

## NPN 2N3713 – 2N3714 – 2N3715 – 2N3716

### EPITAXIAL-BASE TRANSISTORS

The 2N3713, 2N3714, 2N3715 and 2N3716 are silicon epitaxial-base NPN power transistor in Jedec TO-3 metal case. They are intended for use in power linear and switching applications. The complementary PNP types are 2N3789, 2N3790, 2N3791 and 2N3792 respectively. Compliance to RoHS.

#### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Ratings                   |                    | Value       | Unit             |
|-----------|---------------------------|--------------------|-------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage    | $I_E = 0$          | 2N3713      | V                |
|           |                           |                    | 2N3715      |                  |
|           |                           |                    | 2N3714      |                  |
|           |                           |                    | 2N3716      |                  |
| $V_{CEO}$ | Collector-Emitter Voltage | $I_B = 0$          | 2N3713      | V                |
|           |                           |                    | 2N3715      |                  |
|           |                           |                    | 2N3714      |                  |
|           |                           |                    | 2N3716      |                  |
| $V_{EBO}$ | Emitter-Base Voltage      | $I_C = 0$          | 7.0         | V                |
| $I_C$     | Collector Current         |                    | 10          | A                |
| $I_B$     | Base Current              |                    | 4.0         | A                |
| $P_D$     | Total Device Dissipation  | @ $T_C = 25^\circ$ | 150         | W                |
| $T_J$     | Junction Temperature      |                    | -65 to +200 | $^\circ\text{C}$ |
| $T_S$     | Storage Temperature       |                    |             |                  |

#### THERMAL CHARACTERISTICS

| Symbol     | Ratings                                    | Value | Unit               |
|------------|--|-------|--------------------|
| $R_{thJC}$ | Thermal Resistance, Junction to Case (Max) | 1.17  | $^\circ\text{C/W}$ |

## NPN 2N3713 – 2N3714 – 2N3715 – 2N3716

### ELETRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

| Symbol         | Ratings                                       | Test Condition(s)   | Min    | Typ | Max | Unit |    |
|----------------|---|---|--------|-----|-----|------|----|
| $V_{CEO(BR)}$  | Collector-Emitter Breakdown Voltage           | $I_C=200\text{ mA}, I_B=0\text{ (*)}$                                   | 2N3713 | 60  | -   | -    | V  |
|                |   |   | 2N3715 |     |     |      |    |
|                |   |   | 2N3714 | 80  | -   | -    |    |
|                |   |   | 2N3716 |     |     |      |    |
| $V_{CEO(SUS)}$ | Collector-Emitter Sustaining Voltage (*)      | $I_C=200\text{ mA}, I_B=0\text{ (*)}$                                   | 2N3713 | 60  | -   | -    | V  |
|                |   |   | 2N3715 |     |     |      |    |
|                |   |   | 2N3714 | 80  | -   | -    |    |
|                |   |   | 2N3716 |     |     |      |    |
| $I_{CEO}$      | Collector-Emitter Current                     | $V_{CE}=30\text{ V}, I_B=0$   | 2N3713 | -   | -   | 0.7  | mA |
|                |   |   | 2N3715 |     |     |      |    |
|                |   | $V_{CE}=40\text{ V}, I_B=0$   | 2N3714 | -   | -   | 0.7  |    |
|                |   |   | 2N3716 |     |     |      |    |
| $I_{CEV}$      | Collector Cutoff Current                      | $V_{CE}=80\text{ V}, V_{EB}=-1.5\text{ V}$                              | 2N3713 | -   | -   | 1    | mA |
|                |   |   | 2N3715 |     |     |      |    |
|                |   | $V_{CE}=100\text{ V}, V_{EB}=-1.5\text{ V}$                             | 2N3714 | -   | -   | 1    |    |
|                |   |   | 2N3716 |     |     |      |    |
|                |   | $V_{CE}=60\text{ V}, V_{EB}=-1.5\text{ V}$<br>$T_C = 150^\circ\text{C}$ | 2N3713 | -   | -   | 10   |    |
|                |   |   | 2N3715 |     |     |      |    |
|                |   | $V_{CE}=80\text{ V}, V_{EB}=-1.5\text{ V}$<br>$T_C = 150^\circ\text{C}$ | 2N3714 | -   | -   | 10   |    |
|                |   |   | 2N3716 |     |     |      |    |
| $I_{EBO}$      | Emitter Cutoff Current                        | $V_{BE}=7\text{ V}, I_C=0$  | 2N3713 | -   | -   | 5    | mA |
|                |   |   | 2N3714 |     |     |      |    |
|                |   |   | 2N3715 |     |     |      |    |
|                |   |   | 2N3716 |     |     |      |    |
| $h_{FE}$       | DC Current Gain (*) (**)                      | $I_C=1\text{ A}, V_{CE}=2\text{ V}$                                     | 2N3713 | 25  | -   | 90   | -  |
|                |   |   | 2N3714 |     |     |      |    |
|                |   |   | 2N3715 | 50  | -   | 150  |    |
|                |   |   | 2N3716 |     |     |      |    |
|                |   | $I_C=3\text{ A}, V_{CE}=2\text{ V}$                                     | 2N3713 | 15  | -   | -    |    |
|                |   |   | 2N3714 |     |     |      |    |
|                |   |   | 2N3715 | 30  | -   | -    |    |
|                |   |   | 2N3716 |     |     |      |    |
|                |   | $I_C=10\text{ A}, V_{CE}=4\text{ V}$                                    | 2N3713 | 5   | -   | -    |    |
|                |   |   | 2N3714 |     |     |      |    |
|                |   |   | 2N3715 |     |     |      |    |
|                |   |   | 2N3716 |     |     |      |    |
| $V_{CE(SAT)}$  | Collector-Emitter saturation Voltage (*) (**) | $I_C=5\text{ A}, I_B=0.5\text{ A}$                                      | 2N3713 | -   | -   | 1    | V  |
|                |   |   | 2N3714 |     |     |      |    |
|                |   |   | 2N3715 | -   | -   | 0.8  |    |
|                |   |   | 2N3716 |     |     |      |    |

## NPN 2N3713 – 2N3714 – 2N3715 – 2N3716

### ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

| Symbol        | Ratings                                  | Test Condition(s)  | Min    | Typ | Max | Unit |   |
|---------------|--|--|--------|-----|-----|------|---|
| $V_{BE(SAT)}$ | Base-Emitter saturation Voltage (*) (**) | $I_C=5\text{ A}, I_B=0.5\text{ A}$                           | 2N3713 | -   | -   | 2    | V |
|               |  |  | 2N3714 |     |     |      |   |
|               |  |  | 2N3715 | -   | -   | 1.5  |   |
|               |  |  | 2N3716 |     |     |      |   |
| $V_{BE}$      | Base-Emitter Voltage (*) (**)            | $I_C=3\text{ A}, V_{CE}=2\text{ V}$                          | 2N3713 | -   | -   | 1.5  | V |
|               |  |  | 2N3714 |     |     |      |   |
|               |  |  | 2N3715 |     |     |      |   |
|               |  |  | 2N3716 |     |     |      |   |
| $h_{fe}$      | Small Signal Current Gain                | $V_{CE}=10\text{ V}, I_C=0.5\text{ A}$<br>$f=1.0\text{ kHz}$ | 2N3713 | 25  | -   | 250  | - |
|               |  |  | 2N3714 |     |     |      |   |
|               |  |  | 2N3715 |     |     |      |   |
|               |  |  | 2N3716 |     |     |      |   |
|               |  | $V_{CE}=10\text{ V}, I_C=0.5\text{ A}$<br>$f=1.0\text{ MHz}$ | 2N3713 | 4   | -   | 4    | - |
|               |  |  | 2N3714 |     |     |      |   |
|               |  |  | 2N3715 |     |     |      |   |
|               |  |  | 2N3716 |     |     |      |   |

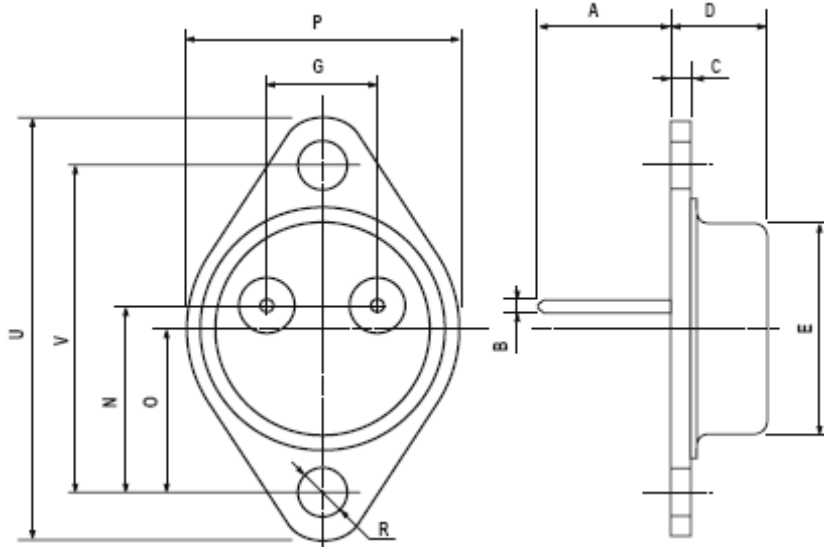
(\*) Pulse Width  $\approx 300\ \mu\text{s}$ , Duty Cycle  $\angle 2.0\%$

(\*\*) These parameters are measured with voltage sensing contacts separate from the current carrying contacts

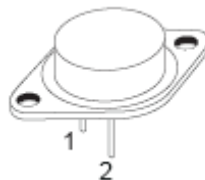
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### MECHANICAL DATA CASE TO-3

| DIMENSIONS (mm) |       |       |
|-----------------|-------|-------|
|                 | min   | max   |
| A               | 11    | 13.10 |
| B               | 0.97  | 1.15  |
| C               | 1.5   | 1.65  |
| D               | 8.32  | 8.92  |
| F               | 19    | 20    |
| G               | 10.70 | 11.1  |
| N               | 16.50 | 17.20 |
| P               | 25    | 26    |
| R               | 4     | 4.09  |
| U               | 38.50 | 39.30 |
| V               | 30    | 30.30 |



|         |           |
|---------|-----------|
| Pin 1 : | Base      |
| Pin 2 : | Emitter   |
| Case :  | Collector |



Revised September 2012

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