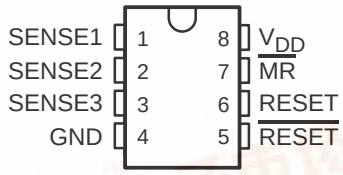
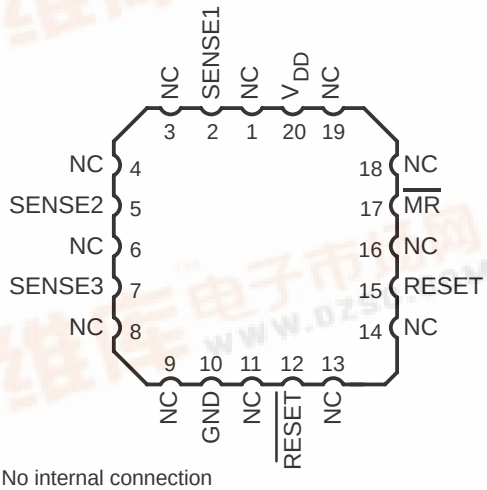
SGLS133A – JANUARY 2003 – REVISED DECEMBER 2003

- 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 μA
- 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°C to 125°C

JG PACKAGE
(TOP VIEW)



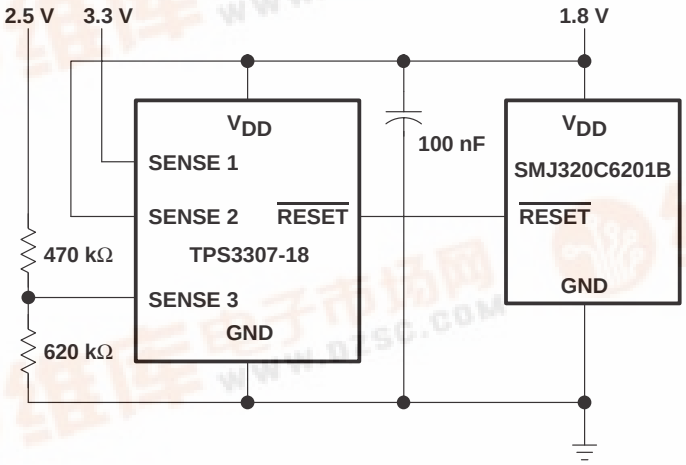
FK PACKAGE
(TOP VIEW)



NC − No internal connection

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.



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

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.

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, $t_{d\,typ}$ = 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

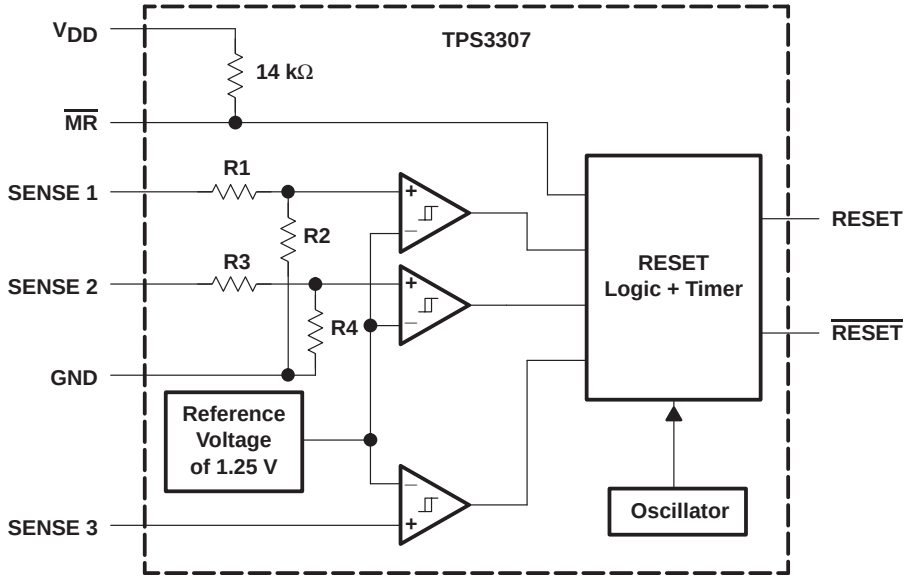
‡ Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION/TRUTH TABLES

