

# NPN Epitaxial Silicon Transistor

## KSD1588

### Low Frequency Power Amplifier

- Low Speed Switching
- This is a Pb-Free Device

### ABSOLUTE MAXIMUM RATINGS

( $T_C = 25^\circ\text{C}$  unless otherwise noted.)

| Symbol    | Parameter                                          | Value     | Unit             |
|-----------|----------------------------------------------------|-----------|------------------|
| $V_{CBO}$ | Collector-Base Voltage                             | 100       | V                |
| $V_{CEO}$ | Collector-Emitter Voltage                          | 60        | V                |
| $V_{EBO}$ | Emitter-Base Voltage                               | 7         | V                |
| $I_C$     | Collector Current (DC)                             | 7         | A                |
| $I_{CP}$  | Collector Current (Pulse) (Note 1)                 | 15        | A                |
| $I_B$     | Base Current                                       | 3.5       | A                |
| $P_C$     | Collector Dissipation ( $T_A = 25^\circ\text{C}$ ) | 2         | W                |
|           | Collector Dissipation ( $T_C = 25^\circ\text{C}$ ) | 30        | W                |
| $T_J$     | Junction Temperature                               | 150       | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature                                | -55 ~ 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.

1.  $PW \leq 300 \mu\text{s}$ , Duty Cycle  $\leq 10\%$ .

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted.)

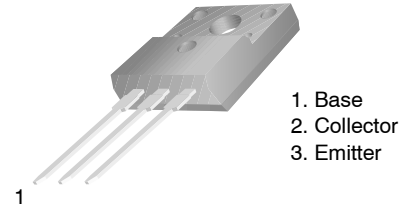
| Symbol                 | Parameter                                     | Test Conditions                                                                              | Min      | Max      | Unit          |
|------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------|----------|----------|---------------|
| $I_{CBO}$              | Collector Cut-off Current                     | $V_{CB} = 80 \text{ V}$ , $I_E = 0$                                                          | –        | 10       | $\mu\text{A}$ |
| $I_{EBO}$              | Emitter Cut-off Current                       | $V_{EB} = 5 \text{ V}$ , $I_C = 0$                                                           | –        | 10       | $\mu\text{A}$ |
| $h_{FE1}$<br>$h_{FE2}$ | DC Current Gain (Note 2)                      | $V_{CE} = 1 \text{ V}$ , $I_C = 3 \text{ A}$<br>$V_{CE} = 1 \text{ V}$ , $I_C = 5 \text{ A}$ | 40<br>20 | 200<br>– |               |
| $V_{CE(sat)}$          | Collector-Emitter Saturation Voltage (Note 2) | $I_C = 5 \text{ A}$ , $I_B = 0.5 \text{ A}$                                                  | –        | 0.5      | V             |
| $V_{BE(sat)}$          | Base-Emitter Saturation Voltage (Note 2)      | $I_C = 5 \text{ A}$ , $I_B = 0.5 \text{ A}$                                                  | –        | 1.5      | V             |

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.

2. Pulse Test:  $PW \leq 350 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

### $h_{FE1}$ Classification

| Classification | R       | O        | Y         |
|----------------|---------|----------|-----------|
| $h_{FE1}$      | 40 ~ 80 | 80 ~ 120 | 100 ~ 200 |



TO-220 Fullpack  
CASE 221AT

### MARKING DIAGRAM

|                       |
|-----------------------|
| D1588–<br>Y<br>AYWWZZ |
|-----------------------|

D1588 = Specific Device Code  
Y =  $h_{FE}$  Grade  
A = Site Code  
YWW = Date Code (Year & Week)  
ZZ = Assembly Lot Code

### ORDERING INFORMATION

| Device     | Package                      | Shipping              |
|------------|------------------------------|-----------------------|
| KSD1588YTU | TO-220 Fullpack<br>(Pb-Free) | 1,000 Units /<br>Tube |

## TYPICAL CHARACTERISTICS

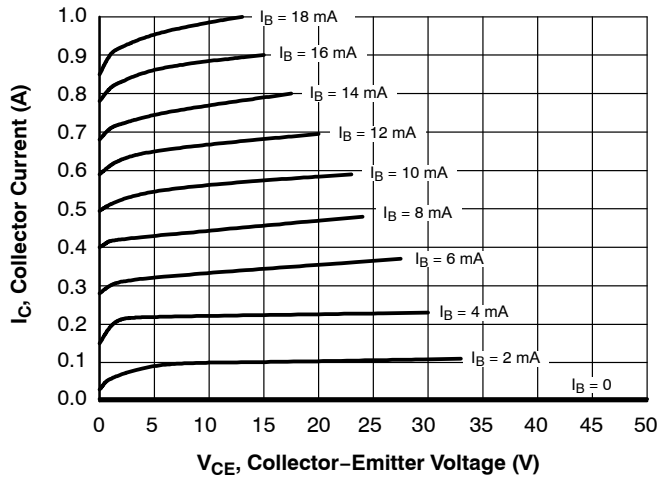


Figure 1. Static Characteristic

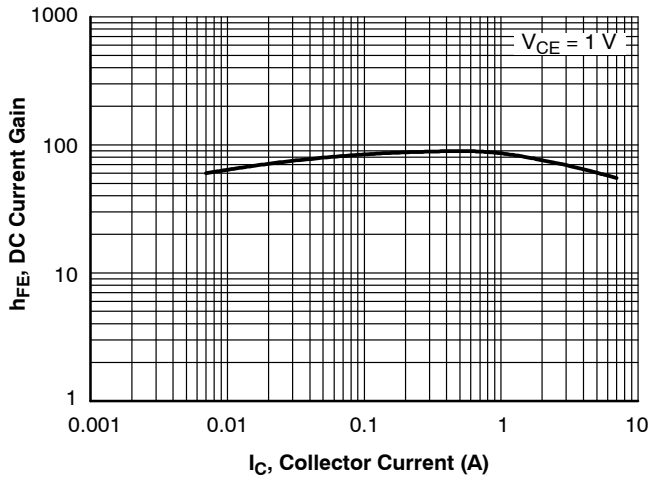


Figure 2. DC Current Gain

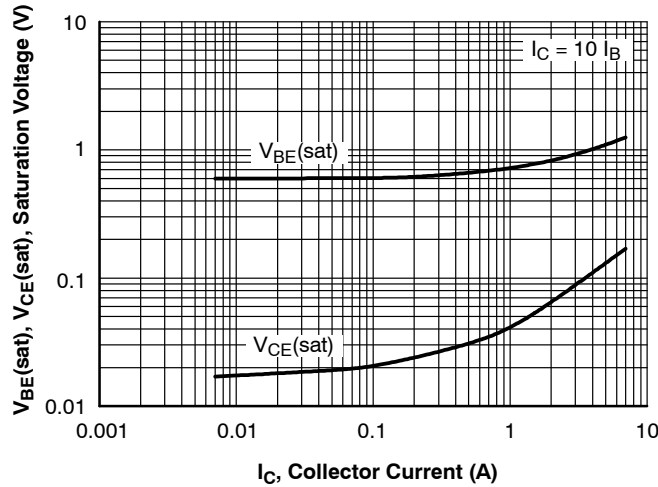


Figure 3. Base-Emitter Saturation Voltage and Collector-Emitter Saturation Voltage

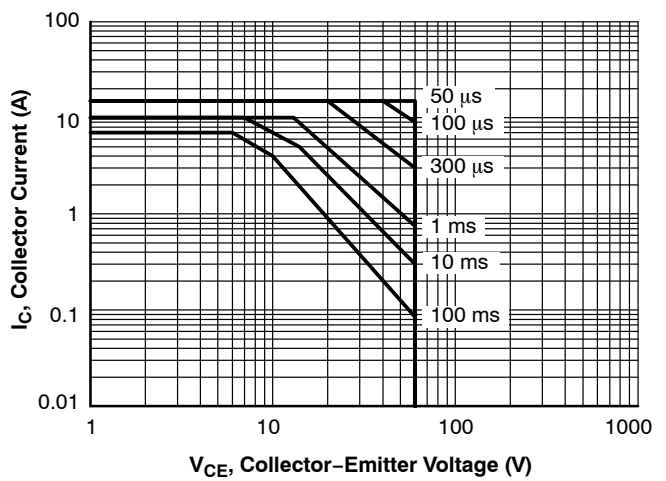


Figure 4. Safe Operating Area

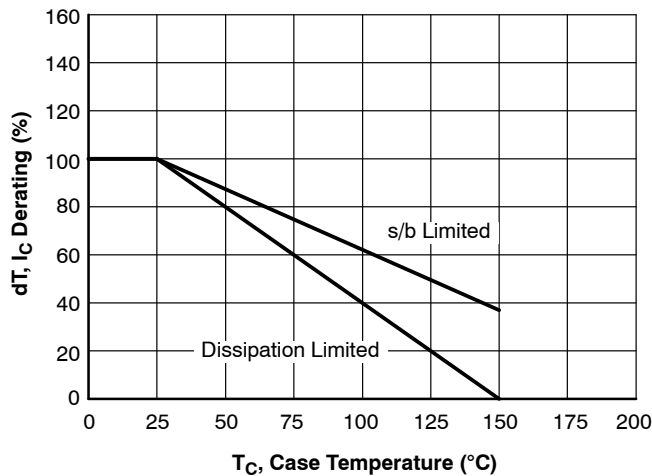


Figure 5. Derating Curve Safe Operating Area

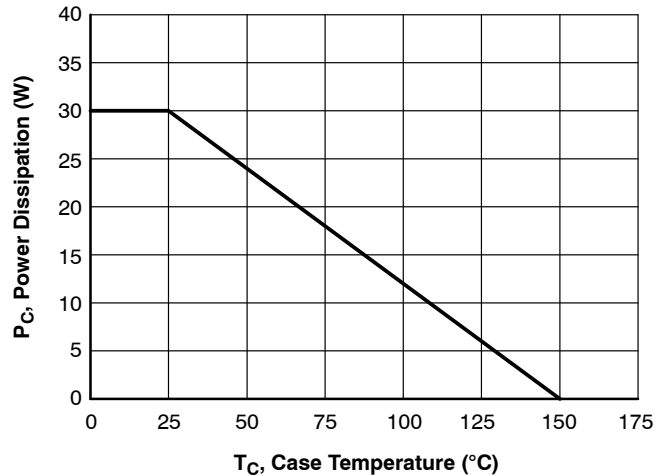
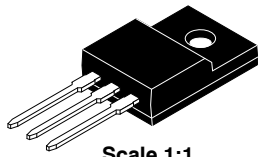


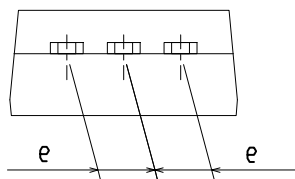
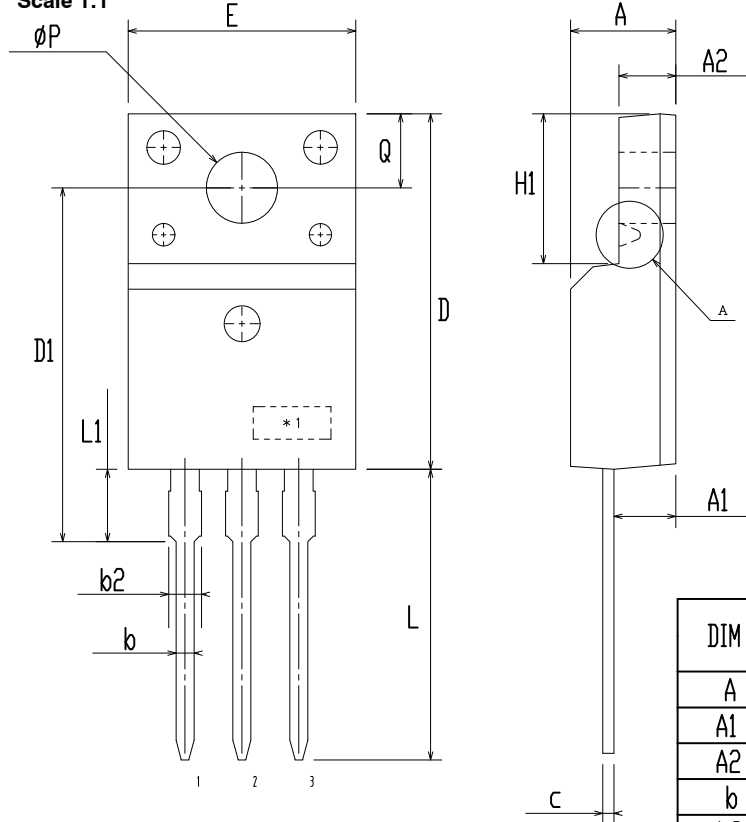
Figure 6. Power Derating

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

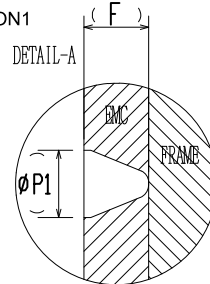
DATE 19 JAN 2021



Scale 1:1



OPTION1



| DIM  | MILLIMETERS |       |       |
|------|-------------|-------|-------|
|      | 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 PROTRUCTIONS.

C. OPTION 1 - WITH SUPPORT PIN HOLE

OPTION 2 - NO SUPPORT PIN HOLE

|                         |                                              |                                                                                                                                                                                     |
|-------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>TO-220 FULLPACK, 3-LEAD / TO-220F-3SG</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                                  |

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