

## Transient Voltage Suppressor

Version: A8 2020/8/12

### Features

- IEC 61000-4-2(ESD)  $\pm 15\text{KV}(\text{air})$ ,  $\pm 8\text{KV}(\text{contact})$
- 400Watts peak pulse power ( $t_p=10/1000\mu\text{S}$ )
- Quick response to surge voltage
- Low clamping voltage
- Moisture sensitivity level: Level 1

### Exterior




DO-214AC (SMA)

### Application Information

- DC Port
- RS485/232/422
- I/O Port

### Agency Approvals

Icon	Description
<b>RoHS</b>	Compliance with 2011/65/EU
<b>HF</b>	Compliance with IEC61249-2-21:2003
	UL Certificated E232249

### Schematic Symbol



BI-directional



UNI-directional

### Part Number and Electrical Parameter

Part Number		Marking		$V_R$	$V_{BR}$	$V_{BR}$	$I_t$	$V_C@I_{PP}^{\textcircled{1}}$	$I_{PP}^{\textcircled{1}}$	$I_R@V_R$
BI	UNI	BI	UNI	(V)	min.(V)	max.(V)	(mA)	(V)	(A)	( $\mu\text{A}$ )
BV-SMAJ5CA	BV-SMAJ5A	A5C	A5	5	6.4	7	10	9.2	43.5	800
BV-SMAJ6CA	BV-SMAJ6A	A6C	A6	6	6.67	7.37	10	10.3	38.8	800
BV-SMAJ6.5CA	BV-SMAJ6.5A	A6.5C	A6.5	6.5	7.22	7.98	10	11.2	35.7	500
BV-SMAJ7CA	BV-SMAJ7A	A7C	A7	7	7.78	8.6	10	12	33.3	200
BV-SMAJ7.5CA	BV-SMAJ7.5A	A7.5C	A7.5	7.5	8.33	9.21	1	12.9	31	100
BV-SMAJ8CA	BV-SMAJ8A	A8C	A8	8	8.89	9.83	1	13.6	29.4	50
BV-SMAJ8.5CA	BV-SMAJ8.5A	A8.5C	A8.5	8.5	9.44	10.4	1	14.4	27.8	20
BV-SMAJ9CA	BV-SMAJ9A	A9C	A9	9	10	11.1	1	15.4	26	10
BV-SMAJ10CA	BV-SMAJ10A	A10C	A10	10	11.1	12.3	1	17	23.5	5
BV-SMAJ11CA	BV-SMAJ11A	A11C	A11	11	12.2	13.5	1	18.2	22	1
BV-SMAJ12CA	BV-SMAJ12A	A12C	A12	12	13.3	14.7	1	19.9	20.1	1
BV-SMAJ13CA	BV-SMAJ13A	A13C	A13	13	14.4	15.9	1	21.5	18.6	1
BV-SMAJ14CA	BV-SMAJ14A	A14C	A14	14	15.6	17.2	1	23.2	17.2	1
BV-SMAJ15CA	BV-SMAJ15A	A15C	A15	15	16.7	18.5	1	24.4	16.4	1
BV-SMAJ16CA	BV-SMAJ16A	A16C	A16	16	17.8	19.7	1	26	15.4	1
BV-SMAJ17CA	BV-SMAJ17A	A17C	A17	17	18.9	20.9	1	27.6	14.5	1

