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STD30NF03L STD30NF03L-1

N-channel 30V - 0.020Ω - 30A - DPAK/IPAK
 STripFET™ II Power MOSFET

General features

Type	V _{DSS}	R _{DS(on)}	I _D
STD30NF03L-1	30V	< 0.025Ω	30A
STD30NF03L	30V	< 0.025Ω	30A

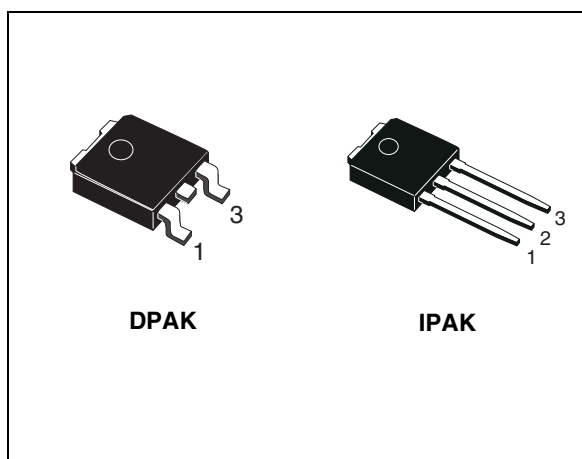
- Low threshold drive

Description

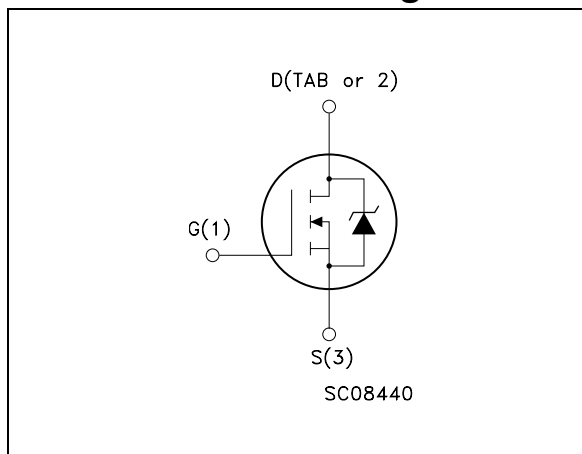
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

Applications

- Switching application



Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STD30NF03L-1	D30NF03L	IPAK	Tube
STD30NF03LT4	D30NF03L	DPAK	Tape & reel

Contents

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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 ($R_{GS} = 20\text{ k}\Omega$)	30	V
V_{GS}	Gate- source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	30	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$	19	A
$I_{DM}^{(2)}$	Drain current (pulsed)	120	A
P_{tot}	Total dissipation at $T_C = 25^\circ\text{C}$	50	W
	Derating Factor	0.27	W/ $^\circ\text{C}$
$E_{AS}^{(3)}$	Single pulse avalanche energy	100	mJ
T_{stg}	Storage temperature	-65 to 175	$^\circ\text{C}$
T_j	Max. operating junction temperature		

1. Current limited by package
2. Pulse width limited by safe operating area.
3. Starting $T_j = 25^\circ\text{C}$, $I_D = 15\text{A}$ $V_{DD} = 15\text{V}$

Table 2. Thermal data

$R_{thj-pcb}$	Thermal resistance junction-pcb max	3.0	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max	100	$^\circ\text{C}/\text{W}$
$R_{thj-sink}$	Thermal resistance case-sink max	1.5	$^\circ\text{C}/\text{W}$
T_J	Maximum lead temperature for soldering purpose	275	$^\circ\text{C}$

Electrical characteristics

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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 ($V_{GS} = 0$)	$V_{DS} = \text{Max rating}$ $V_{DS} = \text{Max rating},$ $T_C = 125^{\circ}C$			1 10	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20V$			± 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	$V_{GS} = 10V, I_D = 15A$ $V_{GS} = 4.5V, I_D = 15A$		0.020 0.028	0.025 0.035	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 15V, I_D = 15A$		13		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	$V_{DS} = 25V, f = 1MHz,$ $V_{GS} = 0$		830 230 92		pF pF pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	$V_{DD} = 15V, I_D = 20A$ $R_G = 4.7\Omega, V_{GS} = 4.5V$ (see Figure 12)		35 205 90 240		ns ns ns ns
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	$V_{DD} = 24V, I_D = 30A,$ $V_{GS} = 5V, R_G = 4.7\Omega$ (see Figure 13)		18 7 8		nC nC nC

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

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Electrical characteristics
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)				30 240	A A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 30A, V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 40A, di/dt = 100A/\mu s,$ $V_{DD} = 15V, T_j = 150^\circ C$ (see Figure 14)		65 72 2		ns nC A

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

Electrical characteristics

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2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

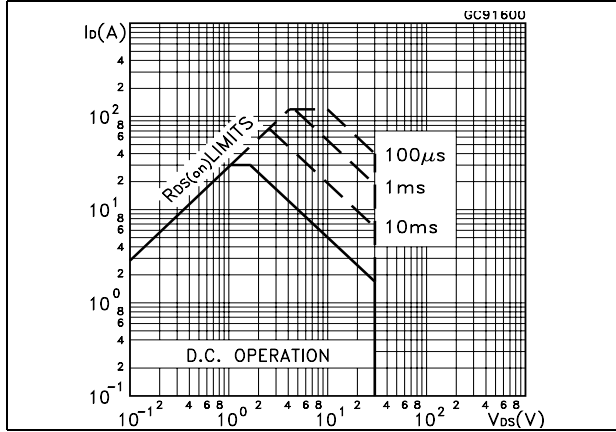


Figure 2. Thermal impedance

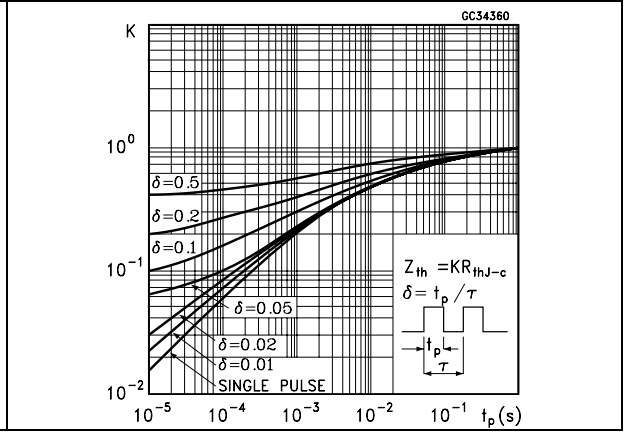


Figure 3. Output characteristics

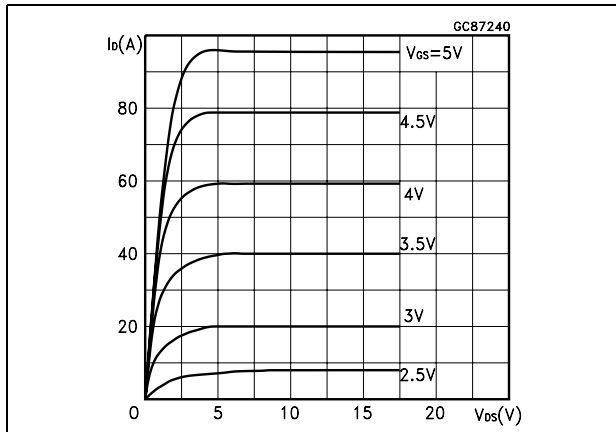


Figure 4. Transfer characteristics

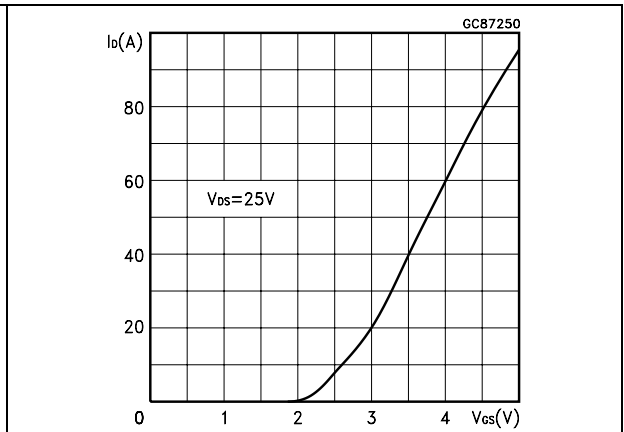


Figure 5. Transconductance

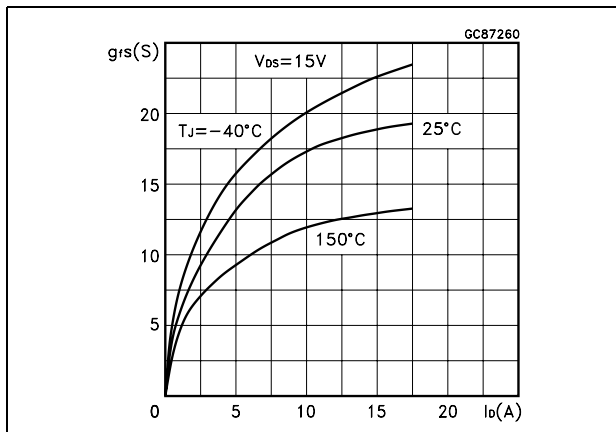
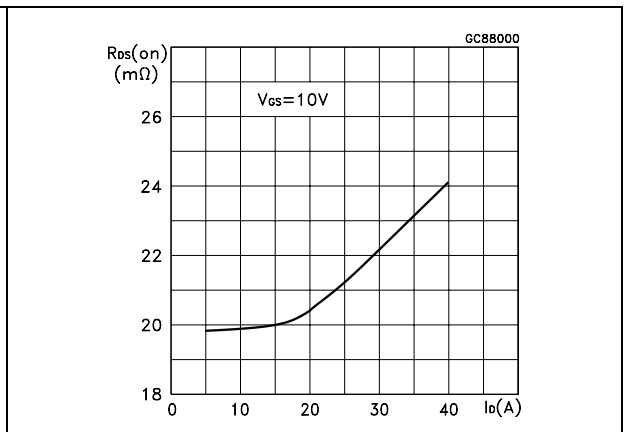


Figure 6. Static drain-source on resistance



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Electrical characteristics

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

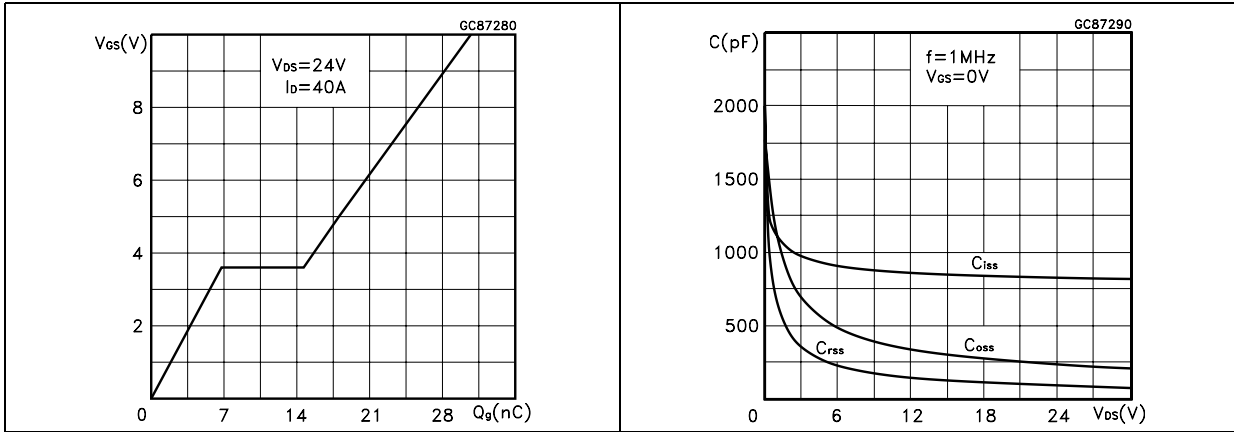


Figure 9. Normalized gate threshold voltage vs. temperature **Figure 10. Normalized on resistance vs. temperature**

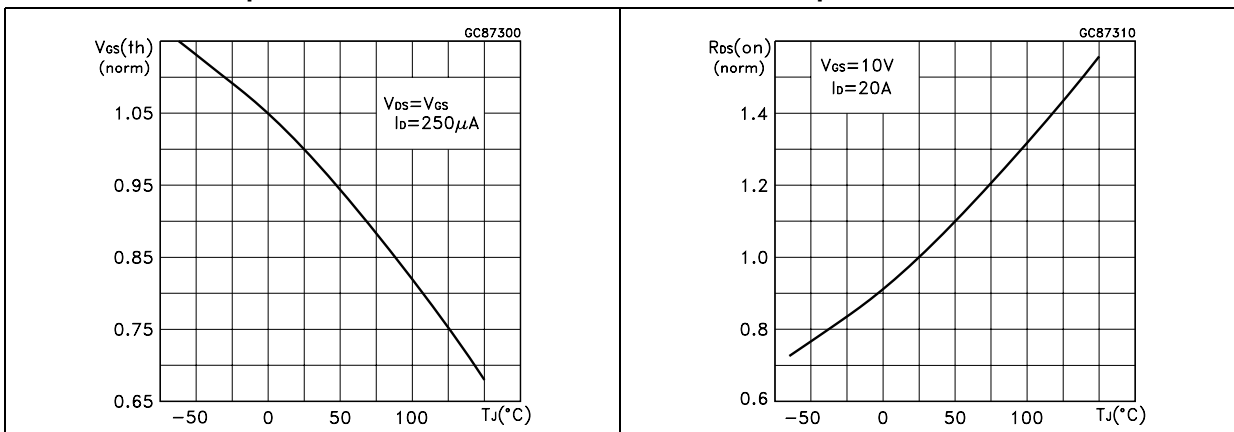
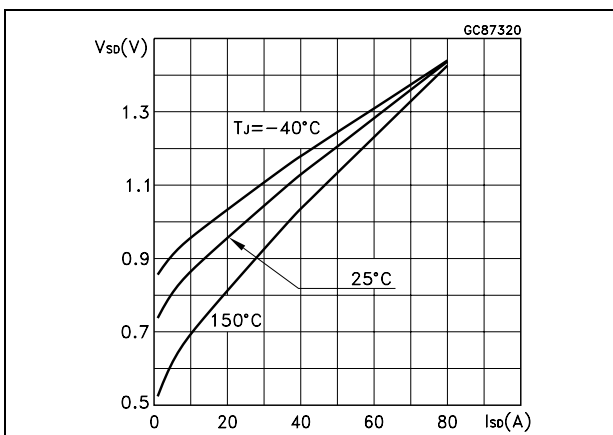


Figure 11. Source-drain diode forward characteristics



Test circuit

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3 Test circuit

Figure 12. Switching times test circuit for resistive load

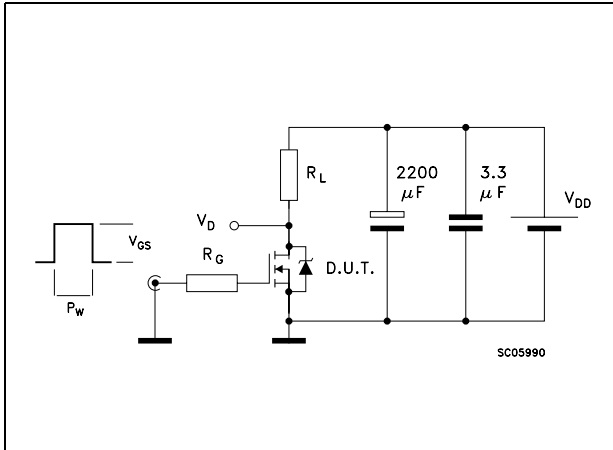


Figure 13. Gate charge test circuit

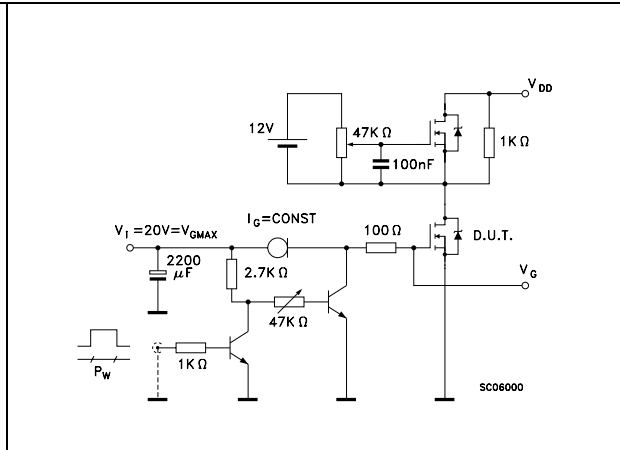


Figure 14. Test circuit for inductive load switching and diode recovery times

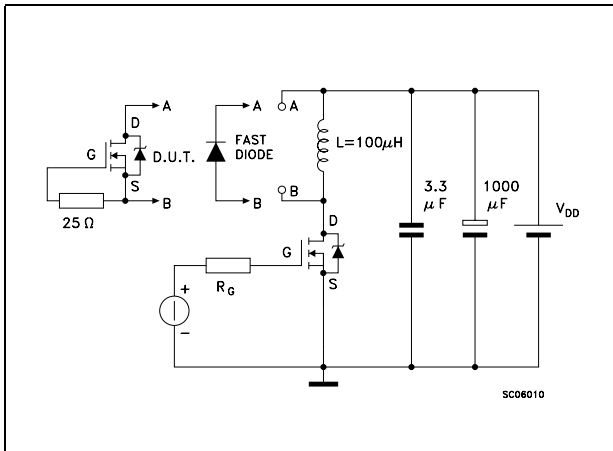


Figure 15. Unclamped Inductive load test circuit

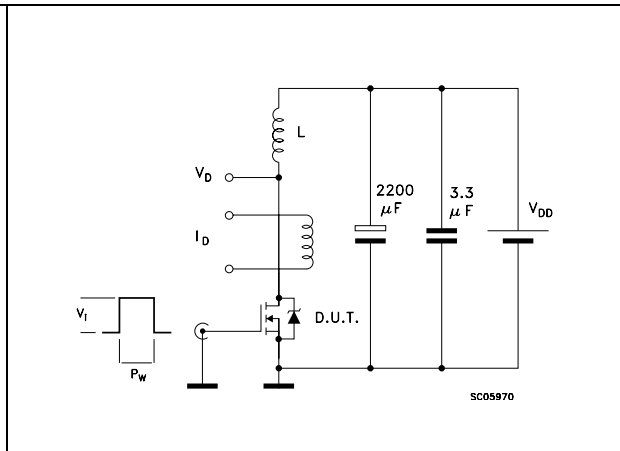


Figure 16. Unclamped inductive waveform

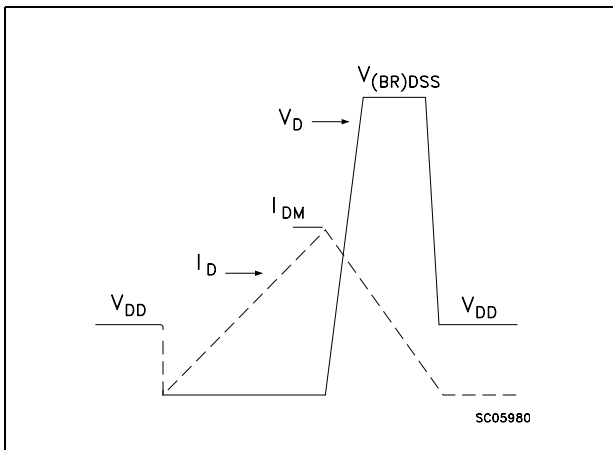
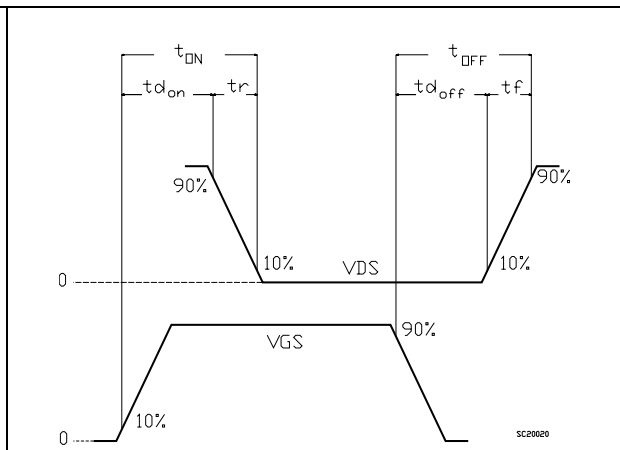


Figure 17. Switching time waveform



4 Package mechanical data

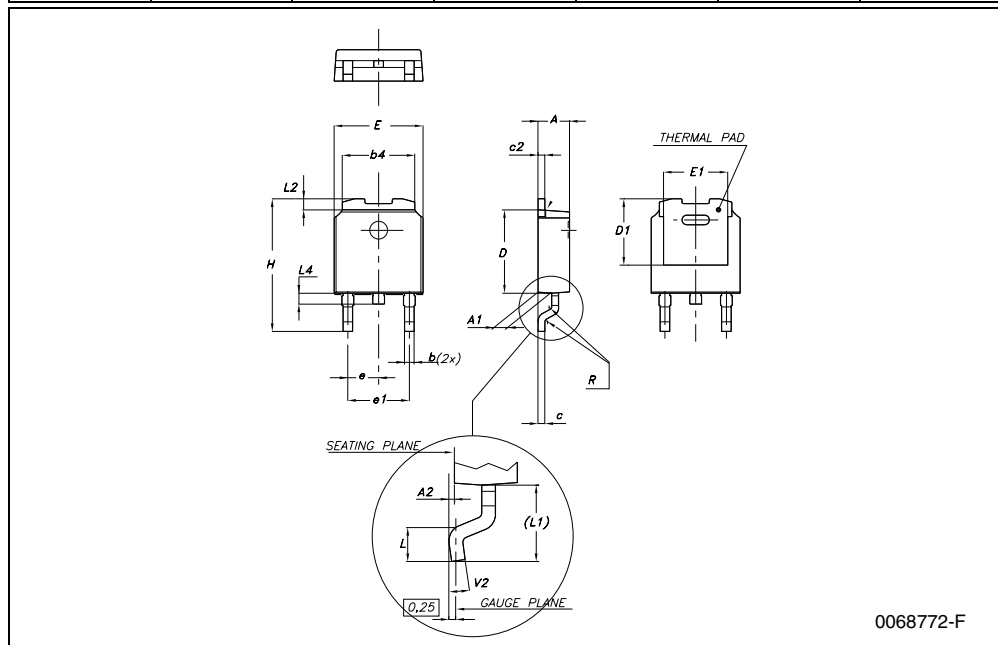
In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings 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

Package mechanical data

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DPAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		2.28			0.090	
e1	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L	1			0.039		
(L1)		2.8			0.110	
L2		0.8			0.031	
L4	0.6		1	0.023		0.039
R		0.2			0.008	
V2	0°		8°	0°		8°

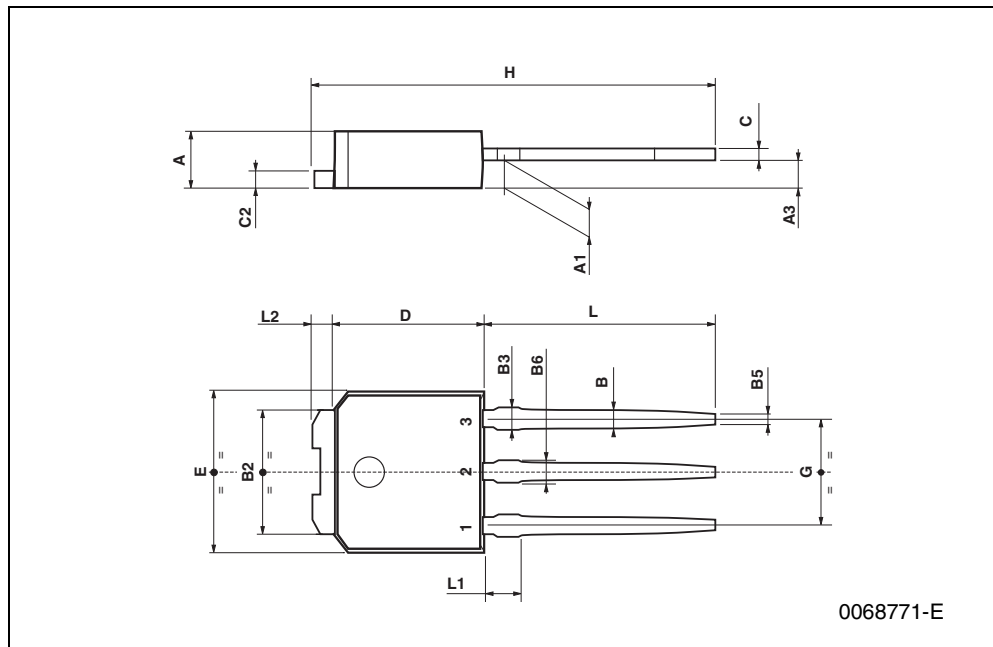


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Package mechanical data

TO-251 (IPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039

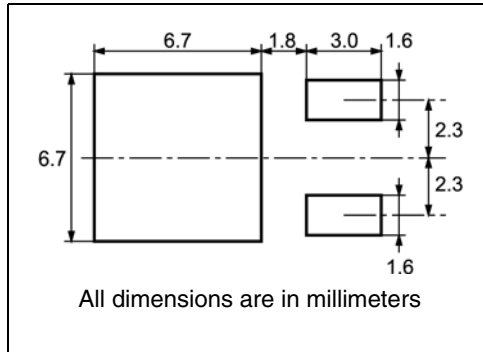


Packing mechanical data

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5 Packing mechanical data

DPAK 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		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY	BULK QTY
2500	2500

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

6 Revision history

Table 6. Revision history

Date	Revision	Changes
21-Jun-2004	4	Preliminary version
03-Jul-2006	5	New template, no content change
20-Feb-2007	6	Typo mistake on page 1

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