1 Characteristics

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

Symbol	Parameter		Value	Unit
P_{PP}	Peak pulse power dissipation(1) (8/20 µs)	$T_{j\ initial} = T_{amb}$	up to 22.5	kW
T_{stg}	Storage temperature range		-65 to + 150	°C
T_j	Operating junction temperature range		-55 to + 150	°C
T_L	Maximum lead temperature for soldering during 10 s.		260	°C

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Table 3. Thermal parameter

Symbol	Parameter		Value	Unit
$R_{th(j-l)}$	Junction to leads	SMC	15	°C/W
		SMB	20	°C/W

Figure 1. Electrical characteristics - definitions

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{BR}	Breakdown voltage
V_{CL}	Clamping voltage
I_{RM}	Leakage current @ V_{RM}
I_{PP}	Peak pulse current
αT	Voltage temperature coefficient
V_F	Forward voltage drop

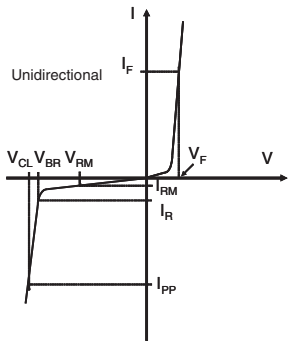


Figure 2. Pulse definition for electrical characteristics

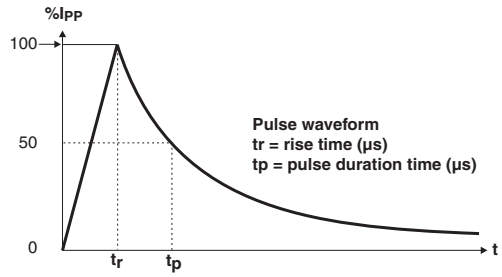


Table 4. Electrical characteristics, parameter values (T_{amb} = 25 °C)

Order code	I_{RM} max @ V_{RM}			V_{BR} @I_R				V_{CL} @I_{PP} 10/1000 µs		V_{CL} @I_{PP} 8/20 µs		αT (1)	C
	25 °C	85 °C		min.	typ.	max.		max.		max.		max.	typ.
	µA		V	V			mA	V	A(2)	V	A(2)	10-4/ °C	nF
LNBTVS3-220U	0.2	1.0	20	22	23.1	24.2	1	33.2	45	35	250	9.3	3
LNBTVS4-220S	0.2	1.0	20	22	23.1	24.2	1	33.2	55	35	334	9.3	3.5
LNBTVS4-221S	0.2	1.0	20	22	23.1	24.2	1	33.2	60	32	334	9.3	5.5
LNBTVS4-222S	0.2	1.0	20	22	23.1	24.2	1	33.2	90	30	334	9.3	6
LNBTVS4-304S	0.2	1.0	28	30	31.5	33	1	45	56	45	334	9.8	4
LNBTVS6-220S	0.2	1.0	20	22	23.1	24.2	1	33.2	90	35	500	9.3	6
LNBTVS6-221S	0.2	1.0	20	22	23.1	24.2	1	33.2	90	32	500	9.3	6
LNBTVS6-304S	0.2	1.0	28	30	31.5	33	1	45	67	45	500	9.8	5

1. To calculate V_{BR} versus junction temperature, use the following formula: V_{BR} @ T_J = V_{BR} @ 25°C x (1 + αT x (T_J – 25)).
2. Surge capability given for both directions.

Figure 3. Peak pulse current versus initial junction temperature with regular footprints (typical values)

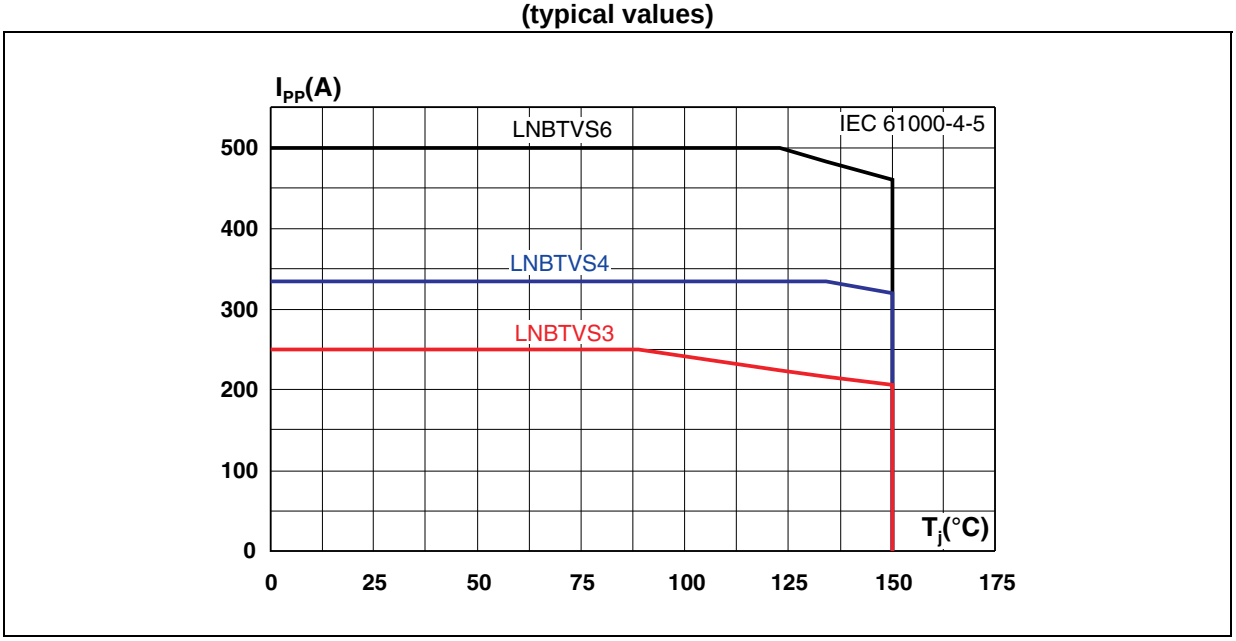


Figure 4. Surge test examples at +4 kV - IEC 61000-4-5, R = 12 Ω

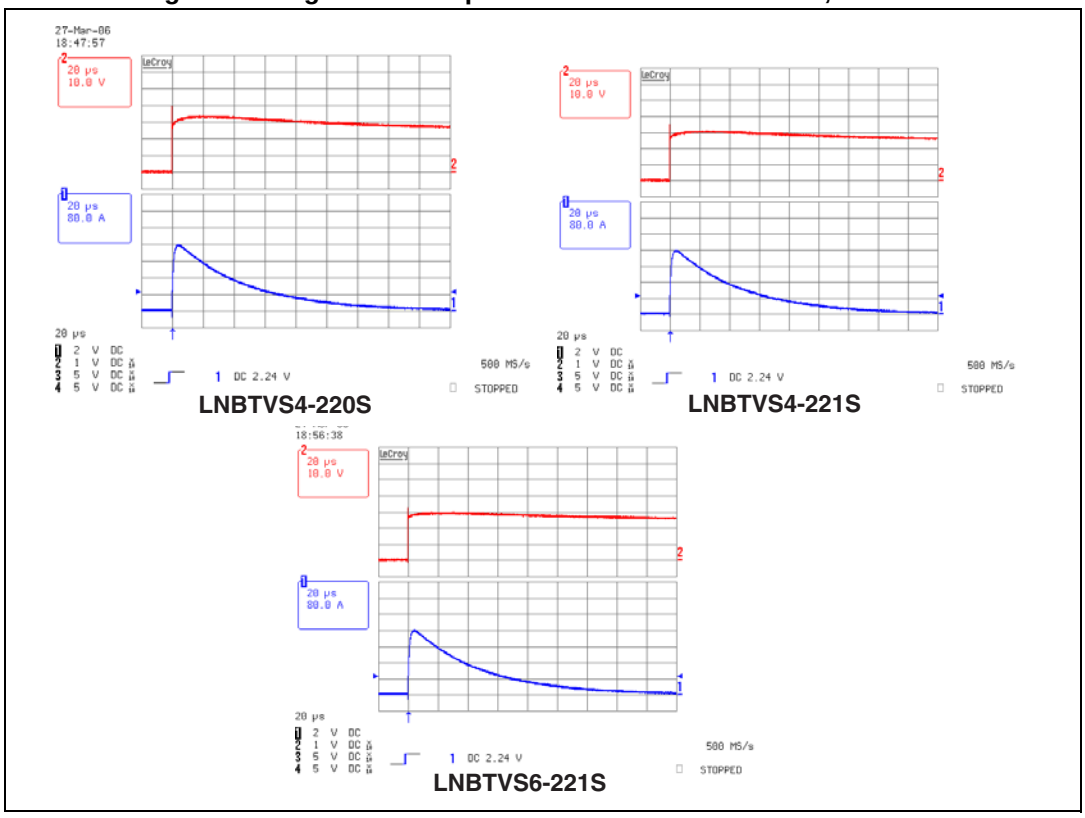
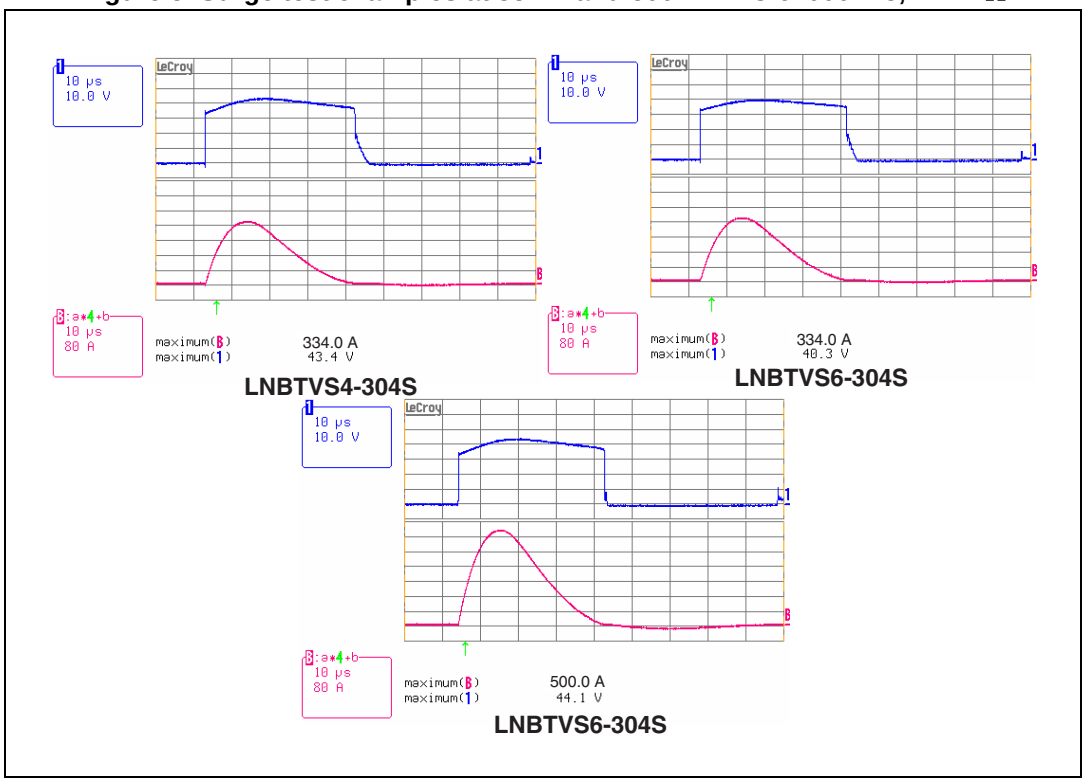


Figure 5. Surge test examples at 334 A and 500 A - IEC 61000-4-5, R = 2 Ω



2 Application information

Figure 6. Application schematic with LNBH23 and LNBTVSx

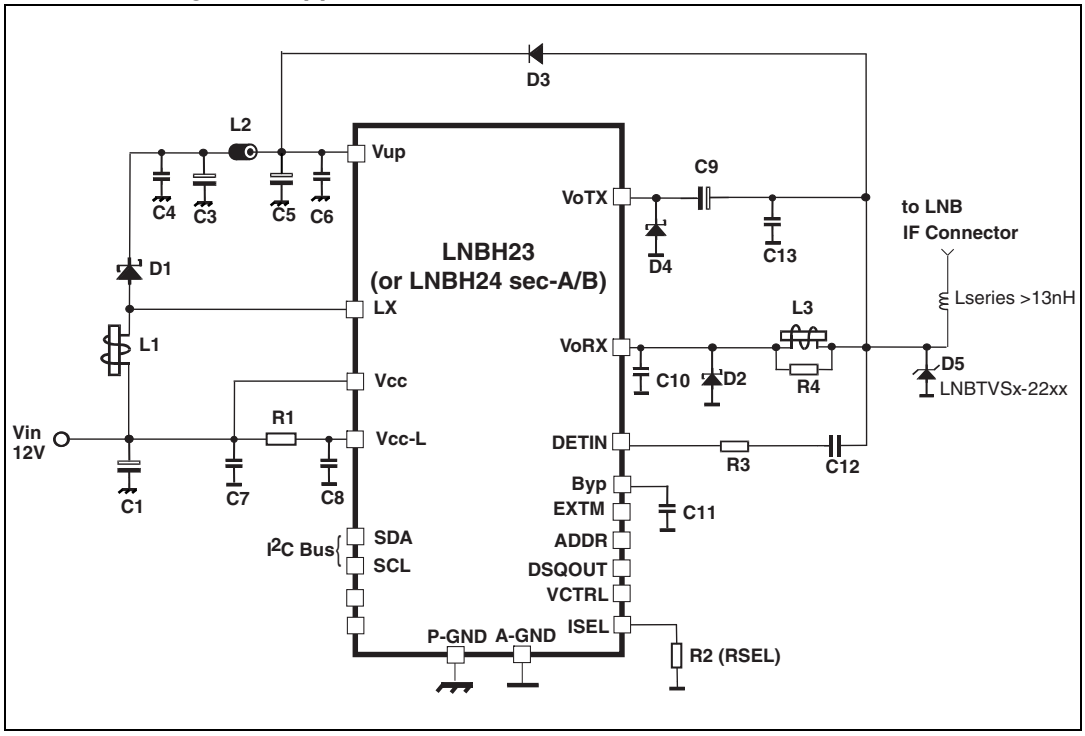


Figure 7. Application schematic with LNBH23L and LNBTVSx

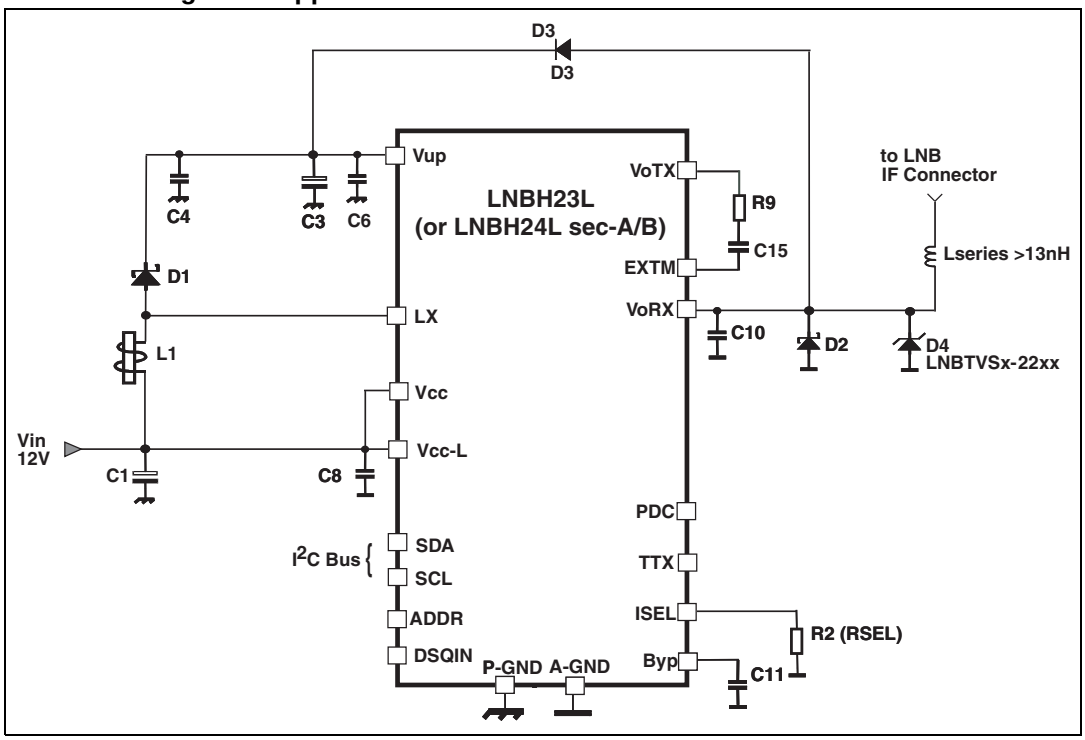
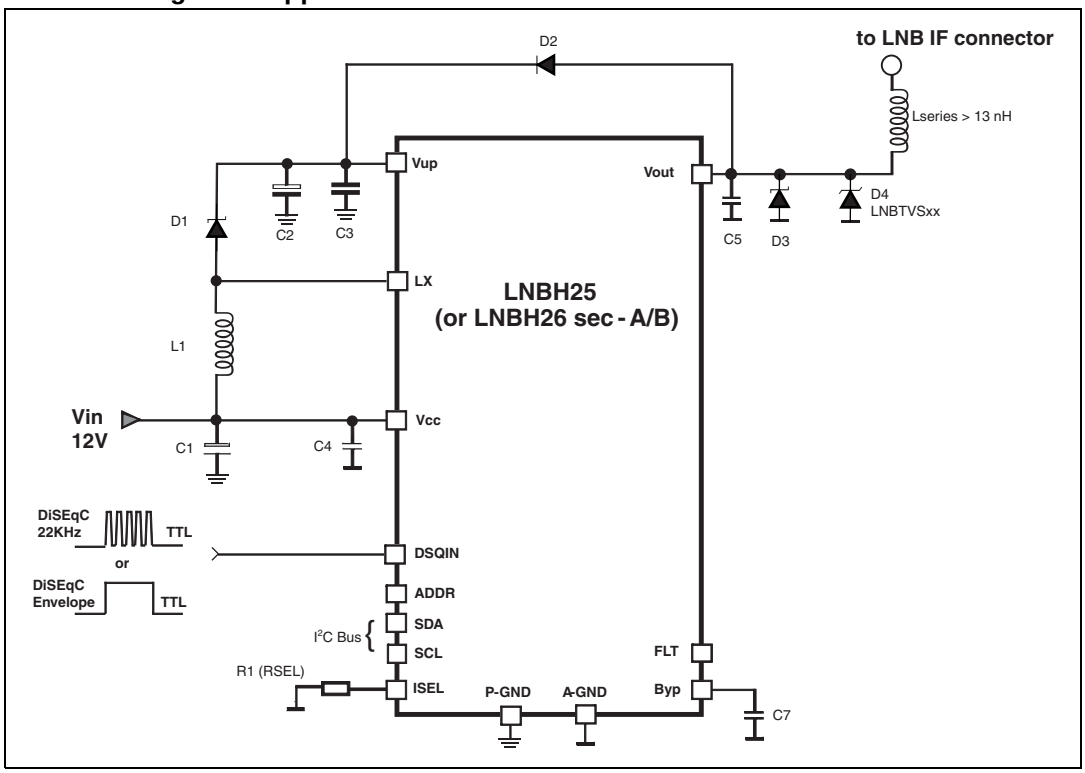


Figure 8. Application schematic with LNBH25/26 and LNBTVSx



LNBHxx output is usually connected to the antenna cable of digital satellite receivers. Atmospheric phenomenon can cause high voltage discharges on the antenna cable causing damages to the attached devices.

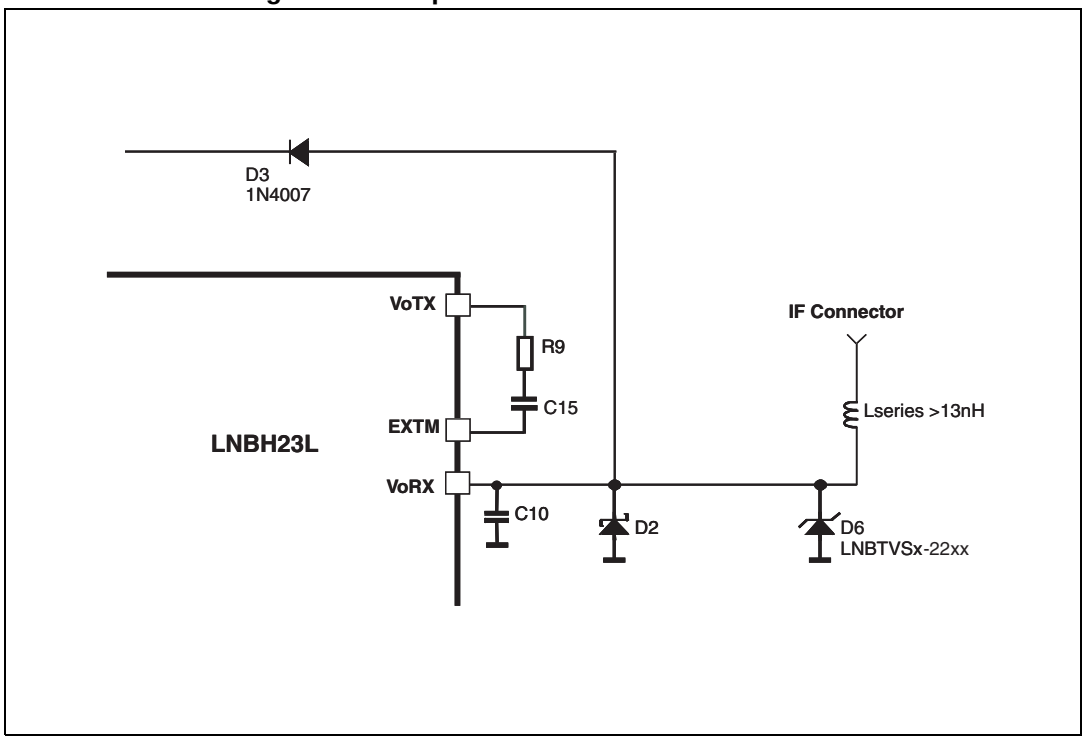
In applications where it is required to be protected against lightning surges, transient voltage suppressor (TVS) devices like LNBTVSx-22xx can be used to protect LNBHxx and the other devices electrically connected to the antenna cable.

The LNBTVSx-22xx diodes are dedicated lightning and electrical overstress surge protection for LNBHxx voltage regulators. These protection diodes were designed to comply with the stringent IEC 61000-4-5 standard with surges up to 500 A with a whole range of products.

TVS diodes have intrinsic capacitance that attenuates the RF signal. For this reason, the LNBTVSx-22xx cannot be directly connected to the IF (RX/TX) cable connector that carries the RF signals coming from the LNB. To suppress the effect of the intrinsic capacitance, an inductance must be placed in series with the TVS diode (see *Figure 9*). The goal of the L series and LNBTVC inductance is to be transparent at 22 kHz and to reject frequencies higher than 900 MHz.

The value of the series inductance is usually > 13 nH, with a current capability higher than the I_{pp} (peak pulse current) expected during the surge.

Figure 9. Example of LNBTVS diode connection



3 Package information

- Case: JEDEC DO-214AB or JEDEC DO-214AA molded plastic over planar junction
- Terminals: solder plated, solderable as per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy is rated UL 94, V0
- RoHS package

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 10. SMC dimension definitions

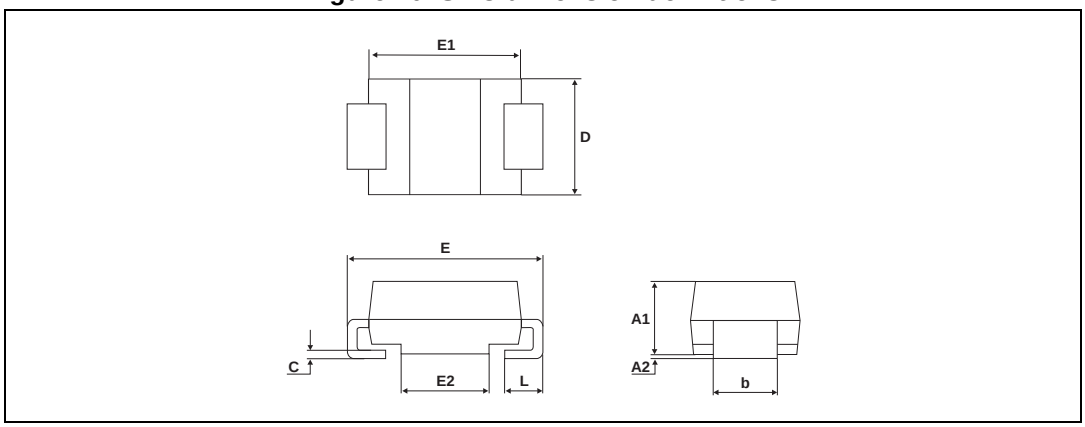


Table 5. SMC dimension values

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	2.90	3.20	0.114	0.126
c	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

Figure 11. SMB dimension definitions

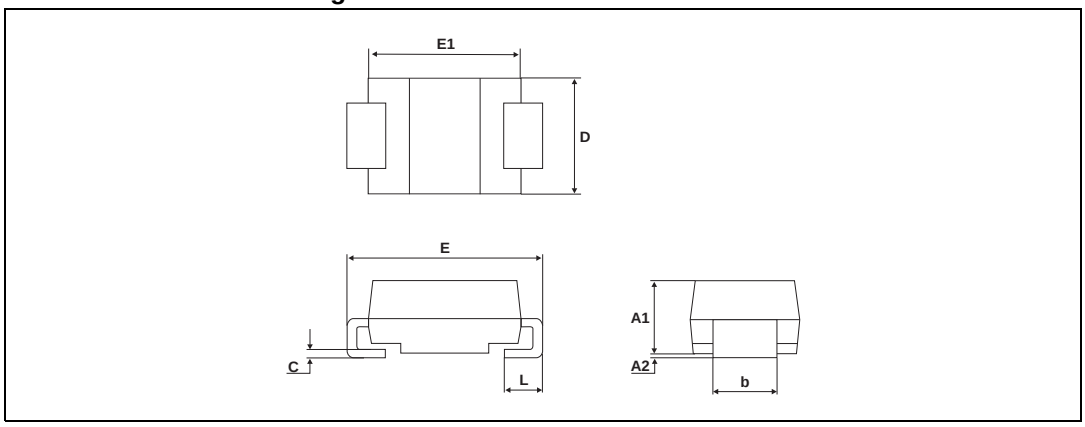


Table 6. SMB dimension values

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 12. SMC footprint dimensions in mm (inches)

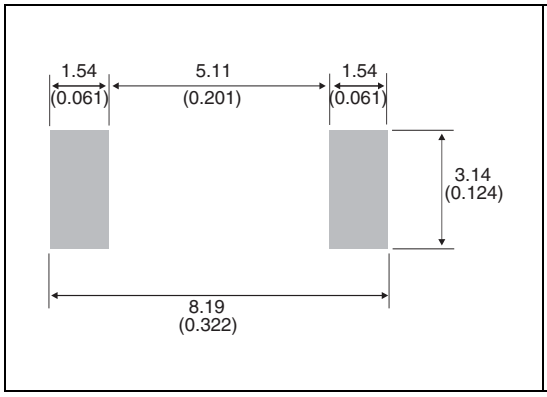


Figure 13. SMB footprint dimensions in mm (inches)

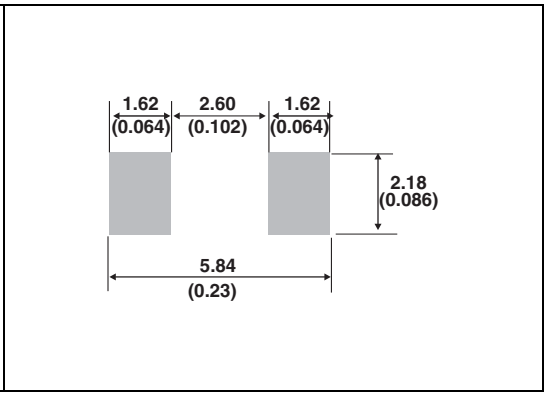
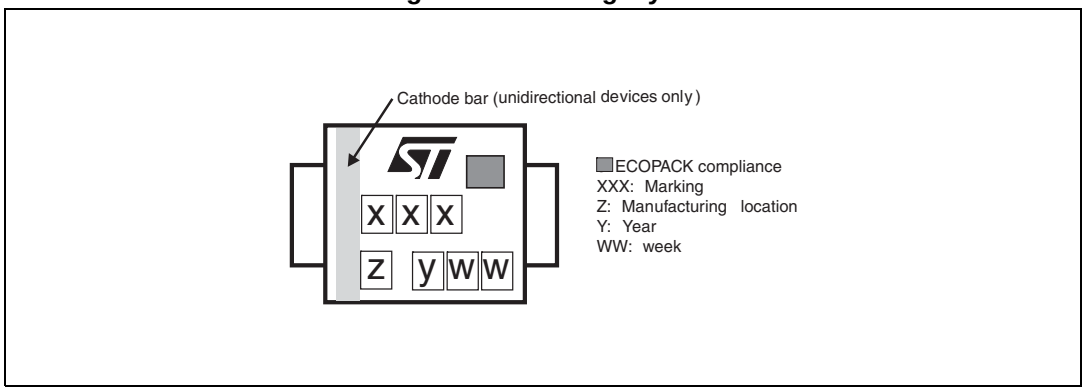


Figure 14. Marking layout



Note: Marking layout can vary according to assembly location.

4 Ordering information

Figure 15. Ordering information scheme

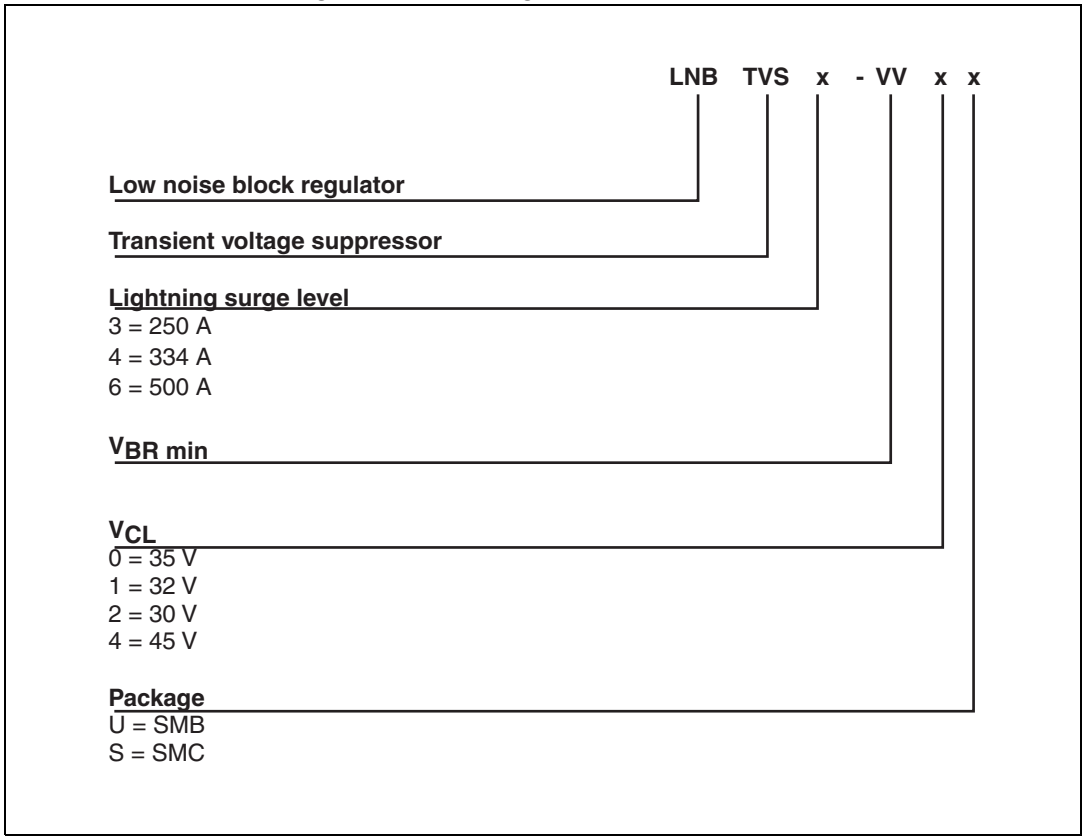


Table 7. Ordering information

Order code	Marking	Package	Weight (g)	Base qty	Delivery mode
LNBTVS3-220U	LC	SMB	0.107	2500	Tape and reel
LNBTVS4-220S	LAA	SMC	0.245	2500	Tape and reel
LNBTVS4-221S	LAB	SMC	0.245	2500	Tape and reel
LNBTVS4-222S	LAC	SMC	0.245	2500	Tape and reel
LNBTVS6-220S	LBA	SMC	0.245	2500	Tape and reel
LNBTVS6-221S	LBB	SMC	0.245	2500	Tape and reel
LNBTVS4-304S	LAD	SMC	0.245	2500	Tape and reel
LNBTVS6-304S	LBC	SMC	0.245	2500	Tape and reel

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
30-Aug-2010	1	First release. This document merges and updates the content of datasheets LNBTVSx-22xx Revision 3, 20-Jan-2007, and LNBTVSx-304 Revision 1, 01-Apr-2008.
22-Oct-2010	2	Updated *Figure 13.*
05-Sep-2011	3	Added *Figure 8*.
21-May-2013	4	Added *Table 1: Device summary*.

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