STB30NF10
STP30NF10 - STP30NF10FP

N-channel 100V - 0.038Ω - 35A - D²PAK/TO-220/TO-220FP Low gate charge STripFET™ II Power MOSFET

General features

| Type	V_{DSS}	$R_{DS(on)}$	I_D
STB30NF10	100V	<0.045Ω	35A
STP30NF10	100V	<0.045Ω	35A
STP30NF10FP	100V	<0.045Ω	35A

- Exceptional dv/dt capability
- 100% avalanche tested
- Application oriented characterization

Description

This Power MOSFET is the latest development of STMicroelectronis unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

Applications

- Switching application

TO-220
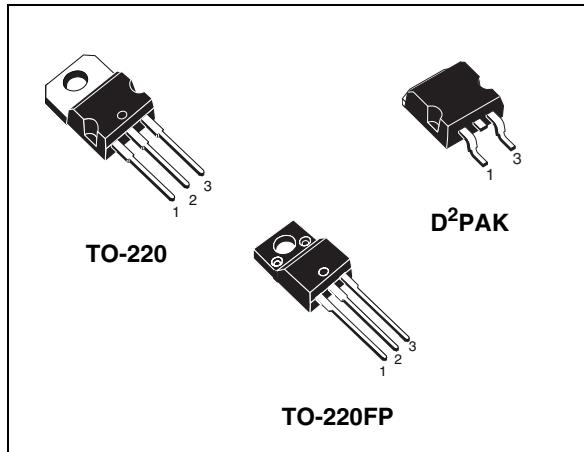
D²PAK

TO-220FP

Internal schematic diagram

D(TAB)

G(1)

S(3)

SC07580
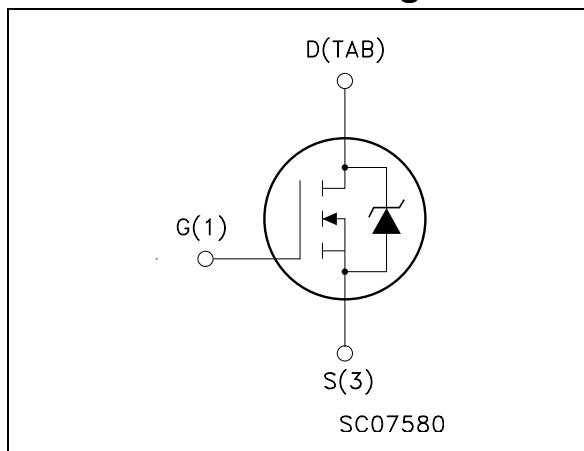
Order codes

Sales type	Marking	Package	Packaging
STB30NF10T4	B30NF10	D²PAK	Tape & reel
STP30NF10	P30NF10	TO-220	Tube
STP30NF10FP	P30NF10FP	TO-220FP	Tube

Contents

1   Electrical ratings

Table 1.   Absolute maximum ratings

Symbol	Parameter	Value		Unit
		D^2PAK TO-220	TO-220FP	
V_{DS}	Drain-source voltage (V_{GS} = 0)	100		V
V_{DGR}	Drain-gate voltage (R_{GS} = 20 kΩ)	100		V
V_{GS}	Gate- source voltage	± 20		V
I_D	Drain current (continuous) at T_C = 25°C	35	18	A
I_D	Drain current (continuous) at T_C = 100°C	25	13	A
I_{DM}[1]	Drain current (pulsed)	140	72	A
P_{tot}	Total dissipation at T_C = 25°C	115	30	W
	Derating Factor	0.77	0.2	W/°C
dv/dt [2]	Peak diode recovery voltage slope	28		V/ns
E_{AS} [3]	Single pulse avalanche energy	275		mJ
V_{ISO}	Insulation withstand voltage (DC)	--	2500	V
T_{stg}	Storage temperature	-55 to 175		°C
T_j	Max. operating junction temperature			

1. Pulse width limited by safe operating area.

2. I_{SD} 30A, di/dt 400A/μs, V_{DD} ≤$V_{(BR)DSS}$, Tj ≤T_{JMAX}

3. Starting T_j = 25 °C, I_D = 15A, V_{DD} = 30V

Table 2.   Thermal data

		D^2PAK TO-220	TO-220FP	
Rthj-case	Thermal resistance junction-case max	1.30	5	°C/W
Rthj-amb	Thermal resistance junction-ambient max	62.5		°C/W
T_J	Maximum lead temperature for soldering purpose	300		°C

2   Electrical characteristics

(T_{CASE}=25°C unless otherwise specified)

Table 3.   On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 250µA, V_{GS} =0	100			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = max ratings V_{DS} = max ratings, T_C = 125°C			1 10	µA µA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ± 20V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 10V, I_D = 15A		0.038	0.045	Ω

Table 4.   Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} [1]	Forward transconductance	V_{DS} = 15V, I_D = 15A		10		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25V, f = 1MHz, V_{GS} = 0		1180 180 80		pF pF pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD} = 50V, I_D = 15A R_G = 4.7Ω V_{GS} = 10V (see *Figure 15*)		15 40 45 10		ns ns ns ns
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 80V, I_D = 12A, V_{GS} = 10V (see *Figure 16*)		40 8 15	55	nC nC nC

1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.

Table 5.   Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} [1]	Source-drain current Source-drain current (pulsed)				35 140	A A
V_{SD} [2]	Forward on voltage	I_{SD} = 30A, V_{GS} = 0			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 30A, di/dt = 100A/µs, V_{DD} = 55V, T_j = 150°C (see *Figure 17*)		110 390 7.5		ns nC A

1. Pulse width limited by safe operating area.

2. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area for TO-220/D²PAK
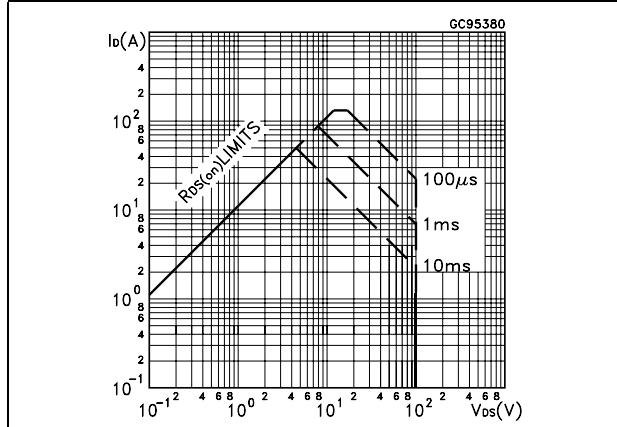
**Figure 2. Thermal impedance for TO-220/D²PAK**
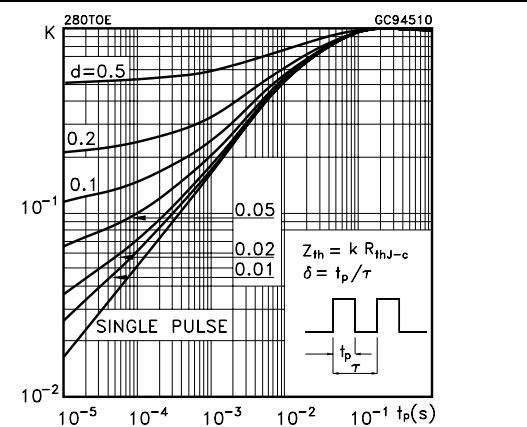

Figure 3. Safe operating area for TO-220FP
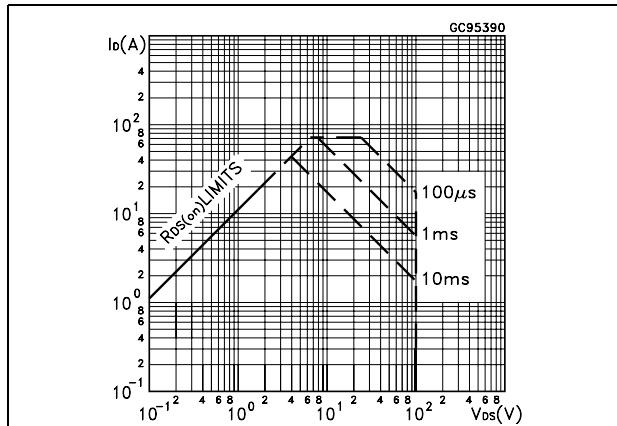
**Figure 4. Thermal impedance for TO-220FP**
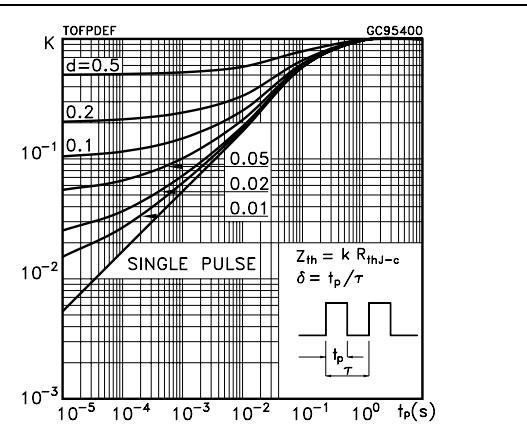
**Figure 5. Output characterisics**
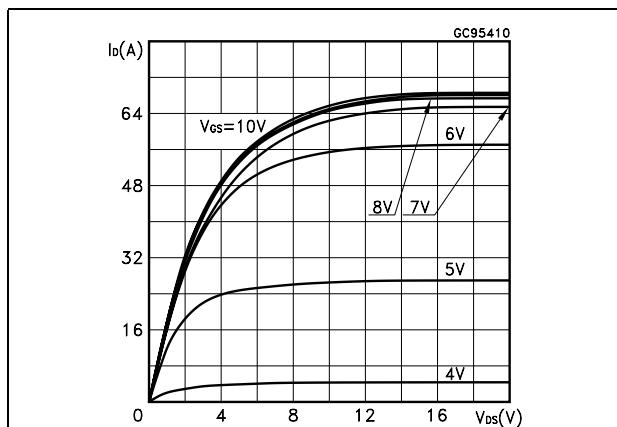
**Figure 6. Transfer characteristics**
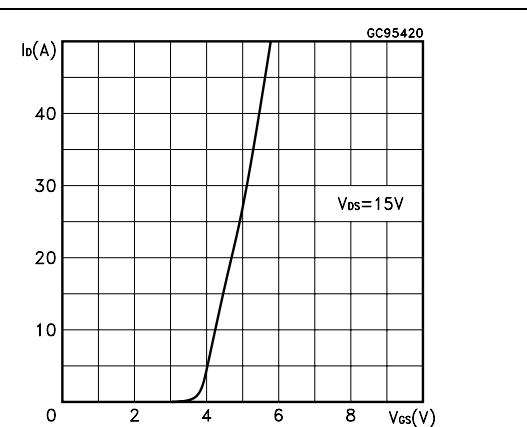
Figure 7.   Transconductance
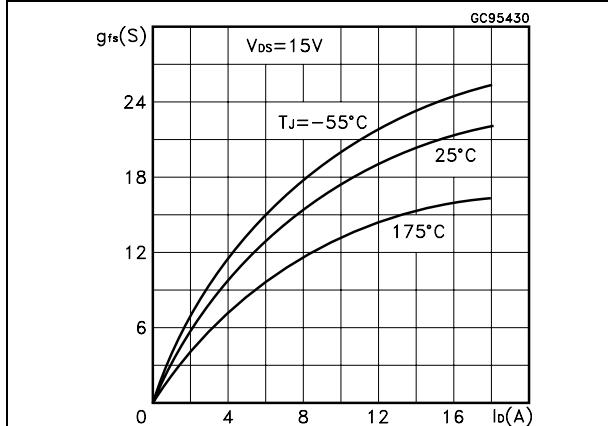

Figure 8.   Static drain-source on resistance
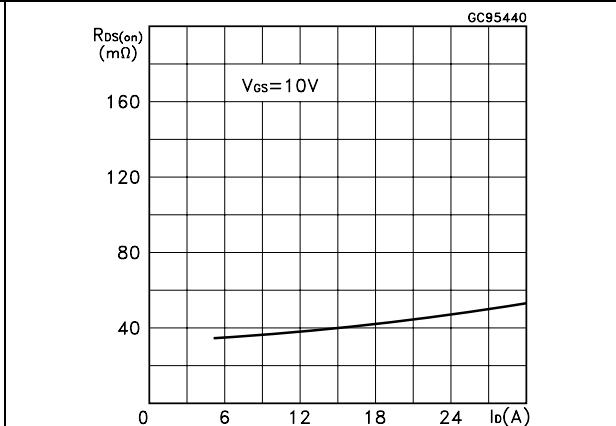

Figure 9.   Gate charge vs gate-source voltage


Figure 10.   Capacitance variations
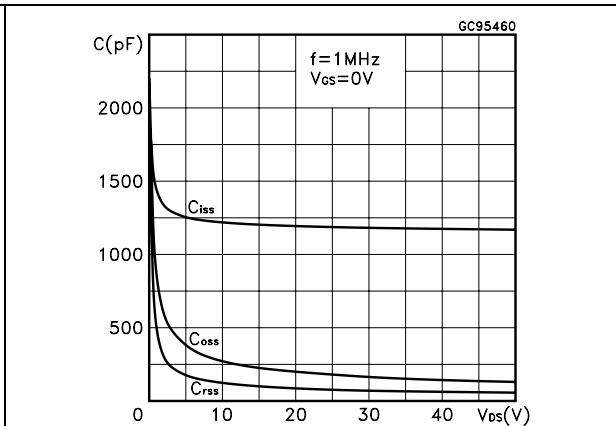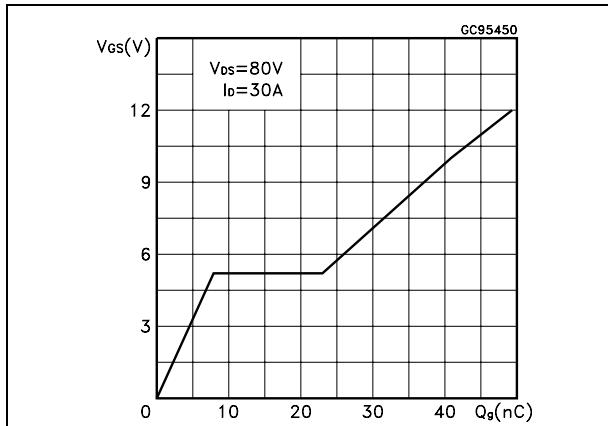
Figure 11.   Normalized gate threshold voltage vs temperature

Figure 12.   Normalized on resistance vs temperature
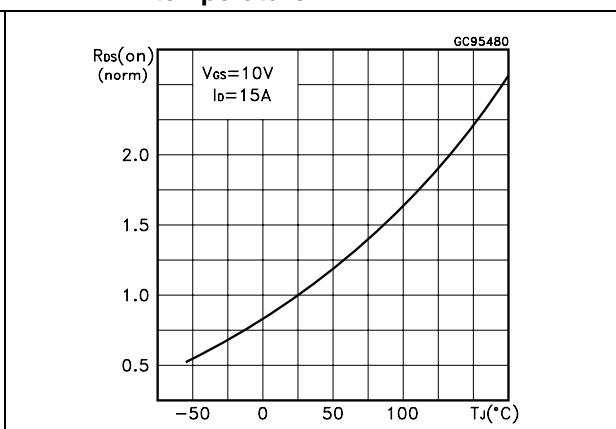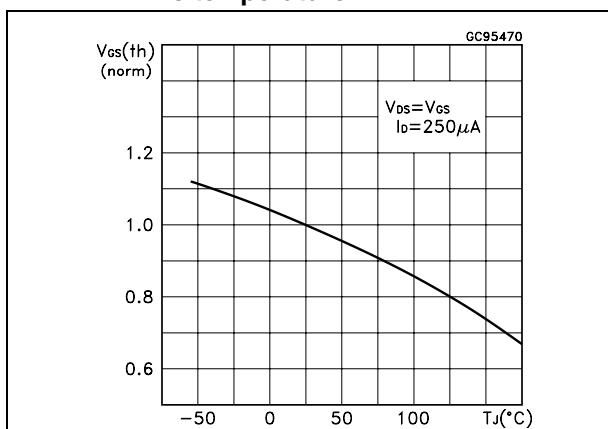
Figure 13. Source-drain diode forward characteristics
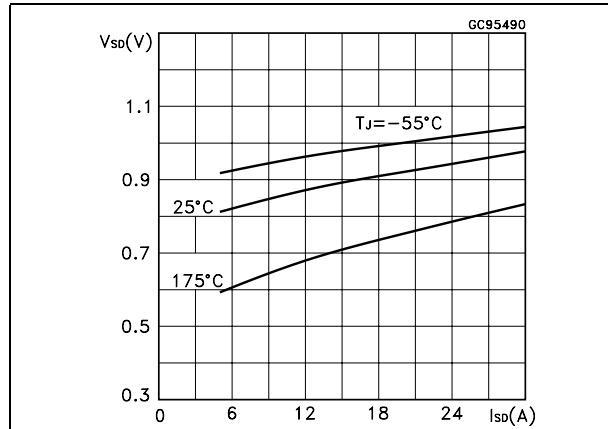
Figure 14. Normalized B$_{VDSS}$ vs temperature
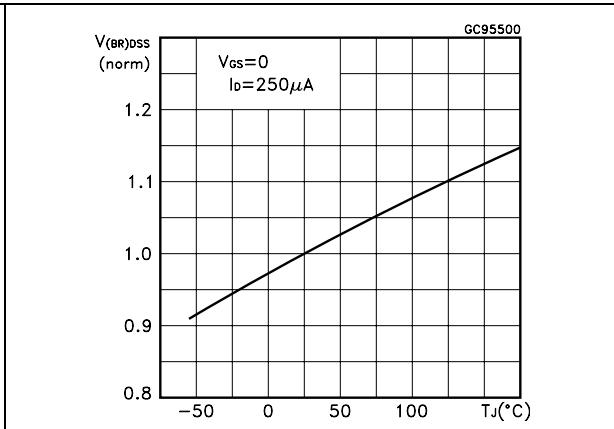
3   Test circuit

Figure 15. Switching times test circuit for resistive load
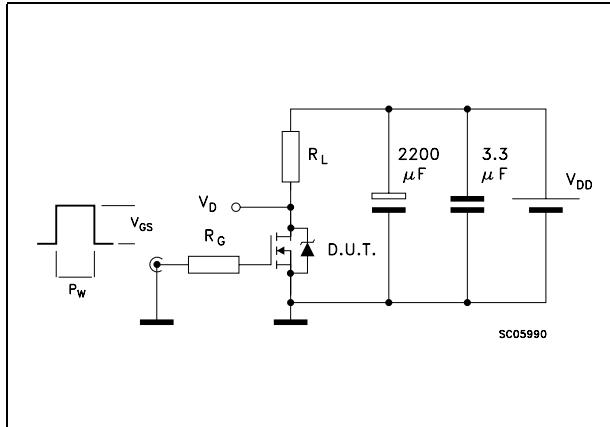
Figure 16. Gate charge test circuit
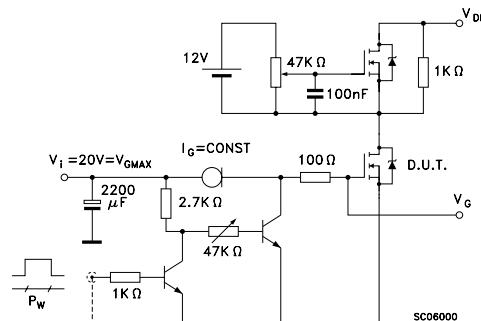
Figure 17. Test circuit for inductive load switching and diode recovery times
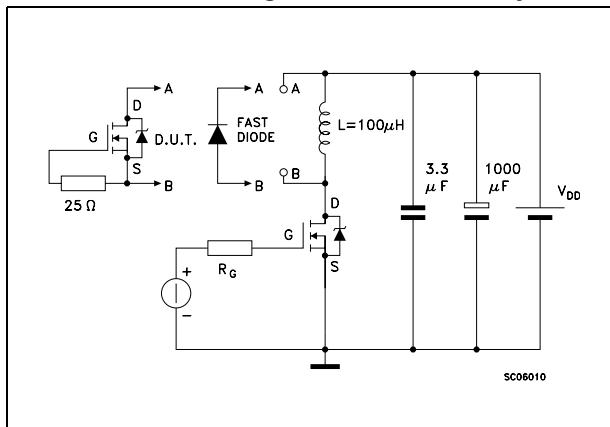
Figure 18. Unclamped Inductive load test circuit
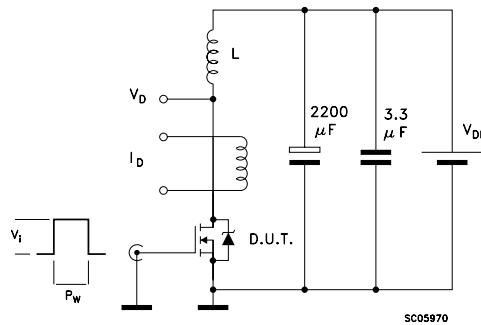
Figure 19. Unclamped inductive waveform
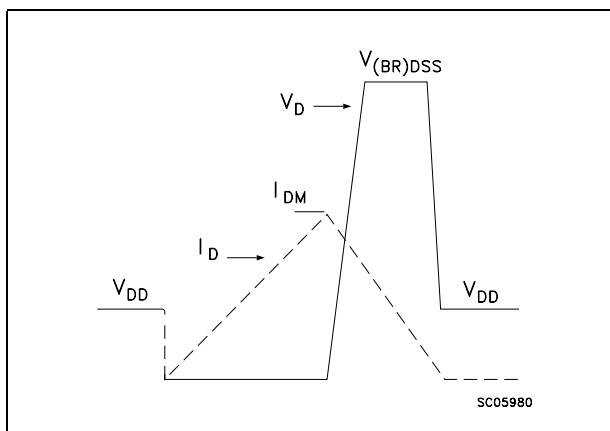
Figure 20. Switching time waveform
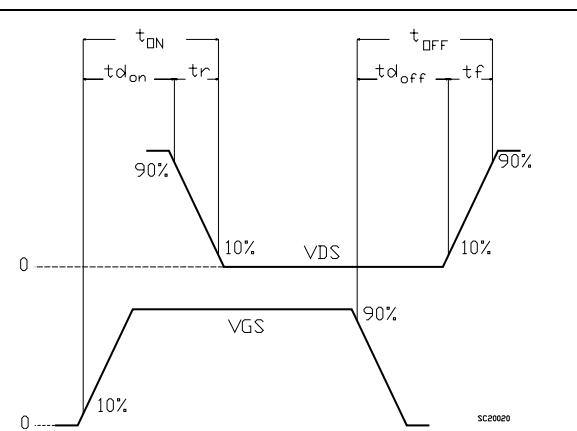
4   Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK®
packages. These packages have a Lead-free second level interconnect . The category of
second level interconnect is marked on the package and on the inner box label, in
compliance with JEDEC Standard JESD97. The maximum ratings related to soldering
conditions are also marked on the inner box label. ECOPACK is an ST trademark.
ECOPACK specifications are available at: www.st.com

D^{2}PAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0º		4º			
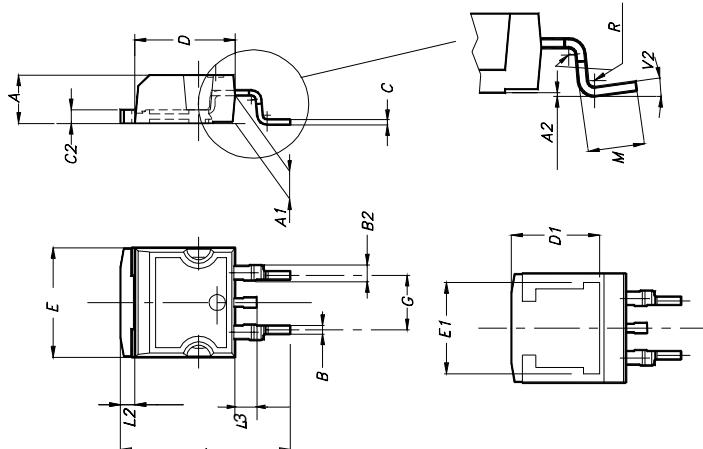
TO-220FP MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	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		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	.0385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126
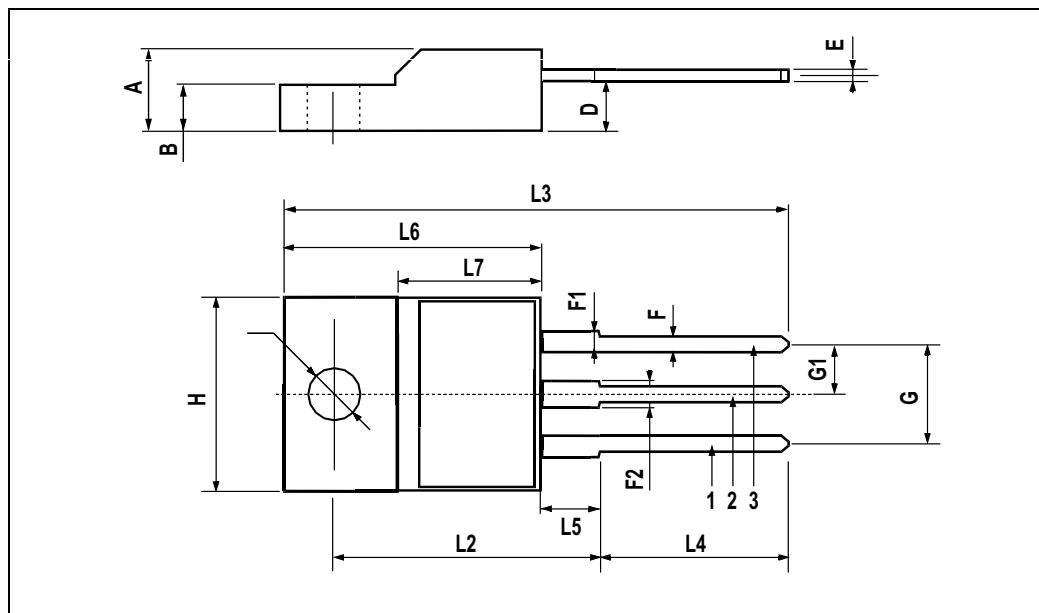
TO-220 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

POA0015988_M
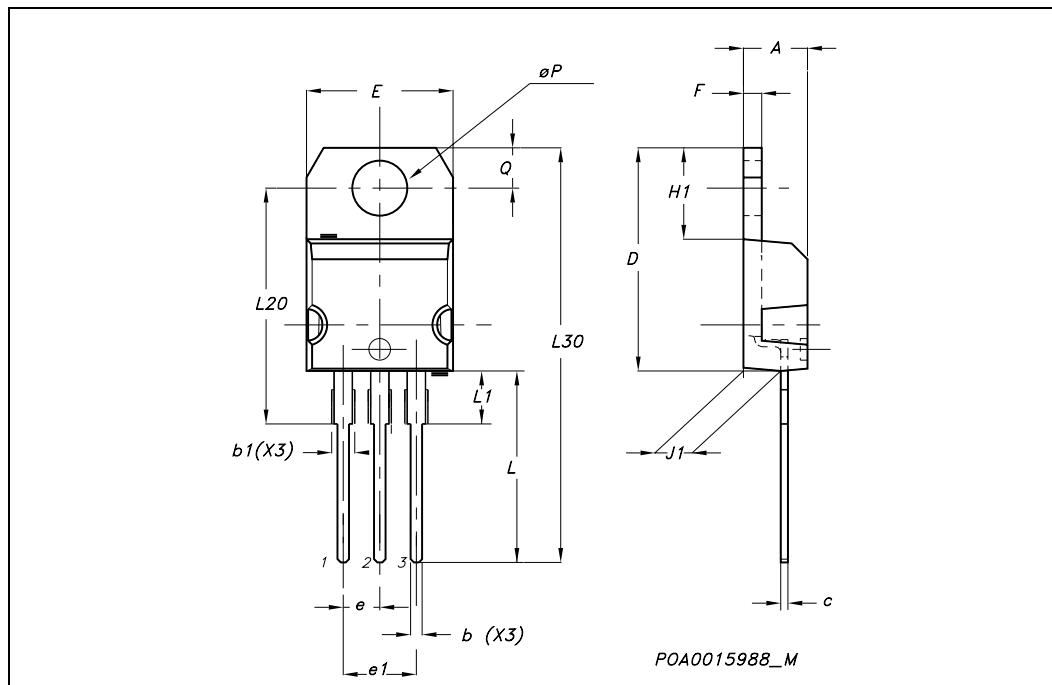
5 Packaging mechanical data

D²PAK FOOTPRINT

16.90

12.20

5.08

1.60

3.50

9.75

All dimensions are in millimeters

TAPE AND REEL SHIPMENT

40 mm min.
Access hole
at slot location

B

A

D

Full radius

Tape slot
in core for
tape start
2.5mm min.
width

T

C

N

G measured
at hub
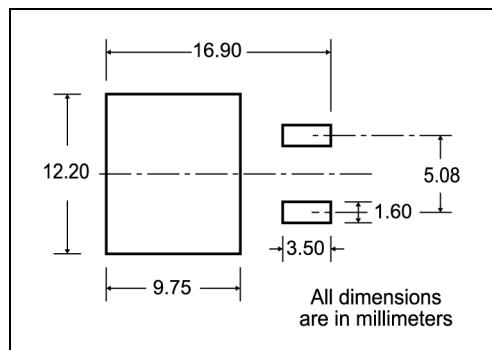
REEL MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956

10 pitches cumulative
tolerance on tape
+ / − 0.2 mm

TOP COVER TAPE

Center line
of cavity

User Direction of Feed

TRL

FEED DIRECTION

R min.

Bending radius

* on sales type

6 Revision history

Table 6. Revision history

Date	Revision	Changes
21-Jun-2004	1	First version
26-Jun-2006	2	New template, no content change

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZE REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS, WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET *category:*

Click to view products by STMicroelectronics *manufacturer:*

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L SBVS138LT1G 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C BUK954R8-60E NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE455 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 DMN2080UCB4-7 TK10A80W,S4X(S SSM6P69NU,LF DMP22D4UFO-7B DMN1006UCA6-7