
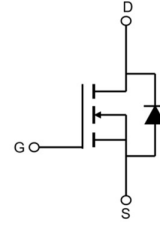


Features <ul style="list-style-type: none"> ● 650V, 7A $R_{DS(ON)} < 1.35\Omega @ V_{GS} = 10V$ ● Fast Switching ● Improved dv/dt Capability 	Application <ul style="list-style-type: none"> ● Load Switch ● PWM Application ● Power management <p style="text-align: center;">100% UIS 100% ΔV_{ds}</p>
 TO-220F	 Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	TUBE (PCS)	Inner Box (PCS)	Per Carton (PCS)
VSM7N65-TF	VSM7N65	TUBE	TO-220F	50	1,000	5,000

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

Symbol	Parameter	Max.	Units
V _{DSS}	Drain-Source Voltage	650	V
V _{GSS}	Gate-Source Voltage	±30	V
I _D	Continuous Drain Current	T _C = 25°C	7
		T _C = 100°C	4.5
I _{DM}	Pulsed Drain Current ^{note1}	28	A
E _{AS}	Single Pulsed Avalanche Energy ^{note2}	198	mJ
P _D	Power Dissipation	63	W
R _{θJC}	Thermal Resistance, Junction to Case	1.98	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient	62.5	°C/W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°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	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V,$ $V_{GS} = 0V, T_J = 25^{\circ}\text{C}$	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 30V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance <small>note3</small>	$V_{GS} = 10V, I_D = 3.5A$	-	1.1	1.35	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	-	1148	-	pF
C_{oss}	Output Capacitance		-	106	-	pF
C_{rss}	Reverse Transfer Capacitance		-	12	-	pF
Q_g	Total Gate Charge	$V_{DS} = 520V, I_D = 7A,$ $V_{GS} = 10V$	-	22	-	nC
Q_{gs}	Gate-Source Charge		-	4.3	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	13	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 325V, I_D = 7A,$ $R_G = 25\Omega$	-	15	-	ns
t_r	Turn-On Rise Time		-	18	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	80	-	ns
t_f	Turn-Off Fall Time		-	35	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	7	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	28	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_{SD} = 7A,$ $T_J = 25^{\circ}\text{C}$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_S = 7A,$ $di/dt = 100A/\mu s$	-	300	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.1	-	μC

- Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature
 2. EAS condition: $T_J = 25^{\circ}\text{C}$, $V_{DD} = 50V$, $V_G = 10V$, $L = 10\text{mH}$, $I_{AS} = 6.3A$
 3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Performance Characteristics

