STB85NF55L
STP85NF55L

N-channel 55 V, 0.0060 Ω, 80 A, TO-220, D²PAK
STripFET™ II Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$ max	I_D
STB85NF55L	55 V	< 0.008 Ω	80 A
STP85NF55L	55 V	< 0.008 Ω	80 A

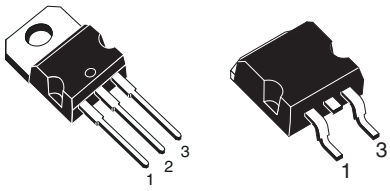
- Low threshold drive

Application

- Switching applications

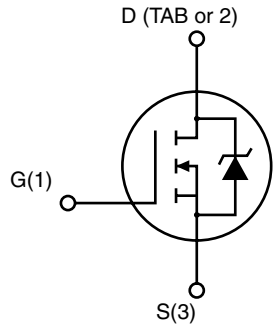
Description

This Power MOSFET is the latest development of STMicroelectronis unique "single feature size" strip-based process. The resulting transistorshows extremely high packing density for low on-resistance, rugged avalanche characteristics andless critical alignment steps therefore a remarkable manufacturing reproducibility.



TO-220 D²PAK

Figure 1. Internal schematic diagram



AM01474v1

Table 1. Device summary

Order code	Marking	Package	Packaging
STB85NF55LT4	B85NF55L	D²PAK	Tape and reel
STP85NF55L	P85NF55L	TO-220	Tube

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	55	V
V_{GS}	Gate-source voltage	± 15	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	80	A
I_D(1)	Drain current (continuous) at T_C=100 °C	80	A
I_{DM}(2)	Drain current (pulsed)	320	A
P_{TOT}	Total dissipation at T_C = 25 °C	300	W
	Derating factor	2.0	W/°C
dv/dt (3)	Peak diode recovery voltage slope	10	V/ns
E_{AS} (4)	Single pulse avalanche energy	980	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. $I_{SD} \leq 80$ A, di/dt ≤ 300 A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$
4. Starting T_J = 25 °C, I_D = 40 A, V_{DD} = 40 V

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		D^2PAK	TO-220	
$R_{thj\text{-}case}$	Thermal resistance junction-case max.	0.5		°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient max.	62.5		°C/W
$R_{thj\text{-}pcb}$	Thermal resistance junction-pcb max.(1)	35		°C/W
T_l	Maximum lead temperature for soldering purpose	300		°C

1. When mounted on 1inch² FR-4 2Oz Cu board

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 = 250 µA, V_{GS}= 0	55			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = max rating, V_{DS} = max rating @125 °C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±15 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	1	1.6	2.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 40 A		0.0060	0.008	Ω
		V_{GS}= 5 V, I_D= 40 A		0.008	0.01	

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} = 15 V, I_D = 40 A	-	130		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25 V, f = 1 MHz, V_{GS} = 0	-	4050 860 300		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 27.5 V, I_D = 80 A V_{GS} = 5 V	-	80 20 45	110	nC nC nC

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

Table 6. 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}= 27.5 V, I_D= 40 A, R_G=4.7 Ω, V_{GS}= 5 V *Figure 14 on page 8*	-	35 165 70 55	-	ns ns ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current		-		80	A
I_{SDM} (1)	Source-drain current (pulsed)		-		320	A
V_{SD} (2)	Forward on voltage	I_{SD} = 80 A, V_{GS} = 0	-		1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 80 A, di/dt = 100 A/µs, V_{DD} = 20 V, T_J = 150 °C *Figure 16 on page 8*	-	80 240 6		ns nC A

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

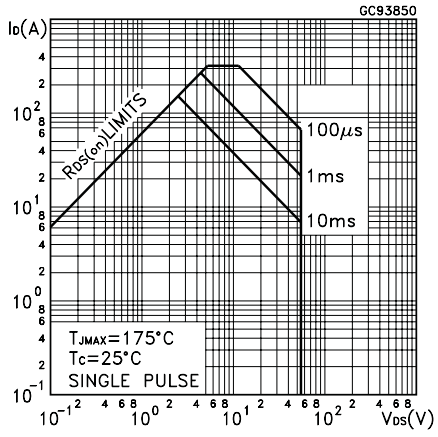


Figure 3. Thermal impedance

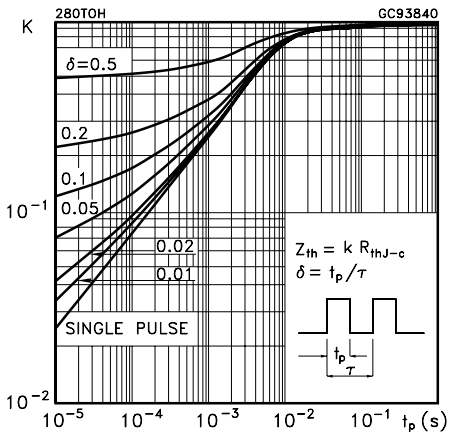


Figure 4. Output characteristics

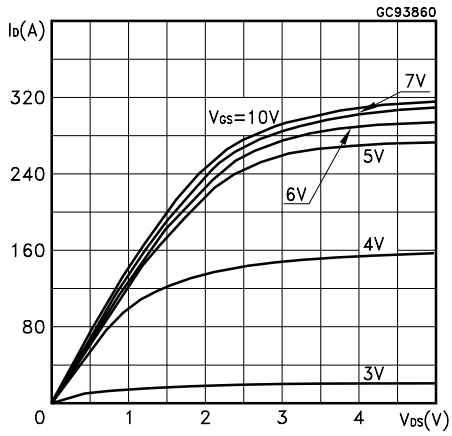


Figure 5. Transfer characteristics

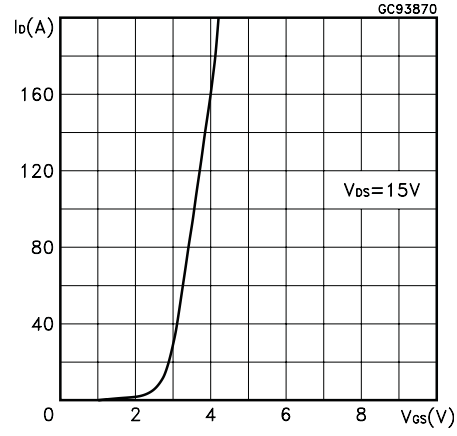


