Description

The VSM25N10 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

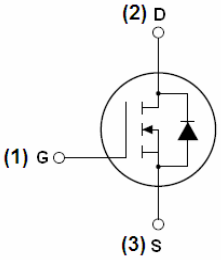
General Features

- V_{DS} = 100V,I_D =25A
  $R_{DS(ON)}$ < 36mΩ @ V_{GS}=10V (Typ:31 mΩ)
- Special process technology for high ESD capability
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

TO-251



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM25N10-T1	VSM25N10	TO-251	-	-	-

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current-Continuous	25	A
I_D (100℃)	Drain Current-Continuous(TC=100℃)	17.6	A
I_{DM}	Pulsed Drain Current	70	A
P_D	Maximum Power Dissipation	70	W
	Derating factor	0.5	W/℃
E_{AS}	Single pulse avalanche energy (Note 5)	110	mJ
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	℃

Thermal Characteristic

$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 2)	2	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

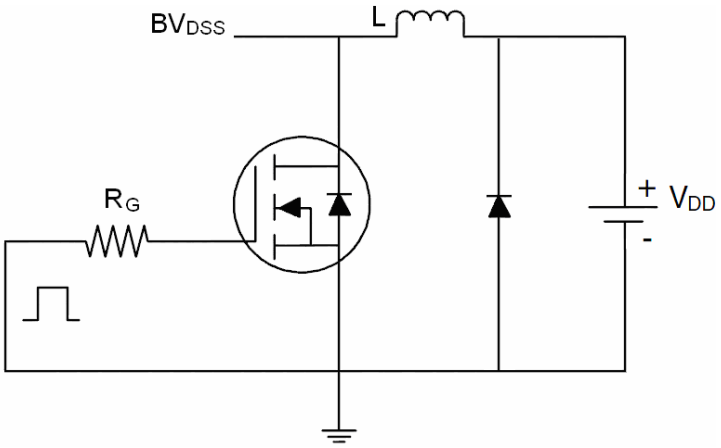
Symbol	Parameter	Condition	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	100	110	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=100V,V_{GS}=0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.0	1.6	2.2	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=15A	-	31	36	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V,I_D=15A	-	12	-	S
Dynamic Characteristics (Note4)						
C_{lss}	Input Capacitance	V_{DS}=50V,V_{GS}=0V, F=1.0MHz	-	3000	-	PF
C_{oss}	Output Capacitance		-	92	-	PF
C_{rss}	Reverse Transfer Capacitance		-	18.3	-	PF
Switching Characteristics (Note 4)						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=50V,R_L=5Ω V_{GS}=10V,R_{GEN}=3Ω	-	9	-	nS
t_r	Turn-on Rise Time		-	9	-	nS
$t_{d(off)}$	Turn-Off Delay Time		-	31	-	nS
t_f	Turn-Off Fall Time		-	9	-	nS
Q_g	Total Gate Charge	V_{DS}=50V,I_D=25A, V_{GS}=10V	-	70.4	-	nC
Q_{gs}	Gate-Source Charge		-	9.0	-	nC
Q_{gd}	Gate-Drain Charge		-	15.3	-	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage (Note 3)	V_{GS}=0V,I_S=25A	-	-	1.2	V
I_S	Diode Forward Current (Note 2)	-	-	-	25	A
t_{rr}	Reverse Recovery Time	TJ = 25°C, IF = 25A di/dt = 100A/μs (Note3)	-	34	-	nS
Qrr	Reverse Recovery Charge		-	56	-	nC

Notes:

