



STF6N62K3, STI6N62K3 STP6N62K3, STU6N62K3

N-channel 620 V, 0.95 Ω , 5.5 A SuperMESH3™ Power MOSFET
in TO-220FP, I²PAK, TO-220, IPAK

Features

Order codes	V _{DSS}	R _{DS(on)} max.	I _D	P _w
STF6N62K3	620 V	< 1.2 Ω	5.5 A	30 W
STI6N62K3				90 W
STP6N62K3				90 W
STU6N62K3				90 W

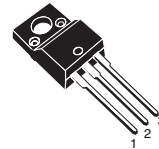
- 100% avalanche tested
- Extremely high dv/dt capability
- Gate charge minimized
- Very low intrinsic capacitance
- Improved diode reverse recovery characteristics
- Zener-protected

Applications

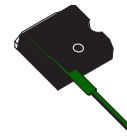
- Switching applications

Description

These SuperMESH3™ Power MOSFETs are the result of improvements applied to STMicroelectronics' SuperMESH™ technology, combined with a new optimized vertical structure. These devices boast an extremely low on-resistance, superior dynamic performance and high avalanche capability, rendering them suitable for the most demanding applications.



TO-220FP



TO-220

Figure 1. Internal schematic diagram

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value				Unit
		TO-220	I ² PAK	I ² PAK	TO-220FP	
V _{DS}	Drain-source voltage	620				V
V _{GS}	Gate- source voltage	± 30				V
I _D	Drain current (continuous) at T _C = 25 °C	5.5		5.5 ⁽¹⁾		A
I _D	Drain current (continuous) at T _C = 100 °C	3		3 ⁽¹⁾		A
I _{DM} ⁽²⁾	Drain current (pulsed)	22		22 ⁽¹⁾		A
P _{TOT}	Total dissipation at T _C = 25 °C	90		30		W
I _{AR} ⁽³⁾	Avalanche current, repetitive or not-repetitive	5.5				A
E _{AS} ⁽⁴⁾	Single pulse avalanche energy	140				mJ
ESD	Gate-source human body model (R=1.5 kΩ, C=100 pF)	2.5				kV
dv/dt ⁽⁵⁾	Peak diode recovery voltage slope	12				V/ns
V _{ISO}	Insulation withstand voltage (RMS) from all three leads to external heat sink (t = 1 s; T _C = 25 °C)	2500				V
T _{stg}	Storage temperature	-55 to 150				°C
T _j	Max. operating junction temperature	150				°C

- Limited by package.
- Pulse width limited by safe operating area.
- Pulse width limited by T_j max.
- Starting T_j = 25 °C, I_D = I_{AR}, V_{DD} = 50 V.
- I_{SD} ≤ 5.5 A, di/dt ≤ 400 A/μs, V_{DD} = 80% V_{(BR)DSS}

Table 3. Thermal data

Symbol	Parameter	TO-220	I ² PAK	I ² PAK	TO-220FP	Unit
R _{thj-case}	Thermal resistance junction-case max.	1.39			4.17	°C/W
R _{thj-amb}	Thermal resistance junction-ambient max.	62.5	100		62.5	°C/W

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 310\text{ V}$, $I_D = 2.75\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (see Figure 19)				
t_r	Rise time					
$t_{d(off)}$	Turn-off-delay time					
t_f	Fall time					

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area for TO-220, I²PAK

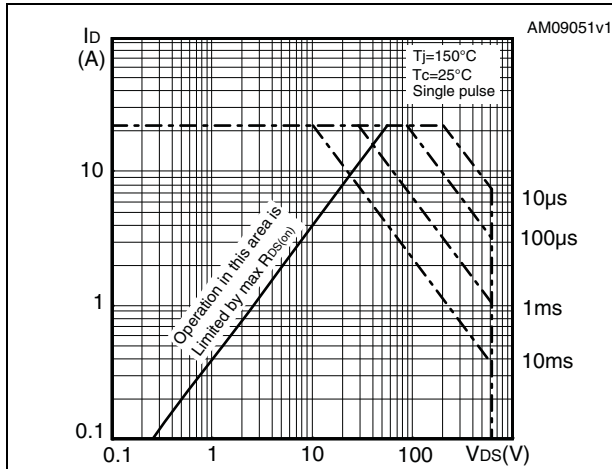


Figure 3. Thermal impedance for TO-220, I²PAK

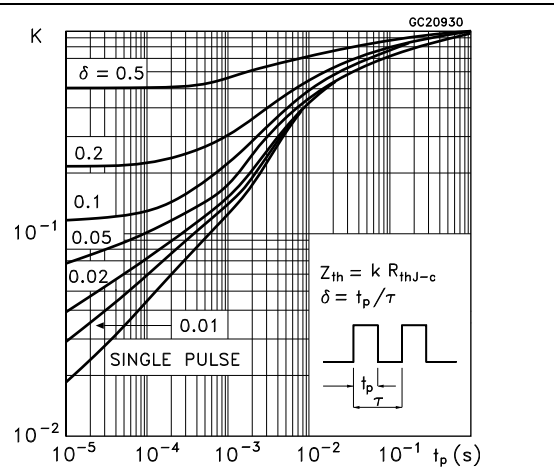


Figure 4. Safe operating area for IPAK

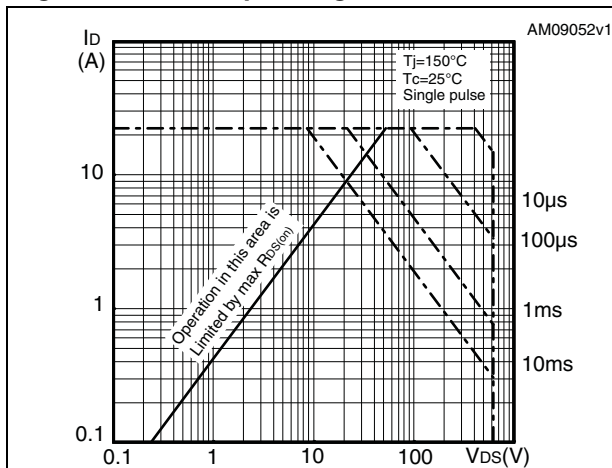


Figure 5. Thermal impedance for IPAK

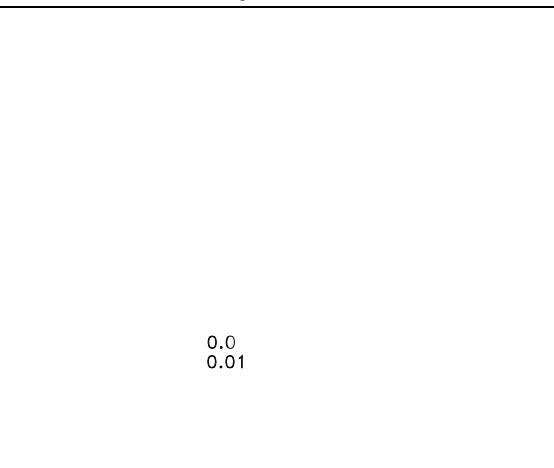


Figure 6. Safe operating area for TO-220FP

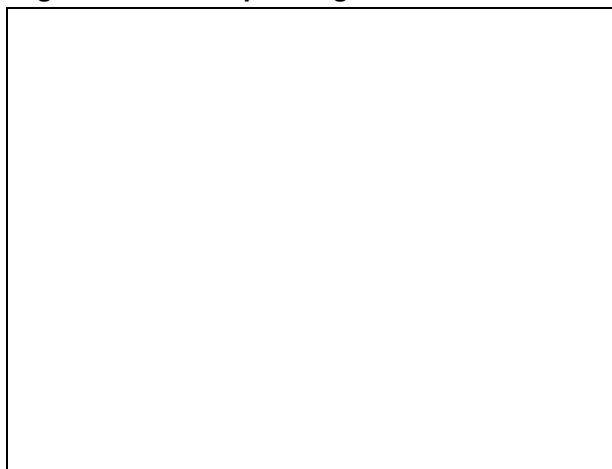


Figure 7. Thermal impedance for TO-220FP



Figure 8. Output characteristics

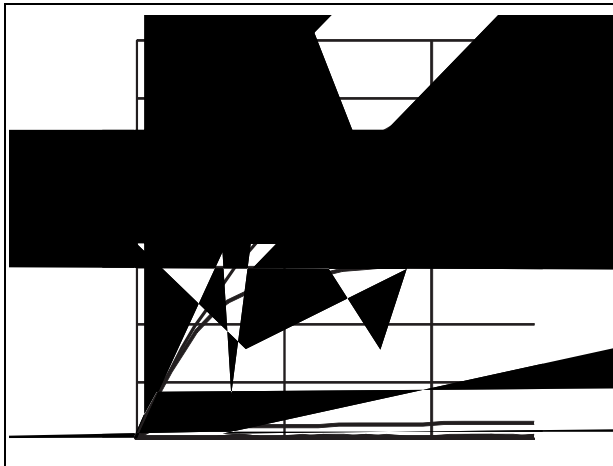


Figure 9. Transfer characteristics



