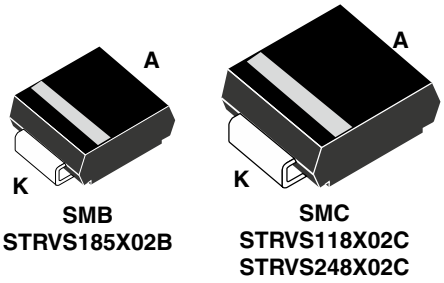
STRVSX

ST repetitive voltage suppressor

Datasheet – production data



Features

- Clamping voltage characteristics defined at 25 °C, 85 °C and 125 °C
- Stand-off voltage range: from 85 V to 188 V
- Low leakage current: 0.2 µA at 25 °C
- Maximum operating junction temperatures:
  - SMB and SMC: 150 °C
  - DO-15 and DO-201: 175°C

Complies with the following standards:

- IEC 61000-4-2 level 4
  - ±15 kV (air discharge)
  - ±8 kV (contact discharge)
- IEC 61000-4-5 level 4
- MIL-STD-883, method 3015, class 3B:
  - 25 kV HBM (human body model)
- MIL-STD-750, method 2026 solderability
- EIA STD RS-481 and IEC 60286-3 packing (surface mount packages)

Applications

- MOSFET protection
- IGBT protection
- Auxiliary power supply

Description

The STRVSX series is a TVS family created to provide simple and effective solutions for designers working on circuits that require protection from repetitive overvoltages.

The STRVSX series is highly reliable and suits applications where the surge frequency makes the protected device temperature increase, for example, MOSFET protection in fly back configuration.

Additional support for designers using these devices is available in the STMicroelectronics application note AN4209: “Design methodology for repetitive voltage suppressors (RVS) in repetitive mode: STRVS”.

Table 1. Device summary

CPN	Clamping voltage I_{PP} = 2 A (125 °)	Package
STRVS118X02C	118 V	SMC
STRVS142X02F	142 V	DO-201
STRVS182X02F	182 V	DO-201
STRVS185X02B	185 V	SMB
STRVS185X02E	185 V	DO-15
STRVS222X02F	222 V	DO-201
STRVS225X02E	225 V	DO-15
STRVS241X02E	241 V	DO-15
STRVS248X02C	248 V	SMC
STRVS252X02F	252 V	DO-201
STRVS280X02F	280 V	DO-201

This is information on a product in full production. www.st.com

1 Characteristics

Table 2. Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter	Value	Unit
T_j	Operating junction temperature range (SMB and SMC)	-55 to 150	°C
	Operating junction temperature range (DO-15 and DO-201)	-55 to 175	°C
T_{stg}	Storage temperature range (SMB and SMC)	-65 to 150	°C
	Storage temperature range (DO-15 and DO-201)	-65 to 175	°C
T_L	Maximum lead temperature for soldering during 10 s (SMB and SMC)	260	°C
	Maximum lead temperature for soldering during 10 s at 5 mm from case (DO-15 and DO-201)	260	°C

Table 3. Thermal resistances

Symbol	Parameter		Value	Unit
$R_{th(j-l)}$	Junction to leads	SMB	13	°C/W
		SMC	12	
		DO-15	35	
		DO-201	23	
$R_{th(j-a)}$	Junction to ambient(1)	SMB	185	
		SMC	150	
		DO-15	105	
		DO-201	100	

1. On printed circuit with recommended pad layout

Figure 1. Electrical characteristics - definitions

Symbol		Parameter
V_{BR}	=	Breakdown voltage
I_{RM}	=	Leakage current @ V_{RM}
V_{RM}	=	Stand-off voltage
V_{CL}	=	Clamping voltage at I_{PP}
V_{CL0}	=	Clamping voltage where R_d line crosses current axis
I_{PP}	=	Peak pulse current
I_F	=	Forward current
V_F	=	Forward voltage
R_d	=	Dynamic resistance
αT	=	Voltage temperature coefficient on V_{BR}

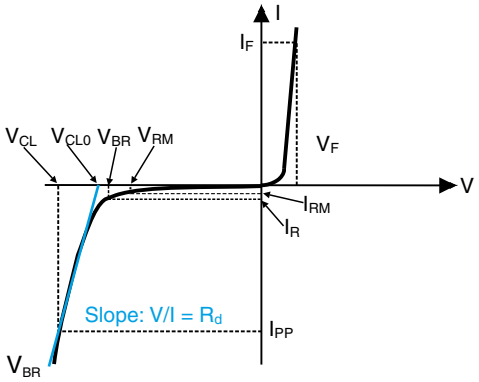


Table 4. Electrical characteristics - values

Order code	I_{RM} max @ V_{RM} (25 °C)		V_{BR} @ I_R(1) (25 °C)			Values @ 125 °C (typ.)				αT
			Min.	Max.		I_{PP}	V_{CL} @ I_{pp}	V_{CL0}	R_d(2)	Max.
	µA	V	V		mA	A	V	V	Ω	10^{-4}/°C
STRVS118X02C	0.2	85	95	105	1	2	118	116	1.0	10.6
STRVS142X02F	1	102	114	126	1	2	142	140	1.0	10.7
STRVS182X02F	1	128	143	158	1	2	182	177	2.5	10.8
STRVS185X02B/E	0.2	128	143	158	1	2	185	178	2.5	10.8
STRVS222X02F	1	154	171	189	1	2	222	213	4.5	10.8
STRVS225X02E	0.5	154	171	189	1	2	225	214	5.5	10.8
STRVS241X02E	0.5	171	190	210	1	2	241	234	3.5	10.8
STRVS248X02C	0.5	171	190	210	1	2	248	238	5.0	10.8
STRVS252X02F	1	171	190	210	1	2	252	239	6.5	10.8
STRVS280X02F	1	188	209	231	1	2	280	263	8.5	10.8

1. To calculate V_{BR} at a given junction temperature, use the following formula: V_{BR} @ T_j = V_{BR} @ 25 °C x (1 + αT x (T_j - 25))
2. R_d = (V_{CL} - V_{CL0})/I_{PP}

Figure 2. Clamping voltage versus peak pulse current - STRVS118X02C (typical values)

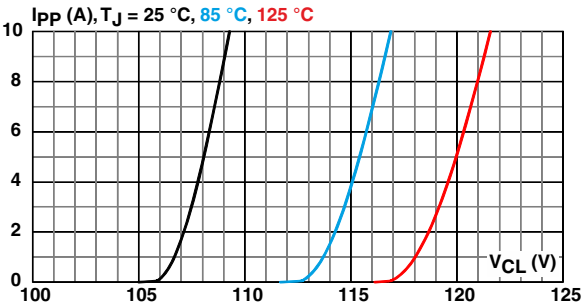


Figure 3. Clamping voltage versus peak pulse current - STRVS142X02F (typical values)

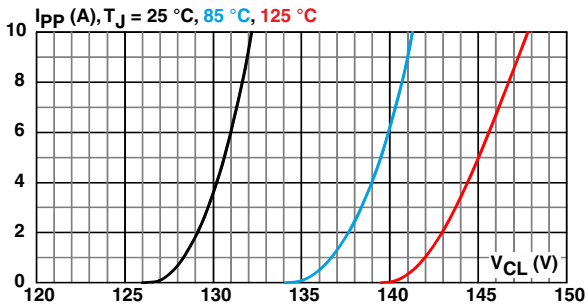


Figure 4. Clamping voltage versus peak pulse current - STRVS182X02F (typical values)

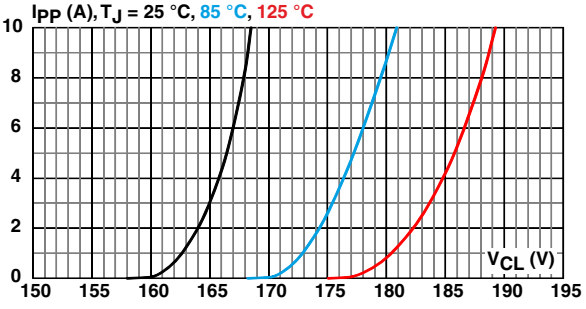


Figure 5. Clamping voltage versus peak pulse current - STRVS185X02B/E (typical values)

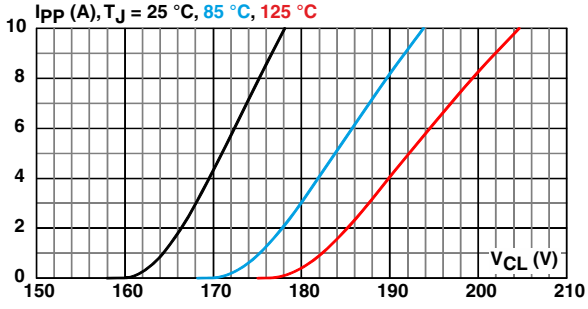


Figure 6. Clamping voltage versus peak pulse current - STRVS222X02F (typical values)

