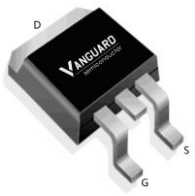
Features

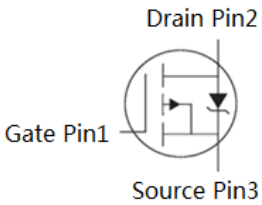
- P-Channel，-5V Logic Level Control
- Enhancement mode
- Low on-resistance RDS(on) @ V_{GS}=-4.5 V
- Fast Switching and High efficiency
- 100% Avalanche Tested
- Pb-free lead plating; RoHS compliant

V_{DS}	-30	V
$R_{DS(on),TYP}$@ V_{GS}=-10 V	6	mΩ
$R_{DS(on),TYP}$@ V_{GS}=-4.5V	9	mΩ
I_D	-100	A

Pb-Free RoHS HF Halogen-Free

TO-263





Part ID	Package Type	Marking	Tape and reel information
VS3506ATD	TO-263	3506ATD	1000pcs/Reel

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

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		-30	V
V_{GS}	Gate-Source voltage		±20	V
I_S	Diode continuous forward current	T_C =25°C	-100	A
I_D	Continuous drain current @V_{GS}=-10V	T_C =25°C	-100	A
		T_C =100°C	-71	A
I_{DM}	Pulse drain current tested ①	T_C =25°C	-400	A
I_{DSM}	Continuous drain current @VGS=-10V	T_A=25°C	-15	A
		T_A=70°C	-12	A
EAS	Avalanche energy, single pulsed ②		132	mJ
P_D	Maximum power dissipation	T_C =25°C	94	W
P_{DSM}	Maximum power dissipation ③	T_A=25°C	2	W
MSL			Level 3	
T_{STG}, T_J	Storage and Junction Temperature Range		-55 to 175	°C
Thermal Characteristics				
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		1.6	°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_J = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	-30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V,V_{GS}=0V	--	--	-1	μA
	Zero Gate Voltage Drain Current(Tj=125℃)	V_{DS}=-30V,V_{GS}=0V	--	--	-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	-1.2	-1.6	-2.3	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=-10V, I_D=-30A	--	6	8	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=-4.5V, I_D=-20A	--	9	12	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=-15V,V_{GS}=0V, f=1MHz	2800	3810	4800	pF
C_{oss}	Output Capacitance		400	545	700	pF
C_{rss}	Reverse Transfer Capacitance		300	400	500	pF
R_g	Gate Resistance	f=1MHz		3.9		Ω
Q_g	Total Gate Charge	V_{DS}=-15V,I_D=-30A, V_{GS}=-10V	--	65	--	nC
Q_{gs}	Gate-Source Charge		--	16.1	--	nC
Q_{gd}	Gate-Drain Charge		--	18.1	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-15V, I_D=-30A, R_G=3.0Ω, V_{GS}=-10V	--	14.4	--	ns
t_r	Turn-on Rise Time		--	11.2	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	99.5	--	us
t_f	Turn-Off Fall Time		--	47.5	--	us
Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=-30A,V_{GS}=0V	--	-0.9	-1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=-30A, V_{GS}=0V di/dt=-100A/μs	--	37	--	ns
Q_{rr}	Reverse Recovery Charge			35		nC

NOTE:

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

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH,R_G = 25Ω, I_{AS} = -18A, V_{GS} =-10V. Part not recommended for use above this value

③ The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 300μs; duty cycle≤ 2%.

Typical Characteristics

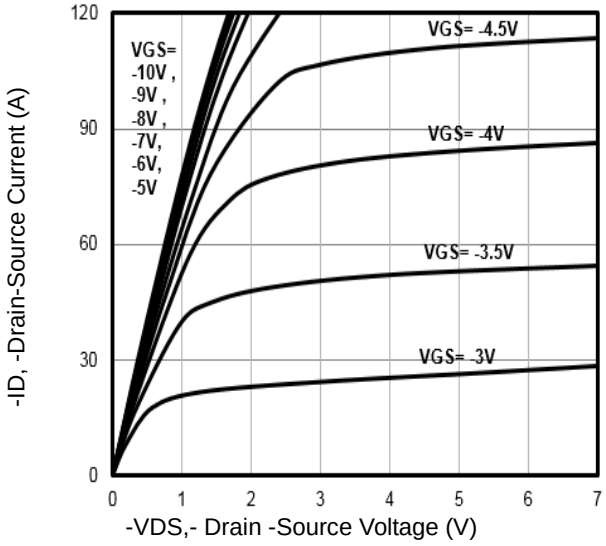


Fig1. Typical Output Characteristics

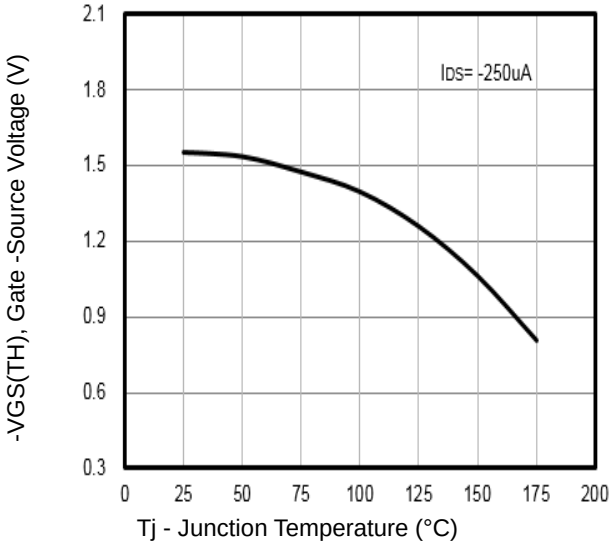


Fig2. $-V_{GS(TH)}$ Gate -Source Voltage Vs.Tj

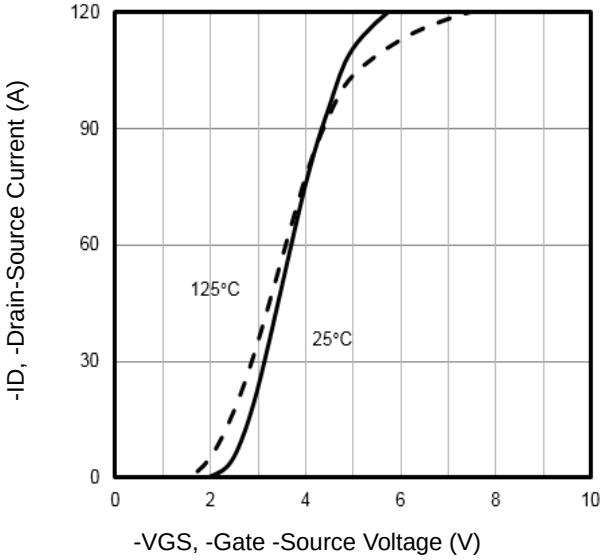


Fig3. Typical Transfer Characteristics

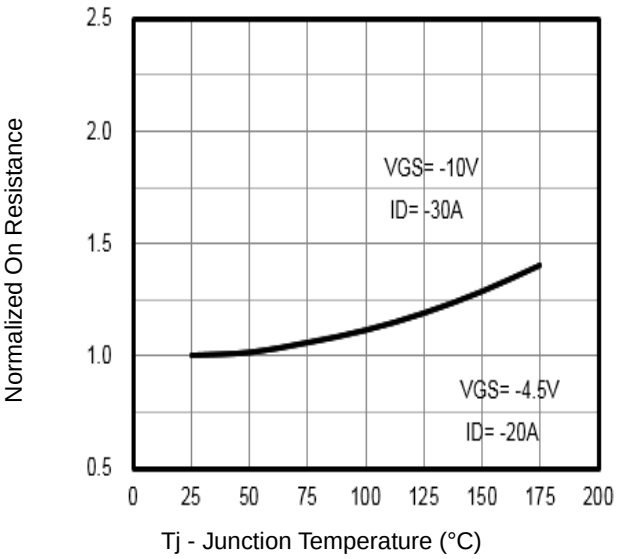


Fig4. Normalized On-Resistance Vs. Tj

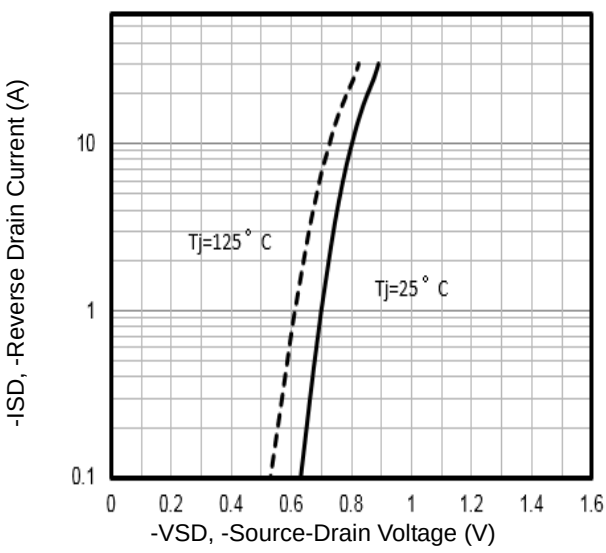


Fig5. Typical Source-Drain Diode Forward Voltage

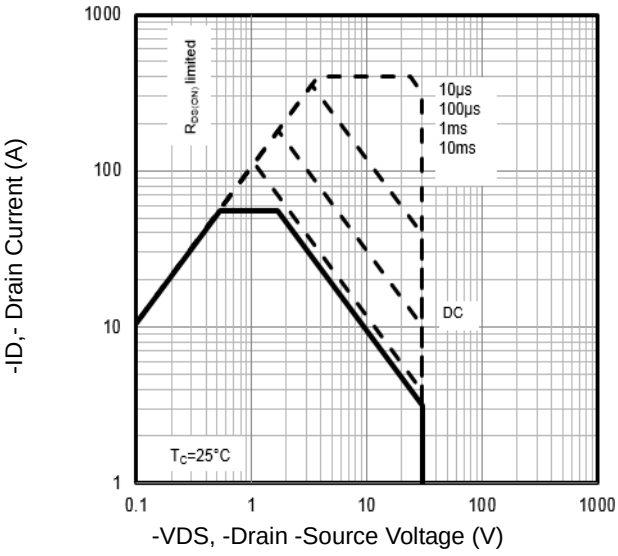


Fig6. Maximum Safe Operating Area

Typical Characteristics

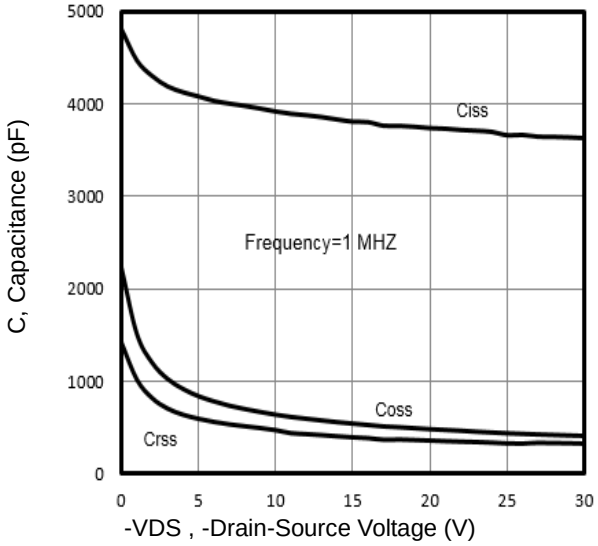


Fig7. Typical Capacitance Vs.Drain-Source Voltage

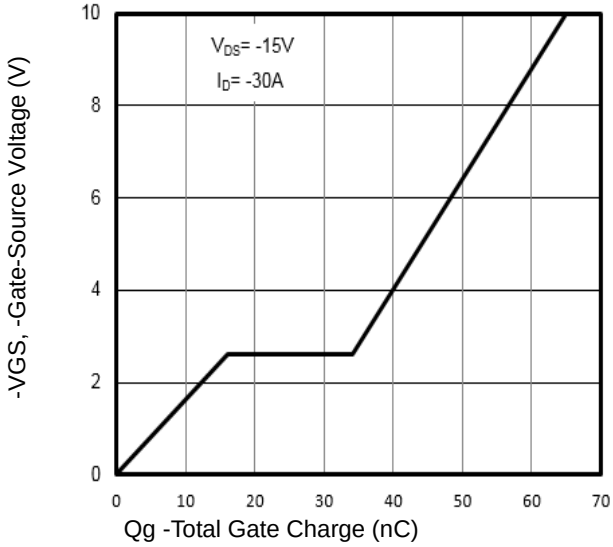
