

NSS40300MZ4

Preferred Device

Bipolar Power Transistors 40 V, 3.0 A, Low $V_{CE(sat)}$ PNP Transistor

ON Semiconductor's e²PowerEdge family of low $V_{CE(sat)}$ transistors are surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical applications are DC-DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e²PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

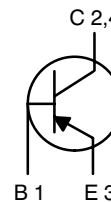
- These are Pb-Free Devices



ON Semiconductor[®]

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PNP TRANSISTOR
3.0 AMPERES
40 VOLTS, 2.0 WATTS

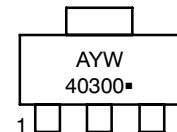


Schematic

MARKING DIAGRAM

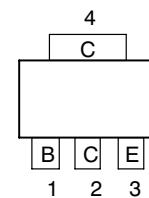


SOT-223
CASE 318E
STYLE 1



A = Assembly Location
Y = Year
W = Work Week
40300 = Specific Device Code
▪ = Pb-Free Package

PIN ASSIGNMENT



Top View Pinout

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

NSS40300MZ4

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|-----------------------------------|-------------|------|
| Collector-Emitter Voltage | V _{CEO} | 40 | Vdc |
| Collector-Base Voltage | V _{CB} | 40 | Vdc |
| Emitter-Base Voltage | V _{EB} | 6.0 | Vdc |
| Base Current - Continuous | I _B | 1.0 | Adc |
| Collector Current - Continuous - Peak | I _C | 3.0 5.0 | Adc |
| Total Power Dissipation Total P _D @ T _A = 25°C mounted on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material Total P _D @ T _A = 25°C mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material | P _D | 2.0 0.80 | W |
| Operating and Storage Junction Temperature Range | T _J , T _{stg} | -55 to +150 | °C |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|--------------------------------------|-----------|------|
| Thermal Resistance, Junction-to-Case - Junction-to-Ambient on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material - Junction-to-Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material | R _{θJA} R _{θJA} | 64 155 | °C/W |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds | T _L | 260 | °C |

ORDERING INFORMATION

| Device | Package | Shipping† |
|----------------|----------------------|--------------------|
| NSS40300MZ4T1G | SOT-223 (Pb-Free) | 1000 / Tape & Reel |
| NSS40300MZ4T3G | SOT-223 (Pb-Free) | 4000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

NSS40300MZ4

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|---|---------------|-----|---|-----|------|
| Collector-Emitter Sustaining Voltage ($I_C = 10\text{ mAdc}$, $I_B = 0\text{ Adc}$) | $V_{CE(sus)}$ | 40 | - | - | Vdc |
| Emitter-Base Voltage ($I_E = 50\text{ }\mu\text{Adc}$, $I_C = 0\text{ Adc}$) | V_{EBO} | 6.0 | - | - | Vdc |
| Collector Cutoff Current ($V_{CB} = 40\text{ Vdc}$) | I_{CBO} | - | - | 100 | nAdc |
| Emitter Cutoff Current ($V_{BE} = 6.0\text{ Vdc}$) | I_{EBO} | - | - | 100 | nAdc |

ON CHARACTERISTICS (Note 1)

| | | | | | |
|---|---------------|-------------------|-------------|-------------------------|-----|
| Collector-Emitter Saturation Voltage ($I_C = 0.5\text{ Adc}$, $I_B = 50\text{ mAdc}$) ($I_C = 1.0\text{ Adc}$, $I_B = 20\text{ mAdc}$) ($I_C = 3.0\text{ Adc}$, $I_B = 0.3\text{ Adc}$) | $V_{CE(sat)}$ | - - - | - - - | 0.070 0.150 0.400 | Vdc |
| Base-Emitter Saturation Voltage ($I_C = 1.0\text{ Adc}$, $I_B = 0.1\text{ Adc}$) | $V_{BE(sat)}$ | - | - | 1.0 | Vdc |
| Base-Emitter On Voltage ($I_C = 1.0\text{ Adc}$, $V_{CE} = 2.0\text{ Vdc}$) | $V_{BE(on)}$ | - | - | 0.9 | Vdc |
| DC Current Gain ($I_C = 0.5\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 1.0\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 3.0\text{ Adc}$, $V_{CE} = 1.0\text{ Vdc}$) | h_{FE} | 200 175 100 | - - - | - 350 - | - |

DYNAMIC CHARACTERISTICS

| | | | | | |
|---|----------|---|-----|---|-----|
| Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $f = 1.0\text{ MHz}$) | C_{ob} | - | 40 | - | pF |
| Input Capacitance ($V_{EB} = 5.0\text{ Vdc}$, $f = 1.0\text{ MHz}$) | C_{ib} | - | 130 | - | pF |
| Current-Gain - Bandwidth Product (Note 2) ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ V}$, $F_{test} = 1.0\text{ MHz}$) | f_T | - | 160 | - | MHz |

1. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.
2. $f_T = |h_{FE}| \cdot f_{test}$

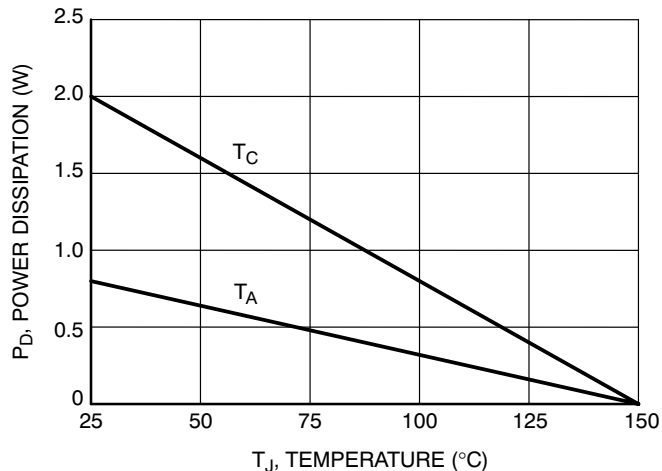


Figure 1. Power Derating

NSS40300MZ4

TYPICAL CHARACTERISTICS

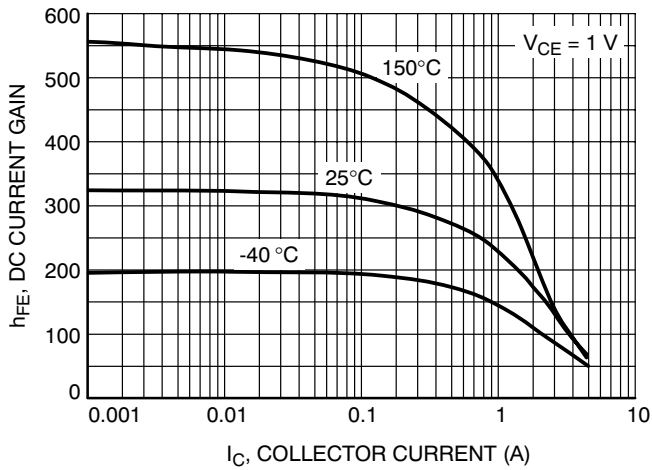


Figure 2. DC Current Gain

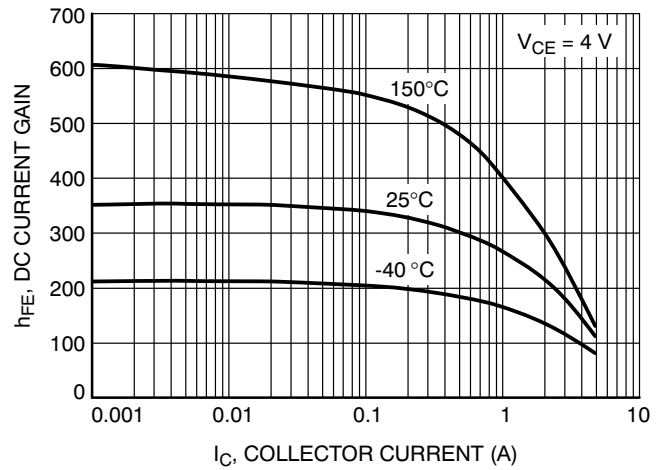


Figure 3. DC Current Gain

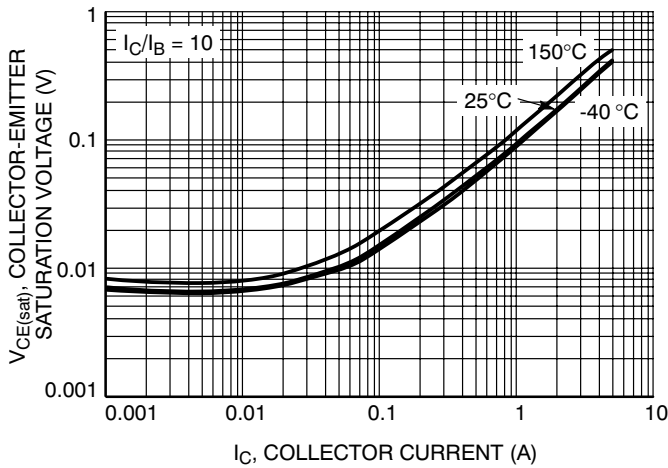


Figure 4. Collector-Emitter Saturation Voltage

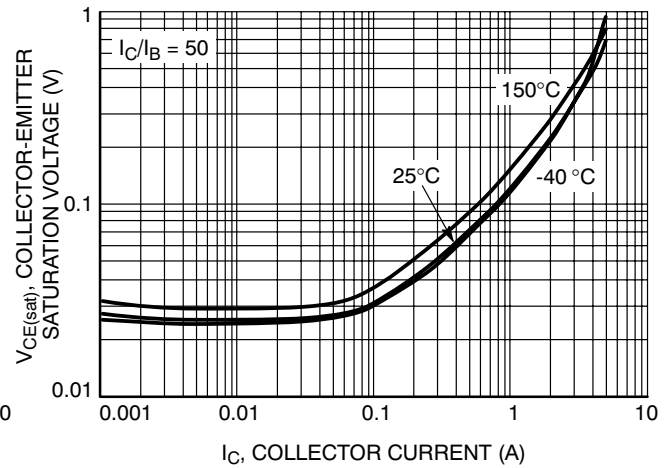


Figure 5. Collector-Emitter Saturation Voltage

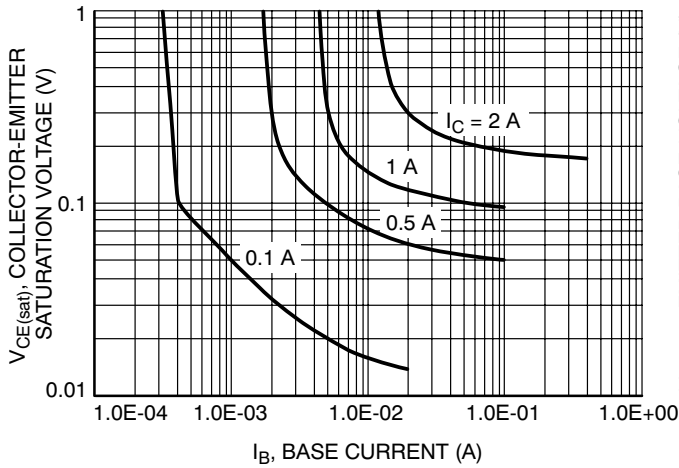


Figure 6. Collector Saturation Region

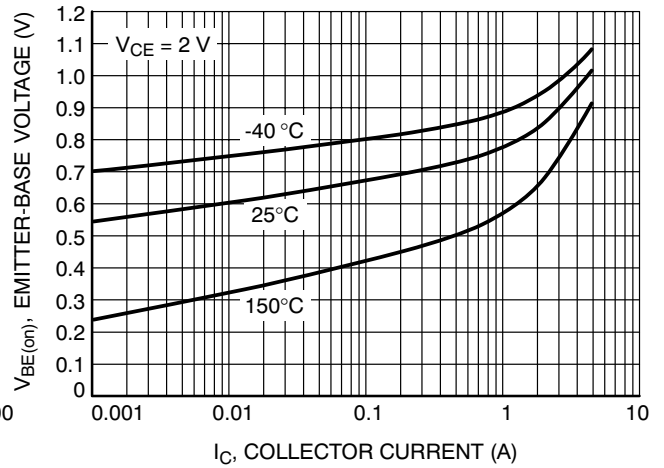


Figure 7. $V_{BE(on)}$ Voltage

TYPICAL CHARACTERISTICS

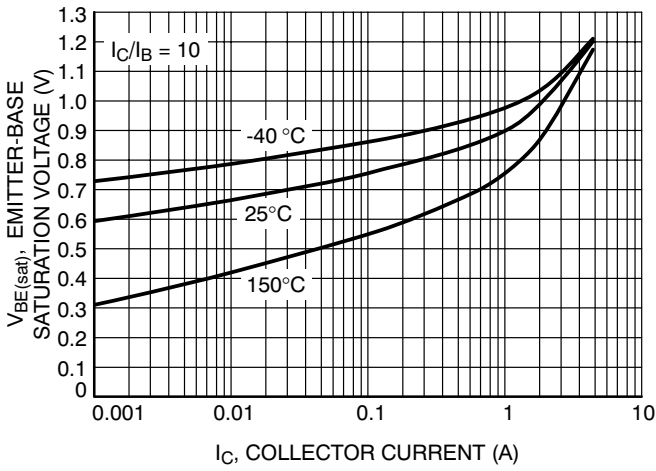


Figure 8. Base-Emitter Saturation Voltage

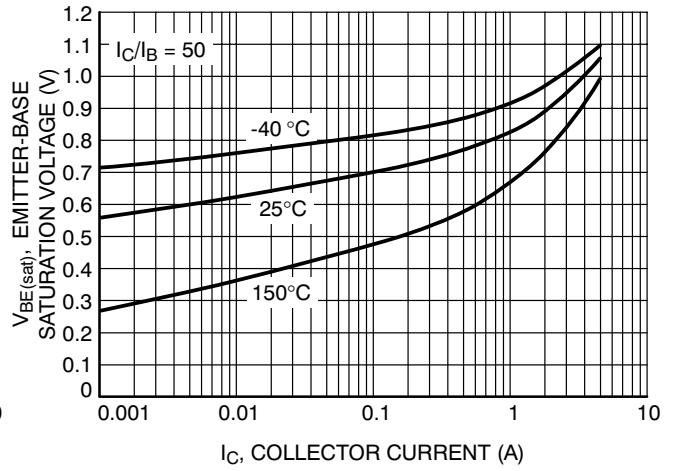


Figure 9. Base-Emitter Saturation Voltage

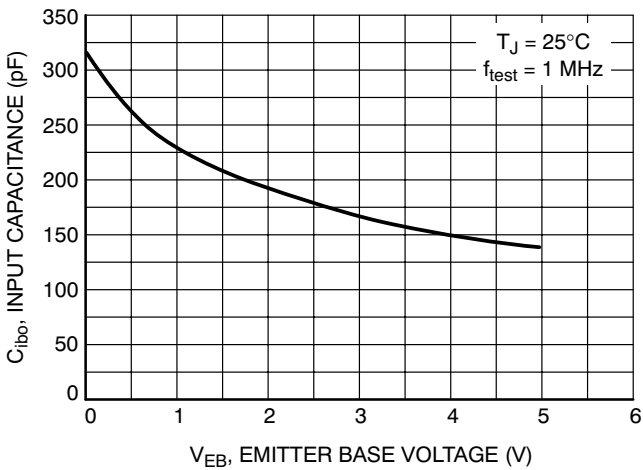


Figure 10. Input Capacitance

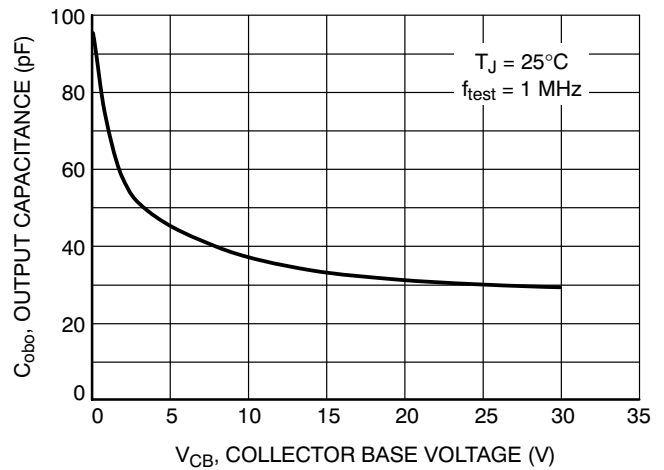


Figure 11. Output Capacitance

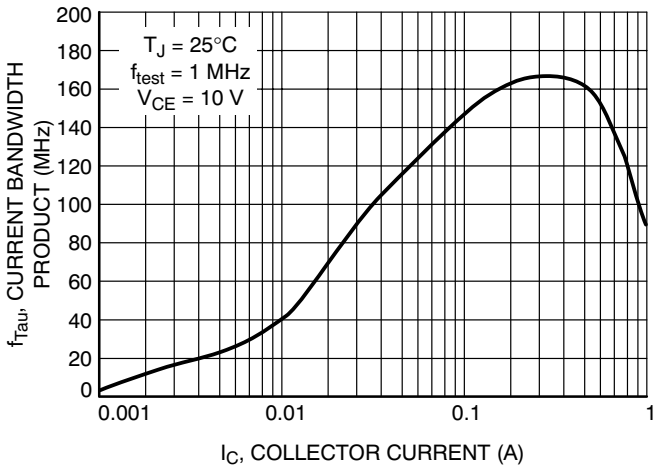


Figure 12. Current-Gain Bandwidth Product

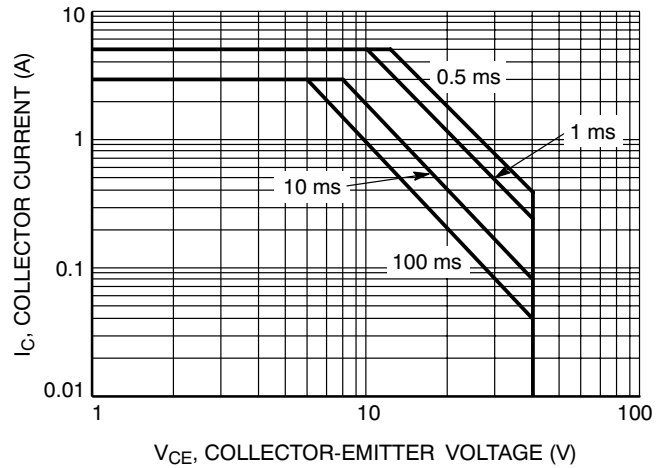
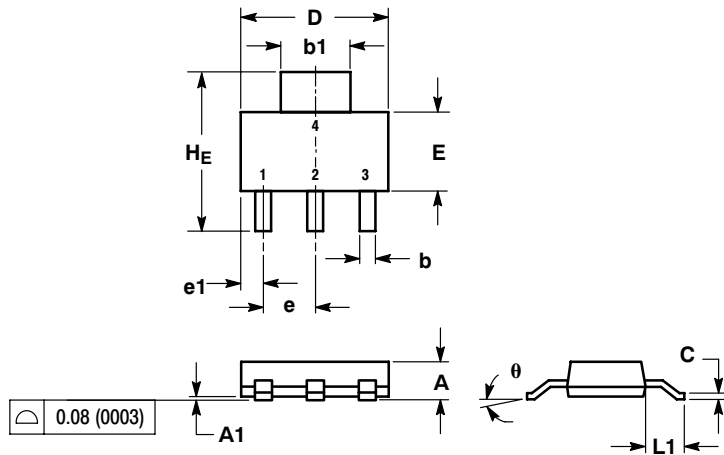


Figure 13. Safe Operating Area

NSS40300MZ4

PACKAGE DIMENSIONS

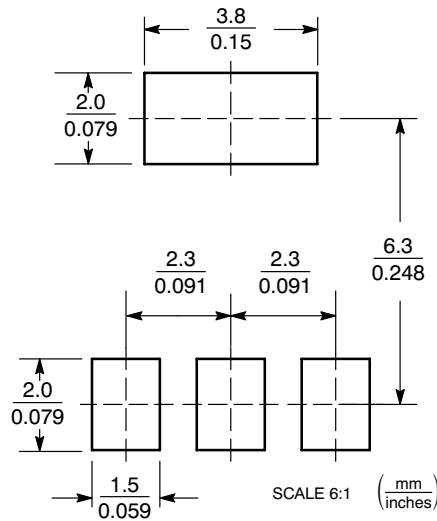
SOT-223 (TO-261)
CASE 318E-04
ISSUE L



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 1.50 | 1.63 | 1.75 | 0.060 | 0.064 | 0.068 |
| A1 | 0.02 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| b | 0.60 | 0.75 | 0.89 | 0.024 | 0.030 | 0.035 |
| b1 | 2.90 | 3.06 | 3.20 | 0.115 | 0.121 | 0.126 |
| c | 0.24 | 0.29 | 0.35 | 0.009 | 0.012 | 0.014 |
| D | 6.30 | 6.50 | 6.70 | 0.249 | 0.256 | 0.263 |
| E | 3.30 | 3.50 | 3.70 | 0.130 | 0.138 | 0.145 |
| e | 2.20 | 2.30 | 2.40 | 0.087 | 0.091 | 0.094 |
| e1 | 0.85 | 0.94 | 1.05 | 0.033 | 0.037 | 0.041 |
| L1 | 1.50 | 1.75 | 2.00 | 0.060 | 0.069 | 0.078 |
| HE | 6.70 | 7.00 | 7.30 | 0.264 | 0.276 | 0.287 |
| θ | 0° | - | 10° | 0° | - | 10° |

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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