

Description

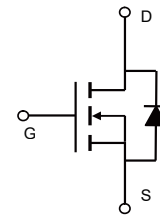
The VSM75N20 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in automotive applications and a wide variety of other applications.

General Features

- $V_{DSS} = 200V, I_D = 75A$
 $R_{DS(ON)} < 22m\Omega @ V_{GS} = 10V$
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM75N20	VSM75N20-TC	TO-220	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	200	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	75	A
Drain Current-Continuous ($T_c = 100^\circ C$)	$I_D (100^\circ C)$	53	A
Pulsed Drain Current (Note 1)	I_{DM}	300	A
Maximum Power Dissipation	P_D	360	W
Derating factor		2.4	W/ $^\circ C$
Single pulse avalanche energy (Note 3)	E_{AS}	600	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 1)	$R_{\theta JC}$	0.42	$^{\circ}\text{C/W}$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

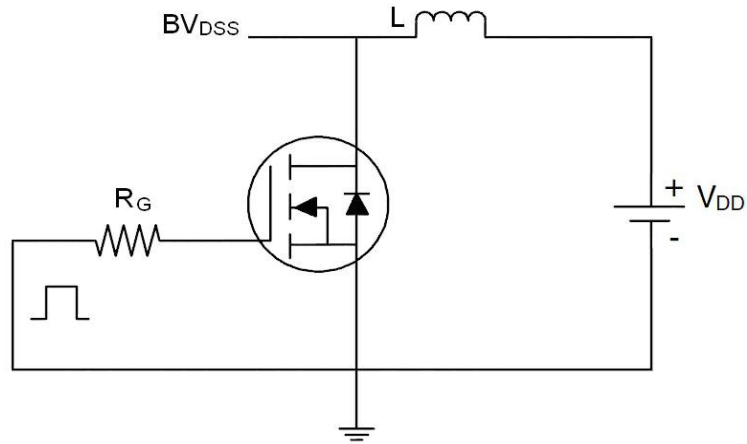
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	200	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =200V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	3	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =40A	-	19	22	mΩ
Forward Transconductance	g _{FS}	V _{DS} =20V, I _D =40A	-	115	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =100V, V _{GS} =0V, F=1.0MHz	-	8238	-	PF
Output Capacitance	C _{oss}		-	275	-	PF
Reverse Transfer Capacitance	C _{rss}		-	112	-	PF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =100V, I _D =40A, V _{GS} =10V, R _G =2.7Ω	-	17	-	nS
Turn-on Rise Time	t _r		-	18	-	nS
Turn-Off Delay Time	t _{d(off)}		-	56	-	nS
Turn-Off Fall Time	t _f		-	22	-	nS
Total Gate Charge	Q _g	ID=40A, VDD=100V, VGS=10V	-	152.7	-	nC
Gate-Source Charge	Q _{gs}		-	44.5	-	nC
Gate-Drain Charge	Q _{gd}		-	47.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =75A	-	-	1.2	V
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = 40A	-	136	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs ^(Note2)	-	458	-	nC

Notes:

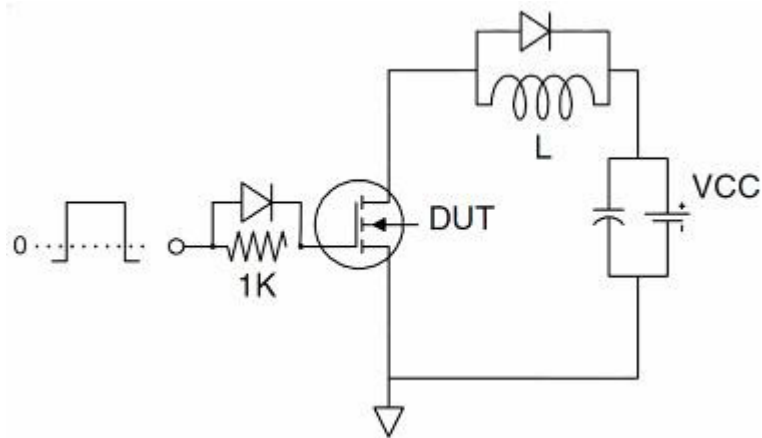
1. Surface Mounted on FR4 Board, $t \leq 10$ sec.
2. Pulse Test: Pulse Width $\leq 400\mu s$, Duty Cycle $\leq 2\%$.
3. EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=50V, V_G=10V, L=1mH, R_g=25\Omega$

Test Circuit

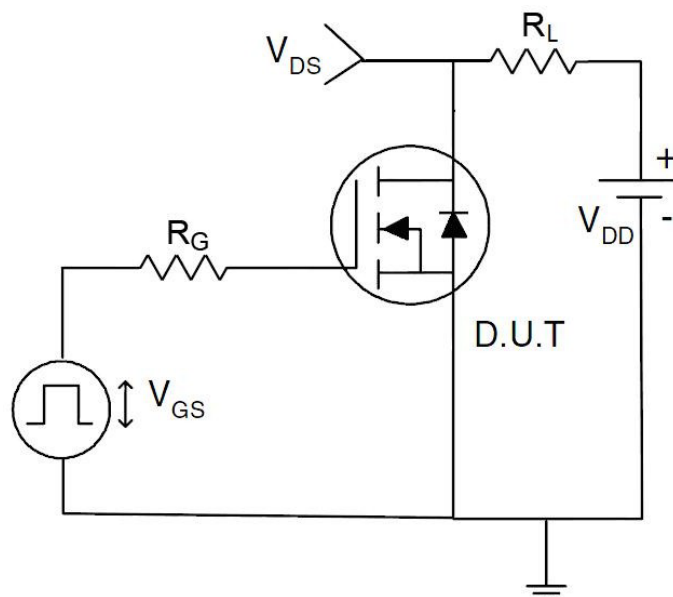
1) E_{AS} test Circuit



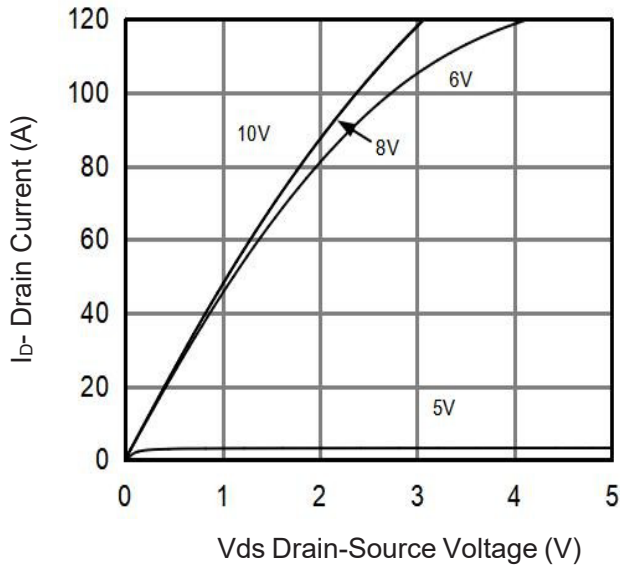
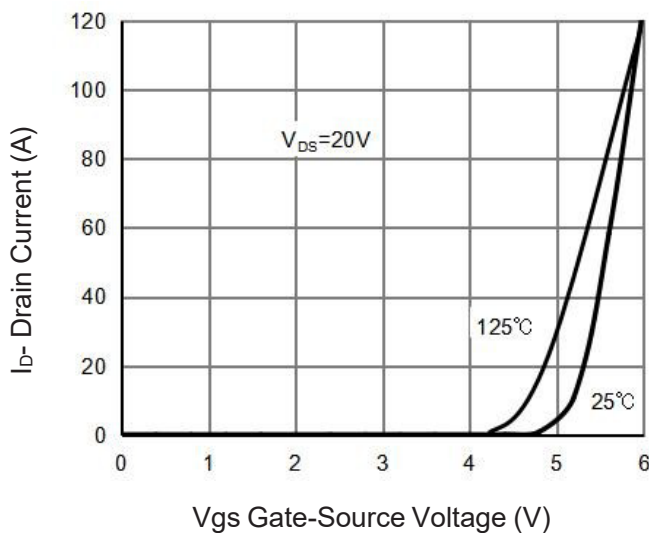
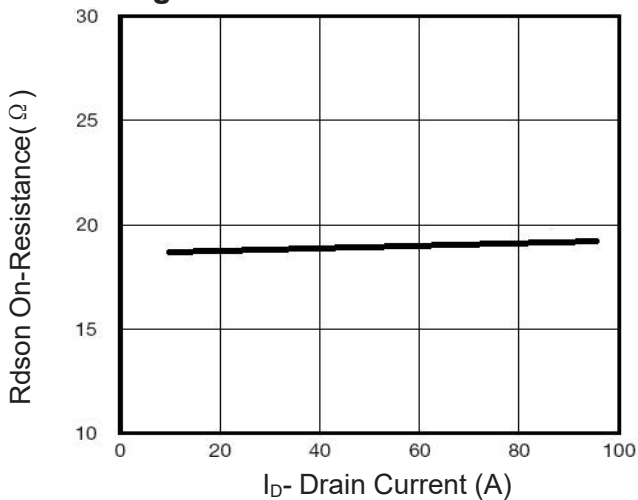
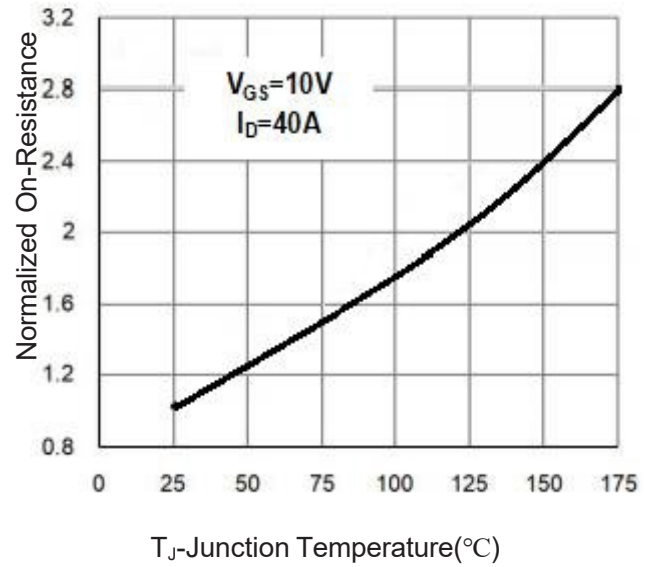
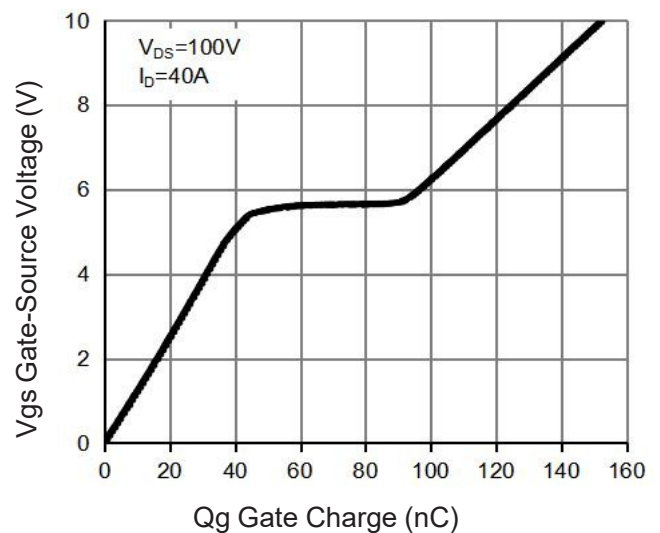
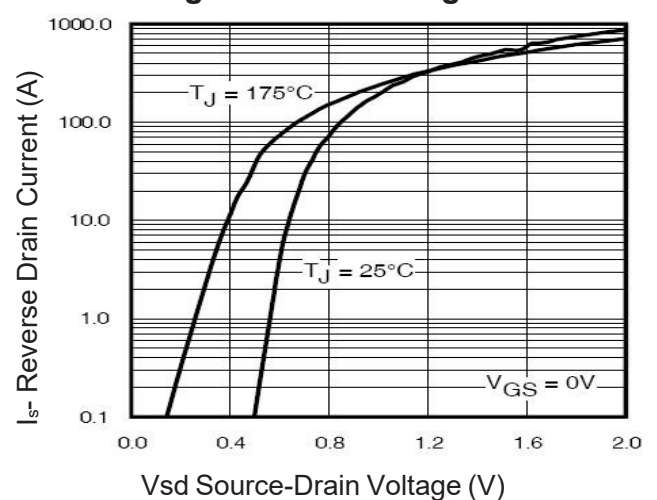
2) Gate charge test Circuit

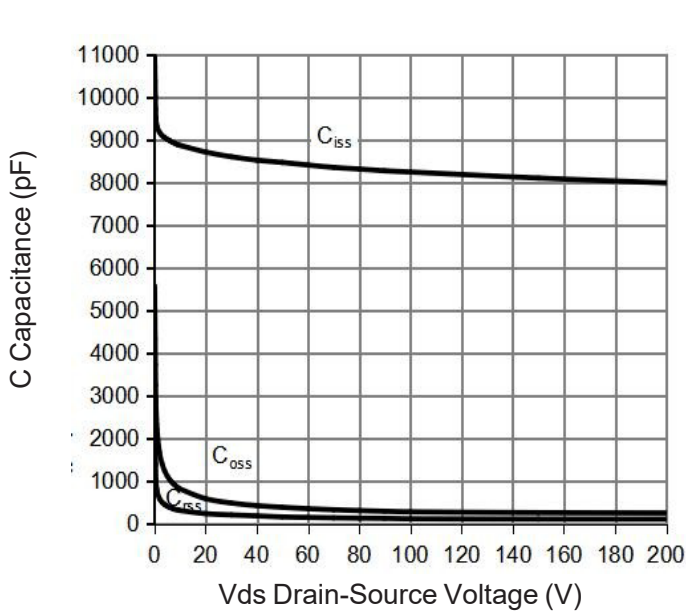
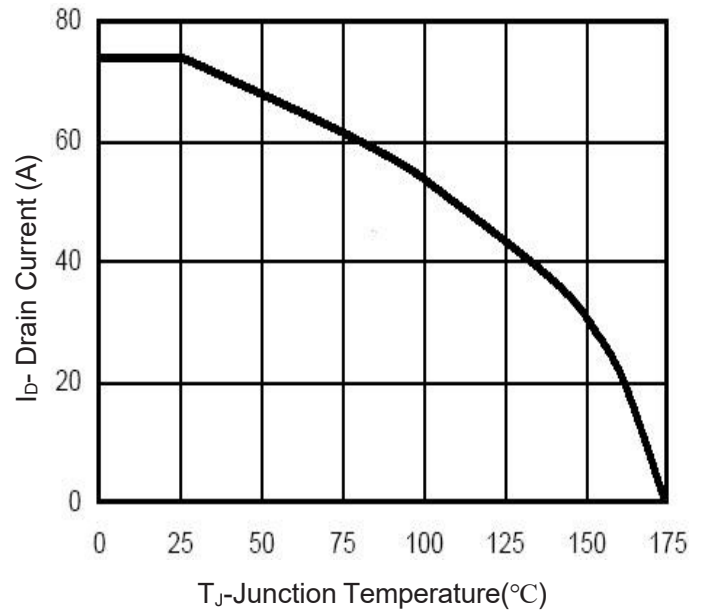
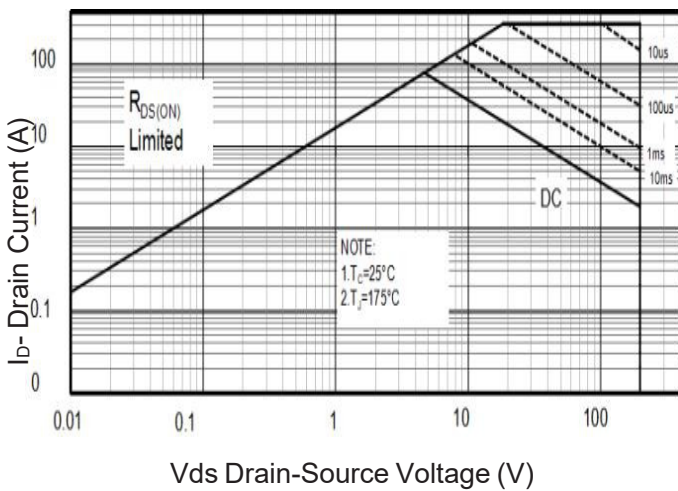
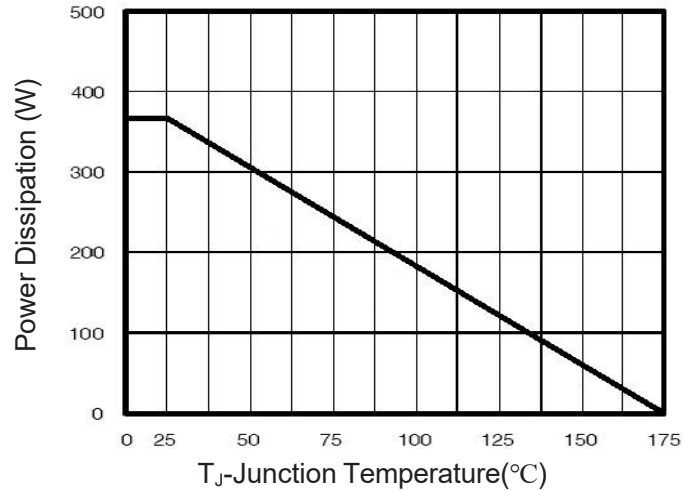
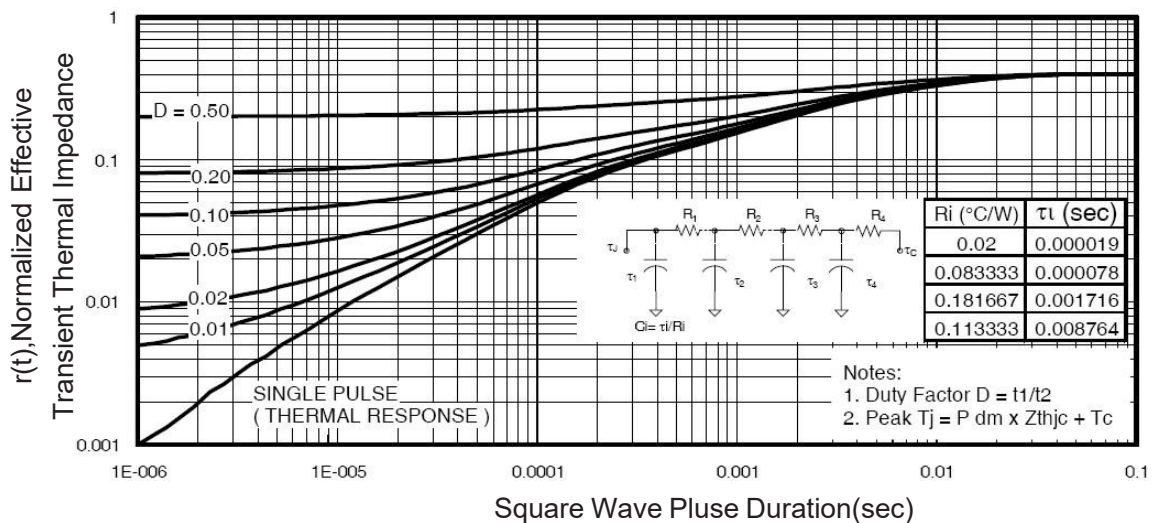


3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics(Curves)


Figure 1 Output Characteristics

Figure 2 Transfer Characteristics

Figure 3 Rdson- Drain Current

Figure 4 Rdson-Junction Temperature

Figure 5 Gate Charge

Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 Current De-rating

Figure 8 Safe Operation Area

Figure 10 Power De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance