Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D T_A = +25°C
50V	1.8Ω @ V_{GS} = 10V	500mA
	2.0Ω @ V_{GS} = 4.5V	450mA

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

- Backlighting
- DC-DC Converters
- Power Management Functions

Features and Benefits

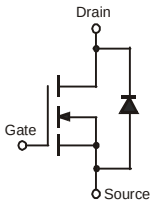
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

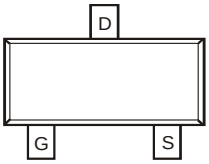
- Case: SOT23
- Case Material: Molded Plastic "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Alloy 42 leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: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

SOT23

Top View



Equivalent Circuit



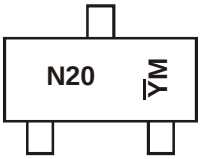
Top View

Ordering Information (Note 5)

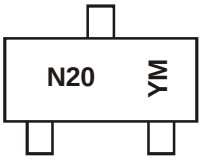
Part Number	Qualification	Case	Packaging
BSN20-7	Standard	SOT23	3000/Tape & Reel
BSN20Q-7	Automotive	SOT23	3000/Tape & Reel

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 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_grade_definitions/
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



Chengdu A/T Site



Shanghai A/T Site

N20 = Product Type Marking Code
YM = Date Code Marking for SAT (Shanghai Assembly/ Test site)
$\overline{Y}\overline{M}$ = Date Code Marking for CAT (Chengdu Assembly/ Test site)
Y or $\overline{Y}$ = Year (ex: A = 2013)
M = Month (ex: 9 = September)

Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015
Code	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

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	50	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current @ T_{SP} = +25°C (Note 6)	Steady State	T_A = +25°C T_A = +100°C	I_D	500 300	mA
Pulsed Drain Current @ T_{SP} = +25°C (Notes 6 & 7)			I_{DM}	1.2	A

Thermal Characteristics

Characteristic	Symbol	Value	Units
Power Dissipation, @T_A = +25°C (Note 6)	P_D	600	mW
Thermal Resistance, Junction to Ambient @T_A = +25°C (Note 6)	$R_{\theta JA}$	200	°C/W
Power Dissipation, @T_{SP} = +25°C (Note 6)	P_D	920	mW
Thermal Resistance, @T_{SP} = +25°C (Note 6)	$R_{\theta JSP}$	136	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	50	–	–	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	–	–	0.5	µA	V_{DS} = 50V, V_{GS} = 0V
Gate-Body Leakage	I_{GSS}	–	–	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	0.4	1.0	1.5	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	–	1.3 1.6	1.8 2.0	Ω	V_{GS} = 10V, I_D = 0.22A V_{GS} = 4.5V, I_D = 0.1A
Forward Transfer Admittance	$\|Y_{fs}\|$	40	320	–	mS	V_{DS} = 10V, I_D = 0.1A
Diode Forward Voltage	V_{SD}	–	1.0	1.5	V	V_{GS} = 0V, I_S = 180mA
Source (diode forward) Current	I_S	–	–	194	mA	T_{SP} = +25°C
Peak Source (diode forward) Current	I_{SM}	–	–	1.2	A	T_{SP} = +25°C (Notes 3 & 4)
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	–	21.8	40	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	–	5.6	15	pF	
Reverse Transfer Capacitance	C_{rss}	–	3.3	10	pF	
Gate Resistance	R_g	–	49	–	Ω	V_{DS} =0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	–	800	–	pC	V_{GS} = 10V, V_{DD} = 25V, I_D = 250mA
Gate-Source Charge	Q_{gs}	–	100	–	pC	
Gate-Drain Charge	Q_{gd}	–	100	–	pC	
Turn-On Delay Time	$t_{D(on)}$	–	2.93	–	ns	V_{DD} = 30V, V_{GEN} = 10V, R_L = 150Ω, R_{GEN} = 50Ω, I_D = 0.2A
Turn-On Rise Time	t_r	–	2.99	–	ns	
Turn-Off Delay Time	$t_{D(off)}$	–	9.45	–	ns	
Turn-Off Fall Time	t_f	–	8.3	–	ns	

Notes: 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.
7. Repetitive rating, pulse width limited by junction temperature.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.

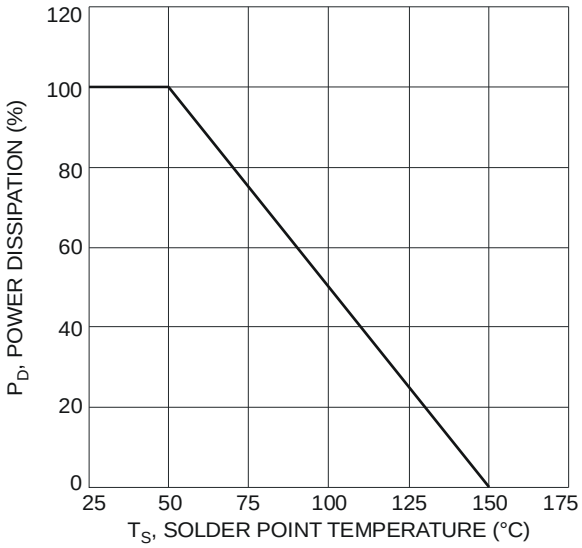


Fig 1. Normalized Total Power Dissipation as a Function of Solder Point Temperature

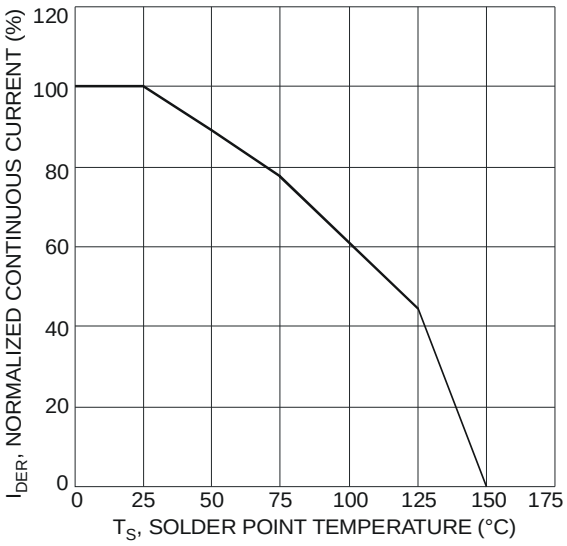


Fig 2. Normalized Continuous Current vs. Solder Point Temperature

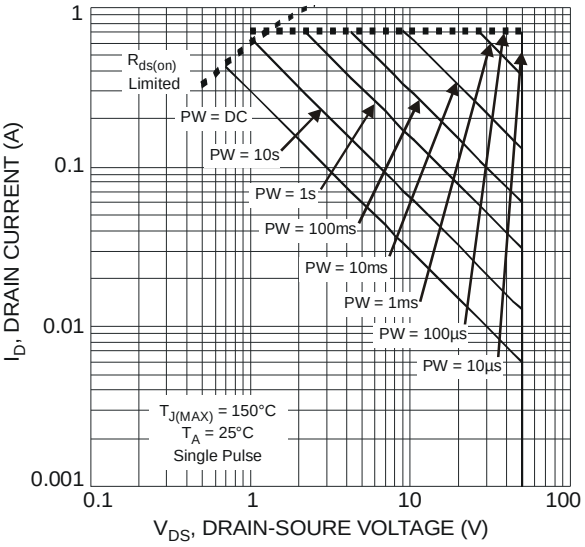


Fig. 3 SOA, Safe Operation Area

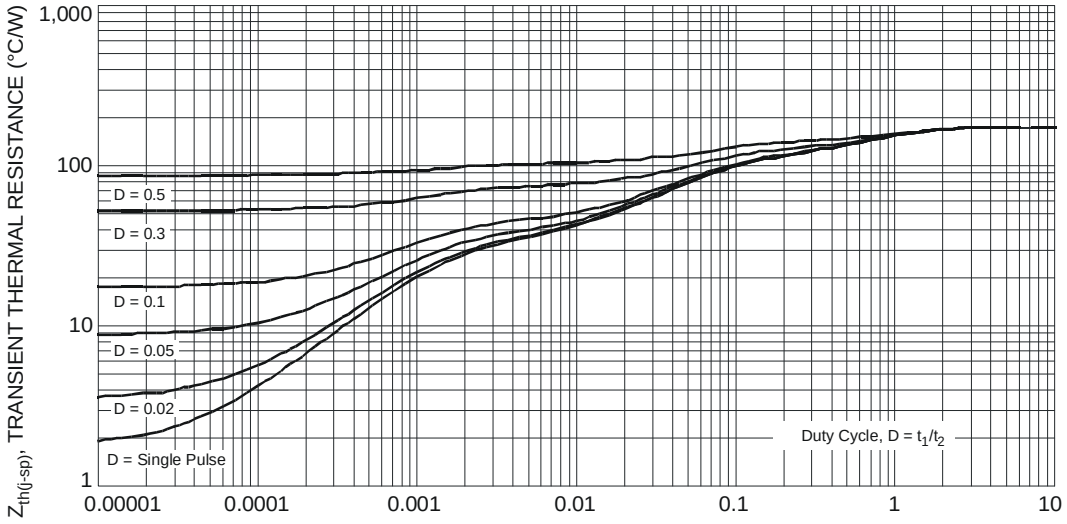


Fig. 4 Transient Thermal Response

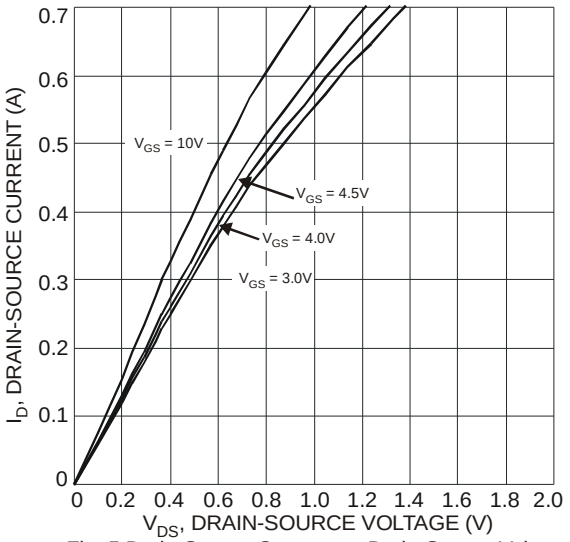


Fig. 5 Drain-Source Current vs. Drain-Source Voltage

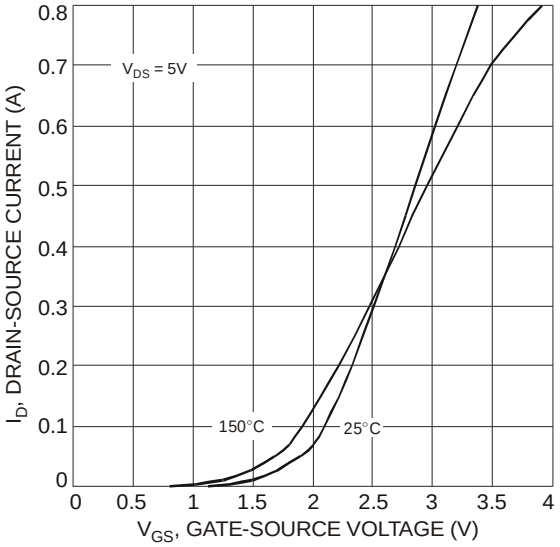


Fig. 6 Transfer Characteristics

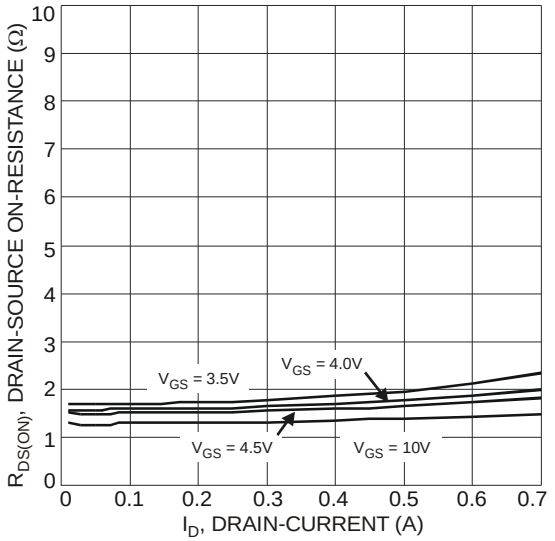


Fig. 7 Drain-Source On-Resistance vs. Drain-Current

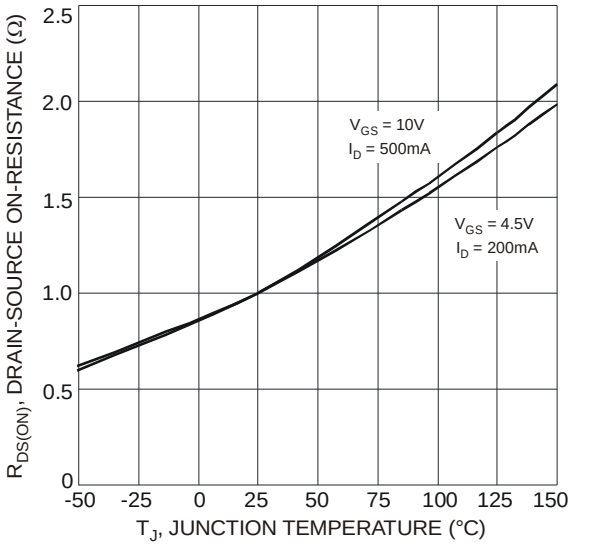


Fig. 8 Drain-Source On-Resistance vs. Junction Temperature

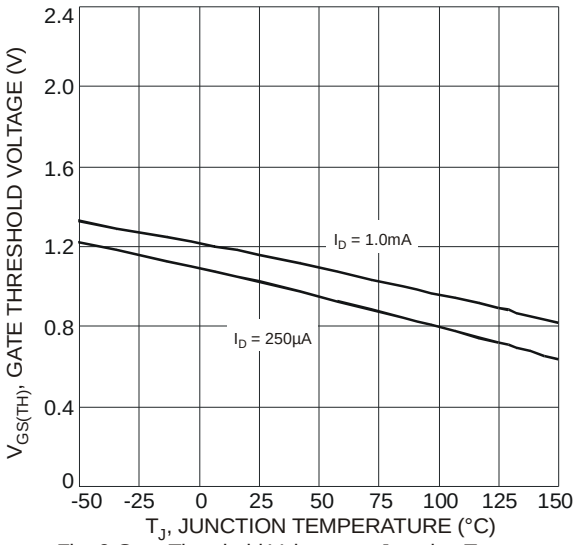


Fig. 9 Gate Threshold Voltage vs. Junction Temperature

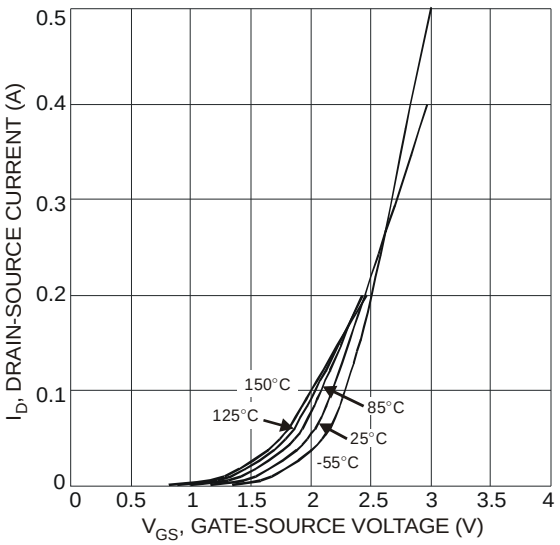


Fig. 10 Transfer Characteristics

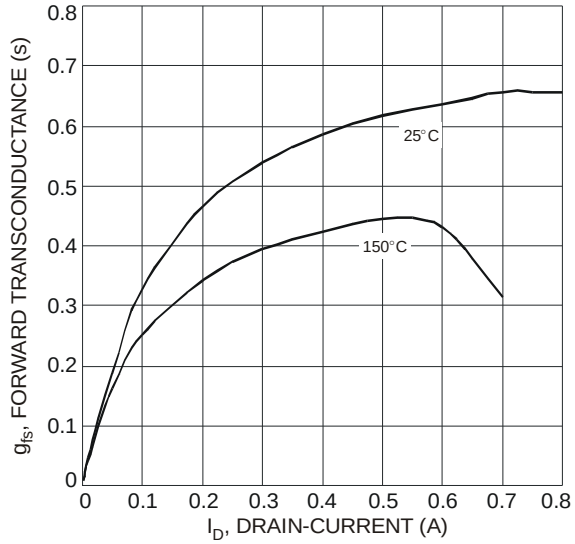


Fig. 11 Typical Transfer Characteristic

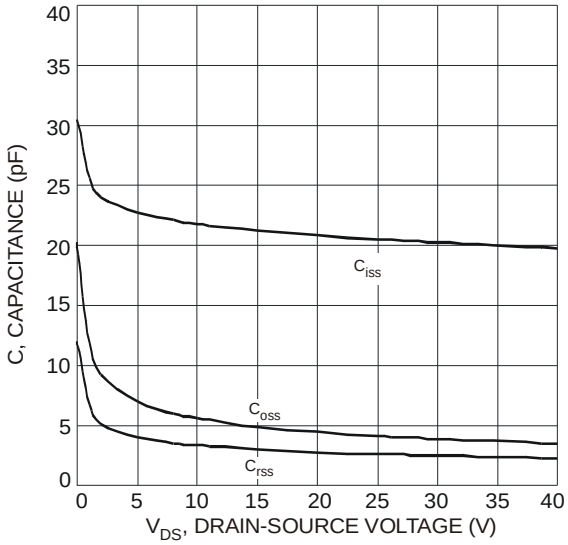


Fig. 12 Capacitance vs. Drain-Source Voltage

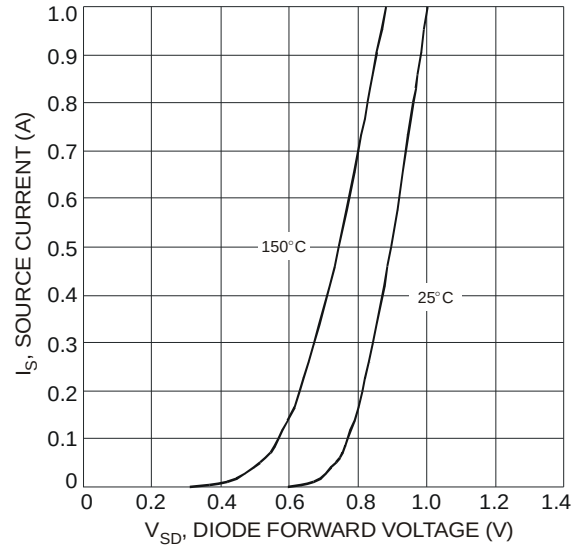
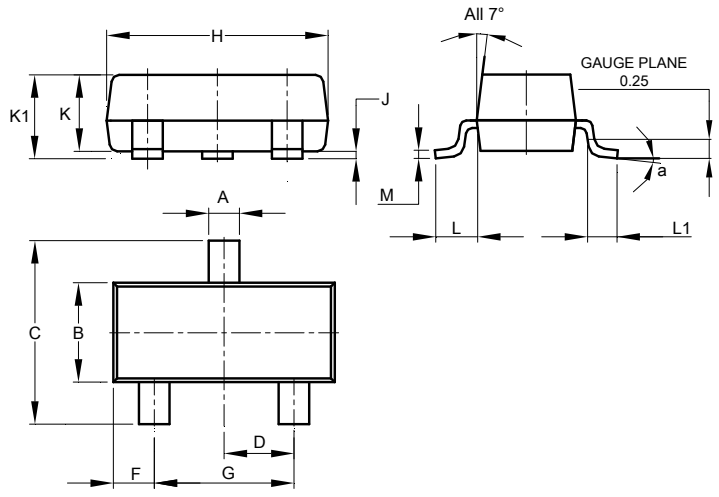


Fig. 13 Source Current vs. Diode Forward Voltage

Package Outline Dimensions

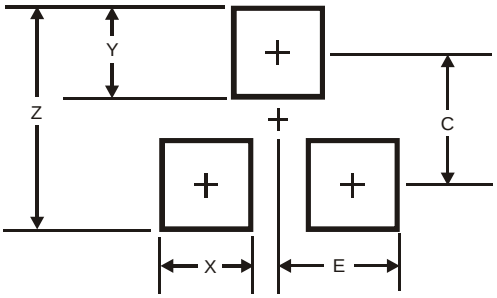
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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
α	8°		
All Dimensions in mm			

Suggested Pad Layout

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



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