



SamHop Microelectronics Corp.

Ver 1.0

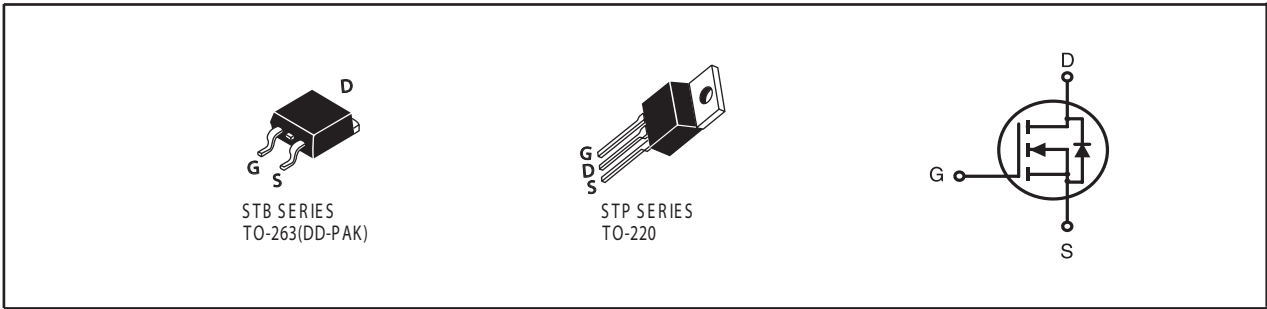
# STB/P432S

## N-Channel Logic Enhancement Mode Field Effect Transistor

| PRODUCT SUMMARY  |                |                              |
|------------------|----------------|------------------------------|
| V <sub>DSS</sub> | I <sub>D</sub> | R <sub>DS(ON)</sub> (mΩ) Max |
| 40V              | 60A            | 9 @ V <sub>GS</sub> =10V     |
|                  |                | 11 @ V <sub>GS</sub> =4.5V   |

### FEATURES

- Super high dense cell design for extremely low R<sub>DS(ON)</sub>.
- High power and current handling capability.
- TO-220 & TO-263 package.



### ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub>=25°C unless otherwise noted)

| Symbol                            | Parameter                                        | Limit      | Units |
|-----------------------------------|--------------------------------------------------|------------|-------|
| V <sub>DS</sub>                   | Drain-Source Voltage                             | 40         | V     |
| V <sub>GS</sub>                   | Gate-Source Voltage                              | ±20        | V     |
| I <sub>D</sub>                    | Drain Current-Continuous <sup>a</sup>            | 60         | A     |
| I <sub>DM</sub>                   | -Pulsed <sup>b</sup>                             | 240        | A     |
| E <sub>AS</sub>                   | Single Pulse Avalanche Energy <sup>d</sup>       | 130        | mJ    |
| P <sub>D</sub>                    | Maximum Power Dissipation <sup>a</sup>           | 62.5       | W     |
| T <sub>J</sub> , T <sub>STG</sub> | Operating Junction and Storage Temperature Range | -55 to 150 | °C    |

### THERMAL CHARACTERISTICS

|                  |                                         |    |      |
|------------------|-----------------------------------------|----|------|
| R <sub>θJC</sub> | Thermal Resistance, Junction-to-Case    | 2  | °C/W |
| R <sub>θJA</sub> | Thermal Resistance, Junction-to-Ambient | 50 | °C/W |

Details are subject to change without notice.

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## ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C unless otherwise noted)

| Symbol                               | Parameter                                             | Conditions                                                                                       | Min | Typ  | Max  | Units |
|--------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----|------|------|-------|
| OFF CHARACTERISTICS                  |                                                       |                                                                                                  |     |      |      |       |
| BV <sub>DSS</sub>                    | Drain-Source Breakdown Voltage                        | V <sub>GS</sub> =0V , I <sub>D</sub> =250uA                                                      | 40  |      |      | V     |
| I <sub>DSS</sub>                     | Zero Gate Voltage Drain Current                       | V <sub>DS</sub> =32V , V <sub>GS</sub> =0V                                                       |     |      | 1    | uA    |
| I <sub>GSS</sub>                     | Gate-Body Leakage Current                             | V <sub>GS</sub> = ±20V , V <sub>DS</sub> =0V                                                     |     |      | ±100 | nA    |
| ON CHARACTERISTICS                   |                                                       |                                                                                                  |     |      |      |       |
| V <sub>GS(th)</sub>                  | Gate Threshold Voltage                                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA                                         | 1   | 1.7  | 3    | V     |
| R <sub>DS(ON)</sub>                  | Drain-Source On-State Resistance                      | V <sub>GS</sub> =10V , I <sub>D</sub> =30A                                                       |     | 7    | 9    | m ohm |
|                                      |                                                       | V <sub>GS</sub> =4.5V , I <sub>D</sub> =28A                                                      |     | 9    | 11   | m ohm |
| g <sub>FS</sub>                      | Forward Transconductance                              | V <sub>DS</sub> =10V , I <sub>D</sub> =30A                                                       |     | 26   |      | S     |
| DYNAMIC CHARACTERISTICS °            |                                                       |                                                                                                  |     |      |      |       |
| C <sub>ISS</sub>                     | Input Capacitance                                     | V <sub>DS</sub> =15V,V <sub>GS</sub> =0V<br>f=1.0MHz                                             |     | 1600 |      | pF    |
| C <sub>OSS</sub>                     | Output Capacitance                                    |                                                                                                  |     | 280  |      | pF    |
| C <sub>RSS</sub>                     | Reverse Transfer Capacitance                          |                                                                                                  |     | 150  |      | pF    |
| SWITCHING CHARACTERISTICS °          |                                                       |                                                                                                  |     |      |      |       |
| t <sub>D(ON)</sub>                   | Turn-On Delay Time                                    | V <sub>DD</sub> =15V<br>I <sub>D</sub> =30A<br>V <sub>GS</sub> =10V<br>R <sub>GEN</sub> =3.3 ohm |     | 20   |      | ns    |
| t <sub>r</sub>                       | Rise Time                                             |                                                                                                  |     | 21   |      | ns    |
| t <sub>D(OFF)</sub>                  | Turn-Off Delay Time                                   |                                                                                                  |     | 45   |      | ns    |
| t <sub>f</sub>                       | Fall Time                                             |                                                                                                  |     | 16   |      | ns    |
| Q <sub>g</sub>                       | Total Gate Charge                                     | V <sub>DS</sub> =15V,I <sub>D</sub> =30A,V <sub>GS</sub> =10V                                    |     | 32   |      | nC    |
|                                      |                                                       | V <sub>DS</sub> =15V,I <sub>D</sub> =28A,V <sub>GS</sub> =4.5V                                   |     | 15   |      | nC    |
| Q <sub>gs</sub>                      | Gate-Source Charge                                    | V <sub>DS</sub> =15V,I <sub>D</sub> =30A,                                                        |     | 3.5  |      | nC    |
| Q <sub>gd</sub>                      | Gate-Drain Charge                                     | V <sub>GS</sub> =10V                                                                             |     | 7.3  |      | nC    |
| DRAIN-SOURCE DIODE CHARACTERISTICS ° |                                                       |                                                                                                  |     |      |      |       |
| I <sub>S</sub>                       | Maximum Continuous Drain-Source Diode Forward Current |                                                                                                  |     |      | 30   | A     |
| V <sub>SD</sub>                      | Diode Forward Voltage                                 | V <sub>GS</sub> =0V,I <sub>S</sub> =30A                                                          |     | 0.95 | 1.3  | V     |

### Notes

- a. Surface Mounted on FR4 Board, t ≤ 10sec.  
b. Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 2%.  
c. Guaranteed by design, not subject to production testing.  
d. Starting T<sub>J</sub>=25°C, L=1.25mH, R<sub>G</sub>=25Ω, V<sub>DD</sub> = 20V. (See Figure13)

