500W, 5V - 170V Transient Voltage Suppressor

FEATURES

- AEC-Q101 qualified available
- Excellent clamping capability
- Low impedance surge resistance
- 500W surge capability at 10/1000μs waveform
- Fast response time: Typically less than 1.0ps from 0 volt to V_{BR} for unidirectional and 5.0ns for bidirectional
- Typical I_R less than 1μA above 10V
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

KEY PARAMETERS		
PARAMETER	**VALUE**	**UNIT**
V_{WM}	5 - 170	V
V_{BR} (uni - directional)	6.4 - 209	V
V_{BR} (bi - directional)	6.4 - 209	V
P_{PK}	500	W
$T_{J\ MAX}$	175	°C
Package	DO-204AC (DO-15)	

APPLICATIONS

- Protect sensitive circuit from damage by high voltage transients
- Lighting, ESD transient voltage protection of IC, system
- Inductive switching load protection of IC, system
- Electrical Fast Transient Immunity protection of IC, system

MECHANICAL DATA

- Case: DO-204AC (DO-15)
- Molding compound meets UL 94V-0 flammability rating
- Terminal: Pure tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.400g (approximately)

DO-204AC (DO-15)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Peak power dissipation at T_A = 25°C, Tp = 1ms[1]	P_{PK}	500	W
Steady state power dissipation at T_L = 75°C lead lengths .375", 9.5mm[2]	P_D	3	W
Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load[3]	I_{FSM}	70	A
Maximum instantaneous forward voltage at 35A for Unidirectional only	V_F	3.5	V
Operating junction temperature range	T_J	-55 to +175	°C
Storage temperature range	T_{STG}	-55 to +175	°C

Note:

1. Non-repetitive current pulse per Fig.3 and Derated above T_A = 25°C per Fig.2
2. Mounted on 10 x 10 mm copper pads to each terminal
3. 8.3ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

Devices for bipolar applications

1. For bidirectional use C or CA suffix for types SA5.0 - types SA170
2. Electrical characteristics apply in both directions

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)								
Part Number	Breakdown voltage V_{BR}@I_T (V)(1)		Test current I_T (mA)	Working stand-off voltage V_{WM} (V)	Reverse leakage @ V_{WM} I_D (uA)	Maximum peak pulse current I_{PPM} (A)(2)	Maximum clamping voltage V_C@I_{PPM} (V)	Maximum temperature coefficient
	V_{BR}		I_T	V_{WM}	I_R	I_{PPM}	V_C	V_{BR}
	V		mA	V	μA	A	V	mV/°C
	Min	Max						
SA5.0	6.40	7.30	10	5.0	600	54.0	9.6	5
SA5.0A	6.40	7.00	10	5.0	600	57.0	9.2	5
SA6.0	6.67	8.15	10	6.0	600	46.0	11.4	5
SA6.0A	6.67	7.37	10	6.0	600	50.0	10.3	5
SA6.5	7.22	8.82	10	6.5	400	42.0	12.3	5
SA6.5A	7.22	7.98	10	6.5	400	46.0	11.2	5
SA7.0	7.78	9.51	10	7.0	150	39.0	13.3	6
SA7.0A	7.78	8.60	10	7.0	150	43.0	12.0	6
SA7.5	8.33	10.20	1	7.5	50	36.0	14.3	7
SA7.5A	8.33	9.21	1	7.5	50	40.0	12.9	7
SA8.0	8.89	10.9	1	8.0	25	35.0	15.0	7
SA8.0A	8.89	9.83	1	8.0	25	38.0	13.6	7
SA8.5	9.44	11.5	1	8.5	10	33.0	15.9	8
SA8.5A	9.44	10.4	1	8.5	10	36.0	14.4	8
SA9.0	10.0	12.2	1	9.0	5	31.0	16.9	9
SA9.0A	10.0	11.1	1	9.0	5	34.0	15.4	9
SA10	11.1	13.6	1	10	1	27.0	18.8	10
SA10A	11.1	12.3	1	10	1	30.0	17.0	10
SA11	12.2	14.9	1	11	1	26.0	20.1	11
SA11A	12.2	13.5	1	11	1	28.0	18.2	11
SA12	13.3	16.3	1	12	1	23.0	22.0	12
SA12A	13.3	14.7	1	12	1	26.3	19.9	12
SA13	14.4	17.6	1	13	1	22.0	23.8	13
SA13A	14.4	15.9	1	13	1	24.0	21.5	13
SA14	15.6	19.1	1	14	1	20.3	25.8	14
SA14A	15.6	17.2	1	14	1	22.6	23.2	14
SA15	16.7	20.4	1	15	1	19.5	26.9	16
SA15A	16.7	18.5	1	15	1	21.0	24.4	16
SA16	17.8	21.8	1	16	1	18.0	28.8	19
SA16A	17.8	19.7	1	16	1	20.0	26.0	17
SA17	18.9	23.1	1	17	1	17.0	30.5	20
SA17A	18.9	20.9	1	17	1	19.0	27.7	19
SA18	20.0	24.4	1	18	1	16.3	32.2	21

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)								
Part Number	**Breakdown voltage V_{BR}@I_T (V)(1)**		**Test current I_T (mA)**	**Working stand-off voltage V_{WM} (V)**	**Reverse leakage @ V_{WM} I_D (uA)**	**Maximum peak pulse current I_{PPM} (A)(2)**	**Maximum clamping voltage V_C@I_{PPM} (V)**	**Maximum temperature coefficient**
	V_{BR}		I_T	V_{WM}	I_R	I_{PPM}	V_C	V_{BR}
	V		mA	V	μA	A	V	mV/°C
	Min	Max						
SA18A	20.0	22.1	1	18	1	17.9	39.4	20
SA20	22.2	27.1	1	20	1	14.0	35.5	25
SA20A	22.2	24.5	1	20	1	16.0	43.0	23
SA22	24.4	29.8	1	22	1	13.0	38.9	28
SA22A	24.4	26.9	1	22	1	14.7	46.6	25
SA24	26.7	32.6	1	24	1	12.0	42.1	31
SA24A	26.7	29.5	1	24	1	13.4	50.1	28
SA26	28.9	35.3	1	26	1	11.0	45.4	31
SA26A	28.9	31.9	1	26	1	12.4	53.5	30
SA28	31.1	38.0	1	28	1	10.0	48.4	35
SA28A	31.1	34.4	1	28	1	11.5	59.0	31
SA30	33.3	40.7	1	30	1	9.8	53.3	39
SA30A	33.3	36.8	1	30	1	10.8	64.3	36
SA33	36.7	44.9	1	33	1	8.8	58.1	42
SA33A	36.7	40.6	1	33	1	9.8	71.4	39
SA36	40.0	48.9	1	36	1	8.1	64.5	46
SA36A	40.0	44.2	1	36	1	9.0	58.1	41
SA40	44.4	54.3	1	40	1	7.3	71.4	51
SA40A	44.4	49.1	1	40	1	8.1	64.5	46
SA43	47.8	58.4	1	43	1	6.8	76.7	55
SA43A	47.8	52.8	1	43	1	7.5	69.4	50
SA45	50.0	61.1	1	45	1	6.5	80.3	58
SA45A	50.0	55.3	1	45	1	7.2	72.7	52
SA48	53.3	65.2	1	48	1	6.1	85.5	63
SA48A	53.3	58.9	1	48	1	6.7	77.4	56
SA51	56.7	69.3	1	51	1	5.7	91.1	66
SA51A	56.7	62.7	1	51	1	6.3	82.4	61
SA54	60.0	73.3	1	54	1	5.4	86.3	71
SA54A	60.0	66.3	1	54	1	6.0	87.1	65
SA58	64.4	78.7	1	58	1	5.0	103	78
SA58A	64.4	71.2	1	58	1	5.6	93.6	70
SA60	66.7	81.5	1	60	1	4.9	107	80
SA60A	66.7	73.7	1	60	1	5.4	96.8	71

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)								
Part Number	**Breakdown voltage V_{BR}@I_T (V)(1)**		**Test current I_T (mA)**	**Working stand-off voltage V_{WM} (V)**	**Reverse leakage @ V_{WM} I_D (uA)**	**Maximum peak pulse current I_{PPM} (A)(2)**	**Maximum clamping voltage V_C@I_{PPM} (V)**	**Maximum temperature coefficient**
	V_{BR}		I_T	V_{WM}	I_R	I_{PPM}	V_C	V_{BR}
	V		mA	V	μA	A	V	mV/°C
	Min	Max						
SA64	71.1	86.9	1	64	1	4.6	114	86
SA64A	71.1	78.6	1	64	1	5.0	103	76
SA70	77.8	95.1	1	70	1	4.2	125	94
SA70A	77.8	86.0	1	70	1	4.6	113	85
SA75	83.3	102	1	75	1	3.9	134	101
SA75A	83.3	92.1	1	75	1	4.3	121	91
SA78	86.7	103	1	78	1	3.7	139	105
SA78A	86.7	95.8	1	78	1	4.1	126	95
SA85	94.4	115	1	85	1	3.4	151	114
SA85A	94.4	104	1	85	1	3.8	137	103
SA90	100	122	1	90	1	3.2	160	121
SA90A	100	111	1	90	1	3.5	146	110
SA100	111	136	1	100	1	2.9	179	135
SA100A	111	123	1	100	1	3.2	162	123
SA110	122	149	1	110	1	2.6	196	148
SA110A	122	135	1	110	1	2.9	177	133
SA120	133	163	1	120	1	2.4	214	162
SA120A	133	147	1	120	1	2.7	193	146
SA130	144	176	1	130	1	2.2	230	175
SA130A	144	159	1	130	1	2.5	209	158
SA150	167	204	1	150	1	1.9	268	203
SA150A	167	185	1	150	1	2.1	243	184
SA160	178	218	1	160	1	2.0	257	217
SA160A	178	197	1	160	1	2.0	259	196
SA170	189	231	1	170	1	1.7	304	230
SA170A	189	209	1	170	1	0.1	275	208

Notes:

1. V_{BR} measure after I_T applied for 300us, I_T = square wave pulse or equivalent.
2. Surge current waveform per Fig.3 and derate per Fig.2
3. For bipolar types having V_{WM} of 10 volts and under, the I_R limit is doubled.
4. All terms and symbols are consistent with ANSI/IEEE C62.35.

ORDERING INFORMATION		
ORDERING CODE[1][2]	**PACKAGE**	**PACKING**
SAx	DO-204AC (DO-15)	3,500 / Tape & Reel
SAx A0G	DO-204AC (DO-15)	1,500 / Ammo box
SAxH	DO-204AC (DO-15)	3,500 / Tape & Reel
SAxHA0G	DO-204AC (DO-15)	1,500 / Ammo box

Notes:

1. “x” defines voltage from 5V (SA5.0) to 170V (SA170)
2. “H” means AEC-Q101 qualified

CHARACTERISTICS CURVES

(T_A = 25°C unless otherwise noted)

Fig.1 Peak Pulse Power Rating Curve

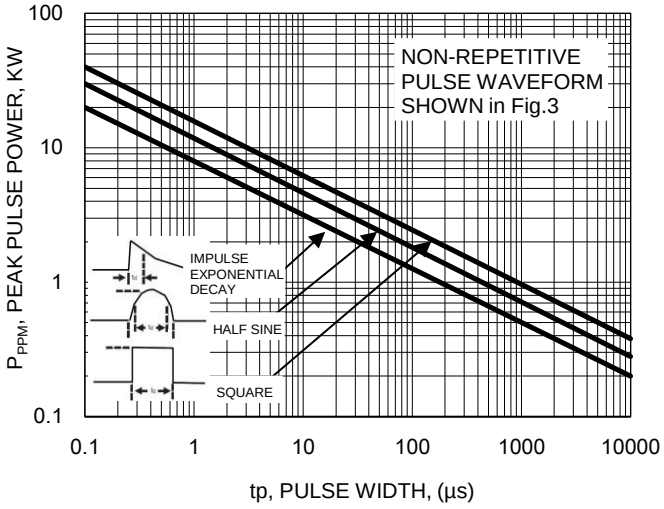


Fig.2 Pulse Derating Curve

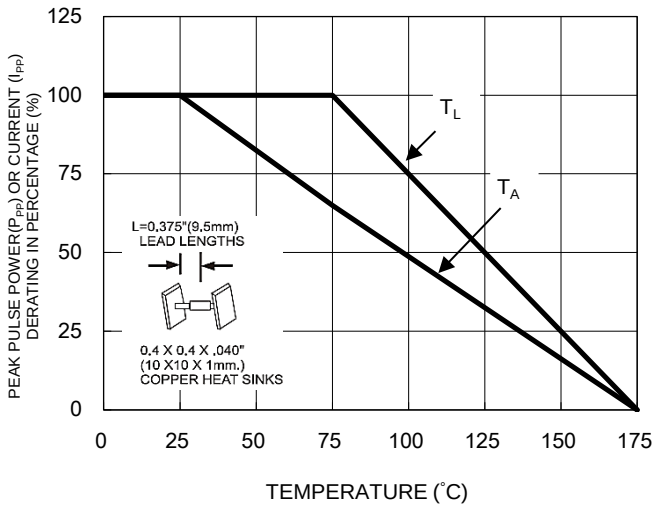


Fig.3 Clamping Power Pulse Waveform

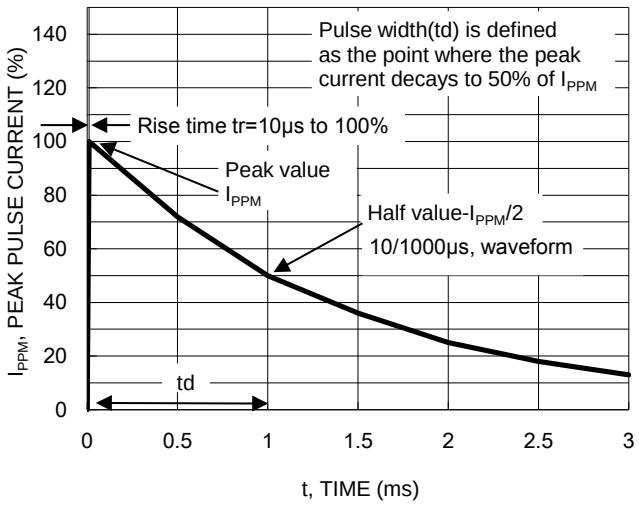
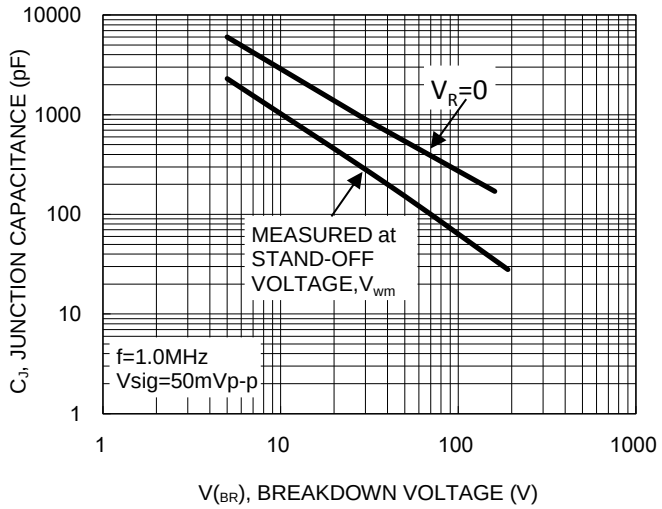


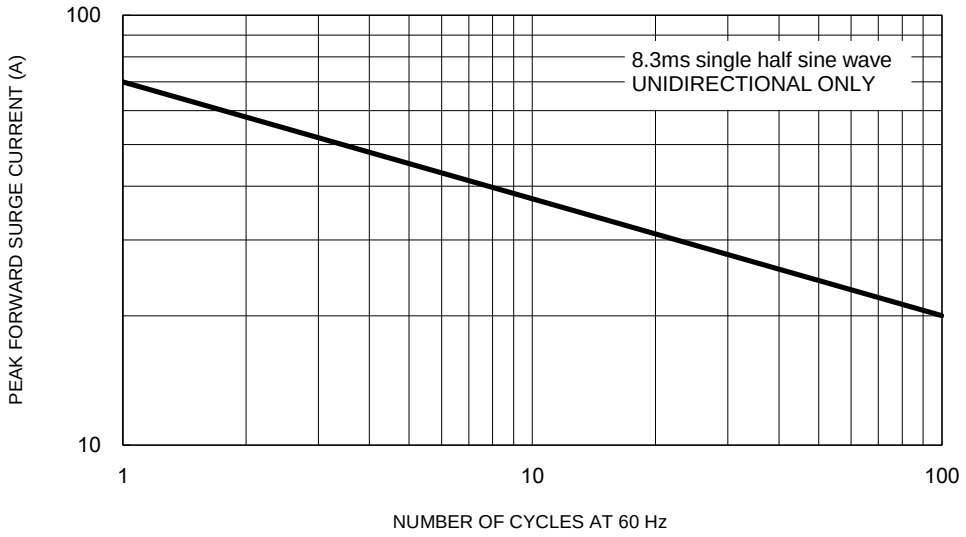
Fig.4 Typical Junction Capacitance



CHARACTERISTICS CURVES

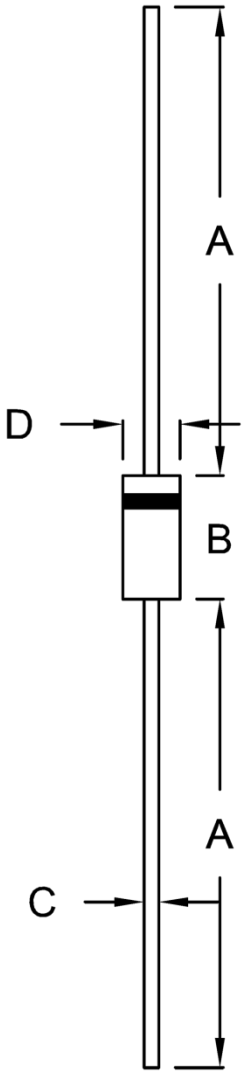
(T_A = 25°C unless otherwise noted)

Fig.5 Maximum Non-Repetitive Forward Surge Current



PACKAGE OUTLINE DIMENSIONS

DO-204AC (DO-15)



DIM.	Unit (mm)		Unit (inch)	
	Min.	Max.	Min.	Max.
A	25.40	-	1.000	-
B	5.80	7.60	0.228	0.299
C	0.70	0.90	0.028	0.035
D	2.60	3.60	0.102	0.142

MARKING DIAGRAM

Cathode band for uni-directional products only

P/N = Marking Code
G = Green Compound
YWW = Date Code
F = Factory Code