



5N80-C

Power MOSFET

5A, 800V N-CHANNEL POWER MOSFET

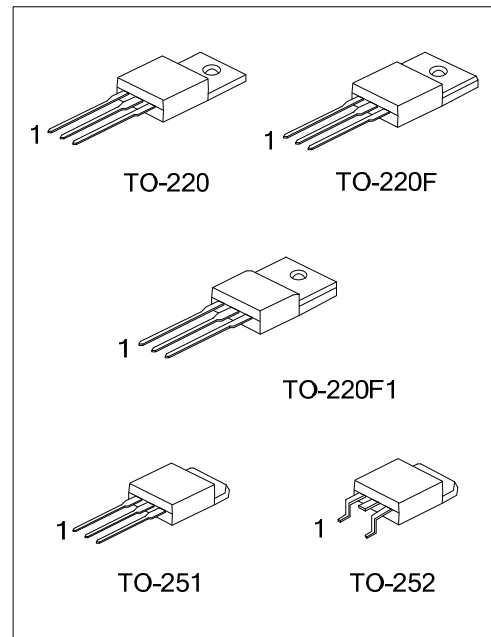
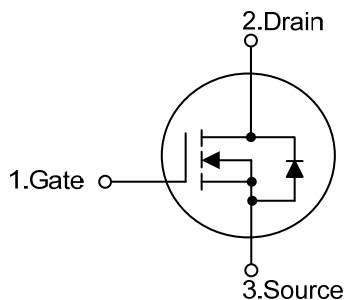
DESCRIPTION

The UTC **5N80-C** provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

FEATURES

- * $R_{DS(ON)} \leq 2.2\Omega$ @ $V_{GS}=10V$, $I_D=2.5A$
- * Low Reverse Transfer Capacitance
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

SYMBOL



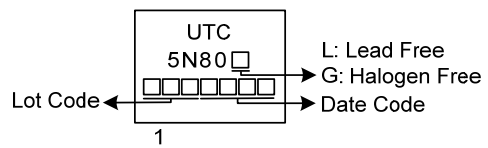
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
5N80L-TA3-T	5N80G-TA3-T	TO-220	G	D	S	Tube
5N80L-TF3-T	5N80G-TF3-T	TO-220F	G	D	S	Tube
5N80L-TF1-T	5N80G-TF1-T	TO-220F1	G	D	S	Tube
5N80L-TM3-T	5N80G-TM3-T	TO-251	G	D	S	Tube
5N80L-TN3-R	5N80G-TN3-R	TO-252	G	D	S	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

5N80G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TM3: TO-251, TN3: TO-252 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	800	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	5	A
	Pulsed (Note 2)	I_{DM}	10	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	76	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.57	V/ns
Power Dissipation	TO-220	P_D	125	W
	TO-220F/TO-220F1		40	W
	TO-251/TO-252		54	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating : Pulse width limited by maximum junction temperature.

3. $L=10\text{mH}$, $I_{AS}=3.9\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 5.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C/W}$
	TO-220F1			
	TO-251/TO-252		110	$^\circ\text{C/W}$
Junction to Case	TO-220	θ_{JC}	1	$^\circ\text{C/W}$
	TO-220F/TO-220F1		3.12	$^\circ\text{C/W}$
	TO-251/TO-252		2.31	$^\circ\text{C/W}$

■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	800			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =800V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	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	3.0		5.0	V
Static Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =2.5A			2.2	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		840		pF
Output Capacitance	C _{OSS}			104		pF
Reverse Transfer Capacitance	C _{RSS}			10.5		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =640V, V _{GS} =10V, I _D =5A I _G =1mA (Note 1, 2)		27		nC
Gate-Source Charge	Q _{GS}			9.2		nC
Gate-Drain Charge	Q _{GD}			8		nC
Turn-On Delay Time (Note 1)	t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =5A, R _G =25Ω (Note 1, 2)		14		ns
Turn-On Rise Time	t _R			19		ns
Turn-Off Delay Time	t _{D(OFF)}			72		ns
Turn-Off Fall Time	t _F			34		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				5	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				10	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =5.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t _{rr}	I _S =5.0A, V _{GS} =0V, dI _F /dt=100A/μs		476		nS
Body Diode Reverse Recovery Charge	Q _{rr}			5.1		μC

Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

D.U.T.

V_{DS}

I_{SD}

L

V_{DD}

R_G

Driver

V_{GS}

Same Type as D.U.T.

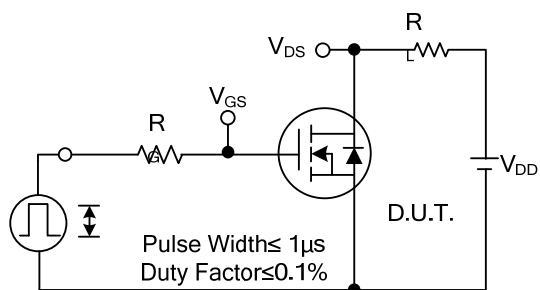
- * dv/dt controlled by R_G
- * I_{SD} controlled by pulse period
- * D.U.T.-Device Under Test

The diagram consists of three vertically aligned waveforms:

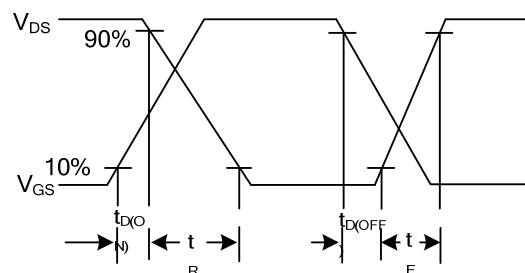
- Top waveform (V_{GS} (Driver)):** A square wave pulse. The pulse width is labeled $D = \frac{\text{Gate Pulse Width}}{\text{Gate Pulse Period}}$. The pulse height is labeled $10V$.
- Middle waveform (I_{SD} (DUT)):** Shows the drain current. During the gate pulse, it rises to a plateau labeled I_{FM} , Body Diode Forward Current. When the gate pulse ends, the current falls, crossing zero into a negative region labeled I_{RM} , Body Diode Reverse Current. The reverse current waveform shows a sharp initial drop labeled di/dt followed by a slower recovery.
- Bottom waveform (V_{DS} (DUT)):** Shows the drain-source voltage. When the current is in the forward region, the voltage is at a low level labeled V_{SD} , Body Diode Forward Voltage Drop. When the current reverses, the voltage rises sharply, showing a peak labeled V_{DD} and a region labeled V_{SD} , Body Diode Recovery dv/dt .

