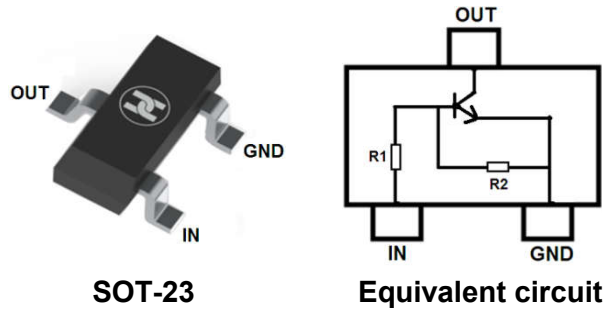


**NPN SILICON TRANSISTORS (BUILT-IN RESISTORS, R1=10kΩ, R2= 47kΩ)**
**FEATURES**

- Simplifies circuit design
- Reduces board space and component count

**MECHANICAL DATA**

- Case: SOT-23
- Case material: Molded plastic. UL flammability
- Classification rating: 94V-0
- Weight: 0.008 grams (approximate)



Marking: A8D

**MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Value	Unit
Collector-emitter voltage	$V_{CEO}$	50	Vdc
Collector-base voltage	$V_{CBO}$	50	Vdc
Collector current-continuous	$I_C$	100	mAdc
Input forward voltage	$V_{IN(fwd)}$	40	Vdc
Input reverse voltage	$V_{IN(rev)}$	6	Vdc
Total device dissipation FR-5 board (note 1)	$T = 25^\circ\text{C}$	246	mW
	Derate above $T=25^\circ\text{C}$	1.6	mW/°C
Thermal resistance, junction to ambient (note 1)	$R_{\theta JA}$	625	°C/W
Junction and storage temperature	$T_J, T_{STG}$	-65 to +150	°C

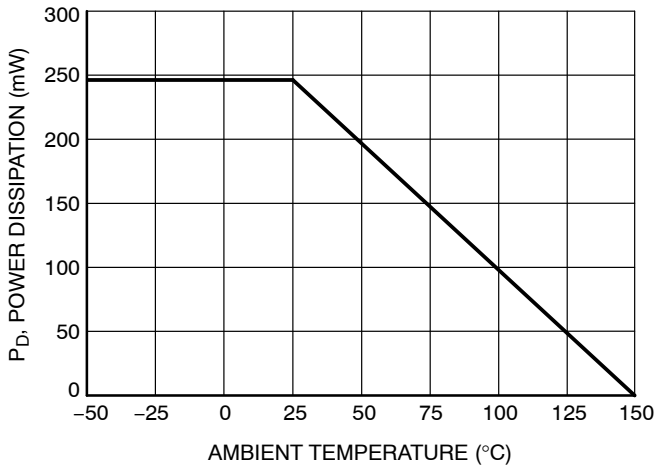
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
Collector-base cutoff current	$I_{CBO}$			100	nAdc	$V_{CB} = 50\text{ V}, I_E = 0$
Collector-emitter cutoff current	$I_{CEO}$			500	nAdc	$V_{CE} = 50\text{ V}, I_B = 0$
Emitter-base cutoff current	$I_{EBO}$			0.2	nAdc	$V_{EB} = 6.0\text{ V}, I_C = 0$
Collector-base breakdown voltage	$V_{(BR)CBO}$	50			Vdc	$I_C = 10\mu\text{A}, I_E = 0$
Collector-emitter breakdown voltage (note 2)	$V_{(BR)CEO}$	50			Vdc	$I_C = 2.0\text{ mA}, I_B = 0$
DC current gain (note 2)	$h_{FE}$	80	140			$I_C = 5.0\text{ mA}, V_{CE} = 10\text{ V}$
Collector-emitter saturation voltage (note 2)	$V_{CE(sat)}$			0.25	Vdc	$I_C = 10\text{ mA}, I_B = 0.3\text{ mA}$
Input voltage (off)	$V_{i(off)}$		0.5	0.7	Vdc	$V_{CE} = 5.0\text{ V}, I_C = 100\mu\text{A}$
Input voltage (on)	$V_{i(on)}$	1.4	0.8		Vdc	$V_{CE} = 0.3\text{ V}, I_C = 1.0\text{ mA}$
Output voltage (on)	$V_{OL}$			0.2	Vdc	$V_{CC} = 5.0\text{ V}, V_B = 2.5\text{ V}, R_L = 1.0\text{ k}\Omega$
Output voltage (off)	$V_{OH}$	4.9			Vdc	$V_{CC} = 5.0\text{ V}, V_B = 0.5\text{ V}, R_L = 1.0\text{ k}\Omega$
Input resistor	R1	7.0	10	13	kΩ	
Resistor Ratio	R1/R2	0.17	0.21	0.25		

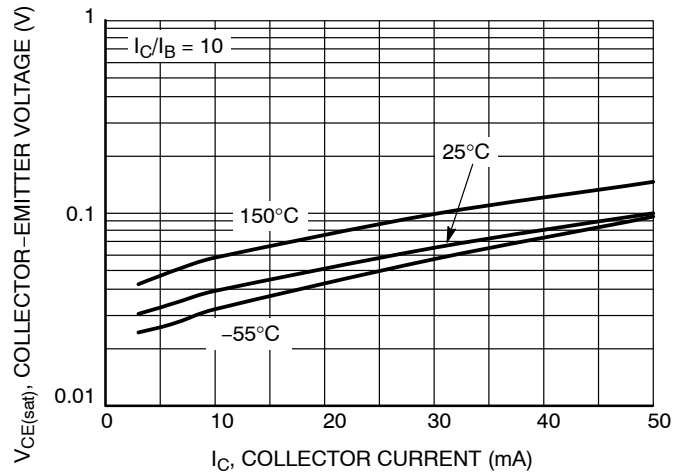
Note: 1.FR-4 @ minimum pad; 2.Pulse Test: Pulse Width &lt; 300 ms, Duty Cycle &lt; 2.0%

NPN SILICON TRANSISTORS (BUILT-IN RESISTORS, R1=10kΩ, R2= 47kΩ)

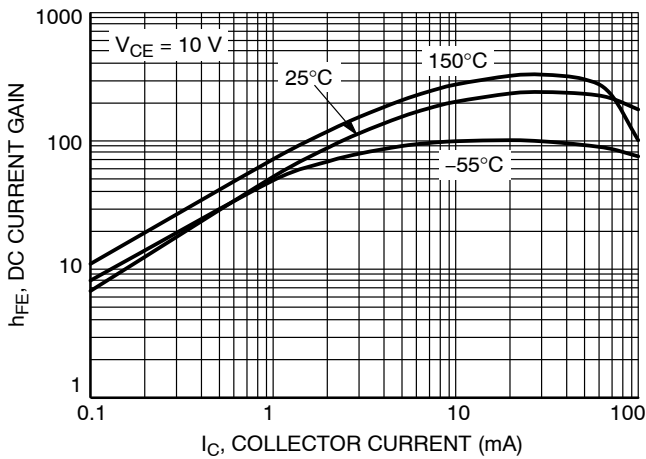
**TYPICAL CHARACTERISTICS**



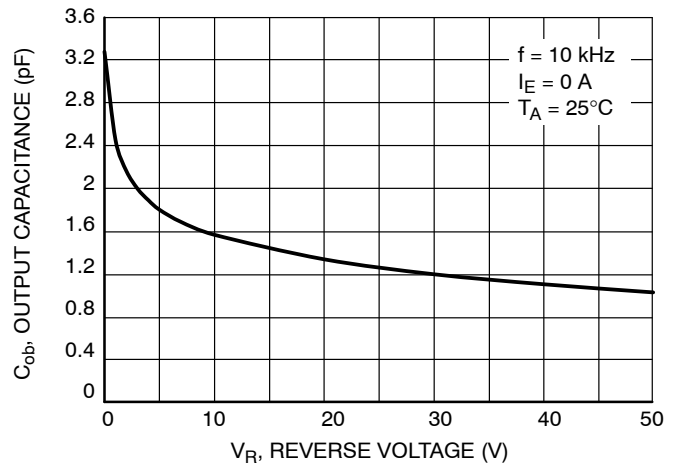
**Figure 1. Derating Curve**



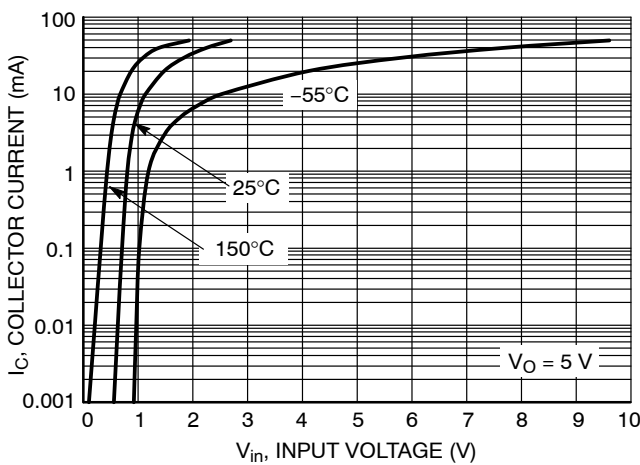
**Figure 2.  $V_{CE(sat)}$  vs.  $I_C$**



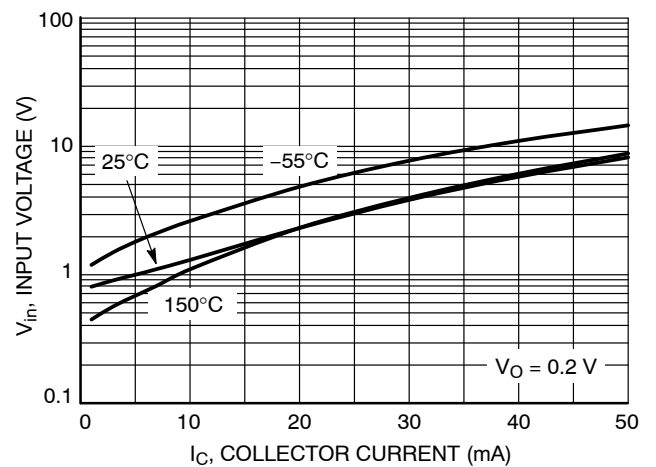
**Figure 3. DC Current Gain**



**Figure 4. Output Capacitance**

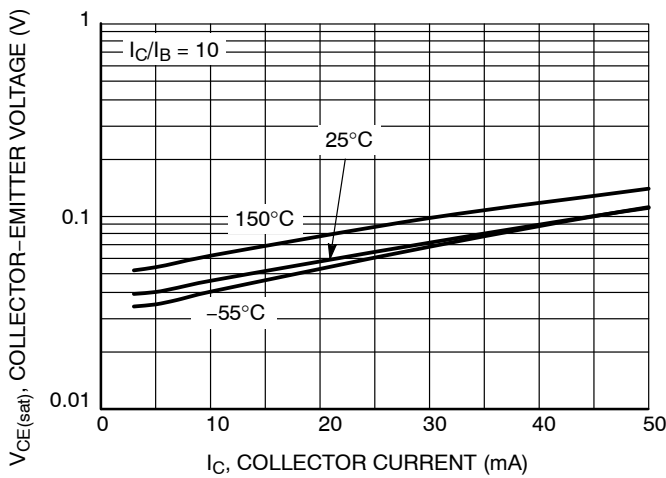


**Figure 5. Output Current vs. Input Voltage**

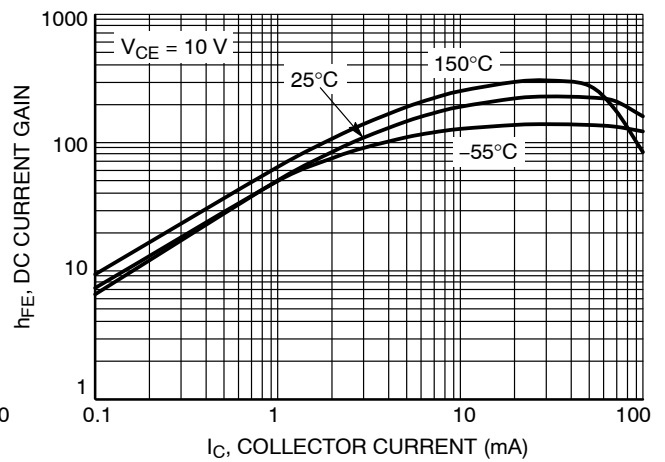


**Figure 6. Input Voltage vs. Output Current**

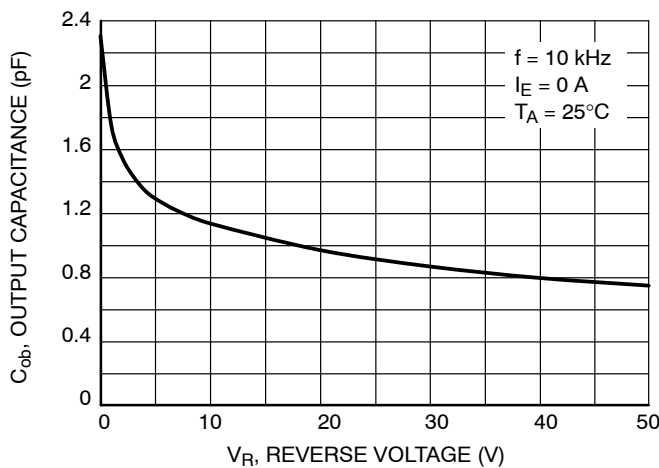
NPN SILICON TRANSISTORS (BUILT-IN RESISTORS, R1=10kΩ, R2= 47kΩ)



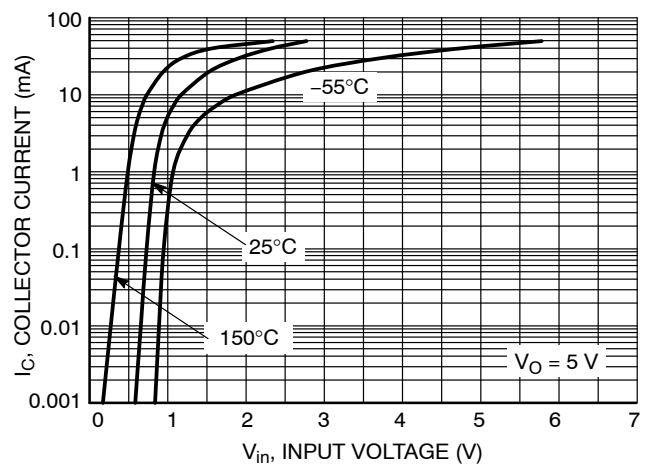
**Figure 7.  $V_{CE(sat)}$  vs.  $I_C$**



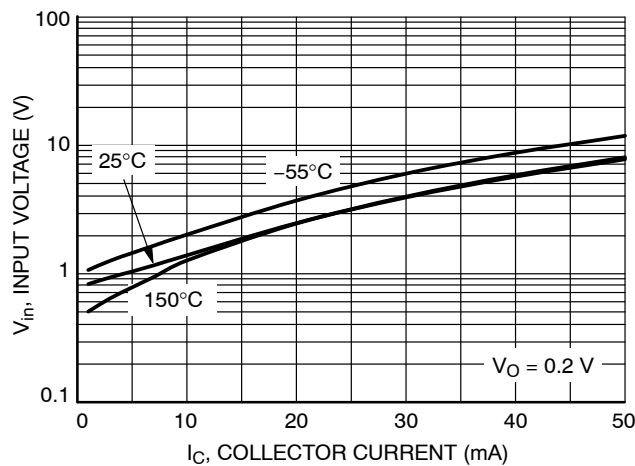
**Figure 8. DC Current Gain**



**Figure 9. Output Capacitance**

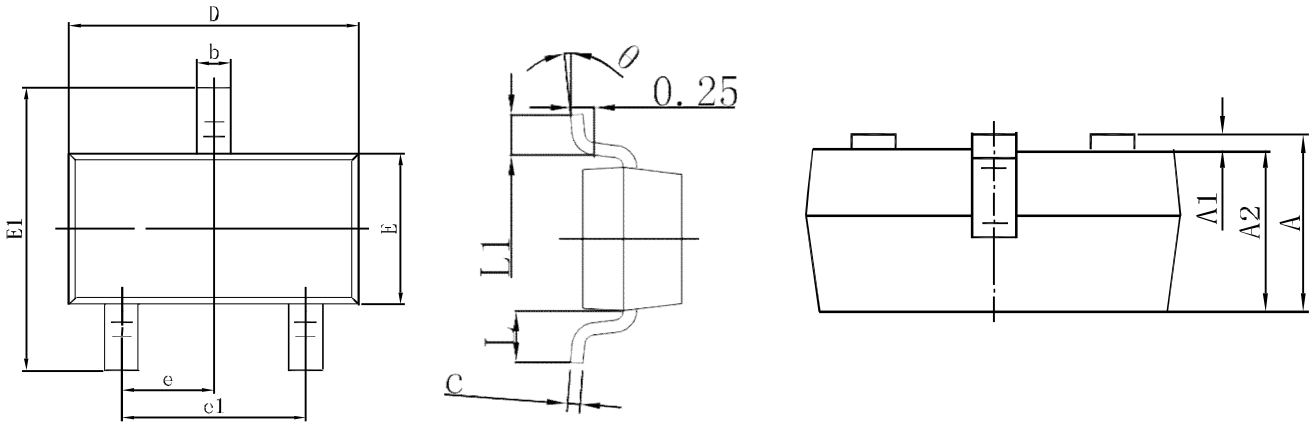


**Figure 10. Output Current vs. Input Voltage**

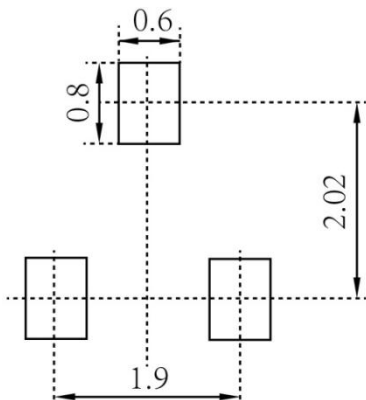


**Figure 11. Input Voltage vs. Output Current**

NPN SILICON TRANSISTORS (BUILT-IN RESISTORS,R1=10kΩ,R2= 47kΩ)

**SOT-23 PACKAGE OUTLINE DIMENSIONS**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

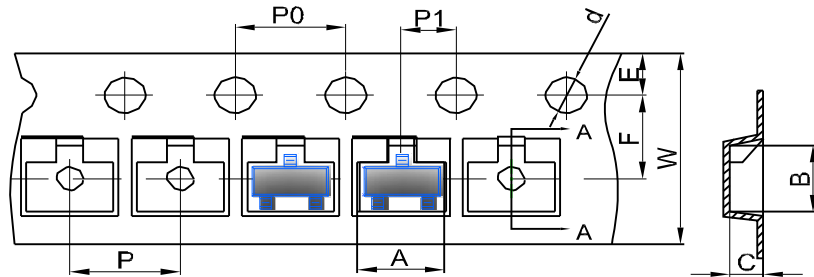
**SOT-23 SUGGESTED PAD LAYOUT**

**Note:**

1. Controlling dimension: in millimeters
