



# THE DATASHEET OF DNLS160-7



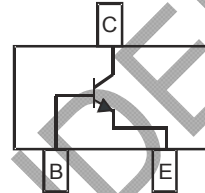
## Features

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (DPLS160)
- 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**



## 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	$^\circ\text{C}/\text{W}$
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 50	nA μA	V <sub>CB</sub> = 60V, I <sub>E</sub> = 0
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>	250 200 100	320 280 165	—	V	V <sub>CE</sub> = 5V, I <sub>C</sub> = 1mA V <sub>CE</sub> = 5V, I <sub>C</sub> = 500mA V <sub>CE</sub> = 5V, I <sub>C</sub> = 1A
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	—	80 80 140	110 140 250	mV	I <sub>C</sub> = 100mA, I <sub>B</sub> = 1mA I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
Collector-Emitter Saturation Resistance	R <sub>CE(SAT)</sub>	—	140	250	mΩ	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
Base-Emitter Saturation Voltage	V <sub>BE(SAT)</sub>	—	0.91	1.1	V	I <sub>C</sub> = 1A, I <sub>B</sub> = 50mA
Base-Emitter Turn On Voltage	V <sub>BE(ON)</sub>	—	0.81	0.9	V	V <sub>CE</sub> = 5V, I <sub>C</sub> = 1A
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	C <sub>obo</sub>	—	7	10	pF	V <sub>CB</sub> = 10V, f = 1.0MHz
Current Gain-Bandwidth Product	f <sub>T</sub>	150	270	—	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%.

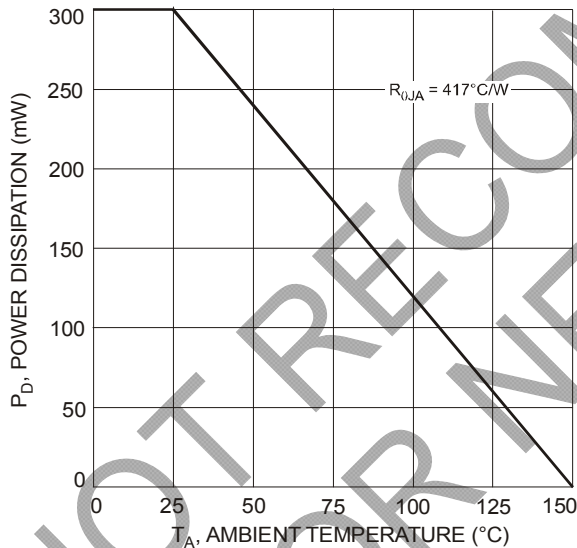


Fig. 1 Maximum Power Dissipation vs. Ambient Temperature

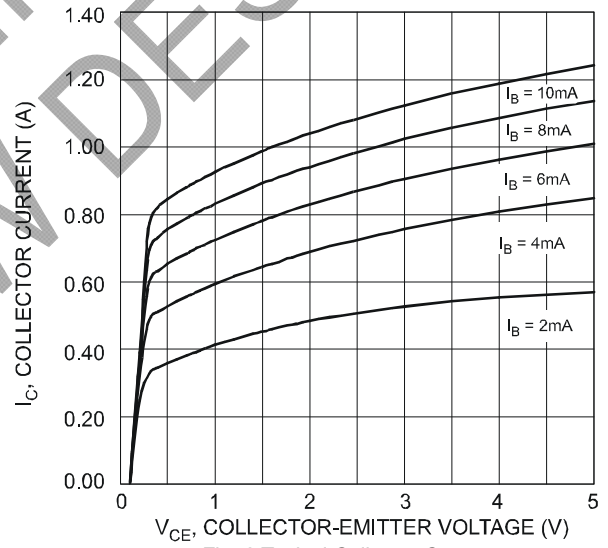


Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage

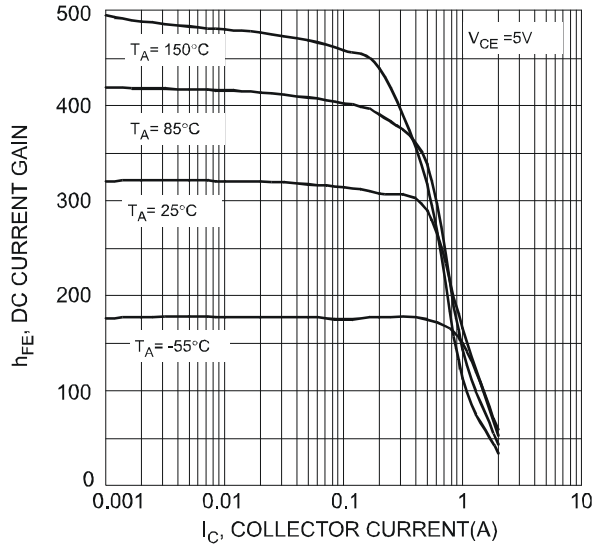


Fig. 3 Typical DC Current Gain vs. Collector Current

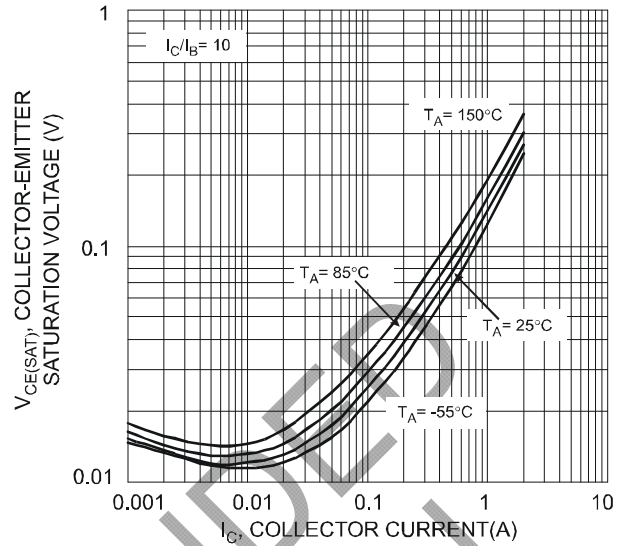


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

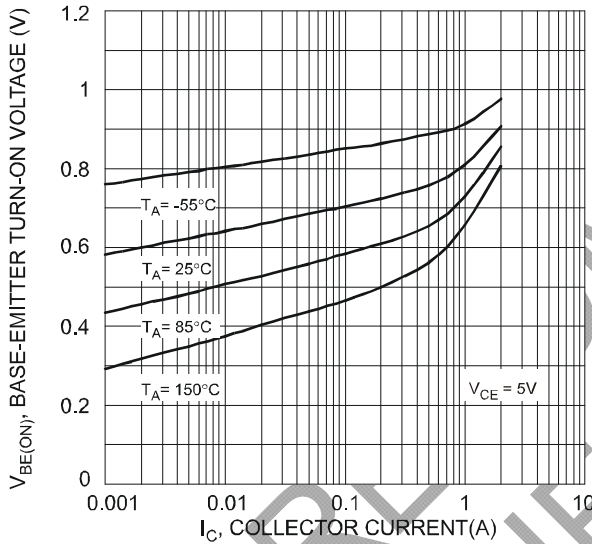


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

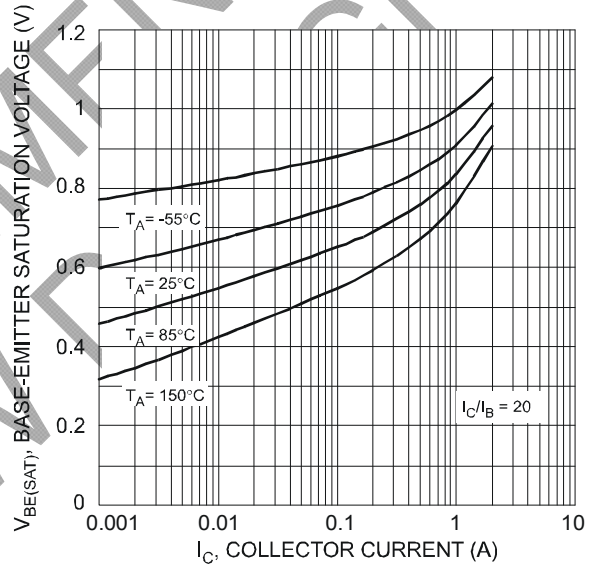


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

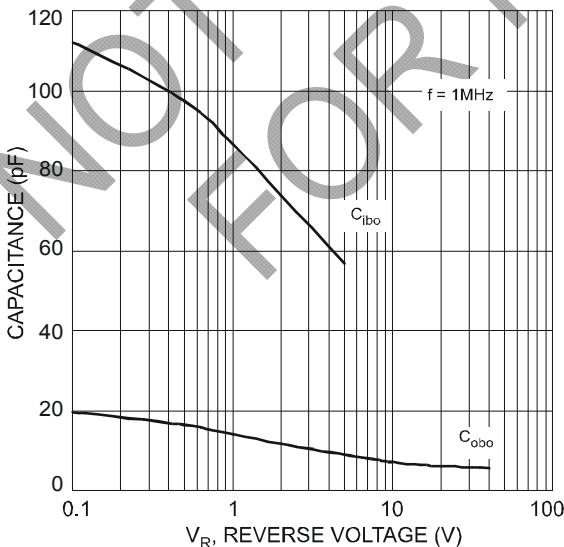


Fig. 7 Typical Capacitance Characteristics

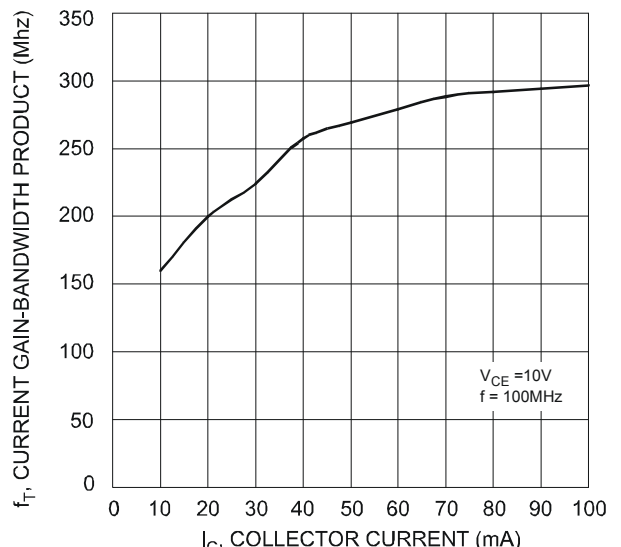


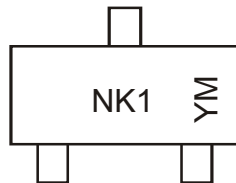
Fig. 8 Typical Gain-Bandwidth Product vs. Collector Current

## Ordering Information (Note 5)

Device	Packaging	Shipping
DNLS160-7	SOT-23	3000/Tape & Reel

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

## Marking Information



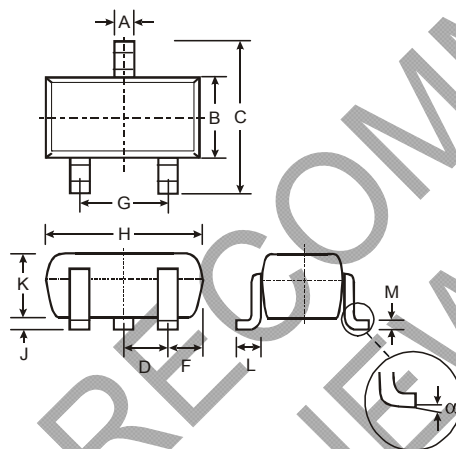
NK1 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year ex: V = 2008  
 M = Month ex: 9 = September

### Date Code Key

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

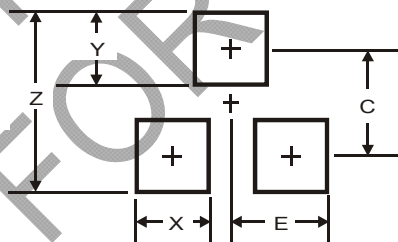
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

## 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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