NEW PRODUCT

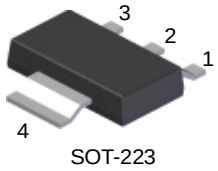
DNLS412E

LOW $V_{CE(SAT)}$ NPN SURFACE MOUNT TRANSISTOR

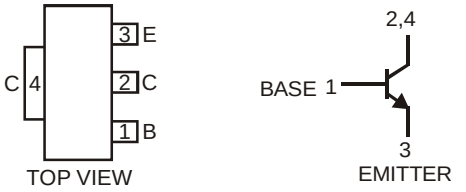
Please click here to visit our online spice models database.

Features

- Epitaxial Planar Die Construction
- Low Collector-Emitter Saturation Resistance $R_{CE(SAT)}$ = 57.5mΩ at 4A
- High DC Current Gain h_{FE} > 400 at I_C = 3A
- Complementary PNP Type Available (DPLS315E)
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**



SOT-223



Schematic and Pin Configuration

Mechanical Data

- Case: SOT-223
- 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 (Lead Free Plating). Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.112 grams (approximate)

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	12	V
Collector-Emitter Voltage	V_{CEO}	12	V
Emitter-Base Voltage	V_{EBO}	5	V
Continuous Collector Current	I_C	4	A
Peak Pulse Current	I_{CM}	10	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation @T_A = 25°C (Note 3)	P_D	1	W
Thermal Resistance, Junction to Ambient Air (Note 3) @T_A = 25°C	$R_{\theta JA}$	125	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
1. No purposefully added lead.
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
3. Device mounted on FR-4 PCB, 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.

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Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Off Characteristics						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	12	—	—	V	I_C = 100μA, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	12	—	—	V	I_C = 10mA, I_B = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	—	—	V	I_E = 100μA, I_C = 0
Collector Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 10V, I_E = 0
Emitter Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 4V, I_C = 0
On Characteristics (Note 4)						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	— — — — —	0.02 0.03 0.06 0.20 0.23	0.04 0.06 0.18 0.35 0.40	V	I_C = 0.1A, I_B = 1mA I_C = 0.1A, I_B = 0.5mA I_C = 1A, I_B = 50mA I_C = 3A, I_B = 20mA I_C = 4A, I_B = 50mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.1	V	I_C = 3A, I_B = 20mA
Base-Emitter Turn-On Voltage	$V_{BE(ON)}$	—	—	1.0	V	V_{CE} = 2V, I_C = 3A
DC Current Gain	h_{FE}	500 400 100	— — —	— — —	—	V_{CE} = 2V, I_C = 0.1A V_{CE} = 2V, I_C = 3A V_{CE} = 2V, I_C = 10A
AC Characteristics						
Transition Frequency	f_T	150	—	—	MHz	V_{CE} = 5V, I_C = 50mA, f = 50MHz
Input Capacitance	C_{ibo}	—	240	—	pF	V_{EB} = 0.5V, f = 1MHz
Output Capacitance	C_{obo}	—	35	—	pF	V_{CB} = 10V, f = 1MHz
Switching Times	t_{on} t_{off}	— —	40 500	— —	ns ns	V_{CC} = 10V, I_C = 500mA I_{B1} = -I_{B2} = 50mA

Notes: 4. Pulse Test: Pulse width ≤300μs. Duty cycle ≤2.0%.

