SEMICONDUCTOR

TECHNI CAL DATA

MMBT3906

PNP EPITAXIAL SILICON TRANSISTOR

GENERAL PURPOSE TRANSISTOR

* Complement to MMBT3904
* Collector Dissipation: Pc=225mW
* Collector-Emitter Voltage :Vceo=- 40V

Package:SOT-23

PIN: / STYLE	1	2	3
NO.1	B	E	C

ABSOLUTE MAXIMUM RATINGS (Ta=25℃ unless otherwise specified)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	Vcbo	-40	V
Collector-Emitter Voltage	Vceo	-40	V
Emitter-Base Voltage	Vebo	-5	V
Collector Current	Ic	-200	mA
Collector Dissipation Ta=25℃*	P_D	225	mW
Junction Temperature	Tj	150	℃
Storage Temperature	Tstg	-55-150	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃ unless otherwise specified)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector-Base Breakdown Voltage	BVcbo	-40			V	Ic= -10uA Ie=0
Collector-Emitter Breakdown Voltage#	BVceo	-40			V	Ic= -1mA Ib=0
Emitter-Base Breakdown Voltage	BVebo	-5			V	Ie= -10uA Ic=0
Emitter-Base Cutoff Current	Iebo			-50	nA	Veb= -3V Ie=0
Collector Cutoff Current	Icex			-50	nA	Vce= -30V Veb= -3V
DC Current Gain	Hfe1	60				Vce= -1V Ic= -0.1mA
DC Current Gain	Hfe2	80				Vce= -1V Ic= -1mA
DC Current Gain	Hfe3	100		300		Vce= -1V Ic= -10mA
DC Current Gain	Hfe4	60				Vce= -1V Ic= -50mA
DC Current Gain	Hfe5	50				Vce= -1V Ic= -100mA
Collector-Emitter Saturation Voltage	Vce(sat)			-0.4	V	Ic= -50mA Ib= -5mA
Collector-Emitter Saturation Voltage	Vce(sat)			-0.25	V	Ic= -10mA Ib= -1mA
Base-Emitter Saturation Voltage	Vbe(sat)			-0.95	V	Ic= -50mA Ib= -5mA
Base-Emitter Saturation Voltage	Vbe(sat)			-0.85	V	Ic= -10mA Ib= -1mA
Output Capacitance	Cobo			4.5	PF	Vce=-5.0V Ie=0 f=1.0MHz
Input Capacitance	Cibo			10	PF	Vce=-0.5V Ie=0 f=1.0MHz
Current Gain-Bandwidth Product	f_T	250			MHz	Vce= -20V Ic= -10mA f=100MHz
Noise Figure	NF			4.0	dB	Vce=5V Ic=100uA Rs=1.0KΩ F=1.0KHz
Delay Time	t_d			35	ns	(VCC = −3.0 Vdc, VEB(off) = −0.5 Vdc I C =− 10 mAdc, I B1 = −1.0 mAdc)
Rise Time	t_r			35	ns	
Storage Time	t_s			225	ns	(VCC = −3.0 Vdc, I C =−10 mAdc I B1 = I B2 = −1.0 mAdc)
Fall Time	t_f			75	ns	

* **Total Device Dissipation :** FR=1X0.75X0.062in Board, Derate 25℃.

 # Pulse Test : Pulse Width ≤300uS,Duty cycle ≤2%

DEVICE MARKING: MMBT3906=2A

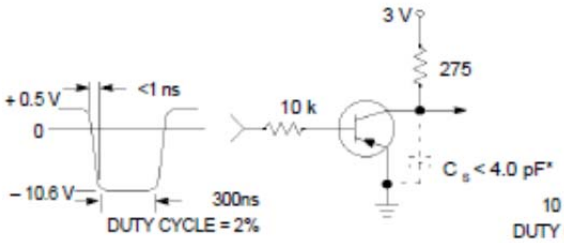

Figure 1. Delay and Rise Time Equivalent Test Circuit

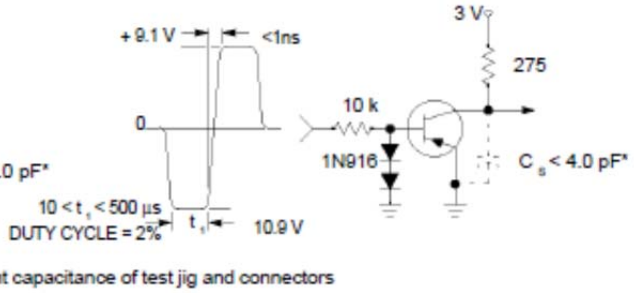

Figure 2. Storage and Fall Time Equivalent Test Circuit

TYPICAL TRANSIENT CHARACTERISTICS

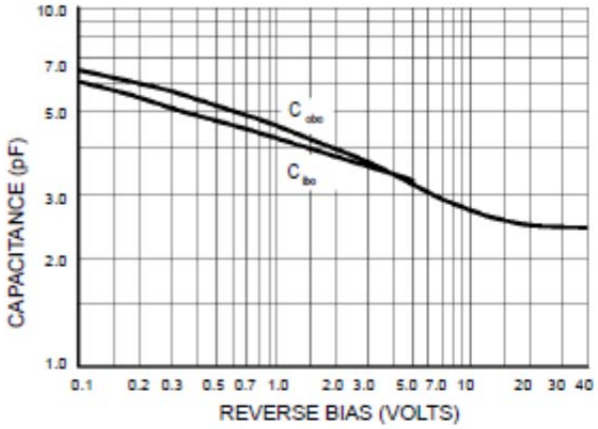

Figure 3. Capacitance

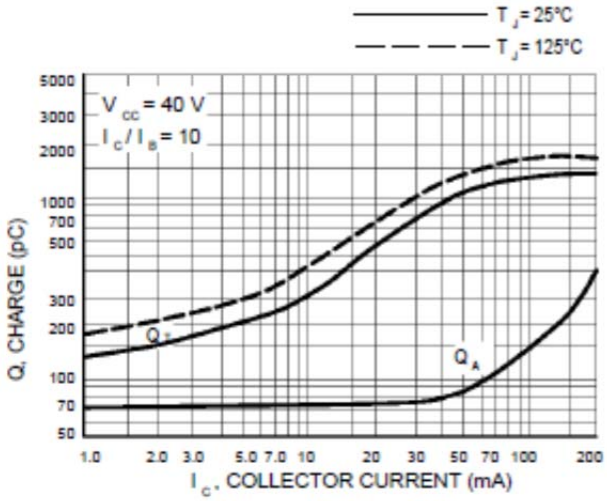

Figure 4. Charge Data

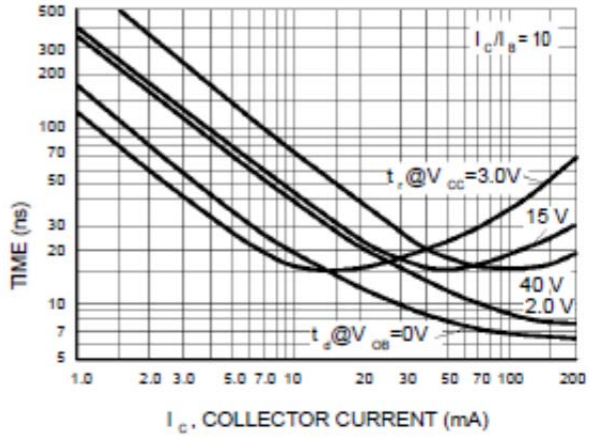

Figure 5. Turn–On Time

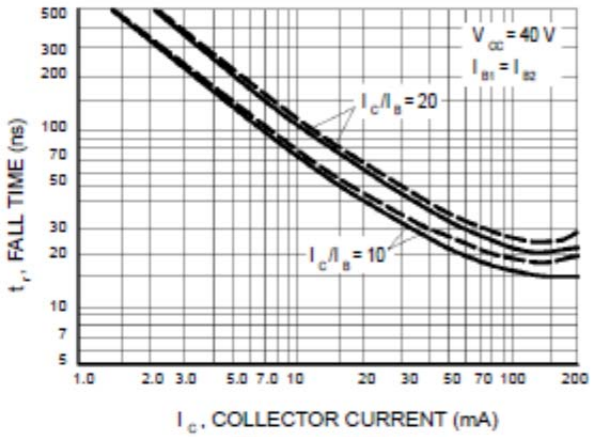

Figure 6. Fall Time

TYPICAL AUDIO SMALL–SIGNAL CHARACTERISTICS

NOISE FIGURE VARIATIONS

(V_{CE} = – 5.0 Vdc, T_A = 25°C, Bandwidth = 1.0 Hz)

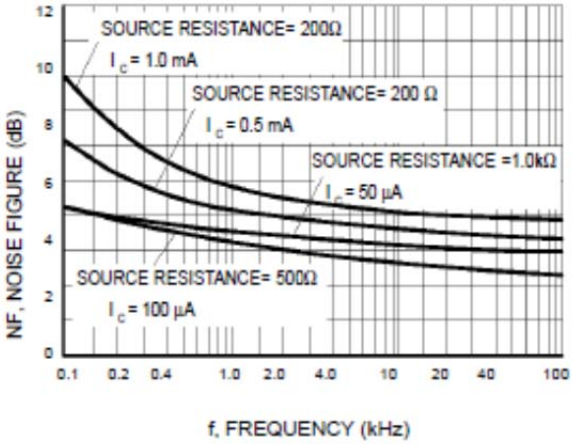

Figure 7. Noise Figure

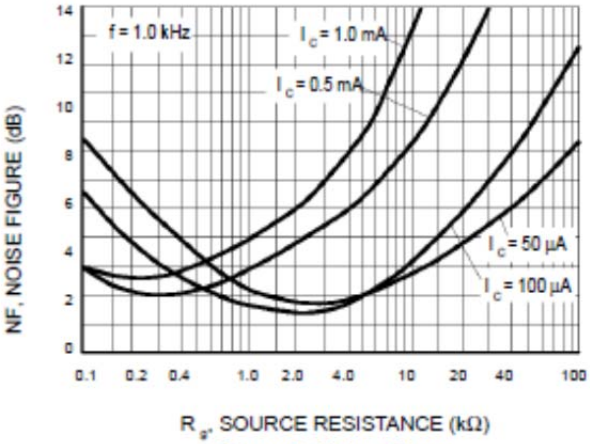

Figure 8. Noise Figure

h PARAMETERS

(V_{CE} = 10 Vdc, f = 1.0 kHz, T_A = 25°C)

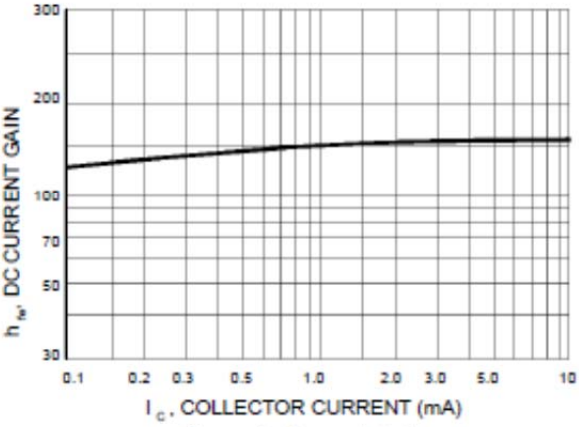

Figure 9. Current Gain

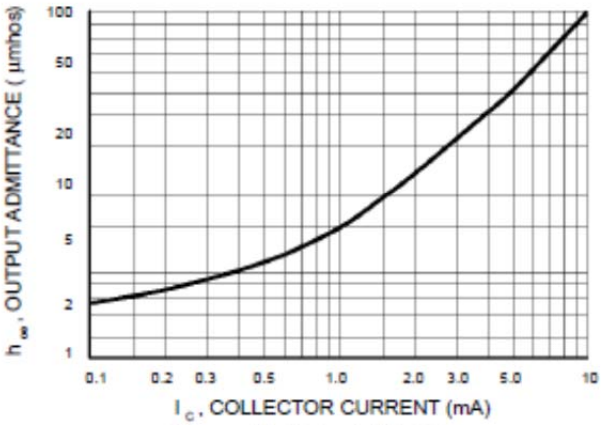

Figure 10. Output Admittance

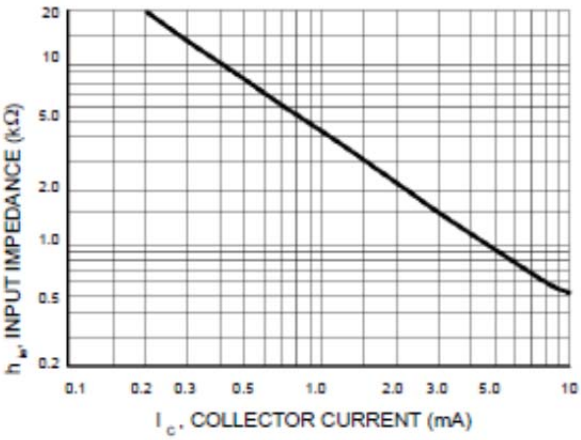

Figure 11. Input Impedance

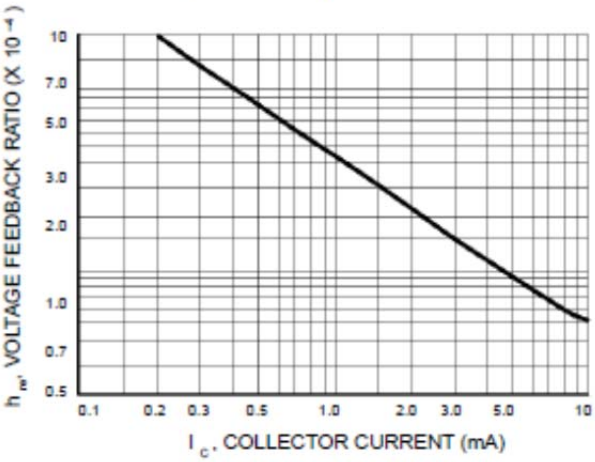

Figure 12. Voltage Feedback Ratio

TYPICAL STATIC CHARACTERISTICS

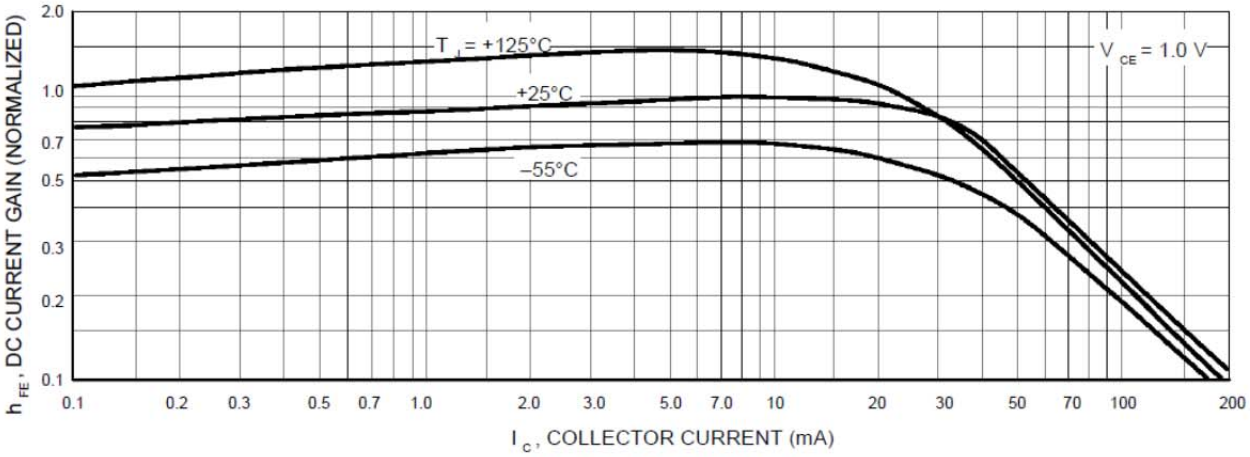

Figure 13. DC Current Gain

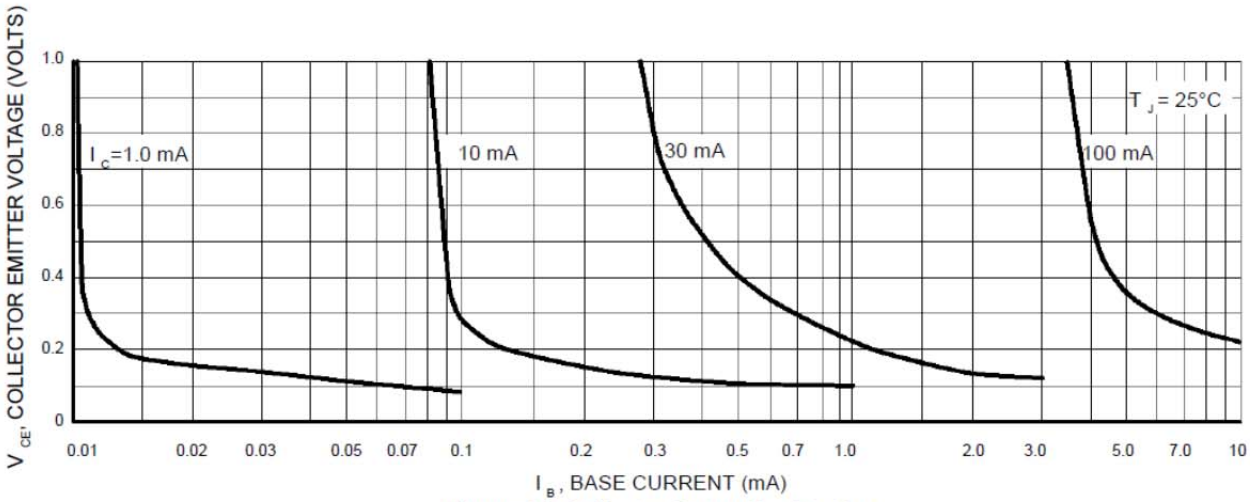

Figure 14. Collector Saturation Region

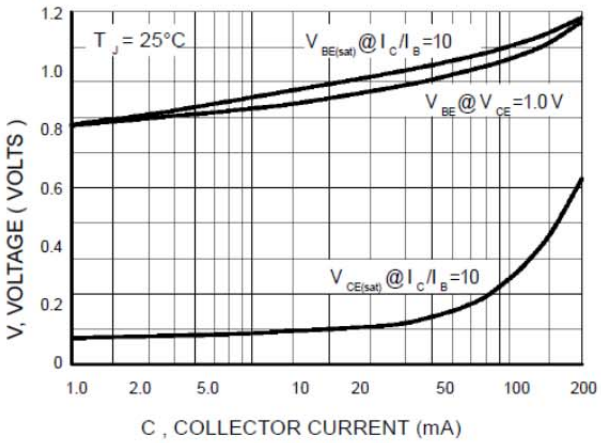

Figure 15. "ON" Voltages

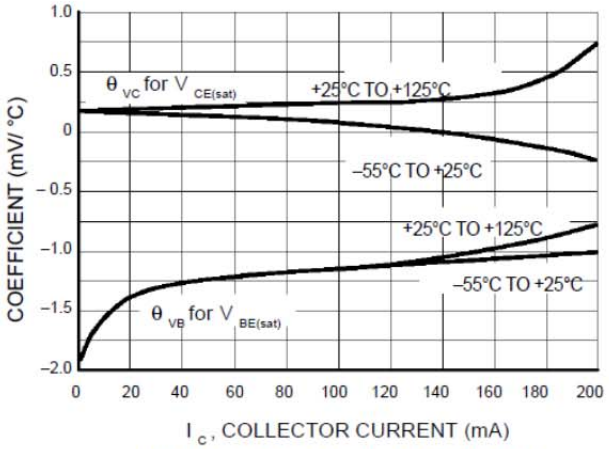

Figure 16. Temperature Coefficients

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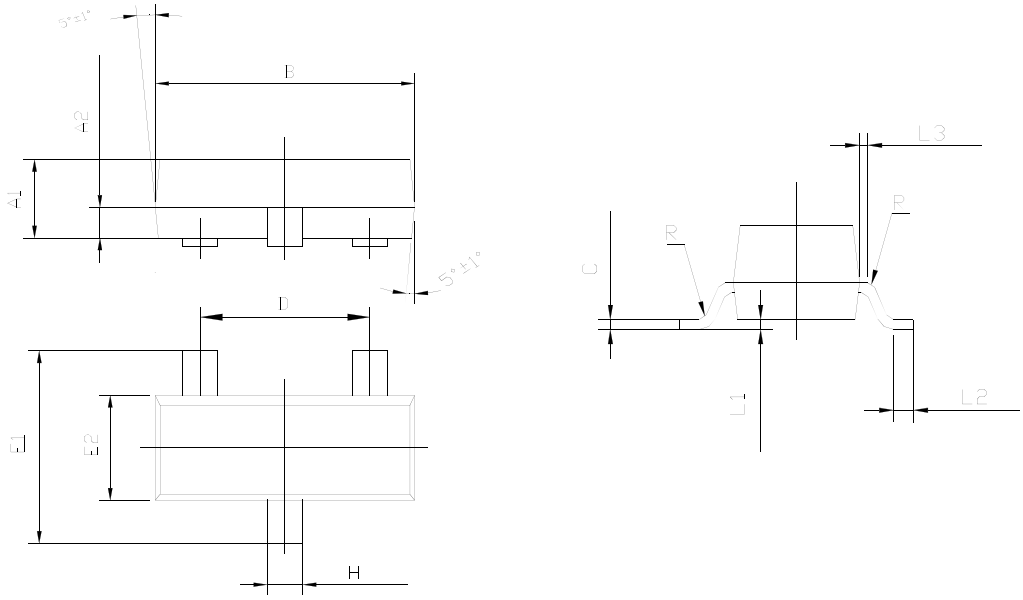
PNP EPITAXIAL SILICON TRANSISTOR

外型尺寸及内部结构图
OUTSIDE DEMENSION AND INTERNAL CONFIGURATION (SOT-23)



Symbol	Dimensions in Millimeters			内部结构 STYLS	管脚PIN		
	Min	Nominal	Max		1 脚	2 脚	3 脚
A1	0.900	0.970	1.000	6	基极 BASE	发射极 EMITTER	集电极 COLLCTOR
A2	0.350	0.380	0.410				
B	2.800	2.900	3.000	8	阳极 ANODE	不连接 NO-CONNECTION	阴极 CATHODE
C	0.085	0.100	0.150				
D	1.800	1.900	2.000	9	阳极 ANODE	阳极 ANODE	阴极 CATHODE
E1	2.200	2.400	2.600				
E2	1.200	1.300	1.400	11	阳极 ANODE	阴极 CATHODE	阳极-阴极 ANODE-CATHODE
H	0.300	0.400	0.500				
L1	0.000		0.100	12	阴极 CATHODE	阴极 CATHODE	阳极 ANODE
L2	0.200						
L3	0.030	0.080	0.130	18	不连接 NO-CONNECTION	阴极 CATHODE	阳极 ANODE
R	0.080TYP						
				19	阴极 CATHODE	阳极 ANODE	阴极-阳极 CATHODE-ANODE

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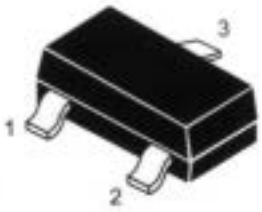
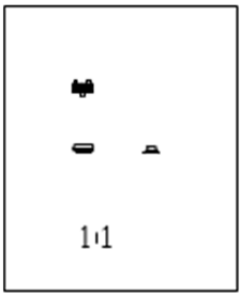
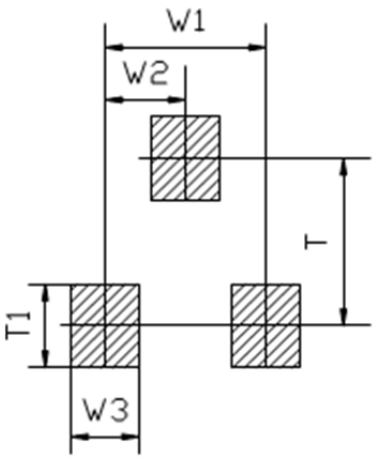




OUTSIDE

Scale 1:1 on letter size paper

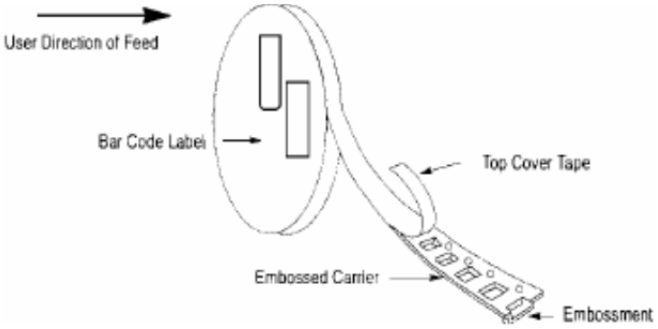


FOOTPRINTS FOR SOLDERING

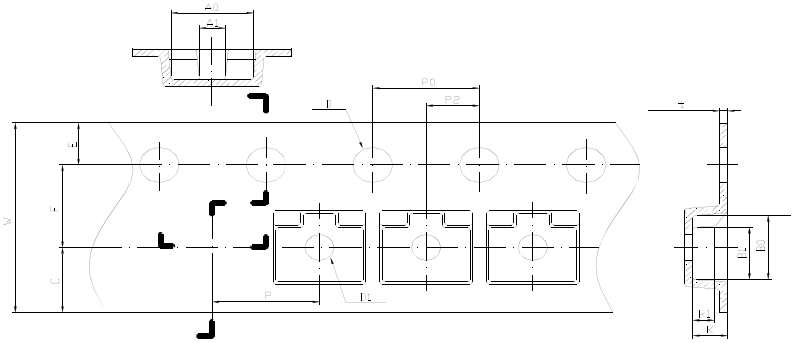
Symbol	Dimensions in Millimeters	Dimensions in Inches
	Nominal	Nominal
W1	1.900	0.0748
W2	0.950	0.0374
W3	0.800	0.0315
T	2.000	0.0787
T1	1.000	0.0394

SOT-23 TAPE AND REEL DATA

SOT-23 PACKAGING:

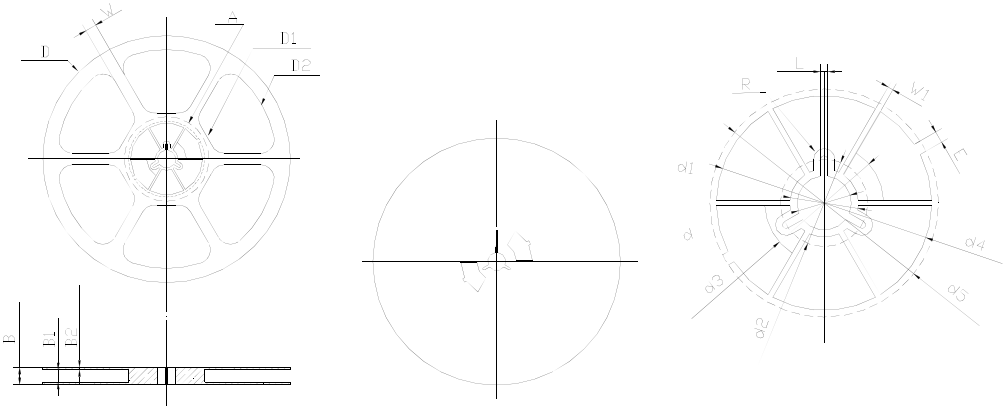


SOT-23 EMBOSSED CARRIER TAPE:



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum
A0	3.050	3.150	3.250	0.1201	0.1240	0.1280
A1	0.900	1.000	1.100	0.0354	0.0394	0.0433
B0	2.669	2.769	2.869	0.1051	0.1090	0.1130
B1	2.100	2.200	2.300	0.0827	0.0866	0.0906
C	2.750TYP			0.1083TYP		
D	1.500	1.500	1.600	0.0591	0.0591	0.0630
D1	0.900	1.000	1.100	0.0354	0.0394	0.0433
E	1.650	1.750	1.850	0.0650	0.0689	0.0728
F	3.450	3.500	3.550	0.1358	0.1378	0.1398
K	1.119	1.219	1.319	0.0441	0.0480	0.0519
K1	0.850TYP			0.03346TYP		
P	3.900	4.000	4.100	0.1535	0.1575	0.1614
P0	3.900	4.000	4.100	0.1535	0.1575	0.1614
P010	39.800	40.000	40.200	1.5669	1.5748	1.5827
P2	1.950	2.000	2.050	0.0768	0.0787	0.0807
t	0.216	0.229	0.242	0.0085	0.0090	0.0095
W	7.900	8.000	8.300	0.3110	0.3150	0.3268

SOT-23 REEL DATA



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum
B	-	-	12.500	-	-	0.4921
B1	8.900	9.000	9.100	0.3504	0.3543	0.3583
B2	1.700	1.750	1.800	0.0669	0.0689	0.0709
D	ϕ177.000	ϕ178.000	ϕ179.000	Φ6.9685	Φ7.0079	Φ7.0472
D1	Φ67.600TYP			Φ2.6614TYP		
D2	Φ157.600TYP			Φ6.2047 TYP		
d	Φ12.800	Φ13.000	Φ13.200	Φ0.5039	Φ0.5118	Φ0.5197
d1	Φ16.40 TYP			Φ0.6457 TYP		
d2	Φ21.000 TYP			Φ0.8268 TYP		
d3	Φ25.200 TYP			Φ0.99221TYP		
d4	Φ50.600	Φ51.600	Φ52.600	Φ1.9921	Φ2.0315	Φ2.0709
d5	Φ53.800	Φ54.800	Φ55.800	Φ2.1181	Φ2.1575	Φ2.1969
E	2.800 TYP			0.1102TYP		
L	1.750 TYP			0.0689 TYP		
R	2.575 TYP			0.1014 TYP		
W	15.000 TYP			0.5906 TYP		
W1	1.300 TYP			0.0512 TYP		