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D45C12 (PNP), D44C12 (NPN)

Complementary Silicon Power Transistor

The D45C12 and D44C12 are for general purpose driver or medium power output stages in CW or switching applications.

Features

- Low Collector–Emitter Saturation Voltage – 0.5 V (Max)
- High f_t for Good Frequency Response
- Low Leakage Current
- Pb–Free Packages are Available*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|------------|--------------------------|
| Collector–Emitter Voltage | V_{CEO} | 80 | Vdc |
| Collector–Emitter Voltage | V_{CES} | 90 | Vdc |
| Emitter Base Voltage | V_{EB} | 5.0 | Vdc |
| Collector Current – Continuous Peak (Note 1) | I_C | 4.0 6.0 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ @ $T_A = 25^\circ\text{C}$ | P_D | 30 1.67 | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | –55 to 150 | $^\circ\text{C}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|-----------------|-----|---------------------------|
| Thermal Resistance, Junction–to–Case | $R_{\theta JC}$ | 4.2 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction–to–Ambient | $R_{\theta JA}$ | 75 | $^\circ\text{C}/\text{W}$ |
| Maximum Lead Temperature for Soldering Purposes: 1/8 in from Case for 5 Sec | T_L | 275 | $^\circ\text{C}$ |

1. Pulse Width \leq 6.0 ms, Duty Cycle \leq 50%.

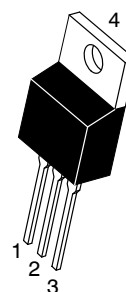
*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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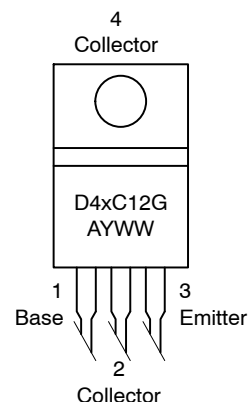
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4.0 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 80 VOLTS



TO-220AB
CASE 221A
STYLE 1

MARKING DIAGRAM & PIN ASSIGNMENT



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

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

D45C12 (PNP), D44C12 (NPN)

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|--|-----------------|----------------|---------------|------|
| DC Current Gain (V _{CE} = 1.0 Vdc, I _C = 0.2 Adc) (V _{CE} = 1.0 Vdc, I _C = 1.0 Adc) (V _{CE} = 1.0 Vdc, I _C = 2.0 Adc) | h _{FE} | 40 20 20 | 120 – – | – |

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

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

OFF CHARACTERISTICS

| | | | | | |
|---|------------------|---|---|-----|----|
| Collector Cutoff Current (V _{CE} = Rated V _{CES} , V _{BE} = 0) | I _{CES} | – | – | 0.1 | μA |
| Emitter Cutoff Current (V _{EB} = 5.0 Vdc) | I _{EBO} | – | – | 10 | μA |

ON CHARACTERISTICS

| | | | | | |
|---|----------------------|---|-------|-----|-----|
| Collector–Emitter Saturation Voltage (I _C = 1.0 Adc, I _B = 50 mAdc) | V _{CE(sat)} | – | 0.135 | 0.5 | Vdc |
| Base–Emitter Saturation Voltage (I _C = 1.0 Adc, I _B = 100 mAdc) | V _{BE(sat)} | – | 0.85 | 1.3 | Vdc |

DYNAMIC CHARACTERISTICS

| | | | | | |
|--|-----------------|---|-----|---|-----|
| Collector Capacitance (V _{CB} = 10 Vdc, f = 1.0 MHz) | C _{cb} | – | 125 | – | pF |
| Gain Bandwidth Product (I _C = 20 mA, V _{CE} = 4.0 Vdc, f = 20 MHz) | f _T | – | 40 | – | MHz |

SWITCHING TIMES

| | | | | | |
|--|---------------------------------|---|-----|-----|----|
| Delay and Rise Times (I _C = 1.0 Adc, I _{B1} = 0.1 Adc) | t _d + t _r | – | 50 | 75 | ns |
| Storage Time (I _C = 1.0 Adc, I _{B1} = I _{B2} = 0.1 Adc) | t _s | – | 350 | 550 | ns |
| Fall Time (I _C = 1.0 Adc, I _{B1} = I _{B2} = 0.1 Adc) | t _f | – | 50 | 75 | ns |

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------|-----------------------|-----------------|
| D45C12 | TO–220AB | 50 Units / Rail |
| D45C12G | TO–220AB (Pb–Free) | |
| D44C12 | TO–220AB | |
| D44C12G | TO–220AB (Pb–Free) | |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

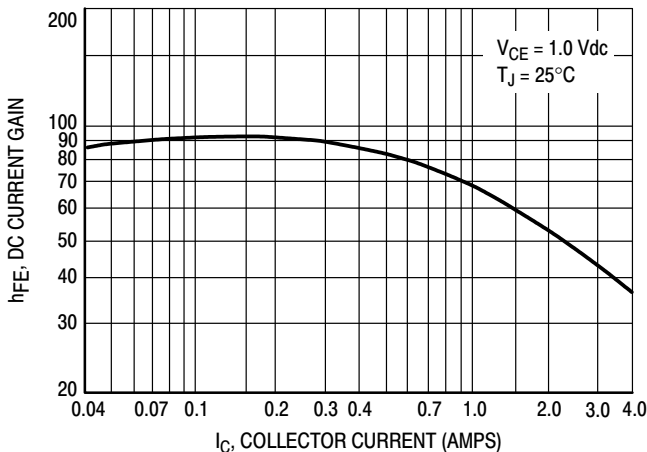


Figure 1. Typical DC Current Gain

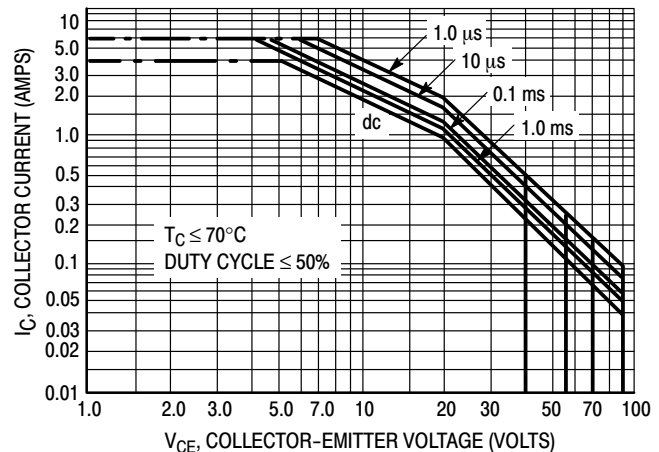
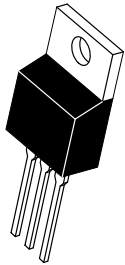


Figure 2. Maximum Rated Forward Bias Safe Operating Area

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

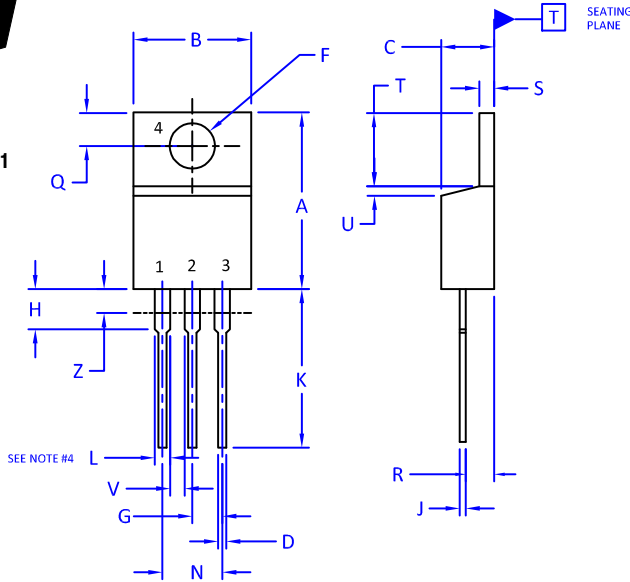
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SCALE 1:1

TO-220 CASE 221A-09 ISSUE AJ

DATE 05 NOV 2019



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

| 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 | 3.60 | 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 | 1.41 |
| 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:

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

STYLE 2:

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

STYLE 3:

- PIN 1. CATHODE
- 2. ANODE
- 3. GATE
- 4. ANODE

STYLE 4:

- PIN 1. MAIN TERMINAL 1
- 2. MAIN TERMINAL 2
- 3. GATE
- 4. MAIN TERMINAL 2

STYLE 5:

- PIN 1. GATE
- 2. DRAIN
- 3. SOURCE
- 4. DRAIN

STYLE 6:

- PIN 1. ANODE
- 2. CATHODE
- 3. ANODE
- 4. CATHODE

STYLE 7:

- PIN 1. CATHODE
- 2. ANODE
- 3. CATHODE
- 4. ANODE

STYLE 8:

- PIN 1. CATHODE
- 2. ANODE
- 3. EXTERNAL TRIP/DELAY
- 4. ANODE

STYLE 9:

- PIN 1. GATE
- 2. COLLECTOR
- 3. EMITTER
- 4. COLLECTOR

STYLE 10:

- PIN 1. GATE
- 2. SOURCE
- 3. DRAIN
- 4. SOURCE

STYLE 11:

- PIN 1. DRAIN
- 2. SOURCE
- 3. GATE
- 4. SOURCE

STYLE 12:

- PIN 1. MAIN TERMINAL 1
- 2. MAIN TERMINAL 2
- 3. GATE
- 4. NOT CONNECTED

| | | |
|-------------------------|--------------------|--|
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