

# Complementary Power Transistors

For Isolated Package Applications

## MJF44H11 (NPN), MJF45H11 (PNP)

Complementary power transistors are for 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 –  
 $V_{CE(sat)} = 1.0\text{ V (Max) @ } 8.0\text{ A}$
- Fast Switching Speeds
- Complementary Pairs Simplifies Designs
- Pb–Free Packages are Available\*

### MAXIMUM RATINGS

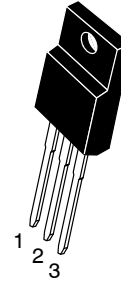
Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	80	Vdc
Emitter–Base Voltage	$V_{EB}$	5	Vdc
Collector Current – Continuous – Peak	$I_C$	10 20	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	36 0.288	W W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.0 0.016	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to 150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	3.5	$^\circ\text{C/W}$
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$

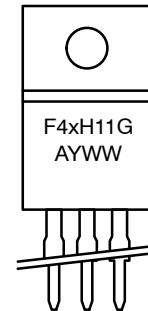
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## SILICON POWER TRANSISTORS 10 AMPERES 80 VOLTS, 36 WATTS



ISOLATED TO–220  
CASE 221D  
STYLE 2

### MARKING DIAGRAM



F4xH11 = Specific Device Code  
x = 4 or 5  
G = Pb–Free Package  
A = Assembly Location  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
MJF44H11	TO–220 FULLPACK	50 Units/Rail
MJF44H11G	TO–220 FULLPACK (Pb–Free)	50 Units/Rail
MJF45H11	TO–220 FULLPACK	50 Units/Rail
MJF45H11G	TO–220 FULLPACK (Pb–Free)	50 Units/Rail

**Preferred** devices are recommended choices for future use and best overall value.

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

# MJF44H11 (NPN), MJF45H11 (PNP)

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

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>OFF CHARACTERISTICS</b>						
Collector-Emitter Sustaining Voltage ( $I_C = 30\text{ mA}$ , $I_B = 0$ )	$V_{CE(sus)}$	80	-	-	Vdc	
Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE} = 0$ )	$I_{CES}$	-	-	1.0	$\mu\text{A}$	
Emitter Cutoff Current ( $V_{EB} = 5\text{ Vdc}$ )	$I_{EBO}$	-	-	10	$\mu\text{A}$	
<b>ON CHARACTERISTICS</b>						
Collector-Emitter Saturation Voltage ( $I_C = 8\text{ Adc}$ , $I_B = 0.4\text{ Adc}$ )	$V_{CE(sat)}$	-	-	1.0	Vdc	
Base-Emitter Saturation Voltage ( $I_C = 8\text{ Adc}$ , $I_B = 0.8\text{ Adc}$ )	$V_{BE(sat)}$	-	-	1.5	Vdc	
DC Current Gain ( $V_{CE} = 1\text{ Vdc}$ , $I_C = 2\text{ Adc}$ )	$h_{FE}$	60	-	-	-	
DC Current Gain ( $V_{CE} = 1\text{ Vdc}$ , $I_C = 4\text{ Adc}$ )		40	-	-	-	
<b>DYNAMIC CHARACTERISTICS</b>						
Collector Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $f_{test} = 1\text{ MHz}$ )	$C_{cb}$	MJF44H11	-	130	-	$\mu\text{F}$
		MJF45H11	-	230	-	
Gain Bandwidth Product ( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )	$f_T$	MJF44H11	-	50	-	MHz
		MJF45H11	-	40	-	
<b>SWITCHING TIMES</b>						
Delay and Rise Times ( $I_C = 5\text{ Adc}$ , $I_{B1} = 0.5\text{ Adc}$ )	MJF44H11 MJF45H11	$t_d + t_r$	-	300	-	ns
			-	135	-	
Storage Time ( $I_C = 5\text{ Adc}$ , $I_{B1} = I_{B2} = 0.5\text{ Adc}$ )	MJF44H11 MJF45H11	$t_s$	-	500	-	ns
			-	500	-	
Fall Time ( $I_C = 5\text{ Adc}$ , $I_{B1} = I_{B2} = 0.5\text{ Adc}$ )	MJF44H11 MJF45H11	$t_f$	-	140	-	ns
			-	100	-	

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.

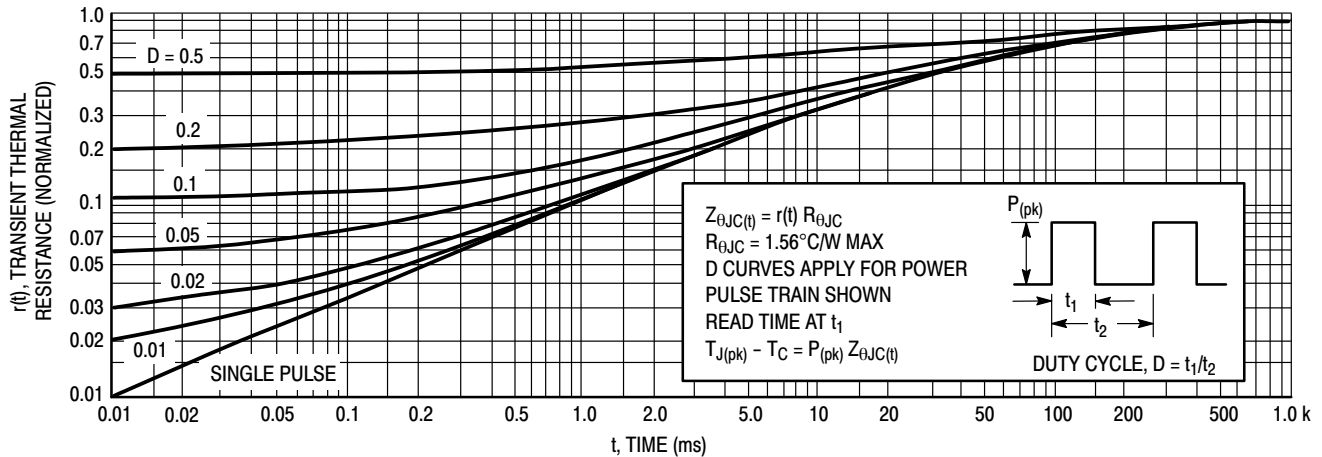
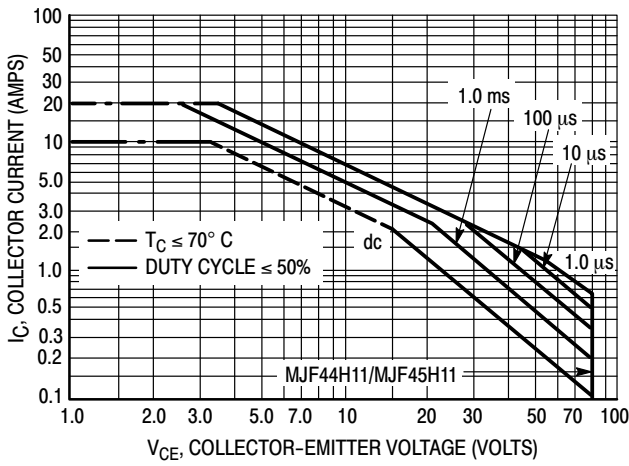


Figure 1. Thermal Response

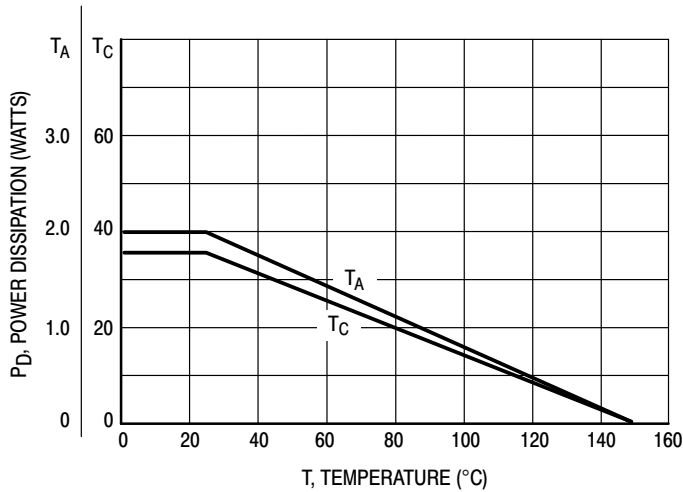
## MJF44H11 (NPN), MJF45H11 (PNP)



**Figure 2. Maximum Rated Forward Bias Safe Operating Area**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 2 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 1. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.



**Figure 3. Power Derating**

# MJF44H11 (NPN), MJF45H11 (PNP)

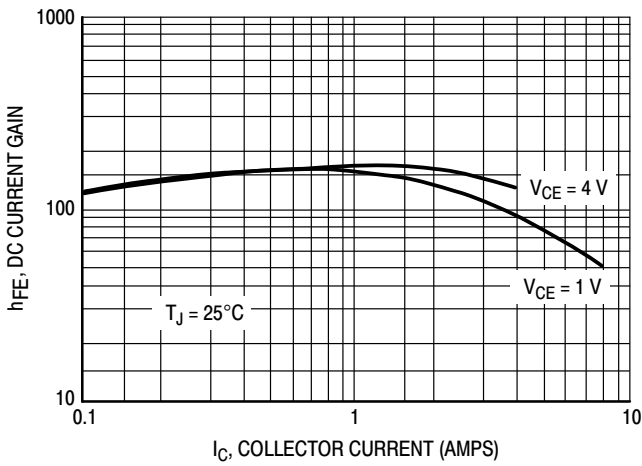


Figure 4. MJF44H11 DC Current Gain

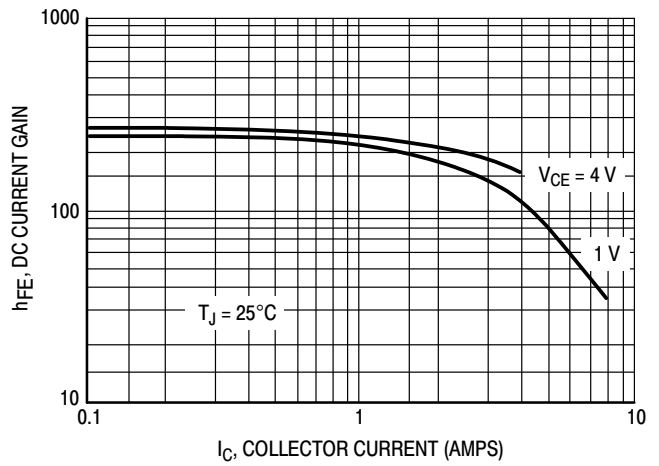


Figure 5. MJF45H11 DC Current Gain

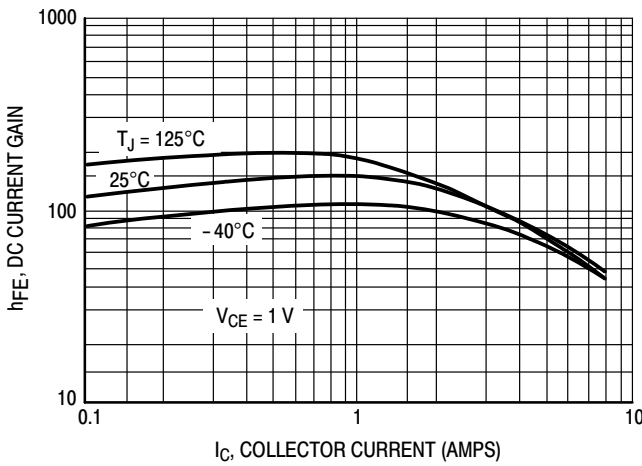


Figure 6. MJF44H11 Current Gain versus Temperature

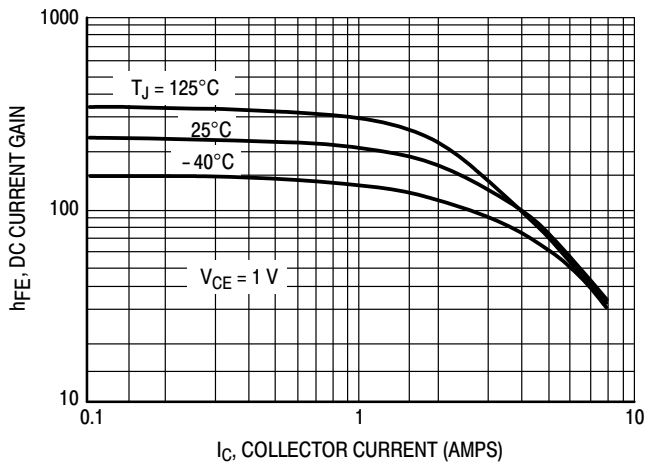


Figure 7. MJF45H11 Current Gain versus Temperature

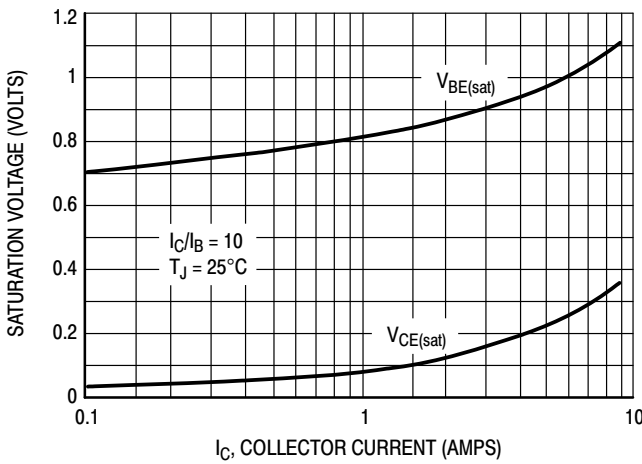


Figure 8. MJF44H11 On-Voltages

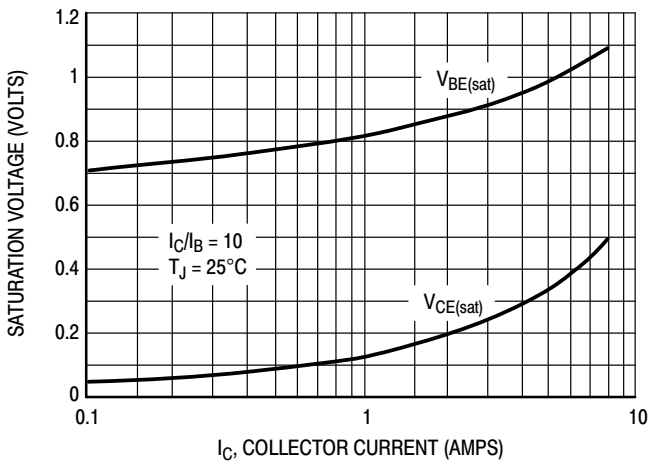
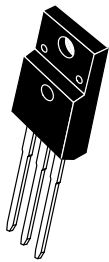


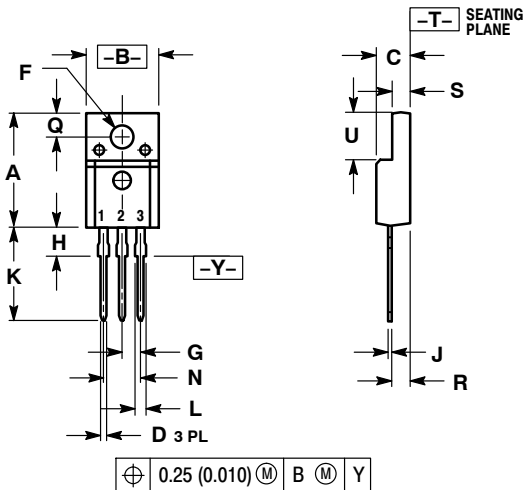
Figure 9. MJF45H11 On-Voltages



SCALE 1:1

TO-220 FULLPAK  
CASE 221D-03  
ISSUE K

DATE 27 FEB 2009



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH
  3. 221D-01 THRU 221D-02 OBSOLETE, NEW STANDARD 221D-03.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.617	0.635	15.67	16.12
B	0.392	0.419	9.96	10.63
C	0.177	0.193	4.50	4.90
D	0.024	0.039	0.60	1.00
F	0.116	0.129	2.95	3.28
G	0.100 BSC		2.54 BSC	
H	0.118	0.135	3.00	3.43
J	0.018	0.025	0.45	0.63
K	0.503	0.541	12.78	13.73
L	0.048	0.058	1.23	1.47
N	0.200 BSC		5.08 BSC	
Q	0.122	0.138	3.10	3.50
R	0.099	0.117	2.51	2.96
S	0.092	0.113	2.34	2.87
U	0.239	0.271	6.06	6.88

⊕ 0.25 (0.010) Ⓜ B Ⓜ Y

- |  |   |  |
|--|---|--|
| STYLE 1:<br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE     | STYLE 2:<br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER | STYLE 3:<br>PIN 1. ANODE<br>2. CATHODE<br>3. ANODE |
| STYLE 4:<br>PIN 1. CATHODE<br>2. ANODE<br>3. CATHODE | STYLE 5:<br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE     | STYLE 6:<br>PIN 1. MT 1<br>2. MT 2<br>3. GATE      |

MARKING  
DIAGRAMS



Bipolar



Rectifier

- |                               |                           |
|-------------------------------|---------------------------|
| xxxxxx = Specific Device Code | A = Assembly Location     |
| G = Pb-Free Package           | Y = Year                  |
| A = Assembly Location         | WW = Work Week            |
| Y = Year                      | xxxxxx = Device Code      |
| WW = Work Week                | G = Pb-Free Package       |
|                               | AKA = Polarity Designator |

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