

## Features

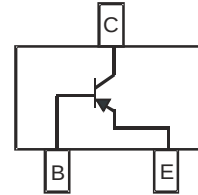
- Epitaxial Planar Die Construction
- Complementary NPN Type Available (DNLS160)
- Surface Mount Package Suited for Automated Assembly
- **Lead Free/RoHS Compliant (Note 1)**
- "Green Device" (Note 2)
- **Qualified to AEC-Q101 Standards for High Reliability**



SOT-23

## Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 4
- Ordering Information: See Page 4
- Weight: 0.008 grams (approximate)



Schematic and Pin Configuration

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

| Characteristic                 | Symbol    | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector-Base Voltage         | $V_{CBO}$ | -80   | V    |
| Collector-Emitter Voltage      | $V_{CEO}$ | -60   | V    |
| Emitter-Base Voltage           | $V_{EBO}$ | -5    | V    |
| Collector Current - Continuous | $I_C$     | -1    | A    |
| Peak Pulse Collector Current   | $I_{CM}$  | -2    | A    |
| Base Current (DC)              | $I_B$     | -300  | mA   |

## Thermal Characteristics

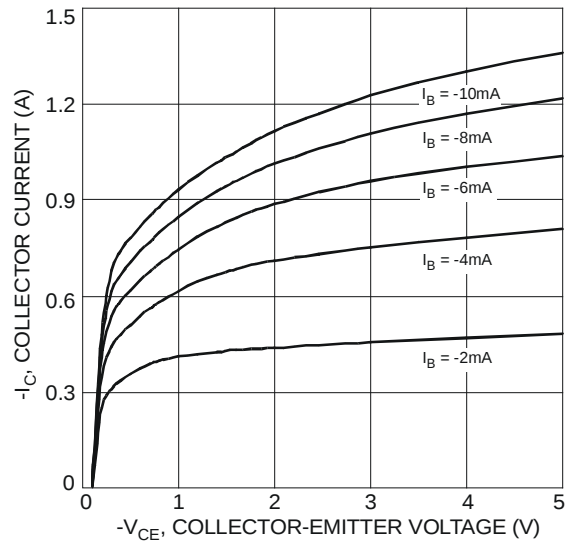
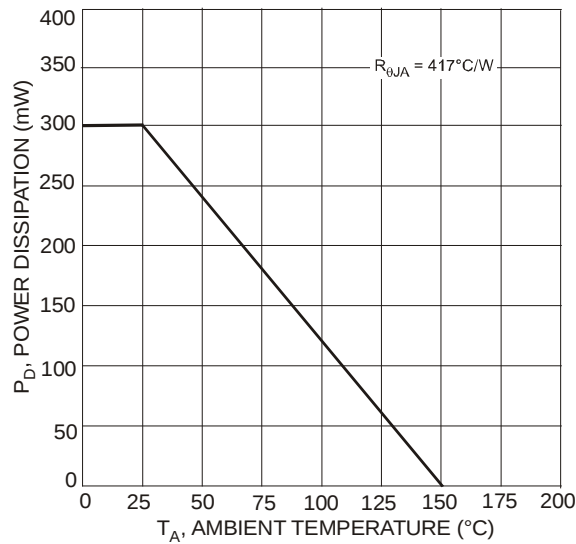
| Characteristic                                                              | Symbol          | Value       | Unit               |
|-----------------------------------------------------------------------------|-----------------|-------------|--------------------|
| Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$                       | $P_D$           | 300         | mW                 |
| Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$ | $R_{\theta JA}$ | 417         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range                                     | $T_J, T_{STG}$  | -55 to +150 | $^\circ\text{C}$   |

- Notes:
1. No purposefully added lead.
  2. Diode's Inc.'s "Green" policy can be found on our website at [http://www.diodes.com/products/lead\\_free/index.php](http://www.diodes.com/products/lead_free/index.php).
  3. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on page 4 or in Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.

# Electrical Characteristics @T<sub>A</sub> = 25°C unless otherwise specified

| Characteristic                          | Symbol               | Min               | Typ                | Max                  | Unit     | Test Condition                                                                                                                                     |
|-----------------------------------------|----------------------|-------------------|--------------------|----------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS (Note 4)</b>     |                      |                   |                    |                      |          |                                                                                                                                                    |
| Collector-Base Breakdown Voltage        | V <sub>(BR)CBO</sub> | -80               | —                  | —                    | V        | I <sub>C</sub> = -100μA, I <sub>E</sub> = 0                                                                                                        |
| Collector-Emitter Breakdown Voltage     | V <sub>(BR)CEO</sub> | -60               | —                  | —                    | V        | I <sub>C</sub> = -10mA, I <sub>B</sub> = 0                                                                                                         |
| Emitter-Base Breakdown Voltage          | V <sub>(BR)EBO</sub> | -5                | —                  | —                    | V        | I <sub>E</sub> = -100μA, I <sub>C</sub> = 0                                                                                                        |
| Collector Cutoff Current                | I <sub>CBO</sub>     | —                 | —                  | -100<br>-50          | nA<br>μA | V <sub>CB</sub> = -60V, I <sub>E</sub> = 0<br>V <sub>CB</sub> = -60V, I <sub>E</sub> = 0, T <sub>A</sub> = 150°C                                   |
| Collector Cutoff Current                | I <sub>CES</sub>     | —                 | —                  | -100                 | nA       | V <sub>CE</sub> = -60V, V <sub>BE</sub> = 0                                                                                                        |
| Emitter Cutoff Current                  | I <sub>EBO</sub>     | —                 | —                  | -100                 | nA       | V <sub>EB</sub> = -5V, I <sub>C</sub> = 0                                                                                                          |
| <b>ON CHARACTERISTICS (Note 4)</b>      |                      |                   |                    |                      |          |                                                                                                                                                    |
| DC Current Gain                         | h <sub>FE</sub>      | 200<br>150<br>100 | 325<br>250<br>180  | —<br>—<br>—          | V        | V <sub>CE</sub> = -5V, I <sub>C</sub> = -1mA<br>V <sub>CE</sub> = -5V, I <sub>C</sub> = -500mA<br>V <sub>CE</sub> = -5V, I <sub>C</sub> = -1A      |
| Collector-Emitter Saturation Voltage    | V <sub>CE(SAT)</sub> | —<br>—<br>—       | -90<br>-90<br>-160 | -160<br>-175<br>-330 | mV       | I <sub>C</sub> = -100mA, I <sub>B</sub> = -1mA<br>I <sub>C</sub> = -500mA, I <sub>B</sub> = -50mA<br>I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA |
| Collector-Emitter Saturation Resistance | R <sub>CE(SAT)</sub> | —                 | 160                | 330                  | mΩ       | I <sub>C</sub> = -1A, I <sub>B</sub> = -100mA                                                                                                      |
| Base-Emitter Saturation Voltage         | V <sub>BE(SAT)</sub> | —                 | -0.95              | -1.1                 | V        | I <sub>C</sub> = -1A, I <sub>B</sub> = -50mA                                                                                                       |
| Base-Emitter Turn On Voltage            | V <sub>BE(ON)</sub>  | —                 | -0.82              | -0.9                 | V        | V <sub>CE</sub> = -5V, I <sub>C</sub> = -1A                                                                                                        |
| <b>SMALL SIGNAL CHARACTERISTICS</b>     |                      |                   |                    |                      |          |                                                                                                                                                    |
| Output Capacitance                      | C <sub>obo</sub>     | —                 | 10                 | 15                   | pF       | V <sub>CB</sub> = -10V, f = 1.0MHz                                                                                                                 |
| Current Gain-Bandwidth Product          | f <sub>T</sub>       | 150               | 220                | —                    | MHz      | V <sub>CE</sub> = -10V, I <sub>C</sub> = -50mA, f = 100MHz                                                                                         |

Notes: 4. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤2%.



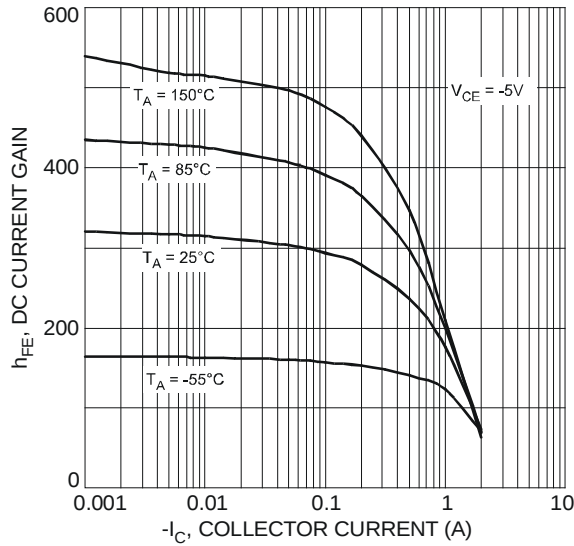


Fig. 3 Typical DC Current Gain vs. Collector Current

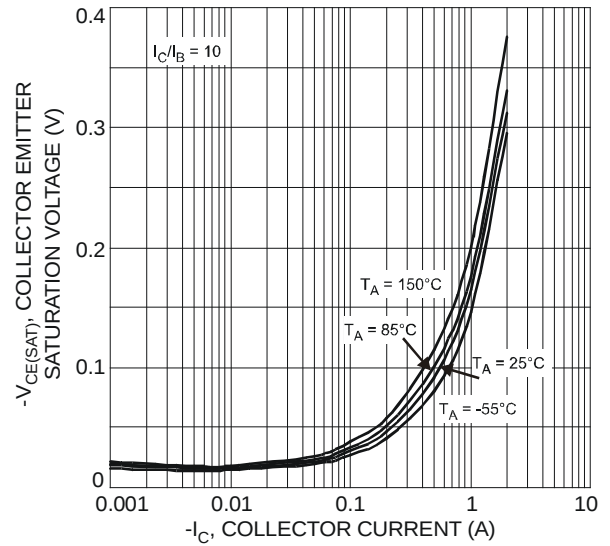


Fig. 4 Typical Collector Emitter Saturation Voltage vs. Collector Current

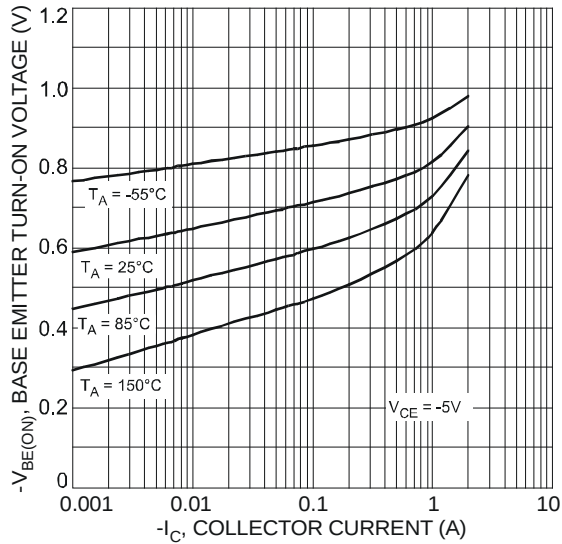


Fig. 5 Typical Base Emitter Turn-On Voltage vs. Collector Current

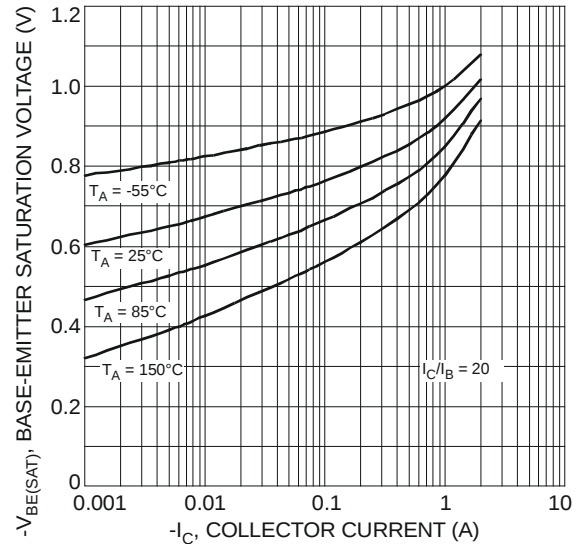


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

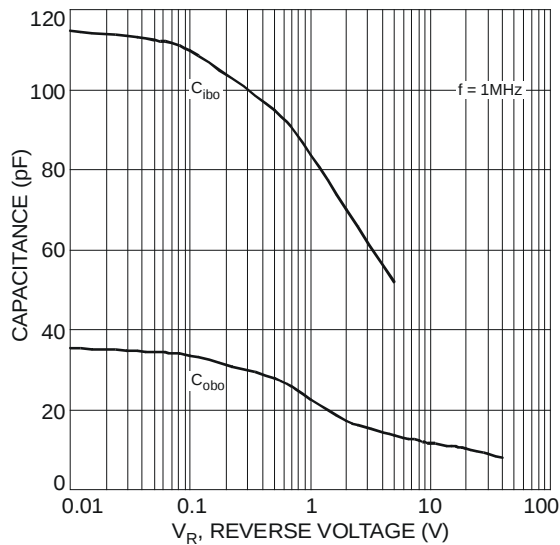


Fig. 7 Typical Total Capacitance

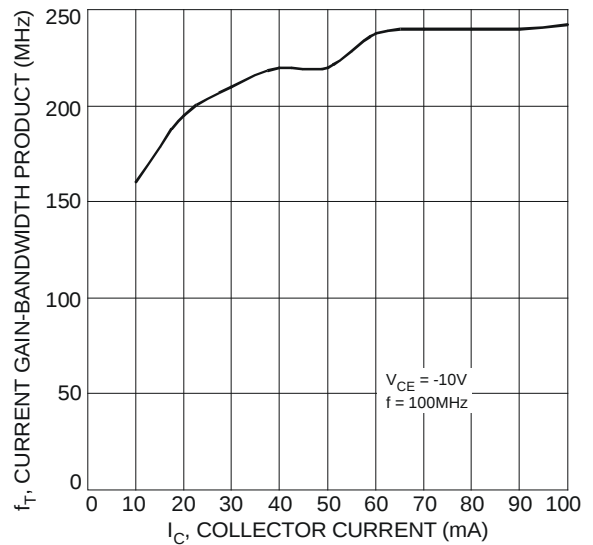


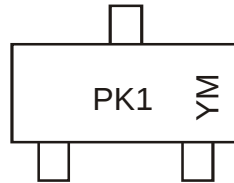
Fig. 8 Typical Gain-Bandwidth Product vs. Collector Current

## Ordering Information (Note 5)

| Device    | Packaging | Shipping         |
|-----------|-----------|------------------|
| DPLS160-7 | SOT-23    | 3000/Tape & Reel |

Notes: 5. For packaging details, go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

## Marking Information



PK1 = Product Type Marking Code  
YM = Date Code Marking  
Y = Year ex: U = 2007  
M = Month ex: 9 = September

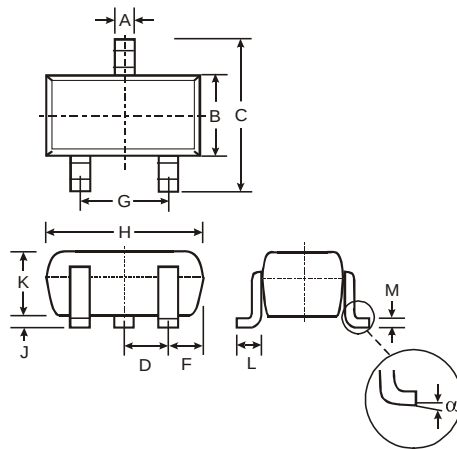
### Date Code Key

| Year | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|------|------|------|------|------|------|------|------|------|
| Code | V    | W    | X    | Y    | Z    | A    | B    | C    |

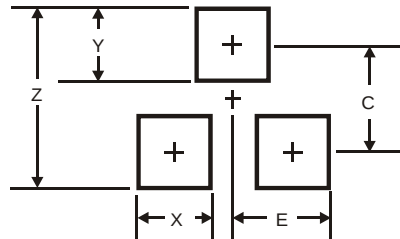
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

## Package Outline Dimensions



| SOT-23               |       |       |
|----------------------|-------|-------|
| Dim                  | Min   | Max   |
| A                    | 0.37  | 0.51  |
| B                    | 1.20  | 1.40  |
| C                    | 2.30  | 2.50  |
| D                    | 0.89  | 1.03  |
| F                    | 0.45  | 0.60  |
| G                    | 1.78  | 2.05  |
| H                    | 2.80  | 3.00  |
| J                    | 0.013 | 0.10  |
| K                    | 0.903 | 1.10  |
| L                    | 0.45  | 0.61  |
| M                    | 0.085 | 0.180 |
| $\alpha$             | 0°    | 8°    |
| All Dimensions in mm |       |       |

## Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z          | 2.9           |
| X          | 0.8           |
| Y          | 0.9           |
| C          | 2.0           |
| E          | 1.35          |

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