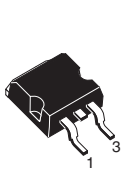
STP36NF06L
STB36NF06L

N-channel 60V - 0.032Ω - 30A - TO-220 - D²PAK
STripFET™ II Power MOSFET

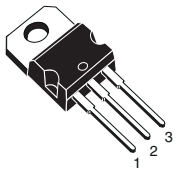
General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STP36NF06L	60V	< 0.04Ω	30A
STB36NF06L	60V	< 0.04Ω	30A

- Exceptional dv/dt capability
- 100% avalanche tested
- Low threshold drive



D²PAK

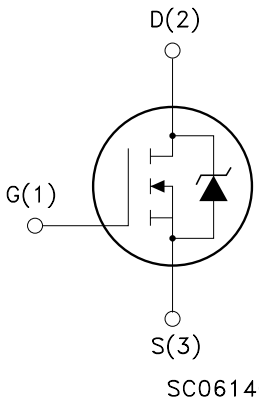


TO-220

Description

This Power MOSFET is the latest development of STMicroelectronics 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.

Internal schematic diagram



Applications

- Switching application

Order codes

Sales type	Marking	Package	Packaging
STP36NF06L	P36NF06L	TO-220	Tube
STB36NF06L	B36NF06	D²PAK	Tape & reel

Contents:

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS}=0)	60	V
V_{DGR}	Drain-gate voltage (R_{GS}=20KΩ)	60	V
V_{GS}	Gate-source voltage	±18	V
I_D	Drain-current (continuos) at Tc=25°C	30	A
I_D	Drain-current (continuos) at Tc=100°C	21	A
I_{DM}(1)	Drain-current (pulsed)	120	A
P_{TOT}	Total dissipation at Tc=25°C	70	W
	Derating factor	0.47	W/°C
dv/dt(2)	Peak diode recovery voltage slope	10	V/ns
E_{AS}(3)	Single pulse avalanche energy	225	mJ
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 175	°C

1. Pulse width limited by safe operating area.
2. I_{SD} ≤30A, di/dt ≤400A/µs, V_{DD} ≤ $V_{(BR)DSS}$, Tj ≤ Tjmax
3. Starting Tj=25°C, I_D=15A, V_{DD}=30V

Table 2. Thermal resistance

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	2.14	°C/W
Rthj-amb	Thermal resistance junction-ambient (free air) 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. Static

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D=250µA, V_{GS}=0	60			V
I_{DSS}	Zero gate voltage drain current (V_{GS}=0)	V_{DS}=Max rating V_{DS}=Max rating Tc=125°C			1 10	µA µA
I_{GSS}	Gate-body leakage current (V_{DS}=0)	V_{GS}=±18V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250µA	1		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}=10V, I_D=15A V_{GS}=5V, I_D=15A		0.032 0.045	0.04 0.05	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test condictions	Min	Typ	Max	Unit
gfs	Forward transconductance	V_{DS}=15V, I_D=15A		15		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS}=25V, f=1MHz,V_{GS}=0		660 170 70		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=30V, I_D=30A V_{GS}=5V		13 4.2 7.8	17	nC nC nC

Table 5. Switching on/off (inductive load)

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay Time Rise time	V_{DD}=30V, I_D=15A R_G=4.7Ω, V_{GS}=5V (see *Figure 14*)		10 80		ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	V_{DD}=30V, I_D=15A R_G=4.7Ω, V_{GS}=5V (see *Figure 14*)		19 13		ns ns

Table 6. Source Drain Diode

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(1)	Source-drain current Source-drain current (pulsed)				30 120	A A
V_{SD}(2)	Forward on voltage	I_{SD}=24A, V_{GS}=0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=20A, V_{DD}=20V, di/dt=100A/µs, Tj=150°C		55 107 3.9		ns nC A

