

MMBTH10L, MMBTH10-4L, SMMBTH10-4L, NSVMMBTH10L

VHF/UHF Transistor

NPN Silicon

Features

- S and NSV Prefixes for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	25	Vdc
Collector-Base Voltage	V_{CBO}	30	Vdc
Emitter-Base Voltage	V_{EBO}	3.0	Vdc

THERMAL CHARACTERISTICS

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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

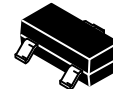
1. FR-5 = $1.0 \times 0.75 \times 0.062$ in.
2. Alumina = $0.4 \times 0.3 \times 0.024$ in. 99.5% alumina

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

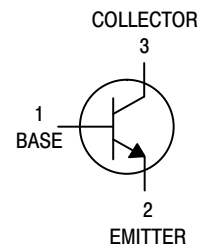


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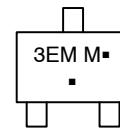
<http://onsemi.com>



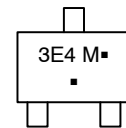
SOT-23 (TO-236)
CASE 318
STYLE 6



MARKING DIAGRAMS



MMBTH10LT1G,
NSVMMBTH10LT1G



MMBTH10-04LT1G

3EM, 3E4 = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
MMBTH10LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
NSVMMBTH10LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBTH10-4LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
MMBTH10LT3G, SMMBTH10-4LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MMBTH10L, MMBTH10-4L, SMMBTH10-4L, NSVMMBTH10L

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 ($I_C = 1.0\text{ mA}$, $I_E = 0$)	$V_{(BR)CEO}$	25	–	–	Vdc
Collector-Base Breakdown Voltage ($I_C = 100\text{ }\mu\text{A}$, $I_E = 0$)	$V_{(BR)CBO}$	30	–	–	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{A}$, $I_C = 0$)	$V_{(BR)EBO}$	3.0	–	–	Vdc
Collector Cutoff Current ($V_{CB} = 25\text{ Vdc}$, $I_E = 0$)	I_{CBO}	–	–	100	nAdc
Emitter Cutoff Current ($V_{EB} = 2.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	–	–	100	nAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 4.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) MMBTH10LT1G, NSVMMBTH10LT1G MMBTH10-4LT1G, SMMBTH10-4LT3G	h_{FE}	60 120	– –	– 240	–
Collector-Emitter Saturation Voltage ($I_C = 4.0\text{ mA}$, $I_E = 0.4\text{ mA}$)	$V_{CE(sat)}$	–	–	0.5	Vdc
Base-Emitter On Voltage ($I_C = 4.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$)	V_{BE}	–	–	0.95	Vdc

SMALL-SIGNAL CHARACTERISTICS

Current-Gain – Bandwidth Product ($I_C = 4.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f = 100\text{ MHz}$) MMBTH10LT1G, NSVMMBTH10LT1G MMBTH10-4LT1G, SMMBTH10-4LT3G	f_T	650 800	– –	– –	MHz
Collector-Base Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{cb}	–	–	0.7	pF
Common-Base Feedback Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{rb}	–	–	0.65	pF
Collector Base Time Constant ($I_C = 4.0\text{ mA}$, $V_{CB} = 10\text{ Vdc}$, $f = 31.8\text{ MHz}$)	$r_b'C_c$	–	–	9.0	ps

TYPICAL CHARACTERISTICS

COMMON-BASE y PARAMETERS versus FREQUENCY

($V_{CB} = 10 \text{ Vdc}$, $I_C = 4.0 \text{ mA dc}$, $T_A = 25^\circ\text{C}$)

y_{ib} , INPUT ADMITTANCE

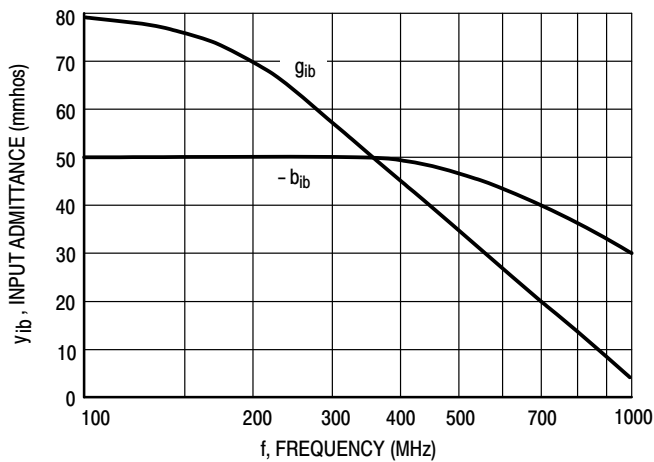


Figure 1. Rectangular Form

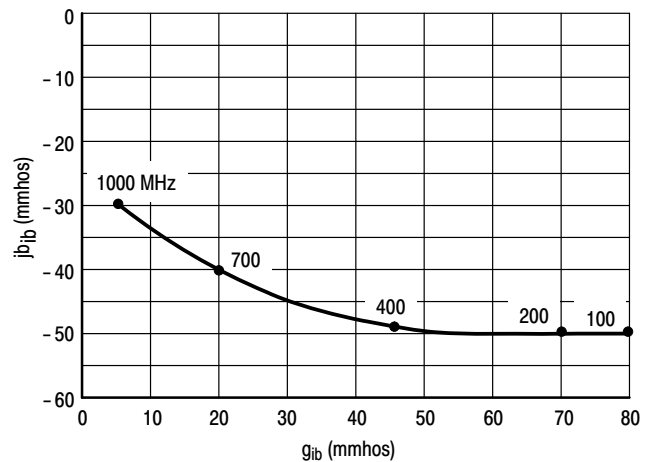


Figure 2. Polar Form

y_{fb} , FORWARD TRANSFER ADMITTANCE

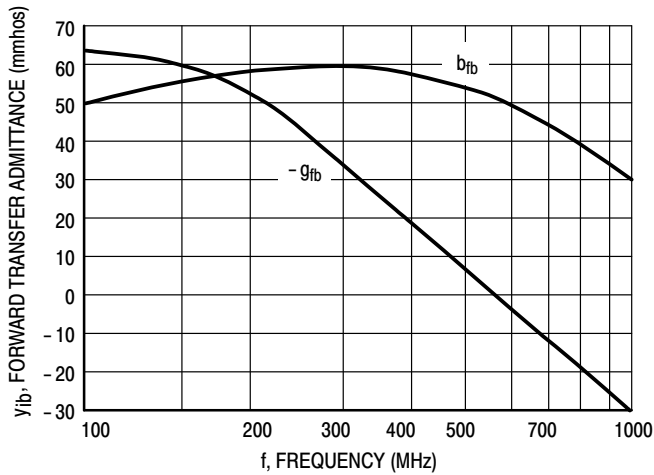


Figure 3. Rectangular Form

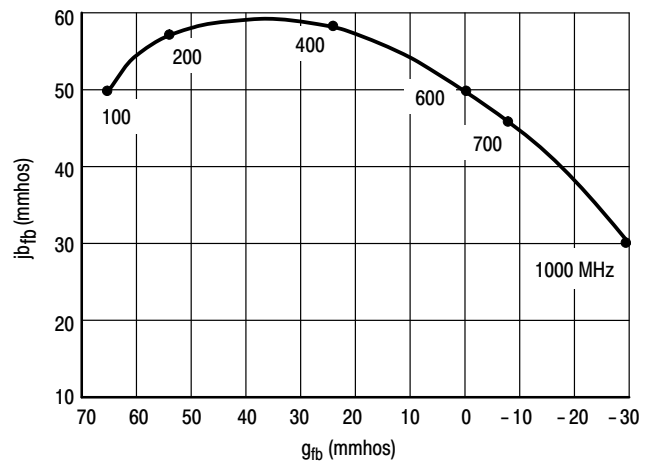


Figure 4. Polar Form

TYPICAL CHARACTERISTICS

COMMON-BASE y PARAMETERS versus FREQUENCY

($V_{CB} = 10$ Vdc, $I_C = 4.0$ mAdc, $T_A = 25^\circ\text{C}$)

y_{rb} , REVERSE TRANSFER ADMITTANCE

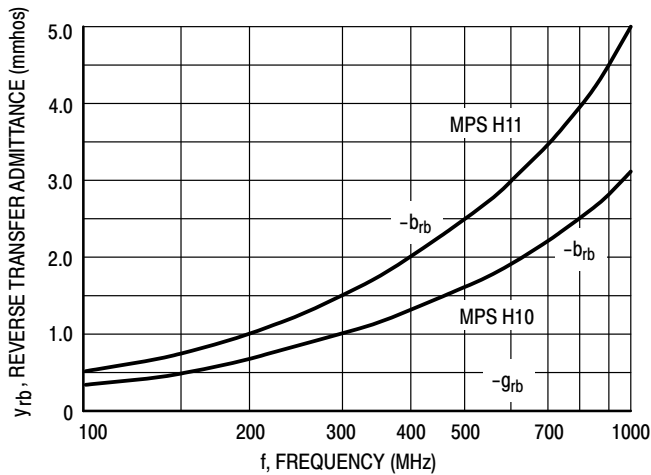


Figure 5. Rectangular Form

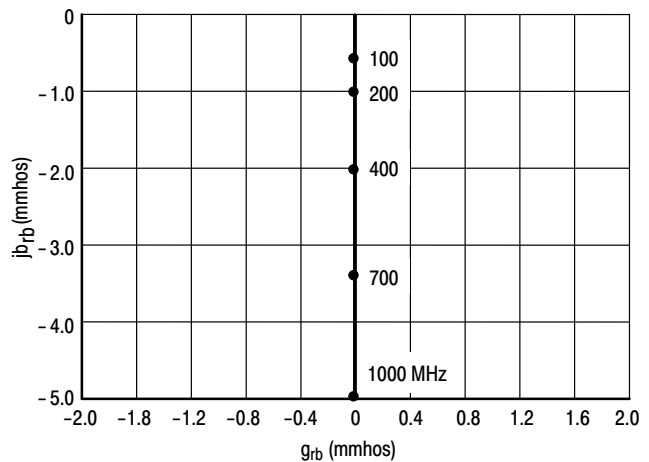


Figure 6. Polar Form

y_{ob} , OUTPUT ADMITTANCE

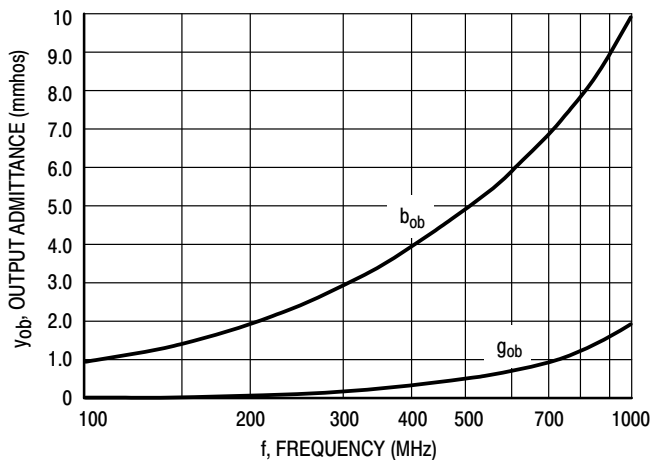


Figure 7. Rectangular Form

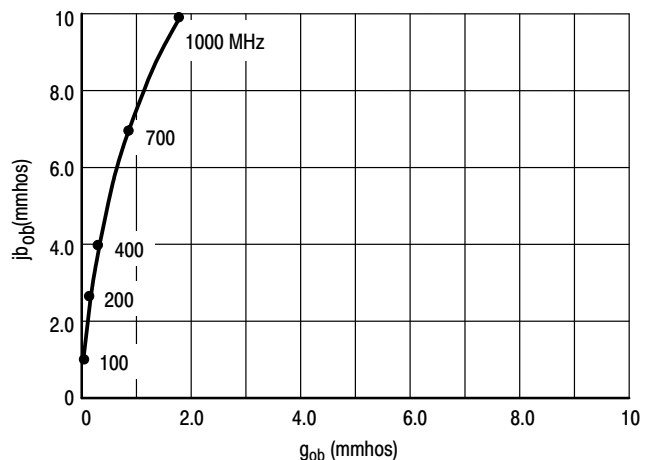


Figure 8. Polar Form

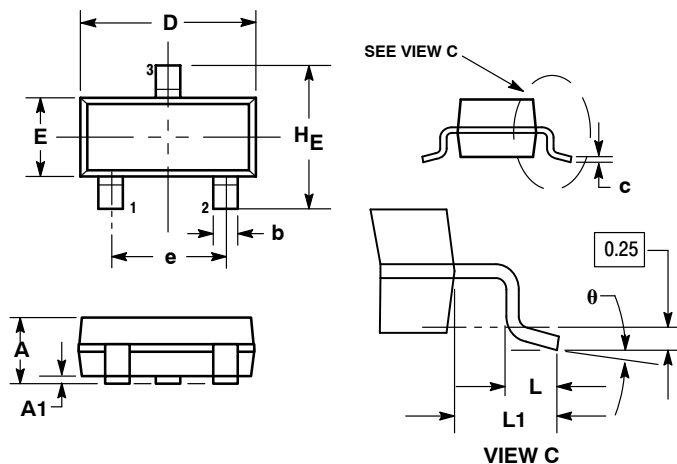
MMBTH10L, MMBTH10-4L, SMMBTH10-4L, NSVMMBTH10L

PACKAGE DIMENSIONS

SOT-23 (TO-236)

CASE 318-08

ISSUE AP



NOTES:

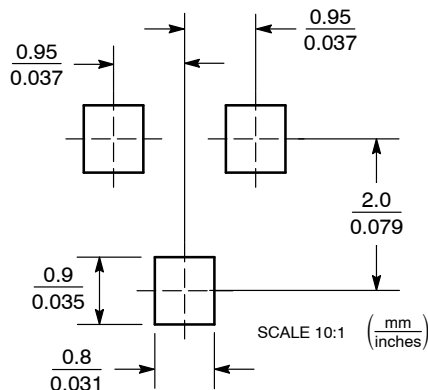
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	---	10°	0°	---	10°

STYLE 6:

- PIN 1. BASE
- EMITTER
- COLLECTOR

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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MMBTH10LT1/D

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