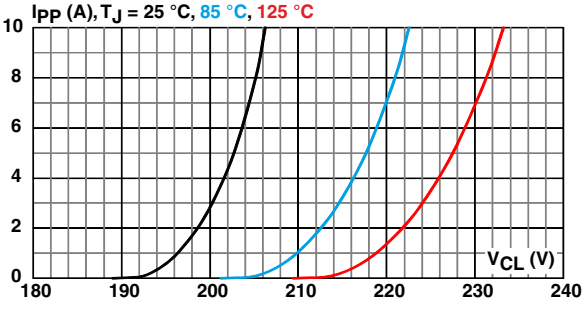


Figure 7. Clamping voltage versus peak pulse current - STRVS225X02E (typical values)

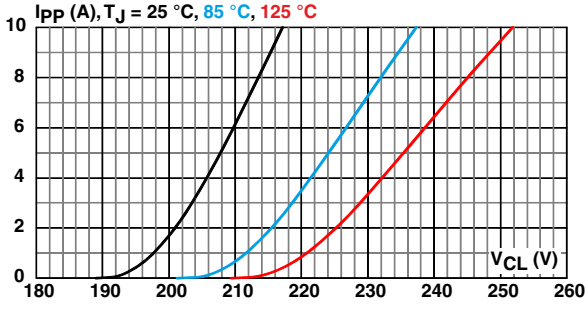


Figure 8. Clamping voltage versus peak pulse current - STRVS241X02E (typical values)

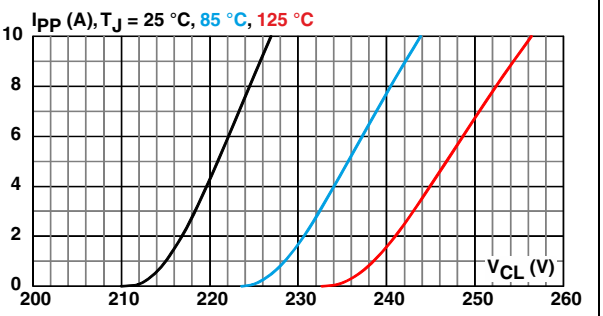


Figure 9. Clamping voltage versus peak pulse current - STRVS248X02C (typical values)

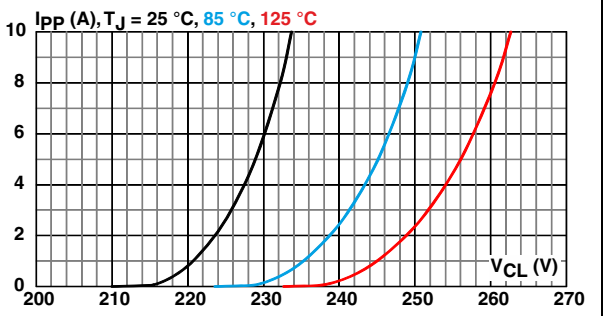


Figure 10. Clamping voltage versus peak pulse current - STRVS252X02F

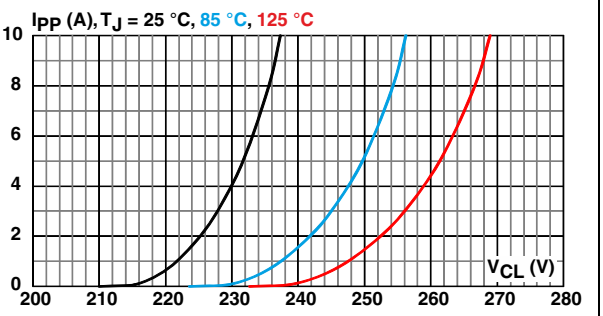


Figure 11. Clamping voltage versus peak pulse current - STRVS280X02F

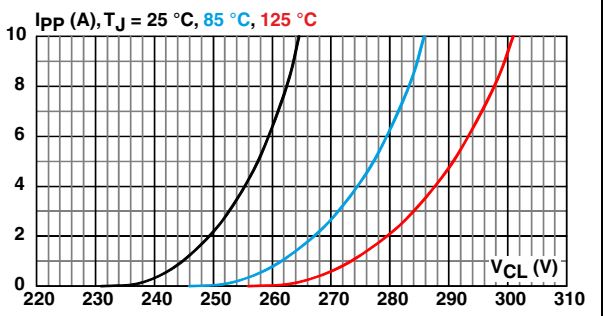


Figure 12. Leakage current versus junction temperature (typical values) STRVSxxxC

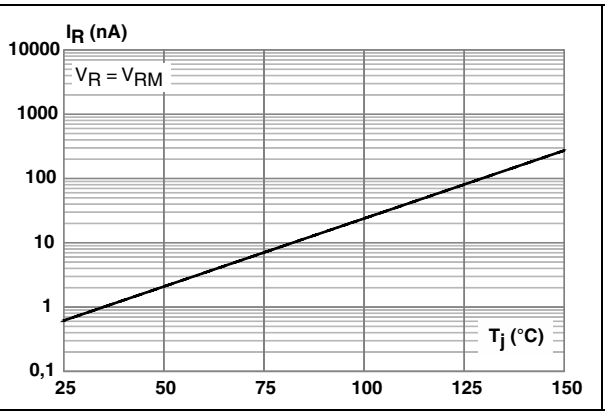


Figure 13. Leakage current versus junction temperature (typical values) STRVSxxxF

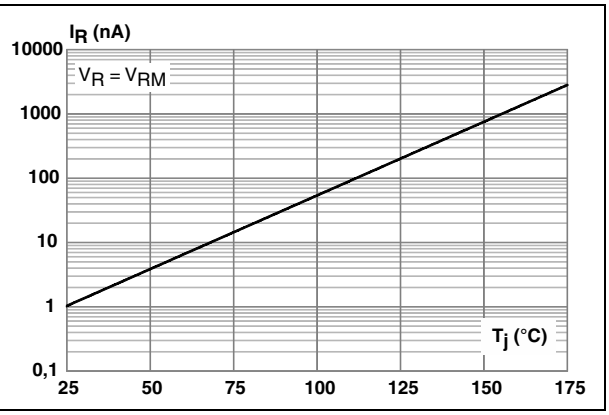


Figure 14. Leakage current versus junction temperature (typical values) STRVSxxxB

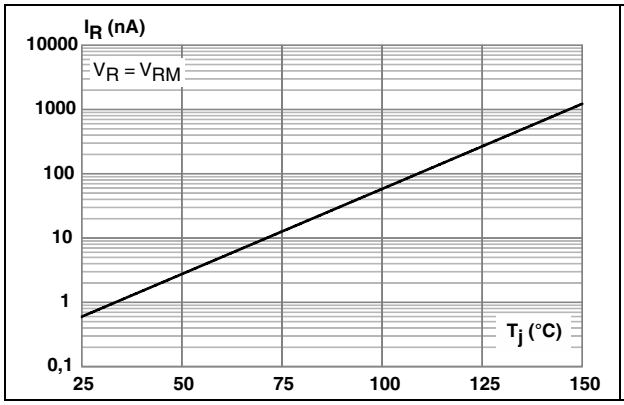


Figure 15. Leakage current versus junction temperature (typical values) STRVSxxxE

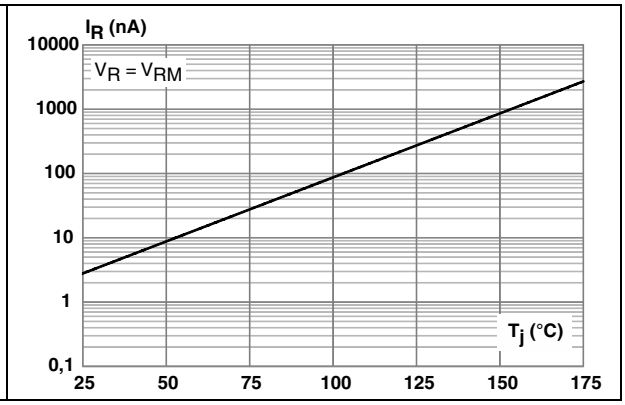


Figure 16. Thermal resistance junction to ambient versus copper surface of connections - SMB

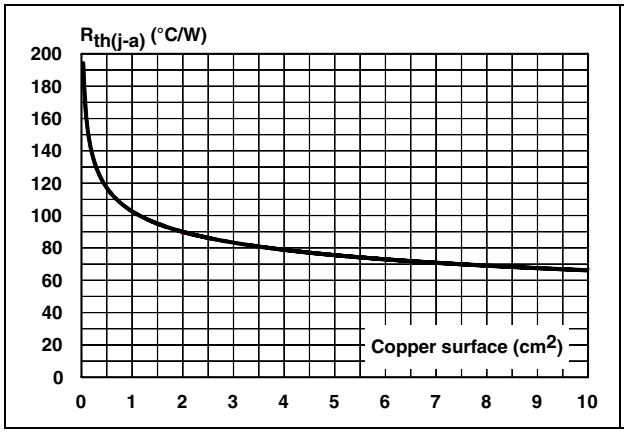


Figure 17. Thermal resistance junction to ambient versus copper surface of connections - SMC

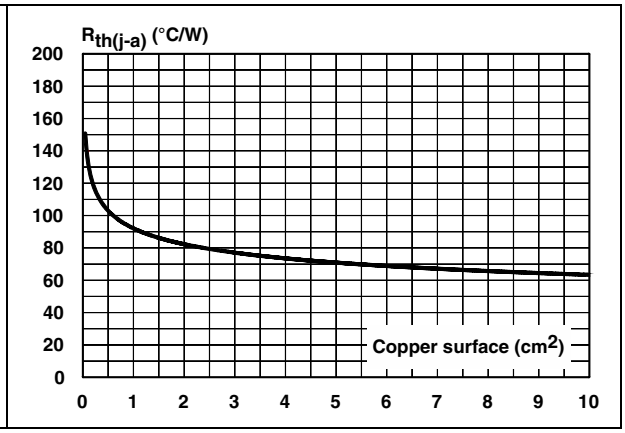


Figure 18. Thermal resistance junction to ambient versus copper surface of connections - DO-15

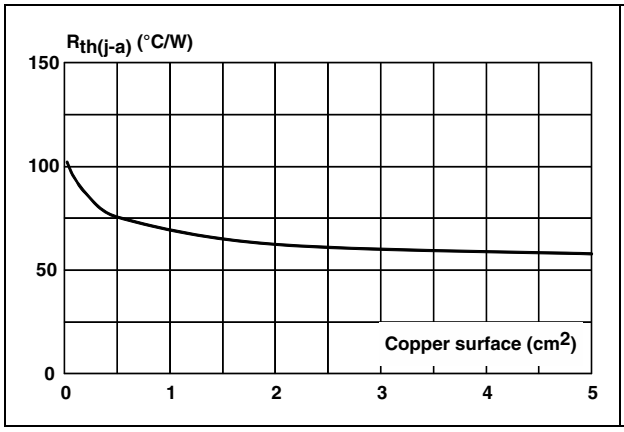
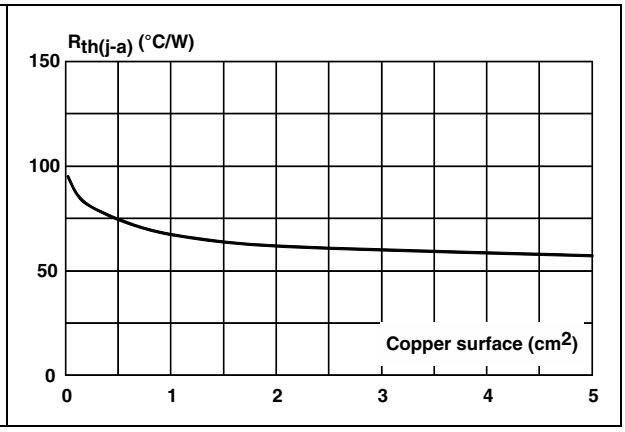


Figure 19. Thermal resistance junction to ambient versus copper surface of connections - DO-201



2 Package information

- Epoxy meets UL94, V0
- Lead-free package
- Polarity: band indicates cathode
- Terminals: solder plated, solderable as per MIL-STD-750, method 2026

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Figure 20. SMB dimension definitions

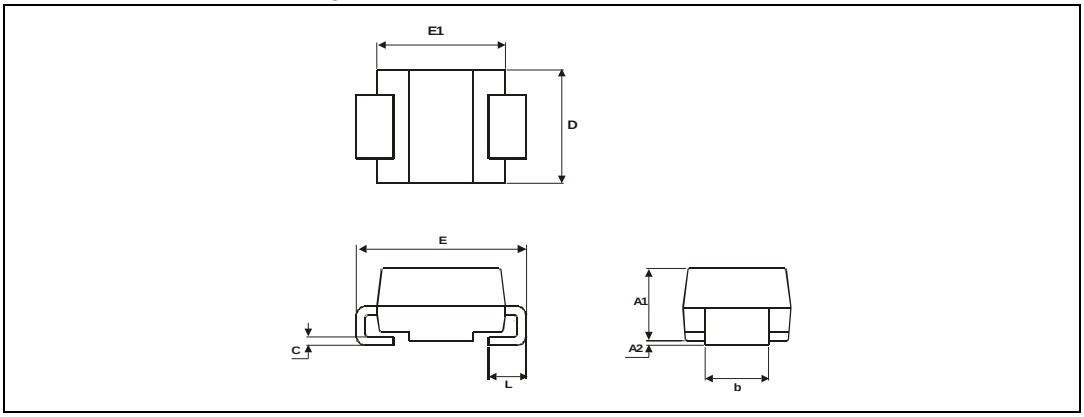


Table 5. SMB dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	1.95	2.20	0.077	0.087
c	0.15	0.40	0.006	0.016
D	3.30	3.95	0.130	0.156
E	5.10	5.60	0.201	0.220
E1	4.05	4.60	0.159	0.181
L	0.75	1.50	0.030	0.059

Figure 21. SMB Footprint, dimensions in mm (inches)

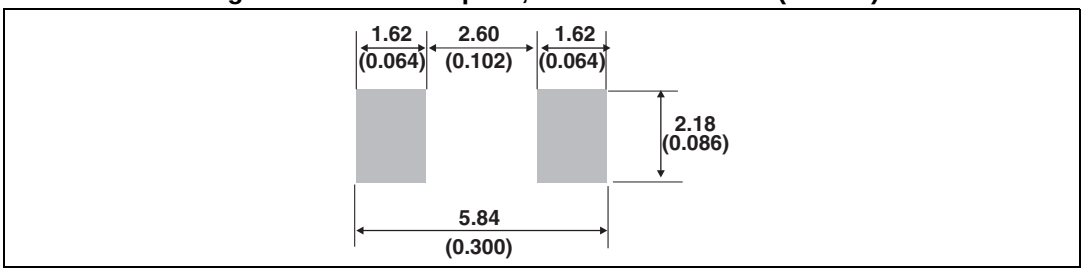


Figure 22. SMB marking layout

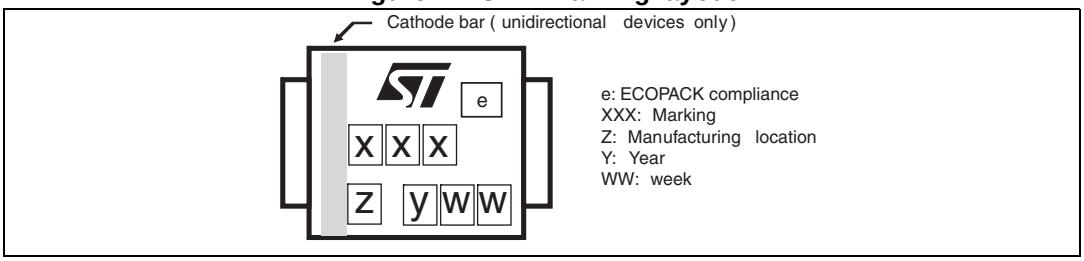


Figure 23. SMC dimension definitions

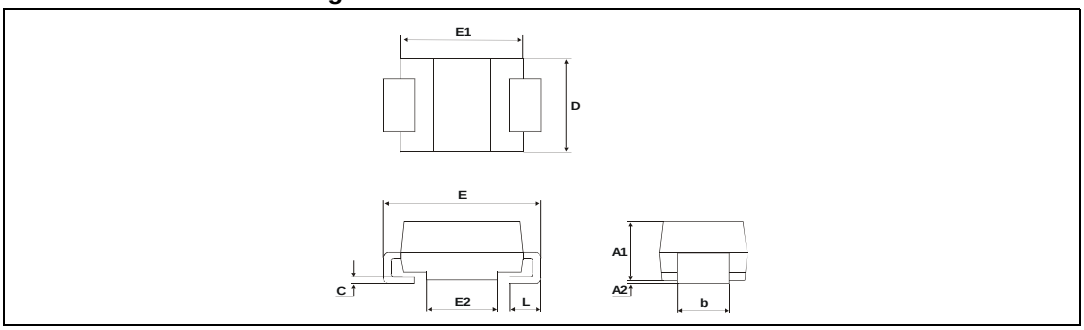


Table 6. SMC dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b(1)	2.90	3.20	0.114	0.126
c(1)	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

1. Dimensions b and c apply to plated leads

Figure 24. SMC footprint, dimensions in mm (inches)

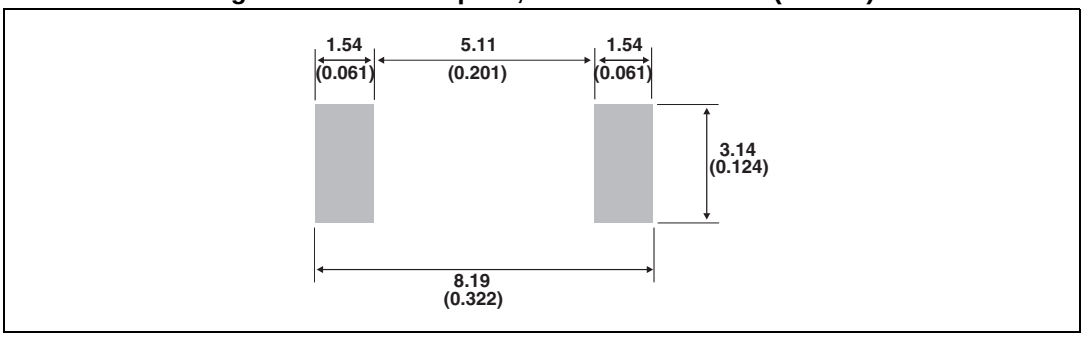


Figure 25. SMC marking layout

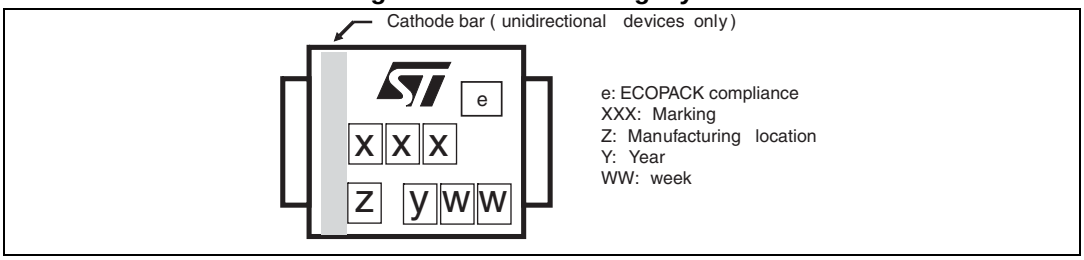


Figure 26. DO-15 dimension definitions

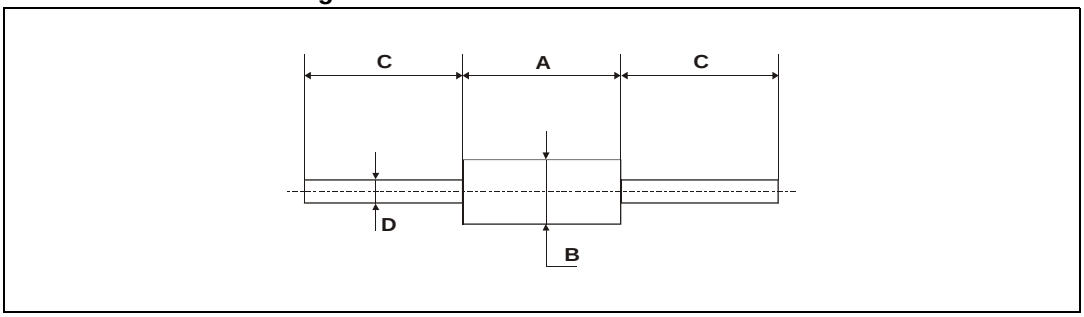


Table 7. DO-15 dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	6.05	6.75	0.238	0.266
B	2.95	3.53	0.116	0.139
C	26	31	1.024	1.220
D	0.71	0.88	0.028	0.035

Figure 27. DO-201 dimension definitions

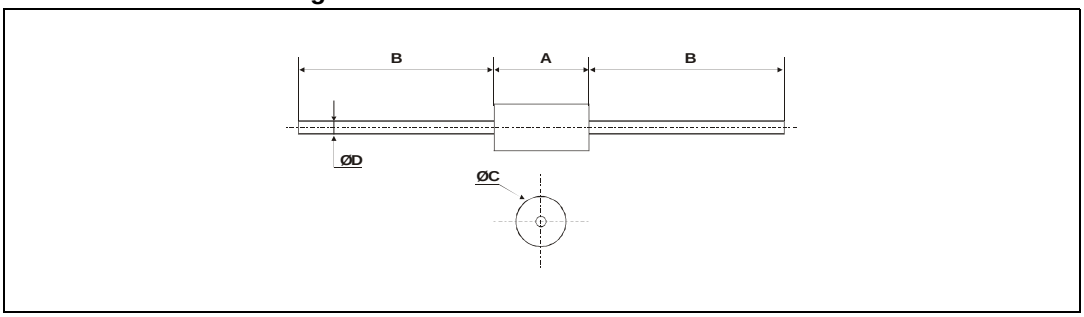


Table 8. DO-201 dimension values

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	8.5	9.5	0.335	0.374
B	25.4		1	
Ø C	4.8	5.3	0.189	0.209
Ø D	0.96	1.06	0.038	0.042

3 Ordering information

Figure 28. Ordering information scheme

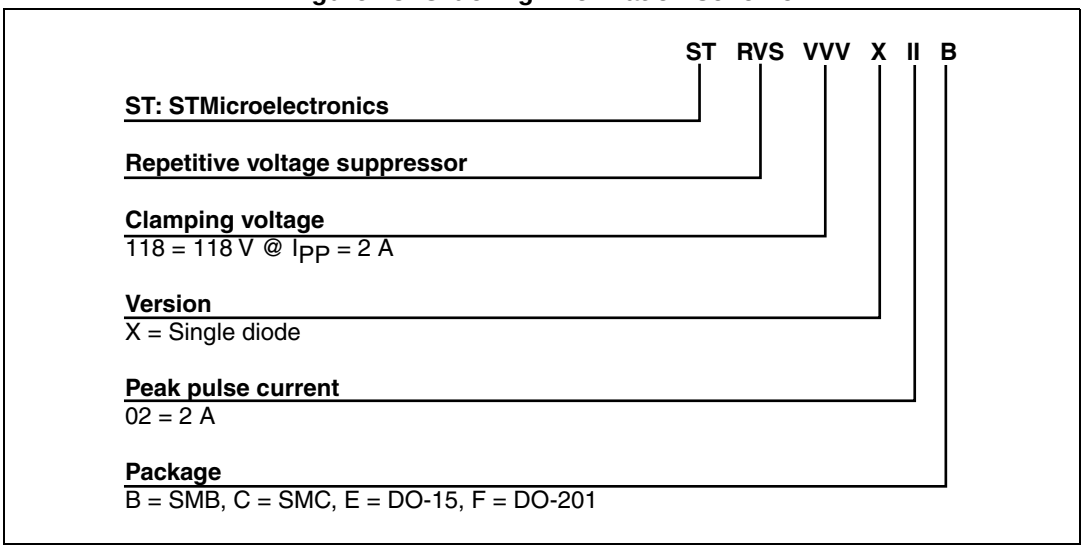


Table 9. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STRVS118X02C	R118C	SMC	0.25 g	2500	Tape and reel
STRVS142X02F	R142F	DO-201	0.90 g	600	Ammopack
STRVS182X02F	R182F	DO-201	0.90 g	600	Ammopack
STRVS185X02B	R185B	SMB	0.12	2500	Tape and reel
STRVS185X02E	R185E	DO-15	0.40	1000	Ammopack
STRVS222X02F	R222F	DO-201	0.90 g	600	Ammopack
STRVS225X02E	R225E	DO-15	0.40	1000	Ammopack
STRVS241X02E	R241E	DO-15	0.40	1000	Ammopack
STRVS248X02C	R4248C	SMC	0.25 g	2500	Tape and reel
STRVS252X02F	R252F	DO-201	0.90 g	600	Ammopack
STRVS280X02F	R280F	DO-201	0.90 g	600	Ammopack

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
05-Mar-2013	1	Initial release.
18-Apr-2013	2	Insertion of *Table 1*.
15-Oct-2013	3	Updated *Table 1*.

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