

ON Semiconductor

Is Now



To learn more about onsemi™, please visit our website at
www.onsemi.com

onsemi and 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 product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. 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 incidental 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 in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use onsemi products for any such unintended or unauthorized application, Buyer shall indemnify and hold onsemi 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 onsemi was negligent regarding the design or manufacture of the part. onsemi is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.

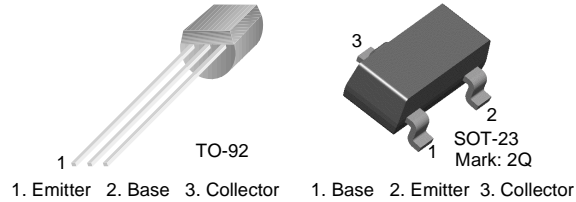


ON Semiconductor®

2N5086/2N5087/MMBT5087

PNP General Purpose Amplifier

- This device is designed for low level, high gain, low noise general purpose amplifier applications at collector currents to 50mA.



Absolute Maximum Ratings* $T_a=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
V_{CEO}	Collector-Emitter Voltage	-50	V
V_{CBO}	Collector-Base Voltage	-50	V
V_{EBO}	Emitter-Base Voltage	-3.0	V
I_C	Collector current - Continuous	-100	mA
T_J, T_{stg}	Junction and Storage Temperature	-55 ~ +150	$^\circ\text{C}$

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:

- These ratings are based on a maximum junction temperature of 150 degrees C.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Electrical Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Max.	Units
Off Characteristics					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage *	$I_C = -1.0\text{mA}, I_B = 0$	-50		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = -100\mu\text{A}, I_E = 0$	-50		V
I_{CEO}	Collector Cutoff Current	$V_{CB} = -10\text{V}, I_E = 0$ $V_{CB} = -35\text{V}, I_E = 0$		-10 -50	nA nA
I_{CBO}	Emitter Cutoff Current	$V_{EB} = -3.0\text{V}, I_C = 0$		-50	nA
On Characteristics					
h_{FE}	DC Current Gain	$I_C = -100\mu\text{A}, V_{CE} = -5.0\text{V}$ $I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}$ $I_C = -10\text{mA}, V_{CE} = -5.0\text{V}$	5086 5087 5086 5087 5086 5087	150 250 150 250 150 250	500 800
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = -10\text{mA}, I_B = -1.0\text{mA}$		-0.3	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}$		-0.85	V
Small Signal Characteristics					
f_T	Current Gain Bandwidth Product	$I_C = -500\mu\text{A}, V_{CE} = -5.0\text{V}, f = 20\text{MHz}$	40		MHz
C_{cb}	Collector-Base Capacitance	$V_{CB} = -5.0\text{V}, I_E = 0, f = 100\text{KHz}$		4.0	pF
h_{fe}	Small-Signal Current Gain	$I_C = -1.0\text{mA}, V_{CE} = -5.0\text{V}, f = 1.0\text{KHz}$	5086 5087	150 250	600 900
NF	Noise Figure	$I_C = -100\mu\text{A}, V_{CE} = -5.0\text{V}, R_S = 3.0\text{k}\Omega, f = 1.0\text{KHz}$	5086 5087		3.0 2.0
					dB
		$I_C = -20\mu\text{A}, V_{CE} = -5.0\text{V}, R_S = 10\text{k}\Omega, f = 10\text{Hz to } 15.7\text{KHz}$	5086 5087		3.0 2.0
					dB

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

2N5086/2N5087/MMBT5087

Thermal Characteristics $T_a=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Max.		Units
		2N5086 2N5087	*MMBT5087	
P_D	Total Device Dissipation	625	350	mW
	Derate above 25°C	5.0	2.8	mW/ $^{\circ}\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3		$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	357	$^{\circ}\text{C}/\text{W}$

* Device mounted on FR-4 PCB $1.6" \times 1.6" \times 0.06."$

Typical Characteristics

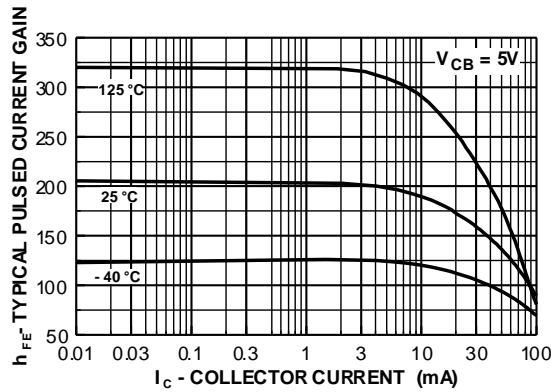


Figure 1. Typical Pulsed Current Gain vs Collector Current

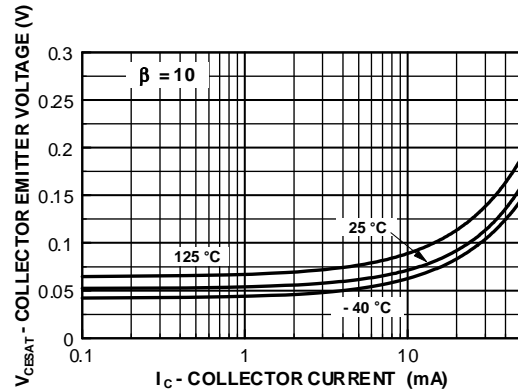


Figure 2. Collector-Emitter Saturation Voltage vs Collector Current

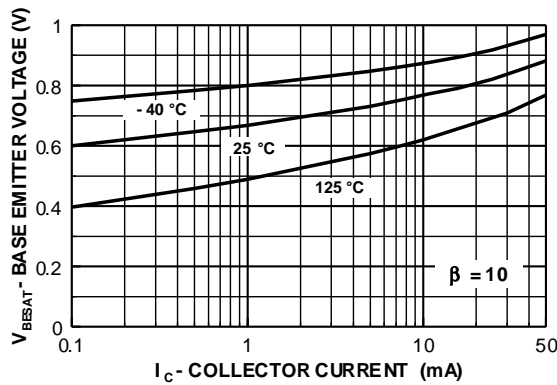


Figure 3. Base-Emitter Saturation Voltage vs Collector Current

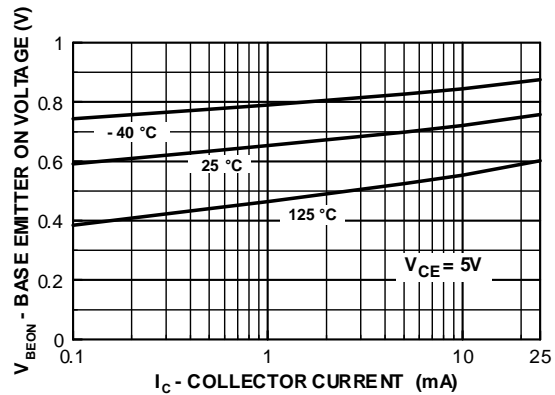


Figure 4. Base-Emitter On Voltage vs Collector Current

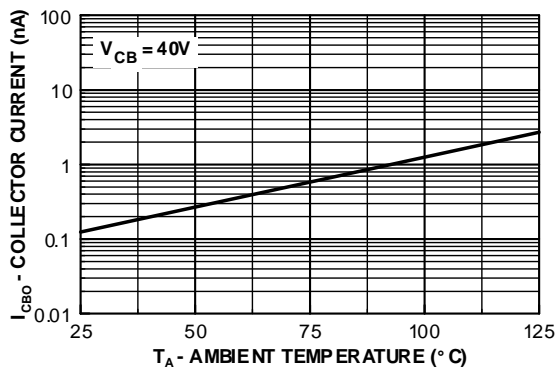


Figure 5. Collector Cutoff Current vs Ambient Temperature

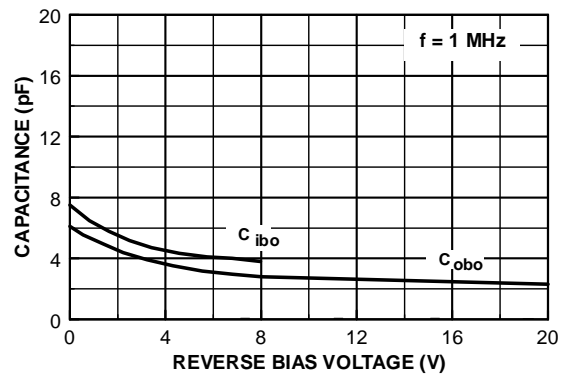


Figure 6. Input and Output Capacitance vs Reverse Voltage

Typical Characteristics (Continue)

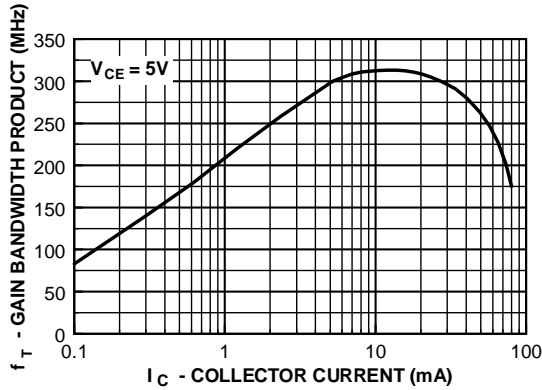


Figure 7. Gain Bandwidth Product vs Collector Current

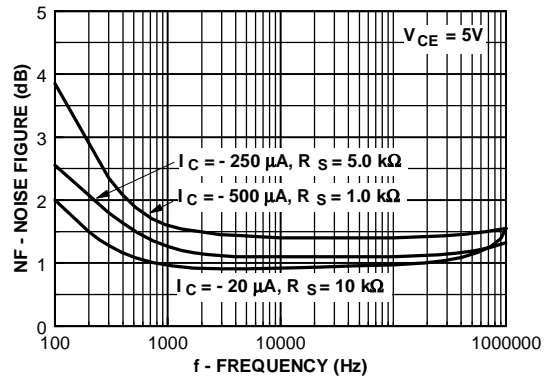


Figure 8. Noise Figure vs Frequency

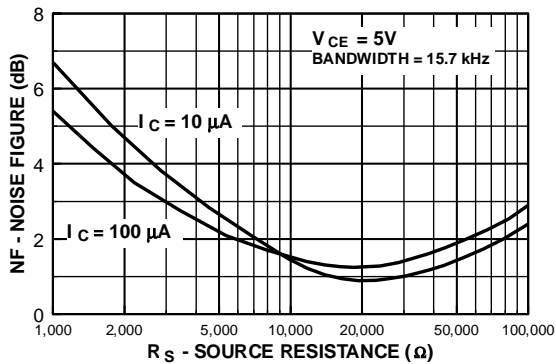


Figure 9. Wideband Noise Frequency vs Source Resistance

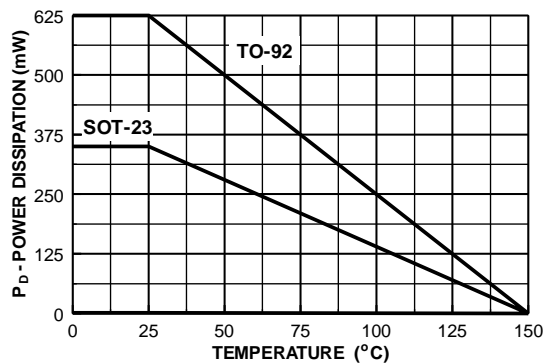


Figure 10. Power Dissipation vs Ambient Temperature

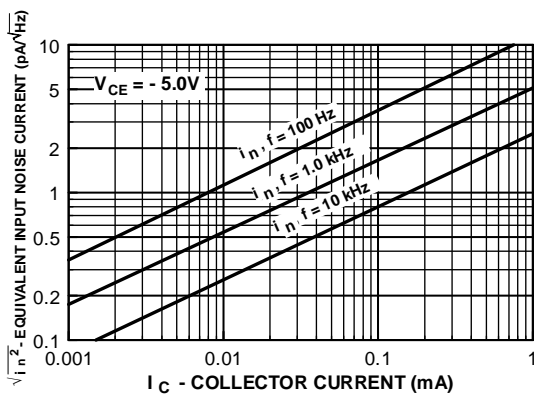


Figure 11. Equivalent Input Noise Current vs Collector Current

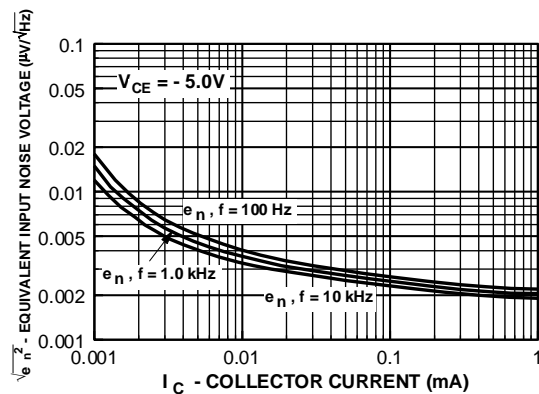


Figure 12. Equivalent Input Noise Voltage vs Collector Current

Typical Characteristics (Continue)

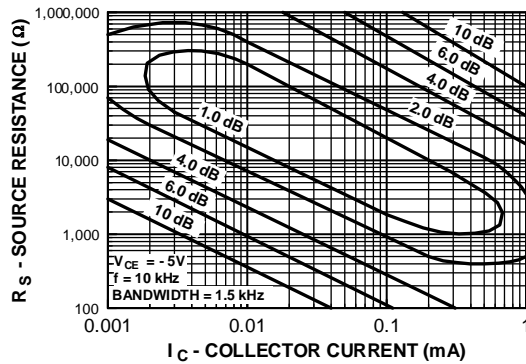


Figure 13. Contours of Constant Narrow Band Noise Figure

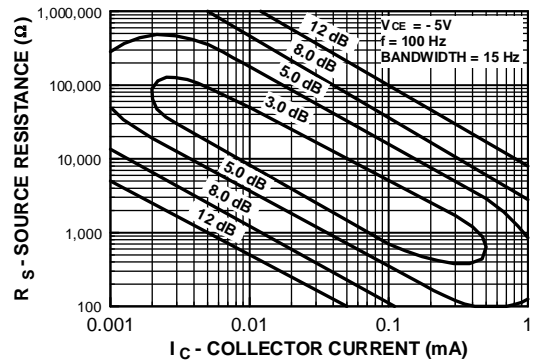


Figure 14. Contours of Constant Narrow Band Noise Figure

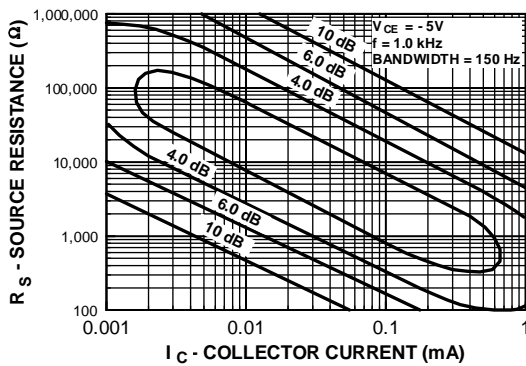


Figure 15. Contours of Constant Narrow Band Noise Figure

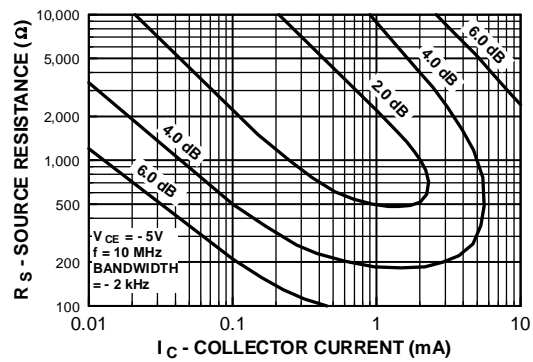
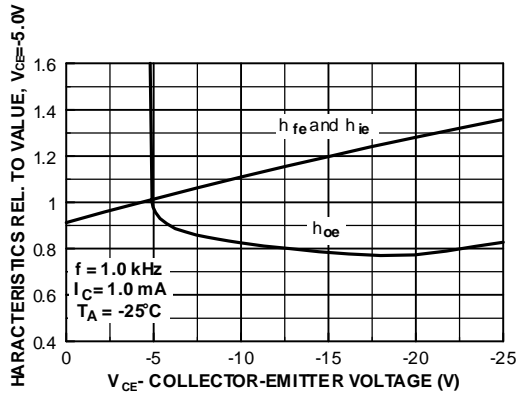
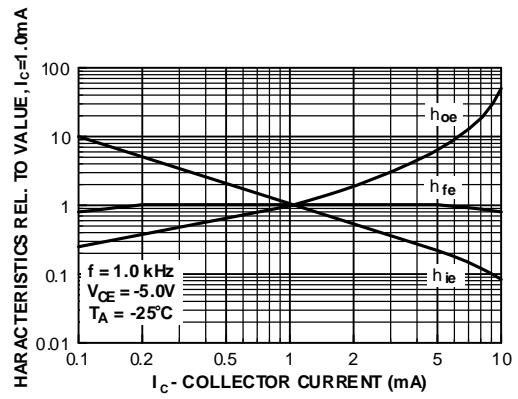


Figure 16. Contours of Constant Narrow Band Noise Figure

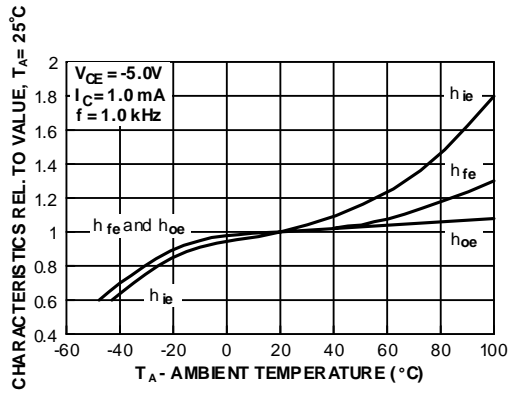
Typical Common Emitter Characteristics (f = 1.0KHz)



Typical Common Emitter Characteristics



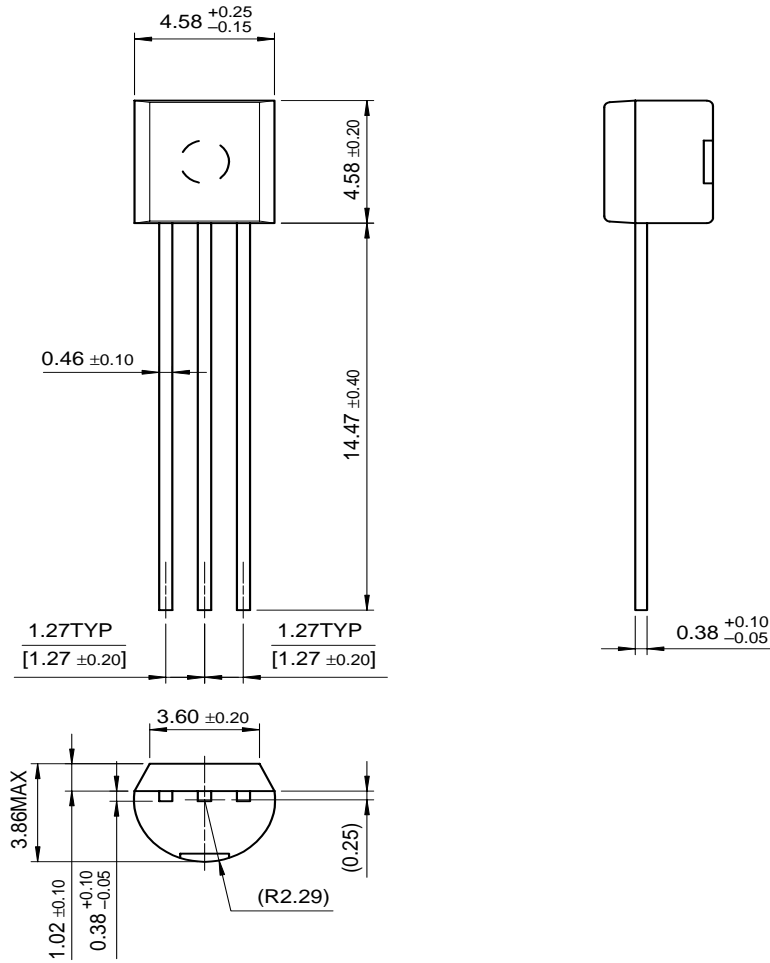
Typical Common Emitter Characteristics



Typical Common Emitter Characteristics

Package Dimensions

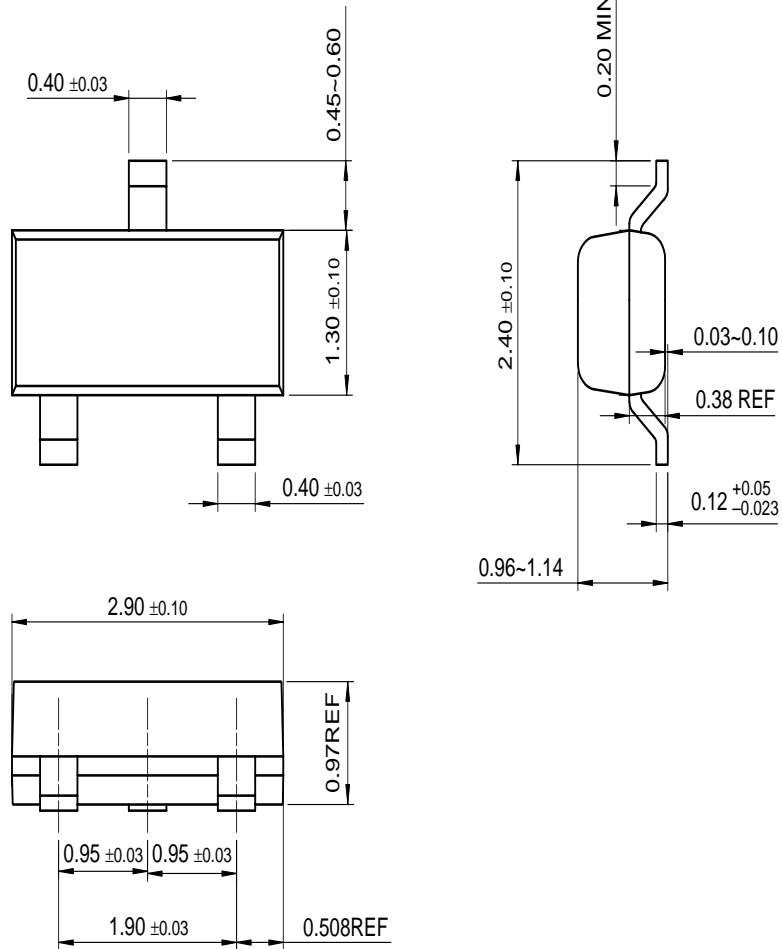
TO-92




Dimensions in Millimeters

Package Dimensions (Continued)

SOT-23



Dimensions in Millimeters

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor 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 in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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
19521 E. 32nd Pkwy, Aurora, Colorado 80011 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

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local
Sales Representative

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[onsemi:](#)

[MMBT5087](#)