Description

The VSM100N15 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

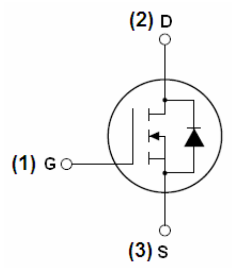
General Features

- V_{DS} =150V,I_D =100A
  $R_{DS(ON)}$ <11mΩ @ V_{GS}=10V (Typ:9.5mΩ)
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Special designed for convertors and power controls
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

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

TO-220C



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM100N15-TC	VSM100N15	TO-220C	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	100	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	70	A
Pulsed Drain Current	I_{DM}	390	A
Maximum Power Dissipation	P_D	370	W
Derating factor		2.47	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	1600	mJ

Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	0.41	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

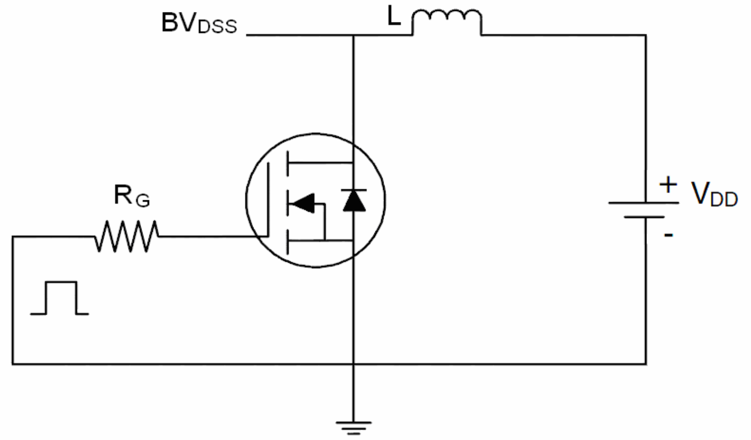
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	150	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=150V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2.5	3.7	4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A	-	9.5	11	mΩ
Forward Transconductance	g_{FS}	V_{DS}=25V,I_D=40A	100	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz	-	7500	-	PF
Output Capacitance	C_{oss}		-	640	-	PF
Reverse Transfer Capacitance	C_{rss}		-	426	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	VDD=75V,ID=2A,RL=15Ω ,RG=2.5Ω,VGS=10V	-	32.5	-	nS
Turn-on Rise Time	t_r		-	30	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	113	-	nS
Turn-Off Fall Time	t_f		-	48	-	nS
Total Gate Charge	Q_g	V_{DS}=75V,I_D=40A, V_{GS}=10V	-	138	-	nC
Gate-Source Charge	Q_{gs}		-	46	-	nC
Gate-Drain Charge	Q_{gd}		-	39	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=40A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	100	A
Reverse Recovery Time	t_{rr}	Tj=25℃,I_F=40A,di/dt=100A/μs (Note3)	-	45		nS
Reverse Recovery Charge	Qrr		-	80		nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

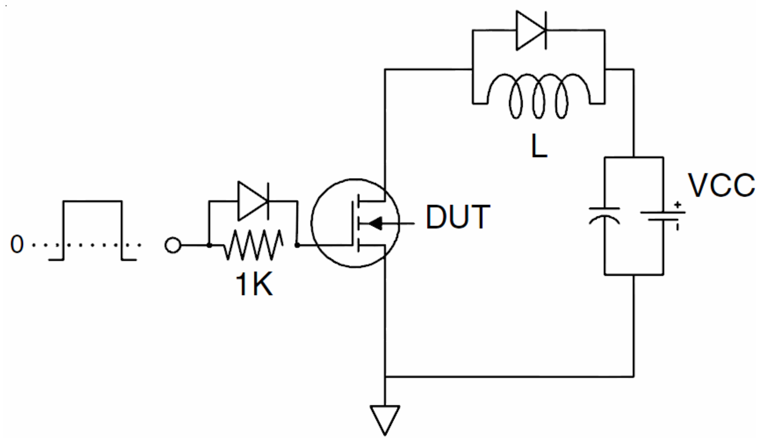
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition：Tj=25℃,V_{DD}=40V,V_G=10V,L=0.5mH,Rg=25Ω

Test circuit

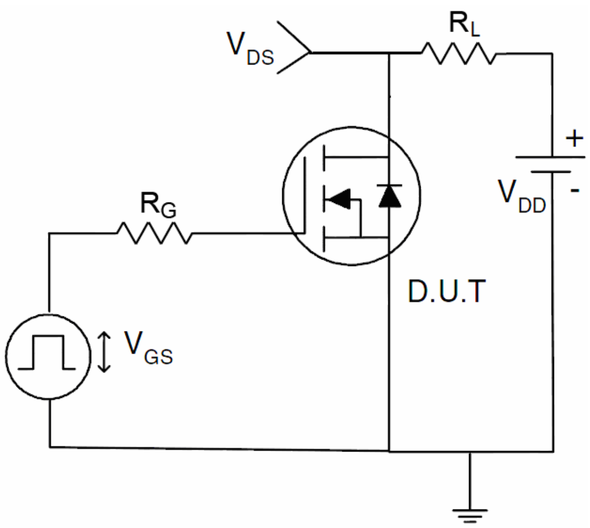
1） E_{AS} test Circuits



2） Gate charge test Circuit:



3） Switch Time Test Circuit:



Typical Electrical and Thermal Characteristics (Curves)

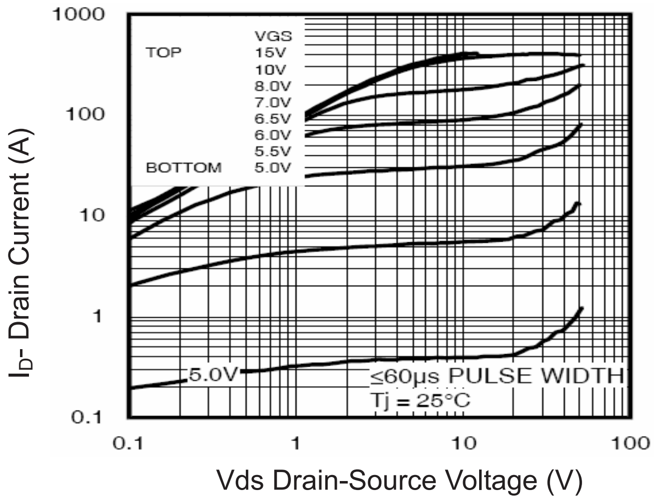


Figure 1 Output Characteristics

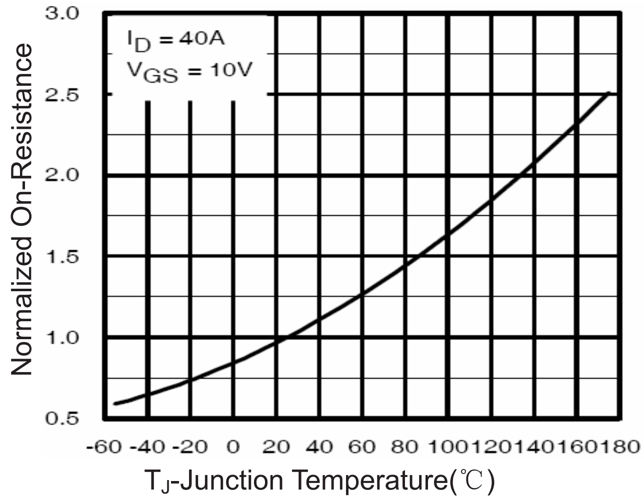


Figure 4 Rdson-JunctionTemperature

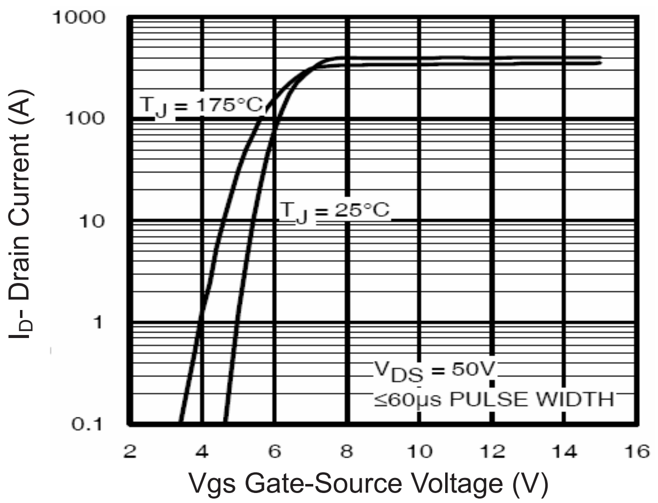


Figure 2 Transfer Characteristics

