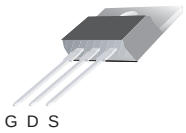
# STP15L01/F

## N-Channel Enhancement Mode Field Effect Transistor

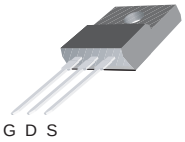
| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DSS}$ | $I_D$ | $R_{DS(ON)}$ (mΩ) Typ |
| 100V | 15A | 110 @ VGS=10V |
| | | 121 @ VGS=4.5V |

### FEATURES

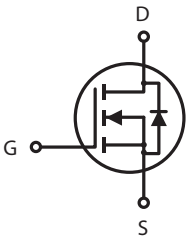
- Super high dense cell design for low $R_{DS(ON)}$.
- Rugged and reliable.
- TO-220 and TO-220F Package.




STP SERIES
TO-220




STF SERIES
TO-220F




### ABSOLUTE MAXIMUM RATINGS ($T_C$=25°C unless otherwise noted)

| Symbol | Parameter | | TO-220 | TO-220F | Units |
|---|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | | 100 | | V |
| $V_{GS}$ | Gate-Source Voltage | | ±20 | ±20 | V |
| $I_D$ | Drain Current-Continuous [a] | $T_C$=25°C | 15 | 15 [e] | A |
| | | $T_C$=70°C | 12.6 | 12.6 [e] | A |
| $I_{DM}$ | -Pulsed [b] | | 45 | 45 [e] | A |
| $E_{AS}$ | Single Pulse Avalanche Energy [d] | | 25 | | mJ |
| $P_D$ | Maximum Power Dissipation [a] | $T_C$=25°C | 58 | 25 | W |
| | | $T_C$=70°C | 40 | 17.5 | W |
| $T_J$, $T_{STG}$ | Operating Junction and Storage Temperature Range | | -55 to 175 | | °C |

### THERMAL CHARACTERISTICS

| | | | | |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case [a] | 2.6 | 6 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient [a] | 62.5 | 62.5 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_A$=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 100 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=80V , $V_{GS}$=0V | | | 1 | uA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$= ±20V , $V_{DS}$=0V | | | ±100 | nA |
| **ON CHARACTERISTICS** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$ , $I_D$=250uA | 1 | 1.7 | 3 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=10V , $I_D$=7A | | 110 | 138 | m-ohm |
| | | $V_{GS}$=4.5V , $I_D$=6A | | 121 | 163 | m-ohm |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=20V , $I_D$=7A | | 15 | | S |
| **DYNAMIC CHARACTERISTICS** [c] | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{DS}$=25V,$V_{GS}$=0V f=1.0MHz | | 675 | | pF |
| $C_{OSS}$ | Output Capacitance | | | 48 | | pF |
| $C_{RSS}$ | Reverse Transfer Capacitance | | | 32 | | pF |
| **SWITCHING CHARACTERISTICS** [c] | | | | | | |
| $t_{D(ON)}$ | Turn-On Delay Time | $V_{DD}$=50V $I_D$=1A $V_{GS}$=10V $R_{GEN}$= 6 ohm | | 16 | | ns |
| $t_r$ | Rise Time | | | 14.5 | | ns |
| $t_{D(OFF)}$ | Turn-Off Delay Time | | | 31 | | ns |
| $t_f$ | Fall Time | | | 6.4 | | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$=50V,$I_D$=7A,$V_{GS}$=10V | | 12.4 | | nC |
| | | $V_{DS}$=50V,$I_D$=7A,$V_{GS}$=4.5V | | 6.4 | | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{DS}$=50V,$I_D$=7A, $V_{GS}$=10V | | 1.7 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 3.5 | | nC |
| **DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V,$I_S$=2A | | 0.8 | 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 $T_J$=25°C,L=0.5mH,$V_{DD}$ = 50V.(See Figure12)
e.Drain current limited by maximum junction temperatrue.

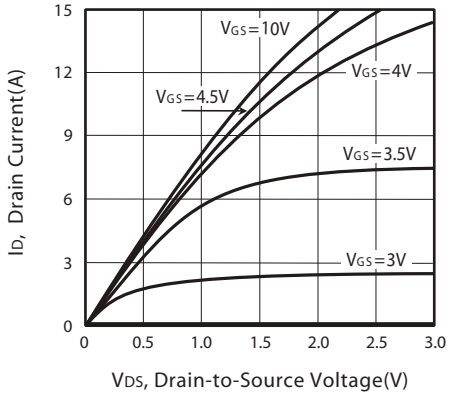



Figure 1. Output Characteristics

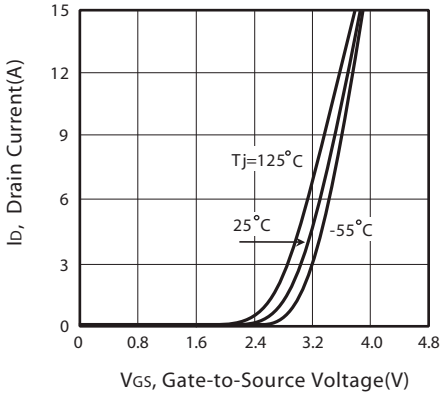



Figure 2. Transfer Characteristics

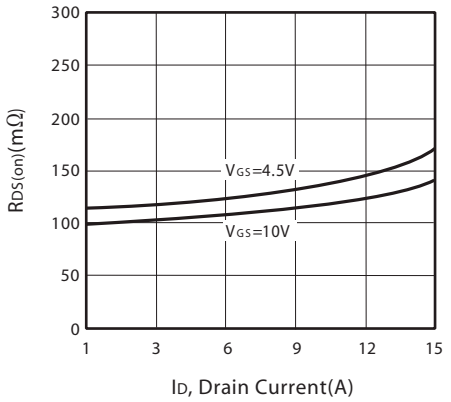



Figure 3. On-Resistance vs. Drain Current and Gate Voltage

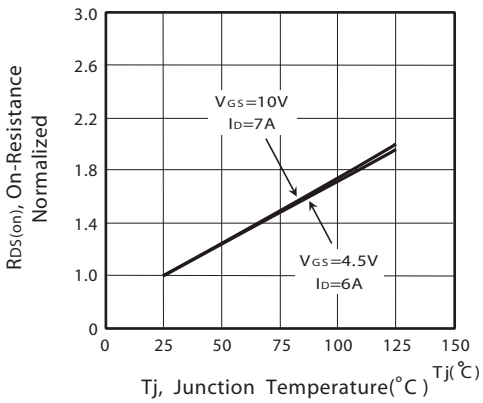



Figure 4. On-Resistance Variation with Drain Current and Temperature

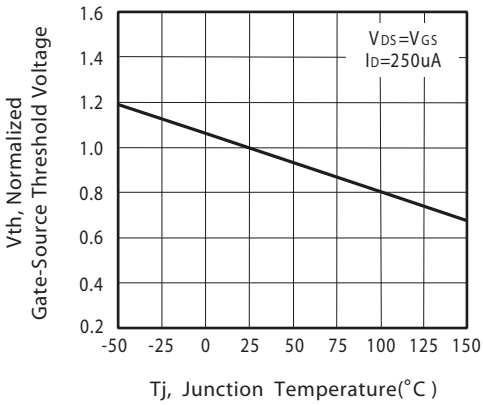



Figure 5. Gate Threshold Variation with Temperature

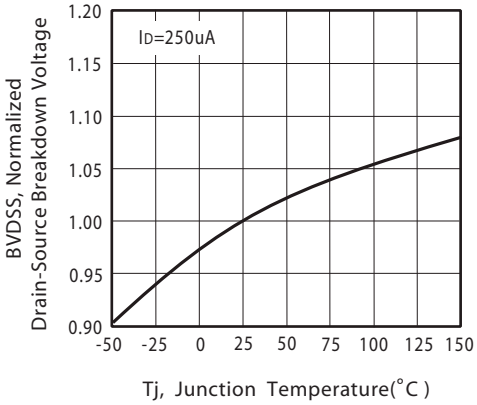



Figure 6. Breakdown Voltage Variation with Temperature

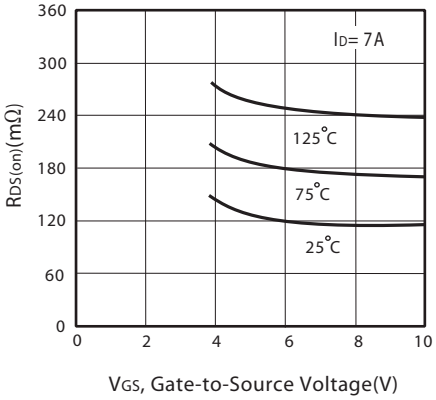



Figure 7. On-Resistance vs. Gate-Source Voltage

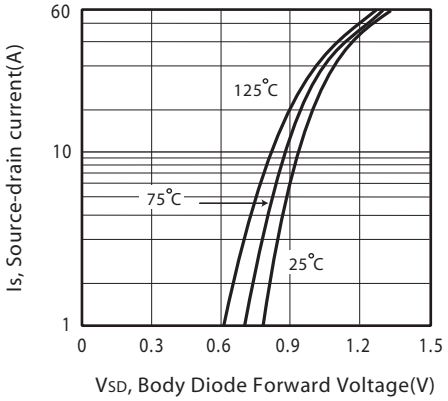



Figure 8. Body Diode Forward Voltage Variation with Source Current

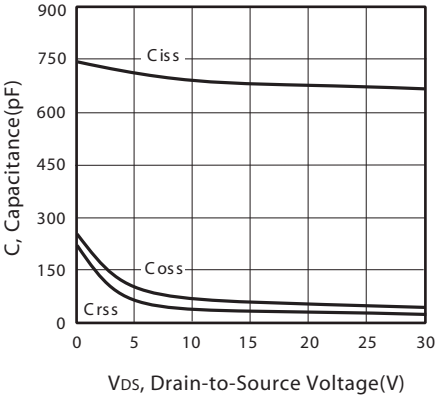



Figure 9. Capacitance

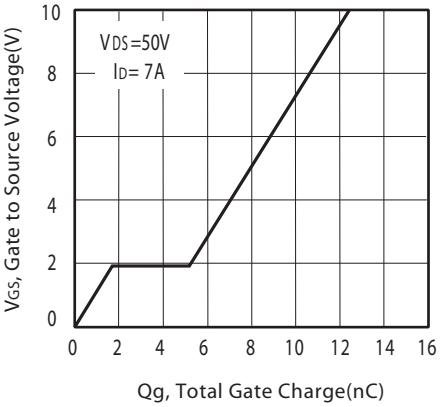



Figure 10. Gate Charge

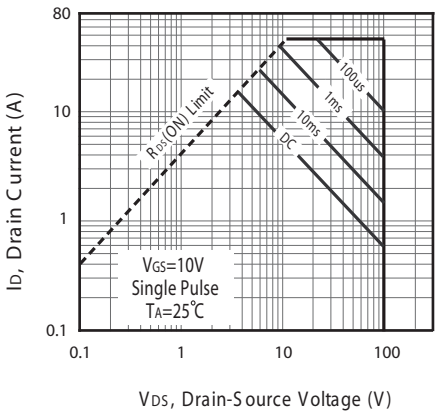



Figure 11a. Maximum Safe Operating Area for STP15L01

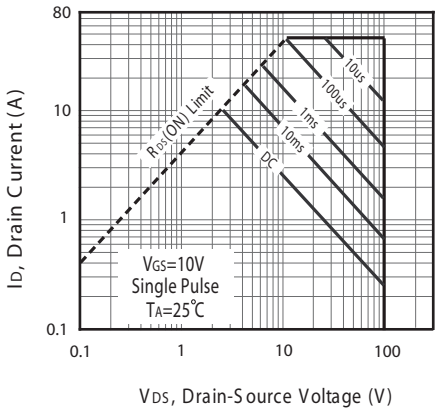
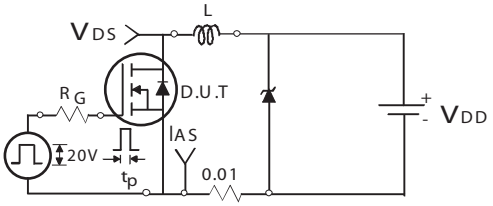
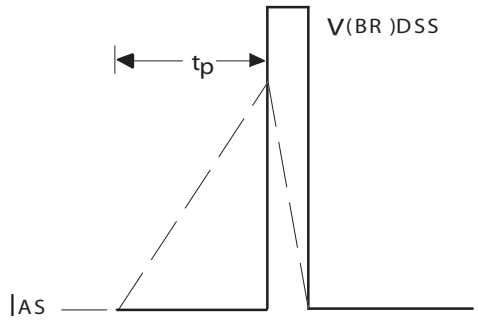



Figure 11b. Maximum Safe Operating Area for STP15L01F




Unclamped Inductive Test Circuit

Figure 12a.




Unclamped Inductive Waveforms

Figure 12b.

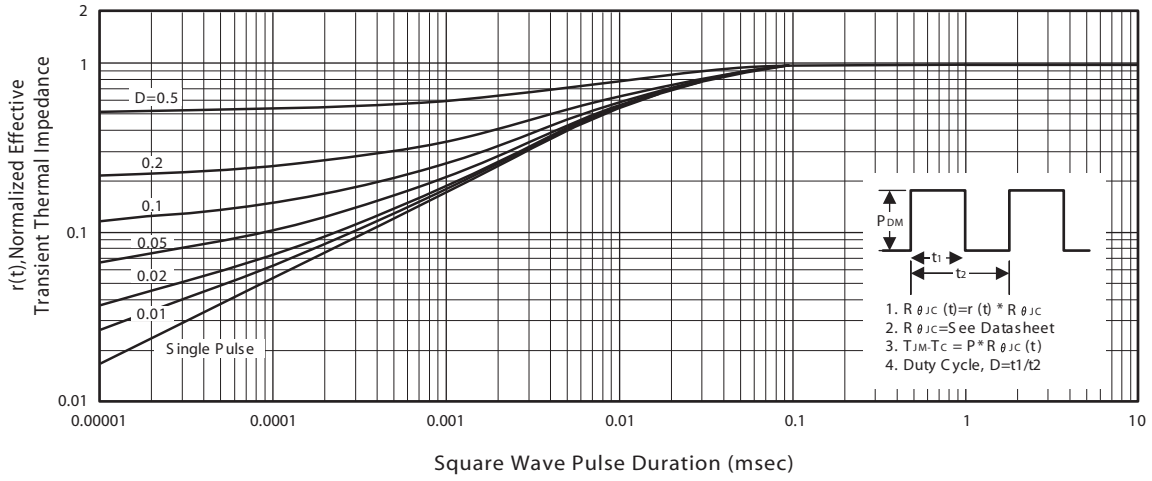



Figure 13a. Normalized Thermal Transient Impedance Curve for STP15L01

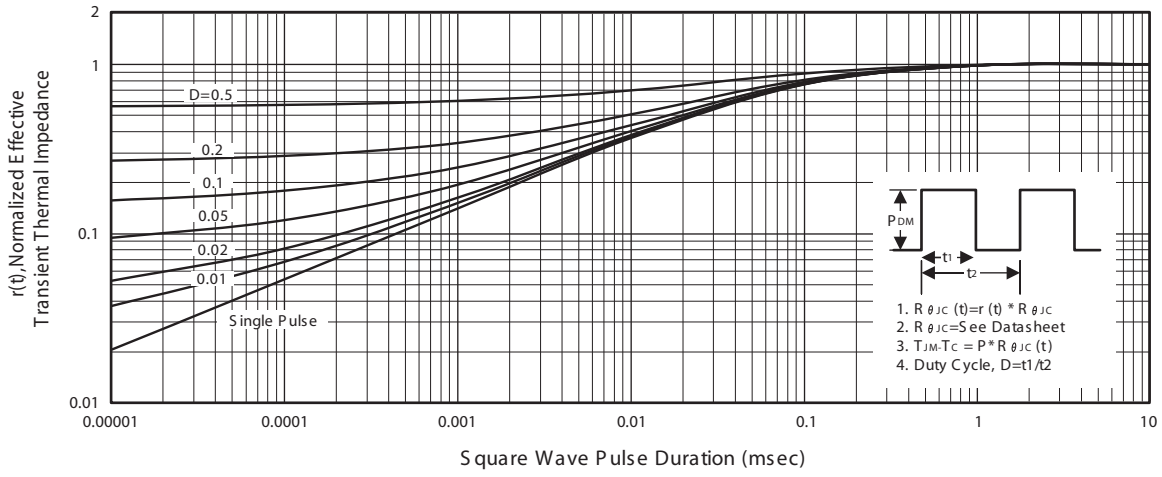
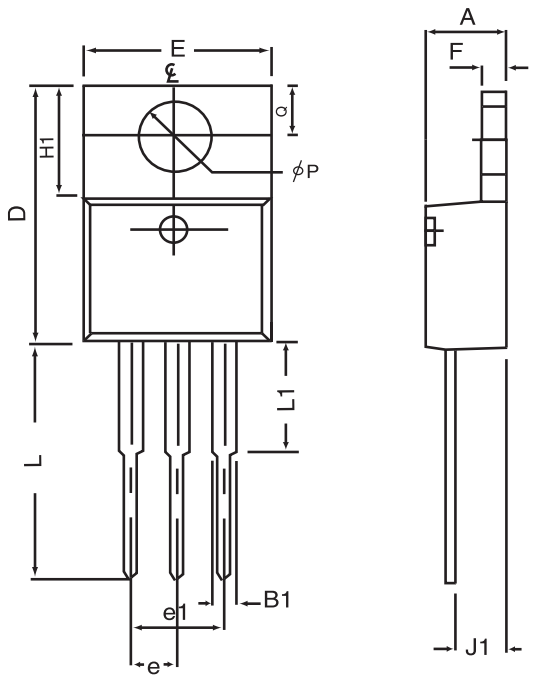



Figure 13b. Normalized Thermal Transient Impedance Curve for STP15L01F

## PACKAGE OUTLINE DIMENSIONS

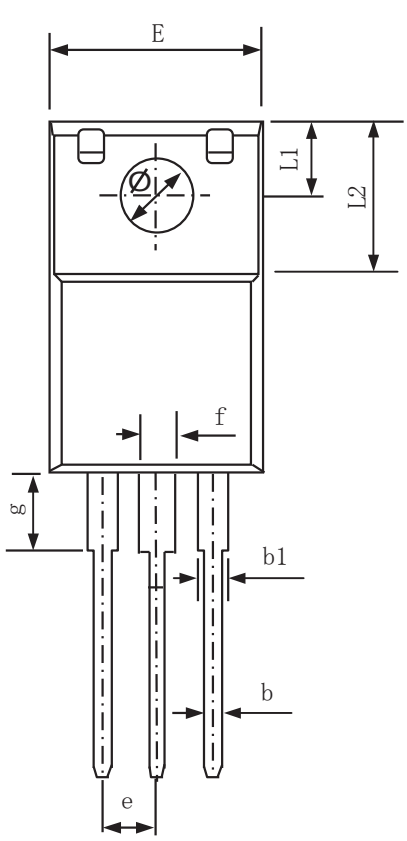
### TO-220

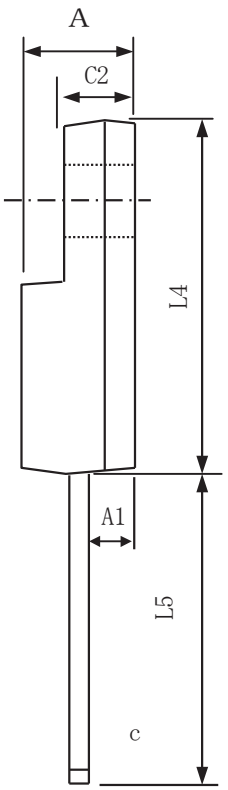


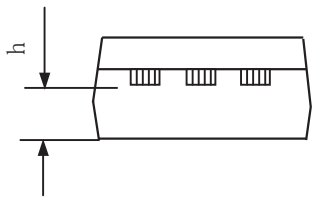

| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 4.32 | 4.80 | 0.170 | 0.189 |
| B1 | 1.27 | 1.65 | 0.050 | 0.630 |
| D | 14.6 | 16.00 | 0.575 | 0.610 |
| E | 9.70 | 10.41 | 0.382 | 0.410 |
| e | 2.34 | 2.74 | 0.092 | 0.108 |
| e1 | 4.68 | 5.48 | 0.184 | 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 |
| φP | 3.50 | 3.94 | 0.138 | 0.155 |
| Q | 2.54 | 3.05 | 0.100 | 0.120 |

## PACKAGE OUTLINE DIMENSIONS

### TO-220F

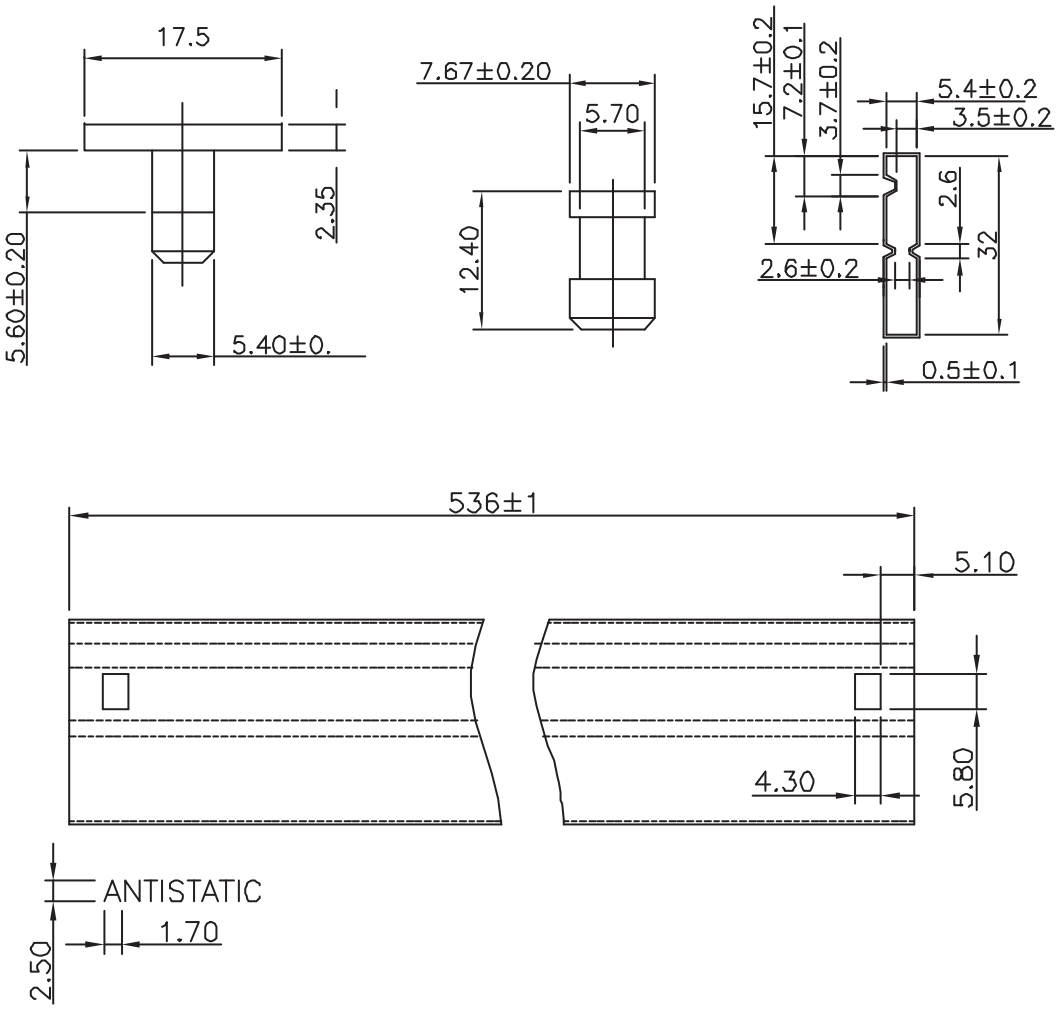


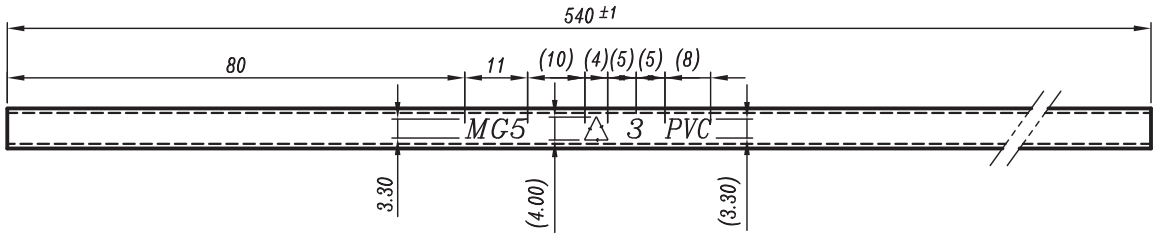




| SYMBOLS | MILLIMETERS | |
|---|---|---|
| | MIN | MAX |
| A | 4.20 | 4.80 |
| A1 | 1.95 | 2.85 |
| b | 0.56 | 1.05 |
| b1 | 0.90 | 1.50 |
| c | 0.55 | 0.80 |
| c2 | 2.50 | 3.10 |
| E | 9.70 | 10.30 |
| L1 | 3.20 | 3.80 |
| L2 | 6.90 | 7.50 |
| L4 | 15.60 | 16.40 |
| L5 | 13.50 | 14.50 |
| Ø | 3.20 | |
| e | 2.55 | |
| f | 1.30 | 1.90 |
| g | 3.40 | 3.80 |
| h | 2.10 | 2.70 |

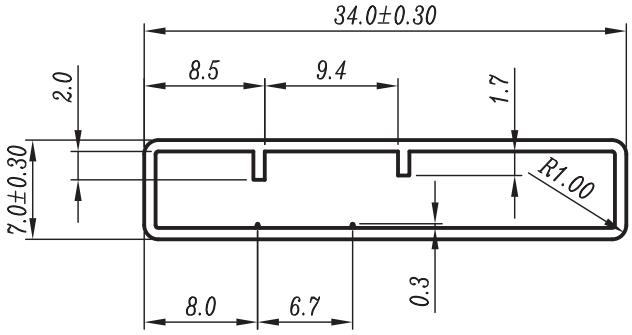
## TO-220 Tube


17.5
2.35
5.60±0.20
5.40±0.
7.67±0.20
5.70
12.40
15.7±0.2
7.2±0.1
3.7±0.2
5.4±0.2
3.5±0.2
2.6
32
2.6±0.2
0.5±0.1
536±1
5.10
4.30
5.80
ANTISTATIC
1.70
2.50

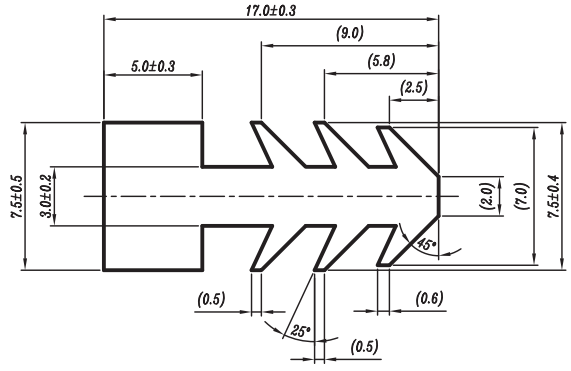
## TO-220F Tube




$t=0.8\pm0.15$




SCALE=2/1




$L=8.0\ ^{+0.5}_{-1}$