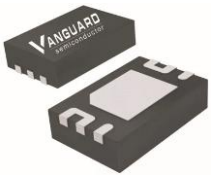
Features

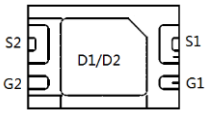
- Dual N-Channel，2.5V Logic Level Control
- Enhancement mode
- Low on-resistance $R_{DS(on)}$ @ V_{GS}=2.5V
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant

V_{DS}	20	V
$R_{DS(on),TYP}$@ V_{GS}=4.5V	7.4	mΩ
$R_{DS(on),TYP}$@ V_{GS}=2.5V	9.4	mΩ
I_D	13	A

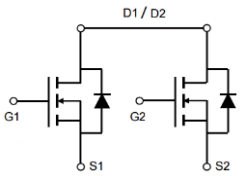
TDFN2x3-6L



Pb-Free RoHS Halogen-Free



Part ID	Package Type	Marking	Tape and reel information
VSA007N02KD	TDFN2x3-6L	7N02	3000pcs/Reel



Maximum ratings, at T_j=25 °C, unless otherwise specified

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		20	V
I_S	Diode continuous forward current	T_A=25°C	13	A
I_D	Continuous drain current	T_A=25°C	13	A
		T_A=100°C	8.2	A
I_{DM}	Pulse drain current tested ①	T_A=25°C	52	A
EAS	Avalanche energy, single pulsed ②		12	mJ
P_D	Maximum power dissipation	T_A=25°C	2	W
VGS	Gate-Source voltage		±12	V
T_{STG} T_J	Storage and operating temperature range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance：Junction to Case	45	°C/W
$R_{\theta JA}$	Thermal Resistance：Junction to Ambient	62.5	°C/W

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_C = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	20	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=20V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=20V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	0.4	0.7	1.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=5A	--	7.4	10	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=3.3V, I_D=4A	--	8.1	11	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=2.5V, I_D=3A	--	9.4	12	mΩ
Dynamic Electrical Characteristics @ T_C= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=10V,V_{GS}=0V, f=1MHz	1000	1225	1450	pF
C_{oss}	Output Capacitance		130	200	270	pF
C_{rss}	Reverse Transfer Capacitance		100	170	240	pF
R_g	Gate Resistance	f=1MHz	--	2.2	--	Ω
Q_g	Total Gate Charge	V_{DS}=10V,I_D=5A, V_{GS}=4.5V	--	15	--	nC
Q_{gs}	Gate-Source Charge		--	6	--	nC
Q_{gd}	Gate-Drain Charge		--	7	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=10V, I_D=5A, R_G=3Ω, V_{GS}=4.5V	--	3.2	--	nS
t_r	Turn-on Rise Time		--	4.6	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	9	--	nS
t_f	Turn-Off Fall Time		--	9.4	--	nS
Source- Drain Diode Characteristics@ T_C = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=5A,V_{GS}=0V	--	0.7	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=5A, V_{GS}=0V di/dt=500A/μs	--	13	--	nS
Q_{rr}	Reverse Recovery Charge			17		nC

NOTE:

① Repetitive rating; pulse width limited by max. junction temperature.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.1mH,R_G = 25Ω, I_{AS} = 12A, V_{GS} =4.5V. Part not recommended for use above this value

③ Pulse width ≤ 300μs; duty cycle≤ 2%.

