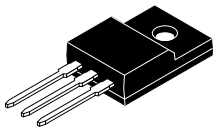
Bipolar Transistor

−50 V, −20 A, Low $V_{CE(sat)}$, NPN TO−220F−3SG

2SA2210



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

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

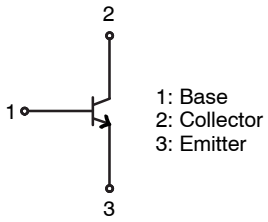
Specifications

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

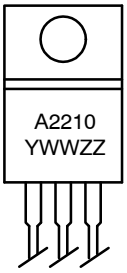
Parameter	Symbol	Condition	Value	Unit
Collector−to−Base Voltage	V_{CBO}		−50	V
Collector−to−Emitter Voltage	V_{CEO}		−50	V
Emitter−to−Base Voltage	V_{EBO}		−6	V
Collector Current	I_C		−20	A
Collector Current (Pulse)	I_{CP}		−25	A
Base Current	I_B		−3	A
Collector Dissipation	P_C		2	W
		T_C = 25°C	30	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°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.

ELECTRICAL CONNECTION



MARKING DIAGRAM



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

ORDERING INFORMATION

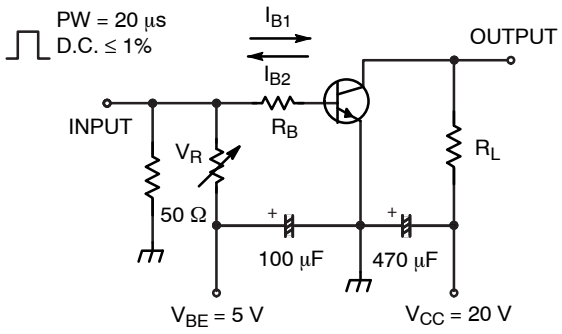
Device	Package	Shipping
2SA2210−1E	TO−220F (Pb−Free)	50 / Tube

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector Cutoff Current	I_{CBO}	V_{CB} = −40 V, I_E = 0 A	–	–	−10	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = −4 V, I_C = 0 A	–	–	−10	μA
DC Current Gain	h_{FE}	V_{CE} = −2 V, I_C = −1 A	150	–	450	
Gain−Bandwidth Product	f_T	V_{CE} = −10 V, I_C = −1 A	–	140	–	MHz
Output Capacitance	Cob	V_{CB} = −10 V, f = 1 MHz	–	215	–	pF
Collector−to−Emitter Saturation Voltage	V_{CE}(sat)	I_C = −7 A, I_B = −350 mA	–	−200	−500	mV
Base−to−Emitter Saturation Voltage	V_{BE}(sat)	I_C = −7 A, I_B = −350 mA	–	–	−1.2	V
Collector−to−Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = −100 μA, I_E = 0 A	−50	–	–	V
Collector−to−Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = −1 mA, R_{BE} = ∞	−50	–	–	V
Emitter−to−Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = −100 μA, I_C = 0 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



$I_C = 20I_{B1} = -20I_{B2} = -7$ A

Figure 1. Switching Time Test Circuit

TYPICAL CHARACTERISTICS

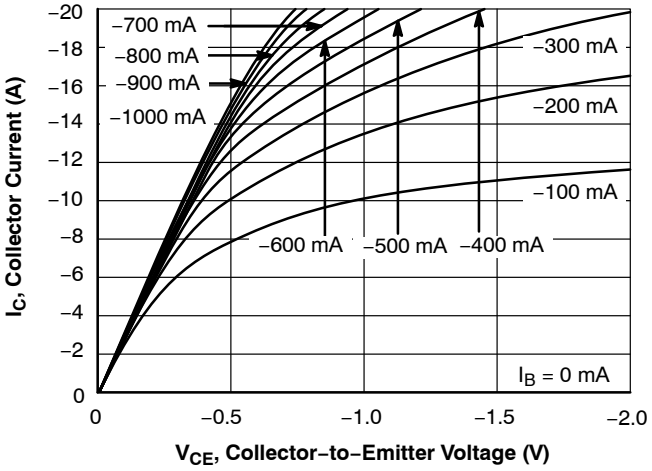


Figure 2. $I_C - V_{CE}$

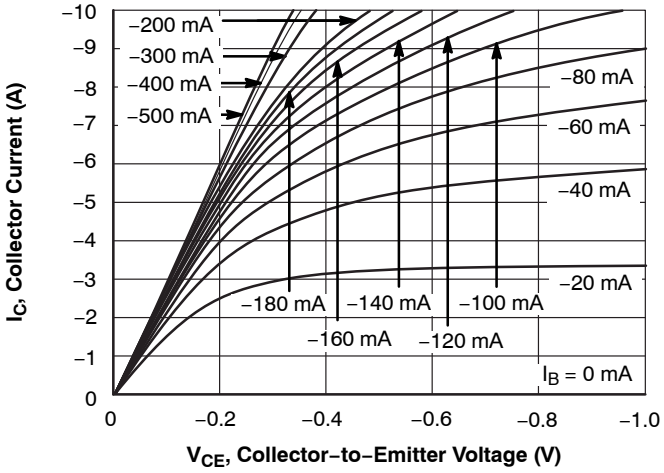


Figure 3. $I_C - V_{CE}$

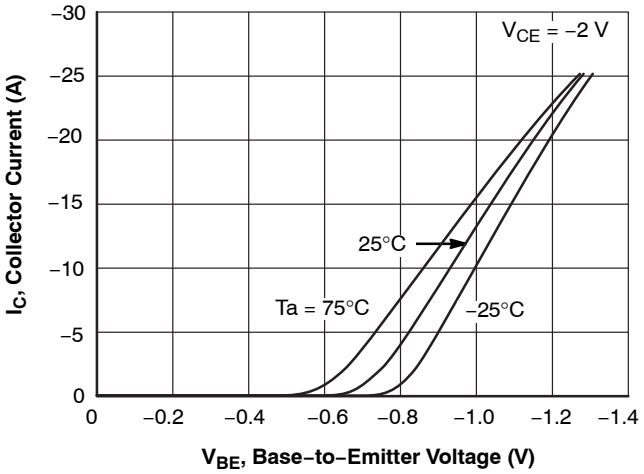


Figure 4. $I_C - V_{BE}$

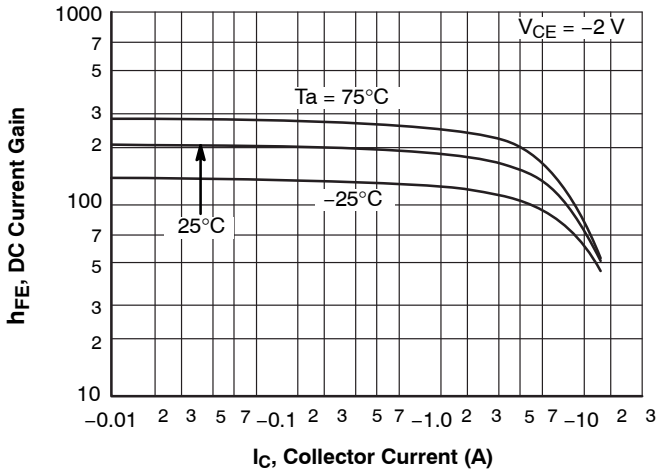


Figure 5. $h_{FE} - I_C$

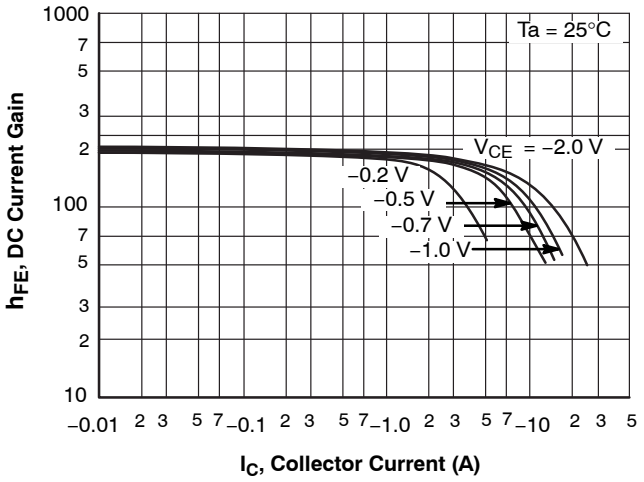


Figure 6. $h_{FE} - I_C$

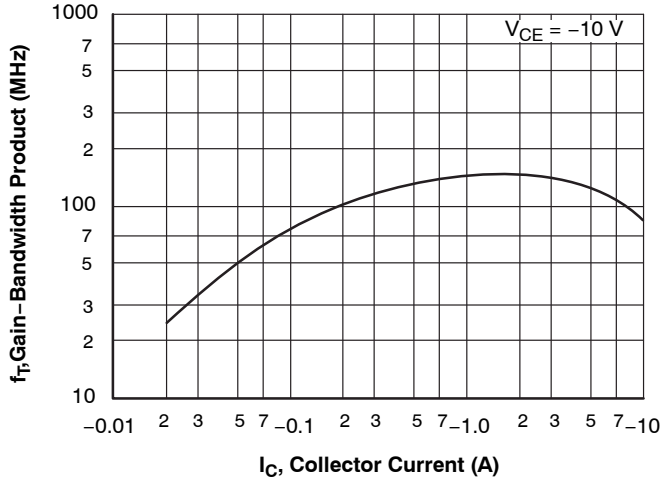


Figure 7. $F_T - I_C$

TYPICAL CHARACTERISTICS (continued)

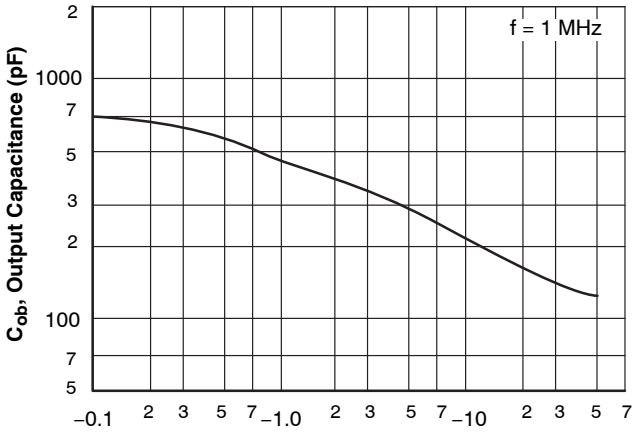


Figure 8. C_{ob} – V_{CB}

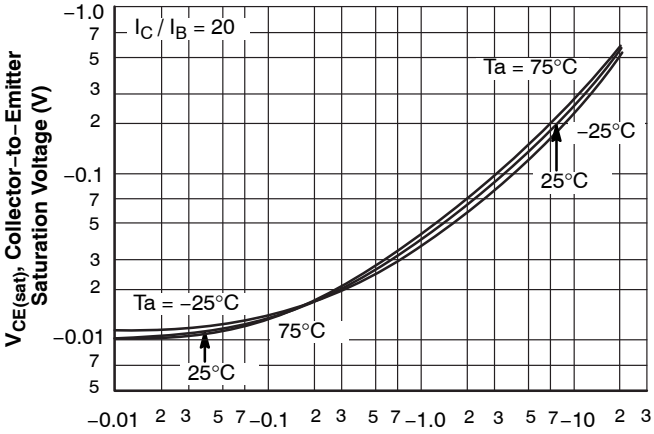


Figure 9. $V_{CE(sat)}$ – I_C

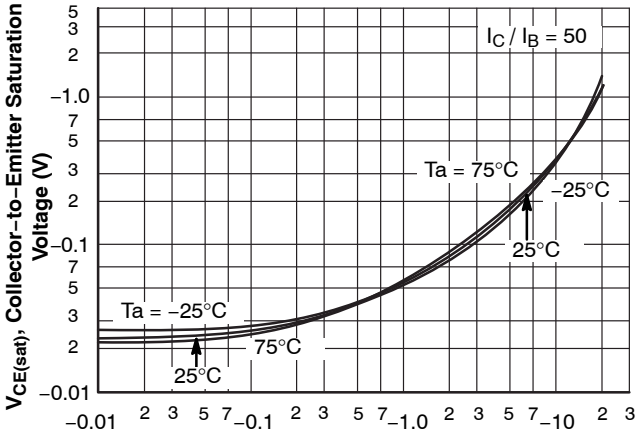


Figure 10. $V_{CE(sat)}$ – I_C

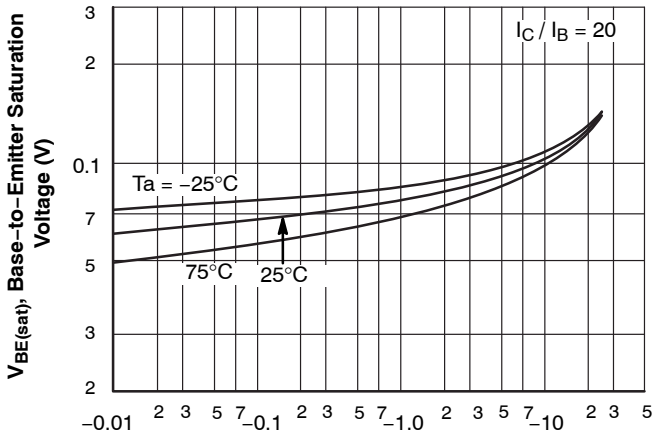


Figure 11. $V_{BE(sat)}$ – I_C

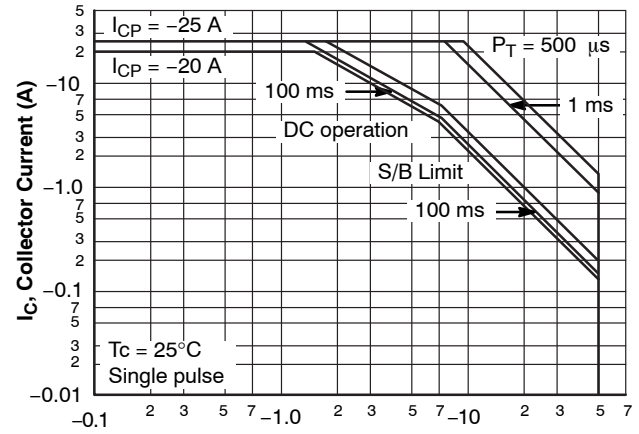


Figure 12. Forward Bias ASO

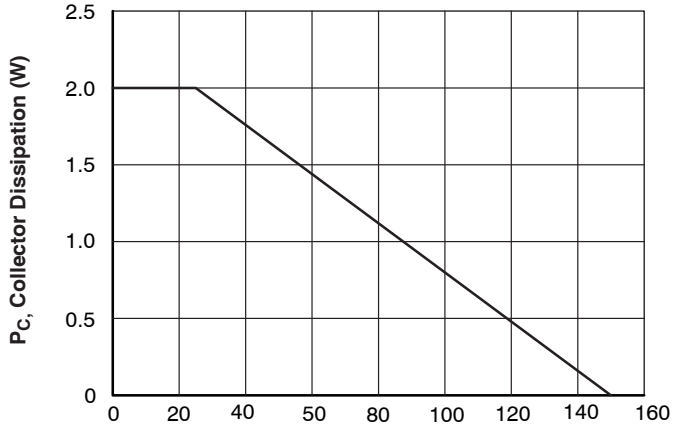


Figure 13. P_C – Ta

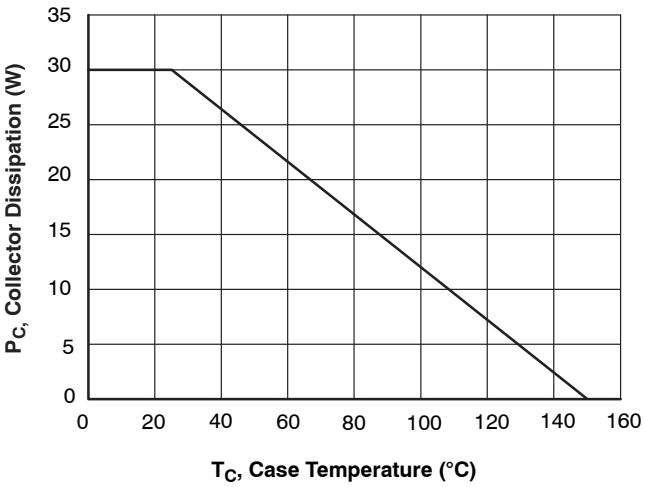
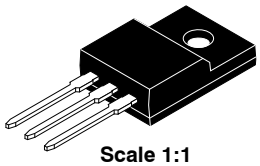


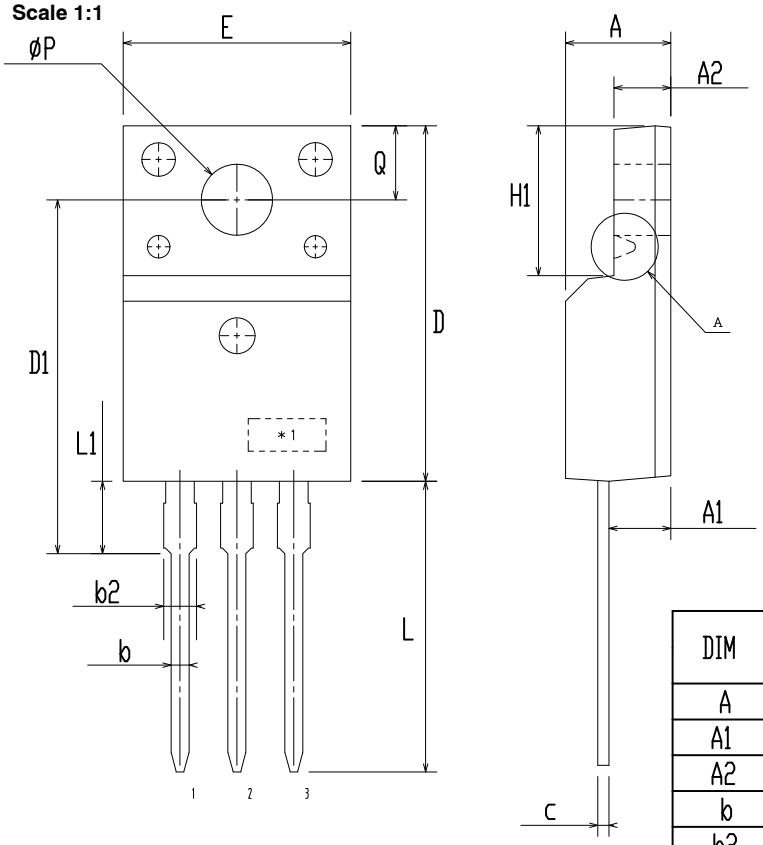
Figure 14. P_C – T_C

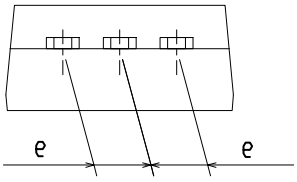
TO−220 Fullpack, 3−Lead / TO−220F−3SG
CASE 221AT
ISSUE B

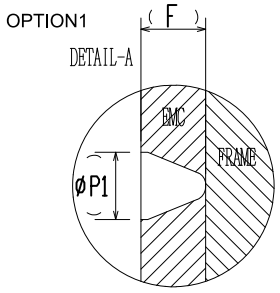
DATE 19 JAN 2021



Scale 1:1







DIM	MILLIMITERS		
	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 PROTRUCSIONS.
C. OPTION 1 - WITH SUPPORT PIN HOLE
OPTION 2 - NO SUPPORT PIN HOLE

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