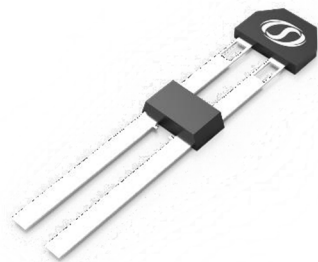

PWM output two-wire differential wheel speed sensor

FEATURES

- Two wire current output interface
- PWM output monitoring angle and position
- Mounting place and Mounting position diagnose function
- Dynamic self-calibration theory
- Back magnetic can select between N and S
- 0 external components
- Single chip solution
- Wide supply voltage range: 4.5V to 24V
- Wide Operating temperature : -40°C to 150°C
- TS-2 package



DESCRIPTION

SC9642TS is a two-wire current output wheel speed sensor based on Pulse Width Modulation Technology. Could be apply to ABS which monitoring Rev speed and direction. High voltage Bic Mos technology is used to ensure high ESD and EMC protection. Excellent sensitivity performance and accuracy at all operating temperature make the device suitable for fierce automotive applications

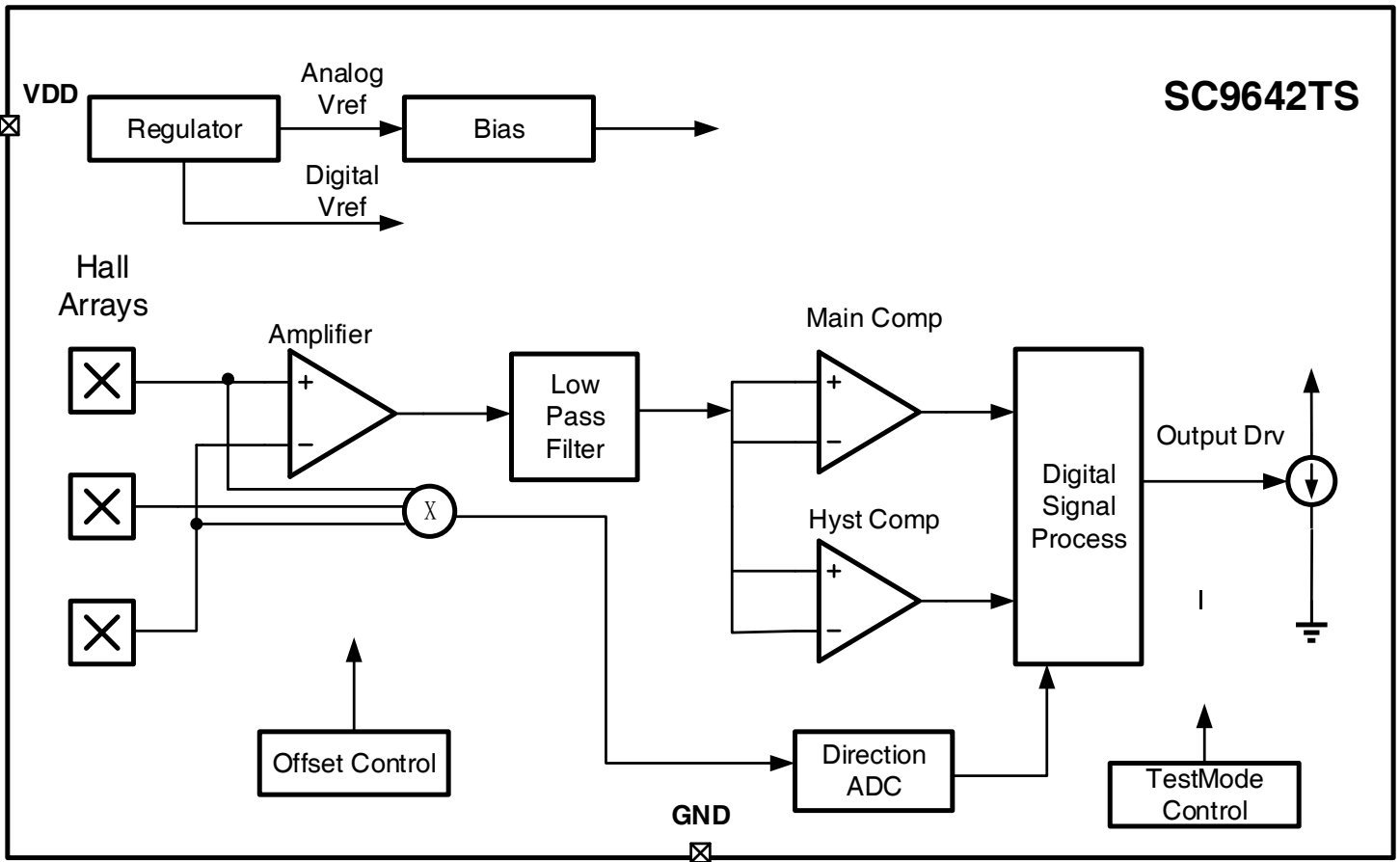
SC9642TS is integrated with a magnetic field that alters when the ring or gear rotates, the chip convert the magnetic field to voltage signal, and then output after being digital converted. SC9642TS is a two wire current output IC, different pulse width are used to indicate different speed and position of the gears or magnetic ring.

The package TS-2 is lead (Pb) free with 100% matte-tin lead frame plating.

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BLOCK DIAGRAM

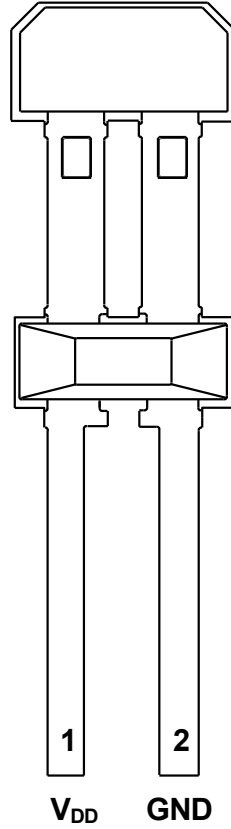


ORDERING INFORMATION

Part Number	Packing	Mounting	Ambient, T _A	Marking
SC9642TS	Bulk, 1500pcs/box	2-pin SIP	-40°C to 150°C	9642TS
SC9642TS braid	1500pcs/box	2-pin SIP	-40°C to 150°C	9642TS

TERMINAL CONFIGURATION

2 Terminal SIP
Ts package
(TOP View)



Terminal		Type	Description
Name	Number		
V _{DD}	1	PWR	4.5V ~ 24 V power supply
GND	2	Ground	Ground

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range

Parameter	Symbol	Min.	Max.	Units
Power supply voltage	V_{DD}	-0.5	30	V
Output terminal voltage	V_{OUT}	-0.5	30	V
Output terminal current sink	I_{SINK}	0	20	mA
Operating ambient temperature	T_A	-40	150	°C
Junction temperature, 5000h $V_{DD} < 16.5V$	T_J	-55	150	°C
Junction temperature, 2500h $V_{DD} < 16.5V$	T_J	-55	160	°C
Junction temperature, 500h $V_{DD} < 16.5V$	T_J	-55	170	°C
Storage temperature	T_{STG}	-65	175	°C

Note: Stresses above those listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ESD PROTECTION

Human Body Model (HBM) tests according to: standard AEC-Q100-002 HBM

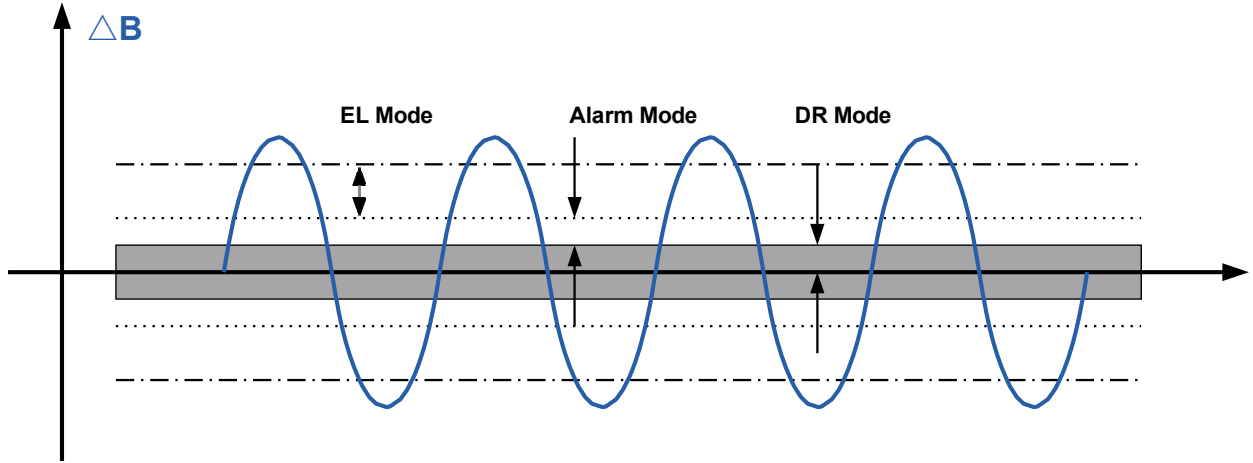
Parameter	Symbol	Limit Values		Units
		Min.	Max.	
ESD-Protection	V_{ESD}	-5	5	kV

OPERATING CHARACTERISTICS

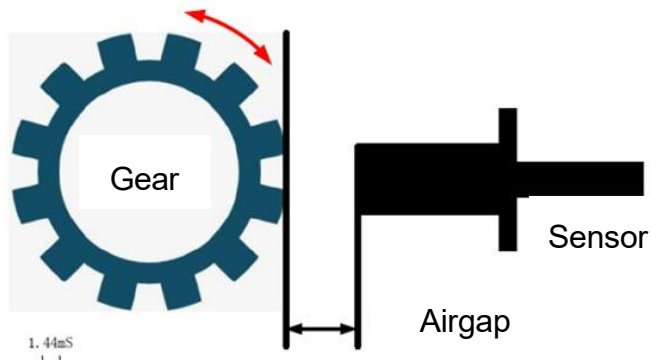
 Valid through the full operating temperature range, $V_{DD}=12V$, $C_{BYPASS}=0.1\mu F$; unless otherwise specified.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Electrical Characteristics						
Supply Voltage	V_{DD}		4.5	12.0	24.0	V
Anti-ac interference	V_{AC}	$f < 50 \text{ kHz}$	--	--	8	Vpp
Back magnetic strength range	B_0		-5000	0	5000	Gs
Hall sensor point magnetic deviation	ΔB_0		-200	0	200	Gs
Hall sensor point deviation induction	ΔB_{ind}		-120	--	120	Gs
Power Off Current	I_{LOW}		5.9	7	8.4	mA
Power On Current	I_{HIGH}		11.8	14	16.8	mA
Current Proportion	I_{HIGH}/I_{LOW}		1.9	--	--	
Output rate of pendulum	t_r, t_f	$R_m=75\text{ohm } T < 150$	8	--	26	mA/uS
Current Ripple	I_x	dI_x/dV_{DD}	--	--	90	$\mu A/V$
Extreme Threshold	ΔB_{limit}	1Hz--2500Hz	--	7.7	--	Gs
Warning Threshold	$\Delta B_{warning}$	1Hz--2500Hz	--	11.5	--	Gs
Threshold Proportion	$\Delta B_{warning}/\Delta B_{limit}$		1.3	2	2.7	
Installation Site Proportion	ΔBEI	: 1Hz--2500Hz	52	72	96	Gs
Initialize delay time	T_d		--	--	300	μS
Calibrate magnetic field edges figure			--	--	6	pulse
Operating Frequency			1.0	--	5000	Hz
Waveform jitter	$S_{Jit-Close}$	$\Delta B > 20Gs$ $1Hz < f_B < 2500Hz$	--	--	± 3	%
	$S_{Jit-Far}$		--	--	± 6	%
	S_{Jit-AC}		--	--	± 3	%
Timing Characteristics						
Pre- Low Time	$t_{pre-low}$		38	45	52	μs
Warning Pulse Width	$t_{Warning}$		38	45	52	μs
DR-L mode Pulse Width	t_{DR-L}		76	90	104	μs
DR-R mode Pulse Width	t_{DR-R}		153	180	207	μs
DR-L & EL mode Pulse Width	$t_{DR-L\&EL}$		306	360	414	μs
DR-R & EL mode Pulse Width	$t_{DR-R\&EL}$		616	720	828	μs
EL mode shift frequency	f_{ELmax}		--	117	--	Hz
Stand Still mode Pulse Width	t_{Stop}		1.232	1.44	1.656	mS
Stand Still mode Pulse Width	T_{Stop}		590	737	848	mS

MAGNETIC FIELD MODE



Magnetic field map



Mounting distance diagram

Stand Still-mode: The installation distance is long or the gear does not rotate, ΔB is less than 7GS, and the chip output waveform is 1.44ms pulse width.

Alarm-mode : When the installation distance is at the critical position, ΔB between 7GS to 12GS, the chip output waveform is 45 μ S pulse width.

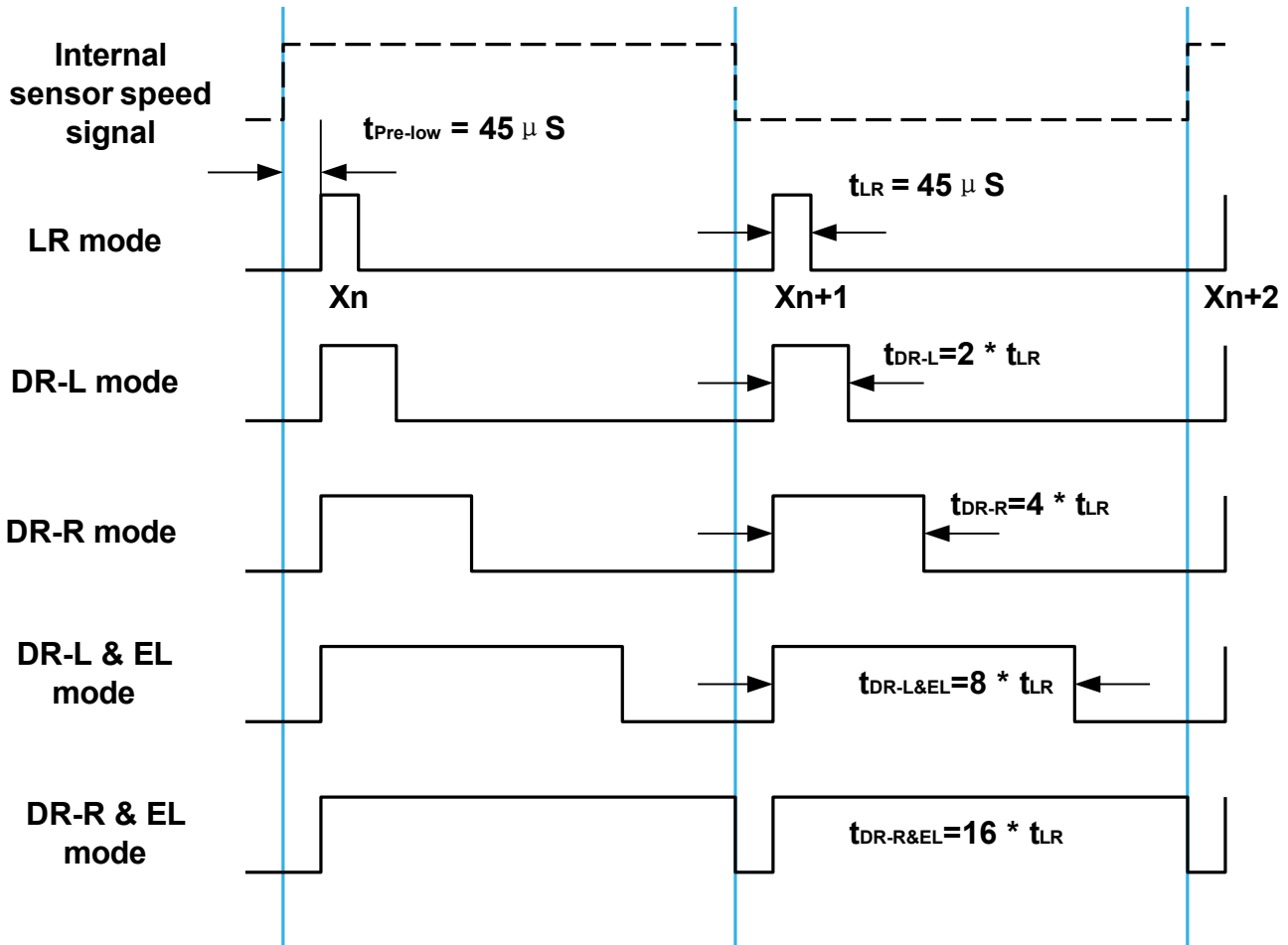
EL-mode: When the installation distance is moderate, ΔB between 12GS and 65GS, and the speed is slow,

The pulse frequency is less than 117Hz, the forward rotation ($V_{DD} \rightarrow GND$) output waveform with 360 μ S pulse width is DR-L&EL, and the reverse rotation ($GND \rightarrow V_{DD}$) output waveform with 720 μ S pulse width is DR-R&EL.

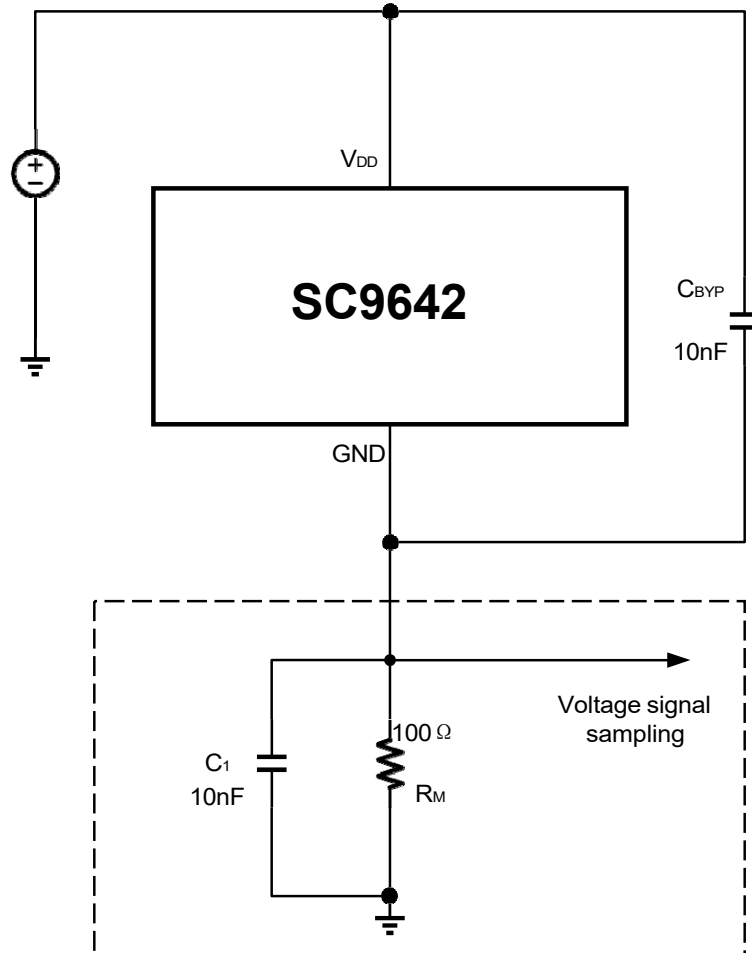
When the speed is fast, the pulse frequency is greater than 117Hz, the forward rotation ($V_{DD} \rightarrow GND$) outputs the waveform with 90 μ S pulse width, and the reverse rotation ($GND \rightarrow V_{DD}$) outputs the waveform with 180 μ S pulse width.

DR-mode: When the installation distance is relatively close, ΔB is greater than 65GS, regardless of speed, forward rotation ($V_{DD} \rightarrow GND$) output waveform with 90 μ S pulse width, mode is DR-L, reverse ($GND \rightarrow V_{DD}$) output waveform with 180 μ S pulse width, mode is DR-R.

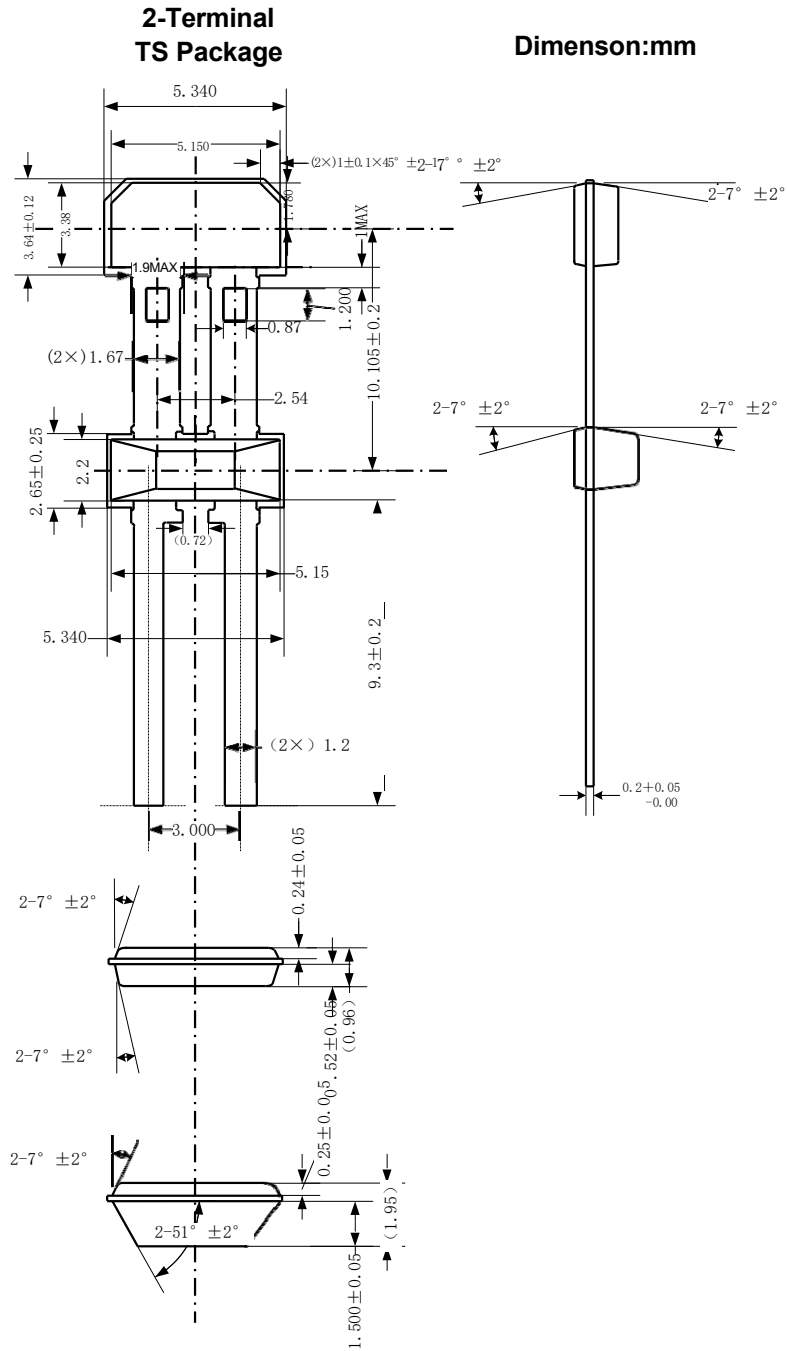
PWM TIMING DEFINITION



TYPICAL APPLICATION



PACKAGE INFORMATION



- Notes:
1. Exact body and lead configuration at vendor's option within limits shown.
 2. Height does not include mold gate flash.

Where no tolerance is specified, dimension is nominal.

REVISION HISTORY

Revision	Date	Description
Rev0.1	2018-05-08	The Preliminary revision
Rev2.3	2019-10-12	The final revision of old datasheet
RevA/1.0	2020-11-19	Unified datasheet format