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

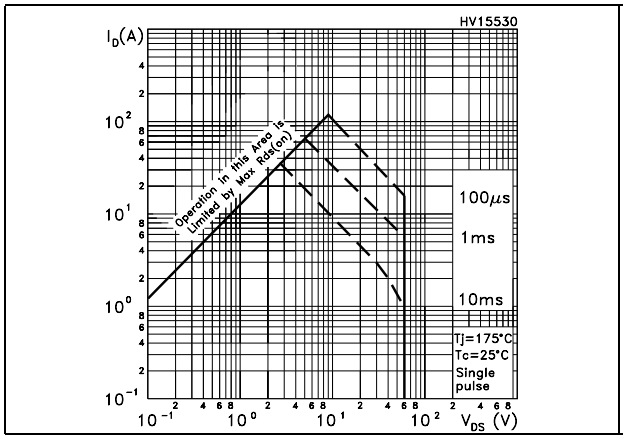


Figure 2. Thermal impedance

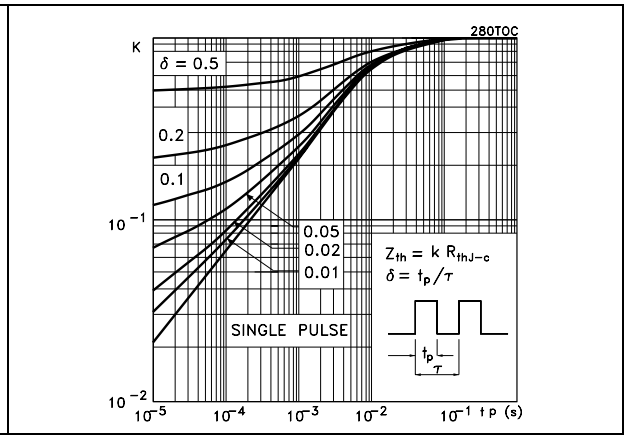


Figure 3. Output characteristics

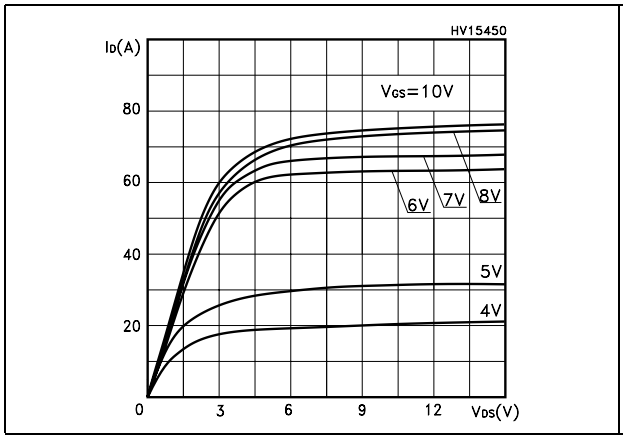


Figure 4. Transfer characteristics

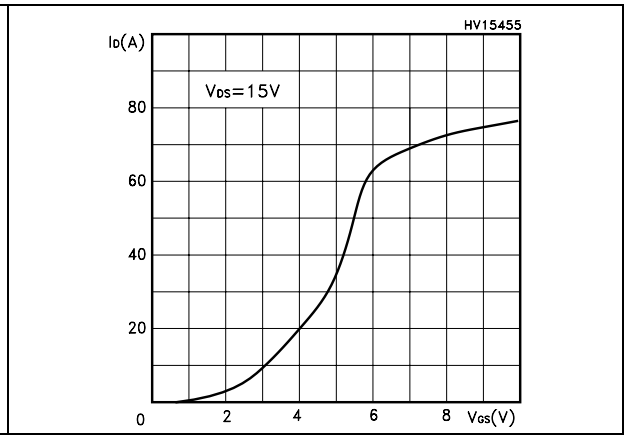


Figure 5. Transconductance

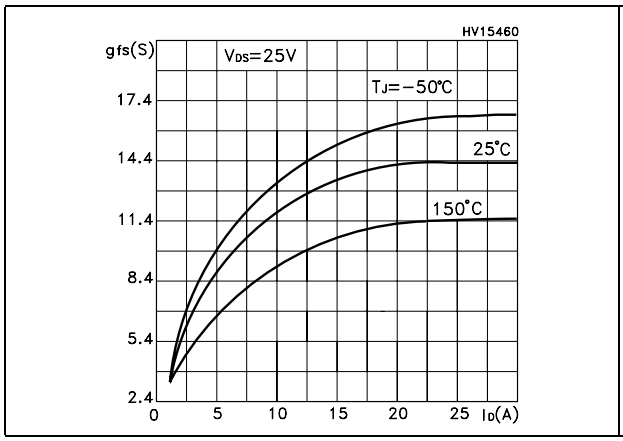


Figure 6. Static drain-source on resistance

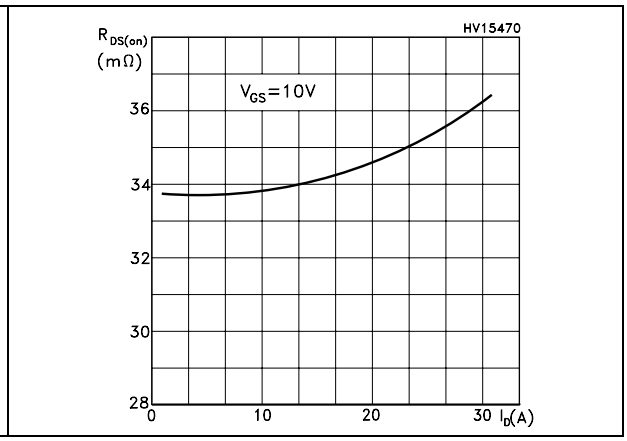


Figure 7. Gate charge vs gate-source voltage

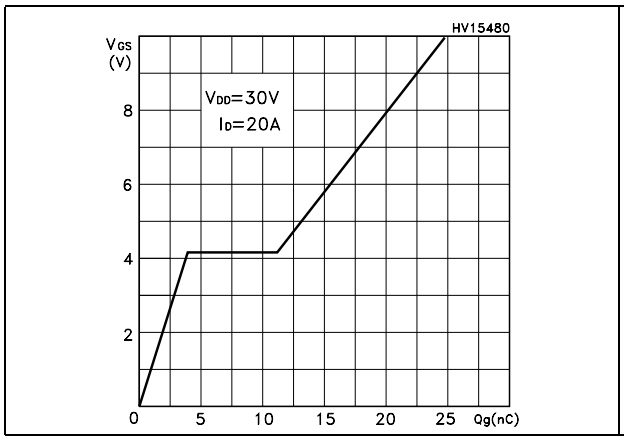


Figure 8. Capacitance variations

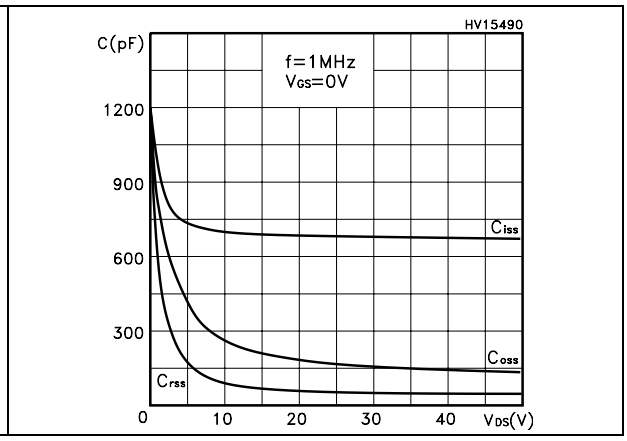


Figure 9. Normalized gate thereshold voltage vs temperature

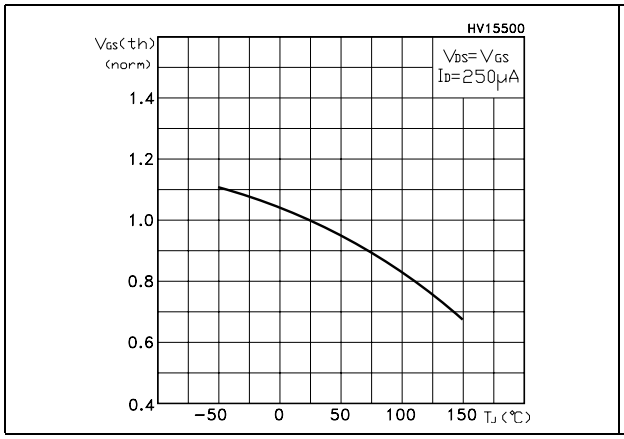


Figure 10. Normalized on resistance vs temperature

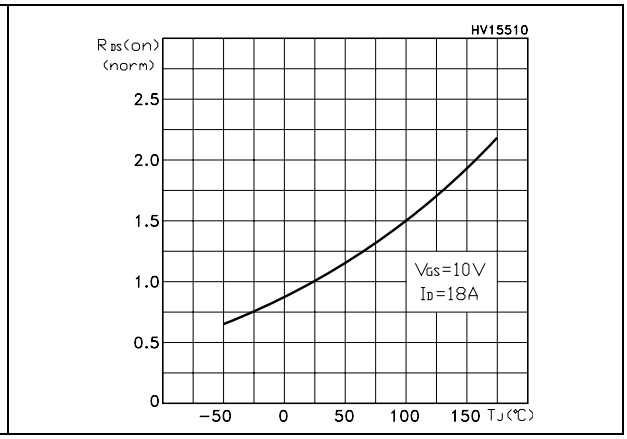
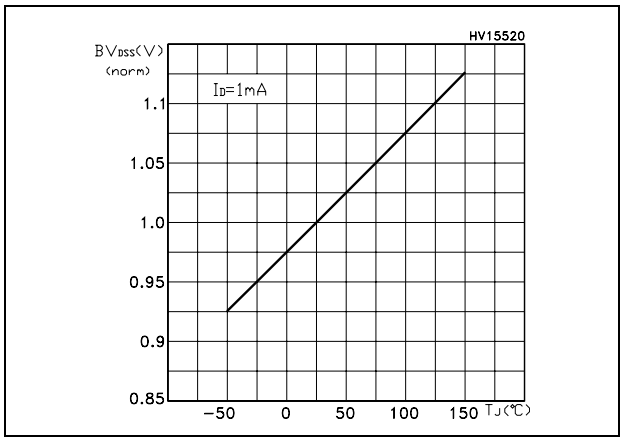


Figure 11. Normalized B_{Vdss} vs temperature



3 Test circuit

Figure 12. Unclamped inductive load test circuit

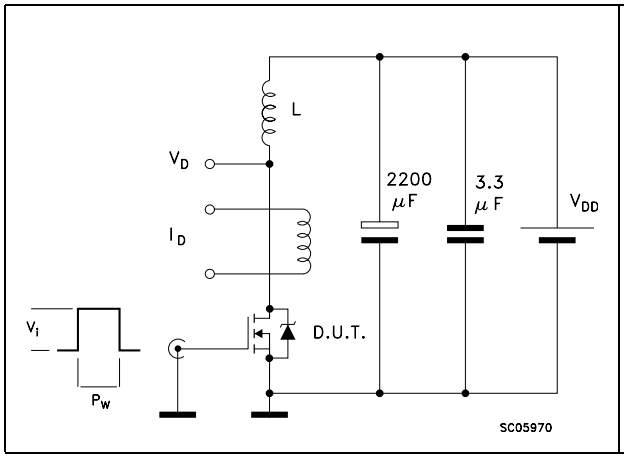


Figure 13. Unclamped inductive wafeform

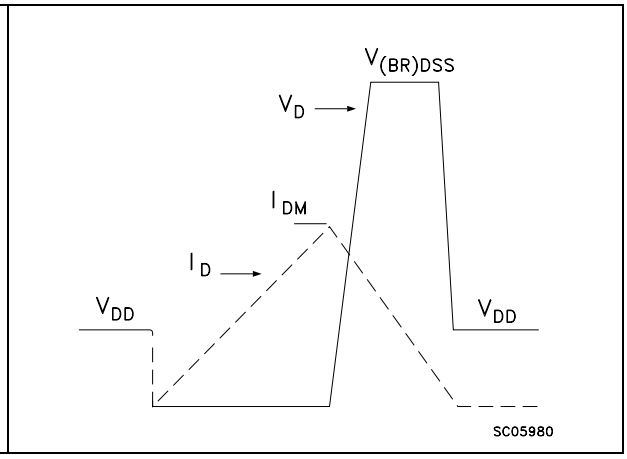


Figure 14. Switching times test circuit for resistive load

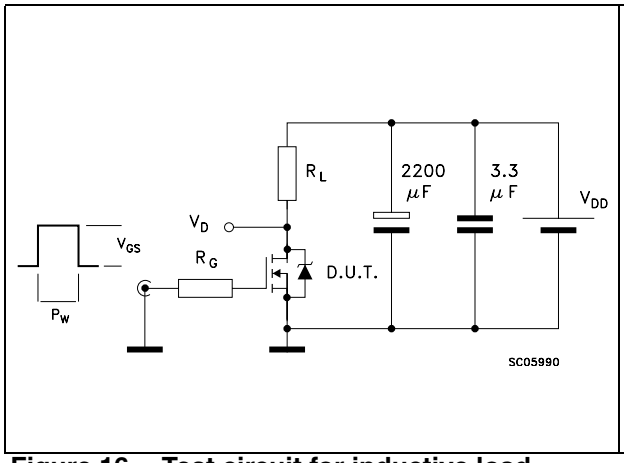


Figure 15. Gate charge test circuit

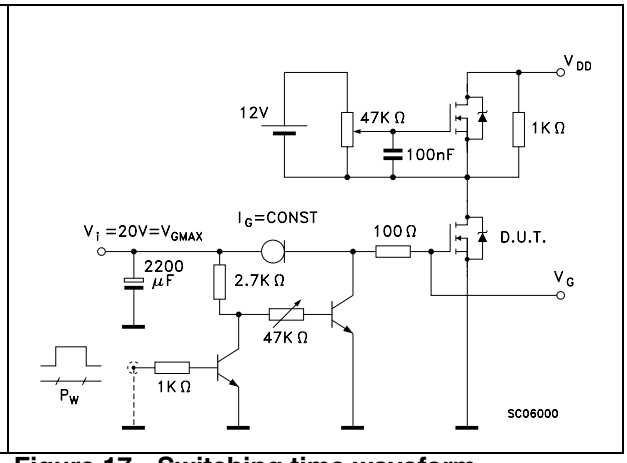


Figure 16. Test circuit for inductive load switching and diode recovery times

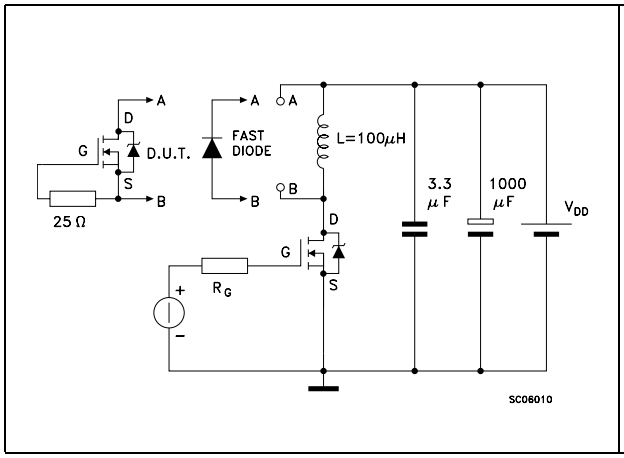
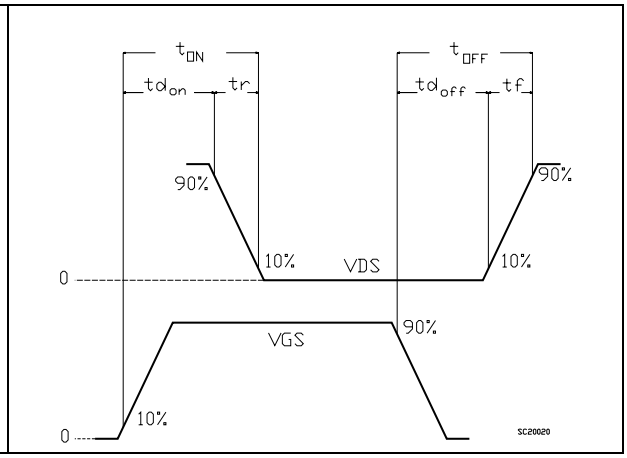


Figure 17. Switching time waveform

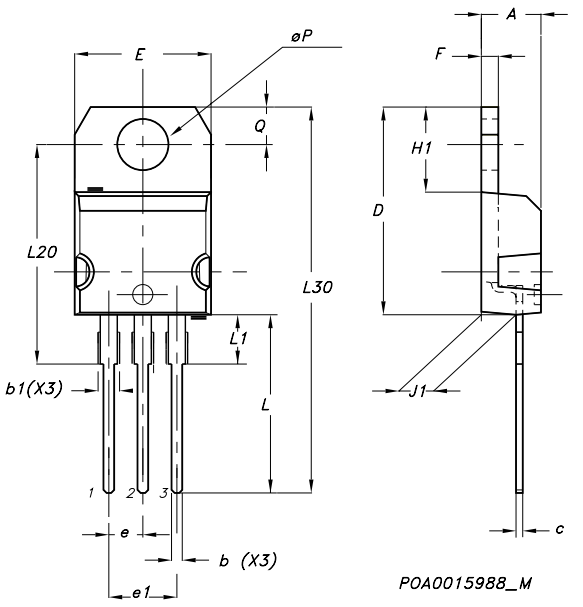


4 Package mechanical data

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

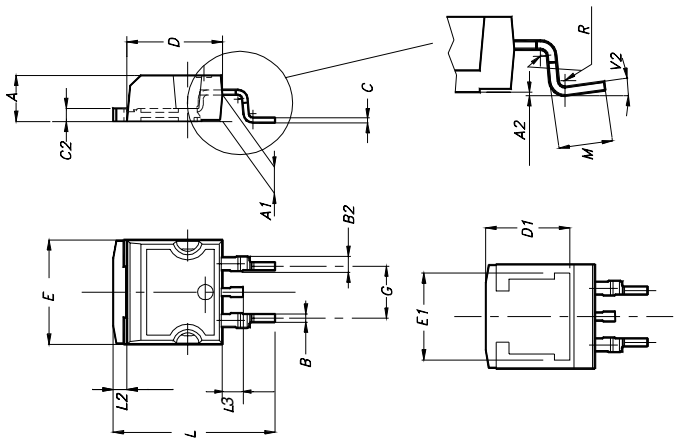
TO-220 MECHANICAL DATA

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



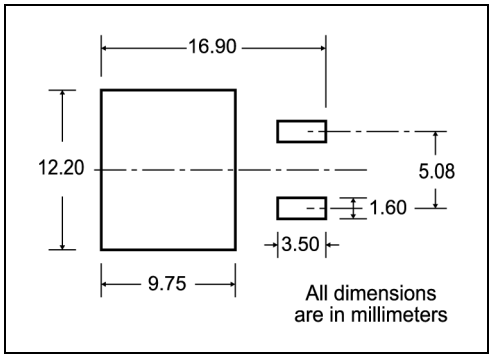
D²PAK MECHANICAL DATA

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	0º		4º			

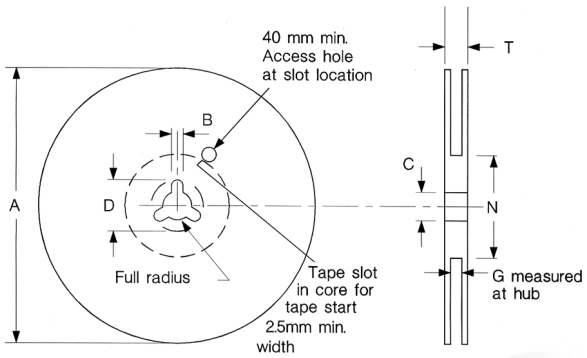


5 Packaging mechanical data

D²PAK FOOTPRINT



TAPE AND REEL SHIPMENT



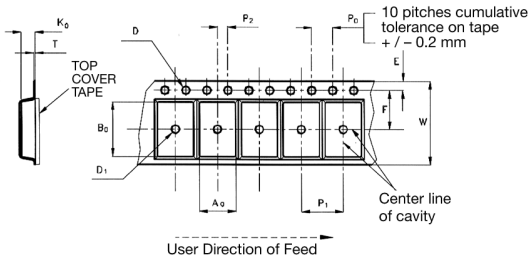
REEL MECHANICAL DATA

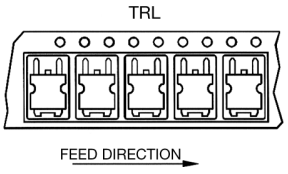
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

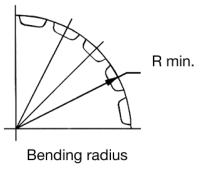
BASE QTY	BULK QTY
1000	1000

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
14-Jun-2003	1	First release
13-Mar-2006	2	Complete version
26-Jun-2006	3	New template, no content change

Mouser Electronics

Authorized Distributor

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STP36NF06L