Description

The VSM10N18 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.

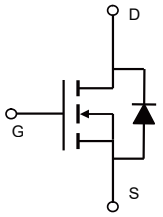
General Features

- V_{DS} = 185 V,I_D = 10 A
  $R_{DS(on)}$ < 210 mΩ @ V_{GS}=10V
  $R_{DS(on)}$ < 250 mΩ @ V_{GS}=4.5V
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

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

TO-252



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM10N18	VSM10N18-T2	TO-252	Ø330mm	16mm	2500units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	185	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	10	A
Drain Current-Continuous(100℃)	I_D (100℃)	7.1	A
Pulsed Drain Current (T_C=25℃)	I_{DM}	40	A
Maximum Power Dissipation	P_D	57	W
Derating factor		0.385	W/℃
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	2.63	℃/W
Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	50	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

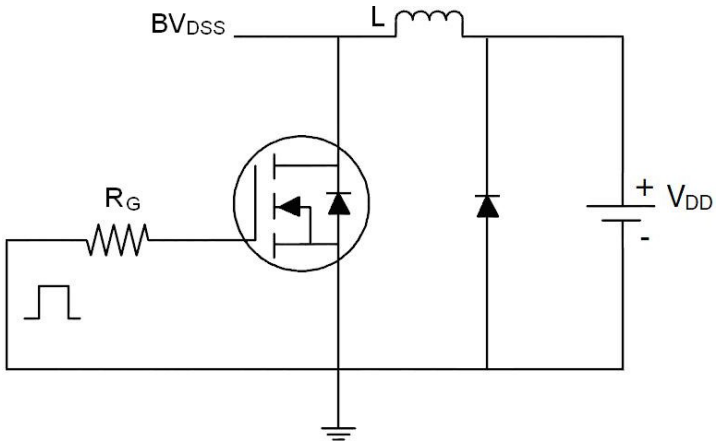
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	185	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=185V,V_{GS}=0V	-	-	1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.5	1.8	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5A	-	183	210	mΩ
		V_{GS}=4.5V, I_D=5A	-	190	250	
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=10A	-	29	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=100V,V_{GS}=0V, F=1.0MHz	-	1062.9	-	pF
Output Capacitance	C_{oss}		-	28.1	-	pF
Reverse Transfer Capacitance	C_{rss}		-	26.9	-	pF
Switching Characteristics(Note 3)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=90V,R_L=5Ω, V_{GS}=10V,R_{GEN}=3Ω	-	8	-	nS
Turn-on Rise Time	t_r		-	13	-	nS
Turn-off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-off Fall Time	t_f		-	8	-	nS
Total Gate Charge	Q_g	V_{DS}=90V,I_D=5A, V_{GS}=10V	-	28.7	-	nC
Gate-Source Charge	Q_{gs}		-	3	-	nC
Gate-Drain Charge	Q_{gd}		-	7.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=10A	-	-	1.2	V
Diode Forward Current	I_S		-	-	10	A

Notes:

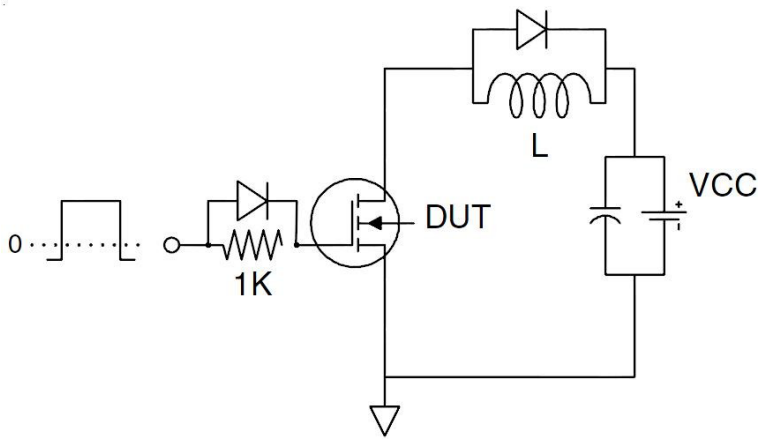
1. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The maximum allowed junction temperature of 175°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.
2. Guaranteed by design, not subject to production.
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°C. The SOA curve provides a single pulse rating.

Test Circuit

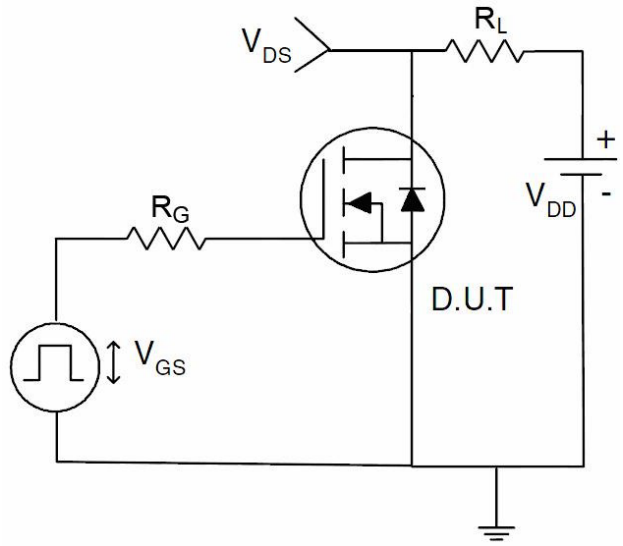
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

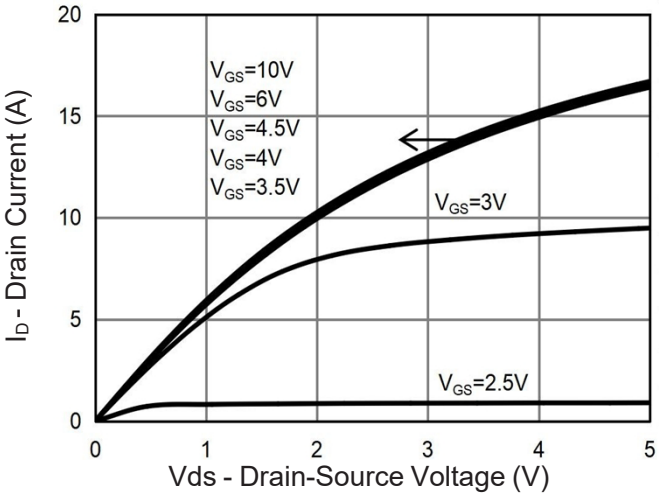


Figure 1 Output Characteristics

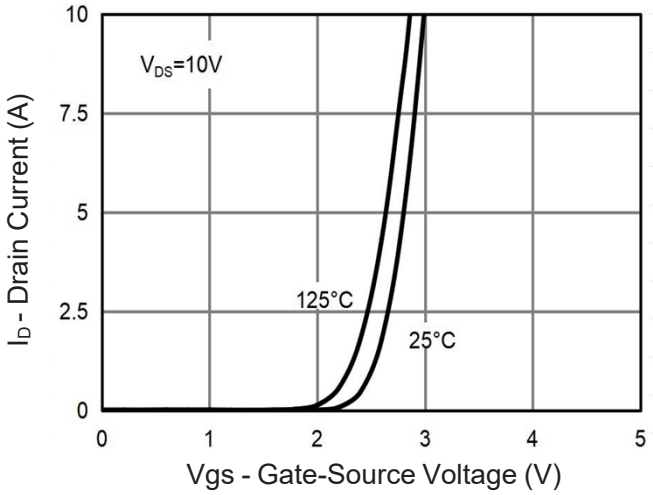


Figure 2 Transfer Characteristics

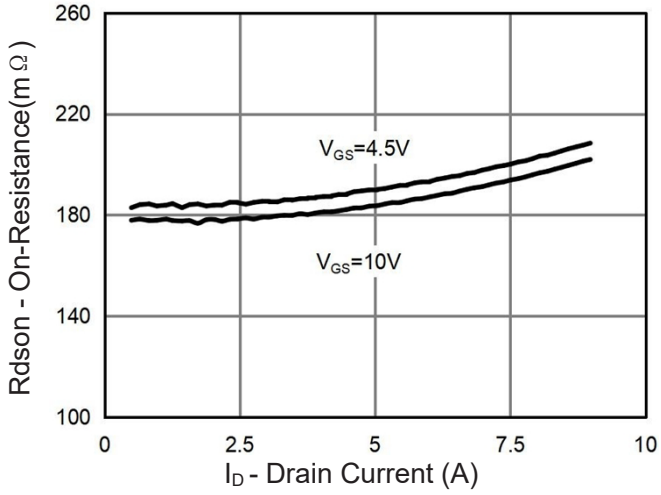


