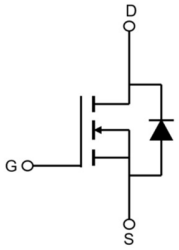
Description

Features	Application
● 40V, 190A $R_{DS(ON)}$ < 2.6mΩ @ V_{GS} = 10V ● Advanced Trench Technology ● Provide Excellent $R_{DS(ON)}$ and Low Gate Charge ● Lead free product is acquired	● Load Switch ● PWM Application ● Power management 100% UIS 100% ΔVds

TO-263



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM190DN04-T3	VSM190DN04	TAPING	TO-263	13inch	1000	5000

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25℃	190	A
		T_C = 100℃	124	A
I_{DM}	Pulsed Drain Current note1		760	A
EAS	Single Pulsed Avalanche Energy note2		576	mJ
P_D	Power Dissipation	T_C = 25℃	197	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.76	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	℃

Electrical Characteristics (T_J=25℃ 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	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V,	-	-	1.0	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	2	3	4	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note3	V_{GS}=10V, I_D=30A	-	1.9	2.6	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=20V, V_{GS}=0V, f=1.0MHz	-	9060	-	pF
C_{oss}	Output Capacitance		-	1000	-	pF
C_{rss}	Reverse Transfer Capacitance		-	666	-	pF
Q_g	Total Gate Charge	V_{DS}=20V, I_D=30A, V_{GS}=10V	-	145	-	nC
Q_{gs}	Gate-Source Charge		-	30	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	37	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=30A, R_L=1Ω, R_{GEN}=3Ω, V_{GS}=10V	-	39	-	ns
t_r	Turn-on Rise Time		-	56	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	108	-	ns
t_f	Turn-off Fall Time		-	71	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	190	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	760	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S=30A	-	-	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	T_J=25℃, I_F=20A,dI/dt=100A/μs	-	50	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	81	-	nC

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

2. EAS condition : T_J=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω,I_{AS}=48A

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

Typical Performance Characteristics

Figure1: Output Characteristics

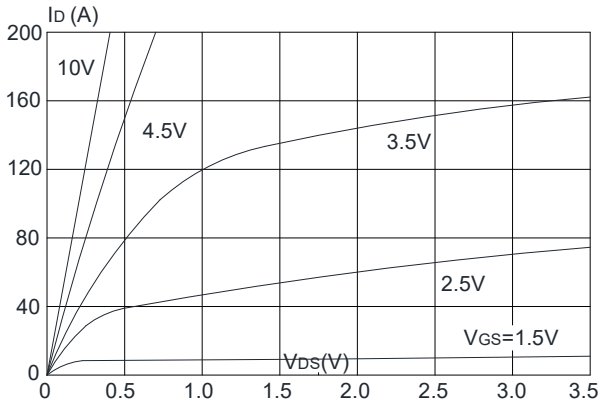


Figure 2: Typical Transfer Characteristics

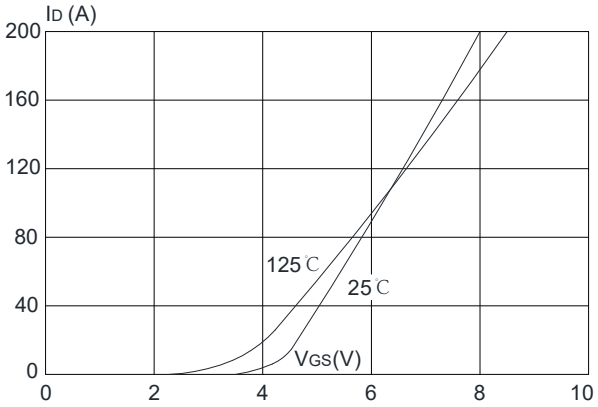


Figure 3: On-resistance vs. Drain Current

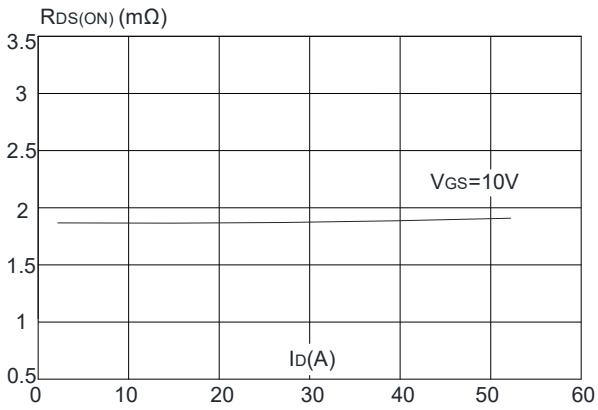


Figure 4: Body Diode Characteristics

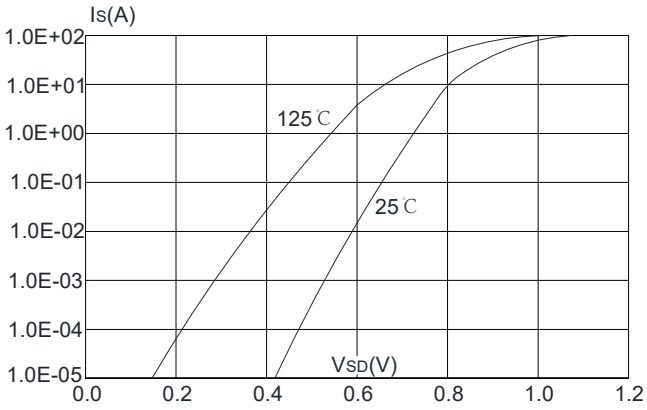


Figure 5: Gate Charge Characteristics

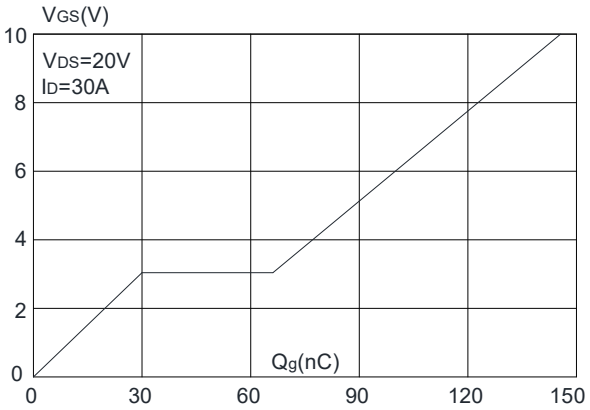


Figure 6: Capacitance Characteristics

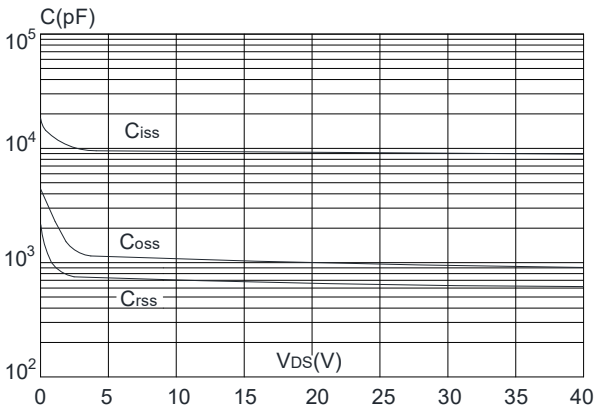


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

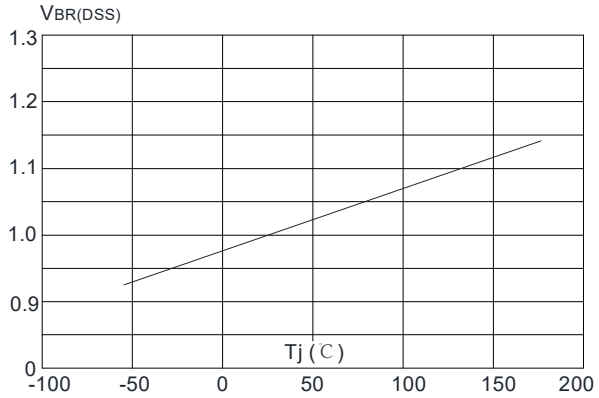


Figure 8: Normalized on Resistance vs. Junction Temperature

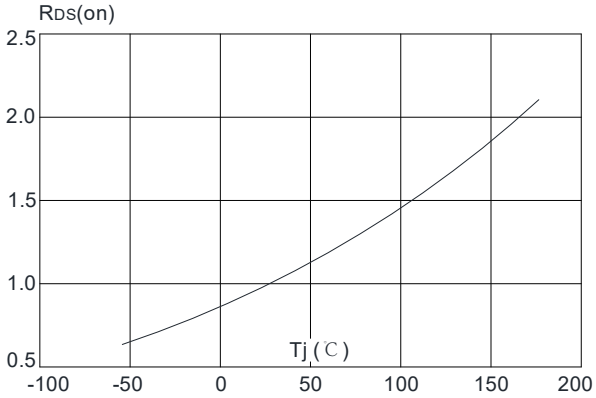


Figure 9: Maximum Safe Operating Area

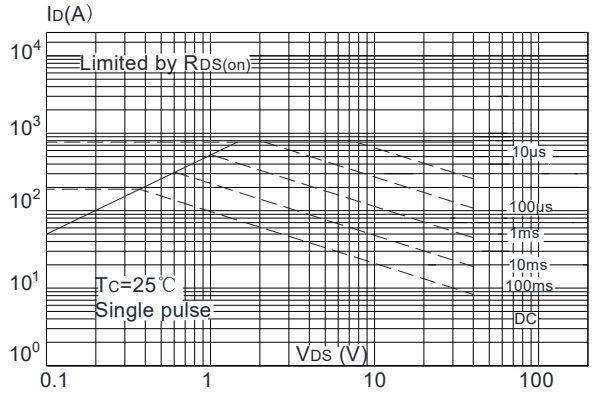


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

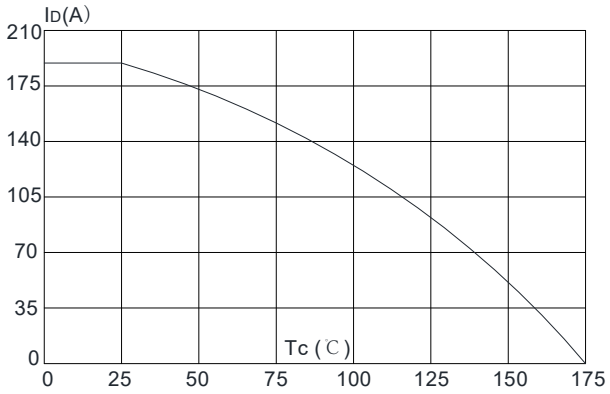
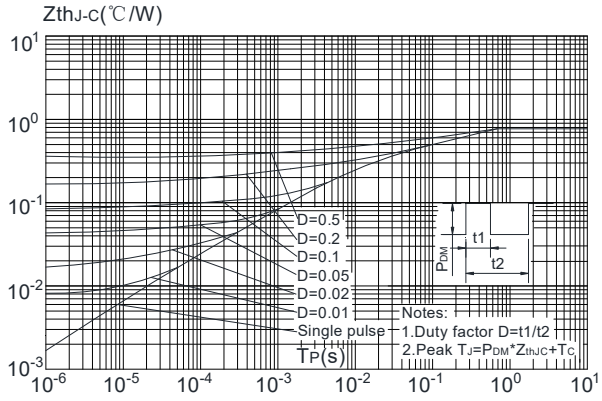


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

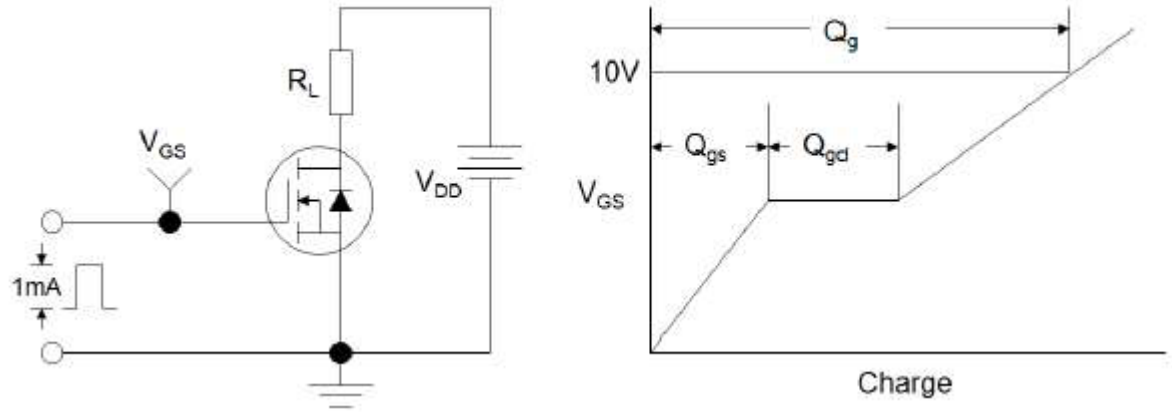


Figure1:Gate Charge Test Circuit & Waveform

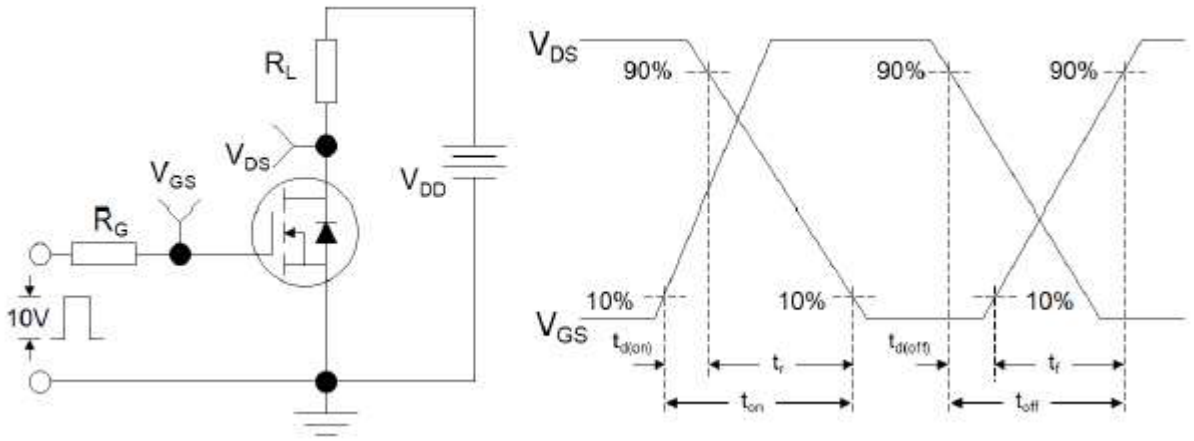


Figure 2: Resistive Switching Test Circuit & Waveforms

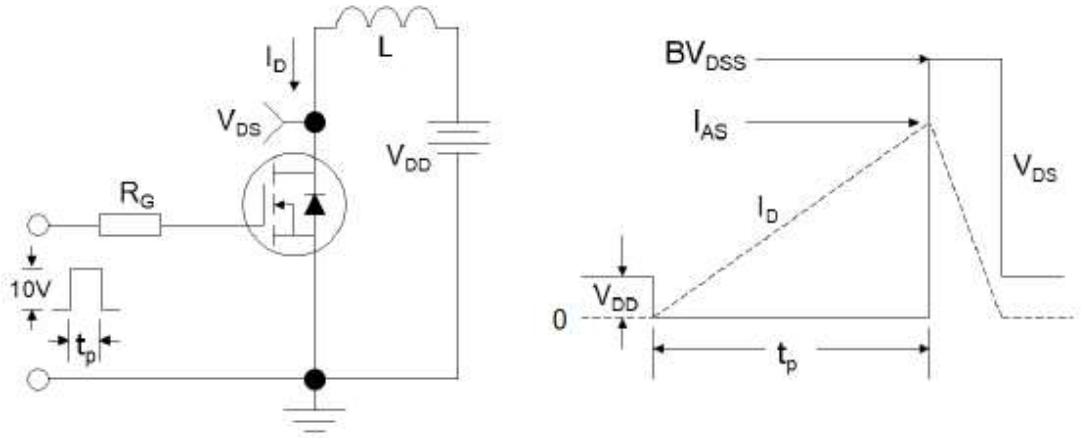


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms