

## Features

- Operate from VCC of 1.2V to 5.5V
- Capacitor-Adjustable Delay
- Active-High/-Low Output Options
- Open-Drain /Push-Pull Output Options
- Detect Voltage Threshold Accurate: 2.5% in full Temperature from -40°C to + 85°C
- Low Supply Current (2µA, Typ.)
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](#) or your local Diodes representative.  
<https://www.diodes.com/quality/product-definitions/>
- Ultra-Small 4-Pin UDFN Package or SOT23-5 Package or SC70-4 package

## Applications

- Computers/Servers/Networking
- Medical Equipment
- Critical µP Monitoring
- Intelligent Instruments
- Set-Top Boxes/Portable Equipment

## Description

The PT7M6518-6550 is a family of small, low-power, voltage-monitoring circuits with adjustable delay time capability. PT7M65xx series features a highly accurate under voltage detector with hysteresis and an externally programmable time delay generator. This combination of features prevents erratic system reset operation.

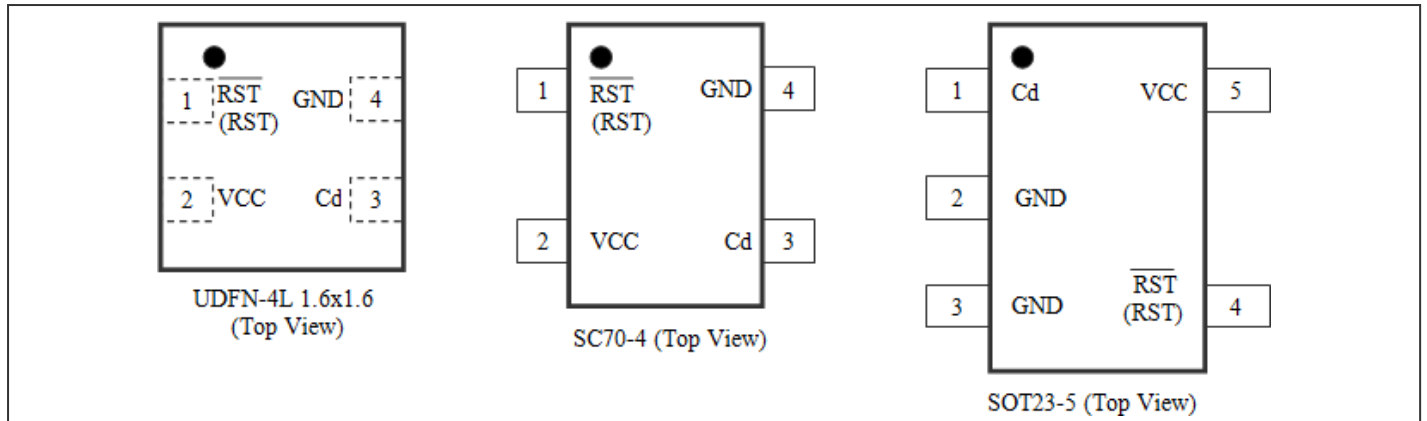
PT7M65xx series provide external capacitor to adjust for set up delay time.

All series operate from a 1.2V to 5.5V supply voltage and are fully specified over the -40°C to + 85°C operating temperature range. This family is available in ultra-small 4-pin UDFN (1.6mm x 1.6mm) and SC70-4 and SOT23-5 packages.

### Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Pin Configuration



## Pin Description

Name	Type	Description
$\overline{\text{RST}}$	O	<b>Active Low Reset Output:</b> $\overline{\text{RST}}$ is asserted to LOW when $V_{CC}$ drops below voltage threshold $V_{TH}$ . value (PT7M65xxCL/NL). PT7M65xxCL output with push-pull. PT7M65xxNL output with open-drain which requires external pullup resistance.
RST	O	<b>Active High Reset Output.</b> RST is asserted High when $V_{CC}$ drops below voltage threshold $V_{TH}$ . voltage (PT7M65xxCH). PT7M65xxCH output with push-pull.
GND	P	<b>Ground.</b>
VCC	P	<b>Supply Voltage.</b> Operation voltage from 1.2V to 5.5V. By pass 0.1uF ceramic capacitor to GND for noise decoupling.
Cd	I/O	<b>Capacitor Delay.</b> Adjustable. Connect an external capacitor from Cd pin to GND to set the Reset inactive delay time (timeout period) after VCC rise over voltage threshold $V_{TH+}$ . Do not short Cd pin to GND directly. The delay time equation as $t_{\text{delay}} = \text{Cd}(\mu\text{F}) \times 4 \times 10^6 \mu\text{s} + 40 \mu\text{s}$ .

Table 1 Function comparison

Item	Part No.	Reset Output				Threshold
		Open-Drain		Push-Pull		
		Active high	Active low	Active high	Active low	
1	PT7M65xxCL	-	-	-	√	1.8V to 5.0V in 100mV increments
2	PT7M65xxCH	-	-	√	-	
3	PT7M65xxNL	-	√	-	-	

## Maximum Ratings

Storage Temperature .....	-65°C to +150°C
Ambient Temperature with Power Applied.....	-40°C to +85°C
Supply Voltage to Ground Potential (V <sub>CC</sub> to GND) .....	-0.3V to +6.0V
DC Input Voltage (All inputs except V <sub>CC</sub> 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

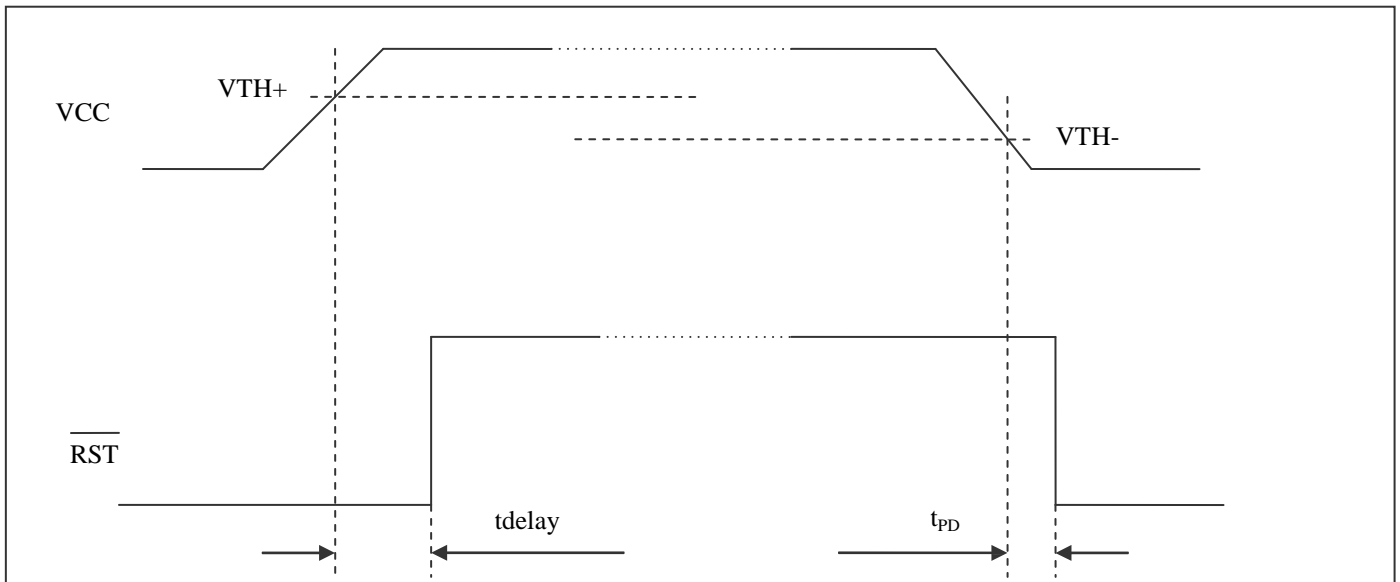
(V<sub>CC</sub> = 1.2V to 5.5V, T<sub>A</sub> = -40~85°C, unless otherwise noted. Typical values are at T<sub>A</sub> = +25°C)

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> = 3.6V. No load.	-	1.3	3.6	μA
			V <sub>CC</sub> = 5V. No load.	-	2.0	5.0	μA
Output Driving	Output high (push-pull)	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 (open-drain or push-pull)	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
V <sub>CC</sub> Detect Voltage Threshold		V <sub>TH-</sub>	+25°C	(V <sub>TH-</sub> ) ×0.985	V <sub>TH-</sub>	(V <sub>TH-</sub> ) ×1.015	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> ) ×0.985	V <sub>TH+</sub>	(V <sub>TH+</sub> ) ×1.015	
			-40°C~85°C	(V <sub>TH+</sub> ) ×0.975	V <sub>TH+</sub>	(V <sub>TH+</sub> ) ×1.025	
Delay charge current		I <sub>cd</sub>	-	200	250	300	nA
Delay voltage Threshold		V <sub>tcd</sub>	C <sub>delay</sub> rising	0.95	1.00	1.05	V
C <sub>delay</sub> pulldown Resistance		R <sub>cdelay</sub>	-	-	200	500	Ω

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

### PT7M65xxNL Timing Diagram



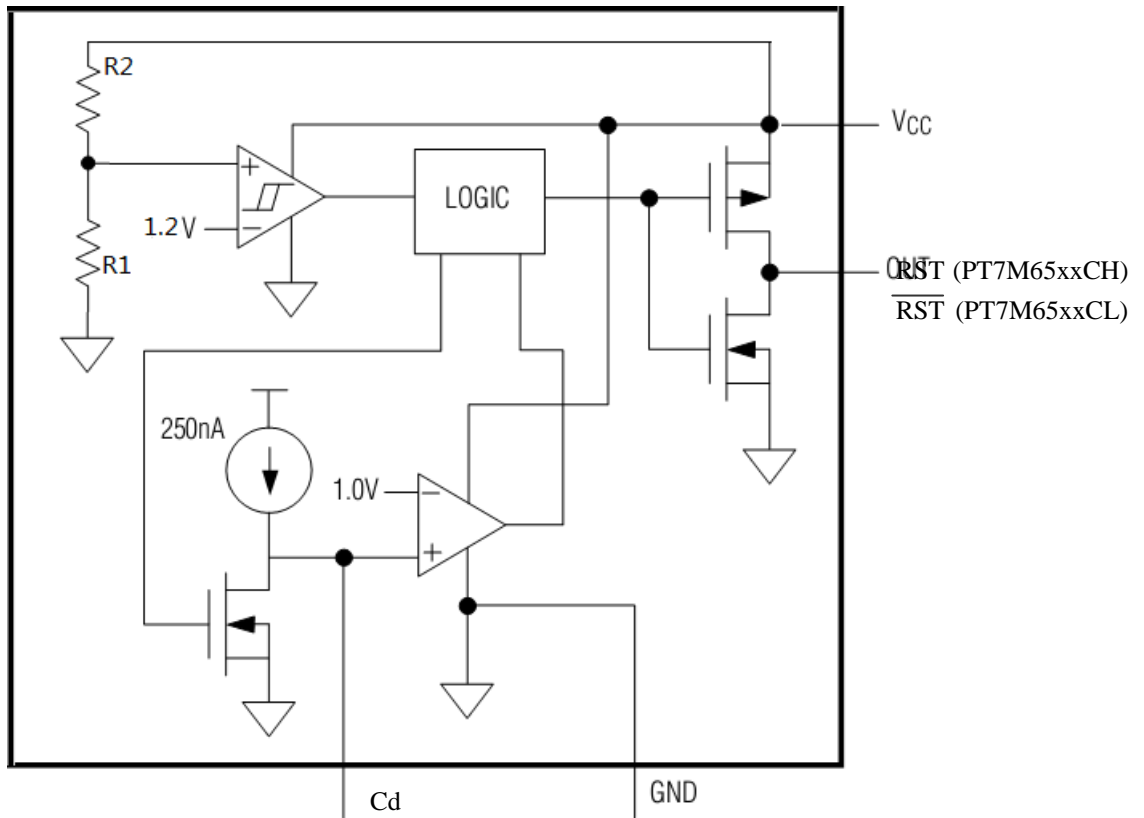
( $V_{CC} = 1.2V$  to  $5.5V$ ,  $T_A = -40\sim 85^\circ C$ , unless otherwise noted. Typical values are at  $T_A = +25^\circ C$ )

Sym.	Description	Test Conditions	Min.	Typ.	Max.	Unit
$t_{PD}$	Reset active Propagation Delay		-	50	-	$\mu s$
$t_{delay}$	Reset inactive delay time after $V_{CC} > V_{TH+}$ (Reset Timeout Period).		-	$Cd(\mu F) \times 4 \times 10^6 + 40$	-	$\mu s$

## Function Description

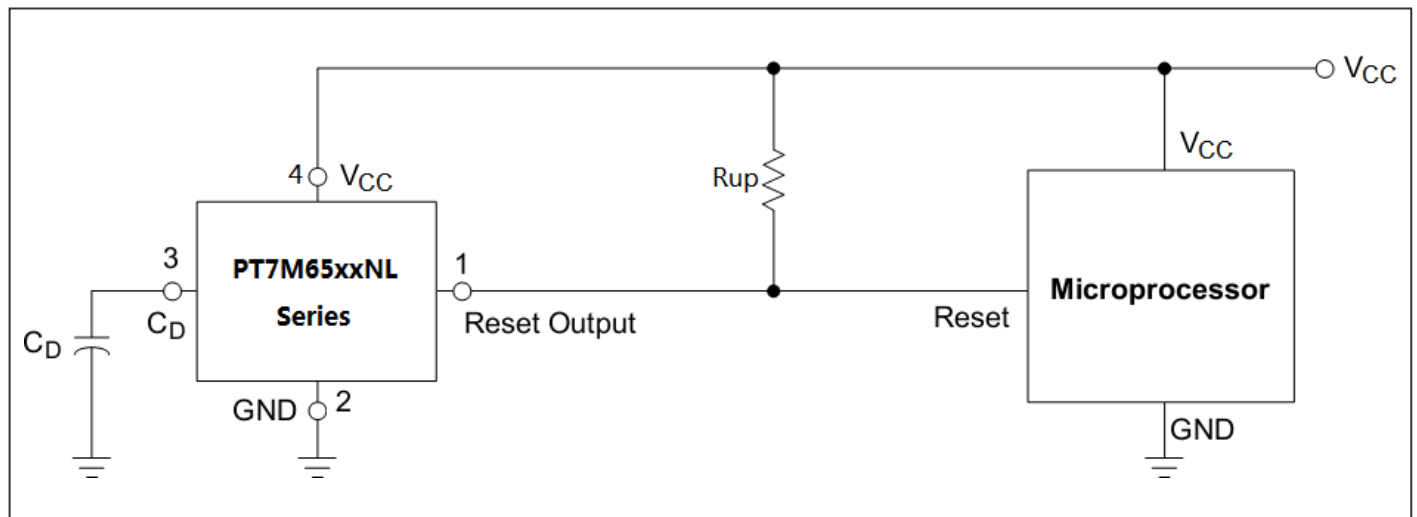
PT7M65xx has adjustable reset output delay time function throw Cd pin with cap. Internal 250nA sourcing will charge the external cap throw Cd pin when VCC is rise above  $V_{TH+}$ , and reset output will disalert after Cd pin voltage is reaches 1V. This delay time is  $t_{delay} = Cd (\mu F) \times 4 \times 10^6 \mu s + 40 \mu s$ . For example, if  $Cd = 1nF$ , the  $t_{delay} = 0.001 \times 4 \times 10^6 \mu s + 40 \mu s = 4040 \mu s$ . Cd pin voltage will be discharged when reset output is assert ok at Vcc falls below Vth-, the discharge resistance is about 200 $\Omega$ .

