

## 1. General description

WeEn's 5th Generation Hyper Fast diode with softer recovery in a 2-lead TO220F plastic package.

## 2. Features and benefits

- Isolated plastic package
- Low leakage current
- Low thermal resistance
- Soft reverse recovery with low recovery current
- Reduces switching losses in associated MOSFET or IGBT

## 3. Applications

- Active PFC in air conditioner
- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 51$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	30			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 51$ °C; square-wave pulse	60			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>	260			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	286			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 30$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	2	2.75	V
		$I_F = 30$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	1.5	2	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 50$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	-	45	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	n.c.	mounting base; isolated		

## 6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYC30X-600PS	TO220F-2L	BYC30X-600PSQ	Tube	50	TO220FE-2L (E)	21-Dec-2020
					SOD113A (A)	10-April-2014

## 7. Marking

Table 4. Marking codes

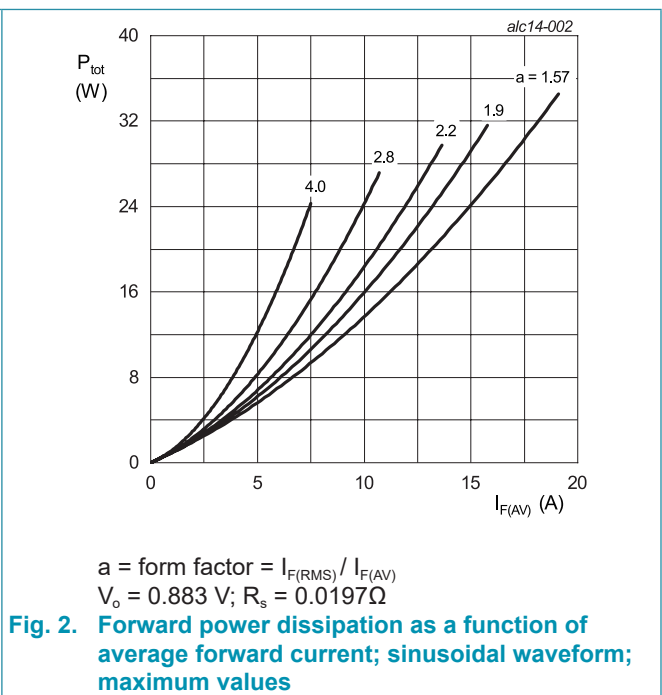
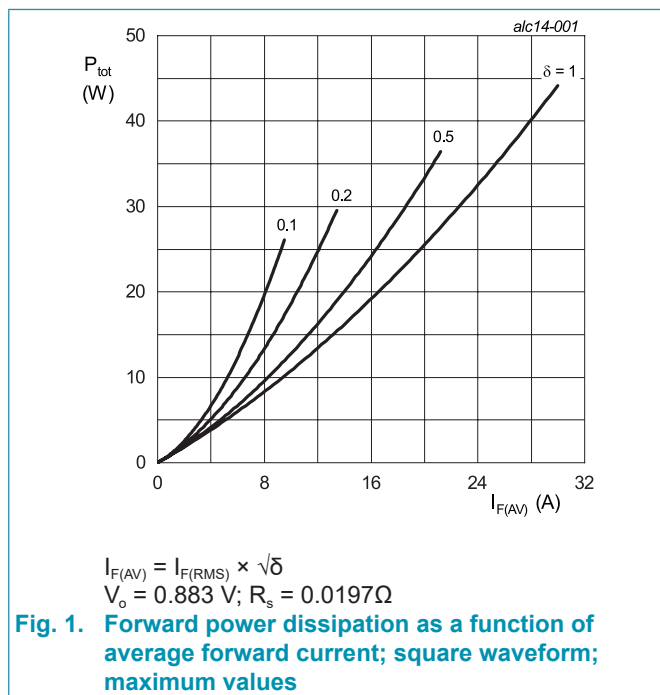
Type number	Marking codes	
	Assembly factory: E	Assembly factory: A
BYC30X-600PS	BYC30X 600PS PJExxxx xx	BYC30X 600PS PJAxxxx xx

### 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		600	V
$V_{RWM}$	crest working reverse voltage		600	V
$V_R$	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_h \leq 51$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	30	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 51$ °C; square-wave pulse	60	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>	260	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse	286	A
$T_{stg}$	storage temperature		-65 to 175	°C
$T_j$	junction temperature		-65 to 175	°C



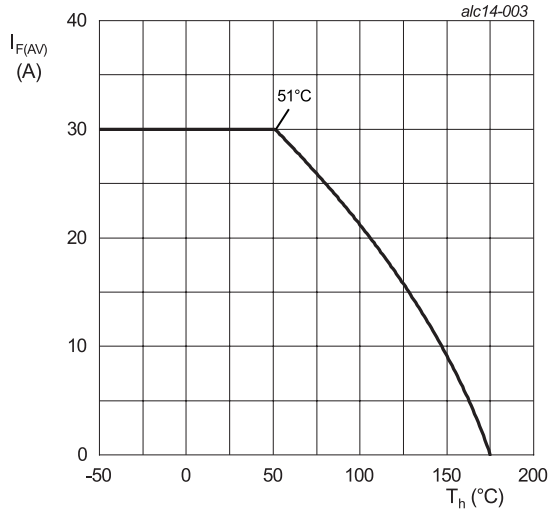


Fig. 3. Forward current as a function of heatsink temperature; maximum values

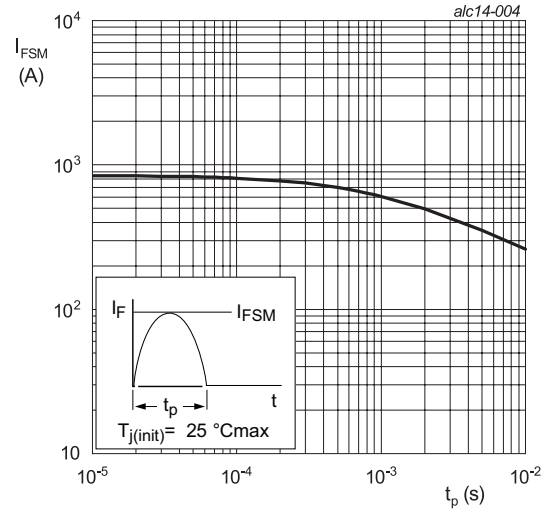


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case		-	-	3	K/W
$R_{th(c-h)}$	thermal resistance from case to heatsink		-	-	0.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

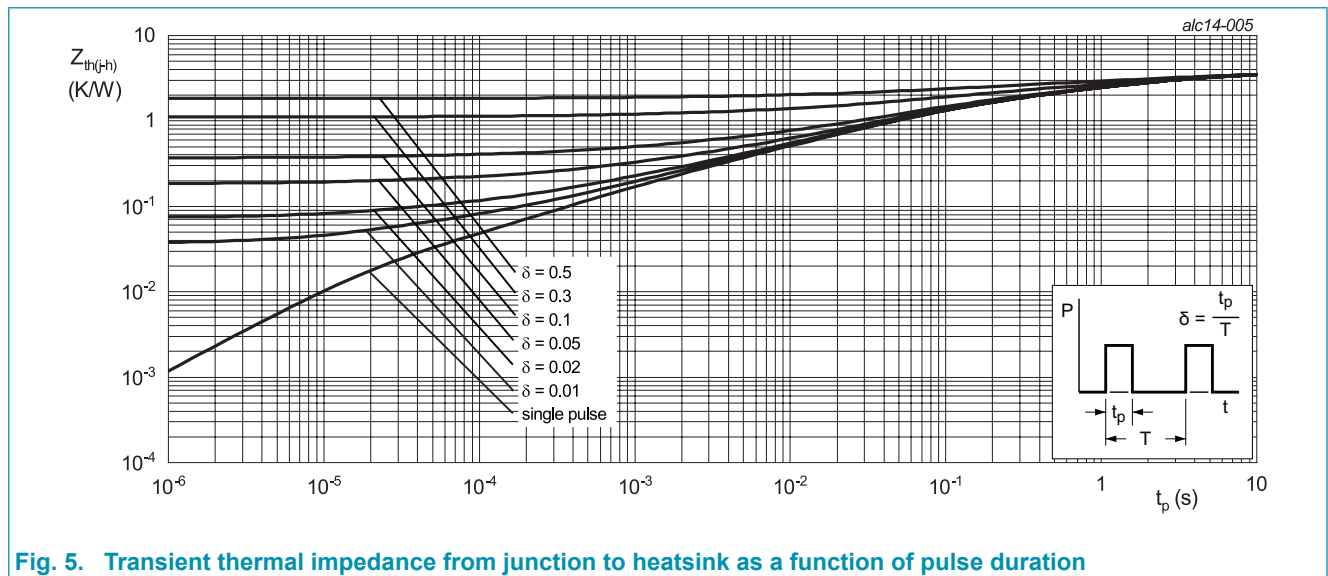


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

### 10. Isolation characteristics

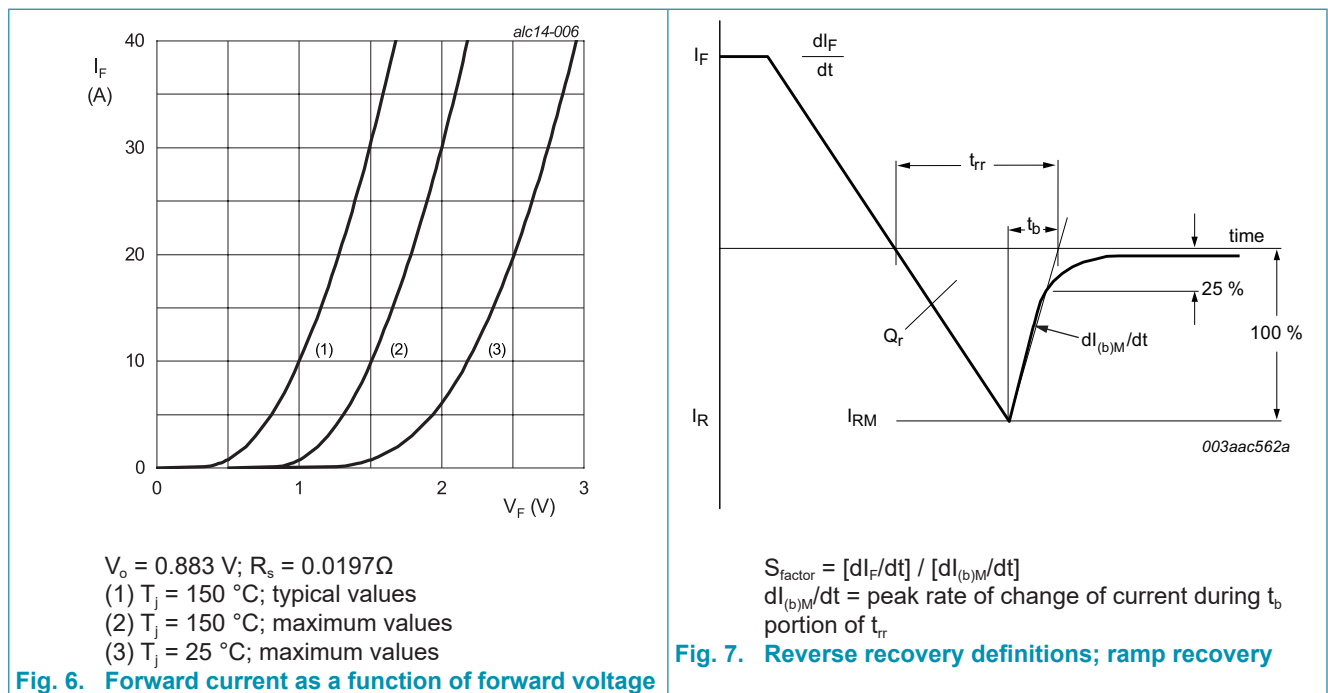
Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz $\leq$ f $\leq$ 60 Hz; RH $\leq$ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free	-	-	2500	V
$C_{isol}$	isolation capacitance	f = 1 MHz; from cathode to external heatsink	-	10	-	PF

### 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 30\text{ A}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 6}$	-	2	2.75	V
		$I_F = 30\text{ A}; T_J = 150\text{ }^\circ\text{C}; \text{Fig. 6}$	-	1.5	2	V
$I_R$	reverse current	$V_R = 600\text{ V}; T_J = 25\text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 600\text{ V}; T_J = 150\text{ }^\circ\text{C}$	-	-	600	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	-	-	45	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	-	51	-	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ }^\circ\text{C}; \text{Fig. 7}$	-	105	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	-	3.7	-	A
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ }^\circ\text{C}; \text{Fig. 7}$	-	9.5	-	A
$Q_r$	recovered charge	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	-	95	-	nC
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ }^\circ\text{C}; \text{Fig. 7}$	-	498	-	nC
$S_{factor}$	softness factor	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_J = 125\text{ }^\circ\text{C}; \text{Fig. 7}$	-	0.55	-	

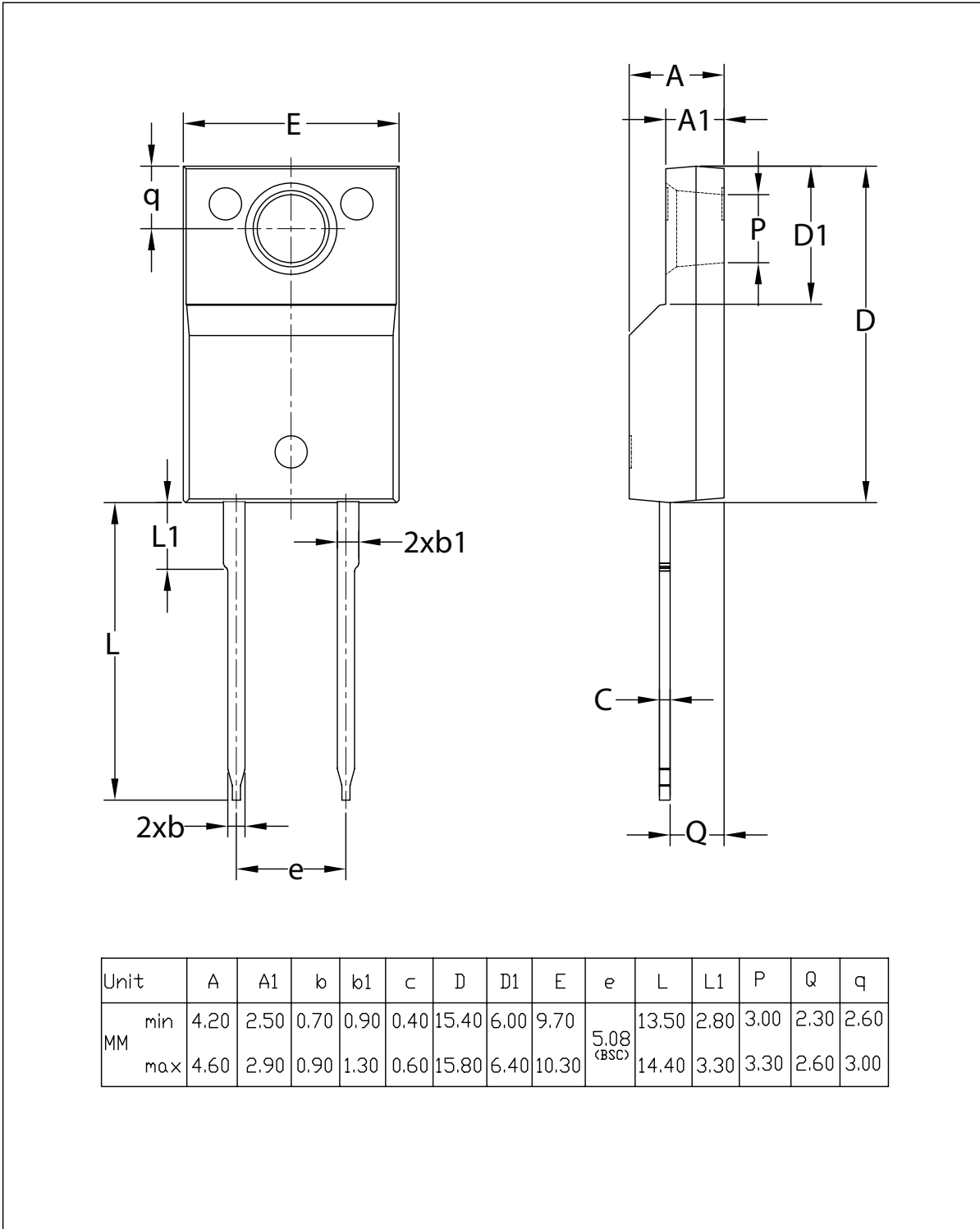


### 12. Package outline

Assembly factory: E

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2 leads TO-220 'full pack'

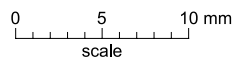
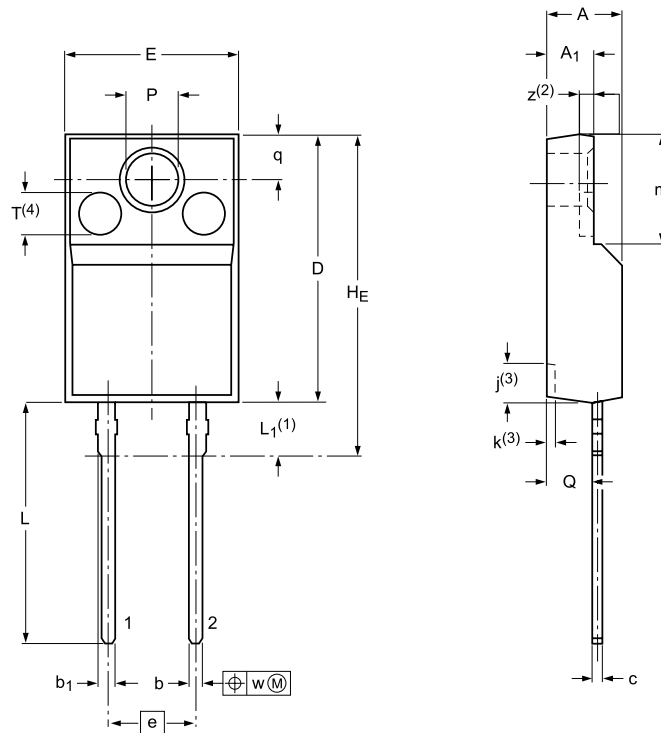
TO220F-2L



Assembly factory: A

Plastic single-ended package; isolated heasink mounted;  
1 mounting hole; 2-lead TO-220F 'full pack'

SOD113A



Dimensions (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	b <sub>1</sub>	c	D	E	e	H <sub>E</sub> max	j <sup>(3)</sup>	k <sup>(3)</sup>	L	L <sub>1</sub> <sup>(1)</sup>	m	P	Q	q	T <sup>(4)</sup>	W	z <sup>(2)</sup>	
mm	max	4.6	3.1	0.9	1.1	0.7	15.8	10.3		2.7	0.8	14.4	3.3	6.5	3.2	2.8		2.6	2.55	0.4	0.8
	nom								5.08	19.0											
	min	4.0	2.5	0.7	0.9	0.4	15.2	9.7		1.7	0.4	13.5	2.8	6.3	3.0	2.3					

Note

1. Terminals are uncontrolled within zone L1.
2. z is depth of T.
3. Dot lines area designs may vary.
4. Eject pin mark is for reference only.

sod113a\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOD113A	2 LEADS TO220F				14-01-14 14-04-10



## 13. Legal information

### 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.

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