

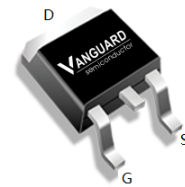
Features

- 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
VS3090BD	TO-252	3090BD	2500pcs/Reel

V_{DS}	30	V
$R_{DS(on),TYP}@ V_{GS}=10\text{ V}$	5.5	m Ω
$R_{DS(on),TYP}@ V_{GS}=4.5\text{ V}$	7.5	m Ω
I_D	68	A

TO-252


Drain Pin 2



Source Pin 3

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	$T_C=25^\circ\text{C}$	68 A
I_D	Continuous drain current@ $V_{GS}=10\text{V}$	$T_C=25^\circ\text{C}$	68 A
		$T_C=100^\circ\text{C}$	43 A
I_{DM}	Pulse drain current tested ①	$T_C=25^\circ\text{C}$	220 A
P_D	Maximum power dissipation	$T_C=25^\circ\text{C}$	50 W
V_{GS}	Gate-Source voltage	± 20	V
$T_{STG} T_J$	Storage and operating temperature range	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	40	$^\circ\text{C/W}$

Drain-Source Avalanche Ratings

EAS	Avalanche Energy, Single Pulsed ②	156	mJ
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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	1.6	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ^③	$V_{GS}=10V, I_D=30A$	--	5.5	7.0	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance ^③	$V_{GS}=4.5V, I_D=20A$	--	7.5	10.0	m Ω
Dynamic Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V,$ $f=1\text{MHz}$	--	1550	--	pF
C_{oss}	Output Capacitance		--	190	--	pF
C_{rss}	Reverse Transfer Capacitance		--	160	--	pF
R_g	Gate Resistance	$f=1\text{MHz}$		2.8		Ω
Q_g	Total Gate Charge	$V_{DS}=15V, I_D=20A,$ $V_{GS}=10V$	--	28	--	nC
Q_{gs}	Gate-Source Charge		--	5.9	--	nC
Q_{gd}	Gate-Drain Charge		--	6.6	--	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		--	6	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	37	--	nS
t_f	Turn-Off Fall Time		--	9	--	nS
Source- Drain Diode Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
V_{SD}	Forward on voltage	$I_{SD}=30A, V_{GS}=0V$	--	0.88	1.2	V
t_{rr}	Reverse Recovery Time	$T_j=25^\circ\text{C}, I_{sd}=20A,$ $di/dt=500A/\mu s$	--	23	--	nS
Q_{rr}	Reverse Recovery Charge				30	

NOTE:

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

Typical Characteristics

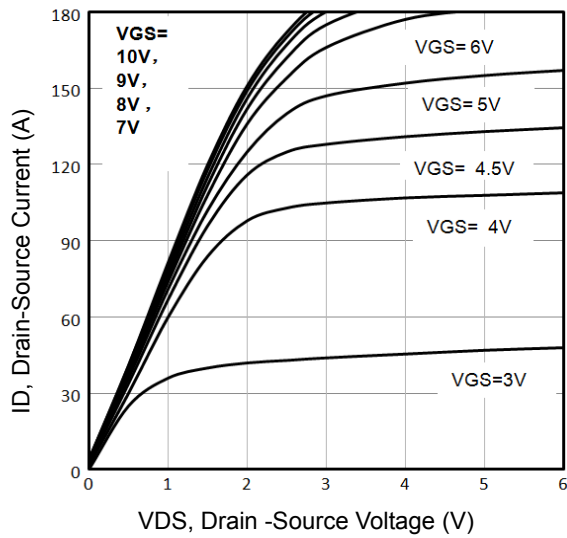


Fig1. Typical Output Characteristics

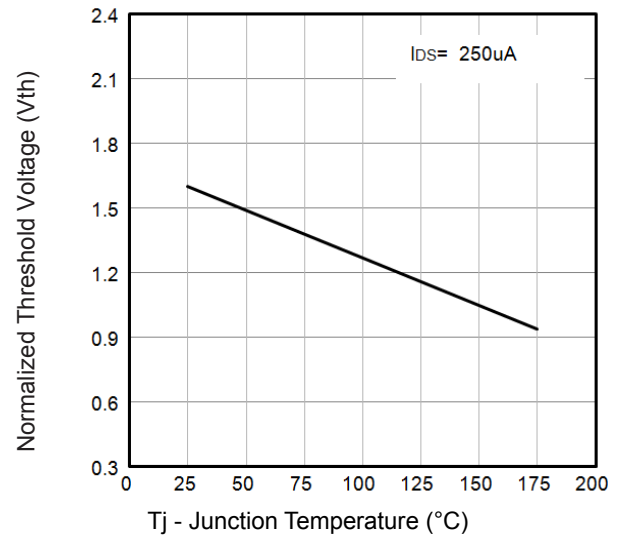


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

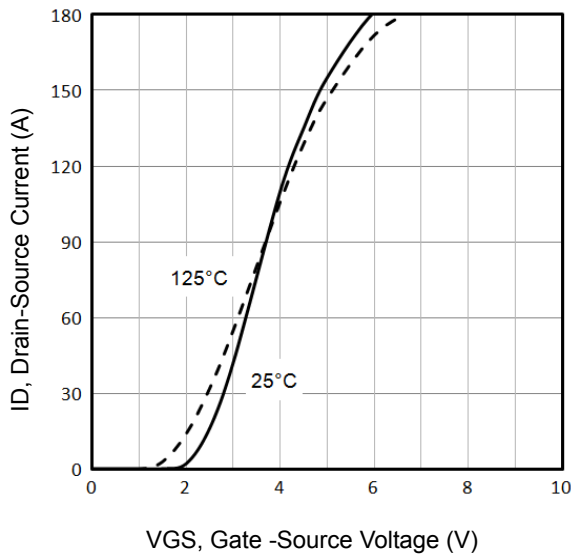


Fig3. Typical Transfer Characteristics

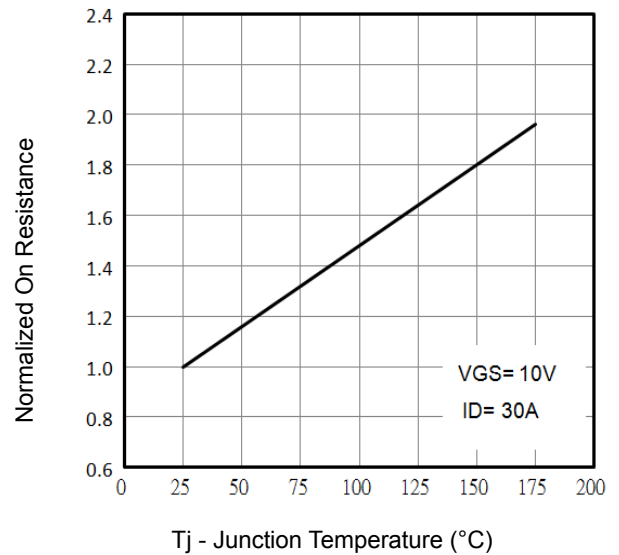


Fig4. Normalized On-Resistance Vs. T_j

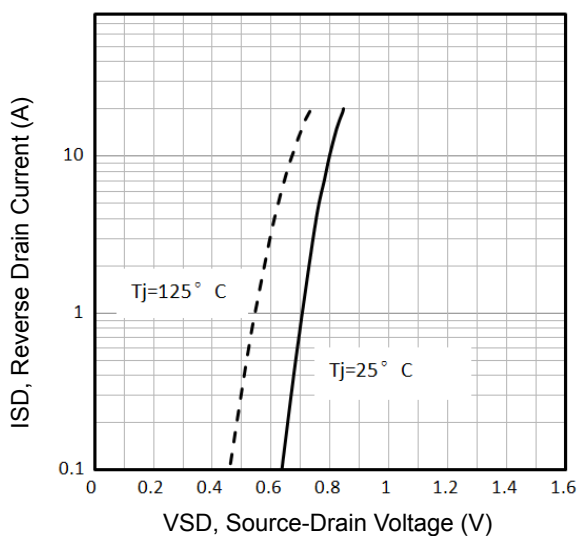


Fig5. Typical Source-Drain Diode Forward Voltage

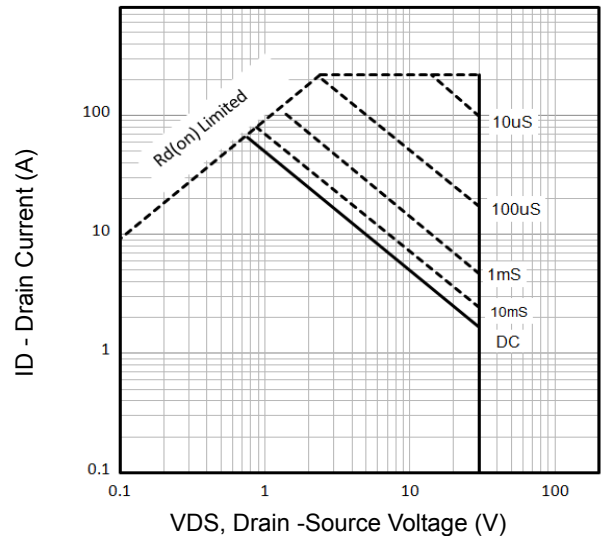


Fig6. Maximum Safe Operating Area

Typical Characteristics

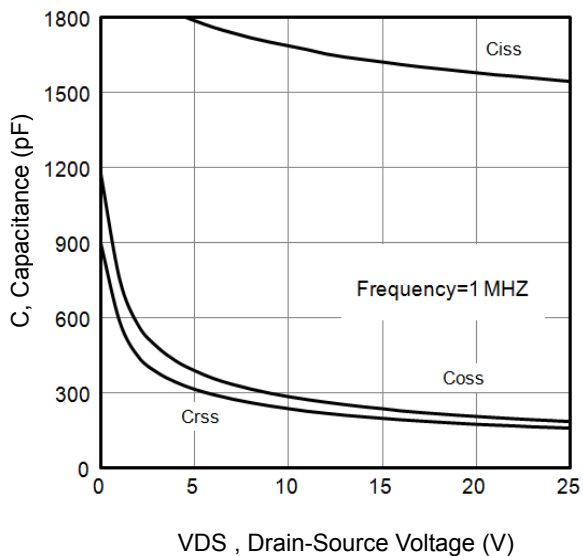


Fig7. Typical Capacitance Vs. Drain-Source Voltage

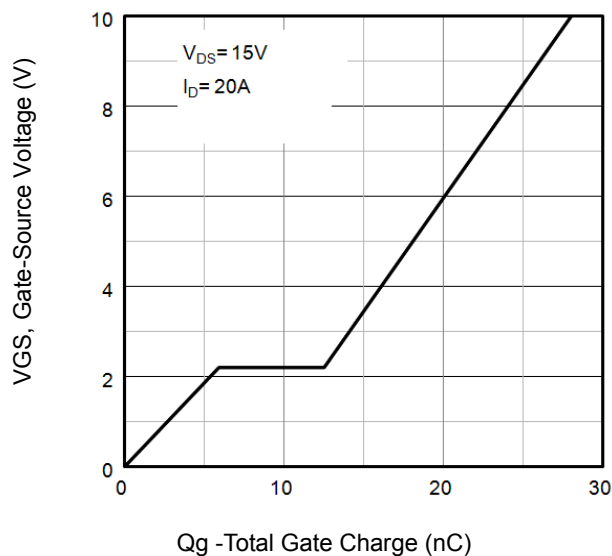


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

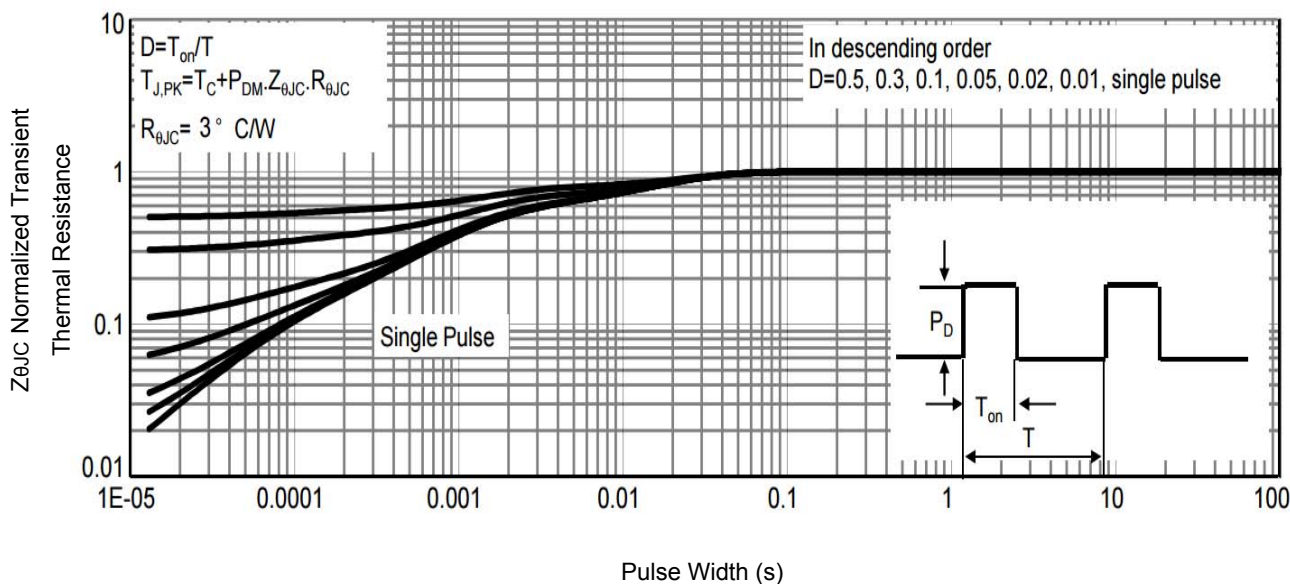


Fig9 . Normalized Maximum Transient Thermal Impedance

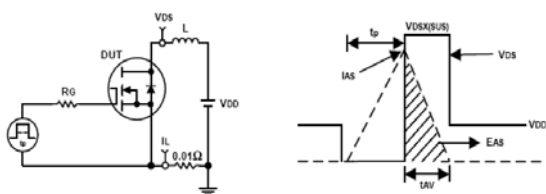


Fig10. Unclamped Inductive Test Circuit and waveforms

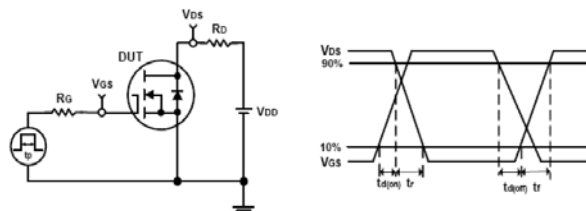
