

Bipolar Transistor

–50 V, –20 A, Low $V_{CE(sat)}$,
NPN 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

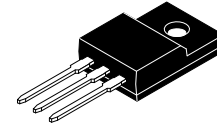
- Relay Drivers, Lamp Drivers, Motor Drivers

Specifications

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

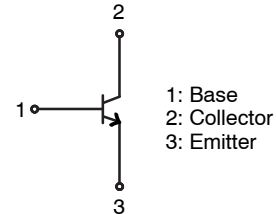
| Parameter | Symbol | Condition | Value | Unit |
|------------------------------|-----------|--------------------------|-------------|------------------|
| Collector–to–Base Voltage | V_{CBO} | | –50 | V |
| Collector–to–Emitter Voltage | V_{CEO} | | –50 | V |
| Emitter–to–Base Voltage | V_{EBO} | | –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 |
| | | $T_C = 25^\circ\text{C}$ | 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 (Pb–Free) | 50 / Tube |

2SA2210

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---------------|---|-----|------|------|---------------|
| Collector Cutoff Current | I_{CBO} | $V_{CB} = -40\text{ V}, I_E = 0\text{ A}$ | – | – | –10 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB} = -4\text{ V}, I_C = 0\text{ A}$ | – | – | –10 | μA |
| 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 | $V_{(BR)CBO}$ | $I_C = -100\text{ }\mu\text{A}, I_E = 0\text{ A}$ | –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 | $V_{(BR)EBO}$ | $I_E = -100\text{ }\mu\text{A}, I_C = 0\text{ A}$ | –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

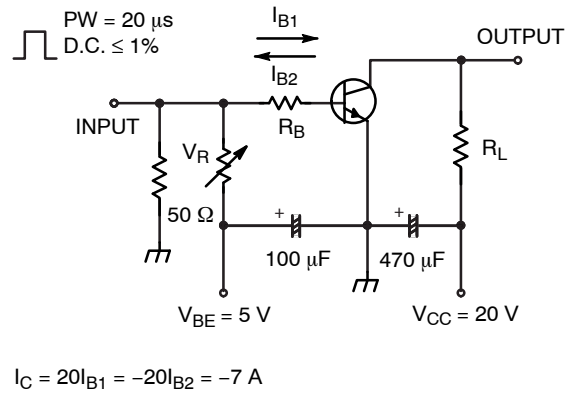
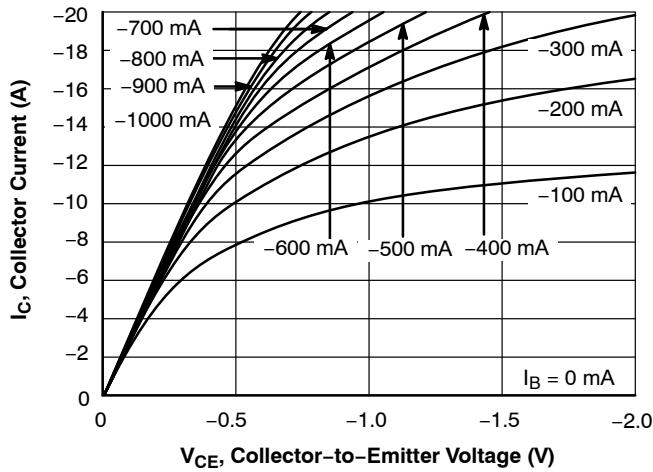
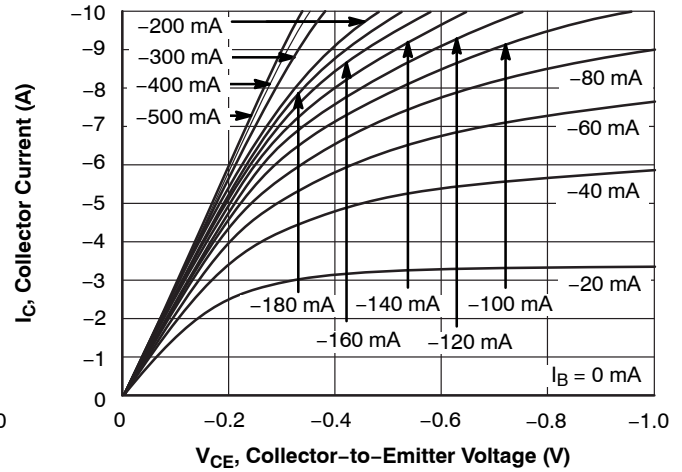
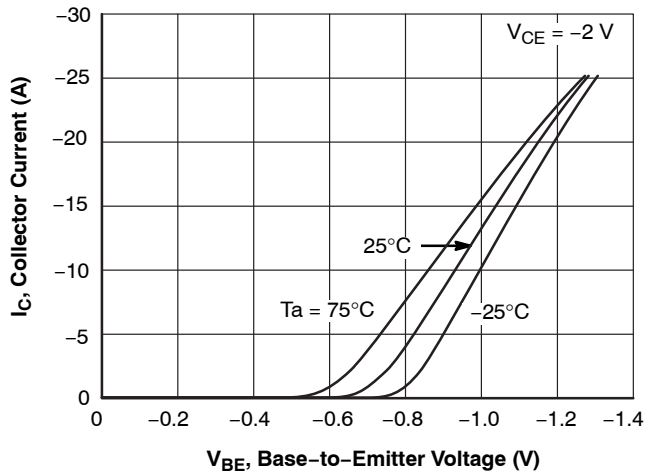
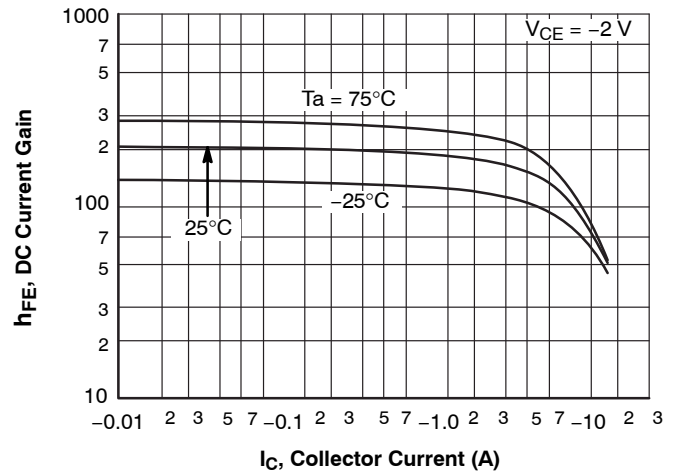
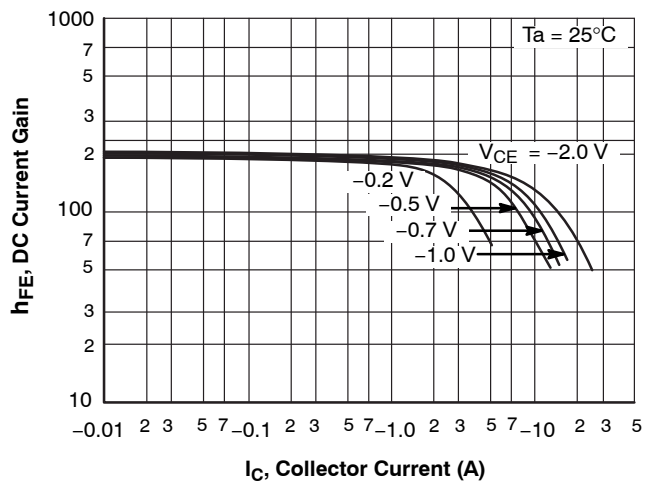
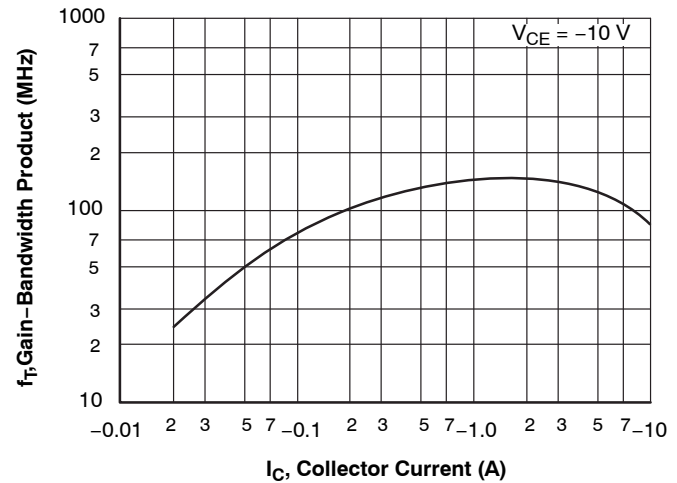


Figure 1. Switching Time Test Circuit

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)

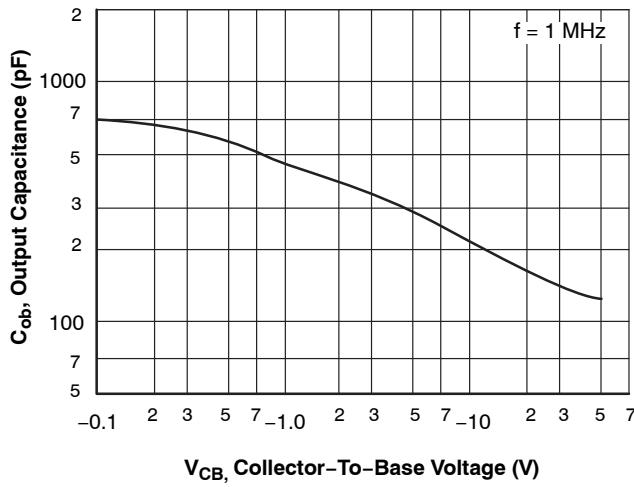


Figure 8. $C_{ob} - V_{CB}$

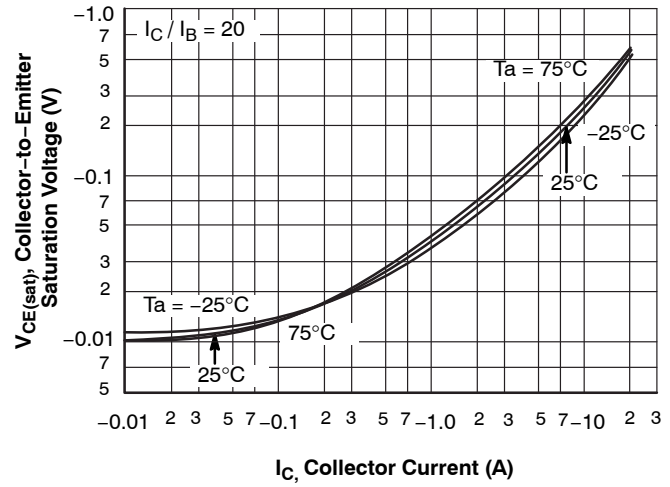


Figure 9. $V_{CE(sat)} - I_C$

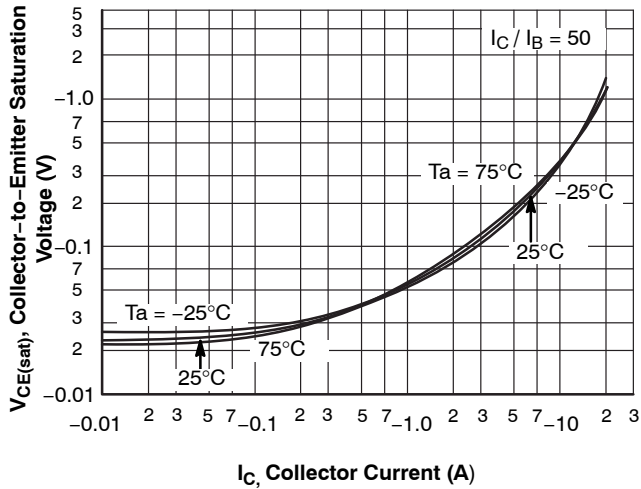


Figure 10. $V_{CE(sat)} - I_C$

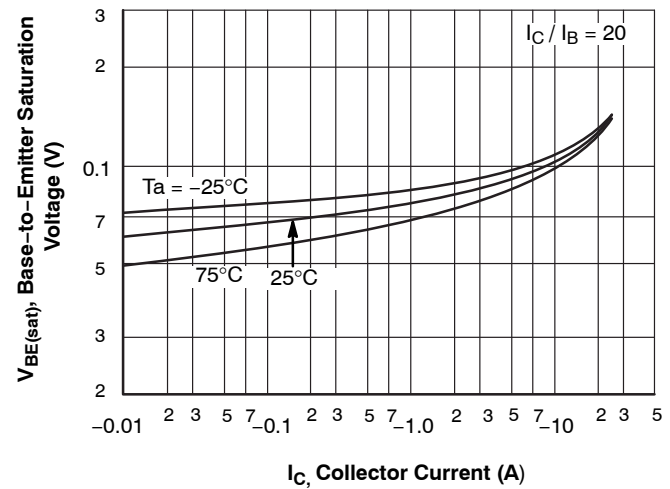


Figure 11. $V_{BE(sat)} - I_C$

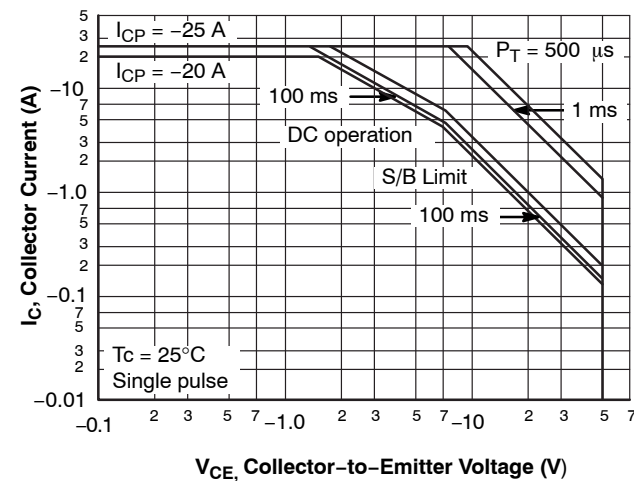


Figure 12. Forward Bias ASO

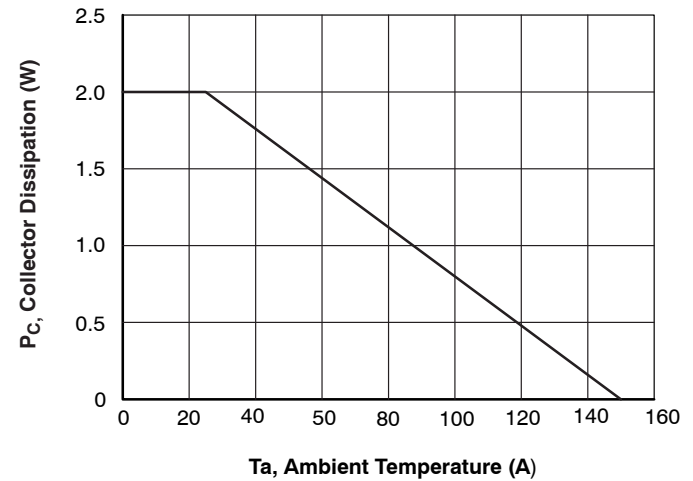


Figure 13. $P_C - T_a$

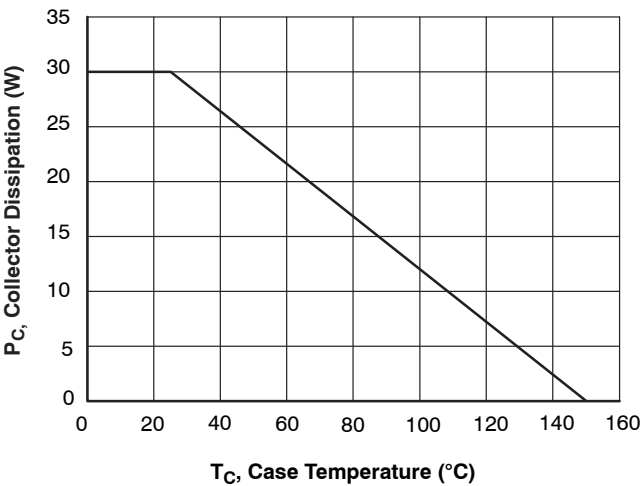
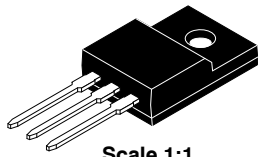


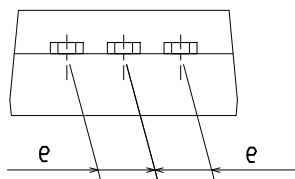
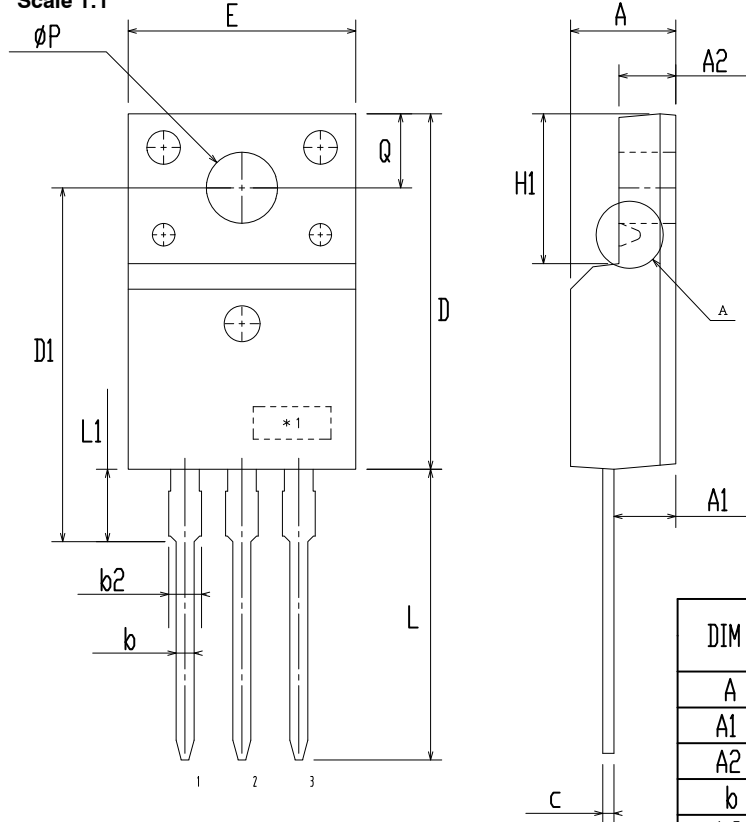
Figure 14. $P_C - T_C$

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

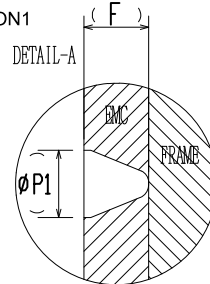
DATE 19 JAN 2021



Scale 1:1



OPTION1



| 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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