

## Features

- Highly accurate:  $\pm 1.5\%$  (25°C)
- Low power consumption: 0.9uA @ 3V Vcc
- Detect voltage range: 1.8 to 5V in 100mV increments
- Operating voltage range: 1.2V ~ 5.5V
- Operating temperature range: -40°C to + 85°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  $V_{TH-}$  and remains asserted until  $V_{CC}$  rises above  $V_{TH+}$  ( $V_{TH+} = V_{TH-} \times 1.05$ ). These devices provide excellent circuit reliability and low cost by eliminating external components and adjustments when monitoring nominal system voltages from +1.8V to +5V in 100mV increments. The series are voltage detectors with a propagation delay of 17 $\mu$ 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°C temperature range.

## Ordering Information

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

**Note 1:** “xx” refer to voltage range, see below table 1.

**Table 1 Suffix “xx” definition of PT7M61xx**

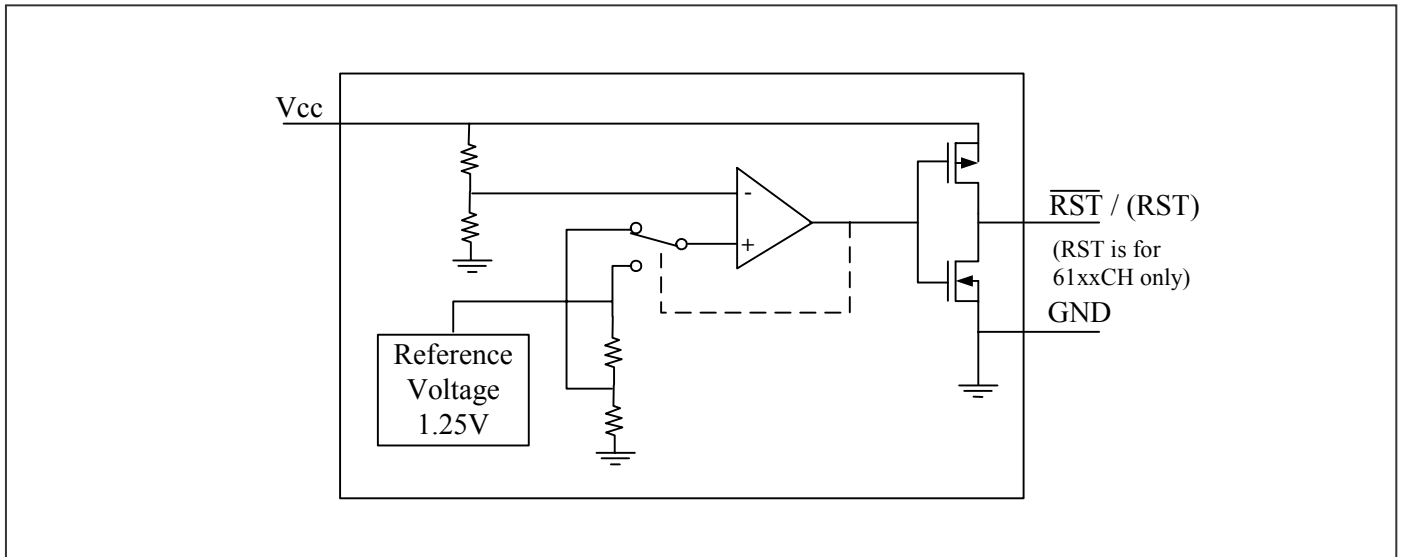
Suffix xx	$V_{TH-}$ (V)	Suffix xx	$V_{TH-}$ (V)	Suffix xx	$V_{TH-}$ (V)	Suffix xx	$V_{TH-}$ (V)	Suffix xx	$V_{TH-}$ (V)
18	1.8	25	2.5	32	3.2	39	3.9	46	4.6
19	1.9	26	2.6	33	3.3	40	4.0	47	4.7
20	2.0	27	2.7	34	3.4	41	4.1	48	4.8
21	2.1	28	2.8	35	3.5	42	4.2	49	4.9
22	2.2	29	2.9	36	3.6	43	4.3	50	5.0
23	2.3	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**