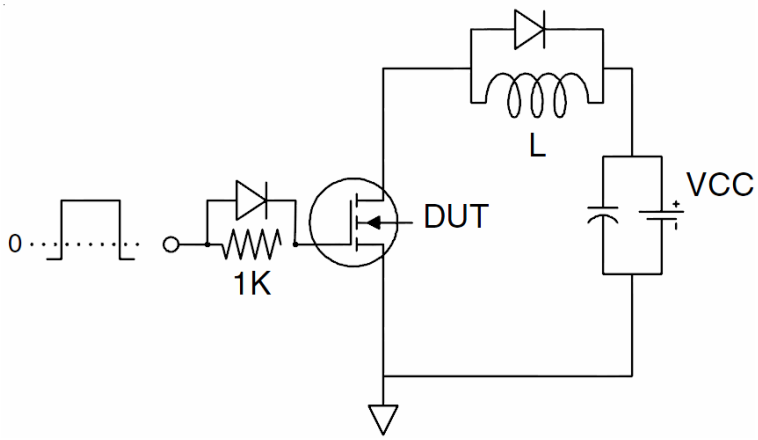
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS Condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω

Test Circuit

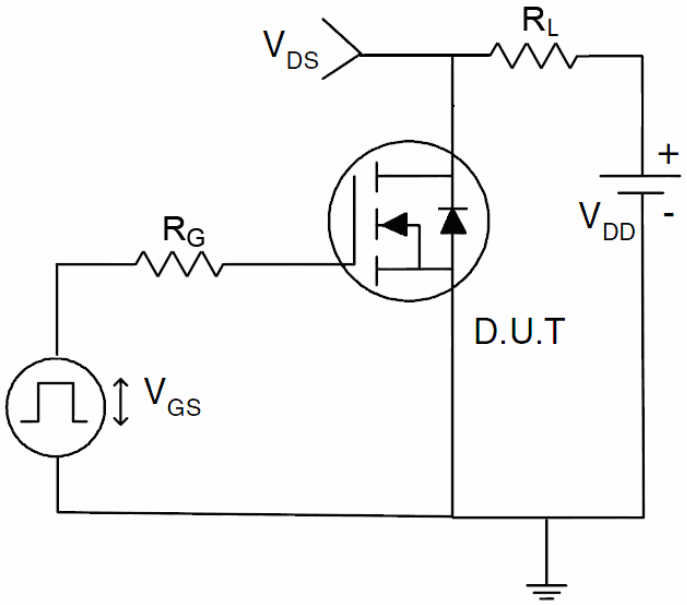
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

