

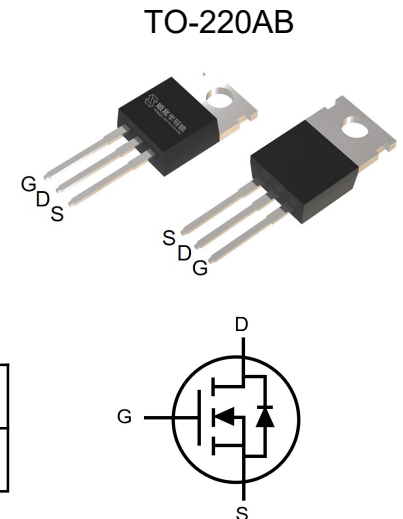
## Features

- Enhancement mode
- Very low on-resistance  $R_{DS(on)}$
- Fast Switching and High efficiency
- 100% Avalanche test

|                                      |     |            |
|--------------------------------------|-----|------------|
| $V_{DS}$                             | 80  | V          |
| $R_{DS(on),TYP}@ V_{GS}=10\text{ V}$ | 4.5 | m $\Omega$ |
| $I_D$                                | 160 | A          |



| Part ID   | Package Type | Marking | Packing    |
|-----------|--------------|---------|------------|
| VS8402ATH | TO-220AB     | 8402ATH | 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                 | 80                        | V                |   |
| $V_{GS}$      | Gate-Source voltage                            | $\pm 25$                  | V                |   |
| $I_S$         | Diode continuous forward current               | $T_C = 25^\circ\text{C}$  | 160              | A |
| $I_D$         | Continuous drain current @ $V_{GS}=10\text{V}$ | $T_C = 25^\circ\text{C}$  | 160              | A |
|               |  | $T_C = 100^\circ\text{C}$ | 113              | A |
| $I_{DM}$      | Pulse drain current tested ①                   | $T_C = 25^\circ\text{C}$  | 640              | A |
| $I_{DSM}$     | Continuous drain current @ $V_{GS}=10\text{V}$ | $T_A = 25^\circ\text{C}$  | 14               | A |
|               |  | $T_A = 70^\circ\text{C}$  | 11               | A |
| $E_{AS}$      | Avalanche energy, single pulsed ②              | 342                       | mJ               |   |
| $P_D$         | Maximum power dissipation                      | $T_C = 25^\circ\text{C}$  | 259              | W |
| $P_{DSM}$     | Maximum power dissipation ③                    | $T_A = 25^\circ\text{C}$  | 2                | W |
| $T_{STG,TJ}$  | Storage and Junction Temperature Range         | -55 to 175                | $^\circ\text{C}$ |   |

## Thermal Characteristics

| Symbol          | Parameter                               | Typical | Max | Unit               |
|-----------------|---|---------|-----|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 0.58    | 0.7 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 62.5    | 75  | $^\circ\text{C/W}$ |

