STB180N10F3
STP180N10F3

N-channel 100 V, 4.0 mΩ, 120 A STripFET™ Power MOSFET D^2PAK, TO-220

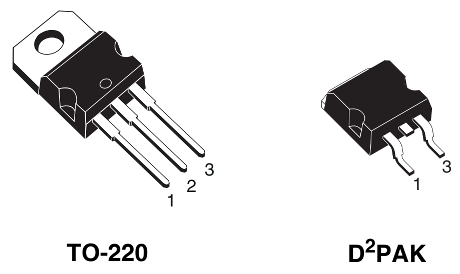
Preliminary Data

Features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STB180N10F3	100 V	4.5 mΩ	120 A(1)
STP180N10F3	100 V	4.8 mΩ	120 A(1)

1. Value limited by wire bonding

- Ultra low on-resistance
- 100% avalanche tested



Application

- High current switching applications

Description

This n-channel enhancement mode Power MOSFET is the latest refinement of STMicroelectronics unique “single feature size” strip-based process with less critical alignment steps and therefore a remarkable manufacturing reproducibility. The resulting transistor shows extremely high packing density for low on resistance, rugged avalanche characteristics and low gate charge.

Figure 1. Internal schematic diagram

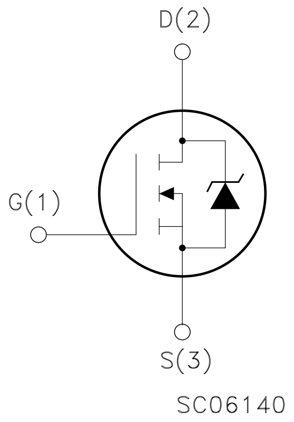


Table 1. Device summary

Order codes	Marking	Package	Packaging
STB180N10F3	180N10F3	D^2PAK	Tape and reel
STP180N10F3	180N10F3	TO-220	Tube

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS}=0)	100	V
V_{GS}	Gate-source voltage	± 20	V
I_D (1)	Drain current (continuous) at T_C = 25°C	120	A
I_D (1)	Drain current (continuous) at T_C=100°C	120	A
I_{DM} (2)	Drain current (pulsed)	480	A
P_{TOT}	Total dissipation at T_C = 25°C	315	W
	Derating factor	2.1	W/°C
dv/dt	Peak diode recovery voltage slope	TBD	V/ns
E_{AS} (3)	Single pulse avalanche energy	TBD	mJ
T_j T_{stg}	Operating junction temperature storage temperature	-55 To 175	°C

1. Current limited by package.
2. Pulse width limited by safe operating area.
3. Starting Tj=25°C, Id=60 A, Vdd=40 V

Table 3. Thermal data

Symbol	Parameter	TO-220	D²PAK	Unit
Rthj-case	Thermal resistance junction-case	0.48		°C/W
Rthj-a	Thermal resistance junction-ambient max	62.5	--	°C/W
Rthj-pcb(1)	Thermal resistance junction-ambient max	--	35	°C/W
T_l	Maximum lead temperature for soldering purpose	300	--	°C

1. When mounted on FR-4 board, on 1inch², 2oz Cu.

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 250 µA, V_{GS}= 0	100			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS}= max rating, V_{DS}= max rating, @125°C			10 100	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20 V			±200	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 60 A D^{2}PAK TO-220			4.5 4.8	mΩ mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} = 15 V , I_D = 60 A		TBD		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25 V, f = 1 MHz, V_{GS} = 0		TBD TBD TBD		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 44 V, I_D = 120 A, V_{GS} = 10 V (see *Figure 3*)		100 TBD C	TBD	nC nC nC

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

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD} = 27.5 V, I_D = 60 A R_G = 4.7 Ω V_{GS} = 10 V (see *Figure 2*, *Figure 7*)		TBD TBD TBD TBD		ns ns ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(1)	Source-drain current Source-drain current (pulsed)				120 480	A A
V_{SD}(2)	Forward on voltage	I_{SD}=120 A, V_{GS}=0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=120 A, di/dt = 100 A/µs, V_{DD}=30 V, Tj=150°C (see *Figure 4*)		TBD TBD TBD		ns µC A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration = 300µs, duty cycle 1.5%

3 Test circuit

Figure 2. Switching times test circuit for resistive load

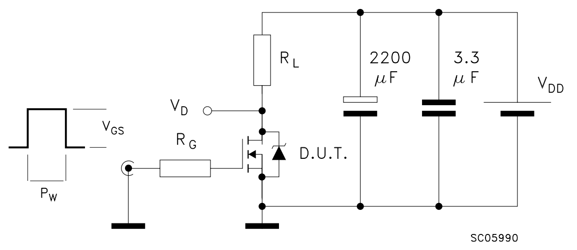


Figure 3. Gate charge test circuit

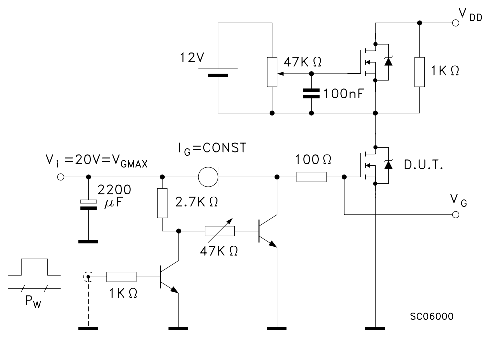


Figure 4. Test circuit for inductive load switching and diode recovery times

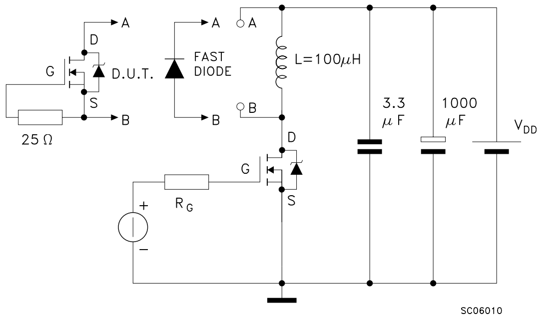


Figure 5. Unclamped inductive load test circuit

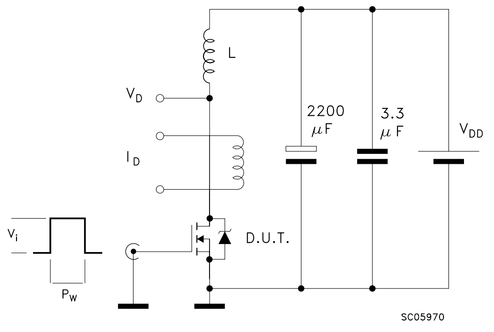


Figure 6. Unclamped inductive waveform

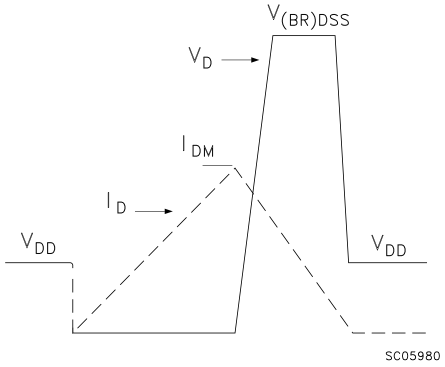
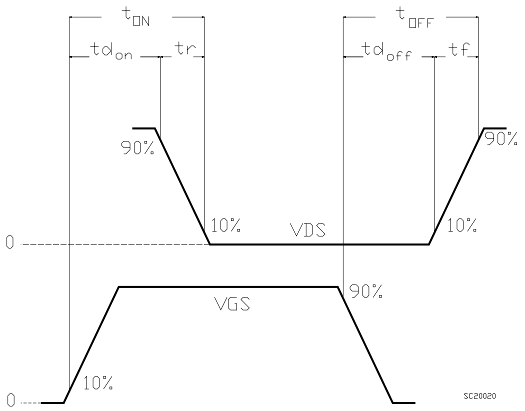


Figure 7. Switching time waveform

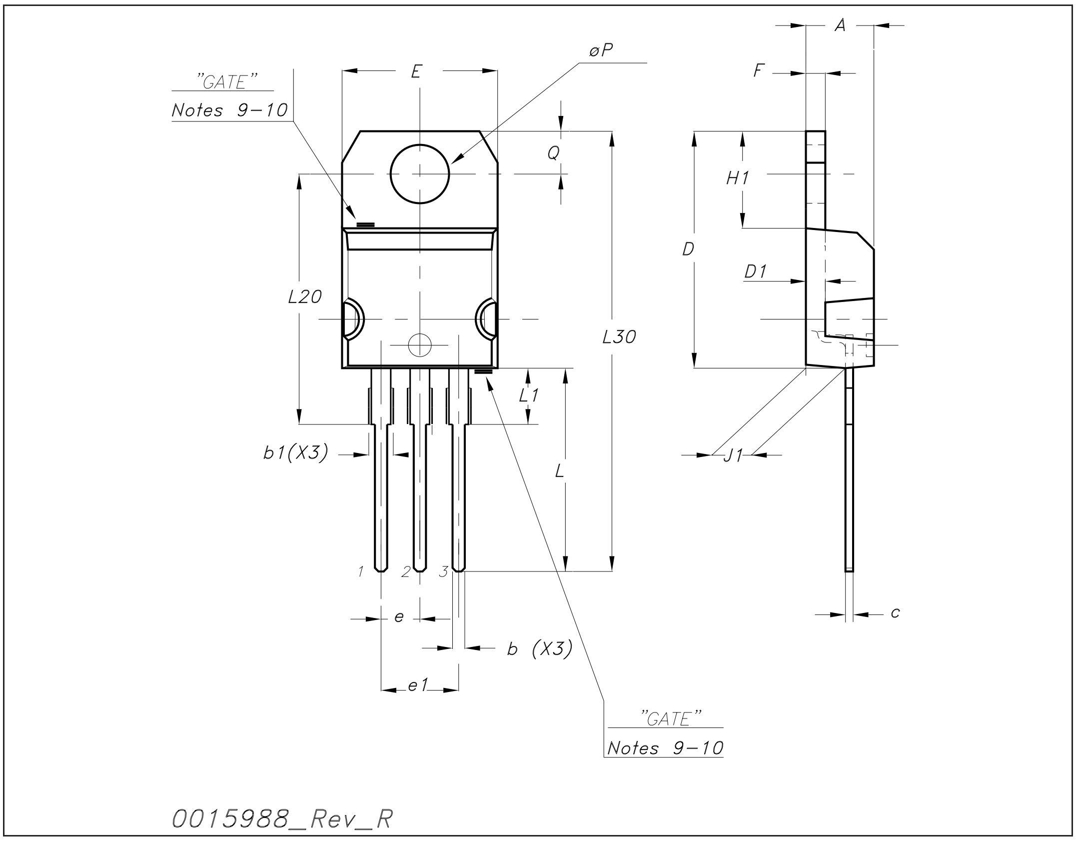


4 Package mechanical data

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*

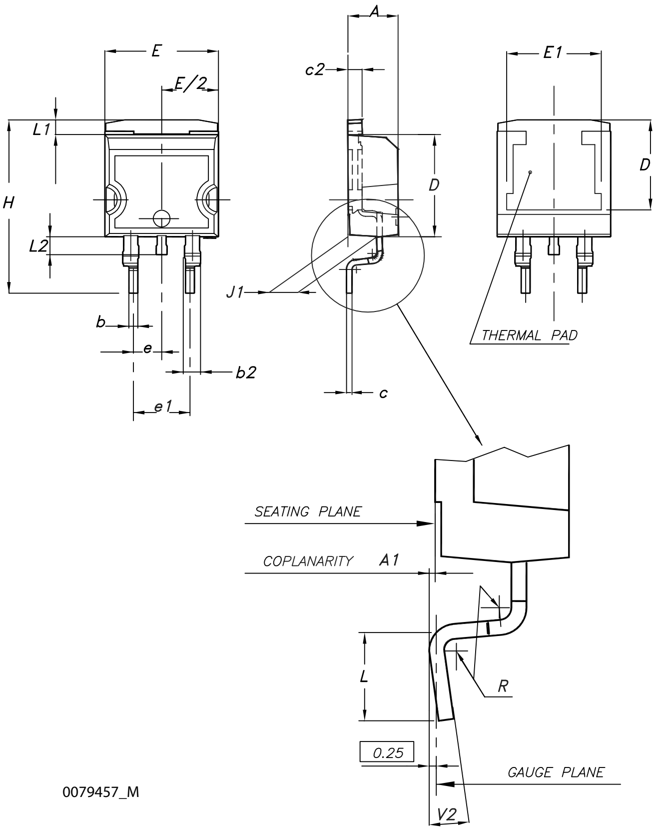
TO-220 mechanical data

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	1.14		1.70	0.044		0.066
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.6		0.62
D1		1.27			0.050	
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		0.051
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	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



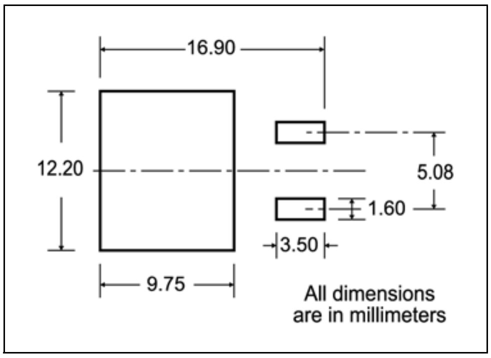
D^{2}PAK (TO-263) mechanical data

Dim	mm			inch		
	Min	Typ	Max	Min	Typ	Max
A	4.40		4.60	0.173		0.181
A1	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		0.053
D	8.95		9.35	0.352		0.368
D1	7.50			0.295		
E	10		10.40	0.394		0.409
E1	8.50			0.334		
e		2.54			0.1	
e1	4.88		5.28	0.192		0.208
H	15		15.85	0.590		0.624
J1	2.49		2.69	0.099		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.40	0.05		0.055
L2	1.30		1.75	0.051		0.069
R		0.4			0.016	
V2	0°		8°	0°		8°

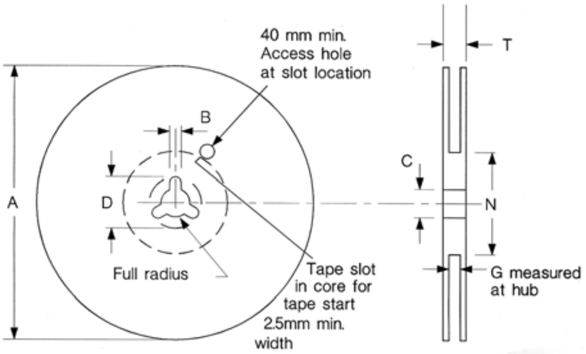


5 Packaging mechanical data

D^2PAK FOOTPRINT



TAPE AND REEL SHIPMENT



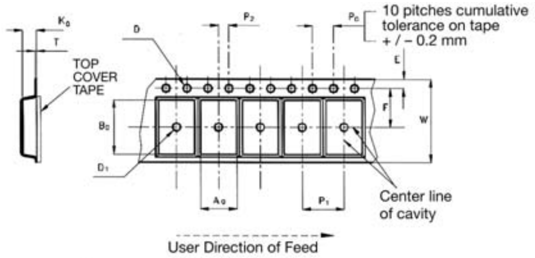
REEL MECHANICAL DATA

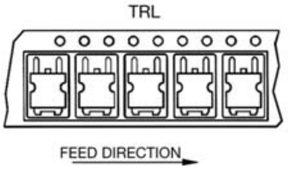
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

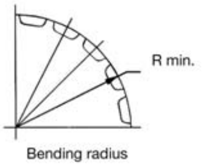
BASE QTY	BULK QTY
1000	1000

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







* on sales type

6 Revision history

Table 8. Document revision history

Date	Revision	Changes
01-Aug-2008	1	First version

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