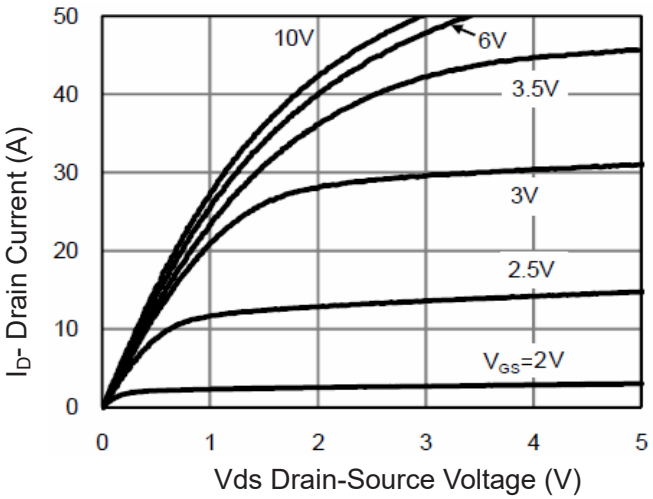


Figure 1 Output Characteristics

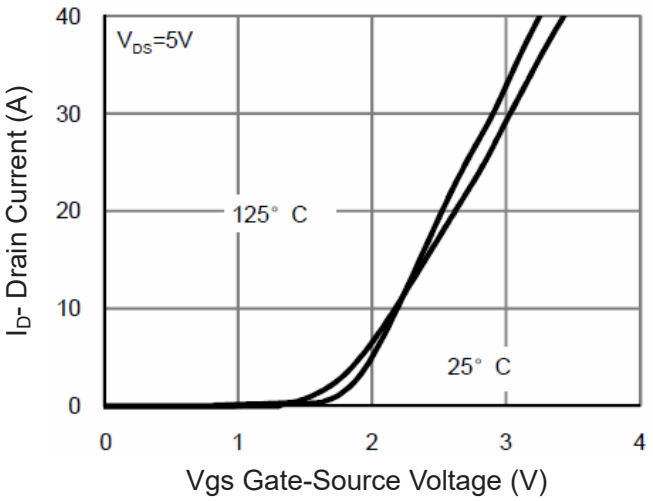


Figure 2 Transfer Characteristics

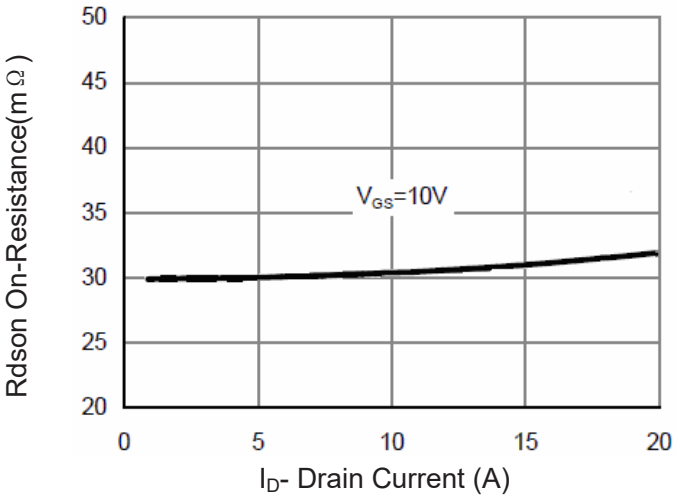


Figure 3 Rdson- Drain Current

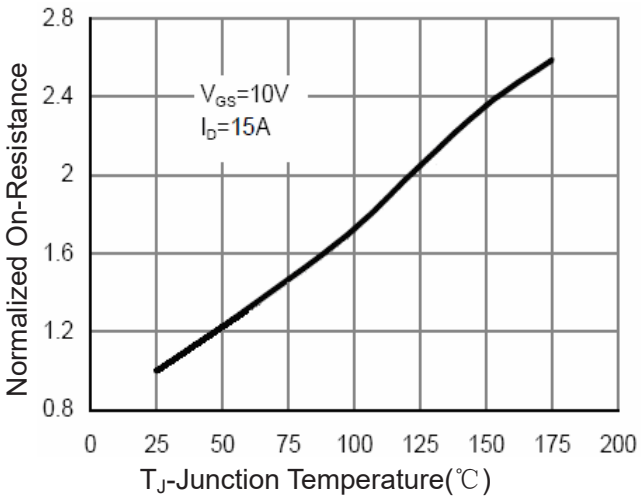


Figure 4 Rdson-JunctionTemperature

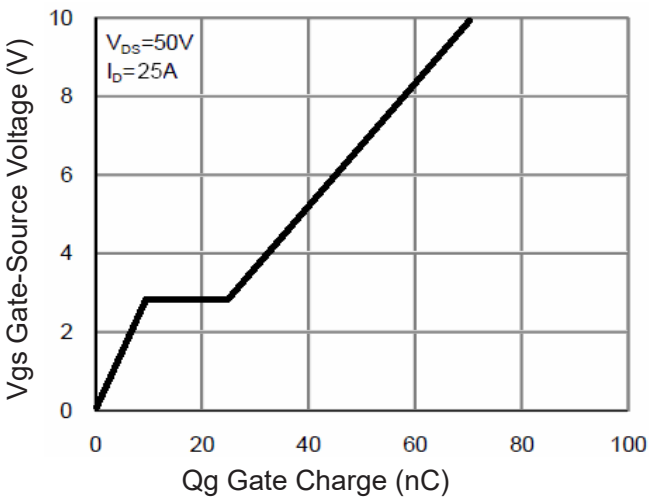


Figure 5 Gate Charge

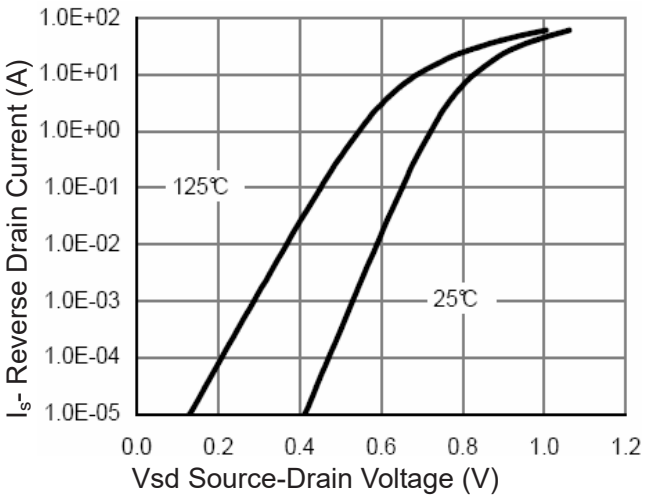


Figure 6 Source- Drain Diode Forward

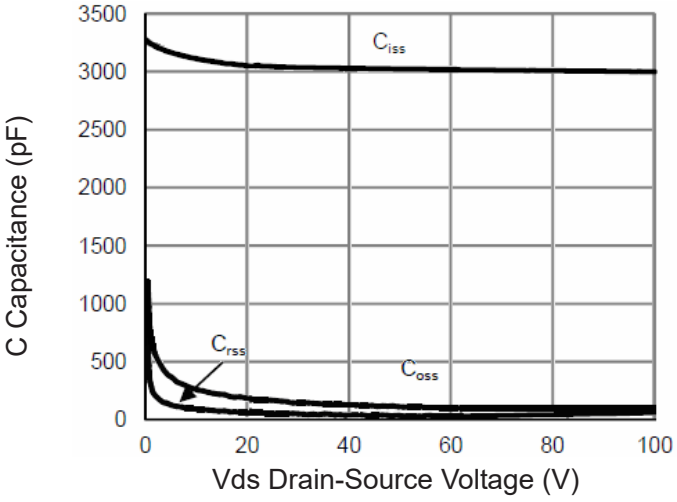


Figure 7 Capacitance vs Vds

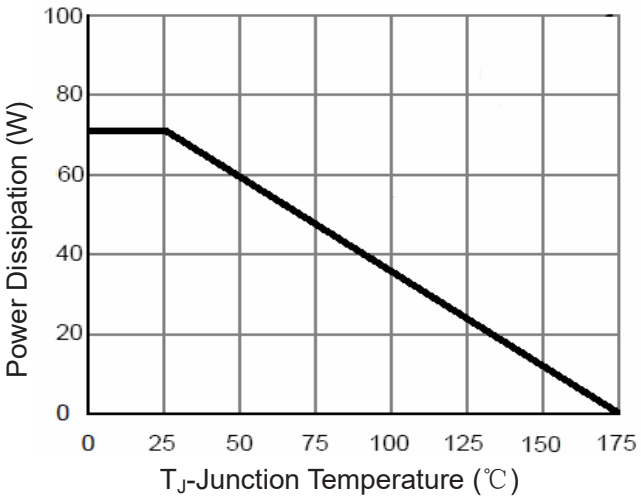


Figure 9 Power De-rating

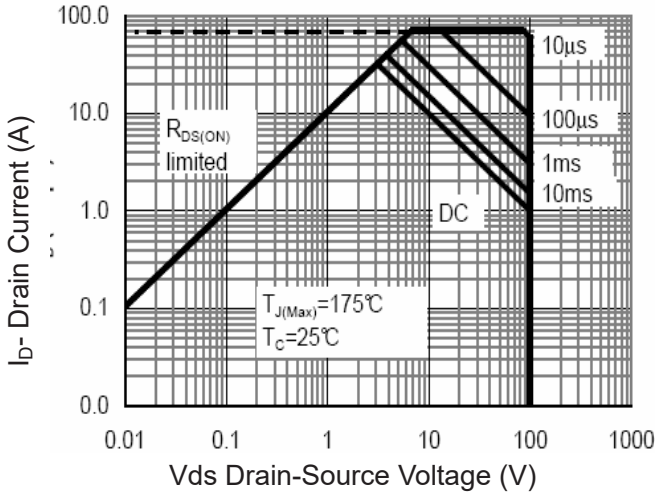


Figure 8 Safe Operation Area

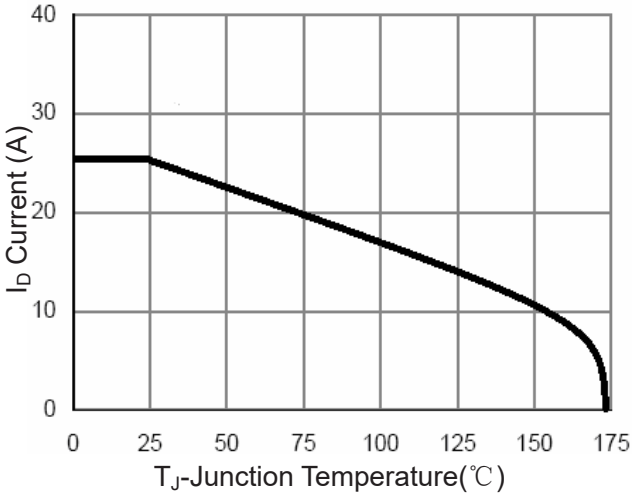


Figure 10ID Current- Junction Temperature

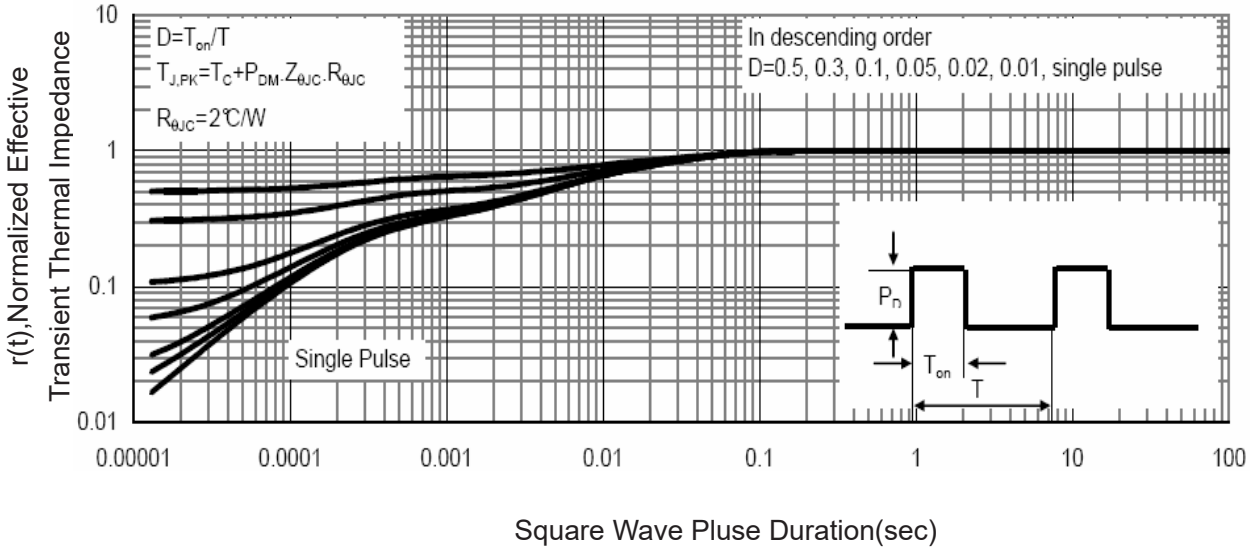


Figure 11 Normalized Maximum Transient Thermal Impedance