DTA114EET1 Series

Preferred Devices

Bias Resistor Transistors

PNP Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

This new 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. The device is housed in the SC−75/SOT−416 package which is designed for low power surface mount applications.

Features

- Pb−Free Packages are Available*
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SC−75/SOT−416 package can be soldered using wave or reflow. The modified gull−winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.
- Available in 8 mm, 7 inch/3000 Unit Tape & Reel

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	50	Vdc
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector Current	I_C	100	mAdc

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.

THERMAL CHARACTERISTICS

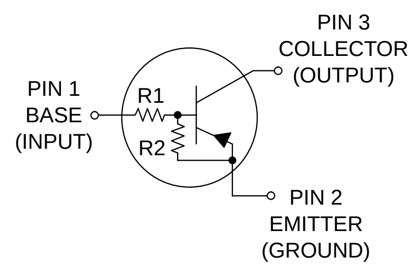
Rating	Symbol	Value	Unit
Total Device Dissipation, FR−4 Board (Note 1) @ T_A = 25°C Derate above 25°C	P_D	200 1.6	mW mW/°C
Thermal Resistance, Junction−to−Ambient (Note 1)	$R_{\theta JA}$	600	°C/W
Total Device Dissipation, FR−4 Board (Note 2) @ T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance, Junction−to−Ambient (Note 2)	$R_{\theta JA}$	400	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

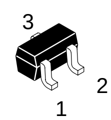
1. FR−4 @ Minimum Pad.
2. FR−4 @ 1.0 × 1.0 Inch Pad.

ON Semiconductor®

http://onsemi.com

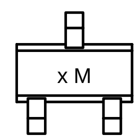
PNP SILICON BIAS RESISTOR TRANSISTORS





SC−75/SOT−416
CASE 463
STYLE 1

MARKING DIAGRAM



x = Specific Device Code
M = Date Code

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

Preferred devices are recommended choices for future use and best overall value.

July, 2004 − Rev. 4

Publication Order Number:
DTA114EET1/D

ORDERING INFORMATION AND RESISTOR VALUES

Device	Marking	R1 (K)	R2 (K)	Package	Shipping†
DTA114EET1	6A	10	10	SC−75	3000 Tape & Reel
DTA124EET1	6B	22	22	SC−75	3000 Tape & Reel
DTA144EET1	6C	47	47	SC−75	3000 Tape & Reel
DTA114YET1	6D	10	47	SC−75	3000 Tape & Reel
DTA114TET1	6E	10	∞	SC−75	3000 Tape & Reel
DTA143TET1	6F	4.7	∞	SC−75	3000 Tape & Reel
DTA123EET1	6H	2.2	2.2	SC−75	3000 Tape & Reel
DTA123EET1G	6H	2.2	2.2	SC−75 (Pb−Free)	3000 Tape & Reel
DTA143EE	6J	4.7	4.7	SC−75	3000 Tape & Reel
DTA143EET1	6J	4.7	4.7	SC−75	3000 Tape & Reel
DTA143EET1G	6J	4.7	4.7	SC−75 (Pb−Free)	3000 Tape & Reel
DTA143ZET1	6K	4.7	47	SC−75	3000 Tape & Reel
DTA124XET1	6L	22	47	SC−75	3000 Tape & Reel
DTA124XET1G	6L	22	47	SC−75 (Pb−Free)	3000 Tape & Reel
DTA123JET1	6M	2.2	47	SC−75	3000 Tape & Reel
DTA115EET1	6N	100	100	SC−75	3000 Tape & Reel
DTA144WET1	6P	47	22	SC−75	3000 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.

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

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)	DTA114EET1	I_{EBO}	−	−	0.5	mAdc
	DTA124EET1		−	−	0.2	
	DTA144EET1		−	−	0.1	
	DTA114YET1		−	−	0.2	
	DTA114TET1		−	−	0.9	
	DTA143TET1		−	−	1.9	
	DTA123EET1		−	−	2.3	
	DTA143EET1		−	−	1.5	
	DTA143ZET1		−	−	0.18	
	DTA124XET1		−	−	0.13	
	DTA123JET1		−	−	0.2	
	DTA115EET1		−	−	0.05	
	DTA144WET1		−	−	0.13	
Collector−Base Breakdown Voltage (I_C = 10 μA, I_E = 0)		$V_{(BR)CBO}$	50	−	−	Vdc
Collector−Emitter Breakdown Voltage (Note 3) (I_C = 2.0 mA, I_B = 0)		$V_{(BR)CEO}$	50	−	−	Vdc

3. Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%

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

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 4)						
DC Current Gain	DTA114EET1	h_{FE}	35	60	−	−
(V_{CE} = 10 V, I_C = 5.0 mA)	DTA124EET1		60	100	−	
	DTA144EET1		80	140	−	
	DTA114YET1		80	140	−	
	DTA114TET1		160	250	−	
	DTA143TET1		160	250	−	
	DTA123EET1		8.0	15	−	
	DTA143EET1		15	27	−	
	DTA143ZET1		80	140	−	
	DTA124XET1		80	130	−	
	DTA123JET1		80	140	−	
	DTA115EET1		80	150	−	
	DTA144WET1		80	140	−	
Collector−Emitter Saturation Voltage (I_C = 10 mA, I_E = 0.3 mA)		$V_{CE(sat)}$	−	−	0.25	Vdc
(I_C = 10 mA, I_B = 5 mA)	DTA123EET1					
(I_C = 10 mA, I_B = 1 mA)	DTA114TET1/DTA143TET1					
	DTA143ZET1/DTA124XET1					
	DTA143EET1					
Output Voltage (on)		V_{OL}				Vdc
(V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	DTA114EET1		−	−	0.2	
	DTA124EET1		−	−	0.2	
	DTA114YET1		−	−	0.2	
	DTA114TET1		−	−	0.2	
	DTA143TET1		−	−	0.2	
	DTA123EET1		−	−	0.2	
	DTA143EET1		−	−	0.2	
	DTA143ZET1		−	−	0.2	
	DTA124XET1		−	−	0.2	
	DTA123JET1		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ)	DTA144EET1		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 5.5 V, R_L = 1.0 kΩ)	DTA115EET1		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 4.0 V, R_L = 1.0 kΩ)	DTA144WET1		−	−	0.2	
Output Voltage (off) (V_{CC} = 5.0 V, V_B = 0.5 V, R_L = 1.0 kΩ)		V_{OH}	4.9	−	−	Vdc
(V_{CC} = 5.0 V, V_B = 0.25 V, R_L = 1.0 kΩ)	DTA114TET1					
	DTA143TET1					
	DTA123EET1					
	DTA143EET1					
Input Resistor	DTA114EET1	R1	7.0	10	13	kΩ
	DTA124EET1		15.4	22	28.6	
	DTA144EET1		32.9	47	61.1	
	DTA114YET1		7.0	10	13	
	DTA114TET1		7.0	10	13	
	DTA143TET1		3.3	4.7	6.1	
	DTA123EET1		1.5	2.2	2.9	
	DTA143EET1		3.3	4.7	6.1	
	DTA143ZET1		3.3	4.7	6.1	
	DTA124XET1		15.4	22	28.6	
	DTA123JET1		1.54	2.2	2.86	
	DTA115EET1		70	100	130	
	DTA144WET1		32.9	47	61.1	
Resistor Ratio		R_1/R_2				−
	DTA114EET1/DTA124EET1					
	DTA144EET1/DTA115EET1		0.8	1.0	1.2	
	DTA114YET1		0.17	0.21	0.25	
	DTA114TET1/DTA143TET1		−	−	−	
	DTA123EET1/DTA143EET1		0.8	1.0	1.2	
	DTA143ZET1		0.055	0.1	0.185	
	DTA124XET1		0.38	0.47	0.56	
	DTA123JET1		0.038	0.047	0.056	
	DTA144WET1		1.7	2.1	2.6	

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

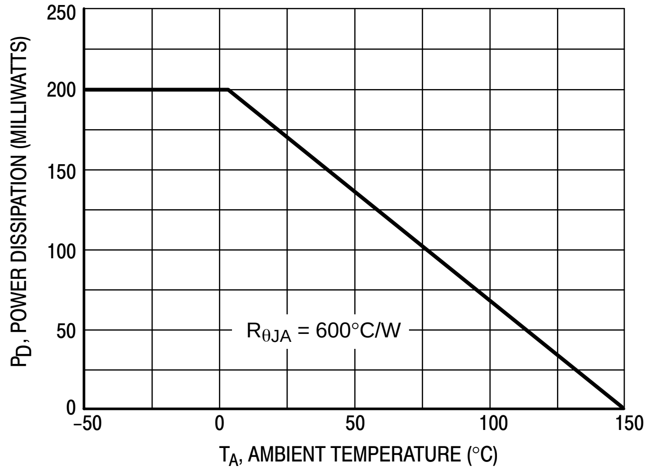


Figure 1. Derating Curve

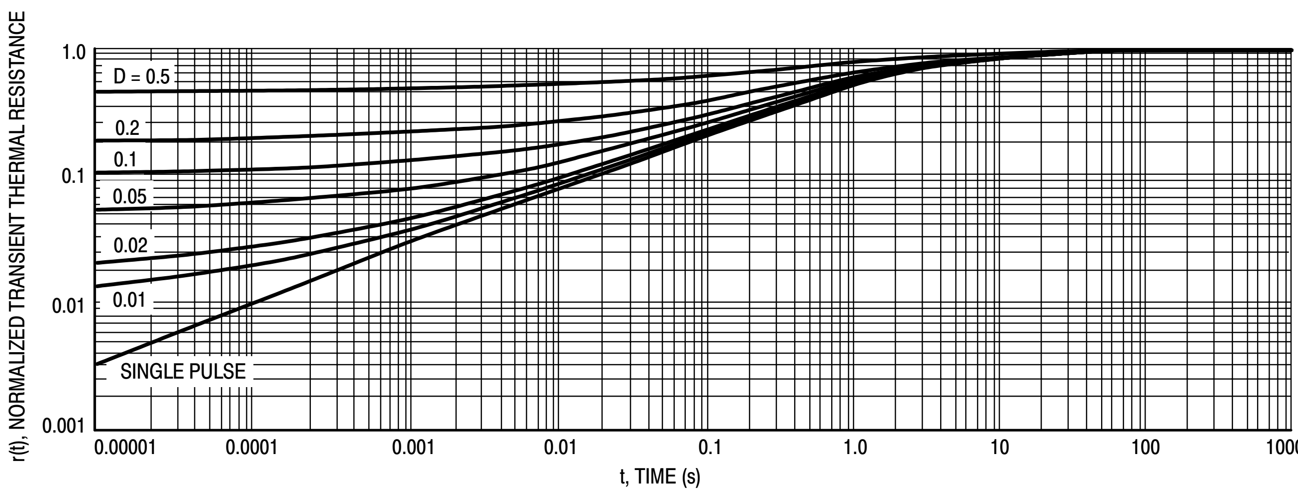


Figure 2. Normalized Thermal Response

TYPICAL ELECTRICAL CHARACTERISTICS − DTA114EET1

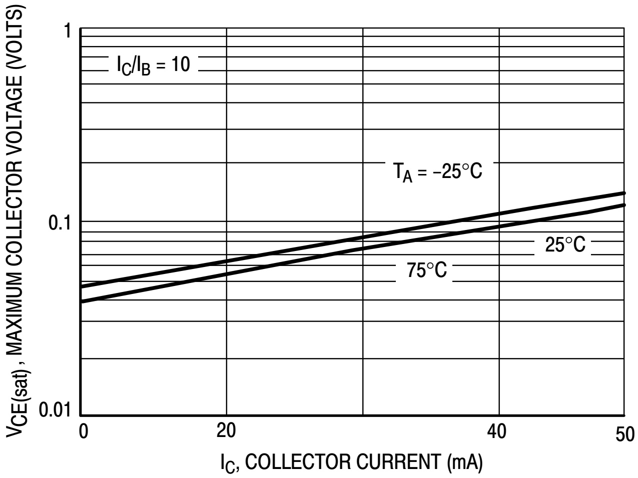


Figure 3. $V_{CE(sat)}$ versus I_C

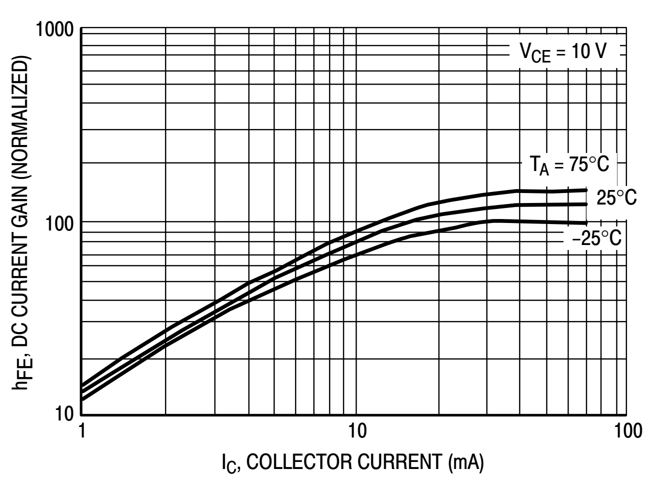


Figure 4. DC Current Gain

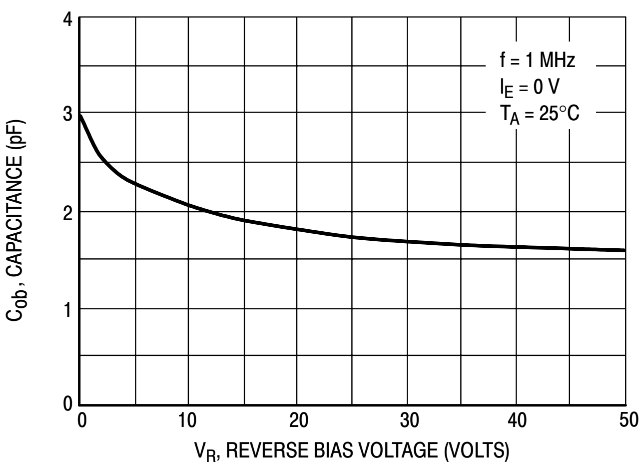


Figure 5. Output Capacitance

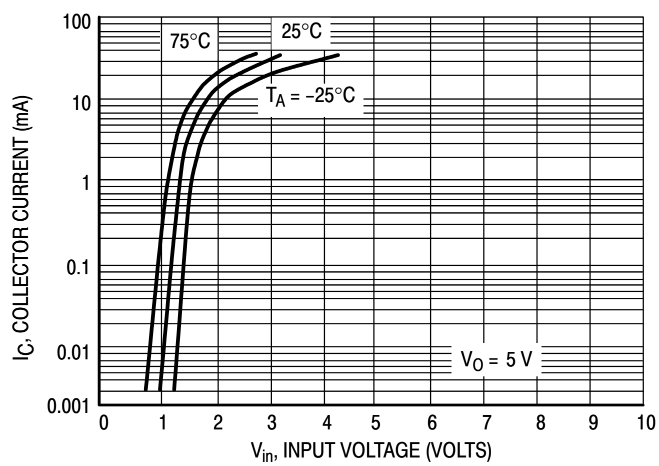


Figure 6. Output Current versus Input Voltage

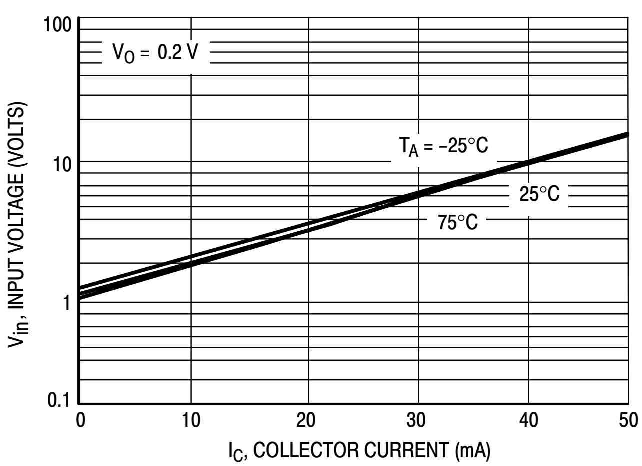


Figure 7. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − DTA124EET1

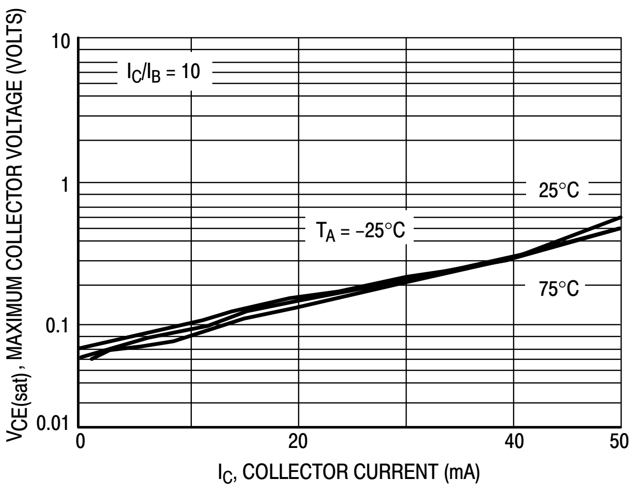


Figure 8. $V_{CE(sat)}$ versus I_C

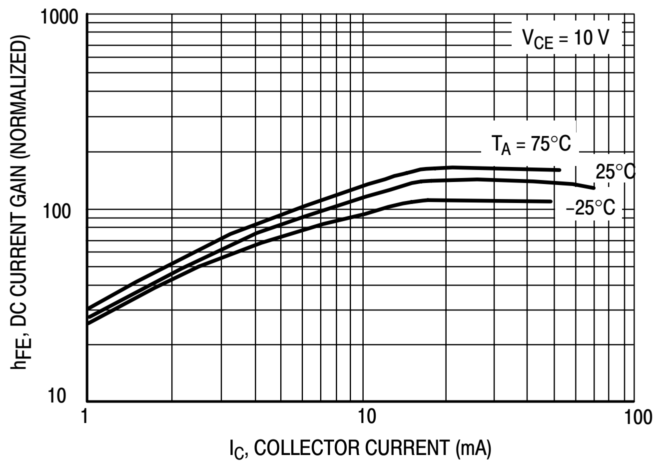


Figure 9. DC Current Gain

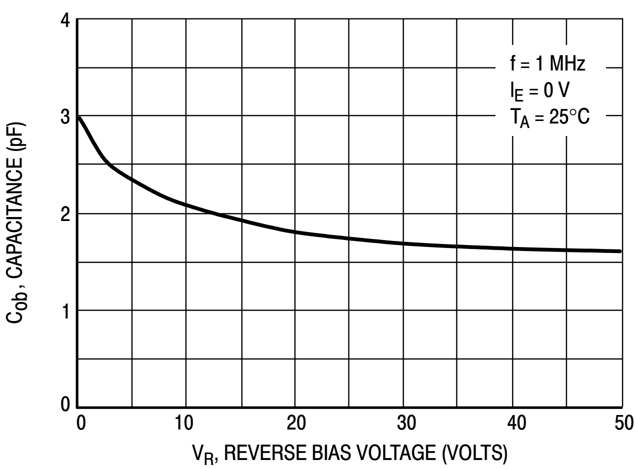


Figure 10. Output Capacitance

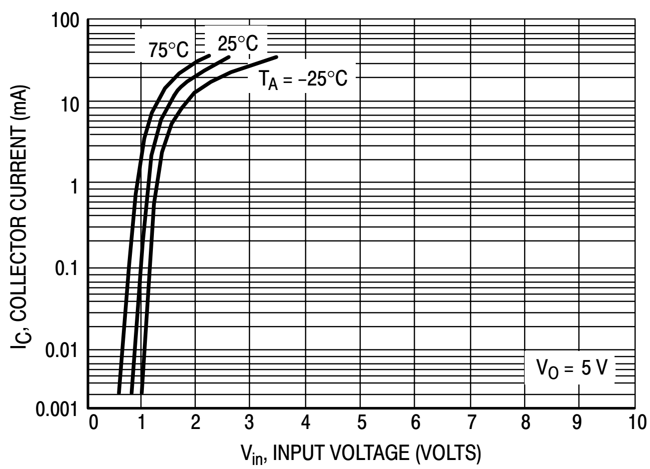


Figure 11. Output Current versus Input Voltage

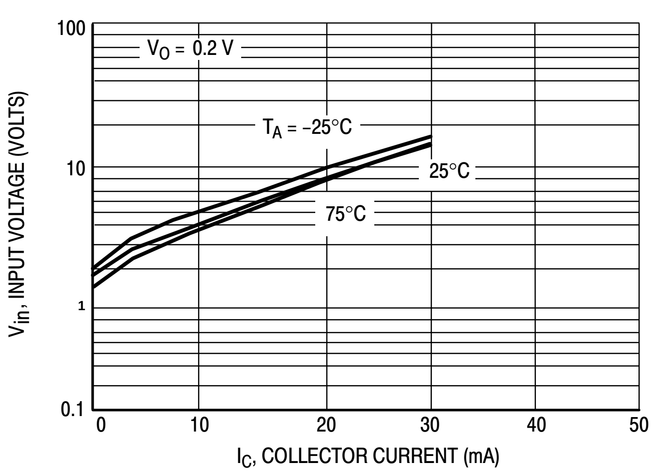


Figure 12. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − DTA144EET1

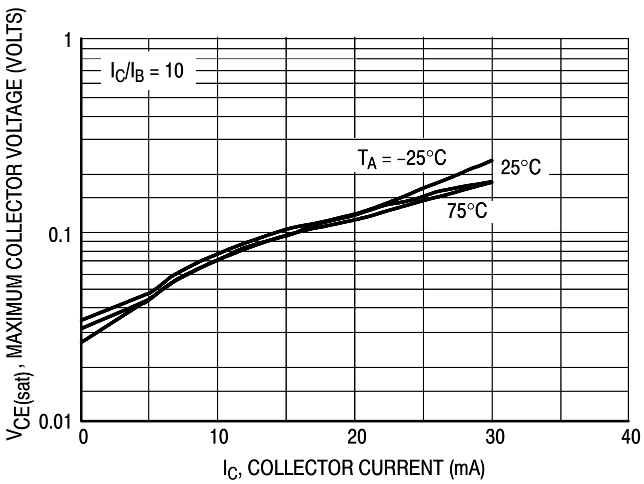


Figure 13. $V_{CE(sat)}$ versus I_C

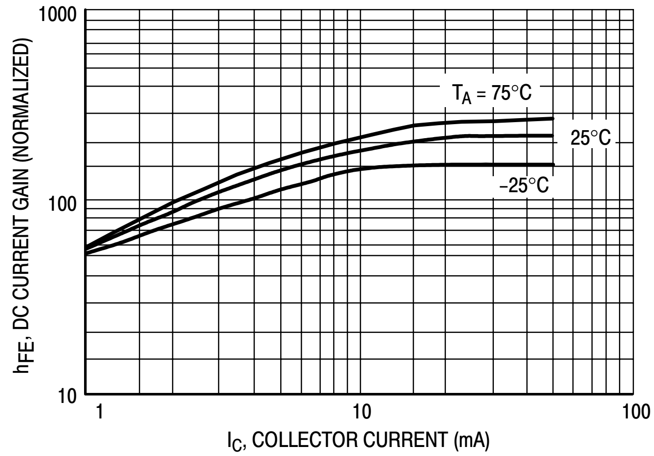


Figure 14. DC Current Gain

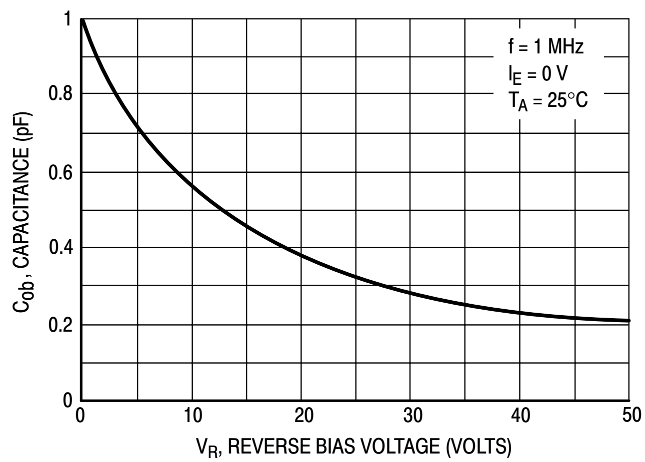


Figure 15. Output Capacitance

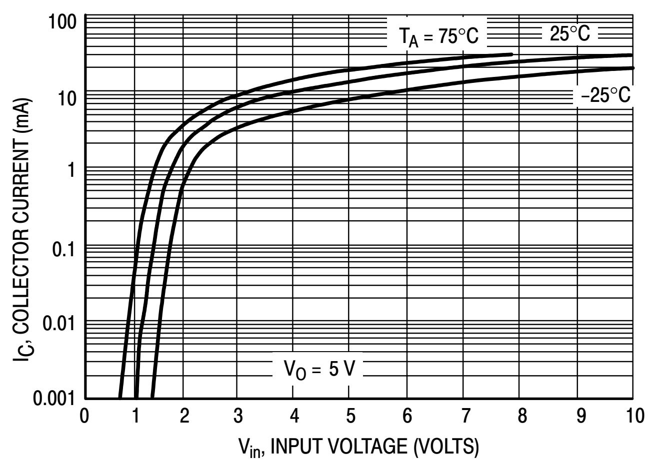


Figure 16. Output Current versus Input Voltage

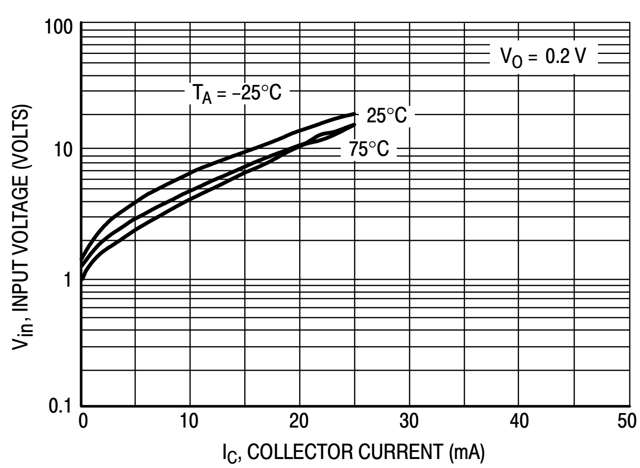


Figure 17. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − DTA114YET1

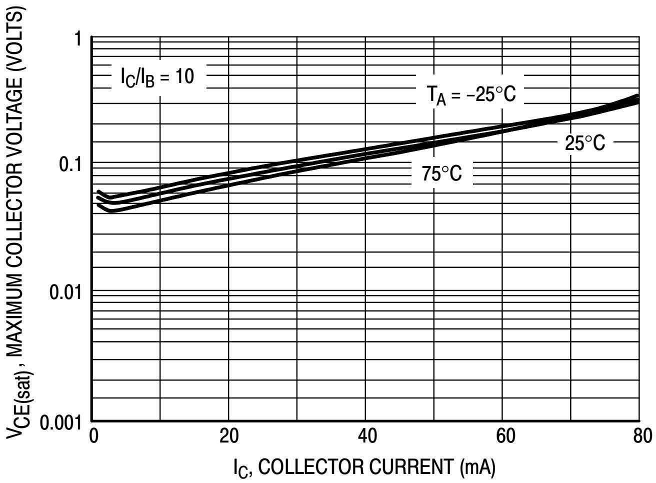


Figure 18. $V_{CE(sat)}$ versus I_C

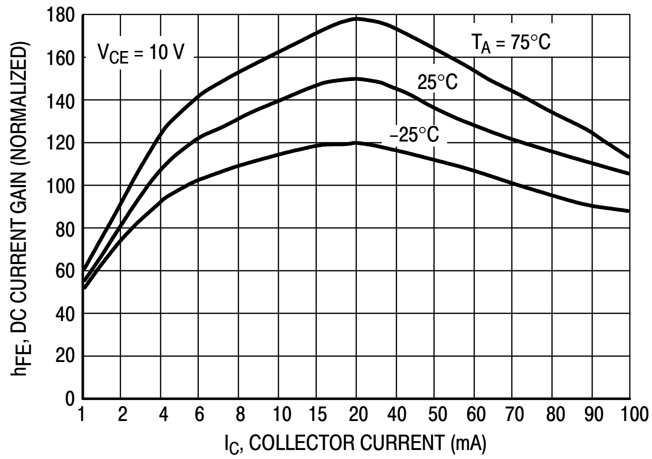


Figure 19. DC Current Gain

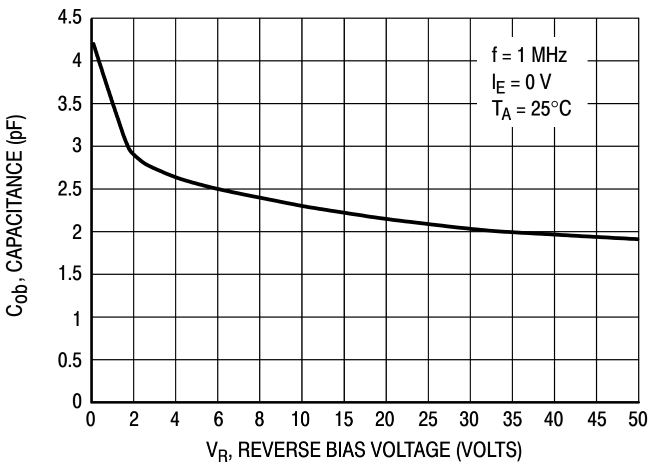


Figure 20. Output Capacitance

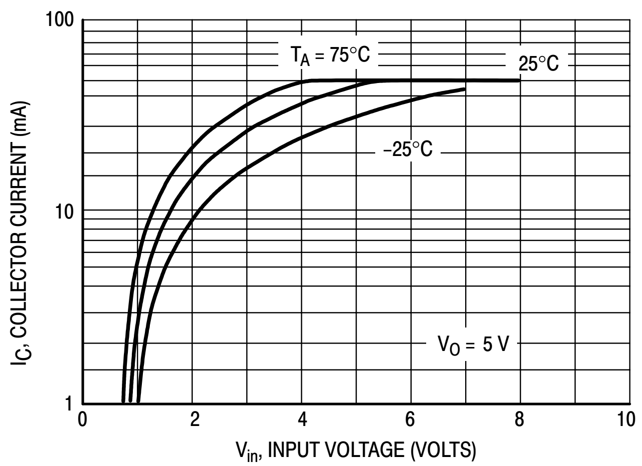


Figure 21. Output Current versus Input Voltage

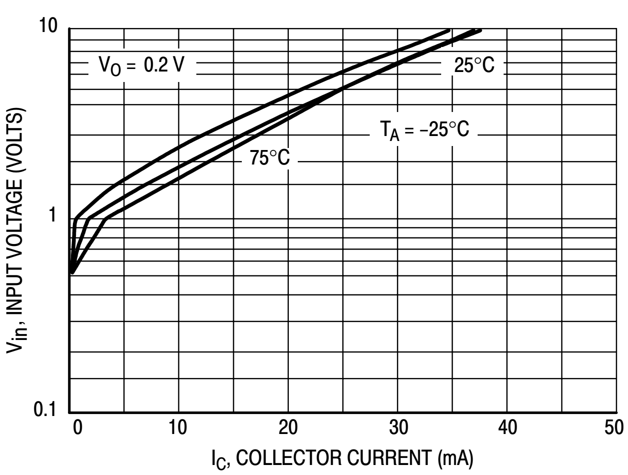


Figure 22. Input Voltage versus Output Current

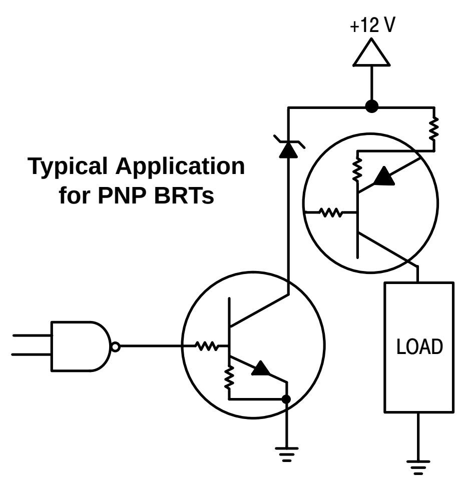


Figure 23. Inexpensive, Unregulated Current Source

TYPICAL ELECTRICAL CHARACTERISTICS — DTA115EET1

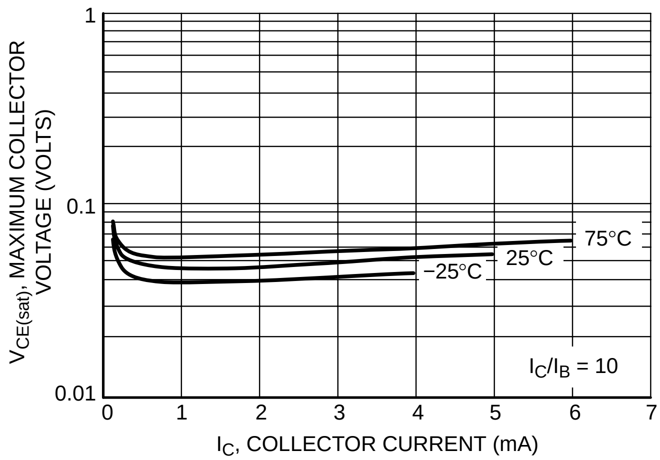


Figure 24. Maximum Collector Voltage versus Collector Current

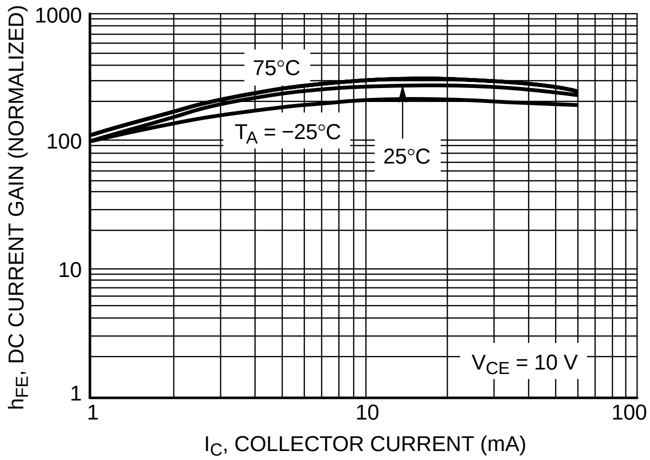


Figure 25. DC Current Gain

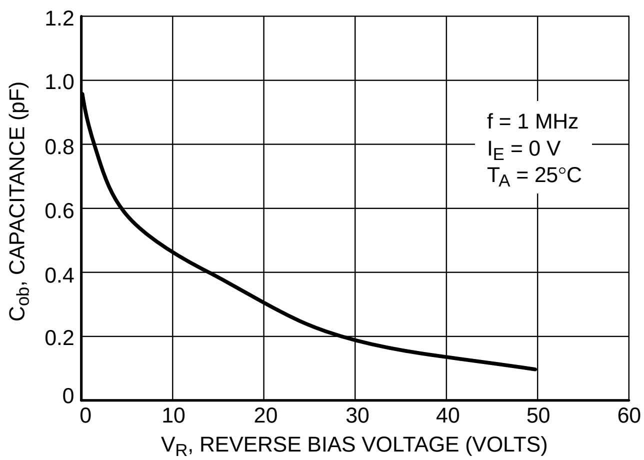


Figure 26. Output Capacitance

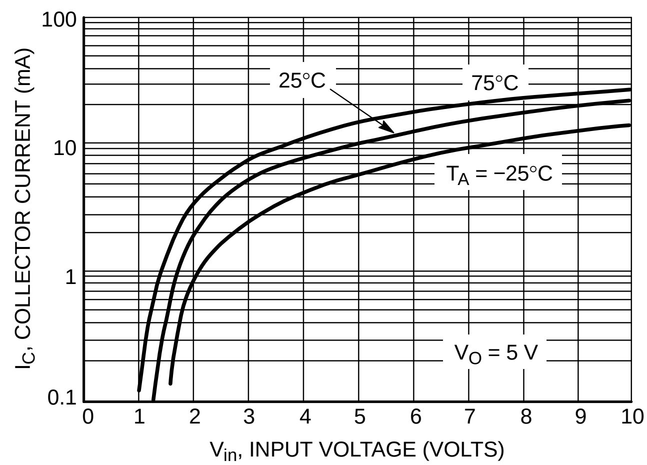


Figure 27. Output Current versus Input Voltage

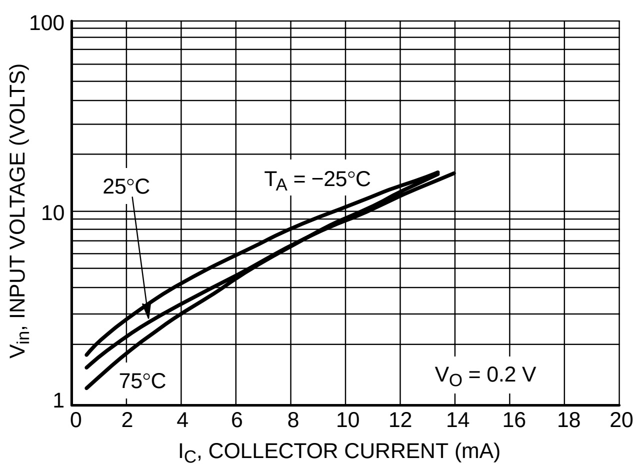


Figure 28. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — DTA144WET1

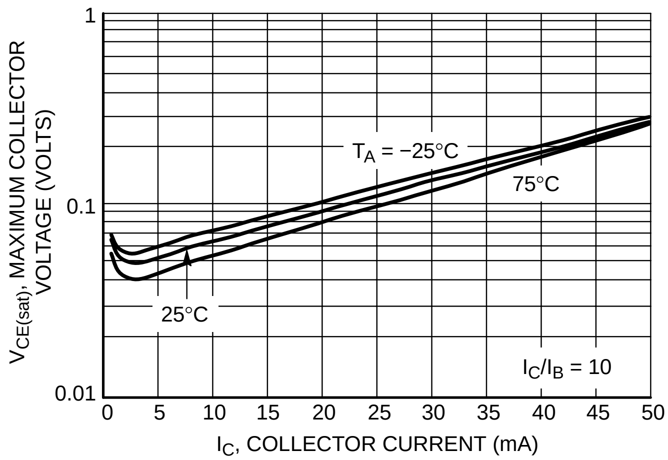


Figure 29. Maximum Collector Voltage versus Collector Current

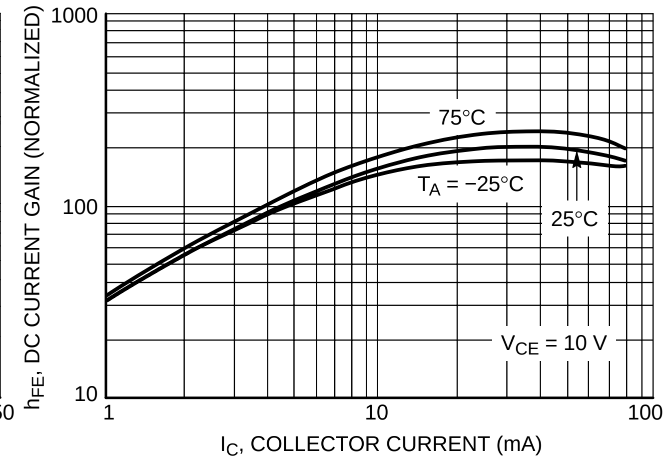


Figure 30. DC Current Gain

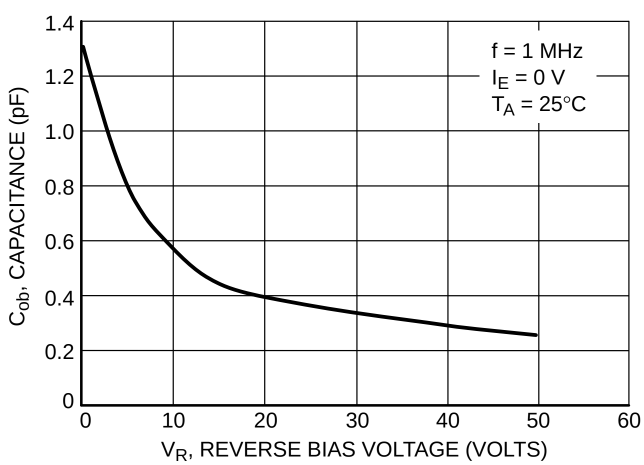


Figure 31. Output Capacitance

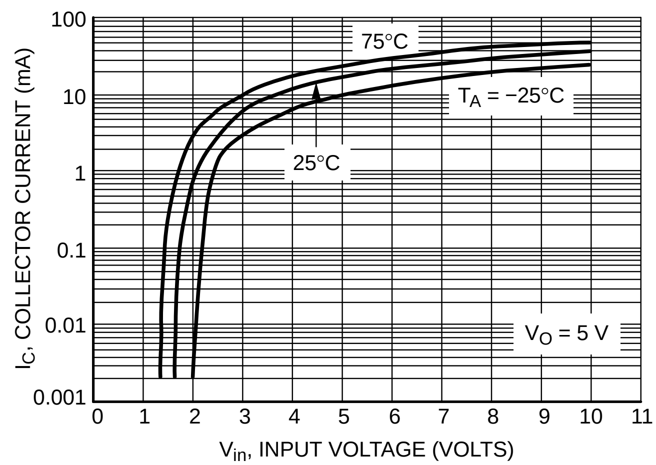


Figure 32. Output Current versus Input Voltage

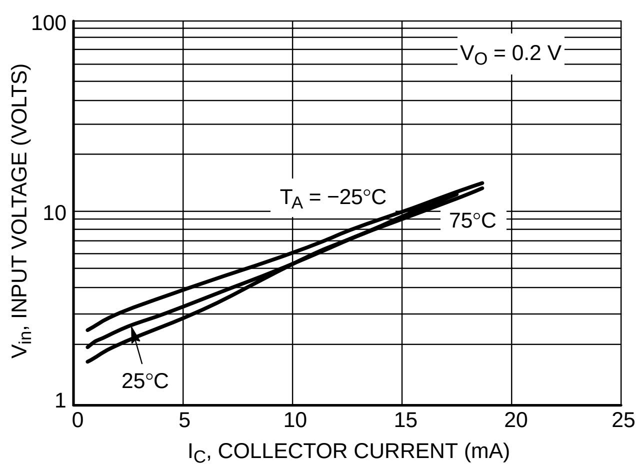
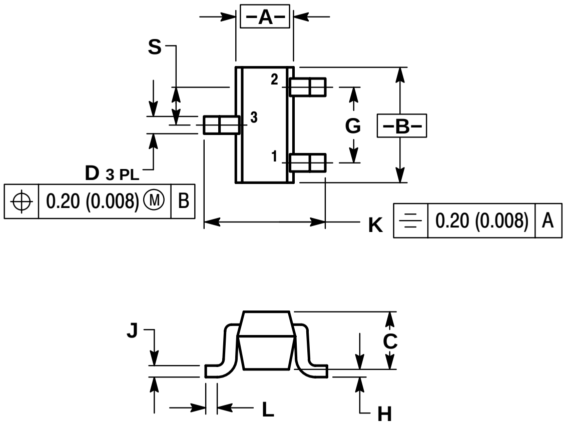


Figure 33. Input Voltage versus Output Current

PACKAGE DIMENSIONS

SC−75/SOT−416
CASE 463−01
ISSUE C

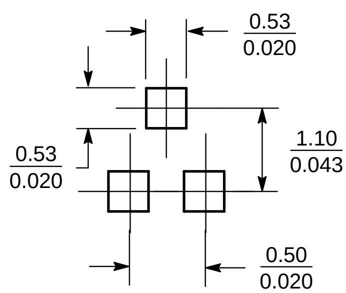


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
B	1.40	1.80	0.055	0.071
C	0.60	0.90	0.024	0.035
D	0.15	0.30	0.006	0.012
G	1.00 BSC		0.039 BSC	
H	−−−	0.10	−−−	0.004
J	0.10	0.25	0.004	0.010
K	1.45	1.75	0.057	0.069
L	0.10	0.20	0.004	0.008
S	0.50 BSC		0.020 BSC	

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*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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