

Description

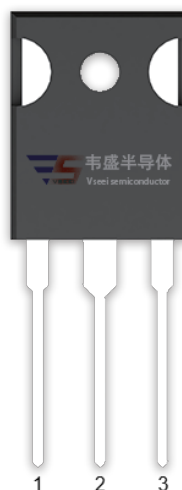
The VSM350N07 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in automotive applications and a wide variety of other applications.

General Features

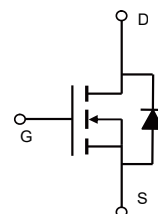
- $V_{DSS}=75V, I_D=350A$
 $R_{DS(ON)} < 2.2m\Omega @ V_{GS}=10V$ (Typ: 1.7 m Ω)
- Good stability and uniformity with high E_{AS}
- Special process technology for high ESD capability
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Application

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



TO-247



Schematic

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
VSM350N07	VSM350N07-T7	TO-247	-	-	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DSS}	75	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	350	A
Drain Current-Continuous($T_C=100^{\circ}C$)	$I_D(100^{\circ}C)$	270	A
Pulsed Drain Current	I_{DM}	1280	A
Maximum Power Dissipation	P_D	460	W
Derating factor		3.07	W/ $^{\circ}C$
Single pulse avalanche energy (Note 3)	E_{AS}	3500	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)	$R_{\theta JC}$	0.33	$^{\circ}C/W$
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Electrical Characteristics (T_C=25°C unless otherwise noted)

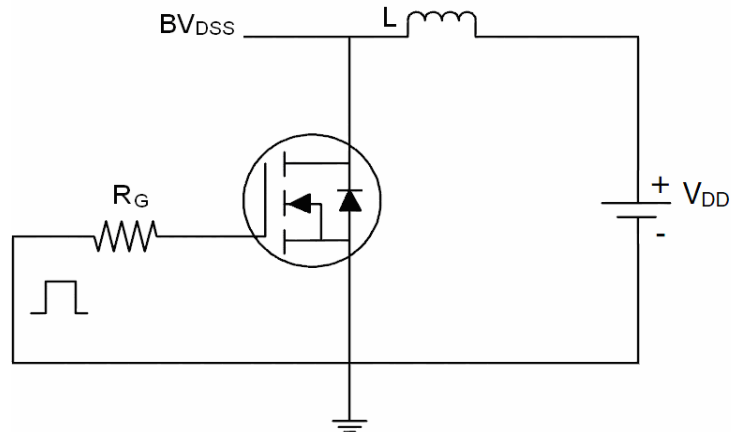
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	75	86	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =75V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±200	nA
On Characteristics						
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	-	1.7	2.2	mΩ
Forward Transconductance	g _{FS}	V _{DS} =25V, I _D =40A	100	-	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, F=1.0MHz	-	25500	-	PF
Output Capacitance	C _{oss}		-	1652	-	PF
Reverse Transfer Capacitance	C _{rss}		-	1261	-	PF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =40V, I _D =40A V _{GS} =10V, R _{GEN} =1.2Ω (Note2)	-	50	-	nS
Turn-on Rise Time	t _r		-	235	-	nS
Turn-Off Delay Time	t _{d(off)}		-	180	-	nS
Turn-Off Fall Time	t _f		-	280	-	nS
Total Gate Charge	Q _g	V _{DS} =40V, I _D =40A, V _{GS} =10V (Note2)	-	586	-	nC
Gate-Source Charge	Q _{gs}		-	120	-	nC
Gate-Drain Charge	Q _{gd}		-	200	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.2	V
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = 40A	-	170	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs (Note2)	-	500	-	nC

Notes:

