

## 1. General description

Dual ultrafast power diode in a TO247 plastic package.

## 2. Features and benefits

- Very low on-state loss
- Fast switching
- Low leakage current
- Low thermal resistance

## 3. Applications

- Active PFC in air conditioner
- Interleaved PFC topology in switched-mode power supplies

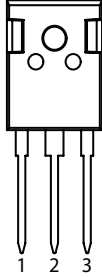
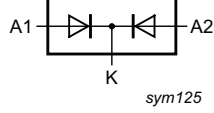
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Absolute maximum rating</b>						
$V_R$	reverse voltage	DC	-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 127\text{ °C}$ ; square-wave pulse; per diode; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	15	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 127\text{ °C}$ ; square-wave pulse	-	-	30	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\ \text{ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse; per diode; <a href="#">Fig. 4</a>	-	-	150	A
		$t_p = 8.3\ \text{ms}$ ; $T_{j(\text{init})} = 25\text{ °C}$ ; sine-wave pulse; per diode	-	-	165	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15\ \text{A}$ ; $T_j = 25\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>	-	1.4	2.1	V
		$I_F = 15\ \text{A}$ ; $T_j = 150\text{ °C}$ ; per diode; <a href="#">Fig. 6</a>	-	1.1	1.8	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\ \text{A}$ ; $V_R = 30\ \text{V}$ ; $di_F/dt = 100\ \text{A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	25	50	ns
		$I_F = 15\ \text{A}$ ; $V_R = 400\ \text{V}$ ; $di_F/dt = 200\ \text{A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	45	-	ns
		$I_F = 15\ \text{A}$ ; $V_R = 400\ \text{V}$ ; $di_F/dt = 200\ \text{A}/\mu\text{s}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 7</a>	-	65	-	ns
		$I_F = 15\ \text{A}$ ; $V_R = 400\ \text{V}$ ; $di_F/dt = 500\ \text{A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	34	-	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		 sym125
2	K	cathode		
3	A2	anode 2		
mb	K	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYV415W-600P	TO247	BYV415W-600PQ	Tube	30	SOT429 (L)	25-Mar-2013
					TO247P (P)	31-Mar-2023

## 7. Marking

Table 4. Marking codes

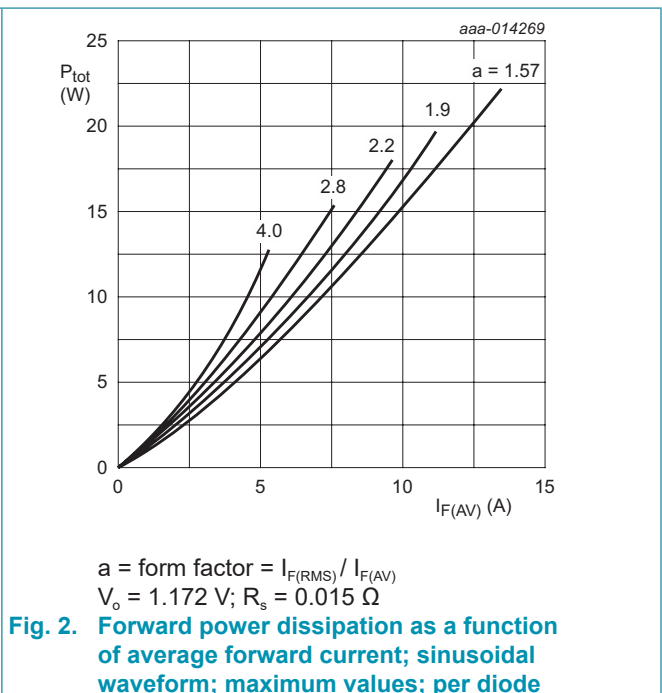
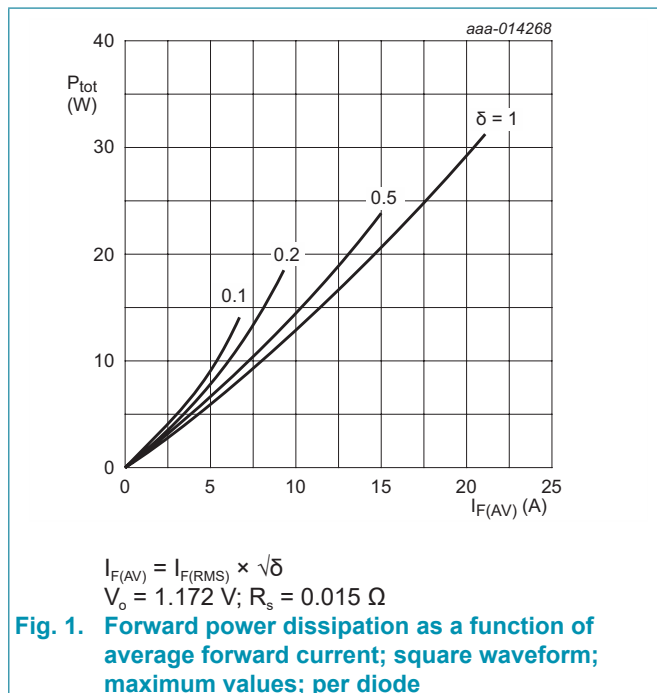
Type number	Marking codes	
	Assembly factory: L	Assembly factory: P
BYV415W-600P	BYV415W 600P PjLxxxx xx	BYV415W 600P PjPxxxx xx

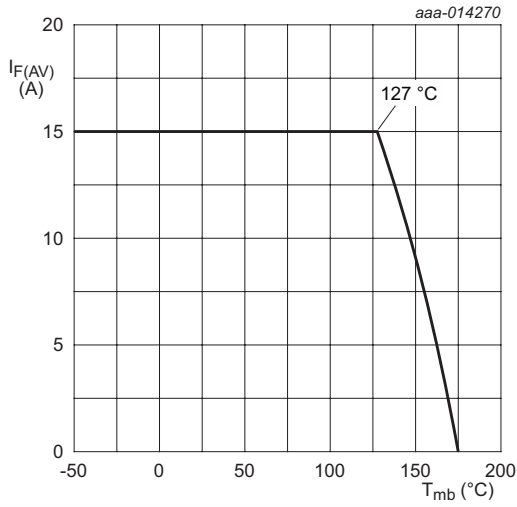
## 8. Limiting values

**Table 5. Limiting values**

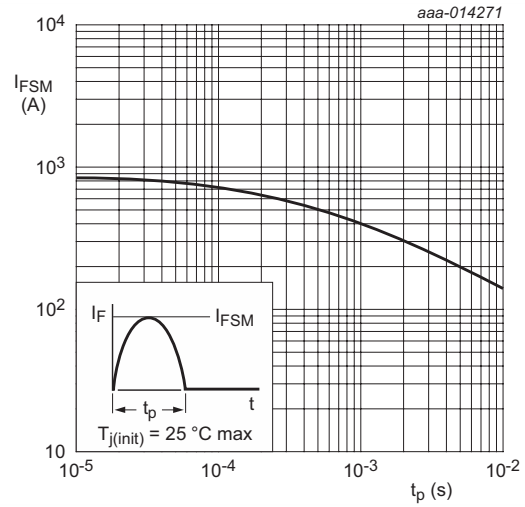
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	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	$\delta = 0.5$ ; $T_{mb} \leq 127\text{ }^\circ\text{C}$ ; square-wave pulse; per diode; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	15	A
$I_{O(AV)}$	average output current	$\delta = 0.5$ ; $T_{mb} \leq 117\text{ }^\circ\text{C}$ ; square-wave pulse; both diodes conducting	-	30	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 127\text{ }^\circ\text{C}$ ; square-wave pulse	-	30	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse; per diode; <a href="#">Fig. 4</a>	-	150	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse; per diode	-	165	A
$T_{stg}$	storage temperature		-65	175	$^\circ\text{C}$
$T_j$	junction temperature		-	175	$^\circ\text{C}$





**Fig. 3. Forward current as a function of mounting base temperature; maximum values; per diode**



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

### 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; per diode; <a href="#">Fig. 5</a>	-	1.2	0.2	K/W
		with heatsink compound; both diodes conducting	-	0.65	1.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	40	-	K/W

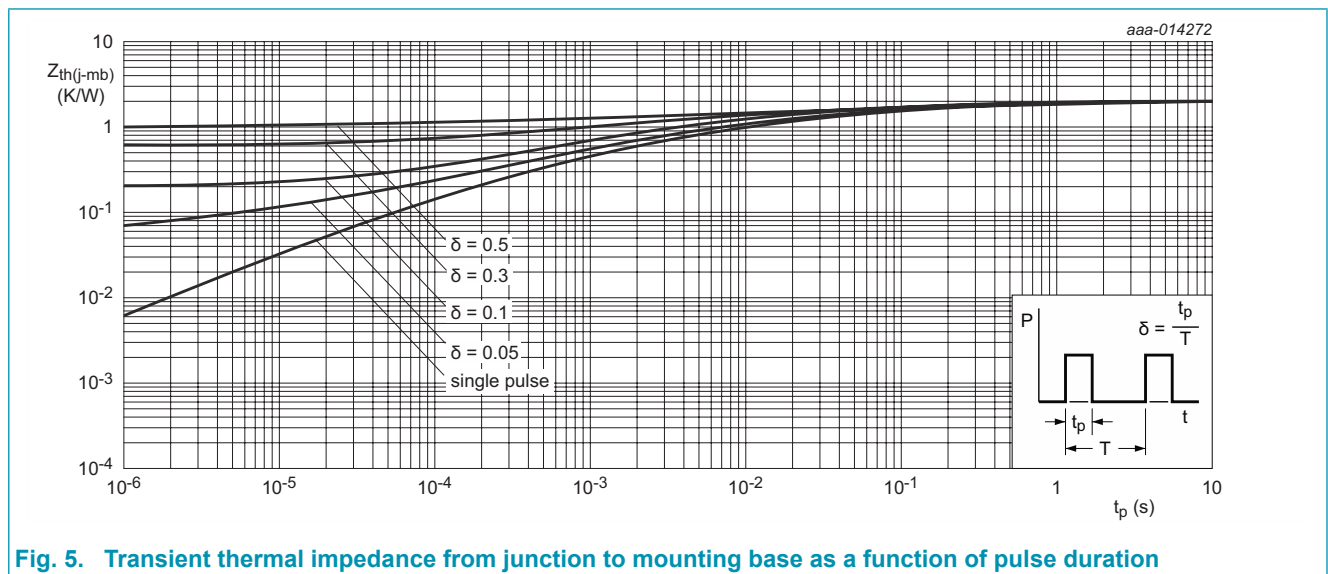
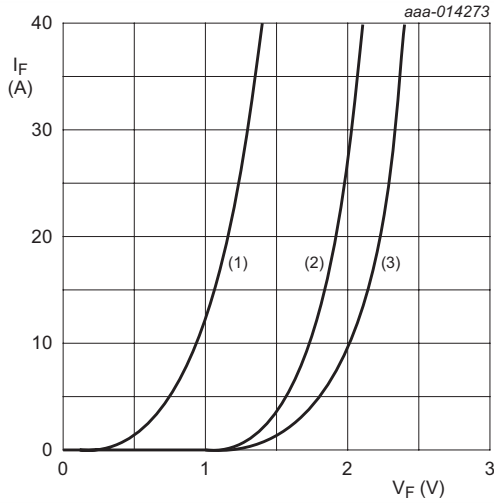


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 10. Characteristics

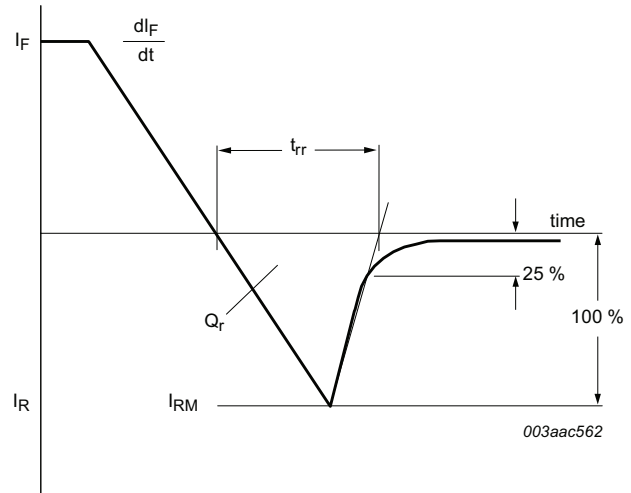
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 15\text{ A}; T_j = 25\text{ °C};$ per diode; <a href="#">Fig. 6</a>	-	1.4	2.1	V
		$I_F = 15\text{ A}; T_j = 150\text{ °C};$ per diode; <a href="#">Fig. 6</a>	-	1.1	1.8	V
$I_R$	reverse current	$V_R = 600\text{ V}; T_j = 25\text{ °C};$ per diode	-	-	10	$\mu\text{A}$
		$V_R = 600\text{ V}; T_j = 125\text{ °C};$ per diode	-	-	500	mA
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; di_F/dt = 100\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ <a href="#">Fig. 7</a>	-	25	50	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ <a href="#">Fig. 7</a>	-	45	-	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s};$ $T_j = 125\text{ °C};$ <a href="#">Fig. 7</a>	-	65	-	ns
		$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 500\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ <a href="#">Fig. 7</a>	-	34	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ <a href="#">Fig. 7</a>	-	5.5	-	A
		$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s};$ $T_j = 125\text{ °C};$ <a href="#">Fig. 7</a>	-	9.7	-	A
$Q_r$	reverse charge	$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ <a href="#">Fig. 7</a>	-	125	-	nC
		$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s};$ $T_j = 125\text{ °C};$ <a href="#">Fig. 7</a>	-	318	-	nC



$V_o = 1.172 \text{ V}; R_s = 0.015 \Omega$   
 (1)  $T_j = 150 \text{ }^\circ\text{C}$ ; typical values  
 (2)  $T_j = 150 \text{ }^\circ\text{C}$ ; maximum values  
 (3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

**Fig. 6. Forward current as a function of forward voltage; per diode**



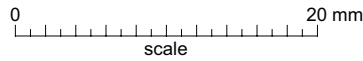
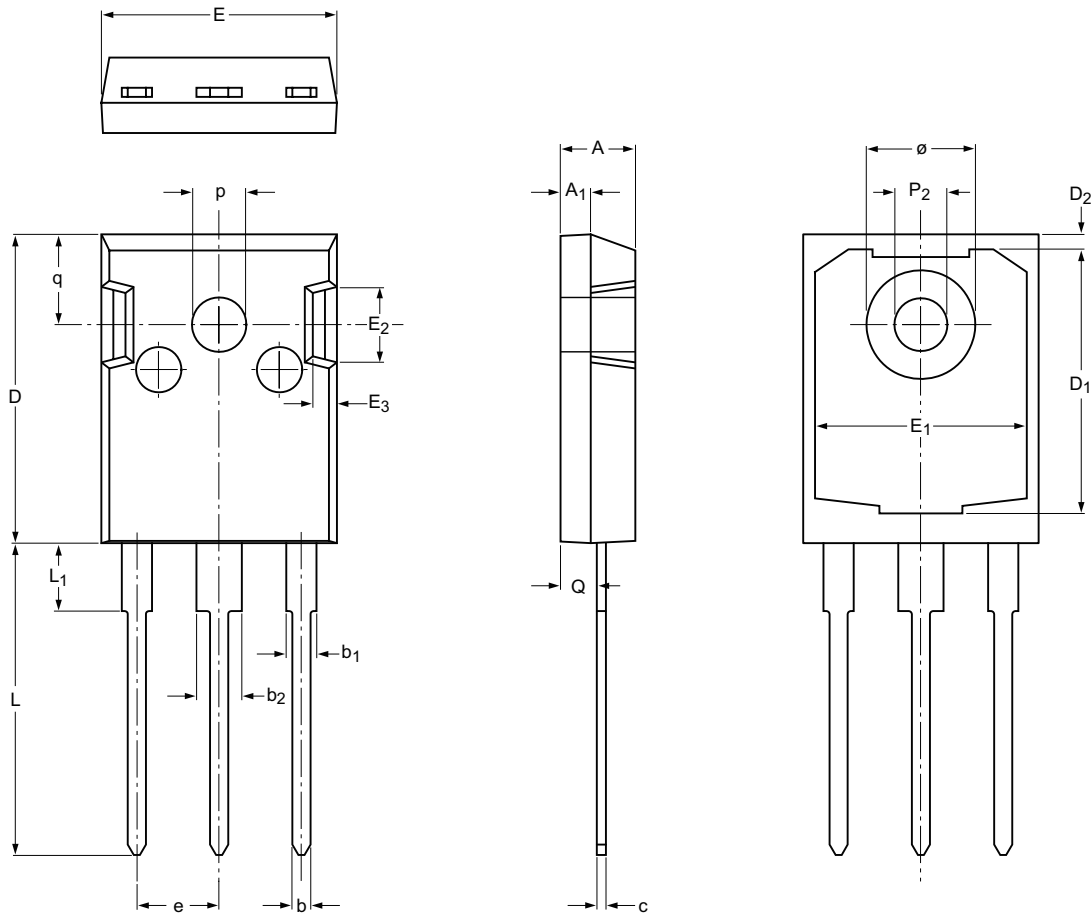
**Fig. 7. Reverse recovery definitions; ramp recovery**

## 11. Package outline

Assembly factory: L

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247

SOT429



Dimensions (mm are the original dimensions)

Unit <sup>(1)</sup>	A	A <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	D	D <sub>1</sub>	D <sub>2</sub>	E	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	e <sup>(1)</sup>	L	L <sub>1</sub>	P <sub>2</sub>	p	Q	q	ø	
max	5.20	2.10	1.40	2.20	3.20	0.70	20.6	17.68	1.20	15.75	14.22	5.20	1.80		20.90	4.75	3.60	3.70	2.60	6.18	7.30	
nom														5.45								
min	4.70	1.90	1.00	1.80	2.80	0.50	20.3	17.28	0.80	15.45	13.82	4.80	1.40		20.40	4.25	3.40	3.50	2.20	5.78	7.10	

Note  
1. Basic spacing between centers.

sot429\_po

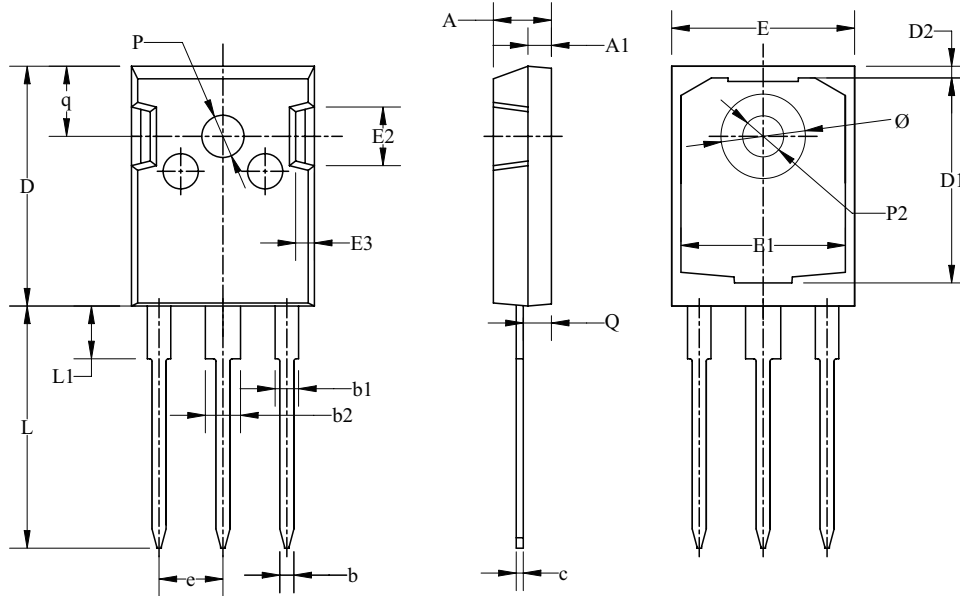
Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT429		TO-247			04-09-14 13-03-25



Assembly factory: P

Plastic single-ended through-hole pack age; headsink mounted; 1 mounting hole; 3 leads TO-247

TO247



Dim	All Dimensions in Millimeters		
	Min	Typ	Max
A	4.70	4.95	5.20
A1	1.90	2.00	2.10
b	1.00	1.20	1.40
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.50	0.60	0.70
D	20.30	20.45	20.60
D1	17.28	17.48	17.68
D2	0.80	1.00	1.20
E	15.45	15.60	15.75
E1	13.82	14.02	14.22
E2	4.80	5.00	5.20
E3	1.40	1.60	1.80
e	5.45 BSC		
L	20.40	20.65	20.90
L1	4.25	4.50	4.75
P2	3.40	3.50	3.60
P	3.50	3.60	3.70
Q	2.20	2.40	2.60
q	5.78	5.98	6.18
Ø	7.10	7.19	7.30

## 12. 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.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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