STTH60AC06C

Turbo 2 ultrafast high voltage rectifier

Datasheet – production data

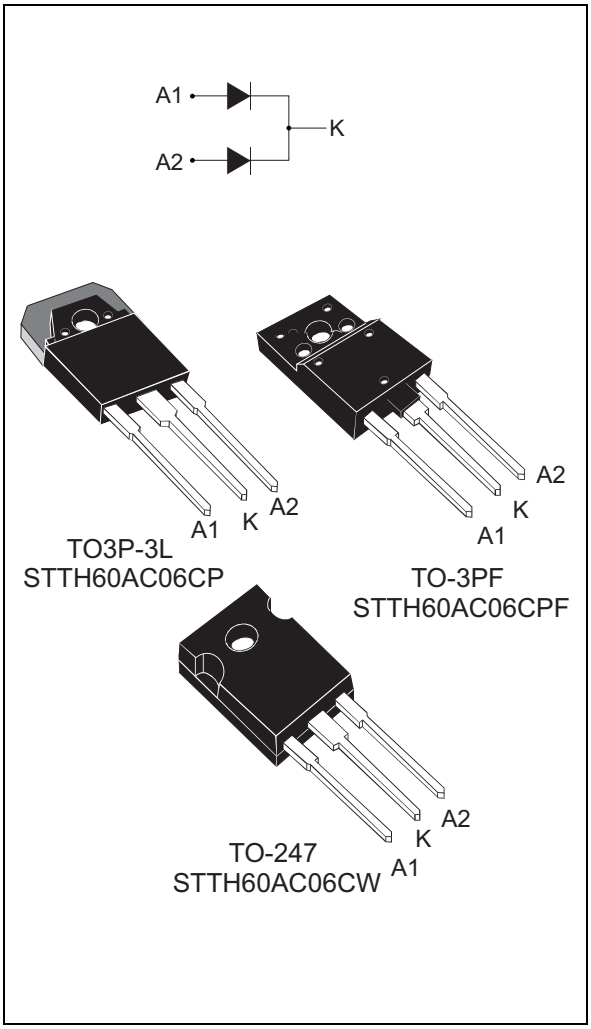


Table 1. Device summary

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

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.

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, δ < 2%
2. Pulse test: t_p = 380 µs, δ < 2%

To evaluate the conduction losses use the following equation:

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

Table 5. Dynamic characteristics (per diode)

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

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

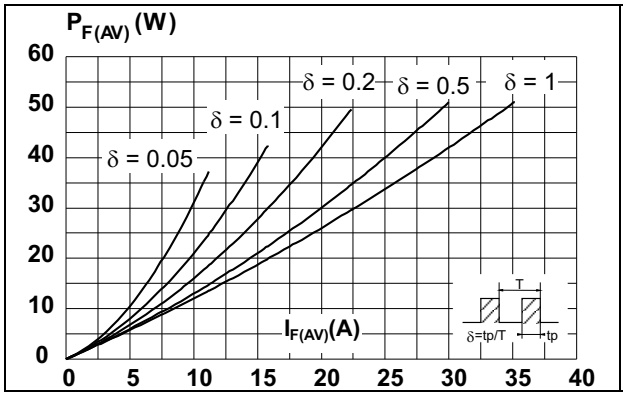


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

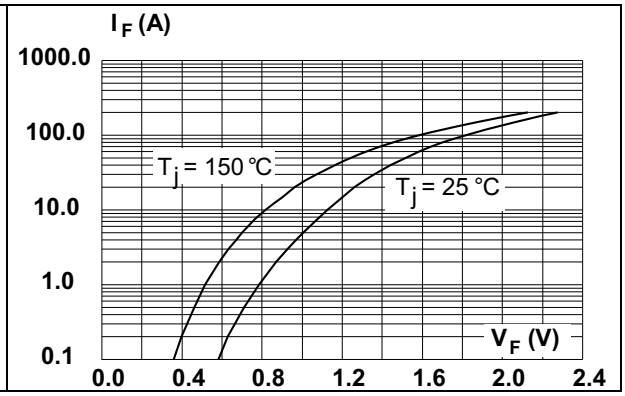


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

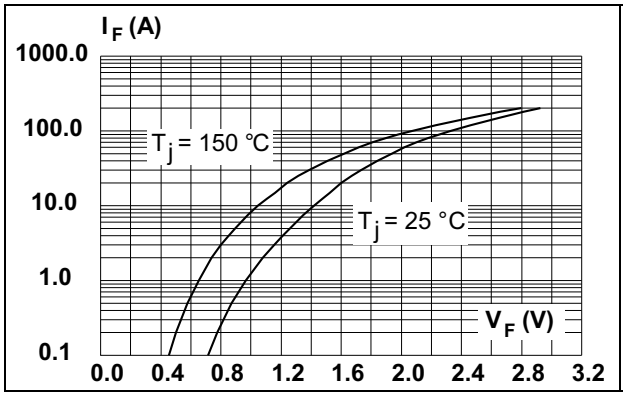


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L, TO247)

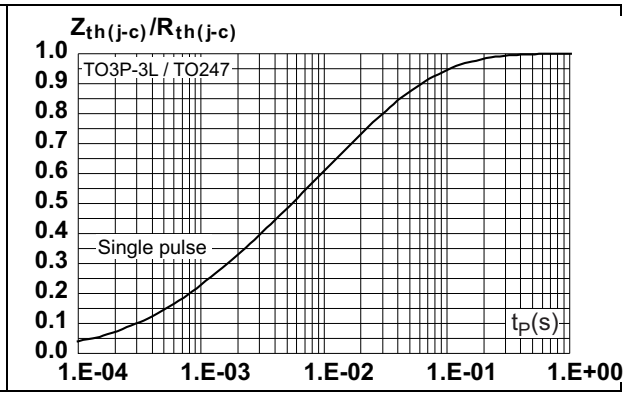


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-3PF)

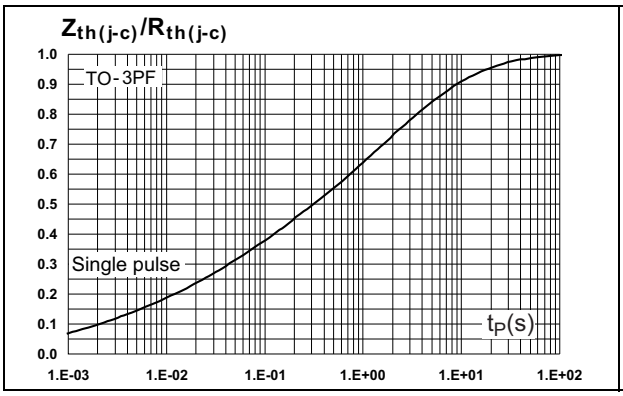


Figure 6. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

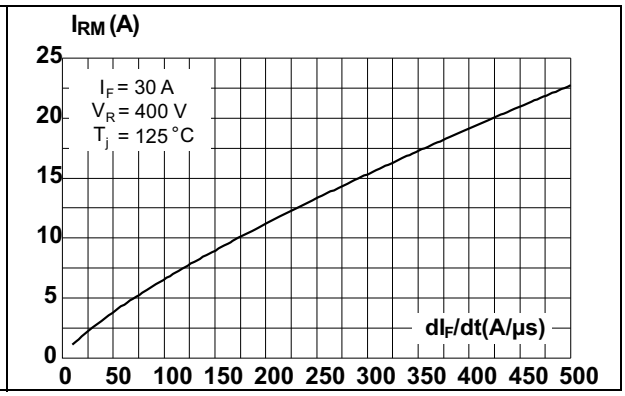


Figure 7. Reverse recovery time versus dI_F/dt (typical values, per diode)

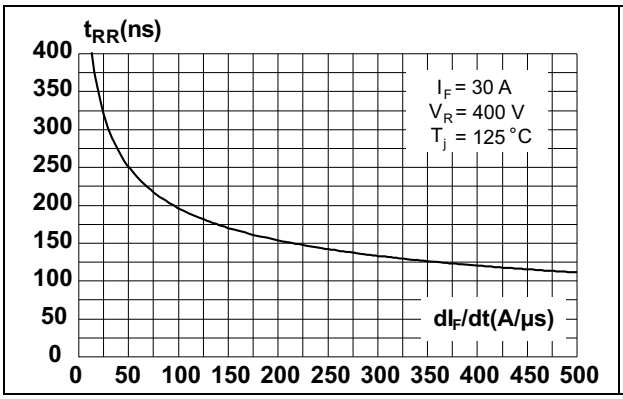


Figure 8. Reverse recovery charges versus dI_F/dt (typical values, per diode)

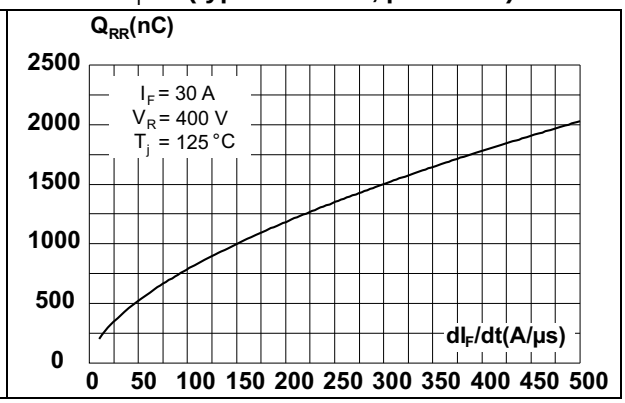


Figure 9. Reverse recovery softness factor versus dI_F/dt (typical values, per diode)

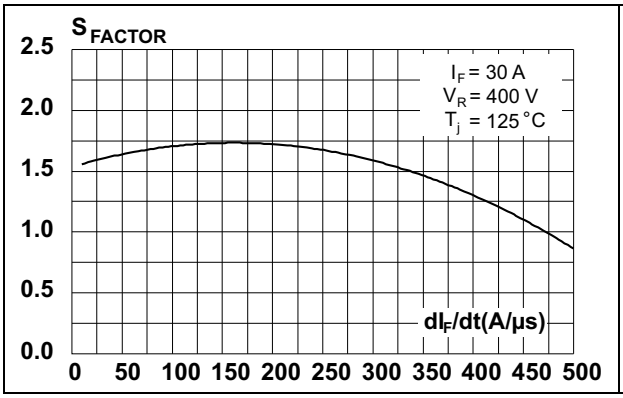


Figure 10. Relative variations of dynamic parameters versus junction temperature

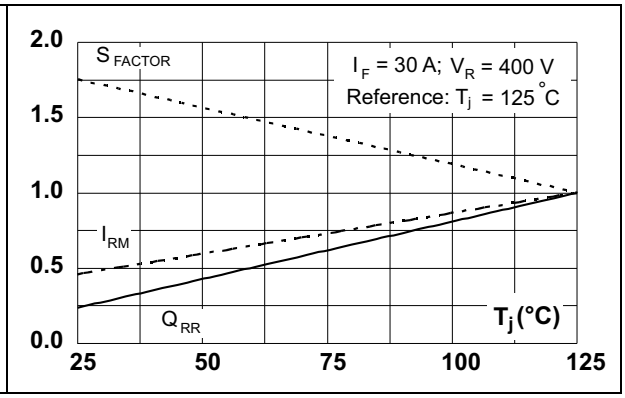


Figure 11. Transient peak forward voltage versus dI_F/dt (typical values, per diode)

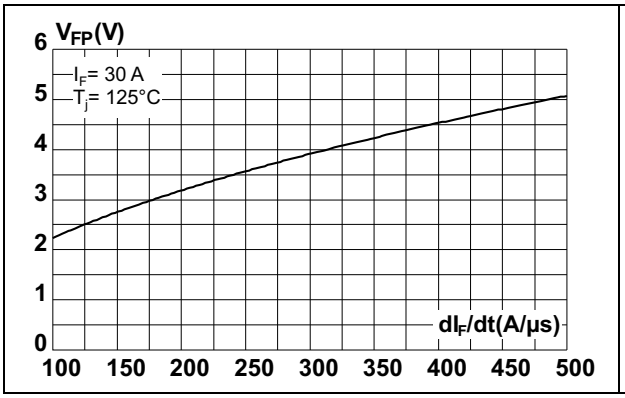


Figure 12. Forward recovery time versus dI_F/dt (typical values, per diode)

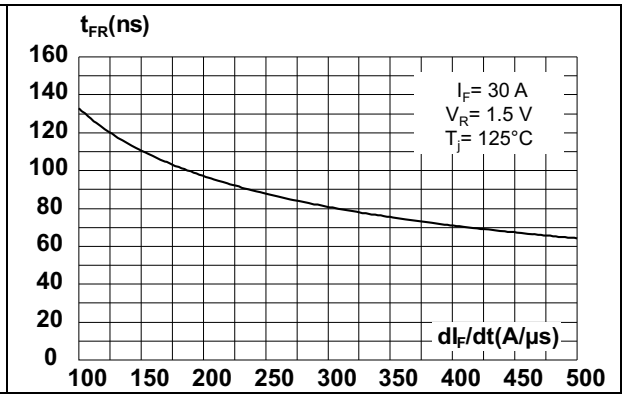
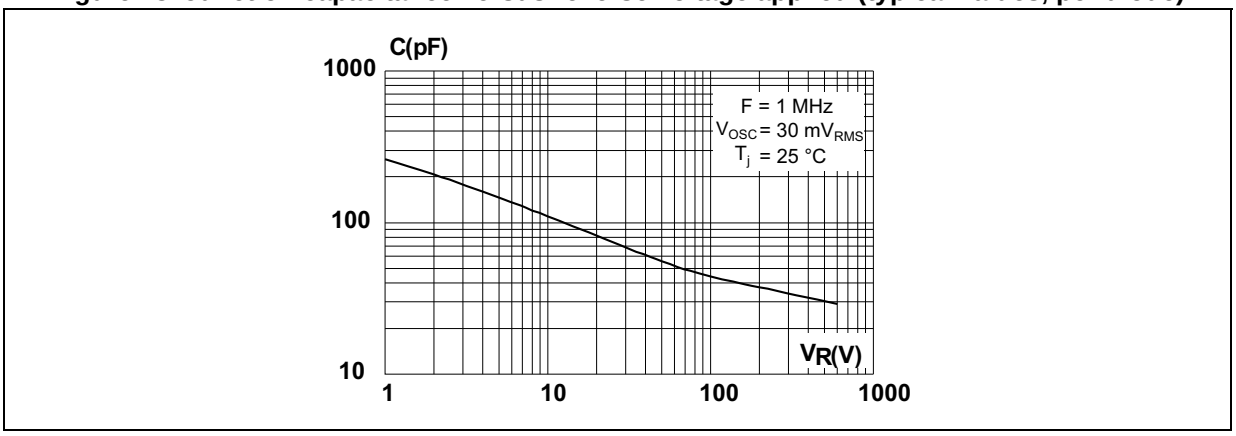


Figure 13. Junction capacitance versus reverse voltage applied (typical values, per diode)



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

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Figure 14. TO3P-3L dimension definitions

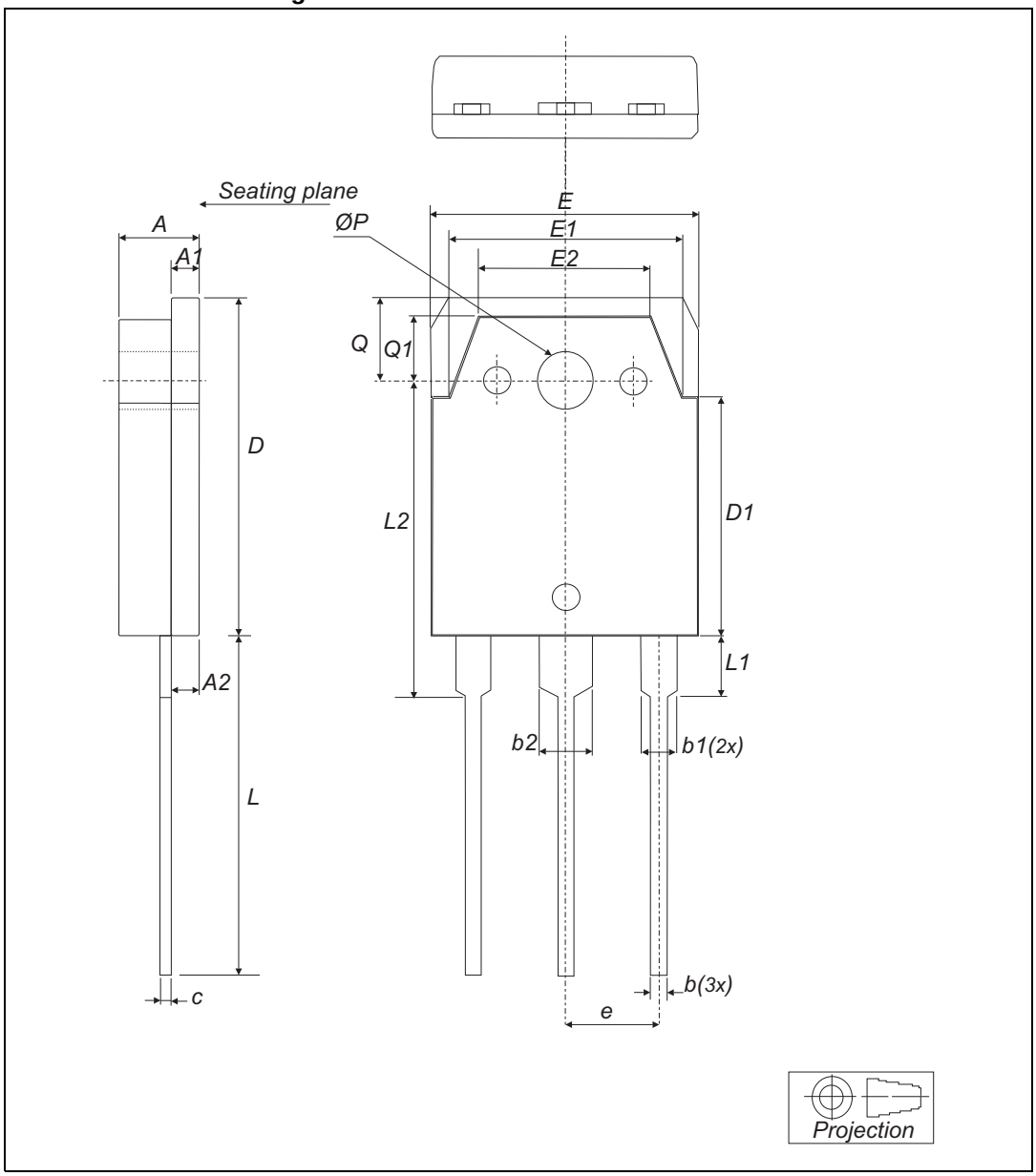

Table 6. TO3P-3L dimension values

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

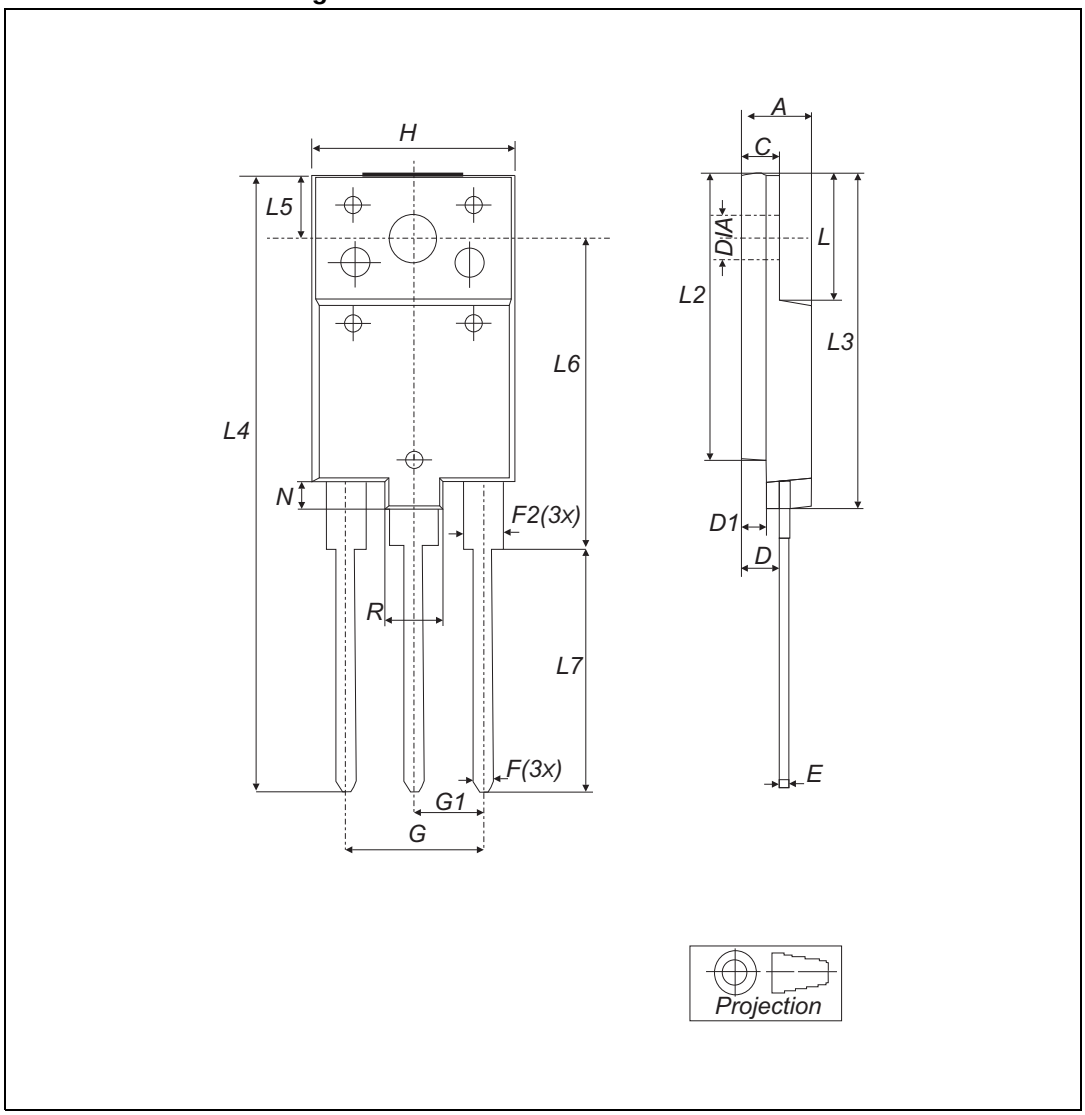

Table 7. TO-3PF dimension values

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

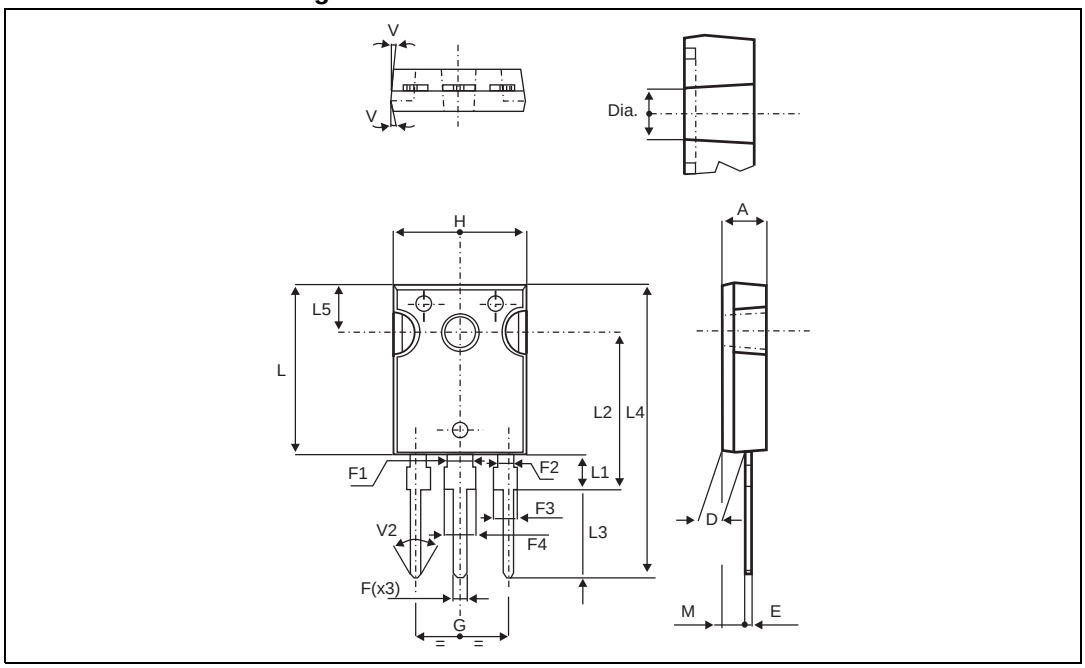

Table 8. TO-247 dimension values

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(1)	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(2)	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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