

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$ $T_A = +25^\circ C$
25V	4Ω @ $V_{GS} = 4.5V$	0.26A
	5Ω @ $V_{GS} = 2.7V$	0.23A

## Description

This new generation MOSFET is designed to minimize the on-state resistance ( $R_{DS(ON)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Applications

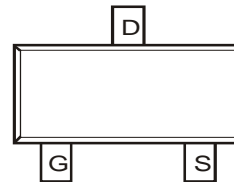
- DC-DC Converters
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.



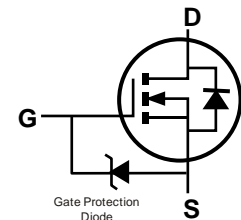
ESD HBM >6kV



Top View



Top View  
Pin Configuration



Equivalent Circuit

## Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Small Surface Mount Package
- ESD Protected Gate (>6kV Human Body Model)
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

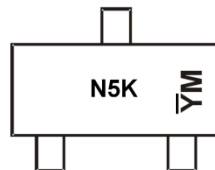
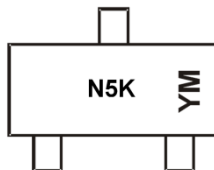
- Case: SOT23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208 e3
- Lead Free Plating (Matte Tin Finish Annealed over Alloy 42 Leadframe).
- Terminal Connections: See Diagram
- Weight: 0.008 grams (Approximate)

## Ordering Information (Note 4)

Part Number	Compliance	Case	Packaging
DMG301NU-7	Standard	SOT23	3,000/Tape & Reel
DMG301NU-13	Standard	SOT23	10,000/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



N5K = Product Type Marking Code  
 YM = Date Code Marking for SAT (Shanghai Assembly/ Test Site)  
 YM = Date Code Marking for CAT (Chengdu Assembly/ Test Site)  
 Y or Ȳ = Year (ex: A = 2013)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

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<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V <sub>DSS</sub>	25	V
Gate-Source Voltage			V <sub>GSS</sub>	8	V
Continuous Drain Current (Note 6) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	0.26	A
		T <sub>A</sub> = +70°C		0.21	
Continuous Drain Current (Note 6) V <sub>GS</sub> = 2.7V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	0.23	A
		T <sub>A</sub> = +70°C		0.18	
Pulsed Drain Current (10μs pulse, duty cycle = 1%)			I <sub>DM</sub>	1.5	A
Maximum Body Diode Continuous Current (Note 6)			I <sub>S</sub>	0.5	A

**Thermal Characteristics**

Characteristic		Symbol	Value	Units
Total Power Dissipation	(Note 5)	P <sub>D</sub>	0.32	W
	(Note 6)		0.4	
Thermal Resistance, Junction to Ambient	(Note 5)	R <sub>θJA</sub>	369	°C/W
	(Note 6)		296	
Thermal Resistance, Junction to Case	(Note 6)	R <sub>θJC</sub>	115	°C
Operating and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 7)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	25	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1.0	μA	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Body Leakage	I <sub>GSS</sub>	—	—	100	nA	V <sub>GS</sub> = 8V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 7)</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.7	—	1.1	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	—	—	4	Ω	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 0.4A
		—	—	5	Ω	V <sub>GS</sub> = 2.7V, I <sub>D</sub> = 0.2A
Forward Transconductance	g <sub>FS</sub>	—	1	—	S	V <sub>DS</sub> = 5V, I <sub>D</sub> = 0.4A
Diode Forward Voltage	V <sub>SD</sub>	—	0.76	1.2	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 0.29A
<b>DYNAMIC CHARACTERISTICS (Note 8)</b>						
Input Capacitance	C <sub>iss</sub>	—	27.9	42	pF	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	6.1	9.2		
Reverse Transfer Capacitance	C <sub>rss</sub>	—	2.0	3.0		
Gate Resistance	R <sub>G</sub>	—	26.4	—	Ω	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz
Total Gate Charge	Q <sub>g</sub>	—	0.36	—	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 5V, I <sub>D</sub> = 0.2A
Gate-Source Charge	Q <sub>gs</sub>	—	0.06	—		
Gate-Drain Charge	Q <sub>gd</sub>	—	0.04	—		
Turn-On Delay Time	t <sub>D(on)</sub>	—	2.9	—	nS	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 6V I <sub>D</sub> = 0.5A, R <sub>θC</sub> = 50Ω
Turn-On Rise Time	t <sub>r</sub>	—	1.8	—		
Turn-Off Delay Time	t <sub>D(off)</sub>	—	6.6	—		
Turn-Off Fall Time	t <sub>f</sub>	—	2.3	—		

- Notes:
- Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to production testing.

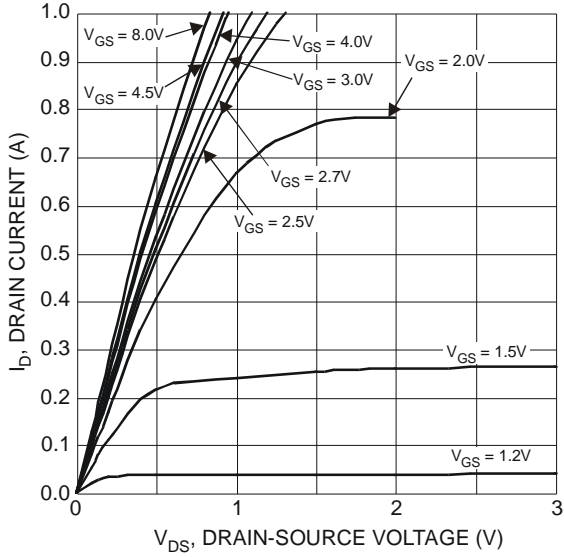


Figure 1 Typical Output Characteristics

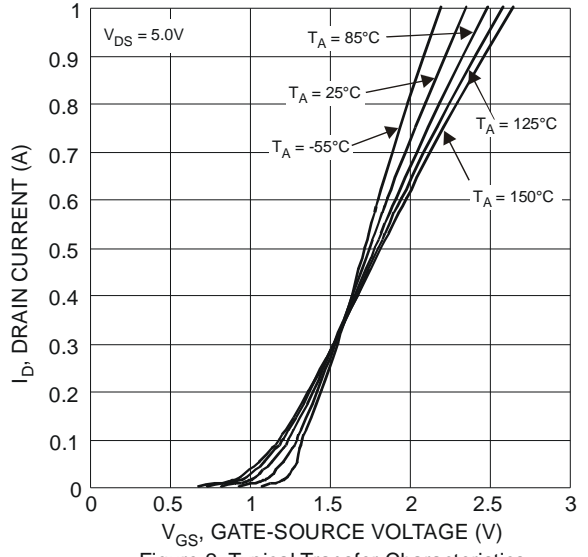


Figure 2 Typical Transfer Characteristics

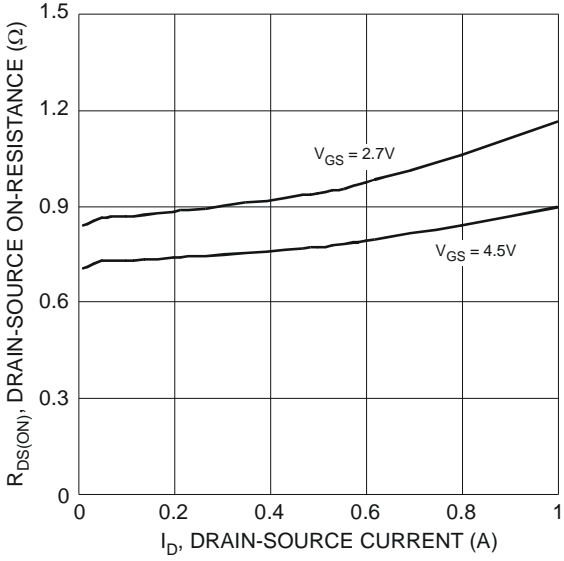


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

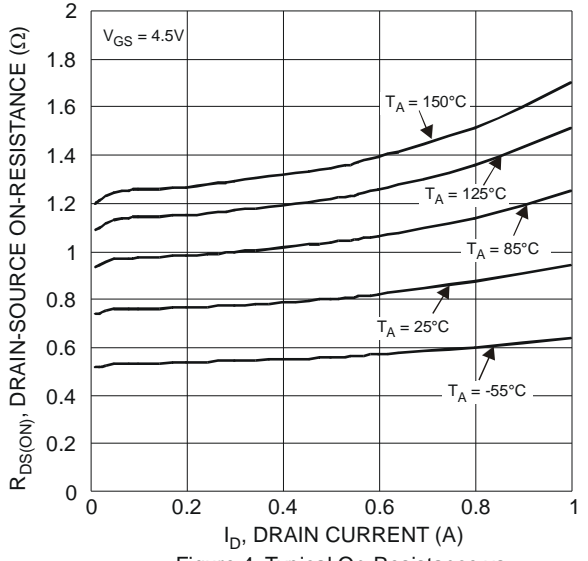


Figure 4 Typical On-Resistance vs. Drain Current and Temperature

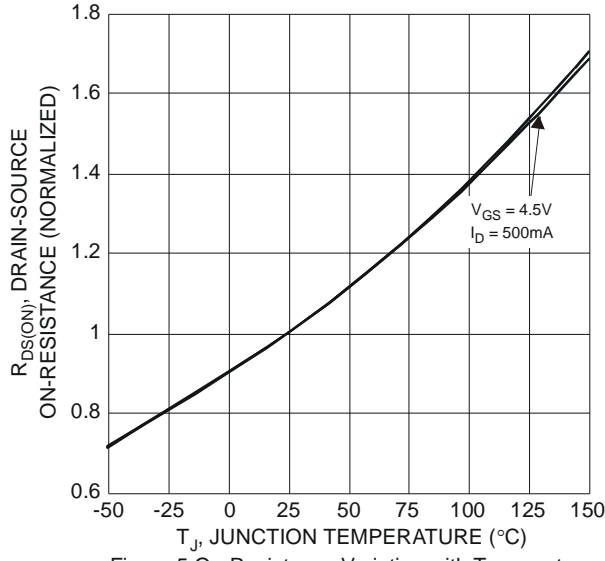


Figure 5 On-Resistance Variation with Temperature

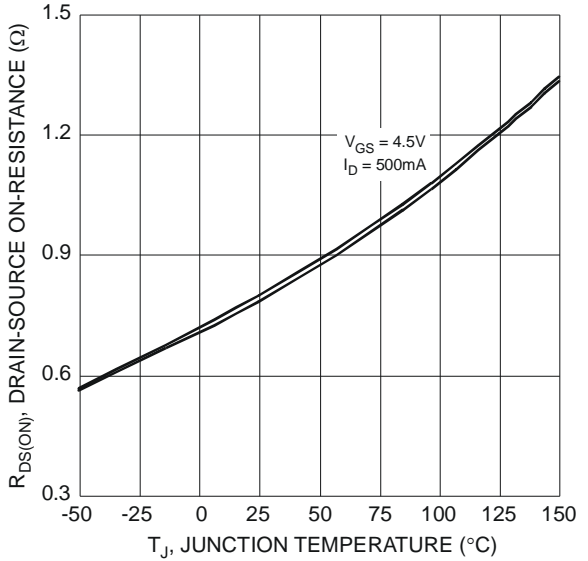


Figure 6 On-Resistance Variation with Temperature

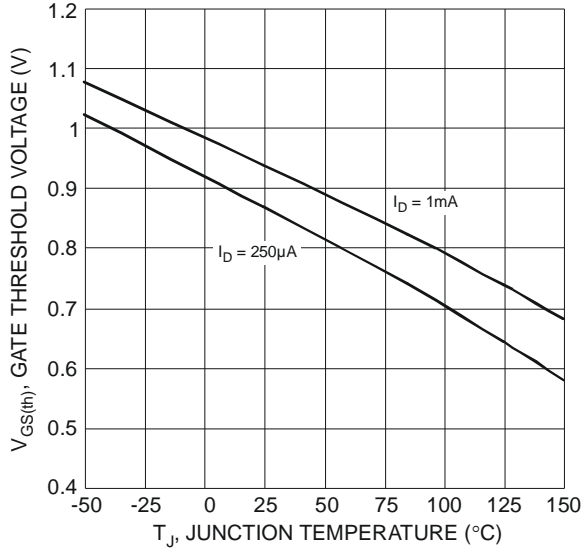


Figure 7 Gate Threshold Variation vs. Ambient Temperature

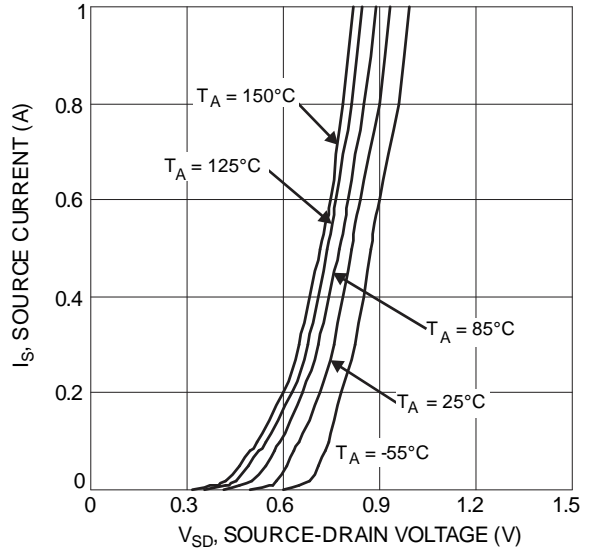


Figure 8 Diode Forward Voltage vs. Current

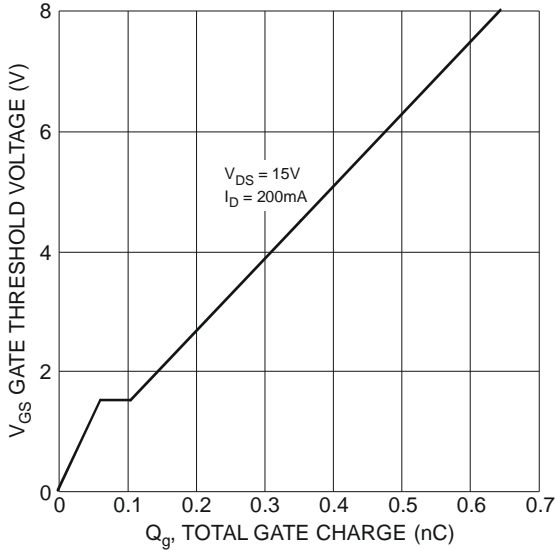


Figure 9 Gate Charge

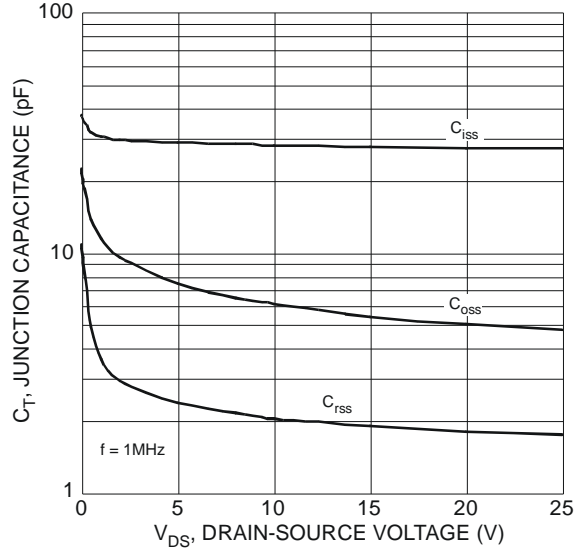


Figure 10 Typical Junction Capacitance

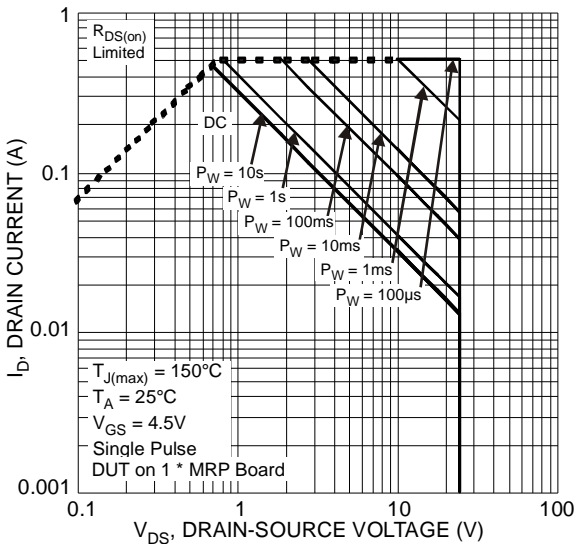


Figure 11 SOA, Safe Operation Area

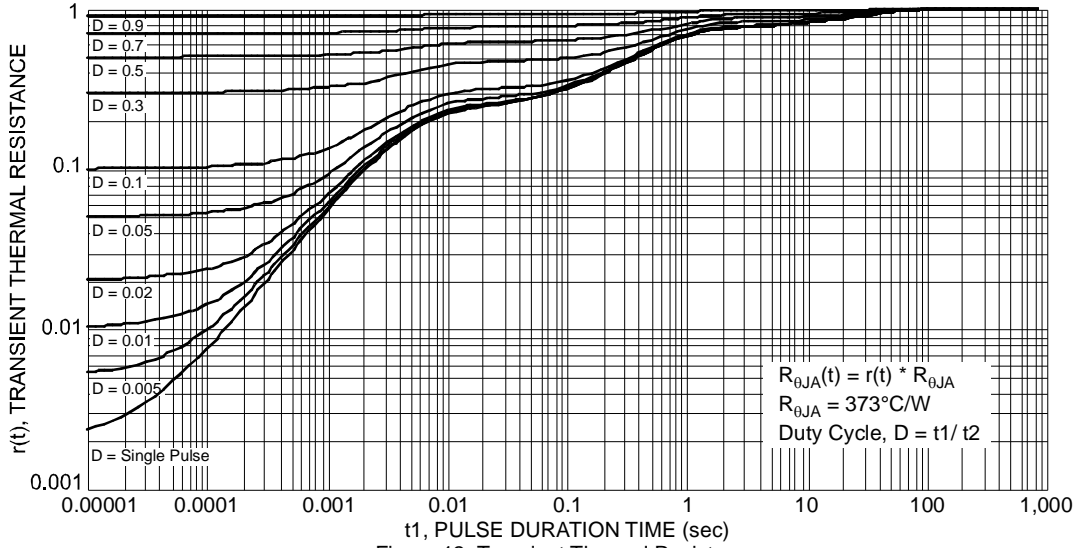
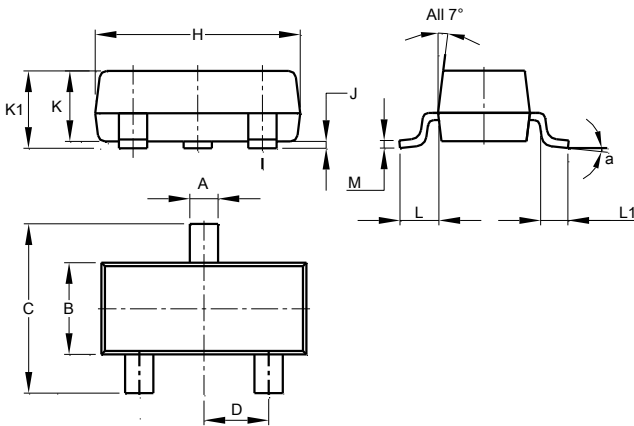


Figure 12 Transient Thermal Resistance

**Package Outline Dimensions**

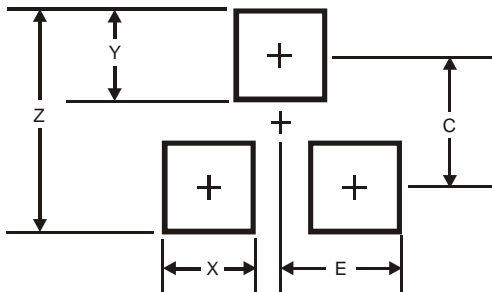
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	8°		
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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

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