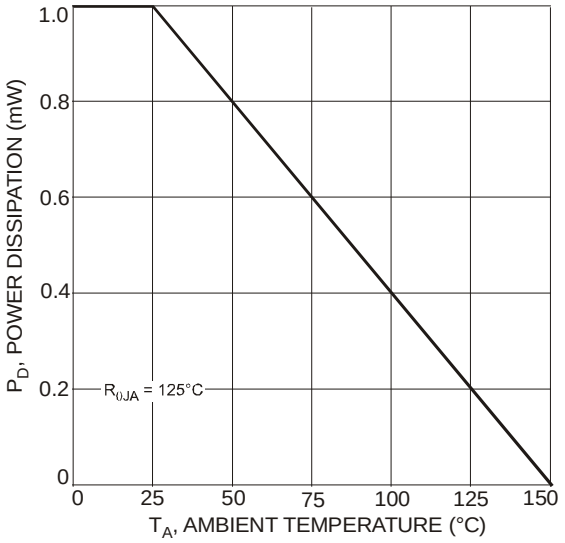

Fig. 1 Max Power Dissipation vs. Ambient Temperature

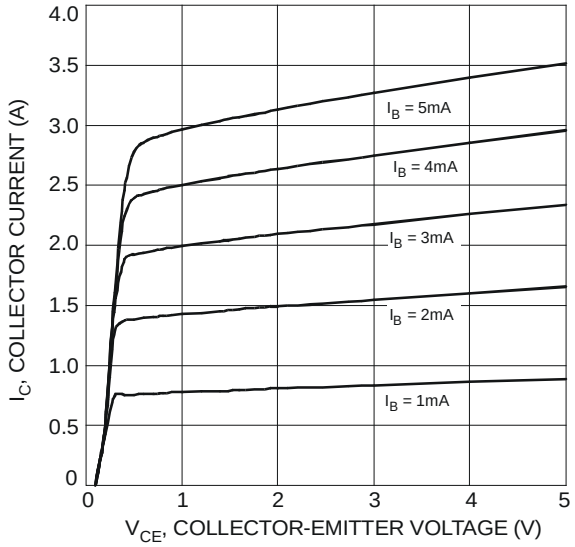

Fig. 2 Typical Collector Current vs. Collector-Emitter Voltage

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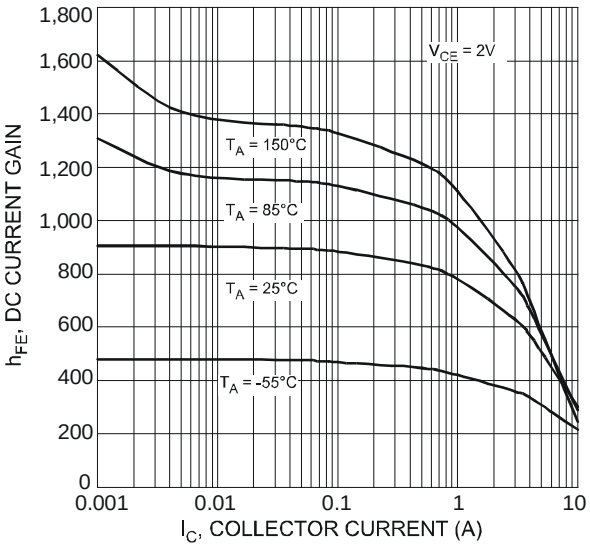


Fig. 3 Typical DC Current Gain vs. Collector Current

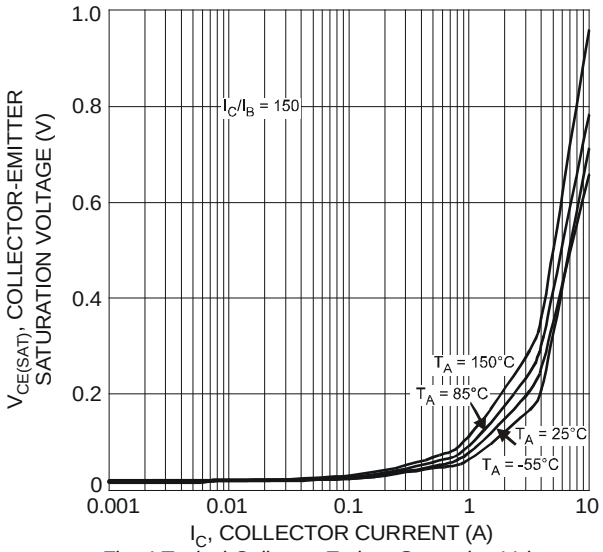


Fig. 4 Typical Collector-Emitter Saturation Voltage vs. Collector Current

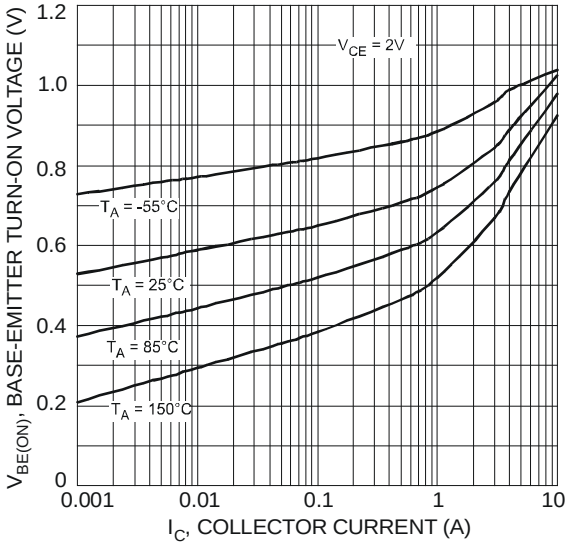


Fig. 5 Typical Base-Emitter Turn-On Voltage vs. Collector Current

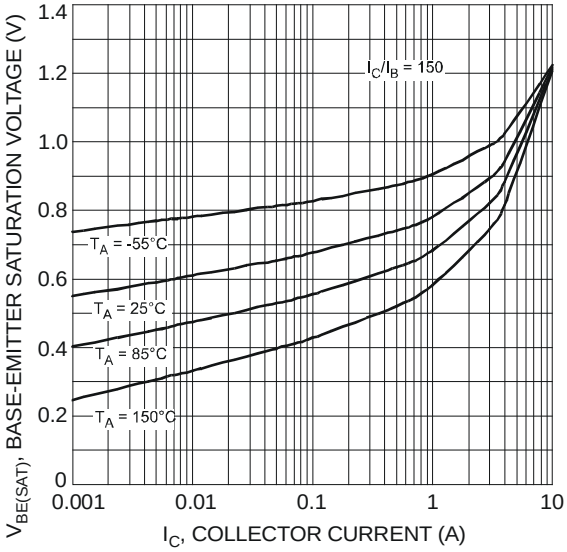


Fig. 6 Typical Base-Emitter Saturation Voltage vs. Collector Current

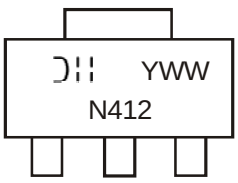
Ordering Information (Note 5)

Device	Packaging	Shipping
DNLS412E-13	SOT-223	2500/Tape & Reel

Notes: 5. For packaging details, go to our website at http://www.diodes.com/ap2007.pdf.

Marking Information

(Top View)



N412 = Product Type Marking Code
YWW = Date Code Marking
Y = Last digit of year ex: 7 = 2007
WW = Week code 01 - 52

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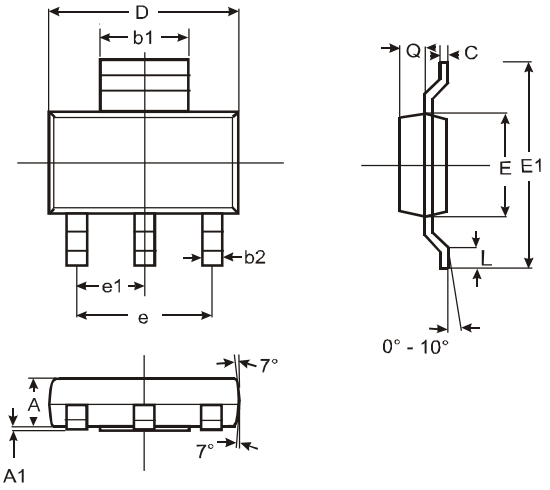
Package Outline Dimensions



SOT-223			
Dim	**Min**	**Max**	**Typ**
A	1.55	1.65	1.60
A1	0.010	0.15	0.05
b1	2.90	3.10	3.00
b2	0.60	0.80	0.70
C	0.20	0.30	0.25
D	6.45	6.55	6.50
E	3.45	3.55	3.50
E1	6.90	7.10	7.00
e	—	—	4.60
e1	—	—	2.30
L	0.85	1.05	0.95
Q	0.84	0.94	0.89
All Dimensions in mm			

Suggested Pad Layout: