

NSS30201MR6T1G, SNSS30201MR6T1G

30 V, 3 A, Low $V_{CE(sat)}$ NPN Transistor

ON Semiconductor's e²PowerEdge family of low $V_{CE(sat)}$ transistors are miniature 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 application 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.

Features

- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb-Free Devices*



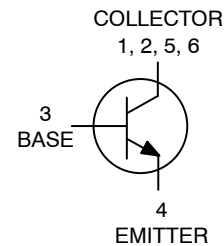
ON Semiconductor®

<http://onsemi.com>

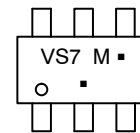
**30 VOLTS
3.0 AMPS
NPN LOW $V_{CE(sat)}$ TRANSISTOR
EQUIVALENT $R_{DS(on)}$ 100 m Ω**



**TSOP-6
CASE 318G
STYLE 6**



DEVICE MARKING



VS7 = Specific Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|-----------------|---------------------|------------------------|
| NSS30201MR6T1G | TSOP-6 (Pb-Free) | 3,000 / Tape & Reel |
| SNSS30201MR6T1G | TSOP-6 (Pb-Free) | 3,000 / 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.

*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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MAXIMUM RATINGS (T_A = 25°C)

| Rating | Symbol | Max | Unit |
|--------------------------------|------------------|-----|------|
| Collector-Emitter Voltage | V _{CEO} | 30 | V |
| Collector-Base Voltage | V _{CBO} | 50 | V |
| Emitter-Base Voltage | V _{EBO} | 5.0 | V |
| Collector Current – Continuous | I _C | 2.0 | A |
| Collector Current – Peak | I _{CM} | 3.0 | A |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|--|--------------|--------------|
| Total Device Dissipation T _A = 25°C Derate above 25°C | P _D (Note 1) | 535 4.3 | mW mW/°C |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} (Note 1) | 234 | °C/W |
| Total Device Dissipation T _A = 25°C Derate above 25°C | P _D (Note 2) | 1,180 9.4 | W mW/°C |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} (Note 2) | 106 | °C/W |
| Thermal Resistance, Junction-to-Lead #1 | R _{θJL} (Note 1) R _{θJL} (Note 2) | 110 50 | °C/W °C/W |
| Total Device Dissipation (Single Pulse < 10 s) | P _{Dsingle} (Notes 2 and 3) | 1.75 | W |
| Junction and Storage Temperature Range | T _J , T _{stg} | -55 to +150 | °C |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. FR-4 with 1 oz and 3.9 mm² of copper area.
2. FR-4 with 1 oz and 645 mm² of copper area.
3. Refer to Figure 8.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|----------------------|-------------------|----------------------|-------------------------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage (I _C = 10 mA, I _B = 0) | V _{(BR)CEO} | 30 | – | – | V |
| Collector – Base Breakdown Voltage (I _C = 0.1 mA, I _E = 0) | V _{(BR)CBO} | 50 | – | – | V |
| Emitter – Base Breakdown Voltage (I _E = 0.1 mA, I _C = 0) | V _{(BR)EBO} | 5.0 | – | – | V |
| Collector Cutoff Current (V _{CB} = 30 V, I _E = 0) | I _{CBO} | – | – | 0.1 | μA |
| Collector – Emitter Cutoff Current (V _{CE} = 30 V) | I _{CES} | – | – | 0.1 | μA |
| Emitter Cutoff Current (V _{EB} = 4.0 V) | I _{EBO} | – | – | 0.1 | μA |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (Note 4) (I _C = 1.0 mA, V _{CE} = 5.0 V) (I _C = 0.5 A, V _{CE} = 5.0 V) (I _C = 1.0 A, V _{CE} = 5.0 V) | h _{FE} | 300 300 200 | – 500 – | – 900 – | |
| Collector – Emitter Saturation Voltage (Note 4) (I _C = 1.0 A, I _B = 100 mA) (I _C = 0.5 A, I _B = 50 mA) (I _C = 0.1 A, I _B = 1.0 mA) | V _{CE(sat)} | – – – | 0.10 0.06 0.05 | 0.200 0.125 0.075 | V |
| Base – Emitter Saturation Voltage (Note 4) (I _C = 1.0 A, I _B = 0.1 A) | V _{BE(sat)} | – | – | 1.1 | V |
| Base – Emitter Turn-on Voltage (Note 4) (I _C = 1.0 A, V _{CE} = 2.0 V) | V _{BE(on)} | – | – | 1.1 | V |
| Cutoff Frequency (I _C = 100 mA, V _{CE} = 5.0 V, f = 100 MHz) | f _T | 200 | 300 | – | MHz |
| Output Capacitance (f = 1.0 MHz) | C _{obo} | – | – | 15 | pF |

4. Pulsed Condition: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

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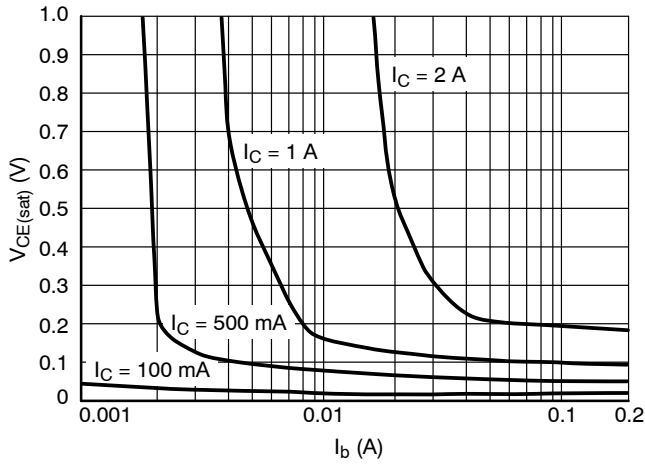


Figure 1. $V_{CE(sat)}$ versus I_b

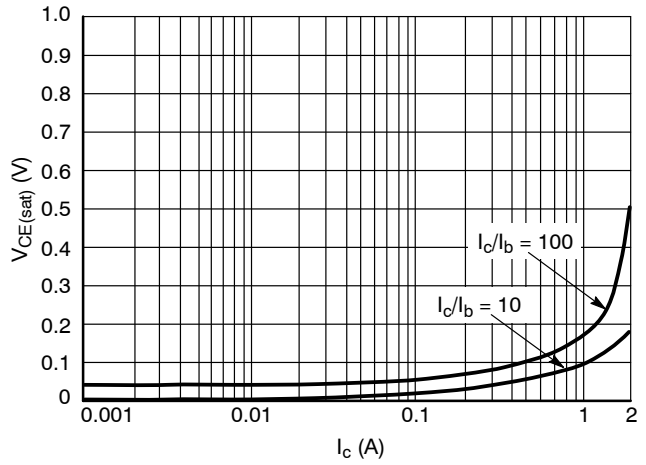


Figure 2. $V_{CE(sat)}$ versus I_c

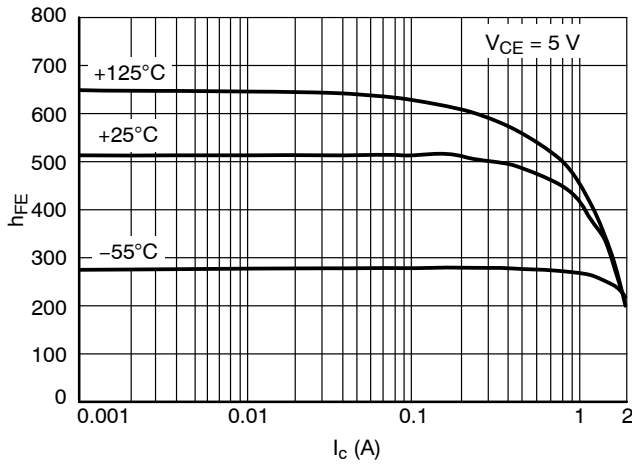


Figure 3. h_{FE} versus I_c

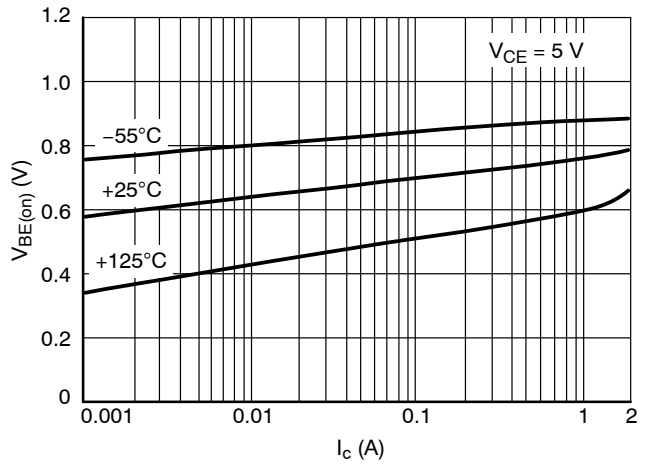


Figure 4. $V_{BE(on)}$ versus I_c

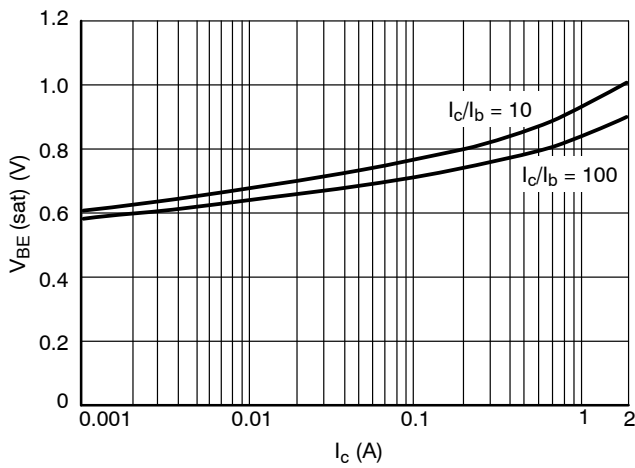


Figure 5. $V_{BE(sat)}$ versus I_c

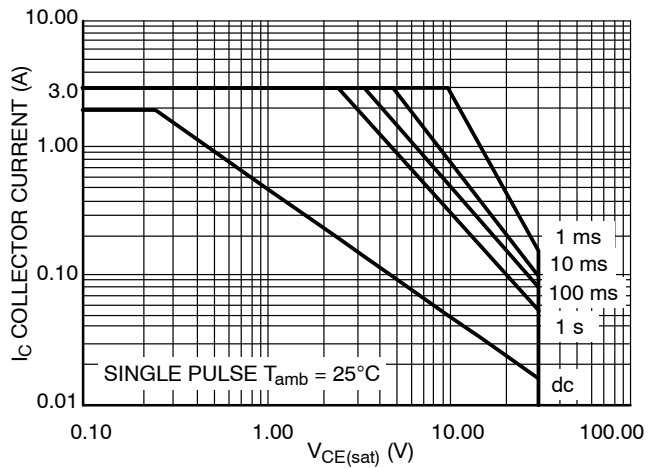


Figure 6. Safe Operating Area

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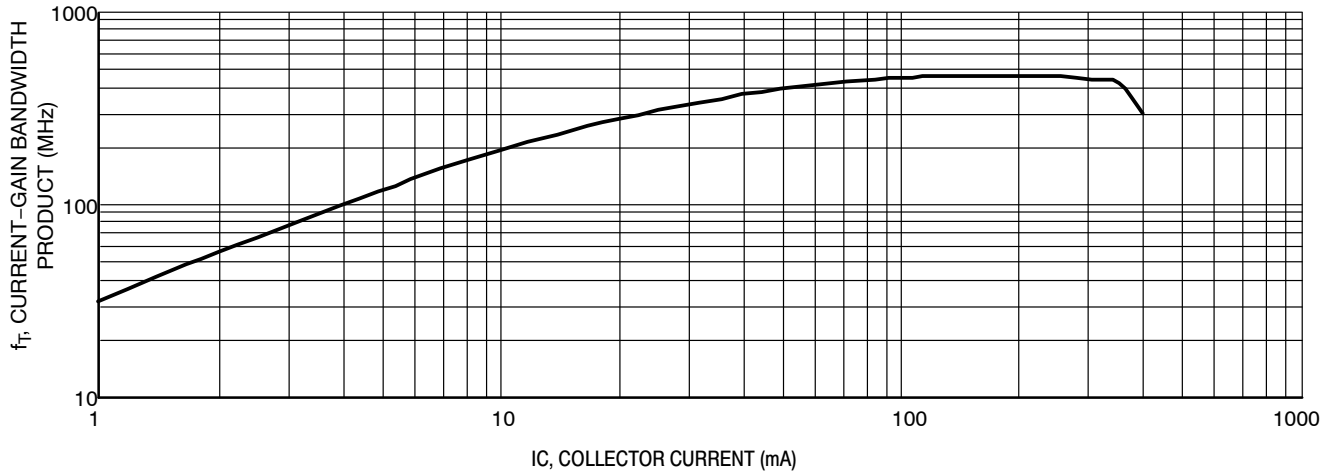


Figure 7. f_T (MHz) versus I_C (mA)
 $V_{CE} = 5.0$ V

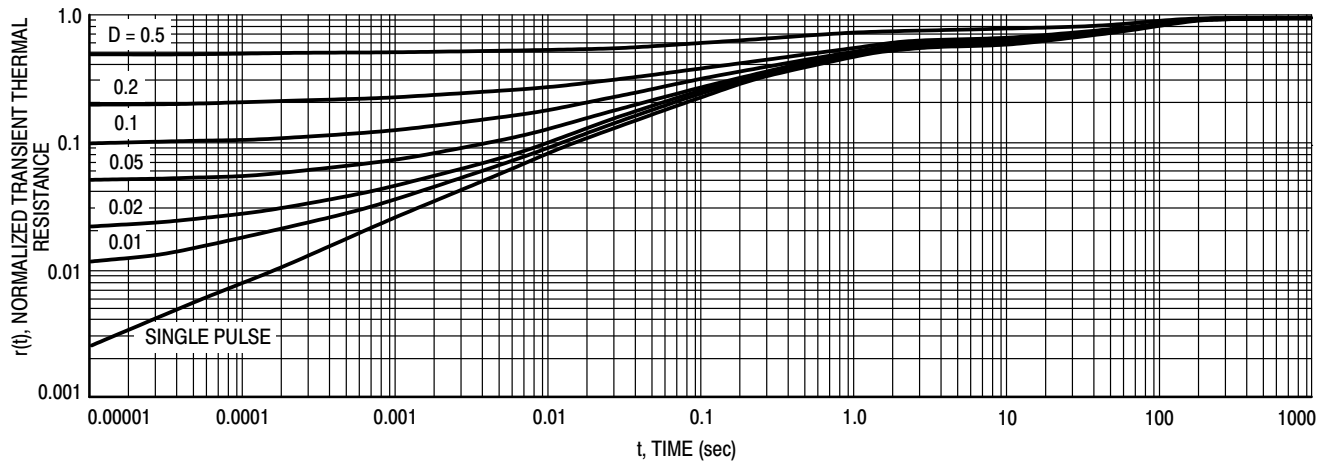
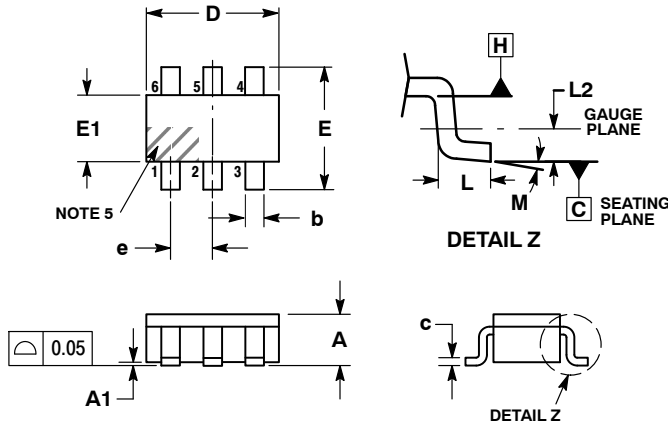


Figure 8. Normalized Thermal Response

NSS30201MR6T1G, SNSS30201MR6T1G

PACKAGE DIMENSIONS

TSOP-6
CASE 318G-02
ISSUE U



NOTES:

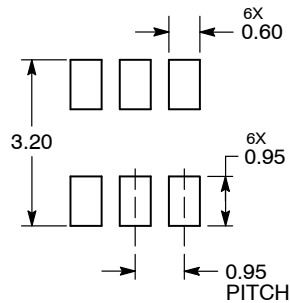
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

| MILLIMETERS | | | |
|-------------|----------|------|------|
| DIM | MIN | NOM | MAX |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.01 | 0.06 | 0.10 |
| b | 0.25 | 0.38 | 0.50 |
| c | 0.10 | 0.18 | 0.26 |
| D | 2.90 | 3.00 | 3.10 |
| E | 2.50 | 2.75 | 3.00 |
| E1 | 1.30 | 1.50 | 1.70 |
| e | 0.85 | 0.95 | 1.05 |
| L | 0.20 | 0.40 | 0.60 |
| L2 | 0.25 BSC | | |
| M | 0° | - | 10° |

STYLE 6:

1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*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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