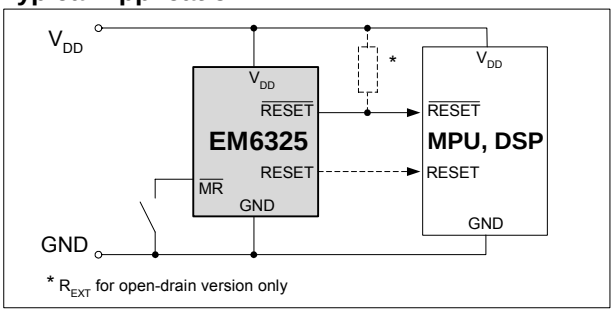
Reset Circuit with Manual Reset

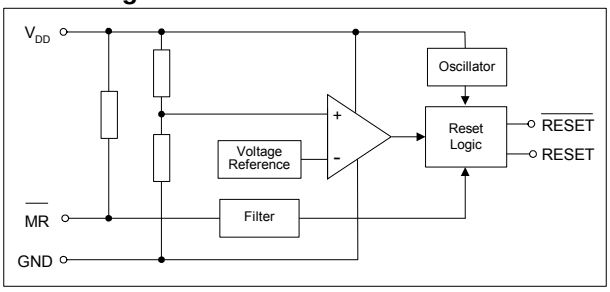
Description

The EM6325 is an ultra-low current reset circuit available in a large variety of configurations and very small packages for maximum flexibility in all end-applications up to 125°C and using power supplies between 1.5V and 5.5V.
This circuit monitors the supply voltage of any electronic system, and generates the appropriate reset signal after a fixed reset timeout period. The threshold defines the minimum allowed voltage which guarantees the good functionality of the system. When V_{DD} rises above V_{TH}, the output remains active for an additional delay time. This allows the system to stabilize before getting fully active.
This circuit features a Manual Reset: an input that asserts reset when pulled low ($\overline{MR}$ with internal pull-up).
Small SC70-4L, SC70-5L and SOT23-5L packages as well as ultra-low supply current of 2.9µA make the EM6325 an ideal choice for portable and battery-operated devices.

Typical Application



Block Diagram



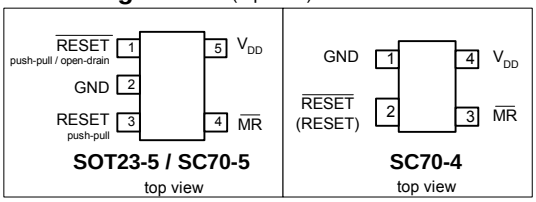
Features

- Manual reset function
- 200ms reset timeout period (1.6ms, 25ms, 1600ms on request)
- Ultra-low supply current of 2.9µA (V_{DD}=3.3V)
- Operating temperature range: -40°C to +125°C
- ±1.5% reset threshold accuracy
- 11 reset threshold voltages V_{TH}: 4.63V, 4.4V, 3.08V, 2.93V, 2.63V, 2.2V, 1.8V, 1.66V, 1.57V, 1.38V, 1.31V
- 3 reset output options:
  - Active-low $\overline{RESET}$ push-pull
  - Active-low $\overline{RESET}$ open-drain
  - Active-high RESET push-pull
- Immune to short negative V_{DD} transients
- Guaranteed Reset valid down to 0.9V
- Threshold hysteresis: 2.1% of V_{TH}
- Very small SOT23-5L, SC70-5L and SC70-4L

Applications

- Computers
- Servers and workstations
- Modems
- Wireless communication
- Metering
- Playstations
- PDA , Webpad
- Automotive systems

Pin Configuration (top view)



Pin Description

Pin		Name	Function
SOT23-5L / SC70-5L	SC70-4L		
1	2	$\overline{RESET}$	Active-low $\overline{RESET}$ output. $\overline{RESET}$ remains low for the reset timeout period and then goes high after all reset conditions are deasserted or after $\overline{MR}$ goes from low to high
2	1	GND	Ground
3	2	RESET	Active-high RESET output. RESET remains high for the reset timeout period and then goes low after all reset conditions are deasserted or after $\overline{MR}$ goes from low to high
4	3	$\overline{MR}$	Manual Reset input with an internal pull-up 15kΩ resistor. Reset remains active as long as $\overline{MR}$ is low and for t_{POR} after $\overline{MR}$ returns high. $\overline{MR}$ can be driven with a CMOS output or shorted to ground with a switch
5	4	V_{DD}	Supply Voltage (5.5V max.)

