

Bipolar Transistor

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

2SC6144SG

Features

- Adoption of MBIT Process
- Large Current Capacitance ($I_C = 10\text{ A}$)
- Low Collector-to-Emitter Saturation Voltage ($V_{CE(sat)} = 180\text{ mV (typ.)}$)
- High-speed Switching ($t_f = 25\text{ ns (typ.)}$)

Applications

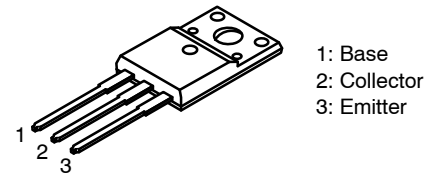
- Relay Drivers, Lamp Drivers, Motor Drivers

Specifications

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

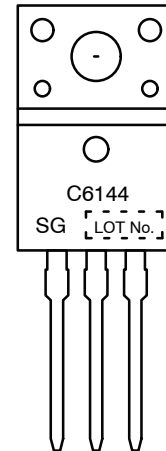
| Parameter | Symbol | Conditions | Ratings | Units |
|------------------------------|-----------|---|-------------|------------------|
| Collector-to-Base Voltage | V_{CBO} | | 60 | V |
| Collector-to-Emitter Voltage | V_{CEO} | | 50 | V |
| Emitter-to-Base Voltage | V_{EBO} | | 5 | V |
| Collector Current | I_C | | 10 | A |
| Collector Current (Pulse) | I_{CP} | | 13 | A |
| Base Current | I_B | | 2 | A |
| Collector Dissipation | P_C | $T_C = 25^\circ\text{C}$, $P_T \leq 1\text{ s}$ | 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.

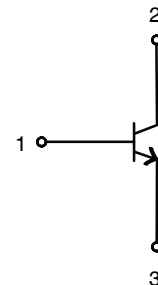


TO-220F-3FS
CASE 221AM

MARKING DIAGRAM



ELECTRICAL CONNECTION



ORDERING INFORMATION

| Device | Package | Shipping |
|-----------|--------------------------|-----------------|
| 2SC6144SG | TO-220F-3FS (Pb-Free) | 50 Units / Tube |

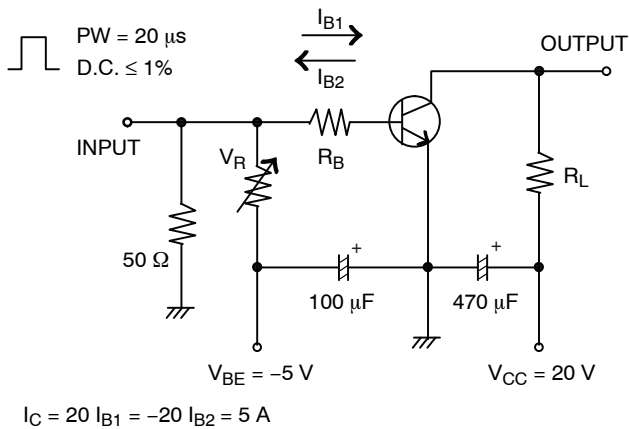
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ELECTRICAL CHARACTERISTICS at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | | | Units |
|---|---------------|--|---------|-----|-----|---------------|
| | | | Min | Typ | Max | |
| 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} | $V_{CE} = 2\text{ V}, I_C = 270\text{ mA}$ | 200 | – | 560 | |
| Gain-Bandwidth Product | f_T | $V_{CE} = 10\text{ V}, I_C = 3\text{ A}$ | – | 330 | – | MHz |
| Output Capacitance | C_{ob} | $V_{CB} = 10\text{ V}, f = 1\text{ MHz}$ | – | 60 | – | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 6\text{ A}, I_B = 300\text{ mA}$ | – | 180 | 360 | 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 | $V_{(BR)CBO}$ | $I_C = 100\text{ }\mu\text{A}, I_E = 0\text{ A}$ | 60 | – | – | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = 1\text{ mA}, R_{BE} = \infty$ | 50 | – | – | V |
| Emitter-to-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E = 100\text{ }\mu\text{A}, I_C = 0\text{ A}$ | 5 | – | – | V |
| Turn-On Time | t_{ON} | See specified Test Circuit. | – | 62 | – | ns |
| Storage Time | t_{stg} | | – | 350 | – | ns |
| Fall Time | t_f | | – | 25 | – | 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



2SC6144SG

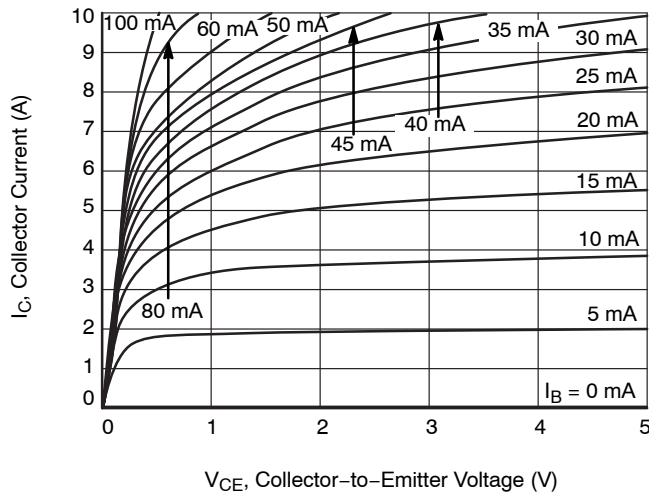


Figure 1. $I_C - V_{CE}$

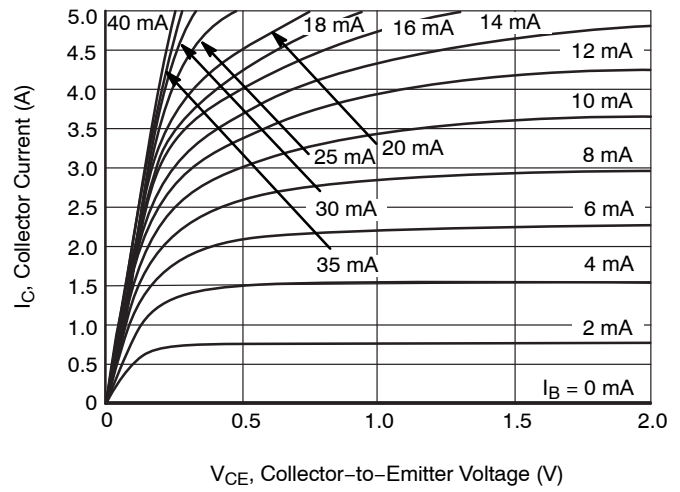


Figure 2. $I_C - V_{CE}$

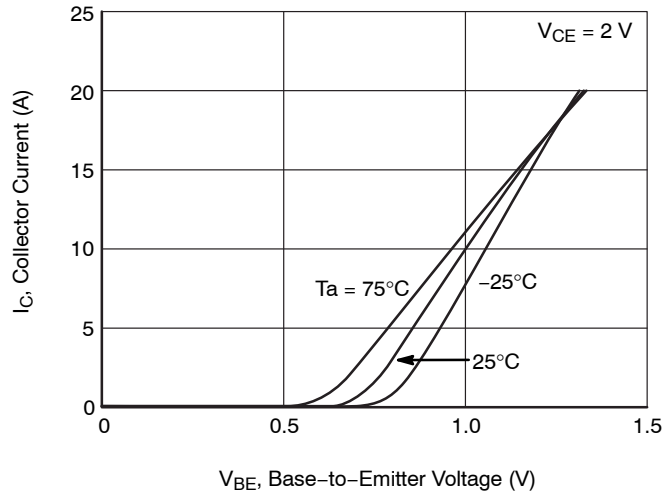


Figure 3. $I_C - V_{BE}$

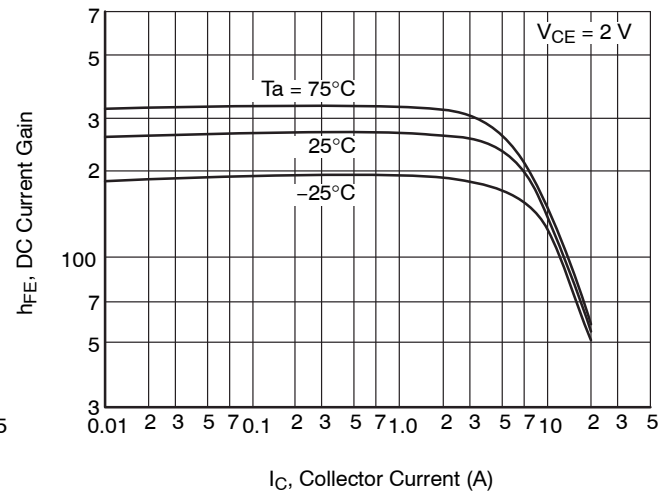


Figure 4. $h_{FE} - I_C$

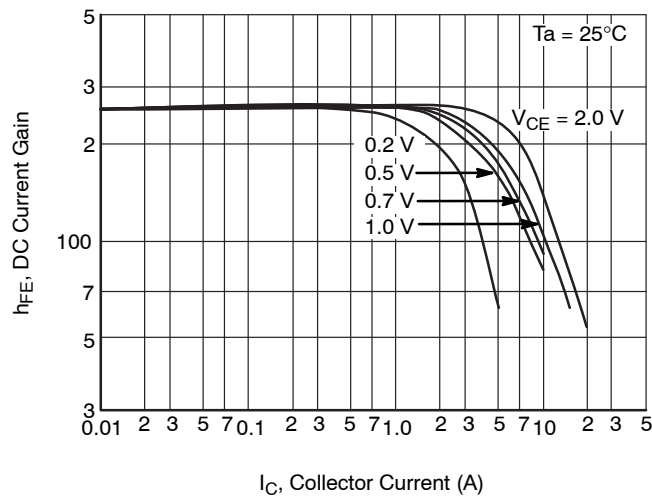


Figure 5. $h_{FE} - I_C$

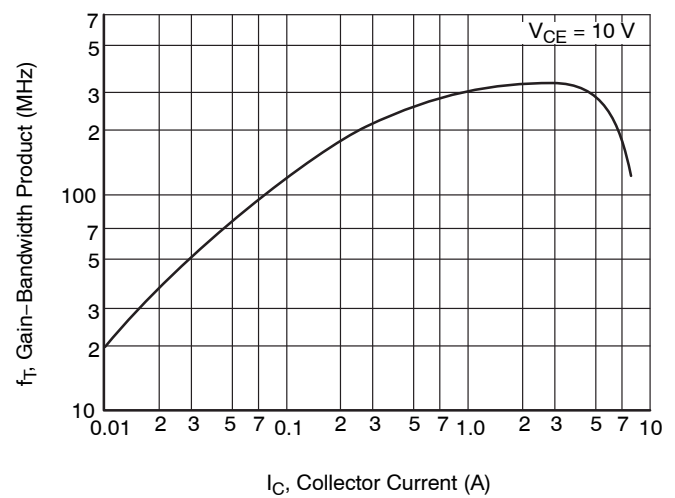


Figure 6. $f_T - I_C$

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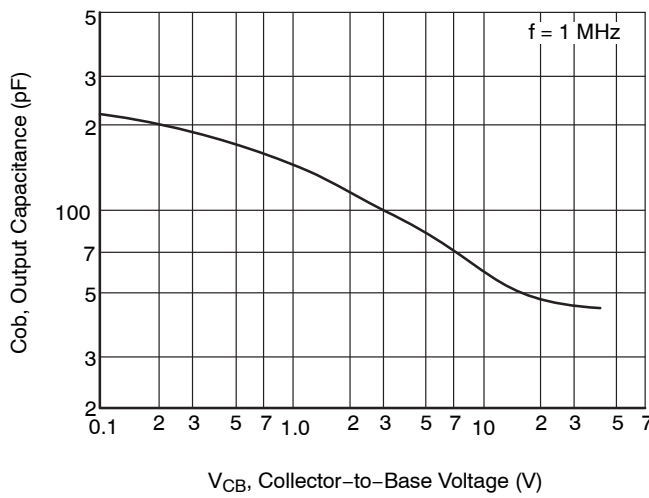


Figure 7. $C_{ob} - V_{CB}$

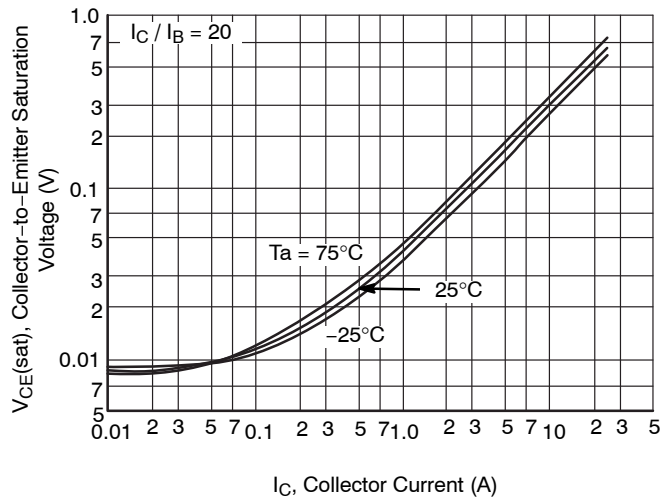


Figure 8. $V_{CE(sat)} - I_C$

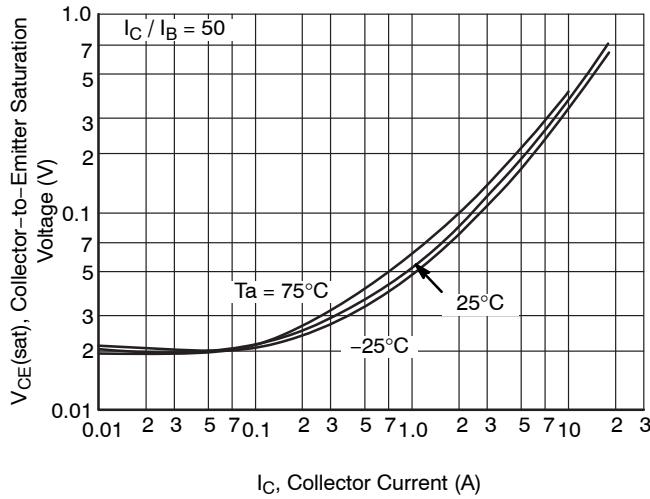


Figure 9. $V_{CE(sat)} - I_C$

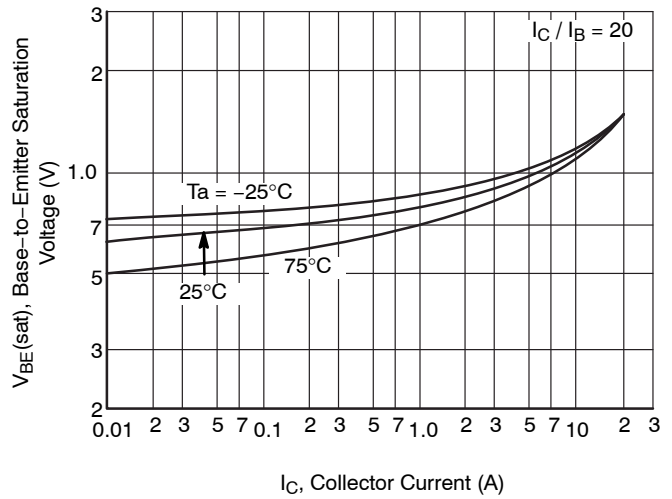


Figure 10. $V_{BE(sat)} - I_C$

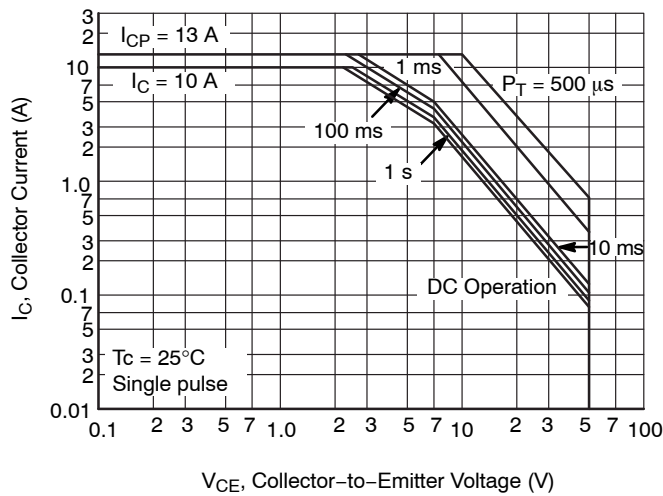


Figure 11. Forward Bias ASO

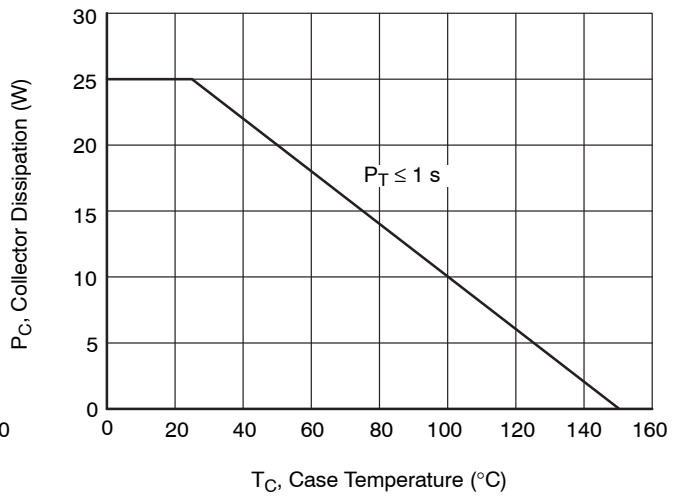
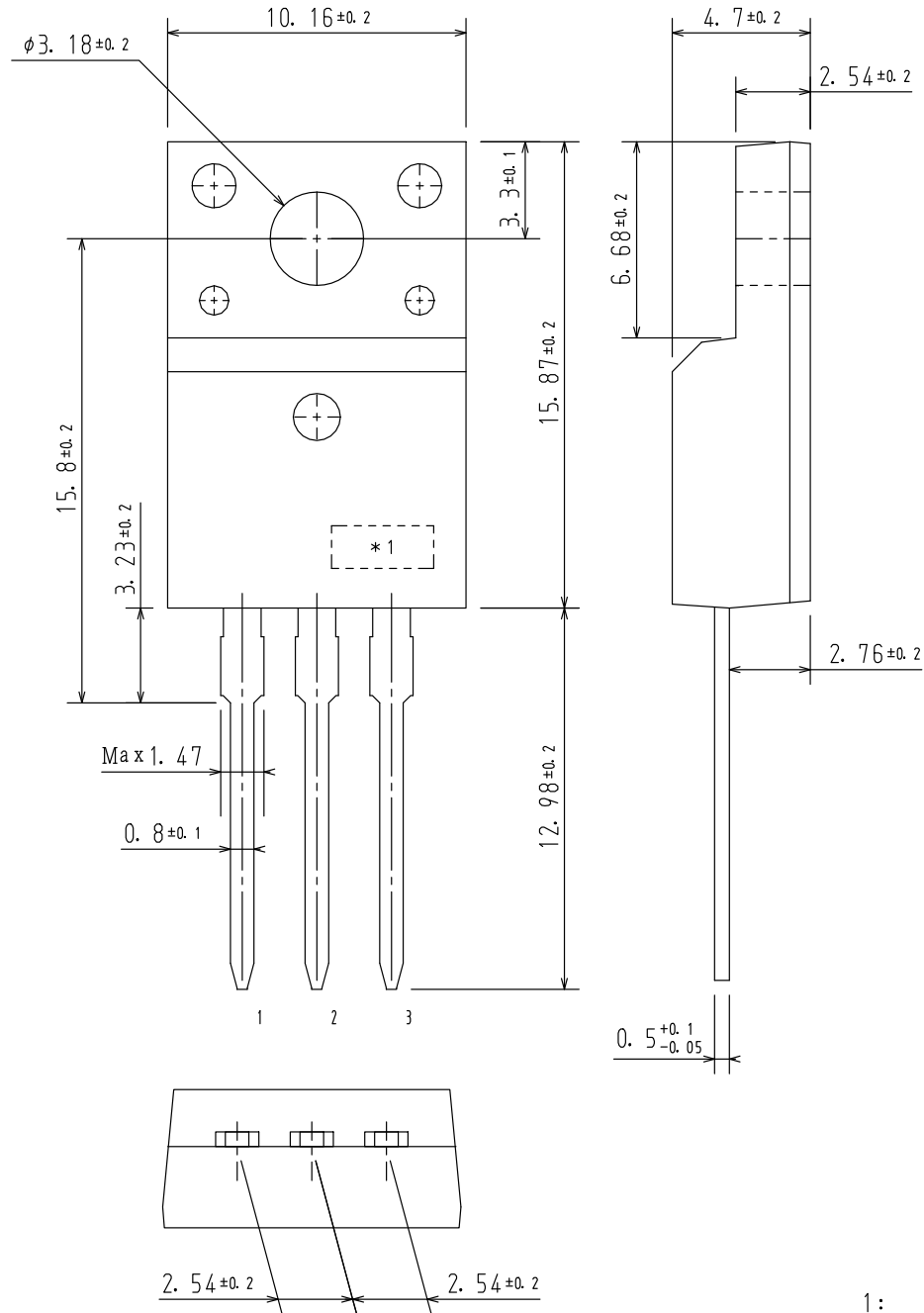


Figure 12. $P_C - T_C$

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

DATE 30 JAN 2012



*1 Lot indication

- 1:
- 2:
- 3:

| | | |
|-------------------------|--------------------|---|
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| DESCRIPTION: | TO-220F-3FS | PAGE 1 OF 1 |

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