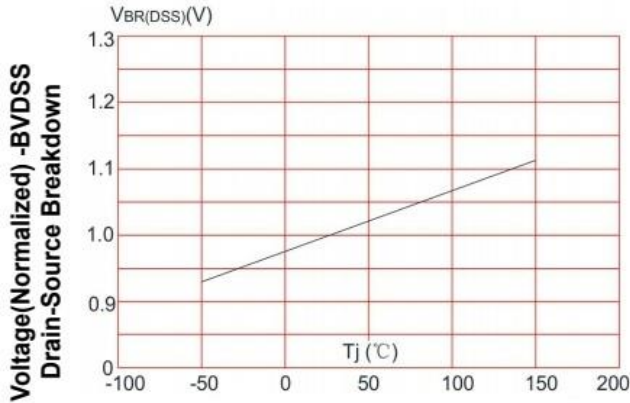


Figure 6. Gate Charge Characteristics

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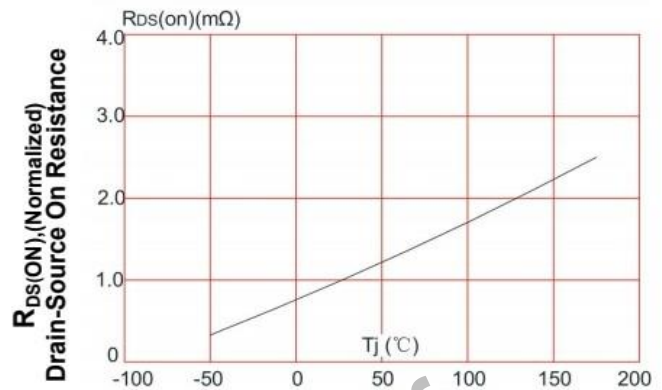
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N- Channel Typical Characteristics (Continued)



T_J , Junction Temperature [$^{\circ}C$]

Figure 7. Breakdown Voltage Variation vs Temperature



T_J , Junction Temperature [$^{\circ}C$]

Figure 8. On-Resistance Variation vs Temperature

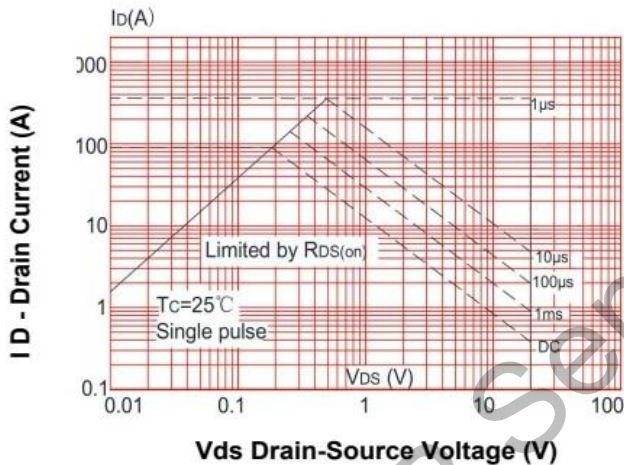


Figure 9. Maximum Safe Operating Area

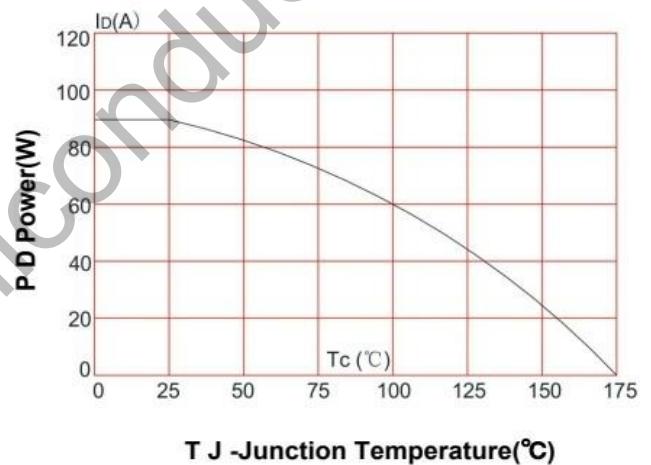


Figure 10. Maximum Power Dissipation vs Case Temperature

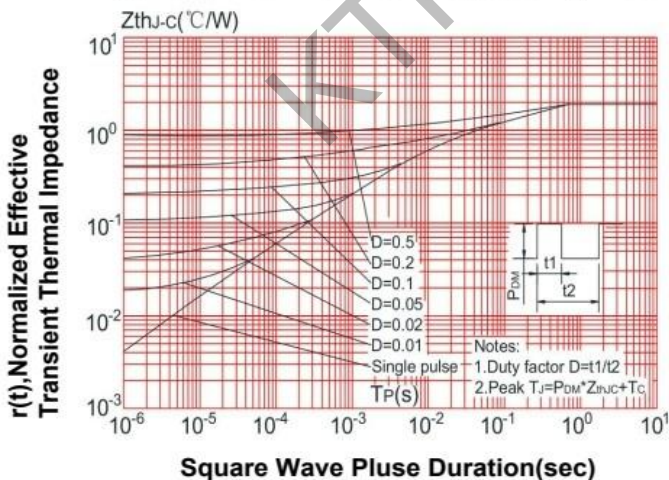
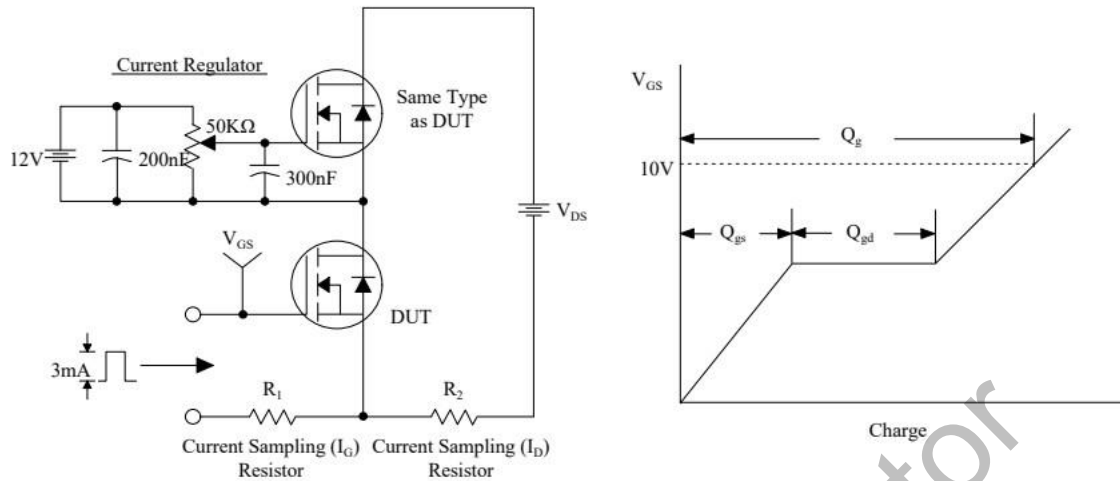


Figure 11. Transient Thermal Response Curve

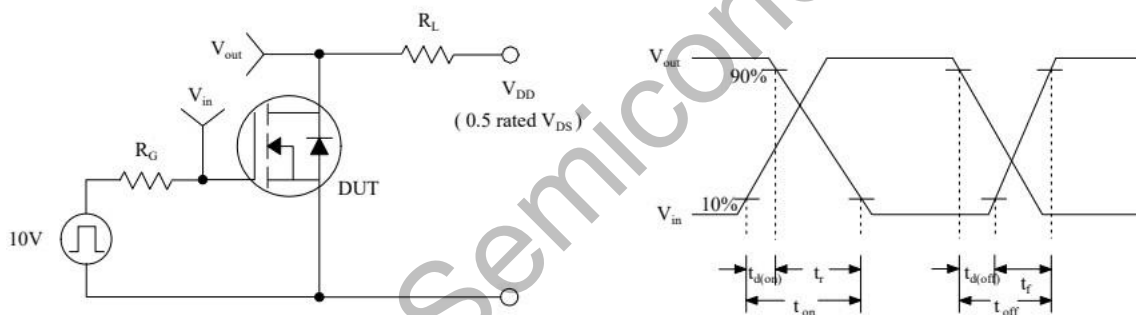
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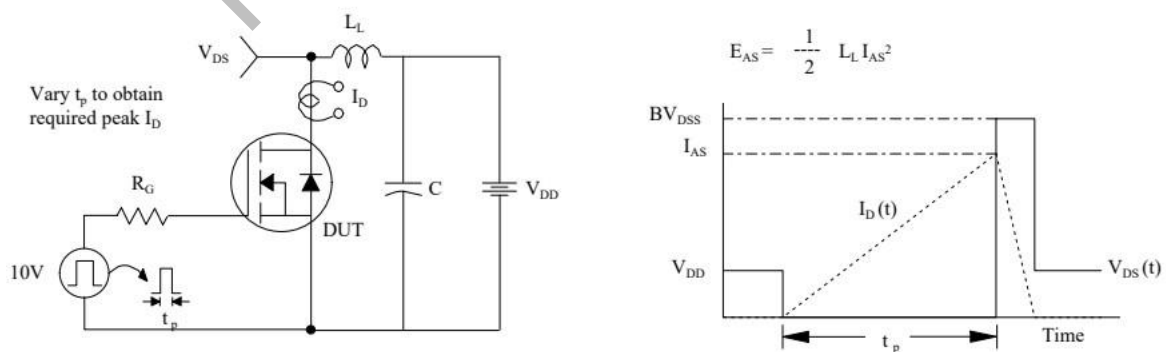
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