2. General tolerance:  $\pm 0.05\text{mm}$
3. The pad layout is for reference purposes only

NPN SILICON TRANSISTORS (BUILT-IN RESISTORS, R1=10kΩ, R2= 47kΩ)

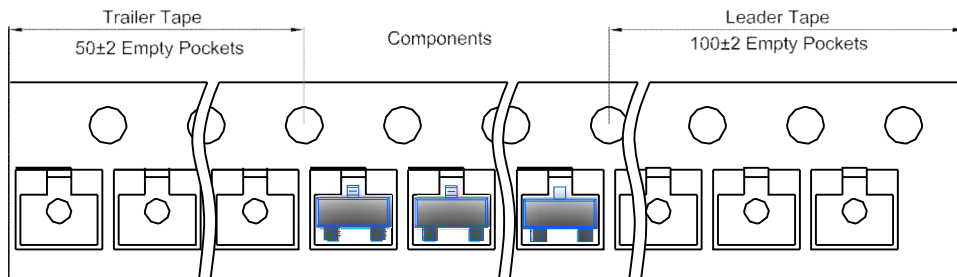
## SOT-23 TAPE AND REEL

### SOT-23 Embossed Carrier Tape

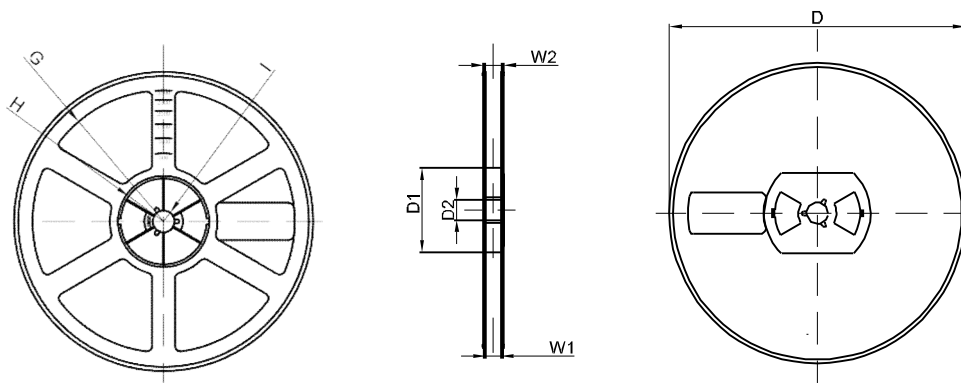


DIMENSIONS ARE IN MILLIMETER										
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

### SOT-23 Tape Leader and Trailer



### SOT-23 Reel



DIMENSIONS ARE IN MILLIMETER								
REEL OPTION	D	D1	D2	G	H	I	W1	W2
7" DIA	Ø178	54.40	13.00	R78	R25.60	R6.50	9.50	12.30
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1