

# Bipolar Transistor

–50 V, –20 A, Low  $V_{CE(sat)}$ ,  
PNP TO-220F-3SG

## 2SA2210

### Features

- Adoption of MBIT Process
- Low Collector-to-Emitter Saturation Voltage
- Large Current Capacitance
- High-Speed Switching
- This is a Pb-Free Device

### Applications

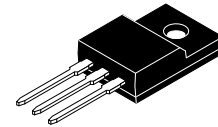
- Relay Drivers, Lamp Drivers, Motor Drivers

### Specifications

#### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25\text{ }^{\circ}\text{C}$ )

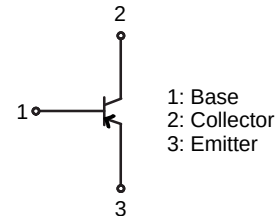
| Parameter                    | Symbol    | Condition                          | Value       | Unit               |
|------------------------------|-----------|------------------------------------|-------------|--------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                                    | –50         | V                  |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                                    | –50         | V                  |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                                    | –6          | V                  |
| Collector Current            | $I_C$     |                                    | –20         | A                  |
| Collector Current (Pulse)    | $I_{CP}$  |                                    | –25         | A                  |
| Base Current                 | $I_B$     |                                    | –3          | A                  |
| Collector Dissipation        | $P_C$     |                                    | 2           | W                  |
|                              |           | $T_C = 25\text{ }^{\circ}\text{C}$ | 30          | W                  |
| Junction Temperature         | $T_J$     |                                    | 150         | $^{\circ}\text{C}$ |
| Storage Temperature          | $T_{stg}$ |                                    | –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.

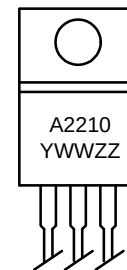


TO-220 Fullpack, 3-Lead /  
TO-220F-3SG  
CASE 221AT

### ELECTRICAL CONNECTION



### MARKING DIAGRAM



A2210 = Device Code  
YWW = Date Code (Year & Week)  
ZZ = Assembly Lot

### ORDERING INFORMATION

| Device     | Package              | Shipping  |
|------------|----------------------|-----------|
| 2SA2210-1E | TO-220F<br>(Pb-Free) | 50 / Tube |

## 2SA2210

### ELECTRICAL CHARACTERISTICS (Ta = 25 °C)

| Parameter                               | Symbol        | Conditions                                   | Min | Typ  | Max  | Unit          |
|-----------------------------------------|---------------|----------------------------------------------|-----|------|------|---------------|
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB} = -40 \text{ V}, I_E = 0 \text{ A}$  | –   | –    | –10  | $\mu\text{A}$ |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB} = -4 \text{ V}, I_C = 0 \text{ A}$   | –   | –    | –10  | $\mu\text{A}$ |
| DC Current Gain                         | $h_{FE}$      | $V_{CE} = -2 \text{ V}, I_C = -1 \text{ A}$  | 150 | –    | 450  |               |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE} = -10 \text{ V}, I_C = -1 \text{ A}$ | –   | 140  | –    | MHz           |
| Output Capacitance                      | $C_{ob}$      | $V_{CB} = -10 \text{ V}, f = 1 \text{ MHz}$  | –   | 215  | –    | pF            |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = -7 \text{ A}, I_B = -350 \text{ mA}$  | –   | –200 | –500 | mV            |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = -7 \text{ A}, I_B = -350 \text{ mA}$  | –   | –    | –1.2 | V             |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C = -100 \mu\text{A}, I_E = 0 \text{ A}$  | –50 | –    | –    | V             |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C = -1 \text{ mA}, R_{BE} = \infty$       | –50 | –    | –    | V             |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E = -100 \mu\text{A}, I_C = 0 \text{ A}$  | –6  | –    | –    | V             |
| Turn-On Time                            | $t_{on}$      | See specified Test Circuit                   |     | 60   | –    | ns            |
| Storage Time                            | $t_{stg}$     |                                              |     | 270  | –    | ns            |
| Fall Time                               | $t_f$         |                                              |     | 20   | –    | 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.

### Switching Time Test Circuit

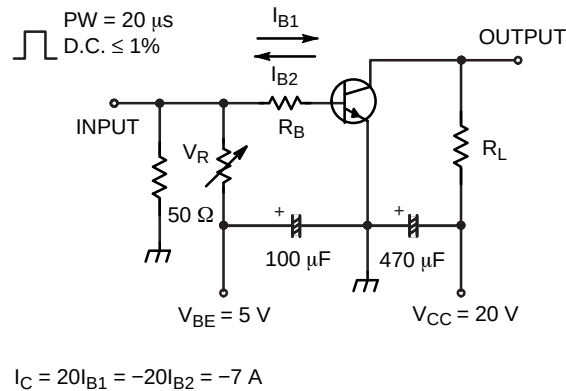
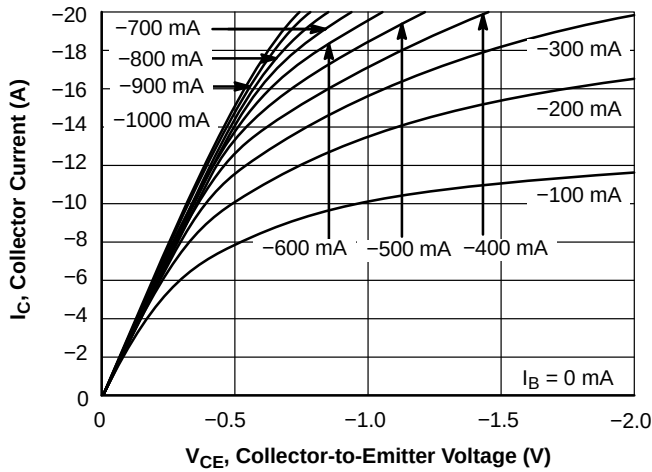
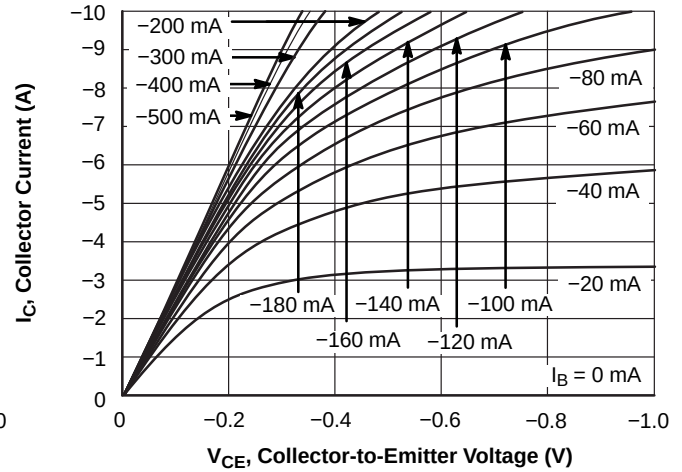
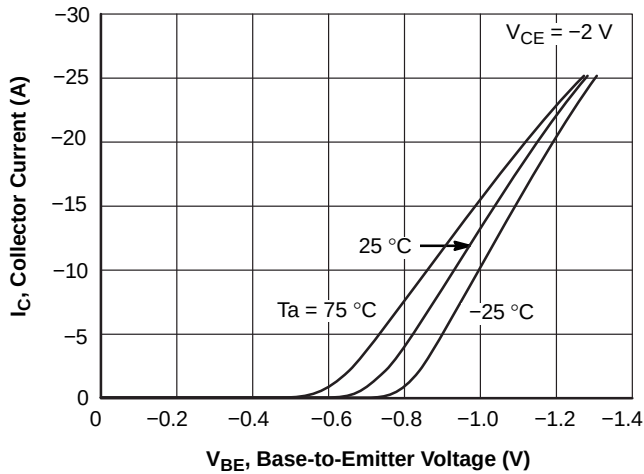
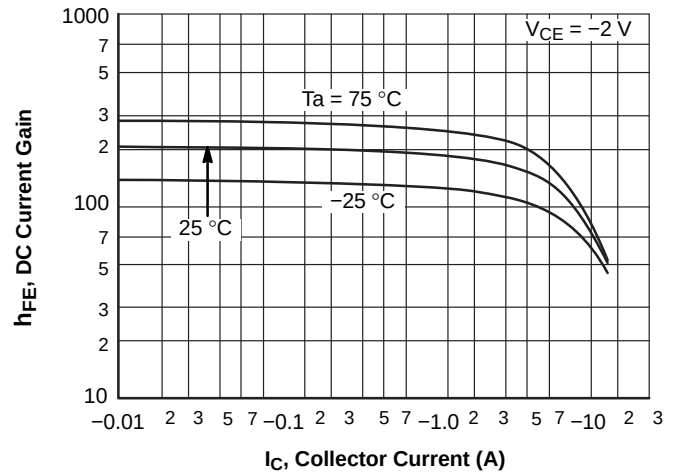
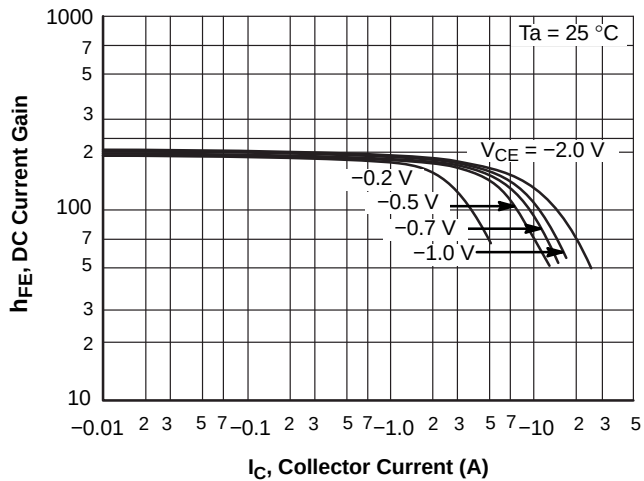
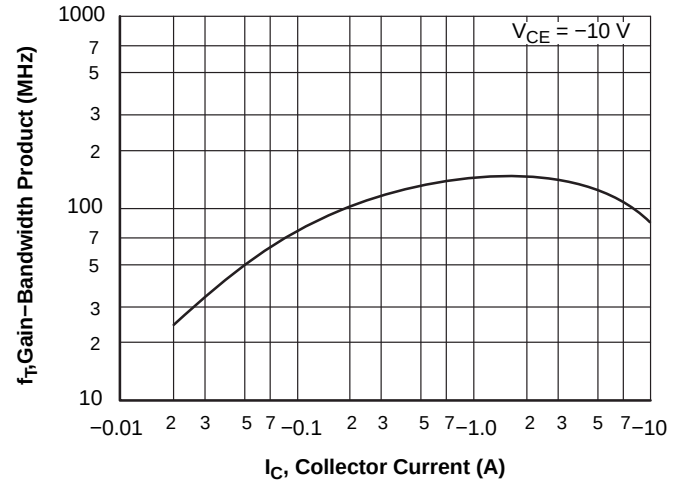
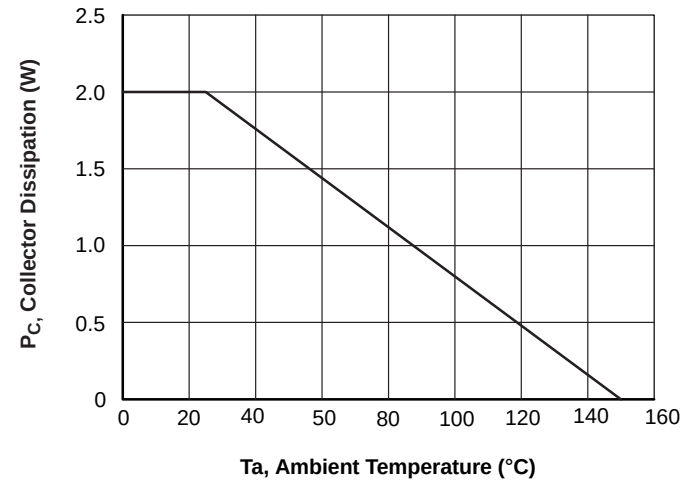
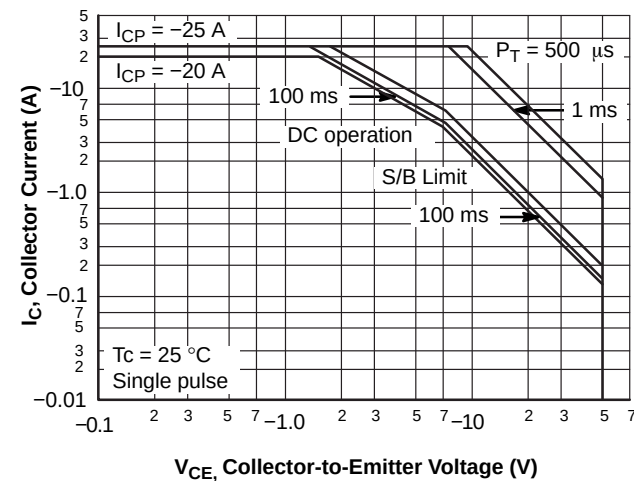
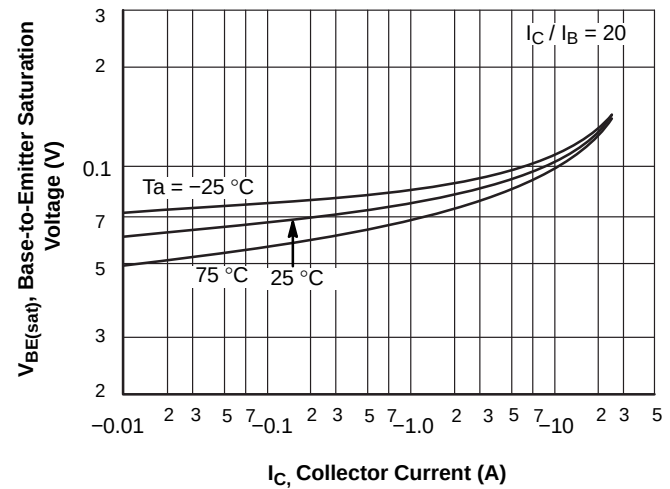
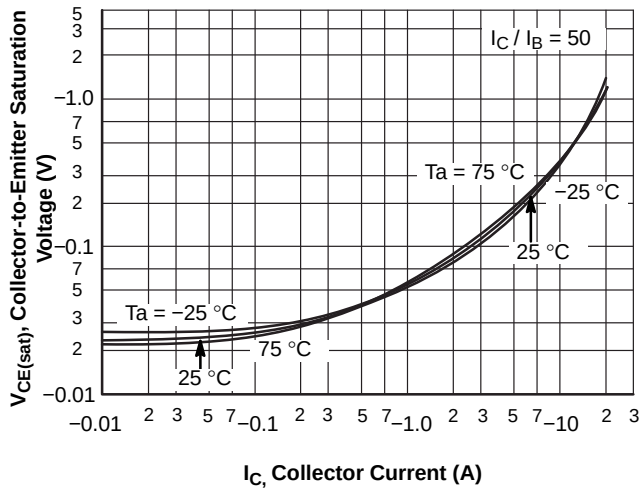
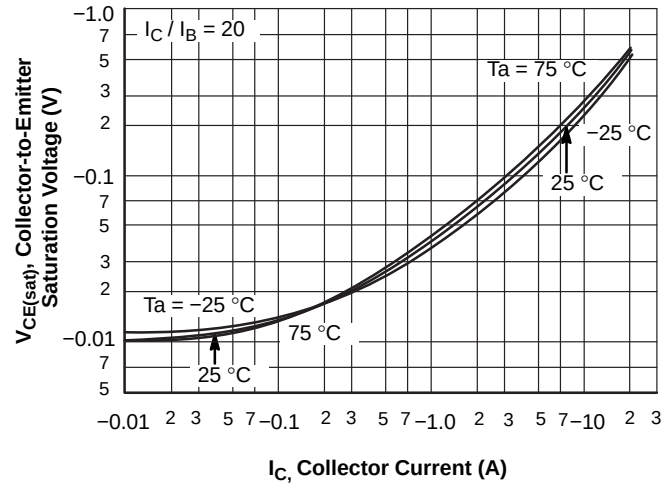
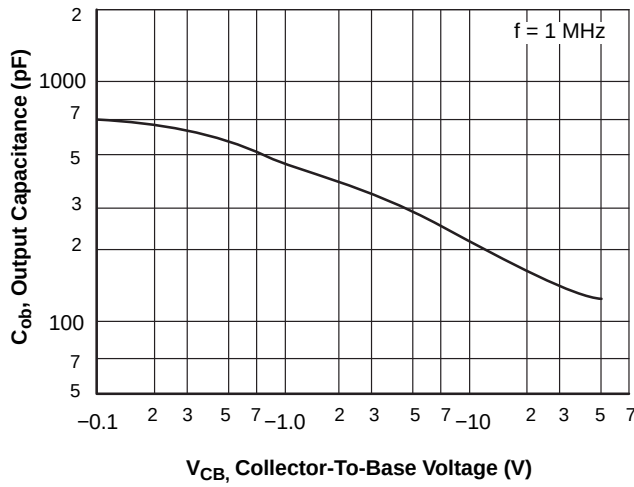


**Figure 1. Switching Time Test Circuit**

## TYPICAL CHARACTERISTICS

Figure 2.  $I_C - V_{CE}$ Figure 3.  $I_C - V_{CE}$ Figure 4.  $I_C - V_{BE}$ Figure 5.  $h_{FE} - I_C$ Figure 6.  $h_{FE} - I_C$ Figure 7.  $F_T - I_C$

## TYPICAL CHARACTERISTICS (continued)



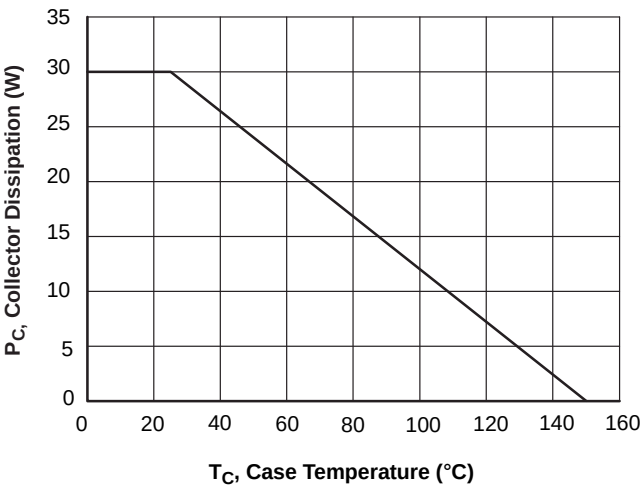


Figure 14.  $P_C - T_C$

## REVISION HISTORY

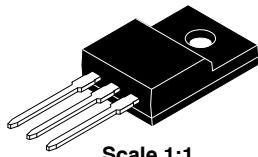
| Revision | Description of Changes                      | Date     |
|----------|---------------------------------------------|----------|
| 2        | Subtitle, Electrical Connection correction. | 7/9/2026 |

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

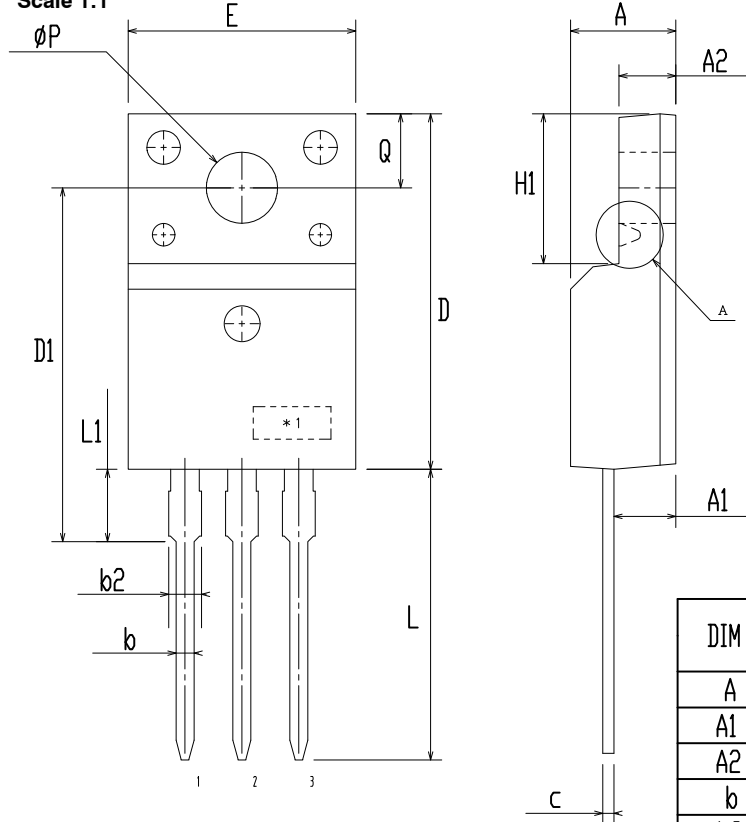


TO-220 Fullpack, 3-Lead / TO-220F-3SG  
CASE 221AT  
ISSUE B

DATE 19 JAN 2021



Scale 1:1



| DIM  | MILLIMETERS |       |       |
|------|-------------|-------|-------|
|      | MIN         | NOM   | MAX   |
| A    | 4.50        | 4.70  | 4.90  |
| A1   | 2.56        | 2.76  | 2.96  |
| A2   | 2.34        | 2.54  | 2.74  |
| b    | 0.70        | 0.80  | 0.90  |
| b2   | ~           | ~     | 1.47  |
| c    | 0.45        | 0.50  | 0.60  |
| D    | 15.67       | 15.87 | 16.07 |
| D1   | 15.60       | 15.80 | 16.00 |
| E    | 9.96        | 10.16 | 10.36 |
| e    | 2.34        | 2.54  | 2.74  |
| F    | ~           | 0.84  | ~     |
| H1   | 6.48        | 6.68  | 6.88  |
| L    | 12.78       | 12.98 | 13.18 |
| L1   | 3.03        | 3.23  | 3.43  |
| Ø P  | 2.98        | 3.18  | 3.38  |
| Ø P1 | ~           | 1.00  | ~     |
| Q    | 3.20        | 3.30  | 3.40  |

NOTES:

- A. DIMENSION AND TOLERANCE AS ASME Y14.5-2009
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUCTIONS.
- C. OPTION 1 - WITH SUPPORT PIN HOLE
- OPTION 2 - NO SUPPORT PIN HOLE

|                  |                                       |                                                                                                                                                                                     |
|------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| DESCRIPTION:     | TO-220 FULLPACK, 3-LEAD / TO-220F-3SG | PAGE 1 OF 1                                                                                                                                                                         |

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