Smart Abs Specification

SA35-11/24bit-LPS-5V

TS5643N100

REVISIONS

No.	DATE	PAGES	DESCRIPTION	APP'D	No.	DATE	PAGES	DESCRIPTION	APP'D
(E) △1	'99 10 20	1, 11	バージョンA						
△2	15 9 4	11	Version B						

TSC 2019-09-25 PC

ED'N No.	. .

DS'D	DATE	MODEL No.	TITLE
S. Shizawa	'96.10.17	TS5643N100	Smart Abs Specification
CH'D K. Tamura			
APP'D			

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
0	5	6	4	3	0	0	1	1	S	4	E	1/△11~~10~~

(E)

TAMAGAWA SEIKI CO., LTD.

1．SCOPE

The smart Abs is low cost versatile multi-turn absolute encoder. The encoder produces incremental and absolute output signals. The absolute signal is converted from parallel format to serial format by a LSI inside the encoder resulting in a serial signal (manchester code) output.

2．TYPE

The encoder type is as follows.
FUNCTION NAME : SA35 - 11/24bit - LPS - 5V.
TYPE : TS5643N100

3．FUNCTION

The smart Abs has the function named pre-load which renews 5bit absolute data to 11bit absolute data.
The 5bit absolute data is the signal at power on. The pre-load operation is performed by rotating the encoder shaft for CW or CCW approximate 2° (mechanical) after power on.
The permissible rotating speed for the pre-road operation is up to 600rpm.
The 13bit multi-turn signal counts ±8192 rotations. The multi-turn signal is stored in a LSI internal counter. This counter is maintained for 1hour by a capacitor incorporated in the encoder.

TSC
2019-09-25
PC

4. SPECIFICATION－ I

Parameter		Condition		Value	Unit
Resolution	Absolute Sig.	Single turn		11	bit/turn
		Multi-turn		13	bit
	Incremental Sig.	Count Sig.		2048	count/turn
		Index Sig.		1	
Frequency Response		Absolute Sig.		170 MAX.	kHz
		Incremental Sig.		170 MAX.	
Absolute Sig. Serial Data		————		See Table Ⅰ & Ⅱ	——
Incremental Sig. Phase		————		See Table Ⅲ	——
Slew Speed		Power supply operation		84 (5000) MAX.	S^{-1} (rpm)
		Battery supply operation (Multi-turn data only)		100 (6000) MAX.	
Acceleration		Power supply operation		80000 MAX.	rad/s^2
		For 10 sec. after power off			
		Battery supply operation		4000 MAX.	
Output		Line driver AM26C31 (RS422A)	Source	20 MAX.	mA
			Sink	20 MAX.	
Operating temperature		————		-10～+85	℃
Storage temperature		————		-20～+90	℃
Humidity		at 40℃, 96Hr Non-condensing		90 MAX.	% RH
Vibration		5～2000Hz 3 direction, 3hr each.		10	G
Shock		11ms 6 direction for 3 repetitions.		200	G

TSC
2019-09-25
PC

第 版

DWG NO.												SHEET
0	5	6	4	3	0	0	1	1	S	4	E	3

(E)

SERIAL SIGNAL FORMAT

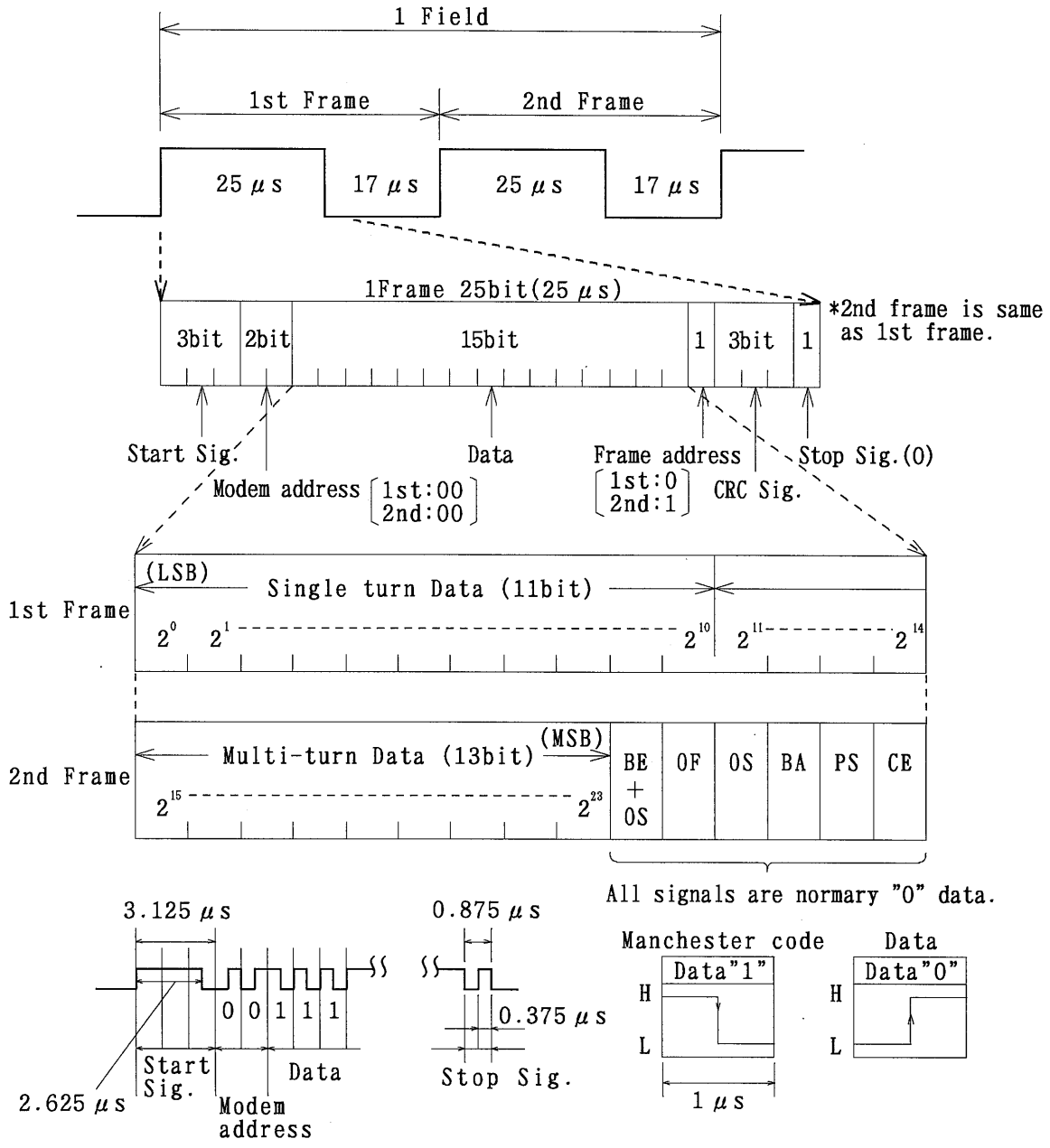

TABLE I

TSC
2019-09-25
PC

第 版

DWG NO.												SHEET
0	5	6	4	3	0	0	1	1	S	4	E	4

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Symbol	Name	Description
BE	Battery Error	If the voltage in the battery supply circuit inside the encoder falls below 2.75±0.25V, BE signal "1" is output. [Remedy] Carry out a reset operation, because an error has occurred in the multi-turn data counter.
OF	Over Flow	The multi-turn counter overflow. The 13bit counter continues to be counted normally even if the OF signal "1" is output. See detail below. [Remedy] Carry out a reset operation.
OS	Over Speed	If the encoder shaft rotates over slew speed and acceleration rate, the OS signal "1" is output. [Remedy] Carry out a reset operation.
BA	Battery Alarm	When the external battery wears out, the BA signal "1" is output. [Remedy] Carry out a reset operation.
PS	Pre-load Status	The PS signal "1" is output until the pre-load operation is performed..
CE	Count Error	If the single turn absolute data error occurs, the CE signal "1" is output. When the absolute data recovers, the CE signal will be "0" data.
BE+OS	———	Battery error & Over speed OR gated signal.

* Over Flow

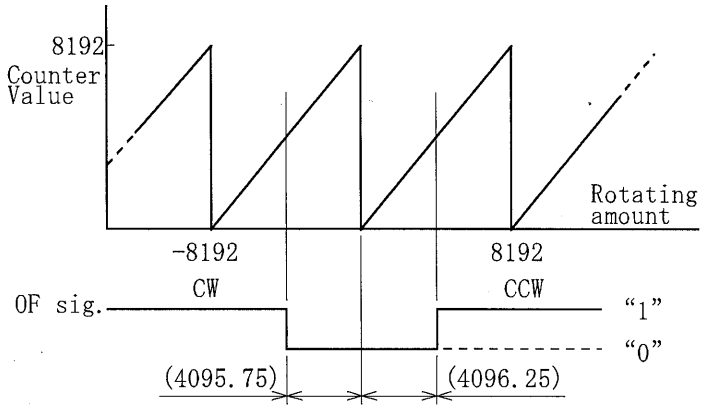


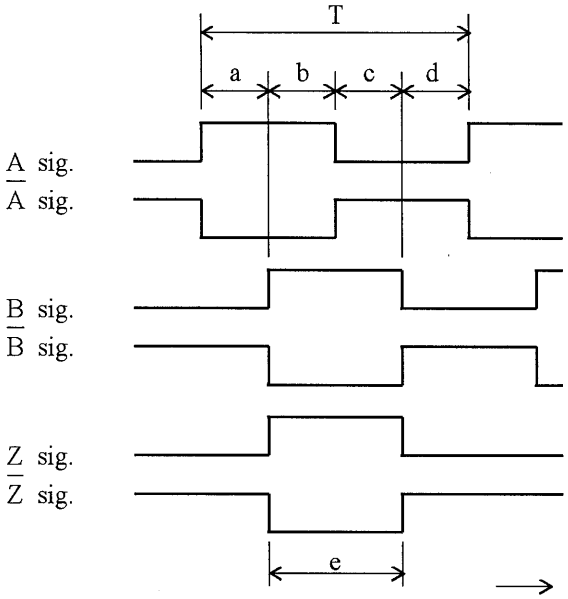
TABLE Ⅱ

TSC 2019-09-25 PC

第 版

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
0 5 6 4 3 0 0 1 1	S	4	E								5

E



→ CCW Viewed from encoder shaft.

T=360° ／2048

a,b,c,d≧0.125T

e=T／2=b+c

TABLE Ⅲ

TSC
2019-09-25
PC

第　　版

DWG NO.												SHEET
0	5	6	4	3	0	0	1	1	S	4	E	6／

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5．SPECIFICATION－Ⅱ(ELECTRICAL)

Characteristics	Condition		Rating Ta=25℃ MIN.	TYP.	MAX.	Unit
Power Supply Voltage (Vcc)	Ta=25℃		4.75	5.0	5.25	V
Power Supply Current	Normal operation				150	mA
	Power on at internal capacitor discharge				*1 500	mA
Power supply operation *2 & Battery supply operation	Power supply to battery supply voltage		4.0	4.2	4.4	V
	Battery supply to power supply voltage		4.1	4.3	4.5	V
Battery voltage				3.6		V
Battery Alarm Voltage	Alarm on (Battery wear out)		3.1	3.25	3.4	V
	Alarm off (Battery renew)		3.2	3.4	3.6	V
Battery Error Voltage	Battery voltage		2.5	2.75	3.0	V
Battery Consumption	at Power on			3.6		μA
	For 10 sec. after power off			15		mA
	Battery operation			*3 90	100	μA
Stand-by time of serial data output at power on	Vcc=4.75V Power supply impedance=0Ω	Internal capacitor full charge			0.1	sec.
		Internal capacitor discharge			0.8	sec.
Internal capacitor operation time	Charge for 3 hr. min. at Vcc=5V.				*4 1	hr.

TSC 2019-09-25 PC

第　　版

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
0 5 6 4 3 0 0 1 1	S	4	E								7

E

Note.

＊1 See Fig.1 below.

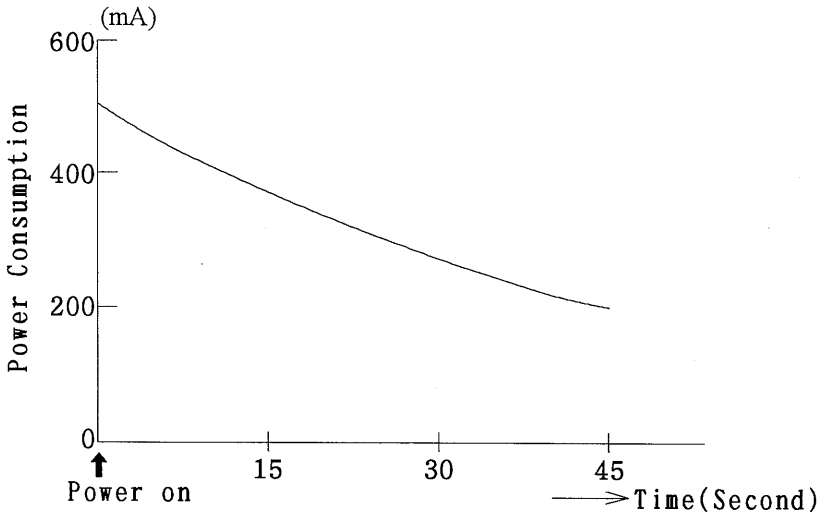


Fig.1

＊2 See Fig.2 below.

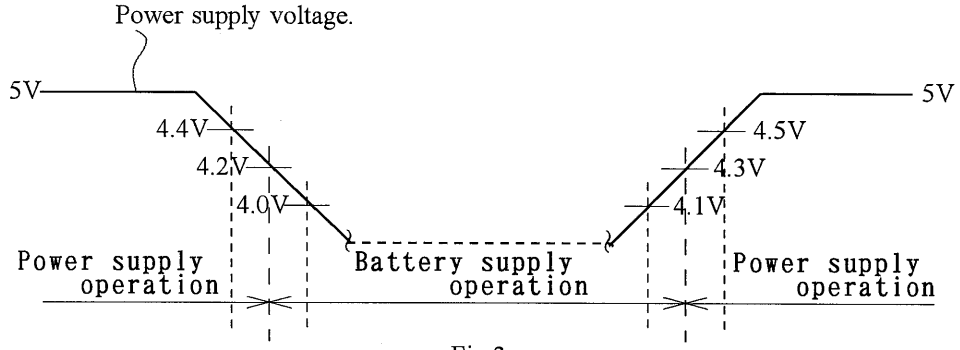


Fig.2

＊3 Battery Comsumption. See Below table.

Slew Speed	Battery Comsumption (Typ.)
0～7.5S^{-1} (0～450rpm)	90 μ A
7.5～15S^{-1} (450～900rpm)	120 μ A
15～ 100S^{-1} (900～ 6000rpm)	210 μ A

TSC 2019-09-25 PC

＊4 Internal capacitor operation time will be 15 minutes typical 10 years later depending on storange & operating temperature.

第 版

DWG NO.												SHEET
0	5	6	4	3	0	0	1	1	S	4	E	8

(E)

6. SPECIFICATION－Ⅲ(MECHANICAL)

Characteristics	Condition	Value			
		MIN.	TYP.	MAX.	
Starting Torque	at 20℃			5.9 (60)	N·m (g·cm)
Moment of Inertia	———		1×10^{-6} (10)		$Kg\cdot m^2$ ($g\cdot cm^2$)
Mounting tolerances	Radial			0.05	mm
	Axial			0.2	mm
	Angular			0.1	deg.
Slew speed	———			100 (6000)	S^{-1} (rpm)
Acceleration	———			8×10^4	rad／S^2
Mass	Without cable			0.3	Kg
Protection	———	IP=40			———

7. CONNECTION

Symbol	Fnctiion	Color
Rx	Serial Data	Brown
$\overline{Rx}$		Brown／Black
A	Incremental	Blue
$\overline{A}$	A sig.	Blue／Black
B	Incremental	Green
$\overline{B}$	B sig.	Green／Black
Z	Index sig.	Yellow
$\overline{Z}$		Yellow／ Black
Vcc	DC +5V	Red
GND	0V	White／Black
VB	Battery (+3.6V)	White
GND	0V	Black
RST	Reset	Gray
CG	Case Ground	Gray／Black

TSC
2019-09-25
PC

第 版

DWG NO.												SHEET
3	4	5	6	7	8	9	10	11	12			
0	5	6	4	3	0	0	1	1	S	4	E	9／

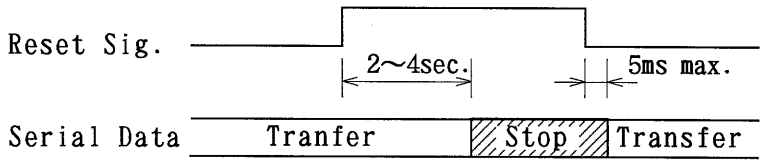
(E)

8. RESET OPERATION

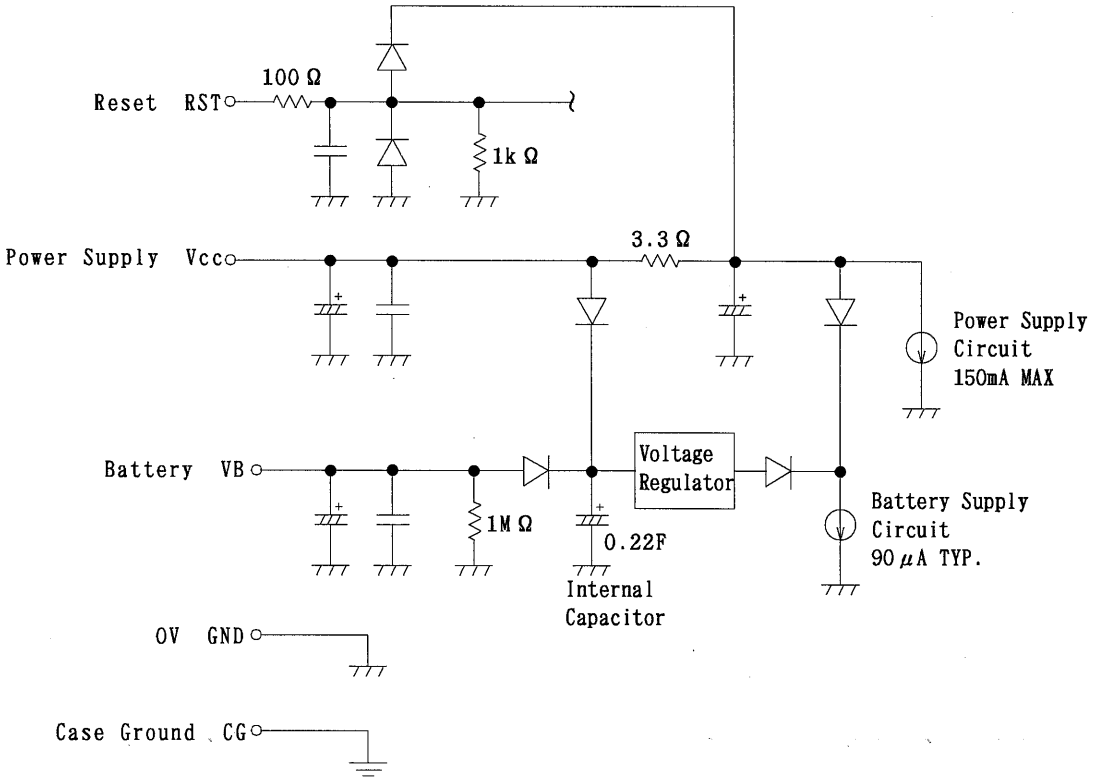
Applying a power supply voltage to the reset terminal for more than 4 seconds at a power supply operation, the following data will be reset.

① Battery Error
② Over Flow
③ Over Speed
④ Multi-turn Counter Data.

Reset signal and serial data timing diagrams is given below.



9. POWER & BATTERY SUPPLY CIRCUIT



TSC
2019-09-25
PC

第 版

DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
0 5 6 4 3 0 0 1 1	S	4	E	10 /							

(E)

変　更　来　歴　表

形式	TS	5643	N	100	E	

	符号	適用製造番号	改訂年月日	改　訂　事　項　（理　由）	決　裁
△1	A		'99・10・20	グリスモレ恒久対策 ベアリング：グリス量：大量：DDタイプ，ディスクマウント：油切構造	（印）（印）（関）
			・　・		
△2	B		15.9.4	Change of ASIC	（印）（下村）（石橋）
			・　・		
			・　・		
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記入の説明

この来歴表は、次のような図面変更が行なわれたとき、製品の製作ロットを明確にするための記録と、製品に符号を表示することにある。

次に示す図面改訂が行なわれた都度、アルファベットAより逐次とり、当該製品に符号を表示する。

1．外来仕様書、承認図に抵触する図面変更が発生したとき。
2．安全性に影響を与える図面変更が発生したとき。
3．機能、性能に重大な影響を与える図面変更が発生したとき。
4．適用される環境条件にて、形状、性能が甚しく変化するような図面変更が発生したとき。
5．信頼性、耐久性に重大な影響を及ぼすような図面変更が発生したとき。
6．重量に著しい影響を及ぼすような図面変更が発生したとき。
7．そ　の　他

TSC 2019-09-25 PC

NPはり付要領は T 20—890	DWG NO.	3	4	5	6	7	8	9	10	11	12	SHEET
	0	5	6	4	3	0	0	1	1	S	4	0	11/11

Ⓔ