Peak Diode Recovery dv/dt Waveforms

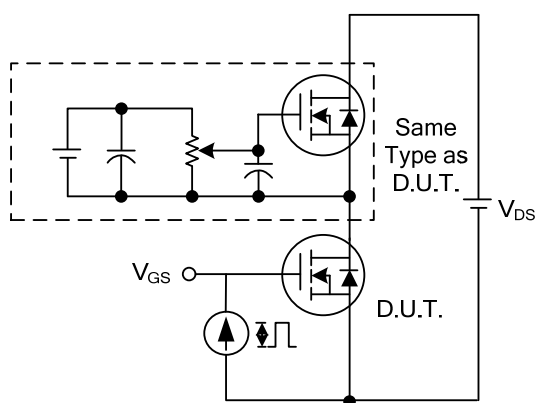
■ TEST CIRCUITS AND WAVEFORMS



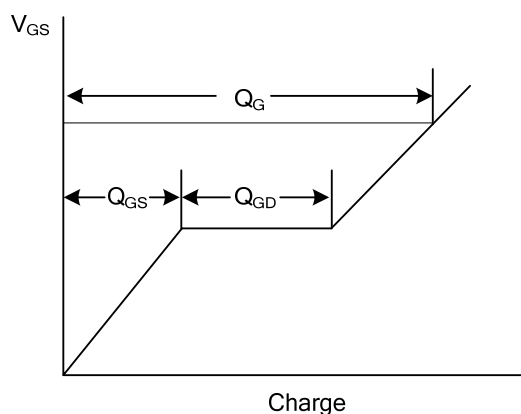
Switching Test Circuit



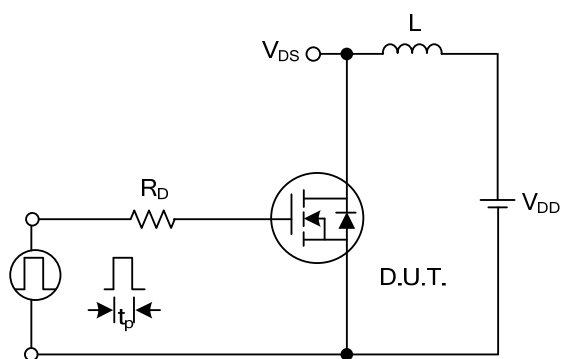
Switching Waveforms



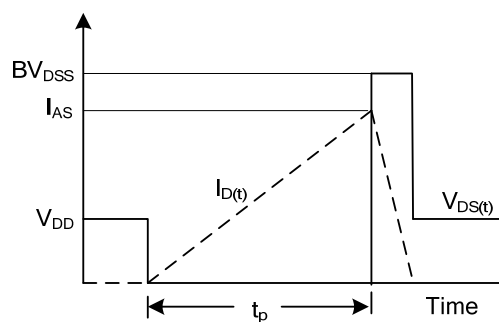
