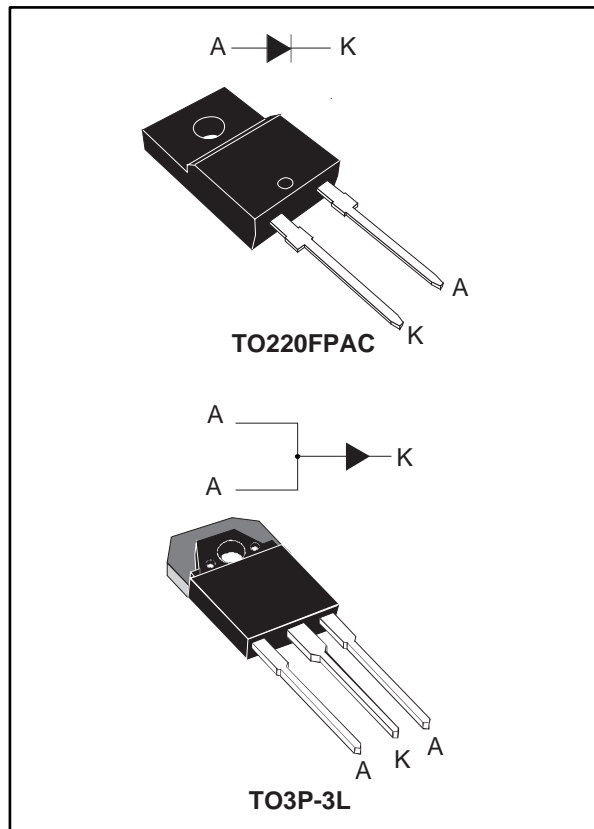


Turbo 2 ultrafast high voltage rectifier

Datasheet - production data



Description

This device, which uses ST Turbo 2 600 V technology, is ideal for switching power supplies and industrial applications as a rectification and discontinuous mode PFC boost diode.

Table 1: Device summary

Symbol	Value
$I_{F(AV)}$	30 A
V_{RRM}	600 V
T_j	175 °C
V_F (typ.)	1.15 V
t_{rr} (max.)	45 ns

Features

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduced switching and conduction losses
- Insulated package: TO-220FPAC
 - Insulated voltage: 2000 V_{RMS} sine

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		30	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal	270	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature		175	°C

Table 3: Thermal parameters

Symbol	Parameter		Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220FPAC	3.5	°C/W
		TO3P-3L	0.7	

Table 4: Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25$ °C	$V_R = V_{RRM}$	-		20	μA
		$T_j = 150$ °C		-	80	800	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25$ °C	$I_F = 30$ A	-		1.95	V
		$T_j = 150$ °C		-	1.15	1.45	

Notes:

(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:

$$P = 1.1 \times I_{F(AV)} + 0.012 \times I_{F(RMS)}^2$$

Table 5: Dynamic electrical characteristics

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	-		35	ns
			$I_F = 1$ A, $dI_F/dt = 50$ A/μs, $V_R = 30$ V	-	45	60	
I_{RM}	Reverse recovery current	$T_j = 125$ °C	$I_F = 30$ A, $dI_F/dt = 100$ A/μs, $V_R = 400$ V	-	6	8	A

1.1 Characteristics (curves)

Figure 1: Average forward power dissipation versus average forward current

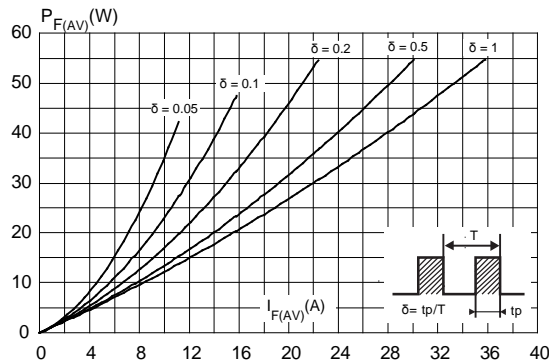


Figure 2: Forward voltage drop versus forward current (typical values)

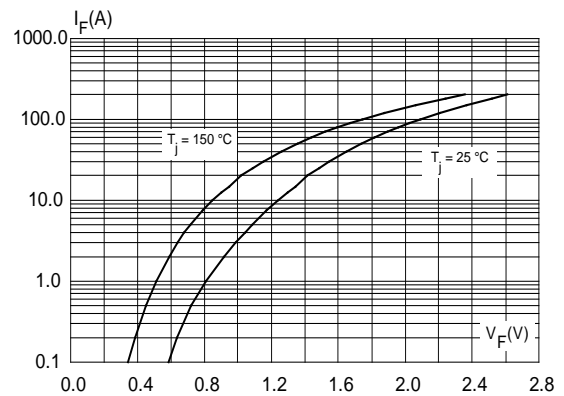


Figure 3: Forward voltage drop versus forward current (maximum values)

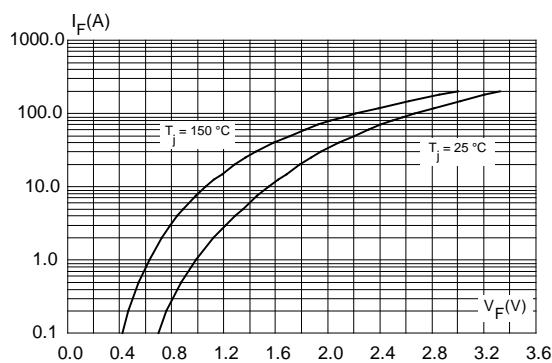


Figure 4: Relative variation of thermal impedance, junction to case, versus pulse duration (TO-220FPAC)

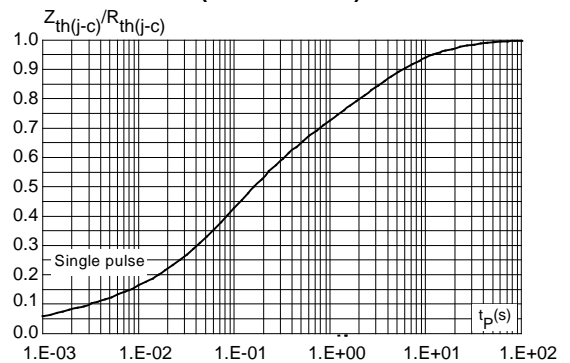


Figure 5: Relative variation of thermal impedance, junction to case, versus pulse duration (TO3P-3L)

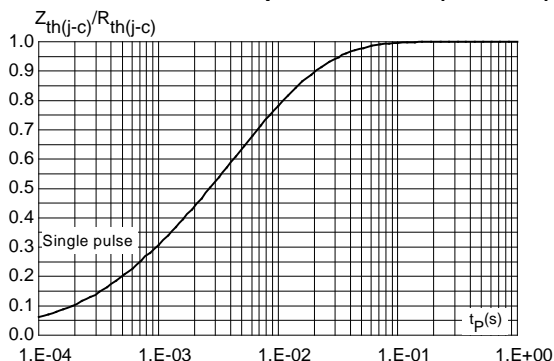


Figure 6: Peak reverse recovery current versus di_F/dt (typical values)

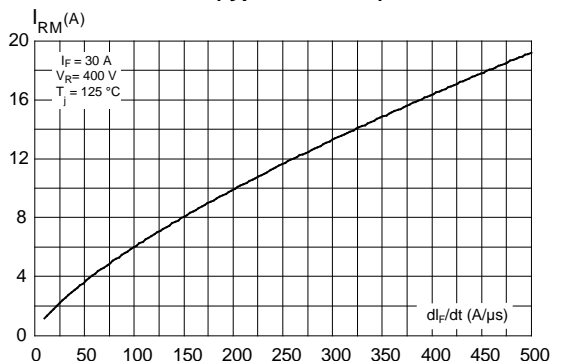


Figure 7: Reverse recovery time versus di_F/dt (typical values)

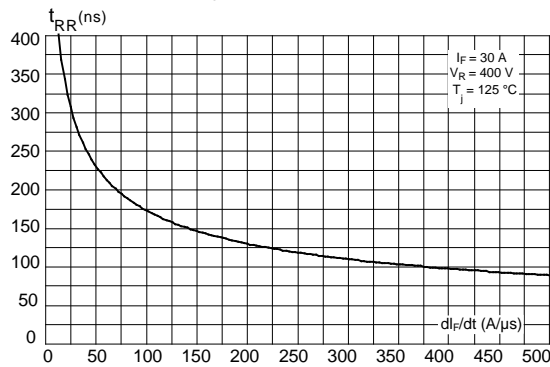


Figure 8: Reverse recovery charges versus di_F/dt (typical values)

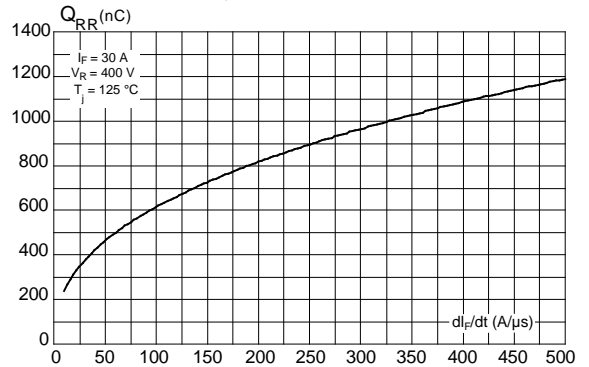


Figure 9: Reverse recovery softness factor versus di_F/dt (typical values)

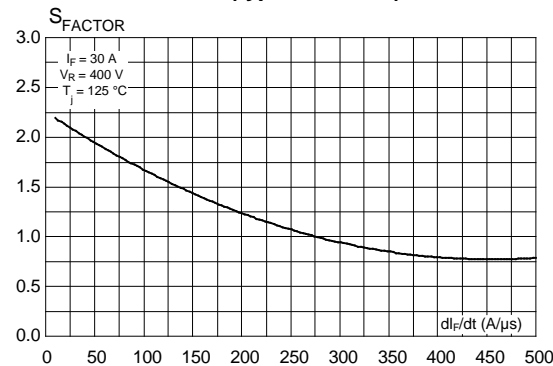


Figure 10: Relative variations of dynamic parameters versus junction temperature

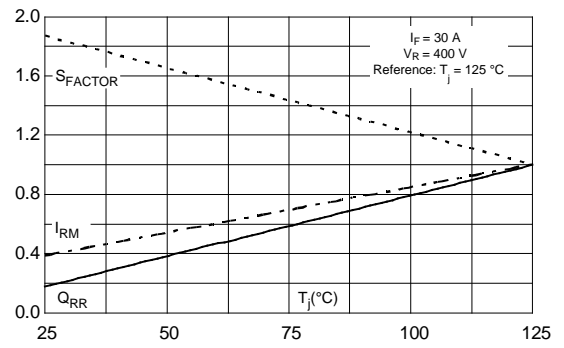
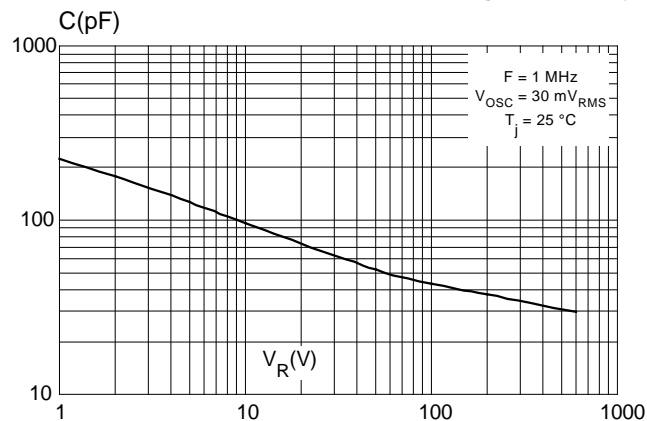


Figure 11: Junction capacitance versus reverse voltage applied (typical values)



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.

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m (for TO-220FPAC)
- Recommended torque: (TO3P-3L) 0.4 to 0.6 N·m
- Maximum torque value: 0.7 N·m (for TO-220FPAC)

2.1 TO3P-3L package information

Figure 12: TO3P-3L package outline

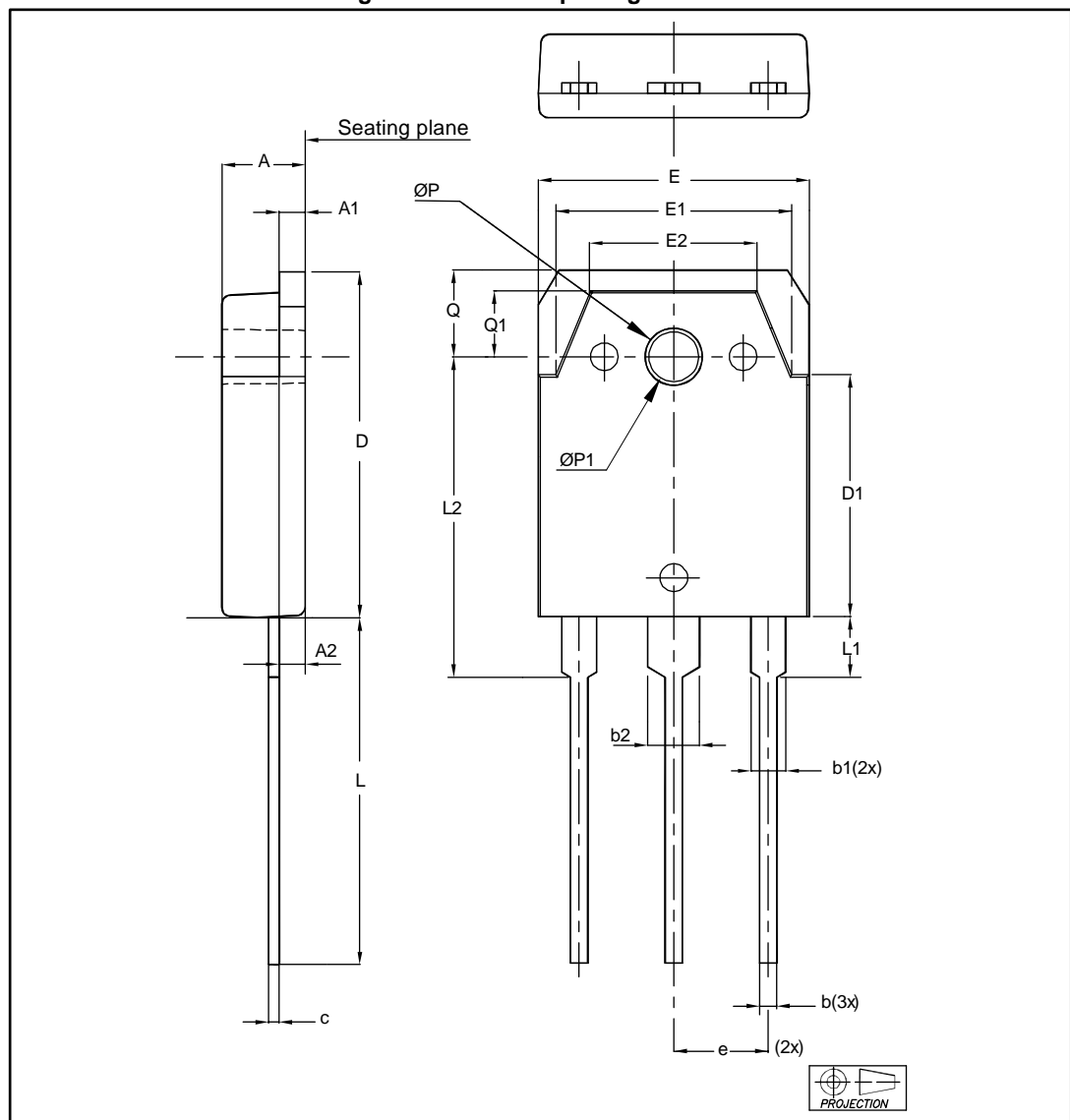


Table 6: TO3P-3L package mechanical data

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-220FPAC package information

Figure 13: TO-220FPAC package outline

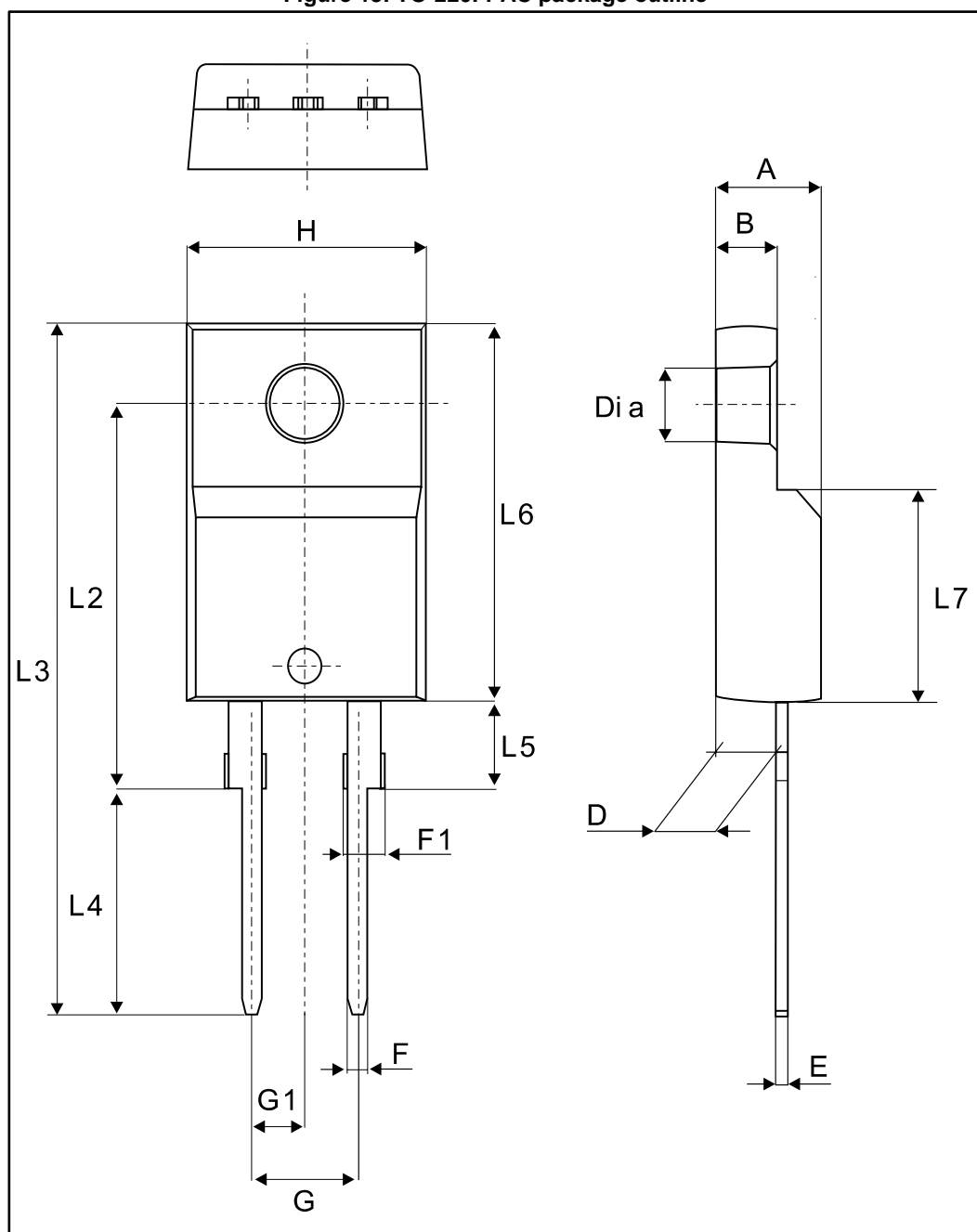


Table 7: TO-220FPAC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
B	2.5	2.7	0.098	0.106
D	2.5	2.75	0.098	0.108
E	0.45	0.70	0.018	0.027
F	0.75	1	0.030	0.039
F1	1.15	1.70	0.045	0.067
G	4.95	5.20	0.195	0.205
G1	2.4	2.7	0.094	0.106
H	10	10.4	0.393	0.409
L2	16 typ.		0.63 typ.	
L3	28.6	30.6	1.126	1.205
L4	9.8	10.6	0.386	0.417
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Diam	3.00	3.20	0.118	0.126

3 Ordering information

Table 8: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30AC06FP	STTH30AC06FP	TO-220FPAC	1.8 g	50	Tube
STTH30AC06SP	STTH30AC06SP	TO3P-3L	5.26 g	30	

4 Revision history

Table 9: Document revision history

Date	Revision	Changes
09-Mar-2016	1	First release.
23-Feb-2018	2	Updated cover image. Minor text changes to improve readability.

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