

## Self-Calibrating TPOS GMR Camshaft Speed Sensor IC

### FEATURES AND BENEFITS

- **GMR technology** integrates high sensitivity MR (magnetoresistive) sensor elements and high precision BiCMOS circuits on a single silicon integrated circuit, offering high accuracy, low magnetic field operation
- **Allegro SM package** with integrated EMC components eliminates need for external EMI protection
- **True target state recognition** at device power-on (TPOS)
- **EEPROM programming** for performance optimization, temperature compensation, and production traceability
- **Flexible orientation:** Able to be mounted at any angle with correct configuration
- **Stray Field Immunity:** Resists aggressor stray fields found in hybrid vehicle environments
- **Backward compatibility** with Allegro's Hall-effect solutions performance
- **Target Profile Diagnostics**

### PACKAGE:



3-pin SIP (suffix SM)

*Not to scale*

### DESCRIPTION

The ATS16351 is a True Power-On State (TPOS) camshaft sensor incorporating a back-biasing magnet, advanced fully synchronous digital IC, and EMC protection circuit all in a single sensing solution.

The ATS16351 incorporates a GMR bridge with an optimized custom magnetic circuit that switches in response to magnetic signals induced by a ferromagnetic target. The IC contains a sophisticated digital circuit designed to match the temperature behavior of the sensor IC with the integrated magnet. Signal processing is used to provide zero-speed performance independent of air gap and is designed for the typical operating conditions found in automotive camshaft sensing applications. The resulting output of the device is a digital representation of the ferromagnetic target profile.

The Auto-TPOS feature of the ATS16351 enables the sensor IC to learn the installation air gap inside of the engine and to autonomously reprogram into memory the optimal threshold for power-on accuracy.

A number of factory-programmable options allow for performance optimization to meet specific application requirements.

The ATS16351PSM is available in a 3-pin package (SM) that is lead (Pb) free, with 100% NiPdAu plating.

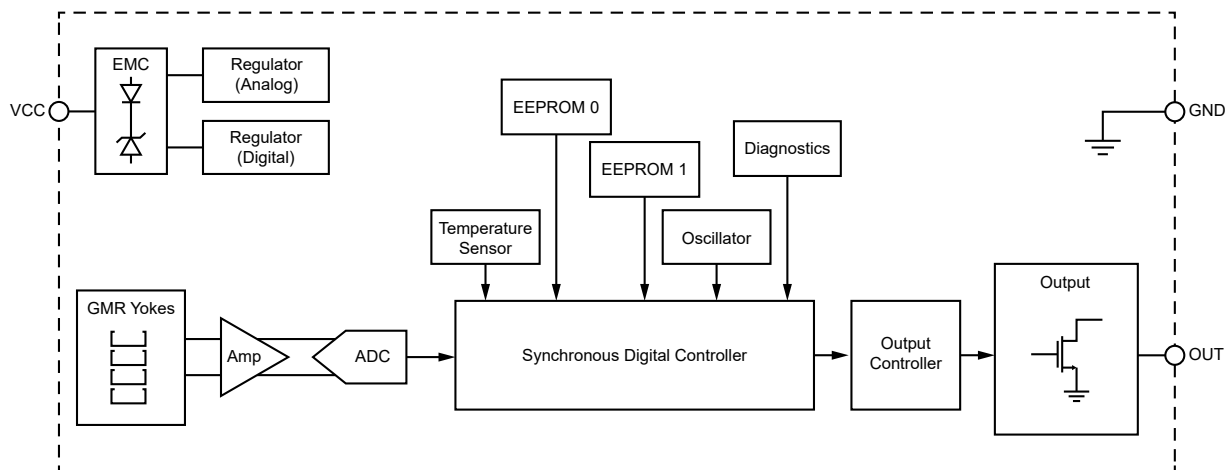


Figure 1: Functional Block Diagram

## PROGRAMMABLE OPTIONS

Name	Available Selections*			
Output Polarity	Low opposite target tooth / high opposite target valley <b>(L Option)</b>		High opposite target tooth / low opposite target valley <b>(H Option)</b>	
Switch Point Variation	C82C85D30D30 <b>(S01 Option)</b>		C83C83D7D7 <b>(S03 Option)</b>	
	S(00-99): C(25-102) C(25-102) D(0-30)D(0-30) indicating threshold level and dynamic slope. 1st and 2nd C(25-102) indicates rising and falling threshold level from C25 to C102 that corresponds to ~20% to ~80% switch point threshold level with a step of ~0.78%. 1st and 2nd D(0-30) indicates rising and falling threshold dynamic slope from D1 to D30 that corresponds to ~0.225 to ~0.975%/mV with a step of ~0.025%/mV.			
Teeth Memory	Number of teeth (memory count); programmable from 1 to 13 <b>(Nx Option)</b>			
Output Fall Time	Slow: typical 5 $\mu$ s <b>(S Option)</b>	Average: typical 2.5 $\mu$ s <b>(A Option)</b>	Fast: typical 1.2 $\mu$ s <b>(F Option)</b>	
Running Mode Hidden Hysteresis	10% <b>(S Option)</b>	15% <b>(R Option)</b>	20% <b>(B Option)</b>	30% <b>(V Option)</b>
Delay Time (tradeoff of jitter vs. speed effect)	No extra delay time (smallest speed effect): 16.7 $\mu$ s <b>(T1 Option)</b>	Small extra delay: 19.7 $\mu$ s <b>(T2 Option)</b>	Medium extra delay: 20.3 $\mu$ s <b>(T3 Option)</b>	Large extra delay (best jitter performance): 40 $\mu$ s <b>(T4 Option)</b>
Target Profiling Diagnostics	Magnetic profile available on output <b>(-D option)</b>		Magnetic profile unavailable on output <b>([blank] option)</b>	

\*Not all combinations of programmable options are available pre-programmed from Allegro. Contact Allegro for details.

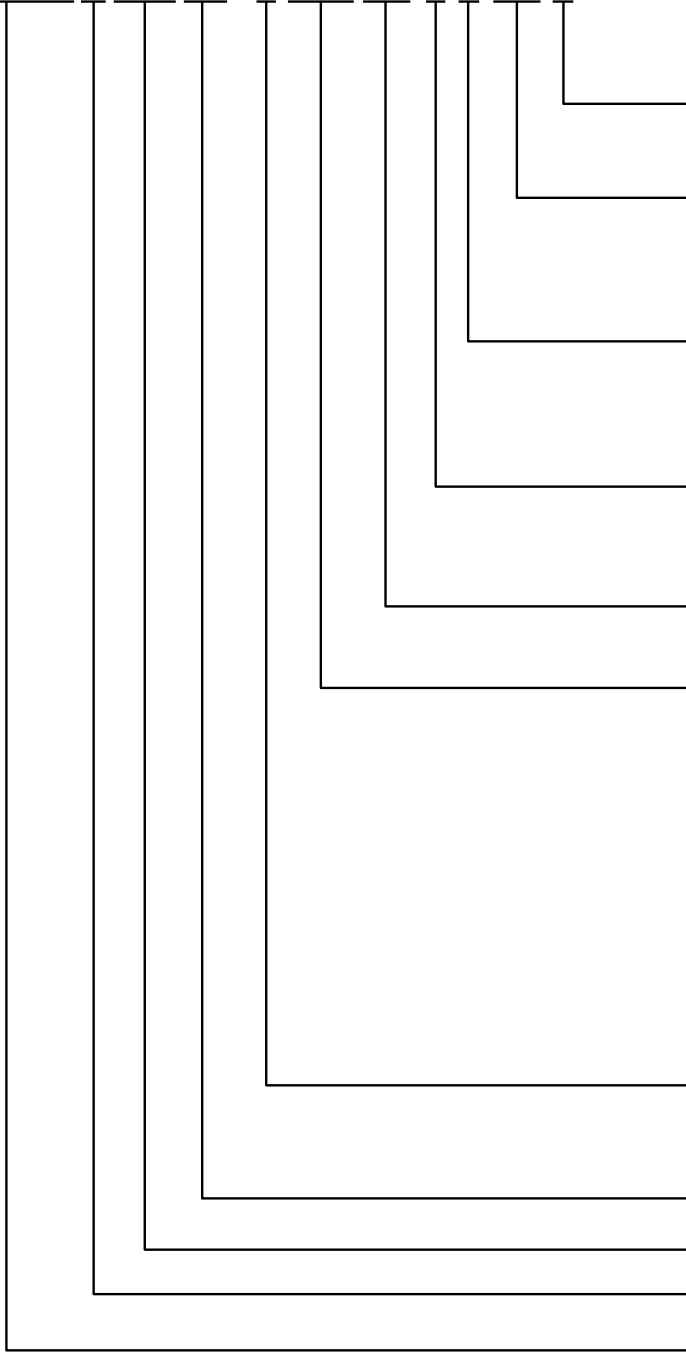
## SELECTION GUIDE

Part Number*	Package	Packing
ATS16351PSMGTN-LS01N12BFRT1-D	3-pin SIP with NiPdAu leadframe plating	Tape and reel, 800 pieces per 13-inch reel
ATS16351PSMGTN-LS03N12BFRT1-D		

\*Not all combinations of programmable options are available pre-programmed from Allegro. Contact Allegro for details.



ATS16351 P SMG TN - □ S □ □ N □ □ □ T □ □



**Target profile diagnostic feature:**

-D: Feature enabled  
[blank]: Feature disabled

**Delay time (typical):**

T1: 16.7  $\mu$ s  
T2: 19.7  $\mu$ s  
T3: 20.3  $\mu$ s  
T4: 40  $\mu$ s

**Hidden hysteresis (typical):**

S: 10%  
R: 15%  
B: 20%  
V: 30%

**Typical Output fall time:**

S: 5  $\mu$ s  
A: 2.5  $\mu$ s  
F: 1.2  $\mu$ s

**Number of teeth memory**

N(1-13): Teeth (memory count) from N1 to N13

**Switch Point variation**

S01 : C82C85D30D30  
S03 : C83C83D7D7

**Options:**

S(00-99): C(25-102) C(25-102) D(0-30)D(0-30)  
indicating threshold level and dynamic slope.  
1st and 2nd C(25-102) indicates rising and falling  
threshold level from C25 to C102 that corresponds  
to ~20% to ~80% switching point threshold level  
with a step of ~0.78%.  
1st and 2nd D(0-30) indicates rising and falling  
threshold dynamic slope from D1 to D30 that  
corresponds to ~ 0.225 to ~ 0.975%/mV with  
a step of ~0.025 %/mV

**Output polarity**

L: Low over tooth  
H: High over tooth

**Packing type**

**Package**

**Temperature range**

**Allegro identifier and device type**

**Per visualizzare il catalogo completo siete invitati ad [effettuare il login sul sito](#) oppure ad [effettuare la registrazione gratuita](#).**