

# Minebea Power Semiconductor Device Inc.

## Power Diode Status List

Date: Nov. 2024

### Compliance status of RoHS directive

**C:**Compliant **S.C:**Compliant (Included RoHS exemption substance) **N:**Non compliant

### Production Status

**M:**Mass production

**O:**Order production

**U:**Under development

**W:**Working sample

**N:**Not for new design

**D:**Discontinued

**E:**Engineering sample

## Load Dump Surge Suppressor Diode

Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production year	Production status
	PRSM (kW)	Vdc (V)	Tj (°C)	Vz (V)		Test Current (mA)				
				Min.	Max.					
ZSH5MA27(※)	3.0kW 62A	18	-40 ~+150	24.0	30.0	10	6A	S.C	2000	M
ZSH5MA27(A)(※)										N
ZSH5MC27(※)	3.2kW 65A							S.C	2007	M
ZSH5MC27(S)(※)										
ZSH5MAZ27	3.4kW 70A	22					S.C	2009	M	
ZSH8MD27										5.7kW 130A
ZSH8MD40	5.7kW 80A	32		S.C	2015	M				
ZSH5MT27C	3.4kW 70A	22		24.0	30.0	10	7A	S.C	2009	M
ZSH5MT27(Z)	4.3kW 90A									O
ZSH5MT40C	4.3kW 62A	32		36.0	44.0	10				M
ZSH5MT48C	4.3kW 50A	39		43.2	52.8	10				M
ZSH5MV14	4.3kW 200A	11		13.0	15.0	10	5	S.C	2013	M
ZSH5MV27	4.3kW 100A	22	24.0	30.0	10	2012			M	

※ Please consider alternative new products as follows.

ZSH5MA27/27(A) --> ZSH5MAZ27,ZSH5MT series,ZSH8MD27

ZSH5MC27/27(S) --> ZSH5MAZ27,ZSH5MT series,ZSH8MD27

# Surge Suppressor Diode

## ◆Surface Mount Type

Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production year	Production status	
	PRSM (kW)	VRM (V)	Tj (°C)	Vz (V)		Test Current (mA)					
				Min.	Max.						
DAM1MB	0.6	-65 ~+185	12	9.7	11.4	12.7	1	4A	S.C	2013	M
			13	10.5	12.4	14.1	1				M
			15	12.1	13.5	15.6	1				M
			16	12.9	15.3	17.1	1				M
			18	14.5	16.8	19.1	1				M
			20	16.2	18.8	21.2	1				O
			22	17.8	20.8	23.3	1				M
			24	19.4	22.7	25.6	1				M
			27	21.8	25.1	28.9	1				M
			30	24.3	28.0	32.0	1				M
			33	26.8	31.0	35.0	1				M
			36	29.1	33.4	38.6	1				M
			39	31.6	36.1	41.9	1				M
			43	34.8	39.8	46.2	1				O
			47	38.0	43.3	50.7	1				M
			51	41.3	46.9	55.1	1				M
			68	55.1	61.2	74.8	1				M
75	60.7	67.5	82.5	1	M						
82	66.4	73.8	90.2	1	O						
DAM2MB	1.2	-65 ~+185	12	9.7	11.4	12.7	1	4B	S.C	2013	O
			13	10.5	12.4	14.1	1				O
			15	12.1	13.5	15.6	1				O
			16	12.9	15.3	17.1	1				O
			18	14.5	16.8	19.1	1				O
			20	16.2	18.8	21.2	1				O
			22	17.8	20.8	23.3	1				O
			24	19.4	22.7	25.6	1				O
			27	21.8	25.1	28.9	1				M
			30	24.3	28.0	32.0	1				M
			33	26.8	31.0	35.0	1				M
			36	29.1	33.4	38.6	1				M
			39	31.6	36.1	41.9	1				M
			43	34.8	39.8	46.2	1				O
			47	38.0	43.3	50.7	1				M
			51	41.3	46.9	55.1	1				O
			68	55.1	61.2	74.8	1				O
75	60.7	67.5	82.5	1	O						
82	66.4	73.8	90.2	1	O						
DAM3MB	1.8	-65 ~+185	12	9.7	11.4	12.7	1	4C	S.C	2013	M
			13	10.5	12.4	14.1	1				M
			15	12.1	13.5	15.6	1				M
			16	12.9	15.3	17.1	1				M
			18	14.5	16.8	19.1	1				O
			20	16.2	18.8	21.2	1				M
			22	17.8	20.8	23.3	1				O
			24	19.4	22.7	25.6	1				O
			27	21.8	25.1	28.9	1				M
			30	24.3	28.0	32.0	1				M
			33	26.8	31.0	35.0	1				M
			36	29.1	33.4	38.6	1				M
			39	31.6	36.1	41.9	1				M
			43	34.8	39.8	46.2	1				O
			47	38.0	43.3	50.7	1				M
			51	41.3	46.9	55.1	1				M
			68	55.1	61.2	74.8	1				M
75	60.7	67.5	82.5	1	O						
82	66.4	73.8	90.2	1	M						

