

# TDK Component Library for Zuken CR-5000 Lightning

ver. 2015.07

TDK Corporation Passive Application Center

July 30, 2015



### < Applicable condition >

The data in this library is obtained under the condition of 25°C, no DC bias, and small signal operation. Proper result might not be obtained if your condition is different from the above one.

### < Terms and conditions regarding TDK Simulation Models >

- (1) This simulation model is being provided solely for informational purposes. Please refer to the specifications of the products in terms of detailed characteristics of such products.
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- (6) The use of this simulation model shall be deemed to have consented to the terms and conditions hereof.



### < Feature of this library >

• The actual property of components can be taken into your circuit simulation because equivalent circuit model that considers inner structure of a part and material property is used.

### < Supported Lightning revisions >

This library can be used with CR-5000 Lightning revision 13 or latter revisions. However, this library might not be used depending on a simulation environment. Please acknowledge it beforehand.

### < Contents in this document >

This document is described assuming the following environment.

OS: Windows XP

CR-5000 Lightning: Revision 13

On different OS or Lightning versions, screen display and/or operation procedure may not correspond to the contents of this document. Please acknowledge it beforehand.

### < Inquiries about Zuken CR-5000 Lightning >

For inquiries about Zuken CR-5000 Lightning please contact: Zuken Inc. : http://www.zuken.com/



### < Files included in this library >

This library includes the following files.

- •TDK\_BED\_v2015.07.ixf equivalent circuit model for chip beads
- •TDK\_CMF\_v2015.07.ixf equivalent circuit model for common-mode filters
- •TDK\_3TF\_v2015.07.ixf equivalent circuit model for 3-terminal filters
- •TDK\_VAR\_v2015.07.ixf equivalent circuit model for chip varistors
- •TDK\_3FC\_v2015.07.ixf equivalent circuit model for 3-terminal feedthrough MLCCs



### < Unzip the install file >

1) Save the zip-formatted install file (e.g. tdk\_library\_for\_lightning\_v201507.zip) in an arbitrary directory.

2) Unzip the install file.

### < Import the ixf files >

1) Open an Lightning Simulation Library Manager window. Select Import... from File menu, then Import window opens.

2) Click Browse... button and select the unzipped ixf file. Click OK.

3) Simulation models and devices are imported.

#### 1) File>Import...



#### 3) Simulation modes and devices are imported.

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Image       Image <th< td=""><td><u>F</u>ile <u>E</u>dit <u>H</u>elp</td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	<u>F</u> ile <u>E</u> dit <u>H</u> elp						
Devices     Models     Packages     Technologies     Vendors     Families     Part Types     Signal/Net Types       Name (v)     Vendor     ID     Type     Family     Source     #Pins     #Models       ACM2012-121-2P     TDK     N=PORT     Project     4     1       ACM2012-361-2P     TDK     N=PORT     Project     4     1       ACM2012-361-2P     TDK     N=PORT     Project     4     1       ACM2012-361-2P     TDK     N=PORT     Project     4     1       ACM2025-102-2P     TDK     N=PORT     Project     4     1       ACM3225-102-2P     TDK     N=PORT     Project     4     1       ACM3225-601-2P     TDK     N=PORT     Project     4     1       ACM4532-601-2P     TDK     N=PORT     Project     4     1       ACM4532-601-2P     Lighthring: Simulation Library: Manager     Eile     Eile     Eile     Eile     Eile       ACT45B-10-2P     TDK     N=Dorat     Yendors     Families     Part Types     Signal/Net Types       ACT45B-10-2P     ACT45B-10-2P     TDK     Medels     ackages     Technologies     Vendors     Families     Part Types     Signal/Net Types <t< th=""><th>🚲 🗋 🚅 🛍 🗙 M</th><th>Library: Project</th><th></th><th></th><th></th><th></th><th></th></t<>	🚲 🗋 🚅 🛍 🗙 M	Library: Project					
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ACM4322-601-2P       Eile Edit Help         ACM4525-601-2P       ACM4525-601-2P         ACM4525-601-2P       ACT456-101-2P         ACT456-101-2P       ACT456-101-2P         ACT456-510-2P       Devices Models] ackages Technologies Vendors Families Part Types Signal/Net Types         ACT456-510-2P       Name         CMM005-800-2P       Name         CMM005-900-2P       ACM2012 201 2P cir         CMM012 201 2P cir       Equival Cir.         Circuit       Project       TDK. Common Mode Fill         TOM1005-800-2P       ACM2012 301 2P cir       Equival Cir.       Circuit       Project         ACM2012 201 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Fill         TOM1005-800-2P       ACM2012 301 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Fill         TOM1010-800-2P       ACM2012 900 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Fill         TOM1010-800-2P       ACM3225 102 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Fill         TOM1080-850-4P       ACM3225 201 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Fill         TOM1080-850-4P       ACM3225 271-2P cir	ACM3225-601-2P	Lightning Simulation	Library Manager				
ACM4532-601-2P       Library: Project         ACM4532-601-2P       ACM4532-601-2P         ACM4532-601-2P       ACT45B-101-2P         ACT45B-101-2P       ACT45B-20-2P         ACT45B-510-2P       Devices         TCM1005-650-2P       Devices         ACM452-601-2P       Name         Kind       Type         Source       Information         TCM1005-650-2P       ACM2012 121 2P cir         CM1015-650-2P       ACM2012 201 2P cir         CM2012 201 2P cir       Equival Cir.         Circuit       Project       TDK. Common Mode Filt         TCM1005-900-2P       ACM2012 201 2P cir       Equival Cir.       Circuit         ACM2012 201 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Filt         TCM120-900-2P       ACM2012 300 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Filt         TCM120-900-2P       ACM2012 900 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Filt         TCM108-8201-4P       ACM2025 102 2P cir       Equival Cir.       Circuit       Project       TDK. Common Mode Filt         TCM1608-350-4P       ACM3225 102 2P cir       Equival Cir.       Circuit       Project <td< td=""><td>ACM3225-800-2P</td><td>File Edit Help</td><td></td><td></td><td></td><td></td><td></td></td<>	ACM3225-800-2P	File Edit Help					
ACM4332-501-2P       AcT458-101-2P         ACT458-101-2P       AcT458-10-2P         ACT458-10-2P       Devices         ACT458-10-2P       Actaster         ACT458-10-2P       Devices         ACT458-10-2P       Name         ACT458-50-2P       Name         CM1005-360-2P       AcM2012 121 2P cir         CM1005-900-2P       AcM2012 201 2P cir         ACM2012 201 2P cir       Equival Cir.         CM1001-500-2P       AcM2012 121 2P cir         ACM2012 201 2P cir       Equival Cir.         CM1010-500-2P       AcM2012 201 2P cir         ACM2012 201 2P cir       Equival Cir.         Circuit       Project       TDK, Common Mode Fill         TCM1010-500-2P       AcM2012 300 2P cir       Equival Cir.       Circuit         TCM1010-500-2P       AcM2012 300 2P cir       Equival Cir.       Circuit       Project       TDK, Common Mode Fill         TCM1010-500-2P       AcM3225 102 P cir       Equival Cir.       Circuit       Project       TDK, Common Mode Fill         TCM1010-550-4P       AcM3225 102 P cir       Equival Cir.       Circuit       Project       TDK, Common Mode Fill         TCM1010-550-4P       AcM3225 271 2P cir       Equival Cir.       Circuit       Project	ACM4532-601-2P						
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Name     Kind     Type     Source     Information       TCM1005-350-2P     Name     Kind     Type     Source     Information       TCM1005-350-2P     Name     Kind     Type     Source     Information       TCM1005-350-2P     ACM2012 121 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1205-301-2P     ACM2012 201 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1205-301-2P     ACM2012 201 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1210-301-2P     ACM2012 301 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1206-201-4P     ACM2012 300 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1006-301-4P     ACM3225 102 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1006-301-4P     ACM3225 102 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1608-350-4P     ACM3225 271 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1608-550-4P     ACM3225 271 2P cir     Equival. Cir.     Circuit     Project     TDK. Common Mode Filt       TCM1608-550-4P	ACT45B-101-2P		i di yi ji i tujecit				
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Name         Kind         Type         Source         Information           TCM1005-650-2P         ACM2012_121_2P.cir         Equival. Cir.         Oircuit         Project         TDK, Common Mode Filt           TCM1005-650-2P         ACM2012_101_2P.cir         Equival. Cir.         Oircuit         Project         TDK, Common Mode Filt           TCM1005-900-2P         ACM2012_901_2P.cir         Equival. Cir.         Circuit         Project         TDK, Common Mode Filt           TCM1210-301-2P         ACM2012_900_2P.cir         Equival. Cir.         Circuit         Project         TDK, Common Mode Filt           TCM1210-900-2P         ACM2012_900_2P.cir         Equival. Cir.         Circuit         Project         TDK, Common Mode Filt           TCM1210-900-2P         ACM2012_910_2P.cir         Equival. Cir.         Circuit         Project         TDK, Common Mode Filt           TCM1608-350-4P         ACM3225_102_P.cir         Equival. Cir.         Circuit         Project         TDK, Common Mode Filt           TCM1608-350-4P         ACM3225_12_P.cir         Equival. Cir.         Circuit         Project         TDK, Common Mode Filt           TCM1608-550-4P         ACM3225_012_P.cir         Equival. Cir.         Circuit         Project         TDK, Common Mode Filt	ACT45B-510-2P	Devices Models ackages re			Types   Olenaly I	net Types	
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AdM2012 121 2P, cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1005-900-2P         ACM2012 201 2P, cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1012-001-2P         ACM2012 301 2P, cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1010-000-2P         ACM2012 901 2P, cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1010-900-2P         ACM3225 102 2P cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1010-900-2P         ACM3225 102 2P cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1010-900-2P         ACM3225 102 2P cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1010-900-2P         ACM3225 102 2P cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1010-900-2P         ACM3225 271 2P cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt           TOM1010-900-2P         ACM3225 271 2P cir         Equival Cir.         Circuit         Project         TDK, Common Mode Filt	TCM1005-650-2P	Hanc	King	турс	Source	miomiddon	
TCM1210-201-2P     ACM2012 201 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt       TCM1210-201-2P     ACM2012 201 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt       TCM1210-301-2P     ACM2012 301 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt       TCM1210-900-2P     ACM2012 900 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt       TCM1608-301-4P     ACM3225 102 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt       TCM1608-350-4P     ACM3225 102 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt       TCM1608-350-4P     ACM3225 102 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt       TCM1608-350-4P     ACM3225 102 2P cir     Equival Cir.     Circuit     Project     TDK, Common Mode Filt	TCM1005-900-2P	AGM2012_121_2P_cir	Equival, Cir.	Circuit	Project	TDK, Commor	i Mode Filt
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TCM1608-201-4P ACM3225_102_2P_cir Equival.Cir. Circuit Project TDK, Common Mode Filt TCM1608-350-4P ACM3225_161_2P_cir Equival.Cir. Circuit Project TDK, Common Mode Filt	TCM1210-900-2P	ACM2012_900_2P_cir	Equival. Cir.	Circuit	Project	TDK, Common	Mode Filt
TCM1608-350-4P ACM3225_101_2P_cir Equival. Cir. Circuit Project TDK, Common Mode Filt ACM3225_271_2P_cir Equival. Cir. Circuit Project TDK, Common Mode Filt	TCM1608-201-4P	ACM3225_102_2P_cir	Equival. Cir.	Circuit	Project	IDK, Commor	Mode Filt
TCM1608-650-4P ACM3225 271 2P_cir Equival. Cir. Circuit Project IDK, Common Mode Filt	TCM1608-350-4P	ACM3225_161_2P_cir	Equival. Cir.	Circuit	Project	TDK, Commor	Mode Filt
	TCM1608-650-4P	AGM3225_271_2P_cir	Equival. Cir.	Gircuit	Project	TDK, Commor	i Mode Filt

# How to use with Lightning Scenario (1)

# **⊗TDK**

### < Putting a symbol >

- 1) In the Scenario Editor, click Add Symbol button.
- 2) Click Circuit Model button.
- 3) Set Pin Count value in the Component window.
- 4) Click OK button in the Component window and put a symbol in a Scenario window.



# How to use with Lightning Scenario (2)

### < Assigning a simulation model >

- 1) Double-click the put symbol. Open a Circuit Model tab in the Model Information window.
- 2) Click Circuit Model... button, then Model Select window opens.
- 3) Select a model due to simulation and click OK button.
- 4) Click OK button in the Model Information window, then the simulation model is assigned to the symbol.

Model Information			📕 Scenario Editor - Scenari	
Component Pin Circuit Model 1	Circuit Model tab		File Edit Add View Tools	
Attailute Value		[]		
Circuit Model				
	Model Selection			
		(1		CIR1
2) Select Model button	Technology: *	Advanced Filter		ACM2012_121_2P_cir
	Name (v) Type Source	Technology VCC #Nedes Chara	icteristics Co	
Select Model	ACM2012_121_2P_cir Series Chroject	0.0 4		
	ACM2012_201_2P_cir Series Chroject	0.0 4	TDK	
OK	ACM2012_900_2P_cir Series CProject	0.0 4		@dov.j.coNomo
	ACM3225_161_2P_cir Series CProject	0.0 4	TDK	edevicenalie
1) Click OV then	ACM3225_271_2P_cir Series CProject ACM3225_601_2P_cir Series CProject	0.0 4 0.0 4		
4) Click OK, then	ACM3225_800_2P_cir Series CProject	0.0 4	TDK	
model is assigned.	ACM4532_601_2P_cir Series CProject ACM4532_801_2P_cir Series CProject	0.0 4		
	ACT45B_101_2P_cir Series CProject	0.0 4	TDK	
	ACT45B_110_2P_cir Series CProject ACT45B_220_2P_cir Series CProject	0.0 4	TDK	
	ACT45B 510 2P cir Series CProject	0.0 4		
	TCM1005_650_2P_cir Series CProject	0.0 4	TDK, Comm	
	TCM1005 900 2P cir Series CProject	0.0 4	TDK, Comm	
		Cruzzl		
	3) Select a 1	nodel, then click OK		

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category	series	pin number	Scenario symbol
chip beads	MMZ MPZ HFxxACC	1 - TOT- 2	<b>x</b> <sup>1</sup> 1 2 2 <b>x</b>
varistors	AVRL AVRM	1 - 2	<b>x</b> <sup>1</sup> 1 2 <b>2</b>



category	series	pin number	Scenario symbol
3-terminal filters	ACH MEM2012S	$1 \xrightarrow{7} 1 \xrightarrow{7} 1 \xrightarrow{7} 2$	x <sup>1</sup> 1 3 x <sup>2</sup> 2 3 x
	MEM1608P MEM2012F		<b>x</b> <sup>1</sup> 1 3 3 <b>x</b> <sup>2</sup> 2 3 <b>x</b>
	MEM1608D	$1 \xrightarrow{7} 00 \xrightarrow{3} 3$	x <sup>1</sup> 1 3 x <sup>2</sup> 2 3 x
	YFF	1 • 3 2	$\begin{array}{c} \mathbf{x} \stackrel{1}{} 1 \\ \mathbf{x} \stackrel{2}{} 2 \end{array} \xrightarrow{3} \mathbf{x}$



category	series	pin number	Scenario symbol
3-terminal filters	MEA1210LC		
	MEA1210PE MEA1210PH	$\begin{array}{c} 4 & 3 \\ \hline \\ 5 \\ \hline \\ 1 \\ 2 \end{array}$	x 1 1 5 x x 2 4 x x 3 3



category	series	pin number	Scenario symbol
3-terminal filters	MEA1608L MEA1608LC MEA2010L MEA2010LC	$\begin{array}{c} 8 & 7 & 6 & 5 \\ \hline & & & & \\ 9 & \hline & & & \\ 1 & 2 & 3 & 4 \end{array}$	1 1 9 8 7 4 4 5 5 5
	MEA1608PE MEA1608PH MEA2010PE	$\begin{array}{c} 8 & 7 & 6 & 5 \\ \hline & & & & & \\ 9 & & & & & \\ 9 & & & & & \\ 1 & 2 & 3 & 4 \end{array}$	1 1 9 8 7 4 4 4 5 5



category	type	pin number	Scenario symbol
common mode filters	with 2 lines	$1 \xrightarrow{4} 2 \xrightarrow{0} 3$	$\begin{array}{c} 1 \\ 1 \\ 2 \\ 2 \\ 3 \\ 3 \\ x \end{array}$
	with 4 lines	$1 \xrightarrow{0} 0 \xrightarrow{1} 8$ $2 \xrightarrow{0} 0 \xrightarrow{1} 7$ $3 \xrightarrow{0} 0 \xrightarrow{1} 6$ $4 \xrightarrow{1} 0 \xrightarrow{1} 5$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$



category	series	pin number	Scenario symbol
3-terminal feedthrough MLCCs	CKD	$1 \xrightarrow{} 3$	x <sup>1</sup> 1 3 x <sup>2</sup> 2 3 x



### < Comparison between equivalent circuit models and measured data >

Comparison between the equivalent circuit models and measured data are shown in the following. Since the equivalent circuit models well match to measured results as shown in the following pages, simulation result that matches to actual property can be obtained.

## Chip Bead "MMZ0603D800CT000"



## **3-Terminal Filter "ACH32C-101"**



### Common-Mode Filter "ACM2012-900-2P"



### Varistor "AVR-M2012C390KT6AB"



# 3-Terminal Feedthrough MLCC "CKD710JB0G105S030EA"



