

### Features

- Optimized for sustain and energy recovery circuits in PDP applications.
- State-of-the-art STripFET™ technology
- Peak collector current  $I_{RP} = 330 \text{ A}$  @  $T_C = 25 \text{ °C}$  (see [Table 2](#))
- Very low-on voltage drop ( $V_{CE(sat)}$ ) and energy per pulse for improved panel efficiency
- High repetitive peak current capability

### Description

Advanced high-density and high-current IGBT technology with low-drop companion diode adapted to various functions in PDP sets.

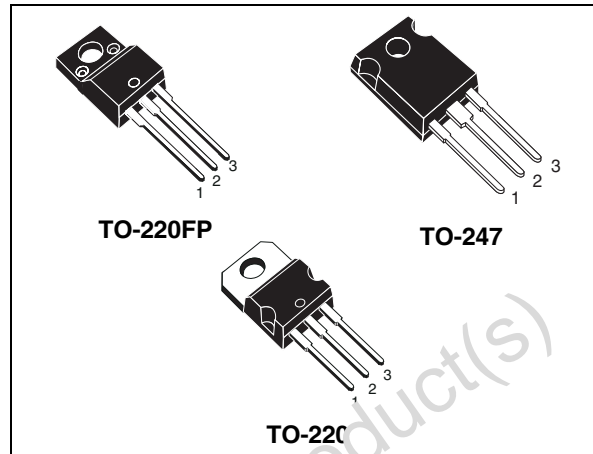


Figure 1. Internal schematic diagram

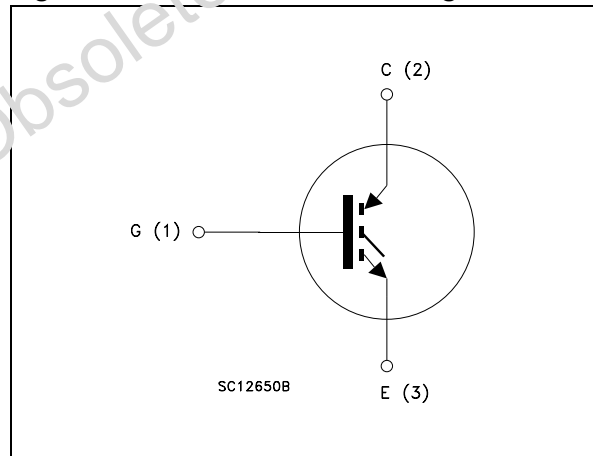


Table 1. Device summary

Order codes	Marking	Package	Packaging
STGF100N30	GF100N30	TO-220FP	Tube
STGP100N30	GP100N30	TO-220	Tube
STGW100N30	GW100N30	TO-247	Tube

# Contents

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value			Unit
		TO-220	TO-247	TO-220FP	
V <sub>CES</sub>	Collector-emitter voltage (V <sub>GE</sub> = 0)	330			V
I <sub>C</sub> <sup>(1)</sup>	Collector current (continuous) at T <sub>C</sub> = 25 °C	90		20	A
I <sub>C</sub> <sup>(1)</sup>	Collector current (continuous) at T <sub>C</sub> = 100 °C	45		10	A
I <sub>CL</sub> <sup>(2)</sup>	Turn-off latching current	330			A
I <sub>RP</sub>	Repetitive peak current at T <sub>C</sub> = 25 °C	330 <sup>(3)</sup>			A
V <sub>GE</sub>	Gate-emitter voltage (continuous)	±20			V
ESD (HBM)	Electrostatic sensitive discharge, human body model applied to all three pins (C = 100 pF, R = 1.5 kΩ)	3			KV
ESD (MM)	Electrostatic sensitive discharge, machine model applied to all three pins (C = 200 pF, R = 0)	300			V
P <sub>TOT</sub>	Total dissipation at T <sub>C</sub> = 25 °C	250		40	W
T <sub>j</sub>	Operating junction temperature	- 55 to 150			°C

1. Calculated according to the iterative formula:

$$I_C(T_C) = \frac{T_{j(max)} - T_C}{R_{thj-c} \times V_{CE(sat)(max)}(T_{j(max)}, I_C(T_C))}$$

2. V<sub>clamp</sub> = 300 V, T<sub>j</sub> = 150 °C, R<sub>G</sub> = 10 Ω, V<sub>GE</sub> = 15 V

3. Half sine wave with duty cycle = 1%, t<sub>on</sub> > 1 μs

**Table 3. Thermal resistance**

Symbol	Parameter	Value			Unit
		TO-220	TO-247	TO-220FP	
R <sub>thj-case</sub>	Thermal resistance junction-case max	0.5		3.2	°C/W
R <sub>thj-amb</sub>	Thermal resistance junction-ambient max	62.5	50	62.5	°C/W

## 2 Electrical characteristics

( $T_{CASE} = 25\text{ °C}$  unless otherwise specified)

**Table 4. Static**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-emitter breakdown voltage ( $V_{GE} = 0$ )	$I_C = 1\text{ mA}$	330			V
$V_{CE(sat)}$	Collector-emitter saturation voltage	$V_{GE} = 15\text{ V}$ , $I_C = 50\text{ A}$ $V_{GE} = 15\text{ V}$ , $I_C = 100\text{ A}$ , $T_C = 125\text{ °C}$		1.9 2.6	2.5	V V
$V_{GE(th)}$	Gate threshold voltage	$V_{CE} = 10\text{ V}$ , $I_C = 1\text{ mA}$	3.0		5.5	V
$I_{CES}$	Collector cut-off current ( $V_{GE} = 0$ )	$V_{CE} = 330\text{ V}$ $V_{CE} = 330\text{ V}$ , $T_C = 125\text{ °C}$		1	3 200	$\mu\text{A}$ $\mu\text{A}$
$I_{GES}$	Gate-emitter leakage current ( $V_{CE} = 0$ )	$V_{GE} = \pm 20\text{ V}$			$\pm 1$	$\mu\text{A}$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$R_{ies}$	Input resistance			2		$\Omega$
$C_{ies}$	Input capacitance	$V_{CE} = 25\text{ V}$ , $f = 1\text{ MHz}$ ,		3550		pF
$C_{oes}$	Output capacitance	$V_{GE} = 0$		35		pF
$C_{res}$	Reverse transfer capacitance			335		pF

**Table 6. Switching on/off (inductive load)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{rise}$	Turn-off voltage rise time	$V_{GE} = 15\text{ V}$ , $I_C = 25\text{ A}$ ,		25		ns
$t_{doff}$	Turn-off delay time	$V_{CC} = 180\text{ V}$		134		ns
$t_{fall}$	Turn-off current fall time	$R_G = 10\ \Omega$ , $L = 25\ \mu\text{H}$ ,		57		ns
$t_{rise}$	Turn-off voltage rise time	$V_{GE} = 15\text{ V}$ , $I_C = 25\text{ A}$ ,		60		ns
$t_{doff}$	Turn-off delay time	$V_{CC} = 180\text{ V}$		200		ns
$t_{fall}$	Turn-off current fall time	$R_G = 10\ \Omega$ , $L = 25\ \mu\text{H}$ , $T_C = 150\text{ °C}$		110		ns
E/p	Energy per pulse	$V_{CC} = 240\text{ V}$ , $V_{GE} = 15\text{ V}$ , $R_G = 5.1\ \Omega$ , $L = 250\text{ nH}$ $C = 0.40\ \mu\text{F}$ (see Figure 15)		490		$\mu\text{J}$

## 2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

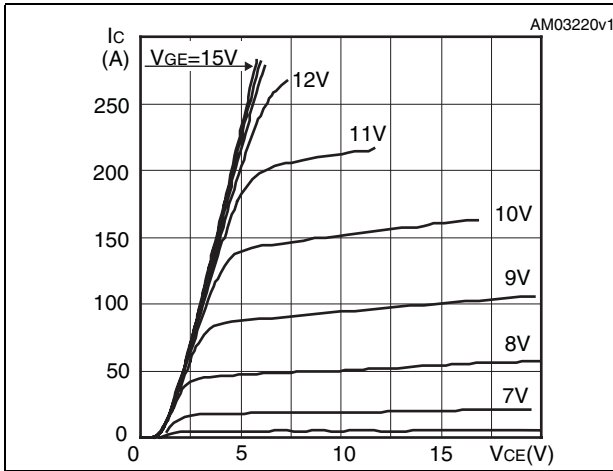


Figure 3. Transfer characteristics

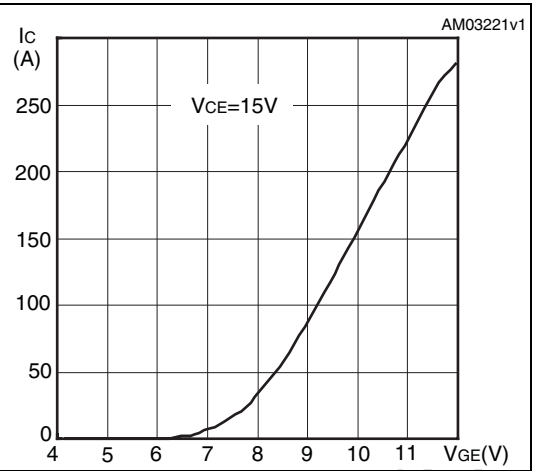


Figure 4. Transconductance

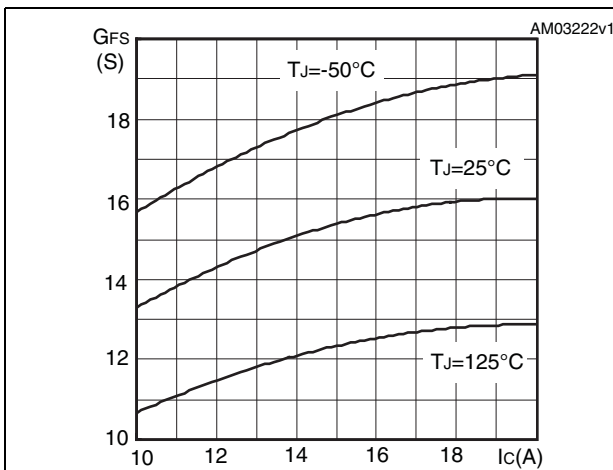


Figure 5. Collector-emitter on voltage vs. temperature

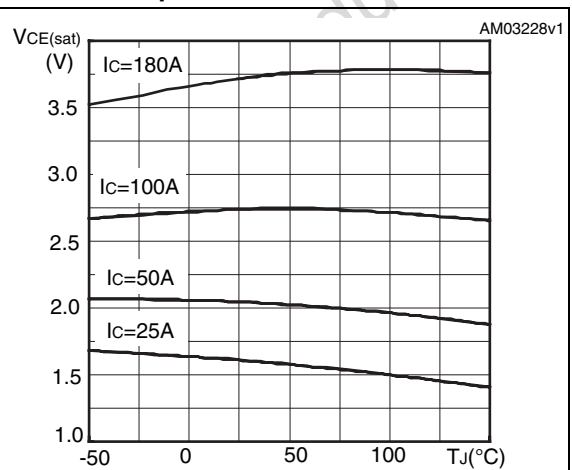


Figure 6. Gate charge vs. gate-source voltage

