

## Plastic-Encapsulate Transistors

DUAL TRANSISTOR (NPN+NPN)

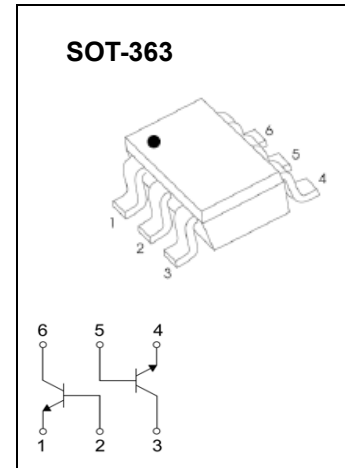
### FEATURES

- Epitaxial planar die construction
- Ideal for low power amplification and switching

MARKING:K6N

MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$  unless otherwise noted)

| Symbol    | Parameter                     | Value   | Units            |
|-----------|-------------------------------|---------|------------------|
| $V_{CBO}$ | Collector-Base Voltage        | 60      | V                |
| $V_{CEO}$ | Collector-Emitter Voltage     | 40      | V                |
| $V_{EBO}$ | Emitter-Base Voltage          | 5       | V                |
| $I_C$     | Collector Current -Continuous | 0.2     | A                |
| $P_C$     | Collector Power Dissipation   | 0.2     | W                |
| $T_J$     | Junction Temperature          | 150     | $^\circ\text{C}$ |
| $T_{stg}$ | Storage Temperature           | -55-150 | $^\circ\text{C}$ |



### ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ unless otherwise specified)

| Parameter                            | Symbol         | Test conditions                                                          | Min  | Typ | Max  | Unit          |
|--------------------------------------|----------------|--------------------------------------------------------------------------|------|-----|------|---------------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$  | $I_C=10\mu\text{A}, I_E=0$                                               | 60   |     |      | V             |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$  | $I_C=1\text{mA}, I_B=0$                                                  | 40   |     |      | V             |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$  | $I_E=10\mu\text{A}, I_C=0$                                               | 5    |     |      | V             |
| Collector cut-off current            | $I_{CBO}$      | $V_{CB}=30\text{V}, I_E=0$                                               |      |     | 0.05 | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$      | $V_{EB}=5\text{V}, I_C=0$                                                |      |     | 0.05 | $\mu\text{A}$ |
| Collector cut-off current            | $I_{CEX}$      | $V_{CE}=30\text{V}, V_{BE(off)}=3\text{V}$                               |      |     | 0.05 | $\mu\text{A}$ |
| DC current gain                      | $h_{FE(1)}$    | $V_{CE}=1\text{V}, I_C=0.1\text{mA}$                                     | 40   |     |      |               |
|                                      | $h_{FE(2)}$    | $V_{CE}=1\text{V}, I_C=1\text{mA}$                                       | 70   |     |      |               |
|                                      | $h_{FE(3)}$    | $V_{CE}=1\text{V}, I_C=10\text{mA}$                                      | 100  |     | 300  |               |
|                                      | $h_{FE(4)}$    | $V_{CE}=1\text{V}, I_C=50\text{mA}$                                      | 60   |     |      |               |
|                                      | $h_{FE(5)}$    | $V_{CE}=1\text{V}, I_C=100\text{mA}$                                     | 30   |     |      |               |
| Collector-emitter saturation voltage | $V_{CE(sat)1}$ | $I_C=10\text{mA}, I_B=1\text{mA}$                                        |      |     | 0.2  | V             |
|                                      | $V_{CE(sat)2}$ | $I_C=50\text{mA}, I_B=5\text{mA}$                                        |      |     | 0.3  | V             |
| Base-emitter saturation voltage      | $V_{BE(sat)1}$ | $I_C=10\text{mA}, I_B=1\text{mA}$                                        | 0.65 |     | 0.85 | V             |
|                                      | $V_{BE(sat)2}$ | $I_C=50\text{mA}, I_B=5\text{mA}$                                        |      |     | 0.95 | V             |
| Transition frequency                 | $f_T$          | $V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHz}$                    | 300  |     |      | MHz           |
| Collector output capacitance         | $C_{ob}$       | $V_{CB}=5\text{V}, I_E=0, f=1\text{MHz}$                                 |      |     | 4    | pF            |
| Noise figure                         | NF             | $V_{CE}=5\text{V}, I_C=0.1\text{mA}, f=1\text{kHz}, R_S=1\text{K}\Omega$ |      |     | 5    | dB            |
| Delay time                           | $t_d$          | $V_{CC}=3\text{V}, V_{BE(off)}=-0.5\text{V}$                             |      |     | 35   | nS            |
| Rise time                            | $t_r$          | $I_C=10\text{mA}, I_{B1}=-I_{B2}=1\text{mA}$                             |      |     | 35   | nS            |
| Storage time                         | $t_s$          | $V_{CC}=3\text{V}, I_C=10\text{mA}$                                      |      |     | 200  | nS            |
| Fall time                            | $t_f$          | $I_{B1}=-I_{B2}=1\text{mA}$                                              |      |     | 50   | nS            |

### TYPICAL TRANSIENT CHARACTERISTICS

—  $T_J = 25^\circ\text{C}$   
- -  $T_J = 125^\circ\text{C}$

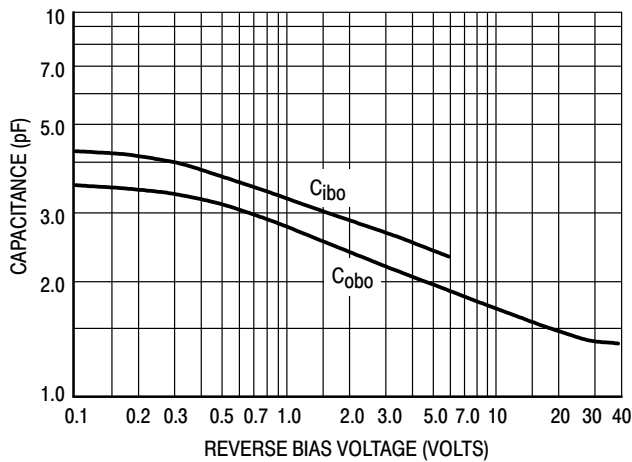


Figure 3. Capacitance

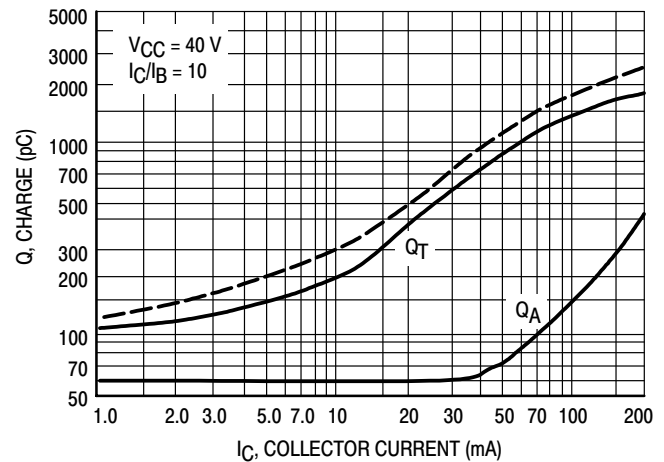


Figure 4. Charge Data

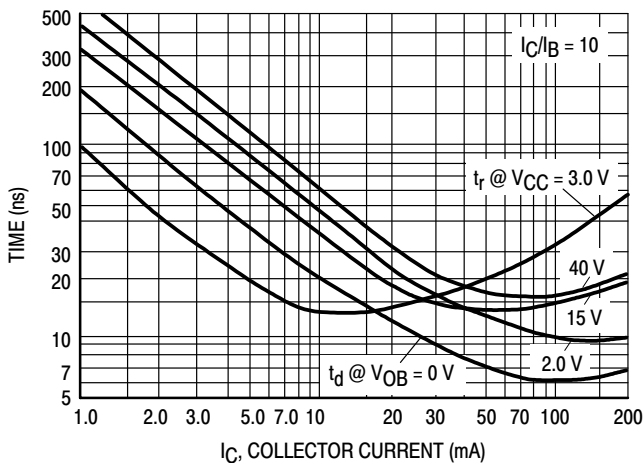


Figure 5. Turn-On Time

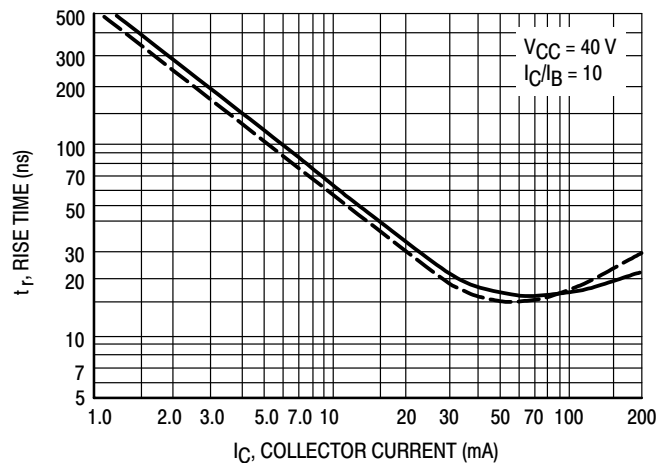


Figure 6. Rise Time

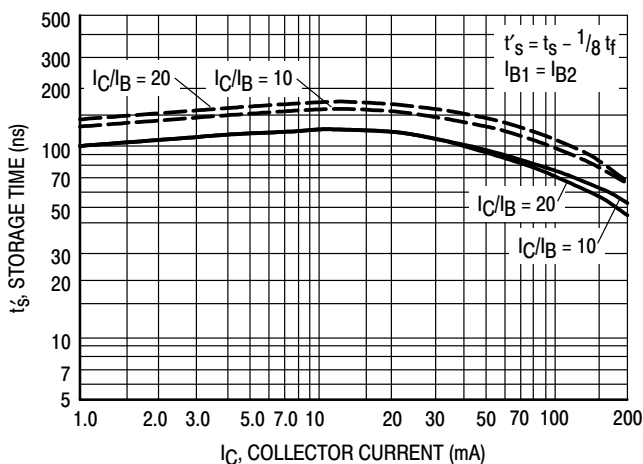


Figure 7. Storage Time

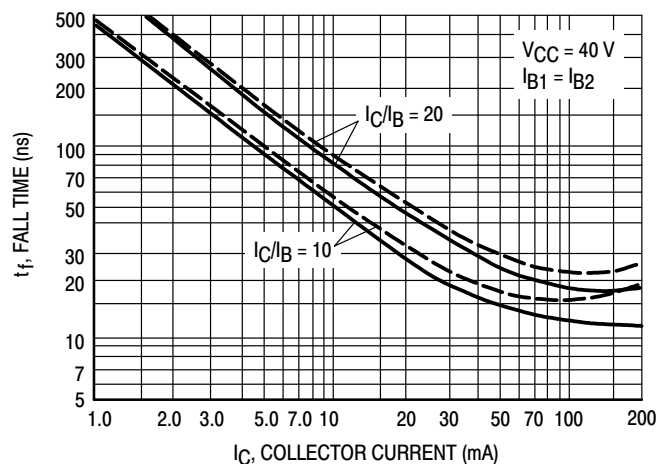


Figure 8. Fall Time

### TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS NOISE FIGURE VARIATIONS

( $V_{CE} = 5.0 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$ , Bandwidth = 1.0 Hz)

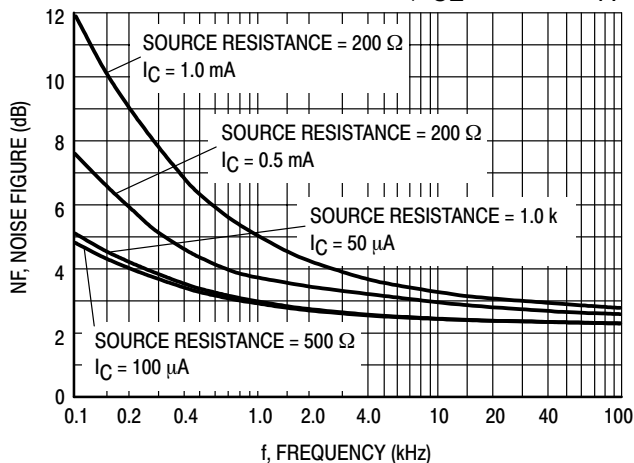


Figure 9. Noise Figure

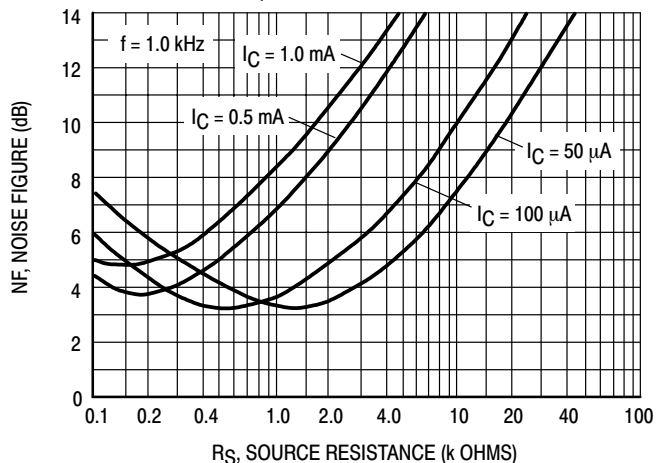


Figure 10. Noise Figure

### h PARAMETERS

( $V_{CE} = 10 \text{ Vdc}$ ,  $f = 1.0 \text{ kHz}$ ,  $T_A = 25^\circ\text{C}$ )

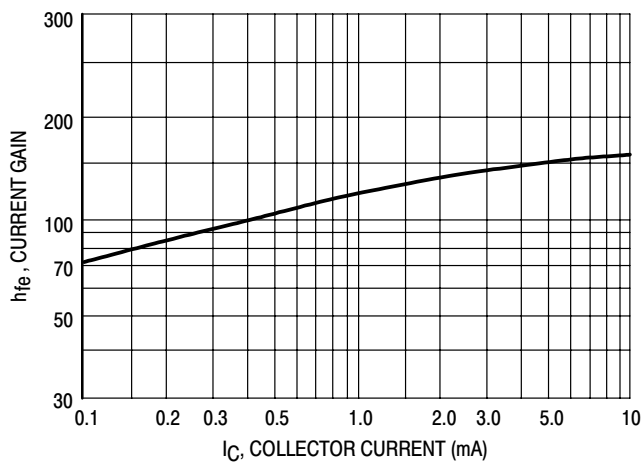


Figure 11. Current Gain

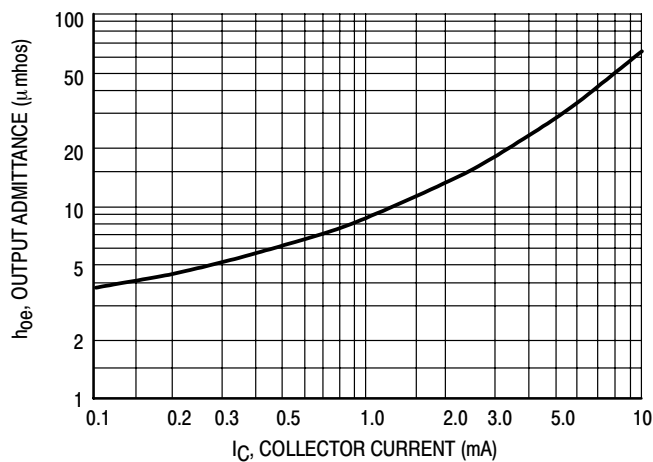


Figure 12. Output Admittance

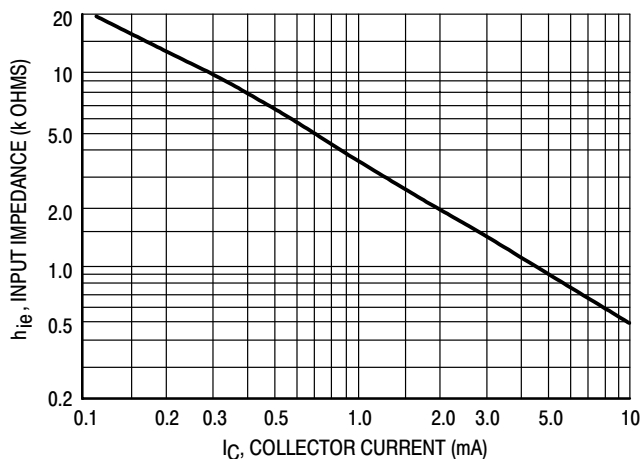


Figure 13. Input Impedance

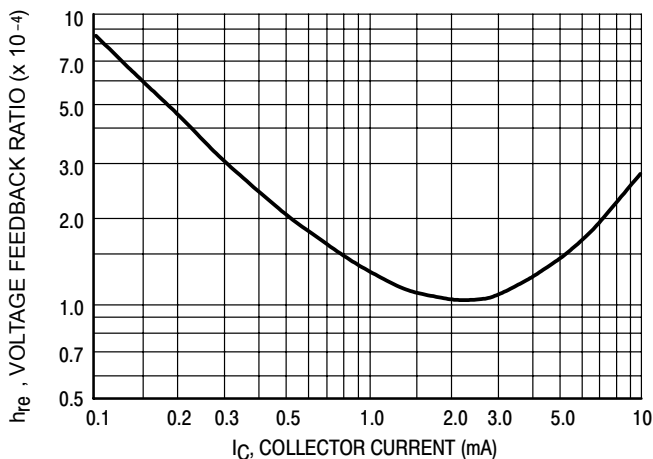


Figure 14. Voltage Feedback Ratio

### TYPICAL STATIC CHARACTERISTICS

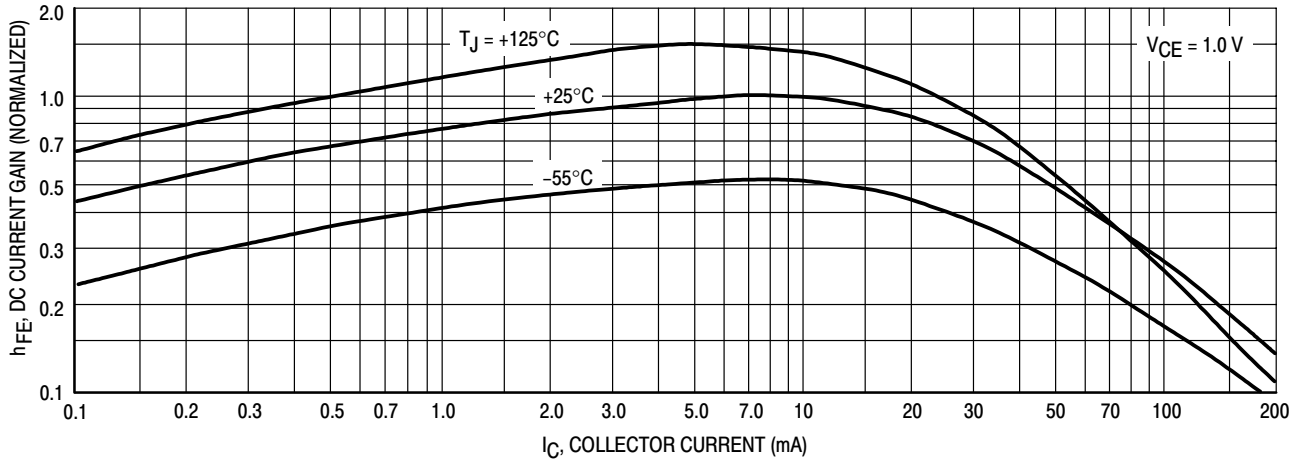


Figure 15. DC Current Gain

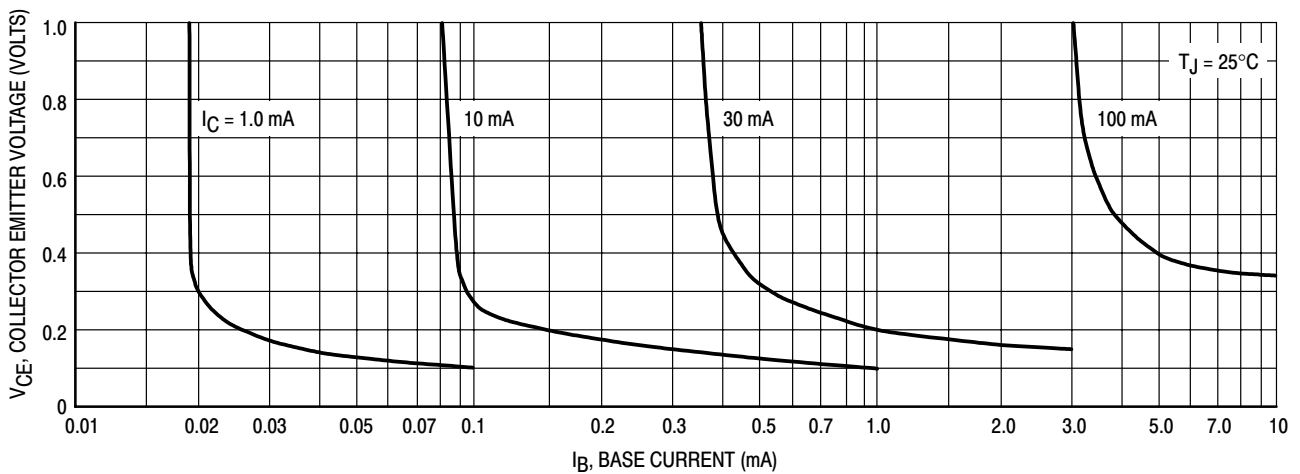


Figure 16. Collector Saturation Region

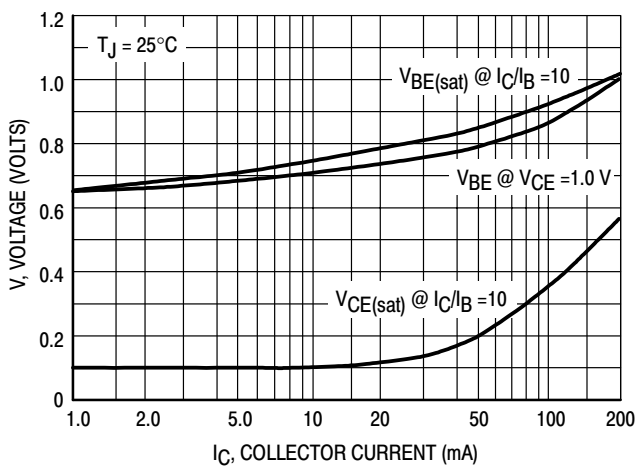


Figure 17. "ON" Voltages

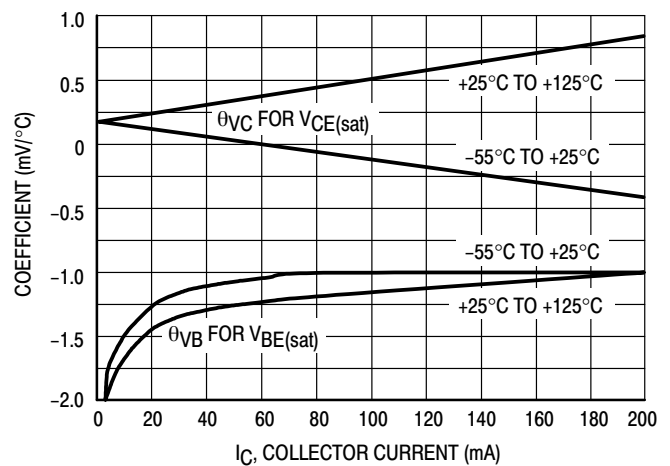
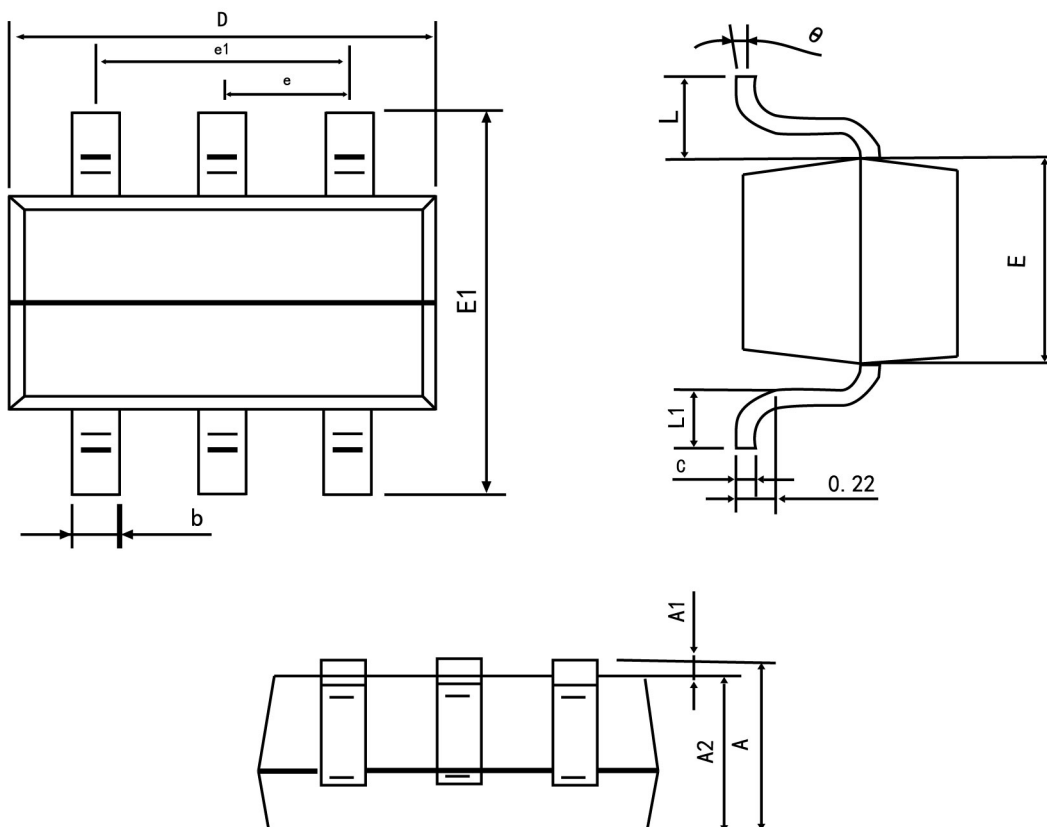


Figure 18. Temperature Coefficients

### SOT-363-Package Outline Dimensions



| Symbol   | Dimension in Millimeters |       |
|----------|--------------------------|-------|
|          | Min                      | Max   |
| A        | 0.900                    | 1.100 |
| A1       | 0.000                    | 0.100 |
| A2       | 0.900                    | 1.000 |
| b        | 0.150                    | 0.350 |
| c        | 0.080                    | 0.150 |
| D        | 2.000                    | 2.200 |
| E        | 1.150                    | 1.350 |
| E1       | 2.150                    | 2.450 |
| e        | 0.650 TYP                |       |
| e1       | 1.200                    | 1.400 |
| L        | 0.525 REF                |       |
| L1       | 0.260                    | 0.460 |
| $\theta$ | 0°                       | 8°    |