STB270N4F3
STI270N4F3 - STP270N4F3

N-channel 40 V - 2.1 mΩ - 160 A - TO-220 - D^{2}PAK - I^{2}PAK
STripFET™ Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$ max	I_D	P_{TOT}
STB270N4F3	40 V	< 2.5 mΩ	160 A	330 W
STI270N4F3	40 V	< 2.9 mΩ	120 A	330 W
STP270N4F3	40 V	< 2.9 mΩ	120 A	330 W

- 100% avalanche tested
- Standard threshold drive

Applications

- High current, switching application
- Automotive

Description

This n-channel enhancement mode Power MOSFET is the latest refinement of STMicroelectronics unique “single feature size“strip-based process with less critical alignment steps and therefore a remarkable manufacturing reproducibility. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and low gate charge.

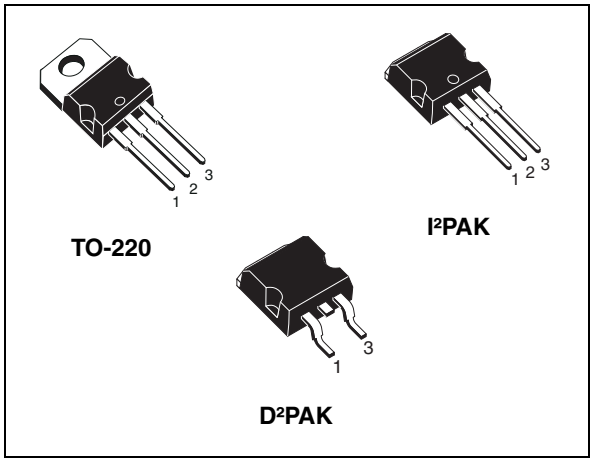

Figure 1. Internal schematic diagram

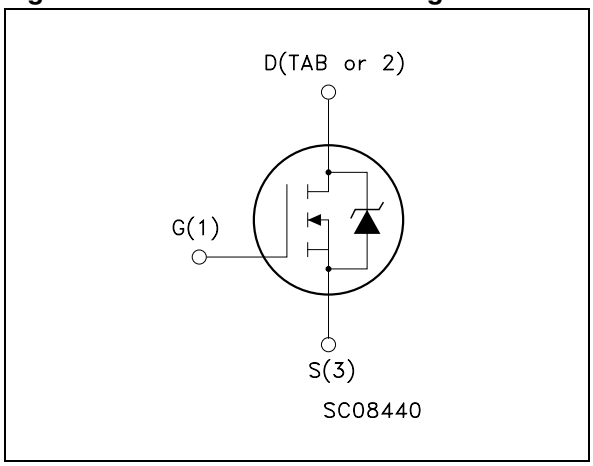

Table 1. Device summary

Order codes	Marking	Package	Packaging
STB270N4F3	270N4F3	D²PAK	Tape and reel
STI270N4F3	270N4F3	I²PAK	Tube
STP270N4F3	270N4F3	TO-220	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		TO-220/I²PAK	D²PAK	
V_{DS}	Drain-source voltage (V_{GS} = 0)	40		V
V_{GS}	Gate-source voltage	± 20		V
I_D(1)	Drain current (continuous) at T_C = 25 °C	120	160	A
I_D(1)	Drain current (continuous) at T_C=100 °C	120	160	A
I_{DM}(2)	Drain current (pulsed)	480	640	A
P_{TOT}	Total dissipation at T_C = 25 °C	330		W
	Derating factor	2.2		W/°C
dv/dt(3)	Peak diode recovery voltage slope	3.5		V/n
E_{AS}(4)	Single pulse avalanche energy	1		J
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 175		°C

1. Current limited by package
2. Pulse width limited by safe operating area
3. $I_{SD} \leq 120A$, di/dt $\leq 200A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$
4. Starting Tj=25°C, I_D =80A, V_{DD}= 32V

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		TO-220/I²PAK	D²PAK	
$R_{thj-case}$	Thermal resistance junction-case max	0.45		°C/W
$R_{thj-pcb}$(1)	Thermal resistance junction-pcb max	--	35	°C/W
R_{thj-a}	Thermal resistance junction-ambient max	62.5	--	°C/W
T_l	Maximum lead temperature for soldering purpose (for 10 sec, 1.6 mm from case)	300	--	°C

1. When mounted on 1inch² FR-4 board, 2 oz Cu.

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		40			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating @125 °C				10 100	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20 V				±200	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA		2		4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 80 A	**TO-220 I²PAK**		2.5	2.9	mΩ
			D²PAK		2.1	2.5	mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} =15 V, I_D = 80 A		200		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25 V, f=1 MHz, V_{GS}=0		7400 1800 47		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge gate-drain charge	V_{DD}=20 V, I_D = 160 A V_{GS} =10 V		110 27 25	150	nC nC nC

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

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	V_{DD}=20 V, I_D= 80 A, R_G=4.7 Ω, V_{GS}=10 V		22 180		ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	V_{DD}=20 V, I_D= 80 A, R_G=4.7 Ω, V_{GS}=10 V		110 45		ns ns

Table 7. Source drain diode

Symbol	Parameter		Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current	**D²PAK**				160	A
		TO-220 **I²PAK**				120	A
I_{SDM}(1)	Source-drain current (pulsed)	**D²PAK**				640	A
		TO-220 **I²PAK**				480	A
V_{SD}(2)	Forward on voltage		I_{SD}=80 A, V_{GS}=0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current		I_{SD}=160 A, di/dt = 100 A/µs, V_{DD}=32 V, Tj=150 °C		70 225 3.2		ns nC A

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