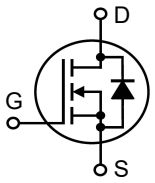
# IXYS

## X4-Class Power MOSFET™

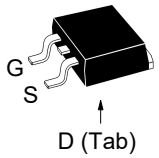
## IXTA94N20X4

$V_{DSS}$ = 200V
$I_{D25}$ = 94A
$R_{DS(on)}$ ≤ 10.6mΩ

N-Channel Enhancement Mode
Avalanche Rated




**TO-263 (IXTA)**




G = Gate D = Drain
S = Source Tab = Drain

| Symbol | Test Conditions | Maximum Ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 175°C | 200 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 175°C, $R_{GS}$ = 1MΩ | 200 | V |
| $V_{GSS}$ | Continuous | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | 94 | A |
| $I_{DM}$ | $T_C$ = 25°C, Pulse Width Limited by $T_{JM}$ | 220 | A |
| $I_A$ | $T_C$ = 25°C | 47 | A |
| $E_{AS}$ | $T_C$ = 25°C | 1 | J |
| dv/dt | $I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$ | 20 | V/ns |
| $P_D$ | $T_C$ = 25°C | 360 | W |
| $T_J$ | | -55 ... +175 | °C |
| $T_{JM}$ | | 175 | °C |
| $T_{stg}$ | | -55 ... +15 | °C |
| $T_{SOLD}$ | Plastic Body for 10s | 260 | °C |
| $F_C$ | Mounting Force | 10..65 / 2.2..14.6 | N/lb |
| Weight | | 2.5 | g |

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 200 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 250μA | 2.5 | | 4.5 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | | | ±100 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$, $V_{GS}$ = 0V | | | 20 | μA |
| | $T_J$ = 150°C | | | 500 | μA |
| $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D = 0.5 \bullet I_{D25}$, Notes 1 & 2 | | | 10.6 | mΩ |

### Features

- International Standard Package
- Low $R_{DS(ON)}$ and $Q_G$
- Avalanche Rated
- Low Package Inductance

### Advantages

- High Power Density
- Easy to Mount
- Space Savings

### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10V, $I_D$ = 0.5 • $I_{D25}$, Note 1 | 60 | 100 | | S |
| $R_{Gi}$ | Gate Input Resistance | | 5.3 | | Ω |
| $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1MHz | | 5050 | | pF |
| $C_{oss}$ | | | 750 | | pF |
| $C_{rss}$ | | | 4 | | pF |
| | **Effective Output Capacitance** | | | | |
| $C_{o(er)}$ | Energy related; $V_{GS}$ = 0V, $V_{DS}$ = 0.8 • $V_{DSS}$ | | 390 | | pF |
| $C_{o(tr)}$ | Time related; $V_{GS}$ = 0V, $V_{DS}$ = 0.8 • $V_{DSS}$ | | 1670 | | pF |
| $t_{d(on)}$ | **Resistive Switching Times** | | 18 | | ns |
| $t_r$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 9 | | ns |
| $t_{d(off)}$ | $R_G$ = 5Ω (External) | | 97 | | ns |
| $t_f$ | | | 7 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 • $I_{D25}$ | | 77 | | nC |
| $Q_{gs}$ | | | 21 | | nC |
| $Q_{gd}$ | | | 25 | | nC |
| $R_{thJC}$ | | | | 0.42 | °C/W |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, Unless Otherwise Specified) | Characteristic Values Min. | Typ. | Max | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 94 | A |
| $I_{SM}$ | Repetitive, pulse Width Limited by $T_{JM}$ | | | 376 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0V, Note 1 | | | 1.4 | V |
| $t_{rr}$ | $I_F$ = 47A, -di/dt = 200A/μs | | 130 | | ns |
| $Q_{RM}$ | $V_R$ = 100V | | 1.1 | | μC |
| $I_{RM}$ | | | 17 | | A |

Notes: 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. On through-hole packages, $R_{DS(on)}$ Kelvin test contact location must be 5mm or less from the package body.

**Fig. 1. Output Characteristics @ $T_J$ = 25ºC**

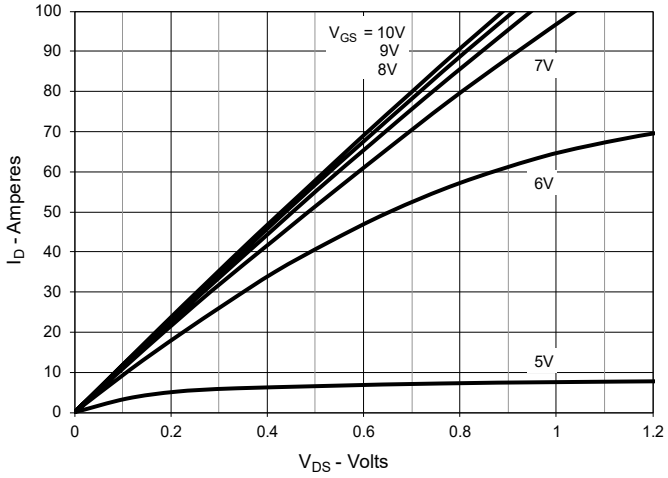



**Fig. 2. Extended Output Characteristics @ $T_J$ = 25ºC**

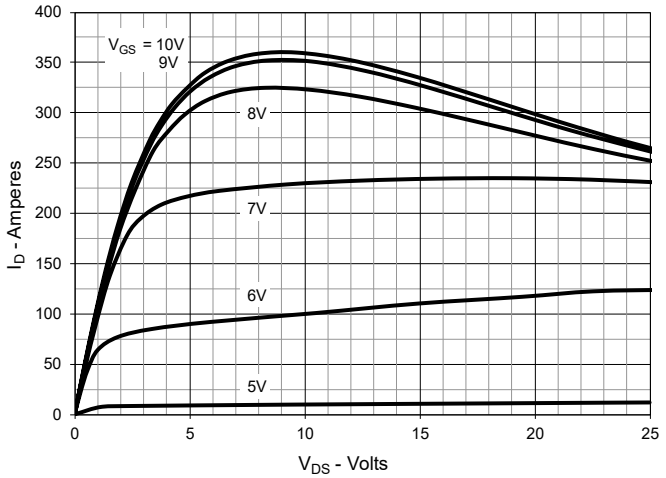



**Fig. 3. Output Characteristics @ $T_J$ = 150ºC**

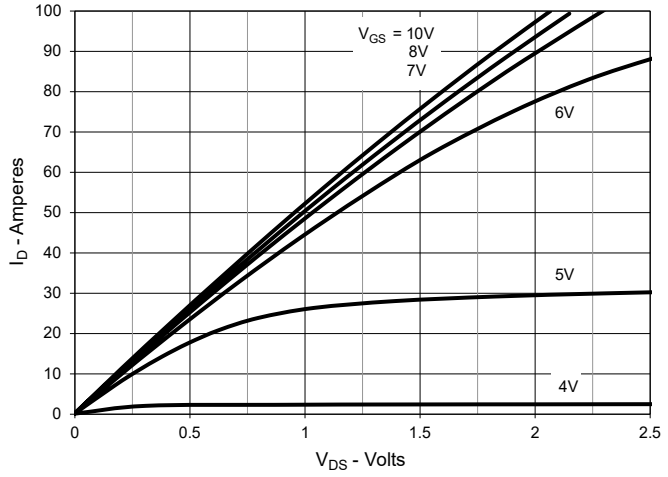



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D$ = 47A Value vs. Junction Temperature**

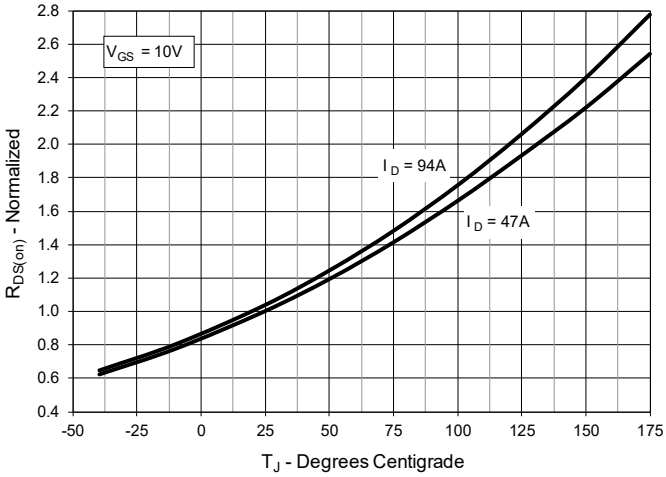



**Fig. 5. $R_{DS(on)}$ Normalized to $I_D$ = 47A Value vs. Drain Current**

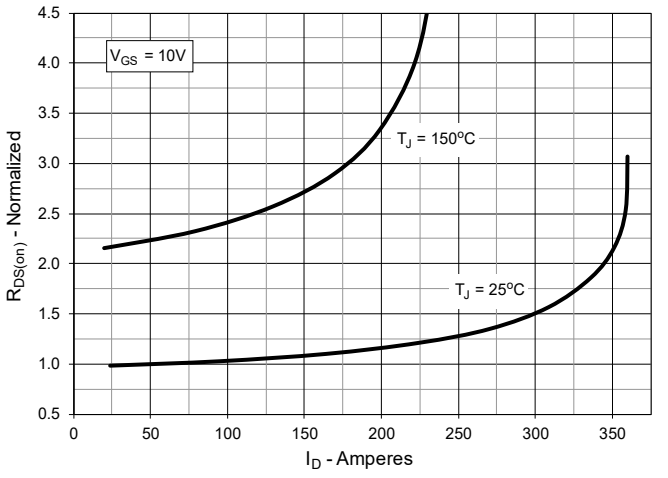



**Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature**

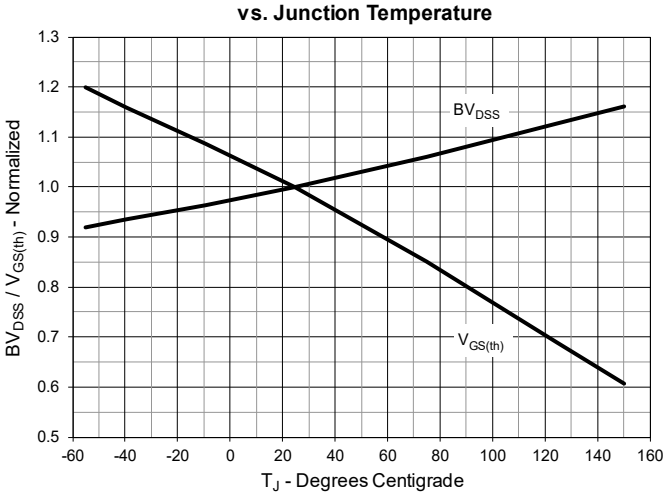


**Fig. 7. Maximum Drain Current vs. Case Temperature**

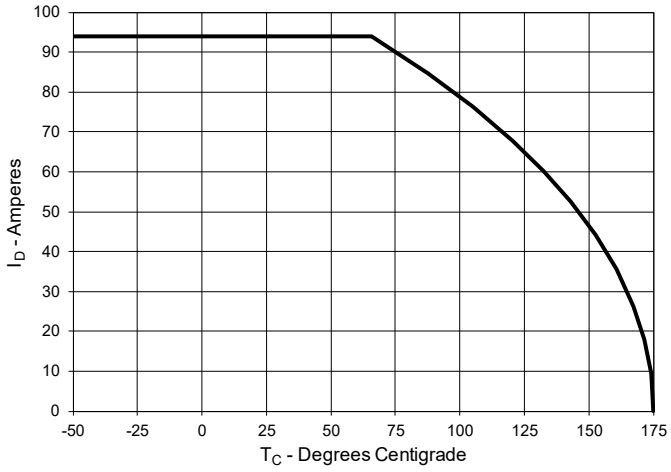



**Fig. 8. Input Admittance**

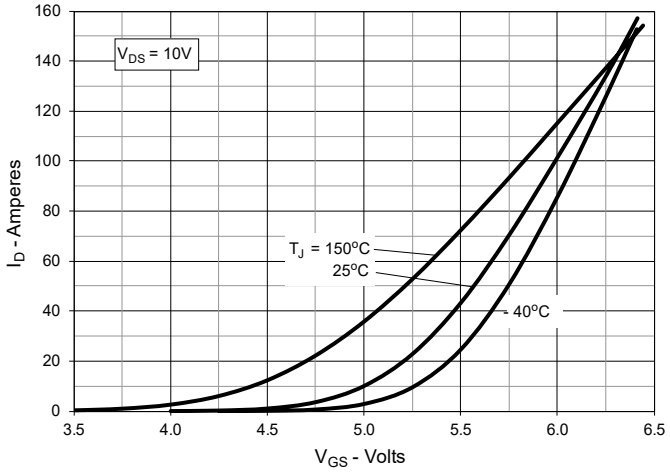



**Fig. 9. Transconductance**

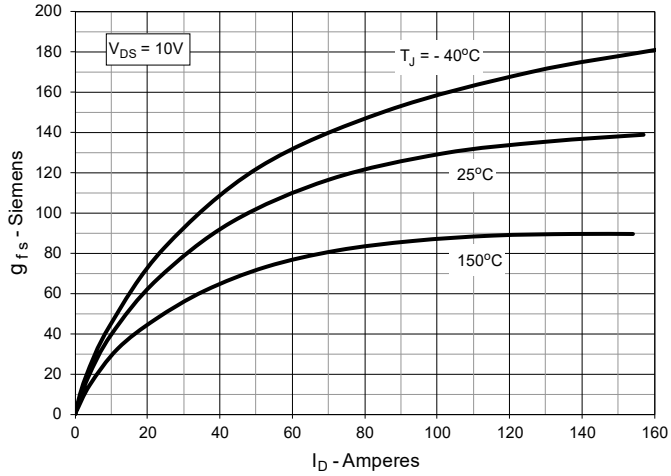



