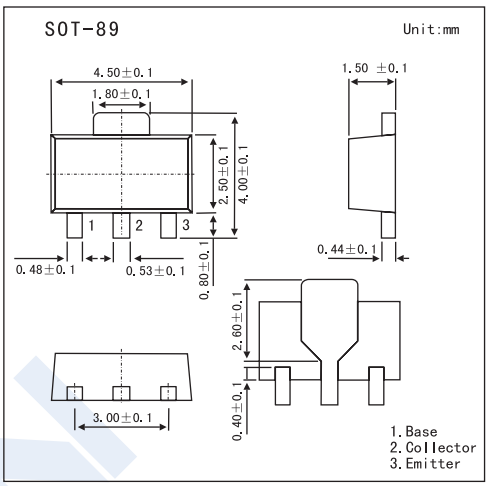
# Power Switching Applications

# 2SA1681




## ■ Features

- Low Saturation Voltage: $V_{CE(sat)}$ = -0.5V(max)($I_C$ = -1A)
- High Speed Switching Time: $t_{stg}$ = 300ns(typ.)
- Small Flat Package
- $P_C$ = 1.0 to 2.0W (mounted on a ceramic substrate)
- Complementary to 2SC4409

## ■ Absolute Maximum Ratings Ta = 25℃

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -60 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -50 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -6 | V |
| Collector Current | $I_C$ | -2 | A |
| Base Current | $I_B$ | -0.2 | A |
| Collector Power Dissipation | $P_C$ | 0.5 | W |
| | $P_C$ * | 1 | |
| Jumction temperature | $T_j$ | 150 | ℃ |
| Storage temperature Range | $T_{stg}$ | -55 to +150 | ℃ |

* Mounted on a ceramic board (250 $mm^2$ x 0.8 t)

## ■ Electrical Characteristics Ta = 25℃

| Parameter | Symbol | Testconditons | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$ = -60V , $I_E$ = 0 | | | -0.1 | μA |
| Emitter Cut-off Current | $I_{EBO}$ | $V_{EB}$ = -6V , $I_C$ = 0 | | | -0.1 | μA |
| DC Current Gain | $h_{FE}$ | $V_{CE}$ = -2V , $I_C$ = -100mA | 120 | | 400 | |
| | | $V_{CE}$ = -2V , $I_C$ = -1.5A | 40 | | | |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C$ = 1A , $I_B$ = -0.05A | | | -0.5 | V |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C$ = 1A , $I_B$ = -0.05A | | | -1.2 | V |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C$ = -10mA, $I_B$ = 0 | -50 | | | V |
| Transition Frequency | $f_T$ | $V_{CE}$ = -2V , $I_C$ = -100mA | | 100 | | MHz |
| Collector Output Capacitance | $C_{ob}$ | $V_{CB}$ = -10V , $I_E$ = 0, f = 1MHz | | 23 | | pF |
| Turn-ON Time | $t_{on}$ | See Test Circuit | | 0.1 | | μs |
| Storage Time | $t_{stg}$ | | | 0.3 | | |
| Fall Time | $t_f$ | | | 0.1 | | |

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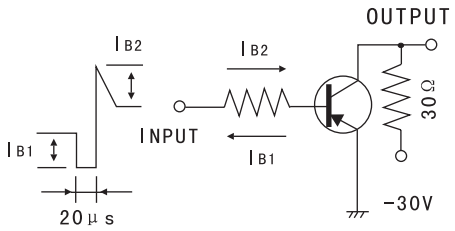
## ■ Test Circuit

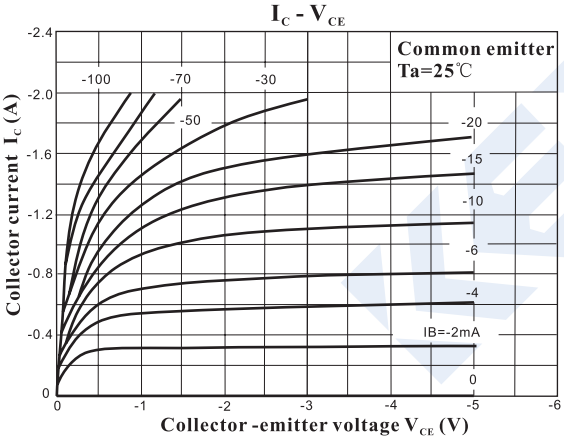


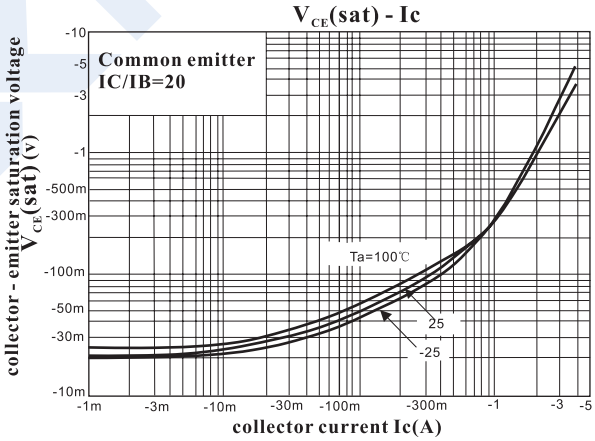

$-I_{B1} = I_{B2} = 0.05A$ , DUTY CYCLE ≤ 1%

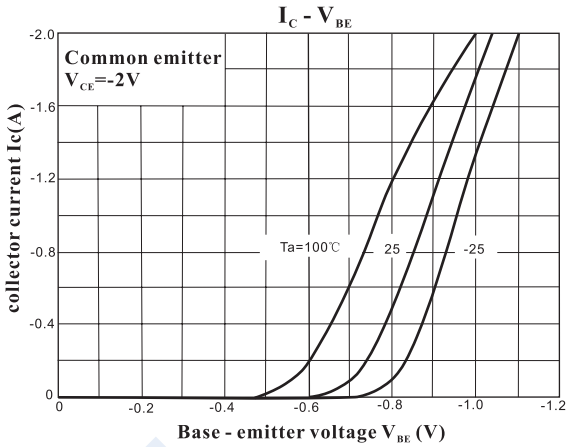
## ■ Marking

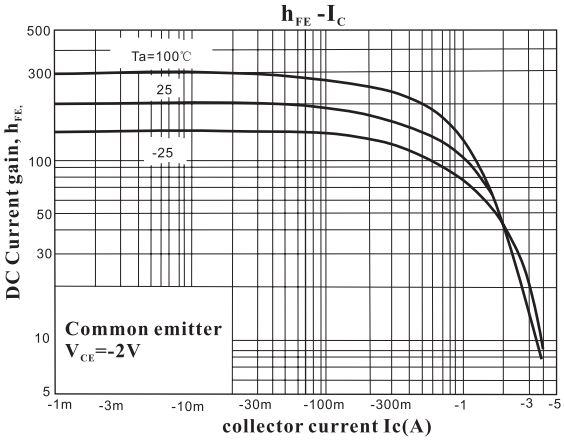
| Marking | LA |
|---|---|

## ■ Electrical Characteristics Curves



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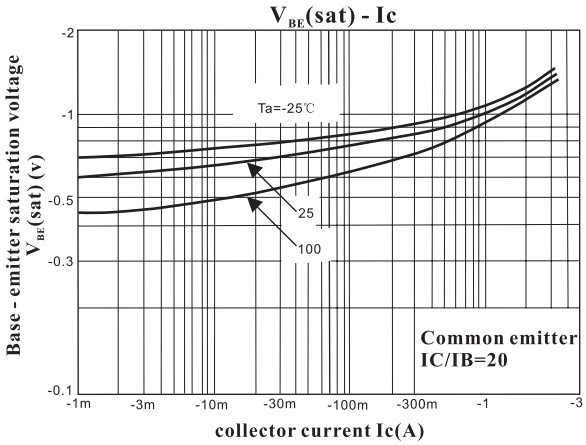
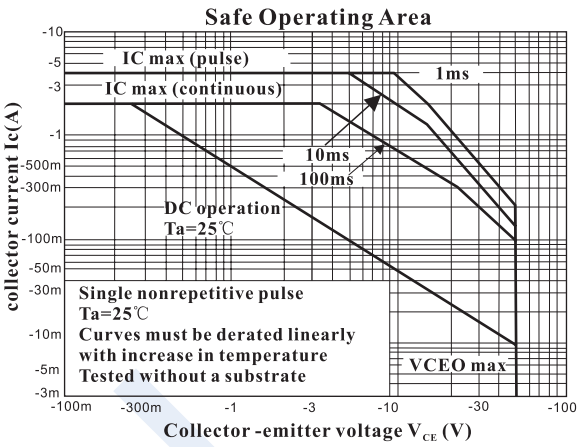

$V_{BE}$(sat) - Ic
Base - emitter saturation voltage $V_{BE}$(sat) (v)
-2
-1
-0.5
-0.3
-0.1
Ta=-25℃
25
100
Common emitter
IC/IB=20
-1m
-3m
-10m
-30m
-100m
-300m
-1
-3
collector current Ic(A)


Safe Operating Area
collector current Ic(A)
-10
-5
-3
-1
-500m
-300m
-100m
-50m
-30m
-10m
-5m
-3m
IC max (pulse)
IC max (continuous)
1ms
10ms
100ms
DC operation
Ta=25℃
Single nonrepetitive pulse
Ta=25℃
Curves must be derated linearly
with increase in temperature
Tested without a substrate
VCEO max
-100m
-300m
-1
-3
-10
-30
-100
Collector -emitter voltage $V_{CE}$ (V)