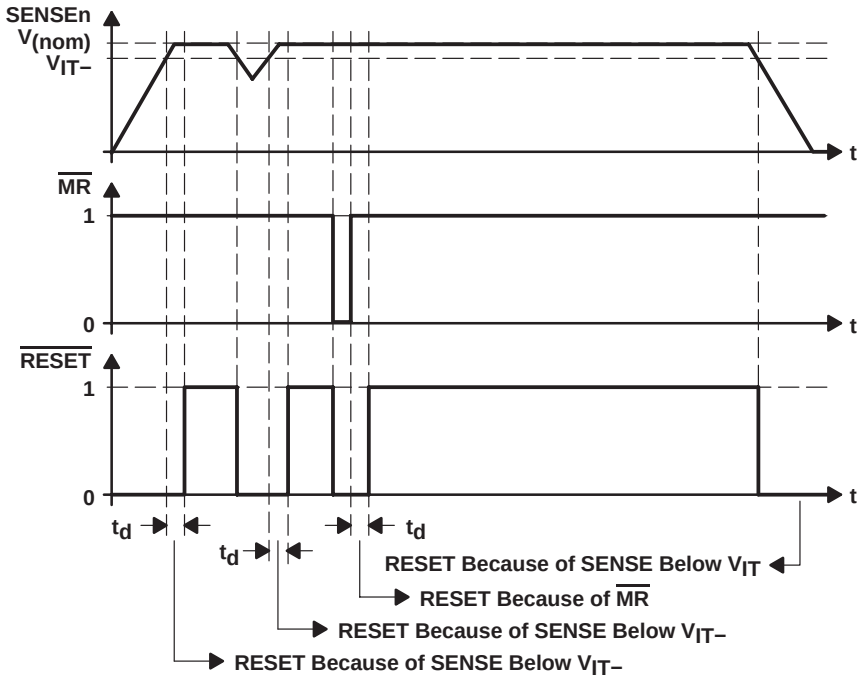
$\overline{\text{MR}}$	SENSE1>V_{IT1}	SENSE2>V_{IT2}	SENSE3>V_{IT3}	$\overline{\text{RESET}}$	RESET
L	X	X	X	L	H
H	0	0	0	L	H
H	0	0	1	L	H
H	0	1	0	L	H
H	0	1	1	L	H
H	1	0	0	L	H
H	1	0	1	L	H
H	1	1	0	L	H
H	1	1	1	H	L

X = Don't care

functional block diagram



timing diagram



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

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

† 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	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 85°C$ POWER RATING	$T_A = 125°C$ 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}	0.7xV_{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_{OH}	High-level output voltage		V_{DD} = 2 V to 6 V, I_{OH} = −20 µA	V_{DD} − 0.2V			V
			V_{DD} = 3.3 V, I_{OH} = −2 mA	V_{DD} − 0.4V			
			V_{DD} = 6 V, I_{OH} = −3 mA	V_{DD} − 0.4V			
V_{OL}	Low-level output voltage		V_{DD} = 2 V to 6 V, I_{OL} = 20 µA			0.2	V
			V_{DD} = 3.3 V, I_{OL} = 2 mA			0.4	
			V_{DD} = 6 V, I_{OL} = 3 mA			0.4	
	Power-up reset voltage (see Note 2)		V_{DD} ≥ 1.1 V, I_{OL} = 20 µA			0.4	V
V_{IT-}	Negative-going input threshold voltage (see Note 3)	VSENSE3	V_{DD} = 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_{hys}	Hysteresis at VSENSEn input		V_{IT-} = 1.25 V	2	10	30	mV
			V_{IT-} = 1.68 V	2	15	40	
			V_{IT-} = 2.93 V	3	30	60	
I_H	High-level input current	$\overline{MR}$	$\overline{MR}$ = 0.7 × V_{DD}, V_{DD} = 6 V		−130	−180	µA
		SENSE1	VSENSE1 = V_{DD} = 6 V		5	8	
		SENSE2	VSENSE2 = V_{DD} = 6 V		6	9	
		SENSE3	VSENSE3 = V_{DD}	−25		25	nA
I_L	Low-level input current	$\overline{MR}$	$\overline{MR}$ = 0 V, V_{DD} = 6 V		−430	−600	µA
		SENSEn	VSENSE1,2,3 = 0 V	−1		1	
I_{DD}	Supply current					40	µA
C_i	Input capacitance		V_I = 0 V to V_{DD}		10		pF

NOTES: 2. The lowest supply voltage at which $\overline{RESET}$ becomes active. t_r, V_{DD} ≥ 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.

timing requirements at V_{DD} = 2 V to 6 V, R_L = 1 MΩ, C_L = 50 pF, T_A = 25°C

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_w	Pulse width	SENSEn	$V_{SENSEnL} = V_{IT-} -0.2$ V, $V_{SENSEnH} = V_{IT+} +0.2$ V	6	10		µs
		$\overline{MR}$	$V_{IH} = 0.7 \times V_{DD}$, $V_{IL} = 0.3 \times V_{DD}$	100	150		ns

switching characteristics at V_{DD} = 2 V to 6 V, R_L = 1 MΩ, C_L = 50 pF, T_A = 25°C

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_d	Delay time		$V_{I(SENSEn)} \geq V_{IT+} + 0.2$ V, $\overline{MR} \geq 0.7 \times V_{DD}$, See timing diagram	140	200	280	ms
t_{PHL}	Propagation (delay) time, high-to-low level output	$\overline{MR}$ to $\overline{RESET}$ $\overline{MR}$ to RESET	$V_{I(SENSEn)} \geq V_{IT+} +0.2$ V, $V_{IH} = 0.7 \times V_{DD}$, $V_{IL} = 0.3 \times V_{DD}$		200	600	ns
t_{PLH}	Propagation (delay) time, low-to-high level output	$\overline{MR}$ to $\overline{RESET}$ $\overline{MR}$ to RESET					
t_{PHL}	Propagation (delay) time, high-to-low level output	SENSEn to $\overline{RESET}$	$V_{IH} = V_{IT+} +0.2$ V, $V_{IL} = V_{IT-} -0.2$ V, $\overline{MR} \geq 0.7 \times V_{DD}$		1	5	µs
t_{PLH}	Propagation (delay) time, low-to-high level output	SENSEn to RESET					

TYPICAL CHARACTERISTICS

NORMALIZED SENSE THRESHOLD VOLTAGE
vs
FREE-AIR TEMPERATURE AT V_{DD}

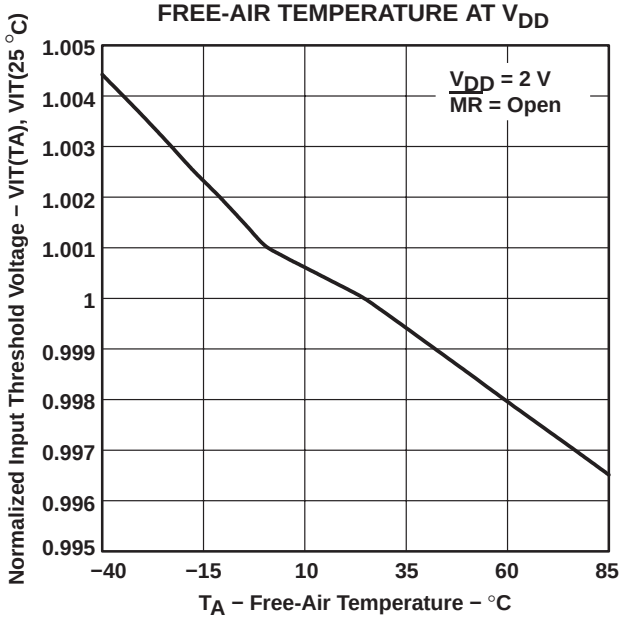


Figure 2

SUPPLY CURRENT
vs
SUPPLY VOLTAGE

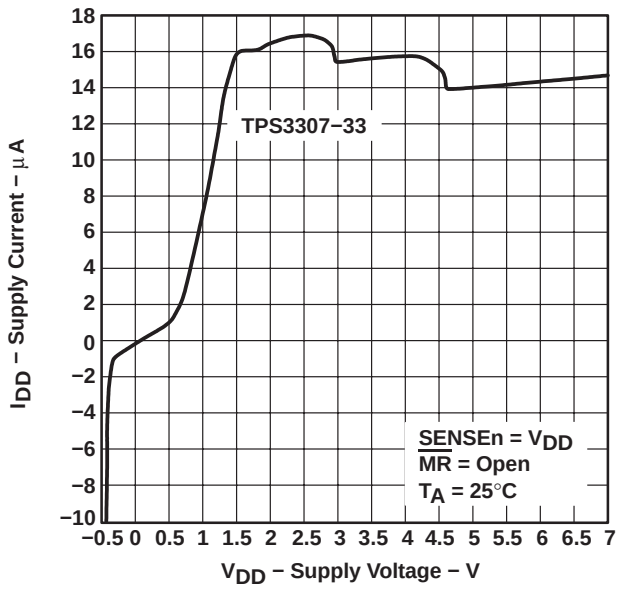


Figure 3

INPUT CURRENT
vs
INPUT VOLTAGE AT $\overline{MR}$

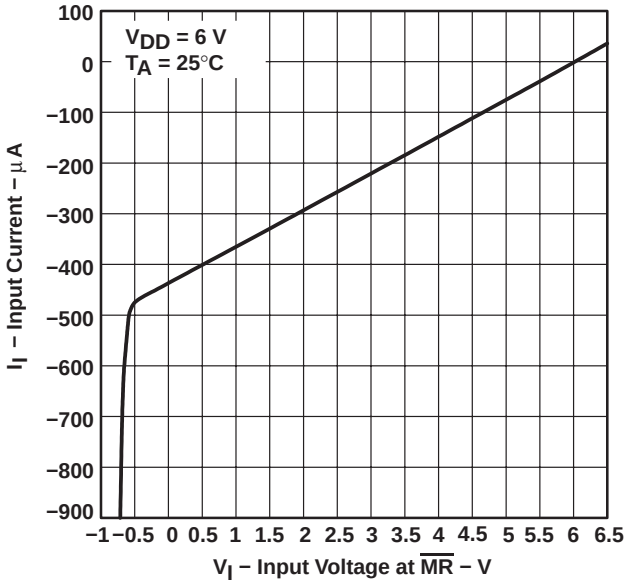


Figure 4

MINIMUM PULSE DURATION AT SENSE
vs
THRESHOLD OVERDRIVE

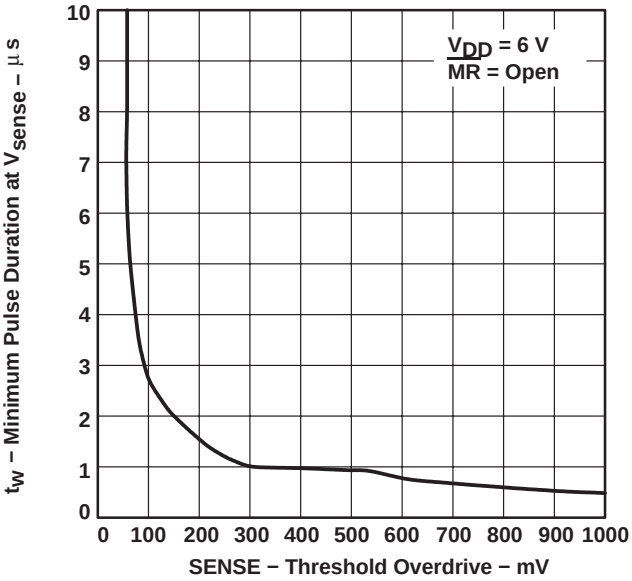


Figure 5

TYPICAL CHARACTERISTICS

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

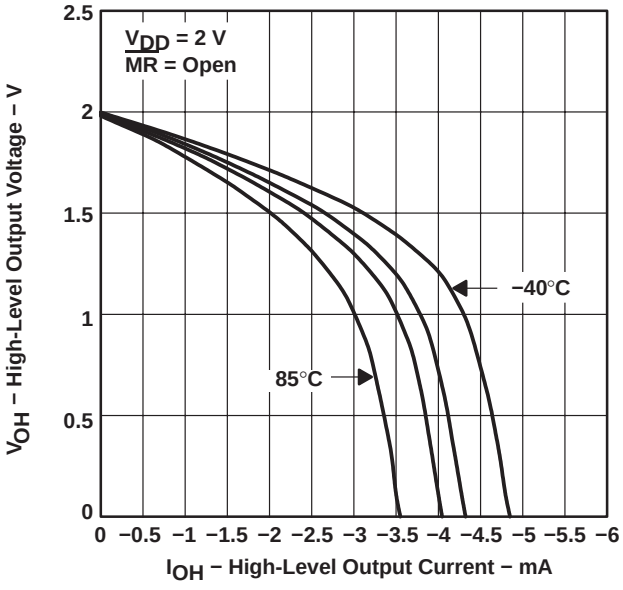


Figure 6

HIGH-LEVEL OUTPUT VOLTAGE
vs
HIGH-LEVEL OUTPUT CURRENT

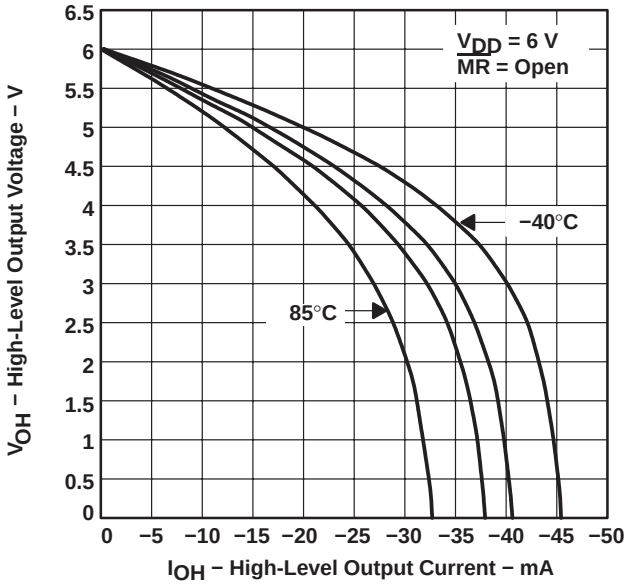


Figure 7

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

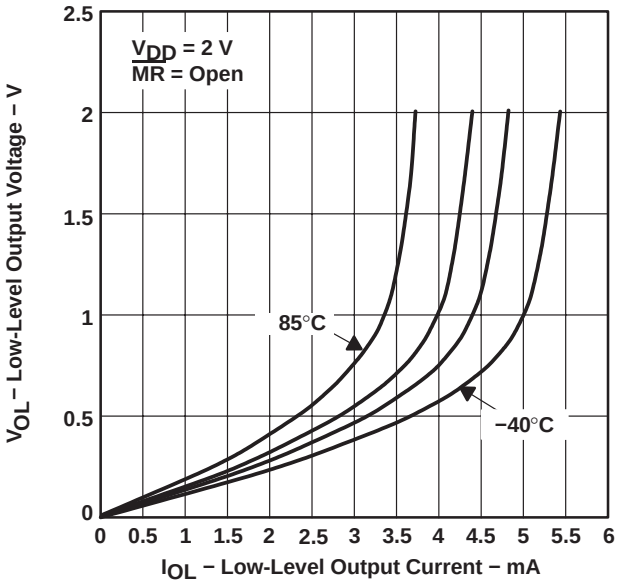


Figure 8

LOW-LEVEL OUTPUT VOLTAGE
vs
LOW-LEVEL OUTPUT CURRENT

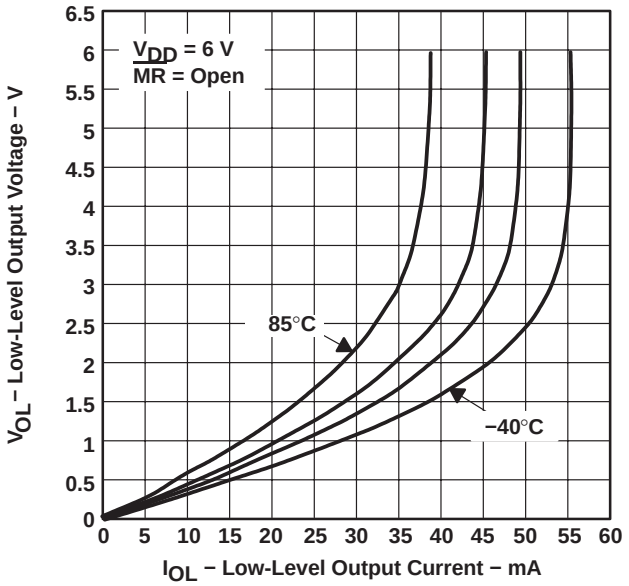


Figure 9

www.ti.com

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/ Ball Finish	MSL Pea
5962-9959101Q2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg
5962-9959101QPA	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg
TPS3307-18MFKB	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg
TPS3307-18MJG	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg
TPS3307-18MJGB	ACTIVE	CDIP	JG	8	1	TBD	A42	N / A for Pkg

