优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Product Summary

BV_{DSS}	$R_{DS(ON)\ MAX}$	$I_{D\ MAX}$ T_A = +25°C
30V	35mΩ @ V_{GS} = 10V	5.5A
	45mΩ @ V_{GS} = 4.5V	4.9A

Description

This 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 Motor Control
- DC-AC Inverters

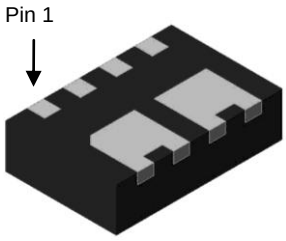
Features

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed

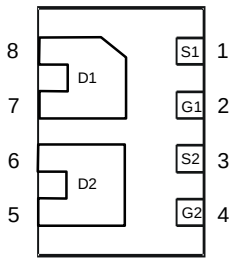
Mechanical Data

- Case: V-DFN3020-8 (Type N)
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – NiPdAu Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.011 grams (Approximate)

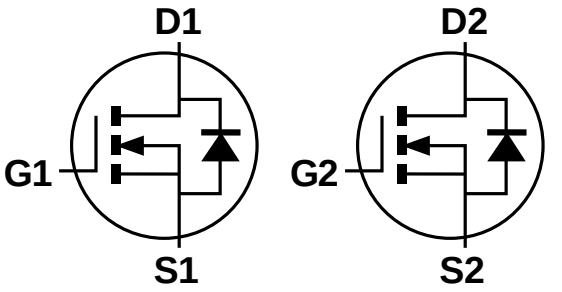
V-DFN3020-8 (Type N)



Bottom View



Bottom View
Pin Configuration



Q1 N-Channel MOSFET Q2 N-Channel MOSFET

Equivalent Circuit

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	5.5 4.4	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	1	A
Pulsed Drain Current			I_{DM}	30	A
Avalanche Current (Note 7) L = 0.1mH			I_{AS}	13	A
Avalanche Energy (Note 7) L = 0.1mH			E_{AS}	9.0	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.77	W
	T_A = +70°C		0.49	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	162	°C/W
	t<10s		116	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.78	W
	T_A = +70°C		1.10	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	71	°C/W
	t<10s		50	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	10.7	°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}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current T_J = +25°C	I_{DSS}	—	—	1.0	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.0	—	2.0	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	26 34	35 45	mΩ	V_{GS} = 10V, I_D = 4.8A V_{GS} = 4.5V, I_D = 4.3A
Diode Forward Voltage	V_{SD}	—	0.75	1.1	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	399	—	pF	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	57	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	50	—	pF	
Gate Resistance	R_g	—	1.36	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	4.5	—	nC	V_{DS} = 15V, I_D = 5.8A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	9.9	—	nC	
Gate-Source Charge	Q_{gs}	—	1.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	1.8	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	3.0	—	ns	V_{DD} = 15V, V_{GS} = 10V, R_L = 2.6Ω, R_G = 3Ω
Turn-On Rise Time	t_R	—	3.3	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	10.6	—	ns	
Turn-Off Fall Time	t_F	—	2.0	—	ns	
Reverse Recovery Time	t_{RR}	—	7.9	—	ns	I_F = 4.8A, di/dt = 100A/μs
Reverse Recovery Charge	Q_{RR}	—	2.4	—	nC	I_F = 4.8A, di/dt = 100A/μs

Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

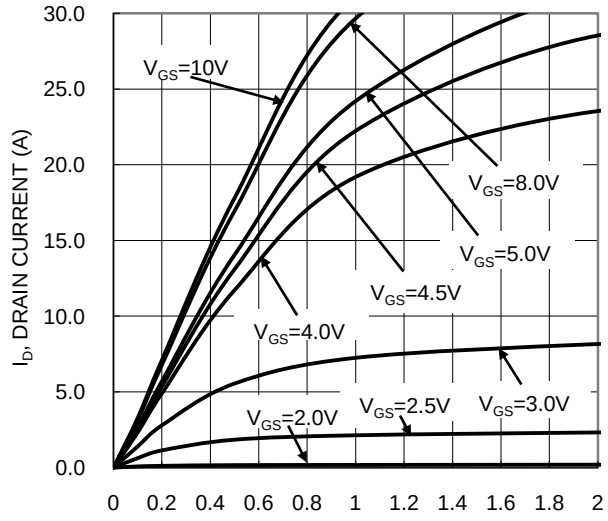


Figure 1. Typical Output Characteristic

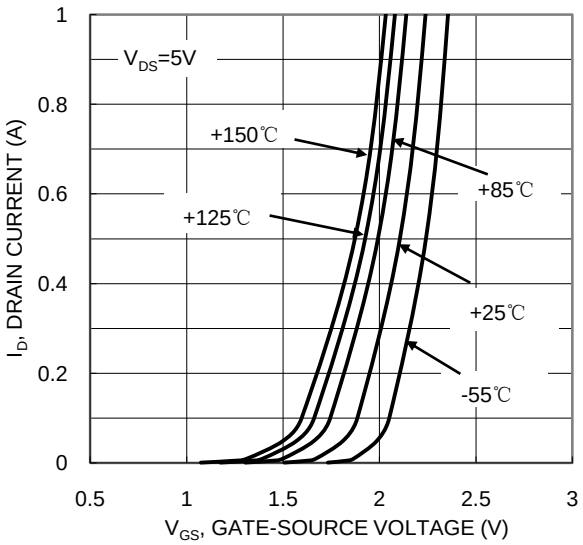


Figure 2. Typical Transfer Characteristic

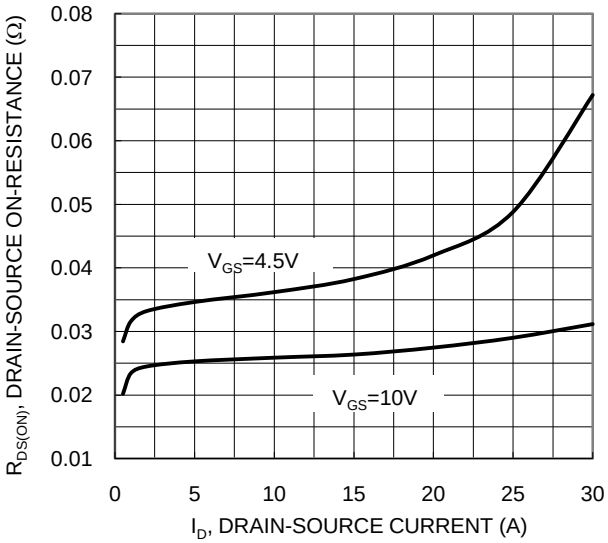


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

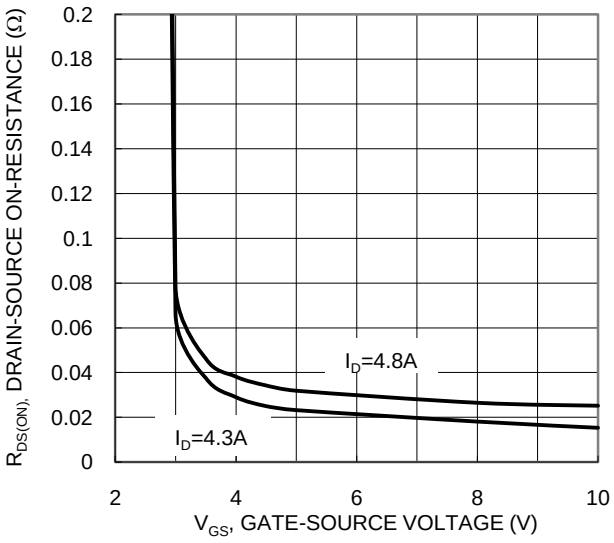


Figure 4. Typical Transfer Characteristic

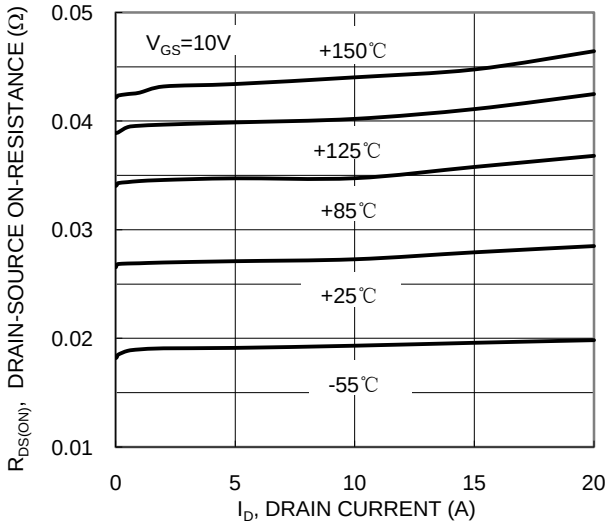