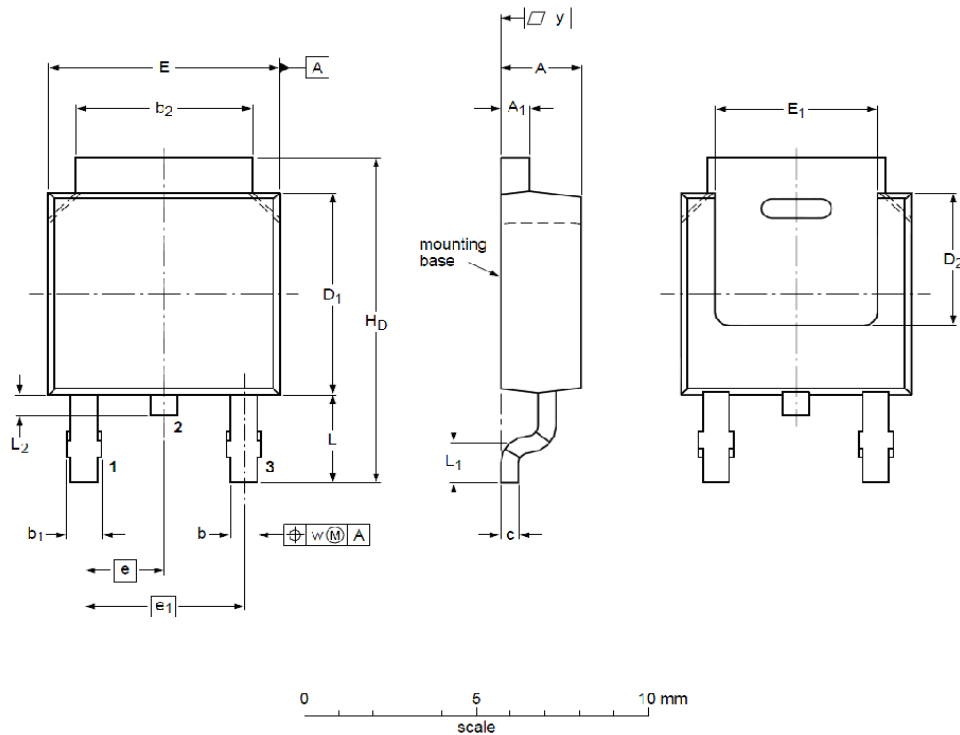


Fig11. Switching Time Test Circuit and waveforms

TO-252 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.22	2.30	2.38	A ₁	0.46	0.58	0.93
b	0.71	0.79	0.89	b ₁	0.90	0.98	1.10
b ₂	5.00	5.30	5.46	c	0.20	0.40	0.56
D ₁	5.98	6.05	6.22	D ₂	--	4.00	--
E	6.47	6.60	6.73	E ₁	5.10	5.28	5.45
e	--	2.28	--	e ₁	--	4.57	--
H _D	9.60	10.08	10.40	L	2.75	2.95	3.05
L ₁	--	0.50	--	L ₂	0.80	0.90	1.10
w	--	0.20	--	y	0.20	--	--

Customer Service

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