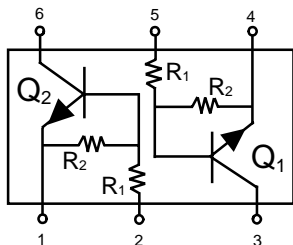
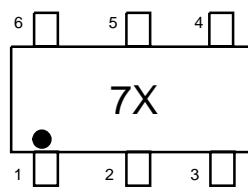


The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates 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

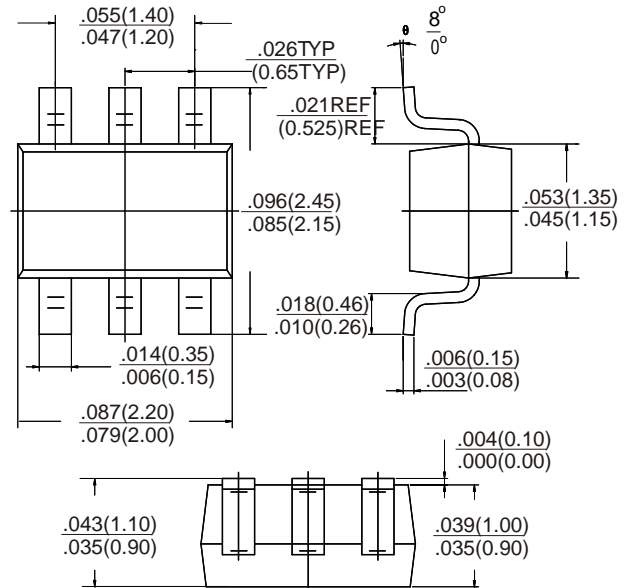


MARKING DIAGRAM



7X = Device Marking

SOT-363



Dimensions in inches and (millimeters)

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted, common for Q 1 and Q 2)

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
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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%

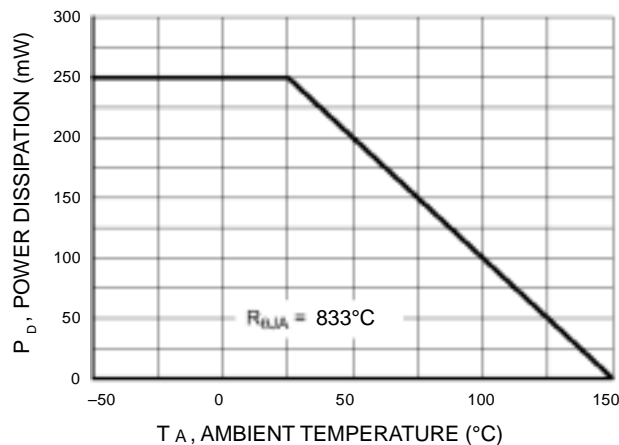
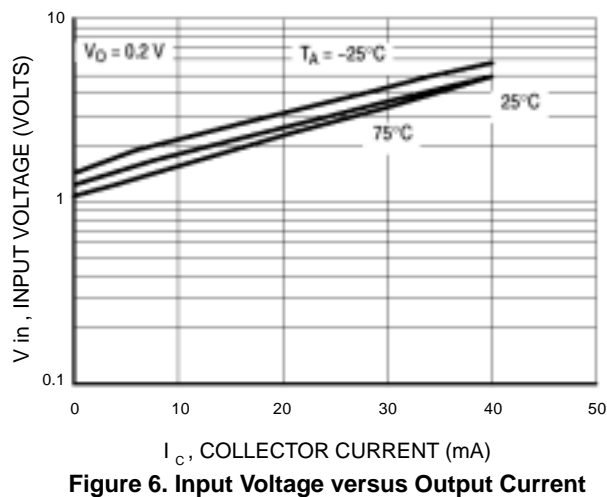
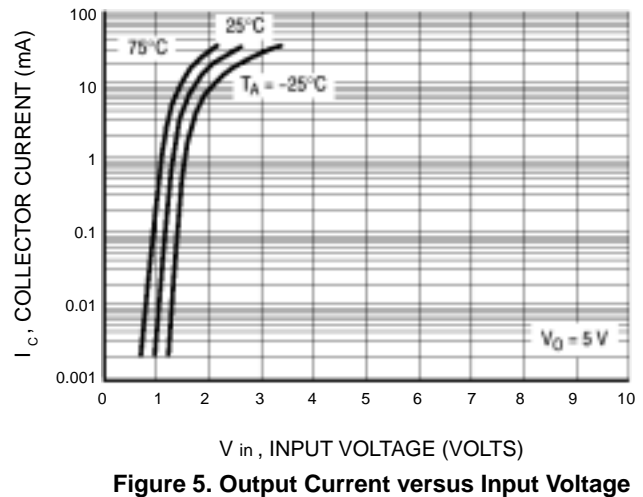
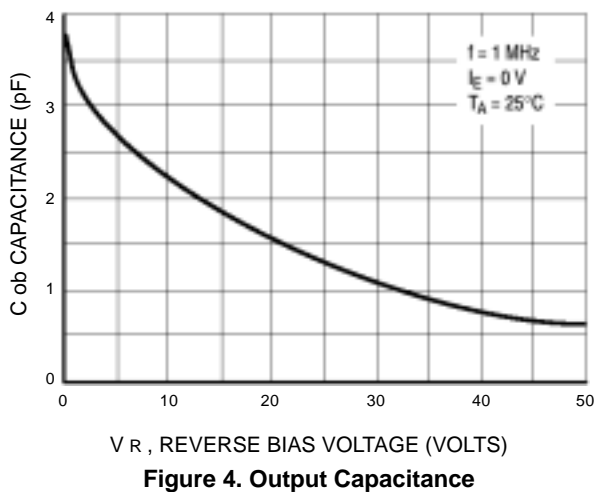
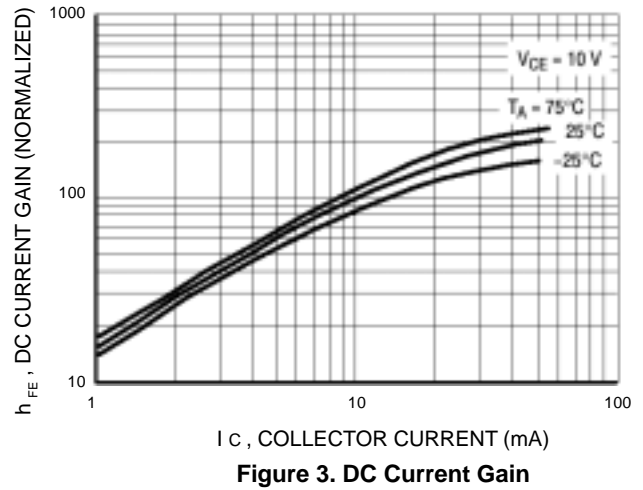
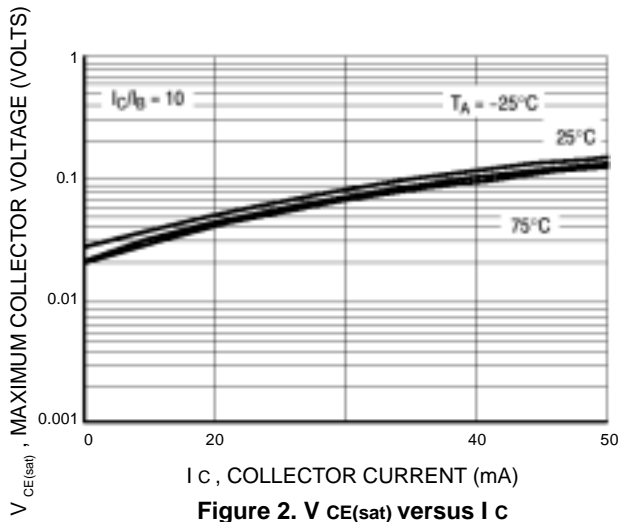
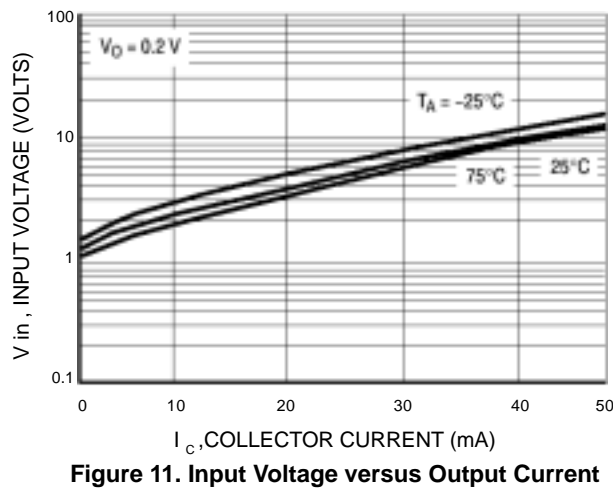
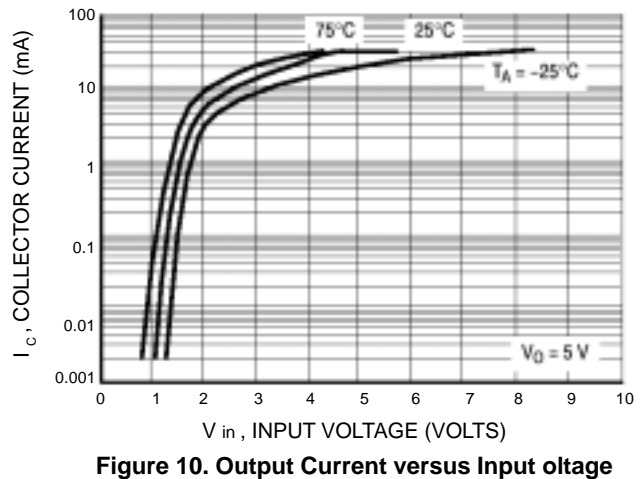
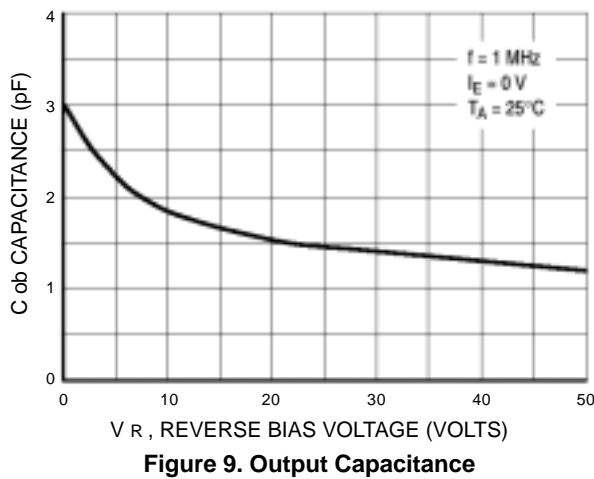
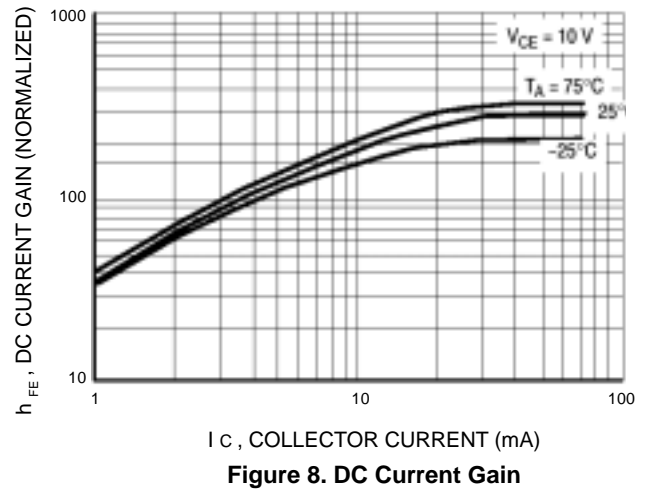
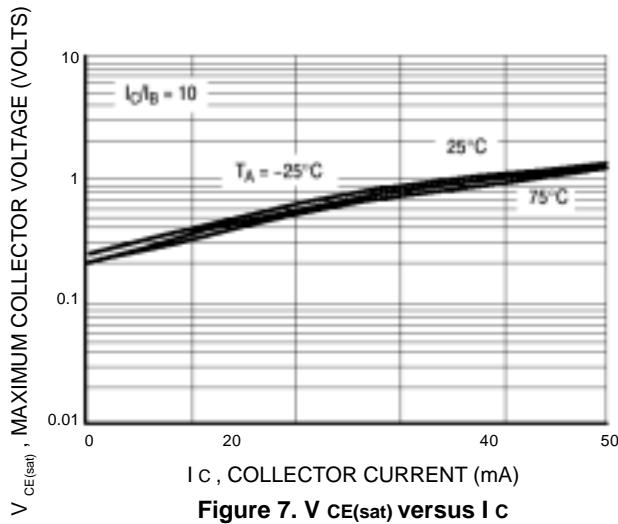


Figure 1. Derating Curve

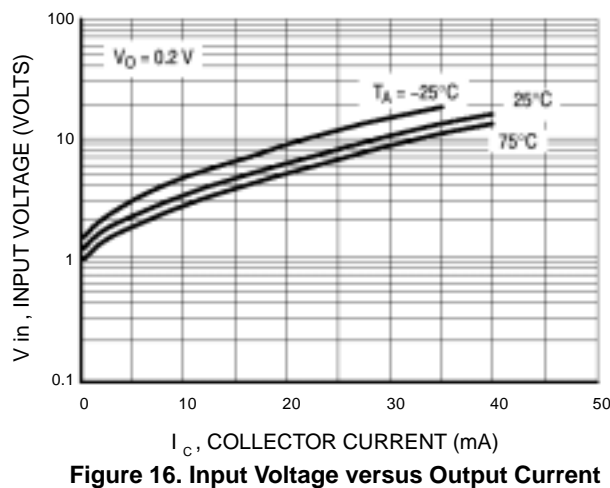
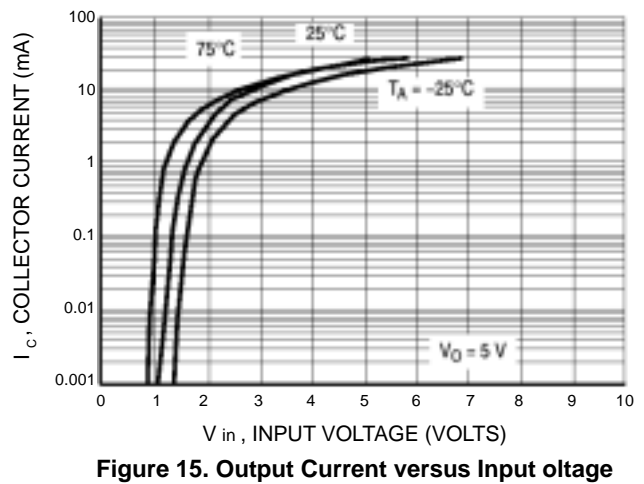
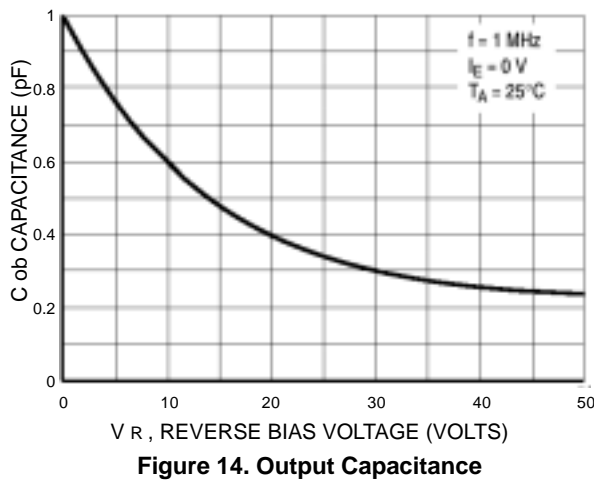
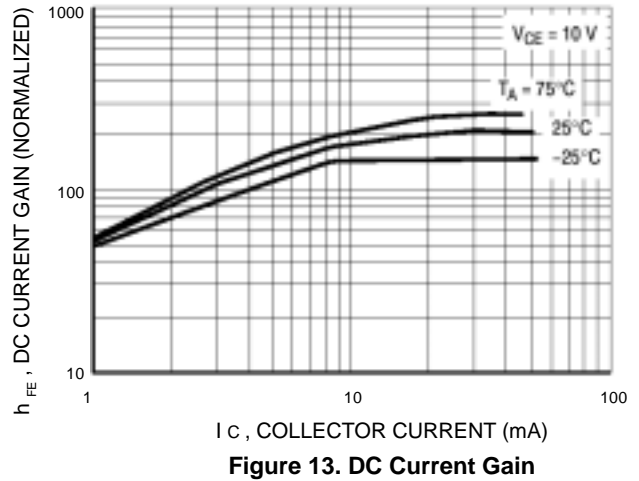
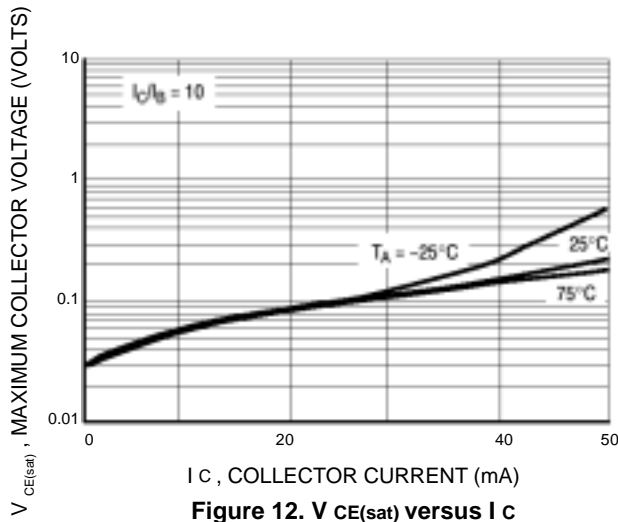
TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5211DW



TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5212DW



TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5213DW



TYPICAL ELECTRICAL CHARACTERISTICS – SMUN5214DW

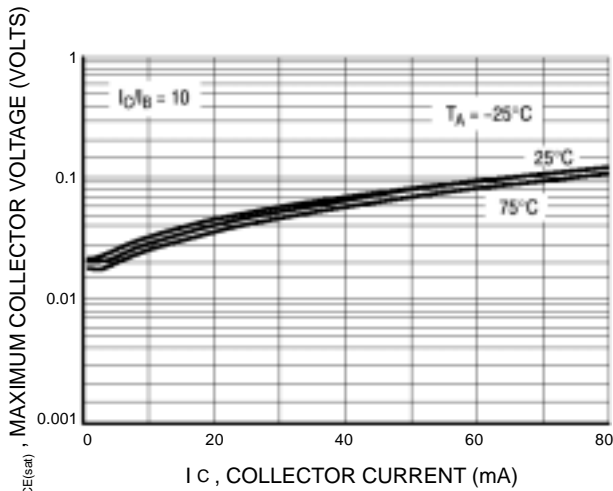


Figure 17. $V_{CE(sat)}$ versus I_c

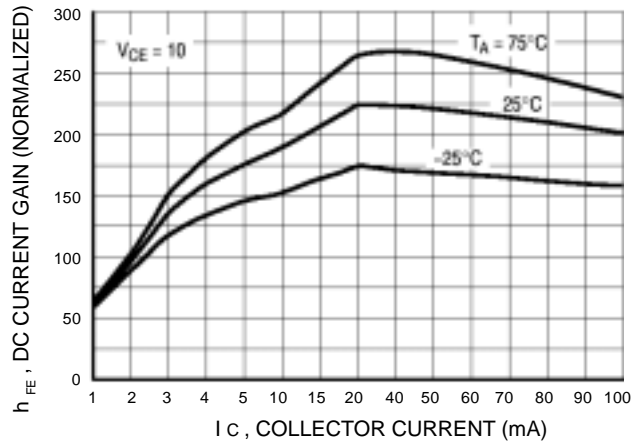


Figure 18. DC Current Gain

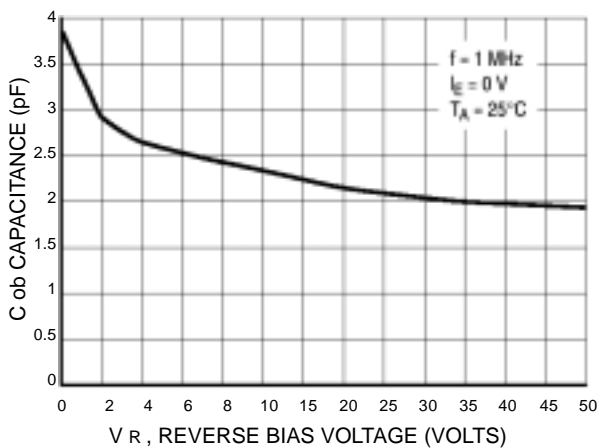


Figure 19. Output Capacitance

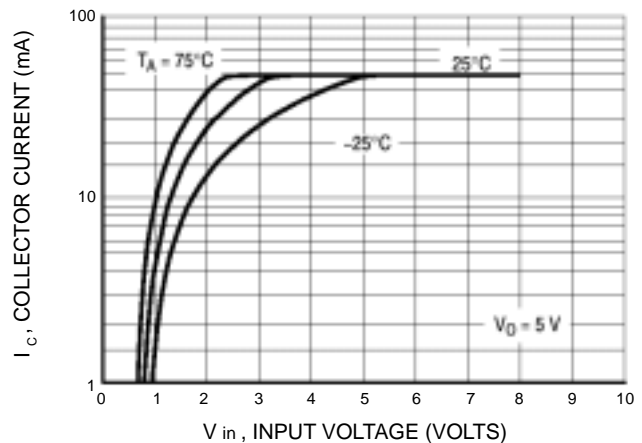


Figure 20. Output Current versus Input Voltage

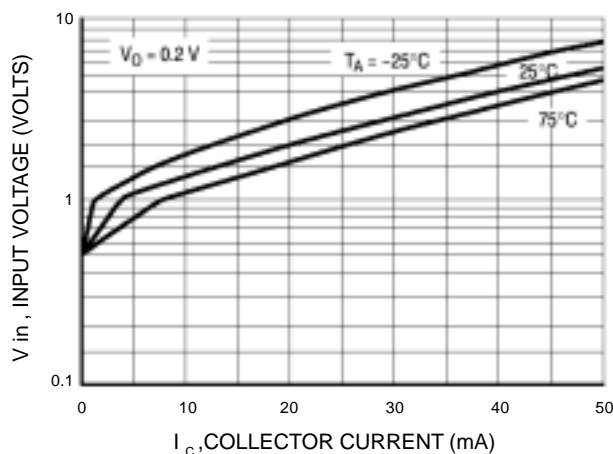


Figure 21. Input Voltage versus Output Current