

Description

The VSM15N06 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

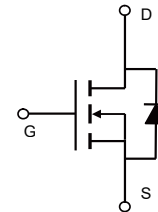
- $V_{DS} = 60\text{ V}, I_D = 15\text{ A}$
 $R_{DS(ON)} < 42.5\text{ m}\Omega @ V_{GS}=10\text{ V}$
 $R_{DS(ON)} < 55\text{ m}\Omega @ V_{GS}=4.5\text{ V}$
- High density cell design for ultra low $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high 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
VSM15N06	VSM15N06-T2	TO-252	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	15	A
Drain Current-Pulsed (Note 1)	I_{DM}	60	A
Maximum Power Dissipation	P_D	22.7	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta jc}$	6.58	$^{\circ}\text{C/W}$
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Electrical Characteristics ($T_A=25^{\circ}\text{C}$ 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	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±10V, V _{DS} =0V	-	-	±1	uA
		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	1.6	2	2.4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =15A	-	37	42.5	mΩ
		V _{GS} =4.5V, I _D =15A	-	48	55	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =15A	-	75	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =30V, V _{GS} =0V, F=1.0MHz	-	673	-	PF
Output Capacitance	C _{oss}		-	46	-	PF
Reverse Transfer Capacitance	C _{rss}		-	45	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =15A V _{GS} =10V, R _{GEN} =10Ω	-	4.2	-	nS
Turn-on Rise Time	t _r		-	3.4	-	nS
Turn-Off Delay Time	t _{d(off)}		-	16	-	nS
Turn-Off Fall Time	t _f		-	2	-	nS
Total Gate Charge	Q _g	V _{DS} =30V, I _D =15A, V _{GS} =10V	-	20.1	-	nC
	Q _{gs}		-	3.6	-	nC
	Q _{gd}		-	5.86	-	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		-	-	15	A
Reverse Recovery Time	t _{rr}	T _J = 25℃, I _F = 20A di/dt = 100A/ μ s	-	27	-	nS
Reverse Recovery Charge	Q _{rr}		-	30	-	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, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

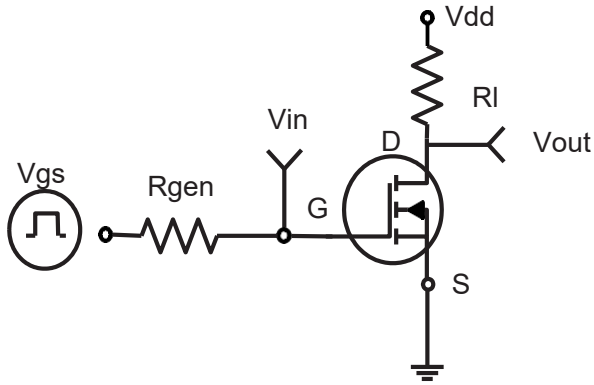


Figure 1: Switching Test Circuit

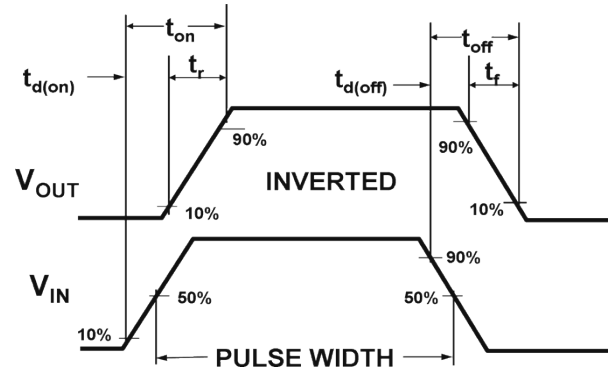


Figure 2: Switching Waveforms

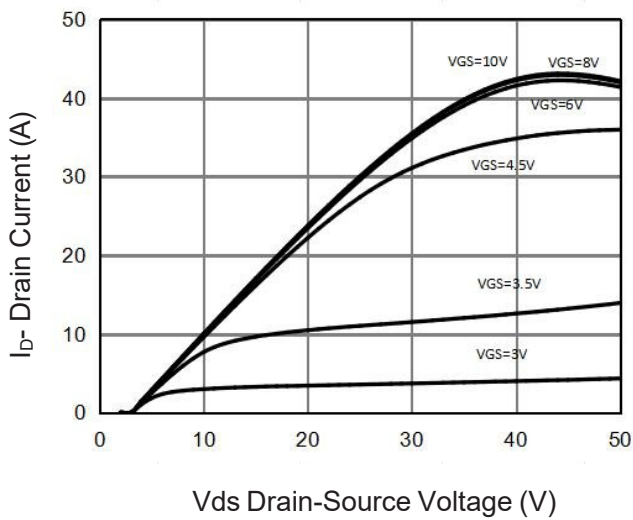


Figure 3: Output Characteristics

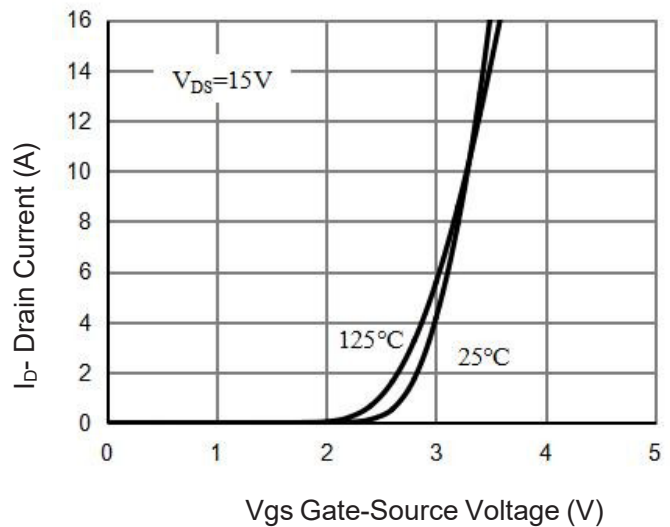


Figure 4: Transfer Characteristics

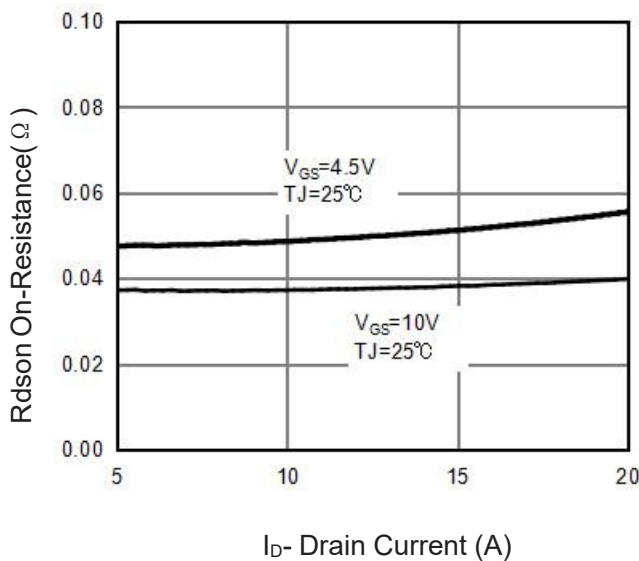


Figure 5: Drain-Source On-Resistance

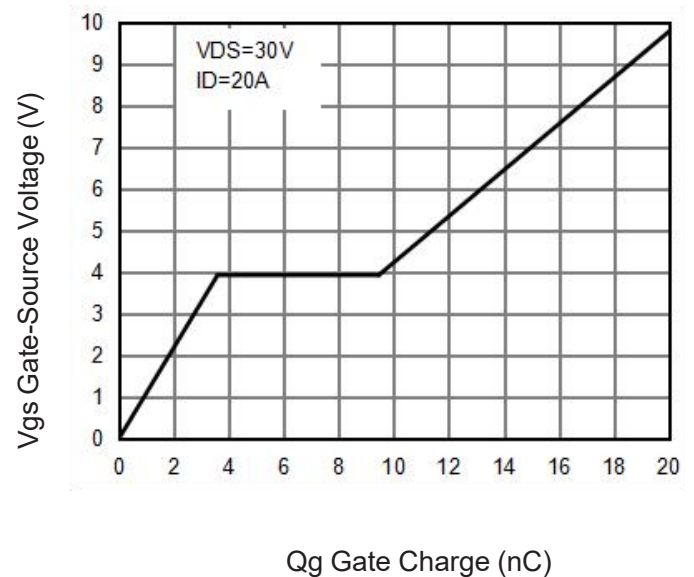
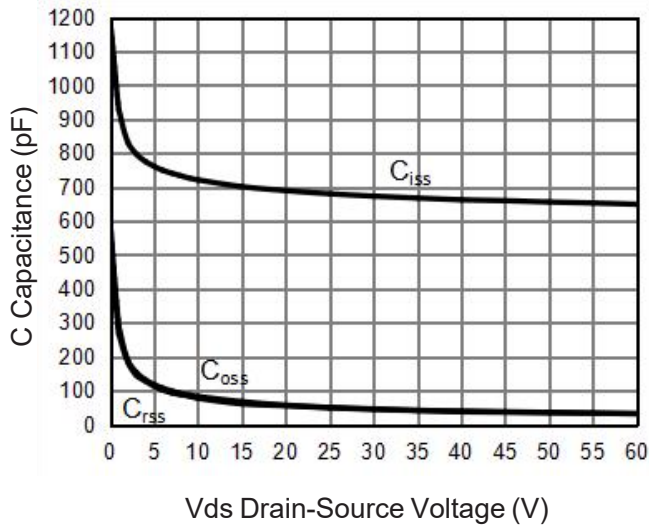
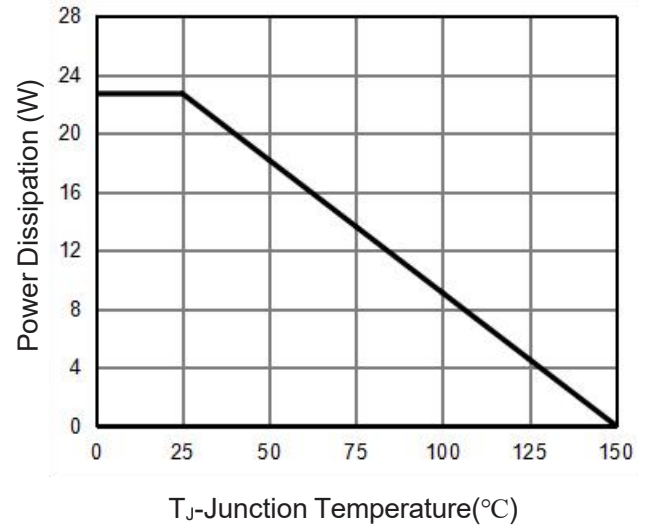
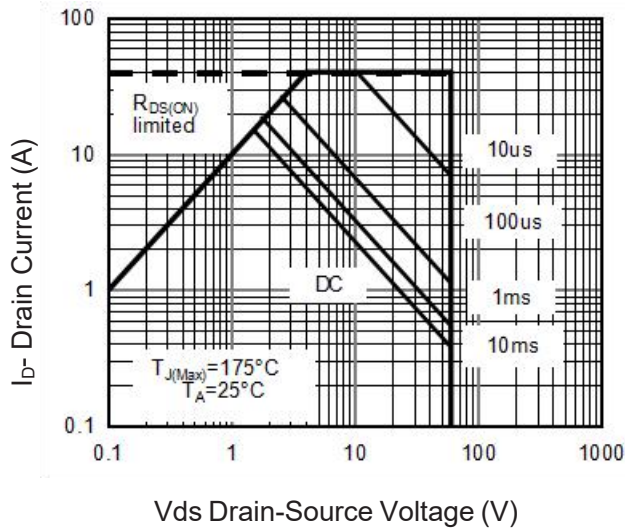
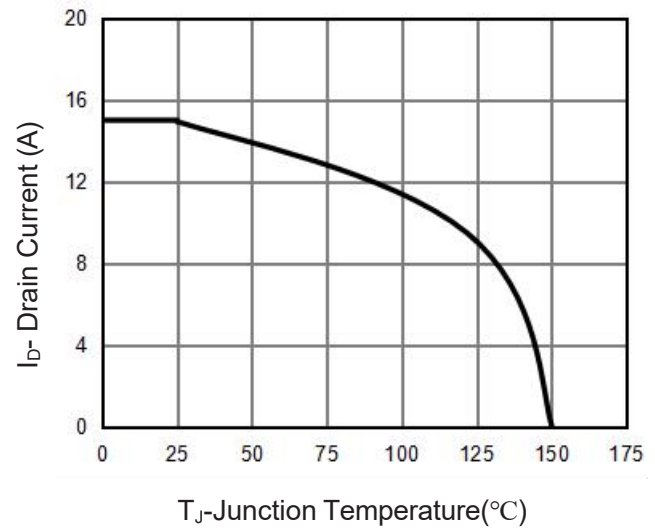
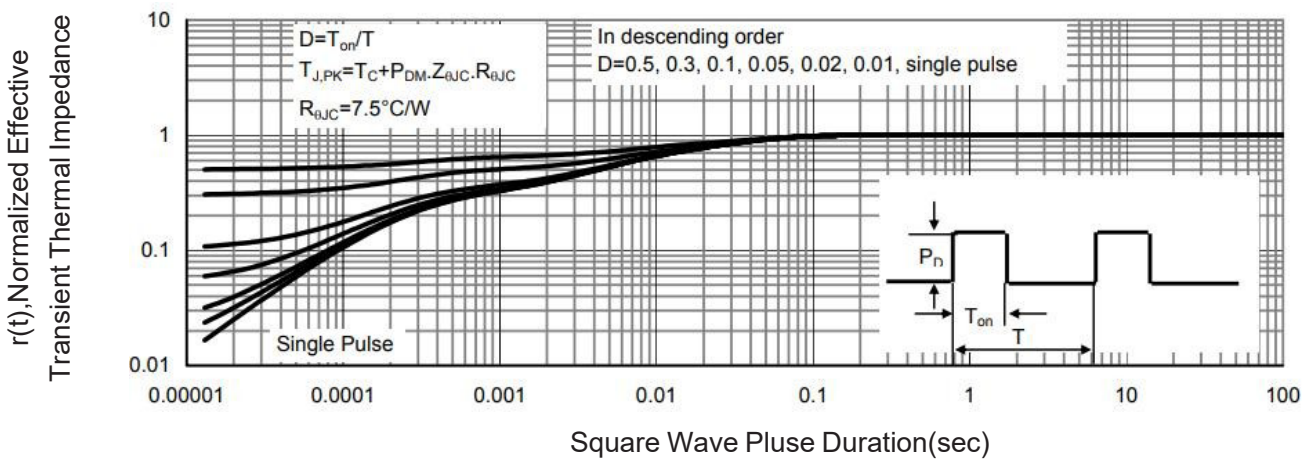


Figure 6: Gate Charge


Figure 7 Capacitance vs Vds

Figure 8 Power De-rating

Figure 9 Safe Operation Area

Figure 10 Current De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance