V_{RM} = 300 V, $I_{F(AV)}$ = 60 A, trr = 50 ns(max.)
Fast Recovery and High Power Diode

CTXS-4603S

Features

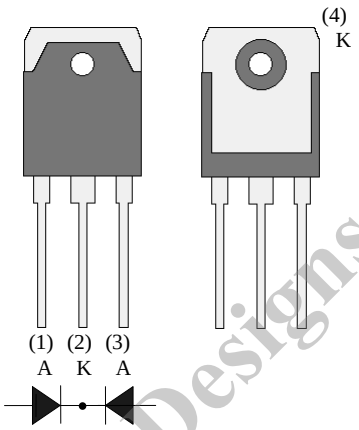
The CTXS-4603S is a high power and fast recovery diode which realize a peak reverse voltage of 300 V, a typical forward voltage drop of 1.05 V (typ.) and typical trr-time of 32 ns (typ.) optimizing a life-time control. It supports high-speed switching and reduces forward-loss.

The low thermal resistance package achieves high performance in terms of heat dissipation.

- V_{RM} ---------- 300 V
- V_F ---------- 1.4 V max. (I_F = 30 A)
- $I_{F(AV)}$ ---------- 60 A
- t_{rr} ---------- 50 ns max.
  (I_F = 500 mA, I_{RP} = 500 mA, 90 % of R.P.)

Package

TO3P-3L



Not to scale

Applications

- For Large Current Secondary Side Rectifier
- For DC-DC Converter, etc.

Not Recommended for New Designs

Absolute Maximum Ratings

- Unless otherwise specified, T_A is 25 °C

Parameter	Symbol	Rating	Unit	Notes
Peak Repetitive Reverse Voltage	V_{RM}	300	V	
Average Forward Current	$I_{F(AV)}$	60	A	
Surge Forward Current	I_{FSM}	300	A	10 ms Half sinewave, one shot
I^2t Limiting Value	I^2t	450	A^2s	1 ms ≤ t ≤10 ms
Junction Temperature	T_j	−40 to 150	°C	
Storage Temperature	T_{stg}	−40 to 150	°C	

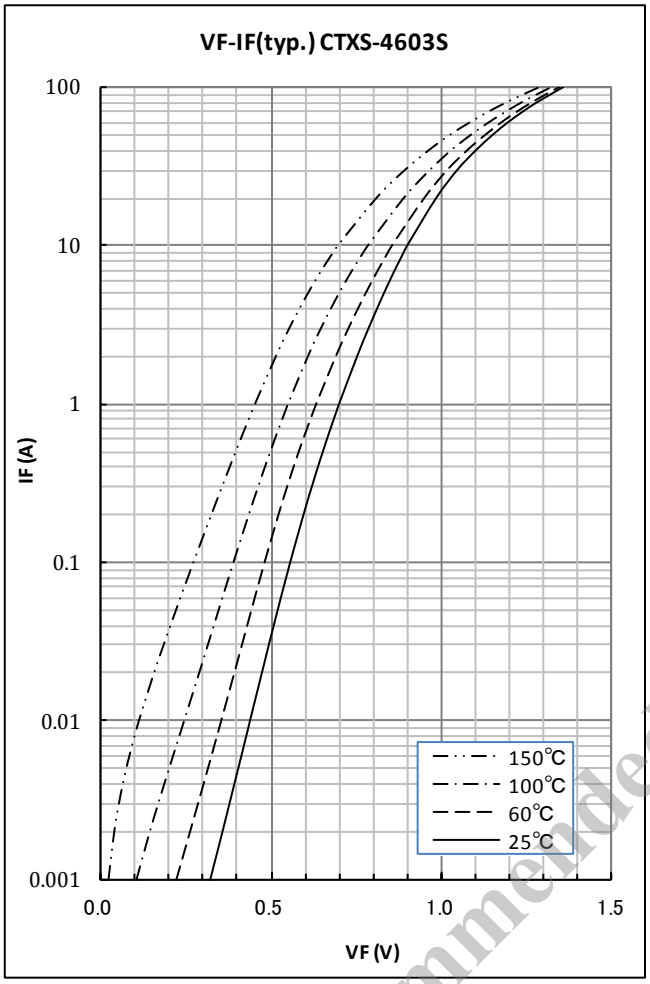
Electrical Characteristics

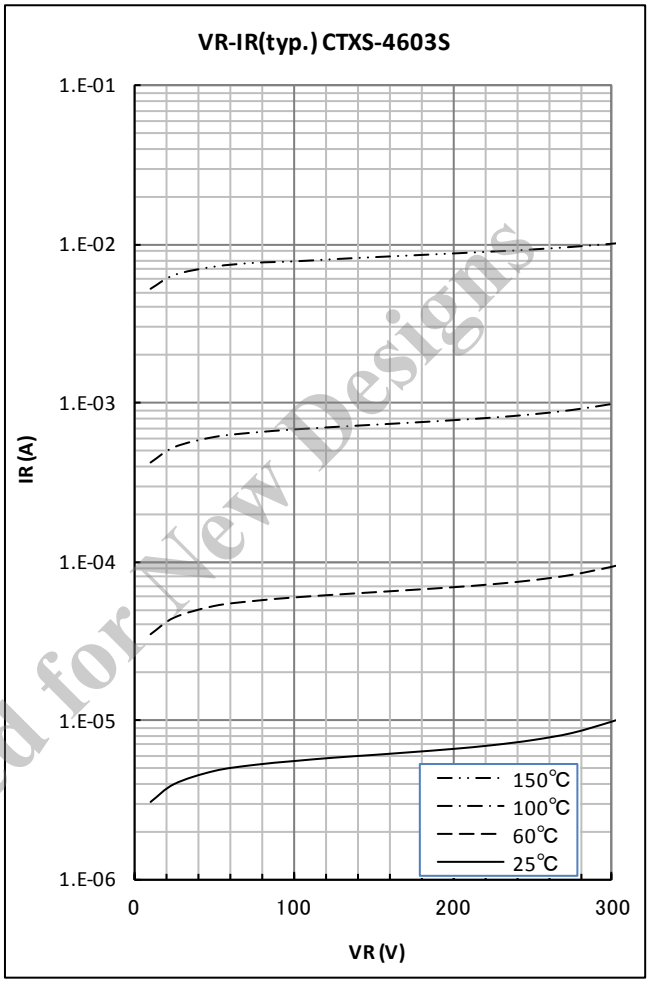
- Unless otherwise specified, T_A is 25 °C

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	I_F = 30 A	−	1.05	1.4	V
Reverse Leakage Current	I_R	$V_R = V_{RM}$	−	−	200	μA
Reverse Leakage Current Under High Temperature	H·I_R	$V_R = V_{RM}$, T_j = 150 °C	−	−	20	mA
Reverse Recovery Time	t_{rr}	$I_F = I_{RP}$ = 500 mA, T_j = 25 °C, 90 % recovery point	−	32	50	ns
Thermal Resistance*	$R_{th(j-c)}$		−	−	1.0	°C/W

* $R_{th(j-c)}$ is thermal resistance between junction and case. Case temperature (T_C) is measured at the under of the screw hole of case.

Performance Curves





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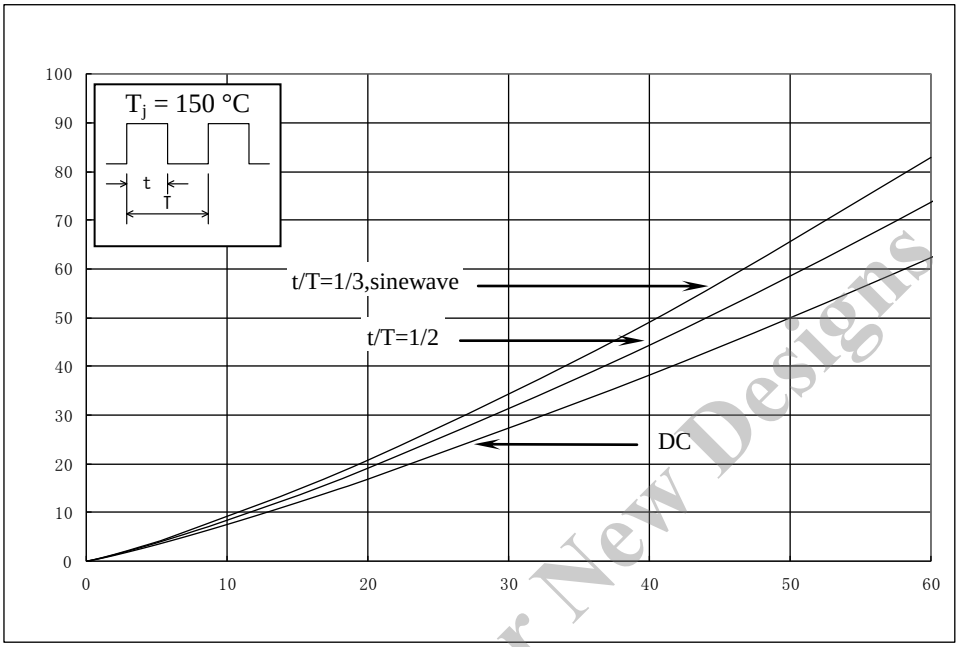
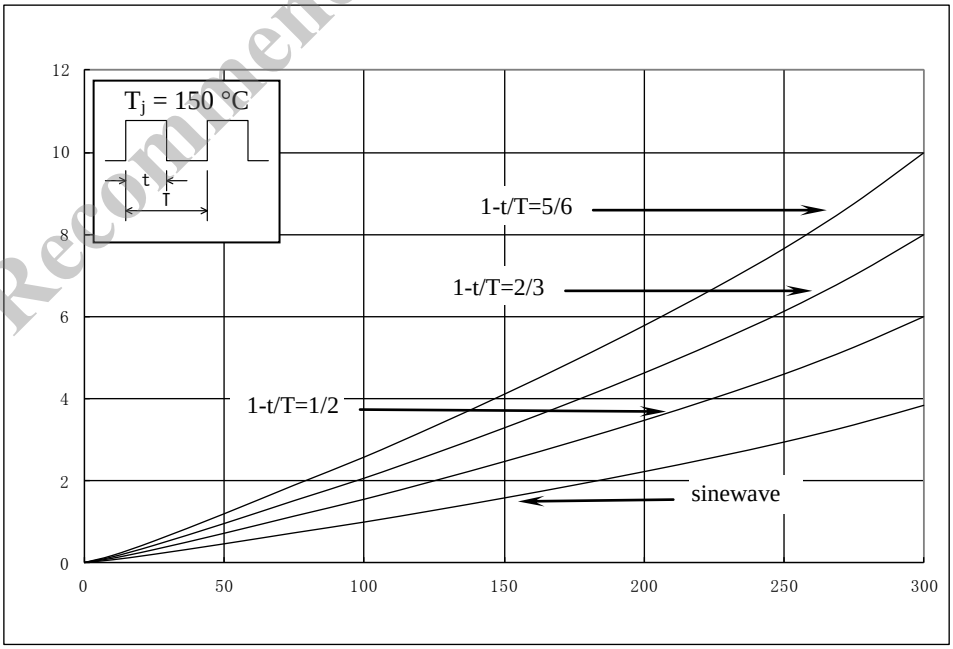
Power Dissipation Curves

$I_{F(AV)}$ — P_F



V_R — P_R



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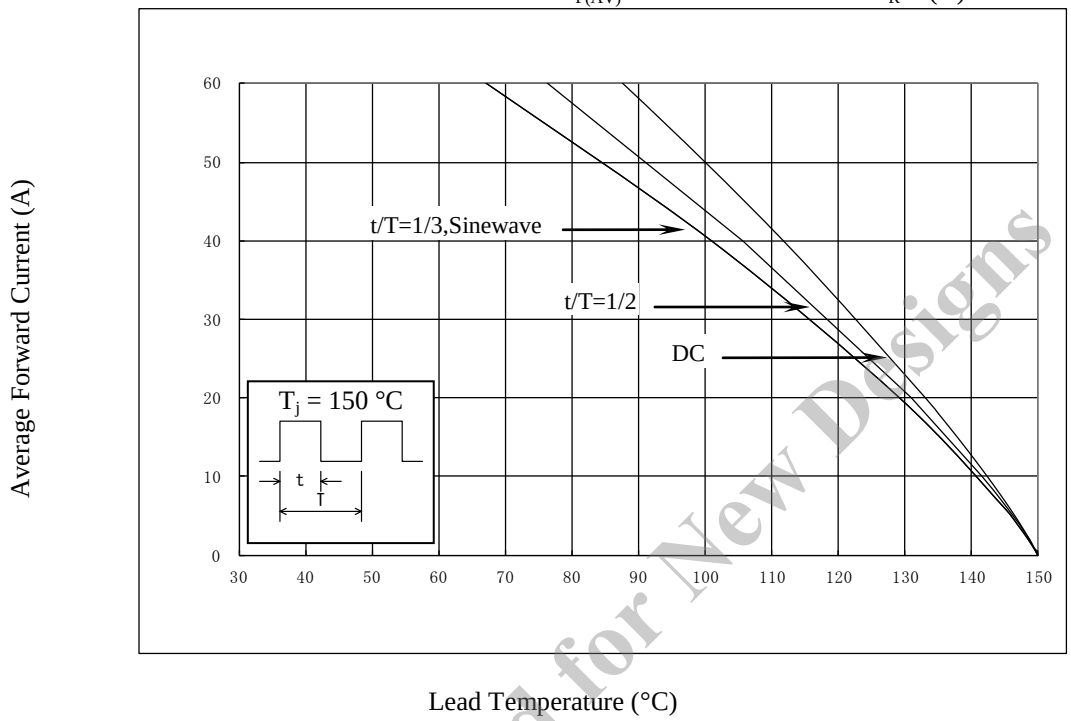
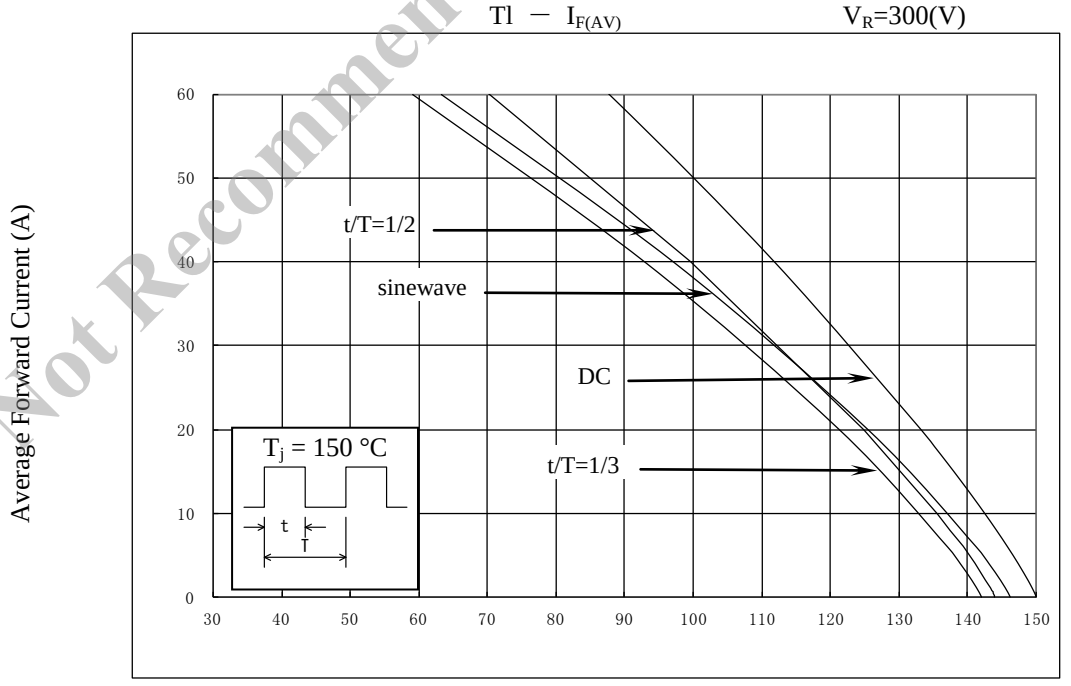
Derating Curves

Tl – $I_{F(AV)}$ V_R=0(V)



Lead Temperature (°C)

Tl – $I_{F(AV)}$ V_R=300(V)



Lead Temperature (°C)

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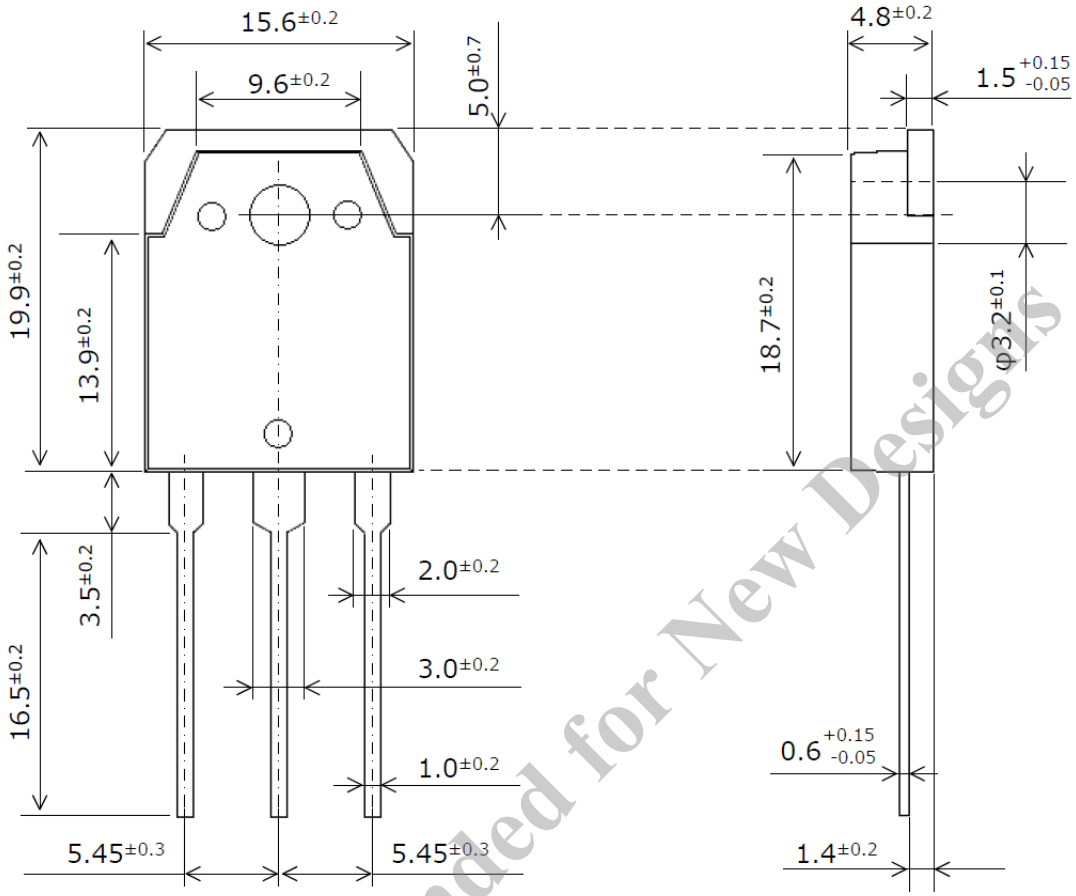
Package Outline

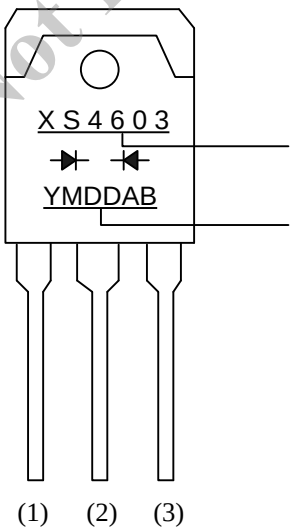
TO3P-3L



NOTES:

1) Dimension is in millimeters.
2) Pin treatment Pb-free. Device composition compliant with the RoHS directive.

Marking Diagram



Part Number

Lot Number

Y is the last digit of year (0 to 9)
M is the month (1 to 9, O, N or D)
DD is the date (two digit of 01 to 31)
A and B are Sanken control number

Not Recommended for New Designs

OPERATING PRECAUTIONS

In the case that you use Sanken products or design your products by using Sanken products, the reliability largely depends on the degree of derating to be made to the rated values. Derating may be interpreted as a case that an operation range is set by derating the load from each rated value or surge voltage or noise is considered for derating in order to assure or improve the reliability. In general, derating factors include electric stresses such as electric voltage, electric current, electric power etc., environmental stresses such as ambient temperature, humidity etc. and thermal stress caused due to self-heating of semiconductor products. For these stresses, instantaneous values, maximum values and minimum values must be taken into consideration. In addition, it should be noted that since power devices or IC's including power devices have large self-heating value, the degree of derating of junction temperature affects the reliability significantly.

Because reliability can be affected adversely by improper storage environments and handling methods, please observe the following cautions.

Cautions for Storage

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

Cautions for Testing and Handling

When tests are carried out during inspection testing and other standard test periods, protect the products from power surges from the testing device, shorts between the product pins, and wrong connections. Ensure all test parameters are within the ratings specified by Sanken for the products.

Remarks About Using Thermal Silicone Grease

- When thermal silicone grease is used, it shall be applied evenly and thinly. If more silicone grease than required is applied, it may produce excess stress.
- The thermal silicone grease that has been stored for a long period of time may cause cracks of the greases, and it cause low radiation performance. In addition, the old grease may cause cracks in the resin mold when screwing the products to a heatsink.
- Fully consider preventing foreign materials from entering into the thermal silicone grease. When foreign material is immixed, radiation performance may be degraded or an insulation failure may occur due to a damaged insulating plate.
- The thermal silicone greases that are recommended for the resin molded semiconductor should be used.
  Our recommended thermal silicone grease is the following, and equivalent of these.

Type	Suppliers
G746	Shin-Etsu Chemical Co., Ltd.
YG6260	Momentive Performance Materials Japan LLC
SC102	Dow Corning Toray Co., Ltd.

Cautions for Mounting to a Heatsink

- When the flatness around the screw hole is insufficient, such as when mounting the products to a heatsink that has an extruded (burred) screw hole, the products can be damaged, even with a lower than recommended screw torque. For mounting the products, the mounting surface flatness should be 0.05mm or less.
- Please select suitable screws for the product shape. Do not use a flat-head machine screw because of the stress to the products. Self-tapping screws are not recommended. When using self-tapping screws, the screw may enter the hole diagonally, not vertically, depending on the conditions of hole before threading or the work situation. That may stress the products and may cause failures.
- Recommended screw torque:

Package	Recommended Screw Torque
TO-220, TO-220F	0.490 to 0.686 N・m (5 to 7 kgf・cm)
TO-3P, TO-3PF, TO-247	0.686 to 0.882 N・m (7 to 9 kgf・cm)
SLA	0.588 to 0.784 N・m (6 to 8 kgf・cm)

Not Recommended for New Designs

- For tightening screws, if a tightening tool (such as a driver) hits the products, the package may crack, and internal stress fractures may occur, which shorten the lifetime of the electrical elements and can cause catastrophic failure. Tightening with an air driver makes a substantial impact. In addition, a screw torque higher than the set torque can be applied and the package may be damaged. Therefore, an electric driver is recommended.
  When the package is tightened at two or more places, first pre-tighten with a lower torque at all places, then tighten with the specified torque. When using a power driver, torque control is mandatory.

- Please pay special attention about the slack of the press mold. In case that the hole diameter of the heatsink is less than 4 mm, it may cause the resin crack at tightening.

Soldering

- When soldering the products, please be sure to minimize the working time, within the following limits:
  - 260 ± 5 °C 10 ± 1 s (Flow, 2 times)
  - 380 ± 10 °C 3.5 ± 0.5 s (Soldering iron, 1 time)
- Soldering should be at a distance of at least 1.5 mm from the body of the products.

Not Recommended for New Designs

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