IAM-20689 – Product Brief

Automotive 6-axis MotionTracking® MEMS Device for ADAS and Autonomous Driving Applications

GENERAL DESCRIPTION

The IAM-20689 is a 6-axis MotionTracking device that combines a 3-axis gyroscope and a 3-axis accelerometer in a small plastic package with wettable flanks option. By leveraging its patented and volume-proven CMOS-MEMS fabrication platform, TDK InvenSense has driven the package size down to a footprint and thickness of 4.5x4.5x1.1 mm^3 (24-pin DQFN), to offer fully integrated, high performance component in a compact form factor.

The IAM-20689 features:

- Six independent mechanical structures
- Gyroscope with programmable full scale range from ±41 dps to ±1966 dps
- Accelerometer with programmable full-scale range from ±2g, to ±65g
- Minimal cross-axis sensitivity between the accelerometer and gyroscope axes
- 10,000 g shock tolerant structure
- Two temperature sensors
- 10 MHz, 32-bits Serial Peripheral Interface (SPI) with CRC-based error-detecting code algorithm
- ISO26262:2018 up to ASIL D
- Automotive-qualified
- Reliability testing performed according to Automotive Electronics Council AEC – Q100 grade 1 (-40°C to 125°C) qualification requirements
- Final test over temperature at: -40°C, 25°C, 125°C

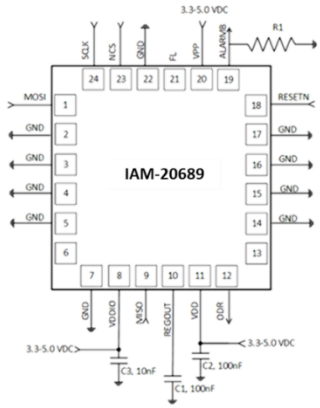
IAM-20689 includes on-chip 16-bit ADCs, programmable digital filters, and embedded seft-test. The device features VDD operating range of 3.0V to 5.5V, separate digital IO supply VDDIO from 3.0V to 5.5V, and current consumption below 10 mA in all operating conditions. The IAM-20689 has been developed according to ISO-26262:2018 as a Safety Element out of Context (SEooC) to address systems with automotive safety integrity level up to ASIL-D. Fault detection over lifetime is achieved by a set of 30 embedded safety mechanisms (SMs) executed either at startup, upon command, or in a continuous manner. Safety Manual is available upon request.

APPLICATIONS

IAM-20689 addresses a wide range of Automotive applications, including but not limited to:

- Traction control systems (TCS)
- Electronic stability control (ESC)
- Roll stability control (RSC)
- Pitch stability control (PSC)
- Rollover airbag systems (ROS)
- Adaptive cruise control (ACC)
- Adaptive front-lighting systems (AFS)
- ADAS
- Other safety chassis stability

TYPICAL OPERATING CIRCUIT

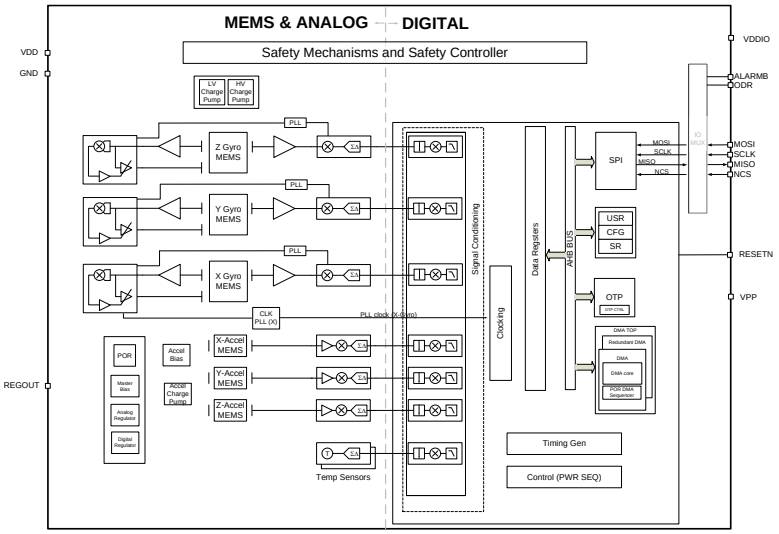


ORDERING INFORMATION

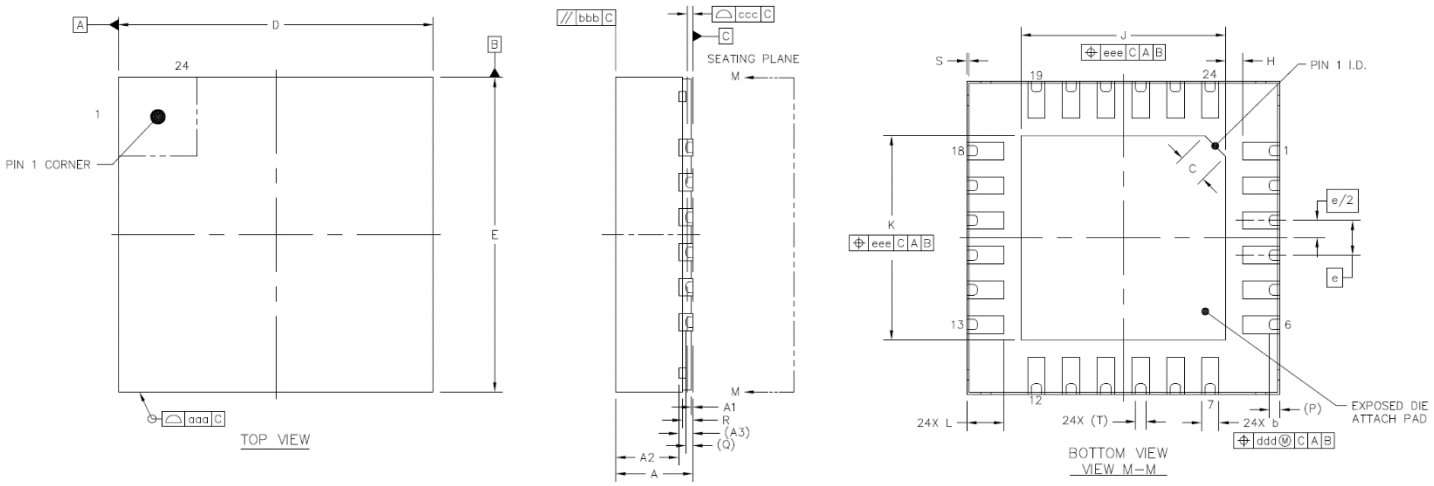
PART NUMBER†	TEMPERATURE	PACKAGE	MSL*
IAM-20689	−40°C to +125°C	24-Pin DQFN	3

†Denotes RoHS and Green-compliant package
* Moisture sensitivity level of the package

BLOCK DIAGRAM



PACKAGE DIMENSIONS



		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	1.05	1.1	1.15
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.9	---
L/F THICKNESS		A3		0.203 REF	
LEAD WIDTH		b	0.18	0.25	0.3
BODY SIZE	X	D	4.4	4.5	4.6
	Y	E	4.4	4.5	4.6
LEAD PITCH		e		0.5 BSC	
EP SIZE	X	J	2.89	2.94	2.99
	Y	K	2.89	2.94	2.99
LEAD LENGTH		L	0.48	0.53	0.58
		C	0.374	0.424	0.474
		H	0.2	0.25	0.3
MOLD FLATNESS		bbb		0.1	
COPLANARITY		ccc		0.08	
LEAD OFFSET		ddd		0.1	
EXPOSED PAD OFFSET		eee		0.1	
		fff		0.05	
HALF–CUT DEPTH		R	0.11	0.15	0.2
HALF–CUT WIDTH		S	0.001	0.015	0.03
WETTABLE DIMPLE WIDTH		T	0.1	0.15	0.2
WETTABLE DIMPLE LENGTH		P	0.05	0.15	0.25
WETTABLE DIMPLE DEPTH		Q	0.05	0.1	0.15

REVISION HISTORY

REVISION DATE	REVISION	DESCRIPTION
09/24/2024	1.0	Initial revision

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