

N-channel Enhancement Mode Power MOSFET

Features

- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired
- 100% UIS TESTED!
- 100% ΔV_{ds} TESTED!

Product Summary

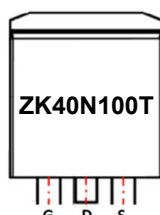
Parameters	Value	Unit
V_{DSS}	40	V
$V_{GS(th_Typ)}$	1.5	V
$I_D(@V_{GS}=10V)$	90	A
$R_{DS(ON_Typ)}(@V_{GS}=10V)$	3.6	m Ω
$R_{DS(ON_Typ)}(@V_{GS}=4.5V)$	4.8	m Ω

Applications

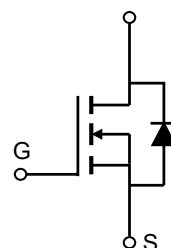
- PWM Application
- Load Switch
- Power Management



TO-252-2L Top View



Marking



Schematic Diagram

Device	Marking	Package	Packing	Reel Size	Tape Width	Reel (pcs)
ZK40N100T	40N100	TO-252	Reel	N/A	N/A	2500

MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	90	A
	$T_C = 100^{\circ}\text{C}$		55	
Pulsed Drain Current		I_{DM}	360	A
Single Pulsed Avalanche Energy		E_{AS}	91	mJ
Power Dissipation		P_D	114	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	1.1	$^{\circ}\text{C/W}$
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	$^{\circ}\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	V _{(BR) DSS}	V _{GS} = 0V, I _D = 1mA	40			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 40V, V _{GS} =0V			1.0	μA
Gate-body leakage current	I _{GSS}	V _{DS} = 0V, V _{GS} =±20V			±100	nA
On characteristics ④						
Gate-threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	1.0	1.5	2.2	V
Static drain-source on-sate resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		3.6	4.8	mΩ
		V _{GS} =4.5V, I _D =15A		4.8	6.6	mΩ
Dynamic characteristics ④ ⑤						
Input capacitance	C _{iss}	V _{DS} =20V,V _{GS} =0V f =1MHz		3200		pF
Output capacitance	C _{oss}			269		
Reverse transfer capacitance	C _{rss}			242		
Gate Resistance	R _G	f =1MHz		3.2		Ω
Switching characteristics ④ ⑤						
Total gate charge	Q _g	V _{GS} =0 to 10V V _{DS} =20V, I _D =45A		68		nC
Gate-source charge	Q _{gs}			10		
Gate-drain charge	Q _{gd}			18		
Turn-on delay time	t _{d(on)}	V _{DS} =15V,I _D =45A V _{GS} =10V,R _{GEN} =4.7Ω		12		ns
Turn-on rise time	t _r			66		
Turn-off delay time	t _{d(off)}			48		
Turn-off fall time	t _f			45		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V _{SD} ④	V _{GS} =0V, I _S =1A			1.2	V
Continuous drain-source diode forward current	I _S ①	T _c =25℃			90	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				360	

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}$, $V_{DD} = 50V$, $V_G = 10V$, $R_G = 25\Omega$, $L = 0.5mH$.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

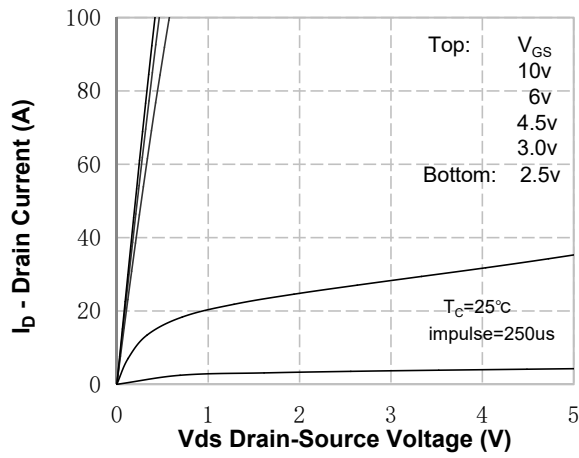


Figure 1. On-Region Characteristics

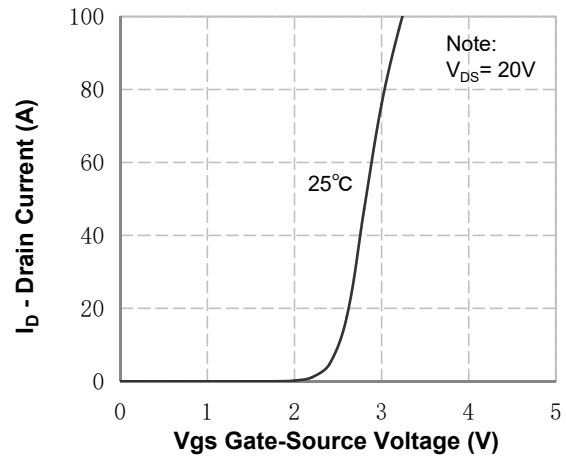


Figure 2. Transfer Characteristics

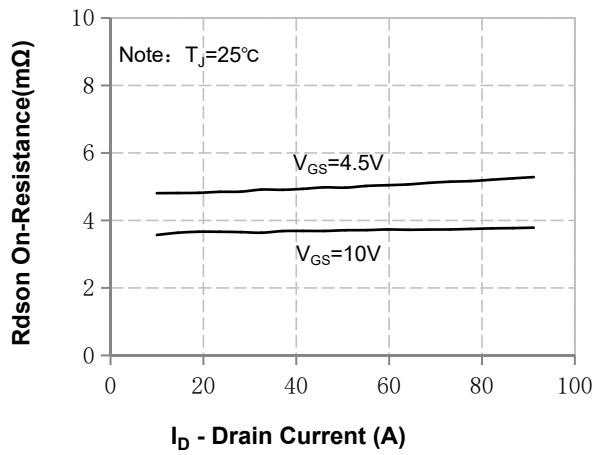


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

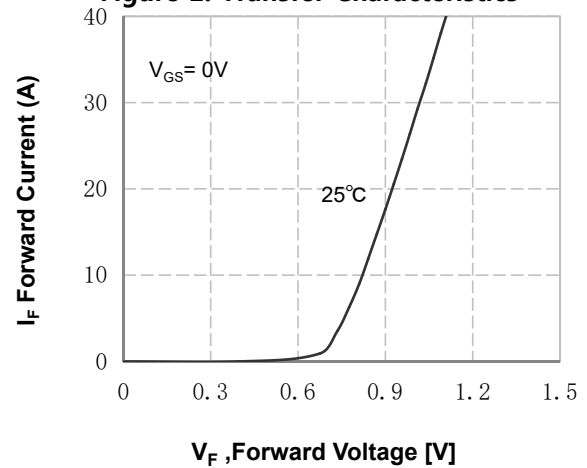


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

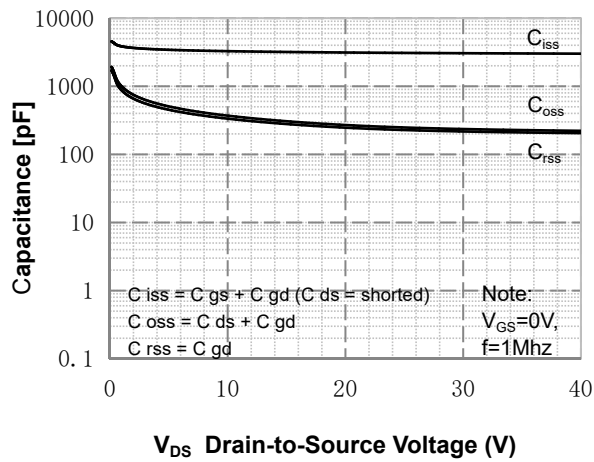


Figure 5. Capacitance Characteristics

