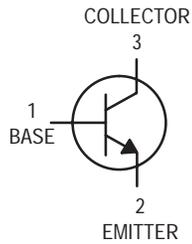


# VHF Mixer Transistor

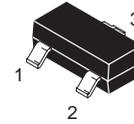
## NPN Silicon

- Designed for
- $f_T = 400$  MHz Min @ 8 mA



### MMBTH24LT1

Motorola Preferred Device



CASE 318-08, STYLE 6  
SOT-23 (TO-236AB)

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	30	Vdc
Collector–Base Voltage	$V_{CBO}$	40	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current – Continuous	$I_C$	50	mAdc

#### DEVICE MARKING

MMBTH24LT1 = M3A

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225	mW
		1.8	mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300	mW
		2.4	mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

#### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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#### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ( $I_C = 1.0$ mAdc, $I_B = 0$ )	$V_{(BR)CEO}$	30	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 100$ $\mu\text{Adc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10$ $\mu\text{Adc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 15$ Vdc, $I_E = 0$ )	$I_{CBO}$	—	—	50	nAdc

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

Preferred devices are Motorola recommended choices for future use and best overall value.

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 8.0 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ )	$h_{FE}$	30	—	—	—
<b>SMALL-SIGNAL CHARACTERISTICS</b>					
Current-Gain – Bandwidth Product <sup>(3)</sup> ( $I_C = 8.0 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	$f_T$	400	620	—	MHz
Collector-Base Capacitance ( $V_{CB} = 10 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{cb}$	—	0.25	0.45	pF
Conversion Gain (213 MHz to 45 MHz) ( $I_C = 8.0 \text{ mAdc}$ , $V_{CC} = 20 \text{ Vdc}$ , Oscillator Injection = 150 mVrms) (60 MHz to 45 MHz) ( $I_C = 8.0 \text{ mAdc}$ , $V_{CC} = 20 \text{ Vdc}$ , Oscillator Injection = 150 mVrms)	—  $C_G$	—  19 24	—  24 20	—  — —	dB

3. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .