

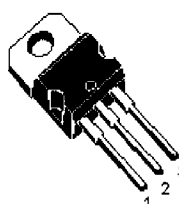
STP5NK80Z - STP5NK80ZFP

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

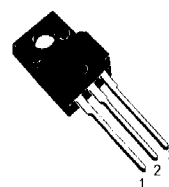
Zener-Protected SuperMESH™ Power MOSFET

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

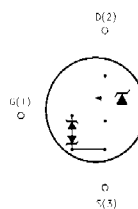


TO-220



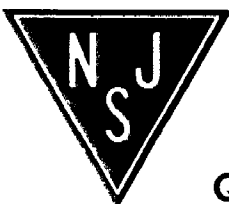
TO-220FP

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

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



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Quality Semi-Conductors

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 ($R_{GS} = 20\text{ k}\Omega$)	800		V
V_{GS}	Gate- source Voltage	± 30		V
I_D	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	4.3	4.3 (*)	A
I_D	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	2.7	2.7 (*)	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	17.2	17.2 (*)	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	110	30	W
	Derating Factor	0.88	0.24	W/ $^\circ\text{C}$
$V_{ESD}(G-S)$	Gate source ESD(HBM-C=100pF, R=1.5K Ω)	3500		V
$dv/dt(1)$	Peak Diode Recovery voltage slope	4.5		V/ns
V_{ISO}	Insulation Withstand Voltage (DC)	-	2500	V
T_j T_{stg}	Operating Junction Temperature Storage Temperature	-55 to 150 -55 to 150		$^\circ\text{C}$ $^\circ\text{C}$

($\bullet$) Pulse width limited by safe operating area

(1) $I_{SD} \leq 4.3\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$.

(*) Limited only by maximum temperature allowed

THERMAL DATA

		TO-220	TO-220FP	
$R_{thj-case}$	Thermal Resistance Junction-case Max	1.14	4.2	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	62.5		$^\circ\text{C}/\text{W}$
T_l	Maximum Lead Temperature For Soldering Purpose	300		$^\circ\text{C}$

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 $T_j = 25^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$)	190	mJ

GATE-SOURCE ZENER DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{GSO}	Gate-Source Breakdown Voltage	$I_{GS} = \pm 1\text{mA}$ (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} .