

- Qualified for Military Applications
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- Triple Supervisory Circuits for DSP and Processor-Based Systems
- Power-On Reset Generator with Fixed Delay Time of 200 ms, No External Capacitor Needed
- Temperature-Compensated Voltage Reference
- Maximum Supply Current of 40  $\mu$ A
- Supply Voltage Range . . . 2 V to 6 V
- Defined  $\overline{\text{RESET}}$  Output from  $V_{DD} \geq 1.1$  V
- CDIP-8 and LCCC-20 Packages
- Temperature Range . . .  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$

## typical applications

Figure 1 lists some of the typical applications for the TPS3307 family, and a schematic diagram for a processor-based system application. This application uses TI part numbers TPS3307-18 and SMJ320C6201B.

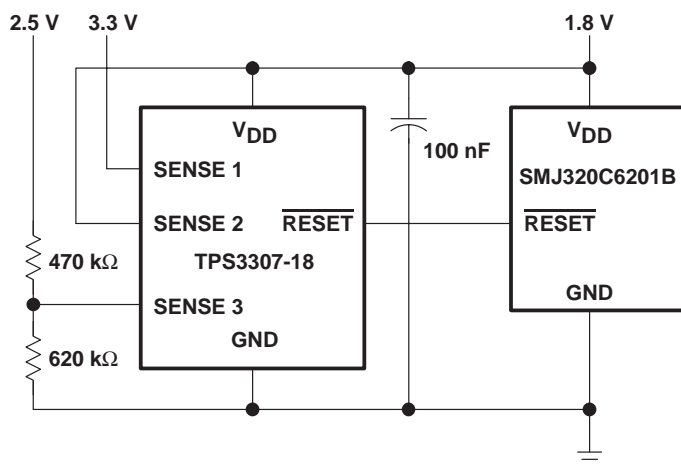


Figure 1. Applications Using the TPS3307-18

## description

The TPS3307-18 is a micropower supply voltage supervisor designed for circuit initialization primarily in automotive DSP and processor-based systems, which require more than one supply voltage.

The TPS3307-18 is designed for monitoring three independent supply voltages: 3.3 V/1.8 V/adj,. The adjustable SENSE input allows the monitoring of any supply voltage  $>1.25$  V.



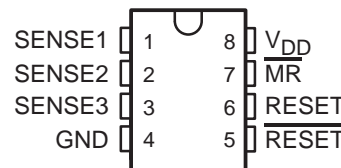
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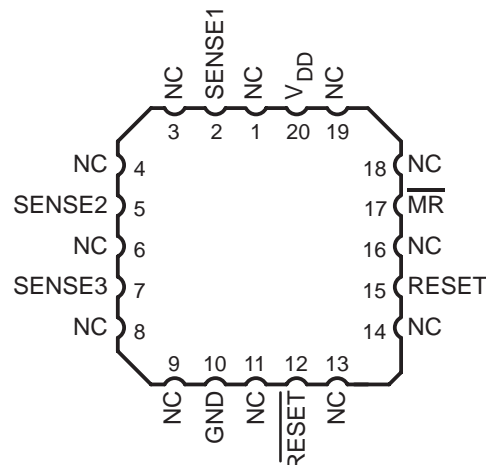
**TEXAS  
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

JG PACKAGE  
(TOP VIEW)



FK PACKAGE  
(TOP VIEW)



NC – No internal connection

- Military applications using DSPs, Microcontrollers or Microprocessors
- Industrial Equipment
- Programmable Controls

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

# TPS3307-18M

## TRIPLE PROCESSOR SUPERVISORS

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### description (continued)

The various supply voltage supervisors are designed to monitor the nominal supply voltage as shown in the following supply voltage monitoring table.

SUPPLY VOLTAGE MONITORING

DEVICE	NOMINAL SUPERVISED VOLTAGE			THRESHOLD VOLTAGE (TYP)		
	SENSE1	SENSE2	SENSE3	SENSE1	SENSE2	SENSE3
TPS3307-18	3.3 V	1.8 V	User defined	2.93 V	1.68 V	1.25 V†

† The actual sense voltage has to be adjusted by an external resistor divider according to the application requirements.

During power-on,  $\overline{\text{RESET}}$  is asserted when the supply voltage  $V_{DD}$  becomes higher than 1.1 V. Thereafter, the supply voltage supervisor monitors the SENSEn inputs and keeps  $\overline{\text{RESET}}$  active as long as SENSEn remain below the threshold voltage  $V_{IT+}$ .

An internal timer delays the return of the  $\overline{\text{RESET}}$  output to the inactive state (high) to ensure proper system reset. The delay time,  $t_{d\text{typ}} = 200$  ms, starts after all SENSEn inputs have risen above the threshold voltage  $V_{IT+}$ . When the voltage at any SENSE input drops below the threshold voltage  $V_{IT-}$ , the  $\overline{\text{RESET}}$  output becomes active (low) again.

The TPS3307-18 incorporates a manual reset input,  $\overline{\text{MR}}$ . A low level at  $\overline{\text{MR}}$  causes  $\overline{\text{RESET}}$  to become active. In addition to the active-low  $\overline{\text{RESET}}$  output, the TPS3307-18 includes an active-high RESET output.

### ORDERING INFORMATION

$T_A$	PACKAGE‡	ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	Ceramic Dual In Line (JG)	TPS3307-18MJGB	TPS3307-18MJGB
	Leadless Ceramic Chip Carrier (FK)	TPS3307-18MFKB	TPS3307-18MFKB

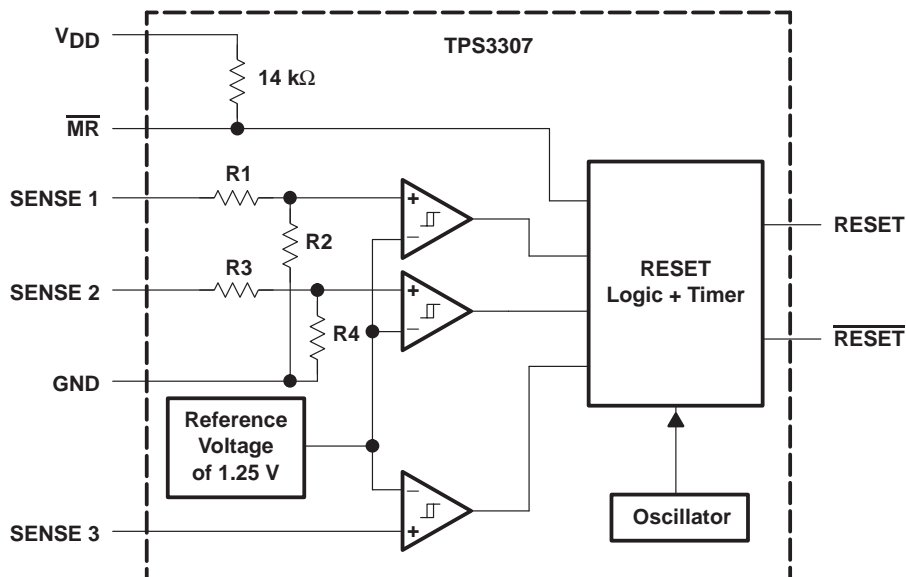
‡ Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

FUNCTION/TRUTH TABLES

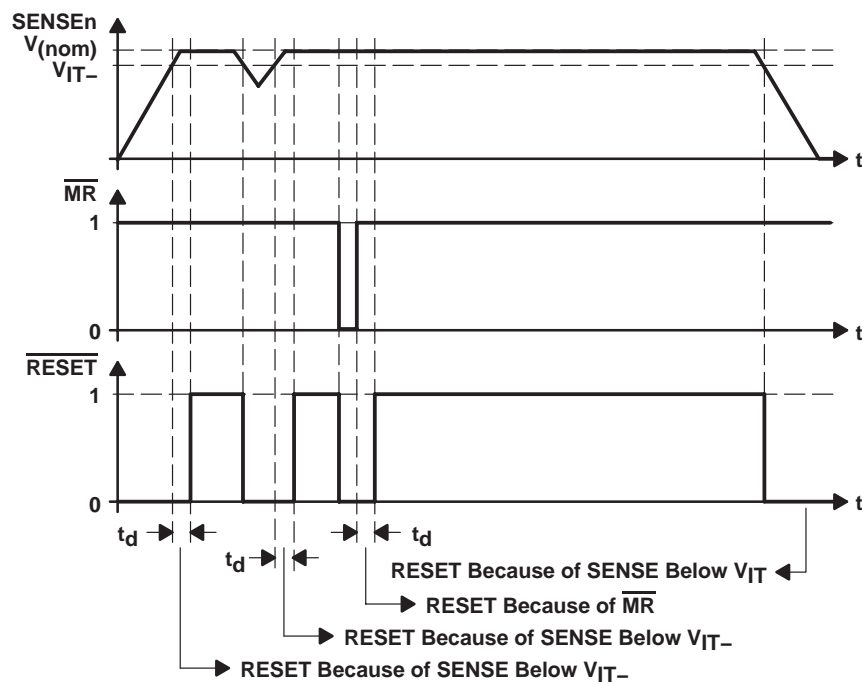
$\overline{\text{MR}}$	$\text{SENSE1} > V_{IT1}$	$\text{SENSE2} > V_{IT2}$	$\text{SENSE3} > V_{IT3}$	$\overline{\text{RESET}}$	RESET
L	X	X	X	L	H
H	0	0	0	L	H
H	0	0	1	L	H
H	0	1	0	L	H
H	0	1	1	L	H
H	1	0	0	L	H
H	1	0	1	L	H
H	1	1	0	L	H
H	1	1	1	H	L

X = Don't care

## functional block diagram



## timing diagram



# TPS3307-18M

## TRIPLE PROCESSOR SUPERVISORS

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### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage, $V_{DD}$ (see Note1)	7 V
All other pins (see Note 1)	–0.3 V to 7 V
Maximum low output current, $I_{OL}$	5 mA
Maximum high output current, $I_{OH}$	–5 mA
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{DD}$ )	±20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{DD}$ )	±20 mA
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range, $T_A$	–55°C to 125°C
Storage temperature range, $T_{stg}$	–65°C to 150°C
Soldering temperature	260°C

<sup>†</sup> Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values are with respect to GND. For reliable operation the device must not be operated at 7 V for more than  $t = 1000$  h continuously.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 85^\circ\text{C}$ POWER RATING	$T_A = 125^\circ\text{C}$ POWER RATING
JG	1 W	6.25 mW/°C	719 mW	625 mW	375 mW
FK	1.39 W	11.58 mW/°C	869 mW	695 mW	232 mW

### recommended operating conditions at specified temperature range

	MIN	MAX	UNIT
Supply voltage, $V_{DD}$	2	6	V
Input voltage at $\overline{MR}$ and SENSE3, $V_I$	0	$V_{DD}+0.3$	V
Input voltage at SENSE1 and SENSE2, $V_I$	0	$(V_{DD}+0.3)V_{IT}/1.25V$	V
High-level input voltage at $\overline{MR}$ , $V_{IH}$	0.7× $V_{DD}$		V
Low-level input voltage at $\overline{MR}$ , $V_{IL}$		0.3× $V_{DD}$	V
Input transition rise and fall rate at $\overline{MR}$ , $\Delta t/\Delta V$		50	ns/V
Operating free-air temperature range, $T_A$	–55	125	°C

**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
V <sub>OH</sub>	High-level output voltage		V <sub>DD</sub> = 2 V to 6 V, I <sub>OH</sub> = -20 μA	V <sub>DD</sub> - 0.2V				V
			V <sub>DD</sub> = 3.3 V, I <sub>OH</sub> = -2 mA	V <sub>DD</sub> - 0.4V				
			V <sub>DD</sub> = 6 V, I <sub>OH</sub> = -3 mA	V <sub>DD</sub> - 0.4V				
V <sub>OL</sub>	Low-level output voltage		V <sub>DD</sub> = 2 V to 6 V, I <sub>OL</sub> = 20 μA			0.2		V
			V <sub>DD</sub> = 3.3 V, I <sub>OL</sub> = 2 mA			0.4		
			V <sub>DD</sub> = 6 V, I <sub>OL</sub> = 3 mA			0.4		
Power-up reset voltage (see Note 2)			V <sub>DD</sub> ≥ 1.1 V, I <sub>OL</sub> = 20 μA			0.4		V
V <sub>IT-</sub>	Negative-going input threshold voltage (see Note 3)	VSENSE3	V <sub>DD</sub> = 2 V to 6 V		1.22	1.25	1.29	V
		VSENSE2			1.64	1.68	1.73	V
		VSENSE1			2.86	2.93	3.02	
V <sub>hys</sub>	Hysteresis at VSENSEn input		V <sub>IT-</sub> = 1.25 V		2	10	30	mV
			V <sub>IT-</sub> = 1.68 V		2	15	40	
			V <sub>IT-</sub> = 2.93 V		3	30	60	
I <sub>H</sub>	High-level input current	$\overline{\text{MR}}$	$\overline{\text{MR}}$ = 0.7 × V <sub>DD</sub> , V <sub>DD</sub> = 6 V		-130	-180		μA
		SENSE1	VSENSE1 = V <sub>DD</sub> = 6 V		5	8		
		SENSE2	VSENSE2 = V <sub>DD</sub> = 6 V		6	9		
		SENSE3	VSENSE3 = V <sub>DD</sub>		-25	25	nA	
I <sub>L</sub>	Low-level input current	$\overline{\text{MR}}$	$\overline{\text{MR}}$ = 0 V, V <sub>DD</sub> = 6 V		-430	-600		μA
		SENSEn	VSENSE1,2,3 = 0 V		-1	1		
I <sub>DD</sub>	Supply current						40	μA
C <sub>i</sub>	Input capacitance		V <sub>I</sub> = 0 V to V <sub>DD</sub>			10		pF

NOTES: 2. The lowest supply voltage at which RESET becomes active. t<sub>r</sub>, V<sub>DD</sub> ≥ 15 µs/V  
3. To ensure best stability of the threshold voltage, a bypass capacitor (ceramic 0.1 µF) should be placed close to the supply terminals.

# TPS3307-18M

## TRIPLE PROCESSOR SUPERVISORS

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timing requirements at  $V_{DD} = 2\text{ V to }6\text{ V}$ ,  $R_L = 1\text{ M}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT	
t <sub>w</sub>	Pulse width	SENSEn	V <sub>SENSEnL</sub> = V <sub>IT−</sub> −0.2 V,    V <sub>SENSEnH</sub> = V <sub>IT+</sub> +0.2 V		6	10	μs
		MR	V <sub>IH</sub> = 0.7 × V <sub>DD</sub> ,    V <sub>IL</sub> = 0.3 × V <sub>DD</sub>		100	150	ns

switching characteristics at  $V_{DD} = 2\text{ V to }6\text{ V}$ ,  $R_L = 1\text{ M}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_d$	Delay time	$V_{\text{I(SENSEn)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{DD}$ , See timing diagram	140	200	280	ms
$t_{\text{PHL}}$	Propagation (delay) time, high-to-low level output	$\overline{\text{MR}}$ to $\overline{\text{RESET}}$ $\overline{\text{MR}}$ to RESET		200	600	ns
$t_{\text{PLH}}$	Propagation (delay) time, low-to-high level output	$\overline{\text{MR}}$ to $\overline{\text{RESET}}$ $\overline{\text{MR}}$ to RESET				
$t_{\text{PHL}}$	Propagation (delay) time, high-to-low level output	$\text{SENSEn}$ to $\overline{\text{RESET}}$		1	5	$\mu\text{s}$
$t_{\text{PLH}}$	Propagation (delay) time, low-to-high level output	$\text{SENSEn}$ to RESET				



## TYPICAL CHARACTERISTICS

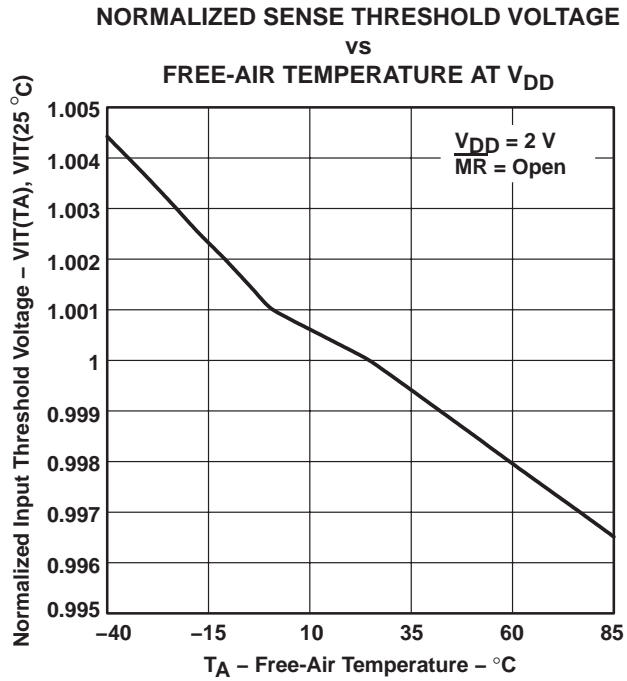


Figure 2

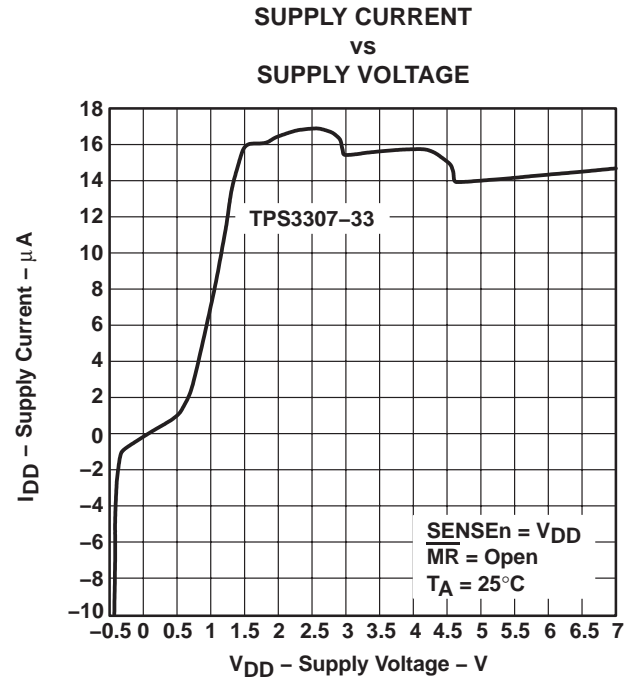


Figure 3

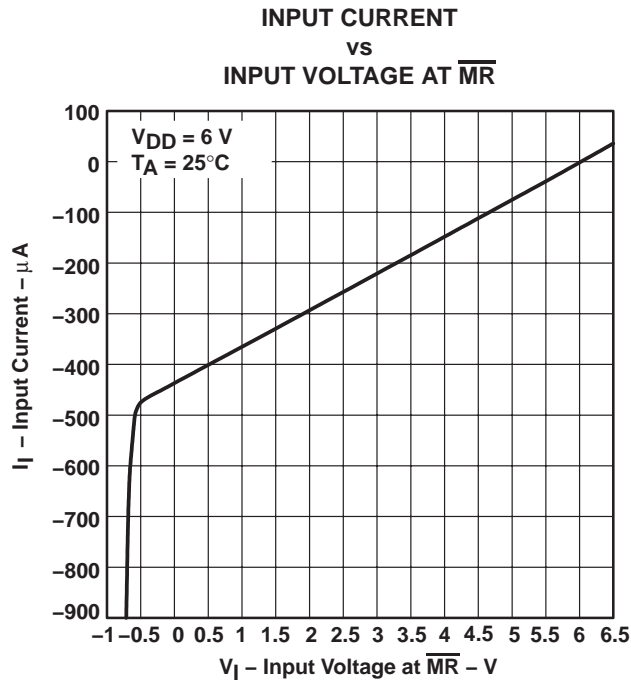


Figure 4

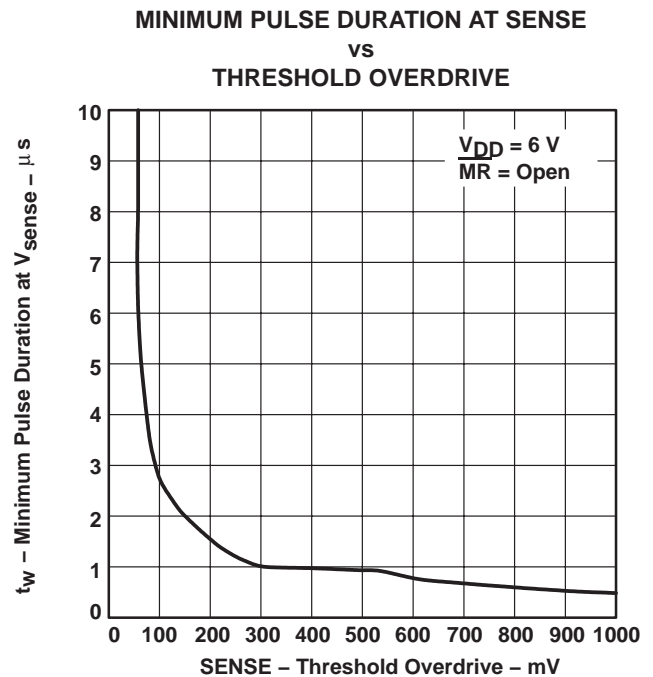
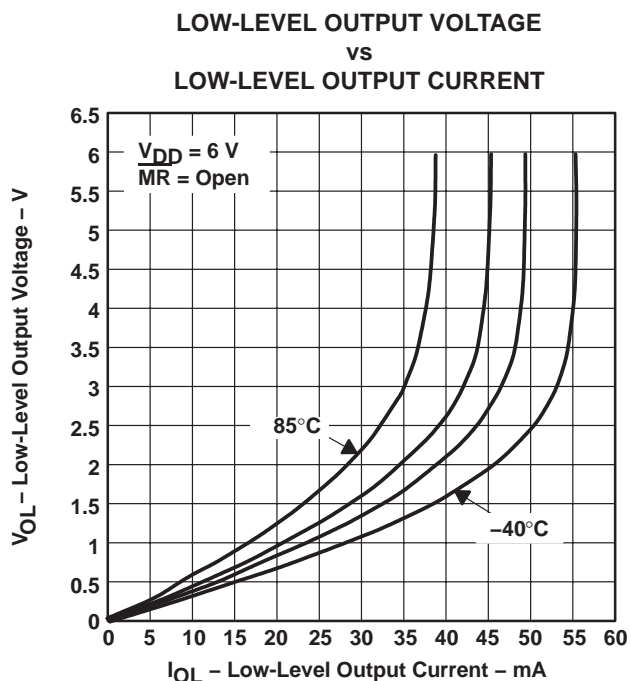
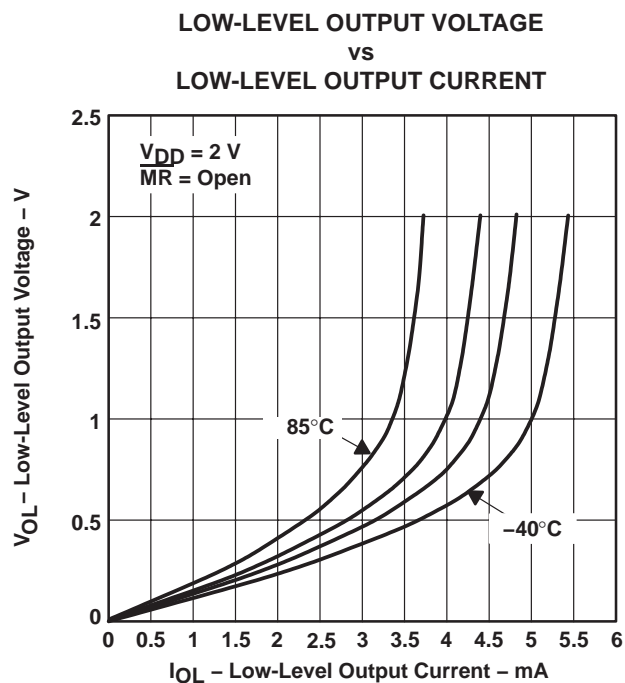
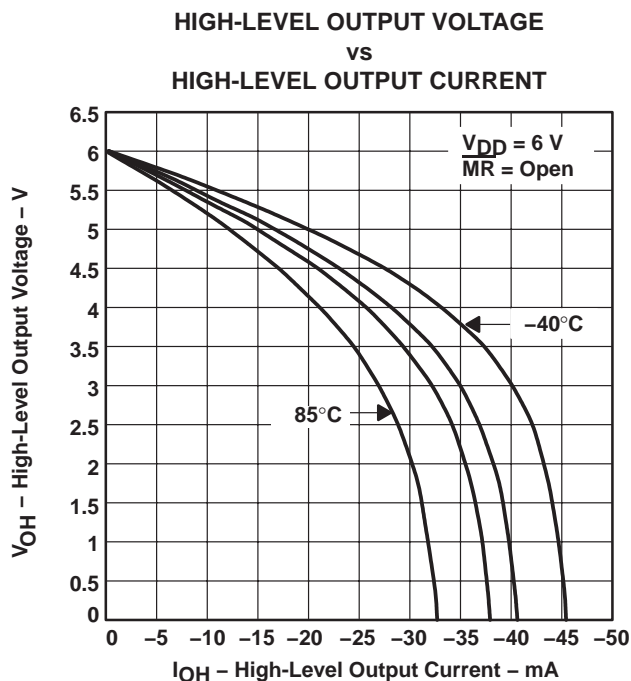
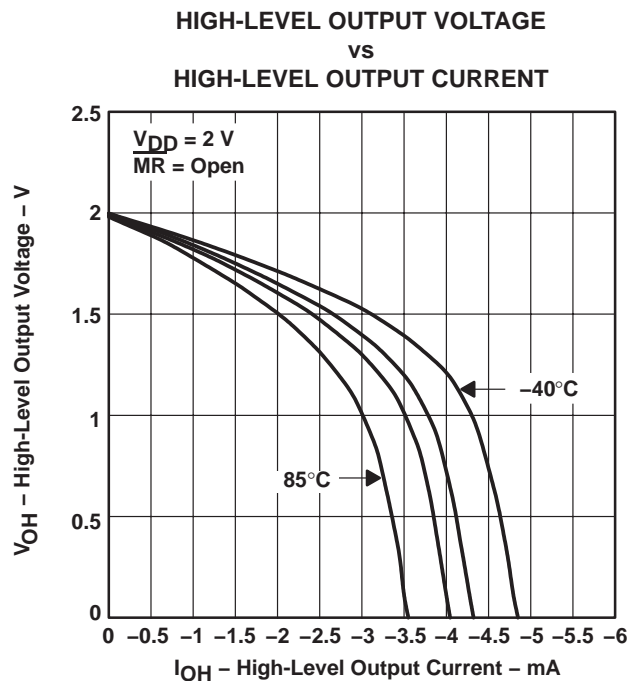


Figure 5

# TPS3307-18M TRIPLE PROCESSOR SUPERVISORS

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## TYPICAL CHARACTERISTICS





## PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">5962-9959101Q2A</a>	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9959101Q2A TPS3307- 18MFKB
<a href="#">5962-9959101QPA</a>	Active	Production	CDIP (JG)   8	50   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	9959101QPA TPS3307-18M
<a href="#">TPS3307-18MFKB</a>	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9959101Q2A TPS3307- 18MFKB
TPS3307-18MFKB.A	Active	Production	LCCC (FK)   20	55   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962- 9959101Q2A TPS3307- 18MFKB
<a href="#">TPS3307-18MJGB</a>	Active	Production	CDIP (JG)   8	50   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	9959101QPA TPS3307-18M
TPS3307-18MJGB.A	Active	Production	CDIP (JG)   8	50   TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	9959101QPA TPS3307-18M

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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**OTHER QUALIFIED VERSIONS OF TPS3307-18M :**

- Automotive : [TPS3307-18-Q1](#)
- Enhanced Product : [TPS3307-EP](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Enhanced Product - Supports Defense, Aerospace and Medical Applications

## TUBE

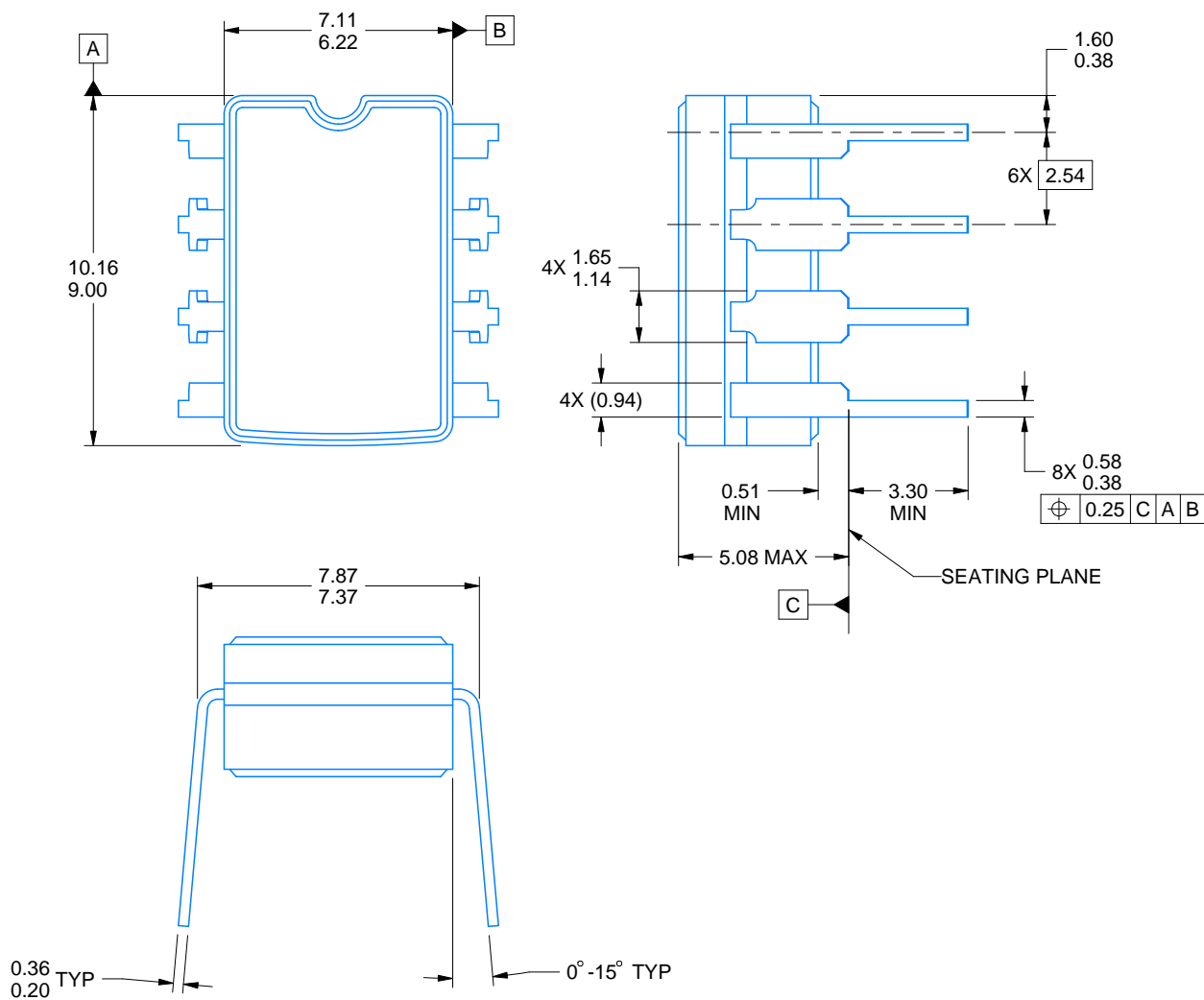


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-9959101Q2A	FK	LCCC	20	55	506.98	12.06	2030	NA
TPS3307-18MFKB	FK	LCCC	20	55	506.98	12.06	2030	NA
TPS3307-18MFKB.A	FK	LCCC	20	55	506.98	12.06	2030	NA

**JG0008A****PACKAGE OUTLINE****CDIP - 5.08 mm max height**

CERAMIC DUAL IN-LINE PACKAGE



4230036/A 09/2023

**NOTES:**

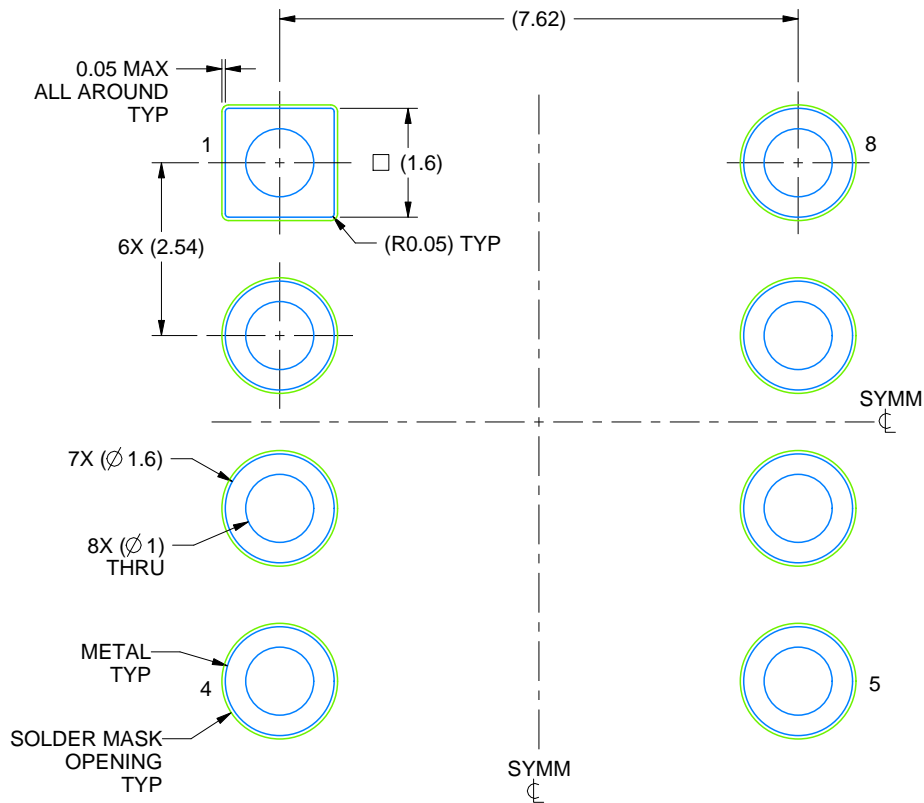
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package can be hermetically sealed with a ceramic lid using glass frit.
4. Index point is provided on cap for terminal identification.
5. Falls within MIL STD 1835 GDIP1-T8

# EXAMPLE BOARD LAYOUT

JG0008A

CDIP - 5.08 mm max height

CERAMIC DUAL IN-LINE PACKAGE



LAND PATTERN EXAMPLE  
NON SOLDER MASK DEFINED  
SCALE: 9X

4230036/A 09/2023

## GENERIC PACKAGE VIEW

**FK 20**

**LCCC - 2.03 mm max height**

8.89 x 8.89, 1.27 mm pitch

LEADLESS CERAMIC CHIP CARRIER

This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



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