Description

The VSM14N06 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.It is ESD protected.

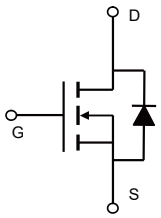
General Features

- V_{DS} =60V ,I_D =14.5A
  $R_{DS(ON)}$ < 51mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ < 62mΩ @ V_{GS}=4.5V
  ESD Rating：2800V HBM
- 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
- Special process technology for high ESD capability

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
VSM14N06	VSM14N06-T2	TO-252	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	14.5	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	12	A
Pulsed Drain Current	I_{DM}	58	A
Maximum Power Dissipation	P_D	24.2	W
Derating factor		0.16	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	25	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	6.2	℃/W
Thermal Resistance,Junction-to-Ambient	$R_{\theta JA}$	50	℃/W

Electrical Characteristics (T_A=25℃unless otherwise noted)

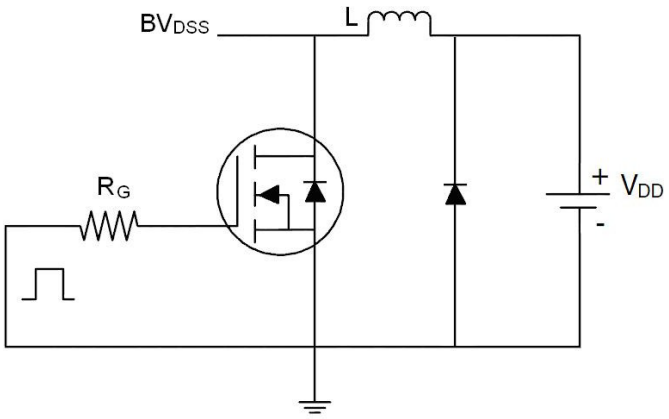
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.1	1.6	2.1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	44	51	mΩ
		V_{GS}=4.5V, I_D=8A	-	49	62	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=10A	-	12	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	-	617	-	pF
Output Capacitance	C_{oss}		-	43.4	-	pF
Reverse Transfer Capacitance	C_{rss}		-	35.7	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,R_L=0.5Ω, R_G=10Ω,V_{GS}=10V	-	7	-	nS
Turn-on Rise Time	t_r		-	11	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	26	-	nS
Turn-Off Fall Time	t_f		-	9	-	nS
Total Gate Charge	Q_g	I_D=4A,V_{DD}=30V,V_{GS}=10V	-	20	-	nC
Gate-Source Charge	Q_{gs}		-	2	-	nC
Gate-Drain Charge	Q_{gd}		-	4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=10A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	14	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 10A di/dt = 100A/μs (Note3)	-	23	-	nS
Reverse Recovery Charge	Qrr		-	10	-	nC

Notes:

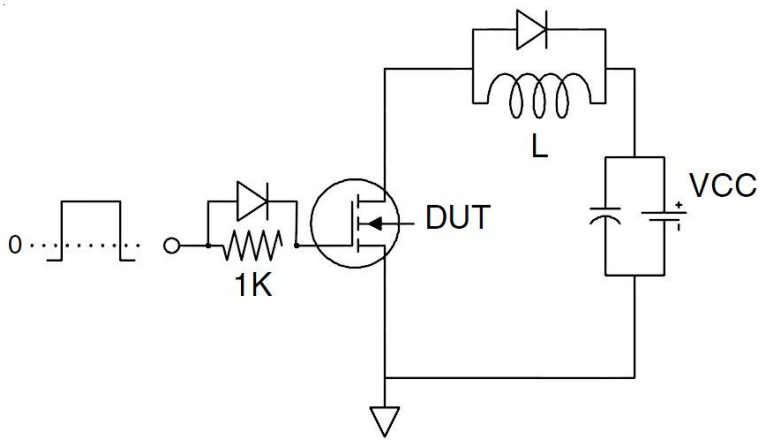
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition：Tj=25℃,V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω

Test circuit

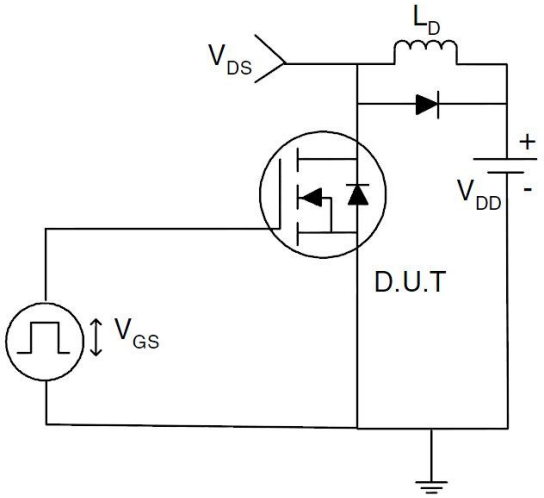
1） **E_{AS} test Circuits**



2） **Gate charge test Circuit:**



3） **Switch Time Test Circuit:**



Typical Electrical and Thermal Characteristics (Curves)

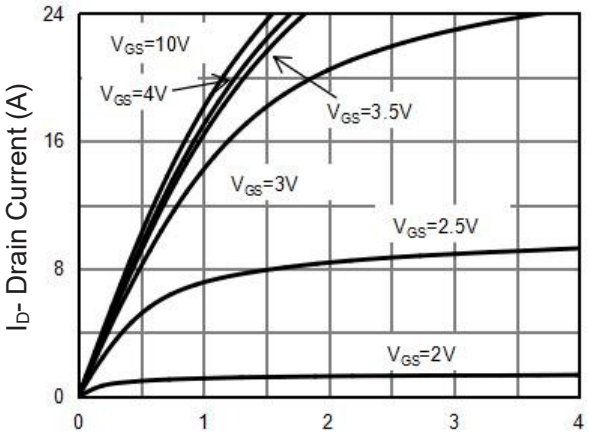


Figure 1 Output Characteristics

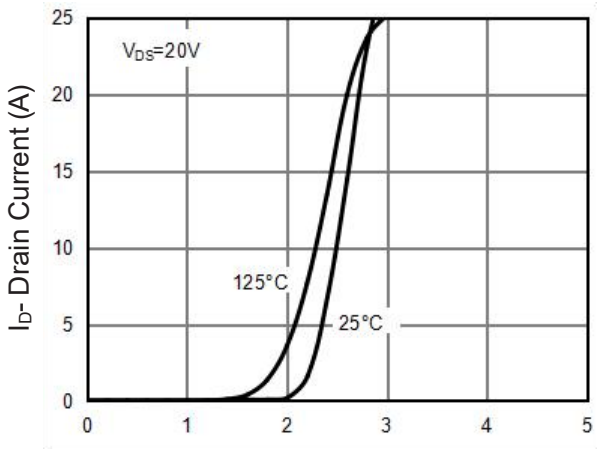


Figure 2 Transfer Characteristics

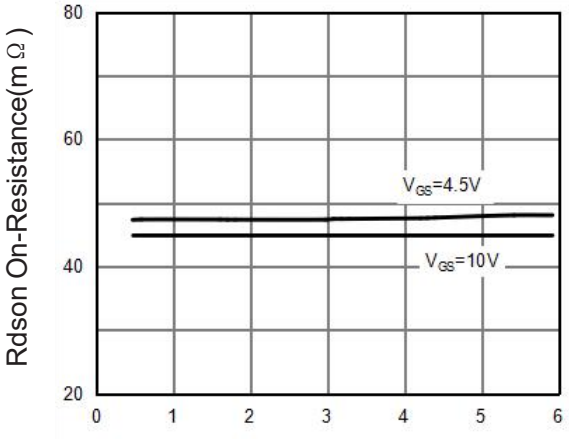


Figure 3 Rdson- Drain Current

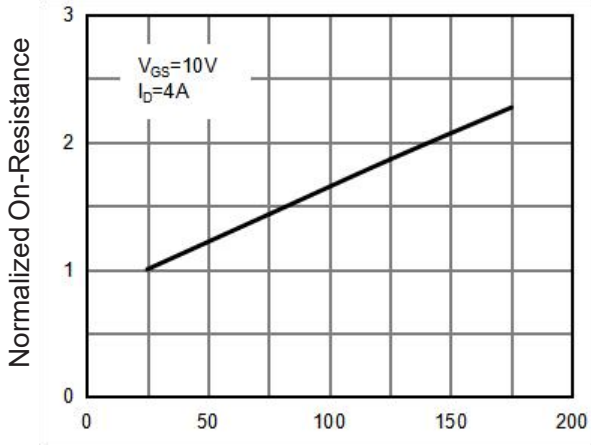


Figure 4 Rdson-JunctionTemperature

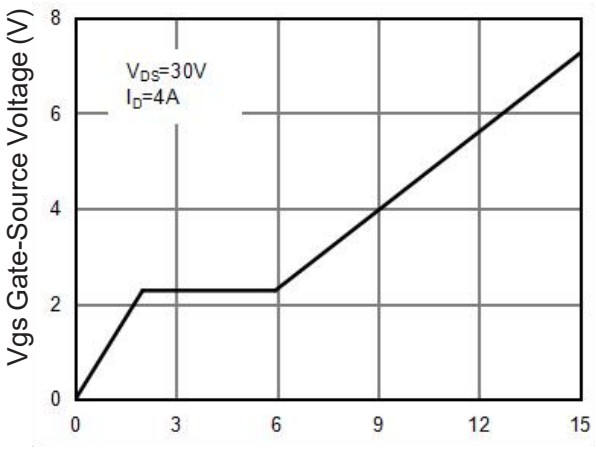


Figure 5 Gate Charge

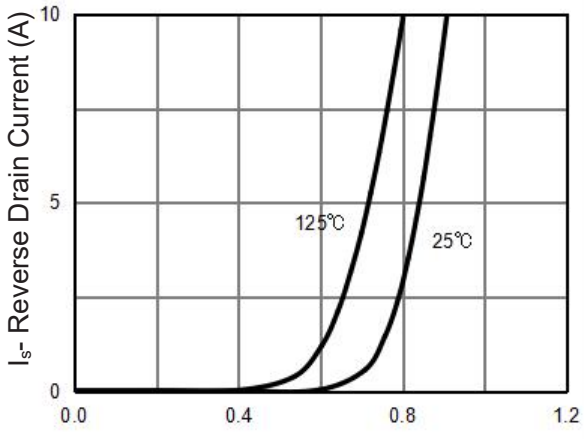


Figure 6 Source- Drain Diode Forward

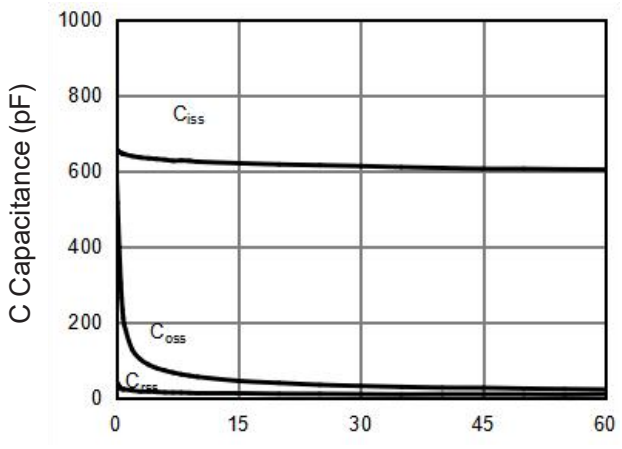


