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STP75NF68

N-channel 68 V, 0.010 Ω , 80 A, TO-220
 STripFET™ II Power MOSFET

Features

Type	V _{DSS}	R _{DS(on) max}	I _D
STP75NF68	68 V	< 0.014 Ω	80 A

- Exceptional dv/dt capability
- 100% avalanche tested

Application

- Switching applications

Description

This Power MOSFET series realized with STMicroelectronics unique STripFET™ process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable in advanced high-efficiency switching applications.

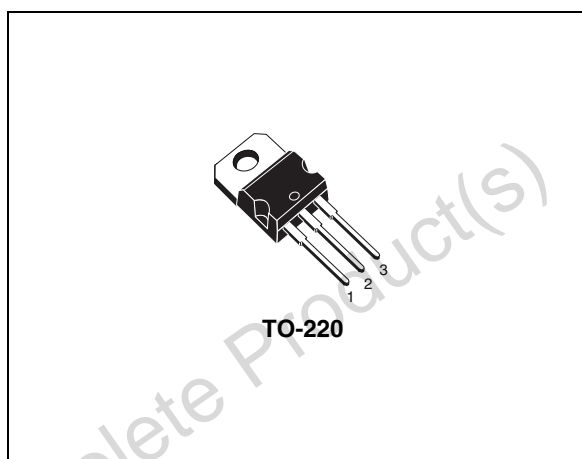


Figure 1. Internal schematic diagram

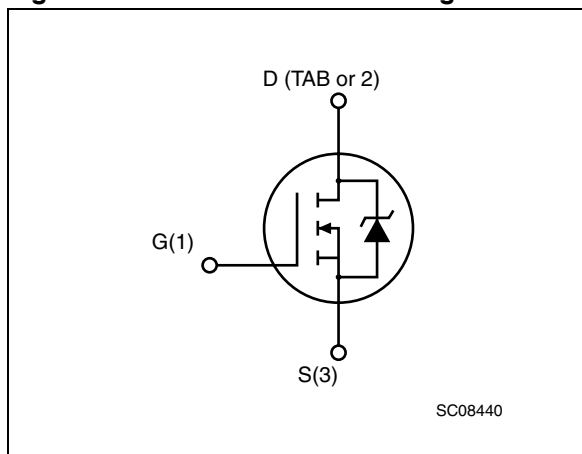


Table 1. Device summary

Order code	Marking	Package	Packaging
STP75NF68	75NF68	TO-220	Tube

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Obsolete Product(s) - Obsolete Product(s)

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source voltage (V _{GS} = 0)	68	V
V _{GS}	Gate-source voltage	± 20	V
I _D	Drain current (continuous) at T _C = 25 °C	80	A
I _D	Drain current (continuous) at T _C =100 °C	56	A
I _{DM} ⁽¹⁾	Drain current (pulsed)	320	A
P _{TOT}	Total dissipation at T _C = 25 °C	190	W
	Derating factor	1.27	W/°C
dv/dt ⁽²⁾	Peak diode recovery voltage slope	13	V/ns
E _{AS} ⁽³⁾	Single pulse avalanche energy	700	mJ
T _{stg}	Storage temperature	-55 to 175	°C
T _J	Operating junction temperature	175	°C

1. Pulse width limited by safe operating area
2. I_{SD} ≤ 80 A, di/dt ≤ 300 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ T_{JMAX}
3. Starting T_J = 25 °C, I_D = 40 A, V_{DD} = 34 V

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R _{thj-case}	Thermal resistance junction-case max	0.79	°C/W
R _{thj-amb}	Thermal resistance junction-ambient max	62.5	°C/W
T _l	Maximum lead temperature for soldering purpose ⁽¹⁾	300	°C

1. 1.6mm from case for 10 sec

Electrical characteristics
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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	68			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} = ±20 V			±100	nA
V _{GS(th)}	Gate threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	2	3	4	V
R _{DS(on)}	Static drain-source on resistance	V _{GS} = 10 V, I _D = 40 A		0.010	0.014	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g _{fs} ⁽¹⁾	Forward transconductance	V _{DS} = 15 V, I _D = 40 A		60		S
C _{iss}	Input capacitance	V _{DS} = 25 V, f = 1 MHz, V _{GS} = 0		2550		pF
C _{oss}	Output capacitance			550		pF
C _{rss}	Reverse transfer capacitance			175		pF
Q _g	Total gate charge	V _{DD} = 34 V, I _D = 80 A V _{GS} = 10 V		75		nC
Q _{gs}	Gate-source charge			17		nC
Q _{gd}	Gate-drain charge			30		nC

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

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Electrical characteristics

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 34\text{ V}$, $I_D = 40\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ <i>Figure 13 on page 8</i>		17		ns
t_r	Rise time			60		ns
$t_{d(off)}$	Turn-off delay time			90		ns
t_f	Fall time			75		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	$I_{SD} = 80\text{ A}$, $V_{GS} = 0$			1.5	V
t_{rr}	Reverse recovery time	$I_{SD} = 80\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 25\text{ V}$, $T_J = 150\text{ }^\circ\text{C}$ <i>Figure 15 on page 8</i>		70		ns
Q_{rr}	Reverse recovery charge			160		μC
I_{RRM}	Reverse recovery current			4.7		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 2. Safe operating area

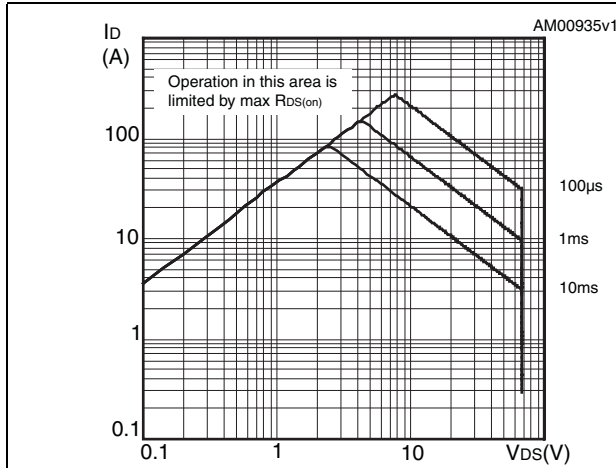


Figure 3. Thermal impedance

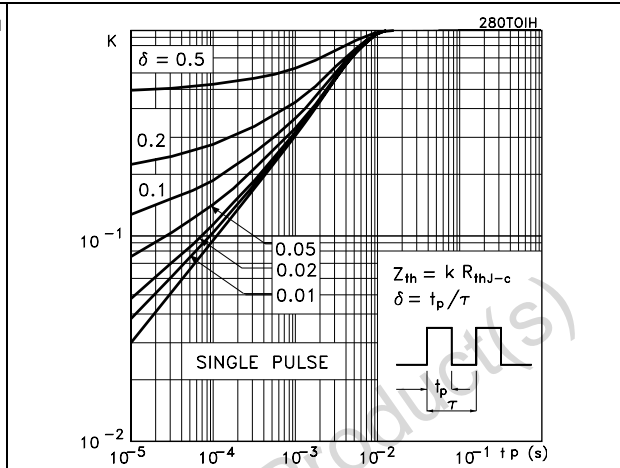


Figure 4. Output characteristics

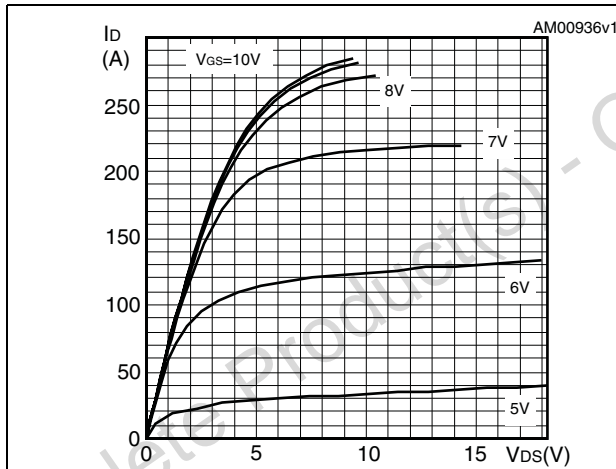


Figure 5. Transfer characteristics

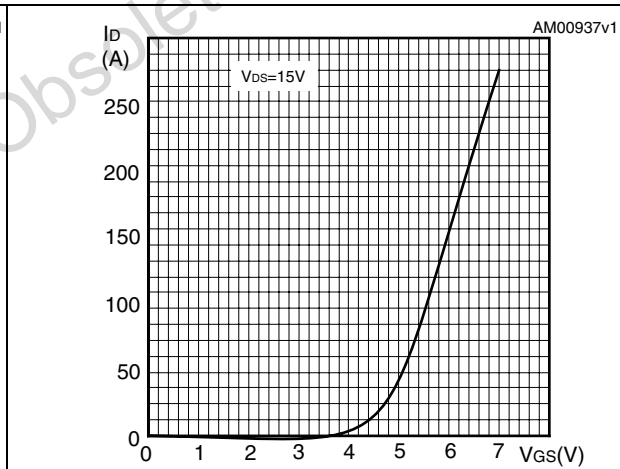


Figure 6. Normalized BV_{DSS} vs temperature

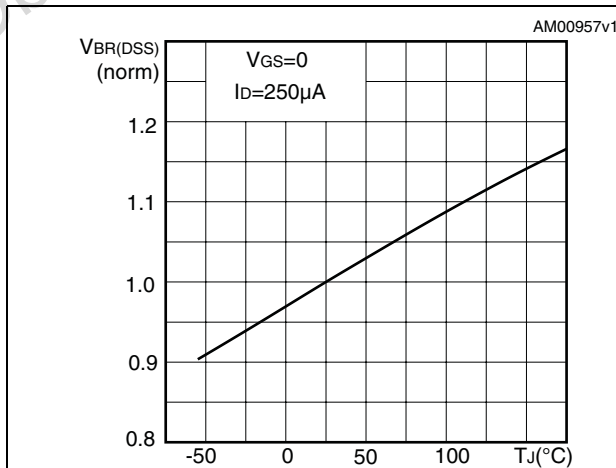
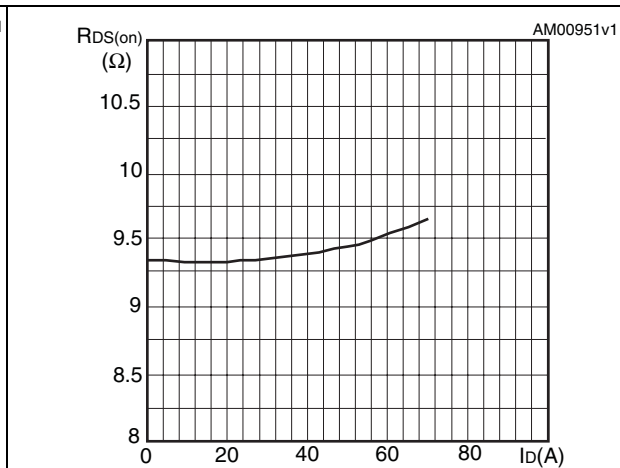


Figure 7. Static drain-source on resistance



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Electrical characteristics

Figure 8. Gate charge vs gate-source voltage **Figure 9. Capacitance variations**

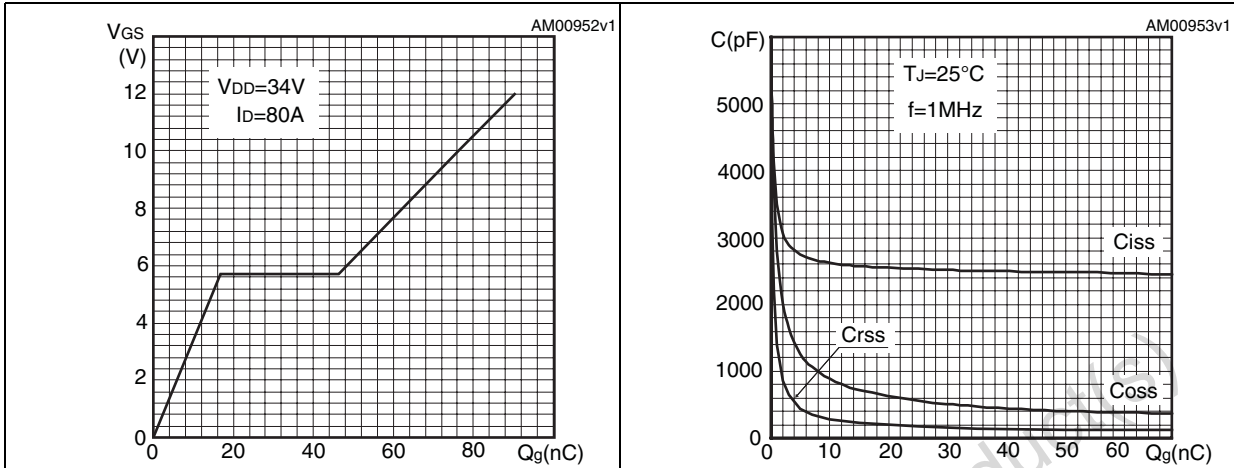


Figure 10. Normalized gate threshold voltage vs temperature **Figure 11. Normalized on resistance vs temperature**

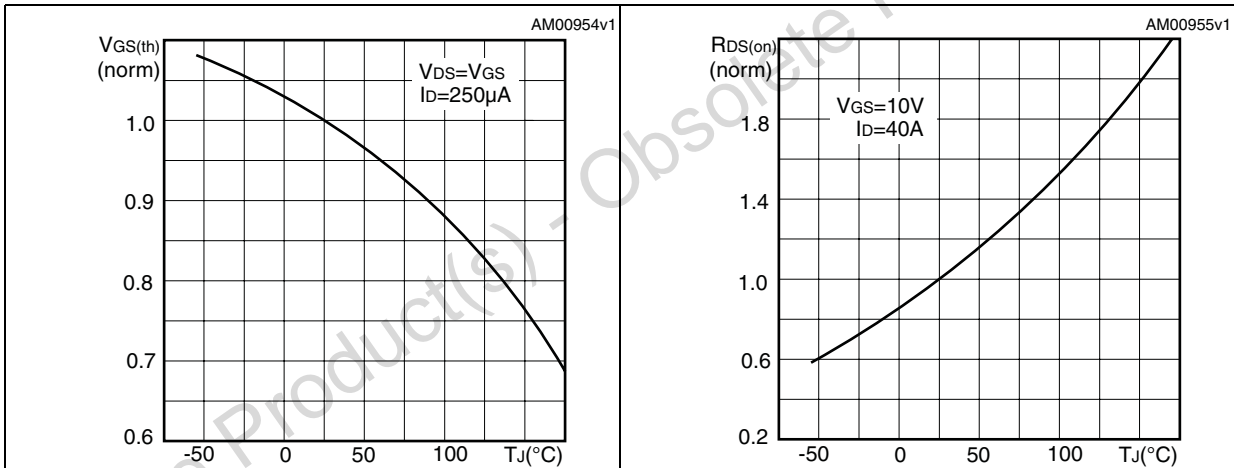
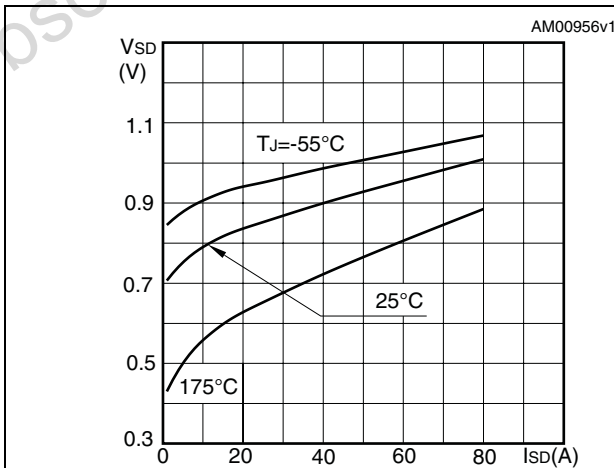


Figure 12. Source-drain diode forward characteristics



3 Test circuits

Figure 13. Switching times test circuit for resistive load

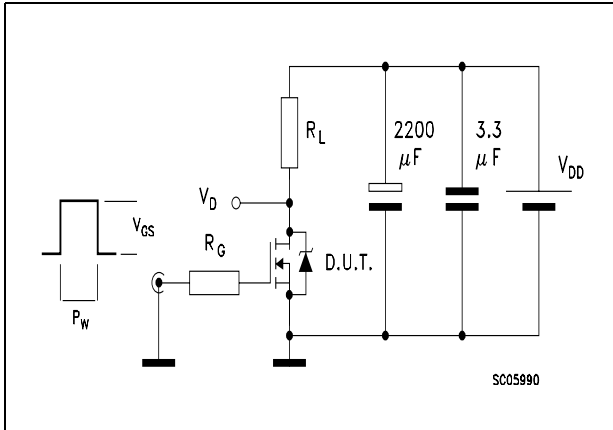


Figure 14. Gate charge test circuit

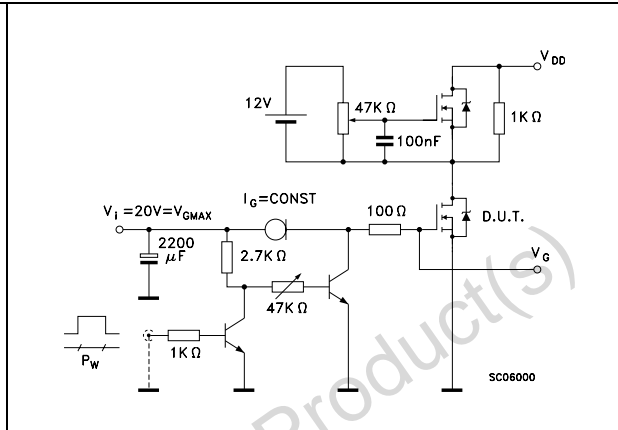


Figure 15. Test circuit for inductive load switching and diode recovery times

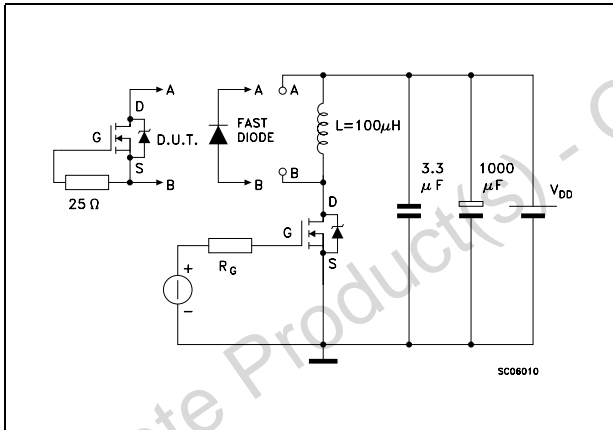


Figure 16. Unclamped inductive load test circuit

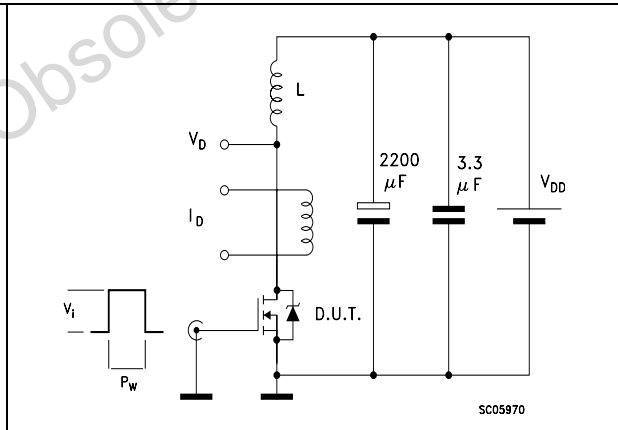
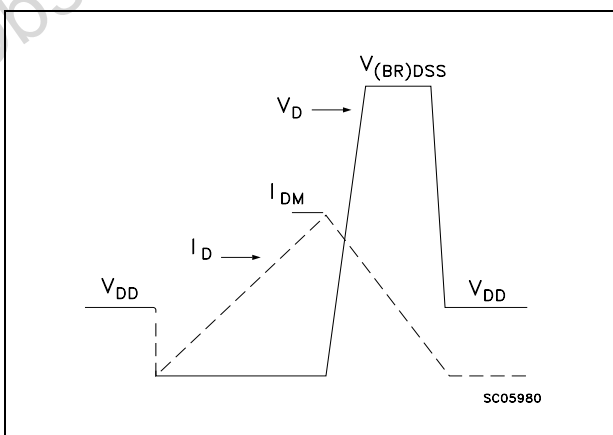


Figure 17. Unclamped inductive waveform



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

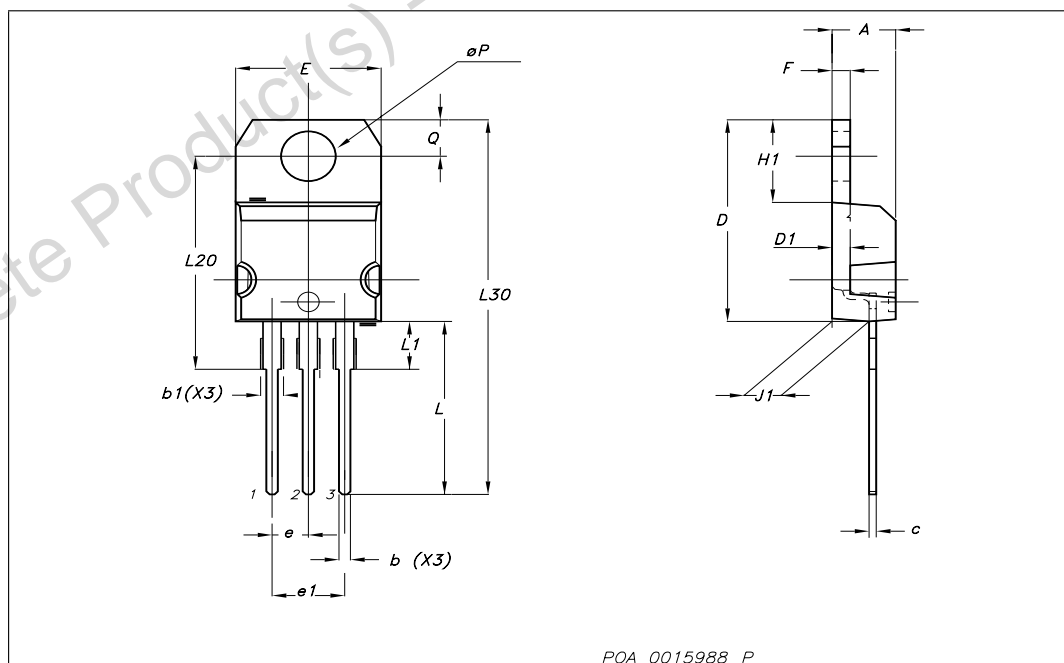
Obsolete Product(s) - Obsolete Product(s)

Package mechanical data

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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	0.49		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



5 Revision history

Table 8. Document revision history

Date	Revision	Changes
24-Jul-2008	1	First release
06-Aug-2008	2	Document status promoted from preliminary data to datasheet

Obsolete Product(s) - Obsolete Product(s)

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