Description

The 9SQL4952 generates 2 100MHz CPU/SRC outputs that exceed the requirements of the CK420BQ specification. The device has 2 output enables for clock management and supports 2 different spread spectrum levels in addition to spread off. It also provides a copy of the 25MHz internal XO. The 9SQL4952 supports both Common Clock and Separate Reference Clock architectures.

Recommended Application

2-output CK420BQ Derivative

Output Features

- 2-100MHz push-pull Low-power (LP) HCSL DIF pairs
- Integrated terminations for 85Ω Zout
- 1 - 3.3V 25MHz LVCMOS REF output

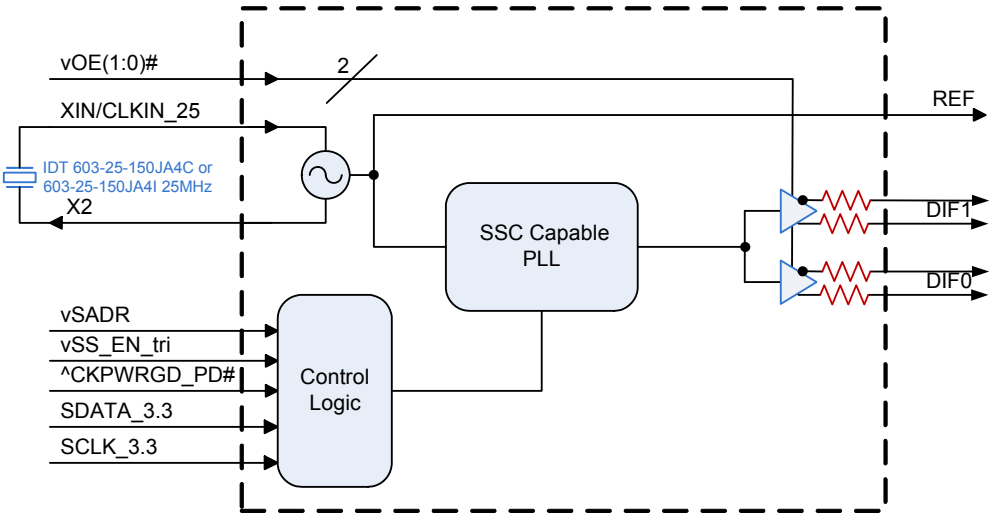
Key Specifications

- DIF outputs:
  - Cycle-to-cycle jitter <50ps
  - Output-to-output skew <50ps
  - PCIe Gen1-2-3 compliant with SSC on or off
  - QPI compliant (SSC on or off)
  - SAS12G compliant (SSC off)
  - 12k-20M phase jitter <2ps rms (SSC off)
- REF output:
  - Phase jitter <300fs rms (SSC off) and < 1ps RMS (SSC on)
- ±50ppm frequency accuracy on all clocks

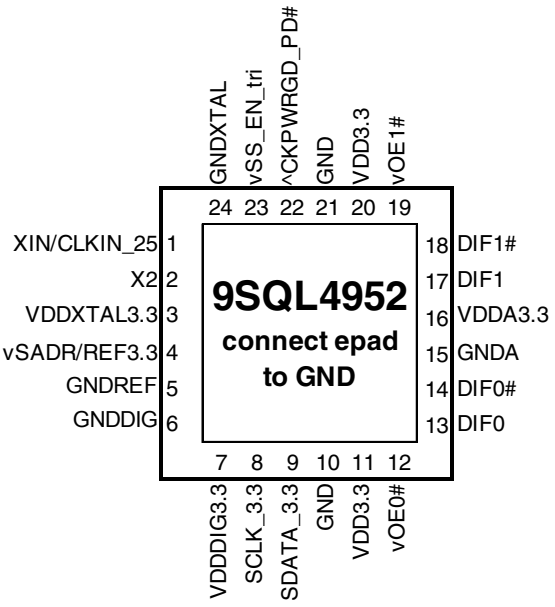
Features/Benefits

- Direct connection to 85Ω transmission lines; saves 8 resistors compared to standard HCSL
- 112mW typical power consumption; eliminates thermal concerns
- Contains default configuration; SMBus interface not required for device operation
- OE# pins; support DIF power management
- 25MHz input frequency; standard crystal frequency
- Pin/SMBus selectable 0%, -0.25% or -0.5% spread on DIF outputs; minimize EMI and phase jitter for each application
- DIF outputs blocked until PLL is locked; clean system start-up
- REF output can be configured to run in standby; eliminates XO from board
- Two selectable SMBus addresses; multiple devices can easily share an SMBus segment
- Space saving 24-pin 4x4mm VFQFPN; minimal board space

Block Diagram



Pin Configuration



24-pin VFQFPN, 4x4 mm, 0.5mm pitch

^ prefix indicates internal 120KOhm pull up resistor

v prefix indicates internal 120KOhm pull down resistor

SMBus Address Selection Table

	SADR	Address	+ Read/Write Bit
State of SADR on first application of CKPWRGD_PD#	0	1101000	x
	1	1101010	x

Power Management Table

CKPWRGD_PD#	SMBus OE bit	DIFx/DIFx#		REF
		True O/P	Comp. O/P	
0	X	Low[1]	Low[1]	Hi-Z[2]
1	1	Running	Running	Running
1	1	Disabled[1]	Disabled[1]	Running
1	0	Disabled[1]	Disabled[1]	Disabled[4]

1. The output state is set by B11[1:0] (Low/Low default)
2. REF is Hi-Z until the 1st assertion of CKPWRGD_PD# high. After this, when CKPWRG_PD# is low, REF is disabled unless Byte3[5]=1, in which case REF is running..
3. Input polarities defined at default values for 9SQL4952.
4. See SMBus description for Byte 3, bit 4

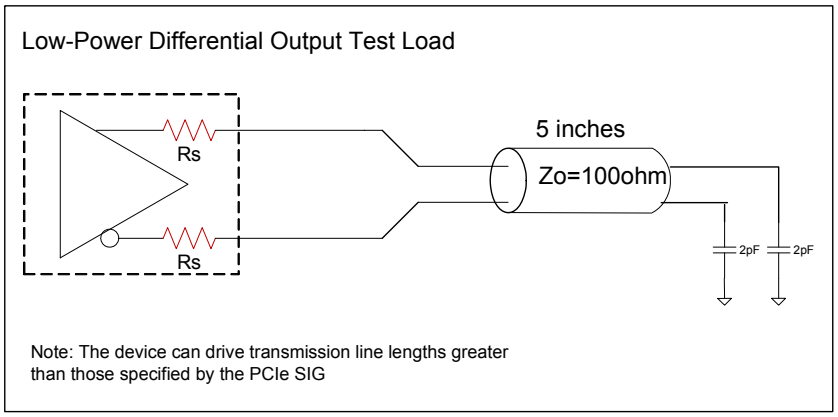
Power Connections

Pin Number		Description
VDD	GND	
3	5,24	XTAL, REF
7	6	Digital Power
11,20	10,21,25	DIF outputs
16	15	PLL Analog

Pin Descriptions

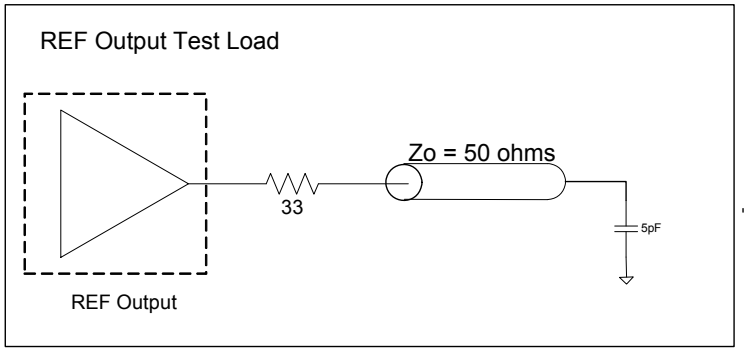
Pin#	Pin Name	Type	Pin Description
1	XIN/CLKIN_25	IN	Crystal input or Reference Clock input. Nominally 25MHz.
2	X2	OUT	Crystal output.
3	VDDXTAL3.3	PWR	Power supply for XTAL, nominal 3.3V
4	vSADR/REF3.3	LATCHED I/O	Latch to select SMBus Address/3.3V LVCMOS copy of X1/REFIN pin
5	GNDREF	GND	Ground pin for the REF outputs.
6	GNDDIG	GND	Ground pin for digital circuitry
7	VDDDIG3.3	PWR	3.3V digital power (dirty power)
8	SCLK_3.3	IN	Clock pin of SMBus circuitry, 3.3V tolerant.
9	SDATA_3.3	I/O	Data pin for SMBus circuitry, 3.3V tolerant.
10	GND	GND	Ground pin.
11	VDD3.3	PWR	Power supply, nominal 3.3V
12	vOE0#	IN	Active low input for enabling DIF pair 0. This pin has an internal pull-down. 1 =disable outputs, 0 = enable outputs
13	DIF0	OUT	Differential true clock output
14	DIF0#	OUT	Differential Complementary clock output
15	GNDA	GND	Ground pin for the PLL core.
16	VDDA3.3	PWR	3.3V power for the PLL core.
17	DIF1	OUT	Differential true clock output
18	DIF1#	OUT	Differential Complementary clock output
19	vOE1#	IN	Active low input for enabling DIF pair 1. This pin has an internal pull-down. 1 =disable outputs, 0 = enable outputs
20	VDD3.3	PWR	Power supply, nominal 3.3V
21	GND	GND	Ground pin.
22	^CKPWRGD_PD#	IN	Input notifies device to sample latched inputs and start up on first high assertion. Low enters Power Down Mode, subsequent high assertions exit Power Down Mode. This pin has internal pull-up resistor.
23	vSS_EN_tri	LATCHED IN	Latched select input to select spread spectrum amount at initial power up : 1 = -0.5% spread, M = -0.25%, 0 = Spread Off
24	GNDXTAL	GND	GND for XTAL
25	ePAD	GND	Connect to ground

Test Loads



Terminations

Device	Zo (Ω)	Rs (Ω)
9SQL4952	100	7.5
9SQL4952	85	None needed



Alternate Terminations

The 9SQL family can easily drive LVPECL, LVDS, and CML logic. See "AN-891 Driving LVPECL, LVDS, and CML Logic with IDT's "Universal" Low-Power HCSL Outputs" for details.

Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the 9SQL4952. These ratings, which are standard values for IDT commercially rated parts, are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Supply Voltage	VDDxxx	Applies to VDD pins.	-0.5		3.9	V	1,2
Input Voltage	V_{IN}		-0.5		V_{DD}+0.5	V	1,3
Input High Voltage, SMBus	V_{IHSMB}	SMBus clock and data pins			3.9	V	1
Storage Temperature	Ts		-65		150	°C	1
Junction Temperature	Tj				125	°C	1
Input ESD protection	ESD prot	Human Body Model	2000			V	1

[1]Guaranteed by design and characterization, not 100% tested in production.

[2] Operation under these conditions is neither implied nor guaranteed.

[3] Not to exceed 4.5V.

Electrical Characteristics–SMBus Parameters

TA = $T_{AMB;}$ Supply Voltages per normal operation conditions, See Test Loads for Loading Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
SMBus Input Low Voltage	V_{ILSMB}	V_{DDSMB} = 3.3V			0.8	V	
SMBus Input High Voltage	V_{IHSMB}	V_{DDSMB} = 3.3V	2.1		3.6	V	
SMBus Output Low Voltage	V_{OLSMB}	@ I_{PULLUP}			0.4	V	
SMBus Sink Current	I_{PULLUP}	@ V_{OL}	4			mA	
Nominal Bus Voltage	V_{DDSMB}		2.7		3.6	V	
SCLK/SDATA Rise Time	t_{RSMB}	(Max VIL - 0.15) to (Min VIH + 0.15)			1000	ns	1
SCLK/SDATA Fall Time	t_{FSMB}	(Min VIH + 0.15) to (Max VIL - 0.15)			300	ns	1
SMBus Operating Frequency	f_{SMB}	SMBus operating frequency	400			kHz	

[1] Guaranteed by design and characterization, not 100% tested in production.

Electrical Characteristics–Input/Supply/Common Parameters–Normal Operating Conditions

TA = $T_{AMB;}$ Supply Voltages per normal operation conditions, See Test Loads for Loading Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Supply Voltage	VDDxxx	Supply voltage for core, analog and single-ended LVCMOS outputs.	3.135	3.3	3.465	V	
Ambient Operating Temperature	T_{AMB}	Industrial range	-40	25	85	°C	
Input High Voltage	V_{IH}	Single-ended inputs, except SMBus	$0.75xV_{DD}$		$V_{DD}+0.3$	V	
Input Mid Voltage	V_{IM}	Single-ended tri-level inputs ('_tri' suffix)	$0.4xV_{DD}$	$0.5\ V_{DD}$	$0.6xV_{DD}$	V	
Input Low Voltage	V_{IL}	Single-ended inputs, except SMBus	-0.3		$0.25xV_{DD}$	V	
Input Current	I_{IN}	Single-ended inputs, V_{IN} = GND, V_{IN} = VDD	-5		5	uA	
	I_{INP}	Single-ended inputs V_{IN} = 0 V; Inputs with internal pull-up resistors V_{IN} = VDD; Inputs with internal pull-down resistors	-200		200	uA	
Input Frequency	F_{in}	XTAL, or X1 input		25		MHz	
Pin Inductance	L_{pin}				7	nH	1
Capacitance	C_{IN}	Logic Inputs, except DIF_IN	1.5		5	pF	1
	C_{OUT}	Output pin capacitance			6	pF	1
Clk Stabilization	T_{STAB}	From V_{DD} Power-Up and after input clock stabilization or de-assertion of PD# to 1st clock		0.35	1.8	ms	1,2
SS Modulation Frequency	f_{MOD}	Allowable Frequency (Triangular Modulation)	30	31.6	33	kHz	1
OE# Latency	$t_{LATOE\#}$	DIF start after OE# assertion DIF stop after OE# deassertion	1		3	clocks	1,3
Tdrive_PD#	t_{DRVPD}	DIF output enable after PD# de-assertion			300	us	1,3
Tfall	t_F	Fall time of single-ended control inputs			5	ns	1,2
Trise	t_R	Rise time of single-ended control inputs			5	ns	1,2

[1] Guaranteed by design and characterization, not 100% tested in production.

[2] Control input must be monotonic from 20% to 80% of input swing.

[3] Time from deassertion until outputs are >200 mV

Electrical Characteristics–DIF Low-Power HCSL Outputs

TA = $T_{AMB;}$ Supply Voltages per normal operation conditions, See Test Loads for Loading Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Slew rate	Trf	Scope averaging on, fast setting	2	3.1	4	V/ns	2,3
		Scope averaging, slow setting	1	2.2	3	V/ns	2,3
Crossing Voltage (abs)	Vcross_abs	Scope averaging off	250	376.5	550	mV	1,4,5
Crossing Voltage (var)	Δ-Vcross	Scope averaging off		13.8	140	mV	1,4,9
Avg. Clock Period Accuracy	T_{PERIOD_AVG}		-50		+2550	ppm	2,10,13
Absolute Period	T_{PERIOD_ABS}	Includes jitter and Spread Spectrum Modulation	9.847		10.203	ns	2,6
Jitter, Cycle to cycle	$t_{jcyc-cyc}$			23	50	ps	2
Voltage High	V_{HIGH}		660	797	850	mV	1
Voltage Low	V_{LOW}		-150	10	150		1
Absolute Max Voltage	Vmax			822	1150	mV	1,7,15
Absolute Min Voltage	Vmin		-300	-101			1,8,15
Duty Cycle	t_{DC}		45	50	55	%	2
Slew rate matching	ΔTrf			6	20	%	1,14
Skew, Output to Output	t_{sk3}	Averaging on, V_T = 50%		24	50	ps	2

[1] Measured from single-ended waveform.

[2] Measured from differential waveform.

[3] Measured from -150 mV to +150 mV on the differential waveform (derived from REFCLK+ minus REFCLK-). The signal must be monotonic through the measurement region for rise and fall time. The 300 mV measurement window is centered on the differential zero crossing.

[4] Measured at crossing point where the instantaneous voltage value of the rising edge of REFCLK+ equals the falling edge of REFCLK-.

[5] Refers to the total variation from the lowest crossing point to the highest, regardless of which edge is crossing. Refers to all crossing points for this measurement.

[6] Defines as the absolute minimum or maximum instantaneous period. This includes cycle to cycle jitter, relative PPM tolerance, and spread spectrum modulation.

[7] Defined as the maximum instantaneous voltage including overshoot.

[8] Defined as the minimum instantaneous voltage including undershoot.

[9] Defined as the total variation of all crossing voltages of Rising REFCLK+ and Falling REFCLK-. This is the maximum allowed variance in V_{CROSS} for any particular system.

[10] Refer to Section 4.3.7.1.1 of the PCI Express Base Specification, Revision 3.0 for information regarding PPM considerations.

[11] System board compliance measurements must use the test load. REFCLK+ and REFCLK- are to be measured at the load capacitors CL. Single ended probes must be used for measurements requiring single ended measurements. Either single ended probes with math or differential probe can be used for differential measurements. Test load CL = 2 pF.

[12] T_{STABLE} is the time the differential clock must maintain a minimum ±150 mV differential voltage after rising/falling edges before it is allowed to droop back into the VRB ±100 mV differential range.

[13] PPM refers to parts per million and is a DC absolute period accuracy specification. 1 PPM is 1/1,000,000th of 100.000000 MHz exactly or 100 Hz. For 300 PPM, then we have an error budget of 100 Hz/PPM * 300 PPM = 30 kHz. The period is to be measured with a frequency counter with measurement window set to 100 ms or greater. The ±300 PPM applies to systems that do not employ Spread Spectrum Clocking, or that use common clock source. For systems employing Spread Spectrum Clocking, there is an additional 2,500 PPM nominal shift in maximum period resulting from the 0.5% down spread resulting in a maximum average period specification of +2,800 PPM.

[14] Matching applies to rising edge rate for REFCLK+ and falling edge rate for REFCLK-. It is measured using a ±75 mV window centered on the median cross point where REFCLK+ rising meets REFCLK- falling. The median cross point is used to calculate the voltage thresholds the oscilloscope is to use for the edge rate calculations. The Rise Edge Rate of REFCLK+ should be compared to the Fall Edge Rate of REFCLK-; the maximum allowed difference should not exceed 20% of the slowest edge rate.

[15] At default SMBus amplitude settings.

Electrical Characteristics–Phase Jitter Parameters

TA = $T_{AMB;}$ Supply Voltages per normal operation conditions, See Test Loads for Loading Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	IND. LIMIT	UNITS	Notes
Phase Jitter	$t_{jphPCIeG1}$	PCIe Gen 1		17	30	86	ps (p-p)	1,2,3
	$t_{jphPCIeG2}$	PCIe Gen 2 Lo Band 10kHz < f < 1.5MHz		0.5	0.9	3	ps (rms)	1,2
		PCIe Gen 2 High Band 1.5MHz < f < Nyquist (50MHz)		1.0	1.5	3.1	ps (rms)	1,2
	$t_{jphPCIeG3}$	PCIe Gen 3 (PLL BW of 2-4MHz, CDR = 10MHz)		0.32	0.40	1	ps (rms)	1,2
		QPI & SMI (4.8Gb/s, 6.4Gb/s 12UI, CDR=17.04M)		0.26	0.35	1	ps (rms)	1,4
	t_{jphQPI_SMI}	QPI & SMI (4.8Gb/s, 6.4Gb/s 12UI, CDR=7.8M)		0.15	0.25	0.5	ps (rms)	1,4
		QPI & SMI (100MHz, 8.0Gb/s, 12UI)		0.12	0.2	0.3	ps (rms)	1,4
		QPI & SMI (100MHz, 9.6Gb/s, 12UI)		0.10	0.15	0.2	ps (rms)	1,4
	$t_{jphSAS12G}$	SAS 12G (only applies with SSC Off)		0.40	0.45	1.3	ps (rms)	1,4,5

[1] Guaranteed by design and characterization, not 100% tested in production.

[2] See http://www.pcisig.com for complete specs

[3] Sample size of at least 100K cycles. This figures extrapolates to 108ps pk-pk @ 1M cycles for a BER of 1-12.

[4] Calculated from Intel-supplied Clock Jitter Tool v 1.6.6

[5] Applies only when SSC is off

Electrical Characteristics–Current Consumption

TA = $T_{AMB;}$ Supply Voltages per normal operation conditions, See Test Loads for Loading Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	NOTES
Operating Supply Current	I_{DDAOP}	VDDA, All outputs active @100MHz		13	16	mA	
	I_{DDOP}	All VDD, except VDDA, All outputs active @100MHz		21	30	mA	
Wake-on-LAN Current (Power down state and Byte 3, bit 5 = '1')	I_{DDAPD}	VDDA, DIF outputs off, REF output running		0.70	1	mA	1
	I_{DDPD}	All VDD, except VDDA, DIF outputs off, REF output running		9.4	1	mA	1
Powerdown Current (Power down state and Byte 3, bit 5 = '0')	I_{DDAPD}	VDDA, all outputs off		0.72	1	mA	
	I_{DDPD}	All VDD, except VDDA, all outputs off		3.9	8	mA	

[1] This is the current required to have the REF output running in Wake-on-LAN mode (Byte 3, bit 5 = 1)

Electrical Characteristics– REF

TA = $T_{AMB;}$ Supply Voltages per normal operation conditions, See Test Loads for Loading Conditions

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	Notes
Long Accuracy	ppm	see Tperiod min-max values		0		ppm	1,2
Clock period	T_{period}	25 MHz output		40		ns	2
Output High Voltage	V_{IH}	I_{OH} = -2mA	$0.8xV_{DDREF}$			V	
Output Low Voltage	V_{IL}	I_{OL} = 2mA			$0.2xV_{DDREF}$	V	
Rise/Fall Slew Rate	t_{rf1}	Byte 3 = 1F, V_{OH} = VDD-0.45V, V_{OL} = 0.45V	0.5	0.8	1.2	V/ns	1
Rise/Fall Slew Rate	t_{rf1}	Byte 3 = 5F, V_{OH} = VDD-0.45V, V_{OL} = 0.45V	1.0	1.5	2.0	V/ns	1,3
Rise/Fall Slew Rate	t_{rf1}	Byte 3 = 9F, V_{OH} = VDD-0.45V, V_{OL} = 0.45V	1.5	2.2	2.8	V/ns	1
Rise/Fall Slew Rate	t_{rf1}	Byte 3 = DF, V_{OH} = VDD-0.45V, V_{OL} = 0.45V	2.2	2.9	3.5	V/ns	1
Duty Cycle	d_{t1X}	V_T = VDD/2 V	45	49.8	55	%	1,4
Duty Cycle Distortion	d_{tcd}	V_T = VDD/2 V	-0.5	0.0	+0.5	%	1,5
Jitter, cycle to cycle	$t_{jcyc-cyc}$	V_T = VDD/2 V		81	250	ps	1,4
Noise floor	t_{jdBc1k}	1kHz offset			-120	dBc	1,4
Noise floor	$t_{jdBc10k}$	10kHz offset to Nyquist			-130	dBc	1,4
Jitter, phase	t_{jphREF}	12kHz to 5MHz, DIF SSC Off			0.3	ps (rms)	1,4
Jitter, phase	t_{jphREF}	12kHz to 5MHz, DIF SSC On			1	ps (rms)	1,4

[1]Guaranteed by design and characterization, not 100% tested in production.

[2] All Long Term Accuracy and Clock Period specifications are guaranteed assuming that REF is trimmed to 25.00 MHz

[3] Default SMBus Value

[4] When driven by a crystal.

[5] When driven by an external oscillator via the X1 pin, X2 should be floating.

General SMBus Serial Interface Information

How to Write

- Controller (host) sends a start bit
- Controller (host) sends the write address
- IDT clock will **acknowledge**
- Controller (host) sends the beginning byte location = N
- IDT clock will **acknowledge**
- Controller (host) sends the byte count = X
- IDT clock will **acknowledge**
- Controller (host) starts sending Byte **N through Byte N+X-1**
- IDT clock will **acknowledge** each byte **one at a time**
- Controller (host) sends a Stop bit

Index Block Write Operation			
Controller (Host)			**IDT (Slave/Receiver)**
T	starT bit		
Slave Address			
WR	WRite		
			ACK
Beginning Byte = N			
			ACK
Data Byte Count = X			
			ACK
Beginning Byte N		X Byte	
			ACK
O			
O			O
O			O
			O
Byte N + X - 1			
			ACK
P	stoP bit		

Note: SMBus Read/Write Address is Latched on SADR pin.

How to Read

- Controller (host) will send a start bit
- Controller (host) sends the write address
- IDT clock will **acknowledge**
- Controller (host) sends the beginning byte location = N
- IDT clock will **acknowledge**
- Controller (host) will send a separate start bit
- Controller (host) sends the read address
- IDT clock will **acknowledge**
- IDT clock will send the data byte count = X
- IDT clock sends Byte **N+X-1**
- IDT clock sends **Byte 0 through Byte X (if $X_{(H)}$ was written to Byte 8)**
- Controller (host) will need to acknowledge each byte
- Controller (host) will send a not acknowledge bit
- Controller (host) will send a stop bit

Index Block Read Operation			
Controller (Host)			**IDT (Slave/Receiver)**
T	starT bit		
Slave Address			
WR	WRite		
			ACK
Beginning Byte = N			
			ACK
RT	Repeat starT		
Slave Address			
RD	ReaD		
			ACK
			Data Byte Count=X
ACK			
		X Byte	Beginning Byte N
ACK			
			O
O			O
O			O
O			
			Byte N + X - 1
N	Not acknowledge		
P	stoP bit		

SMBus Table: Output Enable Register

Byte 0	Name	Control Function	Type	0	1	Default
Bit 7	Reserved					X
Bit 6	Reserved					X
Bit 5	Reserved					X
Bit 4	Reserved					X
Bit 3	Reserved					X
Bit 2	DIF OE1	Output Enable	RW	Low/Low	Enabled	1
Bit 1	DIF OE0	Output Enable	RW	Low/Low	Enabled	1
Bit 0	Reserved					X

1. A low on these bits will overide the OE# pin and force the differential output to the state indicated by B11[1:0] (Low/Low default).

SMBus Table: SS Readback and Vhigh Control Register

Byte 1	Name	Control Function	Type	0	1	Default
Bit 7	SSENRB1	SS Enable Readback Bit1	R	00' for SS_EN_tri = 0, '01' for SS_EN_tri = 'M', '11 for SS_EN_tri = '1'		Latch
Bit 6	SSENRB1	SS Enable Readback Bit0	R			Latch
Bit 5	SSEN_SWCNTRL	Enable SW control of SS	RW	SS control locked	Values in B1[4:3] control SS amount.	0
Bit 4	SSENSW1	SS Enable Software Ctl Bit1	RW[1]	00' = SS Off, '01' = -0.25% SS, '10' = Reserved, '11'= -0.5% SS		0
Bit 3	SSENSW0	SS Enable Software Ctl Bit0	RW[1]			0
Bit 2	Reserved					X
Bit 1	AMPLITUDE 1	Controls Output Amplitude	RW	00 = 0.6V	01 = 0.7V	1
Bit 0	AMPLITUDE 0		RW	10= 0.8V	11 = 0.9V	0

1. B1[5] must be set to a 1 for these bits to have any effect on the part.

SMBus Table: DIF Slew Rate Control Register

Byte 2	Name	Control Function	Type	0	1	Default
Bit 7	Reserved					X
Bit 6	Reserved					X
Bit 5	Reserved					X
Bit 4	Reserved					X
Bit 3	Reserved					X
Bit 2	SLEWRATESEL DIF1	Adjust Slew Rate of DIF1	RW	Slow Setting	Fast Setting	1
Bit 1	SLEWRATESEL DIF0	Adjust Slew Rate of DIF0	RW	Slow Setting	Fast Setting	1
Bit 0	Reserved					X

Note: See "Low-Power HCSL Outputs" table for slew rates.

SMBus Table: REF Control Register

Byte 3	Name	Control Function	Type	0	1	Default
Bit 7	REF	Slew Rate Control	RW	00 = Slowest	01 = Slow	0
Bit 6			RW	10 = Fast	11 = Faster	1
Bit 5	REF Power Down Function	Wake-on-Lan Enable for REF	RW	REF disabled in Power Down	REF runs in Power Down	0
Bit 4	REF OE	REF Output Enable	RW	Disabled[1]	Enabled	1
Bit 3	Reserved					X
Bit 2	Reserved					X
Bit 1	Reserved					X
Bit 0	Reserved					X

1. The disabled state depends on Byte11[1:0]. '00' = Low, '01'=HiZ, '10'=Low, '11'=HIgh

Byte 4 is Reserved

SMBus Table: Revision and Vendor ID Register

Byte 5	Name	Control Function	Type	0	1	Default
Bit 7	RID3	Revision ID	**R**	B rev = 0001		0
Bit 6	RID2		**R**			0
Bit 5	RID1		**R**			0
Bit 4	RID0		**R**			1
Bit 3	VID3	VENDOR ID	**R**	0001 = IDT		0
Bit 2	VID2		**R**			0
Bit 1	VID1		**R**			0
Bit 0	VID0		**R**			1

SMBus Table: Device Type/Device ID

Byte 6	Name	Control Function	Type	0	1	Default
Bit 7	Device Type1	Device Type	**R**	9SQLxxxx=00		0
Bit 6	Device Type0		**R**			0
Bit 5	Device ID5	Device ID	**R**	00010 binary or 02 hex		0
Bit 4	Device ID4		**R**			0
Bit 3	Device ID3		**R**			0
Bit 2	Device ID2		**R**			0
Bit 1	Device ID1		**R**			1
Bit 0	Device ID0		**R**			0

SMBus Table: Byte Count Register

Byte 7	Name	Control Function	Type	0	1	Default
Bit 7	Reserved					X
Bit 6	Reserved					X
Bit 5	Reserved					X
Bit 4	BC4	Byte Count Programming	RW	Writing to this register will configure how many bytes will be read back, default is = 8 bytes.		0
Bit 3	BC3		RW			1
Bit 2	BC2		RW			0
Bit 1	BC1		RW			0
Bit 0	BC0		RW			0

Recommended Crystal Characteristics (3225 package)

PARAMETER	VALUE	UNITS	NOTES
Frequency	25	MHz	1
Resonance Mode	Fundamental	-	1
Frequency Tolerance @ 25°C	±20	PPM Max	1
Frequency Stability, ref @ 25°C Over Operating Temperature Range	±20	PPM Max	1
Temperature Range (commerical)	0~70	°C	1
Temperature Range (industrial)	-40~85	°C	1
Equivalent Series Resistance (ESR)	50	Ω Max	1
Shunt Capacitance (C_O)	7	pF Max	1
Load Capacitance (C_L)	8	pF Max	1
Drive Level	0.3	mW Max	1
Aging per year	±5	PPM Max	1

Notes:
1. IDT 603-25-150JA4C or 603-25-150JA4I

Marking Diagram

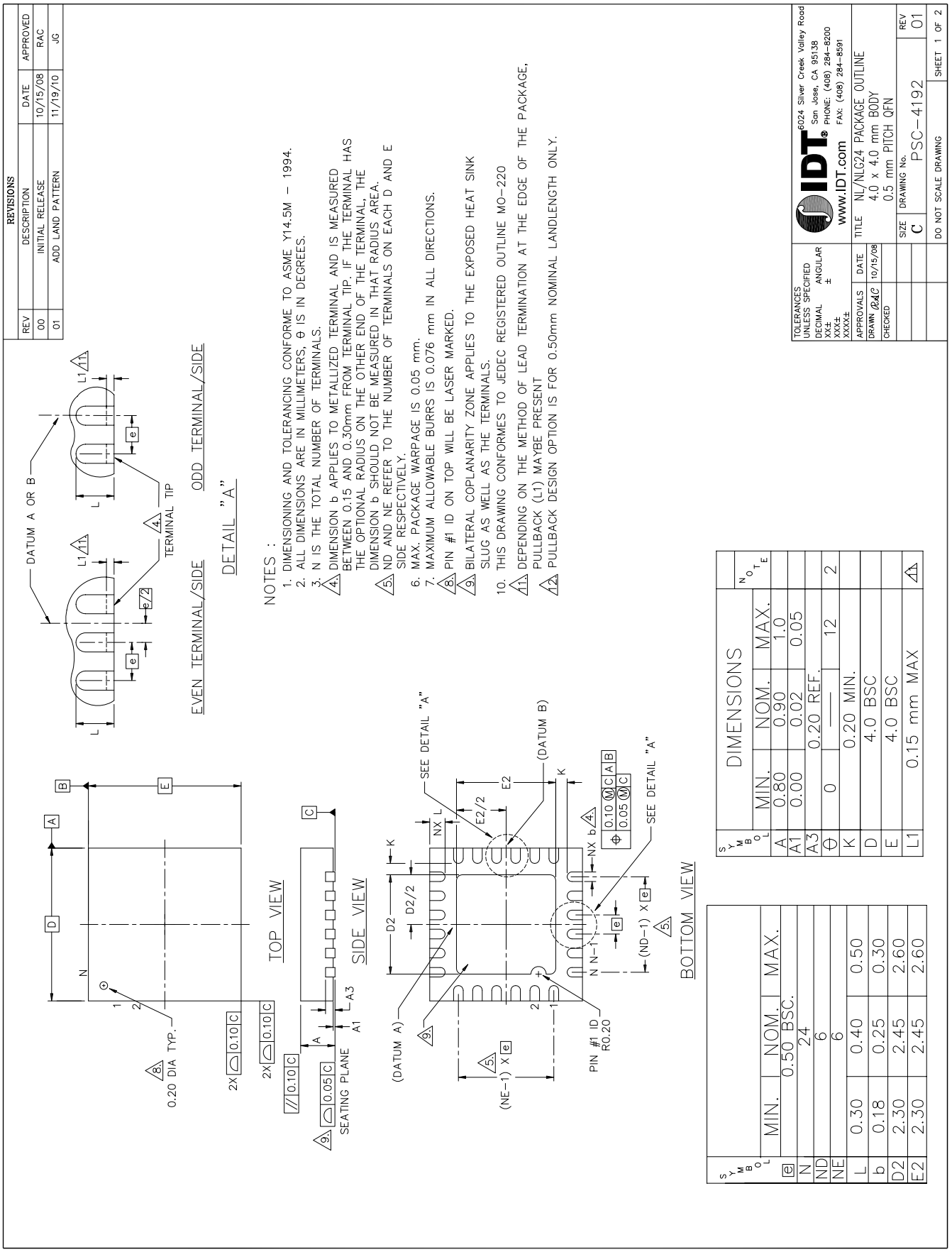
Notes:
1. Line 1: truncated part number
2. “I” denotes industrial temperature range device.
3. “YYWW” is the last two digits of the year and week that the part was assembled.
4. “$” denotes mark code.
5. “LOT” is the lot sequence number.

Thermal Characteristics

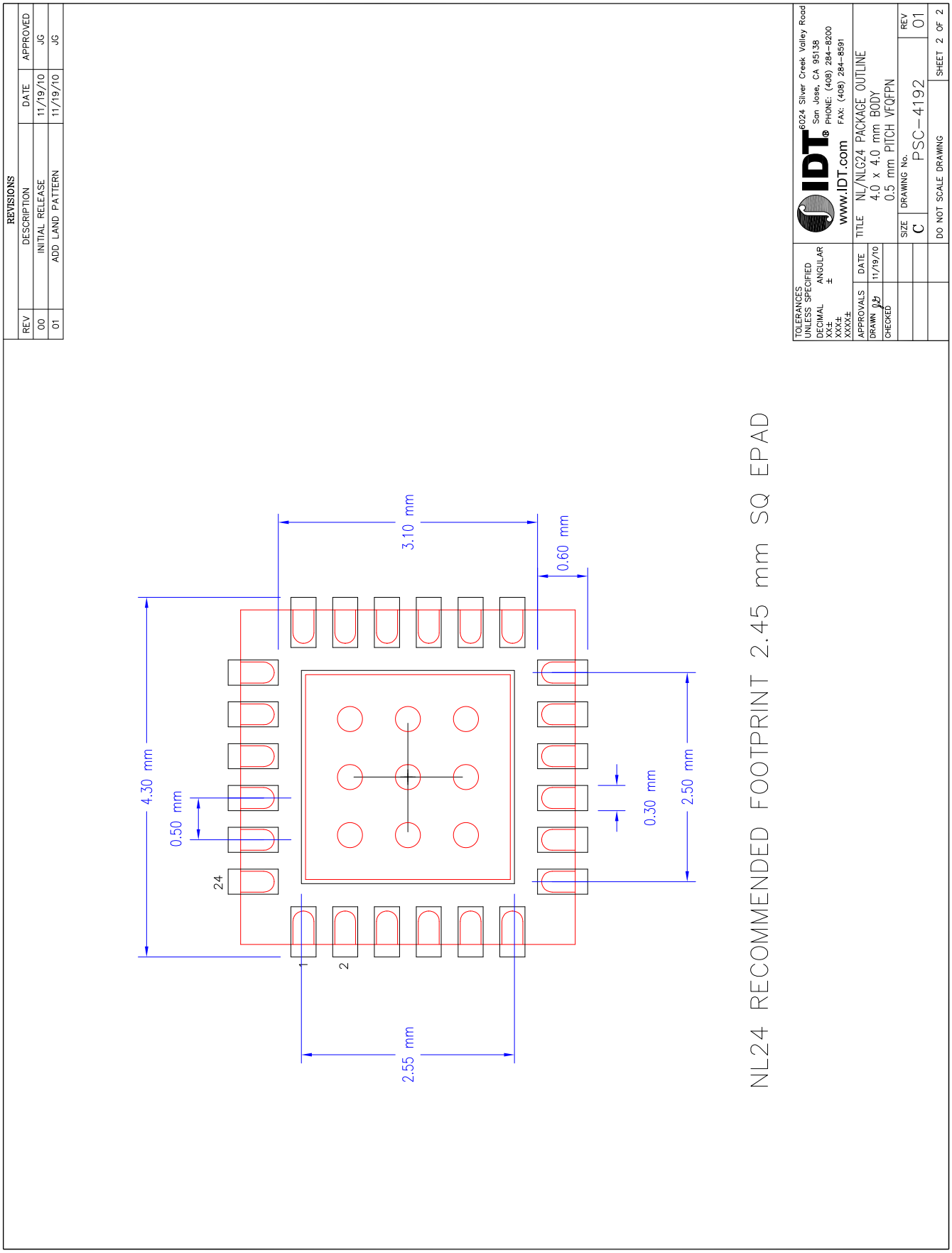
PARAMETER	SYMBOL	CONDITIONS	PKG	TYP VALUE	UNITS	NOTES
Thermal Resistance	θ_{JC}	Junction to Case	NLG24	62	°C/W	1
	θ_{Jb}	Junction to Base		5.4	°C/W	1
	θ_{JA0}	Junction to Air, still air		50	°C/W	1
	θ_{JA1}	Junction to Air, 1 m/s air flow		43	°C/W	1
	θ_{JA3}	Junction to Air, 3 m/s air flow		39	°C/W	1
	θ_{JA5}	Junction to Air, 5 m/s air flow		38	°C/W	1

[1]ePad soldered to board

Package Outline and Package Dimensions (NLG24)



Package Outline and Package Dimensions (NLG24), cont.



Ordering Information

Part / Order Number	Shipping Packaging	Package	Temperature
9SQL4952BNLGI	Trays	24-pin VFQFPN	-40° to +85° C
9SQL4952BNLGI8	Tape and Reel	24-pin VFQFPN	-40° to +85° C

"G" suffix to the part number are the Pb-Free configuration and are RoHS compliant.
"B" is the device revision designator (will not correlate with the datasheet revision).

Revision History

Rev.	Issue Date	Intiator	Description	Page #
A	9/22/2015	RDW	Initial release	Various
B	9/29/2015	RDW	Updates to front page and block diagram. Minor grammatical updates throughout.	Various
C	3/7/2016	RDW	Correct marking diagram	13
D	3/25/2016	RDW	1. Updated ordering information to rev B 2. Update Byte 5 revision ID to B	Various

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