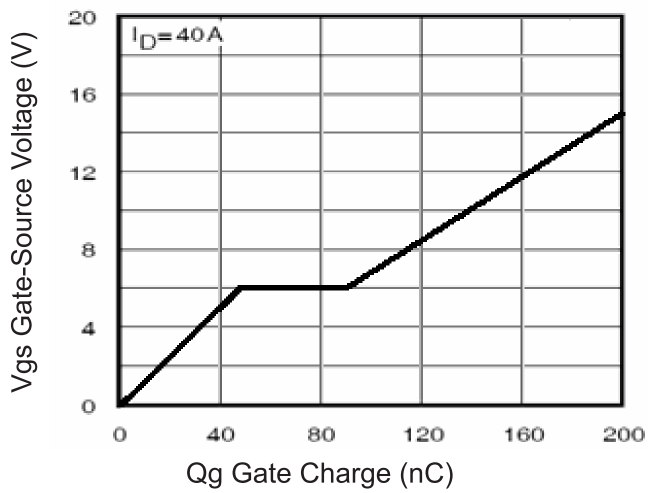


Figure 5 Gate Charge

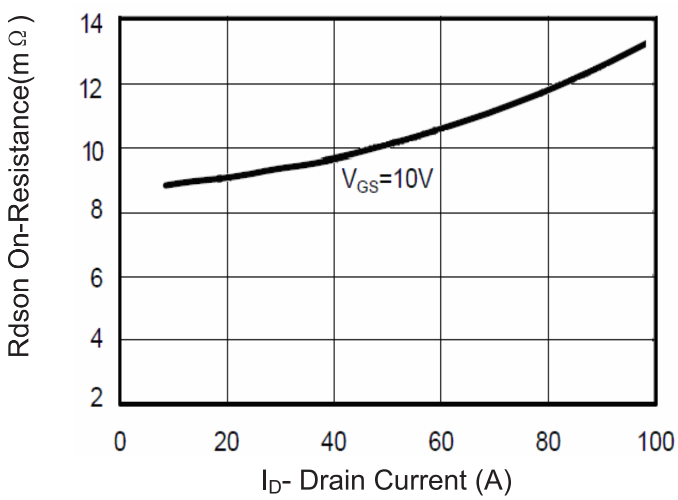


Figure 3 Rdson- Drain Current

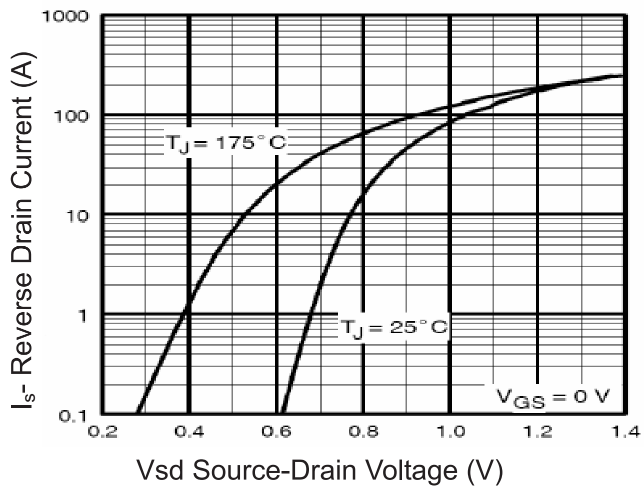


Figure 6 Source- Drain Diode Forward

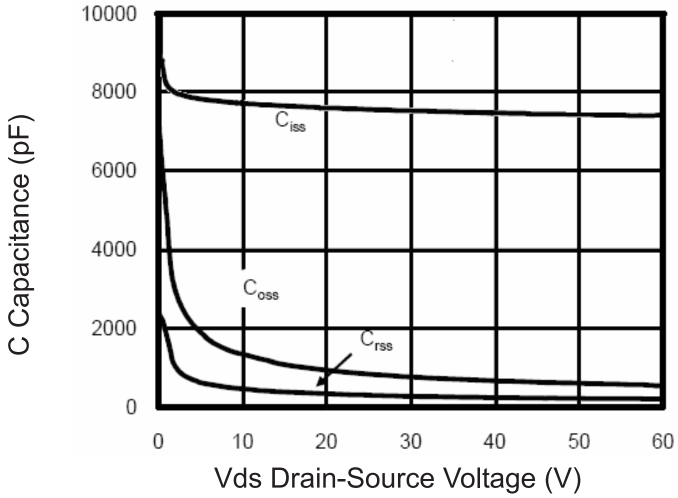


Figure 7 Capacitance vs Vds

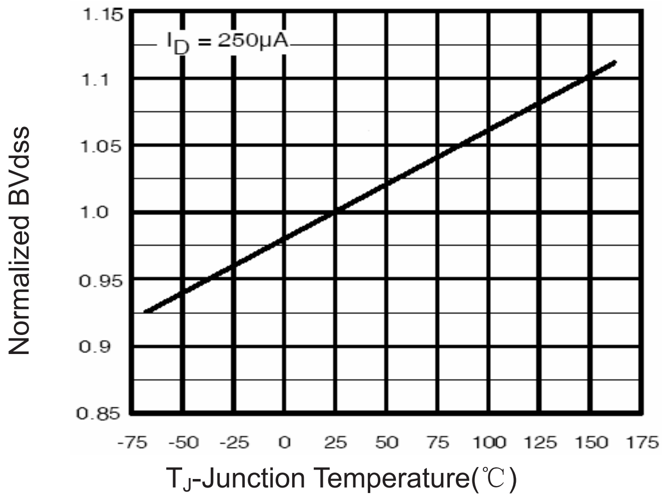


