

Features

- 600 Watts peak pulse power capability at 10x1000μS Waveforms
- Typical I_R less than 1μA above 10VV_R
- Low profile package with low inductance
- Excellent low clamping voltage
- Fast response time: typical less than 1ps from 0V to V_{BR}Min.
- High temperature to reflow soldering: 260°C/40s at terminals
- Surface mounted devices to optimize board space
- Working voltage: 5V-440V
- RoHS Compliant



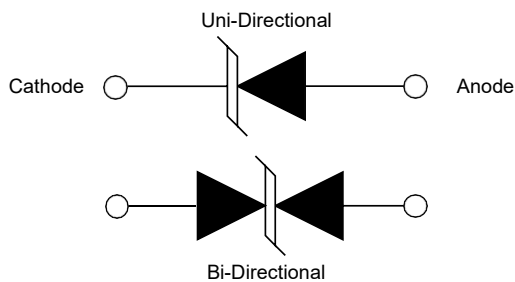
Applications

- Consumer electronic products
- Industries and Automotive
- Desktops, Servers and Notebooks
- Peripherals and Interfaces
- Switching Systems
- Power Management

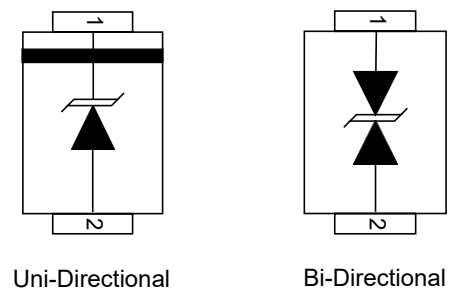
Mechanical Characteristics

- DO-214AA (SMB) package
- Flammability rating: UL 94V-0
- MSL-1 Level
- Marking: Part number, date code
- Packaging: Tape and reel

Circuit Diagram



Pin Configuration



Ordering Information

Part Number	Working Voltage (V)	Unit Weight (g/pcs) Typ.	Quantity Per Reel (pcs)	Reel Size (Inch)	Quantity Per Carton (pcs)
CSEXXXXSMB	5-440	0.098	3,000	13	48,000

Absolute Maximum Rating ($T_A=25^{\circ}\text{C}$, RH=45%-75%, unless otherwise noted)

Symbol	Parameter	Value	Units
P_{PP}	Peak pulse power dissipation on 10/1000 μs waveform	600	Watts
$P_{M(AV)}$	Steady state power dissipation at $T_L=75^{\circ}\text{C}$	5.0	Watts
V_F	Maximum instantaneous forward voltage at 50A for unidirectional	5.0	V
I_{FSM}	Peak forward surge current, 8.3ms single half sine wave (Note 1)	100	A
$R_{\theta JL}$	Typical thermal resistance junction to lead	20	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Typical thermal resistance junction to ambient	100	$^{\circ}\text{C/W}$
T_J/T_{STG}	Operating junction and storage temperature range	-55 to +150	$^{\circ}\text{C}$

Notes:

- 1 Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum

Electrical Characteristics ($T_A=25^{\circ}\text{C}$)

Part Number		V_{RWM}	$I_R@V_{RWM}$	$V_{BR}@I_T$		I_T	$V_C@I_{PP}$	$I_{PP}^{(1)}$
Uni-Polar	Bi-Polar	V	μA	Min(V)	Max(V)	mA	Max(V)	A
CSE5.0UCSMB	CSE5.0BCSMB	5.0	120	6.40	7.00	10	9.2	65.2
CSE6.0UCSMB	CSE6.0BCSMB	6.0	120	6.67	7.37	10	10.3	58.3
CSE6.5UCSMB	CSE6.5BCSMB	6.5	120	7.22	7.98	10	11.2	53.6
CSE7.0UCSMB	CSE7.0BCSMB	7.0	50	7.78	8.60	10	12.0	50.0
CSE7.5UCSMB	CSE7.5BCSMB	7.5	50	8.33	9.21	1	12.9	46.5
CSE8.0UCSMB	CSE8.0BCSMB	8.0	20	8.89	9.83	1	13.6	44.1
CSE8.5UCSMB	CSE8.5BCSMB	8.5	10	9.44	10.40	1	14.4	41.7
CSE9.0UCSMB	CSE9.0BCSMB	9.0	5	10.00	11.10	1	15.4	39.0
CSE10UCSMB	CSE10BCSMB	10	2	11.10	12.30	1	17.0	35.3
CSE11UCSMB	CSE11BCSMB	11	1	12.20	13.50	1	18.2	33.0
CSE12UCSMB	CSE12BCSMB	12	1	13.30	14.70	1	19.9	30.2
CSE13UCSMB	CSE13BCSMB	13	1	14.40	15.90	1	21.5	27.9
CSE14UCSMB	CSE14BCSMB	14	1	15.60	17.20	1	23.2	25.9
CSE15UCSMB	CSE15BCSMB	15	1	16.70	18.50	1	24.4	24.6
CSE16UCSMB	CSE16BCSMB	16	1	17.80	19.70	1	26.0	23.1
CSE17UCSMB	CSE17BCSMB	17	1	18.90	20.90	1	27.6	21.8

Part Number		V_{RWM}	$I_R@V_{RWM}$	$V_{BR}@I_T$		I_T	$V_C@I_{PP}$	$I_{PP}^{(1)}$
Uni-Polar	Bi-Polar	V	μA	Min(V)	Max(V)	mA	Max(V)	A
CSE18UCSMB	CSE18BCSMB	18	1	20.00	22.10	1	29.2	20.6
CSE20UCSMB	CSE20BCSMB	20	1	22.20	24.50	1	32.4	18.6
CSE22UCSMB	CSE22BCSMB	22	1	24.40	26.90	1	35.5	16.9
CSE24UCSMB	CSE24BCSMB	24	1	26.70	29.50	1	38.9	15.4
CSE26UCSMB	CSE26BCSMB	26	1	28.90	31.90	1	42.1	14.3
CSE28UCSMB	CSE28BCSMB	28	1	31.10	34.40	1	45.4	13.2
CSE30UCSMB	CSE30BCSMB	30	1	33.30	36.80	1	48.4	12.4
CSE33UCSMB	CSE33BCSMB	33	1	36.70	40.60	1	53.3	11.3
CSE36UCSMB	CSE36BCSMB	36	1	40.00	44.20	1	58.1	10.4
CSE40UCSMB	CSE40BCSMB	40	1	44.40	49.10	1	64.5	9.3
CSE43UCSMB	CSE43BCSMB	43	1	47.80	52.80	1	69.4	8.7
CSE45UCSMB	CSE45BCSMB	45	1	50.00	55.30	1	72.7	8.3
CSE48UCSMB	CSE48BCSMB	48	1	53.30	58.90	1	77.4	7.8
CSE51UCSMB	CSE51BCSMB	51	1	56.70	62.70	1	82.4	7.3
CSE54UCSMB	CSE54BCSMB	54	1	60.00	66.30	1	87.1	6.9
CSE58UCSMB	CSE58BCSMB	58	1	64.40	71.20	1	93.6	6.4
CSE60UCSMB	CSE60BCSMB	60	1	66.70	73.70	1	96.8	6.2
CSE64UCSMB	CSE64BCSMB	64	1	71.10	78.60	1	103.0	5.8
CSE70UCSMB	CSE70BCSMB	70	1	77.80	86.00	1	113.0	5.3
CSE75UCSMB	CSE75BCSMB	75	1	83.30	92.10	1	121.0	5.0
CSE78UCSMB	CSE78BCSMB	78	1	86.70	95.80	1	126.0	4.8
CSE85UCSMB	CSE85BCSMB	85	1	94.40	104.0	1	137.0	4.4
CSE90UCSMB	CSE90BCSMB	90	1	100.0	111.0	1	146.0	4.1
CSE100UCSMB	CSE100BCSMB	100	1	111.0	123.0	1	162.0	3.7
CSE110UCSMB	CSE110BCSMB	110	1	122.0	135.0	1	177.0	3.4
CSE120UCSMB	CSE120BCSMB	120	1	133.0	147.0	1	193.0	3.1
CSE130UCSMB	CSE130BCSMB	130	1	144.0	159.0	1	209.0	2.9
CSE150UCSMB	CSE150BCSMB	150	1	167.0	185.0	1	243.0	2.5

Part Number		V_{RWM}	$I_R@V_{RWM}$	$V_{BR}@I_T$		I_T	$V_C@I_{PP}$	$I_{PP}^{(1)}$
Uni-Polar	Bi-Polar	V	μA	Min(V)	Max(V)	mA	Max(V)	A
CSE160UCSMB	CSE160BCSMB	160	1	178.0	197.0	1	259.0	2.3
CSE170UCSMB	CSE170BCSMB	170	1	189.0	209.0	1	275.0	2.2
CSE180UCSMB	CSE180BCSMB	180	1	201.0	222.0	1	292.0	2.1
CSE190UCSMB	CSE190BCSMB	190	1	211.0	234.0	1	307.0	2.0
CSE200UCSMB	CSE200BCSMB	200	1	224.0	247.0	1	324.0	1.9
CSE210UCSMB	CSE210BCSMB	210	1	233.0	258.0	1	337.0	1.8
CSE220UCSMB	CSE220BCSMB	220	1	246.0	272.0	1	356.0	1.7
CSE250UCSMB	CSE250BCSMB	250	1	279.0	309.0	1	405.0	1.5
CSE300UCSMB	CSE300BCSMB	300	1	335.0	371.0	1	486.0	1.3
CSE350UCSMB	CSE350BCSMB	350	1	391.0	432.0	1	567.0	1.1
CSE400UCSMB	CSE400BCSMB	400	1	447.0	494.0	1	648.0	0.9
CSE440UCSMB	CSE440BCSMB	440	1	492.0	543.0	1	713.0	0.8

(1) Surge waveform: 10/1000 μs

V_{RWM} : Stand-off voltage – Maximum voltage that can be applied

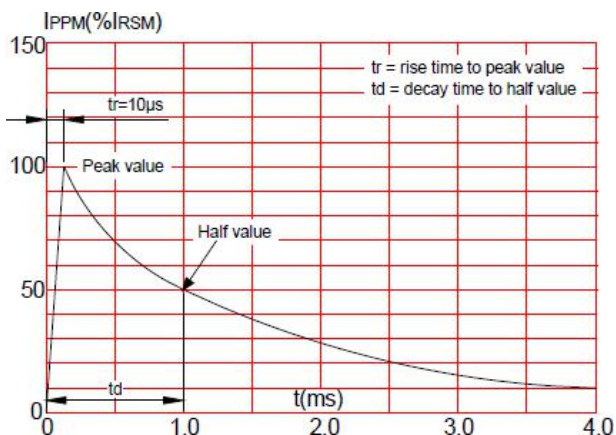
V_{BR} : Breakdown voltage

V_C : Clamping voltage – Peak voltage measured across the suppressor at a specified I_{PP}

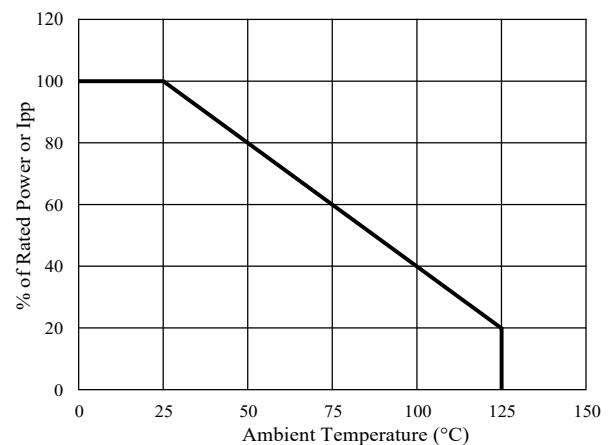
I_R : Reverse leakage current

Typical Characteristics

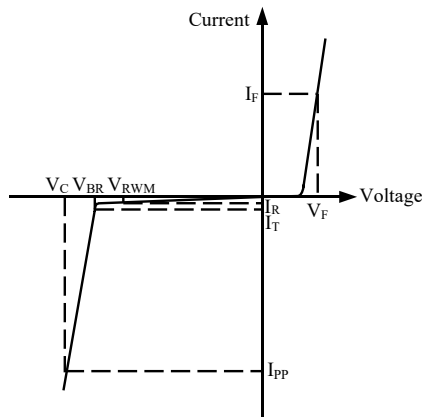
10/1000 μs Pulse Waveform



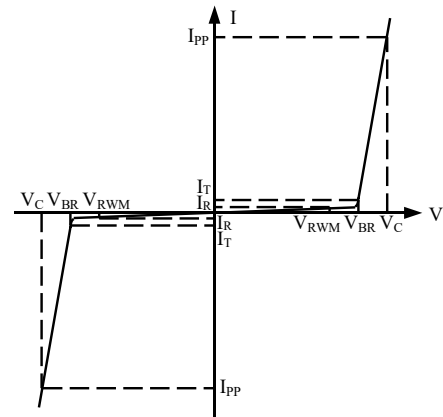
Power Derating Curve



**V-I Curve Characteristics
(Uni-directional)**

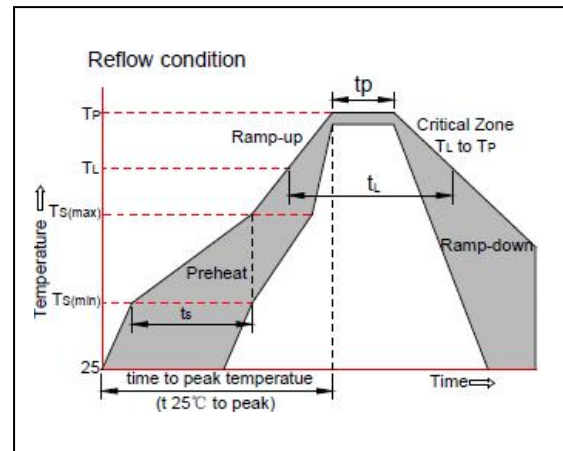


**V-I Curve Characteristics
(Bi-directional)**



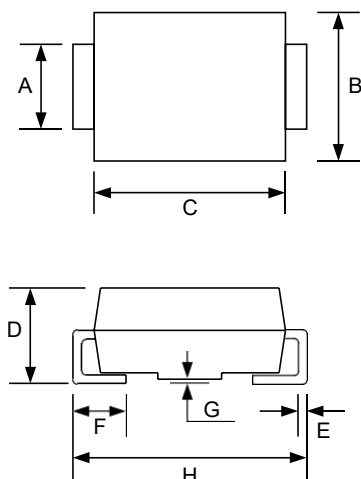
Soldering Parameters

Reflow Condition		Pb-Free Assembly (See figure at right)
Pre Heat	-Temperature Min ($T_{S(min)}$)	+150°C
	-Temperature Max ($T_{S(max)}$)	+200°C
	-Time (Min to Max) (t_s)	60-180 secs.
Average ramp up rate (Liquidus Temp T_L to peak)		3°C/sec. Max
$T_{S(max)}$ to T_L - Ramp up Rate		3°C/sec. Max
Reflow	-Temperature (T_L)(Liquidus)	+217°C
	-Time (t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5) °C
Time within 5°C of actual Peak Temp (t_P)		20-40 secs.
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260°C



Package Outline

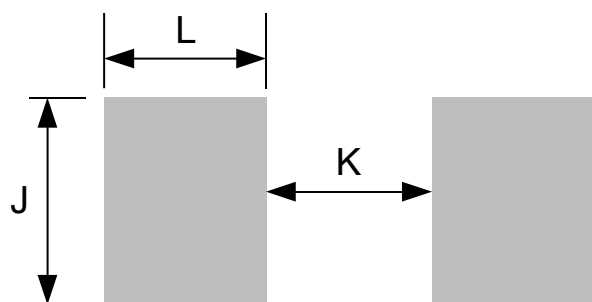
- ☐ DO-214AA (SMB) package
- ☐ 2 leads, small package
- ☐ MSL-1



Package Dimensions

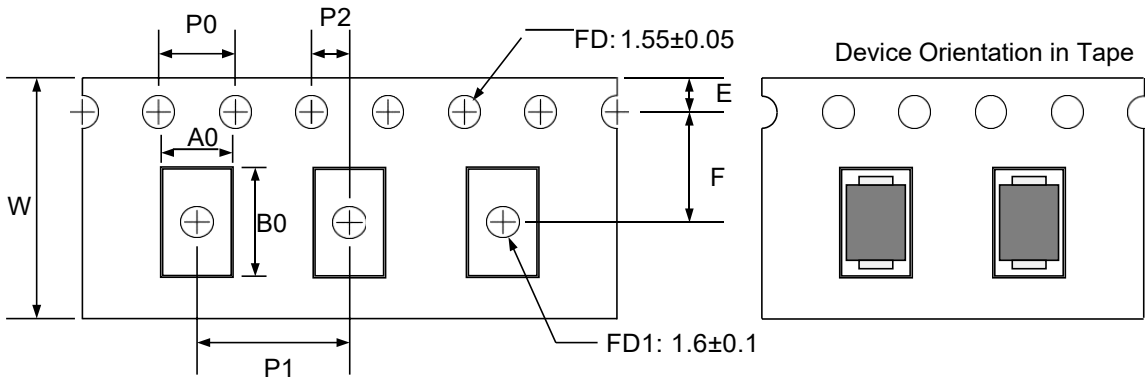
Ref.	Millimeters	Inches
A	1.90-2.20	0.075-0.087
B	3.30-3.94	0.130-0.155
C	4.30-4.80	0.169-0.189
D	2.10-2.40	0.083-0.094
E	0.15-0.31	0.006-0.012
F	0.95-1.52	0.037-0.060
G	0.05-0.20	0.002-0.008
H	5.20-5.60	0.205-0.220

Recommended Soldering Pad

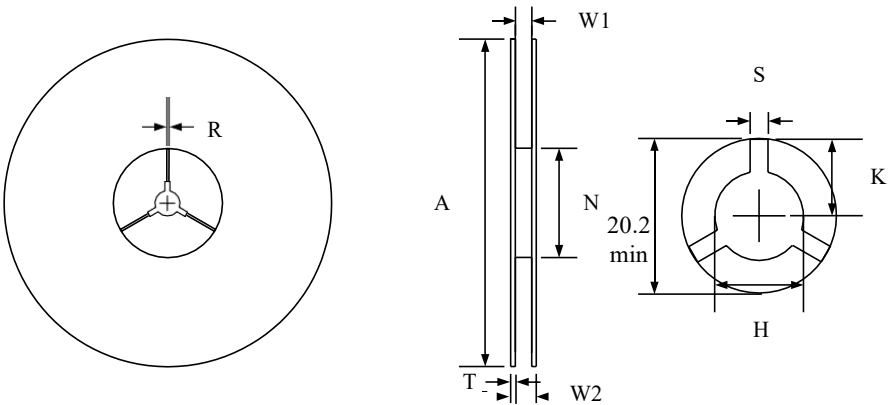


Ref.	Millimeters	Inches
J	2.30 min.	0.091 min.
K	2.60 max.	0.102 max.
L	2.20 min.	0.087 min.

Tape and Reel Specification



Symbol	W	A0	B0	E	F	P1	P0	P2
Dimensions (mm)	12.00±0.3	3.76±0.3	5.69±0.3	1.75±0.2	5.50±0.2	8.00±0.2	4.0±0.2	2.0±0.2



Symbol	A	N	W2	W1	H	T	S	K	R
Dimensions (mm)	330.0±2.0	100.0±2.0	15.7±2.0	12±2.0	13±1.0	2.0±0.2	1.5 min	10.1 min	2.5 min

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