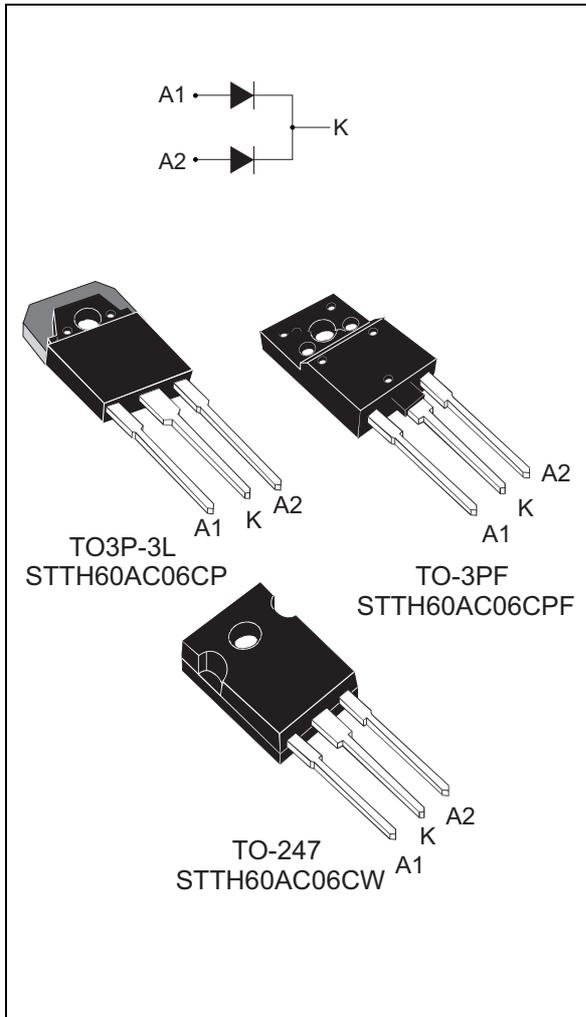


## Turbo 2 ultrafast high voltage rectifier

Datasheet – production data



### Features

- Ultrafast switching
- Low reverse recovery current
- Reduces switching and conduction losses
- Low thermal resistance
- Insulated package TO-3PF:
  - Insulated voltage: 2500 V DC

### Description

The STTH60AC06C, which uses ST Turbo 2 600 V technology, is suited as boost diode especially to use in air conditioning as continuous mode power factor corrections interleaved.

The device is also intended for use as a free wheeling diode in power supplies and other power switching applications.

**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	2 x 30A
$V_{RRM}$	600 V
$t_{rr} \text{ (max)}$	40 ns
$V_F \text{ (max)}$	1.40 V
$T_j \text{ (max)}$	175 °C

# 1 Characteristics

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

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	Forward rms current		50	A
$I_{F(AV)}$	Average forward current	Per diode	30	A
		Per device	60	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	280	A
$T_{stg}$	Storage temperature range		-65 to +175	°C
$T_j$	Maximum operating junction temperature		175	°C

**Table 3. Thermal parameters**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (TO3P-3L, TO247)	Per diode	0.9	°C/W
		Total	0.55	
$R_{th(c)}$	Coupling (TO3P-3L, TO247)		0.2	
$R_{th(j-c)}$	Junction to case (TO-3PF)	Per diode	2.8	
		Total	2.2	
$R_{th(c)}$	Coupling (TO-3PF)		1.6	

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

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25$ °C	$V_R = V_{RRM}$			10	μA
		$T_j = 150$ °C			40	400	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25$ °C	$I_F = 30$ A			1.75	V
		$T_j = 150$ °C			1.07	1.40	
		$T_j = 25$ °C	$I_F = 60$ A			2	
		$T_j = 150$ °C			1.32	1.7	

1. Pulse test:  $t_p = 5$  ms,  $\delta < 2\%$
2. Pulse test:  $t_p = 380$  μs,  $\delta < 2\%$

To evaluate the conduction losses use the following equation:

$$P = 1.1 \times I_{F(AV)} + 0.01 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$			40	ns
			$I_F = 1\text{ A}, V_R = 30\text{ V}, dI_F/dt = -50\text{ A}/\mu\text{s}$		50	70	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ }^\circ\text{C}$	$I_F = 30\text{ A}, V_R = 400\text{ V}, dI_F/dt = -100\text{ A}/\mu\text{s}$		6.5	9	A
$t_{fr}$	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 30\text{ A}, V_{FR} = 1.5\text{ V}, dI_F/dt = +200\text{ A}/\mu\text{s}$			100	ns
$V_{FP}$	Forward recovery voltage				2.5		V

Figure 1. Average forward power dissipation versus average forward current (per diode)

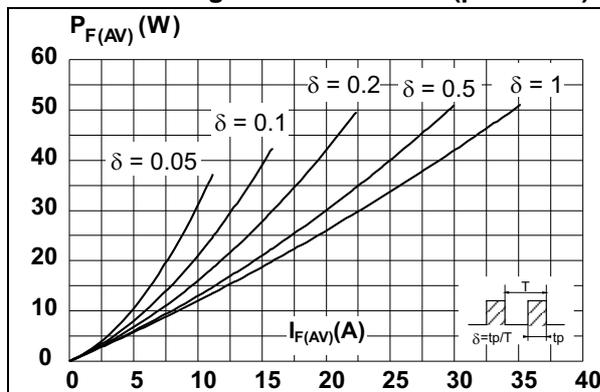


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

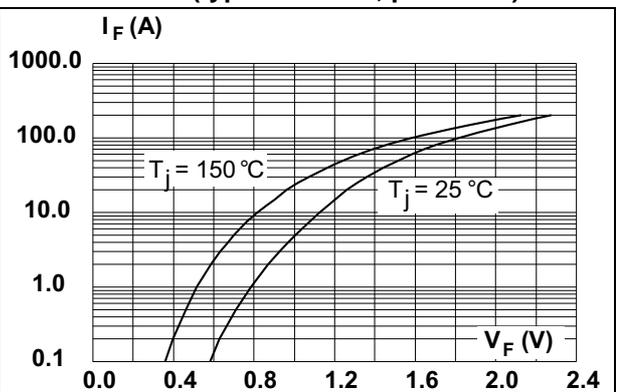


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

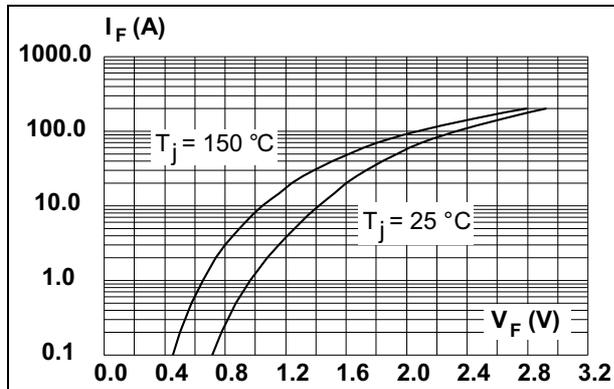


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L, TO247)

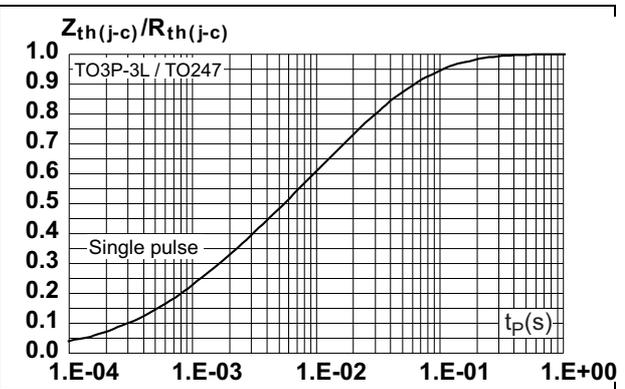


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-3PF)

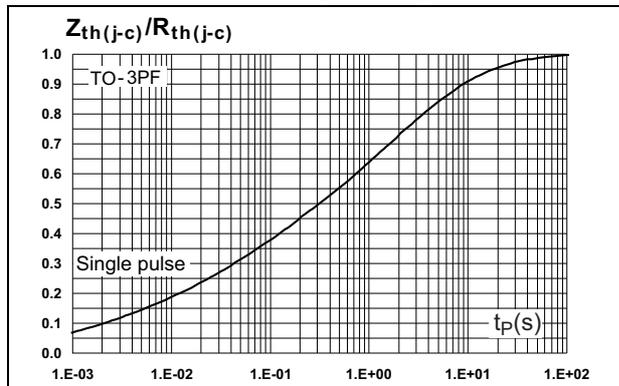


Figure 6. Peak reverse recovery current versus  $di_F/dt$  (typical values, per diode)

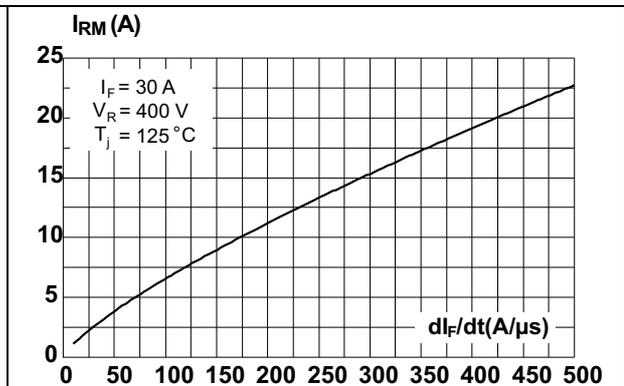


Figure 7. Reverse recovery time versus  $di_F/dt$  (typical values, per diode)

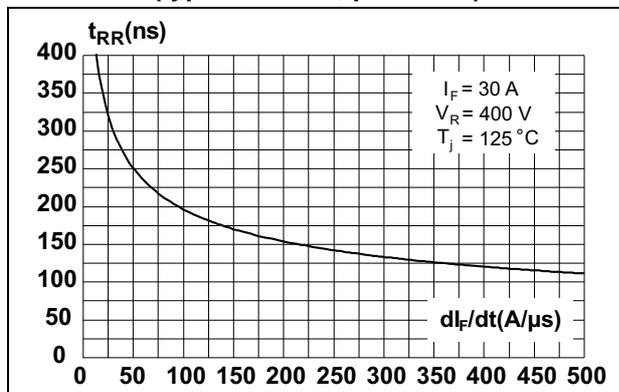


Figure 8. Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)

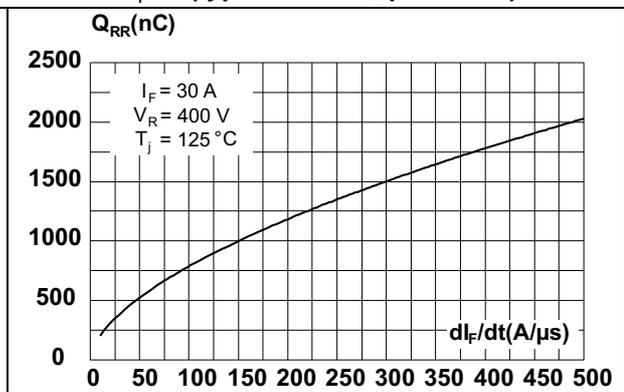


Figure 9. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)

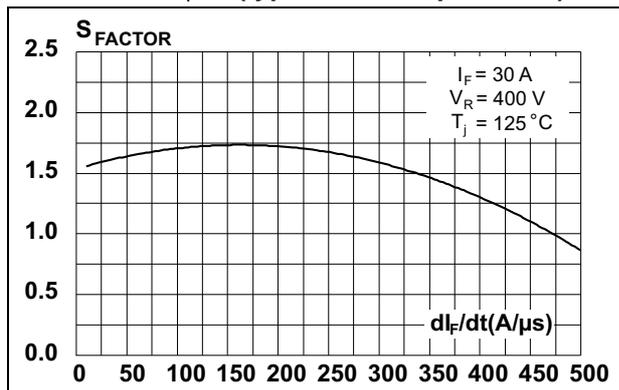


Figure 10. Relative variations of dynamic parameters versus junction temperature

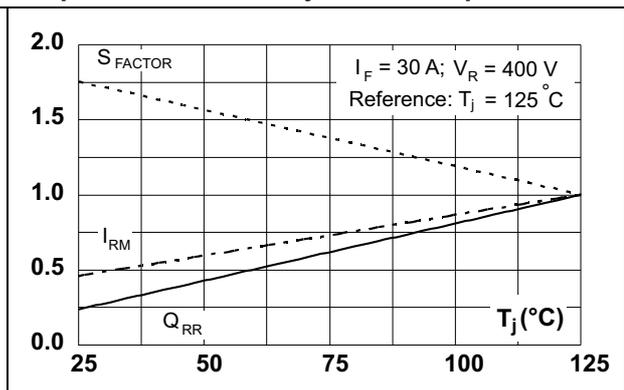


Figure 11. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)

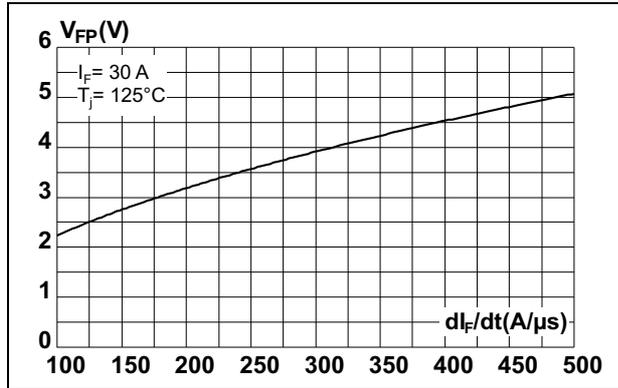


Figure 12. Forward recovery time versus  $di_F/dt$  (typical values, per diode)

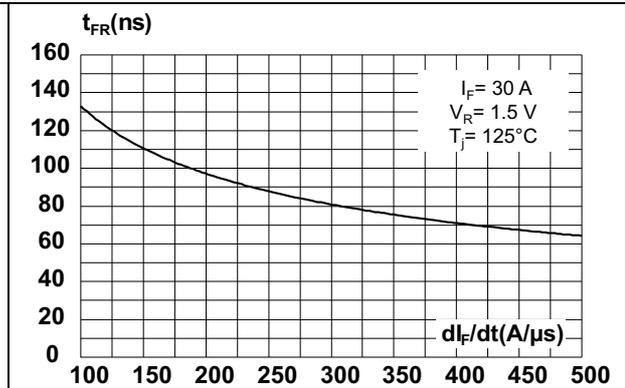
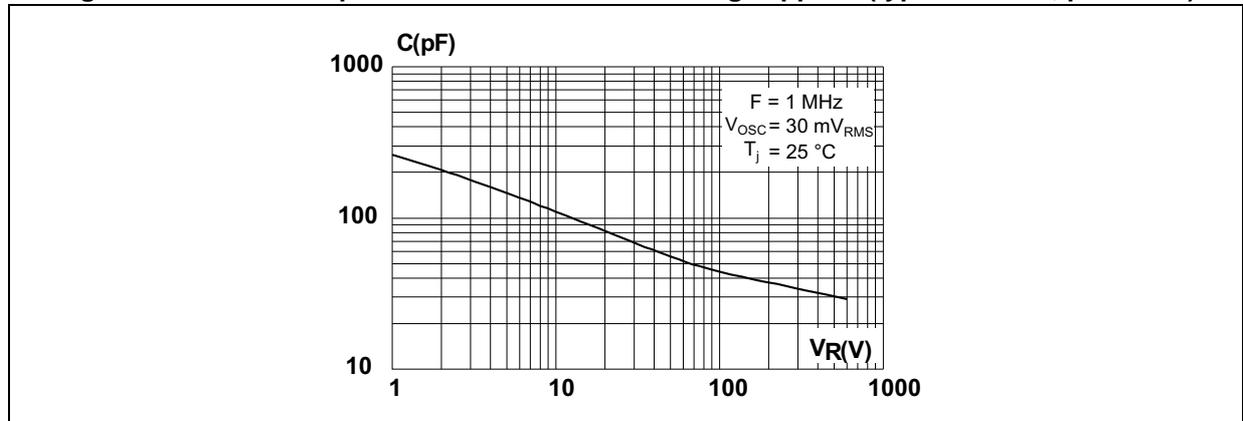


Figure 13. Junction capacitance versus reverse voltage applied (typical values, per diode)



## 2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque: (TO3P-3L, TO-3PF) 0.4 to 0.6 N·m, (TO-247) 0.5 to 1.0 N·m

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

Figure 14. TO3P-3L dimension definitions

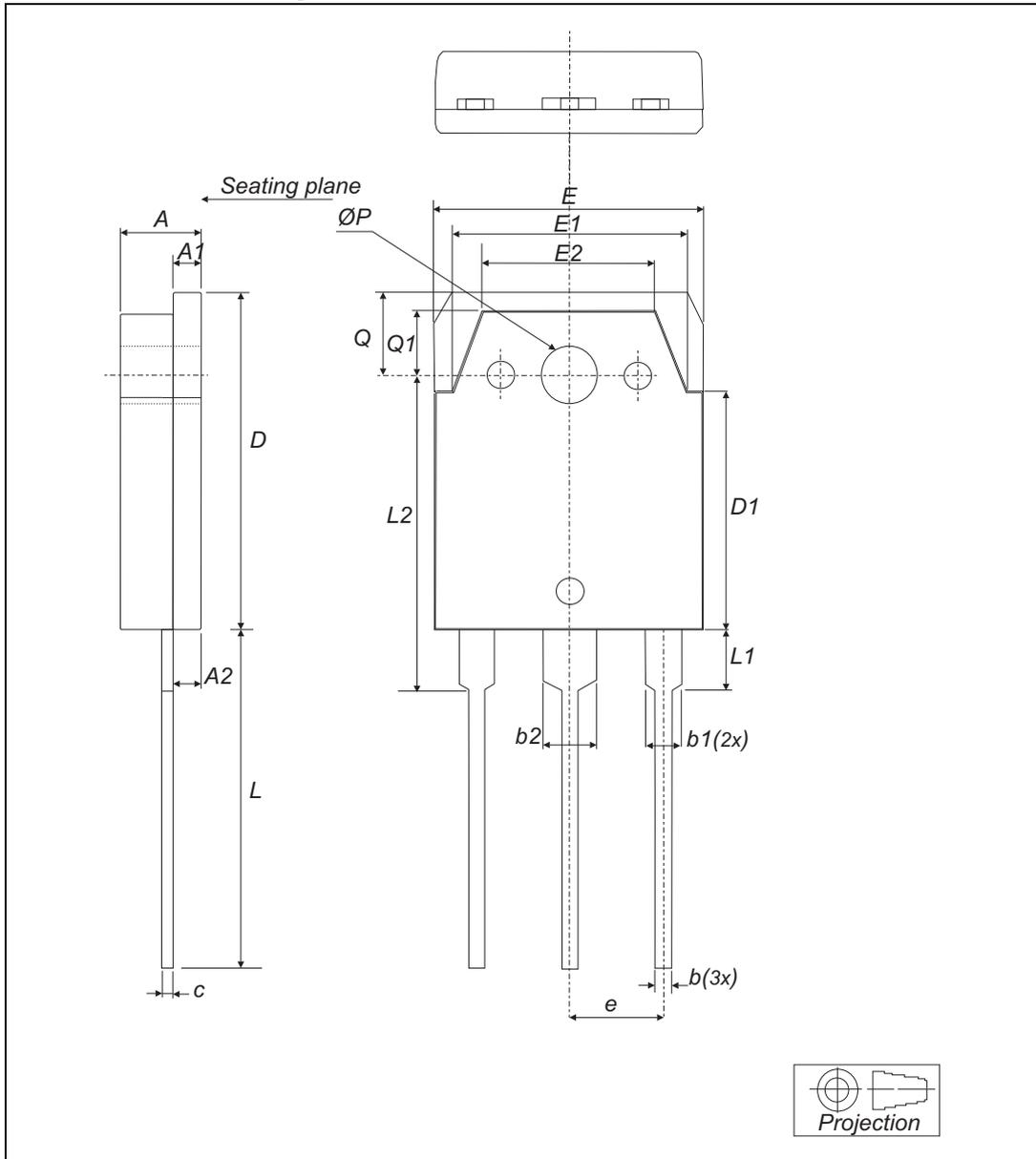


Table 6. TO3P-3L dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.6		5	0.18		0.19
A1	1.45	1.5	1.65	0.05	0.06	0.06
A2	1.20	1.40	1.60	0.04	0.05	0.06
b	0.80	1	1.20	0.03	0.04	0.05
b1	1.80		2.20	0.07		0.08
b2	2.80		3.20	0.11		0.12
c	0.55	0.60	0.75	0.02	0.02	0.03
D	19.70	19.90	20.10	0.77	0.78	0.79
D1		13.90			0.54	
E	15.40		15.80	0.60		0.62
E1		13.60			0.53	
E2		9.60			0.38	
e	5.15	5.45	5.75	0.20	0.21	0.22
L	19.50	20	20.50	0.76	0.78	0.80
L1		3.50			0.14	
L2	18.20	18.40	18.60	0.71	0.72	0.73
ØP	3.10		3.30	0.12		0.13
Q		5			0.19	
Q1		3.80			0.15	

Figure 15. TO-3PF dimension definitions

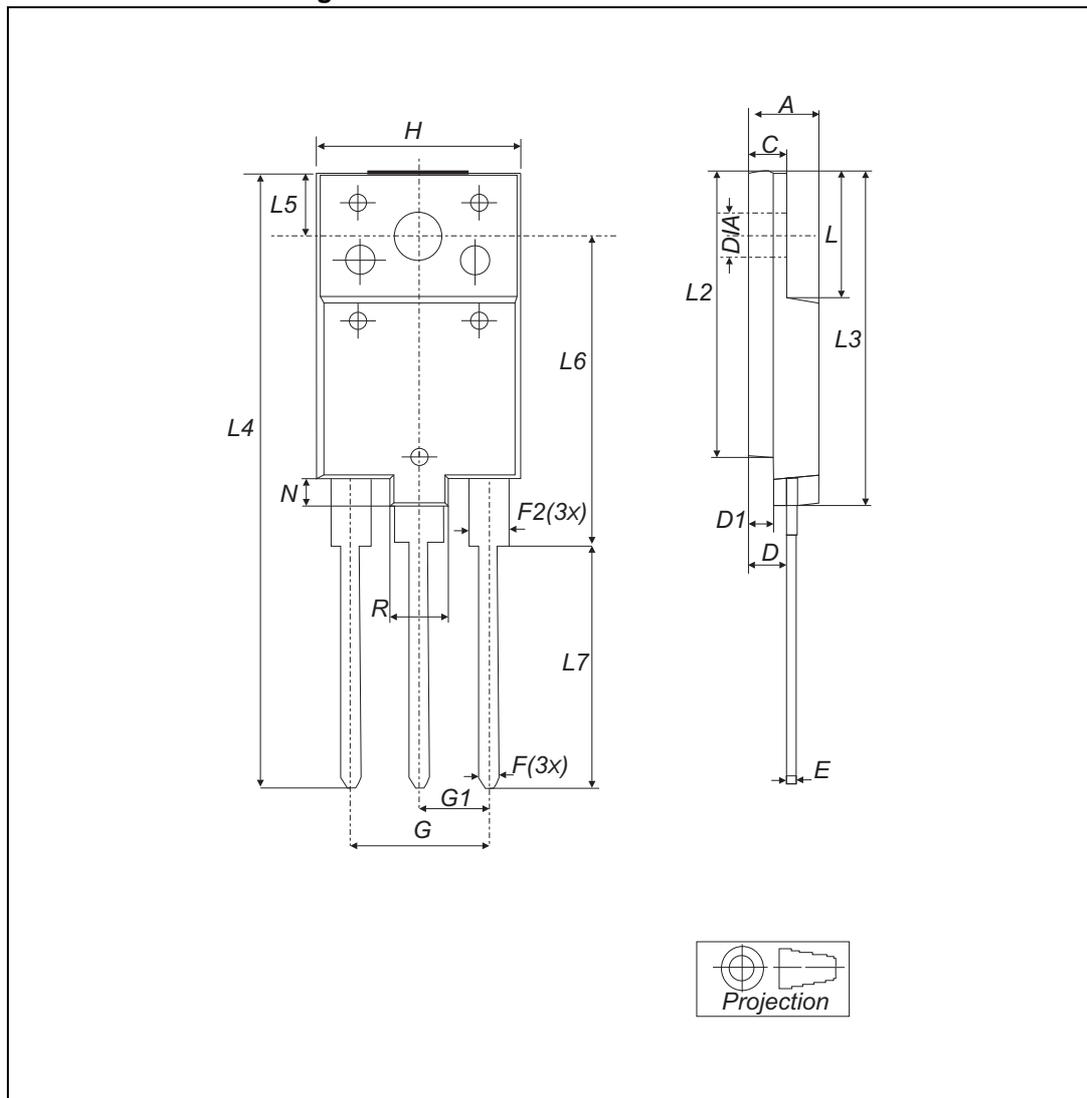


Table 7. TO-3PF dimension values

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	5.30		5.70	0.2		0.22
C	2.80		3.20	0.11		0.12
D	3.10		3.50	0.12		0.13
D1	1.80		2.20	0.07		0.08
E	0.80		1.10	0.03		0.04
F	0.65		0.95	0.025		0.037
F2	1.80		2.20	0.07		0.08
G	10.30		11.50	0.40		0.45
G1		5.45			0.21	
H	15.30		15.70	0.60		0.61
L	9.80	10	10.20	0.38	0.39	0.40
L2	22.20		22.80	0.87		0.90
L3	26.30		26.70	1.03		1.05
L4	43.20		44.40	1.70		1.74
L5	4.30		4.70	0.16		1.18
L6	24.30		24.70	0.95		0.97
L7	14.60		15	0.57		0.59
N	1.80		2.20	0.07		0.08
R	3.80		4.20	0.14		0.16
Dia	3.40		3.80	0.13		0.15

Figure 16. TO-247 dimension definitions

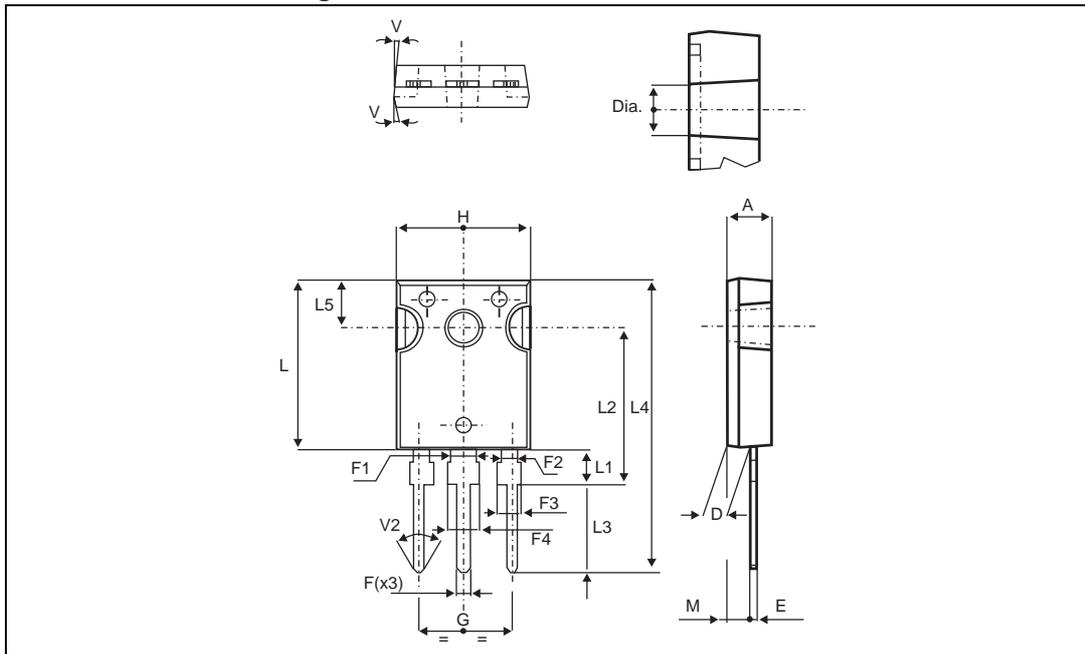


Table 8. TO-247 dimension values

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 typ.			0.728 typ.		
∅P <sup>(2)</sup>	3.55		3.65	0.139		0.143
∅R	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

1. Dimension D plus gate protrusion does not exceed 20.5 mm.
2. Resin thickness around the mounting hole is not less than 0.9 mm.

### 3 Ordering information

**Table 9. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH60AC06CP	STTH60AC06CP	TO3P-3L	5.26	30	Tube
STTH60AC06CPF	TH60AC06C	TO-3PF	5.6	30	Tube
STTH60AC06CW	STTH60AC06CW	TO-247	4.36	30	Tube

### 4 Revision history

**Table 10. Document revision history**

Date	Revision	Changes
23-Jul-2013	1	First release.

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