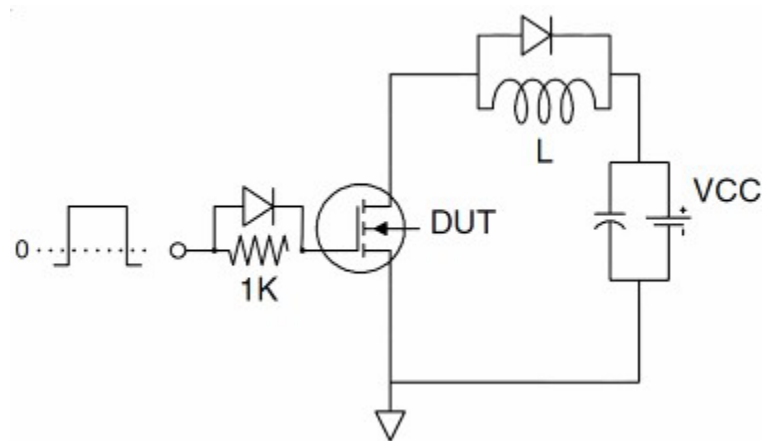
1. Surface Mounted on FR4 Board, t ≤ 10 sec.
2. Pulse Test: Pulse Width ≤ 400μs, Duty Cycle ≤ 2%.
3. EAS condition: T_J=25°C, V_{DD}=37.5V, V_G=10V, L=1mH, R_g=25Ω
4. I_{SD}≤125A, di/dt≤260A/μs, V_{DD}≤V_{(BR)DSS}, T_J ≤175°C

Test circuit

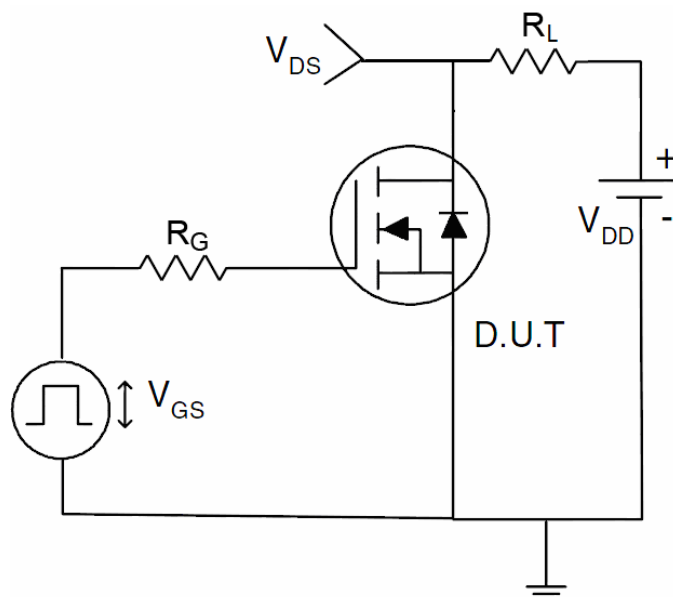
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

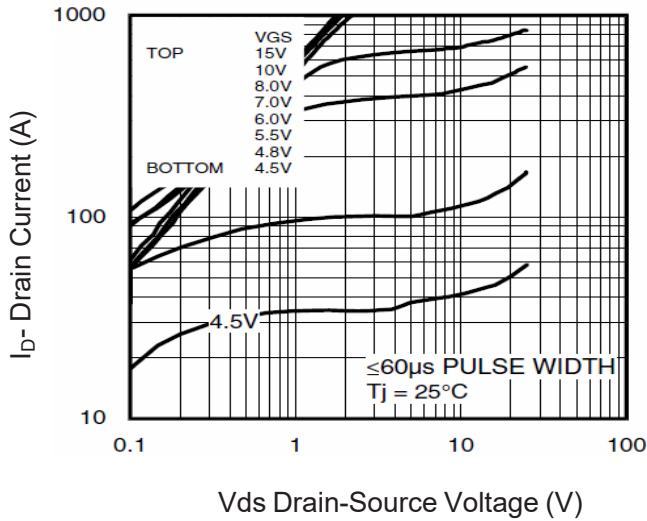


Figure 1 Output Characteristics

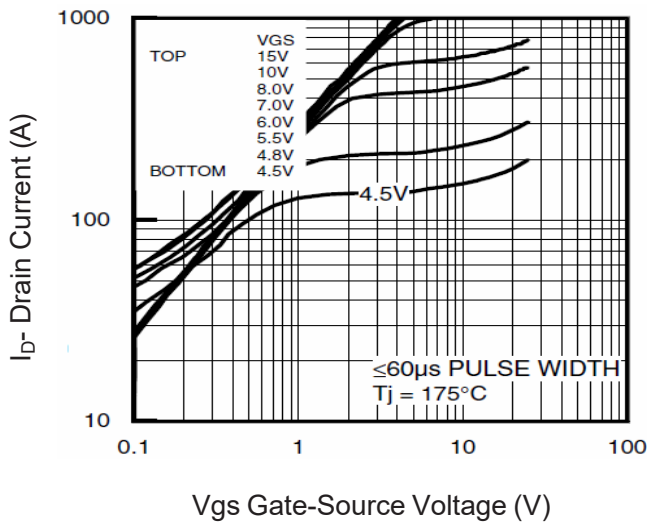


Figure 2 Transfer Characteristics

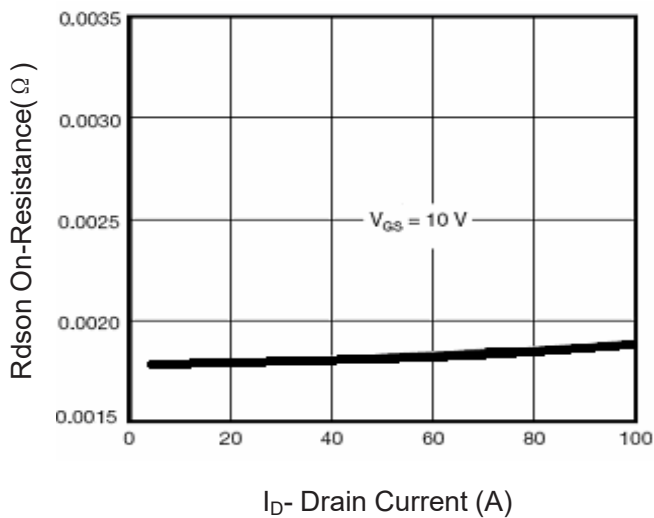


Figure 3 Rdson- Drain Current

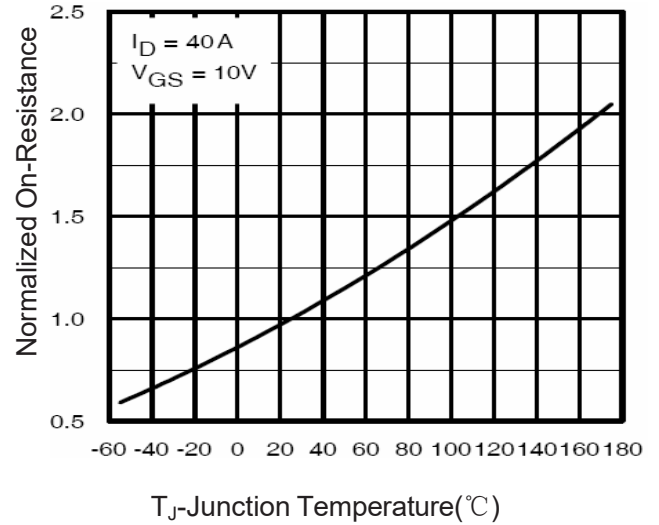


