

## Description

MPT023N10-T, the N-channel Enhanced Power MOSFETs, is obtained by advanced double trench technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. This is suitable device for BMS and high current switching applications.

## KEY CHARACTERISTICS

Parameter	Value	Unit
$V_{DSS}$	100	V
$I_D$	326	A
$R_{DS(on).typ}$	1.4	m $\Omega$

## FEATURES

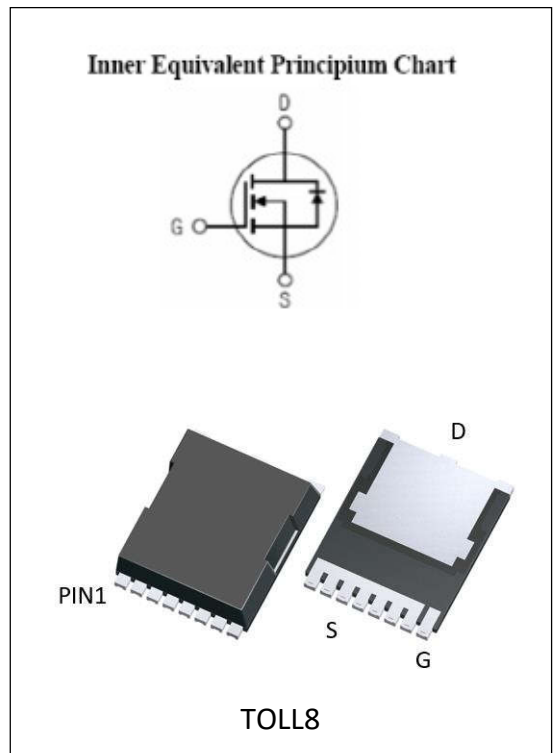
- ① Fast Switching
- ② Low On-Resistance
- ③ Low Gate Charge
- ④ Low Reverse transfer capacitances
- ⑤ High avalanche ruggedness
- ⑥ RoHS product

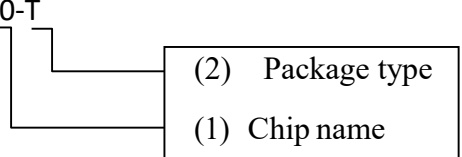
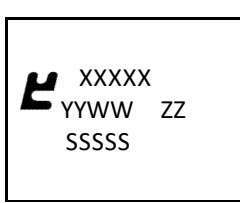
## APPLICATIONS

- ① BMS
- ② High current switching applications

## ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
MPT023N10-T	TOLL8	MPT023N10-T	Reel



<p>MPT023N10-T</p>  <p>(2) Package type (1) Chip name</p> <p>(1) MPT023N10: 2.3m<math>\Omega</math>/100V (2)T: TOLL8</p>	 <p>XXXXX: Product Code YYWW: Year&amp;Week ZZ: Assembly Code SSSSS: Lot Code</p>
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## ABSOLUTE RATINGS

at TC=25°C, unless otherwise specified

Symbol	Parameter	Rating	Units
V <sub>DSS</sub>	Drain-Source Voltage	100	V
I <sub>D</sub>	Continuous Drain Current, Silicon Limited	326	A
	Continuous Drain Current, Package Limited	360	A
	Continuous Drain Current @TC=100°C, Silicon Limited	206	A
I <sub>DM</sub> <sup>Note1</sup>	Pulsed Drain Current	1304	A
V <sub>GS</sub>	Gate-Source Voltage	±20	V
E <sub>AS</sub> <sup>Note2</sup>	Avalanche Energy	1225	mJ
P <sub>D</sub>	Power Dissipation	416.6	W
	Derating Factor above 25°C	3.33	W/°C
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature Range	150, -55 to 150	°C
T <sub>L</sub>	Maximum Temperature for Soldering	260	°C

Note1: Repetitive Rating: Pulse width limited by maximum junction temperature

Note2: L=0.5mH, I<sub>as</sub>=70A, Start T<sub>J</sub> =25°C

## Thermal characteristics

Symbol	Parameter	Max	Units
R <sub>θJC</sub>	Thermal resistance, Junction-Case	0.3	°C/W
R <sub>θJA</sub>	Thermal resistance, Junction-Ambient	62.5	°C/W

## Electrical Characteristics

at TC=25°C, unless otherwise specified

OFF Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
V <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	100	110	--	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	--	--	1	μA
		V <sub>DS</sub> =80V, V <sub>GS</sub> =0V @T <sub>C</sub> =125°C	--	--	100	μA
I <sub>GSS(F)</sub>	Gate-Source Forward Leakage	V <sub>GS</sub> =+20V	--	--	100	nA
I <sub>GSS(R)</sub>	Gate-Source Reverse Leakage	V <sub>GS</sub> =-20V	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Values			Unit s
			Min	Typ	Max	
$R_{DS(on)}$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=50A$	--	1.4	1.8	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Pulse width $t_p \leq 300\mu s, \delta \leq 2\%$						

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$C_{iss}$	Input Capacitance	$V_{DS}=50V, V_{GS}=0, f=1MHz$	--	11260	--	pF
$C_{oss}$	Output Capacitance		--	1715	--	
$C_{rss}$	Reverse Transfer Capacitance		--	328	--	
$Q_g$	Total Gate Charge	$V_{DD}=50V, I_D=100A, V_{GS}=10V$	--	224	--	nC
$Q_{gs}$	Gate-Source charge		--	80	--	
$Q_{gd}$	Gate-Drain charge		--	38	--	
$R_G$	Gate resistance	$V_{GS}=0, V_{DS}=0$		3.6		$\Omega$

Switching Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=50V, I_D=10A, V_{GS}=10V, R_G=3\Omega, \text{Resistive Load}$	--	34	--	ns
$t_r$	Rise Time		--	26	--	
$t_{d(off)}$	Turn-Off Delay Time		--	78	--	
$t_f$	Fall Time		--	30	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Values			Units
			Min	Typ	Max	
$I_S$	Continuous Source Current		--	--	326	A
$I_{SM}$	Maximum Pulsed Current		--	--	1304	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=50A$	--	--	1.2	V
$T_{rr}$	Reverse Recovery Time	$I_S=100A, V_{GS}=0, di/dt=100A/\mu s$	--	100	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	280	--	nC

### Characteristics Curves

Figure 1. Safe Operating Area

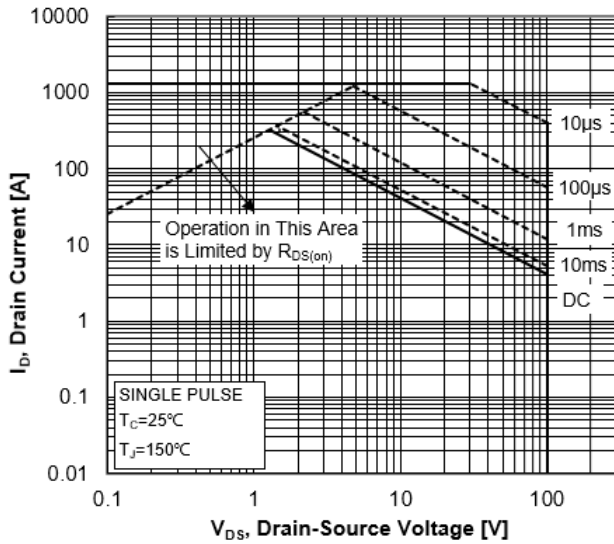


Figure 2. Maximum Power Dissipation vs Case Temperature

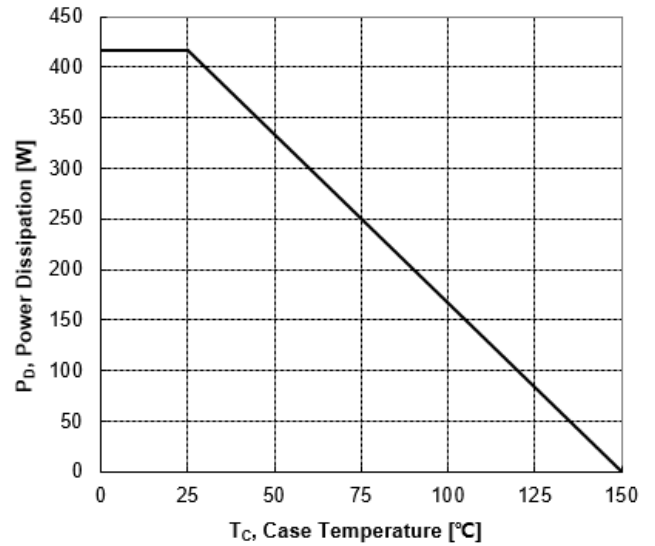


Figure 3. Maximum Continuous Drain Current vs Case Temperature

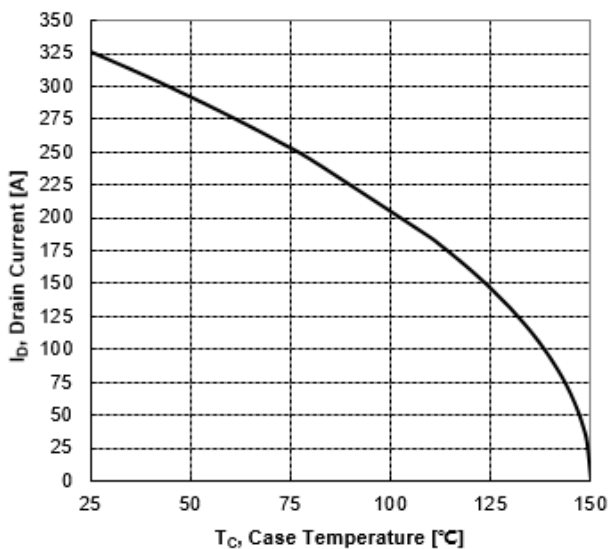


Figure 4. Typical Output Characteristics

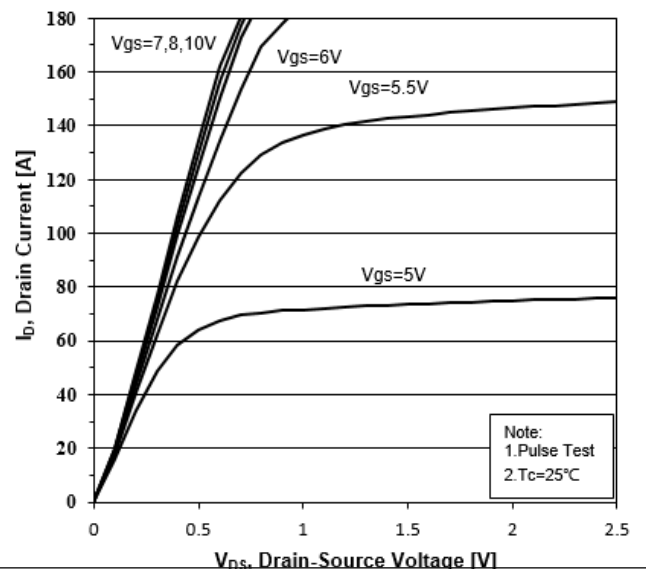


Figure 5. Transient Thermal Impedance

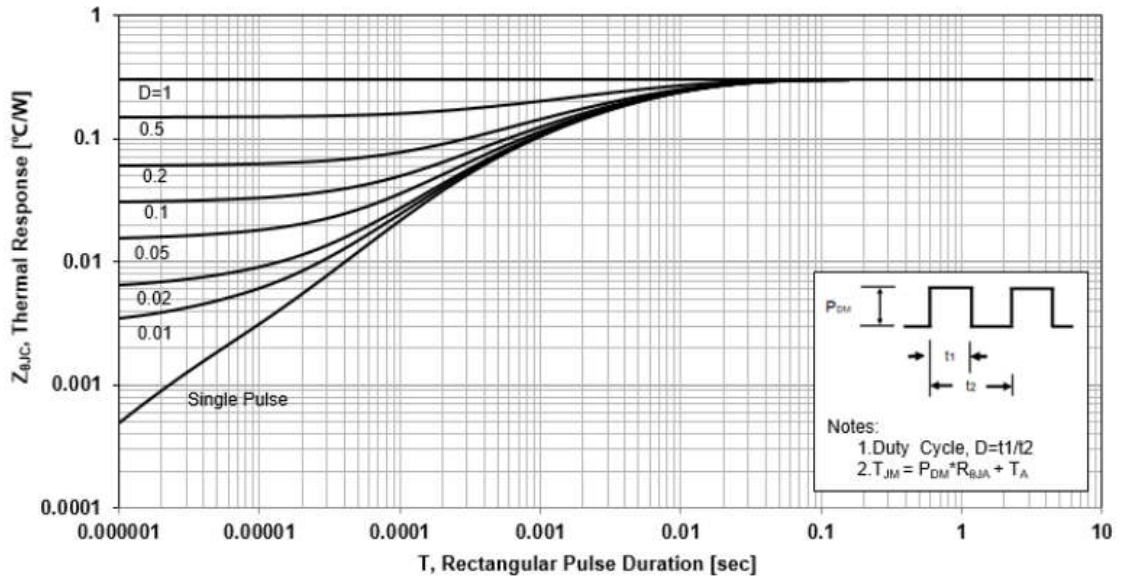


Figure 6. Typical Transfer Characteristics

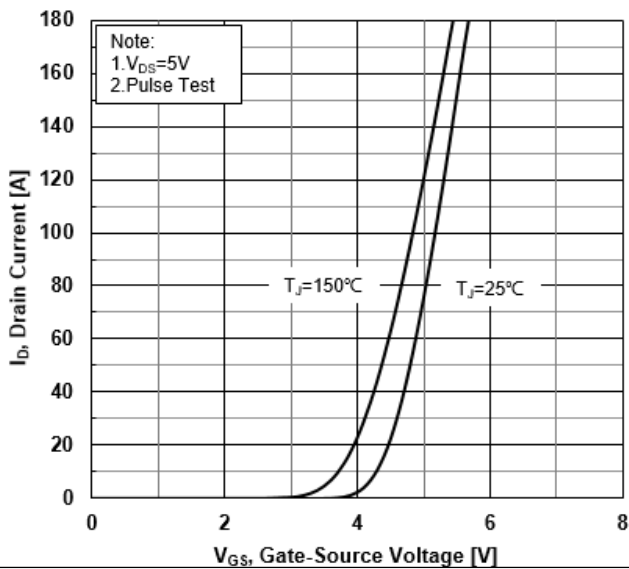


Figure 7. Source-Drain Diode Forward Characteristics

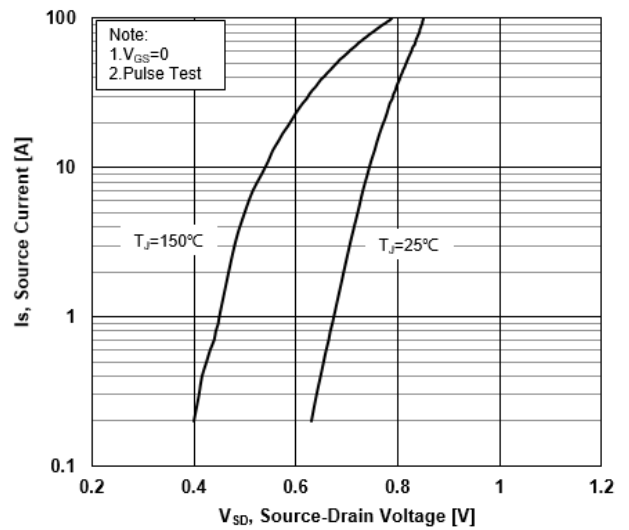


Figure 8. Drain-Source On-Resistance vs Drain Current

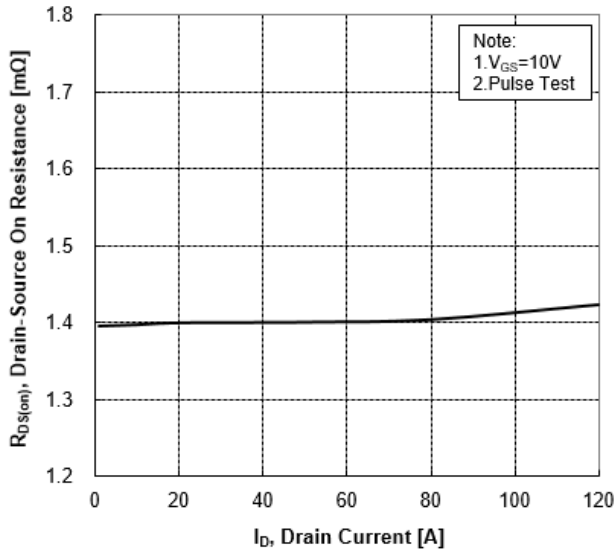


Figure 9. Normalized On-Resistance vs Junction Temperature

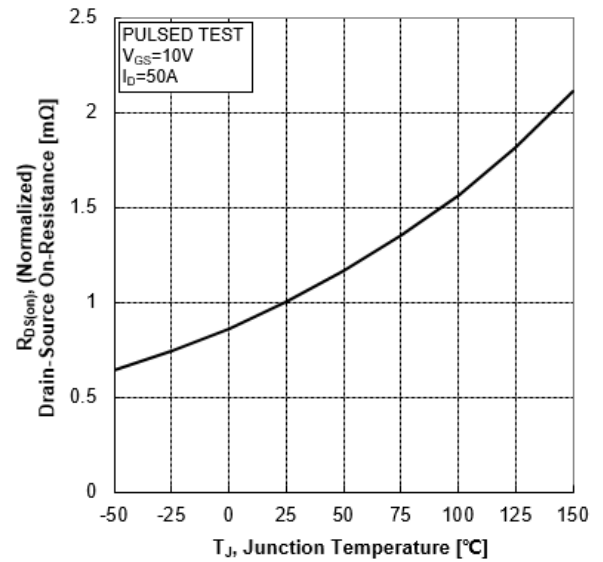