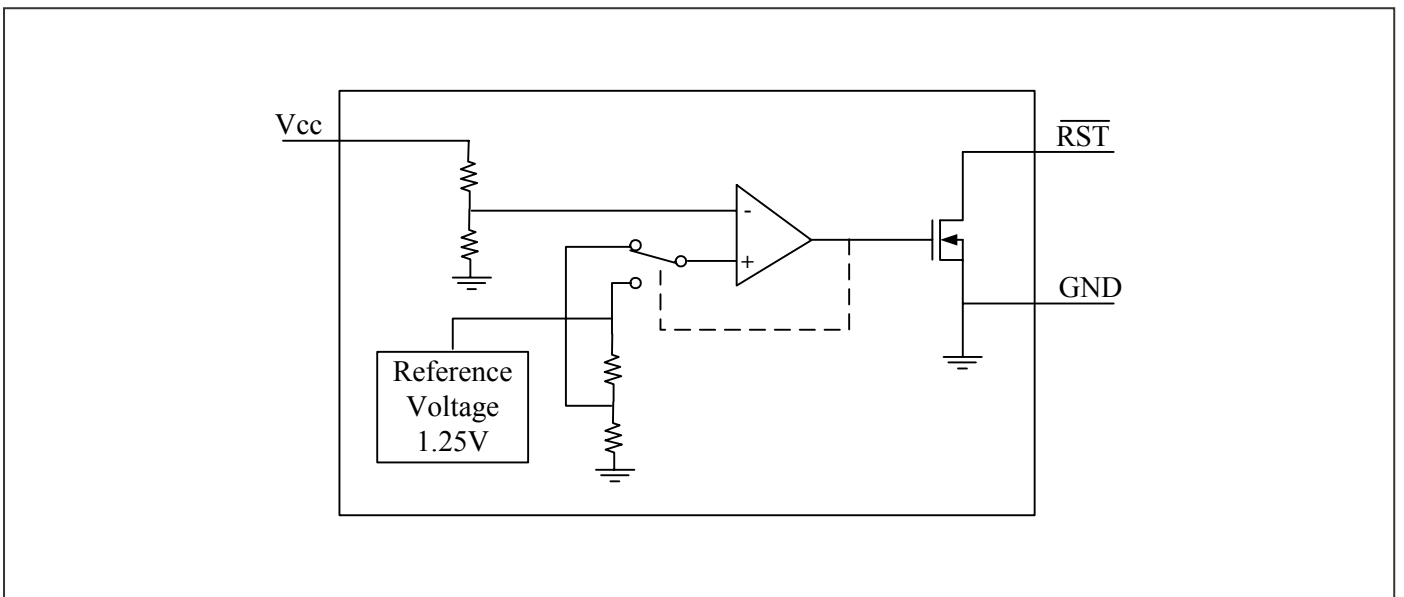
Item	Part No.	Reset Output				Threshold
		Open-Drain		Push-Pull		
		Active high	Active low	Active high	Active low	
1	PT7M61xxCL	-	-	-	√	1.8V to 5.0V in 100mV increments
2	PT7M61xxCLL	-	-	-	√	
3	PT7M61xxCH	-	-	√	-	
4	PT7M61xxNL	-	√	-	-	
5	PT7M61xxNLL	-	√	-	-	