## High Voltage – Fast Recovery Diode

### ◆ Resin Molded Type

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production year	Production status
	VRRM (kV)	* I <sub>F(AV)</sub> (mA)	I <sub>FSM</sub> (A)	T <sub>j</sub> (°C)	V <sub>FM</sub> (at I <sub>FM</sub> ) (V) (mA)	t <sub>rr</sub> (ns)				
DHM3T30	3	3 [15.75]	0.5	-40 ~+120	13 (5)	100	1B	S.C	1989	M
DHM3P40	4				13 (5)	100	1B	S.C	1989	M
DHM3G80	8				25 (5)	100	1F	S.C	1999	M
DHM3J120	12				42 (5)	100	1G	S.C	1999	M
DHM3FJ60	6	1 [63]	0.5		22 (5)	70	1F	S.C	1999	M
DHM3FG80	8	3 [15.75]			28 (5)	70	1F	S.C	1999	M
DHM3UM80	8	1 [100] 3 [15.75]	0.5		23 (5)	40	1F	S.C	1998	M

\* [ ] : Frequency, unit (kHz)

## High Voltage – Fast Recovery Diode (For Automotive)

### ◆ Resin Molded Type

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production year	Production status
	VRRM (kV)	I <sub>F(AV)</sub> (mA)	I <sub>FSM</sub> (A)	T <sub>j</sub> (°C)	V <sub>FM</sub> (at I <sub>FM</sub> ) (V) (mA)	t <sub>rr</sub> (ns)				
DHM10A30	3.0	10	1	+150	8.4 (10)	-	1K	S.C	2011	M
DHM30A10	1.0	30	3		2.0 (10)	-	1M	S.C	2013	M
DHM30A20	2.0	30	3		5.0 (10)	-	1M	S.C	2013	M
DHM30A25	2.5	30	3		5.0 (10)	-	1M	S.C	2014	M
DHM30A30	3.0	30	3		6.0 (10)	-	1F	S.C	2013	M
DHM30A40	4.0	30	3		10.0 (10)	-	1L	S.C	2011	O

## High Voltage – Fast Recovery Diode (For Automotive) Lead(Pb)-Free

### ◆ Resin Molded Type

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production year	Production status
	VRRM (kV)	I <sub>F(AV)</sub> (mA)	I <sub>FSM</sub> (A)	T <sub>j</sub> (°C)	V <sub>FM</sub> (at I <sub>FM</sub> ) (V) (mA)	t <sub>rr</sub> (ns)				
DHM30A10E	1.0	30	3	+150	2.0 (10)	-	1M	C	2017	M
DHM30A20E	2.0	30	3		5.0 (10)	-	1M	C	2017	M
DHM30A25E	2.5	30	3		5.0 (10)	-	1M	C	2016	M
DHM30A30E	3.0	30	3		6.0 (10)	-	1F	C	2017	M
DHM30A40E	4.0	30	3		10.0 (10)	-	1L	C	2017	M

◆ Super Low Loss Diode

Type	Absolute maximum ratings		Characteristics			Outline	RoHS Status	Production year	Production status
	IF(AV) (A)	Tj (°C)	Vz (V)		VFM (at IFM) (V) (A)				
			Min.	Max.					
MSM35J22	35	-40~+175	20	24	0.3 (100)	10	S.C	-	M
MSM35J22R									
MSM50J22	50	-40~+175	20	24	0.12 (100)	10	S.C	-	M
MSM50J22R									

◆ Standard Type Diode

Type	Absolute maximum ratings		Characteristics			Outline	RoHS Status	Production year	Production status
	IF(AV) (A)	Tj (°C)	Vz (V)		VFM (at IFM) (V) (A)				
			Min.	Max.					
ZSM35C22	35	-40~+205	20	23	1.3 (100)	9A	S.C	2013	D
ZSM35C22R						9C			
ZSM50C22	50				1.2 (100)	9A		2012	D
ZSM50C22R						9C			
ZSM70A22	70 (Tc ≤ 205°C)	-40~+225	24	1.2 (100)	9A	2013	D		
ZSM70A22R	50 (Tc ≤ 225°C)				9C				

