STB230NH03L

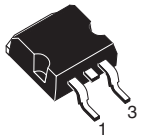
N-channel 30V - 80A - D²PAK STripFET™ Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STB230NH03L	30V	< 3mΩ	80A(1)

1. This value is limited by package

- $R_{DS(on)}$ Qg industry's benchmark
- Conduction losses reduced
- Switching losses reduced
- Low threshold device

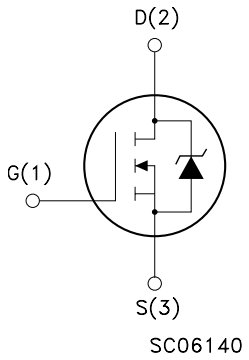


D²PAK

Description

This product utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This is suitable for the most demanding DC-DC converter application where high efficiency is to be achieved.

Internal schematic diagram



Applications

- Switching applications
  - Specifically designed and optimized for high efficiency DC/DC converters
  - OR-ing

Order code

Part number	Marking	Package	Packaging
STB230NH03L	B230NH03L	D²PAK	Tape & reel

Contents

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	30	V
V_{GS}	Gate-source voltage	±20	V
I_D(1)	Drain current (continuous) at T_C = 25°C	250	A
I_D(1)	Drain current (continuous) at T_C=100°C	178	A
I_D(2)	Drain current (continuous) at T_C=25°C	80	A
I_{DM}(3)	Drain current (pulsed)	1000	A
P_{TOT}(4)	Total dissipation at T_C = 25°C	300	W
	Derating factor	2	W/°C
T_J	Operating junction temperature	-55 to 175	°C

1. This value is silicon limited
2. This value is limited by package
3. Pulse width limited by safe operating area
4. This value is rated according to Rthj-c

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	0.5	°C/W
R_{thJA}	Thermal resistance junction-ambient max	62.5	°C/W
T_l	Maximum lead temperature for soldering purpose	300	°C

Table 3. Avalanche data

Symbol	Parameter	Value	Unit
I_{AS}	Avalanche current	60	A
E_{AS}(1)	Single pulse avalanche energy	1150	mJ

1. Starting Tj=25°C, I_D=I_{AV}, V_{DD}=24V

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 = 1mA, V_{GS}= 0	30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 30V, V_{DS} = 30V,Tc=125°C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA	1	1.5	2.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10V, I_D= 40A		2.3	3	mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =10V, f=1 MHz, V_{GS}=0		4700 1600 85		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=15V, I_D = 60A V_{GS} =10V *(see Figure 13)*		72 15 11		nC nC nC
R_G	Gate input resistance	f=1 MHz Gate DC Bias = 0 Test signal level = 20mV open drain		5.5		Ω

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	V_{DD}=15V, I_D=60A, R_G=4.7Ω, V_{GS}=10V *(see Figure 12)*		11 322		ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	V_{DD}=15V, I_D=60A, R_G=4.7Ω, V_{GS}=10V *(see Figure 12)*		123 102		ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} (1) I_{SDM}(2)	Source-drain current Source-drain current (pulsed)				250 1000	A A
V_{SD}(3)	Forward on voltage	I_{SD}=40A, V_{GS}=0			1.3	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}=20V, Tj=25°C *(see Figure 17)*		42 34.7 1.6		ns nC A
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=120A, di/dt = 100A/µs, V_{DD}=20V, Tj=150°C *(see Figure 17)*		47 41.3 1.8		ns nC A

