

# D44H Series (NPN), D45H Series (PNP)

## Complementary Silicon Power Transistors

These series of plastic, silicon NPN and PNP power transistors can be used as general purpose power amplification and switching such as output or driver stages in applications such as switching regulators, converters and power amplifiers.

### Features

- Low Collector–Emitter Saturation Voltage
- Fast Switching Speeds
- Complementary Pairs Simplifies Designs
- These Devices are Pb–Free and are RoHS Compliant\*

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage D44H8, D45H8 D44H11, D45H11	$V_{CEO}$	60 80	Vdc
Emitter Base Voltage	$V_{EB}$	5.0	Vdc
Collector Current – Continuous	$I_C$	10	Adc
Collector Current – Peak (Note 1)	$I_{CM}$	20	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ @ $T_A = 25^\circ\text{C}$	$P_D$	70 2.0	W
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to +150	$^\circ\text{C}$

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	$R_{\theta JC}$	1.8	$^\circ\text{C/W}$
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	$T_L$	275	$^\circ\text{C}$

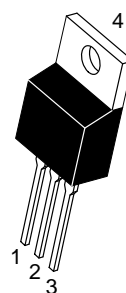
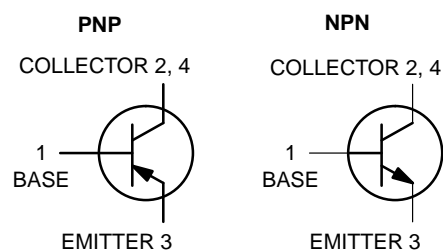
\*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

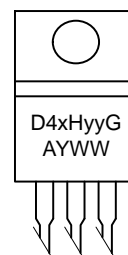
[www.onsemi.com](http://www.onsemi.com)

## 10 AMP COMPLEMENTARY SILICON POWER TRANSISTORS 60, 80 VOLTS



TO-220  
CASE 221A  
STYLE 1

### MARKING DIAGRAM



D4xHyy = Device Code  
x = 4 or 5  
yy = 8 or 11

A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb–Free Package

### ORDERING INFORMATION

Device	Package	Shipping
D44H8G	TO-220 (Pb–Free)	50 Units/Rail
D44H11G	TO-220 (Pb–Free)	50 Units/Rail
D45H8G	TO-220 (Pb–Free)	50 Units/Rail
D45H11G	TO-220 (Pb–Free)	50 Units/Rail

## D44H Series (NPN), D45H Series (PNP)

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

#### OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage ( $I_C = 30\text{ mA}$ , $I_B = 0\text{ A}$ )	D44H8, D45H8 D44H11, D45H11	$V_{CE(sus)}$	60 80	– –	– –	Vdc
Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CE0}$ , $V_{BE} = 0$ )		$I_{CES}$	–	–	10	$\mu\text{A}$
Emitter Cutoff Current ( $V_{EB} = 5.0\text{ Vdc}$ )		$I_{EBO}$	–	–	10	$\mu\text{A}$

#### ON CHARACTERISTICS

DC Current Gain ( $V_{CE} = 1.0\text{ Vdc}$ , $I_C = 2.0\text{ A}$ ) ( $V_{CE} = 1.0\text{ Vdc}$ , $I_C = 4.0\text{ A}$ )		$h_{FE}$	60 40	– –	– –	–
Collector–Emitter Saturation Voltage ( $I_C = 8.0\text{ A}$ , $I_B = 0.4\text{ A}$ )		$V_{CE(sat)}$	–	–	1.0	Vdc
Base–Emitter Saturation Voltage ( $I_C = 8.0\text{ A}$ , $I_B = 0.8\text{ A}$ )		$V_{BE(sat)}$	–	–	1.5	Vdc

#### DYNAMIC CHARACTERISTICS

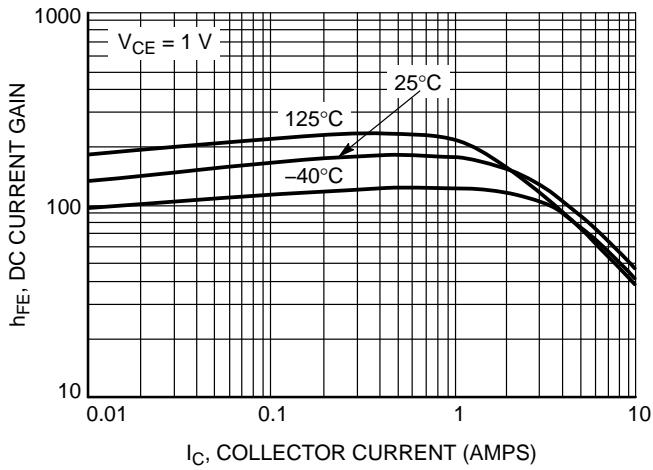
Collector Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )	D44H Series D45H Series	$C_{cb}$	– –	90 160	– –	pF
Gain Bandwidth Product ( $I_C = 0.5\text{ A}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )	D44H Series D45H Series	$f_T$	– –	50 40	– –	MHz

