



# STB180N55 STP180N55

N-CHANNEL 55V - 2.9mΩ - 120A - D<sup>2</sup>PAK - TO-220  
MDmesh™ Low Voltage Power MOSFET

TARGET SPECIFICATION

## General features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STB180N55	55V	3.5mΩ	120A (Note 1)
STP180N55	55V	3.8mΩ	120A (Note 1)

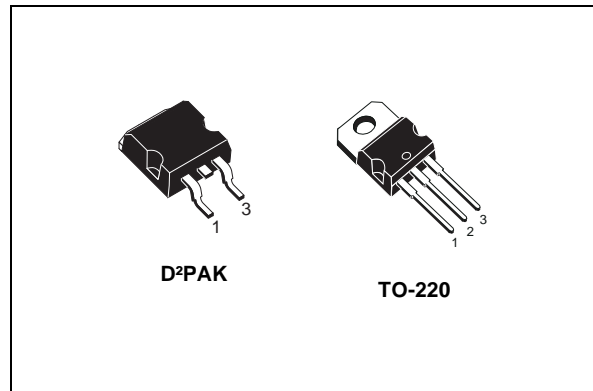
- ULTRA LOW ON-RESISTANCE
- 100% AVALANCHE TESTED

## Description

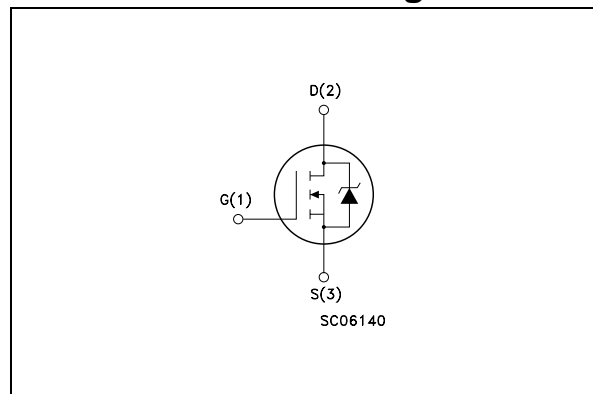
This N-Channel enhancement mode MOSFET is the latest refinement of STMicroelectronic unique "Single Feature Size™" strip-based process with less critical alignment steps and therefore a remarkable manufacturing reproducibility. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and low gate charge.

## Applications

- HIGH CURRENT SWITCHING APPLICATION



## Internal schematic diagram



## Order codes

Sales Type	Marking	Package	Packaging
STB180N55	B180N55	D <sup>2</sup> PAK	TAPE & REEL
STP180N55	P180N55	TO-220	TUBE

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source Voltage ( $V_{GS}=0$ )	55	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$ <i>Note 1</i>	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	120	A
$I_D$ <i>Note 1</i>	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	120	A
$I_{DM}$ <i>Note 2</i>	Drain Current (pulsed)	480	A
$P_{TOT}$	Total Dissipation at $T_C = 25^\circ\text{C}$	315	W
	Derating Factor	2.1	W/ $^\circ\text{C}$
dv/dt	Peak Diode Recovery voltage slope	TBD	V/ns
$E_{AS}$ <i>Note 4</i>	Single Pulse Avalanche Energy	TBD	mJ
$T_j$ $T_{stg}$	Operating Junction Temperature Storage Temperature	-55 to 175	$^\circ\text{C}$

**Table 2. Thermal data**

		TO-220	D <sup>2</sup> PAK	Unit
Rthj-case	Thermal Resistance Junction-case	0.48		$^\circ\text{C}/\text{W}$
Rthj-a	Thermal Resistance Junction-ambient Max	62.5	--	$^\circ\text{C}/\text{W}$
Rthj-pcb <i>Note 5</i>	Thermal Resistance Junction-ambient Max	--	35	$^\circ\text{C}/\text{W}$
$T_l$	Maximum Lead Temperature For Soldering Purpose	300	--	$^\circ\text{C}$

## 2 Electrical characteristics

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

**Table 3. On/off states**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu A, V_{GS} = 0$	55			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating},$ $V_{DS} = \text{Max Rating}, T_c = 125\text{ °C}$			10 100	$\mu A$ $\mu A$
$I_{GSS}$	Gate Body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 20V$			$\pm 200$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2		4	V
$R_{DS(on)}$	Static Drain-Source On Resistance	$V_{GS} = 10V, I_D = 60A$ <b>D<sup>2</sup>PAK</b> <b>TO-220</b>			3.5 3.8	$m\Omega$ $m\Omega$

**Table 4. Dynamic**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}$ <i>Note 3</i>	Forward Transconductance	$V_{DS} = 15V, I_D = 60A$		TBD		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25V, f = 1\text{ MHz}, V_{GS} = 0$		6200		pF
$C_{oss}$	Output Capacitance			1800		pF
$C_{rss}$	Reverse Transfer Capacitance			100		pF
$Q_g$	Total Gate Charge	$V_{DD} = 44V, I_D = 120A$		110	TBD	nC
$Q_{gs}$	Gate-Source Charge	$V_{GS} = 10V$		TBD		nC
$Q_{gd}$	Gate-Drain Charge	(see Figure 2)		TBD		nC

**Table 5. Switching times**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ $t_r$	Turn-on Delay Time Rise Time	$V_{DD}=27V$ , $I_D=60A$ , $R_G=4.7\Omega$ , $V_{GS}=10V$ (see Figure 3)		TBD TBD		ns ns
$t_{d(off)}$ $t_f$	Off voltage Rise Time FallTime	$V_{DD}=27V$ , $I_D=60A$ , $R_G=4.7\Omega$ , $V_{GS}=10V$ (see Figure 3)		TBD TBD		ns ns

**Table 6. Source drain diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$ $I_{SDM}$ <i>Note 2</i>	Source-drain Current Source-drain Current (pulsed)				120 480	A A
$V_{SD}$ <i>Note 3</i>	Forward on Voltage	$I_{SD}=120A$ , $V_{GS}=0$			1.5	V
$t_{rr}$ $Q_{rr}$ $I_{RRM}$	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD}=120A$ , $di/dt = 100A/\mu s$ , $V_{DD}=30V$ , $T_j=150^\circ C$		TBD TBD TBD		ns nC A

(1) Current limited by package

(2) Pulse width limited by safe operating area

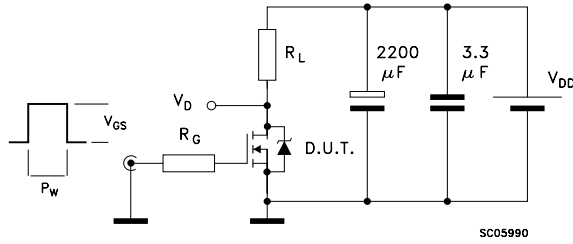
(3) Pulsed: pulse duration = 300 $\mu s$ , duty cycle 1.5%

(4) Starting  $T_j=25^\circ C$ ,  $I_d=60A$ ,  $V_{dd}=40V$

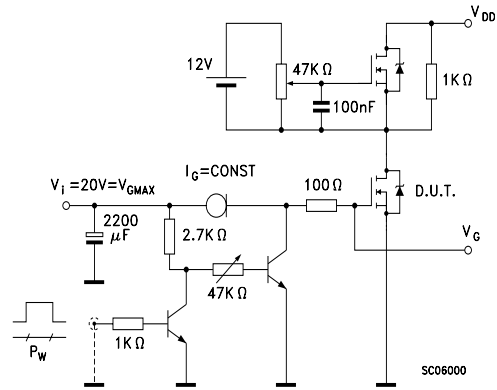
(5) When mounted on 1 inch<sup>2</sup> FR4 2oz Cu

### 3 Test circuits

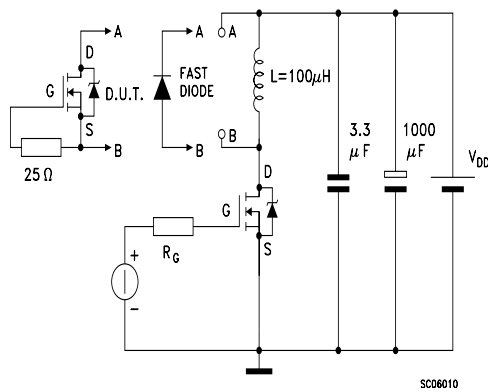
**Figure 1. Switching Times Test Circuit For Resistive Load**



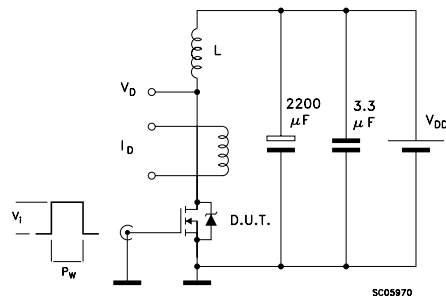
**Figure 2. Gate Charge Test Circuit**



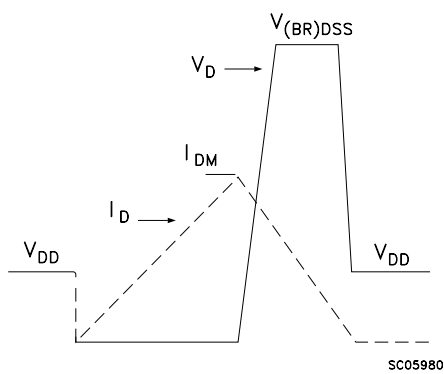
**Figure 3. Test Circuit For Inductive Load Switching and Diode Recovery Times**



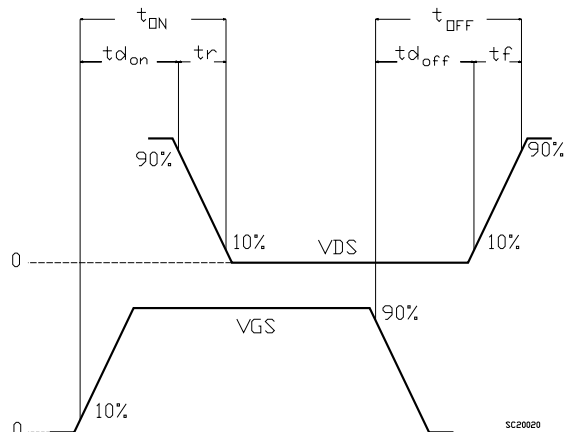
**Figure 5. Unclamped Inductive Load Test Circuit**



**Figure 4. Unclamped Inductive Waveform**



**Figure 6. Switching Time Waveform**

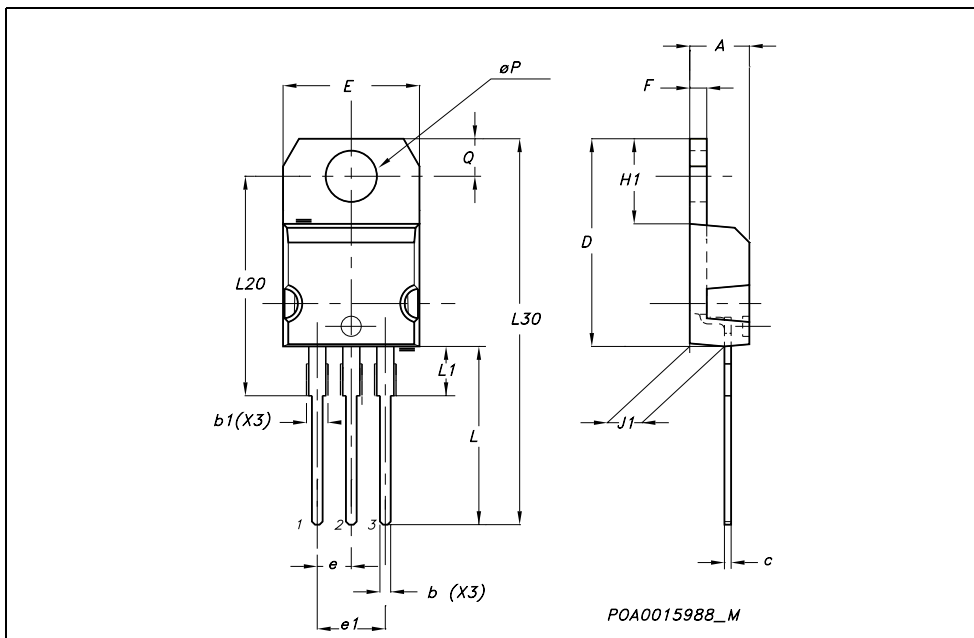


## 4 Package mechanical data

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](http://www.st.com)

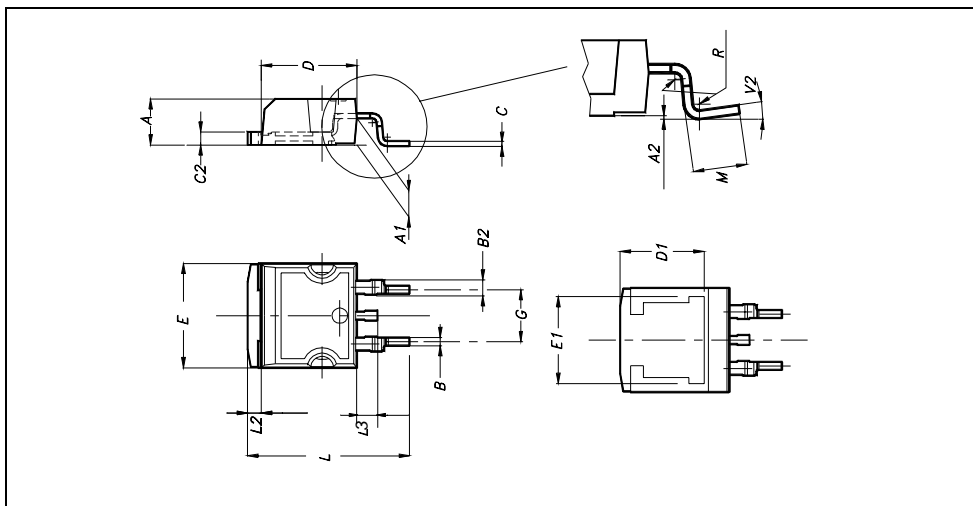
**TO-220 MECHANICAL DATA**

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	1.15		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



**D<sup>2</sup>PAK MECHANICAL DATA**

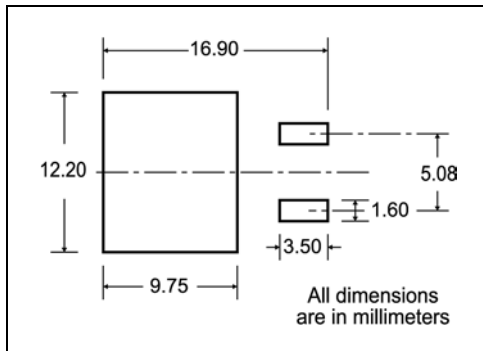
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
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	0°		4°			





# 5 Packing mechanical data

## D<sup>2</sup>PAK FOOTPRINT



## TAPE AND REEL SHIPMENT

**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

**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		0.795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

\* on sales type

## 6 Revision History

Date	Revision	Changes
03-Jan-2006	1	First release

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics.  
All other names are the property of their respective owners

© 2006 STMicroelectronics - All rights reserved

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](http://www.st.com)