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.t
information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all
lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable fo
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package,
the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retard
in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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OTHER QUALIFIED VERSIONS OF TPS3307-18M :

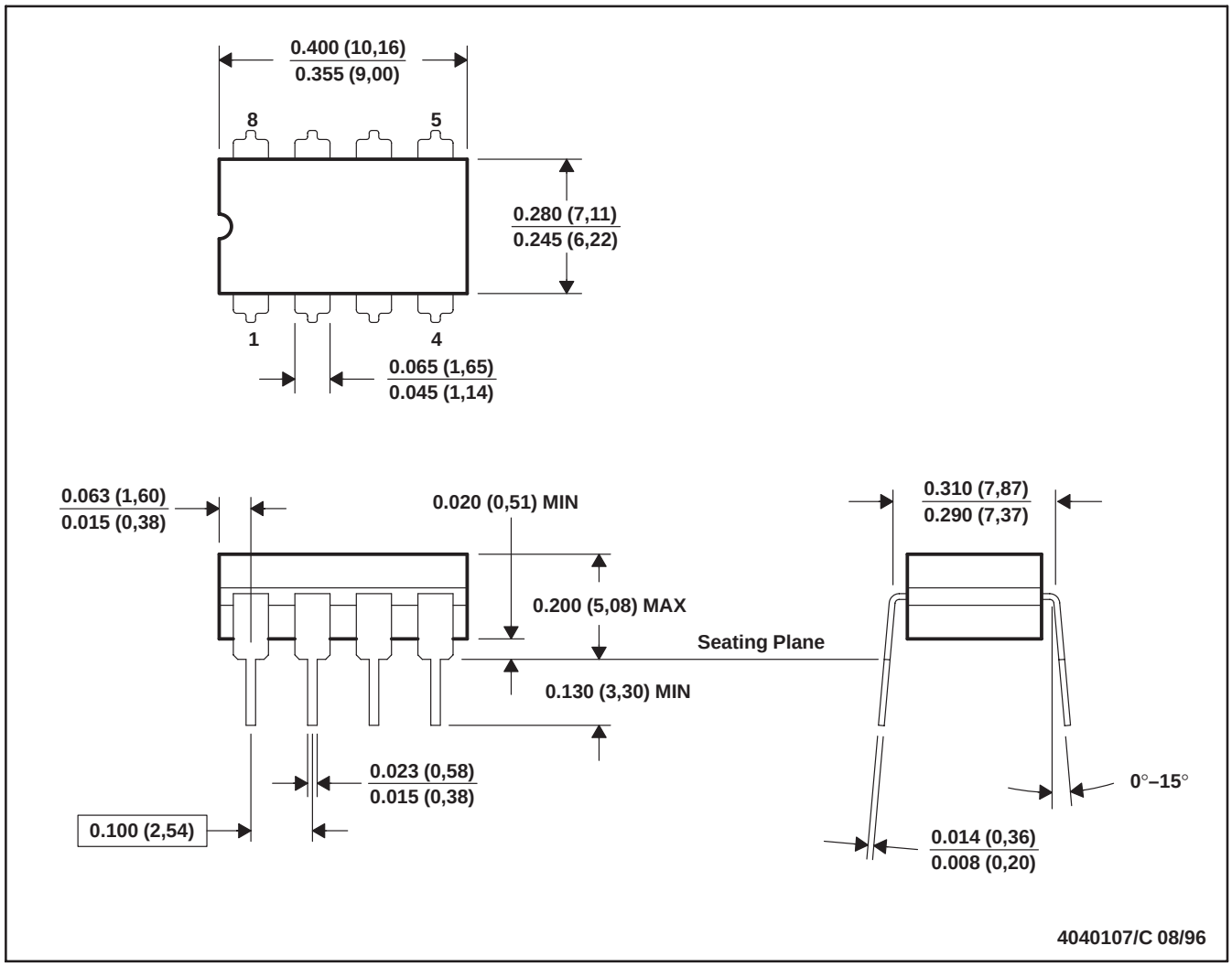
- Catalog: TPS3307-18

- Automotive: TPS3307-18-Q1

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

JG (R-GDIP-T8) **CERAMIC DUAL-IN-LINE**

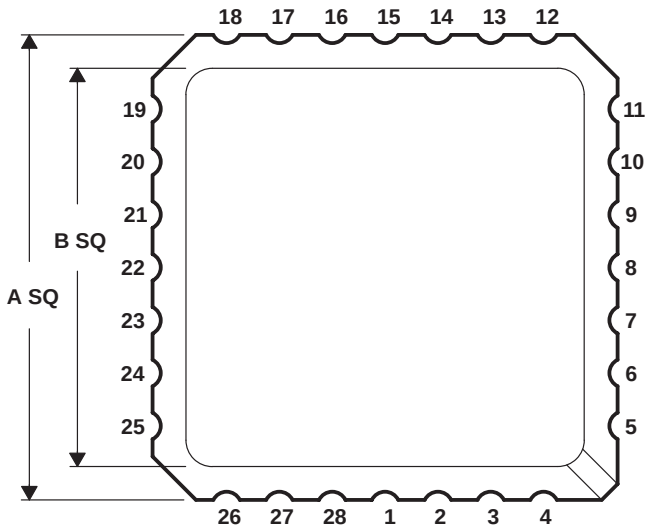


NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification.
E. Falls within MIL STD 1835 GDIP1-T8

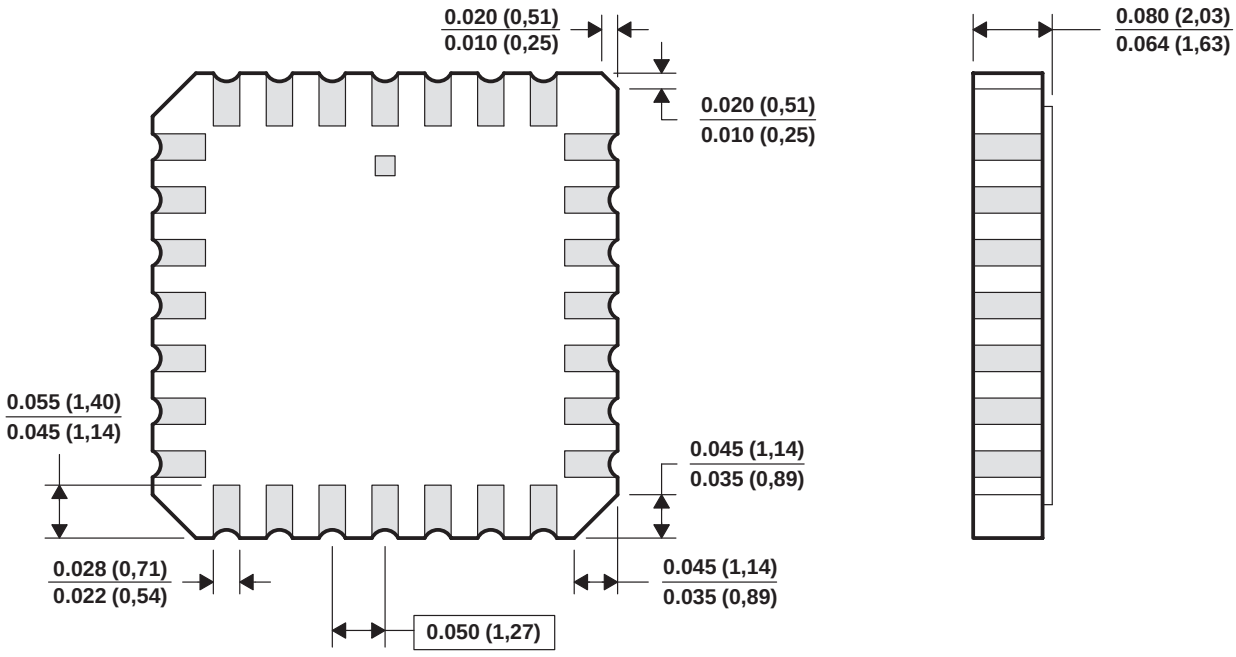
FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.739 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



4040140/D 10/96

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a metal lid.
D. The terminals are gold plated.
E. Falls within JEDEC MS-004

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DSP	dsp.ti.com	Computers and Peripherals	www.ti.com/computers
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Power Mgmt	power.ti.com	Medical	www.ti.com/medical
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Space, Avionics & Defense	www.ti.com/space-avionics-defense
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video and Imaging	www.ti.com/video
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