

Thyristors

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Ordering Information

All products listed must be ordered in standard packing increments.

Product Name	Package	Standard Packing Quantities (Bulk)
SLA0201	SLA12Pin	1080(Stick)
STA203A	STA8Pin	1000(Box)/4050(Stick)
TFC563D	TO220S(Straight)	600(Stick)
TF361H-A	TO220F-A	4000(Stick)
TF541S-A	TO220F	1000(Box)/3750(Stick)
TF561S-A	TO220F	1000(Box)/3750(Stick)
TFA37S	TO220F	1000(Box)/3750(Stick)
TFA38S	TO220F	1000(Box)/3750(Stick)
TFA57S	TO220F	1000(Box)/3750(Stick)
TFA58S	TO220F	1000(Box)/3750(Stick)
TFA87S	TO220F	1000(Box)/3750(Stick)
TFA88S	TO220F	1000(Box)/3750(Stick)
TFA107S	TO220F	1000(Box)/3750(Stick)
TFA108S	TO220F	1000(Box)/3750(Stick)
TMA104S-L	TO220F	1000(Box)/3750(Stick)
TMA106G-L	TO220	4000(Stick)
TMA106H-L	TO220F-A	4000(Stick)
TMA106S-L	TO220F	1000(Box)/3750(Stick)
TMA124S-L	TO220F	1000(Box)/3750(Stick)
TMA126G-L	TO220	4000(Stick)
TMA126H-L	TO220F-A	4000(Stick)
TMA126S-L	TO220F	1000(Box)/3750(Stick)
TMA164B-L	TO3PF	500(Box)/1080(Stick)
TMA164P-L	TO3P	500(Box)/1080(Stick)
TMA164S-L	TO220F	1000(Box)/3750(Stick)
TMA166B-L	TO3PF	500(Box)/1080(Stick)
TMA166G-L	TO220	4000(Stick)
TMA166H-L	TO220F-A	4000(Stick)
TMA166P-L	TO3P	500(Box)/1080(Stick)
TMA166S-L	TO220F	1000(Box)/3750(Stick)
TMA204S-L	TO220F	1000(Box)/3750(Stick)
TMA206S-L	TO220F	1000(Box)/3750(Stick)
TMA254B-L	TO3PF	500(Box)/1080(Stick)
TMA256B-L	TO3PF	500(Box)/1080(Stick)
TMA34S-L	TO220F	1000(Box)/3750(Stick)
TMA36G-L	TO220	4000(Stick)
TMA36H-L	TO220F-A	4000(Stick)
TMA36S-L	TO220F	1000(Box)/3750(Stick)
TMA54S-L	TO220F	1000(Box)/3750(Stick)
TMA56G-L	TO220	4000(Stick)
TMA56H-L	TO220F-A	4000(Stick)
TMA56S-L	TO220F	1000(Box)/3750(Stick)
TMA84S-L	TO220F	1000(Box)/3750(Stick)
TMA86G-L	TO220	4000(Stick)
TMA86H-L	TO220F-A	4000(Stick)
TMA86S-L	TO220F	1000(Box)/3750(Stick)
TMB166S-L	TO220F	1000(Box)/3750(Stick)
TMB206S-L	TO220F	1000(Box)/3750(Stick)

Application Note

Since reliability can be affected adversely by improper storage environment or handling methods during Characteristic tests, please observe the following cautions.

■ Cautions for Storage

- Ensure that storage conditions comply with the normal temperature (5 to 35°C) and the normal relative humidity (around 40 to 75%), and avoid storage locations that experience high temperature and humidity, or extreme changes in temperature or humidity.
- Avoid locations where dust or harmful gases are present, and avoid direct sunlight.
- Reinspect the devices for rust in leads and solderability after stored for a long time.

■ Cautions for Characteristic Tests and Handling

On characteristics test at incoming inspection, etc, take good care to avoid the surge voltages from the test equipment, the short circuit at terminals, or the wrong connection.

■ Silicone Grease

When using a heatsink, please coat thinly and evenly the back surface of the device and both surfaces of the insulating plate with silicone grease to lower the thermal resistance between the device and the heatsink.

Please select proper silicone grease carefully since the oil in some grease products may penetrate the device and result in an extremely short device life.

