

Description

The VSM110N03 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

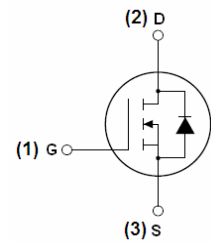
- $V_{DS} = 30V, I_D = 110A$
 $R_{DS(ON)} < 3.6m\Omega @ V_{GS} = 10V$ (Typ: 3.2m Ω)
 $R_{DS(ON)} < 5.0m\Omega @ V_{GS} = 4.5V$ (Typ: 4.0m Ω)
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent 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 Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM110N03-T2	VSM110N03	TO-252	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	110	A
Drain Current-Continuous ($T_C = 100^\circ C$)	$I_D (100^\circ C)$	77.8	A
Pulsed Drain Current	I_{DM}	440	A
Maximum Power Dissipation	P_D	120	W
Single pulse avalanche energy ^(Note 5)	E_{AS}	350	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

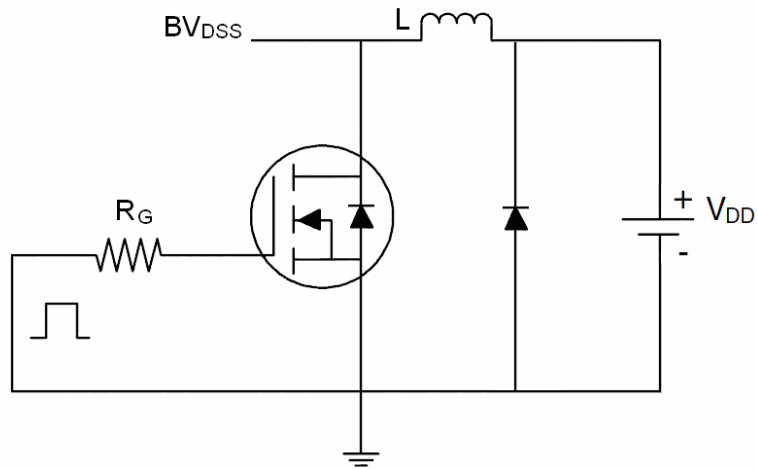
Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	1.25	$^\circ C/W$
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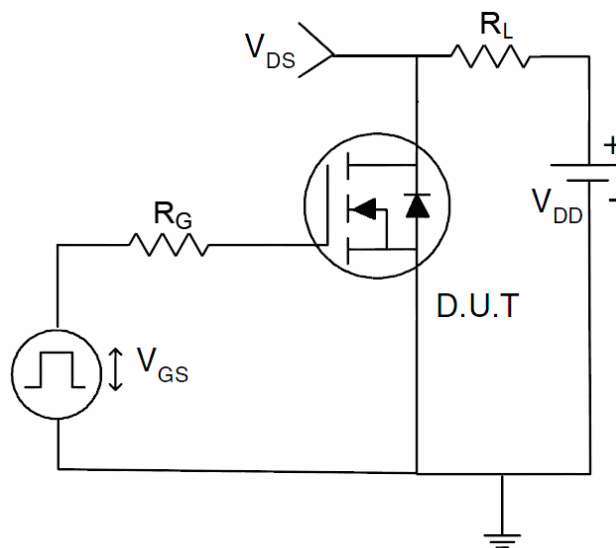
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

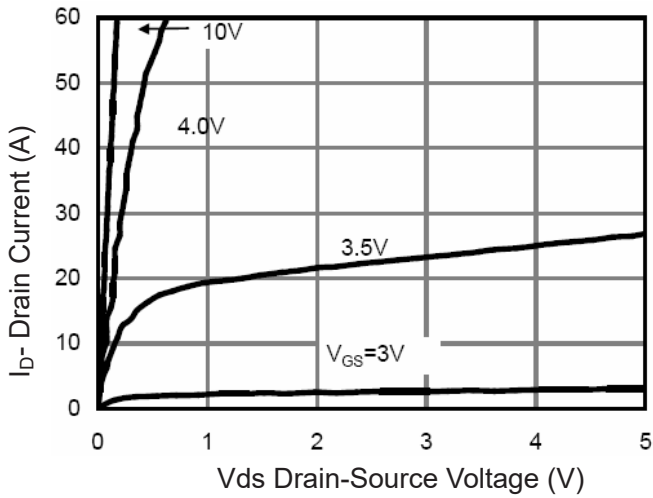
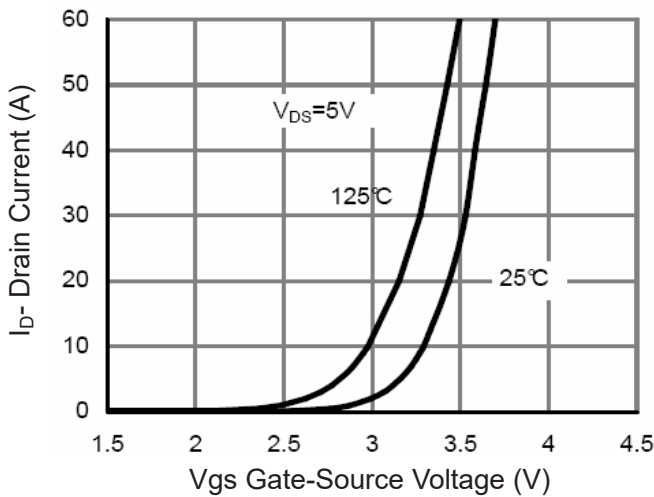
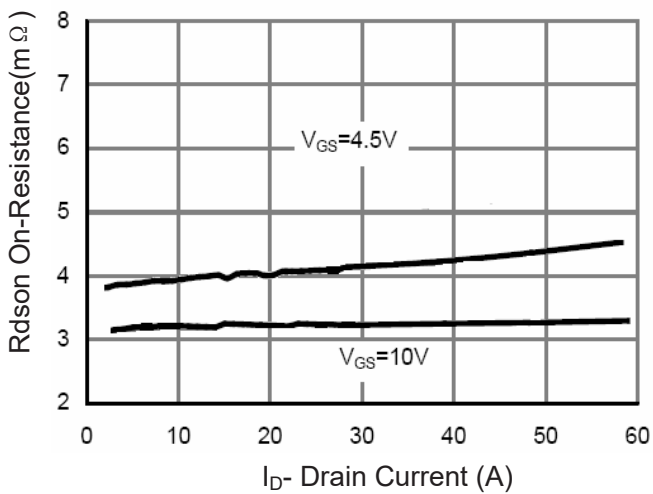
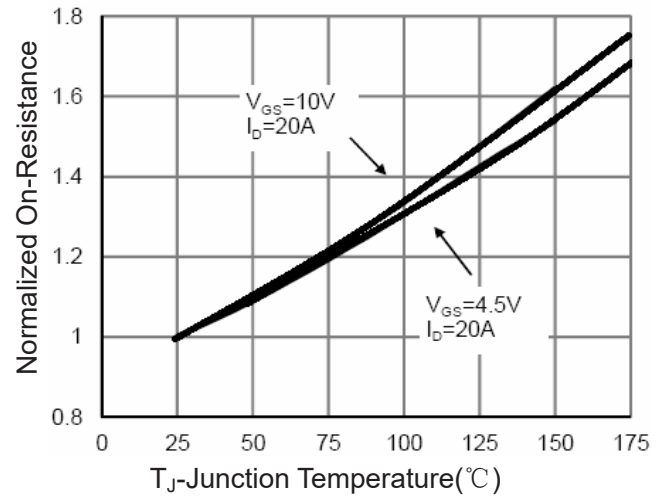
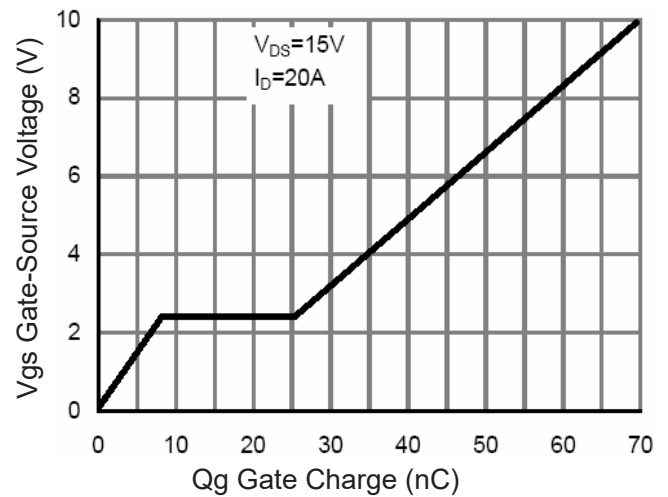
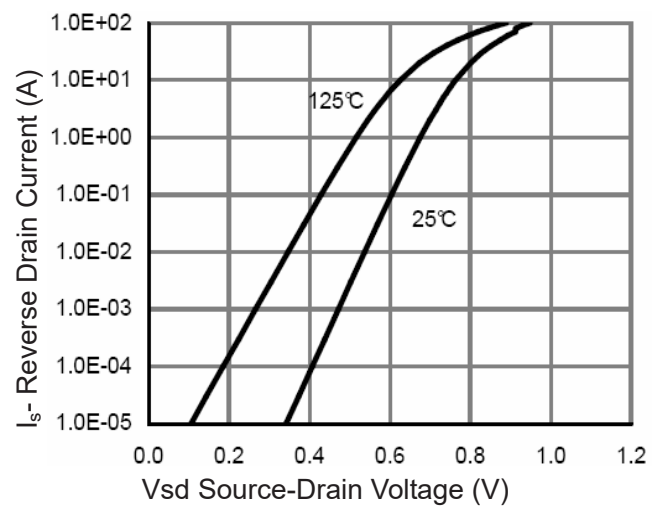
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	3.2	3.6	m Ω
		$V_{GS}=4.5V, I_D=20A$		4.0	5.0	
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=20A$	50	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0\text{MHz}$		2987		PF
Output Capacitance	C_{oss}			429		PF
Reverse Transfer Capacitance	C_{rss}			368		PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=20A$ $V_{GS}=4.5V, R_{GEN}=1.8\Omega$	-	11	-	nS
Turn-on Rise Time	t_r		-	16	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-Off Fall Time	t_f		-	60	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=20A,$ $V_{GS}=10V$		70		nC
Gate-Source Charge	Q_{gs}			8.8		nC
Gate-Drain Charge	Q_{gd}			16.3		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
Diode Forward Current	I_S	-	-	-	110	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 20A$ $di/dt = 100A/\mu s$ (Note 3)	-	56	-	nS
Reverse Recovery Charge	Q_{rr}		-	110	-	nC

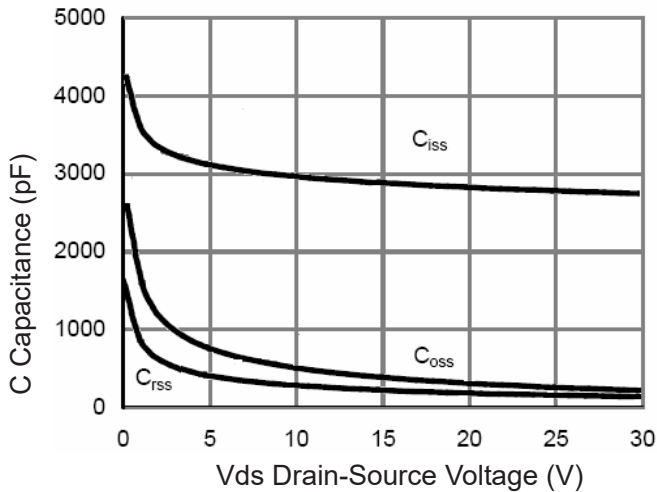
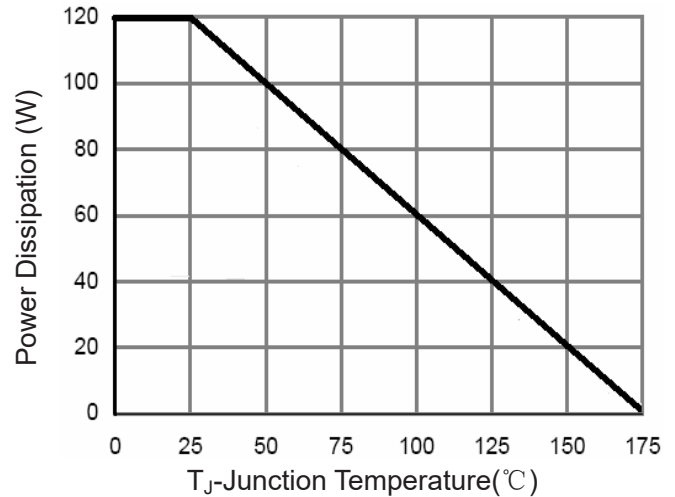
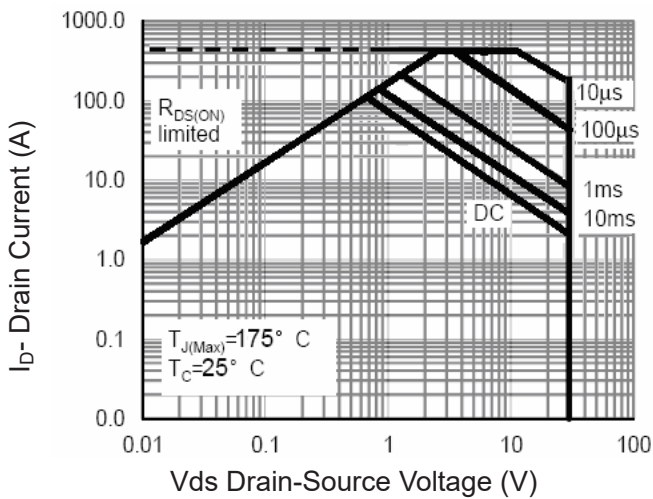
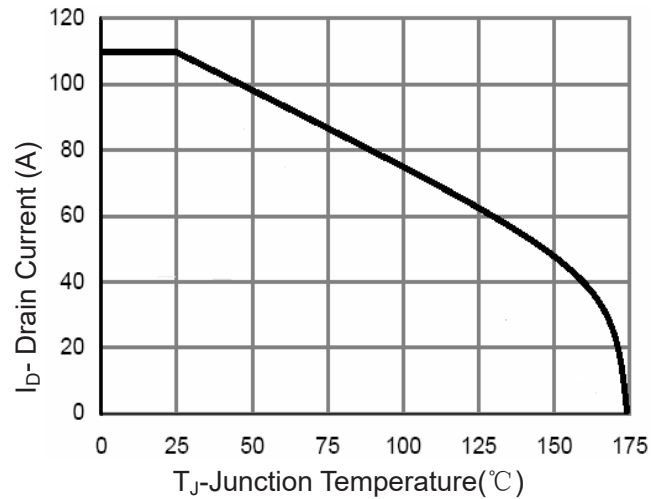
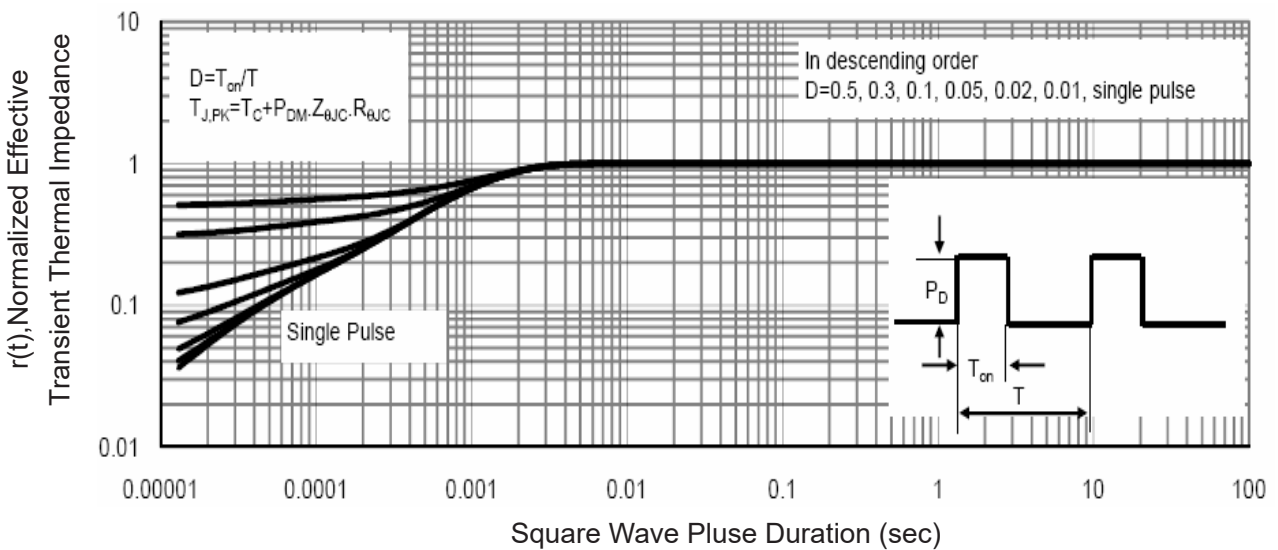
Notes:

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
5. EAS condition: $T_J=25^\circ\text{C}, V_{DD}=15V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega$

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-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

Figure 10 Current De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance