

**BOURNS**®

# **Chip Resistors & Arrays Overview**

## **POWER RATING (WATTS) AND AVAILABLE SIZES PER PRODUCT SERIES**

Туре	Series		01005	0201	0402	0603	0612	0805	0815	1206	1225	2010	2512
Thick Film	CR (A, AS, PF)	General Purpose (A - AEC-Q200 Compliant, Auto Grade) (AS - AEC-Q200 Compliant, Auto Grade, Sulfur-Resistant)	0.03	0.05	0.063	0.1	-	0.125	-	0.25	-	0.5	1
	CRL	Low Ohmic		-	-	0.1	-	0.125	-	0.25	-	0.5	1
	CHV (A)	High Voltage (A - AEC-Q200 Compliant, Auto Grade)		-	-	0.1	-	0.125	-	0.25	-	0.5	1
	CRM (A)	High Power (A - AEC-Q200 Compliant, Auto Grade, Sulfur - Resistant)		-	-	0.125	-	0.25	-	0.5	-	1	2
	CRS (A)	Surge Withstand (A - AEC-Q200 Compliant, Auto Grade, Sulfur-Resistant)		-	-	0.125	-	0.25	-	0.5	-	1	2
	CHP (A)	Ultra High Power (A - AEC-Q200 Compliant, Auto Grade, Sulfur-Resistant)		-	-	0.33	-	0.5	-	0.75	-	-	3
	CMP (A)	High Power, Surge Withstand (A - AEC-Q200 Compliant, Auto Grade, Sulfur-Resistant)		-	-	0.25	-	0.5	-	0.75	-	1	1.5
	CWM-Q	Wide Terminal (Q - AEC-Q200 Compliant, Auto Grade)		-	-	-	1	-	-	-	2	-	-
Thin Film	CRT (AS) (A)	High Precision (AS - Sulfur-Resistant) (A - AEC-Q200 Compliant, Auto Grade)		-	0.063	0.1	-	0.125	-	0.25	-	-	-
Metal Strip	CRF	High Power, Current Sense, AEC-Q200 Compliant, Auto Grade		-	-	-	-	0.5	-	1	-	1	1 & 2
	CRE	High Power, Current Sense, AEC-Q200 Compliant, Auto Grade		-	-	-	-	-	-	-	-	-	2 & 3
	CRA	High Power, Current Sense, AEC-Q200 Compliant, Auto Grade		-	-	-	-	-	-	-	-	-	3
	CRK	Wide Terminal, Current Sense		-	-	-	1	-	1	-	3	-	-
	CST	4-Terminal, Current Sense, AEC-Q200 Compliant, Auto Grade		-	-	-	1	-	-	-	-	-	-
Metal Foil	CFN (A)	High Power, Current Sense, (A - AEC-Q200 Compliant, Auto Grade)		-	0.25	0.5	-	0.75	-	1	-	-	-
	CFG	Wide Terminal, Current sense		-	-	-	1	-	-	-	-	-	-

## **AVAILABLE RESISTANCE VALUE RANGE (OHMS) PER PRODUCT SERIES**

Туре	Series		Very Low Ohmic	Low Ohmic	Middle Ohmic	High Ohmic
Thick Film	CR	General purpose			1 – 20M	
	CRL	Low Ohmic		0.1 - 1		
	CHV	High Voltage				100k - 100M
	CRM	High Power		0.047 - 1	1 – 1M	
	CRS	Surge Withstand			1 – 1M	
	CWM	Wide Terminal			1 – 1M	
Thin Film	CRT (A)	High Precision			10 – 1M	
Metal Strip	CHP	Ultra High Power		0.001 - 1	1 – 1M	
	CMP	High Power, Surge Withstand	/1		1 – 1M	
	CRF	High Power, Current Sense	0.0003-0.05			
	CRE	High Power, Current Sense	0.001 - 0.009			
	CRA	High Power, Current Sense		0.01 - 0.1		
	CRK	Wide Terminal, Current Sense	0.005 - 0.01			
	CST	4-Terminal, Current Sense	0.0005 - 0.002			
Metal Foil	CFN (A)	High Power, Current Sense	0.005 - 0.02			
	CFG	High Power, Current Sense	0.001 - 0.01			

## **CHIP ARRAY SUMMARY**

Bourns®	Sulfur- Resistant Available	AEC-Q200 Compliant/ Auto Grade Available	Package Size	Termination Style
CAT10-J2		•	0402 x 2	concave
CAT10-J4		/ •	0402 x 4	concave
CAT16-J2			0603 x 2	concave
CAT16-J4/F4		•	0603 x 4	concave
CAY06-J2	/.		0201 x 2	convex
CAY10-J2	·	•	0402 x 2	convex
CAY10-J4	<b>/</b>	•	0402 x 4	convex
CAY16-J2			0603 x 2	convex
CAY16-J4/F4	• 1	•	0603 x 4	convex

## **CHIP RESISTOR FEATURES**

#### **Thick Film**

- 1 % in E96 + E24 series
- 5 % in E24 series

#### **Thin Film**

• 0.01 % to 1 % in E96 + E24 series

#### **Metal Foil/Metal Strip**

• Based on the value table in the data sheet

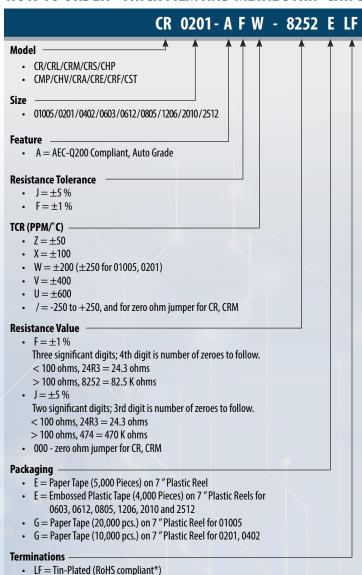
## **STANDARD PACKAGING**

01005 size - 20,000 pcs. / 7 " Plastic Reel 0201 and 0402 sizes - 10,000 pcs. / 7 " Plastic Reel 0603-1206 sizes - 5,000 pcs. / 7 " Plastic Reel 2010, 2512 and 0612 sizes - 4,000 pcs. / 7 " Plastic Reel

## **CHIP RESISTOR & CHIP ARRAY APPLICATIONS**

- Test equipment
- Consumer electronics
- Appliances
- Telecommunications
- Handheld electronics
- Office equipment
- Industrial equipment
- Small signal instrumentation
- DC/DC converters in power modules
- Current sensing
- Snubbers

## **HOW TO ORDER - THICK FILM AND METAL STRIP CHIPS**



PF = Ultra-Low Lead Content, without RoHS exemptions

## **CHIP ARRAYS**

## **Available Types**

- Thick film chip resistor array
- · Convex and concave
- · Isolated, bussed

#### **Available Tolerances**

- 5 % and 1 % in CAT16, CAY16 series
- 5 % in CAY06, CAT10, CAY10 series
- 5 % in E24 series
- 1 % in E96 + E24 series

## **CHIP ARRAY VS. DIP PACKAGE**

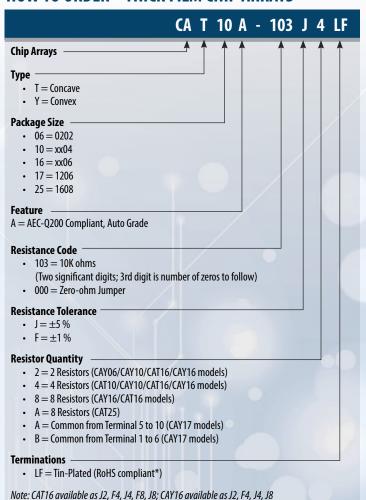
#### **Chip Array**

- Ceramic has topside protective coating
- Terminates to metallization on ceramic
- · Low power

### **DIP Package**

- Ceramic covered with molding
- Terminates to pins connected to ceramic
- · Higher power rating than chip array

## **HOW TO ORDER - THICK FILM CHIP ARRAYS**



# **Chip Resistor Product Information**

## THICK FILM CHIP RESISTORS

1 megohm

RoHS compliant\*

Bourns offers several sizes of thick film chip resistors in standard values for most market requirements. These products provide designers off-the-shelf flexibility of performance, space savings and low cost.

ies	General F	Purpose Resistance		Temperature	Rated Power	_	
	Size	Range	Tolerance	Coefficient	(W)	Packaging	Features
	01005 to 2512	1 ohm to 20 megohms	1 %/5 %	±100 ppm/±250 ppm	0.03 to 1	Tape & Reel	<ul> <li>Small package dimensions</li> <li>Nickel barrier prevents leaching</li> <li>Suitable for most types of soldering</li> <li>RoHS compliant*</li> </ul>
ies	General F	Purpose, Al	EC-Q200	Compliant,	Auto Gra	de	
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0201 to 2512	1 ohm to 20 megohms	1 %/5 %	±100 ppm/±200 ppm/ ±400 ppm/±500 ppm	0.05 to .125	Tape & Reel	Small package dimensions     Nickel barrier prevents leaching     Suitable for most types of soldering     RoHS compliant*
ies	General F	Purpose, Al	EC-Q200	Compliant,	Auto Gra	de, Sulfu	ır-Resistant
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	01005 to 2512	1 ohm to 20 megohms	1 %/5 %	±100 ppm/±200 ppm ±300 ppm /±400 ppm	0.03 to 1	Tape & Reel	Small package dimensions     Nickel barrier prevents leaching     Suitable for most types of soldering     RoHS compliant*
ies	General F	Purpose - L	Jltra-Lov	v Lead Conte	ent		
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0402 to 1206	1 ohm to 10 megohms	1 %/5 %	±100ppm/ ±200 ppm/±400 ppm	0.63 to 0.25	Tape & Reel	RoHS compliant* - without exemption
es	Low Resi	stance Valu	ue - for C	Current Sensi	ng		
,	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0603 to 2512	0.1 to 1 ohm	1 %/5 %	±200 ppm/±600 ppm	0.1 to 1	Tape & Reel	RoHS compliant*
es	High Volt	age	1/1	10		4 1	
7	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0603 to 2512	100K ohms to 100 megohms	1 %/5 %	±100 ppm/±200 ppm	0.1 to 1	Tape & Reel	<ul> <li>UL 1676 Listed</li> <li>UL/IEC 60950 &amp; 60065 Compatible</li> <li>RoHS compliant*</li> </ul>
ries	High Volt	age, AEC-C	2200 Co	mpliant, Aut	o Grade		
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0603 to 2512	100K ohms to 100 megohms	1 %/5 %	±100 ppm/±200 ppm	0.1 to 1	Tape & Reel	<ul> <li>UL 1676 Listed</li> <li>UL/IEC 60950 &amp; 60065 Compatible</li> <li>RoHS compliant*</li> </ul>
ries	Wide Terr	minal, AEC-	-Q200 C	ompliant, Au	ıto Grade	/4	
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
7	0612, 1225	1 ohm to	1 %/5 %	±100 ppm/±200 ppm	1 to 2	Tape & Reel	Wide Terminal     RoHS compliant*

es High					, FlyDaci	k Power Supplies
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0805 to 2	0.047 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.25 to 2	Tape & Reel	<ul><li>Low resistance value available</li><li>RoHS compliant*</li></ul>
High	Power - AEC-	Q200 Cor	mpliant, Auto	o Grade, S	ulfur-Re	esistant
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0603 to 2	0.05 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.125 to 2	Tape & Reel	Low resistance value available     RoHS compliant*
High	Power - AEC-	Q200 Cor	mpliant, Auto	o Grade, S	ulfur-Re	esistant
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0603 to 2	47 mohm to 10 ohm	1 %/5 %	±100 ppm/±200 ppm	0.125 to 2	Tape & Reel	Low resistance value available     RoHS compliant* without exemption
High	Power Surge	-Resistan	t - for Pulse P	ower Apr	olication	ns
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0805 to 2	1 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.25 to 2	Tape & Reel	<ul> <li>IEC 61000-4-5 1.2/50 μs</li> <li>RoHS compliant*</li> </ul>
High	Power Surge	-Resistan	t - AEC-Q200	Complia	nt, Auto	Grade, Sulfur-Resistar
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0603 to 2	1 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.125 to 2	Tape & Reel	• IEC 61000-4-5 1.2/50 μs • RoHS compliant*
Ultra-	High Power I	Resistor				
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0603 to 2	1 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.33 to 3 W	Tape & Reel	RoHS compliant*     High power surge withstanding
: Ultra-	High Power f	Resistor, <i>F</i>	AEC-Q200 Co	mpliant,	Auto Gra	ade, Sulfur Resistant
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0603 to 2	1 ohm to 1 megohm	1 %/5 %	±100 ppm/ ±200 ppm/±150 ppm	0.33 to 3 W	Tape & Reel	RoHS compliant*     High power surge withstanding
High	Power Resisto	or, Surge-	Resistant			
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0603 to 2	1 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.25 to 1.5 W	Tape & Reel	RoHS compliant*     Surge resistant
s High	Power Resisto	or, AEC-Q	200 Complia	int, Auto	Grade, S	urge & Sulfur-Resistar
Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
0603 to 2	1 ohm to 1 megohm	1 %/5 %	±100 ppm/ ±200 ppm/±150 ppm	0.25 to 1.5 W	Tape & Reel	RoHS compliant*     Surge resistant

# **Chip Resistor Product Information**

## THIN FILM CHIP RESISTORS

Bourns® Model CRT Series provides tight tolerance and high precision over a wide range of resistance values.

These resistors are typically used in current sense applications and precision circuits, with specific ordering characteristics for size and performance selection.

CRT Series	High Pred	High Precision									
070	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features				
	0402 to 1206	1 ohm to 1 megohm	0.01 % to 1 %	±2 to ±50 ppm	0.063 to 0.25	Tape & Reel	Ultra-tight tolerance     RoHS compliant*				

CRT-A Series	High Prec	High Precision - AEC-Q200 Compliant, Auto Grade									
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features				
	0402 to 1206	10 ohm to 1 megohm	0.1% to 1%	±-10 to ±-50 ppm	0.063 to 0.25	Tape & Reel	AEC-Q200 compliant     Ultra-tight tolerance     RoHS compliant*				

CRT-AS Series	High Precision - Sulfur-Resistant									
070	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features			
	0402 to 1206	1 ohm to 1 megohm	0.05% to 1%	±10 to ±50 ppm	0.063 to 0.25	Tape & Reel	<ul><li>Sulfur-resistant</li><li>Ultra-tight tolerance</li><li>RoHS compliant*</li></ul>			

RoHS Directive 2015/863, Mar 31, 2015 and Annex.



## **METAL FOIL AND STRIP CHIP RESISTORS**

Bourns offers several metal foil and metal strip chip resistors and EB welded metal strip shunts. These high-power resistors have very low resistance values and TCR due to their metal resistive element and are suitable for all types of current sensing applications.

Metal foil resistors are constructed with a metal foil resistive element mounted on a ceramic substrate for excellent heat conductivity. Metal strip chip resistors have electroplated tin (Sn) outer terminations for soldering onto the board. The resistive element is protected by an epoxy overcoat layer.

CEN Carios	Motal Fai	I Currant C	anca Da	cictor	_	_	
CFN Series	Size	I Current S Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0402 to 1206	0.005 to 0.4 ohm	1%,5%	±50 ppm ±100 ppm	0.25 to 1	Tape & Reel	High power density     RoHS compliant*
CFN(A) Series	Metal Foi	l Current S	ense Re	sistor, AEC-C	)200 Com	pliant, <i>P</i>	\uto Grade
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0402 to 1206	0.005 to 0.4 ohm	1 %, 5 %	±50 ppm ±100 ppm	0.25 to 1	Tape & Reel	<ul><li>High power density</li><li>AEC-Q200 compliant</li><li>RoHS compliant*</li></ul>
CRF Series	High Pow	er Current	Sense (	Chip Resistor	- AEC-Q2	200 Com	pliant, Auto Grade
Rosa	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0805, 1206 2010 & 2512	0.0003 to 0.05 ohm	1 %, 5 %	±50 ppm	0.5 to 3	Tape & Reel	<ul><li>High power density</li><li>AEC-Q200 compliant</li><li>RoHS compliant*</li></ul>
CRE Series	High Pow	er Current	Sense (	Chip Resistor	· - AEC-Q2	200 Com	pliant, Auto Grade
Room	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	2512	0.001 to 0.009 ohm	1%	±50 ppm	2 & 3	Tape & Reel	<ul> <li>Mn/Cu alloy resistor</li> <li>Low EMF</li> <li>AEC-Q200 compliant</li> <li>RoHS compliant*</li> </ul>
CRA Series	High Pow	er Current	: Sense (	Chip Resistor	- AEC-Q2	200 Com	pliant, Auto Grade
Ron	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	2512	0.01 to 0.1 ohm	1%,5%	±50 ppm	3	Tape & Reel	<ul><li>Special alloy resistor</li><li>AEC-Q200 compliant</li><li>RoHS compliant*</li></ul>
CRK Series	Metal Str	ip, Wide Te	rminal (	Current Sens	e Resistor		
Rom	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
							Wide terminal type
	0612, 0815, 1225	0.005 to 0.01 ohm	1%	±50 ppm	1&3	Tape & Reel	<ul><li>Excellent heat dissipation</li><li>RoHS compliant*</li></ul>
CST Series		0.01 ohm					

±100 ppm/±200 ppm

0.0005 to

0.002 ohm

1%

0612

Four terminal design

AEC-Q200 compliant

RoHS compliant\*

Tape & Reel

# **Chip Array Product Information**

## **CHIP RESISTOR ARRAYS WITH CONVEX TERMINALS**

Bourns provides a wide selection of standard resistance values, in several popular sizes, available with convex terminations. Chip arrays require minimal space, and offer cost and component count reductions.

AEC-Q200 compliant, automotive grade and sulfur-resistant designs are available.

	V					
CA	WIL	h- l	А	5	<b>S</b>	

## Chip Resistor Array - Sulfur-Resistant



Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
0202	10 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	<ul> <li>Sulfur-resistant</li> <li>Convex termination style</li> <li>RoHS compliant*</li> </ul>

## CAY10-J2/J4 Series

## Chip Resistor Array



Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
0404, 0804	10 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	Convex termination style 2/4 isolated resistors in an 0404/0804 size package E24 series from 10 ohms to 1 megohm RoHS compliant*

## CAY10A-J2/J4 (AS) Series

## Chip Resistor Array, AEC-Q200 Compliant, Auto Grade - Sulfur-Resistant Available



Size	Resistance Range	Tolerance	Coefficient	Resistor (W)	Features
0404, 0804	3 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	Sulfur-resistant     2/4 isolated resistors in an     0404/0804 size package     E24 series from 3 ohms to 1 megohm

RoHS Directive 2015/863, Mar 31, 2015 and Annex.



CAY16-/	<b>F4</b>	/J4	Sei	ries

## Chip Resistor Array



Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features		
1206	10 ohms to 1 megohm	±1 %, ±5 %	±200 ppm/°C	0.0625	Convex termination style     Isolated elements available     RoHS compliant*		

CAY16A-F4/J4 (AS)

## Chip Resistor Array - AEC-Q200 Compliant, Auto Grade - Sulfur-Resistant Available)



Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
1206	3 ohms to 1 megohm	±1 %, ±5 %	±200 ppm/°C	0.0625	Sulfur-resistant     Convex termination style     RoHS compliant*



# **Chip Array Product Information**

## **CHIP RESISTOR ARRAYS WITH CONCAVE TERMINALS**

Bourns provides a wide selection of standard resistance values in several popular sizes concave terminations. Chip arrays require minimal space, and offer cost and component count reductions.

AEC-Q200 compliant, automotive grade and sulfur-resistant designs are available.

CAT10-J4 Series	Chip Resistor Array					
10-	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
	0804	10 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	<ul> <li>Concave termination style</li> <li>E24 series from 10 ohms to 1 megohm</li> <li>RoHS compliant*</li> </ul>

CAT16-F4/J4 Series	Chip Resistor Array					
70	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
	1206	10 ohms to 1 megohm	±1 %, ±5 %	±200 ppm/°C	0.0625	<ul> <li>Concave termination style</li> <li>2 or 4 isolated elements available</li> <li>RoHS compliant*</li> </ul>

CAT10A-J2/J4 Series	Chip Resistor Array, AEC-Q200 Compliant, Auto Grade					
	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
	0404, 0804	10 ohms to 1 megohm	±5 %	±300 ppm/°C	0.063	Concave termination style E24 series from 10 ohms to 1 megohm RoHS compliant*

RoHS Directive 2015/863, Mar 31, 2015 and Annex.



#### Chip Resistor Array, AEC-Q200 Compliant, Auto Grade CAT16A-F4/J4 Series Resistance Power per Resistor (W) Temperature Size Tolerance **Features** Coefficient Range Concave termination style 2/4 isolated elements available RoHS compliant\* 10 ohms to 1206 1%,5% ±200 ppm/°C 0.0625 1 megohm





# **Worldwide Sales Offices**

Country/Region	Phone	Email
Americas:	+1-951-781-5500	americus@bourns.com
Brazil:	+55 11 5505 0601	americus@bourns.com
China:	+86 21 64821250	asiacus@bourns.com
Europe, Middle East, Africa:	+36 88 885 877	eurocus@bourns.com
Japan:	+81 49 269 3204	asiacus@bourns.com
Korea:	+82 70 4036 7730	asiacus@bourns.com
Mexico:	+52 614 478 0400	mexicus@bourns.com
Singapore:	+65 6348 7227	asiacus@bourns.com
Taiwan:	+886 2 25624117	asiacus@bourns.com
Other Asia-Pacific Countries:	+886 2 25624117	asiacus@bourns.com
Technical Assistance	DI	
Region	Phone	Email

# Technical Assistance Region Phone Email Asia-Pacific: +886 2 25624117 techweb@bourns.com Europe, Middle East, Africa: +36 88 885 877 eurotech@bourns.com Americas: +1-951-781-5500 techweb@bourns.com Export Control Inquiry Email

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