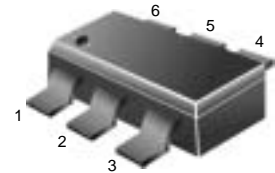


Dual Bias Resistor Transistors

NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

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 DWC3xx 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.

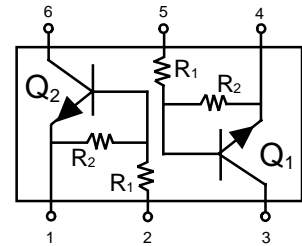
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- We declare that the material of product compliance with RoHS requirements.



SC-88/SOT-363

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

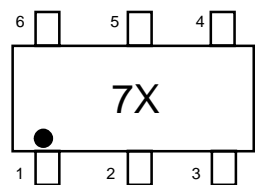


THERMAL CHARACTERISTICS

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

MARKING DIAGRAM



7X = Device Marking
(See Page 2)

DEVICE MARKING INFORMATION

See specific marking information in the device marking table on page 2 of this data sheet.



DWC301~311, DWC317, 322, 323

DEVICE MARKING , RESISTOR VALUES AND ORDERING INFORMATION

Device	Package	Marking	R1(K)	R2(K)	Shipping
DWC301T1G	SOT-363	7J	4.7	4.7	3000/Tape&Reel
DWC301T3G	SOT-363	7J	4.7	4.7	10000/Tape&Reel
DWC302T1G	SOT-363	7A	10	10	3000/Tape&Reel
DWC302T3G	SOT-363	7A	10	10	10000/Tape&Reel
DWC303T1G	SOT-363	7B	22	22	3000/Tape&Reel
DWC303T3G	SOT-363	7B	22	22	10000/Tape&Reel
DWC304T1G	SOT-363	7C	47	47	3000/Tape&Reel
DWC304T3G	SOT-363	7C	47	47	10000/Tape&Reel
DWC305T1G	SOT-363	7M	2.2	47	3000/Tape&Reel
DWC305T3G	SOT-363	7M	2.2	47	10000/Tape&Reel
DWC306T1G	SOT-363	7K	4.7	47	3000/Tape&Reel
DWC306T3G	SOT-363	7K	4.7	47	10000/Tape&Reel
DWC307T1G	SOT-363	7D	10	47	3000/Tape&Reel
DWC307T3G	SOT-363	7D	10	47	10000/Tape&Reel
DWC308T1G	SOT-363	7L	22	47	3000/Tape&Reel
DWC308T3G	SOT-363	7L	22	47	10000/Tape&Reel
DWC309T1G	SOT-363	7P	47	22	3000/Tape&Reel
DWC309T3G	SOT-363	7P	47	22	10000/Tape&Reel
DWC310T1G	SOT-363	7F	4.7		3000/Tape&Reel
DWC310T3G	SOT-363	7F	4.7		10000/Tape&Reel
DWC311T1G	SOT-363	7E	10		3000/Tape&Reel
DWC311T3G	SOT-363	7E	10		10000/Tape&Reel
DWC317T1G	SOT-363	7H	2.2	2.2	3000/Tape&Reel
DWC317T3G	SOT-363	7H	2.2	2.2	10000/Tape&Reel
DWC322T1G	SOT-363	7N	100	100	3000/Tape&Reel
DWC322T3G	SOT-363	7N	100	100	10000/Tape&Reel
DWC323T1G	SOT-363	7G	1	1	3000/Tape&Reel
DWC323T3G	SOT-363	7G	1	1	10000/Tape&Reel



DWC301~311, DWC317, 322, 323

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)	DWC302	I _{EBO}	–	–	0.5	mAdc
	DWC303		–	–	0.2	
	DWC304		–	–	0.1	
	DWC307		–	–	0.2	
	DWC310		–	–	1.9	
	DWC311		–	–	0.9	
	DWC317		–	–	2.3	
	DWC323		–	–	4.3	
	DWC301		–	–	1.5	
	DWC306		–	–	0.18	
	DWC308		–	–	0.13	
	DWC305		–	–	0.2	
	DWC309		–	–	0.13	
	DWC322		–	–	0.05	
Collector-Base Breakdown Voltage (I _C = 10 μA, 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 μs, Duty Cycle < 2.0%



DWC301~311, DWC317, 322, 323

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)	DWC302	h _{FE}	35	60	–		
	DWC303		60	100	–		
	DWC304		80	140	–		
	DWC307		80	140	–		
	DWC310		160	350	–		
	DWC311		160	350	–		
	DWC317		8.0	15	–		
	DWC323		3.0	5.0	–		
	DWC301		15	30	–		
	DWC306		80	200	–		
	DWC308		80	150	–		
	DWC305		80	140	–		
	DW309		80	150	–		
	DWC322		80	140	–		
Collector-Emitter Saturation Voltage (I _C = 10mA, I _B = 0.3 mA) (I _C = 10mA, I _B = 5mA) DWC317/DWC323 (I _C = 10mA, I _B = 1mA) DWC310/DWC311 DWC301/DWC306/DWC308	V _{CE(sat)}	–	–	0.25	Vdc		
Output Voltage (on) (V _{CC} = 5.0 V, V _B = 2.5 V, R _L = 1.0 kΩ)	DWC302	V _{OL}	–	–	0.2	Vdc	
	DWC303		–	–	0.2		
	DWC307		–	–	0.2		
	DWC311		–	–	0.2		
	DWC301		–	–	0.2		
	DWC310		–	–	0.2		
	DWC317		–	–	0.2		
	DWC323		–	–	0.2		
	DWC305		–	–	0.2		
	DWC306		–	–	0.2		
	DWC308		–	–	0.2		
	(V _{CC} = 5.0 V, V _B = 3.5 V, R _L = 1.0 kΩ)	DWC304		–	–		0.2
	(V _{CC} = 5.0 V, V _B = 5.5 V, R _L = 1.0 kΩ)	DWC309		–	–		0.2
(V _{CC} = 5.0 V, V _B = 4.0 V, R _L = 1.0 kΩ)	DWC322		–	–	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) DWC323 (V _{CC} = 5.0 V, V _B = 0.25 V, R _L = 1.0 kΩ) DWC306 DWC310 DWC311	V _{OH}	4.9	–	–	Vdc		

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



DWC301~311, DWC317, 322, 323

ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q_1 and Q_2 .) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
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ON CHARACTERISTICS (Note 6.)

Input Resistor	DWC302	R_1	7.0	10	13	k Ω
	DWC303		15.4	22	28.6	
	DWC304		32.9	47	61.1	
	DWC307		7.0	10	13	
	DWC311		7.0	10	13	
	DWC310		3.3	4.7	6.1	
	DWC323		0.7	1.0	1.3	
	DWC317		1.5	2.2	2.9	
	DWC301		3.3	4.7	6.1	
	DWC306		3.3	4.7	6.1	
	DWC308		15.4	22	28.6	
	DWC305		1.54	2.2	2.86	
	DWC322		70	100	130	
	DWC309		32.9	47	61.1	
Resistor Ratio	DWC302/DWC303	R_1/R_2				
	DWC304/DWC322		0.8	1.0	1.2	
	DWC307/DWC311		0.17	0.21	0.25	
	DWC310/DWC323		–	–	–	
	DWC317/DWC301		0.8	1.0	1.2	
	DWC306		0.055	0.1	0.185	
	DWC308		0.38	0.47	0.56	
	DWC305		0.038	0.047	0.056	
DWC309		1.7	2.1	2.6		

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

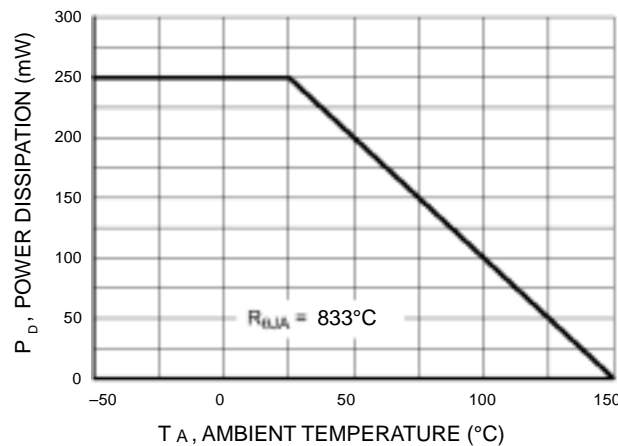
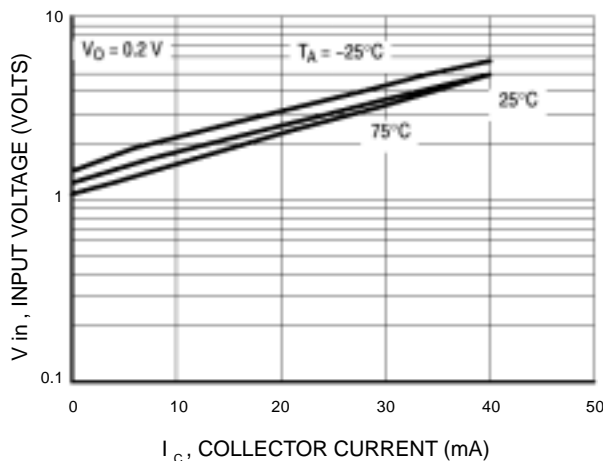
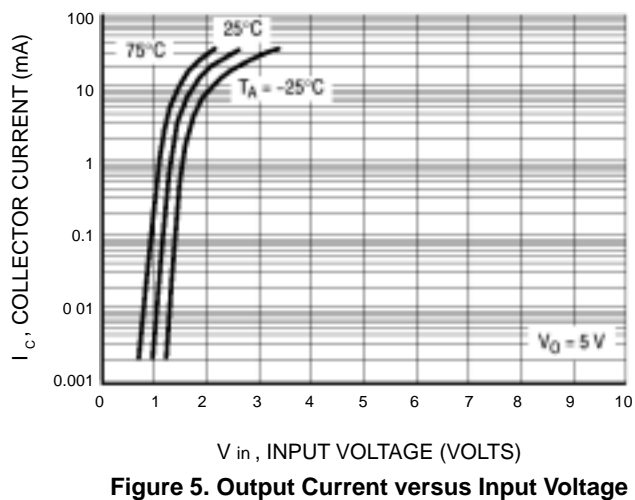
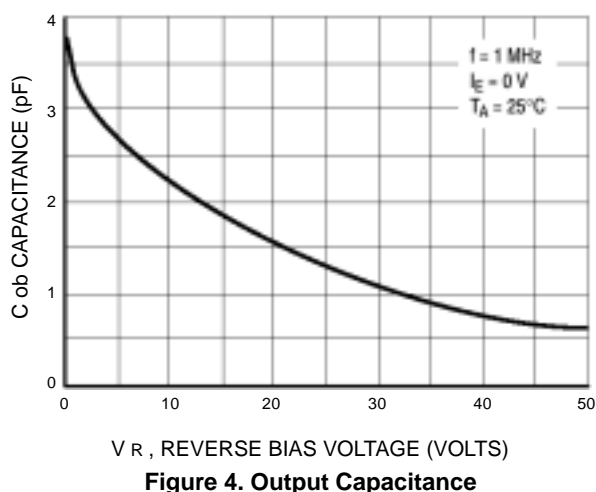
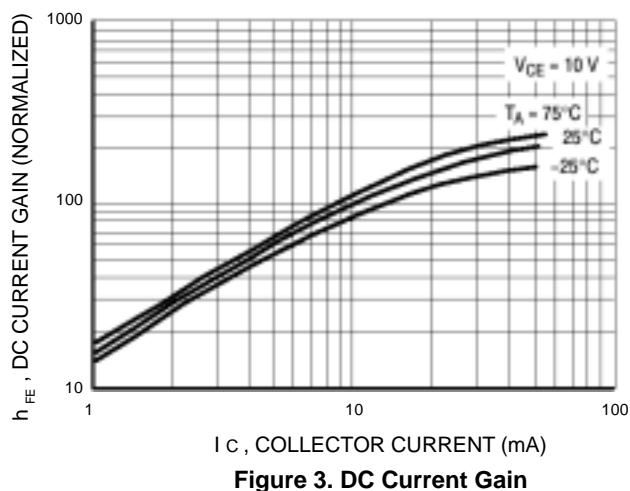
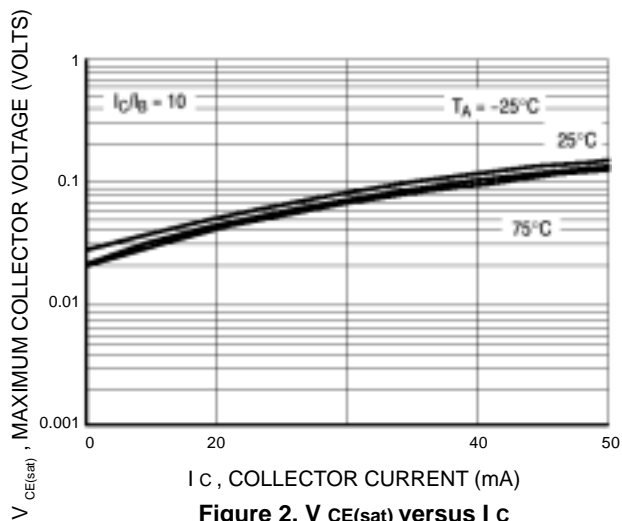
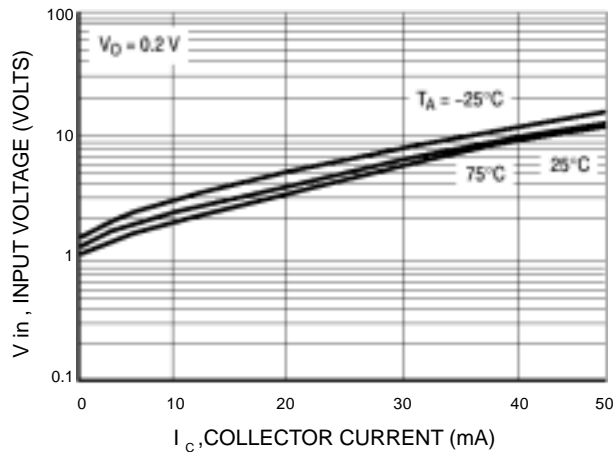
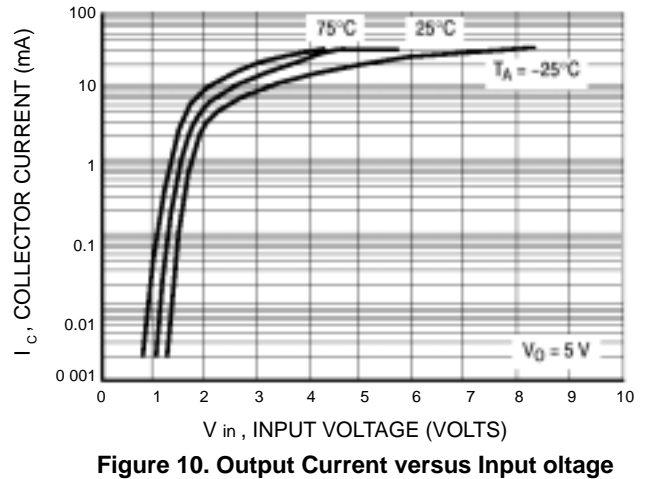
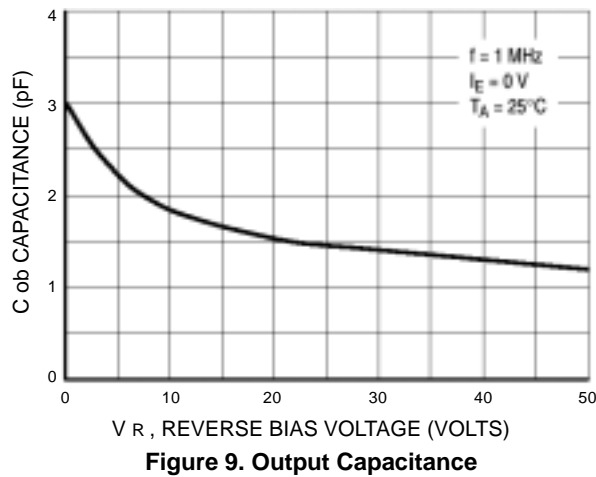
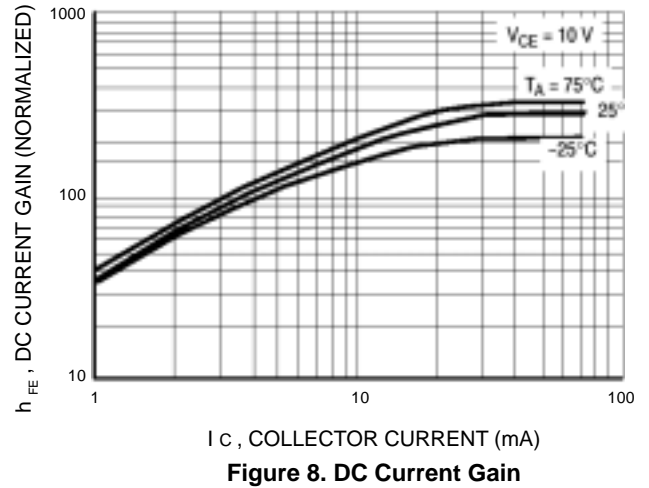
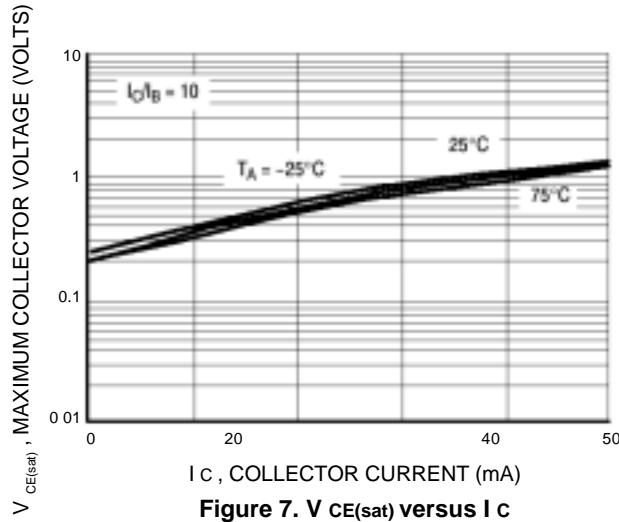


Figure 1. Derating Curve

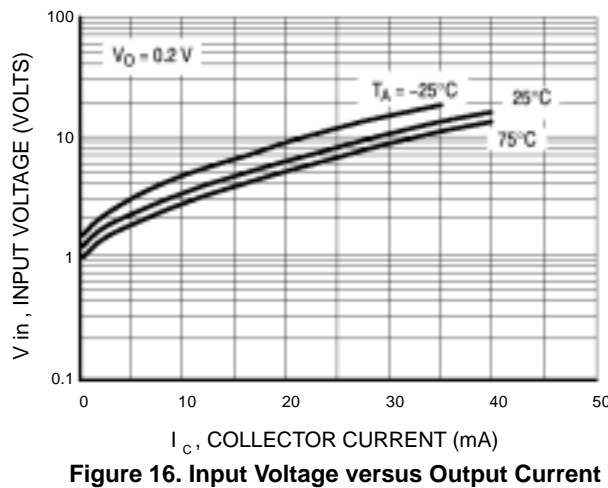
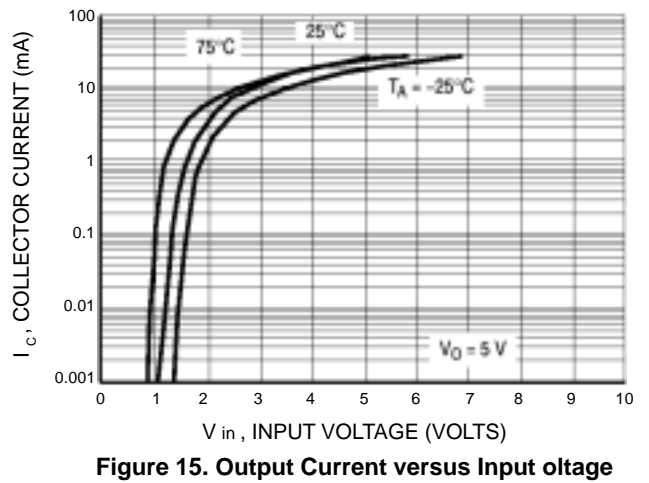
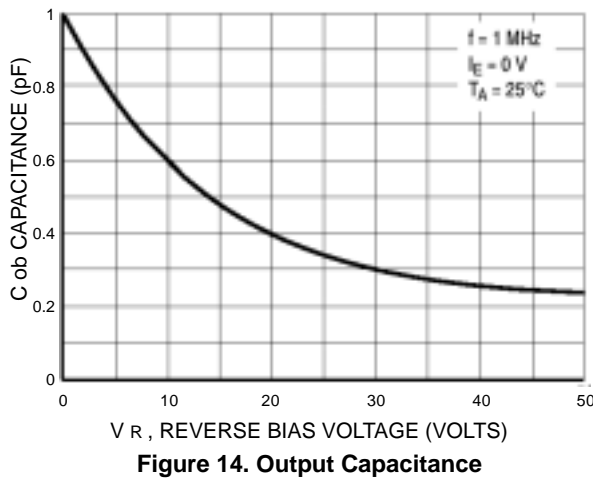
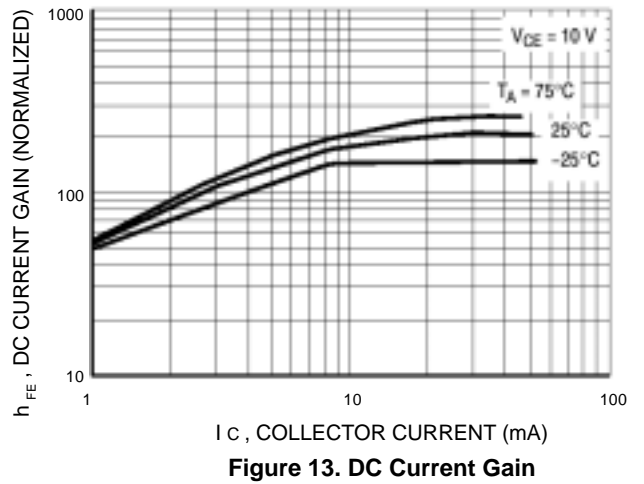
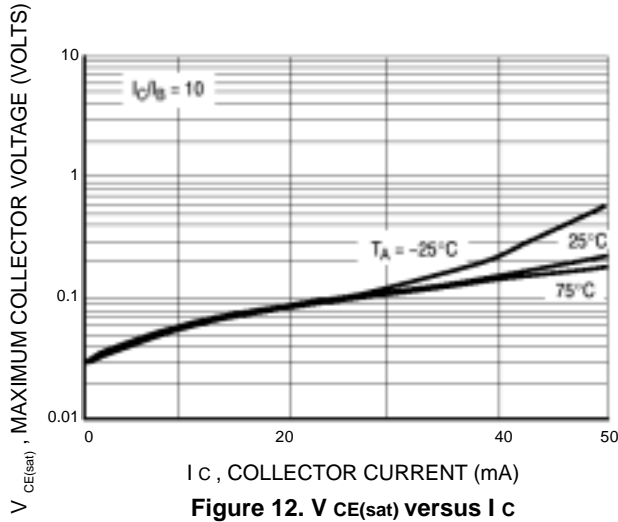
TYPICAL ELECTRICAL CHARACTERISTICS – DWC302



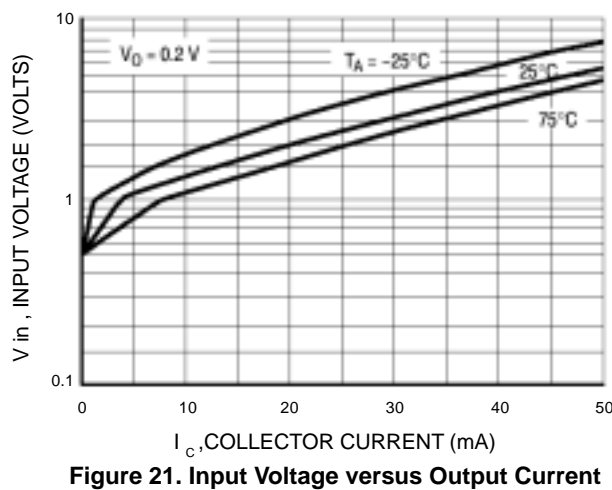
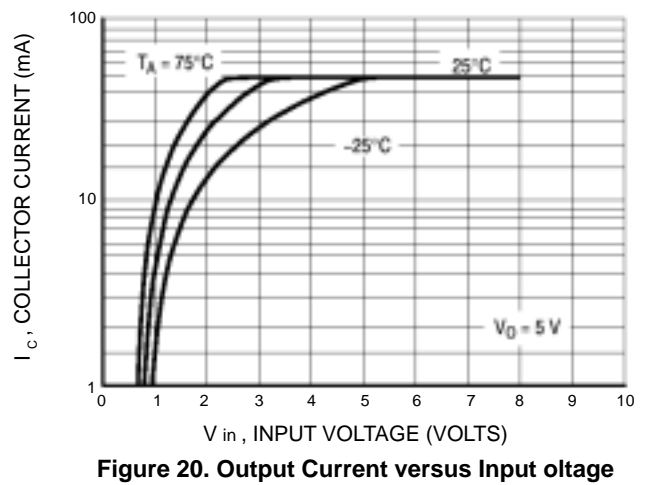
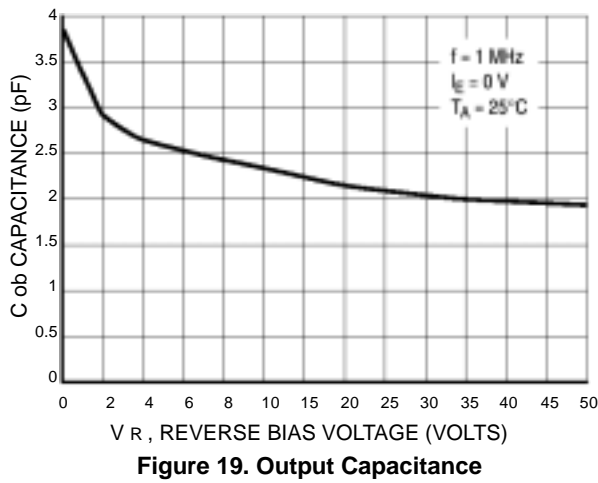
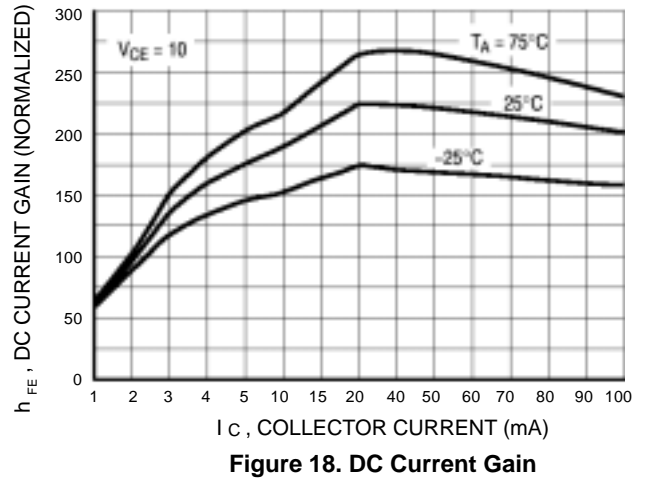
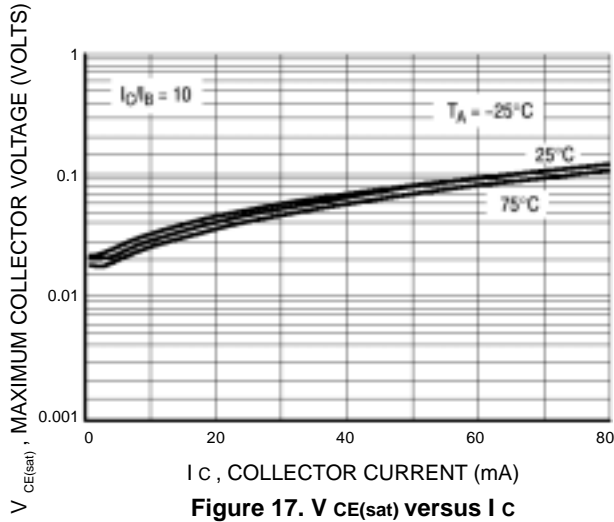
TYPICAL ELECTRICAL CHARACTERISTICS – DWC303



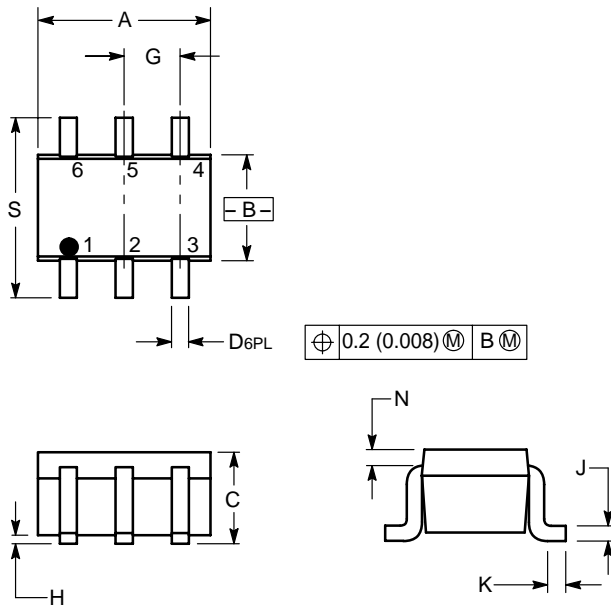
TYPICAL ELECTRICAL CHARACTERISTICS – DWC304



TYPICAL ELECTRICAL CHARACTERISTICS – DWC307



SC-88/SOT-363



NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

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