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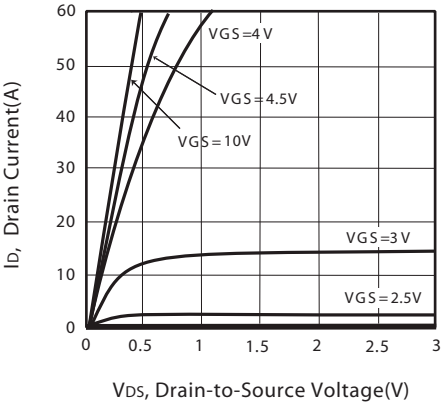


Figure 1. Output Characteristics

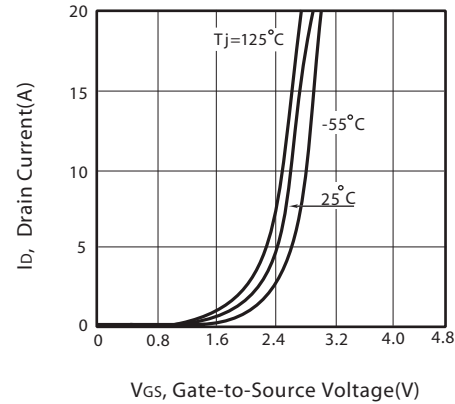


Figure 2. Transfer Characteristics

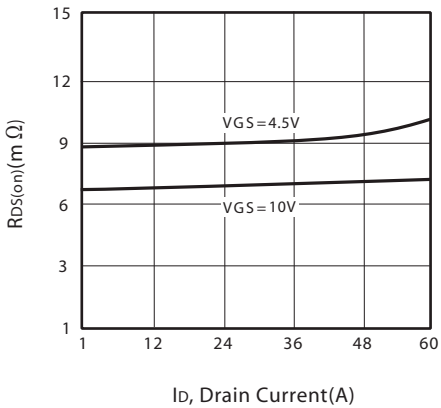


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

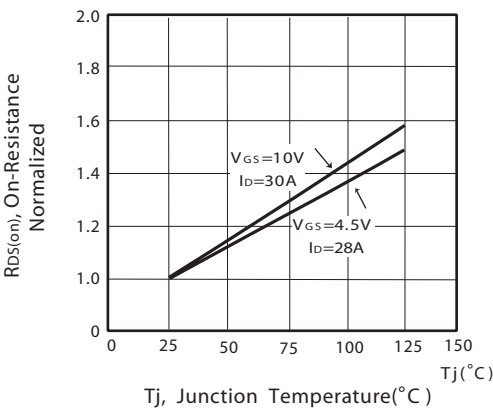


Figure 4. On-Resistance Variation with Drain Current and Temperature

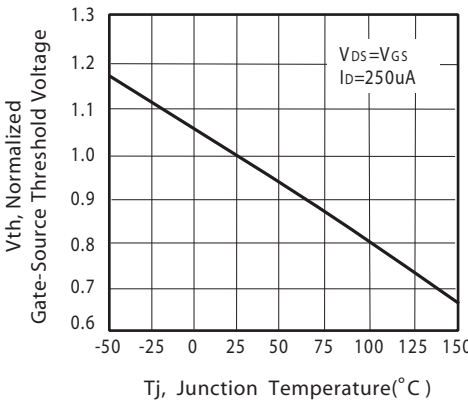


Figure 5. Gate Threshold Variation with Temperature

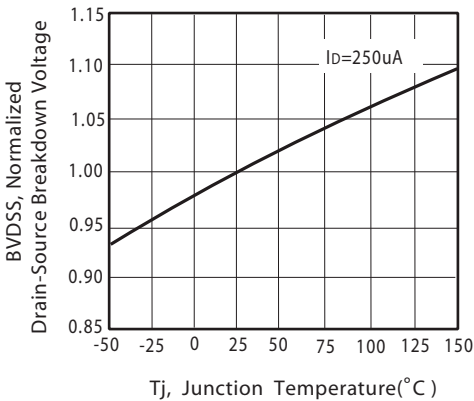


Figure 6. Breakdown Voltage Variation with Temperature

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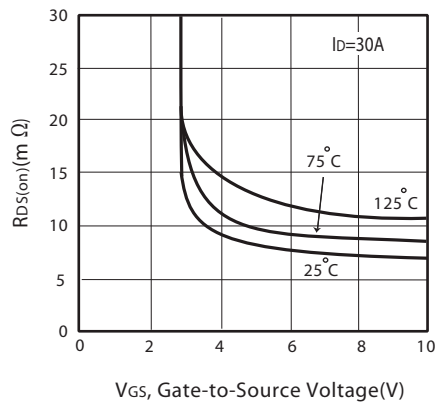


Figure 7. On-Resistance vs. Gate-Source Voltage

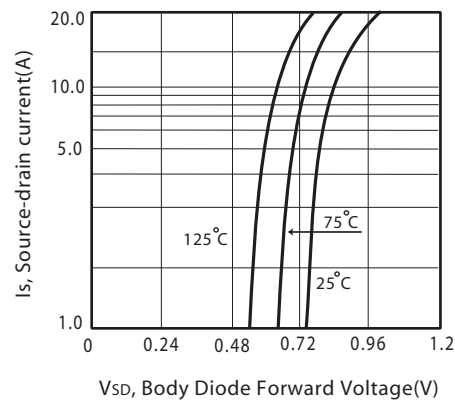


Figure 8. Body Diode Forward Voltage Variation with Source Current

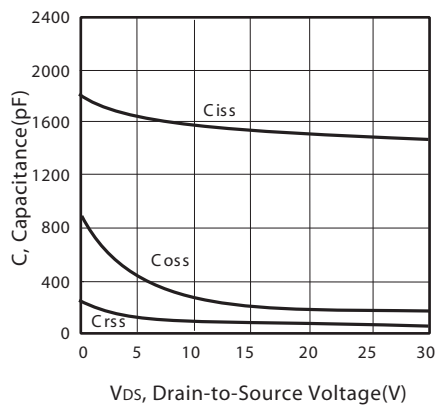


Figure 9. Capacitance

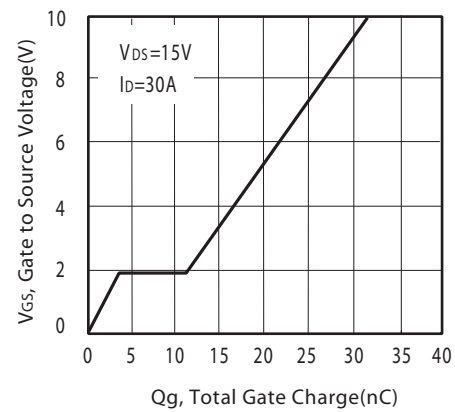


Figure 10. Gate Charge

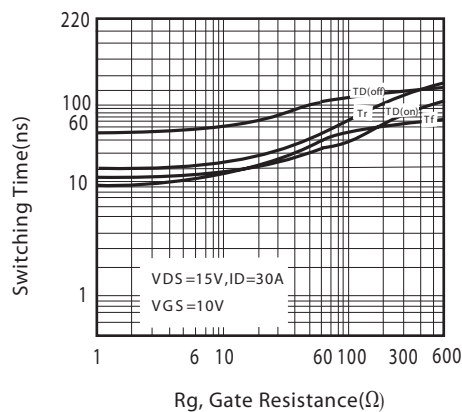


Figure 11. switching characteristics

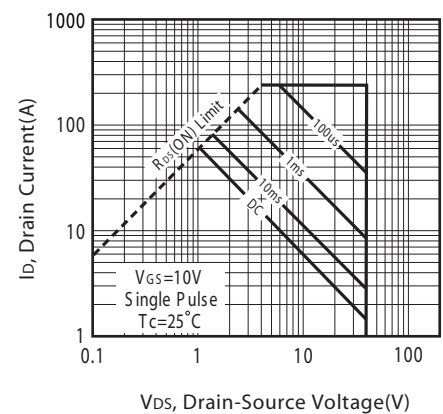
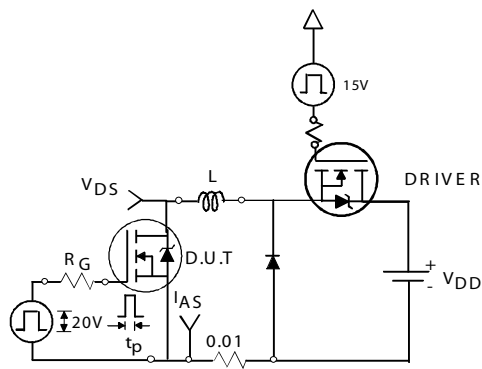


Figure 12. Maximum Safe Operating Area

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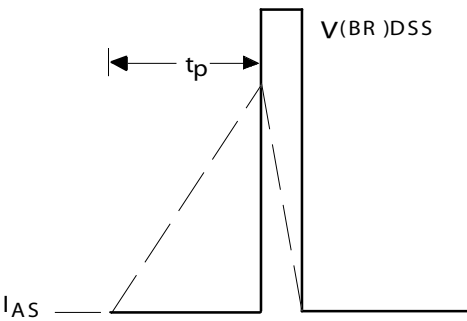
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Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

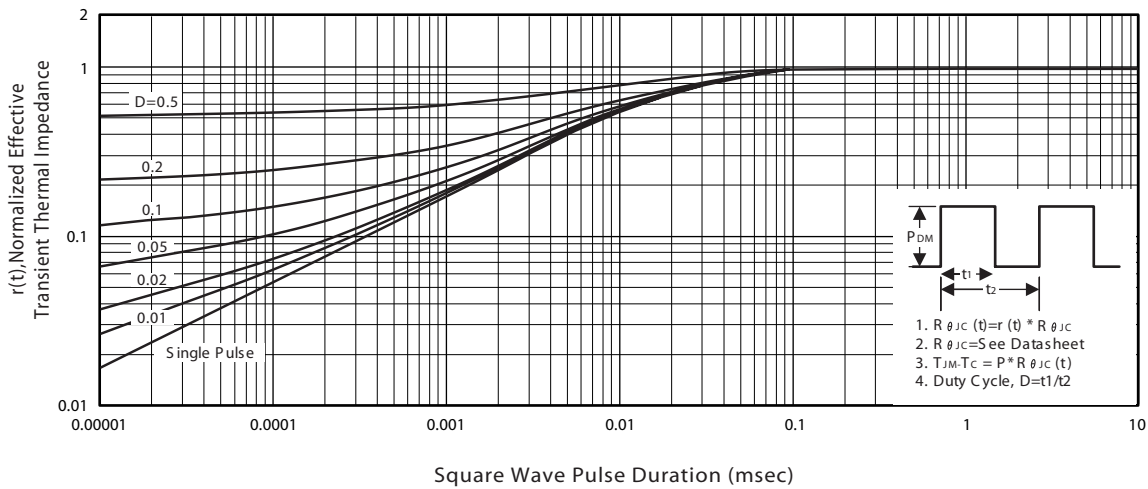


Figure 14. Normalized Thermal Transient Impedance Curve

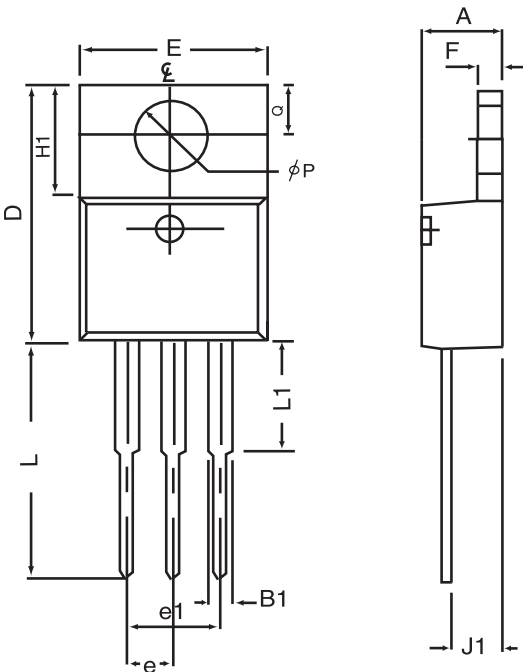
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PACKAGE OUTLINE DIMENSIONS

TO-220



| SYMBOLS  | MILLIMETERS |       | INCHES |       |
|----------|-------------|-------|--------|-------|
|          | MIN         | MAX   | MIN    | MAX   |
| A        | 4.32        | 4.80  | 0.170  | 0.189 |
| B1       | 1.27        | 1.65  | 0.050  | 0.630 |
| D        | 14.6        | 16.00 | 0.575  | 0.610 |
| E        | 9.70        | 10.41 | 0.382  | 0.410 |
| e        | 2.34        | 2.74  | 0.092  | 0.108 |
| e1       | 4.68        | 5.48  | 0.184  | 0.216 |
| F        | 1.14        | 1.40  | 0.045  | 0.055 |
| H1       | 5.97        | 6.73  | 0.235  | 0.265 |
| J1       | 2.20        | 2.79  | 0.087  | 0.110 |
| L        | 12.88       | 14.22 | 0.507  | 0.560 |
| L1       | 3.00        | 6.35  | 0.120  | 0.250 |
| $\phi P$ | 3.50        | 3.94  | 0.138  | 0.155 |
| Q        | 2.54        | 3.05  | 0.100  | 0.120 |

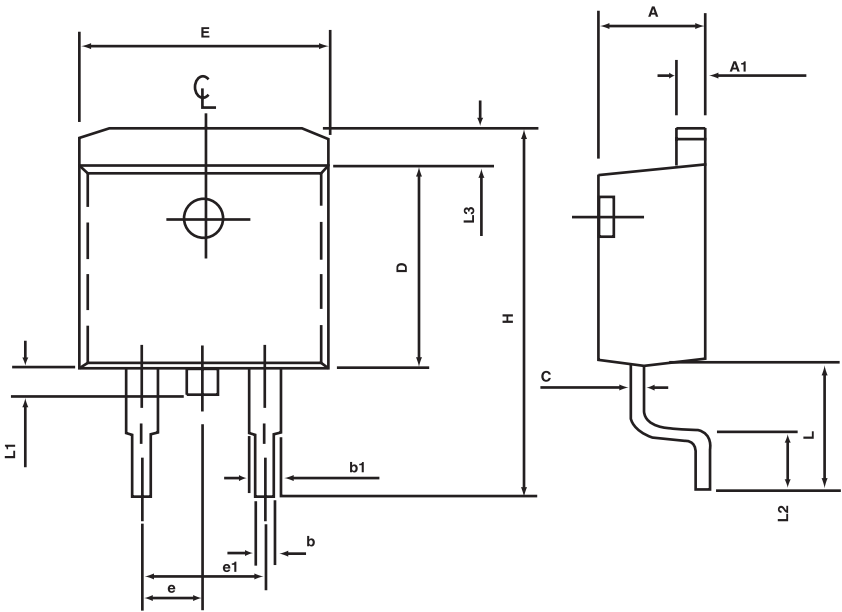
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PACKAGE OUTLINE DIMENSIONS

TO-263AB



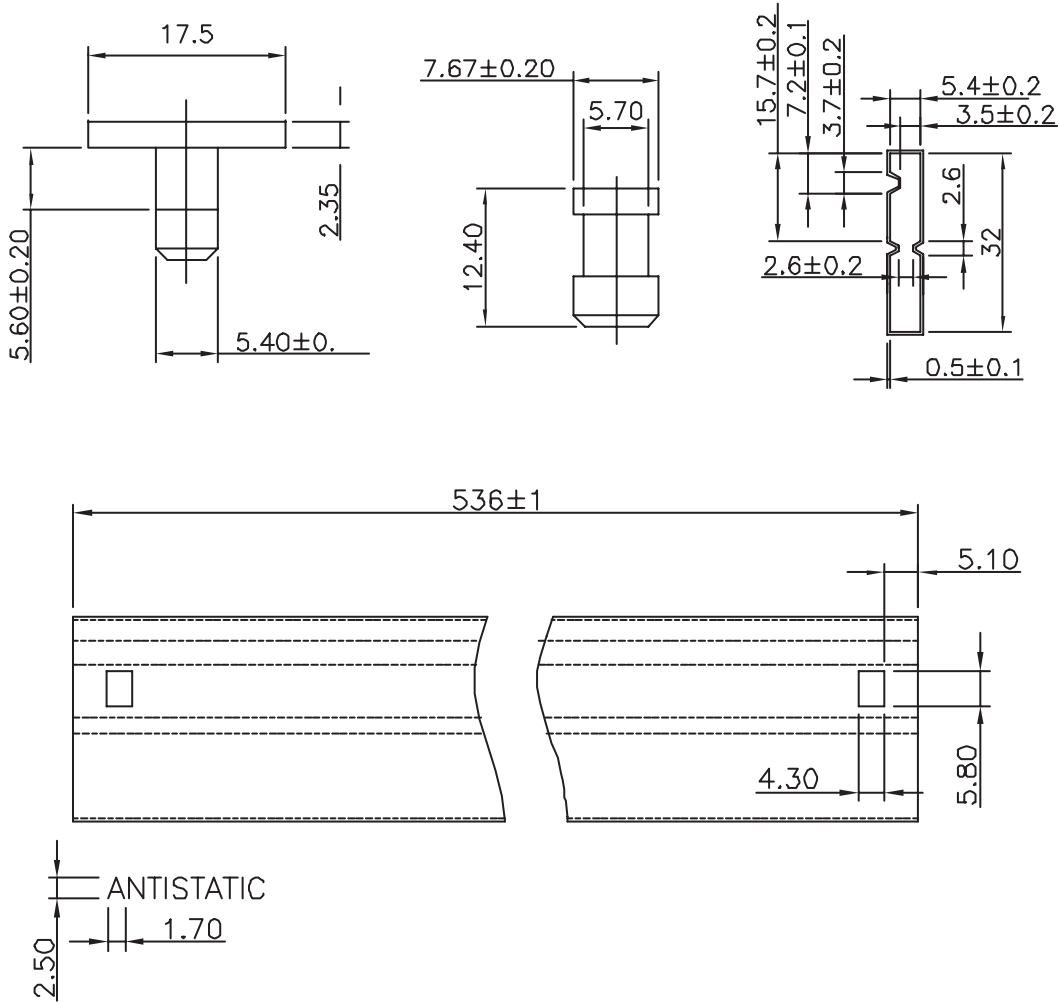
| SYMBOLS | MILLIMETERS |       | INCHES    |       |
|---------|-------------|-------|-----------|-------|
|         | MIN         | MAX   | MIN       | MAX   |
| A       | 4.30        | 4.70  | 0.169     | 0.185 |
| A1      | 1.22        | 1.32  | 0.048     | 0.055 |
| b       | 0.69        | 0.94  | 0.027     | 0.037 |
| b1      | 1.22        | 1.40  | 0.048     | 0.055 |
| C       | 0.36        | 0.56  | 0.014     | 0.022 |
| D       | 8.64        | 9.652 | 0.340     | 0.380 |
| E       | 9.70        | 10.54 | 0.382     | 0.415 |
| e       | 2.29        | 2.79  | 0.090     | 0.110 |
| e1      | 4.83        | 5.33  | 0.190     | 0.210 |
| H       | 14.60       | 15.78 | 0.575     | 0.625 |
| L       | 4.70        | 5.84  | 0.185     | 0.230 |
| L1      | 1.20        | 1.778 | 0.047     | 0.070 |
| L2      | 2.24        | 2.84  | 0.088     | 0.111 |
| L3      | 1.40 MAX    |       | 0.055 MAX |       |

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## TO-220/263AB Tube



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