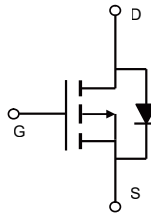


Description

Features ● $V_{DS} = -30V$, $I_D = -60A$ $R_{DS(ON)} < 7.5m\Omega$ @ $V_{GS} = -10V$ $R_{DS(ON)} < 12.6m\Omega$ @ $V_{GS} = -4.5V$ ● 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>
 TO-251	 Schematic

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	TUBE (PCS)	Inner Box (PCS)	Per Carton (PCS)
VSM60P03	VSM60P03-T1	TUBE	TO-251	75	4,950	29,700

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

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		-30	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current	$T_C = 25^\circ C$	-60	A
		$T_C = 100^\circ C$	-39	A
I_{DM}	Pulsed Drain Current ^{note1}		-240	A
E_{AS}	Single Pulsed Avalanche Energy ^{note2}		144	mJ
P_D	Power Dissipation	$T_C = 25^\circ C$	54	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		2.8	°C/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	°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	-30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30V, 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	-1.5	-2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} = -10V, I _D = -30A	-	5.8	7.5	mΩ
		V _{GS} = -4.5V, I _D = -20A	-	9	12.6	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -15V, V _{GS} =0V, f=1.0MHz	-	4650	-	pF
C _{OSS}	Output Capacitance		-	550	-	pF
C _{rSS}	Reverse Transfer Capacitance		-	486	-	pF
Q _g	Total Gate Charge	V _{DS} = -15V, I _D = -20A, V _{GS} = -10V	-	45	-	nC
Q _{gs}	Gate-Source Charge		-	8	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	12	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -15V, I _D = -30A, V _{GS} = -10V, R _{GEN} =2.5Ω	-	19	-	ns
t _r	Turn-on Rise Time		-	15	-	ns
t _{d(off)}	Turn-off Delay Time		-	65	-	ns
t _f	Turn-off Fall Time		-	36	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-60	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-240	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -30A	-	-0.8	-1.2	V

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

2. E_{AS} condition: T_J=25°C, V_{DD}= -15V, V_G= -10V, R_G=25Ω, L=0.5mH, I_{AS}= -24A

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

Typical Performance Characteristics

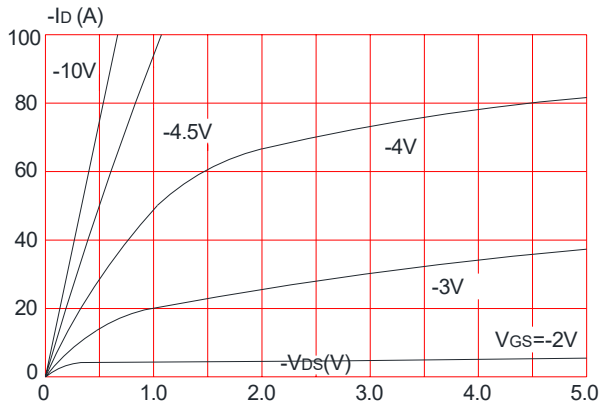
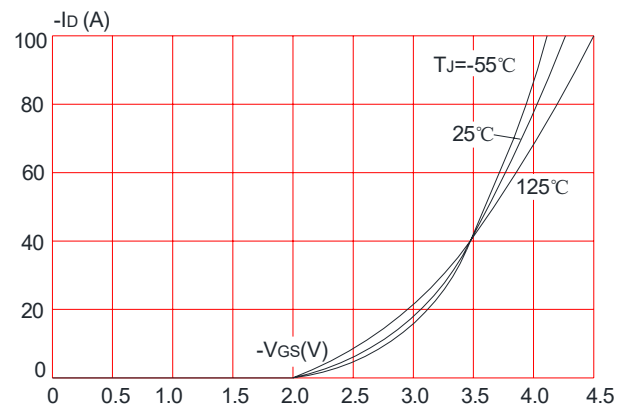
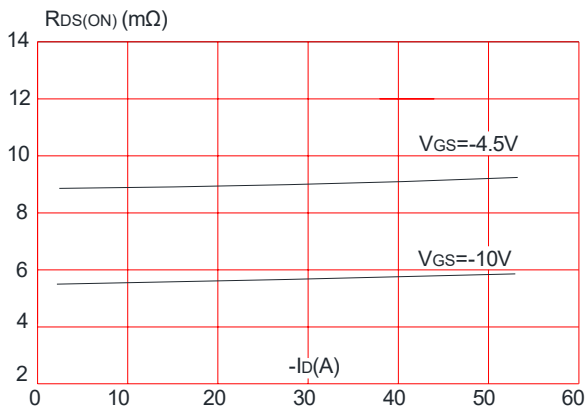
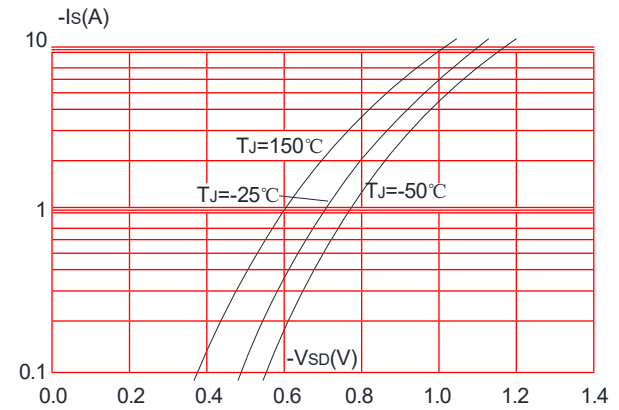
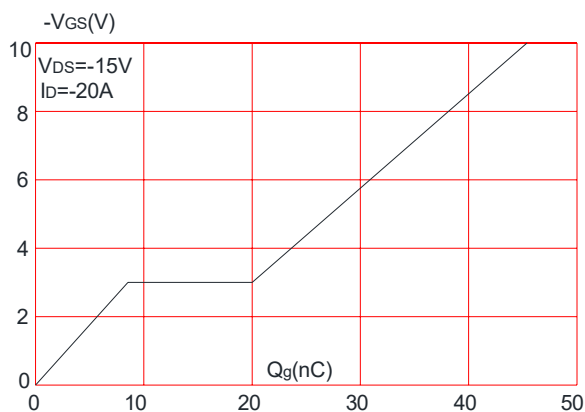
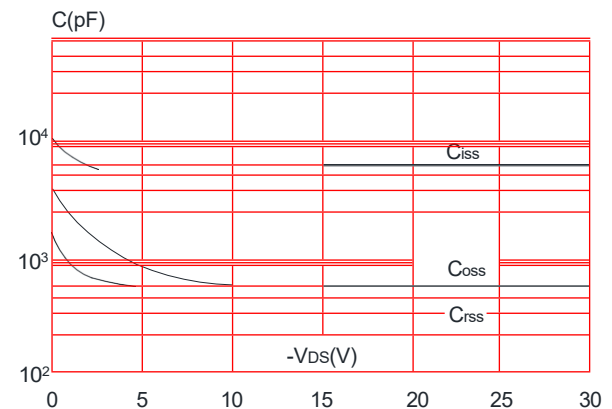
Figure1: Output Characteristics

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

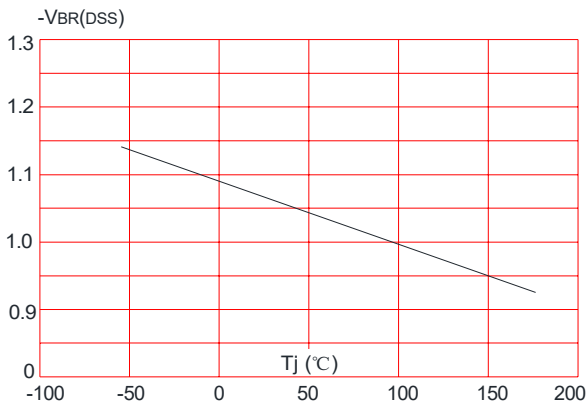


Figure 8: Normalized on Resistance vs. Junction Temperature

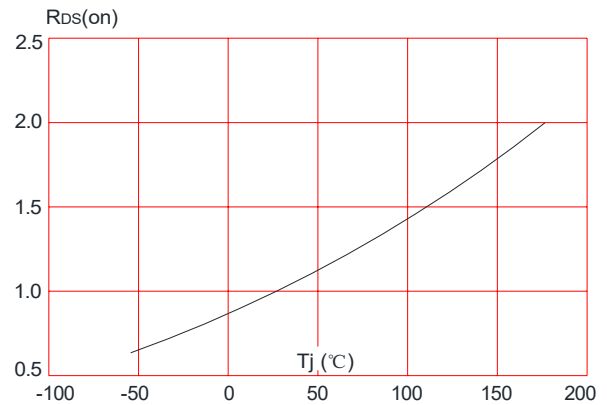


Figure 9: Maximum Safe Operating Area

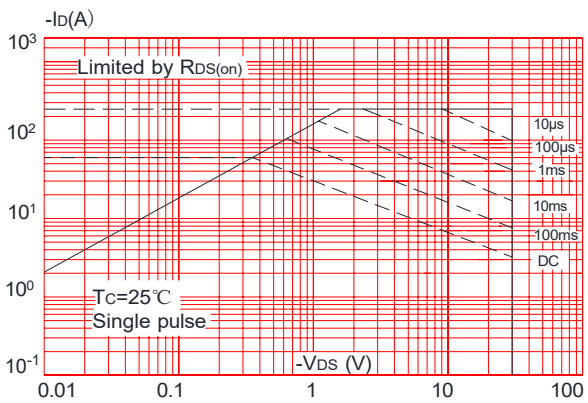


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

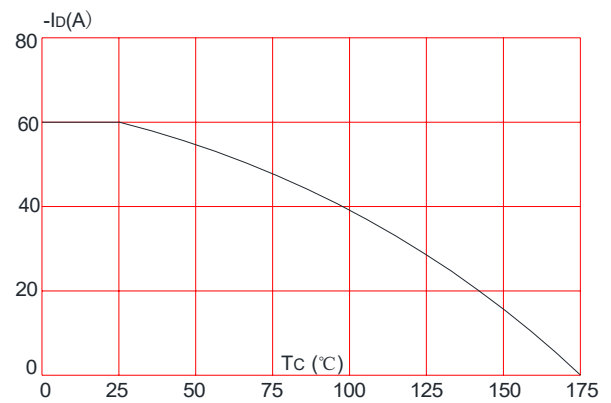
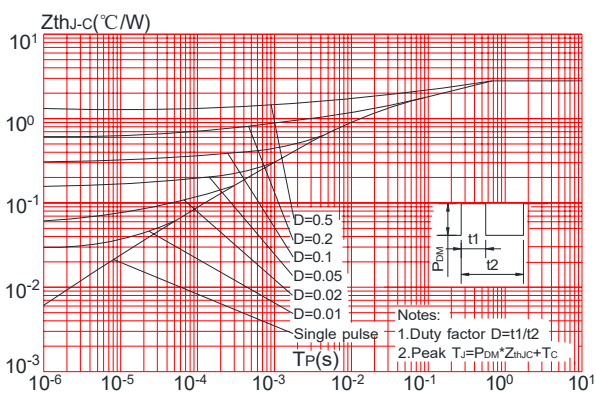
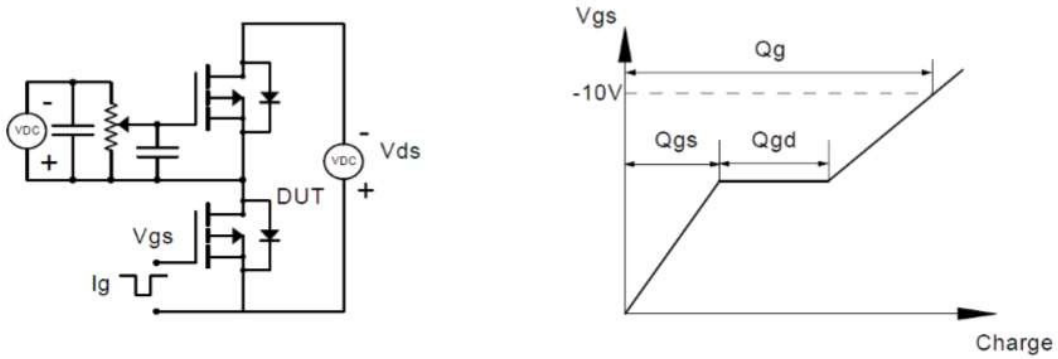


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

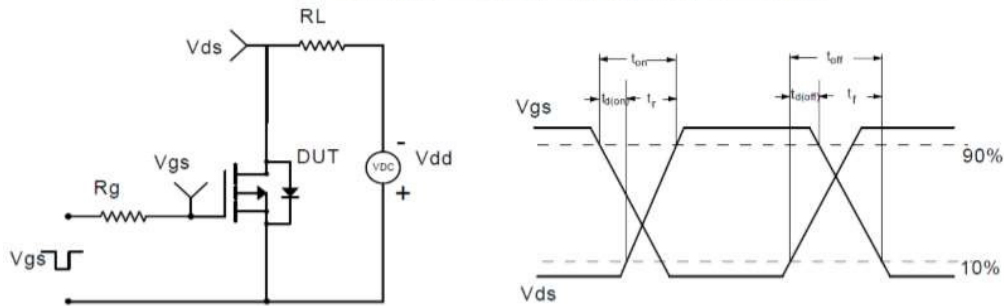


Test Circuit

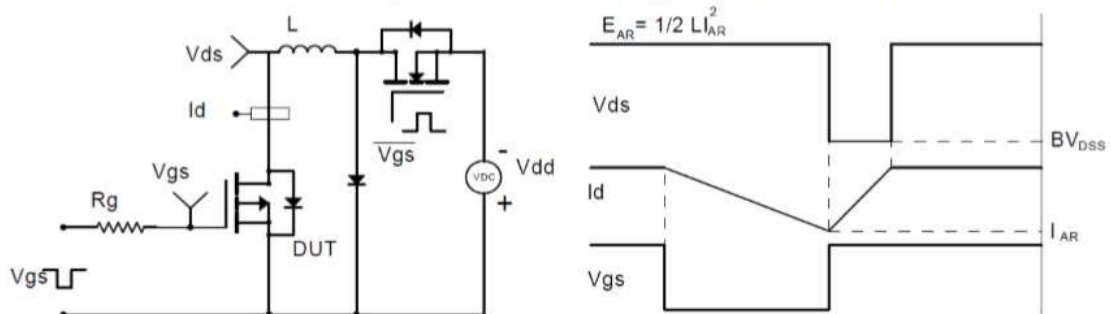
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

