

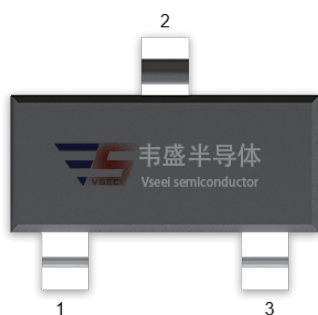
Description

Features

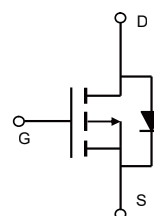
- $V_{DS} = -20V$, $I_D = -4.1A$
 $R_{DS(ON)} < 38m\Omega$ @ $V_{GS} = -4.5V$
 $R_{DS(ON)} < 53m\Omega$ @ $V_{GS} = -2.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired
- ESD Rating: HBM 2.0KV

Application

- PWM Applications
- Load Switch
- Power Management



SOT-23-3



Schematic

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM3415KL	VSM3415KL-S2-3	TAPING	SOT-23-3	7inch	3000	120000

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units
V_{DSS}	Drain-Source Voltage	-20	V
V_{GSS}	Gate-Source Voltage	±10	V
I_D	Continuous Drain Current	$T_A = 25^\circ C$	A
		$T_A = 100^\circ C$	
I_{DM}	Pulsed Drain Current ^{note1}	-16.4	A
P_D	Power Dissipation	1.0	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	125	°C/W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	°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} = ±10V	-	-	±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 note2	V _{GS} =-4.5V, I _D =-4A	-	29	38	mΩ
		V _{GS} =-2.5V, I _D =-3A	-	38	53	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz	-	289	-	pF
C _{oss}	Output Capacitance		-	98	-	pF
C _{rss}	Reverse Transfer Capacitance		-	22	-	pF
Q _g	Total Gate Charge	V _{DS} = -10V, I _D = -4.1A, V _{GS} = -4.5V	-	9	-	nC
Q _{gs}	Gate-Source Charge		-	1	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	2.6	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -10V, R _G = 1Ω, V _{GEN} =-4.5V, R _L =1.2Ω	-	12	-	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		-	-	-4.1	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-16.4	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = -4.1A	-	-	-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

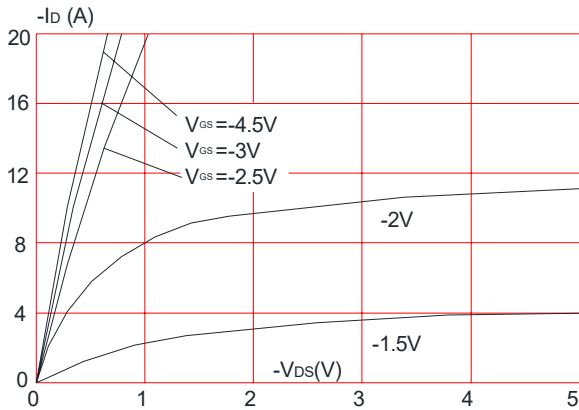
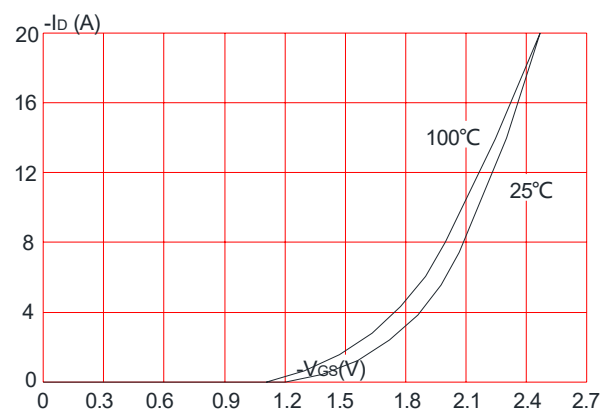
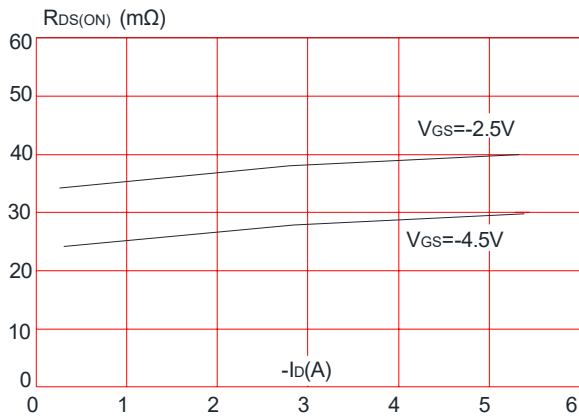
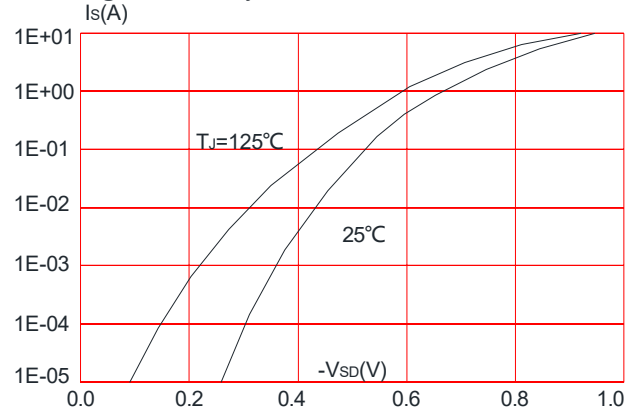
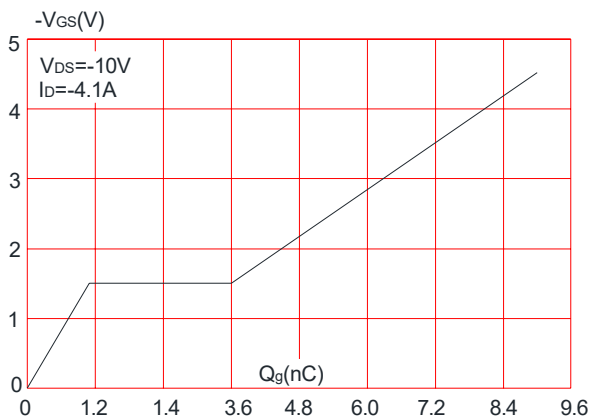
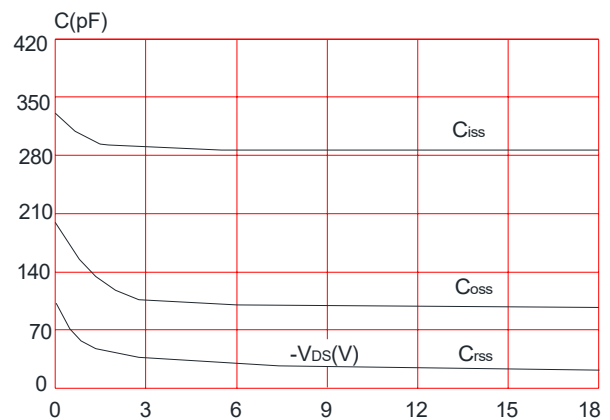
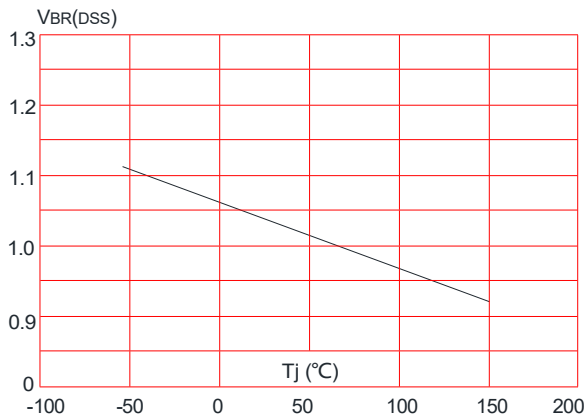
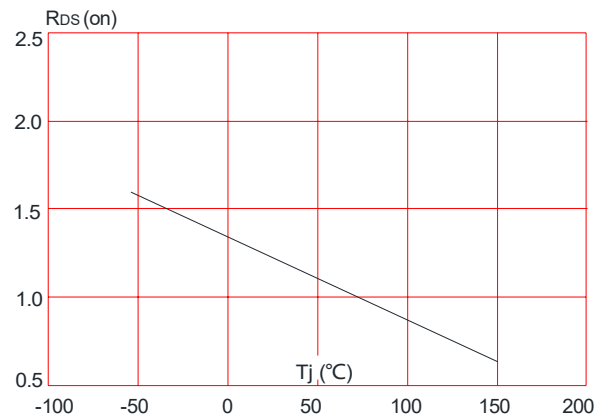
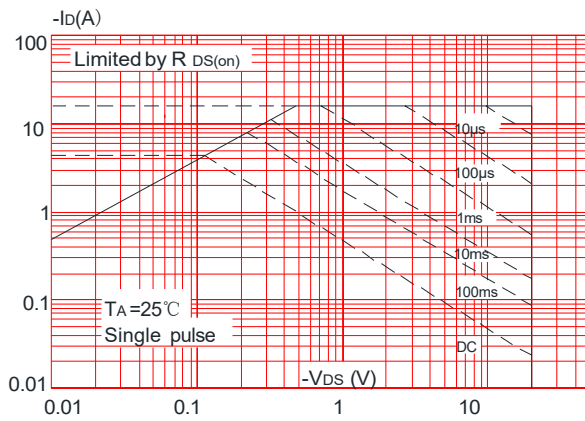
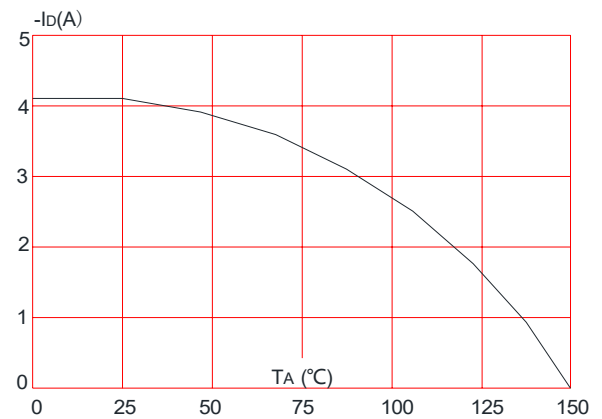
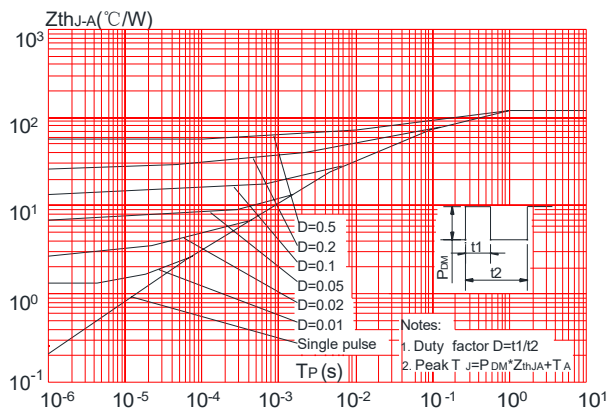
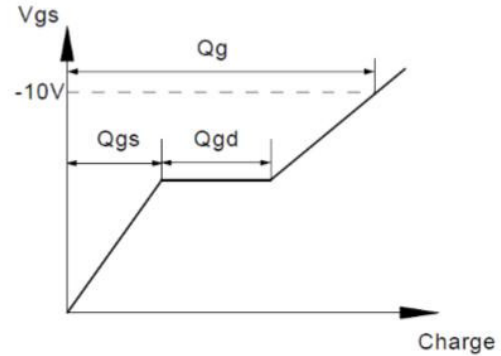
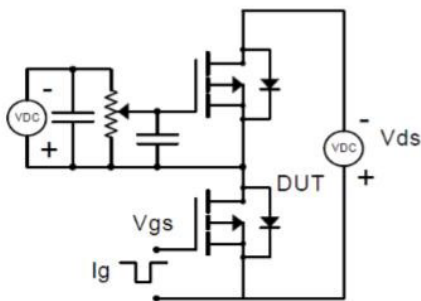
Figure1: Output Characteristics

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


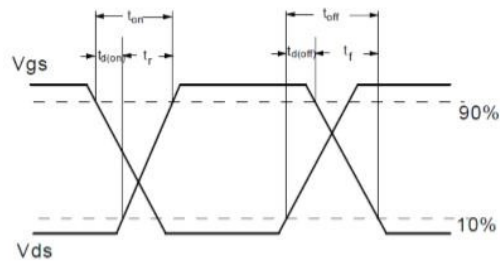
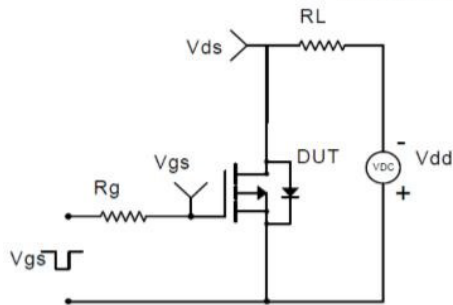
Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

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

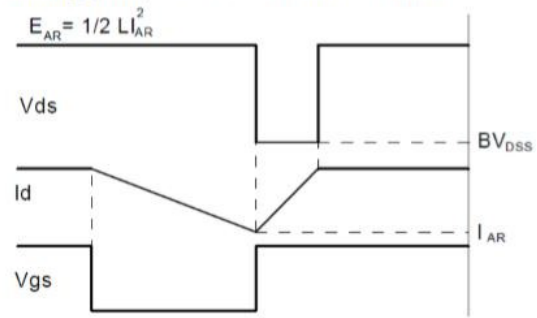
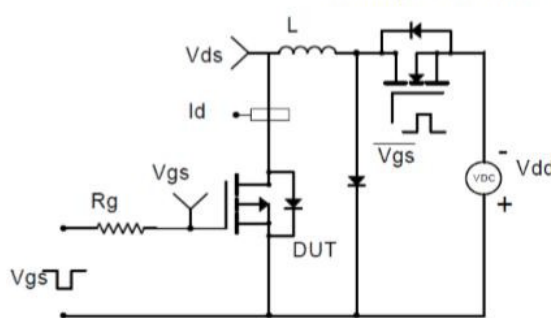
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