## Discontinued

### ◆General-Use Rectifier Diode

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production year	Production status									
	VRRM (V)	IF(AV) (A)	IFSM (A)	Tj (°C)	VFM (at IFM) (V) (A)	trr (ms)													
H14A	100	1.0	45	-40 ~+175	1.0 (1.0)	-	2A	S.C	1989	D									
B	200																		
C	300																		
D	400																		
E	500																		
F	600																		
H	800																		
J	1,000																		
				-40 ~+165															
V06C	200	1.1	35	-65 ~+175	1.4 (1.1)	-	2A	S.C	1976	D									
E	400																		
G	600																		
J	800																		
V03C	200	1.3	40		-65 ~+175	1.1 (1.3)	-	2A	S.C		1975	D							
E	400																		
G	600																		
J	800																		
U05B	100	2.5	100			-65 ~+175	1.1 (2.5)	-	2B	S.C	1975		D						
C	200																		
E	400																		
G	600																		
J	800																		
U15B	100	3	80	-65 ~+175			1.0 (3.0)	-	2B	S.C	1978	D							
C	200																		
E	400																		
					60								-65 ~+175	1.0 (3.0)	-	2B	S.C	1978	D
G	600																		
J	800																		

### ◆Zener Diode

Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production year	Production status
	P (W)	PRSM (Wp)	Tj (°C)	Vz (V)		Test Current (mA)				
				Min.	Max.					
AW01-06	1.0	80	-40 ~+150	5.2	6.8	60	2A	S.C	1976	D
AW01/AU01-07	1.0/2.5	80/160	-40 ~+150 / -40 ~+165	6.2	7.9	25/65	2A/2B	S.C/S.C	1976	D / D
08				7.7	8.7	25/65				
09				8.5	9.6	25/65				
10				9.4	10.6	25/65				
11				10.4	11.6	25/65				
12				11.4	12.7	25/65				
13				12.4	14.1	25/65				
15				13.5	15.6	15/40				
16				15.3	17.1	15/40				
18				16.8	19.1	15/40				
20				18.8	21.2	15/40				
22				20.8	23.3	15/40				
24				22.7	25.6	10/25				
27				25.1	28.9	10/25				
30				28.0	32.0	10/25				
33				31.0	35.0	10/25				

## Discontinued

### ◆Fast Recovery Diode

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production year	Production status
	V <sub>RRM</sub> (V)	I <sub>F(AV)</sub> (A)	I <sub>FSM</sub> (A)	T <sub>j</sub> (°C)	V <sub>FM</sub> (at I <sub>FM</sub> ) (V) (A)	t <sub>rr</sub> (ms)				
DFG1D1	100	1.0	30	-65 ~+150	1.5 (1.0)	50ns	2A	S.C	1986	D
2	200									
4	400									
DFG1C1	100	1.0	35		1.2 (1.0)	0.1	2A	S.C	1985	D
2	200									
4	400									
6	600		30		1.6 (1.0)					
8	800									
DFG3A1	100	3.0	70		1.3 (3.0)	0.1	2B	S.C	1985	D
2	200									
4	400									
V19B	100	1.0	30	1.2 (1.0)	0.2	2A	S.C	1977	D	
C	200									
E	400									
G	600									
DFG1A8	800	1.0	40	-65 ~+165	1.2 (1.0)	0.2	2A	S.C	1982	D
H114B	200	1.0	40	-40 ~+150	1.15 (1.0)	0.2	2A	S.C	1989	D
D	400									
E	500									
F	600									
U19B	100	2.5	80	-65 ~+150	1.3 (2.5)	0.2	2B	S.C	1978	D
C	200									
E	400									
DFG2A6	600	2.5	80	-65 ~+165	1.3 (2.5)	0.2	2B	S.C	1982	D
8	800									
V11J	800	0.4	30	-65 ~+150	2.5 (0.4)	0.4	2A	S.C	1975	D
L	1,000									
M	1,300									
N	1,500									
V09C	200	0.8	35	-65 ~+165	1.6 (0.8)	0.4	2A	S.C	1975	D
E	400									
G	600									
U07J	800	1.0	50	-65 ~+140	2.5 (1.0)	0.4	2B	S.C	1975	D
L	1,000									
M	1,300									
N	1,500									
U06C	200	2.0	80	-65 ~+150	1.2 (2.0)	0.4	2B	S.C	1975	D
E	400									
G	600									

### ◆Controlled Avalanche Diode

Type	Absolute maximum ratings					Characteristics	Outline	RoHS Status	Production year	Production status
	V <sub>RRM</sub> (V)	I <sub>F(AV)</sub> (A)	P <sub>RM</sub> (W)	I <sub>FSM</sub> (A)	T <sub>j</sub> (°C)	V <sub>FM</sub> (at I <sub>FM</sub> ) (V) (A)				
H24F	600	1.0	1,000	45	-65 ~+175	1.0 (1.0)	2A	S.C	1989	D
H	800									
J	1,000				-65 ~+165					
V08E	400	1.1	40	35	-65 ~+175	1.4 (1.1)	2A	S.C	1975	D
G	600									
J	800									
V07E	400	1.3	40	40	-65 ~+175	1.1 (1.3)	2A	S.C	1975	D
G	600									
J	800									
V17A	50	1.3	1,500	50	-40 ~+165	1.1 (1.3)	2A	S.C	1975	D
B	100									
C	200									
D	300									
E	400									
U17B	100	2.5	3,000	100	-40 ~+175	1.1 (2.5)	2B	S.C	1975	D
C	200									
D	300									
E	400									

## Discontinued

### ◆Surge Suppressor Diode

Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production status
	PRSM (kW)	Vbc (V)	Tj (°C)	Vz (V)		Test Current (mA)			
				Min.	Max.				
DAM1MA/3MA10	0.6/1.8	-40~+150	7	9.4	10.6	25/75	4A/4C	S.C	D
11			10.4	11.6	25/75				
12			11.4	12.7	25/75				
13			12.4	14.1	25/75				
15			13.5	15.6	25/75				
16			15.3	17.1	15/75				
18			16.8	19.1	15/45				
20			18.8	21.2	15/45				
22			20.8	23.3	15/45				
24			22.7	25.6	10/30				
27			25.1	28.9	10/30				
30			28.0	32.0	10/30				
33			31.0	35.0	10/30				
36			33.4	38.6	10/30				
39			36.1	41.9	10/20				
43			39.8	46.2	6/20				
47			43.3	50.7	6/20				
51			46.9	55.1	6/20				
68			61.2	74.8	4/10				
75			67.5	82.5	4/10				
82			73.8	90.2	3/10				

### ◆General-Use Rectifier Diode

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production status
	VRRM (V)	* IF(AV) (A)	IFSM (A)	Tj (°C)	VFM (at IFM) (V) (A)	trr (ms)			
DSA3A1	100	3.0	120	-40~+150	1.0 (3.0)	-	2C	S.C	D
2	200								
4	400								

### ◆General-Use Rectifier Diode

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production status
	VRRM (V)	* IF(AV) (A)	IFSM (A)	Tj (°C)	VFM (at IFM) (V) (A)	trr (ms)			
DSM1MA1	100	1.0	25	-40 ~+150	1.1 (1.0)	-	4A	S.C	D
2	200								
4	400								
DSM3MA1	100	3.0	80	-40 ~+150	1.0 (3.0)	-	4B	S.C	D
2	200								
4	400								

### ◆Fast Recovery Diode

Type	Absolute maximum ratings				Characteristics		Outline	RoHS Status	Production year	Production status
	VRRM (V)	IF(AV) (A)	IFSM (A)	Tj (°C)	VFM (at IFM) (V) (A)	trr (ns)				
DFM1MF2	200	1.0	25	-40 ~+150	0.95 (1.0)	35	4A	S.C	1997	D
DFM3MF2	200	3.0	50	-40 ~+150	0.95 (3.0)	35	4B	S.C	1997	D

