Description

The VSM90N06 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.

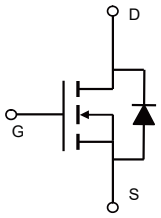
General Features

- V_{DS} =69V,I_D =90A
  $R_{DS(ON)}$ < 7.0mΩ @ V_{GS}=10V (Typ:5.7mΩ)
- 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-220



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM90N06	VSM90N06-TC	TO-220	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	69	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	90	A
Drain Current-Continuous(TC=100℃)	$I_{D\ (100℃)}$	62	A
Pulsed Drain Current	I_{DM}	310	A
Maximum Power Dissipation	P_D	160	W
Derating factor		1.1	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	450	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	0.9	℃/W
Thermal Resistance,Junction-to-Ambient(Note 2)	$R_{\theta JA}$	60	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

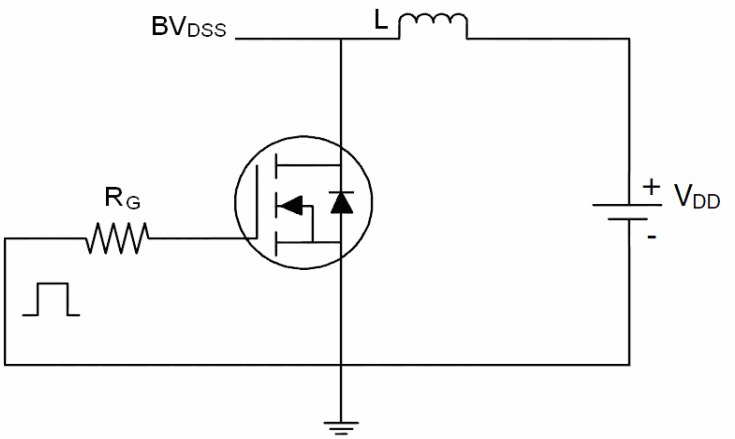
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	B_{VDSS}	V_{GS}=0V I_D=250μA	70	73	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=69V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	2	2.9	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=30A	-	5.7	7.0	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=100A	25	-	-	S
Dynamic Characteristics(Note4)						
Input Capacitance	C_{lss}	V_{DS}=25V,V_{GS}=0V, F=1.0MHz	-	3400	-	PF
Output Capacitance	C_{oss}		-	310	-	PF
Reverse Transfer Capacitance	C_{rss}		-	221	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,I_D=2A,R_L=15Ω V_{GS}=10V,R_G=2.5Ω	-	15	-	nS
Turn-on Rise Time	t_r		-	11	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	52	-	nS
Turn-Off Fall Time	t_f		-	13	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=30A, V_{GS}=10V	-	94	-	nC
Gate-Source Charge	Q_{gs}		-	16	-	nC
Gate-Drain Charge	Q_{gd}		-	24	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=90A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	90	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F =90A di/dt = 100A/μs(Note3)	-	33		nS
Reverse Recovery Charge	Q_{rr}		-	54		nC
Forward Turn-On Time	ton	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

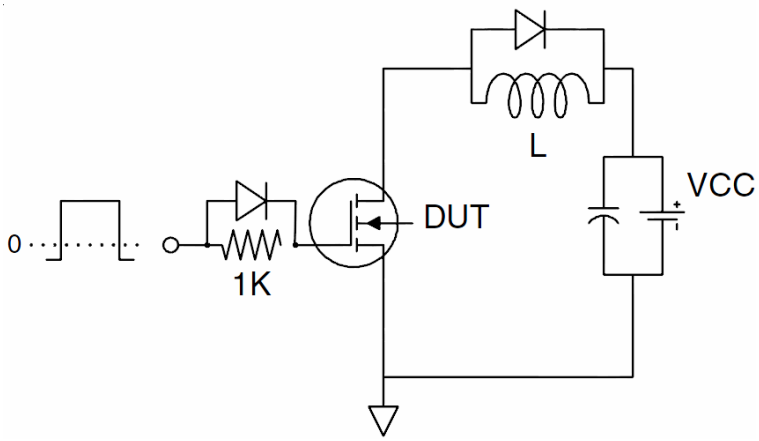
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition:Tj=25℃,V_{DD}=35V,V_G=10V,L=0.5mH,Rg=25Ω

Test Circuit

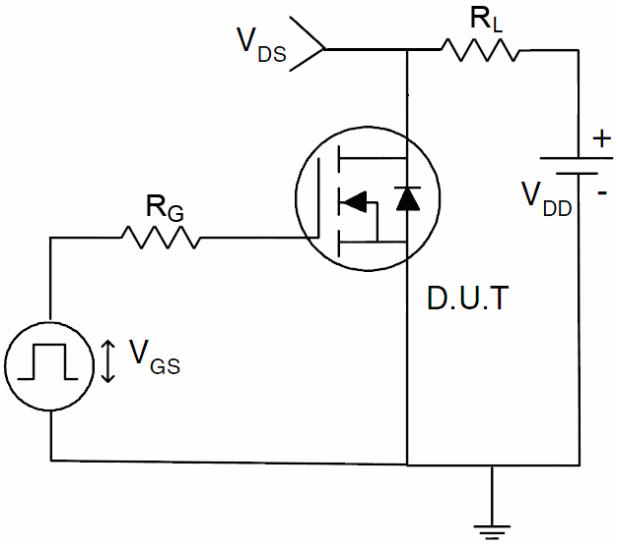
1) EAS test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

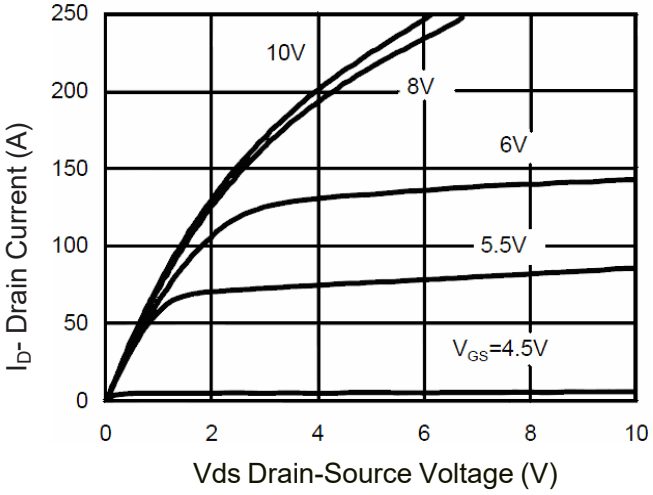


Figure 1 Output Characteristics

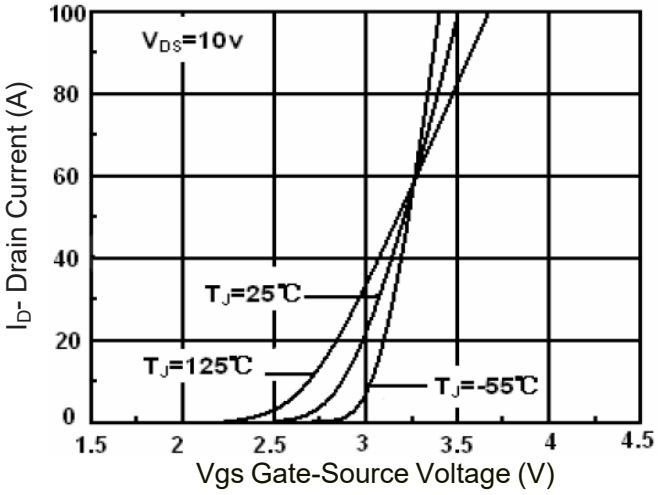


Figure 2 Transfer Characteristics

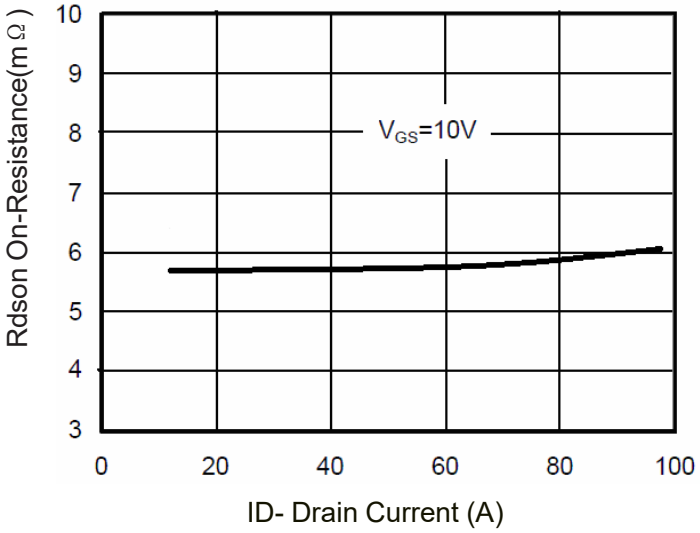


Figure 3 Rdson- Drain Current

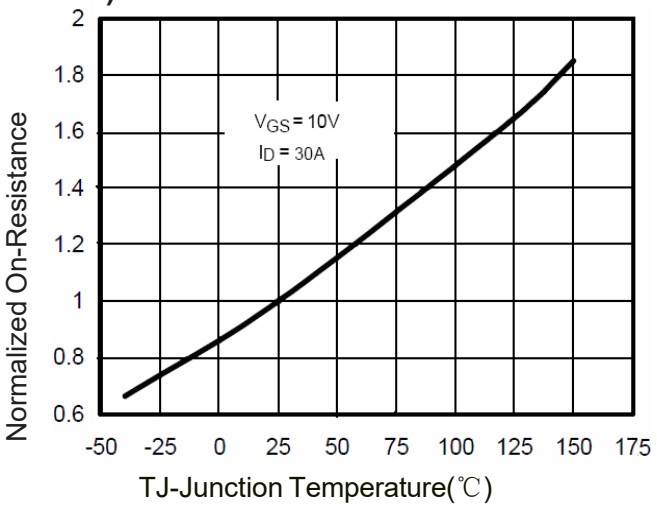


Figure 4 Rdson-JunctionTemperature

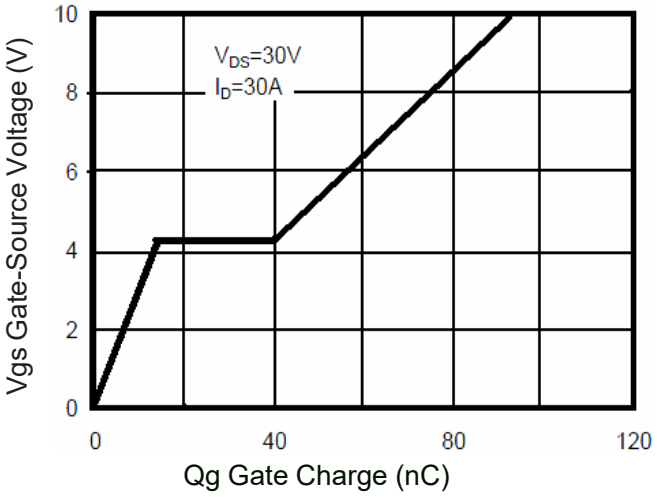


Figure 5 Gate Charge

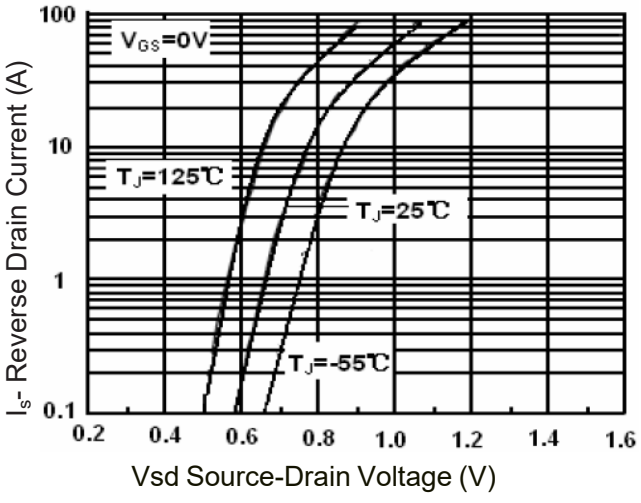


Figure 6 Source- Drain Diode Forward

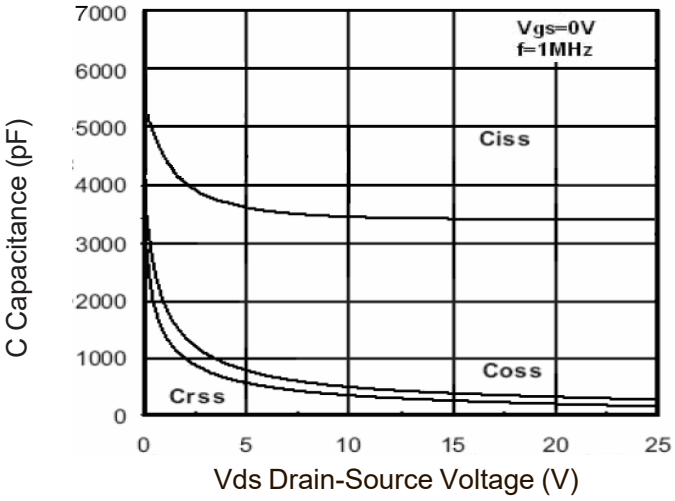


Figure 7 Capacitance vs Vds

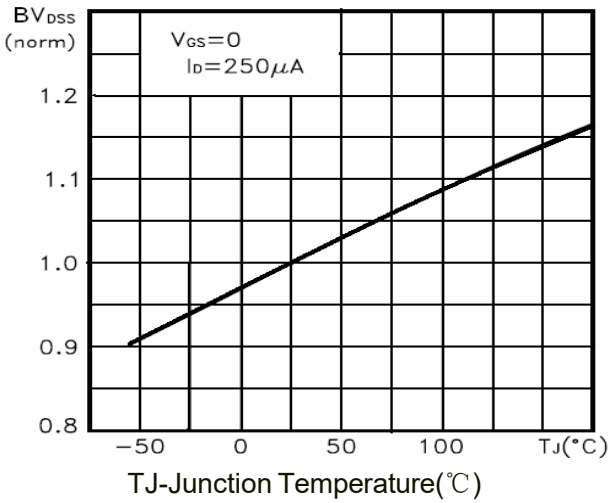


Figure 9 BV_{DSS} vs Junction Temperature

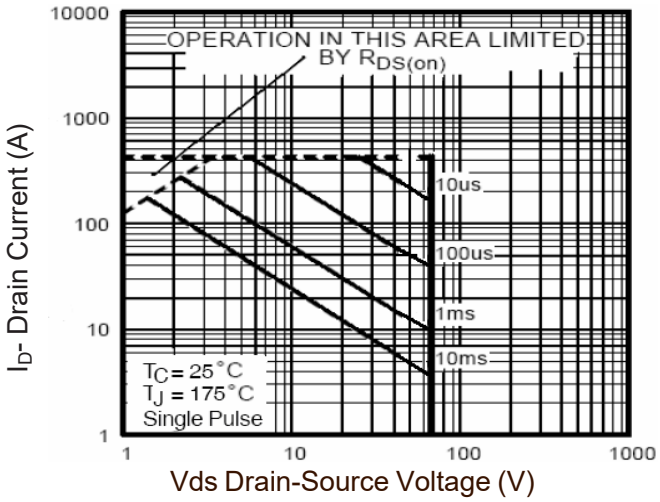


Figure 8 Safe Operation Area

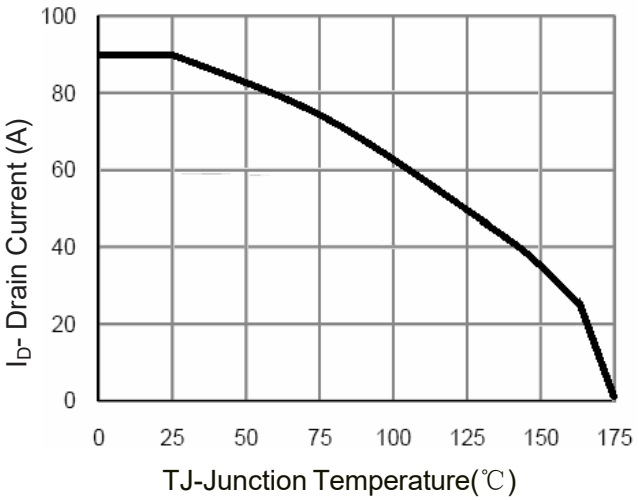


Figure 10 Current vs Junction Temperature

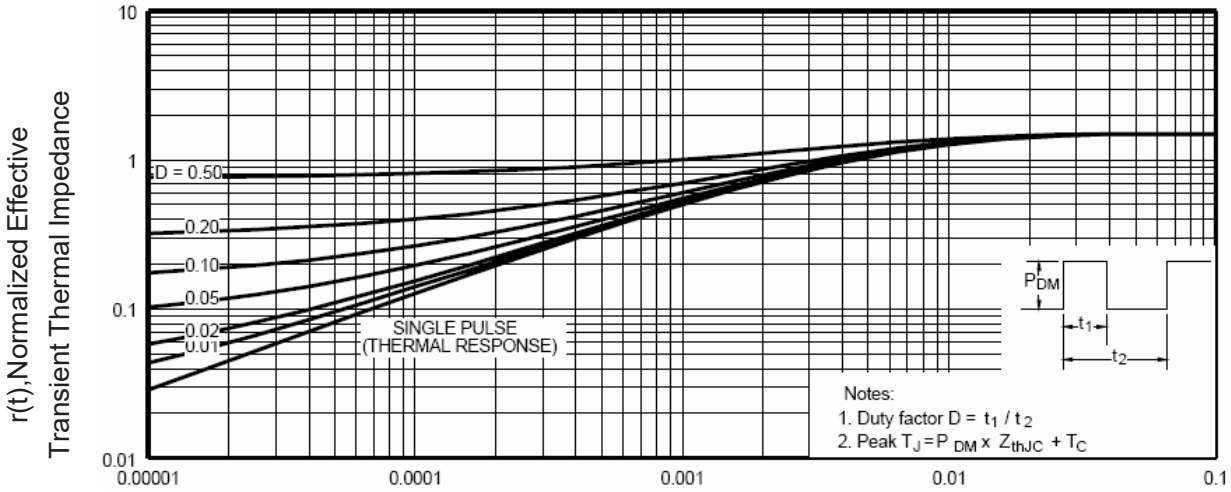


Figure 11 Normalized Maximum Transient Thermal Impedance