**Block Diagram**

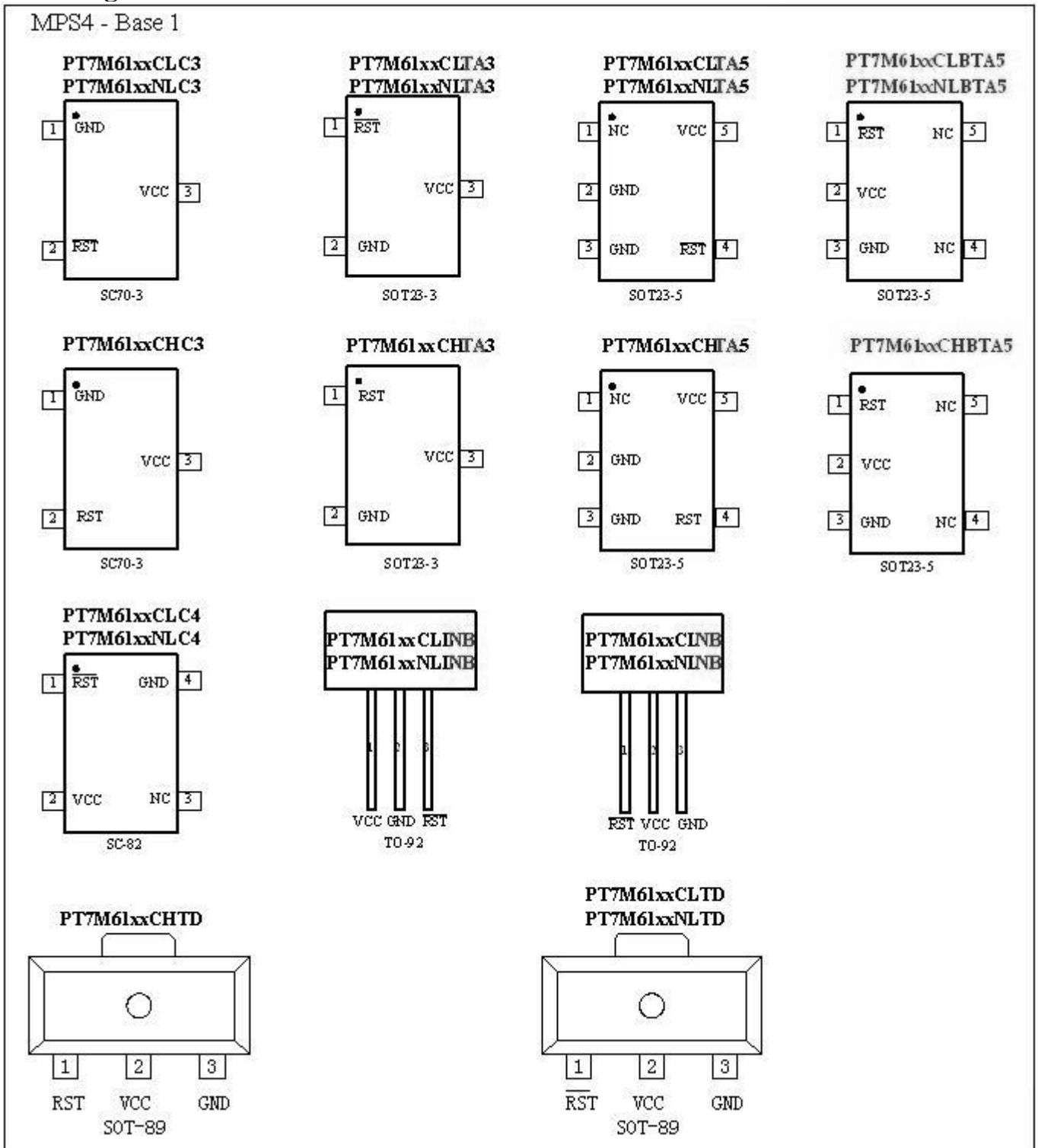
**Block Diagram of PT7M61xxCL/CH/CLL**



**Block Diagram of PT7M61xxNL/NLL**



**Pin Configuration**

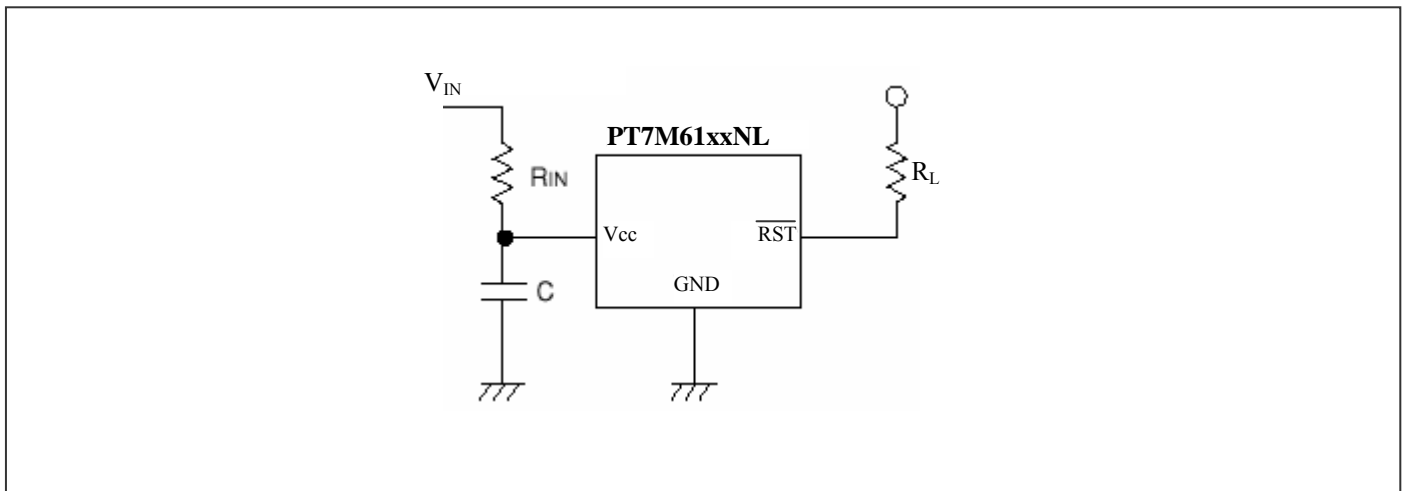


**Pin Description**

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

**Typical Operation Circuit**

**PT7M61xxNL Application Example**



Please use N-ch open drains configuration, when a resistor  $R_{IN}$  is connected between the  $V_{CC}$  pin and power source  $V_{IN}$ . In such cases, please ensure that  $R_{IN}$  is less than 10k $\Omega$  and that  $C$  is more than 0.1 $\mu$ F.  $R_L$  could be 1k $\Omega$  to 510k $\Omega$ .

### 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 <sub>CC</sub> +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

