STTH10LCD06

Turbo2 ultrafast - high voltage rectifier for flat panel displays

Features

- ultrafast switching
- low reverse current
- low thermal resistance
- reduces conduction and switching losses
- insulated package TO-220FPAC:
  - insulated voltage: 2500 V rms
  - typical package capacitance: 12 pF

Description

The STTH10LCD06 uses ST Turbo2 technology. This device is suited for power applications in flat panel displays and especially applicable to switching power supplies in LCDs.

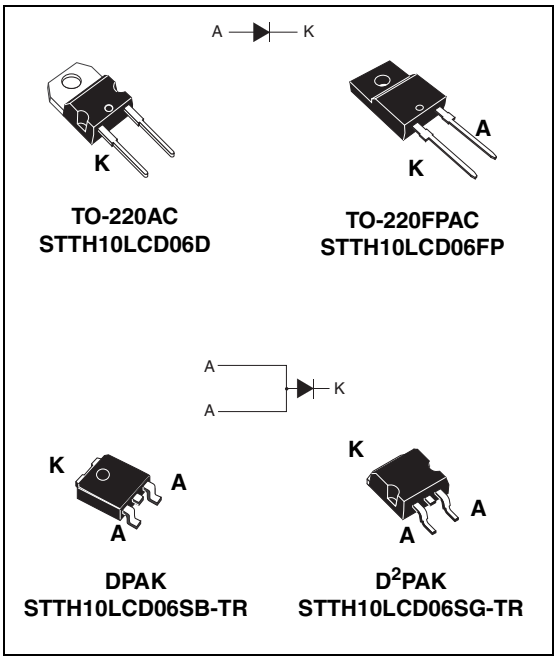


Table 1. Device summary

$I_{F(AV)}$	10 A
V_{RRM}	600 V
T_j	175 °C
V_F (typ)	1.3 V
t_{rr} (max)	50 ns

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 current rms	DPAK		18	A
		TO-220AC, TO-220FPAC, D^2PAK		35	
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	T_c = 105 °C	TO-220AC, DPAK, D^2PAK	10	A
		T_c = 55 °C	TO-220FPAC,	10	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		100	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature(1)			175	°C

1. $\frac{dP_{tot}}{dT_j} < \frac{1}{R_{th(j-a)}}$ condition to avoid thermal runaway for a diode on its own heatsink

Table 3. Thermal resistance

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC, DPAK, D^2PAK	3.5	°C/W
		TO-220FPAC	6	

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	-	5	µA
		T_j = 150 °C		-	13	130	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	-	2	V
		T_j = 150 °C		-	1.3	1.6	

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:
$P = 1.20 \times I_{F(AV)} + 0.040 \times I_F{}^2{}_{(RMS)}$

Table 5. Dynamic electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	I_F = 1 A, dI_F/dt = -50 A/µs, V_R = 30 V, T_j = 25 °C	-	35	50	ns
I_{RM}	Reverse recovery current	I_F = 10 A, dI_F/dt = -50 A/µs, V_R = 400 V, T_j = 125 °C	-	2.0	2.8	A
t_{fr}	Forward recovery time	I_F = 10 A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}, T_j = 25 °C	-	-	230	ns
V_{FP}	Forward recovery voltage	I_F = 10 A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}, T_j = 25 °C	-	4	-	V

Figure 1. Conduction losses versus average current

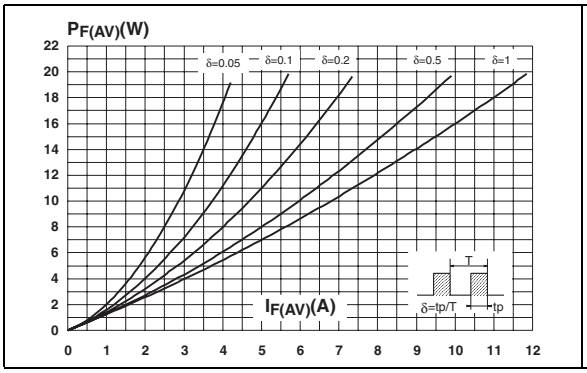


Figure 2. Forward voltage drop versus forward current

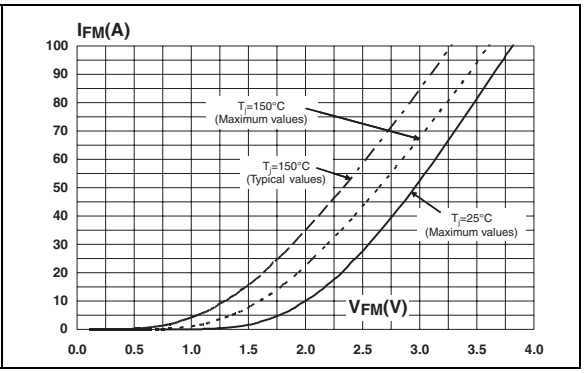


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

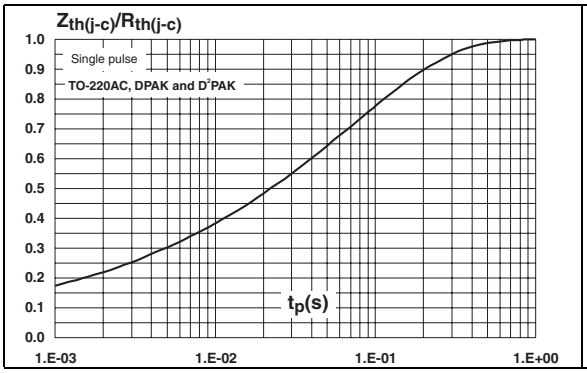


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220FPAC)

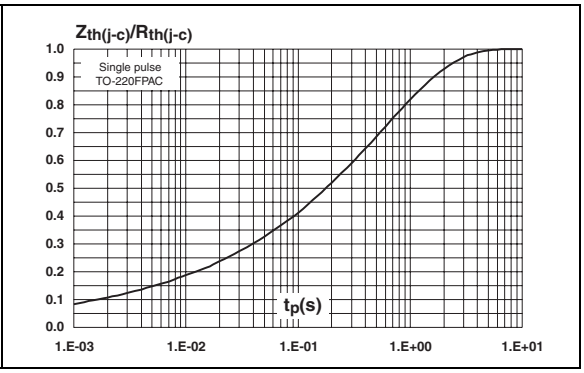


Figure 5. Peak reverse recovery current versus dI_F/dt (typical values)

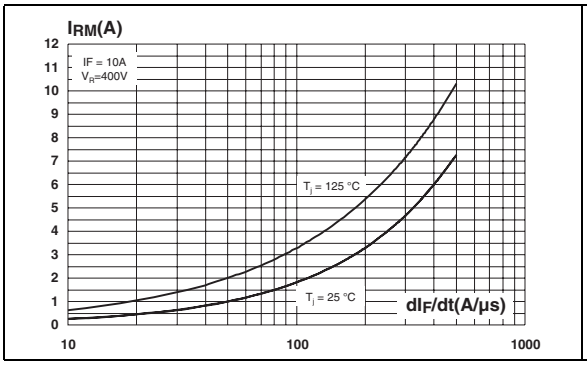


Figure 6. Reverse recovery time versus dI_F/dt (typical values)

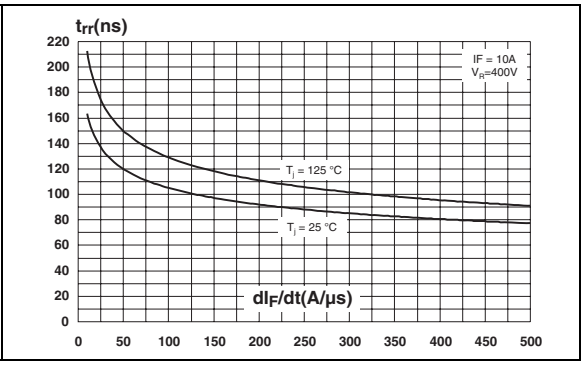


Figure 7. Reverse recovery charges versus dI_F/dt (typical values)

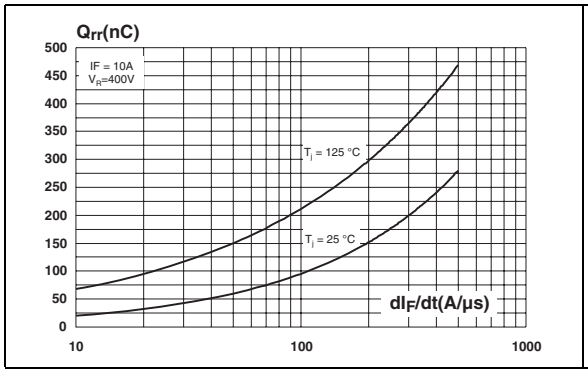


Figure 8. Relative variations of dynamic parameters versus junction temperature

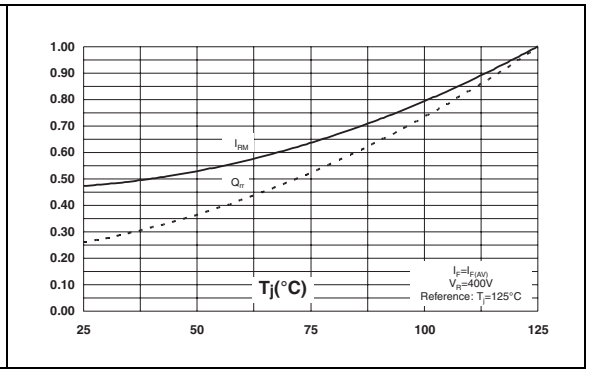


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

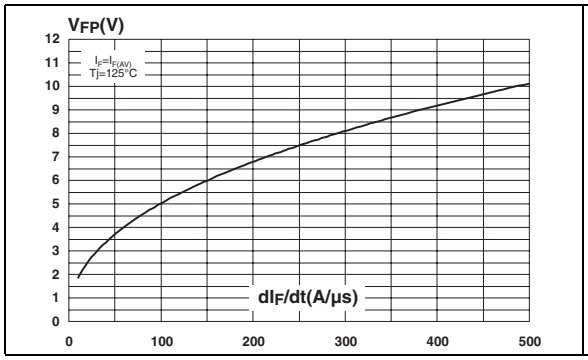


Figure 10. Forward recovery time versus dI_F/dt (typical values)

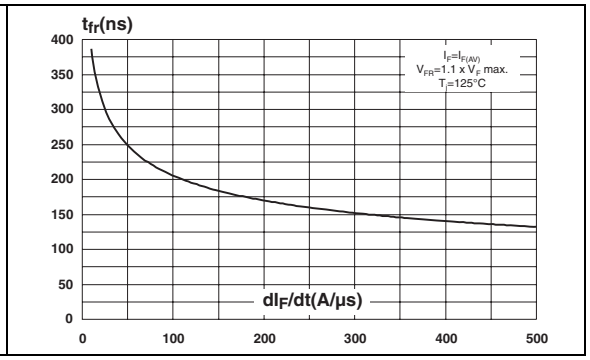
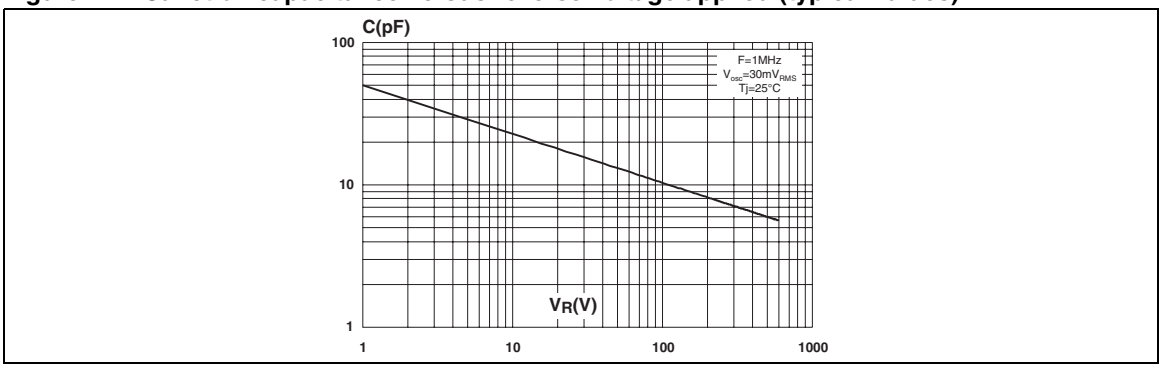


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

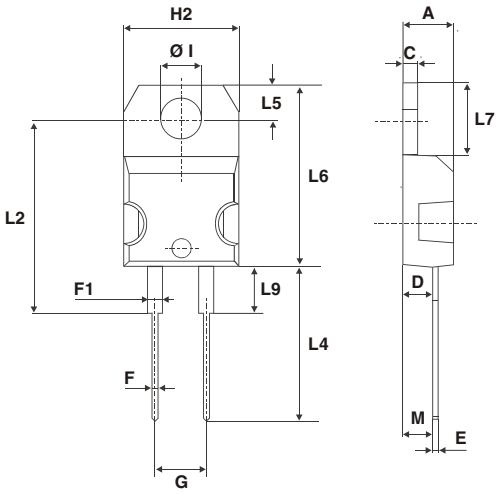


2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.4 to 0.6 N·m

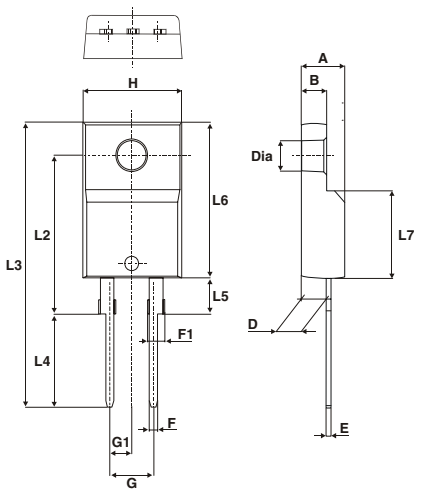
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 6. TO-220AC dimensions



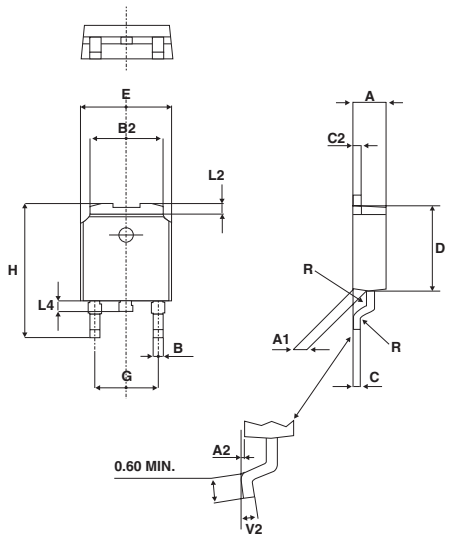
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.6 typ.		0.102 typ.	
Diam. I	3.75	3.85	0.147	0.151

Table 7. TO-220FPAC dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	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
L5	2.9	3.6	0.114	0.142
L6	15.9	16.4	0.626	0.646
L7	9.00	9.30	0.354	0.366
Dia.	3.00	3.20	0.118	0.126

Table 8. DPAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 12. Footprint (dimensions in mm)

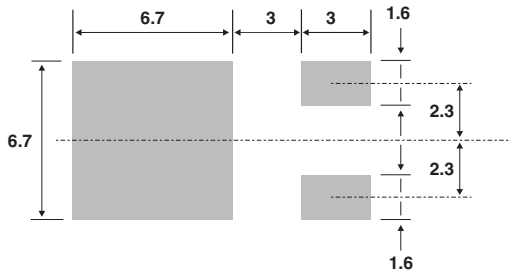
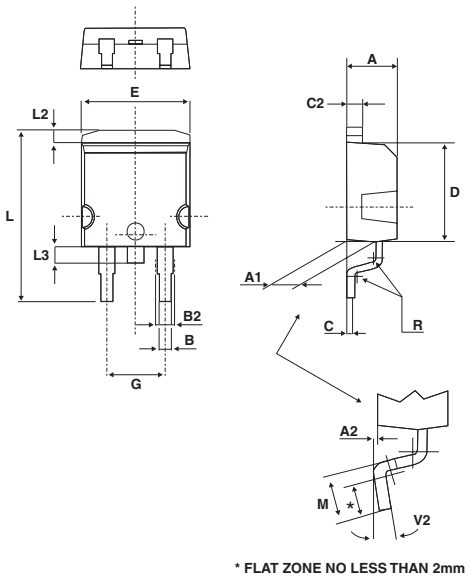
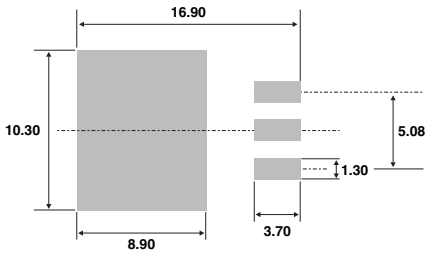


Table 9. D²PAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 13. Footprint (dimensions in mm)



3 Ordering information

Table 10. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH10LCD06D	STTH10LCD06D	TO-220AC	1.86 g	50	Tube
STTH10LCD06FP	STTH10LCD06FP	TO-220FPAC	1.8 g	50	Tube
STTH10LCD06SG-TR	STTH10LCD06SG	D^2PAK	1.8 g	1000	Tape and reel
STTH10LCD06SB-TR	TH10LCD06SB	DPAK	1.8 g	2500	Tape and reel

4 Revision history

Table 11. Document revision history

Date	Revision	Description of changes
15-Jul-2009	1	First issue
30-Sep-2010	2	Updated value of I_{FSM} in *Table 2*.

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