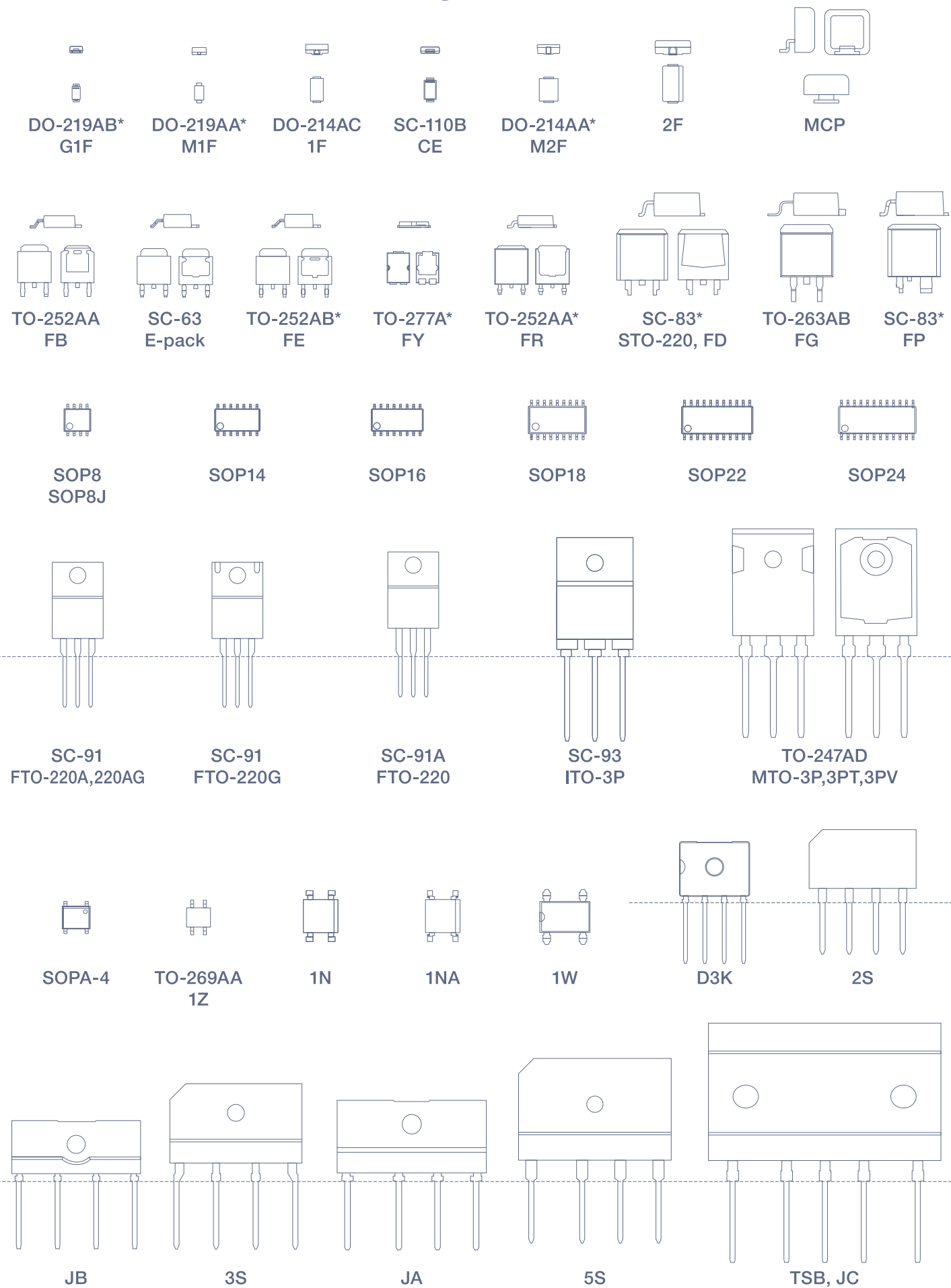
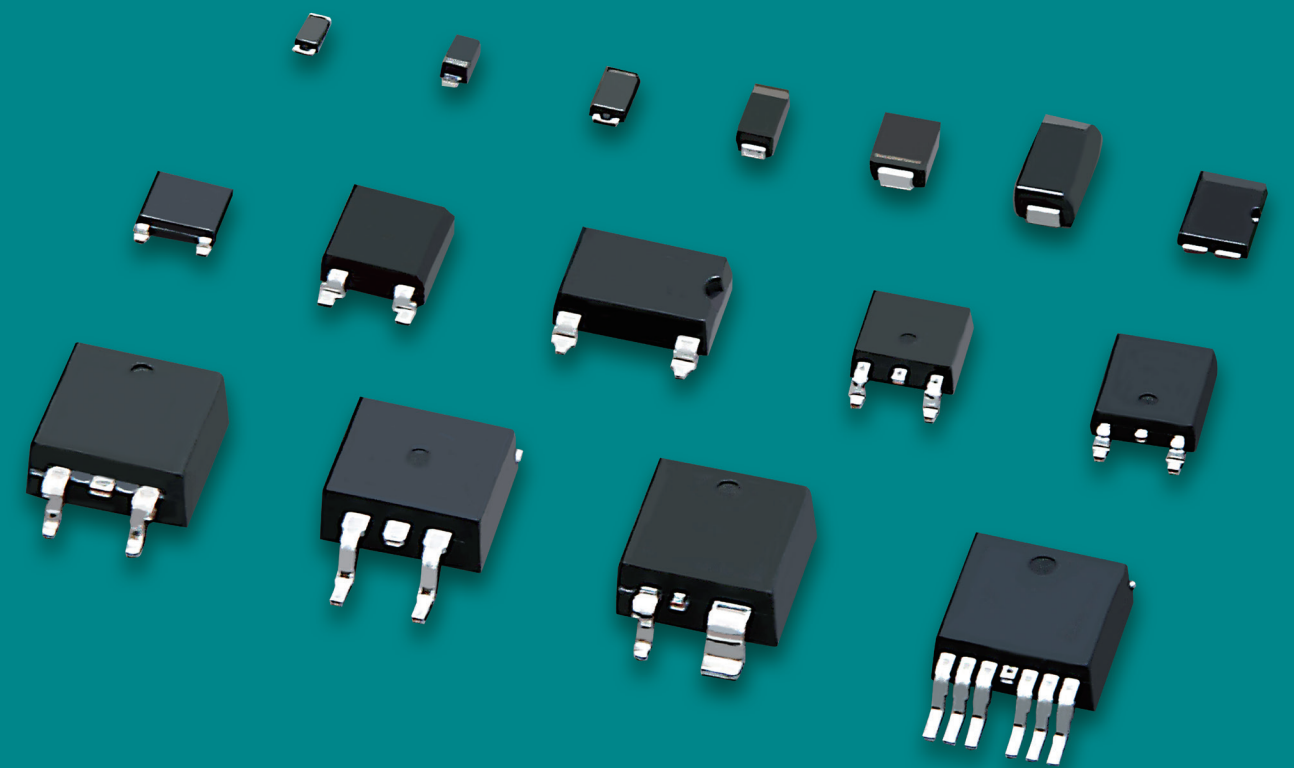


# Package Outline

\* = Similar Package



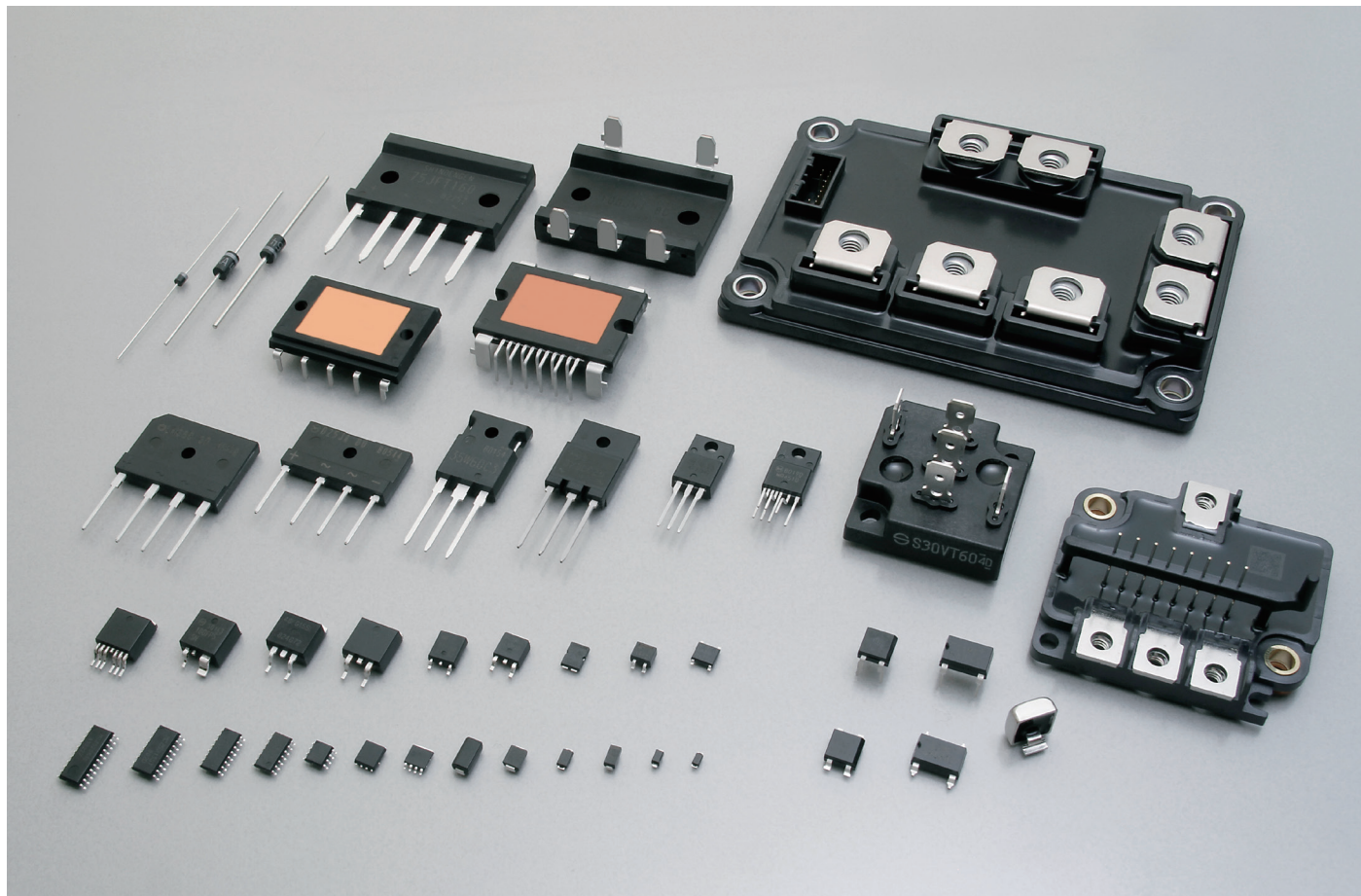
# Semiconductor Product Catalog



Shindengen Electric Manufacturing Co., Ltd.  
[www.shindengen.co.jp](http://www.shindengen.co.jp)

CAT.NO.F072-14a 2103-000(1)

**ShinDengen**  
 New power. Your power.



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- All specifications are subject to change without notice.
- Please consult us for the latest specifications before you order.
- Please use this products after reading manual well.

• Printed April 2021

This catalog includes the products which might be subject to the foreign exchange and foreign trade laws.

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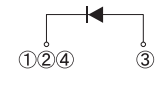



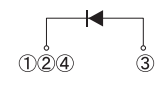





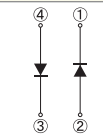

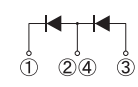
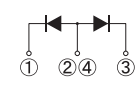
# GENERAL RECTIFYING DIODES

## Single


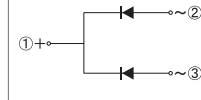
Two Terminal Type							
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]			Remarks
				400	600	800	
 41.0 × 16.0 × 5.0(mm)	TO-247AD - MTO-3PT	K2	30		S30V60T		

Three Terminal Type							
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]			Remarks
				400	600	800	
 41.0 × 16.0 × 5.0(mm)	TO-247AD - MTO-3PV	K6	30		S30V80V		

## Array

Surface Mount							
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]			Remarks
				400	600	800	
 10.0 × 6.8 × 2.6(mm)	- - 1NA	C6-2	3		S1NAD80		
 13.2 × 10.2 × 4.7(mm)	- - SC-83 similar STO-220	H1-5	5		DF5VD60		
			15		DF15VD60		
		H1-7	16		DF16VC60R		

## Diode Module

Diode Module							
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]			Remarks
				400	600	800	
 22.3 × 22.3 × 25.0(mm)	- - D30VC	E2	30		D30VC60		

## Single

Two Terminal Type		Type No.	Absolute Maximum Ratings				Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>C</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F(max)</sub> [V]	Conditions I <sub>F</sub> [A]	I <sub>R(max)</sub> V <sub>R</sub> =V <sub>RRM</sub> [μA]				V <sub>ESD</sub> (typ) [kV]
TO-247AD - MTO-3PT	K2	S30V60T	600	30	119	360	150	1.1	30	10	-	-	-	-

Three Terminal Type		Type No.	Absolute Maximum Ratings				Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>C</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F(max)</sub> [V]	Conditions I <sub>F</sub> [A]	I <sub>R(max)</sub> V <sub>R</sub> =V <sub>RRM</sub> [μA]				V <sub>ESD</sub> (typ) [kV]
TO-247AD - MTO-3PV	K6	S30V80V	800	30	131	450	150	1.1	30	10	-	-	-	○

## Array

Surface Mount		Type No.	Absolute Maximum Ratings				Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>C</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F(max)</sub> [V]	Conditions I <sub>F</sub> [A]	I <sub>R(max)</sub> V <sub>R</sub> =V <sub>RRM</sub> [μA]				V <sub>ESD</sub> (typ) [kV]
- - 1NA	C6-2	S1NAD80	800	3	102 *	110	150	1.05	0.75	10	-	-	-	-
- - SC-83 similar STO-220	H1-5	DF5VD60	600	5	140	140	150	1.05	2.50	10	-	-	-	-
		DF15VD60	600	15	127	190	150	1.05	7.50	10	-	-	-	-
	H1-7	DF16VC60R	600	16	124	190	150	1.05	8.00	10	-	-	-	-

\* : Tl

## Diode Module


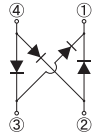





Diode Module		Type No.	Absolute Maximum Ratings				Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>C</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F(max)</sub> [V]	Conditions I <sub>F</sub> [A]	I <sub>R(max)</sub> V <sub>R</sub> =V <sub>RRM</sub> [μA]				V <sub>ESD</sub> (typ) [kV]
- - D30VC	E2	D30VC60	600	30	124	300	150	1.05	15	10	-	-	-	-


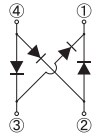




# BRIDGE DIODES

Bridge Diodes are suitable for the rectification of commercial voltage.

Variations are available for various packaging as well as high voltage (Max 1600V), high IFSM, low VF, and low noise.

## Small Bridge Diodes

Surface Mount							
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]			Remarks
				600	800	1000	
 7.0 × 4.7 × 2.6(mm)	TO-269AA 1Z	C2-1	0.8	S1ZB60	S1ZB80		
 6.2 × 5.15 × 1.45(mm)	— SOPA-4	C1	1		D1UBA80		
 10.0 × 6.8 × 2.6(mm)	— 1N	C4	1	S1NB60	S1NB80		
 10.0 × 6.8 × 2.6(mm)	— 1NA	C6-1	1		S1NBB80		
 10.0 × 6.8 × 2.6(mm)	— 1NA	C6-1	1.5	S1NBC60	S1NBC80		
 10.6 × 10.2 × 3.1(mm)	— 1W	C8	1	S1WB(A)60 S1WB(A)60B	S1WB(A)80		
			2		S2WB(A)80		

THD (Through Hole Device)							
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]			Remarks
				600	800	1000	
 3.8 × 4.7 × 2.5(mm)	— 1Z	C3	0.8	S1ZB60	S1ZB80		
 6.5 × 6.8 × 2.5(mm)	— 1N	C5	1	S1NB60	S1NB80		
 6.5 × 6.8 × 2.5(mm)	— 1NA	C7	1		S1NBB80		
 6.5 × 6.8 × 2.5(mm)	— 1NA	C7	1.5	S1NBC60	S1NBC80		
 6.2 × 10.2 × 3.0(mm)	— 1W	C9	1	S1WB(A)60 S1WB(A)60B	S1WB(A)80		
			2		S2WB(A)80		

## Small Bridge Diodes

Surface Mount														
Package		Type No.	Spec. Code	Absolute Maximum Ratings					Electrical Characteristics			Halogen free	UL	Automotive
JEDEC Code JEITA Code House Name	Fig.			V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions Ta [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	I <sub>R</sub> (max) V <sub>R</sub> =V <sub>RRM</sub> [μA]			
TO-269AA	C2-1	S1ZB60	-7072	600	0.8	25	30	150	1.05	0.4	10	—	—	—
1Z		S1ZB80	-7072	800	0.8	25	30	150	1.05	0.4	10	—	—	—
—	C1	D1UBA80	-7062	800	1	25	30	150	0.95	0.4	10	—	—	—
—	C4	S1NB60	-7062	600	1	25	30	150	1.05	0.5	10	—	—	—
1N		S1NB80	-7062	800	1	25	30	150	1.05	0.5	10	—	—	—
—	C6-1	S1NBB80	-7062	800	1	26	50	150	1.05	0.5	10	—	—	—
—		S1NBC60	-7062	600	1.5	105 *	60	150	1.05	0.75	10	—	—	—
1NA		S1NBC80	-7062	800	1.5	105 *	60	150	1.05	0.75	10	—	—	—
—	C8	S1WB(A)60	-7062	600	1	25	30	150	1.00	0.5	10	—	—	—
—		S1WB(A)60B	-7062	600	1	25	50	150	1.00	0.5	10	—	—	—
—		S1WB(A)80	-7062	800	1	25	30	150	1.00	0.5	10	—	—	—
1W		S2WB(A)80	-7062	800	2	112 *	50	-40 to 150	1.05	1	10	—	—	—

\* : TL

THD (Through Hole Device)														
Package		Type No.	Spec. Code	Absolute Maximum Ratings					Electrical Characteristics			Halogen free	UL	Automotive
JEDEC Code JEITA Code House Name	Fig.			V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions Ta [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	I <sub>R</sub> (max) V <sub>R</sub> =V <sub>RRM</sub> [μA]			
—	C3	S1ZB60	-7101	600	0.8	25	30	150	1.05	0.4	10	—	—	—
1Z		S1ZB80	-7101	800	0.8	25	30	150	1.05	0.4	10	—	—	—
—	C5	S1NB60	-7101	600	1	25	30	150	1.05	0.5	10	—	—	—
1N		S1NB80	-7101	800	1	25	30	150	1.05	0.5	10	—	—	—
—	C7	S1NBB80	-7101	800	1	26	50	150	1.05	0.5	10	—	—	—
—		S1NBC60	-7101	600	1.5	105 *	60	150	1.05	0.75	10	—	—	—
1NA		S1NBC80	-7101	800	1.5	105 *	60	150	1.05	0.75	10	—	—	—
—	C9	S1WB(A)60	-7101	600	1	25	30	150	1.00	0.5	10	—	—	—
—		S1WB(A)60B	-7101	600	1	25	50	150	1.00	0.5	10	—	—	—
—		S1WB(A)80	-7101	800	1	25	30	150	1.00	0.5	10	—	—	—
1W		S2WB(A)80	-7101	800	2	112 *	50	-40 to 150	1.05	1	10	—	—	—

\* : TL

BRIDGE DIODES




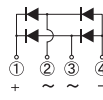







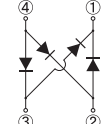
# BRIDGE DIODES


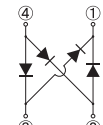

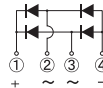

## Low Vf Bridge Diodes

THD (Through Hole Device)							
Package	JEDEC Code JEITA Code House Name	Fig.	If(AV) [A]	VRRM [V]			Remarks
				600	800	1000	
 37.5 × 30.0 × 4.6(mm)	- 5S	D4	15	LL15XB60			
			25	LL25XB60 ★LK25XB60			

★ : Under development

## Low Noise Bridge Diodes

Surface Mount							
Package	JEDEC Code JEITA Code House Name	Fig.	If(AV) [A]	VRRM [V]			Remarks
				600	800	1000	
 10.6 × 10.2 × 3.1(mm)	- 1W	C8	1.1	LN1WBA60			

THD (Through Hole Device)							
Package	JEDEC Code JEITA Code House Name	Fig.	If(AV) [A]	VRRM [V]			Remarks
				600	800	1000	
 6.2 × 10.2 × 3.0(mm)	- 1W	C9	1.1	LN1WBA60			
 32.5 × 25.0 × 4.6(mm)	- 3S	D3	4	LN4SB60			
 37.5 × 30.0 × 4.6(mm)	- 5S	D4	6	LN6SB60			
			15	LN15XB60 LN15XB60H			
			25	LN25XB60			

## Low Vf Bridge Diodes

THD (Through Hole Device)														
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	UL	Automotive
JEDEC Code JEITA Code House Name	Fig.		VRRM [V]	If (AV) [A]	Conditions Tc [°C]	IfSM [A]	Tj [°C]	Vf (max) [V]	Conditions If [A]	Ir (max) Vr=VRRM [μA]	ttr (max) [μs]			
-	D4	LL15XB60	600	15	124	200	150	0.90	7.5	10	3	-	UL	-
-		LL25XB60	600	25	113	300	150	0.92	12.5	10	3	-	UL	■
5S		★LK25XB60	600	25	114	603 *	-55 to 150	0.95	12.5	10	5	-	UL	-

★ : Under development \* : 60Hz ■ : Please contact us. UL : UL recognized (UL File No. E142422)

## Low Noise Bridge Diodes





Surface Mount-THD (Through Hole Device)															
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				UL	Halogen free	Automotive	Remarks
JEDEC Code JEITA Code House Name	Fig.		VRRM [V]	If (AV) [A]	Conditions Tc [°C]	IfSM [A]	Tj [°C]	Vf (max) [V]	Conditions If [A]	Ir (max) Vr=VRRM [μA]	ttr (max) [μs]				
-	C8(SMD) C9(DIP)	LN1WBA60	600	1.1	25 *	50	150	1.00	0.55	10	5	-	-	-	SMD-7072 DIP-7101
-	D3	LN4SB60	600	4	111	150	150	0.95	2	10	5	UL	-	-	
-	D4	LN6SB60	600	6	111	170	150	1.05	3	10	5	UL	-	-	
-		LN15XB60	600	15	100	200	150	1.10	7.5	10	5	-	-	-	
5S		LN15XB60H	600	15	106	290	150	1.05	7.5	10	5	-	-	-	
		LN25XB60	600	25	85	350	150	1.05	12.5	10	5	-	-	-	



\* : Ta UL : UL recognized (UL File No. E142422)


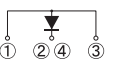


# SCHOTTKY BARRIER DIODES

## Single

Axial						
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]		Remarks
				40	60	
 3.0 x φ 2.6(mm)	— AX057	A1	1	D1NS4	D1NS6	
 5.0 x φ 4.0(mm)	— AX078	A4-1	2	D2S4M	D2S6M	
 7.0 x φ 4.4(mm)	— AX14	A7	3	D3S4M	D3S6M	

Two Terminal Type							
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]			Remarks
				40	60	90	
 28.5 x 10.0 x 4.5(mm)	— SC-91 FTO-220G	J4	5	SG5S4M	SG5S6M	SG5S9M	

Three Terminal Type								
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]				Remarks
				40	60	90	150	
 41.0 x 16.0 x 5.0(mm)	TO-247AD — MTO-3PV	K7-2	40				S40T15V	
			90				S90T15V	

## Single

Axial															
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>a</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	I <sub>r</sub> (max) V <sub>R</sub> =V <sub>RM</sub> [mA]	C <sub>t</sub> (typ) [pF]				
—	A1	D1NS4	40	1	59	30	150	0.55	1	0.8	50	—	—	—	S series
AX057		D1NS6	60	1	46	30	150	0.58	1	1	53	—	—	—	S series
—	A4-1	D2S4M	40	2	122 *1	60	150	0.55	2	2	95	—	—	—	S series
AX078		D2S6M	60	2	119 *1	60	150	0.58	2	2	90	—	—	—	S series
—	A7	D3S4M	40	3	63	80	150	0.55	3	3.5	150	—	—	—	S series
AX14		D3S6M	60	3	133 *1	80	150	0.58	3	2.5	130	—	—	—	S series

\*1 : Tl




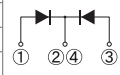
Two Terminal Type															
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>c</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	I <sub>r</sub> (max) V <sub>R</sub> =V <sub>RM</sub> [mA]	C <sub>t</sub> (typ) [pF]				
—	J4	SG5S4M	40	5	131	150	150	0.52	5	0.5	157	—	—	—	S series
SC-91		SG5S6M	60	5	130	120	150	0.56	5	0.5	165	—	—	—	S series
FTO-220G		SG5S9M	90	5	124	90	150	0.75	5	0.5	140	—	—	—	S series

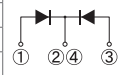
Three Terminal Type															
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>c</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	I <sub>r</sub> (max) V <sub>R</sub> =V <sub>RM</sub> [mA]	C <sub>t</sub> (typ) [pF]				
TO-247AD	K7-2	S40T15V	150	40	131	700	150	0.92	40	0.12	595	—	—	○	N series
MTO-3PV		S90T15V	150	90	122	1400	150	0.95	90	0.35	1690	—	—	○	N series

SCHOTTKY BARRIER DIODES

# SCHOTTKY BARRIER DIODES

## Center Tap, Common Cathode

Surface Mount											
Package	JEDEC Code JEITA Code House Name	Fig.	IF (AV) [A]	VRRM[V]						Remarks	
				30	40	60	90	100	120	150	
 9.5 × 6.6 × 2.65(mm)	— SC-63 E-pack	G1-1	5	DE5SC3ML	DE5SC4M	DE5SC6M					
 9.5 × 6.6 × 2.65(mm)	TO-252AB similar SC-63 FE	G3-1	6		D6FEC4ST			D6FEC10ST	D6FEC12ST	D6FEC15ST	
 13.2 × 10.2 × 4.7(mm)	— SC-83 similar STO-220	H1-1	10		DF10SC4M	DF10SC6	DF10SC9			DF10NC15	
			15		DF15SC4M			DF15JC10		DF15NC15	
			20		DF20SC4M			DF20JC10		DF20NC15	
			25			DF25SC6M					
			30	DF30SC3ML	DF30JC4 DF30SC4M	DF30JC6		DF30JC10		DF30NC15	
			40	DF40SC3L	DF40SC4						
 13.2 × 10.2 × 4.6(mm)	— SC-83 similar FD	H2-2	10					D10FDC10ST			
			20					D20FDC10ST		D20FDC15ST	
			30		D30FDC4S			D30FDC10ST		D30FDC15ST	
			40					D40FDC10ST		D40FDC15ST	



## Center Tap, Common Cathode


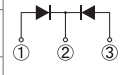

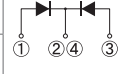

Surface Mount															
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series
JEDEC Code JEITA Code House Name	Fig.		VRRM	IF (AV)	Conditions Tc	IFSM	Tj	Vf (max)	Conditions If	Ir (max) Vr=VRRM	Ct (typ)				
— SC-63 E-pack	G1-1	DE5SC3ML	30	5	110	90	150	0.45	2.5	3.5	190	—	—	■	S series
		DE5SC4M	40	5	101	80	150	0.55	2.5	3.5	150	—	—	■	S series
		DE5SC6M	60	5	92	80	150	0.58	2.5	2.5	130	—	—	■	S series
		DE10SC3L	30	10	124	100	150	0.45	4	5	290	—	—	■	S series
		DE10SC4	40	10	132	100	150	0.55	5	3.5	210	—	—	■	S series
TO-252AB similar SC-63 FE	G3-1	D6FEC4ST	40	6	158	90	175	0.74	3	8μA	93	—	○	○	SL series
		D6FEC10ST	100	6	154	100	175	0.86	3	8μA	60	—	○	○	SL series
		D6FEC12ST	120	6	154	100	175	0.87	3	8μA	60	—	○	○	SL series
		D6FEC15ST	150	6	154	100	175	0.88	3	8μA	52	—	○	○	SL series
		DF10SC4M	40	10	125	100	150	0.55	5	3.5	180	—	—	—	S series
— SC-83 similar STO-220	H1-1	DF10SC6	60	10	132	150	150	0.58	5	4.5	260	—	—	—	S series
		DF10SC9	90	10	131	150	150	0.75	5	3	185	—	—	—	S series
		DF10NC15	150	10	123	100	150	0.88	5	0.2	110	—	—	—	N series
		DF15SC4M	40	15	129	150	150	0.55	7.5	5	340	—	—	—	S series
		DF15JC10	100	15	126	150	150	0.86	7.5	0.6	200	—	—	—	J series
		DF15NC15	150	15	126	150	150	0.88	7.5	0.3	155	—	—	—	N series
		DF20SC4M	40	20	122	230	150	0.55	10	7.5	390	—	—	—	S series
		DF20SC9M	90	20	111	200	150	0.75	10	10	370	—	—	—	S series
		DF20JC10	100	20	121	200	150	0.86	10	0.7	260	—	—	—	J series
		DF20NC15	150	20	121	200	150	0.88	10	0.4	200	—	—	—	N series
		DF25SC6M	60	25	115	300	150	0.58	12.5	10	490	—	—	—	S series
		DF30SC3ML	30	30	119	350	150	0.48	15	10	820	—	—	—	S series
		DF30JC4	40	30	115	250	150	0.61	15	0.7	560	—	—	—	J series
		DF30SC4M	40	30	112	360	150	0.55	15	10	590	—	—	—	S series
		DF30JC6	60	30	108	250	150	0.69	15	0.7	490	—	—	—	J series
		DF30JC10	100	30	116	300	150	0.86	15	1	390	—	—	—	J series
		DF30NC15	150	30	115	300	150	0.88	15	0.5	300	—	—	—	N series
		DF40SC3L	30	40	112	400	150	0.45	15	17	1200	—	—	—	S series
		DF40SC4	40	40	106	350	150	0.55	20	14	860	—	—	—	S series
		— SC-83 similar FD	H2-2	D10FDC10ST	100	10	158	150	175	0.86	5	15μA	104	—	○
D20FDC10ST	100			20	119	250	150	0.86	10	30μA	185	—	○	○	N series
D20FDC15ST	150			20	118	250	150	0.88	10	30μA	159	—	—	○	N series
D30FDC4S	40			30	114	300	150	0.55	15	1.5	415	—	○	○	S series
D30FDC10ST	100			30	108	300	150	0.86	15	40μA	242	—	—	○	N series
D30FDC15ST	150			30	107	300	150	0.88	15	40μA	209	—	—	○	N series
D40FDC10ST	100			40	105	400	150	0.86	20	60μA	360	—	—	○	N series
D40FDC15ST	150			40	103	400	150	0.88	20	60μA	315	—	—	○	N series

■ : Please contact us.

SCHOTTKY BARRIER DIODES

# SCHOTTKY BARRIER DIODES

## Center Tap, Common Cathode

Three Terminal Type													
Package	JEDEC Code JEITA Code House Name	Fig.	IF (AV) [A]	VRRM[V]							Remarks		
				15	30	40	60	90	100	120	150		
 28.5 × 10.0 × 4.5(mm)	- SC-91 FTO-220G	J9	8			SG8SC4M							
			10		SG10SC3LM	SG10SC4M	SG10SC6M	SG10SC9M			SG10TC15M		
			15			SG15SC4M	SG15SC6M						
			20		SG20SC3LM	SG20SC4M	SG20JC6M SG20SC6M	SG20SC9M	SG20TC10M	SG20TC12M	SG20TC15M		
			30		SG30SC3LM	SG30SC4M	SG30JC6M SG30SC6M		SG30TC10M	SG30TC12M	SG30TC15M		
			40						SG40TC10M	SG40TC12M			
 41.0 × 16.0 × 5.0(mm)	TO-247AD - MTO-3PT	K5-2	20					S20SC9MT					
			30				S30SC4MT	S30SC6MT			S30TC15T		
			40	S40HC1R5T									
			60	S60HC1R5T	S60HC3T S60SC3LT	S60SC4MT	S60SC6MT						
 41.0 × 16.0 × 5.0(mm)	TO-247AD - MTO-3PV	K7-1	60						S60JC10V				

## Center Tap, Common Cathode


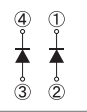
Three Terminal Type															
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series
JEDEC Code JEITA Code House Name	Fig.		VRRM [V]	IF (AV) [A]	Conditions Tc [°C]	IFSM [A]	Tj [°C]	Vf (max) [V]	Conditions If [A]	Ir (max) Vr=VRRM [mA]	Ct (typ) [pF]				
- SC-91 FTO-220G	J9	SG8SC4M	40	8	155	80	175	0.56	4.0	0.3	100	-	-	-	S series
		SG10SC3LM	30	10	136	150	150	0.45	4.0	5	310	-	-	-	S series
		SG10SC4M	40	10	150	150	175	0.52	5.0	0.5	157	-	-	-	S series
		SG10SC6M	60	10	145	140	175	0.56	5.0	0.5	165	-	-	-	S series
		SG10SC9M	90	10	139	150	175	0.75	5.0	0.5	140	-	-	-	S series
		SG10TC15M	150	10	153	120	175	0.88	5.0	15μA	92	-	-	-	SL series
		SG15SC4M	40	15	117	150	150	0.52	7.5	0.8	230	-	-	-	S series
		SG15SC6M	60	15	113	180	150	0.61	7.5	0.6	185	-	-	-	S series
		SG20SC3LM	30	20	124	250	150	0.45	8.0	9	570	-	-	-	S series
		SG20SC4M	40	20	115	200	150	0.52	10.0	1.1	315	-	-	-	S series
		SG20JC6M	60	20	106	200	150	0.69	10.0	0.1	250	-	-	-	J series
		SG20SC6M	60	20	107	200	150	0.61	10.0	0.8	250	-	-	-	S series
		SG20SC9M	90	20	112	200	150	0.75	10.0	1	245	-	-	-	S series
		SG20TC10M	100	20	140	200	175	0.86	10.0	30μA	185	-	-	-	SL series
		SG20TC12M	120	20	137	200	175	0.87	10.0	30μA	175	-	-	-	SL series
		SG20TC15M	150	20	136	200	175	0.88	10.0	30μA	159	-	-	-	SL series
		SG30SC3LM	30	30	117	350	150	0.45	12.5	15	960	-	-	-	M series
		SG30SC4M	40	30	101	300	150	0.55	15.0	1.5	415	-	-	-	S series
		SG30JC6M	60	30	90	250	150	0.69	15.0	0.15	325	-	-	-	J series
		SG30SC6M	60	30	100	300	150	0.61	15.0	1.2	385	-	-	-	S series
		SG30TC10M	100	30	126	300	175	0.86	15.0	40μA	242	-	-	-	SL series
		SG30TC12M	120	30	122	300	175	0.87	15.0	40μA	228	-	-	-	SL series
		SG30TC15M	150	30	122	300	175	0.88	15.0	40μA	209	-	-	-	SL series
		SG40TC10M	100	40	116	350	175	0.86	20.0	60μA	362	-	-	-	SL series
SG40TC12M	120	40	112	350	175	0.87	20.0	60μA	336	-	-	-	SL series		
TO-247AD - MTO-3PT	K5-2	S20SC9MT	90	20	136	200	150	0.75	10.0	1	245	-	-	-	S series
		S30SC4MT	40	30	132	300	150	0.55	15.0	1.5	410	-	-	-	S series
		S30SC6MT	60	30	129	300	150	0.61	15.0	1.2	385	-	-	-	S series
		S30TC15T	150	30	128	300	150	0.88	15.0	40μA	209	-	-	-	N series
		S40HC1R5T	15	40	111	450	125	0.41	20.0	10	960	-	-	-	H series
		S60HC1R5T	15	60	110	600	125	0.41	30.0	15	1400	-	-	-	H series
		S60HC3T	30	60	112	650	125	0.40	30.0	20	1100	-	-	-	H series
		S60SC3LT	30	60	138	650	150	0.48	30.0	25	1600	-	-	-	S series
TO-247AD - MTO-3PV	K7-1	S60SC4MT	40	60	127	500	150	0.55	30.0	3	790	-	-	-	S series
		S60SC6MT	60	60	121	470	150	0.67	30.0	2	640	-	-	-	S series
TO-247AD - MTO-3PV	K7-1	S60JC10V	100	60	118	500	150	0.95	30.0	0.2	695	-	-	○	J series

SCHOTTKY BARRIER DIODES


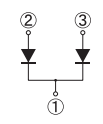

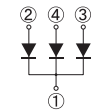


# SCHOTTKY BARRIER DIODES

## Array

Surface Mount						
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]		Remarks
				40	60	
 7.0 × 4.7 × 2.6(mm)	TO-269AA - 1Z	C2-2	1.2	S1ZAS4		

## Diode Module

Surface Mount						
Package	JEDEC Code JEITA Code House Name	Fig.	I <sub>F(AV)</sub> [A]	V <sub>RRM</sub> [V]		Remarks
				40	60	
 43.0 × 27.0 × 21.0(mm)	- - Module	F1	120	D120SC4M	D120SC6M	
			240	D240SC4M	D240SC6M	
 43.0 × 27.0 × 21.0(mm)		F3-1	180	D180SC4M	D180SC6M	
			360	D360SC4M	D360SC6M	

## Array

Surface Mount																
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series	
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>c</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	I <sub>r</sub> (max) V <sub>r</sub> =V <sub>RM</sub> [mA]	C <sub>t</sub> (typ) [pF]					
TO-269AA - 1Z	C2-2	S1ZAS4	40	1.2	47	40	150	0.55	1	1	65	-	-	-	S series	

## Diode Module

Surface Mount																
Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series	
JEDEC Code JEITA Code House Name	Fig.		V <sub>RRM</sub> [V]	I <sub>F(AV)</sub> [A]	Conditions T <sub>c</sub> [°C]	I <sub>FSM</sub> [A]	T <sub>J</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	I <sub>r</sub> (max) V <sub>r</sub> =V <sub>RM</sub> [mA]	C <sub>t</sub> (typ) [pF]					
- - Module	F1	D120SC4M	40	120	90	800	125	0.58	60	40	2.1	-	-	-	S series	
		D120SC6M	60	120	85	800	125	0.67	60	40	2.2	-	-	-	S series	
		D240SC4M	40	240	77	1600	125	0.6	120	80	4.2	-	-	-	S series	
		D240SC6M	60	240	71	1600	125	0.67	120	80	4.4	-	-	-	S series	
	F3-1	D180SC4M	40	180	83	800	125	0.58	60	40	2.1	-	-	-	S series	
		D360SC6M	60	360	64	1600	125	0.6	120	80	4.2	-	-	-	S series	
		D360SC4M	40	360	58	1600	125	0.67	120	80	4.4	-	-	-	S series	


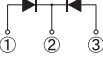


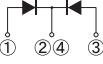
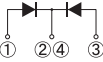


SCHOTTKY BARRIER DIODES





# FAST RECOVERY DIODES

## Center Tap, Common Cathode

Three Terminal Type								
Package	JEDEC Code JEITA Code House Name	Fig.	IF(AV) [A]	VRRM[V]				Remarks
				200	300	400	600	
 28.5 × 10.0 × 4.5(mm)	SC-91 FTO-220AG	J8-1	5			SF5LC40UM		
			10			SF10LC40UM	SF10KC60M	
			20		SF20LC30M	SF20KC60M		
 28.5 × 10.0 × 4.5(mm)	SC-91 FTO-220G	J9	5	SG5LC20USM				
			10	SG10LC20USM				
			20	SG20LC20USM				
 41.0 × 16.0 × 5.0(mm)	TO-247AD MTO-3PT	K5-2	20	S20LC20UST	S20LC30T	S20LC40UT	S20LC60UST	
 41.0 × 16.0 × 5.0(mm)	TO-247AD MTO-3PV	K7-1	20			S20LC40UV	S20LC60USV	

## Center Tap, Common Cathode




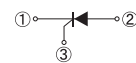


Three Terminal Type		Type No.	Absolute Maximum Ratings					Electrical Characteristics				Halogen free	Based on AEC-Q101	Automotive	Series
JEDEC Code JEITA Code House Name	Fig.		VRRM [V]	IF (AV) [A]	Conditions Tc [°C]	IFSM [A]	Tj [°C]	Vf (max) [V]	Conditions IF [A]	Ir (max) Vr=VRRM [μA]	trr (max) [ns]				
SC-91 FTO-220AG	J8-1	SF5LC40UM	400	5	132	80	150	1.25	2.5	10	30	-	-	-	-
		SF10LC40UM	400	10	120	100	150	1.25	5	10	30	-	-	-	-
		SF10KC60M	600	10	109	120	150	1.50	5	10	85	-	-	■	K series
		SF20LC30M	300	20	107	250	150	1.30	10	25	30	-	-	-	-
SC-91 FTO-220G	J9	SF20KC60M	600	20	97	180	150	1.50	10	10	95	-	-	■	K series
		SG5LC20USM	200	5	133	70	150	0.96	2.5	10	25	-	-	-	-
		SG10LC20USM	200	10	122	90	150	0.96	5	10	25	-	-	-	-
TO-247AD MTO-3PT	K5-2	SG20LC20USM	200	20	95	150	150	0.96	10	10	25	-	-	-	-
		S20LC20UST	200	20	126	120	150	0.96	10	10	25	-	-	-	-
		S20LC30T	300	20	124	220	150	1.30	10	25	30	-	-	-	-
TO-247AD MTO-3PV	K7-1	S20LC40UT	400	20	123	130	150	1.25	10	10	30	-	-	-	-
		S20LC60UST	600	20	63	60	150	3.60	10	50	25	-	-	-	-
		S20LC40UV	400	20	123	200	150	1.25	10	10	30	-	-	○	-
		S20LC60USV	600	20	65	60	150	3.60	10	50	25	-	-	○	-


■ : Please contact us.

# THYRISTORS



The Thyristor, in its normal state, will block an applied voltage in either direction, but when an appropriate current pulse is applied to the gate, current will flow through the anode to the cathode thus turning on power to the load circuit. The Thyristor has a planar passivation, and is available in both the general reverse-blocking type and the type without reverse voltage. The Thyristor without reverse voltage is suitable for a circuit limiting inrush current.

## Thyristors

Package	 10.0 × 6.6 × 2.3(mm)	 28.5 × 10.0 × 4.5(mm)		
JEDEC Code JEITA Code House Name	TO-252AA - FB	SC-91 FTO-220AG		
Fig.	G2-2	J8-5		
Internal Circuit				
$I_T(AV)$ [A]	3	5	5	8
$V_{DRM}$ [V]	400	KC3FB40H	KC5FB40H	
	600		KC5FB60H KC5FB60HR KC5FB60HRT	 KC5SF60HRT
	800			 KC8SF80

 : New product

## Thyristors

Package		Type No.	Absolute Maximum Ratings						Electrical Characteristics					Halogen free	Based on AEC-Q101	Automotive
JEDEC Code JEITA Code House Name	Fig.		$V_{DRM}$ [V]	$V_{RRM}$ [V]	$I_T(AV)$ [A]	Conditions $T_c$ [°C]	$I_{TSM}$ [A]	$T_j$ [°C]	$V_{TM}(max)$ [V]	Conditions $I_{TM}$ [A]	$V_{GT}(max)$ [V]	$I_{GT}(max)$ [μA]	$I_H(max)$ [mA]			
TO-252AA - FB	G2-2	KC3FB40H	400	400	3	111	40	-40 to 125	1.4	4	0.8	100	5	-	-	-
		KC5FB40H	400	400	5	101	65	-40 to 125	1.6	10	0.8	200	typ.1	-	-	-
		KC5FB60H	600	600	5	98	90	-40 to 125	1.8	15	0.8	100	5	-	-	-
		KC5FB60HR	600	-	5	98	90	-40 to 125	1.8	15	0.8	100	5	-	-	-
SC-91 FTO-220AG	J8-5	 KC5SF60HRT	600	-	5	127	82	-40 to 150	1.8	15	0.8	100	5	-	-	-
		 KC8SF80	800	800	8	130	120	-40 to 150	1.5	20	1.0	15mA	100	-	-	-

 : New product





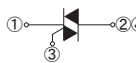
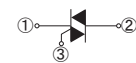








# TRIACs

TRIACs are bidirectional Thyristors.

Our TRIACs are easy to use for motor and heater controls due to balanced gate sensitivity and  $(di/dt)_c$ .


Our lineup ranges from  $V_{DRM}=600$  to 800V,  $I_{T(RMS)}=3$  to 20A.

## TRIACs (Triode for Alternating Current)

Package		 10.0 × 6.6 × 2.3(mm)	 28.5 × 10.0 × 4.5(mm)
JEDEC Code	TO-252AA		SC-91
JEITA Code	-		FTO-220AG
House Name	FB		
Fig.	G2-3		J8-4
Internal Circuit			
$V_{DRM}$ [V]	600		
$I_{T(RMS)}$ [A]	3	 KD3FB60	 KD3SF60E  KD3SF60
	5		 KD5SF60
	8		 KD8SF60
	12		 KD12SF60
	16		 KD16SF60
20		 KD20SF60	


 : New product

## TRIACs (Triode for Alternating Current)

Surface Mount		Type No.	Absolute Maximum Ratings			Electrical Characteristics						Halogen free	Based on AEC-Q101	Automotive
JEDEC Code	Package		$V_{DRM}$	$I_T$	$T_j$	$V_{TM}$	Conditions	$V_{GT}$	$I_{GT}$	$(dv/dt)_c$	Conditions			
JEITA Code	Fig.		[V]	[A]	[°C]	[V]	ITM [A]	(I, II, III)* [V]	(I, II, III)* [mA]	(min) (Tj=150°C, V <sub>0</sub> =2/3V <sub>DRM</sub> ) [V/μs]	(di/dt) <sub>c</sub> [A/ms]			
House Name														
TO-252AA	G2-3	 KD3FB60	600	3	-40 to 150	1.7	4.5	1.5	15	1	-1.5	-	-	-

 : New product \* : Operation mode IV is not guaranteed.

Two Terminal Type		Type No.	Absolute Maximum Ratings			Electrical Characteristics						Halogen free	Based on AEC-Q101	Automotive
JEDEC Code	Package		$V_{DRM}$	$I_T$	$T_j$	$V_{TM}$	Conditions	$V_{GT}$	$I_{GT}$	$(dv/dt)_c$	Conditions			
JEITA Code	Fig.		[V]	[A]	[°C]	[V]	ITM [A]	(I, II, III)* [V]	(I, II, III)* [mA]	(min) (Tj=150°C, V <sub>0</sub> =2/3V <sub>DRM</sub> ) [V/μs]	(di/dt) <sub>c</sub> [A/ms]			
House Name														

 : New product \* : Operation mode IV is not guaranteed.

Operation Mode	Terminal Characteristics		
	① T1	②④ T2	③ G
I	-	+	+
II	-	+	-
III	+	-	-
IV	+	-	+




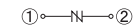
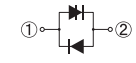
# SURGE ABSORBERS

Surge Absorbers are semiconductor devices of the Thyristor type that turns on when triggered by their rated voltage. They are commonly used for lightning surge protection in communications equipment.

## Thyristor Surge Suppressors

- Features
  1. Bi-directional or uni-directional characteristics.
  2. High speed response.
  3. Large surge current capacity.
  4. Repetitive use against surges is possible.



- Applications
  1. Lightning surge adsorption for communications circuits.
  2. Lightning surge adsorption for transmitters and switchboards.
  3. Surge protection for ISDN terminals.

Series	KL Series	KU Series	KP Series	
Package	 5.0 × 2.5 × 2.0(mm)	 5.1 × 3.75 × 2.0(mm)	 7.6 × 4.0 × 2.8(mm)	
JEDEC Code JEITA Code House Name	DO-214AC - 1F	DO-214AA similar - M2F	- - 2F	
Fig.	B4-3	B7 B8	B9-4	
Internal Circuit				
Off-state Voltage V <sub>0</sub> [V]	5	KL3Z07		
	15	KL3Z18		
	58	KL3L07		
	63		KU10L08	
	70		KU4F8	
	90		KU10NU11	
	92			KP20NU11 KP40NU11
	100		KU4F12	
	115		KU10NU13	
	120	KL3N14	KU10N14 KU15N14	
	175	KL3R20		
	180			KP40RU22
	190		KU10R23NS	
	220		KU10R27NS	
250		KU10R29NS		
275		KU5S31NS KU10S31NS KU10S35NS		

## Varistor

- Features
  1. Bi-directional surge absorption is possible.
  2. Low junction capacitance.

- Applications
  1. Telephone set surge absorption.
  2. Digital communications circuit surge absorption.
  3. ISDN terminal surge absorption.

Package	 5.0 × 2.5 × 2.0(mm)
JEDEC Code JEITA Code House Name	DO-214AC - 1F
Fig.	B4-1
Internal Circuit	
V <sub>F</sub> [V]	2.3 ± 0.25 VR61F1

## Thyristor Surge Suppressors

Package		Type No.	Absolute Maximum Ratings			Electrical Characteristics			Halogen free	UL	Automotive
JEDEC Code JEITA Code House Name	Fig.		V <sub>DRM</sub> [V]	I <sub>TSM</sub> [A]	Conditions [μs]	T <sub>j</sub> [°C]	V <sub>BO</sub> (min) [V]	I <sub>H</sub> (min) [mA]			
DO-214AC - 1F	B4-3	KL3Z07	5	30	10/1000	125	5.5 *1	50	-	-	-
		KL3Z18	15	30	10/1000	125	15.5 *1	50	-	-	-
		KL3L07	58	30	10/1000	125	65	100	90	-	-
		KL3N14	120	30	10/1000	125	130	100	50	-	-
		KL3R20	175	30	10/1000	125	180	100	30	-	-
DO-214AA similar - M2F	B7	KU10L08	63	100	10/1000	125	70	100	180	-	UL*
		KU4F8	70	40	10/1000	125	75	100	100	-	-
	B8	KU10NU11	60	100	10/1000	125	100	150	-	-	-
		KU4F12	100	40	10/1000	125	110	100	100	-	-
	B7	KU10NU13	60	100	10/1000	125	120	100	-	-	-
		KU10N14	120	100	10/1000	125	125	100	140	-	UL*
		KU15N14	120	150	10/1000	125	125	100	110	-	UL*
		KU10R23NS	190	100	10/1000	125	290 *2	100	90	-	-
		KU10R27NS	220	100	10/1000	125	320 *2	100	70	-	UL*
		KU10R29NS	250	100	10/1000	125	400 *2	100	70	-	UL*
-	B9-4	KU5S31NS	275	50	10/1000	125	420 *2	150	70	-	-
		KU10S31NS	275	100	10/1000	125	420 *2	100	90	-	UL*
		KU10S35NS	275	100	10/1000	125	450 *2	100	90	-	-
		KP20NU11	60	325	10/700	125	100	150	295 *3	-	-
-	2F	KP40NU11	60	500	10/700	125	100	150	485 *3	-	-
		KP40RU22	60	500	10/700	125	195	100	285 *3	-	-

\*1 : V<sub>BR</sub> \*2 : V<sub>CL(max)</sub> \*3 : typ.  : UL497B recognized (UL File No.E183905)

## Varistor

Package		Type No.	Absolute Maximum Ratings			Electrical Characteristics		Halogen free	Automotive
JEDEC Code JEITA Code House Name	Fig.		I <sub>F(RMS)</sub> [A]	I <sub>FSM(R.M.S)</sub> [A]	T <sub>j</sub> [°C]	V <sub>F</sub> [V]	Conditions I <sub>F</sub> [mA]		
DO-214AC - 1F	B4-1	VR61F1	0.37(*1)/0.28(*2)	7.5	-55 to 150	2.3 ± 0.25	1	-	-

\*1 : On alumina substrate \*2 : On glass-epoxy substrate










# TVS (Transient Surge Suppressor)

## Power Clampers

- Features
- 1.High speed response.
  - 2.Absorption energy tolerance capacity.
  - 3.Narrow clamping voltage width.
  - 4.Reverse blocking type.

- Application 1.Snubber circuit in the primary side of switch-mode power supplies.

Package	 7.6 × 4.0 × 2.8(mm)	 5.0 × φ 4.0(mm)	 7.0 × φ 4.4(mm)
JEDEC Code	—	—	—
JEITA Code	—	—	—
House Name	2F	AX078	AX10
Fig.	B9-3	A4-2	A5-2
Internal Circuit			
V <sub>BR</sub> (typ) [V]	82	ST02D-82	ST03D-82
	145	ST02D-140F2	ST03D-140
	170	ST02D-170F2	ST03D-170
	200	ST02D-200	ST03D-200
	240		ST03DH-240
	280		★ ST02DH-280
320		★ ST02DH-320	

★ : Under development

## Power Clampers

Surface Mount		Type No.	Absolute Maximum Ratings				Electrical Characteristics						Halogen free	Automotive	
Package			PrSM	ZD		Di	Tj	ZD			Di				
JEDEC Code	JEITA Code			V <sub>RRM</sub>	V <sub>R(DC)</sub>			V <sub>BR</sub> (min)	V <sub>BR</sub> (max)	Conditions I <sub>R</sub>	I <sub>R</sub> (max)	I <sub>R</sub> (max)			Conditions V <sub>R</sub>
—	2F	B9-3	ST02D-140F2	200	120	600	-40 to 150	130	160	1	5	5	600	—	—
—	2F	B9-3	ST02D-170F2	200	145	600	-40 to 150	155	185	1	5	5	600	—	—

Axial		Type No.	Absolute Maximum Ratings				Electrical Characteristics						Halogen free	Automotive	
Package			PrSM	ZD		Di	Tj	ZD			Di				
JEDEC Code	JEITA Code			V <sub>RRM</sub>	V <sub>R(DC)</sub>			V <sub>BR</sub> (min)	V <sub>BR</sub> (max)	Conditions I <sub>R</sub>	I <sub>R</sub> (max)	I <sub>R</sub> (max)			Conditions V <sub>R</sub>
—	AX078	A4-2	ST02D-82	200	67	600	-40 to 150	74	90	1	5	5	600	—	—
—	AX078	A4-2	ST02D-140	200	120	600	-40 to 150	130	160	1	5	5	600	—	—
—	AX078	A4-2	ST02D-170	200	145	600	-40 to 150	155	185	1	5	5	600	—	—
—	AX078	A4-2	ST02D-200	200	170	600	-40 to 150	185	215	1	5	5	600	—	—
—	AX10	A5-2	ST03D-82	300	67	600	-40 to 150	74	90	1	5	5	600	—	—
—	AX10	A5-2	ST03D-140	300	120	600	-40 to 150	130	160	1	5	5	600	—	—
—	AX10	A5-2	ST03D-170	300	145	600	-40 to 150	155	185	1	5	5	600	—	—
—	AX10	A5-2	ST03D-200	300	170	600	-40 to 150	185	215	1	5	5	600	—	—
—	AX10	A5-2	ST03DH-240	300	200	1000	-40 to 150	220	250	1	5	10	1000	—	—
—	AX10	A5-2	★ ST02DH-280	300	230	1000	-40 to 150	250	300	1	5	10	1000	—	—
—	AX10	A5-2	★ ST02DH-320	300	260	1000	-40 to 150	300	350	1	5	10	1000	—	—

★ : Under development



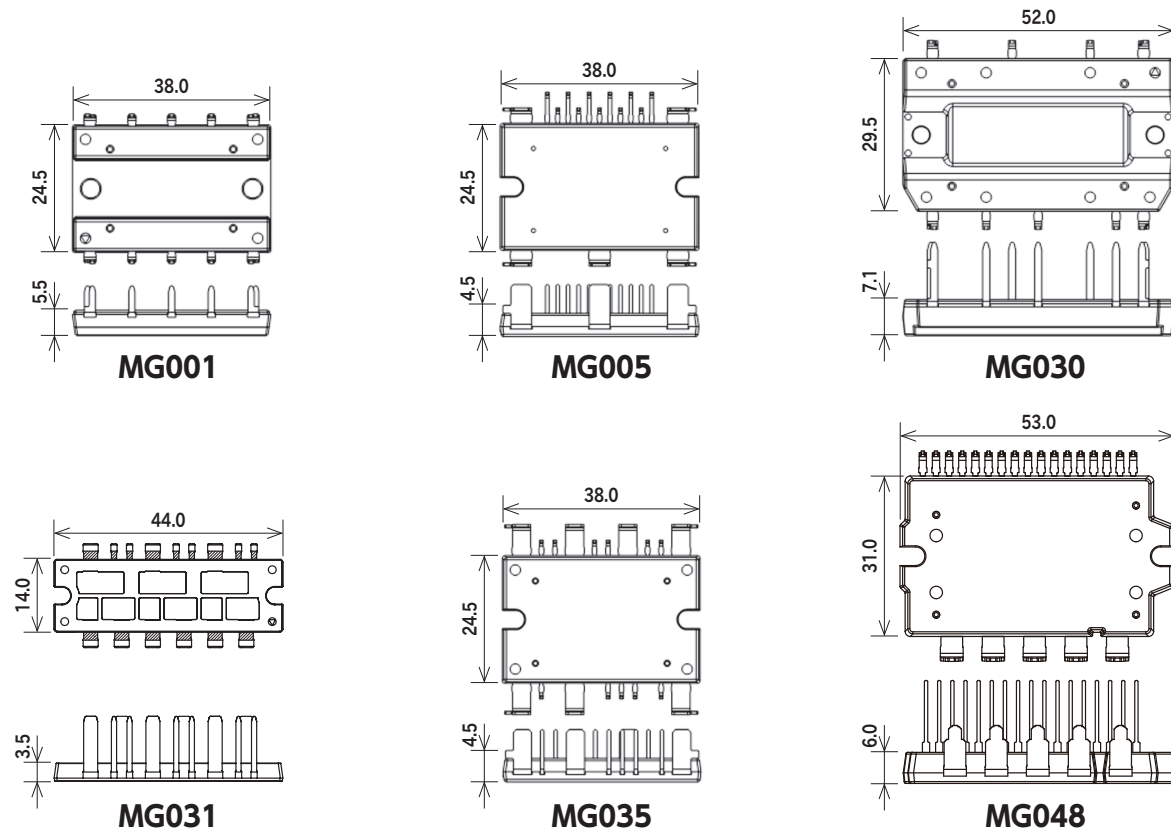




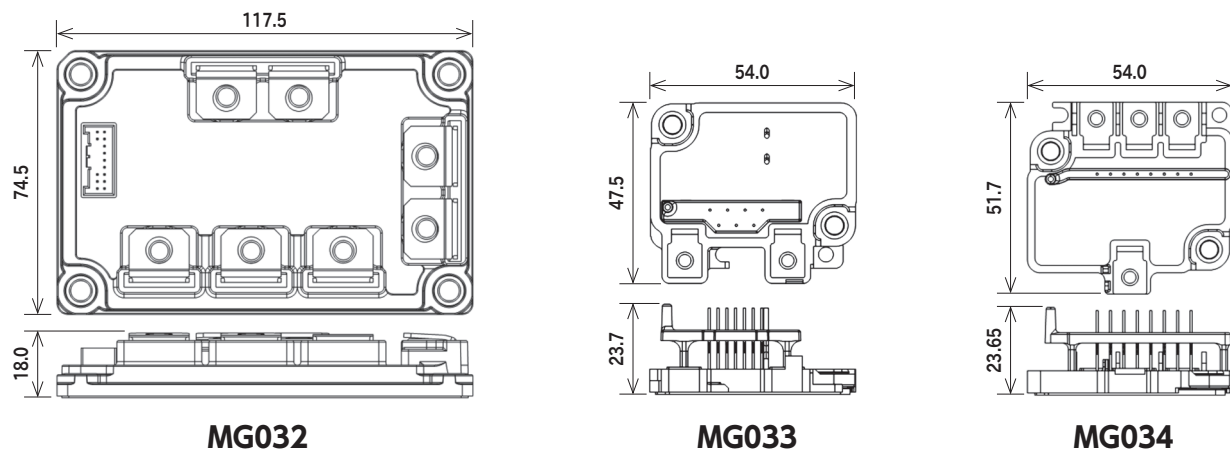
# POWER MODULES

Power Modules include combinations of various power semiconductors. They are easy to design, reduce the number of components needed in the device, are suitable for device downsizing, and mitigate heat-dissipation concerns. At Shindengen, a multitude of packages allow us to meet customer needs of MOSFET, diodes, and other products. Semi customizable support and customizable package design support are available.

