

FMBT3906-Q1

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FMBT3906-Q1

General Purpose PNP Transistors

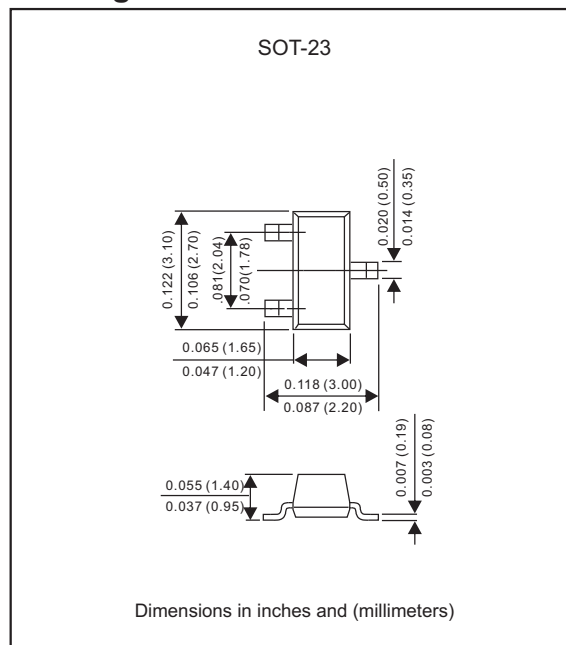
Features

- High collector-emitter breakdown voltage (BV_{CEO} -40V Min.@ $I_C=-1.0mA$)
- Small load switch transistor with high gain and low saturation voltage, is designed for general purpose amplifier and switching applications at collector current
- Capable of 200mW power dissipation
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free part, ex.FMBT3906-Q1-H

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.009 gram

Package outline



Maximum ratings (AT $T_A=25^{\circ}C$ unless otherwise noted)

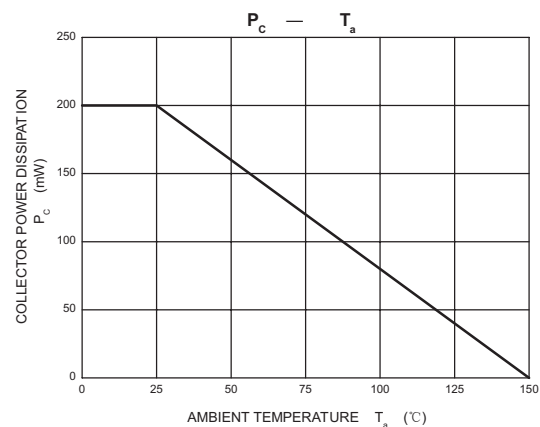
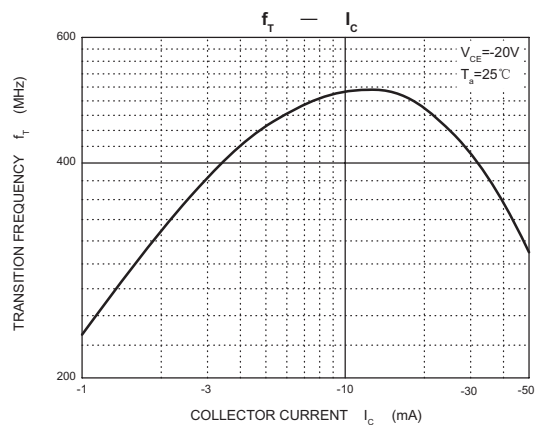
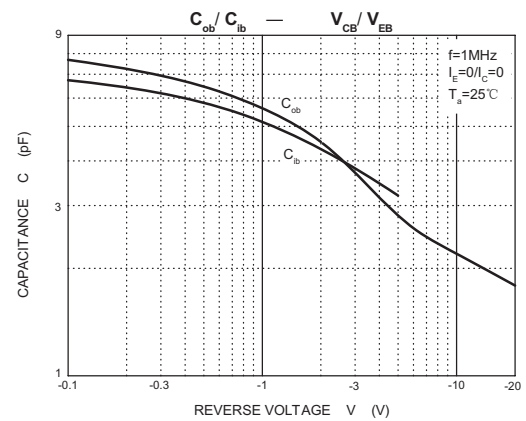
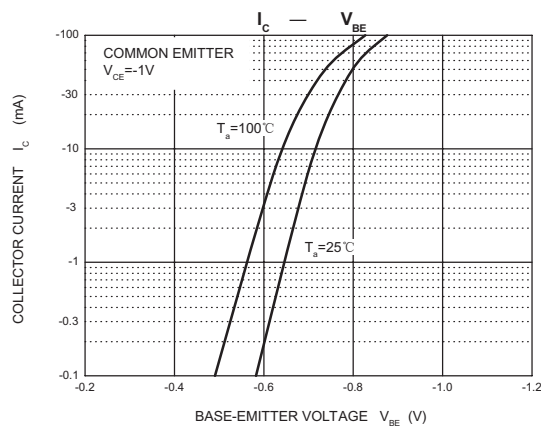
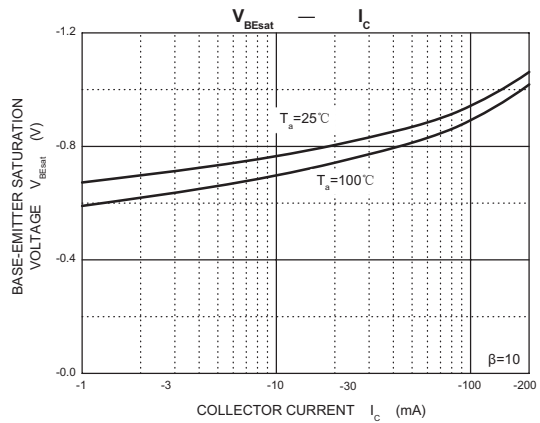
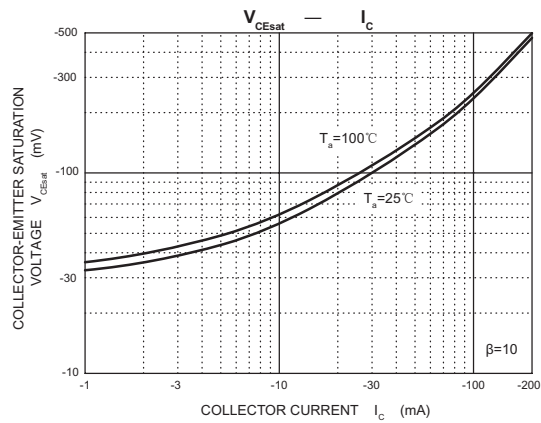
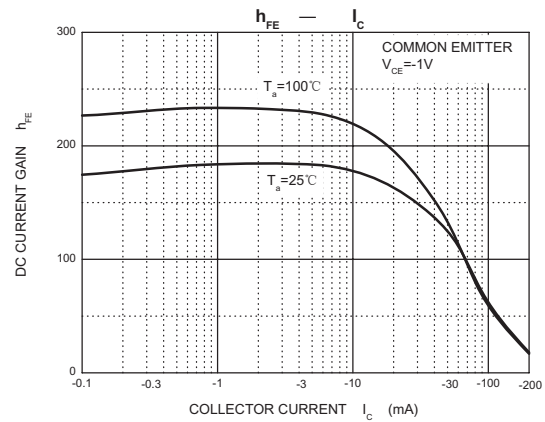
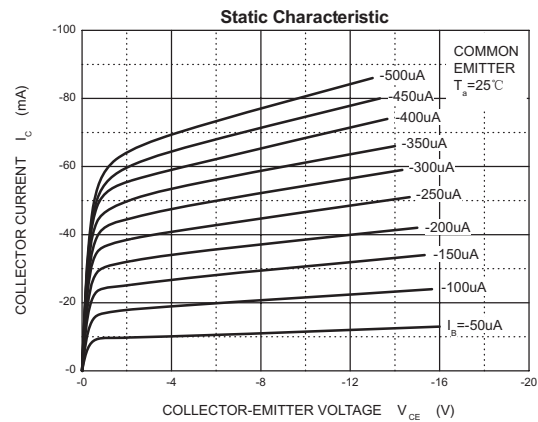
PARAMETER	Symbol	Value	UNIT
Collector-base voltage	V_{CBO}	-40	V
Collector-emitter voltage	V_{CEO}	-40	V
Emitter-base voltage	V_{EBO}	-5	V
Collector current	I_C	-200	mA
Total device dissipation	P_C	200	mW
Thermal resistance junction to ambient	$R_{\theta JA}$	625	$^{\circ}C/W$
Maximum Operation junction temperature range	T_J	+150	$^{\circ}C$
Storage temperature range	T_{STG}	-55 to +150	$^{\circ}C$

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Electrical Characteristics (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

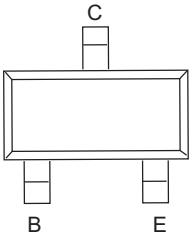
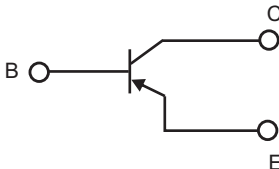
PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Collector-emitter breakdown voltage	$I_C=-1\text{mA}, I_B=0$	$V_{(BR)CEO}$	-40			V
Collector-base breakdown voltage	$I_C=-10\mu\text{A}, I_E=0$	$V_{(BR)CBO}$	-40			V
Emitter-base breakdown voltage	$I_E=-10\mu\text{A}, I_C=0$	$V_{(BR)EBO}$	-5.0			V
Collector cut-off current	$V_{CB}=-40\text{V}, I_E=0$	I_{CBO}			-0.1	μA
Emitter cut-off current	$V_{EB}=-5\text{V}, I_C=0$	I_{EBO}			-0.1	μA
Collector cut-off current	$V_{CE}=-30\text{V}, V_{BE(off)}=-3\text{V}$	I_{CEX}			-50	nA
DC current gain	$I_C=-10\text{mA}, V_{CE}=-1\text{V}$ $I_C=-50\text{mA}, V_{CE}=-1\text{V}$ $I_C=-100\text{mA}, V_{CE}=-1\text{V}$	h_{FE}	100 60 30		300 - -	
Collector-emitter saturation voltage	$I_C=-50\text{mA}, I_B=-5\text{mA}$	$V_{CE(sat)}$			-0.3	V
Base-emitter saturation voltage	$I_C=-50\text{mA}, I_B=-5\text{mA}$	$V_{BE(sat)}$			-0.95	V
Transition frequency	$I_C=-10\text{mA}, V_{CE}=-20\text{V}, f=100\text{MHz}$	f_T	300			MHz
Delay time	$V_{CC}=-3\text{V}, V_{BE}=-0.5\text{V}$	t_d			35	ns
Rise time	$I_C=-10\text{mA}, I_{B1}=-I_{B2}=-1\text{mA}$	t_r			35	ns
Storage time	$V_{CC}=-3\text{V}, I_C=-10\text{mA}, I_{B1}=-I_{B2}=-1\text{mA}$	t_s			225	ns
Fall time		t_f			75	ns

Rating and characteristic curves (FMBT3906-Q1)



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Pinning information

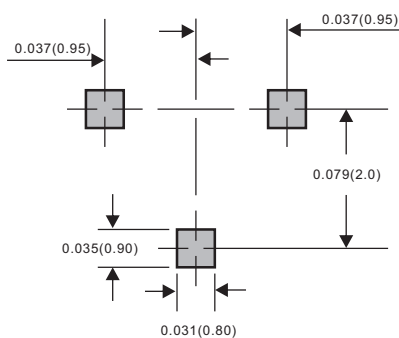
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBT3906-Q1	2A

Suggested solder pad layout

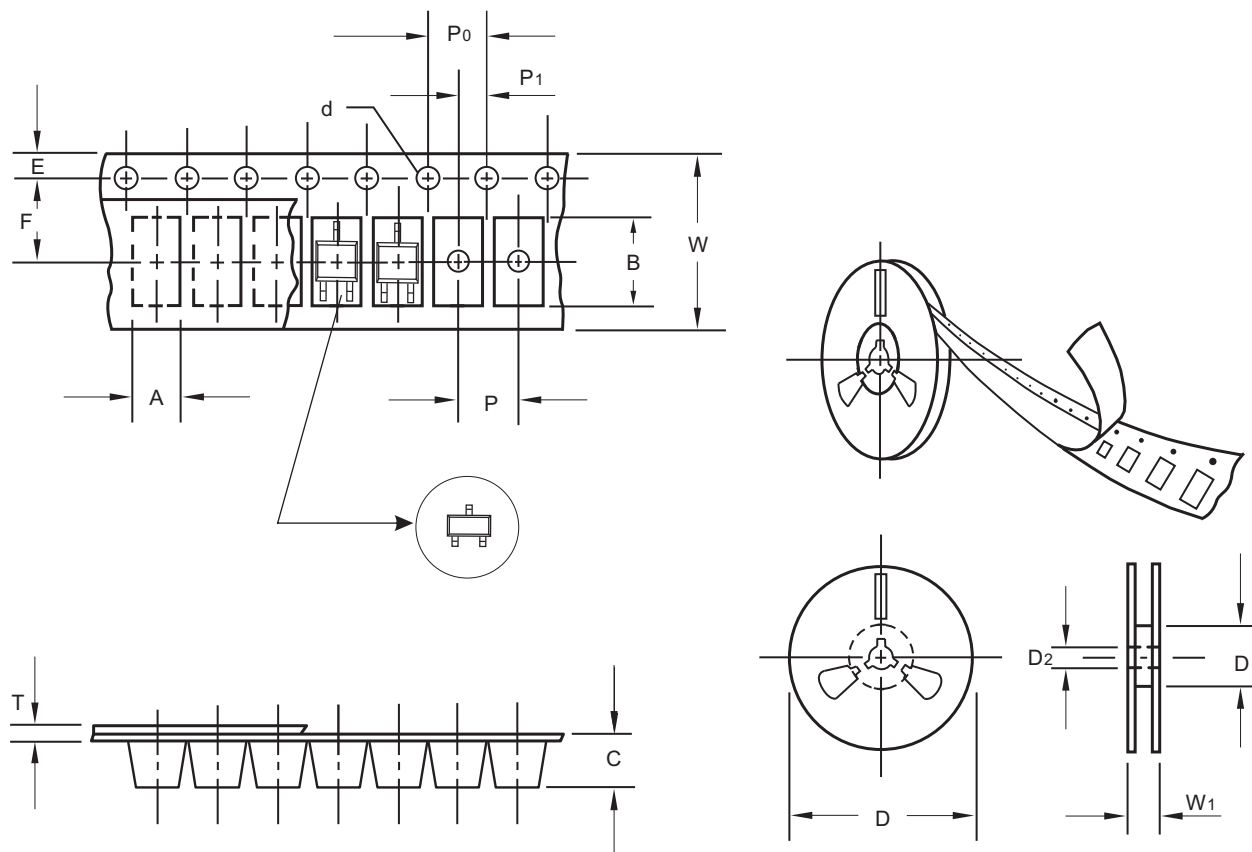
SOT-23



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.20
Carrier length	B	0.1	2.85
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	54.40
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.05	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.015	0.20
Tape width	W	0.3	8.00
Reel width	W1	1.0	12.0

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

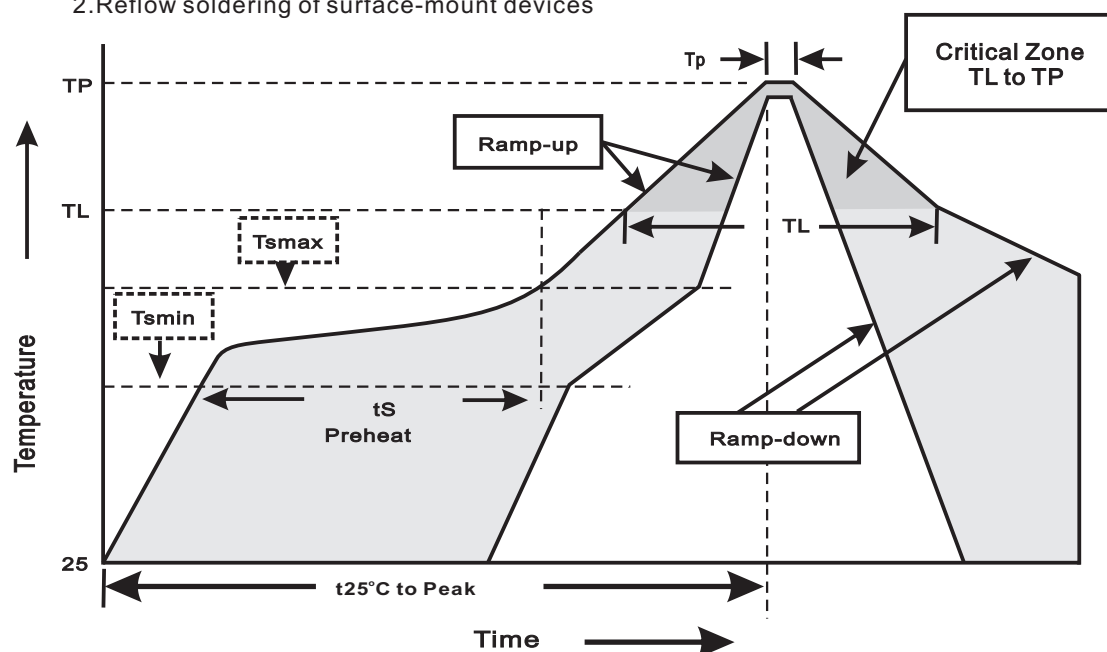
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Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(min to max)(t_s)	150°C 200°C 60~120sec
T_{smax} to T_L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

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High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Intermittent Operating Life	Ta=25°C, $\Delta T_j \geq 100^\circ\text{C}$ On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Reverse Bias	VCE=80%BVCEO (Tj=150°C) Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125°C Test Duration:1000hrs	JESD22 A-103
5. Temperature Cycle	-55°C(15min) to 150°C(15min) Test Cycles:1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5°C for 5sec	J-STD-002
8. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, VCE=80%BVCEO Test Duration:1000hrs	JESD22-A101