DTA114EM3T5G Series

Preferred Devices

Digital Transistors (BRT)

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 digital transistor contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base−emitter resistor. The digital transistor eliminates these individual components by integrating them into a single device. The use of a digital transistor can reduce both system cost and board space. The device is housed in the SOT−723 package which is designed for low power surface mount applications.

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- The SOT−723 Package can be Soldered using Wave or Reflow.
- Available in 4 mm, 8000 Unit Tape & Reel
- These are Pb−Free Devices

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

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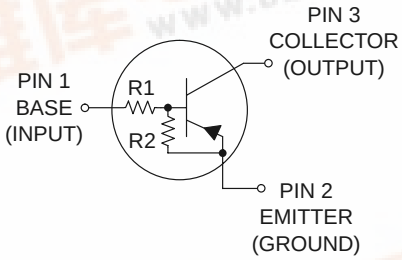
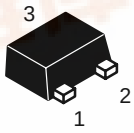
PNP SILICON DIGITAL TRANSISTORS



MARKING DIAGRAM



SOT−723
CASE 631AA
Style 1

xx = Specific Device Code
(See Marking Table on page 2)
M = Date Code

ORDERING INFORMATION

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

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

ORDERING INFORMATION, DEVICE MARKING AND RESISTOR VALUES

Device	Marking	R1 (K)	R2 (K)	Package	Shipping†
DTA114EM3T5G	6A	10	10	SOT−723 (Pb−Free)	8000/Tape & Reel
DTA124EM3T5G*	6B	22	22		
DTA144EM3T5G	6C	47	47		
DTA114YM3T5G	6D	10	47		
DTA114TM3T5G	6E	10	∞		
DTA143TM3T5G*	6F	4.7	∞		
DTA123EM3T5G*	6H	2.2	2.2		
DTA143EM3T5G*	6J	4.7	4.7		
DTA143ZM3T5G*	6K	4.7	47		
DTA124XM3T5G	6L	22	47		
DTA123JM3T5G*	6M	2.2	47		
DTA115EM3T5G	6N	100	100		
DTA144WM3T5G*	6P	47	22		

*Available upon request

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation, FR−4 Board (Note 1.) @ T_A = 25°C Derate above 25°C	P_D	 260 2.0	 mW mW/°C
Thermal Resistance, Junction to Ambient (Note 1.)	$R_{\theta JA}$	480	°C/W
Total Device Dissipation, FR−4 Board (Note 2.) @ T_A = 25°C Derate above 25°C	P_D	 600 4.8	 mW mW/°C
Thermal Resistance, Junction to Ambient (Note 2.)	$R_{\theta JA}$	205	°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)	DTA114EM3T5G	I_{EBO}	−	−	0.5	mAdc
	DTA124EM3T5G		−	−	0.2	
	DTA144EM3T5G		−	−	0.1	
	DTA114YM3T5G		−	−	0.2	
	DTA114TM3T5G		−	−	0.9	
	DTA143TM3T5G		−	−	1.9	
	DTA123EM3T5G		−	−	2.3	
	DTA143EM3T5G		−	−	1.5	
	DTA143ZM3T5G		−	−	0.18	
	DTA124XM3T5G		−	−	0.13	
	DTA123JM3T5G		−	−	0.2	
	DTA115EM3T5G		−	−	0.05	
	DTA144WM3T5G		−	−	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
ON CHARACTERISTICS (Note 3.)						
DC Current Gain (V_{CE} = 10 V, I_C = 5.0 mA)	DTA114EM3T5G	h_{FE}	35	60	−	
	DTA124EM3T5G		60	100	−	
	DTA144EM3T5G		80	140	−	
	DTA114YM3T5G		80	140	−	
	DTA114TM3T5G		160	250	−	
	DTA143TM3T5G		160	250	−	
	DTA123EM3T5G		8.0	15	−	
	DTA143EM3T5G		15	27	−	
	DTA143ZM3T5G		80	140	−	
	DTA124XM3T5G		80	130	−	
	DTA123JM3T5G		80	140	−	
	DTA115EM3T5G		80	150	−	
	DTA144WM3T5G		80	140	−	
Collector−Emitter Saturation Voltage (I_C = 10 mA, I_E = 0.3 mA) (I_C = 10 mA, I_B = 5 mA) DTA123EM3T5G (I_C = 10 mA, I_B = 1 mA) DTA114TM3T5G/DTA143TM3T5G/ DTA143ZM3T5G/DTA124XM3T5G/DTA143EM3T5G		$V_{CE(sat)}$	−	−	0.25	Vdc
Output Voltage (on)		V_{OL}				Vdc
(V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	DTA114EM3T5G		−	−	0.2	
	DTA124EM3T5G		−	−	0.2	
	DTA114YM3T5G		−	−	0.2	
	DTA114TM3T5G		−	−	0.2	
	DTA143TM3T5G		−	−	0.2	
	DTA123EM3T5G		−	−	0.2	
	DTA143EM3T5G		−	−	0.2	
	DTA143ZM3T5G		−	−	0.2	
	DTA124XM3T5G		−	−	0.2	
	DTA123JM3T5G		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ)	DTA144EM3T5G		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 5.5 V, R_L = 1.0 kΩ)	DTA115EM3T5G		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 4.0 V, R_L = 1.0 kΩ)	DTA144WM3T5G		−	−	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 = 0.25 V, R_L = 1.0 kΩ) DTA114TM3T5G DTA143TM3T5G DTA123EM3T5G DTA143EM3T5G		V_{OH}	4.9	−	−	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
Input Resistor	DTA114EM3T5G	R1	7.0	10	13	kΩ
	DTA124EM3T5G		15.4	22	28.6	
	DTA144EM3T5G		32.9	47	61.1	
	DTA114YM3T5G		7.0	10	13	
	DTA114TM3T5G		7.0	10	13	
	DTA143TM3T5G		3.3	4.7	6.1	
	DTA123EM3T5G		1.5	2.2	2.9	
	DTA143EM3T5G		3.3	4.7	6.1	
	DTA143ZM3T5G		3.3	4.7	6.1	
	DTA124XM3T5G		15.4	22	28.6	
	DTA123JM3T5G		1.54	2.2	2.86	
	DTA115EM3T5G		70	100	130	
	DTA144WM3T5G		32.9	47	61.1	
Resistor Ratio	DTA114EM3T5G/DTA124EM3T5G/DTA144EM3T5G	R_1/R_2				
/			0.8	1.0	1.2	
	DTA115EM3T5G		0.17	0.21	0.25	
	DTA114YM3T5G		–	–	–	
	DTA114TM3T5G/DTA143TM3T5G		0.8	1.0	1.2	
	DTA123EM3T5G/DTA143EM3T5G		0.055	0.1	0.185	
	DTA143ZM3T5G		0.38	0.47	0.56	
	DTA124XM3T5G		0.038	0.047	0.056	
	DTA123JM3T5G		1.7	2.1	2.6	
	DTA144WM3T5G					

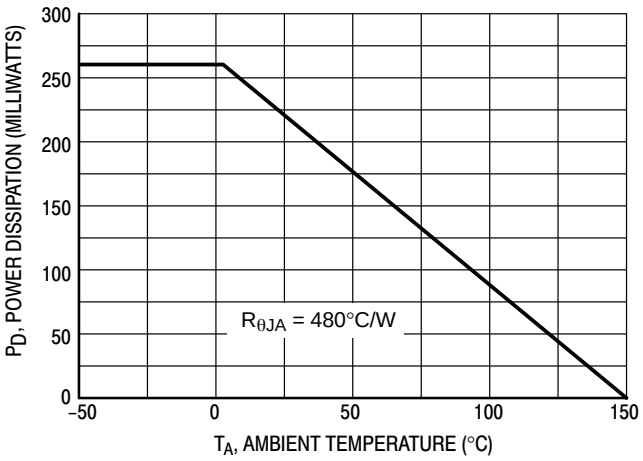


Figure 1. Derating Curve

TYPICAL ELECTRICAL CHARACTERISTICS − DTA114EM3T5G

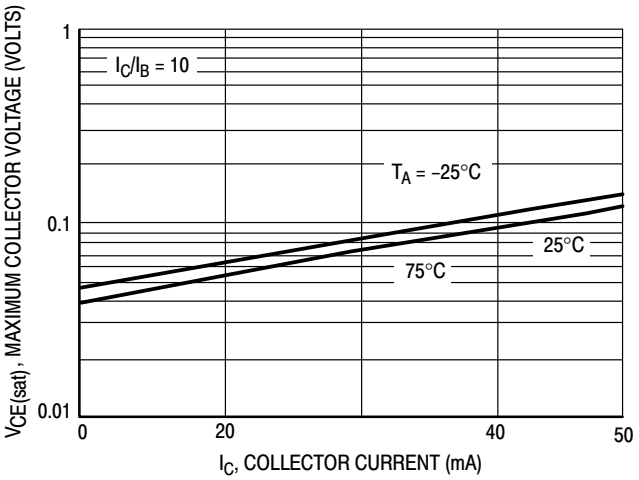


Figure 2. $V_{CE(sat)}$ versus I_C

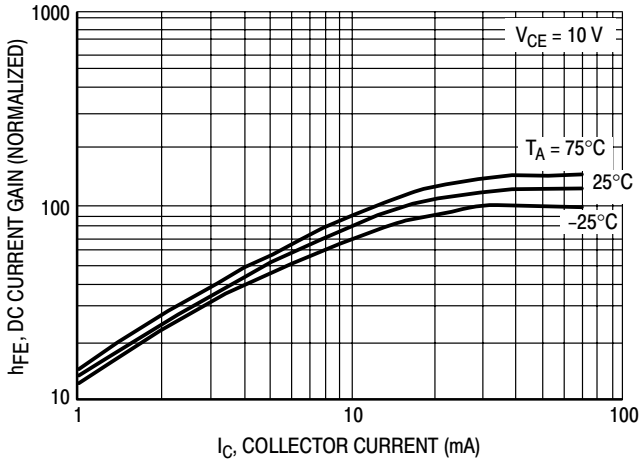


Figure 3. DC Current Gain

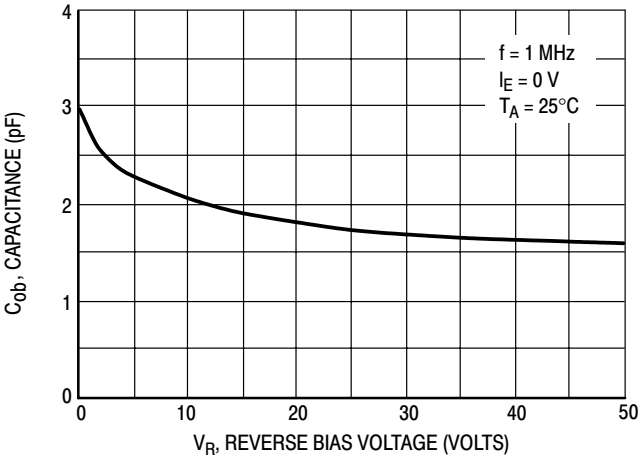


Figure 4. Output Capacitance

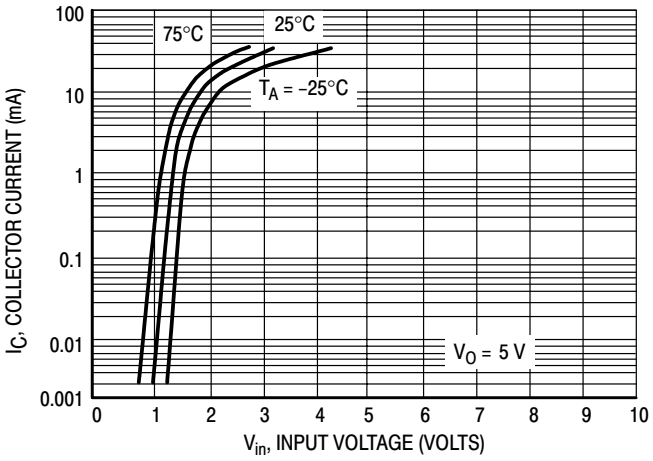


Figure 5. Output Current versus Input Voltage

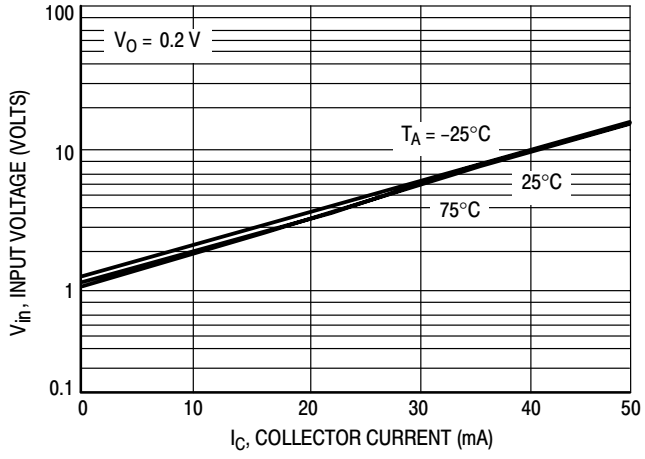


Figure 6. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − DTA124EM3T5G

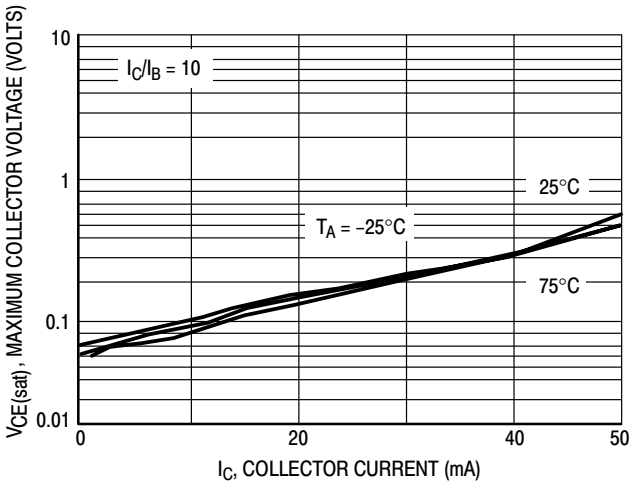


Figure 7. $V_{CE(sat)}$ versus I_C

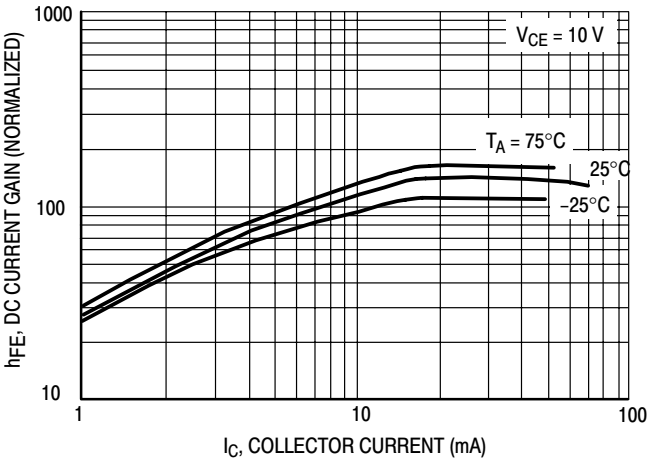


Figure 8. DC Current Gain

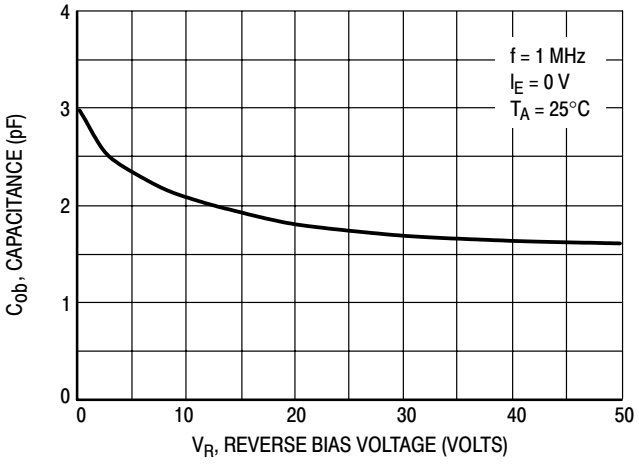


Figure 9. Output Capacitance

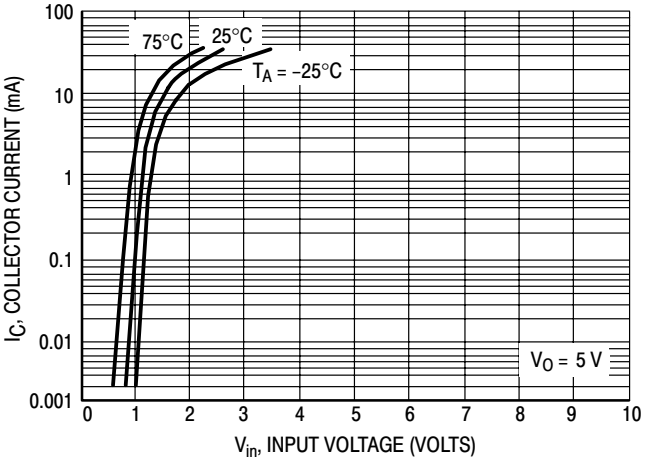


Figure 10. Output Current versus Input Voltage

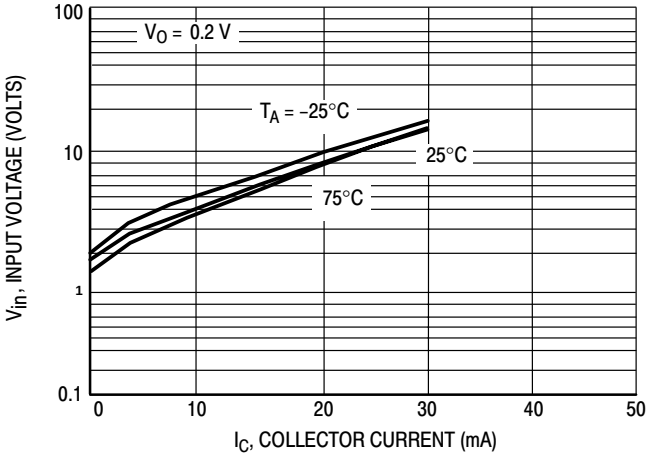


Figure 11. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − DTA144EM3T5G

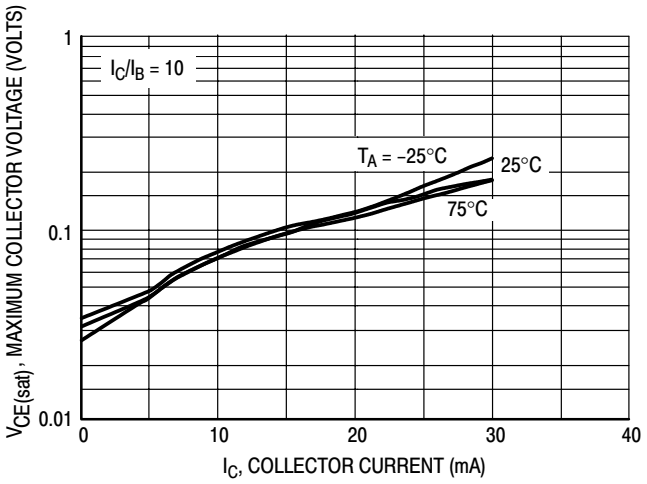


Figure 12. $V_{CE(sat)}$ versus I_C

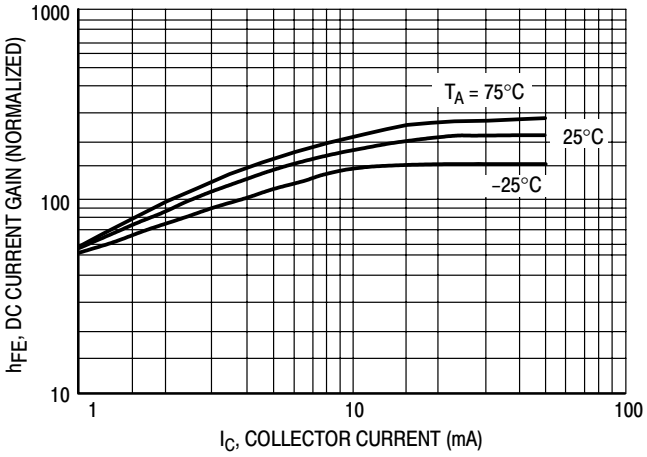


Figure 13. DC Current Gain

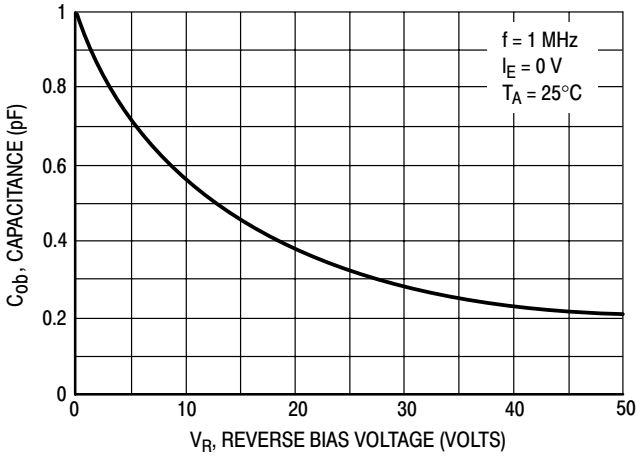


Figure 14. Output Capacitance

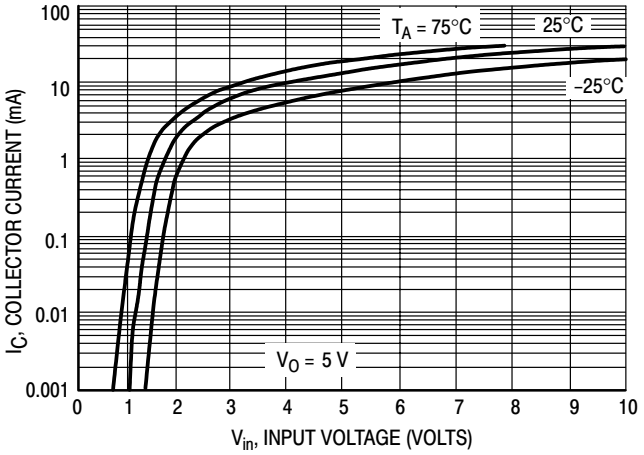


Figure 15. Output Current versus Input Voltage

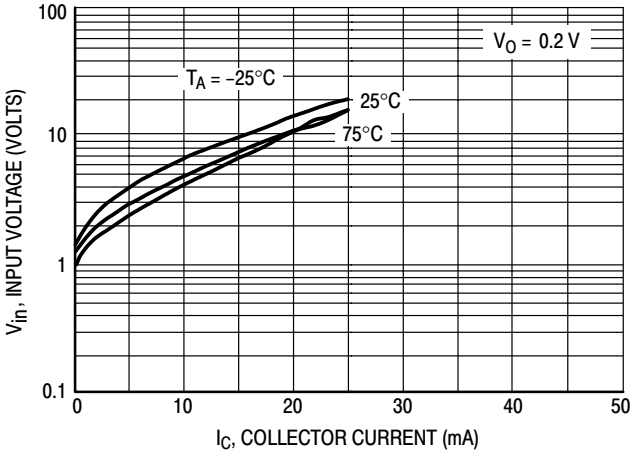


Figure 16. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − DTA114YM3T5G

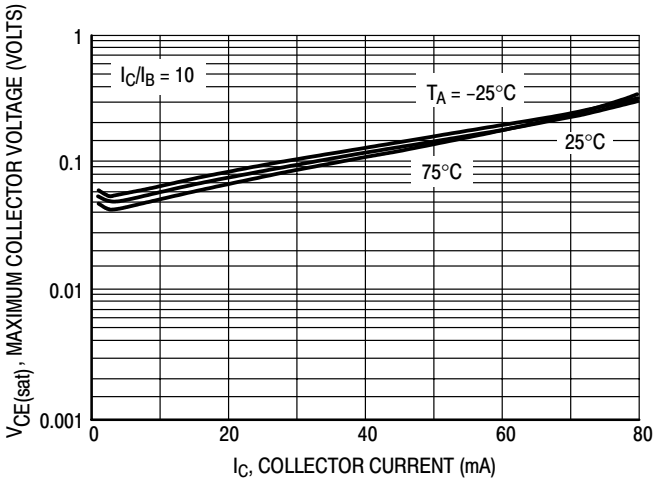


Figure 17. $V_{CE(sat)}$ versus I_C

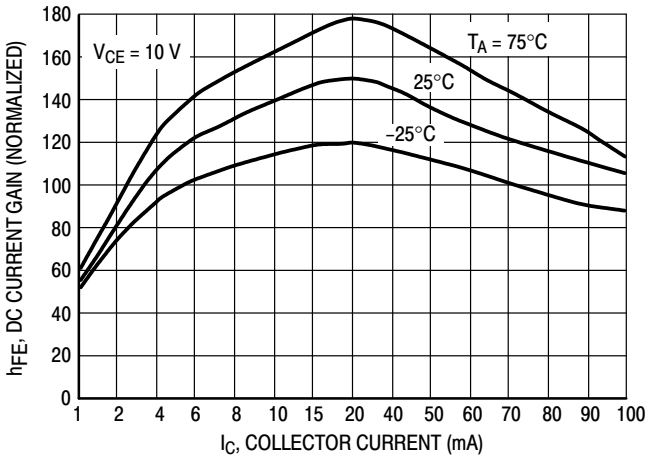


Figure 18. DC Current Gain

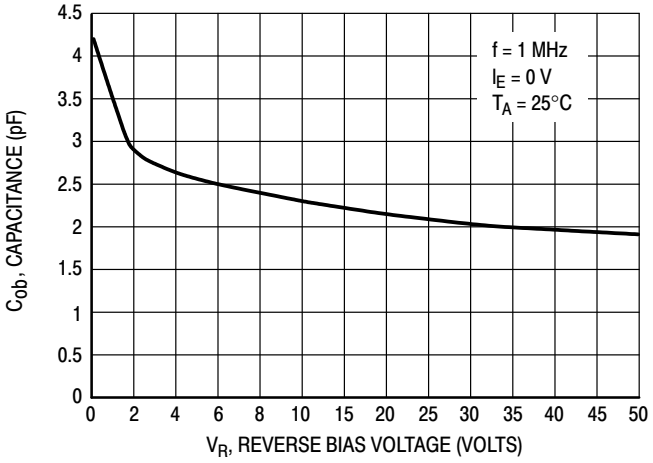


Figure 19. Output Capacitance

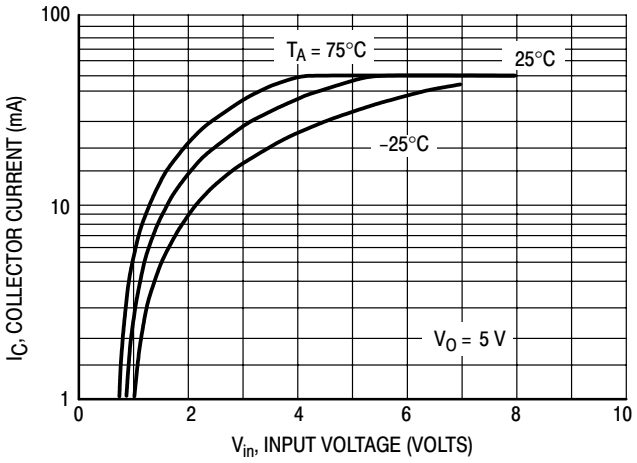


Figure 20. Output Current versus Input Voltage

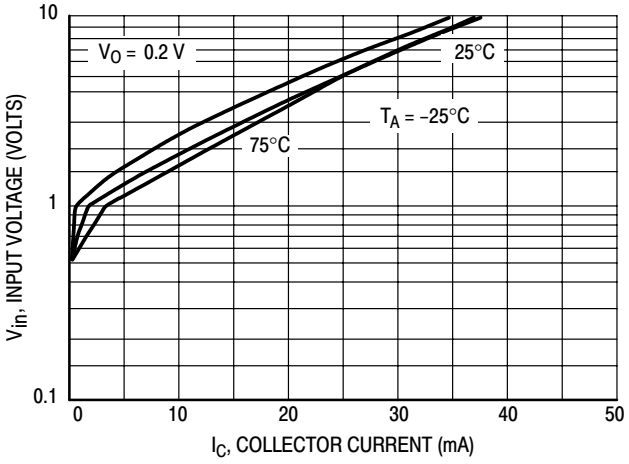


Figure 21. Input Voltage versus Output Current

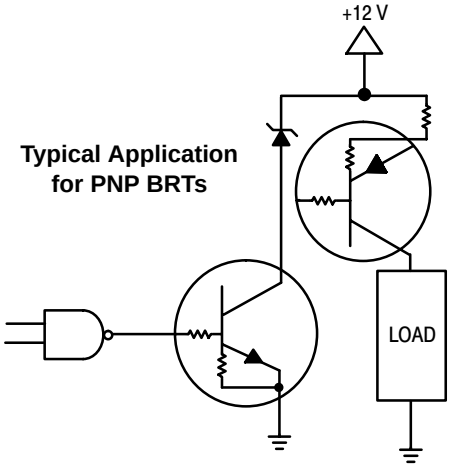


Figure 22. Inexpensive, Unregulated Current Source

TYPICAL ELECTRICAL CHARACTERISTICS — DTA115EM3T5G

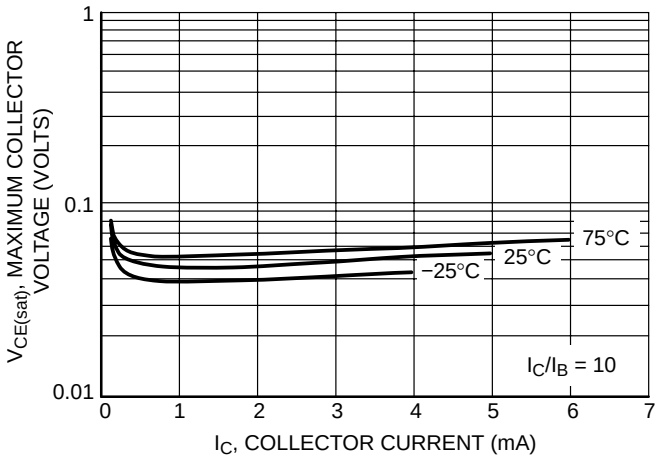


Figure 23. Maximum Collector Voltage versus Collector Current

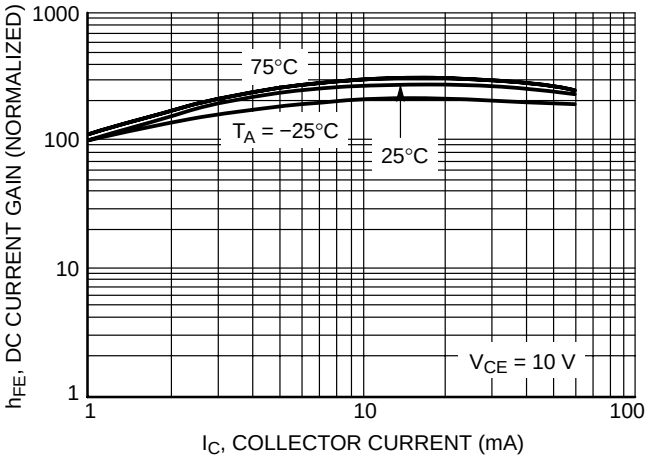


Figure 24. DC Current Gain

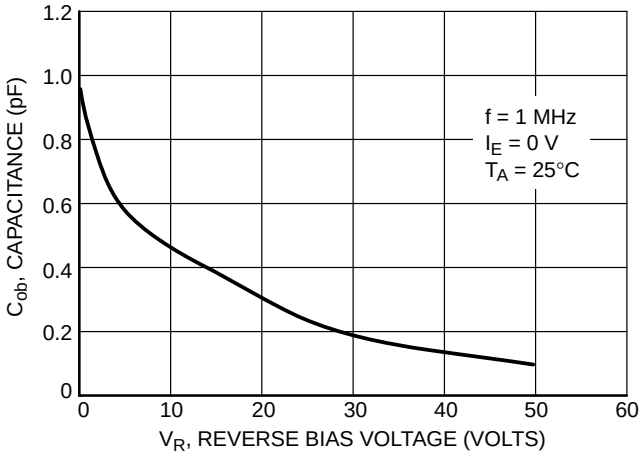


Figure 25. Output Capacitance

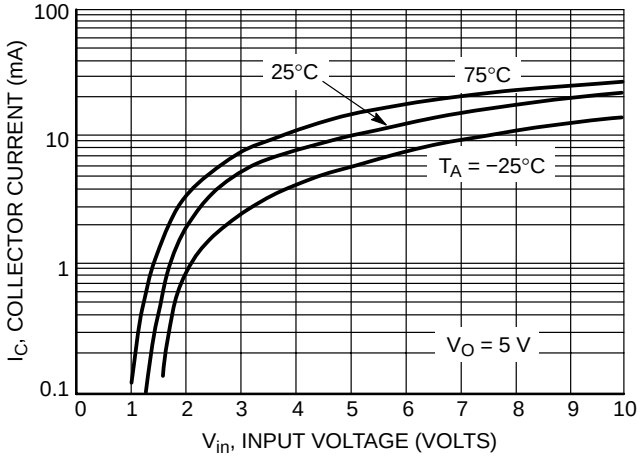


Figure 26. Output Current versus Input Voltage

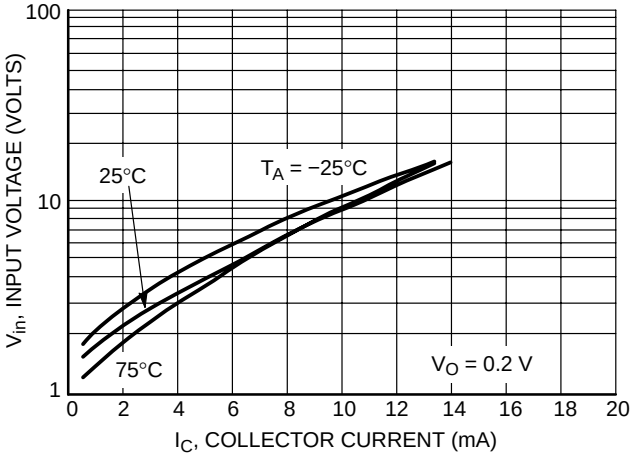


Figure 27. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — DTA144WM3T5G

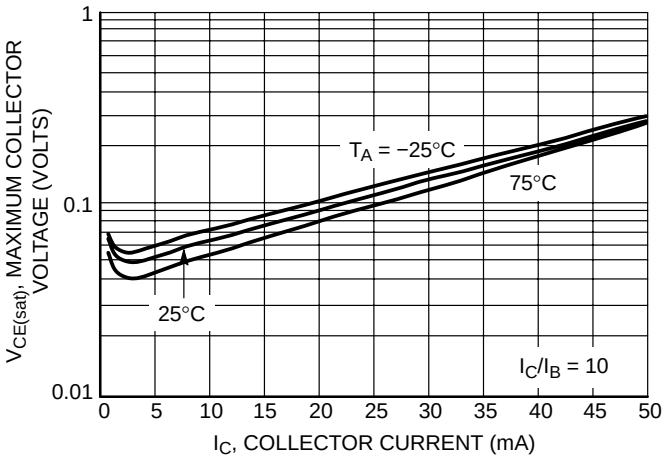


Figure 28. Maximum Collector Voltage versus Collector Current

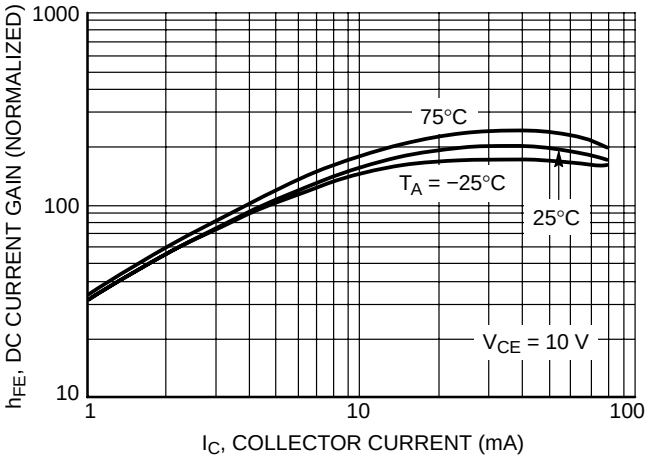


Figure 29. DC Current Gain

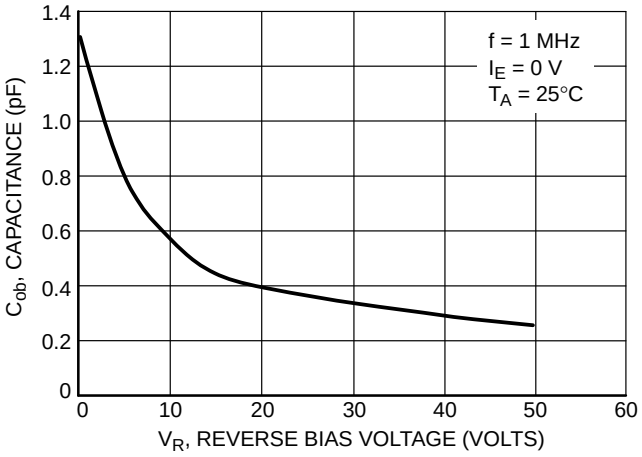


Figure 30. Output Capacitance

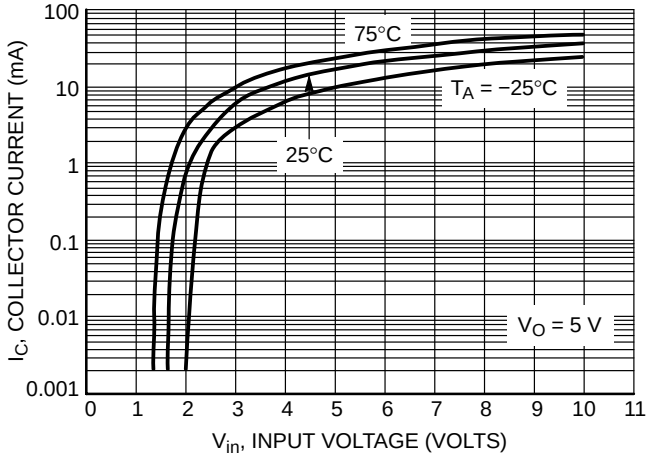


Figure 31. Output Current versus Input Voltage

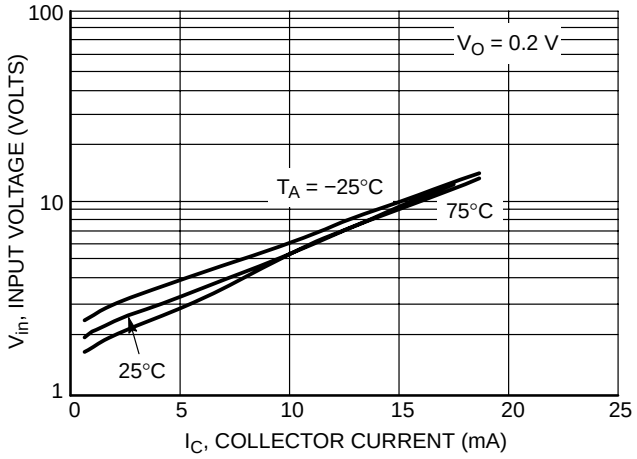
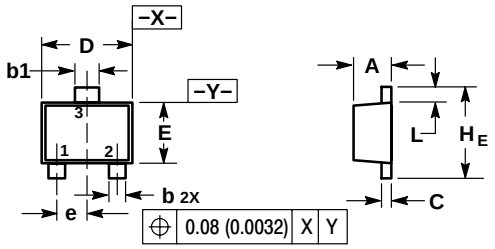


Figure 32. Input Voltage versus Output Current

DTA114EM3T5G Series

PACKAGE DIMENSIONS

SOT−723
CASE 631AA−01
ISSUE A

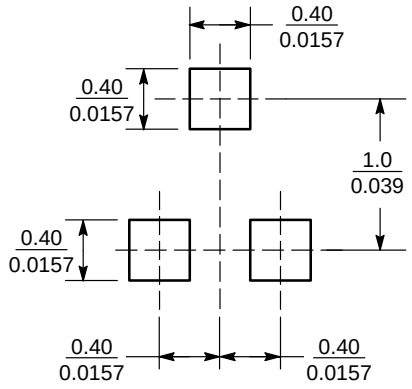


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	0.018	0.020	0.022
b	0.15	0.20	0.27	0.0059	0.0079	0.0106
b1	0.25	0.3	0.35	0.010	0.012	0.014
C	0.07	0.12	0.17	0.0028	0.0047	0.0067
D	1.15	1.20	1.25	0.045	0.047	0.049
E	0.75	0.80	0.85	0.03	0.032	0.034
e	0.40 BSC			0.016 BSC		
H E	1.15	1.20	1.25	0.045	0.047	0.049
L	0.15	0.20	0.25	0.0059	0.0079	0.0098

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

SOLDERING FOOTPRINT*



SCALE 20:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

SOT−723

*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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