Figure 7 Capacitance vs Vds

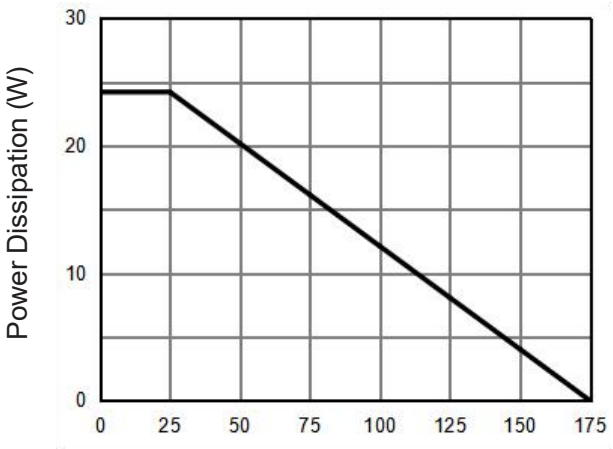


Figure 9 Power De-rating

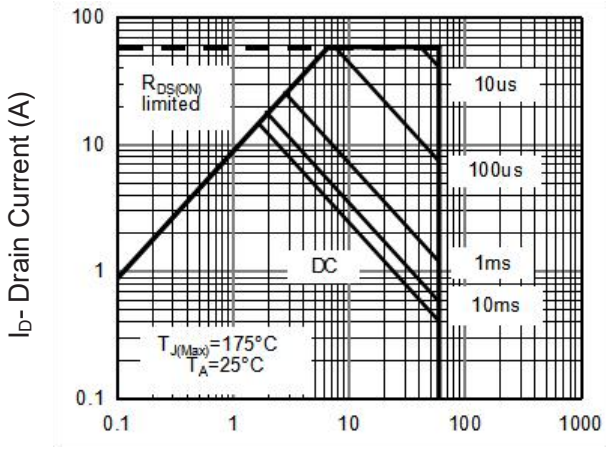


Figure 8 Safe Operation Area

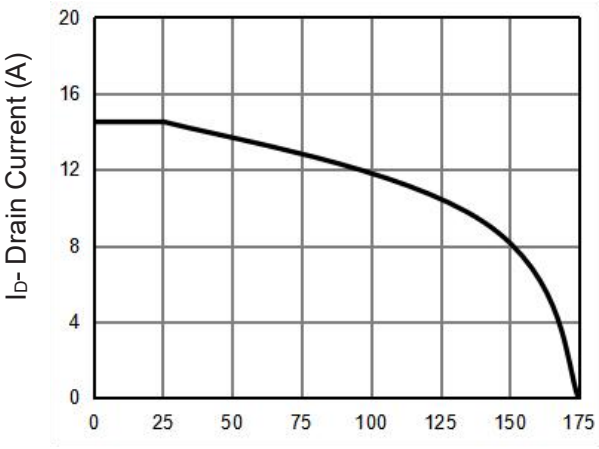


Figure 10 Current De-rating

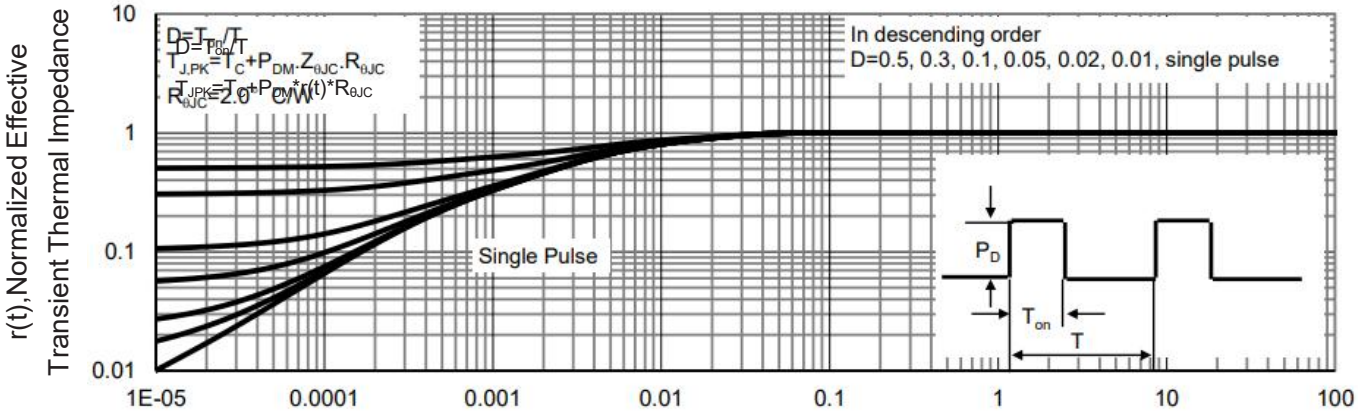


Figure 11 Normalized Maximum Transient Thermal Impedance