



Reset Circuit with Fixed Delay

Description

The EM6353 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.

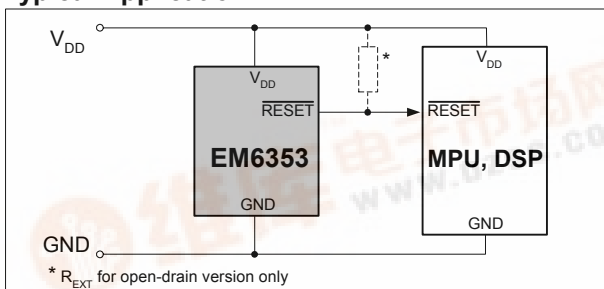
The EM6353 features three output types: active-low push-pull, active-low open-drain and active-high push-pull.

Small SC70-5L and SOT23-3L packages as well as ultra-low supply current of 2.9µA make the EM6353 an ideal choice for portable and battery-operated devices.

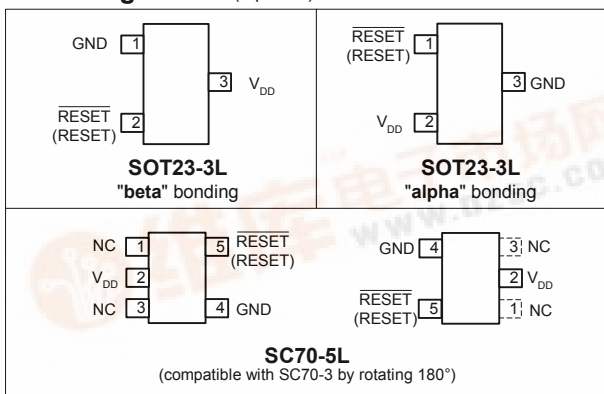
Features

- 200ms reset timeout period (25ms 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
- No external components
- Immune to short negative V_{DD} transients
- Guaranteed Reset valid down to 0.8V
- Threshold hysteresis: 2.1% of V_{TH}
- Very small SOT23-3L and SC70-5L packages

Typical Application



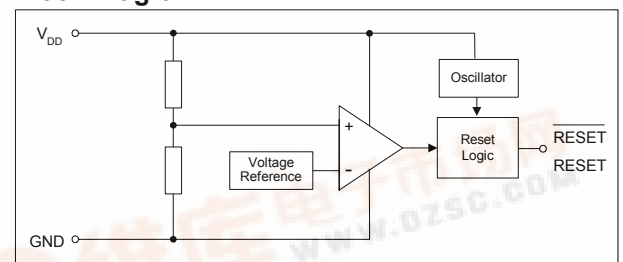
Pin Configuration (top view)



Applications

- Mobile phones
- Set-top boxes
- Video, digital cameras, DVD players and recorders
- Modems
- Personal computers
- Switching hubs
- Copiers and fax
- Utility meters
- Automotive systems

Block Diagram



Pin Description

Pin			Name	Function
SOT23-3L "beta"	SOT23-3L "alpha"	SC70-5L		
1	3	4	GND	Ground
2	1	5	\overline{RESET}	Active-low \overline{RESET} output. \overline{RESET} remains low for the reset timeout period after all reset conditions are deasserted and then goes high.
			RESET	Active-high RESET output. RESET remains high for the reset timeout period after all reset conditions are deasserted and then goes low.
3	2	2	V_{DD}	Supply Voltage (5.5V max.)
-	-	1,3	N.C.	Not connected. Not internally connected.





EM6353

Ordering Information

EM6353 B X 2SP3B - 2.9

Reset Threshold Voltage:

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	

Package & Bonding:

1SP3B = SOT23-3, "alpha", Tape&Reel 3kpcs
 2SP3B = SOT23-3, "beta", Tape&Reel 3kpcs
 SC5B = SC70-5, Tape&Reel 3kpcs

Reset Output Type:

X = Active-low /RES push-pull
 Y = Active-low /RES open-drain
 Z = Active-high RES push-pull

Delay (t_{POR}):

B = 200ms
 A = 25ms

Versions

Please contact EM Microelectronic for availability. Please make sure to give the complete Part Number when ordering. All parts are offered in tape-and-reel only (3000 units).

Threshold Voltage	Delay (t _{POR})	Output Type	Package	Part Number	Top Marking	
1.31V	200ms	Active-low push-pull $\overline{\text{RESET}}$	SOT23-3L "alpha"	EM6353BX1SP3B-1.3	ALBA	
			SOT23-3L "beta"	EM6353BX2SP3B-1.3	ALWA	
			SC70-5L	EM6353BXSC5B-1.3	ALWA	
1.80V	200ms	Active-low push-pull $\overline{\text{RESET}}$	SOT23-3L "alpha"	EM6353BX1SP3B-1.8	ALBE	
			SOT23-3L "beta"	EM6353BX2SP3B-1.8	ALWE	
			SC70-5L	EM6353BXSC5B-1.8	ALWE	
2.63V	200ms	Active-low push-pull $\overline{\text{RESET}}$	SOT23-3L "alpha"	EM6353BX1SP3B-2.6	ALBG	
			SOT23-3L "beta"	EM6353BX2SP3B-2.6	ALWG	
			SC70-5L	EM6353BXSC5B-2.6	ALWG	
		Active-low open-drain $\overline{\text{RESET}}$	SOT23-3L "alpha"	EM6353BY1SP3B-2.6	ALBT	
			SOT23-3L "beta"	EM6353BY2SP3B-2.6	ALWT	
2.93V	200ms	Active-low push-pull $\overline{\text{RESET}}$	SOT23-3L "alpha"	EM6353BX1SP3B-2.9	ALBH	
			SOT23-3L "beta"	EM6353BX2SP3B-2.9	ALWH	
			SC70-5L	EM6353BXSC5B-2.9	ALWH	
		Active-low open-drain $\overline{\text{RESET}}$	SOT23-3L "alpha"	EM6353BY1SP3B-2.9	ALBU	
			SOT23-3L "beta"	EM6353BY2SP3B-2.9	ALWU	
			SC70-5L	EM6353BYSC5B-2.9	ALWU	
		Active-high push-pull RESET		SOT23-3L "beta"	EM6353BZ2SP3B-2.9	ALW6



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Threshold Voltage	Delay (t_{POR})	Output Type	Package	Part Number	Top Marking
3.08V	200ms	Active-low push-pull \overline{RESET}	SOT23-3L "beta"	EM6353BX2SP3B-3.1	ALWJ
			SC70-5L	EM6353BXSC5B-3.1	ALWJ
		Active-low open-drain \overline{RESET}	SOT23-3L "beta"	EM6353BY2SP3B-3.1	ALWV
			Active-high push-pull $RESET$	SOT23-3L "beta"	EM6353BZ2SP3B-3.1
4.40V	200ms	Active-low push-pull \overline{RESET}	SOT23-3L "alpha"	EM6353BX1SP3B-4.4	ALBK
		Active-low open-drain \overline{RESET}	SOT23-3L "alpha"	EM6353BY1SP3B-4.4	ALBW
			SC70-5L	EM6353BYSC5B-4.4	ALWV
4.63V	200ms	Active-low push-pull \overline{RESET}	SOT23-3L "alpha"	EM6353BX1SP3B-4.6	ALBL
			SOT23-3L "beta"	EM6353BX2SP3B-4.6	ALWL
			SC70-5L	EM6353BXSC5B-4.6	ALWL
		Active-low open-drain \overline{RESET}	SOT23-3L "alpha"	EM6353BY1SP3B-4.6	ALBLX
			SOT23-3L "beta"	EM6353BY2SP3B-4.6	ALWX
		Active-high push-pull $RESET$	SOT23-3L "beta"	EM6353BZ2SP3B-4.6	ALW9



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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 maximum to MIL-STD-883C method 3015	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 damage 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 (note 1)	V_{DD}	0.8	5.5	V
Operating Temperature	T_A	-40	+125	°C

Electrical Characteristics

Unless otherwise specified: V_{DD} = 0.8V 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 -40°C to +125°C	- -	2.3	4.6 7	μA
		V_{DD} = 3.3V	+25°C -40°C to +125°C	- -	2.9	5.5 8.3	
		V_{DD} = 5.0V	+25°C -40°C to +125°C	- -	3.4	6.3 9.6	
Threshold voltage (note 3)	V_{TH}	EM6353 – 1.3	+25°C -40°C to +85°C -40°C to +125°C	1.290 1.245 1.221	1.31	1.330 1.382 1.387	V
		EM6353 – 1.4	+25°C -40°C to +85°C -40°C to +125°C	1.359 1.311 1.286	1.38	1.401 1.456 1.461	
		EM6353 – 1.6	+25°C -40°C to +85°C -40°C to +125°C	1.546 1.492 1.463	1.57	1.594 1.656 1.663	
		EM6353 – 1.7	+25°C -40°C to +85°C -40°C to +125°C	1.635 1.577 1.547	1.66	1.685 1.751 1.758	
		EM6353 – 1.8	+25°C -40°C to +85°C -40°C to +125°C	1.773 1.710 1.678	1.80	1.827 1.899 1.906	
		EM6353 – 2.2	+25°C -40°C to +85°C -40°C to +125°C	2.167 2.090 2.050	2.20	2.233 2.321 2.330	
		EM6353 – 2.6	+25°C -40°C to +85°C -40°C to +125°C	2.591 2.499 2.451	2.63	2.669 2.775 2.785	
		EM6353 – 2.9	+25°C -40°C to +85°C -40°C to +125°C	2.886 2.784 2.731	2.93	2.974 3.091 3.103	
		EM6353 – 3.1	+25°C -40°C to +85°C -40°C to +125°C	3.034 2.926 2.871	3.08	3.126 3.249 3.262	
		EM6353 – 4.4	+25°C -40°C to +85°C -40°C to +125°C	4.334 4.180 4.101	4.40	4.466 4.642 4.660	
		EM6353 – 4.6	+25°C -40°C to +85°C -40°C to +125°C	4.561 4.399 4.315	4.63	4.699 4.885 4.903	
		Threshold hysteresis	V_{HYS}	T_A = +25°C	-	2.1%• V_{TH}	

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

V_{DD} min = 0.9V for active-high versions (EM6353_Z).

Note 3: Threshold voltage is specified for V_{DD} falling.



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Electrical Characteristics (continued)

Unless otherwise specified: $V_{DD} = 0.8V$ to $5.5V$, $T_A = -40^{\circ}C$ to $+125^{\circ}C$ (note 1).

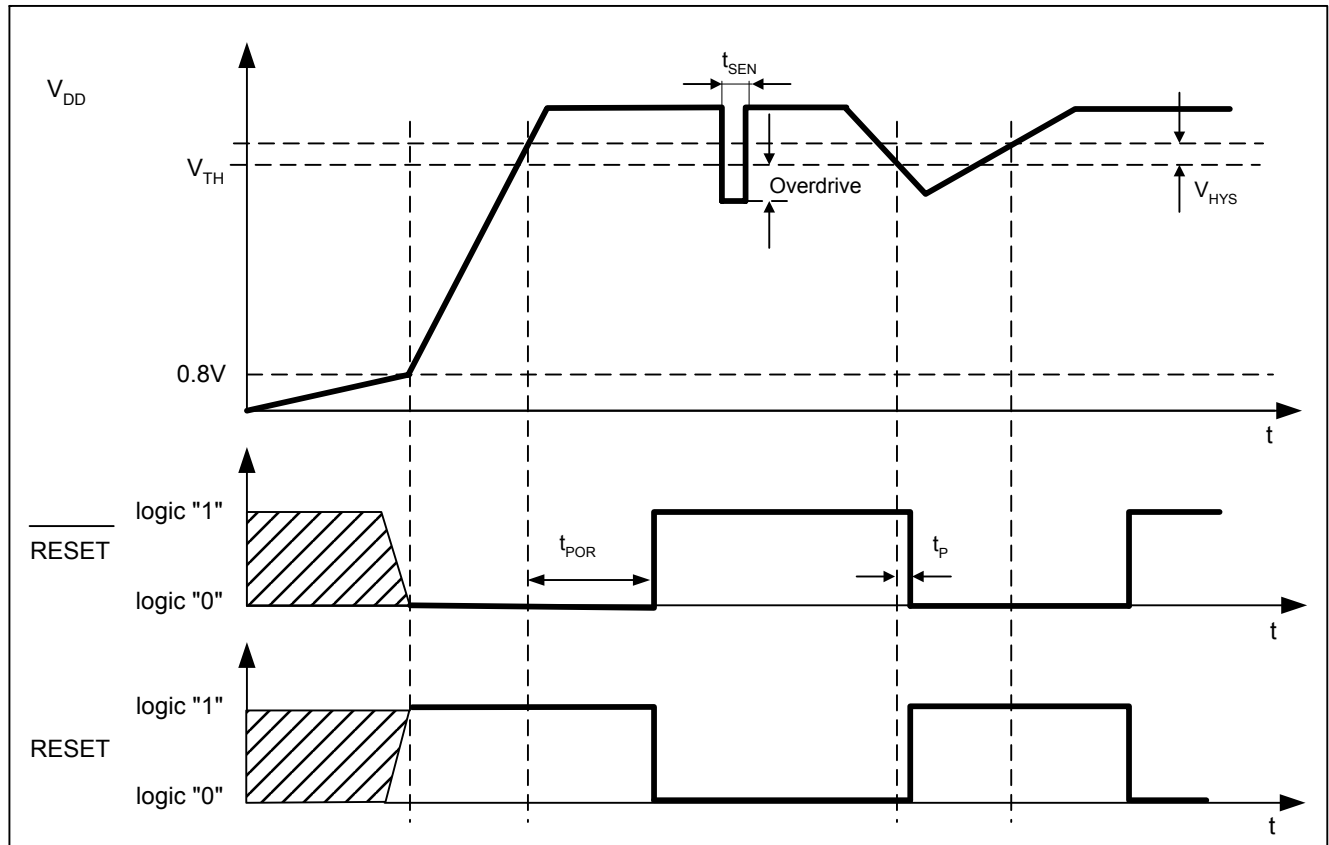
Parameter	Symbol	Conditions	Min	Typ	Max	Unit	
Reset timeout period	t_{POR}	V_{DD} from 0V to $V_{TH(typ)}+15\%$ (note 2 and 4). $T_A = +25^{\circ}C$	EM6353B	155	200	224	ms
			EM6353A	19.4	25	28	
Propagation delay time V_{DD} to \overline{RESET} (\overline{RESET}) delay	t_P	V_{DD} drops from $V_{TH(typ)}+0.2V$ to $V_{TH(typ)}-0.2V$ (note 2). $T_A = +25^{\circ}C$	2	130	255	μs	
Open-drain \overline{RESET} output Voltage	V_{OL}	$V_{DD} > 1V$	$I_{OL} = 100\mu A$	-	-	0.3	V
		$V_{DD} > 2.5V$	$I_{OL} = 1.5mA$	-	-	0.3	
		$V_{DD} > 5V$	$I_{OL} = 3mA$	-	-	0.3	
Push-pull \overline{RESET} / \overline{RESET} Output voltage	V_{OL}	$V_{DD} > 1V$	$I_{OL} = 100\mu A$	-	-	0.3	V
		$V_{DD} > 2.5V$	$I_{OL} = 1.5mA$	-	-	0.3	
		$V_{DD} > 5V$	$I_{OL} = 3mA$	-	-	0.35	
	V_{OH}	$V_{DD} > 1V$	$I_{OH} = -30\mu A$	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 EM6353_Y (open-drain)	-	-	0.5	μA	

Note 1: Production tested at $+25^{\circ}C$ only. Over temperature limits are guaranteed by design, not production tested.
 V_{DD} min=0.9V for active-high versions (EM6353_Z).

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

Note 4: Standard version is EM6353B ($t_{POR} = 200ms$), available at all times. EM6353A ($t_{POR} = 25ms$) is available by mask option and upon minimum order quantity. Please contact EM sales.

Timing Waveforms



Note 6: t_{SEN} = Maximum Transient Duration. Please refer to figure on next page.

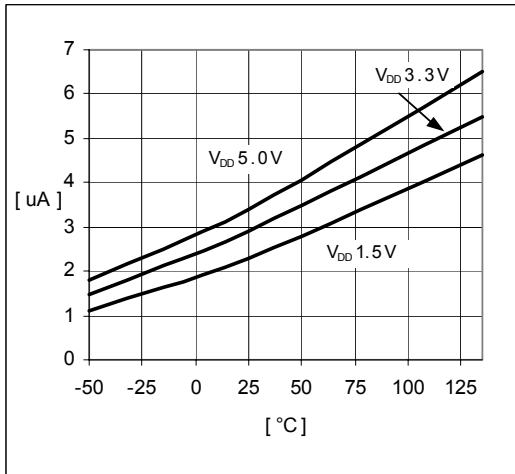
Note 7: Overdrive = $V_{TH} - V_{DD}$. Please refer to figure on next page.



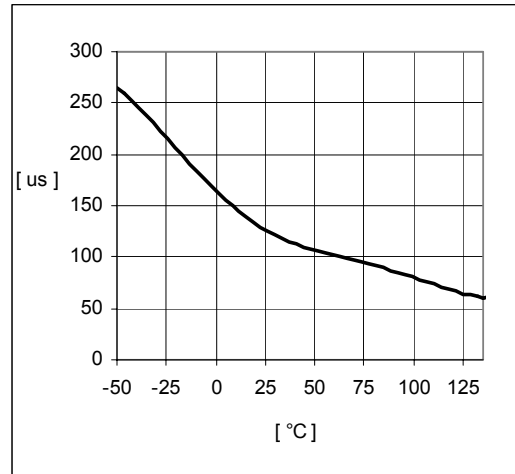
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Typical Operating Characteristics

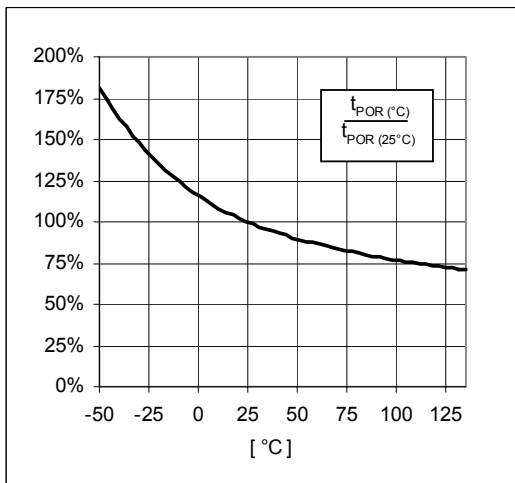
(Typical values are at $T_A=+25^\circ\text{C}$ unless otherwise noted, $\overline{\text{RESET}}$ or RESET open.)



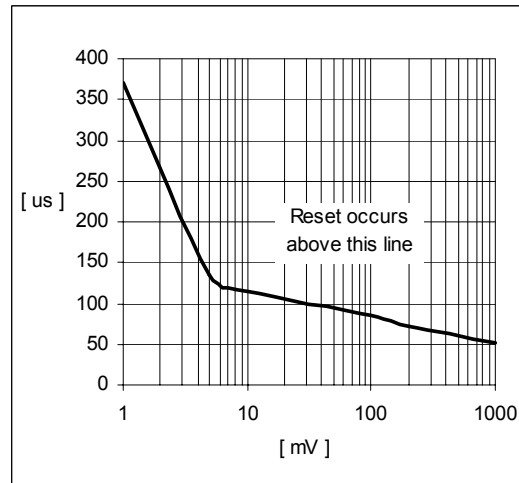
I_{DD} vs. Temperature



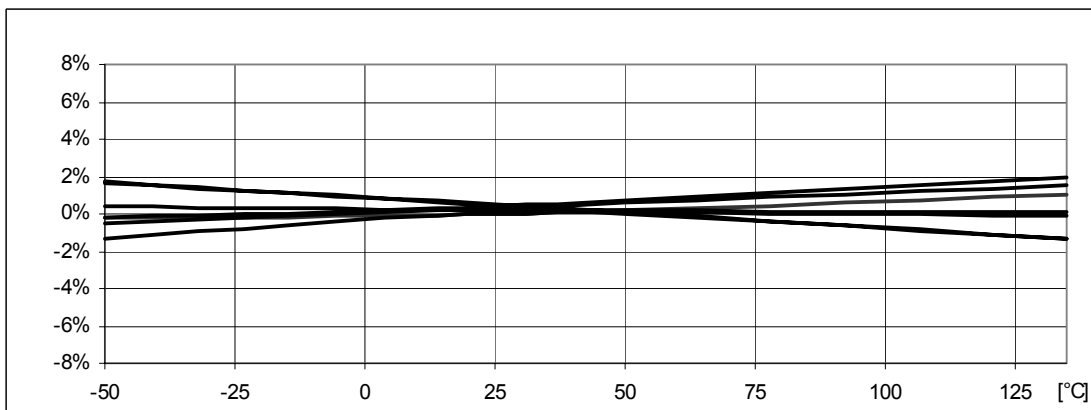
Propagation Time t_P vs. Temperature



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



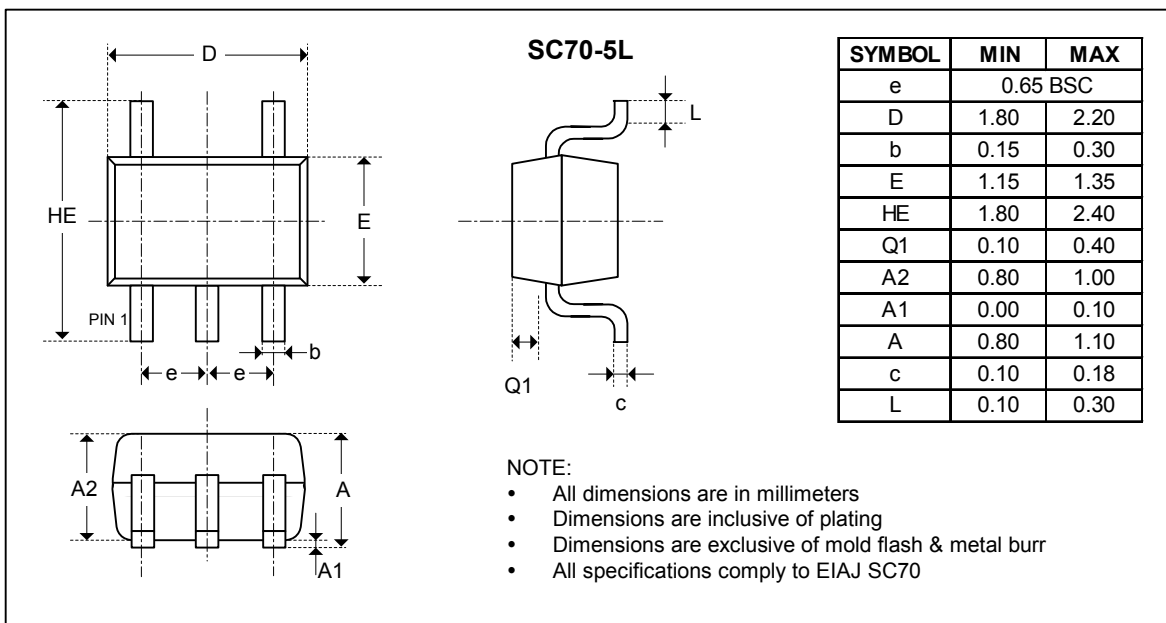
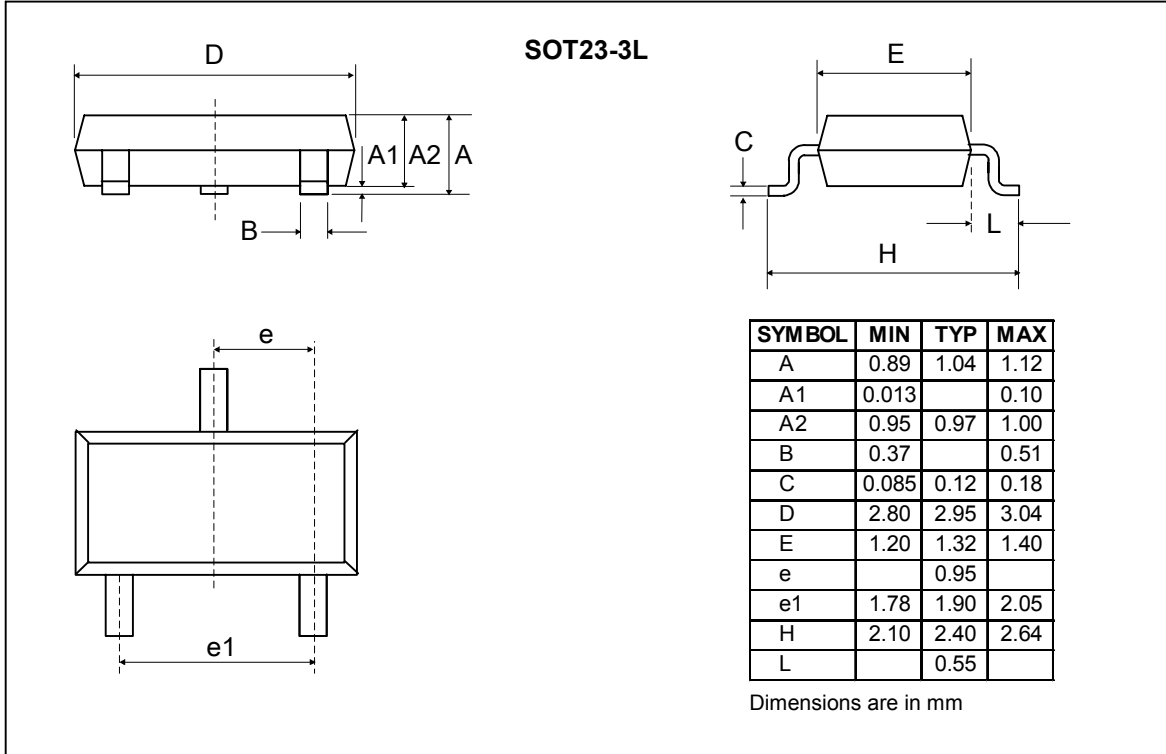
Maximum Transient Duration t_{SEN} vs. Overdrive $V_{TH} - V_{DD}$



Threshold Voltage Variation vs. Temperature (normalized)



Package Information



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.

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Product qualification is performed according to internal EM quality standards for industrial products. For any special requirement (eg. automotive grade) please contact EM Microelectronic-Marin S.A.