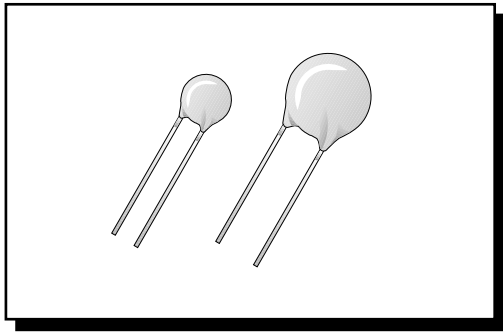


## JOYIN type JVR

A broad range of voltage dependant, symmetrical, metal oxide semiconductor devices (varistors) designed to protect equipment against transient voltage spikes. Connected directly across the supply rails, they offer a convenient and simple solution to transient suppression. Epoxy coated disc construction with radial leads crimped to provide an in-line with body footprint.

N.B. A varistor remains high impedance (non-operative) during normal standby use. When a voltage spike is encountered the impedance rapidly drops to a very low level, clamping the transient voltage to an acceptable level. The varistor absorbs the unwanted energy thereby protecting voltage sensitive components against damage.

Devices with a varistor voltage above 68V now have higher surge/energy ratings



- Broad range
- Choice of voltage & energy ratings
- Fast response
- Protect voltage sensitive components against damage
- Convenient and simple solution to transient suppression
- Body colour **Gold**

### Specification

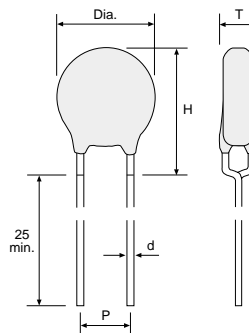
Storage temperature range ..... -40 C to +125 C  
 Max. operating temperature ..... +85 C  
 Max. working surface temperature ..... +115 C  
 Response time ..... <25ns  
 Voltage coefficient/temperature ..... -0.05%/ C  
 Insulation resistance ..... 1000M at 500V  
 Insulation voltage ..... 2500Vd.c.

All JVR types are listed under UL file E153360 as a recognised component.

JVR types with a nominal varistor voltage of 200V and higher have CSA approval.

**SPLT** Manufacturers smallest factory pack quantity for lot integrity and traceability.

### Dimensions (mm)



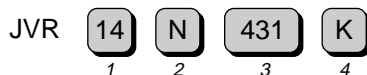
	Dia. max.	H max.	P	d
JVR5N-	6.5	11	5	0.6
JVR7N-	8.4	12	5	0.6
JVR10N-	11.5	15.5	7.5	0.8
JVR14N-	15.6	20.5	7.5	0.8
JVR20N-	21.8	28	10	1.0

Listed types	180K	220K	270K	330K	390K	470K	560K	680K	820K
T max.	3.9	4.1	4.3	4.5	4.3	4.5	4.7	5.0	3.9

Listed types	101K	121K	151K	181K	201K	221K	241K	271K	331K
T max.	4.0	4.2	4.4	4.6	4.7	4.3	4.9	4.5	4.2

Listed types	361K	391K	431K	471K	681K	751K	821K	911K	112K
T max.	5.0	5.6	5.8	4.9	7.0	7.3	7.2	8.1	8.5

### JOYIN Part Number Key (Varistors)



- |   |                            |   |                                       |
|---|----------------------------|---|---------------------------------------|
| 1 | ELEMENT SIZE (Dia.)        | 3 | VARISTOR VOLTAGE                      |
| 2 | MATERIAL<br>N = Zinc Oxide | 4 | VARISTOR VOLTAGE TOLERANCE<br>K = 10% |

**JOYIN type JVR**

A selection of popular types from the Joyin range. Other ratings and taped product available to special order.



Max. Operating Voltage (V)		Varistor Voltage (V)			Max. Clamping Voltage		Withstanding Surge Current		Rated Power (W)	Energy (10/1000 s) (J)	Typ. Cap. (1kHz) (pF)	SPLT pcs	Manf. Part No. & Order Code
rms	d.c.	Nom.	Min.	Max.	(V)	at (A)	1 Surge (A)	2 Surges (A)					
11	14	18	14.4	21.6	40	1.0	100	50	0.01	0.6	1200	1000	JVR5N180K
11	14	18	14.4	21.6	36	2.5	250	125	0.02	1.2	2500	1000	JVR7N180K
11	14	18	14.4	21.6	36	10	1000	500	0.1	4.7	8700	500	JVR14N180K
14	18	22	18.7	26.0	43	2.5	250	125	0.02	1.4	2200	1000	JVR7N220K
14	18	22	18.7	26.0	43	10	1000	500	0.1	5.4	7700	500	JVR14N220K
17	22	27	23.0	31.1	53	2.5	250	125	0.02	1.7	2000	1000	JVR7N270K
17	22	27	23.0	31.1	53	10	1000	500	0.1	6.9	6800	500	JVR14N270K
20	26	33	29.5	36.5	65	2.5	250	125	0.02	2.2	1850	1000	JVR7N330K
20	26	33	29.5	36.5	65	10	1000	500	0.1	8.8	6500	500	JVR14N330K
25	31	39	35	43	77	2.5	250	125	0.02	2.4	1450	1000	JVR7N390K
25	31	39	35	43	77	10	1000	500	0.1	9.4	7500	500	JVR14N390K
30	38	47	42	52	93	2.5	250	125	0.02	3	1150	1000	JVR7N470K
30	38	47	42	52	93	5	500	250	0.05	6	3300	500	JVR10N470K
30	38	47	42	52	93	10	1000	500	0.1	12	6500	500	JVR14N470K
35	45	56	50	62	110	2.5	250	125	0.02	3.5	1050	1000	JVR7N560K
35	45	56	50	62	110	10	1000	500	0.1	14	5600	500	JVR14N560K
40	56	68	61	75	135	2.5	250	125	0.02	4.3	970	1000	JVR7N680K
40	56	68	61	75	135	10	1000	500	0.1	17	4700	500	JVR14N680K
50	65	82	74	90	145	5	800	600	0.1	3.5	255	1000	JVR5N820K
50	65	82	74	90	135	10	1750	1250	0.25	7	510	1000	JVR7N820K
50	65	82	74	90	135	50	6000	4500	0.6	28	2000	500	JVR14N820K
60	85	100	90	110	175	5	800	600	0.1	4.5	210	1000	JVR5N101K
60	85	100	90	110	165	10	1750	1250	0.25	9	425	1000	JVR7N101K
60	85	100	90	110	165	25	3500	2500	0.4	18	850	500	JVR10N101K
60	85	100	90	110	165	50	6000	4500	0.6	36	1700	500	JVR14N101K
75	100	120	108	132	200	10	1750	1250	0.25	11	370	1000	JVR7N121K
75	100	120	108	132	200	50	6000	4500	0.6	44	1400	500	JVR14N121K
95	125	150	135	165	260	5	800	600	0.1	6.5	150	1000	JVR5N151K
95	125	150	135	165	250	10	1750	1250	0.25	13	300	1000	JVR7N151K
95	125	150	135	165	250	25	3500	2500	0.4	25	620	500	JVR10N151K
95	125	150	135	165	250	50	6000	4500	0.6	53	1050	500	JVR14N151K
115	150	180	162	198	320	5	800	600	0.1	8	120	1000	JVR5N181K
115	150	180	162	198	300	10	1750	1250	0.25	16	240	1000	JVR7N181K
115	150	180	162	198	300	25	3500	2500	0.4	32	490	500	JVR10N181K
115	150	180	162	198	300	50	6000	4500	0.6	65	970	500	JVR14N181K
130	170	200	185	225	355	5	800	600	0.1	8.5	110	1000	JVR5N201K
130	170	200	185	225	340	10	1750	1250	0.25	17.5	220	1000	JVR7N201K
130	170	200	185	225	340	25	3500	2500	0.4	35	450	500	JVR10N201K
130	170	200	185	225	340	50	6000	4500	0.6	70	870	500	JVR14N201K
130	170	200	185	225	340	100	10000	6500	1.0	140	1900	150	JVR20N201K
140	180	220	198	242	360	25	3500	2500	0.4	39	430	500	JVR10N221K
140	180	220	198	242	360	50	6000	4500	0.6	78	800	500	JVR14N221K
150	200	240	216	264	415	5	800	600	0.1	10.5	90	1000	JVR5N241K
150	200	240	216	264	395	10	1750	1250	0.25	21	185	1000	JVR7N241K
150	200	240	216	264	395	25	3500	2500	0.4	42	410	500	JVR10N241K
150	200	240	216	264	395	50	6000	4500	0.6	84	750	500	JVR14N241K
150	200	240	216	264	395	100	10000	6500	1.0	168	1590	150	JVR20N241K
175	225	270	247	303	455	25	3500	2500	0.4	49	350	500	JVR10N271K
175	225	270	247	303	455	50	6000	4500	0.6	99	690	500	JVR14N271K
210	275	330	297	363	575	5	800	600	0.1	13	70	1000	JVR5N331K
210	275	330	297	363	550	10	1750	1250	0.25	28	150	1000	JVR7N331K
230	300	360	324	396	620	5	800	600	0.1	16	65	1000	JVR5N361K
230	300	360	324	396	595	10	1750	1250	0.25	32	135	1000	JVR7N361K
230	300	360	324	396	595	25	3500	2500	0.4	65	275	500	JVR10N361K
230	300	360	324	396	595	50	6000	4500	0.6	130	500	500	JVR14N361K
250	320	390	351	429	675	5	800	600	0.1	17	60	1000	JVR5N391K
250	320	390	351	429	650	10	1750	1250	0.25	35	125	1000	JVR7N391K
250	320	390	351	429	650	25	3500	2500	0.4	70	245	500	JVR10N391K
250	320	390	351	429	650	50	6000	4500	0.6	140	470	500	JVR14N391K
250	320	390	351	429	650	100	10000	6500	1.0	275	985	150	JVR20N391K
275	350	430	387	473	745	5	800	600	0.1	20	55	1000	JVR5N431K
275	350	430	387	473	710	10	1750	1250	0.25	40	110	1000	JVR7N431K
275	350	430	387	473	710	25	3500	2500	0.4	80	230	500	JVR10N431K
275	350	430	387	473	710	50	6000	4500	0.6	155	430	500	JVR14N431K
275	350	430	387	473	710	100	10000	6500	1.0	303	890	100	JVR20N431K
300	385	470	423	517	810	5	800	600	0.1	21	50	1000	JVR5N471K
300	385	470	423	517	775	10	1750	1250	0.25	42	105	1000	JVR7N471K
420	560	680	612	748	1120	25	3500	2500	0.4	112	135	500	JVR10N681K
420	560	680	612	748	1120	50	6000	4500	0.6	225	255	250	JVR14N681K
420	560	680	612	748	1120	100	10000	6500	1.0	430	560	100	JVR20N681K
460	615	750	675	825	1240	25	3500	2500	0.4	115	125	500	JVR10N751K
460	615	750	675	825	1240	50	6000	4500	0.6	230	230	250	JVR14N751K
460	615	750	675	825	1240	100	10000	6500	1.0	440	510	100	JVR20N751K
510	670	820	738	902	1355	25	3500	2500	0.4	118	115	250	JVR10N821K
510	670	820	738	902	1355	50	6000	4500	0.6	235	210	250	JVR14N821K
550	745	910	819	1001	1500	25	3500	2500	0.4	127	105	250	JVR10N911K
550	745	910	819	1001	1500	50	6000	4500	0.6	255	190	250	JVR14N911K
550	745	910	819	1001	1500	100	10000	6500	1.0	510	420	100	JVR20N911K
680	895	1100	990	1210	1815	25	3500	2500	0.4	155	85	250	JVR10N112K
680	895	1100	990	1210	1815	50	6000	4500	0.6	310	160	250	JVR14N112K

Cross Reference Chart overleaf &gt;&gt;&gt;

## JOYIN type JVR

### CROSS REFERENCE CHART



Maximum Operating Voltage Vrms Vd.c.	Element Size (Dia.) mm	Energy (10/1000µs) J	JOYIN	Harris GE-MOV	ZNR / Panasonic ERZ-	Thomson VE / VD	Iskra	Siemens SIOV-S	Philips 2322	Power Development/ Thermometrics	PPI / IR Zenamics	Samhwa SVC
11 14	5	0.6	JVR5N180K	V18ZA05	C05DK180	-	CV11K5	05K11	-	-	-	180D-05B
	7	1.2	JVR7N180K	V18ZA1	C07DK180	-	CV11K7	07K11	-	ZL10C	-	180D-07B
	14	4.7	JVR14N180K	V18ZA3	C14DK180	-	CV11K14	14K11	-	ZL10F	-	180D-14B
14 18	7	1.4	JVR7N220K	V22ZA1	C07DK220	-	CV14K7	07K14	-593-51406	ZL14C	Z7L220	220D-07B
	14	5.4	JVR14N220K	V22ZA3	C14DK220	-	CV14K14	14K14	-595-51406	ZL14F	-	220D-14B
17 22	7	1.7	JVR7N270K	V27ZA1	C07DK270	09M00170K	CV17K7	07K17	-593-51706	ZL17C	-	270D-07B
	14	6.9	JVR14N270K	V27ZA4	C14DK270	-	CV17K14	14K17	-595-51706	ZL17F	-	270D-14B
20 26	7	2.2	JVR7N330K	V33ZA1	C07DK330	09M00200K	CV20K7	07K20	-593-52006	ZL20C	Z7L330	330D-07B
	14	8.8	JVR14N330K	V33ZA5	C14DK330	-	CV20K14	14K20	-595-52006	ZL20F	-	330D-14B
25 31	7	2.4	JVR7N390K	V39ZA1	C07DK390	09M00250K	CV25K7	07K25	-593-52506	ZL25C	Z7L390	390D-07B
	14	9.4	JVR14N390K	V39ZA6	C14DK390	17M00250K	CV25K14	14K25	-595-52506	ZL25F	Z15L390	390D-14B
30 38	7	3	JVR7N470K	V47ZA1	C07DK470	09M00300K	CV30K7	07K30	-593-53006	ZL30C	Z7L470	470D-07B
	10	6	JVR10N470K	V47ZA3	C10DK470	13M00300K	CV30K10	10K30	-594-53006	ZL30D	Z10L470	470D-14B
	14	12	JVR14N470K	V47ZA7	C14DK470	17M00300K	CV30K14	14K30	-595-53006	ZL30F	Z15L470	470D-14B
35 45	7	3.5	JVR7N560K	V56ZA2	C07DK560	09M00350K	CV35K7	07K35	-593-53506	ZL35C	Z7L560	560D-07B
	14	14	JVR14N560K	V56ZA8	C14DK560	17M00350K	CV35K14	14K35	-595-53506	ZL35F	Z15L560	560D-14B
40 56	7	4.3	JVR7N680K	V68ZA2	C07DK680	09M00400K	CV40K7	07K40	-593-54006	ZL40C	Z7L680	680D-07B
	14	17	JVR14N680K	V68ZA10	C14DK680	17M00400K	CV40K14	14K40	-595-54006	ZL40F	Z15L680	680D-14B
50 65	5	3.5	JVR5N820K	V82ZA05	C05DK820 V05D820	07M00500K	CV50K5	05K50	-592-55006	-	-	820D-05A
	7	7	JVR7N820K	V82ZA2	C07DK820 V07D820	09M00500K	CV50K7	07K50	-593-55006	ZL50C	-	820D-07A
	14	2.8	JVR14N820K	V82ZA12	C14DK820 V14D820	17M00500K	CV50K14	14K50	-595-55006	ZL50F	Z15L820	820D-14A
60 85	5	4.5	JVR5N101K	V100ZA05	C05DK101	07M00600K	CV60K5	05K60	-592-56006	ZL60B	-	101D-05A
	7	9	JVR7N101K	V100ZA3	C07DK101	09M00600K	CV60K7	07K60	-593-56006	ZL60C	Z7L101	101D-07A
	10	18	JVR10N101K	V100ZA4	C10DK101	13M00600K	CV60K10	10K60	-594-56006	ZL60D	Z10L101	101D-10A
	14	36	JVR14N101K	V100ZA15	C14DK101	17M00600K	CV60K14	14K60	-595-56006	ZL60F	Z15L101	101D-14A
75 100	7	11	JVR7N121K	V120ZA1	C07DK121	09M00750K	CV75K7	07K75	-593-57506	ZL75C	Z7L121	121D-07A
	14	44	JVR14N121K	V120ZA6	C14DK121	17M00750K	CV75K14	14K75	-595-57506	ZL75F	Z15L121	121D-14A
95 125	5	6.5	JVR5N151K	V150ZA05	C05DK151 V05D151	07M00950K	CV95K5	05K95	-592-59506	-	-	151D-05A
	7	13	JVR7N151K	V150ZA1	C07DK151 V07D151	09M00950K	CV95K7	07K95	-593-59506	ZL95C	Z7L151	151D-07A
	10	25	JVR10N151K	V150ZA4	C10DK151 V10D151	13M00950K	CV95K10	10K95	-594-59506	-	-	151D-10A
	14	53	JVR14N151K	V150ZA8	C14DK151 V14D151	17M00950K	CV95K14	14K95	-595-59506	ZL95F	Z15L151	151D-14A
115 150	5	8	JVR5N181K	V180ZA05	-	07M01150K	CV115K5	05K115	-	-	-	-
	7	16	JVR7N181K	V180ZA1	-	09M01150K	CV115K7	07K115	-	-	Z7L181	-
	10	32	JVR10N181K	V180ZA5	-	13M01150K	CV115K10	10K115	-	-	Z10L181	-
	14	65	JVR14N181K	V180ZA10	-	17M01150K	CV115K14	14K115	-	-	Z15L181	-
130 170	5	8.5	JVR5N201K	-	C05DK201 V05D201	07M00131K	CV130K5	05K130	-592-51316	Z120B	-	201D-05A
	7	17.5	JVR7N201K	V130LA2	C07DK201 V07D201	09M00131K	CV130K7	07K130	-593-51316	Z120C	Z7L201	201D-07A
	10	35	JVR10N201K	V130LA5	C10DK201 V10D201	13M00131K	CV130K10	10K130	-594-51316	Z120D	Z10L201	201D-10A
	14	70	JVR14N201K	V130LA10A V130LA10C	C14DK201 V14D201	17M00131K	CV130K14	14K130 14K130E2	-595-51316	Z120F	Z15L201	201D-14A
	20	140	JVR20N201K	(V130LA20A) (V130LA20C)	C20DK201 V20D201	(24M00131K)	CV130K20	20K130 20K130E2	-	(Z120G)	Z21L201	201D-20A
140 180	10	39	JVR10N221K	V140LA5	C10DK221 V10D221	13M00141K	CV140K10	10K140	-594-51416	-	Z10L221	221D-10A
	14	78	JVR14N221K	V140LA10A V140LA10C	C14DK221 V14D221	17M00141K	CV140K14	14K140 14K140E2	-595-51416	-	Z15L221	221D-14A
150 200	5	10.5	JVR5N241K	-	C05DK241 V05D241	07M00151K	CV150K5	05K150	-592-51516	Z135B	-	241D-05A
	7	21	JVR7N241K	V150LA2	C07DK241 V07D241	09M00151K	CV150K7	07K150	-593-51516	Z135C	-	241D-07A
	10	42	JVR10N241K	V150LA5	C10DK241 V10D241	13M00151K	CV150K10	10K150	-594-51516	Z135D	-	241D-10A
	14	84	JVR14N241K	V150LA10A V150LA10C	C14DK241 V14D241	17M00151K	CV150K14	14K150 14K150E2	-595-51516	Z135F	-	241D-14A
	20	168		(V150LA20A)	C20DK241	(24M00151K)	CV150K20	20K150	-	(Z135G)	-	241D-20A

N.B. ( ) = 7.5mm lead pitch. Equivalent Joyin part has a 10mm pitch

Cross Reference Chart continued on following page

**JOYIN type JVR**
**CROSS REFERENCE CHART (cont.)**


Maximum Operating Voltage V <sub>rms</sub> - V <sub>d.c.</sub>	Element Size (Dia.) mm	Energy (10/1000µs) J	JOYIN	Harris GE-MOV	ZNR / Panasonic ERZ-	Thomson VE / VD	Iskra	Siemens SIOV-S	Philips 2322	Power Development/ Thermometrics	PPI / IR Zenamics	Samhwa SVC
175 225	10	49	JVR10N271K	V175LA5	C10DK271 V10D271	13M01750K	CV175K10	10K175	-594-51716	-	-	271D-10A
	14	99	JVR14N271K	V175LA10A V175LA10C	C14DK271 V14D271	17M01750K	CV175K14	14K175	-595-51716	-	Z15L271	271D-14A
210 275	5	13	JVR5N331K	-	V05D331	07M00211K	-	-	-	-	-	-
	7	28	JVR7N331K	-	C07DK331 V07D331	09M00211K	-	-	-	-	-	-
230 300	5	16	JVR5N361K	-	C05DK361 V05D361	07M00231K	CV230K5	05K230	-592-52316	-	-	361D-05A
	7	32	JVR7N361K	V230LA4	C07DK361 V07D361	09M00231K	CV230K7	07K230	-593-52316	-	-	361D-07A
	10	65	JVR10N361K	V230LA10	C10DK361 V10D361	13M00231K	CV230K10	10K230	-594-52316	-	-	361D-10A
	14	130	JVR14N361K	V230LA20A V230LA20C	C14DK361 V14D361	17M00231K	CV230K14	14K230	-595-52316	-	-	361D-14A
250 320	5	17	JVR5N391K	-	C05DK391 V05D391	07M00251K	CV250K5	05K250	-592-52516	Z220B	-	391D-05A
	7	35	JVR7N391K	V250LA4	C07DK391 V07D391	09M00251K	CV250K7	07K250	-593-52516	Z220C	Z7L391	391D-07A
	10	70	JVR10N391K	V250LA10	C10DK391 V10D391	13M00251K	CV250K10	10K250	-594-52516	Z220D	Z10L391	391D-10A
	14	140	JVR14N391K	V250LA20A V250LA20C	C14DK391 V14D391	17M00251K	CV250K14	14K250	-595-52516	Z220F	Z15L391	391D-14A
	20	275	JVR20N391K	(V250LA40A/B) (V250LA40C/CX)	C20DK391 V20D391	(24M00251K)	CV250K20	20K250	-	(Z220G)	Z21L391	391D-20A
275 350	5	20	JVR5N431K	-	C05DK431 V05D431	07M02750K	CV275K5	05K275	-592-52716	Z250B	-	431D-05A
	7	40	JVR7N431K	V275LA4	C07DK431 V07D431	09M02750K	CV275K7	07K275	-593-52716	Z250C	Z7L431	431D-07A
	10	80	JVR10N431K	V275LA10	C10DK431 V10D431	13M02750K	CV275K10	10K275	-594-52716	Z250D	Z10L431	431D-10A
	14	155	JVR14N431K	V275LA20A V275LA20C	C14DK431 V14D431	17M02750K	CV275K14	14K275 14K275E2	-595-52716	Z250F	Z15L431	431D-14A
	20	303	JVR20N431K	(V275LA40A/B) (V275LA40C/CX)	C20DK431 V20D431	(24M02750K)	CV275K20	20K275	-	(Z250G)	Z21L431	431D-20A
300 385	5	21	JVR5N471K	-	C05DK471 V05D471	-	CV300K5	05K300	-592-53016	-	-	471D-05A
	7	42	JVR7N471K	V300LA4	C07DK471 V07D471	09M00301K	CV300K7	07K300	-593-53016	-	Z7L471	471D-07A
420 560	10	112	JVR10N681K	V420LA10	C10DK681 V10D681	13M00421K	CV420K10	10K420	-594-54216	Z380D	-	681D-10A
	14	225	JVR14N681K	V420LA20A	C14DK681 V14D681	17M00421K	CV420K14	14K420	-595-54216	Z380F	Z15L681	681D-14A
	20	430	JVR20N681K	(V420LA40B)	C20DK681 V20D681	(24M00421K)	CV420K20	20K420	-	(Z380G)	Z21L681	681D-20A
460 615	10	115	JVR10N751K	V480LA10	C10DK751 V10D751	13M00461K	CV460K10	10K460	-594-54616	Z415D	-	751D-10A
	14	230	JVR14N751K	V480LA40A	C14DK751 V14D751	17M00461K	CV460K14	14K460	-595-54616	Z415F	-	751D-14A
	20	440	JVR20N751K	(V480LA80A/B)	C20DK751 V20D751	(24M00461K)	CV460K20	20K460	-	(Z415G)	-	751D-20A
510 670	10	118	JVR10N821K	V510LA10	C10DK821 V10D821	13M00511K	CV510K10	10K510	-594-55116	-	-	821D-10A
	14	235	JVR14N821K	V510LA40A	C14DK821 V14D821	17M00511K	CV510K14	14K510	-595-55116	-	Z15L821	821D-14A
550 745	10	127	JVR10N911K	V575LA10	C10DK911 V10D911	13M05750K	CV550K10	10K550	-594-55516	-	-	911D-10A
	14	255	JVR14N911K	V575LA40A	C14DK911 V14D911	17M05750K	CV550K14	14K550	-595-55516	-	-	911D-14A
	20	510	JVR20N911K	(V575LA80B)	C20DK911 V20D911	(24M05750K)	CV550K20	20K550	-	(Z500G)	-	911D-20A
680 895	10	155	JVR10N112K	V660LA10	C10DK112 V10D112	-	CV680K10	10K680	-	-	-	112D-10A
	14	310	JVR14N112K	V660LA50A	C14DK112	-	CV680K14	14K680	-	-	-	112D-14A

N.B. ( ) = 7.5mm lead pitch. Equivalent Joyin part has a 10mm pitch