

650V N-Channel Super-Junction MOSFET
Features

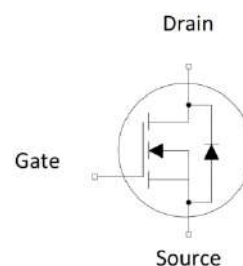
- Fast Switching
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test
- Halogen Free


Product Summary

V_{DS}	650	V
$R_{DS(on), Typ @ V_{GS}=10V}$	91	mΩ
I_D	40	A

Application

- PC、Server power.



Absolute ($T_J = 25^\circ\text{C}$ unless otherwise specified):

Symbol	Parameter	Rating	Units
V_{DSS}	Drain-to-Source Voltage($V_{GS}=0V$)	650	V
I_D	Continuous Drain Current($T_c=25^\circ\text{C}$)	40	A
I_{DM}	Pulsed Drain Current($T_c=25^\circ\text{C}$)	120	A
V_{GSS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy	1000	mJ
dv/dt	Peak Diode Recovery dv/dt	50	V/ns
dv/dt	MOSFET dv/dt ruggedness	100	V/ns
di _f /dt	Maximum diode communication speed	500	A/us
P_D	Power Dissipation($T_c=25^\circ\text{C}$)	338	W
T_J, T_{stg}	Operating and Storage Temperature Range	$-55...+150$	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	300	$^\circ\text{C}$

Thermal Resistance

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Junction-to-Case	0.37	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient	55	$^\circ\text{C/W}$

Notes

1. Limited by T_{Jmax} Maximum duty cycle $D=0.75$
2. Repetitive rating; pulse width limited by maximum junction temperature
3. $L=20.0\text{mH}$, $R_g=25\Omega$, $V_{dd}=50V$, Start $T_J=25^\circ\text{C}$
4. identical low side and high side switch with identical R_g

650V N-Channel Super-Junction MOSFET
Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified):

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Bvdss Temperature Coefficient	$I_D=250\mu A, \text{Reference } 25^\circ\text{C}$	--	0.74	--	V/ $^\circ\text{C}$
I_{DSS}	Drain to Source Leakage Current	$V_{DS} = 650V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	10	μA
		$V_{DS} = 520V, V_{GS} = 0V, T_J = 125^\circ\text{C}$	--	--	500	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS} = +20V, V_{DS} = 0V,$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS} = -20V, V_{DS} = 0V,$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=16A$	--	91	99	m Ω
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5	3.9	4.5	V
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R_g	Gate resistance	$f = 1.0\text{MHz}$	--	3.1	--	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0V, V_{DS} = 100V$ $f = 1.0\text{MHz}$	--	3910	--	pF
C_{oss}	Output Capacitance		--	148	--	
C_{rss}	Reverse Transfer Capacitance		--	0.51	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$I_D = 20A, V_{DD} = 400V$ $R_G = 10\Omega$	--	31	--	ns
t_r	Rise Time		--	28	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	110	--	
t_f	Fall Time		--	55	--	
Q_g	Total Gate Charge	$I_D = 20A, V_{DD} = 480V$ $V_{GS} = 10V$	--	70	--	nC
Q_{gs}	Gate to Source Charge		--	17	--	
Q_{gd}	Gate to Drain ("Miller") Charge		--	32	--	
$V_{plateau}$	Gate Plateau Voltage		--	6.2	--	V

650V N-Channel Super-Junction MOSFET

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	$T_C=25^{\circ}\text{C}$	--	--	40	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	120	A
V_{SD}	Diode Forward Voltage	$I_S=20\text{A}, V_{GS}=0\text{V}$	--	--	1.2	V
T_{rr}	Reverse Recovery Time	$I_S=20\text{A}, T_j = 25^{\circ}\text{C}$ $dI_F/dt=100\text{A}/\mu\text{s},$ $V_{GS}=0\text{V}$	--	140	--	ns
Q_{rr}	Reverse Recovery Charge		--	750	--	nC
I_{rrm}	Reverse Recovery Current		--	11	--	A

