

Features

- N-Channel, 5V Logic Level Control
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5\text{ V}$
- Fast Switching
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant



Part ID	Package Type	Marking	Tape and reel information
VSP005N03MS	PDFN5x6	005N03M	3000pcs/Reel

V_{DS}	30	V
$R_{DS(on),TYP@ V_{GS}=10\text{ V}}$	2.8	m Ω
$R_{DS(on),TYP@ V_{GS}=4.5\text{ V}}$	4.1	m Ω
I_D	105	A

PDFN5x6



Drain Pin5-8



Source Pin 1-3

Absolute maximum ratings, at $T_J=25\text{ }^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	30	V
I_S	Diode continuous forward current	$T_C=25\text{ }^\circ\text{C}$ 105	A
I_D	Continuous drain current@ $V_{GS}=10\text{V}$	$T_C=25\text{ }^\circ\text{C}$ 105	A
		$T_C=100\text{ }^\circ\text{C}$ 68	A
I_{DM}	Pulse drain current tested ①	$T_C=25\text{ }^\circ\text{C}$ 320	A
P_D	Maximum power dissipation	$T_C=25\text{ }^\circ\text{C}$ 69	W
V_{GS}	Gate-Source voltage	± 20	V
$T_{STG} T_J$	Storage and operating temperature range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.8	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	40	$^\circ\text{C/W}$

Drain-Source Avalanche Ratings

EAS	Avalanche Energy, Single Pulsed ②	256	mJ
-----	-----------------------------------	-----	----

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current($V_{DS}=30V, V_{GS}=0V$	--	--	1	μA
	Zero Gate Voltage Drain Current($T_j=125^\circ\text{C}$)	$V_{DS}=30V, V_{GS}=0V$	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.8	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ^③	$V_{GS}=10V, I_D=20A$	--	2.8	4.5	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance ^③	$V_{GS}=4.5V, I_D=15A$	--	4.1	6.0	m Ω
Dynamic Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1\text{MHz}$	--	2530	--	pF
C_{oss}	Output Capacitance		--	380	--	pF
C_{rss}	Reverse Transfer Capacitance		--	295	--	pF
R_g	Gate Resistance	$f=1\text{MHz}$		0.95		Ω
Q_g	Total Gate Charge	$V_{DS}=15V, I_D=20A,$ $V_{GS}=10V$	--	54	--	nC
Q_{gs}	Gate-Source Charge		--	6	--	nC
Q_{gd}	Gate-Drain Charge		--	14	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=15V,$ $I_D=10A,$ $R_G=3.5\Omega,$ $V_{GS}=10V$	--	8	--	nS
t_r	Turn-on Rise Time		--	5	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	27	--	nS
t_f	Turn-Off Fall Time		--	11	--	nS
Source- Drain Diode Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
V_{SD}	Forward on voltage	$I_{SD}=20A, V_{GS}=0V$	--	0.80	1.20	V
t_{rr}	Reverse Recovery Time	$T_j=25^\circ\text{C}, I_{sd}=20A,$ $di/dt=500A/\mu s$	--	43	--	nS
Q_{rr}	Reverse Recovery Charge				37	

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{Jmax} , starting $T_j = 25^\circ\text{C}$, $L = 0.5\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 32A$, $V_{GS} = 10V$. Part not recommended for use above this value
- ③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

Typical Characteristics

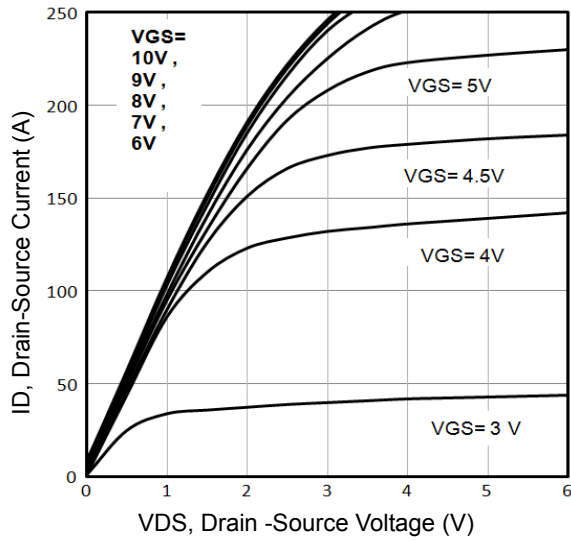


Fig1. Typical Output Characteristics

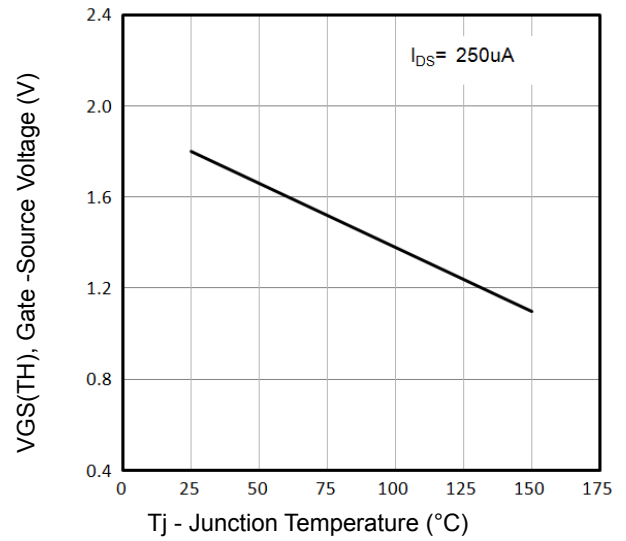


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

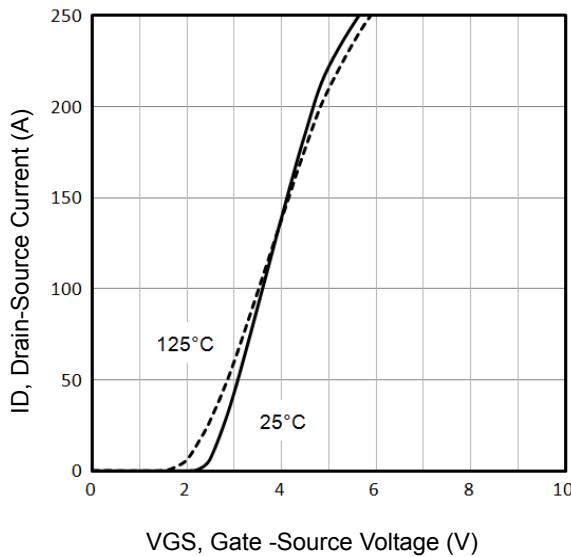


Fig3. Typical Transfer Characteristics

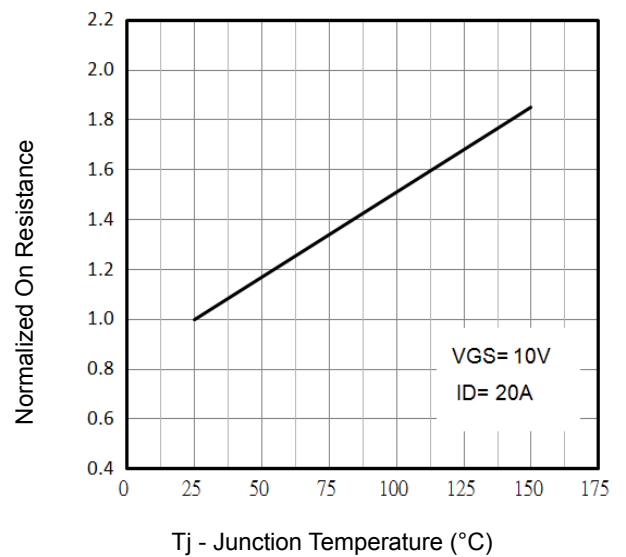


Fig4. Normalized On-Resistance Vs. T_j

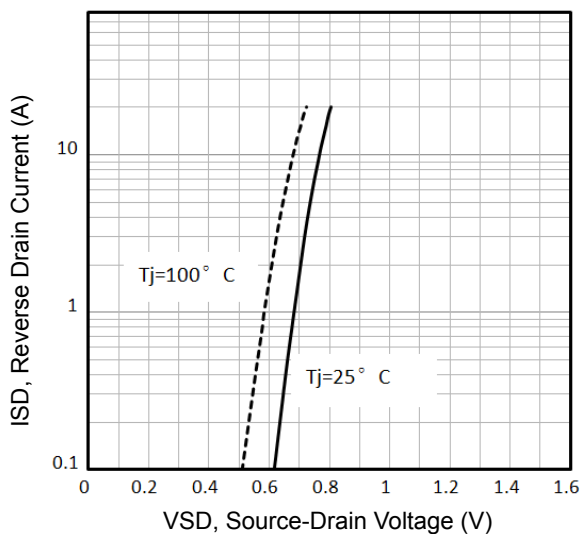


Fig5. Typical Source-Drain Diode Forward Voltage

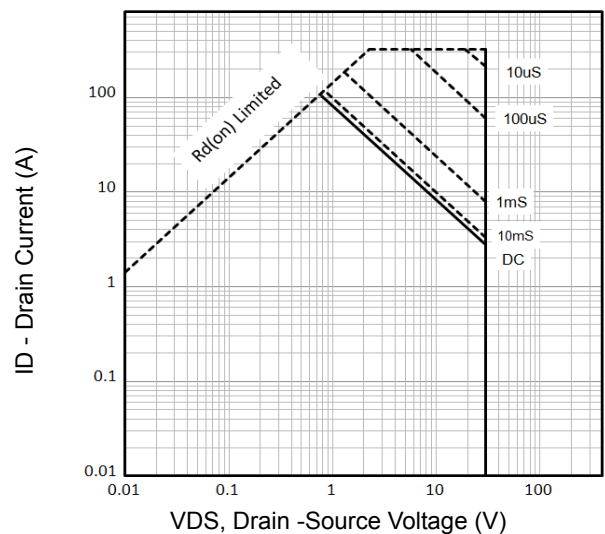


Fig6. Maximum Safe Operating Area

Typical Characteristics

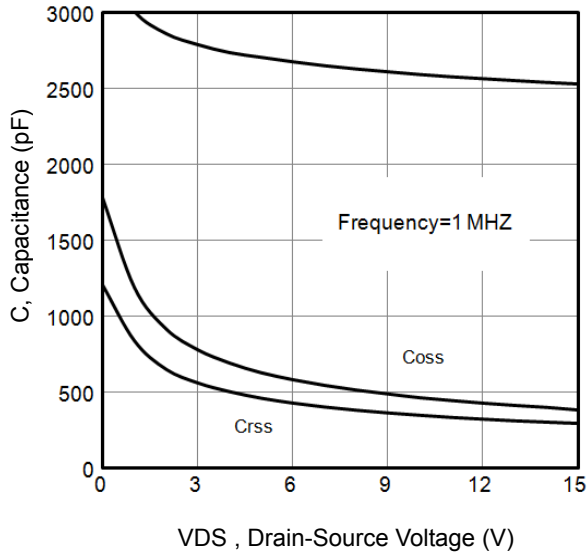


Fig7. Typical Capacitance Vs.Drain-Source Voltage

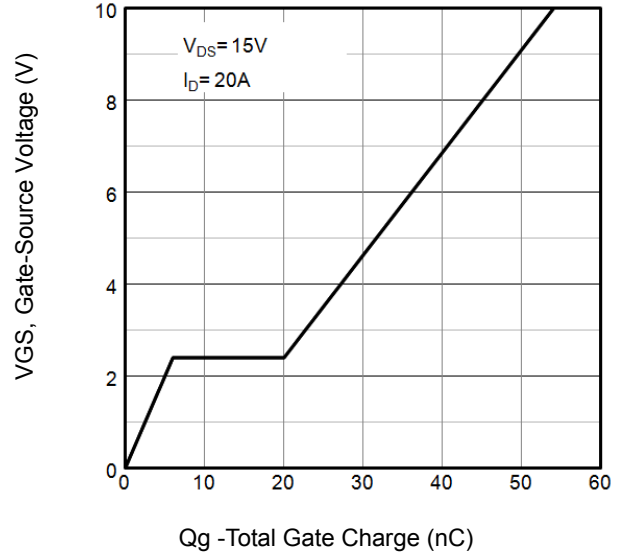


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

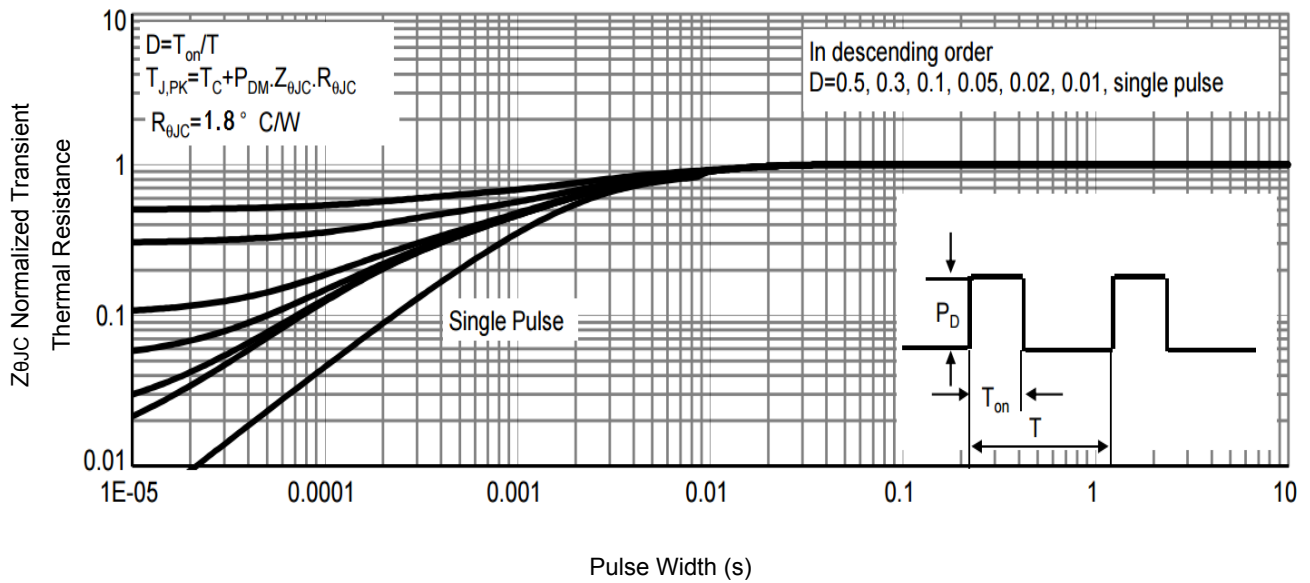


Fig9 . Normalized Maximum Transient Thermal Impedance

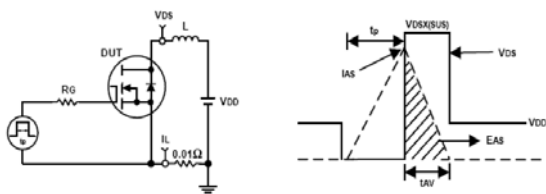


Fig10. Unclamped Inductive Test Circuit and waveforms

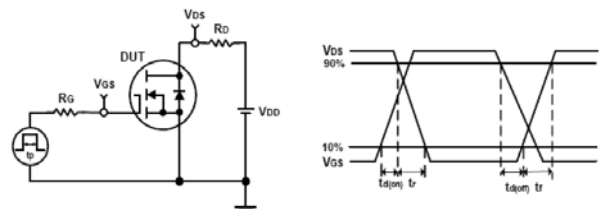
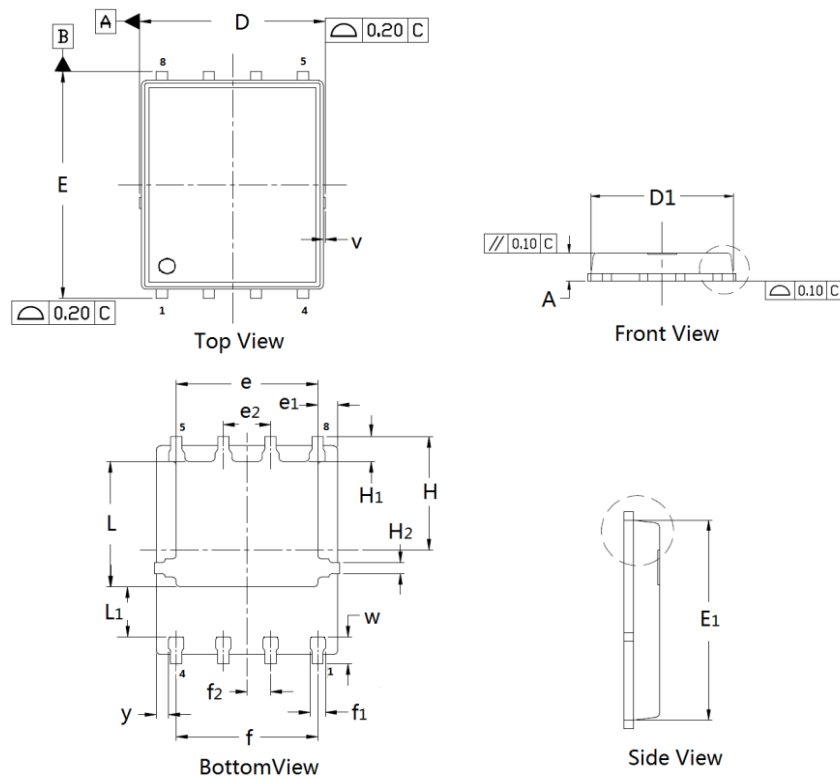


Fig11. Switching Time Test Circuit and waveforms

PDFN5×6 Package Outline Data

DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.02	1.10	D	4.90	4.98	5.10
D ₁	4.80	4.89	5.00	E	6.00	6.11	6.20
E ₁	5.65	5.74	5.85	e	3.72	3.80	3.92
e ₁	--	0.54	--	e ₂	--	1.27	--
f	--	3.82	--	f ₁	0.31	0.37	0.51
f ₂	--	0.64	--	H	--	3.15	--
H ₁	0.59	0.63	0.79	H ₂	0.26	0.28	0.32
L	3.38	3.45	3.58	L ₁	--	1.39	--
v	--	0.13	--	w	0.64	0.68	0.84
y	--	0.34	--		--		--

Customer Service
Sales and Service:
sales@vgsemi.com
Vanguard Semiconductor CO., LTD
TEL: (86-755) -26902410

FAX: (86-755) -26907027

WEB: www.vgsemi.com