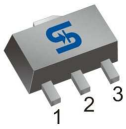


SOT-89



SOT-23



**Pin Definition:**

1. Base
2. Collector
3. Emitter

### PRODUCT SUMMARY

|               |                                    |
|---------------|------------------------------------|
| $BV_{CBO}$    | -20V                               |
| $BV_{CEO}$    | -20V                               |
| $I_C$         | -3A                                |
| $V_{CE(SAT)}$ | -0.2V @ $I_C / I_B = -2A / -100mA$ |

### Features

- Low  $V_{CE(SAT)}$  -0.2 @  $I_C / I_B = -2A / -100mA$  (Typ.)
- Complementary part with TSD2150

### Structure

- Epitaxial Planar Type
- PNP Silicon Transistor

### Ordering Information

| Part No.      | Package | Packing         |
|---------------|---------|-----------------|
| TSB1424CY RM  | SOT-89  | 1Kpcs / 7" Reel |
| TSB1424CY RMG | SOT-89  | 1Kpcs / 7" Reel |
| TSB1424CX RF  | SOT-23  | 3Kpcs / 7" Reel |
| TSB1424CX RFG | SOT-23  | 3Kpcs / 7" Reel |

**Note:** "G" denote for Halogen Free Product

### Absolute Maximum Rating ( $T_a = 25^\circ C$ unless otherwise noted)

| Parameter                                        |       | Symbol           | Limit        |            | Unit |
|--------------------------------------------------|-------|------------------|--------------|------------|------|
|                                                  |       |                  | SOT-89       | SOT-23     |      |
| Collector-Base Voltage                           |       | V <sub>CBO</sub> | -20          |            | V    |
| Collector-Emitter Voltage                        |       | V <sub>CEO</sub> | -20          |            | V    |
| Emitter-Base Voltage                             |       | V <sub>EBO</sub> | -6           |            | V    |
| Collector Current                                | DC    | I <sub>C</sub>   | -3           |            | A    |
|                                                  | Pulse |                  | -5 (note1)   |            |      |
| Collector Power Dissipation                      |       | P <sub>D</sub>   | 0.6          | 0.3        | W    |
|                                                  |       |                  | 2 (note 2)   | 1 (note 2) |      |
| Operating Junction Temperature                   |       | T <sub>J</sub>   | +150         |            | °C   |
| Operating Junction and Storage Temperature Range |       | T <sub>STG</sub> | - 55 to +150 |            | °C   |

**Note:** 1. Single pulse,  $P_w=10ms$ ,  $Duty \leq 50\%$   
 2. When mounted on a 40 x 50 x 0.7mm ceramic board.

### Electrical Specifications ( $T_a = 25^\circ C$ unless otherwise noted)

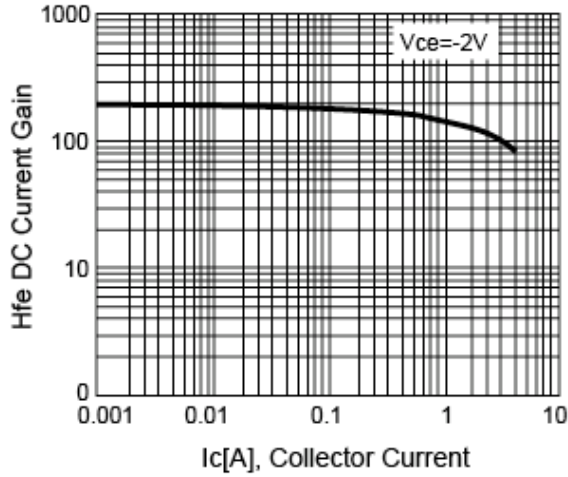
| Parameter                            | Conditions                             | Symbol        | Min | Typ  | Max  | Unit    |
|--------------------------------------|----------------------------------------|---------------|-----|------|------|---------|
| Collector-Base Breakdown Voltage     | $I_C = -50\mu A, I_E = 0$              | $BV_{CBO}$    | -20 | --   | --   | V       |
| Collector-Emitter Breakdown Voltage  | $I_C = -10mA, I_B = 0$                 | $BV_{CEO}$    | -20 | --   | --   | V       |
| Emitter-Base Breakdown Voltage       | $I_E = -50\mu A, I_C = 0$              | $BV_{EBO}$    | -6  | --   | --   | V       |
| Collector Cutoff Current             | $V_{CB} = -20V, I_E = 0$               | $I_{CBO}$     | --  | --   | -0.1 | $\mu A$ |
| Emitter Cutoff Current               | $V_{EB} = -5V, I_C = 0$                | $I_{EBO}$     | --  | --   | -0.1 | $\mu A$ |
| Collector-Emitter Saturation Voltage | $I_C / I_B = -2A / -100mA$             | $V_{CE(SAT)}$ | --  | -0.2 | -0.5 | V       |
| DC Current Transfer Ratio            | $V_{CE} = -2V, I_C = 100mA$            | $h_{FE}$      | 120 | --   | 390  |         |
| Transition Frequency                 | $V_{CE} = -2V, I_E = 0.5A, f = 100MHz$ | $f_T$         | --  | 200  | --   | MHz     |
| Output Capacitance                   | $V_{CB} = -10V, I_E = 0, f = 1MHz$     | $C_{ob}$      | --  | 28   | --   | pF      |

$h_{FE}$  values are classified as follows:

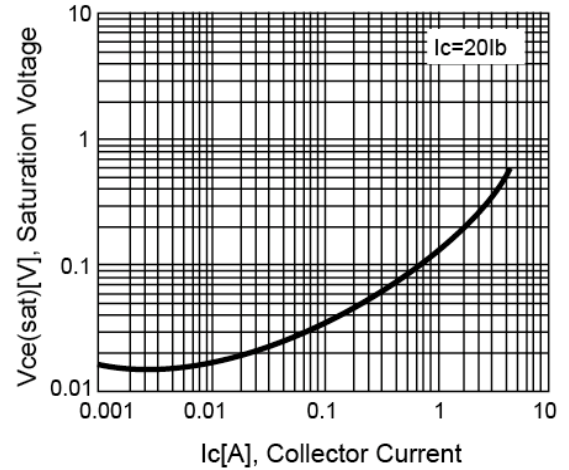
| Rank     | Q       | R       |
|----------|---------|---------|
| $h_{FE}$ | 120~270 | 180~390 |

**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

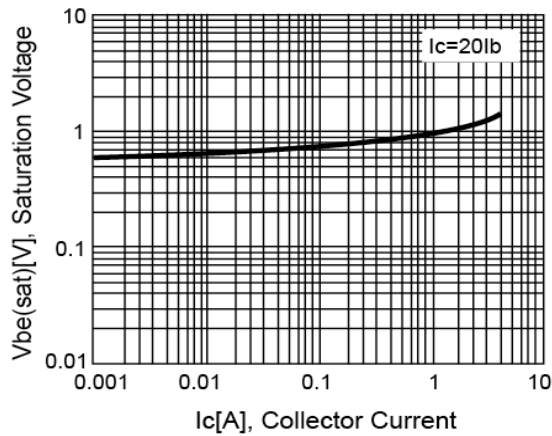
**Figure 1. DC Current Gain**



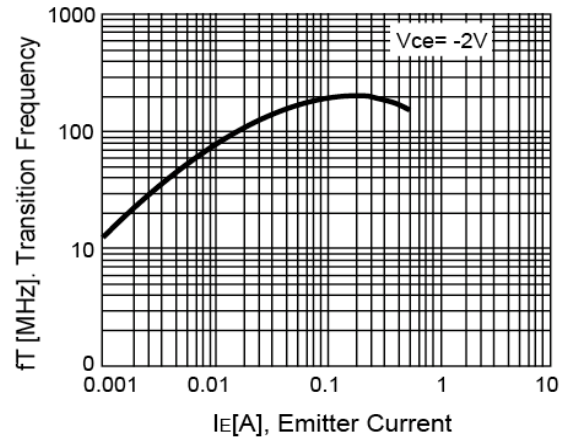
**Figure 2.  $V_{CE(SAT)}$  v.s.  $I_C$**



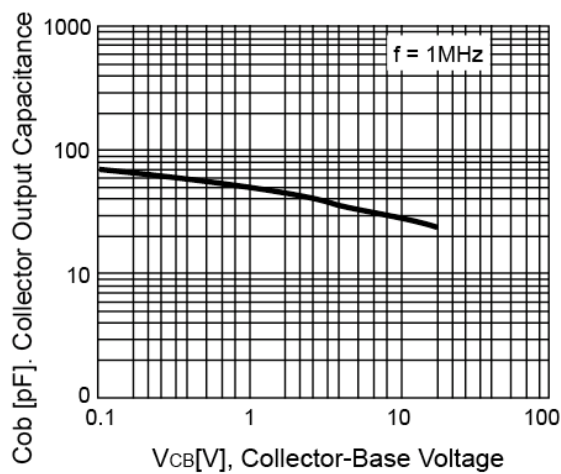
**Figure 3.  $V_{BE(SAT)}$  v.s.  $I_C$**



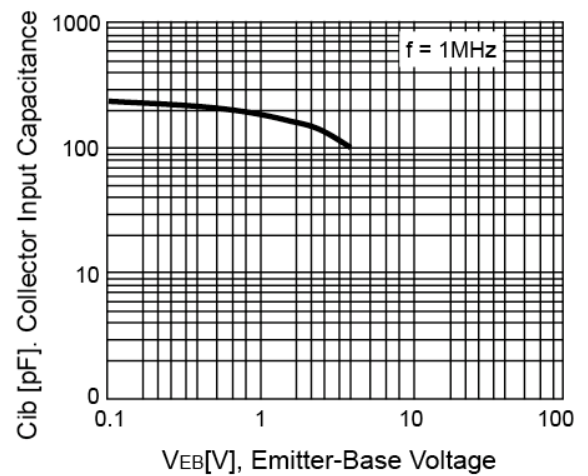
**Figure 4. Transition Frequency v.s.  $I_E$**



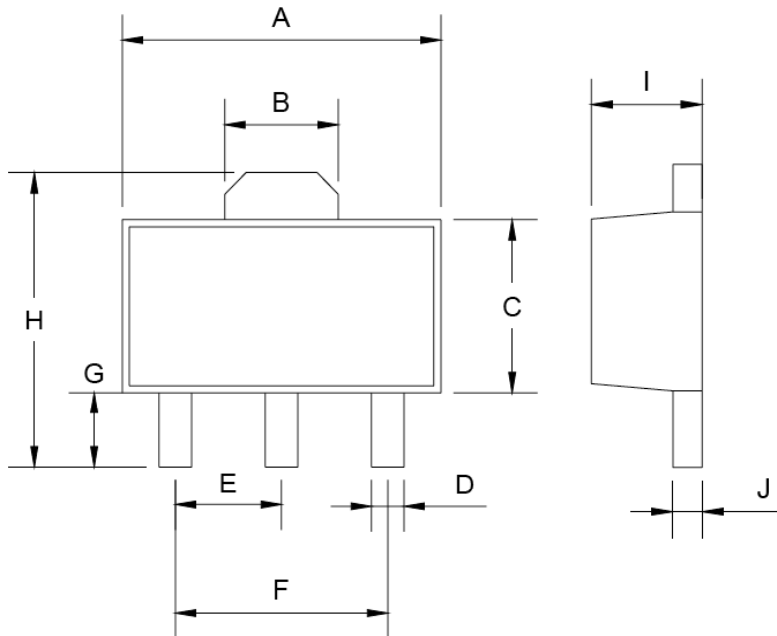
**Figure 5. Collector Output Capacitance vs.  $V_{CB}$**



**Figure 6. Collector Input Capacitance vs.  $V_{EB}$**

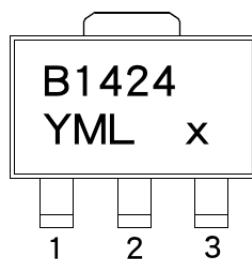


## SOT-89 Mechanical Drawing



| DIM | SOT-89 DIMENSION |      |        |       |
|-----|------------------|------|--------|-------|
|     | MILLIMETERS      |      | INCHES |       |
|     | MIN              | MAX  | MIN    | MAX   |
| A   | 4.40             | 4.60 | 0.173  | 0.181 |
| B   | 1.50             | 1.7  | 0.059  | 0.070 |
| C   | 2.30             | 2.60 | 0.090  | 0.102 |
| D   | 0.40             | 0.52 | 0.016  | 0.020 |
| E   | 1.50             | 1.50 | 0.059  | 0.059 |
| F   | 3.00             | 3.00 | 0.118  | 0.118 |
| G   | 0.89             | 1.20 | 0.035  | 0.047 |
| H   | 4.05             | 4.25 | 0.159  | 0.167 |
| I   | 1.4              | 1.6  | 0.055  | 0.068 |
| J   | 0.35             | 0.44 | 0.014  | 0.017 |

## Marking Diagram



**Y** = Year Code

**M** = Month Code

(A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)

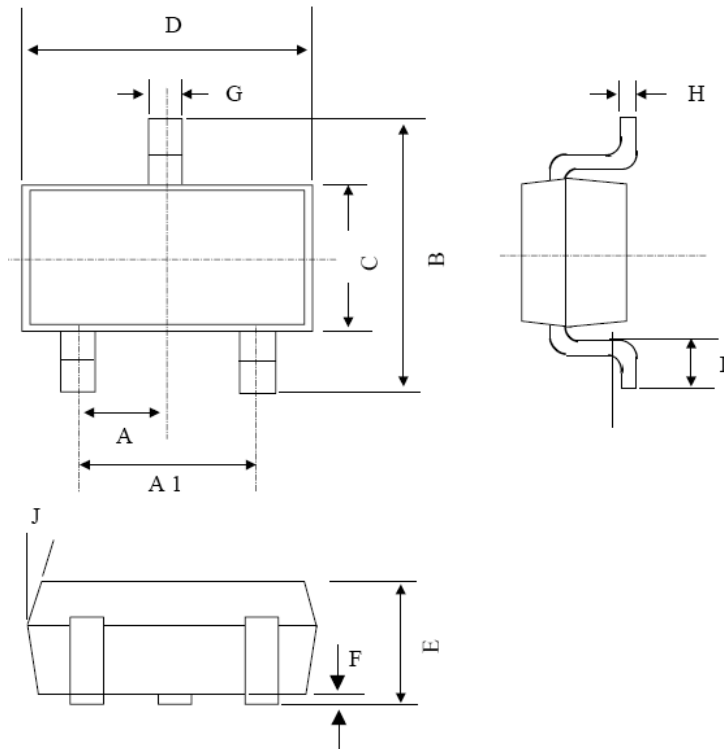
= Month Code for Halogen Free Product

(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)

**L** = Lot Code

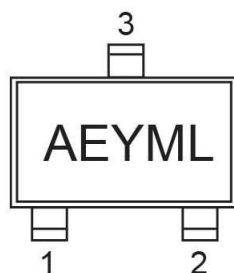
**X** = hFE rank code

## SOT-23 Mechanical Drawing



| SOT-23 DIMENSION |             |      |           |       |
|------------------|-------------|------|-----------|-------|
| DIM              | MILLIMETERS |      | INCHES    |       |
|                  | MIN         | MAX  | MIN       | MAX.  |
| A                | 0.95 BSC    |      | 0.037 BSC |       |
| A1               | 1.9 BSC     |      | 0.074 BSC |       |
| B                | 2.60        | 3.00 | 0.102     | 0.118 |
| C                | 1.40        | 1.70 | 0.055     | 0.067 |
| D                | 2.80        | 3.10 | 0.110     | 0.122 |
| E                | 1.00        | 1.30 | 0.039     | 0.051 |
| F                | 0.00        | 0.10 | 0.000     | 0.004 |
| G                | 0.35        | 0.50 | 0.014     | 0.020 |
| H                | 0.10        | 0.20 | 0.004     | 0.008 |
| I                | 0.30        | 0.60 | 0.012     | 0.024 |
| J                | 5°          | 10°  | 5°        | 10°   |

## Marking Diagram



- Y** = Year Code  
**M** = Month Code  
 (A=Jan, B=Feb, C=Mar, D=Apl, E=May, F=Jun, G=Jul, H=Aug, I=Sep, J=Oct, K=Nov, L=Dec)  
 = Month Code for Halogen Free Product  
 (O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)  
**L** = Lot Code  
**X** = hFE rank code

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