
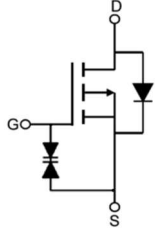


Description

Features <ul style="list-style-type: none"> ● $V_{DS} = -20V$, $I_D = -4A$ ● $R_{DS(ON)} < 48m\Omega$ @ $V_{GS} = -4.5V$ ● $R_{DS(ON)} < 65m\Omega$ @ $V_{GS} = -2.5V$ ● Advanced Trench Technology ● Excellent $R_{DS(ON)}$ and Low Gate Charge ● Lead free product is acquired ● ESD Rating: HBM 2.0KV 	Application <ul style="list-style-type: none"> ● PWM Applications ● Load Switch ● Power Management
 <p>SOT-23-3</p>	 <p>Schematic Diagram</p>

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM3415K-S2	VSM3415K	TAPING	SOT-23-3	7inch	3000	180000

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	± 8	V
I_D	Continuous Drain Current	$T_A = 25^\circ C$	A
		$T_A = 100^\circ C$	
I_{DM}	Pulsed Drain Current ^{note1}	-16	A
P_D	Power Dissipation	$T_A = 25^\circ C$	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	104	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ 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} = ±8V	-	-	±10	uA
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 <small>note2</small>	V _{GS} =-4.5V, I _D =-4A	-	38	48	mΩ
		V _{GS} =-2.5V, I _D =-3A	-	48	65	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz	-	950	-	pF
C _{oss}	Output Capacitance		-	165	-	pF
C _{rss}	Reverse Transfer Capacitance		-	120	-	pF
Q _g	Total Gate Charge	V _{DS} = -10V, I _D = -4A, V _{GS} = -4.5V	-	12	-	nC
Q _{gs}	Gate-Source Charge		-	1.4	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	3.6	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -10V, I _D = -2A, R _G = 3Ω, V _{GEN} =-4.5V, R _L =2.5Ω	-	12	-	ns
t _r	Turn-on Rise Time		-	10	-	ns
t _{d(off)}	Turn-off Delay Time		-	19	-	ns
t _f	Turn-off Fall Time		-	25	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-16	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -4A	-	-	-1.2	V

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

2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

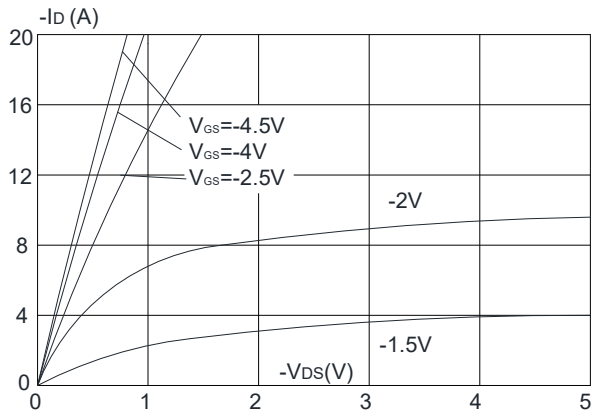
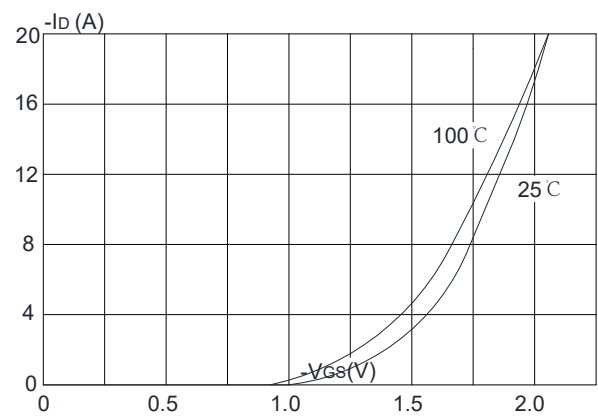
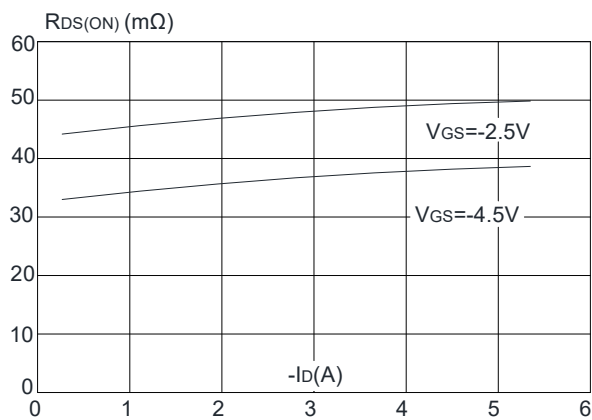
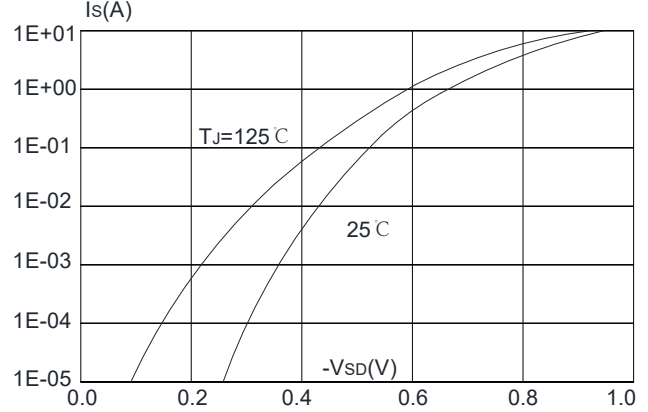
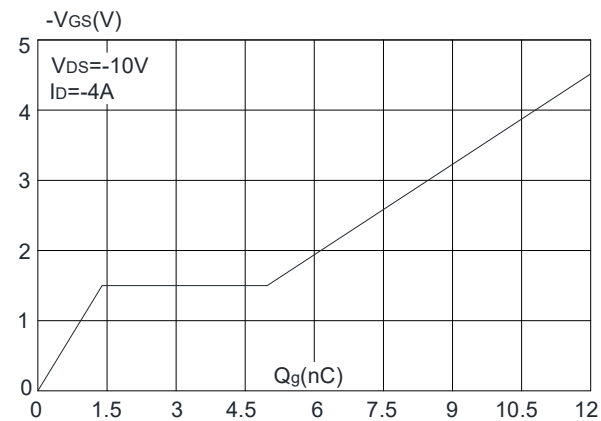
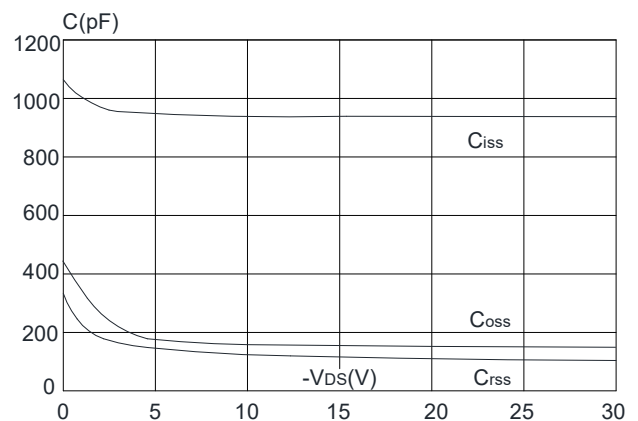
Figure1: Output Characteristics