Figure 10. Normalized Threshold Voltage vs Junction Temperature

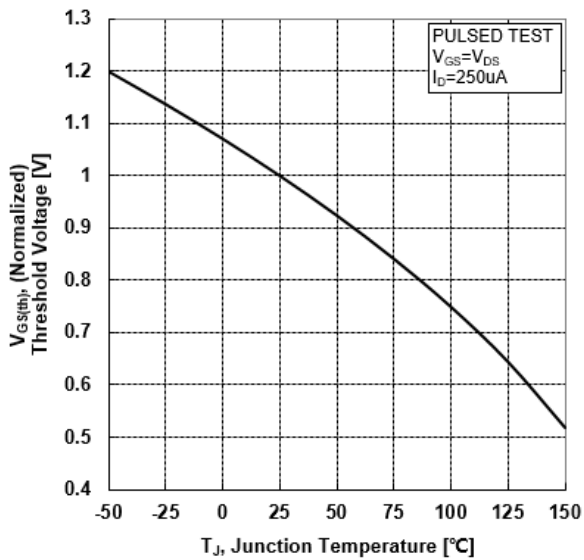


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

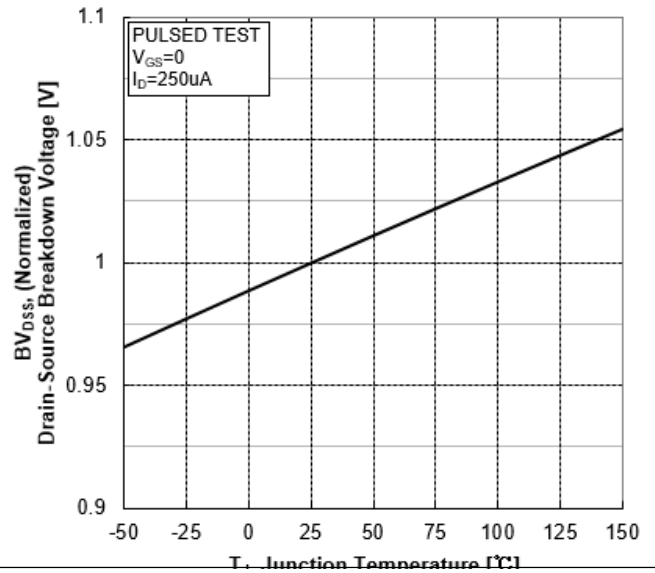


Figure 12. Capacitance Characteristics

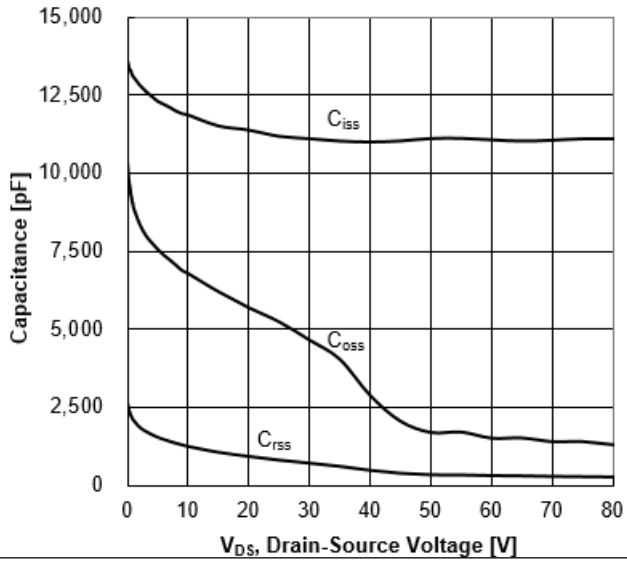
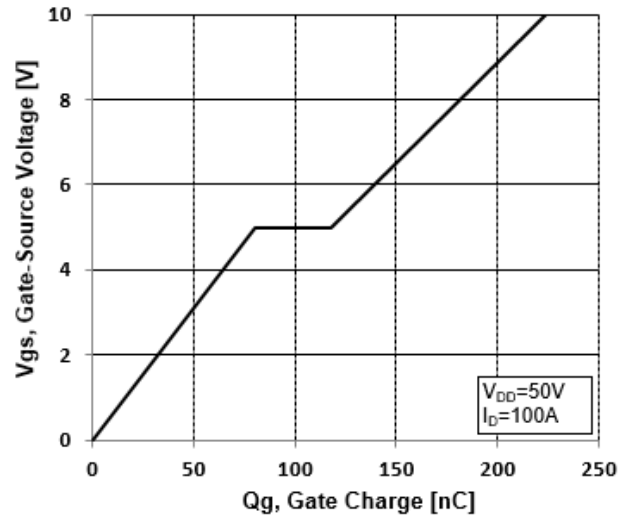


