

Voltage Detector

Features

- Highly accurate: $\pm 1.5\%$ (25°C)
- Low power consumption: $0.9\mu\text{A}$ @ 3V V_{CC}
- Detect voltage range: 1.8 to 5V in 100mV increments
- Operating voltage range: $1.2\text{V} \sim 5.5\text{V}$
- Operating temperature range: -40°C to $+85^{\circ}\text{C}$
- Detect voltage accuracy over temperature: $\pm 2.5\% \times \text{Typ}$
- Output configuration: N-channel open drain or CMOS

Description

The PT7M61xx series of ultra-low-power voltage detectors monitor battery, power-supply and system voltages. Each circuit includes a precision bandgap reference, a comparator, internally trimmed resistor networks that set specified trip thresholds, and an internal 5% threshold hysteresis circuit. Output is asserted when V_{CC} falls below the internal $V_{\text{TH-}}$ and remains asserted until V_{CC} rises above $V_{\text{TH+}}$ ($V_{\text{TH+}} = V_{\text{TH-}} \times 1.05$). These devices provide excellent circuit reliability and low cost by eliminating external components and adjustments when monitoring nominal system voltages from $+1.8\text{V}$ to $+5\text{V}$ in 100mV increments. The series are voltage detectors with a propagation delay of $17\mu\text{s}$.

The family is available with three output stage options: push-pull with active-low output, push-pull with active-high output, and open drain with active-low output. These devices specified over the -40°C to $+85^{\circ}\text{C}$ temperature range.

Ordering Information

Part Number	Package
PT7M61xxCLTA3E	Lead free and Green SOT23-3
PT7M61xxCLTA5E	Lead free and Green SOT23-5
PT7M61xxCLC3E	Lead free and Green SC70-3
PT7M61xxCLC4E	Lead free and Green SC70-4
PT7M61xxCLNBE	Lead free TO92
PT7M61xxCLTDE	Lead free SOT89
PT7M61xxCHTA3E	Lead free and Green SOT23-3
PT7M61xxCHTA5E	Lead free and Green SOT23-5
PT7M61xxCHC3E	Lead free and Green SC70-3
PT7M61xxCHTDE	Lead free SOT89
PT7M61xxNLTA3E	Lead free and Green SOT23-3
PT7M61xxNLTA5E	Lead free and Green SOT23-5
PT7M61xxNLC3E	Lead free and Green SC70-3
PT7M61xxNLC4E	Lead free and Green SC70-4
PT7M61xxNLNBE	Lead free TO92
PT7M61xxNLTDE	Lead free SOT89
PT7M61xxCLLNBE	Lead free TO92
PT7M61xxNLLNBE	Lead free TO92
PT7M61xxCLBTA5E	Lead free and Green SOT23-5
PT7M61xxCHBTA5E	Lead free and Green SOT23-5
PT7M61xxNLBTA5E	Lead free and Green SOT23-5

- Note**
- “xx” refer to voltage range, see below table 1.
 - E=Lead-free and Green Packaging
 - Adding X suffix=Tape/Reel

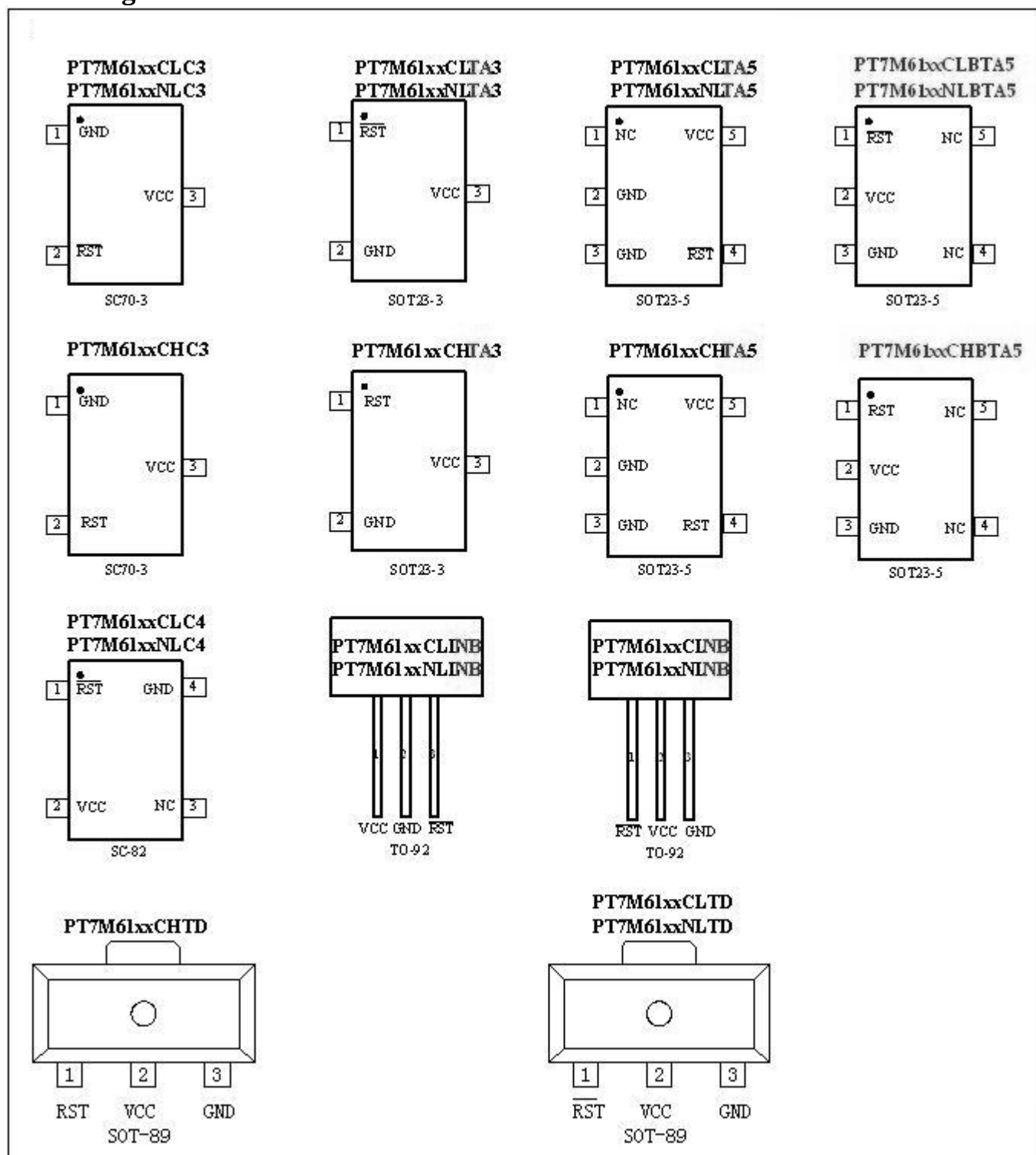
Table 1 Suffix “xx” definition of PT7M61xx

Suffix xx	$V_{\text{TH-}}$ (V)	Suffix xx	$V_{\text{TH-}}$ (V)	Suffix xx	$V_{\text{TH-}}$ (V)	Suffix xx	$V_{\text{TH-}}$ (V)	Suffix xx	$V_{\text{TH-}}$ (V)
18	1.8	25	2.5	32	3.2	39	3.9	46	4.6
19	1.9	26	2.6	33	3.3	40	4.0	47	4.7
20	2.0	27	2.7	34	3.4	41	4.1	48	4.8
21	2.1	28	2.8	35	3.5	42	4.2	49	4.9
22	2.2	29	2.9	36	3.6	43	4.3	50	5.0
23	2.3	30	3.0	37	3.7	44	4.4		
24	2.4	31	3.1	38	3.8	45	4.5		

Table 2 Function comparison Table

Item	Part No.	Reset Output Open-Drain		Reset Output Push-Pull		Threshold
		Active high	Active low	Active high	Active low	
1	PT7M61xxCL	-	-	-	√	1.8V to 5.0V in 100mV increments
2	PT7M61xxCLL	-	-	-	√	
3	PT7M61xxCH	-	-	√	-	
4	PT7M61xxNL	-	√	-	-	
5	PT7M61xxNLL	-	√	-	-	

Pin Configuration



Pin Description

Name	Type	Description
$\overline{\text{RST}}$	O	Reset Output (PT7M61xxCL/NL/CLL/NLL): $\overline{\text{RST}}$ is asserted when V_{CC} drops below voltage threshold V_{TH-} . Active low.
RST	O	Reset Output (PT7M61xxCH): RST is asserted when V_{CC} drops below voltage threshold V_{TH-} . Active high.
GND	P	Ground
V_{CC}	P	Supply Voltage.

Maximum Ratings

Storage Temperature	-65°C to +150°C
Ambient Temperature with Power Applied.....	-40°C to +85°C
Supply Voltage to Ground Potential (Vcc to GND)	-0.3V to +6.0V
DC Input Voltage (All inputs except Vcc and GND).....	-0.3V to $V_{CC}+0.3V$
DC Output Current (All outputs)	20mA
Power Dissipation	320mW (Depend on package)

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 conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

DC Electrical Characteristics

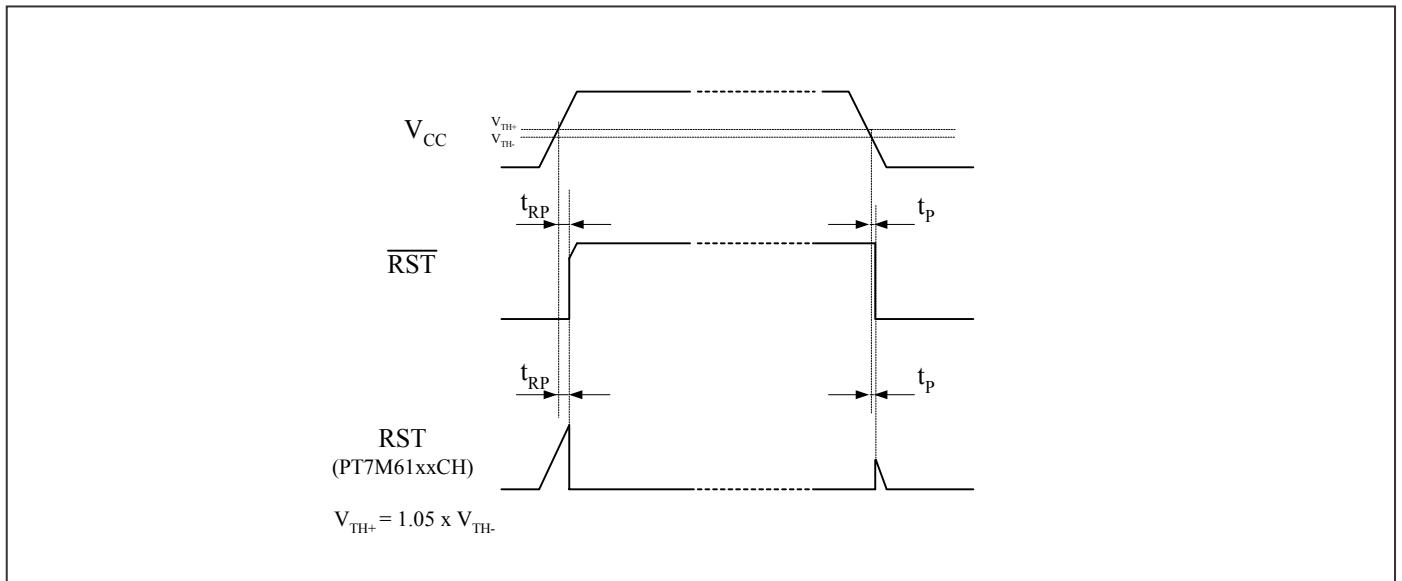
($V_{CC} = 1.2V$ to $5.5V$, $T_A = -40\sim 85^\circ C$, unless otherwise noted. Typical values are at $T_A = +25^\circ C$)

Description		Sym.	Test Conditions	Min	Typ	Max	Unit
Supply Voltage		V _{CC}	T _A = 0~70°C	1.0	-	5.5	V
			T _A = -40~85°C	1.2	-	5.5	
Supply Current		I _{CC}	V _{CC} = 3V. No load.	-	0.9	3.0	μA
			V _{CC} = 5V. No load.	-	1.3	3.6	μA
Output Driving	Output high	V _{OH}	V _{CC} ≥ 1.8V, I _{source} = 1mA	0.8×V _{CC}	-	-	V
			V _{CC} ≥ 2.5V, I _{source} = 3mA	0.8×V _{CC}	-	-	
			V _{CC} ≥ 4.5V, I _{source} = 8mA	0.8×V _{CC}	-	-	
	Output low	V _{OL}	V _{CC} ≥ 1.2V, I _{sink} = 1mA	-	-	0.3	V
			V _{CC} ≥ 2.5V, I _{sink} = 4mA	-	-	0.3	
			V _{CC} ≥ 4.5V, I _{sink} = 9mA	-	-	0.4	
Open-Drain Output Leakage Current		I _{LKG}	-	-	-	1	μA
Voltage Threshold		V _{TH-}	+25°C	(V _{TH-}) ×0.98	V _{TH-}	(V _{TH-}) ×1.02	V
			-40°C~85°C	(V _{TH-}) ×0.975	V _{TH-}	(V _{TH-}) ×1.025	
		V _{TH+}	+25°C	(V _{TH+}) ×0.98	V _{TH+}	(V _{TH+}) ×1.02	
			-40°C~85°C	(V _{TH+}) ×0.975	V _{TH+}	(V _{TH+}) ×1.025	
voltage threshold Hysteresis		V _{HYST}	V _{HYST} = [(V _{TH+})-(V _{TH-})]/(V _{TH-}) ×100%	3	5	6	%

Note: $V_{TH+} = 1.05 \times V_{TH-}$. V_{TH-} is voltage threshold when V_{CC} falls from high to low. V_{TH+} is voltage threshold when V_{CC} rises from low to high.

AC Electrical Characteristics

Timing diagram

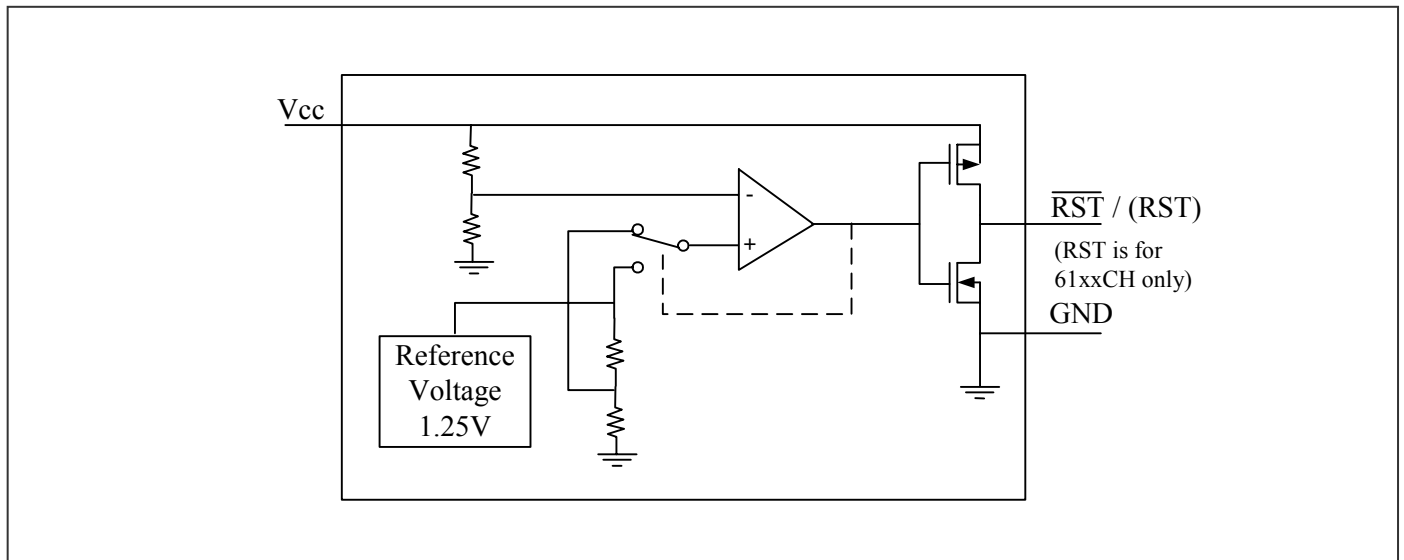


($V_{CC} = 1.2V$ to $5.5V$, $T_A = -40 \sim 85^\circ C$, unless otherwise noted. Typical values are at $T_A = +25^\circ C$)

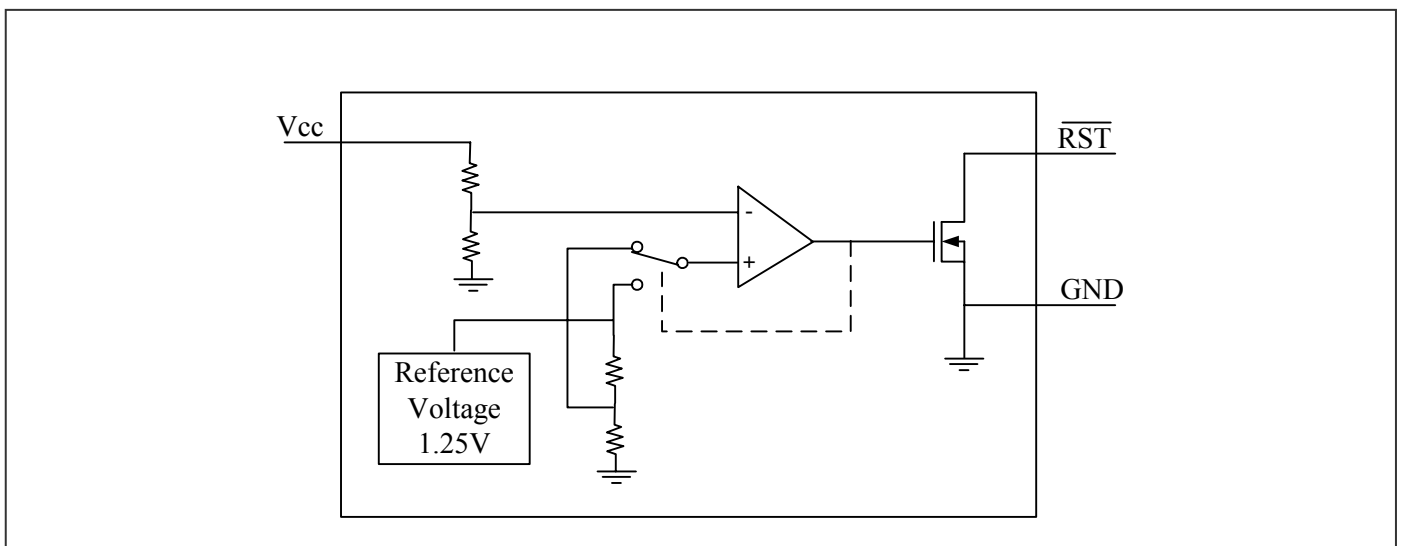
Sym.	Description	Test Conditions	Min	Typ	Max	Unit
t_{RP}	Timeout Period	-	-	-	200	μs
t_p	Delay	-	-	40	-	μs
$t_{overdrive}$	V_{CC} Maximum Transient Duration	Reset threshold overdrive=500mV ($V_{CC} - V_{th} = -500mV$)	-	35	-	μs

Block Diagram

Block Diagram of PT7M61xxCL/CH/CLL

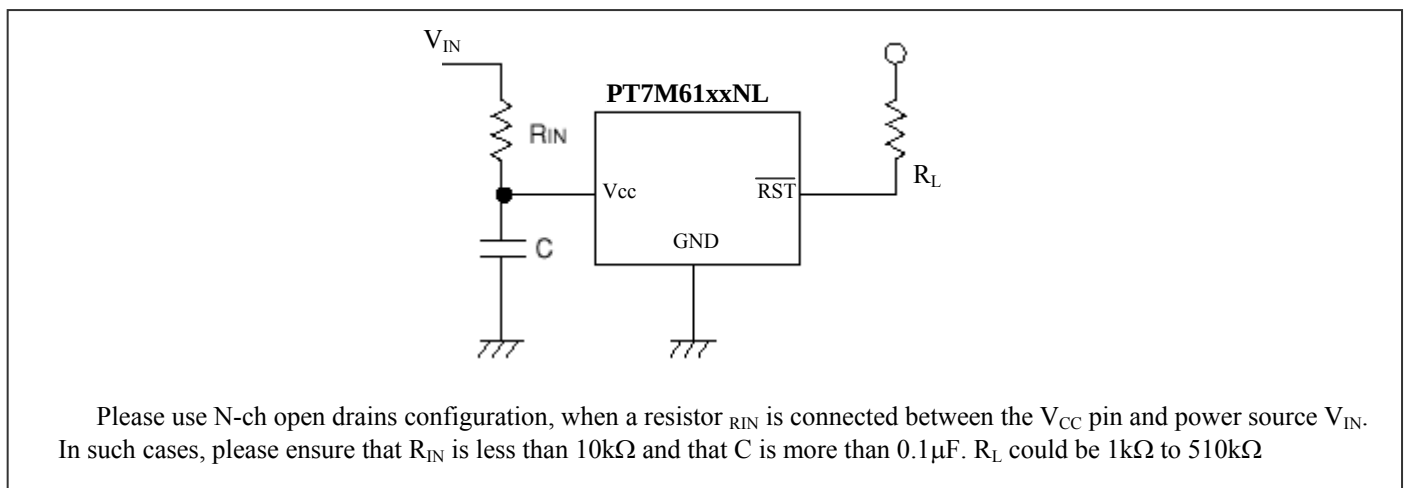


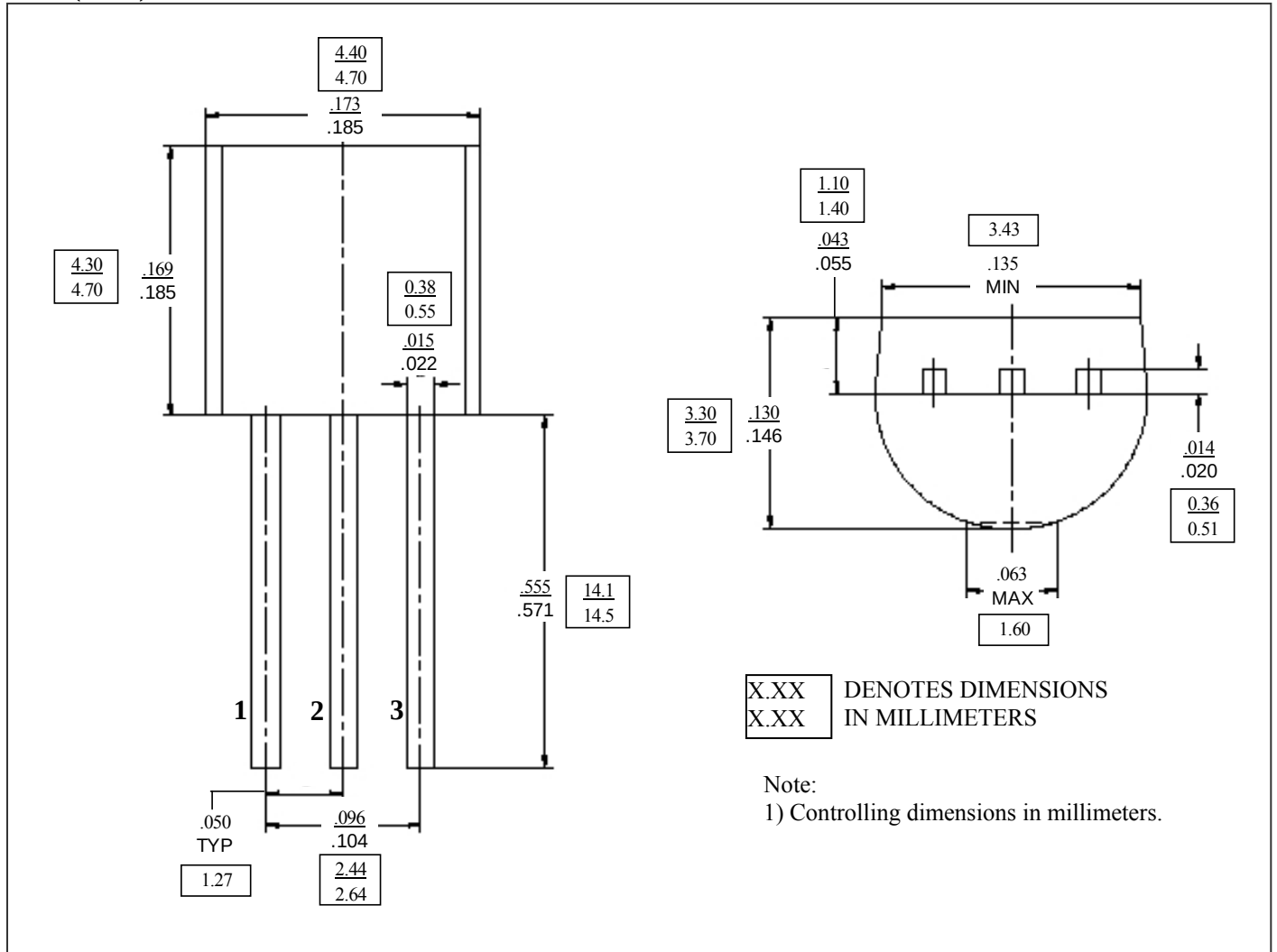
Block Diagram of PT7M61xxNL/NLL



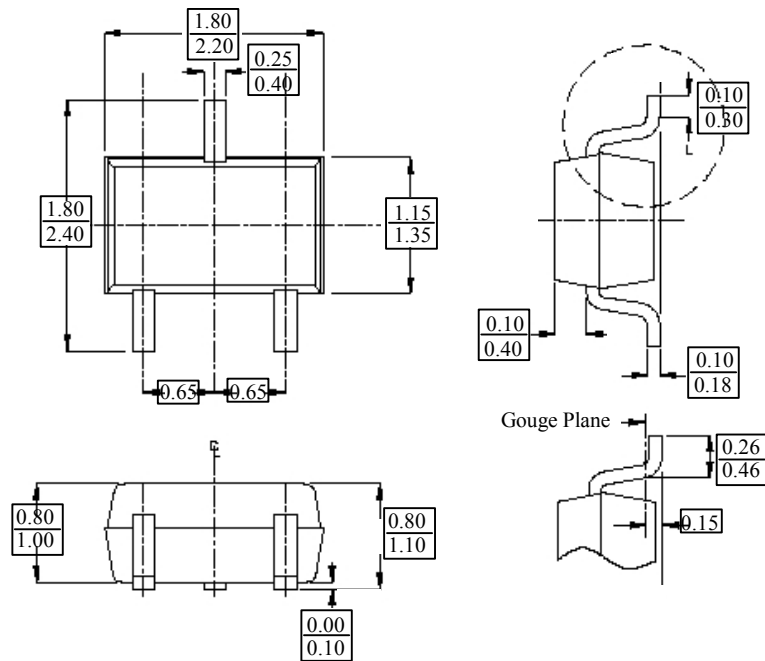
Typical Operation Circuit

PT7M61xxNL Application Example



NB (TO92)


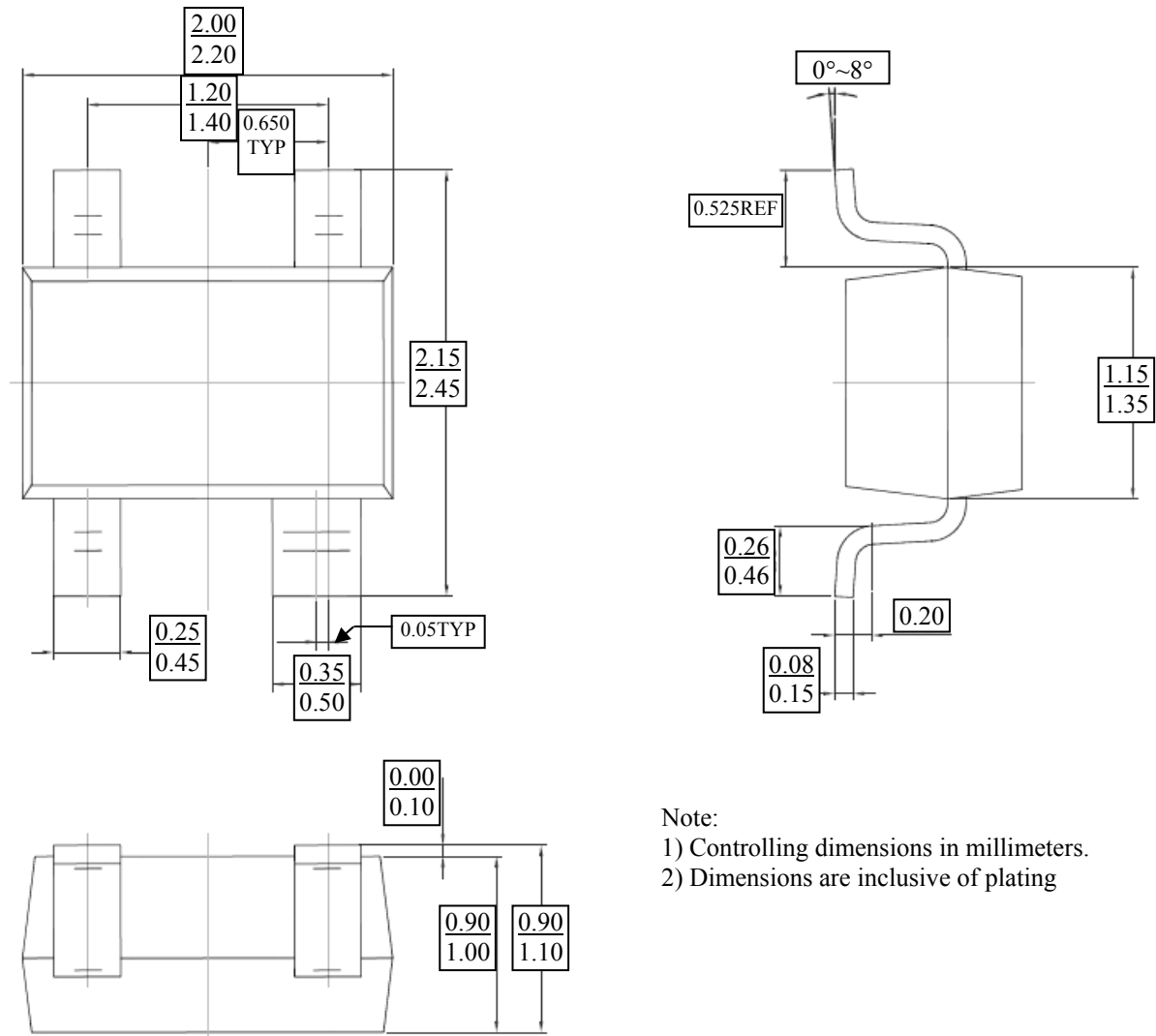
C3 (SC70-3)



X.XX DENOTES DIMENSIONS
X.XX IN MILLIMETERS

Note

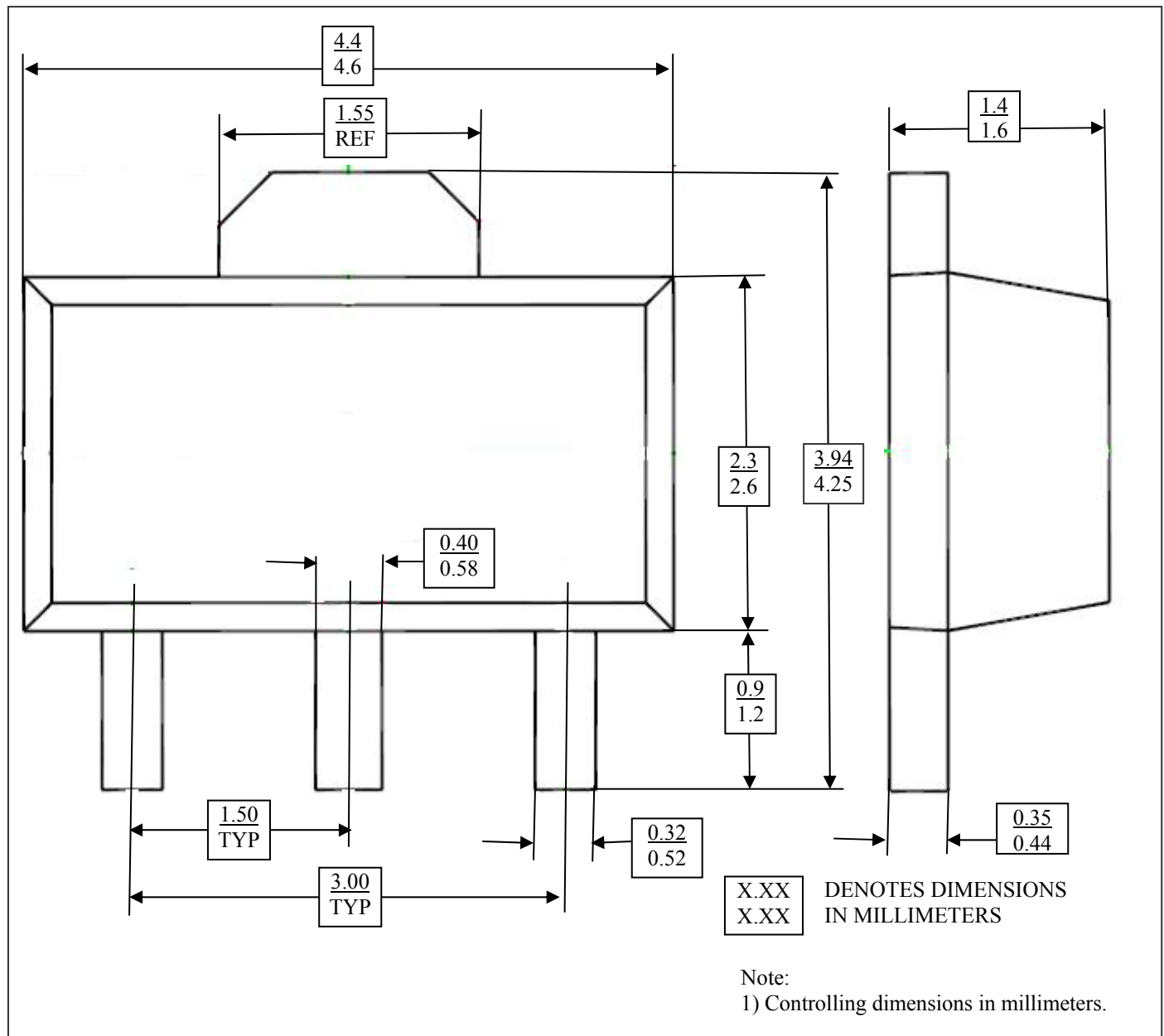
- 1) Controlling dimensions in millimeters.
- 2) Dimensions are inclusive of plating.

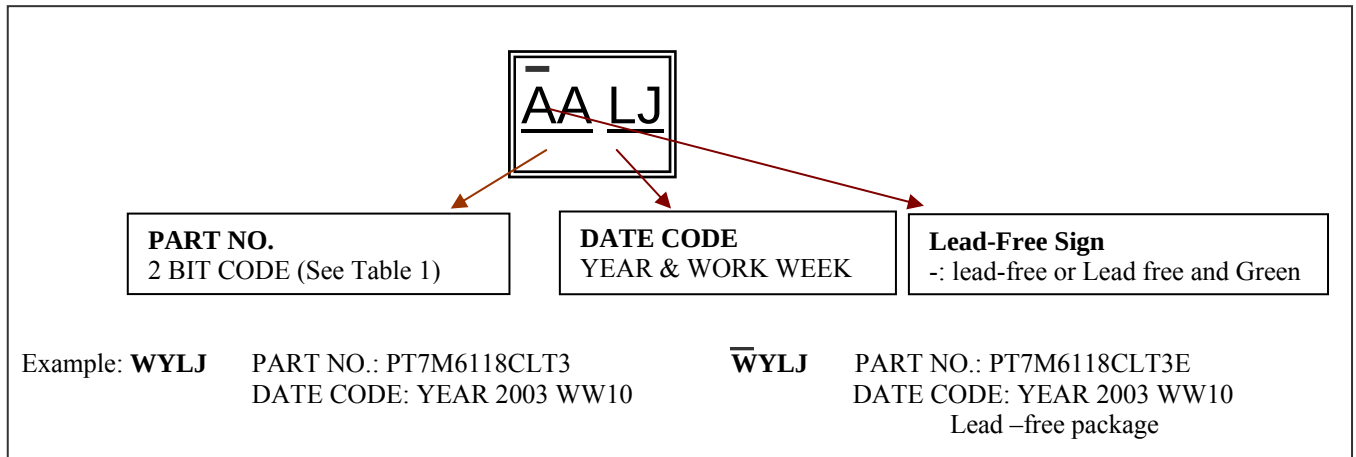
C4 (SC70-4)


Note:

- 1) Controlling dimensions in millimeters.
- 2) Dimensions are inclusive of plating

TD (SOT89)



SOT23/SC70/SOT143 Package Top Marking Instruction

Table 1 Part No code comparison table

No.	Part No.	Code	No.	Part No.	Code	No.	Part No.	Code
1	PT7M6118CL	WY	34	PT7M6129CL	YF	67	PT7M6140CL	ZM
2	PT7M6118CH	WZ	35	PT7M6129CH	YG	68	PT7M6140CH	ZN
3	PT7M6118NL	XA	36	PT7M6129NL	YH	69	PT7M6140NL	ZO
4	PT7M6119CL	XB	37	PT7M6130CL	YI	70	PT7M6141CL	ZP
5	PT7M6119CH	XC	38	PT7M6130CH	YJ	71	PT7M6141CH	ZQ
6	PT7M6119NL	XD	39	PT7M6130NL	YK	72	PT7M6141NL	ZR
7	PT7M6120CL	XE	40	PT7M6131CL	YL	73	PT7M6142CL	ZS
8	PT7M6120CH	XF	41	PT7M6131CH	YM	74	PT7M6142CH	ZT
9	PT7M6120NL	XG	42	PT7M6131NL	YN	75	PT7M6142NL	ZU
10	PT7M6121CL	XH	43	PT7M6132CL	YO	76	PT7M6143CL	ZV
11	PT7M6121CH	XI	44	PT7M6132CH	YP	77	PT7M6143CH	ZW
12	PT7M6121NL	XJ	45	PT7M6132NL	YQ	78	PT7M6143NL	ZX
13	PT7M6122CL	XK	46	PT7M6133CL	YR	79	PT7M6144CL	ZY
14	PT7M6122CH	XL	47	PT7M6133CH	YS	80	PT7M6144CH	ZZ
15	PT7M6122NL	XM	48	PT7M6133NL	YT	81	PT7M6144NL	aa
16	PT7M6123CL	XN	49	PT7M6134CL	YU	82	PT7M6145CL	ab
17	PT7M6123CH	XO	50	PT7M6134CH	YV	83	PT7M6145CH	ac
18	PT7M6123NL	XP	51	PT7M6134NL	YW	84	PT7M6145NL	ad
19	PT7M6124CL	XQ	52	PT7M6135CL	YX	85	PT7M6146CL	ae
20	PT7M6124CH	XR	53	PT7M6135CH	YY	86	PT7M6146CH	af
21	PT7M6124NL	XS	54	PT7M6135NL	YZ	87	PT7M6146NL	ag
22	PT7M6125CL	XT	55	PT7M6136CL	ZA	88	PT7M6147CL	ah
23	PT7M6125CH	XU	56	PT7M6136CH	ZB	89	PT7M6147CH	ai
24	PT7M6125NL	XV	57	PT7M6136NL	ZC	90	PT7M6147NL	aj
25	PT7M6126CL	XW	58	PT7M6137CL	ZD	91	PT7M6148CL	ak
26	PT7M6126CH	XX	59	PT7M6137CH	ZE	92	PT7M6148CH	al
27	PT7M6126NL	XY	60	PT7M6137NL	ZF	93	PT7M6148NL	am
28	PT7M6127CL	XZ	61	PT7M6138CL	ZG	94	PT7M6149CL	an
29	PT7M6127CH	YA	62	PT7M6138CH	ZH	95	PT7M6149CH	ao
30	PT7M6127NL	YB	63	PT7M6138NL	ZI	96	PT7M6149NL	ap
31	PT7M6128CL	YC	64	PT7M6139CL	ZJ	97	PT7M6150CL	aq
32	PT7M6128CH	YD	65	PT7M6139CH	ZK	98	PT7M6150CH	ar
33	PT7M6128NL	YE	66	PT7M6139NL	ZL	99	PT7M6150NL	as

To be continued.

Continued.

No.	Part No.	Code	No.	Part No.	Code	No.	Part No.	Code
100	PT7M6118CLB	wj	133	PT7M6118NLB	xq	166	PT7M6118CHB	bL
101	PT7M6119CLB	wk	134	PT7M6119NLB	xr	167	PT7M6119CHB	bM
102	PT7M6120CLB	wl	135	PT7M6120NLB	xs	168	PT7M6120CHB	bN
103	PT7M6121CLB	wm	136	PT7M6121NLB	xt	169	PT7M6121CHB	bO
104	PT7M6122CLB	wn	137	PT7M6122NLB	xu	170	PT7M6122CHB	bP
105	PT7M6123CLB	wo	138	PT7M6123NLB	xv	171	PT7M6123CHB	bQ
106	PT7M6124CLB	wp	139	PT7M6124NLB	xw	172	PT7M6124CHB	bR
107	PT7M6125CLB	wq	140	PT7M6125NLB	xx	173	PT7M6125CHB	bS
108	PT7M6126CLB	wr	141	PT7M6126NLB	xy	174	PT7M6126CHB	bT
109	PT7M6127CLB	ws	142	PT7M6127NLB	xz	175	PT7M6127CHB	bU
110	PT7M6128CLB	wt	143	PT7M6128NLB	ya	176	PT7M6128CHB	bV
111	PT7M6129CLB	wu	144	PT7M6129NLB	yb	177	PT7M6129CHB	bW
112	PT7M6130CLB	wv	145	PT7M6130NLB	yc	178	PT7M6130CHB	bX
113	PT7M6131CLB	ww	146	PT7M6131NLB	yd	179	PT7M6131CHB	bY
114	PT7M6132CLB	wx	147	PT7M6132NLB	ye	180	PT7M6132CHB	bZ
115	PT7M6133CLB	wy	148	PT7M6133NLB	yf	181	PT7M6133CHB	cA
116	PT7M6134CLB	wz	149	PT7M6134NLB	yg	182	PT7M6134CHB	cB
117	PT7M6135CLB	xa	150	PT7M6135NLB	yh	183	PT7M6135CHB	cC
118	PT7M6136CLB	xb	151	PT7M6136NLB	yi	184	PT7M6136CHB	cD
119	PT7M6137CLB	xc	152	PT7M6137NLB	yj	185	PT7M6137CHB	cE
120	PT7M6138CLB	xd	153	PT7M6138NLB	yk	186	PT7M6138CHB	cF
121	PT7M6139CLB	xe	154	PT7M6139NLB	yl	187	PT7M6139CHB	cG
122	PT7M6140CLB	xf	155	PT7M6140NLB	ym	188	PT7M6140CHB	cH
123	PT7M6141CLB	xg	156	PT7M6141NLB	yn	189	PT7M6141CHB	cI
124	PT7M6142CLB	xh	157	PT7M6142NLB	yo	190	PT7M6142CHB	cJ
125	PT7M6143CLB	xi	158	PT7M6143NLB	yp	191	PT7M6143CHB	cK
126	PT7M6144CLB	xj	159	PT7M6144NLB	yq	192	PT7M6144CHB	cL
127	PT7M6145CLB	xk	160	PT7M6145NLB	yr	193	PT7M6145CHB	cM
128	PT7M6146CLB	xl	161	PT7M6146NLB	ys	194	PT7M6146CHB	cN
129	PT7M6147CLB	xm	162	PT7M6147NLB	yt	195	PT7M6147CHB	cO
130	PT7M6148CLB	xn	163	PT7M6148NLB	yu	196	PT7M6148CHB	cQ
131	PT7M6149CLB	xo	164	PT7M6149NLB	yv	197	PT7M6149CHB	cR
132	PT7M6150CLB	xp	165	PT7M6150NLB	yw	198	PT7M6150CHB	cS