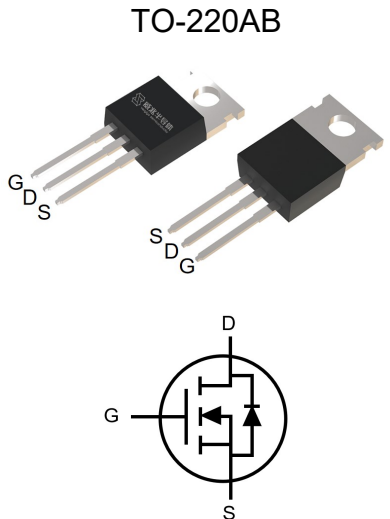


Features

- Enhancement mode
- Very low on-resistance
- Fast Switching and High efficiency
- 100% Avalanche test



Part ID	Package Type	Marking	Packing
VS4401ATH	TO-220AB	4401ATH	50pcs/Tube



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

Symbol	Parameter		Rating	Unit
V(BR)DSS	Drain-Source breakdown voltage		40	V
VGS	Gate-Source voltage		± 25	V
IS	Diode continuous forward current	$T_C = 25^\circ\text{C}$	400	A
ID	Continuous drain current @VGS=10V (Silicon limited)	$T_C = 25^\circ\text{C}$	400	A
ID	Continuous drain current @VGS=10V (Silicon limited)	$T_C = 100^\circ\text{C}$	283	A
ID	Continuous drain current @VGS=10V (Wire bond limited)	$T_C = 25^\circ\text{C}$	130	A
IDM	Pulse drain current tested ①	$T_C = 25^\circ\text{C}$	1000	A
IDSM	Continuous drain current @VGS=10V	$T_A = 25^\circ\text{C}$	29	A
		$T_A = 70^\circ\text{C}$	23	A
EAS	Avalanche energy, single pulsed ②		900	mJ
PD	Maximum power dissipation	$T_C = 25^\circ\text{C}$	375	W
		$T_C = 100^\circ\text{C}$	188	W
PDSM	Maximum power dissipation ③	$T_A = 25^\circ\text{C}$	2	W
		$T_A = 70^\circ\text{C}$	1.3	W
TSTG,TJ	Storage and Junction Temperature Range		-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Max	Unit
R θ JC	Thermal Resistance, Junction-to-Case	0.4	0.5	$^\circ\text{C/W}$
R θ JA	Thermal Resistance, Junction-to-Ambient	62.5	75	$^\circ\text{C/W}$

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(T _j =25°C)	V _{DS} =40V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T _j =125°C)	V _{DS} =40V,V _{GS} =0V	--	--	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±25V,V _{DS} =0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =250μA	2.6	3.1	3.6	V
R _{DS(on)}	Drain-Source On-State Resistance ④	V _{GS} =10V, I _D =80A	--	1.4	1.8	mΩ
		(T _j =100°C)	--	1.7	--	mΩ
Dynamic Electrical Characteristics @ T _j = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =20V,V _{GS} =0V, f=1MHz	9635	12845	17085	pF
C _{oss}	Output Capacitance		1275	1700	2260	pF
C _{rss}	Reverse Transfer Capacitance		1070	1425	1895	pF
R _g	Gate Resistance	f=1MHz	0.2	1.3	5	Ω
Q _g	Total Gate Charge	V _{DS} =20V,I _D =80A, V _{GS} =10V	--	237	315	nC
Q _{gs}	Gate-Source Charge		--	67	89	nC
Q _{gd}	Gate-Drain Charge		--	70	105	nC
Switching Characteristics						
T _{d(on)}	Turn-on Delay Time	V _{DD} =20V, I _D =80A, R _G =3Ω, V _{GS} =10V	--	45	--	ns
T _r	Turn-on Rise Time		--	200	--	ns
T _{d(off)}	Turn-Off Delay Time		--	116	--	ns
T _f	Turn-Off Fall Time		--	112	--	ns
Source- Drain Diode Characteristics@ T _j = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =80A,V _{GS} =0V	--	0.8	1.2	V
T _{rr}	Reverse Recovery Time	I _{sd} =80A, V _{GS} =0V	--	39	78	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	--	32	64	nC