Figure 3 Rdson vs Drain Current

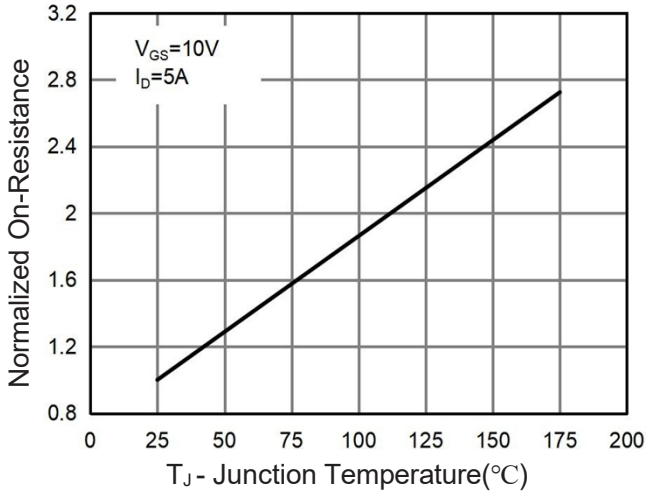


Figure 4 Rdson vs Junction Temperature

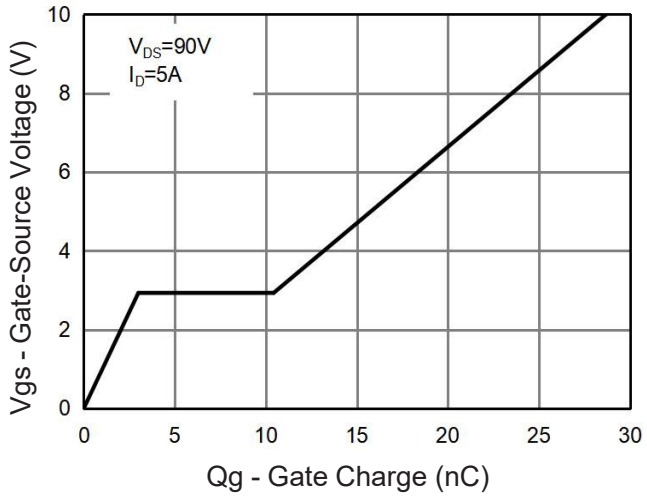


Figure 5 Gate Charge

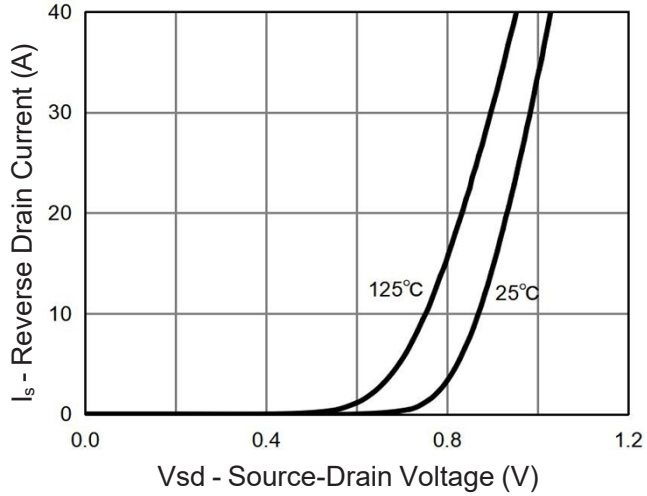


Figure 6 Source- Drain Diode Forward

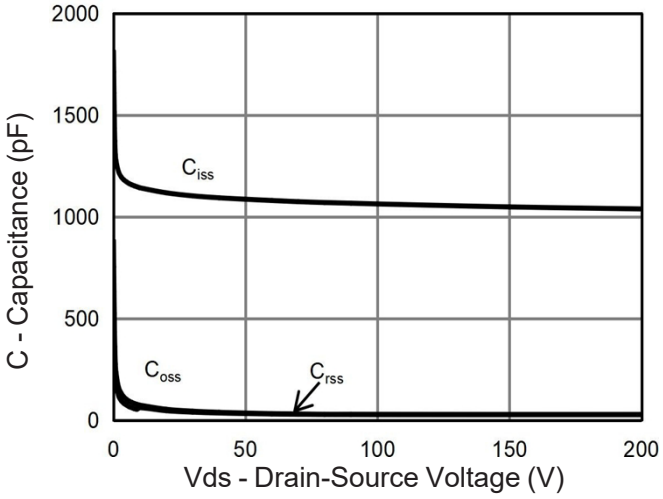


Figure 7 Capacitance vs Vds

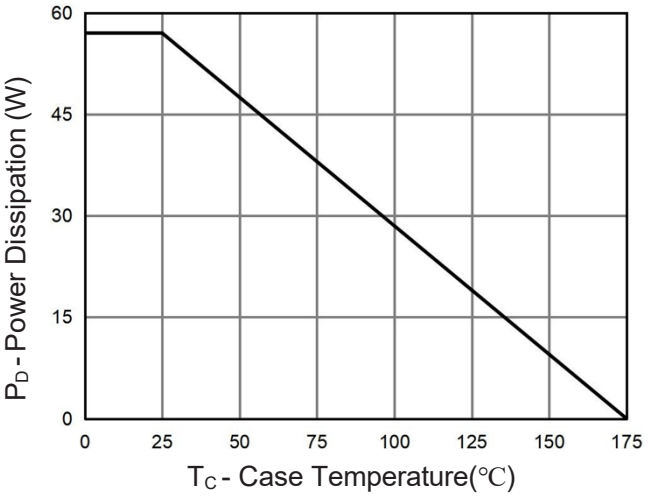


Figure 9 Power De-rating

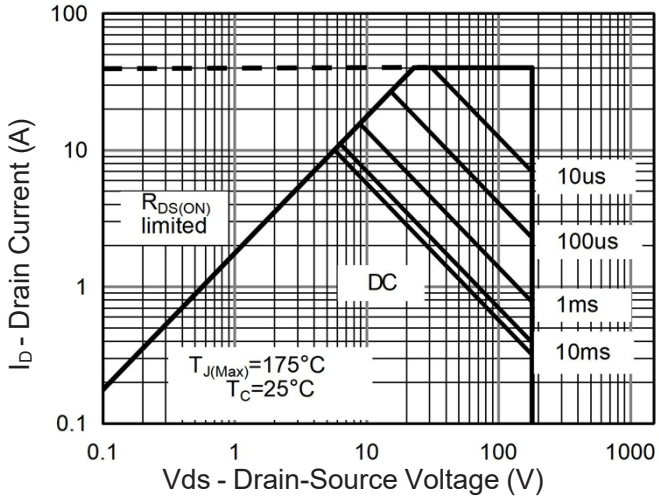


Figure 8 Safe Operation Area(Note 4)

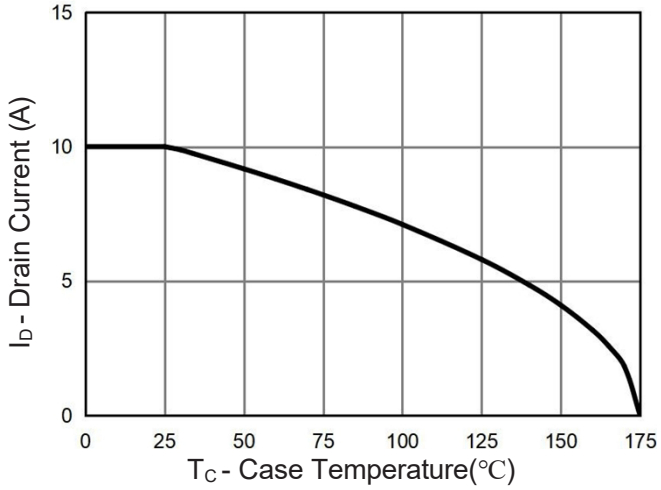


Figure10 Drain Current De-rating

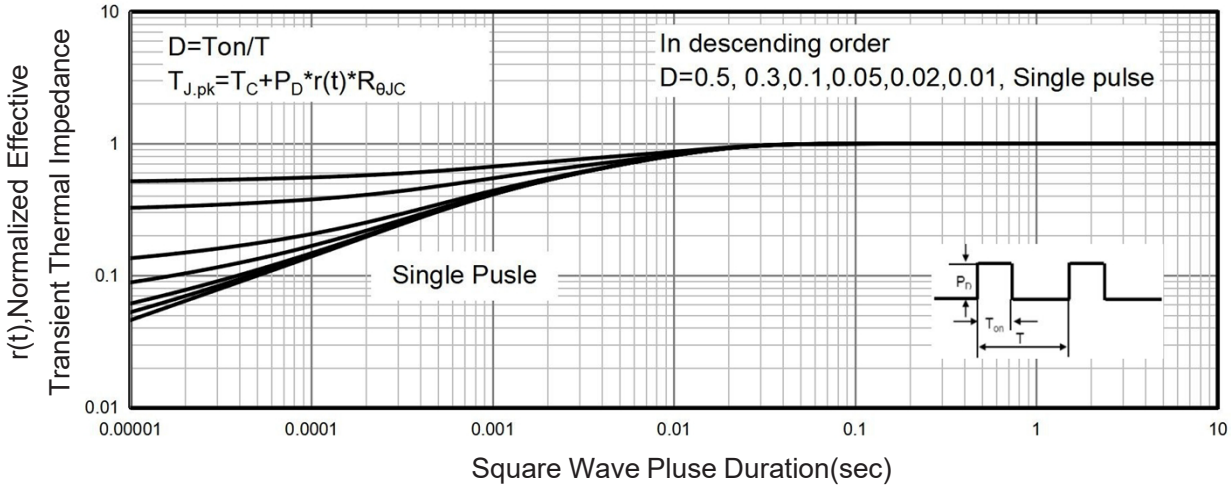


Figure 11 Normalized Maximum Transient Thermal Impedance