

1. Description

The HS4N60 N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

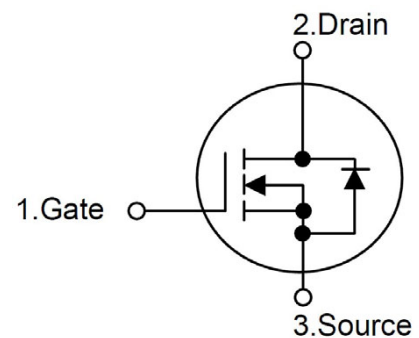
2. Feature

- $R_{DS(ON)}$ Typ = $2.5\Omega @ V_{GS} = 10V$
- Low gate charge (typical 20nC)
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability

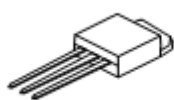
V_{DS}	600	V
$R_{DS(ON)}$ Typ	2.5	Ω
I_D	4	A

3. Pin configuration

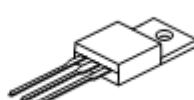
Package	Order Number
TO-252	HS4N60DA
TO-251	HS4N60IA
TO-220F	HS4N60FA
TO-220	HS4N60PA



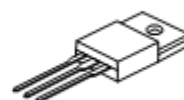
TO-252



TO-251



TO-220



TO-220F

4. Absolute maximum ratings (TC= 25 °C, unless otherwise specified)

Parameter		Symbol	Ratings	Units
Drain-source voltage		V _{DSS}	600	V
Gate-source voltage		V _{GSS}	±30	V
Drain current continuous	T _c =25°C	I _D	4.0	A
	T _c =100°C		2.4A	A
Drain current pulsed (note1)		I _{DP}	16	A
Avalanche energy	Repetitive (note1)	E _{AR}	8.5	mJ
	Single pulse (note2)	E _{AS}	180	mJ
Peak diode recovery dv/dt (note3)		dv/dt	4.5	V/ns
Total power dissipation	T _c =25°C	P _D	100	W
	Derate above 25°C		0.75	W/°C
Junction temperature		T _J	+150	°C
Storage temperature		T _{STG}	-55~+150	°C

5. Thermal characteristics (note6)

Parameter	Symbol	Ratings	Units
Thermal resistance junction-ambient	R _{thJA}	62.5	°C/W
Thermal resistance, case-to-sink typ.	R _{thCS}	0.5	°C/W
Thermal resistance junction-case	R _{thJC}	1.25	°C/W

6. Electrical characteristics (T_C= 25 °C, unless otherwise noted)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	600	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =600V, V _{GS} =0V	-	-	1	μA
		V _{DS} =480V, T _C =125°C	-	-	10	μA
Gate-body leakage current	Forward	I _{GSS}	-	-	100	nA
	Reverse				-100	nA
Breakdown voltage temperature coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA	-	0.7	-	V/°C
On characteristics						
Gate threshold voltage	V _{GS(TH)}	V _{DS} = V _{GS} I _D =250μA	2.0	-	4.0	V
Static drain-source on- resistance	R _{DS(ON)}	V _{DS} =10V, I _D = 2.5A	-	2.5	-	Ω
Dynamic characteristics						
Input capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz	-	500	-	pF
Output capacitance	C _{OSS}		-	50	-	pF
Reverse transfer capacitance	C _{RSS}		-	6	-	pF
Switching characteristics						
Turn-on delay time	t _{D(ON)}	V _{DD} =300V, I _D =4.0A, R _G =25Ω (note4,5)	-	10	-	ns
Rise time	t _R		-	35	-	ns
Turn-off delay time	t _{D(OFF)}		-	35	-	ns
Fall time	t _F		-	40	-	ns
Total gate charge	Q _G	V _{DS} =480V, I _D =4.0A V _{GS} =10V (note4,5)	-	12	-	nC
Gate-source charge	Q _{GS}		-	2.2	-	nC
Gate-drain charge	Q _{GD}		-	5.5	-	nC
Drain-source diode characteristics						
drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _{SD} = 4.0A	-	-	1.4	V
Continuous drain-source current	I _{SD}		-	-	4.0	A
Pulsed drain-source current	I _{SM}		-	-	16	A
Reverse recovery time	t _{RR}	I _{SD} =4.0A dI _{SD} /dt=100A/μs (note4)	-	280	-	ns
Reverse recovery charge	Q _{RR}		-	2.0	-	μC

- Note :
1. Repetitive rating : pulse width limited by maximum junction temperature
 2. L=25mH, I_{AS} = 4.0 A, V_{DD} =50V, R_G = 25 Ω , starting T_J =25°C
 3. I_{SD}≤ 4.0A, di/dt ≤ 200A/ μ s, V_{DD} ≤ BV_{DSS} , starting T_J =25°C
 4. Pulse test : pulse width ≤ 300μ s, duty cycle ≤ 2%
 5. Essentially independent of operating temperature
 6. Thermal characteristics are reported for the TO-220 package