Typical Characteristics

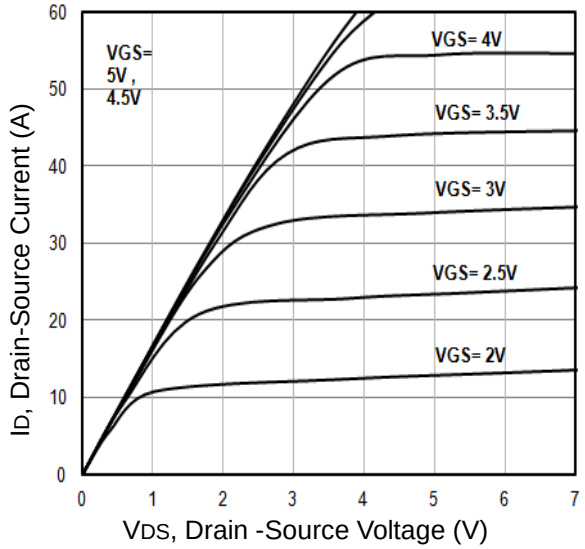


Fig1. Typical Output Characteristics

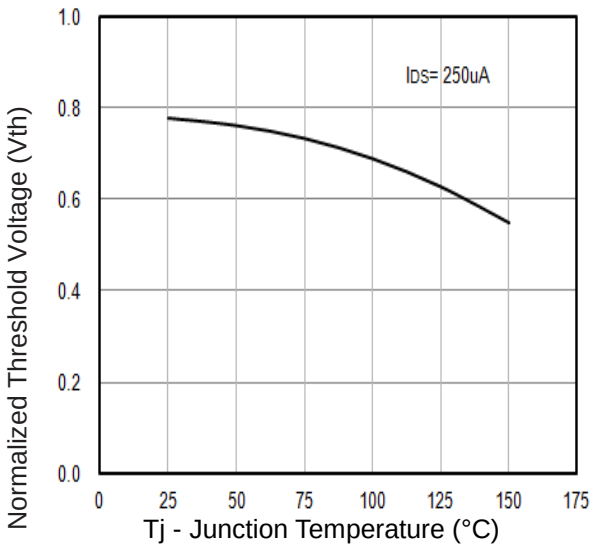


Fig2. Normalized Threshold Voltage Vs. Temperature

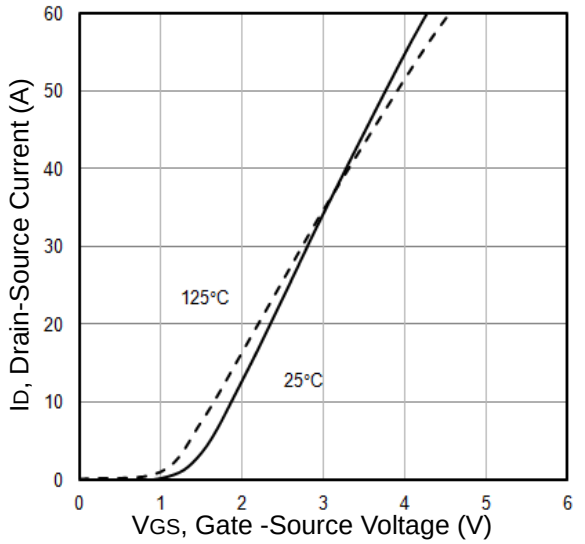


Fig3. Typical Transfer Characteristics

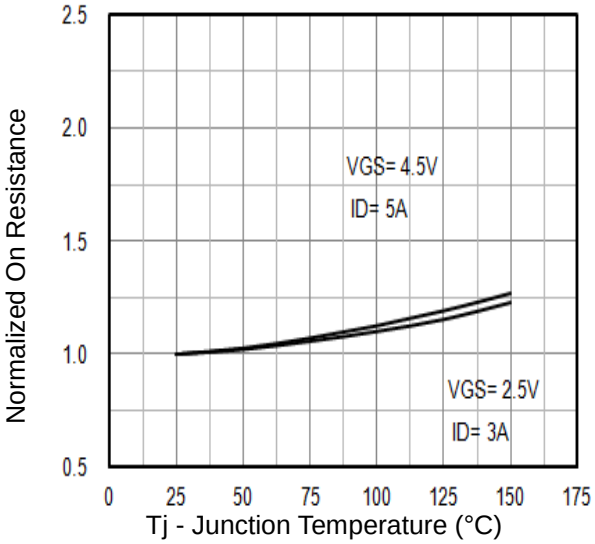


Fig4. Normalized On-Resistance Vs. Temperature

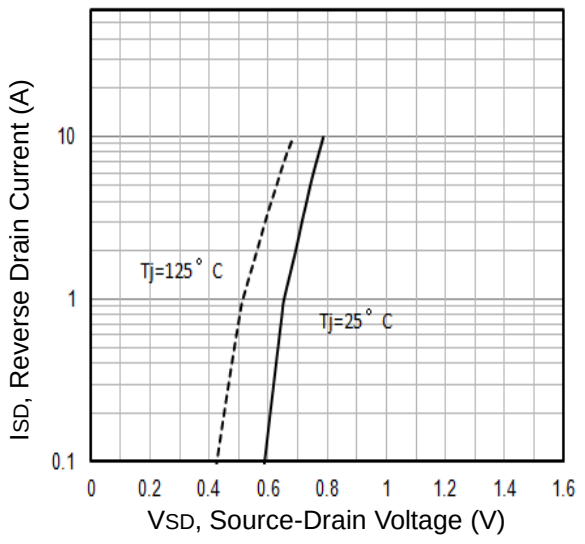


Fig5. Typical Source-Drain Diode Forward Voltage

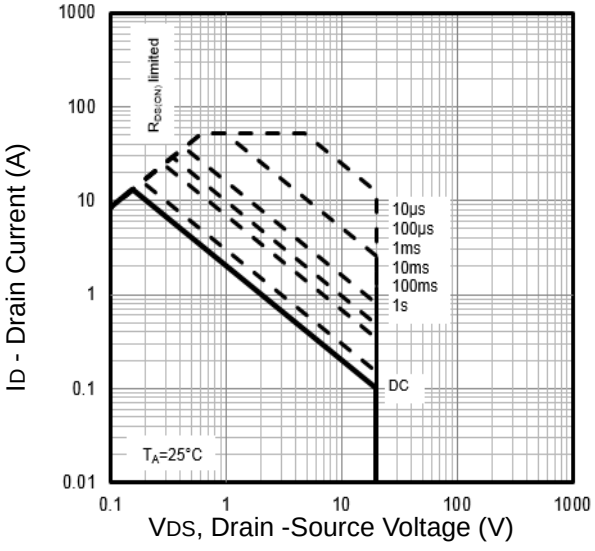


Fig6. Maximum Safe Operating Area

Typical Characteristics

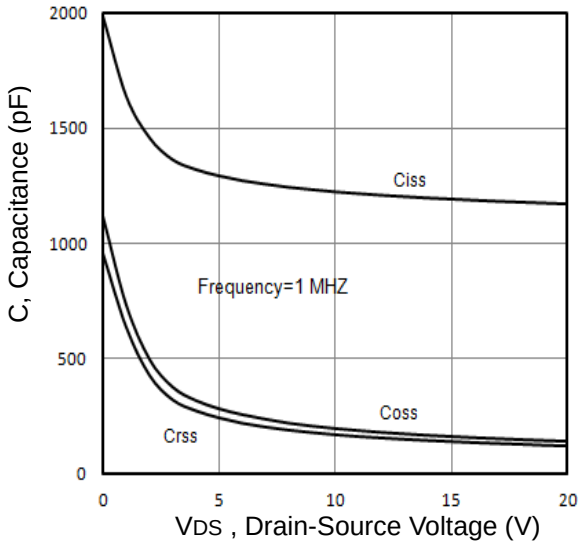


Fig7. Typical Capacitance Vs.Drain-Source Voltage

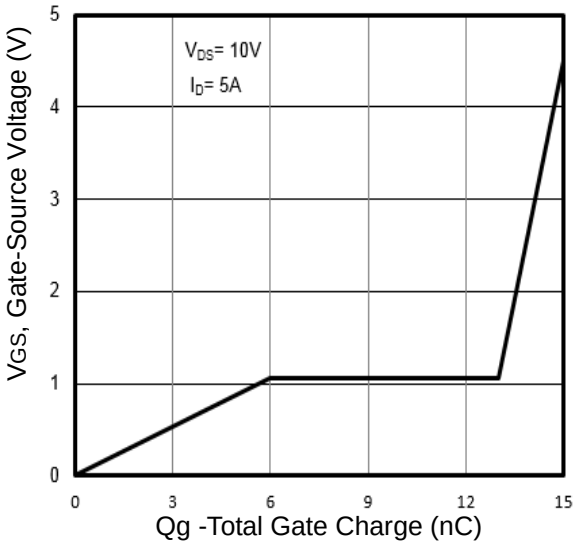


Fig8. Typical Gate Charge Vs.Gate-Source

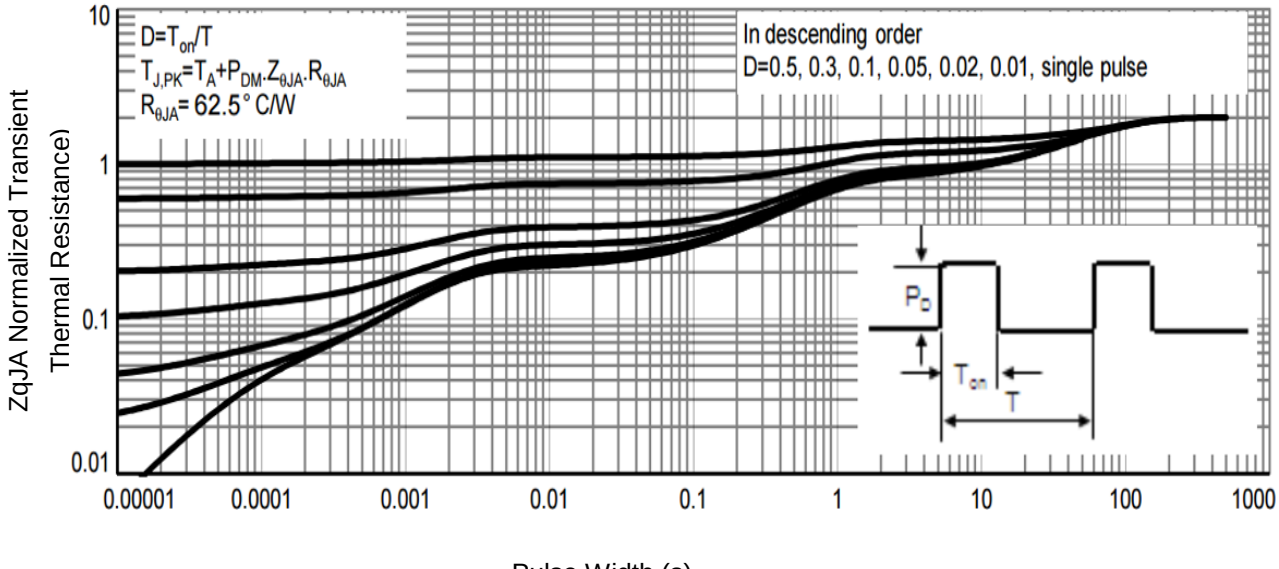


Fig9. Normalized Maximum Transient Thermal Impedance

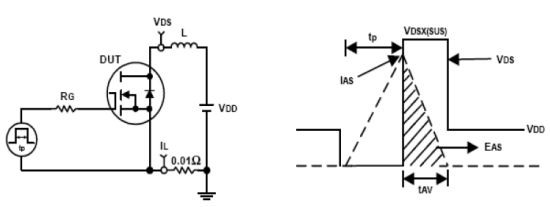


Fig10. Unclamped Inductive Test Circuit and waveforms

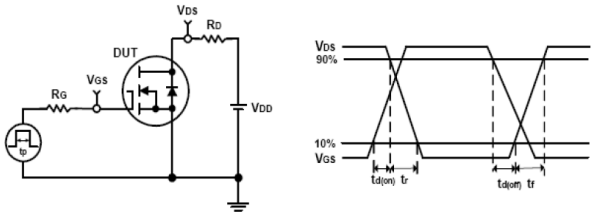
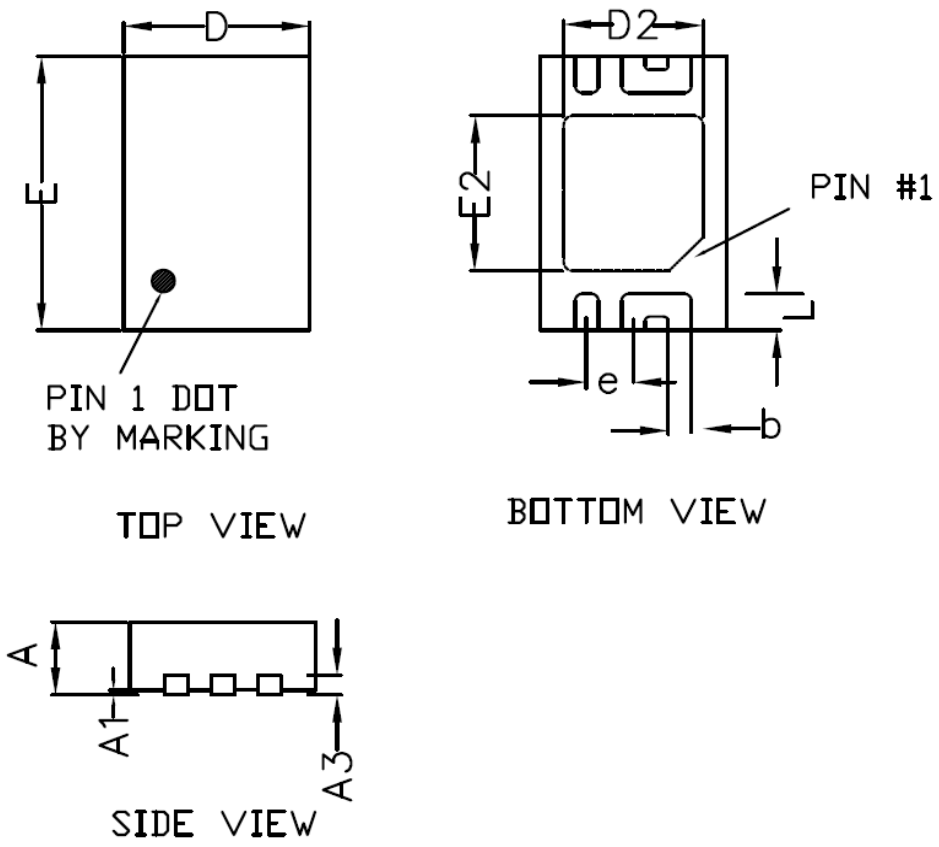


Fig11. Switching Time Test Circuit and waveforms

TDFN2x3-6L Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.80	0.85	**A1**	0.00	--	0.05
A3	0.195	0.200	0.211	**D**	1.95	2.00	2.05
D2	1.45	1.50	1.55	**E**	2.95	3.00	3.05
E2	1.65	1.70	1.75	**b**	0.20	0.25	0.30
L	0.35	0.40	0.45	**e**	0.50 BSC		

Note:

1. Refer to JEDEC MO-229 variation W2030D-1.

Customer Service

Sales and Service:

sales@vgsemi.com

Vanguard Semiconductor CO., LTD

TEL: (86-755) -26902410

FAX: (86-755) -26907027

WEB: **www.vgsemi.com**