Figure 9 BV_{DSS} vs Junction Temperature

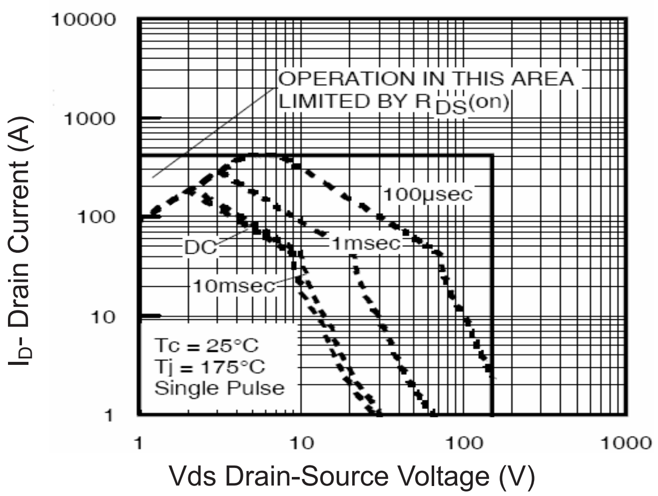


Figure 8 Safe Operation Area

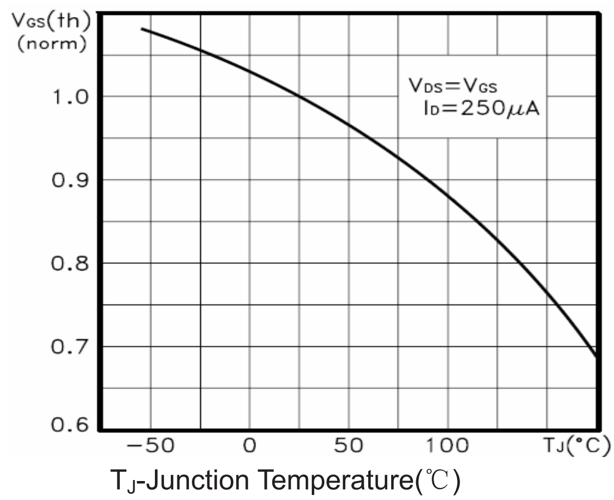


Figure 10 $V_{GS(th)}$ vs Junction Temperature

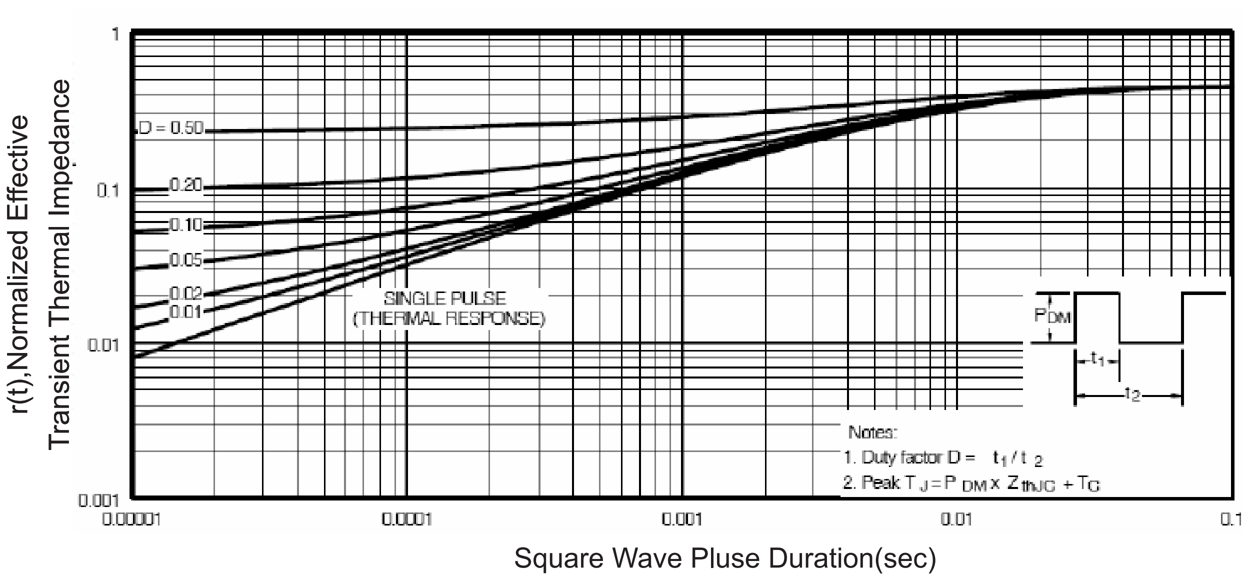


Figure 11 Normalized Maximum Transient Thermal Impedance