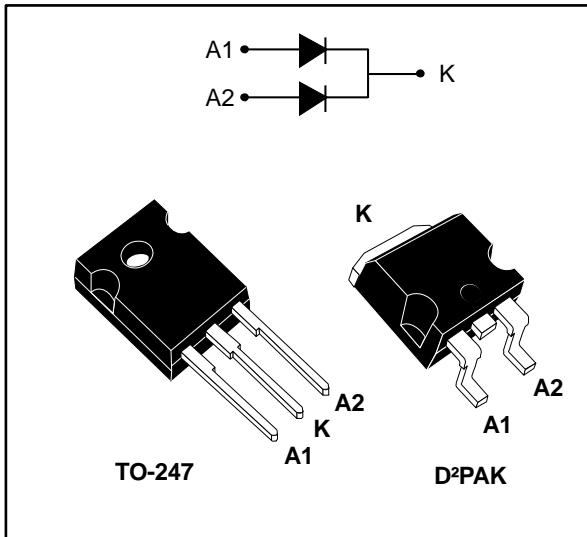


## Turbo 2 ultratfast high voltage rectifier

Datasheet - production data



### Description

This device uses ST Turbo 2 600 V technology, and is particularly suited as boost diode in discontinuous or critical mode power factor corrections.

It is also intended for use as a freewheeling diode in power supplies and other power switching applications.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	up to 2 x 20 A
$V_{RRM}$	600 V
$V_F$ (typ.)	0.95 V
$t_{rr}$ (max.)	55 ns

### Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduce switching and conduction losses
- ECOPACK<sup>®</sup>2 compliant component for D<sup>2</sup>PAK on demand

# 1 Characteristics

**Table 2: Absolute ratings (limiting values, per diode, at 25 °C, unless otherwise specified)**

Symbol	Parameter		Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage		600	V	
I <sub>F(RMS)</sub>	Forward rms current		30	A	
I <sub>F(AV)</sub>	Average forward current δ = 0.5, square wave	T <sub>C</sub> = 140 °C	Per diode	15	A
		T <sub>C</sub> = 125 °C	Per device	30	
		T <sub>C</sub> = 120 °C	Per diode	20	
		T <sub>C</sub> = 110 °C	Per device	40	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	130	A	
T <sub>stg</sub>	Storage temperature range		-65 to +175	°C	
T <sub>j</sub>	Maximum operating junction temperature		+175	°C	

**Table 3: Thermal parameters**

Symbol	Parameter		Max. value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	1.7	°C/W
		Total	1.15	
R <sub>th(c)</sub>	Coupling		0.6	°C/W

When the diodes 1 and 2 are used simultaneously:

$$\Delta T_j (\text{diode1}) = P_{(\text{diode1})} \times R_{\text{th(j-c)}} (\text{per diode}) + P_{(\text{diode2})} \times R_{\text{th(c)}}$$

**Table 4: Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-		15	µA
		T <sub>j</sub> = 150 °C		-	40	400	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 15 A	-		1.55	V
		T <sub>j</sub> = 150 °C		-	0.95	1.2	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 30 A			1.76	
		T <sub>j</sub> = 150 °C		1.15	1.45		

**Notes:**

(1)Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

(2)Pulse test: t<sub>p</sub> = 380 µs, δ < 2%

To evaluate the conduction losses, use the following equation:

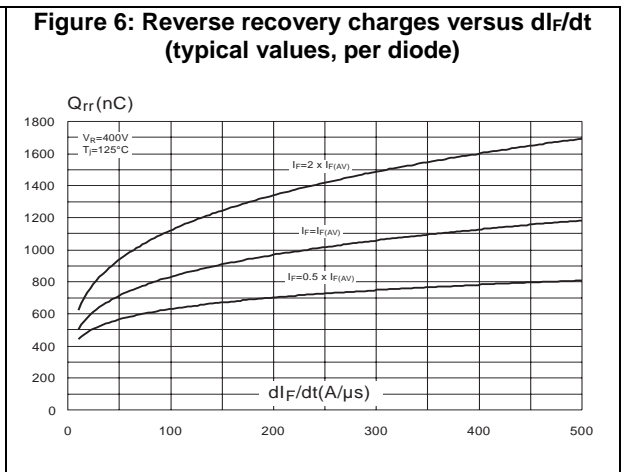
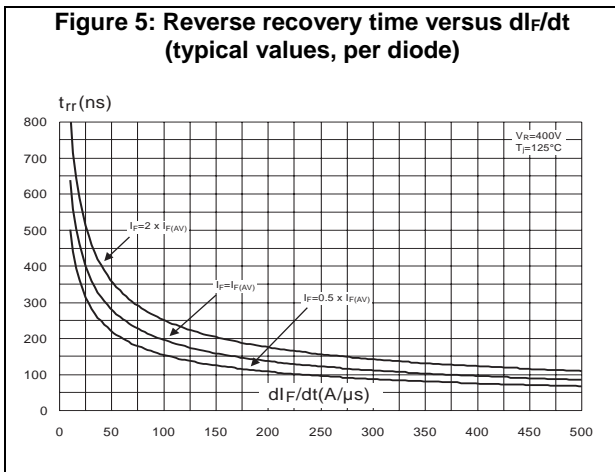
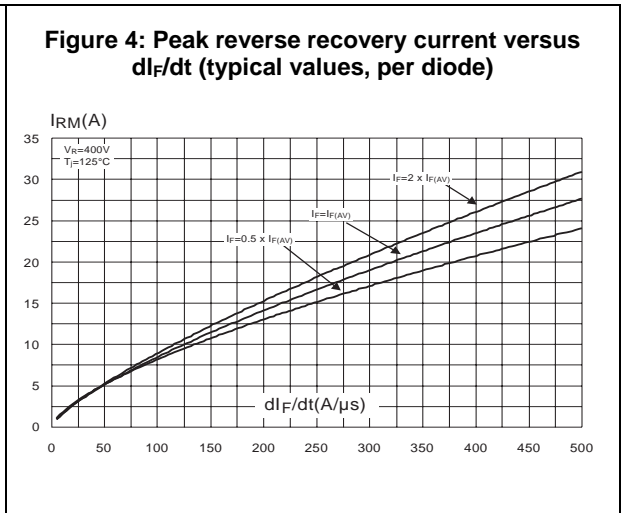
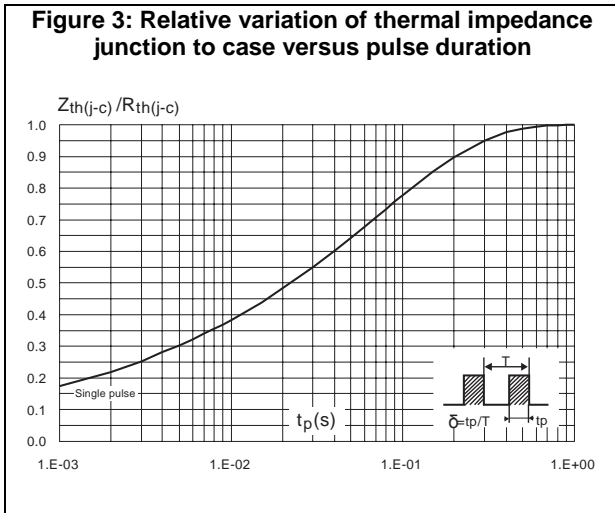
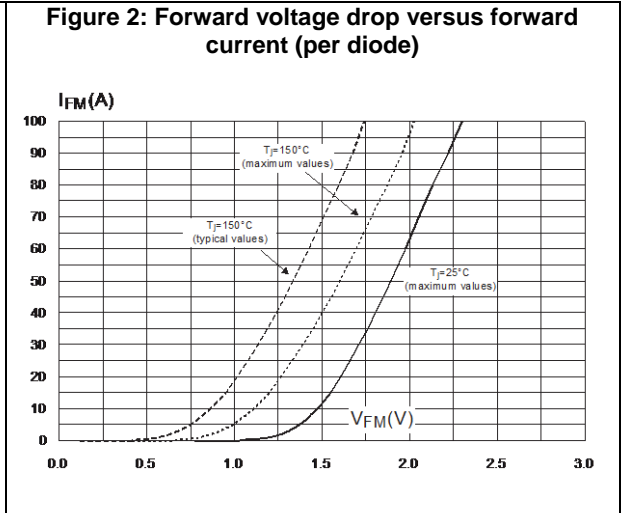
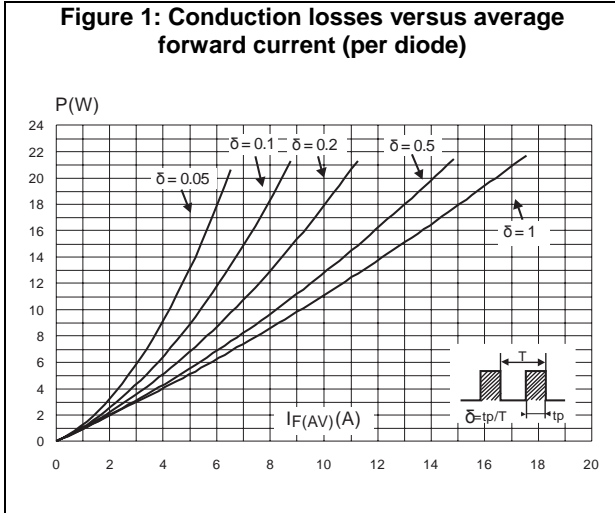
$$P = 0.94 \times I_{F(AV)} + 0.017 \times I_{F(RMS)}^2$$



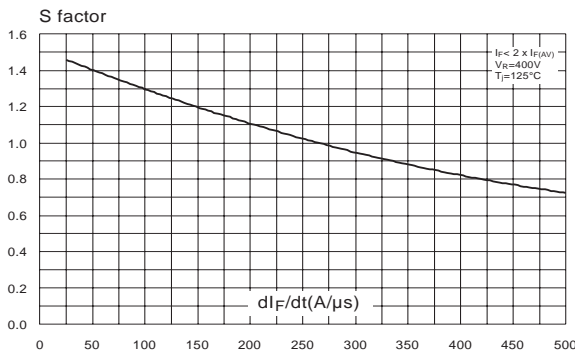
Table 5: Dynamic electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}$ $I_R = 1\text{ A}$ $I_{rr} = 0.25\text{ A}$	-		55	ns
			$I_F = 1\text{ A}$ $V_R = 30\text{ V}$ $di_F/dt = 50\text{ A}/\mu\text{s}$	-	60	85	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 15\text{ A}$ $V_R = 400\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-	8.5	12	A
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}$ $V_{FR} = 1.1 \times V_{Fmax.}$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-		300	ns
$V_{FP}$	Forward recovery voltage			-	3.0		V

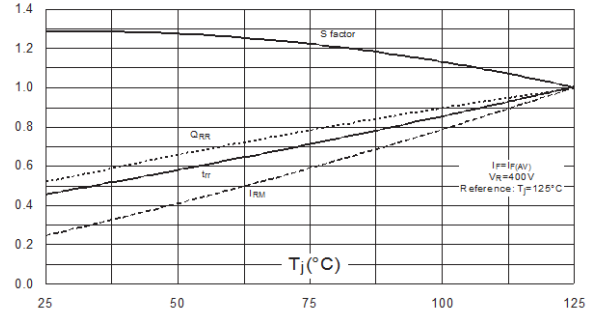
### 1.1 Characteristics (curves)



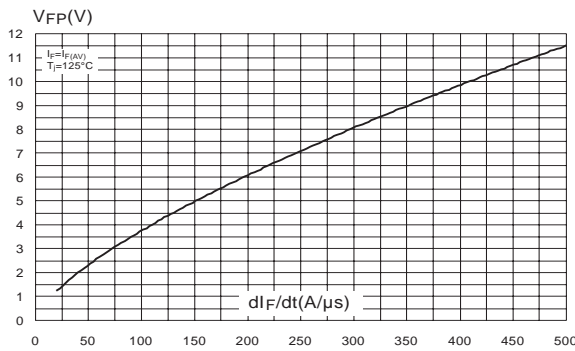
**Figure 7: Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)**



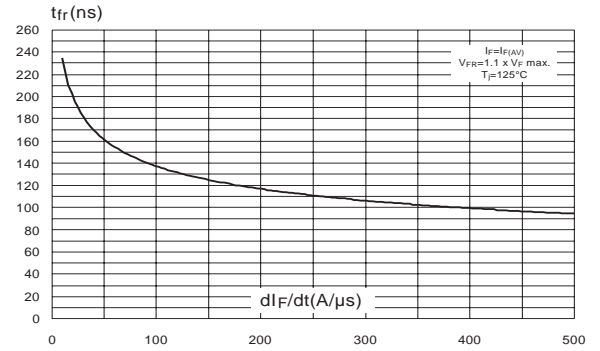
**Figure 8: Relative variation of dynamic parameters versus junction temperature**



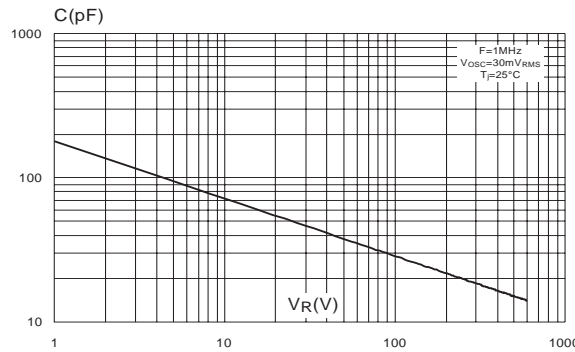
**Figure 9: Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



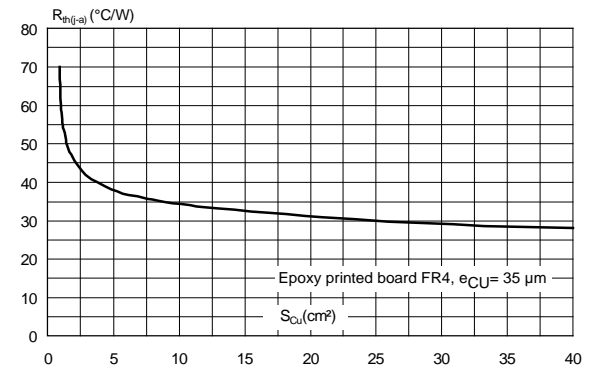
**Figure 10: Forward recovery time versus  $di_F/dt$  (typical values, per diode)**



**Figure 11: Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 12: Thermal resistance, junction to ambient, versus copper surface under tab (D<sup>2</sup>PAK)**



## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

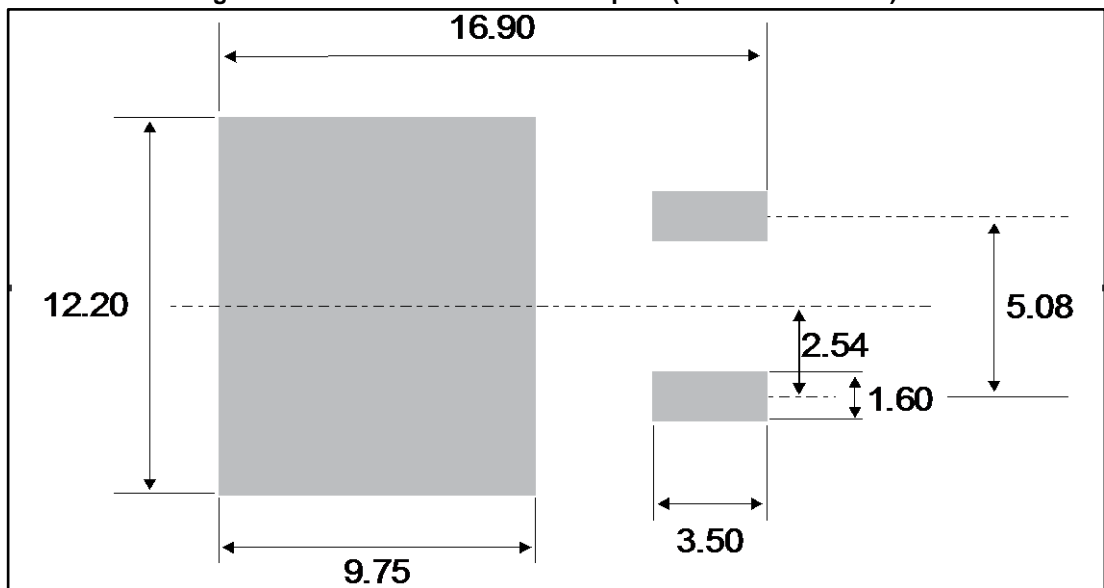
- Cooling method: by conduction (C)
- Epoxy meets UL 94, V0
- Recommended torque value: 0.8 N·m
- Maximum torque value: 1.0 N·m



Table 6: D<sup>2</sup>PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	0.415
E1	8.10	8.90	0.319	0.346
E2	6.85	7.25	0.266	0.282
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	15.00	15.85	0.591	0.624
J1	2.49	2.90	0.097	0.112
L	1.90	2.79	0.075	0.110
L1	1.27	1.65	0.049	0.065
L2	1.30	1.78	0.050	0.070
R	0.4 typ.		0.015	
V2	0°	8°	0°	8°

Figure 14: D<sup>2</sup>PAK recommended footprint (dimensions in mm)





## 2.2 TO-247 package information

Figure 15: TO-247 package outline

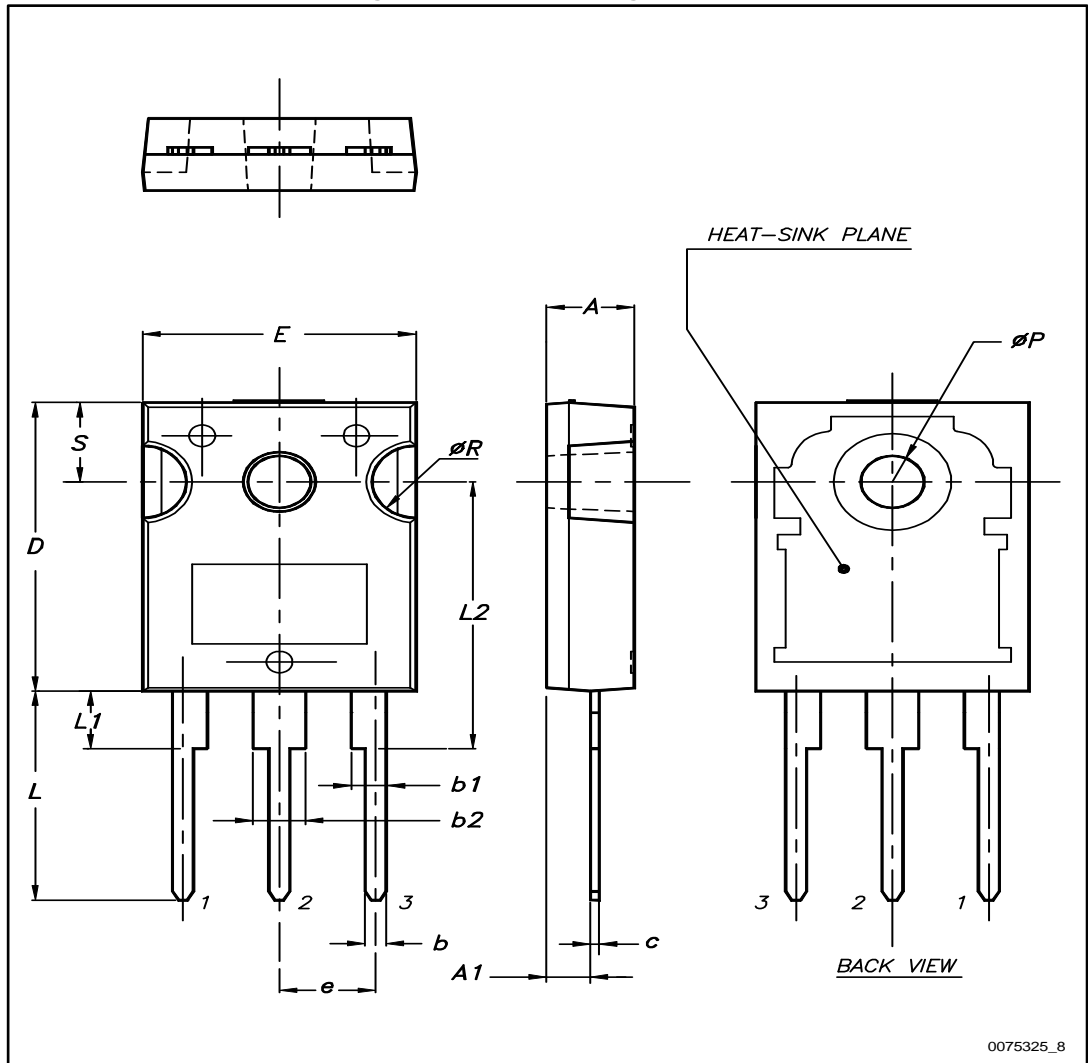


Table 7: TO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.85		5.15	0.191		0.203
A1	2.20		2.60	0.086		0.102
b	1.00		1.40	0.039		0.055
b1	2.00		2.40	0.078		0.094
b2	3.00		3.40	0.118		0.133
c	0.40		0.80	0.015		0.031
D <sup>(1)</sup>	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e	5.30	5.45	5.60	0.209	0.215	0.220
L	14.20		14.80	0.559		0.582
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
ØP <sup>(2)</sup>	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

**Notes:**

<sup>(1)</sup>Dimension D plus gate protusion does not exceed 20.5 mm

<sup>(2)</sup>Resin thickness around the mounting hole is not less than 0.9 mm.

### 3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30L06CG-TR	STTH30L06CG	D <sup>2</sup> PAK	1.48 g	1000	Tape and reel
STTH30L06CW	STTH30L06CW	TO-247	4.46 g	50	Tube

### 4 Revision history

Table 9: Document revision history

Date	Revision	Changes
07-Sep-2004	1	Initial release.
14-Dec-2016	2	Removed TO-220AB package information.

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