



**THE DATASHEET OF  
BT152-400R,127**





# IMPORTANT NOTICE

10 December 2015

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## 1. Global joint venture starts operations as WeEn Semiconductors

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Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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Thank you for your cooperation and understanding,

WeEn Semiconductors



# DATA SHEET

## **BT152 series** Thyristors

Product specification

March 1997



# Thyristors

# BT152 series

## GENERAL DESCRIPTION

Glass passivated thyristors in a plastic envelope, intended for use in applications requiring high bidirectional blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

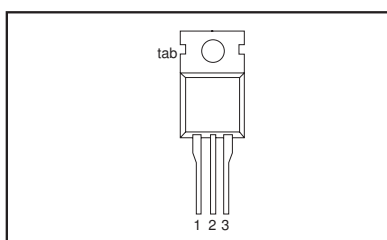
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
$V_{DRM}$	Repetitive peak off-state voltages	<b>400R</b>	<b>600R</b>	<b>800R</b>	V
$V_{RRM}$		450	650	800	
$I_{T(AV)}$	Average on-state current	13	13	13	A
$I_{T(RMS)}$	RMS on-state current	20	20	20	A
$I_{TSM}$	Non-repetitive peak on-state current	200	200	200	A

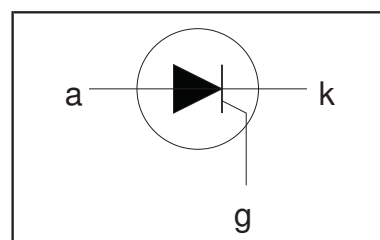
## PINNING - TO220AB

PIN	DESCRIPTION
1	cathode
2	anode
3	gate
tab	anode

## PIN CONFIGURATION



## SYMBOL



## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
				-400R	-600R	-800R	
$V_{DRM}$	Repetitive peak off-state voltages		-	450 <sup>1</sup>	650 <sup>1</sup>	800	V
$I_{T(AV)}$	Average on-state current	half sine wave; $T_{mb} \leq 103\text{ °C}$	-	13			A
$I_{T(RMS)}$	RMS on-state current	all conduction angles	-	20			A
$I_{TSM}$	Non-repetitive peak on-state current	half sine wave; $T_j = 25\text{ °C}$ prior to surge	-	200			A
		$t = 10\text{ ms}$	-	220			A
		$t = 8.3\text{ ms}$	-	200			A <sup>2</sup> s
$I^2t$	$I^2t$ for fusing	$t = 10\text{ ms}$	-	200			A <sup>2</sup> s
$di_T/dt$	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 50\text{ A}$ ; $I_G = 0.2\text{ A}$ ; $di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	200			A/ $\mu\text{s}$
$I_{GM}$	Peak gate current		-	5			A
$V_{GM}$	Peak gate voltage		-	5			V
$V_{RGM}$	Peak reverse gate voltage		-	5			V
$P_{GM}$	Peak gate power		-	20			W
$P_{G(AV)}$	Average gate power	over any 20 ms period	-	0.5			W
$T_{stg}$	Storage temperature		-40	150			°C
$T_j$	Operating junction temperature		-	125			°C

<sup>1</sup> Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ $\mu\text{s}$ .

## Thyristors

## BT152 series

## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	in free air	-	-	1.1	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient		-	60	-	K/W

## STATIC CHARACTERISTICS

$T_j = 25\text{ °C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{GT}$	Gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	3	32	mA
$I_L$	Latching current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	25	80	mA
$I_H$	Holding current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	15	60	mA
$V_T$	On-state voltage	$I_T = 40\text{ A}$	-	1.4	1.75	V
$V_{GT}$	Gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	0.6	1.5	V
$I_D, I_R$	Off-state leakage current	$V_D = V_{DRM(max)}; I_T = 0.1\text{ A}; T_j = 125\text{ °C}$	0.25	0.4	-	V
		$V_D = V_{DRM(max)}; V_R = V_{RRM(max)}; T_j = 125\text{ °C}$	-	0.2	1.0	mA

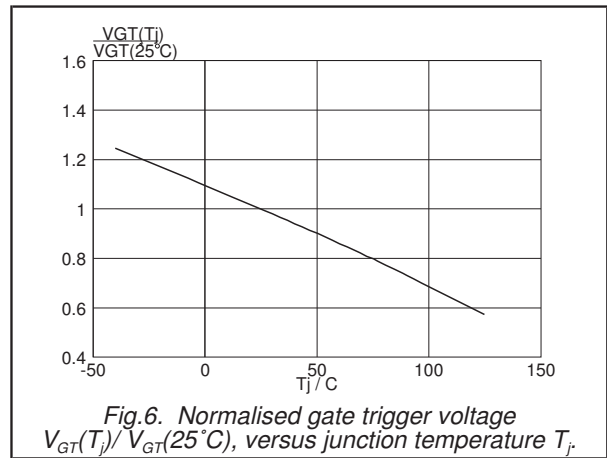
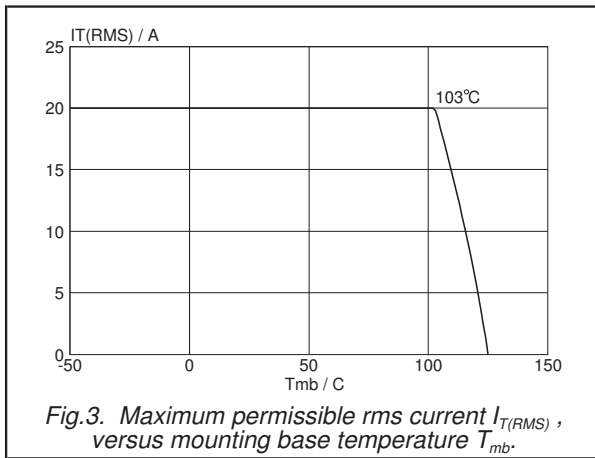
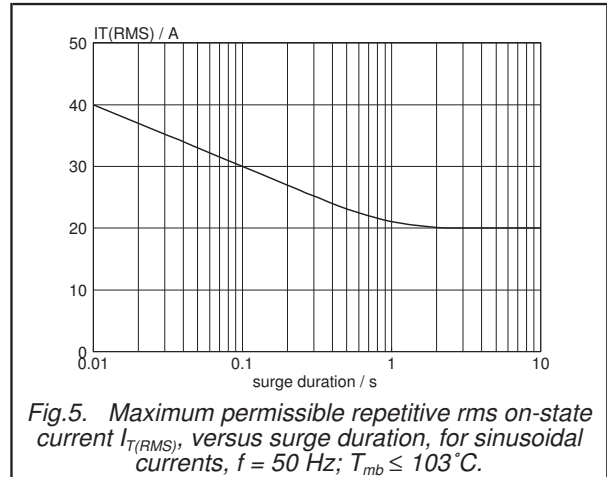
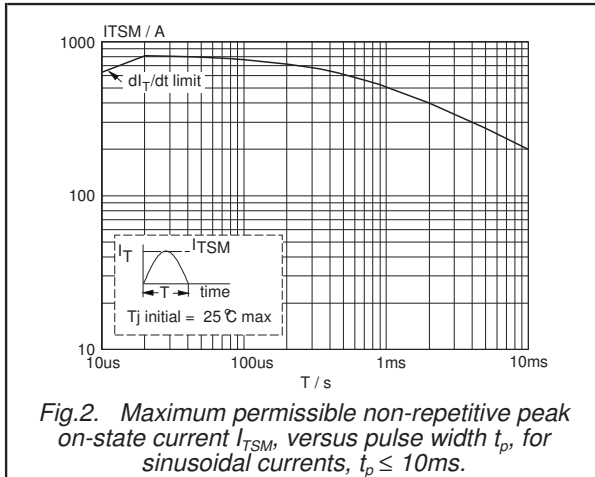
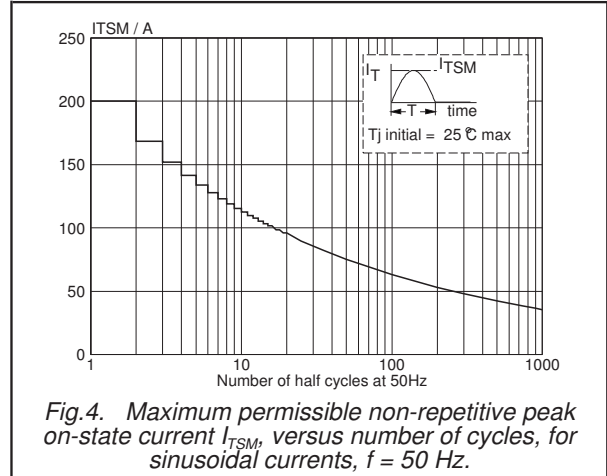
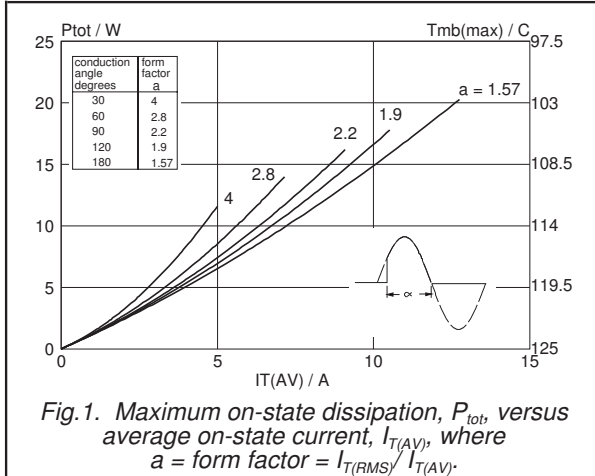
## DYNAMIC CHARACTERISTICS

$T_j = 25\text{ °C}$  unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$dV_D/dt$	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}; T_j = 125\text{ °C};$ exponential waveform gate open circuit	200	300	-	V/ $\mu$ s
$t_{gt}$	Gate controlled turn-on time	$V_D = V_{DRM(max)}; I_G = 0.1\text{ A}; dI_G/dt = 5\text{ A}/\mu\text{s};$ $I_{TM} = 40\text{ A}$	-	2	-	$\mu$ s
$t_q$	Circuit commutated turn-off time	$V_D = 67\% V_{DRM(max)}; T_j = 125\text{ °C};$ $I_{TM} = 50\text{ A}; V_R = 25\text{ V}; dI_{TM}/dt = 30\text{ A}/\mu\text{s};$ $dV_D/dt = 50\text{ V}/\mu\text{s}; R_{GK} = 100\ \Omega$	-	70	-	$\mu$ s

Thyristors

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Thyristors

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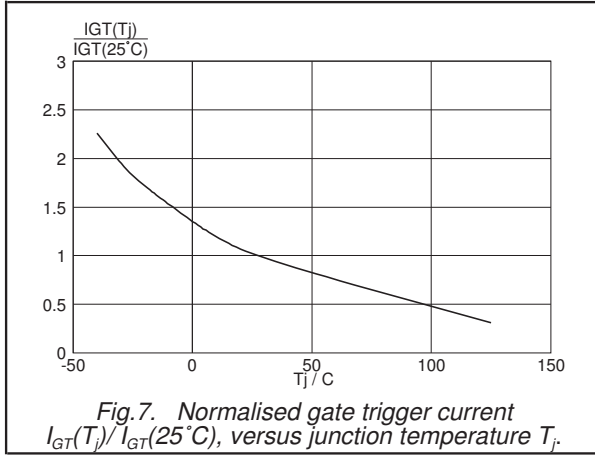


Fig. 7. Normalised gate trigger current  $I_{GT}(T_J) / I_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_J$ .

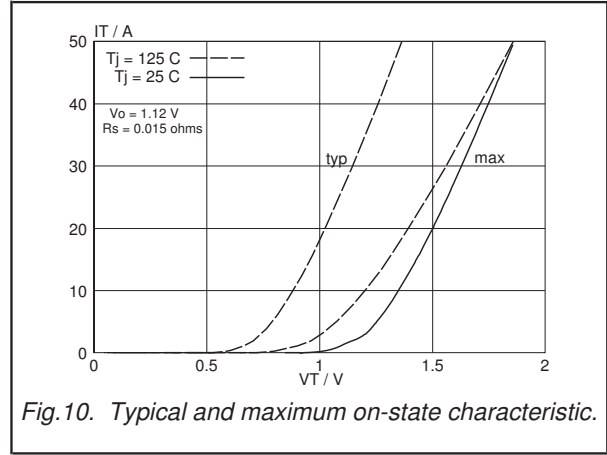


Fig. 10. Typical and maximum on-state characteristic.

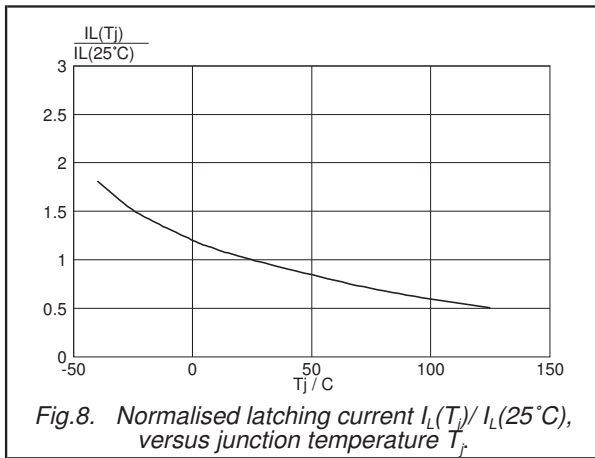


Fig. 8. Normalised latching current  $I_L(T_J) / I_L(25^\circ\text{C})$ , versus junction temperature  $T_J$ .

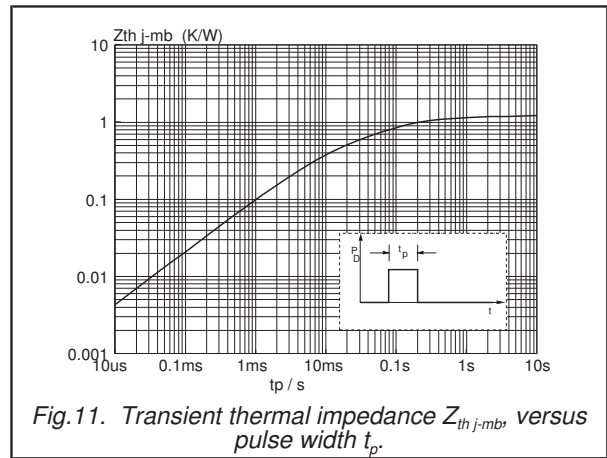


Fig. 11. Transient thermal impedance  $Z_{th(j-mb)}$ , versus pulse width  $t_p$ .

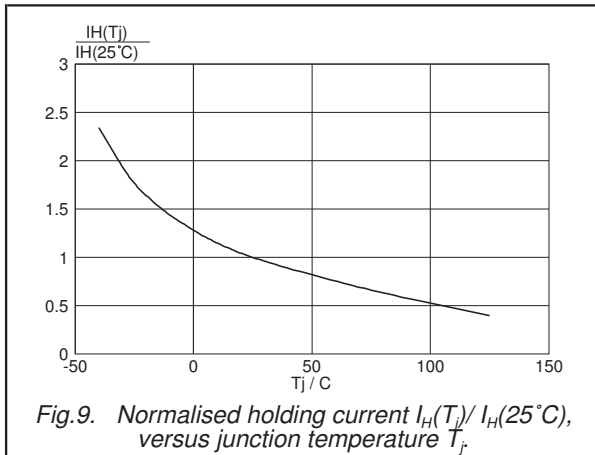


Fig. 9. Normalised holding current  $I_H(T_J) / I_H(25^\circ\text{C})$ , versus junction temperature  $T_J$ .

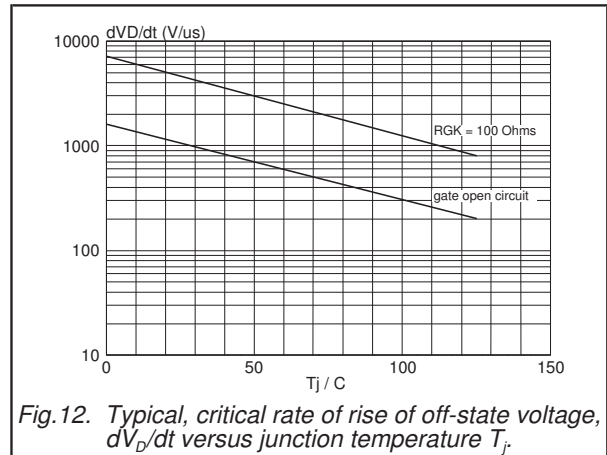


Fig. 12. Typical, critical rate of rise of off-state voltage,  $dV_D/dt$  versus junction temperature  $T_J$ .

Thyristors

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**MECHANICAL DATA**

Dimensions in mm

Net Mass: 2 g

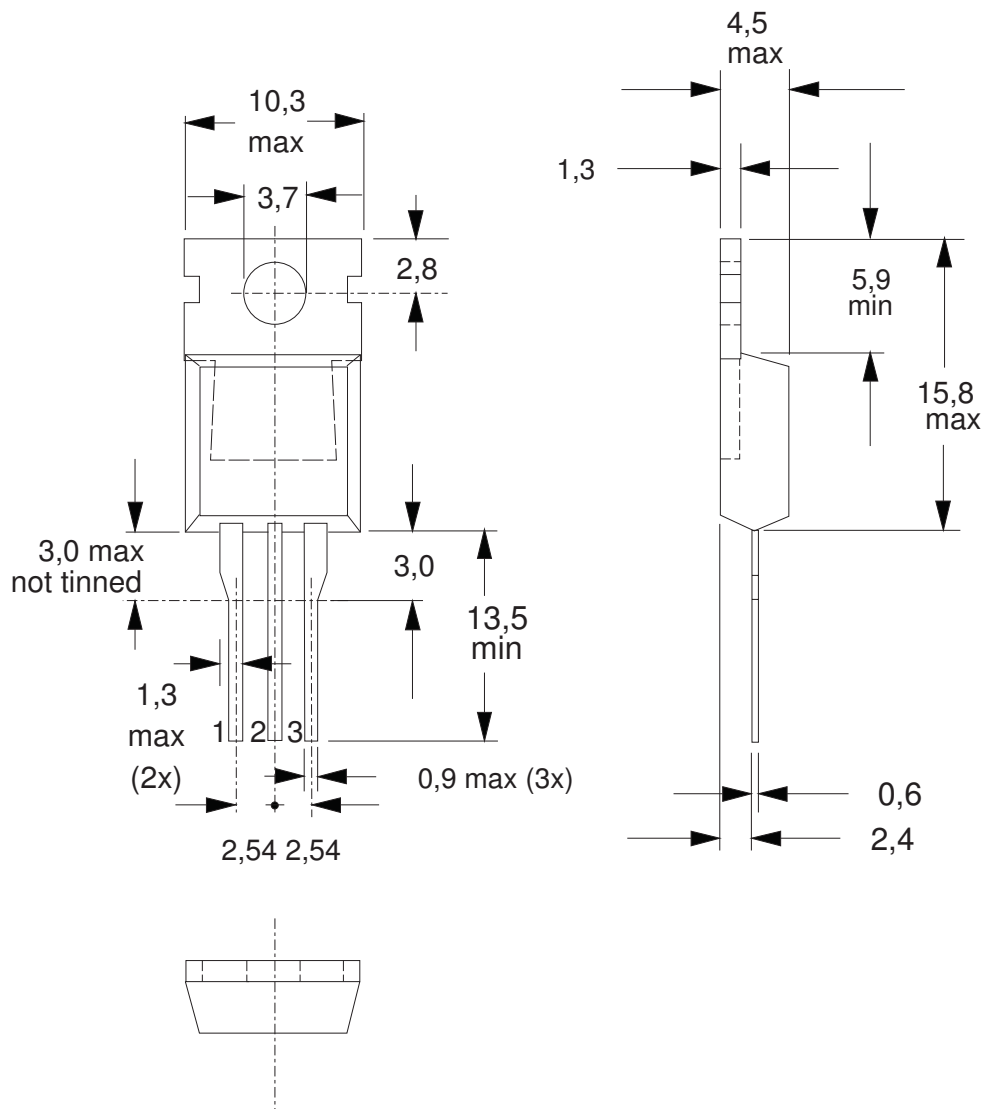


Fig.13. TO220AB; pin 2 connected to mounting base.

**Notes**

1. Refer to mounting instructions for TO220 envelopes.
2. Epoxy meets UL94 V0 at 1/8".

## Legal information

### DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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