

HS34063AP8

Boost / Buck Voltage Regulator

1.2A, 100KHz Boost / Buck DC to DC Converter

● Features

- Operation from 3.0 V to 40 V Input
- Low Standby Current
- Current Limiting
- Output Switch Current to 1.2 A
- Output Voltage Adjustable
- Frequency Operation to 100 kHz
- Precision 2% Reference
- Pb - Free Packages are Available

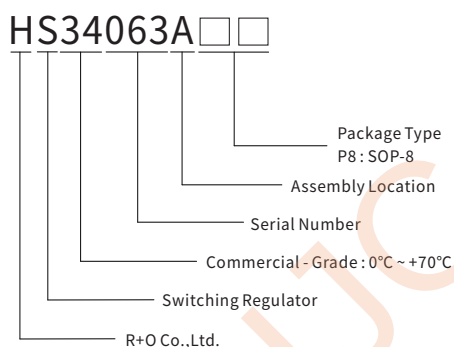
● Applications

- Blood Gas Analyzers : Portable
- Cable Solutions
- Telecommunications
- Portable Devices
- Consumer & Computing

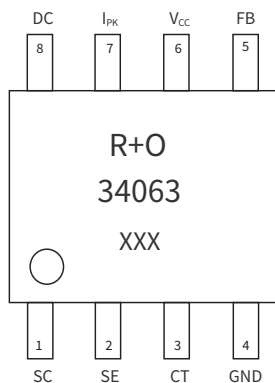
● General Description

The HS34063A Series is a monolithic control circuit containing the primary functions required for DC to DC converters. These devices consist of an internal temperature compensated reference, comparator, controlled duty cycle oscillator with an active current limit circuit, driver and high current output switch. This series was specifically designed to be incorporated in Step - Down and Step - Up and Voltage - Inverting application with a minimum number of external components.

● Part Numbering



● Pin Configuration & Marking



● Pin Description

Pin Number	Pin Name	Functional Description	Pin Number	Pin Name	Functional Description
1	SC	Switch Collector	5	FB	Comparatorm Inverting Input
2	SE	Switch Emitter	6	V _{CC}	Supply Voltage
3	CT	Timing Capacitor	7	I _{PK}	I _{PK} Sense
4	GND	Ground	8	DC	Drive Collector

● Ordering Information

Order Number	Package	Package Code	Unit Weight(g)	Tube/Reel(pcs)	Box(pcs)	Carton(pcs)	Delivery Mode	MSL
HS34063AP8	SOP - 8	R3	0.077	100/4000	8000	80000	13" reel	3

● Functional Block Diagram

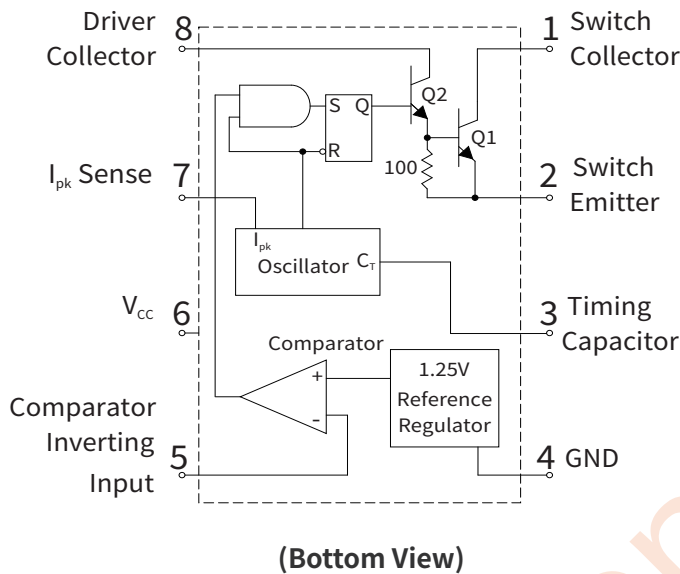


Figure 1. Internal Block Diagram

● Absolute Maximum Ratings (T_A=25°C Unless otherwise specified.)

Parameter	Symbol	Value	Unit
Maximum Supply Voltage	V _{CC}	40	V
Comparator Input Voltage Range	V _{IR}	- 0.3 to +40	V
Switch Collector Voltage	V _{C(switch)}	70	V
Switch Emitter Voltage (V _{Pin1} = 40 V)	V _{E(switch)}	40	V
Switch Collector to Emitter Voltage	V _{CE(switch)}	40	V
Driver Collector Voltage	V _{C(driver)}	40	V
Driver Collector Current	I _{C(driver)}	100	mA
Switch Current	I _{SW}	1.2	A
Power Dissipation	P _D	625	mW
Thermal Resistance (SOP-8)(Junction to Ambient, No Heatsink, Free Air)	R _{JA}	80	°C /W
Operating Junction Temperature	T _J	-65 to +150	°C
Storage Temperature Range	T _{stg}	-65 to +150	°C
Operating Ambient Temperature Range	T _A	-45 to +125	°C

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.

● **Electrical Characteristics**($V_{CC} = 5.0\text{ V}$, $T_A = -45$ to $+125$, unless otherwise specified.)

Parameter Name	Symbol	Test Conditions	Min.	Typ.	Max.	Units
OSCILLATOR						
Oscillator Frequency	f_{osc}	$V_{Pin5} = 0\text{ V}$, $C_T = 1.0\text{ nF}$, $T_A = 25^\circ\text{C}$	24	33	42	kHz
Charge Current	I_{chg}	$V_{CC} = 5.0\text{ V}$ to 40 V , $V_{pin3} = \text{Low}$	24	35	42	μA
Discharge Current	I_{dischg}	$V_{CC} = 5.0\text{ V}$ to 40 V , $V_{pin3} = \text{High}$	140	220	260	μA
Discharge to Charge Current Ratio	I_{dischg} / I_{chg}	P_{in7} to V_{CC} , $T_A = 25^\circ\text{C}$	5.2	6.5	7.5	--
Current Limit Sense Voltage	$V_{ipk(sense)}$	$I_{chg} = I_{dischg}$, $T_A = 25^\circ\text{C}$	250	300	350	mV
OUTPUT SWITCH						
Saturation Voltage, Darlington Connection	$V_{CE(sat)}$	$I_{SW} = 0.8\text{ A}$, Pins 1, 8 connected	--	1.0	1.3	V
Saturation Voltage ^{Note 1}	$V_{CE(sat)}$	$I_{SW} = 1.0\text{ A}$, $R_{Pin8} = 82\Omega$ to V_{CC} , Forced $\beta \approx 20$	--	0.45	0.7	V
DC Current Gain	h_{FE}	$I_{SW} = 1.0\text{ A}$, $V_{CE} = 5.0\text{ V}$, $T_A = 25^\circ\text{C}$	50	75	--	--
Collector Off – State Current	$I_{C(off)}$	$V_{CE} = 40\text{ V}$	--	0.01	100	μA
COMPARATOR						
Threshold Voltage	V_{th}	$V_{CC} = 5.0\text{ V}$, $T_A = 25^\circ\text{C}$	1.23	1.25	1.27	V
Threshold Voltage Line Regulation	Reg_{line}	$V_{CC} = 5.0\text{ V}$ to 40 V	--	1.4	5.0	mV
Input Bias Current	I_{IB}	$V_{in} = 0\text{ V}$	--	-20	-400	μA
TOTAL DEVICE						
Supply Current	I_{CC}	$V_{CC} = 5.0\text{ V}$ to 40 V , $C_T = 1.0\text{ nF}$, Pin 7 = V_{CC} , $V_{Pin5} > V_{th}$, Pin 2 = GND, remaining pins open	--	--	4.0	mA

Note 1. If the output switch is driven into hard saturation (non - Darlington configuration) at low switch currents ($\leq 300\text{ mA}$) and high driver currents ($\geq 30\text{ mA}$), it may take up to $2.0\mu\text{s}$ for it to come out of saturation. This condition will shorten the off time at frequencies $\geq 30\text{ kHz}$, and is magnified at high temperatures. This condition does not occur with a Darlington configuration, since the output switch cannot saturate. If a non - Darlington configuration is used, the following output drive condition is recommended:

Forced β of output switch : $[I_{C(output)} / (I_{C(driver)} - 7.0\text{ mA})] \geq 10$, the 100Ω resistor in the emitter of the driver device requires about 7.0 mA before the output switch conducts.

Typical Applications

Application of HS34063A in inverter circuits

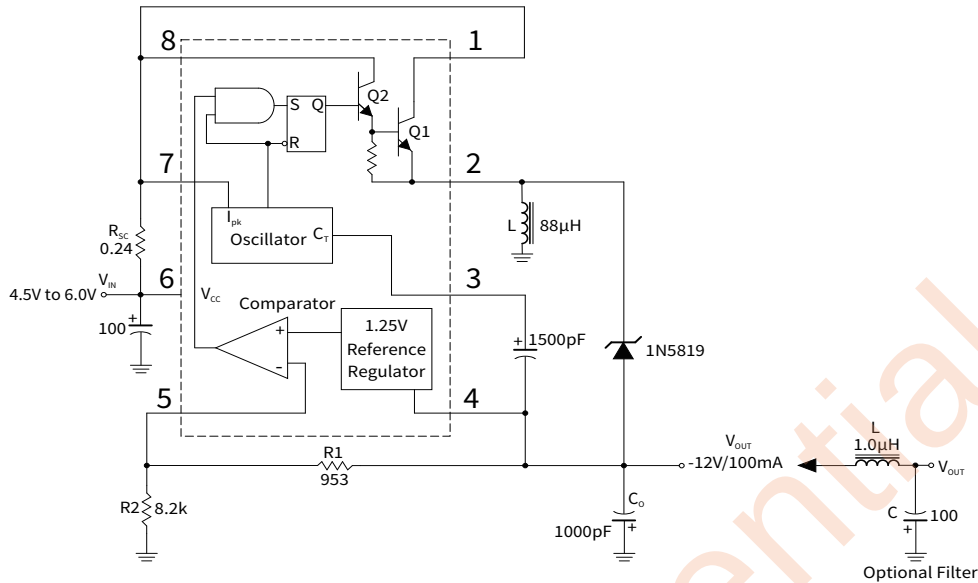


Figure 2. Application circuit of Voltage Inverting Converter

Test Parameter	Conditions	Results
Line Regulation	$V_{IN} = 4.5\text{ V to }6.0\text{ V}, I_O = 100\text{ mA}$	$3.0\text{ mV} = \pm 0.012\%$
Load Regulation	$V_{IN} = 5.0\text{ V}, I_O = 10\text{ mA to }100\text{ mA}$	$0.022\text{ V} = \pm 0.09\%$
Output Ripple	$V_{IN} = 5.0\text{ V}, I_O = 100\text{ mA}$	500 mVpp
Short Circuit Current	$V_{IN} = 5.0\text{ V}, R_L = 0.1\ \Omega$	910 mA
Efficiency	$V_{IN} = 5.0\text{ V}, I_O = 100\text{ mA}$	62.2%
Output Ripple With Optional Filter	$V_{IN} = 5.0\text{ V}, I_O = 100\text{ mA}$	70 mVpp

Table 1. Test parameters of Voltage Inverting Converter

Application of HS34063A in Boost Converter

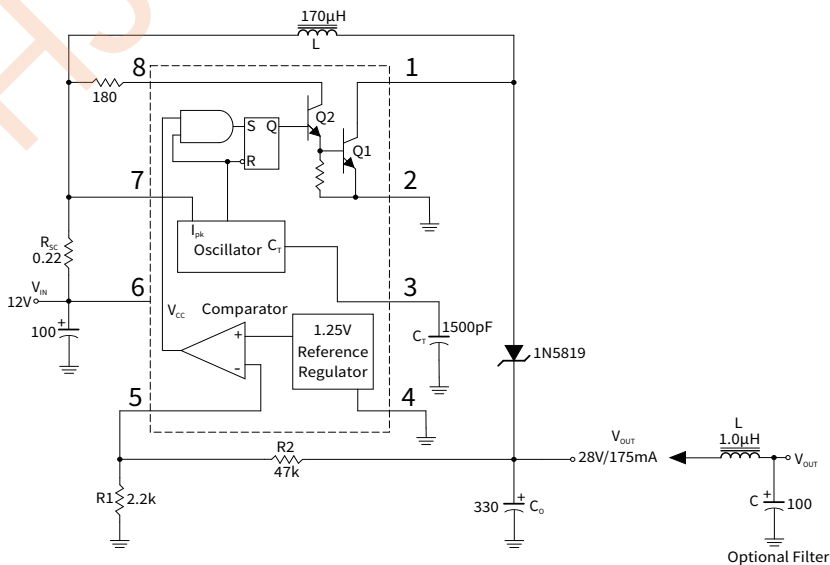


Figure 3. Application circuit of Boost Converter

● Typical Applications(Cont.)

Application of HS34063A in Boost Converter(Cont.)

Test Parameter	Conditions	Results
Line Regulation	$V_{IN} = 8.0\text{ V to }16\text{ V}, I_O = 175\text{ mA}$	$30\text{ mV} = \pm 0.05\%$
Load Regulation	$V_{IN} = 12\text{ V}, I_O = 75\text{ mA to }175\text{ mA}$	$10\text{ mV} = \pm 0.017\%$
Output Ripple	$V_{IN} = 12\text{ V}, I_O = 175\text{ mA}$	400 mV_{PP}
Efficiency	$V_{IN} = 12\text{ V}, I_O = 175\text{ mA}$	87.7%
Output Ripple With Optional Filter	$V_{IN} = 12\text{ V}, I_O = 175\text{ mA}$	40 mV_{PP}

Table 2.Test parameters of Boost Converter

Application of HS34063A in Buck Converter

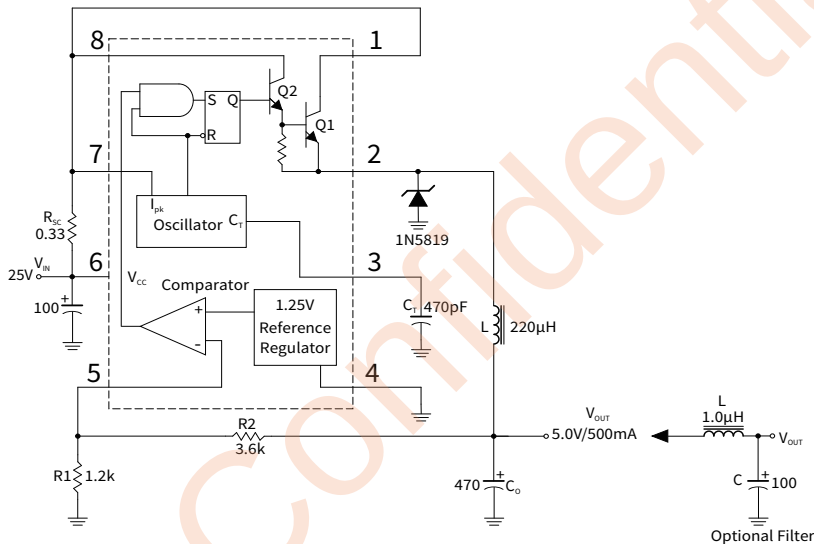
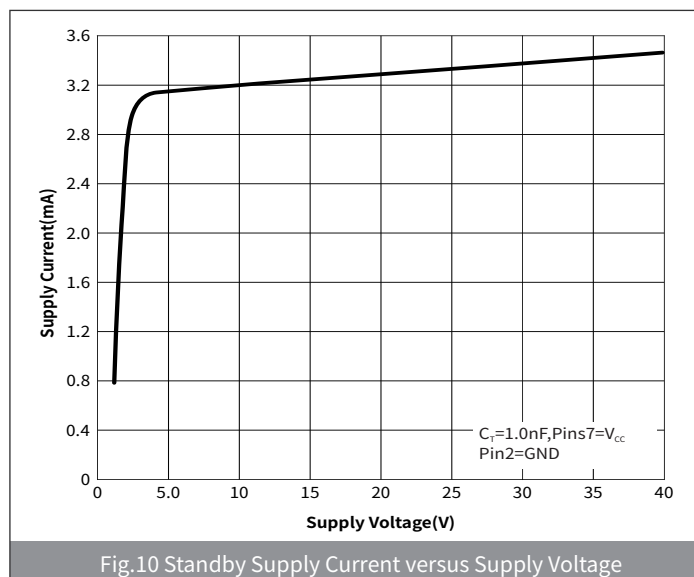
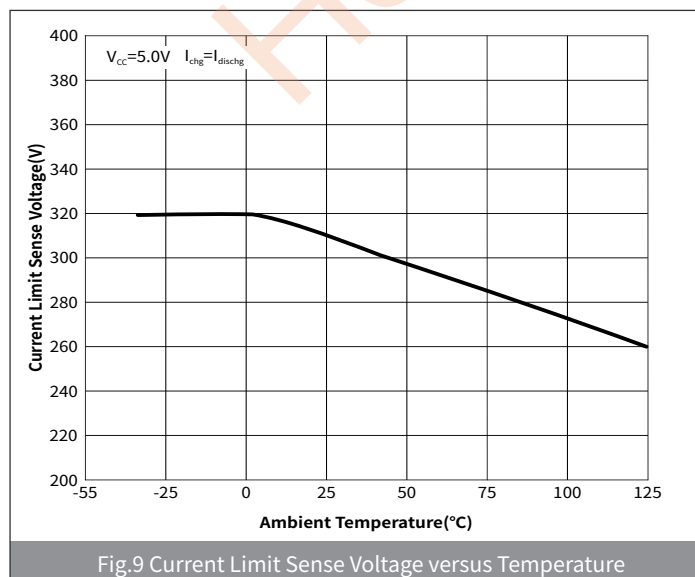
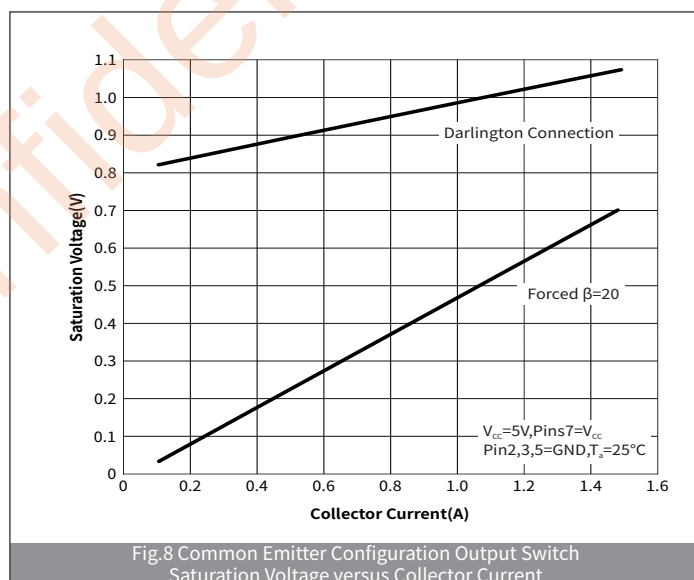
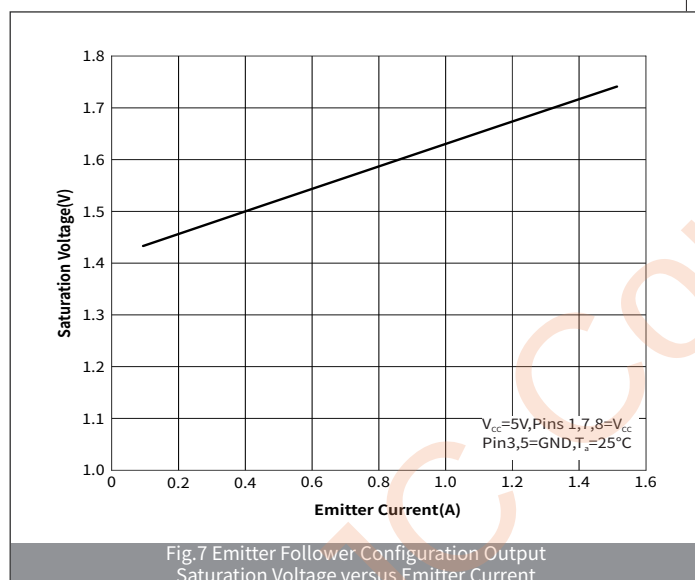
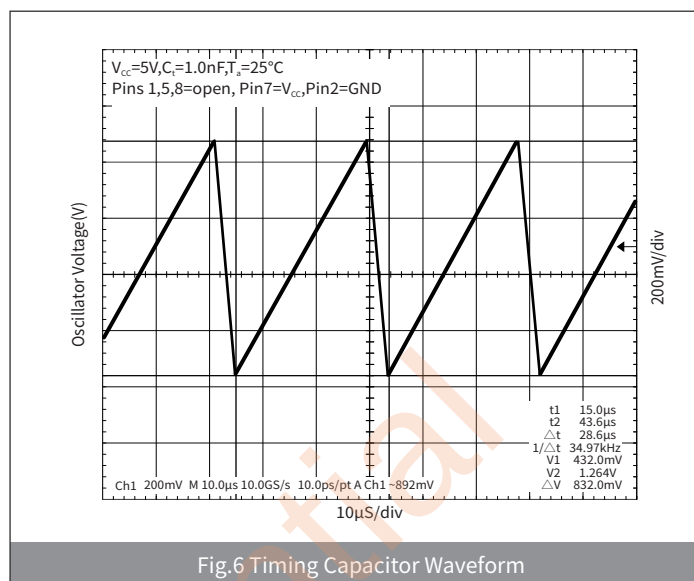
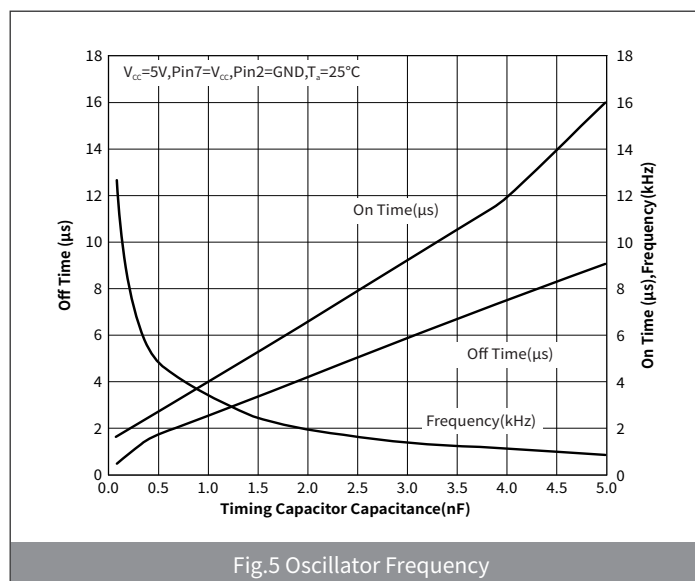


Figure 4. Application circuit of Buck Converter

Test Parameter	Conditions	Results
Line Regulation	$V_{IN} = 15\text{ V to }25\text{ V}, I_O = 500\text{ mA}$	$12\text{ mV} = \pm 0.12\%$
Load Regulation	$V_{IN} = 25\text{ V}, I_O = 50\text{ mA to }500\text{ mA}$	$3.0\text{ mV} = \pm 0.03\%$
Output Ripple	$V_{IN} = 25\text{ V}, I_O = 500\text{ mA}$	120 mV_{PP}
Short Circuit Current	$V_{IN} = 25\text{ V}, R_L = 0.1\ \Omega$	1.1 A
Efficiency	$V_{IN} = 25\text{ V}, I_O = 500\text{ mA}$	83.7%
Output Ripple With Optional Filter	$V_{IN} = 25\text{ V}, I_O = 500\text{ mA}$	40 mV_{PP}

Table 3. Test parameters of Boost Converter

● Typical Performance Characteristics



HS34063AP8

Boost / Buck Voltage Regulator

● Package Outline Dimensions (SOP-8)

Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	5.70	6.30	0.224	0.248
B	5.13MAX.		0.202MAX.	
C	4.72	5.12	0.186	0.201
E	1.80MAX.		0.071MAX.	
F	0.31	0.51	0.0122	0.020
F1	1.27TYP.		0.050TYP.	
G	3.75	4.15	0.148	0.163
H	1.35	1.65	0.053	0.065
H1	0.1	0.25	0.004	0.010
L	0.3	0.7	0.012	0.028
L1	0.21TYP.		0.008TYP.	
θ	-	8°	-	8°

● Suggested Pad Layout

Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
a	2.90	3.10	0.114	0.122
J	5.10	5.30	0.201	0.209
K	1.17	1.37	0.046	0.054
X	2.10	2.30	0.083	0.091
X1	7.30	7.50	0.287	0.295
Y	0.50	0.70	0.020	0.028
Y1	3.71	3.91	0.146	0.154