

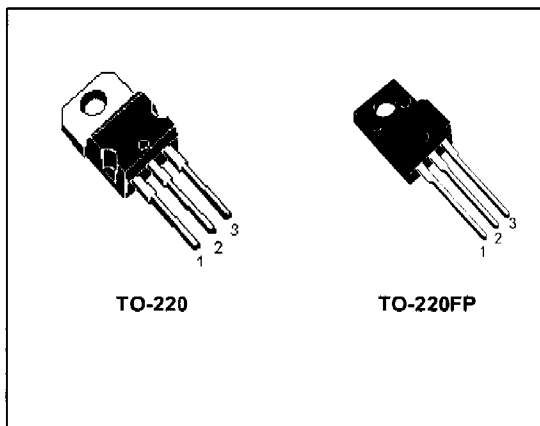
STP5NK80Z - STP5NK80ZFP

N-CHANNEL 800V - 1.9Ω - 4.3A TO-220/TO-220FP

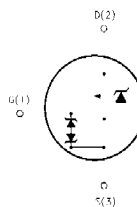
Zener-Protected SuperMESH™ Power MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D	P _w
STP5NK80Z	800 V	< 2.4 Ω	4.3 A	110 W
STP5NK80ZFP	800 V	< 2.4 Ω	4.3 A	30 W

- TYPICAL R_{DS(on)} = 1.9 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- GATE CHARGE MINIMIZED
- VERY LOW INTRINSIC CAPACITANCES
- VERY GOOD MANUFACTURING REPEATABILITY



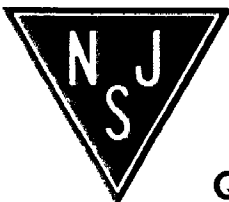
INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- IDEAL FOR OFF-LINE POWER SUPPLIES, ADAPTORS AND PFC
- LIGHTING

NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.



STP5NK80Z - STP5NK80ZFP

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		STP5NK80Z	STP5NK80ZFP	
V _{DS}	Drain-source Voltage (V _{GS} = 0)	800		V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	800		V
V _{GS}	Gate- source Voltage	± 30		V
I _D	Drain Current (continuous) at T _C = 25°C	4.3	4.3 (*)	A
I _D	Drain Current (continuous) at T _C = 100°C	2.7	2.7 (*)	A
I _{DM} (●)	Drain Current (pulsed)	17.2	17.2 (*)	A
P _{TOT}	Total Dissipation at T _C = 25°C	110	30	W
	Derating Factor	0.88	0.24	W/°C
V _{ESD(G-S)}	Gate source ESD(HBM-C=100pF, R=1.5KΩ)	3500		V
dv/dt (1)	Peak Diode Recovery voltage slope	4.5		V/ns
V _{ISO}	Insulation Withstand Voltage (DC)	-	2500	V
T _j	Operating Junction Temperature	-55 to 150		°C
T _{stg}	Storage Temperature	-55 to 150		°C

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤ 4.3A, di/dt ≤ 200A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

(*) Limited only by maximum temperature allowed

THERMAL DATA

		TO-220	TO-220FP	
R _{thj-case}	Thermal Resistance Junction-case Max	1.14	4.2	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient Max	62.5		°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	300		°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	4.3	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	190	mJ

GATE-SOURCE ZENER DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV _{GSO}	Gate-Source Breakdown Voltage	I _{gs} =± 1mA (Open Drain)	30			V

(#) When mounted on minimum Footprint

STP5NK80Z - STP5NK80ZFP

**ELECTRICAL CHARACTERISTICS (TCASE =25°C UNLESS OTHERWISE SPECIFIED)
ON/OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 1 \text{ mA}, V_{GS} = 0$	800			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}, T_C = 125^\circ\text{C}$			1 50	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 30\text{V}$			± 10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 100\mu\text{A}$	3	3.75	4.5	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{V}, I_D = 2.15 \text{ A}$		1.9	2.4	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs} (1)$	Forward Transconductance	$V_{DS} = 15 \text{ V}, I_D = 2.15 \text{ A}$		4.25		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25\text{V}, f = 1 \text{ MHz}, V_{GS} = 0$		910 98 20		pF pF pF
$C_{oss \text{ eq.}} (3)$	Equivalent Output Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V to } 400\text{V}$		40		pF

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 400 \text{ V}, I_D = 2 \text{ A}$ $R_G = 4.7\Omega, V_{GS} = 10 \text{ V}$ (Resistive Load see, Figure 3)		18 25		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 640\text{V}, I_D = 4.3 \text{ A},$ $V_{GS} = 10\text{V}$		32.4 5 18.5	45.5	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 400 \text{ V}, I_D = 2 \text{ A}$ $R_G = 4.7\Omega, V_{GS} = 10 \text{ V}$ (Resistive Load see, Figure 3)		45 30		ns ns
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 640\text{V}, I_D = 4.3 \text{ A},$ $R_G = 4.7\Omega, V_{GS} = 10\text{V}$ (Inductive Load see, Figure 5)		22 10 32		ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM} (2)$	Source-drain Current Source-drain Current (pulsed)				4.3 17.2	A A
$V_{SD} (1)$	Forward On Voltage	$I_{SD} = 4.3 \text{ A}, V_{GS} = 0$			1.6	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 4.3 \text{ A}, di/dt = 100\text{A}/\mu\text{s}$ $V_{DD} = 40\text{V}, T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		500 3 12		ns μC A

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

2. Pulse width limited by safe operating area.

3. $C_{oss \text{ eq.}}$ is defined as a constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DSS} .