STTH60AC06C

Turbo 2 ultrafast high voltage rectifier

Datasheet − production data

TO3P-3L

TO-3PF

TO-247 LL

TO-247
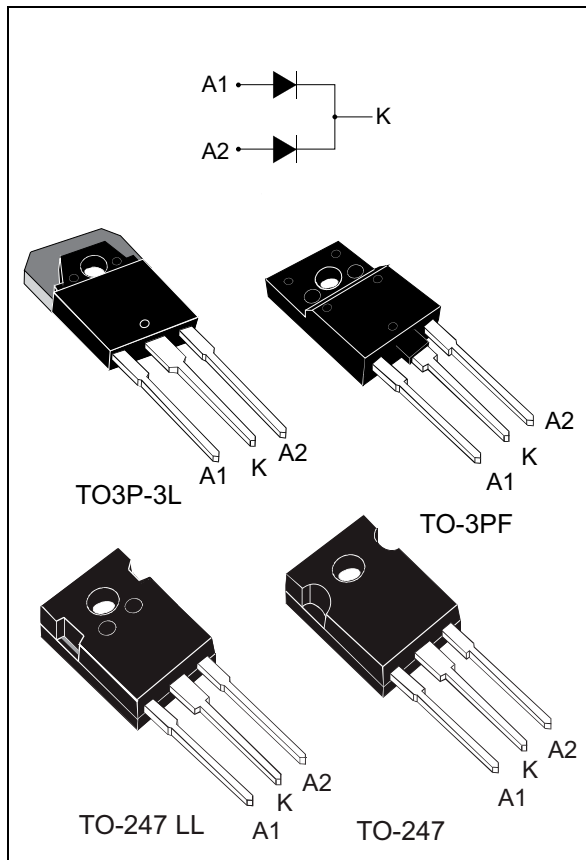
Description

This device uses ST Turbo 2 600 V technology and is specially suited for use as a boost diode in air conditioning equipment as continuous mode interleaved power factor correction.

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 30 A
V_{RRM}	600 V
t_{rr} (typ)	40 ns
V_F (typ)	1.4 V
T_j	175 °C

Features

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

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, TO-247, TO-247 LL)	Per diode	0.9	°C/W
		Total	0.55	
$R_{th(c)}$	Coupling (TO3P-3L, TO-247, TO-247 LL)		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:

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

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
			$I_F = 1\ A,\ V_R = 30\ V,\ dI_F/dt = -50\ A/\mu s$		50	70	
I_{RM}	Reverse recovery current	$T_j = 125\ °C$	$I_F = 30\ A,\ V_R = 400\ V,$ $dI_F/dt = -100\ A/\mu s$		6.5	9	A
t_{fr}	Forward recovery time	$T_j = 25\ °C$	$I_F = 30\ A,\ V_{FR} = 1.5\ V,$ $dI_F/dt = +200\ A/\mu s$			100	ns
V_{FP}	Forward recovery voltage				2.5		V

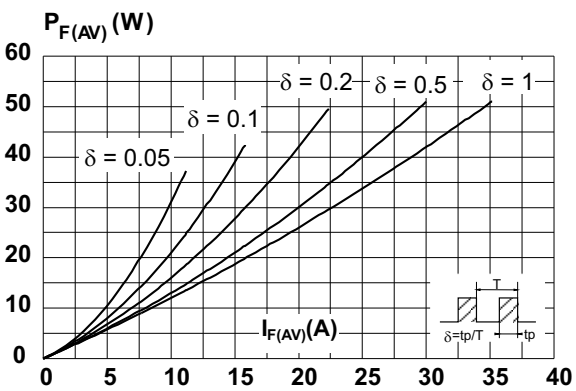**Figure 1. Average forward power dissipation versus average forward current (per diode)**

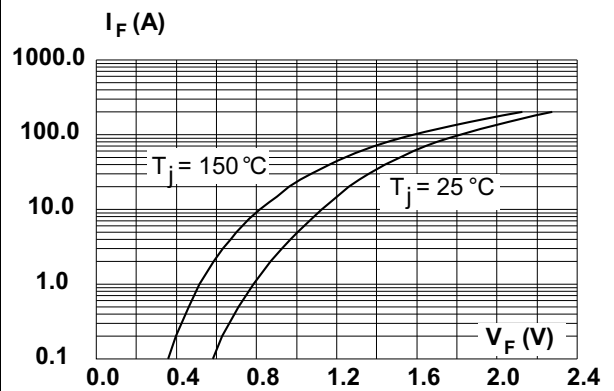**Figure 2. Forward voltage drop versus forward current (typical values, per diode)**

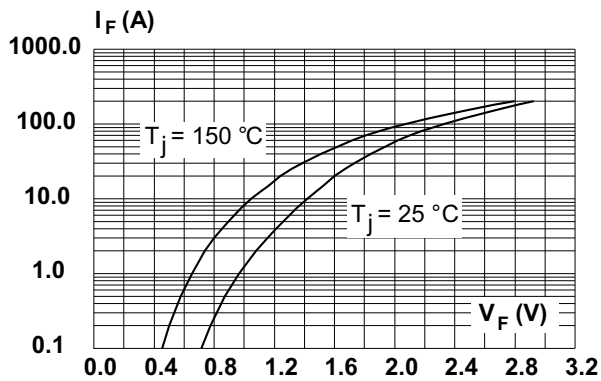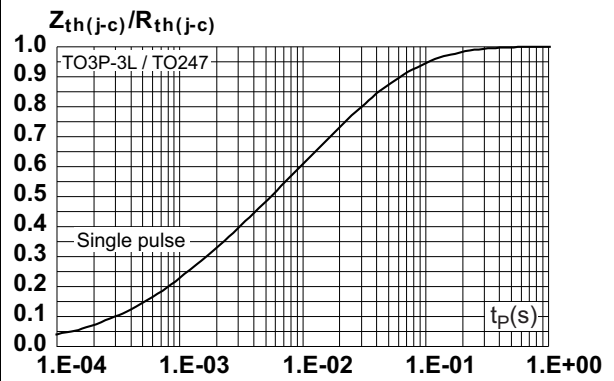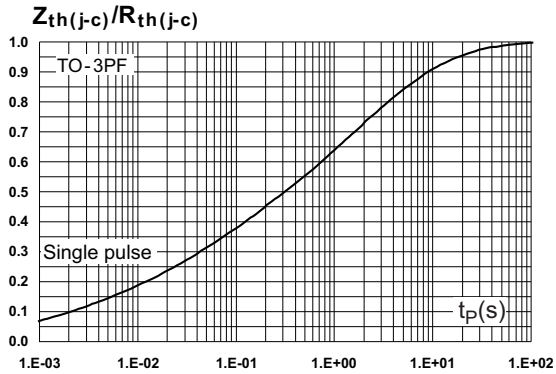**Figure 3. Forward voltage drop versus forward current (maximum values, per diode)**

Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L, TO-247, TO-247LL)
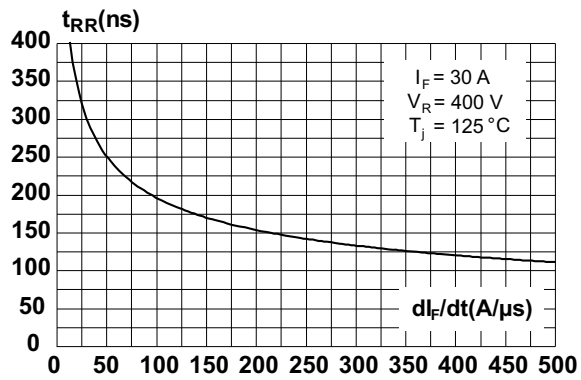
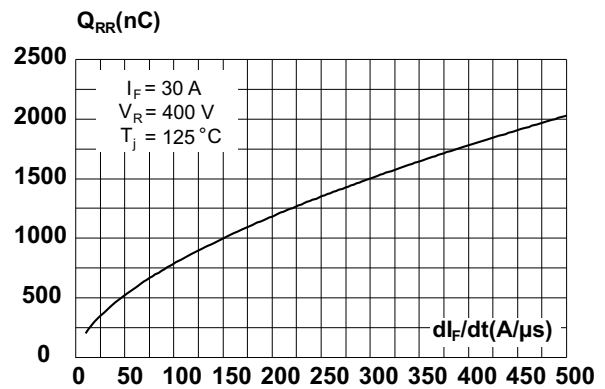**Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration (TO-3PF)**

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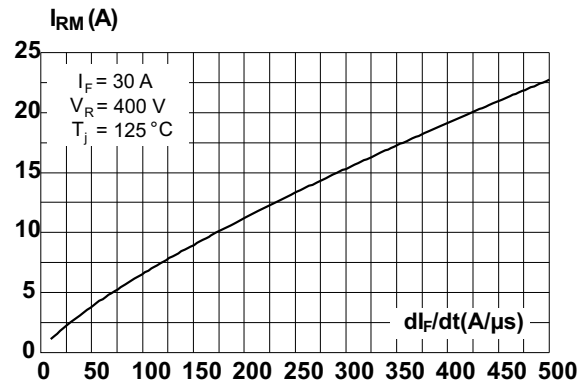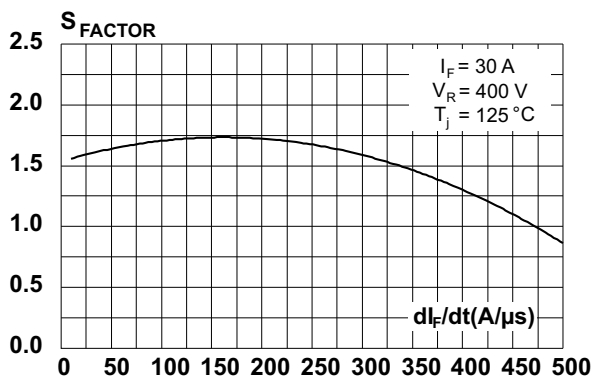

Figure 7. Reverse recovery time versus dI$_F$/dt (typical values, per diode)

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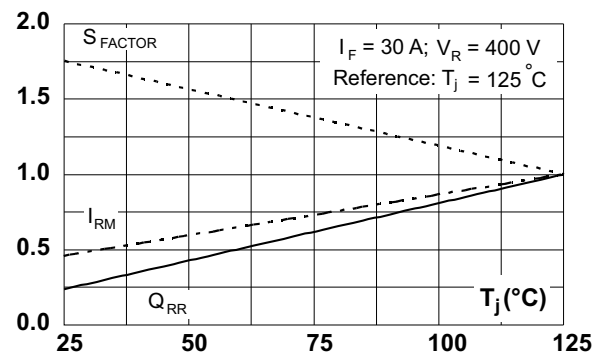
Figure 11. Transient peak forward voltage versus dI$_F$/dt (typical values, per diode)
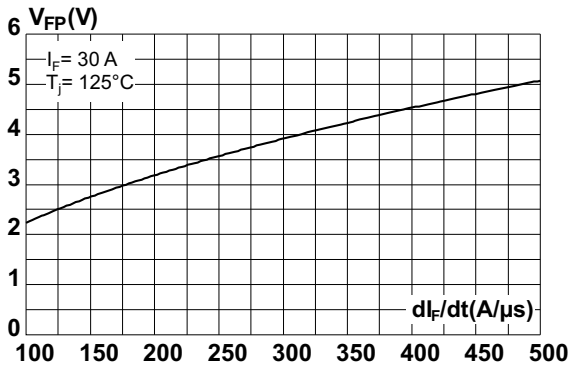

Figure 12. Forward recovery time versus dI$_F$/dt (typical values, per diode)
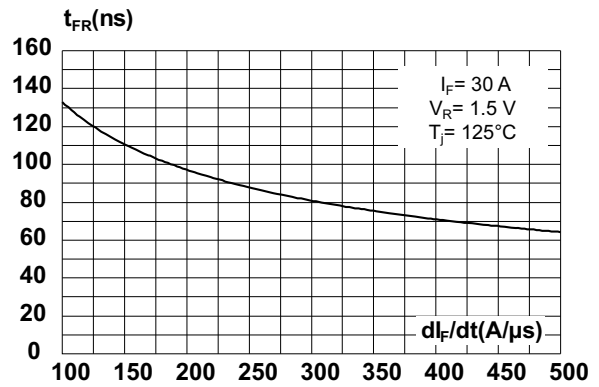
Figure 13. Junction capacitance versus reverse voltage applied (typical values, per diode)
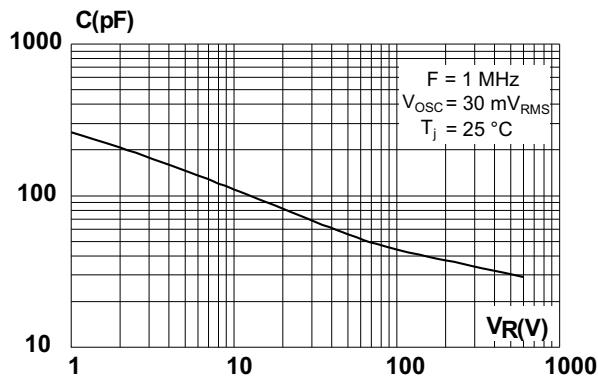
2 Package information

- 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
- Maximum torque value (TO-247 LL): 1.0 N·m

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2.1 TO3P-3L package information

Figure 14. TO3P-3L package outline
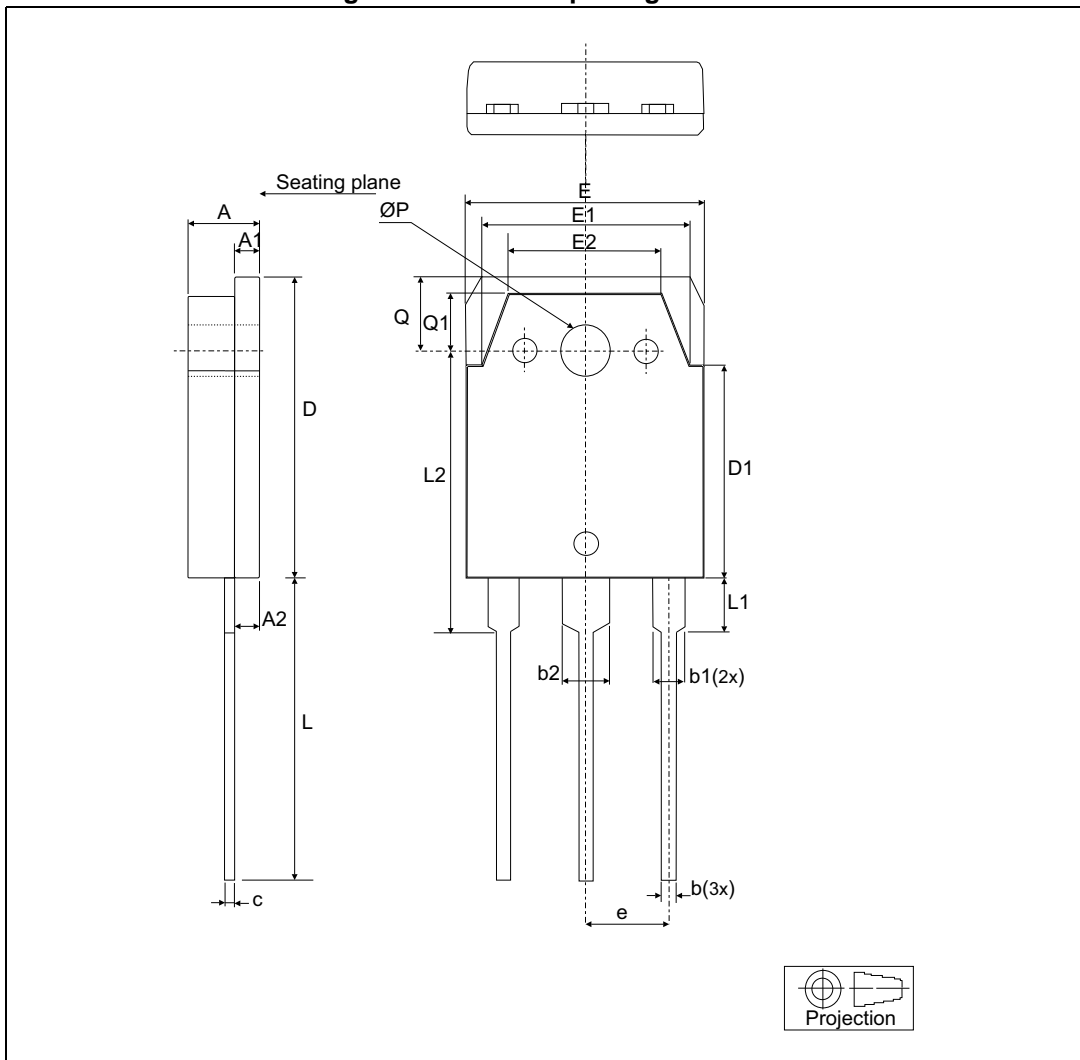
Table 6. TO3P-3L package mechanical data

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	

2.2 TO-3PF package information

Figure 15. TO-3PF package outline
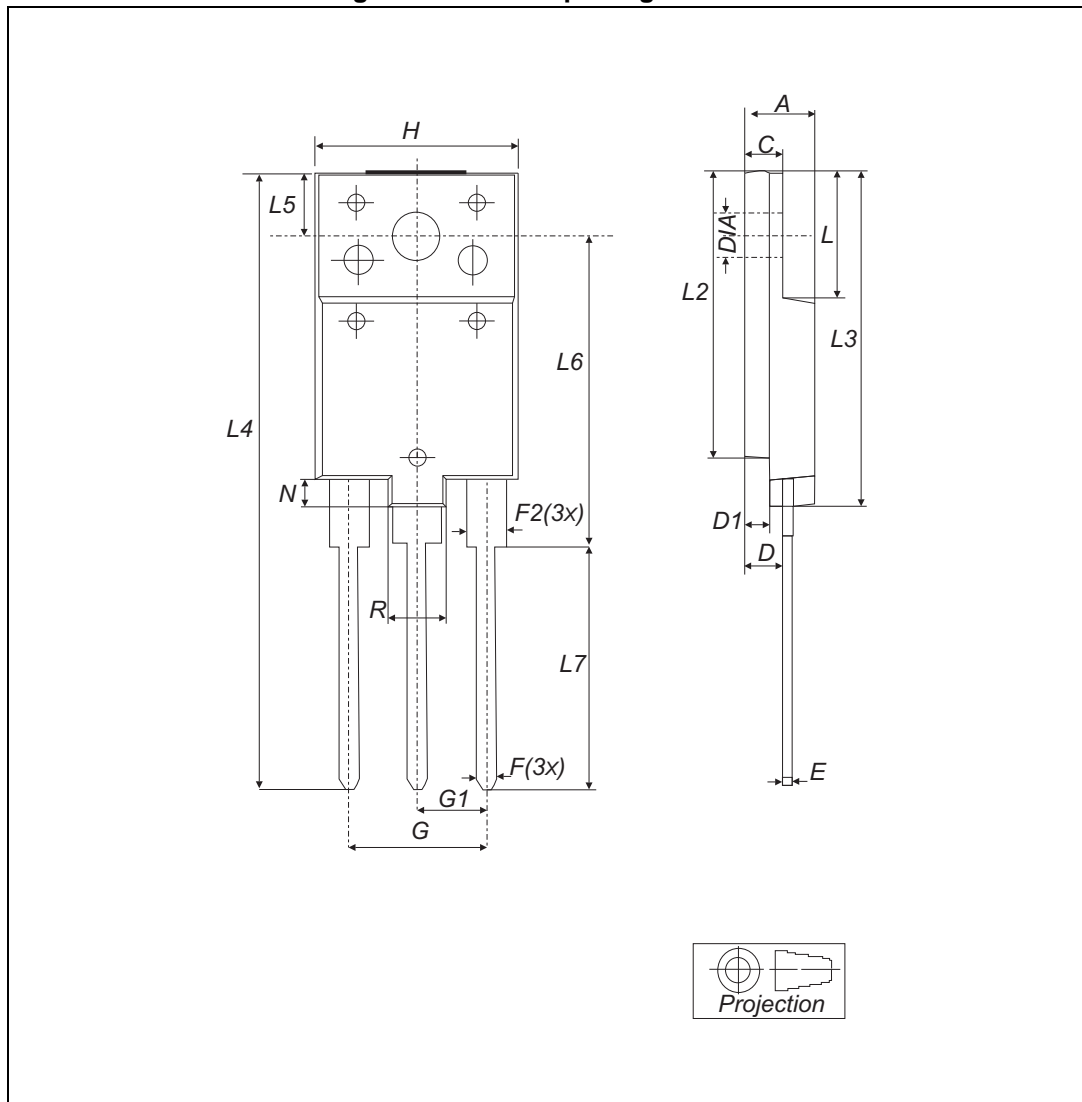
Table 7. TO-3PF mechanical data

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	22.80		23.20	0.89		0.91
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

2.3 TO-247 LL package information

Figure 16. TO-247 LL package outline
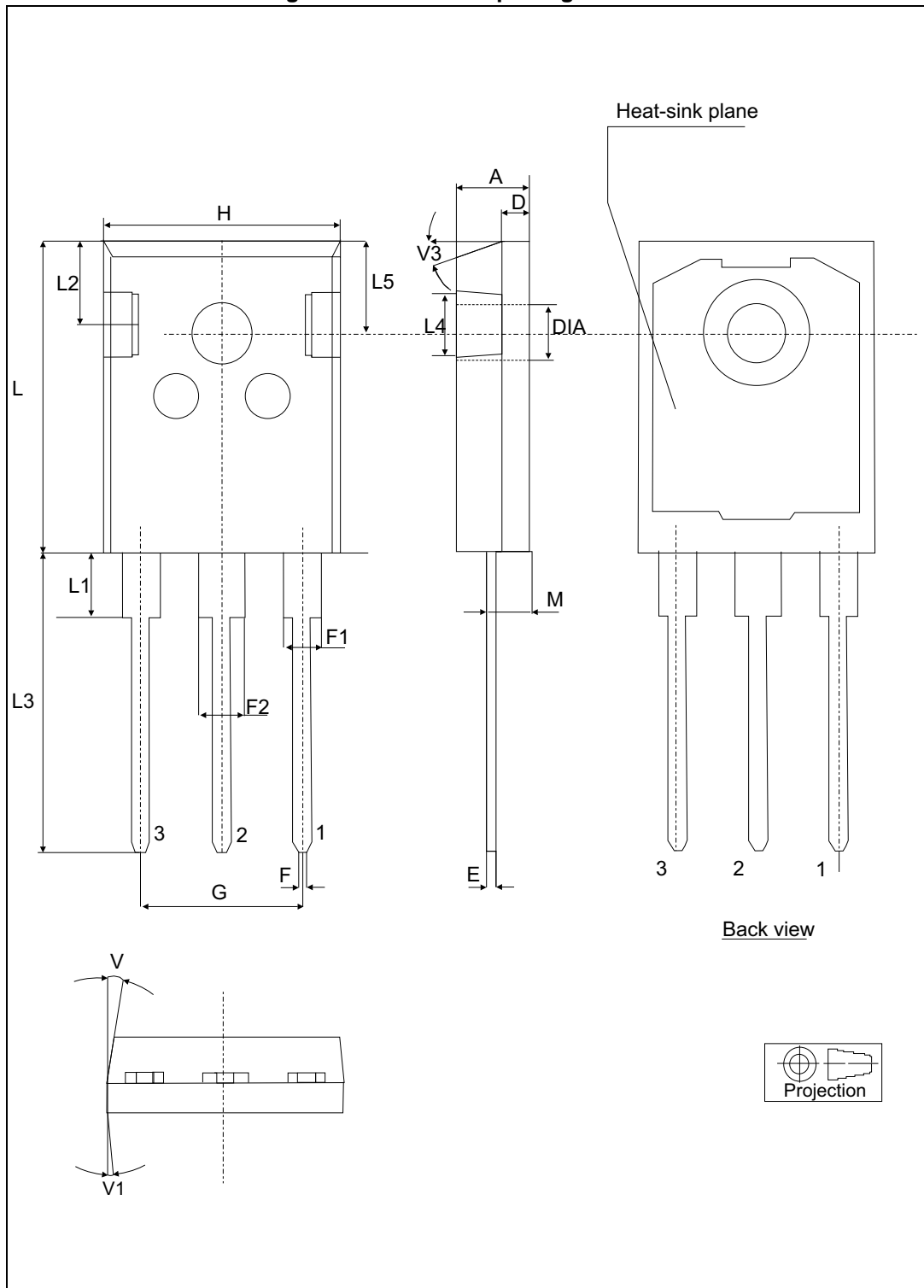
Table 8. TO-247 LL mechanical data

Ref.	Dimensions					
	Millimeters			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	0.11		0.133
G	10.90 BSC			0.429 BSC		
H	15.77		16.02	0.62		0.63
L	20.82		21.07	0.81		0.82
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		0.10
V		10°			10°	
V1		3°			3°	
V3		20°			20°	
$\varnothing$	3.55		3.66	0.139		0.143

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 LL	4.36	30	Tube
STTH60AC06CWL	STTH60AC06CWL	TO-247 LL	4.36	30	Tube

4 Revision history

Table 10. Document revision history

Date	Revision	Changes
23-Jul-2013	1	First release.
20-Mar-2017	2	Added TO-247LL package information and reformatted to current standard.
29-Mar-2017	3	Updated *Table 9*.

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