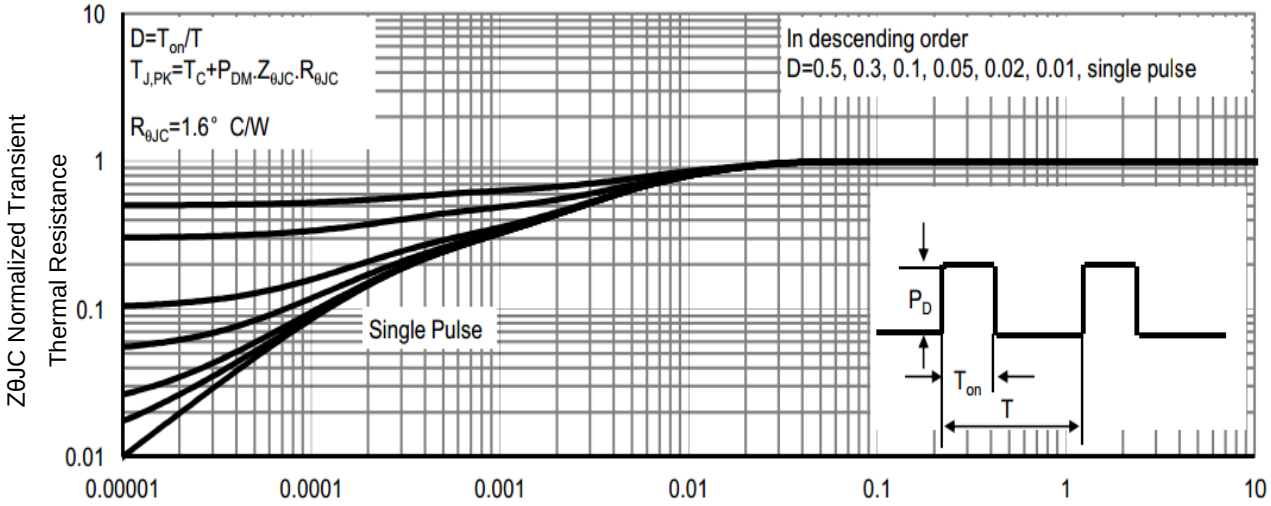


Fig8. Typical Gate Charge Vs.Gate-Source Voltage



Pulse Width (s)

Fig9. Normalized Maximum Transient Thermal Impedance

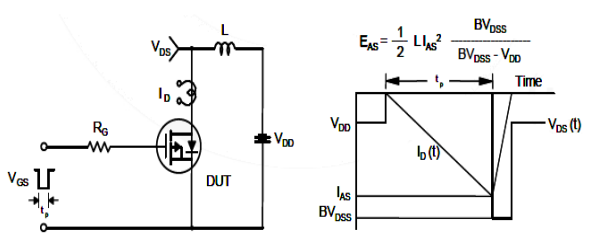


Fig10. Unclamped Inductive Test Circuit and Waveforms

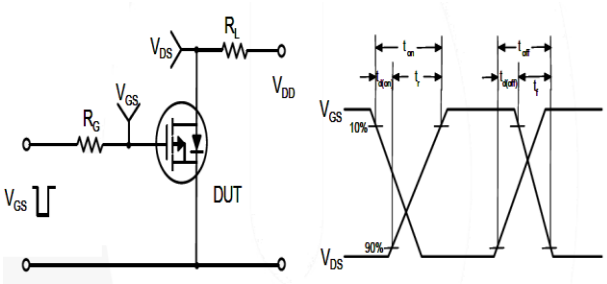
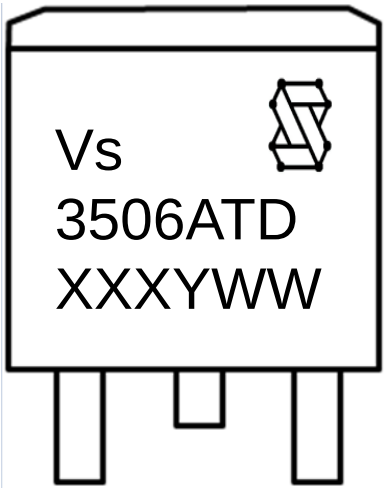