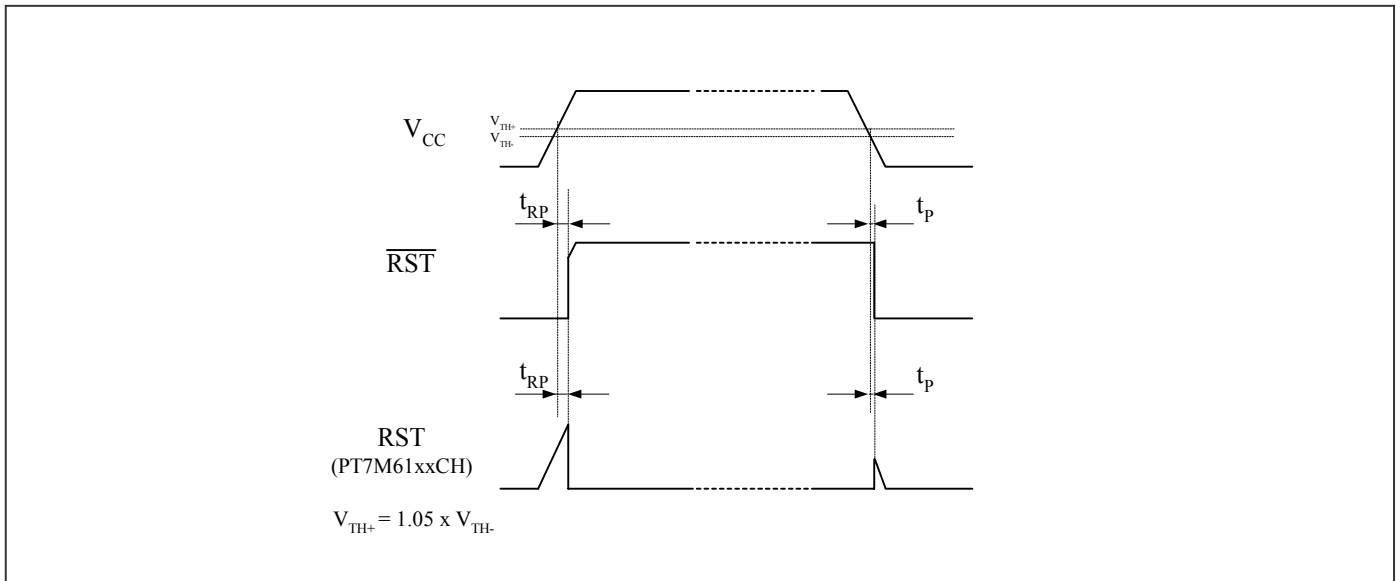
(V<sub>CC</sub> = 1.2V to 5.5V, T<sub>A</sub> = -40~85°C, unless otherwise noted. Typical values are at T<sub>A</sub> = +25°C)

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

**Note:** V<sub>TH+</sub> = 1.05 × V<sub>TH-</sub>. V<sub>TH-</sub> is voltage threshold when V<sub>CC</sub> falls from high to low. V<sub>TH+</sub> is voltage threshold when V<sub>CC</sub> rises from low to high.

**AC Electrical Characteristics**

**Timing diagram**

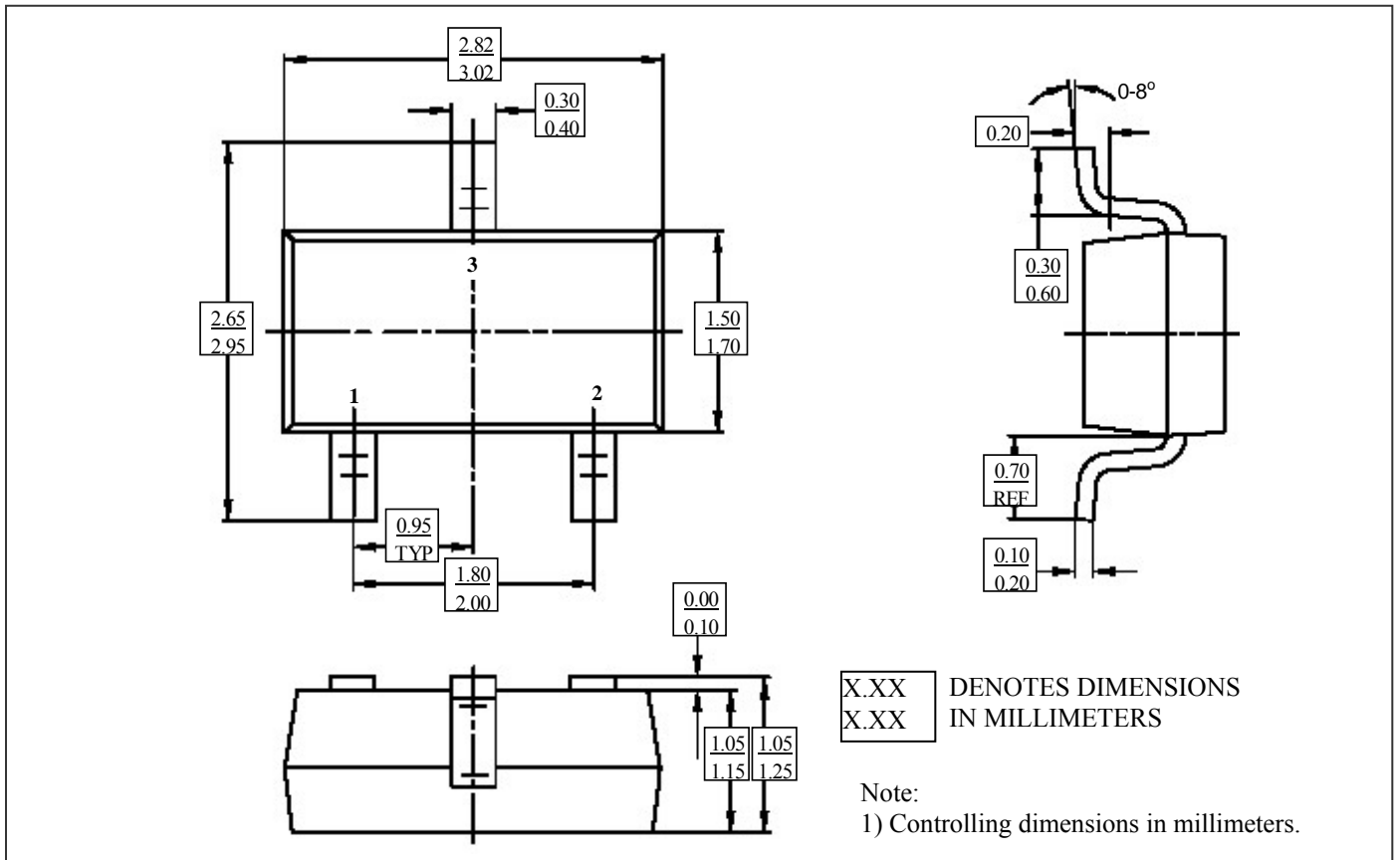


( $V_{CC} = 1.2V$  to  $5.5V$ ,  $T_A = -40 \sim 85^\circ C$ , unless otherwise noted. Typical values are at  $T_A = +25^\circ C$ )

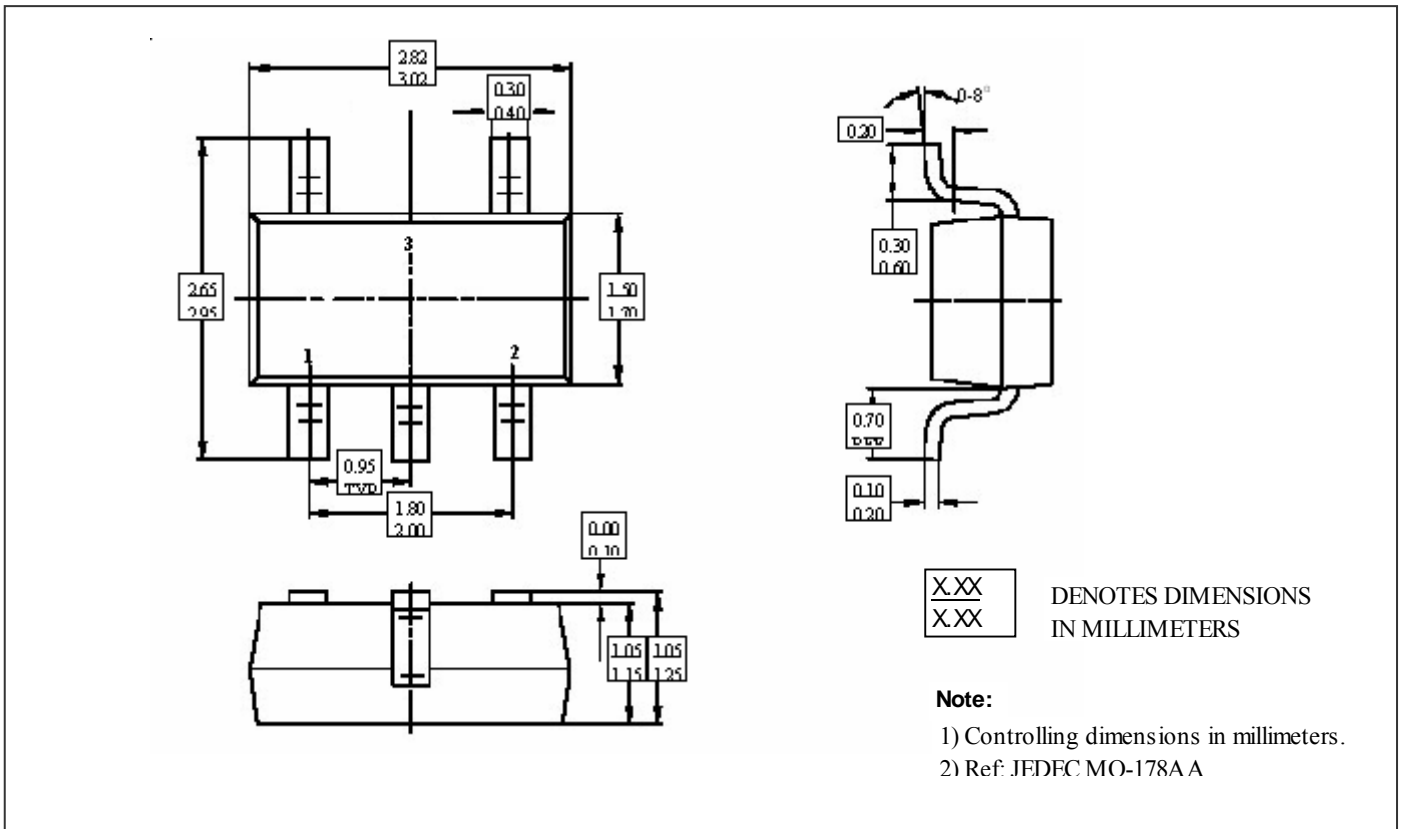
Sym.	Description	Test Conditions	Min	Typ	Max	Unit
$t_{RP}$	Timeout Period	-	-	-	200	$\mu s$
$t_p$	Delay	-	-	40	-	$\mu s$
$t_{overdrive}$	$V_{CC}$ Maximum Transient Duration	Reset threshold overdrive=500mV ( $V_{CC} - V_{th} = -500mV$ )	-	35	-	$\mu s$

**Mechanical Information**

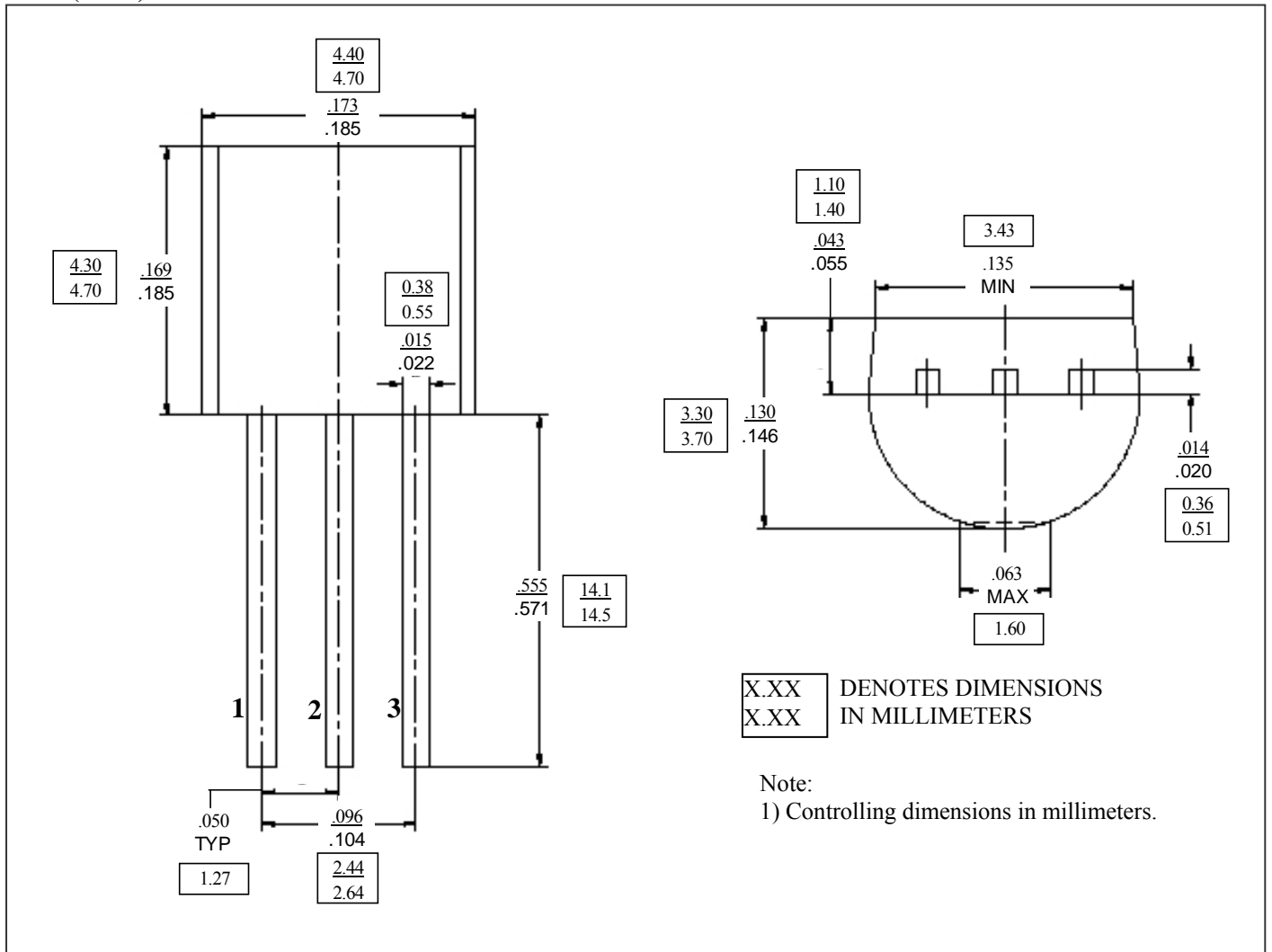
TA3 (SOT23-3)



TA5 (SOT23-5)

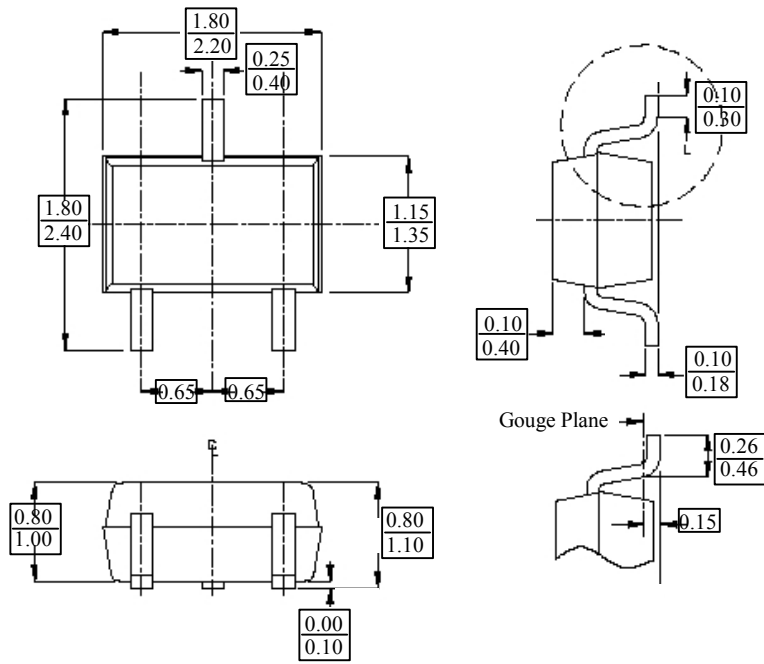


**NB (TO92)**





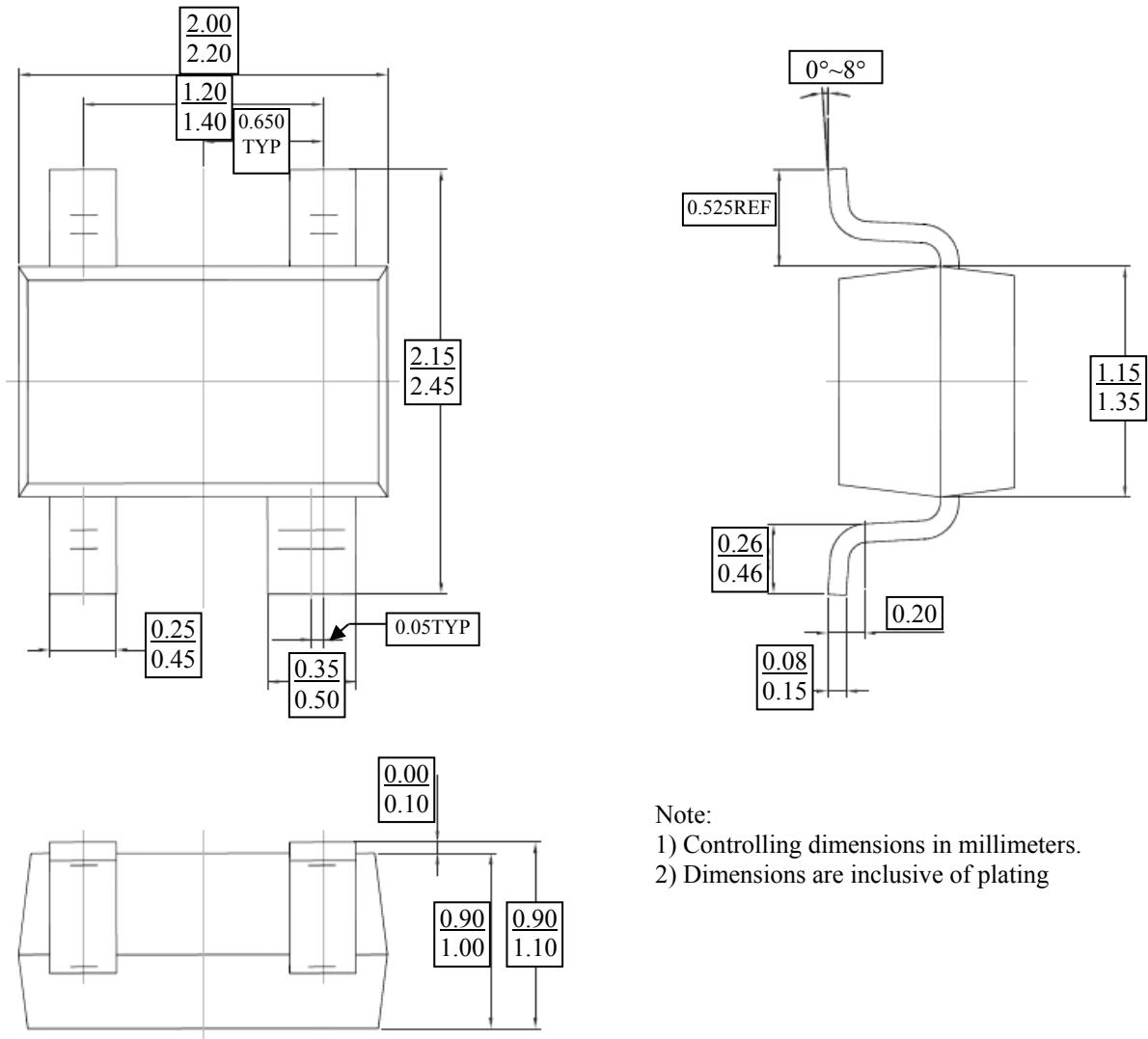
C3 (SC70-3)



$\frac{X.XX}{X.XX}$  DENOTES DIMENSIONS  
 IN MILLIMETERS

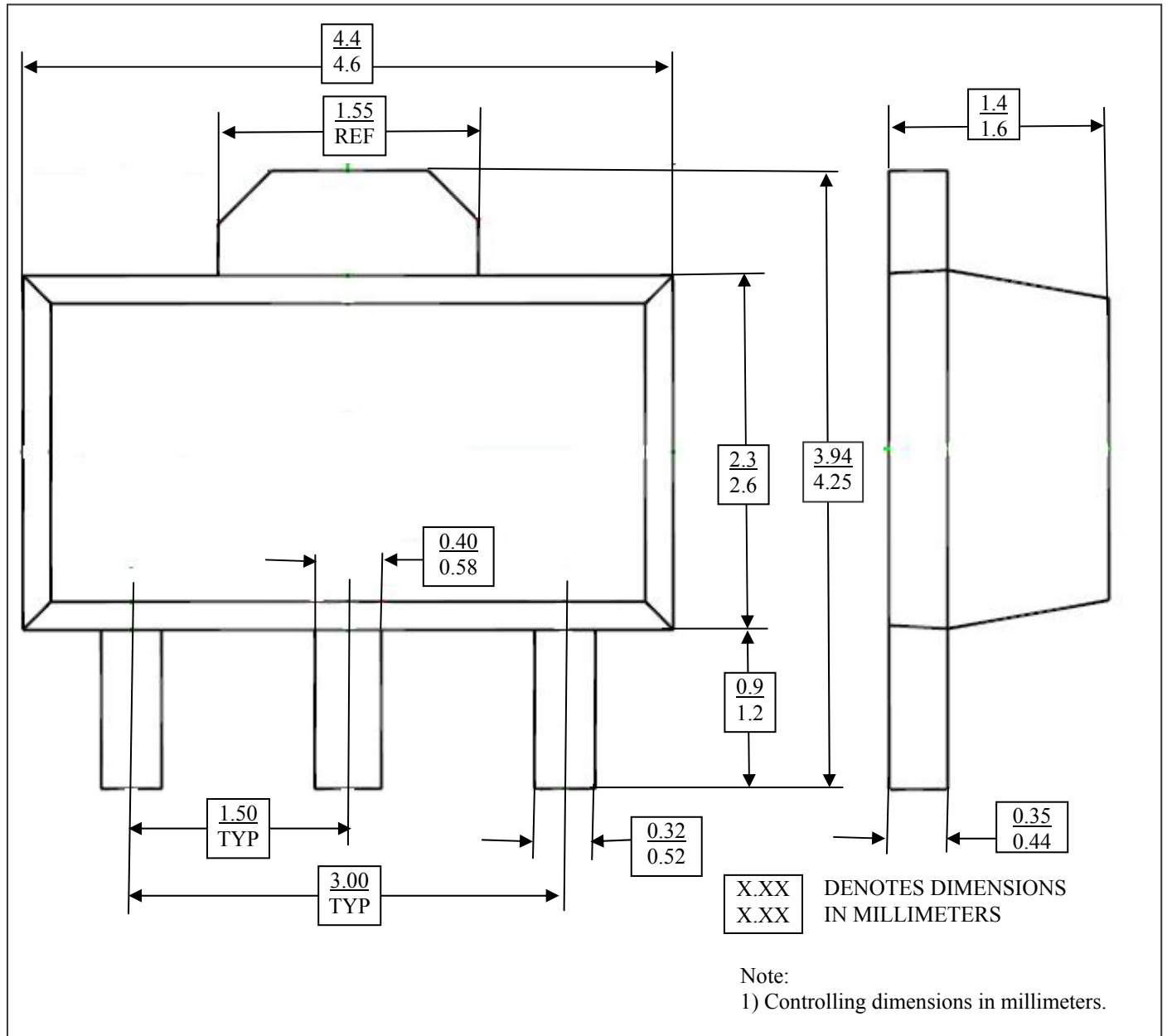
Note  
 1) Controlling dimensions in millimeters.  
 2) Dimensions are inclusive of plating.

C4 (SC70-4)

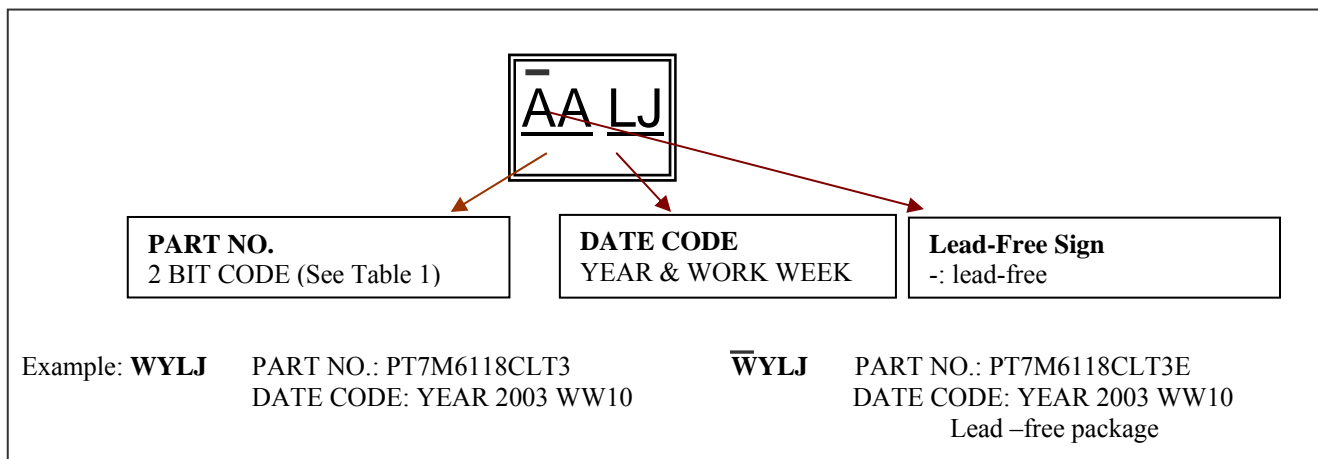


Note:  
 1) Controlling dimensions in millimeters.  
 2) Dimensions are inclusive of plating

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.**

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

**Notes**

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***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

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