

SCG4600 Synchronous Clock Generators

**CONNOR
WINFIELD**



PLL

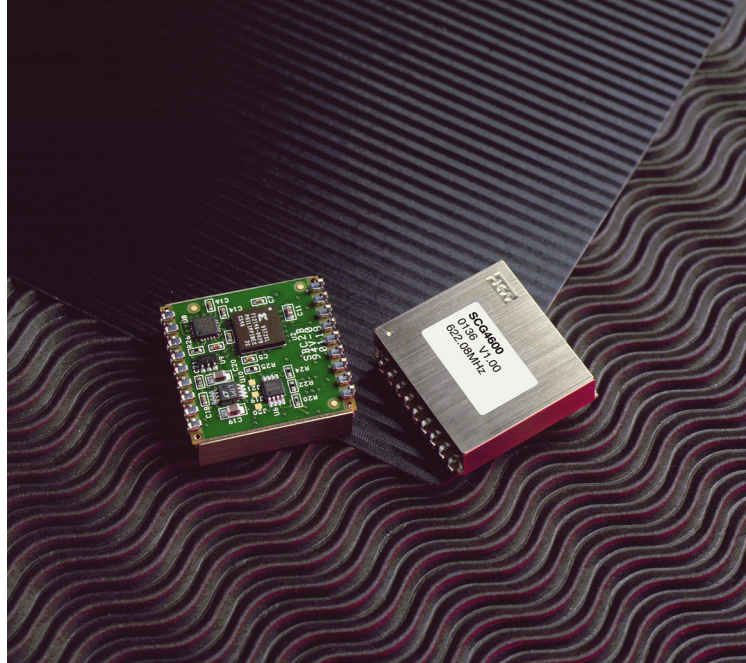
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General Description

The SCG4600 is a digital phase locked loop generating CML outputs from an intrinsically low jitter voltage controlled crystal oscillator.

The SCG4600 can lock to one of two external 8 kHz references, which is selectable using the SELAB input select pin. The unit has an acquisition time of about 1.5 seconds and it is tolerant of different reference duty cycles.

The SCG4600 includes an alarm output that indicates deviations from normal operation. If a Loss-of-Reference (LOR) or Loss-of-Lock (LOL) is detected the alarm will indicate the need for a reference rearrangement. If both references A and B are absent the module will enter Free Run operation. The FRstatus pin will indicate that the module is in Free Run operation. Frequency stability during Free Run operation is guaranteed to ± 20 PPM. Additionally the Free Run mode may be entered manually.

The package dimensions are 1.05" x 1.03" x .375" (maximum) on a 4 layer FR4 board with J-Leads. Parts are assembled using high temperature solder to withstand 180°C surface mount reflow processes.

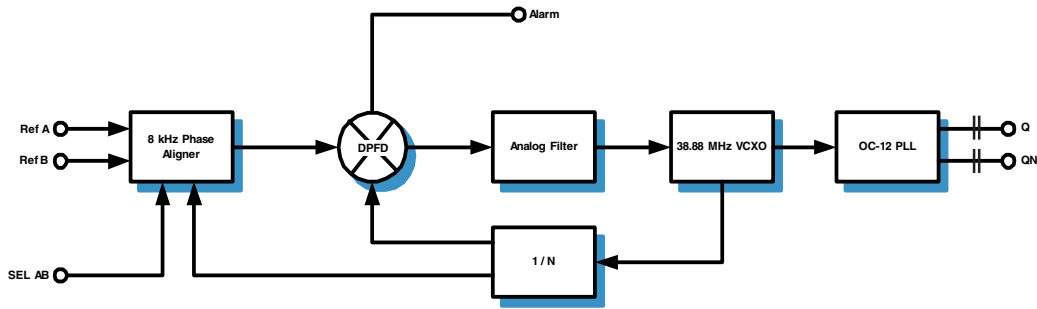
Features

- Phase Locked Output Frequency Control
- Intrinsically Low Jitter Crystal Oscillator
- CML Outputs
- Dual 8 kHz References
- LOR & LOL Alarm.
- Force Free Run Function
- Automatic Free Run Operation on Loss of Both References A & B
- Input Duty Cycle Tolerant
- 3.3VDC Power Supply

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Revision	P01
Date	19 July 02
Issued By	MBatts

Block Diagram

Figure 1



Absolute Maximum Rating

Table 1

Symbol	Parameter	Minimum	Nominal	Maximum	Units	Notes
V_{cc}	Power Supply Voltage	-0.5	-	+4.0	Volts	1.0
V_i	Input Voltage	-0.5	-	+5.5	Volts	1.0
T_s	Storage Temperature	-40.0	-	+85	°C	1.0

Operating Specifications

Table 2

Symbol	Parameter	Minimum	Nominal	Maximum	Units	Notes
V_{cc}	Power Supply Voltage	3.135	3.3	3.465	Volts	2.0
I_{cc}	Power Supply Current	-	200	-	mA	
T_o	Temperature Range	0	-	70	°C	
F_o	Available Output Frequencies	-	622.08 155.52	-	MHz MHz	
F_{fr}	Free Run Frequency	-20	-	20	ppm	
F_{refa}	Reference Frequency A	-	8	-	kHz	
F_{refb}	Reference Frequency B	-	8	-	kHz	
F_{cap}	Capture/pull-in range	-25	-	25	ppm	
F_{bw}	Jitter Filter Bandwidth	-	-	3	Hz	3.0
T_{jtol}	Input Jitter Tolerance	-	-	6.25	µs	
T_{aq}	Acquisition Time	-	1.4	-	s	4.0
T_{rf}	Output Rise and Fall Time	-	100	-	ps	5.0
DC	Output Duty Cycle (20% 80%)	45	-	55	%	
$MTIE_{sr}$	MTIE @ Synchronization Rearrangement	-	50	-	ns	

NOTES:

- 1.0 Operation of the device at these or any other condition beyond those listed under Operating Specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods of time may affect device reliability.
- 2.0 Requires external regulation and supply decoupling. (2.2 uF, 330 pF)
- 3.0 3db loop response.
- 4.0 From a 20 PPM step in reference frequency
- 5.0 CML outputs ac coupled into 50-ohm load to V_{cc} .

Input And Output Characteristics

Table 3

Symbol	Parameter	Minimum	Nominal	Maximum	Units	Notes
CMOS Input and Output Characteristics						
V_{ih}	High Level Input Voltage	2.0	-	5.5	V	
V_{il}	Low Level Input Voltage	0.0	-	0.8	V	
T_{io}	I/O to Output Valid	-	-	10	ns	
C_I	Output Capacitance	-	-	10	pF	
V_{oh}	High Level Output Voltage	2.4	-	-	V	
V_{ol}	Low Level Output Voltage	-	-	0.4	V	
T_{ir}	Input Reference Pulse Width	25.72	-	-	ns	
CML Output Characteristics						
V_{od}	Differential Output Voltage	-	800	1200	mV	5.0

Input Selection / Output Response

Table 4

RESET	ENABLE	SEL _{AB}	INPUTS			FR _{status}	OUTPUTS			NOTE
			REF _A	REF _B	FR		ALARM	Q	QN	
1	0	X	X	X	X	1	X	X	X	FR
X	1	X	X	X	X	HZ	HZ	X	X	
0	0	X	X	X	1	1	1	X	X	FR
0	0	0	A	A	0	0	0	X	X	RA
0	0	1	A	A	0	0	0	X	X	RB
0	0	0	NA	A	0	0	1	X	X	U
0	0	1	NA	A	0	0	0	X	X	RB
0	0	1	A	NA	0	0	1	X	X	U
0	0	0	A	NA	0	0	0	X	X	RA
0	0	X	NA	NA	0	1	1	X	X	FR

NOTES:

A Active
 FR Free Run Mode
 NA Not Active
 HZ High Impedance

RA Locked to Reference A
 RB Locked to Reference B
 U Unstable (due to conditions shown, switch to active reference or Free Run)
 X Don't care

Jitter Generation Specifications

Table 5

	<u>SONET Jitter BW 12 kHz - 1.3 MHz</u>
Frequency (MHz)	pS (RMS)
155.52	2.2 Typ.
	<u>SONET Jitter BW 12 kHz - 5 MHz</u>
	pS (RMS)
622.08	1.9 Typ.



Pin Description

All SCG4600 Models

Table 6

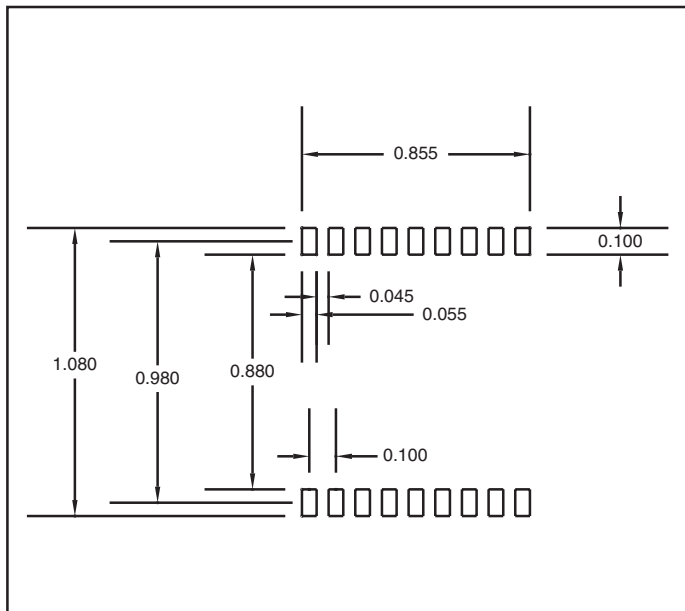
Pin #	Pin Name	Pin Information	Note
1	ENABLE	CML Enable / CMOS Tri-State (Enable = 0, Disable = 1)	9.0
2	TCK	No Connection, Internal Factory Programming Input.	8.0
3	TDO	No Connection, Internal Factory Programming Input.	8.0
4	REF _A	CMOS Reference Frequency Input.	
5	SEL _{AB}	Input Reference Select Pin. (REFA = 0, REFB = 1)	9.0
6	RESET	RESET. (RESET = 1)	9.0
7	REF _B	CMOS Reference Frequency Input.	
8	GND	Ground.	
9	FR _{status}	Free Run Status. (FR = 1)	
10	V _{cc}	Supply Voltage relative to ground.	
11	N/C	No Connection.	8.0
12	ALARM	Loss of Reference / Lock alarm. (Alarm = 1)	
13	FR	Force Free Run. (Phase Lock = 0, Free Run = 1)	9.0
14	TDI	No Connection, Internal Factory Programming Input.	8.0
15	TMS	No Connection, Internal Factory Programming Input.	8.0
16	QN	Negative Differential CML Output.	10.0
17	GND	Ground.	
18	Q	Positive Differential CML Output.	10.0

NOTES

- 8.0 Do not connect pin
- 9.0 Input pulled to ground
- 10.0 CML Outputs are internally AC coupled

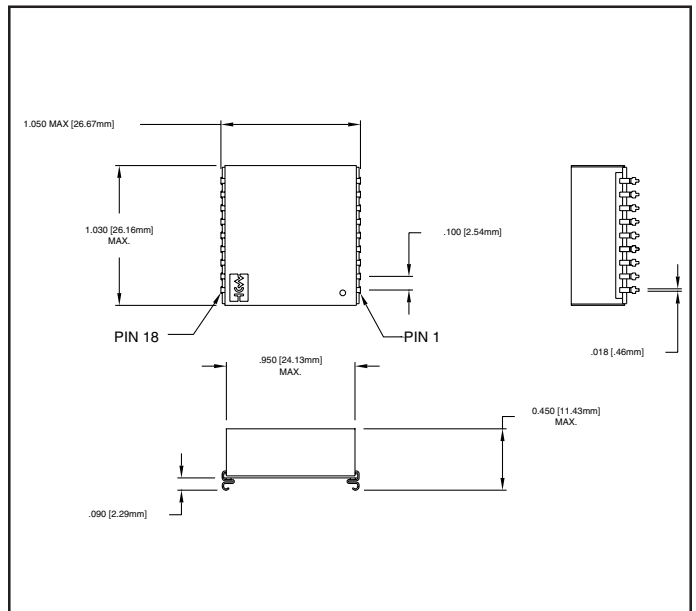
Circuit Board Footprint Recommendations

Figure 2



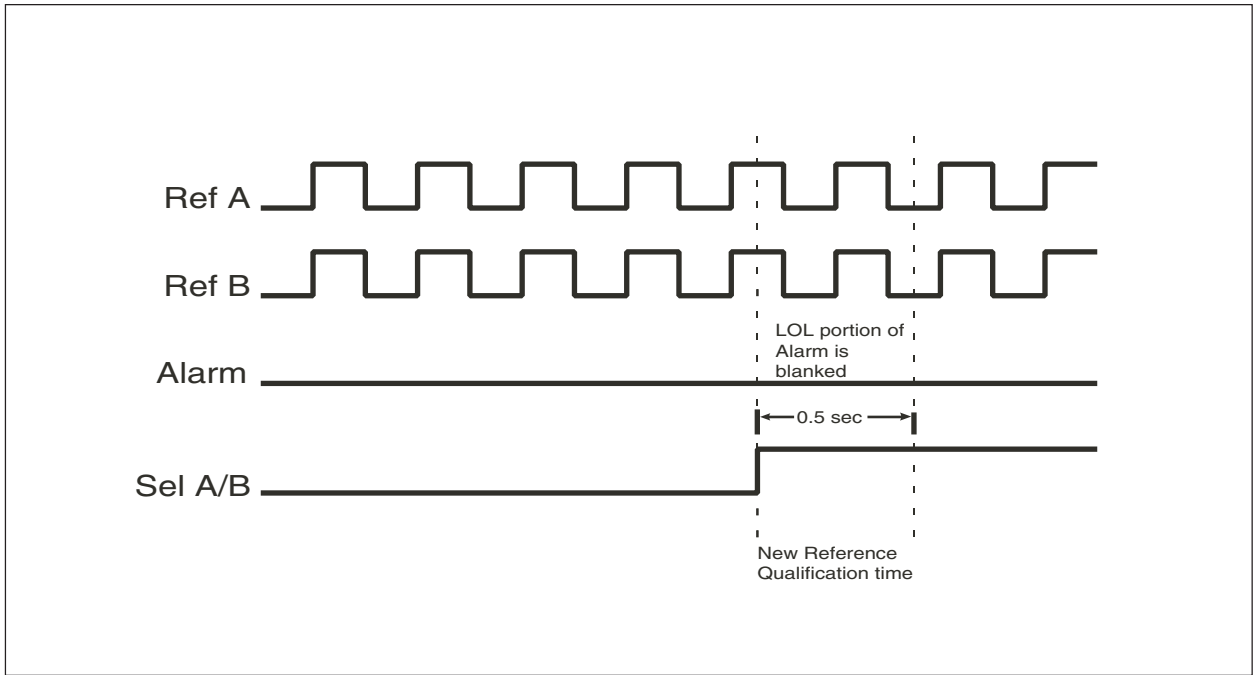
Mechanical Dimensions

Figure 3



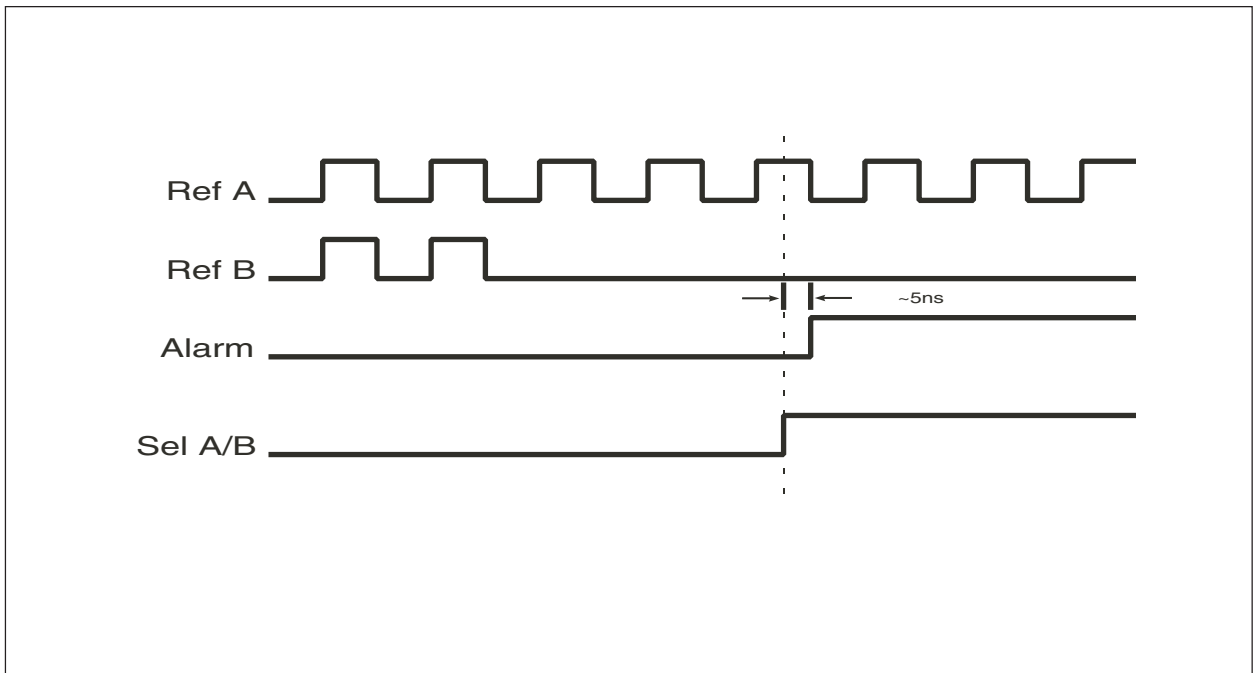
Switch from A to B when both are good signals

Figure 4



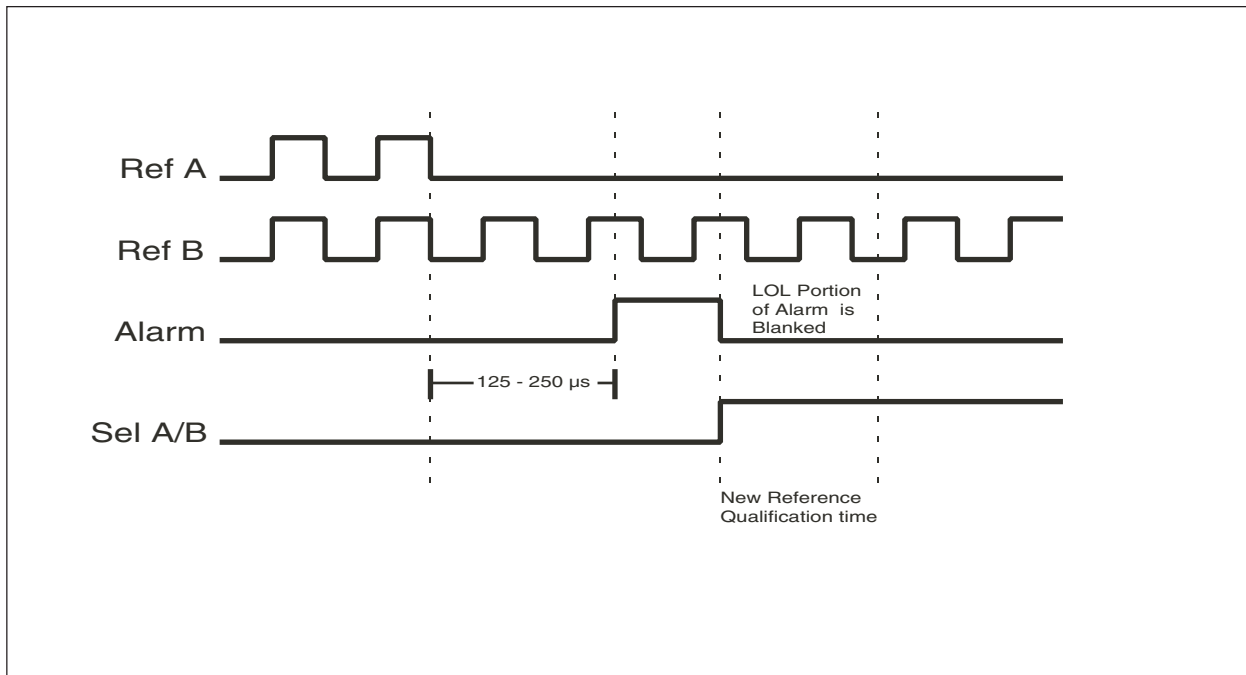
Switch from A to B when Reference B is lost

Figure 5



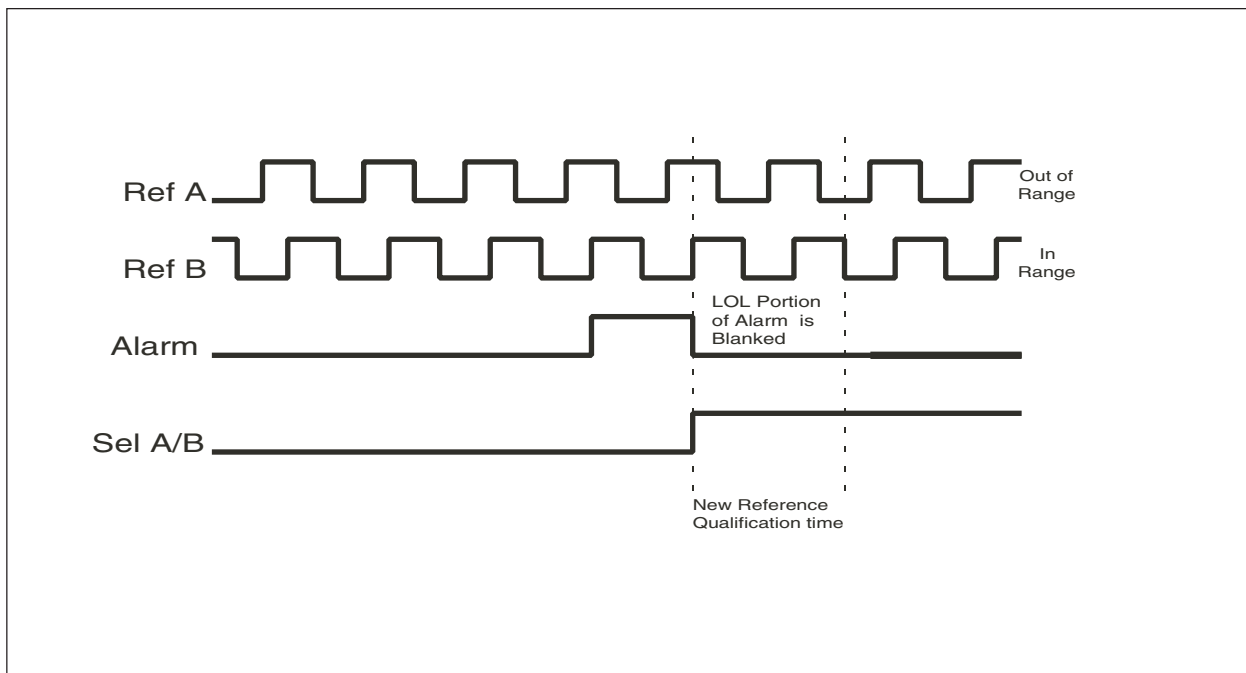
Switch from A to B after Reference A is lost

Figure 6



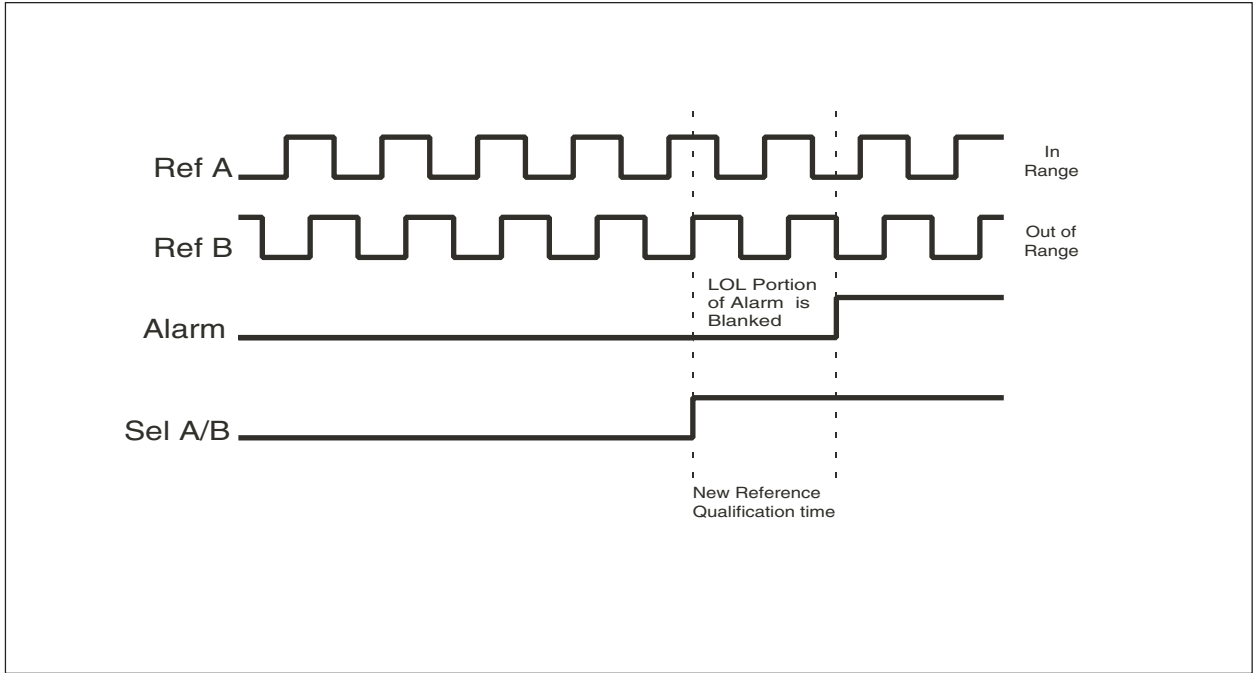
Switch from A to B when A is out of range

Figure 7



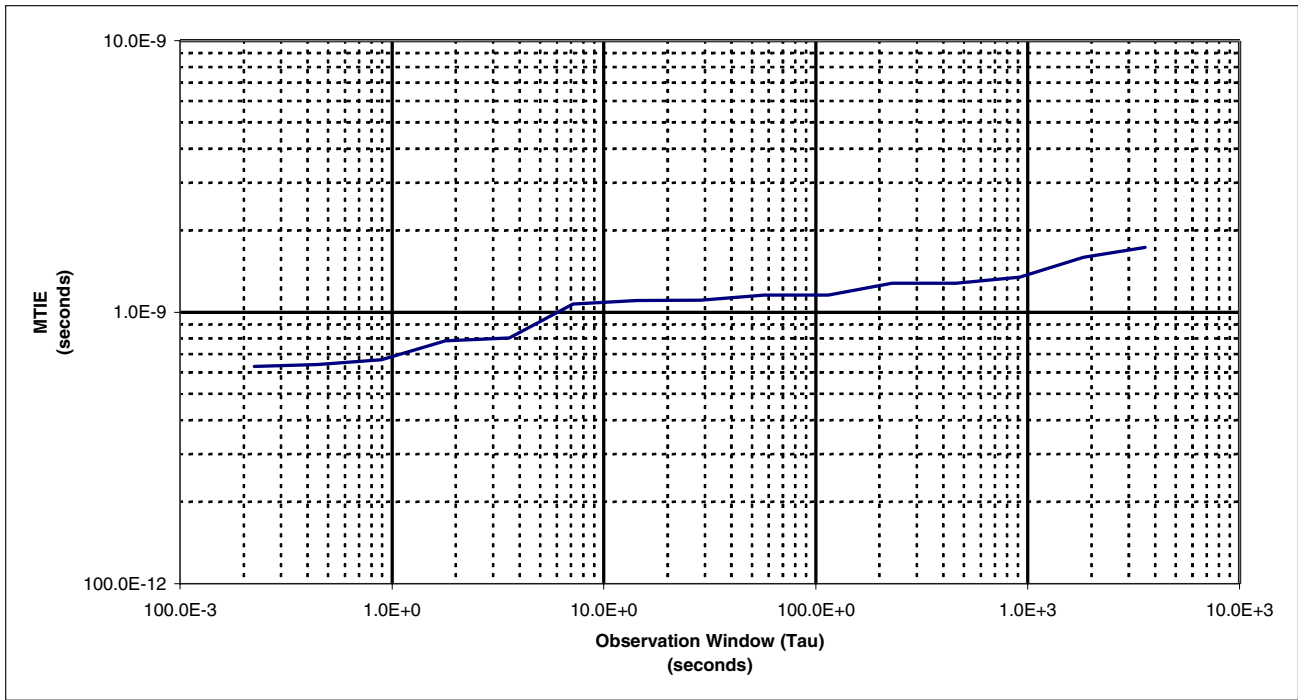
Switch from A to B when B is out of range

Figure 8



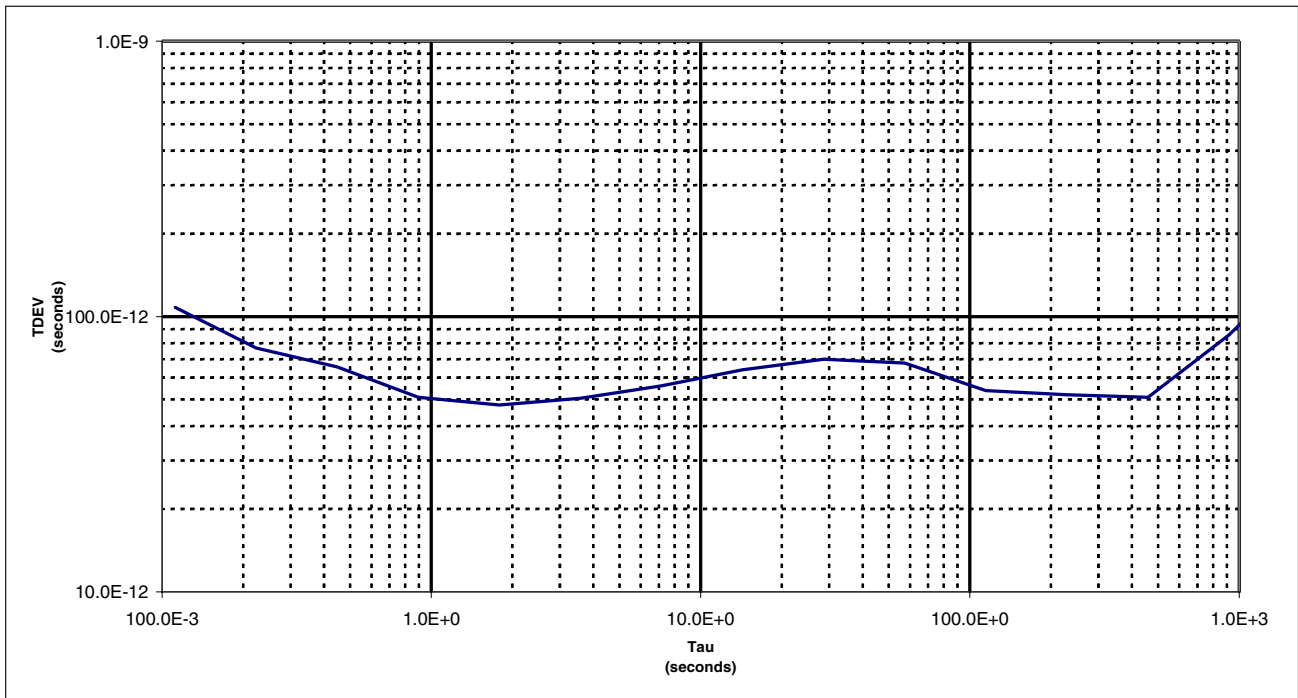
Typical 622.08 MHz MTIE Measurement

Figure 9



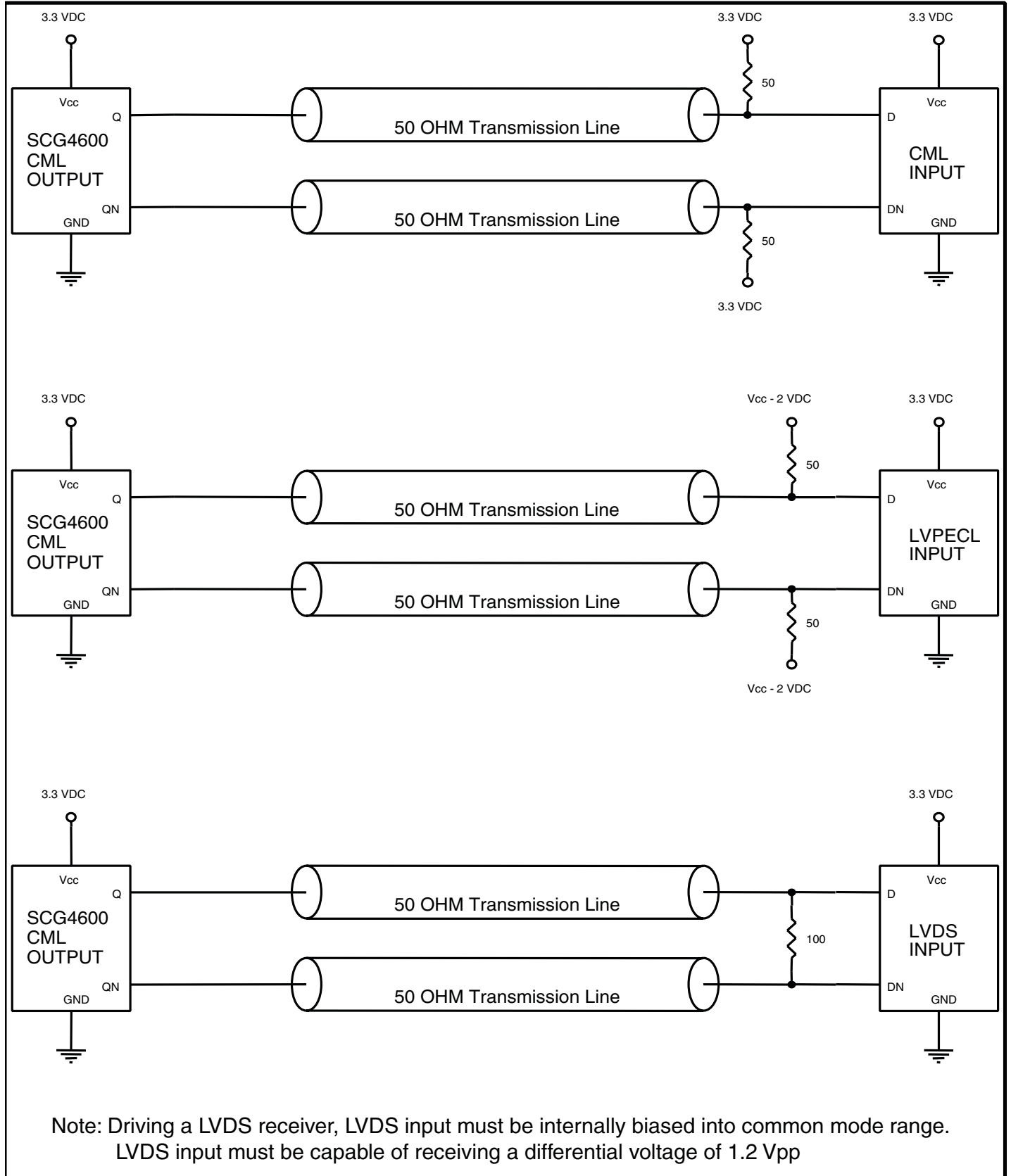
Typical 622.08 MHz TDEV Measurement

Figure 10



Suggested Differential Output Termination

Figure 13



Ordering Information

SCG{XXXX}-{FFF.FFF}{M}

XXXX equals a specific model (4600)

FFF.FFF equals the CML Output frequency (155.52, 622.08 MHz)

M equals MHZ and is added to all part numbers

Example: To order an SCG4600 with an CML Output of 622.08 MHz,
Order part number SCG4600-622.08M

Please contact Connor-Winfield for other frequencies that may be available.



Revision	Revision Date	Note
P00	01/17/01	Preliminary informational release
P01	7/19/02	Added new frequency & reformatted