Gate Charge Test Circuit



Gate Charge Waveform

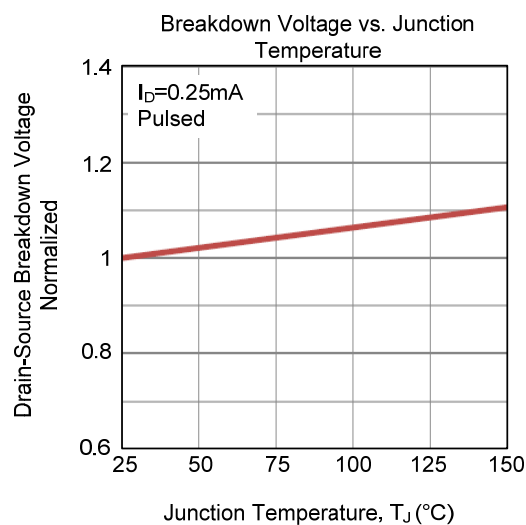
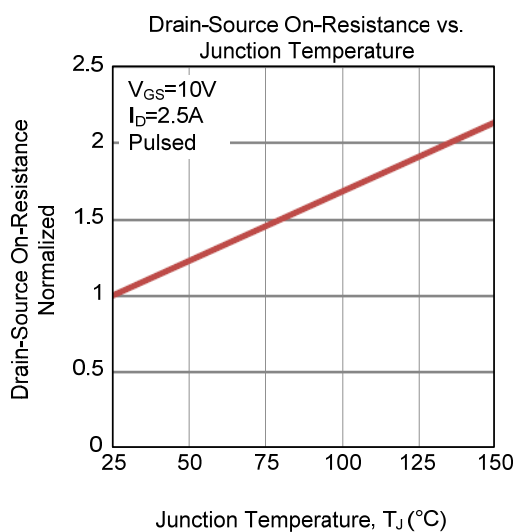
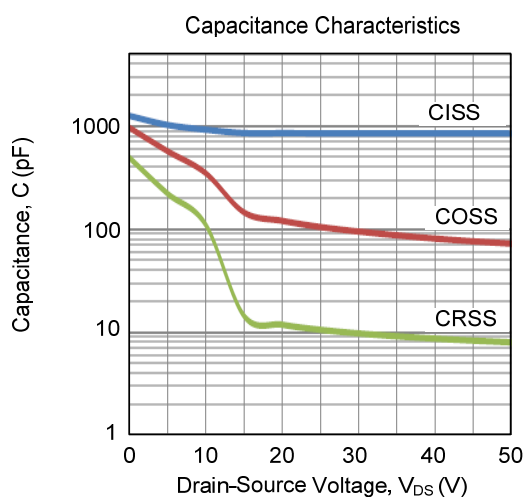
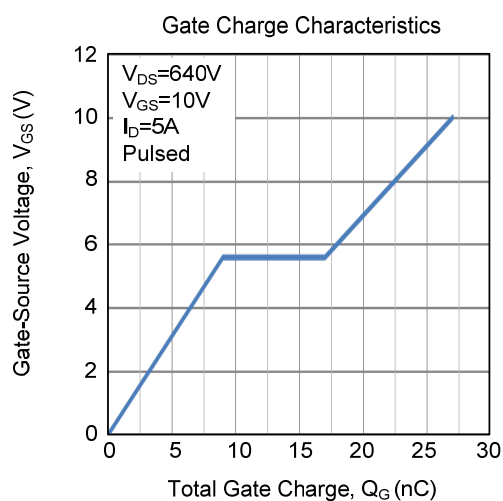
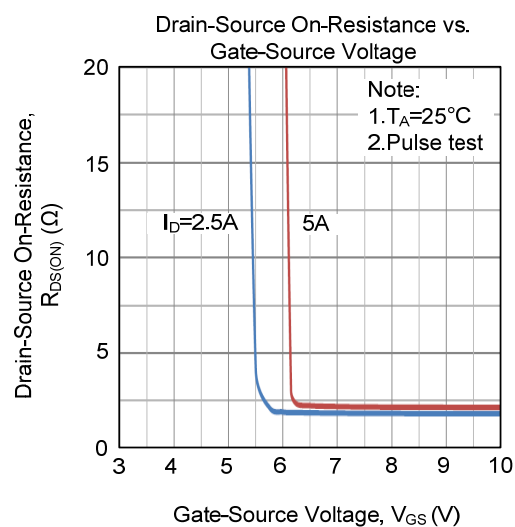
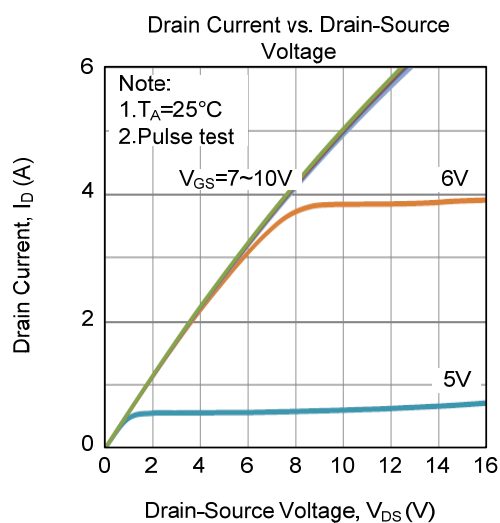


Unclamped Inductive Switching Test Circuit

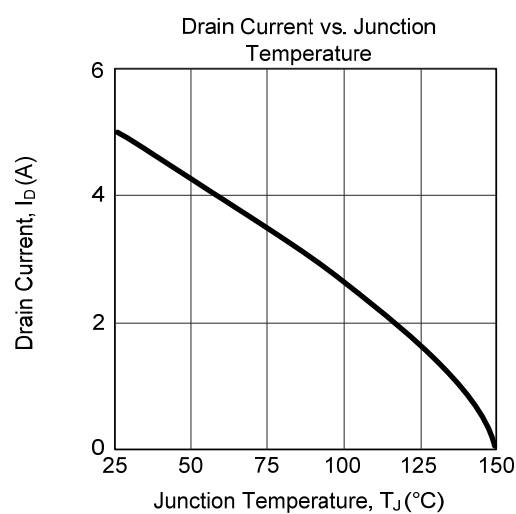
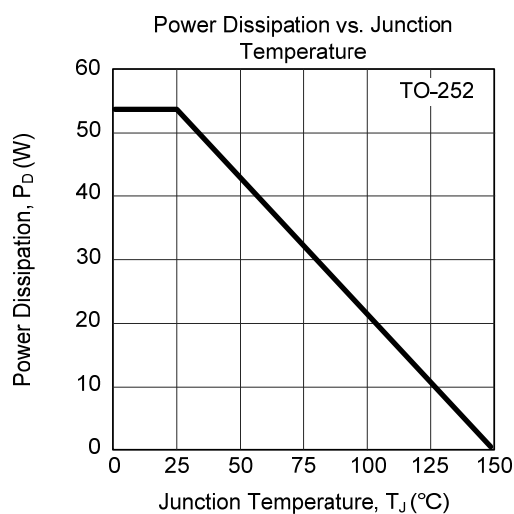
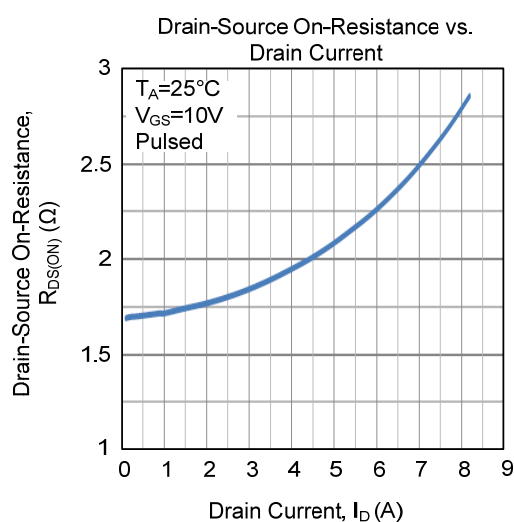
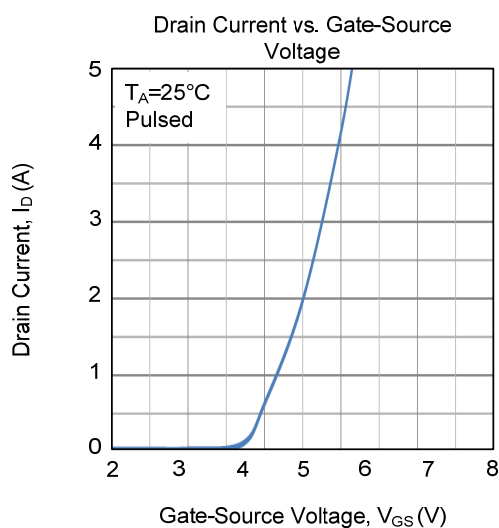
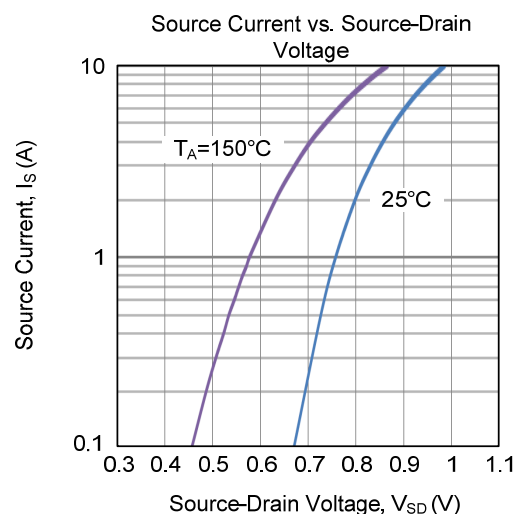
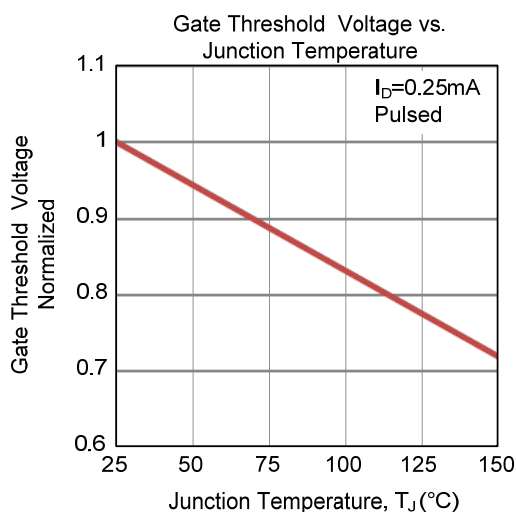


Unclamped Inductive Switching Waveforms

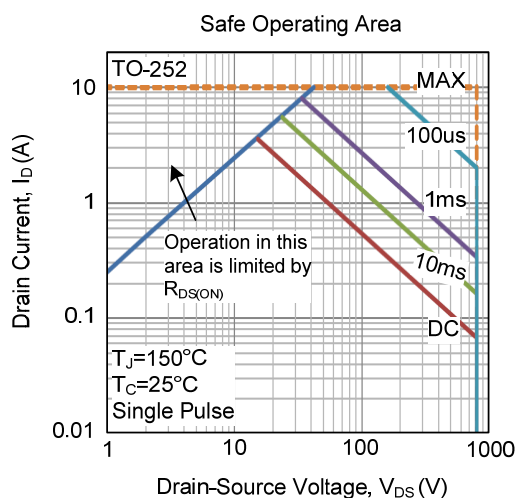
TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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