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

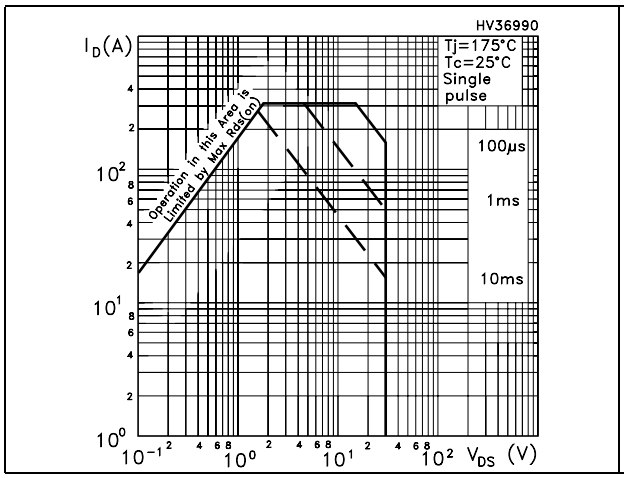


Figure 2. Thermal impedance

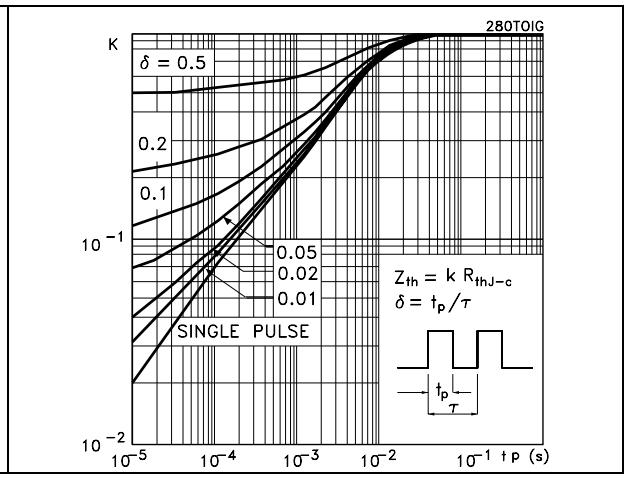


Figure 3. Output characteristics

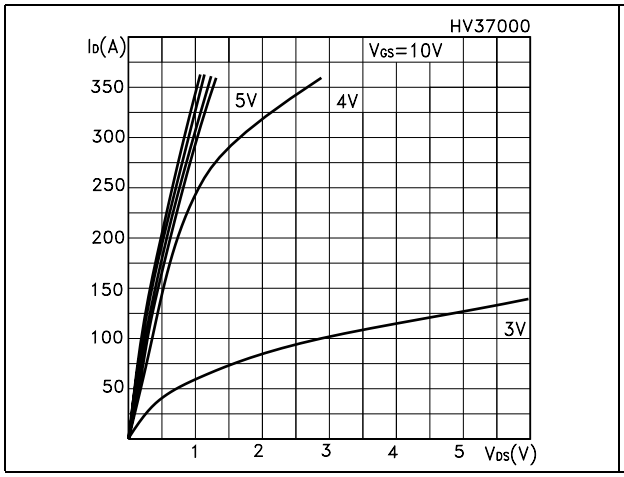


Figure 4. Transfer characteristics

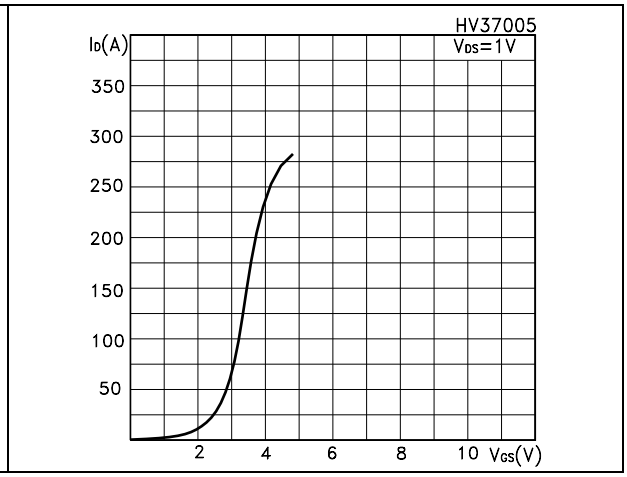


Figure 5. Static drain-source on resistance

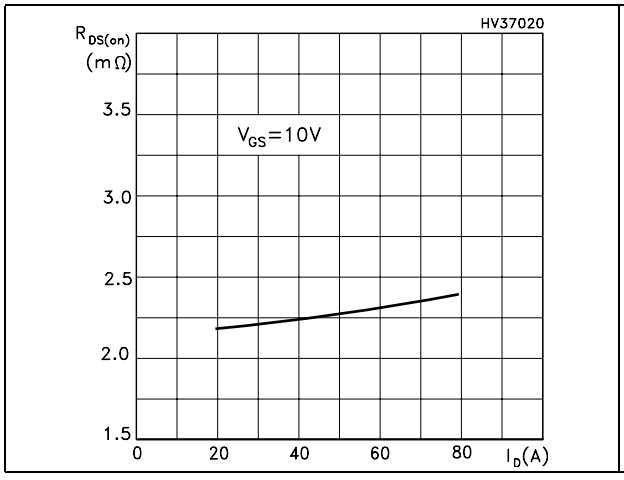


Figure 6. Normalized BV_{DSS} vs temperature

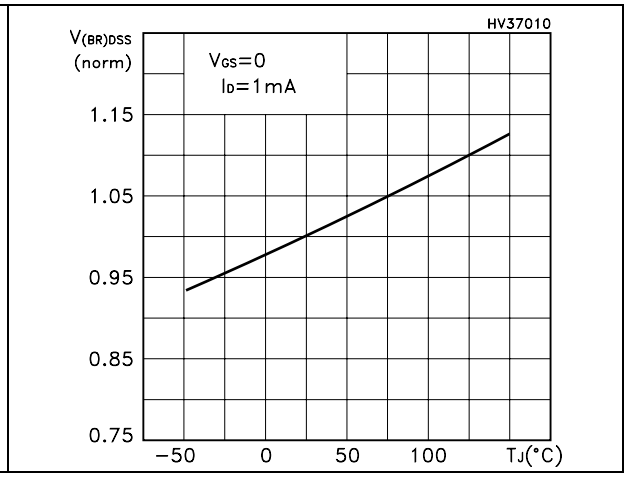


Figure 7. Gate charge vs gate-source voltage

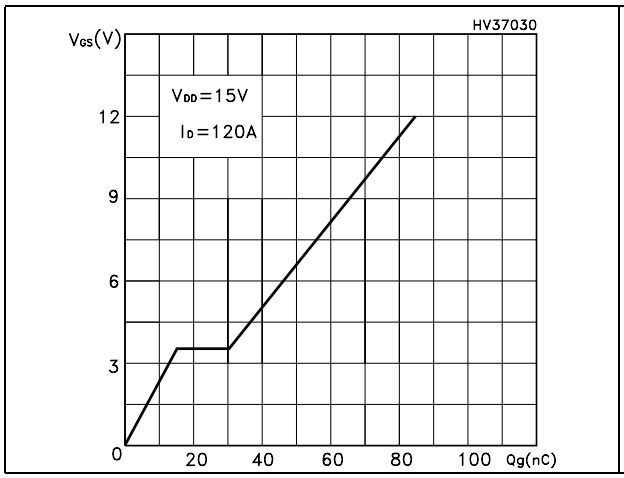


Figure 8. Capacitance variations

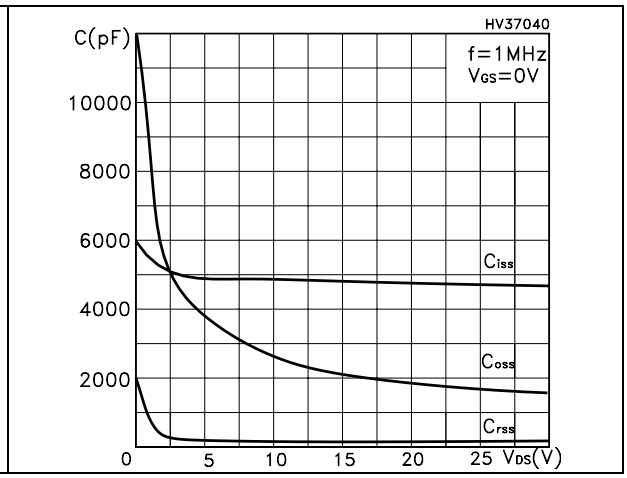


Figure 9. Normalized gate threshold voltage vs temperature

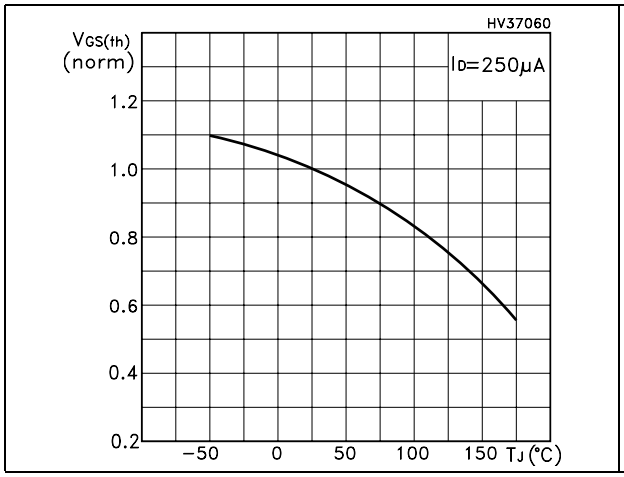


Figure 10. Normalized on resistance vs temperature

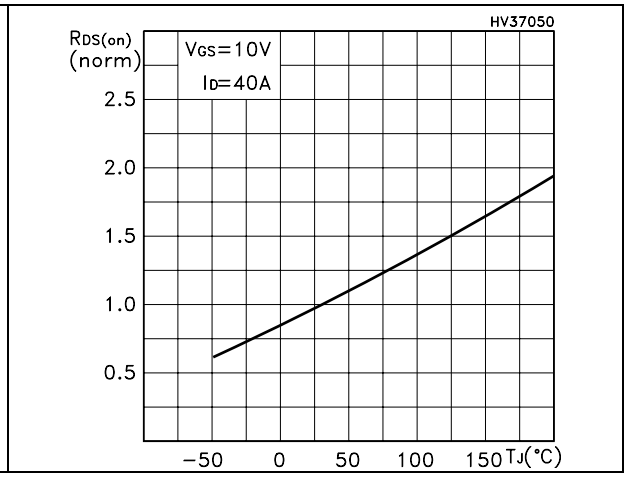
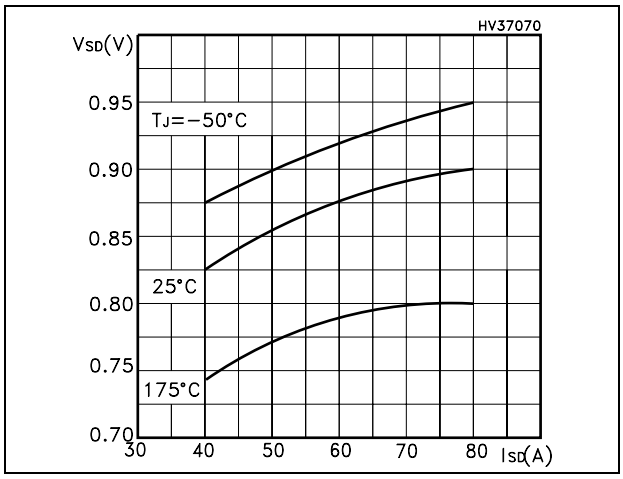


Figure 11. Source-drain diode forward characteristics



3 Test circuit

Figure 12. Switching times test circuit for resistive load

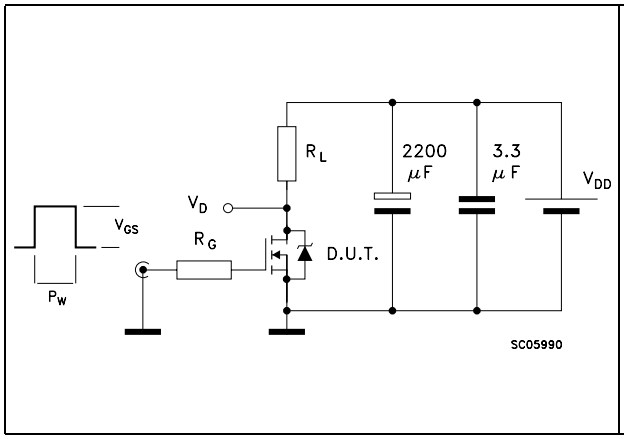


Figure 13. Gate charge test circuit

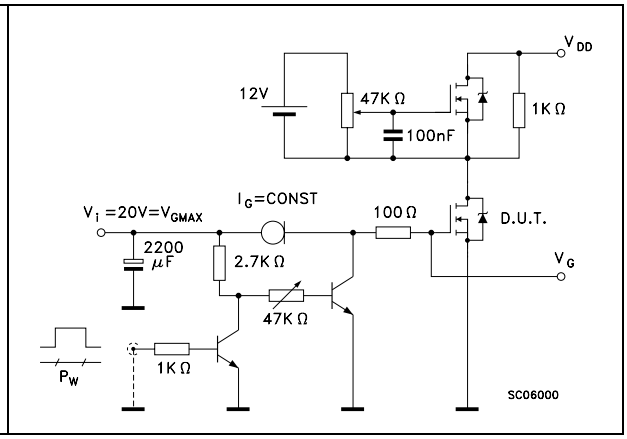


Figure 14. Test circuit for inductive load switching and diode recovery times

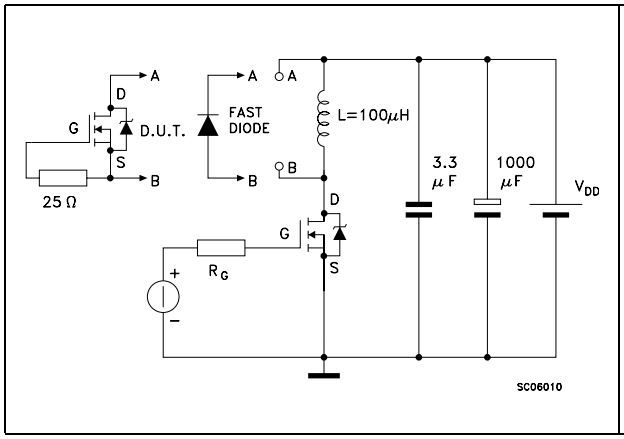


Figure 15. Unclamped Inductive load test circuit

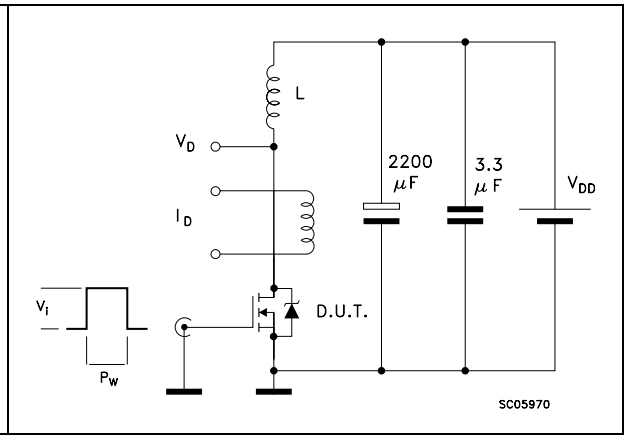


Figure 16. Unclamped inductive waveform

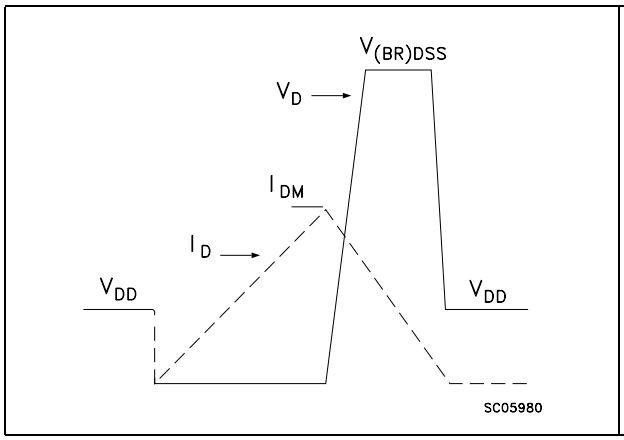
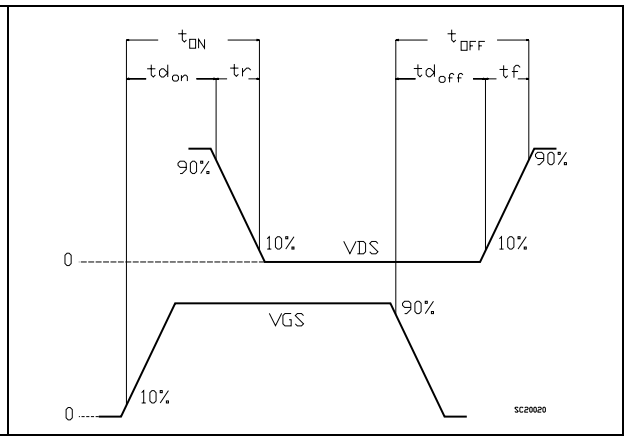


Figure 17. Switching time waveform

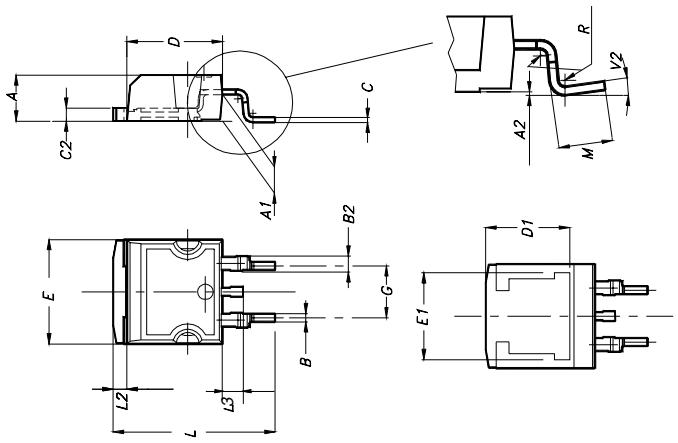


4 Package mechanical data

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*

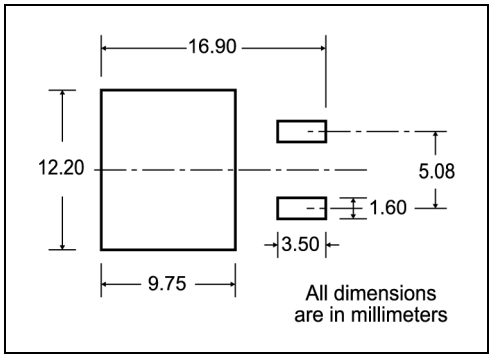
D^2PAK MECHANICAL DATA

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			

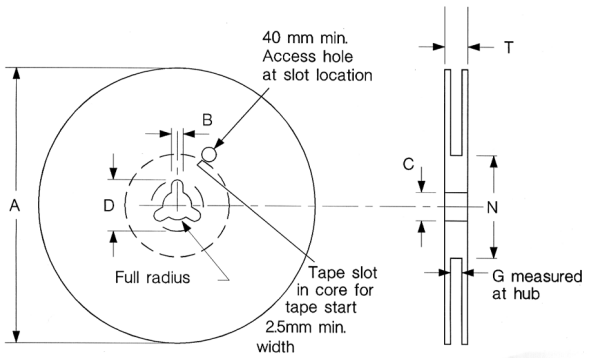


5 Packaging mechanical data

D²PAK FOOTPRINT



TAPE AND REEL SHIPMENT



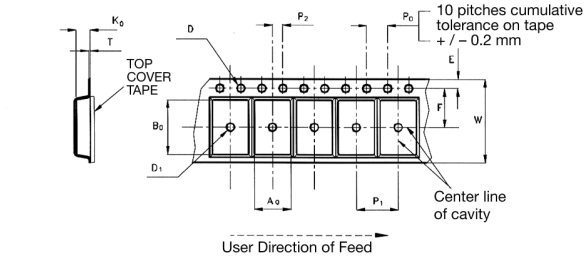
REEL MECHANICAL DATA

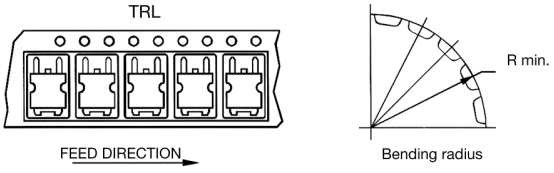
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

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 8. Revision history

Date	Revision	Changes
08-Jun-2007	1	Initial release.

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