N-Channel Trench Power MOSFET

General Description

The H D100N02 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a wide variety of applications.

Features

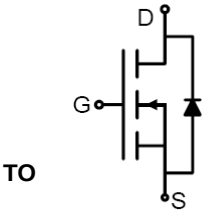
- V_{DS} = 20V,ID =100 A
  $R_{DS(ON)}$ < 5.5mΩ @ V_{GS} =4.5V
  $R_{DS(ON)}$ < 9mΩ @ V_{GS} =2.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

- Battery Protection
- Load switch
- Power management

100% UIS TESTED!
100% ΔVds TESTED!

BV_{DSS} = 20 V
$R_{DS(on)}$ =5.5mΩ
I_D = 100 A



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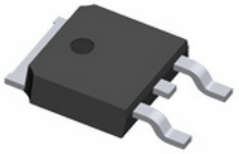
Schematic Diagram



-252(DPAK) top view

Table 1. Absolute Maximum Ratings (T_A=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V）	20	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±12	V
I_D	Drain Current-Continuous(T_C=25℃) **(Note 1)**	100	A
	Drain Current-Continuous(T_C=100℃)	100	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed **(Note 2)**	340	A
P_D	Maximum Power Dissipation(T_C=25℃)	87	W
	Maximum Power Dissipation(T_C=100℃)	43	W
E_{AS}	Avalanche energy **(Note 3)**	340	mJ
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	℃

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	-	1.72	℃/W

Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	20	25		V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V,V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	0.5	0.7	1.1	V
g_{FS}	Forward Transconductance	V_{DS}=5V,I_D=15A		40		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=4.5V, I_D=20A(Tc=25℃)		3.9	5.5	mΩ
		V_{GS}=4.5V, I_D=20A (Tc=125℃)		5.4	8	mΩ
		V_{GS}=2.5V, I_D=15A		6	9	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V, f=1.0MHz		2800		pF
C_{oss}	Output Capacitance			353		pF
C_{rss}	Reverse Transfer Capacitance			265		pF
Rg	Gate resistance	V_{GS}=0V, V_{DS}=0V,f=1.0MHz		1.1		Ω
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=4.5V, V_{DS}=15V, R_L=0.75Ω,R_{GEN}=3Ω		17		nS
t_r	Turn-on Rise Time			49		nS
$t_{d(off)}$	Turn-Off Delay Time			74		nS
t_f	Turn-Off Fall Time			26		nS
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=12A		32		nC
Q_{gs}	Gate-Source Charge			3		nC
Q_{gd}	Gate-Drain Charge			11		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)				100	A
V_{SD}	Forward on Voltage	V_{GS}=0V,I_S=20A			1.2	V
t_{rr}	Body Diode Reverse Recovery Time	I_F=20A, dI/dt=100A/μs		23		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=20A, dI/dt=100A/μs		10		nC

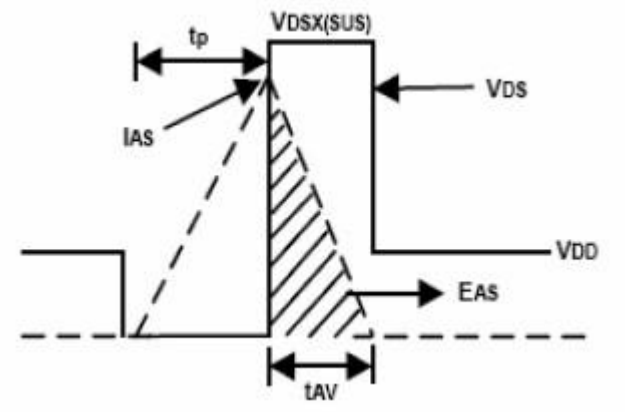
Notes 1.The maximum current rating is package limited.

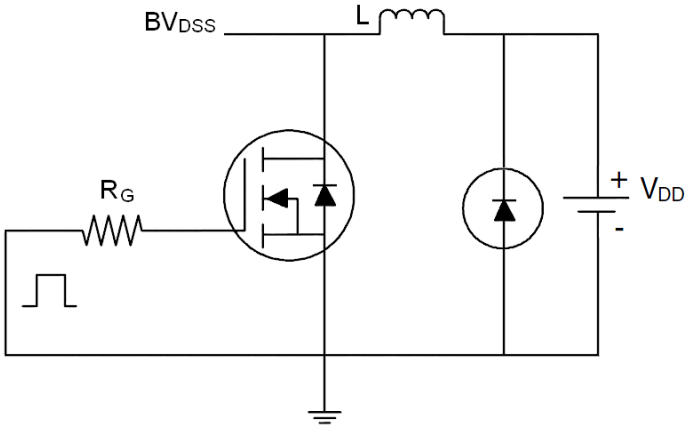
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T_J=25℃,VDD=30V,V_G=4.5V, RG=25Ω,

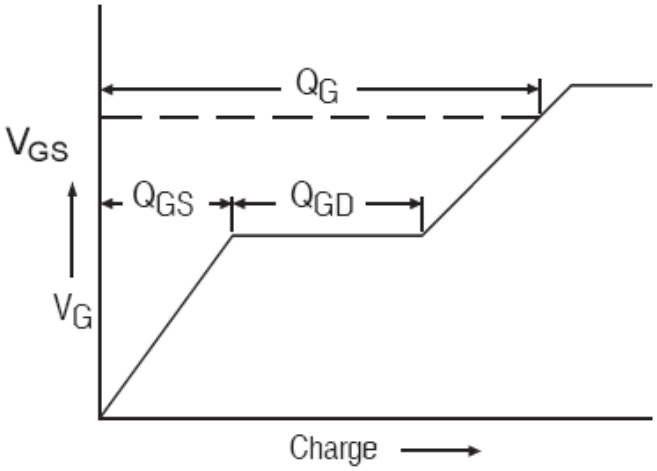
Test Circuit

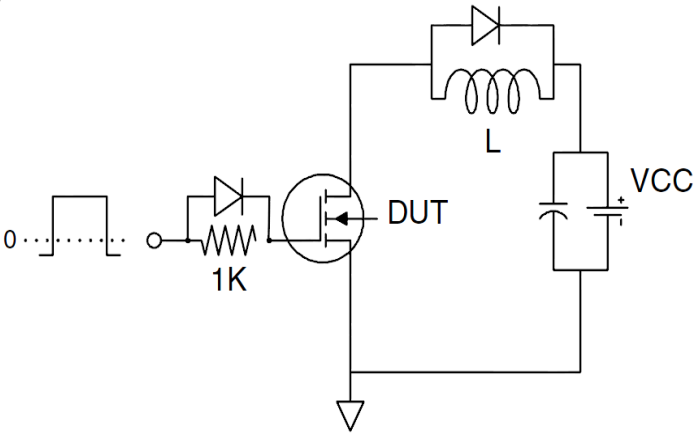
1) E_{AS} Test Circuits



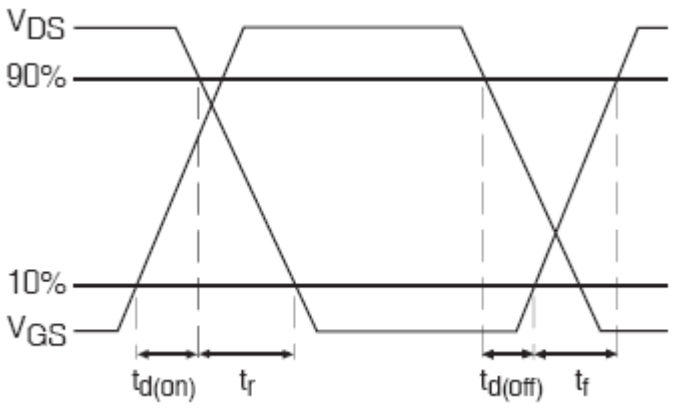


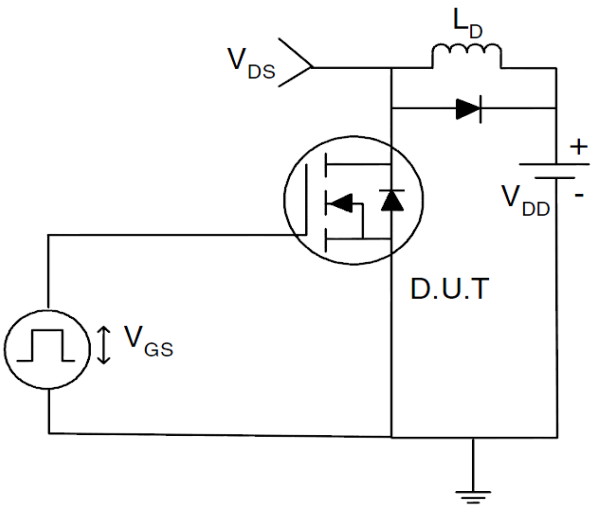
2) **Gate Charge Test Circuit:**





3) **Switch Time Test Circuit:**





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure 1. Output Characteristics

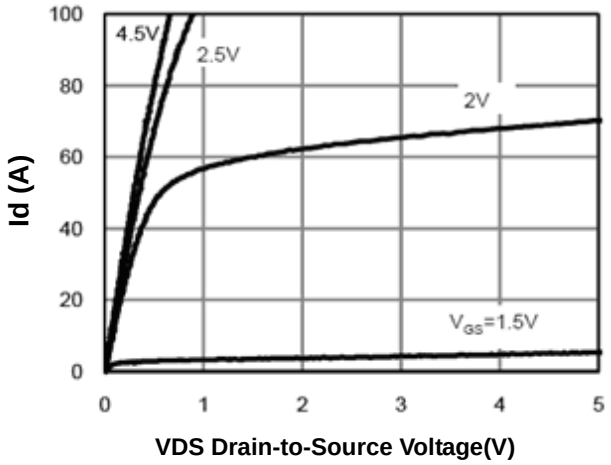


Figure 2. Transfer Characteristics

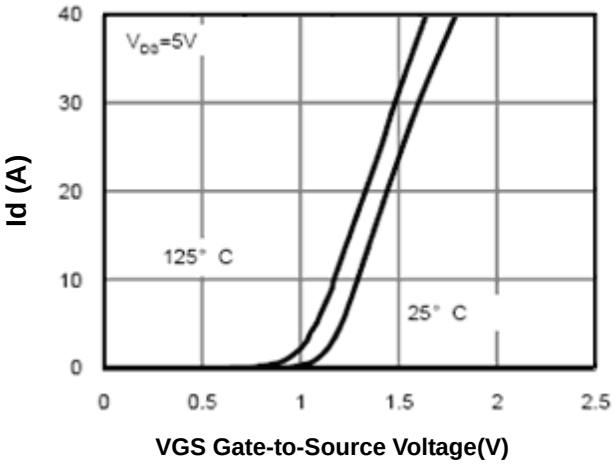


Figure 3. Max BV_{DSS} vs Junction Temperature

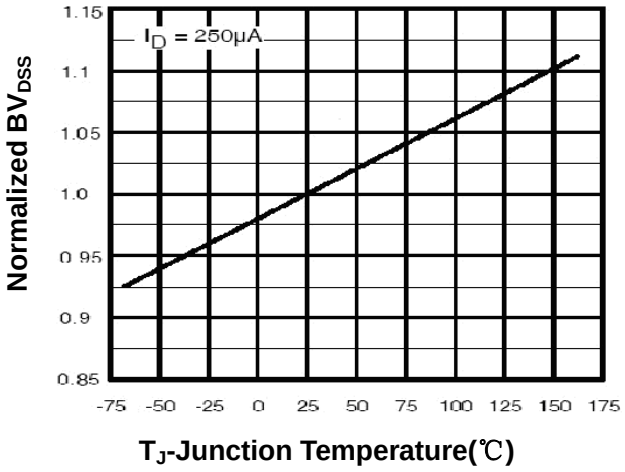


Figure 4. Drain Current

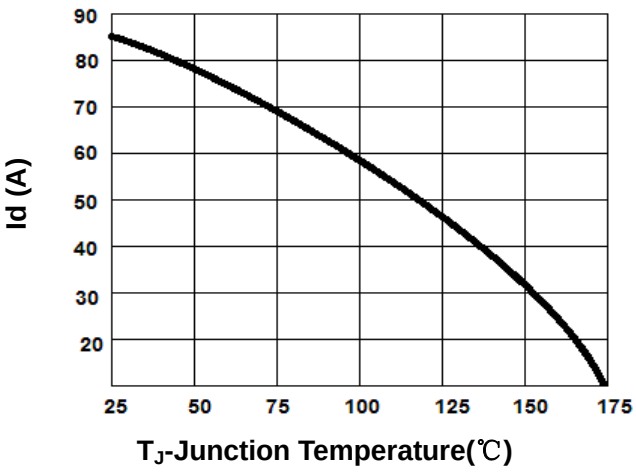


Figure 5. $V_{GS(th)}$ vs Junction Temperature

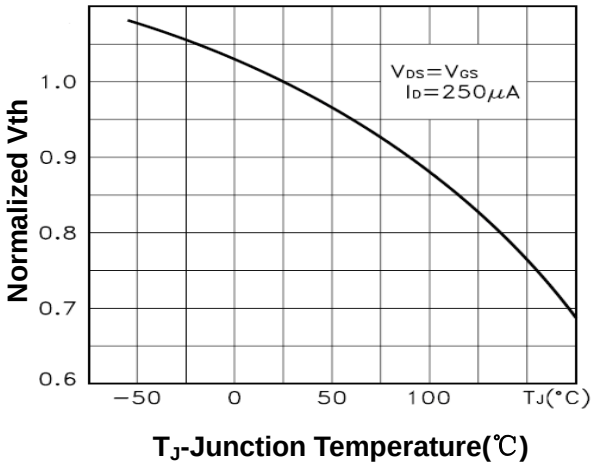


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

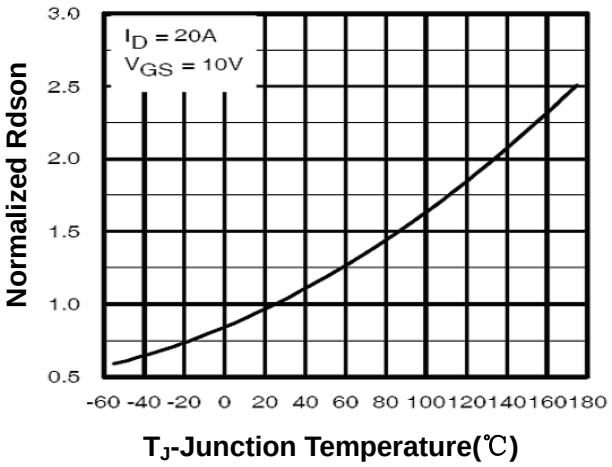


Figure 7. Gate Charge Waveforms

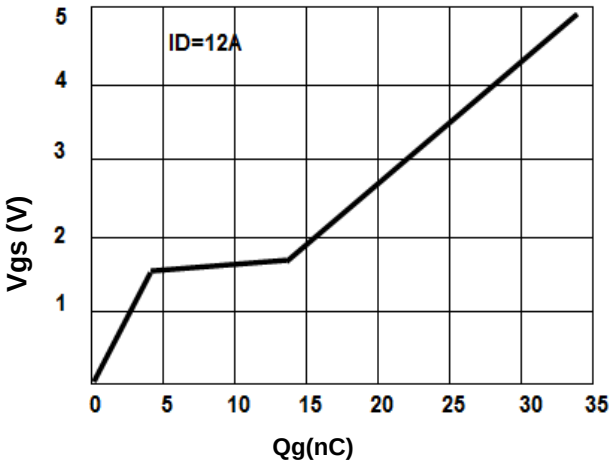


Figure 8. Capacitance

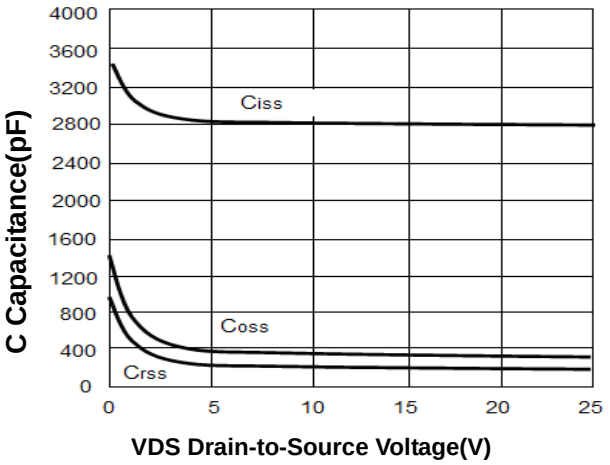


Figure 9. Body-Diode Characteristics

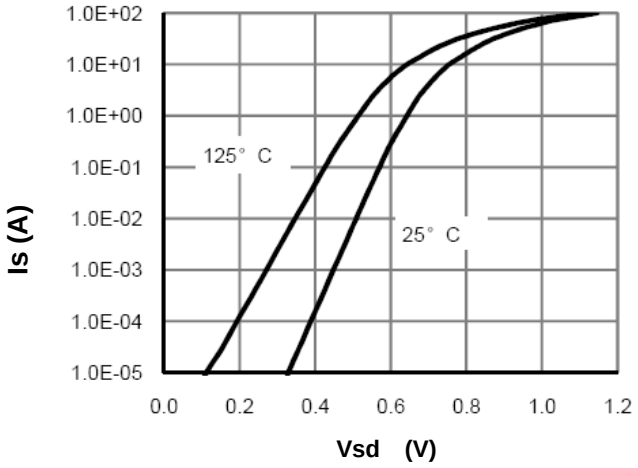


Figure 10. Maximum Safe Operating Area

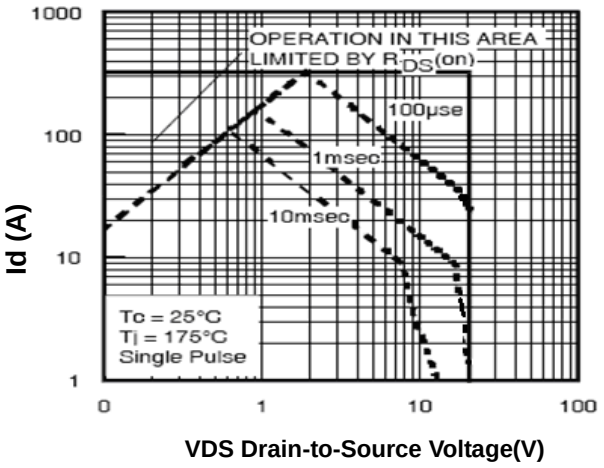
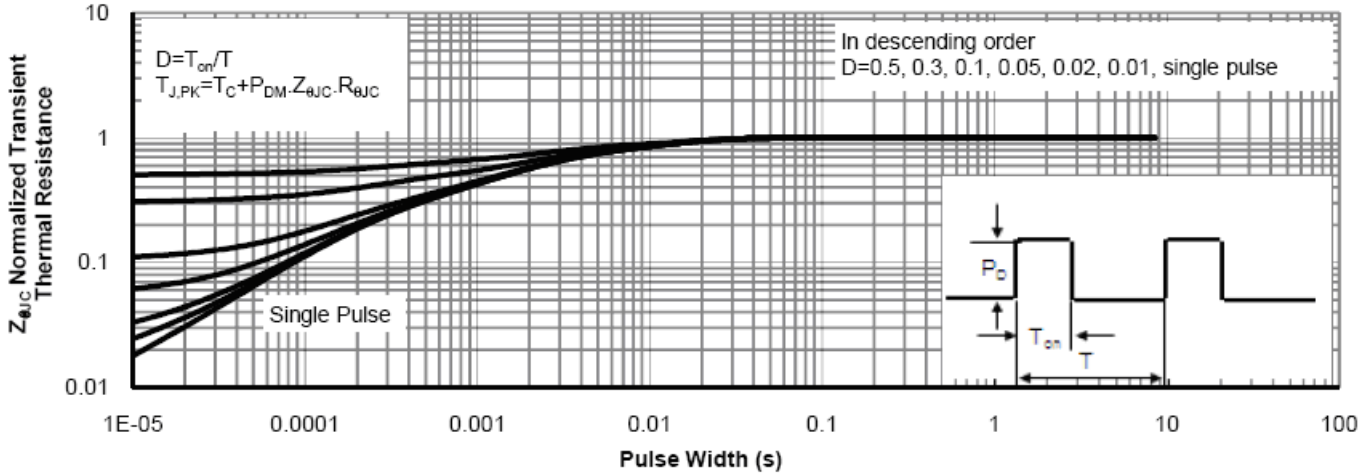


Figure 11. Normalized Maximum Transient Thermal Impedance



TO-252 Package Information