



## M28S

## NPN SILICON TRANSISTOR

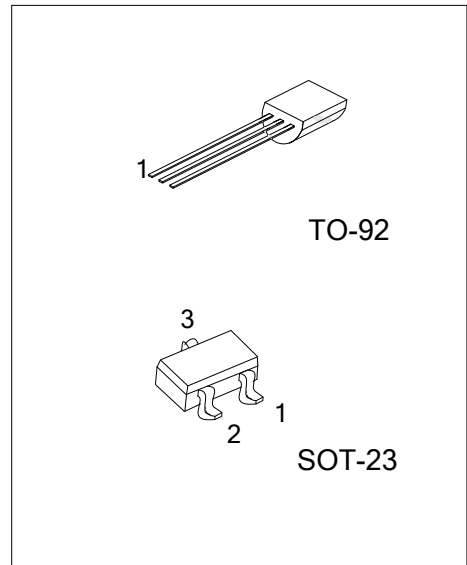
### AUDIO OUTPUT DRIVER AMPLIFIER

#### ■ FEATURES

- \* Excellent HFE Linearity
- \* High DC Current Gain
- \* High Power Dissipation

#### ■ APPLICATION

- \* Audio Output Driver Amplifier
- \* General Purpose Switch



#### ■ ORDERING INFORMATION

| Ordering Number |               | Package | Pin Assignment |   |   | Packing   |
|-----------------|---------------|---------|----------------|---|---|-----------|
| Lead Free       | Halogen Free  |         | 1              | 2 | 3 |           |
| -               | M28SG-x-AE3-R | SOT-23  | E              | C | B | Tape Reel |
| M28SL-x-T92-B   | M28SG-x-T92-B | TO-92   | E              | C | B | Tape Box  |
| M28SL-x-T92-K   | M28SG-x-T92-K | TO-92   | E              | C | B | Bulk      |

Note: Pin Assignment: B: Base C: Collector E: Emitter

|                                                                                                                                                           |                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>M28SG-x-AE3-R</p> <ul style="list-style-type: none"><li>(1) Packing Type</li><li>(2) Package Type</li><li>(3) Rank</li><li>(4) Green Package</li></ul> | <ul style="list-style-type: none"><li>(1) B: Tape Box, K: Bulk, R: Tape Reel</li><li>(2) AB3: SOT-23, T92: TO-92</li><li>(3) x: refer to Classification of <math>h_{FE1}</math></li><li>(4) G: Halogen Free and Lead Free, L: Lead Free</li></ul> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### ■ MARKING

| SOT-23 | TO-92 |
|--------|-------|
|        |       |

■ **ABSOLUTE MAXIMUM RATING** ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                                      | SYMBOL    | RATINGS    | UNIT               |
|------------------------------------------------|-----------|------------|--------------------|
| Collector-Base Voltage                         | $V_{CBO}$ | 40         | V                  |
| Collector-emitter Voltage                      | $V_{CEO}$ | 20         | V                  |
| Emitter-Base Voltage                           | $V_{EBO}$ | 6          | V                  |
| Collector Current                              | $I_C$     | 1.25       | A                  |
| Base Current                                   | $I_B$     | 0.4        | A                  |
| Power Dissipation ( $T_A=25^{\circ}\text{C}$ ) | $P_D$     | 850        | mW                 |
| Junction Temperature                           | $T_J$     | +150       | $^{\circ}\text{C}$ |
| Storage Temperature                            | $T_{STG}$ | -55 ~ +150 | $^{\circ}\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

| PARAMETER                            | SYMBOL        | TEST CONDITIONS                                           | MIN | TYP | MAX  | UNIT |
|--------------------------------------|---------------|-----------------------------------------------------------|-----|-----|------|------|
| Collector-Base Voltage               | $V_{CBO}$     | $I_C=0.1\text{mA}$                                        | 40  |     |      | V    |
| Collector-Emitter Voltage            | $V_{CEO}$     | $I_C=1\text{mA}$                                          | 20  |     |      | V    |
| Emitter-Base Voltage                 | $V_{EBO}$     | $I_E=0.1\text{mA}$                                        | 6   |     |      | V    |
| Collector Cutoff Current             | $I_{CBO}$     | $V_{CB}=35\text{V}$ , $I_E=0$                             |     |     | 100  | nA   |
| Emitter Cutoff Current               | $I_{EBO}$     | $V_{EB}=5\text{V}$ , $I_C=0$                              |     |     | 100  | nA   |
| <b>ON CHARACTERISTICS</b>            |               |                                                           |     |     |      |      |
| DC Current Gain (Note)               | $h_{FE1}$     | $V_{CE}=1\text{V}$ , $I_C=1\text{mA}$                     | 290 |     |      |      |
|                                      | $h_{FE2}$     | $V_{CE}=1\text{V}$ , $I_C=0.1\text{A}$                    | 300 |     | 1000 |      |
|                                      | $h_{FE3}$     | $V_{CE}=1\text{V}$ , $I_C=0.3\text{A}$                    | 300 |     |      |      |
|                                      | $h_{FE4}$     | $V_{CE}=1\text{V}$ , $I_C=0.5\text{A}$                    | 300 |     |      |      |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C=600\text{mA}$ , $I_B=20\text{mA}$                    |     |     | 0.55 | V    |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>  |               |                                                           |     |     |      |      |
| Current Gain Bandwidth Product       | $f_T$         | $V_{CE}=10\text{V}$ , $I_C=50\text{mA}$ , $f=1\text{MHz}$ | 100 |     |      | MHz  |
| Output Capacitance                   | $C_{OB}$      | $V_{CB}=10\text{V}$ , $I_E=0$ , $f=1\text{MHz}$           |     | 9   |      | pF   |

■ **CLASSIFICATION OF  $h_{FE2}$**

| RANK  | B       | C       | D        |
|-------|---------|---------|----------|
| RANGE | 300-550 | 500-700 | 650-1000 |

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