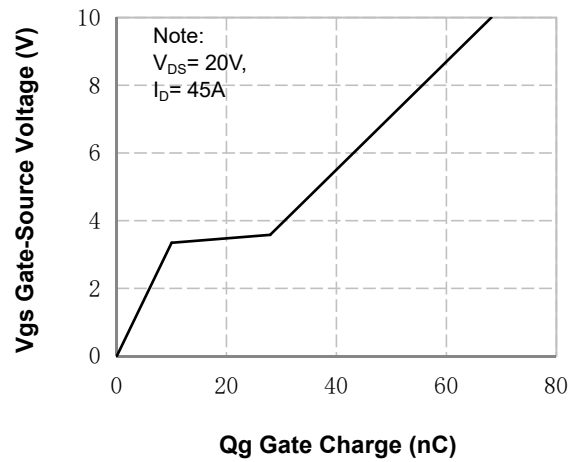


Figure 6. Gate Charge Characteristics

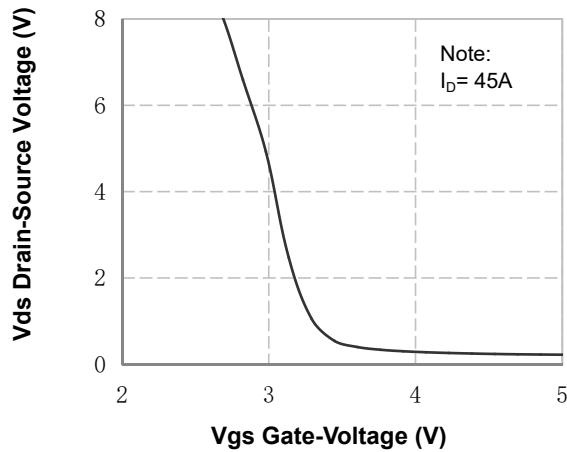


Figure 7. V_{DS} Drain-Source Voltage vs Gate Voltage

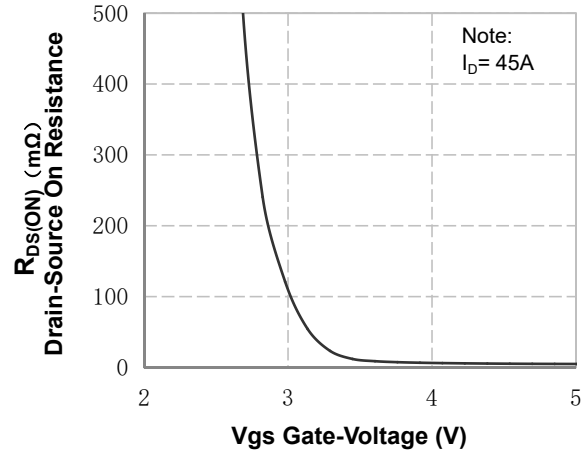


Figure 8. On-Resistance vs Gate Voltage

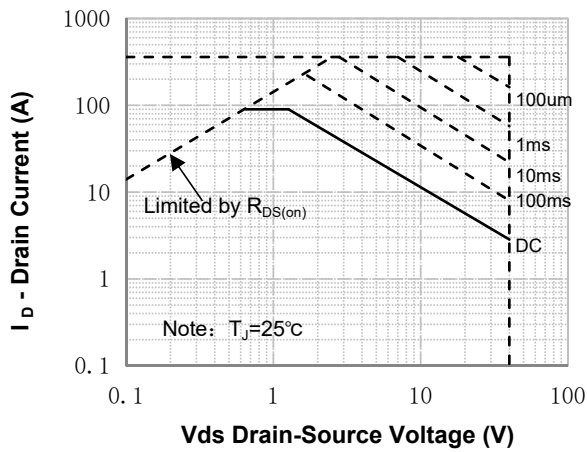


Figure 9. Maximum Safe Operating Area

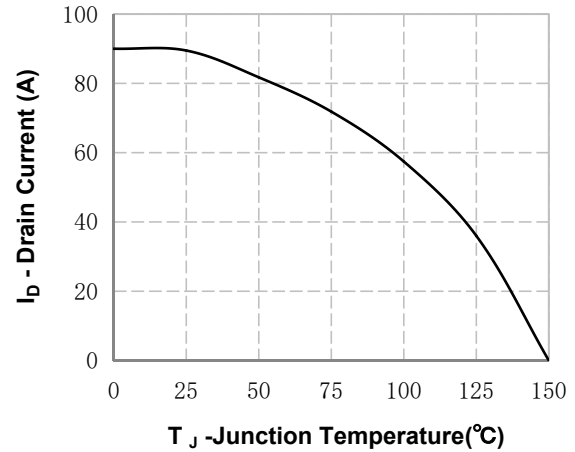


Figure 10. Maximum Continuous Drain Current vs Temperature

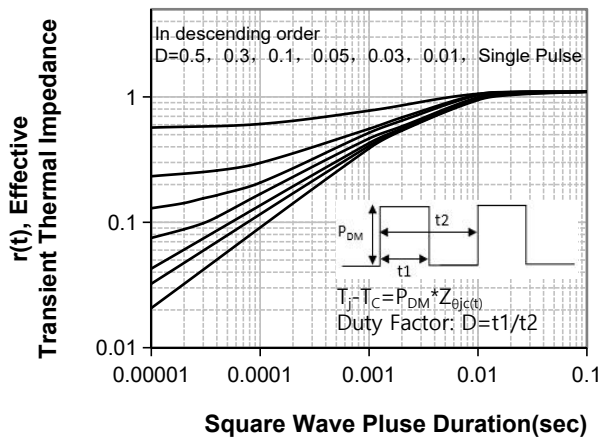
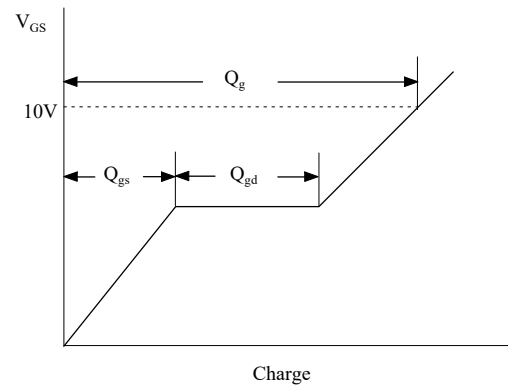
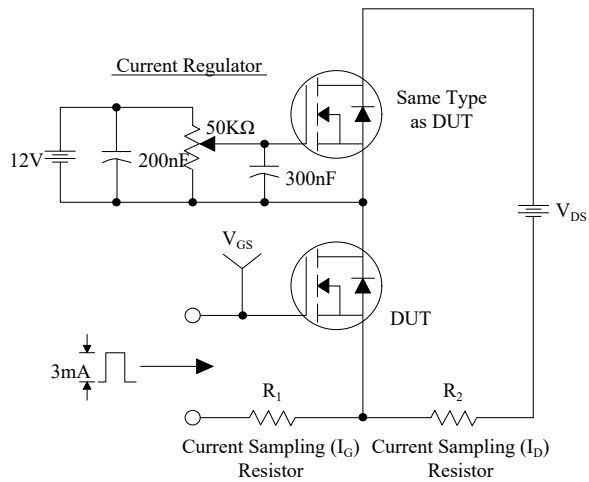
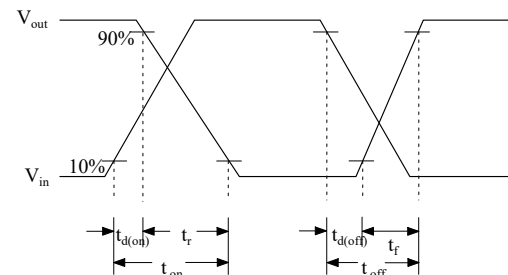
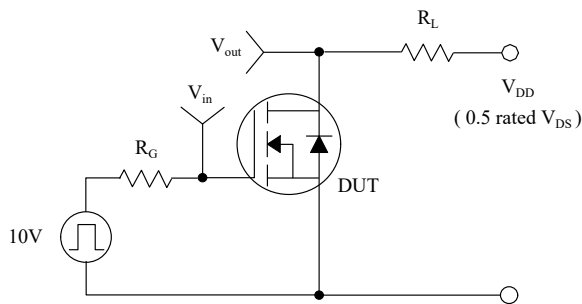


Figure 11. Transient Thermal Response Curve

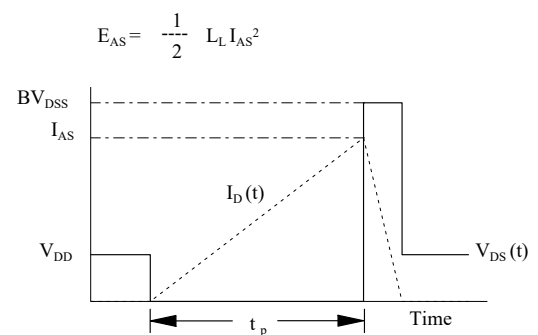
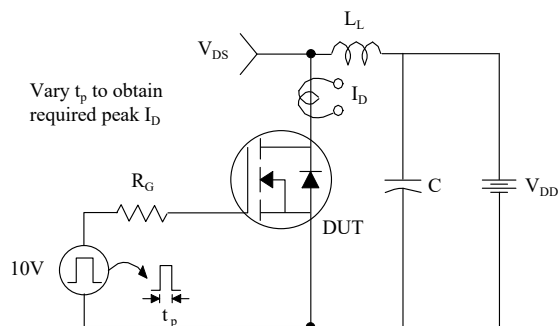
Gate Charge Test Circuit & Waveform



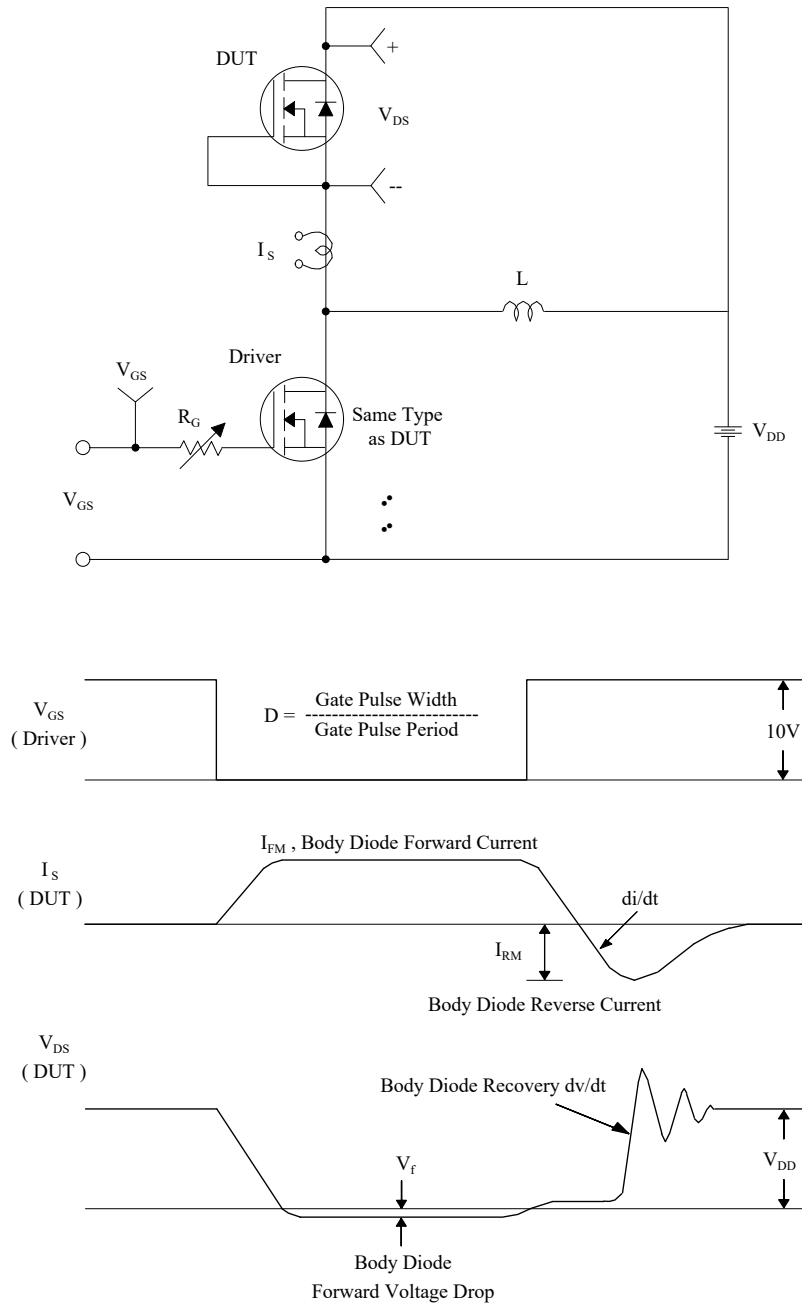
Resistive Switching Test Circuit & Waveforms



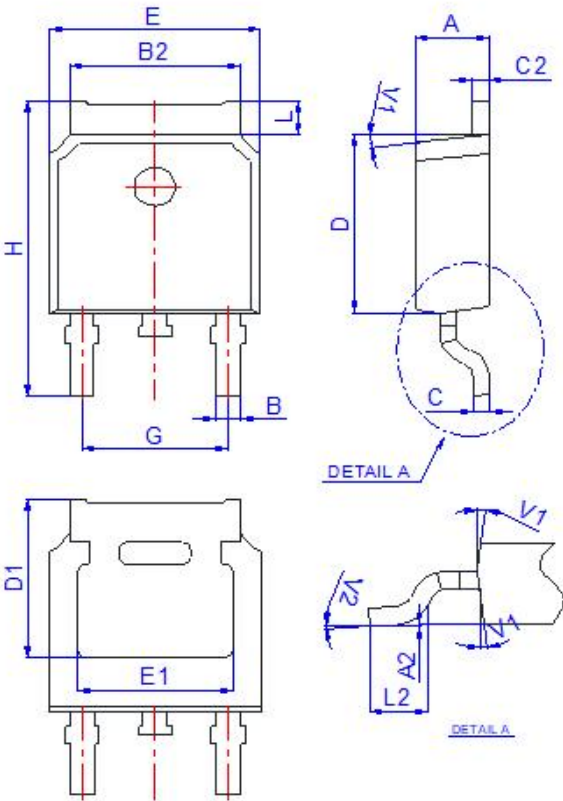
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Mechanical Data(TO-252-2L)



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°