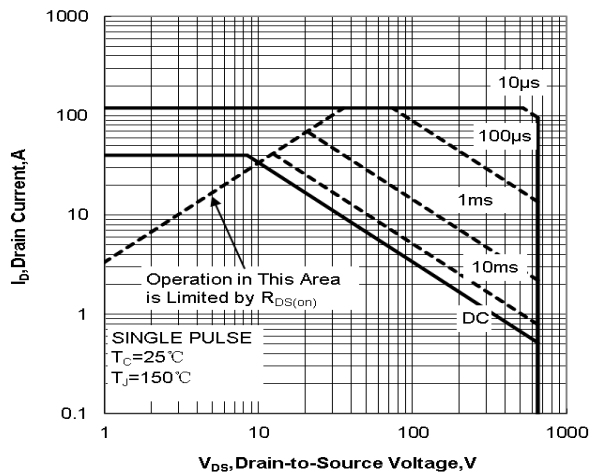
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Characteristics Curve:


Figure.1 Maximum Forward Bias Safe Operating Area

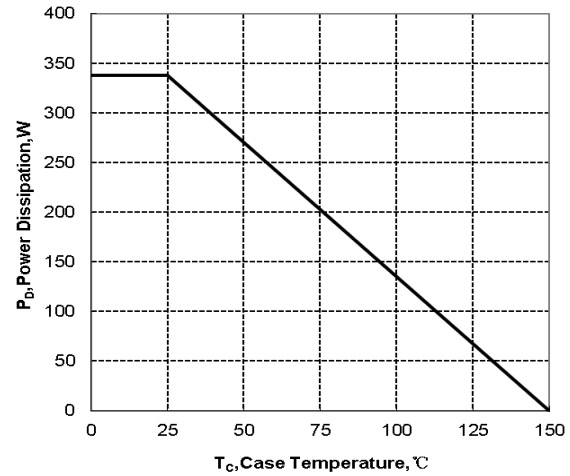


Figure.2 Maximum Power Dissipation vs Case Temperature

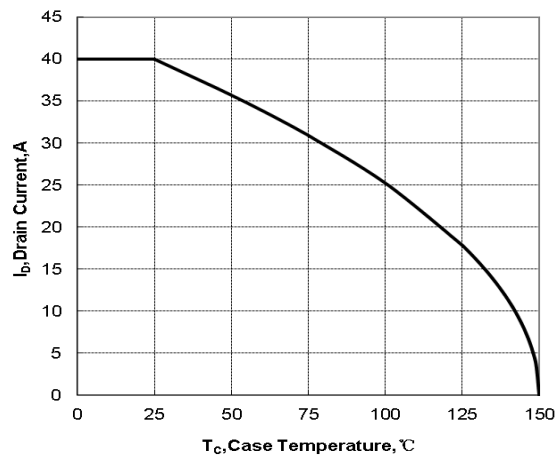


Figure.3 Maximum Continuous Drain Current vs Case Temperature

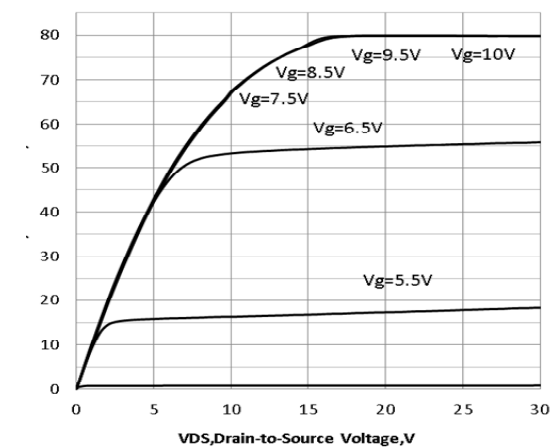


Figure.4 Typical Output Characteristics

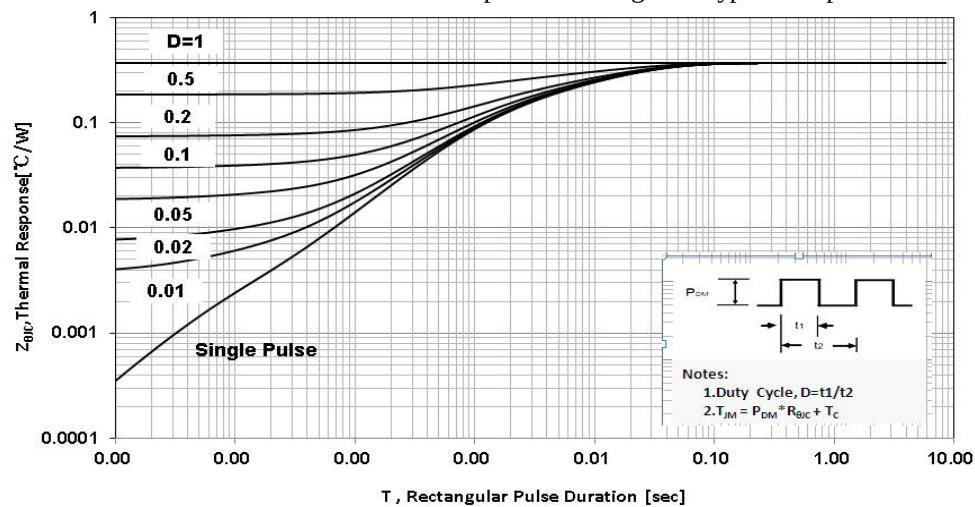


Figure.5 Maximum Effective Thermal Impedance , Junction to Case

650V N-Channel Super-Junction MOSFET

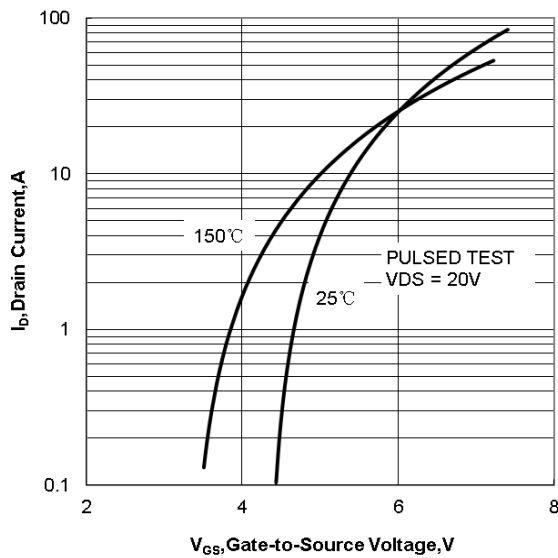


Figure.6 Typical Transfer Characteristics

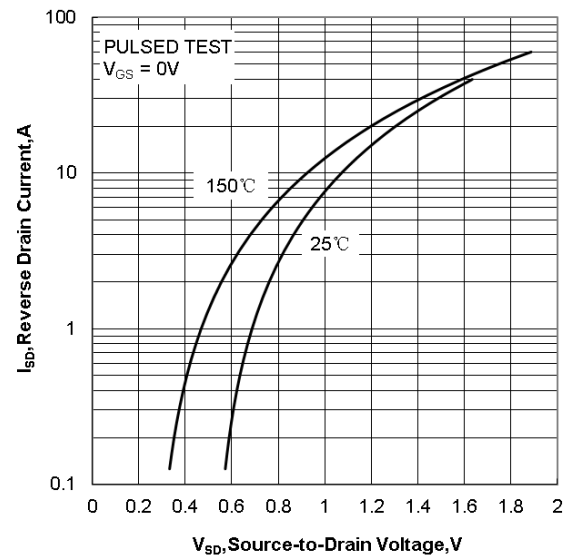


Figure.7 Typical Body Diode Transfer Characteristics

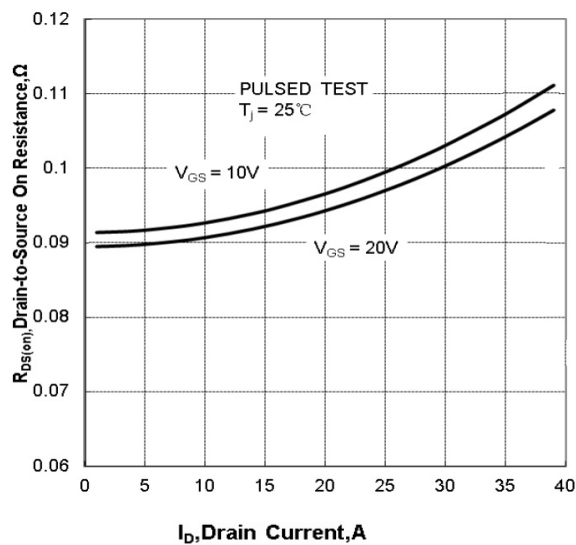


Figure.8 Typical Drain to Source ON Resistance vs Drain Current

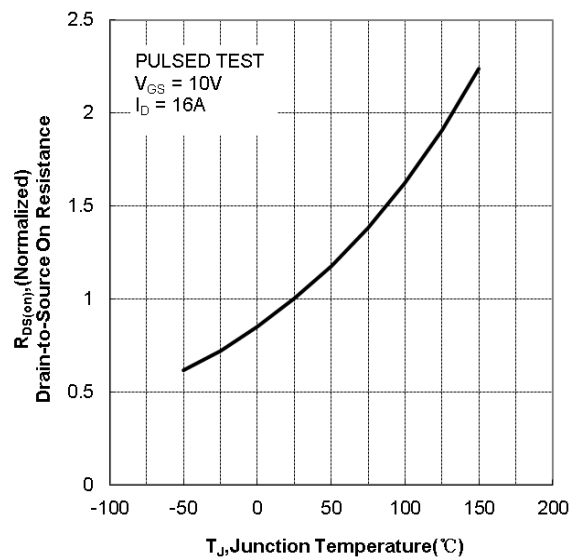


Figure.9 Typical Drain to Source on Resistance vs Junction Temperature

650V N-Channel Super-Junction MOSFET

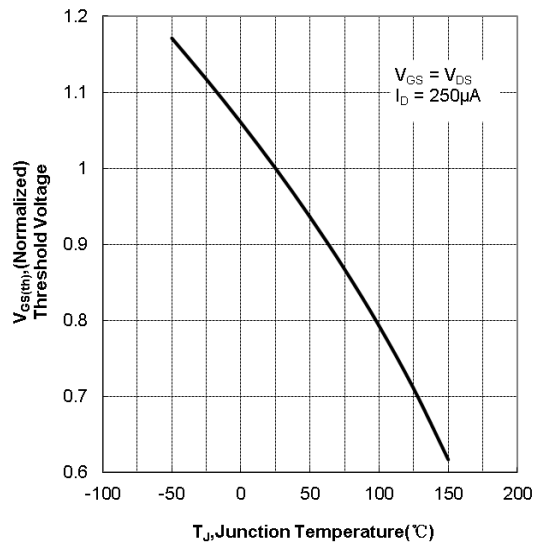


Figure.10 Typical Theshold Voltage vs Junction Temperatu

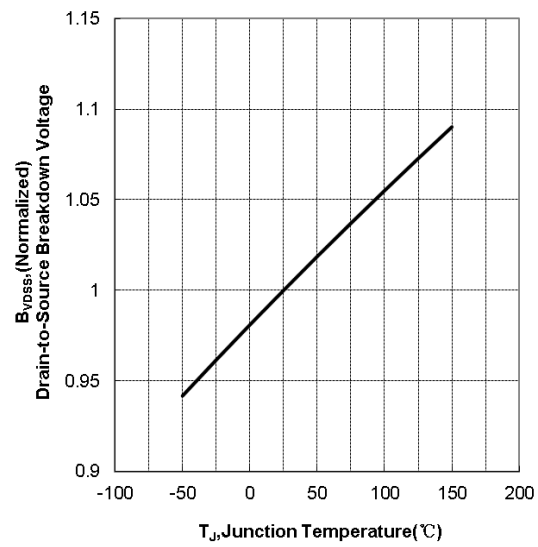


Figure 11 Typical Breakdown Voltage vs Junction Temperatu

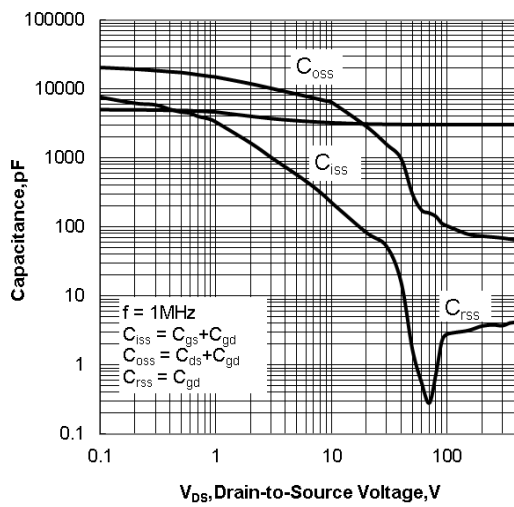


Figure.12 Typical Capacitance vs Drain to Source Voltage

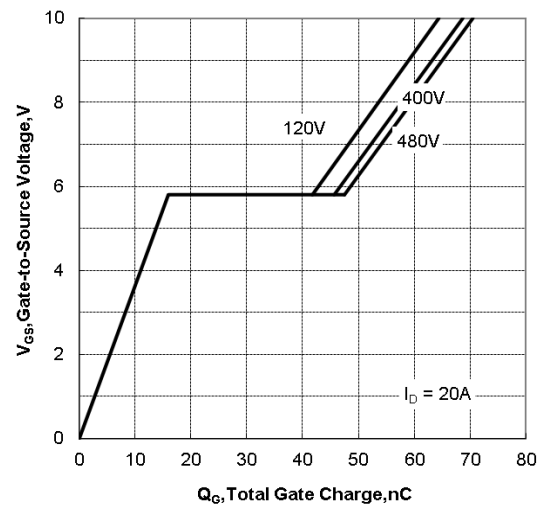


Figure.13 Typical Gate Charge vs Gate to Source Voltage

Test Circuit and Waveform

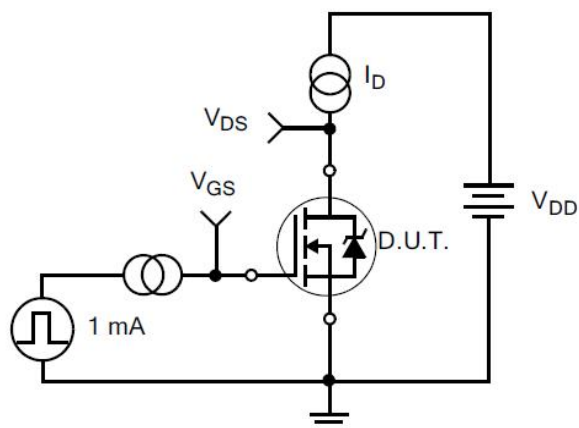


Figure 14. Gate Charge Test Circuit

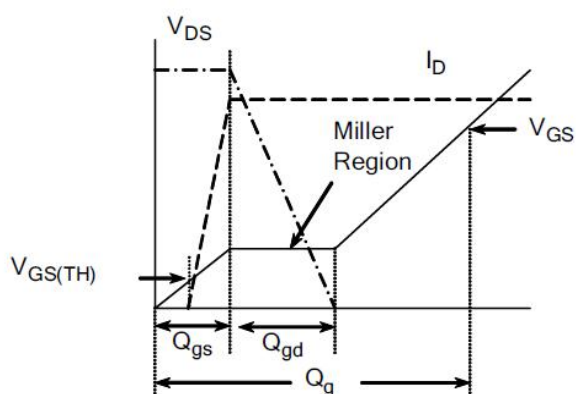


Figure 15. Gate Charge Waveforms

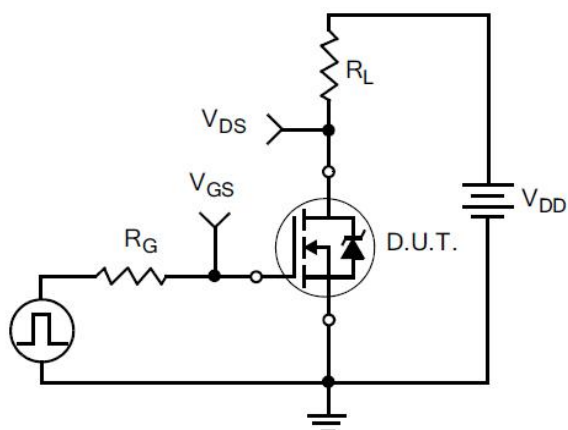


Figure 16. Resistive Switching Test Circuit

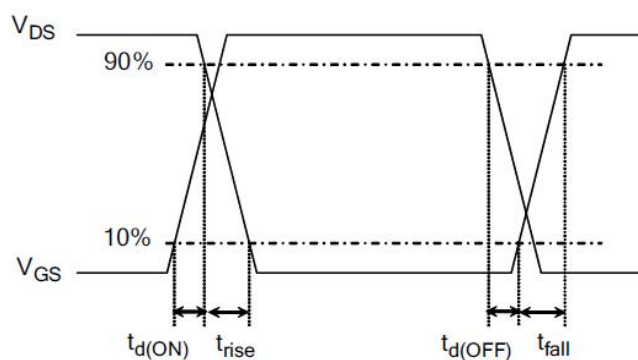


Figure 17. Resistive Switching Waveforms

650V N-Channel Super-Junction MOSFET

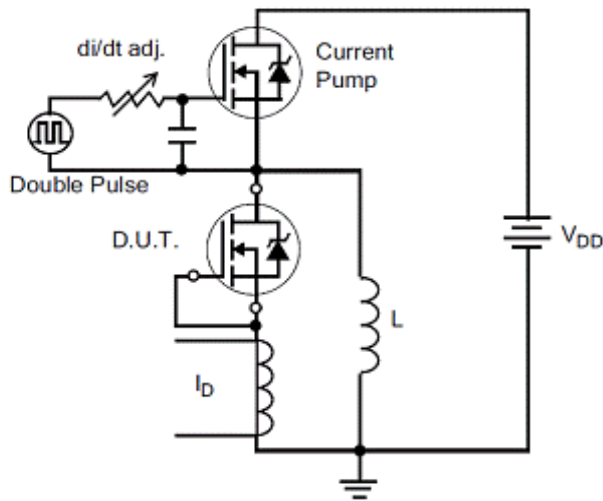


Figure 18. Diode Reverse Recovery Test Circuit

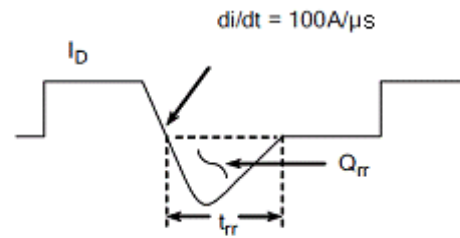


Figure 19. Diode Reverse Recovery Waveform

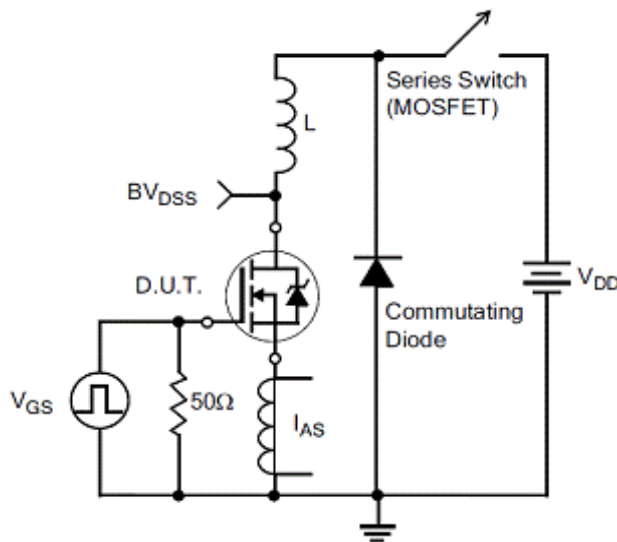


Figure20.Unclamped Inductive Switching Test Circuit

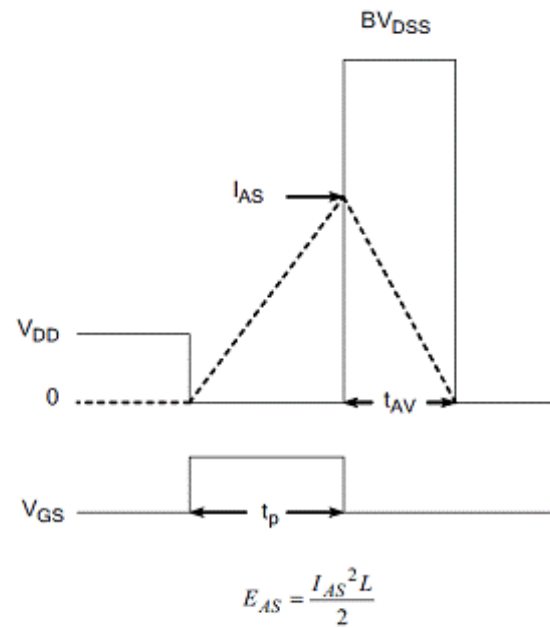
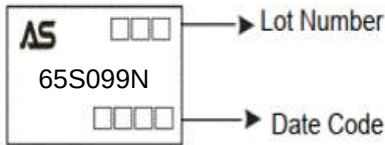
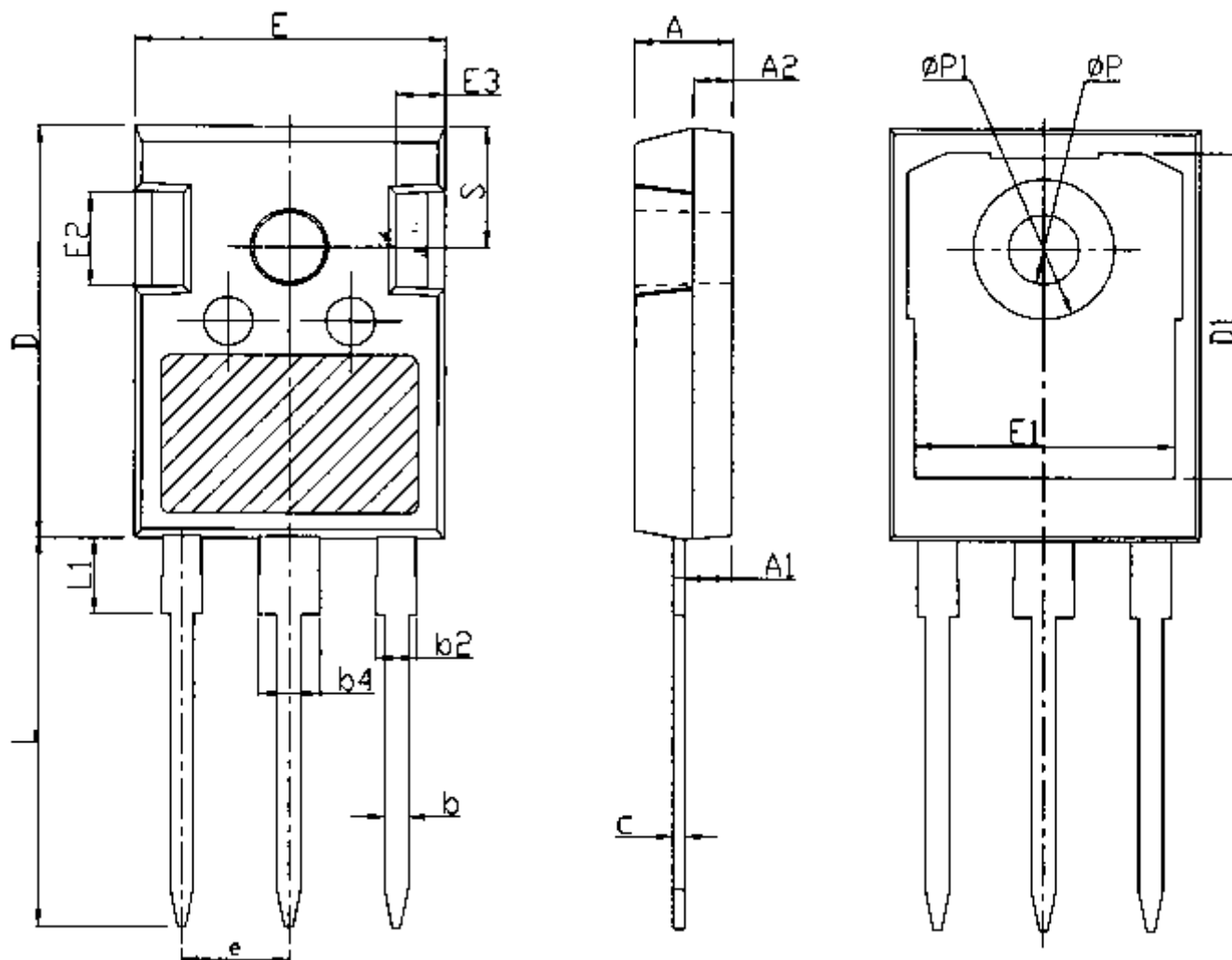


Figure21.Unclamped Inductive Switching Waveform

Ordering and Marking Information

Ordering Device No.	Marking	Package	Packing	Quantity
ASDM65S099NX-R	65S099N	TO-247	Tube	30/Tube

PACKAGE	MARKING
TO-247	 The diagram shows a TO-247 package with the following markings: - AS logo 65S099N - Two boxes for Lot Number - Four boxes for Date Code

650V N-Channel Super-Junction MOSFET
TO-247


Unit:mm			
Symbol	Min.	Nom	Max.
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85

Unit:mm			
Symbol	Min.	Nom.	Max.
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

650V N-Channel Super-Junction MOSFET**IMPORTANT NOTICE**

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