## Transfer Type Package Sample



## Potting Type Package Sample

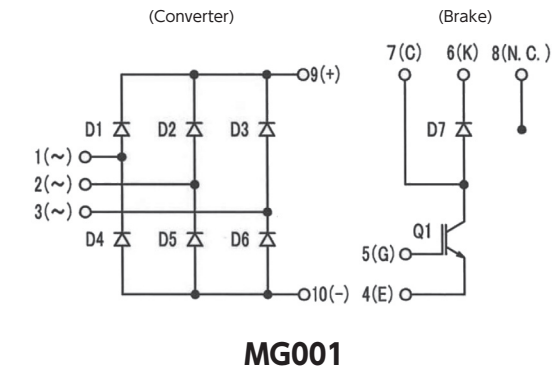


## CB Module Series

Package		Type No.	Converter Diode					Brake IGBT				Brake FRD					Halogen free	UL	Automotive	
JEDEC Code JEITA Code House Name	Fig.		Absolute Maximum Ratings		Electric Characteristics			Absolute Maximum Ratings		Electric Characteristics		Absolute Maximum Ratings		Electric Characteristics						
			V <sub>RRM</sub> [V]	I <sub>F</sub> (AV) [A]	Conditions T <sub>C</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]	V <sub>CEs</sub> [V]	I <sub>C</sub> [A]	V <sub>CE</sub> (sat) (typ) [V]	Conditions I <sub>C</sub> [A]	V <sub>RRM</sub> [V]	I <sub>F</sub> (AV) [A]	Conditions T <sub>C</sub> [°C]	V <sub>F</sub> (max) [V]	Conditions I <sub>F</sub> [A]				t <sub>rr</sub> (max) [ns]
-	F4	MG001AK028060A	600	20	137	1.05	7	600	28	1.70	28	600	3	137	1.65	3	50	○	UL	-
MG001		MG001AL030060A	600	30	136	1.05	10	600	30	1.5	30	600	3	137	1.65	3	50	○	UL	-

■: New product    UL: UL recognized (UL File No. E142422)

## Equivalent Circuit Schematic

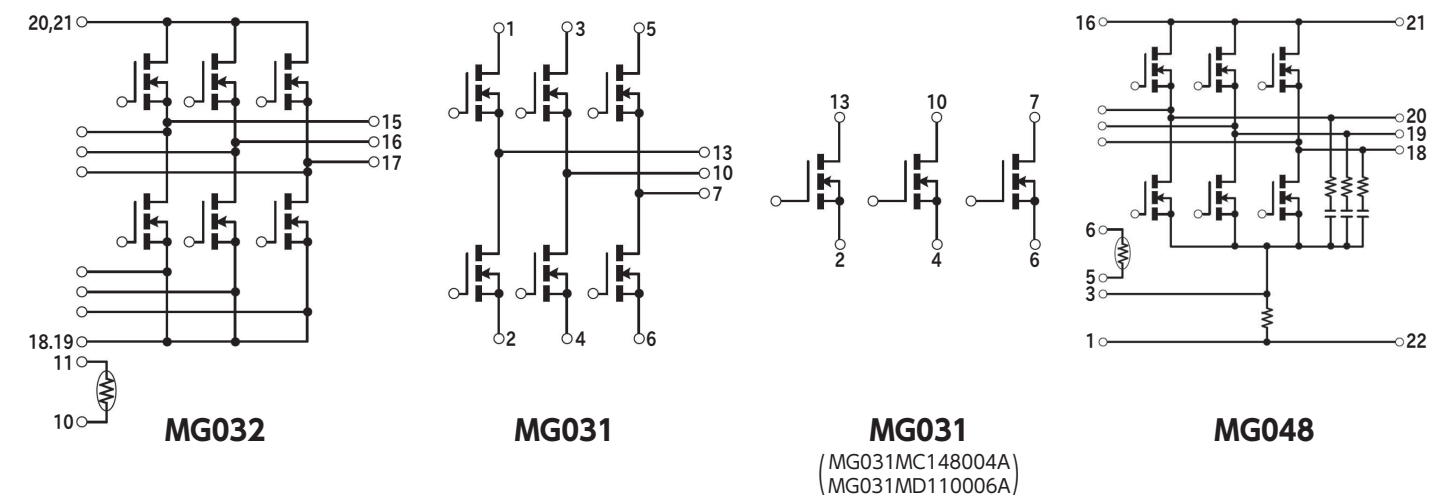


## INV Module Series

Package		Type No.	Absolute Maximum Ratings					Electrical Characteristics						Halogen free	UL	Automotive
JEDEC Code JEITA Code House Name	Fig.		V <sub>DSS</sub> [V]	I <sub>D</sub> [A]	I <sub>DP</sub> [A]	P <sub>T</sub> [W]	T <sub>ch</sub> [°C]	R <sub>DS(ON)</sub> (typ) [mΩ]	R <sub>DS(ON)</sub> (max) [mΩ]	C <sub>iss</sub> (typ) [pF]	Q <sub>g</sub> (typ) [nC]	V <sub>th</sub> (typ) [V]	R <sub>th(j-c)</sub> (max) [°C/W]			
			V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V	V <sub>GS</sub> =10V			
-	F6	MG032A4207R5A	75	420	840	500	150	-	0.98	80120	505	3.0	0.25	-	-	○
MG032		MG032B420010A	100	420	840	500	150	0.99	1.37	91800	500	3.0	0.25	-	-	○
-	F5	MG031B090004A	40	90	360	125	175	2.34	3.2	4180	76	2.0	1.2	○	-	○
-		MG031E120004A	40	120	480	104	150	2.5	3.1	TBD	TBD	3.0	1.2	○	-	■
-		MG031G148004A	40	148	592	154	175	1.75	2.2	5330	96	3.0	0.97	○	-	○
MG031		MG031L080006A	60	80	320	104	150	4.5	5.6	3390	58	3.0	1.2	○	-	■
-		MG031N110006A	60	110	440	128	150	3.0	3.8	5430	89	3.0	0.97	○	-	■
-		MG031MC148004A	40	148	592	128	150	1.75	2.2	5330	96	3.0	0.97	○	-	■
-		MG031MD110006A	60	110	440	128	150	3.0	3.8	5430	89	3.0	0.97	○	-	■
MG048	F8	MG048A150004A	40	150	600	147	150	2.1	2.7	5900	111	3.0	0.85	○	-	■
-		MG048B100006A	60	100	400	147	150	2.92	3.65	8100	129	3.0	0.85	○	-	■

■: New product    ★: Under development    ■: Please contact us.

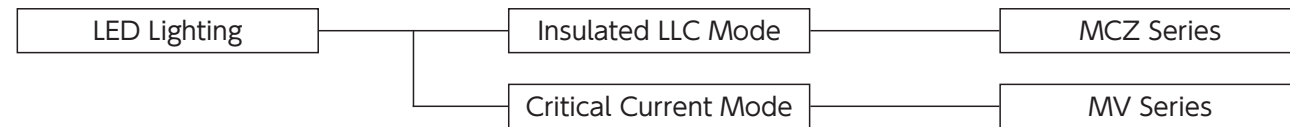
## Equivalent Circuit Schematic



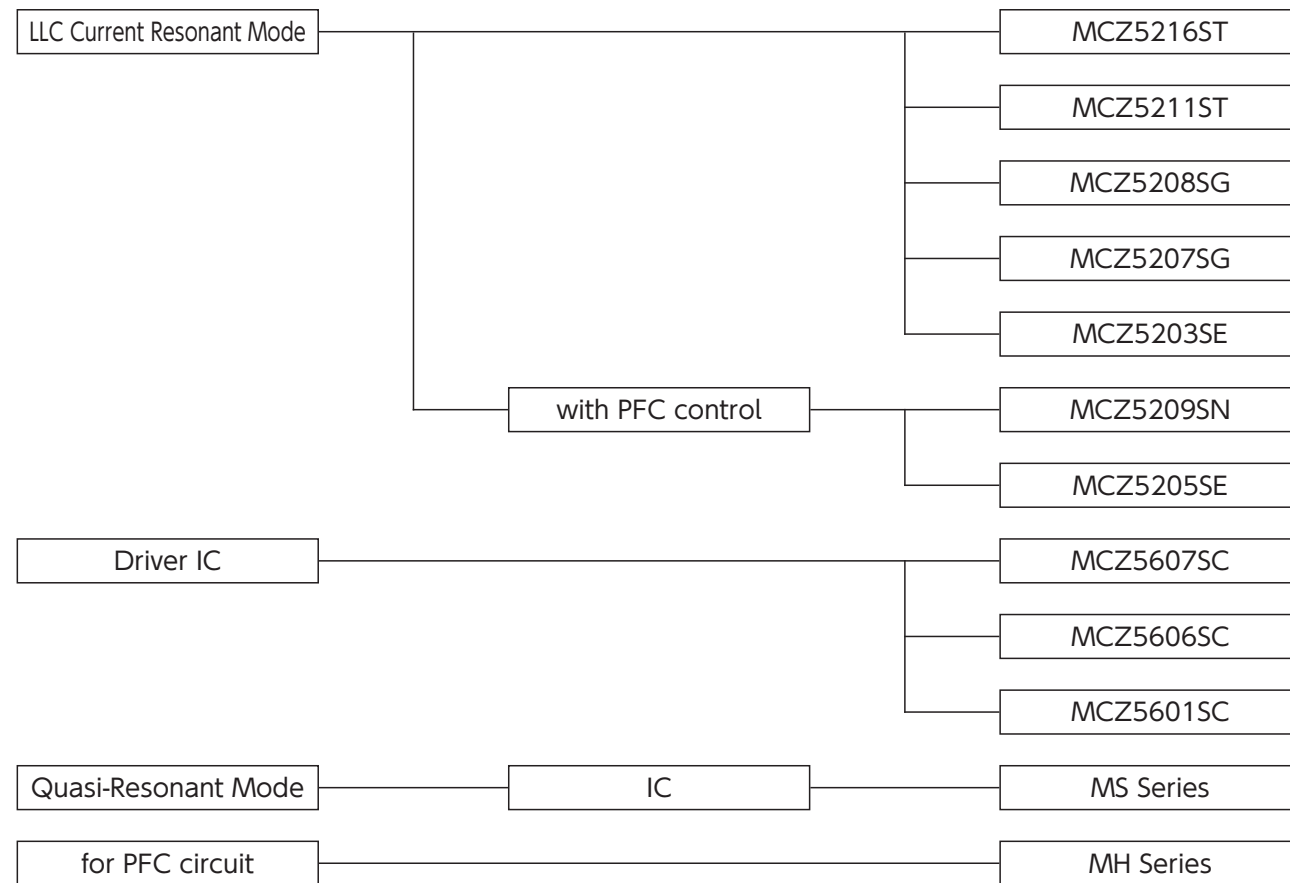
# POWER ICs

## Line up

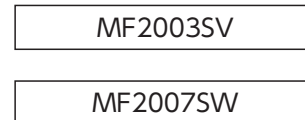
### IC for LED Lighting



### IC for Power Supply



### Ideal Diode IC





## IC for LED Lighting

### Current Mode Power Supply ICs for LED Lighting : MV Series

- Outline The MV series has a specialized function for LED lighting with PWM & Linear dimming that operates critical current mode without auxiliary winding. On and off width modulation function allows for smooth deep dimming of 1% or less.

## MV Series

Critical Current Mode Power Supply ICs for LED Lighting													
Package		Type No.	HV Startup	Vcc [V]	Output	ON/OFF	Built-in Regulator Voltage [V]	Linear Dimming	PWM Dimming	Halogen free	Automotive		
JEDEC Code JEITA Code House Name	Fig.												
	-	SOP8J	L2	MV1001SC	Yes	9 to 16	1ch	-	-	Yes	Yes	-	-
				MV1002SC	No							-	-
				MV1011SC	Yes							-	-
				MV1012SC	No							-	-
	-	SOP16	L5	MV2002SG	No	10 to 16	2ch	Cont. by REF Voltage	3.3	-	-	-	-
				MV2052SG	No							5	-

# POWER ICs

## IC for Power Supply

### LLC Current Resonant Mode Controller ICs for Bridge Converter : MCZ Series

**Outline** The MCZ series is an advanced symmetric LLC current resonant mode controller for bridge converters. Symmetric LLC resonant converter applications are greatly expanding due to their extremely high efficiency and low noise characteristics.

### High/Low Side Driver IC

**Outline** A driving IC for MOSFET and IGBT power devices. With built-in high-withstand voltage components, it can be used for a variety of uses such as inverter and power supply, etc.

### Low Power Standby Quasi-Resonant Power Supply ICs : MS Series

**Outline** The MS series consumes much less power in standby mode than conventional MR series. The ICs incorporate various functions to make it more user-friendly and easier to design a power supply with fewer external components.

### PFC ICs : MH Series

**Outline** The MH series is a PFC circuit control IC which enables multistage interleave. An efficient, high power operation is possible by utilizing a follower IC composed of multistage interleave and a leader IC that can be used alone.








## Ideal Diode IC

### Ideal Diode IC V-Diode™ MF Series

**Outline** This is an ideal diode IC with a built-in reverse connection and reverse current protection it is used for electronic units with batteries as input sources. By using a built-in or a separate MOSFET to control the IC, it allows reducing the size of the circuit board as well as lowering loss and increasing heat dissipation.


## MCZ Series

### LLC Current Resonant Mode Controller ICs for Bridge Converter

Package		Type No.	Type	HV Startup	High-side Drive	Vcc (max) [V]	Vin Sensing	Burst Mode	Maximum Frequency [kHz]	X-cap. discharge	Capacitive Mode Protection	Over Voltage Protection	Over Current Protection	Halogen free	Automotive
JEDEC Code	JEITA Code														
	-	MCZ5216ST	LLC Current Resonant Mode	Yes				Yes	500	Yes					
	-														
	SOP18	MCZ5211ST	LLC Current Resonant Mode	Yes				Yes	500	No					
	-	-													
	SOP24	MCZ5209SN	LLC Current Resonant Mode with PFC Control	Yes				Yes	300	No					
	-	-													
	SOP16	MCZ5207SG	LLC Current Resonant Mode	No	Yes	35	Yes	Yes	300	No	Yes	Latch	Timer Latch	-	-
	-	-													
	SOP16	MCZ5208SG	LLC Current Resonant Mode	No				Yes	500	No					
	-	-													
	SOP22	MCZ5205SE	LLC Current Resonant Mode with PFC Control	No				No	300	No					
	-	-													
	SOP22	MCZ5203SE	LLC Current Resonant Mode	No				No	300	No		-			
	-	-													

■ : New product



### High/Low Side Driver ICs

Package		Type No.	Output	High-side Floating Supply Voltage [V]	Vcc (max) [V]	Input/Output Channel	Vcc_UVLO [V]	VBS_UVLO [V]	Source [mA]	Sink [mA]	Halogen free	Automotive
JEDEC Code	JEITA Code											
	-	★ MCZ5607SC	High-side/ Low-side	622	22	2/2	8.2 to 8.9	8.2 to 8.9	220	450	Not identified	-
	-	★ MCZ5606SC		622	22	2/2	8.2 to 8.9	8.2 to 8.9	220	450	Not identified	-
	SOP8J	MCZ5601SC		600	22	2/2	8.2 to 9.0	7.2 to 8.0	400	400	○	-

■ : New product ★ : Under development

## MS Series


### Low Power Standby Quasi-Resonant Power Supply ICs

Package		Type No.	Vin [V]	Vcc [V]	Over Voltage Protection	Over Current Protection	Stand-by Operation	Bottom Skip	Halogen free	Automotive
JEDEC Code	JEITA Code									
	-	★ MS1007SH	95 to 450	11 to 21	Auto restart	Auto restart	Auto Burst Mode	1 skip	-	-
	-	MS1004SH					Auto Burst Mode/ S-Stby Mode	2 skip	-	-
	SOP8/7J	MS1003SH					Auto Burst Mode/ S-Stby Mode	1 skip	-	-
	-	MS1006SK	11 to 24	Vcc Latch	Timer Latch 2sec. (typ)	Auto Burst Mode/ UT-Stby Mode	2 skip	-	-	
	SOP14	MS1005SK				Auto Burst Mode/ UT-Stby Mode	1 skip	-	-	

★ : Under development



## MH Series

### PFC ICs

Package		Type No.	Type	Operation Mode	Vin Sensing	Vcc [V]	Zero Current Detection	Diodes Short Protection	FB Open Short Protection	Over Voltage Protection	Halogen free	Automotive
JEDEC Code	JEITA Code											
	-	MH2501SC	Critical Current Mode	Leader	Unnecessary	13 to 23	Auxiliary Winding	Yes	Yes	Yes	-	-
	SOP8J	MH2511SC	Synchronizes with Leader IC	Follower		11 to 23	-	No	No	No	-	-

## MF Series

### Ideal Diode IC

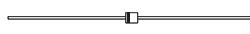
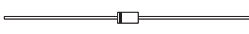
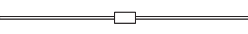
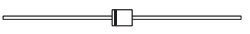
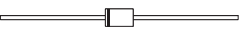

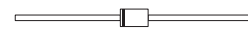
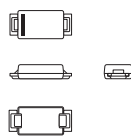
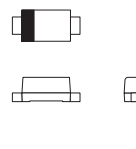
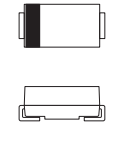
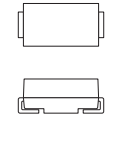
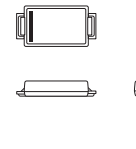
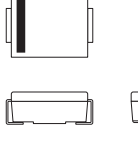
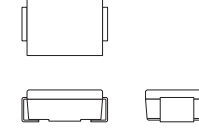
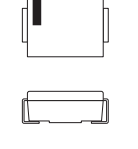
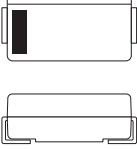
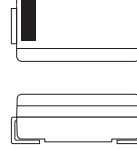
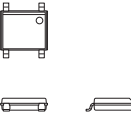
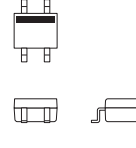
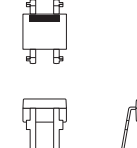
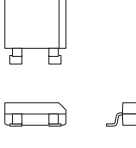
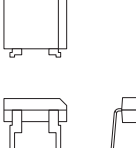
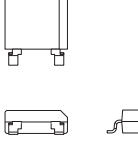
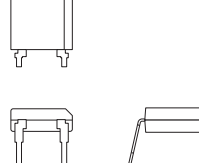
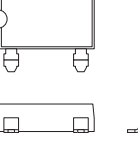
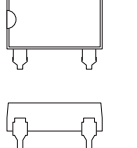




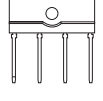

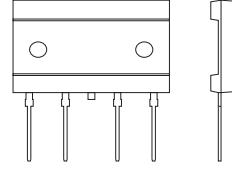
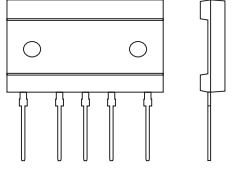
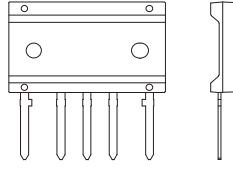
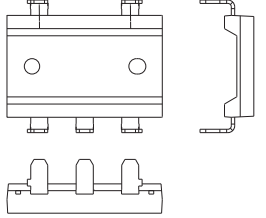

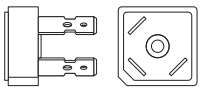


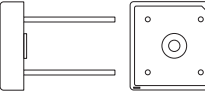
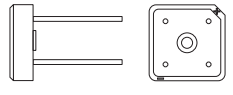
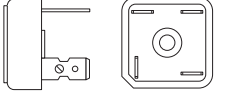

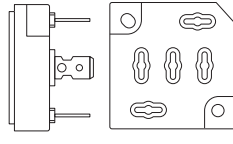
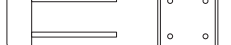
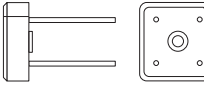


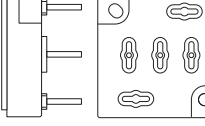
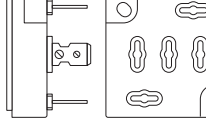
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JEDEC Code	JEITA Code									
	-	★ MF2003SV	Built-in Pch MOSFET	2.5 to 40	Yes	Yes	57	Quiescent Current = 3μA	Not identified	○
	WSON8									
	-	★ MF2007SW	Driver IC for Separate Nch MOSFET	3.5 to 70	Yes	Yes	-	Shutdown Supply Current = 10μA	Not identified	○
	TSSOP10									

★ : Under development

POWER ICs



# PACKAGE LIST

	1	2	3	4	5		6	7	8	9	10
A	A1 Package:AX057 	A2 Package:AX06 	A3 Package:AX06 	A4 Package:AX078 	A5 Package:AX10 		A6 Package:AX10 	A7 Package:AX14 			
B	B1 Package:DO-219AB similar <small>GE</small> 	B2 Package:DO-219AA <small>MJE</small> 	B3 Package:DO-214AC <small>JE</small> 	B4 Package:DO-214AC <small>JE</small> 	B5 Package:SC-110B <small>GE</small> 		B6 Package:DO-214AA similar <small>MJE</small> 	B7 Package:DO-214AA similar <small>MJE</small> 	B8 Package:DO-214AA similar <small>MJE</small> 	B9 Package:2F 	B10 Package:2F 
C	C1 Package:SOPA-4 	C2 Package:TO-269AA <small>JE</small> 	C3 Package:1Z (DIP) 	C4 Package:1N (SMD) 	C5 Package:1N (DIP) 		C6 Package:1NA (SMD) 	C7 Package:1NA (DIP) 	C8 Package:1W (SMD) 	C9 Package:1W (DIP) 	
D	D1 Package:D3K 	D2 Package:2S 	D3 Package:3S 	D4 Package:5S 	D5 Package:JB 		D6 Package:JA 	D7 Package:TSB (4pin), JC (4pin) 	D8 Package:TSB (5pin), JC (5pin) 	D9 Package:JF 	D10 Package:JH 
E	E1 Package:MCP 	E2 Package:D30VC 	E3 Package:S2VB 	E4 Package:S4VB 	E5 Package:S5VB 		E6 Package:S10VB 	E7 Package:S15VB 	E8 Package:S25VB 	E9 Package:S50VB 	E10 Package:S3WB 
	11	12	13	14	15						
E	E11 Package:S10WB 	E12 Package:S15WB 	E13 Package:S20WB 	E14 Package:SVTA 	E15 Package:SVT 						

PACKAGE LIST

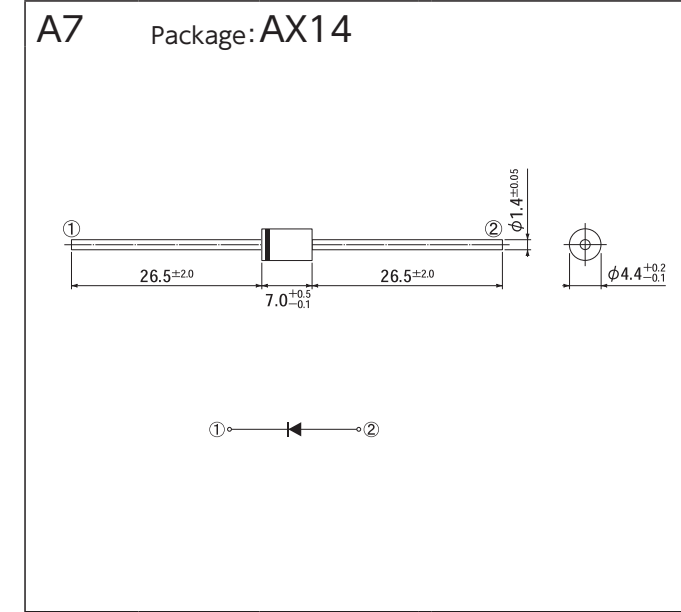
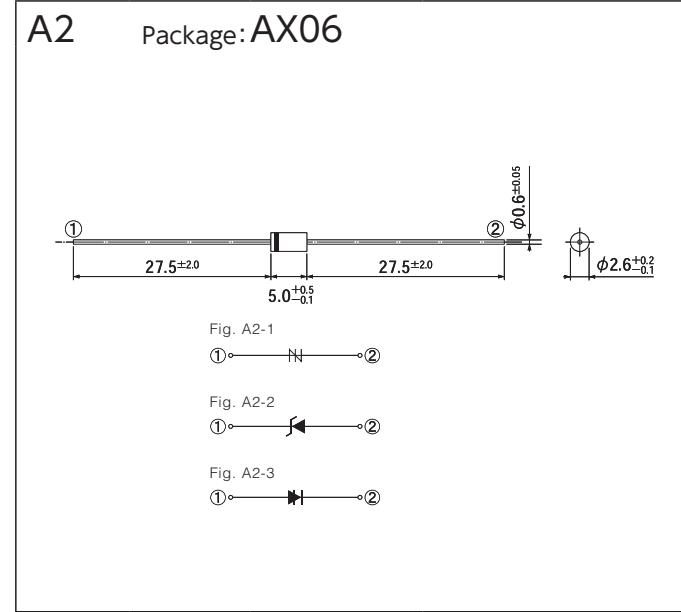
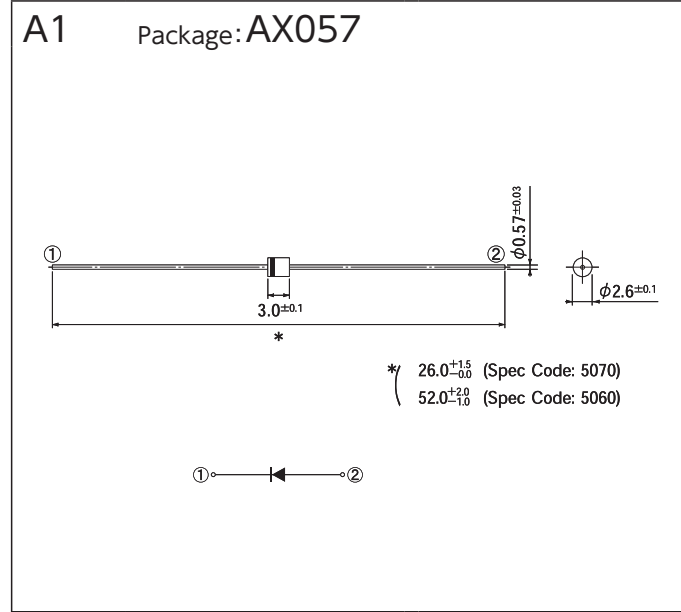
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F	F1 Package:Module 	F2 Package:Module 	F3 Package:Module 	F4 Package:MG001 	F5 Package:MG031 	F6 Package:MG032 	F7 Package:MG038 	F8 Package:MG048 	F9 Package:MG060 	F10 Package:MG061 
G	G1 Package:SC-63 Epack 	G2 Package:TO-252AA EB 	G3 Package:TO-252AB similar EB 	G4 Package:DO-277A similar EY 	G5 Package:TO-252AA similar EB 	G6 Package:LA 	G7 Package:MO-235B similar LE 			
H	H1 Package:SC-83 similar STQ-220 	H2 Package:SC-83 similar EB 	H3 Package:TO-263AB-1 EB 	H4 Package:TO-263AB EB 	H5 Package:SC-83 similar EB 	H6 Package:TO-263AB EZ 	H7 Package:TO-263-SC EZ-2R 			
J	J1 Package:SC-91A ETO-220(2pin) 	J2 Package:SC-91 ETO-220A(2pin) 	J3 Package:SC-91 ETO-220AG(2pin) 	J4 Package:SC-91 ETO-220S(2pin) 	J5 Package:TO-220AB EA 	J6 Package:SC-91A ETO-220(3pin) 	J7 Package:SC-91 ETO-220A(3pin) 	J8 Package:SC-91 ETO-220AG(3pin) 	J9 Package:SC-91 ETO-220G(3pin) 	
K	K1 Package:SC-93 ETO-3P(2pin) 	K2 Package:TO-247AD MTO-3P(2pin) 	K3 Package:SC-93 ETO-3P(3pin) 	K4 Package:TO-247AD MTO-3P(3pin) 	K5 Package:TO-247AD MTO-3P(3pin) 	K6 Package:TO-247AD MTO-3P 	K7 Package:TO-247AD MTO-3P 			
L	L1 Package:SOP8 	L2 Package:SOP8J 	L3 Package:SOP8/7J 	L4 Package:SOP14 	L5 Package:SOP16 	L6 Package:SOP18 	L7 Package:SOP22 	L8 Package:SOP24 	L9 Package:WSON8 	L10 Package:TSSOP10 

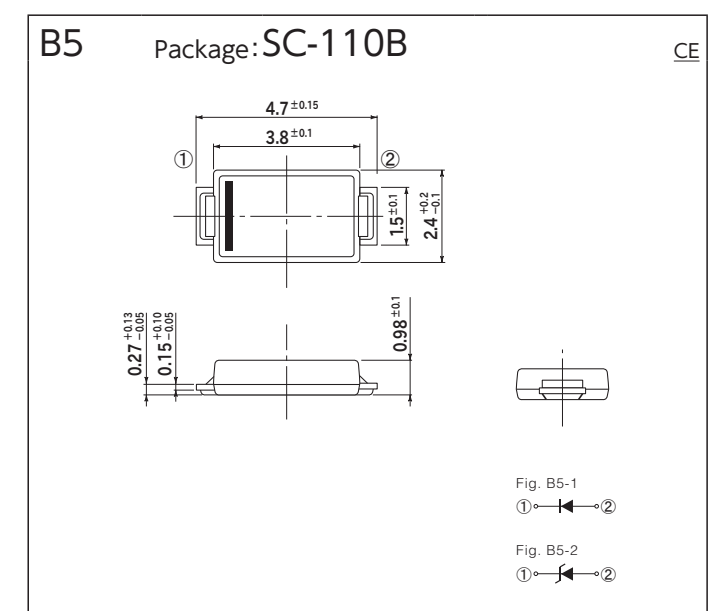
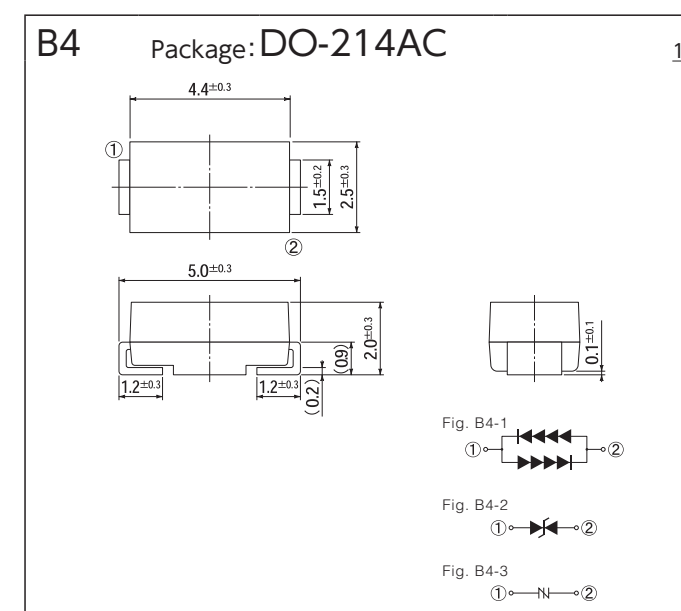
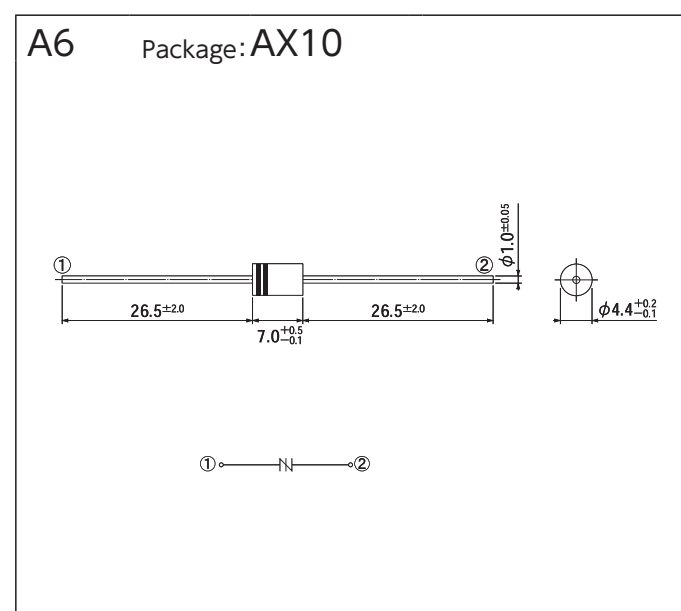
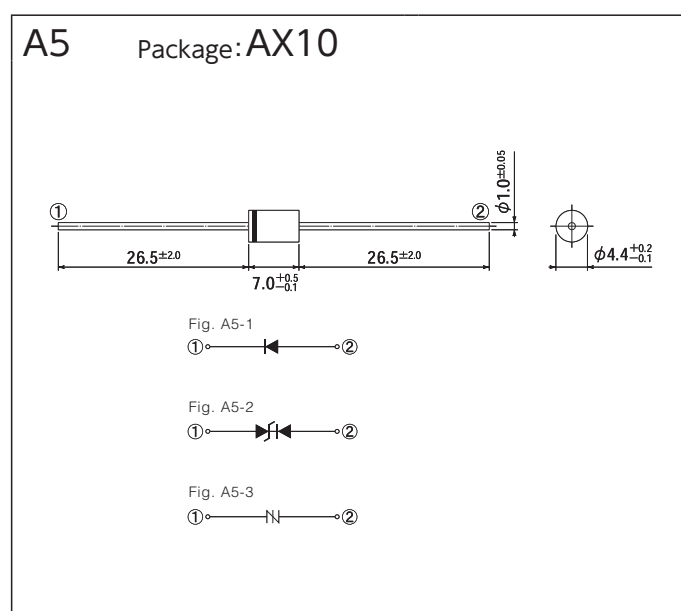
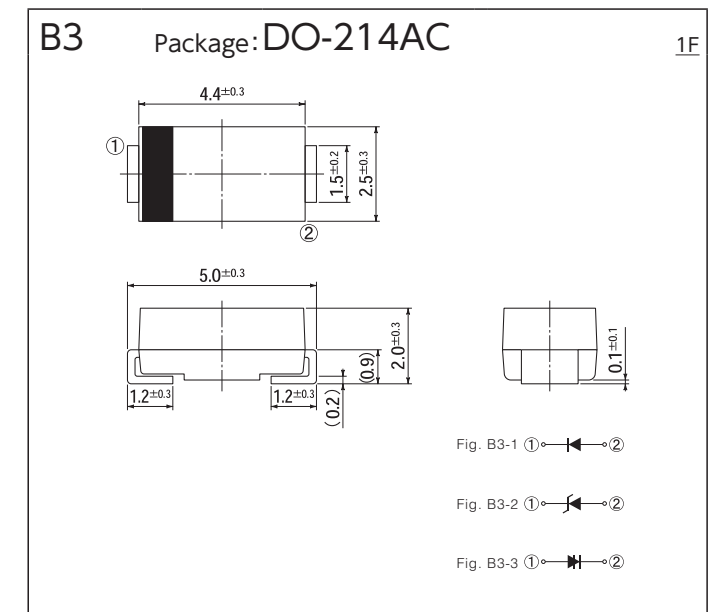
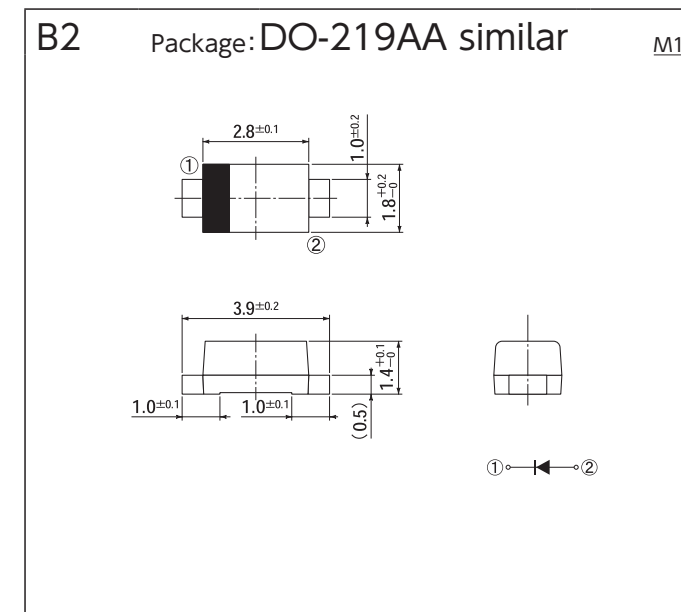
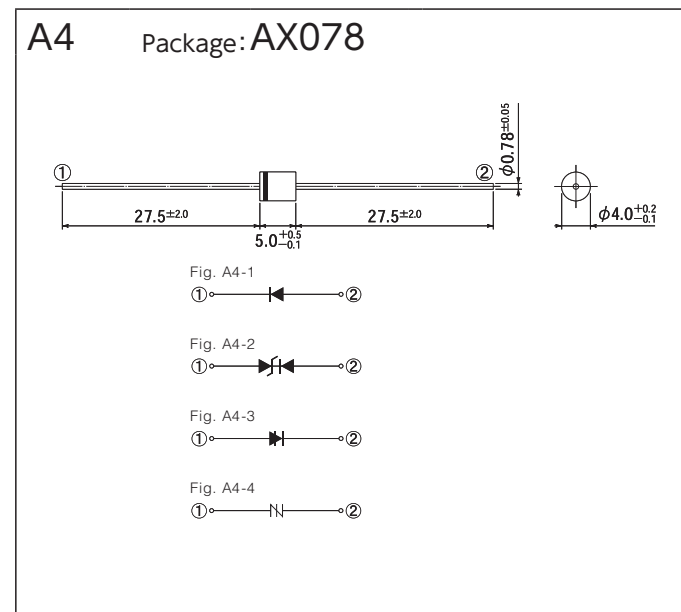
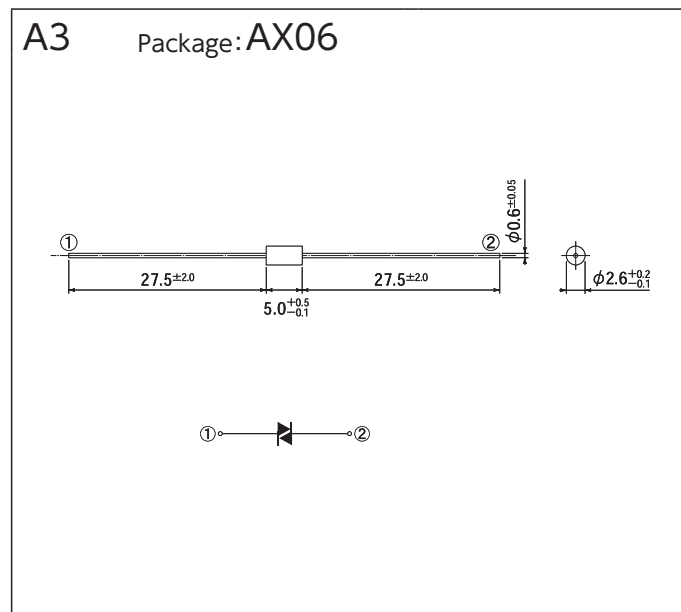
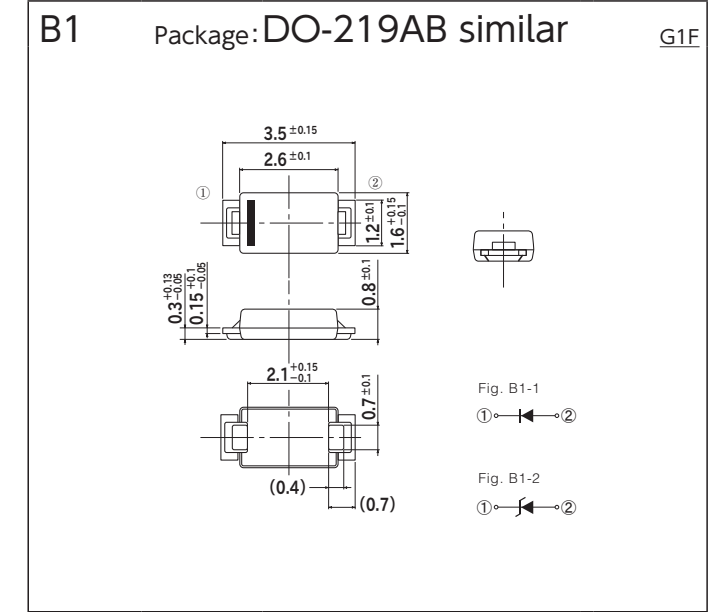
PACKAGE LIST

# OUTLINE DIMENSIONS

[Unit:mm]



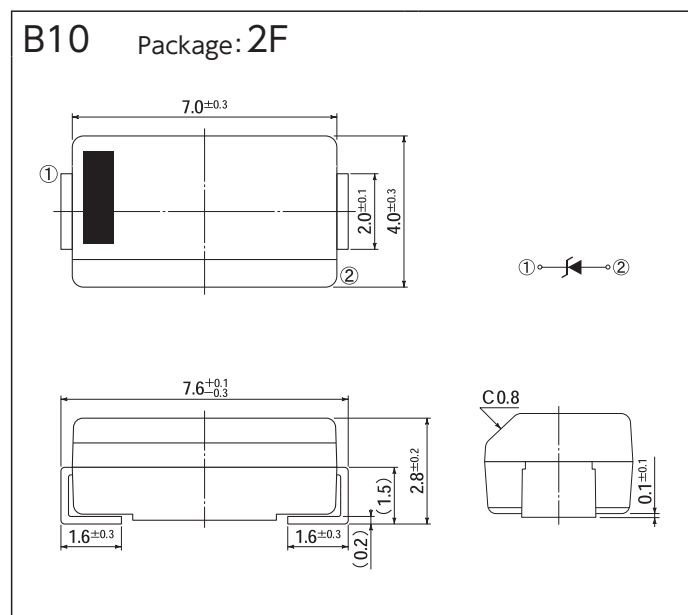
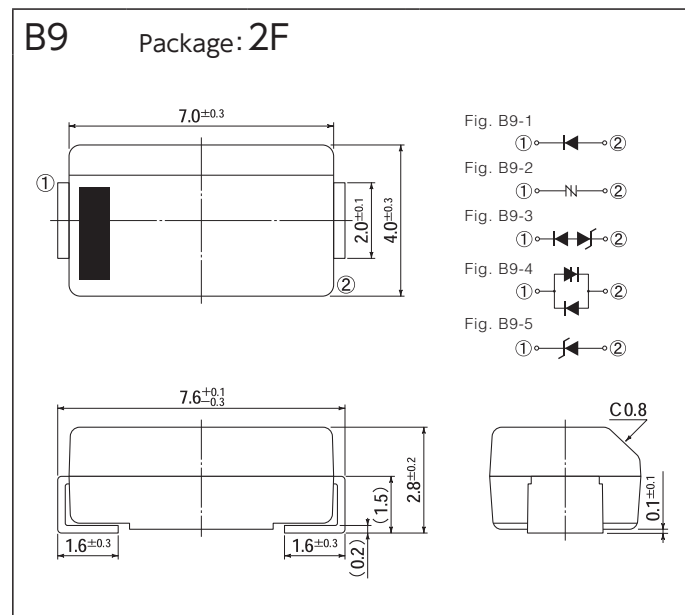
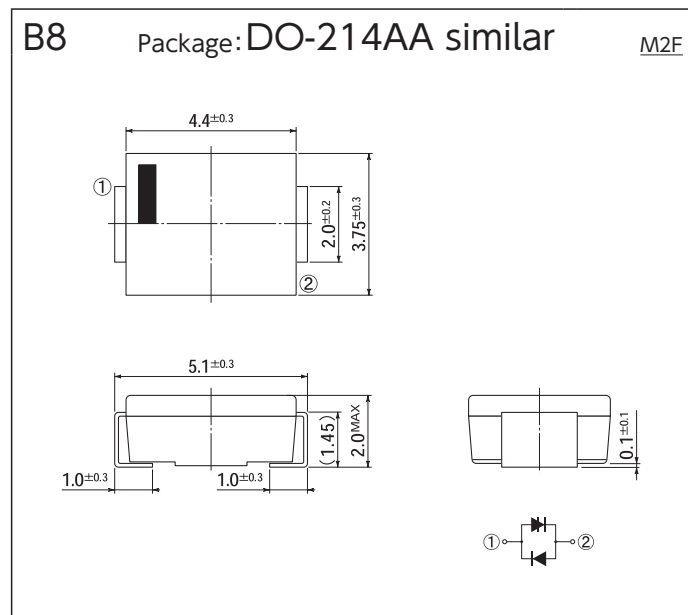
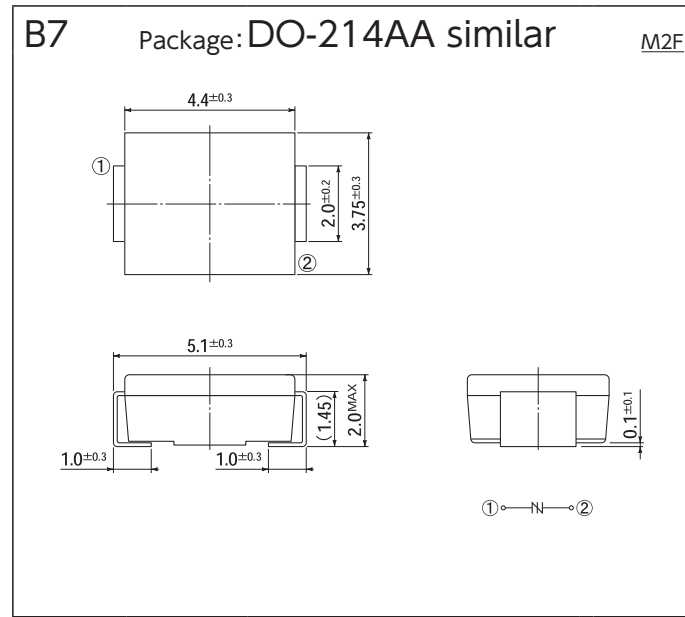
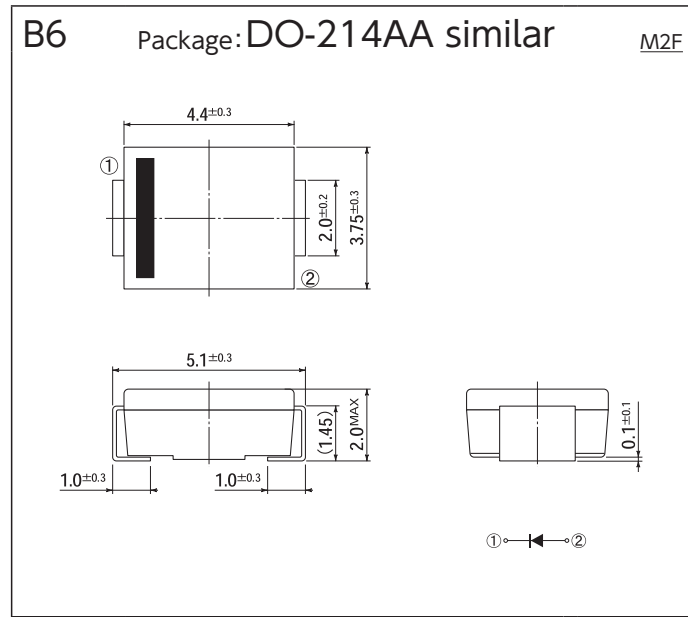
[Unit:mm]



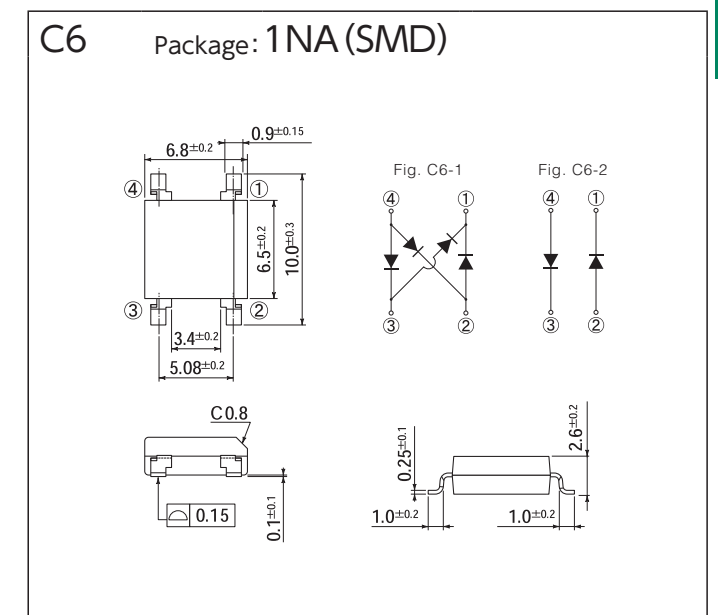
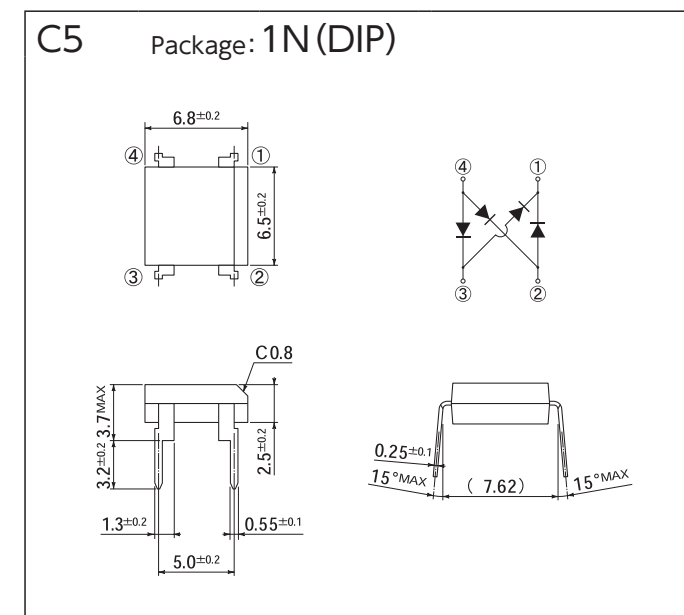
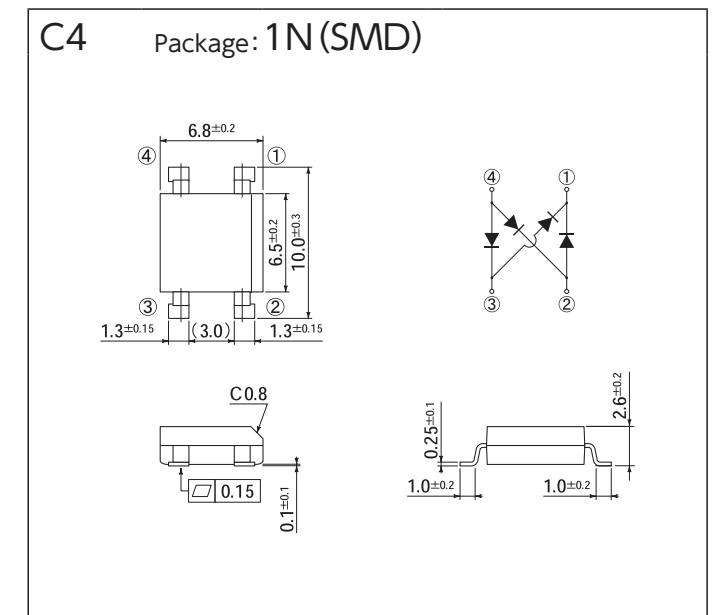
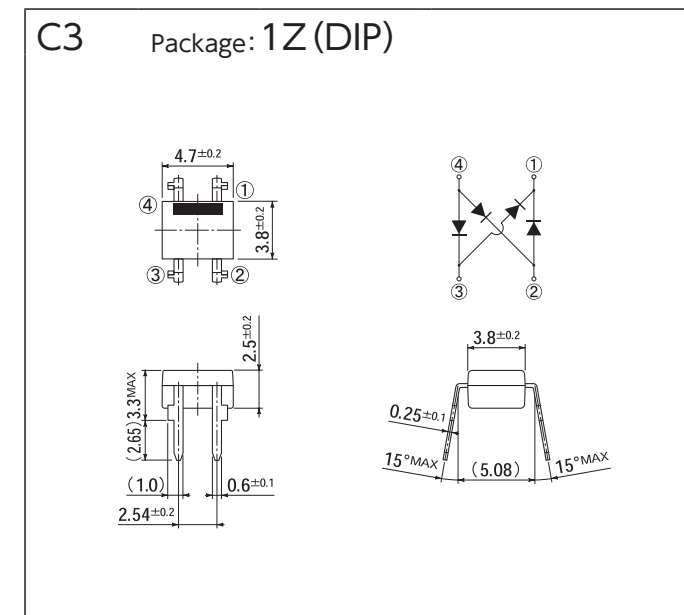
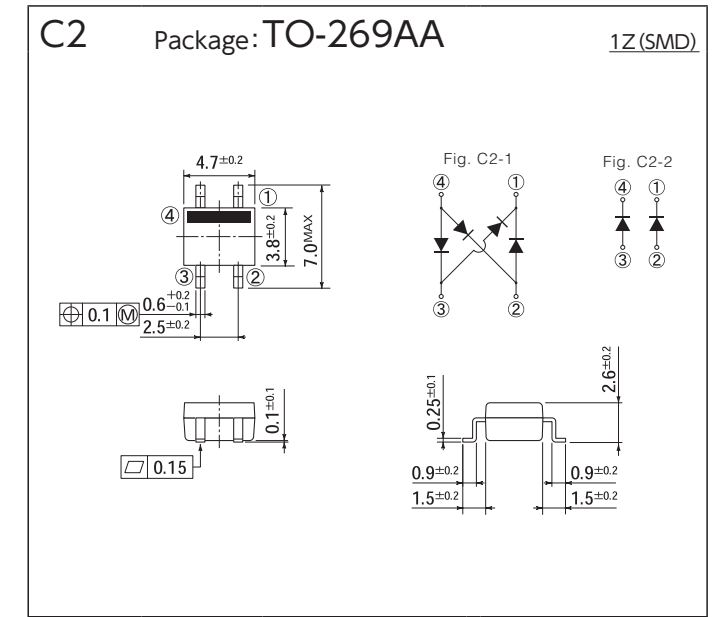
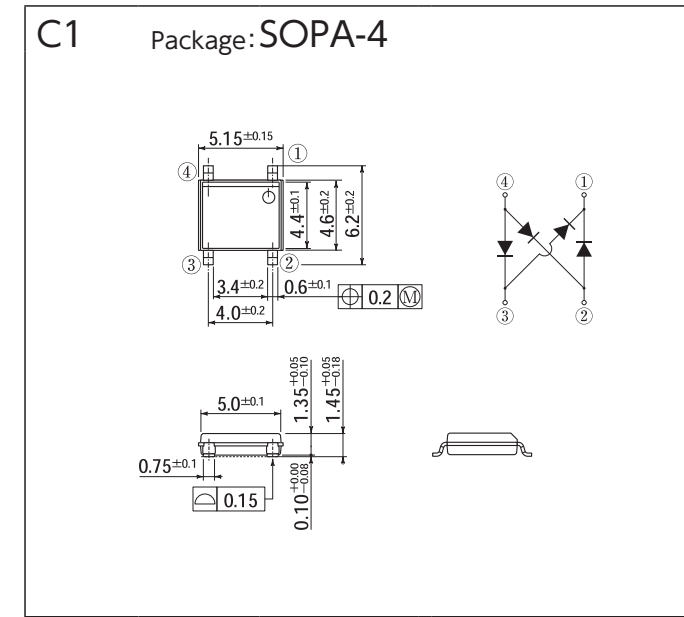
OUTLINE DIMENSIONS

# OUTLINE DIMENSIONS

[Unit:mm]

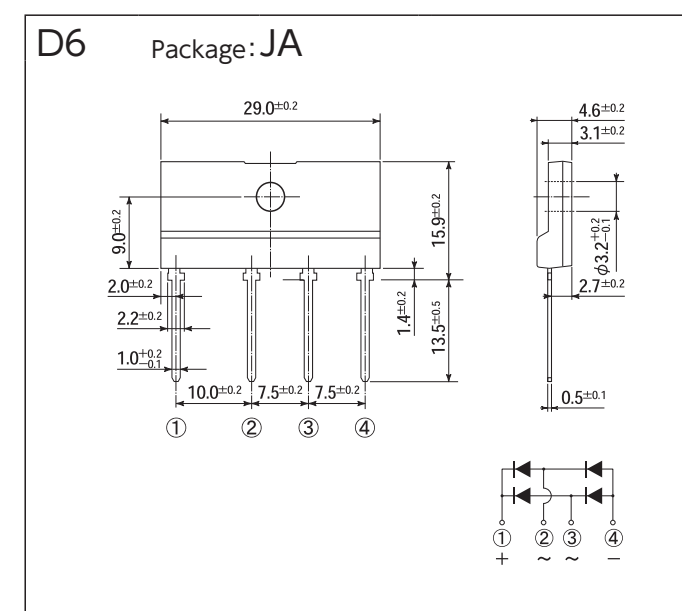
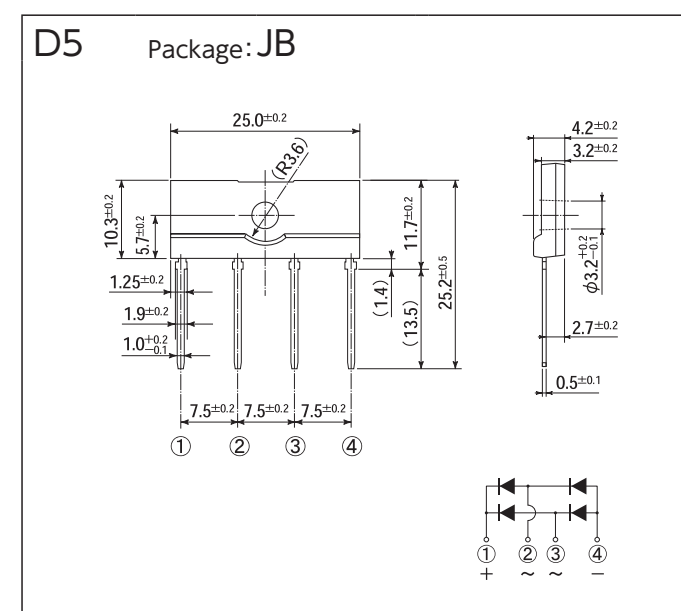
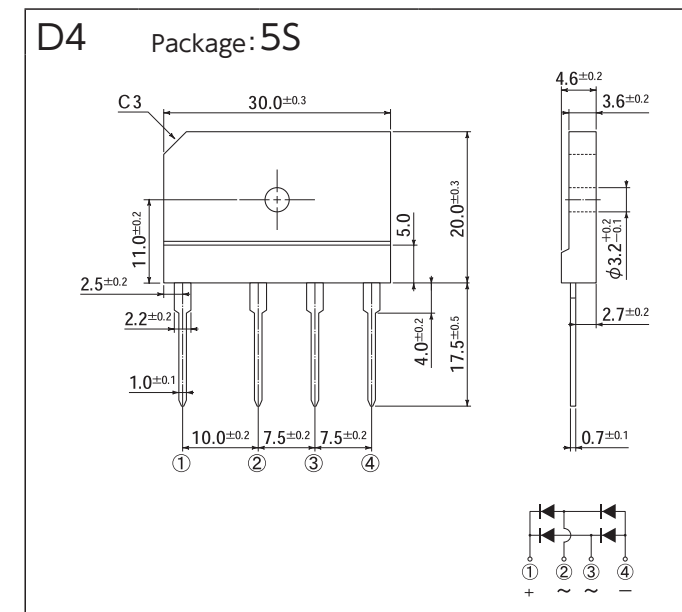
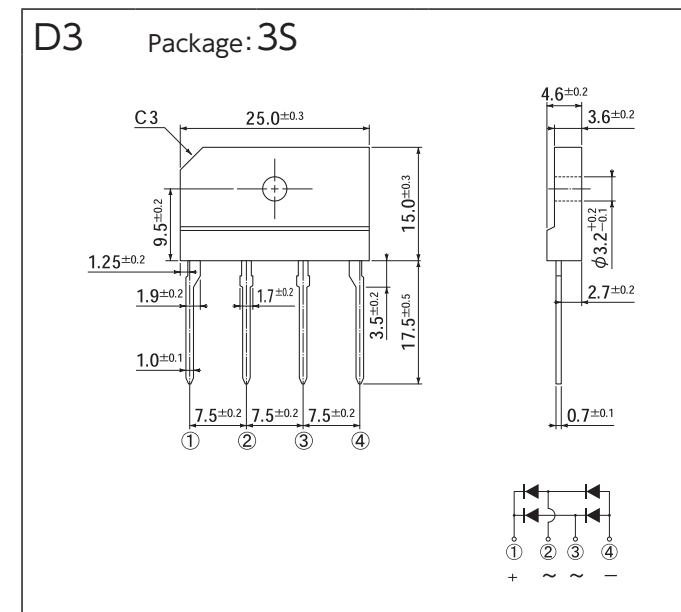
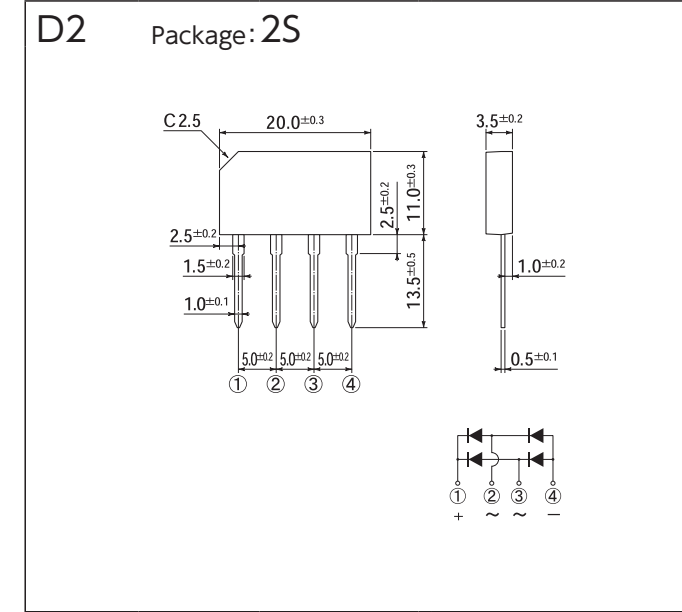
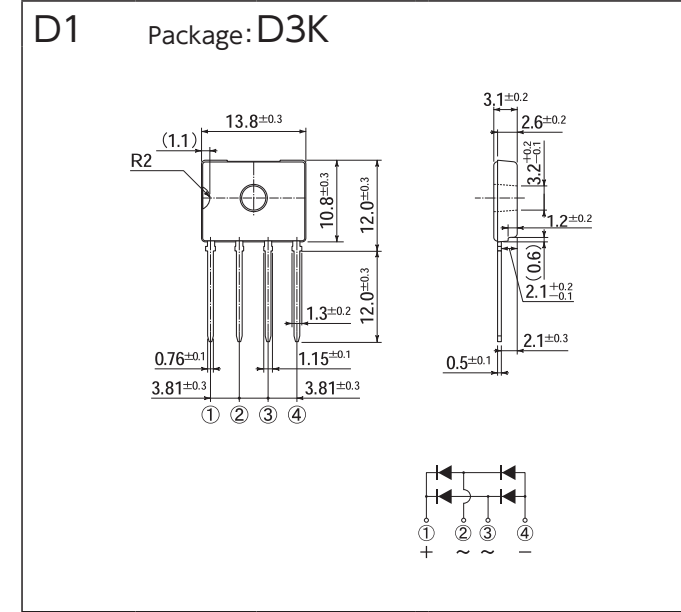
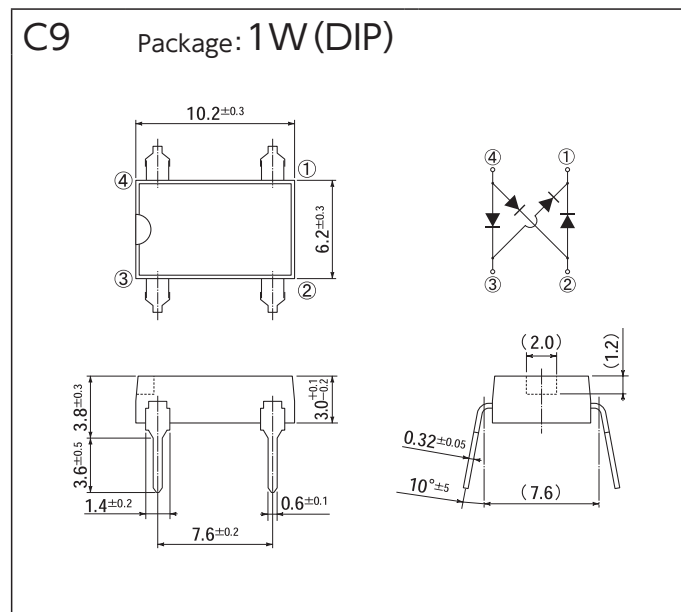
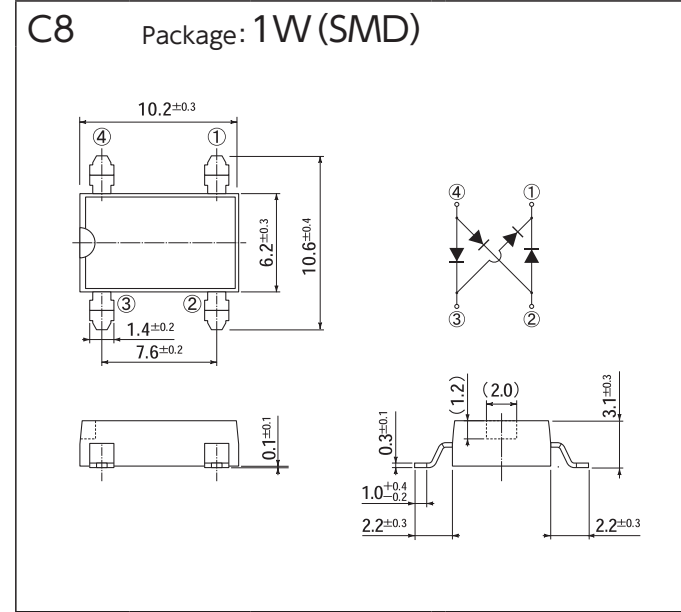
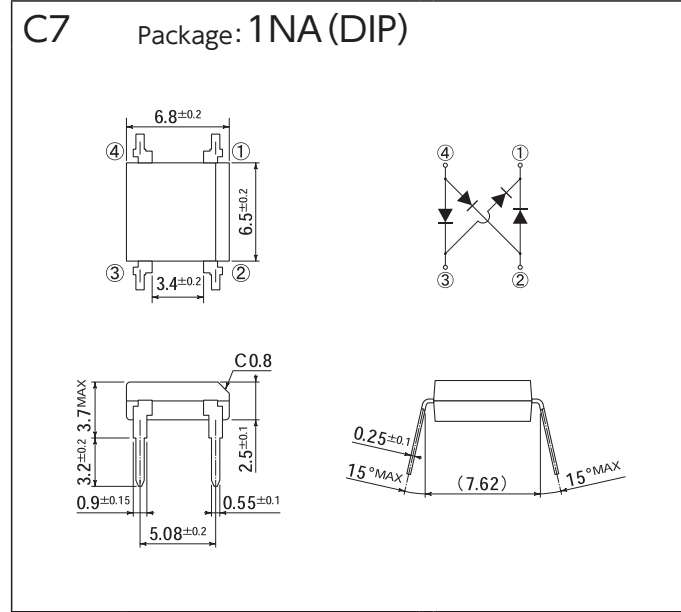


[Unit:mm]



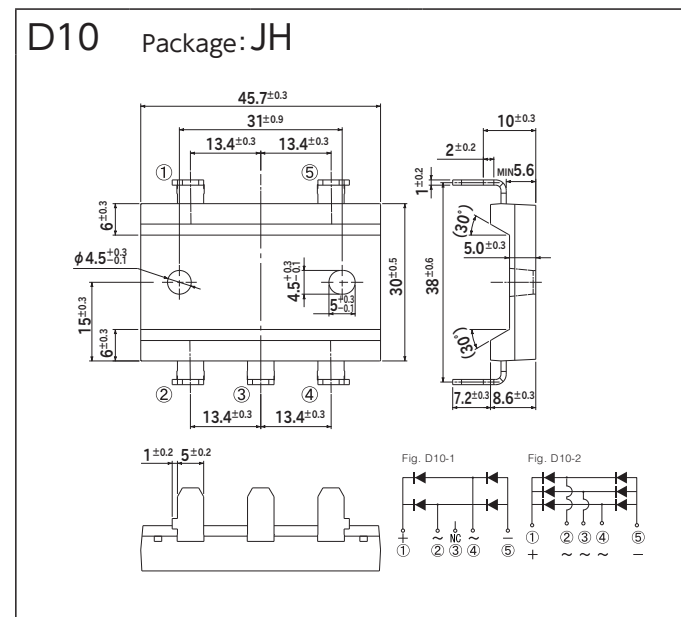
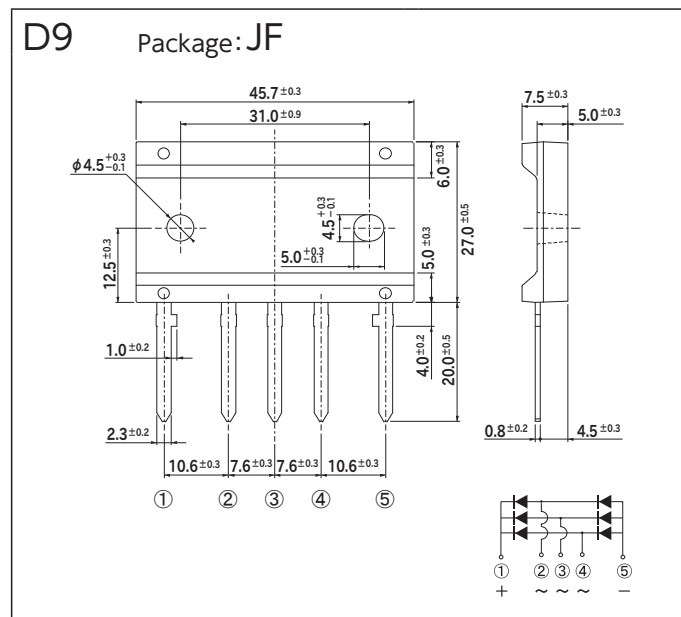
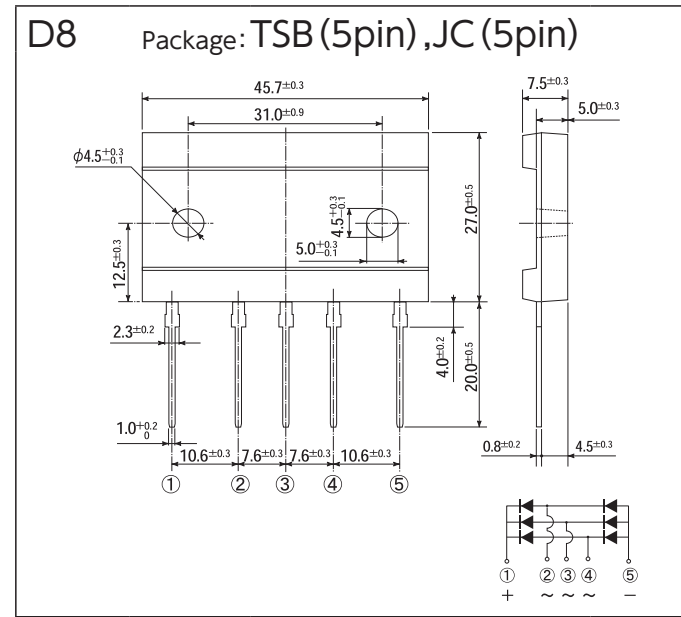
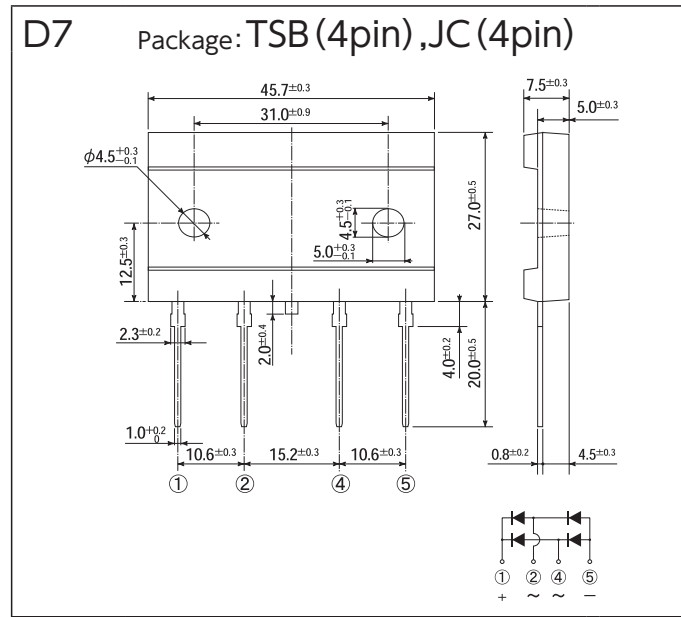
# OUTLINE DIMENSIONS

[Unit:mm]

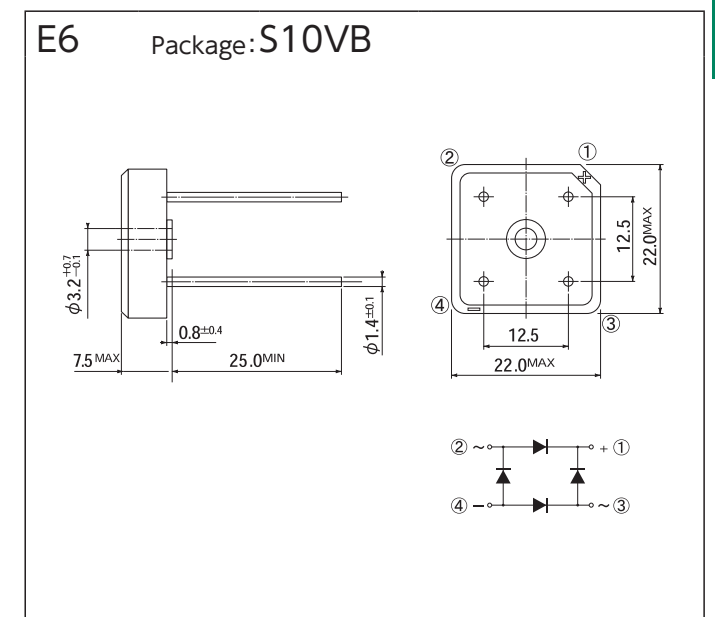
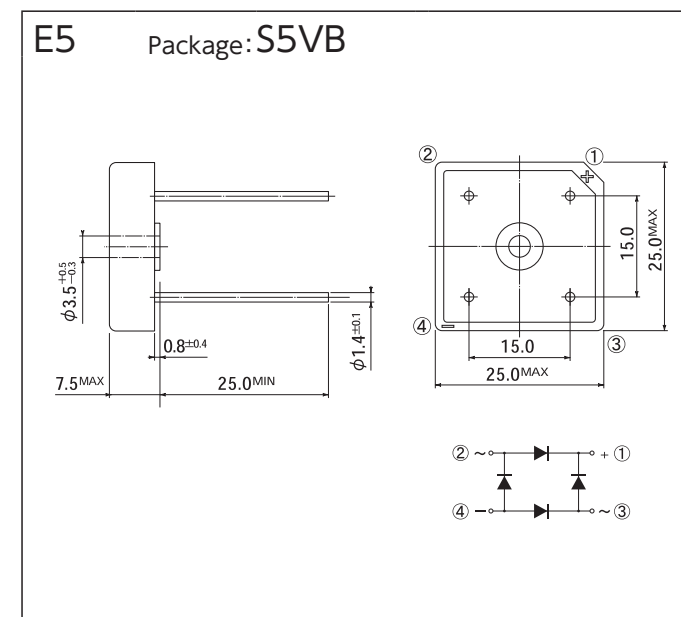
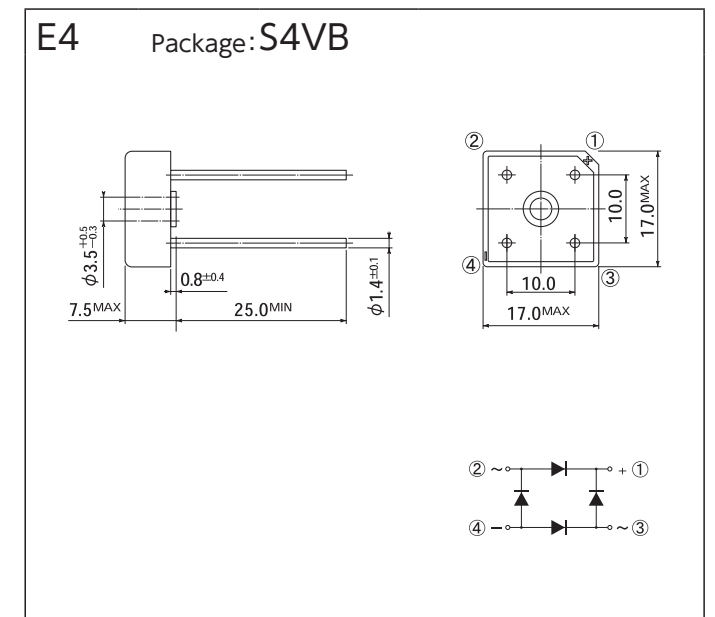
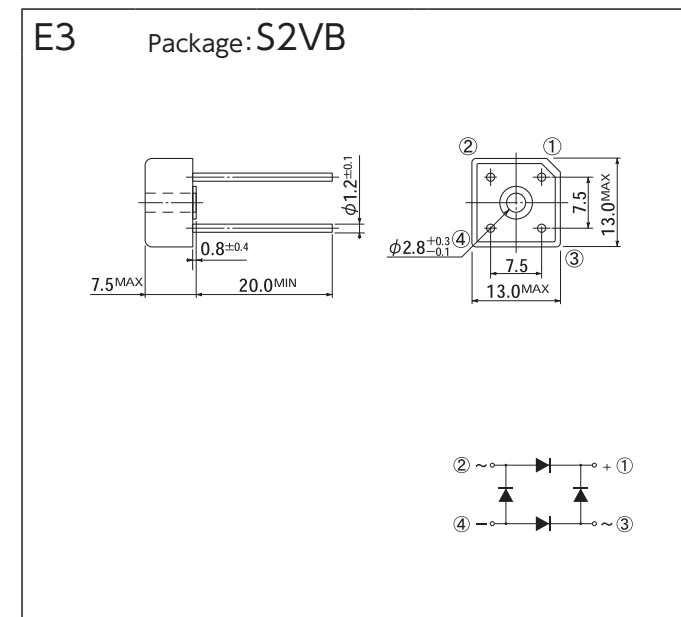
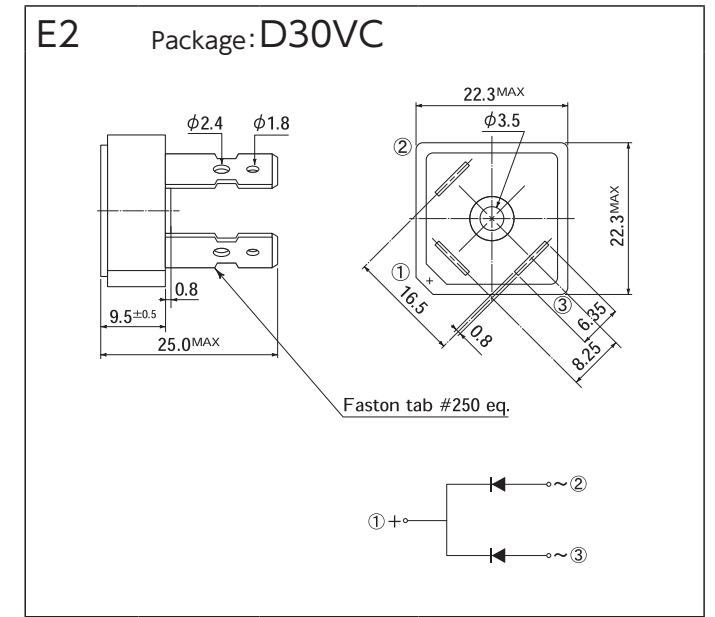
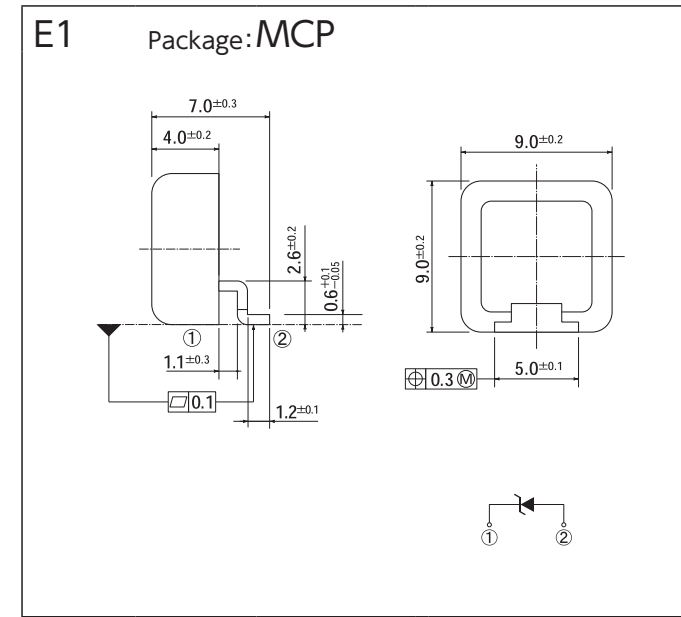


# OUTLINE DIMENSIONS

[Unit:mm]



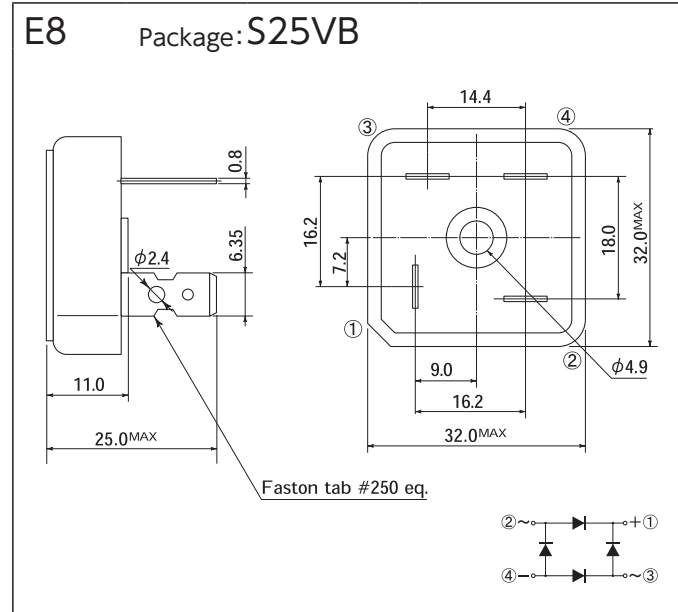
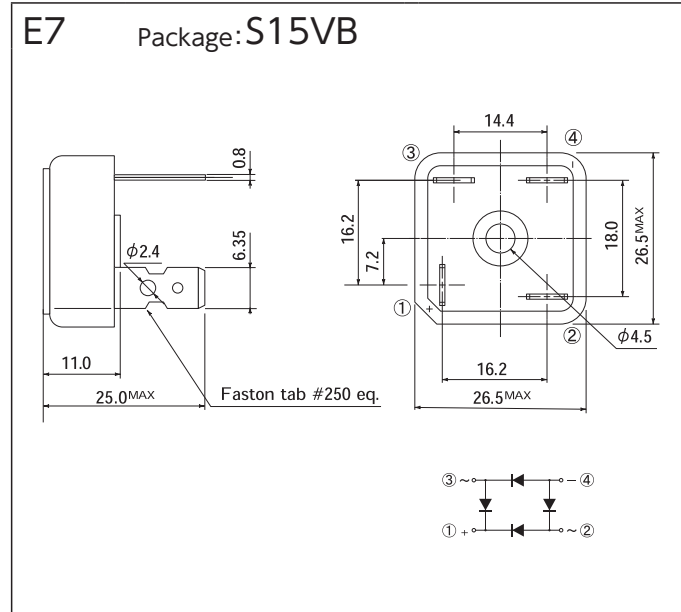
[Unit:mm]



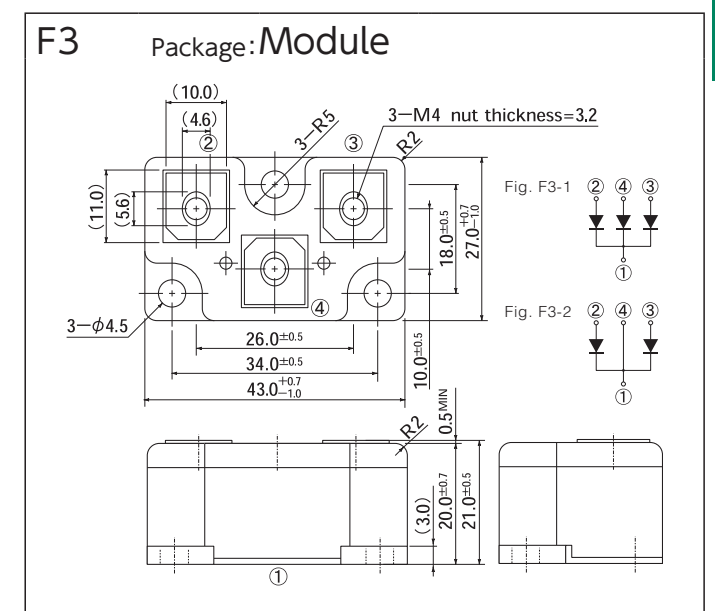
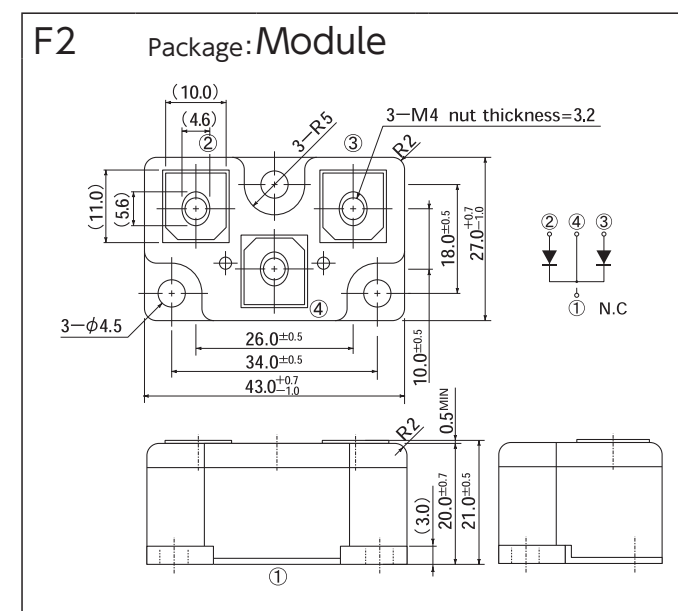
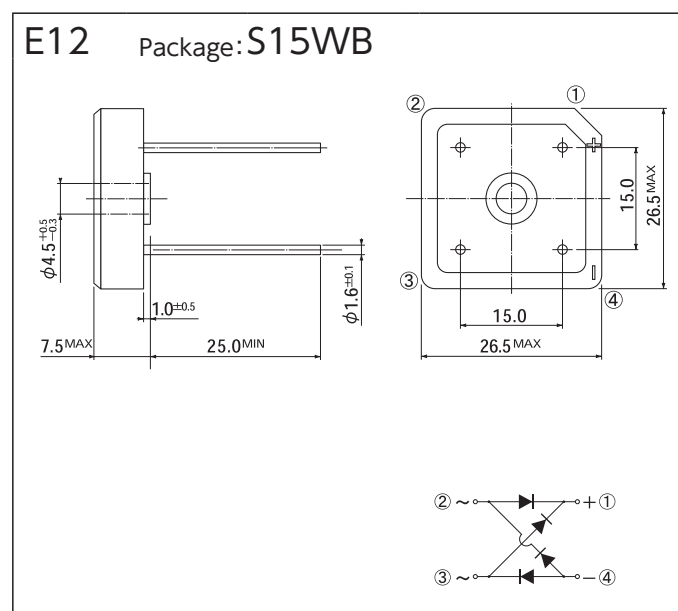
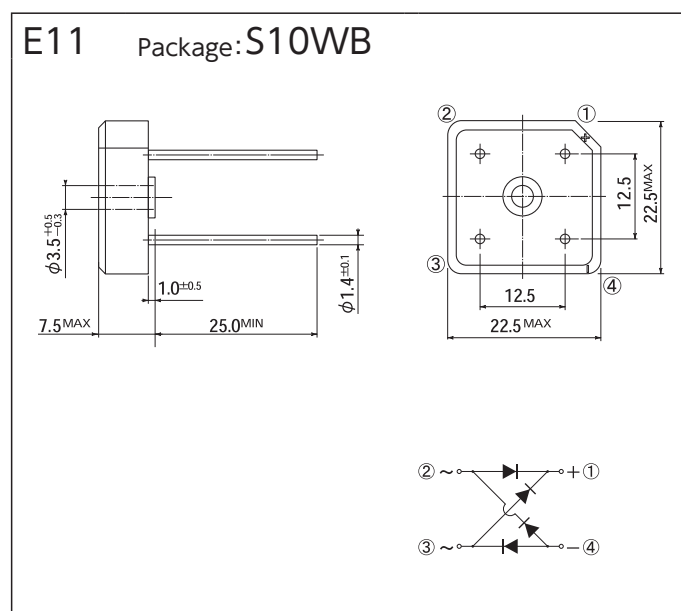
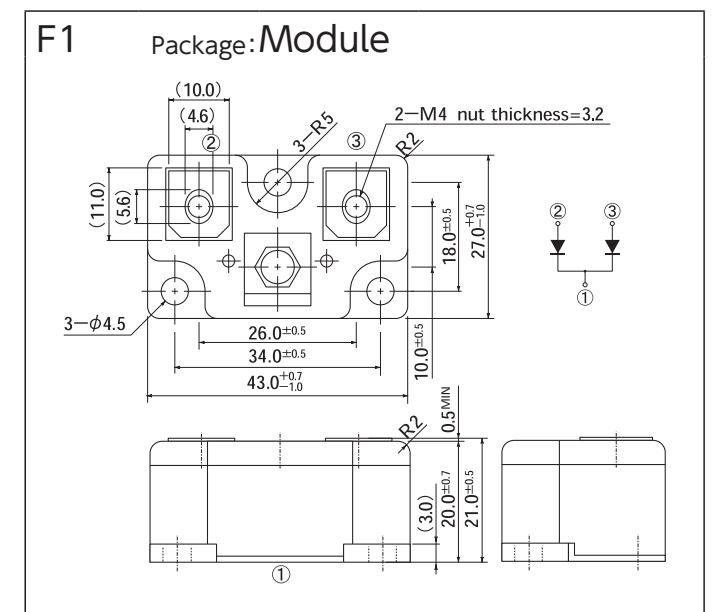
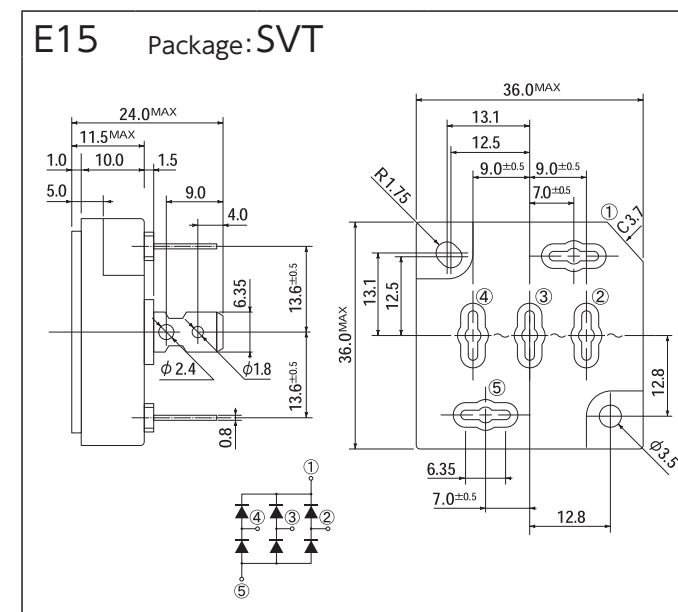
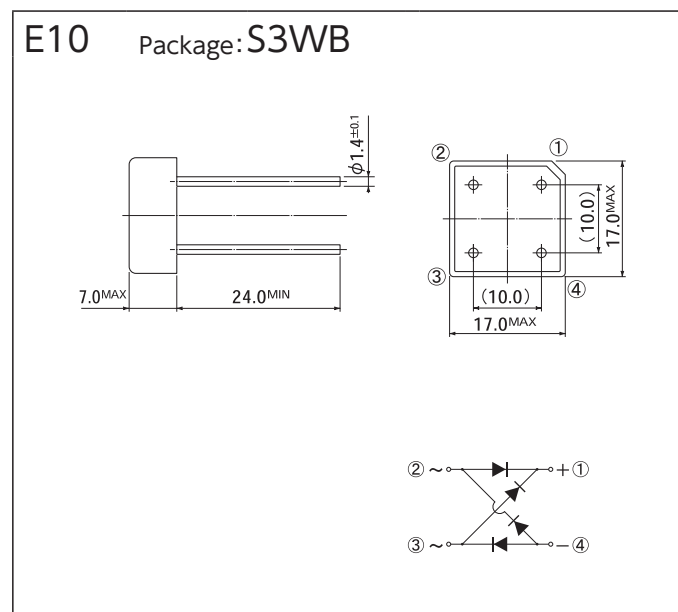
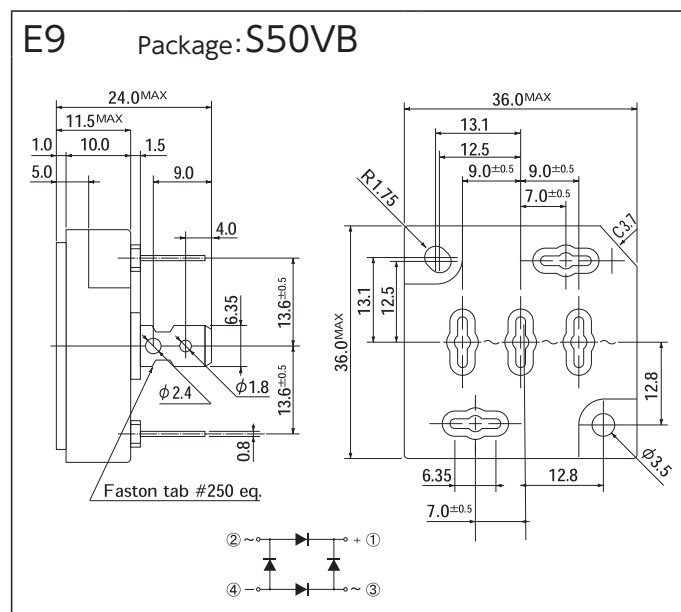
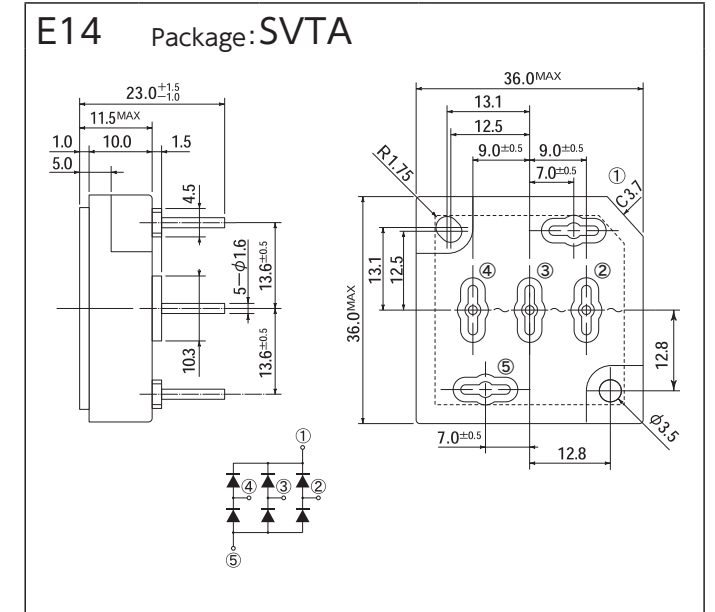
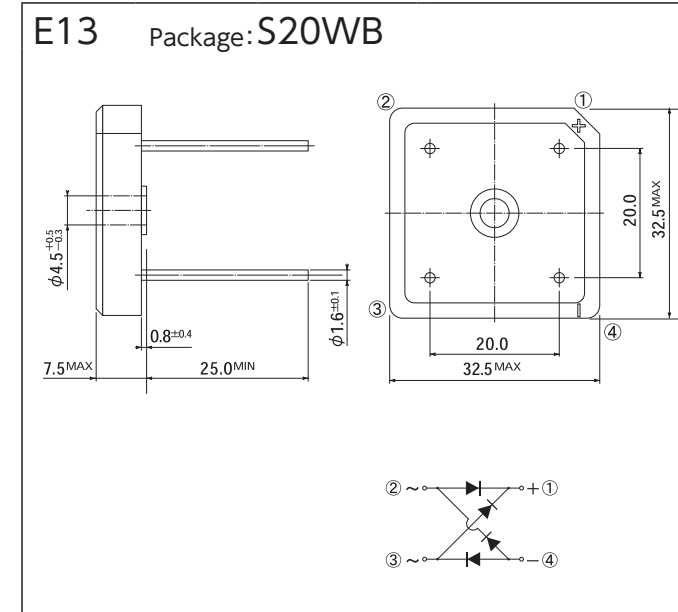
OUTLINE DIMENSIONS

# OUTLINE DIMENSIONS

[Unit:mm]



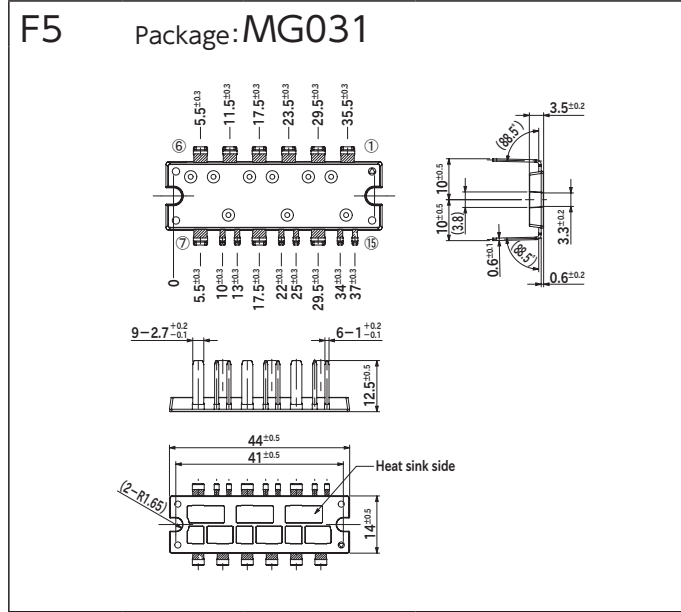
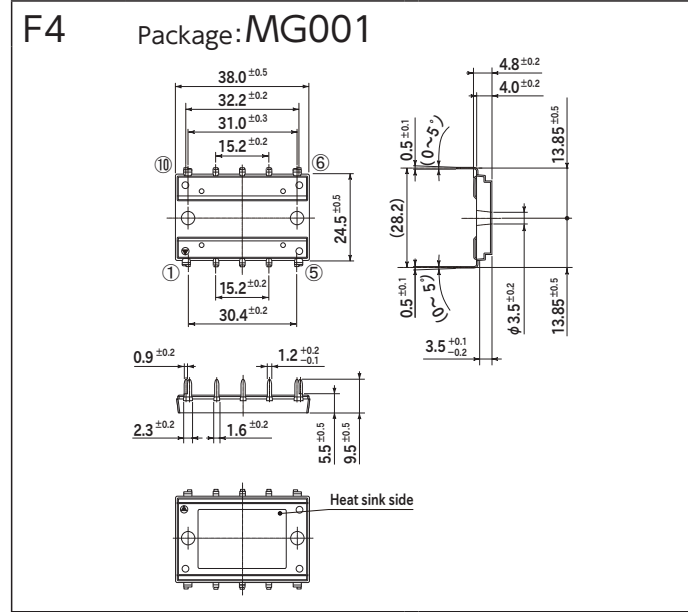
[Unit:mm]



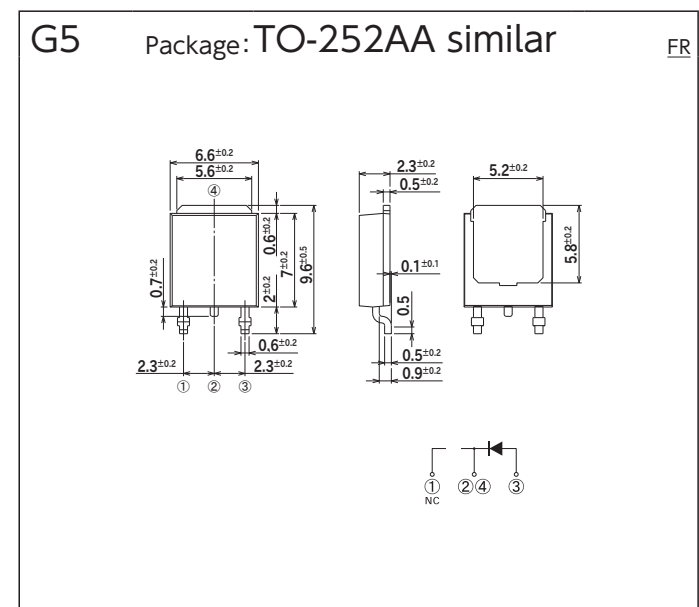
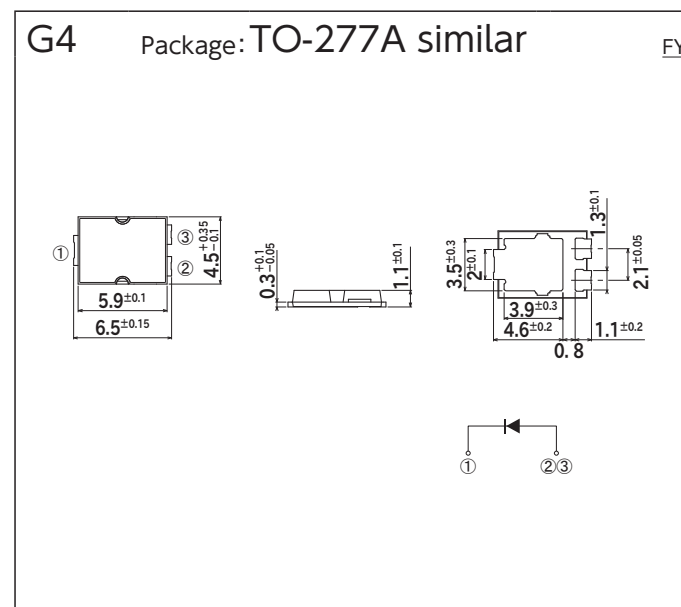
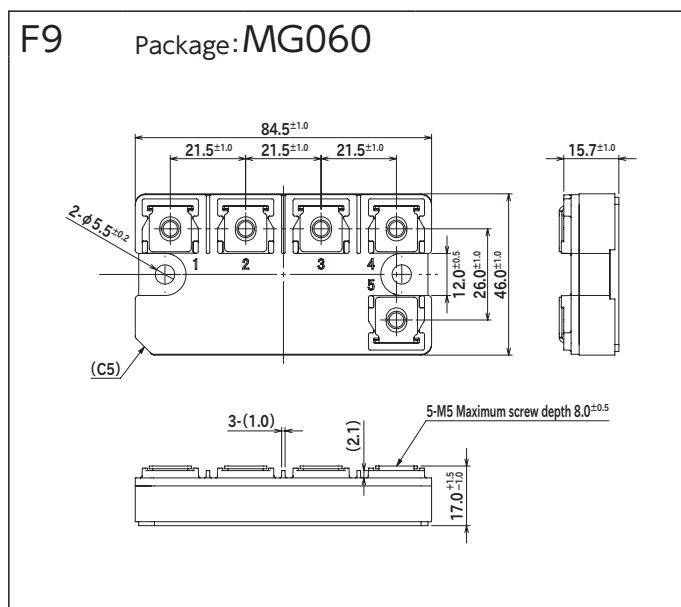
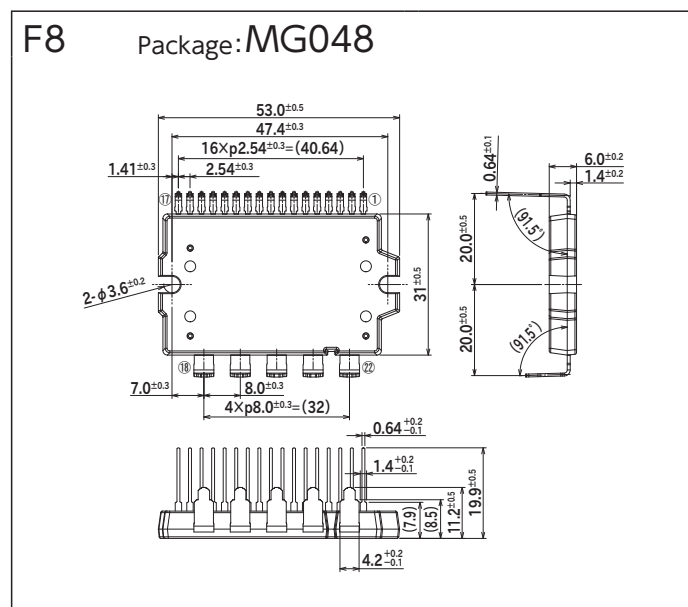
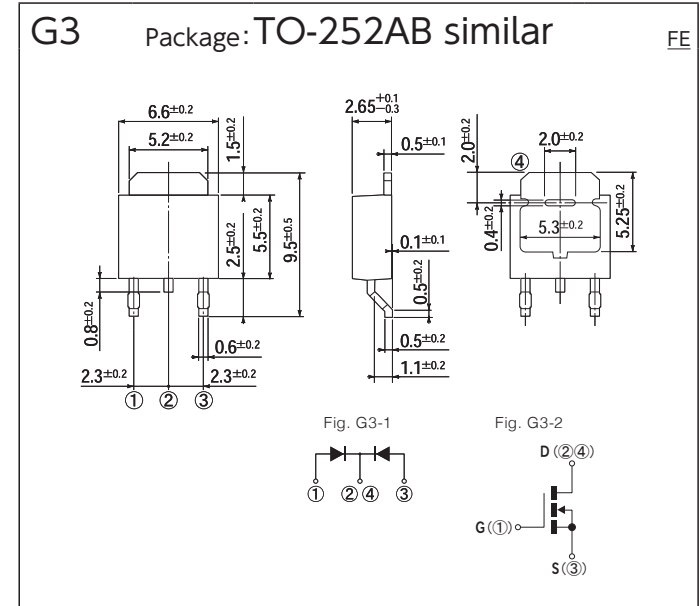
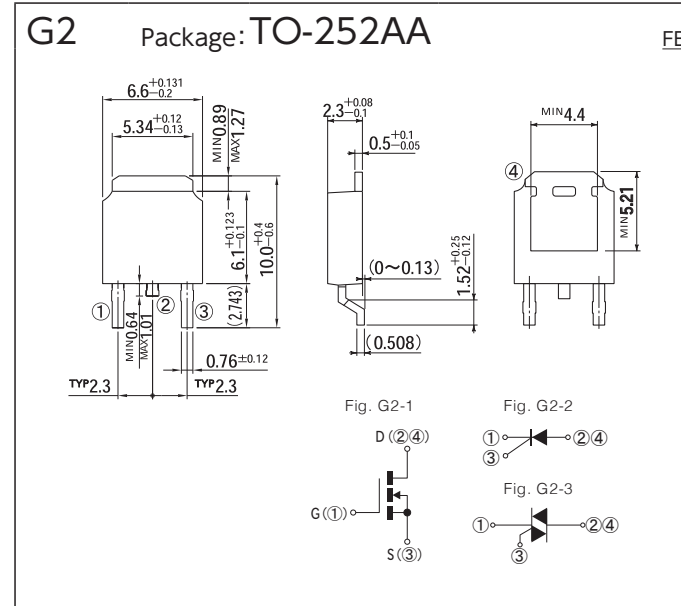
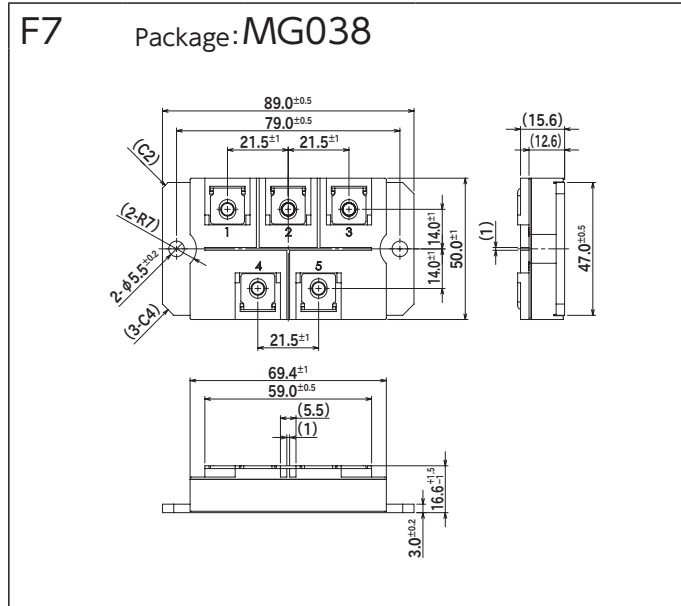
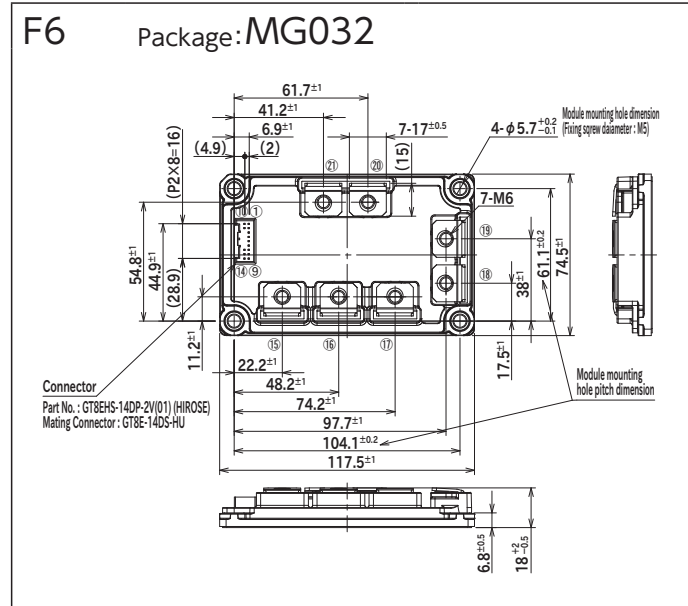
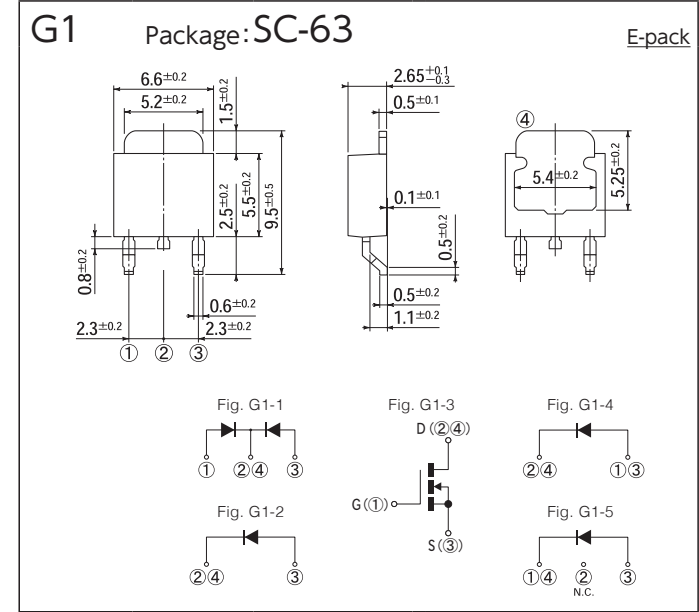
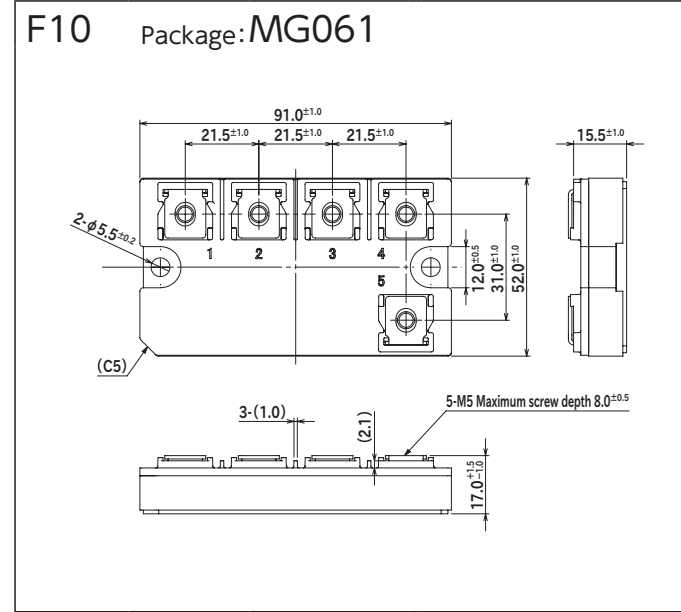
OUTLINE DIMENSIONS

# OUTLINE DIMENSIONS

[Unit:mm]



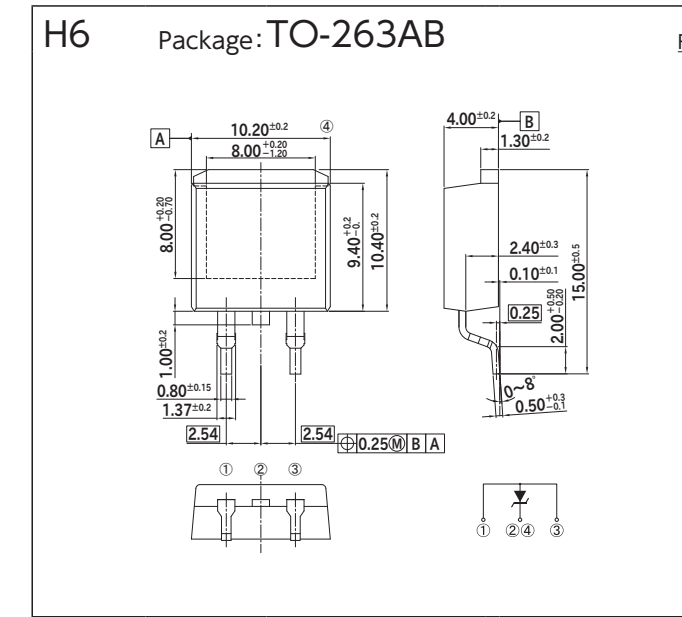
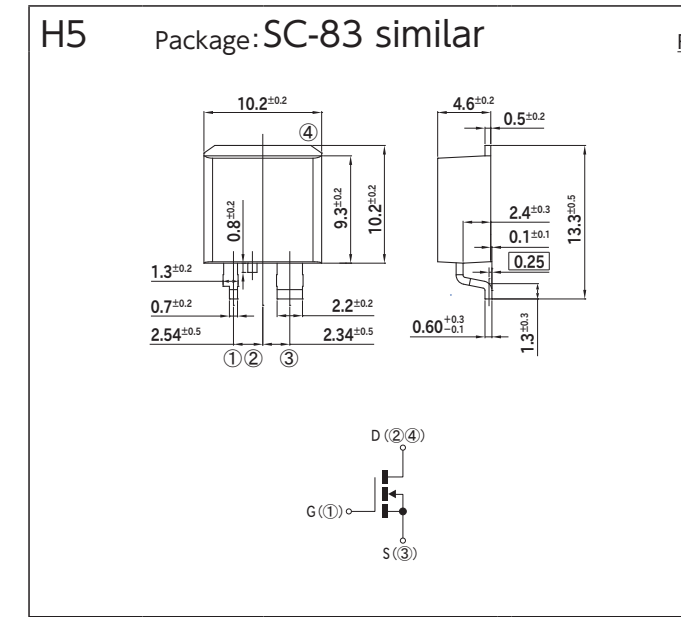
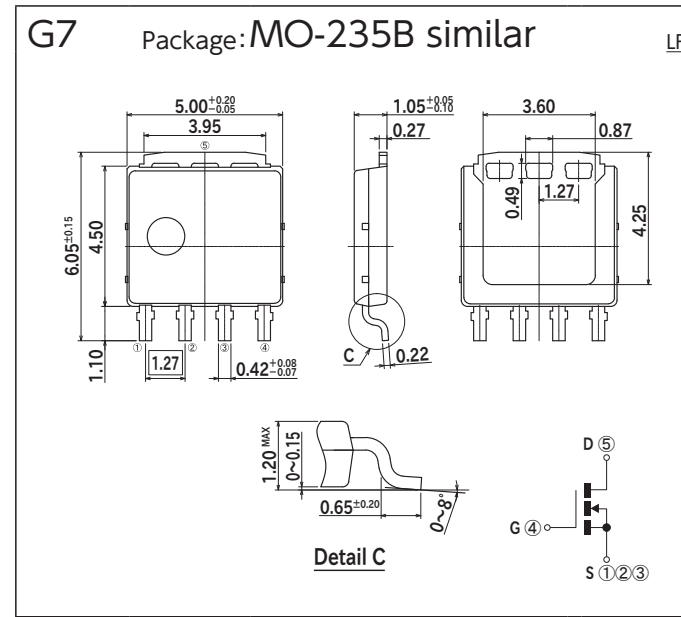
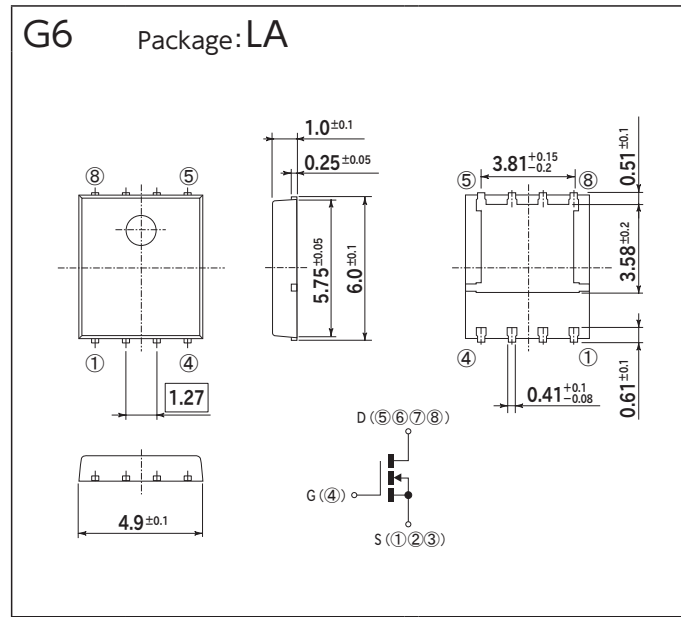
[Unit:mm]



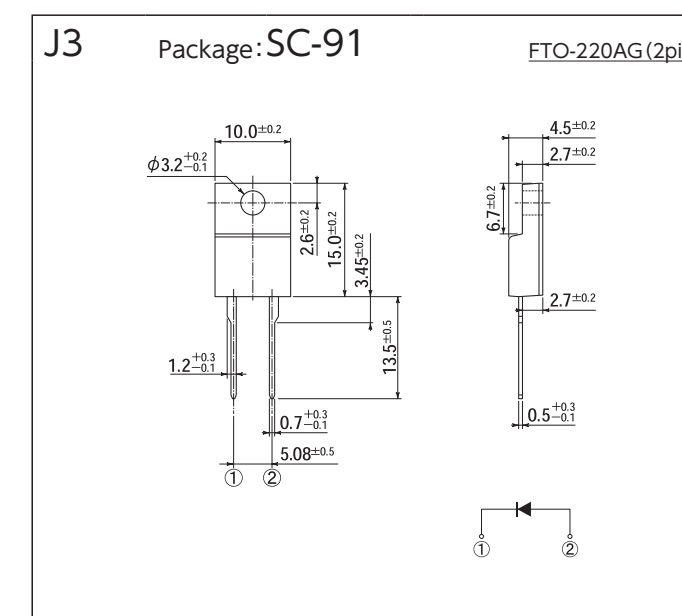
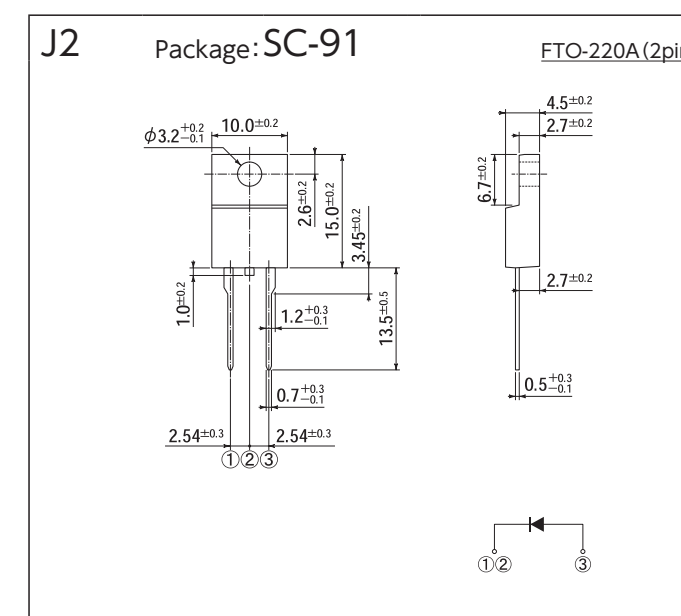
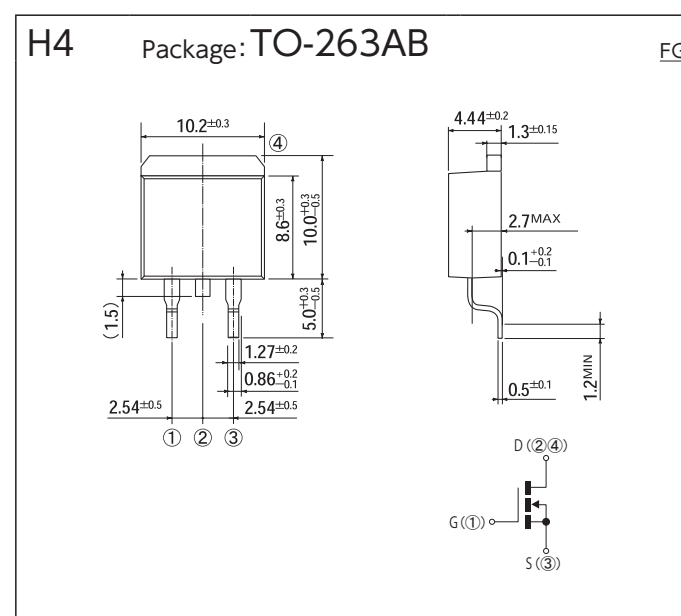
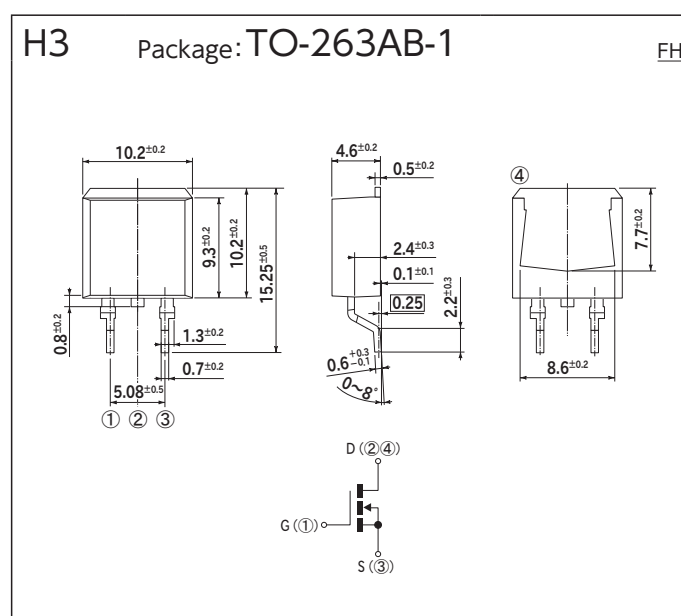
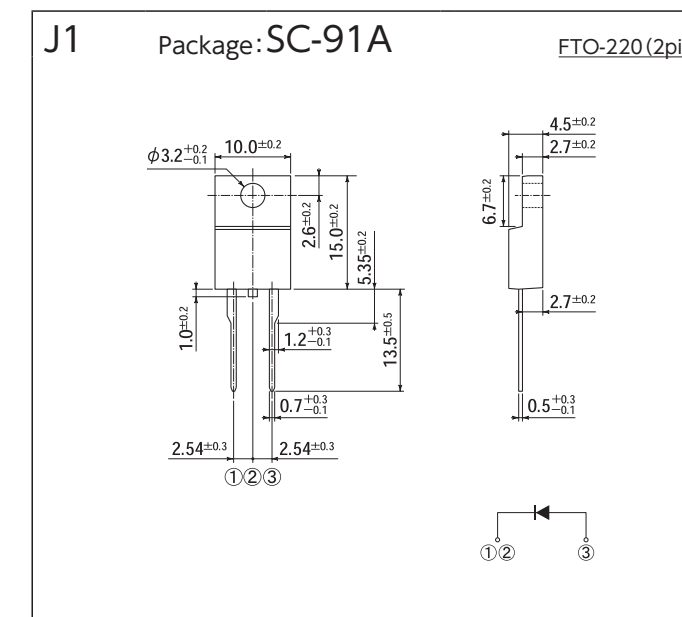
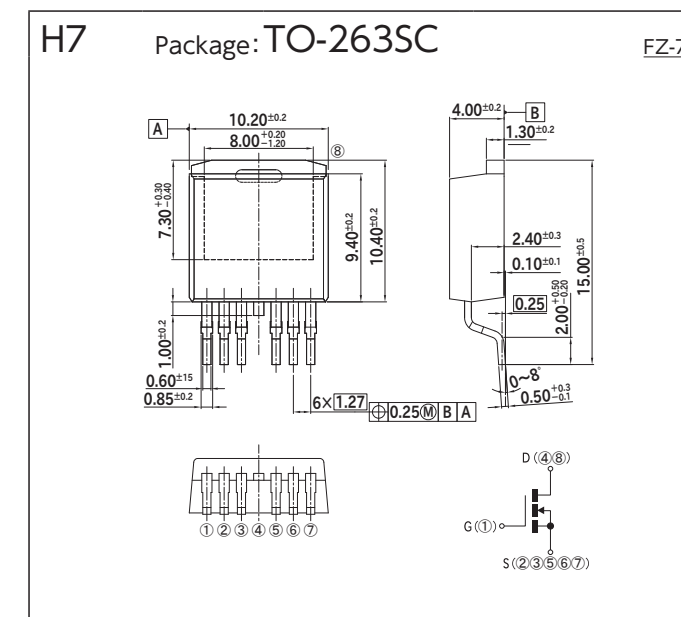
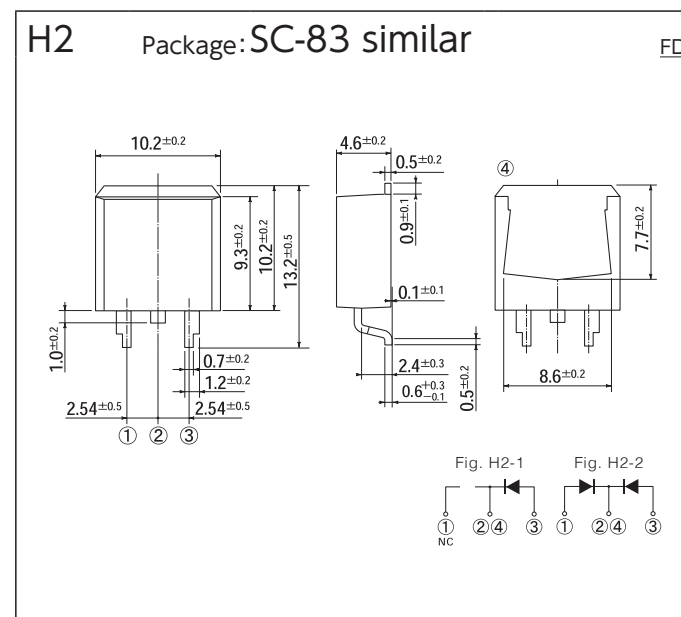
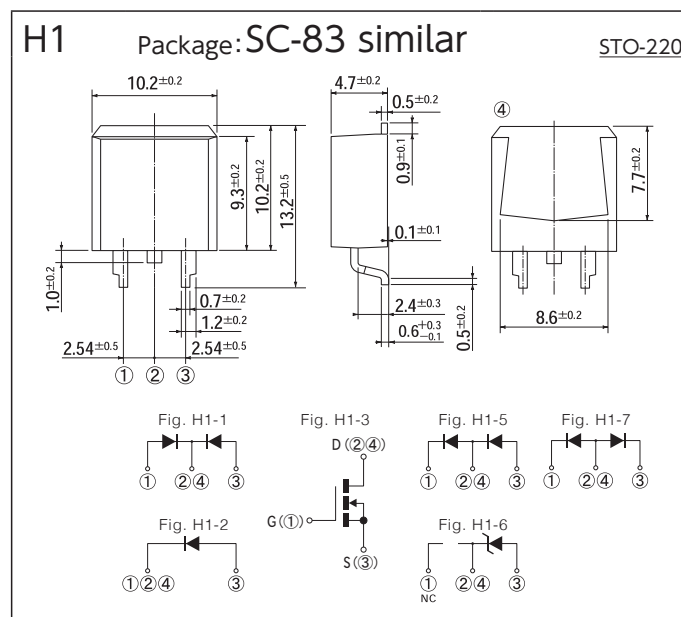


# OUTLINE DIMENSIONS

[Unit:mm]



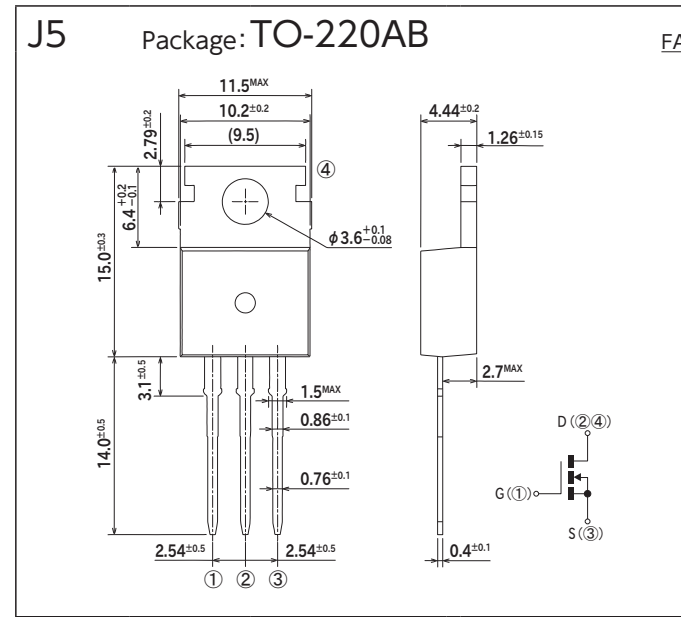
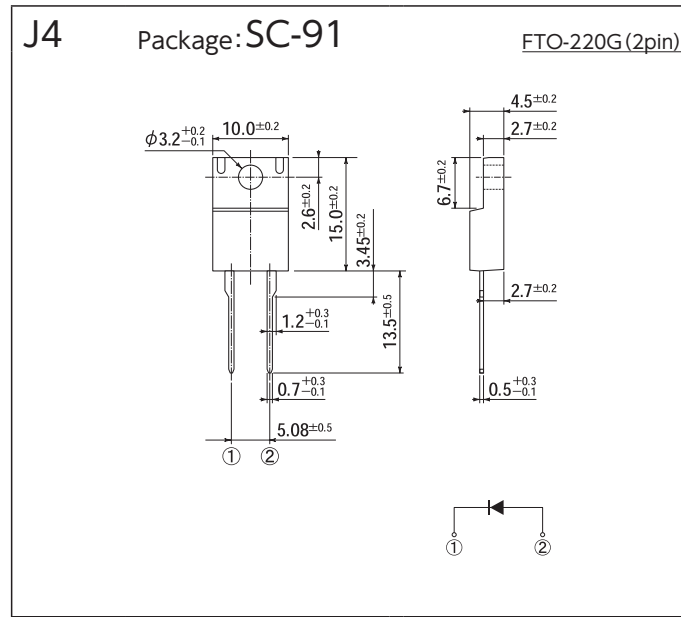
[Unit:mm]



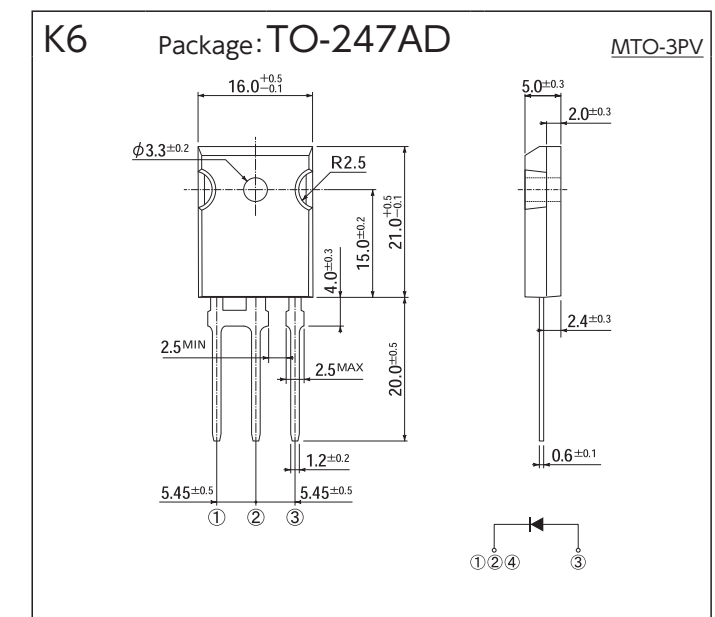
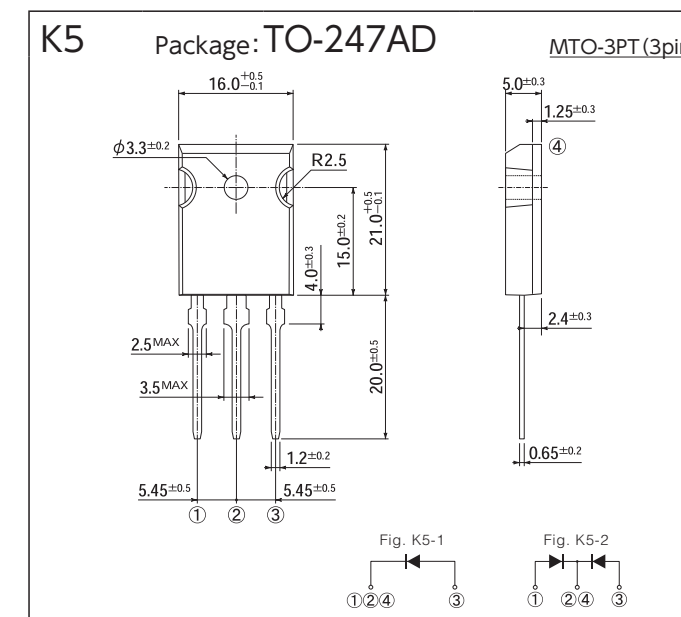
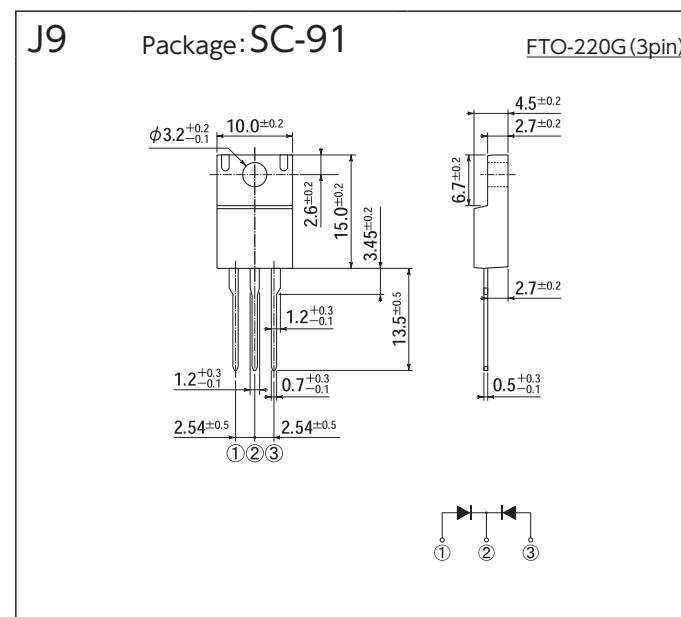
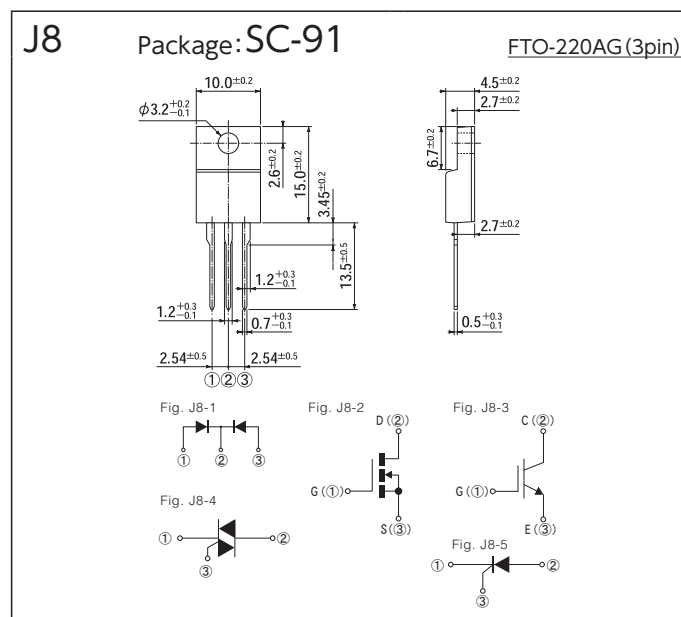
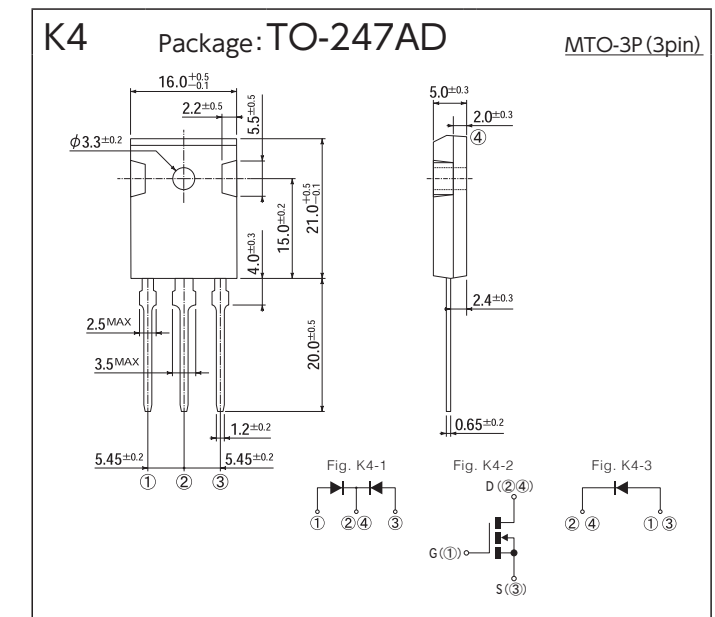
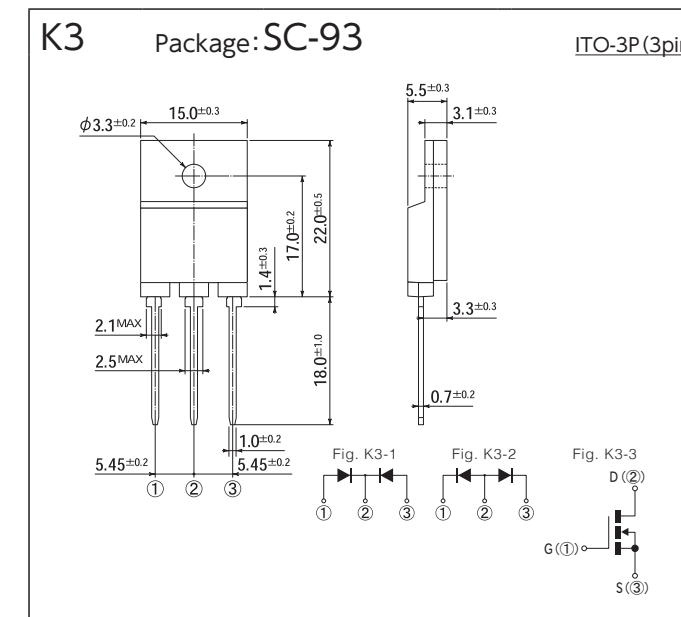
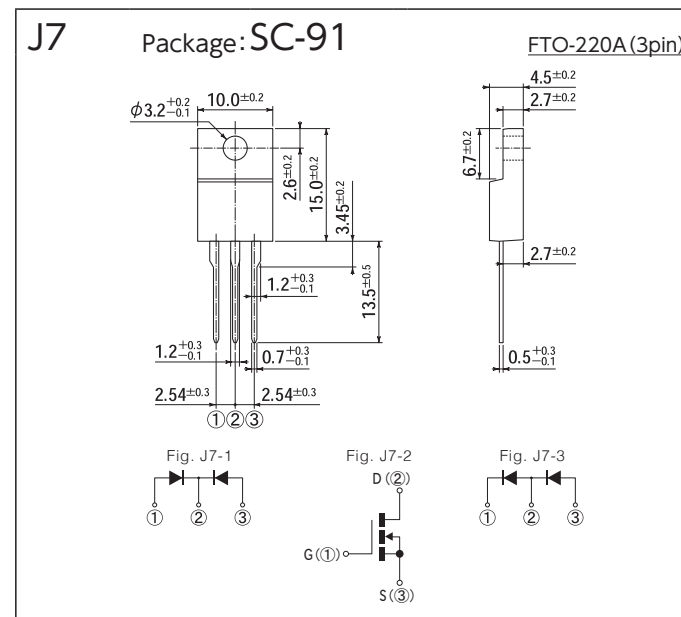
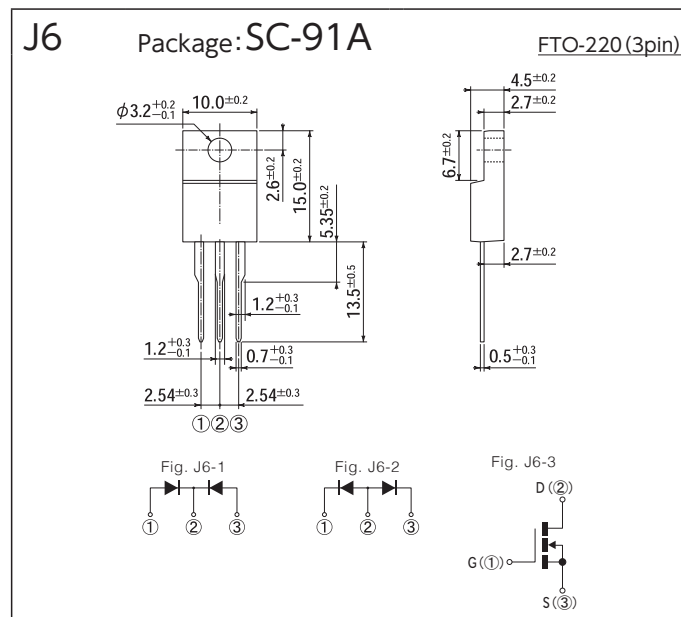
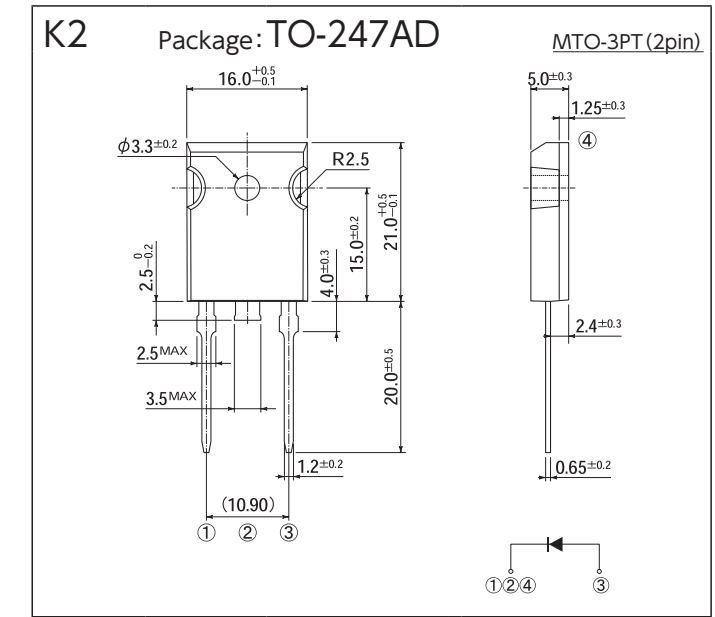
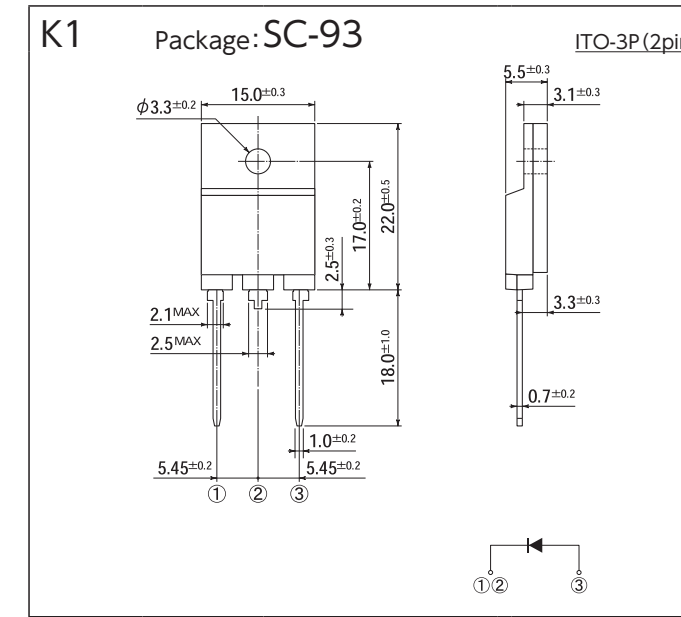
OUTLINE DIMENSIONS

# OUTLINE DIMENSIONS

[Unit:mm]



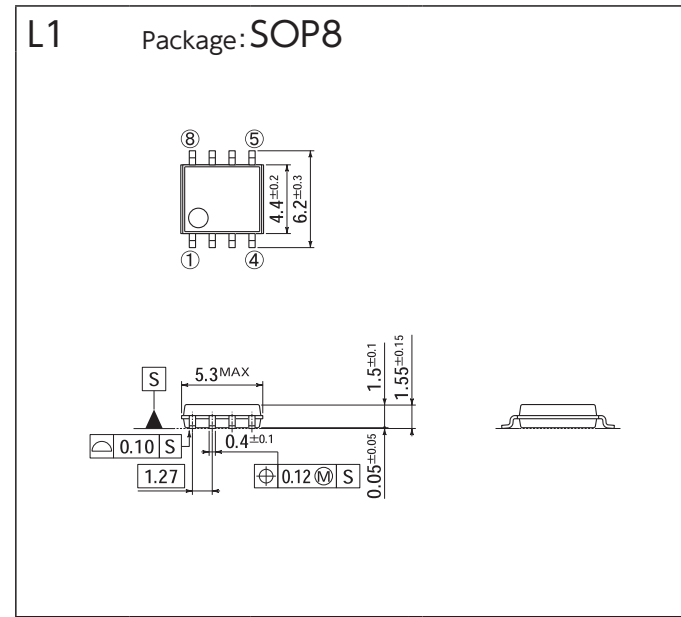
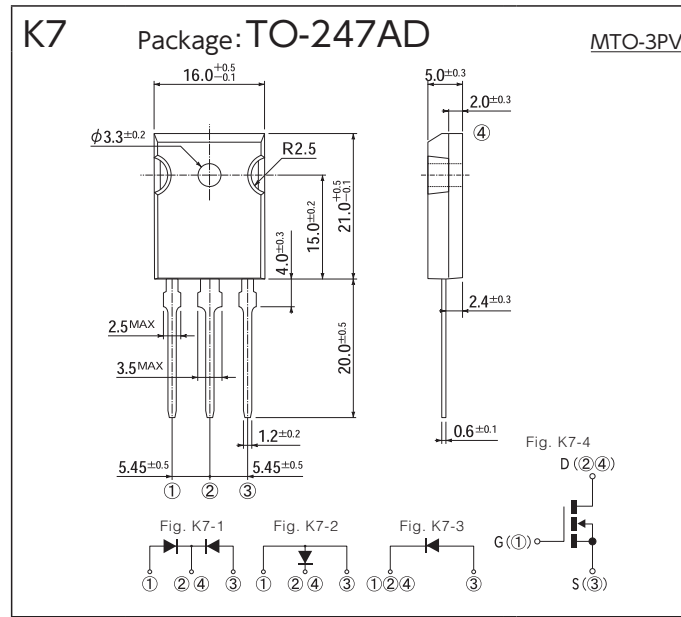
[Unit:mm]



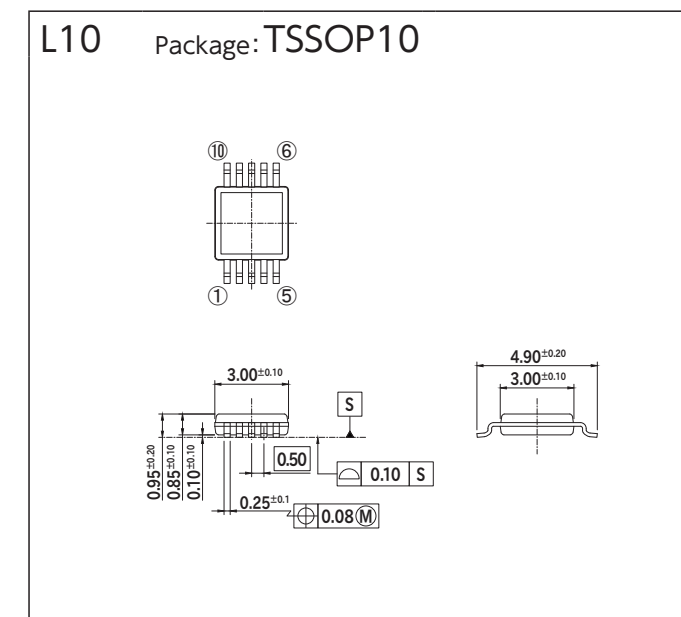
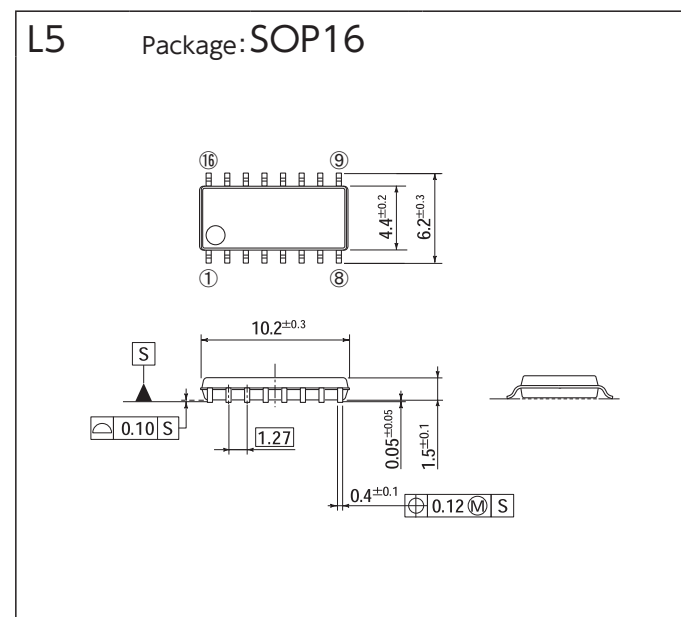
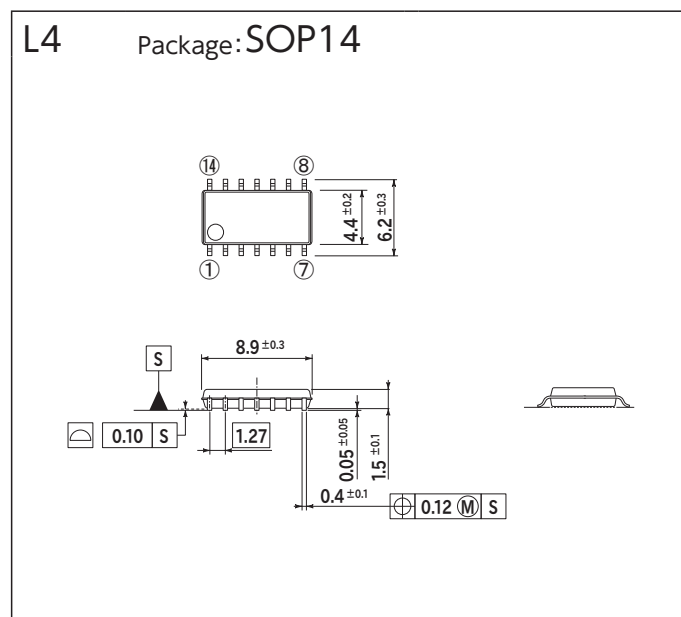
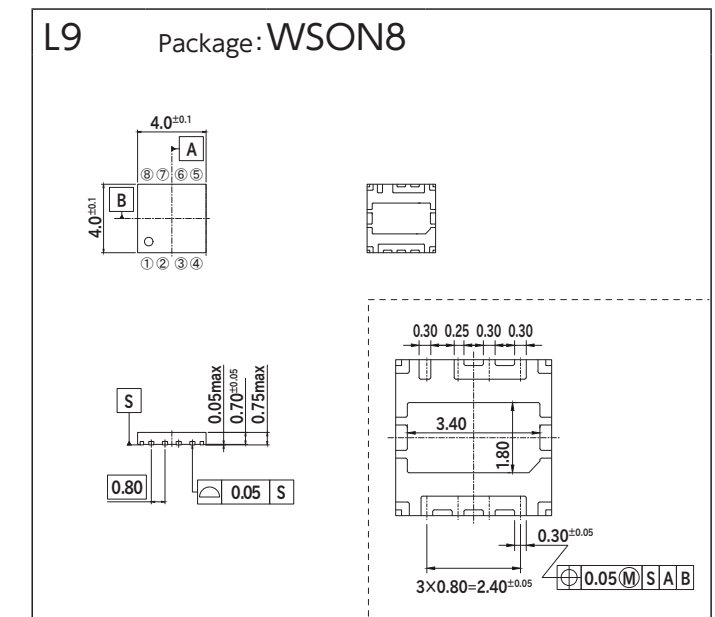
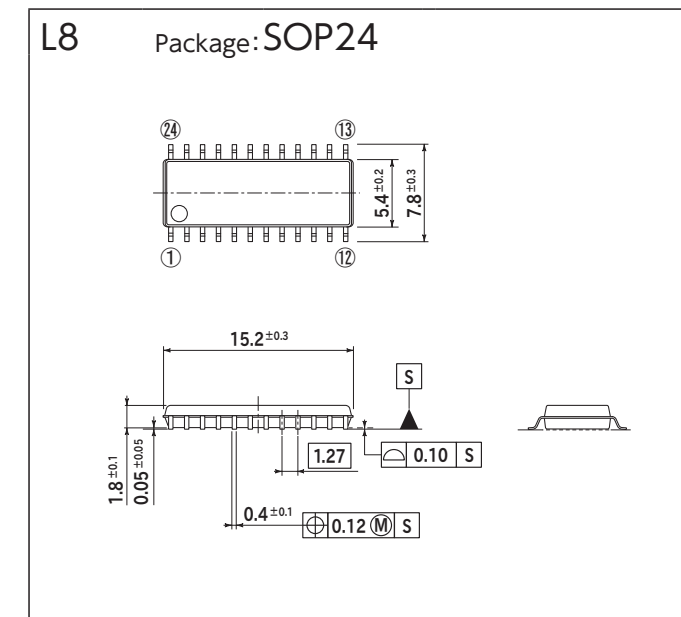
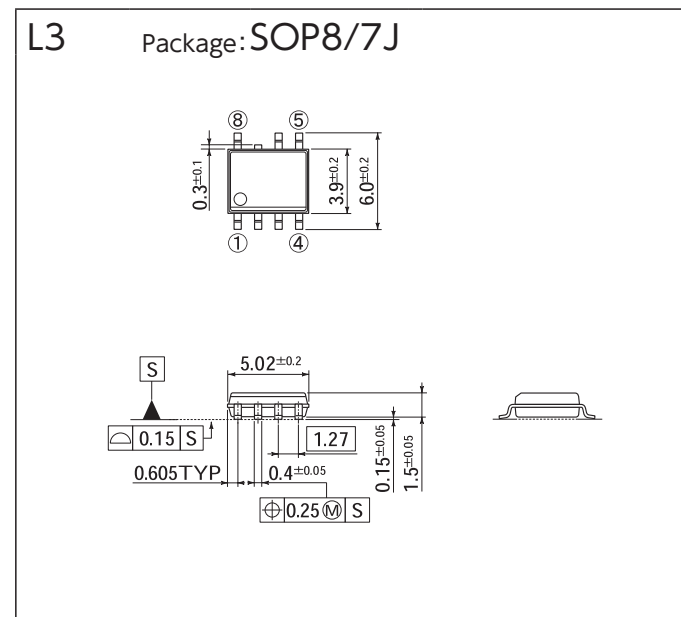
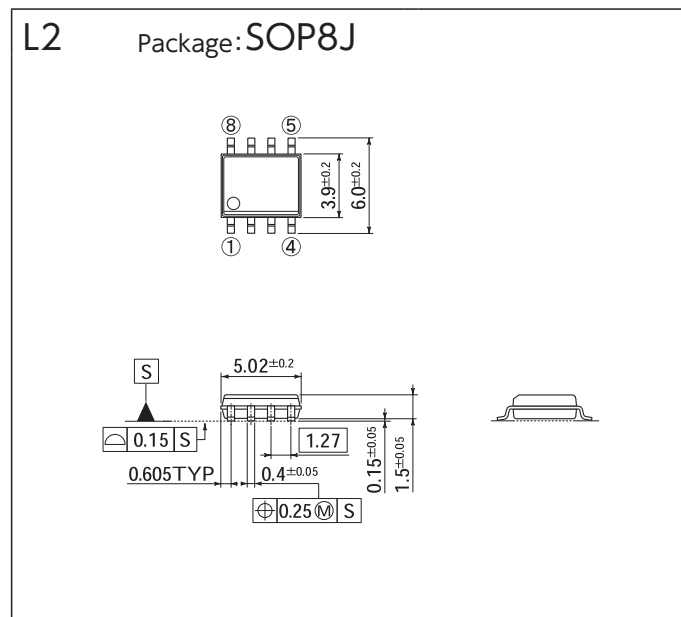
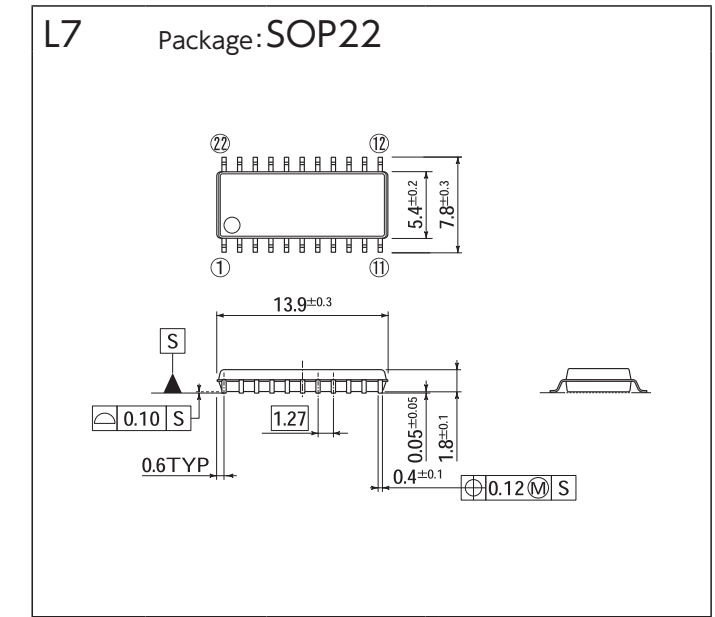
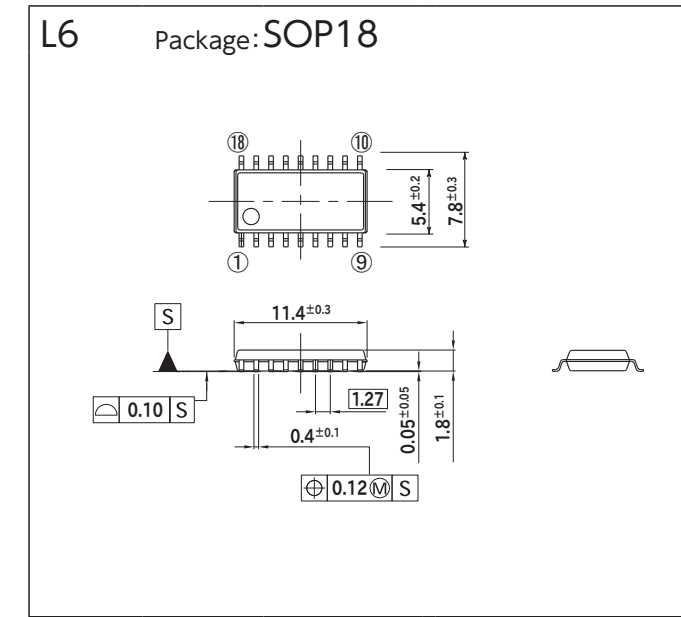
OUTLINE DIMENSIONS

# OUTLINE DIMENSIONS

[Unit:mm]



[Unit:mm]



OUTLINE DIMENSIONS



# NOTES

## How to Order

### 1. Indication of Spec. Code when ordering

Please specify the Spec. Code when ordering semiconductors.  
For the Spec. Code, Please refer to as follows and "PACKING SPECIFICATION".

**Example** Ordering THD type of S1ZB60  
S1ZB60-7101

### 2. Spec Code

The code specifies each packing form, lead forming and terminal plate material.  
Please refer to "PACKING SPECIFICATION".

**Example** 5 0 0 0

- 5 : Terminal forming
  - 0 : Straight terminal
  - 1 to 9 : Each number shows type of form
- 0 : Packing form
  - 0 : Standard
  - In case of surface mounting devices
    - 5, 6 : Small reel
    - 7 : Large reel
  - In case of axial device
    - 6 : Lead length 52mm (T52)
    - 7 : Lead length 26mm (T26)
- 0 : Minimum packing unit
  - 0 : Bulk, tray or taping
  - 1 : Magazine
  - 5 : Tray
  - 6 : Packed (FTO-220 Package)
- 0 : Terminal plate material
  - 3 : Ni/Pd/Au, Sn-Ag
  - 4 : Ni, Ag
  - 5 : Sn-Ag-Cu, Sn, Ag, Sn-Cu
  - 6 : Sn
  - 7 : Sn-Bi

## Outline of Packing Form

### 1. Minimum packing unit

- Bulk : The form in which parts are inserted into plastic bags or cardboard boxes.
- Tray : The form in which parts are inserted in to containers made of resin.



- Magazine : The form in which parts are inserted into resin cartridges designated for automatic inserters.



- Taping
  - Reel (Surface mounting devices)

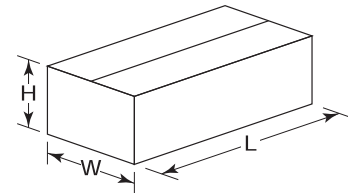


- Box (Axial devices)



### 2. Packing Box Dimensions

See the following pages for the dimensions of each cardboard box.



## About AEC-Q101 & Automotive Grade

### 1. AEC-Q101

These products are based on AEC-Q101.

### 2. Automotive Grade

These products are produced on a designated production line qualified for internal automotive standards.

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[BAS16E6433HTMA1](#) [BAT 54-02LRH E6327](#) [NSR05F40QNXT5G](#) [NTE555](#) [JANS1N6640](#) [SB07-03C-TB-H](#) [SB1003M3-TL-W](#) [SK310-T](#)  
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[NRVBM120ET1G](#) [NSR01L30MXT5G](#) [NTE573](#)