



MMBT2222A

SMALL SIGNAL NPN TRANSISTOR

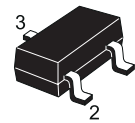
PRELIMINARY DATA

Type	Marking
MMBT2222A	M22

- SILICON EPITAXIAL PLANAR NPN TRANSISTOR
- MINIATURE SOT-23 PLASTIC PACKAGE FOR SURFACE MOUNTING CIRCUITS
- TAPE & REEL PACKING
- THE PNP COMPLEMENTARY TYPE IS MMBT2907A

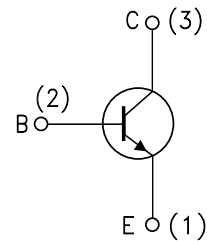
APPLICATIONS

- WELL SUITABLE FOR PORTABLE EQUIPMENT
- SMALL LOAD SWITCH TRANSISTOR WITH HIGH GAIN AND LOW SATURATION VOLTAGE



SOT-23

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Emitter Voltage ($I_E = 0$)	75	V
V_{CEO}	Collector-Emitter Voltage ($I_B = 0$)	40	V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$)	6	V
I_C	Collector Current	0.6	A
I_{CM}	Collector Peak Current ($t_p < 5$ ms)	0.8	A
P_{tot}	Total Dissipation at $T_{amb} = 25$ °C	350	mW
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

MMBT2222A

THERMAL DATA

R _{thj-amb} •	Thermal Resistance Junction-Ambient	Max	357.1	°C/W
------------------------	-------------------------------------	-----	-------	------

• Device mounted on a PCB area of 1 cm².

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
I _{CEX}	Collector Cut-off Current (V _{BE} = -3 V)	V _{CE} = 60 V			10	nA	
I _{BEX}	Base Cut-off Current (V _{BE} = -3 V)	V _{CE} = 60 V			20	nA	
I _{CBO}	Collector Cut-off Current (I _E = 0)	V _{CB} = 75 V V _{CB} = 75 V			10 10	nA μA	
I _{EBO}	Emitter Cut-off Current (I _C = 0)	V _{EB} = 3 V			15	nA	
V _{(BR)CEO} *	Collector-Emitter Breakdown Voltage (I _B = 0)	I _C = 10 mA	40			V	
V _{(BR)CBO}	Collector-Base Breakdown Voltage (I _E = 0)	I _C = 10 μA	75			V	
V _{(BR)EBO}	Emitter-Base Breakdown Voltage (I _C = 0)	I _E = 10 μA	6			V	
V _{CE(sat)} *	Collector-Emitter Saturation Voltage	I _C = 150 mA I _C = 500 mA			0.3 1	V V	
V _{BE(sat)} *	Collector-Base Saturation Voltage	I _C = 150 mA I _C = 500 mA	0.6		1.2 2	V V	
h _{FE} *	DC Current Gain	I _C = 0.1 mA I _C = 1 mA I _C = 10 mA I _C = 150 mA I _C = 150 mA I _C = 500 mA	V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 10 V V _{CE} = 1 V V _{CE} = 10 V	35 50 75 100 50 40		300	
f _T	Transition Frequency	I _C = 20 mA V _{CE} = 20V f = 100MHz		270		MHz	
C _{CBO}	Collector-Base Capacitance	I _E = 0 V _{CB} = 10 V f = 1 MHz		4	8	pF	
C _{EBO}	Emitter-Base Capacitance	I _C = 0 V _{EB} = 0.5 V f = 1MHz		20	25	pF	
NF	Noise Figure	I _C = 0.1 mA V _{CE} = 10 V f = 1 KHz Δf = 200 Hz R _G = 1 KΩ		4		dB	
h _{ie} *	Input Impedance	V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz	2 0.25		8 1.25	KΩ KΩ	
h _{re} *	Reverse Voltage Ratio	V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz			8 4	10 ⁻⁴ 10 ⁻⁴	
h _{fe} *	Small Signal Current Gain	V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz	50 75		300 375		
h _{oe} *	Output Admittance	V _{CE} = 10 V I _C = 1 mA f = 1 KHz V _{CE} = 10 V I _C = 10 mA f = 1 KHz	5 25		35 200	μS μS	

* Pulsed: Pulse duration = 300 μs, duty cycle ≤ 2 %

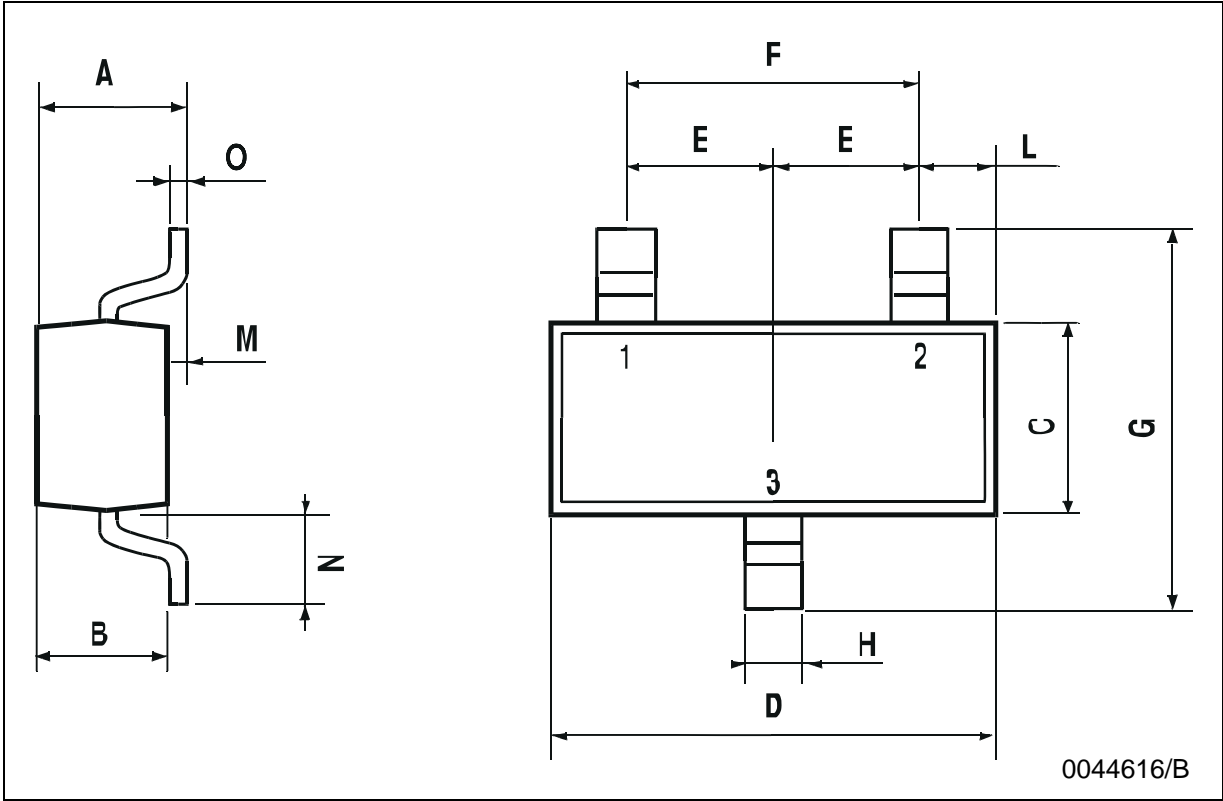
ELECTRICAL CHARACTERISTICS (Continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_d	Delay Time	$I_C = 150 \text{ mA}$ $I_B = 15 \text{ mA}$		5	10	ns
t_r	Rise Time	$V_{CC} = 30 \text{ V}$		12	25	ns
t_s	Storage Time	$I_C = 150 \text{ mA}$ $I_{B1} = - I_{B2} = 15 \text{ mA}$		185	225	ns
t_f	Fall Time	$V_{CC} = 30 \text{ V}$		24	60	ns

* Pulsed: Pulse duration = 300 μs , duty cycle $\leq 2\%$

SOT-23 MECHANICAL DATA

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	0.85		1.1	33.4		43.3
B	0.65		0.95	25.6		37.4
C	1.20		1.4	47.2		55.1
D	2.80		3	110.2		118
E	0.95		1.05	37.4		41.3
F	1.9		2.05	74.8		80.7
G	2.1		2.5	82.6		98.4
H	0.38		0.48	14.9		18.8
L	0.3		0.6	11.8		23.6
M	0		0.1	0		3.9
N	0.3		0.65	11.8		25.6
O	0.09		0.17	3.5		6.7



0044616/B

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 2003 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>