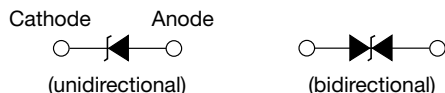


Surface-Mount TRANSZORB® Transient Voltage Suppressors


SMA (DO-214AC)


LINKS TO ADDITIONAL RESOURCES



3D Models

PRIMARY CHARACTERISTICS

V_{BR} uni-directional	6.40 V to 231 V
V_{BR} bi-directional	6.40 V to 231 V
V_{WM}	5.0 V to 188 V
P_{PPM}	400 W, 300 W
P_D	3.3 W
I_{FSM}	40 A
T_J max.	150 °C
Polarity	Unidirectional, bidirectional
Package	SMA (DO-214AC)

DEVICES FOR BIDIRECTION APPLICATIONS

For bidirectional use CA suffix (e.g. SMAJ10CA).
Electrical characteristics apply in both directions.

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, automotive, and telecommunication.

FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in unidirectional and bidirectional
- 400 W peak pulse power capability with a 10/1000 μ s waveform, repetitive rate (duty cycle): 0.01 % (300 W above 78 V)
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available
 - Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



MECHANICAL DATA

Case: SMA (DO-214AC)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS-compliant, commercial grade

Base P/N-M3 - halogen-free, RoHS-compliant, commercial grade

Base P/NHE3_X - RoHS-compliant and AEC-Q101 qualified

Base P/NHM3_X - halogen-free, RoHS-compliant, and AEC-Q101 qualified

("_X" denotes revision code e.g. A, B, ...)

Terminals: matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3, M3, HE3, and HM3 suffix meets JESD 201 class 2 whisker test

Polarity: for unidirectional types the band denotes cathode end, no marking on bidirectional types

MAXIMUM RATINGS ($T_A = 25$ °C unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation with a 10/1000 μ s waveform (1)(2) (fig. 1)	P_{PPM}	400	W
Peak pulse current with a waveform (1)	I_{PPM}	See next table	A
Power dissipation on infinite heatsink at $T_A = 50$ °C	P_D	3.3	W
Peak forward surge current 8.3 ms single half sine-wave unidirectional only (2)	I_{FSM}	40	A
Operating junction and storage temperature range	T_J, T_{STG}	-55 to +150	°C

Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above $T_A = 25$ °C per fig. 2. Rating is 300 W above 78 V

(2) Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal

**ELECTRICAL CHARACTERISTICS** ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

DEVICE TYPE	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V_{BR} AT I_T ⁽¹⁾ (V)		TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (μA) ⁽³⁾	MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (A) ⁽²⁾	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)	MAXIMUM TEMPERATURE COEFFICIENT OF V_{BR} (%/ $^{\circ}\text{C}$)
	UNI	BI	MIN.	MAX.						
(+)SMAJ5.0A ⁽⁵⁾	AE	WE	6.40	7.07	10	5.0	800	43.5	9.2	0.057
(+)SMAJ6.0A	AG	WG	6.67	7.37	10	6.0	800	38.8	10.3	0.059
(+)SMAJ6.5A	AK	WK	7.22	7.98	10	6.5	500	35.7	11.2	0.061
(+)SMAJ7.0A	AM	WM	7.78	8.60	10	7.0	200	33.3	12.0	0.065
(+)SMAJ7.5A	AP	WP	8.33	9.21	1.0	7.5	100	31.0	12.9	0.067
(+)SMAJ8.0A	AR	WR	8.89	9.83	1.0	8.0	50	29.4	13.6	0.069
(+)SMAJ8.5A	AT	WT	9.44	10.4	1.0	8.5	10	27.8	14.4	0.073
(+)SMAJ9.0A	AV	WV	10.0	11.1	1.0	9.0	5.0	26.0	15.4	0.074
(+)SMAJ10A	AX	WX	11.1	12.3	1.0	10	1.0	23.5	17.0	0.078
(+)SMAJ11A	AZ	WZ	12.2	13.5	1.0	11	1.0	22.0	18.2	0.080
(+)SMAJ12A	BE	XE	13.3	14.7	1.0	12	1.0	20.1	19.9	0.083
(+)SMAJ13A	BG	XG	14.4	15.9	1.0	13	1.0	18.6	21.5	0.084
(+)SMAJ14A	BK	XK	15.6	17.2	1.0	14	1.0	17.2	23.2	0.087
(+)SMAJ15A	BM	XM	16.7	18.5	1.0	15	1.0	16.4	24.4	0.088
(+)SMAJ16A	BP	XP	17.8	19.7	1.0	16	1.0	15.4	26.0	0.089
(+)SMAJ17A	BR	XR	18.9	20.9	1.0	17	1.0	14.5	27.6	0.090
(+)SMAJ18A	BT	XT	20.0	22.1	1.0	18	1.0	13.7	29.2	0.092
(+)SMAJ20A	BV	XV	22.2	24.5	1.0	20	1.0	12.3	32.4	0.094
(+)SMAJ22A	BX	XX	24.4	26.9	1.0	22	1.0	11.3	35.5	0.096
(+)SMAJ24A	BZ	XZ	26.7	29.5	1.0	24	1.0	10.3	38.9	0.096
(+)SMAJ26A	CE	YE	28.9	31.9	1.0	26	1.0	9.5	42.1	0.097
(+)SMAJ28A	CG	YG	31.1	34.4	1.0	28	1.0	8.8	45.4	0.098
(+)SMAJ30A	CK	YK	33.3	36.8	1.0	30	1.0	8.3	48.4	0.099
(+)SMAJ33A	CM	YM	36.7	40.6	1.0	33	1.0	7.5	53.3	0.100
(+)SMAJ36A	CP	YP	40.0	44.2	1.0	36	1.0	6.9	58.1	0.100
(+)SMAJ40A	CR	YR	44.4	49.1	1.0	40	1.0	6.2	64.5	0.101
(+)SMAJ43A	CT	YT	47.8	52.8	1.0	43	1.0	5.8	69.4	0.102
(+)SMAJ45A	CV	YV	50.0	55.3	1.0	45	1.0	5.5	72.7	0.102
(+)SMAJ48A	CX	YX	53.3	58.9	1.0	48	1.0	5.2	77.4	0.103
(+)SMAJ51A	CZ	YZ	56.7	62.7	1.0	51	1.0	4.9	82.4	0.104
(+)SMAJ54A	RE	ZE	60.0	66.3	1.0	54	1.0	4.6	87.1	0.104
(+)SMAJ58A	RG	ZG	64.4	71.2	1.0	58	1.0	4.3	93.6	0.104
(+)SMAJ60A	RK	ZK	66.7	73.7	1.0	60	1.0	4.1	96.8	0.105
(+)SMAJ64A	RM	ZM	71.1	78.6	1.0	64	1.0	3.9	103	0.105
(+)SMAJ70A	RP	ZP	77.8	86.0	1.0	70	1.0	3.5	113	0.105
(+)SMAJ75A	RR	ZR	83.3	92.1	1.0	75	1.0	3.3	121	0.106
(+)SMAJ78A	RT	ZT	86.7	95.8	1.0	78	1.0	3.2	126	0.106
(+)SMAJ85A	RV	ZV	94.4	104	1.0	85	1.0	2.2	137	0.106
(+)SMAJ90A	RX	ZX	100	111	1.0	90	1.0	2.1	146	0.106
(+)SMAJ100A	RZ	ZZ	111	123	1.0	100	1.0	1.9	162	0.107
(+)SMAJ110A	SE	VE	122	135	1.0	110	1.0	1.7	177	0.107
(+)SMAJ120A	VG	VG	133	147	1.0	120	1.0	1.6	193	0.108
(+)SMAJ130A	VK	VK	144	159	1.0	130	1.0	1.4	209	0.108
(+)SMAJ150A	VM	VM	167	185	1.0	150	1.0	1.2	243	0.108
(+)SMAJ160A	SP	VP	178	197	1.0	160	1.0	1.2	259	0.108
(+)SMAJ170A	SR	VR	189	209	1.0	170	1.0	1.09	275	0.108
(+)SMAJ188A	SS	VS	209	231	1.0	188	1.0	0.91	328	0.108

Notes(1) Pulse test: $t_p \leq 50\text{ ms}$

(2) Surge current waveform per fig. 3 and derate per fig. 2

(3) For bidirectional types having V_{WM} of 10 V and less, the I_D limit is doubled

(4) All terms and symbols are consistent with ANSI/IEEE C62.35

(5) For the bi-directional SMAJ5.0CA, the maximum V_{BR} is 7.25 V(6) $V_F = 3.5\text{ V}$ at $I_F = 25\text{ A}$ (unidirectional only)

(*) Underwriters Laboratory Recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both unidirectional and bidirectional device

**THERMAL CHARACTERISTICS** ($T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to ambient ⁽¹⁾	$R_{\theta JA}$	120	$^{\circ}\text{C/W}$
Typical thermal resistance, junction to lead	$R_{\theta JL}$	30	$^{\circ}\text{C/W}$

Note⁽¹⁾ Mounted on minimum recommended pad layout**ORDERING INFORMATION** (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SMAJ5.0A-E3/61	0.064	61	1800	7" diameter plastic tape and reel
SMAJ5.0A-M3/61				
SMAJ5.0A-E3/5A	0.064	5A	7500	13" diameter plastic tape and reel
SMAJ5.0A-M3/5A				
SMAJ5.0AHE3_A/H ⁽¹⁾	0.064	H	1800	7" diameter plastic tape and reel
SMAJ5.0AHM3_A/H ⁽¹⁾				
SMAJ5.0AHE3_A/I ⁽¹⁾	0.064	I	7500	13" diameter plastic tape and reel
SMAJ5.0AHM3_A/I ⁽¹⁾				

Note⁽¹⁾ AEC-Q101 qualified

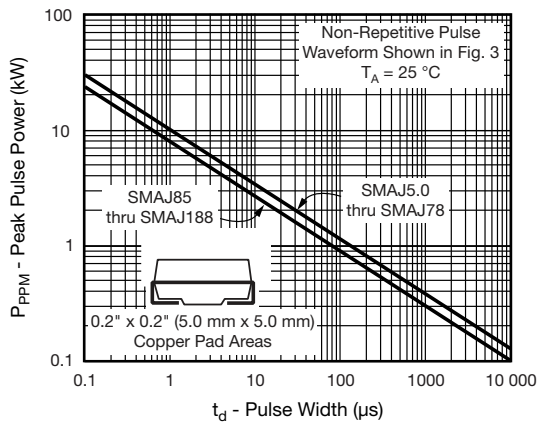
RATINGS AND CHARACTERISTICS CURVES ($T_A = 25^\circ\text{C}$ unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve

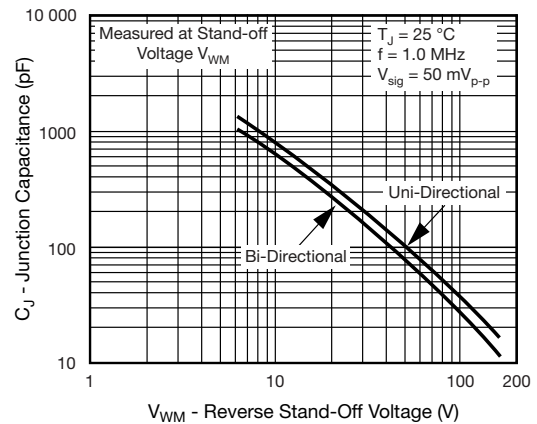


Fig. 4 - Typical Junction Capacitance

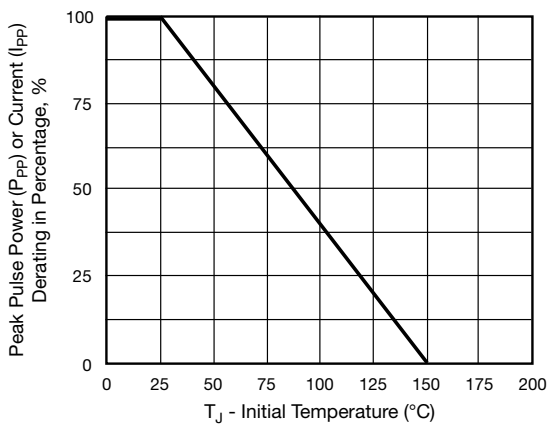


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

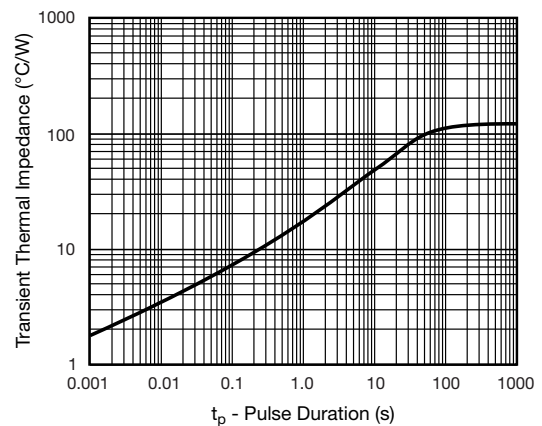


Fig. 5 - Typical Transient Thermal Impedance

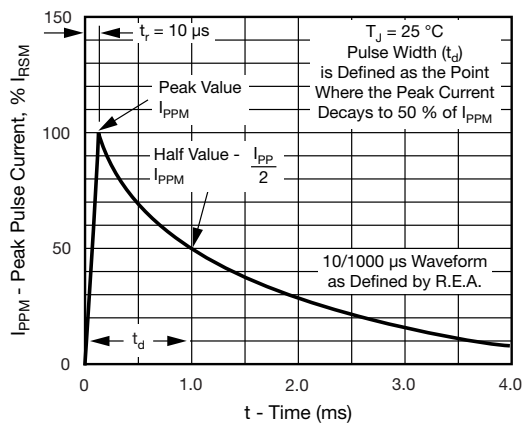


Fig. 3 - Pulse Waveform

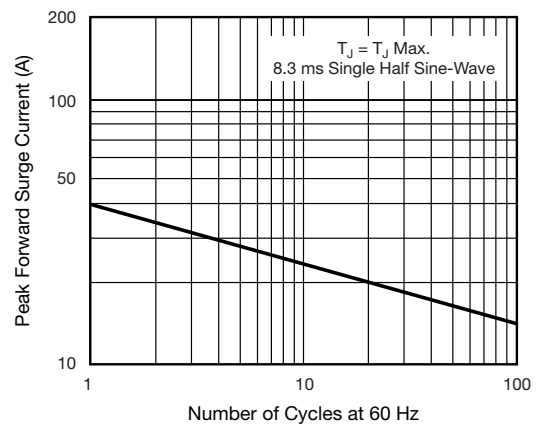
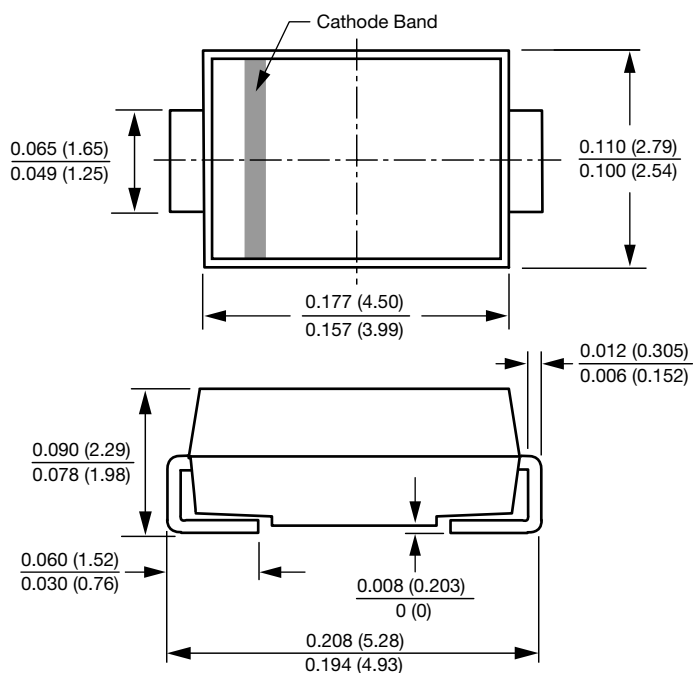


Fig. 6 - Maximum Non-Repetitive Forward Surge Current Unidirectional Only

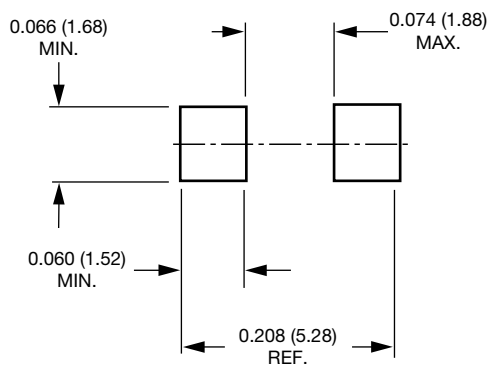


PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMA (DO-214AC)



Mounting Pad Layout





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Packaging Information

PACKAGING ORDERING CODE		
ANTI-STATIC PACKAGE CODE	PREFERRED PACKAGE CODE	PACKAGING DESCRIPTION
51, A		Bulk
52, 52T	P	SMB (DO-214AA) / SMBG (DO-215AA), 12 mm tape, 7" diameter plastic reel
2D	P	SM5-8A (DO-218AB), 24 mm tape, 13" diameter plastic reel, anode towards sprocket hole
2E, K		SM5-8A (DO-218AB), 24 mm tape, 13" diameter plastic reel, cathode towards sprocket hole
2M, P		Tube packaging for 5KP/6KA type lead formed components
53, B		26 mm horizontal taping and ammo box packaging
54, C	P	52.4 mm horizontal tape, 13" diameter paper reel
5A, 5AT	P	SMA (DO-214AC), 12 mm tape, 13" diameter plastic reel
5B, 5BT	P	SMB (DO-214AA) / SMBG (DO-215AA), 12 mm tape, 13" diameter plastic reel
5CA	P	GF1 (DO-214BA), 12 mm tape, 13" diameter plastic reel
57, 57T	P	SMC (DO-214AB) / SMCG (DO-215AB), 16 mm tape, 7" diameter plastic reel
6A	P	SlimSMA (DO-221AC), 12 mm tape, 7" diameter plastic reel
6B	P	SlimSMA (DO-221AC), 12 mm tape, 13" diameter plastic reel
9A, 9AT	P	SMC (DO-214AB) / SMCG (DO-215AB), 16 mm tape, 13" diameter plastic reel
61, 61T	P	SMA (DO-214AC), 12 mm tape, 7" diameter plastic reel
67A	P	GF1 (DO-214BA), 12 mm tape, 7" diameter plastic reel
72, E	P	Bulk pack for bridge and special axial-leaded formed devices
73, D		52.4 mm horizontal tape and ammo box packaging
77	P	DFS bridge, 16 mm tape, 13" diameter paper reel
80	P	MB-S (TO-269AA) bridge, 12 mm tape, 13" diameter paper reel
81	P	D ² PAK (TO-263AB) 24 mm tape, 13" diameter reinforced hub plastic reel
8W	P	D ² PAK (TO-263AB) (wire bond) 24 mm tape, 13" diameter reinforced hub plastic reel
83	P	GL34 (DO-213AA) 8 mm tape, 13" diameter plastic reel
84A	P	SMP (DO-220AA) 12 mm tape, 7" diameter plastic reel
85A	P	SMP (DO-220AA) 12 mm tape, 13" diameter plastic reel
86A	P	SMPC (TO-277A), 12 mm tape, 7" diameter plastic reel
87A	P	SMPC (TO-277A), 12 mm tape, 13" diameter plastic reel
89A	P	MicroSMP (DO-219AD), 8 mm tape, 7" diameter plastic reel
45, P	P	Anti-static tube packaging for Bridge and Power Pack
4W, P	P	Anti-static tube packaging for wire bond TO-220, ITO-220, TO-262 and TO-263
96	P	GL41 (DO-213AB), 12 mm tape, 7" diameter plastic reel
97	P	GL41 (DO-213AB), 12 mm tape, 13" diameter plastic reel
98	P	GL34 (DO-213AA), 8 mm tape, 7" diameter plastic reel
100, V		MPG06 pseudo radial tape, cathode first out of ammo pack
H	P	Tape in 7" diameter plastic reel
I	P	Tape in 13" diameter plastic reel
TR	P	SMA (DO-214AC), 12 mm tape, 7" diameter plastic reel ⁽¹⁾
TR3	P	SMA (DO-214AC), 12 mm tape, 13" diameter plastic reel ⁽¹⁾

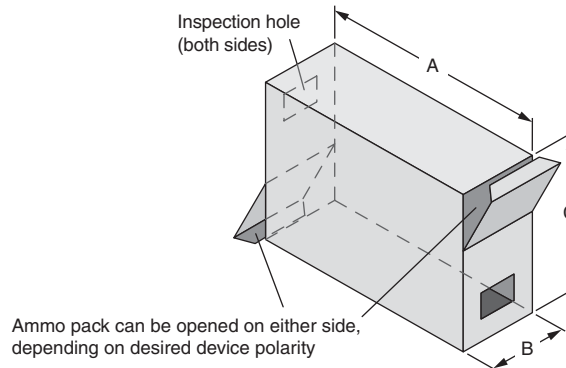
Notes

- "P" and bold letter denotes preferred package code
- A "T" suffix added to the packaging codes for SMA, SMB and SMC products indicates that the patented folded-frame construction is used. This does not apply to TR and TR3 codes or TRANSZORB® TVS in SMA and SMB
- ⁽¹⁾ Formerly sold by Vishay Telefunken® (Telefunken® is a registered trademark of Electro Holding GmbH)



BULK PACKAGING					
CASE TYPES	PREFERRED PACKAGE CODE	PACKAGING	BOX SIZE		QUANTITY
			INCHES	cm	EA.
DF-M, DF-S, DFL-S	45	Anti-static plastic tubes	17.4 length	44.1 length	50
GSIB-5S, PB	45	Anti-static plastic tubes	24.2 length	61.5 length	20
GBU, BU	45	Anti-static plastic tubes	18.5 length	47 length	20
GBL	45	Anti-static plastic tubes	17.5 length	44.5 length	20
TO-220AB / AC, ITO-220AC / AB, TO-262AA	45, 4W	Anti-static plastic tubes	21.0 length	53.7 length	50
TO-247AD	45	Anti-static plastic tubes	20.0 length	50.8 length	30
MBS (TO-269AA)	45	Anti-static plastic tubes	20.3 x 0.41	51.5 x 1.04	100
GBL	51	Anti-static PVC tray	12.5 x 6.1 x 1.0	31.7 x 15.5 x 2.5	400
GBPC12-35W	51	Paper box	12.5 x 12.5 x 1.7	31.7 x 31.7 x 4.3	100
GBPC6	51	Paper box	7.5 x 7.5 x 1.43	19.0 x 19.0 x 3.6	100
KBL	51	Anti-static PVC tray	12.2 x 6.1 x 1.5	30.9 x 15.5 x 3.8	300
GBPC12-35	51	Paper box	12.5 x 12.5 x 1.7	31.7 x 31.7 x 4.3	100
KBU4, 6, 8	51	Anti-static PVC tray	12.2 x 6.1 x 1.5	30.9 x 15.5 x 3.8	250
WOG, 2WOG	51	Plastic bags	-	-	100
GBU / BU	51	Paper tray	13.1 x 6.6 x 1.2	33.2 x 16.8 x 3.0	250

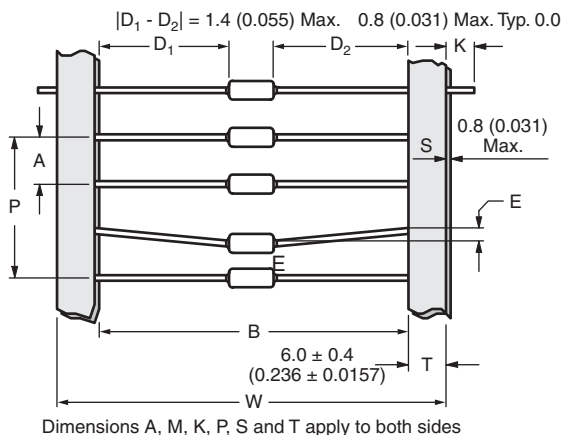
AXIAL-LEADED TAPE AND REEL PACKAGING



All axial-leaded devices are packed in accordance with EIA standard RS-296-E. The diagrams given below refer to these specifications.

TABLE 1 - AMMO PACK PACKAGING

PACKAGING	AVAILABLE PRODUCT OUTLINES	PREFERRED PACKAGE CODE	DIMENSION A	DIMENSION B	DIMENSION C	QUANTITY BOX
26 mm horizontal tape, ammo pack	DO-41 (DO-204AL), MPG06 DO-15 (DO-204AC) P300	53, B 53, B 53, B	9.7" (247 mm)	1.7" (44 mm)	3.7" (95 mm)	3.0K 1.5K 0.75K
52 mm horizontal tape, ammo pack	DO-41 (DO-204AL), MPG06 DO-15 (DO-204AC) DO-201AD, GP20 P600	73, D 73, D 73, D 73, D	10.0" (255 mm)	3.15" (80 mm)	4.53" (115 mm)	3.0K 2.0K 1.0K 0.3K
Pseudo / radial tape, ammo pack	MPG06	100, V	13.4" (340 mm)	1.8" (47 mm)	7.9" (200 mm)	2.0K

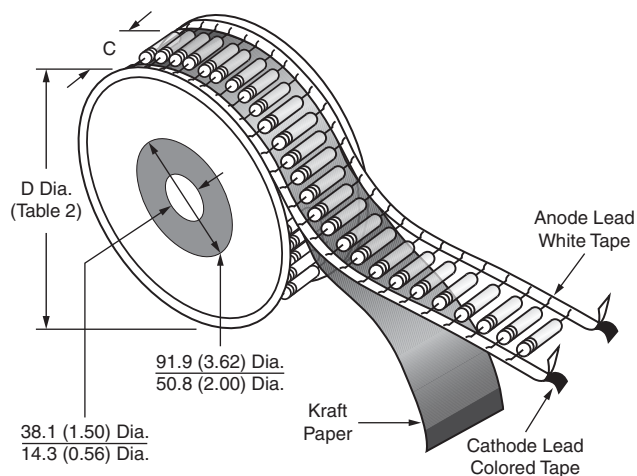


Dimensions in millimeters (inches)

Description	Symbol	
Component Pitch	A	2, 3
Inside Tape Spacing	B	2, 3
Lead to Lead Eccentricity	$ D_1 - D_2 $	-
Lead Extension	K	-
Lead Bending	E	2
Cumulative Pitch	P	3
Exposed Adhesive	S	-
Tape Width	T	-

All polarized components shall be oriented in the same direction

Fig. 1



The "C" dimension of Fig. 2 is between flanges of the component reel and shall be 1.5 mm (0.059") to 8.00 mm (0.315") greater than the overall taped component width "W" (Fig. 1). Where "W" dimension is 68.2 mm (2.68") max.

Fig. 2



AXIAL-LEADED TAPE AND REEL PACKAGING

TABLE 2 - REEL AND AMMO PACK TAPING SPECIFICATIONS

COMPONENT CASE TYPE	PREFERRED PACKAGE CODE	UNITS PER REEL	COMPONENT PITCH “A” Fig. 1		INSIDE TAPE SPACING “B” Fig. 1		REEL DIMENSION “D” Fig. 2		LEAD BENDING “E” Fig. 1	
		EA.	INCHES	mm	INCHES	mm	INCHES	mm	INCHES	mm
DO-15 (DO-204AC)	54, C	4000	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
DO-201AD	54, C	1400	0.395	10.0	2.06	52.4	13.0	330	0.047	1.2
DO-41 (DO-204AL)	54, C	5500	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
DFS Surface-Mount	77	1500	Fig. 8		-	-	13.0	330	Fig. 8	-
GF1 (DO-214BA)	67A, H / 5CA, I	1500 / 6500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
GL34 (DO-213AA)	98, H / 83, I	2500 / 9000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
GL41 (DO-213AB)	96, H / 97, I	1500 / 5000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
GP10E Radial	Fig. 5 and Fig. 6	2500	0.500	12.7	-	-	13.0	330	0.079	2.0
GP10E	54, C	5500	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
GP20/1.5KE	54, C	1400	0.395	10.0	2.06	52.4	13.0	330	0.047	1.2
MPG06	54, C	5500	0.200	5.0	2.06	52.4	13.0	330	0.047	1.2
P600	54, C	800	0.395	10.0	2.06	52.4	13.0	330	0.047	1.2
SMP (DO-220AA)	84A, H / 85A, I	3000 / 10 000	Fig. 8		-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMF (DO-219AB)	H / I	3000 / 10 000			-	-	7.0 / 13.0	178 / 300	Fig. 8	-
SMPD (TO-263AC) / SMPA (DO-221BC)	I	2000 / 14 000			-	-	13.0	330	Fig. 8	-
MicroSMP (DO-219AD) / MicroSMF (DO-219AC)	89A / H	4500			-	-	7.0	178	Fig. 8	-
SMPC (TO-277A)	86A, H / 87A, I	1500 / 6500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMA (DO-214AC)	61, 61T, TR, H / 5A, 5AT, TR3, I	1800 / 7500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMB (DO-214AA) / SMBG (DO-215AA)	52, 52T, H / 5B, 5BT, I	750 / 3200			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SMC (DO-214AB) / SMCG (DO-215AB)	57, 57T, H / 9A, 9AT, I	850 / 3500			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
DO-218AB / AC	2D / I	750			-	-	13.0	330	Fig. 8	-
D ² PAK (TO-263AB)	81, 8W, I	800			-	-	13.0	330	Fig. 8	-
MBS (TO-269AA)	80, I	3000			-	-	13.0	330	Fig. 8	-
SlimSMA (DO-221AC)	6A, H / 6B, I	3500 / 14 000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SlimSMAW (DO-221AD)	H, I	3500 / 14 000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
SlimDPAK (TO-252AE)	I	4500			-	-	13.0	330	Fig. 8	-
FlatPAK 5 x 6	H / I	1500 / 6000			-	-	7.0 / 13.0	178 / 330	Fig. 8	-
MicroSMP (DO-219AD)	I	16 000			-	-	13.0	330	Fig. 8	-
SMPA (DO-221BC)	H	3500			-	-	7.0	178	Fig. 8	-

Note

- Package codes, 61/5A, 52/5B are matrix-frame constructions for TRANSZORB® TVS in SMA and SMB only

TABLE 3 - COMPONENT AND INSIDE HORIZONTAL TAPE SPACING

COMPONENT BODY DIAMETER	COMPONENTS SPACING A (LEAD TO LEAD)	INSIDE TAPE SPACING "B"	CUMULATIVE PITCH TOLERANCE
0 mm to 5 mm (0.0" to 0.197")	5.0 mm ± 0.5 mm (0.197" ± 0.020")	26 mm + 1.5 mm / - 0.0 mm (1.024" + 0.059" / - 0.0")	Not to exceed 1.5 mm (0.059") over 6 consecutive components
0 mm to 5 mm (0.0" to 0.197")	5.0 mm ± 0.5 mm (0.197" ± 0.020")	52.4 mm + 1.5 mm / - 0.4 mm (2.062" + 0.059" / - 0.016")	
5.01 mm to 10 mm (0.197" to 0.394")	10 mm ± 0.5 mm (0.394" ± 0.020")	52.4 mm + 1.5 mm / - 0.4 mm (2.062" + 0.059" / - 0.016")	

DIMENSIONS in millimeters (inches)

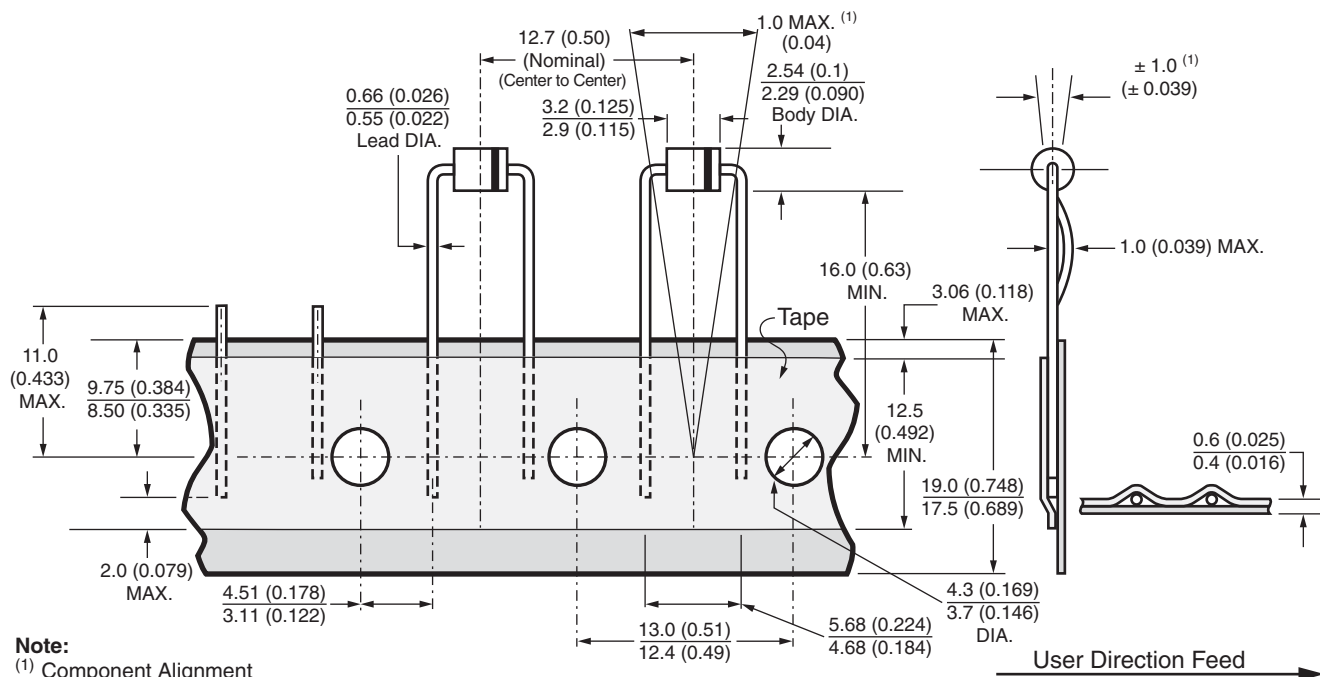


Fig. 3 - Pseudo Radial

RADIAL TAPE PACKAGING

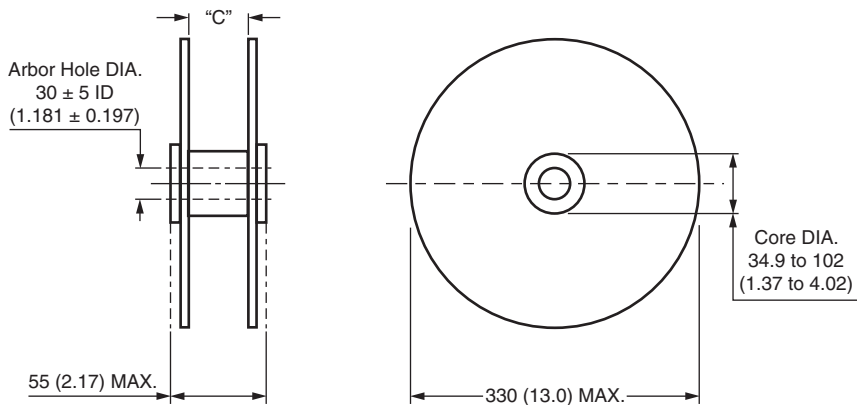


Fig. 4 - Reel Dimensions

Notes

- "C" dimension between the reel flanges shall be governed by the overall width of the taped components and shall be 1.5 mm (0.057") to 8.0 mm (0.315") greater than the overall width
- All leaded devices are packaged in accordance with EIA standard RS-468-A specification and are available on reel or in fan fold box (ammo pack)
- All dimensions are in millimeters and (inches)

SURFACE MOUNT TAPE AND REEL PACKAGING

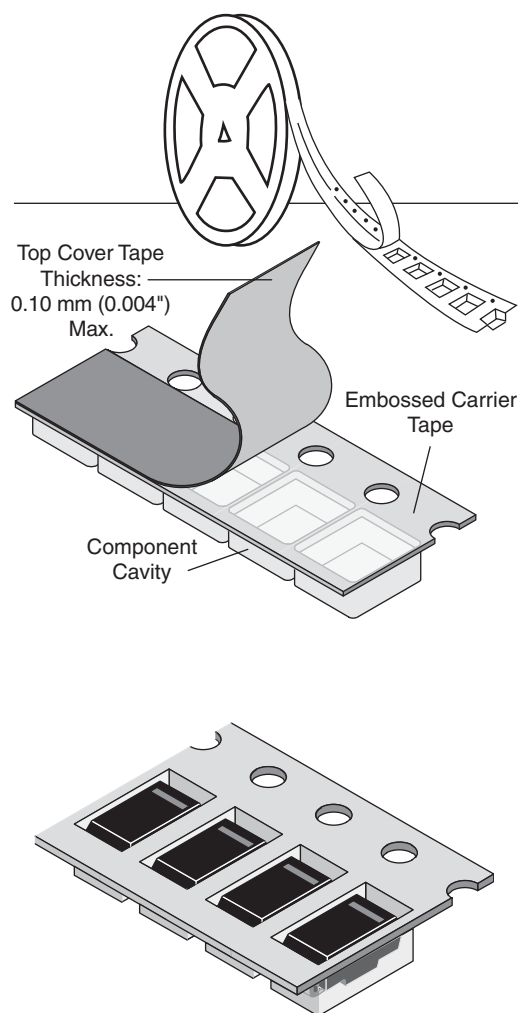


Fig. 5

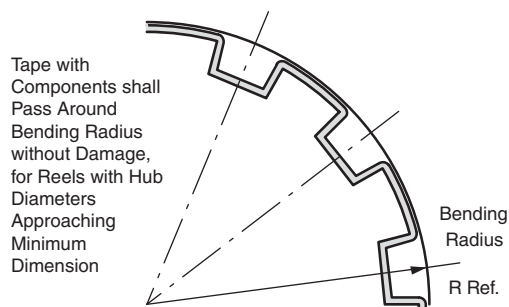


Fig. 6

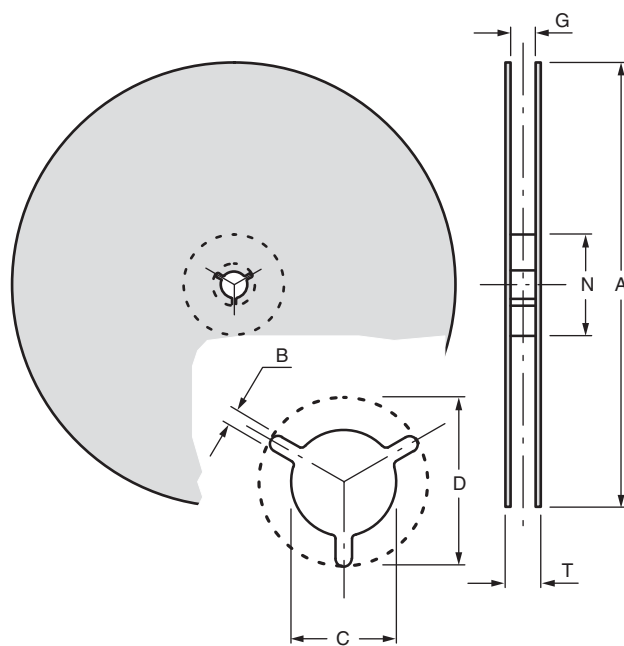


Fig. 7

DIMENSIONS in millimeters (inches)							
TAPE SIZE	A MAX.	B MIN.	C	D MIN.	N MIN.	G MAX.	T MAX.
8 mm (0.315)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	9.9 (0.389)	14.4 (0.567)
12 mm (0.472)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	14.4 (0.567)	18.4 (0.724)
16 mm (0.630)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	18.4 (0.724)	22.4 (0.802)
24 mm (0.945)	330 ± 2.0 (13.0 ± 0.079) 178 ± 2.0 (7.0 ± 0.079)	1.5 (0.059)	13.0 ± 0.20 (0.51 ± 0.008)	20.2 (0.795)	50 (1.97)	26.4 (1.039)	30.4 (1.197)

SURFACE MOUNT TAPE AND REEL PACKAGING

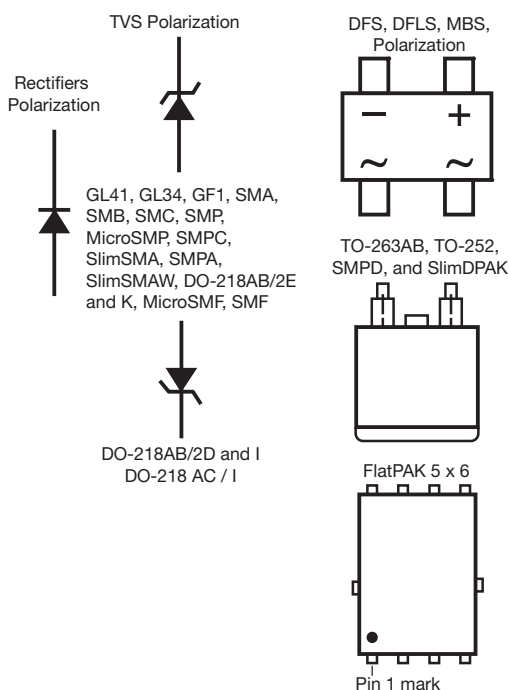
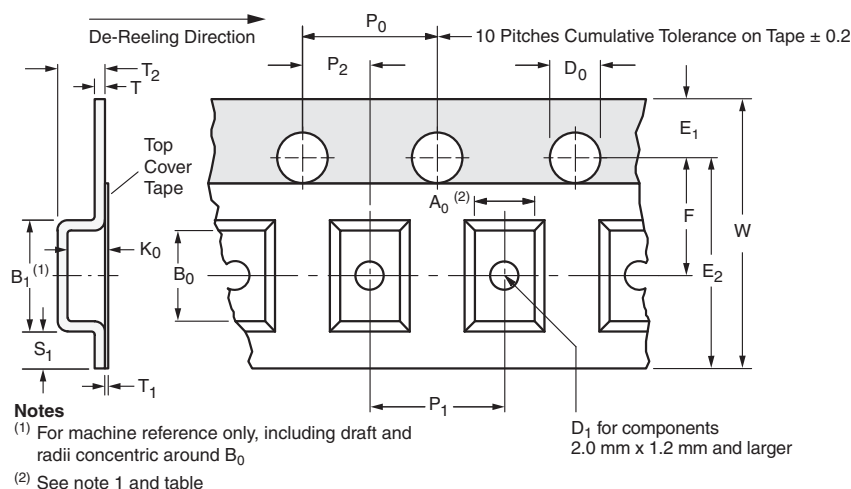


Fig. 8

8 mm, 12 mm, 16 mm, AND 24 mm EMBOSSED TAPE in millimeters (inches)								
TAPE SIZE	D_0	E_1	P_0	P_2	A_0, B_0, K_0	S_1 MIN.	T MAX.	T_1 MAX.
8 mm, 12 mm	1.5 ± 0.1 (0.059 $\pm$ 0.004)	1.75 ± 0.1 (0.069 $\pm$ 0.004)	4.0 ± 0.1 (0.157 $\pm$ 0.004)	2.0 ± 0.05 (0.079 $\pm$ 0.002)	(1)	0.6 (0.024)	0.600 (0.024)	0.1 (0.004)
16 mm, 24 mm				2.0 ± 0.1 (0.079 $\pm$ 0.004)				



DIMENSIONS in millimeters (inches)									
CASE TYPE	TAPE SIZE	B ₁ MAX.	D ₁ MIN.	E ₂ MIN.	F	P ₁	R REF.	T ₂ MAX.	W MAX.
GL34 (DO-213AA)	8 (0.315)	4.2 (0.165)	1.0 (0.039)	6.25 (0.246)	3.5 ± 0.05 (0.138 ± 0.002)	4.0 ± 0.10 (0.157 ± 0.004)	20 (0.787)	2.4 (0.094)	8.3 (0.327)
MicroSMP (DO-219AB) / MicroSMF (DO-219AD)		3.28 (0.129)		6.05 (0.238)				1.919 (0.076)	
SMF (DO-219AB)		-						1.8 (0.07)	8.2 (0.322)
GL34 (DO-213AA)	12 (0.472)	8.2 (0.323)	1.5 (0.059)	10.25 (0.404)	5.5 ± 0.05 (0.217 ± 0.002)	8.0 ± 0.10 (0.315 ± 0.004)	25 (0.984)	4.5 (0.177)	12.3 (0.484)
GF1 (DO-214BA)								3.25 (0.128)	
SMA (DO-214AC)								2.64 (0.104)	
SMP (DO-220AA)								1.84 (0.072)	
SMPC (TO-277A)		7.0 (0.276)						1.43 (0.056)	
SMB (DO-214AA) / SMBG (DO-215AA)		8.2 (0.323)						2.77 (0.109)	
SMC (DO-214AB) / SMCG (DO-215AB)	16 (0.630)	12.1 (0.476)		14.25 (0.561)	7.5 ± 0.1 (0.295 ± 0.004)	12.0 ± 0.10 (0.472 ± 0.004)		2.64 (0.104)	16.3 (0.642)
SlimDPAK (TO-252AE)								2.0 (0.079)	
DFS								3.91 (0.154)	
D ² PAK (TO-263AB) DO-218AB / AC	24 (0.945)	20.1 (0.791)		22.25 (0.876)	11.5 ± 0.1 (0.453 ± 0.004)	16.0 ± 0.10 (0.630 ± 0.004)		5.31 (0.209)	24.3 (0.957)
SMPD (TO-263AC)						12.0 ± 0.10 (0.472 ± 0.004)		2.35 (0.093)	
SlimSMA (DO-221AC) / SMPA (DO-221BC)	12 (0.472)	6.2 (0.244)		10.25 (0.404)	5.5 ± 0.05 (0.217 ± 0.002)	4.0 ± 0.10 (0.157 ± 0.004)		1.53 (0.060)	12.3 (0.484)
SlimSMAW (DO-221AD)						8.0 ± 0.10 (0.315 ± 0.004)		1.61 (0.063)	
FlatPAK 5 x 6		1.20 ± 0.10 (0.047 ± 0.004)							

Notes

- (1) A₀, B₀, and K₀ are determined by the maximum dimensions of the component size. The clearance between the component and the cavity must be within 0.05 mm (0.002") min. to 0.5 mm (0.02") max. for 8 mm tape and 12 mm tape, 0.15 mm (0.066") min. to 0.90 mm (0.035") max. for 16 mm tape and 0.15 mm (0.006") min. to 1.0 mm (0.59") max. for 24 mm tape
- (2) All surface mount components are packed in accordance with EIA standard 481-E