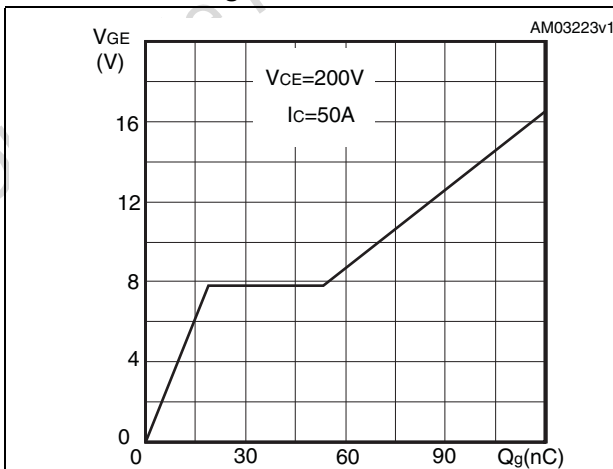
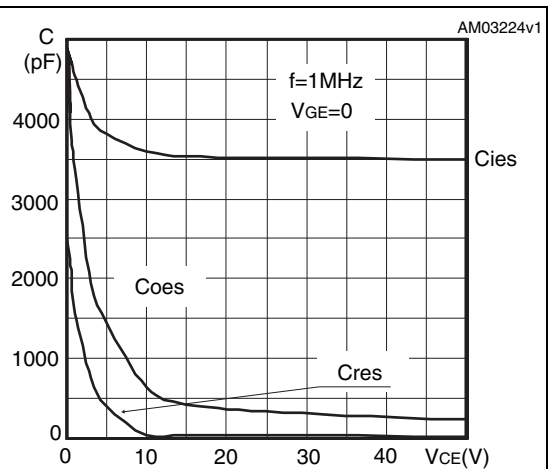
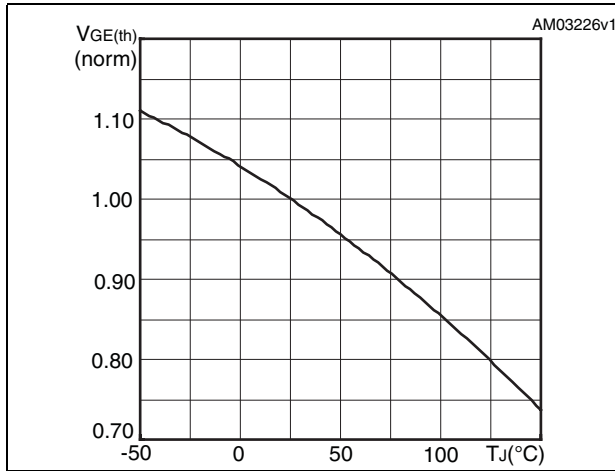


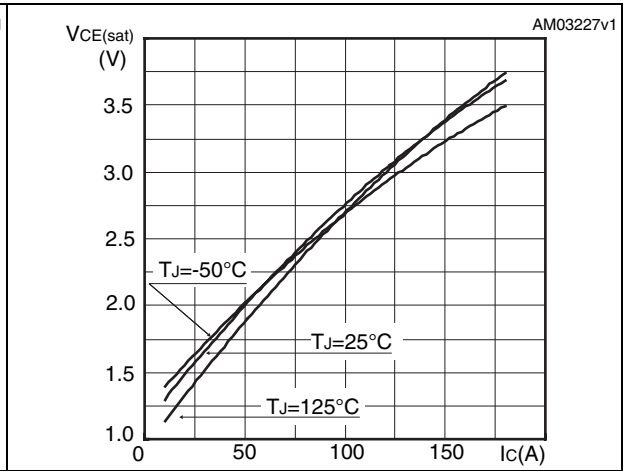
Figure 7. Capacitance variations



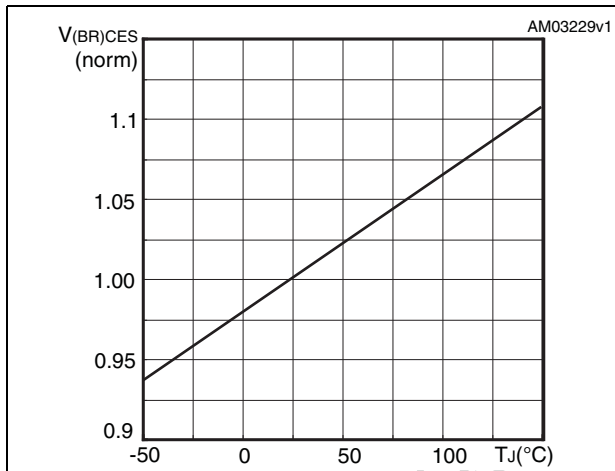
**Figure 8. Normalized gate threshold voltage vs. temperature**



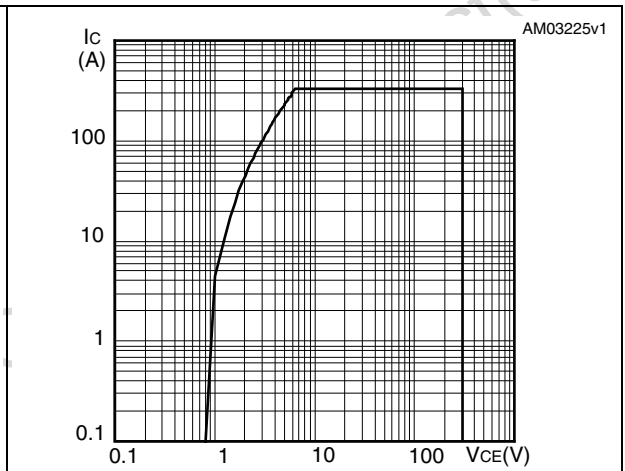
**Figure 9. Collector-emitter on voltage vs. collector current**



**Figure 10. Normalized breakdown voltage vs. temperature**



**Figure 11. Turn-off SOA**



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### 3 Test circuits

Figure 12. Test circuit for inductive load switching

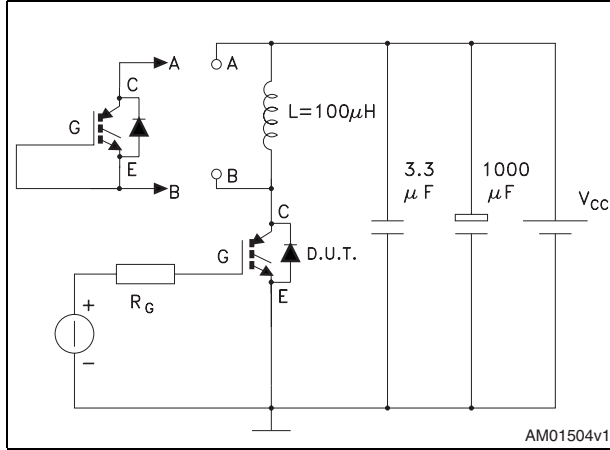


Figure 13. Gate charge test circuit

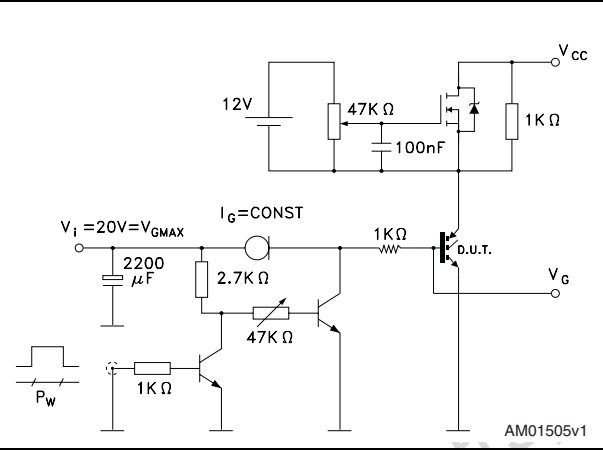


Figure 14. Switching waveforms

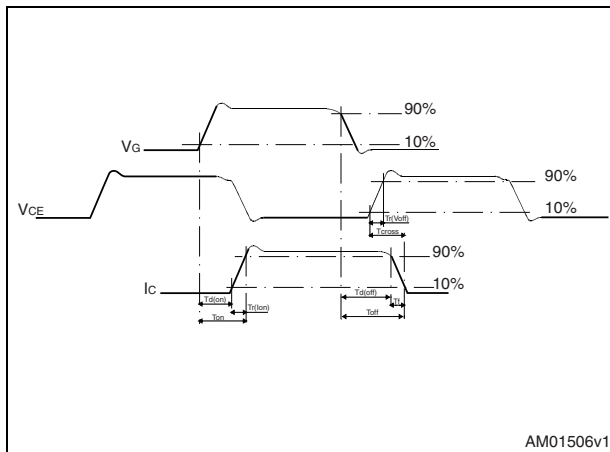
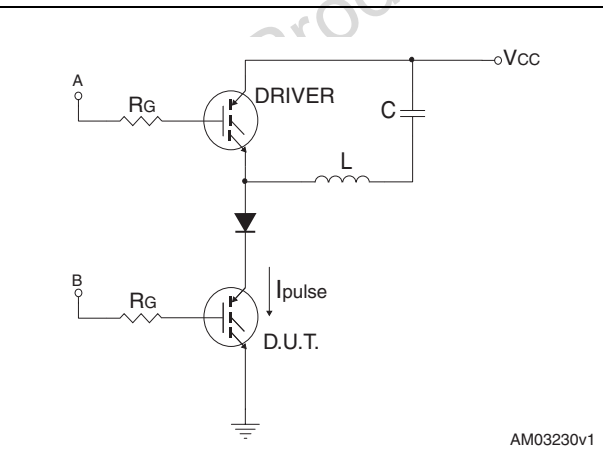


Figure 15. Energy per pulse test circuit



## 4 Package mechanical data

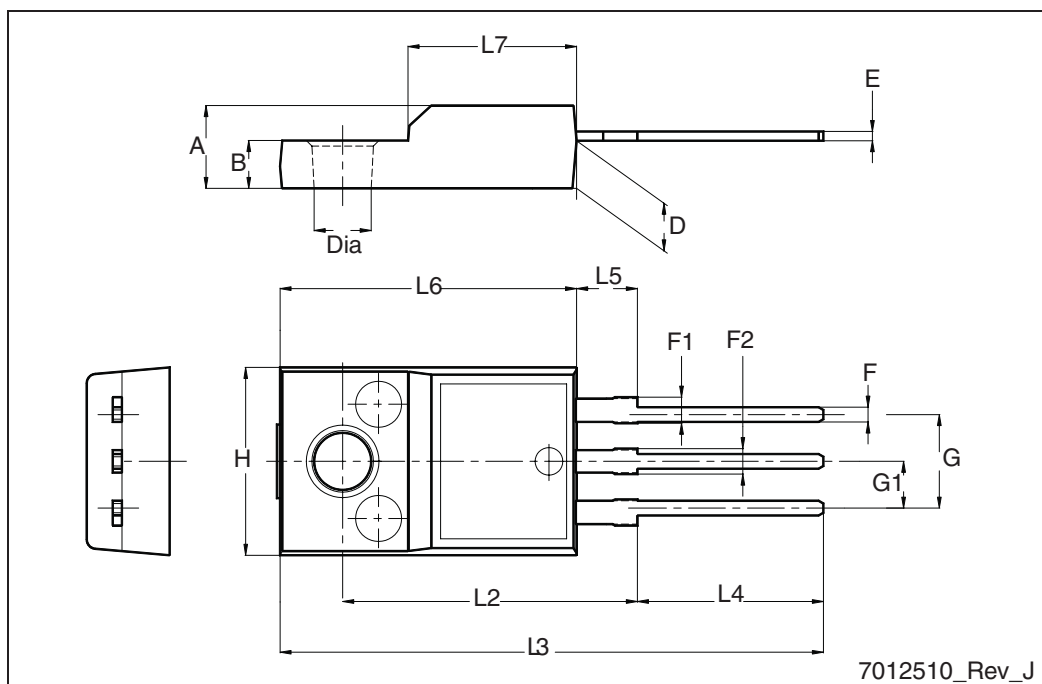
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## TO-220FP mechanical data

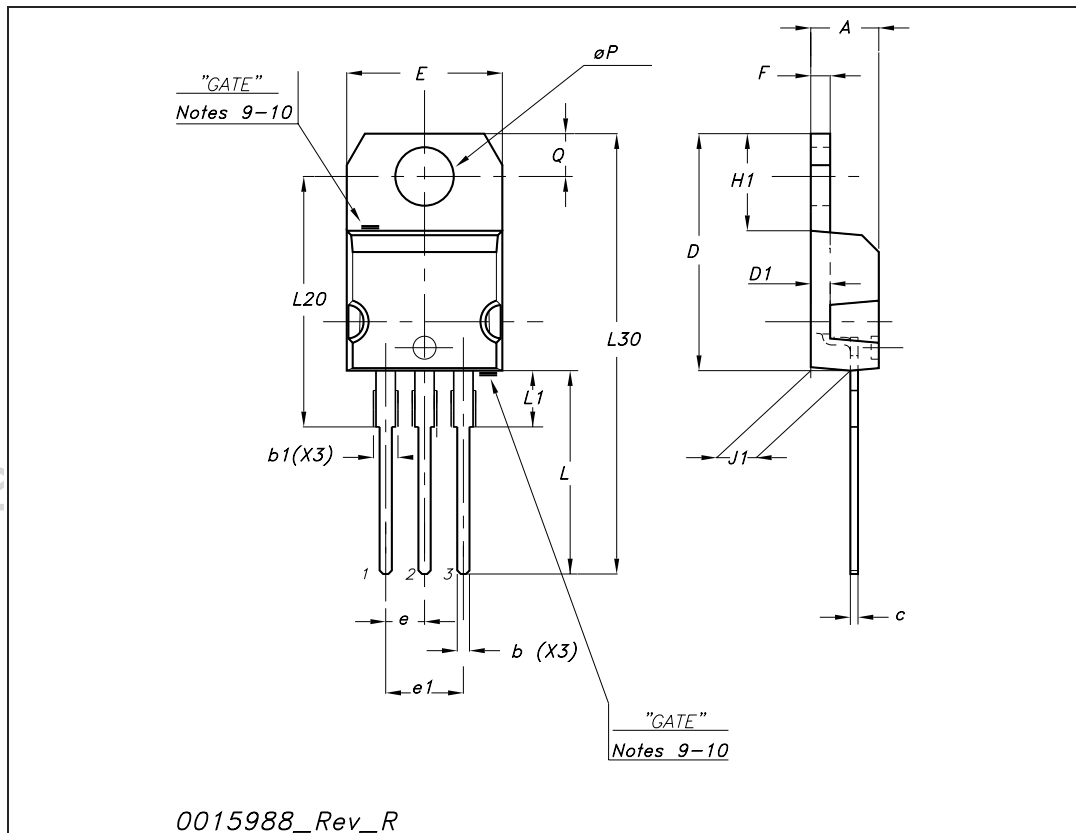
Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.5
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2



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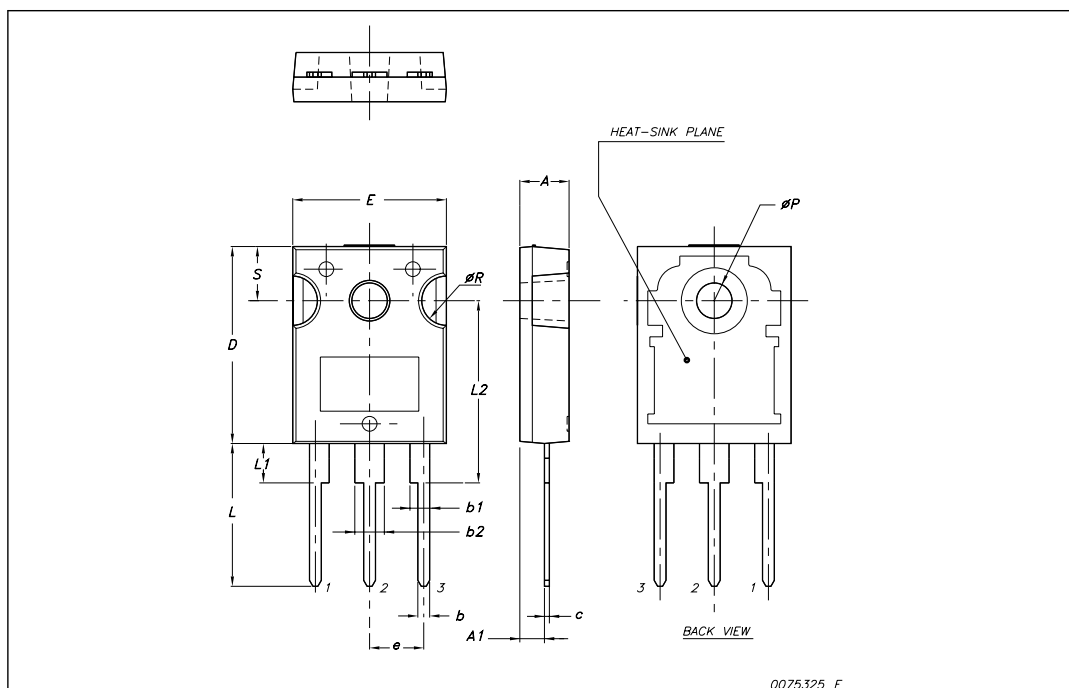
TO-220 mechanical data

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	0.48		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



## TO-247 Mechanical data

Dim.	mm.		
	Min.	Typ	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e		5.45	
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
øP	3.55		3.65
øR	4.50		5.50
S		5.50	



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## 5 Revision history

Table 7. Document revision history

Date	Revision	Changes
11-Feb-2009	1	Initial release.

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