CONNOR WINFIELD
THE CONNOR-WINFIELD CORP.
2111 COMPREHENSIVE DRIVE.
AURORA, IL 60505.
FAX (630) 851-5040.
PHONE (630) 851-4722
HTTP://WWW.CONWIN.COM

NETWORK ELEMENT TIMING GENERATOR

STRATUM 3 SIMPLIFIED CONTROL TIMING MODULES (MSTM-S3-R)

DESCRIPTION

The Connor-Winfield Stratum 3 Simplified Control Timing Module acts as a complete system clock module for general Stratum 3 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) Holdover, 2) External Reference #1, 3) External Reference #2, and 4) Free Run. The table below illustrates the control signal inputs and corresponding operational states:

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. Holdover 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 holdover performance of the MSTM. In Free Run mode, operation (A=0, B=0) is a guaranteed output of 4.6 ppm of the nominal frequency.

Alarm signals are generated at the Alarm Output during Holdover 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 VCXO tuning voltage is approaching within 10% the limits of its lock capability and that the External Reference Input may be erroneous. A high level indicates an alarm condition. Real-time indication of the operational mode is available at unique operating mode outputs on pins 1-4.

Control loop filters effectively attenuate any reference jitter and smooth out phase transients.

Fig. 1

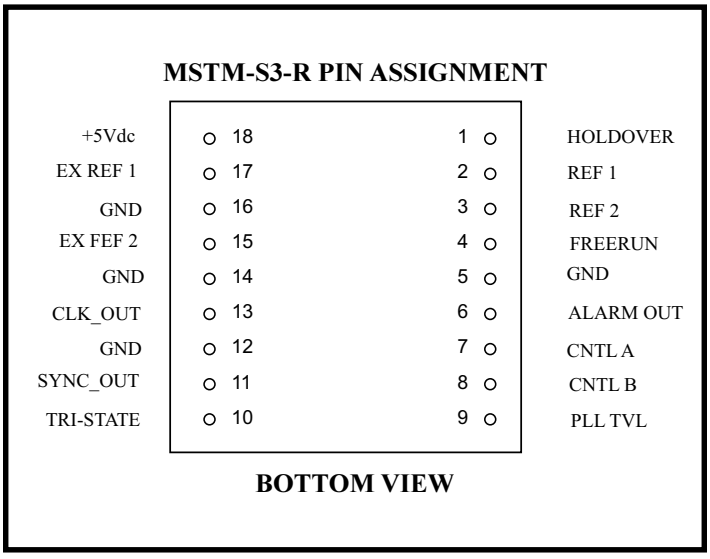


Fig. 2

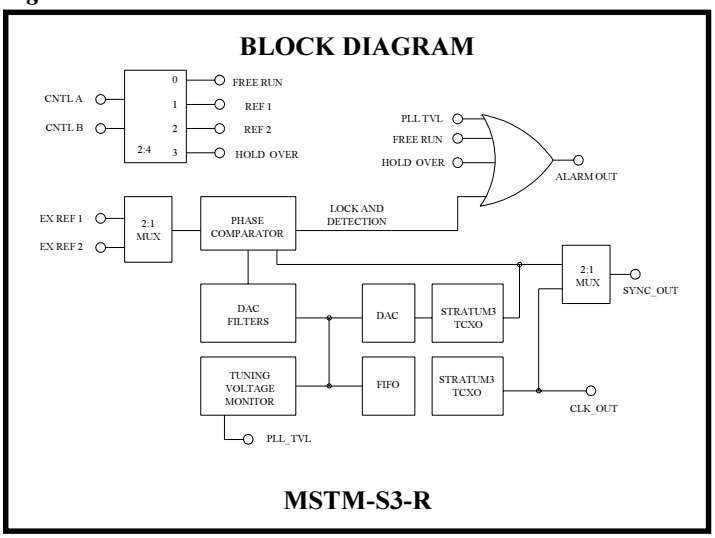


TABLE 1.0

CONTROL INPUTS			OPERATIONAL MODE		INDICATOR PIN OUTPUTS					
TRI-STATE	A	B			REF 1	REF2	HOLD OVER	FREE RUN	PLL_TVL	ALARM OUTPUT
0	0	0	FREE RUN MODE (DEFAULT)		0	0	0	1	0	1
0	1	0	EXTERNAL REFERENCE #1 MODE	NORMAL	1	0	0	0	0	0
				PLL TUNING VOLTAGE LIMIT	1	0	0	0	1	1
				LOR + LOL	1	0	0	0	0	1
0	0	1	EXTERNAL REFERENCE #2 MODE	NORMAL	0	1	0	0	0	0
				PLL TUNING VOLTAGE LIMIT	0	1	0	0	1	1
				LOR + LOL	0	1	0	0	0	1
0	1	1	HOLD OVER MODE		0	0	1	0	0 or 1	1
1	X	X	TRI-STATE MODE		HIGH IMPEDANCE					

STRATUM 3 SIMPLIFIED CONTROL TIMING MODULES (MSTM-S3-R)

TABLES OF CONTENTS

TABLE 2.0 ABSOLUTE MAXIMUM RATING

SYMBOL	PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTES
V_{CC}	Power Supply Voltage (V_{CC} to GND)	-0.5		+7	Volts	1.0
V_{IN}	Input voltage with respect to ground	-0.5		V_{CC} + 0.5	Volts	1.0
T_{STG}	Storage temperature	-65°		+150°	°C	1.0

TABLE 3.0 INPUT AND OUTPUT CHARACTERISTICS

SYMBOL	PARAMETER	MINIMUM	NOMINAL	MAXIMUM	UNITS	NOTES
V_{TH}	Reset threshold voltage	4.25		4.5	V	2.0
V_{CC}	Supply Voltage	4.75	5.0	5.25	V	
V_{IH}	High level input voltage (TTL Compatible)	2.0		V_{CC}	V	
V_{IL}	Low level input voltage (TTL Compatible)	0.0		0.8	V	
V_{OH}	High level output voltage @ I_{OH}= -8.0 mA, V_{CC} minimum	2.4			V	
V_{OL}	Low level output voltage @ I_{OH}= 8.0 mA, V_{CC} maximum			0.4	V	
t_{IN}	Transition time of input signal			250.0	nS	
C_{IN}	Input capacitance			15.0	pF	
C_{OUT}	Output capacitance		50.0		pF	
t_{HL}	Transition time of clock output from high to low with no load		4.0		nS	
t_{LH}	Transition time of clock output from low to high with no load		4.0		nS	
t_{RIP}	8 kHz input reference signal's positive pulse width	25.0			nS	
t_{RIN}	8 kHz input reference signal's negative pulse width	25.0			nS	

TABLE 4.0 SPECIFICATIONS

PARAMETER		NOTES
Frequency Range	19.44 MHz	
Supply Current	120 mA	
Timing Reference Inputs	8 kHz	3.0
Jitter and Phase Tolerance	Ref-GR-1244-CORE 4.2 - 4.4	
Wander Generation	Ref-GR-1244-CORE 5.3	
Free Run Accuracy	±4.6 ppm	
Hold Over Stabilty	±0.37	4.0
Initial Offset	0.05	
Temperature	0.28	
Drift	0.04	
Hold Over History	30 sec.	
Pull-in / Hold-in Range	±4.6 ppm Minimum	5.0
Lock Time	< 100 sec.	
Correction Period	125 uS	
TVL Alarm	1 = WARNING : Refernce is nearing operational limit	6.0

PIN DESCRIPTION

MSTM-S3 PIN #		
1	**HOLD OVER**	-Output. High when the control inputs select Holdover.
2	**REF 1**	-Output. High when the control inputs select EX REF 1.
3	**REF 2**	-Output. High when the control inputs select EX REF 2.
4	**FREE RUN**	-Output. High when the control input selects Free Run.
5	**Gnd**	-Ground.
6	**ALARM_OUT**	-Ouput. =1,If (FREE RUN + HOLD OVER + LOR + LOL + PLL_TVL) .
7	**CNTL A**	-Mode control input.
8	**CNTL B**	-Mode control input.
9	**PLL_TVL**	-Tuning Voltage Alarm. =1 If CAPTURE RANGE NEAR 10% OF EXTREME (~11ppm).
10	**TRI-STATE**	-Tri-state enable = 1. All outputs ae put into a high impedance state.
11	**SYNC_OUT**	-Syncronized output.
12	**Gnd**	-Ground.
13	**CLK_OUT**	-Stratum 3 TCXO output. (Non-synchronized).
14	**Gnd**	-Ground.
15	**EX REF 2**	-External Reference #2 Input. (8 KHz)
16	**Gnd**	-Ground.
17	**EX REF 1**	-Input. External Reference #1 Input. (8 KHz)
18	**+5 Vdc**	+5 Volt DC supply.

NOTES FOR TABLES 1.0 - 4.0

NOTES:

1.0 Operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions is not implied. Exposure to Absolute Maximum Ratings conditions for extended periods of time may affect device reliability.

2.0 Power-on Reset will activate within the stated range

3.0 Ref- GR1244-CORE 3.2.1 R3-1.

4.0 Holdover stability is the cumulative fractional frequency offset containing Initial Offset, Temperature, and Drift components as described by Bellcore GR-1244-CORE 5.2.

5.0 Pull-in range is the minimum frequency deviation on the reference inputs to the timing module that can be overcome to pull itself into synchronization with the reference.

6.0 A '1' level indicates unit is within the extreme 10% of its operating range tracking the reference (~11ppm). Consult factory for use as a reference quilifier.

Fig. 3

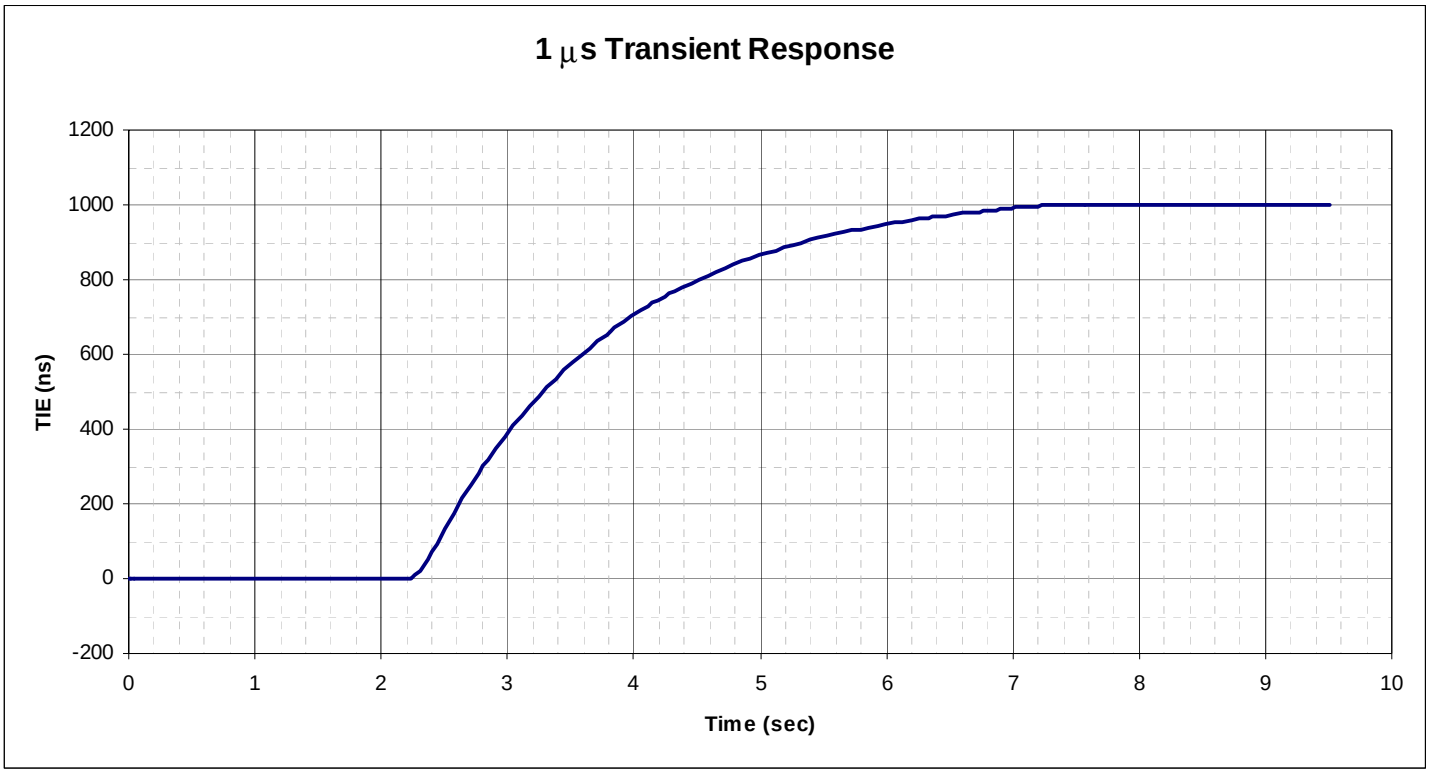

1 μs Transient Response
TIE (ns)
1200
1000
800
600
400
200
0
-200
0
1
2
3
4
5
6
7
8
9
10
Time (sec)

Fig. 4

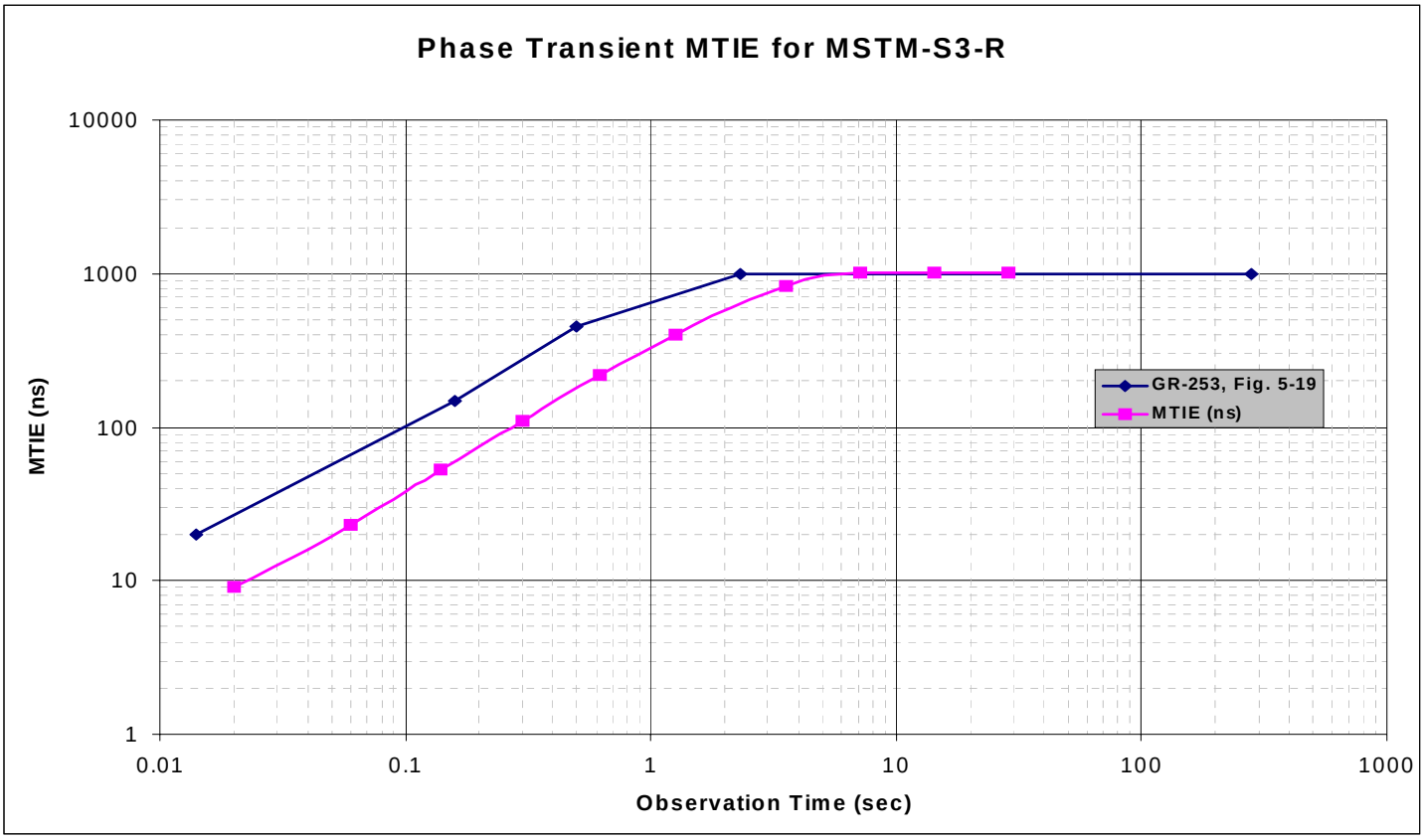

Phase Transient MTIE for MSTM-S3-R
MTIE (ns)
10000
1000
100
10
1
0.01
0.1
1
10
100
1000
Observation Time (sec)
GR-253, Fig. 5-19
MTIE (ns)

Fig. 5

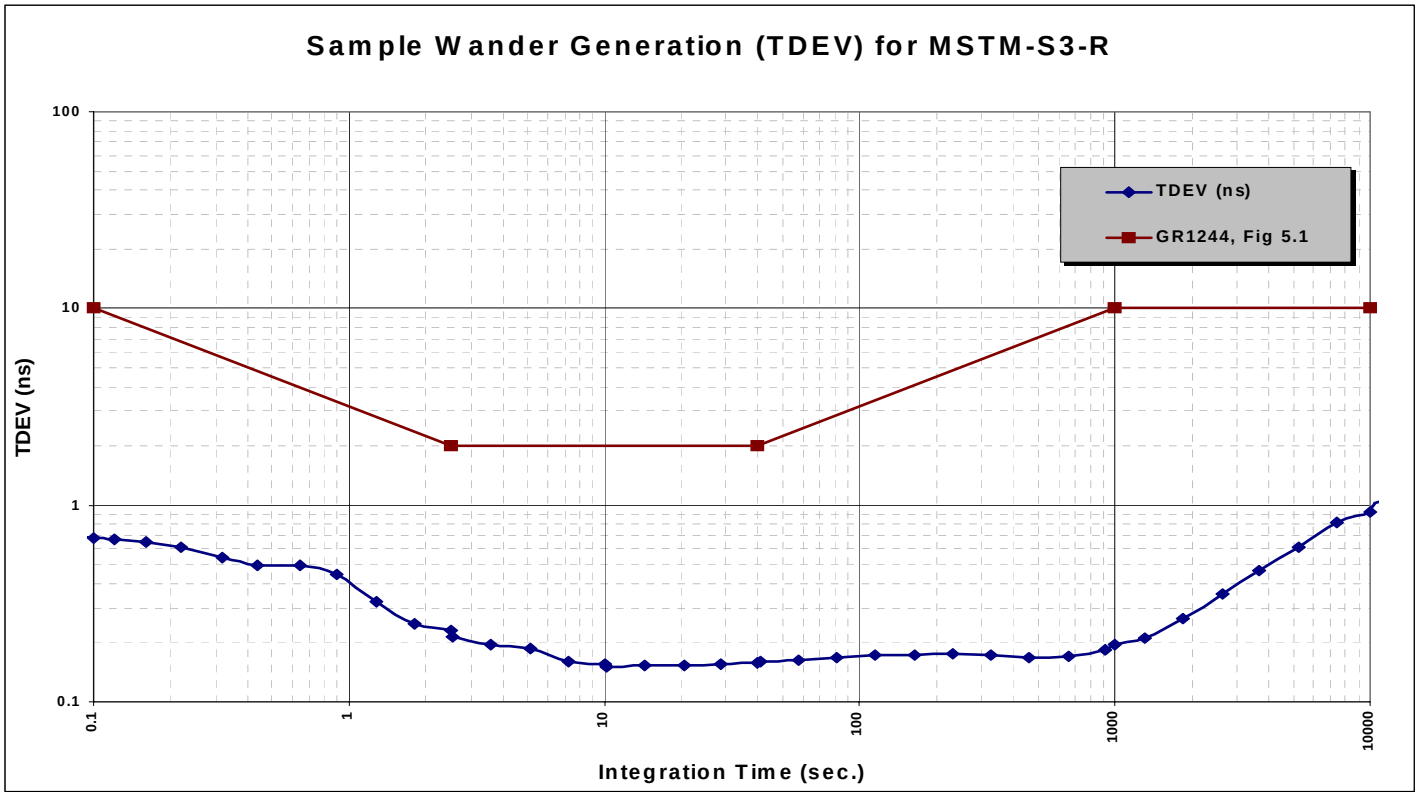
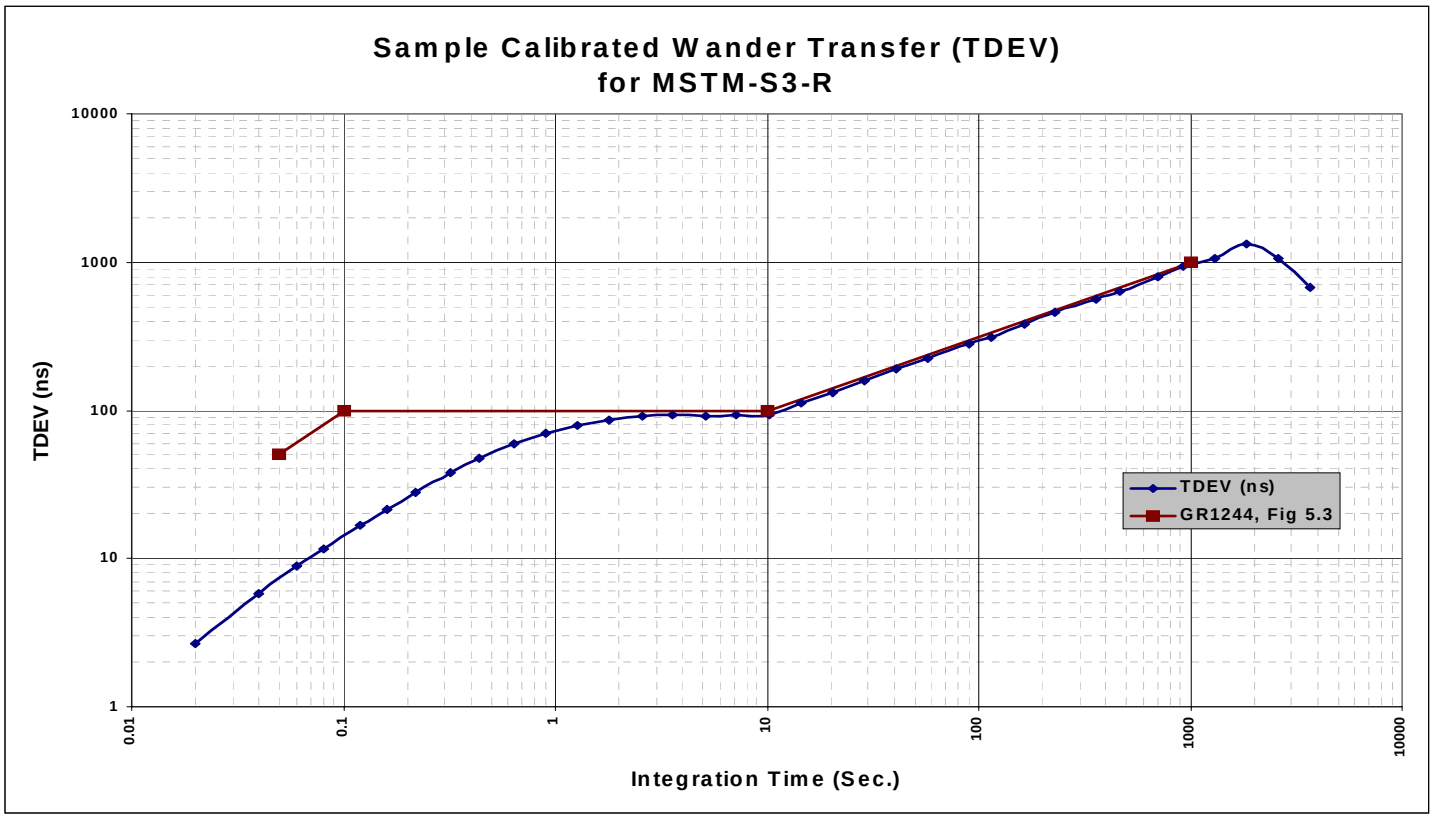

Sample Wander Generation (TDEV) for MSTM-S3-R
TDEV (ns)
GR1244, Fig 5.1
100
10
1
0.1
TDEV (ns)
0.1
1
10
100
1000
10000
Integration Time (sec.)

Fig. 6


Sample Calibrated Wander Transfer (TDEV) for MSTM-S3-R
10000
1000
100
10
1
TDEV (ns)
TDEV (ns)
GR1244, Fig 5.3
0.01
0.1
1
10
100
1000
10000
Integration Time (Sec.)

STRATUM 3 SIMPLIFIED CONTROL TIMING MODULES (MSTM-S3-R)

Fig. 6

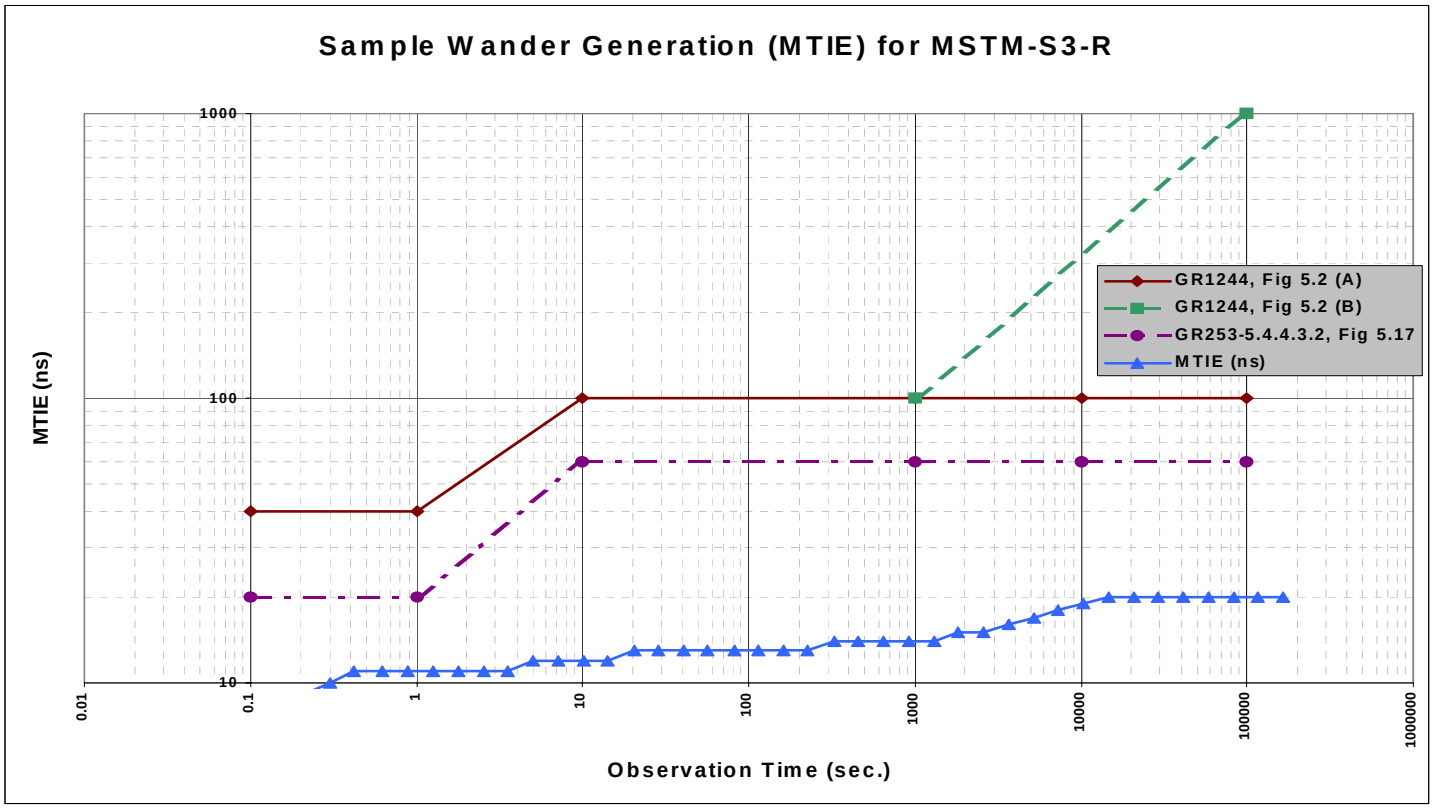
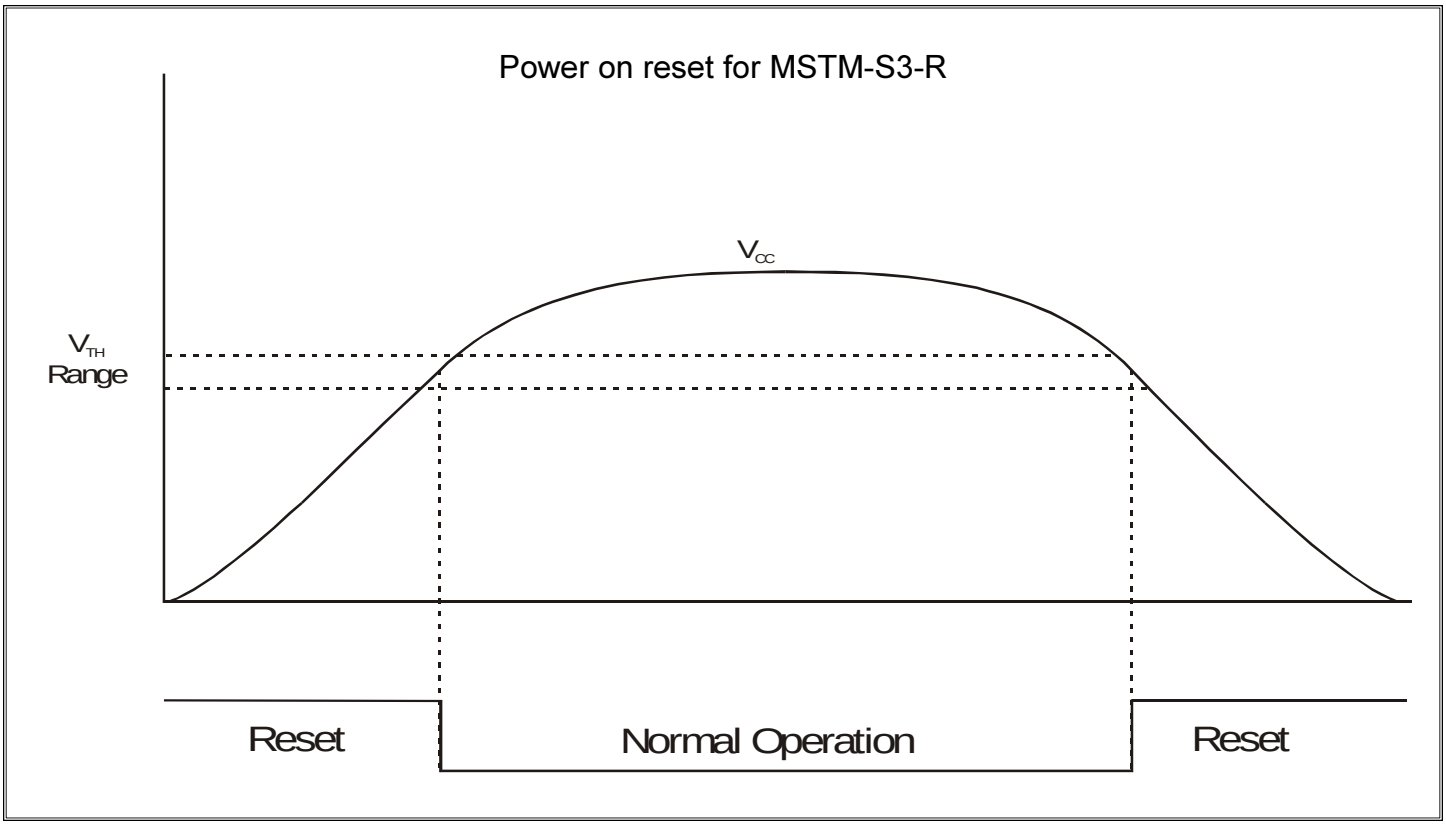


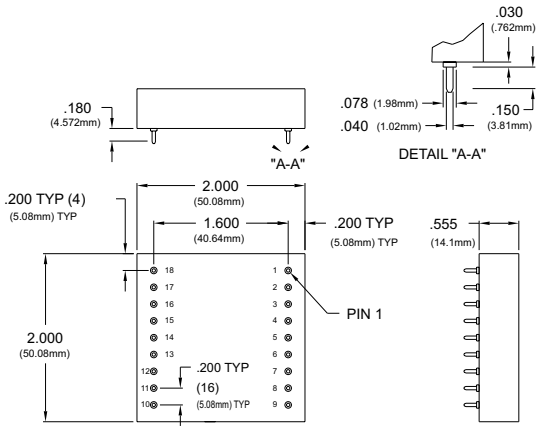
Fig. 7



STRATUM 3 SIMPLIFIED CONTROL TIMING MODULES (MSTM-S3-R)

Fig. 8

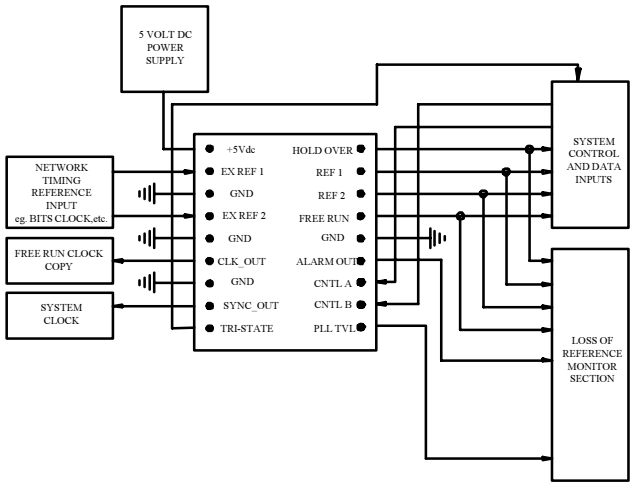
MSTM-S3 PACKAGE WITH COVER



BOTTOM VIEW

Fig. 9

APPLICATIONS CIRCUIT DIAGRAM BLOCK DIAGRAM



REVISION	REVISION DATE	NOTE
P00	3/6/01	Preliminary Release
P01	3/9/01	Added Reset graph
P02	3/21/01	Added min/max Vcc