STB160N75F3
STP160N75F3 - STW160N75F3

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

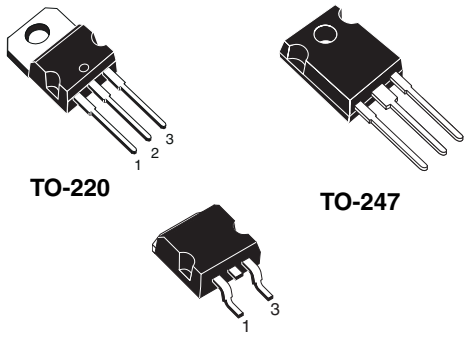
TARGET SPECIFICATION

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

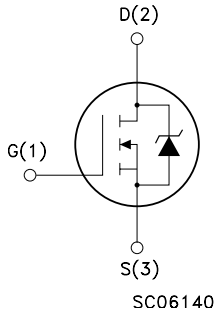
- Ultra low on-resistance
- 100% Avalanche tested



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.

Internal schematic diagram



Applications

- Switching application

Order codes

Part number	Marking	Package	Packaging
STB160N75F3	160N75F3	D²PAK	Tape & reel
STP160N75F3	160N75F3	TO-220	Tube
STW160N75F3	160N75F3	TO-247	Tube

Contents

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°C	120	A
I_D (1)	Drain current (continuous) at T_C = 100°C	96	A
I_{DM}(2)	Drain current (pulsed)	480	A
P_{TOT} (3)	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}	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. Rated according to Rthj-case

Table 2. Thermal resistance

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	0.48	°C/W
Rthj-amb	Thermal resistance junction-ambient max	62.5	°C/W
T_l	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		75			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} = ±20V				±200	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA		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	mΩ mΩ

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} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25V, f=1 MHz, V_{GS}=0		7000 1100 32		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=44V, I_D = 60A V_{GS} =10V *(see Figure 2)*		110 Tbd Tbd	Tbd	nC nC nC

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

Table 5. Switching times

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}=35 V, I_D= 60A, R_G=4.7Ω, V_{GS}=10V, *(see Figure 4)*		Tbd Tbd Tbd Tbd		ns ns ns ns

Table 6. 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}=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/µs, V_{DD}=30 V, Tj=150°C *(see Figure 3)*		75 195 5		ns nC A

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

3 Test circuit

Figure 1. Switching times test circuit for resistive load

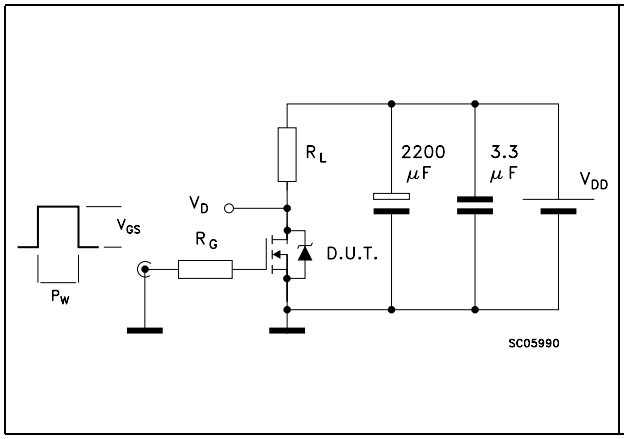


Figure 2. Gate charge test circuit

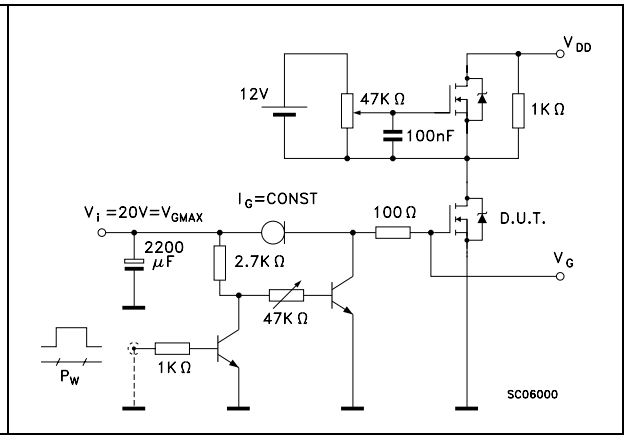


Figure 3. Test circuit for inductive load switching and diode recovery times

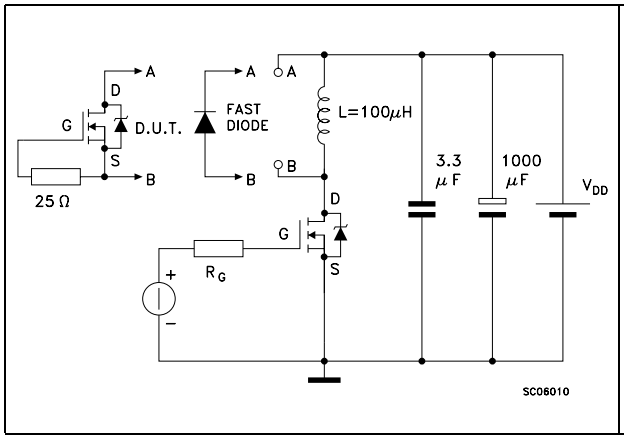


Figure 4. Unclamped inductive load test circuit

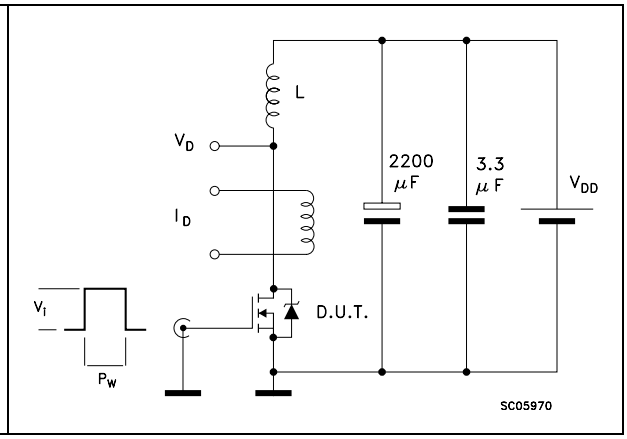


Figure 5. Unclamped inductive waveform

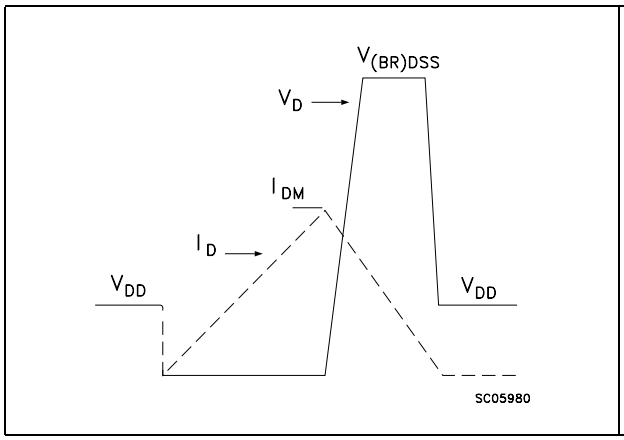
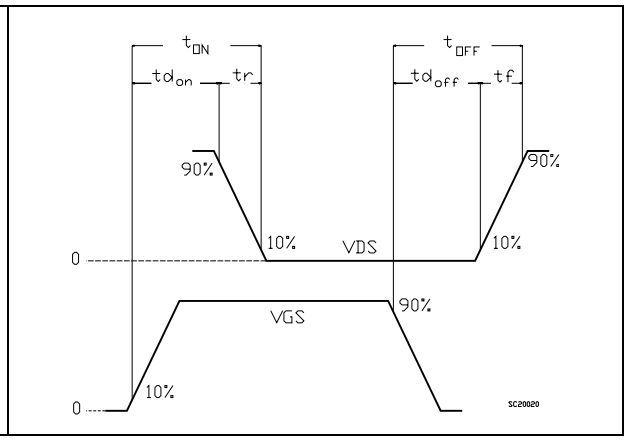


Figure 6. Switching time waveform

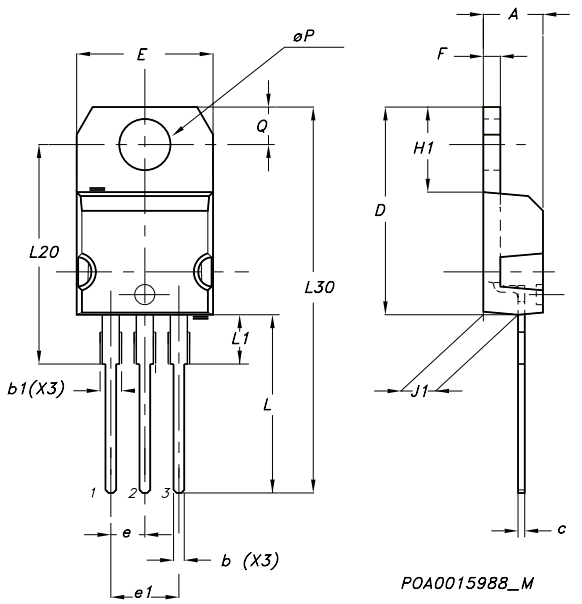


4 Package mechanical data

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*

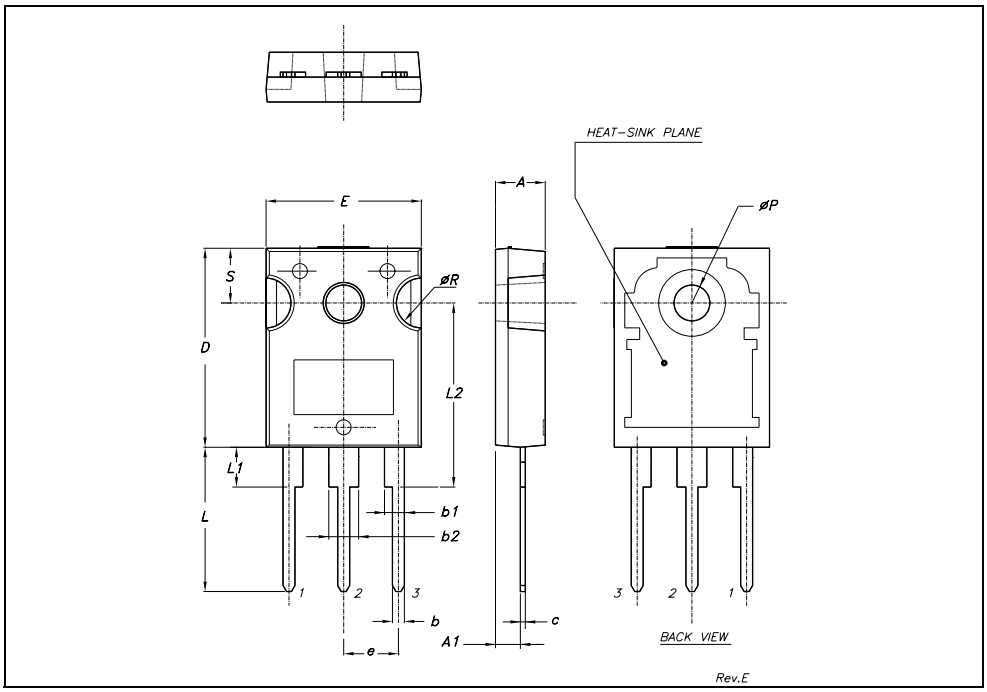
TO-220 MECHANICAL DATA

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



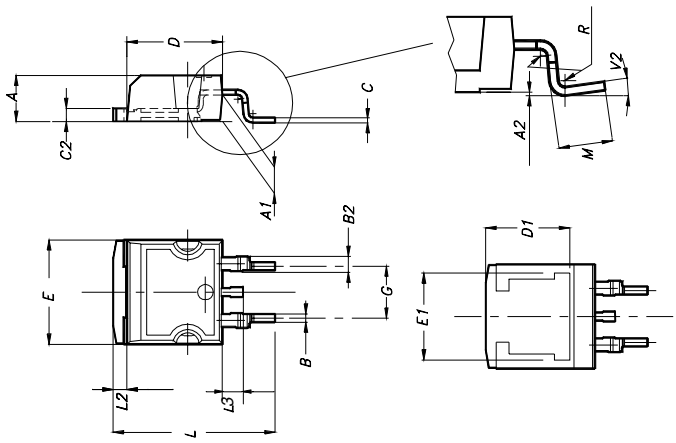
TO-247 MECHANICAL DATA

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	



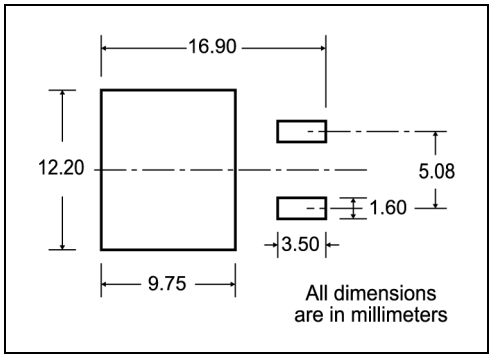
D^2PAK MECHANICAL DATA

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			

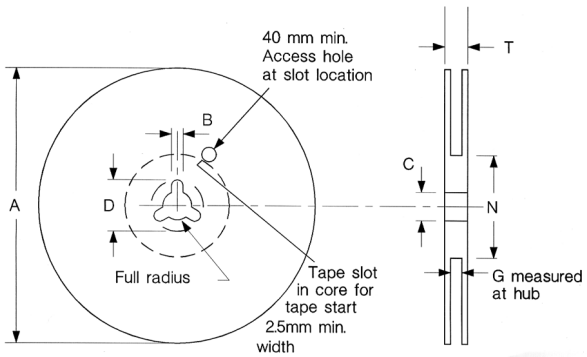


5 Packaging mechanical data

D²PAK FOOTPRINT



TAPE AND REEL SHIPMENT



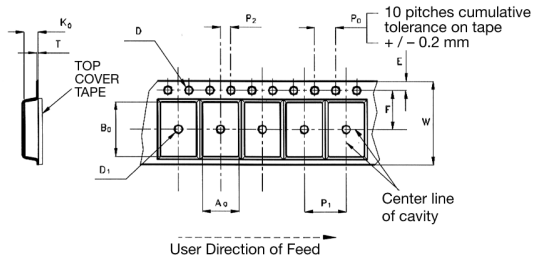
REEL MECHANICAL DATA

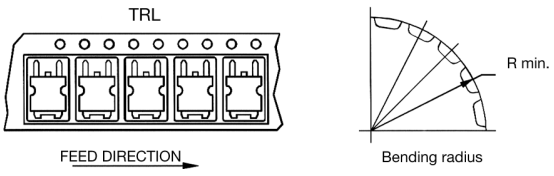
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

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 7. Revision history

Date	Revision	Changes
07-Feb-2007	1	First release