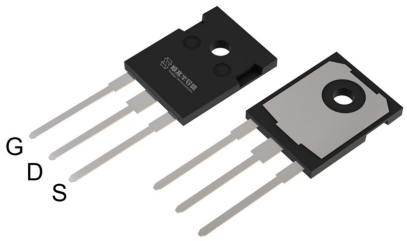
## Features

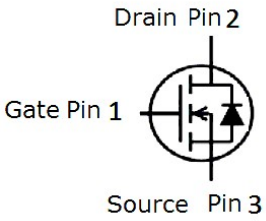
- Enhancement mode
- Very Low on-resistance $R_{DS(on)}$
- Fast Switching and High efficiency
- 100% Avalanche test

| | | |
|---|---|---|
| $V_{DS}$ | 100 | V |
| $R_{DS(on),TYP}$@ $V_{GS}$=10 V | 2.6 | mΩ |
| $I_D$ | 320 | A |

TO-247




Pb-Free RoHS HF Halogen-Free




| Part ID | Package Type | Marking | Packing |
|---|---|---|---|
| VS320N10AU | TO-247 | 320N10A | 30pcs/Tube |

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

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage | | 100 | V |
| $V_{GS}$ | Gate-Source voltage | | ±25 | V |
| $I_S$ | Diode continuous forward current | $T_C$=25°C | 320 | A |
| $I_D$ | Continuous drain current @VGS=10V | $T_C$=25°C | 320 | A |
| | | $T_C$=100°C | 226 | A |
| $I_{DM}$ | Pulse drain current tested ① | $T_C$=25°C | 1280 | A |
| $I_{DSM}$ | Continuous drain current @VGS=10V | $T_A$=25°C | 23 | A |
| | | $T_A$=70°C | 18 | A |
| EAS | Avalanche energy, single pulsed ② | | 625 | mJ |
| $P_D$ | Maximum power dissipation | $T_C$=25°C | 500 | W |
| | | $T_C$=100°C | 250 | W |
| $P_{DSM}$ | Maximum power dissipation ③ | $T_A$=25°C | 2.5 | W |
| | | $T_A$=70°C | 1.6 | W |
| $T_{STG}$,$T_J$ | Storage and Junction Temperature Range | | -55 to 175 | °C |

## Thermal Characteristics

| Symbol | Parameter | Typical | Max | Unit |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 0.3 | 0.36 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 50 | 60 | °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 | 100 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=100V,$V_{GS}$=0V | -- | -- | 1 | μA |
| | Zero Gate Voltage Drain Current($T_j$=125℃) | $V_{DS}$=100V,$V_{GS}$=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, $I_D$=120A | -- | 2.6 | 3.1 | mΩ |
| | | $T_j$=100℃ | -- | 3.9 | -- | mΩ |
| **Dynamic Electrical Characteristics @ $T_j$ = 25°C (unless otherwise stated)** | | | | | | |
| Ciss | Input Capacitance | $V_{DS}$=30V,$V_{GS}$=0V, f=1MHz | 23480 | 31305 | 41635 | pF |
| Coss | Output Capacitance | | 1000 | 1335 | 1775 | pF |
| Crss | Reverse Transfer Capacitance | | 325 | 430 | 570 | pF |
| Rg | Gate Resistance | f=1MHz | 0.2 | 0.7 | 5 | Ω |
| Qg | Total Gate Charge | $V_{DS}$=50V,$I_D$=80A, $V_{GS}$=10V | -- | 452 | 600 | nC |
| Qgs | Gate-Source Charge | | -- | 131 | 174 | nC |
| Qgd | Gate-Drain Charge | | -- | 119 | 179 | nC |
| **Switching Characteristics** | | | | | | |
| Td(on) | Turn-on Delay Time | $V_{DD}$=50V, $I_D$=80A, $R_G$=3Ω, $V_{GS}$=10V | -- | 77 | -- | ns |
| Tr | Turn-on Rise Time | | -- | 142 | -- | ns |
| Td(off) | Turn-Off Delay Time | | -- | 190 | -- | ns |
| Tf | Turn-Off Fall Time | | -- | 137 | -- | ns |
| **Source- Drain Diode Characteristics@ $T_j$= 25°C (unless otherwise stated)** | | | | | | |
| $V_{SD}$ | Forward on voltage | $I_{SD}$=120A,$V_{GS}$=0V | -- | 0.9 | 1.2 | V |
| Trr | Reverse Recovery Time | $T_j$=25℃,$I_{sd}$=80A, $V_{GS}$=0V di/dt=100A/μs | -- | 63 | -- | ns |
| Qrr | Reverse Recovery Charge | | -- | 144 | -- | 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, $I_{AS}$ =50A, $V_{GS}$ =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 ≤ 380μs; duty cycle≤ 2%.

## Typical Characteristics

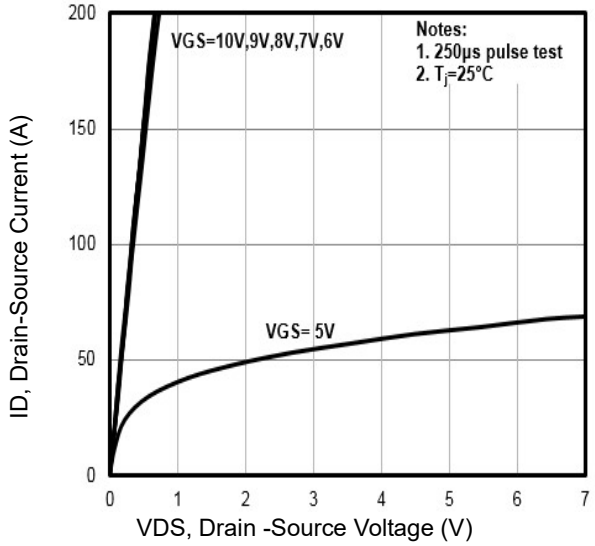



**Fig1.** Typical Output Characteristics

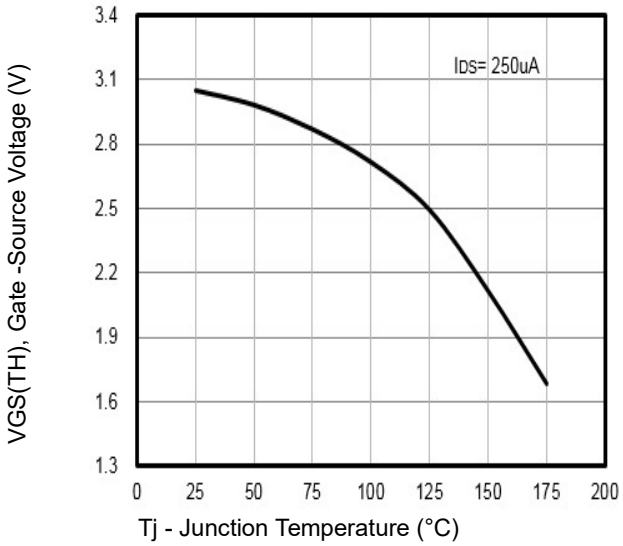



**Fig2.** $V_{GS(TH)}$ Gate -Source Voltage Vs.Tj

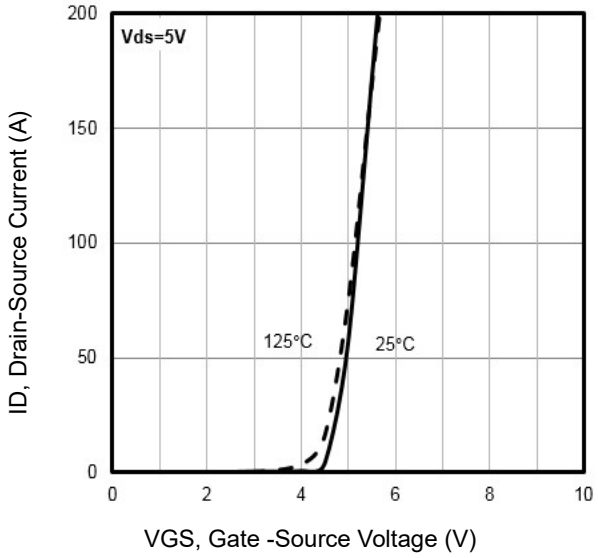



**Fig3.** Typical Transfer Characteristics

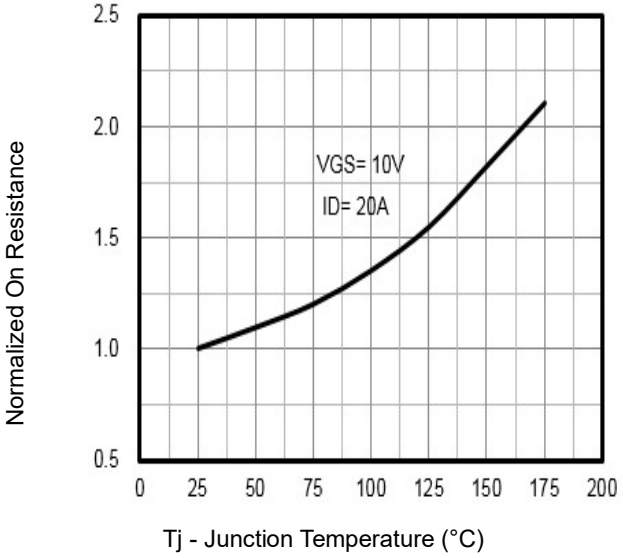



**Fig4.** Normalized On-Resistance Vs. Tj

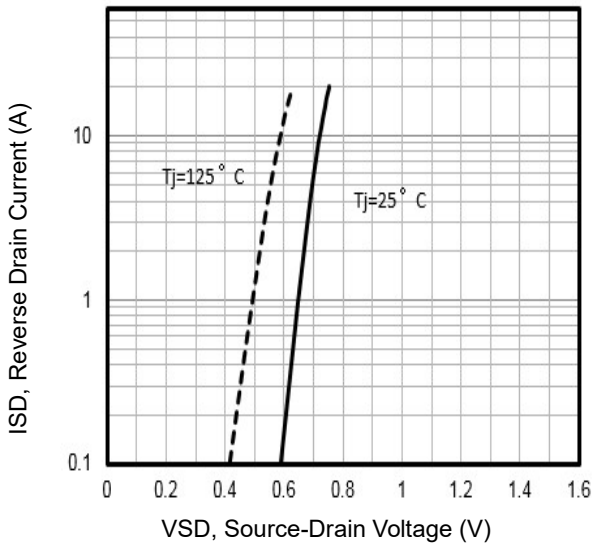



**Fig5.** Typical Source-Drain Diode Forward Voltage

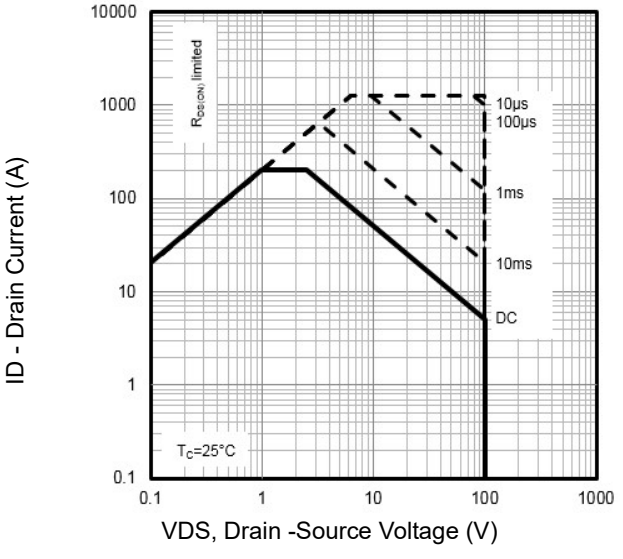



**Fig6.** Maximum Safe Operating Area

## Typical Characteristics

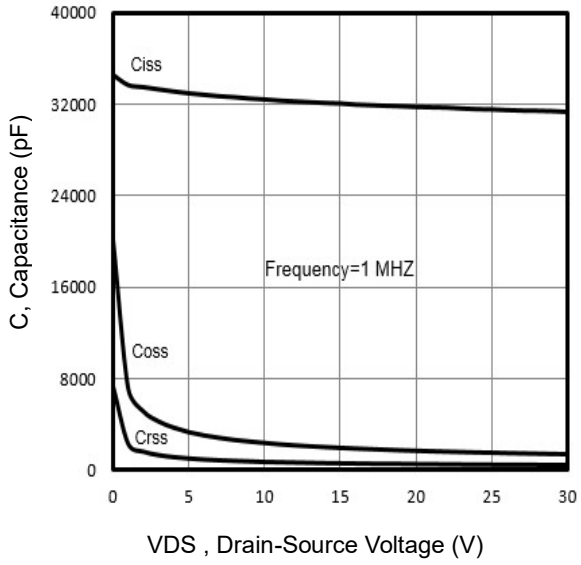



**Fig7.** Typical Capacitance Vs.Drain-Source Voltage

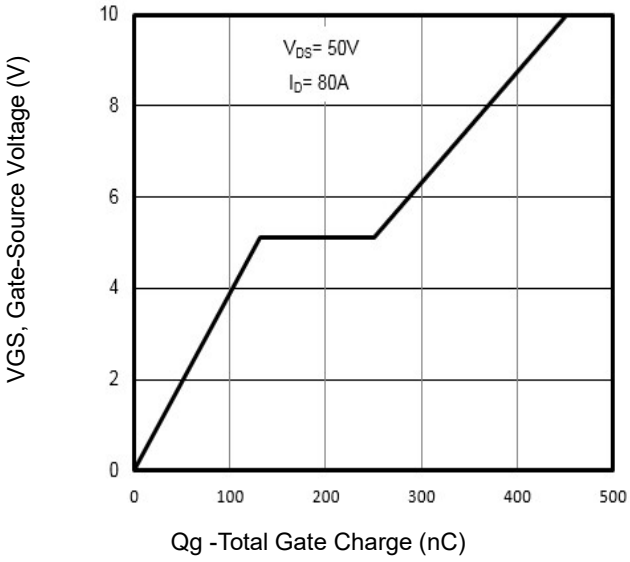



**Fig8.** Typical Gate Charge Vs.Gate-Source Voltage

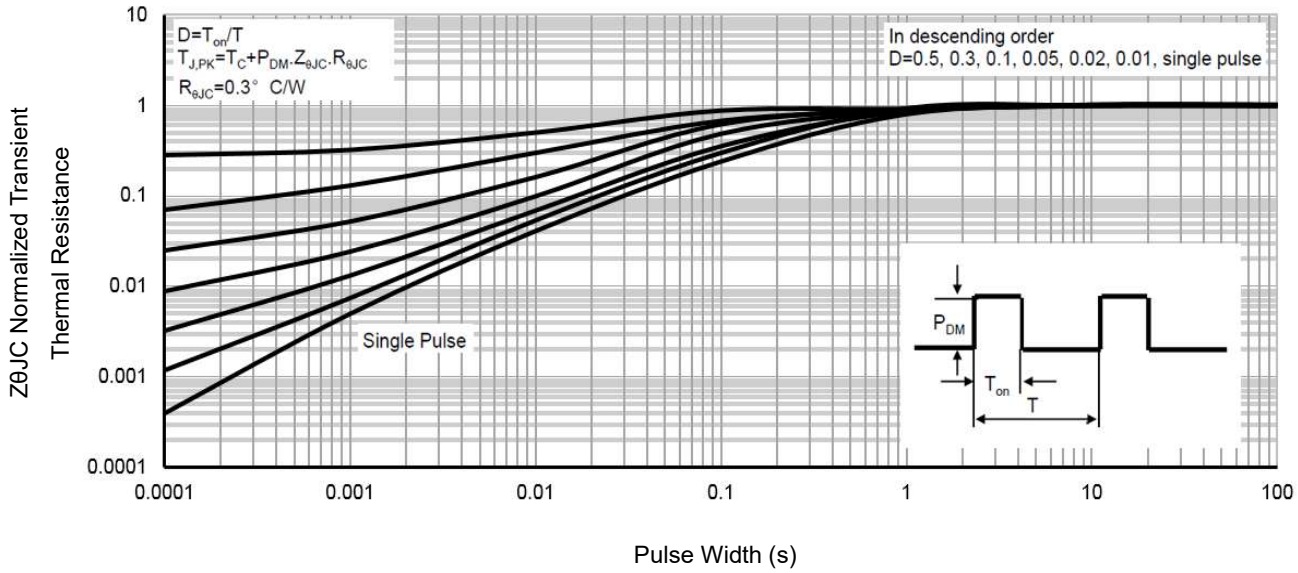



**Fig9.** Normalized Maximum Transient Thermal Impedance

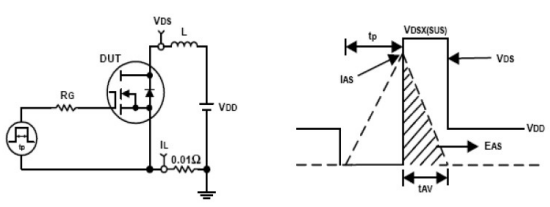



**Fig10.** Unclamped Inductive Test Circuit and waveforms

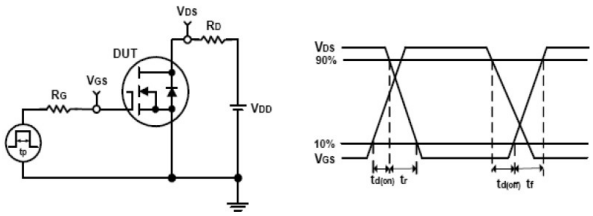
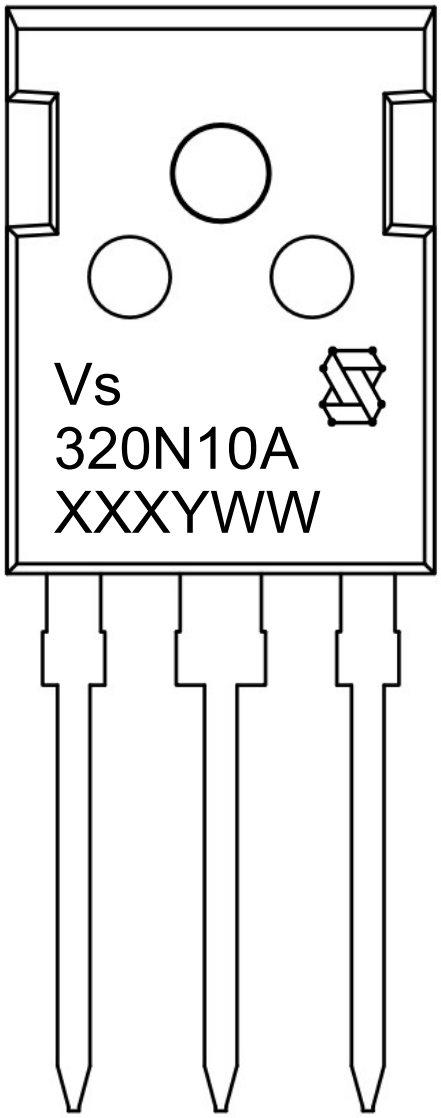



**Fig11.** Switching Time Test Circuit and waveforms

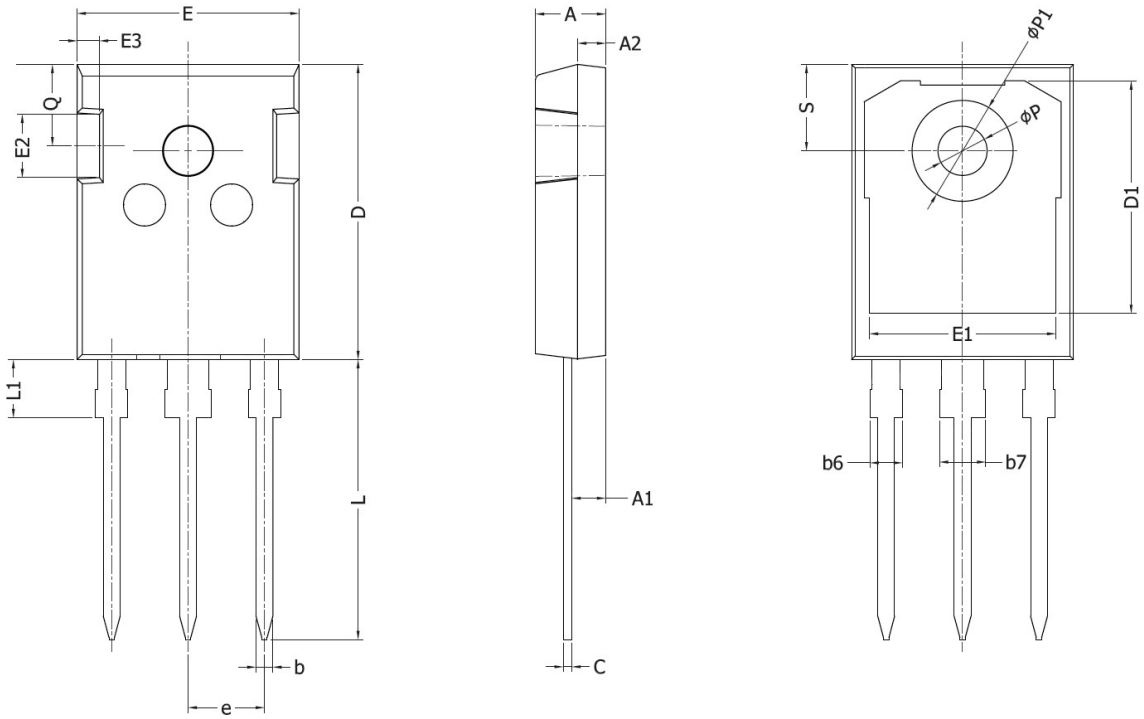
## Marking Information




1st line: Vergiga Code（Vs）， Vergiga Logo
2nd line: Part Number（320N10A）
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-247 Package Outline Data




| Symbol | Dimensions (unit: mm) | | |
|---|---|---|---|
| | Min | Nom | Max |
| A | 4.80 | 5.00 | 5.20 |
| A1 | 2.21 | 2.41 | 2.59 |
| A2 | 1.85 | 2.00 | 2.15 |
| b | 1.11 | 1.21 | 1.36 |
| b6 | 1.91 | -- | 2.21 |
| b7 | 2.91 | -- | 3.21 |
| C | 0.51 | 0.61 | 0.75 |
| D | 20.80 | 21.00 | 21.30 |
| D1 | 16.25 | 16.55 | 16.85 |
| E | 15.50 | 15.80 | 16.10 |
| E1 | 13.00 | 13.30 | 13.60 |
| E2 | 4.40 | -- | 5.20 |
| E3 | 1.50 | 1.60 | 1.70 |
| e | 5.44 BSC | | |
| L | 19.80 | 19.92 | 20.22 |
| L1 | -- | -- | 4.30 |
| ΦP | 3.40 | 3.60 | 3.80 |
| ΦP1 | 7.00 | -- | 7.40 |
| Q | 5.60 | 5.80 | 6.00 |
| S | 6.05 | 6.15 | 6.25 |

**Notes:**

1. **Package Reference: JEDEC TO-247, Variation AD.**
2. **All Dimensions Are In mm.**
3. **Slot Required, Notch May Be Rounded**
4. **Dimension D & E Do Not Include Mold Flash. Mold Flash Shall Not Exceed 0.127mm Pre Side.**
5. **Thermal Pad Contour Optional Within Dimension D1 & E1.**
6. **Lead Finish Uncontrolled In L1.**

## Customer Service

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