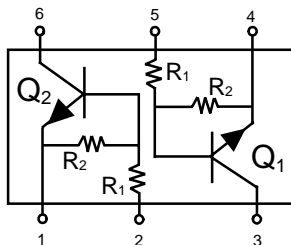
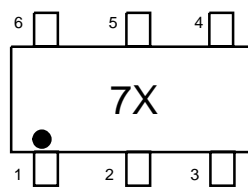


The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates these individual components by integrating them into a single device. In the SMUN5211DW series, two BRT devices are housed in the SOT-363 package which is ideal for low power surface mount applications where board space is at a premium.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Pb-Free Package is available

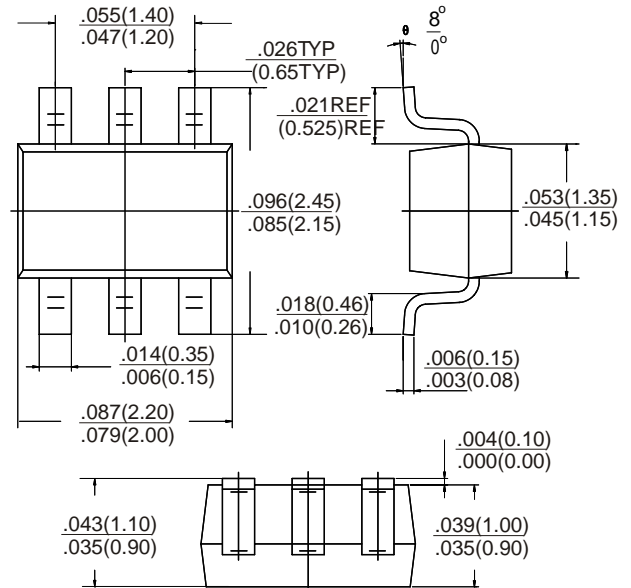


MARKING DIAGRAM



7X = Device Marking

SOT-363



Dimensions in inches and (millimeters)

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted, common for Q₁ and Q₂)

| Rating | Symbol | Value | Unit |
|---------------------------|------------------|-------|------|
| Collector-Base Voltage | V _{CBO} | 50 | Vdc |
| Collector-Emitter Voltage | V _{CEO} | 50 | Vdc |
| Collector Current | I _C | 100 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic (One Junction Heated) | Symbol | Max | | Unit |
|--|-----------------------------------|-------------|--------|-------|
| | | Note 1 | Note 2 | |
| Total Device Dissipation T _A = 25°C | P _D | 187 | 256 | mW |
| Derate above 25°C | | 1.5 | 2.0 | mW/°C |
| Thermal Resistance – Junction-to-Ambient | R _{JA} | 670 | 490 | °C/W |
| Characteristic (Both Junctions Heated) | Symbol | Max | | Unit |
| | | Note 1 | Note 2 | |
| Total Device Dissipation T _A = 25°C | P _D | 250 | 385 | mW |
| Derate above 25°C | | 2.0 | 3.0 | mW/°C |
| Thermal Resistance – Junction-to-Ambient | R _{θJA} | 493 | 325 | °C/W |
| Thermal Resistance – Junction-to-Lead | R _{θJL} | 188 | 208 | °C/W |
| Junction and Storage Temperature | T _J , T _{stg} | -55 to +150 | | °C |

1. FR-4 @ Minimum Pad 2. FR-4 @ 1.0 x 1.0 inch Pad

DEVICE MARKING , RESISTOR VALUES AND ORDERING INFORMATION

| Device | Package | Marking | R1(K) | R2(K) | Shipping |
|------------|---------|---------|-------|-------|----------------|
| SMUN5211DW | SOT-363 | 7A | 10 | 10 | 3000/Tape&Reel |
| SMUN5212DW | SOT-363 | 7B | 22 | 22 | 3000/Tape&Reel |
| SMUN5213DW | SOT-363 | 7C | 47 | 47 | 3000/Tape&Reel |
| SMUN5214DW | SOT-363 | 7D | 10 | 47 | 3000/Tape&Reel |
| SMUN5215DW | SOT-363 | 7E | 10 | open | 3000/Tape&Reel |
| SMUN5216DW | SOT-363 | 7F | 4.7 | open | 3000/Tape&Reel |
| SMUN5230DW | SOT-363 | 7G | 1 | 1 | 3000/Tape&Reel |
| SMUN5231DW | SOT-363 | 7H | 2.2 | 2.2 | 3000/Tape&Reel |
| SMUN5232DW | SOT-363 | 7J | 4.7 | 4.7 | 3000/Tape&Reel |
| SMUN5233DW | SOT-363 | 7K | 4.7 | 47 | 3000/Tape&Reel |
| SMUN5234DW | SOT-363 | 7L | 22 | 47 | 3000/Tape&Reel |
| SMUN5235DW | SOT-363 | 7M | 2.2 | 47 | 3000/Tape&Reel |
| SMUN5236DW | SOT-363 | 7N | 100 | 100 | 3000/Tape&Reel |
| SMUN5237DW | SOT-363 | 7P | 47 | 22 | 3000/Tape&Reel |

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted, common for Q₁ and Q₂)

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

OFF CHARACTERISTICS

| | | | | | | |
|---|--|----------------------|------|---|------|------|
| Collector-Base Cutoff Current | (V _{CB} = 50 V, I _E = 0) | I _{CBO} | – | – | 100 | nAdc |
| Collector-Emitter Cutoff Current | (V _{CE} = 50 V, I _B = 0) | I _{CEO} | – | – | 500 | nAdc |
| Emitter-Base Cutoff Current (V _{EB} = 6.0 V, I _C = 0) | SMUN5211DW | I _{EBO} | – | – | 0.5 | mAdc |
| | SMUN5212DW | | – | – | 0.2 | |
| | SMUN5213DW | | – | – | 0.1 | |
| | SMUN5214DW | | – | – | 0.2 | |
| | SMUN5215DW | | – | – | 0.9 | |
| | SMUN5216DW | | – | – | 1.9 | |
| | SMUN5230DW | | – | – | 4.3 | |
| | SMUN5231DW | | – | – | 2.3 | |
| | SMUN5232DW | | – | – | 1.5 | |
| | SMUN5233DW | | – | – | 0.18 | |
| | SMUN5234DW | | – | – | 0.13 | |
| | SMUN5235DW | | – | – | 0.2 | |
| SMUN5236DW | – | – | 0.05 | | | |
| SMUN5237DW | – | – | 0.13 | | | |
| Collector-Base Breakdown Voltage (I _C = 10 ∞A, I _E = 0) | | V _{(BR)CBO} | 50 | – | – | Vdc |
| Collector-Emitter Breakdown Voltage (Note 4.) (I _C = 2.0 mA, I _B = 0) | | V _{(BR)CEO} | 50 | – | – | Vdc |

4. Pulse Test: Pulse Width < 300 ∞s, Duty Cycle < 2.0%

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted, common for Q₁ and Q₂) (Continued)

| Characteristic | Symbol | Min | Typ | Max | Unit | |
|---|--|-----------------|-----|------|------|-----|
| ON CHARACTERISTICS (Note 5.) | | | | | | |
| DC Current Gain (V _{CE} = 10 V, I _C = 5.0 mA) | SMUN5211DW | h _{FE} | 35 | 60 | – | |
| | SMUN5212DW | | 60 | 100 | – | |
| | SMUN5213DW | | 80 | 140 | – | |
| | SMUN5214DW | | 80 | 140 | – | |
| | SMUN5215DW | | 160 | 350 | – | |
| | SMUN5216DW | | 160 | 350 | – | |
| | SMUN5230DW | | 3.0 | 5.0 | – | |
| | SMUN5231DW | | 8.0 | 15 | – | |
| | SMUN5232DW | | 15 | 30 | – | |
| | SMUN5233DW | | 80 | 200 | – | |
| | SMUN5234DW | | 80 | 150 | – | |
| | SMUN5235DW | | 80 | 140 | – | |
| | SMUN5236DW | | 80 | 150 | – | |
| | SMUN5237DW | | 80 | 140 | – | |
| Collector-Emitter Saturation Voltage (I _C = 10mA, I _B = 0.3 mA) (I _C = 10mA, I _B = 5mA) (I _C = 10mA, I _B = 1mA) | V _{CE(sat)} | – | – | 0.25 | Vdc | |
| SMUN5230DW/SMUN5231DW SMUN5215DW/SMUN5216DW SMUN5232DW/SMUN5233DW/SMUN5234DW | | | | | | |
| Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ) | SMUN5211DW | V _{OL} | – | – | 0.2 | |
| | SMUN5212DW | | – | – | 0.2 | |
| | SMUN5214DW | | – | – | 0.2 | |
| | SMUN5215DW | | – | – | 0.2 | |
| | SMUN5216DW | | – | – | 0.2 | |
| | SMUN5230DW | | – | – | 0.2 | |
| | SMUN5231DW | | – | – | 0.2 | |
| | SMUN5232DW | | – | – | 0.2 | |
| | SMUN5233DW | | – | – | 0.2 | |
| | SMUN5234DW | | – | – | 0.2 | |
| | SMUN5235DW | | – | – | 0.2 | |
| | (V _{CC} = 5.0 V, V _B = 3.5 V, R _L = 1.0 kΩ) | SMUN5213DW | | – | – | 0.2 |
| | (V _{CC} = 5.0 V, V _B = 5.5 V, R _L = 1.0 kΩ) | SMUN5236DW | | – | – | 0.2 |
| (V _{CC} = 5.0 V, V _B = 4.0 V, R _L = 1.0 kΩ) | SMUN5237DW | | – | – | 0.2 | |
| Output Voltage (off) (V _{CC} = 5.0 V, V _B = 0.5 V, R _L = 1.0 kΩ) (V _{CC} = 5.0 V, V _B = 0.05 V, R _L = 1.0 kΩ) (V _{CC} = 5.0 V, V _B = 0.25 V, R _L = 1.0 kΩ) | V _{OH} | 4.9 | – | – | Vdc | |
| SMUN5230DW SMUN5215DW SMUN5216DW SMUN5233DW | | | | | | |

5. Pulse Test: Pulse Width < 300 ms, Duty Cycle < 2.0%

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted, common for Q₁ and Q₂.) (Continued)

| Characteristic | Symbol | Min | Typ | Max | Unit | |
|-------------------------------------|-----------------------|--------------------------------|-------|-------|-------|----|
| ON CHARACTERISTICS (Note 6.) | | | | | | |
| Input Resistor | SMUN5211DW | R ₁ | 7.0 | 10 | 13 | kΩ |
| | SMUN5212DW | | 15.4 | 22 | 28.6 | |
| | SMUN5213DW | | 32.9 | 47 | 61.1 | |
| | SMUN5214DW | | 7.0 | 10 | 13 | |
| | SMUN5215DW | | 7.0 | 10 | 13 | |
| | SMUN5216DW | | 3.3 | 4.7 | 6.1 | |
| | SMUN5230DW | | 0.7 | 1.0 | 1.3 | |
| | SMUN5231DW | | 1.5 | 2.2 | 2.9 | |
| | SMUN5232DW | | 3.3 | 4.7 | 6.1 | |
| | SMUN5233DW | | 3.3 | 4.7 | 6.1 | |
| | SMUN5234DW | | 15.4 | 22 | 28.6 | |
| | SMUN5235DW | | 1.54 | 2.2 | 2.86 | |
| | SMUN5236DW | | 70 | 100 | 130 | |
| | SMUN5237DW | | 32.9 | 47 | 61.1 | |
| Resistor Ratio | SMUN5211DW/SMUN5212DW | R ₁ /R ₂ | | | | |
| | SMUN5213DW/SMUN5236DW | | 0.8 | 1.0 | 1.2 | |
| | SMUN5214DW/SMUN5215DW | | 0.17 | 0.21 | 0.25 | |
| | SMUN5216DW/SMUN5230DW | | – | – | – | |
| | SMUN5231DW/SMUN5232DW | | 0.8 | 1.0 | 1.2 | |
| | SMUN5233DW | | 0.055 | 0.1 | 0.185 | |
| | SMUN5234DW | | 0.38 | 0.47 | 0.56 | |
| | SMUN5235DW | | 0.038 | 0.047 | 0.056 | |
| SMUN5237DW | | 1.7 | 2.1 | 2.6 | | |

6. Pulse Test: Pulse Width < 300 ms, Duty Cycle < 2.0%

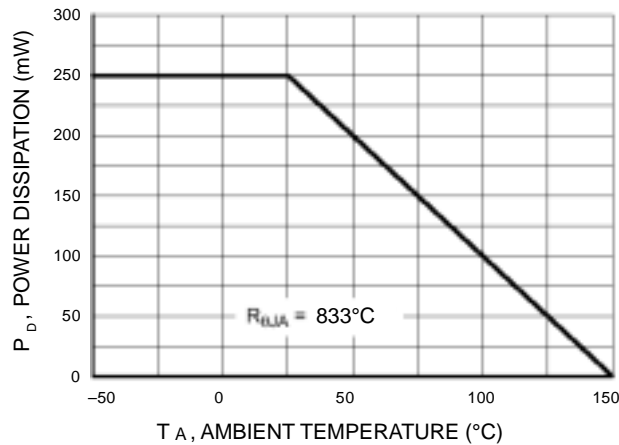


Figure 1. Derating Curve

TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5211DW

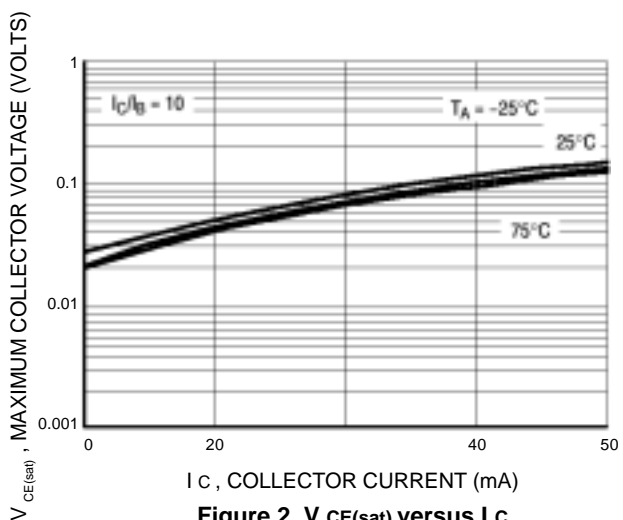


Figure 2. $V_{CE(sat)}$ versus I_c

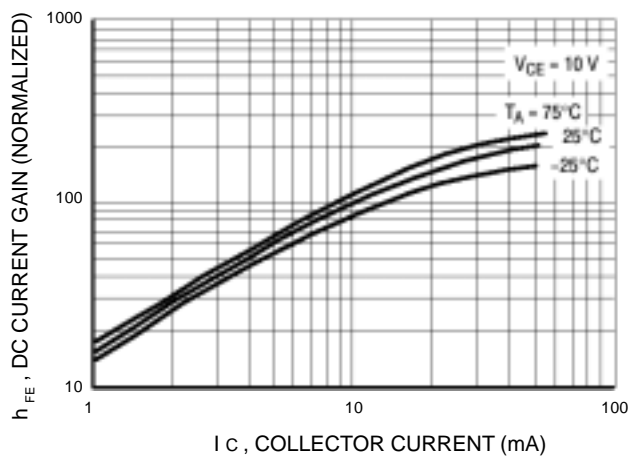


Figure 3. DC Current Gain

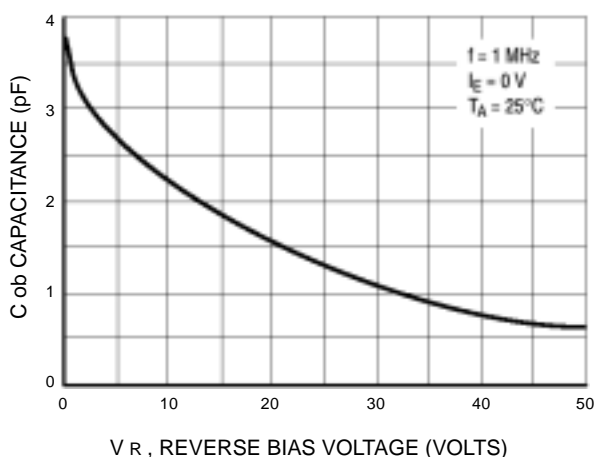


Figure 4. Output Capacitance

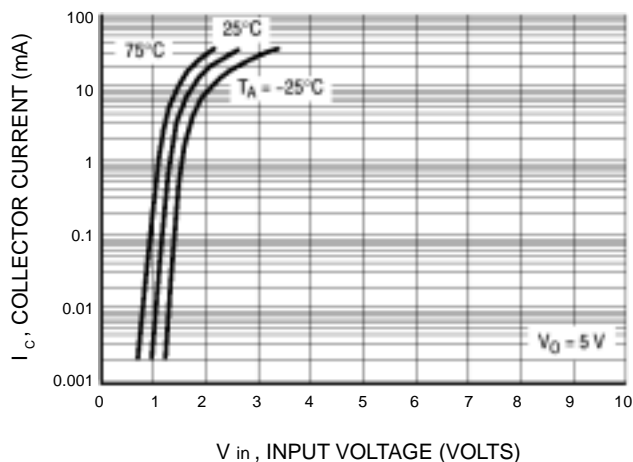


Figure 5. Output Current versus Input Voltage

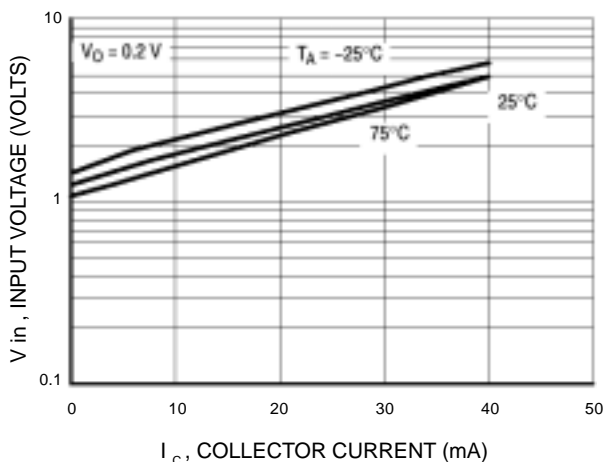
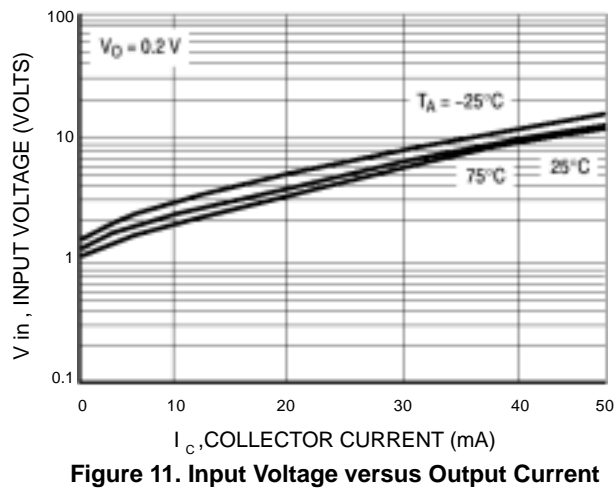
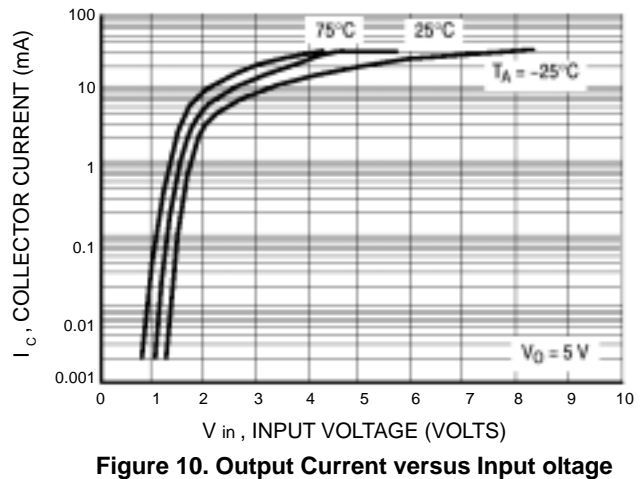
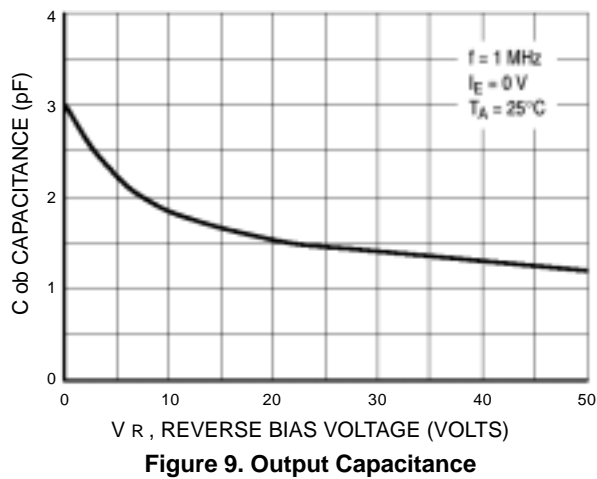
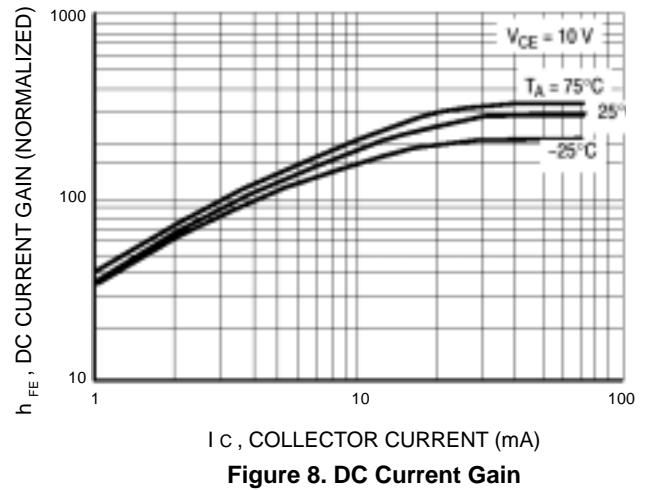
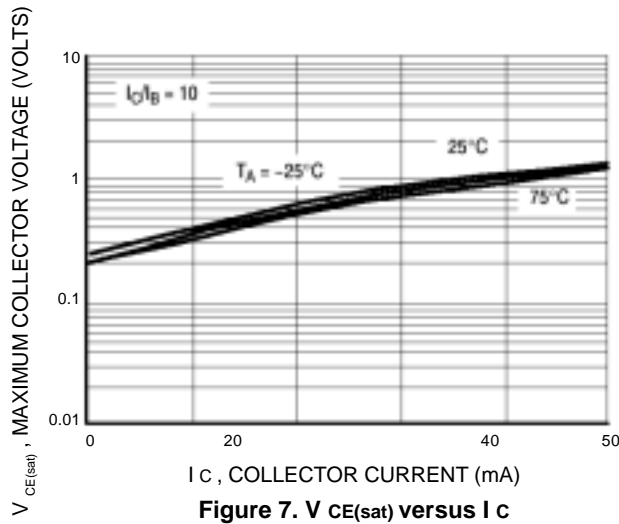
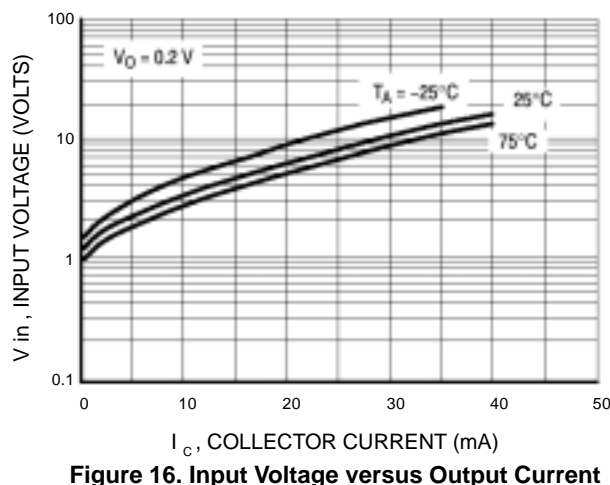
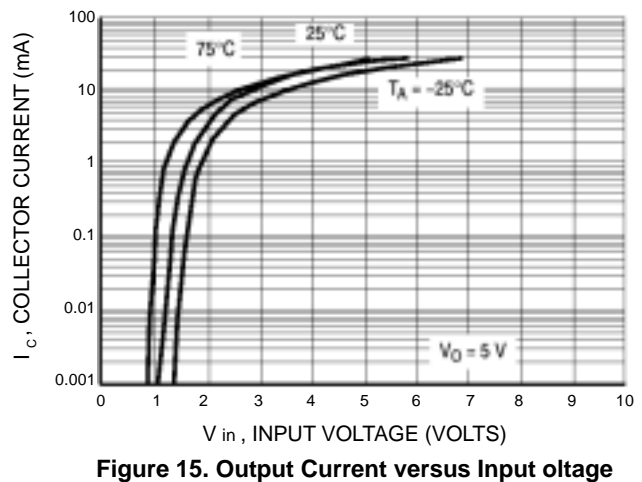
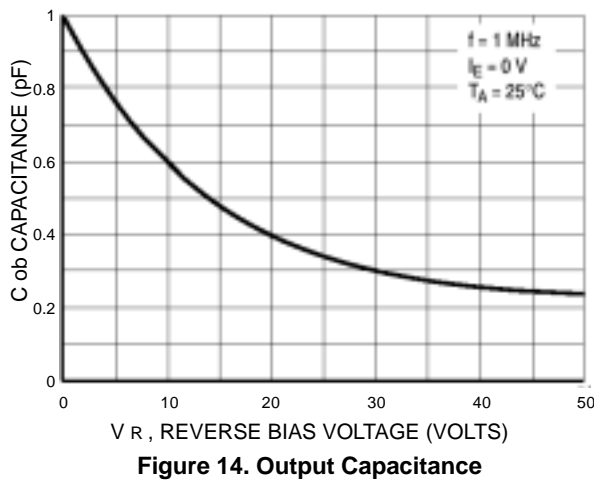
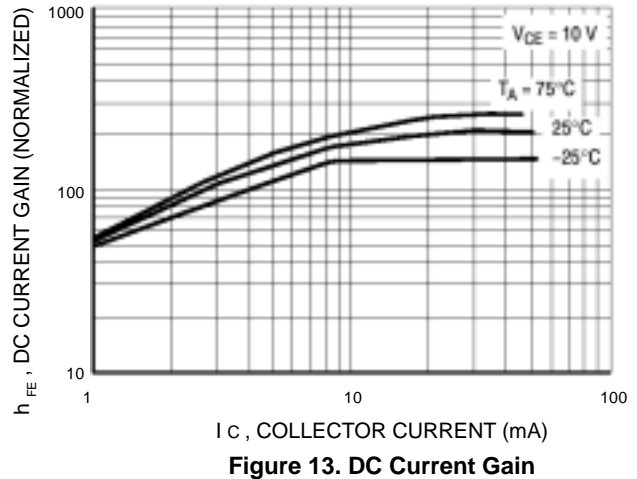
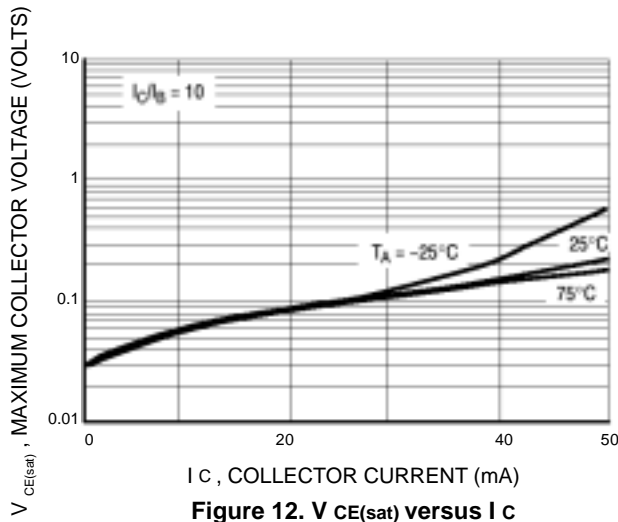


Figure 6. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5212DW



TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5213DW



TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5214DW

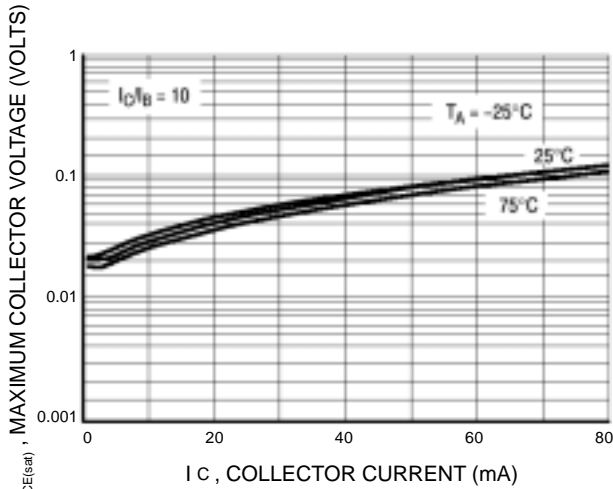


Figure 17. $V_{CE(sat)}$ versus I_c

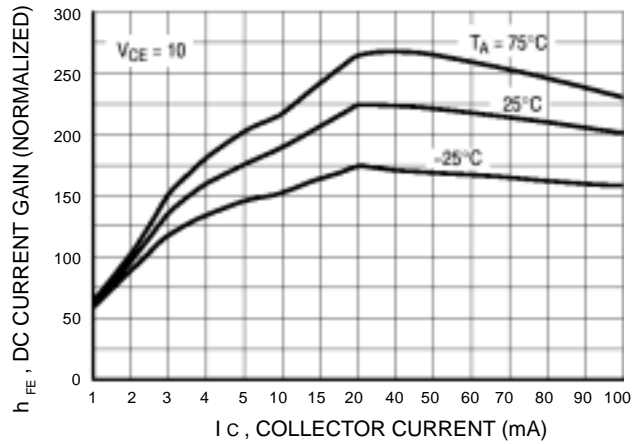


Figure 18. DC Current Gain

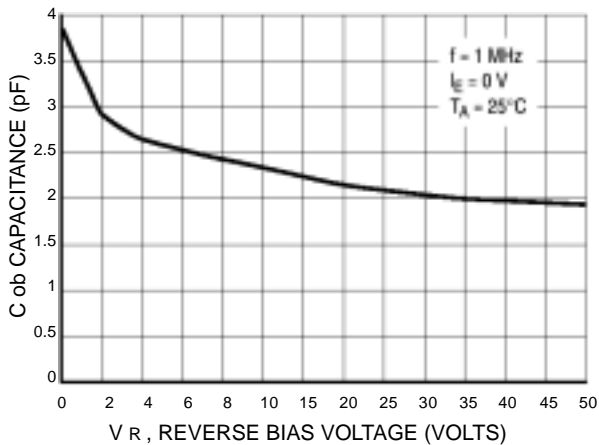


Figure 19. Output Capacitance

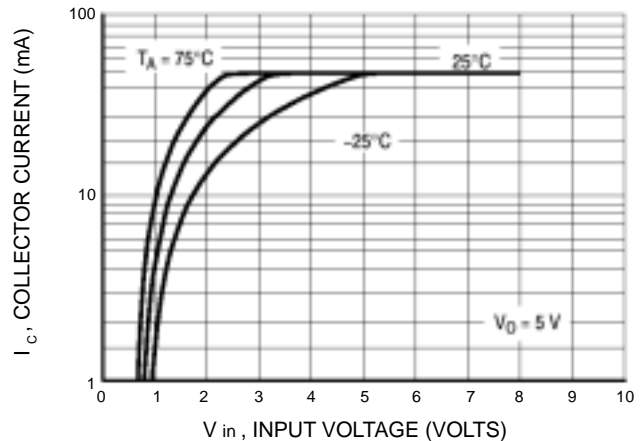


Figure 20. Output Current versus Input Voltage

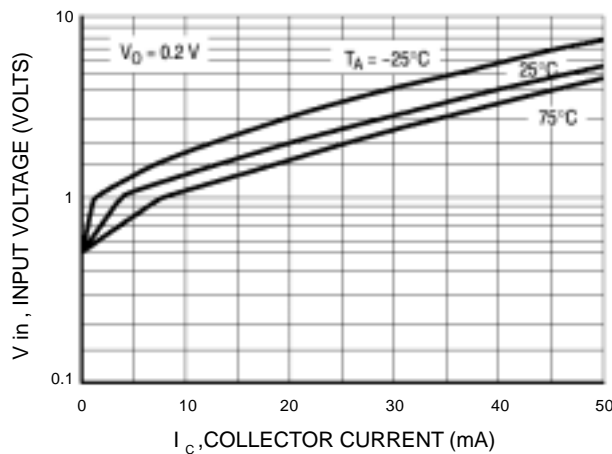


Figure 21. Input Voltage versus Output Current