WINSOURCE ELECTRONICS

THE DATASHEET OF

DTA144WET1

DTA114EET1 Series, SDTA114EET1 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

- 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.
- AEC−Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- Pb−Free Packages are Available*

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

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.

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

ON Semiconductor®

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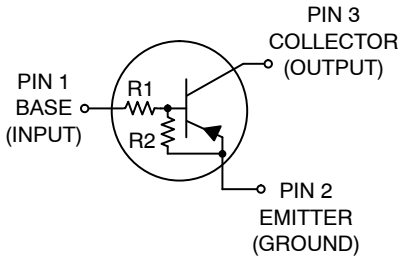
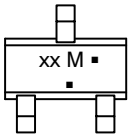
PNP SILICON BIAS RESISTOR TRANSISTORS

SC−75 (SOT−416)
CASE 463
STYLE 1



MARKING DIAGRAM



xx = Specific Device Code
xx = (Refer to page 4)
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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

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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.

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)	I_{EBO}				mAdc
DTA114EET1		−	−	0.5	
DTA124EET1		−	−	0.2	
DTA144EET1		−	−	0.1	
DTA114YET1, SDTA114YET1		−	−	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)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 4)					
DC Current Gain (V_{CE} = 10 V, I_C = 5.0 mA)	h_{FE}				−
DTA114EET1		35	60	−	
DTA124EET1		60	100	−	
DTA144EET1		80	140	−	
DTA114YET1, SDTA114YET1		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	−	

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

ON CHARACTERISTICS (Note 4)

Collector−Emitter Saturation Voltage (I_C = 10 mA, I_E = 0.3 mA) (I_C = 10 mA, I_B = 5 mA) DTA123EET1 (I_C = 10 mA, I_B = 1 mA) DTA114TET1/DTA143TET1 DTA143ZET1/DTA124XET1 DTA143EET1	$V_{CE(sat)}$	–	–	0.25	Vdc
Output Voltage (on) (V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	V_{OL}				Vdc
DTA114EET1		–	–	0.2	
DTA124EET1		–	–	0.2	
DTA114YET1, SDTA114YET1		–	–	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	

5. 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 6)					
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 = 0.25 V, R_L = 1.0 kΩ) DTA114TET1 DTA143TET1 DTA123EET1 DTA143EET1	V_{OH}	4.9	–	–	Vdc
Input Resistor	R1				kΩ
DTA114EET1		7.0	10	13	
DTA124EET1		15.4	22	28.6	
DTA144EET1		32.9	47	61.1	
DTA114YET1, SDTA114YET1		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, SDTA114YET1		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	

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

ORDERING INFORMATION AND RESISTOR VALUES

Device	Marking	R1 (K)	R2 (K)	Package	Shipping†
DTA114EET1	6A	10	10	SC−75	3,000 Tape & Reel
DTA114EET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA124EET1	6B	22	22	SC−75	3,000 Tape & Reel
DTA124EET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA144EET1	6C	47	47	SC−75	3,000 Tape & Reel
DTA144EET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA114YET1	6D	10	47	SC−75	3,000 Tape & Reel
DTA114YET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
SDTA114YET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA114TET1	6E	10	∞	SC−75	3,000 Tape & Reel
DTA114TET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA143TET1	6F	4.7	∞	SC−75	3,000 Tape & Reel
DTA143TET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA123EET1	6H	2.2	2.2	SC−75	3,000 Tape & Reel
DTA123EET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA143EET1	43	4.7	4.7	SC−75	3,000 Tape & Reel
DTA143EET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA143ZET1	6K	4.7	47	SC−75	3,000 Tape & Reel
DTA143ZET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA124XET1	6L	22	47	SC−75	3,000 Tape & Reel
DTA124XET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA123JET1	6M	2.2	47	SC−75	3,000 Tape & Reel
DTA123JET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA115EET1	6N	100	100	SC−75	3,000 Tape & Reel
DTA115EET1G				SC−75 (Pb−Free)	3,000 Tape & Reel
DTA144WET1	6P	47	22	SC−75	3,000 Tape & Reel
DTA144WET1G				SC−75 (Pb−Free)	3,000 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.

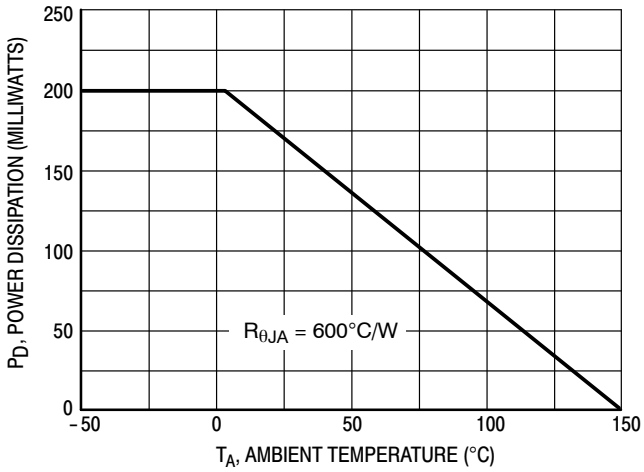


Figure 1. Derating Curve

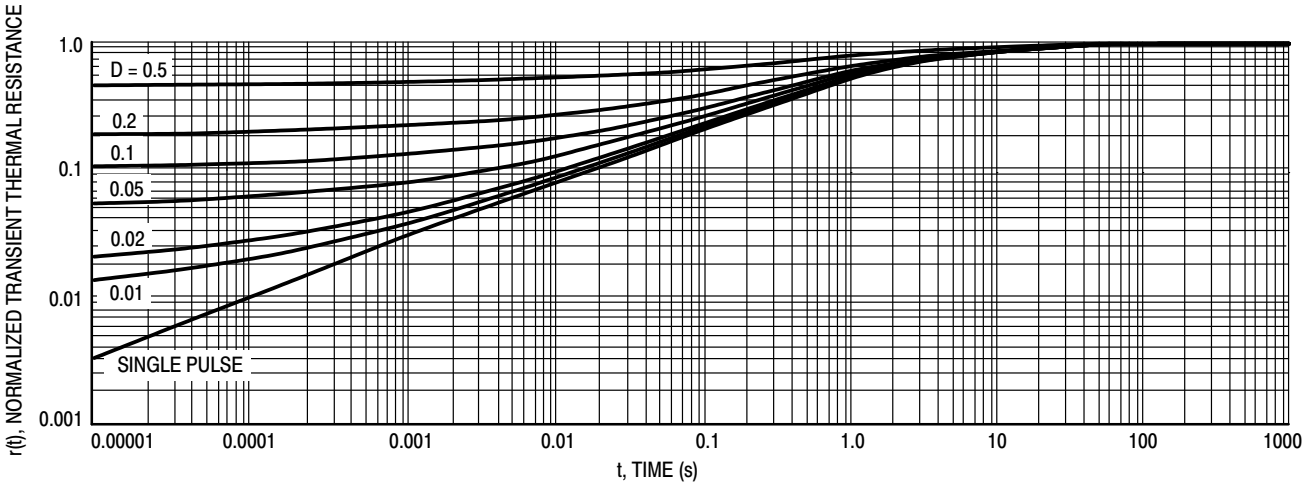


Figure 2. Normalized Thermal Response

TYPICAL ELECTRICAL CHARACTERISTICS – DTA114EET1

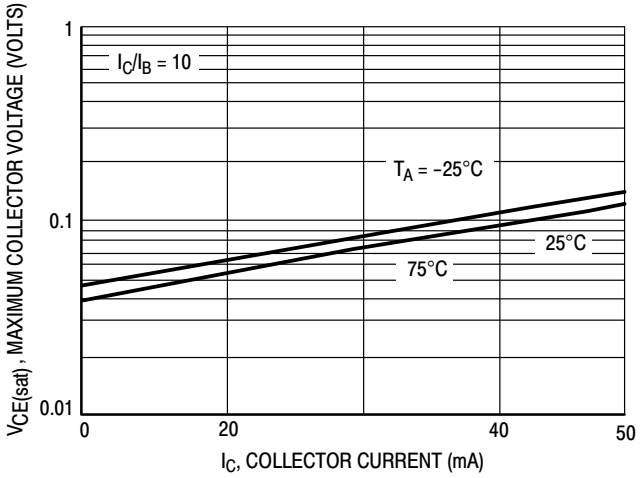


Figure 3. $V_{CE(sat)}$ versus I_C

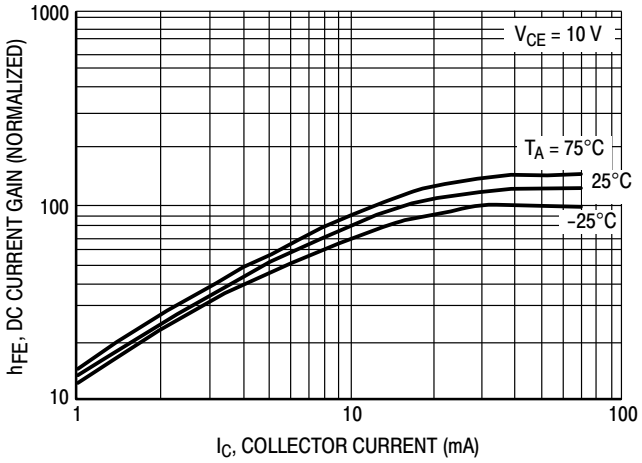


Figure 4. DC Current Gain

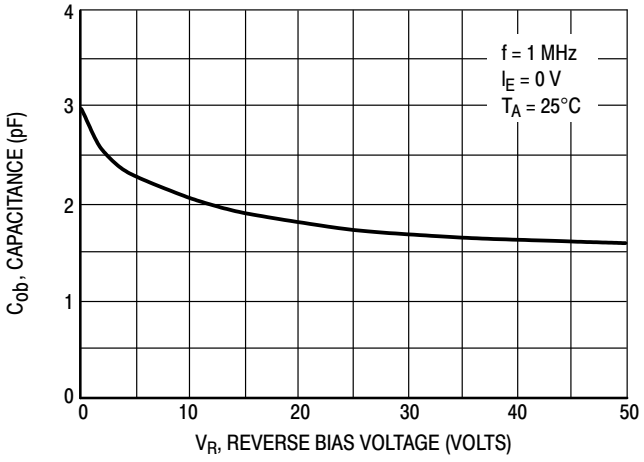


Figure 5. Output Capacitance

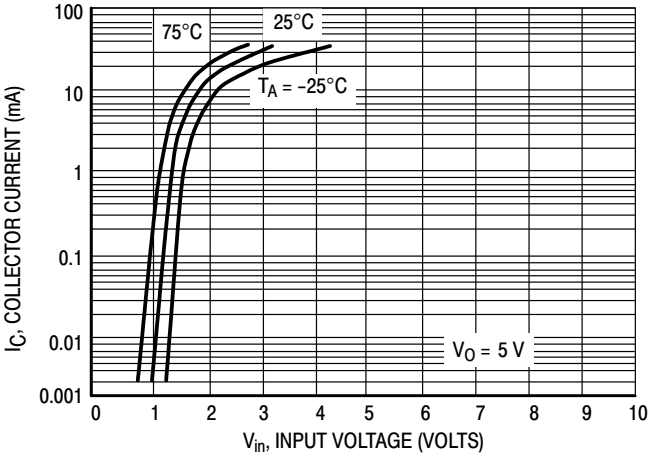


Figure 6. Output Current versus Input Voltage

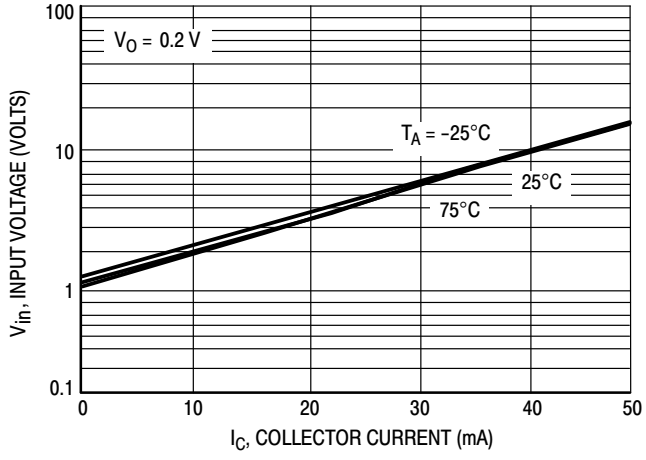


Figure 7. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – DTA123EET1

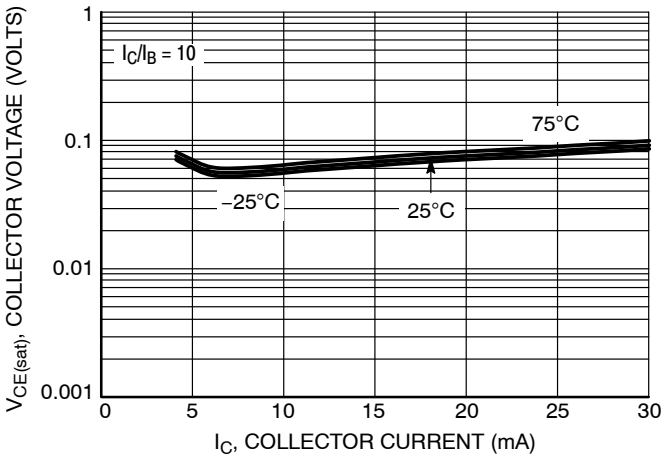


Figure 8. $V_{CE(sat)}$ versus I_C

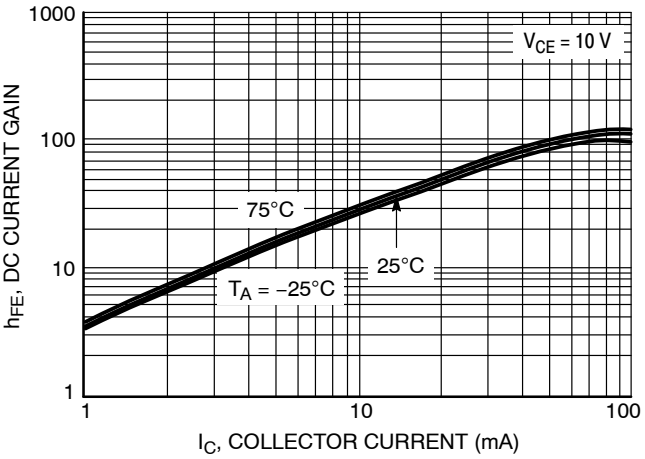


Figure 9. DC Current Gain

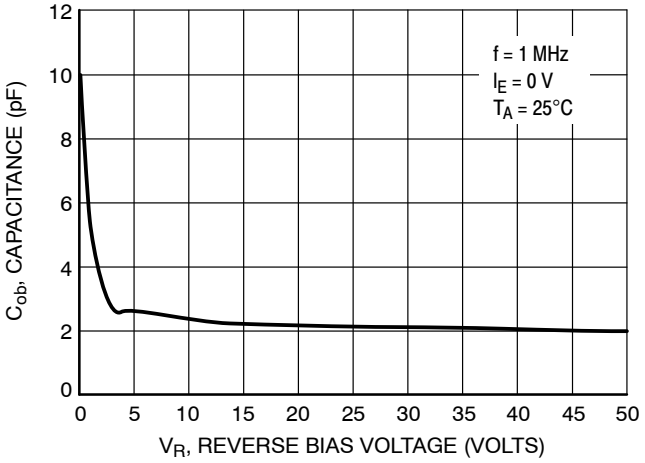


Figure 10. Output Capacitance

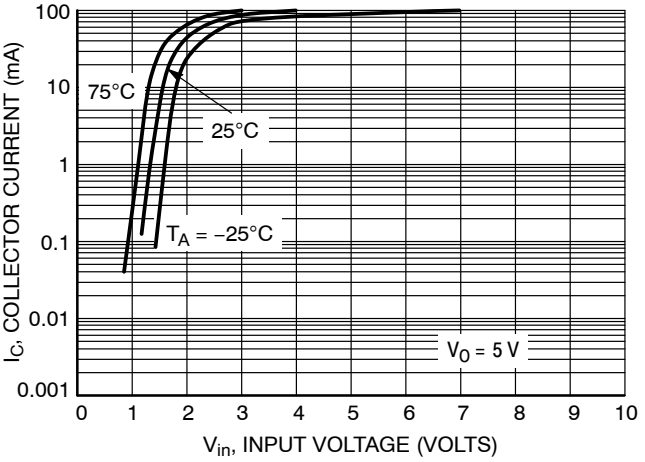


Figure 11. Output Current versus Input Voltage

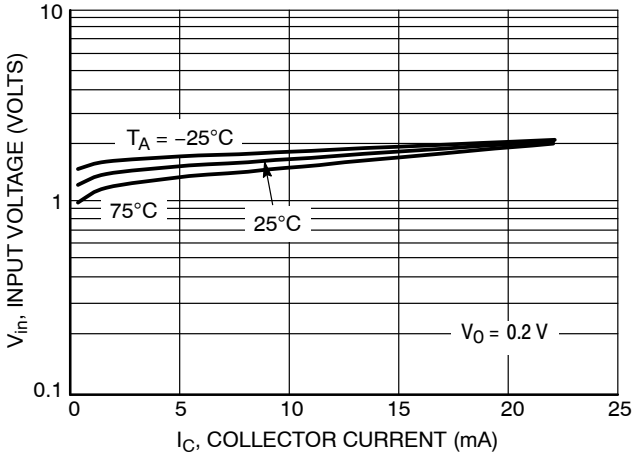


Figure 12. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – DTA124EET1

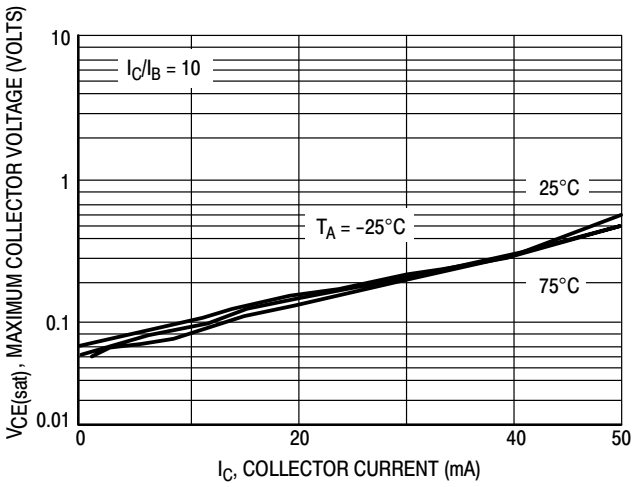


Figure 13. $V_{CE(sat)}$ versus I_C

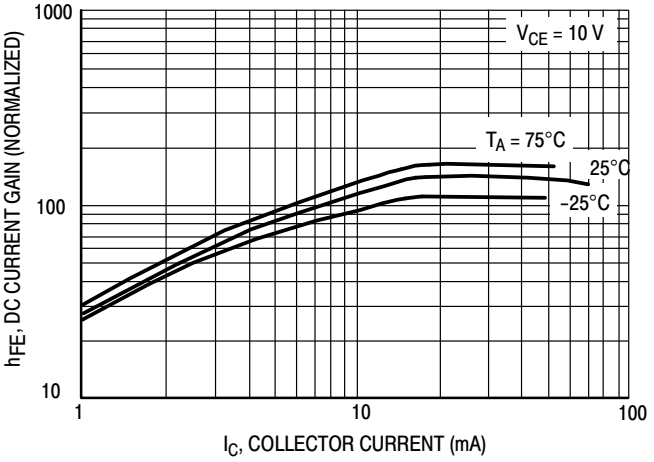


Figure 14. DC Current Gain

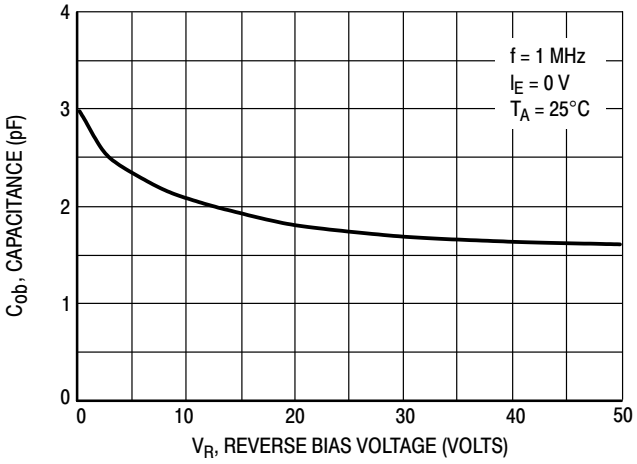


Figure 15. Output Capacitance

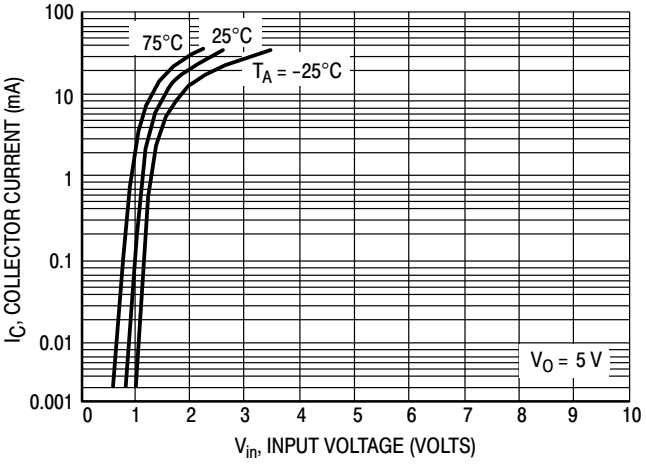


Figure 16. Output Current versus Input Voltage

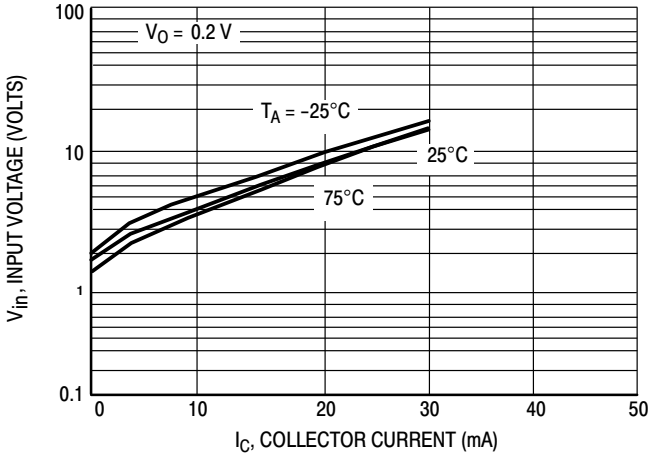


Figure 17. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – DTA144EET1

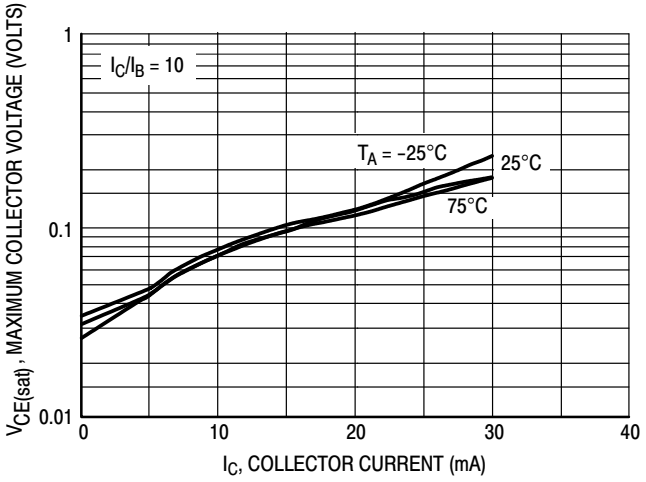


Figure 18. $V_{CE(sat)}$ versus I_C

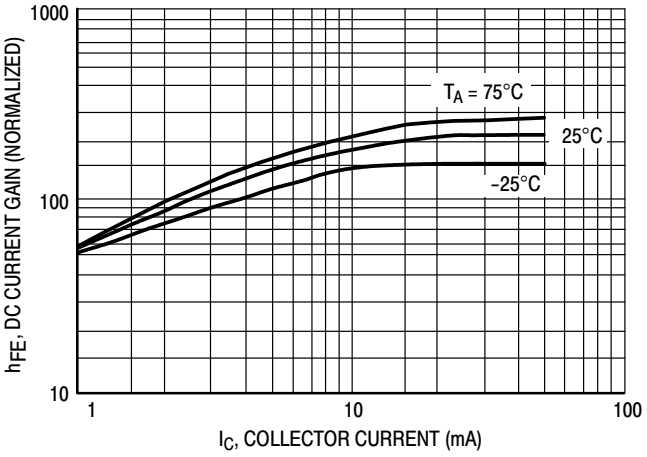


Figure 19. DC Current Gain

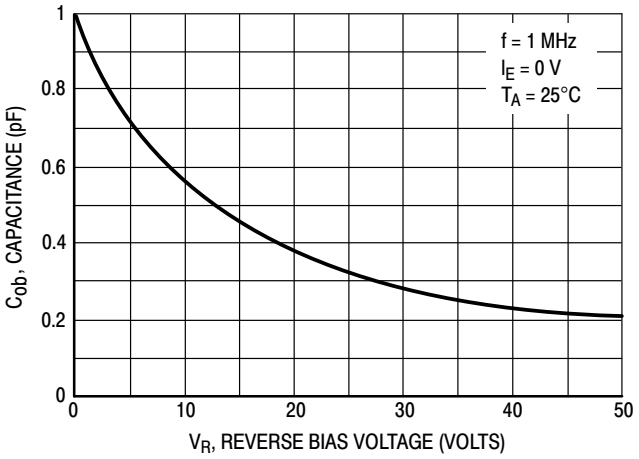


Figure 20. Output Capacitance

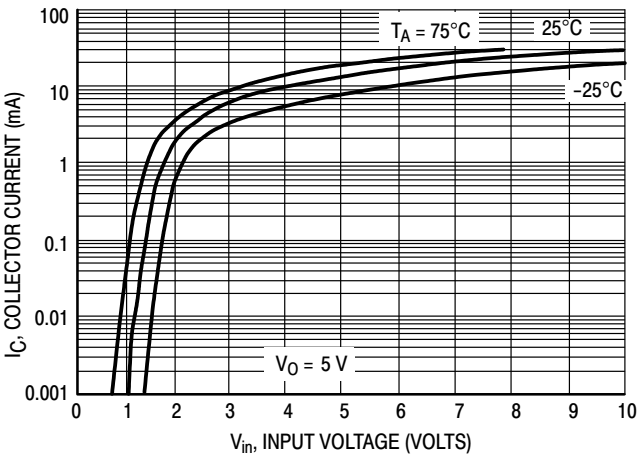


Figure 21. Output Current versus Input Voltage

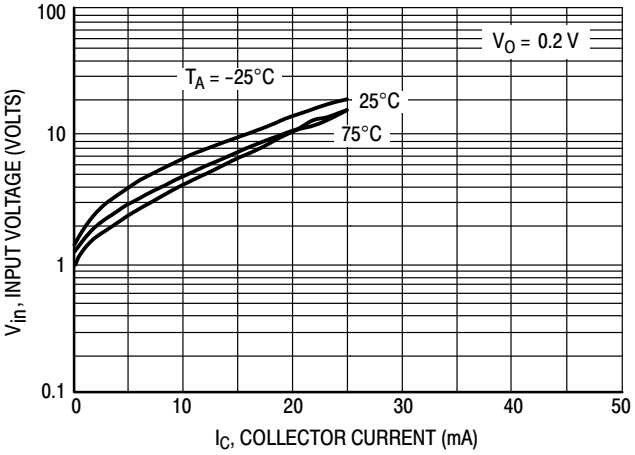


Figure 22. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS – DTA114YET1, SDTA114YET1

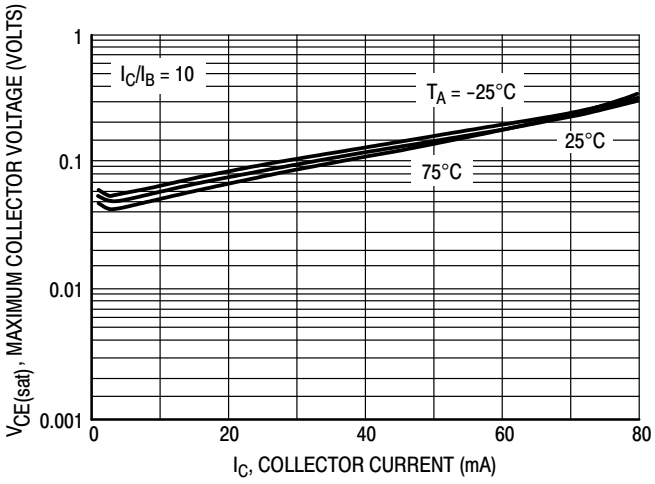


Figure 23. $V_{CE(sat)}$ versus I_C

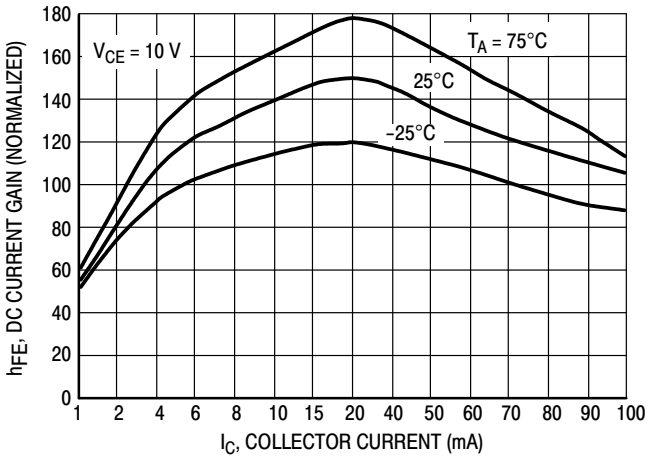


Figure 24. DC Current Gain

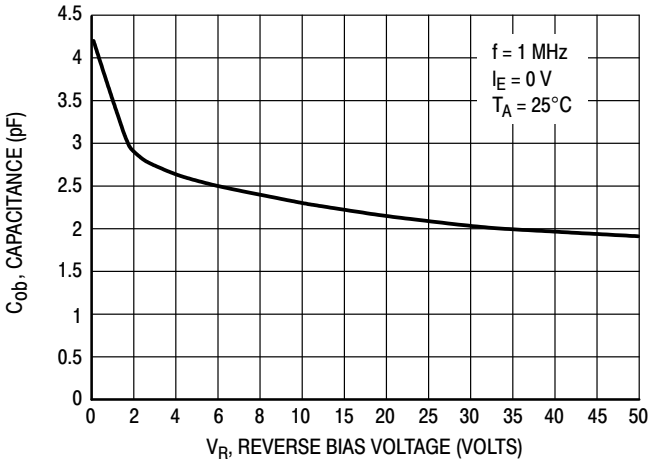


Figure 25. Output Capacitance

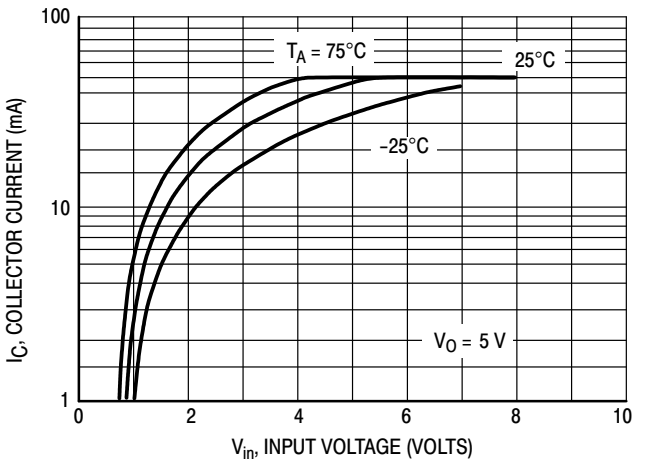


Figure 26. Output Current versus Input Voltage

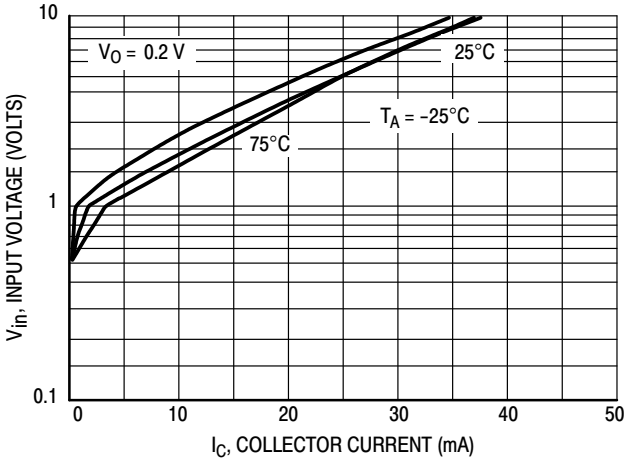


Figure 27. Input Voltage versus Output Current

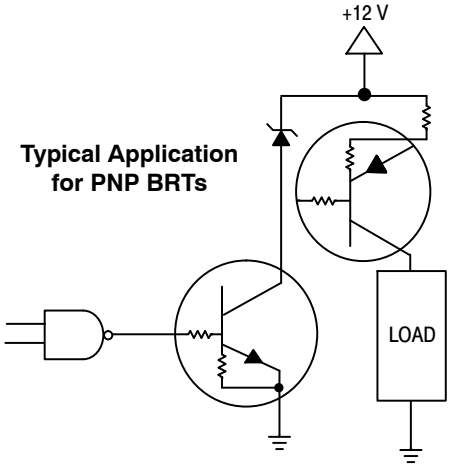


Figure 28. Inexpensive, Unregulated Current Source

TYPICAL ELECTRICAL CHARACTERISTICS — DTA115EET1

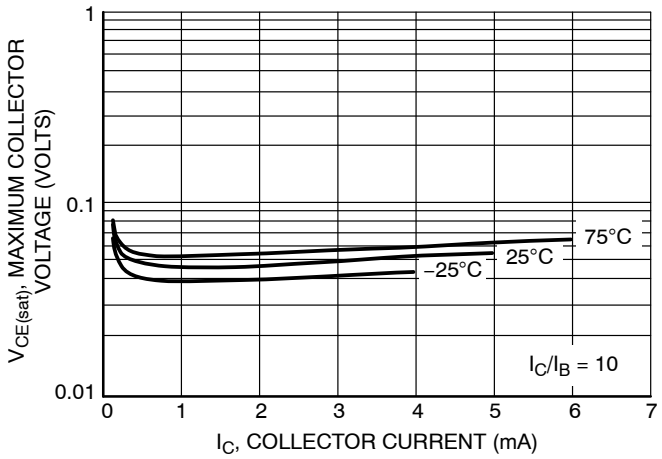


Figure 29. Maximum Collector Voltage versus Collector Current

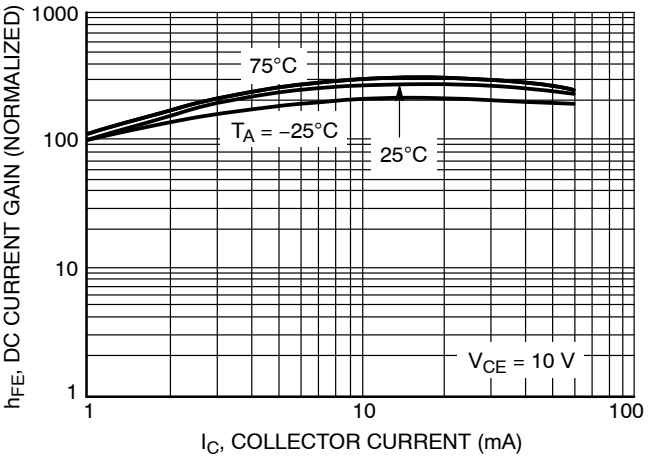


Figure 30. DC Current Gain

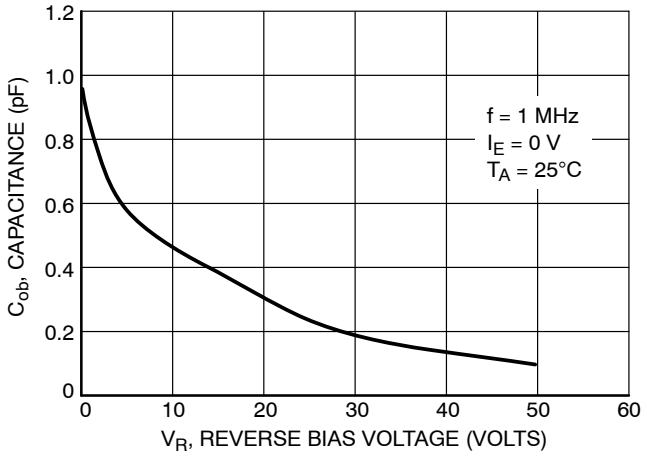


Figure 31. Output Capacitance

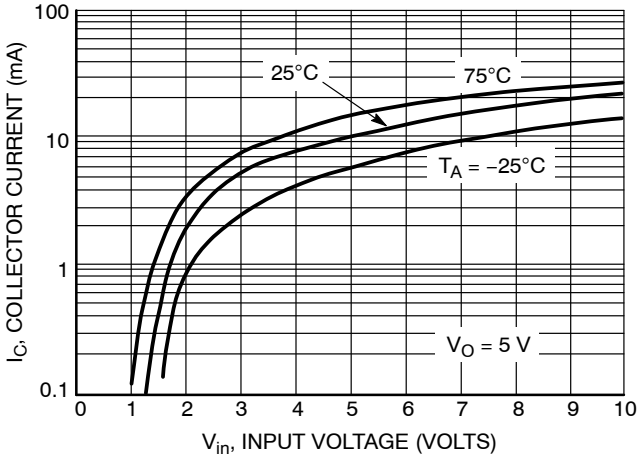


Figure 32. Output Current versus Input Voltage

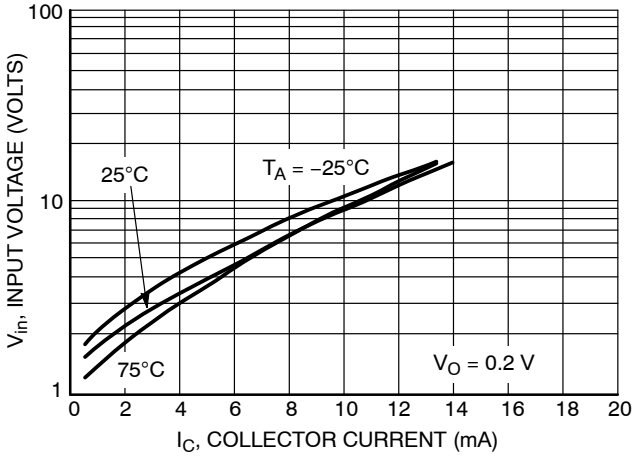


Figure 33. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — DTA144WET1

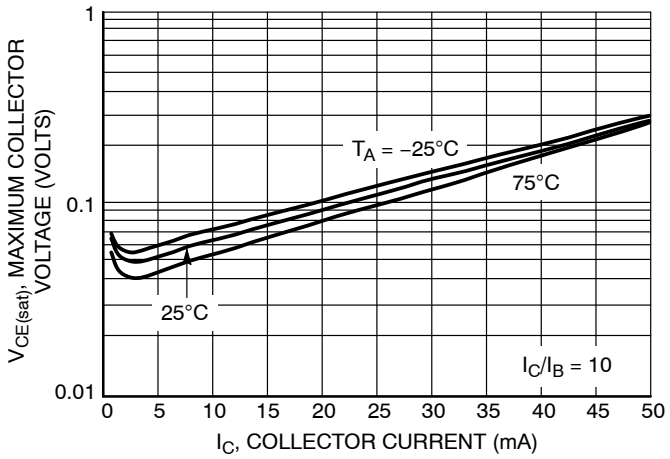


Figure 34. Maximum Collector Voltage versus Collector Current

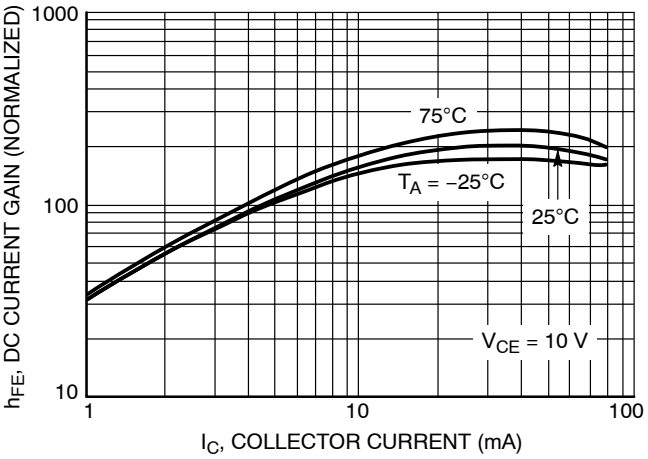


Figure 35. DC Current Gain

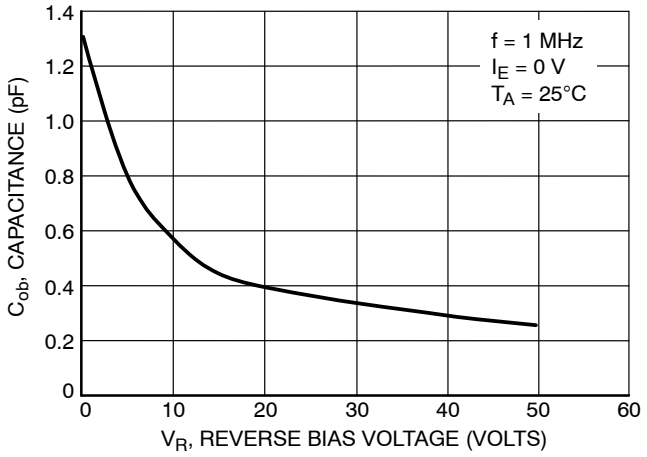


Figure 36. Output Capacitance

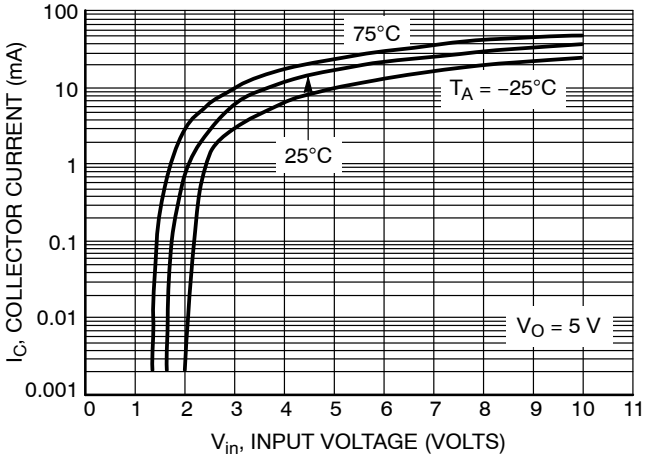


Figure 37. Output Current versus Input Voltage

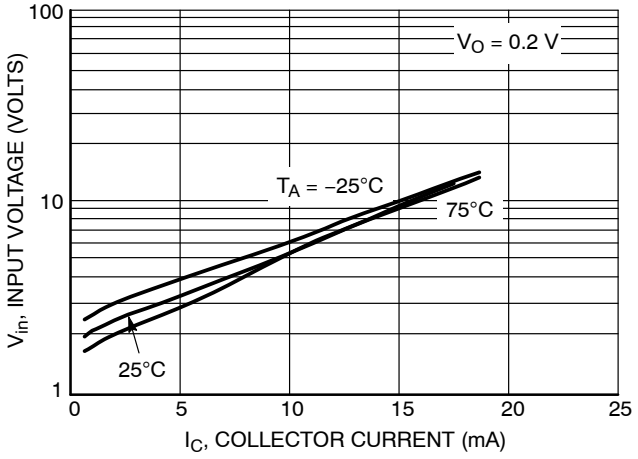
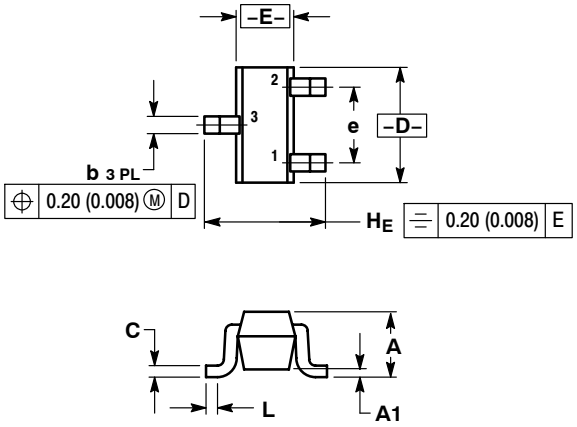


Figure 38. Input Voltage versus Output Current

PACKAGE DIMENSIONS

SC−75/SOT−416
CASE 463−01
ISSUE F

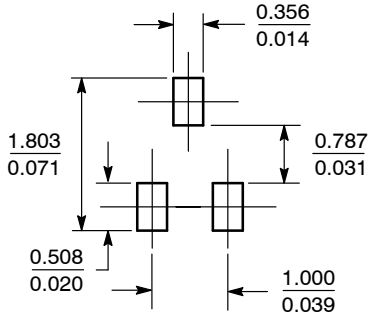


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.027	0.031	0.035
A1	0.00	0.05	0.10	0.000	0.002	0.004
b	0.15	0.20	0.30	0.006	0.008	0.012
C	0.10	0.15	0.25	0.004	0.006	0.010
D	1.55	1.60	1.65	0.059	0.063	0.067
E	0.70	0.80	0.90	0.027	0.031	0.035
e	1.00 BSC			0.04 BSC		
L	0.10	0.15	0.20	0.004	0.006	0.008
H_E	1.50	1.60	1.70	0.061	0.063	0.065

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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