Positive-Voltage Regulator

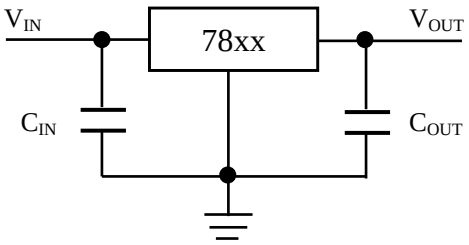
◆ Description

The 78xx series are fixed-voltage monolithic integrated circuit voltage regulators designed for wide range of applications. Each of these regulators can deliver up to 1.5A of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload.

◆ Features

- Three Terminal Regulators.
- Output Current up to:1.5A.
- No External Components.
- Internal Thermal Overload Protection.
- Internal Short-Circuit Limiting.
- Output Voltage Offered in 4% Tolerance.

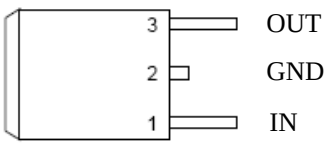
◆ Typical Application



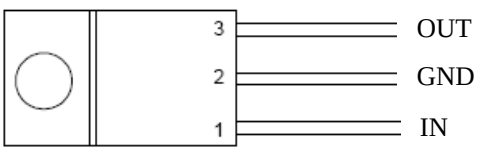
◆ Applications

- Linear Regulator
- Microprocessor Power Supply
- Graphic Card
- Mother Board
- Security Product

◆ Pin Description



TO-263 (Top View)



TO-220 (Top View)

◆ Ordering Information

Part Number	Temperature Range	Package	Pin Assignment			Packing
			Input	GND	Output	
7805GI	-40 °C ~ +125 °C	TO-263	1	2	3	Tape & Reel
7806GI						
7808GI						
7809GI						
7810GI						
7812GI						
7815GI						
7818GI						
7820GI						
7824GI						
7805FI	-40 °C ~ +125 °C	TO-220	1	2	3	Tube
7806FI						
7808FI						
7809FI						
7810FI						
7812FI						
7815FI						
7818FI						
7820FI						
7824FI						

◆ Absolute Maximum Ratings

Symbol	Parameter	Value		Unit
		7805~7818	7820~7824	
V_{IN}	Input voltage	35	40	V
I_{OUT}	Output current	1.5		A
TA	Operating ambient temperature	-40 ~ +125		°C
T_J	Operating junction temperature	150		°C
T_{STG}	Storage temperature	-65 ~ +150		°C
T_{LEAD}	Lead temperature 1.6mm from case for 10 seconds	260		°C

◆ Thermal Characteristics

Symbol	Parameter	Package	Typical Value	Unit
θ_{JA}	Thermal Resistance From Junction to Ambient in Free Air. (Measured with the component mounted on a high effective thermal conductivity test board in free air.)	TO-263	55	°C/W
		TO-220	65	

◆ 7805 Electrical Characteristics (T_A=25°C, V_{IN}=10V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			4.8	5.0	5.2	V
		I_O=5mA to 1.0A V_{IN}=7V to 20V	0 to 125°C	4.75	5.00	5.25	
Reg_{line}	Line regulation	V_{IN}=7V to 25V		-	-	100	mV
		V_{IN}=8V to 12V		-	-	50	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	50	mV
		I_O=5mA to 1.0A		-	-	100	
PSRR	Ripple rejection	V_{IN}=8V to 18V, f=120Hz		62	80	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	40	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=7V to 25V	0 to 125°C	-	-	1.3	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7806 Electrical Characteristics (T_A=25°C, V_{IN}=11V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			5.75	6.00	6.25	V
		I_O=5mA to 1.0A V_{IN}=8V to 21V	0 to 125°C	5.7	6.0	6.3	
Reg_{line}	Line regulation	V_{IN}=8V to 25V		-	-	120	mV
		V_{IN}=9V to 13V		-	-	60	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	60	mV
		I_O=5mA to 1.0A		-	-	120	
PSRR	Ripple rejection	V_{IN}=9V to 19V, f=120Hz		62	80	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	45	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=8V to 25V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7808 Electrical Characteristics (T_A=25°C, V_{IN}=14V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			7.7	8.0	8.3	V
		I_O=5mA to 1.0A V_{IN}=10.5V to 23V	0 to 125°C	7.6	8.0	8.4	
Reg_{line}	Line regulation	V_{IN}=10.5V to 25V		-	-	160	mV
		V_{IN}=11V to 17V		-	-	80	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	80	mV
		I_O=5mA to 1.0A		-	-	160	
PSRR	Ripple rejection	V_{IN}=11.5V to 21.5V, f=120Hz		62	80	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	52	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=10.5V to 25V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7809 Electrical Characteristics (T_A=25°C, V_{IN}=15V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			8.65	9.00	9.35	V
		I_O=5mA to 1.0A V_{IN}=11.5V to 24V	0 to 125°C	8.55	9.00	9.45	
Reg_{line}	Line regulation	V_{IN}=11V to 26V		-	-	180	mV
		V_{IN}=11.5V to 17V		-	-	90	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	90	mV
		I_O=5mA to 1.0A		-	-	180	
PSRR	Ripple rejection	V_{IN}=12V to 23.5V, f=120Hz		62	80	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	58	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=11.5V to 26V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7812 Electrical Characteristics (T_A=25°C, V_{IN}=19V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			11.5	12.0	12.5	V
		I_O=5mA to 1.0A V_{IN}=14.5V to 27V	0 to 125°C	11.4	12.0	12.6	
Reg_{line}	Line regulation	V_{IN}=14.5V to 30V		-	-	240	mV
		V_{IN}=16V to 23V		-	-	120	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	120	mV
		I_O=5mA to 1.0A		-	-	240	
PSRR	Ripple rejection	V_{IN}=15V to 25V, f=120Hz		62	80	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	75	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=14.5V to 30V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7815 Electrical Characteristics (T_A=25°C, V_{IN}=23V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			14.4	15.0	15.6	V
		I_O=5mA to 1.0A V_{IN}=17.5V to 30V	0 to 125°C	14.25	15.0	15.75	
Reg_{line}	Line regulation	V_{IN}=17.5V to 30V		-	-	300	mV
		V_{IN}=20V to 26V		-	-	150	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	150	mV
		I_O=5mA to 1.0A		-	-	300	
PSRR	Ripple rejection	V_{IN}=18.5V to 28.5V, f=120Hz		60	70	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	100	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=17.5V to 30V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7818 Electrical Characteristics (T_A=25°C, V_{IN}=27V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			17.3	18.0	18.7	V
		I_O=5mA to 1.0A V_{IN}=21V to 33V	0 to 125°C	17.1	18.0	18.9	
Reg_{line}	Line regulation	V_{IN}=21.5V to 33V		-	-	360	mV
		V_{IN}=24V to 30V		-	-	180	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	180	mV
		I_O=5mA to 1.0A		-	-	360	
PSRR	Ripple rejection	V_{IN}=22.5V to 32V, f=120Hz		60	70	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	100	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=21V to 33V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7820 Electrical Characteristics (T_A=25°C, V_{IN}=29V, I_{OUT}=500mA, unless otherwise noted .)

Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			19.2	20.0	20.8	V
		I_O=5mA to 1.0A V_{IN}=23V to 35V	0 to 125°C	19.0	20.0	21.0	
Reg_{line}	Line regulation	V_{IN}=23V to 35V		-	-	400	mV
		V_{IN}=26V to 32V		-	-	200	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	200	mV
		I_O=5mA to 1.0A		-	-	400	
PSRR	Ripple rejection	V_{IN}=24.5V to 35V, f=120Hz		55	65	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	120	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=23V to 35V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

◆ 7824 Electrical Characteristics (T_A=25°C, V_{IN}=31V, I_{OUT}=500mA, unless otherwise noted .)

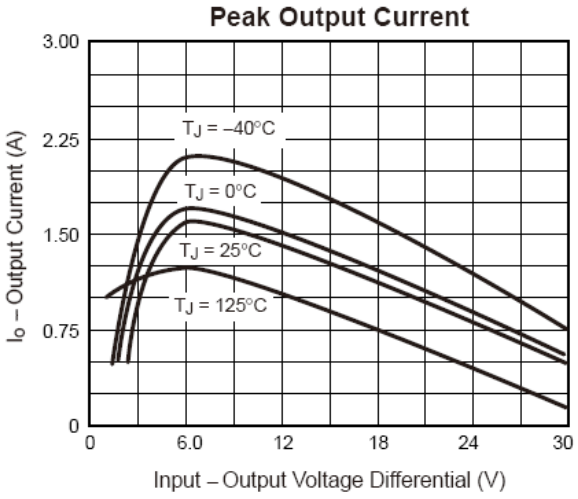
Symbol	Parameter	Test Conditions*		Min.	Typ.	Max.	Unit
V_{OUT}**	Output voltage			23.0	24.0	25.0	V
		I_O=5mA to 1.0A V_{IN}=27V to 38V	0 to 125°C	22.8	24.0	25.2	
Reg_{line}	Line regulation	V_{IN}=27V to 38V		-	-	480	mV
		V_{IN}=30V to 36V		-	-	240	
Reg_{load}	Load regulation	I_O=250mA to 750mA		-	-	240	mV
		I_O=5mA to 1.0A		-	-	480	
PSRR	Ripple rejection	V_{IN}=28.5V to 37V, f=120Hz		55	65	-	dB
V_n	Output noise voltage	F=10Hz~100Hz		-	140	-	uV
$V_{DROPOUT}$	Dropout voltage			-	2.0	-	V
I_Q	Bias current			-	-	8.0	mA
$\triangle I_Q$	Bias current change	V_{IN}=27V to 38V	0 to 125°C	-	-	1.0	mA
		I_O=5mA to 1.0A		-	-	0.5	

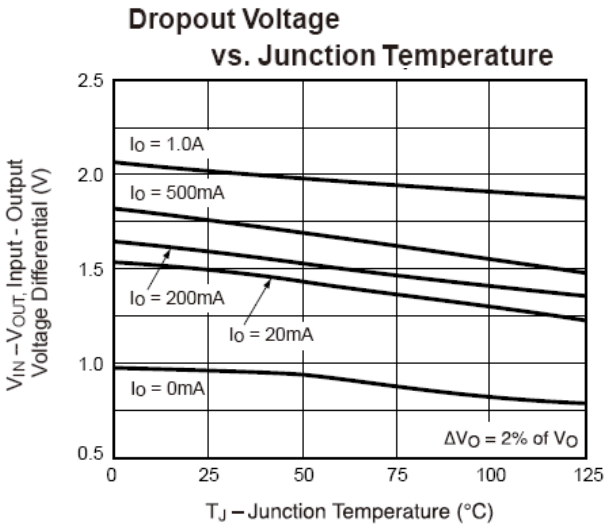
Note:

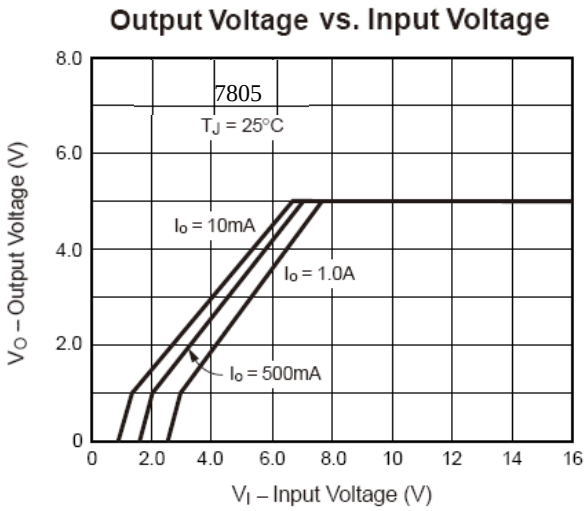
* Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33uF capacitor across the input and a 0.1uF capacitor across the output.

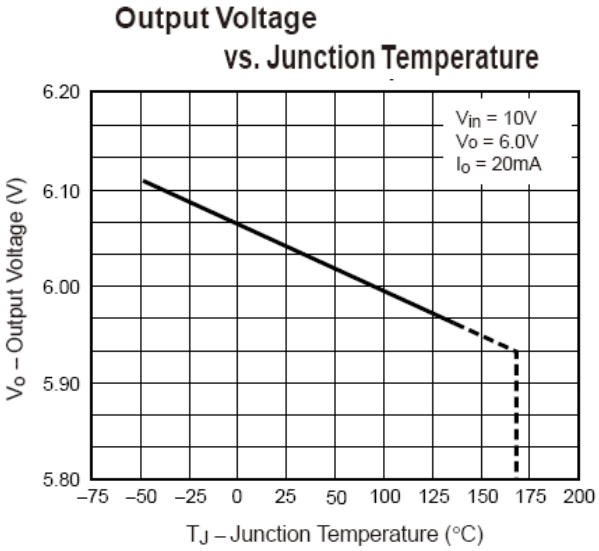
** The specification applies only for DC power dissipation permitted by absolute maximum rating.

◆ Typical Characteristics



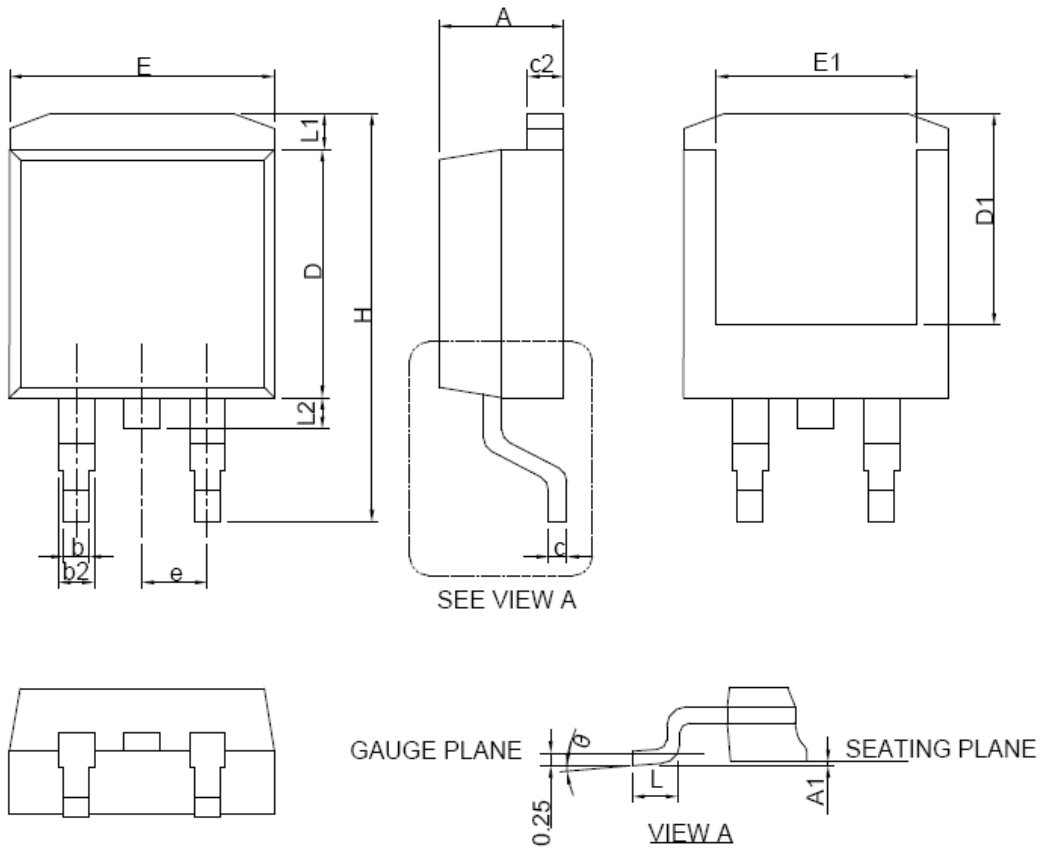






◆ Package Information

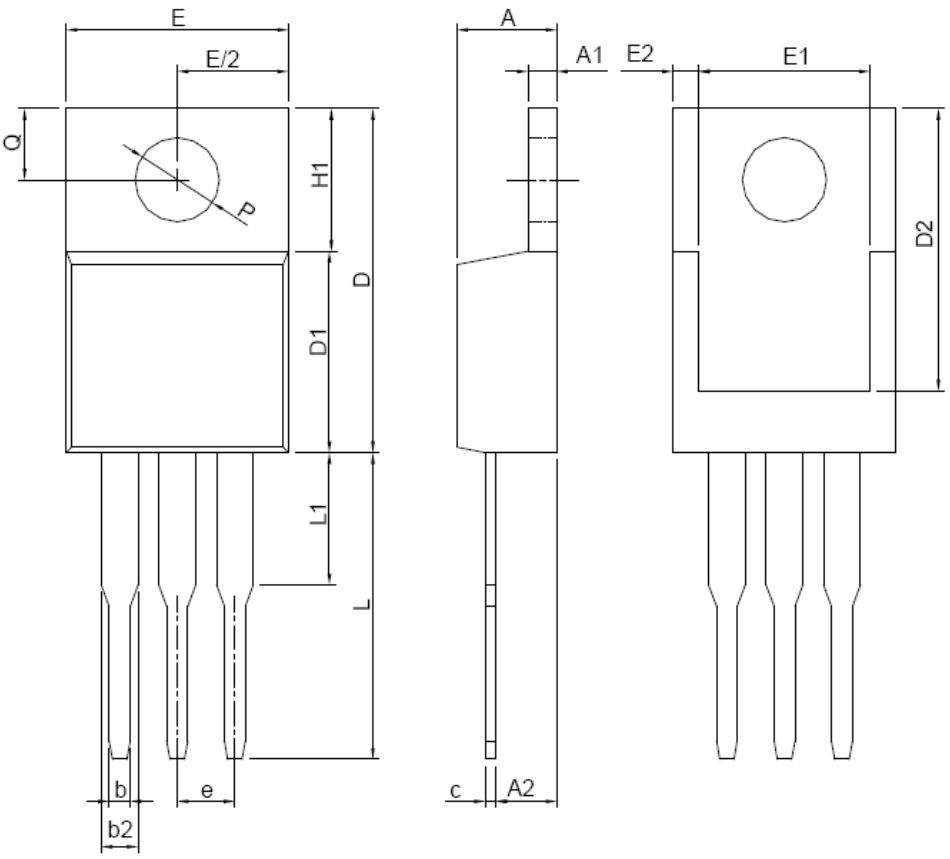
TO-263



SYMBOL	TO-263			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b2	1.14	1.78	0.045	0.070
c	0.38	0.74	0.015	0.029
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380
D1	6.00	9.00	0.236	0.354
E	9.65	11.43	0.380	0.450
E1	6.22	9.00	0.245	0.354
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1		1.68		0.066
L2		1.78		0.070
θ	0°	8°	0°	8°

◆ Package Information

TO-220



SYMBOL	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	12.88	0.480	0.507
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
E2		0.76		0.030
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1		6.35		0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135