Figure 13. Typical Gate Charge vs Gate-Source Voltage



Test Circuit and Waveform

Figure 14. Resistive Switching Test Circuit

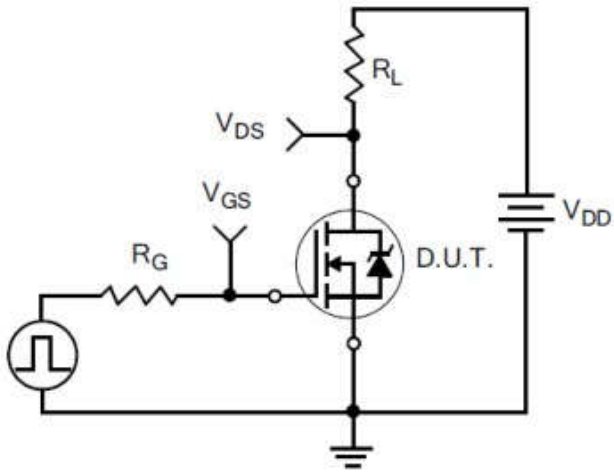


Figure 15. Resistive Switching Waveforms

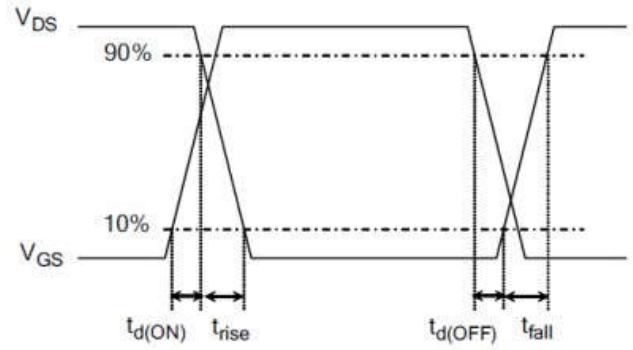


Figure 16. Gate Charge Test Circuit

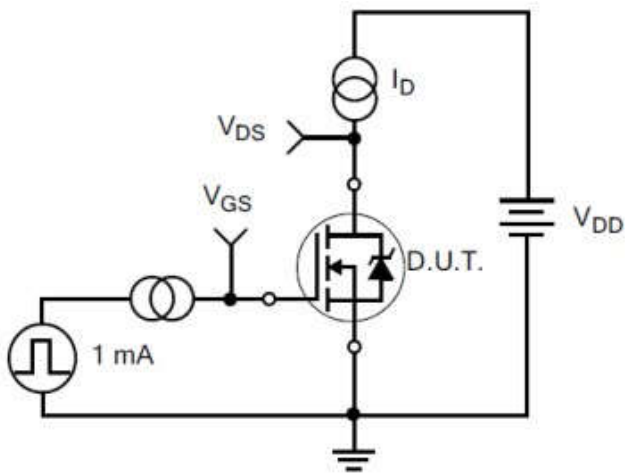


Figure 17. Gate Charge Waveforms

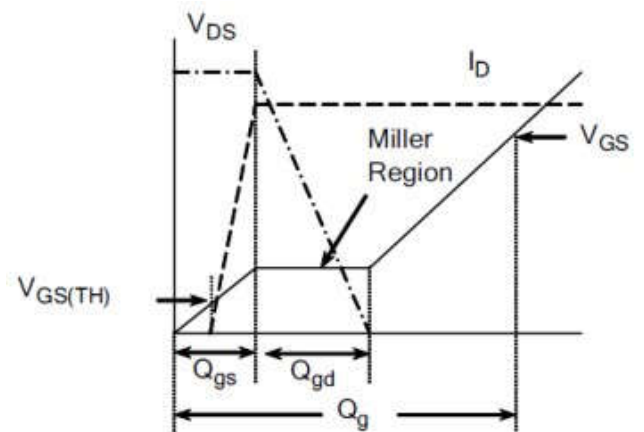




Figure 18. Diode Reverse Recovery Test Circuit

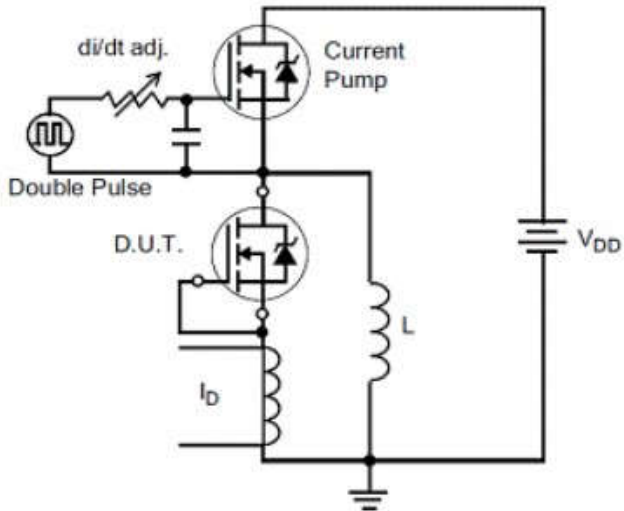


Figure 19. Diode Reverse Recovery Waveform

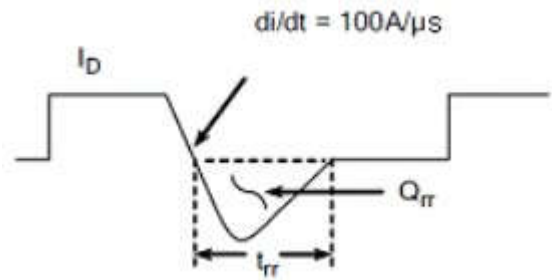


Figure 20. Unclamped Inductive Switching Test Circuit

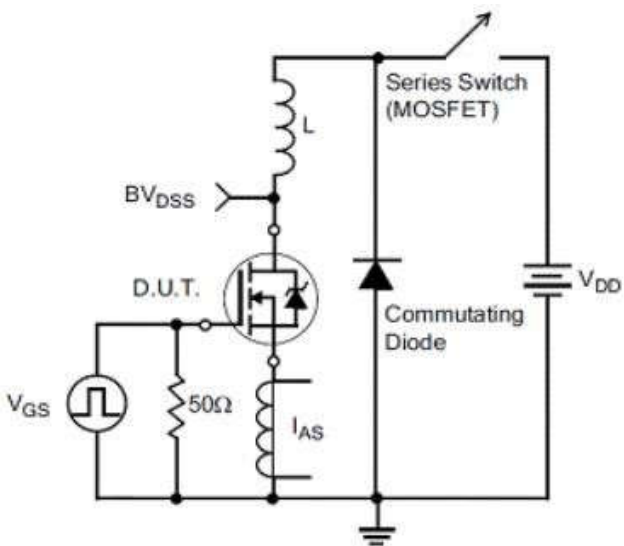
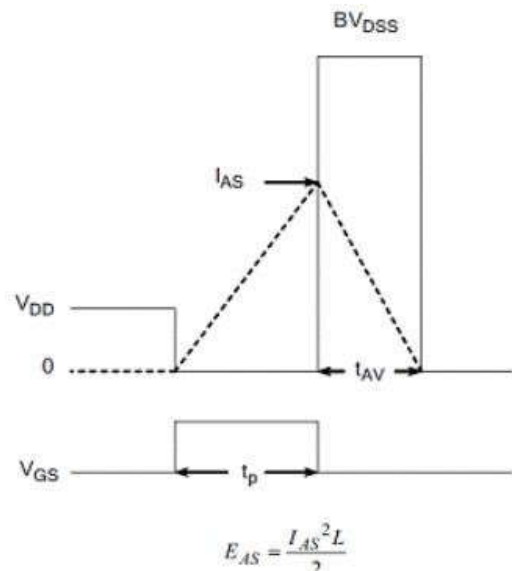
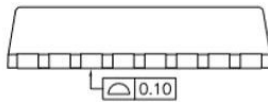
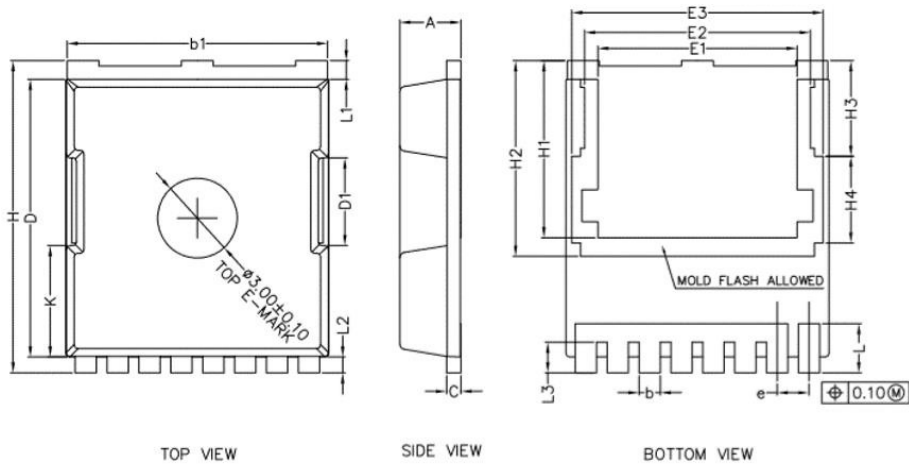


Figure 21. Unclamped Inductive Switching Waveform



Package Description

TOLL-8



SIDE VIEW

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
c	0.40	0.50	0.60
D	10.28	10.43	10.58
D1	3.15	3.30	3.45
E	9.70	9.90	10.10
E1	7.35	7.50	7.65
E2	8.35	8.50	8.65
E3	9.31	9.46	9.61
e	1.10	1.20	1.30
H	11.48	11.73	11.88
H1	6.55	6.65	6.75
H2	7.20	7.35	7.50
H3	3.44	3.59	3.74
H4	3.11	3.26	3.41
K	4.03	4.18	4.33
L	1.60	1.85	2.10
L1	0.55	0.70	0.85
L2	0.45	0.60	0.75
L3	1.00	1.15	1.30



**NOTE:**

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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