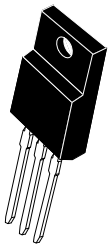
Bipolar Transistor

–50 V, –10 A, Low V_{CE}(sat), PNP TO–220F–3FS

2SA2222SG



TO–220F–3FS
CASE 221AM

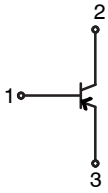
Features

- Adoption of MBIT Process
- Large Current Capacity (I_C = –10 A)
- Low Collector to Emitter Saturation Voltage (V_{CE}(sat) = –250 mV (Typ.))
- High–speed Switching (tf = 22 ns (Typ.))
- This is a Pb–Free Device

Applications

- Relay Drivers, Lamp Drivers, Motor Drivers

ELECTRICAL CONNECTION



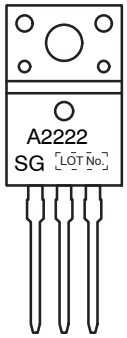
1: Base
2: Collector
3: Emitter

SPECIFICATIONS
ABSOLUTE MAXIMUM RATINGS at Ta = 25°C

Symbol	Parameter	Condition	Value	Unit
V_{CBO}	Collector–to–Base Voltage		–50	V
V_{CEO}	Collector–to–Emitter Voltage		–50	V
V_{EBO}	Emitter–to–Base Voltage		–6	V
I_C	Collector Current		–10	A
I_{CP}	Collector Current (Pulse)	PW ≤ 10 μs, duty cycle ≤1%	–13	A
I_B	Base Current		–2	A
P_C	Collector Dissipation	Tc = 25°C, P_T≤1s	25	W
T_J	Junction Temperature		150	°C
T_{STG}	Storage Temperature		–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.

MARKING DIAGRAM



ORDERING INFORMATION

Device	Package	Shipping
2SA2222SG	TO–220F–3FS (Pb–Free)	50 Units / Tube

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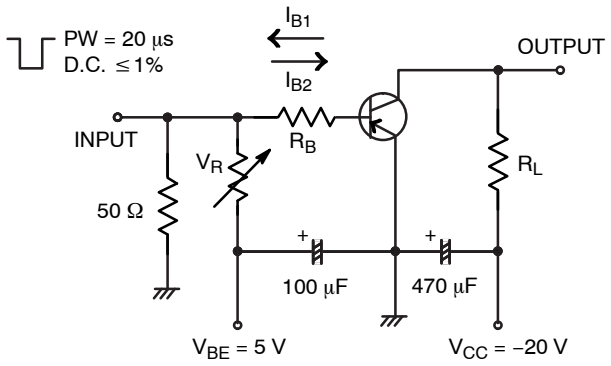
ELECTRICAL CHARACTERISTICS at Ta = 25°C

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Collector Cutoff Current	I_{CBO}	V_{CB} = −40 V, I_E = 0 A			−10	μA
Emitter Cutoff Current	I_{EBO}	V_{EB} = −4V, I_C = 0 A			−10	μA
DC Current Gain	h_{FE}	V_{CE} = −2 V, I_C = −270 mA	150		450	
Gain−Bandwidth Product	f_T	V_{CE} = −10 V, I_C = −1 A		230		MHz
Output Capacitance	Cob	V_{CB} = −10 V, f = 1 MHz		115		pF
Collector−to−Emitter Saturation Voltage	V_{CE}(sat)	I_C = −6 A, I_B = −300 mA		−250	−500	mV
Base−to−Emitter Saturation Voltage	V_{BE}(sat)	I_C = −6 A, I_B = −300 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		40		ns
Storage Time	t_{stg}			240		ns
Fall Time	t_f			22		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 = 20 I_{B1} = −20 I_{B2} = −5 A

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TYPICAL CHARACTERISTICS

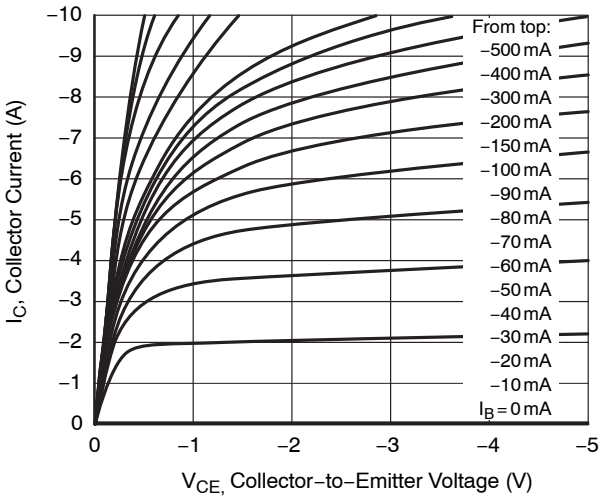

Figure 1. $I_C - V_{CE}$

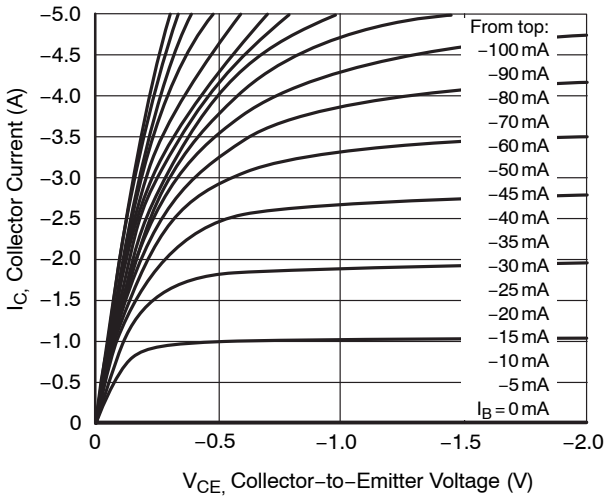

Figure 2. $I_C - V_{CE}$

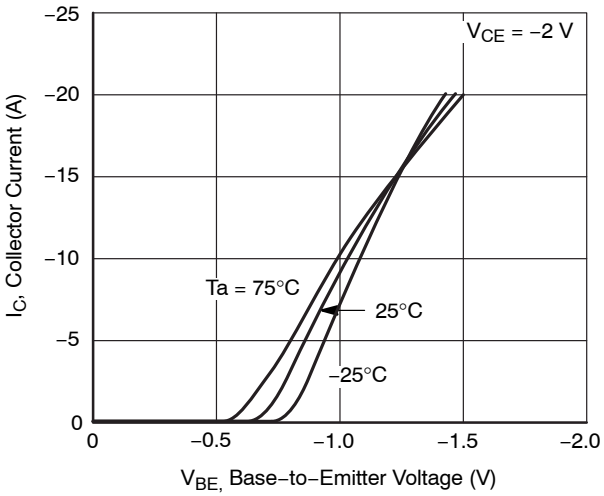

Figure 3. $I_C - V_{BE}$

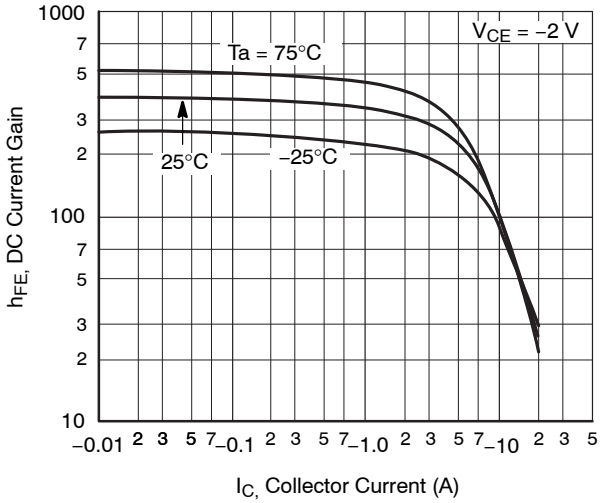

Figure 4. $h_{FE} - I_C$

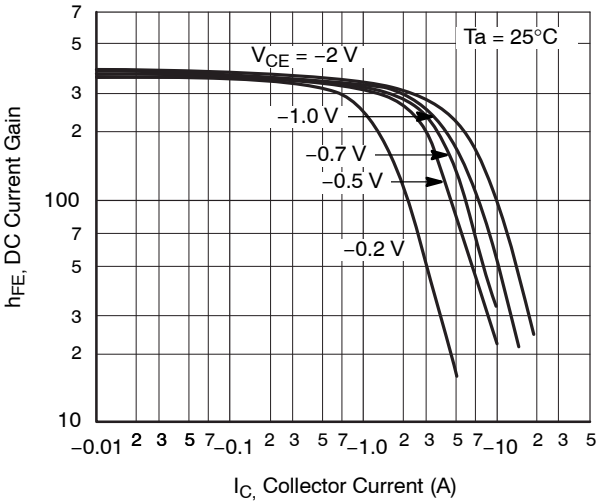

Figure 5. $h_{FE} - I_C$

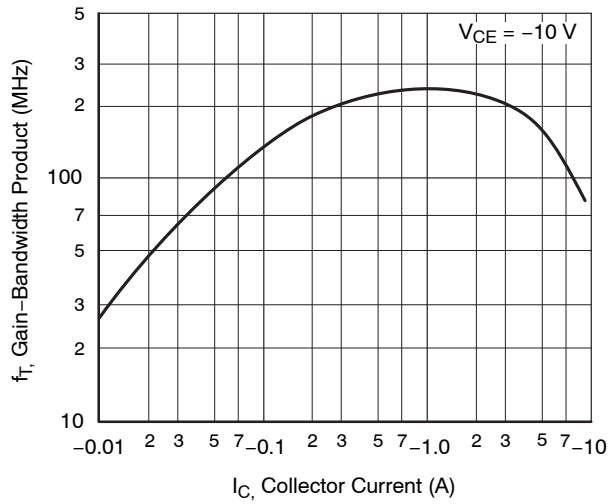

Figure 6. $f_T - I_C$

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TYPICAL CHARACTERISTICS (CONTINUED)

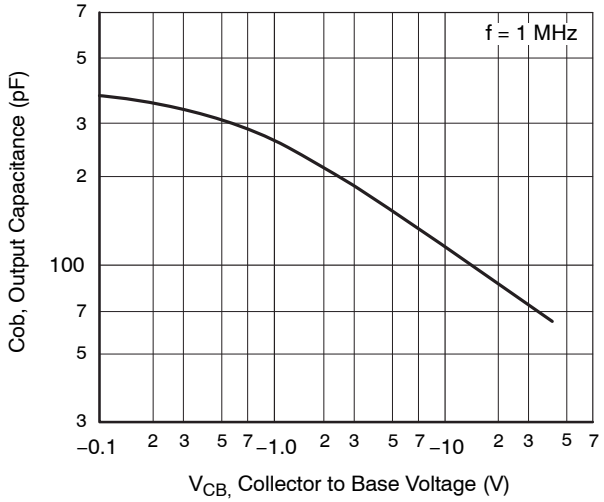

Figure 7. Cob – V_{CB}

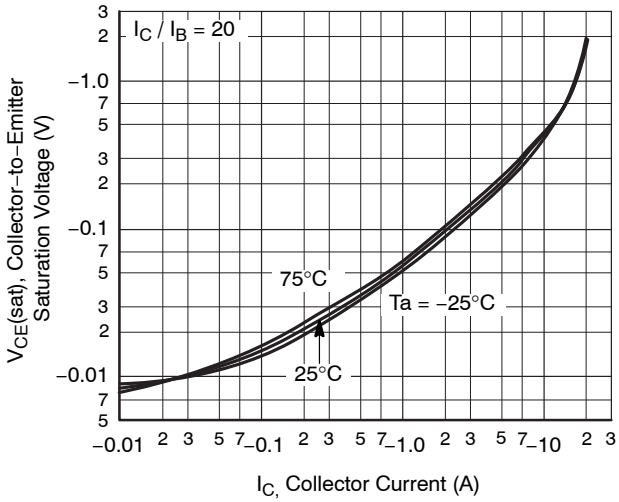

Figure 8. $V_{CE}(sat)$ – I_C

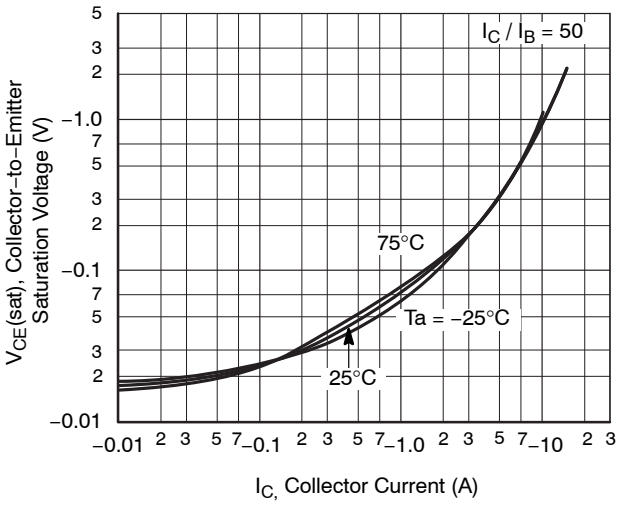

Figure 9. $V_{CE}(sat)$ – I_C

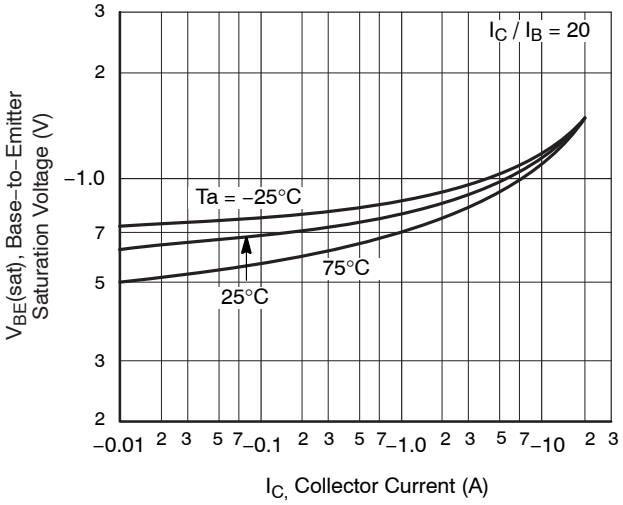

Figure 10. $V_{BE}(sat)$ – I_C

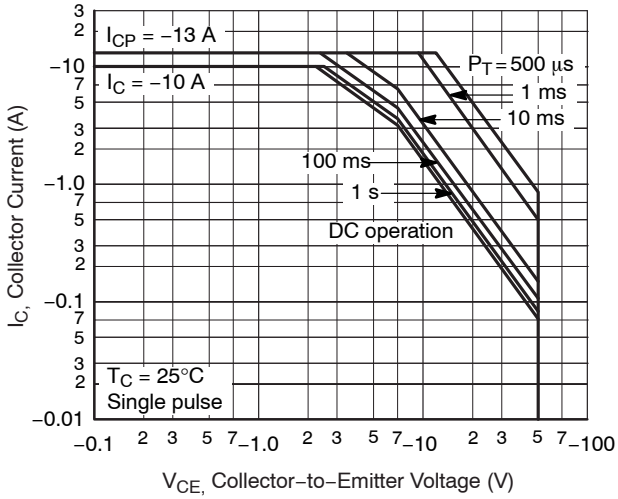

Figure 11. Forward Bias A S O

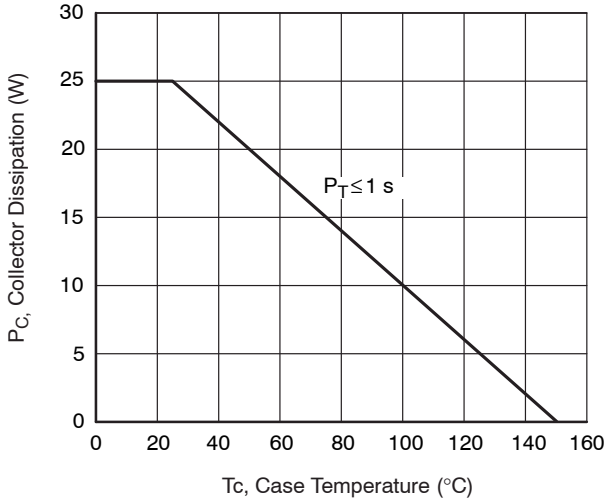

Figure 12. P_C – Tc

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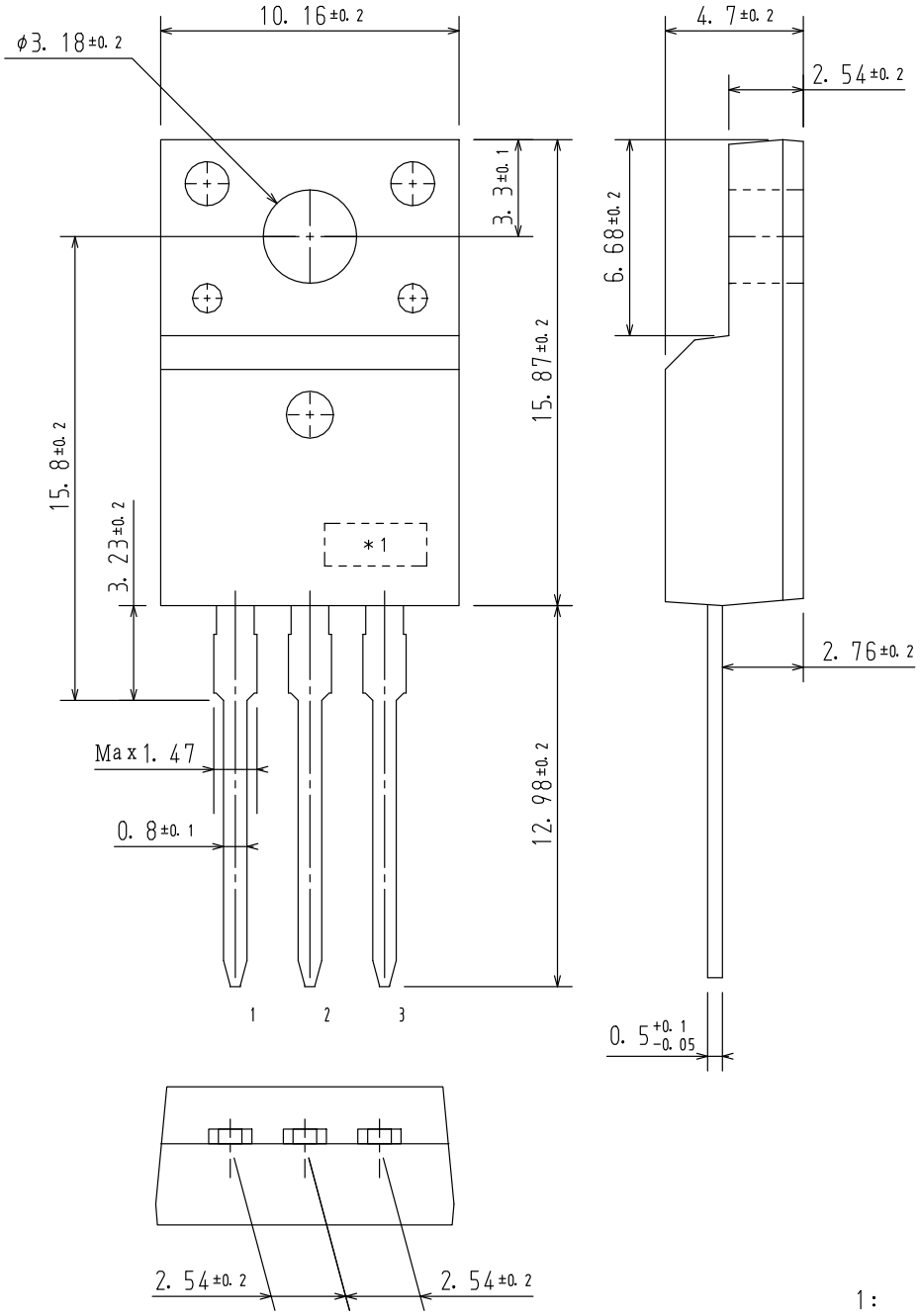

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