
PWM protocol two-wire differential wheel speed sensor

FEATURES

- Two-wire current interface
- Detect speed and direction
- Detect magnetic or gear tooth
- PWM protocol
- AECQ100 Grade0
- South and North pole pre-induction possible
- Large air gap
- Single chip solution
- Wide supply voltage range: 4.5V to 24V
- Wide Operating temperature : -40°C to 150°C
- TS-2 package
- Enhanced PWM jitter stability
- Enhanced EMC performance with 2.2nF integrated capacitor

DESCRIPTION

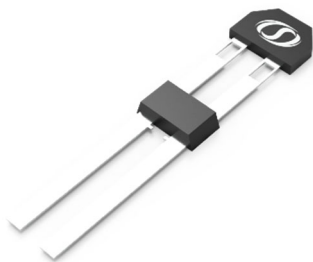
The SC9642TS-EC is an integrated, active magnetic field sensor for wheel speed applications based on Hall technology, Its basic function is to measure the speed and direction of a pole wheel or a ferromagnetic toothed wheel.

It has a two wire-current interface using the PWM protocol for communication, provides the speed and the direction information of wheel rotation.

Its unique circuit makes reliability meets AECQ100 standard and reaches Grade0 .

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

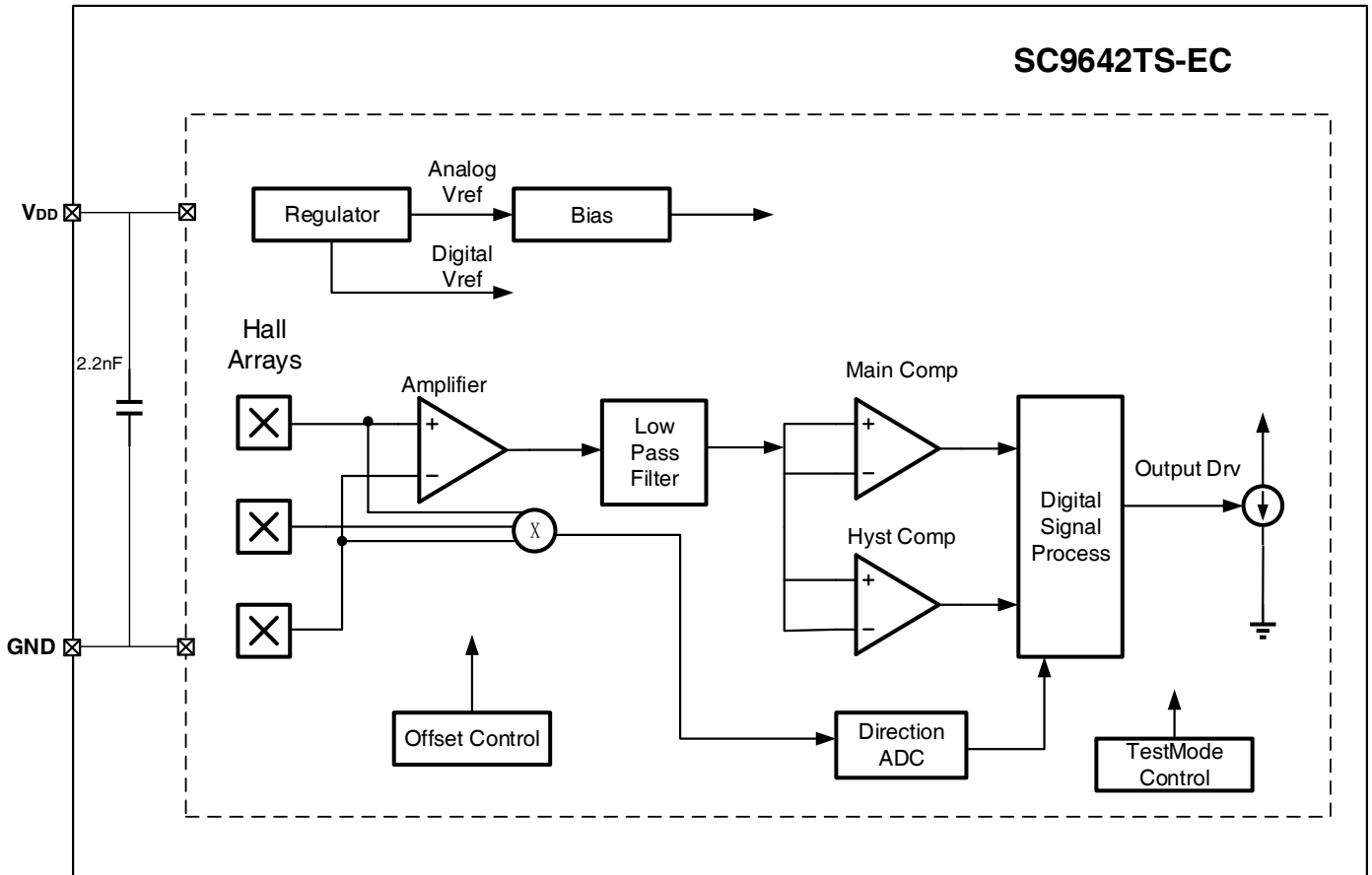
Sensor integrated a 2.2nF ceramic capacitor to enhance EMC performance.



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BLOCK DIAGRAM

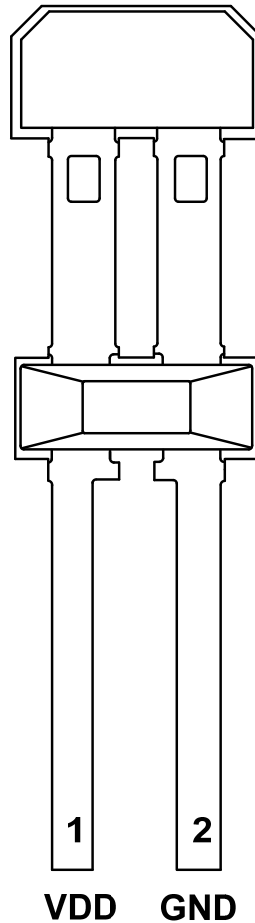


ORDERING INFORMATION

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

TERMINAL CONFIGURATION

2 Terminal SIP
Ts package
(TOP View)



Terminal		Type	Description
Name	Number		
VDD	1	Power	4.5V ~ 24 V power supply
GND	2	Ground	Ground

ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range

Parameter	Symbol	Min.	Max.	Units	Remarks
Power supply voltage	V _{DD}	-0.5	30	V	
Reverse polarity current	I _{DDR}		200	mA	R _M > 75 Ω included in V _{DD} , t < 4h
Operating ambient temperature	T _A	-40	150	°C	
Junction temperature	T _J	-55	150	°C	5000h V _{DD} < 16.5V
Junction temperature	T _J	-55	160	°C	2500h V _{DD} < 16.5V
Junction temperature	T _J	-55	170	°C	500h V _{DD} < 16.5V
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

ELECTRO MAGNETIC COMPATIBILITY

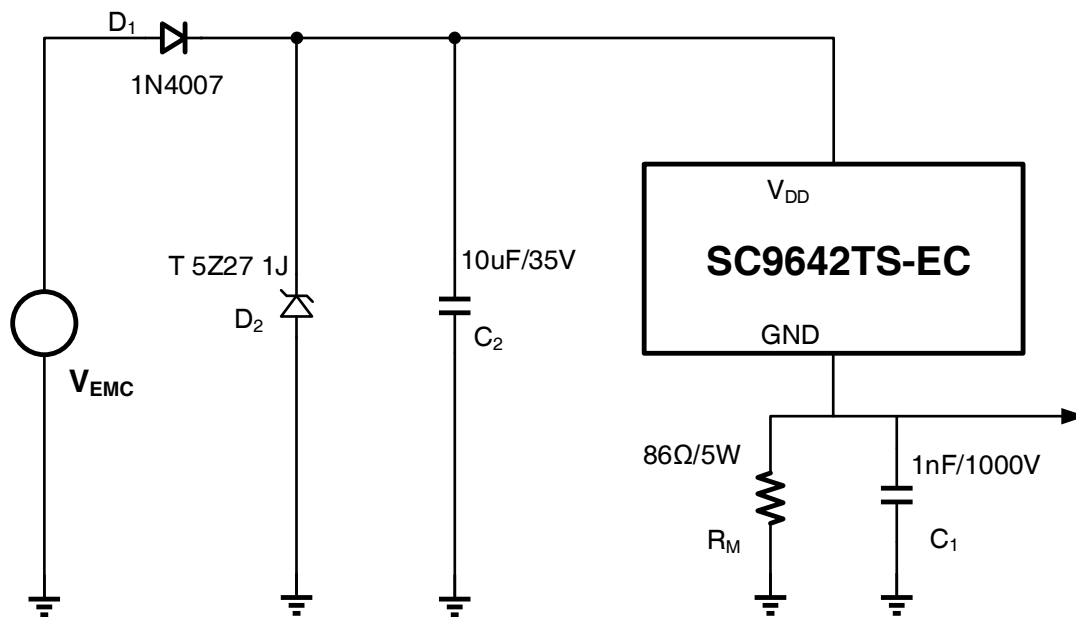
Ref. ISO 7637-2; see the test circuit for EMC tests;

$\Delta B_{PP} = 2\text{mT}$ (amplitude of sinus signal); $V_{DD} = 13.5\text{V}$, $f_B = 1\text{ kHz}$; $T_A = 25^\circ\text{C}$; $R_M \geq 75\ \Omega$;

Parameter	Symbol	Level / Typ.	Status
Test pulse 1	V_{EMC}	IV / -150V	C
Test pulse 2a		IV / 112V	C
Test pulse 3a		IV / -220V	A
Test pulse 3b		IV / 150V	A
Test pulse 5b		IV / 34V	C

1. Test criteria for status A: No missing pulse no additional pulse on the IC output signal plus duty cycle and jitter are in specification limits.
2. Test criteria for status B: No missing pulse no additional pulse on the IC output signal.
3. Test criteria for status C: One or more parameter can be out of specification during the exposure but returns automatically to normal operation after exposure is removed.

Test circuit for EMC test



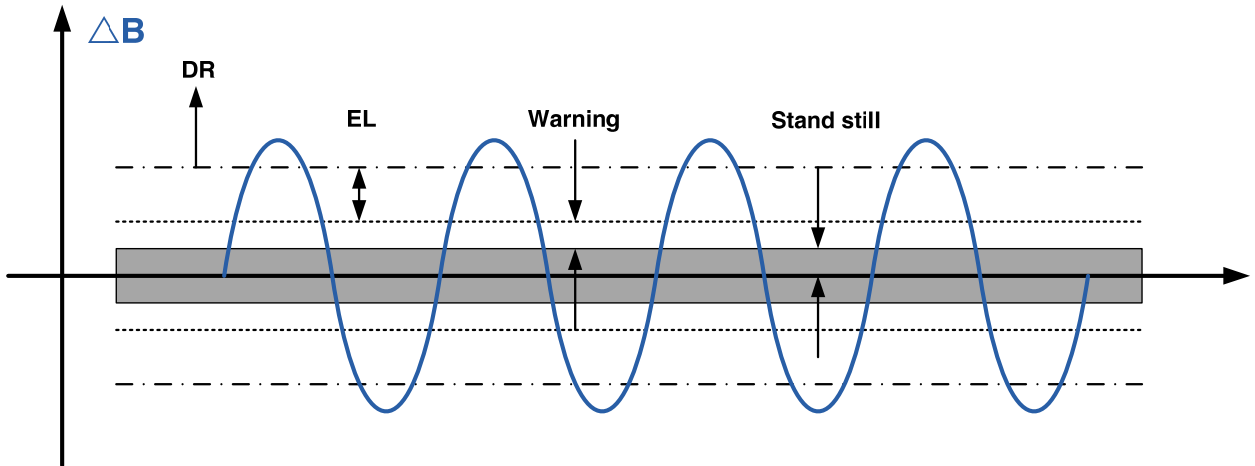
OPERATING CHARACTERISTICS

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

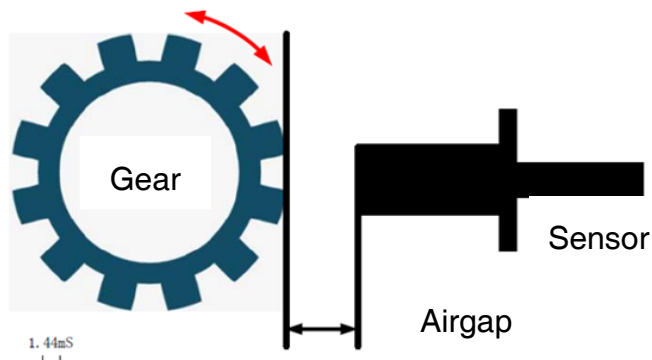
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Electrical Characteristics						
Supply Voltage	V_{DD}		4.5	12.0	24.0	V
Anti-AC interference	V_{AC}	$f < 50 \text{ kHz}$	--	--	8	Vpp
Back magnetic strength range	B_0		-5000	0	5000	Gs
Pre-induction offset between outer probes	$\Delta B_{start_1/r}$		-200	0	200	Gs
Differential induction	ΔB		-1200	--	1200	Gs
Supply Current	I_{LOW}		5.9	7	8.4	mA
Supply Current	I_{HIGH}		11.8	14	16.8	mA
Supply Current ratio	I_{HIGH}/I_{LOW}		1.9	--	--	
Output rise/fall slew rate	t_r, t_f	$R_m=75\text{ohm } T_A < 150$	8	--	26	mA/uS
Current Ripple	I_x	dI_x/dV_{DD}	--	--	90	$\mu A/V$
Limit threshold	ΔB_{limit}	1Hz--2500Hz	--	7.7	--	Gs
Airgap Warning threshold	$\Delta B_{warning}$	1Hz--2500Hz	--	11.5	--	Gs
Limit-warning threshold ratio	$\Delta B_{warning}/\Delta B_{limit}$		1.3	2	2.7	
Assembly position threshold	ΔB_{EL}	1Hz--2500Hz	52	72	96	Gs
Initial calibration time	t_d		--	--	300	μS
Magnetic edges required for offset calibration	$n_{DZ-calibration}$		--	--	6	pulse
Operating Frequency	f		1.0	--	5000	Hz
Duty cycle	DC		40	50	60	%
jitter	$S_{Jit-Close}$	$\Delta B > 20Gs$	--	--	± 3	%
	$S_{Jit-Far}$	$1Hz < f < 2500Hz$	--	--	± 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 Pulse Width	t_{DR-L}		76	90	104	μs
DR-R Pulse Width	t_{DR-R}		153	180	207	μs
DR-L & EL Pulse Width	$t_{DR-L\&EL}$		306	360	414	μs
DR-R & EL Pulse Width	$t_{DR-R\&EL}$		616	720	828	μs
Output of EL pluse maximum frequency	f_{ELmax}		--	117	--	Hz
Stand Still Pulse Width	t_{Stop}		1.232	1.44	1.656	mS

Stand Still period	T_{Stop}	590	737	848	mS
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MAGNETIC FIELD



Definition of differential magnetic flux density range



Mounting distance diagram

Stand Still: The installation distance is far or the gear does not rotate, ΔB is less than 7GS, the chip output pulse width is 1.44ms, period is 737ms.

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

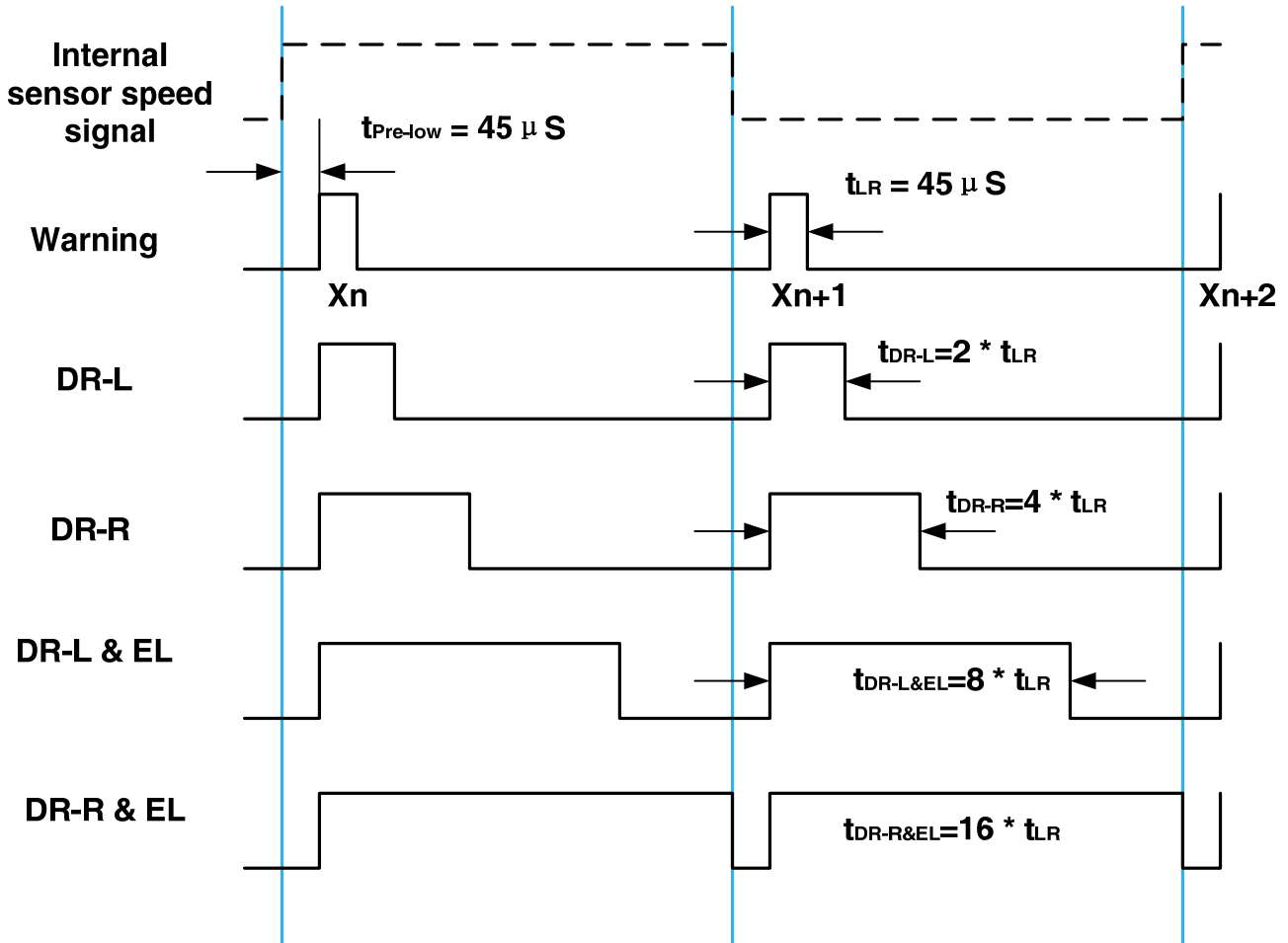
EL: When the installation distance is moderate, ΔB between 12GS and 65GS, and the speed is slow,

When the frequency is below 117Hz, the forward rotation (VDD \rightarrow GND) ,output pulse width is 360 μ S ,which is DR-L&EL, and the reverse rotation (GND \rightarrow VDD) output pulse width is 720 μ S , which is DR-R&EL.

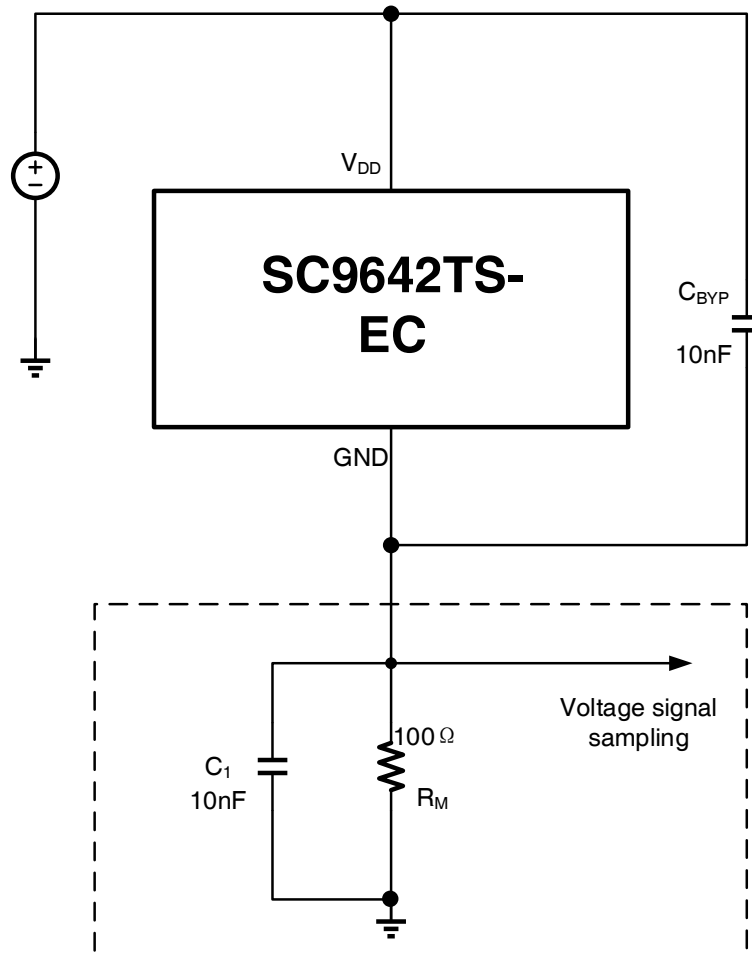
When the frequency is beyond 117HZ, the forward rotation (VDD \rightarrow GND) ,output pulse width is 90 μ S, which is DR-L&EL, and the reverse rotation (GND \rightarrow VDD) output pulse width is 180 μ S, which is DR-R&EL.

DR: When the installation distance is relatively close, ΔB is greater than 65GS, regardless of frequency, forward rotation (VDD \rightarrow GND) output pulse width is 90 μ S ,which is DR-L, reverse (GND \rightarrow VDD) output pulse width is 180 μ S, which is DR-R.

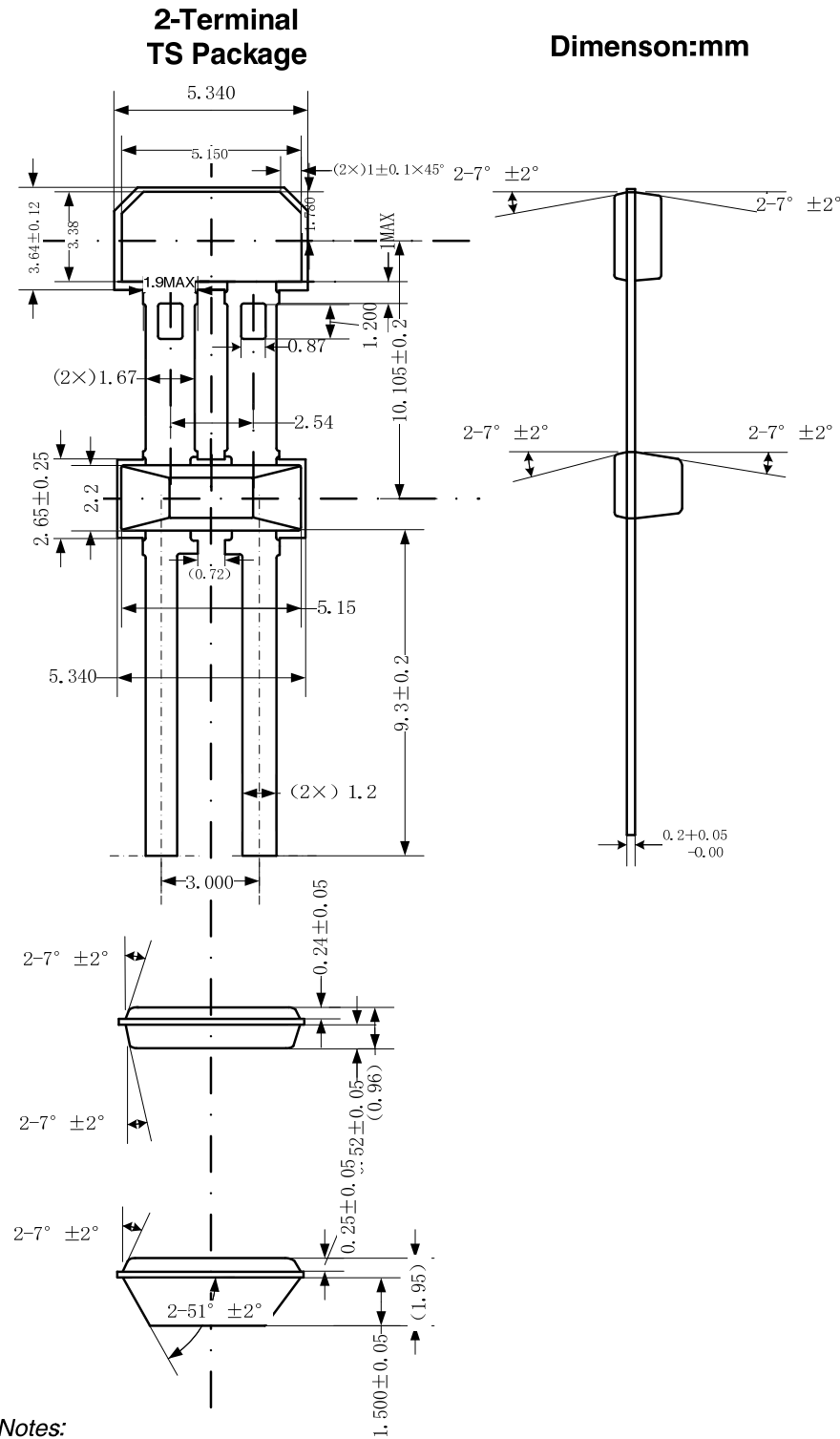
PWM TIMING DEFINITION



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
RevA/1.0	2022-11-22	The Final revision

单击下面可查看定价，库存，交付和生命周期等信息

[>>Semiment \(赛卓电子\)](#)