



STP100NF03L-03 STB100NF03L-03 STB100NF03L-03-1

N-channel 30V - 0.0026Ω - 100A - D²PAK/I²PAK/TO-220
STripFET™ III Power MOSFET

General features

Type	V _{DSS}	R _{DS(on)}	I _D
STB100NF03L-03	30V	<0.0032Ω	100A
STB100NF03L-03-1	30V	<0.0032Ω	100A
STP100NF03L-03	30V	<0.0032Ω	100A

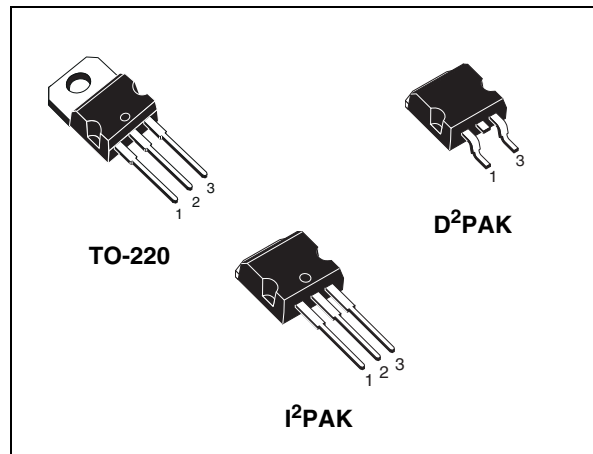
- Low threshold drive
- 100% avalanche tested
- Logic level device

Description

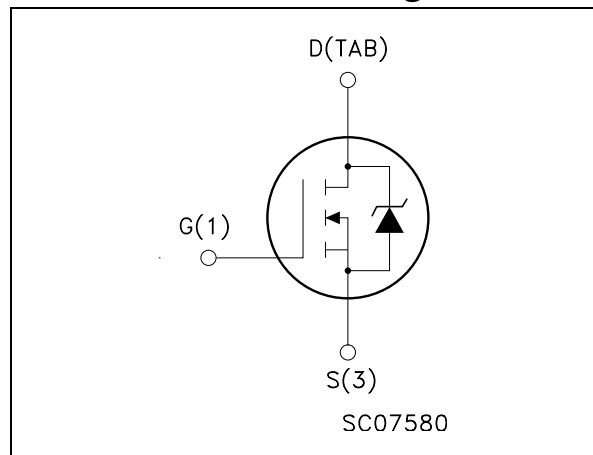
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

Applications

- Switching application



Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STB100NF03L-03T4	B100NF03L	D ² PAK	Tape & reel
STB100NF03L-03-1	B100NF03L	I ² PAK	Tube
STP100NF03L-03	P100NF03L	TO-220	Tube

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1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	30	V
V_{DGR}	Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)	24	V
V_{GS}	Gate- source voltage	± 16	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	100	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	100	A
$I_{DM}^{(2)}$	Drain current (pulsed)	400	A
P_{tot}	Total dissipation at $T_C = 25^\circ\text{C}$	300	W
	Derating Factor	2	W/°C
$E_{AS}^{(3)}$	Single pulse avalanche energy	1.9	J
T_{stg}	Storage temperature	-55 to 175	°C
T_j	Max. operating junction temperature		

1. Value limited by wire bonding
2. Pulse width limited by safe operating area.
3. Starting $T_j = 25^\circ\text{C}$, $I_D = 50\text{A}$, $V_{DD} = 50\text{V}$

Table 2. Thermal data

Rthj-case	Thermal resistance junction-case max	0.5	°C/W
Rthj-amb	Thermal resistance junction-ambient max	62.5	°C/W
T_J	Maximum lead temperature for soldering purpose	300	°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	$I_D = 250\mu A, V_{GS} = 0$	30			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{max ratings}$ $V_{DS} = \text{max ratings},$ $T_C = 125^{\circ}C$			1 10	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 16V$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	1.7	2.5	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10V, I_D = 50A$ $V_{GS} = 4.5V, I_D = 50A$		0.0026 0.0032	0.0032 0.0045	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}^{max},$ $I_D = 30A$	10			S
C_{iss}	Input capacitance	$V_{DS} = 25V, f = 1MHz,$ $V_{GS} = 0$		6200		pF
C_{oss}	Output capacitance			1720		pF
C_{rss}	Reverse transfer capacitance			300		pF
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15V, I_D = 50A$ $R_G = 4.7\Omega, V_{GS} = 4.5V$ (see Figure 13)		35		ns
t_r	Rise time			315		ns
$t_{d(off)}$	Turn-off delay time			115		ns
t_f	Fall time			95		ns
Q_g	Total gate charge	$V_{DD} = 24V, I_D = 100A,$ $V_{GS} = 5V$ (see Figure 14)		88		nC
Q_{gs}	Gate-source charge			22.5		nC
Q_{gd}	Gate-drain charge			36		nC

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

Table 5. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}^{(1)}$	Source-drain current Source-drain current (pulsed)				100 400	A A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 100A, V_{GS} = 0$			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 100A,$ $di/dt = 100A/\mu s,$ $V_{DD} = 20V, T_j = 150^\circ C$ (see Figure 15)		75 150 4		ns nC A

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

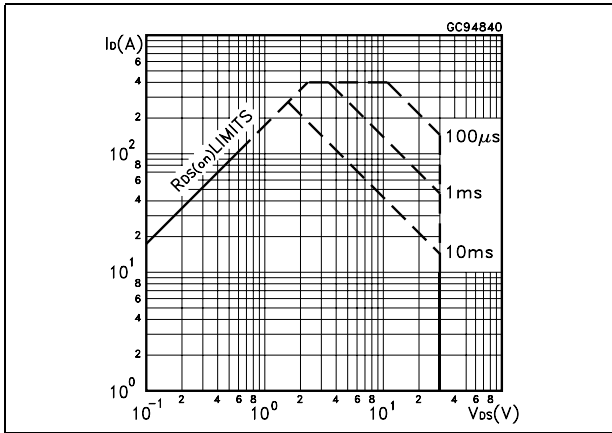


Figure 2. Thermal impedance

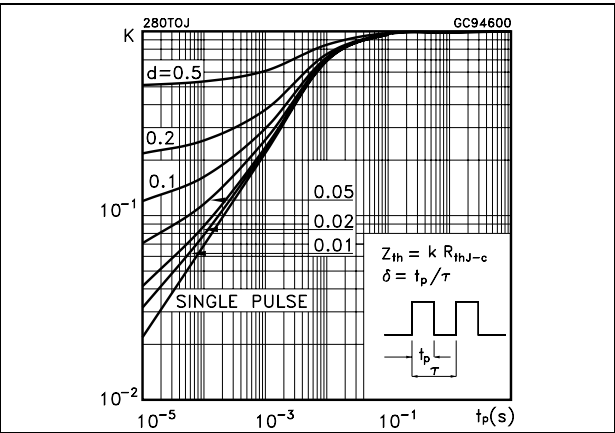


Figure 3. Output characteristics

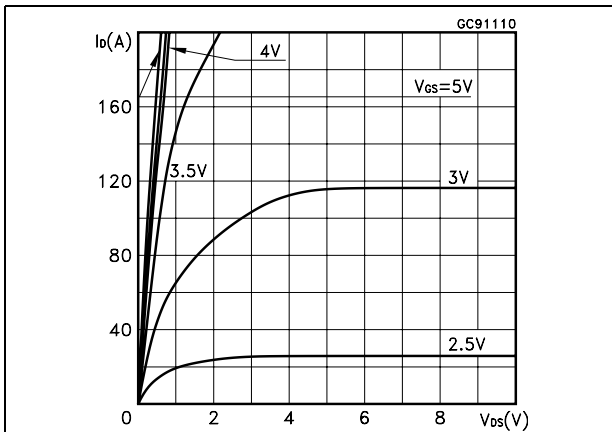


Figure 4. Transfer characteristics

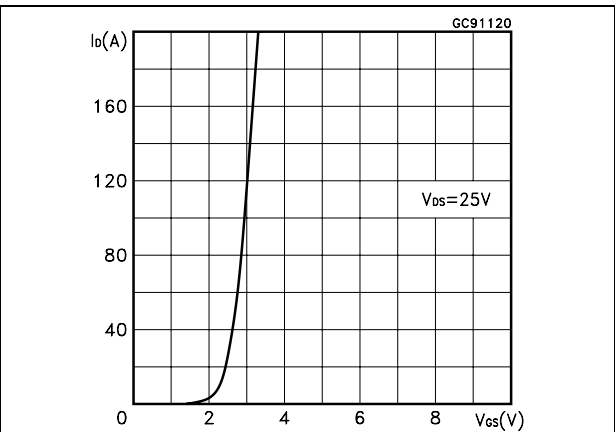


Figure 5. Transconductance

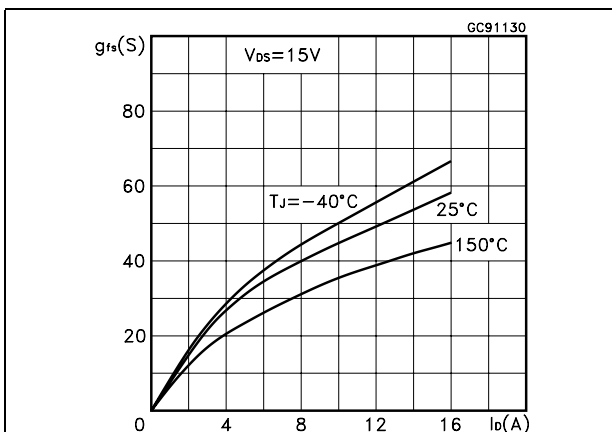


Figure 6. Static drain-source on resistance

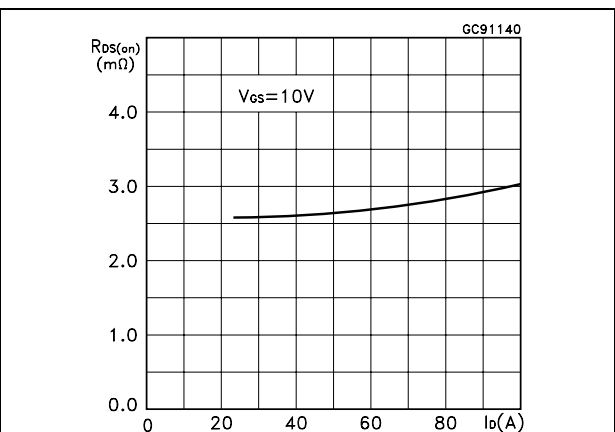


Figure 7. Gate charge vs gate-source voltage Figure 8. Capacitance variations

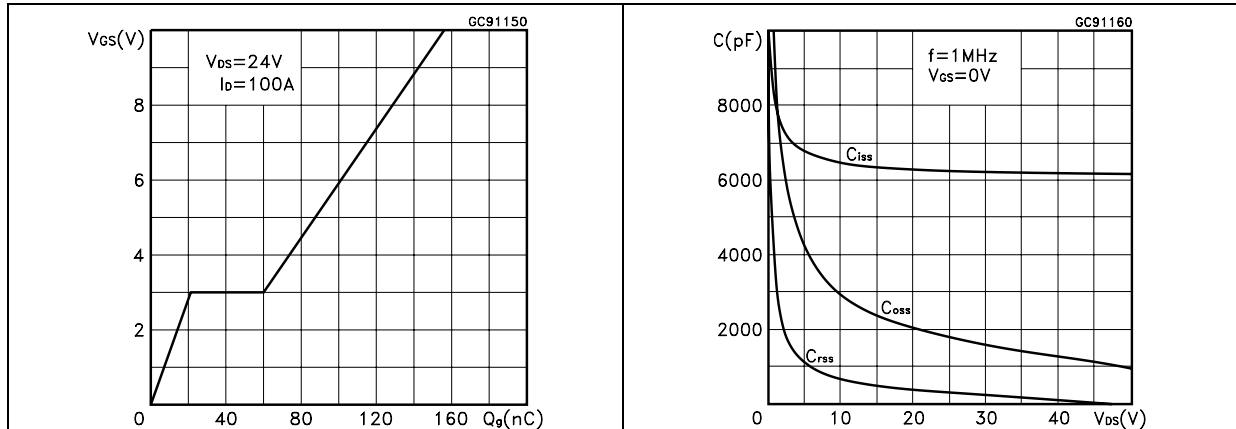


Figure 9. Normalized gate threshold voltage vs temperature Figure 10. Normalized on resistance vs temperature

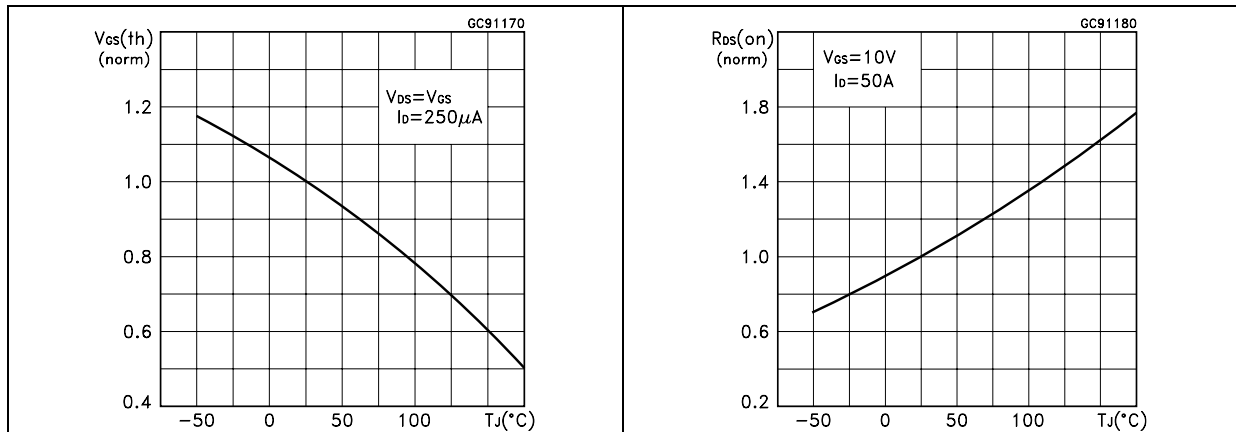
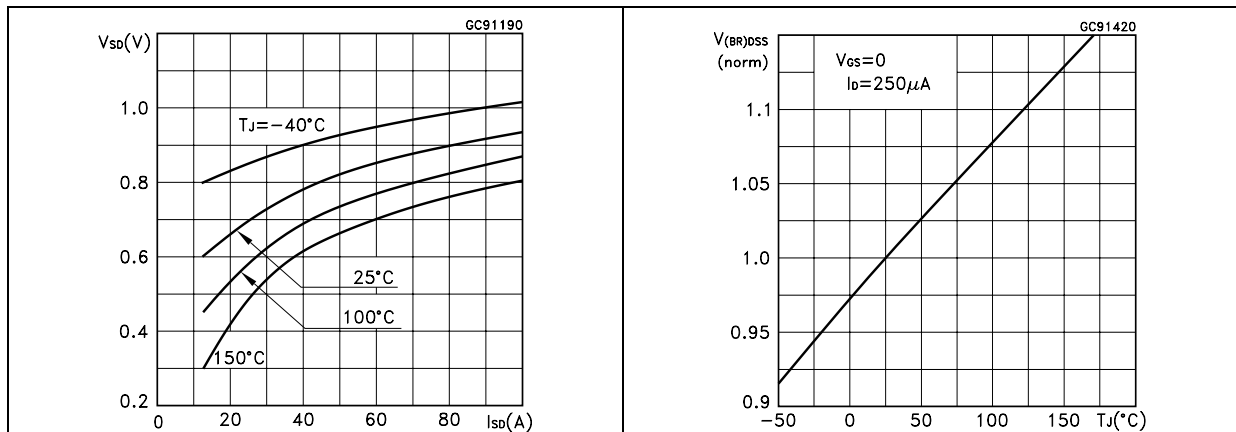


Figure 11. Source-drain diode forward characteristics Figure 12. Normalized $B_{V_{DS}}$ vs temperature



3 Test circuit

Figure 13. Switching times test circuit for resistive load



Figure 14. Gate charge test circuit



Figure 15. Test circuit for inductive load switching and diode recovery times

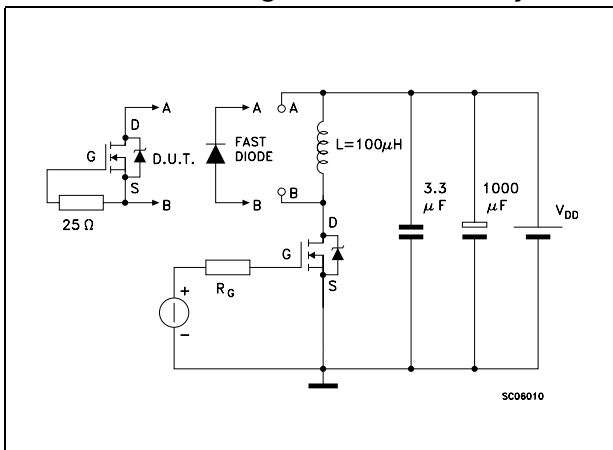


Figure 16. Unclamped Inductive load test circuit

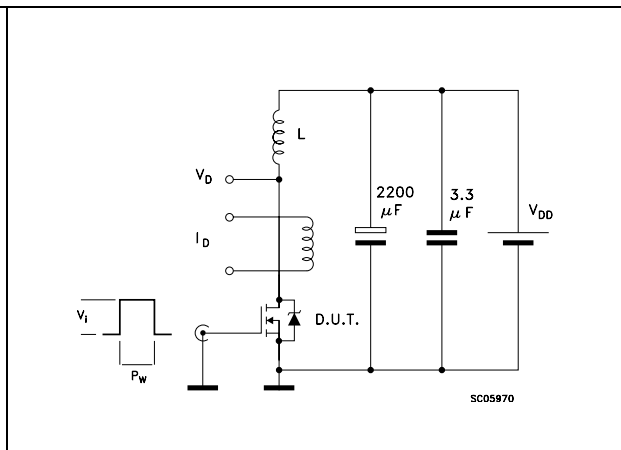
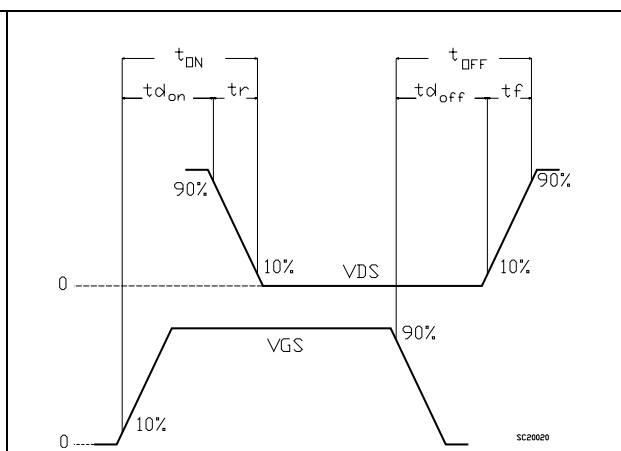


Figure 17. Unclamped inductive waveform



Figure 18. Switching time waveform

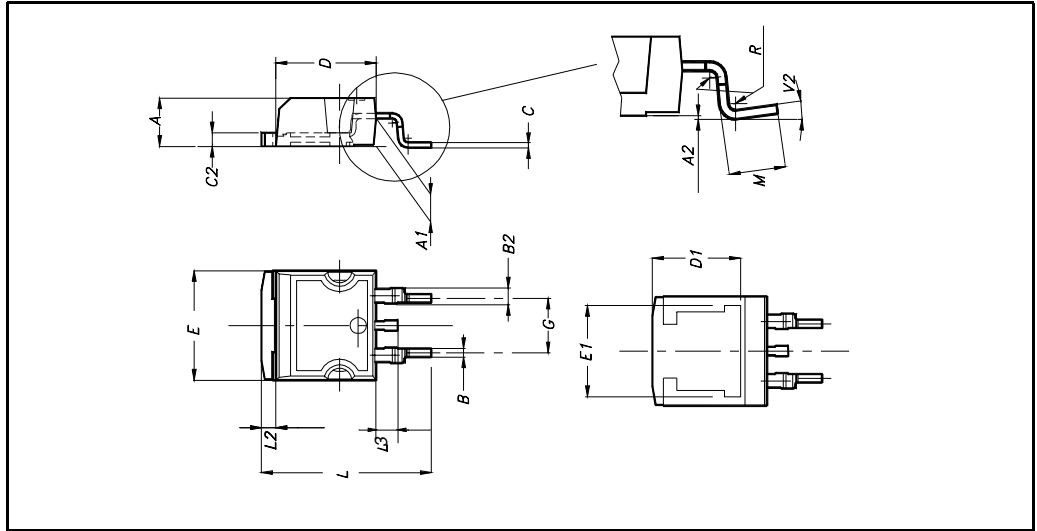


4 Package mechanical data

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

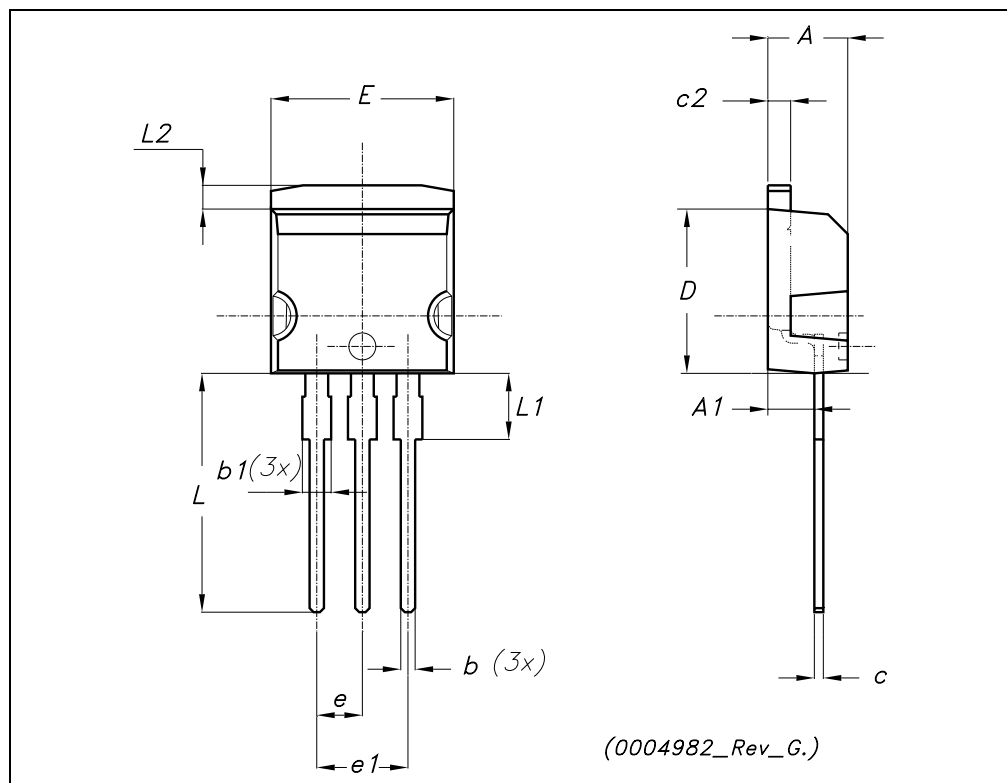
D²PAK MECHANICAL DATA

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°			



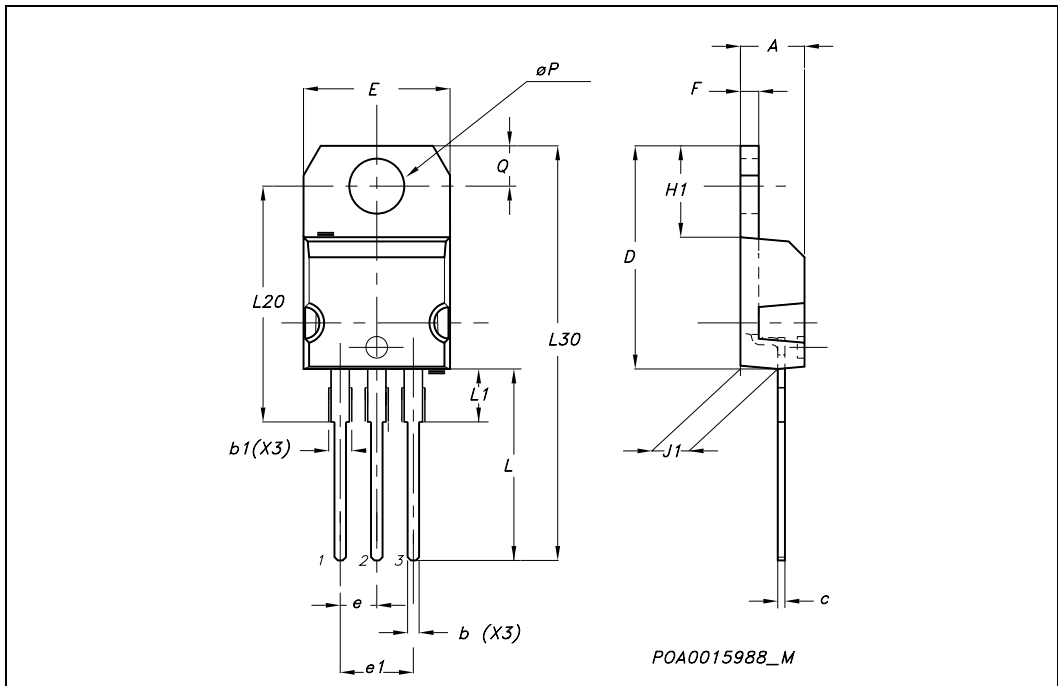
TO-262 (I²PAK) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
A1	2.40		2.72	0.094		0.107
b	0.61		0.88	0.024		0.034
b1	1.14		1.70	0.044		0.066
c	0.49		0.70	0.019		0.027
c2	1.23		1.32	0.048		0.052
D	8.95		9.35	0.352		0.368
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
E	10		10.40	0.393		0.410
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L2	1.27		1.40	0.050		0.055



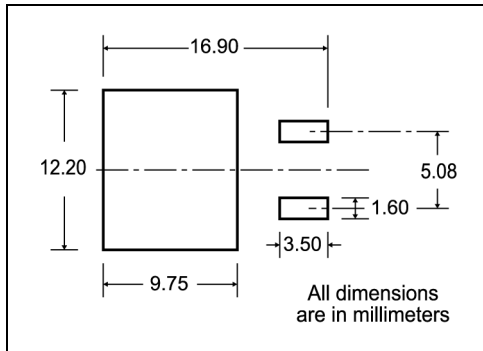
TO-220 MECHANICAL DATA

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



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

10 pitches cumulative tolerance on tape +/- 0.2 mm

Center line of cavity

Bending radius

* on sales type

6 Revision history

Table 6. Revision history

Date	Revision	Changes
21-Jun-2006	1	First document
19-Jun-2006	2	New template, no content change

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