

**Product Summary**

| $V_{DS}$ | $R_{DS(ON)_TYP}$                |          | $I_{D\_MAX}$ |
|----------|---------------------------------|----------|--------------|
| 100 V    | 1.7 m $\Omega$ @ $V_{GS} = 10V$ | TO263-3L | 274 A        |
|          | 1.9 m $\Omega$ @ $V_{GS} = 10V$ | TO220-3L |              |

**Features**

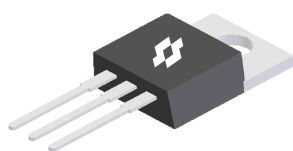
- Low On-Resistance
- Excellent FoM (figure of merit)
- 100%  $\Delta V_{DS}$  & UIS & Rg Tested


**Applications**

- DC/DC in Telecoms and Industrial
- Synchronous Rectification in SMPS
- Hard Switching and High Speed Circuit

**Mechanical Data**

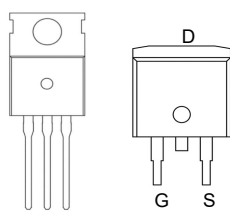
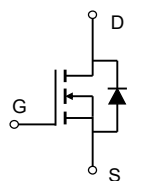
- Green Molding Compound
- Moisture Sensitivity: Level 1 per J-STD-020
- UL Flammability Classification Rating 94V-0

**TO220-3L**


Top View

**TO263-3L**


Top View


 PIN Configuration  
(Top View)


Schematic Diagram

**Ordering Information**

| Orderable Part Number | Package Type | Device Marking | Form          | Quantity (pcs) |
|-----------------------|--------------|----------------|---------------|----------------|
| SMT10T02AHS           | TO220-3L     | 10T02AH        | Tube          | 50             |
| SMT10T02AHT           | TO263-3L     | 10T02AH        | 13" Tape&Reel | 1,000          |

**Maximum Ratings** (@  $T_C = 25^\circ\text{C}$ , unless otherwise specified.)

| Parameter                                                  | Symbol         | Value      | Unit             |
|------------------------------------------------------------|----------------|------------|------------------|
| Drain - Source Voltage                                     | $V_{DS}$       | 100        | V                |
| Gate - Source Voltage                                      | $V_{GS}$       | $\pm 20$   | V                |
| Continuous Drain Current ( $V_{GS} = 10V$ ) <sup>(1)</sup> | $I_D$          | 274        | A                |
|                                                            |                | 194        | A                |
| Pulsed Drain Current <sup>(2)</sup>                        | $I_{DM}$       | 1095       | A                |
| Single Pulse Avalanche Energy <sup>(3)</sup>               | $E_{AS}$       | 2016       | mJ               |
| Single Pulse Avalanche Current ( $L = 0.1mH$ )             | $I_{AS}$       | 117        | A                |
| Power Dissipation                                          | $P_D$          | 306        | W                |
|                                                            |                | 153        | W                |
| Junction & Storage Temperature Range                       | $T_J, T_{STG}$ | -55 ~ +175 | $^\circ\text{C}$ |

**Thermal Characteristics**

| Parameter                                              | Symbol          | Typ. | Max. | Unit               |
|--------------------------------------------------------|-----------------|------|------|--------------------|
| Thermal Resistance, Junction-to-Ambient <sup>(4)</sup> | $R_{\theta JA}$ | 25   | 32   | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case <sup>(5)</sup>    | $R_{\theta JC}$ | 0.38 | 0.49 | $^\circ\text{C/W}$ |

**Electrical Characteristics** (@  $T_J = 25^\circ\text{C}$ , unless otherwise specified.)

| Parameter                                         | Symbol               | Test Condition                                                                                | Min.     | Typ. | Max. | Unit |    |
|---------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|----------|------|------|------|----|
| Off Characteristics <sup>(6)</sup>                |                      |                                                                                               |          |      |      |      |    |
| Drain-Source Breakdown Voltage                    | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                                  | 100      | -    | -    | V    |    |
| Zero Gate Voltage Drain Current                   | I <sub>DSS</sub>     | V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V                                                  | -        | -    | 1.0  | μA   |    |
|                                                   |                      | T <sub>J</sub> = 125°C                                                                        | -        | -    | 100  | μA   |    |
| Gate-Source Leakage Current                       | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                  | -        | -    | ±100 | nA   |    |
| On Characteristics <sup>(6)</sup>                 |                      |                                                                                               |          |      |      |      |    |
| Gate Threshold Voltage                            | V <sub>GS(th)</sub>  | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250μA                                    | 2.0      | 3.0  | 4.0  | V    |    |
| Static Drain-Source On-Resistance                 | R <sub>DS(ON)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                                   | TO263-3L | -    | 1.7  | 2.1  | mΩ |
|                                                   |                      |                                                                                               | TO220-3L | -    | 1.9  | 2.3  | mΩ |
| Forward Transconductance                          | g <sub>fs</sub>      | V <sub>DS</sub> = 5.0V, I <sub>D</sub> = 20A                                                  | -        | 78   | -    | S    |    |
| Diodes Forward Voltage                            | V <sub>SD</sub>      | I <sub>S</sub> = 2.0A, V <sub>GS</sub> = 0V                                                   | -        | 0.7  | 1.2  | V    |    |
| Dynamic Characteristics <sup>(7)</sup>            |                      |                                                                                               |          |      |      |      |    |
| Input Capacitance                                 | C <sub>iss</sub>     | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1MHz                                         | -        | 9660 | -    | pF   |    |
| Output Capacitance                                | C <sub>oss</sub>     |                                                                                               | -        | 3476 | -    | pF   |    |
| Reverse Transfer Capacitance                      | C <sub>rss</sub>     |                                                                                               | -        | 48   | -    | pF   |    |
| Gate Resistance                                   | R <sub>g</sub>       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1MHz                                          | -        | 2.0  | -    | Ω    |    |
| Switching Characteristics <sup>(7)</sup>          |                      |                                                                                               |          |      |      |      |    |
| Turn-On DelayTime                                 | t <sub>d(on)</sub>   | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 50V<br>I <sub>D</sub> = 20A, R <sub>GEN</sub> = 3.0Ω | -        | 25   | -    | ns   |    |
| Rise Time                                         | t <sub>r</sub>       |                                                                                               | -        | 42   | -    | ns   |    |
| Turn-Off DelayTime                                | t <sub>d(off)</sub>  |                                                                                               | -        | 87   | -    | ns   |    |
| Fall Time                                         | t <sub>f</sub>       |                                                                                               | -        | 63   | -    | ns   |    |
| Gate Charge Characteristics <sup>(7)</sup>        |                      |                                                                                               |          |      |      |      |    |
| Total Gate Charge (V <sub>GS</sub> = 10V)         | Q <sub>g</sub>       | V <sub>DS</sub> = 50V, I <sub>D</sub> = 20A<br>V <sub>GS</sub> = 10V                          | -        | 140  | -    | nC   |    |
| Total Gate Charge (V <sub>GS</sub> = 6.0V)        | Q <sub>g</sub>       |                                                                                               | -        | 88   | -    | nC   |    |
| Gate-Source Charge                                | Q <sub>gs</sub>      |                                                                                               | -        | 38   | -    | nC   |    |
| Gate-Drain Charge                                 | Q <sub>gd</sub>      |                                                                                               | -        | 27   | -    | nC   |    |
| Gate Plateau Voltage                              | V <sub>plateau</sub> |                                                                                               | -        | 4.2  | -    | V    |    |
| Drain-Source Diode Characteristics <sup>(7)</sup> |                      |                                                                                               |          |      |      |      |    |
| Body Diode Reverse Recovery Time                  | t <sub>rr</sub>      | I <sub>F</sub> = 20A, dI/dt = 100A/μs,                                                        | -        | 105  | -    | ns   |    |
| Body Diode Reverse Recovery Charge                | Q <sub>rr</sub>      | T <sub>J</sub> = 25°C                                                                         | -        | 394  | -    | nC   |    |
| Diode Forward Current                             | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                                         | -        | -    | 204  | A    |    |

**Notes:**

1. This current is chip limited, which is calculated based on  $R_{thjc}$ .
2. This current is calculated on single pulse with 10us Single Pulse.
3. Defined by design, not subject to production test,  $E_{AS}$  condition:  $T_J=25^\circ\text{C}$ ,  $V_{DD}=50V$ ,  $V_{GS}=10V$ ,  $L=1.0mH$ .
4. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
5. Thermal resistance from junction to the exposed pad.
6. Short duration pulse test used to minimize self-heating effect.
7. Defined by design, not subject to production.

### Typical Electrical and Thermal Characteristics

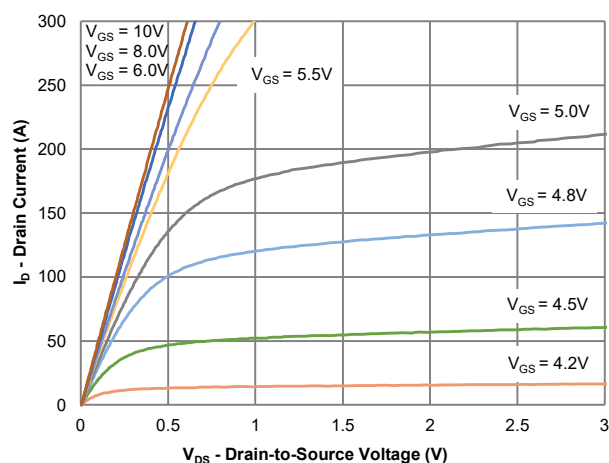


Figure 1: Output Characteristics

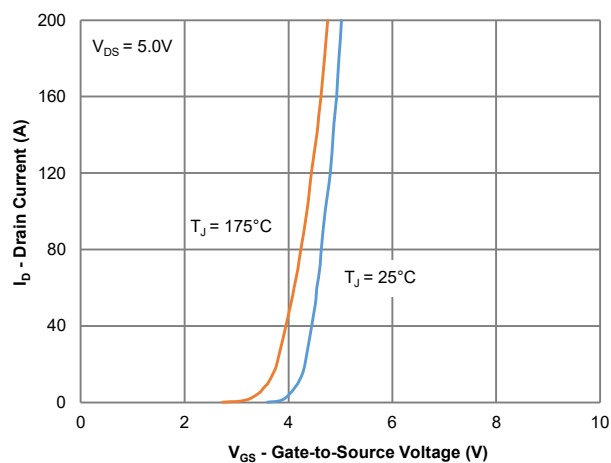


Figure 2: Transfer Characteristics

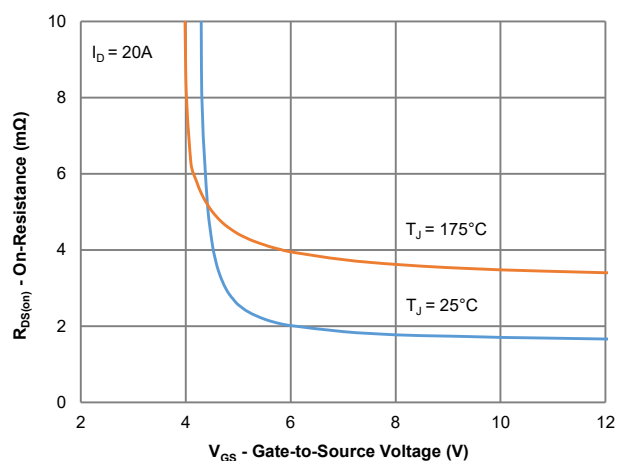


Figure 3: On-Resistance vs. Gate-Source Voltage

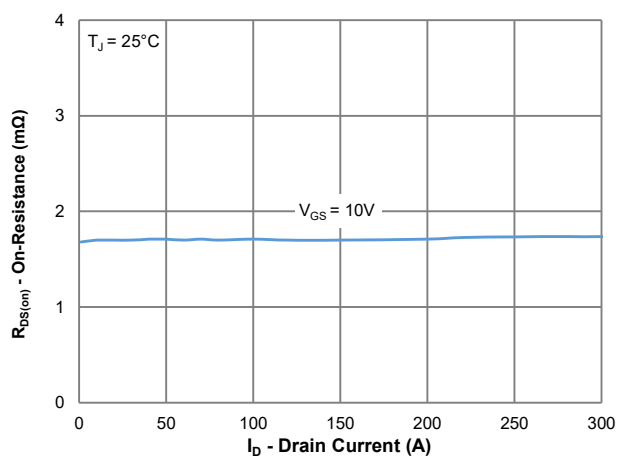


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

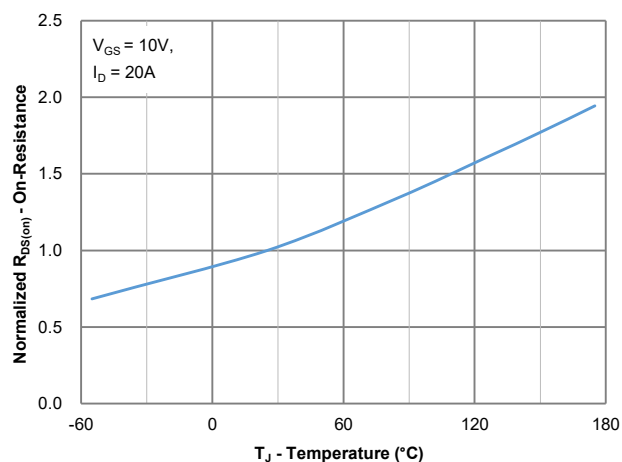


Figure 5: On-Resistance vs. Junction Temperature

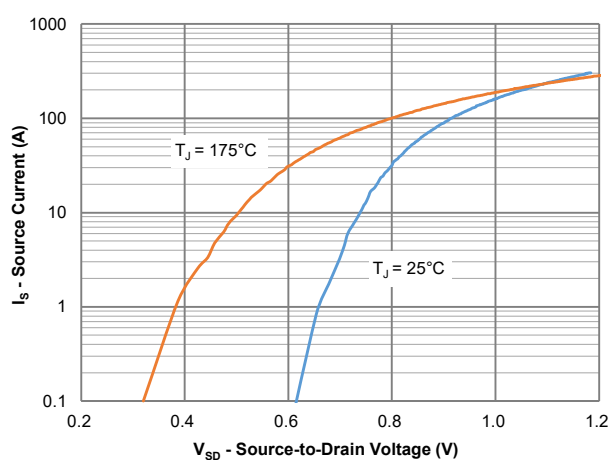


Figure 6: Source-Drain Diode Forward Voltage

### Typical Electrical and Thermal Characteristics

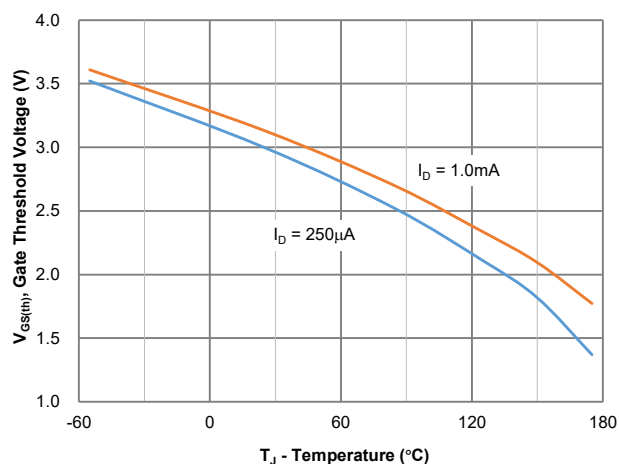


Figure 7: Gate Threshold Variation vs. Junction Temperature

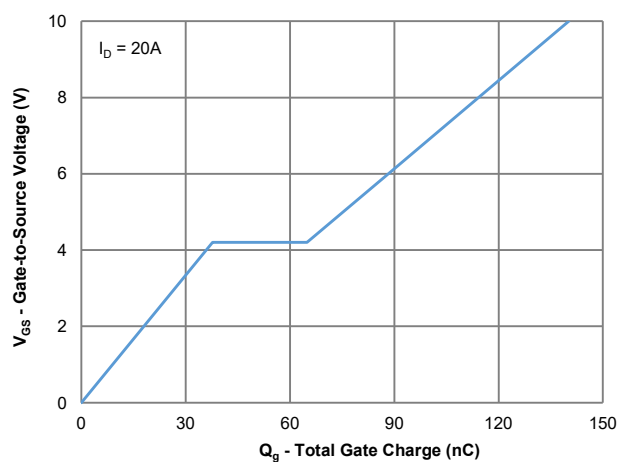


Figure 8: Gate Charge Characteristics

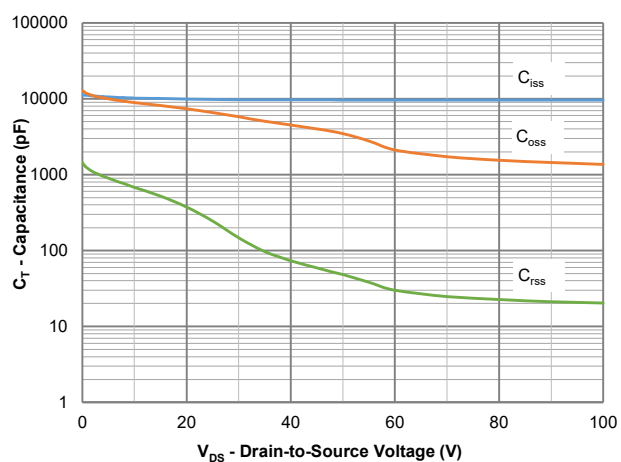


Figure 9: Capacitance Characteristics

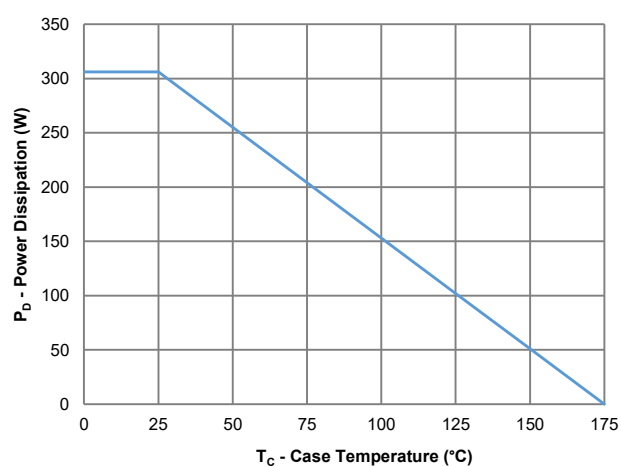


Figure 10: Power Derating

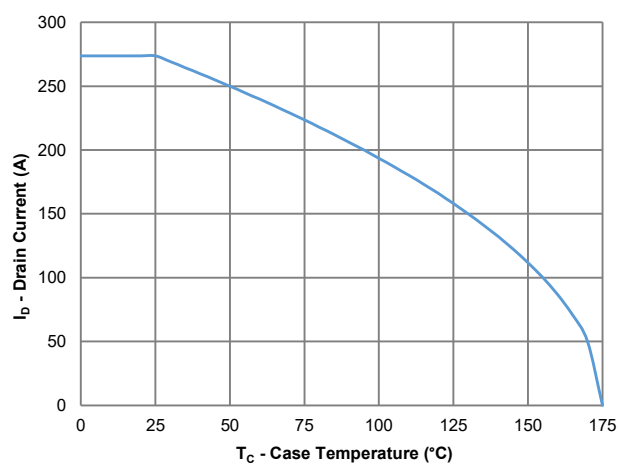


Figure 11: Current Derating

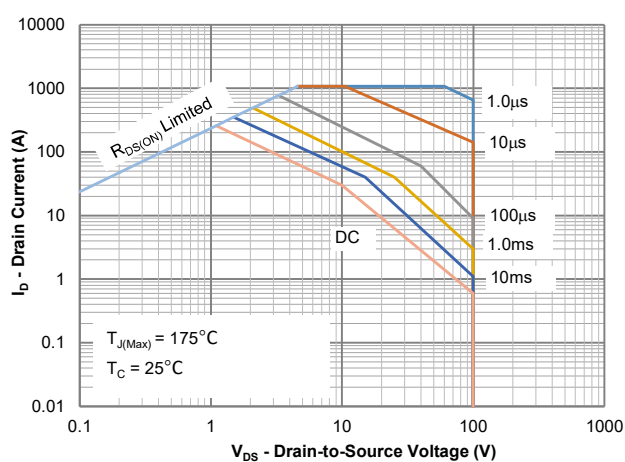
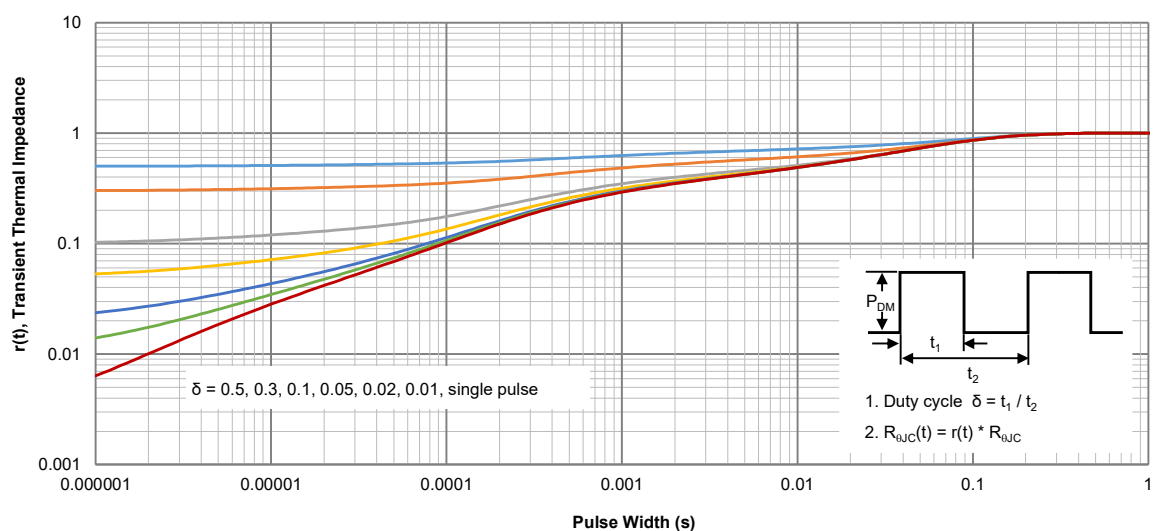
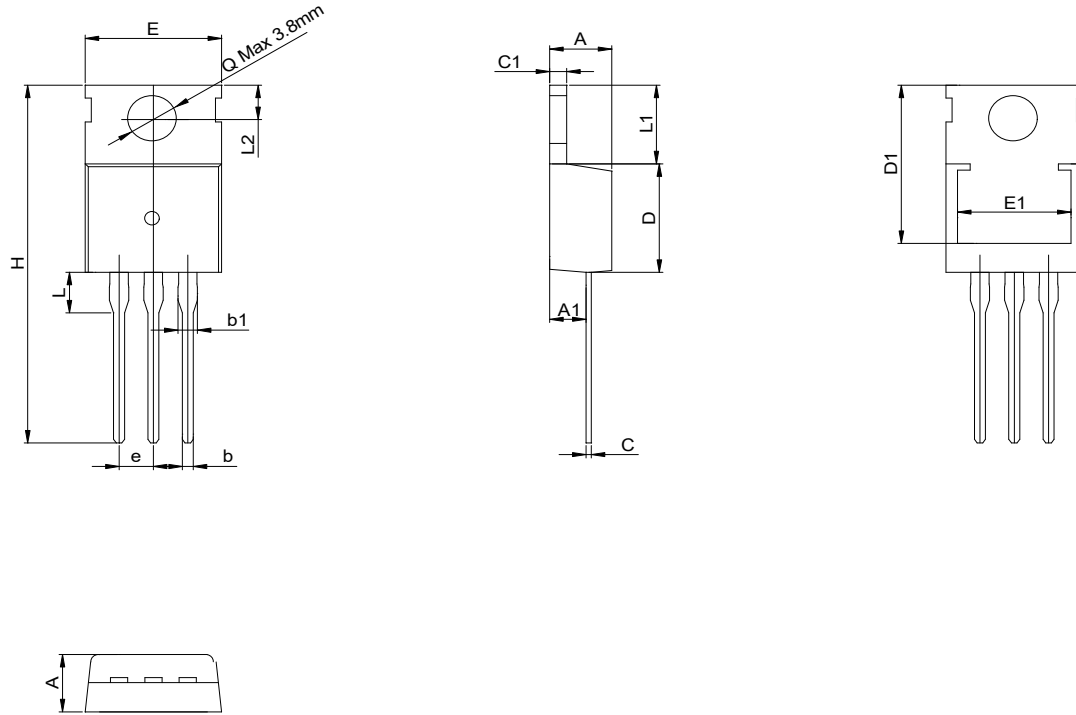


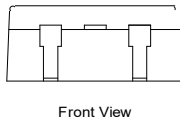
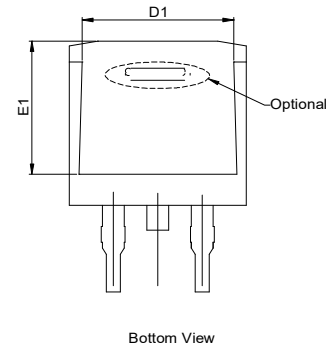
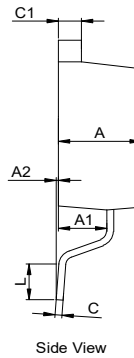
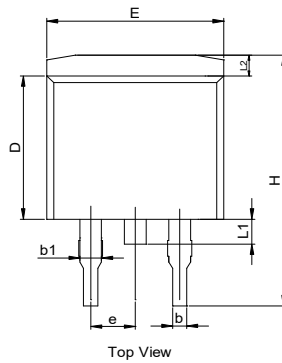
Figure 12: Safe Operating Area

**Typical Electrical and Thermal Characteristics**

**Figure 13: Normalized Maximum Transient Thermal Impedance**

**TO220-3L Package Outline**
**Package Outline**

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMENSIONS IN MILLIMETER (ANGLE IN DEGREE).
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH.

| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 4.35       | 4.50  | 4.70  |
| A1   | 2.20       | 2.30  | 3.00  |
| b    | 0.70       | 0.80  | 0.95  |
| b1   | 1.10       | 1.30  | 1.50  |
| C    | 0.45       | 0.50  | 0.60  |
| C1   | 1.23       | 1.30  | 1.40  |
| H    | 28.00      | 28.80 | 29.80 |
| D    | 8.80       | 9.21  | 9.90  |
| D1   | 12.80      | 13.20 | 13.60 |
| E    | 9.70       | 10.00 | 10.50 |
| E1   | 7.40       | 8.00  | 8.60  |
| L    | --         | --    | 3.80  |
| L1   | 6.25       | 6.50  | 6.90  |
| L2   | 2.40       | 2.90  | 3.05  |
| e    | 2.54 BSC   |       |       |

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| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 4.20       | 4.50  | 4.70  |
| A1   | 2.30       | --    | 2.85  |
| A2   | 0.00       | 0.10  | 0.25  |
| b    | 0.70       | 0.80  | 0.95  |
| b1   | 1.15       | 1.30  | 1.70  |
| C    | 0.30       | 0.50  | 0.60  |
| C1   | 1.15       | 1.30  | 1.42  |
| H    | 14.00      | 15.20 | 15.88 |
| D    | 8.50       | 9.20  | 9.60  |
| D1   | 6.80       | 7.75  | 8.00  |
| E    | 9.78       | 10.00 | 10.36 |
| E1   | 6.80       | 7.95  | 8.10  |
| L    | 1.50       | --    | 2.80  |
| L1   | --         | --    | 1.75  |
| L2   | 1.35 REF   |       |       |
| e    | --         | 2.54  | --    |

**Recommended Soldering Footprint :**