Figure 6. Transconductance

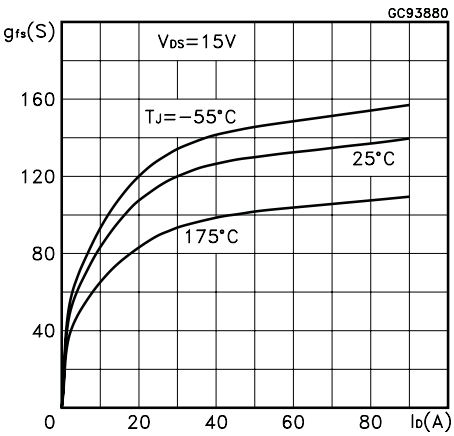


Figure 7. Static drain-source on resistance

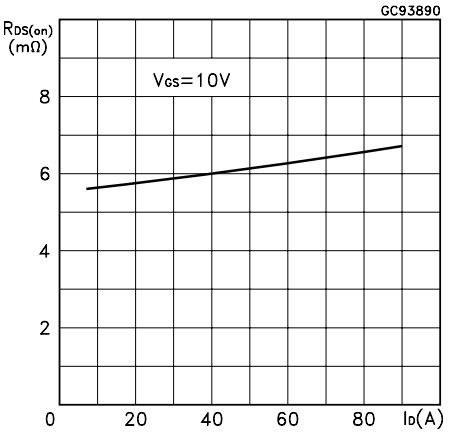


Figure 8. Gate charge vs gate-source voltage

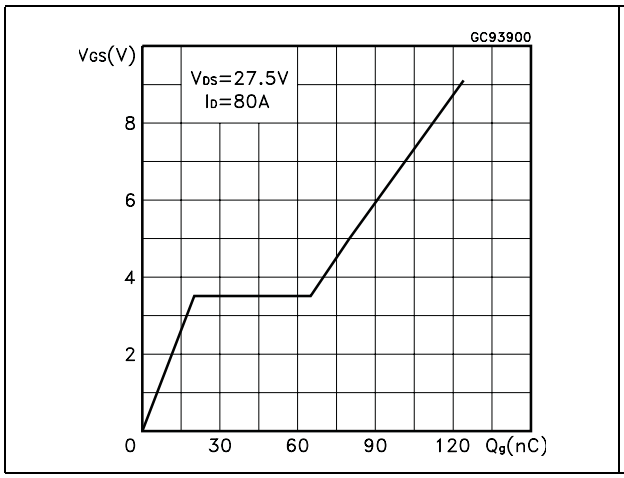


Figure 9. Capacitance variations

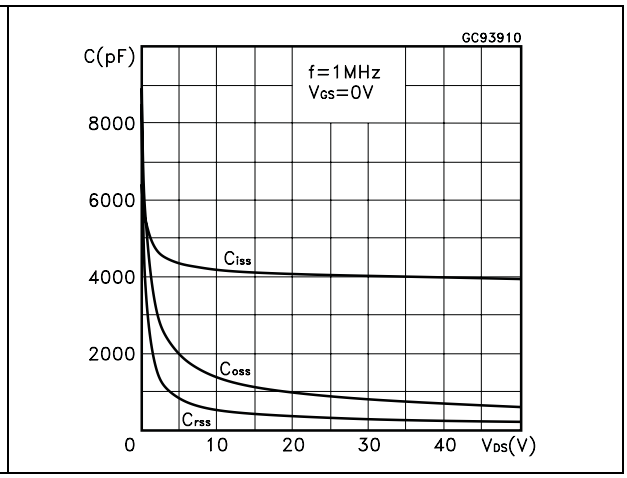


Figure 10. Normalized gate threshold voltage vs temperature

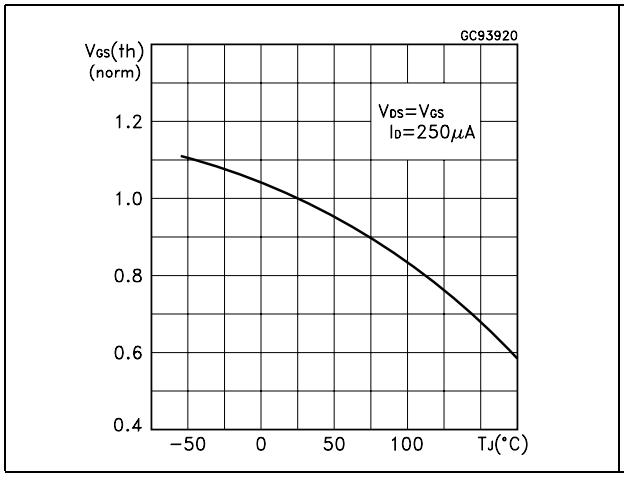


Figure 11. Normalized on resistance vs temperature

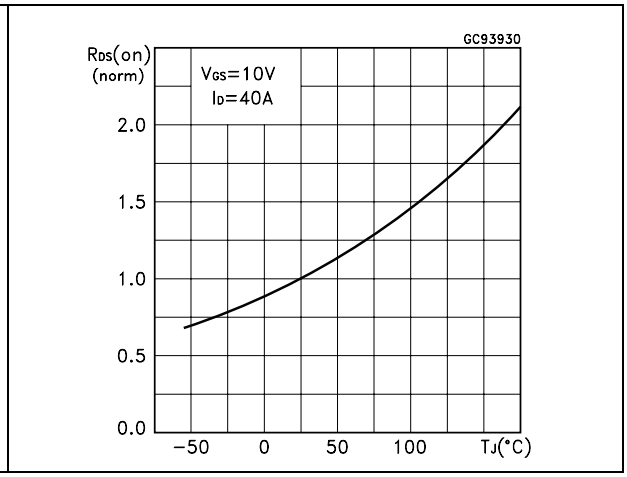


Figure 12. Source-drain diode forward characteristics

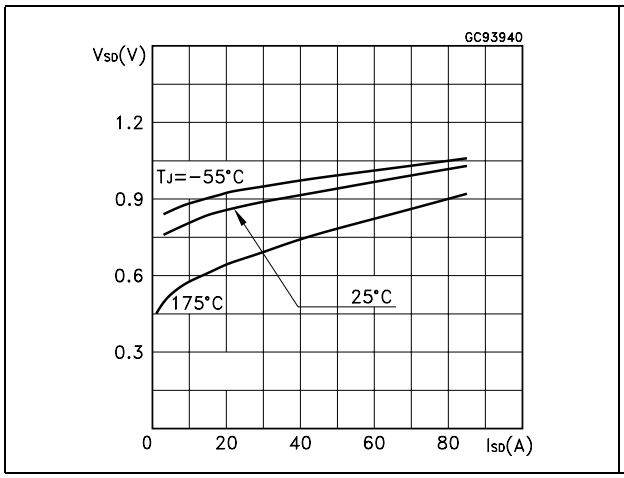
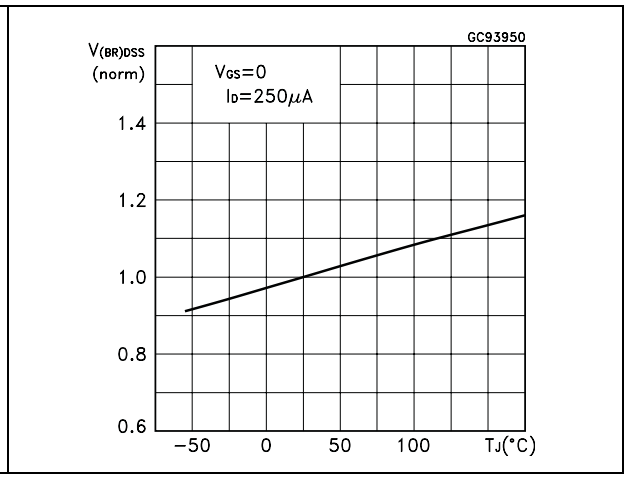


Figure 13. Normalized B_{VDSS} vs temperature



3 Test circuits

Figure 14. Switching times test circuit for resistive load

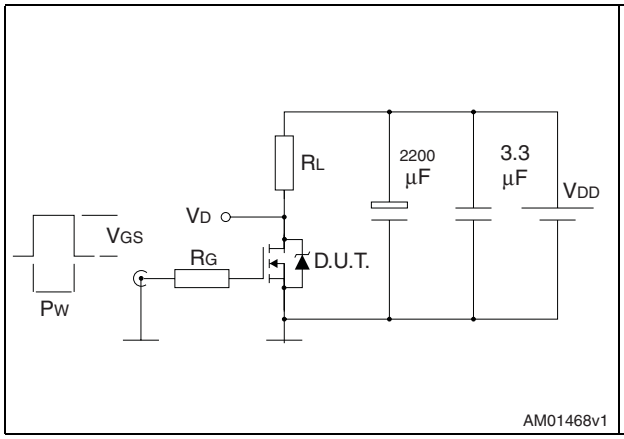


Figure 15. Gate charge test circuit

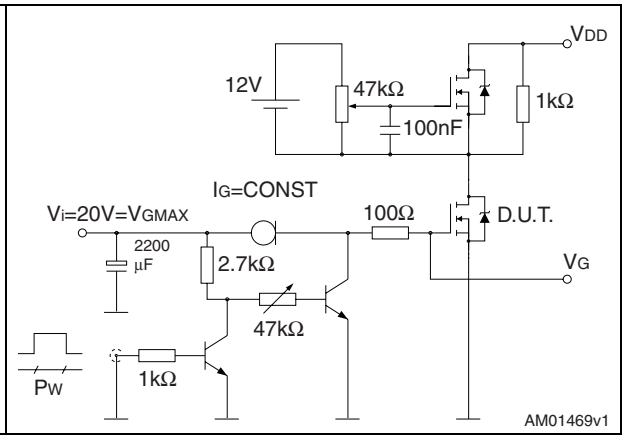


Figure 16. Test circuit for inductive load switching and diode recovery times

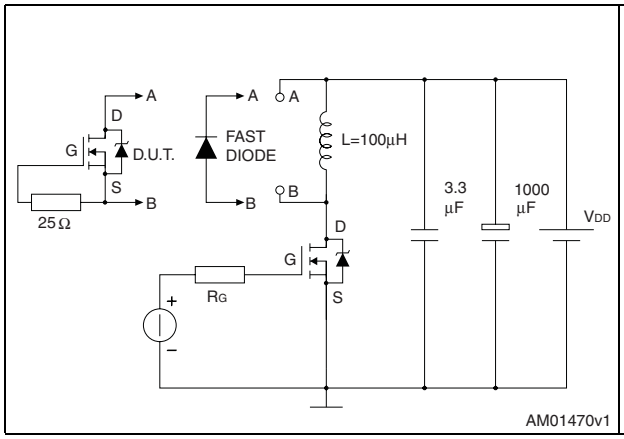


Figure 17. Unclamped inductive load test circuit

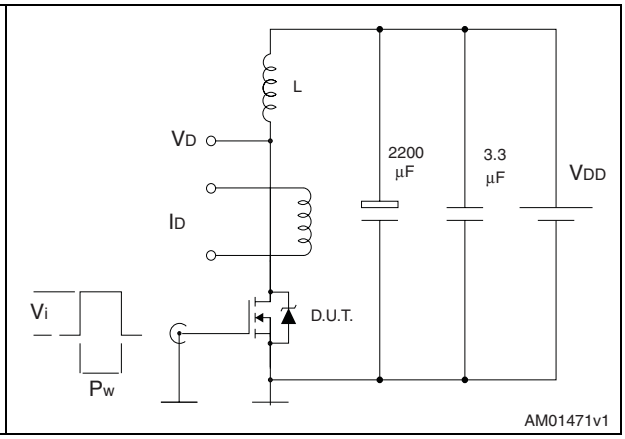
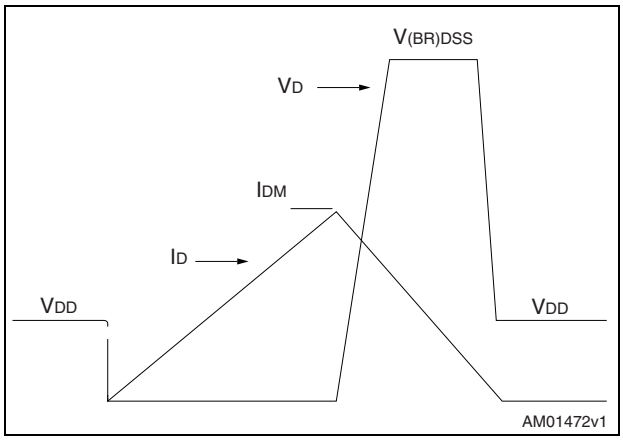


Figure 18. Unclamped inductive waveform

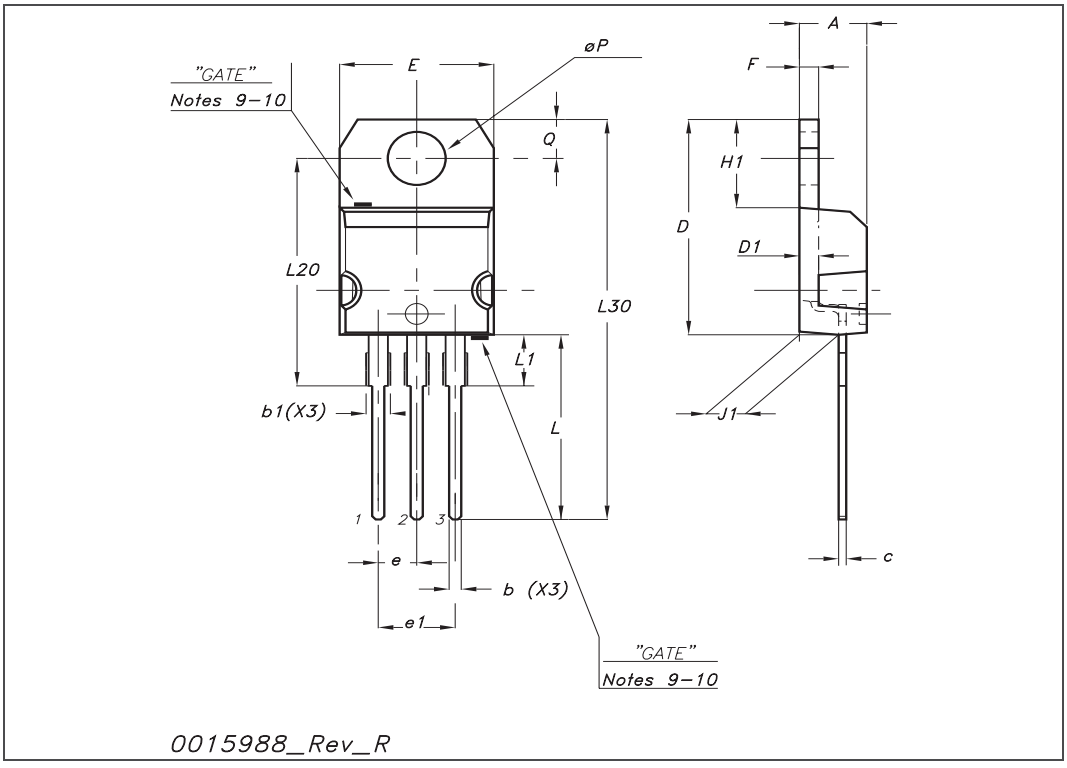


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

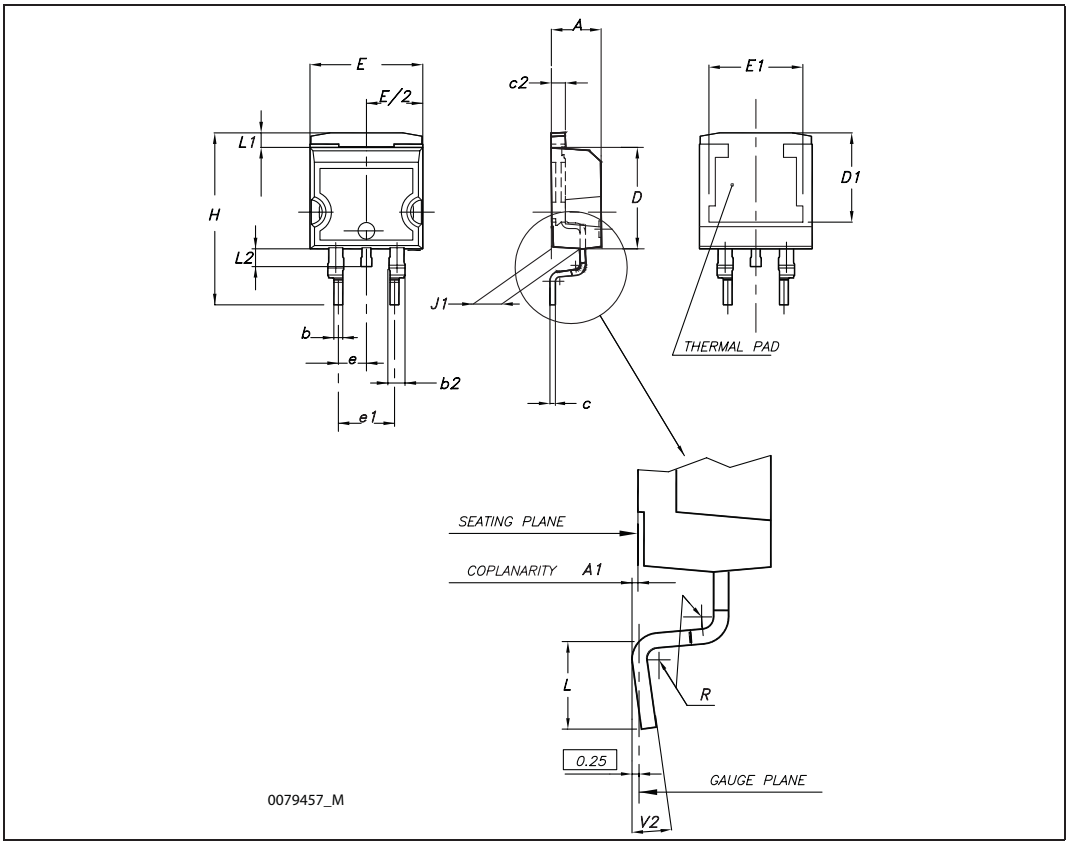
TO-220 mechanical data

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	1.14		1.70	0.044		0.066
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.6		0.62
D1		1.27			0.050	
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		0.051
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	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



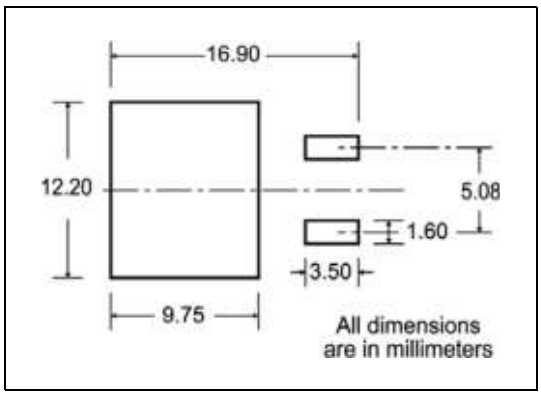
D^2PAK (TO-263) mechanical data

Dim	mm			inch		
	Min	Typ	Max	Min	Typ	Max
A	4.40		4.60	0.173		0.181
A1	0.03		0.23	0.001		0.009
b	0.70		0.93	0.027		0.037
b2	1.14		1.70	0.045		0.067
c	0.45		0.60	0.017		0.024
c2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1	7.50			0.295		
E	10		10.40	0.394		0.409
E1	8.50			0.334		
e		2.54			0.1	
e1	4.88		5.28	0.192		0.208
H	15		15.85	0.590		0.624
J1	2.49		2.69	0.099		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.40	0.05		0.055
L2	1.30		1.75	0.051		0.069
R		0.4			0.016	
V2	0°		8°	0°		8°

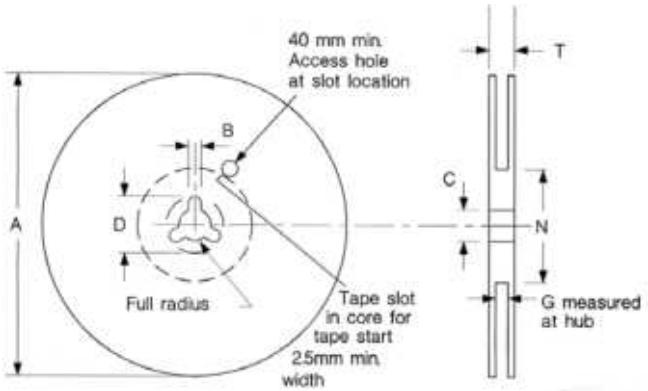


5 Packaging mechanical data

D²PAK FOOTPRINT



TAPE AND REEL SHIPMENT



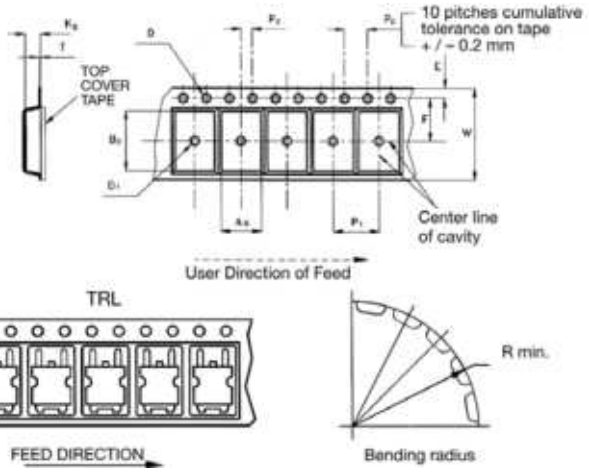
REEL MECHANICAL DATA

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



6 Revision history

Table 8. Document revision history

Date	Revision	Changes
19-May-2009	7	New ECOPACK® statement in *Section 4: Package mechanical data* Content reworked to improve readability, no technical changes
06-Aug-2009	8	*Table 3: Thermal data* has been updated

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