**Block Diagram**



**Typical Operation Circuit**

PT7M65xxNL Application Example



**Note:** Capacitor-Adjustable Delay application.

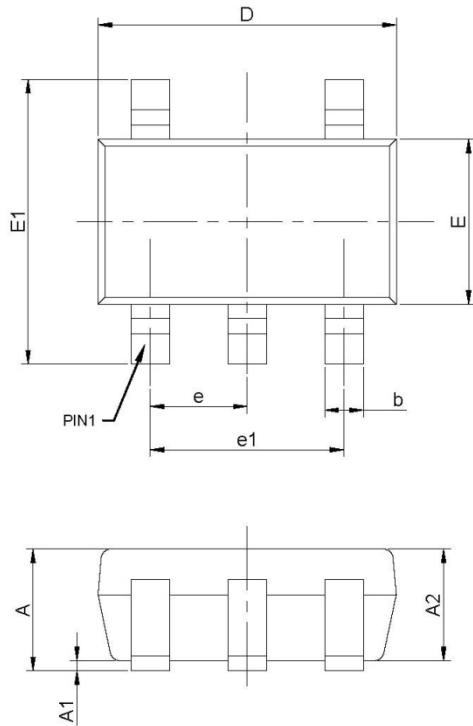
Connect an external capacitor ( $C_{cd}$ ) from Cd to GND delay period.

$$t_{\text{delay}} = C_d(\mu\text{f}) \times 4 \times 10^6 \mu\text{s} + 40 \mu\text{s}$$

There is a fixed short delay (40 $\mu\text{s}$ , typ.) for the output deasserting when  $V_{in}$  falls below  $V_{th}$ .

**Packaging Mechanical:**

**5-SOT23 (TA)**



PKG. DIMENSIONS(MM)		
SYMBOL	Min	Max
A	1.05	1.25
A1	0.00	0.10
A2	1.05	1.15
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	1.50	1.70
E1	2.65	2.95
e	0.95 BSC	
e1	1.80	2.00
L	0.30	0.60
θ	0°	8°

**Note:**

1. Ref: JEDEC MO-178C/AA



DATE: 06/18/13

DESCRIPTION: 5-Pin, Small Outline Transistor Plastic Package (SOT23)

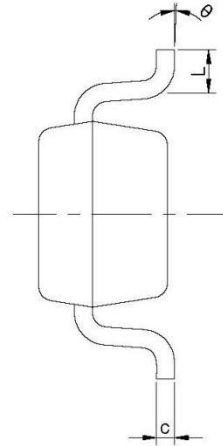
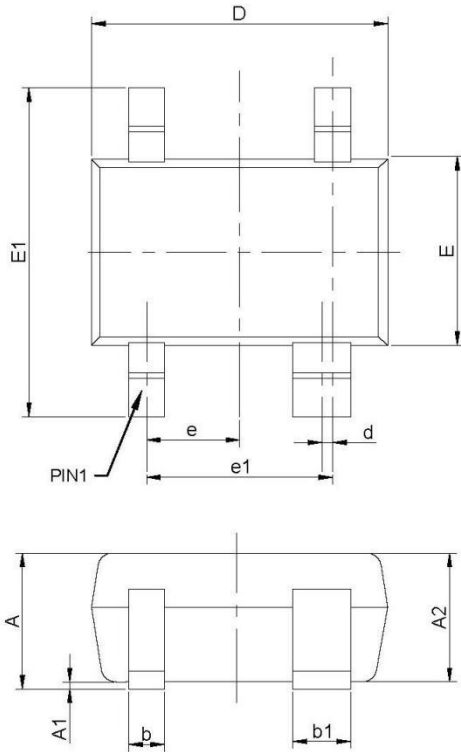
PACKAGE CODE: TA (TA5)

DOCUMENT CONTROL #: PD-2144

REVISION: --

13-0183

**4-SC70 (C)**



PKG. DIMENSIONS(MM)		
SYMBOL	Min	Max
A	0.90	1.10
A1	0.00	0.10
A2	0.90	1.00
b	0.25	0.40
b1	0.35	0.50
c	0.08	0.15
D	2.00	2.20
d	0.05 TYP	
E	1.15	1.35
E1	2.15	2.45
e	0.65 TYP	
e1	1.20	1.40
L	0.26	0.46
$\theta$	0°	8°

**Notes:**

1. Ref: JEDEC MO-203B



DATE: 06/18/13

DESCRIPTION: 4-Pin, SOT343 (SC70)

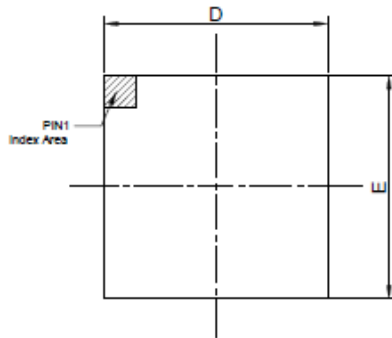
PACKAGE CODE: C (C4)

DOCUMENT CONTROL#: PD-2148

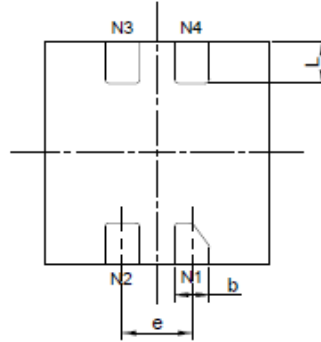
REVISION: --

13-0187

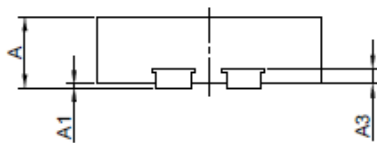
4-UDFN (XV)



TOP VIEW



BOTTOM VIEW



SIDE VIEW

PKG. DIMENSIONS(MM)		
SYMBOL	Min	Max
A	0.45	0.55
A1	0.00	0.05
A3	0.11 REF	
D	1.55	1.65
E	1.55	1.65
b	0.20	0.30
e	0.50 TYP	
L	0.25	0.35

Notes:

1. Ref. JEDEC MO-287A



DATE: 06/18/13

DESCRIPTION: 4-Pin, UDFN, 1.6X1.6, MIS

PACKAGE CODE: XV (XV4)

DOCUMENT CONTROL #: PD-2130

REVISION: -

For latest package info.

please check: <http://www.diodes.com/design/support/packaging/pericom-packaging/packaging-mechanicals-and-thermal-characteristics/>



## Ordering Information

Part Number	Package Code	Package Description
PT7M65xxCLTAEX	TA	5-Pin, Small Outline Transistor Plastic Package (SOT23)
PT7M65xxCLCEX	C	4-Pin, SOT343 (SC70)
PT7M65xxCLXVEX	XV	4-Pin, 1.6X1.6 (UDFN), MIS
PT7M65xxNLTAEX	TA	5-Pin, Small Outline Transistor Plastic Package (SOT23)
PT7M65xxNLXVEX	XV	4-Pin, 1.6X1.6 (UDFN), MIS
PT7M65xxNLCEX	C	4-Pin, SOT343 (SC70)
*PT7M65xxCHTAEX	TA	5-Pin, Small Outline Transistor Plastic Package (SOT23)
*PT7M65xxCHXVEX	XV	4-Pin, 1.6X1.6 (UDFN), MIS
*PT7M65xxCHC4EX	C	4-Pin, SOT343 (SC70)

### Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. E = Pb-free and Green
5. X suffix = Tape/Reel

**Table 2 Suffix "xx" definition of PT7M65xx**

Suffix xx	V <sub>TH</sub> (V)	Suffix xx	V <sub>TH</sub> (V)	Suffix xx	V <sub>TH</sub> (V)	Suffix xx	V <sub>TH</sub> (V)	Suffix xx	V <sub>TH</sub> (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		

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