

Product Brief 2020

SMD Surge Arresters

Gas Discharge Tubes for Overvoltage Protection

Series and applications

• S15

World's smallest 2-electrode surge arrester designed to protect data lines and Ethernet ports

• S20, S25

Miniature 2-electrode surge arrester designed to protect data lines and Ethernet ports

• S30, S32

Miniature 2-electrode surge arrester designed to protect data lines and Ethernet ports

• S50, S5B

Miniature 2-electrode surge arrester with medium current handling capability for cable modems, DSL- line cards etc.

• S8A

Miniature 2-electrode surge arrester with high current handling capability for i.e. antenna protection

• TG20, TG30 Miniature 3-electrode surge arrester designed to protect data lines and Ethernet ports

• TQ90

Miniature 3-electrode surge arrester with medium current handling capability for cable modems, DSL- line cards etc.



Overvoltage protection of data lines with gas discharge tubes

Voltage surges in telecommunication systems caused by lightning or line power faults can affect sensitive electronic circuitry.

Manufacturers of telecom equipment such as DSL and cable modems using overvoltage protection by gas discharge tubes (GDTs).

GDTs shunt surge currents to ground and limit overvoltages to a harmless level. Major advantages are their extremely low capacitance and high insulation resistance, making them almost invisible in normal operation. In the new S32, S5 and S8 series TDK offers arresters with high current handling capability combined with excellent SMD configurability.

In the new miniature series S15, S20, S30 (2-electrode arrester) and TG3 (3-electrode arrester) TDK has now also introduced overvoltage protection by gas-filled surge arresters for applications where space is a limiting factor.

Overvoltage protection in power circuits

SMD Surge arresters as S30-A90X, S20-A140X in parallel to chokes eliminate the energy to avoid overvoltage's due to oscillation during switch on/off.



Gigabit Ethernet

Line to GND 6.0 kV, 10/700 μ s @ 40 Ω Surge arrester suggested types: S30-A90X, S20-A140X, S25-A90X or 3-electrode TG30-A90XSMD

Gigabit Ethernet surge solution 1



Gigabit Ethernet surge solution 2



Outdoor Gigabit Ethernet surge solution 2-electrode (Power over Ethernet)

Standard IEC 61000-4-5

- Common mode 6 kV 10 operations
 [5x (+) & 5x (-)] in 1.2/50 μs load 12 Ω
 - Surge arrester suggested type: S30-A90X
 (10 operations [5x (+) & 5x (-)] 8/20 μs 3 kA) or 3-electrode TG30-A90XSMD
 (10 operations [5x (+) & 5x (-)] 8/20 μs 3 kA)
 - CTVS suggested type:
 CT2220S50E3G
 (10 operations 8/20 µs 3 kA)

Standard ITU-T K21

- Common mode 6 kV 10 operations [5x (+) & 5x (-)] in 1.2/50 μs load 10 Ω
 - Surge arrester suggested type: 2-electrode S30-A90X
 (10 operations [5x (+) & 5x (-)] 8/20 μs 3 kA) or 3-electrode TG30-A90XSMD
 (10 operations [5x (+) & 5x (-)] 8/20 μs 3 kA)
 - CTVS suggested type: CT1812KS0E2G_U (10 operations [5x (+) & 5x (-)] 8/20 µs 1.5 kA)





Outdoor Gigabit Ethernet surge solution 3-electrode (Power over Ethernet)



2-electrode arresters							
Series	S15	S20					Unit
Type <u>SMD</u>	S15-A140	S20-	A140X	S20-A200X		S20-A470X	
Ordering code	B88069X5373N104	B880	69X3013T303	B88069X973	13T303	B88069X1193T303	
Dimensions	2 × 1.2 × 1.2 3.2 × 1.6 × 1.6 EIA 0805/ metric 2012 EIA size 1206/ metric		3216			mm	
Nom. DC spark overvoltage V_{sdcN}	140 140		200			470	V
Tolerance of V_{sdcN}	±30	±30		±30		±30	%
Impulse spark-overvoltage							
@ 100 V/ μs 90% of measured values	< 600	< 800)	< 600		< 1050	V
@ 100 V/µs typical values	< 500 < 700)	< 500		< 950	V
@ 1 kV/µs 90% of measured values	< 800	< 900)	< 800		< 900	V
@ 1 kV/µs typical values	< 700	< 800)	< 700		< 800	V
Service life							
10 operations 8/20 µs	0.25	0.5		0.5		0.5	kA
10 operations 5/320 µs	150	150		150		150	A
Insulation resistance	> 1	> 1		> 1		> 1	GΩ
Capacitance @ 1 MHz	< 0.1	< 0.3		< 0.3		< 0.3	pF
Series	S25	,					
Type <u>SMD</u>	S25-A90X		S25-A200X		S25-C	420X	
Ordering code	B88069X2253T203		B88069X2263T203		B88069X4813T203		
Dimensions	3.2 × 2.5 × 2.5 EIA size 1210/ metric 3	225	1		1		mm
Nom. DC spark overvoltage $V_{_{sdcN}}$	90		200		420		V
Tolerance of V _{sdcN}	±20		±20		-15/+35		%
Impulse spark-overvoltage			1				1
@ 100 V/µs 90% of measured values	< 500		< 700		< 850		V
@ 100 V/µs typical values	< 400		< 500		< 750		V
@ 1 kV/µs 90% of measured values	< 700		< 850		< 950		V
@ 1 kV/µs typical values	< 600		< 700		< 900		V
Service life							
10 operations 50 Hz, 1 s	-		-		1		A
10 operations 8/20 µs	1		1		1		kA
10 operations 5/320 µs	150		150		150		А
Insulation resistance	> 1		> 1		> 1		GΩ
Capacitance @ 1 MHz	< 0.3		< 0.3		< 0.3		pF



2-electrode surge arresters	5								
Series	S30								Unit
Type <u>SMD</u>	S30-A75X	S30	-A90X	S30-A23	ΟX	S30-A230XS		S30-A300XS	
Ordering code	B88069X1023T253	B88	069X9231T253	B88069X	5941T253	B88069X98017	253	B88069X6891T253	
Dimensions	4.5 × 3.2 × 2.7 EIA case size 1812	2/ me	etric 4532						mm
Nom. DC spark overvoltage V_{sdcN}	75	90		230		230		300	V
Tolerance of V_{sdcN}	±30	±30		±25		±30		±30	%
Impulse spark-overvoltage									
@ 100 V/µs 90% of measured values	< 400	< 50	00	< 650		< 500		< 580	V
@ 100 V/µs typical values	< 350	< 400		< 550		< 400		< 500	V
@ 1 kV/µs 90% of measured values	< 700	< 60	00	< 800		< 600		< 650	V
@ 1 kV/µs typical values	< 650	< 50	00	< 700		< 500		< 550	V
Service life									
10 operations 50 Hz, 1 s	2.5	2.5		2		-		-	А
300 operations 8/20 μs	100	100		100		100		100	А
10 operations 8/20 µs	3	3		2		1		1	kA
1 operation 8/20 μs	3.5	3.5		2		2		2	kA
10 operations 5/320 μs	150	150		150		150		150	А
10 operations 10/1000 µs	10	10		10		10		10	А
Insulation resistance	> 1	> 1		> 1		> 1		> 1	GΩ
Capacitance @ 1 MHz	< 0.4	< 0.	4	< 0.4		< 0.4		< 0.4	pF
Series	S30								
Type <u>SMD</u>	S30-A350X	S30-A400X		S30-A420		0XS S30		-A600XS	
Ordering code	B88069X8361T25	3	B88069X5211	T253	B88069X	6311T253	B88	069X2673T253	
Dimensions	4.5 × 3.2 × 2.7 EIA case size 1812	2/ me	etric 4532						mm
Nom. DC spark overvoltage $\mathbf{V}_{_{\text{sdcN}}}$	350		400	420			600		V
Tolerance of V_{sdcN}	±25		±25		+25		+25		%
Impulse spark-overvoltage							ΞZJ		
					120	I	τζ		
@ 100 V/µs 90% of measured values	< 750		< 800		< 650		< 11	00	V
@ 100 V/µs 90% of measured values @ 100 V/µs typical values	< 750 < 600		< 800 < 650		< 650 < 550		< 11< 10	00	V V
 @ 100 V/µs 90% of measured values @ 100 V/µs typical values @ 1 kV/µs 90% of measured values 	< 750 < 600 < 900		< 800 < 650 < 950		< 650 < 550 < 750		< 11 < 10 < 12	00 000 200	V V V
 @ 100 V/µs 90% of measured values @ 100 V/µs typical values @ 1 kV/µs 90% of measured values @ 1 kV/µs typical values 	< 750 < 600 < 900 < 750		< 800 < 650 < 950 < 800		< 650 < 550 < 750 < 600		< 11 < 10 < 12 < 11	000 200 100	V V V V
 @ 100 V/µs 90% of measured values @ 100 V/µs typical values @ 1 kV/µs 90% of measured values @ 1 kV/µs typical values Service life 	< 750 < 600 < 900 < 750		< 800 < 650 < 950 < 800		< 650 < 550 < 750 < 600		< 11 < 10 < 12 < 11	100 000 200 100	V V V
 @ 100 V/µs 90% of measured values @ 100 V/µs typical values @ 1 kV/µs 90% of measured values @ 1 kV/µs typical values Service life 10 operations 50 Hz, 1 s 	< 750 < 600 < 900 < 750		< 800 < 650 < 950 < 800		< 650 < 550 < 750 < 600		< 11 < 10 < 12 < 11 2	000000000000000000000000000000000000000	V V V V
 @ 100 V/µs 90% of measured values @ 100 V/µs typical values @ 1 kV/µs 90% of measured values @ 1 kV/µs typical values Service life 10 operations 50 Hz, 1 s 300 operations 8/20 µs 	< 750 < 600 < 900 < 750 2 100		< 800 < 650 < 950 < 800 2 100		< 650 < 550 < 750 < 600 - 100		 < 11 < 10 < 12 < 11 	100 200 200	V V V V A A
 @ 100 V/µs 90% of measured values @ 100 V/µs typical values @ 1 kV/µs 90% of measured values @ 1 kV/µs typical values Service life 10 operations 50 Hz, 1 s 300 operations 8/20 µs 10 operations 8/20 µs 	 < 750 < 600 < 900 < 750 2 100 2 		< 800 < 650 < 950 < 800 2 100 2		< 650 < 550 < 750 < 600 - 100 1		 11 10 11 2 100 1 	000000000000000000000000000000000000000	V V V A A kA
 @ 100 V/µs 90% of measured values @ 100 V/µs typical values @ 1 kV/µs 90% of measured values @ 1 kV/µs typical values Service life 10 operations 50 Hz, 1 s 300 operations 8/20 µs 10 operation 8/20 µs 1 operation 8/20 µs 	 < 750 < 600 < 900 < 750 2 100 2 2.5		< 800 < 650 < 950 < 800 2 100 2 2.5		< 650 < 550 < 750 < 600 - 100 1 -		< 11 < 10 < 12 < 11 2 100 1 -	100 200 200	V V V V A A kA kA
 @ 100 V/μs 90% of measured values @ 100 V/μs typical values @ 1 kV/μs 90% of measured values @ 1 kV/μs typical values Service life 10 operations 50 Hz, 1 s 300 operations 8/20 μs 10 operation 8/20 μs 1 operation 8/20 μs 10 operations 5/320 μs 	 < 750 < 600 < 900 < 750 2 100 2 2.5 150		< 800 < 650 < 950 < 800 2 100 2 2.5 150		< 650 < 550 < 750 < 600 - 100 1 - 150		< 111 < 10 < 12 < 11 2 100 1 - 150	000000000000000000000000000000000000000	V V V A A kA kA A
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 @ 100 V/μs 90% of measured values @ 100 V/μs typical values @ 1 kV/μs 90% of measured values @ 1 kV/μs typical values Ø 1 kV/μs typical values Service life 10 operations 50 Hz, 1 s 300 operations 8/20 μs 10 operations 8/20 μs 10 operations 5/320 μs 10 operations 10/1000 μs Insulation resistance 	 < 750 < 600 < 900 < 750 2 100 2 150 10 > 1		< 800 < 650 < 950 < 800 2 100 2 2.5 150 10 > 1		< 650 < 550 < 750 < 600 - 100 1 - 150 10 > 1		 < 111 < 100 < 12 100 1 - 150 10 > 1 	000000000000000000000000000000000000000	V V V A A κΑ κΑ κΑ Α Α Α α



2-electrode surge arresters							
Series	S32	S50		S5B	Unit		
Type <u>SMD</u>	S32-A90X	S50-A90X	S50-A230X	S5B-A90XHC			
Ordering code	upon request	B88069X1913T902	B88069X1923T902	B88069X5923T902			
Dimensions	4.5 × 3.2 × 3.2	5.7 × 5 × 5 EIA size 2220/ metric	5750	$5 \times 5.4 \times 5.4$	mm		
Nom. DC spark overvoltage V_{sdcN}	90	90	230	230	V		
Tolerance of V_{sdcN}	±20	±20	±20	±20	%		
Impulse spark-overvoltage							
@ 100 V/µs 90% of measured values	< 500	< 550	< 550	< 500	V		
@ 100 V/µs typical values	< 400	< 500	< 500	< 450	V		
@ 1 kV/ μs 90% of measured values	< 600	< 600	< 650	< 600	V		
@ 1 kV/µs typical values	< 500	< 550	< 600	< 550	V		
Service life							
10 operations 50 Hz, 1 s	5	5	5	10	A		
10 operations 8/20 µs	5	5	5	10	kA		
1 operation 8/20 µs	-	10	10	12	kA		
10 operations 5/320 μs	150	-	-	-	A		
1 operation 10/350 μs	0.5	0.5	0.5	1	kA		
300 operations 10/1000 µs	10	100	100	100	А		
Insulation resistance	> 1	> 1	> 1	> 1	GΩ		
Capacitance @ 1 MHz	< 0.4	< 1	< 1	< 0.5	pF		
Series	S8A						
Type <u>SMD</u>	S8A-A75XHC	S8A-A90XHC	S8A-A230XHC	S8A-A350XHC			
Ordering code	B88069X5733T602	B88069X4693T602	B88069X5783T602	B88069X5803T602			
Dimensions	6 × 8.3 × 8.3				mm		
Nom. DC spark overvoltage V_{sdcN}	75	90	230	350	V		
Tolerance of V_{sdcN}	±20	±20	±20	±20	%		
Impulse spark-overvoltage							
@ 100 V/µs 90% of measured values	< 350	< 500	< 550	< 700	V		
@ 100 V/µs typical values	< 300	< 450	< 500	< 650	V		
@ 1 kV/µs 90% of measured values	< 550	< 600	< 650	< 900	V		
@ 1 kV/µs typical values	< 500	< 550	< 600	< 850	V		
Service life							
10 operations 50 Hz, 1 s	20	20	20	20	A		
10 operations 8/20 µs	20	20	20	20	kA		
1 operation 8/20 μs	25	25	25	25	kA		
1 operation 10/350 μs	5	5	5	5	kA		
300 operations 10/1000 μs	100	100	100	100	А		
Insulation resistance	> 1	> 1	> 1	> 1	GΩ		
Capacitance @ 1 MHz	< 1.5	< 1.5	< 1.5	< 1.5	pF		

3-electrode surge arresters					
Series	TG20			Unit	
Type <u>SMD</u>	TG20-C420SMD6				
Ordering code	B88069X5433T203				
Dimensions	3.8 × 2.7 × 4.2			mm	
Nom. DC spark overvoltage V_{sdcN}	420				
Tolerance of V _{sdcN}	-15/+33			%	
Impulse spark-overvoltage					
@ 100 V/ μs 90% of measured values	< 850				
@ 100 V/µs typical values	< 750			V	
@ 1 kV/ μs 90% of measured values	< 1000			V	
@ 1 kV/µs typical values	< 920			V	
Service life					
1 operation 8/20 μs	2			kA	
10 operations 5/320 μs	150			A	
Insulation resistance	> 1			GΩ	
Capacitance @ 1 MHz	< 1			pF	
Series	TG30		TQ90	Unit	
Type <u>SMD</u>	TG30-A90XSMD	TG30-A420XSMDS	TQ90-A90		
Ordering code	B88069X9991T203	B88069X1833T203	B88069X1963T902		
Dimensions	ø3.5 × 6.8		5 × 5 × 7.6	mm	
Nom. DC spark overvoltage V_{sdcN}	90	420	90	V	
Tolerance of V_{sdcN}	±30	±30	±20	%	
Impulse spark-overvoltage					
@ 100 V/µs 90% of measured values	> 450	< 700	< 450	V	
@ 100 V/µs typical values	< 350	< 600	< 350	V	
@ 1 kV/µs 90% of measured values	< 650	< 800	< 650	V	
@ 1 kV/µs typical values	< 550	< 700	< 550	V	
Service life					
10 operations 50 Hz, 1 s	6	2	10	A	
300 operations 8/20 μs	100	100	-	A	
10 operations 8/20 µs	6	3	10	kA	
1 operation 8/20 μs	-	-	15	kA	
10 operations 5/320 μs	150	150	150	A	
10 operations 10/1000 μs	-	-	200	A	
1 operation 10/350 μs	-	-	2	kA	
300 operations 10/1000 μs	20	20	200	A	
Insulation resistance	> 1	> 1	> 1	GΩ	
Capacitance @ 1 MHz	< 1.2	< 1.2	< 1.2	pF	

EPCOS





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