Fourteen bit binary serial counter

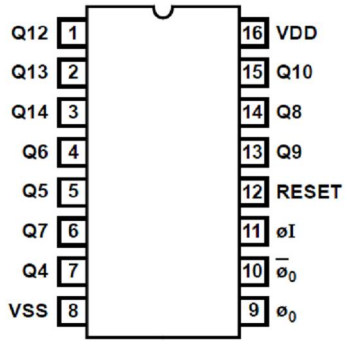
Description：

CD4060 includes an oscillator and a set of fourteen bit binary serial counters. The structure of the oscillator can be an RC or crystal oscillator circuit. When Reset is set to high level, the counter is reset to zero and the oscillator is invalid. All counter bits are master and slave triggers. The falling edge counters of CP1 (and CP0) are counted in binary, and Schmitt triggers are used on the clock pulse line to have unlimited clock rise and fall times.

Main features:

-Power supply up to 18 (maximum)
-Public Reset RESET
-Input can reach 12MHz at 15V
-Can work completely statically
-Buffer input and output
-Schmidt triggers input pulse
-Standardized and symmetrical output characteristics
5V, 10V, 15V three levels

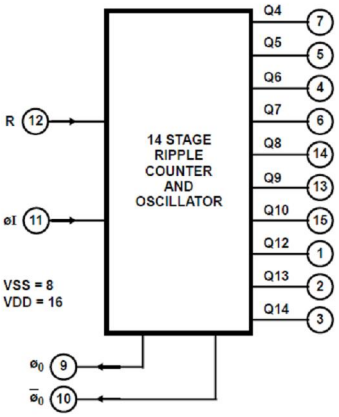
Pin arrangement diagram:



Characteristics of oscillator:

RC or crystal oscillator configuration
At 15V, the RC oscillator can reach a frequency of 690kHz.

Functional Block Diagram:



Application:Control Count

-Timer
-Frequency divider
-Time-delay circuit

Absolute Maximum Ratings：

parameter	Symbol	Max	Unit
working voltage	V_{CC}	-0.5-18	V
Input/output voltage	V_{IN}、$V_{I/O}$	-0.5+VSS-VDD+0.5V	V
Input current	I_I	±10	mA
Dissipated power	P_D	500	mW
working temperature	T_A	0-70	℃
Storage temperature	T_S	-65-150	℃
Pin welding temperature	T_W	260,10s	℃

Note: Limit parameters refer to the limit values that cannot be exceeded under any conditions. If the limit value is exceeded, it may cause physical damage such as product degradation; At the same time, it cannot be guaranteed that the chip can function properly when approaching the limit parameters.

electrical characteristic

PARAMETER	SYMBOL	CONDITIONS (NOTE 1)		TEMPERATURE (° C)	LIMITS		UNITS
					MIN	MAX	
Supply Current	IDD	VDD = 18V, VIN = VDD or GND		+25	-	10	uA
Input Leakage Current	IIL	VIN = VDD or GND	VDD = 18V	+25	-300	-	nA
Input Leakage Current	IIH	VIN = VDD or GND	VDD = 18V	+25	-	300	nA
Output Voltage	VOL15	VDD = 15V, No Load		+25	-	50	mV
Output Voltage	VOH15	VDD = 15V, No Load (Note 3)		+25	14.95	-	V
Output Current (Sink) (Excluding pins 9 & 10)	IOL5	VDD = 5V, VOUT = 0.4V		+25	0.53	-	mA
	IOL10	VDD = 10V, VOUT = 0.5V		+25	1.4	-	mA
	IOL15	VDD = 15V, VOUT = 1.5V		+25	3.5	-	mA
Output Current (Source) (Excluding pins 9 & 10)	IOH5A	VDD = 5V, VOUT = 4.6V		+25	-	-0.53	mA
	IOH5B	VDD = 5V, VOUT = 2.5V		+25	-	-1.8	mA
	IOH10	VDD = 10V, VOUT = 9.5V		+25	-	-1.4	mA
	IOH15	VDD = 15V, VOUT = 13.5V		+25	-	-3.5	mA
N Threshold Voltage	VNTH	VDD = 10V, ISS = -10uA		+25	-2.8	-0.7	V
P Threshold Voltage	VPTH	VSS = 0V, IDD = 10uA		+25	0.7	2.8	V
Functional	F	VDD = 2.8V, VIN = VDD or GND		+25	VOH > VDD/2	VOL < VDD/2	V
		VDD = 18V, VIN = VDD or GND					
		VDD = 3V, VIN = VDD or GND					
Input Voltage Low (Note 2)	VIL	VDD = 5V, VOH > 4.5V, VOL < 0.5V		+25	-	1.5	V
Input Voltage High (Note 2)	VIH	VDD = 5V, VOH > 4.5V, VOL < 0.5V		+25	3.5	-	V
Input Voltage Low (Note 2)	VIL	VDD = 15V, VOH > 13.5V, VOL < 1.5V		+25	-	4	V
Input Voltage High (Note 2)	VIH	VDD = 15V, VOH > 13.5V, VOL < 1.5V		+25	11	-	V

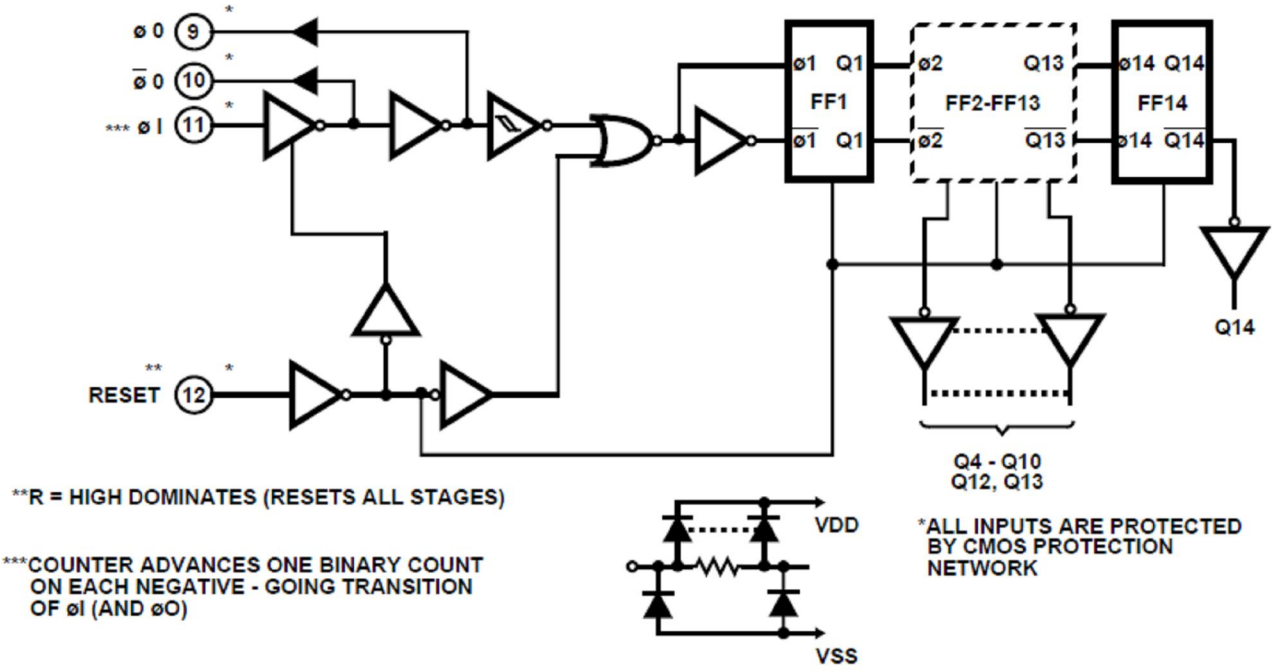
Notes: 1. All voltages referenced to device GND, 100% testing being implemented.

2. Go/No Go test with limits applied to inputs.

3. For accuracy, voltage is measured differentially to VDD. Limitis 0.050V max.

PARAMETER	SYMBOL	CONDITIONS	TEMPERATURE (° C)	LIMITS		UNITS
				MIN	MAX	
Drive Current at Pin 9 Oscillator Design	IOL	VDD = 5V, VO = .4V	+25	0.16	-	mA
		VDD = 10V, VO = .5V	+25	0.42	-	mA
		VDD = 15V, VO = 1.5V	+25	-1.0	-	mA
Drive Current at Pin 9 Oscillator Design	IOH	VDD = 5V	+25	-	-.16	mA
		VDD = 10V	+25	-	-.42	mA
		VDD = 15V	+25	-	1.0	mA
Propagation Delay Input Pulse øI to Q4	TPHL1 TPLH1	VDD = 10V	+25	-	300	ns
		VDD = 15V	+25	-	200	ns
Propagation Delay QN to QN + 1	TPHL2 TPLH2	VDD = 10V	+25	-	100	ns
		VDD = 15V	+25	-	80	ns
Propagation Delay RESET	TPHL3	VDD = 10V	+25	-	160	ns
		VDD = 15V	+25	-	100	ns
Transition Time	TTHL TTLH	VDD = 10V	+25	-	100	ns
		VDD = 15V	+25	-	80	ns
Maximum Input Pulse Frequency	FØI	VDD = 10V	+25	8	-	MHz
		VDD = 15V	+25	12	-	MHz
Minimum RESET Pulse Width	TW	VDD = 5V	+25	-	120	ns
		VDD = 10V	+25	-	60	ns
		VDD = 15V	+25	-	40	ns
Minimum Input Pulse Width F = 100kHz	TW	VDD = 5V	+25	-	100	ns
		VDD = 10V	+25	-	40	ns
		VDD = 15V	+25	-	30	ns
RC Operation RX Max	RX	VDD = 5V, CX = 10 F	+25	-	20	MΩ
		VDD = 10V, CX = 50 F	+25	-	20	MΩ
		VDD = 15V, CX = 10 F	+25	-	10	MΩ
RC Operation CX Max	CX	VDD = 5V, RX = 500kΩ	+25	-	1000	F
		VDD = 10V, RX = 300kΩ	+25	-	50	F
		VDD = 15V, RX = 300kΩ	+25	-	50	F
Maximum Oscillator Frequency (Note 4)	RX = 5kΩ CX = 15pF	VDD = 10V	+25	530	810	ns
		VDD = 15V	+25	690	940	ns
RC Operation Variation of Frequency (Unit-to-Unit)	CX = 200pF RS = 560K RX = 50k	VDD = 5V	+25	18	25	kHz
		VDD = 10V	+25	20	26	kHz
		VDD = 15V	+25	21.1	27	kHz
Variation of Frequency with Voltage Change	CX = 200pF RS = 560K	5V to 10V	+25	-	2	kHz
		10V to 15V	+25	-	1	kHz
Input Capacitance	CIN	Any Input	+25	-	7.5	pF

Internal Block Diagram:



Characteristic curve:

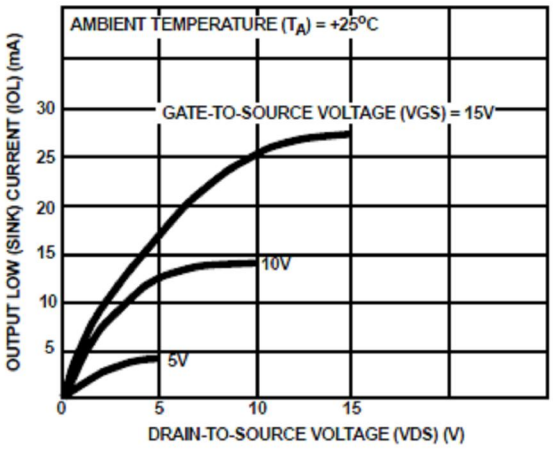


FIGURE 1. TYPICAL N-CHANNEL OUTPUT LOW SINK CURRENT CHARACTERISTICS

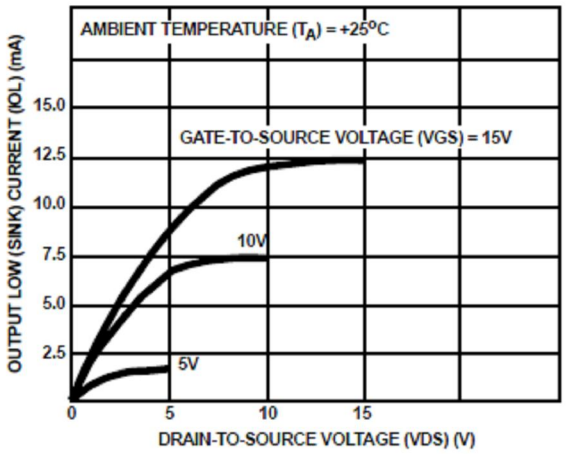


FIGURE 2. MINIMUM N-CHANNEL OUTPUT LOW (SINK) CURRENT CHARACTERISTICS

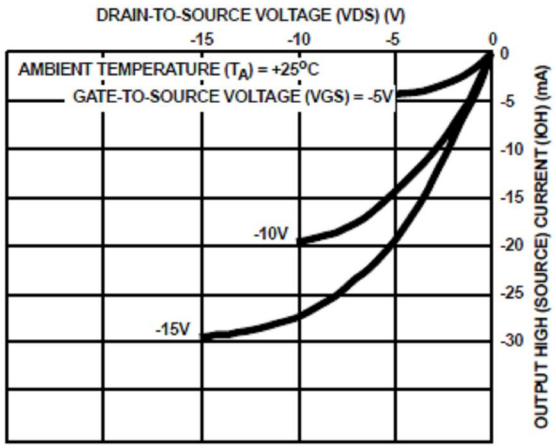


FIGURE 3. TYPICAL P-CHANNEL OUTPUT HIGH (SOURCE) CURRENT CHARACTERISTICS

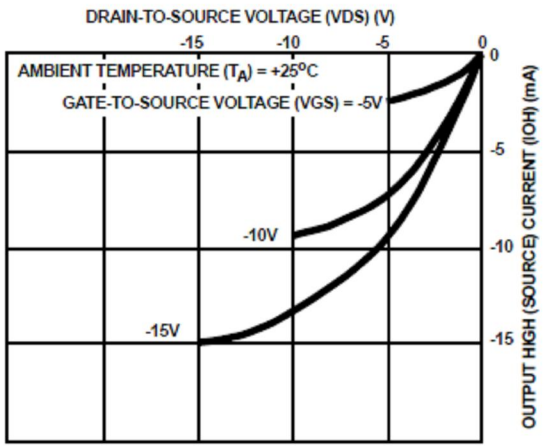


FIGURE 4. MINIMUM P-CHANNEL OUTPUT HIGH (SOURCE) CURRENT CHARACTERISTICS

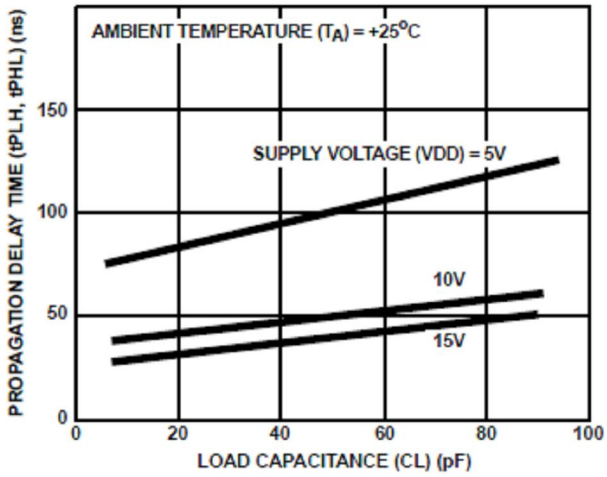


FIGURE 5. TYPICAL PROPAGATION DELAY TIME (QN TO QN+1) AS A FUNCTION OF LOAD CAPACITANCE

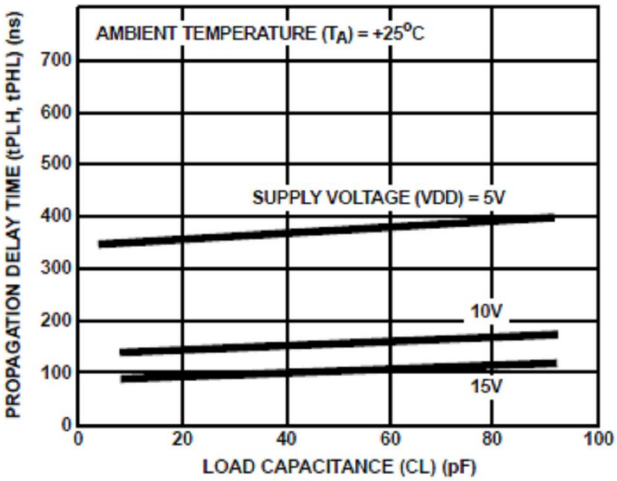


FIGURE 6. TYPICAL PROPAGATION DELAY TIME (Ø1 TO Q4 OUTPUT) AS A FUNCTION OF LOAD CAPACITANCE

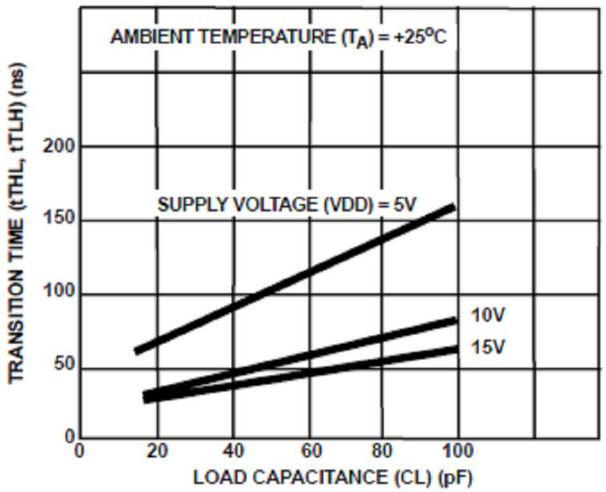


FIGURE 7. TYPICAL TRANSITION TIME AS A FUNCTION OF LOAD CAPACITANCE

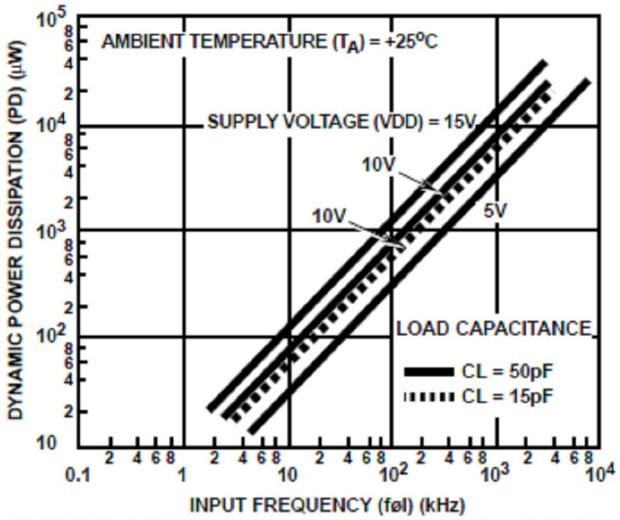


FIGURE 8. TYPICAL DYNAMIC POWER DISSIPATION AS A FUNCTION OF INPUT FREQUENCY

Test circuit:

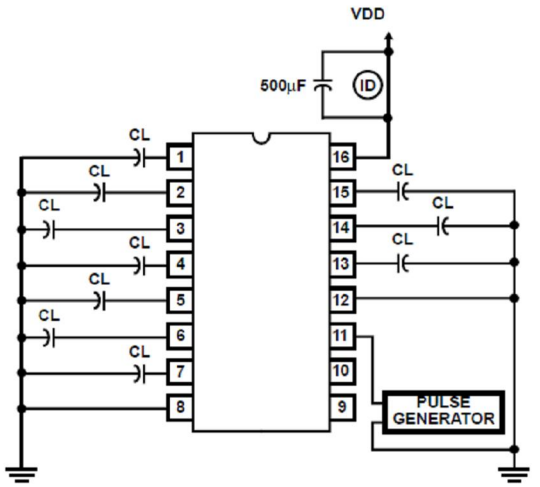


FIGURE 9. DYNAMIC POWER DISSIPATION TEST CIRCUIT

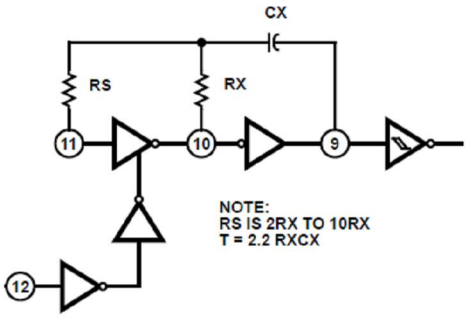
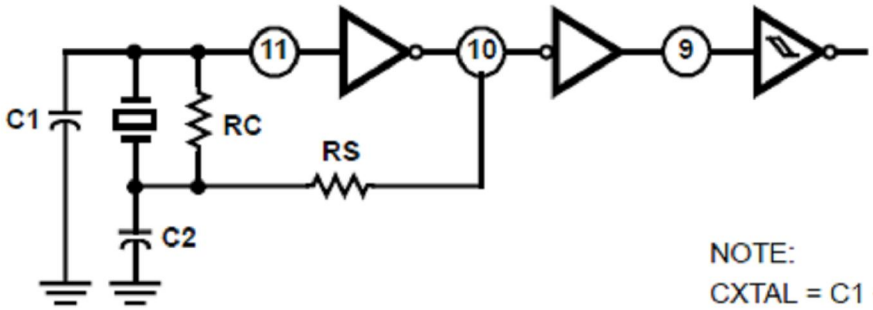


FIGURE 10. TYPICAL RC CIRCUIT

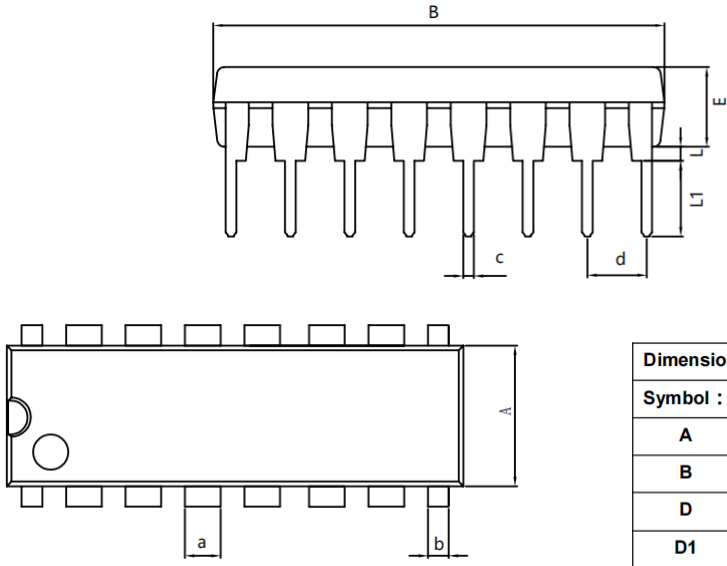


NOTE:
CXTAL = C1 + C2 + CSTRAY
RC = Broader frequency response
RS = Current limiting

FIGURE 11. TYPICAL CRYSTAL CIRCUIT

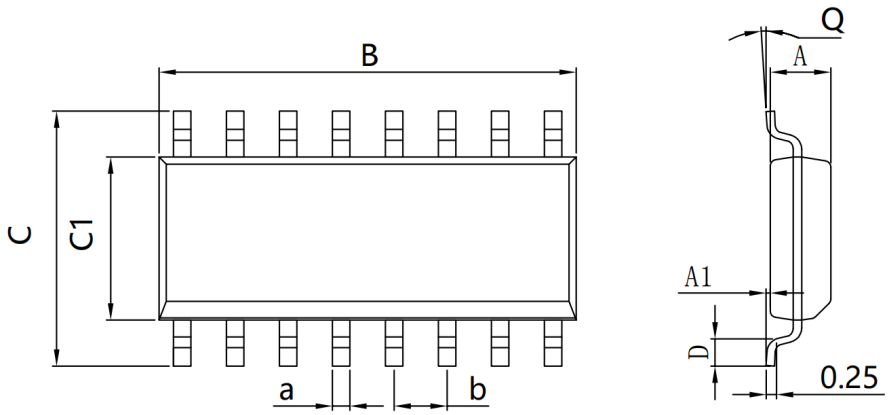
PACKAGE MECHANICAL DATA

DIP16



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	6.100	6.680	L	0.500	0.800
B	18.940	19.560	a	1.524 TYP	
D	8.200	9.200	b	0.889 TYP	
D1	7.42	7.820	c	0.457 TYP	
E	3.100	3.550	d	2.540 TYP	
L	0.500	0.800			

SOP16



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	1.225	1.570	D	0.400	0.950
A1	0.100	0.250	Q	0°	8°
B	9.800	10.00	a	0.420 TYP	
C	5.800	6.250	b	1.270 TYP	
C1	3.800	4.000			