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

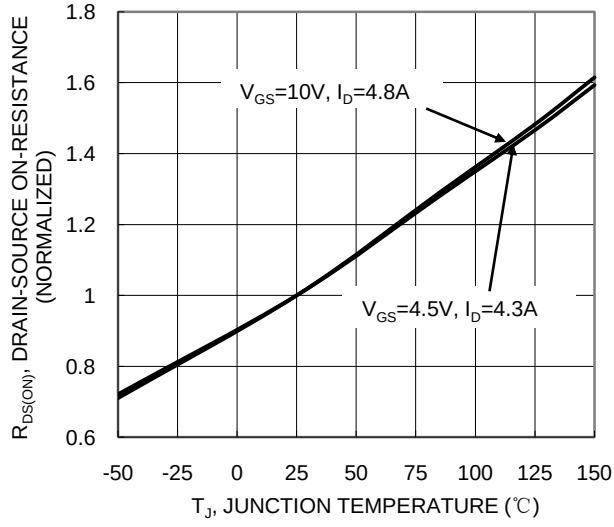


Figure 6. On-Resistance Variation with Temperature

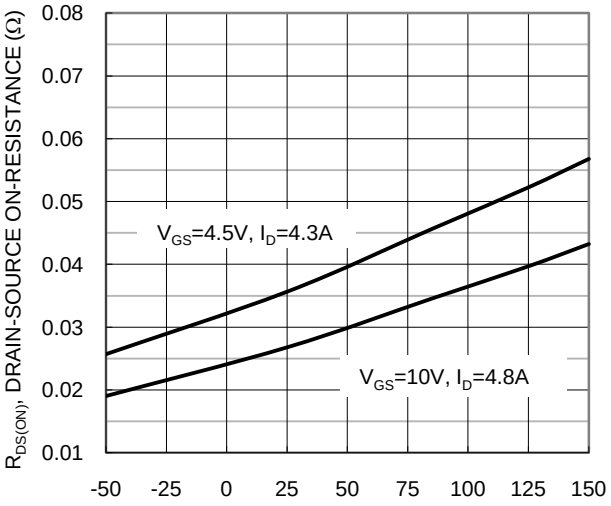


Figure 7. On-Resistance Variation with Temperature

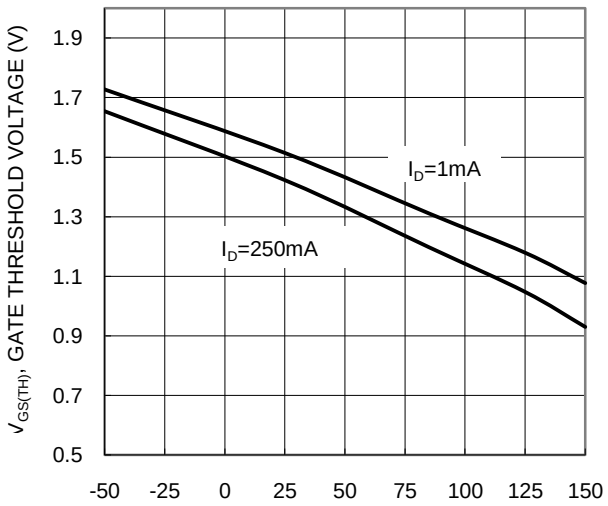


Figure 8. Gate Threshold Variation vs JunctionTemperature

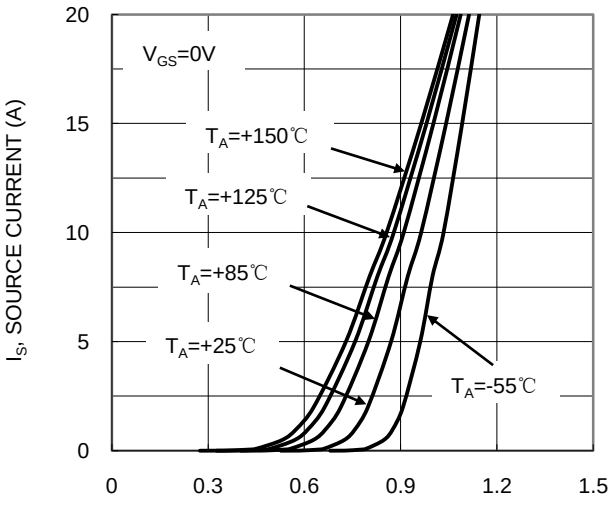


Figure 9. Diode Forward Voltage vs. Current

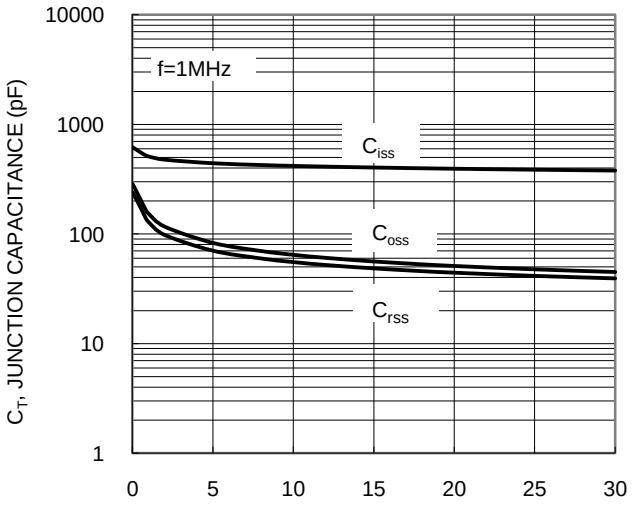


Figure 10. Typical Junction Capacitance

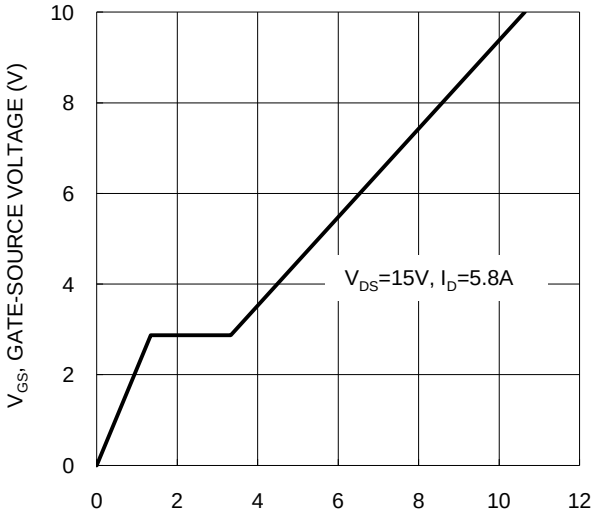


Figure 11. Gate Charge

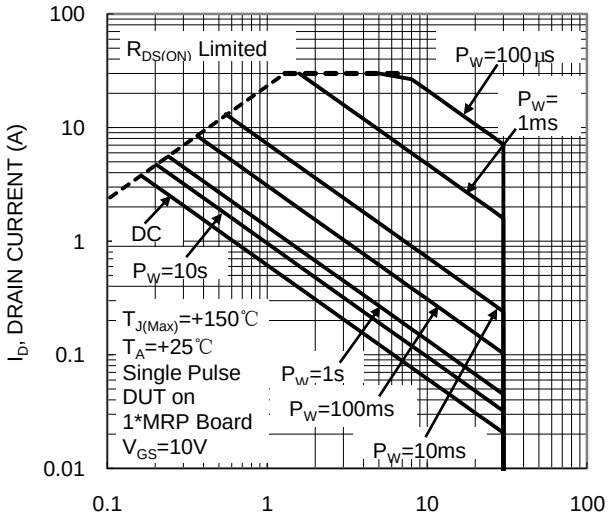
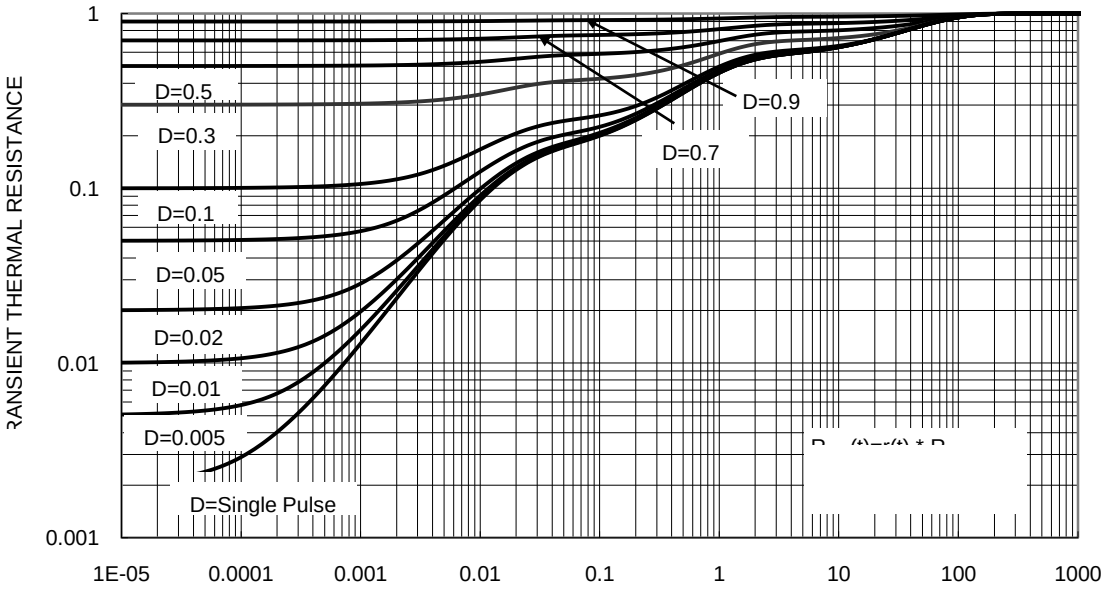
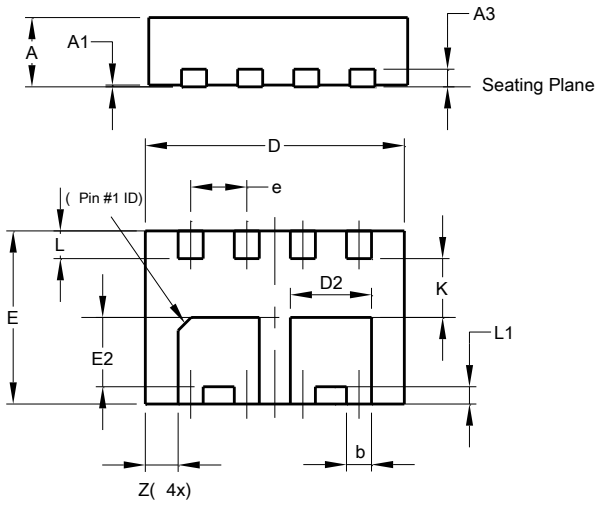


Figure 12. SOA, Safe Operation Area


1
0.1
0.01
0.001
RANSIENT THERMAL RESISTANCE
D=0.5
D=0.3
D=0.1
D=0.05
D=0.02
D=0.01
D=0.005
D=Single Pulse
D=0.9
D=0.7
1E-05
0.0001
0.001
0.01
0.1
1
10
100
1000

Package Outline Dimensions

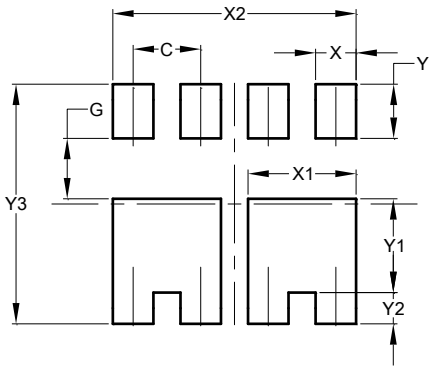
V-DFN3020-8 (Type N)



V-DFN3020-8 (Type N)			
Dim	**Min**	**Max**	**Typ**
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	0.203
b	0.24	0.34	0.29
D	2.95	3.05	3.00
D2	0.84	1.04	0.94
e	-	-	0.65
E	1.95	2.05	2.00
E2	0.70	0.90	0.80
L	0.27	0.37	0.32
L1	0.15	0.25	0.20
K	-	-	0.68
Z	-	-	0.38
All Dimensions in mm			

Suggested Pad Layout

V-DFN3020-8 (Type N)



Dimensions	Value (in mm)
C	0.650
G	0.580
X	0.390
X1	1.040
X2	2.340
Y	0.520
Y1	0.900
Y2	0.300
Y3	2.300