

## NPN High Power Silicon Transistor

Rev. V1

### Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/538
- TO-3 (TO-204AA) Package



### Electrical Characteristics

| Parameter                                                 | Test Conditions                                                                                                                        | Symbol        | Units           | Min.       | Max.     |
|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|------------|----------|
| <b>Off Characteristics</b>                                |                                                                                                                                        |               |                 |            |          |
| Collector - Emitter Breakdown Voltage                     | $I_C = 200 \text{ mAdc}$ , 2N6676<br>$I_C = 200 \text{ mAdc}$ , 2N6678                                                                 | $V_{(BR)CEO}$ | Vdc             | 300<br>400 | —        |
| Collector - Emitter Cutoff Current                        | $V_{CE} = 450 \text{ Vdc}$ , $V_{BE} = -1.5 \text{ Vdc}$ , 2N6676<br>$V_{CE} = 650 \text{ Vdc}$ , $V_{BE} = -1.5 \text{ Vdc}$ , 2N6678 | $I_{CEX}$     | $\mu\text{Adc}$ | —          | 1.0      |
| Emitter - Base Cutoff Current                             | $V_{EB} = 7 \text{ Vdc}$                                                                                                               | $I_{EBO}$     | mAdc            | —          | 2.0      |
| Collector - Base Cutoff Current                           | $V_{CB} = 450 \text{ Vdc}$ , 2N6676<br>$V_{CB} = 650 \text{ Vdc}$ , 2N6678                                                             | $I_{CBO}$     | mAdc            | —          | 1.0      |
| <b>On Characteristics<sup>1</sup></b>                     |                                                                                                                                        |               |                 |            |          |
| Forward Current Transfer Ratio                            | $I_C = 1 \text{ Adc}$ , $V_{CE} = 3 \text{ Vdc}$<br>$I_C = 15 \text{ Adc}$ , $V_{CE} = 3 \text{ Vdc}$                                  | $H_{FE}$      | -               | 15<br>8    | 40<br>20 |
| Collector - Emitter Sustaining Voltage                    | $I_C = 15 \text{ Adc}$ , $I_B = 3 \text{ Adc}$                                                                                         | $V_{CE(SAT)}$ | Vdc             | —          | 1.0      |
| Base - Emitter Saturation Voltage                         | $I_C = 15 \text{ Adc}$ , $I_B = 3 \text{ Adc}$                                                                                         | $V_{BE(SAT)}$ | Vdc             | —          | 1.5      |
| <b>Dynamic Characteristics</b>                            |                                                                                                                                        |               |                 |            |          |
| Small-Signal Short-Circuit Forward Current Transfer Ratio | $I_C = 1 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 5 \text{ kHz}$                                                                | $ H_{FE} $    | -               | 3          | 10       |
| Output Capacitance                                        | $V_{CB} = 10 \text{ Vdc}$ , $I_E = 0$ , $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$                                                    | $C_{OBO}$     | pF              | 150        | 500      |

1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

## NPN High Power Silicon Transistor

Rev. V1

## Electrical Characteristics

| Parameter                                                                                | Test Conditions                                                   | Symbol         | Units | Min. | Max. |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------------|-------|------|------|
| Switching Characteristics                                                                |                                                                   |                |       |      |      |
| Delay Time                                                                               | See figure 12 of MIL-PRF-19500/538                                | T <sub>D</sub> | μs    | —    | 0.1  |
| Rise Time                                                                                |                                                                   | T <sub>R</sub> |       |      | 0.6  |
| Storage Time                                                                             |                                                                   | T <sub>S</sub> |       |      | 2.5  |
| Fall Time                                                                                |                                                                   | T <sub>F</sub> |       |      | 0.5  |
| Cross-Over Time                                                                          |                                                                   | T <sub>C</sub> |       |      | 0.5  |
| Safe Operating Area                                                                      |                                                                   |                |       |      |      |
| DC Tests: T <sub>C</sub> = +25°C, 1 Cycle, t = 1.0 s (see figure 4 of MIL-PRF-19500/537) |                                                                   |                |       |      |      |
| Test 1:                                                                                  | V <sub>CE</sub> = 11.7 Vdc, I <sub>C</sub> = 15 Adc               |                |       |      |      |
| Test 2:                                                                                  | V <sub>CE</sub> = 30 Vdc, I <sub>C</sub> = 5.9 Adc                |                |       |      |      |
| Test 3:                                                                                  | V <sub>CE</sub> = 100 Vdc, I <sub>C</sub> = 0.25 Adc              |                |       |      |      |
| Test 4:                                                                                  | V <sub>CE</sub> = 300 Vdc, I <sub>C</sub> = 20 mAdc, (for 2N6676) |                |       |      |      |
| Test 5:                                                                                  | V <sub>CE</sub> = 400 Vdc, I <sub>C</sub> = 10 mAdc, (for 2N6678) |                |       |      |      |
| Clamped Switch:                                                                          |                                                                   |                |       |      |      |
| T <sub>A</sub> = +25°C, V <sub>CC</sub> = 15 Vdc                                         |                                                                   |                |       |      |      |
| Clamp Voltage = 350; I <sub>C</sub> = 15 Adc, (2N6676)                                   |                                                                   |                |       |      |      |
| Clamp Voltage = 450; I <sub>C</sub> = 15 Adc, (2N6678)                                   |                                                                   |                |       |      |      |

## Absolute Maximum Ratings

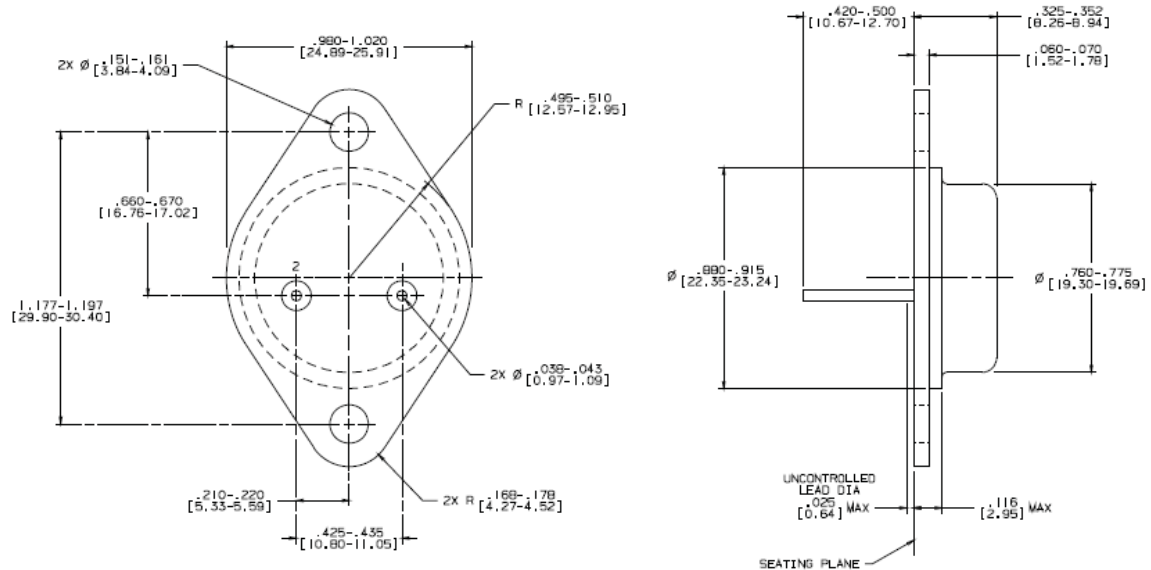
| Ratings                                                                               | Symbol            | 2N6676      | 2N6678 | Units            |
|---------------------------------------------------------------------------------------|-------------------|-------------|--------|------------------|
| Collector - Emitter Voltage                                                           | $V_{CEO}$         | 300         | 400    | Vdc              |
| Collector - Base Voltage                                                              | $V_{CBO}/V_{CBX}$ | 450         | 650    | Vdc              |
| Emitter - Base Voltage                                                                | $V_{EBO}$         | 8           |        | Vdc              |
| Collector Current                                                                     | $I_C$             | 15          |        | Adc              |
| Base Current                                                                          | $I_B$             | 5           |        | Adc              |
| Total Power Dissipation<br>@ $T_A = +25^\circ\text{C}$<br>@ $T_A = +25^\circ\text{C}$ | $P_T$             | 6<br>175    |        | W                |
| Operating & Storage Temperature Range                                                 | $T_{OP}, T_{STG}$ | -65 to +200 |        | $^\circ\text{C}$ |

2. Derate linearly @ 34.2 mW /  $^\circ\text{C}$  for  $T_A > 25^\circ\text{C}$ .

## Thermal Characteristics

| Characteristics                      | Symbol          | Max. Value          |
|--------------------------------------|-----------------|---------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | $1^\circ\text{C/W}$ |

### Outline Drawing



#### NOTES:

1. STANDARD HEADER TYPE SOLID BASE.
2. STANDARD LEAD FINISH: PER MIL-M-38510 TYPE X OR EQUIVALENT.
3. LEAD NOT BENT GREATER THAN 15°.
4. DIMENSIONS BASED ON JEDEC STANDARD TO-3 PUBLICATION 95, PA

MACOM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with MACOM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.