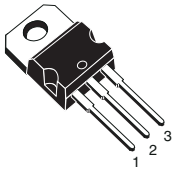
STP75NS04Z

N-channel Clamped - 7mΩ - 80A - TO-220
Fully protected MESH Overlay™ III Power MOSFET

General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STP75NS04Z	Clamped	< 11mΩ	80A

- Low capacitance and gate charge
- 100% avalanche tested
- 175°C maximum junction temperature



TO-220

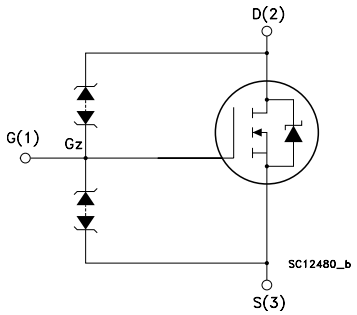
Description

This fully clamped MOSFET is produced by using the latest advanced Company's Mesh Overlay process which is based on a novel strip layout. The inherent benefits of a new technology coupled with the extra clamping capabilities make this product particularly suitable for the harshest operation conditions such as those encoured in power tools. Any other application requiring extra ruggedness is also recommended.

Applications

- Switching application
- Power tools

Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STP75NS04Z	P75NS04Z	TO-220	Tube

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	Clamped	V
V_{DG}	Drain-gate voltage (V_{GS} = 0)	Clamped	V
V_{GS}	Gate-source voltage	Clamped	V
I_D(1)	Drain current (continuous) at T_C = 25°C	80	A
I_D	Drain current (continuous) at T_C = 100°C	63	A
I_{DG}	Drain gate current (continuos)	±50	mA
I_{GS}	Gate source current (continuos)	±50	mA
I_{DM}(2)	Drain current (pulsed)	320	A
P_{TOT}	Total dissipation at T_C = 25°C	110	W
	Derating factor	0.73	W/°C
V_{ESD}	Gate-source ESD (HBM-C=100pF, R=1.5KΩ)	±8	kV
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 175	°C

1. Current limited by wire bonding
2. Pulse with limited by safe operating area

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case Max	1.36	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient Max	62.5	°C/W
T_l	Maximum lead temperature for soldering purpose	300	°C

Table 3. Avalanche data

Symbol	Parameter	Value	Unit
E_{AS}	Single pulse avalanche energy (starting Tj=25°C, I_D=I_{AR}, V_{DD}=25V)	470	mJ

2 Electrical characteristics

(T_{CASE}=25°C unless otherwise specified)

Table 4. On/off states

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 1mA, V_{GS}= 0	33			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 16V			1	µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±10V			2	µA
V_{GSS}	Gate threshold breakdown voltage	I_{GS}= ±100µA	18			V
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10V, I_D= 40A		7	11	mΩ

Table 5. Dynamic

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} =15V, I_D = 15A		50		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} =0		1860 628 196		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}= 20V, I_D= 80 A, V_{GS}= 10 V		50 14 16		nC nC nC

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

Table 6. Switching on/off

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	V_{DD}= 20V, I_D = 40A R_G= 4.7 Ω, V_{GS}= 10V,		16 248		ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	V_{DD}= 20V, I_D = 40A R_G= 4.7 Ω, V_{GS}= 10V,		53 85		ns ns

Table 7. Source drain diode

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}(1)	Source-drain current Source-drain current (pulsed)				80 320	A A
V_{SD}(2)	Forward on Voltage	I_{SD}=80A, V_{GS}=0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=80A, di/dt = 100A/µs, V_{DD}=30V, Tj=150°C		53 91 3.4		ns nC A

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

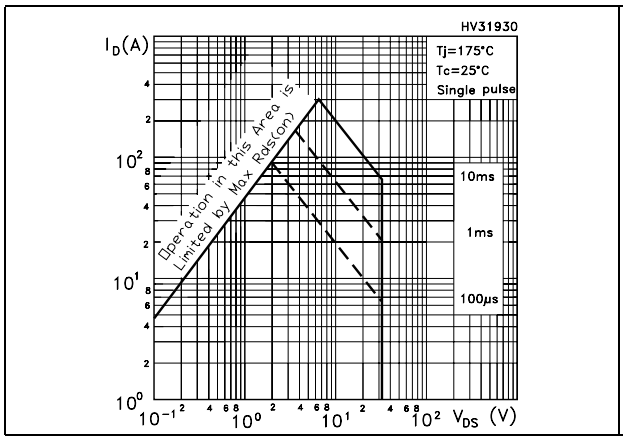


Figure 2. Thermal impedance

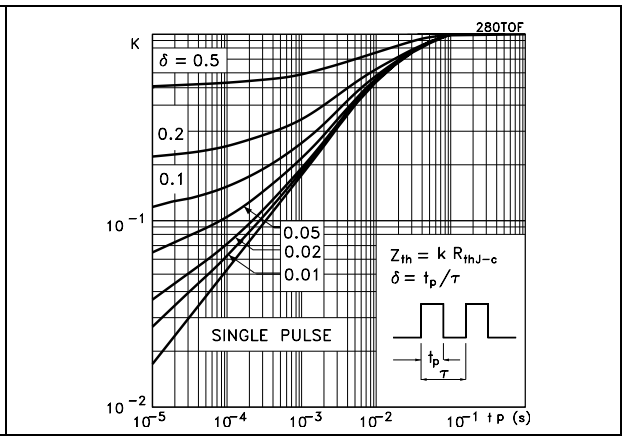


Figure 3. Output characterisics

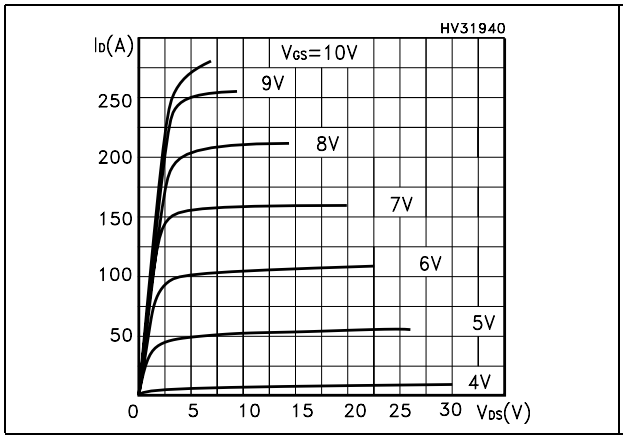


Figure 4. Transfer characteristics

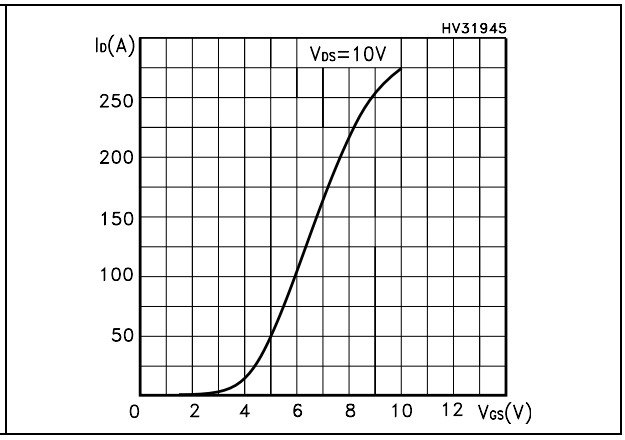


Figure 5. Normalized B_{VDSS} vs temperature

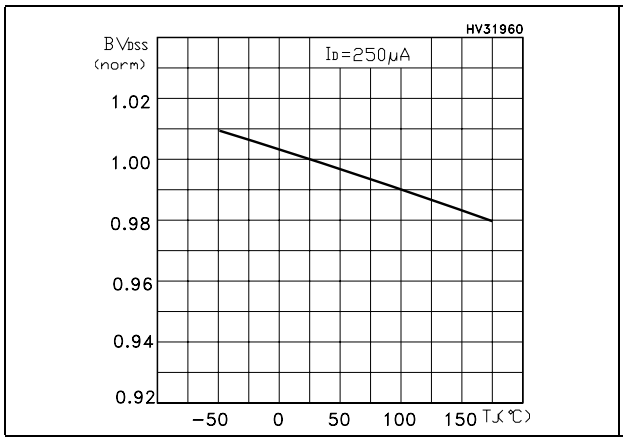


Figure 6. Static drain-source on resistance