

**STRATUM 4E SIMPLIFIED CONTROL TIMING MODULES (MSTM-S4E-INT)**

**DESCRIPTION**

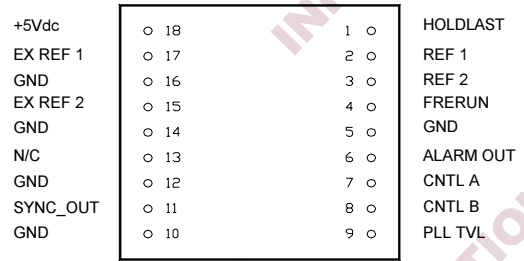
The Connor-Winfield Stratum 4E Simplified Control Timing Module acts as a complete system clock module for general Stratum 4E timing applications. The MSTM is designed for external control functions. Full external control input allows for selection and monitoring of any of four possible operating states: 1) Holdlast, 2) External Clock #1, 3) External Clock #2, and 4) Free Run. The following table illustrates the control signal input and corresponding operational state:

CONTROL INPUT		OPERATIONAL MODE	ALARM OUTPUT
A	B		
0	0	Free Run- Nominal Clock Output	(Yes)
1	0	External Reference #1	(No)
0	1	External Reference #2	(No)
1	1	Holdlast -Output maintained at last lock input value	(Yes)

In the absence of External Control Inputs (A,B), the MSTM enters the Free Run mode and signals an External Alarm. The MSTM will enter other operating modes upon application of a proper control signal. Mode 1 operation (A=1, B=0) results in an output signal that is phase locked to the External Reference Input #1. Mode 2 operation (A=0, B=1) results in an output signal that is phase locked to External Reference Input #2. Holdlast mode operation (A=1, B=1) results in an output signal at or near the frequency as determined by the latest (last) locked-signal input values and the holdlast performance of the MSTM.

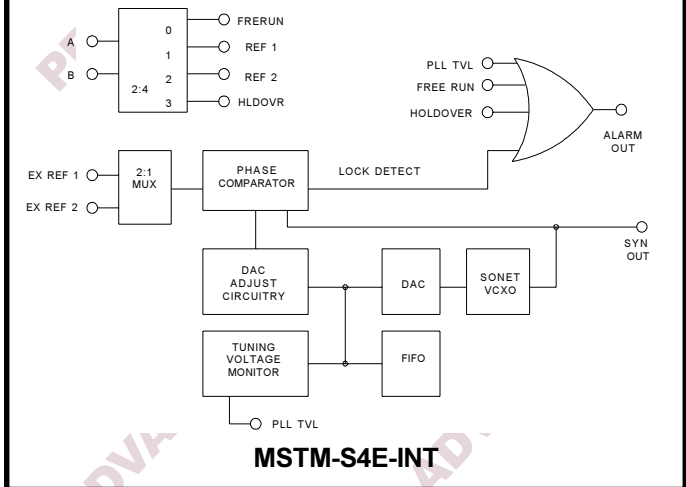
Alarm signals are generated at the Alarm Output during Holdlast and Free Run operation. Alarm Signals are also generated by loss-of-lock, loss of Reference, and by a Tune-Limit indication from the PLL. A Tune-Limit alarm signal indicates that the module has approached the limits of its lock capability and that the External Reference Input may be erroneous. Real-time indication of the operational mode is available at unique operating mode outputs on pins 1-4.

**MSTM-S4E PIN ASSIGNMENT**



**BOTTOM VIEW**

**BLOCK DIAGRAM**




**STRATUM 4E SIMPLIFIED CONTROL  
 TIMING MODULES (MSTM-S4E-INT)**
**TABLES OF CONTENTS**
**TABLE 1.0**
**ABSOLUTE MAXIMUM RATING**

SYMBOL	PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTES
V <sub>CC</sub>	Power supply voltage (V <sub>CC</sub> to GND)	-0.5		+7.0	Volts	1.0
V <sub>IN</sub>	Input voltage with respect to ground	-0.5		V <sub>CC</sub> +0.5	Volts	1.0
T <sub>STG</sub>	Storage temperature	-65.0		+150.0	deg. C	1.0

**NOTE 1.0:** Stresses beyond those listed under Absolute Maximum Rating may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions is not implied. Exposure of Absolute Maximum Ratings conditions for extended periods of time may affect device reliability.

**TABLE 2.0**
**RECOMMENDED OPERATING CONDITIONS**

SYMBOL	PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTES
V <sub>CC</sub>	Power supply voltage (V <sub>CC</sub> to GND)	+4.75	+5.00	+5.25	Volts	
V <sub>IH</sub>	High level input voltage -TTL	2.0		V <sub>CC</sub>	Vdc	
V <sub>IL</sub>	Low level input voltage TTL	0		0.8	Vdc	
T <sub>OP</sub>	Operating temperature	0		+60.0	deg. C	

**TABLE 3.0**
**DC CHARACTERISTICS**

SYMBOL	PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTES
V <sub>OH</sub>	High level output voltage -I <sub>OH</sub> =-8.0 mA, V <sub>CC</sub> =min.	+3.86			V	
V <sub>OL</sub>	Low level input voltage -I <sub>OL</sub> =8.0 mA, V <sub>CC</sub> =max.			+0.4	V	

**TABLE 4.0**
**SPECIFICATIONS**

PARAMETER		NOTES
Frequency Range (SYNC_OUT)	19.44 MHz	
Supply Current	100 mA Maximum	
Timing Reference Inputs	6.48 MHz	5.0
Jitter, Phase, and Wander Tolerance	Ref-GR-12440-CORE 4.2-4.4	
Wander Generation	Ref-GR-12440-CORE 5.3	
Free-Run Accuracy (SYNC_OUT)	±20 ppm	
Holdlast Stability	±20 ppm	2.0
Initial Offset	1 ppm	
Temperature	±10 ppm	
Drift	±1 ppm	
HoldLAST History	60 seconds	
Pull-in / Hold-in Range	50 ppm	3.0
Lock Time	< 100 secs	
Lock Accuracy	100 nS	4.0

**STRATUM 4E SIMPLIFIED CONTROL  
TIMING MODULES (MSTM-S4E-INT)****PIN DESCRIPTION****MSTM-S4E****PIN #**

1	HOLDLAST	-Output. High when the control inputs select Holdlast.
2	REF_1	-Output. High when control inputs select EX REF_1 input.
3	REF_2	-Output. High when control inputs select EX REF_2 input.
4	FRERUN	-Output. High when control input selects free run mode.
5	Gnd	-System signal/power ground.
6	ALARM_OUT	-Output. =1, If (FRERUN + HOLDLAST + $\overline{\text{PLL}}$ + TVL).
7	CNTL_A	-Input. Along with CNTL_B selects operating mode.
8	CNTL_B	-Input. Along with CNTL_A selects operating mode.
9	PLL_TVL	-Output. =1 If (REF LOST + OUT OF RANGE + OUT OF SYNC).
10	Gnd	-System signal/power ground.
11	SYNC_OUT	-Output. 19.44 MHz. (synchronized to reference inputs).
12	Gnd	-Ground.
13	N/C	- N/C
14	Gnd	-System signal/power ground.
15	EX_REF_2	-Input. External Reference #2 Input.
16	Gnd	-System signal/power ground.
17	EX_REF_1	-Input. External Reference #1 Input.
18	+5 Vdc	-System Power Input.

**NOTES FOR TABLES 1-4****NOTES:**

- 2.0 HoldLAST stability is the cumulative fractional frequency offset containing Initial Offset, Temperature, and Drift components as described by Bellcore GR-1244-CORE 5.2.
- 3.0 Pull-in range is the maximum frequency deviation on the reference inputs to the timing module that can be overcome to pull itself into synchronization with the reference.
- 4.0 After 100 seconds at stable room temperature.
- 5.0 For EXREF1 and EXREF2.

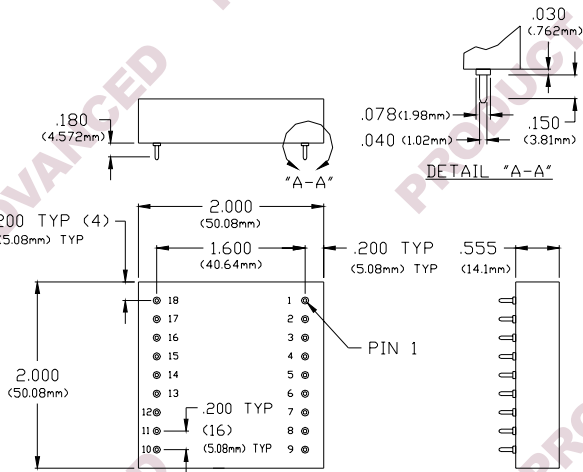
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Specifications subject to change without notice.

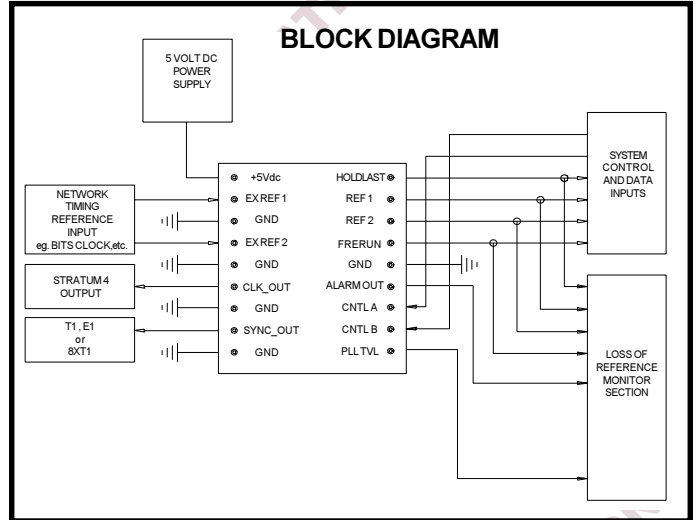
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**MSTM-S3/S4E  
 PACKAGE**



**APPLICATIONS CIRCUIT DIAGRAM**



**MECHANICAL CHARACTERISTICS**

**MECHANICAL SHOCK 883D 2002 CONDITION B**  
 1500 G's 0.5 ms.

**VIBRATION 883D-2007 CONDITION A**  
 0.06" DA or 20 g Peak Acceleration 20 to 2000 Hz.

**ENVIRONMENTAL CHARACTERISTICS**

**TEMPERATURE CYCLE 883D METHOD 1010.7 CONDITION B**  
 10 Cycles -55 to +125 Degrees C.

**HTOB - HIGH TEMPERATURE OPERATING BIAS**  
 1000 Hours +125 Degrees C.

**FACTORY RELIABILITY AUDIT**

**TEMPERATURE CYCLE**  
 500 Cycles -55 to +125 Degrees C.

**HTOB - HIGH TEMPERATURE OPERATING BIAS**  
 1000 Hours +125 Degrees C.

**PARTS TO BE QUALIFIED TO BELLCORE TR-NWT-00357**

**TEMPERATURE CYCLE**  
 -40 to +85 Degrees C.

**72 HOUR BURN-IN**  
 +25 Degrees C.