**Fig. 10. Forward Voltage Drop of Intrinsic Diode**

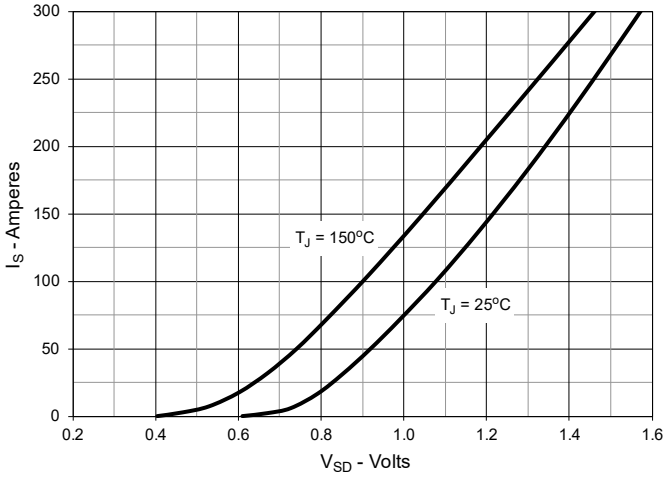



**Fig. 11. Gate Charge**

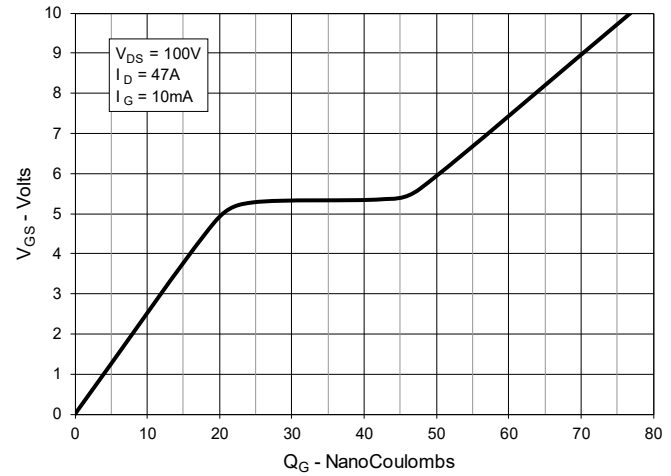



**Fig. 12. Capacitance**

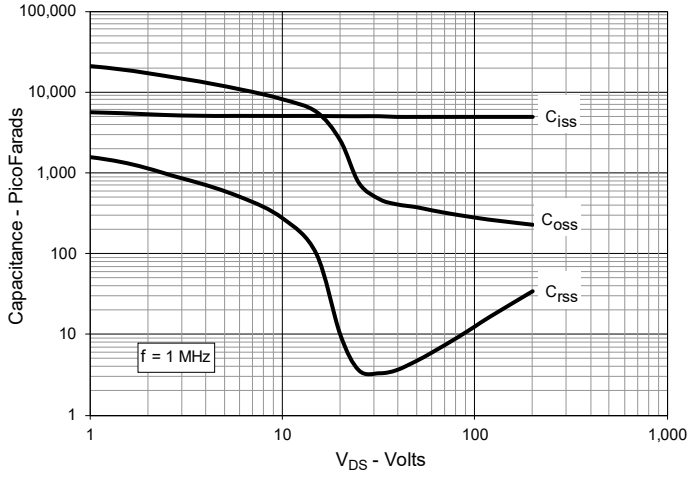


**Fig. 13. Output Capacitance Stored Energy**

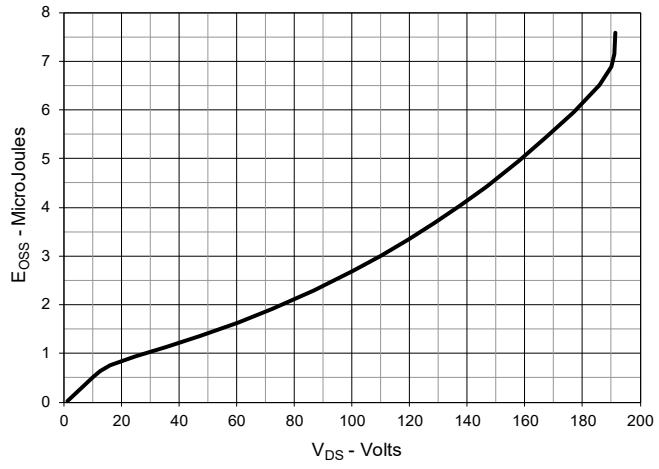



**Fig. 14. Forward-Bias Safe Operating Area**

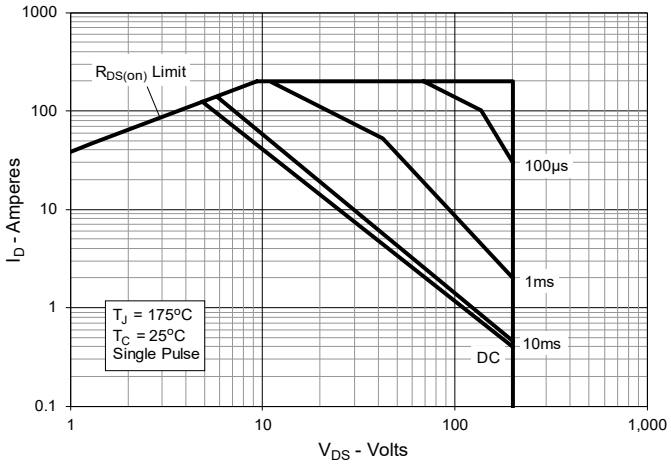
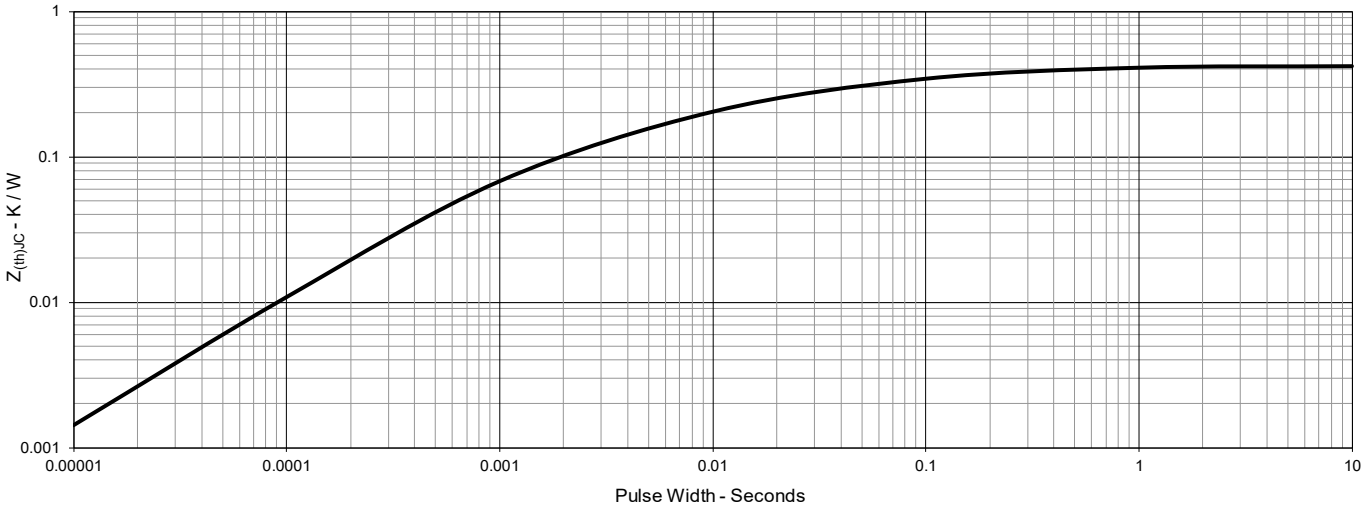
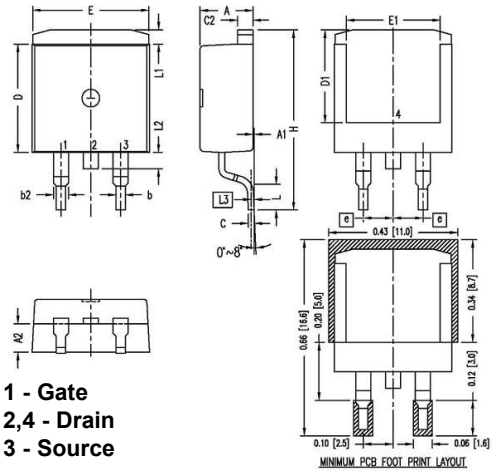



**Fig. 15. Maximum Transient Thermal Impedance**



**TO-263 Outline**




**1 - Gate**
**2,4 - Drain**
**3 - Source**

| SYM | INCHES | | MILLIMETER | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .170 | .185 | 4.30 | 4.70 |
| A1 | .000 | .008 | 0.00 | 0.20 |
| A2 | .091 | .098 | 2.30 | 2.50 |
| b | .028 | .035 | 0.70 | 0.90 |
| b2 | .046 | .060 | 1.18 | 1.52 |
| C | .018 | .024 | 0.45 | 0.60 |
| C2 | .049 | .060 | 1.25 | 1.52 |
| D | .340 | .370 | 8.63 | 9.40 |
| D1 | .300 | .327 | 7.62 | 8.30 |
| E | .380 | .410 | 9.65 | 10.41 |
| E1 | .270 | .330 | 6.86 | 8.38 |
| e | .100 | BSC | 2.54 | BSC |
| H | .580 | .620 | 14.73 | 15.75 |
| L | .075 | .105 | 1.91 | 2.67 |
| L1 | .039 | .060 | 1.00 | 1.52 |
| L2 | — | .070 | — | 1.77 |
| L3 | .010 | BSC | 0.254 | BSC |

NOTE:
1. This drawing meets all dimensions requirement of JEDEC outlines TO-263AB.
2. All metal surface are matte pure tin plated except trimmed area.
3. L3 is Gauge plane to measure L.
4. These dimension do not include mold flash and they will not exceed 0.005[0.13] per side.