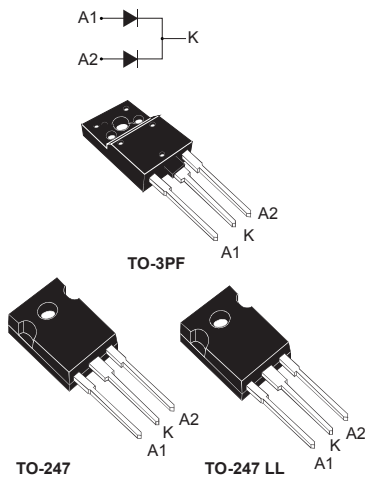


600 V, 2 x 30 A ultrafast high voltage diode



Features

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

Applications

- Air conditioning equipment
- Power supplies and converters
- Boost PFC
- Rectification diode
- Freewheeling diode

Description

The **STTH60AC06C** 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 freewheeling diode in power supplies and other power switching applications.

Product status link

[STTH60AC06C](#)

Product summary

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

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		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 2. Thermal parameters

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

For more information, refer to the following application note :

- [AN5088](#): Rectifiers thermal management, handling and mounting recommendations

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	$I_F = 30$ A	-		1.75	V
		$T_j = 150$ °C		-	1.07	1.40	
		$T_j = 25$ °C	$I_F = 60$ A	-		2.00	
		$T_j = 150$ °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:

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

For more information, refer to the following application notes related to the power losses :

- [AN604](#): Calculation of conduction losses in a power rectifier
- [AN5028](#): Calculation of turn-off power losses generated by an ultrafast diode

Table 4. Dynamic characteristics (per diode)

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

1.1 Characteristics (curves)

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

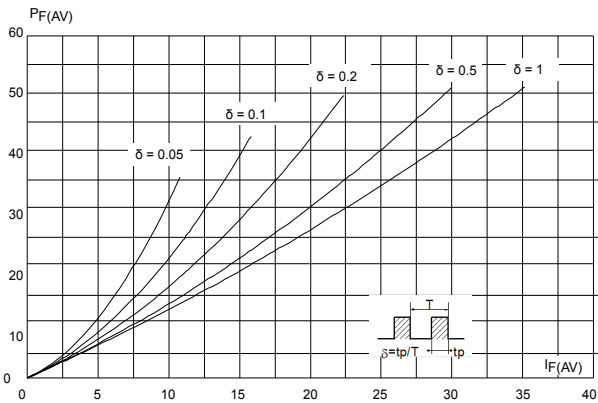


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

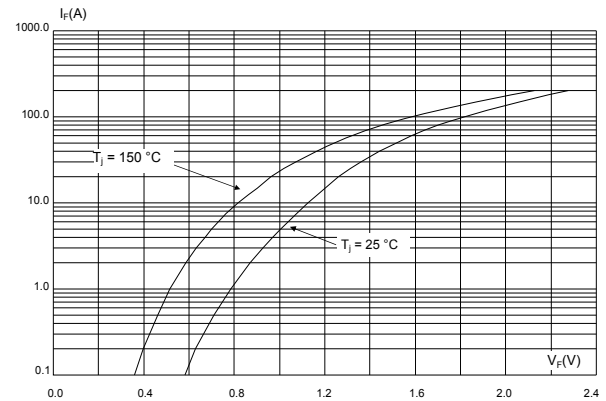


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

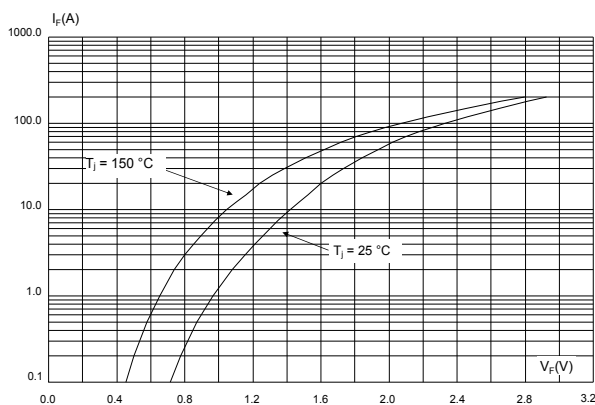


Figure 4. Relative variation of thermal impedance, junction to case, versus pulse duration

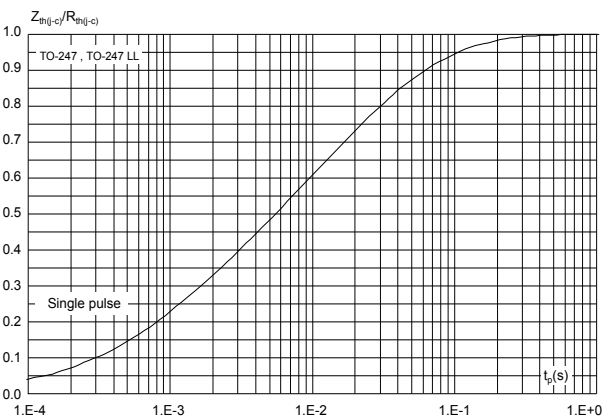


Figure 5. Relative variation of thermal impedance, junction to case, versus pulse duration

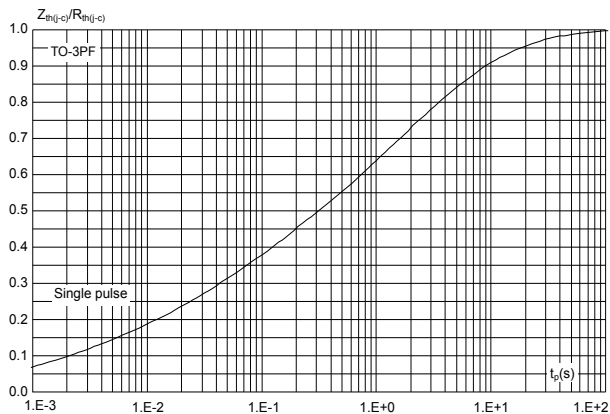


Figure 6. Peak reverse recovery current versus di_F/dt (typical values, per diode)

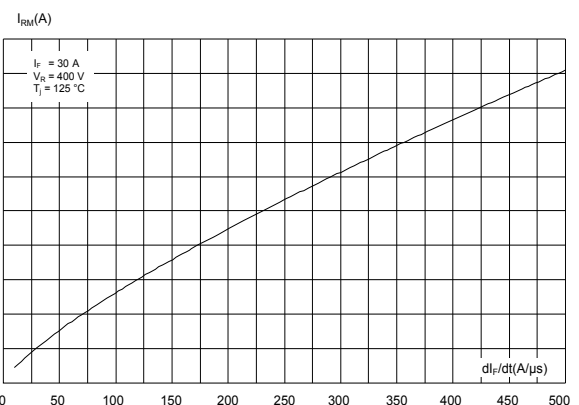


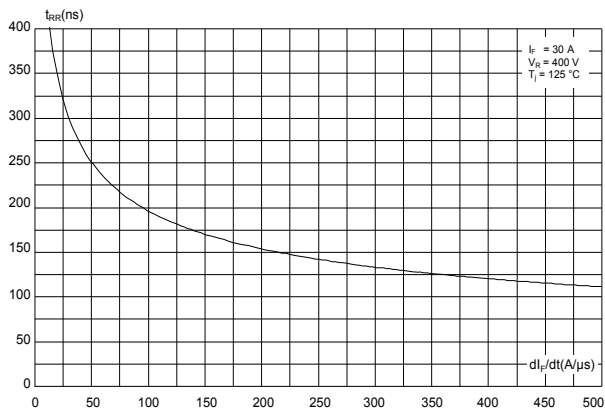
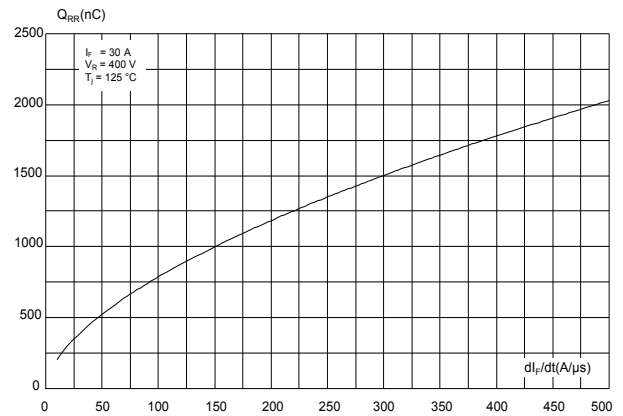
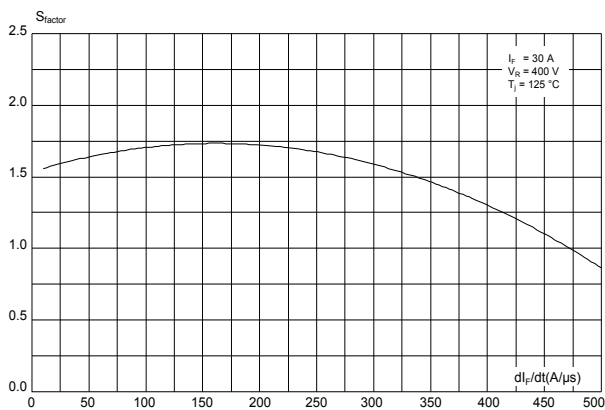
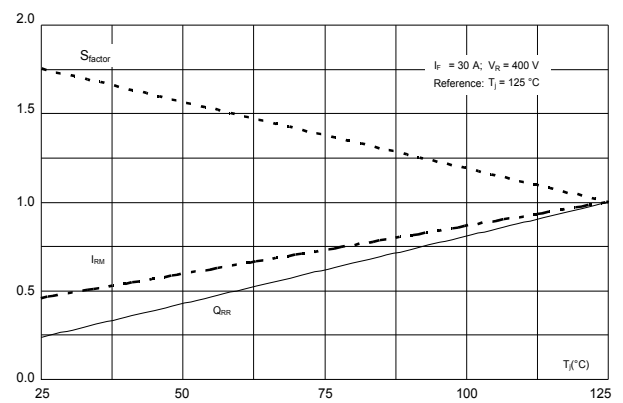
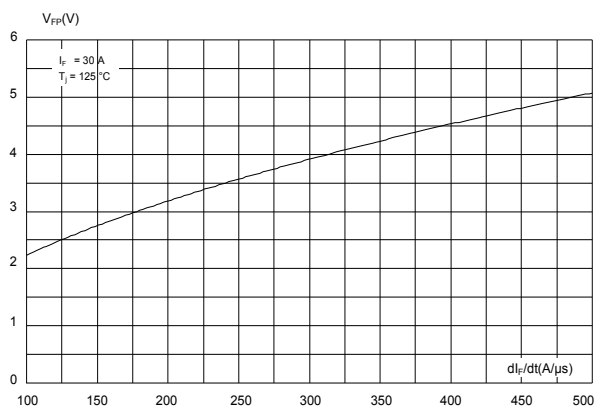
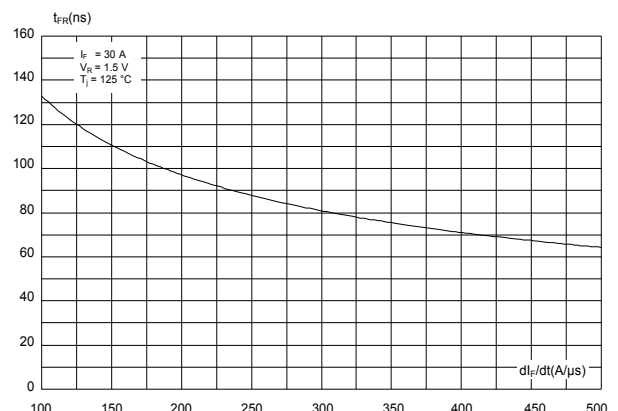
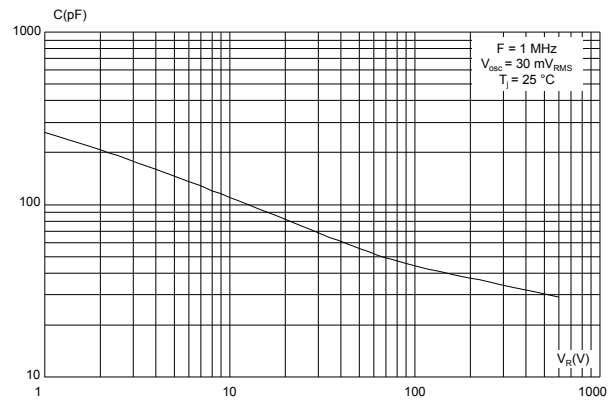
Figure 7. Reverse recovery time versus di_F/dt
 (typical values, per diode)

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)



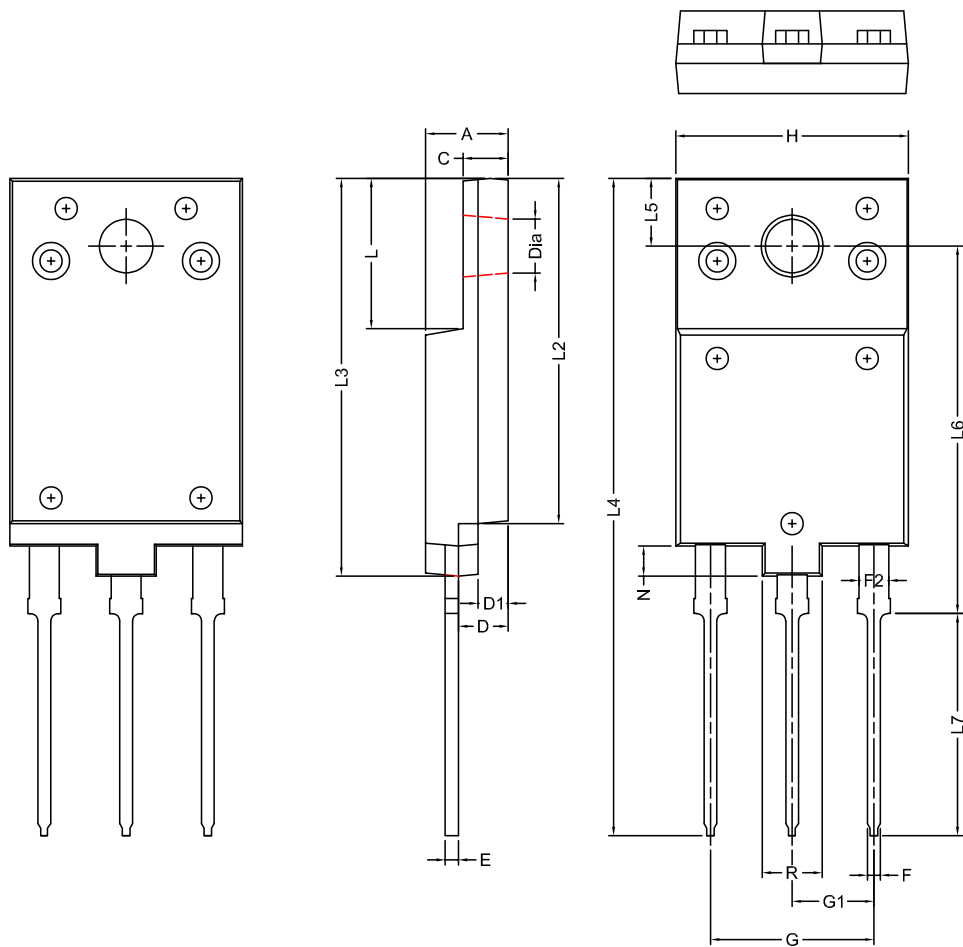
2 Package information

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 TO-3PF package information

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

Figure 14. TO-3PF package outline



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Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

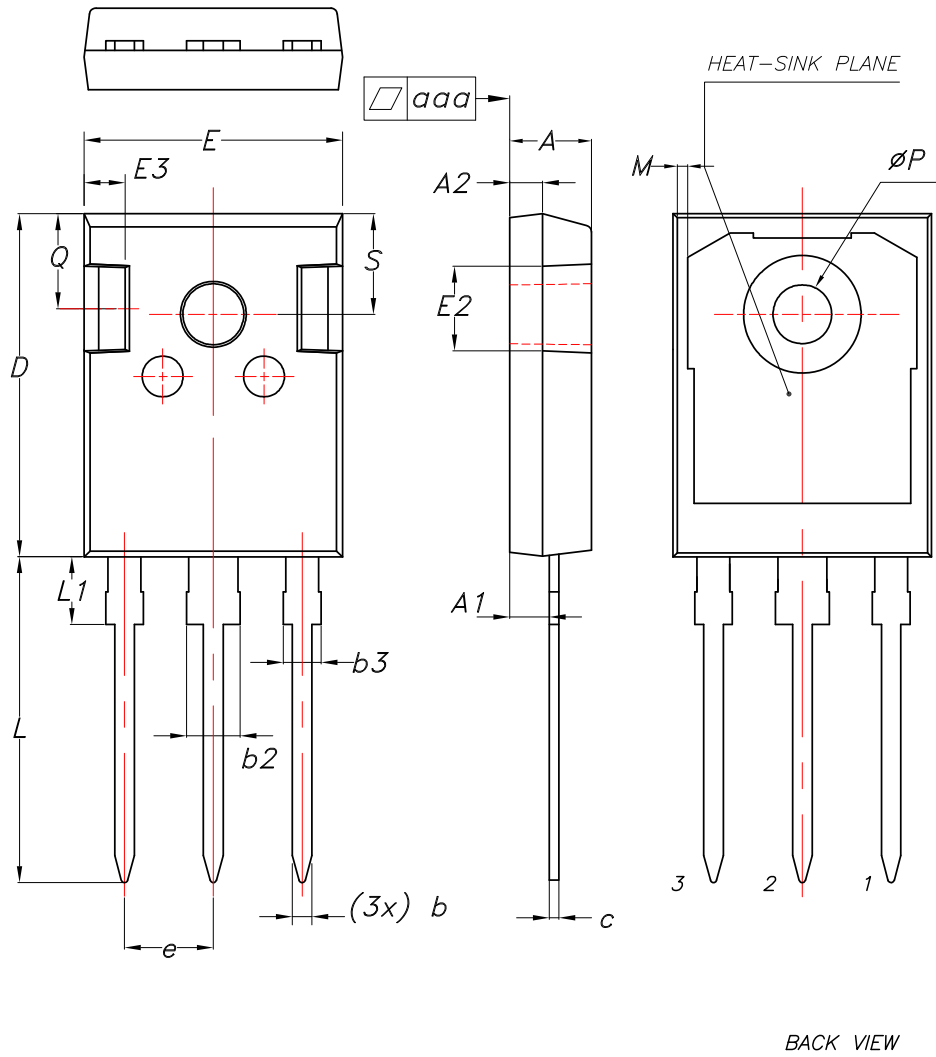
Table 5. TO-3PF mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	5.30	5.50	5.70
C	2.80	3.00	3.20
D	3.10	3.30	3.50
D1	1.80	2.00	2.20
E	0.80	0.95	1.10
F	0.65	0.80	0.95
F2	1.80	2.00	2.20
G	10.30	10.90	11.50
G1		5.45	
H	15.30	15.50	15.70
L	9.80	10.00	10.20
L2	22.80	23.00	23.20
L3	26.30	26.50	26.70
L4	43.20	43.80	44.40
L5	4.30	4.50	4.70
L6	24.30	24.50	24.70
L7	14.60	14.80	15.00
N	1.80	2.00	2.20
R	3.80	4.00	4.20
Dia	3.40	3.60	3.80

2.2 TO-247 LL package information

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

Figure 15. TO-247 LL package outline



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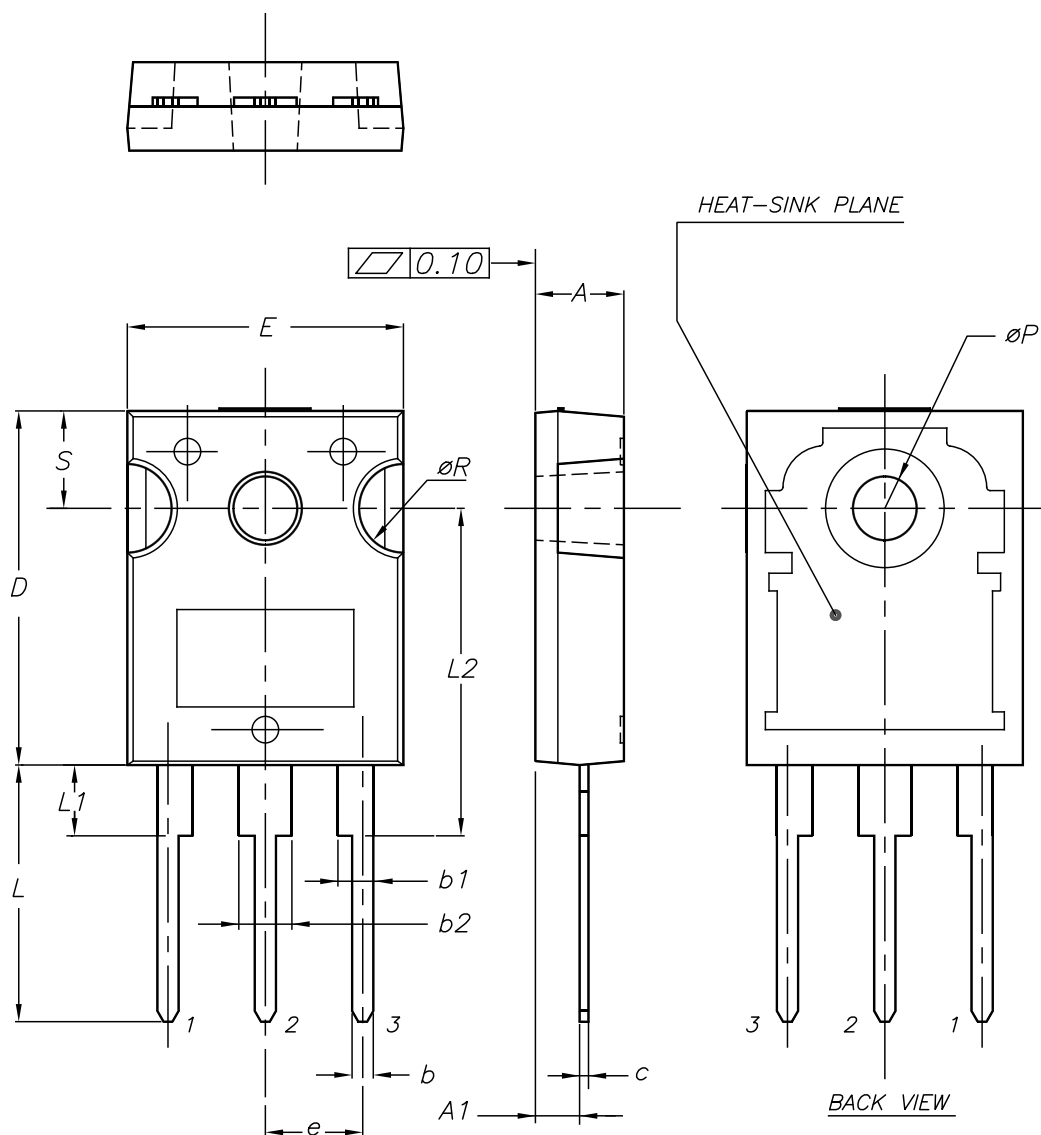
Table 6. TO-247 LL package mechanical data

Dim.	mm.			Inches (only for reference)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.90	5.00	5.10	0.192	0.196	0.200
A1	2.31	2.41	2.51	0.090	0.094	0.098
A2	1.90	2.00	2.10	0.074	0.078	0.082
b	1.16		1.26	0.045		0.049
b2			3.25			0.128
b3			2.25			0.089
c	0.59		0.66	0.0232		0.0260
D	20.90	21.00	21.10	0.8228	0.826	0.830
E	15.70	15.80	15.90	0.6181	0.622	0.626
E2	4.90	5.00	5.10	0.192	0.196	0.200
E3	2.40	2.50	2.60	0.094	0.098	0.102
e	5.34	5.44	5.54	0.2102	0.2142	0.2181
L	19.80	19.92	20.10	0.779	0.784	0.792
L1			4.30			0.170
M	0.35		0.95	0.013		0.038
P	3.50	3.60	3.70	0.137	0.141	0.145
Q	5.60		6.00	0.220		0.236
S	6.05	6.15	6.25	0.238	0.242	0.246
aaa		0.04	0.10		0.001	0.004

2.3 TO-247 package information

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

Figure 16. TO-247 package outline



0075325_10

Table 7. TO-247 package mechanical data

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	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	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			0.728	
ØP	3.55		3.65	0.139		0.143
ØR	4.50		5.50	0.177		0.217
S	5.30	5.50	5.70	0.209	0.216	0.224

3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH60AC06CPF	TH60AC06C	TO-3PF	5.6 g	30	Tube
STTH60AC06CWL	STTH60AC06CWL	TO-247 LL	4.36 g	30	
STTH60AC06CW	STTH60AC06CW	TO-247	4.43 g	30	

Revision history

Table 9. Document revision history

Date	Version	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 <i>Table 9</i> .
30-Oct-2025	4	Added Section Applications , and updated Section 2: Package information . Removed TO3P-3L package information.

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