



STB160N75F3 STP160N75F3 - STW160N75F3

N-channel 75V - 3.5mΩ - 120A - TO-220 - TO-247 - D²PAK
MDmesh™ low voltage Power MOSFET

TARGET SPECIFICATION

General features

Type	V _{DSS}	R _{DS(on)}	I _D
STB160N75F3	75V	4.2mΩ	120A ⁽¹⁾
STP160N75F3	75V	4.5mΩ	120A ⁽¹⁾
STW160N75F3	75V	4.5mΩ	120A ⁽¹⁾

1. Current limited by package

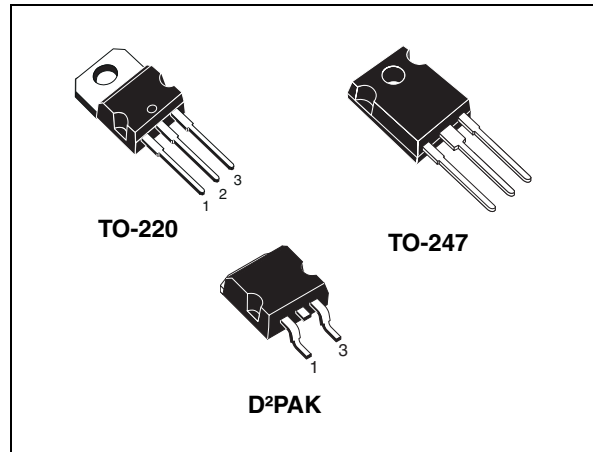
- Ultra low on-resistance
- 100% Avalanche tested

Description

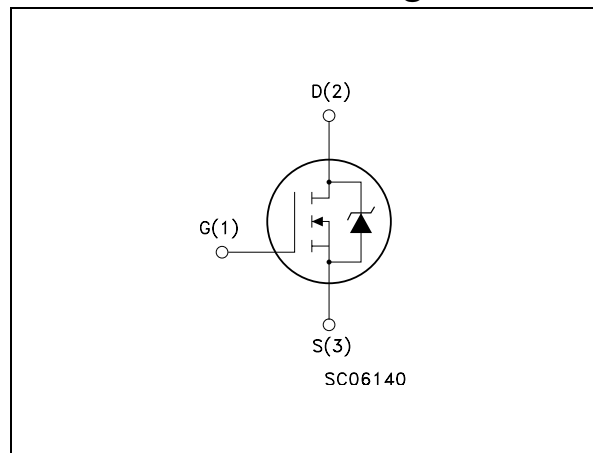
This N-channel enhancement mode Power MOSFET is the latest refinement of STMicroelectronics unique “Single Feature Size™” strip-based process with less critical alignment steps and therefore a remarkable manufacturing reproducibility. The resulting transistor shows extremely high packing density for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

Applications

- Switching application



Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STB160N75F3	160N75F3	D ² PAK	Tape & reel
STP160N75F3	160N75F3	TO-220	Tube
STW160N75F3	160N75F3	TO-247	Tube

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1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	75	V
V_{GS}	Gate-source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	120	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	96	A
$I_{DM}^{(2)}$	Drain current (pulsed)	480	A
$P_{TOT}^{(3)}$	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}	Single pulse avalanche energy	Tbd	mJ
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 175	$^\circ\text{C}$

1. Current limited by package
2. Pulse width limited by safe operating area
3. Rated according to Rthj-case

Table 2. Thermal resistance

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	0.48	$^\circ\text{C}/\text{W}$
Rthj-amb	Thermal resistance junction-ambient max	62.5	$^\circ\text{C}/\text{W}$
T_l	Maximum lead temperature for soldering purpose	300	$^\circ\text{C}$

2 Electrical characteristics

($T_{CASE}=25^{\circ}C$ unless otherwise specified)

Table 3. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\mu A, V_{GS} = 0$	75			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max rating},$ $V_{DS} = \text{Max rating}, @ 125^{\circ}C$			10 100	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20V$			± 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	$V_{GS} = 10V, I_D = 60A$				
		D²PAK		3.5 3.2	4.5 4.2	$m\Omega$ $m\Omega$

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 15V, I_D = 4.5A$ $I_D = 10A$		Tbd		S
C_{iss}	Input capacitance			7000		pF
C_{oss}	Output capacitance	$V_{DS} = 25V, f = 1 \text{ MHz}, V_{GS} = 0$		1100		pF
C_{rss}	Reverse transfer capacitance			32		pF
Q_g	Total gate charge	$V_{DD} = 44V, I_D = 60A$		110	Tbd	nC
Q_{gs}	Gate-source charge	$V_{GS} = 10V$		Tbd		nC
Q_{gd}	Gate-drain charge	(see Figure 2)		Tbd		nC

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

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=35\text{ V}$, $I_D=60\text{ A}$, $R_G=4.7\Omega$, $V_{GS}=10\text{ V}$, (see Figure 4)		Tbd		ns
t_r	Rise time			Tbd		ns
$t_{d(off)}$	Turn-off delay time			Tbd		ns
t_f	Fall time			Tbd		ns

Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current				120	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				480	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD}=120\text{ A}$, $V_{GS}=0$			1.5	V
t_{rr}	Reverse recovery time	$I_{SD}=120\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD}=30\text{ V}$, $T_j=150^\circ\text{C}$ (see Figure 3)		75		ns
Q_{rr}	Reverse recovery charge			195		nC
I_{RRM}	Reverse recovery current			5		A

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

3 Test circuit

Figure 1. Switching times test circuit for resistive load

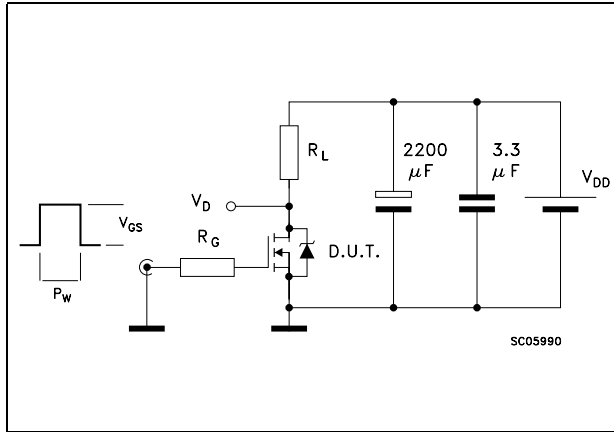


Figure 2. Gate charge test circuit

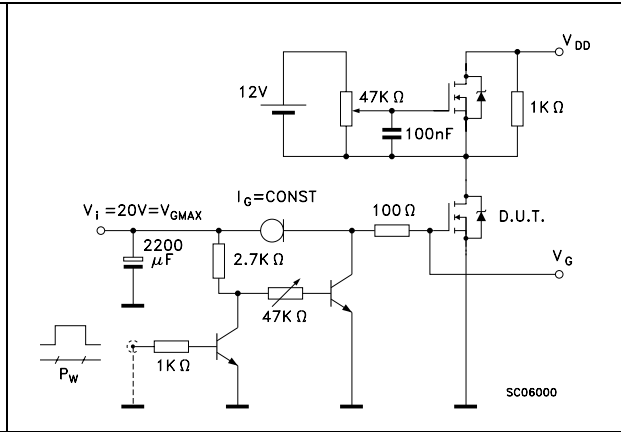


Figure 3. Test circuit for inductive load switching and diode recovery times

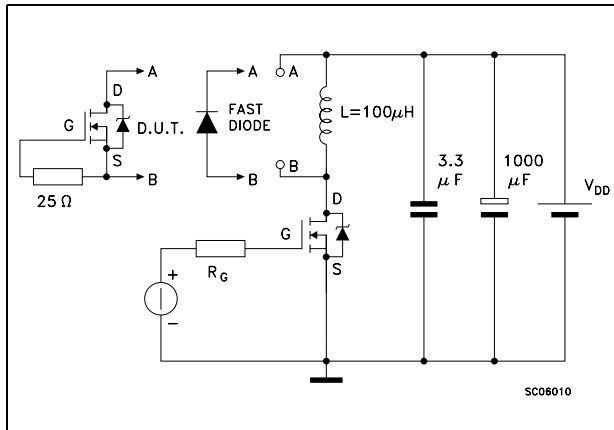


Figure 4. Unclamped inductive load test circuit

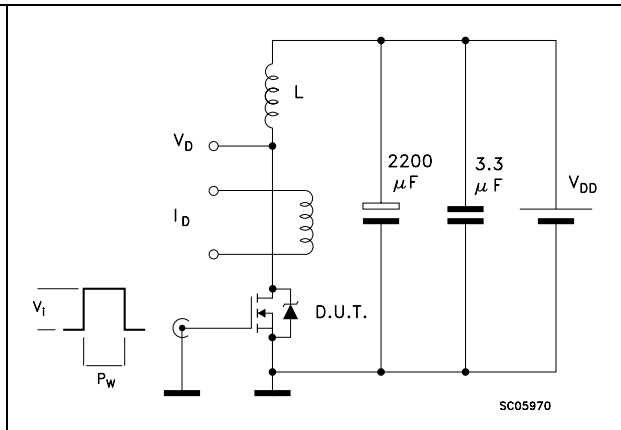


Figure 5. Unclamped inductive waveform

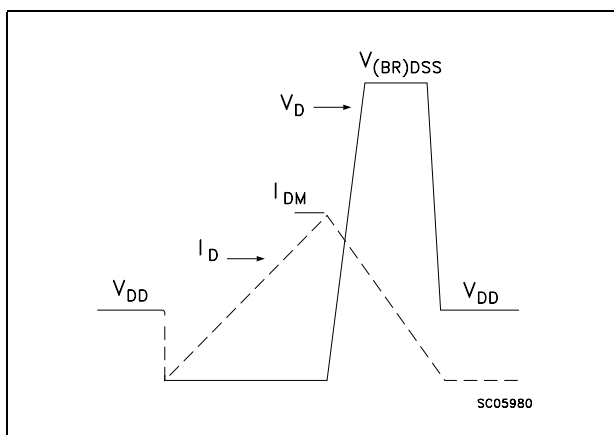
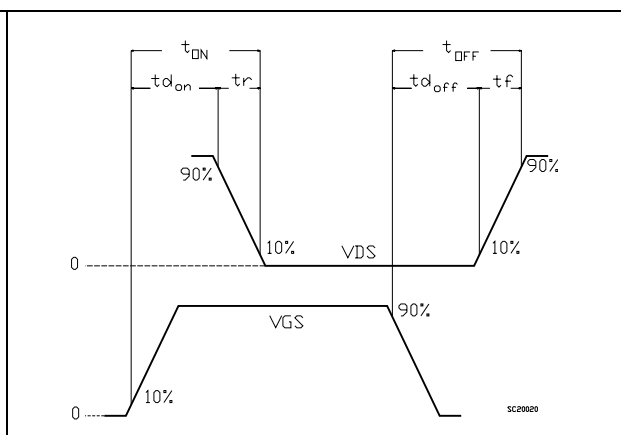


Figure 6. Switching time waveform

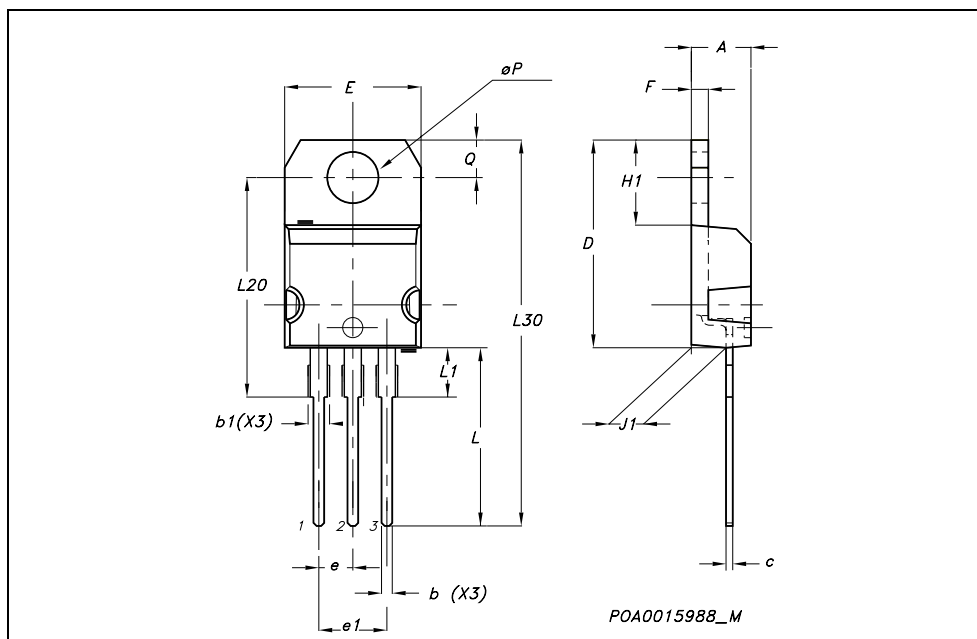


4 Package mechanical data

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

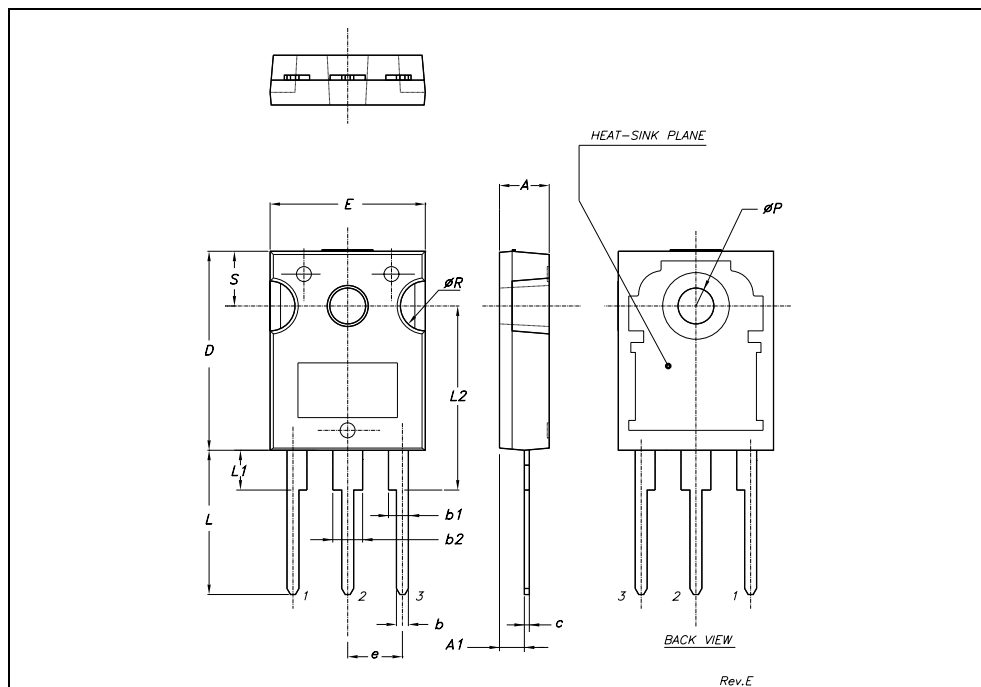
TO-220 MECHANICAL DATA

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



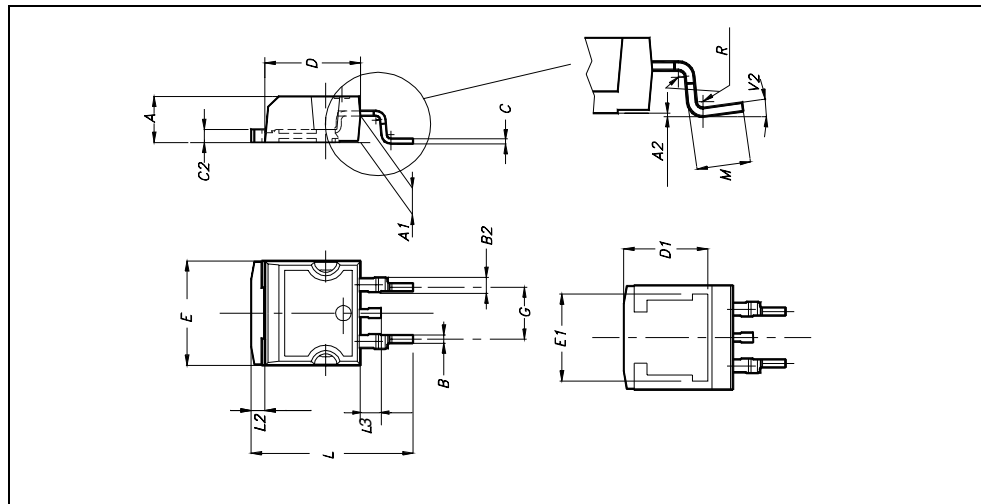
TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
øP	3.55		3.65	0.140		0.143
øR	4.50		5.50	0.177		0.216
S		5.50			0.216	



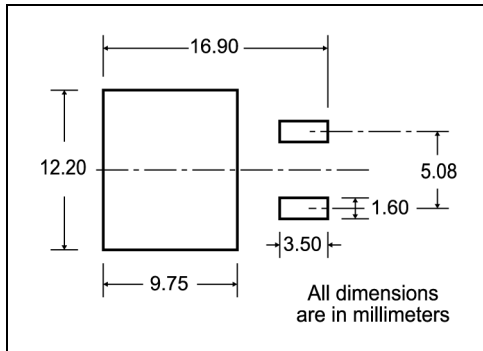
D²PAK MECHANICAL DATA

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 Packaging mechanical data

D²PAK 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

TRL

* on sales type

6 Revision history

Table 7. Revision history

Date	Revision	Changes
07-Feb-2007	1	First release

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