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Part Number		Marking		V <sub>R</sub> (V)	V <sub>BR</sub> min.(V)	V <sub>BR</sub> max.(V)	I <sub>T</sub> (mA)	V <sub>C@I<sub>PP</sub></sub> <sup>①</sup> (V)	I <sub>PP</sub> <sup>①</sup> (A)	I <sub>R@V<sub>R</sub></sub> (uA)
BI	UNI	BI	UNI							
BV-SMAJ18CA	BV-SMAJ18A	A18C	A18	18	20	22.1	1	29.2	13.7	1
BV-SMAJ20CA	BV-SMAJ20A	A20C	A20	20	22.2	24.5	1	32.4	12.3	1
BV-SMAJ22CA	BV-SMAJ22A	A22C	A22	22	24.4	26.9	1	35.5	11.3	1
BV-SMAJ24CA	BV-SMAJ24A	A24C	A24	24	26.7	29.5	1	38.9	10.3	1
BV-SMAJ26CA	BV-SMAJ26A	A26C	A26	26	28.9	31.9	1	42.1	9.5	1
BV-SMAJ28CA	BV-SMAJ28A	A28C	A28	28	31.1	34.4	1	45.4	8.8	1
BV-SMAJ30CA	BV-SMAJ30A	A30C	A30	30	33.3	36.8	1	48.4	8.3	1
BV-SMAJ33CA	BV-SMAJ33A	A33C	A33	33	36.7	40.6	1	53.3	7.5	1
BV-SMAJ36CA	BV-SMAJ36A	A36C	A36	36	40	44.2	1	58.1	6.9	1
BV-SMAJ40CA	BV-SMAJ40A	A40C	A40	40	44.4	49.1	1	64.5	6.2	1
BV-SMAJ43CA	BV-SMAJ43A	A43C	A43	43	47.8	52.8	1	69.4	5.8	1
BV-SMAJ45CA	BV-SMAJ45A	A45C	A45	45	50	55.3	1	72.7	5.5	1
BV-SMAJ48CA	BV-SMAJ48A	A48C	A48	48	53.3	58.9	1	77.4	5.2	1
BV-SMAJ51CA	BV-SMAJ51A	A51C	A51	51	56.7	62.7	1	82.4	4.9	1
BV-SMAJ54CA	BV-SMAJ54A	A54C	A54	54	60	66.3	1	87.1	4.6	1
BV-SMAJ58CA	BV-SMAJ58A	A58C	A58	58	64.4	71.2	1	93.6	4.3	1
BV-SMAJ60CA	BV-SMAJ60A	A60C	A60	60	66.7	73.7	1	96.8	4.1	1
BV-SMAJ64CA	BV-SMAJ64A	A64C	A64	64	71.1	78.6	1	103	3.9	1
BV-SMAJ70CA	BV-SMAJ70A	A70C	A70	70	77.8	86	1	113	3.5	1
BV-SMAJ75CA	BV-SMAJ75A	A75C	A75	75	83.3	92.1	1	121	3.3	1
BV-SMAJ78CA	BV-SMAJ78A	A78C	A78	78	86.7	95.8	1	126	3.2	1
BV-SMAJ85CA	BV-SMAJ85A	A85C	A85	85	94.4	104	1	137	2.9	1
BV-SMAJ90CA	BV-SMAJ90A	A90C	A90	90	100	111	1	146	2.7	1
BV-SMAJ100CA	BV-SMAJ100A	A100C	A100	100	111	123	1	162	2.5	1
BV-SMAJ110CA	BV-SMAJ110A	A110C	A110	110	122	135	1	177	2.3	1
BV-SMAJ120CA	BV-SMAJ120A	A120C	A120	120	133	147	1	193	2.1	1
BV-SMAJ130CA	BV-SMAJ130A	A130C	A130	130	144	159	1	209	1.9	1
BV-SMAJ150CA	BV-SMAJ150A	A150C	A150	150	167	185	1	243	1.6	1
BV-SMAJ160CA	BV-SMAJ160A	A160C	A160	160	178	197	1	259	1.5	1
BV-SMAJ170CA	BV-SMAJ170A	A170C	A170	170	189	209	1	275	1.5	1
BV-SMAJ180C <sup>②</sup>	BV-SMAJ180 <sup>②</sup>	A180C	A180	180	201	222	1	292	1.4	1
BV-SMAJ200C <sup>②</sup>	BV-SMAJ200 <sup>②</sup>	A200C	A200	200	224	247	1	324	1.2	1
BV-SMAJ220C <sup>②</sup>	BV-SMAJ220 <sup>②</sup>	A220C	A220	220	246	272	1	356	1.1	1
BV-SMAJ250C <sup>②</sup>	BV-SMAJ250 <sup>②</sup>	A250C	A250	250	279	309	1	405	1.0	1
BV-SMAJ300C <sup>②</sup>	BV-SMAJ300 <sup>②</sup>	A300C	A300	300	335	371	1	486	0.8	1
BV-SMAJ350C <sup>②</sup>	BV-SMAJ350 <sup>②</sup>	A350C	A350	350	391	432	1	567	0.7	1
BV-SMAJ400C <sup>②</sup>	BV-SMAJ400 <sup>②</sup>	A400C	A400	400	447	494	1	648	0.6	1
BV-SMAJ440C <sup>②</sup>	BV-SMAJ440 <sup>②</sup>	A440C	A440	440	492	543	1	713	0.6	1

Note: Absolute maximum ratings measured at T= 25°C RH = 45%-75% (unless otherwise noted).

①Surge Waveform: 10/1000μS

②These part numbers do not have UL497b safety certification

Mark



BI:AXXC



UNI:AXX

#### Part Number System

BV —SMAJ XX C A  
(1) (2) (3) (4) (5)

(1) Bencent Transient Voltage Suppressor

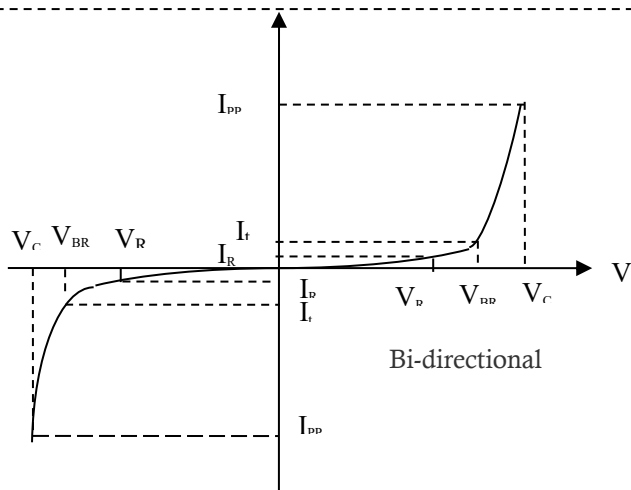
(2) Series Code

(3)  $V_R=XXV$

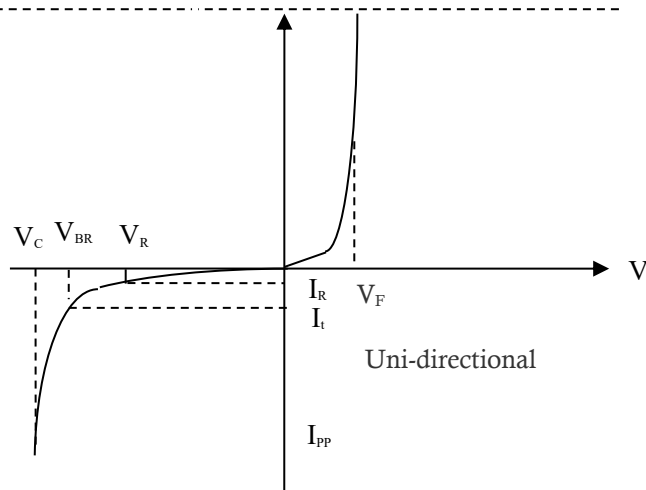
(4) BI-directional

(5) Suffix 'A' denotes 5% tolerance devices

#### V-I Curve



Bi-directional



Uni-directional

Parameters	Definition
$V_F$	Forward Voltage drop for UNI-directional
$V_C$	Clamping Voltage
$I_{PP}$	Surge Waveform 10/1000 $\mu$ s
$V_R$	Stand-off Voltage
$V_{BR}$	Breakdown Voltage
$I_R$	Reverse Leakage Current
$I_T$	Test Current
Ppp	Peak Pulse Power Dissipation

## Transient Voltage Suppressor

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### Thermal Considerations

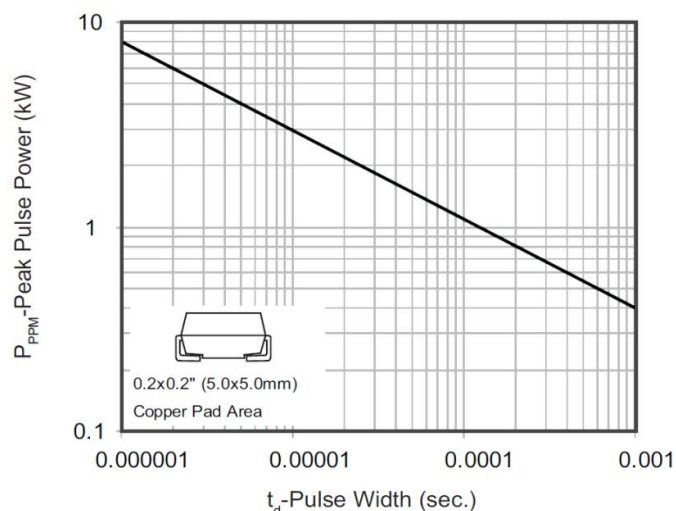
symbol	Parameter	Value	Unit
$T_J$	Operating Junction Temperature Range	-55 to +150	°C
$T_S$	Storage Temperature Range	-55 to +150	°C
$V_F$	Maximum Instantaneous Forward; Voltage at 25A for Unidirectional Only (Note 1)	3.5/5	V
$I_{FSM}$	Peak Forward Surge Current, 8.3ms;Single Half Sine Wave (Note 2)	40	A

Notes:

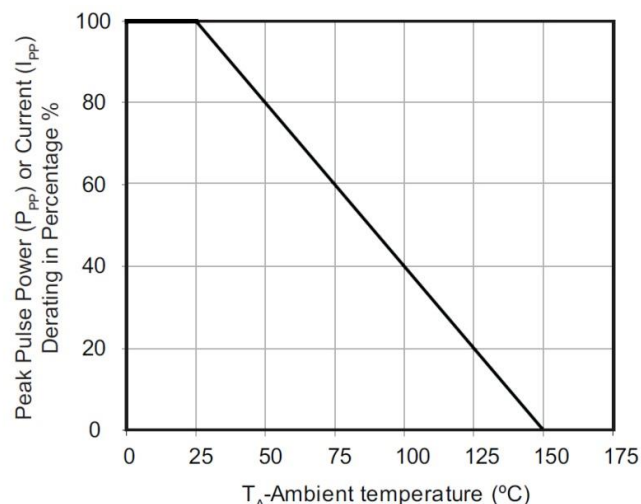
1.  $V_F < 3.5V$  for single die parts and  $V_F < 5.0V$  for stacked-die parts.
2. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only.

### Typical Characteristics

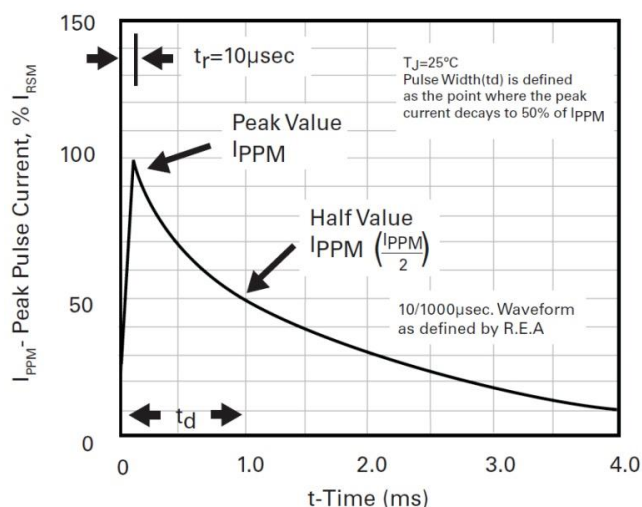
Peak Pulse Power Rating Curve



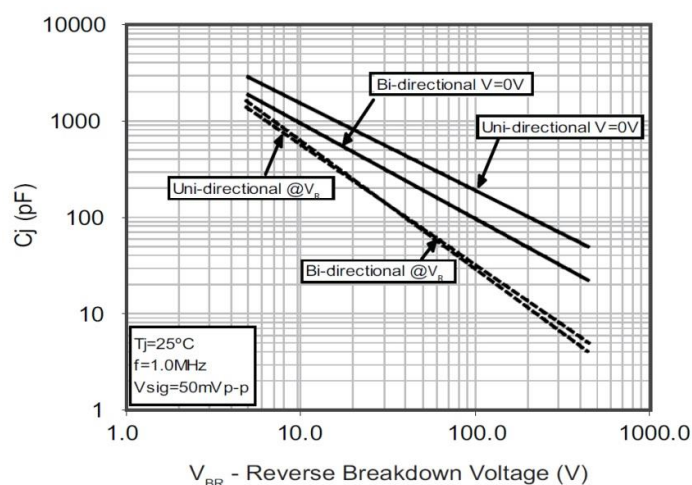
Pulse Derating Curve



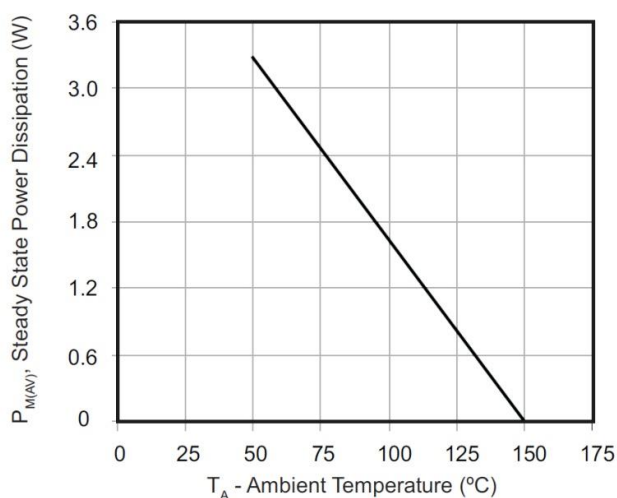
Pulse Waveform



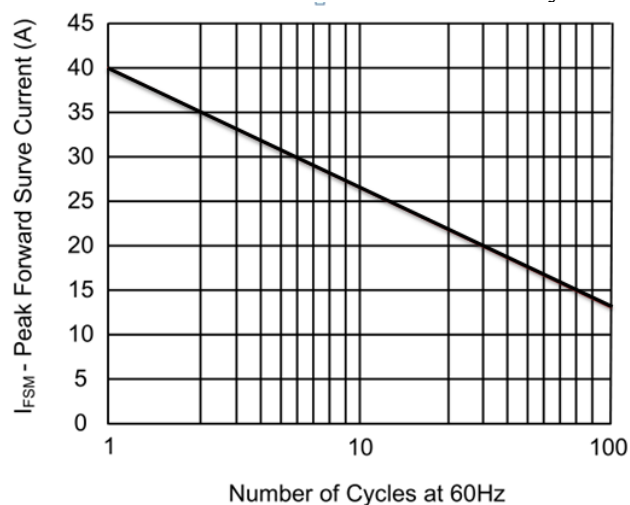
Typical Junction Capacitance



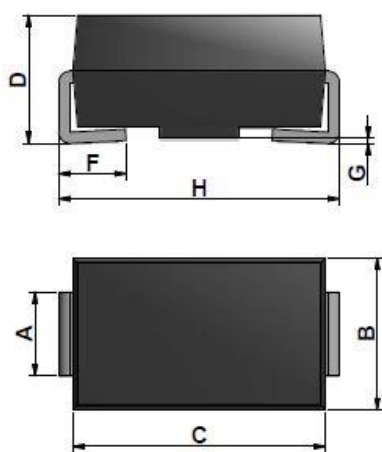
### Steady State Power Dissipation Derating Curve



### Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

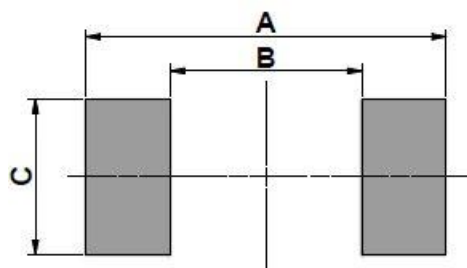


## Product Dimensions



REF.	mm	inch
A	$1.5 \pm 0.15$	$0.059 \pm 0.006$
B	$2.7 \pm 0.3$	$0.106 \pm 0.012$
C	$4.4 \pm 0.3$	$0.173 \pm 0.012$
D	$2 \sim 2.50$	$0.079 \sim 0.098$
F	$1.2 \pm 0.3$	$0.047 \pm 0.012$
G	$0 \sim 0.4$	$0 \sim 0.016$
H	$5 \pm 0.3$	$0.197 \pm 0.012$

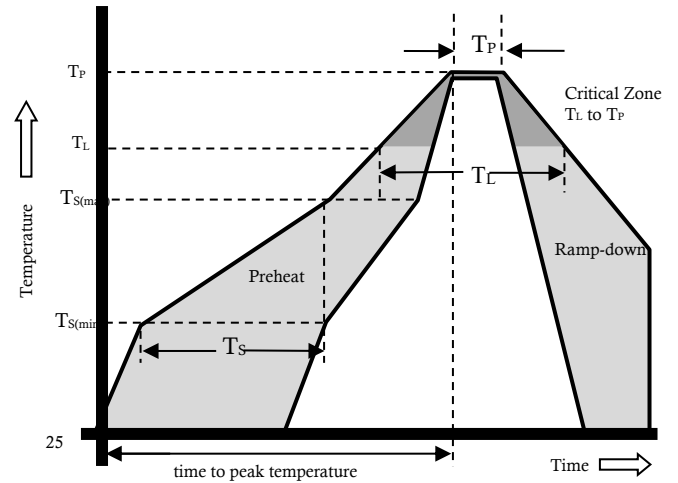
## Recommended Soldering Pad



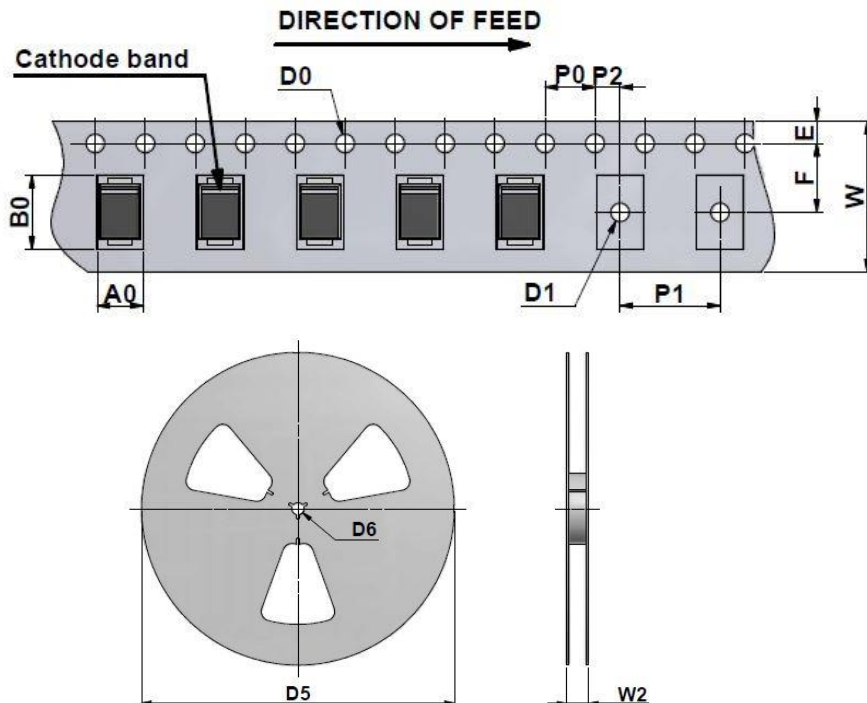
REF	mm	inch
A	6	0.236
B	2	0.079
C	2	0.079

### Reflow Profile

Reflow Condition		Pb-Free Assembly
Pre Heat	Temperature Min.	+150°C
	Temperature Max.	+200°C
	Time (Min to Max)	60 – 180 seconds
Average ramp up rate (Liquidus Temp (T <sub>L</sub> ) to peak)		3°C/second max
Ts(max) to T <sub>L</sub> - Ramp-up Rate		3°C/second max
Reflow	- Temperature (T <sub>L</sub> ) (Liquidus)	217°C
	- Temperature (T <sub>L</sub> )	60 – 150 seconds
Peak Temp (T <sub>P</sub> )		260+0/-5 °C
Time within 5°C of actual Peak Temp (T <sub>P</sub> )		8-15 seconds
Ramp-down Rate		6°C/s max
Time 25°C to peak Temp (T <sub>P</sub> )		8 min max.
Do not exceed		260°C



### Package Reel Information



REF.	mm	inch
W	12±1	0.472±0.039
E	1.75±0.3	0.069±0.012
F	5.5±0.3	0.217±0.012
D0	1.55±0.15	0.061±0.006
D1	1.55±0.15	0.061±0.006
P0	4.0±0.2	0.157±0.008
P1	4.0±0.2	0.157±0.008
P2	2.0±0.2	0.079±0.008
A0	2.85±0.3	0.112±0.012
B0	5.4±0.3	0.213±0.012
D5	Ø330	Ø13
D6	Ø13.5±1.0	Ø0.531±0.039
W2	18±2.0	0.709±0.079

Outline	Reel (pcs)	Per Carton (pcs)	Reel Diameters (mm)	Carton Size(mm)		
				L	W	H
Taping	5,000	80,000	330	360	360	385

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