Recommended Silicone Grease

- G-746 (Shin-Etsu Chemical)
- YG6260 (Momentive Performance Materials Inc.)
- SC102 (Dow Corning Toray Silicone)

■ Mounting Torque

When mounting torque is insufficient, thermal resistance increases, and so heat radiation effect is decreased. When the torque is excessive, the screw may be broken, the heatsink may be deformed, and the device frame may be distorted, resulting in the device damage. Recommended mounting torque per package is as follows:

● Mounting Torque Table

Package	Screw Torque
TO220	0.490 to 0.686 N•m (5 to 7kgf•cm)
TO220F-A, TO220F (FM20)	
TO3P (MT100)	0.686 to 0.882 N•m (7 to 9kgf•cm)
TO3PF (FM100)	
SLA (SIP with Fin)	0.588 to 0.784 N•m (6 to 8kgf•cm)

- * When the surface of a heatsink where Full Mold package is to be mounted is not flat due to the burred metal bracket for screwing around the mounting hole of the heatsink, the resin of the package might be cracked even if the torque is lower than the recommended value.
- * When a screw is fastened with an air driver for the Full Mold package, a large impact is generated at the time of stop, and the resin may crack even if the torque is lower than the recommended value. An electric driver, therefore, should be used instead of an air driver.

■ Heatsink

A larger contact area between the device and the heatsink is required for more effective heat radiation. To ensure a larger contact area, minimize mounting holes. And select a heatsink with a surface smooth enough and free from burrs and slivers.

■ Soldering Temperature

In general, the device mounted on a printed circuit board is subjected to high temperatures from flow solder in a solder bath, or, from a soldering iron at hand soldering.

The testing method and test conditions (JIS-C-7021 standards) for a device's heat resistance to soldering are:

At a distance of 1.5mm from the device's main body, apply 260°C for 10 seconds, and 350°C for 3 seconds.

Please observe these limits and finish soldering in as short a time as possible.

Since reliability can be affected adversely by improper storage environment or handling methods during Characteristic tests, please observe the following cautions.

3-1 Thyristors

Thyristors

Part Number	Absolute Maximum Ratings												I _{RRM} I _{IDRM} (mA) max	Conditions T _j (°C)
	V _{RSM} V _{DSM} (V)	V _{RRM} V _{DRM} (V)	I _T (AV) (A)	Conditions T _c (°C)	I _T (RMS) (50Hz) (A)	I _{TSM} 50Hz Single Half Sine Wave, Default T _j =125°C (A)	P _{GM} (W)	P _G (AV) (W)	V _{RGM} (V)	I _{FGM} (A)	T _j (°C)	T _{stg} (°C)		
TF541S-A	500	400	5.0	88	7.8	80	5.0	0.5	5.0	2.0	-40 to +125		2.0	125
SLA0201	650	600	5 × 4		7.8	80	5.0	0.5	5.0	2.0	-40 to +125		2.0	125
TF361H-A	700	600	3.0	83	4.7	*1 60	5.0	0.5	5.0	2.0	-40~+110	-40~+125	2.0	125
TF561S-A	700	600	5.0	88	7.8	80	5.0	0.5	5.0	2.0	-40 to +125		2.0	125
TFA37S	-	700	3.0	127	4.7	60	5.0	0.5	5.0	2.0	-40 to +150		2.0	150
TFA57S	-	700	5.0	115	7.8	80	5.0	0.5	5.0	2.0	-40 to +150		2.0	150
TFA87S	-	700	8.0	98	12.6	120	5.0	0.5	5.0	2.0	-40 to +150		2.0	150
TFA107S	-	700	10	86	15.7	160	5.0	0.5	5.0	2.0	-40 to +150		2.0	150
TFA38S	-	800	3.0	50	4.7	60	5.0	0.5	5.0	2.0	-40 to +150		2.0	150
TFA58S	-	800	5.0	50	7.8	80	5.0	0.5	5.0	2.0	-40 to +150		2.0	150
TFA88S	-	800	8.0	50	12.6	120	5.0	0.5	5.0	2.0	-40 to +150		2.0	150
TFA108S	-	800	10	50	15.7	160	5.0	0.5	5.0	2.0	-40 to +150		2.0	150

*1: Default T_j=110°C

3-Pin Reverse Conducting Thyristors for HID Lamp Ignition

Part Number	Absolute Maximum Ratings										I _{IDRM} (mA) max	Conditions T _j (°C)	V _{TM} (V) max	Conditions	
	V _{DRM} (V)	I _{TRM} *1 (A)	di/dt*1 (A/μs)	P _{GM} (W)	P _G (AV) (W)	V _{RGM} (V)	I _{FGM} *2 (A)	I _{FRM} (A)	T _j (°C)	T _{stg} (°C)				T _c (°C)	I _{TM} (A)
TFC563D	600	500	1500	5.0	0.5	5.0	2.0	450	-40 to +125		1.0	125	1.4	25	10

*1: T_c≤100°C, V_D≤430V, W_p≤1.0μs, I_G≥70mA, dig/dt≥0.5A/μs, 100kcycles

*2: T_c≤100°C, V_D≤430V, W_p≤1.0μs, 100kcycles

Electrical Characteristics																	Package	Mass g
V _{TM} (V) max	Conditions T _c (°C) I _{TM} (A)		V _{GT} (V)		I _{GT} (mA)		Conditions T _c (°C)	V _{GD} (V) min	T _j (°C)	Conditions V _D (V)	dv/dt (V/μs) typ	Conditions T _j (°C)	V _D (V)	I _H (mA) typ	R _{th} (°C/W) max			
	1.4	25	10		1.5	0.03	0.2	25	0.1	125	1/2V _{DRM}	20	125	1/2V _{DRM}	4.0	4.0	TO220F	2.0
1.4	25	10	0.7	1.5	5.0	10	25	0.1	125	1/2V _{DRM}	50	125	1/2V _{DRM}	4.0		SIP12 with Fin (SLA12Pin)	6.0	
1.4	25	5.0		1.5	—	0.1	25	0.1	125	1/2V _{DRM}	50	110	1/2V _{DRM}	—	5	TO220F-A	2.0	
1.4	25	10		1.5	0.03	0.2	25	0.1	125	1/2V _{DRM}	20	125	1/2V _{DRM}	4.0	4.0	TO220F	2.0	
1.5	25	10	—	1.0	7.0	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	15	4.1	TO220F	2.0	
1.5	25	15	—	1.0	7.0	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	15	3.8	TO220F	2.0	
1.4	25	20	—	1.0	7.0	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	20	3.5	TO220F	2.0	
1.35	25	20	—	1.0	7.0	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	20	3.4	TO220F	2.0	
1.5	25	10	—	1.0	—	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	15	4.1	TO220F	2.0	
1.5	25	15	—	1.0	—	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	15	3.8	TO220F	2.0	
1.5	25	20	—	1.0	—	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	20	3.5	TO220F	2.0	
1.35	25	20	—	1.0	—	15	25	0.2	125	1/2V _{DRM}	300	125	1/2V _{DRM}	20	3.4	TO220F	2.0	

Electrical Characteristics												Package	Mass (g)
V _{GT} (V)		I _{GT} (mA)		Conditions T _c (°C)	V _{GD} (V) min	Conditions T _j (°C) V _D (V)		I _H (mA) typ	R _{th} (°C/W) max	V _F (V) max	Conditions IF (A)		
typ	max	typ	max	25	0.1	125	480	12	4.0	1.4	10	TO-220S	1.5

