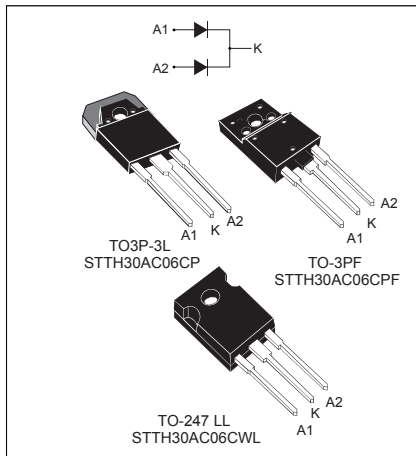


## Turbo 2 ultrafast high voltage rectifier



### Features

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

### Description

The **STTH30AC06C** uses ST Turbo 2 600 V technology. It is suited as boost diode specially for use in air conditioning equipment as continuous mode interleaved power factor correction.

Product status link	
<a href="#">STTH30AC06C</a>	
Product summary	
<b>I<sub>F(AV)</sub></b>	2 x 15 A
<b>V<sub>RRM</sub></b>	600 V
<b>t<sub>rr</sub> (typ)</b>	40 ns
<b>V<sub>F</sub> (typ)</b>	1.15 V
<b>T<sub>j</sub></b>	175 °C

# 1 Characteristics

**Table 1. 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		30	A
$I_{F(AV)}$	Average forward current	Per diode	15	A
		Per device	30	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	140	A
$T_{stg}$	Storage temperature range		-65 to +175	°C
$T_j$	Maximum operating junction temperature		175	°C

**Table 2. Thermal parameters**

Symbol	Parameter		Max. value	Unit	
$R_{th(j-c)}$	Junction to case	TO3P-3L, TO247 LL	Per diode	1.5	°C/W
			Total	0.85	
		TO-3PF	Per diode	3.5	
			Total	2.7	
$R_{th(c)}$	Coupling	TO3P-3L, TO247 LL)	0.2		
		TO-3PF	1.9		

**Table 3. 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	$I_F = 15$ A	-		1.95	V
		$T_j = 150$ °C		-	1.15	1.45	
		$T_j = 25$ °C	$I_F = 30$ A	-		2.25	
		$T_j = 150$ °C		-	1.42	1.8	

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:

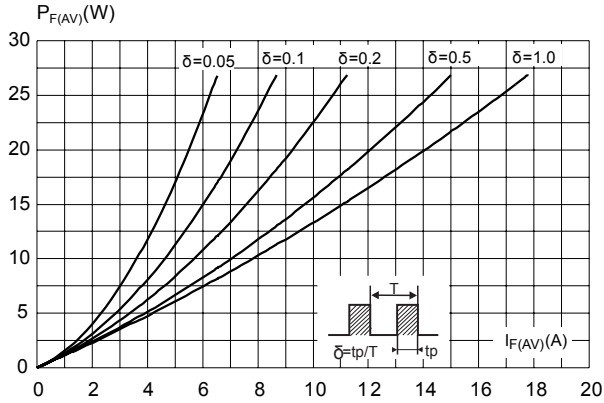
$$P = 1.1 \times I_{F(AV)} + 0.023 \times I_{F(RMS)}^2$$

**Table 4. Dynamic characteristics (per diode)**

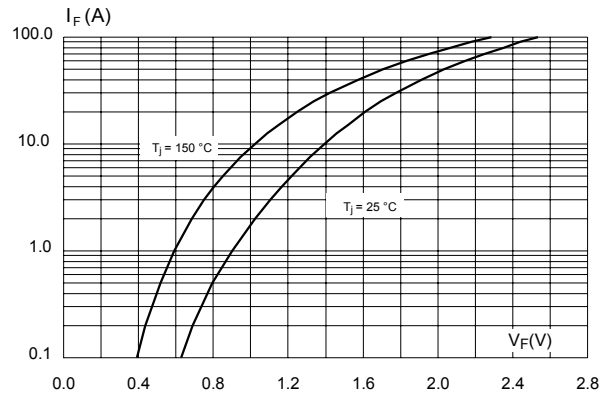
Symbol	Parameters	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}, I_R = 1\text{ A}$	-		30	ns
			$I_F = 1\text{ A}, dI_F/dt = 50\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	40	55	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 15\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}, V_R = 400\text{ V}$	-	4	5.5	A
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 15\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}, V_{FR} = 1.9\text{ V}$	-		100	ns
$V_{FP}$	Forward recovery voltage			-	2.5		V

### 1.1 Characteristics (curves)

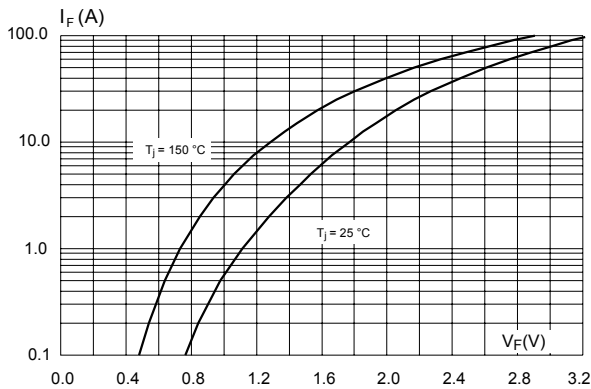
**Figure 1. Average forward power dissipation versus average forward current (per diode)**



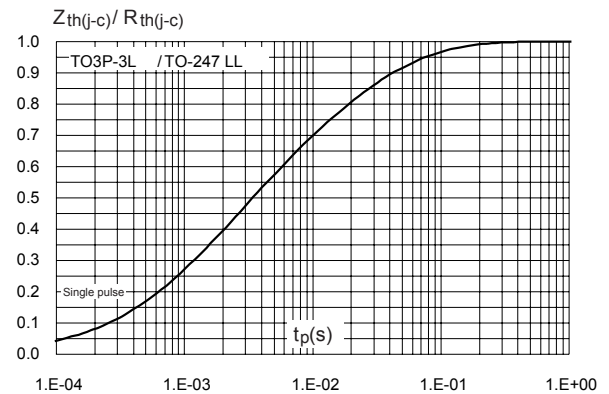
**Figure 2. Forward voltage drop versus forward current (typical values, per diode)**



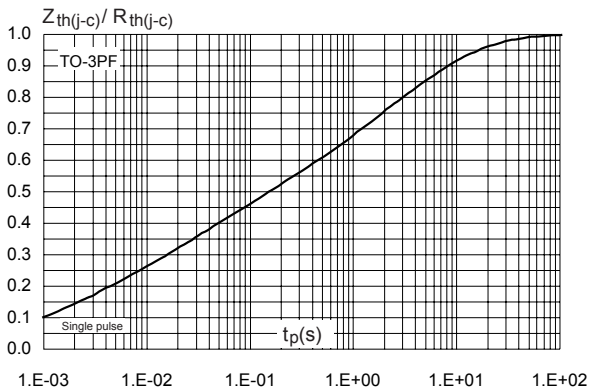
**Figure 3. Forward voltage drop versus forward current (maximum values, per diode)**



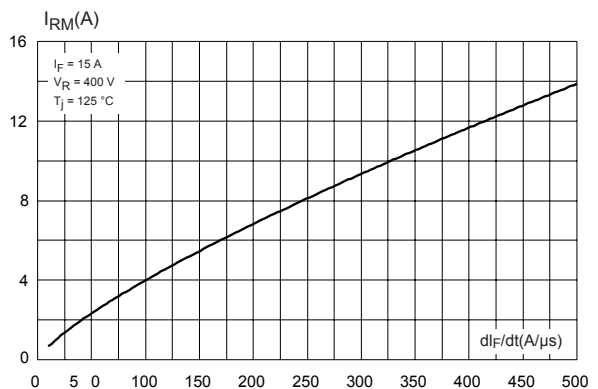
**Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L, TO247 LL)**



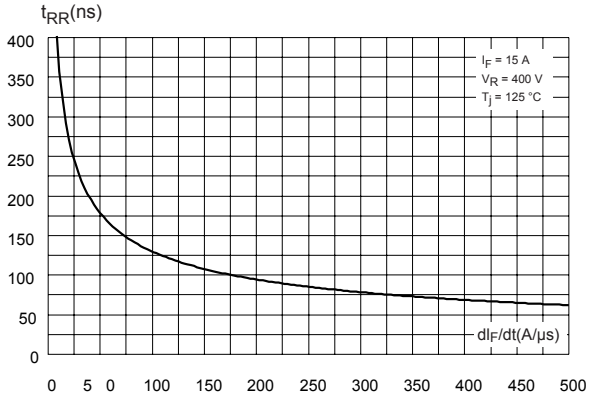
**Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L)**



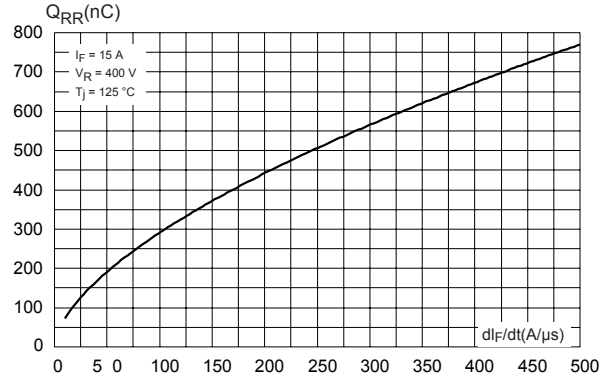
**Figure 6. Peak reverse recovery current versus  $di_F/dt$  (typical values, per diode)**



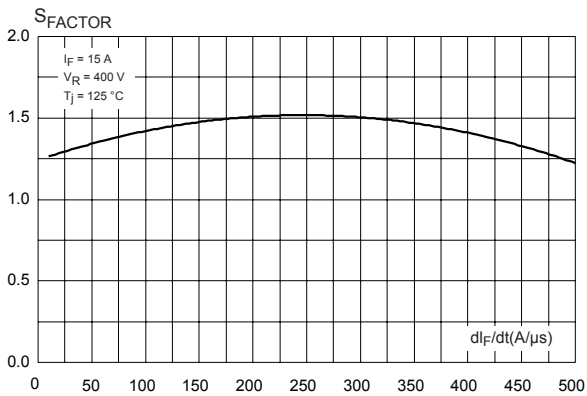
**Figure 7. Reverse recovery time versus  $di_F/dt$  (typical values, per diode)**



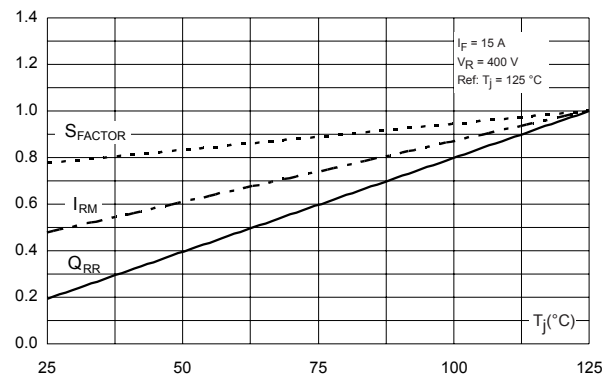
**Figure 8. Reverse recovery charges versus  $di_F/dt$  (typical values, per diode)**



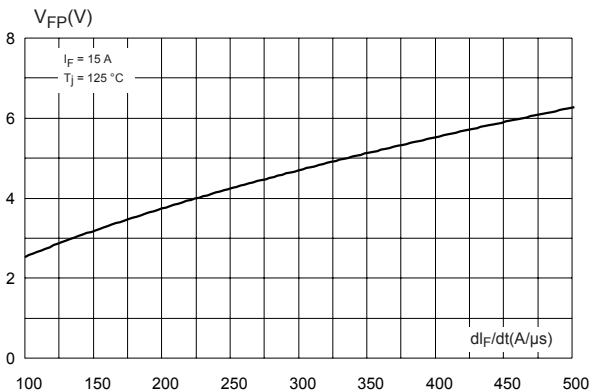
**Figure 9. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)**



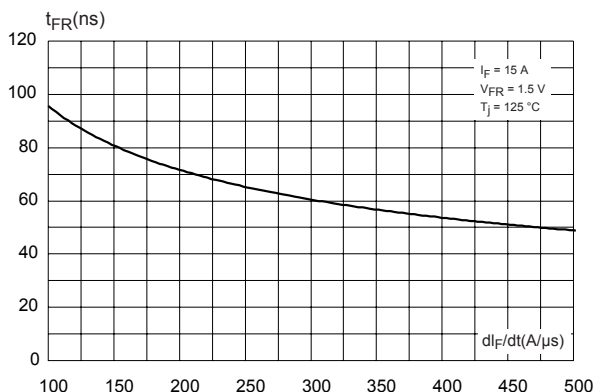
**Figure 10. Relative variations of dynamic parameters versus junction temperature**



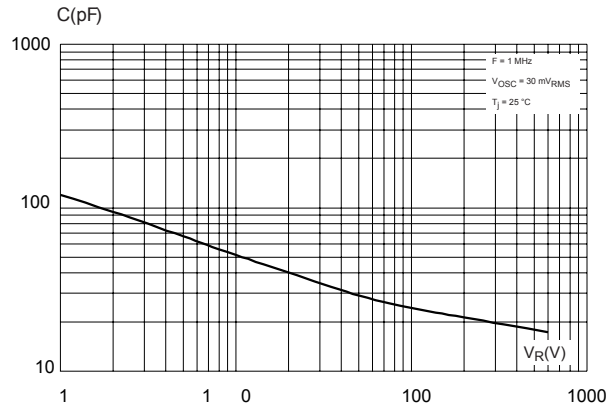
**Figure 11. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



**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)**



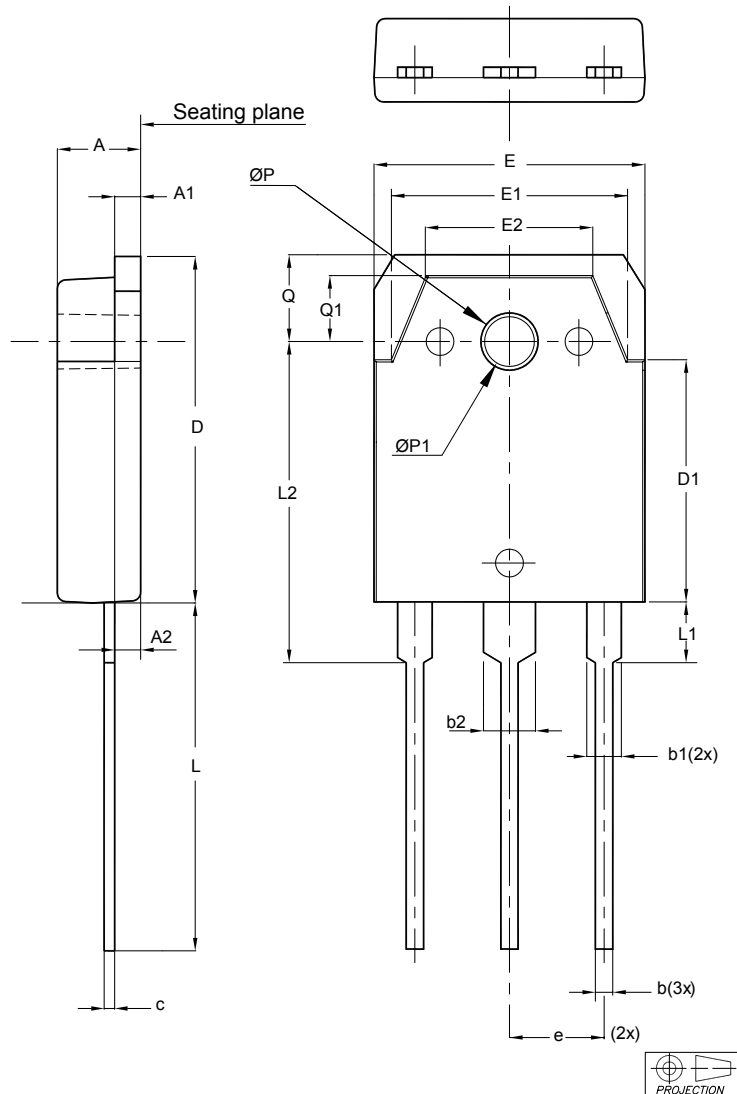
## 2 Package information

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.

### 2.1 TO3P-3L package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque: 0.8 to 1.0 N·m

**Figure 14. TO3P-3L package outline**



**Table 5. TO3P-3L package mechanical data**

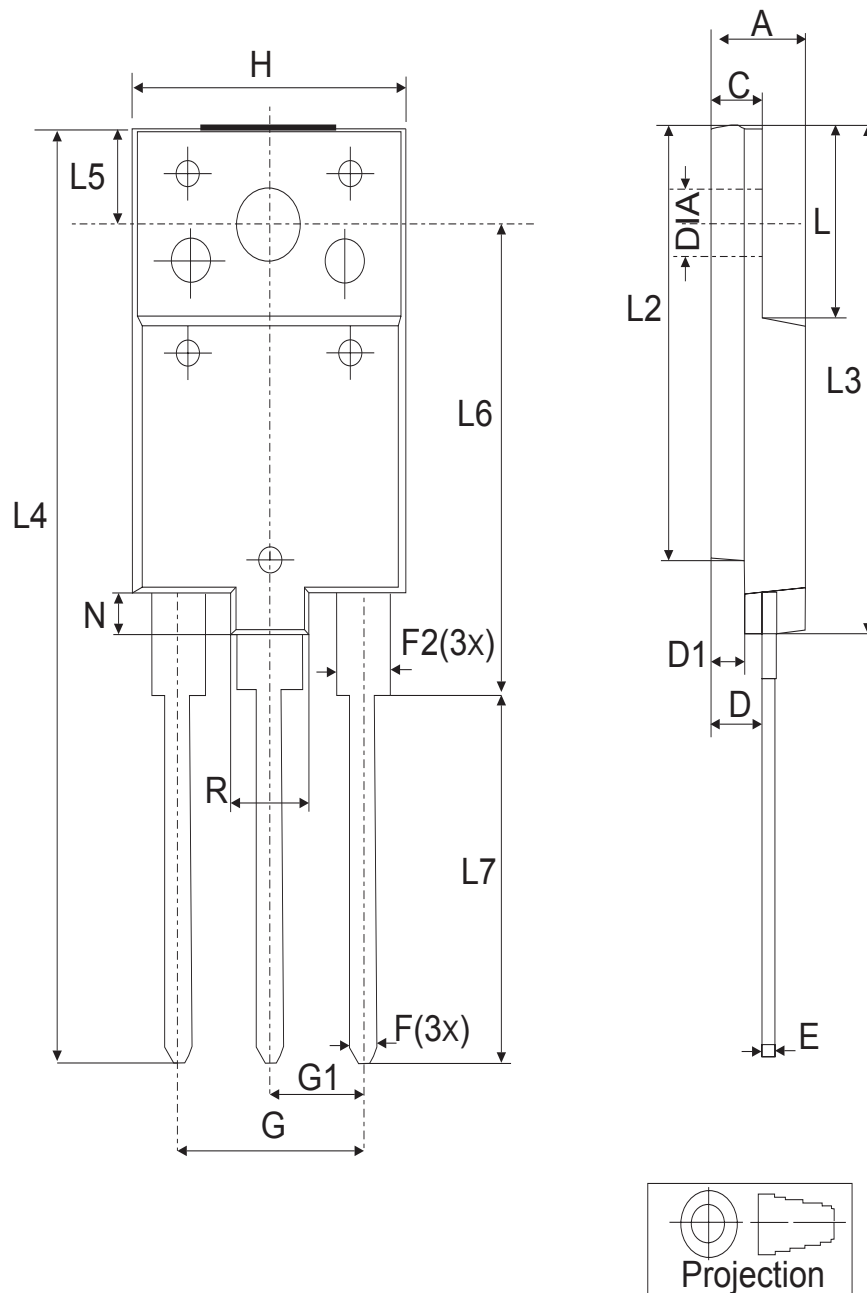
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.60	4.80	5	0.18	0.19	0.19
A1	1.45	1.50	1.65	0.05	0.06	0.06
A2	1.20	1.40	1.60	0.04	0.05	0.06
b	0.80	1.00	1.20	0.03	0.04	0.05
b1	1.80	2.00	2.20	0.07	0.08	0.08
b2	2.80	3.00	3.20	0.11	0.12	0.12
c	0.55	0.60	0.75	0.02	0.02	0.03
D	19.70	19.90	20.10	0.77	0.78	0.79
D1	13.70	13.90	14.10	0.54	0.54	0.55
E	15.40	15.60	15.80	0.60	0.61	0.62
E1	13.40	13.60	13.80	0.53	0.53	0.54
E2	9.40	9.60	9.90	0.37	0.38	0.39
e	5.15	5.45	5.75	0.20	0.21	0.22
L	19.80	20	20.20	0.78	0.78	0.79
L1	3.30	3.50	3.70	0.13	0.14	0.14
L2	18.20	18.40	18.60	0.71	0.72	0.73
Diam. P	3.30	3.40	3.50	0.13	0.13	0.14
Diam. P1	3.10	3.20	3.30	0.12	0.12	0.13
Q	4.80	5	5.20	0.19	0.19	0.20
Q1	3.60	3.80	4	0.14	0.15	0.16



## 2.2 TO-3PF package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque: 0.8 to 1.0 N·m

Figure 15. TO-3PF package outline



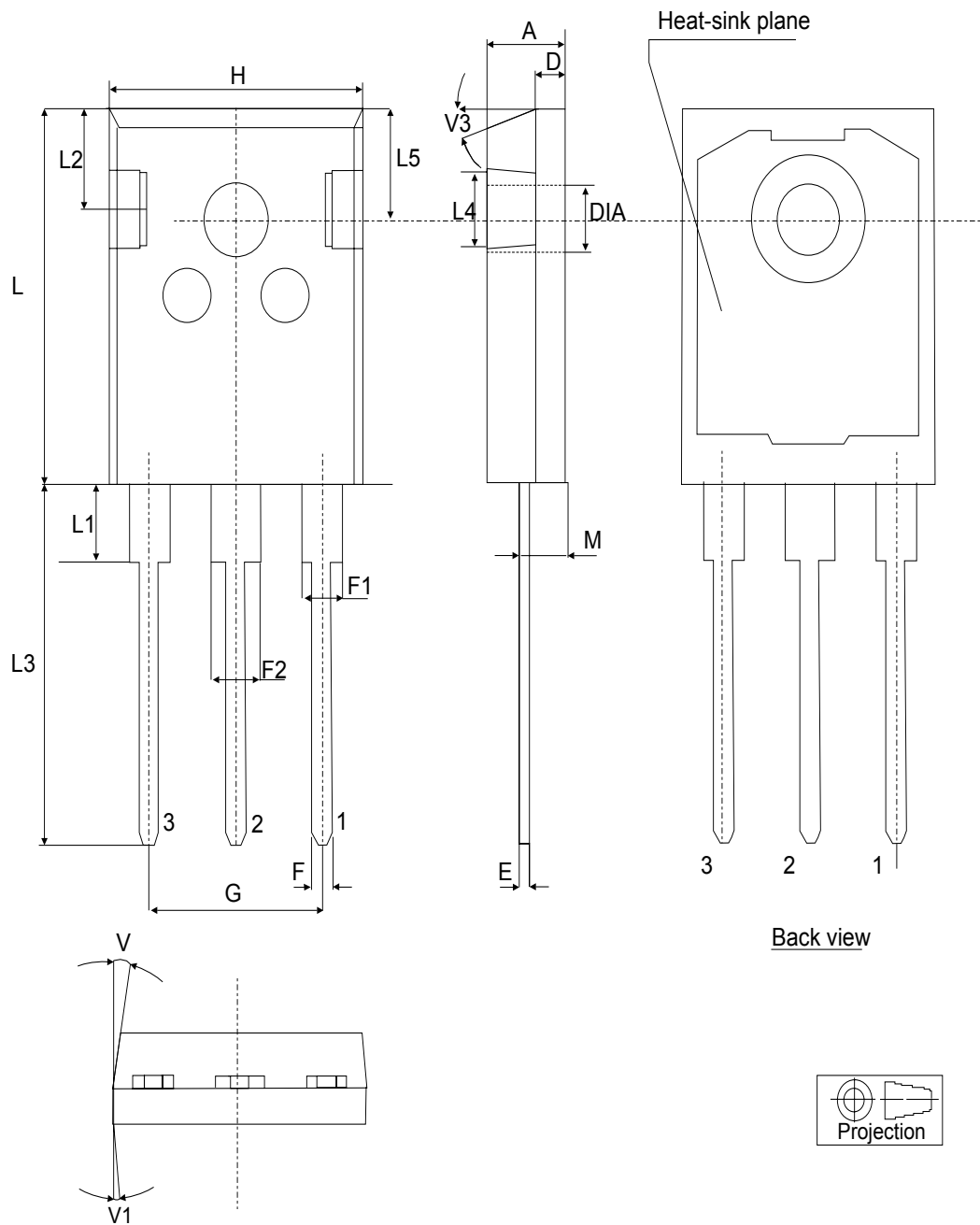
**Table 6. TO-3PF mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	5.30		5.70
C	2.80		3.20
D	3.10		3.50
D1	1.80		2.20
E	0.80		1.10
F	0.65		0.95
F2	1.80		2.20
G	10.30		11.50
G1		5.45	
H	15.30		15.70
L	9.80	10	10.20
L2	22.80		23.20
L3	26.30		26.70
L4	43.20		44.40
L5	4.30		4.70
L6	24.30		24.70
L7	14.60		15
N	1.80		2.20
R	3.80		4.20
Dia	3.40		3.80

### 2.3 TO-247 long leads package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Maximum torque value: 1.0 N·m

Figure 16. TO-247 long leads package outline



**Table 7. TO-247 long leads package mechanical data**

Dim.	mm.			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.90		5.15	0.192		0.202
D	1.85		2.10	0.072		0.082
E	0.55		0.67	0.021		0.026
F	1.07		1.32	0.042		0.051
F1	1.90		2.38	0.074		0.093
F2	2.87		3.38	0.110		0.133
G	10.90 BSC			0.429 BSC		
H	15.77		16.02	0.620		0.630
L	20.82		21.07	0.810		0.820
L1	4.16		4.47	0.163		0.175
L2	5.49		5.74	0.216		0.225
L3	20.05		20.30	0.789		0.799
L4	3.68		3.93	0.144		0.154
L5	6.04		6.29	0.237		0.247
M	2.25		2.55	0.088		0.100
V		10°			10°	
V1		3°			3°	
V3		20°			20°	
DIA	3.55		3.66	0.139		0.143

### 3 STTH30AC06C Ordering information

**Table 8. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30AC06CP	STTH30AC06C	TO3P-3L	5.26 g	30	Tube
STTH30AC06CPF	TH30AC06C	TO-3PF	5.6 g	30	
STTH30AC06CWL	STTH30AC06CWL	TO-247 LL	4.36 g	30	

## Revision history

**Table 9. Document revision history**

Date	Version	Changes
13-Nov-2013	1	Initial release.
25-Jun-2015	2	Update of cover page and Table 7. Format updated to current standard.
01-Jul-2015	3	Updated Features.
05-Sep-2016	4	Updated Figure 16.
18-Apr-2018	5	Updated TO247LL POA drawing.

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