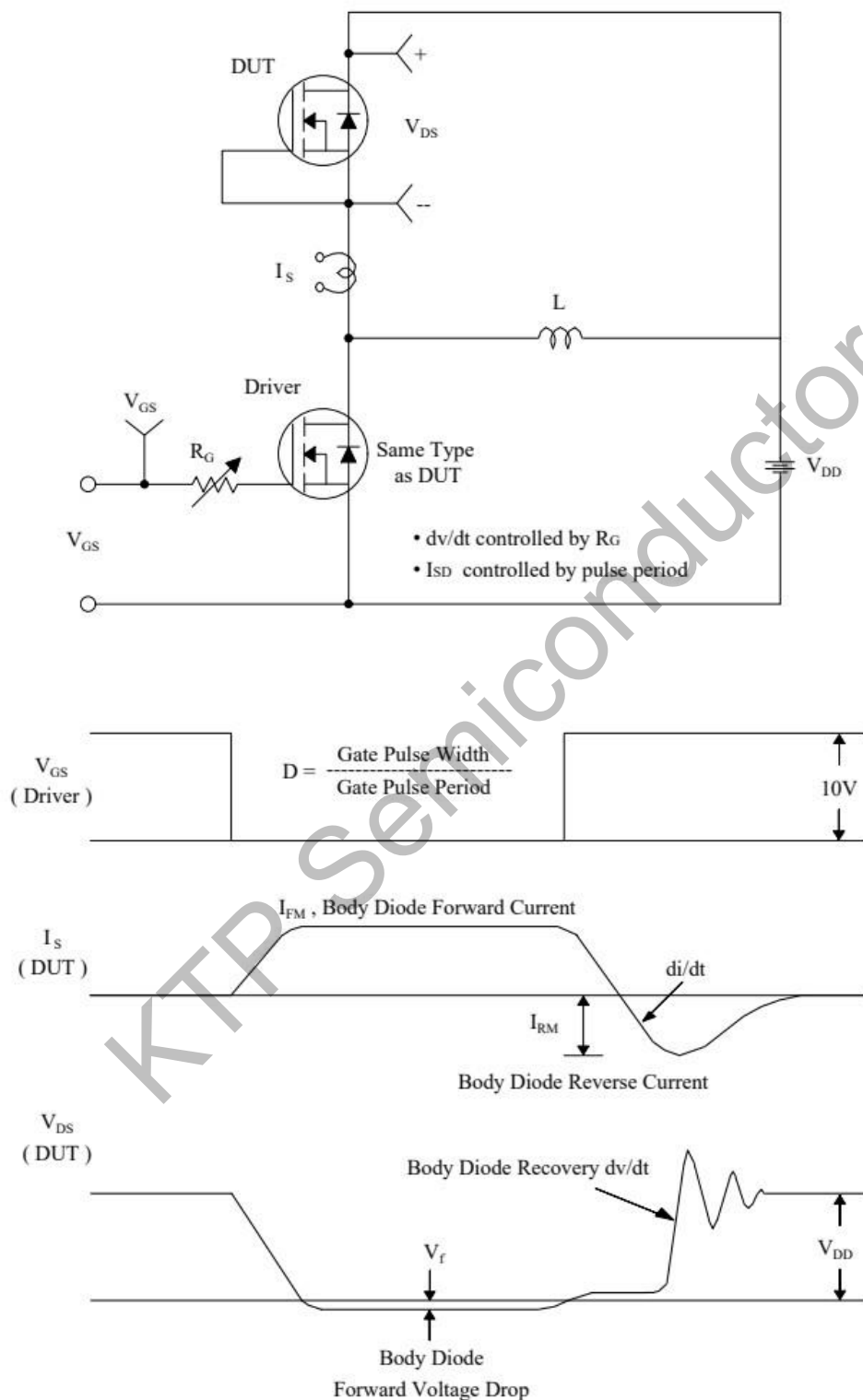
Unclamped Inductive Switching Test Circuit & Waveforms