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

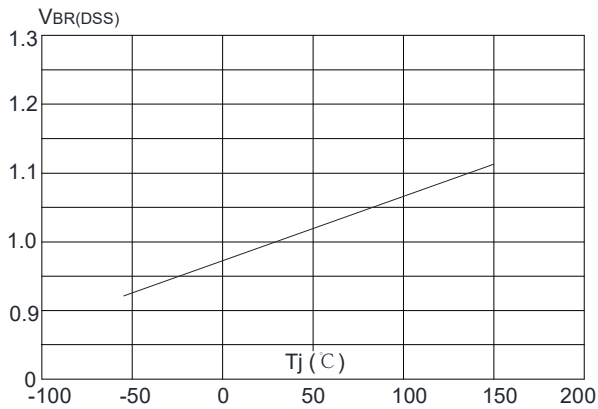


Figure 8: Normalized on Resistance vs. Junction Temperature

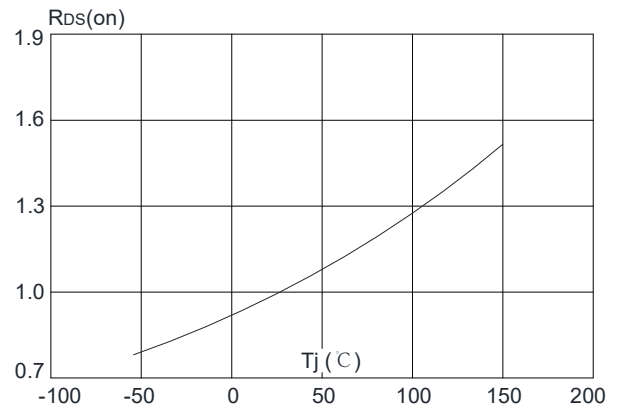


Figure 9: Maximum Safe Operating Area

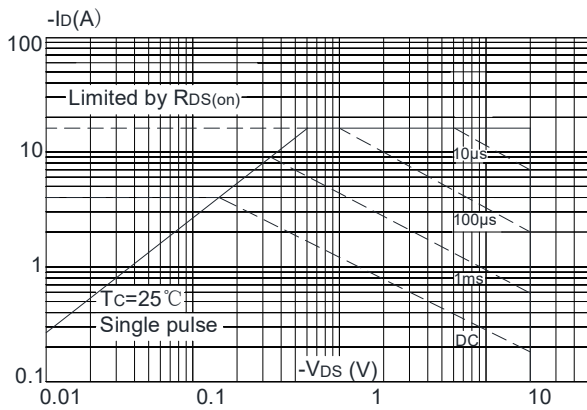


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

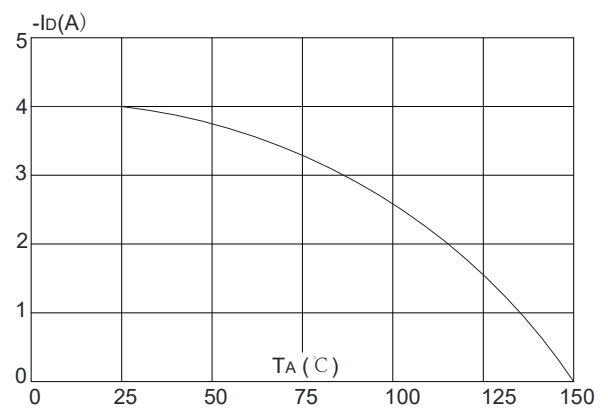
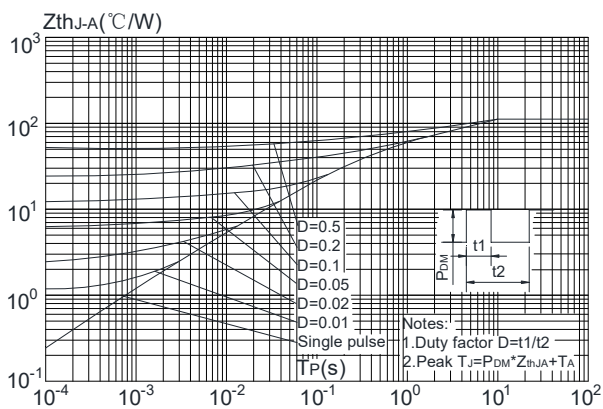
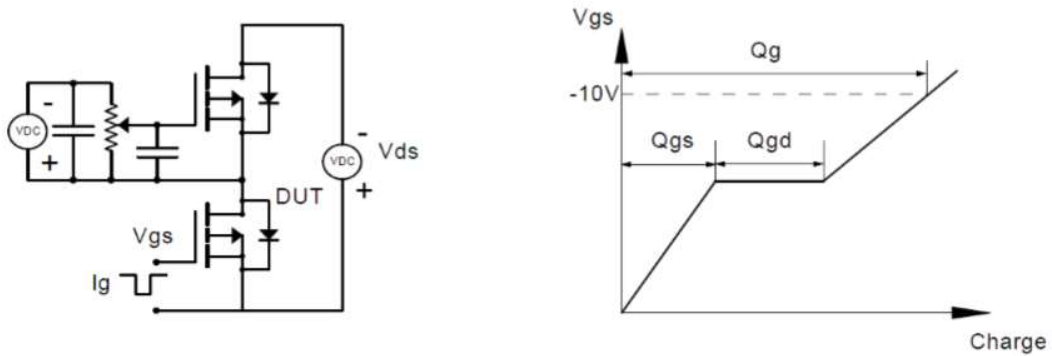


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

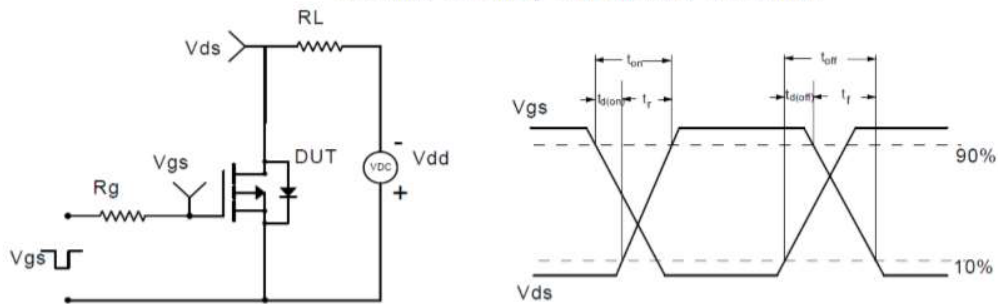


Test Circuit

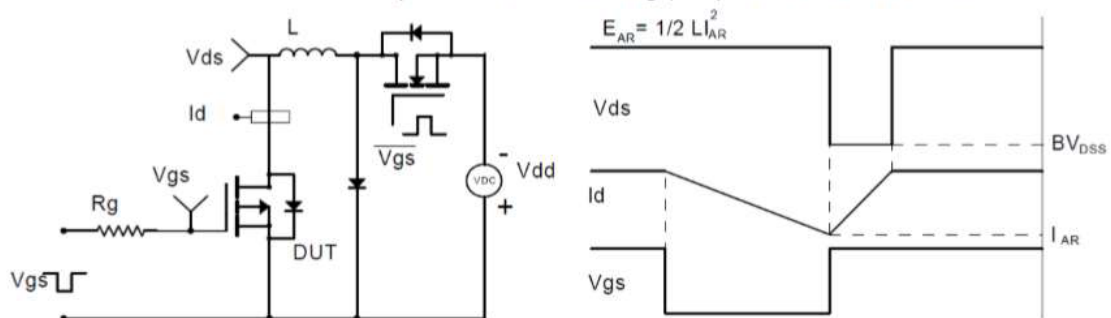
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

