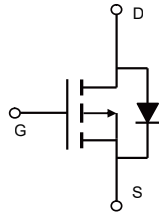


Description

Features ● -20V, -5A ● $R_{DS(ON)} < 26m\Omega$ @ $V_{GS} = -4.5V$ ● $R_{DS(ON)} < 37m\Omega$ @ $V_{GS} = -2.5V$ ● Advanced Trench Technology ● Provide Excellent $R_{DS(ON)}$ and Low Gate Charge ● Lead free product is acquired	Application ● Load Switch ● PWM Application ● Power management
 SOT-23-3	 Schematic

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM250P02A	VSM250P02A-S2-3	TAPING	SOT-23-3	7inch	3000	120000

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

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	-20	V
V_{GSS}	Gate-Source Voltage	± 12	V
I_D	Continuous Drain Current	$T_A = 25^\circ C$	A
		$T_A = 100^\circ C$	A
I_{DM}	Pulsed Drain Current ^{note1}	-20	A
P_D	Power Dissipation	$T_A = 25^\circ C$	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	114	$^\circ C/W$
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	-20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} =0V,	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±12V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-0.4	-0.7	-1.0	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} = -4.5V, I _D = -5A	-	20	26	mΩ
		V _{GS} = -2.5V, I _D = -4A	-	27	37	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10V, V _{GS} =0V, f=1.0MHz	-	1200	-	pF
C _{oss}	Output Capacitance		-	191	-	pF
C _{rss}	Reverse Transfer Capacitance		-	168	-	pF
Q _g	Total Gate Charge	V _{DS} = -10V, I _D = -5A, V _{GS} = -4.5V	-	33.7	-	nC
Q _{gs}	Gate-Source Charge		-	3.5	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	10.5	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -10V, I _D = -5A, V _{GS} = -4.5V,R _{GEN} =10Ω	-	11	-	ns
t _r	Turn-on Rise Time		-	35	-	ns
t _{d(off)}	Turn-off Delay Time		-	30	-	ns
t _f	Turn-off Fall Time		-	10	-	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. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Performance Characteristics

Figure 1: Output Characteristics

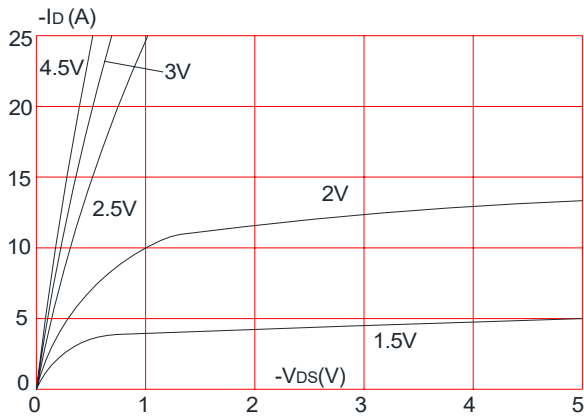


Figure 2: Typical Transfer Characteristics

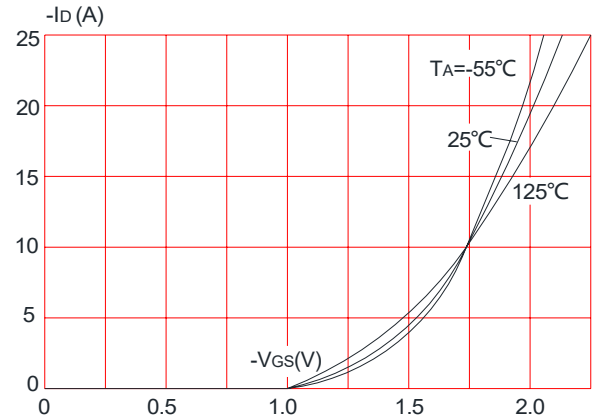


Figure 3: On-resistance vs. Drain Current

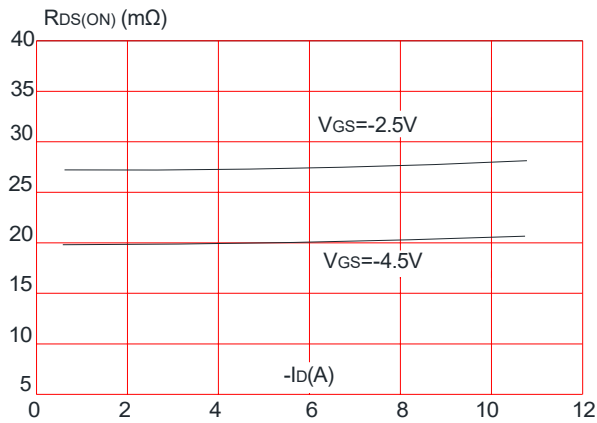


Figure 4: Body Diode Characteristics

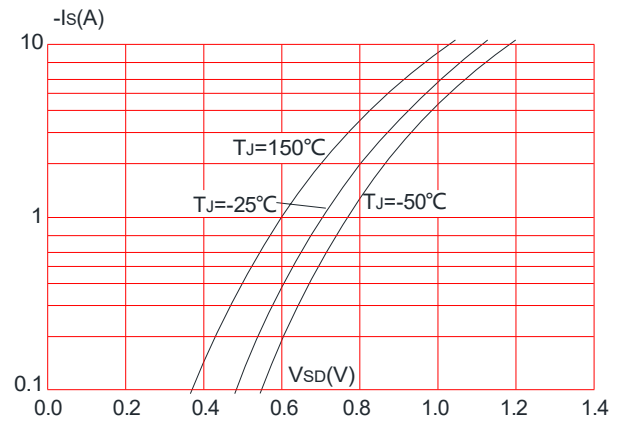


Figure 5: Gate Charge Characteristics

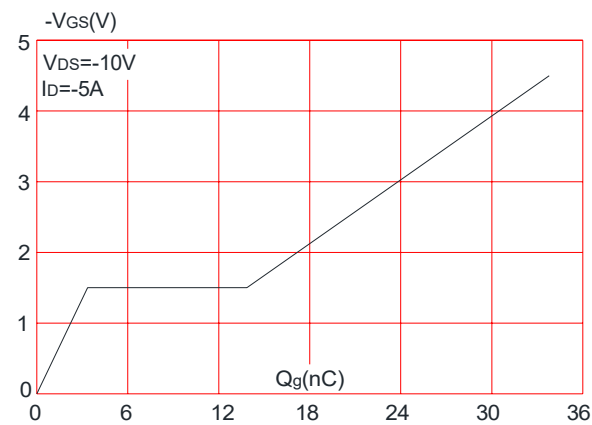


Figure 6: Capacitance Characteristics

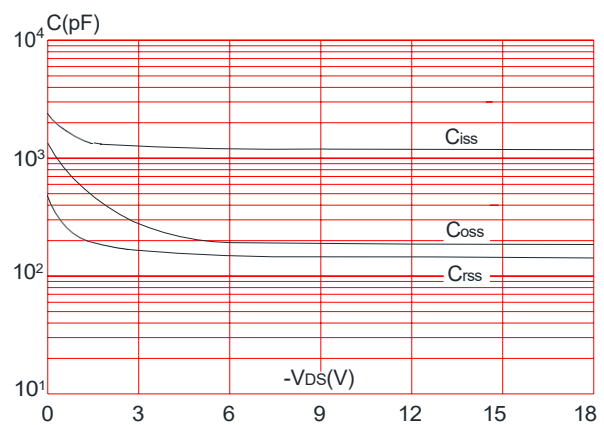


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

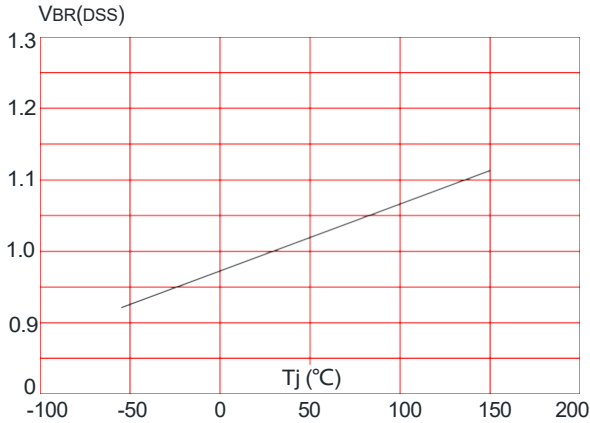


Figure 8: Normalized on Resistance vs. Junction Temperature

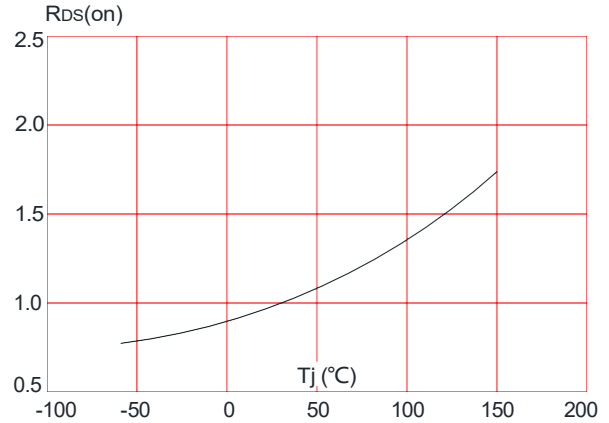


Figure 9: Maximum Safe Operating Area

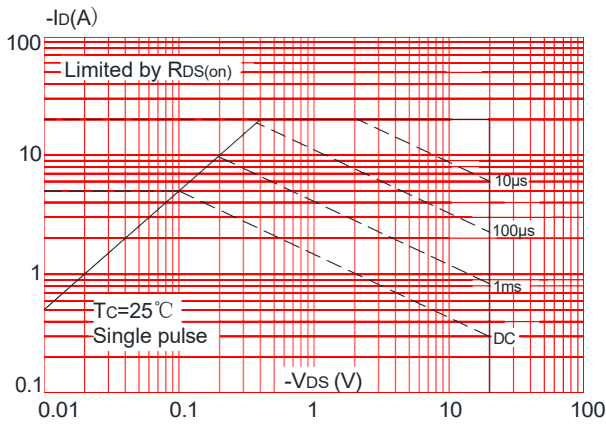


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

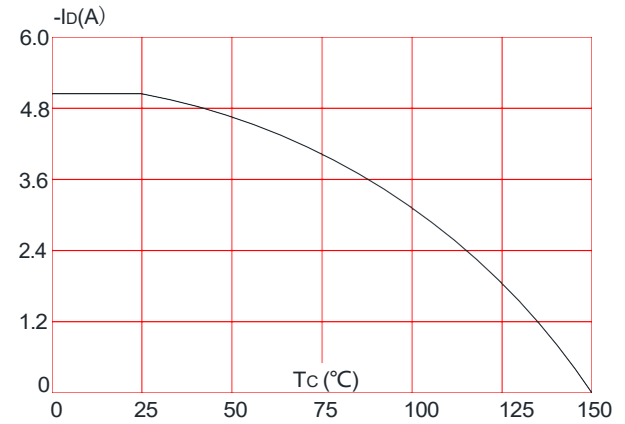
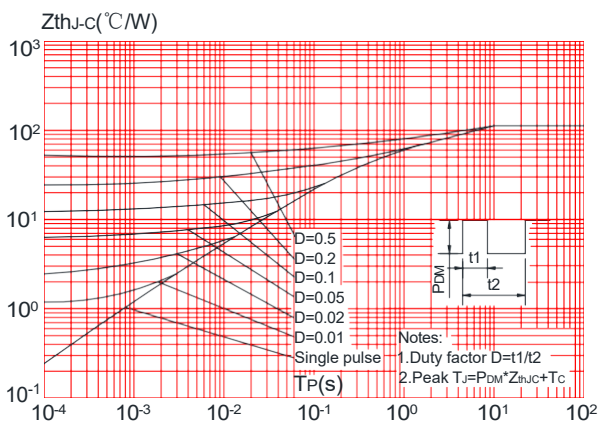
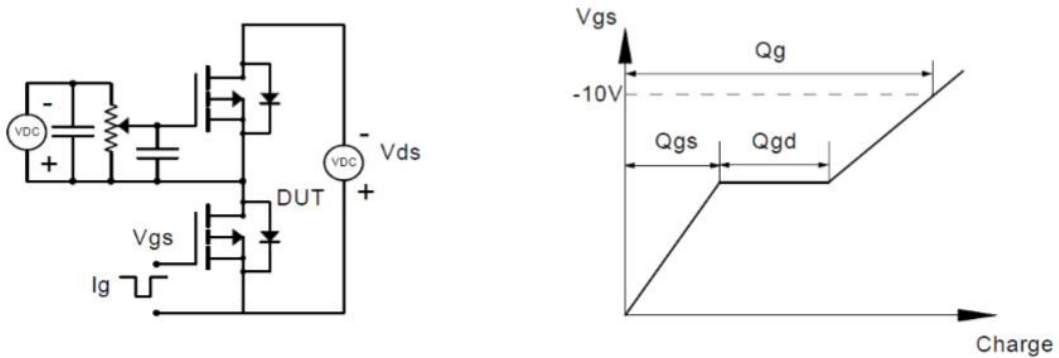


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

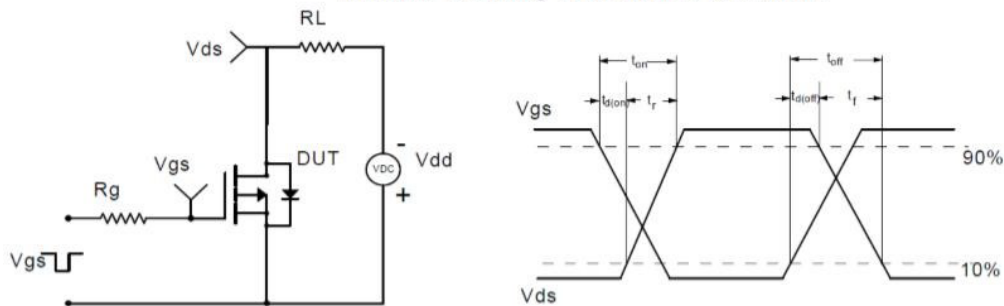


Test Circuit

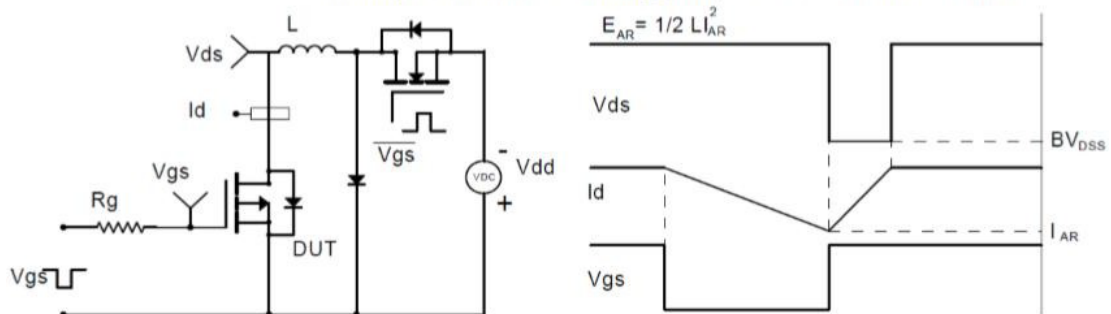
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

