

**NPN SURFACE MOUNT DARLINGTON TRANSISTOR**
**Features**

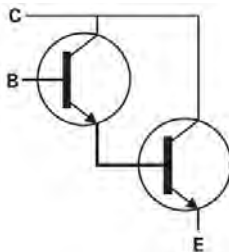
- 40V Darlington Transistor
- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- High Current Gain
- Ultra-Small Surface Mount Package
- **Lead Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free "Green" Device (Note 2)**

**Mechanical Data**

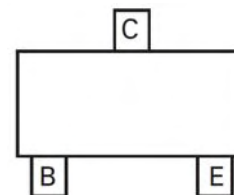
- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Weight: 0.006 grams (approximate)



Top View



Device symbol

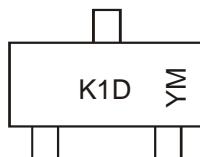


Pin-out Top view

**Ordering Information** (Note 3)

| Product      | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|---------|--------------------|-----------------|-------------------|
| MMST6427-7-F | K1D     | 7                  | 8               | 3,000             |

- Notes:
1. No purposefully added lead.
  2. Diodes Inc.'s "Green" Policy can be found on our website at <http://www.diodes.com>
  3. For Packaging Details, go to our website at <http://www.diodes.com>.

**Marking Information**


K1D= Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: X = 2010  
 M = Month ex: 9 = September

## Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|
| Code | X    | Y    | Z    | A    | B    | C    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                                   | Symbol          | Value       | Unit               |
|--|-----------------|-------------|--------------------|
| Collector-Base Voltage                           | $V_{CB0}$       | 40          | V                  |
| Collector-Emitter Voltage                        | $V_{CEO}$       | 40          | V                  |
| Emitter-Base Voltage                             | $V_{EBO}$       | 12          | V                  |
| Collector Current - Continuous (Note 4)          | $I_C$           | 500         | mA                 |
| Power Dissipation (Note 4)                       | $P_d$           | 200         | mW                 |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 625         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range          | $T_j, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

**Electrical Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                       | Symbol        | Min                        | Max                           | Unit          | Test Condition  |
|--------------------------------------|---------------|----------------------------|-------------------------------|---------------|---|
| <b>OFF CHARACTERISTICS (Note 5)</b>  |               |                            |                               |               |   |
| Collector-Base Breakdown Voltage     | $BV_{CB0}$    | 40                         | —                             | V             | $I_C = 100\mu\text{A}, I_E = 0$   |
| Collector-Emitter Breakdown Voltage  | $BV_{CEO}$    | 40                         | —                             | V             | $I_C = 10\text{mA}, I_B = 0$  |
| Emitter-Base Breakdown Voltage       | $BV_{EBO}$    | 12                         | —                             | V             | $I_E = 10\mu\text{A}, I_C = 0$  |
| Collector Cutoff Current             | $I_{CB0}$     | —                          | 50                            | nA            | $V_{CB} = 30\text{V}, I_E = 0$  |
| Collector Cutoff Current             | $I_{CEO}$     | —                          | 1.0                           | $\mu\text{A}$ | $V_{CE} = 25\text{V}, I_B = 0$  |
| Emitter Cutoff Current               | $I_{EBO}$     | —                          | 50                            | nA            | $V_{EB} = 10\text{V}, I_C = 0$  |
| <b>ON CHARACTERISTICS (Note 5)</b>   |               |                            |                               |               |   |
| DC Current Gain                      | $h_{FE}$      | 10,000<br>20,000<br>14,000 | 100,000<br>200,000<br>140,000 | —             | $I_C = 10\text{mA}, V_{CE} = 5.0\text{V}$<br>$I_C = 100\text{mA}, V_{CE} = 5.0\text{V}$<br>$I_C = 500\text{mA}, V_{CE} = 5.0\text{V}$ |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | —                          | 1.2<br>1.5                    | V             | $I_C = 50\text{mA}, I_B = 0.5\text{mA}$<br>$I_C = 500\text{mA}, I_B = 0.5\text{mA}$   |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | —                          | 2.0                           | V             | $I_C = 500\text{mA}, I_B = 0.5\text{mA}$  |
| Base-Emitter On Voltage              | $V_{BE(on)}$  | —                          | 1.75                          | V             | $I_C = 50\text{mA}, V_{CE} = 5.0\text{V}$   |
| <b>SMALL SIGNAL CHARACTERISTICS</b>  |               |                            |                               |               |   |
| Output Capacitance                   | $C_{obo}$     | 8.0 Typical                |                               | pF            | $V_{CB} = 10\text{V}, f = 1.0\text{MHz}, I_E = 0$   |
| Input Capacitance                    | $C_{ibo}$     | 15 Typical                 |                               | pF            | $V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}, I_C = 0$  |

- Notes: 4. Device mounted on 25mm x 22 mm x 1.6mm FR4 PCB, 1oz copper, singled sided  
5. Short duration pulse test used to minimize self-heating effect.

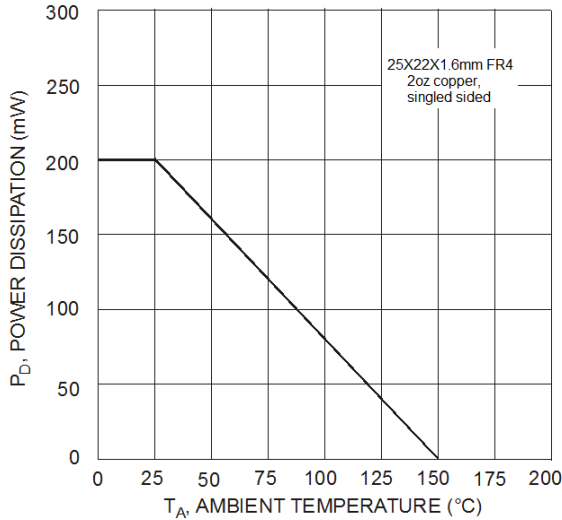


Fig. 1, Max Power Dissipation vs. Ambient Temperature

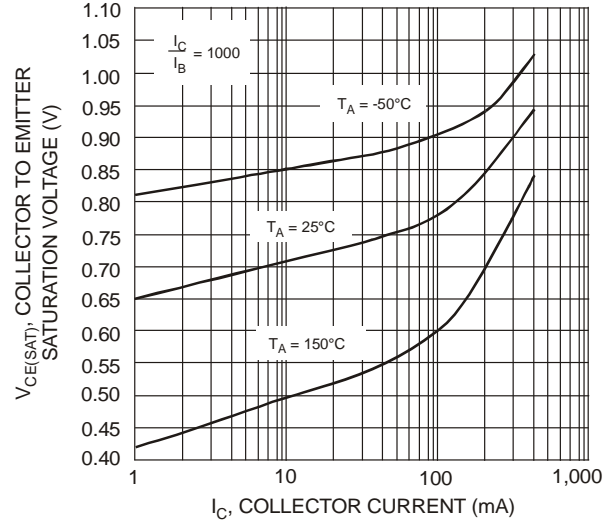


Fig. 2, Collector Emitter Saturation Voltage vs. Collector Current

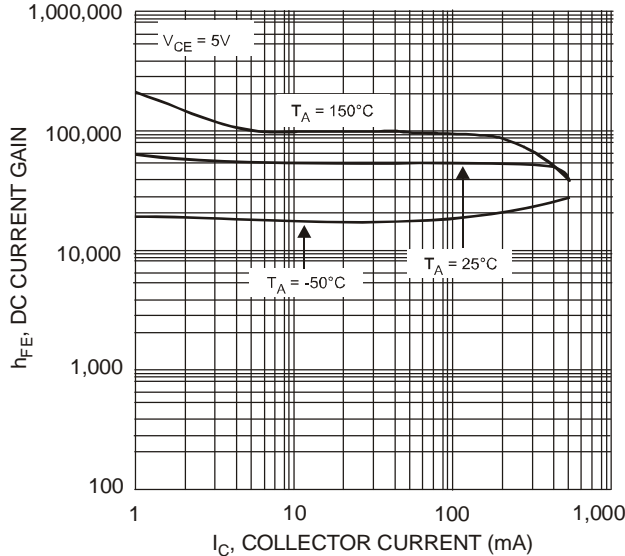


Fig. 3, DC Current Gain vs. Collector Current

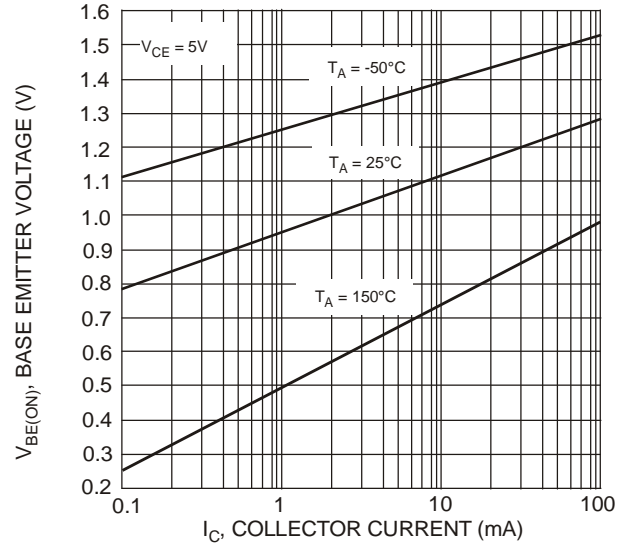


Fig. 4, Base Emitter Voltage vs. Collector Current

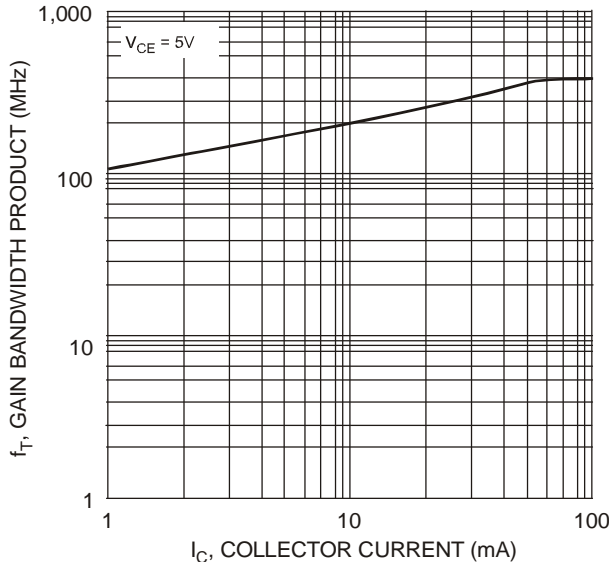
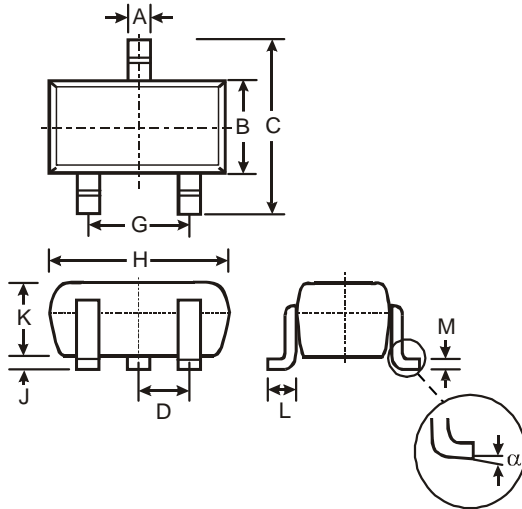


Fig. 5, Gain Bandwidth Product vs. Collector Current

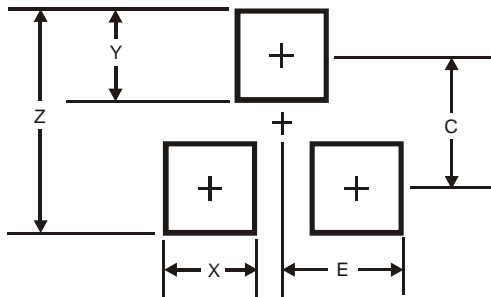
**Package Outline Dimensions**



| SOT323   |      |      |      |
|----------|------|------|------|
| Dim      | Min  | Max  | Typ  |
| A        | 0.25 | 0.40 | 0.30 |
| B        | 1.15 | 1.35 | 1.30 |
| C        | 2.00 | 2.20 | 2.10 |
| D        | -    | -    | 0.65 |
| G        | 1.20 | 1.40 | 1.30 |
| H        | 1.80 | 2.20 | 2.15 |
| J        | 0.0  | 0.10 | 0.05 |
| K        | 0.90 | 1.00 | 1.00 |
| L        | 0.25 | 0.40 | 0.30 |
| M        | 0.10 | 0.18 | 0.11 |
| $\alpha$ | 0°   | 8°   | -    |

All Dimensions in mm

**Suggested Pad Layout**



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.8           |
| X          | 0.7           |
| Y          | 0.9           |
| C          | 1.9           |
| E          | 1.0           |

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