Figure 4 Rdson-Junction Temperature

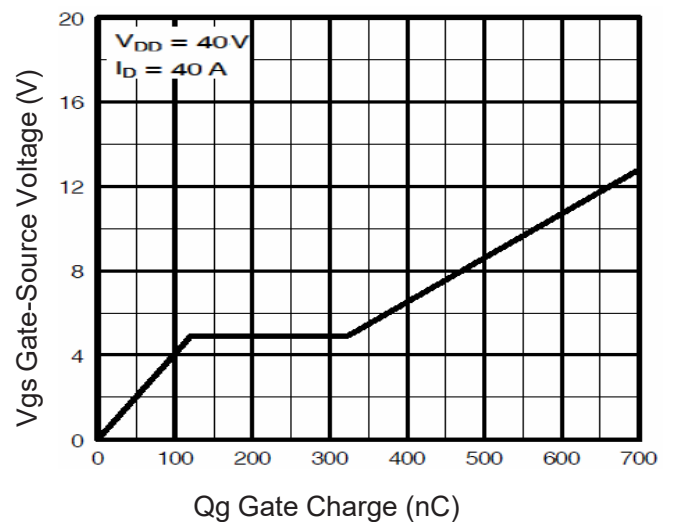


Figure 5 Gate Charge

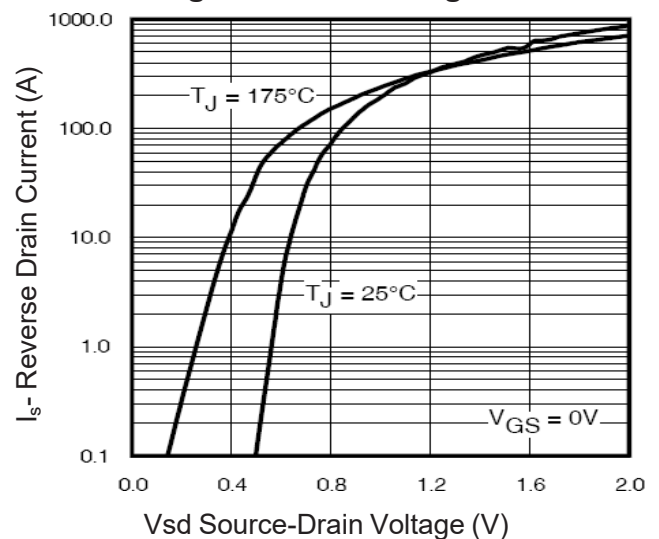
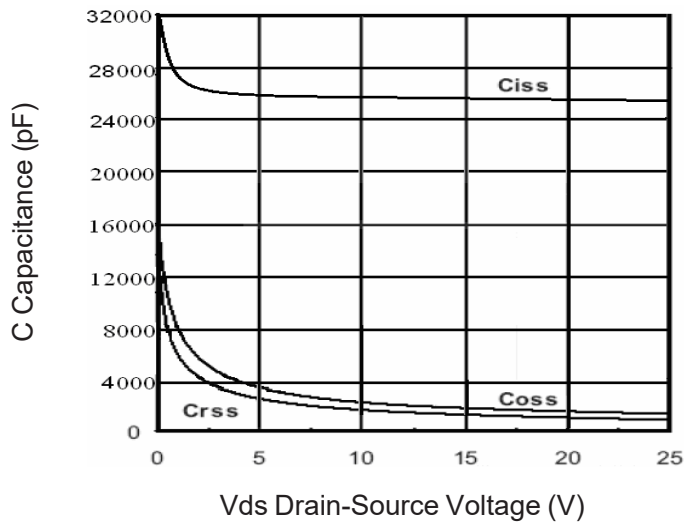
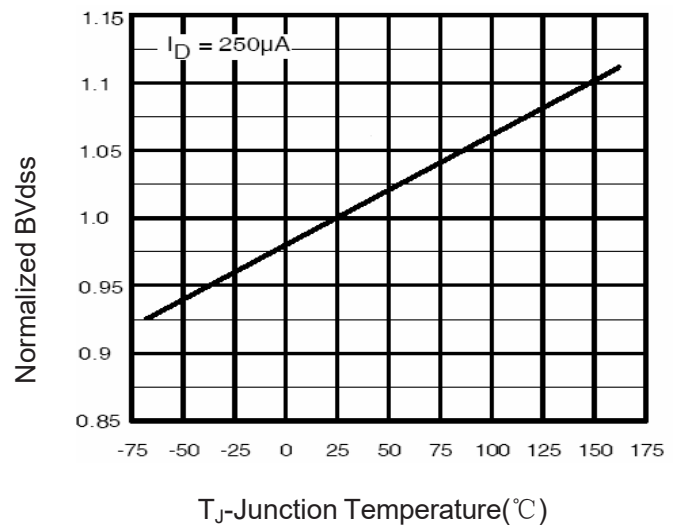
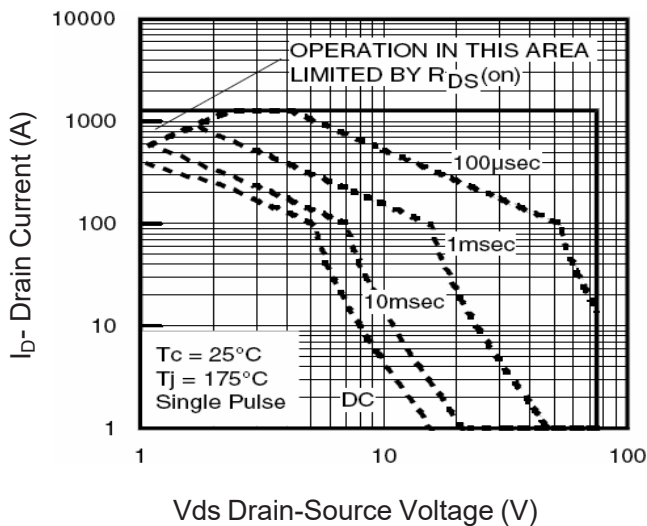
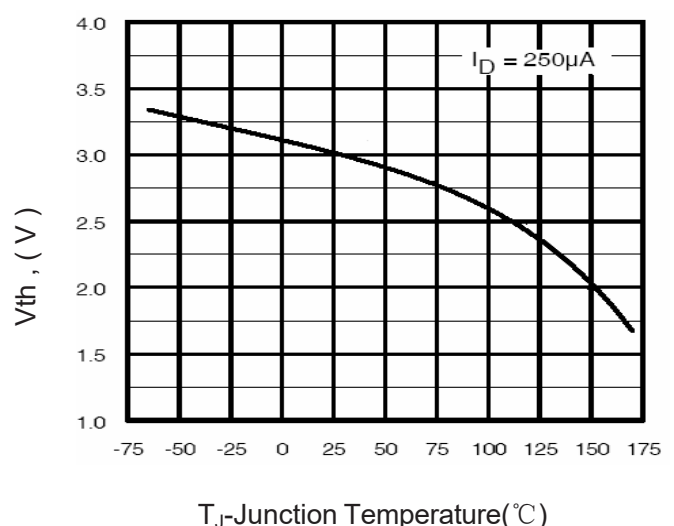
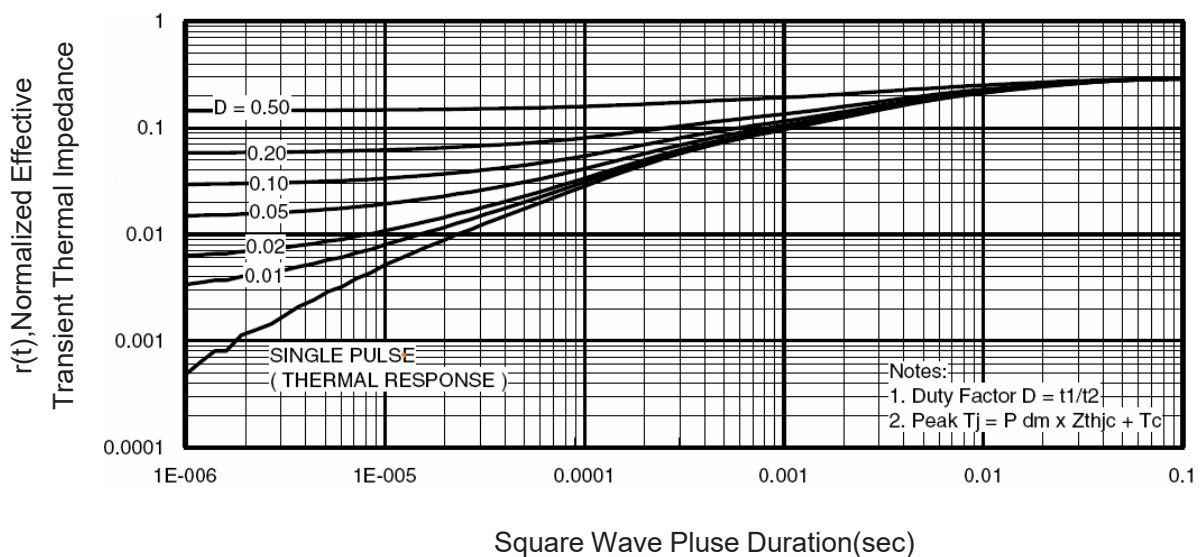


Figure 6 Source- Drain Diode Forward


Figure 7 Capacitance vs Vds

Figure 9 BV_{DSS} vs Junction Temperature

Figure 8 Safe Operation Area

Figure 10 V_{GS(th)} vs Junction Temperature

Figure 11 Normalized Maximum Transient Thermal Impedance