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

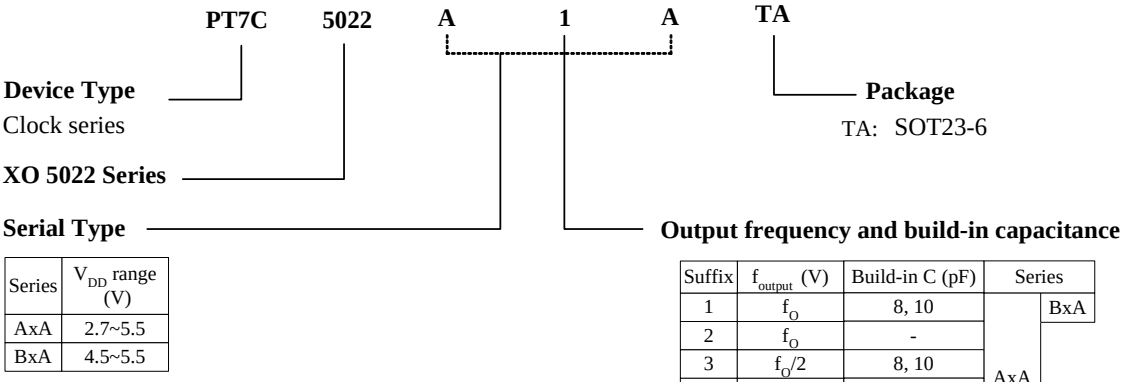
Description

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.



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

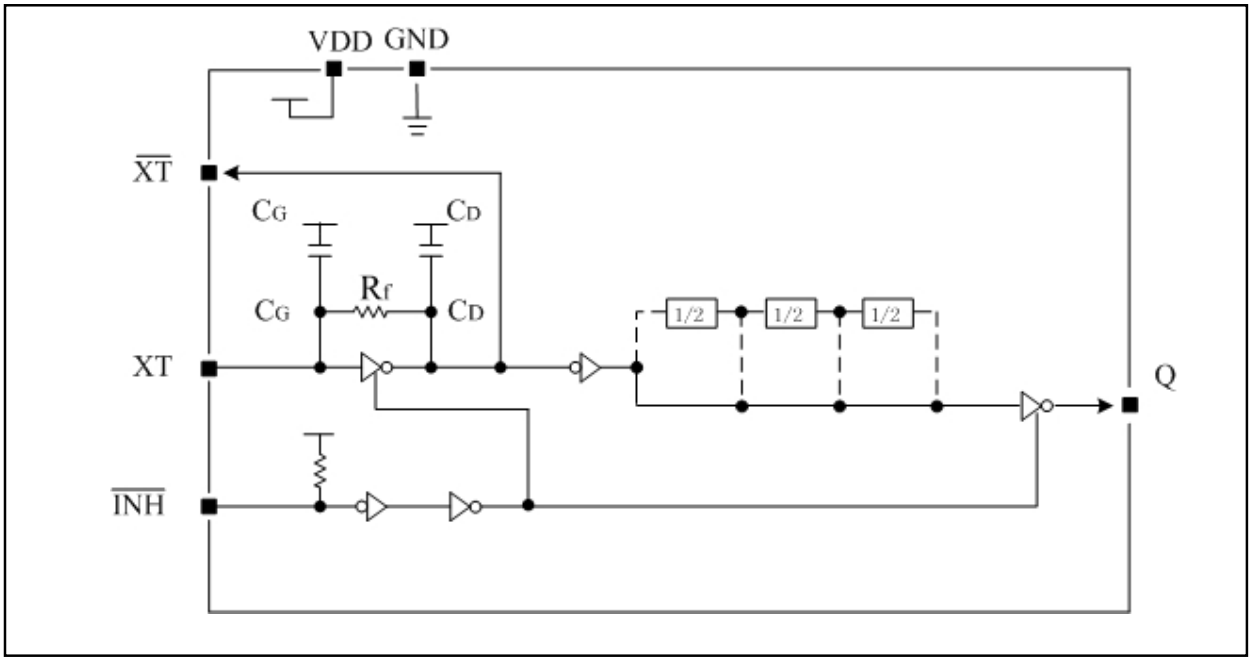
Suffix	f_{output} (V)	Build-in C (pF)	Series	
1	f_O	8, 10	AxA	BxA
2	f_O	-		
3	$f_O/2$	8, 10		
4	$f_O/2$	-		
5	$f_O/4$	8, 10		
7	$f_O/8$			

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



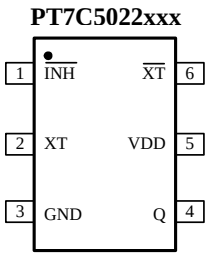
Function Description

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

Pin Information

Pin Configuration



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 $\overline{XT}$.

Maximum Ratings

Storage Temperature (die form) ..... -65°C to +150°C
Storage Temperature (package form) ..... -55°C to +125°C
Ambient Temperature with Power Applied..... -40°C to +85°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 ≤30MHz, C_L≤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 ≤30MHz, C_L≤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

DC Electrical Characteristics

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

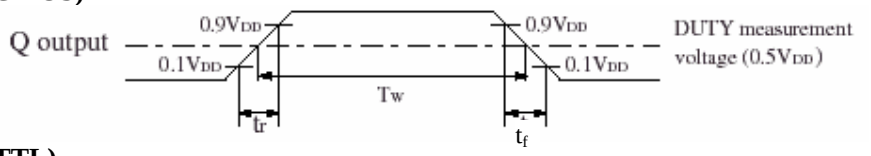
Sym.	Parameter	Condition		Min	Typ	Max	Unit
I_{DD}	Current consumption	INH = open, Measurement cct 3, load cct 1, C_L = 15 pF, 30 MHz cr ystal oscillator		-	4	7	mA
V_{IH}	High level input voltage	INH pin		2.0	-	-	V
V_{IL}	Low level input voltage	INH pin		-	-	0.5	V
R_{UP}	INH pull-up resistance	Measurement 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.

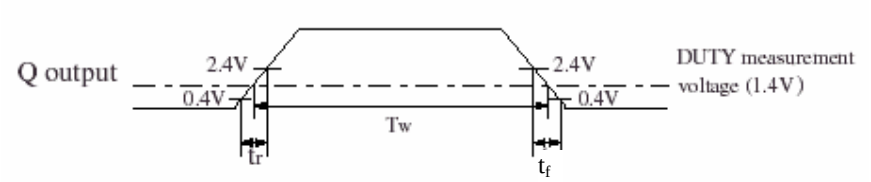
Sym.	Parameter	Condition			Min	Typ	Max	Unit
I_{DD}	Current consumption	INH = open, Measurement cct 3, C_L = 15 pF, 30MHz crystal	Load cct 1	PT7C5022AxA	-	7	12	mA
			Load cct 2	PT7C5022BxA	-	7	12	
V_{IH}	High level input voltage	INH			2.0	-	-	V
V_{IL}	Low level input voltage	INH			-	-	0.8	V
R_{UP}	INH 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	

AC Electrical Characteristics

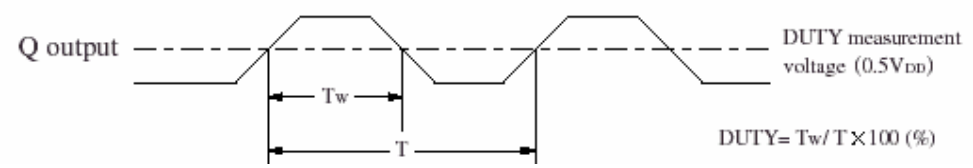
Output duty level (CMOS)



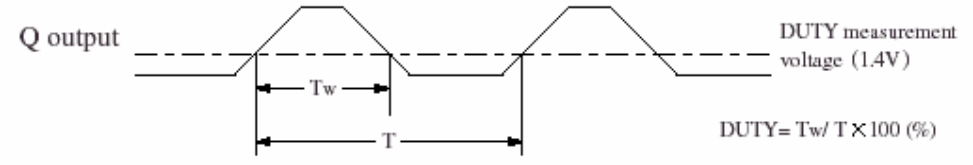
Output duty level (TTL)



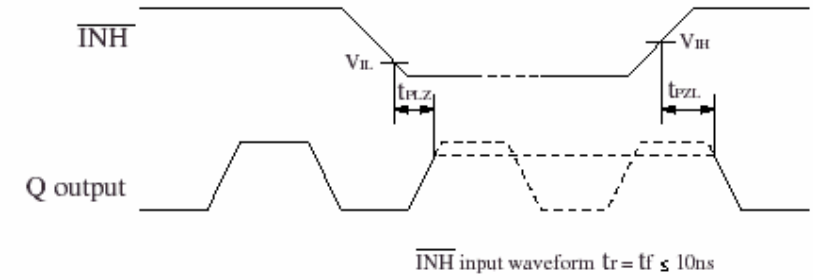
Output duty cycle (CMOS)



Output duty cycle (TTL)



Output Enable/Disable Delay



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.

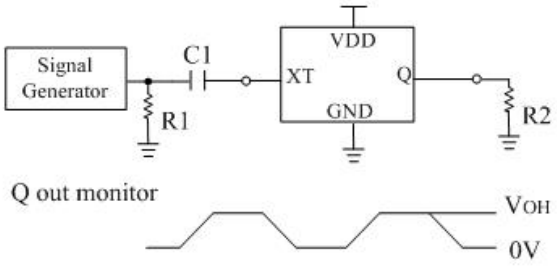
TTL: BxA series
5V operation: V_{DD} = 4.5 to 5.5 V, T_A = -20 to 80°C, unless otherwise noted.

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.

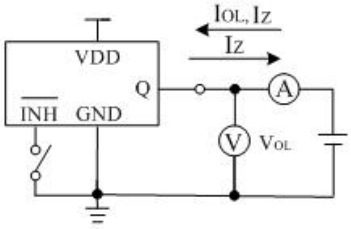
Measurement Circuit

Measurement cct 1

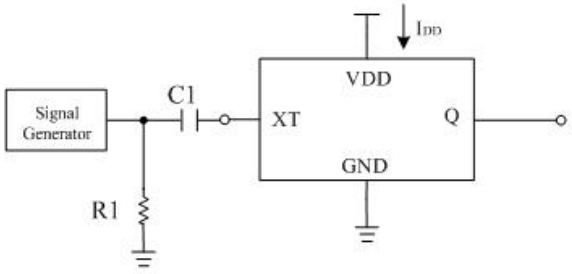


2.0 V_{P-P}, 10MHz sine wave input signal (3V operation)
3.5 V_{P-P}, 10MHz sine wave input signal (5V operation)
C1: 0.001mF
R1: 50
R2: 525 (3V operation)
490 (5V operation)

Measurement cct 2



Measurement cct 3

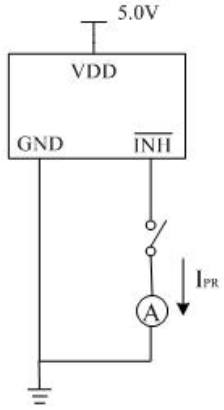


R1: 50ohm

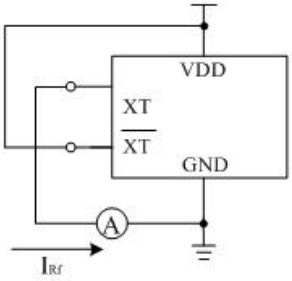
2.0 V_{P-P}, 30MHz sine wave input signal (3V operation)
3.5 V_{P-P}, 30MHz sine wave input signal (5V operation)
C1: 0.001F
R1: 50

Measurement cct 4

$$R_{UP} = \frac{V_{DD}}{I_{PR}}$$

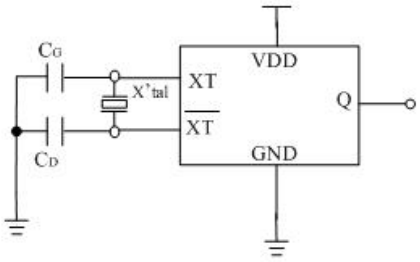


Measurement cct 5

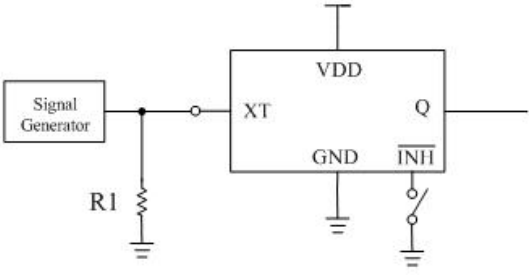


$$Rf = \frac{V_{DD}}{I_{RF}}$$

Measurement cct 6

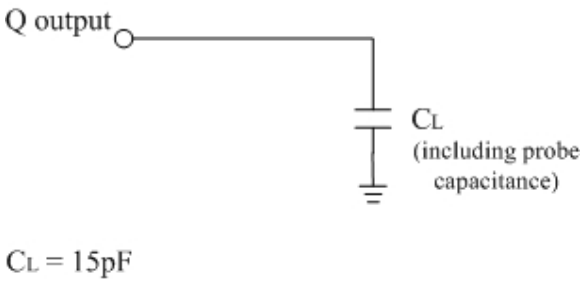


Measurement cct 7



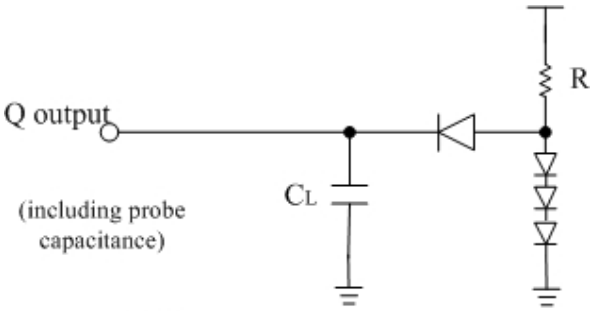
R1: 50ohm

Load cct 1



CL = 15pF

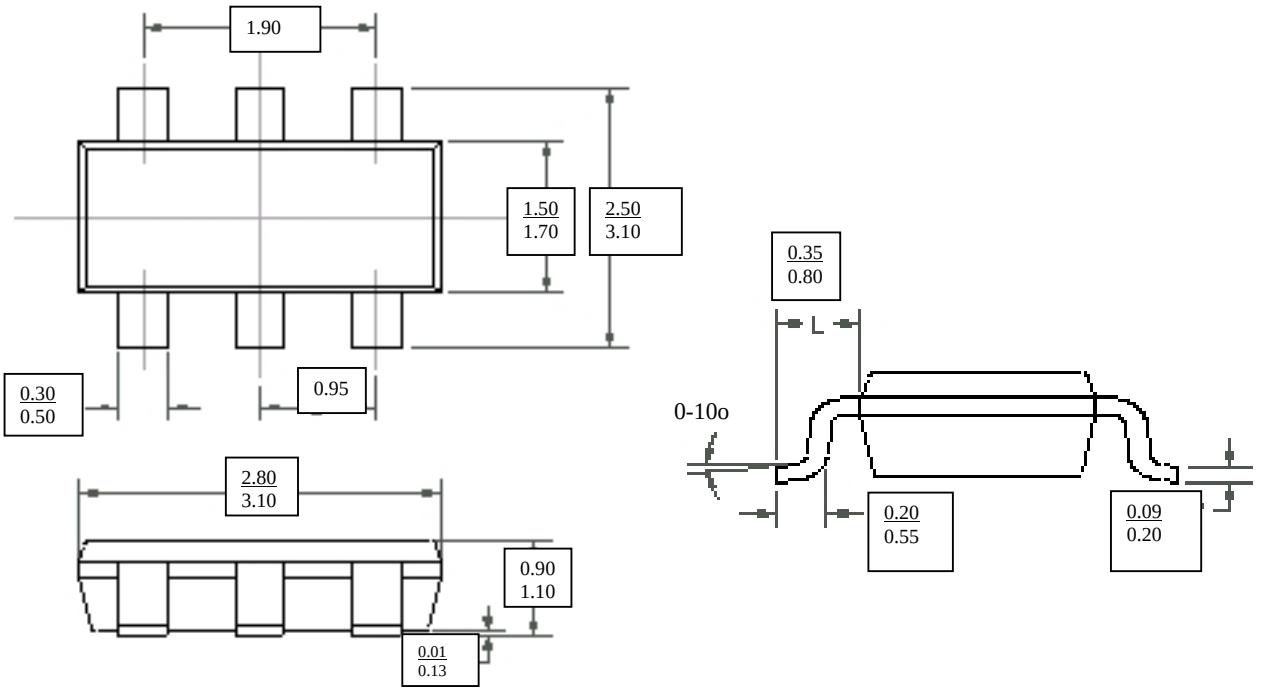
Load cct 2



CL =15pF
R=800ohm

Mechanical Information

SOT23-6 Package Drawing

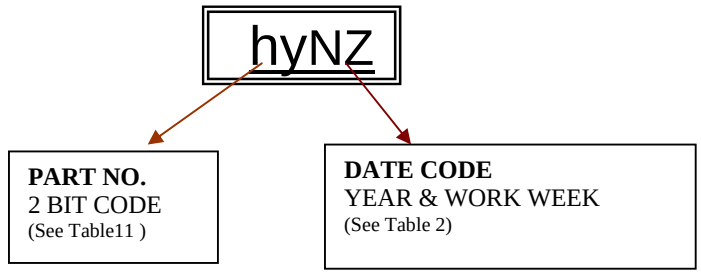


X.XX
X.XX

DENOTES DIMENSIONS
IN MILLIMETERS

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

SOT-23 Package Top Marking Instruction



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

Table 2

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

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

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

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

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

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

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

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