

# Bipolar Transistor

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

## 2SA2222SG

### 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 ( $t_f = 22$  ns (Typ.))
- This is a Pb-Free Device

### Applications

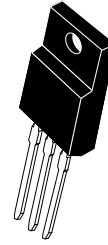
- Relay Drivers, Lamp Drivers, Motor Drivers

### SPECIFICATIONS

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

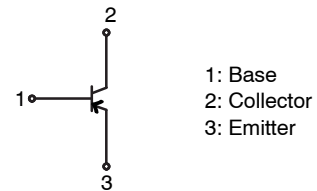
Parameter	Symbol	Value	Unit
Collector-to-Base Voltage	$V_{CBO}$	-50	V
Collector-to-Emitter Voltage	$V_{CEO}$	-50	V
Emitter-to-Base Voltage	$V_{EBO}$	-6	V
Collector Current	$I_C$	-10	A
Collector Current (Pulse)	$I_{CP}$	-13	A
Base Current	$I_B$	-2	A
Collector Dissipation	$T_c = 25^\circ\text{C}, P_T \leq 1\text{s}$	$P_C$	25 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.

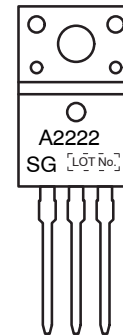


TO-220F-3FS  
CASE 221AM

### ELECTRICAL CONNECTION



### MARKING DIAGRAM



### ORDERING INFORMATION

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

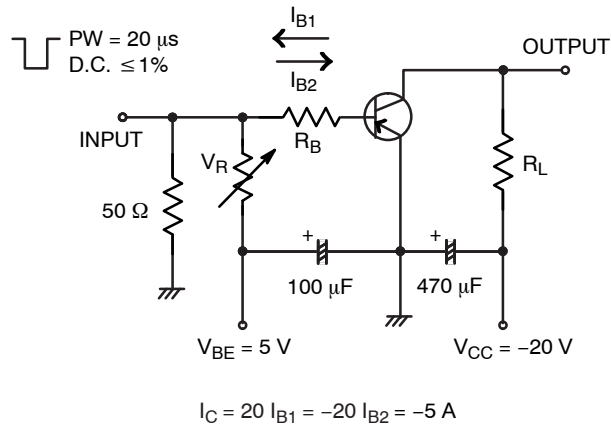
## 2SA2222SG

### ELECTRICAL CHARACTERISTICS at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
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	$h_{FE}$	$V_{CE} = -2\text{ V}, I_C = -270\text{ mA}$	150		450	
Gain-Bandwidth Product	$f_T$	$V_{CE} = -10\text{ V}, I_C = -1\text{ A}$		230		MHz
Output Capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, f = 1\text{ MHz}$		115		pF
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = -6\text{ A}, I_B = -300\text{ mA}$		-250	-500	mV
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = -6\text{ A}, I_B = -300\text{ mA}$			-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		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



TYPICAL CHARACTERISTICS

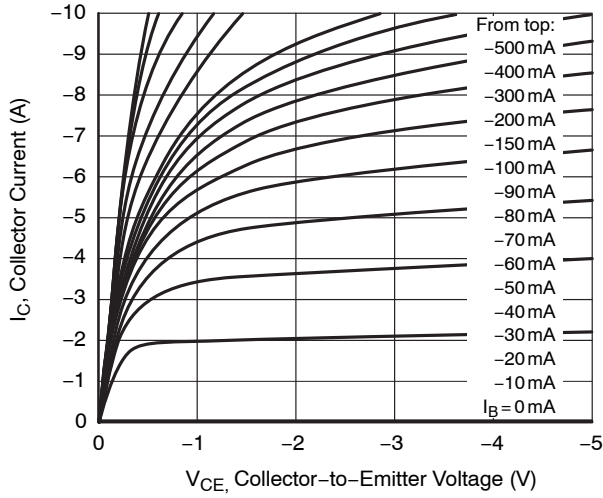


Figure 1.  $I_C - V_{CE}$

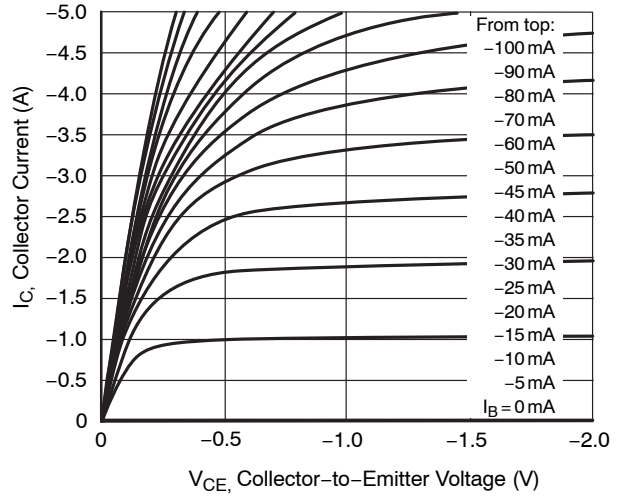


Figure 2.  $I_C - V_{CE}$

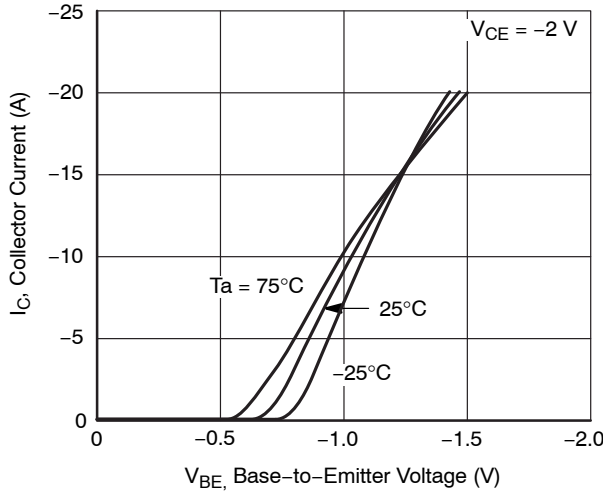


Figure 3.  $I_C - V_{BE}$

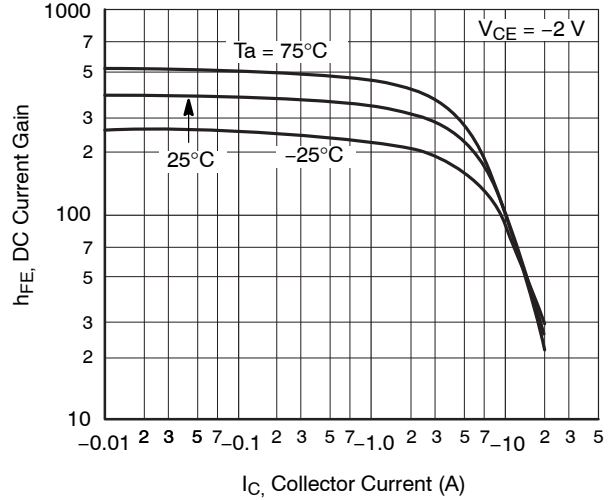


Figure 4.  $h_{FE} - I_C$

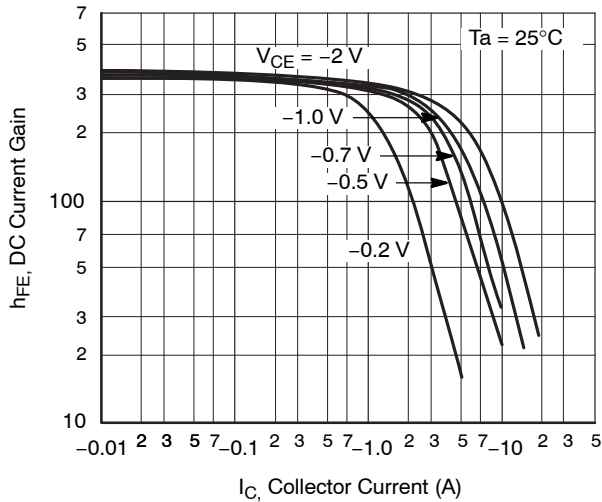


Figure 5.  $h_{FE} - I_C$

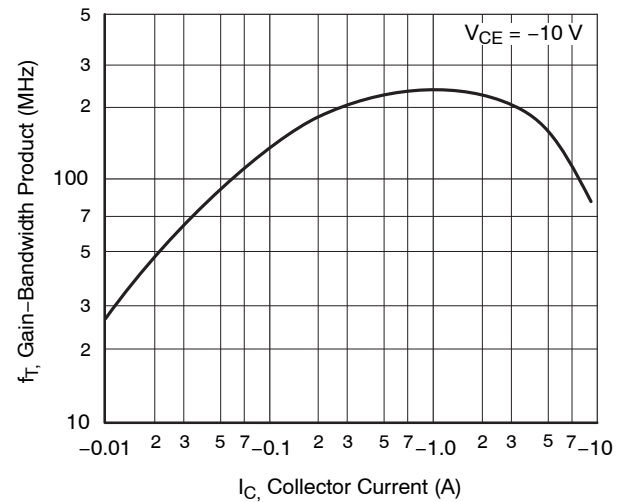


Figure 6.  $f_T - I_C$

TYPICAL CHARACTERISTICS (continued)

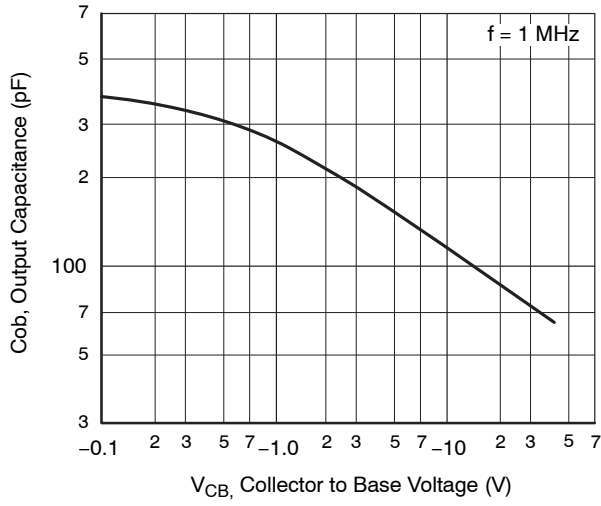


Figure 7.  $C_{ob} - V_{CB}$

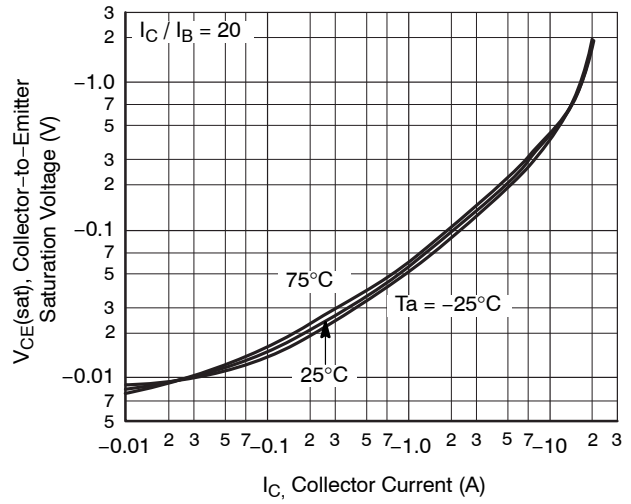


Figure 8.  $V_{CE(sat)} - I_C$

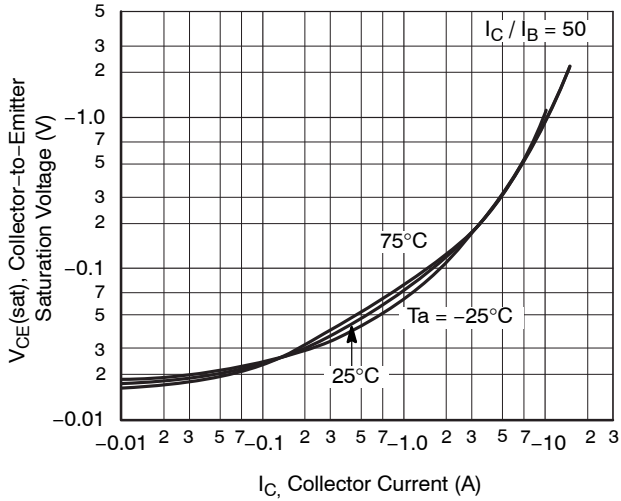


Figure 9.  $V_{CE(sat)} - I_C$

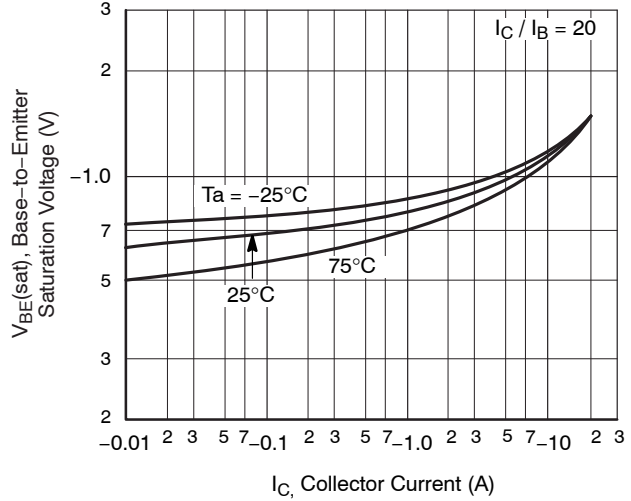


Figure 10.  $V_{BE(sat)} - I_C$

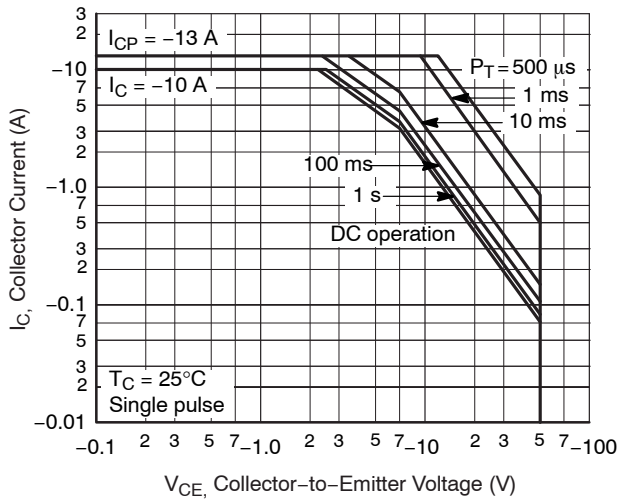


Figure 11. Forward Bias A S O

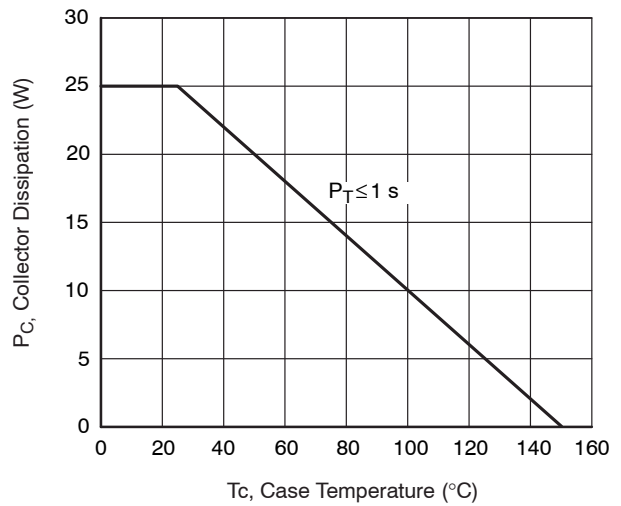
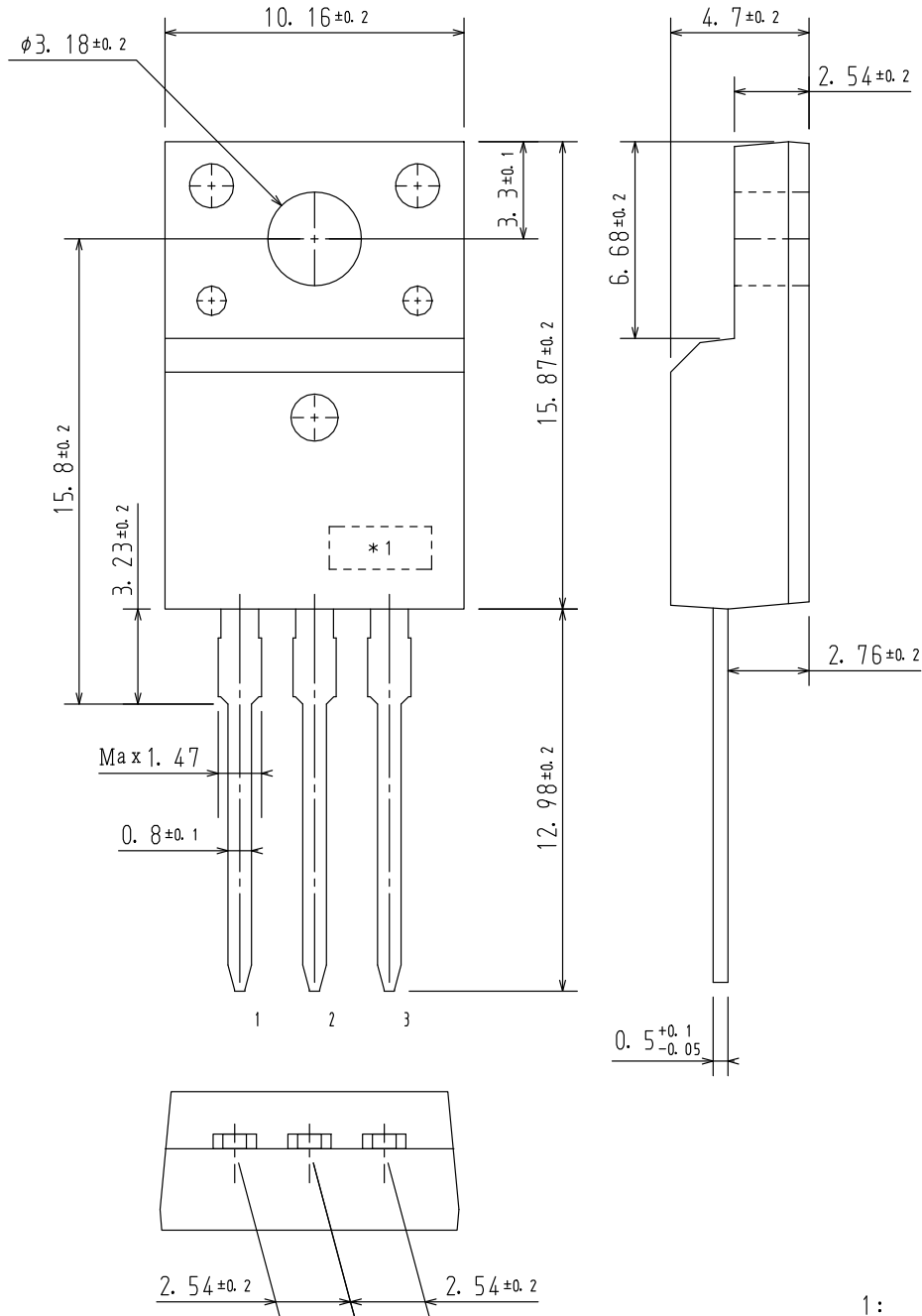


Figure 12.  $P_C - T_c$

**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

**TO-220F-3FS**  
**CASE 221AM**  
**ISSUE O**


DATE 30 JAN 2012



- 1:
- 2:
- 3:

\*1 Lot indication

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