

# 2SC5658M3T5G, 2SC5658RM3T5G

## NPN Silicon General Purpose Amplifier Transistor

This NPN transistor is designed for general purpose amplifier applications. This device is housed in the SOT-723 package which is designed for low power surface mount applications, where board space is at a premium.

### Features

- Reduces Board Space
- High  $h_{FE}$ , 210–460 (typical)
- Low  $V_{CE(sat)}$ , < 0.5 V
- ESD Performance: Human Body Model; > 2000 V, Machine Model; > 200 V
- Available in 8 mm, 7-inch/3000 Unit Tape and Reel
- These are Pb-Free Devices

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Rating	Symbol	Value	Unit
Collector-Base Voltage	$V_{(BR)CBO}$	50	Vdc
Collector-Emitter Voltage	$V_{(BR)CEO}$	50	Vdc
Emitter-Base Voltage	$V_{(BR)EBO}$	7.0	Vdc
Collector Current – Continuous	$I_C$	150	mAdc

### THERMAL CHARACTERISTICS

Rating	Symbol	Max	Unit
Power Dissipation (Note 1)	$P_D$	260	mW
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55 ~ +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.

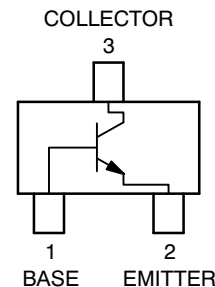
1. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.



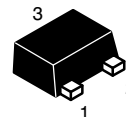
**ON Semiconductor®**

<http://onsemi.com>

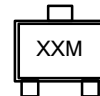
## NPN GENERAL PURPOSE AMPLIFIER TRANSISTORS SURFACE MOUNT



### MARKING DIAGRAM



SOT-723  
CASE 631AA



XX = Specific Device Code  
(B9 = 2SC5658M3T5G  
RM = 2SC5658RM3T5G)  
M = Date Code

### ORDERING INFORMATION

Device	Package	Shipping†
2SC5658M3T5G	SOT-723 (Pb-Free)	3000/Tape & Reel
2SC5658RM3T5G	SOT-723 (Pb-Free)	3000/Tape & Reel

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

## 2SC5658M3T5G, 2SC5658RM3T5G

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

Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage (I <sub>C</sub> = 50 μAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	50	–	–	Vdc
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 1.0 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	50	–	–	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 50 μAdc, I <sub>E</sub> = 0)	V <sub>(BR)EBO</sub>	7.0	–	–	Vdc
Collector-Base Cutoff Current (V <sub>CB</sub> = 30 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	–	–	0.5	μA
Emitter-Base Cutoff Current (V <sub>EB</sub> = 4.0 Vdc, I <sub>B</sub> = 0)	I <sub>EBO</sub>	–	–	0.5	μA
Collector-Emitter Saturation Voltage (Note 2) (I <sub>C</sub> = 50 mAdc, I <sub>B</sub> = 5.0 mAdc)	V <sub>CE(sat)</sub>	–	–	0.4	Vdc
DC Current Gain (Note 2) (V <sub>CE</sub> = 6.0 Vdc, I <sub>C</sub> = 1.0 mAdc)      2SC5658M3T5G (V <sub>CE</sub> = 6.0 Vdc, I <sub>C</sub> = 1.0 mAdc)      2SC5658RM3T5G	h <sub>FE</sub>	120 215	– –	560 375	–
Transition Frequency (V <sub>CE</sub> = 12 Vdc, I <sub>C</sub> = 2.0 mAdc, f = 30 MHz)	f <sub>T</sub>	–	180	–	MHz
Output Capacitance (V <sub>CB</sub> = 12 Vdc, I <sub>C</sub> = 0 Adc, f = 1.0 MHz)	C <sub>OB</sub>	–	2.0	–	pF

2. Pulse Test: Pulse Width ≤ 300 μs, D.C. ≤ 2%.

TYPICAL ELECTRICAL CHARACTERISTICS

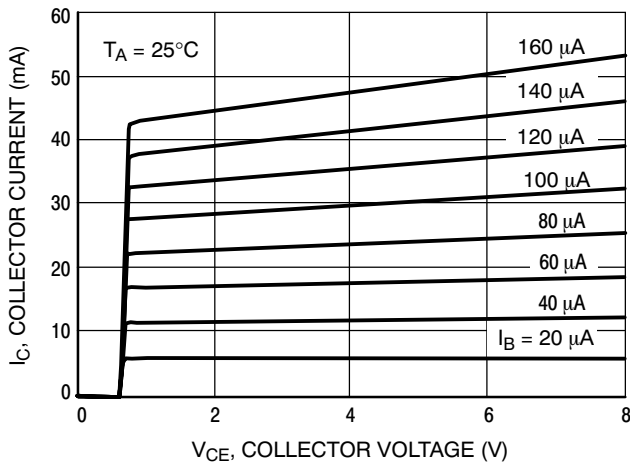


Figure 1.  $I_C - V_{CE}$

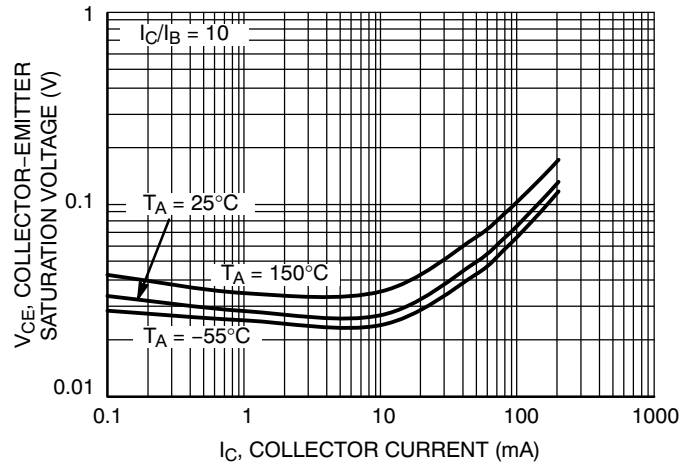


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

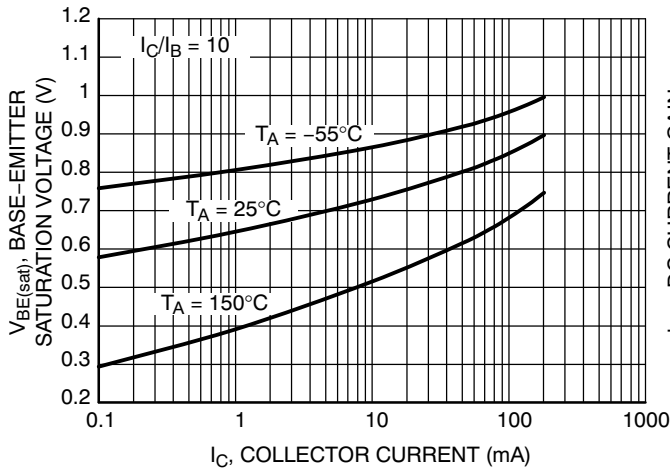


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

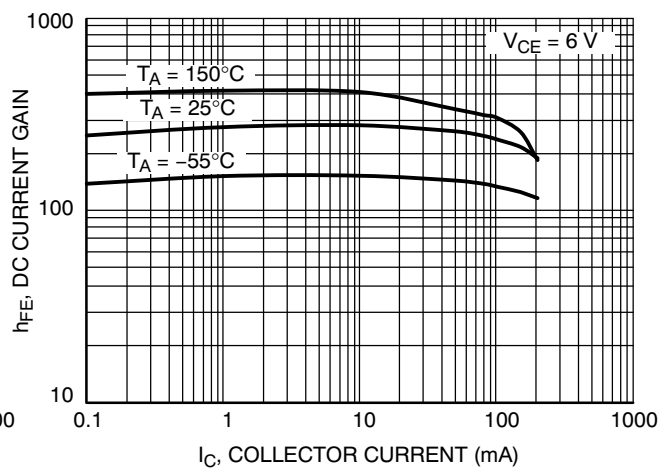


Figure 4. DC Current Gain vs. Collector Current

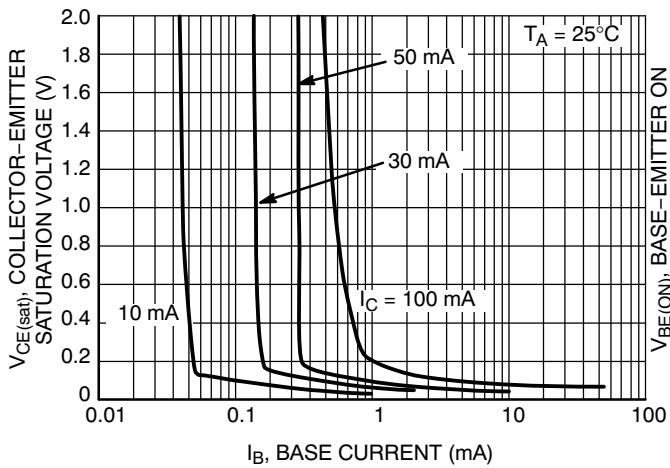


Figure 5. Saturation Region

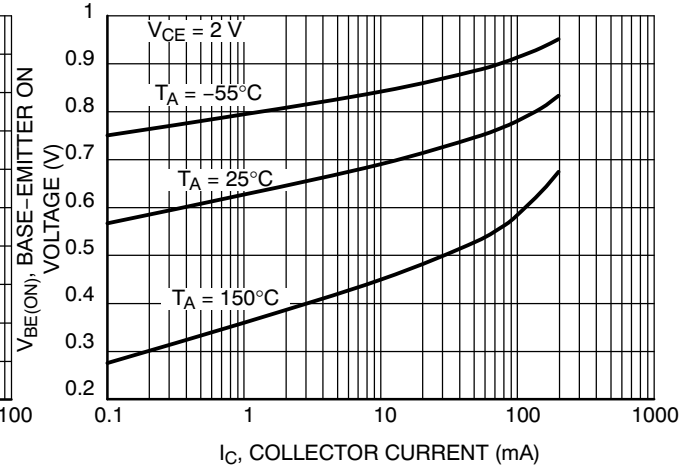


Figure 6. Base-Emitter Turn-ON Voltage vs. Collector Current

# 2SC5658M3T5G, 2SC5658RM3T5G

## TYPICAL ELECTRICAL CHARACTERISTICS

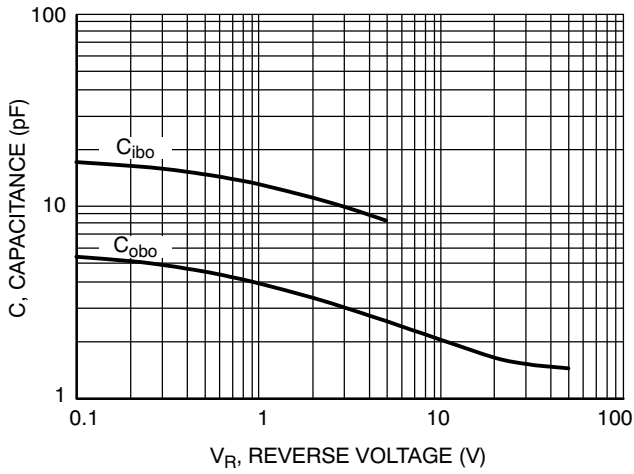


Figure 7. Capacitance

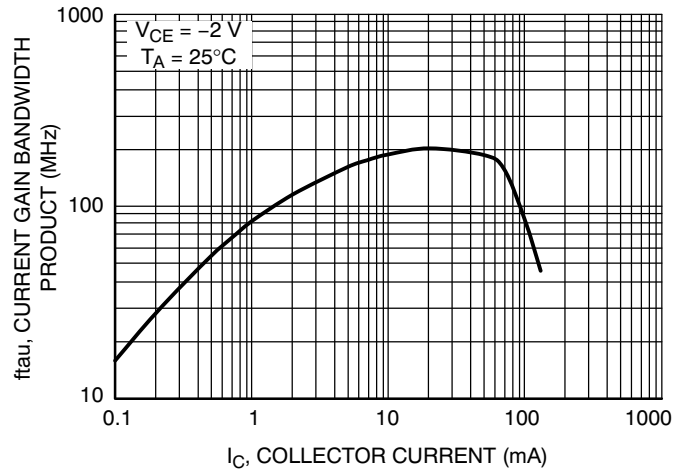


Figure 8. Current Gain Bandwidth Product vs. Collector Current

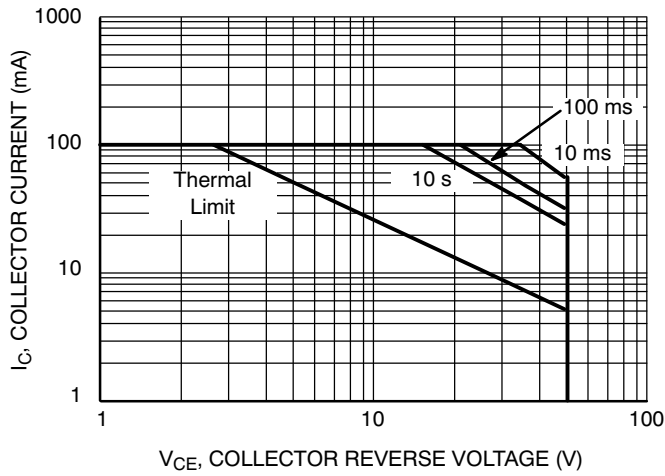
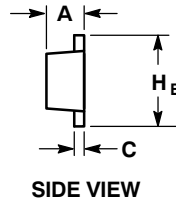
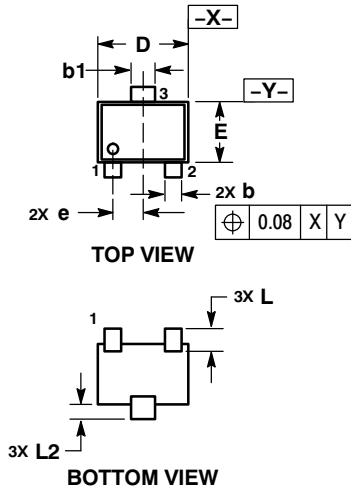


Figure 9. Safe Operating Area

# 2SC5658M3T5G, 2SC5658RM3T5G

## PACKAGE DIMENSIONS

SOT-723  
CASE 631AA  
ISSUE D

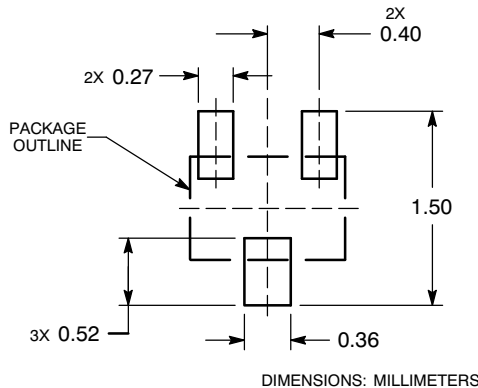


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. 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		
	MIN	NOM	MAX
A	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

### RECOMMENDED 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.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC 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 incidental damages. "Typical" parameters which may be provided in SCILLC 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. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**  
Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative



LittleDiode supplies new, hard to find or obsolete electronic components and semiconductors all over the world.

With over two million different components listed you are sure to find the part you need.

Feel free to visit us today at our online store:

[LittleDiode.com](http://LittleDiode.com)

Looking forward to providing you with the best possible service.