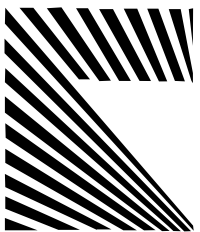
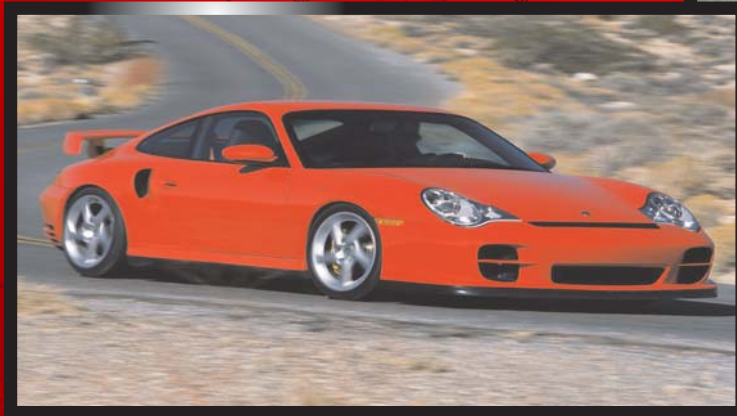


# HIGH RELIABILITY OSCILLATORS



Cardinal Components, Inc., 155 Rt. 46 W., Wayne, N.J. 07470  
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RECOMMENDED SOLDER  
PAD LAYOUT

5.1

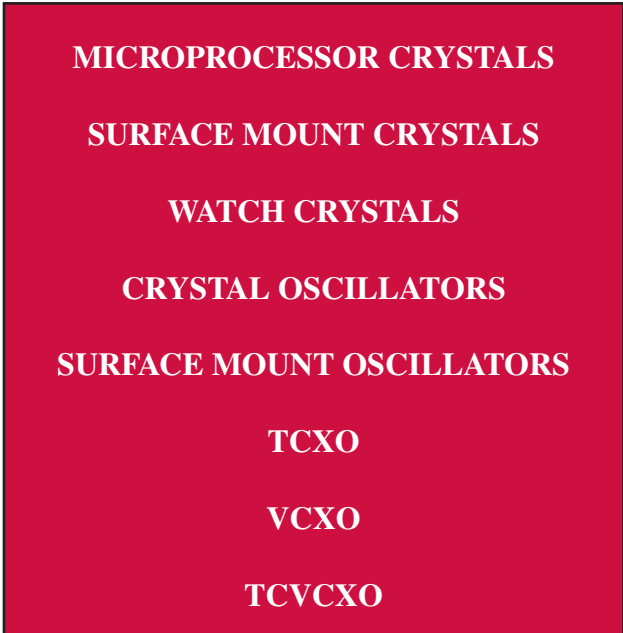
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Cardinal Components, Inc., provides a broad range of timing products, technical expertise, innovation, and commitment to quality. We have enjoyed long relationships with our customers who come back because they know that, no matter what the challenge, Cardinal will get the job done!

Certified ISO-9001:2000, Cardinal is committed to providing the best quality products, technical support, and superior service to our customers. Our engineering staff can answer your questions, as well as provide design aid for both new and existing products. Cardinal's pricing and delivery lead times are the most competitive in the crystal components industry. Sales representatives, distributors, and a dedicated in-house sales department focus on providing a high level of service to meet your needs.



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- \* LVPECL Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment

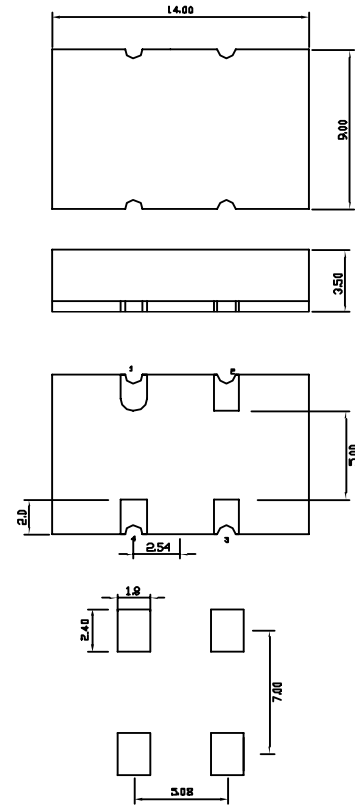


Part Numbering Example: CFE4 Z - A5 BP - 222.5792

CFE4	Z	A5	BP	222.5792
<b>SERIES</b>	<b>PACKAGING OPTIONS</b>	<b>OPERATING TEMP.</b>	<b>STABILITY</b>	<b>FREQUENCY</b>
CFE4	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C A7 = -40°C ~ +85°C	Blank = ±100 ppm BP = ±50 ppm	

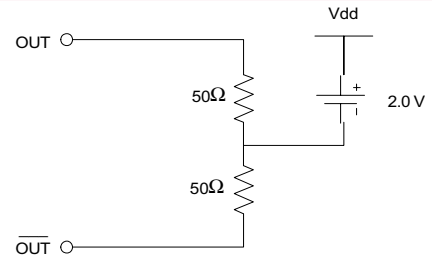
Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	-50		+ 50	ppm
Supply Voltage:	3.135	3.3	3.465	V
Operating Temperature:	-40		+ 85	°C
Storage Temperature:	-55		+ 125	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			5	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 1.025		Vdd - 1.62	V
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVPECL			
Packaging:	Tape and Reel 1000 pcs per Reel			

CFE4



- PIN Function**
- 1 LVPECL-
  - 2 Ground
  - 3 LVPECL+
  - 4 VDD

LVPECL Levels Test Circuit



- \* LVDS Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment

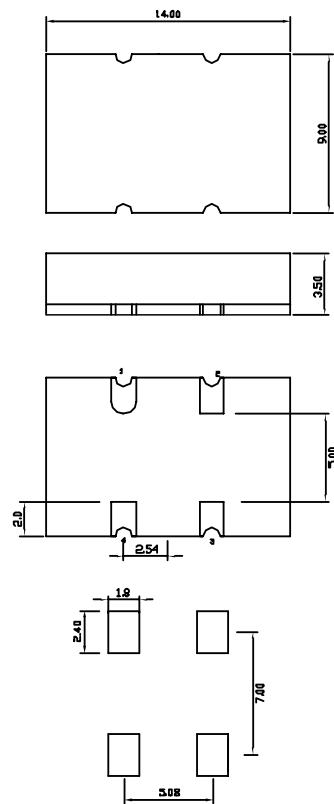


**Part Numbering Example: CFL4 Z - A5 BP - 222.5792**

CFL4	Z	A5	BP	222.5792
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY
CFL4	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C A7 = -40°C ~ +85°C	Blank = ±100 ppm BP = ±50 ppm	

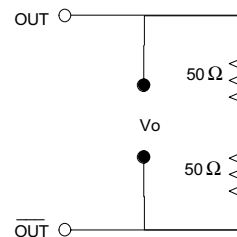
Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	-50		+ 50	ppm
Supply Voltage:	3.135	3.3	3.465	V
Operating Temperature:	-40		+ 85	°C
Storage Temperature:	-55		+ 125	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			5	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 0.9		Vdd - 1.6	V V
Output Differential Voltage:	247	355	454	mV
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVDS			
Packaging:	Tape and Reel 1000 pcs per Reel			

**CFL4**



- PIN Function**
- 1 LVDSL-
  - 2 Ground
  - 3 LVDS+
  - 4 VDD

**LVDS Levels Test Circuit**



- \* LVPECL Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



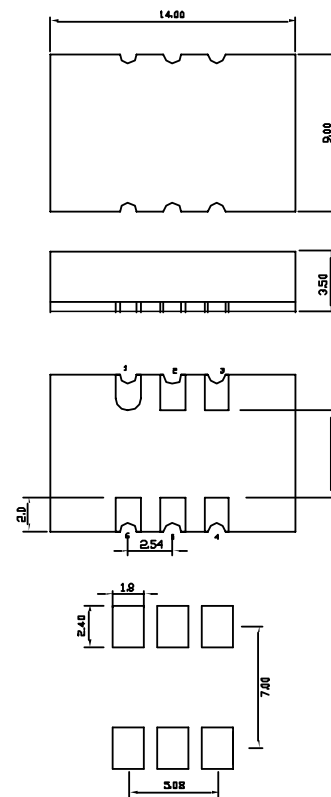
**Part Numbering Example: CFED Z - A5 BP - 222.5792 TS**

CFED	Z	A5	BP	222.5792	TS
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY	TRI-STATE
CFED	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C A7 = -40°C ~ +85°C	Blank = ±100 ppm BP = ±50 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	-50		+ 50	ppm
Supply Voltage:	3.135	3.3	3.465	V
Operating Temperature:	-40		+ 85	°C
Storage Temperature:	-55		+ 125	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			5	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 1.025		Vdd - 1.62	V
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVPECL			
Packaging:	Tape and Reel 1000 pcs per Reel			

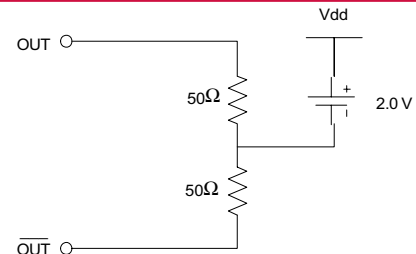
**CFED**

Dimensions are in mm



- PIN Function**
- 1 DISABLE
  - 2 NO CONNECT
  - 3 Ground
  - 4 LVPECL +
  - 5 LVPECL -
  - 6 Vdd

**LVPECL Levels Test Circuit**



- \* LVDS Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



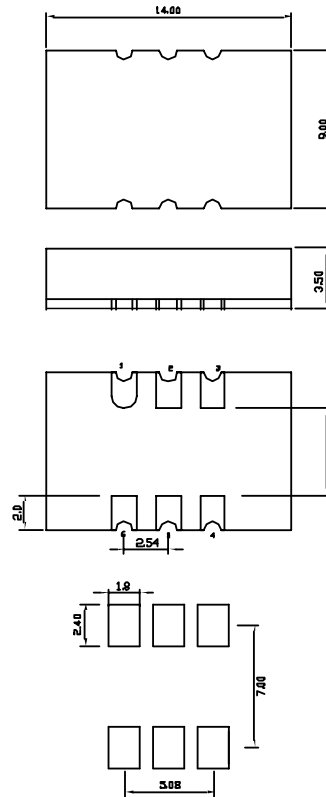
Part Numbering Example: CFL Z - A5 BP - 222.5792 TS

CFL	Z	A5	BP	222.5792	TS
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY	TRI-STATE
CFL	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C A7 = -40°C ~ +85°C	Blank = ±100 ppm BP = ±50 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	-50		+ 50	ppm
Supply Voltage:	3.135	3.3	3.465	V
Operating Temperature:	-40		+ 85	°C
Storage Temperature:	-55		+ 125	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			5	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 0.9		Vdd - 1.6	V V
Output Differential Voltage:	247	355	454	mV
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVDS			
Packaging:	Tape and Reel 1000 pcs per Reel			

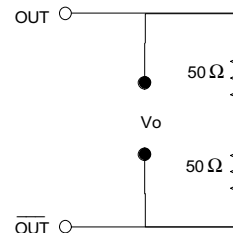
CFL

Dimensions are in mm



- PIN Function**
- 1 ENABLE
  - 2 NO CONNECT
  - 3 Ground
  - 4 LVDS +
  - 5 LVDS -
  - 6 Vdd

LVDS Levels Test Circuit



- \* LVPECL Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



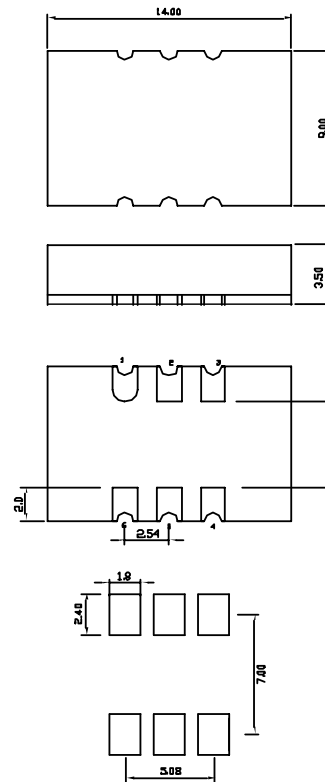
Part Numbering Example: CFVE Z - A5 BP - 222.5792 TS

CFVE	Z	A5	BP	222.5792	TS
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY	TRI-STATE
CFVE	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C A7 = -40°C ~ +85°C	Blank = ±100 ppm BP = ±50 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	-50		+ 50	ppm
Supply Voltage:	3.135	3.3	3.465	V
Frequency Tuning Range:		±100		ppm
External Control Voltage:	0.35		3.0	V
Operating Temperature:	-40		+ 85	°C
Storage Temperature:	-55		+ 125	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			5	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 1.025		Vdd - 1.62	V
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVPECL			
Packaging:	Tape and Reel 1000 pcs per Reel			

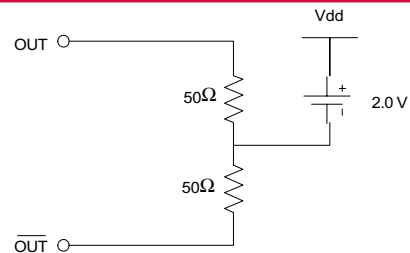
CFVE

Dimensions are in mm



- PIN Function**
- 1 VCONTROL
  - 2 ENABLE
  - 3 Ground
  - 4 LVPECL +
  - 5 LVPECL -
  - 6 Vdd

LVPECL Levels Test Circuit





- \* LVPECL Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



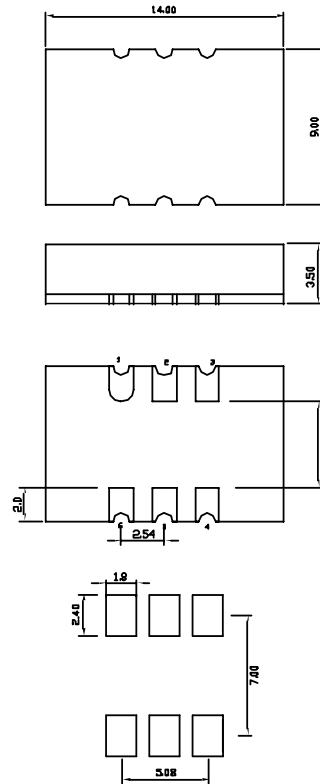
Part Numbering Example: CFVED Z - A5 BP - 222.5792 TS

CFVED	Z	A5	BP	222.5792	TS
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY	TRI-STATE
CFVED	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C A7 = -40°C ~ +85°C	Blank = ±100 ppm BP = ±50 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	-50		+ 50	ppm
Supply Voltage:	3.135	3.3	3.465	V
Frequency Tuning Range:		±100		ppm
External Control Voltage:	0.35		3.0	V
Operating Temperature:	-40		+ 85	°C
Storage Temperature:	-55		+ 125	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) <i>Ta</i> =25°C, <i>Vdd</i> =3.3V			5	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage:				
Voh	Vdd - 1.025			V
Vol			Vdd - 1.62	V
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVPECL			
Packaging:	Tape and Reel 1000 pcs per Reel			

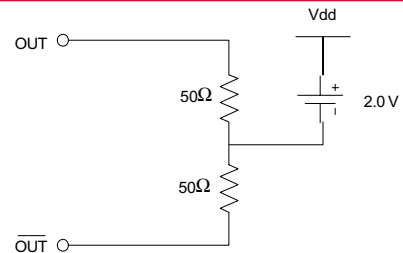
CFVED

Dimensions are in mm



- PIN Function
- 1 VCONTROL
  - 2 DISABLE
  - 3 Ground
  - 4 LVPECL +
  - 5 LVPECL -
  - 6 Vdd

LVPECL Levels Test Circuit





- \* LVDS Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



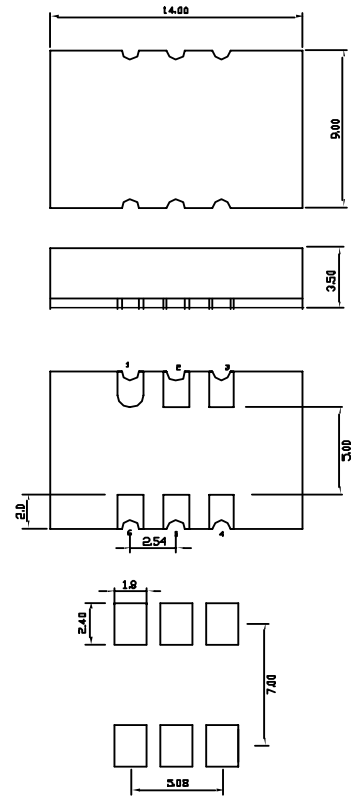
Part Numbering Example: CFVL Z - A5 BP - 222.5792 TS

CFVL	Z	A5	BP	222.5792	TS
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY	TRI-STATE
CFVL	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C A7 = -40°C ~ +85°C	Blank = ±100 ppm BP = ±50 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	-50		+ 50	ppm
Supply Voltage:	3.135	3.3	3.465	V
Frequency Tuning Range:		± 100		ppm
External Control Voltage:	0.35		3.0	V
Operating Temperature:	-40		+ 85	°C
Storage Temperature:	-55		+ 125	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			5	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 0.9		Vdd - 1.6	V
Output Differential Voltage:	247	355	454	mV
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVDS			
Packaging:	Tape and Reel 1000 pcs per Reel			

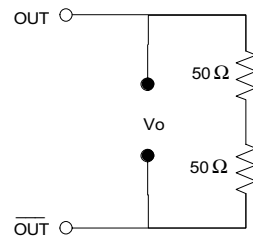
CFVL

Dimensions are in mm



- PIN Function
- 1 VCONTROL
  - 2 ENABLE
  - 3 Ground
  - 4 LVDS +
  - 5 LVDS -
  - 6 Vdd

LVDS Levels Test Circuit



- \* LVPECL Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



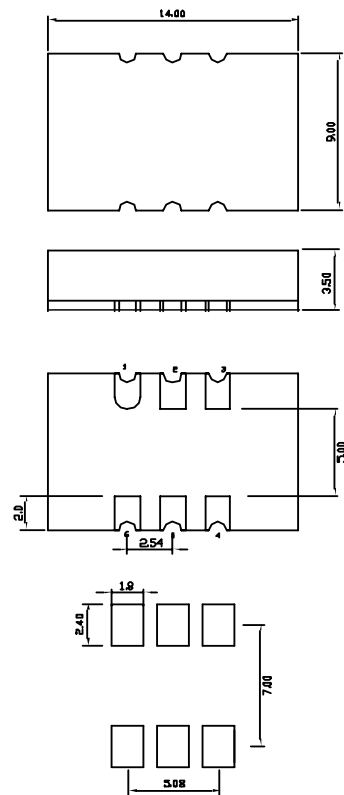
Part Numbering Example: CTED Z - A5 B3 - 222.5792 TS

<b>CTED</b>	<b>Z</b>	<b>A5</b>	<b>B3</b>	<b>222.5792</b>	<b>TS</b>
<b>SERIES</b>	<b>PACKAGING OPTIONS</b>	<b>OPERATING TEMP.</b>	<b>STABILITY</b>	<b>FREQUENCY</b>	<b>TRI-STATE</b>
CTED	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C	B3 = ±2.5 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	- 2.5		+ 2.5	ppm
Supply Voltage:	3.135	3.3	3.465	V
Operating Temperature:	-30		+ 70	°C
Storage Temperature:	-40		+ 85	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			1	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 1.025		Vdd - 1.62	V V
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVPECL			
Packaging:	Tape and Reel 1000 pcs per Reel			

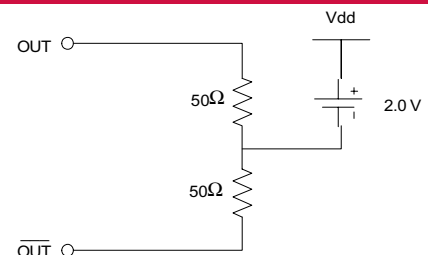
CTED

Dimensions are in mm



- PIN Function**
- 1 DISABLE
  - 2 NO CONNECT
  - 3 Ground
  - 4 LVPECL +
  - 5 LVPECL -
  - 6 Vdd

LVPECL Levels Test Circuit



- \* LVDS Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



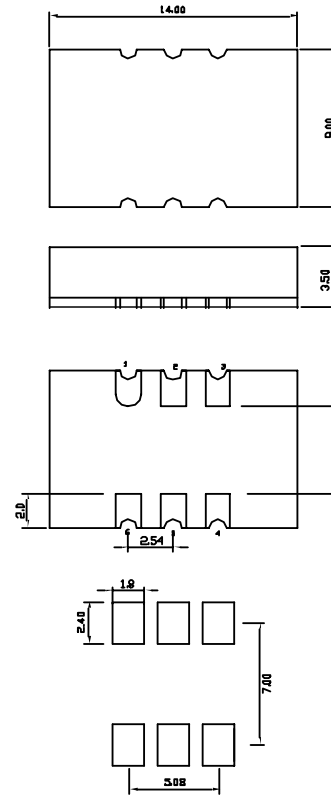
Part Numbering Example: CTL Z - A5 B3 - 222.5792 TS

CTL	Z	A5	B3	222.5792	TS
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY	TRI-STATE
CTL	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C	B3 = ± 2.5 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	- 2.5		+ 2.5	ppm
Supply Voltage:	3.135	3.3	3.465	V
Operating Temperature:	-30		+ 70	°C
Storage Temperature:	-40		+ 85	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			1	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 0.9		Vdd - 1.6	V
Output Differential Voltage:	247	355	454	mV
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVDS			
Packaging:	Tape and Reel 1000 pcs per Reel			

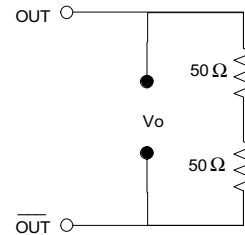
CTL

Dimensions are in mm



- PIN Function**
- 1 ENABLE
  - 2 NO CONNECT
  - 3 Ground
  - 4 LVDS +
  - 5 LVDS -
  - 6 Vdd

LVDS Levels Test Circuit



- \* LVPECL Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



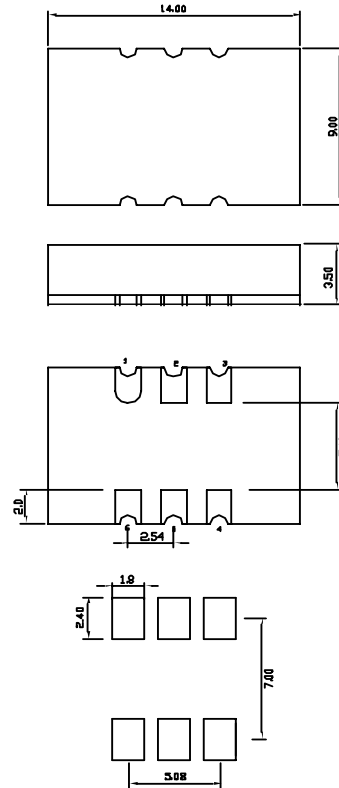
**Part Numbering Example: CTVED Z - A5 B3 - 222.5792 TS**

CTVED	Z	A5	B3	222.5792	TS
SERIES	PACKAGING OPTIONS	OPERATING TEMP.	STABILITY	FREQUENCY	TRI-STATE
CTVED	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C	B3 = ±2.5 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	- 2.5		+ 2.5	ppm
Supply Voltage:	3.135	3.3	3.465	V
Frequency Tuning Range:		+/- 8		ppm
External Control Voltage:	0.35		3.0	V
Operating Temperature:	-30		+ 70	°C
Storage Temperature:	-40		+ 85	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			1	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage:				
Voh	Vdd - 1.025			V
Vol			Vdd - 1.62	V
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVPECL			
Packaging:	Tape and Reel 1000 pcs per Reel			

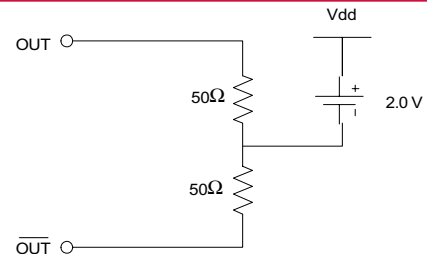
**CTVED**

Dimensions are in mm



- PIN Function**
- 1 VCONTROL
  - 2 DISABLE
  - 3 Ground
  - 4 LVPECL +
  - 5 LVPECL -
  - 6 Vdd

**LVPECL Levels Test Circuit**



- \* LVDS Output
- \* Industry Standard Outline

- Applications**
- \* Serial Communications
  - \* Routers
  - \* Switches
  - \* WAN Interfaces
  - \* Test Equipment



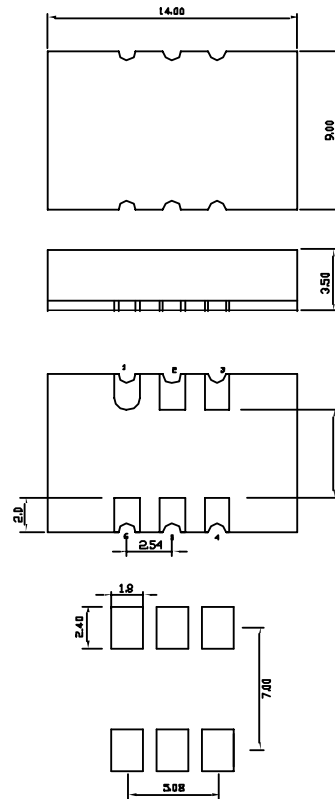
Part Numbering Example: CTVL Z - A5 B3 - 222.5792 TS

<b>CTVL</b>	<b>Z</b>	<b>A5</b>	<b>B3</b>	<b>222.5792</b>	<b>TS</b>
<b>SERIES</b>	<b>PACKAGING OPTIONS</b>	<b>OPERATING TEMP.</b>	<b>STABILITY</b>	<b>FREQUENCY</b>	<b>TRI-STATE</b>
CTVL	Blank = Bulk Z = Tape and Reel	Blank = 0°C ~ +70°C A5 = -20°C ~ +70°C	B3 = ±2.5 ppm		TS = Tri-State

Specifications:	Min	Typ	Max	Unit
Frequency Range:	38		640	MHz
Stability:	- 2.5		+ 2.5	ppm
Supply Voltage:	3.135	3.3	3.465	V
Frequency Tuning Range:		+/- 8		ppm
External Control Voltage:	0.35		3.0	V
Operating Temperature:	-30		+ 70	°C
Storage Temperature:	-40		+ 85	°C
Duty Cycle:	45		55	%
Start-Up Time:		3	10	mS
Aging: (ppm/1st Year) Ta=25C, Vdd=3.3V			1	ppm
Supply Current:			100	mA
Short Circuit Current:		± 50		mA
RMS Period Jitter:		5		pS
RMS Integrated Jitter: 12kHz to 20MHz		0.7		pS
Phase Noise @ 10kHz:			-120	dBc/Hz
Output Voltage: Voh Vol	Vdd - 0.9		Vdd - 1.6	V V
Output Differential Voltage:	247	355	454	mV
Rise/Fall Time:		0.4	0.8	nS
Output Level:	LVDS			
Packaging:	Tape and Reel 1000 pcs per Reel			

CTVL

Dimensions are in mm



- PIN Function**
- 1 VCONTROL
  - 2 ENABLE
  - 3 Ground
  - 4 LVDS +
  - 5 LVDS -
  - 6 Vdd

LVDS Levels Test Circuit

