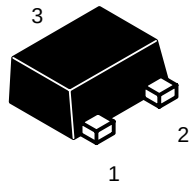
Bias Resistor Transistors

PNP Silicon Surface Mount Transistors With Monolithic Bias Resistor Network

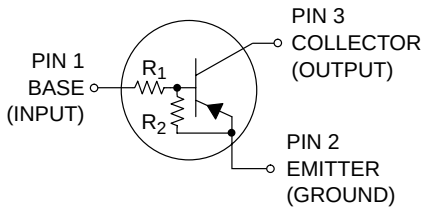
LDTA114EM3T5G Series

This new series of digital transistors is designed to replace a single device and its external resistor bias 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. 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 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.



SOT-723



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

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D	260 (Note 1) 600 (Note 2) 2.0 (Note 1) 4.8 (Note 2)	mW mW/°C
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	480 (Note 1) 205 (Note 2)	°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 x 1.0 inch Pad

MARKING DIAGRAM

xx = Specific Device Code
M = Date Code

LDTA114EM3T5G_Series

ORDERING INFORMATION, DEVICE MARKING AND RESISTOR VALUES

Device	Marking	R1 (K)	R2 (K)	Package	Shipping
LDTA114EM3T5G	6A	10	10	SOT−723 (Pb−Free)	8000/Tape & Reel
LDTA124EM3T5G	6B	22	22		
LDTA144EM3T5G	6C	47	47		
LDTA114YM3T5G	6D	10	47		
LDTA114TM3T5G	6E	10	∞		
LDTA143TM3T5G	6F	4.7	∞		
LDTA123EM3T5G	6H	2.2	2.2		
LDTA143EM3T5G	6J	4.7	4.7		
LDTA143ZM3T5G	6K	4.7	47		
LDTA124XM3T5G	6L	22	47		
LDTA123JM3T5G	6M	2.2	47		
LDTA115EM3T5G	6N	100	100		
LDTA144WM3T5G	6P	47	22		

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	LDTA114EM3T5G	I_{EBO}	−	−	0.5	mAdc
(V_{EB} = 6.0 V, I_C = 0)	LDTA124EM3T5G		−	−	0.2	
	LDTA144EM3T5G		−	−	0.1	
	LDTA114YM3T5G		−	−	0.2	
	LDTA114TM3T5G		−	−	0.9	
	LDTA143TM3T5G		−	−	1.9	
	LDTA123EM3T5G		−	−	2.3	
	LDTA143EM3T5G		−	−	1.5	
	LDTA143ZM3T5G		−	−	0.18	
	LDTA124XM3T5G		−	−	0.13	
	LDTA123JM3T5G		−	−	0.2	
	LDTA115EM3T5G		−	−	0.05	
	LDTA144WM3T5G		−	−	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	LDTA114EM3T5G	h_{FE}	35	60	−	
(V_{CE} = 10 V, I_C = 5.0 mA)	LDTA124EM3T5G		60	100	−	
	LDTA144EM3T5G		80	140	−	
	LDTA114YM3T5G		80	140	−	
	LDTA114TM3T5G		160	250	−	
	LDTA143TM3T5G		160	250	−	
	LDTA123EM3T5G		8.0	15	−	
	LDTA143EM3T5G		15	27	−	
	LDTA143ZM3T5G		80	140	−	
	LDTA124XM3T5G		80	130	−	
	LDTA123JM3T5G		80	140	−	
	LDTA115EM3T5G		80	150	−	
	LDTA144WM3T5G		80	140	−	
Collector−Emitter Saturation Voltage (I_C = 10 mA, I_E = 0.3 mA) (I_C = 10 mA, I_B = 5 mA) LDTA123EM3T5G (I_C = 10 mA, I_B = 1 mA) LDTA114TM3T5G/LDTA143TM3T5G/ LDTA143ZM3T5G/LDTA124XM3T5G/LDTA143EM3T5G		$V_{CE(sat)}$	−	−	0.25	Vdc
Output Voltage (on)		V_{OL}				Vdc
(V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	LDTA114EM3T5G		−	−	0.2	
	LDTA124EM3T5G		−	−	0.2	
	LDTA114YM3T5G		−	−	0.2	
	LDTA114TM3T5G		−	−	0.2	
	LDTA143TM3T5G		−	−	0.2	
	LDTA123EM3T5G		−	−	0.2	
	LDTA143EM3T5G		−	−	0.2	
	LDTA143ZM3T5G		−	−	0.2	
	LDTA124XM3T5G		−	−	0.2	
	LDTA123JM3T5G		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ)	LDTA144EM3T5G		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 5.5 V, R_L = 1.0 kΩ)	LDTA115EM3T5G		−	−	0.2	
(V_{CC} = 5.0 V, V_B = 4.0 V, R_L = 1.0 kΩ)	LDTA144WM3T5G		−	−	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)	LDTA114TM3T5G					
	LDTA143TM3T5G					
	LDTA123EM3T5G					
	LDTA143EM3T5G					

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

LDTA114EM3T5G_Series

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

Characteristic		Symbol	Min	Typ	Max	Unit
Input Resistor	LDTA114EM3T5G	R1	7.0	10	13	kΩ
	LDTA124EM3T5G		15.4	22	28.6	
	LDTA144EM3T5G		32.9	47	61.1	
	LDTA114YM3T5G		7.0	10	13	
	LDTA114TM3T5G		7.0	10	13	
	LDTA143TM3T5G		3.3	4.7	6.1	
	LDTA123EM3T5G		1.5	2.2	2.9	
	LDTA143EM3T5G		3.3	4.7	6.1	
	LDTA143ZM3T5G		3.3	4.7	6.1	
	LDTA124XM3T5G		15.4	22	28.6	
	LDTA123JM3T5G		1.54	2.2	2.86	
	LDTA115EM3T5G		70	100	130	
	LDTA144WM3T5G		32.9	47	61.1	
Resistor Ratio /	LDTA114EM3T5G/LDTA124EM3T5G/LDTA144EM3T5G	R_1/R_2	0.8	1.0	1.2	
	LDTA115EM3T5G		0.17	0.21	0.25	
	LDTA114YM3T5G		–	–	–	
	LDTA114TM3T5G/LDTA143TM3T5G		0.8	1.0	1.2	
	LDTA123EM3T5G/LDTA143EM3T5G		0.055	0.1	0.185	
	LDTA143ZM3T5G		0.38	0.47	0.56	
	LDTA124XM3T5G		0.038	0.047	0.056	
	LDTA123JM3T5G		1.7	2.1	2.6	
	LDTA144WM3T5G					

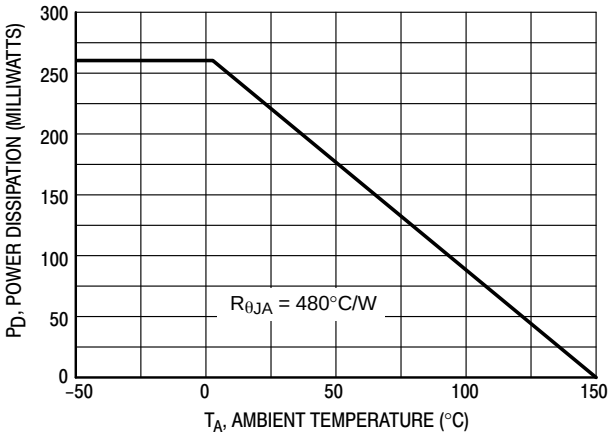


Figure 1. Derating Curve

TYPICAL ELECTRICAL CHARACTERISTICS − LDTA114EM3T5G

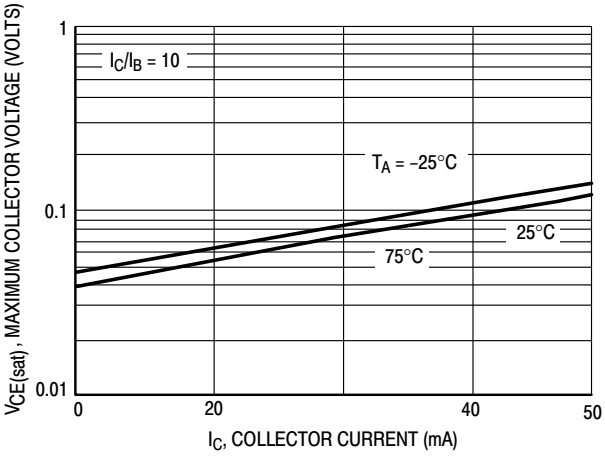


Figure 2. $V_{CE(sat)}$ versus I_C

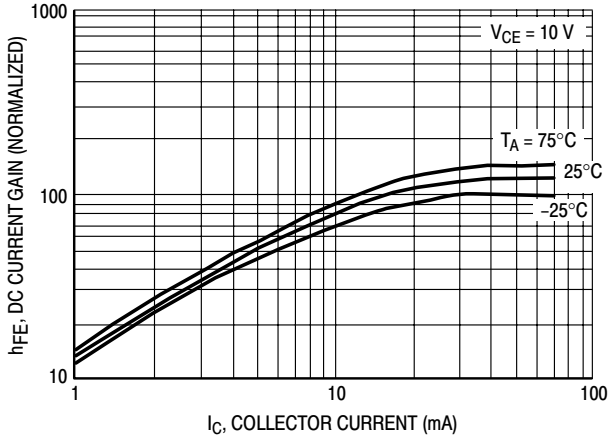


Figure 3. DC Current Gain

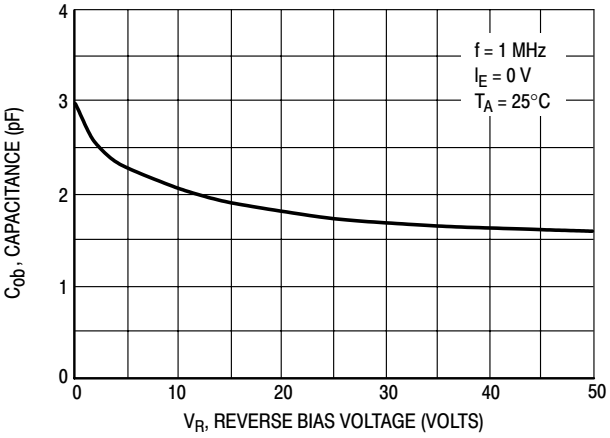


Figure 4. Output Capacitance

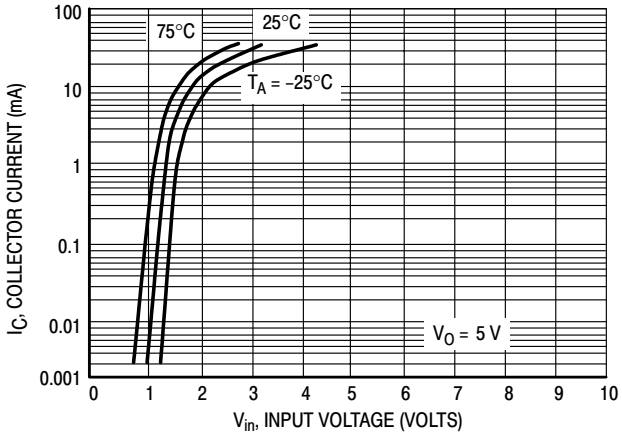


Figure 5. Output Current versus Input Voltage

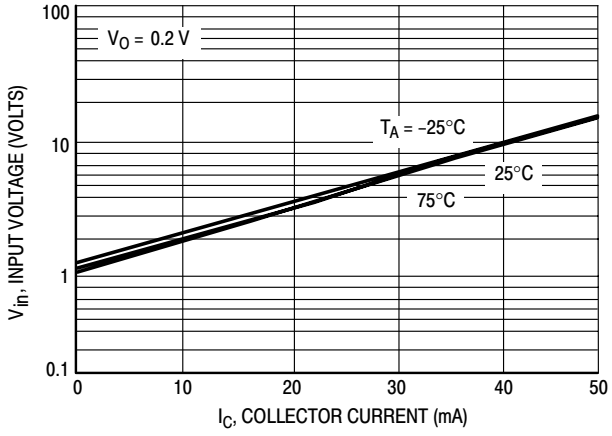


Figure 6. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − LDTA124EM3T5G

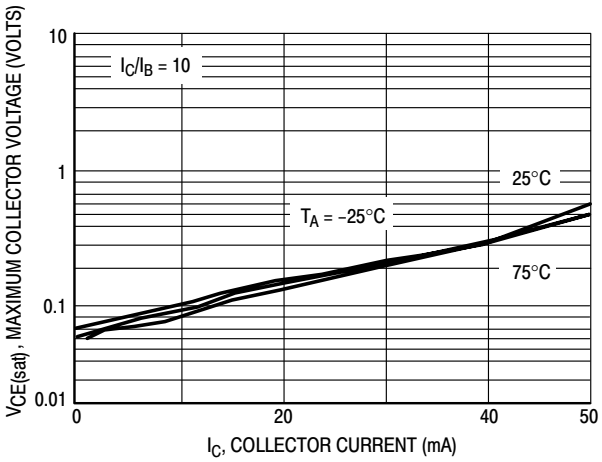


Figure 7. $V_{CE(sat)}$ versus I_C

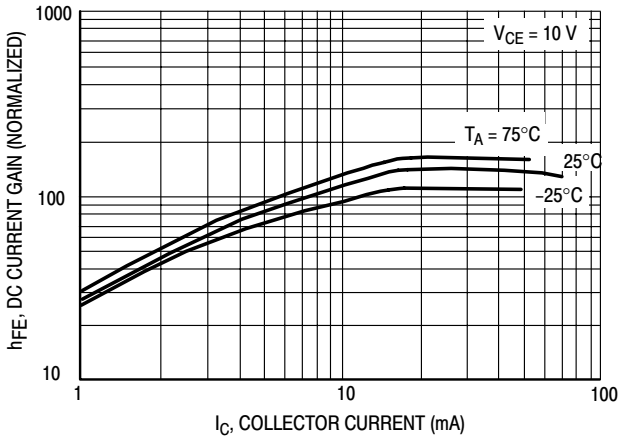


Figure 8. DC Current Gain

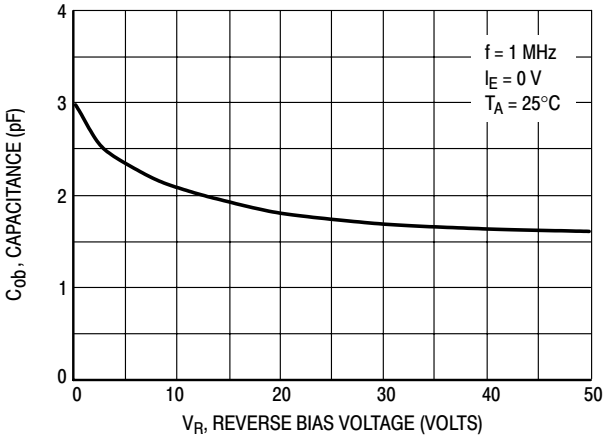


Figure 9. Output Capacitance

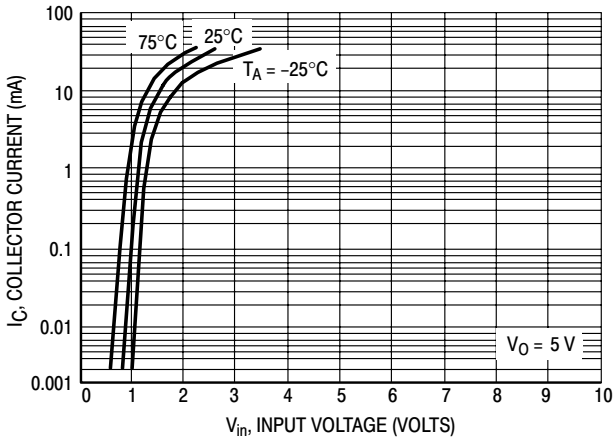


Figure 10. Output Current versus Input Voltage

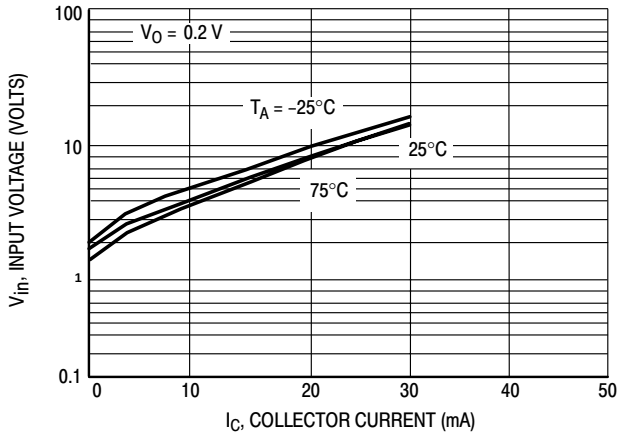


Figure 11. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − LDTA144EM3T5G

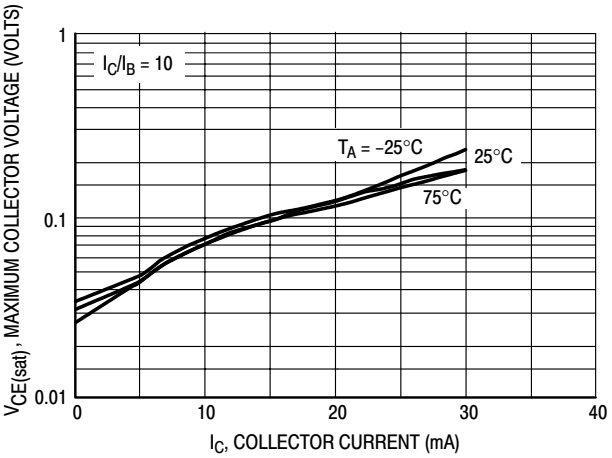


Figure 12. $V_{CE(sat)}$ versus I_C

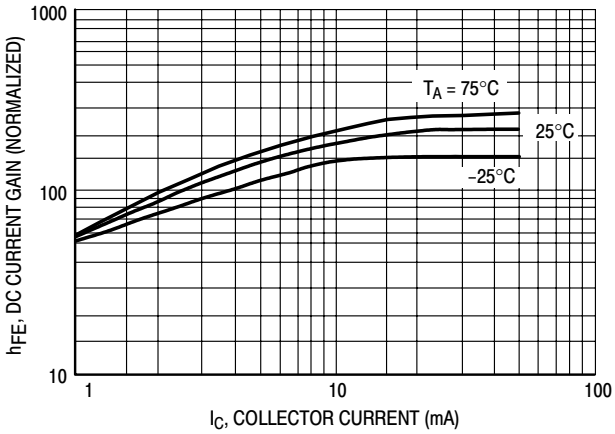


Figure 13. DC Current Gain

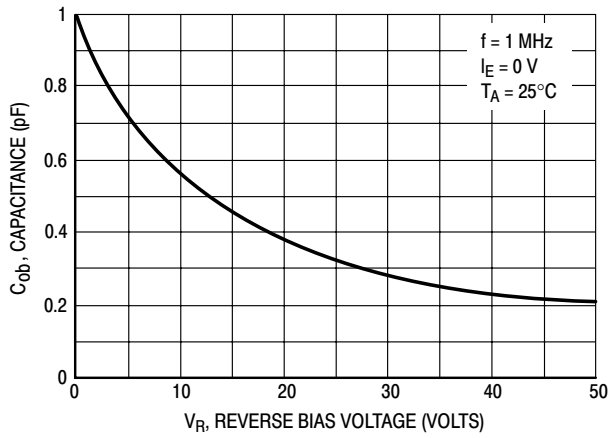


Figure 14. Output Capacitance

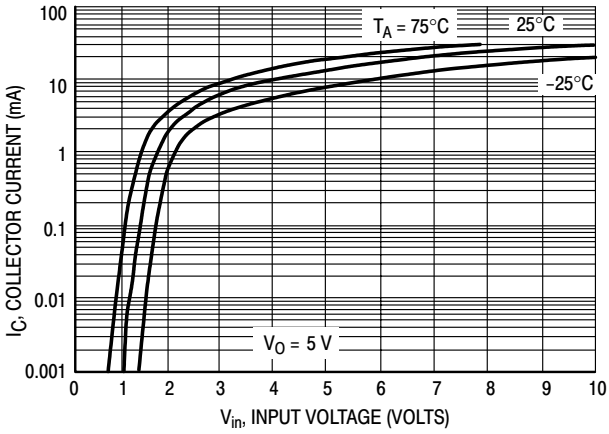


Figure 15. Output Current versus Input Voltage

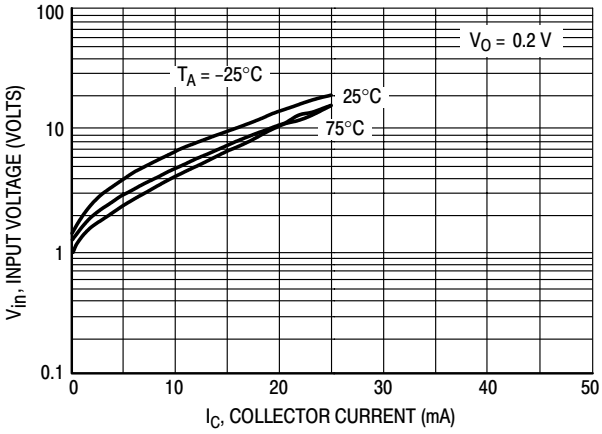


Figure 16. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS − LDTA114YM3T5G

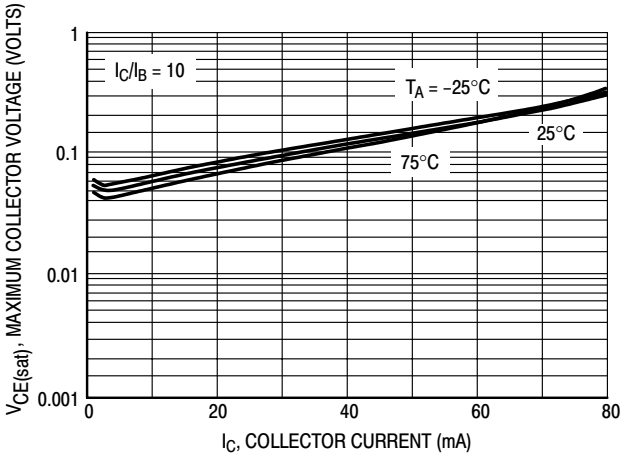


Figure 17. $V_{CE(sat)}$ versus I_C

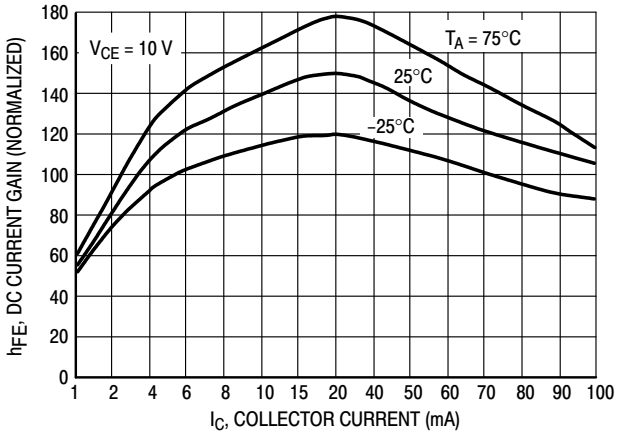


Figure 18. DC Current Gain

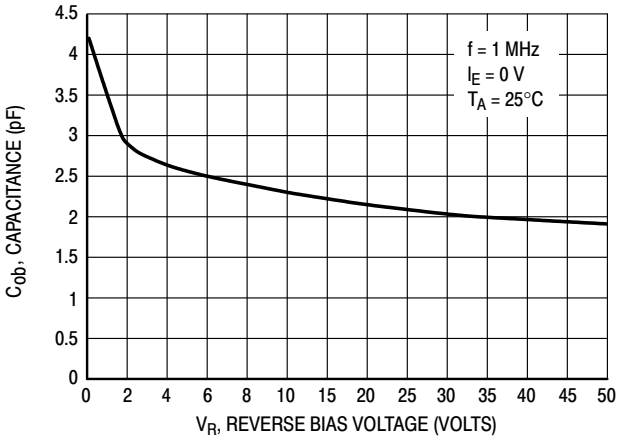


Figure 19. Output Capacitance

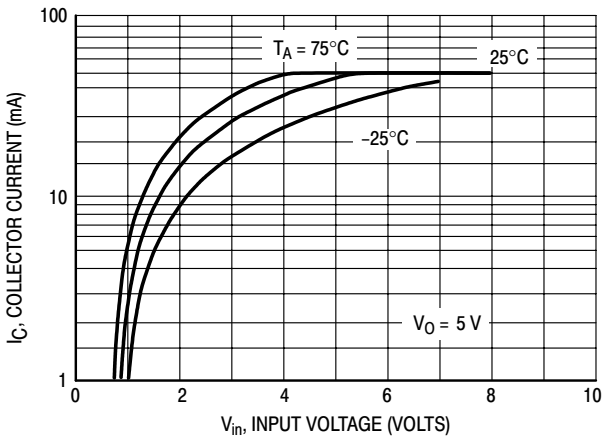


Figure 20. Output Current versus Input Voltage

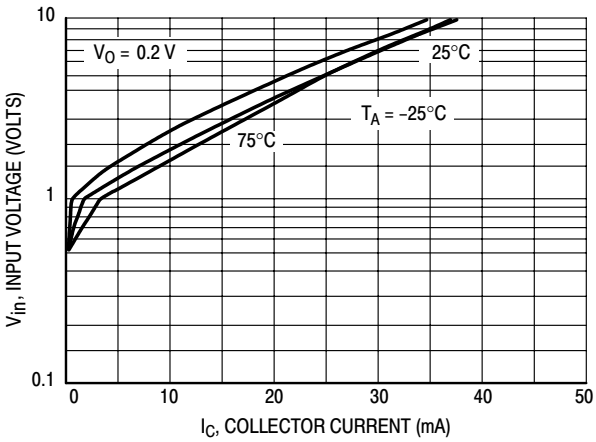


Figure 21. Input Voltage versus Output Current

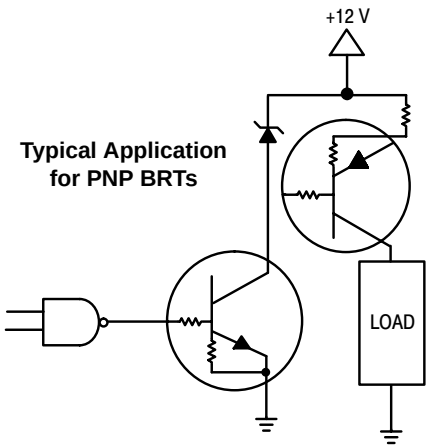


Figure 22. Inexpensive, Unregulated Current Source

TYPICAL ELECTRICAL CHARACTERISTICS — LDTA115EM3T5G

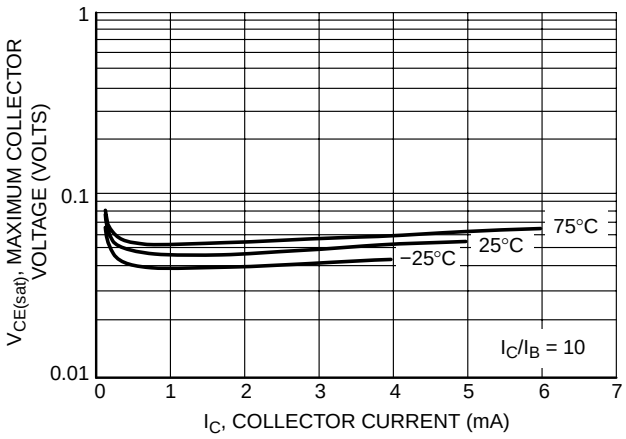


Figure 23. Maximum Collector Voltage versus Collector Current

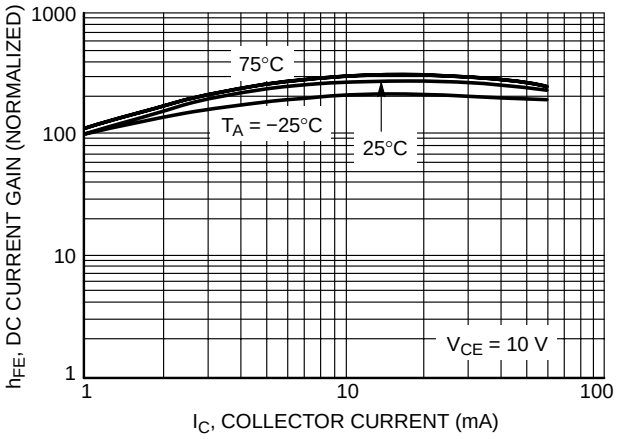


Figure 24. DC Current Gain

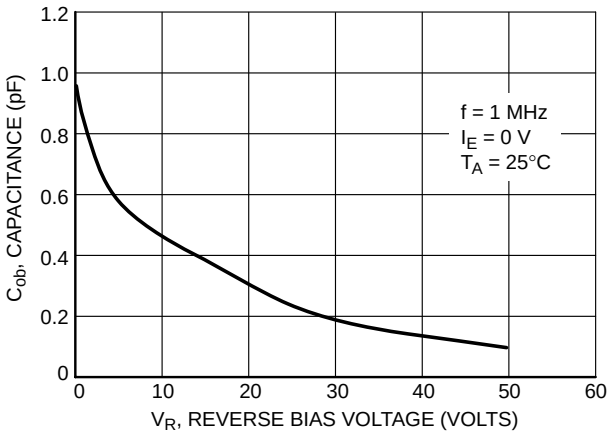


Figure 25. Output Capacitance

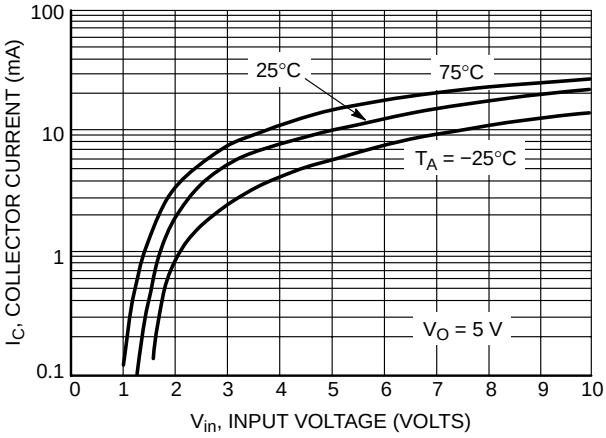


Figure 26. Output Current versus Input Voltage

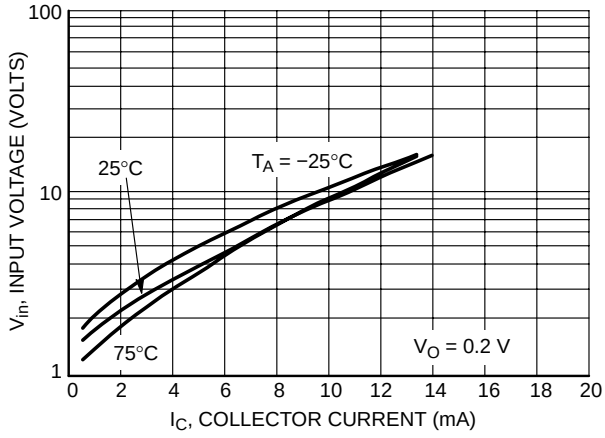


Figure 27. Input Voltage versus Output Current

TYPICAL ELECTRICAL CHARACTERISTICS — LDTA144WM3T5G

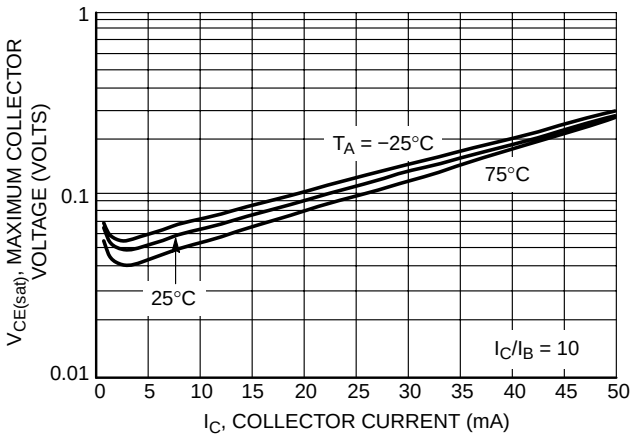


Figure 28. Maximum Collector Voltage versus Collector Current

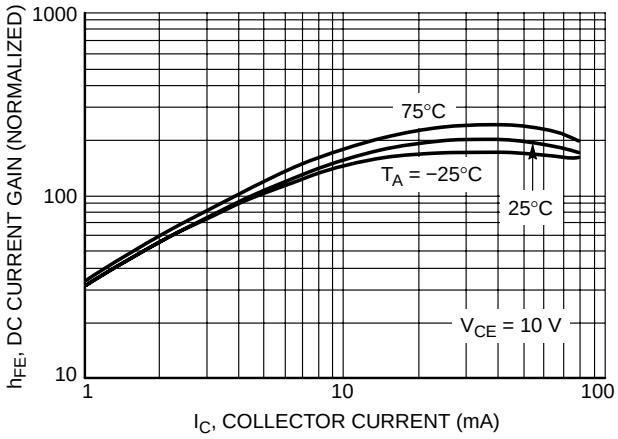


Figure 29. DC Current Gain

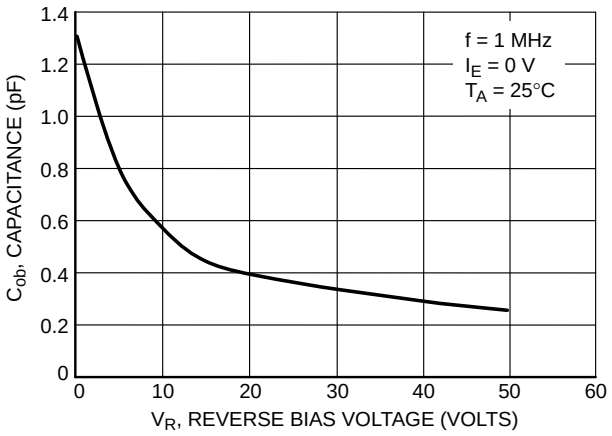


Figure 30. Output Capacitance

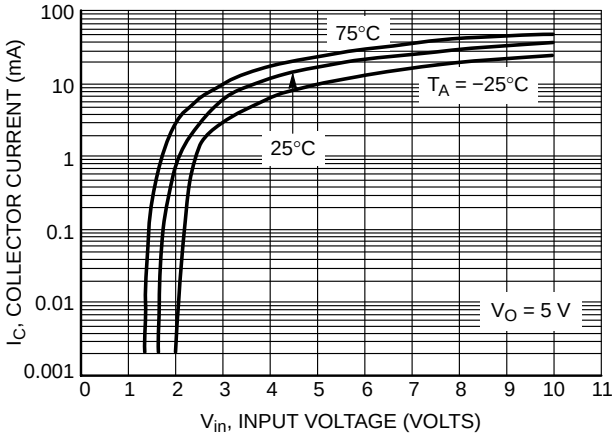


Figure 31. Output Current versus Input Voltage

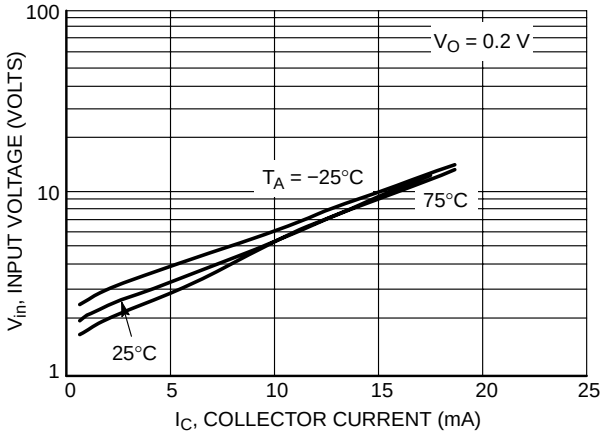
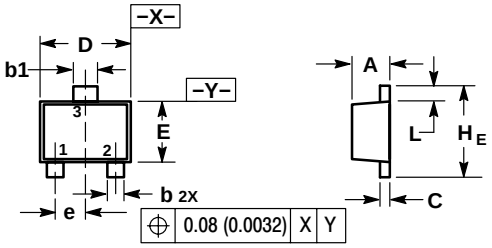


Figure 32. Input Voltage versus Output Current

LDTA114EM3T5G_Series

PACKAGE DIMENSIONS

SOT−723

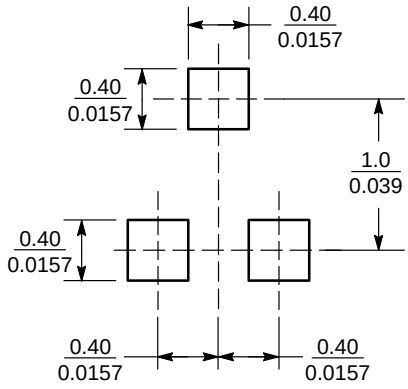


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

PIN 1. BASE
2. EMITTER
3. COLLECTOR

	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

SOLDERING FOOTPRINT



$\left(\frac{mm}{inches}\right)$