

FMBT2222 / FMBT2222A

List

List.....	1
Package outline.....	2
Features.....	2
Mechanical data.....	2
Maximum ratings	2
Electrical Characteristics.....	3~4
Rating and characteristic curves.....	5~6
Pinning information.....	7
Marking.....	7
Suggested solder pad layout.....	7
Packing information.....	8
Reel packing.....	9
Suggested thermal profiles for soldering processes.....	9

FMBT2222 / FMBT2222A

600mA Silicon NPN Epitaxial Planar Transistor

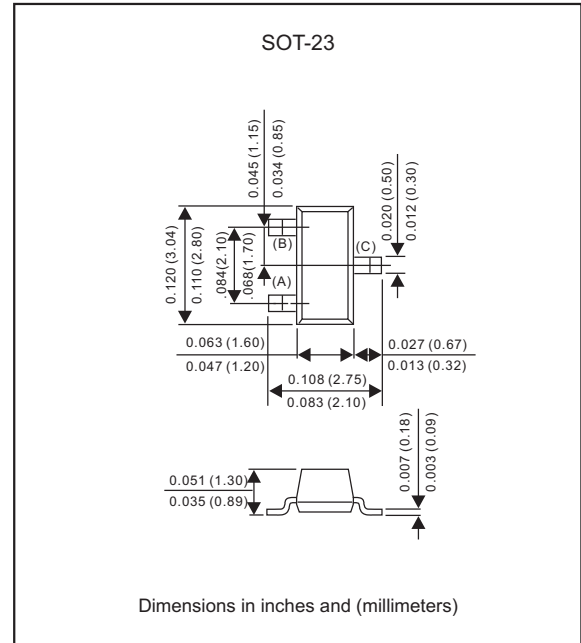
Features

- High collector-emitterbreakdien voltage. (BV_{CEO} = 40V@I_C=10mA)
- Small load switch transistor with high gain and low stauration voltage, is designed for general purpose amflifier and switching applications at collector current.
- Capable of 225mW power dissipation.
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen-free part, ex.FMBT2222-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 0.008 gram

Package outline



Maximum ratings (AT T_A=25°C unless otherwise noted)

PARAMETER	CONDITIONS	Symbol	FMBT2222	FMBT2222A	UNIT
Collector-Base voltage		V _{CBO}	60	75	V
Collector-Emitter voltage		V _{CEO}	30	40	V
Emitter-Base voltage		V _{EBO}	5.0	6.0	V
Collector current		I _C	600		mA
Total device dissipation FR-5 board (1)	T _A = 25°C	P _D	225		mW
	Derate above 25°C	P _D	1.8		mW/°C
Thermal resistance	Junction to ambient	R _{θJA}	556		°C/W
Total device dissipation alumina substrate(2)	T _A = 25°C	P _D	300		mW
	Derate above 25°C	P _D	2.4		mW/°C
Thermal resistance	Junction to ambient	R _{θJA}	417		°C/W
Operating temperature		T _J	-55 ~ +150		°C
Storage temperature		T _{STG}	-65 ~ +150		

1.FR-5 = 1.0 X 0.75 X 0.062 in.

2.Alumina = 0.4 X 0.3 X 0.024 in. 99.5% alumina.

FMBT2222 / FMBT2222A

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted)

Characteristics		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (IC=10 mAdc, IB=0)	FMBT2222 FMBT2222A	V(BR)CEO	30 40	- -	Vdc
Collector-Base Breakdown Voltage (IC=10 µAdc, IE=0)	FMBT2222 FMBT2222A	V(BR)CBO	60 75	- -	Vdc
Emitter-Base Breakdown Voltage (IE=10 µAdc, IC=0)	FMBT2222 FMBT2222A	V(BR)EBO	5.0 6.0	- -	Vdc
Collector Cutoff Current (VCE=60 Vdc, VEB (off)=3.0 Vdc)	FMBT2222A	ICEX	-	10	nAdc
Collector Cutoff Current (VCB=50 Vdc, IE=0)	FMBT2222	ICBO	-	0.01	µAdc
(VCB=60Vdc, IE=0)	FMBT2222A		-	0.01	
(VCB=50Vdc, IE=0, TA=125 °C)	FMBT2222		-	10	
(VCB=60Vdc, IE=0, TA=125 °C)	FMBT2222A		-	10	
Emitter Cutoff Current (VEB=3.0 Vdc, IC=0)	FMBT2222A	IEBO	-	100	nAdc
Base Cutoff Current (VCE=60Vdc, VEB(off)=3.0Vdc)	FMBT2222A	IBL	-	20	nAdc

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted) (Continued)

Characteristics		Symbol	Min	Max	Unit
ON CHARACTERISTICS					
DC Current Gain		hFE			-
(IC=0.1 mAdc, VCE=10 Vdc)			35	-	
(IC=1.0 mAdc, VCE=10 Vdc)			50	-	
(IC=10 mAdc, VCE=10 Vdc)			75	-	
(IC=10 mAdc, VCE=10 Vdc, TA=-55°C)	FMBT2222A ONLY		35	-	
(IC=150 mAdc, VCE=10 Vdc) (3)			100	300	
(IC=150 mAdc, VCE=1.0Vdc) (3)			50	-	
(IC=500 mAdc, VCE=10 Vdc) (3)	FMBT2222 FMBT2222A	30 40	- -		
Collector-Emitter Saturation Voltage (3)	FMBT2222 FMBT2222A	VCE(sat)		0.4	Vdc
(IC=150 mAdc, IB=15mAdc)			-	0.3	
(IC=500 mAdc, IB=50mAdc)	FMBT2222 FMBT2222A		-	1.6	
			-	1.0	
Base-Emitter Saturation Voltage (3)	FMBT2222 FMBT2222A	VBE(sat)		1.3	Vdc
(IC=150 mAdc, IB=15mAdc)			0.6	1.2	
(IC=500 mAdc, IB=50mAdc)	FMBT2222 FMBT2222A		-	2.6	
			-	2.0	

FMBT2222 / FMBT2222A

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristics	Symbol	Min	Max	Unit
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain-Bandwidth Product (4) (I _C =20 mAdc, V _{CE} =20 Vdc, f=100MHz)	FMBT2222 FMBT2222A	f _T	250 300	- - MHz
Output Capacitance (V _{CB} =10 Vdc, I _E =0, f=1.0MHz)	FMBT2222 FMBT2222A	C _{obo}	-	8.0 pF
Input Capacitance (V _{EB} =0.5 Vdc, I _C =0, f=1.0MHz)	FMBT2222 FMBT2222A	C _{ibo}	-	30 25 pF
Input Impedance (I _C =1.0 mAdc, V _{CE} =10 Vdc, f=1.0 kHz) (I _C =10 mAdc, V _{CE} =10 Vdc, f=1.0 kHz)	FMBT2222A FMBT2222A	h _{ie}	2.0 0.25	8.0 1.25 kW
Voltage Feedback Ratio (I _C =1.0 mAdc, V _{CE} =10 Vdc, f=1.0 kHz) (I _C =10 mAdc, V _{CE} =10 Vdc, f=1.0 kHz)	FMBT2222A FMBT2222A	h _{re}	-	8.0 4.0 x 10 ⁻⁴
Small-Signal Current Gain (I _C =1.0 mAdc, V _{CE} =10Vdc, f=1.0 kHz) (I _C =10 mAdc, V _{CE} =10Vdc, f=1.0 kHz)	FMBT2222A FMBT2222A	h _{fe}	50 75	300 375 -
Output Admittance (I _C =1.0 mAdc, V _{CE} =10Vdc, f=-1.0kHz) (I _C =10 mAdc, V _{CE} =10Vdc, f=-1.0kHz)	FMBT2222A FMBT2222A	h _{oe}	5.0 25	35 200 mhos
Collector Base Time Constant (I _E =20 mAdc, V _{CB} =20 Vdc, f=31.8 MHz)	FMBT2222A	r _b , C _C	-	150 ps
Noise Figure (I _C =100 A dc, V _{CE} =10Vdc, R _S =1.0kW, f=1.0kHz)	FMBT2222A	NF	-	4.0 dB

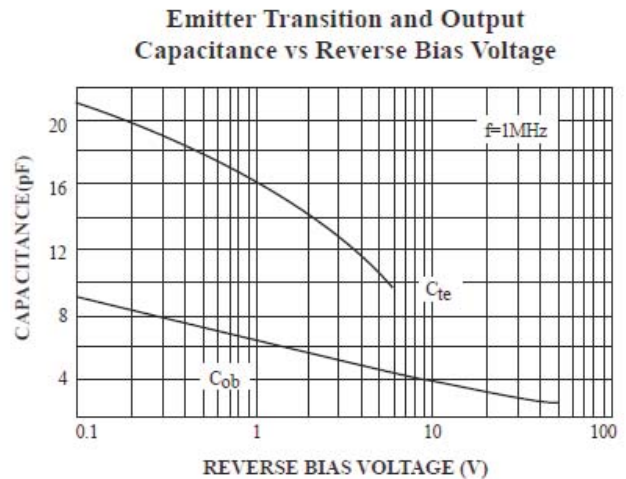
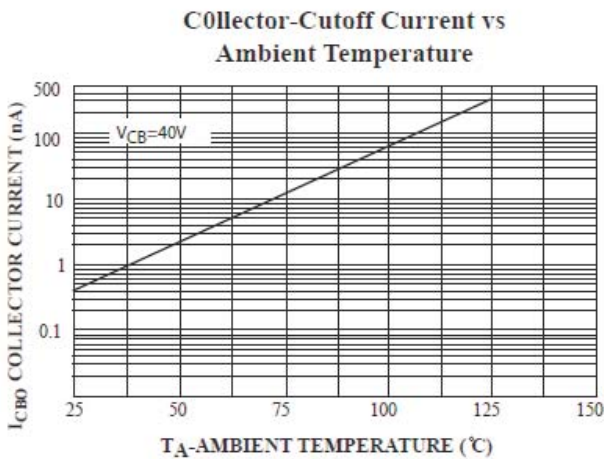
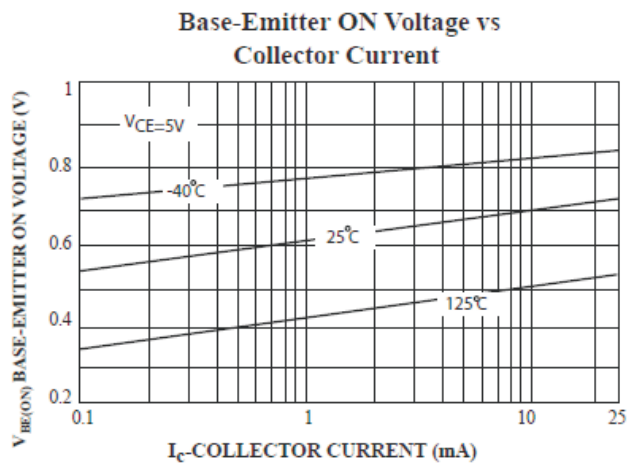
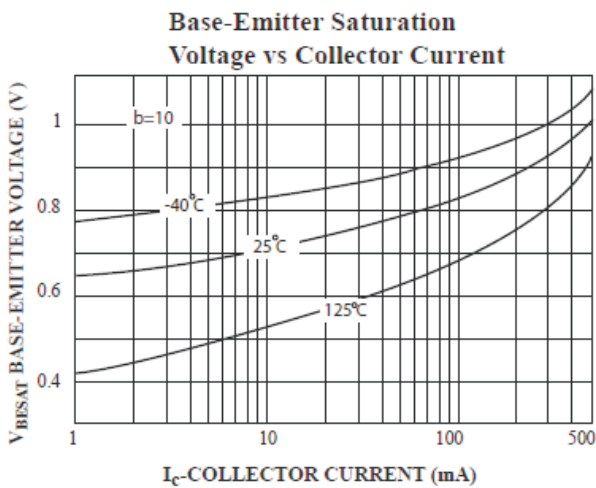
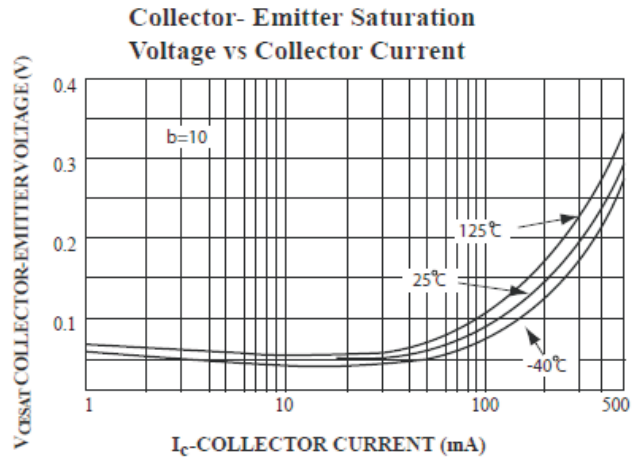
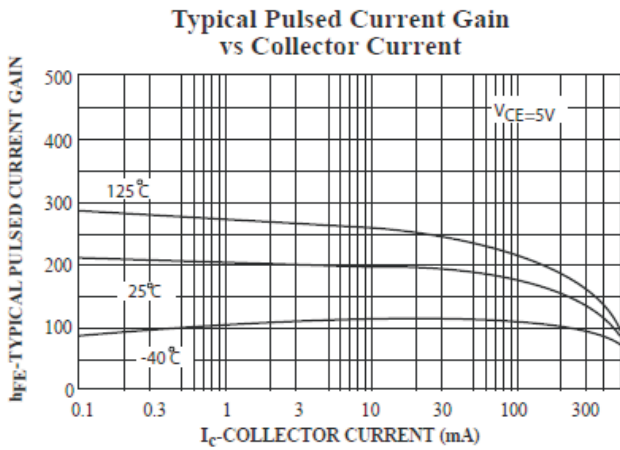
SWITCHING CHARACTERISTICS(FMBT2222A only)

Delay Time	(V _{CC} =30 Vdc, V _{BE} (off)=-0.5Vdc, I _C =150 mAdc, I _{B1} =15 mAdc)	t _d	-	10	ns
Rise Time		t _r	-	25	
Storage Time	(V _{CC} =30 Vdc, I _C =150 mAdc, I _{B1} =I _{B2} =15 mAdc)	t _s	-	225	ns
Fall Time		t _f	-	60	

3. Pulse Test: Pulse Width 300 μs, Duty Cycle ≤ 2.0%.

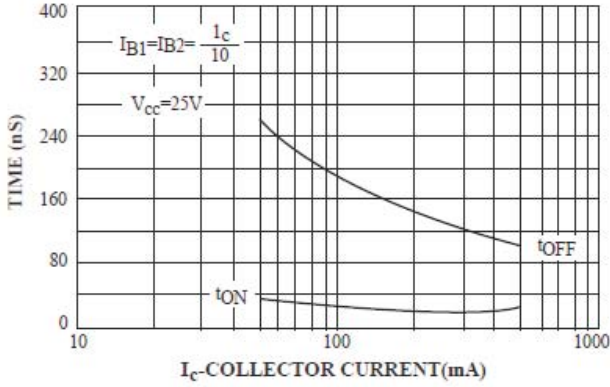
4. f_T is defined as the frequency at which I_{hfe} extrapolates to unity.

Rating and characteristic curves (FMBT2222 / FMBT2222A)

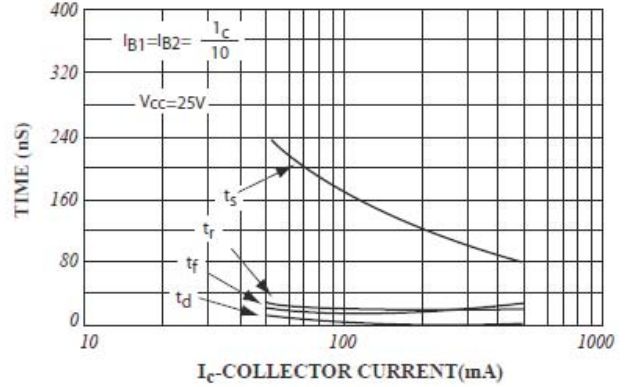


Rating and characteristic curves (FMBT2222 / FMBT2222A)

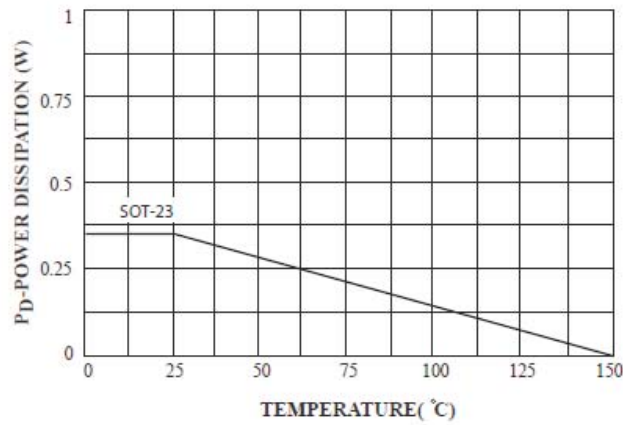
Turn On and Turn Off Times vs Collector Current



Switching Times vs Collector Current

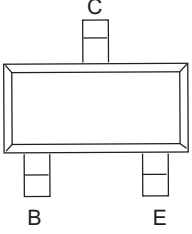
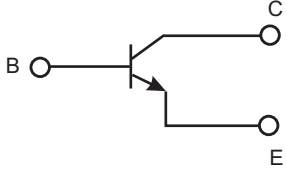


Power Dissipation vs Ambient Temperature



FMBT2222 / FMBT2222A

Pinning information

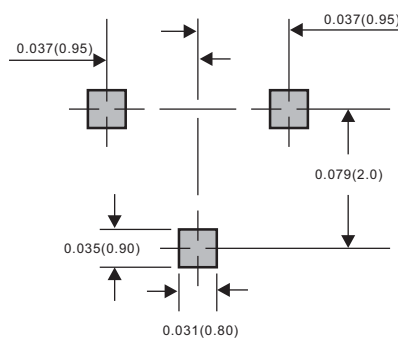
Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

Type number	Marking code
FMBT2222	M1B
FMBT2222A	1P

Suggested solder pad layout

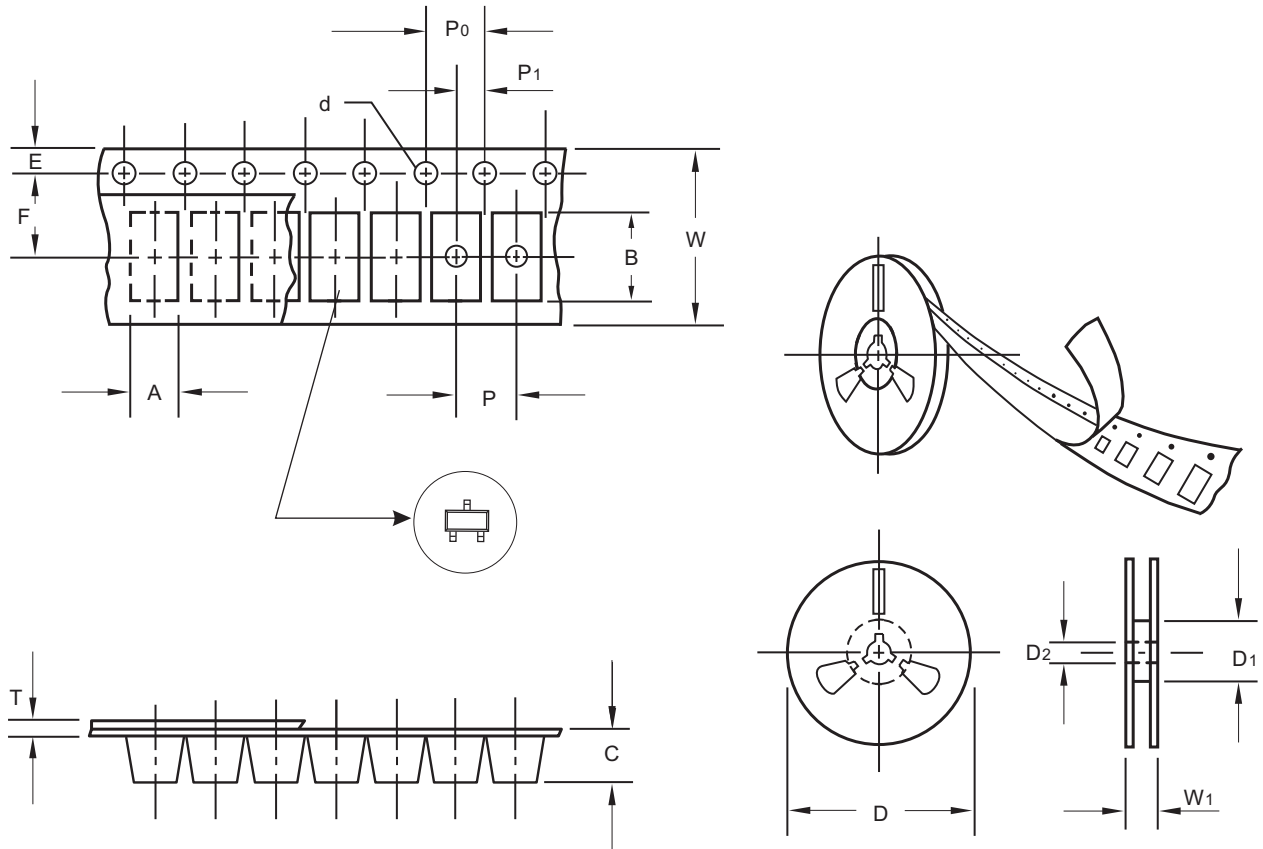
SOT-23



Dimensions in inches and (millimeters)

FMBT2222 / FMBT2222A

Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
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	55.00
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	12.0

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

