

# D44VH10 (NPN), D45VH10 (PNP)

## Complementary Silicon Power Transistors

These complementary silicon power transistors are designed for high-speed switching applications, such as switching regulators and high frequency inverters. The devices are also well-suited for drivers for high power switching circuits.

### Features

- Fast Switching
- Key Parameters Specified @ 100°C
- Low Collector-Emitter Saturation Voltage
- Complementary Pairs Simplify Circuit Designs
- These Devices are Pb-Free and are RoHS Compliant\*

### MAXIMUM RATINGS

| Rating   | Symbol         | Value      | Unit      |
|--|----------------|------------|-----------|
| Collector-Emitter Voltage  | $V_{CEO}$      | 80         | Vdc       |
| Collector-Emitter Voltage  | $V_{CEV}$      | 100        | Vdc       |
| Emitter Base Voltage   | $V_{EB}$       | 7.0        | Vdc       |
| Collector Current – Continuous   | $I_C$          | 15         | Adc       |
| Collector Current – Peak (Note 1)  | $I_{CM}$       | 20         | Adc       |
| Total Power Dissipation<br>@ $T_C = 25^\circ\text{C}$<br>Derate above 25°C | $P_D$          | 83<br>0.67 | W<br>W/°C |
| Operating and Storage Junction<br>Temperature Range                        | $T_J, T_{stg}$ | -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. Pulse Width  $\leq 6.0$  ms, Duty Cycle  $\leq 50\%$ .

### THERMAL CHARACTERISTICS

| Characteristic   | Symbol          | Max  | Unit |
|--|-----------------|------|------|
| Thermal Resistance, Junction to Case   | $R_{\theta JC}$ | 1.5  | °C/W |
| Thermal Resistance, Junction to Ambient  | $R_{\theta JA}$ | 62.5 | °C/W |
| Maximum Lead Temperature for Soldering<br>Purposes: 1/8" from Case for 5 Seconds | $T_L$           | 275  | °C   |

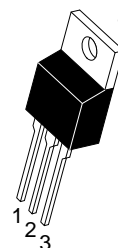
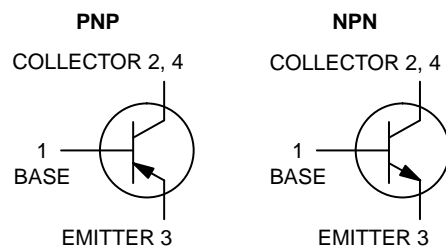
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

## 15 A COMPLEMENTARY SILICON POWER TRANSISTORS 80 V, 83 W



TO-220  
CASE 221A  
STYLE 1

### MARKING DIAGRAM



x = 4 or 5  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

| Device   | Package             | Shipping      |
|----------|---------------------|---------------|
| D44VH10G | TO-220<br>(Pb-Free) | 50 Units/Rail |
| D45VH10G | TO-220<br>(Pb-Free) | 50 Units/Rail |

# D44VH10 (NPN), D45VH10 (PNP)

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

| Characteristic   | Symbol                | Min    | Typ    | Max       | Unit |
|--|-----------------------|--------|--------|-----------|------|
| <b>OFF CHARACTERISTICS</b>   |                       |        |        |           |      |
| Collector–Emitter Sustaining Voltage (Note 2)<br>(I <sub>C</sub> = 25 mA, I <sub>B</sub> = 0)  | V <sub>CEO(sus)</sub> | 80     | –      | –         | Vdc  |
| Collector–Emitter Cutoff Current<br>(V <sub>CE</sub> = Rated V <sub>CEV</sub> , V <sub>BE(off)</sub> = 4.0 Vdc)<br>(V <sub>CE</sub> = Rated V <sub>CEV</sub> , V <sub>BE(off)</sub> = 4.0 Vdc, T <sub>C</sub> = 100°C) | I <sub>CEV</sub>      | –<br>– | –<br>– | 10<br>100 | μAdc |
| Emitter Base Cutoff Current<br>(V <sub>EB</sub> = 7.0 Vdc, I <sub>C</sub> = 0)   | I <sub>EBO</sub>      | –      | –      | 10        | μAdc |

## ON CHARACTERISTICS (Note 2)

|   |                      |                  |                  |                          |     |
|---|----------------------|------------------|------------------|--------------------------|-----|
| DC Current Gain<br>(I <sub>C</sub> = 2.0 Adc, V <sub>CE</sub> = 1.0 Vdc)<br>(I <sub>C</sub> = 4.0 Adc, V <sub>CE</sub> = 1.0 Vdc)   | h <sub>FE</sub>      | 35<br>20         | –<br>–           | –<br>–                   | –   |
| Collector–Emitter Saturation Voltage<br>(I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.4 Adc)<br>D44VH10<br>(I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.8 Adc)<br>D45VH10<br>(I <sub>C</sub> = 15 Adc, I <sub>B</sub> = 3.0 Adc, T <sub>C</sub> = 100°C)<br>D44VH10<br>D45VH10   | V <sub>CE(sat)</sub> | –<br>–<br>–<br>– | –<br>–<br>–<br>– | 0.4<br>1.0<br>0.8<br>1.5 | Vdc |
| Base–Emitter Saturation Voltage<br>(I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.4 Adc)<br>D44VH10<br>(I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.8 Adc)<br>D45VH10<br>(I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.4 Adc, T <sub>C</sub> = 100°C)<br>D44VH10<br>(I <sub>C</sub> = 8.0 Adc, I <sub>B</sub> = 0.8 Adc, T <sub>C</sub> = 100°C)<br>D45VH10 | V <sub>BE(sat)</sub> | –<br>–<br>–<br>– | –<br>–<br>–<br>– | 1.2<br>1.0<br>1.1<br>1.5 | Vdc |

## DYNAMIC CHARACTERISTICS

|   |                 |        |            |        |     |
|---|-----------------|--------|------------|--------|-----|
| Current Gain Bandwidth Product<br>(I <sub>C</sub> = 0.1 Adc, V <sub>CE</sub> = 10 Vdc, f = 20 MHz)                      | f <sub>T</sub>  | –      | 50         | –      | MHz |
| Output Capacitance<br>(V <sub>CB</sub> = 10 Vdc, I <sub>C</sub> = 0, f <sub>test</sub> = 1.0 MHz)<br>D44VH10<br>D45VH10 | C <sub>ob</sub> | –<br>– | 120<br>275 | –<br>– | pF  |

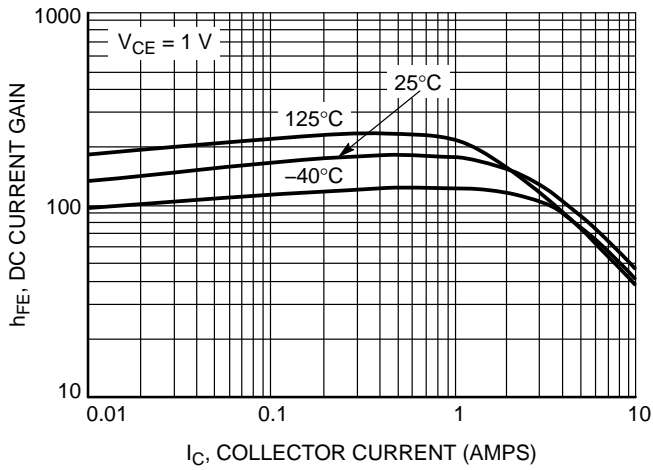
## SWITCHING CHARACTERISTICS

|              |   |                |   |   |     |    |
|--------------|---|----------------|---|---|-----|----|
| Delay Time   | (V <sub>CC</sub> = 20 Vdc, I <sub>C</sub> = 8.0 Adc, I <sub>B1</sub> = I <sub>B2</sub> = 0.8 Adc) | t <sub>d</sub> | – | – | 50  | ns |
| Rise Time    |   | t <sub>r</sub> | – | – | 250 |    |
| Storage Time |   | t <sub>s</sub> | – | – | 700 |    |
| Fall Time    |   | t <sub>f</sub> | – | – | 90  |    |

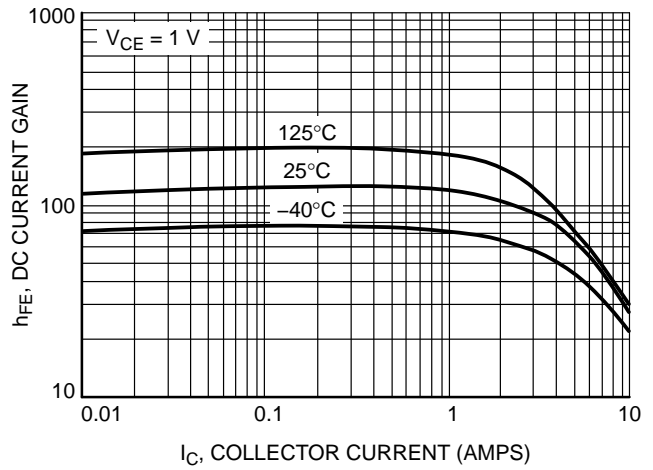
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

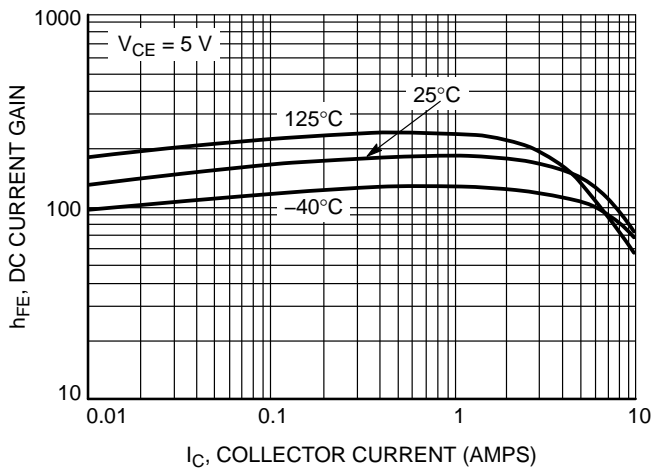
## D44VH10 (NPN), D45VH10 (PNP)



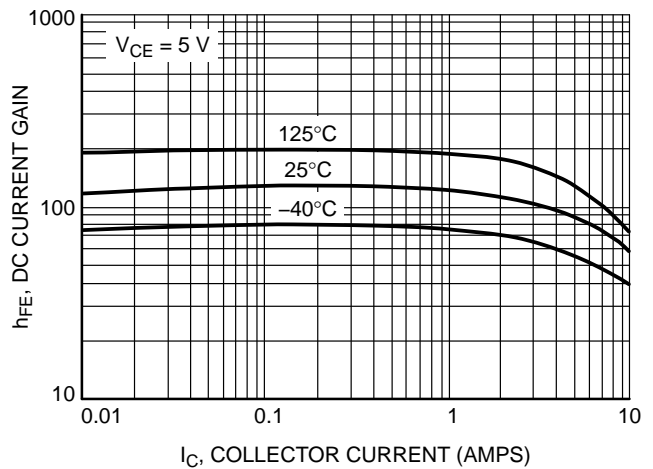
**Figure 1. D44VH10 DC Current Gain**



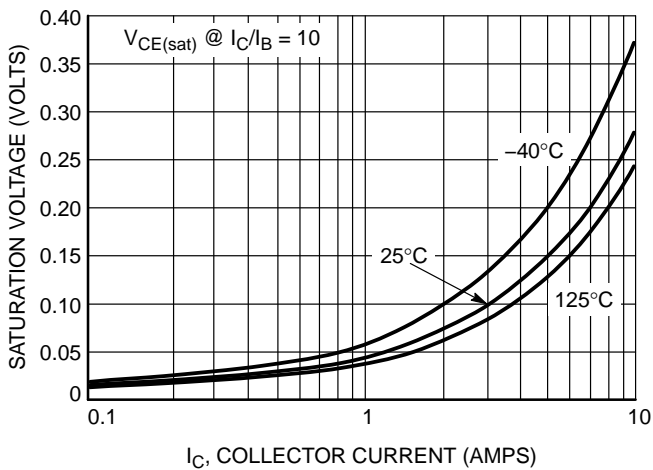
**Figure 2. D45VH10 DC Current Gain**



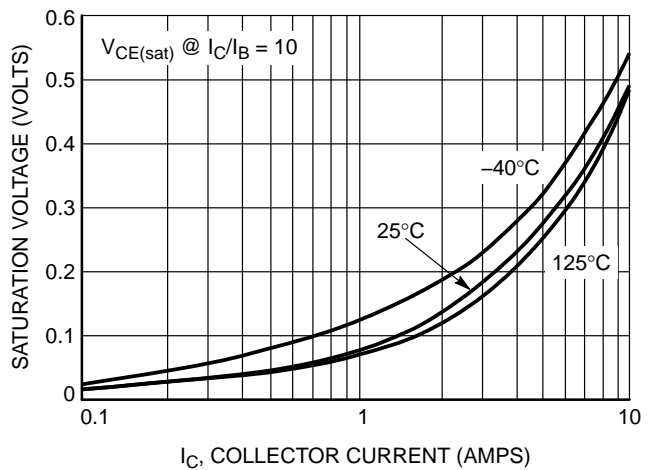
**Figure 3. D44VH10 DC Current Gain**



**Figure 4. D45VH10 DC Current Gain**



**Figure 5. D44VH10 ON-Voltage**



**Figure 6. D45VH10 ON-Voltage**

## D44VH10 (NPN), D45VH10 (PNP)

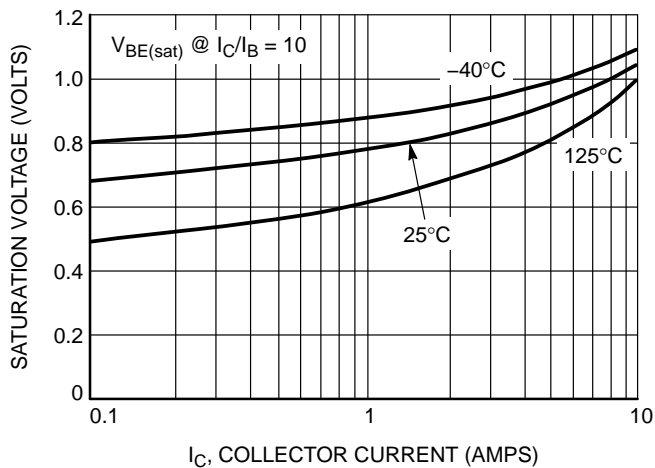


Figure 7. D44VH10 ON-Voltage

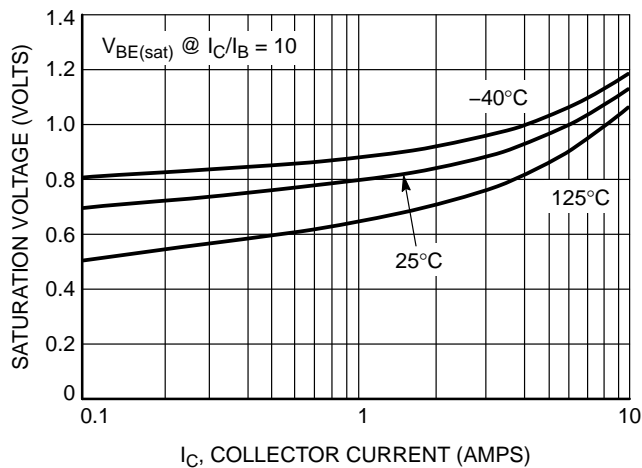


Figure 8. D45VH10 ON-Voltage

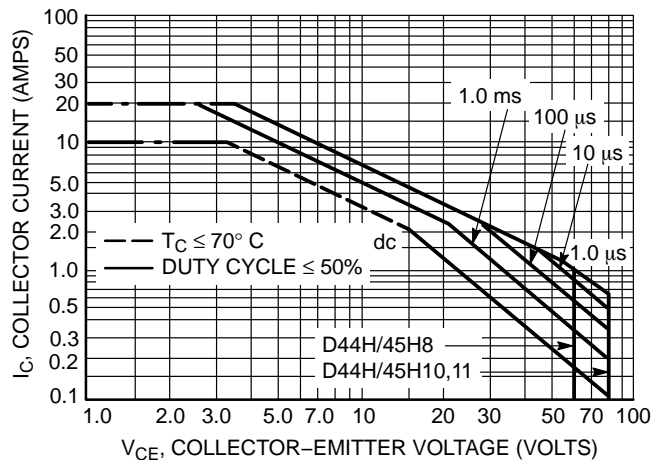


Figure 9. Maximum Rated Forward Bias Safe Operating Area

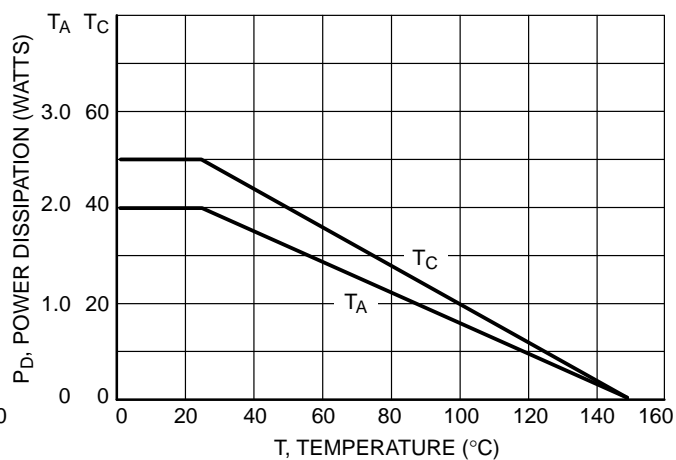


Figure 10. Power Derating

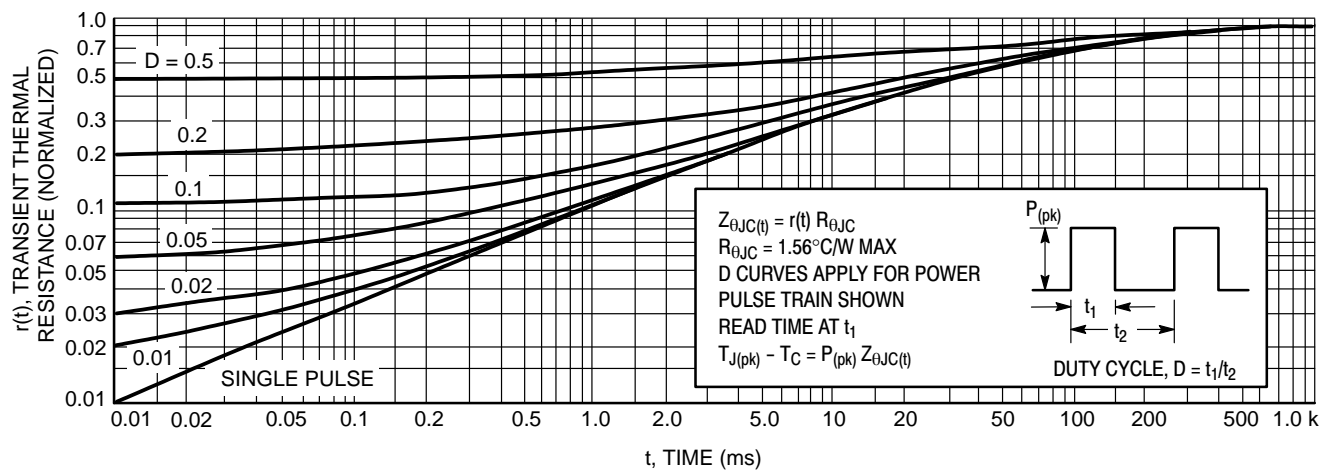


Figure 11. Thermal Response

**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 [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.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)