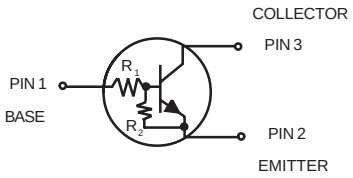
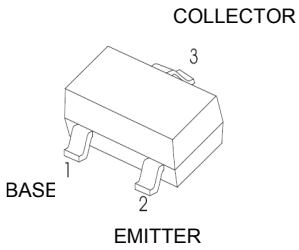
迈拓电子
MAITUO ELECTRONIC

MMUN52xxW Series Bias Resistor Transistor

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 SC–70/SOT–323 package which is designed for low power surface mount applications.





SOT-323

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	202 (Note 1.) 310 (Note 2.) 1.6 (Note 1.) 2.5 (Note 2.)	mW mW/°C
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	618 (Note 1.) 403 (Note 2.)	°C/W
Thermal Resistance – Junction-to-Lead	$R_{\theta JL}$	280 (Note 1.) 332 (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

DEVICE MARKING RESISTOR VALUES AND ORDERING INFORMATION

Device	Package	Marking	R1(K)	R2(K)
MMUN5211W	SOT-323	8A	10	10
MMUN5212W	SOT-323	8B	22	22
MMUN5213W	SOT-323	8C	47	47
MMUN5214W	SOT-323	8D	10	47
MMUN5215W	SOT-323	8E	10	∞
MMUN5216W	SOT-323	8F	4.7	∞
MMUN5230W	SOT-323	8G	1	1
MMUN5231W	SOT-323	8H	2.2	2.2
MMUN5232W	SOT-323	8J	4.7	4.7
MMUN5233W	SOT-323	8K	4.7	47
MMUN5234W	SOT-323	8L	22	47
MMUN5235W	SOT-323	8M	2.2	47
MMUN5236W	SOT-323	8N	100	100
MMUN5237W	SOT-323	8P	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 (V_{EB} = 6.0 V, I_C = 0)	MMUN5211W	I_{EBO}	–	–	0.5	mAdc
	MMUN5212W		–	–	0.2	
	MMUN5213W		–	–	0.1	
	MMUN5214W		–	–	0.2	
	MMUN5215W		–	–	0.9	
	MMUN5216W		–	–	1.9	
	MMUN5230W		–	–	4.3	
	MMUN5231W		–	–	2.3	
	MMUN5232W		–	–	1.5	
	MMUN5233W		–	–	0.18	
	MMUN5234W		–	–	0.13	
	MMUN5235W		–	–	0.2	
	MMUN5236W		–	–	0.05	
	MMUN5237W		–	–	0.13	
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
ON CHARACTERISTICS (Note 4.)						
DC Current Gain (V_{CE} = 10 V, I_C = 5.0 mA)	MMUN5211W	h_{FE}	35	60	220	
	MMUN5212W		60	100	–	
	MMUN5213W		80	140	320	
	MMUN5214W		80	140	–	
	MMUN5215W		160	350	–	
	MMUN5216W		160	350	–	
	MMUN5230W		3.0	5.0	–	
	MMUN5231W		8.0	15	–	
	MMUN5232W		15	30	–	
	MMUN5233W		80	200	–	
	MMUN5234W		80	150	–	
	MMUN5235W		80	140	–	
	MMUN5236W		80	150	–	
	MMUN5237W		80	140	–	
Collector-Emitter Saturation Voltage (I_C = 10 mA, I_B = 0.3 mA) (I_C = 10 mA, I_B = 5 mA) LMUN5230T1/LMUN5231T1 (I_C = 10 mA, I_B = 1 mA) LMUN5215T1/LMUN5216T1/ LMUN5232T1/LMUN5233T1/LMUN5234T1		$V_{CE(sat)}$	–	–	0.25	Vdc
Output Voltage (on) (V_{CC} = 5.0 V, V_B = 2.5 V, R_L = 1.0 kΩ)	MMUN5211W	V_{OL}	–	–	0.2	Vdc
	MMUN5212W		–	–	0.2	
	MMUN5213W		–	–	0.2	
	MMUN5214W		–	–	0.2	
	MMUN5215W		–	–	0.2	
	MMUN5216W		–	–	0.2	
	MMUN5230W		–	–	0.2	
	MMUN5231W		–	–	0.2	
	MMUN5232W		–	–	0.2	
	MMUN5233W		–	–	0.2	
	MMUN5234W		–	–	0.2	
(V_{CC} = 5.0 V, V_B = 3.5 V, R_L = 1.0 kΩ	MMUN5235W		–	–	0.2	
(V_{CC} = 5.0 V, V_B = 5.5 V, R_L = 1.0 kΩ	MMUN5236W		–	–	0.2	
(V_{CC} = 5.0 V, V_B = 4.0 V, R_L = 1.0 kΩ	MMUN5237W		–	–	0.2	

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

ELECTRICAL CHARACTERISTICS (T_A = 25℃ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 5.) (Continued)					
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 = 0.050 V, R_L = 1.0 kΩ) MMUN5230W (V_{CC} = 5.0 V, V_B = 0.25 V, R_L = 1.0 kΩ) MMUN5215W MMUN5216W MMUN5233W	V_{OH}	4.9	–	–	Vdc
Input Resistor MMUN5211W	R_1	7.0	10	13	kΩ
MMUN5212W		15.4	22	28.6	
MMUN5213W		32.9	47	61.1	
MMUN5214W		7.0	10	13	
MMUN5215W		7.0	10	13	
MMUN5216W		3.3	4.7	6.1	
MMUN5230W		0.7	1.0	1.3	
MMUN5231W		1.5	2.2	2.9	
MMUN5232W		3.3	4.7	6.1	
MMUN5233W		3.3	4.7	6.1	
MMUN5234W		15.4	22	28.6	
MMUN5235W		1.54	2.2	2.86	
MMUN5236W		70	100	130	
MMUN5237W		32.9	47	61.1	
Resistor Rati MMUN5211W /MMUN5212W /MMUN5213W / MMUN5236W	R_1/R_2	0.8	1.0	1.2	
MMUN5214W		0.17	0.21	0.25	
MMUN5215W /MMUN5216W		–	–	–	
MMUN5230W /MMUN5231W /MMUN5232W		0.8	1.0	1.2	
MMUN5233W		0.055	0.1	0.185	
MMUN5234W		0.38	0.47	0.56	
MMUN5235W		0.038	0.047	0.056	
MMUN5237W		1.7	2.1	2.6	

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

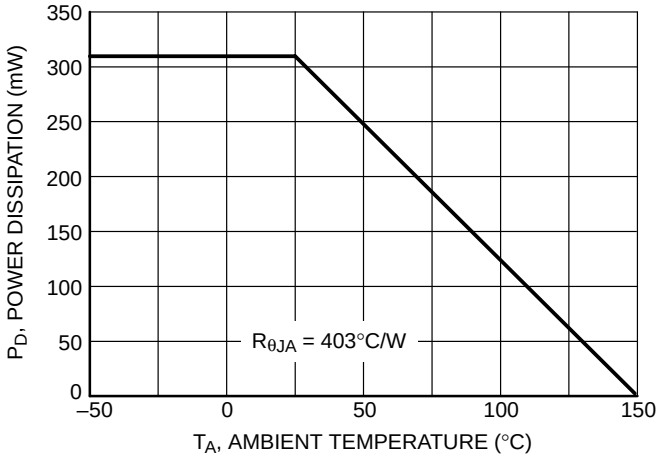


Figure 1. Derating Curve

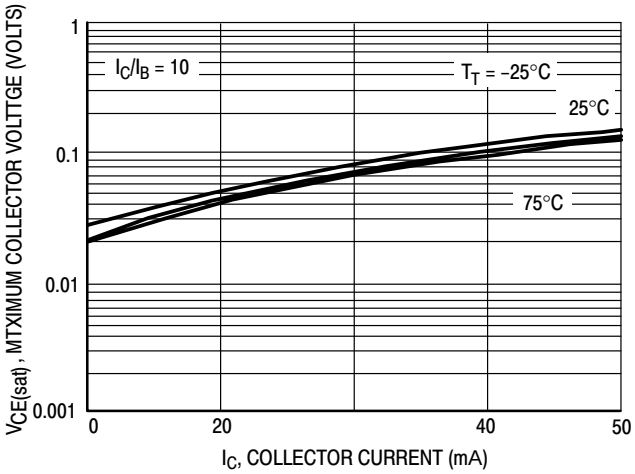


Figure 2. $V_{CE(sat)}$ versus I_C

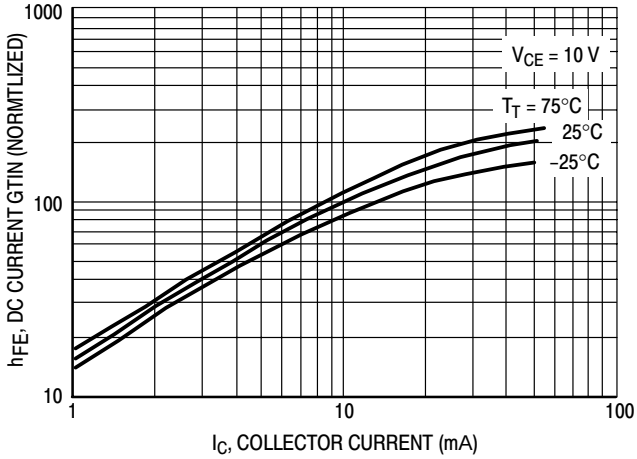


Figure 3. DC Current Gain

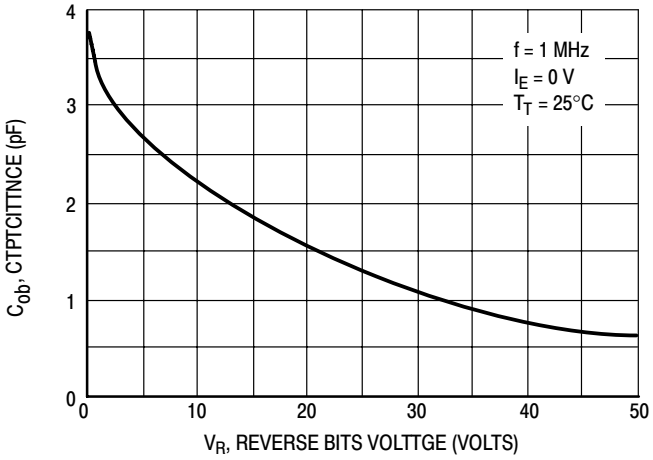


Figure 4. Output Capacitance

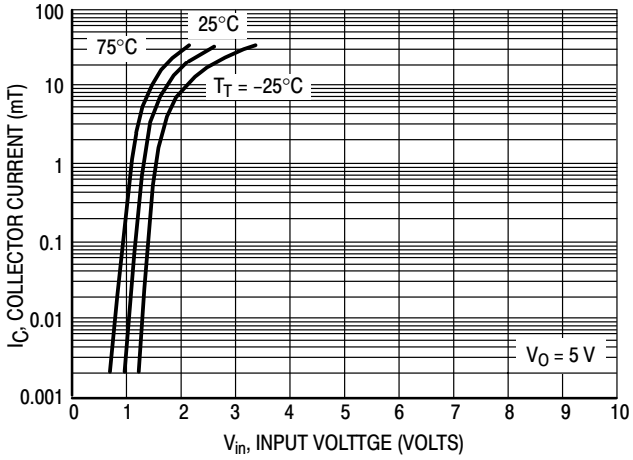
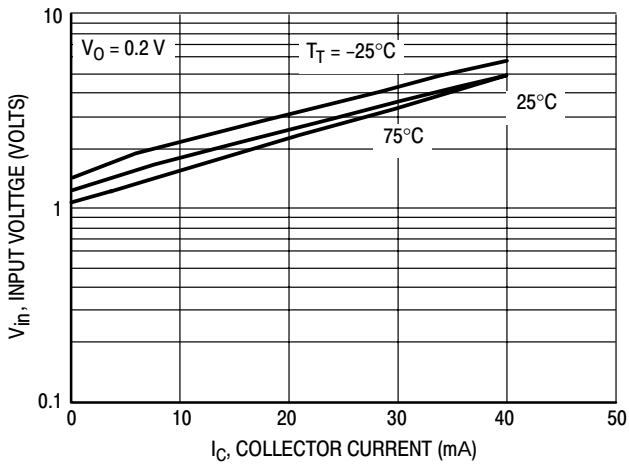


Figure 5. Output Current versus Input Voltage



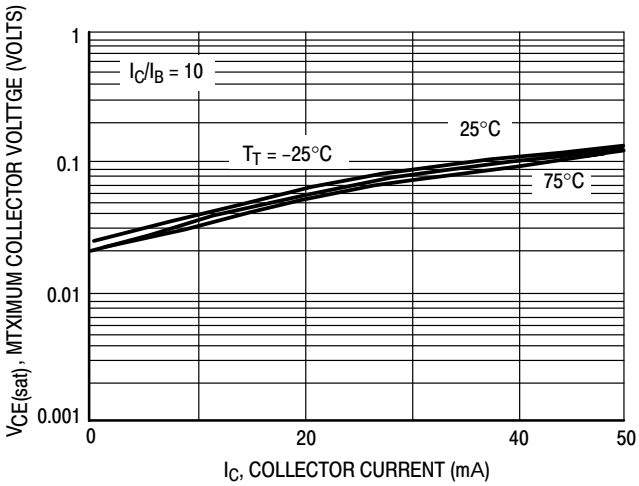


Figure 7. $V_{CE(sat)}$ versus I_C

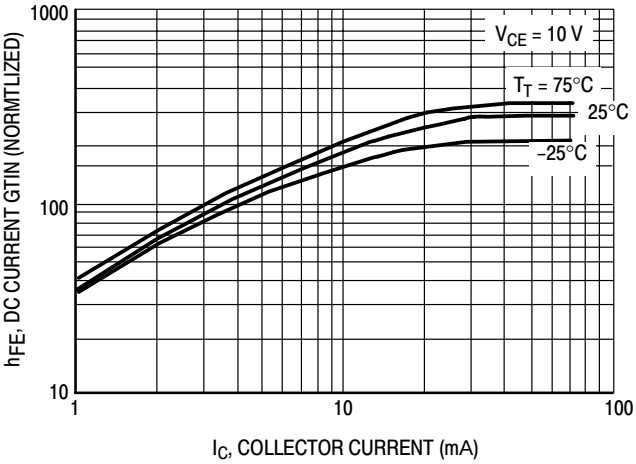


Figure 8. DC Current Gain

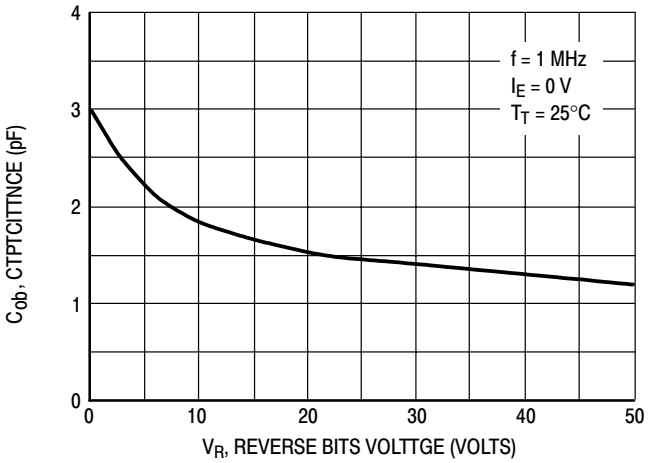


Figure 9. Output Capacitance

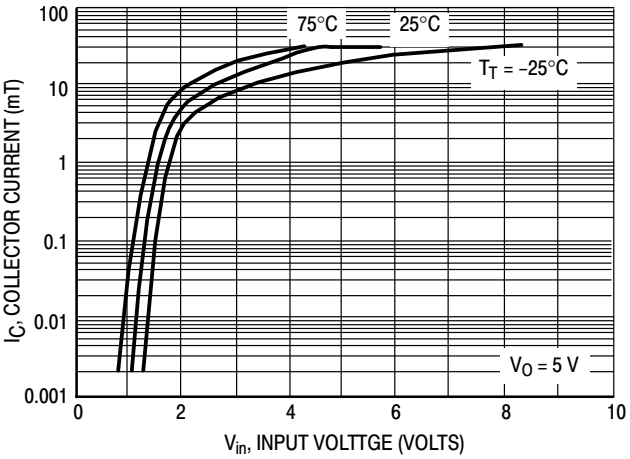
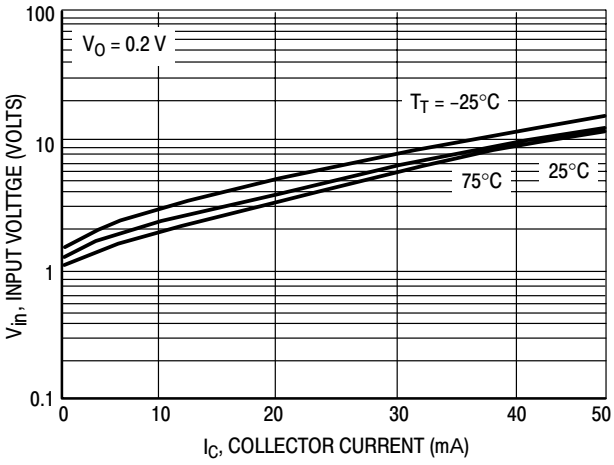


Figure 10. Output Current versus Input Voltage



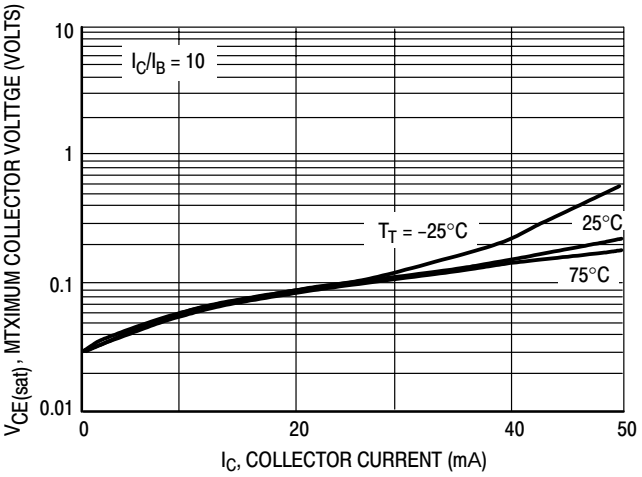


Figure 12. $V_{CE(sat)}$ versus I_C

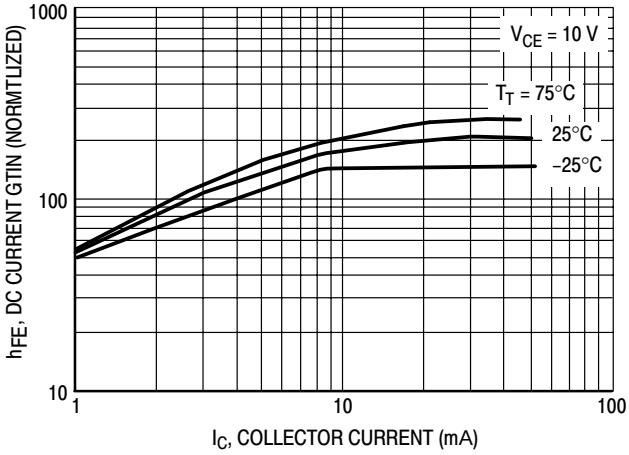


Figure 13. DC Current Gain

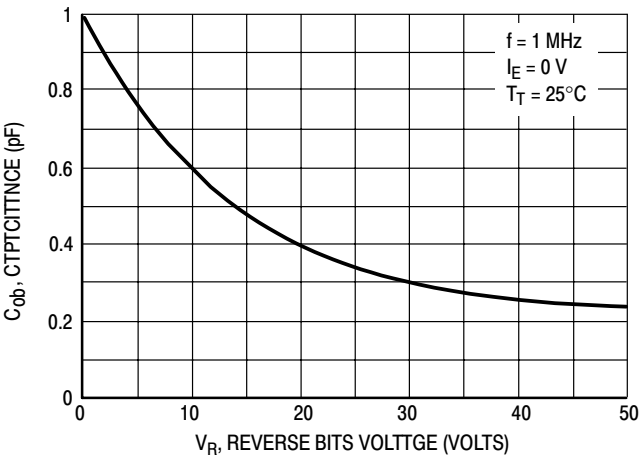


Figure 14. Output Capacitance

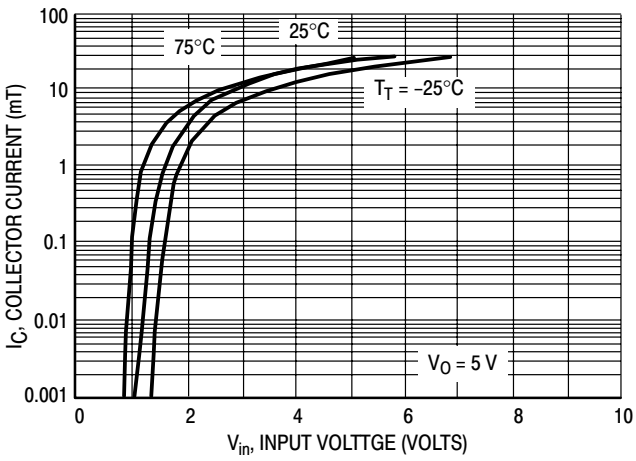
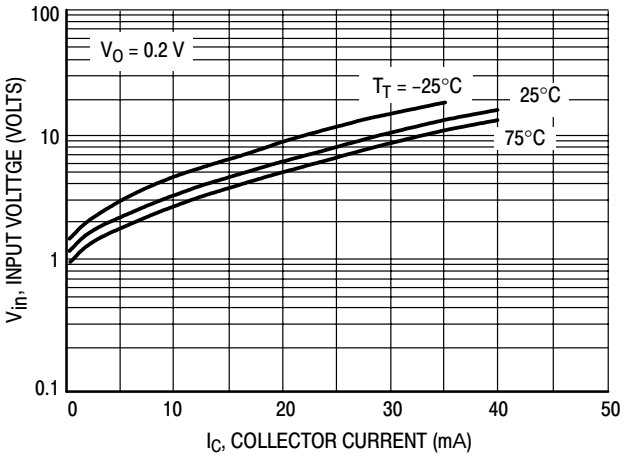


Figure 15. Output Current versus Input Voltage



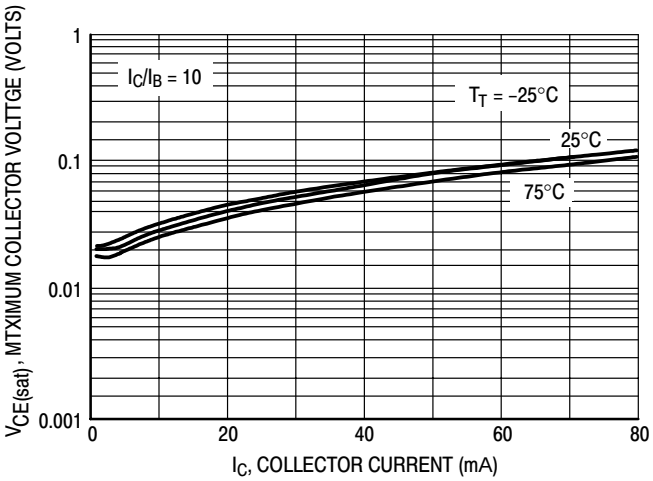


Figure 17. $V_{CE(sat)}$ versus I_C

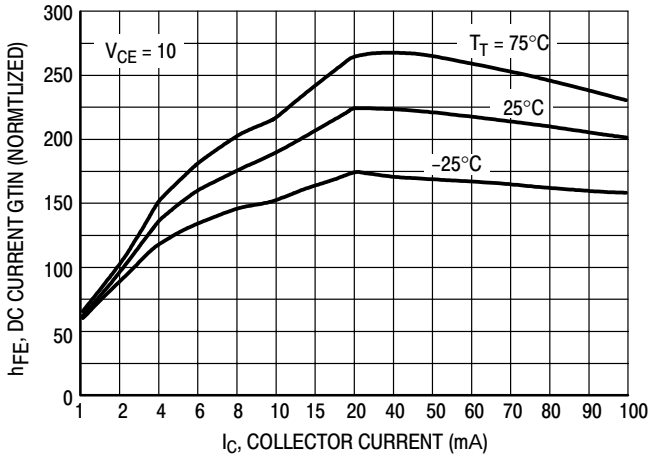


Figure 18. DC Current Gain

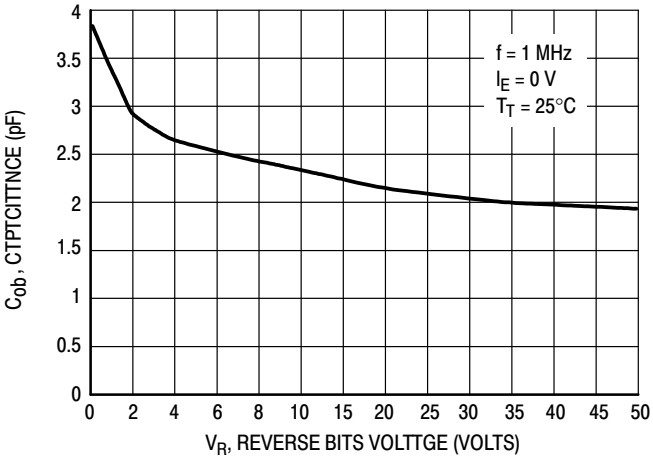


Figure 19. Output Capacitance

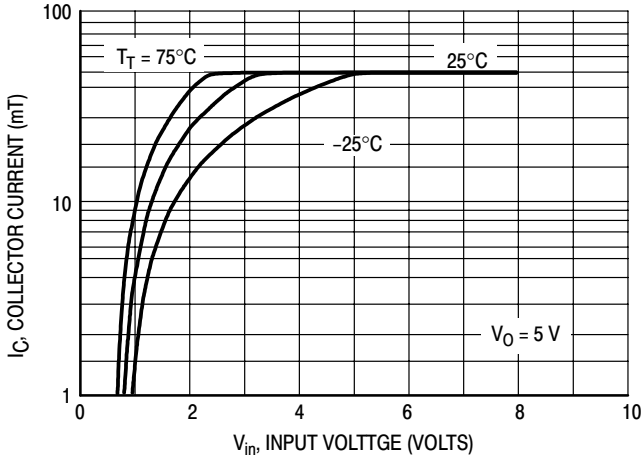
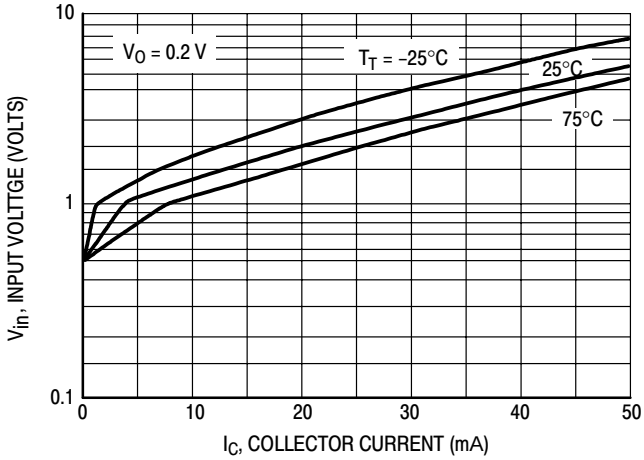
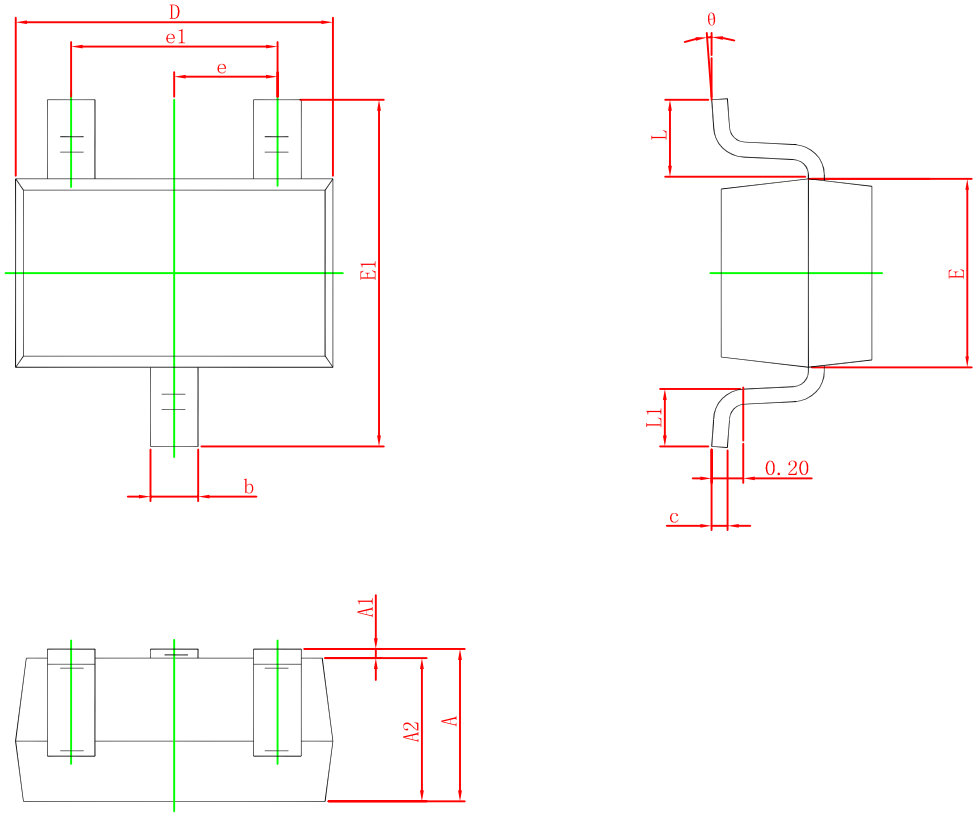


Figure 20. Output Current versus Input Voltage



迈拓电子
MAITUO ELECTRONIC

SOT-323 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.200	0.400	0.008	0.016
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP.		0.026 TYP.	
e1	1.200	1.400	0.047	0.055
L	0.525 REF.		0.021 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°