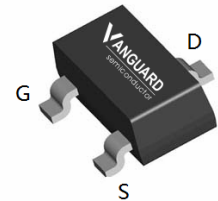


Features

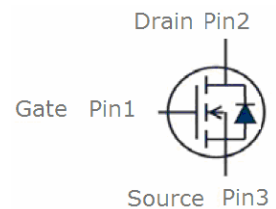
- N-Channel
- Enhancement mode
- Very low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5\text{ V}$
- Fast Switching
- High Effective
- Pb-free lead plating; RoHS compliant; Hg-Free

V_{DS}	40	V
$R_{DS(on),TYP}@ V_{GS}=10\text{ V}$	36	m Ω
$R_{DS(on),TYP}@ V_{GS}=4.5\text{ V}$	42	m Ω
I_D	4	A

SOT23



Part ID	Package Type	Marking	Tape and reel information
VSC045N04MS	SOT23	004	3000pcs/reel



Maximum ratings, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	40	V
I_S	Diode continuous forward current	$T_C=25\text{ }^\circ\text{C}$ 4	A
I_D	Continuous drain current @ $V_{GS}=10\text{ V}$	$T_C=25\text{ }^\circ\text{C}$ 4	A
		$T_C=100\text{ }^\circ\text{C}$ 2.5	A
I_{DM}	Pulse drain current tested ①	$T_C=25\text{ }^\circ\text{C}$ 16	A
P_D	Maximum power dissipation	$T_C=25\text{ }^\circ\text{C}$ 1.25	W
V_{GS}	Gate-Source voltage	± 20	V
T_{STG}	Storage temperature range	-55 to 175	$^\circ\text{C}$
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	80	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	100	$^\circ\text{C/W}$

Typical Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current(Tc=25°C)	V _{DS} =32V, V _{GS} =0V	--	0.01	1	μA
	Zero Gate Voltage Drain Current(Tc=125°C)	V _{DS} =32V, V _{GS} =0V	--	5	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =4A	--	36	45	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =2A	--	42	50	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz	--	345	--	pF
C _{oss}	Output Capacitance		--	43	--	pF
C _{rss}	Reverse Transfer Capacitance		--	18	--	pF
Q _g	Total Gate Charge	V _{DS} =20V, I _D =3A, V _{GS} =10V	--	8.6	--	nC
Q _{gs}	Gate-Source Charge		--	1.7	--	nC
Q _{gd}	Gate-Drain Charge		--	2.2	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =20V, I _D =1A, R _G =6.8Ω, V _{GS} =10V	--	5.8	--	nS
t _r	Turn-on Rise Time		--	2.8	--	nS
t _{d(off)}	Turn-Off Delay Time		--	16	--	nS
t _f	Turn-Off Fall Time		--	2.2	--	nS
Source- Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated)						
I _{SD}	Source-drain current(Body Diode)	T _c =25°C	--	--	4	A
V _{SD}	Forward on voltage	I _{SD} =4A, V _{GS} =0V	--	0.79	1.3	V
t _{rr}	Reverse Recovery Time	T _J =25°C, I _{sd} =3A, V _{GS} =0V	--	25	--	nS
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs		28		nC

NOTE:

① Pulse width ≤ 300μs; duty cycle ≤ 2%.

Typical Characteristics

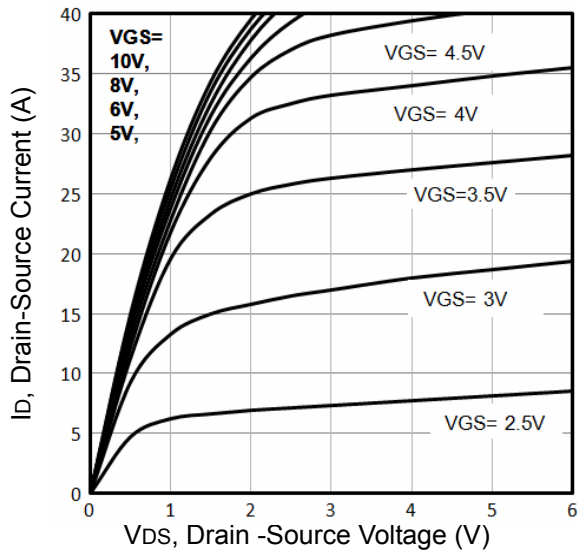


Fig1. Typical Output Characteristics

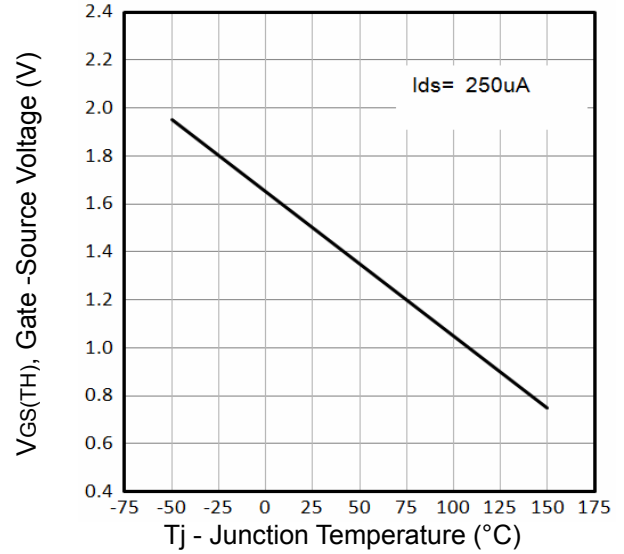


Fig2. Threshold Voltage Vs. Temperature

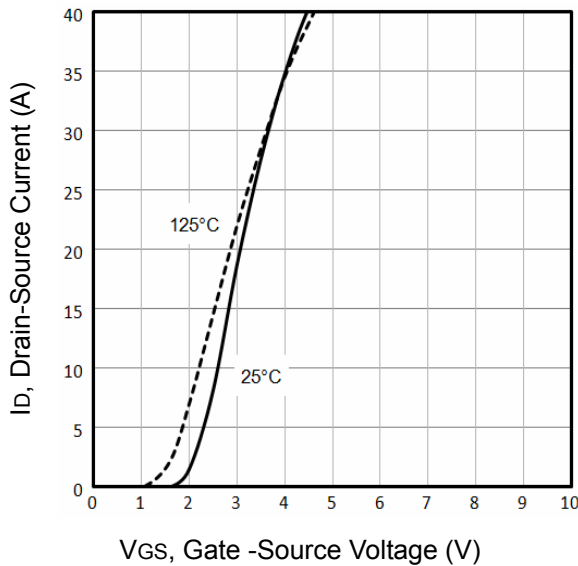


Fig3. Typical Transfer Characteristics

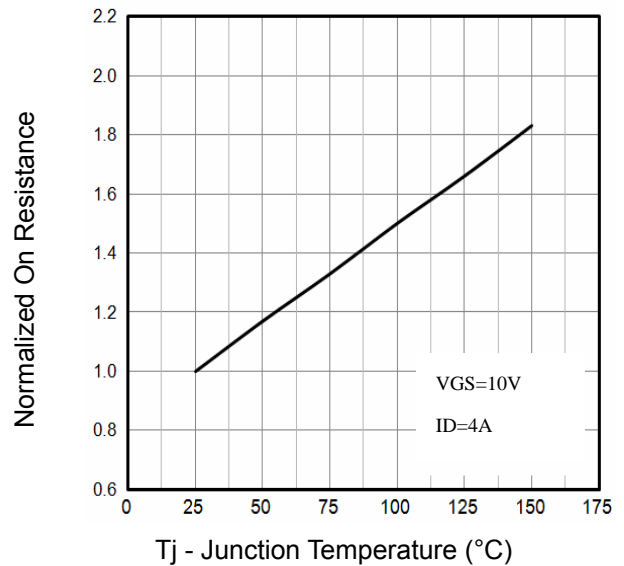


Fig4. Normalized On-Resistance Vs. Temperature

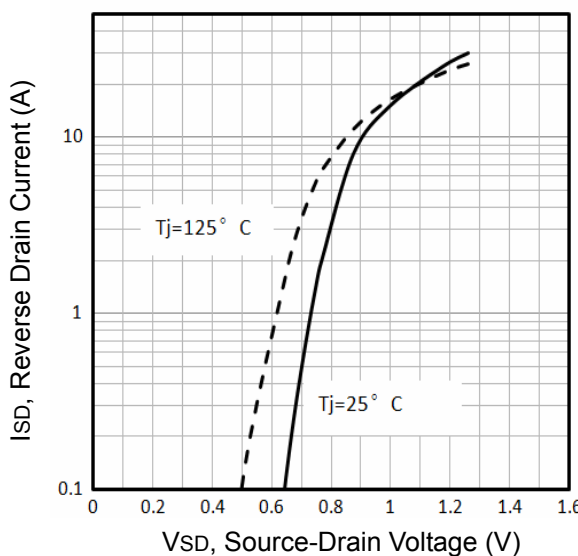


Fig5. Typical Source-Drain Diode Forward Voltage

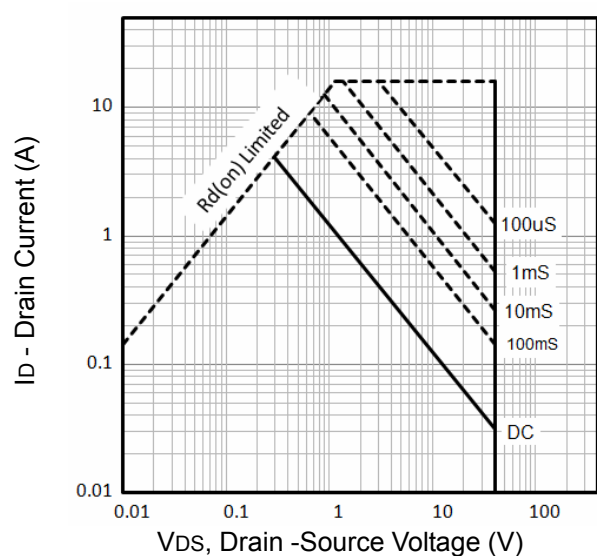


Fig6. Maximum Safe Operating Area

Typical Characteristics

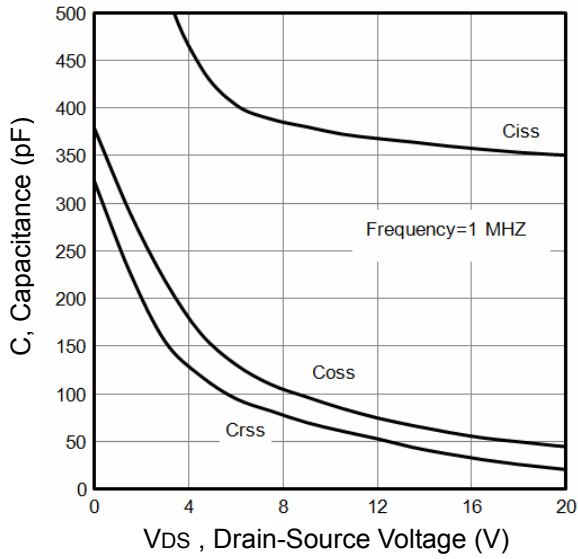


Fig7. Typical Capacitance Vs.Drain-Source Voltage

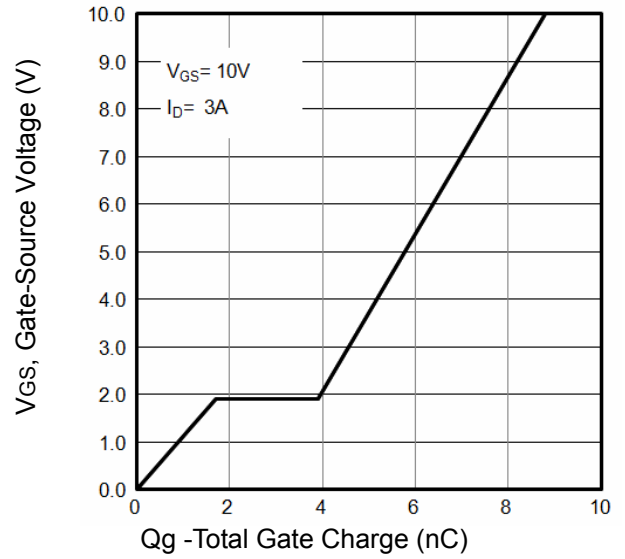


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

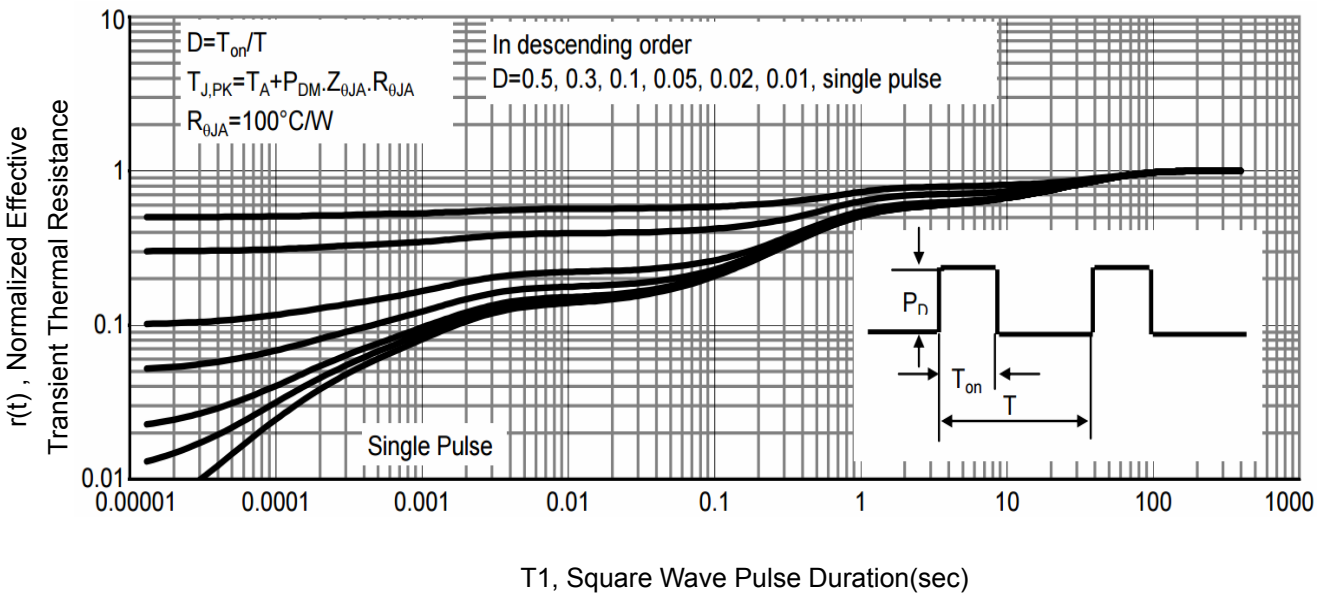


Fig9. T1 ,Transient Thermal Response Curve

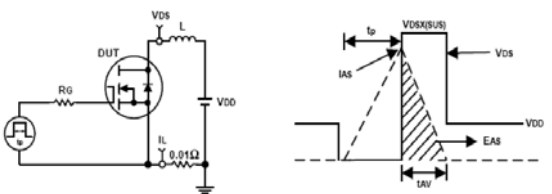


Fig10. Unclamped Inductive Test Circuit and waveforms

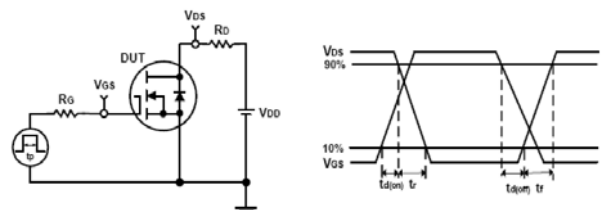
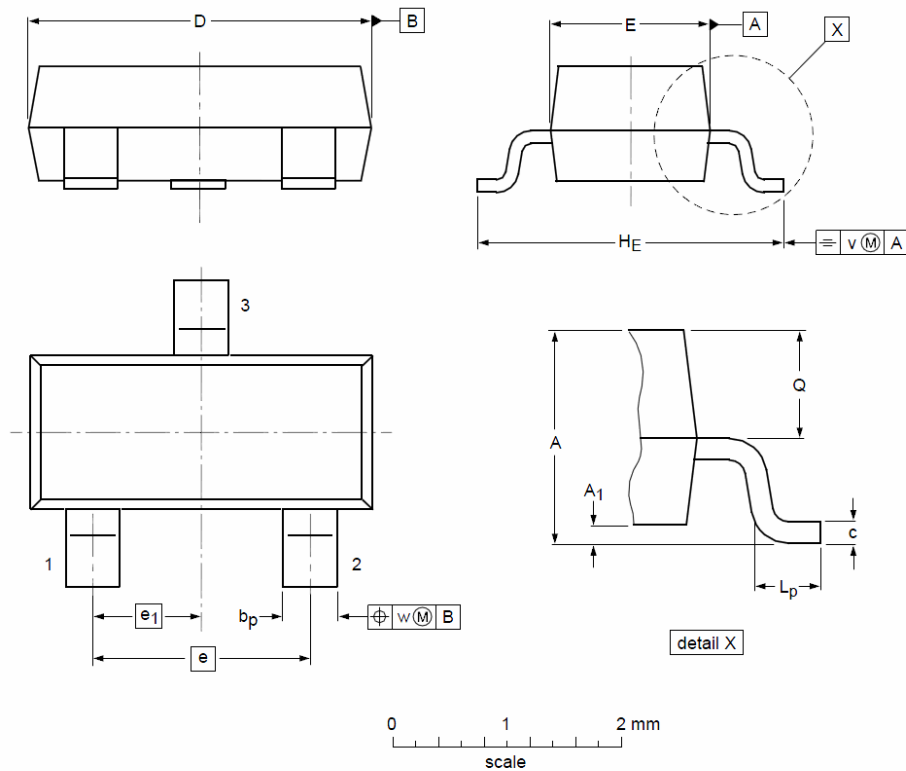


Fig11. Switching Time Test Circuit and waveforms

SOT23 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.03	1.10	A ₁	0.01	0.05	0.10
b _p	0.38	0.42	0.48	c	0.09	0.13	0.15
D	2.80	2.92	3.00	E	1.20	1.33	1.40
e	--	1.90	--	e ₁	--	0.95	--
H _E	2.10	2.40	2.50	L _p	0.15	0.23	0.45
Q	0.45	0.49	0.55	v	--	0.20	--
w	--	0.10	--				

Customer Service

Sales and Service:

Sales@vgsemi.com

Vanguard Semiconductor CO., LTD

TEL: (86-755) -26902410

FAX: (86-755) -26907027

WEB: www.vgsemi.com