

Description

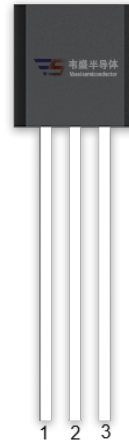
The VSM6N10 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

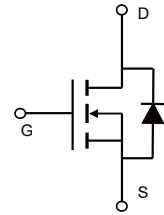
- $V_{DS} = 100V, I_D = 6A$
 $R_{DS(ON)} < 140m\Omega @ V_{GS}=10V$ (Typ:110m Ω)
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

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



TO-92



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM6N10	VSM6N10-T9	TO-92	-	-	-

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	6	A
Drain Current-Pulsed (Note 1)	I_{DM}	24	A
Maximum Power Dissipation	P_D	3	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	41.7	$^{\circ}C/W$
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Electrical Characteristics ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	110	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA

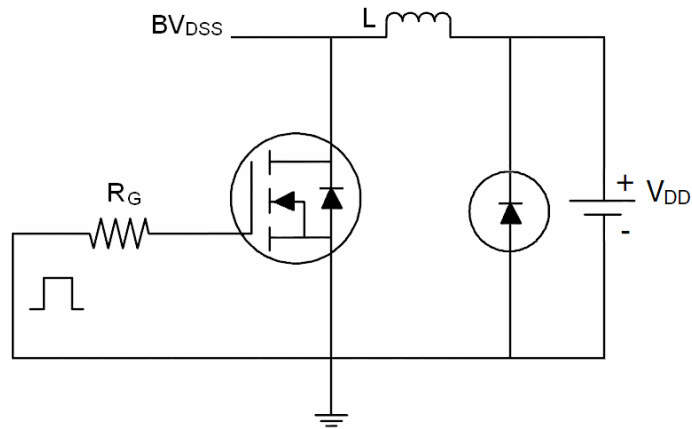
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	1.2	1.8	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =5A	-	110	140	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V,I _D =2.9A	-	8	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =25V,V _{GS} =0V, F=1.0MHz	-	690	-	PF
Output Capacitance	C _{oss}		-	120	-	PF
Reverse Transfer Capacitance	C _{rss}		-	90	-	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	-	11	-	nS
Turn-on Rise Time	t _r		-	7.4	-	nS
Turn-Off Delay Time	t _{d(off)}		-	35	-	nS
Turn-Off Fall Time	t _f		-	9.1	-	nS
Total Gate Charge	Q _g	V _{DS} =30V,I _D =3A, V _{GS} =10V	-	15.5		nC
Gate-Source Charge	Q _{gs}		-	3.2	-	nC
Gate-Drain Charge	Q _{gd}		-	4.7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V,I _S =6A	-	-	1.2	V
Diode Forward Current (Note 2)	I _S		-	-	6	A

Notes:

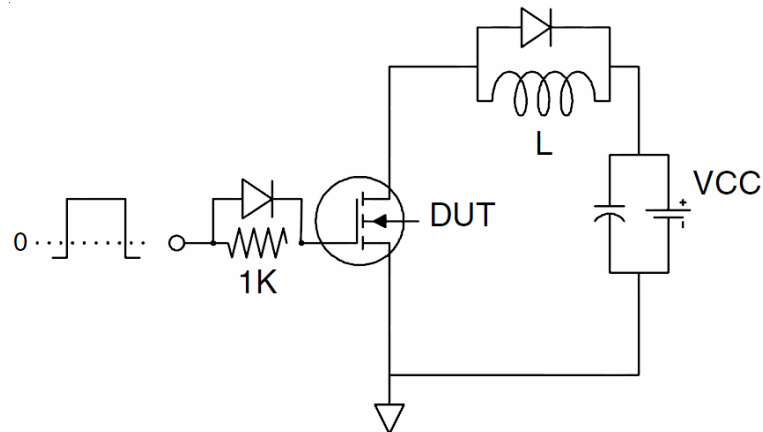
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test Circuit