#### SWITCHING TIMES

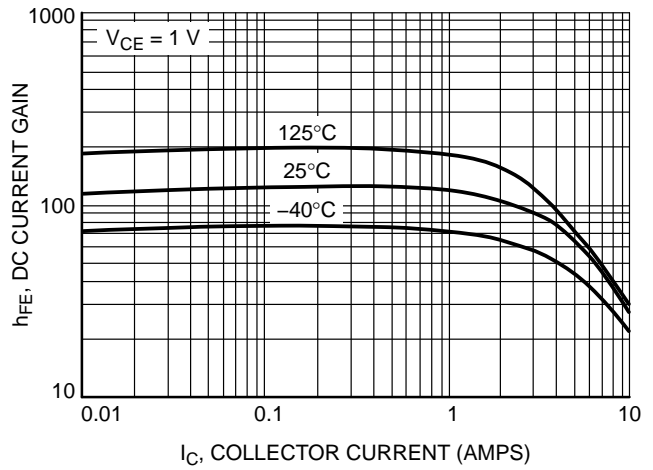
Delay and Rise Times ( $I_C = 5.0\text{ A}$ , $I_{B1} = 0.5\text{ A}$ )	D44H Series D45H Series	$t_d + t_r$	– –	300 135	– –	ns
Storage Time ( $I_C = 5.0\text{ A}$ , $I_{B1} = I_{B2} = 0.5\text{ A}$ )	D44H Series D45H Series	$t_s$	– –	500 500	– –	ns
Fall Time ( $I_C = 5.0\text{ A}$ , $I_{B1} = I_{B2} = 0.5\text{ A}$ )	D44H Series D45H Series	$t_f$	– –	140 100	– –	ns

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.

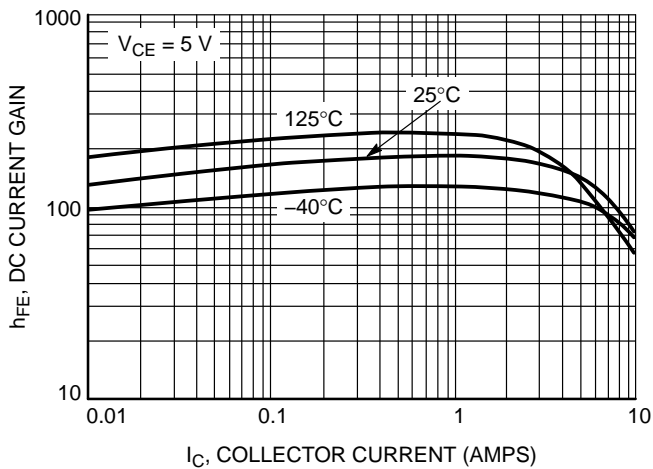
## D44H Series (NPN), D45H Series (PNP)



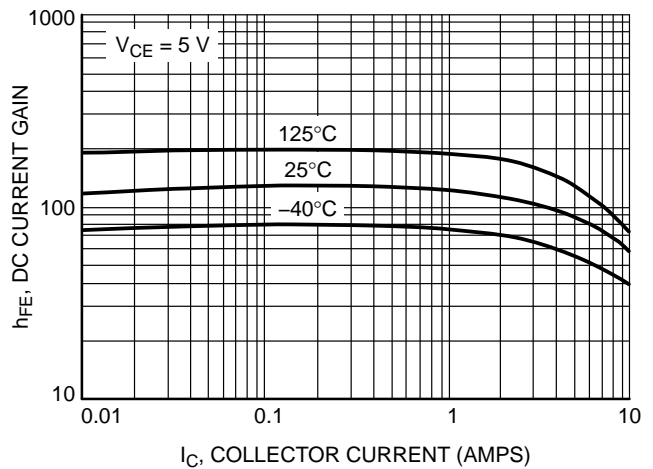
**Figure 1. D44H11 DC Current Gain**



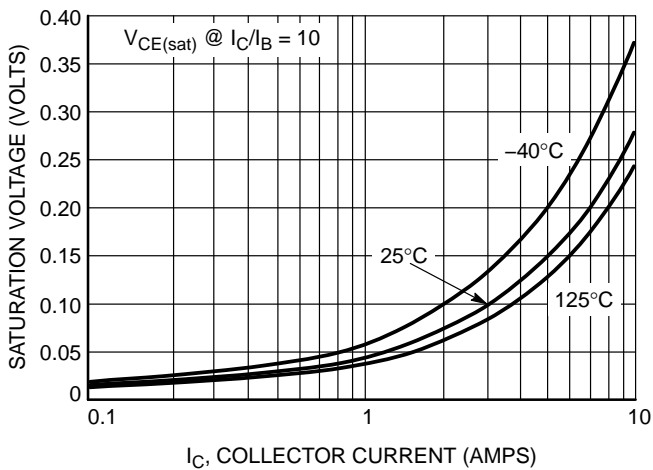
**Figure 2. D45H11 DC Current Gain**



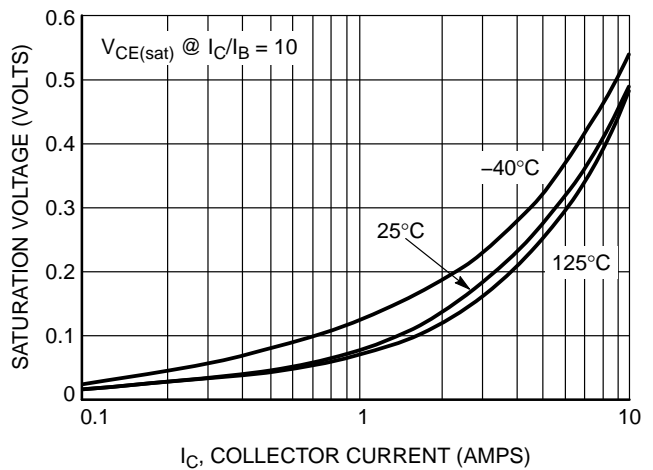
**Figure 3. D44H11 DC Current Gain**



**Figure 4. D45H11 DC Current Gain**

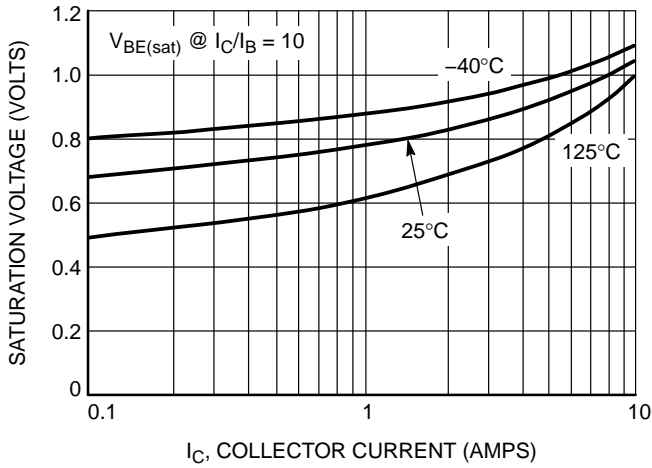


**Figure 5. D44H11 ON-Voltage**

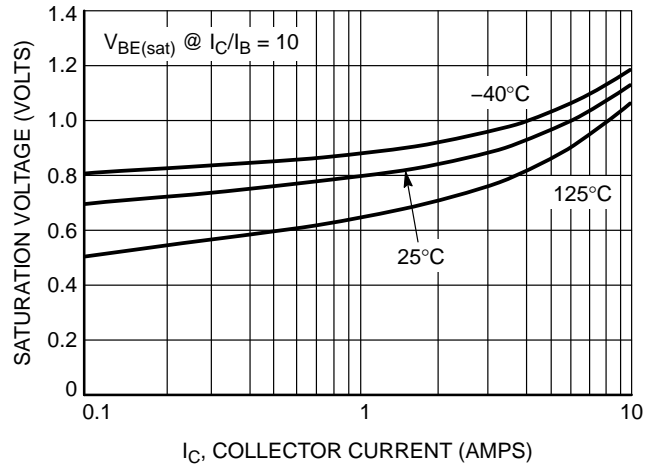


**Figure 6. D45H11 ON-Voltage**

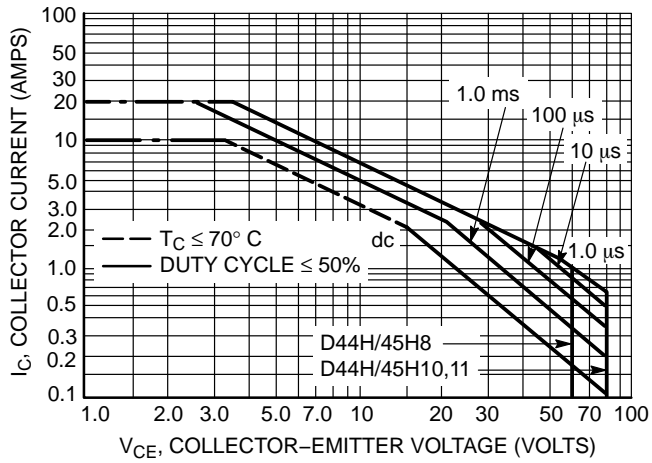
## D44H Series (NPN), D45H Series (PNP)



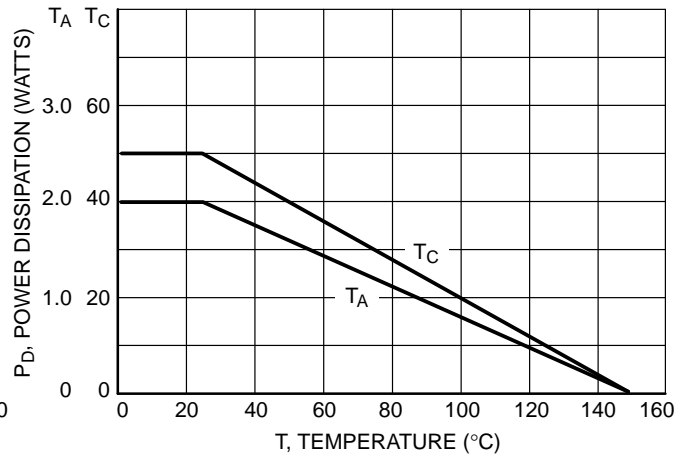
**Figure 7. D44H11 ON-Voltage**



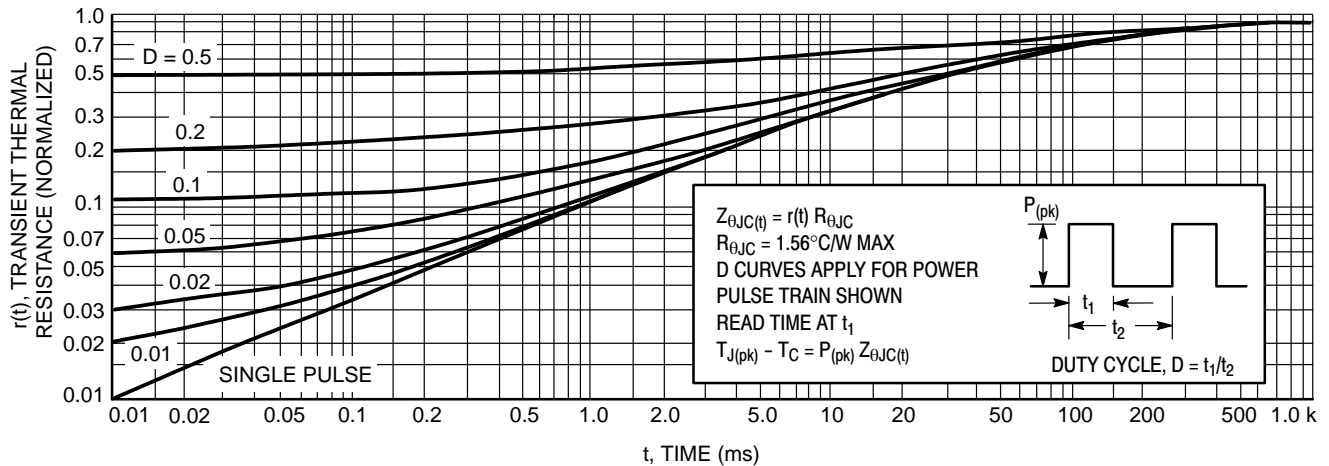
**Figure 8. D45H11 ON-Voltage**



**Figure 9. Maximum Rated Forward Bias Safe Operating Area**



**Figure 10. Power Derating**

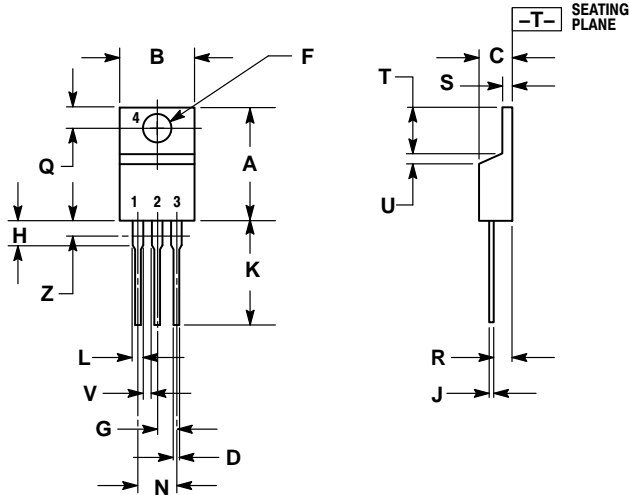


**Figure 11. Thermal Response**

# D44H Series (NPN), D45H Series (PNP)

## PACKAGE DIMENSIONS

TO-220  
CASE 221A-09  
ISSUE AH




**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

**STYLE 1:**

1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

ON Semiconductor and the  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC'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). 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](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