## Discontinued

### ◆ Surge Suppressor Diode

Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production status					
	PRSM (kW)	VDC (V)	Tj (°C)	Vz (V)		Test Current (mA)								
				Min.	Max.									
DAM1SA/1A10	0.6	-40 ~+150	7	9.4	10.6	25	1A/1B	S.C / S.C	D / D					
11			8	10.4	11.6	25								
12			9	11.4	12.7	25								
13			10	12.4	14.1	25								
15			11	13.5	15.6	25								
16			12	15.3	17.1	15								
18			13	16.8	19.1	15								
20			14	18.8	21.2	15								
22			16	20.8	23.3	15								
24			18	22.7	25.6	10								
27			20	25.1	28.9	10								
30			22	28.0	32.0	10								
33			24	31.0	35.0	10								
36			26	33.4	38.6	10								
39			28	36.1	41.9	10								
43			31	39.8	46.2	6								
47			34	43.3	50.7	6								
51			37	46.9	55.1	6								
DAM3A/3B10			1.8	-40 ~+150	7	9.4				10.6	75	1E/1D	S.C / S.C	D / D
11					8	10.4				11.6	75			
12	9	11.4			12.7	75								
13	10	12.4			14.1	75								
15	11	13.5			15.6	75								
16	12	15.3			17.1	75								
18	13	16.8			19.1	45								
20	14	18.8			21.2	45								
22	16	20.8			23.3	45								
24	18	22.7			25.6	30								
27	20	25.1			28.9	30								
30	22	28.0			32.0	30								
33	24	31.0			35.0	30								
36	26	33.4			38.6	30								
39	28	36.1			41.9	30								
43	31	39.8			46.2	20								
47	34	43.3			50.7	20								
51	37	46.9			55.1	20								

### ◆ High Voltage – Fast Recovery Diode

Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production status
	VRRM (kV)	* If(AV) (mA)	IFSM (A)	Tj (°C)	VFM (at IFM) (V)	trr (ns)			
DHM3S20	2	3 [15.75]	0.5	-40 ~+120	10 (5)	100	1B	S.C	D
DHM3UG120	12	1 [100] 3 [15.75]			36 (5)	40	1G	S.C	D
DHM3C140	14	3 [15.75]			45 (5)	100	1H	S.C	D

\* [ ] : Frequency, unit (kHz)

### ◆ Load Dump Surge Suppressor Diode

Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production status
	PRSM(kW)	VDC (V)	Tj (°C)	Vz (V)		Iz (mA)			
				Min.	Max.				
ZSA5A27	3.0kW 62A	18	-40 ~+150	24.0	30.0	10	3A	S.C	D
ZSA5MA27							3B	S.C	D
ZSH5MA27(S)							6A	S.C	D
ZSH5MT53C	4.3kW 45A	43	-40 ~+150	47.7	58.3	10	7A	S.C	D
ZSH5ME27	3.4kW 70A	22		24.0	30.0	10	8	S.C	D

### ◆ Fast Recovery Diode

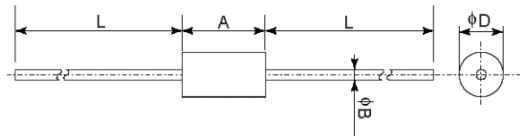
Type	Absolute maximum ratings			Characteristics			Outline	RoHS Status	Production status
	VRRM (kV)	* If(AV) (A)	IFSM (A)	Tj (°C)	VFM (at IFM) (V)	trr (ms)			
DFG1E 6	600	0.3	5	-65~+150	5.0(0.3)	35ns	2A	S.C	D
8	800								
10	1,000								



# Outline

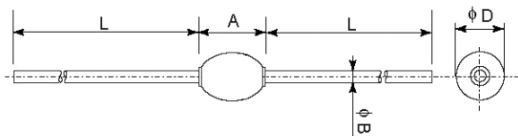
[Dimensions in mm]

## ●Outline No.1



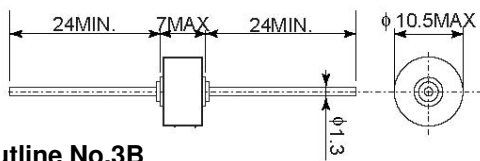
Items	A	φD	φB	L (Min.)
1A	3	2.5	0.6	28
1B	5	2.65	0.6	27
1C	5	2.65	0.8	27
1D	6	3.6	0.8	26
1E	7.5	6.4	1.2	26
1F	6.5	2.5	0.5	28
1G	10	2.5	0.5	26
1H	10	3	0.6	26,28
1J	8	3	0.6	28
1K	6.5	2.5	0.5	27
1L	8	3	0.6	27
1M	5	2.5	0.5	27

## ●Outline No.2

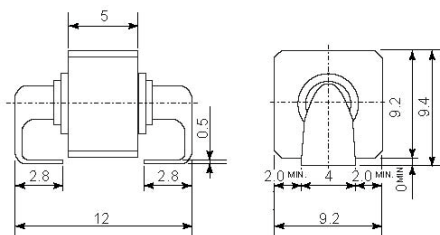


Items	A (Max.)	φD (Max.)	φB	L (Min.)
2A	5	3.5	0.8	29
2B	7	5	1.2	28
2C	7	5	1.2	27

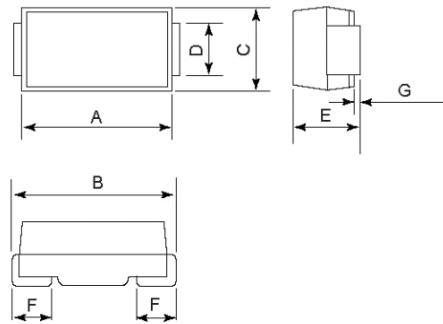
## ●Outline No.3A



## ●Outline No.3B

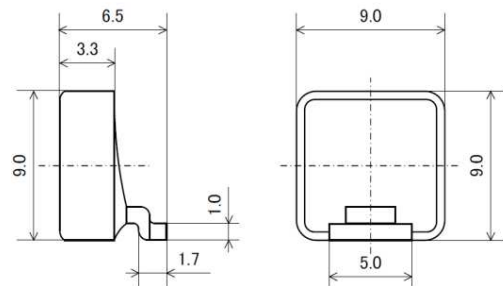


## ●Outline No.4

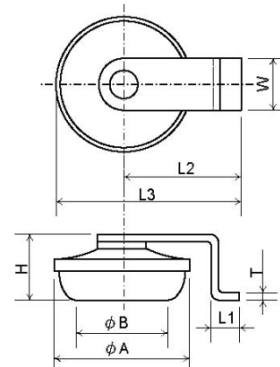


Items	A	B	C	D	E	F	G
4A	4.3	4.7	2.5	1.5	2.0	1.2	0.1
4B	4.4	5.4	3.6	2.0	2.3	1.2	0.2
4C	7.0	7.6	4.0	2.0	2.5	1.4	0.2

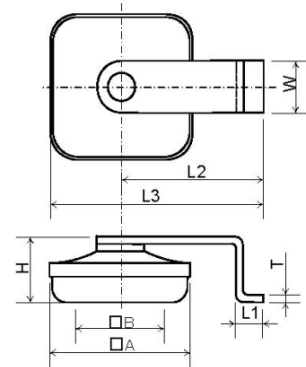
## ●Outline No.5



## ●Outline No.6



## ●Outline No.7A, 7B



Items	A	B	L1	L2	L3	H	W	T
6A	9.6	7.4	2.0	8.3	13.1	4.4	3.5	0.5
6B*	9.6	-	2.0	8.3	13.1	6.0	3.5	0.5
7A	10.0	7.5	2.0	10.0	15.0	4.4	3.5	0.5
7B**	10.0	7.5	2.0	10.0	15.0	4.4	2.7	0.5

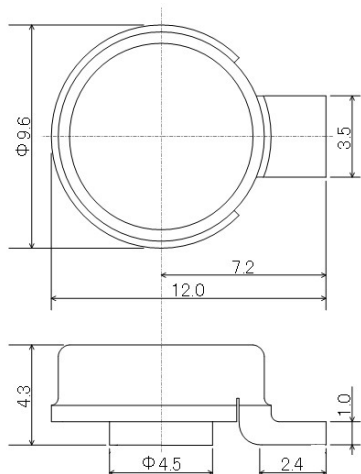
\*:Packages is different

\*\*::JEDEC DO-218AB Compatible

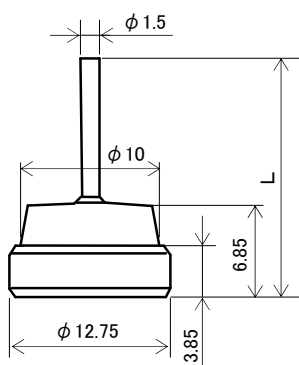
# Outline

[Dimensions in mm]

## ● Outline No.8

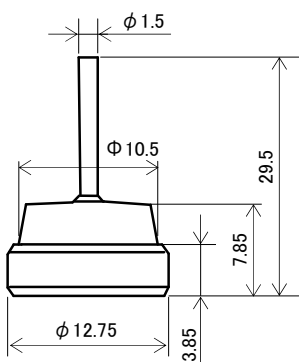


## ● Outline No.9A, 9B, 9C, 9D



Items	L
9A	19.2
9B	28.5
9C	17.0

## ● Outline No.10



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