Ultra Series™ Crystal Oscillator Si541 Data Sheet

Ultra Low Jitter Dual Any-Frequency XO (125 fs), 0.2 to 1500 MHz
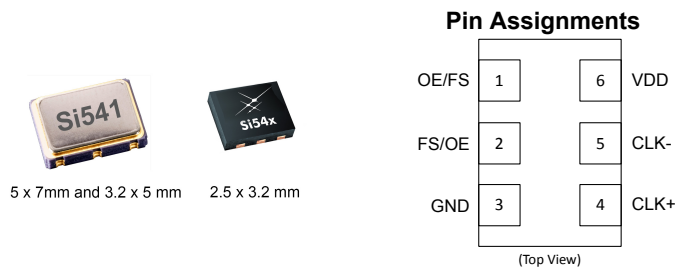
The Si541 Ultra Series™ oscillator utilizes Skyworks Solutions' advanced 4th generation DSPLL® technology to provide an ultra-low jitter, low phase noise clock at two selectable frequencies. The device is factory-programmed to provide any two selectable frequencies from 0.2 to 1500 MHz with <1 ppb resolution and maintains exceptionally low jitter for both integer and fractional frequencies across its operating range. The Si541 offers excellent reliability and frequency stability as well as guaranteed aging performance. On-chip power supply filtering provides industry-leading power supply noise rejection, simplifying the task of generating low jitter clocks in noisy systems that use switched-mode power supplies. Offered in industry-standard footprints, the Si541 has a dramatically simplified supply chain that enables Skyworks to ship custom frequency samples 1-2 weeks after receipt of order. Unlike a traditional XO, where a different crystal is required for each output frequency, the Si541 uses one simple crystal and a DSPLL IC-based approach to provide the desired output frequencies. This process also guarantees 100% electrical testing of every device. The Si541 is factory-configurable for a wide variety of user specifications, including frequency, output format, and OE pin location/polarity. Specific configurations are factory-programmed at time of shipment, eliminating the long lead times associated with custom oscillators.

KEY FEATURES

- Available with any two selectable frequencies from 0.2 MHz to 1500 MHz
- Very low jitter: 125 fs Typ RMS (12 kHz – 20 MHz)
- Excellent PSNR and supply noise immunity: –80 dBc Typ
- 7 ppm stability option (-40 to 85 C)
- 3.3 V, 2.5 V and 1.8 V V_{DD} supply operation from the same part number
- LVPECL, LVDS, CML, HCSL, CMOS, and Dual CMOS output options
- 2.5x3.2, 3.2x5, 5x7 mm package options
- Any custom frequency available with 1-2 week lead times

APPLICATIONS

- 100G/200G/400G OTN, coherent optics
- 10G/40G/100G optical ethernet
- 3G-SDI/12G-SDI/24G-SDI broadcast video
- Servers, switches, storage, NICs, search acceleration
- Test and measurement
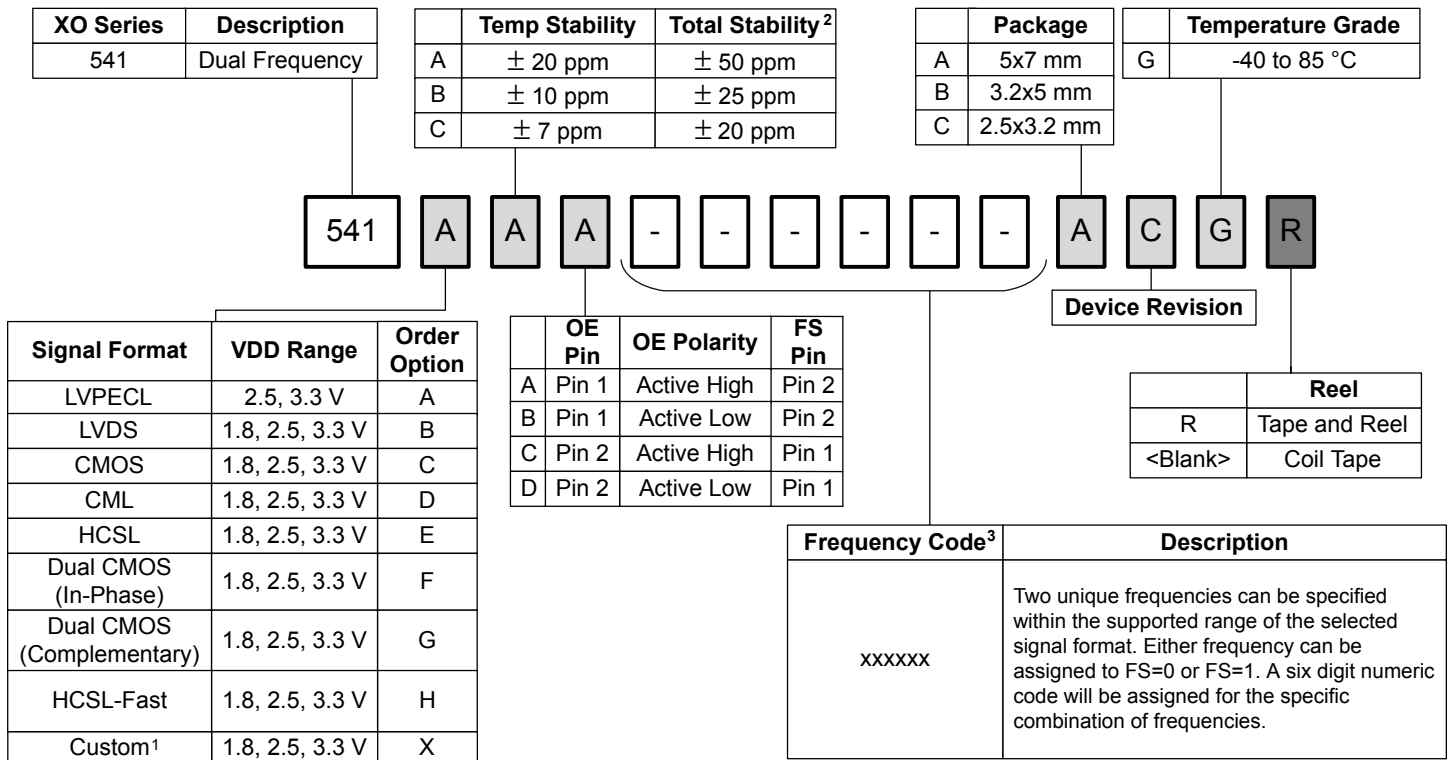- Clock and data recovery
- FPGA/ASIC clocking

Pin Assignments

5 x 7mm and 3.2 x 5 mm   2.5 x 3.2 mm

OE/FS	1	6	VDD
FS/OE	2	5	CLK-
GND	3	4	CLK+

(Top View)

Pin #	Descriptions
1, 2	*Selectable via ordering option* OE = Output enable; FS = Frequency Select
3	GND = Ground
4	CLK+ = Clock output
5	CLK- = Complementary clock output. Not used for CMOS.
6	VDD = Power supply
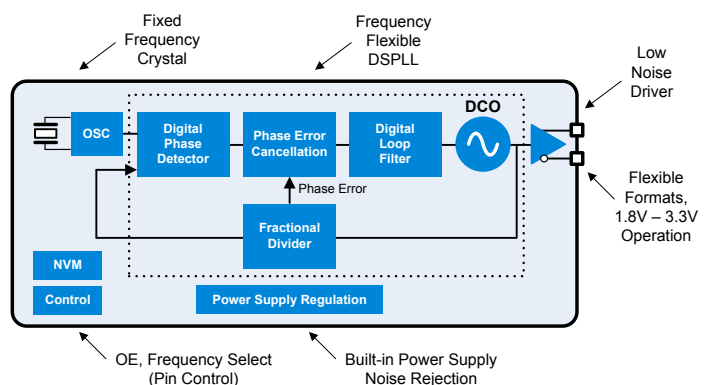
1. Ordering Guide

The Si541 XO supports a variety of options including frequency, output format, and OE pin location/polarity, as shown in the chart below. Specific device configurations are programmed into the part at time of shipment, and samples are available in 1-2 weeks. Skyworks Solutions provides an online part number configuration utility to simplify this process. Refer to https://www.skyworksinc.com/Products/Timing-Oscillators to access this tool and for further ordering instructions.

XO Series	Description
541	Dual Frequency

	Temp Stability	Total Stability [2]
A	± 20 ppm	± 50 ppm
B	± 10 ppm	± 25 ppm
C	± 7 ppm	± 20 ppm

	Package
A	5x7 mm
B	3.2x5 mm
C	2.5x3.2 mm

	Temperature Grade
G	-40 to 85 °C

541 A A A - - - - - - A C G R

Device Revision

Signal Format	VDD Range	Order Option
LVPECL	2.5, 3.3 V	A
LVDS	1.8, 2.5, 3.3 V	B
CMOS	1.8, 2.5, 3.3 V	C
CML	1.8, 2.5, 3.3 V	D
HCSL	1.8, 2.5, 3.3 V	E
Dual CMOS (In-Phase)	1.8, 2.5, 3.3 V	F
Dual CMOS (Complementary)	1.8, 2.5, 3.3 V	G
HCSL-Fast	1.8, 2.5, 3.3 V	H
Custom[1]	1.8, 2.5, 3.3 V	X

	OE Pin	OE Polarity	FS Pin
A	Pin 1	Active High	Pin 2
B	Pin 1	Active Low	Pin 2
C	Pin 2	Active High	Pin 1
D	Pin 2	Active Low	Pin 1

	Reel
R	Tape and Reel
<Blank>	Coil Tape

Frequency Code[3]	Description
xxxxxx	Two unique frequencies can be specified within the supported range of the selected signal format. Either frequency can be assigned to FS=0 or FS=1. A six digit numeric code will be assigned for the specific combination of frequencies.

Notes:
1. Contact Skyworks for non-standard configurations.
2. Total stability includes temp stability, initial accuracy, load pulling, VDD variation, and 20 year aging at 70 °C.
3. Create custom part numbers at https://www.skyworksinc.com/Products/Timing-Oscillators.

1.1 Technical Support

Frequently Asked Questions (FAQ)	https://www.skyworksinc.com/products/timing/ultra-series-crystal-oscillators-xo/si541
Oscillator Phase Noise Lookup Utility	https://www.skyworksinc.com/tools/oscillator-phase-noise
Quality and Reliability	www.skyworksinc.com/quality
Development Kits	https://www.skyworksinc.com/Products/Timing-Oscillators

2. Electrical Specifications

Table 2.1. Electrical Specifications

V_{DD} = 1.8 V, 2.5 or 3.3 V ± 5%, T_A = –40 to 85 ºC

Parameter	Symbol	Test Condition/Comment	Min	Typ	Max	Unit
Temperature Range	T_A		–40	—	85	ºC
Frequency Range	F_{CLK}	LVPECL, LVDS, CML	0.2	—	1500	MHz
		HCSL	0.2	—	400	MHz
		CMOS, Dual CMOS	0.2	—	250	MHz
Supply Voltage	V_{DD}	3.3 V	3.135	3.3	3.465	V
		2.5 V	2.375	2.5	2.625	V
		1.8 V	1.71	1.8	1.89	V
Supply Current	I_{DD}	LVPECL (output enabled)	—	100	145	mA
		LVDS/CML (output enabled)	—	75	111	mA
		HCSL (output enabled)	—	80	125	mA
		HCSL-Fast (output enabled)	—	88	137	mA
		CMOS (output enabled)	—	74	108	mA
		Dual CMOS (output enabled)	—	80	125	mA
		Tristate Hi-Z (output disabled)	—	64	100	mA
Temperature Stability		Frequency stability Grade A	–20	—	20	ppm
		Frequency stability Grade B	–10	—	10	ppm
		Frequency stability Grade C	–7	—	7	ppm
Total Stability[1]	F_{STAB}	Frequency stability Grade A	–50	—	50	ppm
		Frequency stability Grade B	–25	—	25	ppm
		Frequency stability Grade C	–20	—	20	ppm
Rise/Fall Time (20% to 80% V_{PP})	T_R/T_F	LVPECL/LVDS/CML	—	—	350	ps
		CMOS / Dual CMOS, (C_L = 5 pF)	—	0.5	1.5	ns
		HCSL, F_{CLK} >50 MHz	—	—	550	ps
		HCSL-Fast, F_{CLK} >50 MHz	—	—	275	ps
Duty Cycle	D_C	All formats	45	—	55	%
Output Enable (OE) Frequency Select (FS)[2]	V_{IH}		0.7 × V_{DD}	—	—	V
	V_{IL}		—	—	0.3 × V_{DD}	V
	T_D	Output Disable Time, F_{CLK} >10 MHz	—	—	3	µs
	T_E	Output Enable Time, F_{CLK} > 10 MHz	—	—	20	µs
	T_{FS}	Settling Time after FS Change	—	—	10	ms
Powerup Time	t_{OSC}	Time from 0.9 × V_{DD} until output frequency (F_{CLK}) within spec	—	—	10	ms

Parameter	Symbol	Test Condition/Comment	Min	Typ	Max	Unit
Powerup VDD Ramp Rate	V_{RAMP}	Fastest VDD ramp allowed on startup	—	—	100	V/ms
LVPECL Output Option[3]	V_{OC}	Mid-level	$V_{DD} - 1.42$	—	$V_{DD} - 1.25$	V
	V_O	Swing (diff)	1.1	—	1.9	V_{PP}
LVDS Output Option[4]	V_{OC}	Mid-level (2.5 V, 3.3 V VDD)	1.125	1.20	1.275	V
		Mid-level (1.8 V VDD)	0.8	0.9	1.0	V
	V_O	Swing ($F_{CLK} \leq 1.4$ GHz)	0.6	0.7	0.9	V_{PP}
		Swing ($F_{CLK} > 1.4$ GHz)	0.5	0.7	0.9	V_{PP}
HCSL Output Option[5] HCSL-Fast Output Option[5]	V_{OH}	Output voltage high	660	750	850	mV
	V_{OL}	Output voltage low	−150	0	150	mV
	V_C	Crossing voltage	250	350	550	mV
CML Output Option (AC-Coupled)	V_O	Swing (diff)	0.6	0.8	1.0	V_{PP}
CMOS Output Option	V_{OH}	I_{OH} = 8/6/4 mA for 3.3/2.5/1.8 V VDD	$0.85 \times V_{DD}$	—	—	V
	V_{OL}	I_{OL} = 8/6/4 mA for 3.3/2.5/1.8 V VDD	—	—	$0.15 \times V_{DD}$	V

Notes:

1. Total Stability includes temperature stability, initial accuracy, load pulling, VDD variation, and aging for 20 yrs at 70 ºC.
2. OE includes a 50 kΩ pull-up to VDD for OE active high. Includes a 50 kΩ pull-down to GND for OE active low. FS includes a 50 kΩ pull-up to VDD.
3. 50 Ω to V_{DD} – 2.0 V. Additional DC current from the output driver will flow through the 50Ω resistors, resulting in a shift in common mode voltage. The measurements in this table have accounted for this.
4. R_{term} = 100 Ω (differential).
5. 50 Ω to GND.

Table 2.2. Clock Output Phase Jitter and PSNR

V_{DD} = 1.8 V, 2.5 or 3.3 V ± 5%, T_A = –40 to 85 ºC

Parameter	Symbol	Test Condition/Comment	Min	Typ	Max	Unit
Phase Jitter (RMS, 12kHz - 20MHz)[1] 2.5 x 3.2 mm, 3.2 x 5 mm, $F_{CLK} \geq 100$ MHz	ϕ_J	Differential Formats	—	125	200	fs
		CMOS, Dual CMOS	—	200	—	fs
Phase Jitter (RMS, 12kHz - 20MHz)[1] 5 x 7 mm, $F_{CLK} \geq 100$ MHz		Differential Formats	—	150	200	fs
		CMOS, Dual CMOS	—	200	—	fs
Spurs Induced by External Power Supply Noise, 50 mVpp Ripple. LVDS 156.25 MHz Output	PSNR	100 kHz sine wave	—	-83	—	dBc
		200 kHz sine wave	—	-83	—	
		500 kHz sine wave	—	-82	—	
		1 MHz sine wave	—	-85	—	

Note:

1. Guaranteed by characterization. Jitter inclusive of any spurs.

Table 2.3. 3.2 x 5 mm Clock Output Phase Noise (Typical, 50ppm Total Stability Option)

Offset Frequency (f)	156.25 MHz LVDS	200 MHz LVDS	644.53125 MHz LVDS	Unit
100 Hz	−110	−107	−99	
1 kHz	−121	−120	−109	
10 kHz	−132	−130	−121	
100 kHz	−139	−137	−127	dBc/Hz
1 MHz	−151	−149	−138	
10 MHz	−160	−161	−155	
20 MHz	−161	−162	−157	
Offset Frequency (f)	**156.25 MHz LVPECL**	**200 MHz LVPECL**	**644.53125 MHz LVPECL**	**Unit**
100 Hz	−113	−110	−100	
1 kHz	−123	−120	−110	
10 kHz	−133	−130	−119	
100 kHz	−139	−137	−127	dBc/Hz
1 MHz	−151	−149	−138	
10 MHz	−162	−166	−156	
20 MHz	−163	−167	−157	
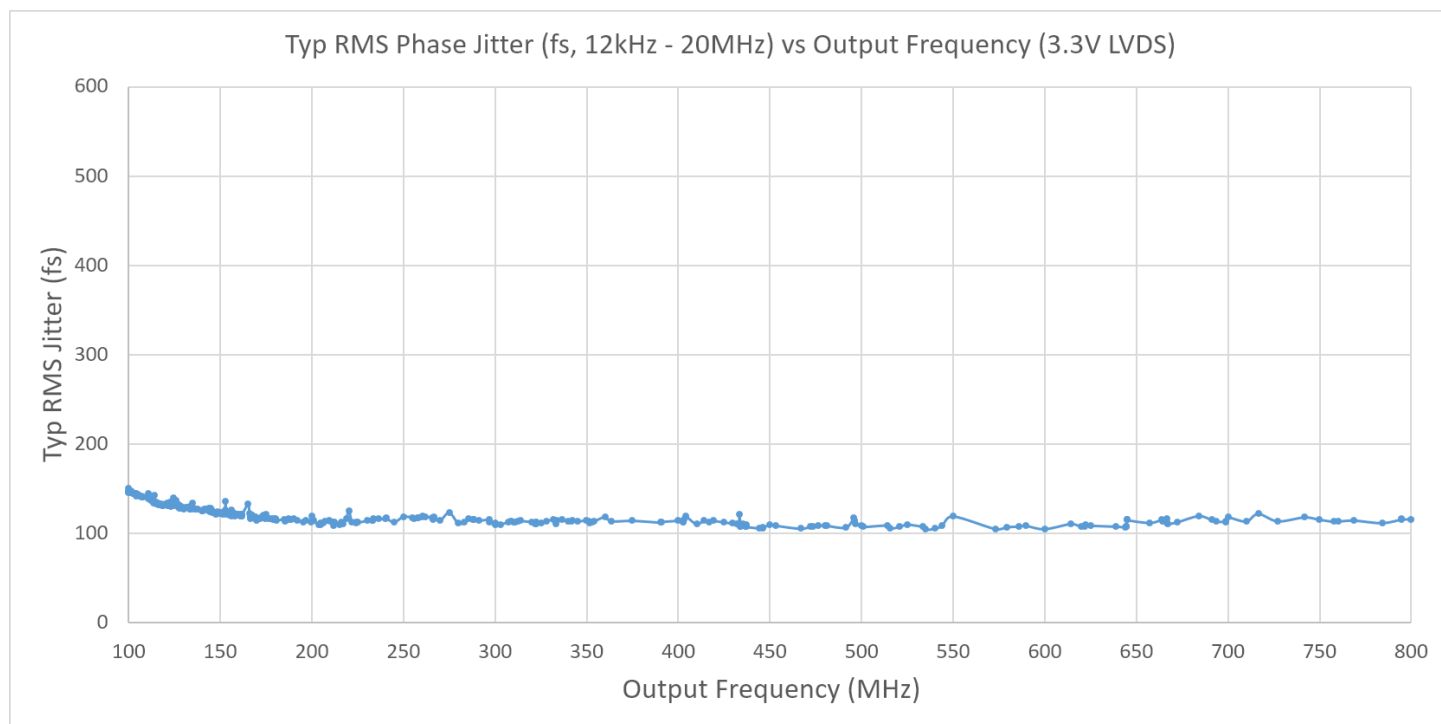
Phase jitter measured with Agilent E5052 using a differential-to-single ended converter (balun or buffer). Measurements collected for >700 commonly used frequencies. Phase noise plots for specific frequencies are available using our free, online Oscillator Phase Noise Lookup Tool at https://www.skyworksinc.com/Products/Timing-Oscillators.

Figure 2.1. Phase Jitter vs. Output Frequency

Table 2.4. Environmental Compliance and Package Information

Parameter	Test Condition
Mechanical Shock	MIL-STD-883, Method 2002
Mechanical Vibration	MIL-STD-883, Method 2007
Solderability	MIL-STD-883, Method 2003
Gross and Fine Leak	MIL-STD-883, Method 1014
Resistance to Solder Heat	MIL-STD-883, Method 2036
Moisture Sensitivity Level (MSL): 3.2 x 5, 5 x 7 packages	1
Moisture Sensitivity Level (MSL): 2.5 x 3.2 package	2
Contact Pads: 3.2x5, 5x7 packages	Au/Ni (0.3 - 1.0 µm / 1.27 - 8.89 µm)
Contact Pads: 2.5x3.2 packages	Au/Pd/Ni (0.03 - 0.12 µm / 0.1 - 0.2 µm / 3.0 - 8.0 µm)

Note:

1. For additional product information not listed in the data sheet (e.g. RoHS Certifications, MDDS data, qualification data, REACH Declarations, ECCN codes, etc.), refer to our "Corporate Request For Information" portal found here: www.skyworksinc.com/quality.

Table 2.5. Thermal Conditions

Max Junction Temperature = 125° C

Package	Parameter	Symbol	Test Condition	Value	Unit
2.5 x 3.2 mm 6-pin DFN	Thermal Resistance Junction to Ambient	Θ_{JA}	Still Air, 85 °C	80	°C/W
	Thermal Parameter Junction to Board	Ψ_{JB}	Still Air, 85 °C	39	°C/W
	Thermal Parameter Junction to Top Center	Ψ_{JT}	Still Air, 85 °C	17	°C/W
3.2 × 5 mm 6-pin CLCC	Thermal Resistance Junction to Ambient	Θ_{JA}	Still Air, 85 °C	55	°C/W
	Thermal Parameter Junction to Board	Ψ_{JB}	Still Air, 85 °C	20	°C/W
	Thermal Parameter Junction to Top Center	Ψ_{JT}	Still Air, 85 °C	20	°C/W
5 × 7 mm 6-pin CLCC	Thermal Resistance Junction to Ambient	Θ_{JA}	Still Air, 85 °C	53	°C/W
	Thermal Parameter Junction to Board	Ψ_{JB}	Still Air, 85 °C	26	°C/W
	Thermal Parameter Junction to Top Center	Ψ_{JT}	Still Air, 85 °C	26	°C/W

Note:

1. Based on PCB Dimensions: 4.5" x 7", PCB Thickness: 1.6 mm, Number of Cu Layers: 4.

Table 2.6. Absolute Maximum Ratings[1]

Parameter	Symbol	Rating	Unit
Maximum Operating Temp.	T_{AMAX}	95	°C
Storage Temperature	T_S	−55 to 125	°C
Supply Voltage	V_{DD}	−0.5 to 3.8	°C
Input Voltage	V_{IN}	−0.5 to V_{DD} + 0.3	V
ESD HBM (JESD22-A114)	HBM	2.0	kV
Solder Temperature[2]	T_{PEAK}	260	°C
Solder Time at T_{PEAK}[2]	T_P	20–40	sec

Notes:
1. Stresses beyond those listed in this table may cause permanent damage to the device. Functional operation specification compliance is not implied at these conditions. Exposure to maximum rating conditions for extended periods may affect device reliability.
2. The device is compliant with JEDEC J-STD-020.

3. Dual CMOS Buffer

Dual CMOS output format ordering options support either complementary or in-phase signals for two identical frequency outputs. This feature enables replacement of multiple XOs with a single Si541 device.
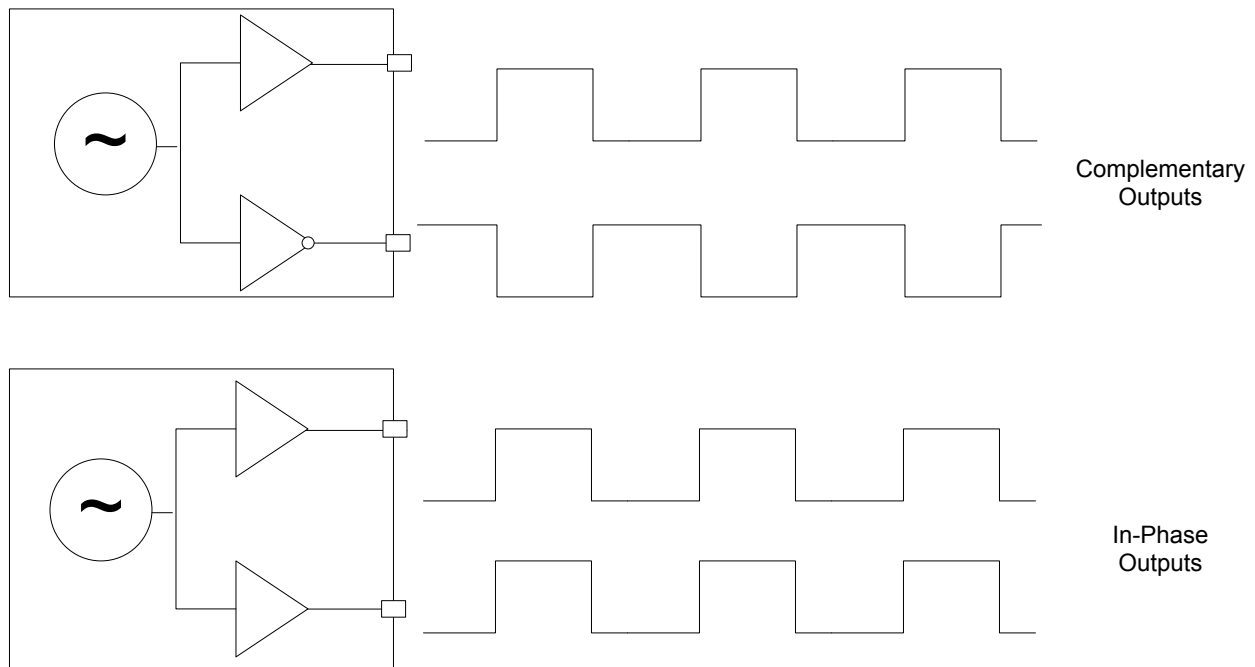
Figure 3.1. Integrated 1:2 CMOS Buffer Supports Complementary or In-Phase Outputs

4. Recommended Output Terminations

The output drivers support both AC-coupled and DC-coupled terminations as shown in figures below.
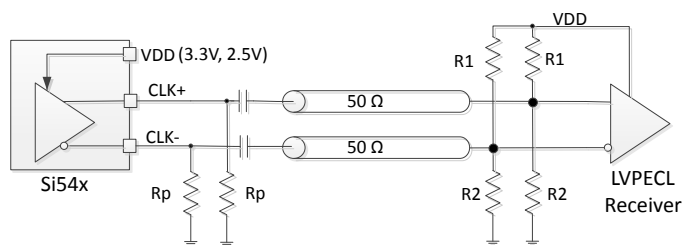
AC-Coupled LVPECL – Thevenin Termination
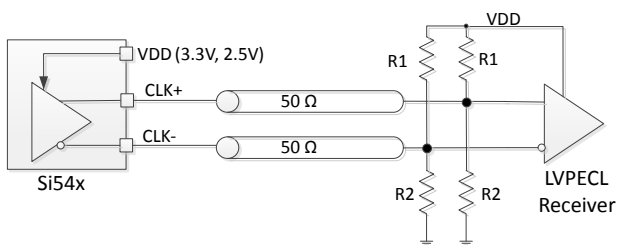
DC-Coupled LVPECL – Thevenin Termination
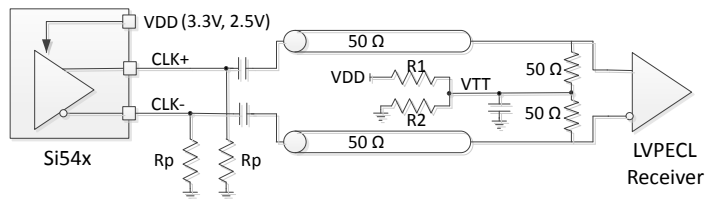
AC-Coupled LVPECL - 50 Ω w/VTT Bias
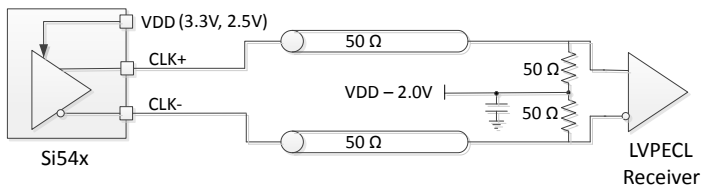
DC-Coupled LVPECL - 50 Ω w/VTT Bias

Figure 4.1. LVPECL Output Terminations

AC Coupled LVPECL Termination Resistor Values			
VDD	R1	R2	Rp
3.3 V	82.5 Ω	127 Ω	130 Ω
2.5 V	62.5 Ω	250 Ω	90 Ω

DC Coupled LVPECL Termination Resistor Values		
VDD	R1	R2
3.3 V	127 Ω	82.5 Ω
2.5 V	250 Ω	62.5 Ω

DC-Coupled LVDS

Source Terminated HCSL

AC-Coupled LVDS

Destination Terminated HCSL
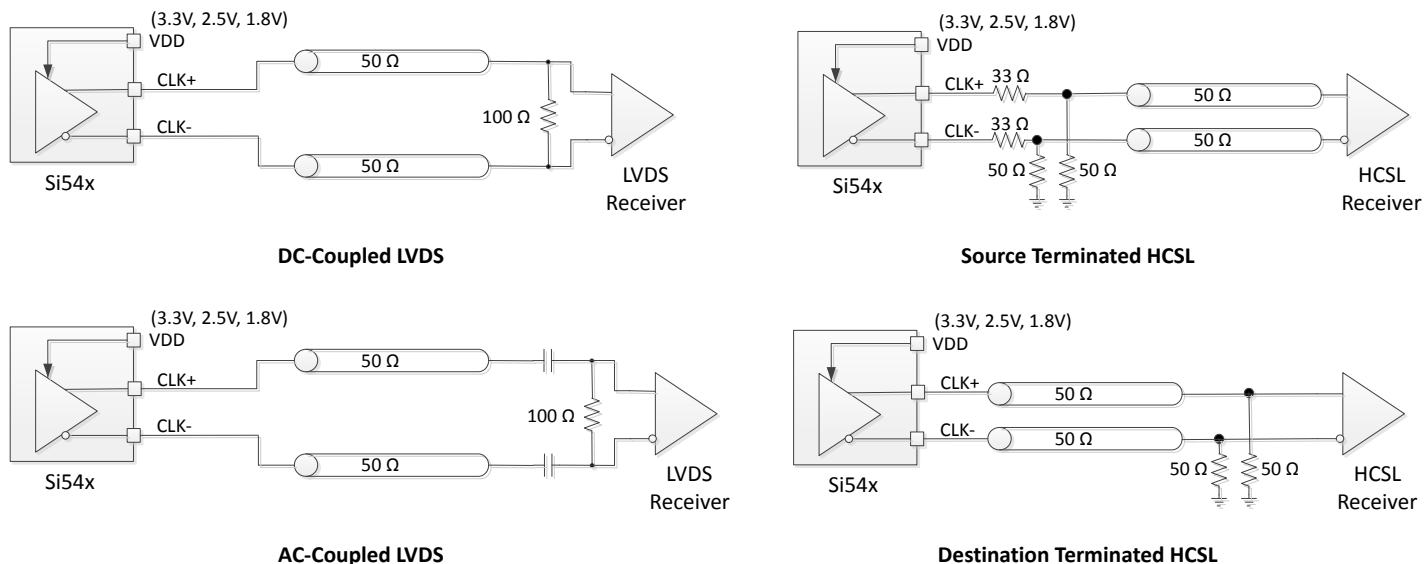
Figure 4.2. LVDS and HCSL Output Terminations

CML Termination without VCM

Single CMOS Termination

CML Termination with VCM

Dual CMOS Termination
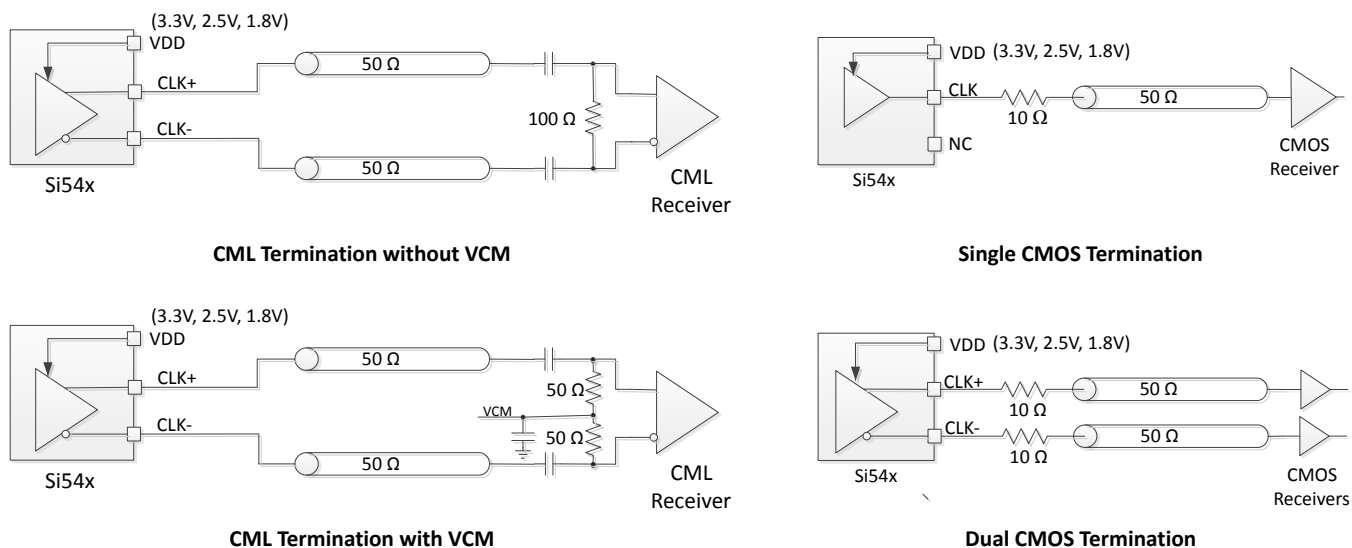
Figure 4.3. CML and CMOS Output Terminations

5. Package Outline

5.1 Package Outline (5×7 mm)

The figure below illustrates the package details for the 5×7 mm Si541. The table below lists the values for the dimensions shown in the illustration.
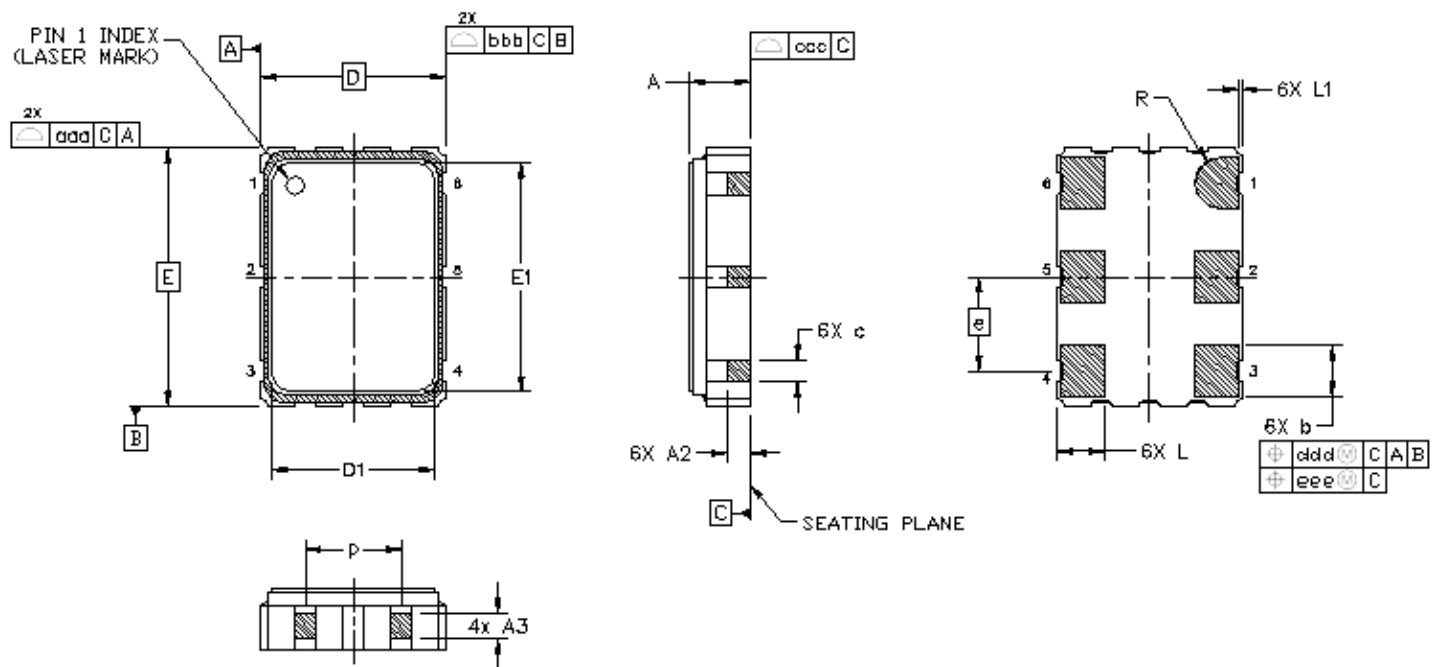
Figure 5.1. Si541 (5×7 mm) Outline Diagram

Table 5.1. Package Diagram Dimensions (mm)

Dimension	Min	Nom	Max	Dimension	Min	Nom	Max
A	1.13	1.28	1.43	L	1.17	1.27	1.37
A2	0.50	0.55	0.60	L1	0.05	0.10	0.15
A3	0.50	0.55	0.60	p	1.70	—	1.90
b	1.30	1.40	1.50	R		0.70 REF	
c	0.50	0.60	0.70	aaa		0.15	
D		5.00 BSC		bbb		0.15	
D1	4.30	4.40	4.50	ccc		0.08	
e		2.54 BSC		ddd		0.10	
E		7.00 BSC		eee		0.05	
E1	6.10	6.20	6.30				

Notes:
1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing per ANSI Y14.5M-1994.

5.2 Package Outline (3.2×5 mm)

The figure below illustrates the package details for the 3.2×5 mm Si541. The table below lists the values for the dimensions shown in the illustration.
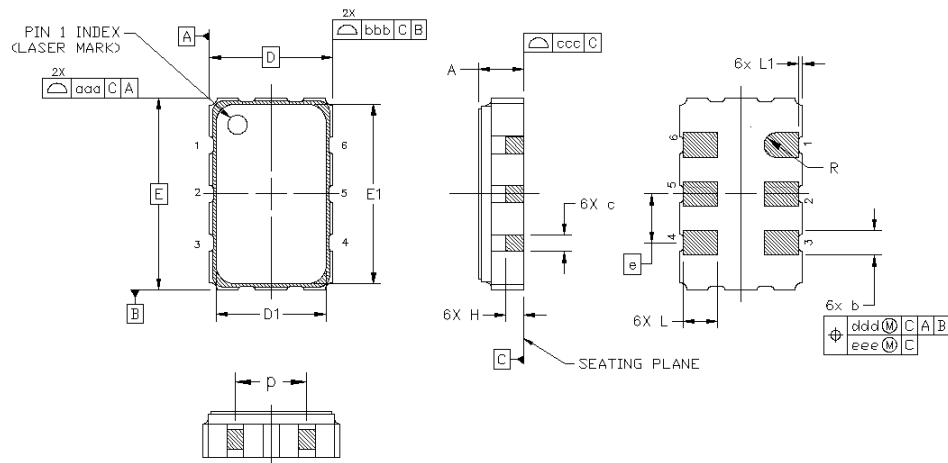

Figure 5.2. Si541 (3.2×5 mm) Outline Diagram

Table 5.2. Package Diagram Dimensions (mm)

Dimension	Min	Nom	Max
A	1.06	1.17	1.33
b	0.54	0.64	0.74
c	0.35	0.45	0.55
D		3.20 BSC	
D1	2.55	2.60	2.65
e		1.27 BSC	
E		5.00 BSC	
E1	4.35	4.40	4.45
H	0.45	0.55	0.65
L	0.80	0.90	1.00
L1	0.05	0.10	0.15
p	1.36	1.46	1.56
R		0.32 REF	
aaa		0.15	
bbb		0.15	
ccc		0.08	
ddd		0.10	
eee		0.05	

Notes:
1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing per ANSI Y14.5M-1994.

5.3 Package Outline (2.5x3.2 mm)

The figure below illustrates the package details for the 2.5x3.2 mm Si541. The table below lists the values for the dimensions shown in the illustration.
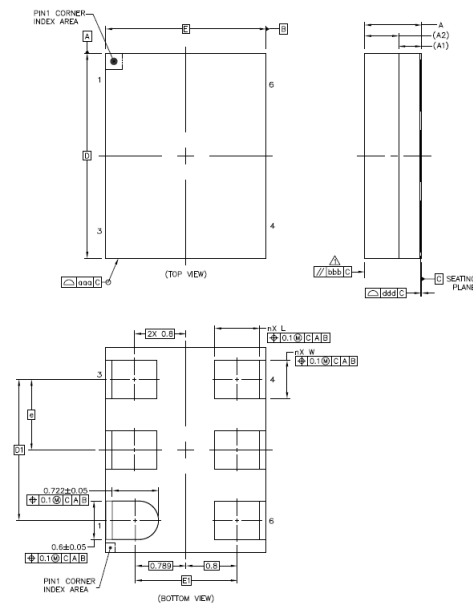
Figure 5.3. Si541 (2.5×3.2 mm) Outline Diagram

Table 5.3. Package Diagram Dimensions (mm)

Dimension	Min	Nom	Max
A	0.85	0.90	1.00
A1		0.36 REF	
A2		0.53 REF	
W	0.55	0.60	0.65
D		3.2 BSC	
E		2.5 BSC	
e		1.10 BSC	
L	0.65	0.70	0.75
n		5	
D1		2.2 BSC	
E1		1.589 BSC	
aaa		0.10	
bbb		0.10	
ddd		0.08	

Notes:
1. The dimensions in parentheses are reference.
2. All dimensions in millimeters (mm).
3. Dimensioning and Tolerancing per ANSI Y14.5M-1994.

6. PCB Land Pattern

6.1 PCB Land Pattern (5×7 mm)

The figure below illustrates the 5×7 mm PCB land pattern for the Si541. The table below lists the values for the dimensions shown in the illustration.
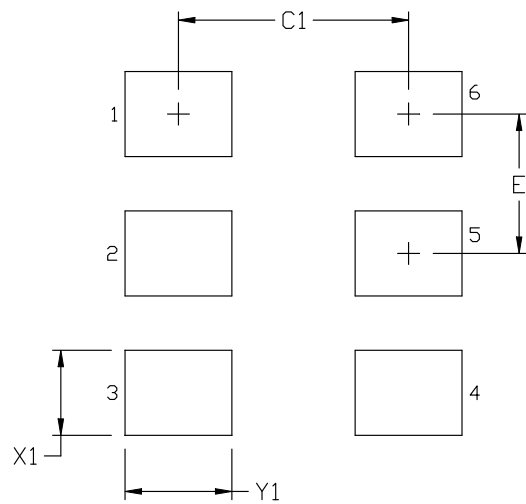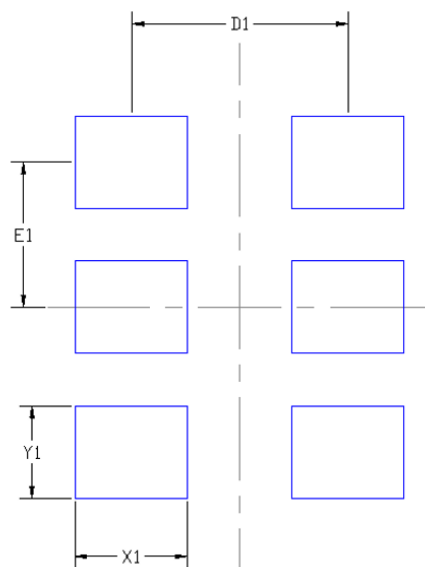

Figure 6.1. Si541 (5×7 mm) PCB Land Pattern

Table 6.1. PCB Land Pattern Dimensions (mm)

Dimension	(mm)
C1	4.20
E	2.54
X1	1.55
Y1	1.95

Notes:

General

1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing is per the ANSI Y14.5M-1994 specification.
3. This Land Pattern Design is based on the IPC-7351 guidelines.
4. All dimensions shown are at Maximum Material Condition (MMC). Least Material Condition (LMC) is calculated based on a Fabrication Allowance of 0.05 mm.

Solder Mask Design

1. All metal pads are to be non-solder mask defined (NSMD). Clearance between the solder mask and the metal pad is to be 60 μm minimum, all the way around the pad.

Stencil Design

1. A stainless steel, laser-cut and electro-polished stencil with trapezoidal walls should be used to assure good solder paste release.
2. The stencil thickness should be 0.125 mm (5 mils).
3. The ratio of stencil aperture to land pad size should be 1:1.

Card Assembly

1. A No-Clean, Type-3 solder paste is recommended.
2. The recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

6.2 PCB Land Pattern (3.2×5 mm)

The figure below illustrates the 3.2×5.0 mm PCB land pattern for the Si541. The table below lists the values for the dimensions shown in the illustration.
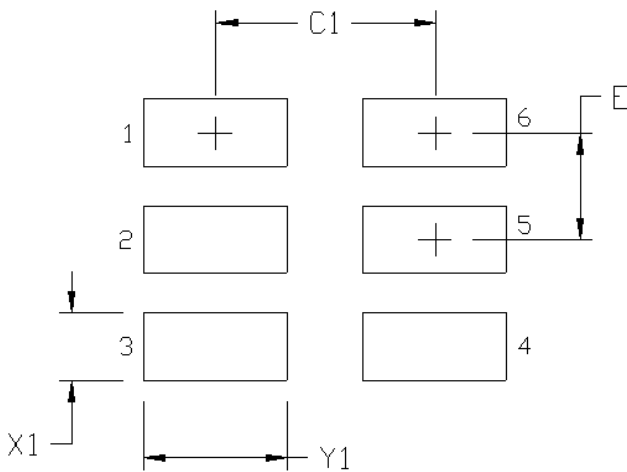
Figure 6.2. Si541 (3.2×5 mm) PCB Land Pattern

Table 6.2. PCB Land Pattern Dimensions (mm)

Dimension	(mm)
C1	2.60
E	1.27
X1	0.80
Y1	1.70

Notes:

General

1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing is per the ANSI Y14.5M-1994 specification.
3. This Land Pattern Design is based on the IPC-7351 guidelines.
4. All dimensions shown are at Maximum Material Condition (MMC). Least Material Condition (LMC) is calculated based on a Fabrication Allowance of 0.05 mm.

Solder Mask Design

1. All metal pads are to be non-solder mask defined (NSMD). Clearance between the solder mask and the metal pad is to be 60 μm minimum, all the way around the pad.

Stencil Design

1. A stainless steel, laser-cut and electro-polished stencil with trapezoidal walls should be used to assure good solder paste release.
2. The stencil thickness should be 0.125 mm (5 mils).
3. The ratio of stencil aperture to land pad size should be 1:1.

Card Assembly

1. A No-Clean, Type-3 solder paste is recommended.
2. The recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

6.3 PCB Land Pattern (2.5×3.2 mm)

The figure below illustrates the 2.5×3.2 mm PCB land pattern for the Si541. The table below lists the values for the dimensions shown in the illustration.

Figure 6.3. Si541 (2.5×3.2 mm) PCB Land Pattern

Table 6.3. PCB Land Pattern Dimensions (mm)

Dimension	Description	Value (mm)
X1	Width - leads on long sides	0.85
Y1	Height - leads on long sides	0.7
D1	Pitch in X directions of XLY1 leads	1.639
E1	Lead pitch XLY1 leads	1.10

Notes: The following notes and stencil design are shared as recommendations only. A customer or user may find it necessary to use different parameters and fine-tune their SMT process as required for their application and tooling.

General

1. All dimensions shown are in millimeters (mm) unless otherwise noted.
2. Dimensioning and Tolerancing is per the ANSI Y14.5M-1994 specification.
3. This Land Pattern Design is based on the IPC-7351 guidelines.
4. All dimensions shown are at Maximum Material Condition (MMC). Least Material Condition (LMC) is calculated based on a Fabrication Allowance of 0.05 mm.

Solder Mask Design

1. All metal pads are to be non-solder mask defined (NSMD). Clearance between the solder mask and the metal pad is to be 60 μm minimum, all the way around the pad.

Stencil Design

1. A stainless steel, laser-cut and electro-polished stencil with trapezoidal walls should be used to assure good solder paste release.
2. The stencil thickness should be 0.125 mm (5 mils).
3. The ratio of stencil aperture to land pad size should be 0.8:1 for the pads.

Card Assembly

1. A No-Clean, Type-3 solder paste is recommended.
2. The recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.

7. Top Marking (5x7 and 3.2x5 Packages)

The figure below illustrates the mark specification for the Si541. The table below lists the line information.
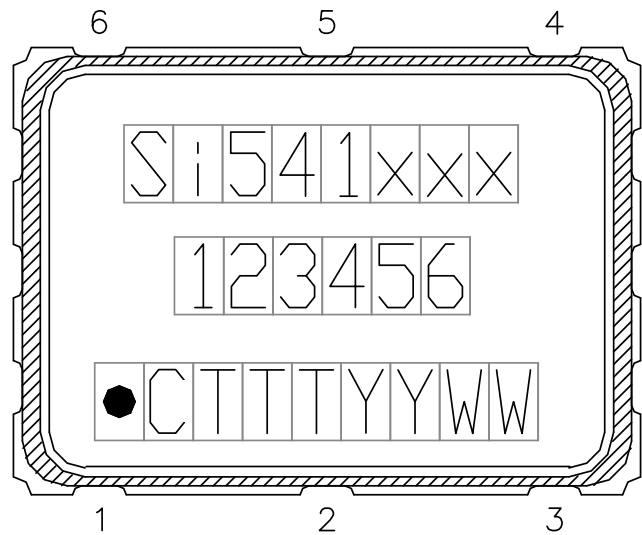
Figure 7.1. Mark Specification

Table 7.1. Si541 Top Mark Description

Line	Position	Description
1	1–8	"Si541", xxx = Ordering Option 1, Option 2, Option 3 (e.g. Si541AAA)
2	1–6	Frequency Code (6-digit custom code as described in the Ordering Guide)
3		**Trace Code**
	Position 1	Pin 1 orientation mark (dot)
	Position 2	Product Revision (C)
	Position 3–5	Tiny Trace Code (3 alphanumeric characters per assembly release instructions)
	Position 6–7	Year (last two digits of the year), to be assigned by assembly site (ex: 2017 = 17)
	Position 8–9	Calendar Work Week number (1–53), to be assigned by assembly site

8. Top Marking (2.5x3.2 Package)

The figure below illustrates the mark specification for the Si541 2.5x3.2 package sizes. The table below lists the line information.
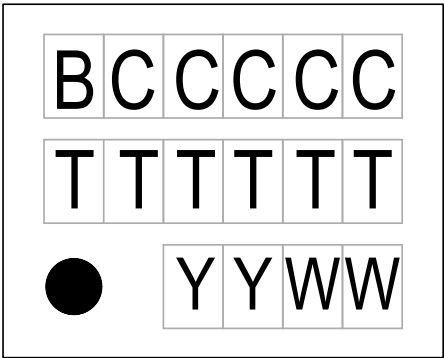
Figure 8.1. Mark Specification

Table 8.1. Si541 Top Mark Description

Line	Position	Description
1	1–6	B = Si541, CCCCC = Custom Mark Code
2		**Trace Code**
	1–6	Six-digit trace code per assembly release instructions
3	Position 1	Pin 1 orientation mark (dot)
	Position 2–3	Year (last two digits of the year), to be assigned by assembly site (exp: 2017 = 17)
	Position 4–5	Calendar Work Week number (1–53), to be assigned by assembly site

9. Revision History

Revision 206610A

May, 2023
- Updated Min and Nom package diagram dimensions specs in 5.3 Package Outline (2.5x3.2 mm).

Revision 1.3

June 2021
- Updated Ordering Guide and topmark for RevC silicon
- Added HCSL-Fast (faster tR/tF) ordering option
- Updated Table 2.1, Powerup VDD Ramp Rate

Revision 1.2

September 2020
- Updated Table 2.1, Powerup VDD Ramp Rate and LVDS Swing

Revision 1.1

November 2019
- Added 2.5x3.2 mm package option.

Revision 1.0

July 2018
- Added 20 ppm total stability option.

Revision 0.75

March 2018
- Added 25 ppm total stability option.

Revision 0.71

December 11, 2017
- Added 5x7 package and land pattern.

Revision 0.7

June 27, 2017
- Initial release.

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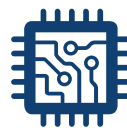
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541BAA001099CBG	541BAA001099CBGR	541BAA001148CBG	541BAA001148CBGR	541ACA001119CBG
541BCA000230BBGR	541CAA001059BBG	541CAA001059BBGR	541CAD000989BBG	541CAD000989BBGR
541ACA001119CBGR	541GAB000246BAG	541GAB000246BAGR	541AAA001040BAG	541DAB001016BAG
541DAB001016BAGR	541BCA000230BBG	541EAB000346BAG	541EAB000346BAGR	541FAB001022BAG
541FAB001022BAGR	541FAB001023BAG	541FAB001023BAGR	541DAA001028BAG	541DAA001028BAGR
541DAB000246BAG	541DAB000246BAGR	541EAB000246BAG	541EAB000246BAGR	541BAB000246BAG
541BAB000246BAGR	541CAA001021BAGR	541CAA001037BAGR	541CAB000246BAG	541CAB000246BAGR
541BAA001020BAG	541BAA001020BAGR	541BAA001036BAG	541BAA001036BAGR	541BAA001043BAG
541BAA001043BAGR	541ACA000149CBG	541ACA000149CBGR	541BCA001158CBG	541BCA001158CBGR
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541ACA001151ABGR	541ACA001153ABG	541ACA001153ABGR	541BAA000286ABG	541BAA000286ABGR
541AAA001015BBG	541AAA001015BBGR	541AAA001040BBG	541AAA001040BBGR	541AAB000246BBG
541AAB000246BBGR	541EAB000346BBG	541EAB000346BBGR	541FAB001022BBG	541FAB001022BBGR
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541DAB001016BBGR	541EAB000246BBG	541EAB000246BBGR	541CAA001037BBG	541CAA001037BBGR
541CAB000246BBG	541CAB000246BBGR	541DAA001028BBG	541DAA001028BBGR	541BAA001043BBG
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