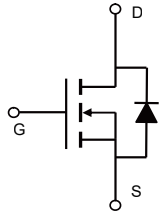


Description

Features ● $V_{DS}=60V$, $I_D=5A$ $R_{DS(ON)} < 100m\Omega$ @ $V_{GS} = 10V$ $R_{DS(ON)} < 125m\Omega$ @ $V_{GS} = 4.5V$ ● Advanced Trench Technology ● Excellent $R_{DS(ON)}$ and Low Gate Charge ● Lead free product is acquired	Application ● Load Switch ● PWM Application ● Power management <i>100% UIS TESTED!</i> <i>100% ΔV_{ds} TESTED!</i>
 SOT-223	 Schematic

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM5N06	VSM5N06-S23	TAPING	SOT-223	13inch	4000	40000

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

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	$T_A = 25^{\circ}C$	A
		$T_A = 100^{\circ}C$	
I_{DM}	Pulsed Drain Current ^{note1}	20	A
EAS	Single Pulsed Avalanche Energy ^{note2}	4	mJ
P_D	Power Dissipation	4	W
$R_{\theta JA}$	Thermal Resistance, Junction to Case	31	$^{\circ}C/W$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^{\circ}C$

Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = 250μA	60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} = 0V,	-	-	1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1.0	1.5	2.2	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} =10V, I _D =3A	-	75	100	mΩ
		V _{GS} =4.5V, I _D =2A	-	87	125	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz	-	350	-	pF
C _{oss}	Output Capacitance		-	29	-	pF
C _{rss}	Reverse Transfer Capacitance		-	23	-	pF
Q _g	Total Gate Charge	V _{DS} = 30V, I _D = 3A, V _{GS} = 10V	-	9	-	nC
Q _{gs}	Gate-Source Charge		-	1.5	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	2	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = 30V, I _D =2A, R _{GEN} =3Ω, V _{GS} =10V,	-	5	-	ns
t _r	Turn-on Rise Time		-	7	-	ns
t _{d(off)}	Turn-off Delay Time		-	37	-	ns
t _f	Turn-off Fall Time		-	22	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	20	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S =5A	-	-	1.2	V

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : T_J=25°C, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25Ω, I_{AS}=4A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

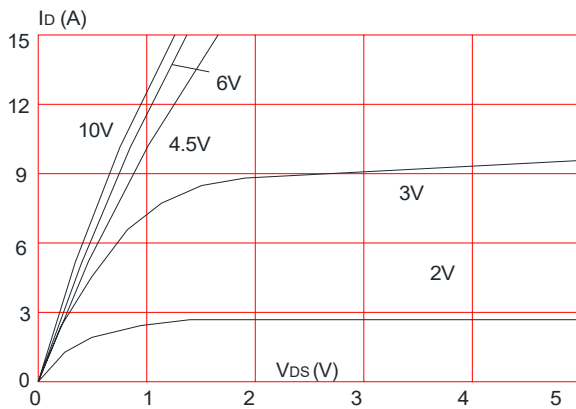
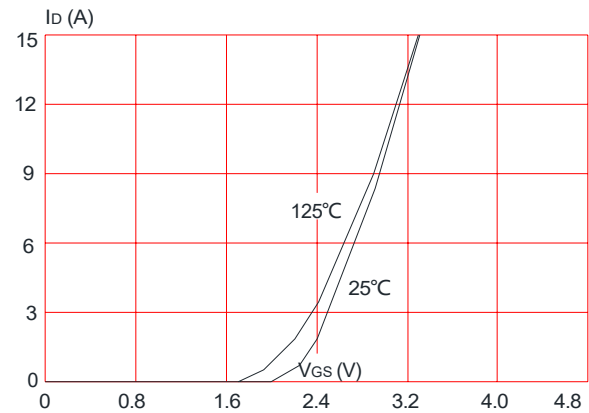
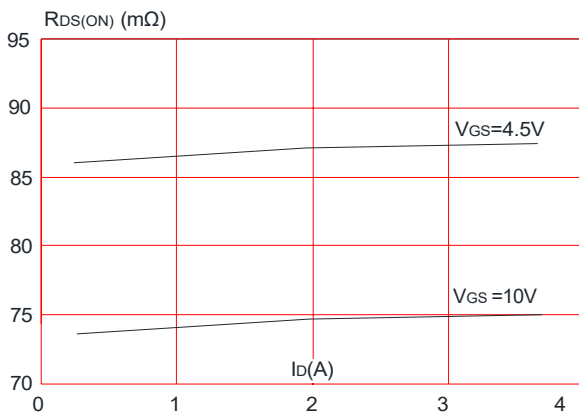
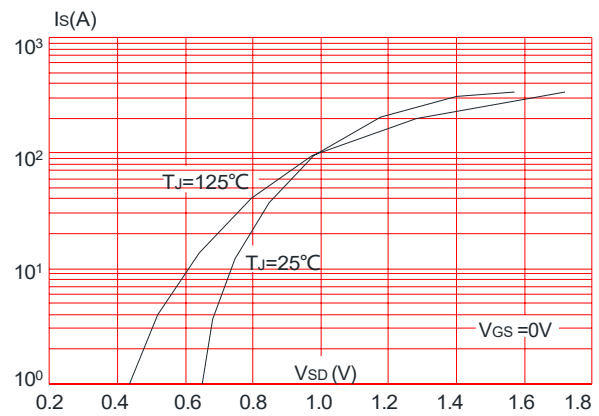
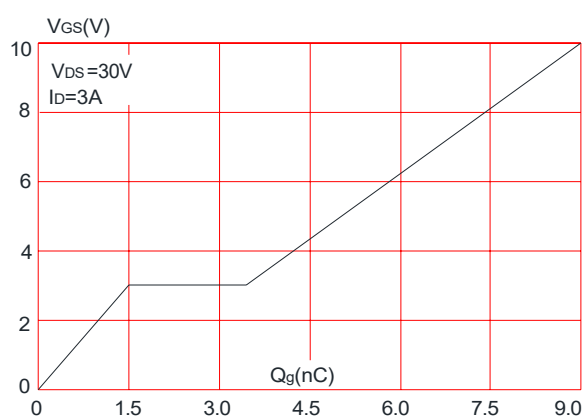
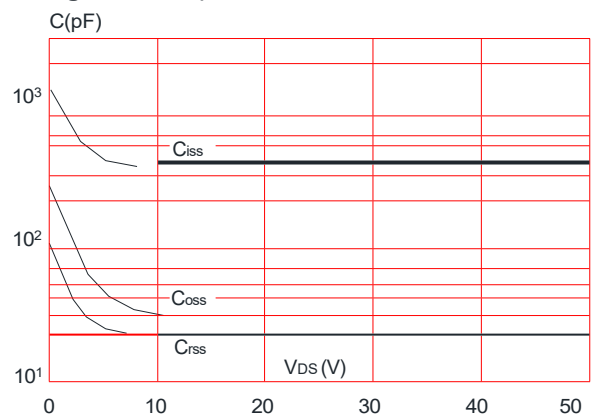
Figure1: Output Characteristics

Figure 2: Typical Transfer Characteristics

Figure 3: On-resistance vs. Drain Current

Figure 4: Body Diode Characteristics

Figure 5: Gate Charge Characteristics

Figure 6: Capacitance Characteristics


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

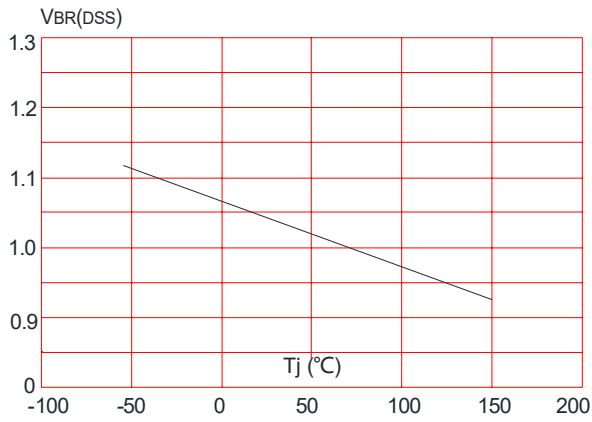


Figure 8: Normalized on Resistance vs. Junction Temperature

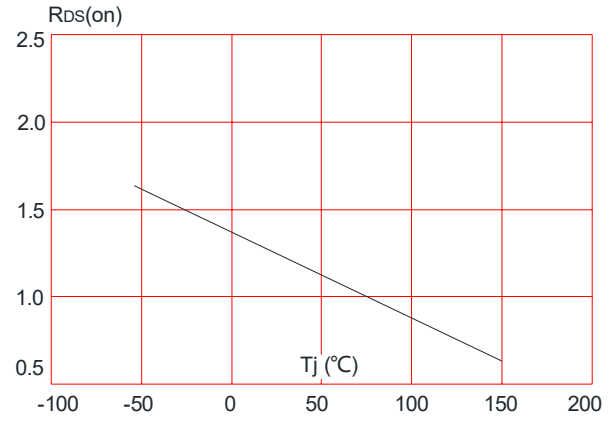


Figure 9: Maximum Safe Operating Area

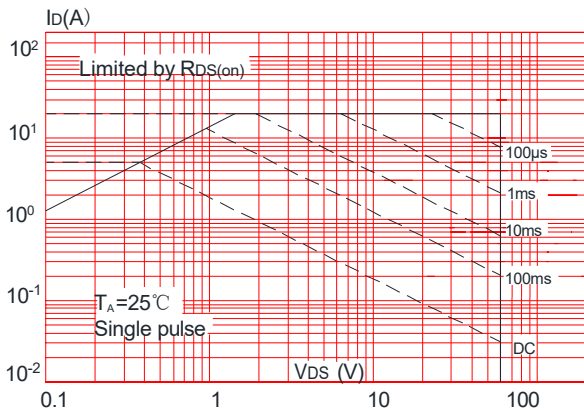


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

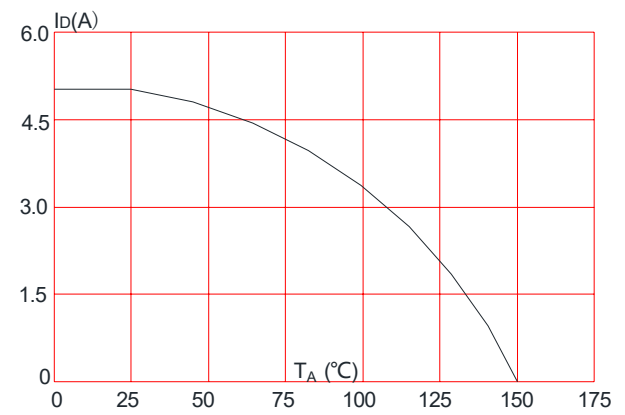
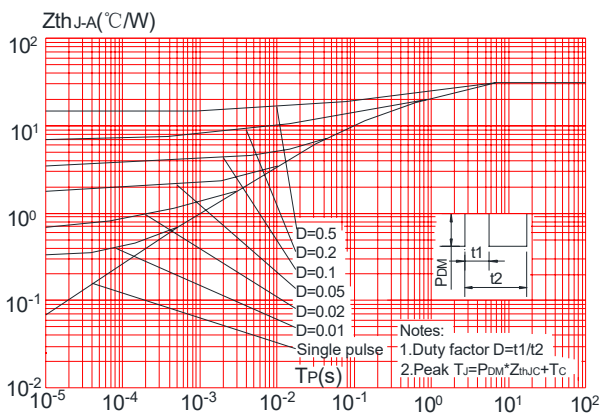


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Test Circuit

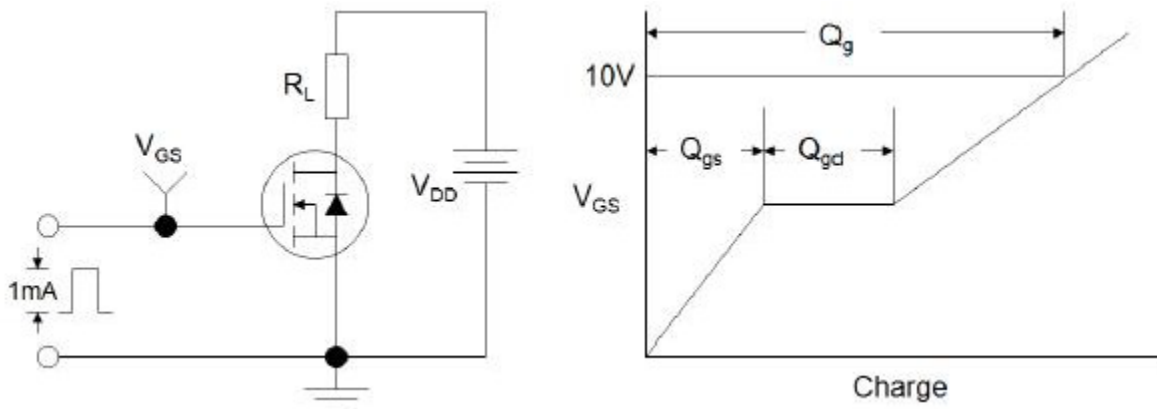


Figure1:Gate Charge Test Circuit & Waveform

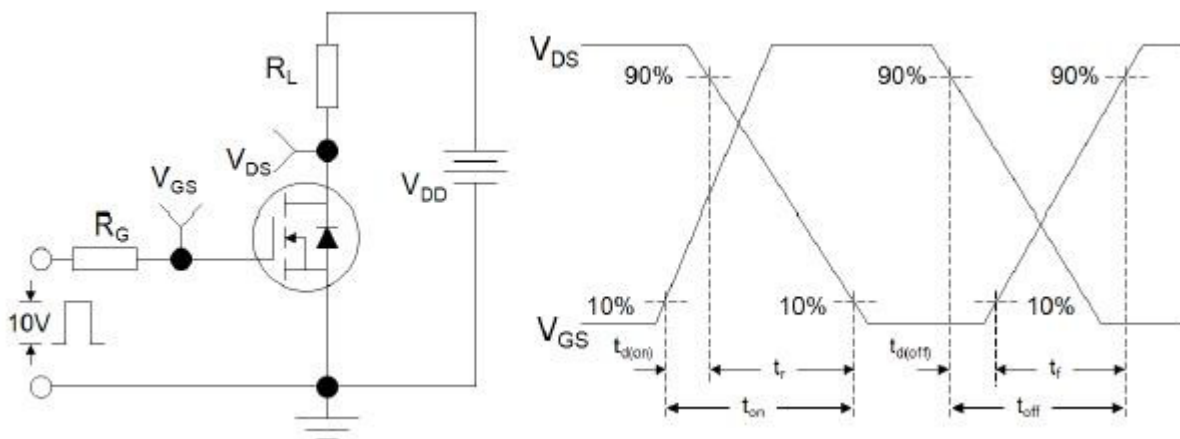


Figure 2: Resistive Switching Test Circuit & Waveforms

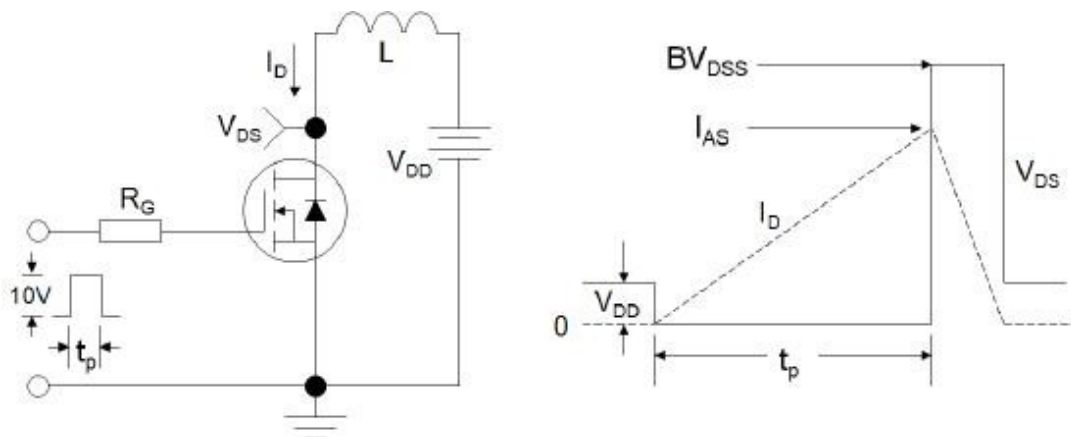


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms