

MUN5311DW1, SMUN5311DW1, NSBC114EPDXV6, NSBC114EPDP6

Complementary Bias Resistor Transistors

R1 = 10 kΩ, R2 = 10 kΩ

NPN and PNP Transistors with Monolithic Bias Resistor Network

This series of digital transistors is designed to replace a single device and its external resistor bias network. The Bias Resistor Transistor (BRT) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. The BRT eliminates these individual components by integrating them into a single device. The use of a BRT can reduce both system cost and board space.

Features

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- S and NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

(T_A = 25°C both polarities Q₁ (PNP) & Q₂ (NPN), unless otherwise noted)

| Rating | Symbol | Max | Unit |
|--------------------------------|----------------------|-----|------|
| Collector-Base Voltage | V _{CBO} | 50 | Vdc |
| Collector-Emitter Voltage | V _{CEO} | 50 | Vdc |
| Collector Current – Continuous | I _C | 100 | mAdc |
| Input Forward Voltage | V _{IN(fwd)} | 40 | Vdc |
| Input Reverse Voltage | V _{IN(rev)} | 10 | Vdc |

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.

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|----------------------------------|---------|-----------------------|
| MUN5311DW1T1G, SMUN5311DW1T1G | SOT-363 | 3,000/Tape & Reel |
| MUN5311DW1T2G, SMUN5311DW1T2G | SOT-363 | 3,000/Tape & Reel |
| SMUN5311DW1T3G | SOT-363 | 10,000/Tape & Reel |
| NSBC114EPDXV6T1G | SOT-563 | 4,000/Tape & Reel |
| NSBC114EPDXV6T5G | SOT-563 | 8,000/Tape & Reel |
| NSBC114EPDP6T5G | SOT-963 | 8,000/Tape & Reel |

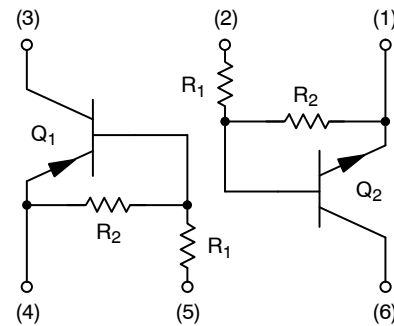
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



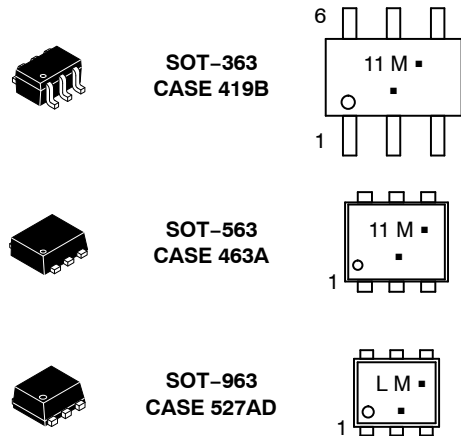
ON Semiconductor®

<http://onsemi.com>

PIN CONNECTIONS



MARKING DIAGRAMS



11/L = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

MUN5311DW1, SMUN5311DW1, NSBC114EPDXV6, NSBC114EPDP6

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|----------------|--------|-----|------|
|----------------|--------|-----|------|

MUN5311DW1 (SOT-363) ONE JUNCTION HEATED

| | | | | |
|--|----------------------|-----------------|------------|---------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ | (Note 1) (Note 2) | P_D | 187 256 | mW |
| Derate above 25°C | (Note 1) (Note 2) | | 1.5 2.0 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | (Note 1) (Note 2) | $R_{\theta JA}$ | 670 490 | $^\circ\text{C}/\text{W}$ |

MUN5311DW1 (SOT-363) BOTH JUNCTION HEATED (Note 3)

| | | | | |
|--|----------------------|-----------------|-------------|---------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ | (Note 1) (Note 2) | P_D | 250 385 | mW |
| Derate above 25°C | (Note 1) (Note 2) | | 2.0 3.0 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | (Note 1) (Note 2) | $R_{\theta JA}$ | 493 325 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Lead | (Note 1) (Note 2) | $R_{\theta JL}$ | 188 208 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

NSBC114EPDXV6 (SOT-563) ONE JUNCTION HEATED

| | | | | |
|--|----------|-----------------|-----|---------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ | (Note 1) | P_D | 357 | mW |
| Derate above 25°C | (Note 1) | | 2.9 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | (Note 1) | $R_{\theta JA}$ | 350 | $^\circ\text{C}/\text{W}$ |

NSBC114EPDXV6 (SOT-563) BOTH JUNCTION HEATED (Note 3)

| | | | | |
|--|----------|-----------------|-------------|---------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ | (Note 1) | P_D | 500 | mW |
| Derate above 25°C | (Note 1) | | 4.0 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | (Note 1) | $R_{\theta JA}$ | 250 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

NSBC114EPDP6 (SOT-963) ONE JUNCTION HEATED

| | | | | |
|--|----------------------|-----------------|------------|---------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ | (Note 4) (Note 5) | P_D | 231 269 | MW |
| Derate above 25°C | (Note 4) (Note 5) | | 1.9 2.2 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | (Note 4) (Note 5) | $R_{\theta JA}$ | 540 464 | $^\circ\text{C}/\text{W}$ |

NSBC114EPDP6 (SOT-963) BOTH JUNCTION HEATED (Note 3)

| | | | | |
|--|----------------------|-----------------|-------------|---------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ | (Note 4) (Note 5) | P_D | 339 408 | MW |
| Derate above 25°C | (Note 4) (Note 5) | | 2.7 3.3 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient | (Note 4) (Note 5) | $R_{\theta JA}$ | 369 306 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

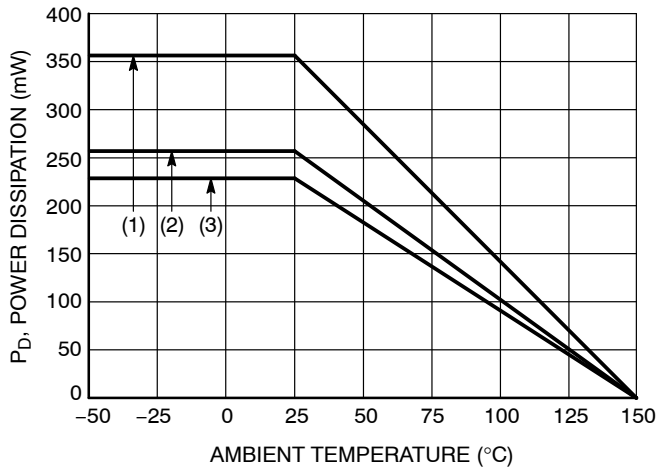
- FR-4 @ Minimum Pad.
- FR-4 @ 1.0×1.0 Inch Pad.
- Both junction heated values assume total power is sum of two equally powered channels.
- FR-4 @ 100 mm^2 , 1 oz. copper traces, still air.
- FR-4 @ 500 mm^2 , 1 oz. copper traces, still air.

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ both polarities Q_1 (PNP) & Q_2 (NPN), unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------|-----|-----|------|------------|
| OFF CHARACTERISTICS | | | | | |
| Collector-Base Cutoff Current ($V_{CB} = 50\text{ V}$, $I_E = 0$) | I_{CBO} | - | - | 100 | nAdc |
| Collector-Emitter Cutoff Current ($V_{CE} = 50\text{ V}$, $I_B = 0$) | I_{CEO} | - | - | 500 | nAdc |
| Emitter-Base Cutoff Current ($V_{EB} = 6.0\text{ V}$, $I_C = 0$) | I_{EBO} | - | - | 0.5 | mAdc |
| Collector-Base Breakdown Voltage ($I_C = 10\ \mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | 50 | - | - | Vdc |
| Collector-Emitter Breakdown Voltage (Note 6) ($I_C = 2.0\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 50 | - | - | Vdc |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (Note 6) ($I_C = 5.0\text{ mA}$, $V_{CE} = 10\text{ V}$) | h_{FE} | 35 | 60 | - | |
| Collector-Emitter Saturation Voltage (Note 6) ($I_C = 10\text{ mA}$, $I_B = 0.3\text{ mA}$) | $V_{CE(sat)}$ | - | - | 0.25 | V |
| Input Voltage (Off) ($V_{CE} = 5.0\text{ V}$, $I_C = 100\ \mu\text{A}$) (NPN) ($V_{CE} = 5.0\text{ V}$, $I_C = 100\ \mu\text{A}$) (PNP) | $V_{i(off)}$ | - | 1.2 | - | Vdc |
| Input Voltage (On) ($V_{CE} = 0.2\text{ V}$, $I_C = 10\text{ mA}$) (NPN) ($V_{CE} = 0.2\text{ V}$, $I_C = 10\text{ mA}$) (PNP) | $V_{i(on)}$ | - | 2.0 | - | Vdc |
| Output Voltage (On) ($V_{CC} = 5.0\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) | V_{OL} | - | - | 0.2 | Vdc |
| Output Voltage (Off) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) | V_{OH} | 4.9 | - | - | Vdc |
| Input Resistor | R1 | 7.0 | 10 | 13 | k Ω |
| Resistor Ratio | R_1/R_2 | 0.8 | 1.0 | 1.2 | |

6. Pulsed Condition: Pulse Width = 300 ms, Duty Cycle \leq 2%.



- (1) SOT-363; 1.0 × 1.0 Inch Pad
- (2) SOT-563; Minimum Pad
- (3) SOT-963; 100 mm², 1 oz. Copper Trace

Figure 1. Derating Curve

TYPICAL CHARACTERISTICS – NPN TRANSISTOR
MUN5311DW1, NSBC114EPDXV6

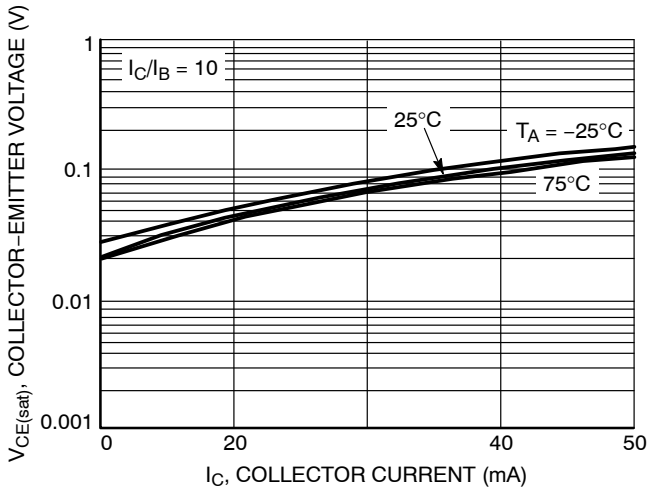


Figure 2. $V_{CE(sat)}$ vs. I_C

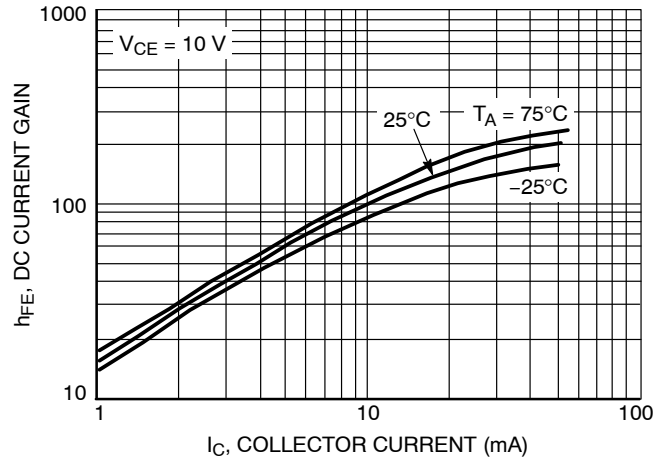


Figure 3. DC Current Gain

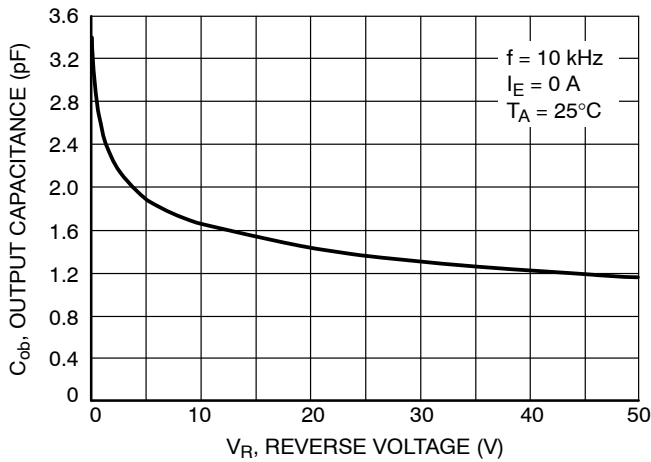


Figure 4. Output Capacitance

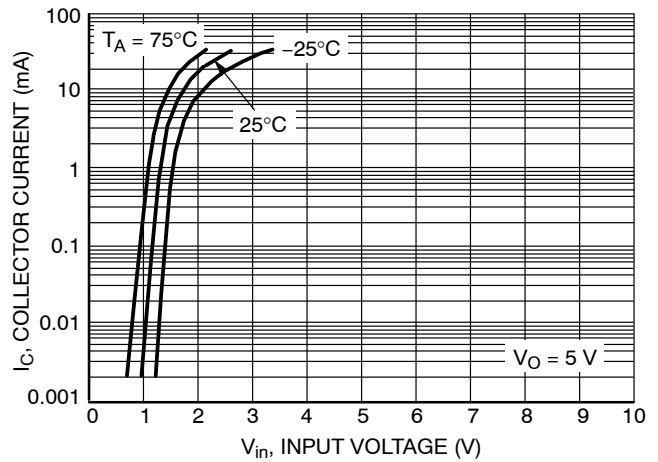


Figure 5. Output Current vs. Input Voltage

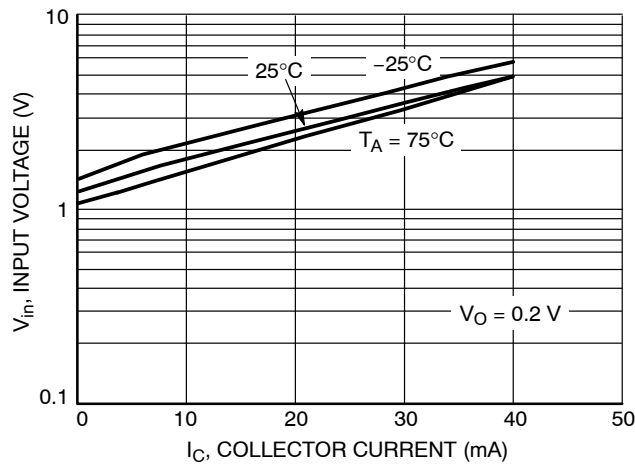


Figure 6. Input Voltage vs. Output Current

TYPICAL CHARACTERISTICS – PNP TRANSISTOR
MUN5311DW1, NSBC114EPDXV6

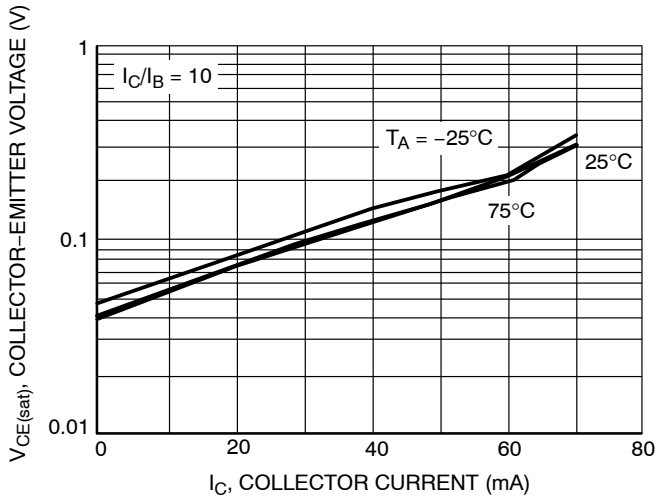


Figure 7. $V_{CE(sat)}$ vs. I_C

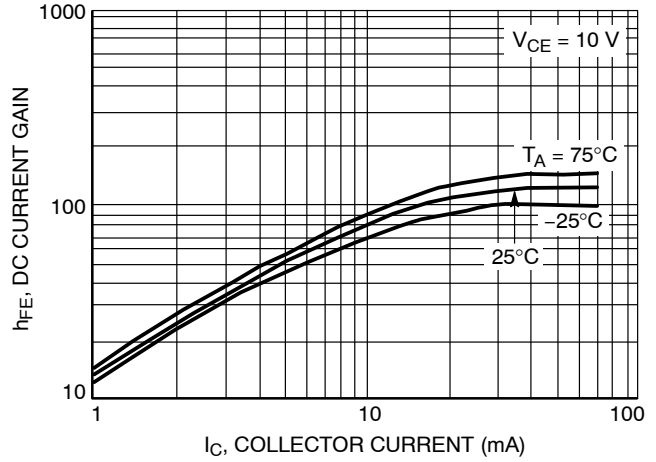


Figure 8. DC Current Gain

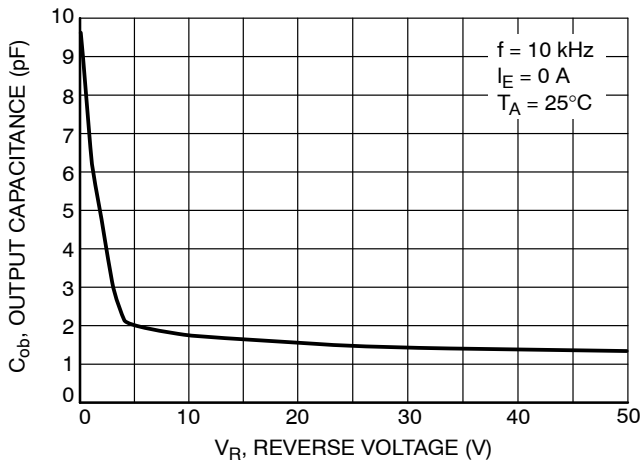


Figure 9. Output Capacitance

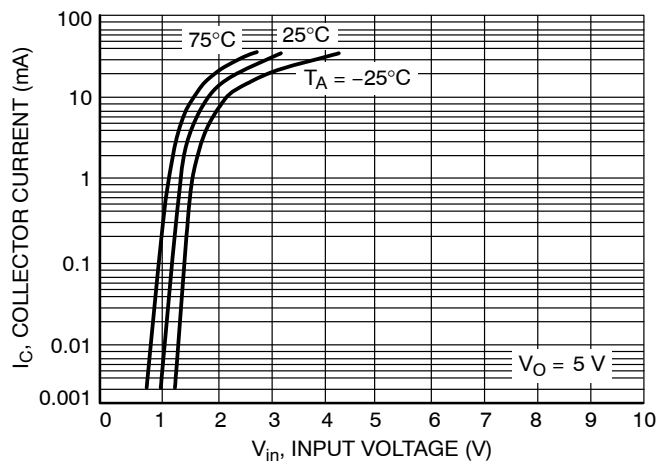


Figure 10. Output Current vs. Input Voltage

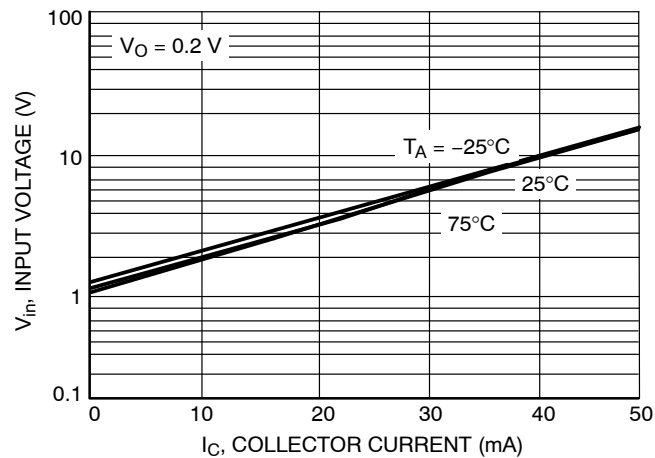


Figure 11. Input Voltage vs. Output Current

TYPICAL CHARACTERISTICS – NPN TRANSISTOR
NSBC114EPDP6

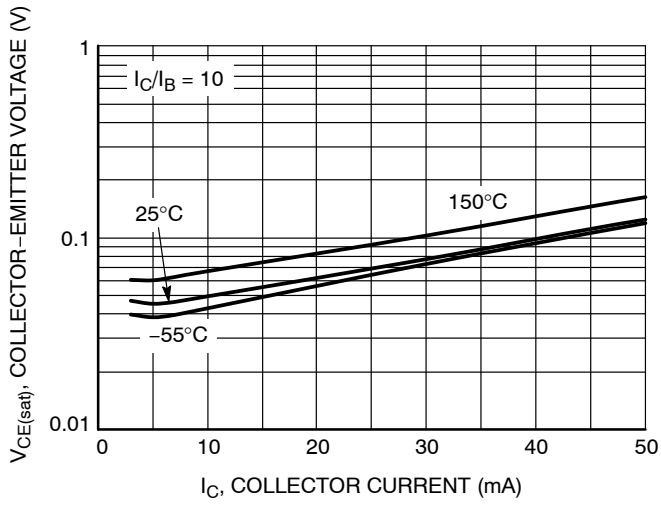


Figure 12. $V_{CE(sat)}$ vs. I_C

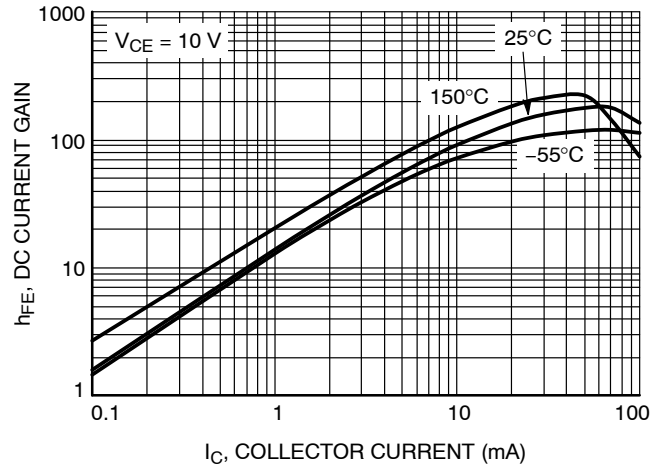


Figure 13. DC Current Gain

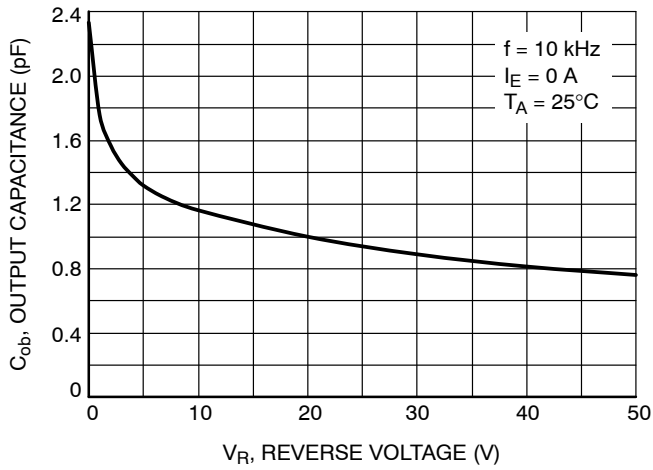


Figure 14. Output Capacitance

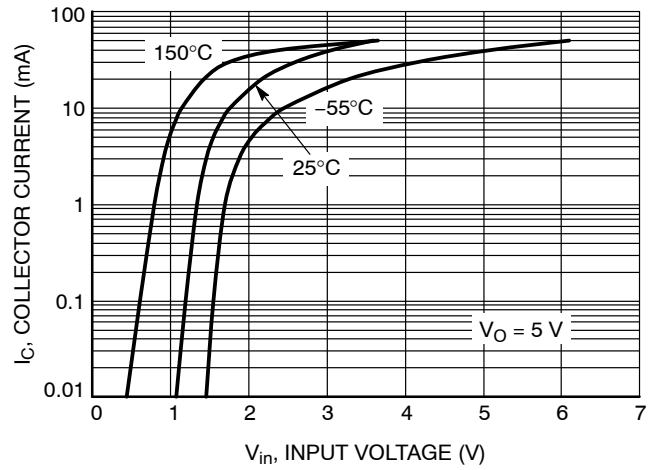


Figure 15. Output Current vs. Input Voltage

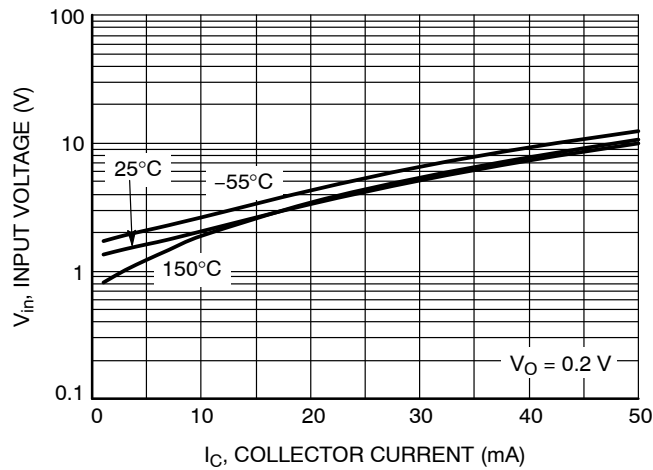


Figure 16. Input Voltage vs. Output Current

TYPICAL CHARACTERISTICS – PNP TRANSISTOR
NSBC114EPDP6

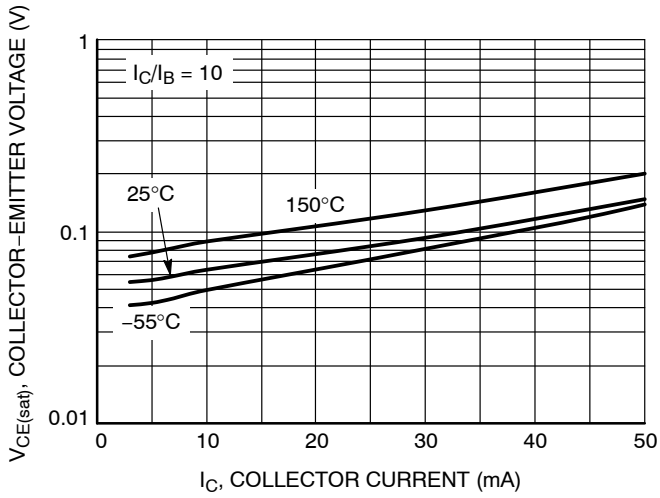


Figure 17. $V_{CE(sat)}$ vs. I_C

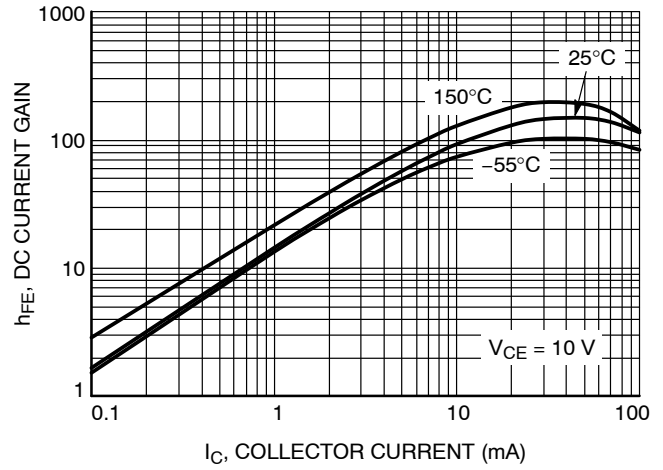


Figure 18. DC Current Gain

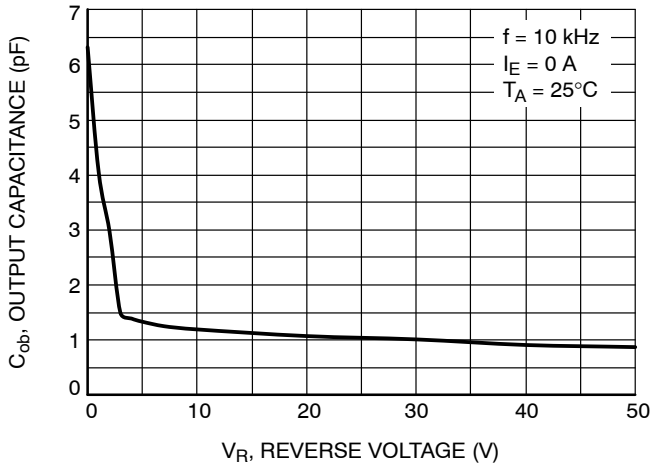


Figure 19. Output Capacitance

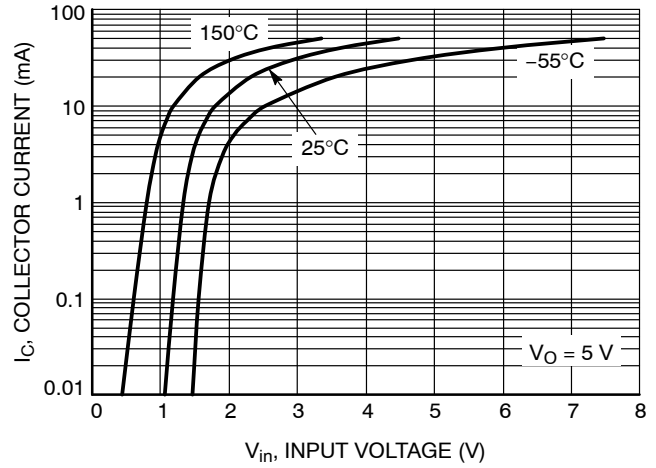


Figure 20. Output Current vs. Input Voltage

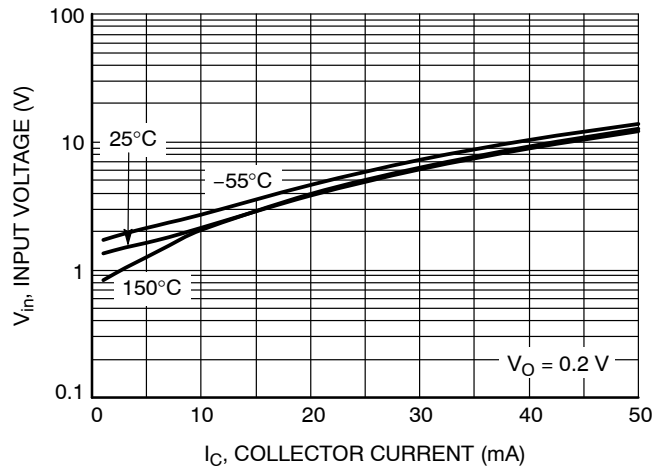
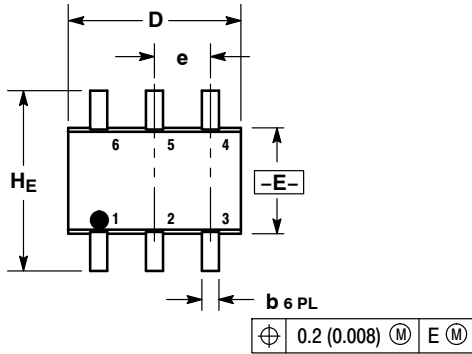


Figure 21. Input Voltage vs. Output Current

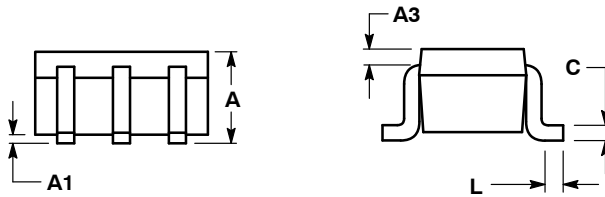
PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363
CASE 419B-02
ISSUE W

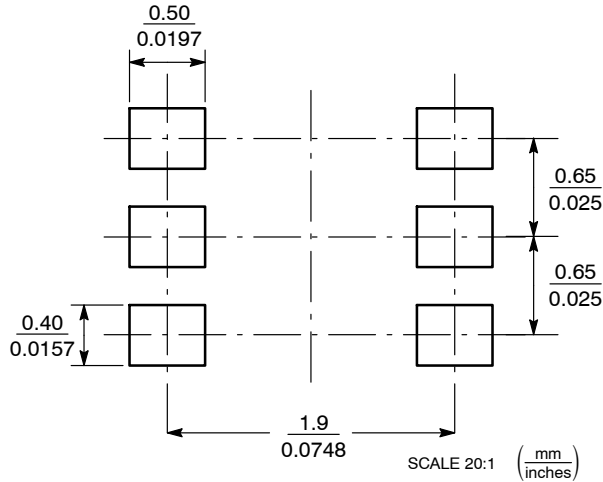


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | 0.95 | 1.10 | 0.031 | 0.037 | 0.043 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A3 | 0.20 REF | | | 0.008 REF | | |
| b | 0.10 | 0.21 | 0.30 | 0.004 | 0.008 | 0.012 |
| C | 0.10 | 0.14 | 0.25 | 0.004 | 0.005 | 0.010 |
| D | 1.80 | 2.00 | 2.20 | 0.070 | 0.078 | 0.086 |
| E | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| HE | 2.00 | 2.10 | 2.20 | 0.078 | 0.082 | 0.086 |



SOLDERING FOOTPRINT*

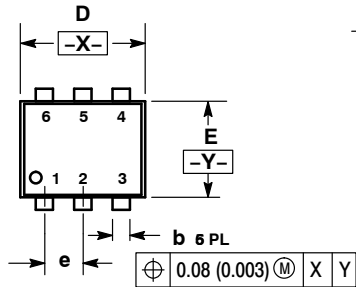


SC-88/SC70-6/SOT-363

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

PACKAGE DIMENSIONS

SOT-563, 6 LEAD
CASE 463A
ISSUE F

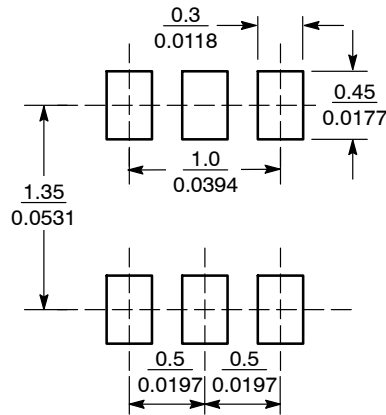


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| DIM | MILLIMETERS | | | INCHES | | |
|----------------|-------------|------|------|----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.50 | 0.55 | 0.60 | 0.020 | 0.021 | 0.023 |
| b | 0.17 | 0.22 | 0.27 | 0.007 | 0.009 | 0.011 |
| C | 0.08 | 0.12 | 0.18 | 0.003 | 0.005 | 0.007 |
| D | 1.50 | 1.60 | 1.70 | 0.059 | 0.062 | 0.066 |
| E | 1.10 | 1.20 | 1.30 | 0.043 | 0.047 | 0.051 |
| e | 0.5 BSC | | | 0.02 BSC | | |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| H _E | 1.50 | 1.60 | 1.70 | 0.059 | 0.062 | 0.066 |

SOLDERING FOOTPRINT*



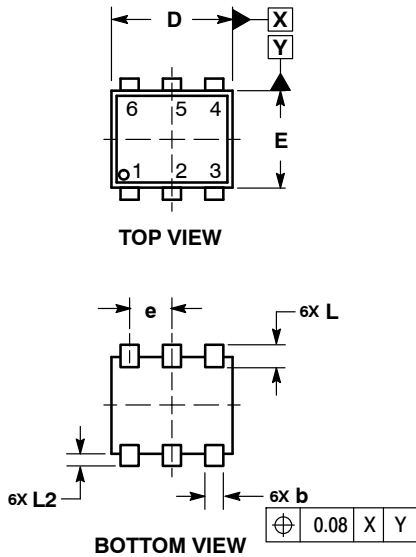
SCALE 20:1 ($\frac{\text{mm}}{\text{inches}}$)

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

MUN5311DW1, SMUN5311DW1, NSBC114EPDXV6, NSBC114EPDP6

PACKAGE DIMENSIONS

SOT-963 CASE 527AD ISSUE E

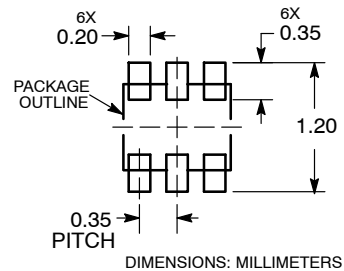


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS | | |
|----------------|-------------|------|------|
| | MIN | NOM | MAX |
| A | 0.34 | 0.37 | 0.40 |
| b | 0.10 | 0.15 | 0.20 |
| C | 0.07 | 0.12 | 0.17 |
| D | 0.95 | 1.00 | 1.05 |
| E | 0.75 | 0.80 | 0.85 |
| e | 0.35 BSC | | |
| H _E | 0.95 | 1.00 | 1.05 |
| L | 0.19 REF | | |
| L2 | 0.05 | 0.10 | 0.15 |

RECOMMENDED MOUNTING 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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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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