

Description

Features

- V_{DS} =650V, I_D =11A $R_{DS(ON)}$ <0.42Ω @ VGS =10V
- Multi-Epi process SJ-MOSFET
- Smart design in high voltage technology
- Ultra lower on-resistance
- Fast switching
- Ultra low gate charge
- Low reverse recovery charge

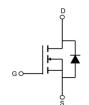
Application

- Power factor correction (PFC)
- Switched mode power supplies (SMPS)
- Uninterruptible power supply (UPS)

100% UIS 100% ΔVds







Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
VSM11N65-T2	VSM11N65	TAPING	TO-252	13inch	2500	25000

Absolute Maximum Ratings (T_C=25 ℃ 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	11	Α	
		T _C = 100°C	7.2		
I _{DM}	Pulsed Drain Current note1		44	Α	
E _{AS}	Single Pulsed Avalanche Energy note2		54.5	mJ	
P_D	Power Dissipation	T _C = 25°C	118	W	
Rejc	Thermal Resistance, Junction to Case		1.06	°C/W	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		62	°C/W	
T_{J}, T_{STG}	Operating and Storage Temperature Range		-55 to +150	$^{\circ}$ C	



Electrical Characteristics (T_J=25°C unless otherwise specified)

Off Characteristic V(BRI)DSS Drain-Source Breakdown Voltage VGS=0V, Ib=250µA 650 - - V VDS=650V, VGS=0V, Ib=250µA For incomplete VDS=650V, VGS=0V, Ib=250µA For incomplete VDS=650V, VGS=0V, Ib=250µA VDS=650V, VGS=10V, Ib=250µA VDS=650V, VGS=0V, Ib=250µA VDS=650V, Ib=25	Symbol	Parameter	Test Condition	Min.	Тур.	Max.	Units
Vos =650V, Vos = 0V, Vos =650V, Vos = 10V, Vos =650V, Vos =650	Off Charac	cteristic					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	650	-	-	V
V _{DS} = 650V, V _{GS} = 0V, T _J = 125°C		7 0 1 1/1 5 1 0 1		-	-	1	μA
$ \begin{array}{ c c c c c } \hline \textbf{On Characteristics} \\ \hline \textbf{V}_{GS(th)} & \textbf{Gate Threshold Voltage} & \textbf{V}_{DS} = \textbf{V}_{GS}, \ \textbf{I}_{D} = 250 \mu A & 2.0 & 3.0 & 4.0 & V \\ \hline \textbf{R}_{DS(on)} & \textbf{Static Drain-Source on-Resistance} & \textbf{V}_{GS} = 10 V, \ \textbf{I}_{D} = 5.5 A & - & 0.36 & 0.42 & \Omega \\ \hline \hline \textbf{Dynamic Characteristics} \\ \hline \textbf{C}_{iss} & \textbf{Input Capacitance} & \textbf{V}_{DS} = 50 V, \ \textbf{V}_{GS} = 0 V, \\ \hline \textbf{C}_{Oss} & \textbf{Output Capacitance} & \textbf{V}_{DS} = 50 V, \ \textbf{V}_{GS} = 0 V, \\ \hline \textbf{C}_{rss} & \textbf{Reverse Transfer Capacitance} & \textbf{V}_{DS} = 480 V, \ \textbf{I}_{D} = 11 A, \\ \hline \textbf{Q}_{gs} & \textbf{Gate-Source Charge} & \textbf{V}_{DS} = 480 V, \ \textbf{I}_{D} = 11 A, \\ \hline \textbf{Q}_{gd} & \textbf{Gate-Drain("Miller") Charge} & \textbf{V}_{DS} = 380 V, \ \textbf{I}_{D} = 5.5 A, \\ \hline \textbf{V}_{gs} = 10 V & \textbf{V}_{gs} = 10$		Zero Gate Voltage Drain Current		-	-	100	μA
$\begin{array}{ c c c c }\hline V_{GS(Ih)} & Gate Threshold Voltage \\ R_{DS(on)} & Static Drain-Source on-Resistance \\ notes & V_{GS} = 10V, \ I_{D} = 5.5A \\ \hline \\ Dynamic Characteristics \\ \hline \\ C_{Iss} & Input Capacitance \\ C_{Oss} & Output Capacitance \\ C_{Trss} & Reverse Transfer Capacitance \\ Q_{g} & Total Gate Charge \\ Q_{gd} & Gate-Source Charge \\ Q_{gd} & Gate-Drain("Miller") Charge \\ \hline \\ t_{I} & Turn-on Delay Time \\ t_{I} & Turn-on Rise Time \\ t_{I} & Turn-off Fall Time \\ \hline \\ Is & Maximum Continuous Drain to Source Diode Forward Current \\ Is & Maximum Pulsed Drain to Source Diode Forward VGS = 0V, I_{S} = 11A \\ V_{GS} $	I _{GSS}	Gate to Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	±100	nA
Static Drain-Source on-Resistance Nose = 10V, Ib = 5.5A - 0.36 0.42 Ω	On Charac	teristics					
Note	V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	2.0	3.0	4.0	V
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	R _{DS(on)}		V _{GS} =10V, I _D =5.5A	-	0.36	0.42	Ω
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Dynamic C	Characteristics					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	C _{iss}	Input Capacitance	., 50,/.), 0,/	-	710	_	pF
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Coss	Output Capacitance	, - ,	-	41	-	pF
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	C _{rss}	Reverse Transfer Capacitance	7 T = 1.UMHZ	-	4.5	-	pF
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Qg	Total Gate Charge	., ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	39	-	nC
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Q_{gs}	Gate-Source Charge	· · · · · ·	-	4	-	nC
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Q_{gd}	Gate-Drain("Miller") Charge	VGS - 10 V	ı	20	-	nC
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Switching	Characteristics					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	t _{d(on)}	Turn-on Delay Time		-	10	-	ns
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t _r	Turn-on Rise Time	$V_{DS} = 380V, I_{D} = 5.5A,$	-	7	-	ns
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	t _{d(off)}	Turn-off Delay Time	V_{GS} =10V, R_{G} =6.8 Ω	-	57	-	ns
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	t _f	Turn-off Fall Time		-	8	_	ns
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Drain-Sou	rce Diode Characteristics and Maxim	um Ratings				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Is				-	11	А
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	I _{SM}				-	44	Α
trr Reverse Recovery Time V _{GS} =0V, I _S =5.5A, - 280 - ns		$V_{CS} = 0$ $V_{CS} = 11$ A		-	-	1.2	V
	trr		V _{GS} =0V, I _S =5.5A.	-	280	-	ns
QII INCOCIOCINOCOVOIY OHAIQO QII/QI TOUZ/MO - Z.O - LIC	Qrr	Reverse Recovery Charge	di/dt=100A/µs	-	2.8	-	μC

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

- 2. EAS condition: T_J = 25°C, V_{DD} = 50V, V_G =10V, L=10mH, I_{AS} =3.3A
- 3. Pulse Test: Pulse Width≤300µs, Duty Cycle≤2%



Typical Performance Characteristics

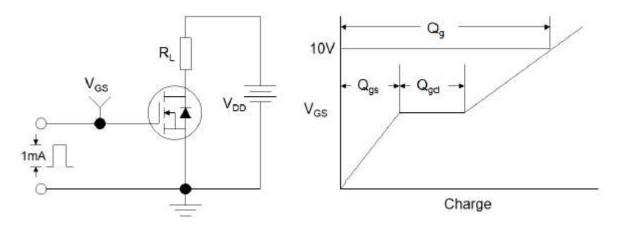


Figure1:Gate Charge Test Circuit & Waveform

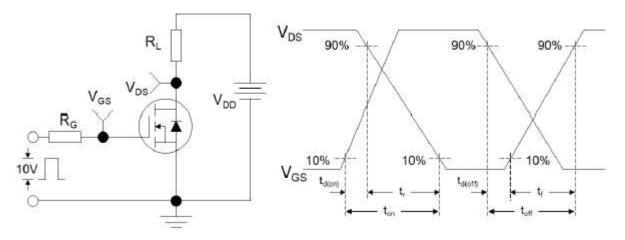


Figure 2: Resistive Switching Test Circuit & Waveforms

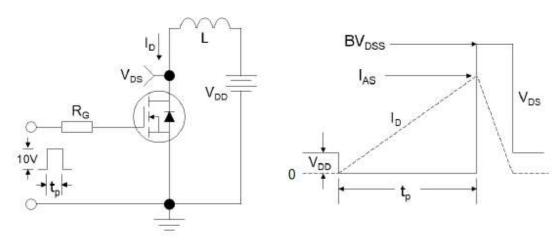


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms