

# ON Semiconductor

## Is Now

# onsemi™

To learn more about onsemi™, please visit our website at  
[www.onsemi.com](http://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](http://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.



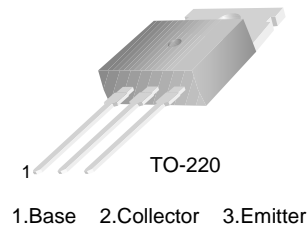
ON Semiconductor®

# TIP31A / TIP31C

## NPN Epitaxial Silicon Transistor

### Features

- Medium Power Linear Switching Applications
- Complementary to TIP32 Series



### Ordering Information

Part Number	Top Mark	Package	Packing Method
TIP31A	TIP31A	TO-220 3L (Single Gauge)	Bulk
TIP31C	TIP31C	TO-220 3L (Single Gauge)	Bulk
TIP31CTU	TIP31C	TO-220 3L (Single Gauge)	Rail

### Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage	TIP31A	60
		TIP31C	100
$V_{CEO}$	Collector-Emitter Voltage	TIP31A	60
		TIP31C	100
$V_{EBO}$	Emitter-Base Voltage	5	V
$I_C$	Collector Current (DC)	3	A
$I_{CP}$	Collector Current (Pulse)	5	A
$I_B$	Base Current	1	A
$T_J$	Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-65 to 150	$^\circ\text{C}$

## Thermal Characteristics

Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$P_C$	Collector Dissipation ( $T_A = 25^\circ\text{C}$ )	2	W
	Collector Dissipation ( $T_C = 25^\circ\text{C}$ )	40	

## Electrical Characteristics

Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Max.	Unit	
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage <sup>(1)</sup>	TIP31A	$I_C = 30\text{ mA}, I_B = 0$	60		V
		TIP31C		100		
$I_{CEO}$	Collector Cut-Off Current	TIP31A	$V_{CE} = 30\text{ V}, I_B = 0$		0.3	mA
		TIP31C	$V_{CE} = 60\text{ V}, I_B = 0$		0.3	
$I_{CES}$	Collector Cut-Off Current	TIP31A	$V_{CE} = 60\text{ V}, V_{EB} = 0$		200	$\mu\text{A}$
		TIP31C	$V_{CE} = 100\text{ V}, V_{EB} = 0$		200	
$I_{EBO}$	Emitter Cut-Off Current	$V_{EB} = 5\text{ V}, I_C = 0$		1	mA	
$h_{FE}$	DC Current Gain <sup>(1)</sup>	$V_{CE} = 4\text{ V}, I_C = 1\text{ A}$	25			
		$V_{CE} = 4\text{ V}, I_C = 3\text{ A}$	10	50		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage <sup>(1)</sup>	$I_C = 3\text{ A}, I_B = 375\text{ mA}$		1.2	V	
$V_{BE(on)}$	Base-Emitter On Voltage <sup>(1)</sup>	$V_{CE} = 4\text{ V}, I_C = 3\text{ A}$		1.8	V	
$f_T$	Current Gain Bandwidth Product	$V_{CE} = 10\text{ V}, I_C = 500\text{ mA}, f = 1\text{ MHz}$	3.0		MHz	

### Note:

1. Pulse test:  $p_w \leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

## Typical Performance Characteristics

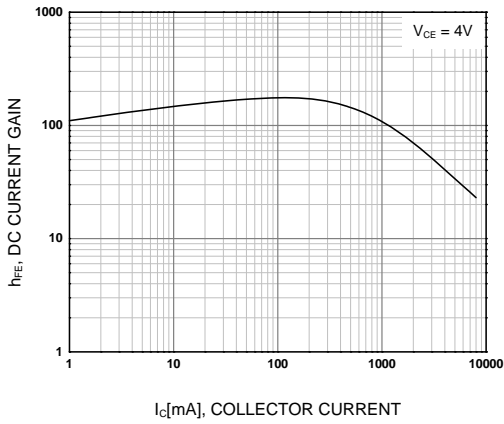


Figure 1. DC Current Gain

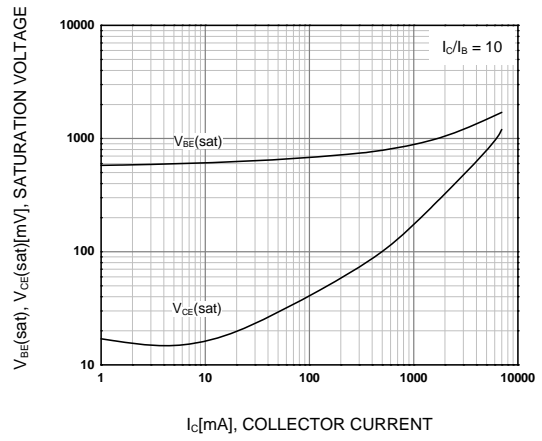


Figure 2. Base-Emitter Saturation Voltage and Collector-Emitter Saturation Voltage

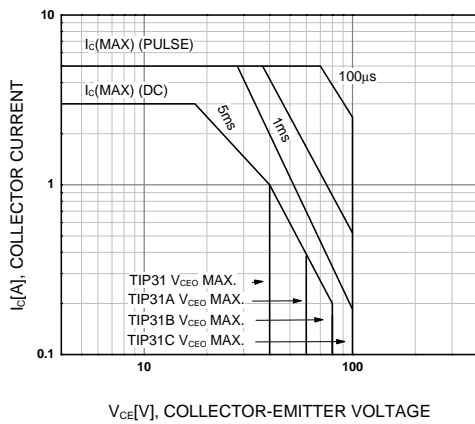


Figure 3. Safe Operating Area

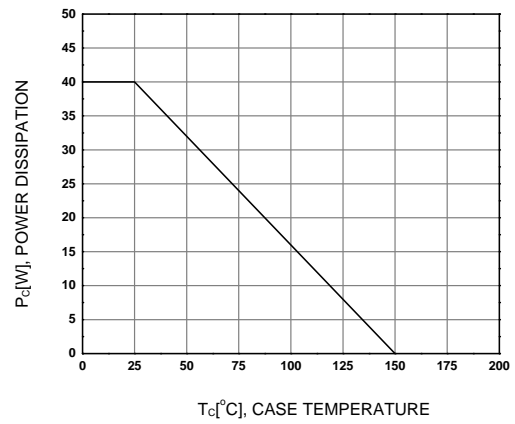


Figure 4. Power Derating

Physical Dimensions

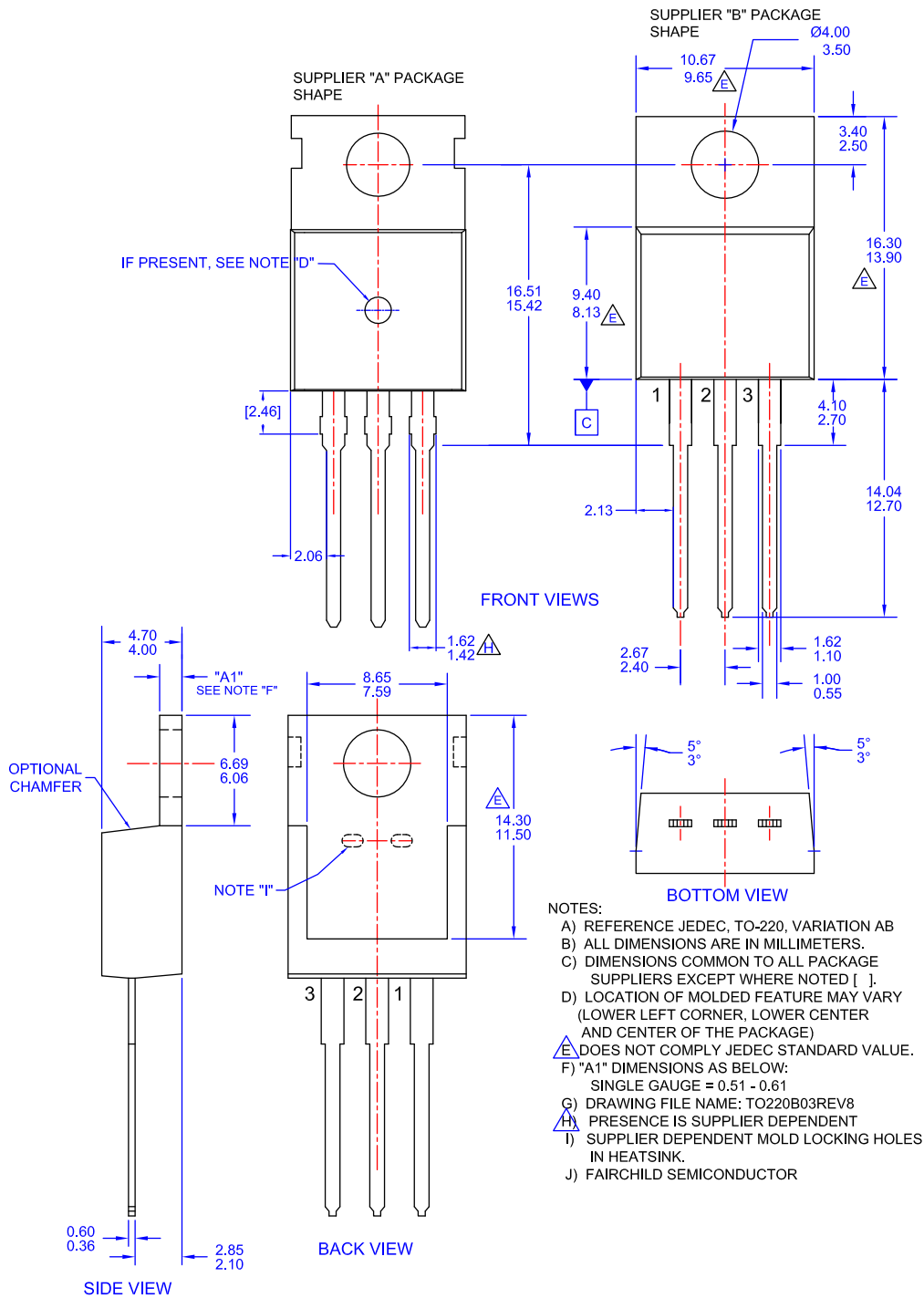


Figure 5. TO-220, MOLDED, 3LEAD, JEDEC VARIATION AB

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](http://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](mailto: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

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Bipolar Transistors - BJT category](#):*

*Click to view products by [ON Semiconductor manufacturer](#):*

Other Similar products are found below :

[619691C](#) [MCH4017-TL-H](#) [BC546/116](#) [BC557/116](#) [BSW67A](#) [NTE158](#) [NTE187A](#) [NTE195A](#) [NTE2302](#) [NTE2330](#) [NTE63](#) [C4460](#)  
[2SA1419T-TD-H](#) [2SA1721-O\(TE85L,F\)](#) [2SA2126-E](#) [2SB1204S-TL-E](#) [2SC5488A-TL-H](#) [2SD2150T100R](#) [SP000011176](#) [FMMTA92QTA](#)  
[2N2369ADCSM](#) [2SC2412KT146S](#) [2SC5490A-TL-H](#) [2SD1816S-TL-E](#) [2SD1816T-TL-E](#) [CMXT2207 TR](#) [CPH6501-TL-E](#) [MCH4021-TL-E](#)  
[US6T6TR](#) [732314D](#) [CMXT3906 TR](#) [CPH3121-TL-E](#) [CPH6021-TL-H](#) [873787E](#) [IMZ2AT108](#) [UMX21NTR](#) [EMT2T2R](#) [MCH6102-TL-E](#)  
[FP204-TL-E](#) [NJL0302DG](#) [2N3583](#) [2SA1434-TB-E](#) [2SC3143-4-TB-E](#) [2SD1621S-TD-E](#) [NTE103](#) [30A02MH-TL-E](#) [NSV40301MZ4T1G](#)  
[NTE101](#) [NTE13](#) [NTE15](#)