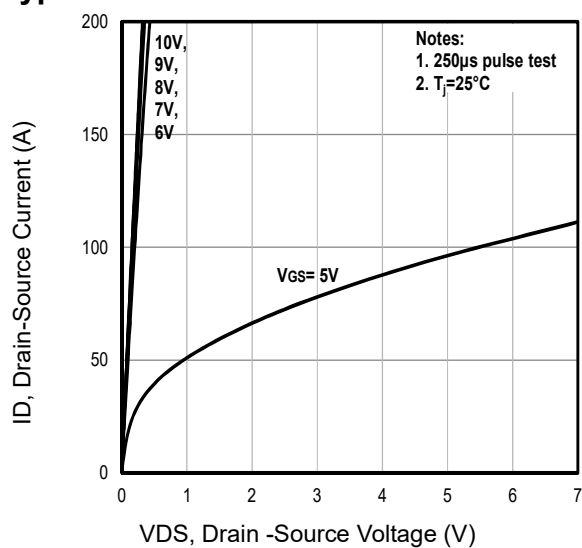
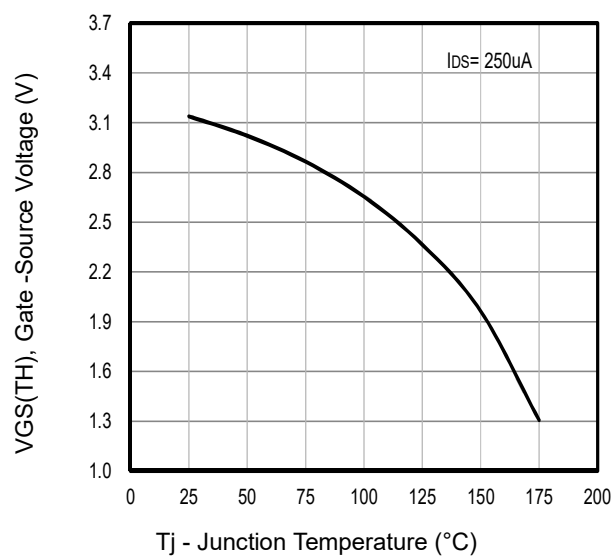
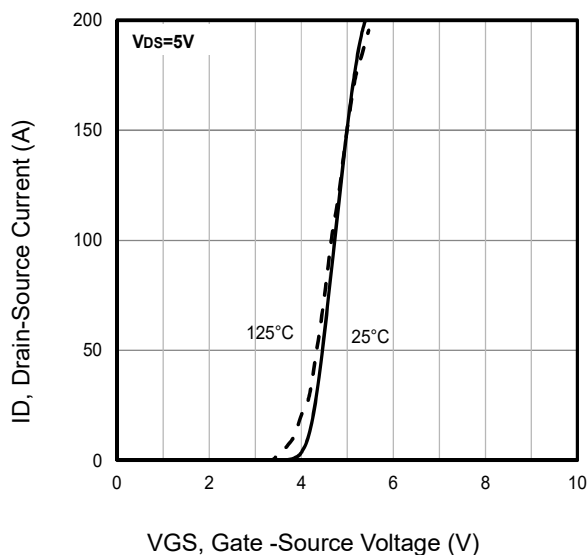
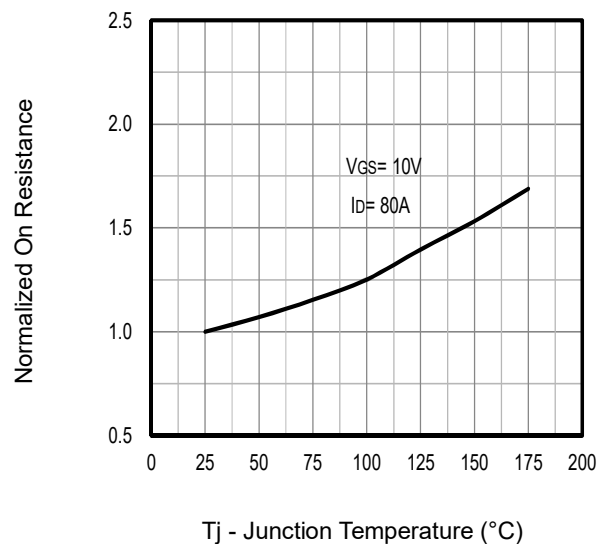
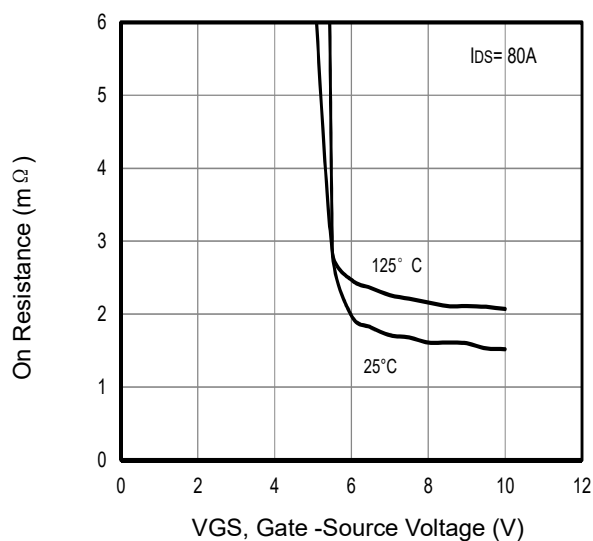
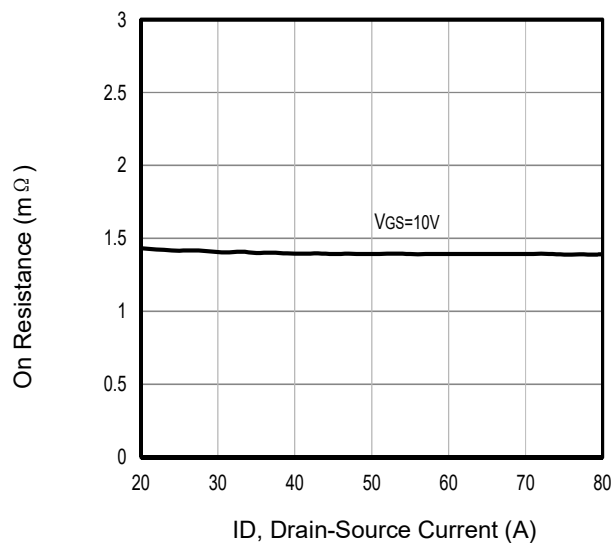
NOTE: ① Single pulse; pulse width ≤ 100μs.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 60A, V_{GS} = 10V. Part not recommended for use above this value

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

④ Pulse width ≤ 380μs; duty cycles ≤ 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. On Resistance Vs Gate-Source Voltage

Fig6. On Resistance Vs Drain Current and Gate Voltage

Typical Characteristics

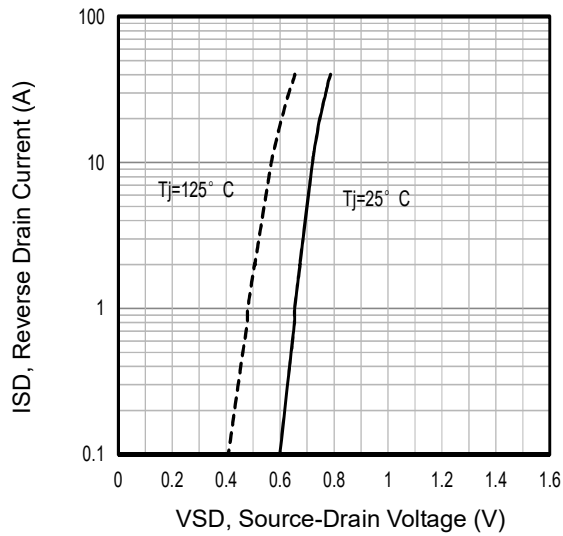


Fig7. Typical Source-Drain Diode Forward Voltage

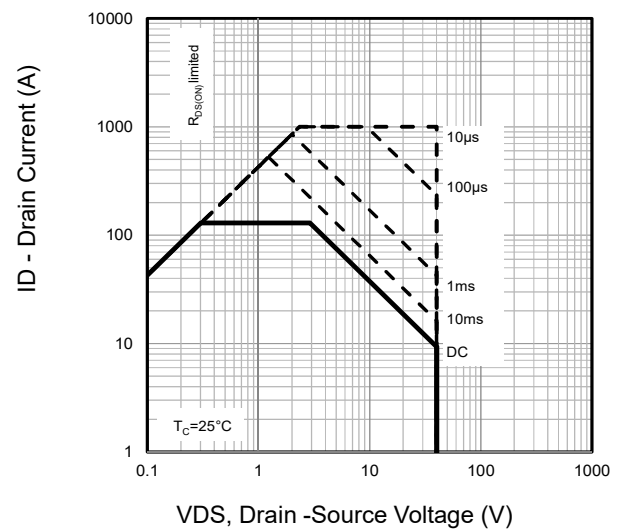


Fig8. Maximum Safe Operating Area

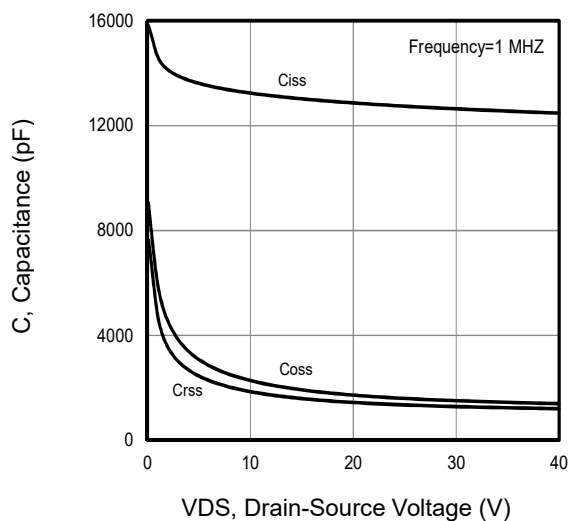


Fig9. Typical Capacitance Vs. Drain-Source Voltage

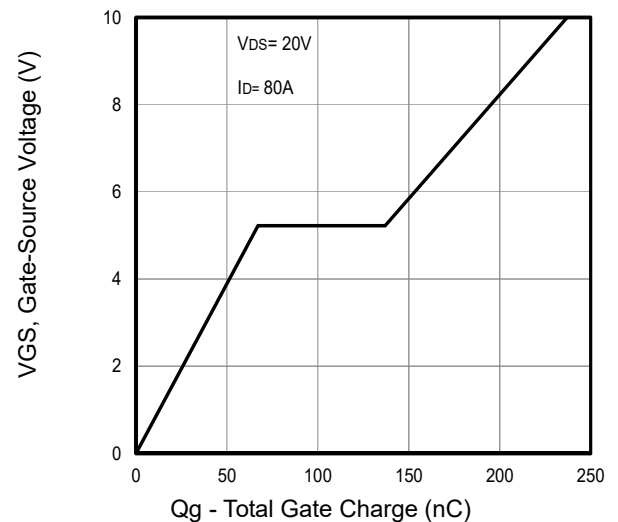


Fig10. Typical Gate Charge Vs. Gate-Source Voltage

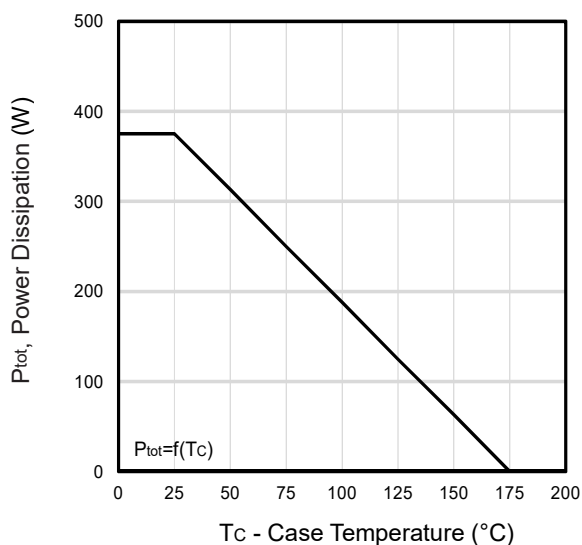


Fig11. Power Dissipation Vs. Case Temperature

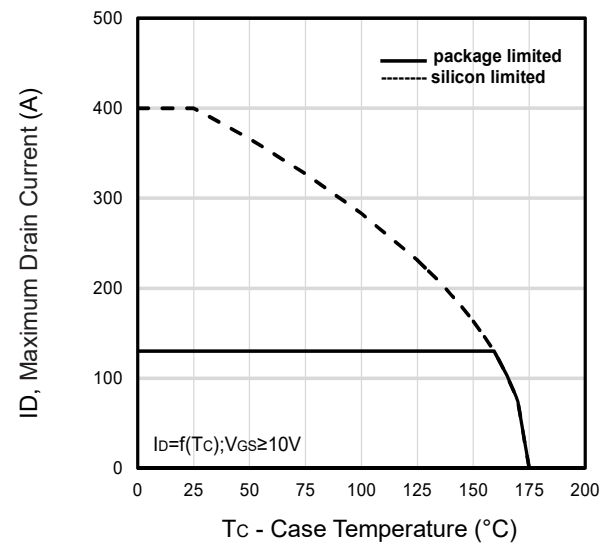


Fig12. Maximum Drain Current Vs. Case Temperature

Typical Characteristics

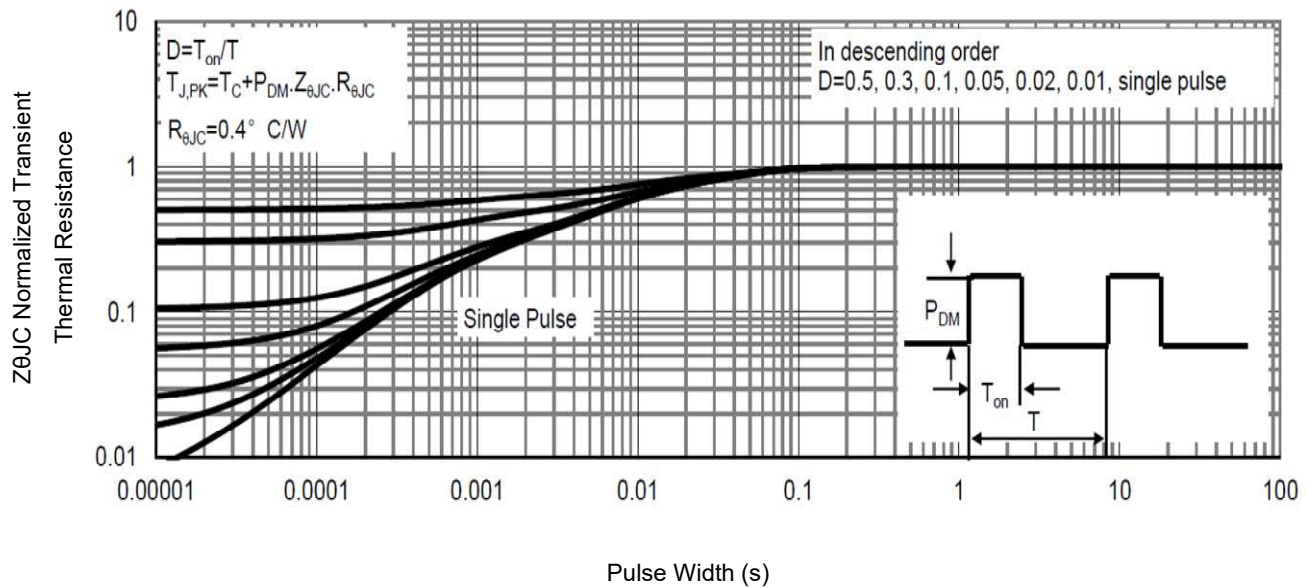


Fig13 . Normalized Maximum Transient Thermal Impedance

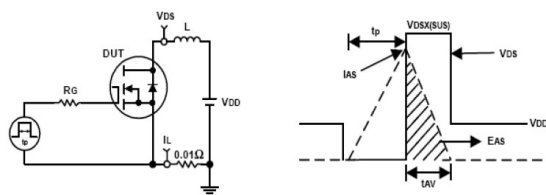


Fig14. Unclamped Inductive Test Circuit and waveforms

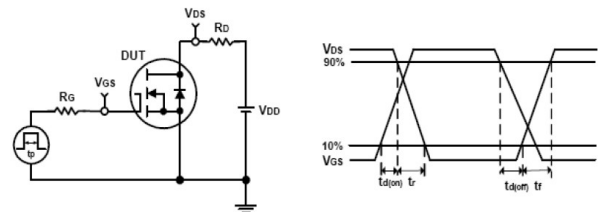
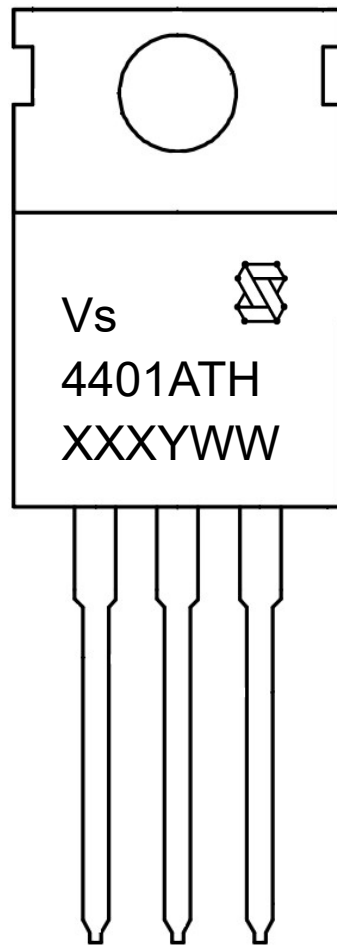


Fig15. Switching Time Test Circuit and waveforms

Marking Information



1st line: Vergiga Code (Vs) ,Vergiga Logo

2nd line: Part Number (4401ATH)

3rd line: Date code (XXXYWW)

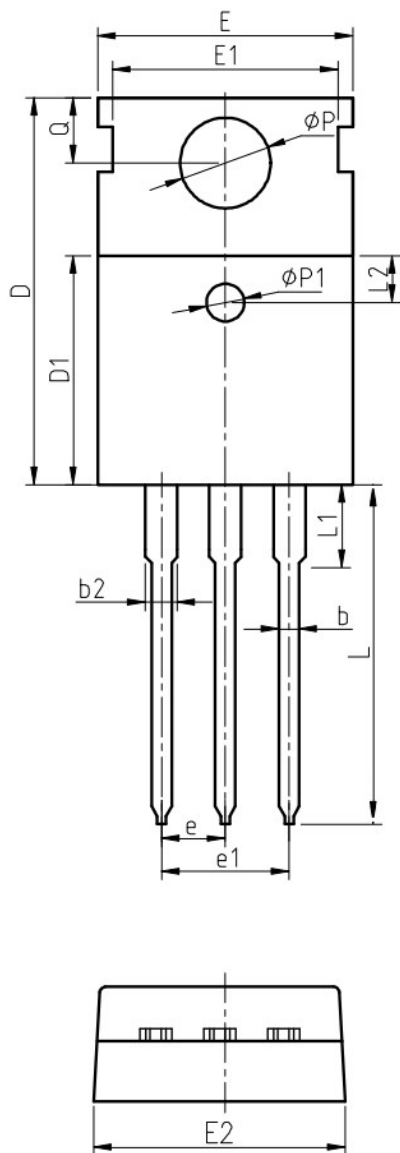
XXX: Wafer Lot Number Code , code changed with Lot Number

Y: Year Code, refer to table below

WW: Week Code (01 to 53)

Code	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

TO-220AB Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.30	4.52	4.70
A1	1.15	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	1.00
b2	1.17	1.32	1.50
c	0.45	0.50	0.61
D	15.30	15.65	15.90
D1	9.00	9.20	9.40
DEP	0.05	0.10	0.25
E	9.66	9.90	10.28
E1	-	8.70	-
E2	9.80	10.00	10.20
ΦP1	1.40	1.50	1.60
e	2.54 BSC		
e1	5.08 BSC		
H1	6.40	6.50	6.80
L	12.70	-	14.27
L1	-	-	3.95
L2	2.40	2.50	2.60
ΦP	3.53	3.60	3.70
Q	2.70	2.80	2.90
θ1	5 °	7 °	9 °
θ2	1 °	3 °	5 °

Notes:

1. Refer to JEDEC TO-220 variation AB
2. Dimension "D" and "E" do NOT include mold flash. Mold flash shall not exceed 0.127mm per side.

Customer Service

Sales and Service:

sales@vgsemi.com

Vergiga Semiconductor CO., LTD

TEL: (86-755) -26902410

FAX: (86-755) -26907027

WEB: www.vgsemi.com