

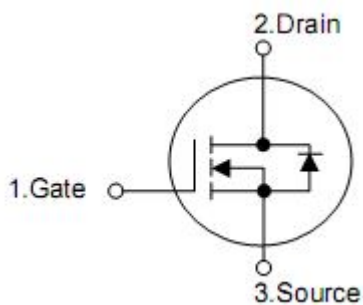
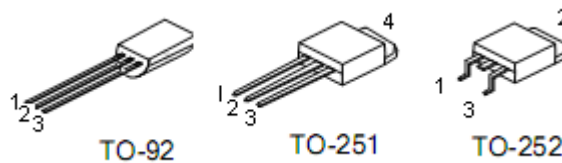
1. Description

The 1N65 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

- 1A, 650V, $R_{DS(on)} = 9.3\Omega @ V_{GS} = 10V$
- Low gate charge (typical 5.0nC)
- High ruggedness
- Fast switching capability
- Avalanche energy specified
- 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}	650			V
Gate-source voltage	V_{GSS}	± 30			V
Drain current continuous	I_D	$T_C = 25\text{ }^\circ\text{C}$	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	650	-	-	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=59mH, 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