
DATA SHEET

SB-TFR/D Series

(TIMING / FREQUENCY STANDARD & RF DISTRIBUTION)

**Miniature Timing & Frequency module for audio systems
and femto-cell, cellular base stations, telecommunications,
other precision timing & frequency applications.**



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2.0 Introduction

The SB-TFR/D series is precision timing & frequency module handling timing and distribution within the telecommunications, measuring equipment, audio.

It is designed to support several timing sources available within the base station, providing base stations manufacturers with flexible yet powerful synchronization management capabilities. Also, it can use external timing standard of precision test equipments and other application.

These products provide accurate centralized reference signals with the best quality, lowest noise And the most uptime to an assortment of telecommunications infrastructures, thereby assuring the highest level of precision and reliability throughout the system.

The SB-TFR/D series is equipped with 2 channel output and it has various options. That's why when used with SBtron's timing & frequency modules effectively distribute signals and generate all rates needed for today's complex telecommunications systems, test facilities, engineering laboratories and audio systems.

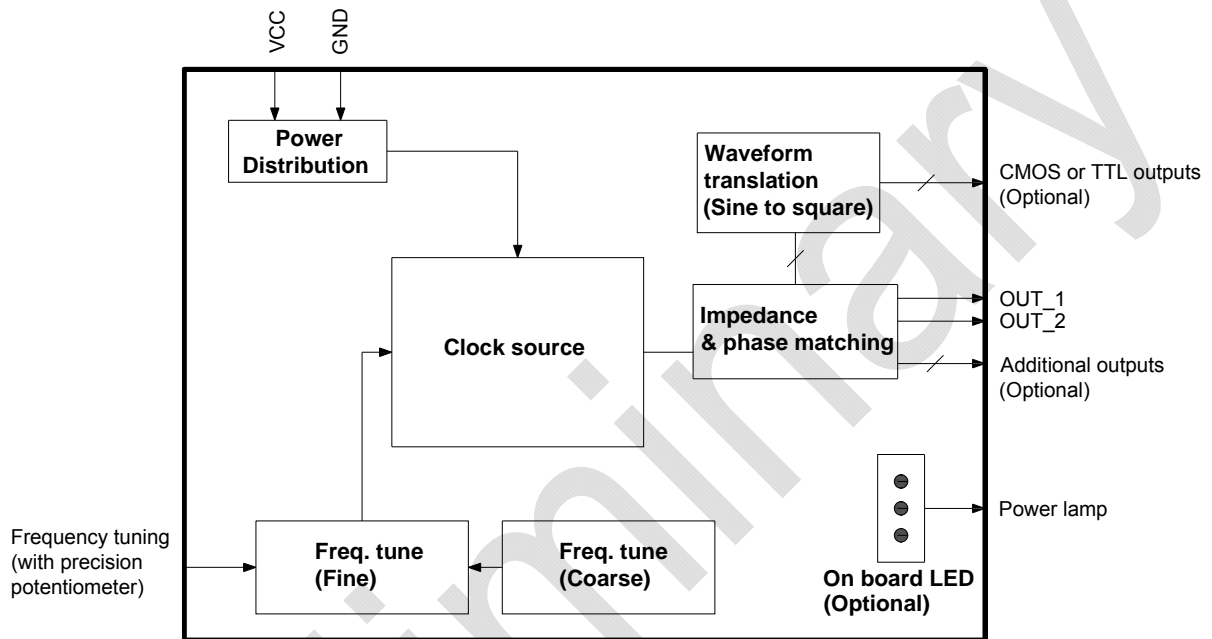
Preliminary

Note: The model number is different for internal timing standard.

3.0 Description

This module is especially designed to make the most cost-effective OEM solution for the customers. The module size is 145x76x48mm. (other size is available)

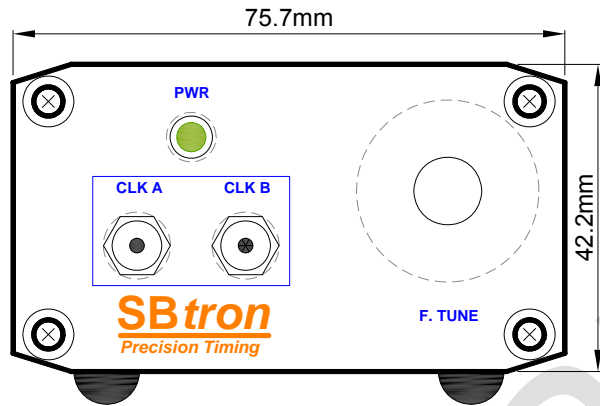
3.1 The SB-TFR/D Block diagram



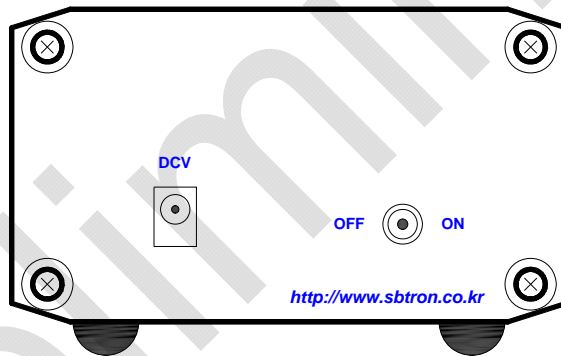
<Figure 1> SB-TFR/D series block diagram

4.0 Dimensions

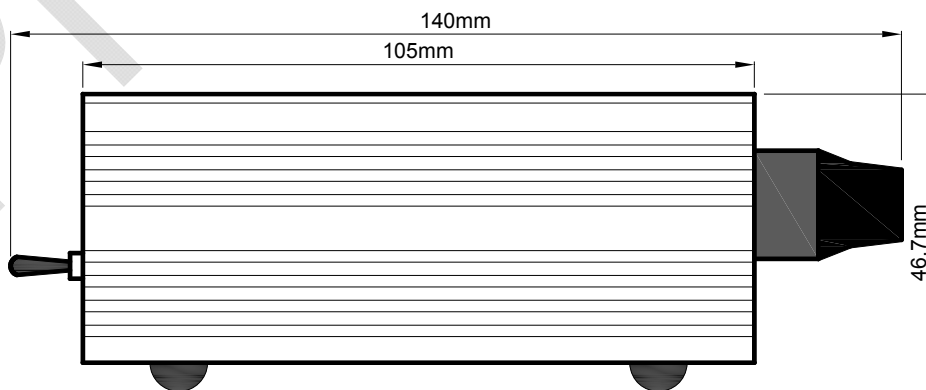
4.1 Outlines



< Front view >



< Rear view >



< Side view >

Note: Dimensions subjects to change without notice.

4.2 Actual figure



< Front view >



< Rear view >



< Side View >



< Top view with adaptor >

Note: Dimensions subjects to change without notice.

5.0 The SB-TFR/D series Electrical specifications

5.1 SB-TFR/D-SINE

TIMING / FREQUENCY STANDARD & RF DISTRIBUTION			
SBTRON www.sbtron.co.kr	SB-TFR/D-SINE • Precision timing • High stable	APPLICATION • Audio systems • Test facilities & Laboratory • Broadcasting frequency	• Telecommunication systems • Wi-MAX and Wi-Bro, LTE • E911
	ELECTRICAL CHARACTERISTICS		
Frequency range	10.000000	Refer to the ordering information for other frequency	MHz
Frequency stability	$\leq \pm 1 \times 10^{-8}$	Refer to the ordering information for other stability	Hz
Operating temperature range	0 to 70	Refer to the ordering information for other temperature range	°C
Short term stability Allan variance (1S)	$2 \times 10^{-11}/\text{sec.}$ +25°C & after one hour from power on, without external interferences(i.e. EMC/EMI or RF radiation)		
Aging	$\leq \pm 1 \times 10^{-9}/\text{day}$ (at 25°C & after 30 days)		Hz
	$\leq \pm 1 \times 10^{-7}/\text{year}$		Hz
vs. Power supply	$\leq \pm 3 \times 10^{-9}$ (at Vcc $\pm 5\%$)		Hz
vs. Load change	$\leq \pm 3 \times 10^{-9}$ (at 50Ω $\pm 5\%$)		Hz
Output waveform	Sinusoid(=Sine)		
Output level	7dBm	Refer to the ordering information for other output level	Typical
Load	50Ω		
Input voltage	+5Vdc		Vdc
Power consumption (warm-up)	800 mA (at 25°C & 10MHz)		Max.
Power consumption (steady state)	400 mA (at 25°C & 10MHz)		Max.
Warm-up time	5 minutes (at 25°C & reach to $\leq \pm 3 \times 10^{-8}$)		Max.
Control voltage	+2.5V ± 2.5 V		Typical
Reference voltage	+4.0V ± 1.0 V		
Input impedance	50KΩ		Min.
Tuning range	± 0.3 ppm		Min.
Linearity	± 10 %		Max.
Slope	Positive		
Harmonics	-45dBc		Min
Storage temperature range	-40~85		°C
Phase noise (@10MHz & typical)			dBc/Hz
1Hz	-85		
10Hz	-115		
100Hz	-135		
1KHz	-145		
10KHz	-150		
100KHz	-155		
ENVIRONMENTAL CONDITIONS			
Vibration	IEC60068-2-6 Test Fc.		
Shock	IEC60068-2-27 Test Ea.		

Note: Specifications subjects to change without notice.

5.2 SB-TFR/D-SQUARE (TTL/LVCMOS)

TIMING / FREQUENCY STANDARD & RF DISTRIBUTION			
SBTRON www.sbtron.co.kr	SB-TFR/D-SQUARE • Precision timing • High stable	APPLICATION • Audio systems • Test facilities & Laboratory • Broadcasting frequency	• Telecommunication systems • Wi-MAX and Wi-Bro, LTE • E911
	ELECTRICAL CHARACTERISTICS		
Frequency range	10.000	Refer to the ordering information for other frequency	MHz
Frequency stability	$\leq \pm 1 \times 10^{-8}$	Refer to the ordering information for other stability	Hz
Operating temperature range	-10 to 60	Refer to the ordering information for other temperature range	°C
Short term stability Allan variance (1S)	$2 \times 10^{-11}/\text{sec.}$ +25°C & after one hour from power on, without external interferences(i.e. EMC/EMI or RF radiation)		Typical
Aging	$\leq \pm 5 \times 10^{-10}/\text{day}$ (at 25°C & after 30 days)		Hz
	$\leq \pm 5 \times 10^{-9}$ / first year		Hz
vs. Power supply	$\leq \pm 5 \times 10^{-9}$ (at Vcc $\pm 5\%$)		Hz
vs. Load change	$\leq \pm 5 \times 10^{-9}$ (at 15pF $\pm 5\%$)		Hz
Output waveform	Square(=TTL/LVCMOS)		
Output "0" level	+0.4V		Max.
Output "1" level	+2.4V		Min.
Rising time	5ns (at +0.4V to +2.4V)		Max.
Falling time	5ns (at +2.4V to +0.4V)		Max.
Duty ratio	45/55% or 55/45%		Min.
Load	15pF		Typical
Input voltage	+5Vdc		Vdc
Power consumption (warm-up)	1000 mA (at 25°C & 10MHz)		Max.
Power consumption (steady state)	350 mA (at 25°C & 10MHz)		Max.
Warm-up time	15 minutes (at 25°C & reach to $\leq \pm 5 \times 10^{-8}$)		Max.
Control voltage	+2.5V ± 2.5 V		Typical
Reference voltage	+4.0V ± 1.0 V		
Input impedance	100K Ω		Min.
Tuning range	± 0.3 ppm		Min.
Linearity	± 10 %		Max.
Slope	Positive		
Harmonics	-45dBc		Min
Storage temperature range	-40~85		°C
Phase noise (@10MHz & typical)			dBc/Hz
10Hz	-120		
100Hz	-135		
1KHz	-145		
10KHz	-155		
ENVIRONMENTAL CONDITIONS			
Vibration	IEC60068-2-6 Test Fc.		
Shock	IEC60068-2-27 Test Ea.		

Note: Specifications subjects to change without notice.

5.3 SB-TFR/D-SINE-LPN(Low Phase Noise)

TIMING / FREQUENCY STANDARD & RF DISTRIBUTION			
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	ELECTRICAL CHARACTERISTICS		
Frequency range	100.000	Refer to the ordering information for other frequency	MHz
Frequency stability	$\leq \pm 3 \times 10^{-8}$	Refer to the ordering information for other stability	Hz
Operating temperature range	-30 to 70	Refer to the ordering information for other temperature range	°C
Short term stability Allan variance (1S)	3×10^{-11} /sec. +25°C & after one hour from power on, without external interferences(i.e. EMC/EMI or RF radiation)		Typical
Aging	$\leq \pm 3 \times 10^{-9}$ /day (at 25°C & after 30 days)		Hz
	$\leq \pm 3 \times 10^{-7}$ / first year		Hz
vs. Power supply	$\leq \pm 3 \times 10^{-9}$ (at Vcc $\pm 5\%$)		Hz
vs. Load change	$\leq \pm 5 \times 10^{-9}$ (at 50Ω $\pm 5\%$)		Hz
Output waveform	Sinusoid(=Sine)		
Output level	7dBm	Refer to the ordering information for other output level	Typical
Load	50Ω		
Input voltage	+5Vdc		
Power consumption (warm-up)	3.5Watts(at 25°C & 100MHz)		
Power consumption (steady state)	1.5Watts (at 25°C & 100MHz)		
Warm-up time	5 minutes (at 25°C & reach to $\leq \pm 3 \times 10^{-8}$)		
Control voltage	+0V to +4.2V		
Reference voltage	+4.2V ± 0.2 V		
Input impedance	50KΩ		
Tuning range	± 0.3 ppm		
Linearity	± 10 %		
Slope	Positive		
Harmonics	-25dBc		
Storage temperature range	-40~85		
Phase noise (@100MHz & typical)			dBc/Hz
1Hz	-85		
10Hz	-115		
100Hz	-135		
1KHz	-145		
10KHz	-150		
100KHz	-155		
ENVIRONMENTAL CONDITIONS			
Vibration	Per MII-STD-202, 5G swift sine 10 to 2000Hz		
Mechanical Shock	Per MII-STD-202, 30G half sine pulse, 11ms		

Note: Specifications subjects to change without notice.

5.4 SB-TFR/D-SQUARE(TTL/LVCMOS)-LPN(Low Phase Noise)

TIMING / FREQUENCY STANDARD & RF DISTRIBUTION			
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	ELECTRICAL CHARACTERISTICS		
Frequency range	100.000	Refer to the ordering information for other frequency	MHz
Frequency stability	$\leq \pm 3 \times 10^{-8}$	Refer to the ordering information for other stability	Hz
Operating temperature range	-30 to 70	Refer to the ordering information for other temperature range	°C
Short term stability Allan variance (1S)	3×10^{-11} /sec. +25°C & after one hour from power on, without external interferences(i.e. EMC/EMI or RF radiation)		Typical
Aging	$\leq \pm 3 \times 10^{-9}$ /day (at 25°C & after 30 days)		Hz
	$\leq \pm 3 \times 10^{-7}$ / first year		Hz
vs. Power supply	$\leq \pm 3 \times 10^{-9}$ (at Vcc $\pm 5\%$)		Hz
vs. Load change	$\leq \pm 5 \times 10^{-9}$ (at 15pF $\pm 5\%$)		Hz
Output waveform	Square(=TTL/LVCMOS)		
Output "0" level	+0.4V		Max.
Output "1" level	+2.4V		Min.
Rising time	3ns (at +0.4V to +2.4V)		Max.
Falling time	3ns (at +2.4V to +0.4V)		Max.
Duty ratio	45/55% or 55/45%		Typical
Load	5pF//10K Ω		Typical
Input voltage	+5Vdc		Vdc
Power consumption (warm-up)	3.5Watts (at 25°C & 100MHz)		Max.
Power consumption (steady state)	1.5Watts (at 25°C & 100MHz)		Max.
Warm-up time	30 minutes (at 25°C & reach to $\leq \pm 5 \times 10^{-8}$)		Max.
Control voltage	+0V to +4.2V		Typical
Reference voltage	+4.2V ± 0.2 V		Typical
Input impedance	100K Ω		Min.
Tuning range	± 0.3 ppm		Min.
Linearity	± 10 %		Max.
Slope	Positive		
Harmonics	-45dBc		Min
Storage temperature range	-50~90		°C
Phase noise (@100MHz & typical)			dBc/Hz
10Hz	-95		
100Hz	-125		
1KHz	-155		
10KHz	-168		
ENVIRONMENTAL CONDITIONS			
Vibration	Per MII-STD-202, 5G swift sine 10 to 2000Hz		
Mechanical Shock	Per MII-STD-202, 30G half sine pulse, 11ms		

Note: Specifications subjects to change without notice.

6.0 Ordering information

6.1 Ordering example

SB-TFR/D	-	Temperature	-	Stability	-	Aging/day	-	Aging/first year	-	Frequency	-	Others
SB-TFR/D		A		T050		AD010		AFY010		10.000M		STD

6.2 Ordering code

Item	
SI	Sine wave
SQ	Square wave(TTL/LVCMOS) - Low Phase Noise
LPSI	Sine wave - Low Phase Noise
LPSQ	Square wave(TTL/LVCMOS)
-	-
-	-

Temperature range	
A	0°C ~ 50°C
B	0°C ~ 70°C
C	-10°C ~ 60°C
D	-20°C ~ 70°C
E	-30°C ~ 70°C
F	-40°C ~ 85°C

Stability over temperature range		
T100	$\pm 1 \times 10^{-7}$	A ~ F
T050	$\pm 5 \times 10^{-8}$	A ~ F
T030	$\pm 3 \times 10^{-8}$	A ~ E
T020	$\pm 2 \times 10^{-8}$	A ~ E
T010	$\pm 1 \times 10^{-8}$	A ~ E
T005	$\pm 5 \times 10^{-9}$	A ~ B

Aging/day	
AD100	$\pm 1 \times 10^{-7}$
AD010	$\pm 1 \times 10^{-8}$
AD005	$\pm 5 \times 10^{-9}$
AD003	$\pm 3 \times 10^{-9}$
AD002	$\pm 2 \times 10^{-9}$
-	-

Aging/first year	
AFY100	$\pm 1 \times 10^{-7}$
AFY300	$\pm 3 \times 10^{-7}$
AFY500	$\pm 5 \times 10^{-5}$
-	-
-	-
-	-

Others	
STD	Standard
OPT	Optional
SPC	Special
-	-
-	-
-	-

Preliminary