

# SILICON HIGH SPEED POWER TRANSISTORS

**2SC 2431**  
(FT3812)  
**2SC 2432**  
(FT3862)

September 1979

## SILICON NPN RING EMITTER TRANSISTOR (RET)

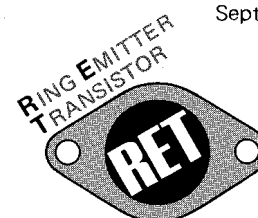
The 2SC2431/2SC2432 are silicon NPN general purpose, high power switching transistors fabricated with Fujitsu's unique Ring Emitter Transistor (RET) technology. RET devices are constructed with multiple emitters connected through diffused ballast resistors which provide uniform current density. This structure permits the design of high power transistors with exceptional switching characteristics and frequency response in high current applications.

The 2SC2431/2SC2432 are especially well-suited for switching regulators, DC to DC converters, power amplifiers or other applications where large SOA is required. PNP complements, 2SA1041/2SA1042, are available.

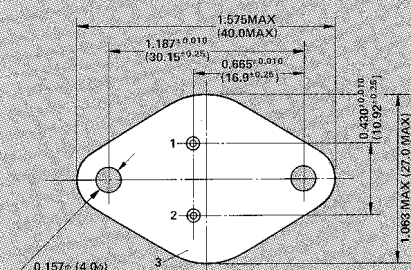
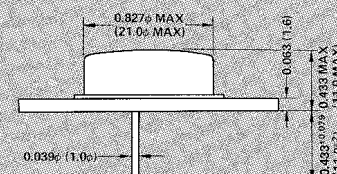
- Ultra-fast switching speed at 10A  
 $t_r = 0.20 \mu s$  typ  
 $t_{off} = 0.35 \mu s$  typ
- Improved Reverse Second-Breakdown Capability
- Excellent Safe Operating Area
- High  $f_T = 80$  MHz (typ)

## ABSOLUTE MAXIMUM RATINGS

| Rating                                             | Symbol    | Value      |         | Unit       |
|----------------------------------------------------|-----------|------------|---------|------------|
|                                                    |           | 2SC2431    | 2SC2432 |            |
| Collector to Base Voltage                          | $V_{CBO}$ | 120        | 70      | V          |
| Emitter to Base Voltage                            | $V_{EBO}$ | 5          | 5       | V          |
| Collector to Emitter Voltage                       | $V_{CEO}$ | 120        | 70      | V          |
| Collector Current                                  | $I_C$     | 15         | 15      | A          |
| Base Current                                       | $I_B$     | 5          | 5       | A          |
| Collector Power Dissipation ( $T_C = 25^\circ C$ ) | $P_C$     | 100        | 100     | W          |
| Junction Temperature                               | $T_j$     | +175       |         | $^\circ C$ |
| Storage Temperature Range                          | $T_{stg}$ | -65 ~ +175 |         | $^\circ C$ |



## OUTLINE DIMENSION JEDEC TO-3



1: Emitter 2: Base 3: Collector (Case)  
Dimension in inches and (millimeters)

## ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ C$ )

| Parameter                               | Symbol        | Test Conditions                               | Limits  |      |      |         |      |      | Unit    |
|-----------------------------------------|---------------|-----------------------------------------------|---------|------|------|---------|------|------|---------|
|                                         |               |                                               | 2SC2431 |      |      | 2SC2432 |      |      |         |
|                                         |               |                                               | Min.    | Typ. | Max. | Min.    | Typ. | Max. |         |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB}=120V, I_E=0$                          | —       | —    | 50   | —       | —    | —    | $\mu A$ |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB}=70V, I_E=0$                           | —       | —    | —    | —       | —    | 50   | $\mu A$ |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB}=4V, I_C=0$                            | —       | —    | 50   | —       | —    | 50   | $\mu A$ |
| Collector Cutoff Current                | $I_{CEO}$     | $V_{CE}=120V, I_B=0$                          | —       | —    | 1    | —       | —    | —    | mA      |
| Collector Cutoff Current                | $I_{CEO}$     | $V_{CE}=70V, I_B=0$                           | —       | —    | —    | —       | —    | 1    | mA      |
| Collector to Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=50\mu A, I_E=0$                          | 120     | —    | —    | 70      | —    | —    | V       |
| Emitter to Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=1mA, I_C=0$                              | 5       | —    | —    | 5       | —    | —    | V       |
| Collector to Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=10mA, R_{BE}=\infty$                     | 120     | —    | —    | 70      | —    | —    | V       |
| DC Current Gain                         | $h_{FE1}$     | $V_{CE}=5V, I_C=1.5A$ *                       | 35      | —    | 200  | 35      | —    | 200  |         |
| DC Current Gain                         | $h_{FE2}$     | $V_{CE}=5V, I_C=15A$ *                        | 7       | —    | —    | 10      | —    | —    |         |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=7A, I_B=0.7A$ *                          | —       | 0.5  | 1.5  | —       | 0.5  | 1.5  | V       |
| Base to Emitter Saturation Voltage      | $V_{BE(sat)}$ |                                               | —       | —    | 1.8  | —       | —    | 1.8  | V       |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=10V, I_C=1A$                          | —       | 80   | —    | —       | 80   | —    | MHz     |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=10V, I_E=0, f=1MHz$                   | —       | 250  | —    | —       | 250  | —    | pF      |
| Rise Time                               | $t_r$         | $I_C=10A, R_L=3\Omega$<br>$I_{B1}=-I_{B2}=1A$ | —       | 0.20 | —    | —       | 0.20 | —    | $\mu s$ |
| Storage Time                            | $t_{stg}$     |                                               | —       | 0.20 | —    | —       | 0.20 | —    | $\mu s$ |
| Fall Time                               | $t_f$         |                                               | —       | 0.15 | —    | —       | 0.15 | —    | $\mu s$ |

\* Pulsed: Pulse Width  $\leq 300 \mu s$   
Duty Cycle  $\leq 6\%$