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Features

- Up to 30MHz operation

- Fundamental oscillation

- Capacitors 8pF C_G and 10pF C_D built-in (except A2A, A4A series)

- Inverter amplifier feedback resistor built-in

- TTL input level

- 8 mA (V_{DD} = 4.5 V) drive capability

- 4 mA (V_{DD} = 2.7 V) drive capability

- Output three-state function

- 2.7 to 5.5 V supply voltage (AxA series)

- 4.5 to 5.5 V supply voltage (BxA series)

- Clock output (f_O, $f_O/2$, $f_O/4$, $f_O/8$ determined by internal connection, f_O is oscillator frequency)

- 6-Pin SOT23 package

Application

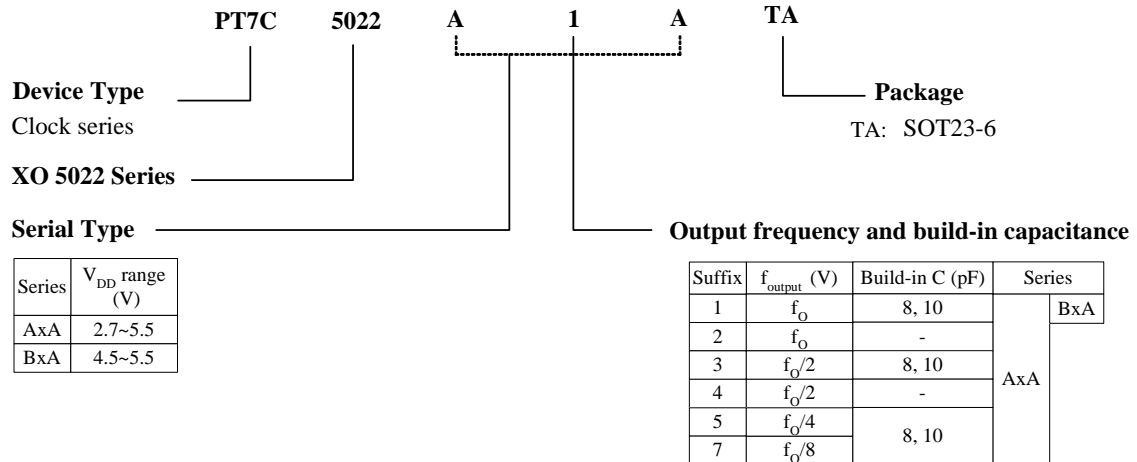Used for crystal oscillate

Description

The PT7C5022 series are crystal oscillator module ICs that incorporate high-frequency, low current consumption oscillator and output buffer circuits. Feedback resistors and high-frequency capacitors are built-in, eliminating the need for external components to make a stable fundamental-harmonic oscillator.

Ordering Information

Part No.	Package	Operating Range
PT7C5022AxATA	SOT23-6	Industrial
PT7C5022AxATAE	Lead free SOT23-6	Industrial
PT7C5022BxATA	SOT23-6	Industrial
PT7C5022BxATAE	Lead free SOT23-6	Industrial

**Note:** Below is the detailed definition of part no.

PT7C   5022   A   1   A   TA

Device Type
Clock series

XO 5022 Series

Serial Type

Package
TA: SOT23-6

Output frequency and build-in capacitance

Series	V_{DD} range (V)
AxA	2.7~5.5
BxA	4.5~5.5

Suffix	f_{output} (V)	Build-in C (pF)	Series	
1	f_O	8, 10		BxA
2	f_O	-		
3	$f_O/2$	8, 10	AxA	
4	$f_O/2$	-		
5	$f_O/4$	8, 10		
7	$f_O/8$			

Series configuration

Series	Part No.	Output freq.	Built-in capacitance (pF)		Recommended operating freq. (MHz)		V_{DD} (V)	Output level	Standby output state
			C_G	C_D	3V V_{DD}	5V V_{DD}			
AxA	PT7C5022A1A	f_o	8	10	4~24	4~30	2.7 ~ 5.5	CMOS	High impedance
	PT7C5022A2A	f_o	-	-					
	PT7C5022A3A	$f_o/2$	8	10	4~30	4~30			
	PT7C5022A4A	$f_o/2$	-	-					
	PT7C5022A5A	$f_o/4$	8	10					
	PT7C5022A7A	$f_o/8$							
BxA	PT7C5022B1A	f_o	8	10	-	4~30	4.5 ~ 5.5	TTL	

g_m ratio is 1; feedback resistor R_f is 600Ω.

Block Diagram
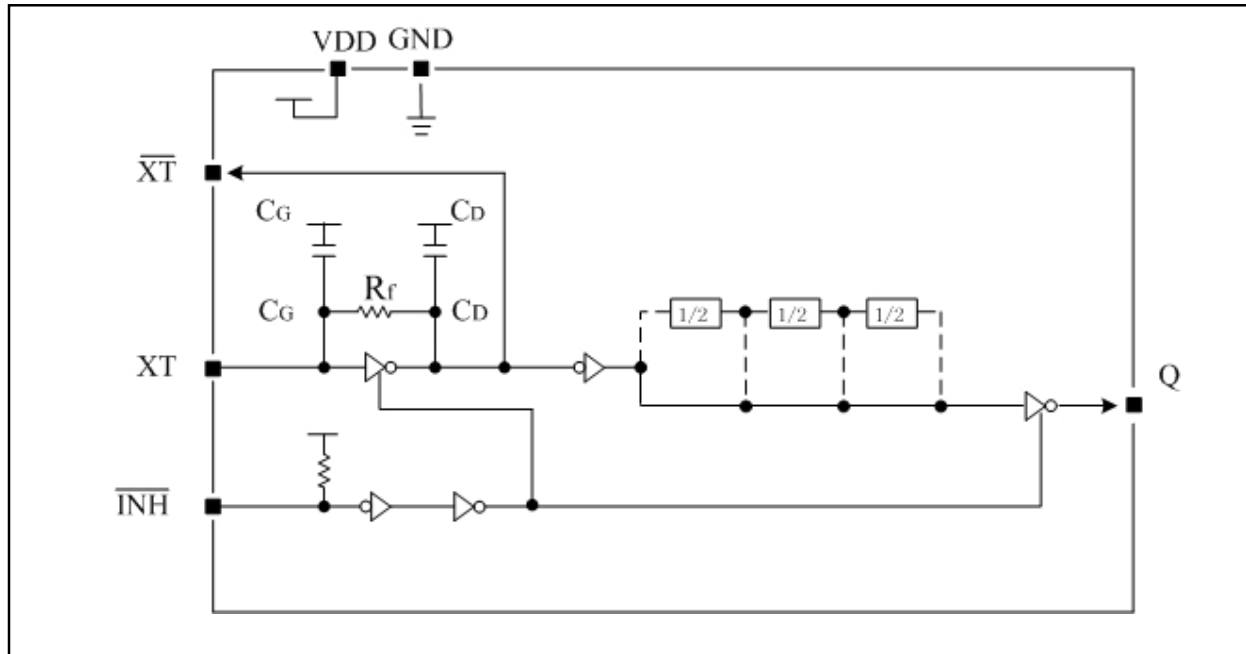
Function Description

When $\overline{INH}$ goes LOW, the output on Q becomes high impedance

INH	Q	Oscillator
HIGH (or open)	Any f_O, $f_O/2$, $f_O/4$, $f_O/8$ output frequency	Normal operation
Low	High impedance	Stopped

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Pin Information

Pin Configuration

PT7C5022xxx

1	INH	XT 6
2	XT	VDD 5
3	GND	Q 4

SOT23-6 package
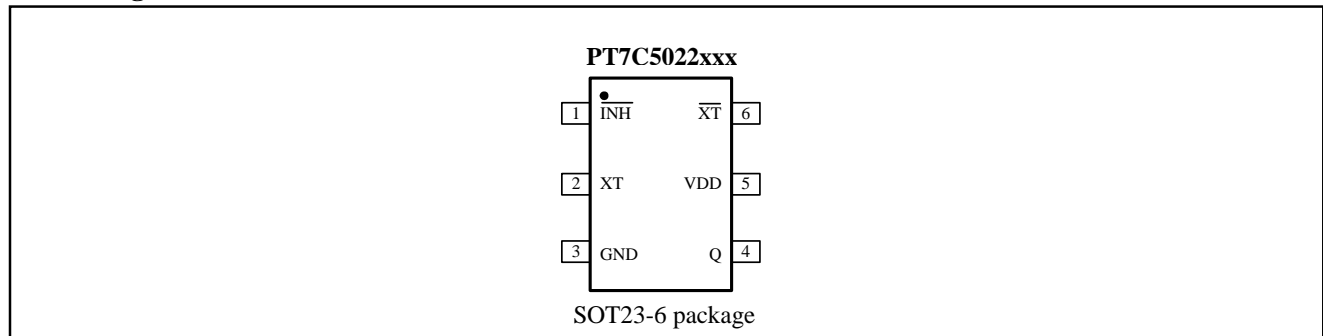
Pin Description

Pin	Sym	Type	Description	
1	$\overline{INH}$	I	Output state control input. High impedance when LOW. Pull-up resistor built in.	
2	XT	I	Amplifier input.	Crystal oscillator connected between XT and $\overline{XT}$.
3	GND	P	Ground.	
4	Q	O	Output. Output frequency (fo, fo /2, fo /4, fo /8) determined by internal connection, fo is oscillator frequency.	
5	V_{DD}	P	Supply voltage.	
6	$\overline{XT}$	O	Amplifier output.	Crystal oscillator connected between XT and $\overline{XT}$.

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Maximum Ratings

Storage Temperature (die form) .... $-65^{\circ}C$ to $+150^{\circ}C$

Storage Temperature (package form) .... $-55^{\circ}C$ to $+125^{\circ}C$

Ambient Temperature with Power Applied .... $-40^{\circ}C$ to $+85^{\circ}C$

Supply Voltage to Ground Potential (V_{DD} to GND .... $-0.5V$ to $7.0V$

DC Input (All Other Inputs except V_{DD} & GND) ..$-0.5V$ to V_{DD} $+0.5V$

DC Output Current 13mA

Power Dissipation .... 250mW (package form)

Note:
Stresses greater than those listed under MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other condi-tions above those indicated in the operational sec-tions of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Recommended Operating Conditions

3 V operation: AxA series

f $\leq$30MHz, $C_L \leq$15pF

Parameter	Sym	Conditions	Min	Typ	Max	Unit
Supply voltage	V_{DD}	-	2.7	-	3.6	V
Input voltage	V_{IN}	-	GND	-	V_{DD}	V
Operating temperature	T_{OPR}	-	-20	-	80	°C

5 V operation: AxA series, BxA series

f $\leq$30MHz, $C_L \leq$15pF

Parameter	Sym	Conditions	Min	Typ	Max	Unit
Supply voltage	V_{DD}	-	4.5	-	5.5	V
Input voltage	V_{IN}	-	GND	-	V_{DD}	V
Operating temperature	T_{OPR}	-	-20	-	80	°C

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DC Electrical Characteristics

3V operation: AxA series
V_{DD} = 2.7 to 3.6V, T_A = -20 to 80°C, unless otherwise noted.

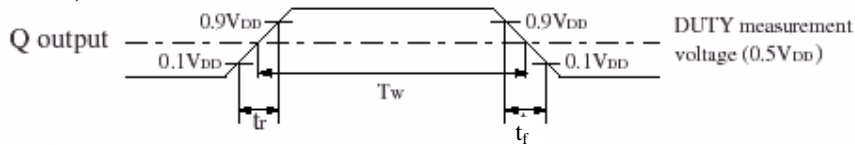| Sym.	Parameter	Condition		Min	Typ	Max	Unit
I_{DD}	Current consumption	INH = open, Measurement cct 3, load cct 1, C_L = 15 pF, 30 MHz cr ystal oscillator		-	4	7	mA
V_{IH}	High level input voltage	INH pin		2.0	-	-	V
V_{IL}	Low level input voltage	INH pin		-	-	0.5	V
R_{UP}	INH pull-up resistance	Measurement cct 4		25	100	250	kΩ
R_f	Feedback resistance	Measurement cct 5		200	600	1000	kΩ
C_G	Built-in capacitance	Design value, determined by the internal wafer pattern	PT7C5022A1A, PT7C5022A3A, PT7C5022A5A, PT7C5022A7A	7.44	8	8.56	pF
C_D				9.3	10	10.7	
V_{OH}	High level output voltage	Q: Measurement cct 1, I_{OH} = 4mA		2.1	2.4	-	V
V_{OL}	Low level output voltage	Q: Measurement cct 2, I_{OL} = 4mA		-	0.3	0.4	V
I_Z	Output leakage current	Q: Measurement cct 2, V_{DD} = 3.6V, V_{INH} = LOW	V_{OH} = V_{DD}	-	-	10	µA
			V_{OL} = GND	-	-	10	

5V operation: AxA series/BxA series
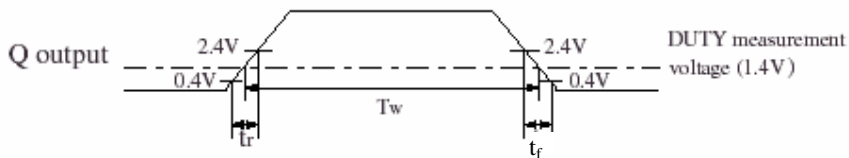V_{DD} = 4.5 to 5.5 V, T_A = -20 to 80°C, unless otherwise noted.

Sym.	Parameter	Condition			Min	Typ	Max	Unit
I_{DD}	Current consumption	INH = open, Measurement cct 3, C_L = 15 pF, 30MHz crystal	Load cct 1	PT7C5022AxA	-	7	12	mA
			Load cct 2	PT7C5022BxA	-	7	12	
V_{IH}	High level input voltage	INH			2.0	-	-	V
V_{IL}	Low level input voltage	INH			-	-	0.8	V
R_{UP}	INH pull-up resistance	Measurement cct 4			25	100	250	kΩ
R_f	Feedback resistance	Measurement cct 5			200	600	1000	kΩ
C_G	Built-in capacitance	Design value, determined by the internal wafer pattern	PT7C5022A1A, PT7C5022A3A, PT7C5022A5A, PT7C5022A7A, PT7C5022B1A		7.44	8	8.56	pF
C_D					9.3	10	10.7	
V_{OH}	High level output voltage	Q: Measurement cct 1, I_{OH} = 8 mA			3.9	4.2	-	V
V_{OL}	Low level output voltage	Q: Measurement cct 1, I_{OL} = 8 mA			-	0.3	0.4	V
I_Z	Output leakage current	Q: Measurement cct 2, INH=LOW	V_{OH} = V_{DD}		-	-	10	µA
			V_{OL} = GND		-	-	10	

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AC Electrical Characteristics

Output duty level (CMOS)

Q output — 0.9V$_{DD}$ ... 0.9V$_{DD}$ — DUTY measurement voltage (0.5V$_{DD}$)
0.1V$_{DD}$ ... 0.1V$_{DD}$
Tw
tr   t$_f$

Output duty level (TTL)

Q output — 2.4V ... 2.4V — DUTY measurement voltage (1.4V)
0.4V ... 0.4V
Tw
tr   t$_f$

Output duty cycle (CMOS)

Q output — DUTY measurement voltage (0.5V$_{DD}$)
Tw
T
DUTY= Tw/ T × 100 (%)

Output duty cycle (TTL)

Q output — DUTY measurement voltage (1.4V)
Tw
T
DUTY= Tw/ T × 100 (%)
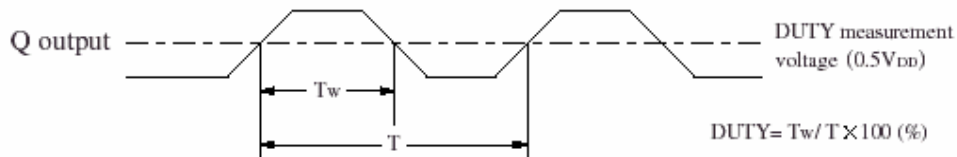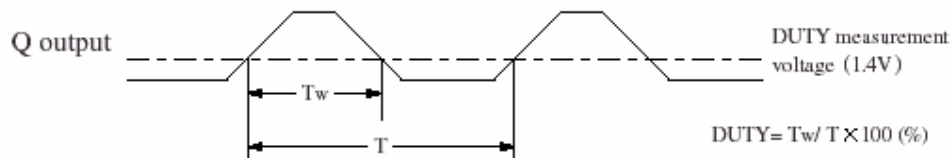
Output Enable/Disable Delay

$\overline{INH}$
V$_{IL}$ V$_{IH}$
t$_{PLZ}$ t$_{PZL}$
Q output

$\overline{INH}$ input waveform tr = tf ≤ 10ns
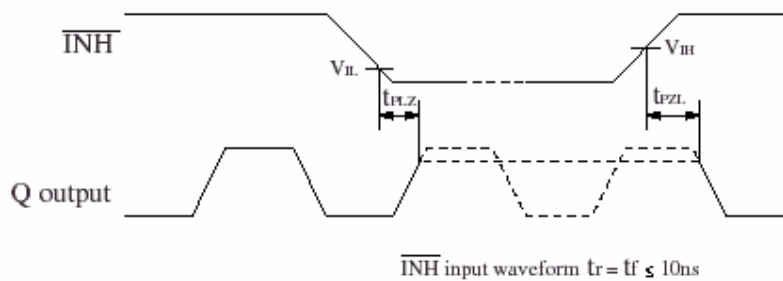
CMOS: AxA series
3V operation: V_{DD} = 2.7 to 3.6V, T_A = -20 to 80°C, unless otherwise noted.

Sym	Parameter	Conditions		Min	Typ	Max	Unit
t_r	Output rise time	Measurement cct 6, load cct 1, C_L = 15 pF	$0.2V_{DD}$ to $0.8V_{DD}$	-	5	10	ns
			$0.1V_{DD}$ to $0.9V_{DD}$	-	10	20	
t_f	Output fall time	Measurement cct 6, load cct 1, C_L = 15 pF	$0.8V_{DD}$ to $0.2V_{DD}$	-	5	10	ns
			$0.9V_{DD}$ to $0.1V_{DD}$	-	10	20	
Duty	Output duty cycle	Measurement cct 6, load cct 1, T_A = 25°C, V_{DD} = 3V, C_L = 15 pF, f = 30MHz		45	-	55	%
t_{PLZ}	Output disable delay time (**Note**)	Measurement cct 7, load cct 1, T_A = 25°C, V_{DD} = 3 V, C_L =15 pF		-	-	100	ns
t_{PZL}	Output enable delay time (**Note**)			-	-	100	

Note: Oscillator stop function is built-in. When INH goes LOW, normal output stops. When INH goes HIGH, normal output is not resumed until after the oscillator start-up time has elapsed.

5V operation: V_{DD} = 4.5 to 5.5 V, T_A = -20 to 80°C, unless otherwise noted.

Sym	Parameter	Conditions	Min	Typ	Max	Unit
t_r	Output rise time	Measurement cct 6, load cct 1, $0.1V_{DD}$ to $0.9V_{DD}$, C_L = 15 pF	-	3.5	7	ns
t_f	Output fall time	Measurement cct 6, load cct 1, $0.1V_{DD}$ to $0.9V_{DD}$, C_L = 15 pF	-	3.5	7	ns
Duty	Output duty cycle1	Measurement cct 6, load cct 1, T_A = 25°C, V_{DD} = 5 V, C_L = 15 pF, f = 30MHz	45	-	55	%
t_{PLZ}	Output disable delay time (**Note**)	Measurement cct 6, load cct 1, T_A = 25°C, V_{DD} = 5 V, C_L =15 pF	-	-	100	ns
t_{PZL}	Output enable delay time (**Note**)		-	-	100	

Note: Oscillator stop function is built-in. When INH goes LOW, normal output stops. When INH goes HIGH, normal output is not resumed until after the oscillator start-up time has elapsed.

TTL: BxA series
5V operation: V_{DD} = 4.5 to 5.5 V, T_A = -20 to 80°C, unless otherwise noted.

Sym	Parameter	Conditions	Min	Typ	Max	Unit
t_{r3}	Output rise time	Measurement cct 6, load cct 2, 0.4V to 2.4V, C_L = 15 pF	-	2.5	7	ns
t_{f3}	Output fall time	Measurement cct 6, load cct 2, 2.4V to 0.4V, C_L = 15 pF	-	2.5	7	ns
Duty	Output duty cycle	Measurement cct 6, load cct 2, T_A = 25°C, V_{DD} = 5 V, C_L = 15 pF, f = 30MHz	45	-	55	%
t_{PLZ}	Output disable delay time (**Note**)	Measurement cct 7, load cct 2, T_A = 25°C, V_{DD} = 5 V, C_L =15 pF	-	-	100	ns
t_{PZL}	Output enable delay time (**Note**)		-	-	100	

Note: Oscillator stop function is built-in. When INH goes LOW, normal output stops. When INH goes HIGH, normal output is not resumed until afte r the oscillator start-up time has elapsed.
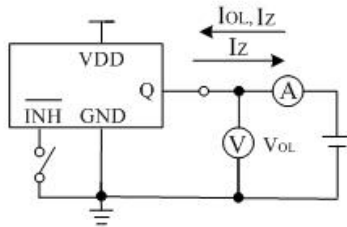
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Measurement Circuit

Measurement cct 1

Q out monitor
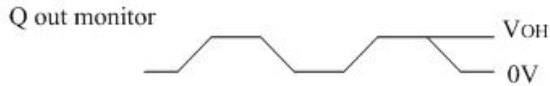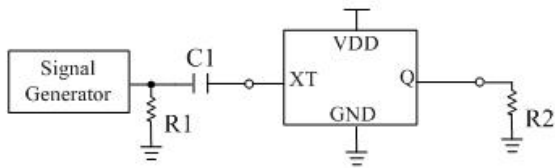
2.0 $V_{P.-P}$, 10MHz sine wave input signal (3V operation)
3.5 $V_{P.-P}$, 10MHz sine wave input signal (5V operation)
C1: 0.001mF
R1: 50
R2: 525 (3V operation)
        490 (5V operation)

Measurement cct 2

Measurement cct 3

R1: 50ohm
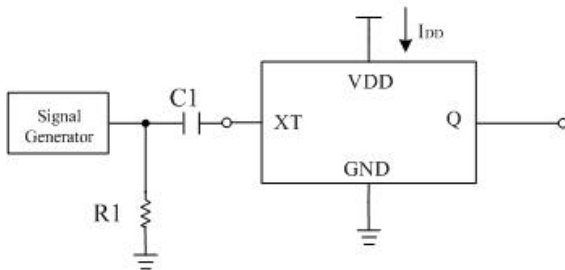
2.0 $V_{P.-P}$, 30MHz sine wave input signal (3V operation)
3.5 $V_{P.-P}$, 30MHz sine wave input signal (5V operation)
C1: 0.001F
R1: 50

Measurement cct 4

$$R_{UP} = \frac{V_{DD}}{I_{PR}}$$
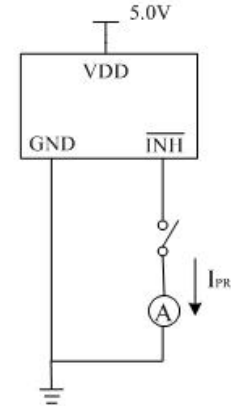
Measurement cct 5
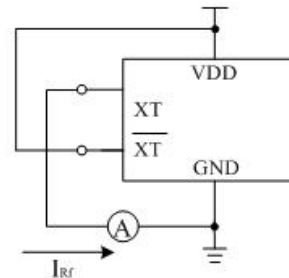
$$R_f = \frac{V_{DD}}{I_{RF}}$$

Measurement cct 6
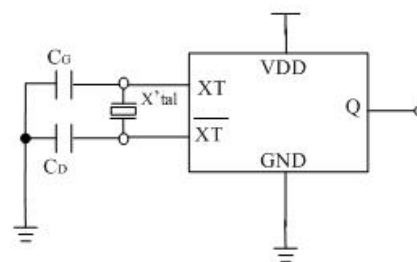
Measurement cct 7

R1: 50ohm

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Load cct 1

Q output

C_L
(including probe
capacitance)

$C_L = 15pF$

Load cct 2

Q output

(including probe
capacitance)

C_L

R

$C_L = 15pF$
R=800ohm

PT *Pericom Technology Inc.*
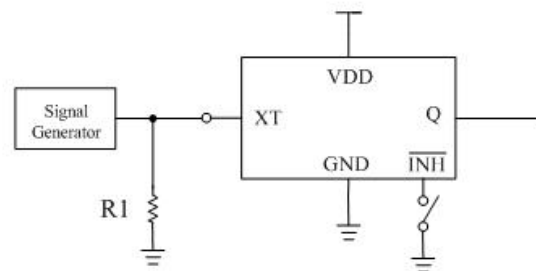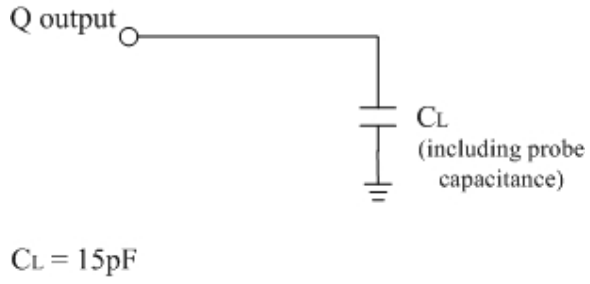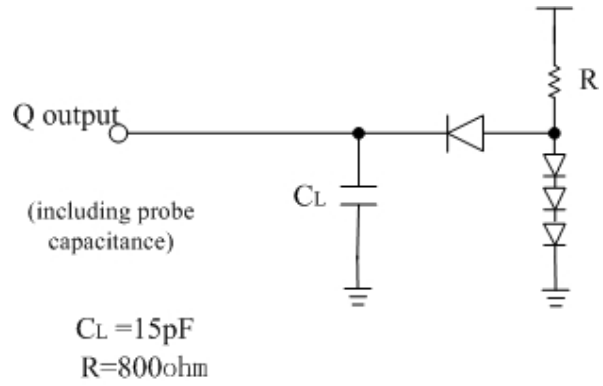
Mechanical Information

SOT23-6 Package Drawing

1.90

1.50
1.70

2.50
3.10

0.35
0.80

L

0.30
0.50

0.95

0-10o

2.80
3.10

0.90
1.10

0.20
0.55

0.09
0.20

0.01
0.13

X.XX
X.XX

DENOTES DIMENSIONS
IN MILLIMETERS

Note:
1) Controlling dimensions in millimeters.
2) Ref: JDDEC MO-178AB

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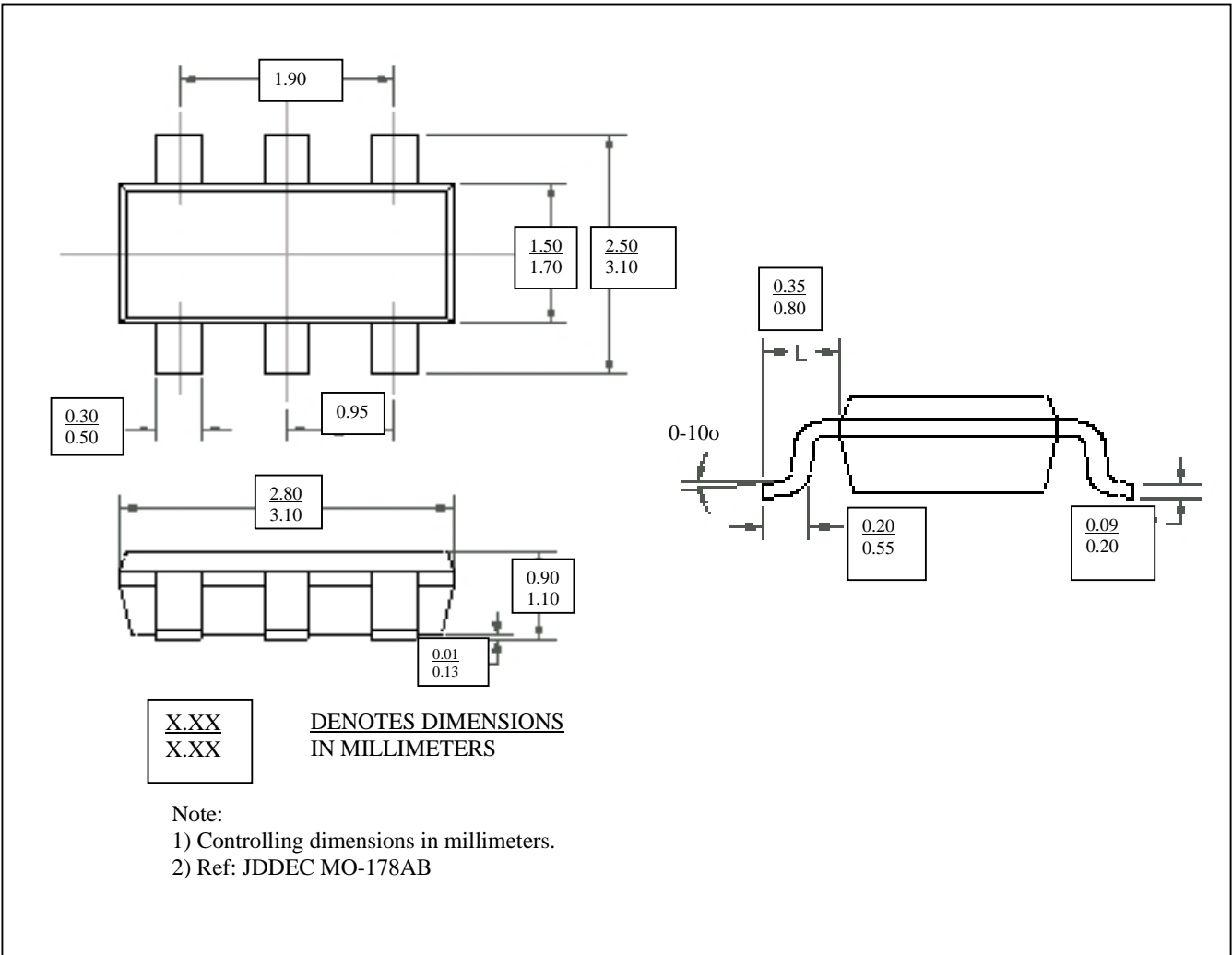
SOT-23 Package Top Marking Instruction

hyNZ

PART NO.
2 BIT CODE
(See Table11)

DATE CODE
YEAR & WORK WEEK
(See Table 2)

Sample: hyNZ → PART NO.: PT7C5022A1A
DATE CODE: YEAR 2004   WW26

Table 1 :

PART NO	2 BIT CODE	PART NO	2 BIT CODE
PT7C5022A1A	hy	PT7C5022B1A	if
PT7C5022A2A	hz	PT7C5022B2A	ig
PT7C5022A3A	ia	PT7C5022B3A	ih
PT7C5022A4A	ib	PT7C5022B4A	ii
PT7C5022A5A	ic	PT7C5022B5A	ij
PT7C5022A6A	id	PT7C5022B6A	ik
PT7C5022A7A	ie	PT7C5022B7A	il

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Table 2

Year		WW		Year		WW		Year		WW		Year		WW		Year		WW		Year		WW		Year		WW	
1998	A	1	A	1999	C	1	A	2000	E	1	A	2001	G	1	A	2002	J	1	A	2003	L	1	A	2004	N	1	A
1998	A	2	B	1999	C	2	B	2000	E	2	B	2001	G	2	B	2002	J	2	B	2003	L	2	B	2004	N	2	B
1998	A	3	C	1999	C	3	C	2000	E	3	C	2001	G	3	C	2002	J	3	C	2003	L	3	C	2004	N	3	C
1998	A	4	D	1999	C	4	D	2000	E	4	D	2001	G	4	D	2002	J	4	D	2003	L	4	D	2004	N	4	D
1998	A	5	E	1999	C	5	E	2000	E	5	E	2001	G	5	E	2002	J	5	E	2003	L	5	E	2004	N	5	E
1998	A	6	F	1999	C	6	F	2000	E	6	F	2001	G	6	F	2002	J	6	F	2003	L	6	F	2004	N	6	F
1998	A	7	G	1999	C	7	G	2000	E	7	G	2001	G	7	G	2002	J	7	G	2003	L	7	G	2004	N	7	G
1998	A	8	H	1999	C	8	H	2000	E	8	H	2001	G	8	H	2002	J	8	H	2003	L	8	H	2004	N	8	H
1998	A	9	I	1999	C	9	I	2000	E	9	I	2001	G	9	I	2002	J	9	I	2003	L	9	I	2004	N	9	I
1998	A	10	J	1999	C	10	J	2000	E	10	J	2001	G	10	J	2002	J	10	J	2003	L	10	J	2004	N	10	J
1998	A	11	K	1999	C	11	K	2000	E	11	K	2001	G	11	K	2002	J	11	K	2003	L	11	K	2004	N	11	K
1998	A	12	L	1999	C	12	L	2000	E	12	L	2001	G	12	L	2002	J	12	L	2003	L	12	L	2004	N	12	L
1998	A	13	M	1999	C	13	M	2000	E	13	M	2001	G	13	M	2002	J	13	M	2003	L	13	M	2004	N	13	M
1998	A	14	N	1999	C	14	N	2000	E	14	N	2001	G	14	N	2002	J	14	N	2003	L	14	N	2004	N	14	N
1998	A	15	O	1999	C	15	O	2000	E	15	O	2001	G	15	O	2002	J	15	O	2003	L	15	O	2004	N	15	O
1998	A	16	P	1999	C	16	P	2000	E	16	P	2001	G	16	P	2002	J	16	P	2003	L	16	P	2004	N	16	P
1998	A	17	Q	1999	C	17	Q	2000	E	17	Q	2001	G	17	Q	2002	J	17	Q	2003	L	17	Q	2004	N	17	Q
1998	A	18	R	1999	C	18	R	2000	E	18	R	2001	G	18	R	2002	J	18	R	2003	L	18	R	2004	N	18	R
1998	A	19	S	1999	C	19	S	2000	E	19	S	2001	G	19	S	2002	J	19	S	2003	L	19	S	2004	N	19	S
1998	A	20	T	1999	C	20	T	2000	E	20	T	2001	G	20	T	2002	J	20	T	2003	L	20	T	2004	N	20	T
1998	A	21	U	1999	C	21	U	2000	E	21	U	2001	G	21	U	2002	J	21	U	2003	L	21	U	2004	N	21	U
1998	A	22	V	1999	C	22	V	2000	E	22	V	2001	G	22	V	2002	J	22	V	2003	L	22	V	2004	N	22	V
1998	A	23	W	1999	C	23	W	2000	E	23	W	2001	G	23	W	2002	J	23	W	2003	L	23	W	2004	N	23	W
1998	A	24	X	1999	C	24	X	2000	E	24	X	2001	G	24	X	2002	J	24	X	2003	L	24	X	2004	N	24	X
1998	A	25	Y	1999	C	25	Y	2000	E	25	Y	2001	G	25	Y	2002	J	25	Y	2003	L	25	Y	2004	N	25	Y
1998	A	26	Z	1999	C	26	Z	2000	E	26	Z	2001	G	26	Z	2002	J	26	Z	2003	L	26	Z	2004	N	26	Z
1998	B	27	A	1999	D	27	A	2000	F	27	A	2001	H	27	A	2002	K	27	A	2003	M	27	A	2004	O	27	A
1998	B	28	B	1999	D	28	B	2000	F	28	B	2001	H	28	B	2002	K	28	B	2003	M	28	B	2004	O	28	B
1998	B	29	C	1999	D	29	C	2000	F	29	C	2001	H	29	C	2002	K	29	C	2003	M	29	C	2004	O	29	C
1998	B	30	D	1999	D	30	D	2000	F	30	D	2001	H	30	D	2002	K	30	D	2003	M	30	D	2004	O	30	D
1998	B	31	E	1999	D	31	E	2000	F	31	E	2001	H	31	E	2002	K	31	E	2003	M	31	E	2004	O	31	E
1998	B	32	F	1999	D	32	F	2000	F	32	F	2001	H	32	F	2002	K	32	F	2003	M	32	F	2004	O	32	F
1998	B	33	G	1999	D	33	G	2000	F	33	G	2001	H	33	G	2002	K	33	G	2003	M	33	G	2004	O	33	G
1998	B	34	H	1999	D	34	H	2000	F	34	H	2001	H	34	H	2002	K	34	H	2003	M	34	H	2004	O	34	H
1998	B	35	I	1999	D	35	I	2000	F	35	I	2001	H	35	I	2002	K	35	I	2003	M	35	I	2004	O	35	I
1998	B	36	J	1999	D	36	J	2000	F	36	J	2001	H	36	J	2002	K	36	J	2003	M	36	J	2004	O	36	J
1998	B	37	K	1999	D	37	K	2000	F	37	K	2001	H	37	K	2002	K	37	K	2003	M	37	K	2004	O	37	K
1998	B	38	L	1999	D	38	L	2000	F	38	L	2001	H	38	L	2002	K	38	L	2003	M	38	L	2004	O	38	L
1998	B	39	M	1999	D	39	M	2000	F	39	M	2001	H	39	M	2002	K	39	M	2003	M	39	M	2004	O	39	M
1998	B	40	N	1999	D	40	N	2000	F	40	N	2001	H	40	N	2002	K	40	N	2003	M	40	N	2004	O	40	N
1998	B	41	O	1999	D	41	O	2000	F	41	O	2001	H	41	O	2002	K	41	O	2003	M	41	O	2004	O	41	O
1998	B	42	P	1999	D	42	P	2000	F	42	P	2001	H	42	P	2002	K	42	P	2003	M	42	P	2004	O	42	P
1998	B	43	Q	1999	D	43	Q	2000	F	43	Q	2001	H	43	Q	2002	K	43	Q	2003	M	43	Q	2004	O	43	Q
1998	B	44	R	1999	D	44	R	2000	F	44	R	2001	H	44	R	2002	K	44	R	2003	M	44	R	2004	O	44	R
1998	B	45	S	1999	D	45	S	2000	F	45	S	2001	H	45	S	2002	K	45	S	2003	M	45	S	2004	O	45	S
1998	B	46	T	1999	D	46	T	2000	F	46	T	2001	H	46	T	2002	K	46	T	2003	M	46	T	2004	O	46	T
1998	B	47	U	1999	D	47	U	2000	F	47	U	2001	H	47	U	2002	K	47	U	2003	M	47	U	2004	O	47	U
1998	B	48	V	1999	D	48	V	2000	F	48	V	2001	H	48	V	2002	K	48	V	2003	M	48	V	2004	O	48	V
1998	B	49	W	1999	D	49	W	2000	F	49	W	2001	H	49	W	2002	K	49	W	2003	M	49	W	2004	O	49	W
1998	B	50	X	1999	D	50	X	2000	F	50	X	2001	H	50	X	2002	K	50	X	2003	M	50	X	2004	O	50	X
1998	B	51	Y	1999	D	51	Y	2000	F	51	Y	2001	H	51	Y	2002	K	51	Y	2003	M	51	Y	2004	O	51	Y
1998	B	52	Z	1999	D	52	Z	2000	F	52	Z	2001	H	52	Z	2002	K	52	Z	2003	M	52	Z	2004	O	52	Z

Notes

Pericom Technology Inc.

Email: support@pti.com.cn   Web Site: www.pti.com.cn, www.pti-ic.com

China: No. 20 Building, 3/F, 481 Guiping Road, Shanghai, 200233, China
Tel: (86)-21-6485 0576   Fax: (86)-21-6485 2181

Asia Pacific: Unit 1517, 15/F, Chevalier Commercial Centre, 8 Wang Hoi Rd, Kowloon Bay, Hongkong
Tel: (852)-2243 3660   Fax: (852)- 2243 3667

U.S.A.:   3545 North First Street, San Jose, California 95134, USA
Tel: (1)-408-435 0800   Fax: (1)-408-435 1100