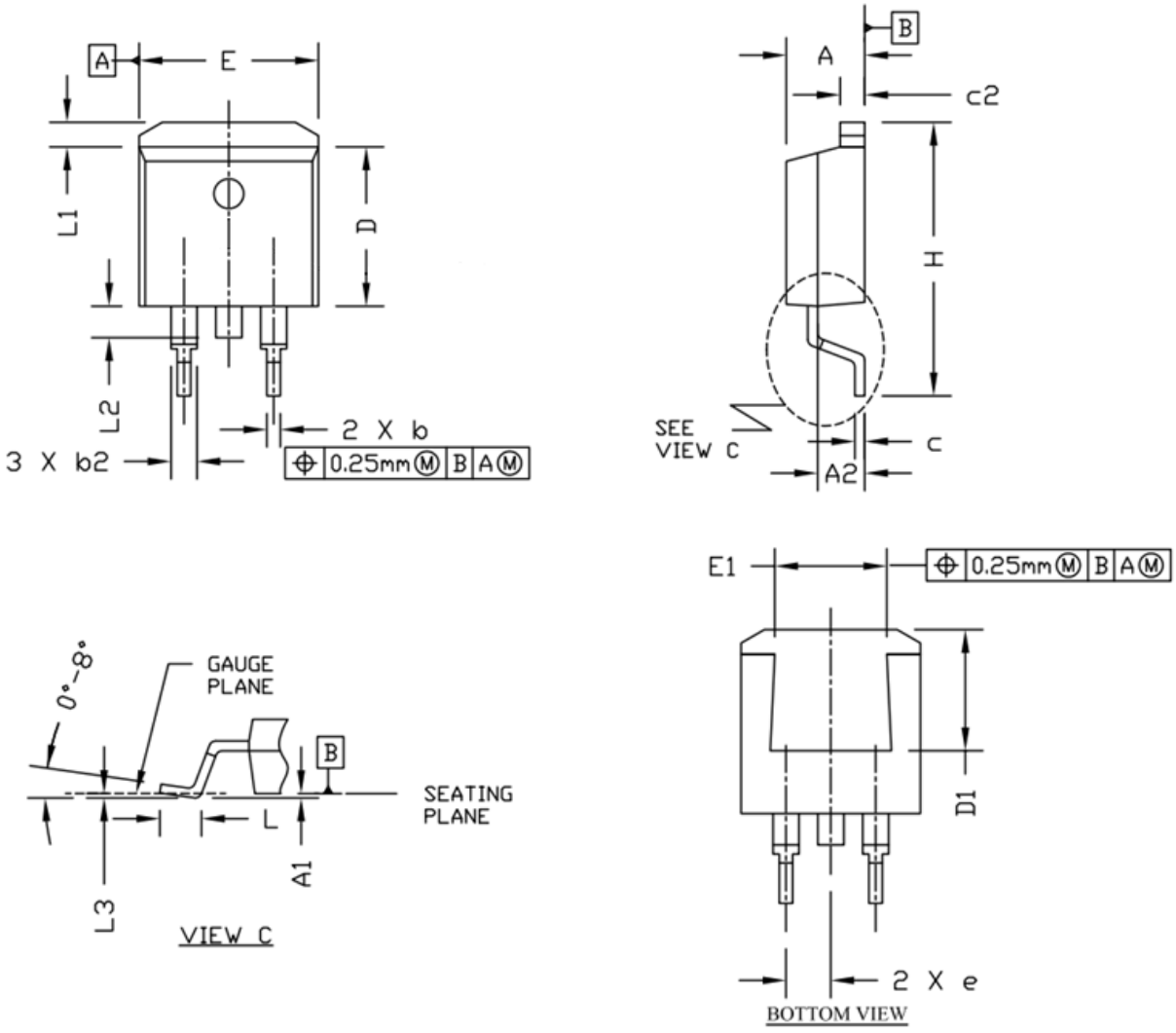
Fig11. Switching Time Test Circuit and waveforms

Marking Information



1st line: Vanguard Code（Vs）， Vanguard Logo
2nd line: Part Number（3506ATD）
3rd line: Date code （XXXYWW）
XXX: Wafer Lot Number
Y: Year Code， e.g. E means 2017
WW: Week Code

TO-263 Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.400	4.570	4.700
A1	0.000	0.100	0.200
A2	2.300	2.400	2.500
b	0.700	0.800	0.900
b2	1.200	1.270	1.360
c	0.381	0.500	0.737
c2	1.220	1.300	1.350
D	8.600	9.200	9.300
D1	6.860		
e	2.540 BSC		
E	9.780	9.880	10.260
E1	6.225		
H	14.700	15.100	15.500
L	2.000	2.550	2.750
L1	1.000	1.200	1.400
L2	1.300	1.600	1.700
L3	0.255 BSC		

Notes:

1. Refer to JEDEC TO-263 variation AB
2. Dimension "D" & "E" do NOT include mold flash, mold flash shall not exceed 0.127mm per side.

Customer Service

Sales and Service:
sales@vgsemi.com

Vanguard Semiconductor CO., LTD
TEL: (86-755) -26902410
FAX: (86-755) -26907027
WEB: www.vgsemi.com