

## S3D08065A S3D08065E S3D08065G S3D08065F S3D08065I 650V SIC POWER SCHOTTKY RECTIFIERS

### Description


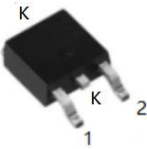
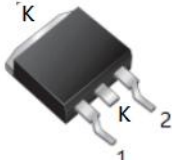
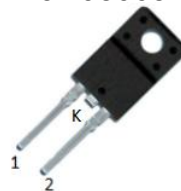



This 650V 8A diode is high voltage Schottky rectifier that has very low total conduction losses and very stable switching characteristics over temperature extremes. The S3D08065A/S3D08065E/S3D08065G/S3D08065F are ideal for energy sensitive, high frequency applications in challenging environments.

### 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

| S3D08065A                                                                           | S3D08065E                                                                           | S3D08065G                                                                           | S3D08065F                                                                             | S3D08065I                                                                             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |  |
| TO-220AC<br>(TO-220-2)                                                              | DPAK<br>(TO-252-2)                                                                  | D <sup>2</sup> PAK<br>(TO-263-2)                                                    | ITO-220AC<br>(TO-220-F2)                                                              | TO-220-Isolation                                                                      |
|  |                                                                                     |                                                                                     |                                                                                       |  |

## 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>$V_{DC}$ | -                                         | 650  | V     |
| Average Rectified Forward Current                                                      | $I_{F(AV)1}$                       | $T_c=25^{\circ}C$                         | 27   | A     |
|                                                                                        | $I_{F(AV)2}$                       | $T_c=153^{\circ}C$                        | 8    | A     |
| Repetitive Peak Forward Surge Current                                                  | $I_{FRM1}$                         | 10ms, Half Sine pulse, $T_c=25^{\circ}C$  | 37.5 | A     |
|                                                                                        | $I_{FRM2}$                         | 10ms, Half Sine pulse, $T_c=110^{\circ}C$ | 25.5 | A     |
| Peak One Cycle Non-Repetitive Surge Current                                            | $I_{FSM1}$                         | 10ms, Half Sine pulse, $T_c=25^{\circ}C$  | 90   | A     |
|                                                                                        | $I_{FSM2}$                         | 10ms, Half Sine pulse, $T_c=110^{\circ}C$ | 60   | A     |
| Non-Repetitive Peak Forward Surge Current                                              | $I_{F,Max}$                        | 10 $\mu$ s. Pulse, $T_c=25^{\circ}C$      | 650  | A     |
|                                                                                        | $I_{F,Max}$                        | 10 $\mu$ s. Pulse, $T_c=110^{\circ}C$     | 530  | A     |
| Power Dissipation                                                                      | $P_{tot1}$                         | $T_c=25^{\circ}C$                         | 103  | W     |
|                                                                                        | $P_{tot1}$                         | $T_c=110^{\circ}C$                        | 44.5 | W     |

## Electrical Characteristics:

| Characteristics           | Symbol   | Condition                                                               | Typ.  | Max. | Units   |
|---------------------------|----------|-------------------------------------------------------------------------|-------|------|---------|
| Forward Voltage Drop*     | $V_{F1}$ | @ 8A, Pulse, $T_J = 25^{\circ}C$                                        | 1.45  | 1.7  | V       |
|                           | $V_{F2}$ | @ 8A, Pulse, $T_J = 175^{\circ}C$                                       | 1.7   | 2.4  | V       |
| Reverse Current*          | $I_{R1}$ | @ $V_R =$ rated $V_R$ , $T_J = 25^{\circ}C$                             | 0.3   | 10   | $\mu$ A |
|                           | $I_{R2}$ | @ $V_R =$ rated $V_R$ , $T_J = 175^{\circ}C$                            | 3     | 100  | $\mu$ A |
| Junction Capacitance      | $C_T$    | $V_R=0V$ , $T_J=25^{\circ}C$ , $f=1MHz$                                 | 650   | -    | pF      |
| Reverse Recovery Charge   | $Q_c$    | $I_F = 8A$ , $di/dt = 200A/\mu s$<br>$V_R = 400V$ , $T_J = 25^{\circ}C$ | 40.55 | -    | nC      |
| Capacitance Stored Energy | $E_C$    | $V_R = 400V$ , $T_J = 25^{\circ}C$                                      | 9.93  | -    | $\mu$ J |

\* Pulse width < 300  $\mu$ s, duty cycle < 2%

### Thermal-Mechanical Specifications:

| Characteristics                             | Symbol          | S3D08065A   | S3D08065E | S3D08065G | S3D08065F | S3D08065I | Units |
|---------------------------------------------|-----------------|-------------|-----------|-----------|-----------|-----------|-------|
| Junction Temperature                        | $T_J$           | -55 to +175 |           |           |           |           | °C    |
| Storage Temperature                         | $T_{stg}$       | -55 to +175 |           |           |           |           | °C    |
| Typical Thermal Resistance Junction to Case | $R_{\theta JC}$ | 1.46        | 1.5       | 1.65      | 3.5       | 2.8       | °C/W  |

### Ordering Information

| Device      | Package              | Shipping       |
|-------------|----------------------|----------------|
| S3D08065A   | TO-220AC(TO-220-2)   | 50pcs / tube   |
| S3D08065E   | DPAK(TO-252-2)       | 2500pcs / reel |
| S3D08065ETR | DPAK(TO-252-2)       | 2500pcs / reel |
| S3D08065G   | D2PAK(TO-263-2)      | 800pcs / reel  |
| S3D08065GTR | D2PAK(TO-263-2)      | 800pcs / reel  |
| S3D08065F   | ITO-220AC(TO-220-F2) | 50pcs / tube   |
| S3D08065I   | TO-220-Isolation     | 50pcs / tube   |

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our tape and reel packaging specification.

## Ratings and Characteristics Curves

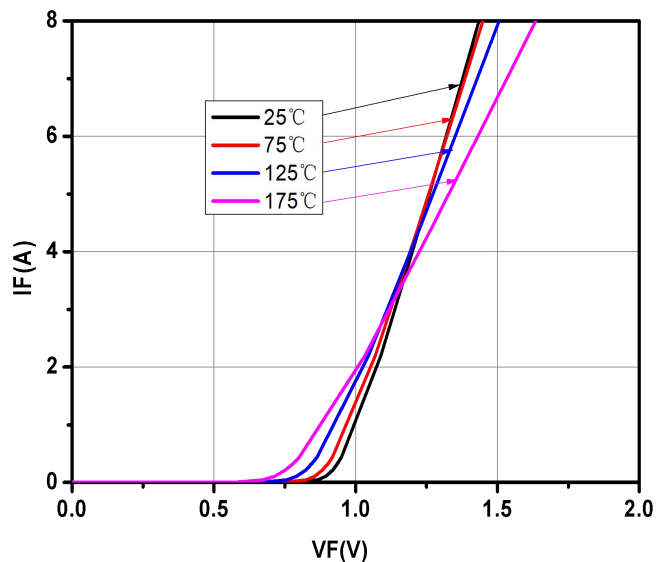


Fig.1-Typical Forward Voltage Characteristics

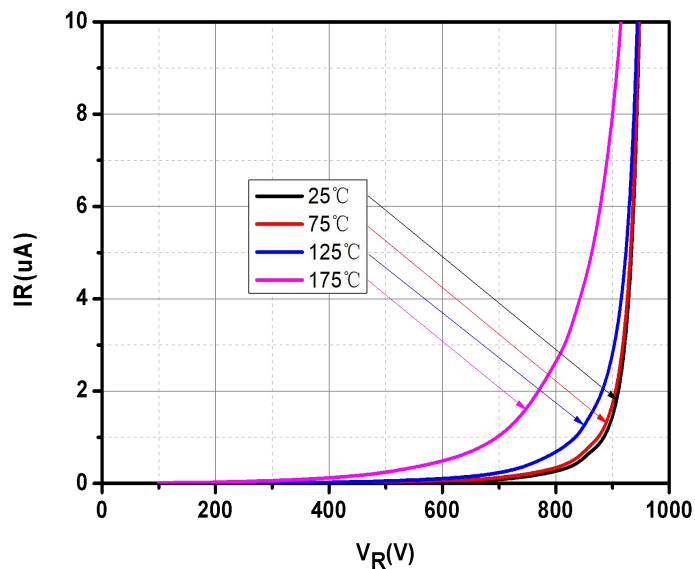


Fig.2-Typical Reverse Characteristics

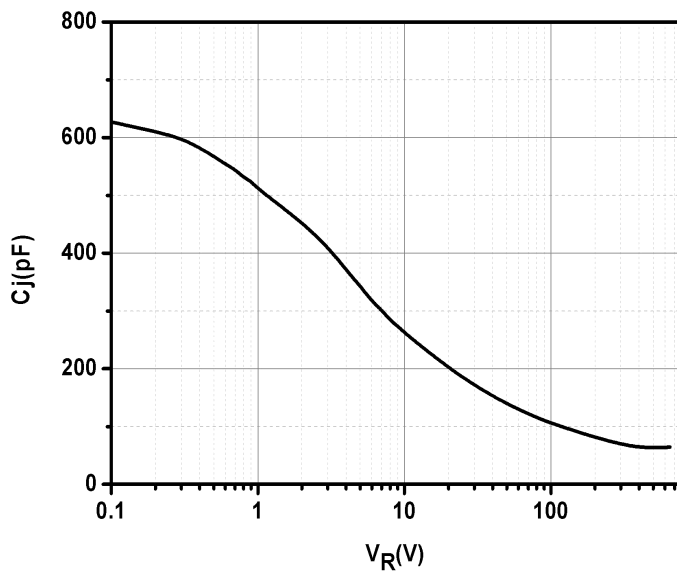


Fig.3-Capacitance vs. Reverse Voltage

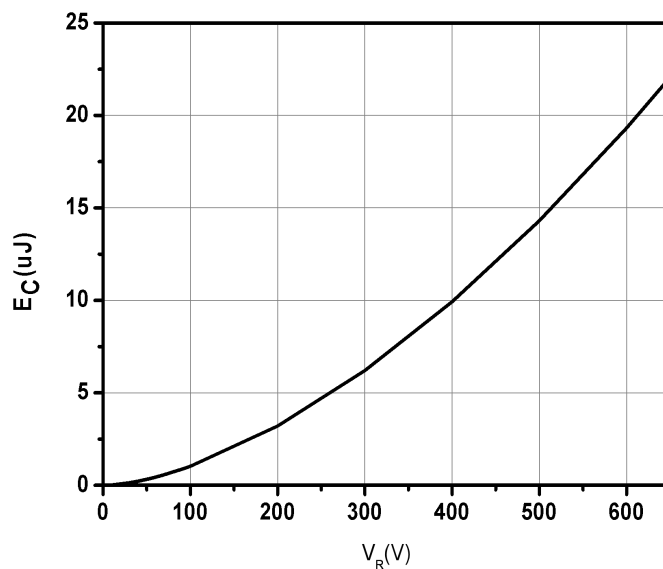


Fig.4-Total Capacitance Charge vs. Reverse Voltage

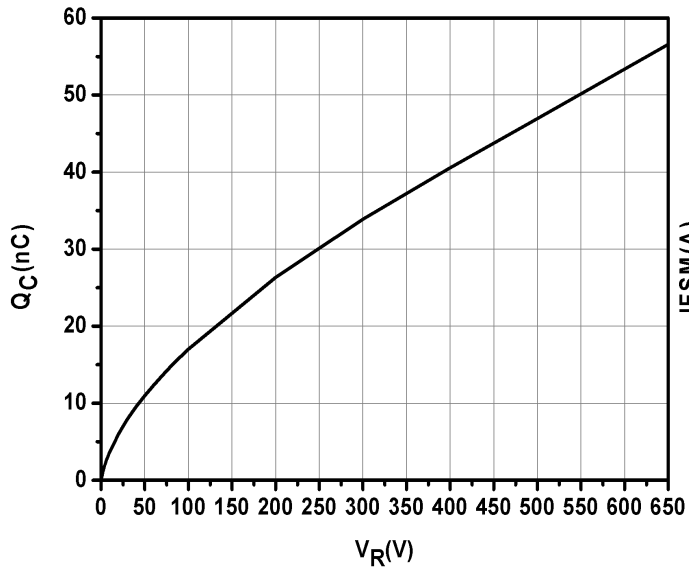


Fig.5-Capacitance Stored Energy

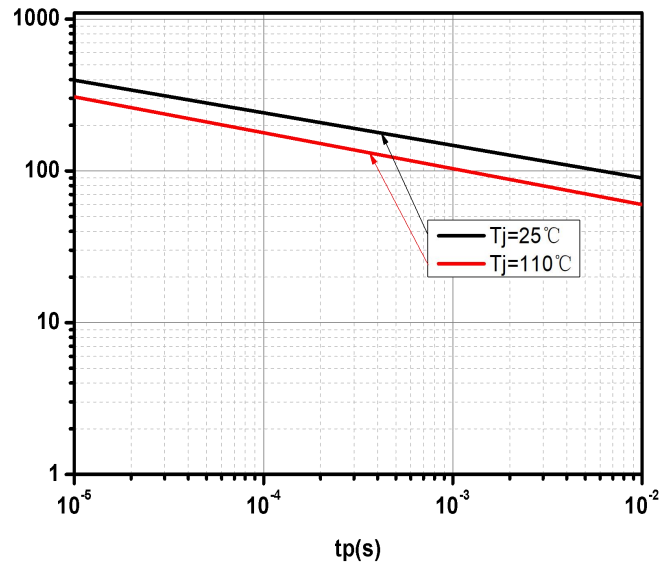


Fig.6-Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

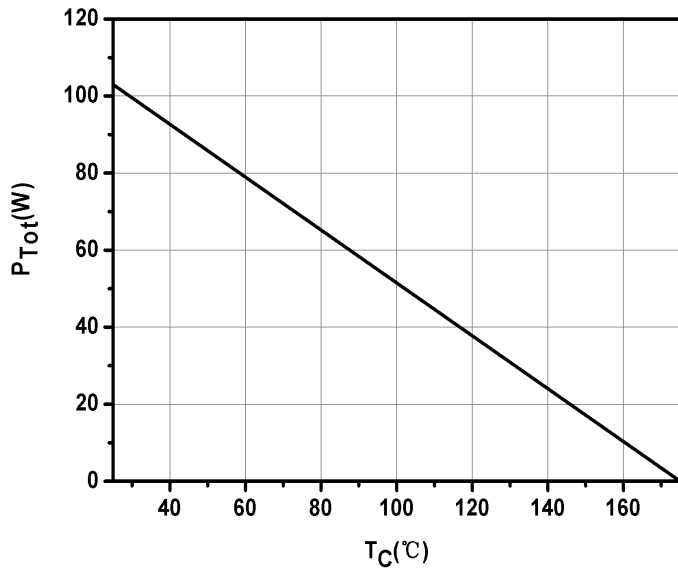


Fig.7-Power Derating

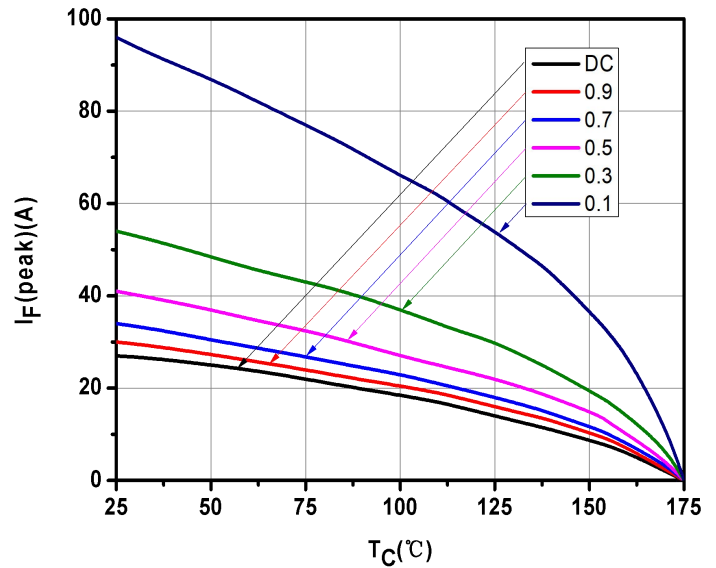
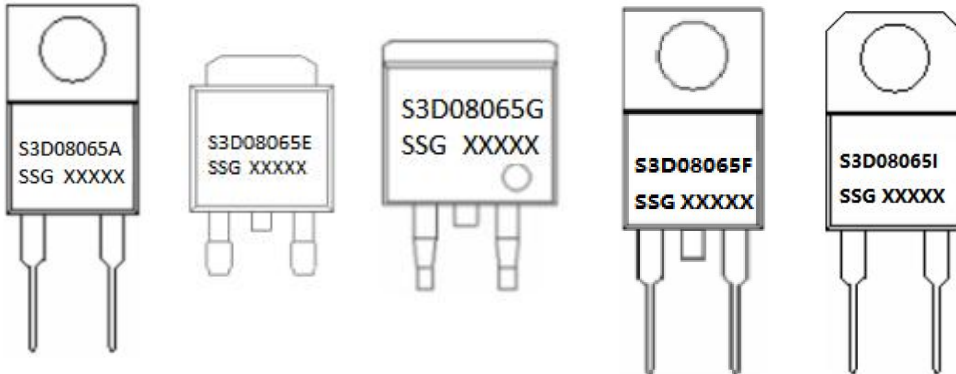


Fig.8-Current Derating

## Marking Diagram

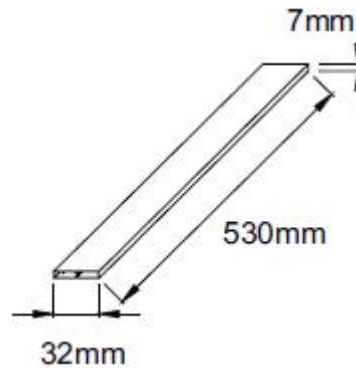


Where XXXXX is YYWWL

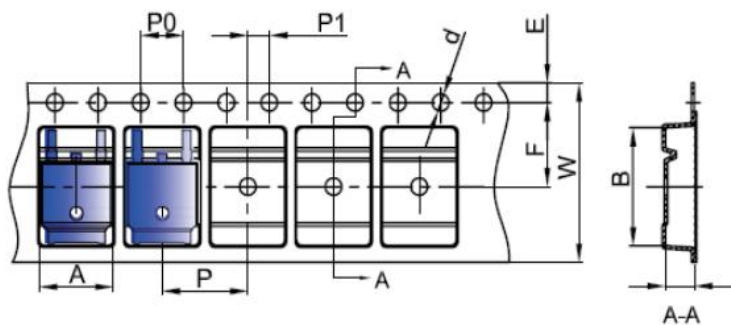
S3D = Device Type  
A/E/G/F/I = Package type  
08 = Forward Current (8A)  
65 = Reverse Voltage (650V)  
SSG = SSG  
YY = Year  
WW = Week  
L = Lot Number

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

## Tube Specification(TO-220-2/TO-220-F2/TO-220-Isolation)

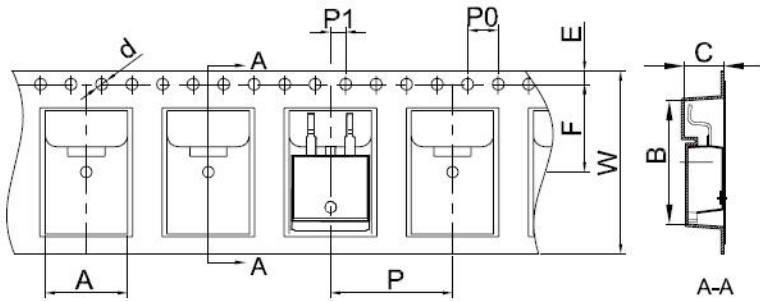


## Carrier Tape & Reel Specification DPAK(TO-252-2)



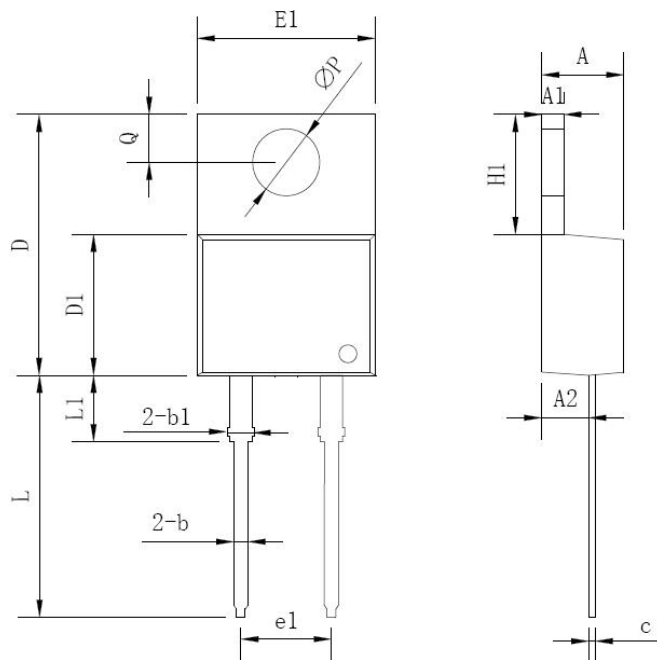
| SYMBOL | Millimeters |       |
|--------|-------------|-------|
|        | Min.        | Max.  |
| A      | 6.80        | 7.00  |
| B      | 10.40       | 10.60 |
| C      | 2.60        | 2.80  |
| d      | Φ1.45       | Φ1.65 |
| E      | 1.65        | 1.85  |
| F      | 7.40        | 7.60  |
| P0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

### Carrier Tape & Reel Specification D2PAK(TO-263-2)



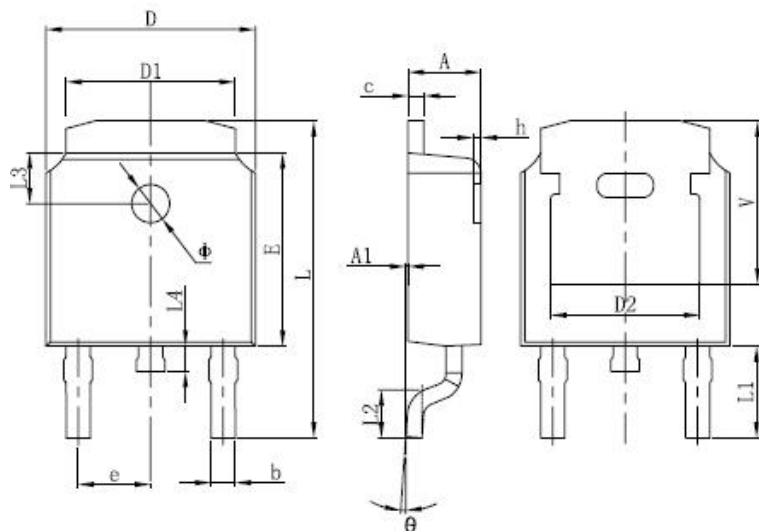
| SYMBOL | Millimeters |       |
|--------|-------------|-------|
|        | Min.        | Max.  |
| A      | 10.70       | 10.90 |
| B      | 16.03       | 16.23 |
| C      | 5.11        | 5.31  |
| d      | 1.45        | 1.65  |
| E      | 1.65        | 1.85  |
| F      | 11.40       | 11.60 |
| P0     | 3.90        | 4.10  |
| P      | 15.90       | 16.10 |
| P1     | 1.90        | 2.10  |
| W      | 23.90       | 24.30 |

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



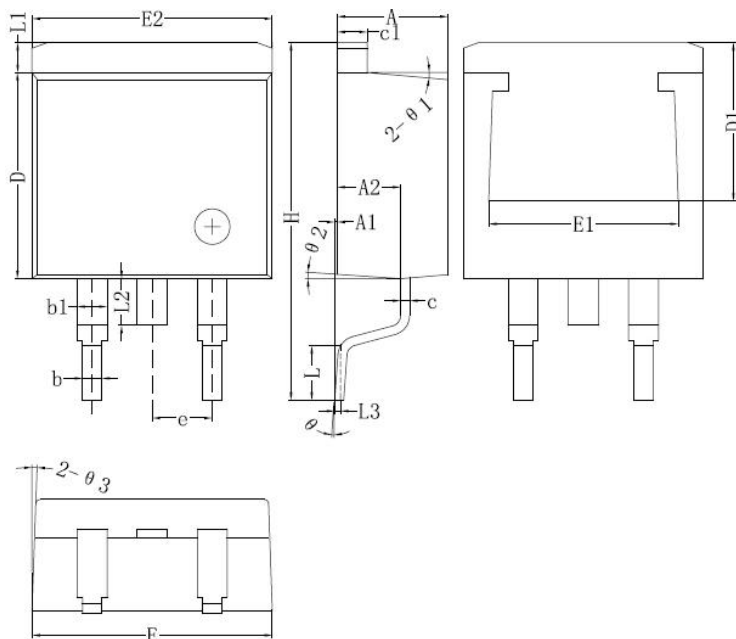
| Symbol | Dimensions in millimeters |         |       |
|--------|---------------------------|---------|-------|
|        | Min.                      | Typical | Max.  |
| A      | 3.56                      | -       | 4.83  |
| A1     | 0.51                      | -       | 1.40  |
| A2     | 2.03                      | -       | 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  |
| 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    | -     |
| Q      | 2.54                      | -       | 3.43  |

### 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                      | -    | -     |

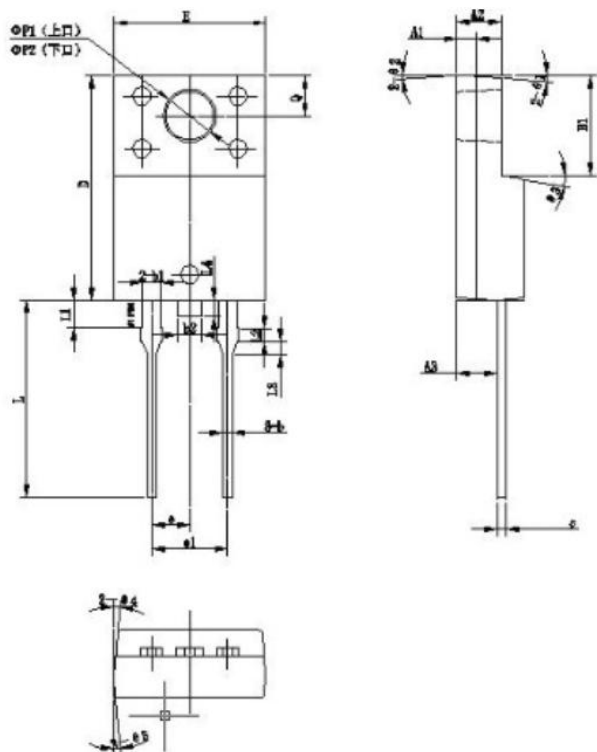
### Mechanical Dimensions D<sup>2</sup>PAK(TO-263-2)



| Symbol | Dimensions in millimeters |       |
|--------|---------------------------|-------|
|        | Min.                      | Max.  |
| A      | 4.06                      | 4.83  |
| A1     | 0                         | 0.26  |
| b      | 0.51                      | 0.99  |
| b1     | 1.14                      | 1.78  |
| c      | 0.31                      | 0.74  |
| c1     | 1.14                      | 1.65  |
| D      | 8.38                      | 9.65  |
| D1     | 6.40                      |       |
| E1     | 6.22                      |       |
| E2     | 9.65                      | 10.67 |
| e      | 2.54BSC                   |       |
| H      | 14.6                      | 15.88 |
| L      | 1.78                      | 2.8   |
| L1     | -                         | 1.68  |
| L2     | -                         | 2.2   |
| L3     | 0.255BSC                  |       |
| Θ      | 0                         | 8°    |

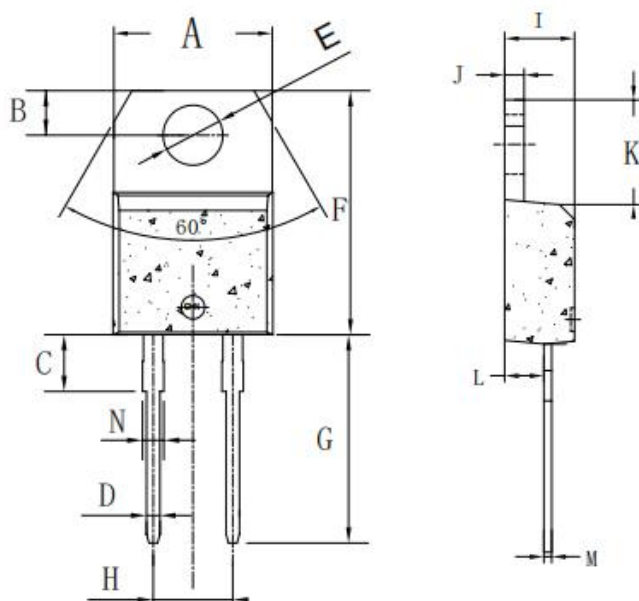


**Mechanical Dimensions ITO-220AC(TO-220-2F)**



| 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 |
| e       |                           | 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°      |       |

**Mechanical Dimensions TO-220-Isolation**



| Symbol | Dimensions in millimeters |         |      |
|--------|---------------------------|---------|------|
|        | Min.                      | Typical | Max. |
| A      | 9.7                       | -       | 10.4 |
| B      | 2.65                      | -       | 3.1  |
| C      | 2.8                       | -       | 4.2  |
| D      | 0.7                       | -       | 0.92 |
| E      | 3.75                      | -       | 3.95 |
| F      | 14.8                      | -       | 16.1 |
| G      | 13.05                     | -       | 13.6 |
| H      | 4.9                       | -       | 5.3  |
| I      | 4.38                      | -       | 4.61 |
| J      | 1.15                      | -       | 1.36 |
| K      | 5.85                      | -       | 6.82 |
| L      | 2.35                      | -       | 2.75 |
| M      | 0.35                      | -       | 0.65 |
| N      | 1.18                      | -       | 1.42 |

Notes: New Mechanical Dimensions is performed from date code 25041.

**Technical Data**  
**Data Sheet N2425, REV. F**



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