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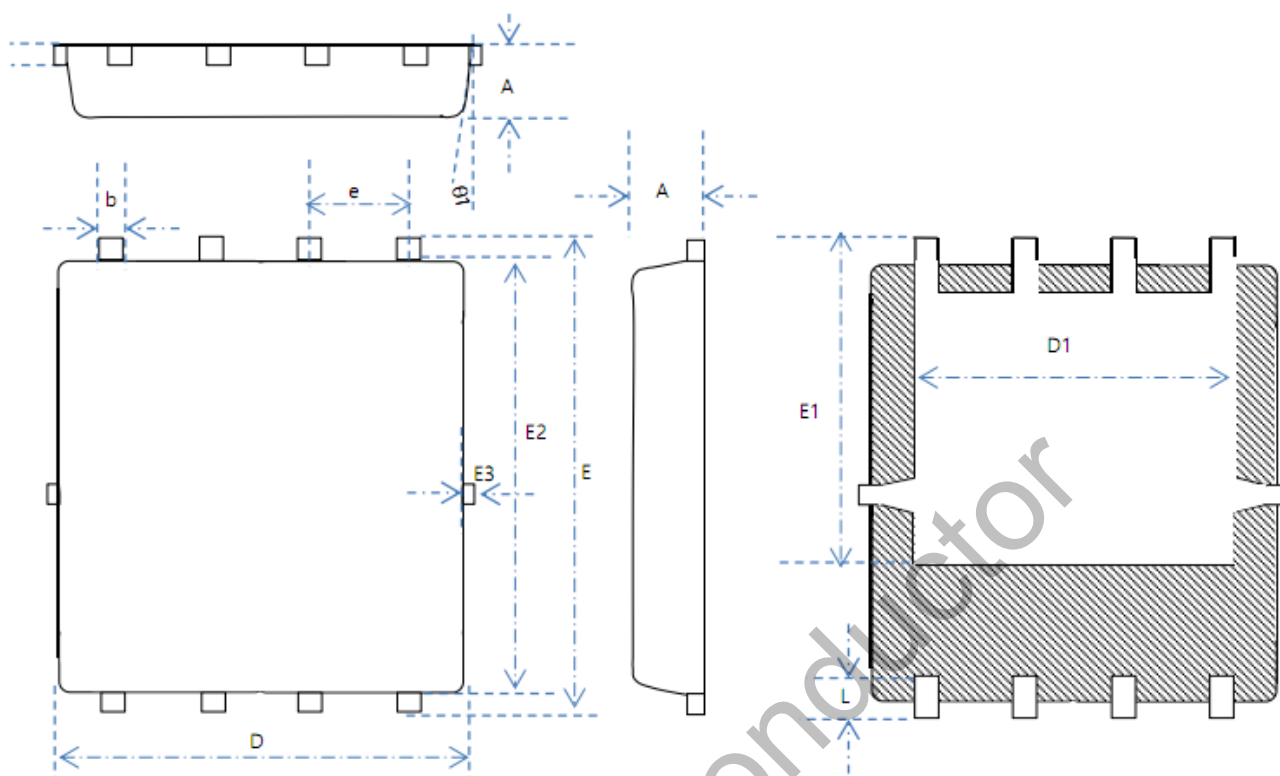
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Peak Diode Recovery dv/dt Test Circuit & Waveforms



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SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.85	0.95	1.05	D	5.10	5.20	5.30
A1	0.254 REF			e	1.270 TYPE		
b	-	0.30	-	D1	3.90	4.0	4.10
E	5.85	6.05	6.25	L	0.54	0.64	0.74
E1	3.90	4.10	4.30				
E2	5.45	5.55	5.65	θ1	8°	10°	12°
E3	-	-	0.15				