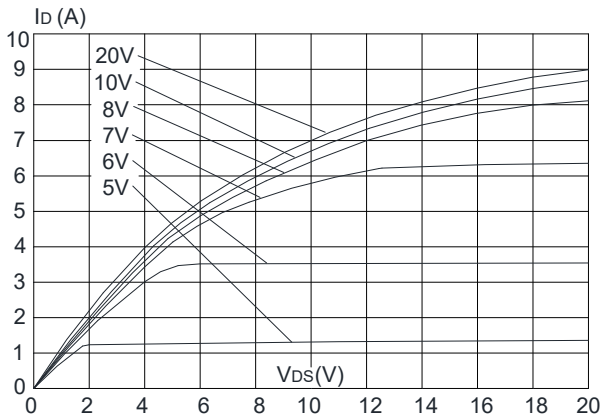
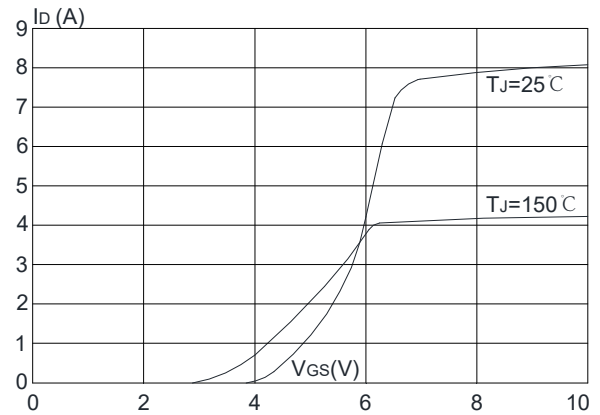
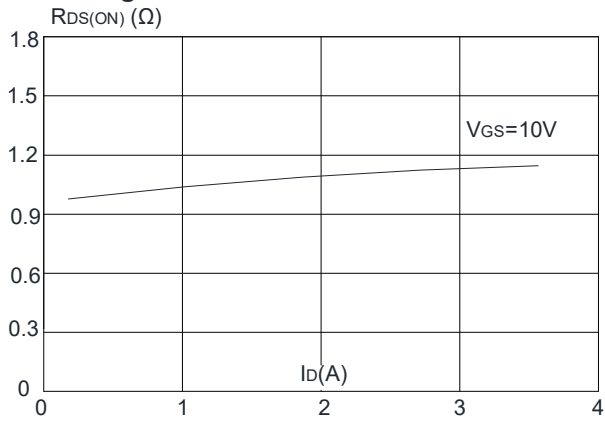
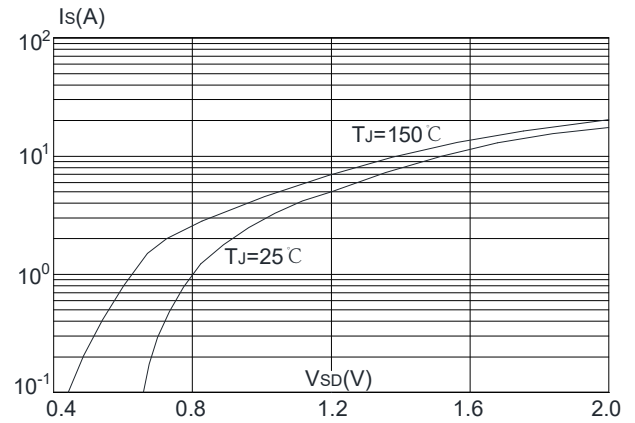
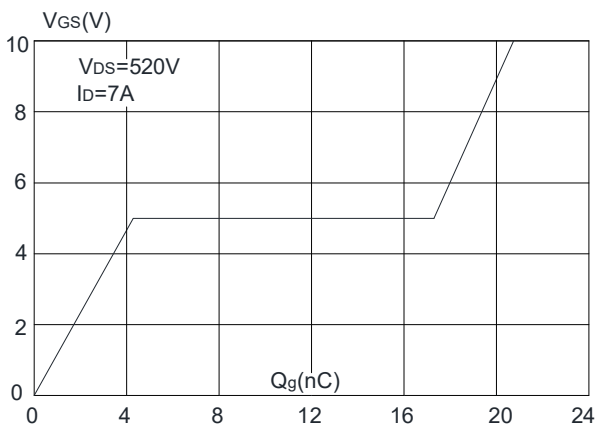
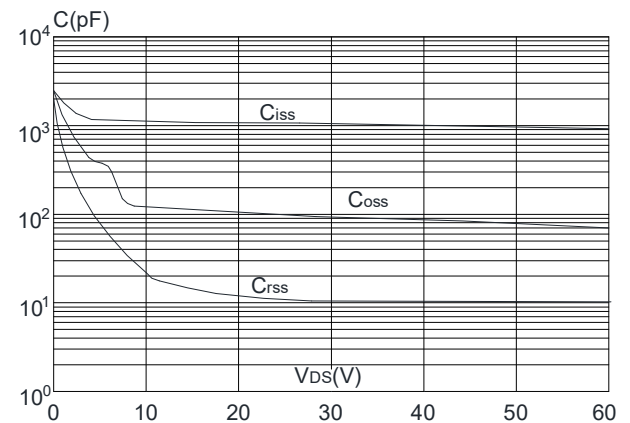
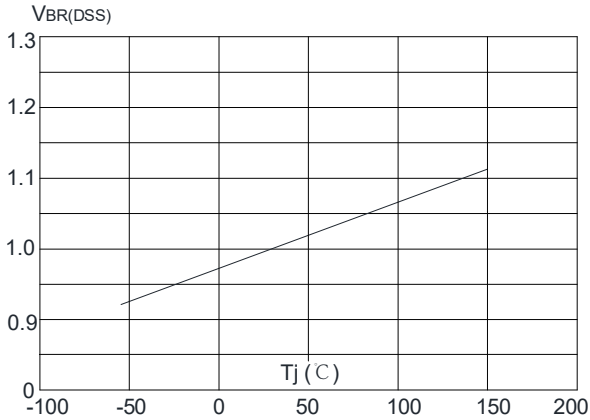
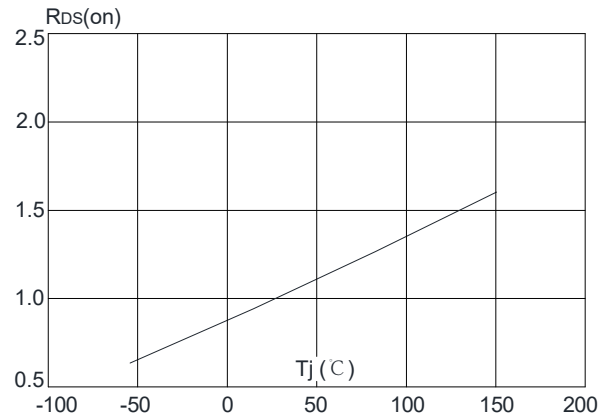
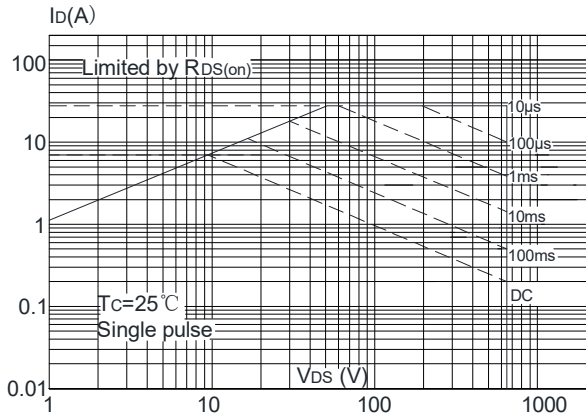
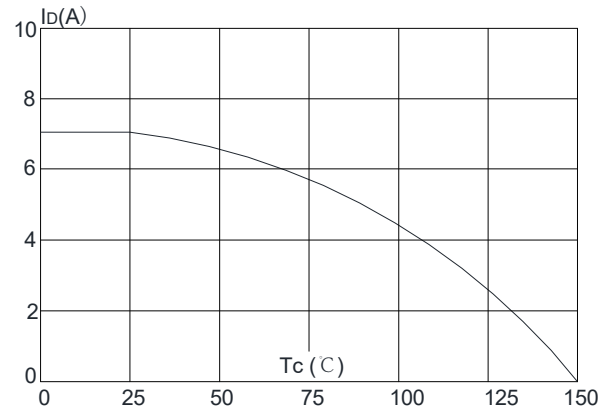
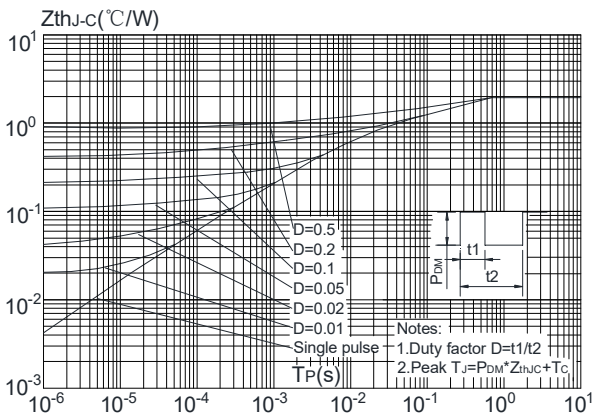
Figure 1: Output Characteristics

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

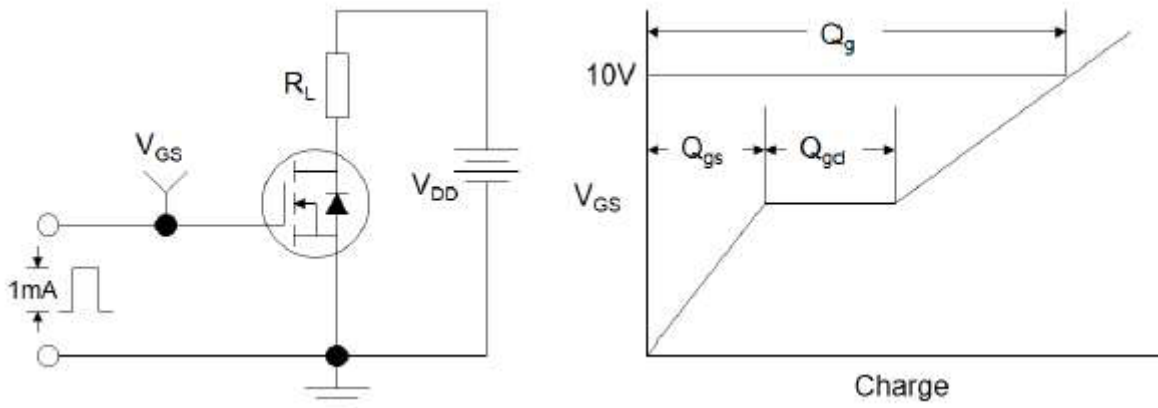


Figure1:Gate Charge Test Circuit & Waveform

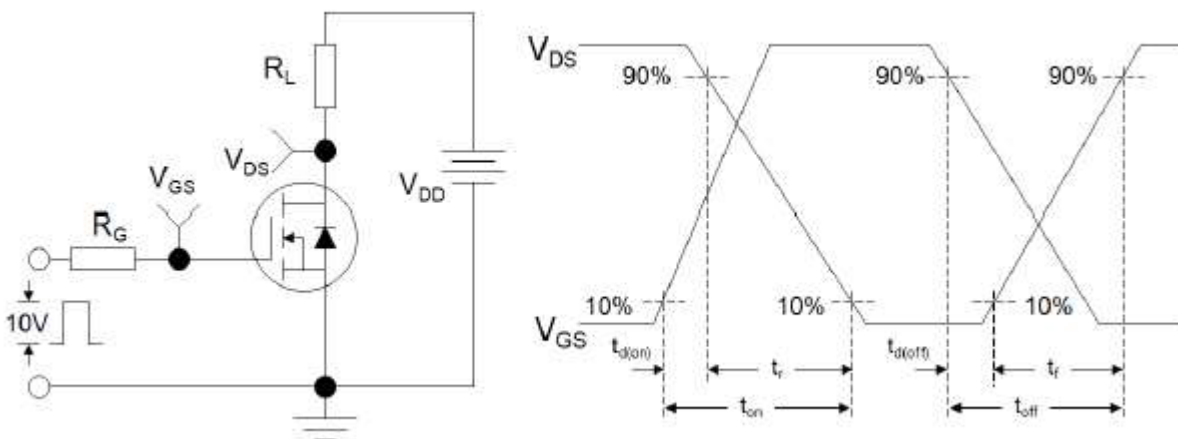


Figure 2: Resistive Switching Test Circuit & Waveforms

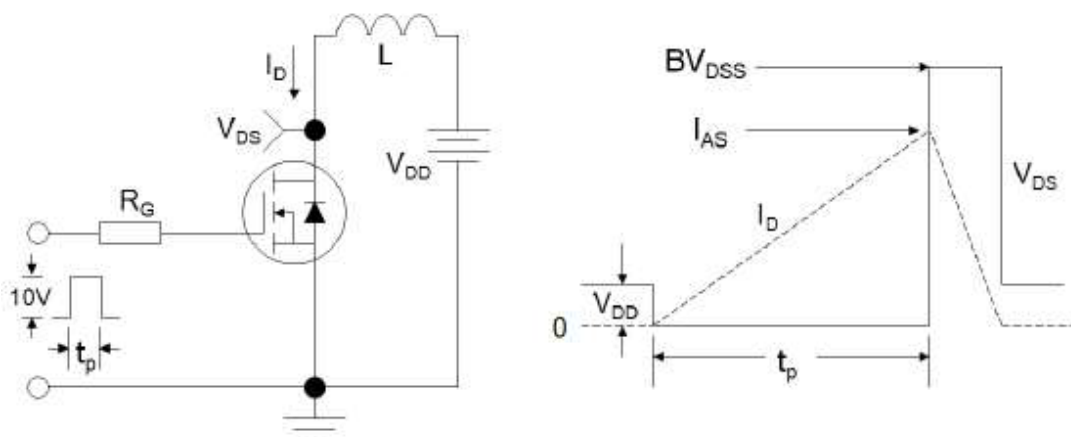


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms