

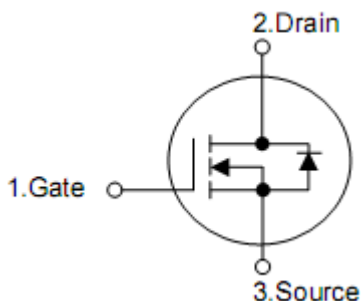
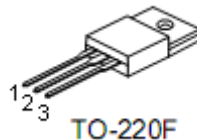
1. Description

The 3N80 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

- $R_{DS(on)}=4.8\Omega @ V_{GS}=10V$
- Low gate charge (typical 13nC)
- High ruggedness
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability

3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

4. Absolute maximum ratings

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

Parameter		Symbol	Rating	Units
Drain-source voltage		V_{DSS}	800	V
Gate-source voltage		V_{GSS}	+30	V
Drain current continuous	$T_C=25^\circ\text{C}$	I_D	3	A
	$T_C=100^\circ\text{C}$		1.9	A
Drain current pulsed (note1)		I_{DP}	12	A
Avalanche energy	Repetitive (note1)	E_{AR}	10.7	mJ
	Single pulse (note2)	E_{AS}	320	mJ
Peak diode recovery dv/dt (note3)		dv/dt	4.5	V/ns
Total power dissipation	$T_C=25\text{ }^\circ\text{C}$	P_D	39	W
	derate above $25\text{ }^\circ\text{C}$		0.31	W/ $^\circ\text{C}$
Junction temperature		T_J	+150	$^\circ\text{C}$
Storage temperature		T_{STG}	-55~+150	$^\circ\text{C}$

5. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance, junction-ambient	R_{thJA}	62.5	$^\circ\text{C/W}$
Thermal resistance, case-to-sink typ.	R_{thCS}	-	$^\circ\text{C/W}$
Thermal resistance, junction-case	R_{thJC}	3.2	$^\circ\text{C/W}$

6. Electrical characteristics

 (T_J=25°C, unless otherwise notes)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	800	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =800V, V _{GS} =0V	-	-	1	μA
		V _{DS} =640V, 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	-	1	-	V/°C
On characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	3.0	-	5.0	V
Static drain-source on-resistance	R _{DS(on)}	V _{DS} =10V, I _D =1.5A	-	4.0	4.8	Ω
Dynamic characteristics						
Input capacitance	C _{iSS}	V _{DS} =25V, V _{GS} =0V, f=1MHz	-	543	705	pF
Output capacitance	C _{oss}		-	54	70	pF
Reverse transfer capacitance	C _{rss}		-	5.5	7.5	pF
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =400V, I _D =3.0A, R _G =25Ω (note4,5)	-	15	40	ns
Rise time	t _r		-	43.5	95	ns
Turn-off delay time	t _{d(off)}		-	22.5	55	ns
Fall time	t _f		-	32	75	ns
Total gate charge	Q _g	V _{DS} =640V, I _D =3.0A, V _{GS} =10V (note4,5)	-	13	16.5	nC
Gate-source charge	Q _{gs}		-	3.4	-	nC
Gate-drain charge	Q _{gd}		-	5.8	-	nC
Drain-source diode characteristics						
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _{SD} =3.0A	-	-	1.4	V
Continuous drain-source current	I _{SD}		-	-	3.0	A
Pulsed drain-source current	I _{SM}		-	-	12.0	A
Reverse recovery time	t _{rr}	V _{GS} =0V, I _{SD} =3.0A di _{SD} /dt=100A/μs (note4)	-	642	-	ns
Reverse recovery charge	Q _{rr}		-	4.0	-	μC

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

 2. L=67mH, I_{AS}=3.0A, V_{DD}=50V, R_G=25Ω, starting T_J=25°C

 3. I_{SD}≤3.0A, 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

7. Test circuits and waveforms

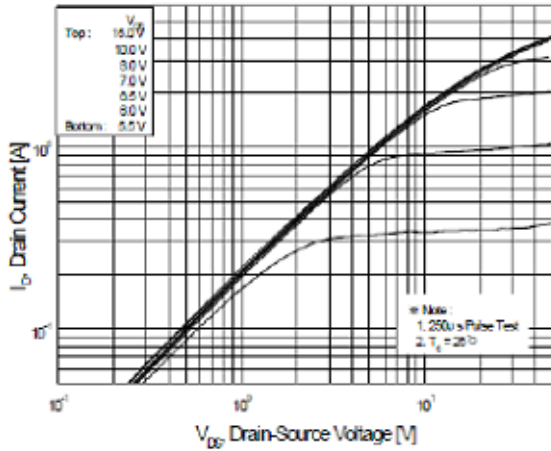


Figure 1. On-Region Characteristics

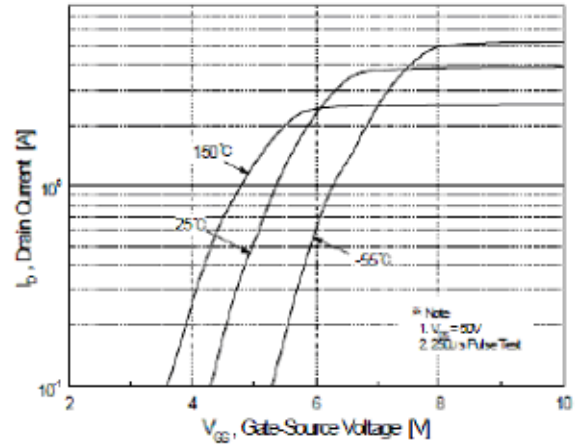


Figure 2. Transfer Characteristics

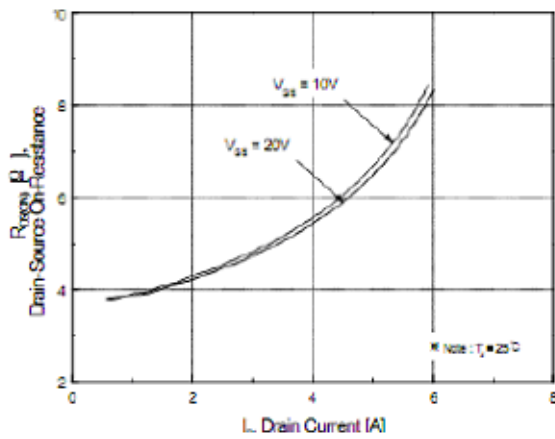


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

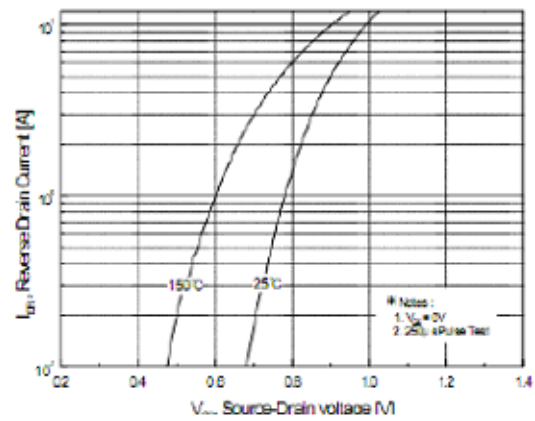


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

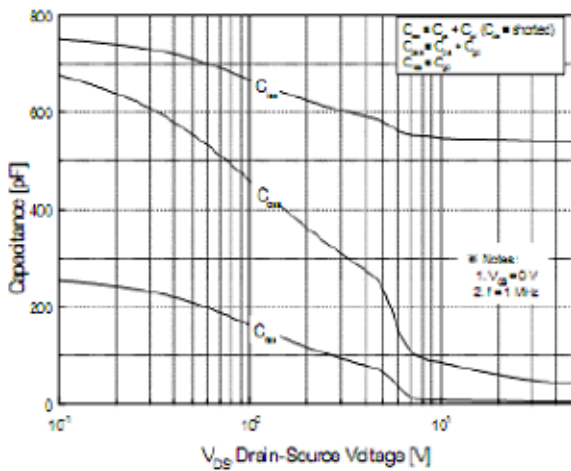


Figure 5. Capacitance Characteristics

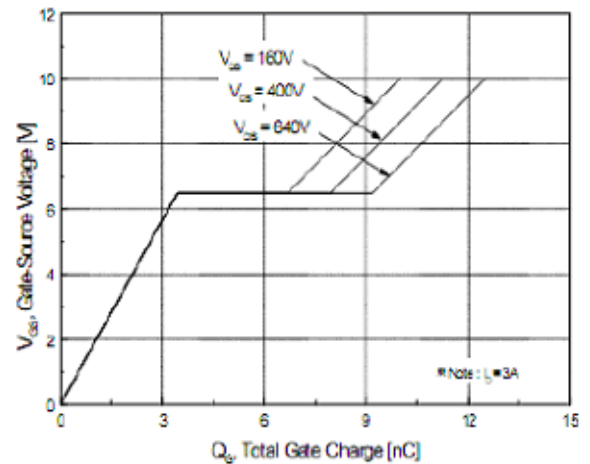
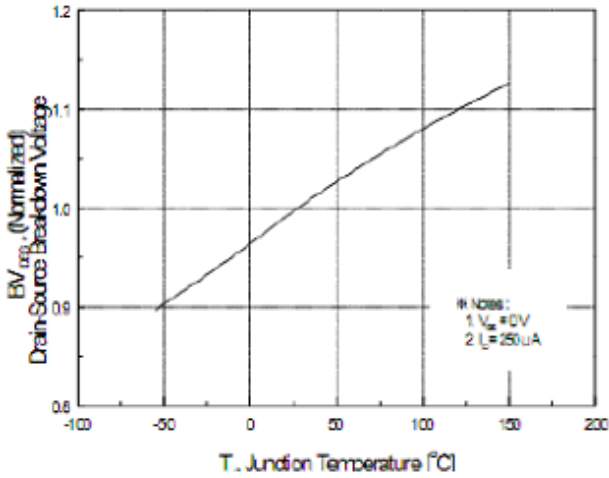
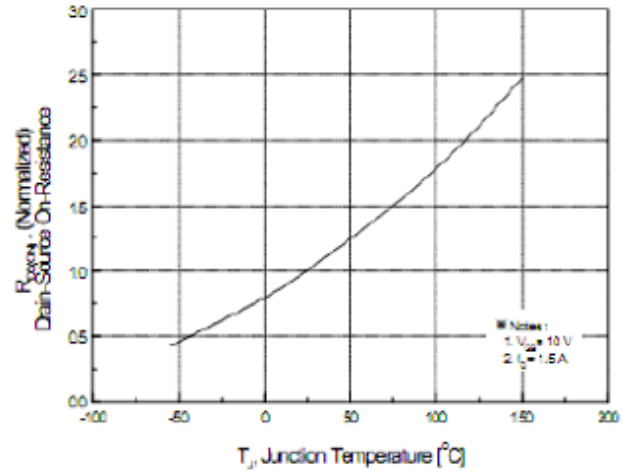
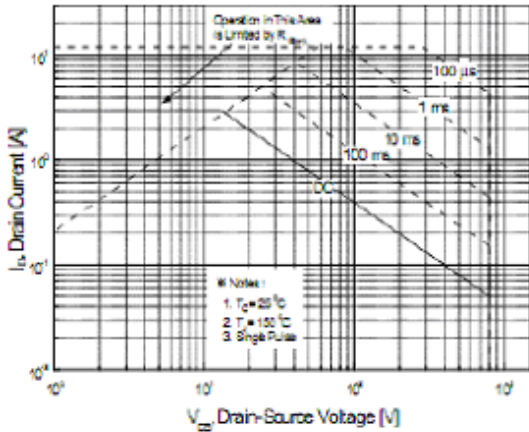
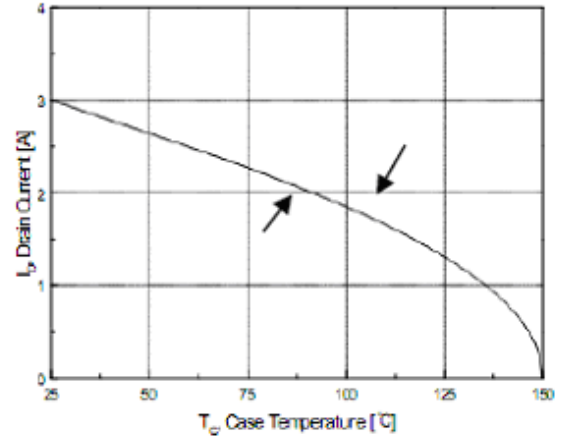
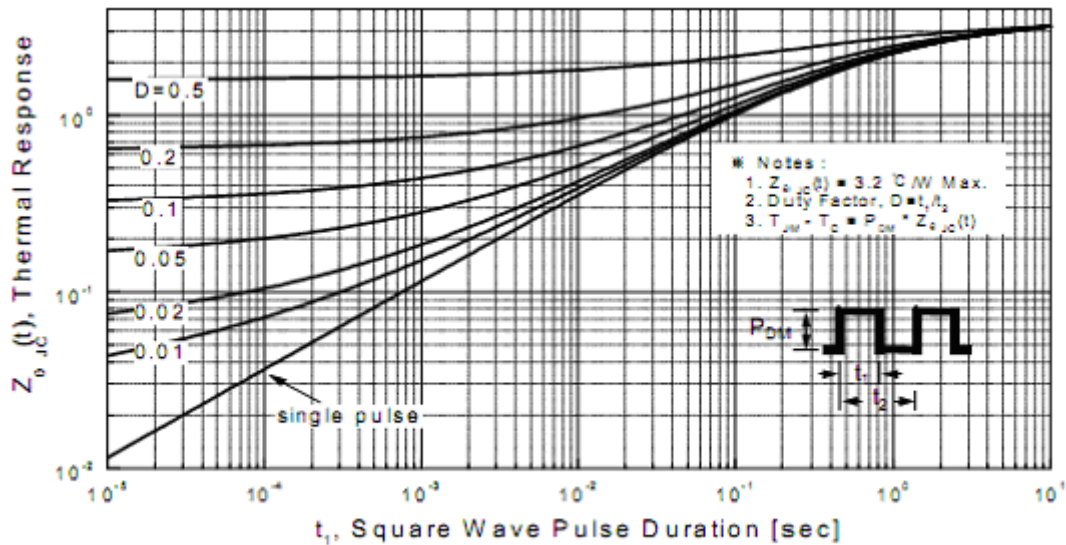


Figure 6. Gate Charge Characteristics


Figure 7. Breakdown Voltage Variation

Figure 8. On-Resistance Variation vs Temperature

Figure 9 . Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs Case Temperature

Figure 11. Transient Thermal Response Curve