

## S4D10120A/S4D10120E/S4D10120H/S4D10120F 1200V SIC POWER SCHOTTKY RECTIFIERS

### Description

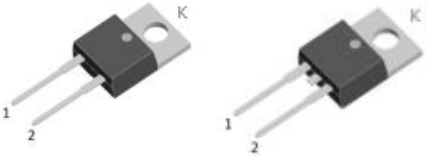

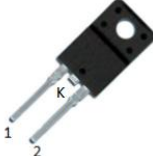


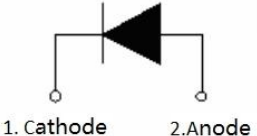
This 1200V 10A diode is high voltage Schottky rectifier that has very low total conduction losses and very stable switching characteristics over temperature extremes. The S4D10120A/S4D10120E/S4D10120H/S4D10120F are ideal for energy sensitive, high frequency applications in challenging environments.

### Features

- 175°C T<sub>J</sub> operation
- Ultra-low switching loss
- Switching speeds independent of operating temperature
- Low total conduction losses
- High forward surge current capability
- High package isolation voltage
- Terminals finish: 100% Pure Tin
- “-A” is an AEC-Q101 qualified device
- Pb – Free Device
- All SMC parts are traceable to the wafer lot
- Additional electrical and life testing can be performed upon request

### Applications

- Alternative energy inverters
- Power Factor Correction (PFC)
- Free-Wheeling diodes
- Switching supply output rectification
- Reverse polarity protection

|  |  |   |  |
|--|--|---|--|
| <p>S4D10120A</p>  | <p>S4D10120E</p>  | <p>S4D10120F</p>  | <p>S4D10120H</p>  |
| <p>TO-220AC<br/>(TO-220-2)</p>   | <p>DPAK<br/>(TO-252-2)</p>   | <p>ITO-220AC<br/>(TO-220-F2)</p>  | <p>TO-247AC<br/>(TO-247-2)</p>   |
|                   |  |   |                   |

### Maximum Ratings:

| Characteristics  | Symbol                          | Condition   | Max.  | Units |
|--|---------------------------------|---|-------|-------|
| Peak Repetitive Reverse Voltage<br>Working Peak Reverse Voltage<br>DC Blocking Voltage | $V_{RRM}$<br>$V_{RWM}$<br>$V_R$ | -   | 1200  | V     |
| Average Rectified Forward Current  | $I_{F(AV)1}$                    | $T_c = 25^\circ\text{C}$                            | 33    | A     |
|  | $I_{F(AV)2}$                    | $T_c = 153^\circ\text{C}$                           | 10    | A     |
| Repetitive Peak Forward Surge Current  | $I_{FRM1}$                      | 10 ms, Half Sine pulse, $T_c = 25^\circ\text{C}$    | 46    | A     |
|  | $I_{FRM2}$                      | 10 ms, Half Sine pulse, $T_c = 110^\circ\text{C}$   | 30    | A     |
| Peak One Cycle Non-Repetitive Surge Current  | $I_{FSM1}$                      | 10ms, Half Sine pulse, $T_c = 25^\circ\text{C}$     | 105   | A     |
|  | $I_{FSM2}$                      | 10ms, Half Sine pulse, $T_c = 110^\circ\text{C}$    | 80    | A     |
| Non-Repetitive Peak Forward Surge Current  | $I_{F,Max1}$                    | 10 $\mu\text{s}$ . Pulse, $T_c = 25^\circ\text{C}$  | 750   | A     |
|  | $I_{F,Max2}$                    | 10 $\mu\text{s}$ . Pulse, $T_c = 110^\circ\text{C}$ | 620   | A     |
| Power Dissipation  | $P_{tot1}$                      | $T_c = 25^\circ\text{C}$                            | 150.0 | W     |
|  | $P_{tot2}$                      | $T_c = 110^\circ\text{C}$                           | 65.0  | W     |

### Electrical Characteristics:

| Characteristics           | Symbol   | Condition  | Typ.  | Max. | Units         |
|---------------------------|----------|--|-------|------|---------------|
| Forward Voltage Drop*     | $V_{F1}$ | @ 10A, Pulse, $T_J = 25^\circ\text{C}$   | 1.5   | 1.8  | V             |
|                           | $V_{F2}$ | @ 10A, Pulse, $T_J = 175^\circ\text{C}$  | 2.2   | 3.0  | V             |
| Reverse Current*          | $I_{R1}$ | @ $V_R = \text{rated } V_R$<br>$T_J = 25^\circ\text{C}$  | 2     | 30   | $\mu\text{A}$ |
|                           | $I_{R2}$ | @ $V_R = \text{rated } V_R$<br>$T_J = 175^\circ\text{C}$   | 8     | 40   | $\mu\text{A}$ |
| Junction Capacitance      | $C_T$    | $V_R = 0\text{V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{MHz}$   | 772   | -    | pF            |
| Reverse Recovery Charge   | $Q_c$    | $I_F = 10\text{A}$ , $di/dt = 200\text{A}/\mu\text{s}$<br>$V_R = 800\text{V}$ , $T_J = 25^\circ\text{C}$ | 56.46 | -    | nC            |
| Capacitance Stored Energy | $E_c$    | $V_R = 800\text{V}$  | 30.51 | -    | $\mu\text{J}$ |

\* Pulse width < 300  $\mu\text{s}$ , duty cycle < 2

### Thermal-Mechanical Specifications:

| Characteristics                                | Symbol          | S4D10120A   | S4D10120E | S4D10120H | S4D10120F | Units                     |
|--|-----------------|-------------|-----------|-----------|-----------|---------------------------|
| Junction Temperature                           | $T_J$           | -55 to +175 |           |           |           | $^\circ\text{C}$          |
| Storage Temperature                            | $T_{stg}$       | -55 to +175 |           |           |           | $^\circ\text{C}$          |
| Typical Thermal Resistance<br>Junction to Case | $R_{\theta JC}$ | 0.9         | 0.9       | 0.98      | 4         | $^\circ\text{C}/\text{W}$ |

**Ratings and Characteristics Curves**

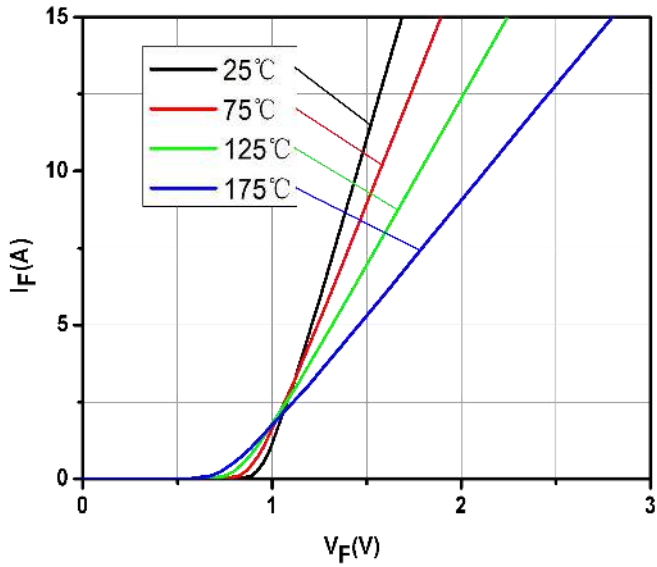


Fig.1-Typical Forward Voltage Characteristics

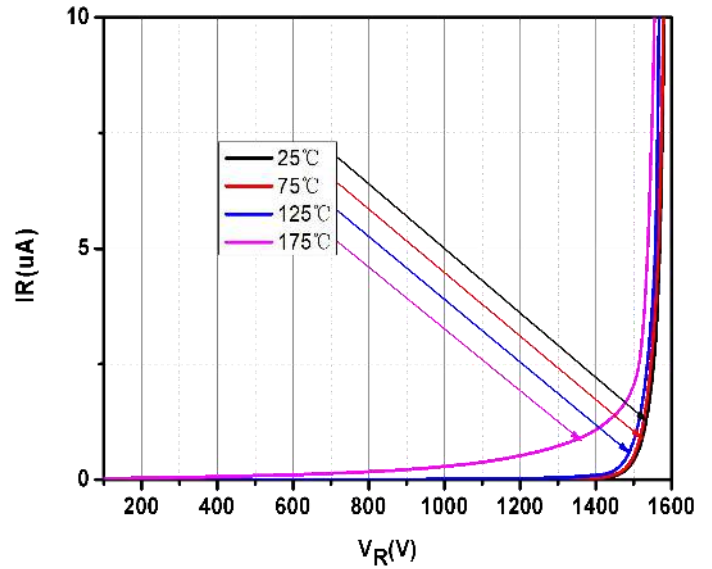


Fig.2-Typical Reverse Characteristics

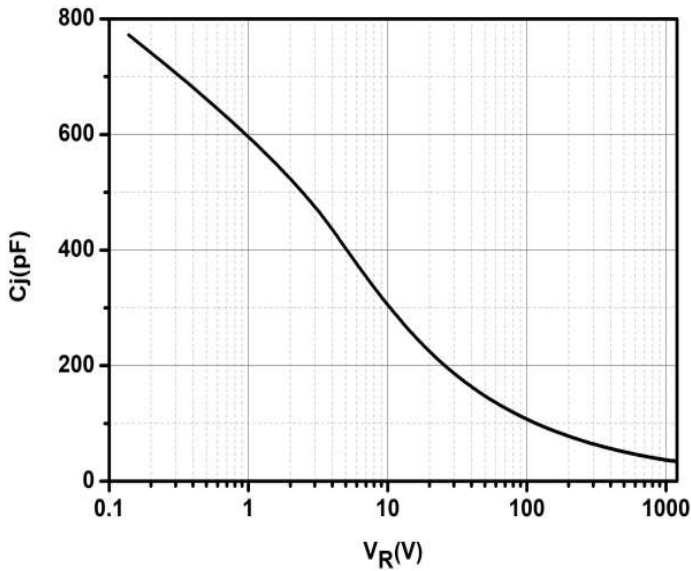


Fig.3-Capacitance vs. Reverse Voltage

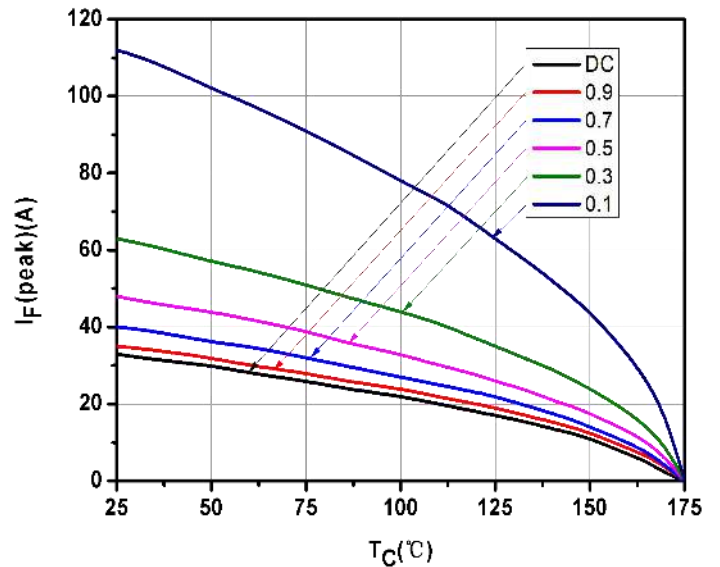


Fig.4-Current Derating

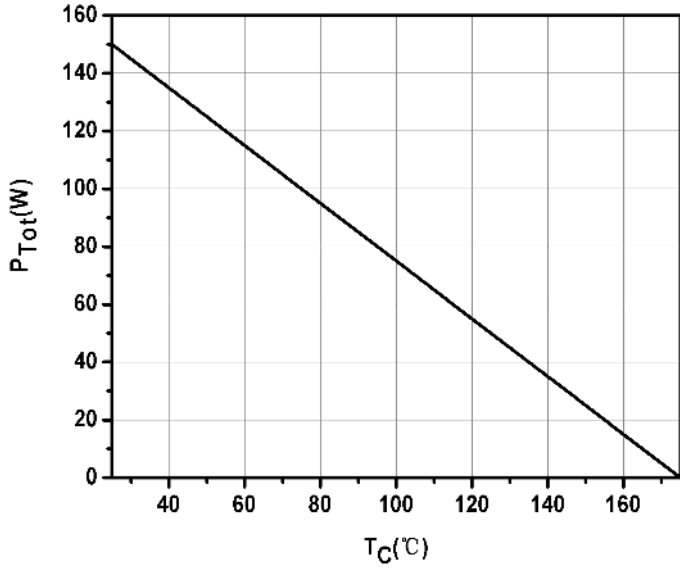


Fig.5-Power Derating

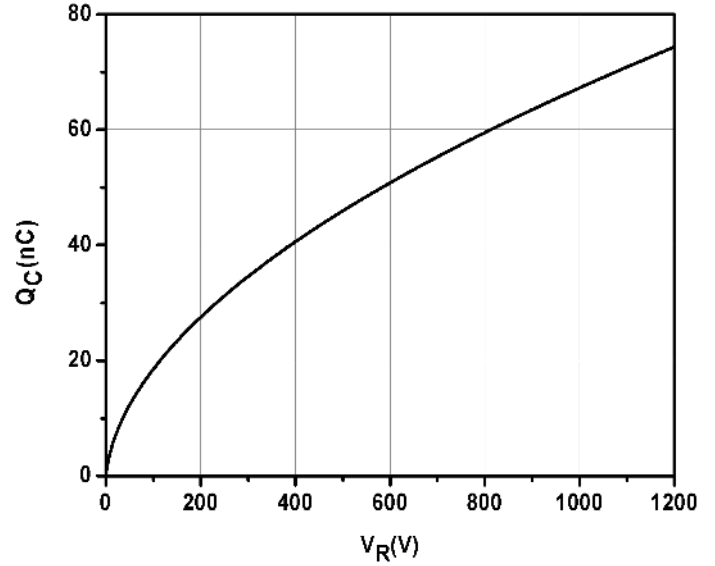


Fig.6-Total Capacitance Charge vs. Reverse Voltage

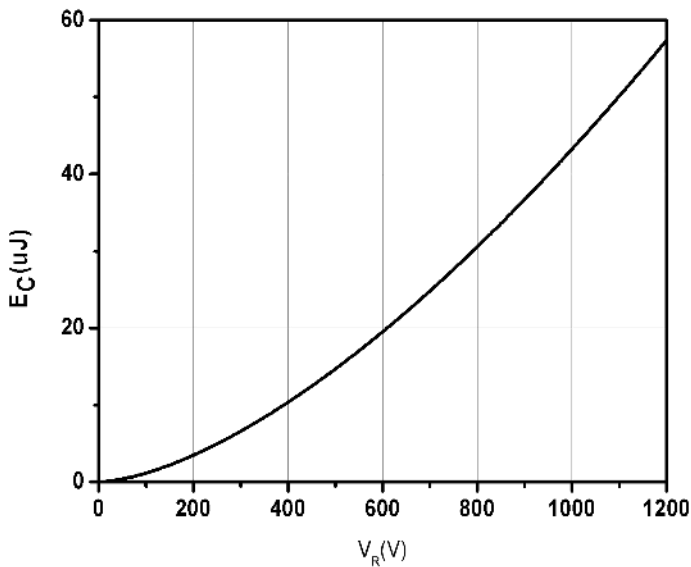


Fig.7-Capacitance Stored Energy

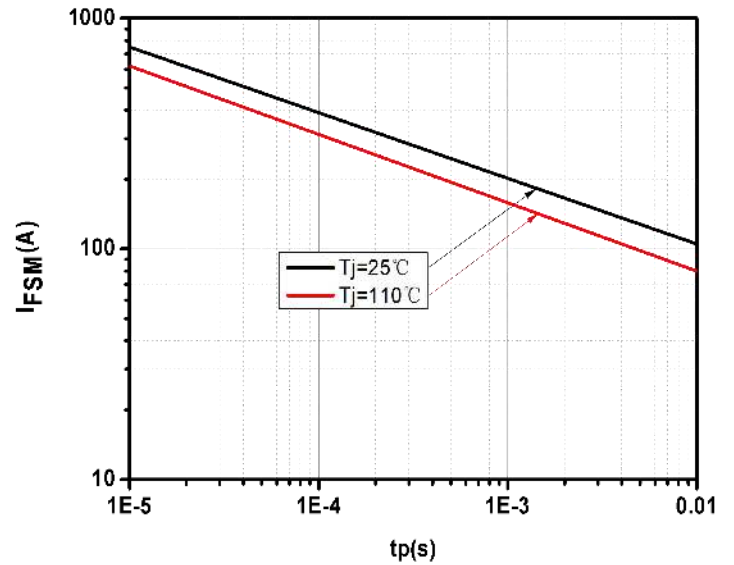


Fig.8-Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

## Ordering Information

| Device      | Package              | Shipping       |
|-------------|----------------------|----------------|
| S4D10120A   | TO-220AC(TO-220-2)   | 50pcs / tube   |
| S4D10120E   | DPAK(TO-252-2)       | 2500pcs / reel |
| S4D10120ETR | DPAK(TO-252-2)       | 2500pcs / reel |
| S4D10120H   | TO-247AC(TO-247-2)   | 25pcs / tube   |
| S4D10120F   | ITO-220AC(TO-220-F2) | 50pcs / tube   |

## Marking Diagram

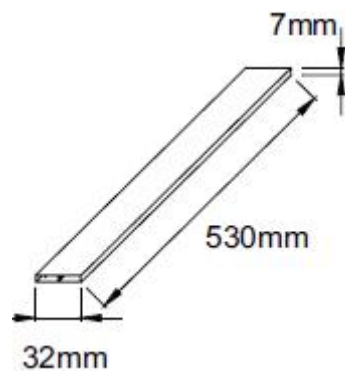


Where XXXXX is YYWWL

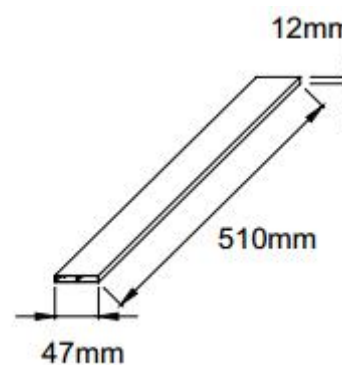
S4D = Device Type  
A/E/H/F = Package type  
10 = Forward Current (10A)  
120 = Reverse Voltage (1200V)  
SSG = SSG  
YY = Year  
WW = Week  
L = Lot Number

**Cautions:** Molding resin  
Epoxy resin UL:94V-0

## Tube Specification

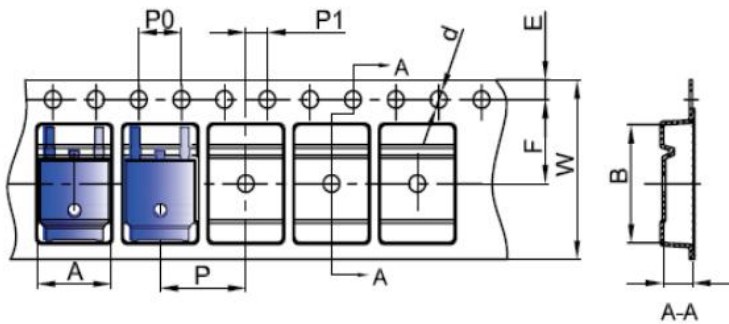


TO-220AC(TO-220-2)  
ITO-220AC(TO-220-F2)



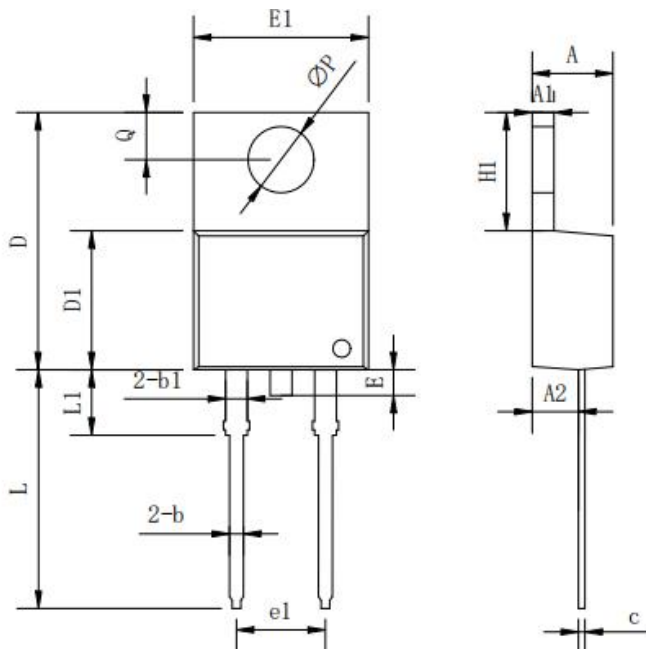
TO-247AC(TO-247-2)

**Carrier Tape & Reel Specification DPAK(TO-252-2)**



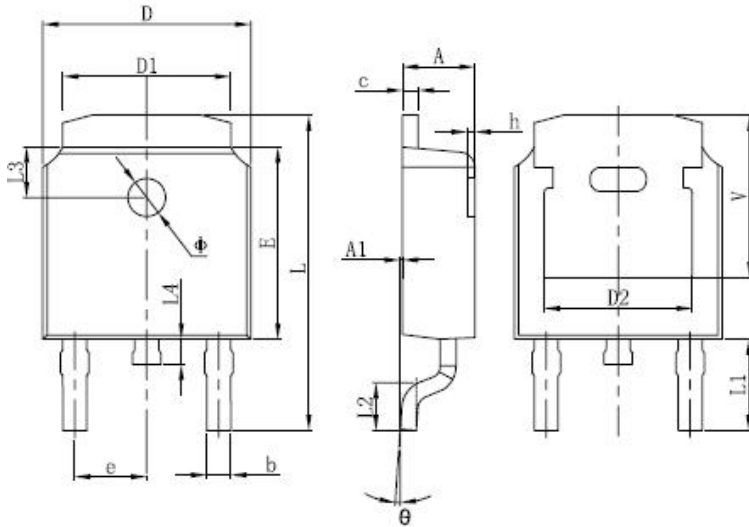
| SYMBOL | Millimeters |       |
|--------|-------------|-------|
|        | Min.        | Max.  |
| A      | 6.80        | 7.00  |
| B      | 10.40       | 10.60 |
| C      | 2.60        | 2.80  |
| d      | Φ1.45       | Φ1.65 |
| E      | 1.65        | 1.85  |
| F      | 7.40        | 7.60  |
| P0     | 3.90        | 4.10  |
| P      | 7.90        | 8.10  |
| P1     | 1.90        | 2.10  |
| W      | 15.90       | 16.30 |

**Mechanical Dimensions TO-220AC(TO-220-2)**



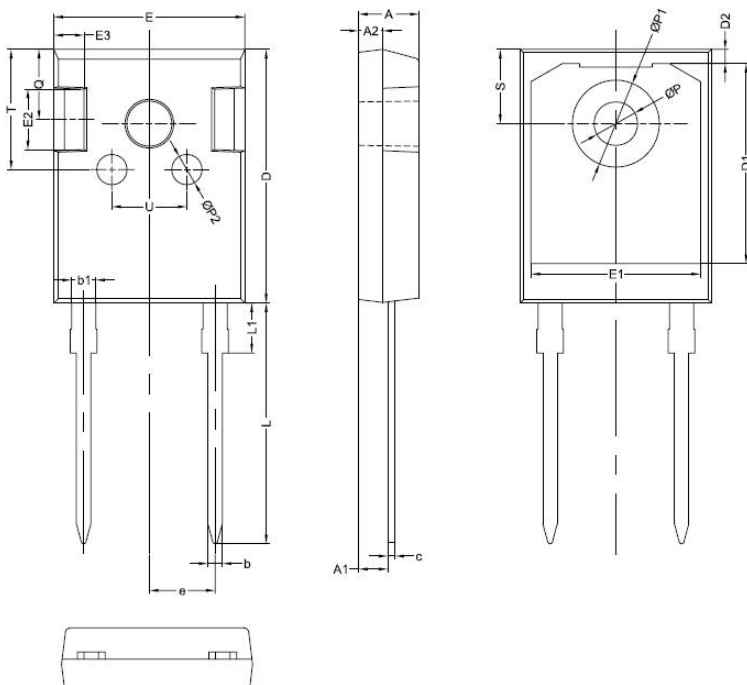
| Symbol | Dimensions in millimeters |         |       |
|--------|---------------------------|---------|-------|
|        | Min.                      | Typical | Max.  |
| A      | 3.56                      | -       | 4.83  |
| A1     | 0.51                      | -       | 1.40  |
| A2     | 2.03                      | -       | 2.92  |
| b      | 0.38                      | -       | 1.02  |
| b1     | 1.14                      | -       | 1.78  |
| c      | 0.31                      | -       | 0.61  |
| D      | 14.22                     | -       | 16.51 |
| D1     | 8.38                      | -       | 9.42  |
| E      | -                         | -       | 1.78  |
| E1     | 9.65                      | 10.16   | 10.67 |
| e1     | -                         | 5.08    | -     |
| H1     | 5.84                      | -       | 6.86  |
| L      | 12.70                     | -       | 14.73 |
| L1     | -                         | -       | 6.35  |
| ΦP     | -                         | 3.56    | -     |

### Mechanical Dimensions DPAK(TO-252-2)



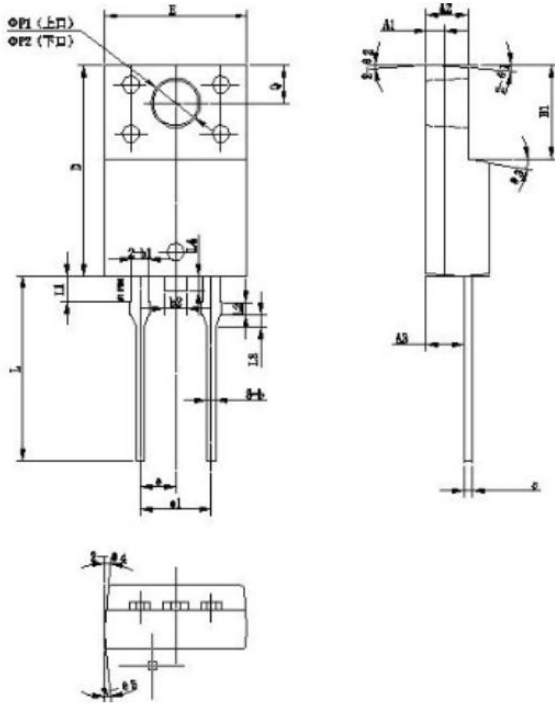
| SYMBOL | Dimensions in millimeters |      |       |
|--------|---------------------------|------|-------|
|        | Min.                      | Typ. | Max.  |
| A      | 2.18                      | -    | 2.39  |
| A1     | -                         | -    | 0.13  |
| b      | 0.64                      | -    | 0.89  |
| c      | 0.46                      | -    | 0.89  |
| D      | 6.35                      | -    | 6.73  |
| D1     | 4.95                      | -    | 5.46  |
| D2     | 4.32                      | -    | -     |
| E      | 5.97                      | 6.1  | 6.22  |
| e      | 2.29BSC                   |      |       |
| L      | 9.4                       | -    | 10.41 |
| L1     | 2.90 REF.                 |      |       |
| L2     | 1.4                       | 1.52 | 1.78  |
| L3     | 1.60 REF.                 |      |       |
| L4     | -                         | -    | 1.02  |
| Φ      | 1.1                       | -    | 1.3   |
| Θ      | 0°                        | -    | 10°   |
| V      | 5.21                      | -    | -     |

### Mechanical Dimensions TO-247AC(TO-247-2)



| SYMBOL | Millimeters |       |       |
|--------|-------------|-------|-------|
|        | MIN.        | TYP.  | MAX.  |
| A      | 4.80        | 5.00  | 5.20  |
| A1     | 2.20        | 2.41  | 2.61  |
| A2     | 1.90        | 2.00  | 2.10  |
| b      | 1.10        | 1.20  | 1.35  |
| b1     | 1.80        | 2.00  | 2.20  |
| c      | 0.50        | 0.60  | 0.75  |
| D      | 20.30       | 21.00 | 21.20 |
| D1     |             | 16.58 |       |
| D2     |             | 1.17  |       |
| E      | 15.60       | 15.80 | 16.00 |
| E1     |             | 14.02 |       |
| E2     |             | 5.00  |       |
| E3     |             | 2.50  |       |
| e      |             | 5.44  |       |
| L      | 19.42       | 19.92 | 20.42 |
| L1     |             | 4.13  |       |
| P      | 3.50        | 3.60  | 3.70  |
| P1     | 7.1         | 7.19  | 7.40  |
| P2     |             | 2.50  |       |
| Q      |             | 5.80  |       |
| S      | 6.05        | 6.15  | 6.25  |
| T      |             | 10.00 |       |
| U      |             | 6.20  |       |

**Mechanical Dimensions ITO-220AC(TO-220-2F)**



| Symbol  | Dimensions in millimeters |         |       |
|---------|---------------------------|---------|-------|
|         | Min.                      | Typical | Max.  |
| A       | 4.30                      | 4.0     | 4.70  |
| A1      |                           | 1.30    |       |
| A2      | 2.80                      | 3.00    | 3.20  |
| A3      | 2.50                      | 2.70    | 2.90  |
| b       | 0.5                       | 0.6     | 0.75  |
| b1      |                           | 1.20    |       |
| b2      |                           | 1.60    |       |
| e       | 0.55                      | 0.6     | 0.75  |
| D       | 14.80                     | 15.00   | 15.20 |
| E       | 8.96                      | 10.14   | 10.36 |
| e1      |                           | 2.55    |       |
| e1      |                           | 5.10    |       |
| H1      | 8.50                      | 8.70    | 8.90  |
| L       | 17.70                     | 18.20   | 18.70 |
| L1      |                           | 1.80    |       |
| L2      |                           | 1.00    |       |
| L3      |                           | 0.80    |       |
| L4      |                           | 1.10    |       |
| ΦP1(上口) | 3.30                      | 3.50    | 3.70  |
| ΦP1(下口) | 2.99                      | 3.19    | 3.39  |
| Q       | 2.50                      | 2.70    | 2.90  |
| Θ1      |                           | 5°      |       |
| Θ2      |                           | 4°      |       |
| Θ3      |                           | 10°     |       |
| Θ4      |                           | 5°      |       |
| Θ5      |                           | 5°      |       |





S4D10120A  
S4D10120E  
S4D10120H  
S4D10120F

**Technical Data**  
**Data Sheet N2321, REV.G**



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