

SICR5650 / SICRB5650 / SICRD5650 / SICRF5650 650V SiC POWER SCHOTTKY RECTIFIER

Description

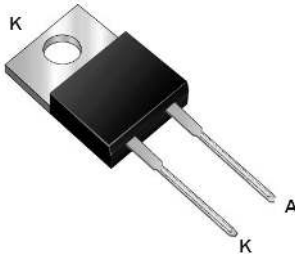
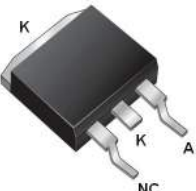



SICR5650/ SICRB5650/ SICRD5650/ SICRF5650 are all single SiC Schottky rectifiers packaged in TO-220AC, D2PAK, DPAK and ITO-220AC case. The device is a high voltage Schottky rectifier that has very low total conduction losses and very stable switching characteristics over temperature extremes. The SICR5650/ SICRB5650/ SICRD5650/ SICRF5650 are ideal for energy sensitive, high frequency applications in challenging environments.

Applications

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

Features

- 175°C T_J operation
- Ultra-low switching loss
- Switching speeds independent of operating temperature
- Low total conduction losses
- High forward surge current capability
- High package isolation voltage
- Guard ring for enhanced ruggedness and long term reliability
- Pb - Free Device
- All SMC parts are traceable to the wafer lot
- Additional electrical and life testing can be performed upon request

| SICR5650 | SICRB5650 | SICRD5650 | SICRF5650 |
|---|---|--|---|
|  |  |  |  |
| TO-220AC | D ² PAK | DPAK | ITO-220AC |
|  | | | |

Maximum Ratings:

| Characteristics | Symbol | Condition | Max. | Units |
|--|--|---|------|-------|
| Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage | V _{RRM} V _{RWM} V _R | - | 650 | V |
| Average Rectified Forward Current | I _{F(AV)} | 50% duty cycle @T _c =105°C, rectangular wave form | 5 | A |
| Peak One Cycle Non-Repetitive Surge Current | I _{FSM} | 8.3ms, Half Sine pulse | 60 | A |

Electrical Characteristics:

| Characteristics | Symbol | Condition | Typ. | Max. | Units |
|--|-----------|---|------|--------|------------------|
| Forward Voltage Drop* | V_{F1} | @ 5A, Pulse, $T_J = 25\text{ }^\circ\text{C}$ | 1.5 | 1.7 | V |
| | V_{F2} | @ 5A, Pulse, $T_J = 150\text{ }^\circ\text{C}$ | 1.98 | 2.5 | V |
| Reverse Current at DC condition* | I_{R1} | @ $V_R = \text{rated } V_R$ $T_J = 25\text{ }^\circ\text{C}$ | 5 | 60 | μA |
| Reverse Current * | I_{R2} | @ $V_R = \text{rated } V_R$ $T_J = 125\text{ }^\circ\text{C}$ | 70 | 250 | μA |
| Junction Capacitance | C_T | @ $V_R = 5\text{V}$, $T_C = 25\text{ }^\circ\text{C}$ $f_{SIG} = 1\text{MHz}$ | - | TBD | pF |
| Series Inductance | L_S | Measured lead to lead 5 mm from package body | - | TBD | nH |
| Voltage Rate of Change | dv/dt | - | - | 10,000 | V/ μs |
| RSM Isolation Voltage ($t = 1.0\text{ second}$, R. H. $\leq 30\%$, $T_A = 25\text{ }^\circ\text{C}$) | V_{ISO} | Clip mounting, the epoxy body away from the heatsink edge by more than 0.110" along the lead direction. | - | 4500 | V |
| | | Clip mounting, the epoxy body is inside the heatsink. | - | 3500 | |
| | | Screw mounting, the epoxy body is inside the heatsink. | - | 1500 | |

* Pulse width < 300 μs , duty cycle < 2%

Thermal-Mechanical Specifications:

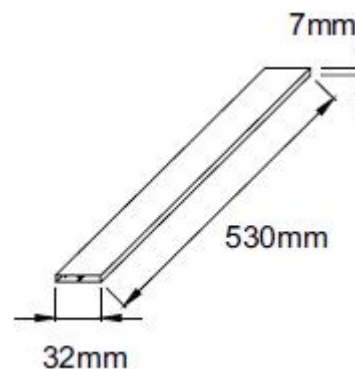
| Characteristics | Symbol | SICR5650 | SICRB5650 | SICRD5650 | SICRF5650 | Units |
|---|-----------------|-------------|-----------|-----------|-----------|--------------------|
| Junction Temperature | T_J | -55 to +175 | | | | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to +175 | | | | $^\circ\text{C}$ |
| Maximum Thermal Resistance Junction to Case | $R_{\theta JC}$ | 2.4 | 2.4 | 2.4 | 4.2 | $^\circ\text{C/W}$ |

Ordering Information

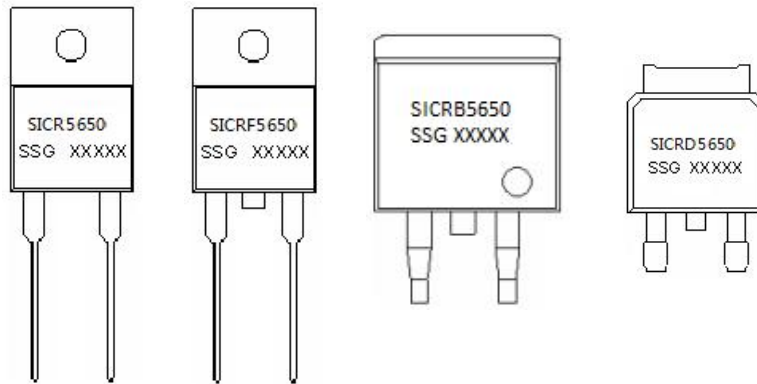
| Device | Package | Weight | Shipping |
|-----------|--------------------|--------|----------------|
| SICR5650 | TO-220AC | 1.8g | 50pcs / tube |
| SICRB5650 | D ² PAK | 1.85g | 800pcs / reel |
| SICRD5650 | DPAK | 0.39g | 2500pcs / reel |
| SICRF5650 | ITO-220AC | 1.8g | 50pcs / tube |

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

Tube Specification(TO-220AC/ITO-220AC)



Marking Diagram

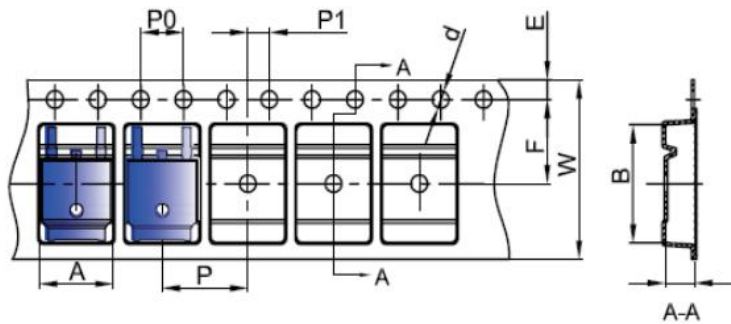


Where XXXXX is YYWWL

SICR = Device Type
B/D/F = Package type
5 = Forward Current (5A)
650 = Reverse Voltage (650V)
SSG = SSG
YY = Year
WW = Week
L = Lot Number

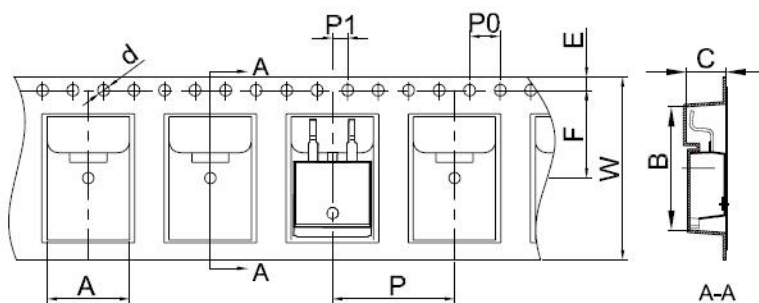
Cautions: Molding resin
Epoxy resin UL:94V-0

