

## Surface Mount Transient Voltage Suppressor Diodes

### Uni-directional



### Bi-directional



### Features

- For surface mounted applications
- Low-profile package
- Ideal for automated placement
- Available in Unidirectional and Bidirectional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform
- Low incremental surge resistance, excellent clamping capability
- Very fast response time
- High temperature soldering guaranteed: 260 °C/10 s at terminals
- Meets MSL level 1
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Typical Applications

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, telecommunication.

### Mechanical Data

- **Package:** DO-214AC (SMA)  
Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant, halogen-free
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102
- **Polarity:** For uni-directional types the band denotes cathode end, no marking on bi-directional types

### ■Maximum Ratings ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

PARAMETER	SYMBOL	UNIT	Max
Peak power dissipation, with a 10/1000us waveform (1) (2) (Fig.1)	$P_{PPM}$	W	400
Peak pulse current, with a 10/1000us waveform (1)	$I_{PPM}$	A	See Next Table
Power dissipation, on infinite heat sink at $T_L=75^\circ\text{C}$	$P_D$	W	1.0
Peak forward surge current, 8.3 ms single half sine-wave unidirectional only (2)	$I_{FSM}$	A	40
Operating junction and storage temperature range	$T_J, T_{STG}$	$^\circ\text{C}$	-55 to +150

### ■Electrical Characteristics ( $T_a=25^\circ\text{C}$ Unless otherwise specified)

PARAMETER	SYMBOL	UNIT	VALUE
Maximum instantaneous forward voltage @ at 25A for unidirectional only (3)	$V_F$	V	3.5/5.0
Maximum instantaneous forward voltage @ at 1A for unidirectional only	$V_F$	V	1.5



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## ■ Thermal Characteristics (T<sub>A</sub>=25°C Unless otherwise specified)

PARAMETER	SYMBOL	UNIT	Conditions	VALUE
Thermal resistance(Typical)	R <sub>θJL</sub>	°C/W	junction to lead	30
	R <sub>θJA</sub>	°C/W	junction to ambient	120

Notes:

- (1) Non-repetitive current pulse, per Fig. 3 and derated above T<sub>A</sub> = 25°C per Fig.2.
- (2) Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal
- (3) V<sub>F</sub><3.5V for devices of V<sub>BR</sub><200V and V<sub>F</sub><5.0V for devices of V<sub>BR</sub>>201V

## ■ Electrical Characteristics (T<sub>A</sub>=25°C Unless otherwise specified)

Part Number (Uni)	Part Number (Bi)	Breakdown Voltage V <sub>BR</sub> @I <sub>T</sub>			Maximum Reverse Leakage I <sub>R</sub> <sup>(6)</sup> @ V <sub>RWM</sub> (μA)	Working Peak Reverse Voltage V <sub>RWM</sub> (V)	Maximum Reverse Surge Current I <sub>PP</sub> <sup>(5)</sup> (A)	Maximum Clamping Voltage V <sub>c</sub> @ I <sub>PP</sub> (V)
		Min(V)	Max (V)	I <sub>T</sub> <sup>(4)</sup> (mA)				
SMAJ5.0	SMAJ5.0C	6.40	7.30	10	800	5.0	41.67	9.6
SMAJ5.0A	SMAJ5.0CA	6.40	7.07	10	800	5.0	43.38	9.2
SMAJ6.0	SMAJ6.0C	6.67	8.15	10	800	6.0	35.09	11.4
SMAJ6.0A	SMAJ6.0CA	6.67	7.37	10	800	6.0	38.83	10.3
SMAJ6.5	SMAJ6.5C	7.22	8.82	10	500	6.5	32.52	12.3
SMAJ6.5A	SMAJ6.5CA	7.22	7.98	10	500	6.5	35.71	11.2
SMAJ7.0	SMAJ7.0C	7.78	9.51	10	200	7.0	30.08	13.3
SMAJ7.0A	SMAJ7.0CA	7.78	8.60	10	200	7.0	33.33	12.0
SMAJ7.5	SMAJ7.5C	8.33	10.20	1	100	7.5	27.97	14.3
SMAJ7.5A	SMAJ7.5CA	8.33	9.21	1	100	7.5	31.01	12.9
SMAJ8.0	SMAJ8.0C	8.89	10.90	1	50	8.0	26.67	15.0
SMAJ8.0A	SMAJ8.0CA	8.89	9.83	1	50	8.0	29.41	13.6
SMAJ8.5	SMAJ8.5C	9.44	11.50	1	10	8.5	25.16	15.9
SMAJ8.5A	SMAJ8.5CA	9.44	10.40	1	10	8.5	27.78	14.4
SMAJ9.0	SMAJ9.0C	10.00	12.20	1	5	9.0	23.67	16.9
SMAJ9.0A	SMAJ9.0CA	10.00	11.10	1	5	9.0	25.97	15.4
SMAJ10	SMAJ10C	11.10	13.60	1	5	10.0	21.28	18.8
SMAJ10A	SMAJ10CA	11.10	12.30	1	5	10.0	23.53	17.0
SMAJ11	SMAJ11C	12.20	14.90	1	5	11.0	19.90	20.1
SMAJ11A	SMAJ11CA	12.20	13.50	1	5	11.0	21.98	18.2
SMAJ12	SMAJ12C	13.30	16.30	1	5	12.0	18.18	22.0
SMAJ12A	SMAJ12CA	13.30	14.70	1	5	12.0	20.10	19.9
SMAJ13	SMAJ13C	14.40	17.60	1	5	13.0	16.81	23.8
SMAJ13A	SMAJ13CA	14.40	15.90	1	5	13.0	18.60	21.5
SMAJ14	SMAJ14C	15.60	19.10	1	5	14.0	15.50	25.8
SMAJ14A	SMAJ14CA	15.60	17.20	1	5	14.0	17.24	23.2
SMAJ15	SMAJ15C	16.70	20.40	1	5	15.0	14.87	26.9
SMAJ15A	SMAJ15CA	16.70	18.50	1	5	15.0	16.39	24.4



# SMAJ SERIES

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Part Number (Uni)	Part Number (Bi)	Breakdown Voltage V <sub>BR</sub> @I <sub>T</sub>			Maximum Reverse Leakage I <sub>R</sub> <sup>(6)</sup> @ V <sub>RWM</sub> (μA)	Working Peak Reverse Voltage V <sub>RWM</sub> (V)	Maximum Reverse Surge Current I <sub>PP</sub> <sup>(5)</sup> (A)	Maximum Clamping Voltage V <sub>c</sub> @ I <sub>PP</sub> (V)
		Min(V)	Max (V)	I <sub>T</sub> <sup>(4)</sup> (mA)				
SMAJ16	SMAJ16C	17.80	21.80	1	5	16.0	13.89	28.8
SMAJ16A	SMAJ16CA	17.80	19.70	1	5	16.0	15.40	26.0
SMAJ17	SMAJ17C	18.90	23.10	1	5	17.0	13.11	30.5
SMAJ17A	SMAJ17CA	18.90	20.90	1	5	17.0	14.49	27.6
SMAJ18	SMAJ18C	20.00	24.40	1	5	18.0	12.42	32.2
SMAJ18A	SMAJ18CA	20.00	22.10	1	5	18.0	13.70	29.2
SMAJ19	SMAJ19C	21.10	25.70	1	5	19.0	11.76	34.0
SMAJ19A	SMAJ19CA	21.10	23.30	1	5	19.0	13.00	30.8
SMAJ20	SMAJ20C	22.20	27.10	1	5	20.0	11.17	35.8
SMAJ20A	SMAJ20CA	22.20	24.50	1	5	20.0	12.35	32.4
SMAJ22	SMAJ22C	24.40	29.80	1	5	22.0	10.15	39.4
SMAJ22A	SMAJ22CA	24.40	26.90	1	5	22.0	11.27	35.5
SMAJ24	SMAJ24C	26.70	32.60	1	5	24.0	9.30	43.0
SMAJ24A	SMAJ24CA	26.70	29.50	1	5	24.0	10.28	38.9
SMAJ26	SMAJ26C	28.90	35.30	1	5	26.0	8.58	46.6
SMAJ26A	SMAJ26CA	28.90	31.90	1	5	26.0	9.50	42.1
SMAJ28	SMAJ28C	31.10	38.00	1	5	28.0	8.00	50.0
SMAJ28A	SMAJ28CA	31.10	34.40	1	5	28.0	8.81	45.4
SMAJ30	SMAJ30C	33.30	40.70	1	5	30.0	7.48	53.5
SMAJ30A	SMAJ30CA	33.30	36.80	1	5	30.0	8.26	48.4
SMAJ33	SMAJ33C	36.70	44.90	1	5	33.0	6.78	59.0
SMAJ33A	SMAJ33CA	36.70	40.60	1	5	33.0	7.50	53.3
SMAJ36	SMAJ36C	40.00	48.90	1	5	36.0	6.22	64.3
SMAJ36A	SMAJ36CA	40.00	44.20	1	5	36.0	6.88	58.1
SMAJ40	SMAJ40C	44.40	54.30	1	5	40.0	5.60	71.4
SMAJ40A	SMAJ40CA	44.40	49.10	1	5	40.0	6.20	64.5
SMAJ43	SMAJ43C	47.80	58.40	1	5	43.0	5.22	76.7
SMAJ43A	SMAJ43CA	47.80	52.80	1	5	43.0	5.76	69.4
SMAJ45	SMAJ45C	50.00	61.10	1	5	45.0	4.98	80.3
SMAJ45A	SMAJ45CA	50.00	55.30	1	5	45.0	5.50	72.7
SMAJ48	SMAJ48C	53.30	65.10	1	5	48.0	4.68	85.5
SMAJ48A	SMAJ48CA	53.30	58.90	1	5	48.0	5.17	77.4
SMAJ51	SMAJ51C	56.70	69.30	1	5	51.0	4.39	91.1
SMAJ51A	SMAJ51CA	56.70	62.70	1	5	51.0	4.85	82.4
SMAJ54	SMAJ54C	60.00	73.30	1	5	54.0	4.15	96.3
SMAJ54A	SMAJ54CA	60.00	66.30	1	5	54.0	4.59	87.1
SMAJ58	SMAJ58C	64.40	78.70	1	5	58.0	3.88	103.0
SMAJ58A	SMAJ58CA	64.40	71.20	1	5	58.0	4.27	93.6
SMAJ60	SMAJ60C	66.70	81.50	1	5	60.0	3.74	107.0
SMAJ60A	SMAJ60CA	66.70	73.70	1	5	60.0	4.13	96.8



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		Min(V)	Max (V)	I <sub>T</sub> <sup>(4)</sup> (mA)				
SMAJ64	SMAJ64C	71.10	86.90	1	5	64.0	3.51	114.0
SMAJ64A	SMAJ64CA	71.10	78.60	1	5	64.0	3.88	103.0
SMAJ70	SMAJ70C	77.80	95.10	1	5	70.0	3.20	125.0
SMAJ70A	SMAJ70CA	77.80	86.00	1	5	70.0	3.54	113.0
SMAJ75	SMAJ75C	83.30	102.00	1	5	75.0	2.99	134.0
SMAJ75A	SMAJ75CA	83.30	92.10	1	5	75.0	3.31	121.0
SMAJ78	SMAJ78C	86.70	106.00	1	5	78.0	2.88	139.0
SMAJ78A	SMAJ78CA	86.70	95.80	1	5	78.0	3.17	126.0
SMAJ80	SMAJ80C	88.90	108.80	1	5	80.0	2.79	143.2
SMAJ80A	SMAJ80CA	88.80	97.60	1	5	80.0	3.09	129.0
SMAJ85	SMAJ85C	94.40	115.00	1	5	85.0	2.65	151.0
SMAJ85A	SMAJ85CA	94.40	104.00	1	5	85.0	2.92	137.0
SMAJ90	SMAJ90C	100.00	122.00	1	5	90.0	2.50	160.0
SMAJ90A	SMAJ90CA	100.00	111.00	1	5	90.0	2.74	146.0
SMAJ100	SMAJ100C	111.00	136.00	1	5	100.0	2.23	179.0
SMAJ100A	SMAJ100CA	111.00	123.00	1	5	100.0	2.47	162.0
SMAJ110	SMAJ110C	122.00	149.00	1	5	110.0	2.04	196.0
SMAJ110A	SMAJ110CA	122.00	135.00	1	5	110.0	2.26	177.0
SMAJ120	SMAJ120C	133.00	163.00	1	5	120.0	1.87	214.0
SMAJ120A	SMAJ120CA	133.00	147.00	1	5	120.0	2.07	193.0
SMAJ130	SMAJ130C	144.00	176.00	1	5	130.0	1.73	231.0
SMAJ130A	SMAJ130CA	144.00	159.00	1	5	130.0	1.91	209.0
SMAJ140	SMAJ140C	155.00	190.00	1	5	140.0	1.60	250.6
SMAJ140A	SMAJ140CA	155.00	171.00	1	5	140.0	1.76	226.8
SMAJ150	SMAJ150C	167.00	204.00	1	5	150.0	1.49	268.0
SMAJ150A	SMAJ150CA	167.00	185.00	1	5	150.0	1.65	243.0
SMAJ160	SMAJ160C	178.00	218.00	1	5	160.0	1.39	287.0
SMAJ160A	SMAJ160CA	178.00	197.00	1	5	160.0	1.54	259.0
SMAJ170	SMAJ170C	189.00	231.00	1	5	170.0	1.32	304.0
SMAJ170A	SMAJ170CA	189.00	209.00	1	5	170.0	1.45	275.0
SMAJ180	SMAJ180C	200.00	244.00	1	5	180.0	1.24	322.2
SMAJ180A	SMAJ180CA	200.00	220.00	1	5	180.0	1.37	291.6
SMAJ190	SMAJ190C	211.00	258.00	1	5	190.0	1.18	340.1
SMAJ190A	SMAJ190CA	211.00	232.00	1	5	190.0	1.30	307.8
SMAJ200A	SMAJ200CA	224.00	247.00	1	1	200.0	1.23	324.0
SMAJ220A	SMAJ220CA	246.00	272.00	1	1	220.0	1.12	356.0
SMAJ250A	SMAJ250CA	279.00	309.00	1	1	250.0	0.99	405.0
SMAJ300A	SMAJ300CA	335.00	371.00	1	1	300.0	0.82	486.0
SMAJ350A	SMAJ350CA	391.00	432.00	1	1	350.0	0.71	567.0
SMAJ400A	SMAJ400CA	447.00	494.00	1	1	400.0	0.62	648.0
SMAJ440A	SMAJ440CA	492.00	543.00	1	1	440.0	0.56	713.0



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## Notes:

- (4) Pulse test:  $t_p \leq 50\text{ms}$
- (5) Surge current waveform per Fig. 3 and derated per Fig.2.
- (6) For bi-directional types having  $V_{RWM}$  of 10 V and less, the  $I_R$  limit is doubled.

## ■ Characteristics (Typical)

FIG1: Peak Pulse Power Rating Curve

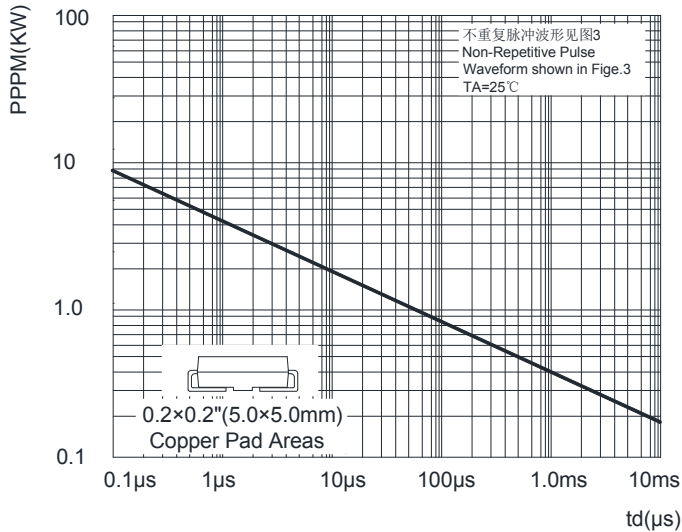


FIG2: Pulse Power or Current vs. Initial Junction Temperature

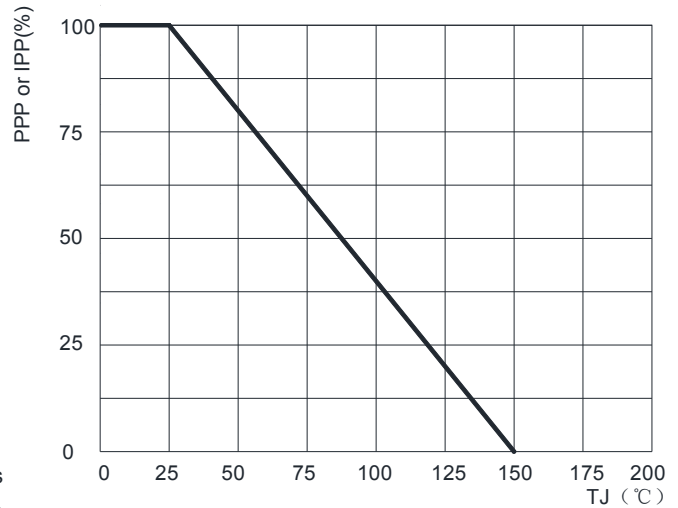


FIG3: Pulse Waveform

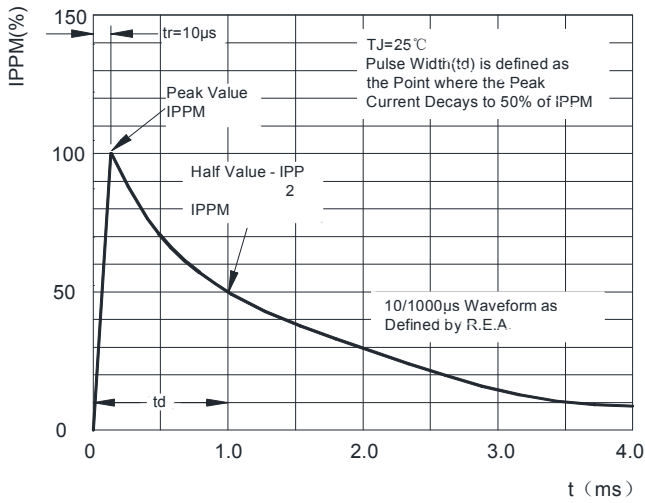


FIG4: Typical Transient Thermal Impedance

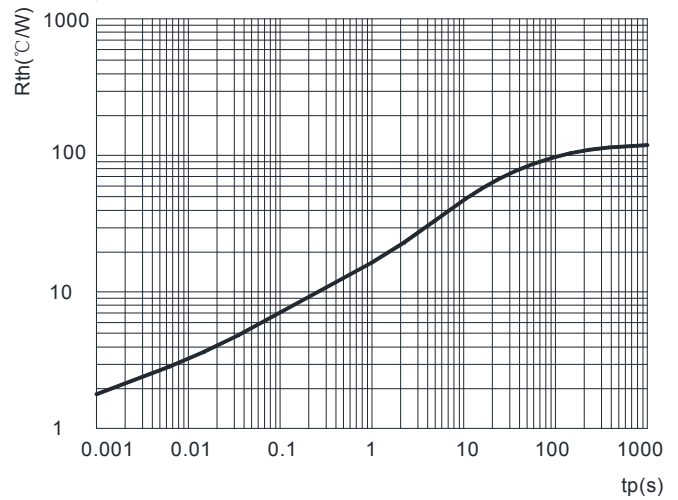
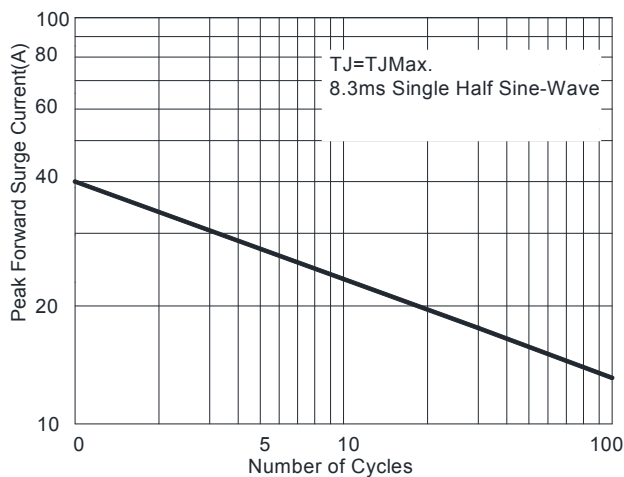


FIG5: Maximum Non-Repetitive Surge Current



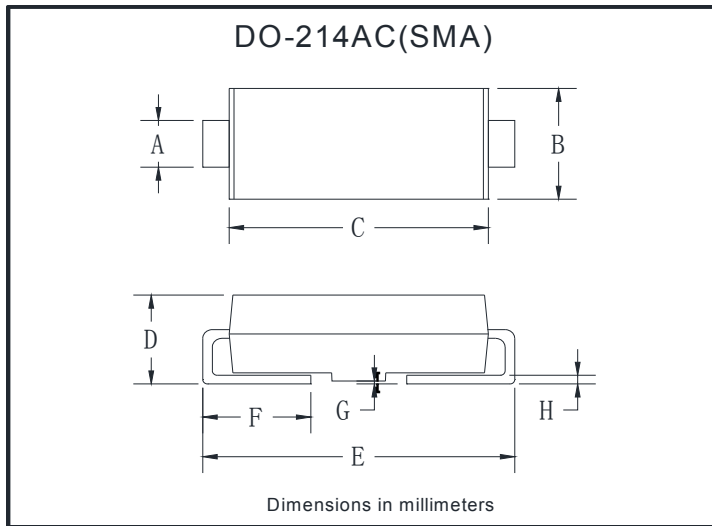


# SMAJ SERIES

## Ordering Information (Example)

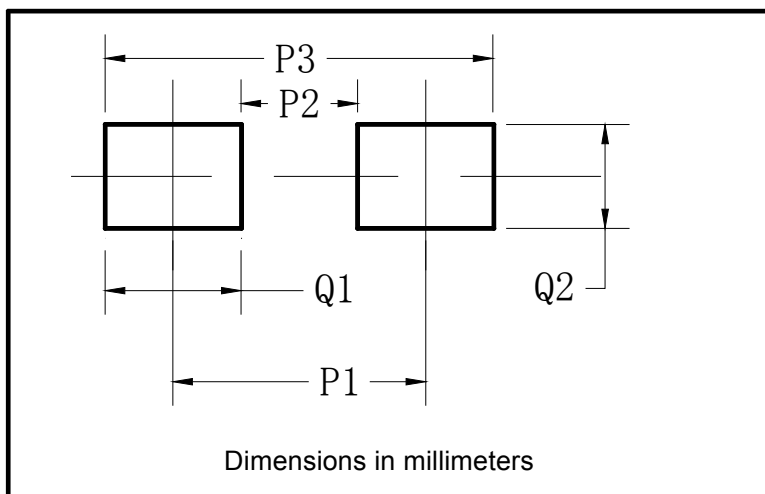
PREFERRED P/N	PACKAGE CODE	UNIT WEIGHT(g)	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
SMAJ SERIES	F1	Approximate 0.059	5000	10000	80000	13" reel
SMAJ SERIES	F2	Approximate 0.059	7500	15000	120000	13" reel
SMAJ SERIES	F3	Approximate 0.059	7500	15000	60000	13" reel
SMAJ SERIES	F4	Approximate 0.059	1800	7200	57600	7" reel
SMAJ SERIES	F5	Approximate 0.059	2000	8000	64000	7" reel
SMAJ SERIES	F6	Approximate 0.059	5000	10000	100000	13" reel

## Outline Dimensions



DO-214AC(SMA)		
Dim	Min	Max
A	1.25	1.58
B	2.40	2.83
C	4.25	4.75
D	1.90	2.30
E	4.93	5.28
F	0.76	1.41
G	0.08	0.20
H	0.15	0.31

## Suggested Pad Layout



DO-214AC(SMA)	
Dim	Millimeters
P1	4.00
P2	1.50
P3	6.50
Q1	2.50
Q2	1.70



## SMAJ SERIES

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