

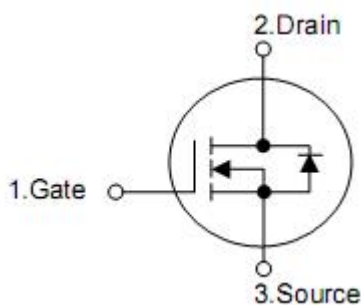
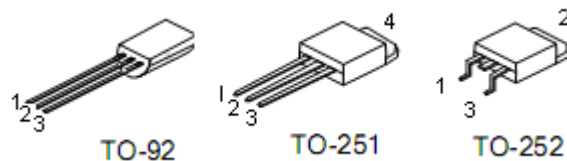
1. Description

The XXW1N60D 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. Features

- n** 1A, 600V, $R_{DS(on)} = 9.3\Omega$ @ $V_{GS} = 10V$
- n** Low gate charge (typical 5.0nC)
- n** High ruggedness
- n** Fast switching capability
- n** Avalanche energy specified
- n** Improved dv/dt capability

3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Absolute maximum ratings

($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Parameter		Symbol	Rating			Unit
			TO251	TO252	TO92	
Drain-source voltage		V_{DSS}	600			V
Gate-source voltage		V_{GSS}	± 30			V
Drain current continuous	$T_C = 25\text{ }^{\circ}\text{C}$	I_D	1.0		0.3*	A
	$T_C = 100\text{ }^{\circ}\text{C}$		0.6		0.18*	A
Drain current pulsed (note 1)		I_{DP}	4.0		1.0*	A
Repetitive avalanche energy (note 1)		E_{AR}	2.8		0.3	mJ
Single pulsed avalanche energy (note 2)		E_{AS}	33		33	mJ
Peak diode recovery dv/dt (note 3)		dv/dt	4.5			V/ns
Total Power dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	P_D	28		1.0	W
	derate above $25\text{ }^{\circ}\text{C}$	P_D	0.22		0.02	W/ $^{\circ}\text{C}$
Junction temperature		T_J	+150			$^{\circ}\text{C}$
Storage temperature		T_{STG}	-55~+150			$^{\circ}\text{C}$

*Drain current limited by maximum junction temperature

5. Thermal characteristics

Parameter	Symbol	Ratings			Unit
		TO251	TO252	TO92	
Thermal resistance, junction -ambient	R_{thJA}	50* (110)		140	$^{\circ}\text{C/W}$
Thermal resistance, case-to-sink typ	R_{thCS}	-		-	
Thermal resistance, junction -case	R_{thJC}	4.53		50	

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
Breakdown voltage temperature coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA		-	0.6	-	V/°C
Zero gate voltage drain current	I _{DSS}	V _{GS} =0V, V _{DS} =600V	TO251, TO252	-	-	1	μA
			TO92	-	-	50	
		T _C =125°C, V _{DS} =480V	TO251, TO252	-	-	10	μA
			TO92	-	-	250	
Gate body leakage current, forward	I _{GSS}	V _{GS} =30V, V _{DS} =0V		-	-	100	nA
Gate body leakage current, reverse	I _{GSS}	V _{GS} =-30V, V _{DS} =0V		-	-	-100	nA
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 =0.5A(TO251.TO252) I _D =0.15A(TO92)		-	9.3	11.5	Ω
Dynamic characteristics							
Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		-	120	150	pF
Output capacitance	C _{oss}			-	20	60	pF
Reverse transfer capacitance	C _{rss}			-	3	4	pF
Switching characteristics							
Turn-on delay time	t _{d(on)}	V _{DD} =300V, I _D =1.2A, R _G =25Ω (note4,5)		-	7	24	ns
Turn-on rise time	t _r			-	21	52	ns
Turn-off delay time	t _{d(off)}			-	13	36	ns
Turn-off fall time	t _f			-	27	64	ns
Total gate charge	Q _G	V _{DS} =480V, I _D =1.1A V _{GS} =10V		-	4.8	6.2	nC
Gate-source charge	Q _{GS}			-	0.7	-	nC
Gate-drain charge	Q _{GD}			-	2.7	-	nC
Drain source diode characteristics and maximum ratings							
Continuous drain-source current	I _{SD}	TO251.TO252		-	-	1.0	A
		TO92		-	-	0.3	
Pulsed drain-source current	I _{SM}	TO251.TO252		-	-	4.0	A
		TO92		-	-	1.2	
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _{SD} =1.0A(TO251.TO252). I _{SD} =0.3A(TO92)		-	-	1.4	V
Reverse recovery time	t _{RR}	I _{SD} =1.2A, dI _{SD} /dt=100A/μs (note4)		--	190	--	ns
Reverse recovery charge	Q _{RR}			--	0.53	--	μC

Note: 1. repetitive rating: pulse width limited by maximum junction temperature;

 2. V_{DD}=50V, R_G=25Ω, starting T_J=25°C, L=50mH, I_{AS}=1.1A;

 3. I_{SD}≤1.1A(TO251, TO252), I_{SD}≤0.3A(TO92), di/dt≤200A/μs, V_{DD}≤BV_{DSS}, starting T_J=25°C

4. Pulse test: pulse width≤300μs, duty cycle≤2%

5. Essentially independent of operating temperature