

NPN SILICON PLASTIC POWER TRANSISTOR

MJD13003

**DPAK (TO-252)
Plastic Package**



PIN CONFIGURATION
1. BASE
2. COLLECTOR
3. EMITTER

Designed for High Voltage, High Speed Power Switching Inductive Circuits Applications

ABSOLUTE MAXIMUM RATINGS

| DESCRIPTION | SYMBOL | VALUE | UNIT |
|---|----------------|--------------|---------------------|
| Collector Emitter Voltage | V_{CEO} | 400 | V |
| Collector Emitter Voltage | V_{CEV} | 700 | V |
| Emitter Base Voltage | V_{EBO} | 9.0 | V |
| Collector Current Continuous | I_C | 1.5 | A |
| Peak | $*I_{CM}$ | 3.0 | A |
| Base Current Continuous | I_B | 0.75 | A |
| Peak | $*I_{BM}$ | 1.5 | A |
| Emitter Current Continuous | I_E | 2.25 | A |
| Peak | $*I_{EM}$ | 4.5 | A |
| Total Power Dissipation at $T_a=25^\circ\text{C}$ | $**P_D$ | 1.56 | W |
| Derate Above 25°C | | 0.0125 | W/ $^\circ\text{C}$ |
| Total Power Dissipation at $T_c=25^\circ\text{C}$ | P_D | 15 | W |
| Derate Above 25°C | | 0.12 | W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_j, T_{stg} | - 65 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| | | | |
|---|-----------------|------|--------------------|
| Junction to Case | $R_{th(j-c)}$ | 8.33 | $^\circ\text{C/W}$ |
| Junction to Ambient in free air | $**R_{th(j-a)}$ | 80 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes | T_L | 260 | $^\circ\text{C}$ |

*Pulse Test:- Pulse Width=5ms, Duty Cycle $\leq 10\%$

** When Surface Mounted on Minimum Pad Sizes Recommended

ELECTRICAL CHARACTERISTICS ($T_c=25^\circ\text{C}$ unless specified otherwise)

| DESCRIPTION | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|---------------------------|-------------|---|------------|-----|------------|----------|
| Collector Emitter Voltage | V_{CEO} | $I_C=1\text{mA}, I_B=0$ | 400 | | | V |
| Collector Cut Off Current | I_{CEV} | $V_{CEV}=\text{Rated Value}, V_{BE(\text{off})}=1.5\text{V}$ $V_{CEV}=\text{Rated Value}, V_{BE(\text{off})}=1.5\text{V}, T_c=100^\circ\text{C}$ | | | 0.1 2.0 | mA mA |
| Emitter Cut Off Current | I_{EBO} | $V_{EB}=9\text{V}, I_C=0$ | | | 1.0 | mA |
| DC Current Gain | $***h_{FE}$ | $I_C=0.5\text{A}, V_{CE}=2\text{V}$ $I_C=1\text{A}, V_{CE}=2\text{V}$ | 8.0 5.0 | | 40 25 | |

***Pulse Test:- Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

MJD13003Rev160506E



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ELECTRICAL CHARACTERISTICS ($T_c=25^\circ\text{C}$ unless specified otherwise)

| DESCRIPTION | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|--------------------------------------|---------------------|--|-----|-----|-----|------|
| Collector Emitter Saturation Voltage | $^{***}V_{CE(sat)}$ | $I_C=0.5\text{A}, I_B=0.1\text{A}$ | | | 0.5 | V |
| | | $I_C=1\text{A}, I_B=0.25\text{A}$ | | | 1.0 | V |
| | | $I_C=1.5\text{A}, I_B=0.5\text{A}$ | | | 3.0 | V |
| | | $I_C=1\text{A}, I_B=0.25\text{A}, T_c=100^\circ\text{C}$ | | | 1.0 | V |
| Base Emitter Saturation Voltage | $^{***}V_{BE(sat)}$ | $I_C=0.5\text{A}, I_B=0.1\text{A}$ | | | 1.0 | V |
| | | $I_C=1\text{A}, I_B=0.25\text{A}$ | | | 1.2 | V |
| | | $I_C=1\text{A}, I_B=0.25\text{A}, T_c=100^\circ\text{C}$ | | | 1.1 | V |

DYNAMIC CHARACTERISTICS

| DESCRIPTION | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|--------------------------------|----------|--|-----|-----|-----|------|
| Current Gain Bandwidth Product | f_T | $I_C=100\text{mA}, V_{CE}=10\text{V}, f=1\text{MHz}$ | 4.0 | | | MHz |
| Output Capacitance | C_{ob} | $V_{CB}=10\text{V}, I_E=0\text{V}, f=0.1\text{MHz}$ | | 21 | | pF |

Resistive Load

| | | | | | | |
|--------------|-------|---|--|--|-----|---------------|
| Delay Time | t_d | $V_{CC}=125\text{V}, I_C=1\text{A}, I_{B1}=I_{B2}=0.2\text{A}, t_p=25\mu\text{s},$ Duty Cycle 1% | | | 0.1 | μs |
| Rise Time | t_r | | | | 1.0 | μs |
| Storage Time | t_s | | | | 4.0 | μs |
| Fall Time | t_f | | | | 0.7 | μs |

Inductive Load, Clamped

| | | | | | | |
|----------------------|----------|---|--|------|------|---------------|
| Voltage Storage Time | t_{sv} | $V_{Clamp}=300\text{V}, I_C=1\text{A}, I_{B1}=0.2\text{A}, V_{BE(off)}=5\text{V},$ $T_c=100^\circ\text{C}$ | | | 4.00 | μs |
| Crossover Time | t_C | | | | 0.75 | μs |
| Fall Time | t_{fi} | | | 0.15 | | μs |

Second Breakdown Characteristics

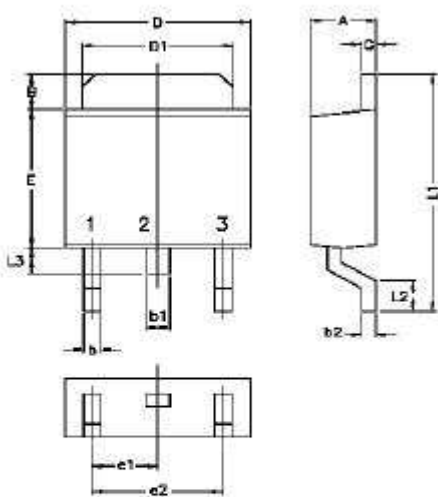
| DESCRIPTION | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|---|-----------|--|------|-----|-----|------|
| Second Breakdown Collector Current with Base Forward Biased | $I_{S/b}$ | $V_{CE}=100\text{V}, t=1.0\text{ sec}$ | 0.15 | | | A |

| | | |
|---------------|---------------------------|--|
| MARKING | CDIL MJD13003 XY MX | |
| XY= Date Code | | |

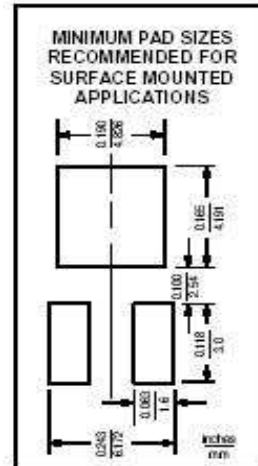
***Pulse Test:- Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

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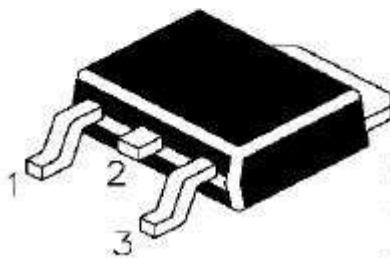
DPAK PACKAGE OUTLINE DIMENSIONS



| DIM | MIN. | MAX. |
|-----|------|------|
| A | 2.20 | 2.40 |
| B | 1.30 | 1.50 |
| b | 0.55 | 0.85 |
| b1 | 0.75 | 0.85 |
| b2 | 0.46 | 0.56 |
| C | 0.46 | 0.56 |
| D | 6.40 | 6.60 |
| D1 | 5.20 | 5.40 |
| E | 5.40 | 5.60 |
| e1 | 2.25 | 2.35 |
| e2 | 4.50 | 4.70 |
| L1 | 9.25 | 9.75 |
| L2 | 0.5 | — |
| L3 | 0.90 | 1.10 |



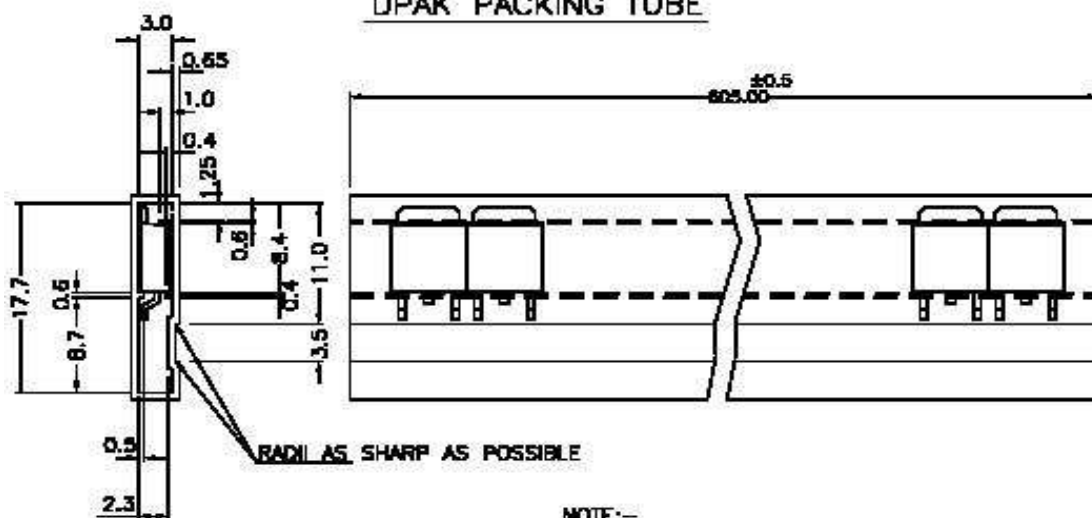
ALL DIMENSIONS ARE IN mm



PIN CONFIGURATION

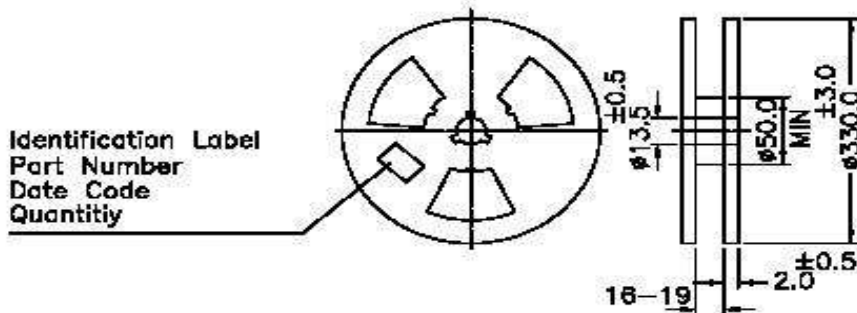
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DPAK PACKING TUBE

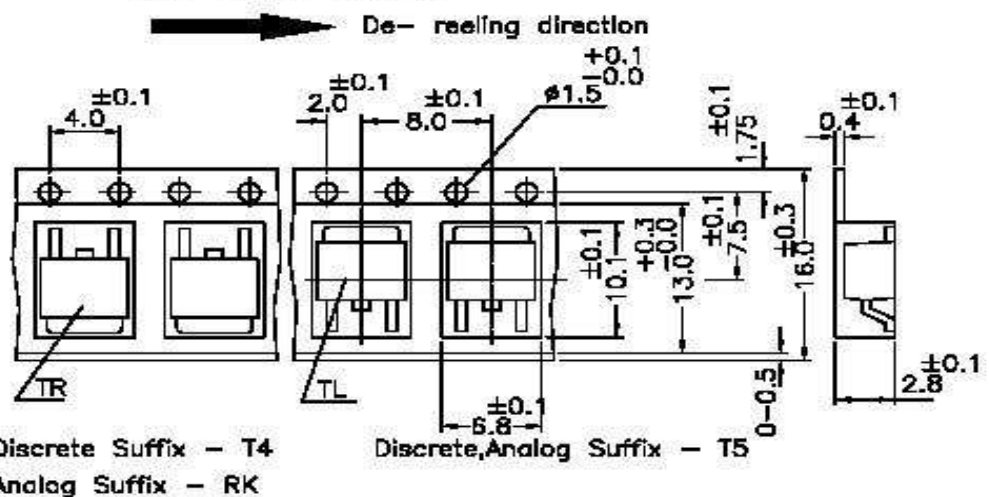


NOTE:-
80 Pcs/TUBE
2.5 K/REEL
ALL DIMENSIONS ARE IN mm

DPAK TAPE & REEL SPECIFICATION

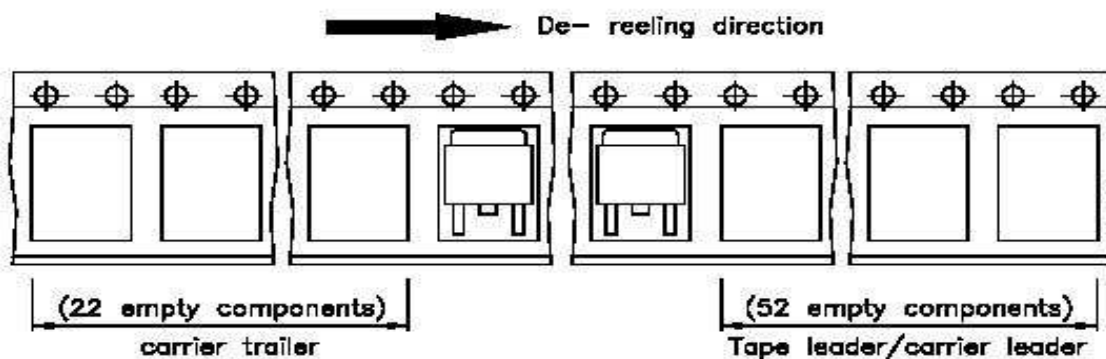


TAPE & REEL



Notes:-

A maximum of three consecutive components may be missing. Provided this gap is followed by six consecutive components.



Component Disposal Instructions

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

Disclaimer

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).

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