



Micro Commercial Components  
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## Features

- Operating And Storage Temperatures  $-55^{\circ}\text{C}$  to  $150^{\circ}\text{C}$
- $R_{\theta JA}$  is  $556^{\circ}\text{C/W}$  (Mounted on FR-5 PCB  $1.0'' \times 0.75'' \times 0.062''$ )
- Capable of 225mWatts of Power Dissipation
- Marking Code: MMBTA13 ---K2D; MMBTA14 ---- 1N

## Electrical Characteristics @ $25^{\circ}\text{C}$ Unless Otherwise Specified

| Symbol | Parameter | Min | Max | Units |
|--------|-----------|-----|-----|-------|
|--------|-----------|-----|-----|-------|

### OFF CHARACTERISTICS

|               |                                                                              |     |     |      |
|---------------|------------------------------------------------------------------------------|-----|-----|------|
| $V_{(BR)CEO}$ | Collector-Emitter Breakdown Voltage*<br>( $I_C=100\mu\text{Adc}$ , $I_B=0$ ) | 30  |     | Vdc  |
| $V_{(BR)CBO}$ | Collector-Base Breakdown Voltage                                             | 30  |     | Vdc  |
| $V_{(BR)EBO}$ | Emitter-Base Breakdown Voltage                                               | 10  |     | Vdc  |
| $I_C$         | Collector Current-Continuous                                                 | 300 |     | mAdc |
| $I_{CBO}$     | Collector Cutoff Current<br>( $V_{CB}=30\text{Vdc}$ , $I_E=0$ )              |     | 100 | nAdc |
| $I_{EBO}$     | Emitter Cutoff Current<br>( $V_{EB}=10\text{Vdc}$ , $I_C=0$ )                |     | 100 | nAdc |

### ON CHARACTERISTICS

|                    |                                                                                         |                |     |     |
|--------------------|-----------------------------------------------------------------------------------------|----------------|-----|-----|
| $h_{FE}$           | DC Current Gain*                                                                        |                |     |     |
| MMBTA13<br>MMBTA14 | ( $I_C=10\text{mAdc}$ , $V_{CE}=5.0\text{Vdc}$ )                                        | 5000<br>10000  |     |     |
| MMBTA13<br>MMBTA14 | ( $I_C=150\text{mAdc}$ , $V_{CE}=1.0\text{Vdc}$ )                                       | 10000<br>20000 |     |     |
| $V_{CE(sat)}$      | Collector-Emitter Saturation Voltage<br>( $I_C=100\text{mAdc}$ , $I_B=0.1\text{mAdc}$ ) |                | 1.5 | Vdc |
| $V_{BE(sat)}$      | Base-Emitter Saturation Voltage<br>( $I_C=100\text{mAdc}$ , $V_{CE}=5.0\text{Vdc}$ )    |                | 2.0 | Vdc |

### SMALL-SIGNAL CHARACTERISTICS

|           |                                                                                                        |     |     |     |
|-----------|--------------------------------------------------------------------------------------------------------|-----|-----|-----|
| $f_T$     | Current Gain-Bandwidth Product<br>( $I_C=10\text{mAdc}$ , $V_{CE}=5.0\text{Vdc}$ , $f=100\text{MHz}$ ) | 125 |     | MHz |
| $C_{obo}$ | Output Capacitance<br>( $V_{CB}=10\text{Vdc}$ , $I_E=0$ , $f=1.0\text{MHz}$ )                          |     | 8.0 | pF  |
| $C_{ibo}$ | Input Capacitance<br>( $V_{BE}=0.5\text{Vdc}$ , $I_C=0$ , $f=1.0\text{MHz}$ )                          |     | 15  | pF  |

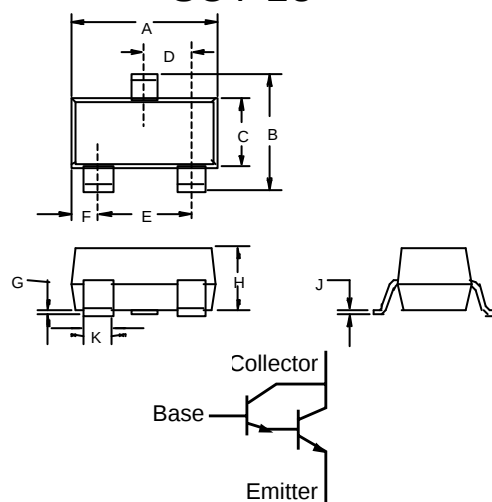
### SWITCHING CHARACTERISTICS

|       |              |                                                    |     |    |
|-------|--------------|----------------------------------------------------|-----|----|
| $t_d$ | Delay Time   | ( $V_{CC}=30\text{Vdc}$ , $V_{BE}=0.5\text{Vdc}$ ) | 10  | ns |
| $t_r$ | Rise Time    | $I_C=150\text{mAdc}$ , $I_{B1}=15\text{mAdc}$      | 25  | ns |
| $t_s$ | Storage Time | ( $V_{CC}=30\text{Vdc}$ , $I_C=150\text{mAdc}$ )   | 225 | ns |
| $t_f$ | Fall Time    | $I_{B1}=I_{B2}=15\text{mAdc}$                      | 60  | ns |

## MMBTA13 MMBTA14

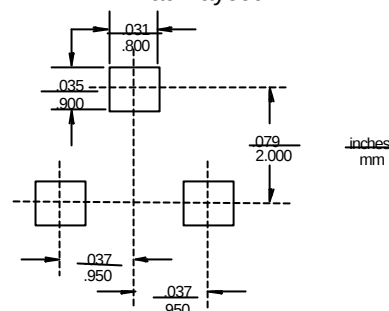
## NPN Darlington Amplifier Transistor

### SOT-23



| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | .110   | .120  | 2.80 | 3.04 |      |
| B   | .083   | .098  | 2.10 | 2.64 |      |
| C   | .047   | .055  | 1.20 | 1.40 |      |
| D   | .035   | .041  | .89  | 1.03 |      |
| E   | .070   | .081  | 1.78 | 2.05 |      |
| F   | .018   | .024  | .45  | .60  |      |
| G   | .0005  | .0039 | .013 | .100 |      |
| H   | .035   | .044  | .89  | 1.12 |      |
| J   | .003   | .007  | .085 | .180 |      |
| K   | .015   | .020  | .37  | .51  |      |

