MMBT2222A

SMALL SIGNAL NPN TRANSISTOR

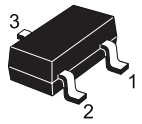
PRELIMINARY DATA

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

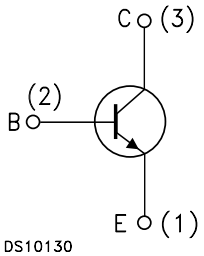
APPLICATIONS

- 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

THERMAL DATA

$R_{thj\text{-}amb}$ •	Thermal Resistance Junction-Ambient	Max	357.1	°C/W

• Device mounted on a PCB area of 1 cm^2 .

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 T_j = 150 °C			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_B = 15 mA I_C = 500 mA I_B = 50 mA			0.3 1	V V
$V_{BE(sat)}$*	Collector-Base Saturation Voltage	I_C = 150 mA I_B = 15 mA I_C = 500 mA I_B = 50 mA	0.6		1.2 2	V V
h_{FE}*	DC Current Gain	I_C = 0.1 mA V_{CE} = 10 V I_C = 1 mA V_{CE} = 10 V I_C = 10 mA V_{CE} = 10 V I_C = 150 mA V_{CE} = 10 V I_C = 150 mA V_{CE} = 1 V I_C = 500 mA 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 mA I_B = 15 mA V_{CC} = 30 V		5	10	ns
t_r	Rise Time			12	25	ns
t_s	Storage Time	I_C = 150 mA I_{B1} = - I_{B2} = 15 mA V_{CC} = 30 V		185	225	ns
t_f	Fall Time			24	60	ns

∗ Pulsed: Pulse duration = 300 µs, duty cycle ≤ 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