

Features

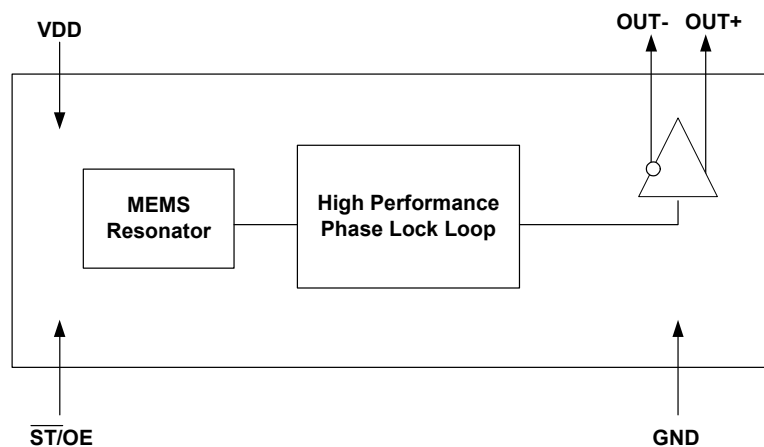
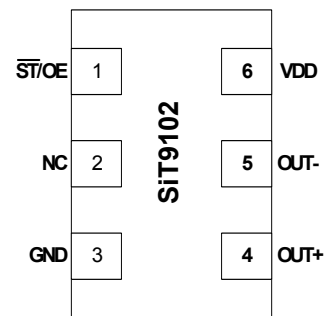
- Extremely low RMS phase jitter (random)
 - <1 ps (typical)
- Wide frequency range
 - 10 MHz to 220 MHz
- Low frequency tolerance
 - ± 10 PPM, ± 12 PPM, ± 15 PPM
 - ± 20 PPM, ± 25 PPM, ± 50 PPM
- Operating voltage
 - 1.8, 2.5 or 3.3 V
- Operating temperature range
 - Industrial, -40 to 85 °C
 - Extended Commercial, -20 to 70 °C
 - Commercial, 0 to 70 °C
- Small footprint
 - 5.0 x 3.2 x 0.85 mm
 - **7.0 x 5.0 x 0.85 mm**
- Pb-free and ROHs compliant
- Spread Spectrum Option (contact factory)
- Ultra-reliable start up and greater immunity from interference

Benefits

- Ultra fast lead time: 2 to 3 weeks
- No crystal or capacitors required
- Eliminates crystal qualification time
- 50% + board saving space
- More cost effective than quartz oscillators, quartz crystals and clock ICs.
- Completely quartz-free

Applications

- Server
- Router
- RAID controller
- Gigabit Ethernet
- 10 Gigabit Ethernet
- Fiber Channel
- SATA / SAS
- PCI-Express
- System clock
- Networking and computing

Block Diagram**Pinout**

Pin Description

Pin No.	Name		Pin Description
1	ST/OE	Input	Standby or Output Enable pin for OUT+ and OUT-. OE: When High or Open : OUT+ and OUT- = active When Low : OUT+ and OUT- = High Impedance state ST: When High or Open : OUT+ and OUT- = active When Low : OUT+ and OUT- = High Impedance State
2	NC	NA	Do Not connect pin, leave it floating.
3	GND	Power	VDD power supply ground. Connect to Ground
4	OUT+	Output	1 to 220 MHz programmable clock output .
5	OUT-	Output	1 to 220 MHz programmable clock output .

Absolute Maximum Ratings

Attempted operation outside the absolute maximum ratings of the part may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

Absolute Maximum Table

Parameter	Min.	Max.	Unit
Storage Temperature	-65	150	°C
VDD	-0.5	+4.00	V
Theta JA (with copper plane on VDD and GND)	–	TBD	°C/W
Theta JC (with PCB traces of 0.010 inch to all pins)	–	TBD	°C/W
Soldering Temperature (follow standard Pb free soldering guidelines)	–	260	°C
Number of Program Writes	–	1	NA
Program Retention over -40 to 125C, Process, VDD (0 to 3.6V)	–	1,000+	years
Human Body Model (JESD22-A114)	2000	–	–
Charged Device Model (JESD22-C101)	750	–	–
Machine Model (JESD22-A115)	200	–	–

Environmental Compliance

Parameter	Condition/Test Method
Mechanical Shock	MIL-STD-883F, Method 2002, 50 KG Shock
Mechanical Vibration	MIL-STD-883F, Method 2007, 70 G Vibration
Temperature Cycle	MIL-STD-883F, Method 1010-65-150°C (1000 cycle)
Solderability	MIL-STD-883F, Method 2003
Moisture Sensibility Level	MSL1

DC Electrical Specifications

LVCOMS, 3.3V $\pm 10\%$ or 2.5V $\pm 10\%$ or 1.8V $\pm 5\%$, -40 to 85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{IH}	Input High Voltage		70	–	–	%V _{DD}
V _{IL}	Input Low Voltage		–	–	30	%V _{DD}
I _{IH}	Input High Current	OE or ST pin	–	–	TBD	μA
I _{IL}	Input Low Current	OE or ST pin	TBD	–	–	μA

LVPECL, 3.3V $\pm 10\%$ or 2.5V $\pm 10\%$, -40 to 85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{DD}	Supply Voltage		2.97	3.3	3.63	V
			2.25	2.5	2.75	V
I _{DD}	Supply Current	V _{DD} = 3.3V	–	70	TBD	mA
		V _{DD} = 2.5V	–	70	TBD	mA
V _{OH}	Output High Voltage	50 Ohm termination to V _{DD} - 2.0V	V _{DD} -1.1	–	V _{DD} -0.7	V
V _{OL}	Output Low Voltage	See Figure 1.	V _{DD} -2.0	–	V _{DD} -1.4	V
V _{swing}	Pk-PK Output Voltage Swing		600	800	1000	mV

LVDS, 3.3V $\pm 10\%$ or 2.5V $\pm 10\%$, -40 to 85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V _{DD}	Supply Voltage		2.97	3.3	3.63	V
			2.25	2.5	2.75	V
I _{DD}	Supply Current	V _{DD} = 3.3V	–	40	TBD	mA
		V _{DD} = 2.5V	–	40	TBD	mA
V _{OD1}	Differential Output Voltage	Swing Mode = Normal	250	350	400	mV
ΔV _{OD1}	V _{OD} Magnitude Change	Single load termination.	–	–	50	mV
V _{OS1}	Offset Voltage	See Figure 2.	–	1.2	–	V
ΔV _{OS1}	V _{OS} Magnitude Change		–	–	50	mV
V _{OD2}	Differential Output Voltage	Swing Mode = High	500	700	800	mV
ΔV _{OD2}	V _{OD} Magnitude Change	Single load termination.	–	–	50	mV
V _{OS2}	Offset Voltage	See Figure 2.	–	1.2	–	V
ΔV _{OS2}	V _{OS} Magnitude Change		–	–	50	mV
V _{OD3}	Differential Output Voltage	Swing Mode = High	250	350	400	mV
ΔV _{OD3}	V _{OD} Magnitude Change	Double load termination.	–	–	50	mV
V _{OS3}	Offset Voltage	See Figure 3.	–	1.2	–	V
ΔV _{OS3}	V _{OS} Magnitude Change		–	–	50	mV

CML, 3.3V $\pm 10\%$ or 2.5V $\pm 10\%$ or 1.8V $\pm 5\%$, -40 to 85°C

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
V _{DD}	Supply Voltage			2.97	3.3	3.63	V
				2.25	2.5	2.75	V
				1.71	1.8	1.89	V
I _{DD}	Supply Current	V _{DD} = 3.3V	Excluding Load Termination Current	–	70	TBD	mA
		V _{DD} = 2.5V		–	70	TBD	mA
		V _{DD} = 1.8V		–	70	TBD	mA
V _{OH1}	Output High Voltage	Swing Mode = Normal Single Load Termination See Figure 4.		V _{DD} -0.1	–	V _{DD}	V
V _{OL1}	Output Low Voltage			V _{DD} -0.5	V _{DD} -0.4	V _{DD} -0.3	V
V _{swing1}	Pk-PK Output Voltage Swing			300	400	500	mV
V _{OH2}	Output High Voltage	Swing Mode = High Single Load Termination See Figure 4.		V _{DD} -0.1	–	V _{DD}	V
V _{OL2}	Output Low Voltage			V _{DD} -1.0	V _{DD} -0.8	V _{DD} -0.6	V
V _{swing2}	Pk-PK Output Voltage Swing			600	800	1000	mV
V _{OH3}	Output High Voltage	Swing Mode = High Double Load Termination See Figure 5.		V _{DD} -0.1	–	V _{DD}	V
V _{OL3}	Output Low Voltage			V _{DD} -0.5	V _{DD} -0.4	V _{DD} -0.3	V
V _{swing3}	Pk-PK Output Voltage Swing			300	400	500	mV

AC Electrical Specifications

LVPECL, 3.3V $\pm 10\%$, -40 to 85°C

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F _{out}	Output Frequency		10	–	220	MHz
F _{sta}	Frequency Stability	Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change	0 to 70°C	–	+10	PPM
			-20 to 70°C	–	+12	PPM
			-40 to 85°C	–	+15	PPM
			0 to 70°C	–	+25	PPM
			-20 to 70°C	–	+50	PPM
			-40 to 85°C	–	+100	PPM
F _{age}	Aging	First year @ 25°C	–	–	1	PPM
DC	Duty Cycle		45	–	55	%
t _R /t _F	Output Rise/Fall Time	20% to 80%	TBD	300	TBD	ps
PH _J	RMS Phase Jitter (random)	F _{out} = 106.25 MHz @ BW: 637 kHz to 10 MHz	–	0.8	–	ps
		F _{out} = 156.25 MHz @ BW: 1.87 to 20 MHz	–	0.5	–	ps
		F _{out} = 200 MHz @ BW: 1 to 20 MHz	–	0.5	–	ps
P _J	RMS Period Jitter	F _{out} = 106.25 MHz	–	3.0	TBD	ps
		F _{out} = 156.25 MHz	–	2.5	TBD	ps
		F _{out} = 200 MHz	–	2.0	TBD	ps

LVPECL, 2.5V $\pm 10\%$, -40 to 85°C

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
F _{out}	Output Frequency			10	–	220	MHz
F _{sta}	Frequency Stability	Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change	0 to 70°C	-10	–	+10	PPM
			-20 to 70°C	-12	–	+12	PPM
			-40 to 85°C	-15	–	+15	PPM
			0 to 70°C	-25		+25	PPM
			-20 to 70°C	-50		+50	PPM
			-40 to 85°C	-100		+100	PPM
F _{age}	Aging	First year @ 25°C		–	–	1	PPM
DC	Duty Cycle			45	–	55	%
t _R /t _F	Output Rise/Fall Time	20% to 80%		–	300	TBD	ps
PH _J	RMS Phase Jitter (random)	F _{out} = 106.25 MHz @ BW: 637 kHz to10 MHz		–	0.8	–	ps
		F _{out} = 156.25 MHz @ BW: 1.87 to 20 MHz		–	0.5	–	ps
		F _{out} = 200 MHz @ BW: 1 to 20 MHz		–	0.5	–	ps
P _J	RMS Period Jitter	F _{out} = 106.25 MHz		–	3.0	TBD	ps
		F _{out} = 156.25 MHz		–	2.5	TBD	ps
		F _{out} = 200 MHz		–	2.0	TBD	ps

LVDS, 3.3V $\pm 10\%$, -40 to 85°C

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
F _{out}	Output Frequency			10	–	220	MHz
F _{sta}	Frequency Stability	Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change	0 to 70°C	-10	–	+10	PPM
			-20 to 70°C	-12	–	+12	PPM
			-40 to 85°C	-15	–	+15	PPM
			0 to 70°C	-25		+25	PPM
			-20 to 70°C	-50		+50	PPM
			-40 to 85°C	-100		+100	PPM
F _{age}	Aging	First year @ 25°C		–	–	1	PPM
DC	Duty Cycle			45	–	55	%
t _R /t _F	Output Rise/Fall Time	20% to 80%		–	300	TBD	ps
PH _J	RMS Phase Jitter (random)	F _{out} = 106.25 MHz @ BW: 637 kHz to 10 MHz		–	0.8	–	ps
		F _{out} = 156.25 MHz @ BW: 1.87 to 20 MHz		–	0.5	–	ps
		F _{out} = 200 MHz @ BW: 1 to 20 MHz		–	0.5	–	ps
P _J	RMS Period Jitter	F _{out} = 106.25 MHz		–	3.0	TBD	ps
		F _{out} = 156.25 MHz		–	2.5	TBD	ps
		F _{out} = 200 MHz		–	2.0	TBD	ps

LVDS, 2.5V $\pm 10\%$, -40 to 85°C

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
F _{out}	Output Frequency			10	–	220	MHz
F _{sta}	Frequency Stability	Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change	0 to 70°C	-10	–	+10	PPM
			-20 to 70°C	-12	–	+12	PPM
			-40 to 85°C	-15	–	+15	PPM
			0 to 70°C -20 to 70°C -40 to 85°C	-25		+25	PPM
				-50		+50	PPM
				-100		+100	PPM
F _{age}	Aging	First year @ 25°C		–	–	1	PPM
DC	Duty Cycle			45	–	55	%
t _R /t _F	Output Rise/Fall Time	20% to 80%		–	300	TBD	ps
PH _J	RMS Phase Jitter (random)	F _{out} = 106.25 MHz @ BW: 637 kHz to 10 MHz		–	0.8	–	ps
		F _{out} = 156.25 MHz @ BW: 1.87 to 20 MHz		–	0.5	–	ps
		F _{out} = 200 MHz @ BW: 1 to 20 MHz		–	0.5	–	ps
P _J	RMS Period Jitter	F _{out} = 106.25 MHz		–	3.0	TBD	ps
		F _{out} = 156.25 MHz		–	2.5	TBD	ps
		F _{out} = 200 MHz		–	2.0	TBD	ps

CML, 3.3V $\pm 10\%$, -40 to 85°C

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
F _{out}	Output Frequency			10	–	220	MHz
F _{sta}	Frequency Stability	Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change	0 to 70°C	-10	–	+10	PPM
			-20 to 70°C	-12	–	+12	PPM
			-40 to 85°C	-15	–	+15	PPM
			0 to 70°C	-25		+25	PPM
			-20 to 70°C	-50		+50	PPM
			-40 to 85°C	-100		+100	PPM
F _{age}	Aging	First year @ 25°C		–	–	1	PPM
DC	Duty Cycle			45	–	55	%
t _R /t _F	Output Rise/Fall Time	20% to 80%		–	300	TBD	ps
PH _J	RMS Phase Jitter (random)	F _{out} = 106.25 MHz @ BW: 637 kHz to10 MHz		–	0.8	–	ps
		F _{out} = 156.25 MHz @ BW: 1.87 to 20 MHz		–	0.5	–	ps
		F _{out} = 200 MHz @ BW: 1 to 20 MHz		–	0.5	–	ps
P _J	RMS Period Jitter	F _{out} = 106.25 MHz		–	3.0	TBD	ps
		F _{out} = 156.25 MHz		–	2.5	TBD	ps
		F _{out} = 200 MHz		–	2.0	TBD	ps

CML, 2.5V \pm 10% , -40 to 85°C

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
F _{out}	Output Frequency			10	–	220	MHz
F _{sta}	Frequency Stability	Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change	0 to 70°C	-10	–	+10	PPM
			-20 to 70°C	-12	–	+12	PPM
			-40 to 85°C	-15	–	+15	PPM
			0 to 70°C	-25		+25	PPM
			-20 to 70°C	-50		+50	PPM
			-40 to 85°C	-100		+100	PPM
F _{age}	Aging	First year @ 25°C		–	–	1	PPM
DC	Duty Cycle			45	–	55	%
t _R /t _F	Output Rise/Fall Time	20% to 80%		–	300	TBD	ps
PH _J	RMS Phase Jitter (random)	F _{out} = 106.25 MHz @ BW: 637 kHz to10 MHz		–	0.8	–	ps
		F _{out} = 156.25 MHz @ BW: 1.87 to 20 MHz		–	0.5	–	ps
		F _{out} = 200 MHz @ BW: 1 to 20 MHz		–	0.5	–	ps
P _J	RMS Period Jitter	F _{out} = 106.25 MHz		–	3.0	TBD	ps
		F _{out} = 156.25 MHz		–	2.5	TBD	ps
		F _{out} = 200 MHz		–	2.0	TBD	ps

CML, 1.8V \pm 5% , -40 to 85°C

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
F _{out}	Output Frequency			10	–	220	MHz
F _{sta}	Frequency Stability	Inclusive of initial tolerance, operating temp., rated power supply voltage change, load change	0 to 70°C	-15	–	+15	PPM
			-20 to 70°C	-20	–	+20	PPM
			-40 to 85°C	-20	–	+20	PPM
			0 to 70°C	-25		+25	PPM
			-20 to 70°C	-50		+50	PPM
			-40 to 85°C	-100		+100	PPM
F _{age}	Aging	First year @ 25°C		–	–	1	PPM
DC	Duty Cycle			45	–	55	%
t _R /t _F	Output Rise/Fall Time	20% to 80%		–	300	TBD	ps
PH _J	RMS Phase Jitter (random)	F _{out} = 106.25 MHz @ BW: 637 kHz to10 MHz		–	0.8	–	ps
		F _{out} = 156.25 MHz @ BW: 1.87 to 20 MHz		–	0.5	–	ps
		F _{out} = 200 MHz @ BW: 1 to 20 MHz		–	0.5	–	ps
P _J	RMS Period Jitter	F _{out} = 106.25 MHz		–	3.0	TBD	ps
		F _{out} = 156.25 MHz		–	2.5	TBD	ps
		F _{out} = 200 MHz		–	2.0	TBD	ps

Termination Diagrams

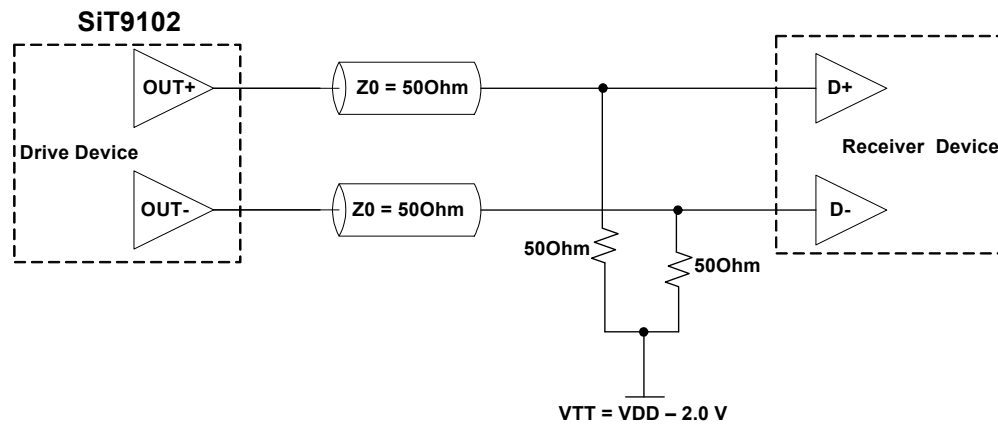


Figure 1. LVPECL Typical Termination

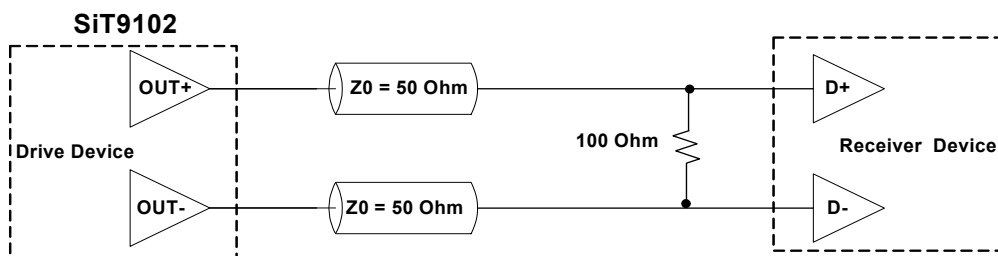
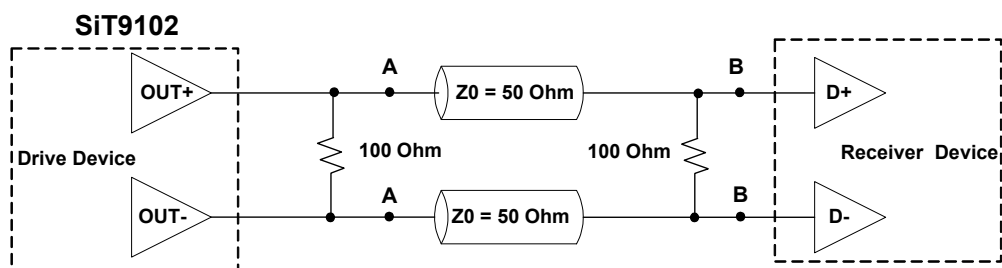


Figure 2. LVDS Single Termination (Load Terminated)



Note: For AC coupled operation, include/insert decoupling caps at points A or B

Figure 3. LVDS Double Termination (Source + Load Terminated)

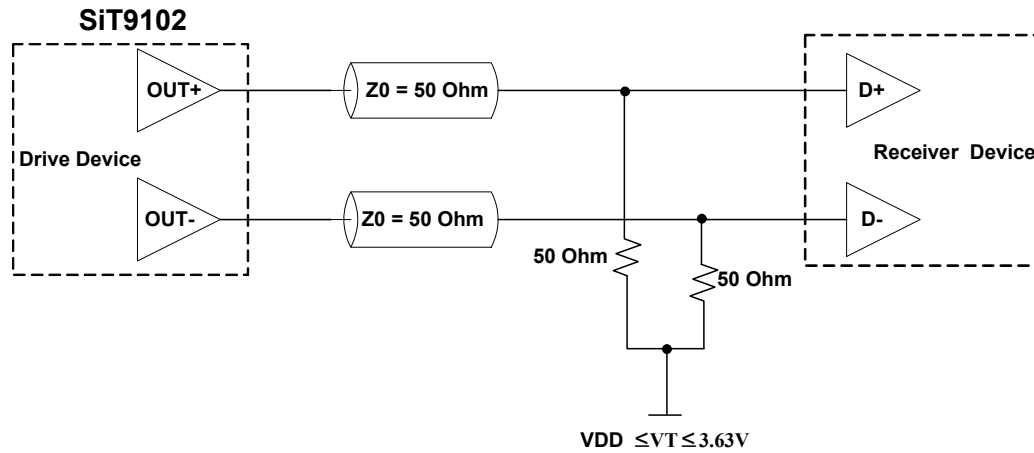
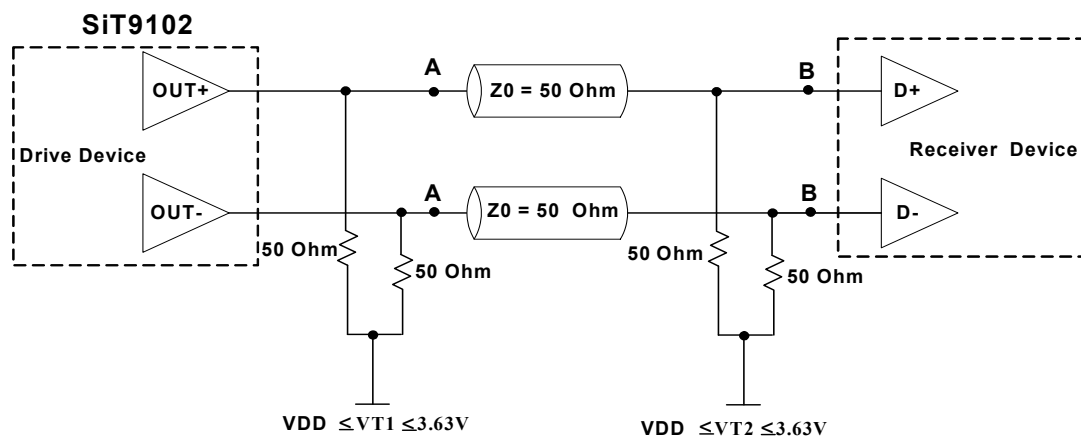


Figure 4. CML Single Load Termination



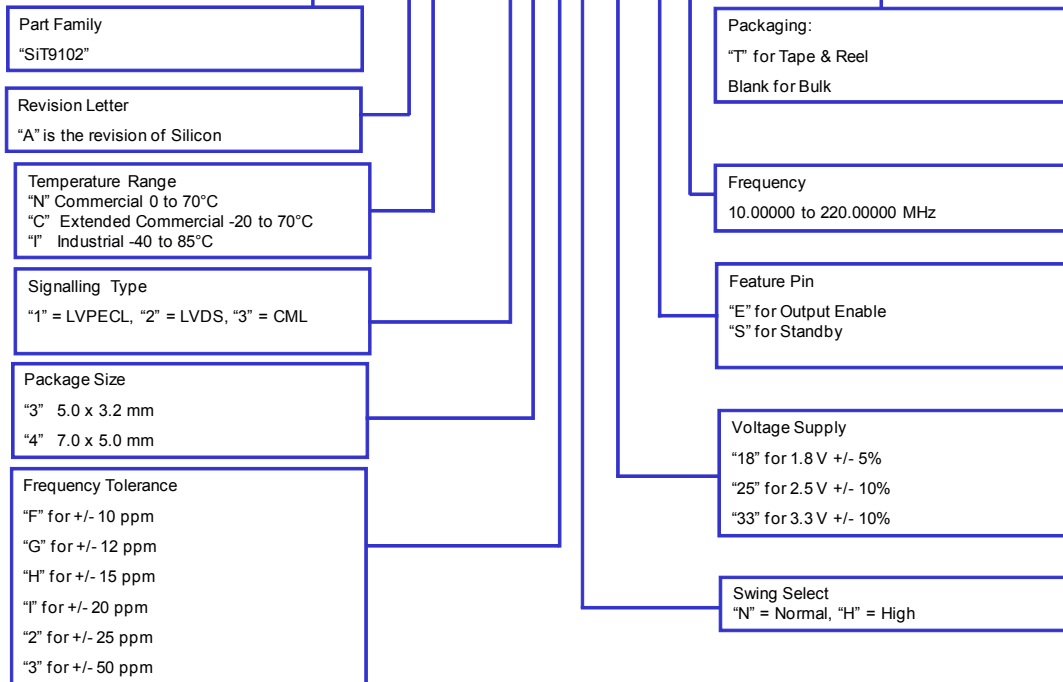
Notes:

1. For DC-coupled operation, $V_{T1} = V_{T2}$ 2. For AC-coupled operation, V_{T2} sets the input common mode of Receiver Device and need not to be related to V_{T1}

Figure 5. CML Double Load Termination

Ordering Information

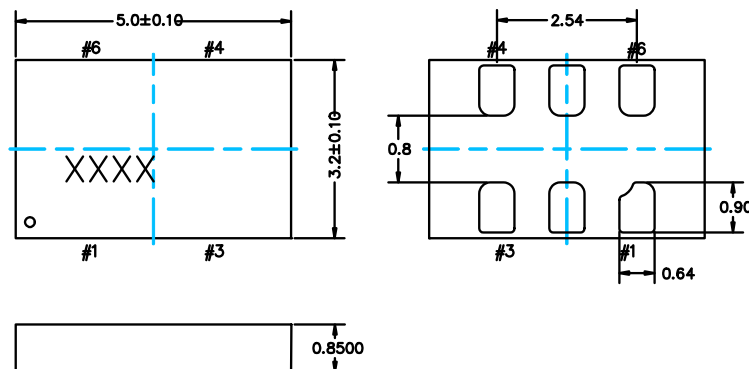
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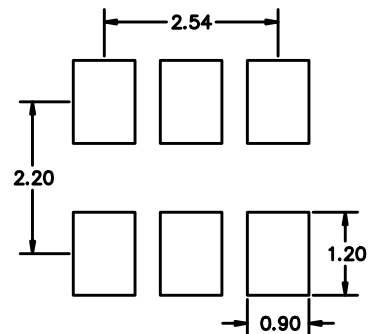
Package Information ^[1]

Dimension (mm)

5.0 x 3.2 x 0.85mm

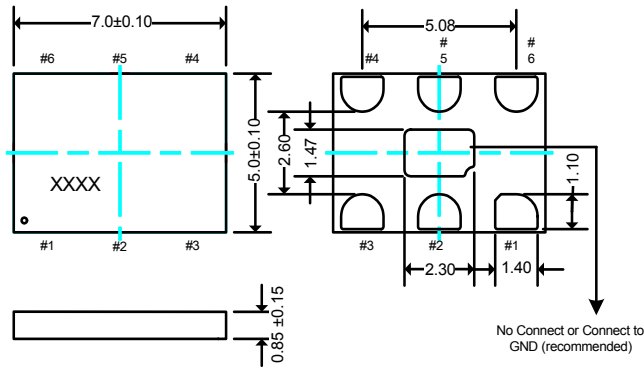
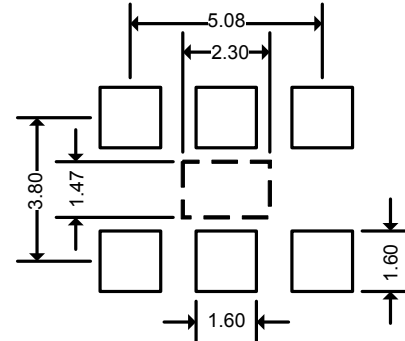


Land Pattern^[2] (recommended) (mm)



Notes:

1. xxxx top marking denotes manufacturing lot number.
2. A capacitor of value 0.1µF between VDD and GND is recommended

Package Information (continued)^[1]
Dimension (mm)
7.0 x 5.0 x 0.85mm

Land Pattern^[2] (recommended) (mm)


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