Ordering Information

EM6325 C X SP5B - 2.9 +

Delay (t_{POR}):
C = 200ms B = 25ms
A = 1.6ms D = 1600ms

Reset Output Type:
X = Active-low /RES push-pull
Active-high RES push-pull
Y = Active-low /RES open-drain
Active-high RES push-pull
Z = Active-high RES push-pull

Package:
SP5B = SOT23-5, Tape&Reel 3000 pcs
SC5B = SC70-5, Tape&Reel 3000 pcs
SC4B = SC70-4, Tape&Reel 3000 pcs

RoHS Compliance:
+ = lead-free/green mold compliant
[blank] = leaded

Reset Threshold Voltage (V_{TH}):
1.3 = 1.31V 2.6 = 2.63V
1.4 = 1.38V 2.9 = 2.93V
1.6 = 1.57V 3.1 = 3.08V
1.7 = 1.66V 4.4 = 4.40V
1.8 = 1.80V 4.6 = 4.63V
2.2 = 2.20V

Top Marking

Package top marking below is for most parts in leaded package (first letter is “A”). For lead-free/green mold (RoHS) parts, the first letter of top marking begins with letter “B” instead of letter “A”. The underscore "_ _" refers to the four-letter code for the package (eg. SP5B, SC4B, …).

Part Number	Top Marking	Part Number	Top Marking	Part Number	Top Marking	Part Number	Top Marking
EM6325AX__-1.3	ANAA	EM6325BX__-1.3	ANBA	EM6325CX__-1.3	ANCA	EM6325DX__-1.3	ANDA
EM6325AX__-1.4	ANAB	EM6325BX__-1.4	ANBB	EM6325CX__-1.4	ANCB	EM6325DX__-1.4	ANDB
EM6325AX__-1.6	ANAC	EM6325BX__-1.6	ANBC	EM6325CX__-1.6	ANCC	EM6325DX__-1.6	ANDC
EM6325AX__-1.7	ANAD	EM6325BX__-1.7	ANBD	EM6325CX__-1.7	ANCD	EM6325DX__-1.7	ANDD
EM6325AX__-1.8	ANAE	EM6325BX__-1.8	ANBE	EM6325CX__-1.8	ANCE	EM6325DX__-1.8	ANDE
EM6325AX__-2.2	ANAF	EM6325BX__-2.2	ANBF	EM6325CX__-2.2	ANCF	EM6325DX__-2.2	ANDF
EM6325AX__-2.6	ANAG	EM6325BX__-2.6	ANBG	EM6325CX__-2.6	ANCG	EM6325DX__-2.6	ANDG
EM6325AX__-2.9	ANAH	EM6325BX__-2.9	ANBH	EM6325CX__-2.9	ANCH	EM6325DX__-2.9	ANDH
EM6325AX__-3.1	ANAJ	EM6325BX__-3.1	ANBJ	EM6325CX__-3.1	ANCJ	EM6325DX__-3.1	ANDJ
EM6325AX__-4.4	ANAK	EM6325BX__-4.4	ANBK	EM6325CX__-4.4	ANCK	EM6325DX__-4.4	ANDK
EM6325AX__-4.6	ANAL	EM6325BX__-4.6	ANBL	EM6325CX__-4.6	ANCL	EM6325DX__-4.6	ANDL
EM6325AY__-1.3	ANAM	EM6325BY__-1.3	ANBM	EM6325CY__-1.3	ANCM	EM6325DY__-1.3	ANDM
EM6325AY__-1.4	ANAN	EM6325BY__-1.4	ANBN	EM6325CY__-1.4	ANCN	EM6325DY__-1.4	ANDN
EM6325AY__-1.6	ANAP	EM6325BY__-1.6	ANBP	EM6325CY__-1.6	ANCP	EM6325DY__-1.6	ANDP
EM6325AY__-1.7	ANAQ	EM6325BY__-1.7	ANBQ	EM6325CY__-1.7	ANCQ	EM6325DY__-1.7	ANDQ
EM6325AY__-1.8	ANAR	EM6325BY__-1.8	ANBR	EM6325CY__-1.8	ANCR	EM6325DY__-1.8	ANDR
EM6325AY__-2.2	ANAS	EM6325BY__-2.2	ANBS	EM6325CY__-2.2	ANCS	EM6325DY__-2.2	ANDS
EM6325AY__-2.6	ANAT	EM6325BY__-2.6	ANBT	EM6325CY__-2.6	ANCT	EM6325DY__-2.6	ANDT
EM6325AY__-2.9	ANAU	EM6325BY__-2.9	ANBU	EM6325CY__-2.9	ANCU	EM6325DY__-2.9	ANDU
EM6325AY__-3.1	ANAV	EM6325BY__-3.1	ANBV	EM6325CY__-3.1	ANCV	EM6325DY__-3.1	ANDV
EM6325AY__-4.4	ANAW	EM6325BY__-4.4	ANBW	EM6325CY__-4.4	ANCW	EM6325DY__-4.4	ANDW
EM6325AY__-4.6	ANAX	EM6325BY__-4.6	ANBX	EM6325CY__-4.6	ANCX	EM6325DY__-4.6	ANDX

Standard Versions, Samples

Sample stock is generally held on **standard versions** (below) only. Non standard versions have a 30,000 pieces minimum order quantity. Please contact factory for other versions not shown here and for availability of non standard versions.

EM6325AXSC4B-2.9
EM6325CXSC5B-2.9
EM6325CXSP5B-1.3
EM6325CXSP5B-2.6
EM6325CXSP5B-2.9
EM6325CXSP5B-3.1
EM6325CYSP5B-2.9
EM6325CYSP5B-4.6
EM6325DXSC4B-2.6
EM6325CXSP5B-4.6

Absolute Maximum Ratings

Parameter	Symbol	Conditions
Voltage at V_{DD} to GND	V_{DD}	-0.3V to +6V
Minimum voltage at any signal pin	V_{MIN}	GND - 0.3V
Maximum voltage at any signal pin	V_{MAX}	V_{DD} + 0.3V
Electrostatic discharge max. to MIL-STD-883C method 3015.7 with ref. to V_{SS}	V_{ESD}	2000V
Max. soldering conditions	T_{MAX}	250°C x 10s
Storage Temperature Range	T_{STG}	-65°C to +150°C

Stresses above these listed maximum ratings may cause permanent damages to the device. Exposure beyond specified operating conditions may affect device reliability or cause malfunction.

Handling Procedures

This device has built-in protection against high static voltages or electric fields; however, anti-static precautions must be taken as for any other CMOS component. Unless otherwise specified, proper operation can only occur when all terminal voltages are kept within the voltage range. Unused inputs must always be tied to a defined logic voltage level.

Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply voltage	V_{DD}	0.9	5.5	V
Operating Temperature	T_A	-40	+125	°C

Electrical Characteristics

Unless otherwise specified: V_{DD}= 0.9V to 5.5V, T_A=-40°C to +125°C (note 1).

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Supply current (note 2)	I_{DD}	V_{DD}=1.5V	+25°C	-	2.3	4.6	µA
			-40°C to +125°C	-		7	
		V_{DD}=3.3V	+25°C	-	2.9	5.5	
			-40°C to +125°C	-		8.3	
		V_{DD}=5.0V	+25°C	-	3.4	6.3	
			-40°C to +125°C	-		9.6	
Threshold voltage (note 3)	V_{TH}	EM6325 – 1.3	+25°C	1.290	1.31	1.330	V
			-40°C to +85°C	1.245		1.382	
			-40°C to +125°C	1.221		1.387	
		EM6325 – 1.4	+25°C	1.359	1.38	1.401	
			-40°C to +85°C	1.311		1.456	
			-40°C to +125°C	1.286		1.461	
		EM6325 – 1.6	+25°C	1.546	1.57	1.594	
			-40°C to +85°C	1.492		1.656	
			-40°C to +125°C	1.463		1.663	
		EM6325 – 1.7	+25°C	1.635	1.66	1.685	
			-40°C to +85°C	1.577		1.751	
			-40°C to +125°C	1.547		1.758	
		EM6325 – 1.8	+25°C	1.773	1.80	1.827	
			-40°C to +85°C	1.710		1.899	
			-40°C to +125°C	1.678		1.906	
		EM6325 – 2.2	+25°C	2.167	2.20	2.233	
			-40°C to +85°C	2.090		2.321	
			-40°C to +125°C	2.050		2.330	
		EM6325 – 2.6	+25°C	2.591	2.63	2.669	
			-40°C to +85°C	2.499		2.775	
			-40°C to +125°C	2.451		2.785	
		EM6325 – 2.9	+25°C	2.886	2.93	2.974	
			-40°C to +85°C	2.784		3.091	
			-40°C to +125°C	2.731		3.103	
		EM6325 – 3.1	+25°C	3.034	3.08	3.126	
			-40°C to +85°C	2.926		3.249	
			-40°C to +125°C	2.871		3.262	
		EM6325 – 4.4	+25°C	4.334	4.40	4.466	
			-40°C to +85°C	4.180		4.642	
			-40°C to +125°C	4.101		4.660	
		EM6325 – 4.6	+25°C	4.561	4.63	4.699	
			-40°C to +85°C	4.399		4.885	
			-40°C to +125°C	4.315		4.903	
Threshold hysteresis	V_{HYS}	T_A=+25°C		-	2.1%•V_{TH}	-	V