Carrier Tape & Reel Specification DPAK



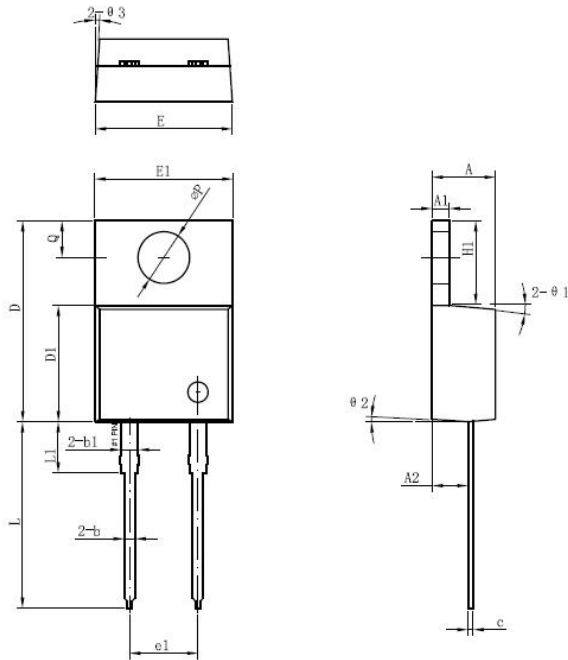
| SYMBOL | Millimeters | |
|--------|-------------|-------|
| | Min. | Max. |
| A | 6.80 | 7.00 |
| B | 10.40 | 10.60 |
| C | 2.60 | 2.80 |
| d | Φ1.45 | Φ1.65 |
| E | 1.65 | 1.85 |
| F | 7.40 | 7.60 |
| P0 | 3.90 | 4.10 |
| P | 7.90 | 8.10 |
| P1 | 1.90 | 2.10 |
| W | 15.90 | 16.30 |

Carrier Tape & Reel Specification D2PAK



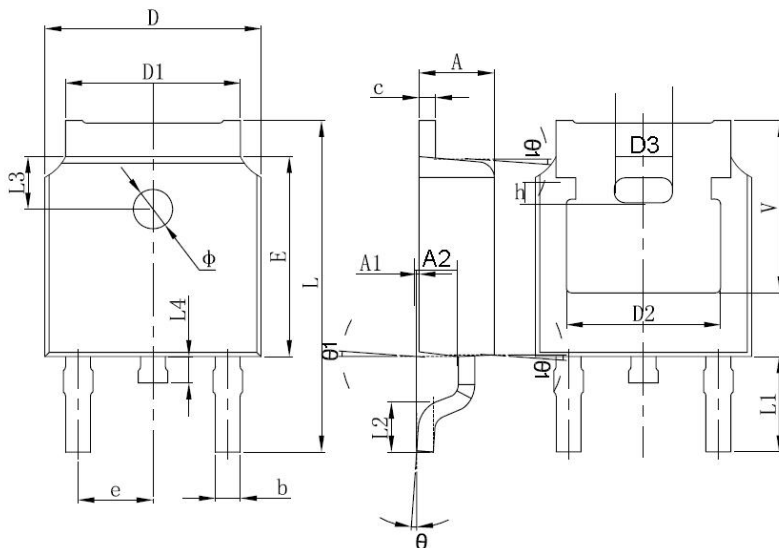
| SYMBOL | Millimeters | |
|--------|-------------|-------|
| | Min. | Max. |
| A | 10.70 | 10.90 |
| B | 16.03 | 16.23 |
| C | 5.11 | 5.31 |
| d | 1.45 | 1.65 |
| E | 1.65 | 1.85 |
| F | 11.40 | 11.60 |
| P0 | 3.90 | 4.10 |
| P | 15.90 | 16.10 |
| P1 | 1.90 | 2.10 |
| W | 23.90 | 24.30 |

Mechanical Dimensions TO-220AC



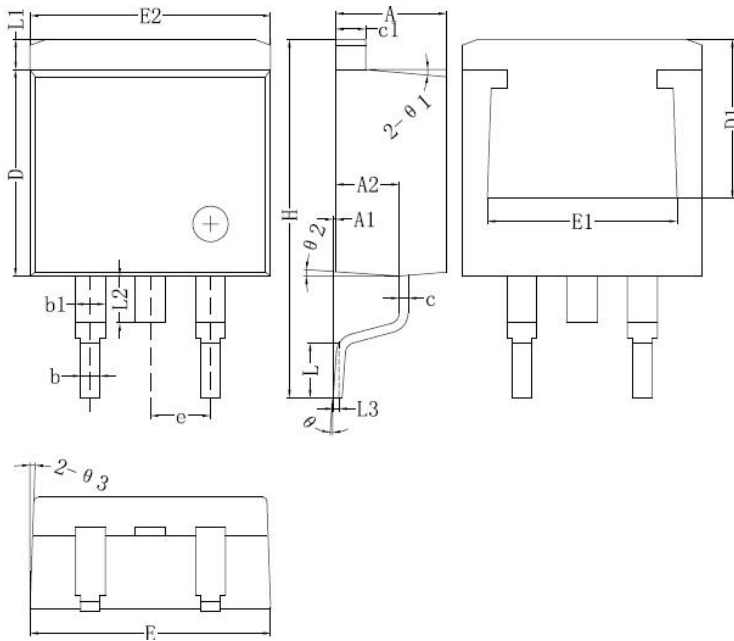
| Symbol | Dimensions in millimeters | | |
|------------|---------------------------|---------|-------|
| | Min. | Typical | Max. |
| A | 4.47 | 4.70 | 4.85 |
| A1 | 1.17 | 1.27 | 1.37 |
| A2 | 2.52 | 2.69 | 2.89 |
| b | 0.71 | 0.81 | 0.96 |
| b1 | 1.17 | 1.27 | 1.37 |
| c | 0.31 | 0.38 | 0.61 |
| D | 14.64 | 14.94 | 15.24 |
| D1 | 8.50 | 8.07 | 8.90 |
| E | 10.01 | 10.16 | 10.31 |
| E1 | 9.98 | 10.18 | 10.38 |
| e1 | 4.98 | 5.08 | 5.18 |
| H1 | 6.04 | 6.24 | 6.44 |
| L | 13.00 | 13.86 | 14.08 |
| L1 | 3.56 | 3.80 | 3.96 |
| ΦP | 3.74 | 3.84 | 4.04 |
| Q | 2.54 | 2.74 | 2.94 |
| $\Theta 1$ | | 5° | |
| $\Theta 2$ | | 4° | |
| $\Theta 3$ | | 4° | |

Mechanical Dimensions DPAK



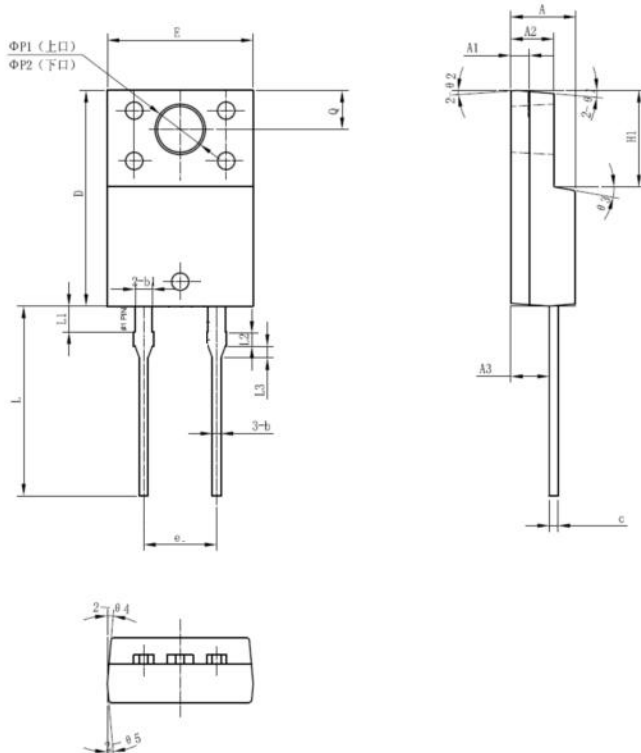
| SYMBOL | Millimeters | | Inches | |
|----------|-------------|-------|------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 2.20 | 2.40 | 0.087 | 0.094 |
| A1 | 0.00 | 0.127 | 0.000 | 0.005 |
| b | 0.66 | 0.86 | 0.026 | 0.034 |
| c | 0.46 | 0.60 | 0.018 | 0.024 |
| D | 6.50 | 6.70 | 0.256 | 0.264 |
| D1 | 5.13 | 5.46 | 0.202 | 0.215 |
| D2 | 4.83 REF. | | 0.190 REF. | |
| E | 6.00 | 6.20 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.70 | 10.40 | 0.381 | 0.409 |
| L1 | 2.90 REF. | | 0.144 REF. | |
| L2 | 1.40 | 1.70 | 0.055 | 0.067 |
| L3 | 1.60 REF. | | 0.063 REF. | |
| L4 | 0.60 | 1.00 | 0.024 | 0.039 |
| Φ | 1.10 | 1.30 | 0.043 | 0.051 |
| Θ | 0° | 8° | 0° | 8° |
| h | 0.00 | 0.30 | 0.000 | 0.012 |
| V | 5.35 REF. | | 0.211 REF. | |

Mechanical Dimensions D²PAK



| Symbol | Dimensions in millimeters | | |
|--------|---------------------------|---------|-------|
| | Min. | Typical | Max. |
| A | 4.55 | 4.70 | 4.85 |
| A1 | 0 | 0.10 | 0.25 |
| A2 | 2.59 | 2.69 | 2.89 |
| b | 0.71 | 0.81 | 0.96 |
| b1 | | 1.27 | |
| c | 0.36 | 0.38 | 0.61 |
| c1 | 1.17 | 1.27 | 1.37 |
| D | 8.55 | 8.70 | 8.85 |
| D1 | 6.40 | | |
| E | 10.01 | 10.16 | 10.31 |
| E1 | 7.6 | | |
| E2 | 9.98 | 10.08 | 10.18 |
| e | | 2.54 | |
| H | 14.6 | 15.1 | 15.6 |
| L | 2.00 | 2.30 | 2.70 |
| L1 | 1.17 | 1.27 | 1.40 |
| L2 | | | 2.20 |
| L3 | | 0.25BSC | |
| e | 0 | - | 8° |
| e1 | | 5° | |
| e2 | | 4° | |
| e3 | | 4° | |

Mechanical Dimensions ITO-220AC



| SYMBOL | Millimeters | | |
|---------|-------------|-------|-------|
| | MIN. | TYP. | MAX. |
| A | 4.30 | 4.50 | 4.70 |
| A1 | 1.10 | 1.30 | 1.50 |
| A2 | 2.50 | 3.00 | 3.20 |
| A3 | 2.50 | 2.70 | 2.90 |
| b | 0.50 | 0.60 | 0.85 |
| b1 | 1.10 | 1.20 | 1.35 |
| c | 0.50 | 0.60 | 0.85 |
| D | 14.80 | 15.00 | 15.20 |
| E | 9.96 | 10.16 | 10.36 |
| e | - | 5.10 | - |
| H1 | 6.50 | 6.70 | 6.90 |
| L | 12.70 | 13.20 | 13.70 |
| L1 | 1.60 | 1.80 | 2.00 |
| L2 | 0.80 | 1.00 | 1.20 |
| L3 | 0.60 | 0.80 | 1.00 |
| ΦP1(上口) | 3.30 | 3.50 | 3.70 |
| ΦP2(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° | |

Technical Data
Data Sheet N1870, Draft 1



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