**Electrical Characteristics**

| Symbol   | Parameter  | Condition  | Min. | Typ. | Max.  | Unit |
|--|--|--|------|------|-------|------|
| <b>Static Electrical Characteristics @ T<sub>J</sub>=25°C (unless otherwise stated)</b>    |  |  |      |      |       |      |
| V(BR)DSS   | Drain-Source Breakdown Voltage                         | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA   | 80   | --   | --    | V    |
| IDSS   | Zero Gate Voltage Drain Current                        | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V  | --   | --   | 1     | μA   |
|  | Zero Gate Voltage Drain Current(T <sub>J</sub> =125°C) | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V  | --   | --   | 100   | μA   |
| IGSS   | Gate-Body Leakage Current                              | V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V   | --   | --   | ±100  | nA   |
| VGS(th)  | Gate Threshold Voltage                                 | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                     | 2.6  | 3.1  | 3.6   | V    |
| RDS(on)  | Drain-Source On-State Resistance ④                     | V <sub>GS</sub> =10V, I <sub>D</sub> =80A  | --   | 4.5  | 6     | mΩ   |
|  |  | T <sub>J</sub> =100°C  | --   | 6.3  | --    | mΩ   |
| <b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b> |  |  |      |      |       |      |
| Ciss   | Input Capacitance                                      | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,<br>f=1MHz   | 6490 | 8655 | 11510 | pF   |
| Coss   | Output Capacitance                                     |  | 360  | 480  | 640   | pF   |
| Crss   | Reverse Transfer Capacitance                           |  | 265  | 350  | 465   | pF   |
| Rg   | Gate Resistance  | f=1MHz   | 0.2  | 2.7  | 5     | Ω    |
| Qg   | Total Gate Charge                                      | V <sub>DS</sub> =40V, I <sub>D</sub> =40A,<br>V <sub>GS</sub> =10V                           | --   | 144  | 192   | nC   |
| Qgs  | Gate-Source Charge                                     |  | --   | 40   | 53    | nC   |
| Qgd  | Gate-Drain Charge                                      |  | --   | 41   | 62    | nC   |
| <b>Switching Characteristics</b>   |  |  |      |      |       |      |
| Td(on)   | Turn-on Delay Time                                     | V <sub>DD</sub> =40V,<br>I <sub>D</sub> =40A,<br>R <sub>G</sub> =3Ω,<br>V <sub>GS</sub> =10V | --   | 22   | --    | ns   |
| Tr   | Turn-on Rise Time                                      |  | --   | 85   | --    | ns   |
| Td(off)  | Turn-Off Delay Time                                    |  | --   | 101  | --    | ns   |
| Tf   | Turn-Off Fall Time                                     |  | --   | 59   | --    | ns   |
| <b>Source- Drain Diode Characteristics@ T<sub>J</sub> = 25°C (unless otherwise stated)</b> |  |  |      |      |       |      |
| VSD  | Forward on voltage                                     | I <sub>SD</sub> =80A, V <sub>GS</sub> =0V  | --   | 0.9  | 1.2   | V    |
| Trr  | Reverse Recovery Time                                  | T <sub>J</sub> =25°C, I <sub>SD</sub> =40A,<br>V <sub>GS</sub> =0V                           | --   | 33   | 66    | ns   |
| Qrr  | Reverse Recovery Charge                                | di/dt=100A/μs  | --   | 44   | 88    | nC   |

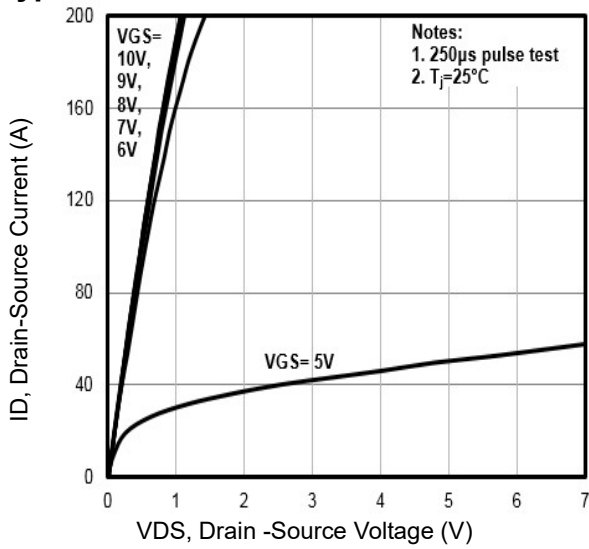
NOTE: ① Repetitive rating; pulse width limited by max junction temperature.

② Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25°C, L = 0.5mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 37A, V<sub>GS</sub> = 10V. Part not recommended for use above this value

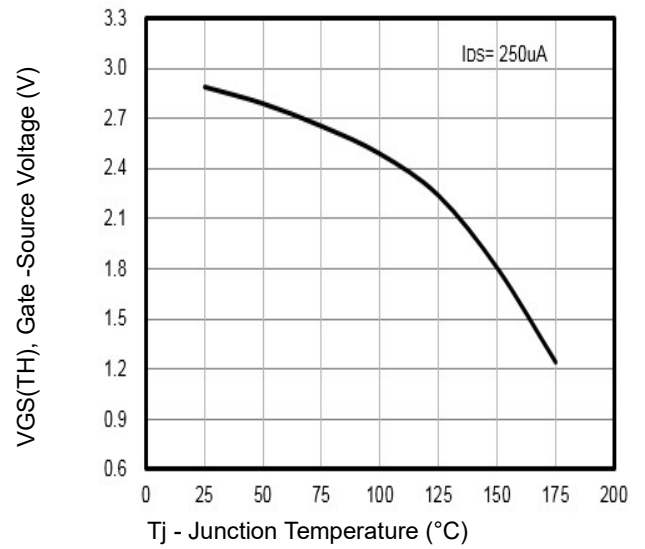
③ The power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 380μs; duty cycle ≤ 2%.

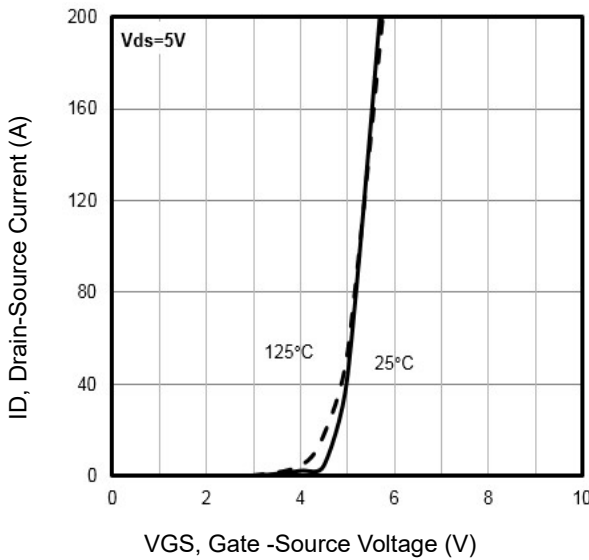
**Typical Characteristics**



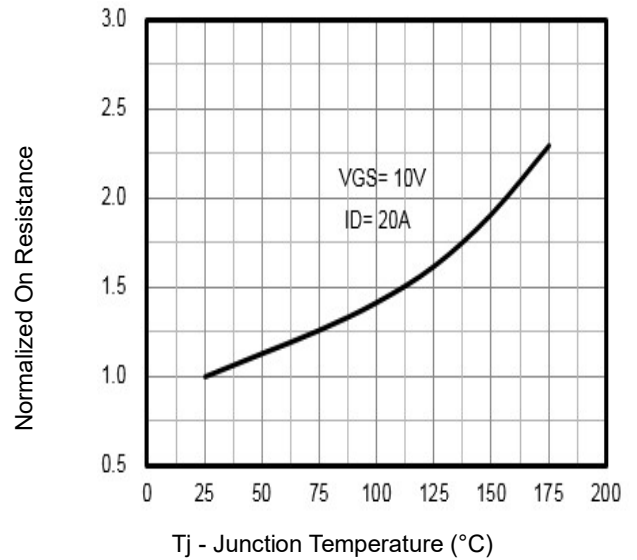
**Fig1.** Typical Output Characteristics



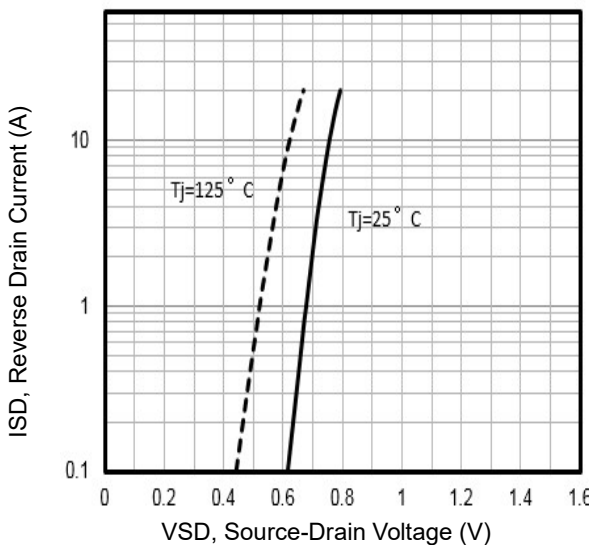
**Fig2.**  $V_{GS(TH)}$  Gate -Source Voltage Vs.  $T_j$



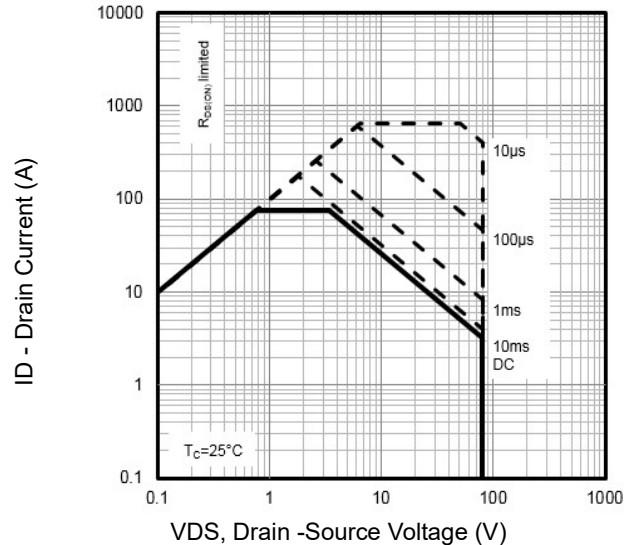
**Fig3.** Typical Transfer Characteristics



**Fig4.** Normalized On-Resistance Vs.  $T_j$

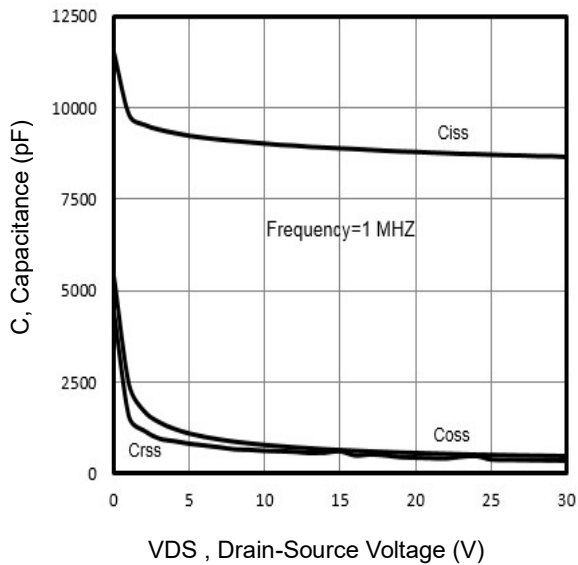


**Fig5.** Typical Source-Drain Diode Forward Voltage

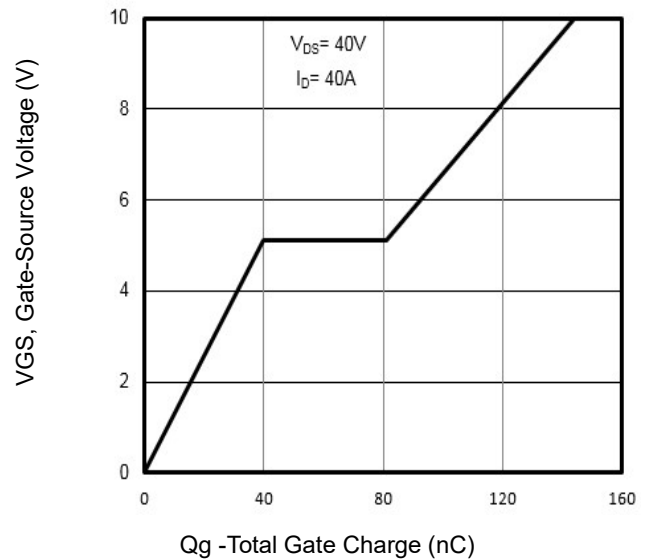


**Fig6.** Maximum Safe Operating Area

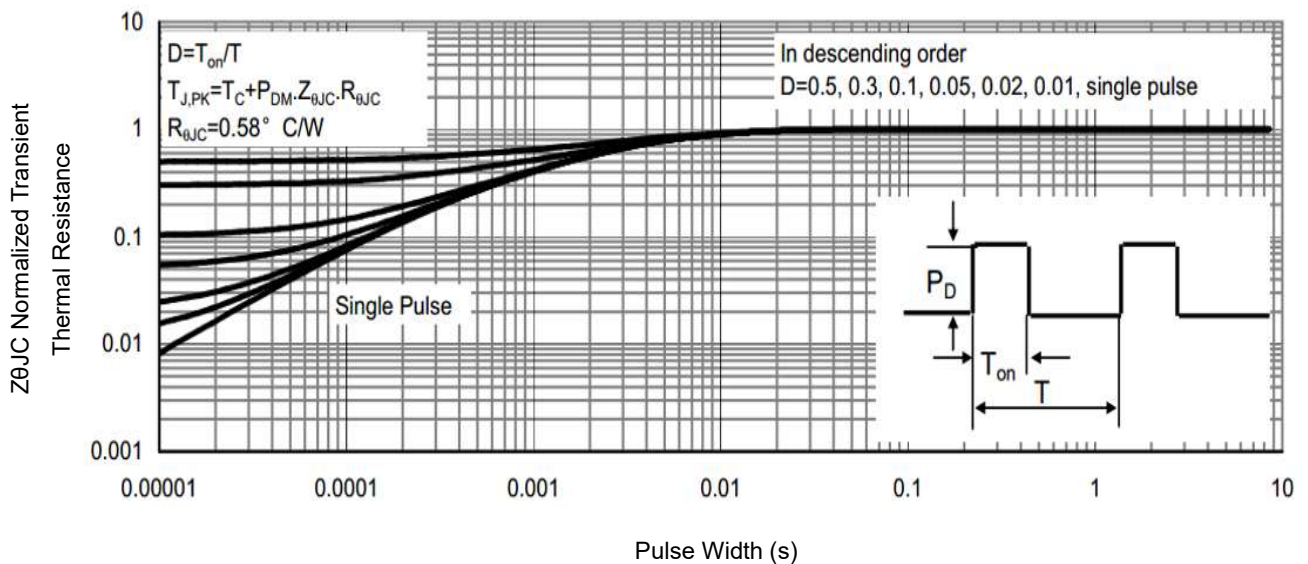
**Typical Characteristics**



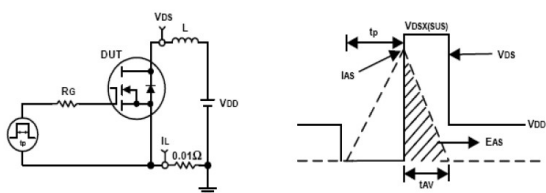
**Fig7.** Typical Capacitance Vs.Drain-Source Voltage



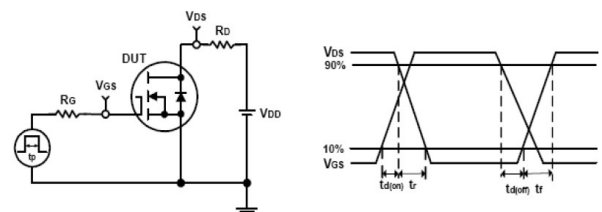
**Fig8.** Typical Gate Charge Vs.Gate-Source Voltage



**Fig9.** Normalized Maximum Transient Thermal Impedance

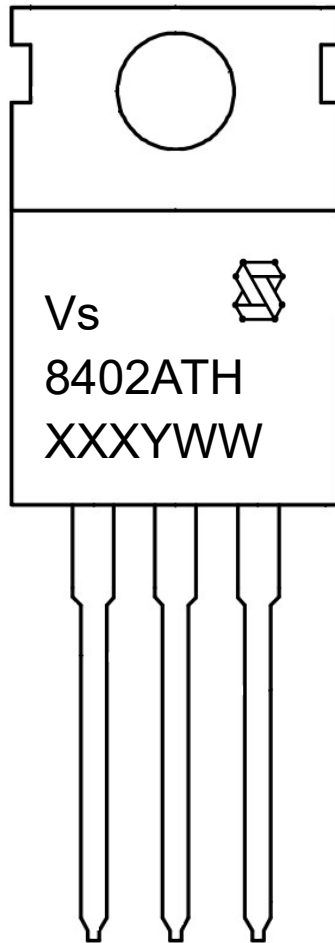


**Fig10.** Unclamped Inductive Test Circuit and waveforms



**Fig11.** Switching Time Test Circuit and waveforms

Marking Information



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

2nd line: Part Number (8402ATH)

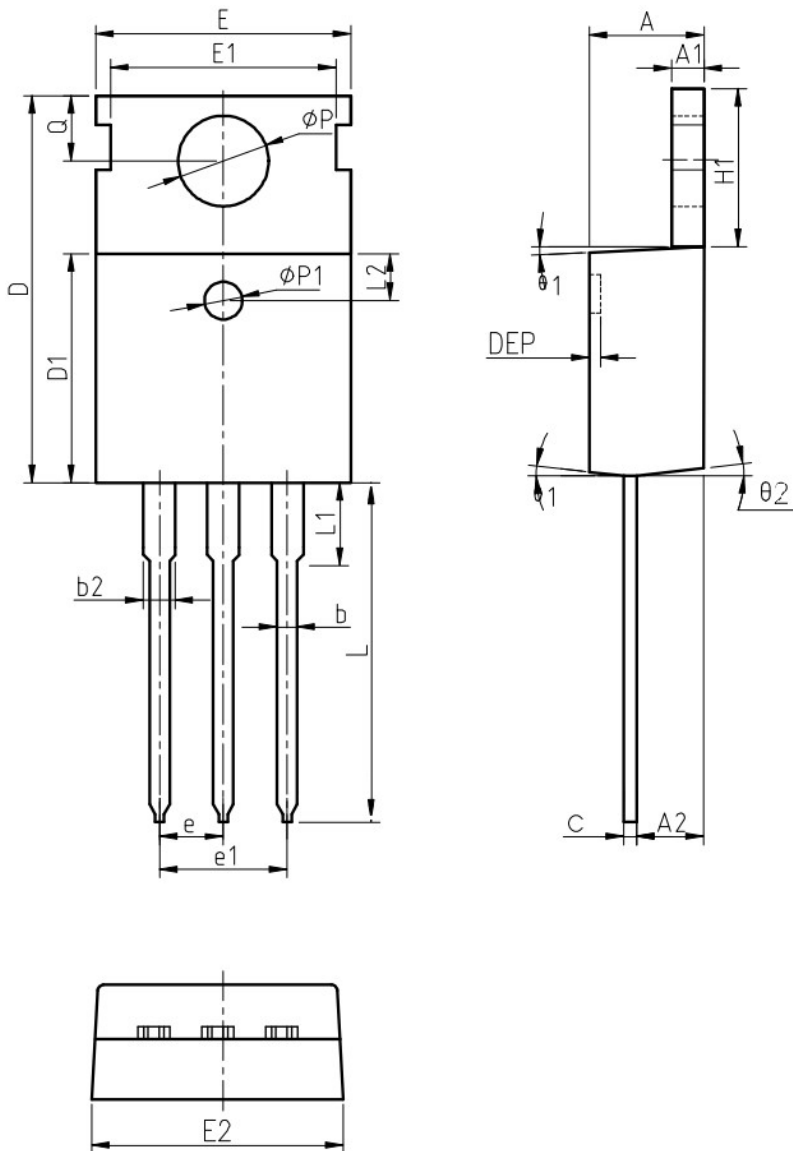
3rd line: Date code (XXXYWW)

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   |
| <b>A</b>                     | 4.30                  | 4.52  | 4.70  |
| <b>A1</b>                    | 1.15                  | 1.30  | 1.40  |
| <b>A2</b>                    | 2.20                  | 2.40  | 2.60  |
| <b>b</b>                     | 0.70                  | 0.80  | 1.00  |
| <b>b2</b>                    | 1.17                  | 1.32  | 1.50  |
| <b>c</b>                     | 0.45                  | 0.50  | 0.61  |
| <b>D</b>                     | 15.30                 | 15.65 | 15.90 |
| <b>D1</b>                    | 9.00                  | 9.20  | 9.40  |
| <b>DEP</b>                   | 0.05                  | 0.10  | 0.25  |
| <b>E</b>                     | 9.66                  | 9.90  | 10.28 |
| <b>E1</b>                    | -                     | 8.70  | -     |
| <b>E2</b>                    | 9.80                  | 10.00 | 10.20 |
| $\phi P1$                    | 1.40                  | 1.50  | 1.60  |
| <b>e</b>                     | 2.54 BSC              |       |       |
| <b>e1</b>                    | 5.08 BSC              |       |       |
| <b>H1</b>                    | 6.40                  | 6.50  | 6.80  |
| <b>L</b>                     | 12.70                 | -     | 14.27 |
| <b>L1</b>                    | -                     | -     | 3.95  |
| <b>L2</b>                    | 2.40                  | 2.50  | 2.60  |
| $\phi P$                     | 3.53                  | 3.60  | 3.70  |
| <b>Q</b>                     | 2.70                  | 2.80  | 2.90  |
| <b><math>\theta_1</math></b> | 5 °                   | 7 °   | 9 °   |
| <b><math>\theta_2</math></b> | 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](mailto:sales@vgsemi.com)
**Vergiga Semiconductor CO., LTD**
**TEL:** (86-755) -26902410

**FAX:** (86-755) -26907027

**WEB:** [www.vgsemi.com](http://www.vgsemi.com)

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [MOSFET](#) category:*

*Click to view products by [Vanguard](#) manufacturer:*

Other Similar products are found below :

[614233C](#) [648584F](#) [IRFD120](#) [IRFF430](#) [JANTX2N5237](#) [2N7000](#) [FCA20N60\\_F109](#) [FDZ595PZ](#) [AOD464](#) [2SK2267\(Q\)](#) [2SK2545\(Q,T\)](#)  
[405094E](#) [423220D](#) [MIC4420CM-TR](#) [VN1206L](#) [614234A](#) [715780A](#) [SSM6J414TU,LF\(T](#) [751625C](#) [PSMN4R2-30MLD](#)  
[TK31J60W5,S1VQ\(O](#) [2SK2614\(TE16L1,Q\)](#) [DMN1017UCP3-7](#) [EFC2J004NUZTDG](#) [FCAB21350L1](#) [P85W28HP2F-7071](#) [DMN1053UCP4-7](#)  
[NTE2384](#) [NTE2969](#) [NTE6400A](#) [DMN2080UCB4-7](#) [DMN61D9UWQ-13](#) [US6M2GTR](#) [DMN31D5UDJ-7](#) [SSM6P54TU,LF](#) [DMP22D4UFO-](#)  
[7B](#) [IPS60R3K4CEAKMA1](#) [DMN1006UCA6-7](#) [DMN16M9UCA6-7](#) [STF5N65M6](#) [STU5N65M6](#) [C3M0021120D](#) [DMN13M9UCA6-7](#)  
[BSS340NWH6327XTSA1](#) [MCM3400A-TP](#) [DMTH10H4M6SPS-13](#) [IRF40SC240ARMA1](#) [IPS60R1K0PFD7SAKMA1](#)  
[IPS60R360PFD7SAKMA1](#) [IPS60R600PFD7SAKMA1](#)