Note 1: Production tested at +25°C only. Over temperature limits are guaranteed by design, not production tested.
Note 3: Threshold voltage is specified for V_{DD} falling.

Electrical Characteristics (continued)

Unless otherwise specified: V_{DD}= 0.9V to 5.5V, T_A=-40°C to +125° C (note 1).

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Reset timeout period	t_{POR}	(note 2 and 4) V_{DD} from 0V to $V_{TH\ (typ)}$+15% T_A= +25°C	EM6325C	155	200	224	ms
			EM6325A	0.7	1.6	3.8	
			EM6325B	19.4	25	28	
			EM6325D	1240	1600	1792	
Propagation delay time V_{DD} to $\overline{\text{RESET}}$ (RESET) delay	t_P	V_{DD} drops from $V_{TH\ (typ)}$+0.2V to $V_{TH\ (typ)}$-0.2V (note 2). T_A= +25°C		2	130	255	µs
Open-drain $\overline{\text{RESET}}$ output Voltage	V_{OL}	V_{DD}>1V	I_{OL}=100µA	-	-	0.3	V
		V_{DD}>2.5V	I_{OL}=1.5mA	-	-	0.3	
		V_{DD}>5V	I_{OL}=3mA	-	-	0.35	
Push-pull RESET / $\overline{\text{RESET}}$ Output voltage	V_{OL}	V_{DD}>1V	I_{OL}=100µA	-	-	0.3	V
		V_{DD}>2.5V	I_{OL}=1.5mA	-	-	0.3	
		V_{DD}>5V	I_{OL}=3mA	-	-	0.35	
	V_{OH}	V_{DD}>1V	I_{OH}=-30µA	0.8	-	-	
		V_{DD}>2.5V	I_{OH}=-1.5mA	2	-	-	
		V_{DD}>5V	I_{OH}=-3mA	4	-	-	
Output leakage current	I_{LEAK}	Only for EM6325_Y (open-drain)		-	-	0.5	µA
MANUAL RESET ($\overline{\text{MR}}$)							
$\overline{\text{MR}}$ Input low	V_{MRT} low	T_A= +25°C				0.3•V_{DD}	V
$\overline{\text{MR}}$ Input high	V_{MRT} high			0.7•V_{DD}			V
$\overline{\text{MR}}$ to Reset delay	t_{MD}				0.3		µs
Pulse width at $\overline{\text{MR}}$ (note 5)	t_{PMD}			1			µs
$\overline{\text{MR}}$ Internal Pull-up resistor	R_{MR}	T_A=-40°C to +125°C		4.8	15	31	kΩ

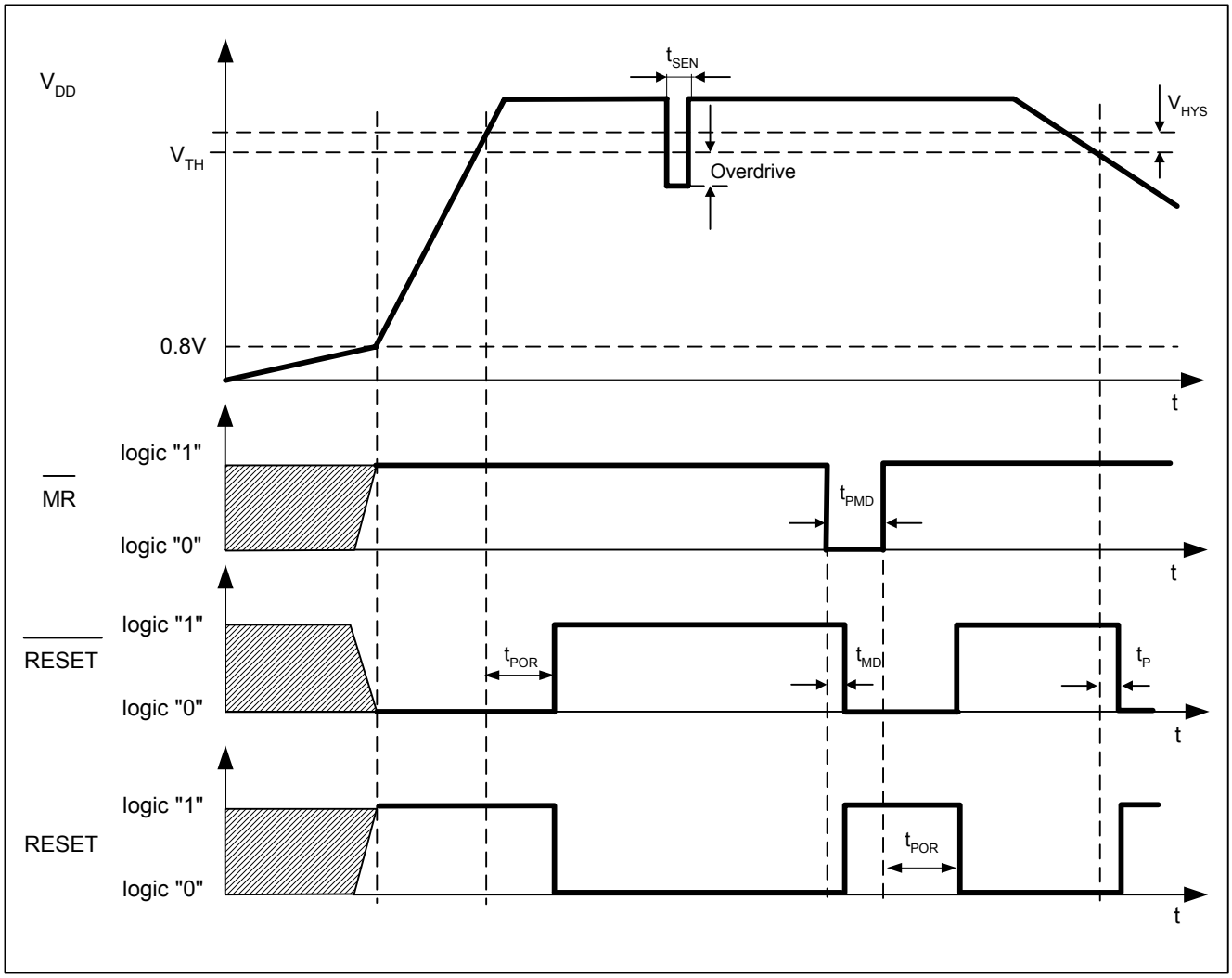
Note 1: Production tested at +25°C only. Over temperature limits are guaranteed by design, not production tested.

Note 2: $\overline{\text{RESET}}$ (RESET) open.

Note 4: Standard version for t_{POR} is 200ms (typ), available at all times. Other option (1.6ms, 25ms, 1600ms) are available by mask option and upon minimum order quantity. Please contact EM sales.

Note 5: Pulse width must be greater than 1µs to ensure the $\overline{\text{RESET}}$ (RESET) to go active.

Timing Waveforms



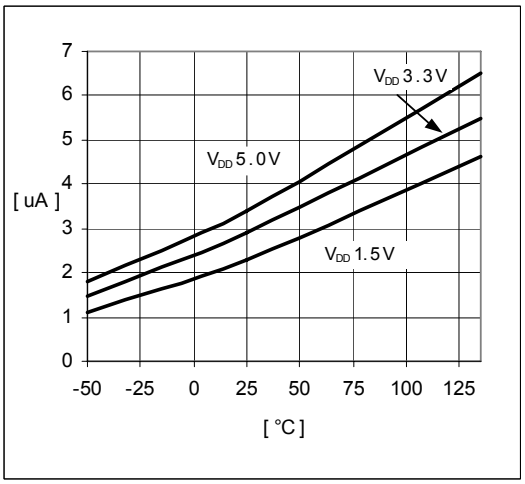
Note 6: t_{SEN} = Maximum Transient Duration. Please refer to figure on the next page.
Note 7: Overdrive = V_{TH} -V_{DD}. Please refer to figure on the next page.

Manual Reset Input

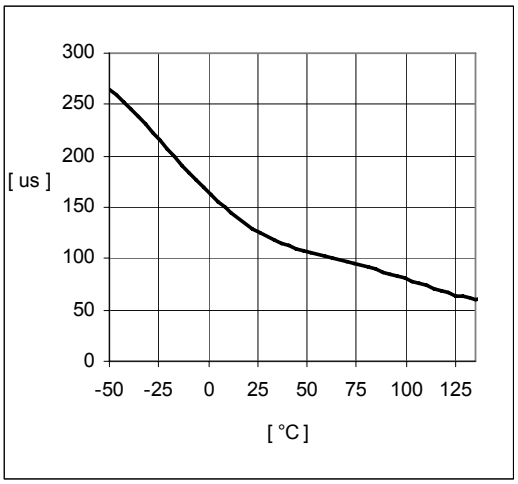
A logic low on $\overline{MR}$ asserts a reset. Reset remains asserted while $\overline{MR}$ is low, and for t_{POR} (200ms nominal for EM6325C) after it returns high. $\overline{MR}$ has an internal 15kΩ pull-up resistor, so it can be left open if unused. This input can be driven with CMOS logic levels or with open-drain outputs. Connect a normally open momentary switch from $\overline{MR}$ to V_{SS} to create a manual-reset function; debounce circuitry is integrated. If $\overline{MR}$ is driven from long cable or the device is used in a noisy environment, connect a 0.1µF capacitor from $\overline{MR}$ to V_{SS} to provide additional noise immunity (stronger external additional pull-up resistor can also be added).

Typical Operating Characteristics

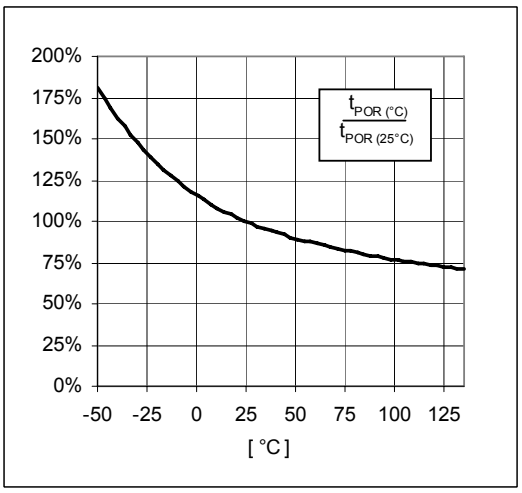
(Typical values are at T_A=+25°C unless otherwise noted, $\overline{MR}$, $\overline{RESET}$ and RESET open.)



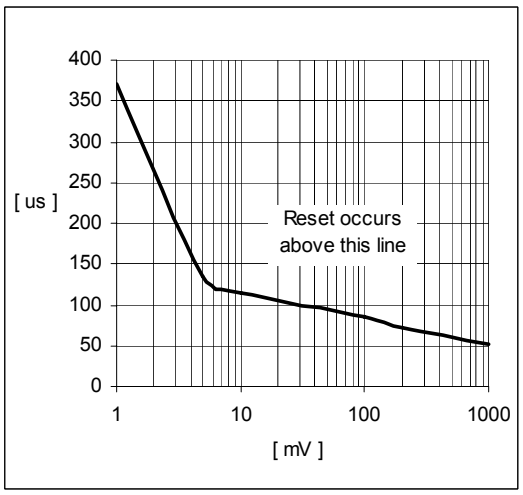
I_{DD} vs. Temperature



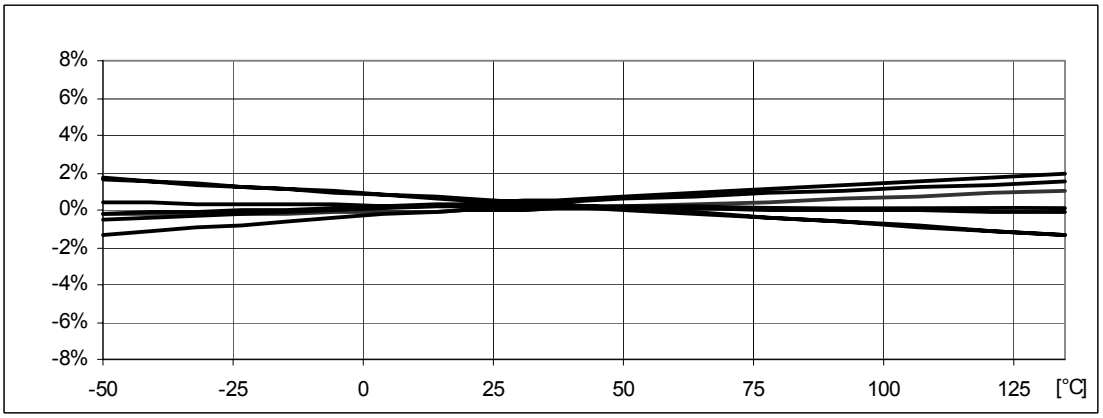
Propagation Time t_P vs. Temperature



Reset Timeout Period t_{POR} vs. Temperature (normalized with respect to $t_{POR\ 25°C}$)



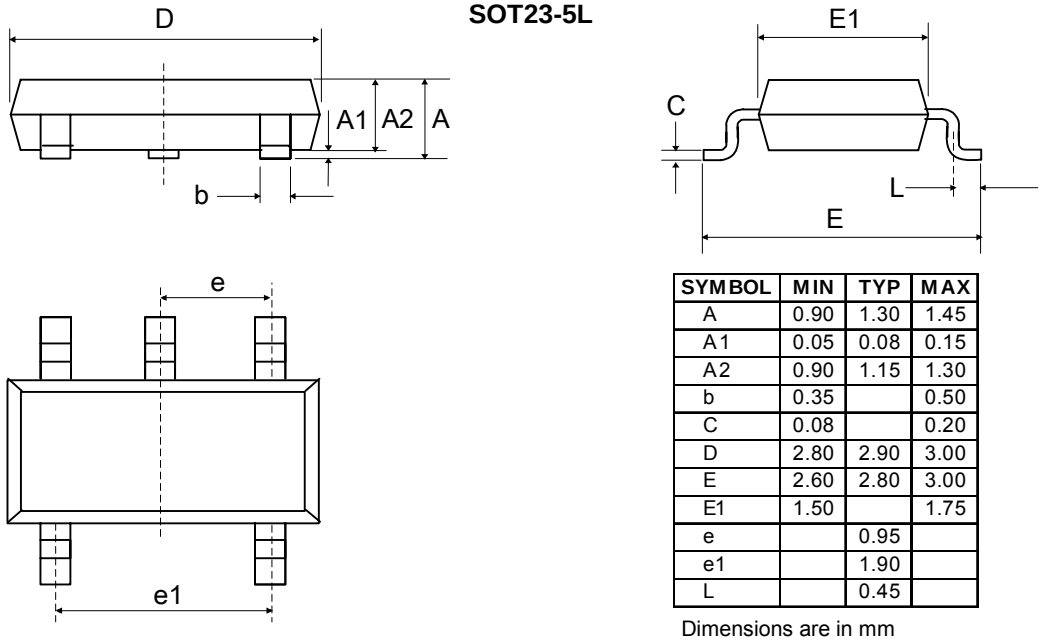
Maximum Transient Duration t_{SEN} vs. Overdrive V_{TH}-V_{DD}



Threshold Voltage Variation vs. Temperature (normalized)

Package Information

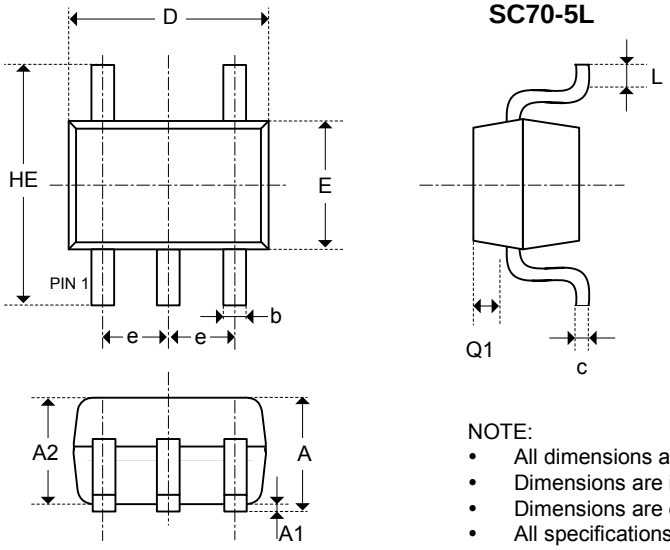
SOT23-5L



SYMBOL	MIN	TYP	MAX
A	0.90	1.30	1.45
A1	0.05	0.08	0.15
A2	0.90	1.15	1.30
b	0.35		0.50
C	0.08		0.20
D	2.80	2.90	3.00
E	2.60	2.80	3.00
E1	1.50		1.75
e		0.95	
e1		1.90	
L		0.45	

Dimensions are in mm

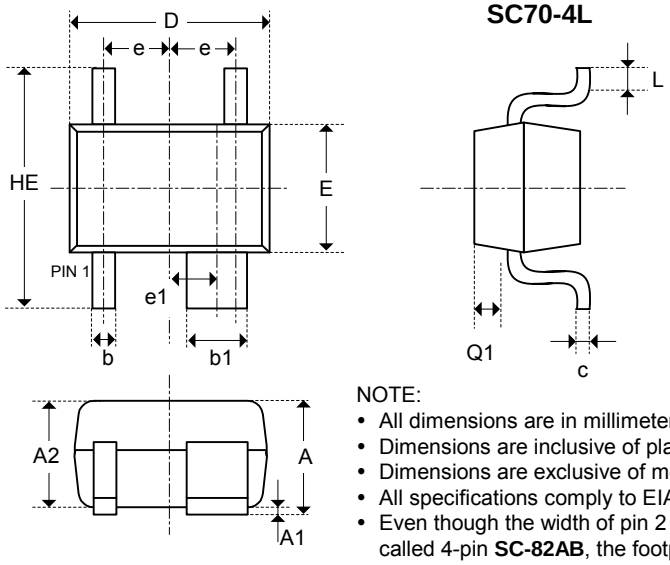
SC70-5L



SYMBOL	MIN	MAX
e	0.65 BSC	
D	1.80	2.20
b	0.15	0.30
E	1.15	1.35
HE	1.80	2.40
Q1	0.10	0.40
A2	0.80	1.00
A1	0.00	0.10
A	0.80	1.10
c	0.10	0.18
L	0.10	0.30

NOTE:
- All dimensions are in millimeters
- Dimensions are inclusive of plating
- Dimensions are exclusive of mold flash & metal burr
- All specifications comply to EIAJ SC70

SC70-4L



SYMBOL	MIN	MAX
e	0.65 BSC	
e1	0.5 BSC	
D	1.80	2.20
b	0.15	0.30
b1	0.575	0.70
E	1.15	1.35
HE	1.80	2.40
Q1	0.10	0.40
A2	0.80	1.00
A1	0.00	0.10
A	0.80	1.10
c	0.10	0.18
L	0.10	0.30

NOTE:

- All dimensions are in millimeters
- Dimensions are inclusive of plating
- Dimensions are exclusive of mold flash & metal burr
- All specifications comply to EIAJ SC70
- Even though the width of pin 2 on SC70-4L is slightly larger than on so-called 4-pin **SC-82AB**, the footprint of SC70-4L package is **compatible** with the footprint of **SC-82AB** package from other suppliers, and thus suitable for pin-to-pin replacement. Please check footprint on PCB.

Traceability for small packages

Due to the limited space on the package surface, the bottom marking contains a limited number of characters that provide only partial information for lot traceability. Full information for complete traceability is however provided on the packing labels of the product at delivery from EM. It is highly recommended that the customer insures full lot traceability of EM product in his final product.