

FMBT2222AE

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FMBT2222AE

600mA, 40V NPN Plastic-Encapsulate Transistor

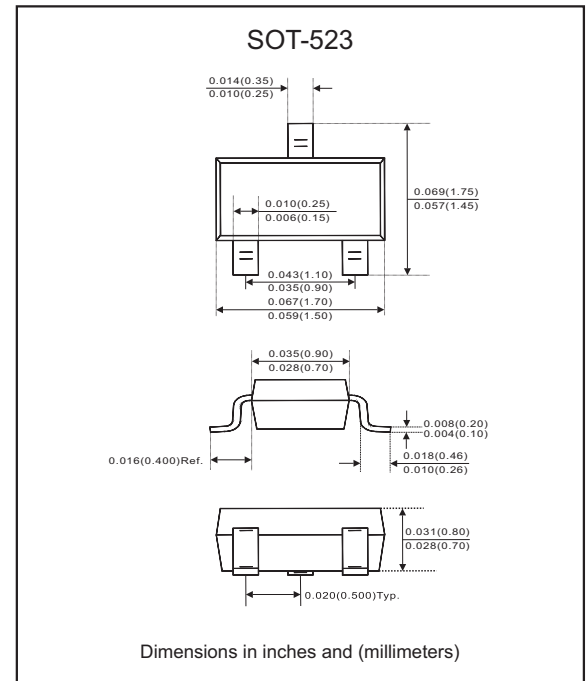
Features

- For switching and amplifier applications.
- $BV_{CEO}=65V$, $I_C=100mA$.
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex. FMBT2222AE-H

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-523
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.003 gram

Package outline



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

Parameter	Symbol	Ratings	Unit
Collector-base voltage	V_{CBO}	75	V
Collector-emitter voltage	V_{CEO}	40	V
Emitter-base voltage	V_{EBO}	6	V
DC collector current	I_C	600	mA
Power dissipation	P_D	150	mW
Junction temperature	T_J	+150	$^{\circ}C$
Storage temperature	T_{STG}	-55 ~ +150	$^{\circ}C$

FMBT2222AE**Electrical characteristics** ($T_A=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector cut off current	$V_{CB} = 60\text{V}$	I_{CBO}			100	nA
Emitter base cutoff current	$V_{EB} = 3\text{V}$	I_{EBO}			100	nA
Collector base breakdown voltage	$I_C = 10\mu\text{A}$	$V_{(BR)CBO}$	75			V
Collector emitter breakdown voltage	$I_C = 10\text{mA}$	$V_{(BR)CEO}$	40			V
Emitter base breakdown voltage	$I_C = 10\mu\text{A}$	$V_{(BR)EBO}$	6			V
Collector emitter saturation voltage	$I_C = 150\text{mA}, I_B = 15\text{mA}$	$V_{CE(sat)}$			0.3	V
	$I_C = 500\text{mA}, I_B = 50\text{mA}$	$V_{CE(sat)}$			1	
Base emitter on voltage	$I_C = 150\text{mA}, I_B = 15\text{mA}$	$V_{BE(sat)}$	0.6		1.2	V
	$I_C = 150\text{mA}, I_B = 50\text{mA}$	$V_{BE(sat)}$			2	
	$V_{CE} = 10\text{V}, I_C = 0.1\text{mA}$	h_{FE}	35			
	$V_{CE} = 10\text{V}, I_C = 1\text{mA}$		50			
	$V_{CE} = 10\text{V}, I_C = 10\text{mA}$		75			
	$V_{CE} = 1\text{V}, I_C = 150\text{mA}$		50			
	$V_{CE} = 10\text{V}, I_C = 150\text{mA}$		100		300	
DC current gain	$V_{CE} = 10\text{V}, I_C = 500\text{mA}$		40			
Transition Frequency	$V_{CE} = 20\text{V}, I_E = 20\text{mA}, f = 100\text{MHz}$	f_T	300			MHz
Output capacitance	$V_{CB}=10\text{V}, f=1\text{KHz}$	C_{ob}			8	pF
Delay time	$V_{CC}=30\text{V}, V_{BE(OFF)}=0.5\text{V}, I_C=150\text{mA}, I_{B1}=15\text{mA}$	t_d			10	ns
Rise time	$V_{CC}=30\text{V}, V_{BE(OFF)}=0.5\text{V}, I_C=150\text{mA}, I_{B1}=15\text{mA}$	t_r			25	ns
Storage time	$V_{CC}=30\text{V}, I_C=150\text{mA}, I_{B1}=-I_{B2}=15\text{mA}$	t_{sg}			225	ns
Fall time	$V_{CC}=30\text{V}, I_C=150\text{mA}, I_{B1}=-I_{B2}=15\text{mA}$	t_f			60	ns

Rating and characteristic curves (FMBT2222AE)

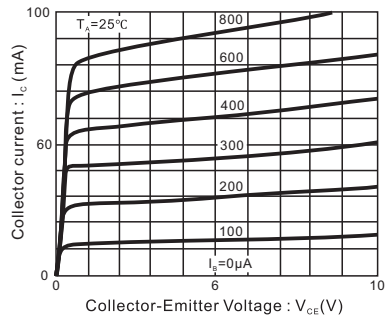


Fig.1 Grounded Emitter Output Characteristics

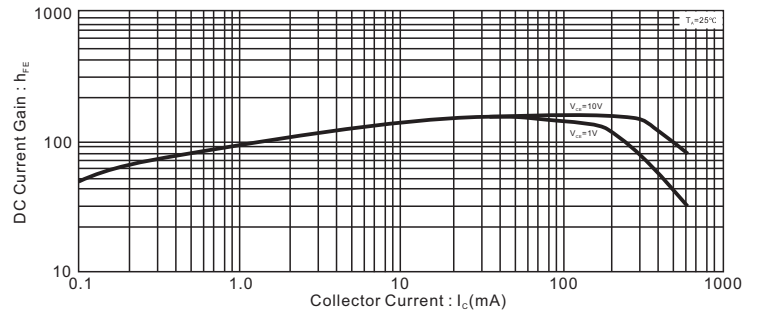


Fig.3. DC Current Gain vs. Collector Current

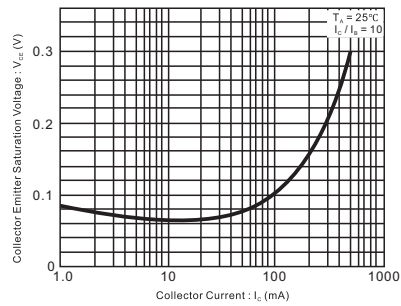


Fig.2 Collector-Emitter Saturation Voltage vs. Collector Current

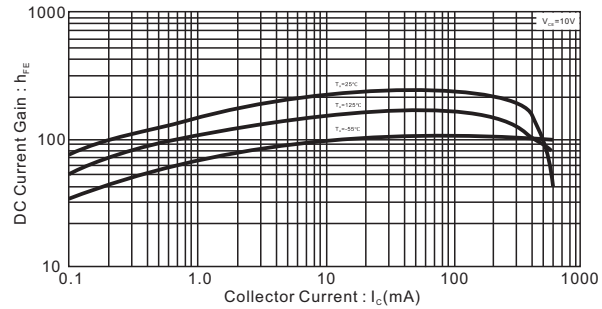


Fig.4 DC Current Gain vs. Collector Current

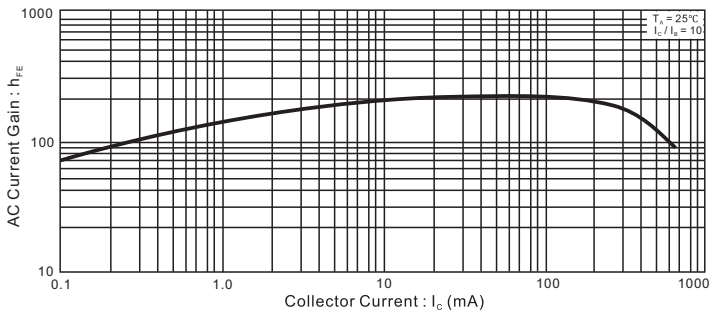


Fig.5 AC Current Gain vs. Collector Current

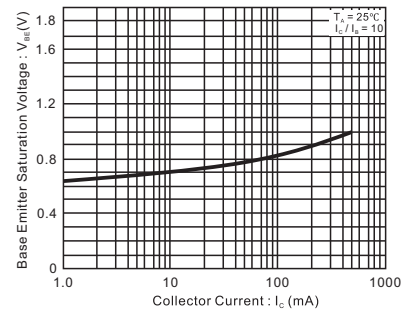
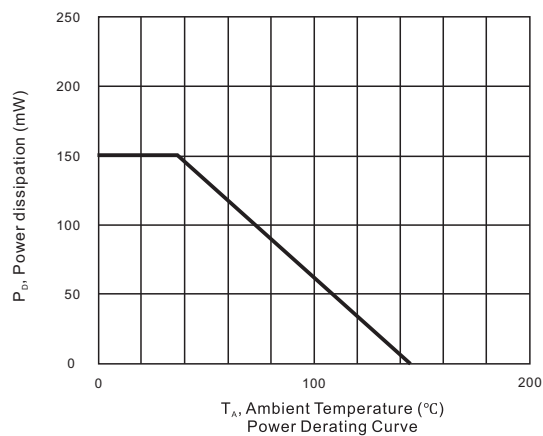
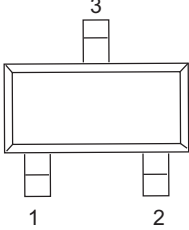
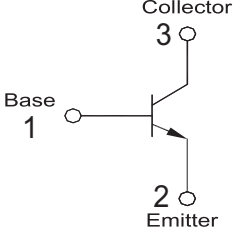


Fig.5 Base-Emitter Saturation Voltage vs. Collector Current

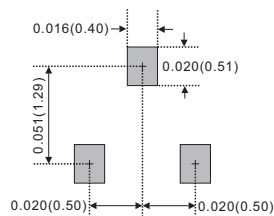


FMBT2222AE**Pinning information**

Pin	Simplified outline	Symbol
Pin1 BASE Pin2 EMITTER Pin3 COLLECTOR		

Marking

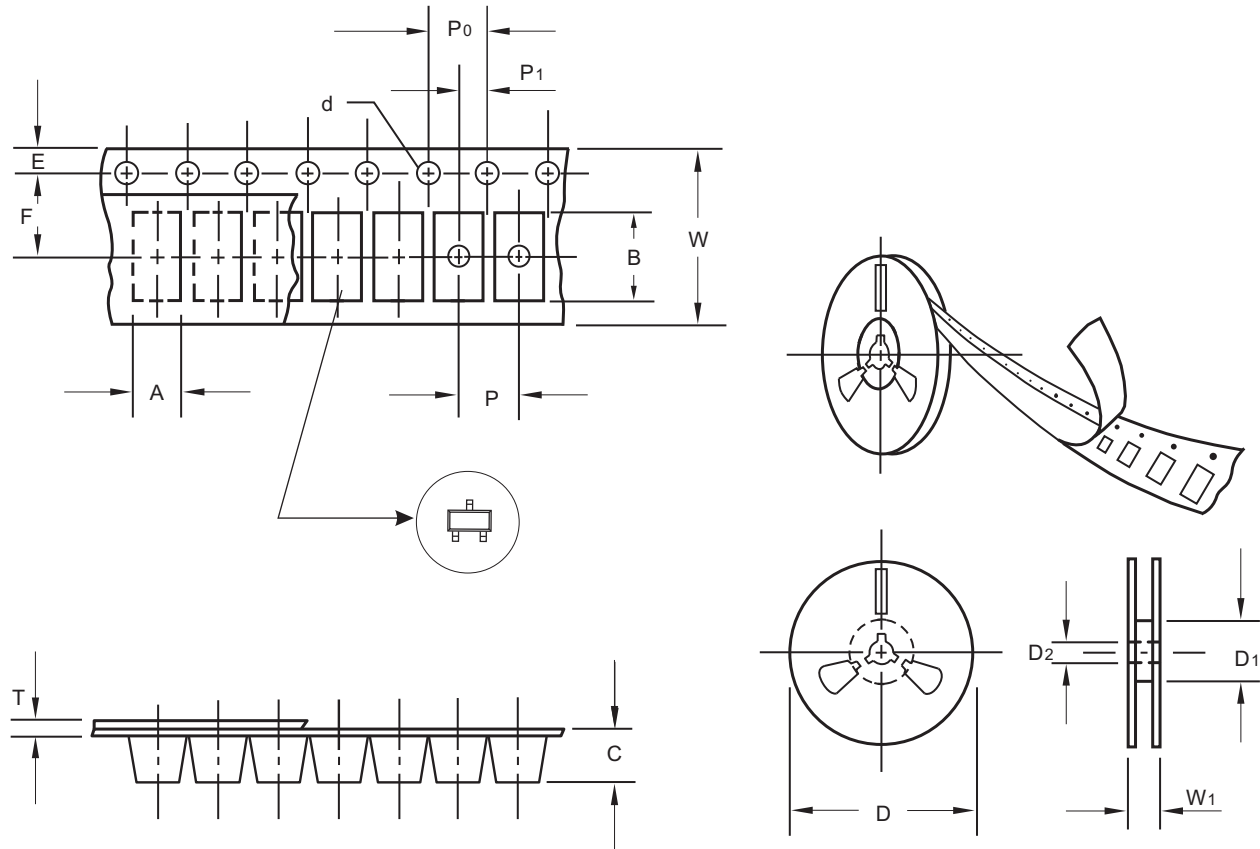
Type number	Marking code
FMBT2222AE	1P

Suggested solder pad layout**SOT-523**

Dimensions in inches and (millimeters)

FMBT2222AE

Packing information



unit:mm

Item	Symbol	Tolerance	SOT-523
Carrier width	A	0.1	1.85
Carrier length	B	0.1	1.85
Carrier depth	C	0.1	0.875
Sprocket hole	d	0.1	1.5
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	60.00
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	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	9.50

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

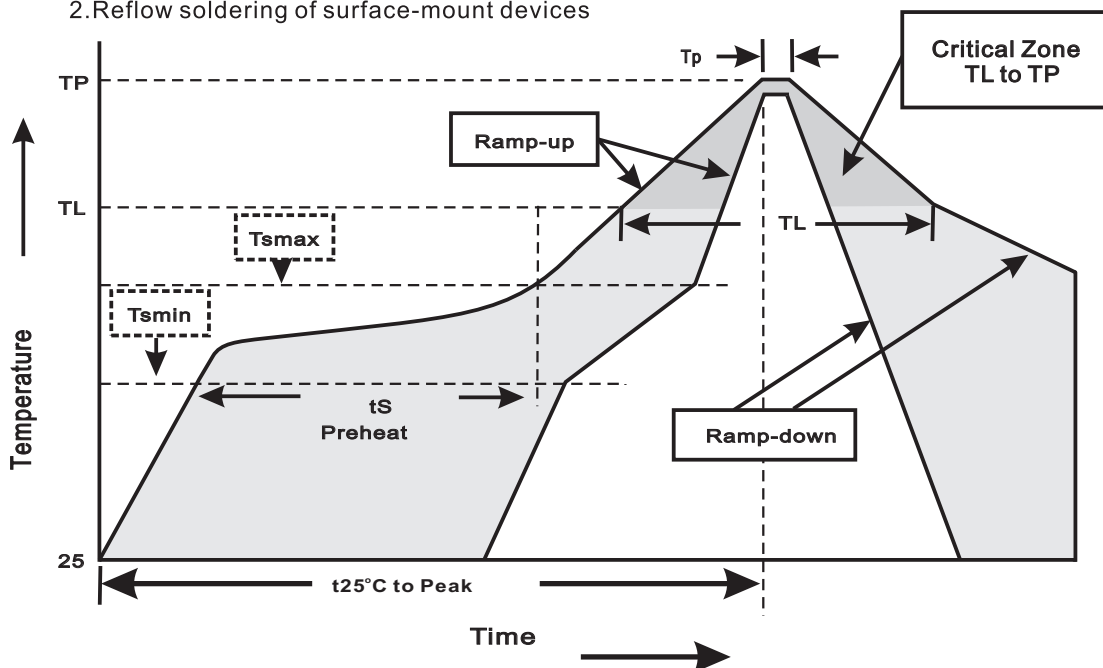
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Reel packing

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-523	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	9.5

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