3-2 Triacs

Triacs

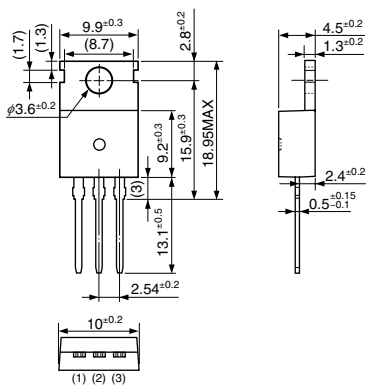
Part Number	Absolute Maximum Ratings										IDRM1		IDRM2		V _{TM}	
	V _{DRM}	I _{T (RMS)}	Conditions T _c (°C)	I _{TSM}	Conditions	P _{GM}	P _{G (AV)}	I _{GM}	T _J	T _{stg}	(mA) max	Conditions	(mA) max	Conditions	V _{TM} (V) max	Conditions I _{TM} (A)
	(V)	(A)		(A)		(W)	(W)	(A)	(°C)	(°C)						
TMA34S-L	400	3	109	30	125	3	0.3	0.5	-40 to +125		0.1		2		1.5	4.5
TMA54S-L	400	5	102	50	125	5	0.5	2	-40 to +125		0.1		2		1.5	7
TMA84S-L	400	8	92	80	125	5	0.5	2	-40 to +125		0.1		2		1.5	12
TMA104S-L	400	10	85	100	125	5	0.5	2	-40 to +125		0.1		2		1.5	14
TMA124S-L	400	12	77	120	125	5	0.5	2	-40 to +125		0.1		2		1.5	17
TMA164S-L	400	16	66	160	125	5	0.5	2	-40 to +125		0.1		2		1.45	20
TMA164P-L	400	16	108	160	125	5	0.5	2	-40 to +125		0.1		2		1.4	20
TMA164B-L	400	16	98	160	125	5	0.5	2	-40 to +125		0.1		2		1.4	20
TMA204S-L	400	20	53	190	125	5	0.5	2	-40 to +125		0.1		2		1.4	20
TMA254B-L	400	25	83	250	125	5	0.5	2	-40 to +125		0.1		2		1.3	20
STA203A	400	1.2×3	97	10	125	1.2	0.1	0.5	-40 to +125		0.1		1		1.6	1.6
TMA36S-L	600	3	109	30	125	3	0.3	0.5	-40 to +125		0.1		2		1.5	4.5
TMA36G-L	600	3	115	30	25	3	0.5	0.5	-40 to +125		0.1		2		1.5	4.5
TMA36H-L	600	3	109	30	25	3	0.5	0.5	-40 to +125		0.1		2		1.5	4.5
TMA56S-L	600	5	102	50	125	5	0.5	2	-40 to +125		0.1		2		1.5	7
TMA56G-L	600	5	111	50	25	5	0.5	2	-40 to +125		0.1		2		1.5	7
TMA56H-L	600	5	101	50	25	5	0.5	2	-40 to +125		0.1		2		1.5	7
TMA86S-L	600	8	92	80	125	5	0.5	2	-40 to +125	25°C	0.1	2	125°C		1.5	12
TMA86G-L	600	8	107	80	25	5	0.5	2	-40 to +125		0.1		2		1.5	12
TMA86H-L	600	8	91	80	25	5	0.5	2	-40 to +125		0.1		2		1.5	12
TMA106S-L	600	10	85	100	125	5	0.5	2	-40 to +125		0.1		2		1.5	14
TMA106G-L	600	10	105	100	25	5	0.5	2	-40 to +125		0.1		2		1.5	14
TMA106H-L	600	10	83	100	25	5	0.5	2	-40 to +125		0.1		2		1.5	14
TMA126S-L	600	12	77	120	125	5	0.5	2	-40 to +125		0.1		2		1.5	17
TMA126G-L	600	12	103	120	25	5	0.5	2	-40 to +125		0.1		2		1.5	17
TMA126H-L	600	12	78	120	25	5	0.5	2	-40 to +125		0.1		2		1.5	17
TMA166S-L	600	16	66	160	125	5	0.5	2	-40 to +125		0.1		2		1.45	20
TMA166G-L	600	16	100	160	25	5	0.5	2	-40 to +125		0.1		2		1.45	20
TMA166H-L	600	16	65	160	25	5	0.5	2	-40 to +125		0.1		2		1.45	20
TMA166P-L	600	16	108	160	125	5	0.5	2	-40 to +125		0.1		2		1.4	20
TMA166B-L	600	16	98	160	125	5	0.5	2	-40 to +125		0.1		2		1.4	20
TMB166S-L	600	16	94	160	125	5	0.5	2	-40 to +150		0.1		2		1.45	20
TMA206S-L	600	20	53	190	125	5	0.5	2	-40 to +125		0.1		2		1.4	20
TMB206S-L	600	20	85	200	125	5	0.5	2	-40 to +150		0.1		2		1.4	20
TMA256B-L	600	25	83	250	125	5	0.5	2	-40 to +125		0.1		2		1.3	20

Electrical Characteristics (T_j = 25°C, unless otherwise specified)

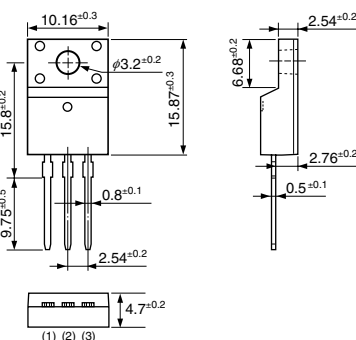
	V _{GT}			Conditions		I _{GT}			Conditions		V _{GD}		(dv/dt) c		R _{th(j-c)} (°C/W) max	Package	Mass (g)		
	Mode I (T2+, G+) (V) max	Mode II (T2+, G-) (V) max	Mode III (T2-, G-) (V) max	V _D (V)	R _L (Ω)	Mode I (T2+, G+) (mA) max	Mode II (T2+, G-) (mA) max	Mode III (T2-, G-) (mA) max	V _D (V)	R _L (Ω)	T _j (°C)	V _O (V)	(V/us) min	Conditions (dv/dt) c (-A/ms)				T _j (°C)	
	1.5	1.5	1.5	12	20	20	20	20	12	20	0.2	125	1/2V _{DRM}	5	1.5	125	4.5	TO220F	2.0
	1.5	1.5	1.5	12	20	20	20	20	12	20	0.2	125	1/2V _{DRM}	5	2.5	125	4	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	4	125	3.7	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	5	125	3.6	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.1	125	1/2V _{DRM}	10	6	125	3.5	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	8	125	3.3	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	8	125	1.2	TO3P	6.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	8	125	1.8	TO3PF	6.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	10	125	3.2	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	12	125	1.6	TO3PF	6.5
	3.5	1.2	1.2	6	10	3	3	3	6	10	0.2	125	1/2V _{DRM}	1		125	20	STA8pin	2.0
	1.5	1.5	1.5	12	20	15/20	15/20	15/20	12	20	0.2	125	1/2V _{DRM}	5	1.5	125	4.5	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	5	1.5	125	3	TO220	2.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	5	1.5	125	4.6	TO220F-A	2.0
	1.5	1.5	1.5	12	20	15/20	15/20	15/20	12	20	0.2	125	1/2V _{DRM}	5	2.5	125	4	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	5	2.5	125	2.5	TO220	2.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	5	2.5	125	4.2	TO220F-A	2.0
	1.5	1.5	1.5	12	20	20/30	20/30	20/30	12	20	0.2	125	1/2V _{DRM}	10	4	125	3.7	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	4	125	2	TO220	2.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	4	125	3.8	TO220F-A	2.0
	1.5	1.5	1.5	12	20	20/30	20/30	20/30	12	20	0.2	125	1/2V _{DRM}	10	5	125	3.6	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	5	125	1.8	TO220	2.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	5	125	3.7	TO220F-A	2.0
	1.5	1.5	1.5	12	20	20/30	20/30	20/30	12	20	0.2	125	1/2V _{DRM}	10	6	125	3.5	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	6	125	1.6	TO220	2.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	6	125	3.5	TO220F-A	2.0
	1.5	1.5	1.5	12	20	20/30	20/30	20/30	12	20	0.2	125	1/2V _{DRM}	10	8	125	3.3	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	8	125	1.4	TO220	2.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	8	125	3.3	TO220F-A	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	8	125	1.2	TO3P	6.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	8	125	1.8	TO3PF	6.5
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	10	125	3.0	TO220F	2.0
	1.5	1.5	1.5	12	20	20/30	20/30	20/30	12	20	0.2	125	1/2V _{DRM}	10	10	125	3.2	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	10	125	2.7	TO220F	2.0
	1.5	1.5	1.5	12	20	30	30	30	12	20	0.2	125	1/2V _{DRM}	10	12	125	1.6	TO3PF	6.5

Package Type (Dimensions)

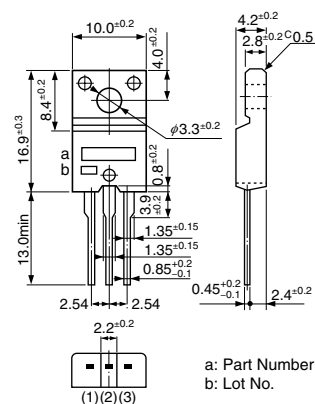
• TO-220



• TO-220F-A



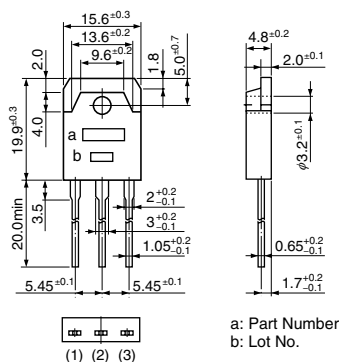
• TO-220F



a: Part Number
b: Lot No.

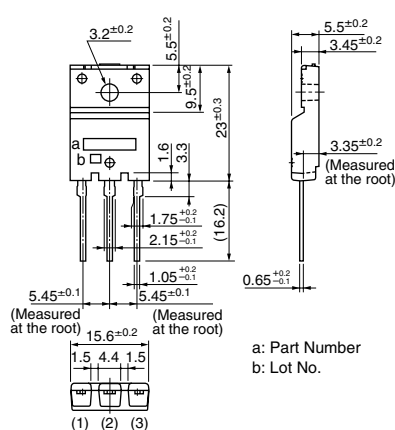
Pin No.	
(1)	Cathode (T ₁)
(2)	Anode (T ₂)
(3)	Gate (G)
()	Triacs

• TO-3P



a: Part Number
b: Lot No.

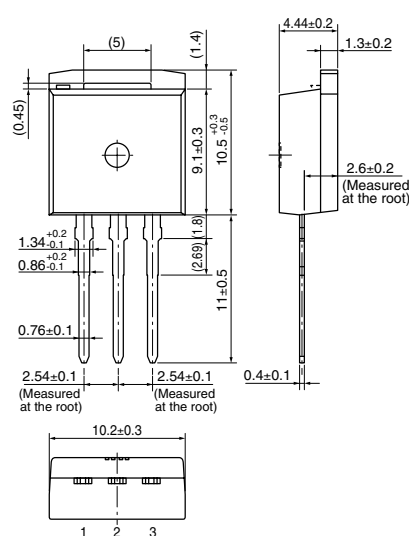
• TO-3PF



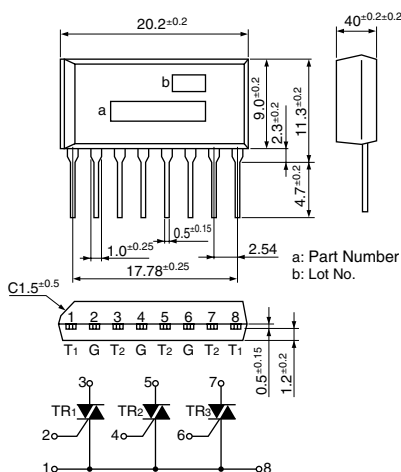
a: Part Number
b: Lot No.

- (1) Terminal 1 (T₁)
- (2) Terminal 2 (T₂)
- (3) Gate (G)

• TO-220S Straight

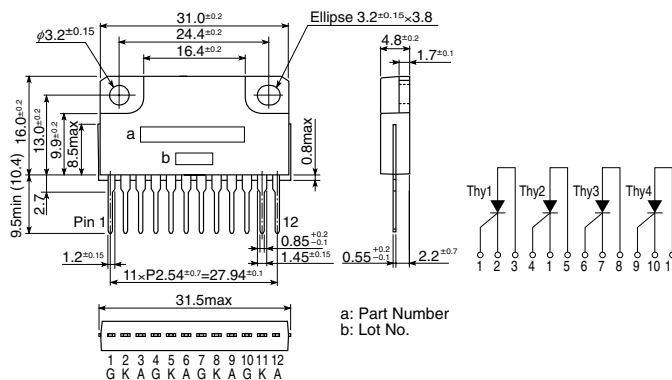


• STA8Pin



a: Part Number
b: Lot No.

• SLA12Pin



a: Part Number
b: Lot No.

(Unit: mm)