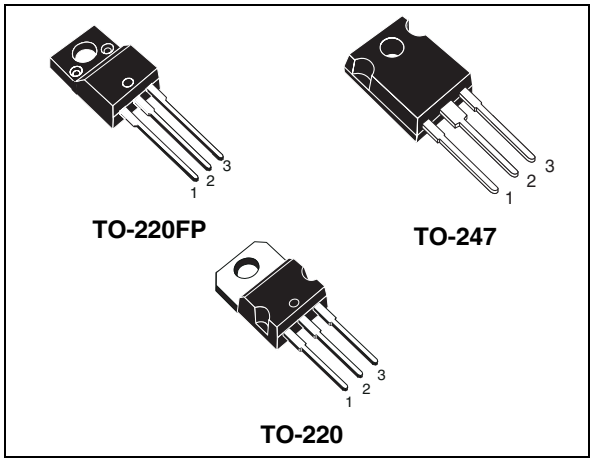
STGF100N30
STGP100N30, STGW100N30

90 A - 330 V - fast IGBT

Features

- Optimized for sustain and energy recovery circuits in PDP applications.
- State-of-the-art STripFET™ technology
- Peak collector current I_{RP} = 330 A @ T_C = 25 °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

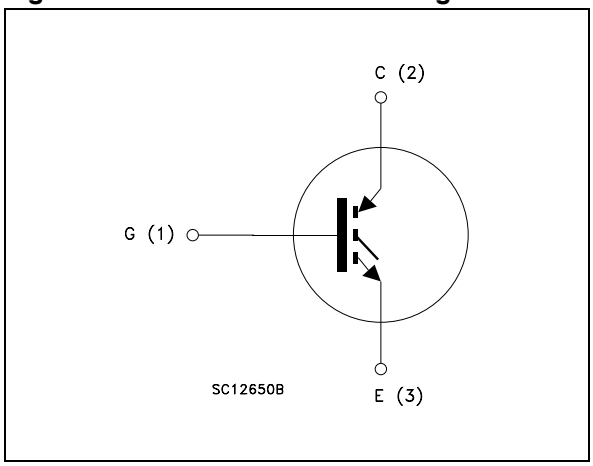


Table 1. Device summary

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

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value			Unit
		TO-220	TO-247	TO-220FP	
V_{CES}	Collector-emitter voltage (V_{GE} = 0)	330			V
I_C (1)	Collector current (continuous) at T_C = 25 °C	90		20	A
I_C (1)	Collector current (continuous) at T_C = 100 °C	45		10	A
I_{CL} (2)	Turn-off latching current	330			A
I_{RP}	Repetitive peak current at T_C = 25 °C	330 (3)			A
V_{GE}	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_{TOT}	Total dissipation at T_C = 25 °C	250		40	W
T_j	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_{clamp}= 300 V, T_j= 150 °C, R_G=10 Ω, V_{GE}=15 V
3. Half sine wave with duty cycle = 1%, t_{on} >1 µs

Table 3. Thermal resistance

Symbol	Parameter	Value			Unit
		TO-220	TO-247	TO-220FP	
$R_{thj\text{-}case}$	Thermal resistance junction-case max	0.5		3.2	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient max	62.5	50	62.5	°C/W

2 Electrical characteristics

(T_{CASE} = 25 °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 mA	330			V
$V_{CE(sat)}$	Collector-emitter saturation voltage	V_{GE}= 15 V, I_C= 50 A V_{GE}= 15 V, I_C= 100 A,T_C=125 °C		1.9 2.6	2.5	V V
$V_{GE(th)}$	Gate threshold voltage	V_{CE}=10 V, I_C= 1 mA	3.0		5.5	V
I_{CES}	Collector cut-off current (V_{GE}=0)	V_{CE}= 330 V V_{CE}= 330 V, T_C = 125 °C		1	3 200	µA µA
I_{GES}	Gate-emitter leakage current (V_{CE}= 0)	V_{GE}= ± 20 V			±1	µA

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
R_{ies}	Input resistance			2		Ω
C_{ies}	Input capacitance	V_{CE} = 25 V, f = 1 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} t_{doff} t_{fall}	Turn-off voltage rise time Turn-off delay time Turn-off current fall time	V_{GE} = 15 V, I_C = 25 A, V_{CC}=180 V R_G= 10 Ω, L= 25 µH,		25 134 57		ns ns ns
t_{rise} t_{doff} t_{fall}	Turn-off voltage rise time Turn-off delay time Turn-off current fall time	V_{GE} = 15 V, I_C = 25 A, V_{CC}=180 V R_G= 10 Ω, L= 25 µH, T_C= 150 °C		60 200 110		ns ns ns
E/p	Energy per pulse	V_{CC}=240 V, V_{GE} = 15 V, R_G= 5.1 Ω, L= 250 nH C=0.40 µF *(see Figure 15)*		490		µJ

2.1 Electrical characteristics (curves)

Figure 2. Output characteristics

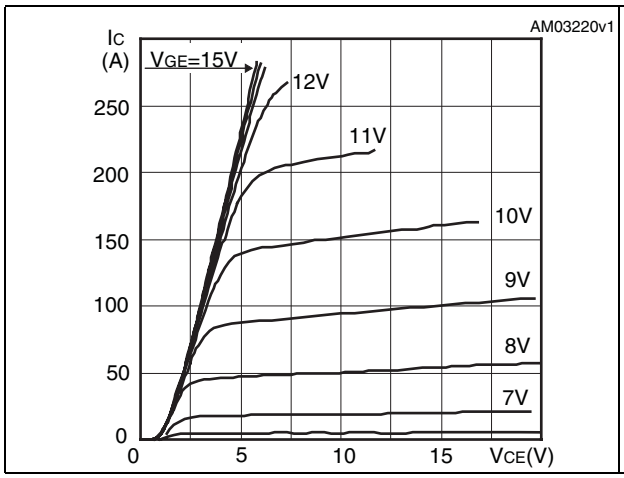


Figure 3. Transtransfer characteristics

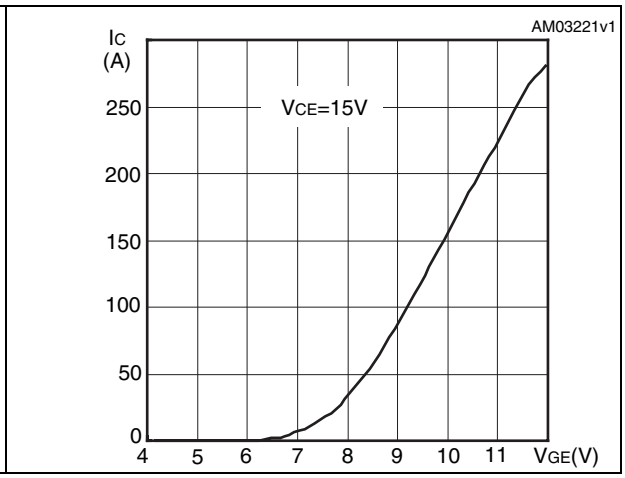


Figure 4. Transconductance

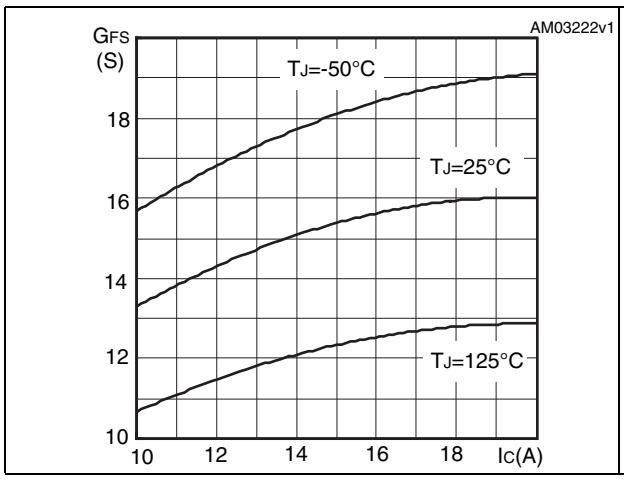


Figure 5. Collector-emitter on voltage vs. temperature

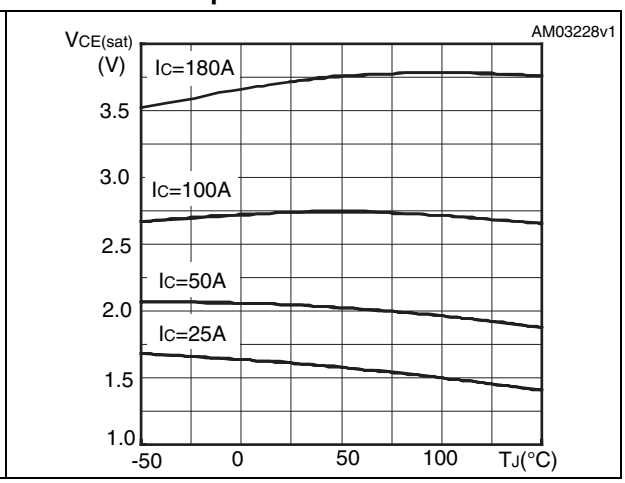


Figure 6. Gate charge vs. gate-source voltage

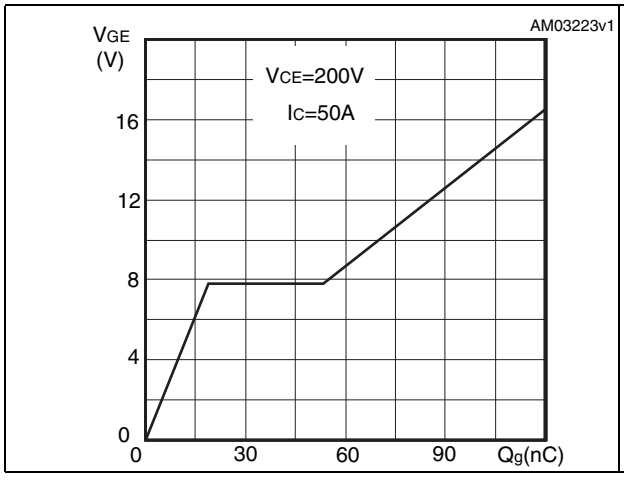


Figure 7. Capacitance variations

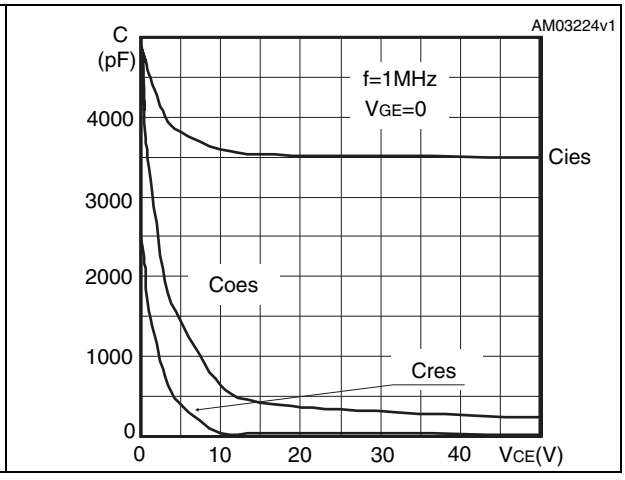


Figure 8. Normalized gate threshold voltage vs. temperature

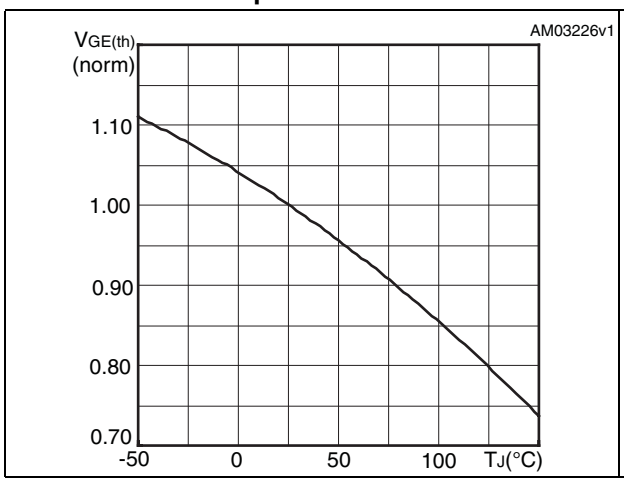


Figure 9. Collector-emitter on voltage vs. collector current

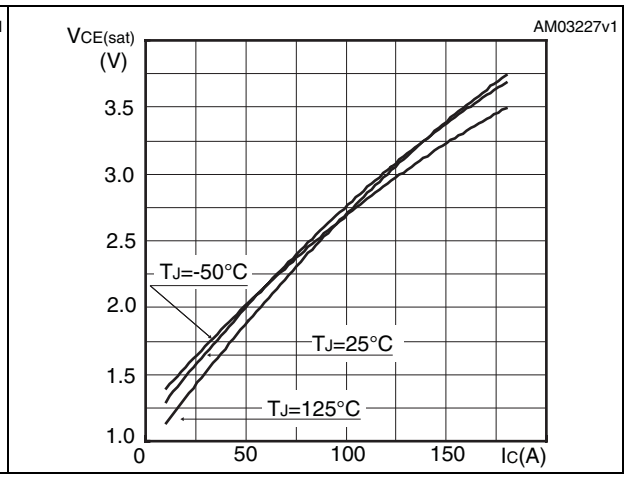


Figure 10. Normalized breakdown voltage vs. temperature

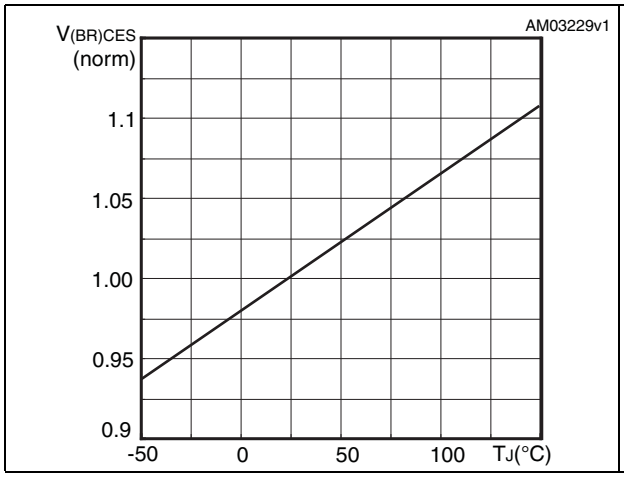
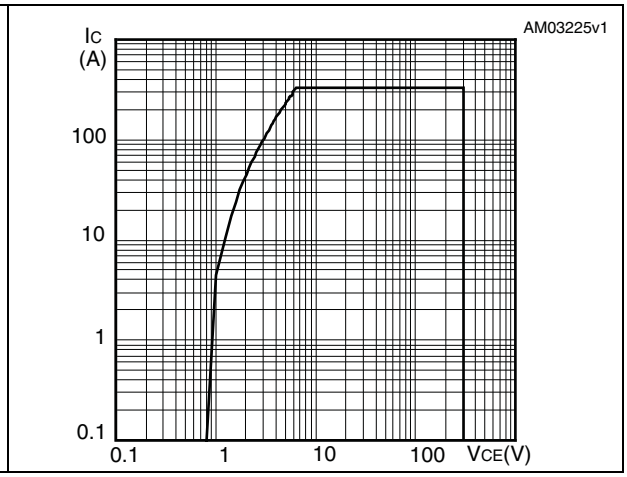


Figure 11. Turn-off SOA



3 Test circuits

Figure 12. Test circuit for inductive load switching

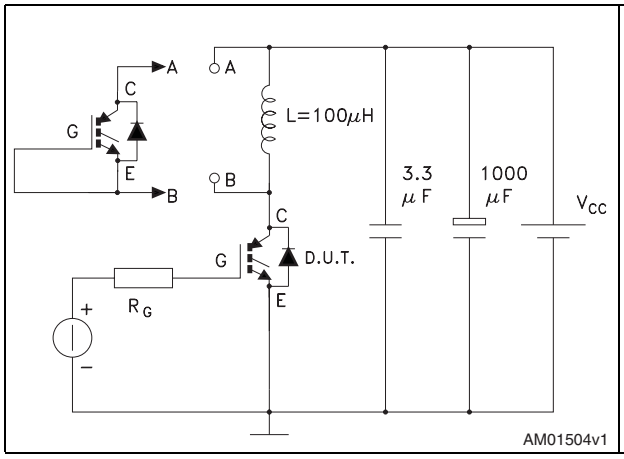


Figure 13. Gate charge test circuit

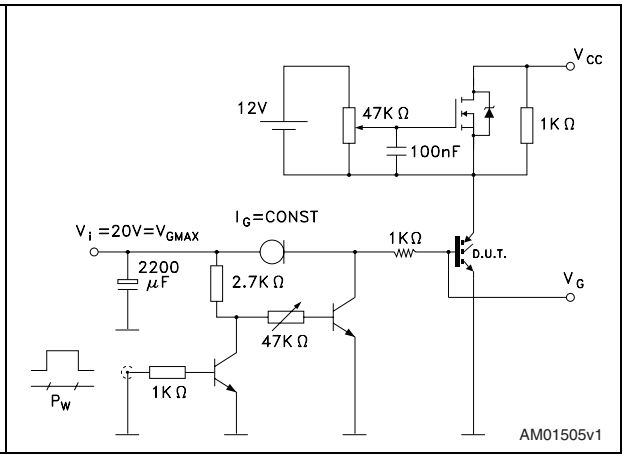


Figure 14. Switching waveforms

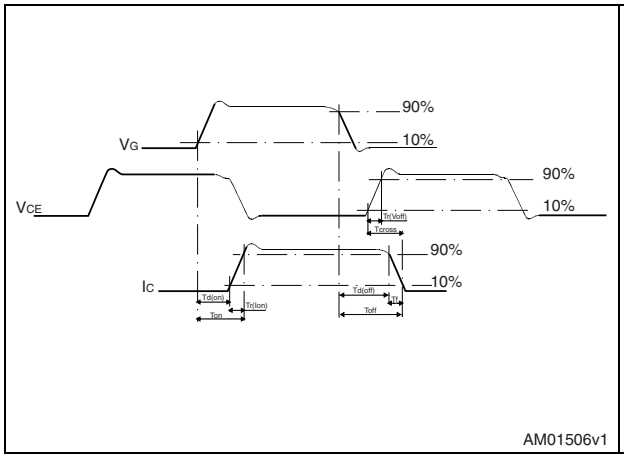
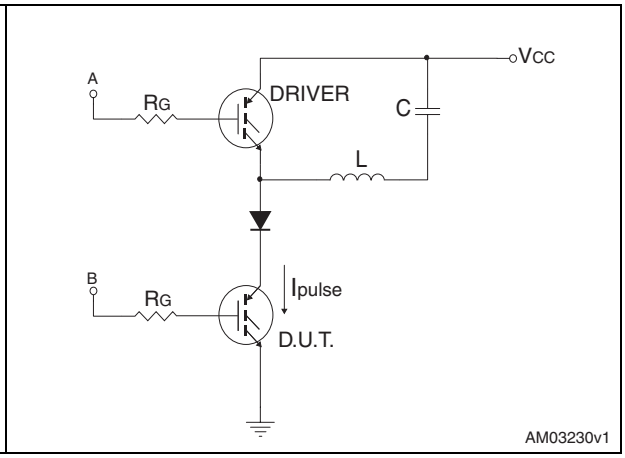


Figure 15. Energy per pulse test circuit



4 Package mechanical data

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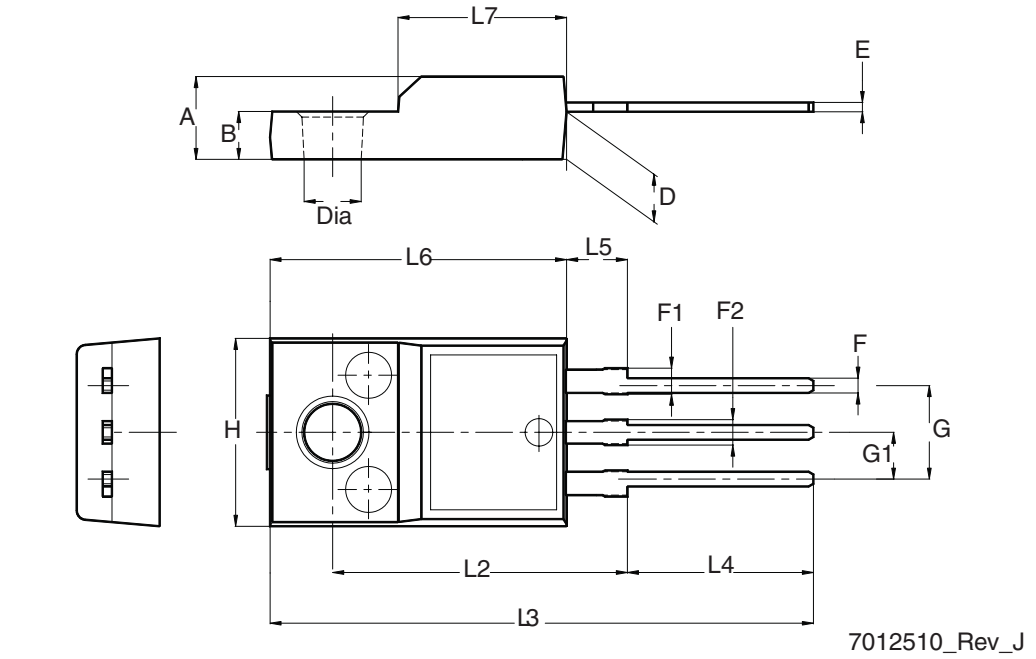
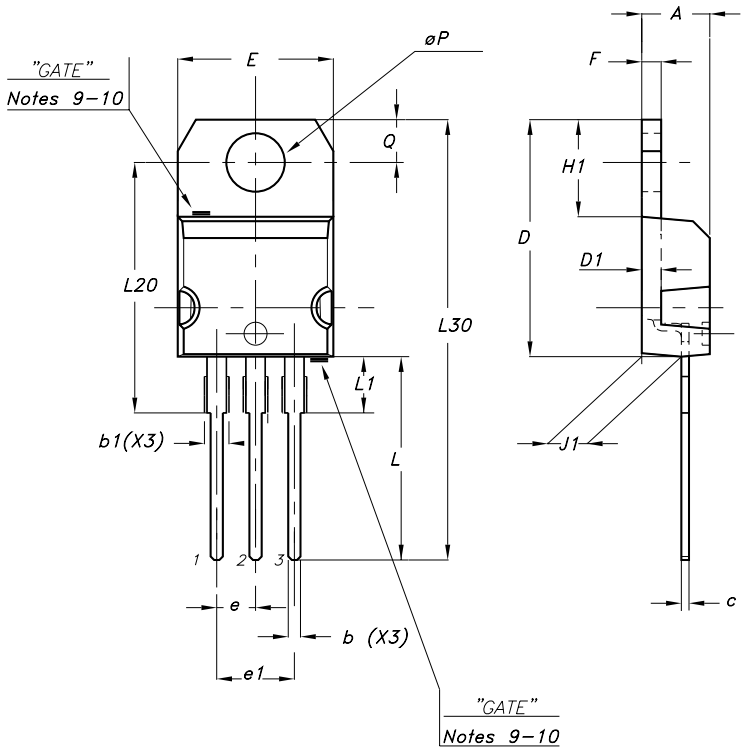
TO-220FP mechanical data

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



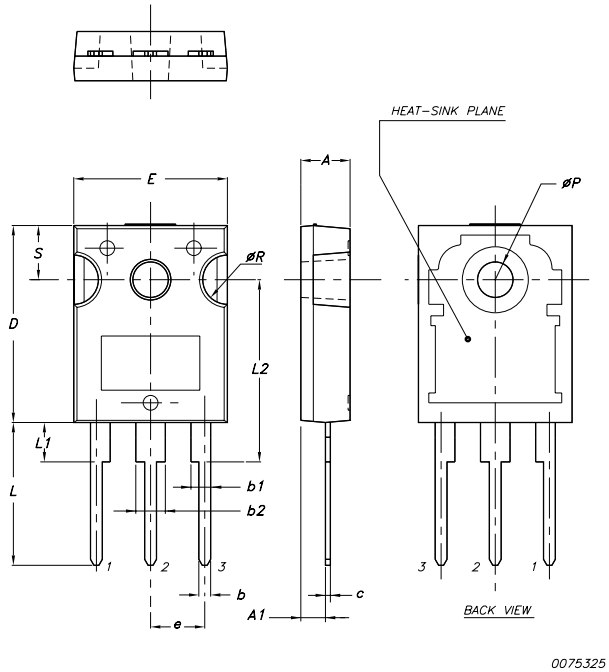
TO-220 mechanical data

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	



5 Revision history

Table 7. Document revision history

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

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