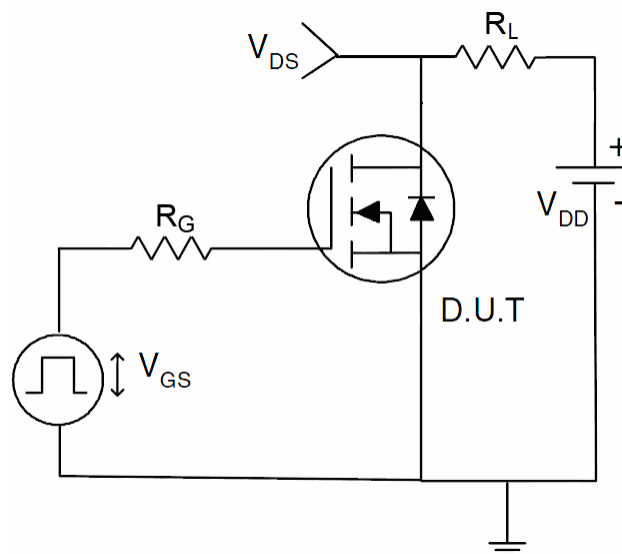
1) E_{AS} test circuit



2) Gate charge test circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (curves)

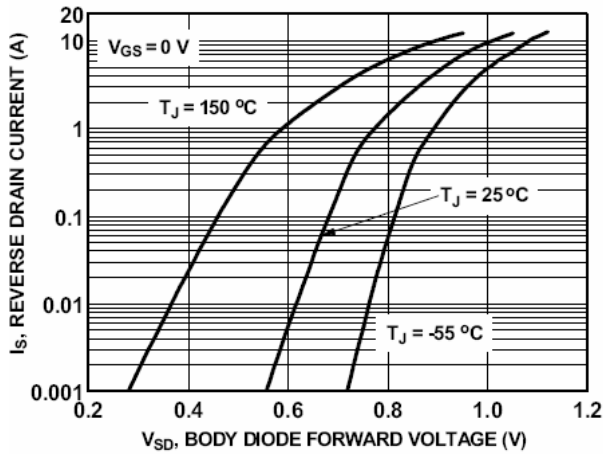
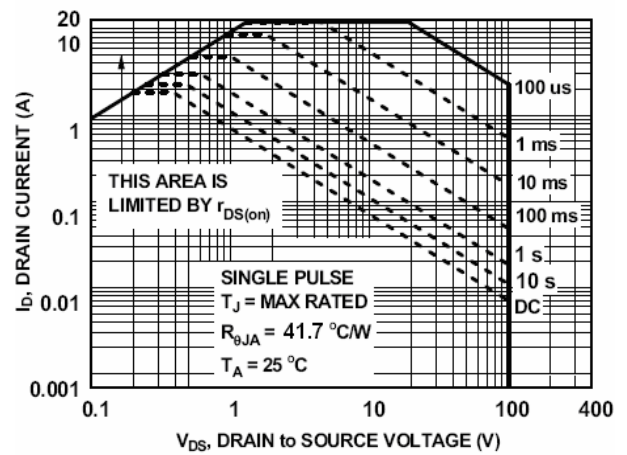
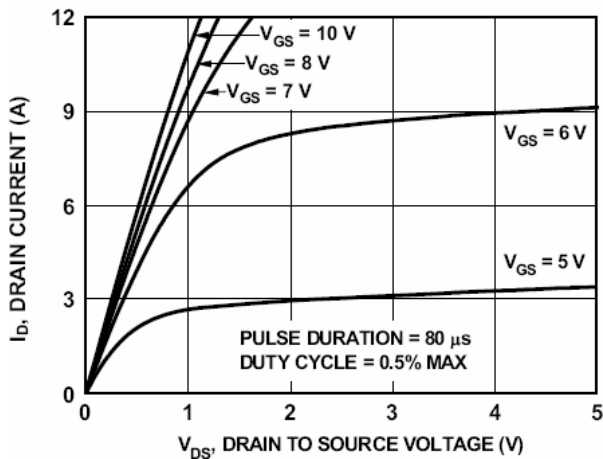
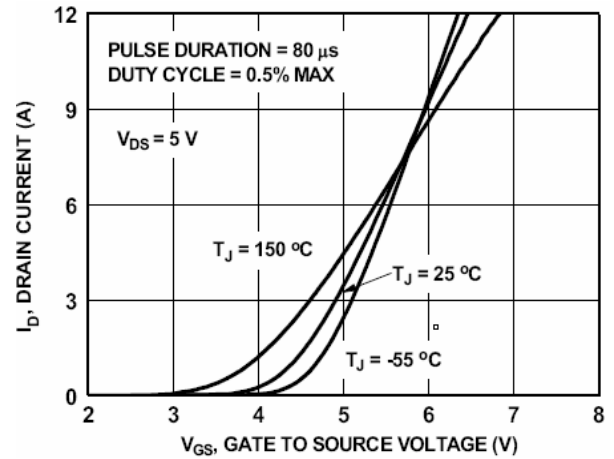
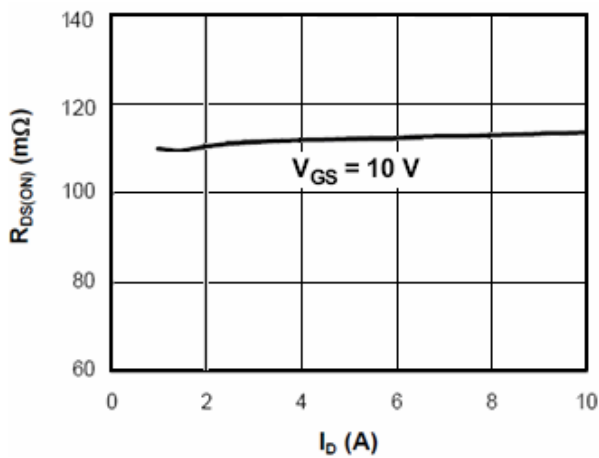
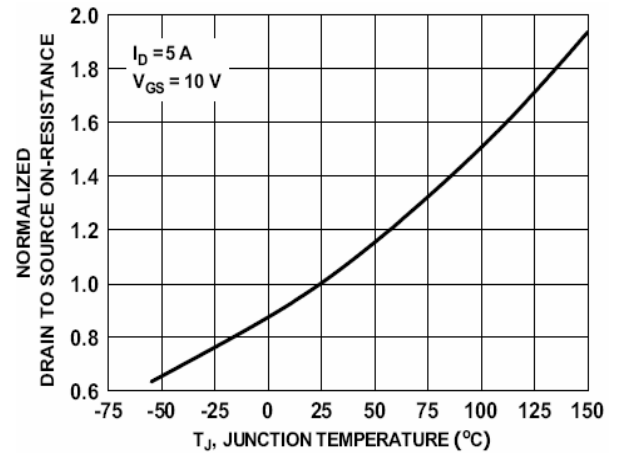
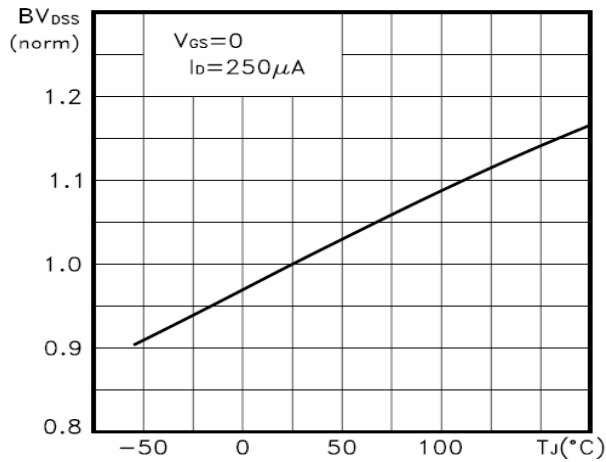
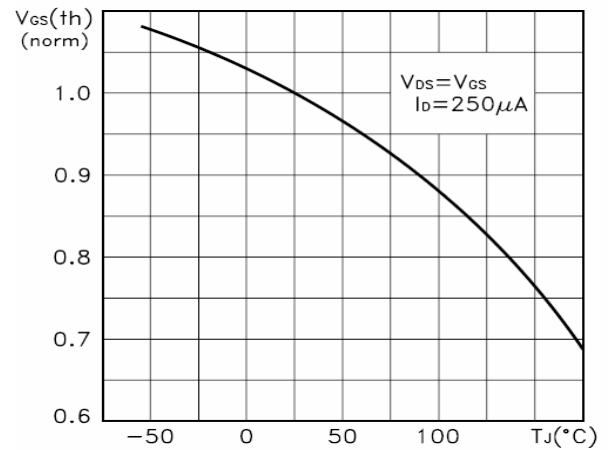
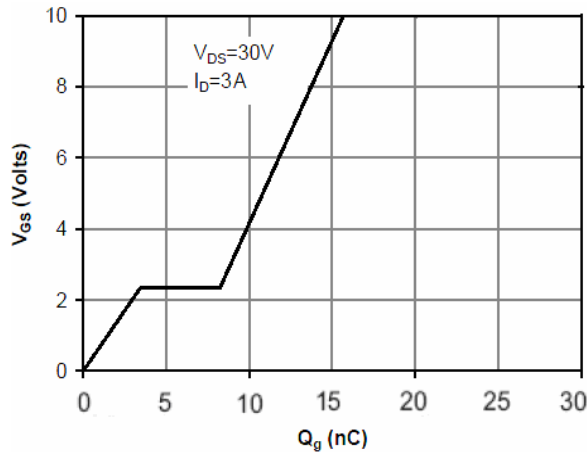
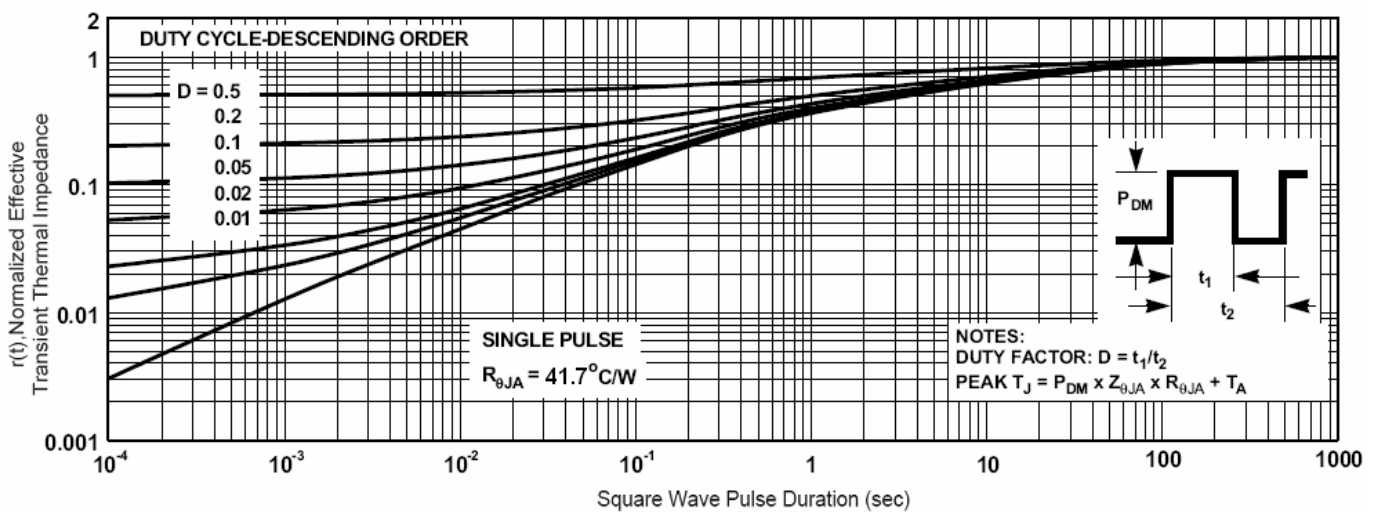
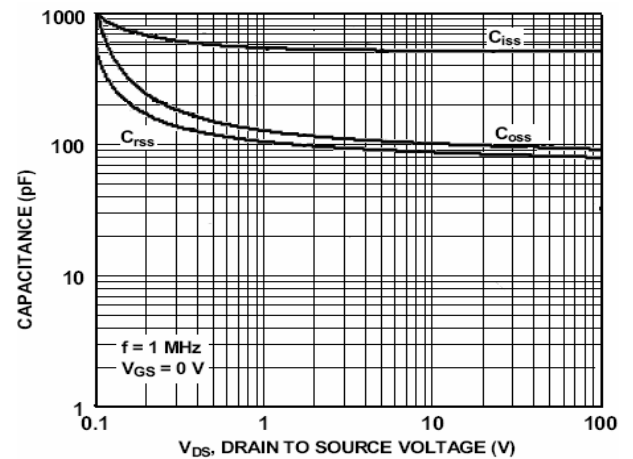
Figure1. Source-Drain Diode Forward Voltage

Figure2. Safe operating area

Figure3. Output characteristics

Figure4. Transfer characteristics

Figure5. Static drain-source on resistance

Figure6. $R_{DS(on)}$ vs Junction Temperature


Figure7. BV_{DSS} vs Junction Temperature

Figure8. $V_{GS(th)}$ vs Junction Temperature

Figure9. Gate charge waveforms

Figure10. Capacitance

Figure11. Normalized Maximum Transient Thermal Impedance