IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

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.

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Thank you for your cooperation and understanding,

WeEn Semiconductors

TYN16-600RT

SCR

Rev. 1 — 2 July 2012 Product data sheet

1. Product profile

1.1 General description

Planar passivated Silicon Controlled Rectifier (SCR) in a SOT78 (TO-220AB) plastic package intended for use in applications requiring very high inrush current capability, high thermal cycling performance and high junction temperature capability ($T_{j(max)}$ = 150 °C).

1.2 Features and benefits

- High junction operating temperature capability
- High thermal cycling performance
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Very high current surge capability

1.3 Applications

- Ignition circuits
- Motor control
- Protection circuits e.g. SMPS inrush current
- Voltage regulation

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)}$ = 25 °C; t_p = 10 ms; see Figure 4; see Figure 5	-	-	210	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	-	-	231	A
T_j	junction temperature		-	-	150	°C
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq$ 134 °C; see Figure 3	-	-	10.2	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq$ 134 °C; see Figure 1; see Figure 2	-	-	16	A

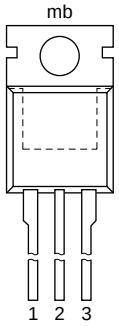
Table 1. Quick reference data *...continued*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; see Figure 7	-	4.5	25	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 150 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit	300	-	-	V/µs

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
3	G	gate		
mb	A	mounting base; connected to anode		



TO-220AB (SOT78)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
TYN16-600RT	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

4. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	600	V
V_{RRM}	repetitive peak reverse voltage		-	600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 134$ °C; see Figure 3	-	10.2	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 134$ °C; see Figure 1; see Figure 2	-	16	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; see Figure 4; see Figure 5	-	210	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms	-	231	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse	-	220.5	A^2s
dI_T/dt	rate of rise of on-state current	$I_T = 40$ A; $I_G = 200$ mA; $dI_G/dt = 200$ mA/µs	-	50	A/µs
I_{GM}	peak gate current		-	5	A
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	-	1	W
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C

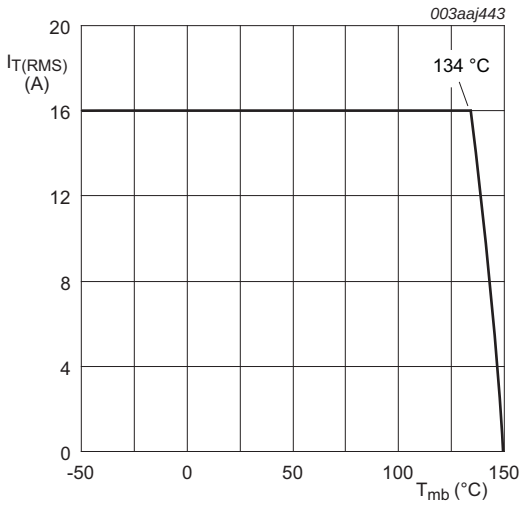


Fig 1. RMS on-state current as a function of mounting base temperature; maximum values

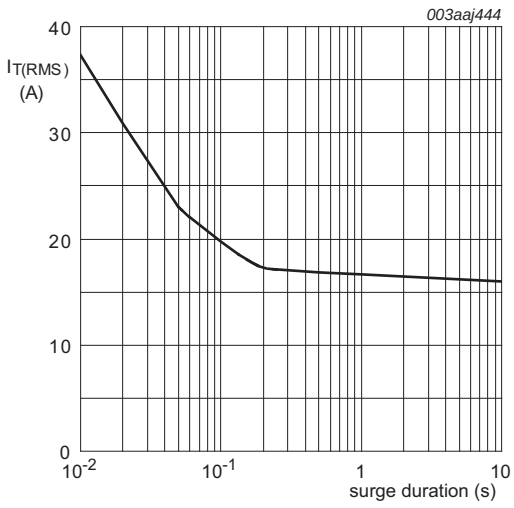
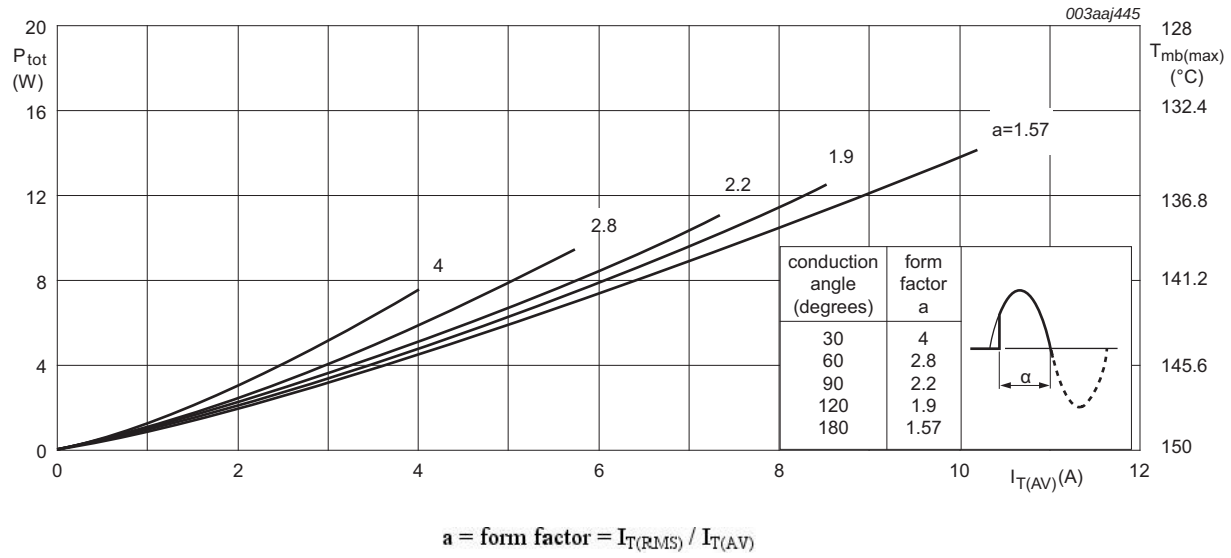
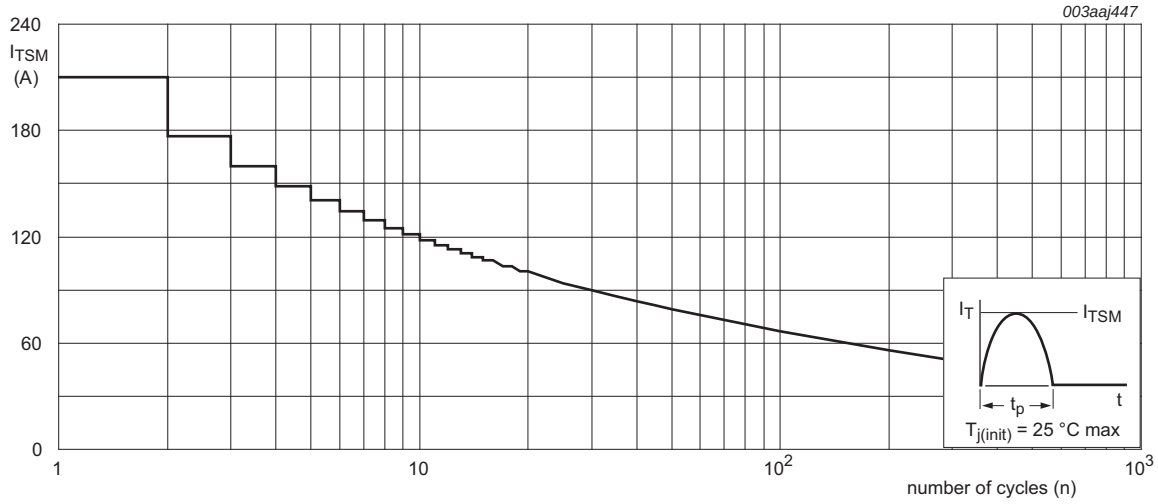


Fig 2. RMS on-state current as a function of surge duration; maximum values



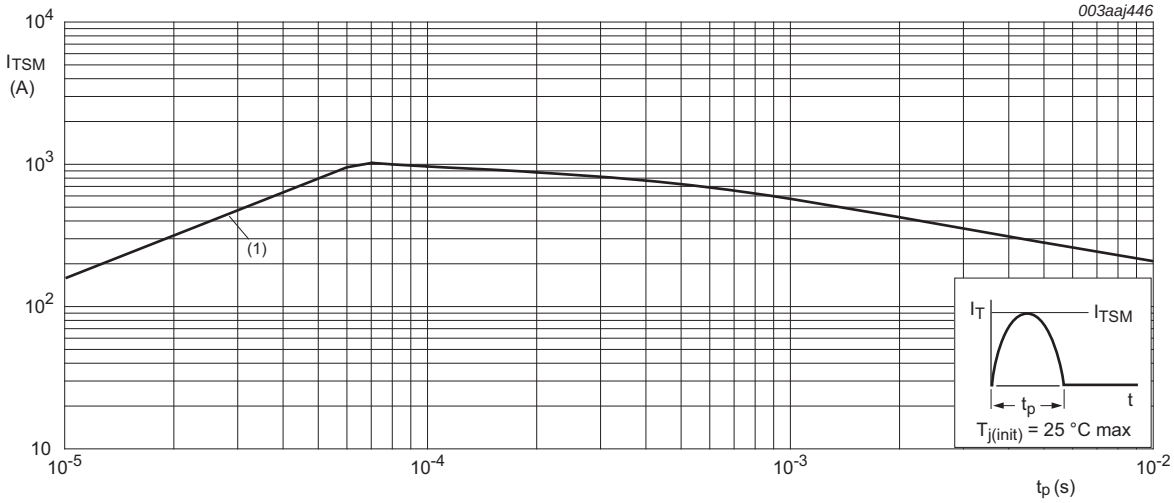
$$a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$$

Fig 3. Total power dissipation as a function of average on-state current; maximum values



$$f = 50\ Hz$$

Fig 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 10$ ms; (1) dI_T / dt limit

Fig 5. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 6	-	-	1.1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

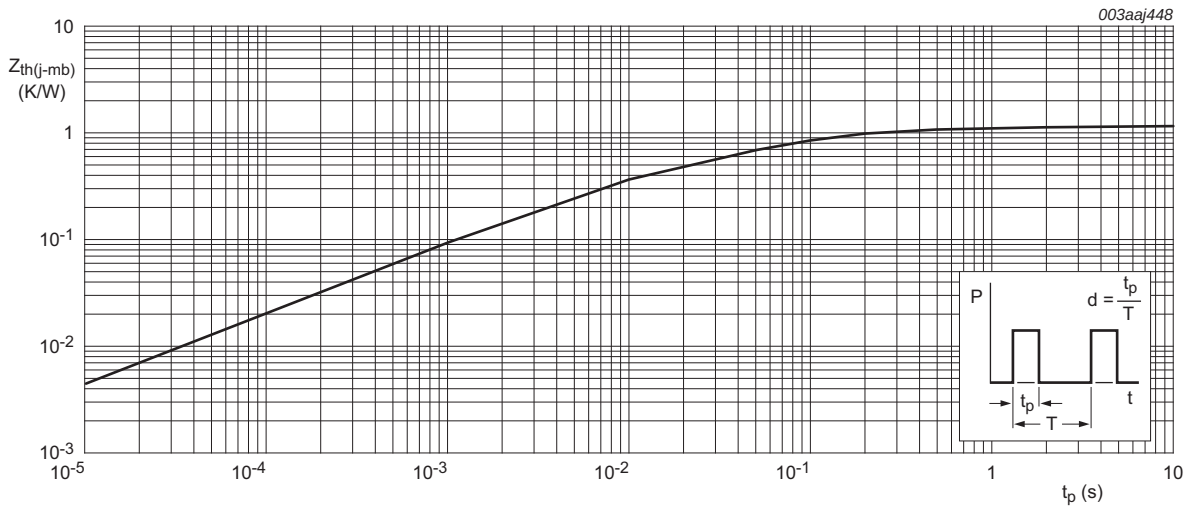


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; see Figure 7	-	4.5	25	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T_j = 25 °C; see Figure 8	-	21	60	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; see Figure 9	-	16	40	mA
V_T	on-state voltage	I_T = 32 A; T_j = 25 °C; see Figure 10	-	1.2	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; see Figure 11	-	0.7	1.3	V
		V_D = 400 V; I_T = 0.1 A; T_j = 150 °C; see Figure 11	0.2	0.4	-	V
I_D	off-state current	V_D = 600 V; T_j = 150 °C	-	0.2	1	mA
I_R	reverse current	T_j = 150 °C; V_R = 600 V	-	0.2	1	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 150 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit	300	-	-	V/µs

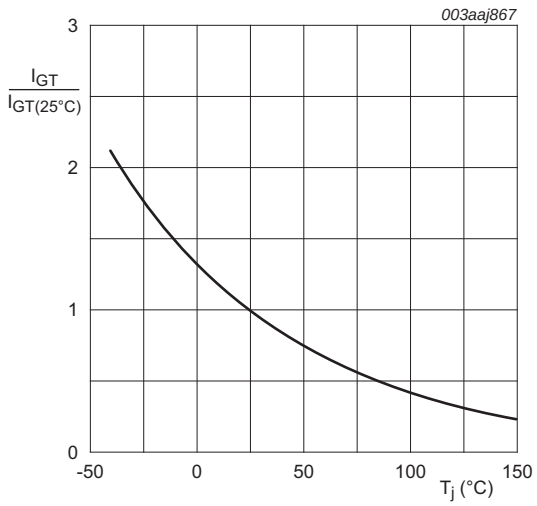


Fig 7. Normalized gate trigger current as a function of junction temperature

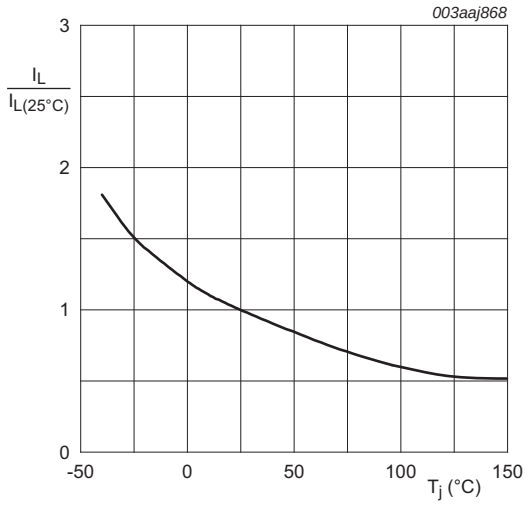


Fig 8. Normalized latching current as a function of junction temperature

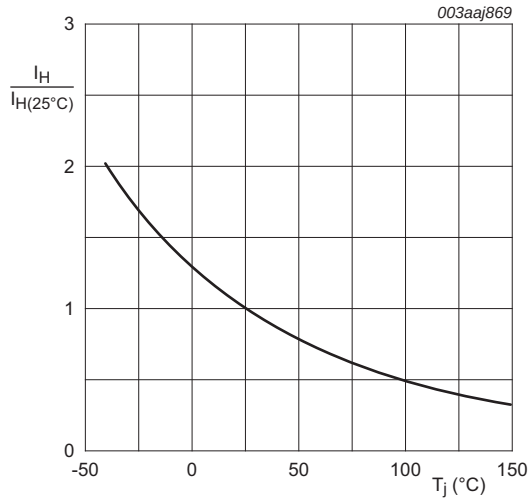
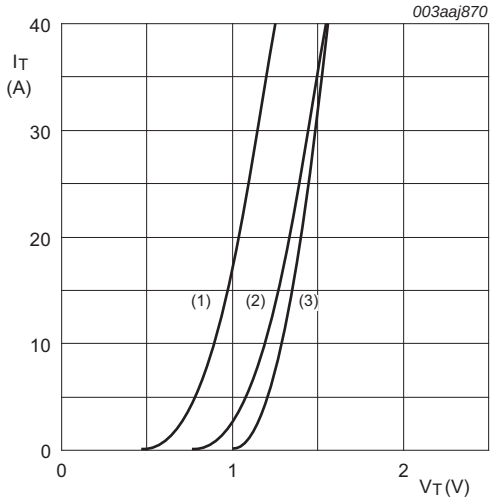


Fig 9. Normalized holding current as a function of junction temperature



V_o = 1.0336 V; R_s = 0.0141 Ω

(1) T_j = 150 °C; typical values

(2) T_j = 150 °C; maximum values

(3) T_j = 25 °C; maximum values

Fig 10. On-state current as a function of on-state voltage

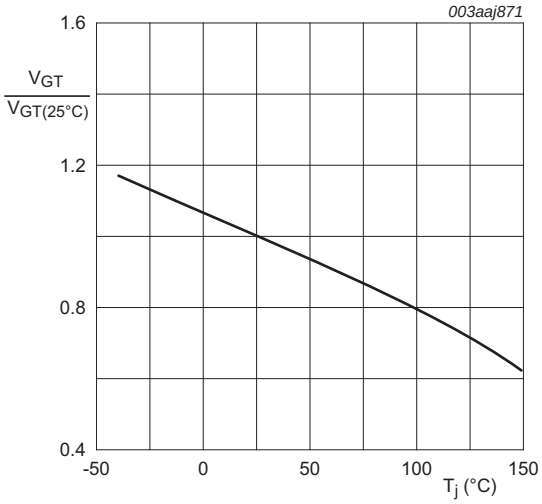
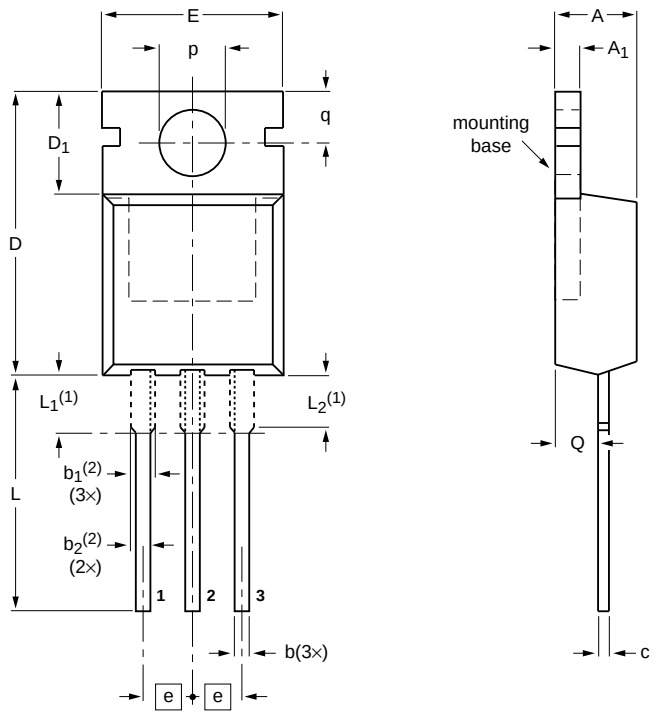


Fig 11. Normalized gate trigger voltage as a function of junction temperature

7. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **SOT78**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1(2)	b_2(2)	c	D	D_1	E	e	L	L_1(1)	L_2(1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			~~08-04-23~~ 08-06-13

Fig 12. TO-220AB (SOT78)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
TYN16-600RT v.1	20120702	Product data sheet	-	-

9. Legal information

9.1 Data sheet status

Document status[1] [2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

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11. Contents

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