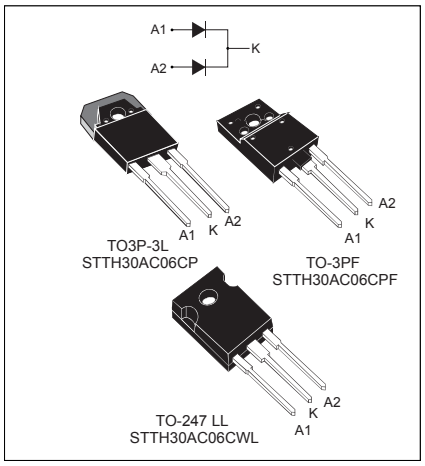
Turbo 2 ultrafast high voltage rectifier



Features

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

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	
STTH30AC06C	
Product summary	
$I_{F(AV)}$	2 x 15 A
V_{RRM}	600 V
t_{rr} (typ)	40 ns
V_F (typ)	1.15 V
T_j	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, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2 %*

To evaluate the conduction losses, use the following equation:

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

Table 4. Dynamic characteristics (per diode)

Symbol	Parameters	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	-		30	ns
			I_F = 1 A, dI_F/dt = 50 A/µs, V_R = 30 V	-	40	55	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 15 A, dI_F/dt = 100 A/µs, V_R = 400 V	-	4	5.5	A
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 15 A, dI_F/dt = 100 A/µs, V_{FR} = 1.9 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)

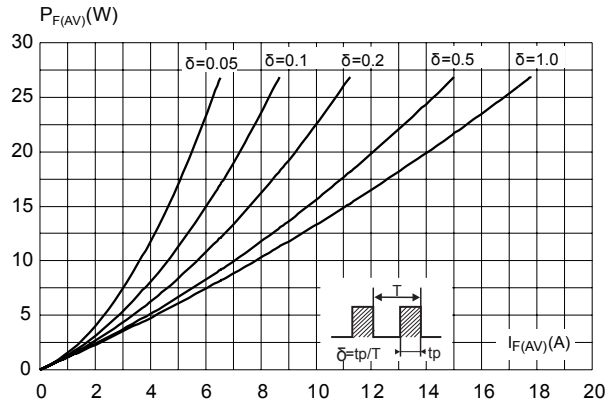


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

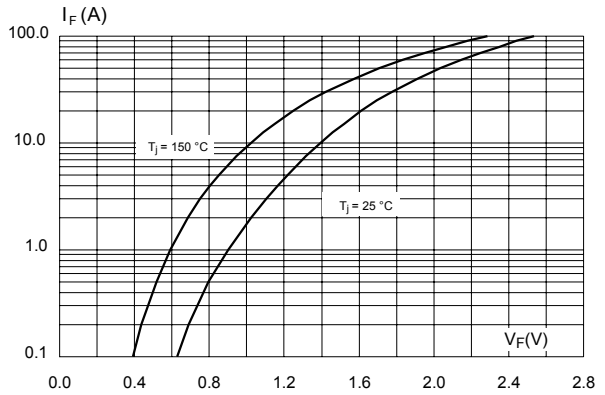


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

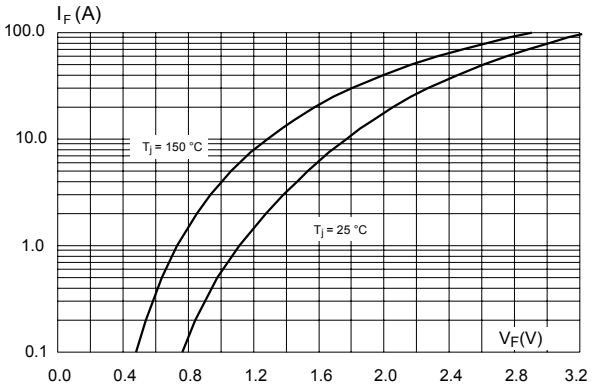


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L, TO247 LL)

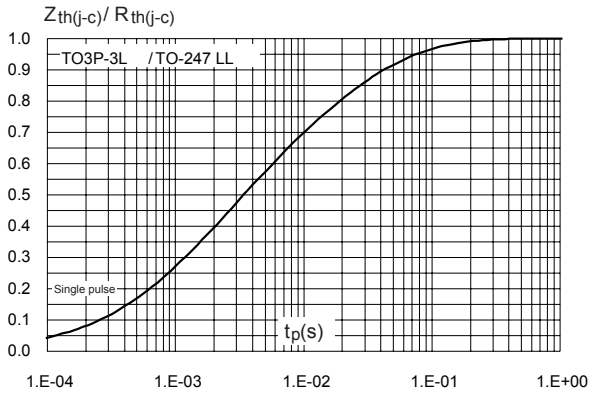


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L)

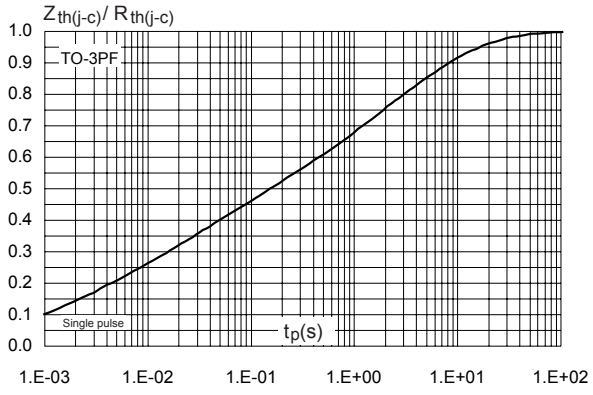


Figure 6. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

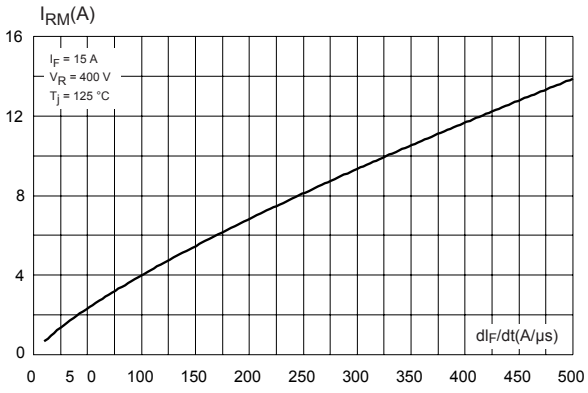


Figure 7. Reverse recovery time versus dI_F/dt (typical values, per diode)

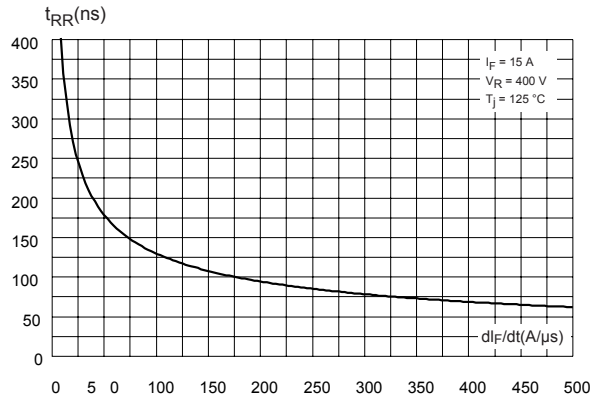


Figure 8. Reverse recovery charges versus dI_F/dt (typical values, per diode)

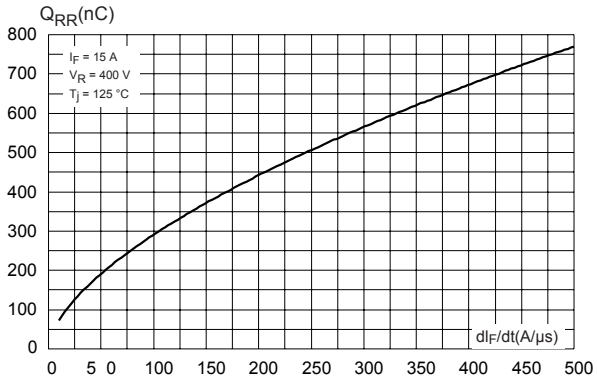


Figure 9. Reverse recovery softness factor versus dI_F/dt (typical values, per diode)

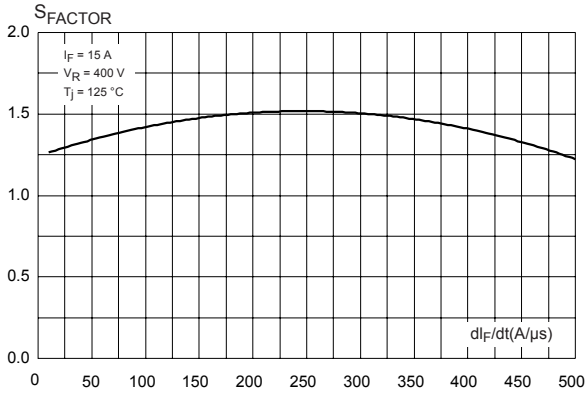


Figure 10. Relative variations of dynamic parameters versus junction temperature

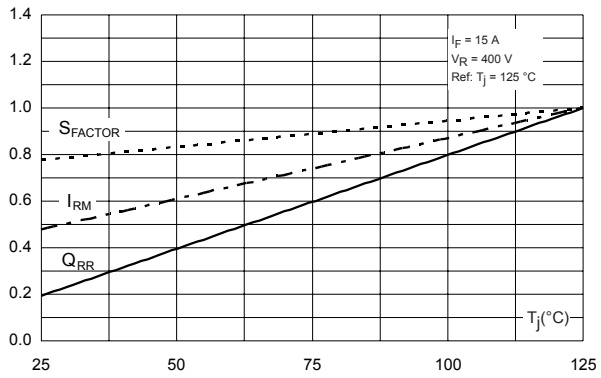


Figure 11. Transient peak forward voltage versus dI_F/dt (typical values, per diode)

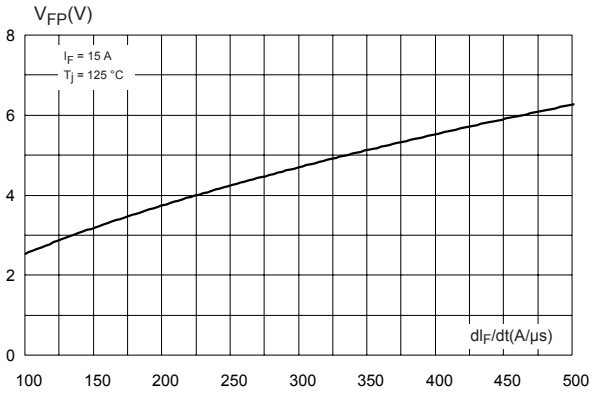


Figure 12. Forward recovery time versus dI_F/dt (typical values, per diode)

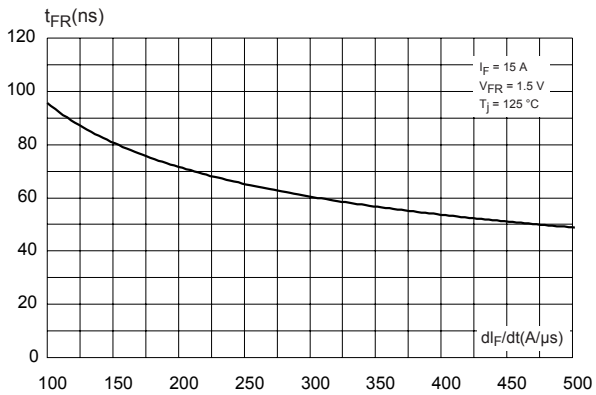
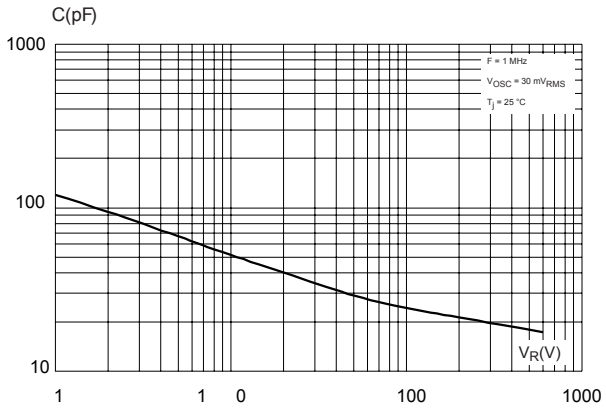


Figure 13. Junction capacitance versus reverse voltage applied (typical values, per diode)



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. 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

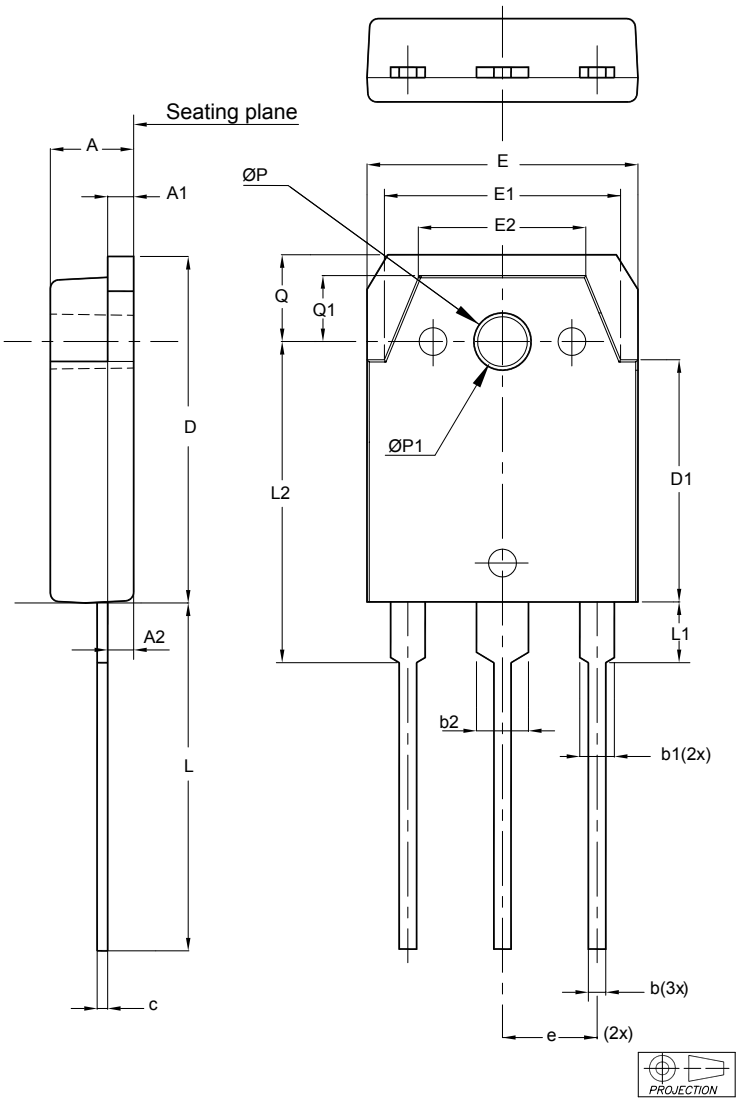


Table 5. **TO3P-3L package mechanical data**

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

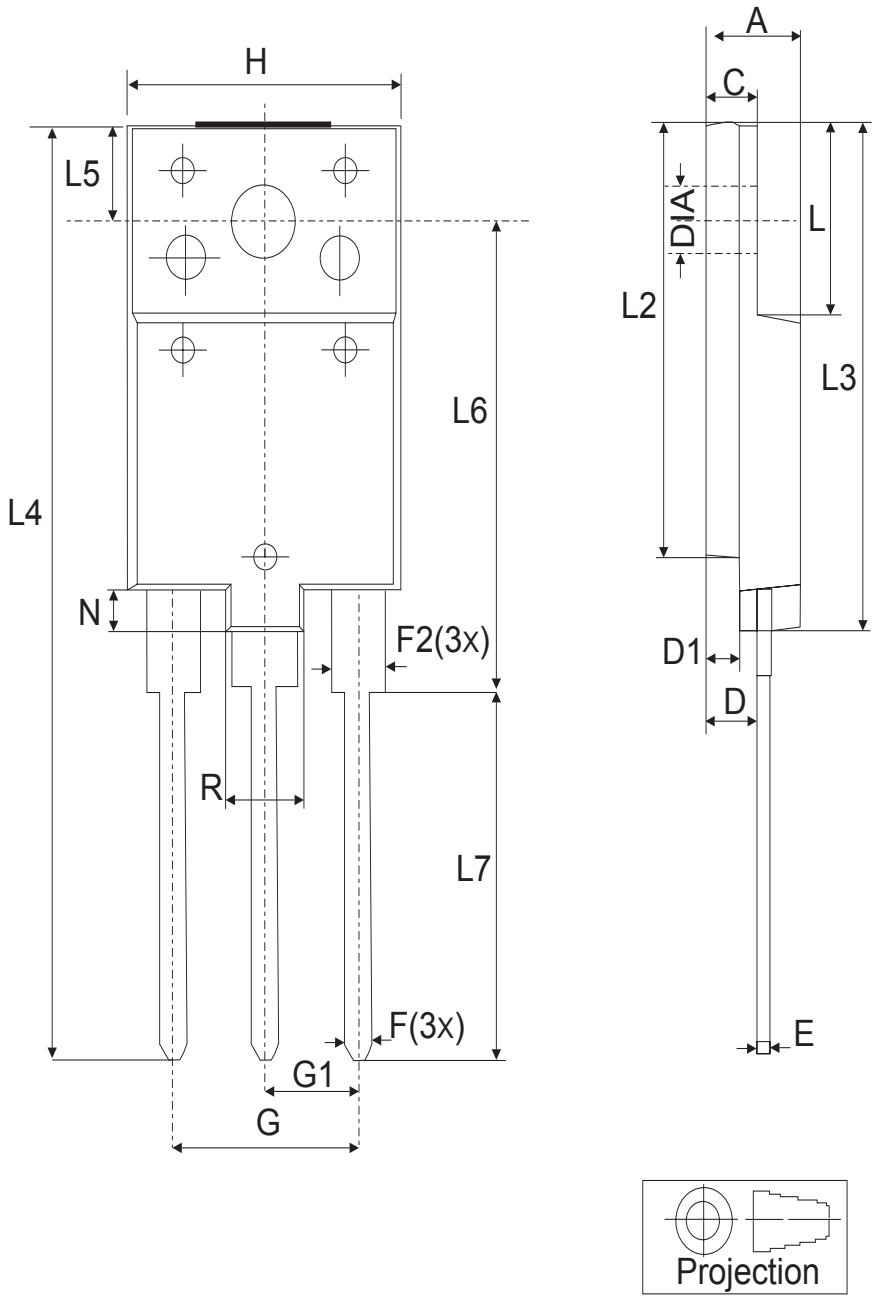


Table 6. **TO-3PF mechanical data**

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

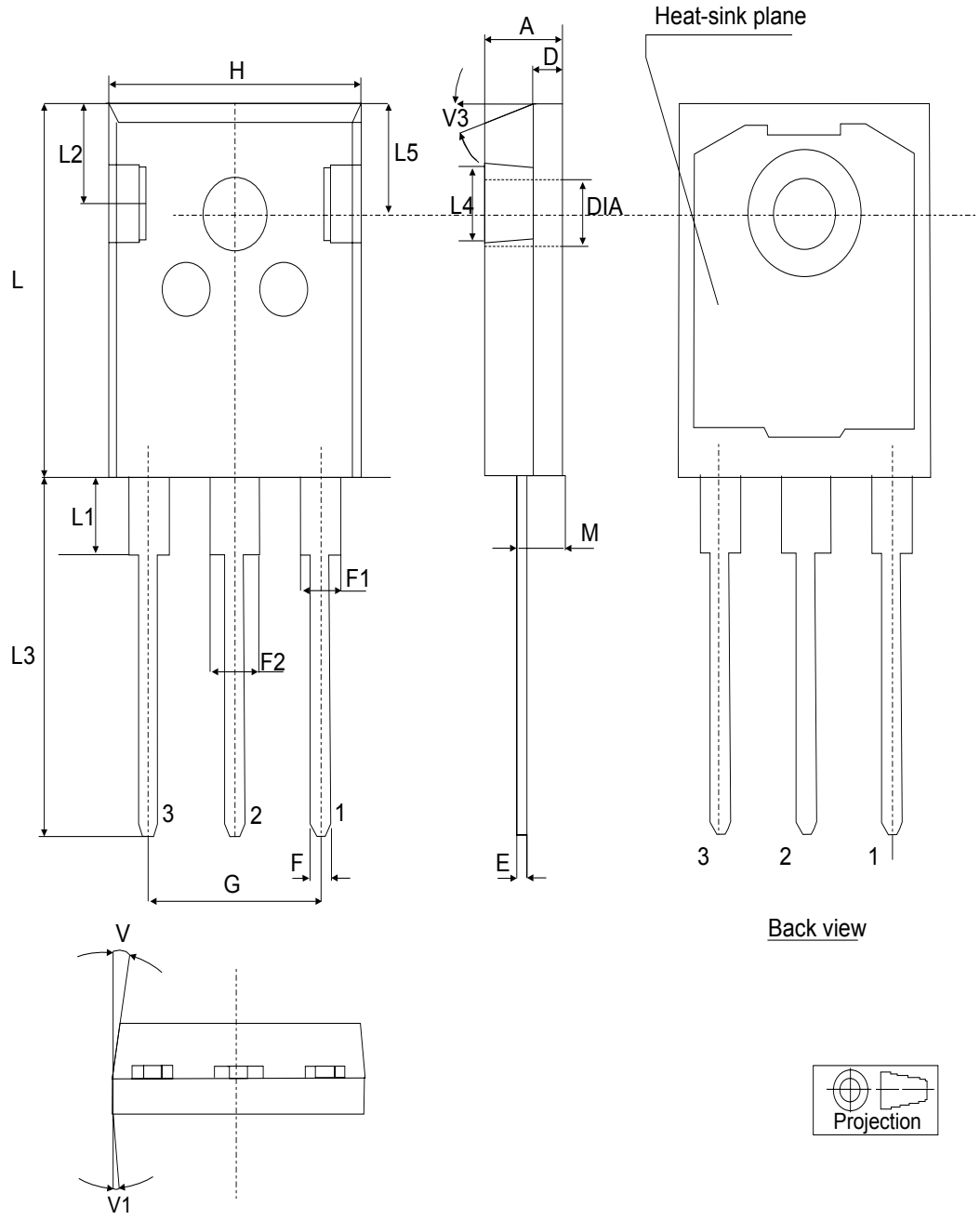


Table 7. **TO-247 long leads package mechanical data**

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.

LifeElectronics
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