### Suggested Solder Pad Layout



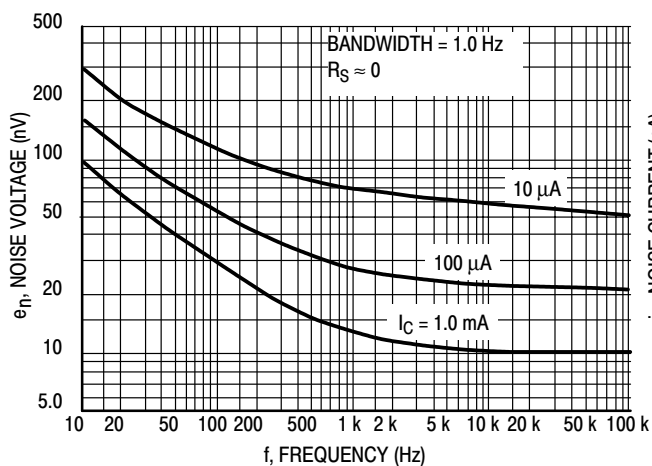


Figure 2. Noise Voltage

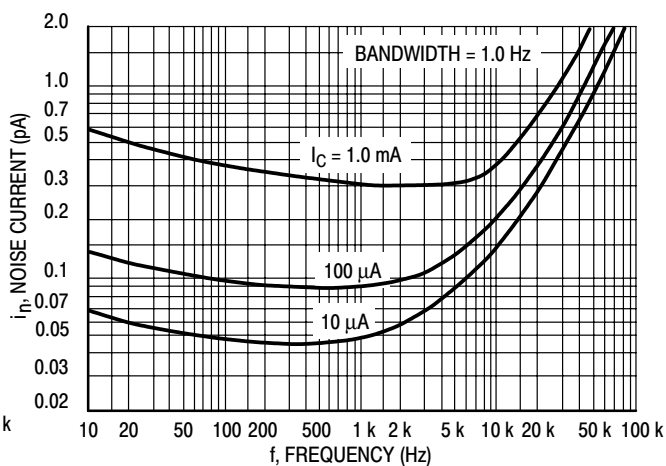


Figure 3. Noise Current

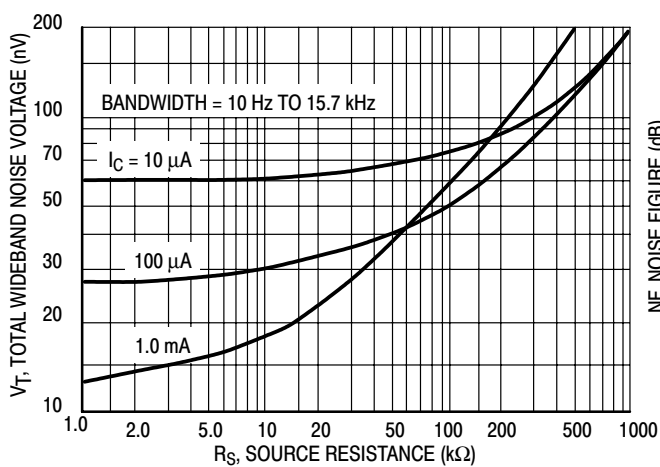


Figure 4. Total Wideband Noise Voltage

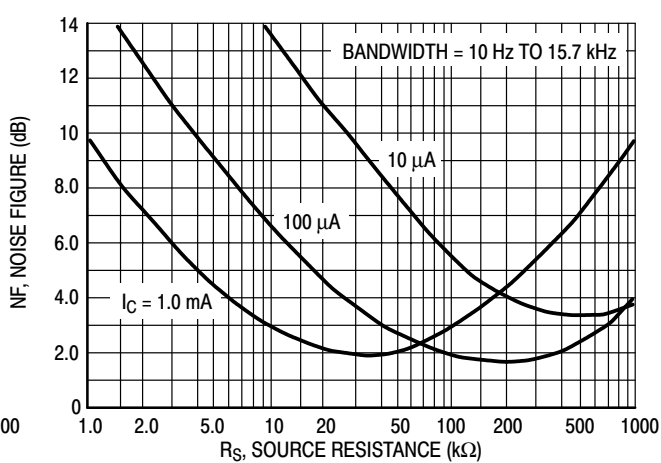


Figure 5. Wideband Noise Figure

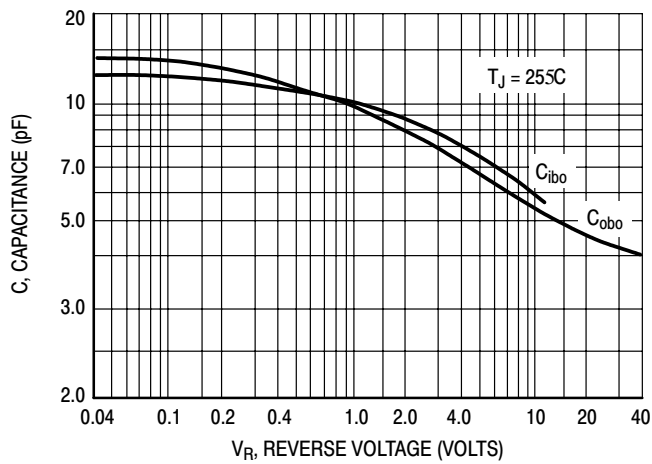


Figure 6. Capacitance

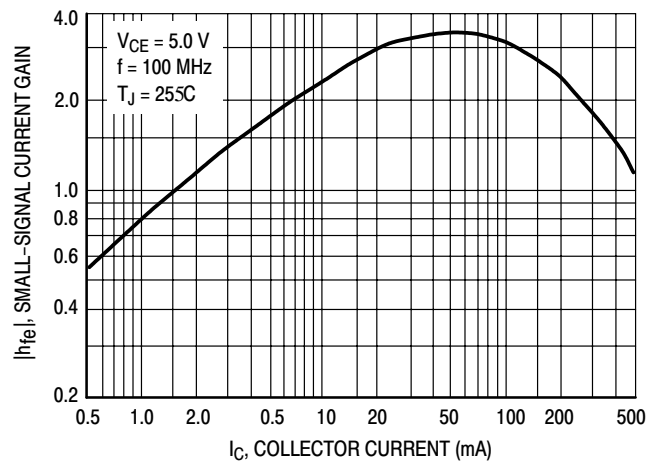


Figure 7. High Frequency Current Gain

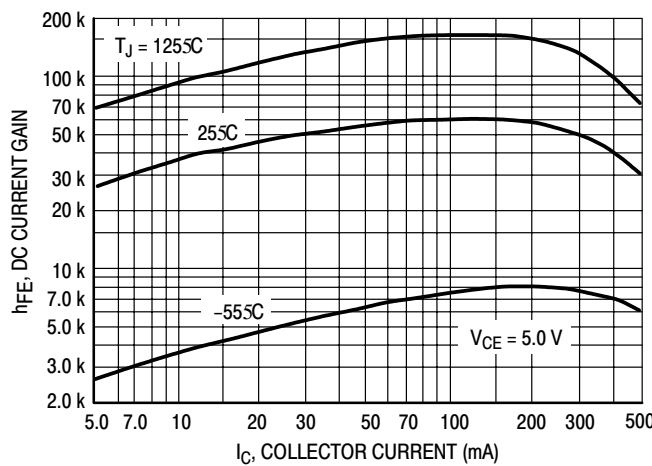


Figure 8. DC Current Gain

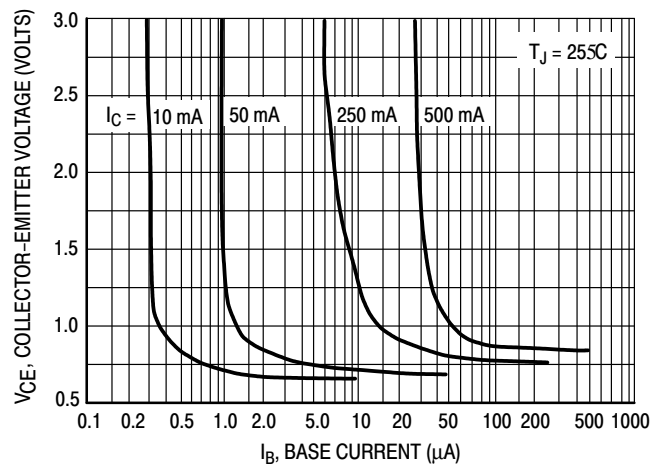


Figure 9. Collector Saturation Region

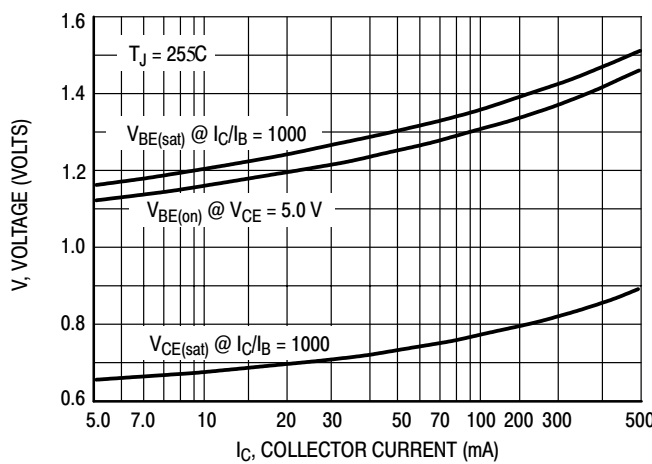


Figure 10. "On" Voltages

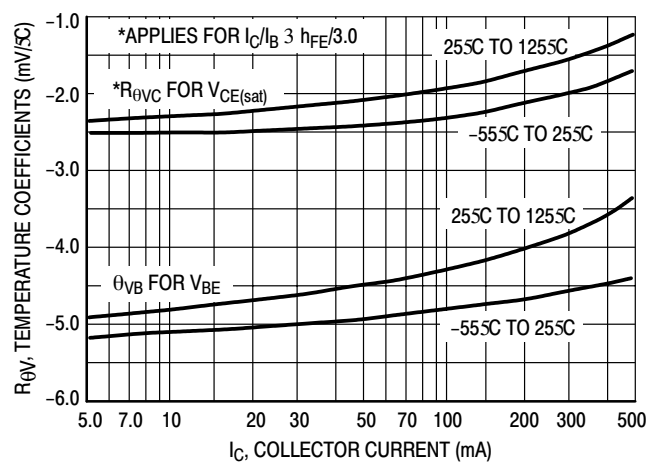


Figure 11. Temperature Coefficients

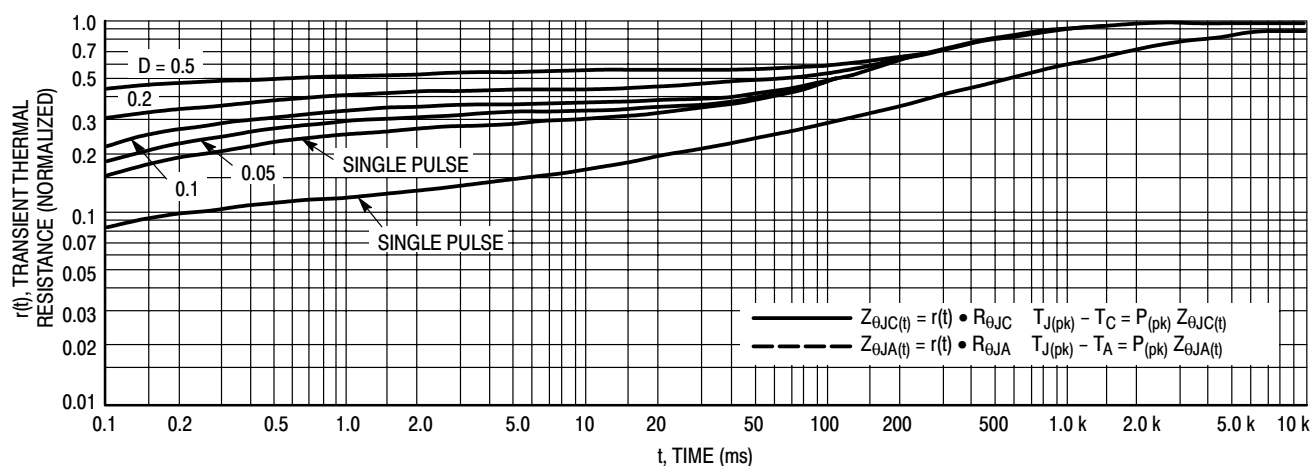


Figure 12. Thermal Response

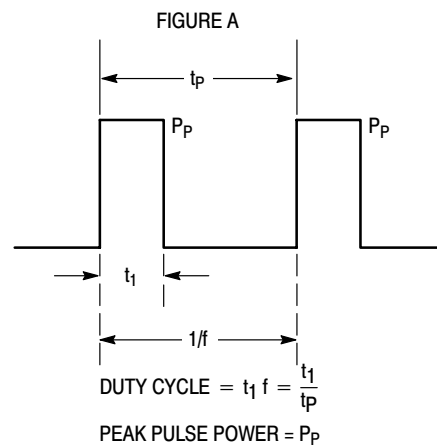
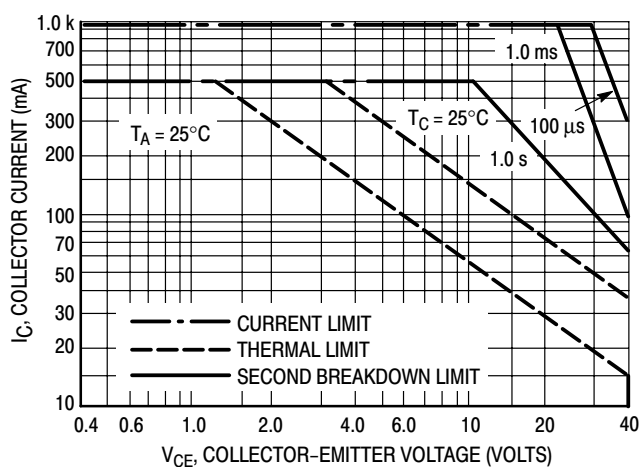


Figure 13. Active Region Safe Operating Area Design Note: Use of Transient Thermal Resistance Data