

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D $T_A = +25^\circ\text{C}$
20V	$0.55\Omega @ V_{GS} = 4.5V$	630mA
	$0.9\Omega @ V_{GS} = 1.8V$	410mA

Description

This new generation MOSFET has been 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

Features and Benefits

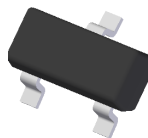
- Low On-Resistance: $R_{DS(ON)} = 550_{(max)}\text{m}\Omega @ V_{GS} = 4.5V$
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected up to 2KV**
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**
- Qualified to AEC-Q101 standards for High Reliability**

Mechanical Data

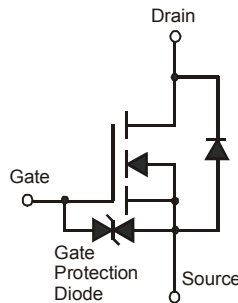
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208 **e3**
- Terminal Connections: See Diagram
- Weight: 0.008 grams (approximate)



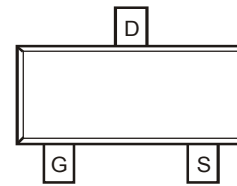
SOT23



Top View



Equivalent Circuit



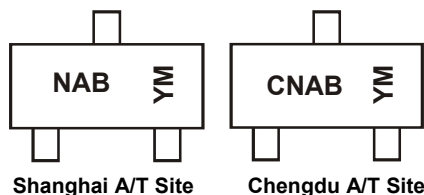
Top View

Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2004K-7	SOT23	3000/Tape & Reel

- Notes:
- EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 - See 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.
 - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>

Marking Information



NAB and CNAB = Product Type Marking Code
 NAB = SAT (Shanghai Assembly / Test site)
 CNAB = CAT (Chengdu Assembly / Test site)
 YM = Date Code Marking
 Y = Year (ex: A = 2013)
 M = Month (ex: 9 = September)

Date Code Key

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

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

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	20	V
Gate-Source Voltage			V _{GSS}	±8	V
Drain Current (Note 5) V _{GS} = 4.5V	Steady State	T _A = +25°C	I _D	630	mA
		T _A = +85°C		450	
Drain Current (Note 5) V _{GS} = 1.8V	Steady State	T _A = +25°C	I _D	410	mA
		T _A = +85°C		300	
Pulsed Drain Current (Note 6)			I _{DM}	1.5	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	P _D	350	mW
Thermal Resistance, Junction to Ambient	R _{θJA}	357	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-65 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV _{DSS}	20	—	—	V	V _{GS} = 0V, I _D = 10μA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±1	μA	V _{GS} = ±4.5V, V _{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	V _{GS(th)}	0.5	—	1.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	0.4	0.55	Ω	V _{GS} = 4.5V, I _D = 540mA
			0.5	0.70		V _{GS} = 2.5V, I _D = 500mA
			0.7	0.9		V _{GS} = 1.8V, I _D = 350mA
Forward Transfer Admittance	Y _{fs}	200	—	—	ms	V _{DS} = 10V, I _D = 0.2A
Source Current	I _S	—	—	0.5	A	—
Diode Forward Voltage (Note 7)	V _{SD}	0.6	—	1	V	V _{GS} = 0V, I _S = 500mA
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	—	—	150	pF	V _{DS} = 16V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oss}	—	—	25	pF	
Reverse Transfer Capacitance	C _{rss}	—	—	20	pF	
Gate Resistance	R _g	—	292	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge	Q _g	—	0.9	—	nC	V _{DS} = 15V, V _{GS} = 4.5V, I _D = 0.5A
Gate-Source Charge	Q _{gs}	—	0.2	—		
Gate-Drain Charge	Q _{gd}	—	0.2	—		
Turn-On Delay Time	t _{D(on)}	—	5.7	—	ns	V _{GS} = 8V, V _{DS} = 15V, R _G = 6Ω, R _L = 30Ω
Turn-On Rise Time	t _r	—	8.4	—		
Turn-Off Delay Time	t _{D(off)}	—	59.4	—		
Turn-Off Fall Time	t _f	—	37.6	—		
Body Diode Reverse Recovery Time	t _{rr}	—	5.5	—	ns	I _S = 0.5A, dI/dt = -100A/μs
Body Diode Reverse Recovery Charge	Q _{rr}	—	0.85	—	nC	I _S = 0.5A, dI/dt = -100A/μs

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout, single sided.
6. Pulse width ≤10μs, Duty Cycle ≤1%.
7. Short duration pulse test used to minimize self-heating effect.

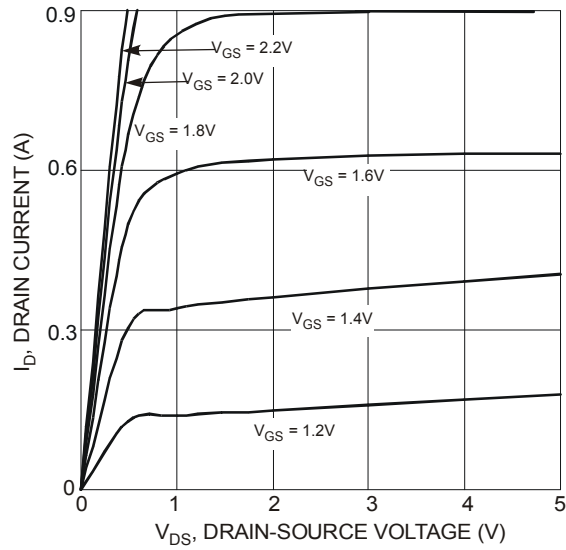


Figure 1 Typical Output Characteristics

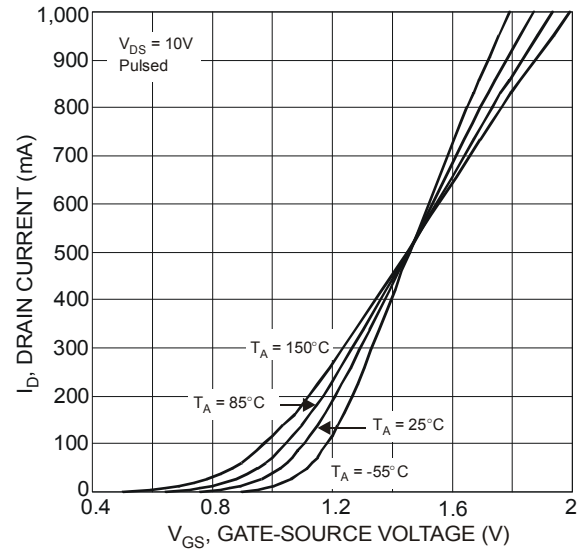


Figure 2 Reverse Drain Current vs. Source-Drain Voltage

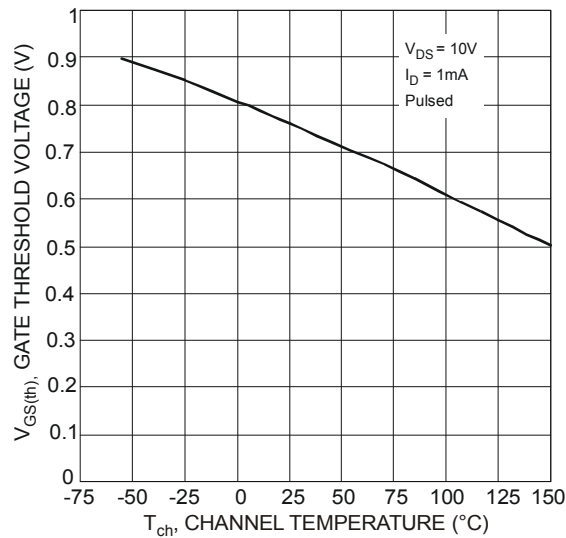


Figure 3 Gate Threshold Voltage vs. Channel Temperature

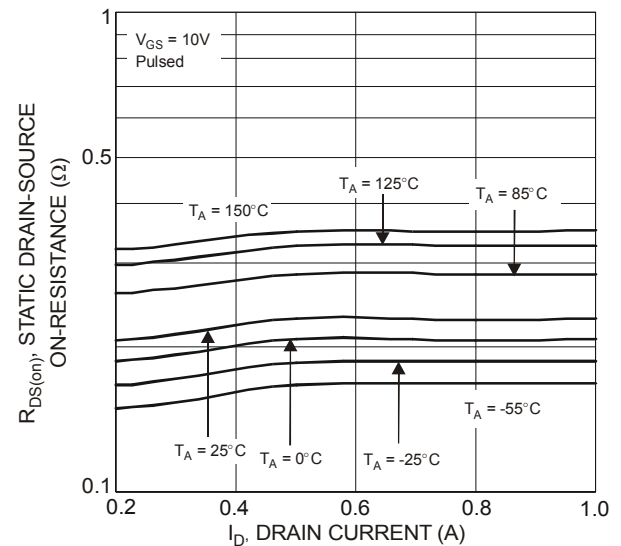


Figure 4 Static Drain-Source On-Resistance vs. Drain Current

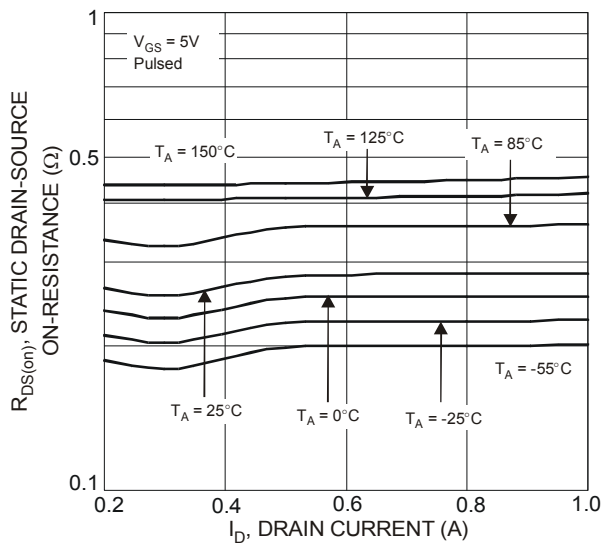


Figure 5 Static Drain-Source On-Resistance vs. Drain Current

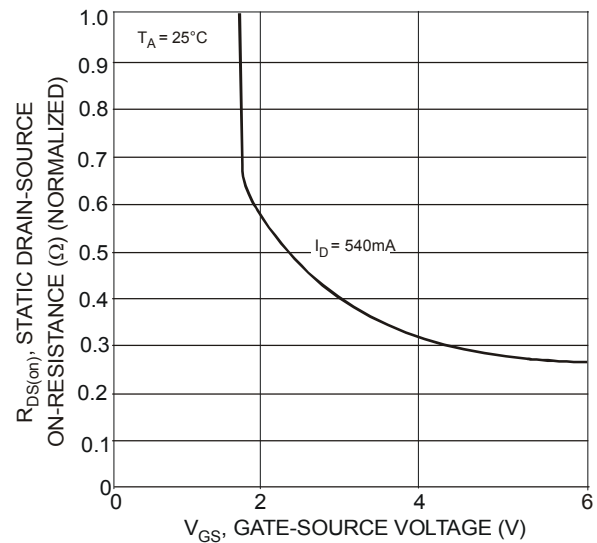


Figure 6 Static Drain-Source, On-Resistance vs. Gate-Source Voltage

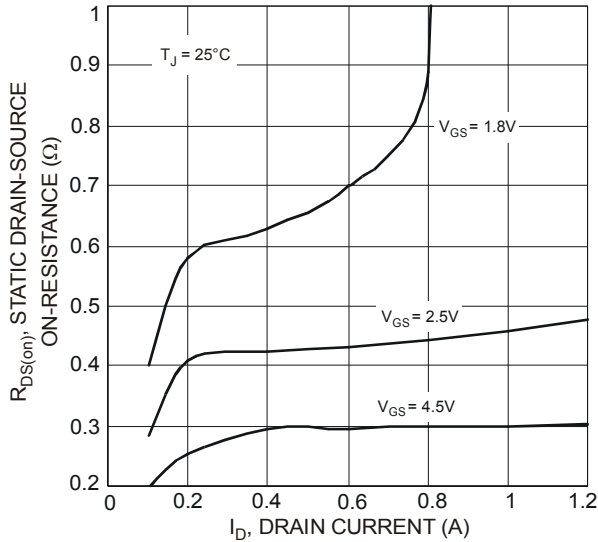


Figure 7 On-Resistance vs. Drain Current and Gate Voltage

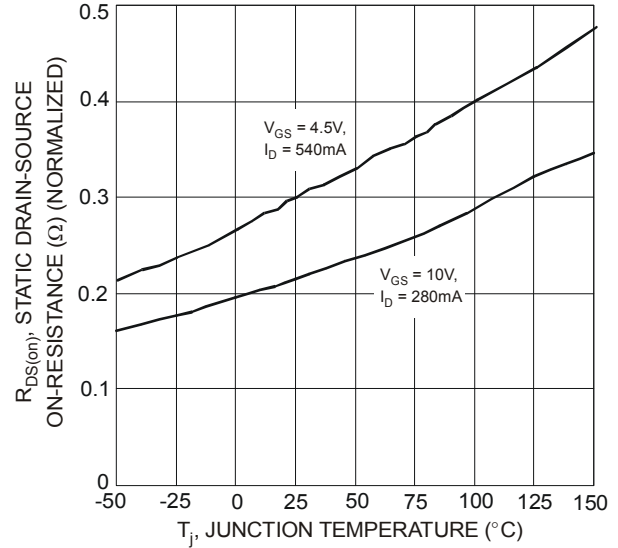


Figure 8 Static Drain-Source, On-Resistance vs. Temperature

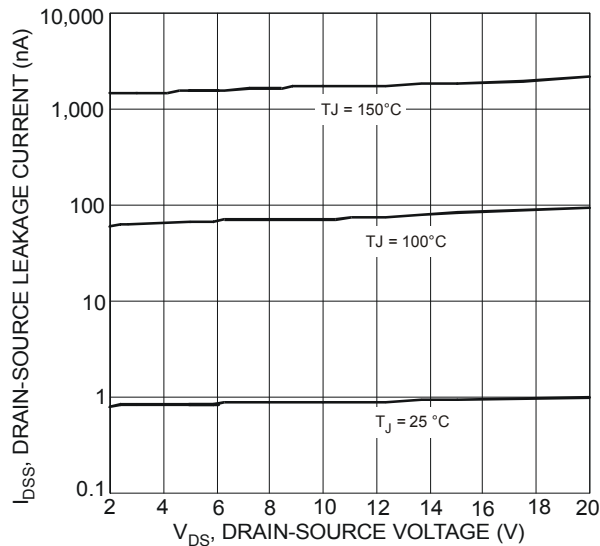


Figure 9 Drain Source Leakage Current vs. Voltage

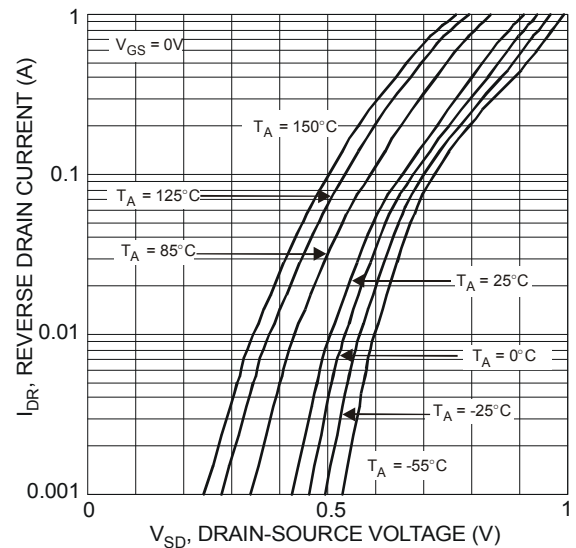


Figure 10 Reverse Drain Current vs. Source-Drain Voltage

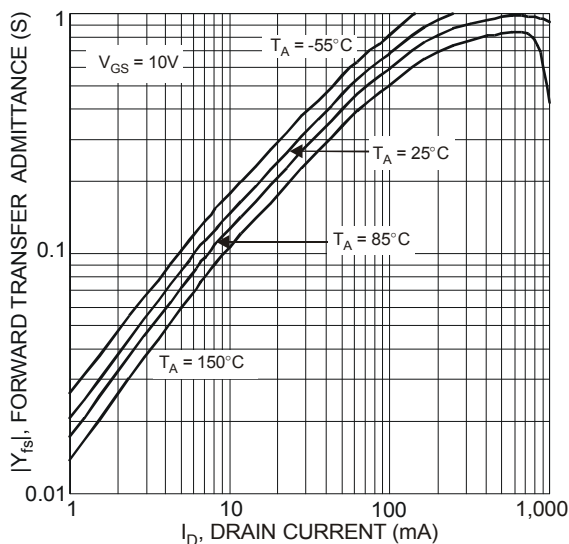


Figure 11 Forward Transfer Admittance vs. Drain Current

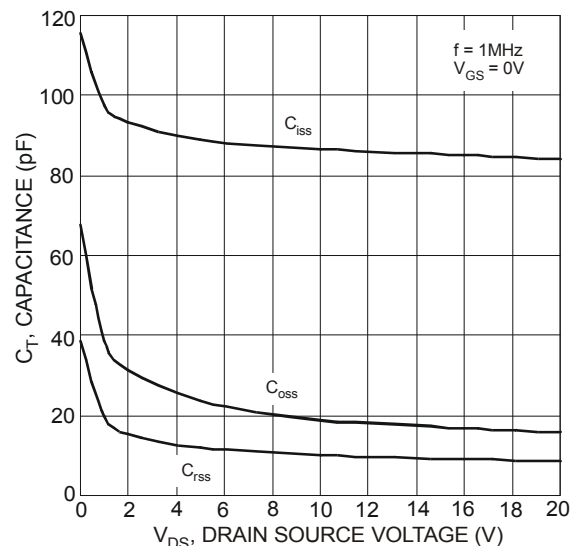


Figure 12 Capacitance Variation

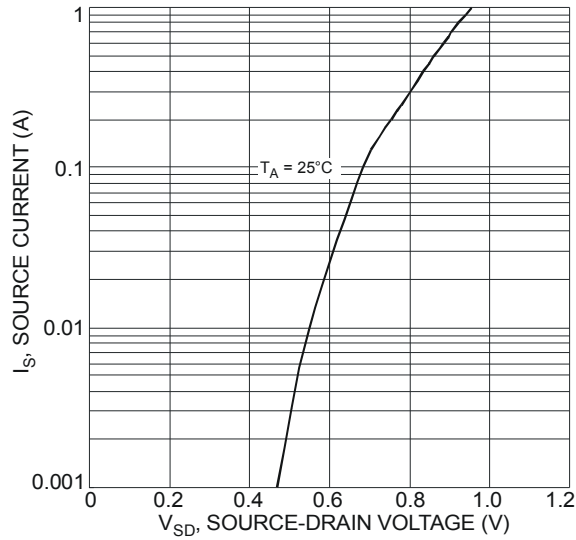


Figure 13 Diode Forward Voltage vs. Current

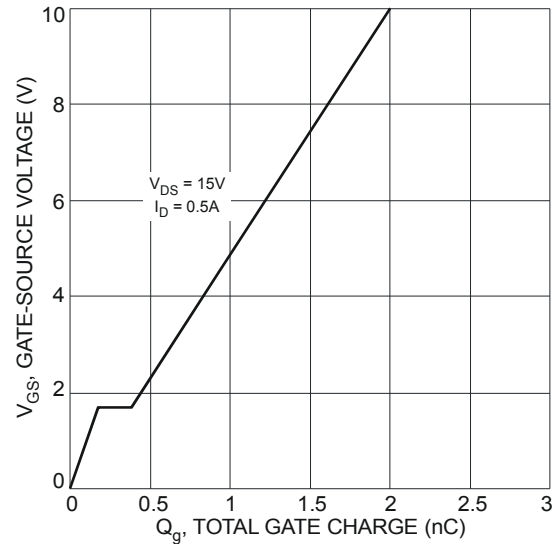
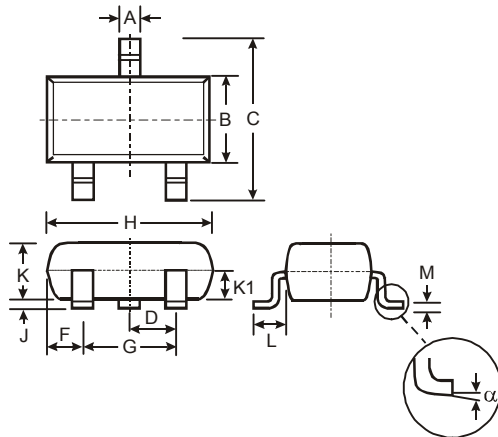


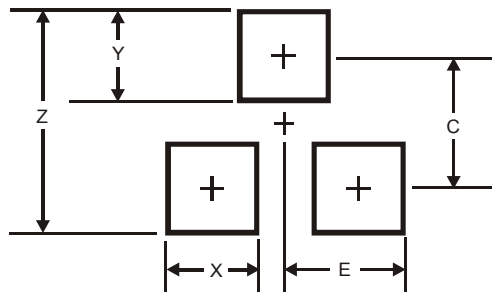
Figure 14 Gate-Charge Characteristics

Package Outline Dimensions



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	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	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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