# PNP General Purpose Transistor

The MMBT2907AM3T5G device is a spin-off of our popular SOT-23 three-leaded device. It is designed for general purpose amplifier applications and is housed in the SOT-723 surface mount package. This device is ideal for low-power surface mount applications where board space is at a premium.

## Features

- Reduces Board Space
- NSV Prefix 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 <sub>CEO</sub>	-60	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	-60	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	-5.0	Vdc
Collector Current – Continuous	Ι <sub>C</sub>	-600	mAdc

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Мах	Unit
Total Device Dissipation FR-5 Board (Note 1) $T_A = 25^{\circ}C$ Derate above $25^{\circ}C$	P <sub>D</sub>	265 2.1	mW mW/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	470	°C/W
Total Device Dissipation Alumina Substrate, (Note 2) T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	640 5.1	mW mW/°C
Thermal Resistance, Junction-to-Ambient	$R_{ hetaJA}$	195	°C/W
Junction and Storage Temperature	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

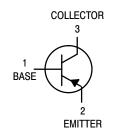
1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.

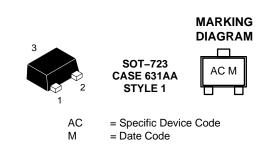
2. Alumina = 0.4  $\times$  0.3  $\times$  0.024 in. 99.5% alumina.



# **ON Semiconductor®**

www.onsemi.com





# ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MMBT2907AM3T5G	SOT-723 (Pb-Free)	8000/Tape & Reel
NSVMMBT2907AM3T5G	SOT-723 (Pb-Free)	8000/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.

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (Note 3) $(I_C = -10 \text{ mAdc}, I_B = 0)$	V <sub>(BR)CEO</sub>	-60	-	Vdc
Collector – Base Breakdown Voltage $(I_C = -10 \ \mu Adc, I_E = 0)$	V <sub>(BR)</sub> CBO	-60	_	Vdc
Emitter-Base Breakdown Voltage ( $I_E = -10 \ \mu Adc, I_C = 0$ )	V <sub>(BR)EBO</sub>	-5.0	_	Vdc
Collector Cutoff Current ( $V_{CE} = -30 \text{ Vdc}, V_{EB(off)} = -0.5 \text{ Vdc}$ )	I <sub>CEX</sub>	_	-50	nAdc
Collector Cutoff Current ( $V_{CB} = -50 \text{ Vdc}, I_E = 0$ ) ( $V_{CB} = -50 \text{ Vdc}, I_E = 0, T_A = 125^{\circ}C$ )	I <sub>CBO</sub>		-0.010 -10	μAdc
Base Cutoff Current (V <sub>CE</sub> = -30 Vdc, V <sub>EB(off)</sub> = -0.5 Vdc)	I <sub>BL</sub>	-	-50	nAdc
ON CHARACTERISTICS		•	•	•

DC Current Gain	h <sub>FE</sub>			-
$(I_{C} = -0.1 \text{ mAdc}, V_{CE} = -10 \text{ Vdc})$		75	-	
$(I_{C} = -1.0 \text{ mAdc}, V_{CE} = -10 \text{ Vdc})$		100	-	
$(I_{C} = -10 \text{ mAdc}, V_{CE} = -10 \text{ Vdc})$		100	-	
$(I_{C} = -150 \text{ mAdc}, V_{CE} = -10 \text{ Vdc})$		100	300	
$(I_{C} = -500 \text{ mAdc}, V_{CE} = -10 \text{ Vdc})$ (Note 3)		50	-	
Collector – Emitter Saturation Voltage (Note 3)	V <sub>CE(sat)</sub>			Vdc
$(I_{C} = -150 \text{ mAdc}, I_{B} = -15 \text{ mAdc})$ (Note 3)	. ,	-	-0.4	
$(I_{C} = -500 \text{ mAdc}, I_{B} = -50 \text{ mAdc})$		-	-1.6	
Base – Emitter Saturation Voltage (Note 3)	V <sub>BE(sat)</sub>			Vdc
$(I_{C} = -150 \text{ mAdc}, I_{B} = -15 \text{ mAdc})$	. ,	-	-1.3	
$(I_{C} = -500 \text{ mAdc}, I_{B} = -50 \text{ mAdc})$		-	-2.6	

## SMALL-SIGNAL CHARACTERISTICS

Current-Gain – Bandwidth Product (Notes 3, 4) ( $I_C = -50 \text{ mAdc}, V_{CE} = -20 \text{ Vdc}, f = 100 \text{ MHz}$ )	f <sub>T</sub>	200	_	MHz
Output Capacitance (V <sub>CB</sub> = -10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>obo</sub>	-	8.0	pF
Input Capacitance ( $V_{EB} = -2.0 \text{ Vdc}, I_C = 0, f = 1.0 \text{ MHz}$ )	C <sub>ibo</sub>	I	30	

#### SWITCHING CHARACTERISTICS

Turn–On Time		t <sub>on</sub>	-	45	
Delay Time	$(V_{CC} = -30 \text{ Vdc}, I_C = -150 \text{ mAdc}, I_{B1} = -15 \text{ mAdc})$	t <sub>d</sub>	-	10	
Rise Time		t <sub>r</sub>	-	40	
Turn–Off Time		t <sub>off</sub>	-	100	ns
Storage Time	$(V_{CC} = -6.0 \text{ Vdc}, I_C = -150 \text{ mAdc}, I_{B1} = I_{B2} = -15 \text{ mAdc})$	t <sub>s</sub>	-	80	
Fall Time		t <sub>f</sub>	-	30	]

 $\begin{array}{ll} \mbox{3. Pulse Test: Pulse Width} \leq 300 \ \mu \mbox{s, Duty Cycle} \leq 2.0\%. \\ \mbox{4. } f_T \mbox{ is defined as the frequency at which } |h_{fe}| \ extrapolates to unity. \\ \end{array}$ 

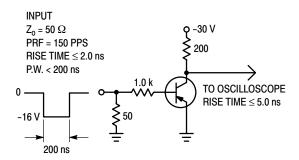
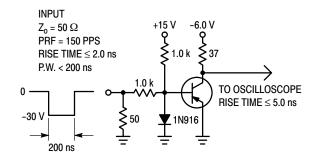
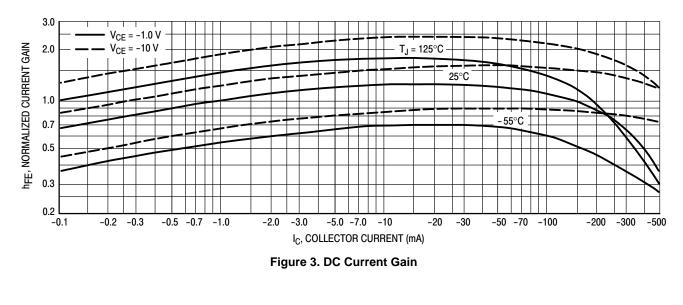


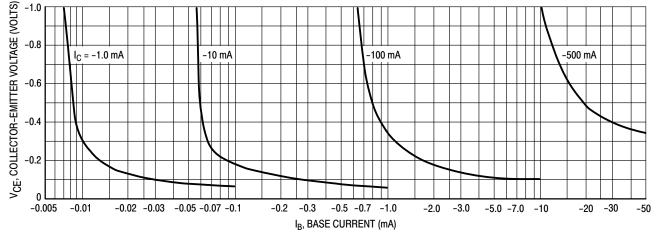
Figure 1. Delay and Rise Time Test Circuit



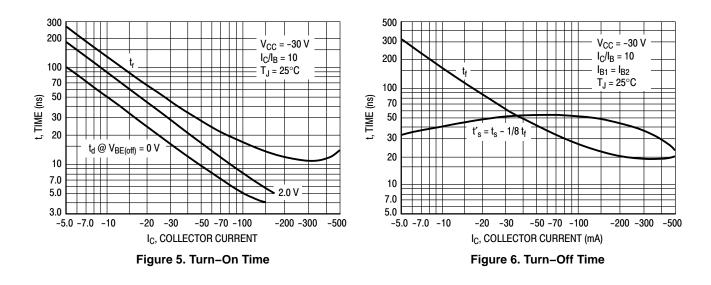


# **TYPICAL CHARACTERISTICS**



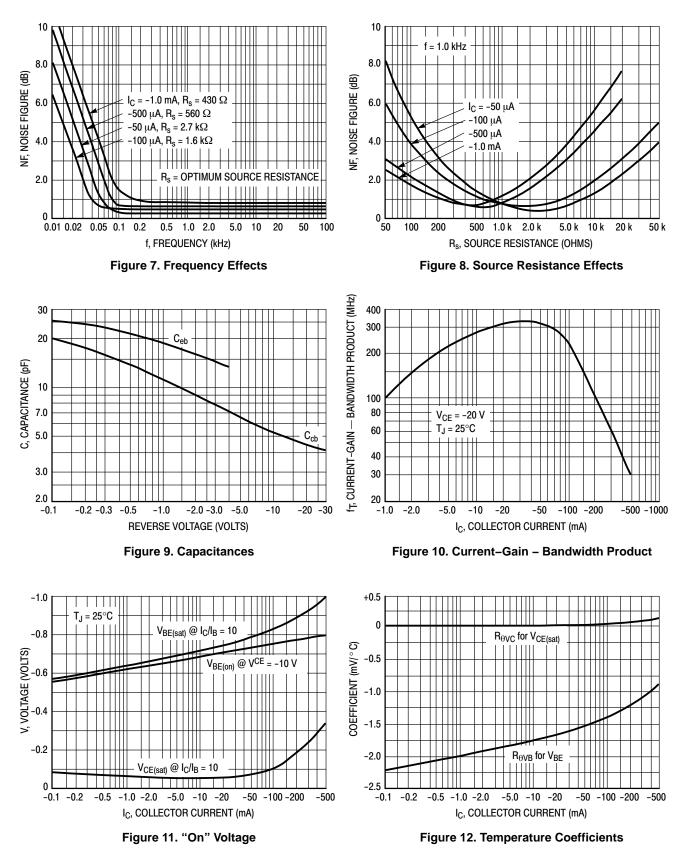






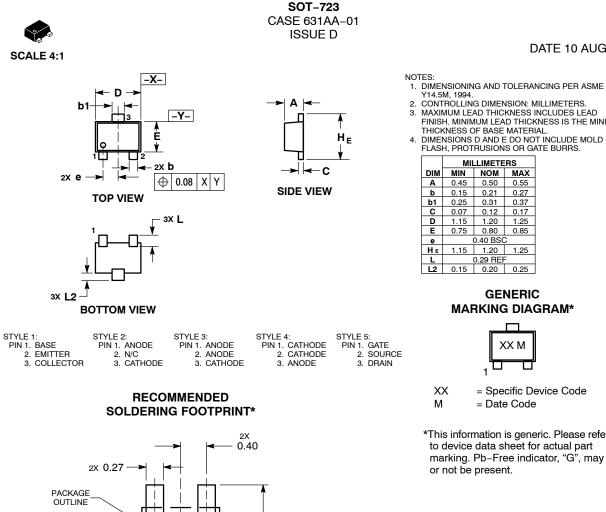


 $V_{CE}$  = 10 Vdc,  $T_A$  = 25°C



www.onsemi.com 5





1.50

#### DATE 10 AUG 2009

- THISH. MINIMUM LEAD THICKNESS INCLOSE LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			
DIM	MIN	NOM	MAX	
Α	0.45	0.50	0.55	
b	0.15	0.21	0.27	
b1	0.25	0.31	0.37	
С	0.07	0.12	0.17	
D	1.15	1.20	1.25	
Е	0.75	0.80	0.85	
е		0.40 BSC	2	
ΗE	1.15	1.20	1.25	
L	0.29 REF			
L2	0.15	0.20	0.25	

## GENERIC **MARKING DIAGRAM\***

ĺ	XX N	1
1		Π

= Specific Device Code

= Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

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

0.36 DIMENSIONS: MILLIMETERS

DOCUMENT NUMBER:	98AON12989D	Electronic versions are uncontrolled except when accessed directly from the Document Reposition Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION: SOT-723 PAGE 1 OF			PAGE 1 OF 1
ON Semiconductor reserves the right the suitability of its products for any pa	to make changes without further notice to an articular purpose, nor does ON Semiconductor	stries, LLC dba ON Semiconductor or its subsidiaries in the United States y products herein. ON Semiconductor makes no warranty, representation r assume any liability arising out of the application or use of any product or icidental damages. ON Semiconductor does not convey any license under	or guarantee regarding r circuit, and specifically

© Semiconductor Components Industries, LLC, 2019

зх 0.52

onsemi, ONSEMI, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at <u>www.onsemi.com/site/pdf/Patent-Marking.pdf</u>. onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or indental damages. Buyer is responsible for its products and applications using onsemi products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by onsemi. "Typical" parameters which may be provided in onsemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. onsemi does not convey any license under any of its intellectual property rights nor the rights of others. onsemi products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification. Buyer shall indemnify and hold onsemi and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs,

#### ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation onsemi Website: www.onsemi.com ONLINE SUPPORT: <u>www.onsemi.com/support</u> For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales