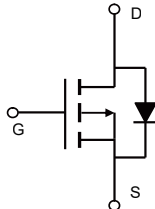


Description

Features ● $V_{DS} = -40V$, $I_D = -12A$ $R_{DS(ON)} < 14.3m\Omega$ @ $V_{GS} = -10V$ $R_{DS(ON)} < 22m\Omega$ @ $V_{GS} = -4.5V$ ● Advanced Trench Technology ● Excellent $R_{DS(ON)}$ and Low Gate Charge ● Lead free product is acquired	Application ● PWM Applications ● Load Switch ● Power Management <i>100% UIS TESTED!</i> <i>100% ΔV_{ds} TESTED!</i>
 SOP-8	 Schematic

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM12P04	VSM12P04-S8	TAPING	SOP-8	13inch	4000	48000

Absolute Maximum Ratings ($T_A = 25^\circ C$ 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 _A = 25°C	-12	A
		T _A = 100°C	-7.8	A
I _{DM}	Pulsed Drain Current ^{note1}		-48	A
P _D	Power Dissipation	T _A = 25°C	3.5	W
R _{θJA}	Thermal Resistance, Junction to Ambient		36	°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	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40V, 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	-1.7	-2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note2	V _{GS} = -10V, I _D = -12A	-	11	14.3	mΩ
		V _{GS} = -4.5V, I _D = -10A	-	15.5	22	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -20V, V _{GS} =0V, f=1.0MHz	-	3800	-	pF
C _{Oss}	Output Capacitance		-	329	-	pF
C _{rss}	Reverse Transfer Capacitance		-	289	-	pF
Q _g	Total Gate Charge	V _{DS} = -20V, I _D = -12A, V _{GS} = -10V	-	42	-	nC
Q _{gs}	Gate-Source Charge		-	7.3	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	8.5	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -20V, I _D = -12A, V _{GS} = -10V, R _{GEN} =2.5Ω	-	10	-	ns
t _r	Turn-on Rise Time		-	21	-	ns
t _{d(off)}	Turn-off Delay Time		-	53	-	ns
t _f	Turn-off Fall Time		-	29	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-12	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-48	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -12A	-	-0.8	-1.2	V
trr	Reverse Recovery Time	V _{GS} =0V, I _S = -12A, di/dt=100A/μs	-	39	-	ns
Qrr	Reverse Recovery Charge		-	42	-	nC

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

2. Pulse Test: Pulse Width≤300μs, Duty Cycles≤2%

Typical Performance Characteristics

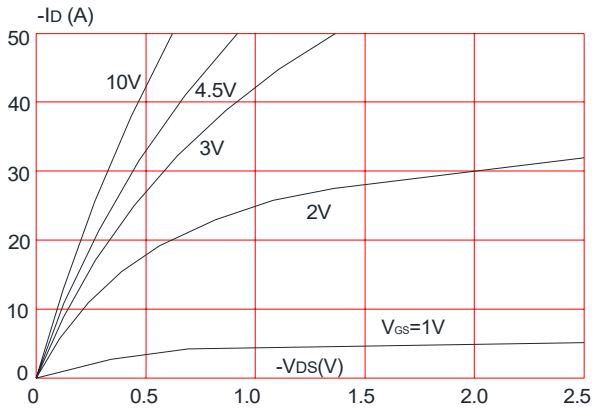
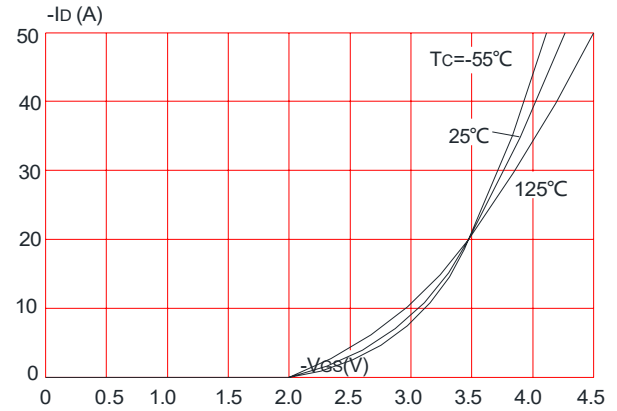
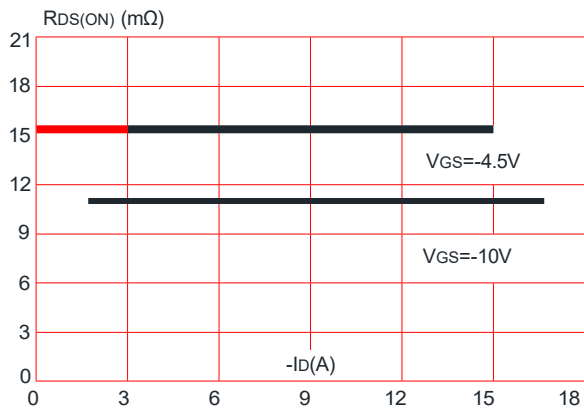
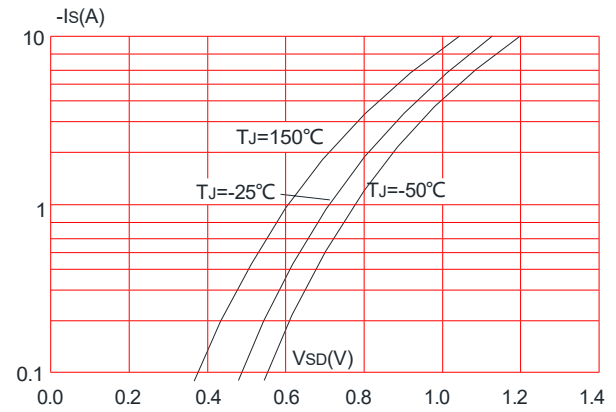
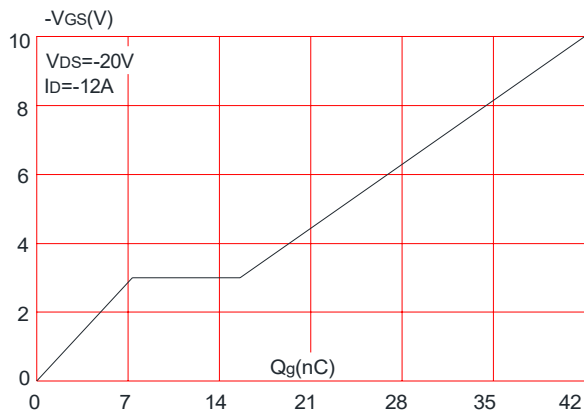
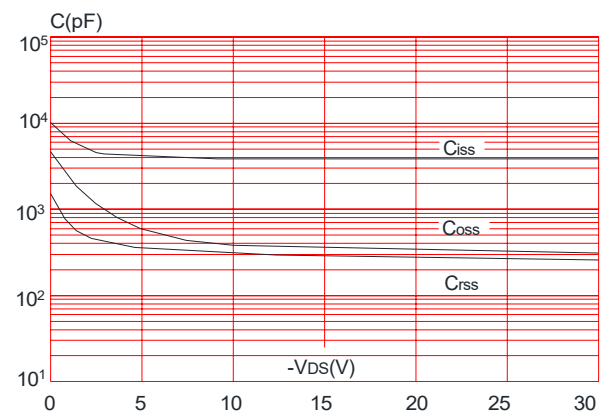
Figure1: Output Characteristics

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

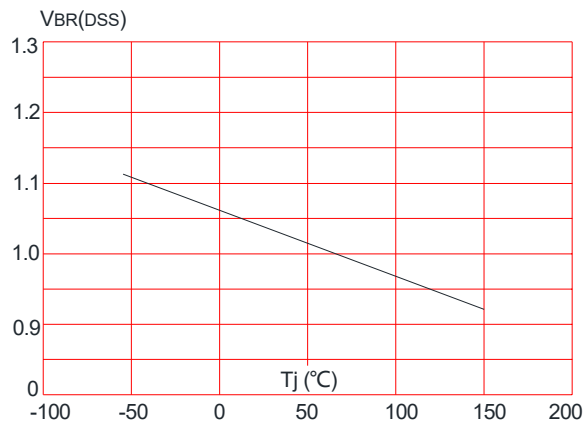


Figure 8: Normalized on Resistance vs. Junction Temperature

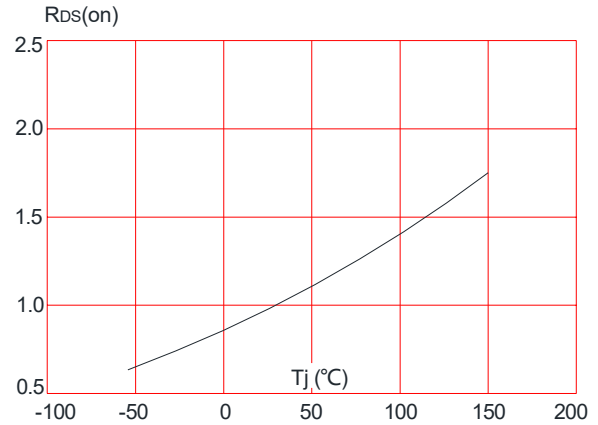


Figure 9: Maximum Safe Operating Area

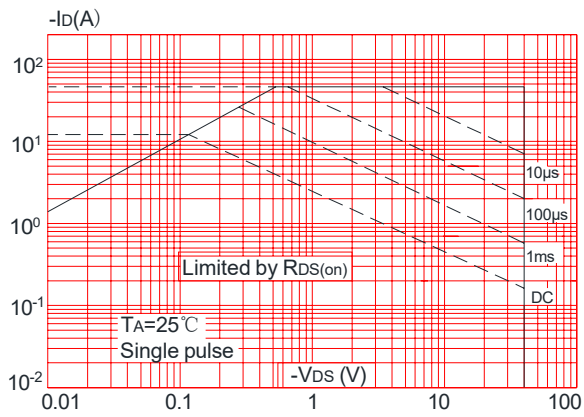


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

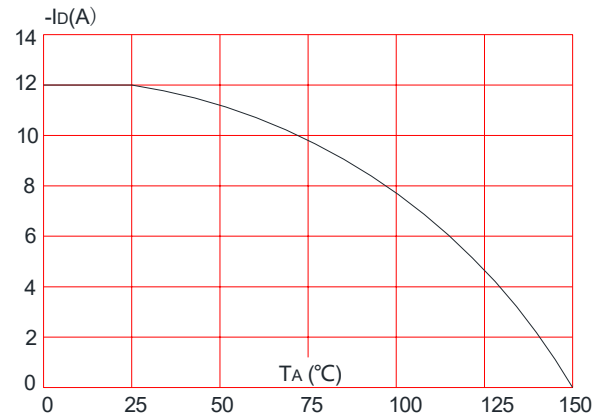
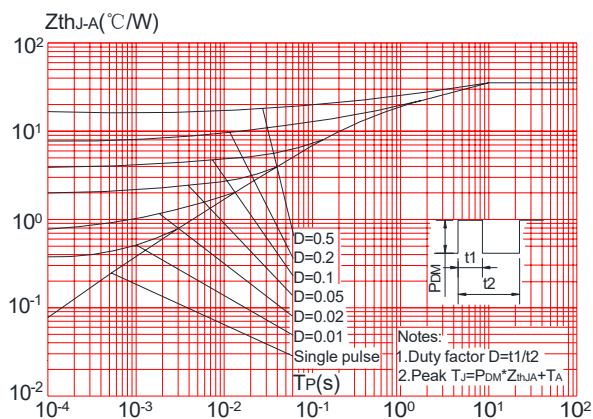
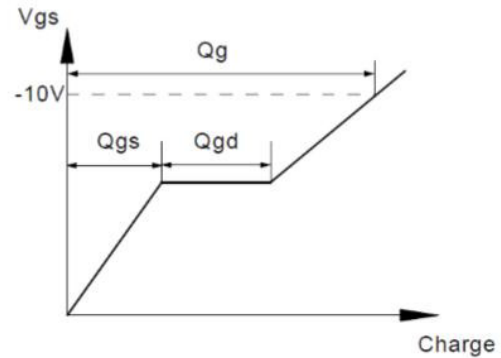
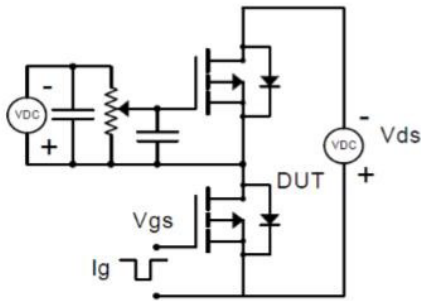


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

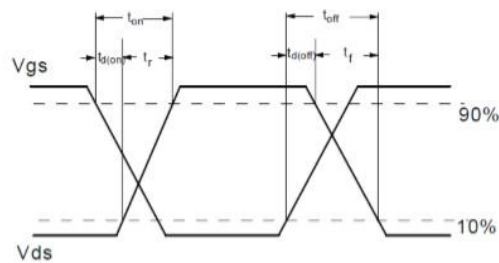
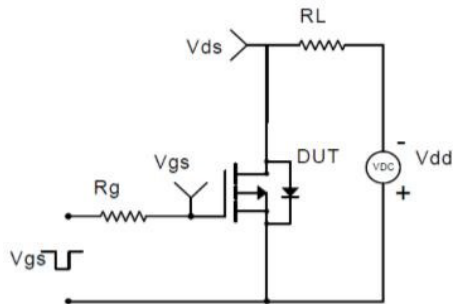


Test Circuit

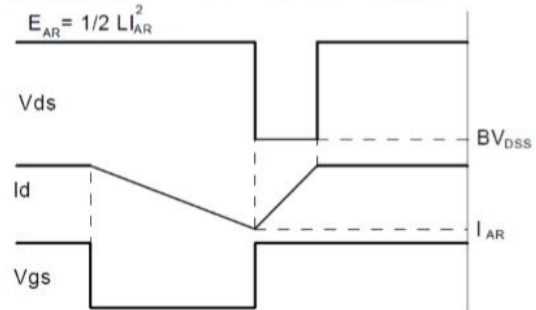
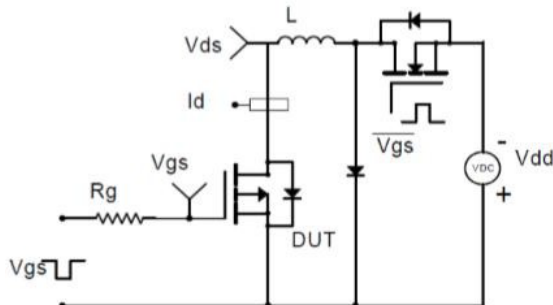
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