Figure 10. Gate charge vs gate-source voltage

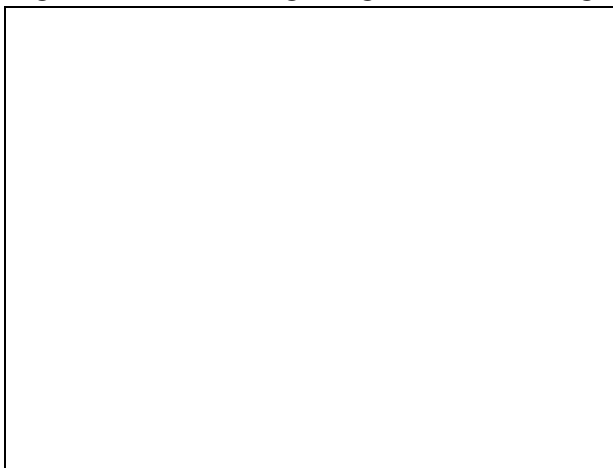


Figure 11. Static drain-source on resistance



Figure 12. Capacitance variations

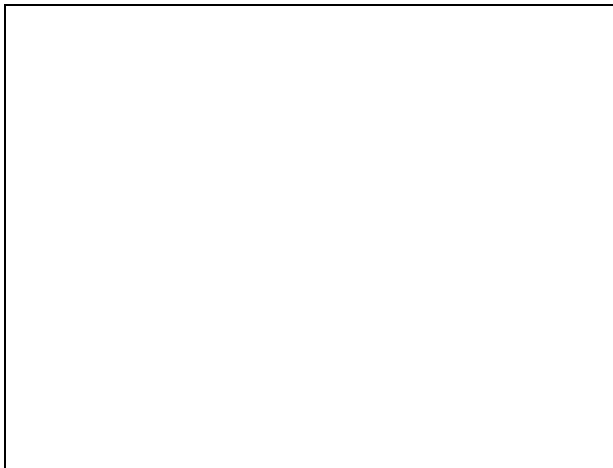


Figure 13. Output capacitance stored energy

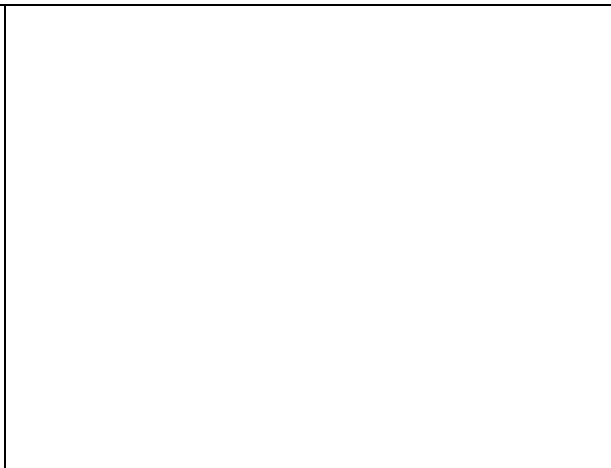


Figure 14. Normalized gate threshold voltage vs temperature

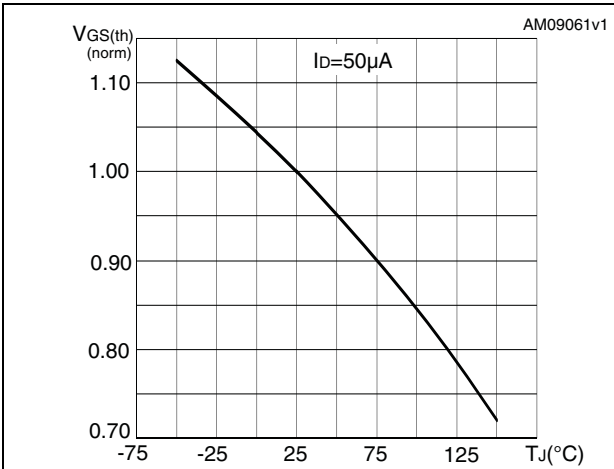


Figure 15. Normalized on resistance vs temperature

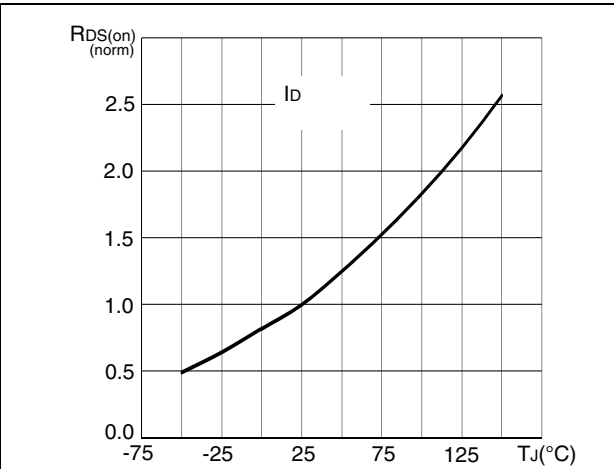


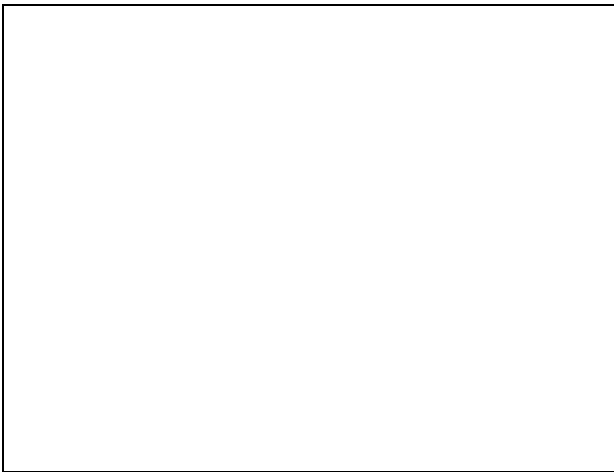
Figure 16. Normalized BV_{DSS} vs temperature



Figure 17. Source-drain diode forward characteristics



Figure 18. Maximum avalanche energy vs temperature



3 Test circuits

Figure 19. Switching times test circuit for resistive load



AM01468v1

Figure 20. Gate charge test circuit



AM01469v1

Figure 21. Test circuit for inductive load switching and diode recovery times



AM01470v1

Figure 22. Unclamped Inductive load test circuit



AM01471v1

Figure 23. Unclamped inductive waveform



AM01472v1

Figure 24. Switching time waveform



AM01473v1

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

Table 9. 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		1.70
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

Figure 25. TO-220FP drawing

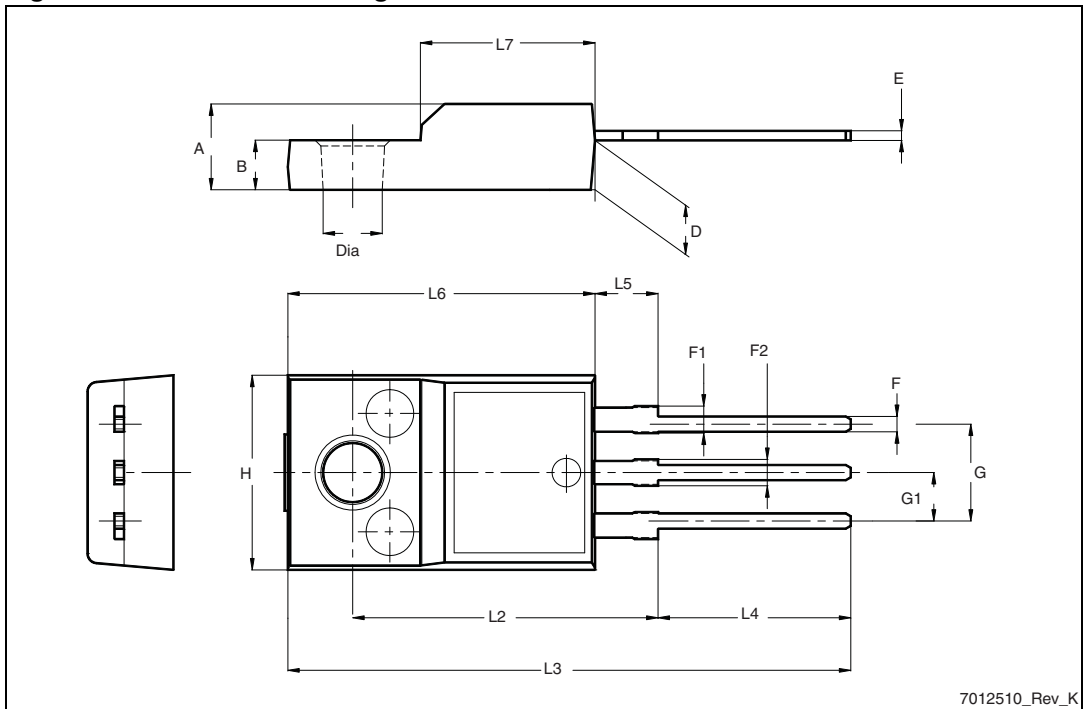


Table 10. I²PAK (TO-262) mechanical data

DIM.	mm.		
	min.	typ	max.
A	4.40		4.60
A1	2.40		2.72
b	0.61		0.88
b1	1.14		1.70
c	0.49		0.70
c2	1.23		1.32
D	8.95		9.35
e	2.40		2.70
e1	4.95		5.15
E	10		10.40
L	13		14
L1	3.50		3.93
L2	1.27		1.40

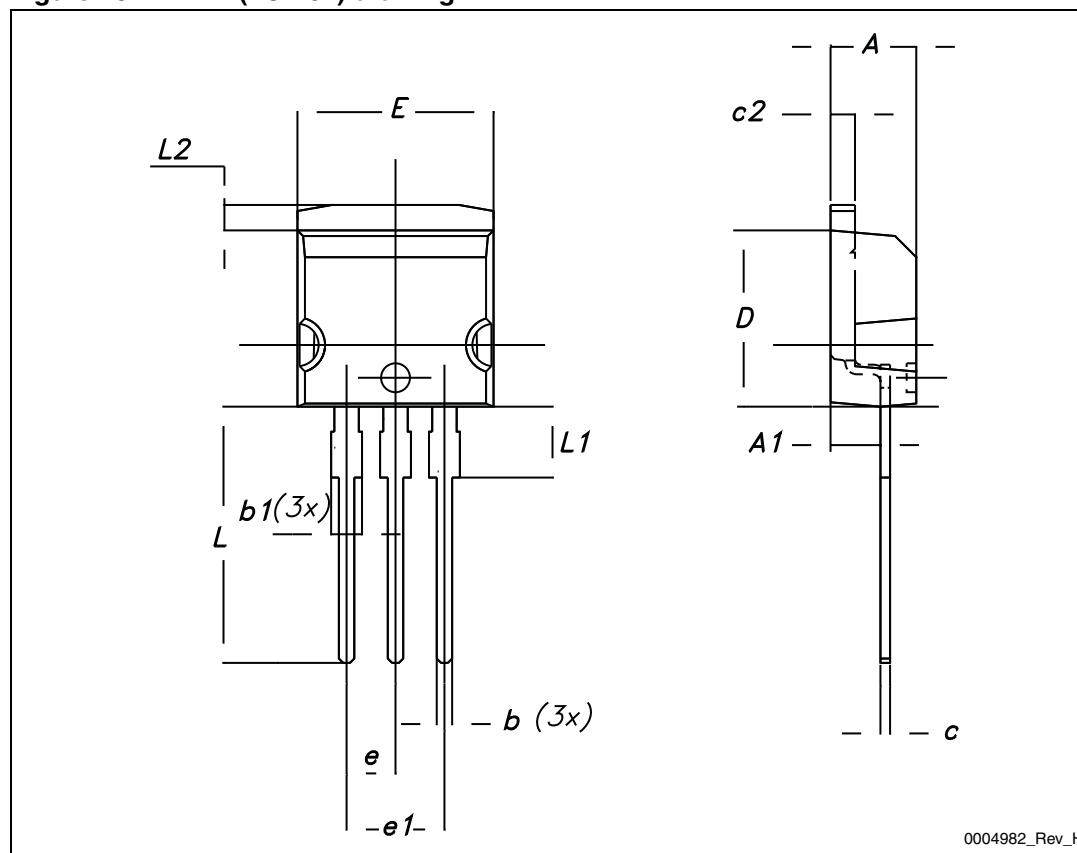
Figure 26. I²PAK (TO-262) drawing

Table 11. TO-220 type A mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
ØP	3.75		3.85
Q	2.65		2.95

Figure 27. TO-220 type A drawing

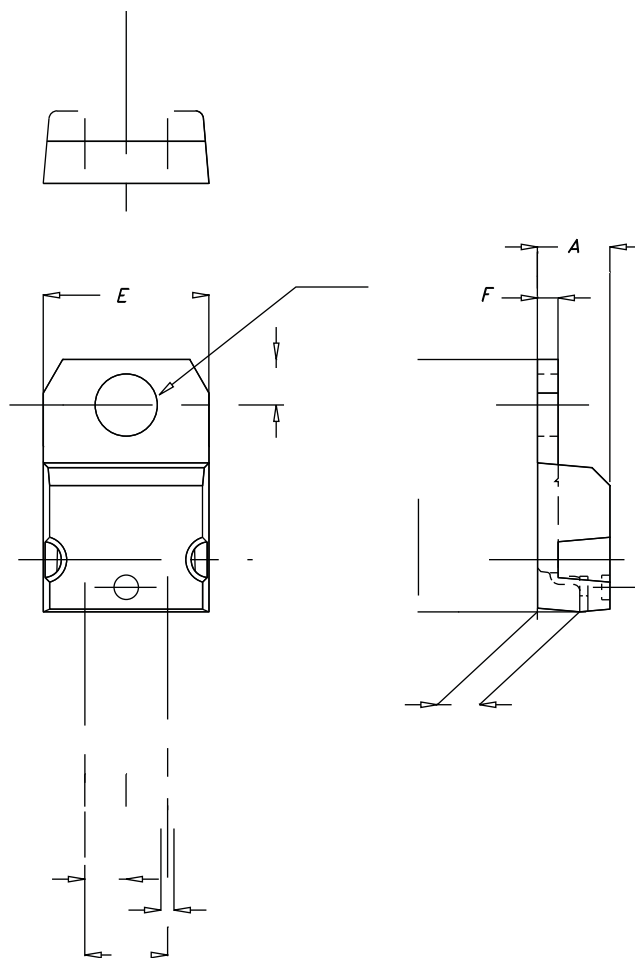
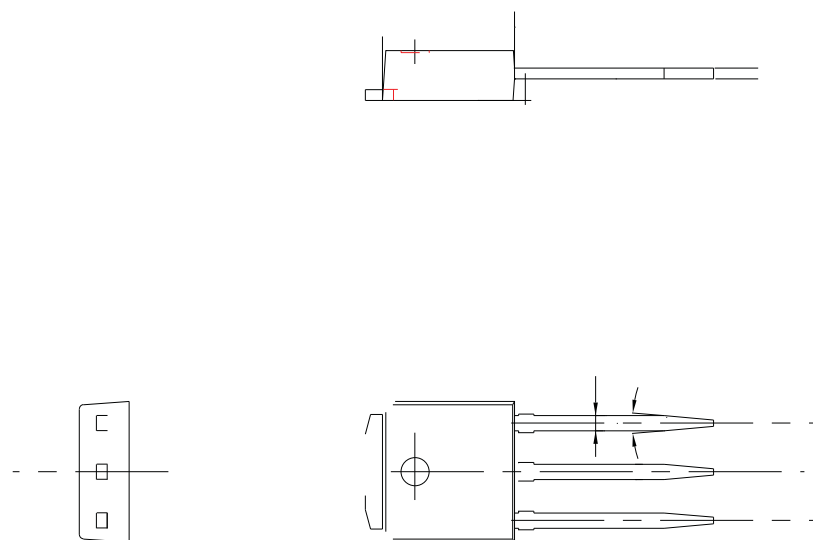


Figure 28. IPAK (TO-251) drawing



5 Revision history

Table 13. Document revision history

Date	Revision	Changes
19-May-2006	1	First release.
02-May-2011	2	R _G value has been updated.
06-Dec-2011	3	Removed p/n STD6N62K3 in DPAK.

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