

# SMA4038

NPN Darlington

With built-in flywheel diode

External dimensions ..... SMA (15-pin)

## Absolute maximum ratings

(Ta=25°C)

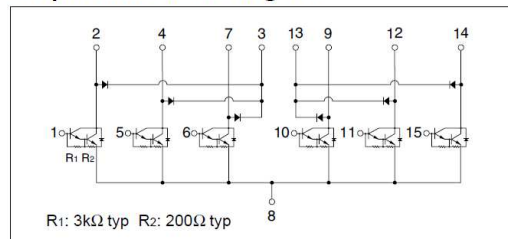
| Symbol           | Ratings                     | Unit |
|------------------|-----------------------------|------|
| V <sub>CB0</sub> | 120                         | V    |
| V <sub>CEO</sub> | 120                         | V    |
| V <sub>EBO</sub> | 6                           | V    |
| I <sub>C</sub>   | 3                           | A    |
| I <sub>CP</sub>  | 5 (PW≤1ms, Du≤50%)          | A    |
| I <sub>B</sub>   | 0.2                         | A    |
| I <sub>F</sub>   | 3 (PW≤0.5ms, Du≤25%)        | A    |
| I <sub>FSM</sub> | 5 (PW≤10ms, Single pulse)   | A    |
| V <sub>R</sub>   | 120                         | V    |
| P <sub>T</sub>   | 4 (Ta=25°C)<br>20 (Tc=25°C) | W    |
| T <sub>J</sub>   | 150                         | °C   |
| T <sub>stg</sub> | -40 to +150                 | °C   |

## Electrical characteristics

(Ta=25°C)

| Symbol                | Specification |      |      | Unit | Conditions                                                                               |
|-----------------------|---------------|------|------|------|------------------------------------------------------------------------------------------|
|                       | min           | typ  | max  |      |                                                                                          |
| I <sub>CB0</sub>      |               |      | 10   | μA   | V <sub>CB</sub> =120V                                                                    |
| I <sub>EBO</sub>      |               |      | 10   | mA   | V <sub>EB</sub> =6V                                                                      |
| V <sub>CEO</sub>      | 120           |      |      | V    | I <sub>C</sub> =25mA                                                                     |
| V <sub>CEO(SUS)</sub> | 120           |      |      | V    | I <sub>C</sub> =1.5A                                                                     |
| h <sub>FE</sub>       | 2000          | 5000 | 1500 |      | V <sub>CE</sub> =4V, I <sub>C</sub> =1.5A                                                |
| V <sub>CE(sat)</sub>  |               | 1.1  | 1.5  | V    | I <sub>C</sub> =1.5A, I <sub>B</sub> =3mA                                                |
| V <sub>BE(sat)</sub>  |               | 1.7  | 2.0  | V    |                                                                                          |
| V <sub>FEC</sub>      |               | 1.4  |      | V    | I <sub>FEC</sub> =1.5A                                                                   |
| ton                   |               | 0.5  |      | μs   | V <sub>CC</sub> ≐30V,<br>I <sub>C</sub> =1.5A,<br>I <sub>B1</sub> =-I <sub>B2</sub> =3mA |
| tstg                  |               | 2.4  |      | μs   |                                                                                          |
| tf                    |               | 1.0  |      | μs   |                                                                                          |
| Cob                   |               | 30   |      | pF   | V <sub>CB</sub> =10V, f=1MHz                                                             |

## Equivalent circuit diagram



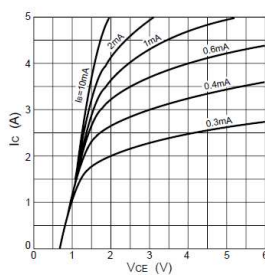
## Diode for flyback voltage absorption

(Ta=25°C)

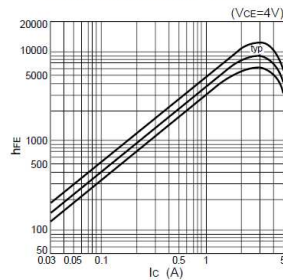
| Symbol         | Specification |     |     | Unit | Conditions             |
|----------------|---------------|-----|-----|------|------------------------|
|                | min           | typ | max |      |                        |
| V <sub>R</sub> | 120           |     |     | V    | I <sub>R</sub> =10μA   |
| V <sub>F</sub> |               |     | 1.8 | V    | I <sub>F</sub> =1A     |
| I <sub>R</sub> |               |     | 10  | μA   | V <sub>R</sub> =120V   |
| trr            |               | 100 |     | ns   | I <sub>F</sub> =±100mA |

## Characteristic curves

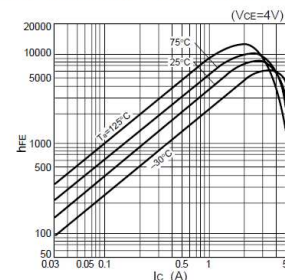
I<sub>C</sub>-V<sub>CE</sub> Characteristics (Typical)



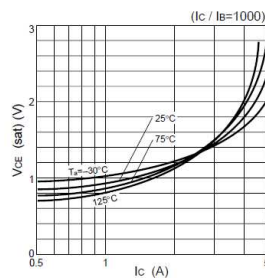
h<sub>FE</sub>-I<sub>C</sub> Characteristics (Typical)



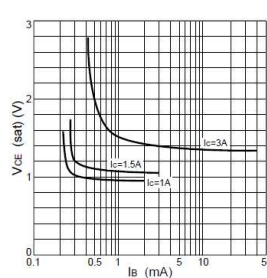
h<sub>FE</sub>-I<sub>C</sub> Temperature Characteristics (Typical)



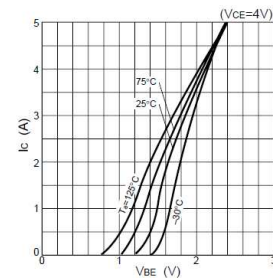
V<sub>CE(sat)</sub>-I<sub>C</sub> Temperature Characteristics (Typical)



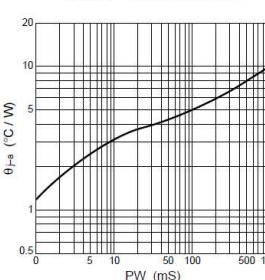
V<sub>CE(sat)</sub>-I<sub>B</sub> Characteristics (Typical)



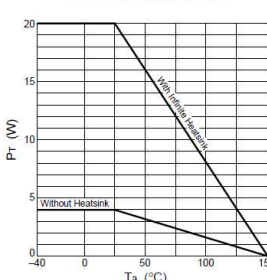
I<sub>C</sub>-V<sub>BE</sub> Temperature Characteristics (Typical)



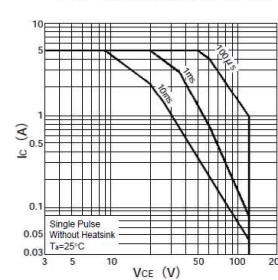
θ<sub>J-A</sub>-PW Characteristics



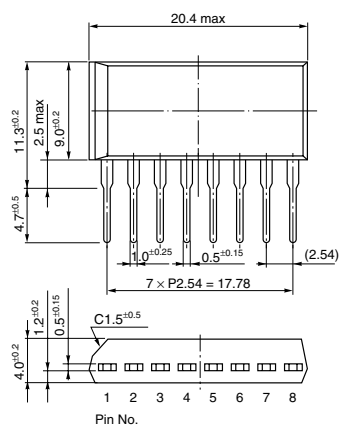
P<sub>T</sub>-T<sub>a</sub> Characteristics



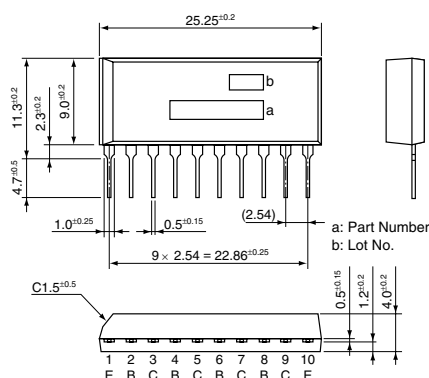
Safe Operating Area (SOA)



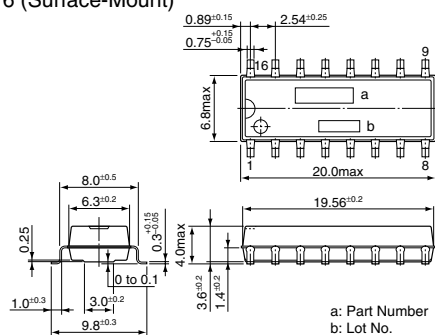
• SIP 8 (STA8Pin)



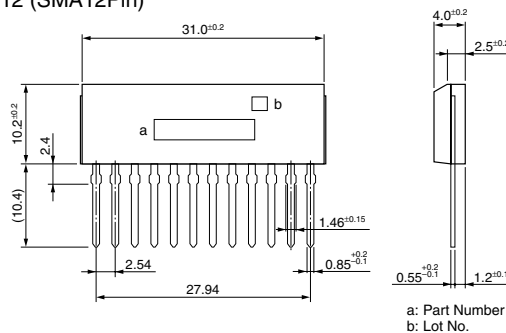
• SIP 10 (STA10Pin)



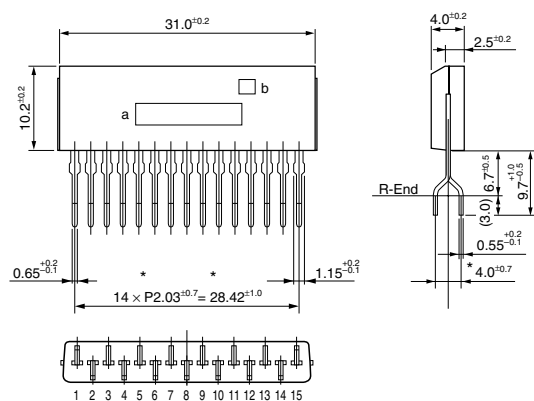
• PS 16 (Surface-Mount)



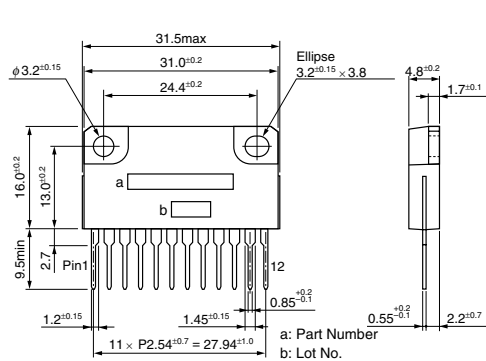
• SIP 12 (SMA12Pin)



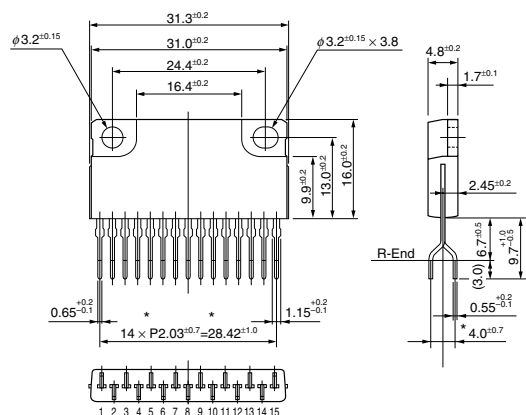
• SIP 15 (SMA15Pin)



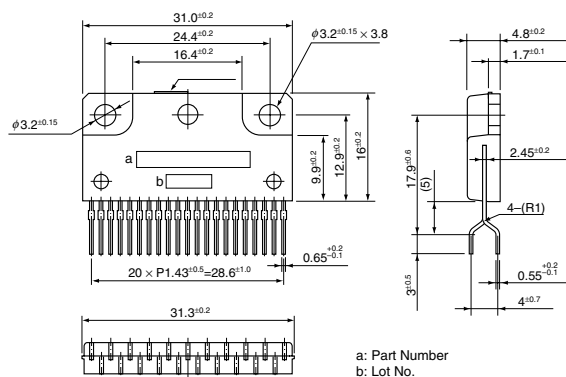
• SIP 12 with Fin (SLA12Pin)



• SIP 15 with Fin (SLA15Pin)



• SIP 21 with Fin (SLA21Pin)



(Unit:mm)