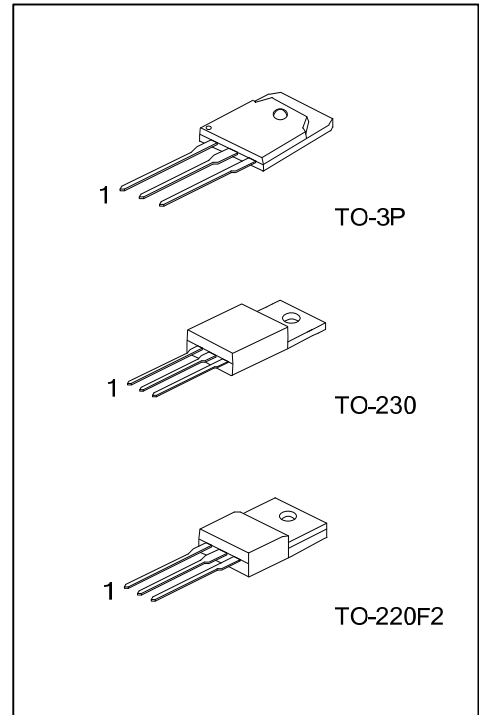
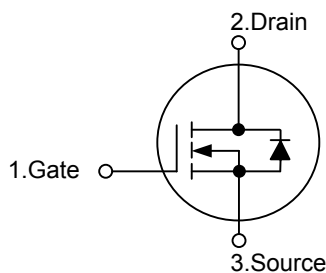


**10N80****Power MOSFET****10A, 800V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **10N80** uses UTC's advanced proprietary, planar stripe, DMOS technology to 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

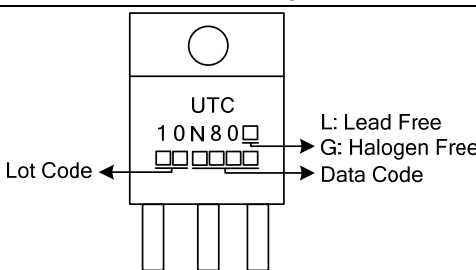
- * $R_{DS(ON)} < 1.1\Omega$ @ $V_{GS} = 10V$
- * Ultra Low Gate Charge (Typical 45nC)
- * Low Reverse Transfer Capacitance ($C_{RSS} =$ Typical 15pF)
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10N80L-T3P-T	10N80G-T3P-T	TO-3P	G	D	S	Tube
10N80L-TC3-T	10N80G-TC3-T	TO-230	G	D	S	Tube
10N80L-TF2-T	10N80G-TF2-T	TO-220F2	G	D	S	Tube

10N80L-T3P-T (1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube (2) T3P: TO-3P, TC3: TO-230, TF2: TO-220F2 (3) L: Lead Free, G: Halogen Free
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MARKING INFORMATION

PACKAGE	MARKING
TO-3P/TO-230/TO-220F2	 UTC 10N80 Lot Code Data Code L: Lead Free G: Halogen Free 1 2 3

■ **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
Continuous Drain Current ($T_C = 25^\circ\text{C}$)		I_D	10	A
Pulsed Drain Current (Note 2)		I_{DM}	40	A
Avalanche Current (Note 2)		I_{AR}	10	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	920	mJ
	Repetitive (Note 2)	E_{AR}	24	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-3P	P_D	240	W
	TO-230		156	
	TO-220F2		66	
Linear Derating Factor above $T_C = 25^\circ\text{C}$	TO-3P		1.92	$\text{W}/^\circ\text{C}$
	TO-230		1.25	
	TO-220F2		0.528	
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. $L=17.3\text{mH}$, $I_{AS}=10\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

4. $I_{SD} \leq 10\text{ A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$.

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-3P	θ_{JA}	40	$^\circ\text{C}/\text{W}$
	TO-220F2/TO-230		62.5	
Junction to Case	TO-3P	θ_{JC}	0.52	$^\circ\text{C}/\text{W}$
	TO-230		0.8	
	TO-220F2		1.89	

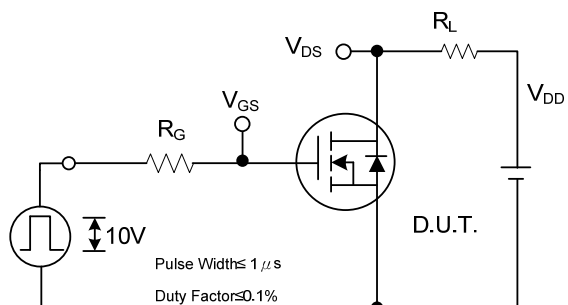
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0 V, I _D =250 μA	800			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =800V, V _{GS} =0 V			10	μA
		V _{DS} =640V, T _C =125°C			100	
Gate-Body Leakage Current	I _{GSS}	V _{DS} =0 V, V _{GS} = ±30 V			±100	nA
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		0.98		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 _{GS} = 10V, I _D = 5.0A		0.9	1.1	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		2150	2800	pF
Output Capacitance	C _{OSS}			180	230	pF
Reverse Transfer Capacitance	C _{RSS}			15	20	pF
SWITCHING PARAMETERS						
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =400V, I _D =10.0A, R _G =25Ω (Note 1,2)		50	110	ns
Turn-ON Rise Time	t _R			130	270	
Turn-OFF Delay Time	t _{D(OFF)}			90	190	
Turn-OFF Fall-Time	t _F			80	170	
Total Gate Charge	Q _G	V _{DS} =640V, V _{GS} =10V, I _D =10.0A (Note 1,2)		45	58	nC
Gate Source Charge	Q _{GS}			13.5		
Gate Drain Charge	Q _{GD}			17		
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V _{SD}	I _S =10.0 A,V _{GS} =0V			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	I _S				10.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				40.0	
Reverse Recovery Time	t _{rr}	V _{GS} = 0V, dI _F /dt = 100 A/μs,		730		ns
Reverse Recovery Charge	Q _{RR}	I _S = 10.0A (Note 1)		10.9		nC

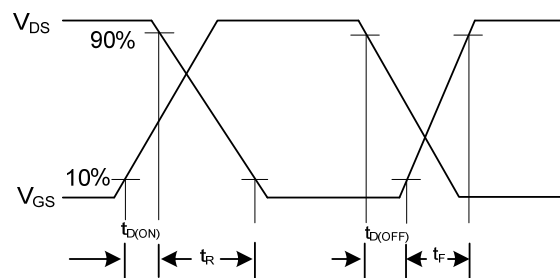
Notes: 1. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

2. Independent of operating temperature.

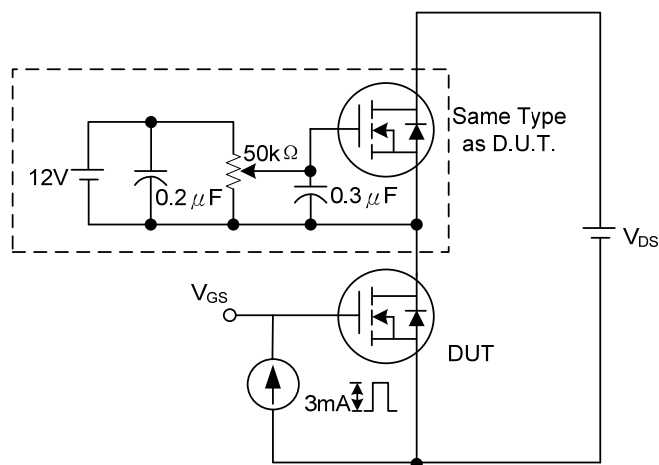
■ TEST CIRCUIT



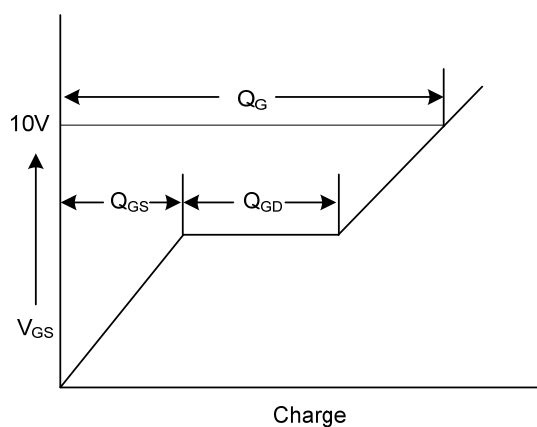
Switching Test Circuit



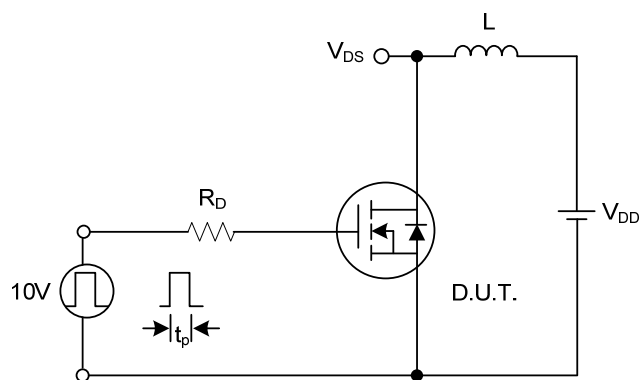
Switching Waveforms



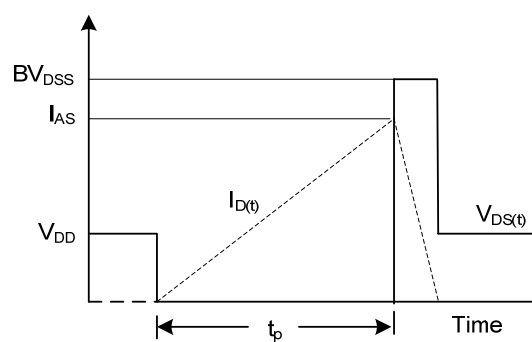
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

D.U.T.

V_{DS}

V_{DD}

L

R_G

Driver

Same Type as D.U.T.

V_{GS}

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

The diagram illustrates the timing relationships for a MOSFET switching event, showing the relationship between the gate-source voltage (V_{GS}), the drain-source current (I_{SD}), and the drain-source voltage (V_{DS}).

Top Trace: V_{GS} (Driver)

- Shows a square wave pulse with a pulse width (P.W.) and a period.
- The duty cycle is defined as $D = \frac{P.W.}{Period}$.
- The peak gate voltage is $V_{GS} = 10V$.

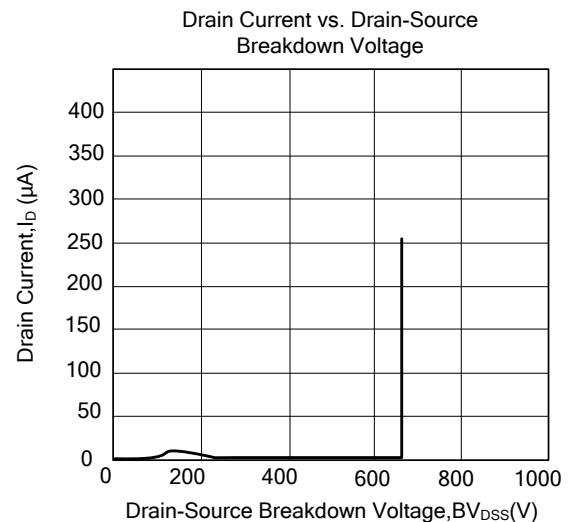
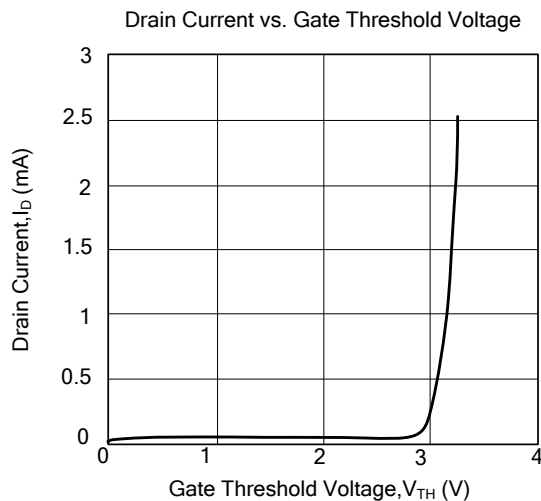
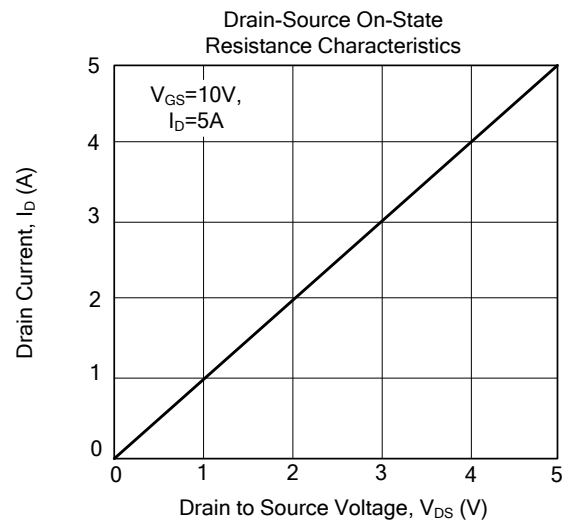
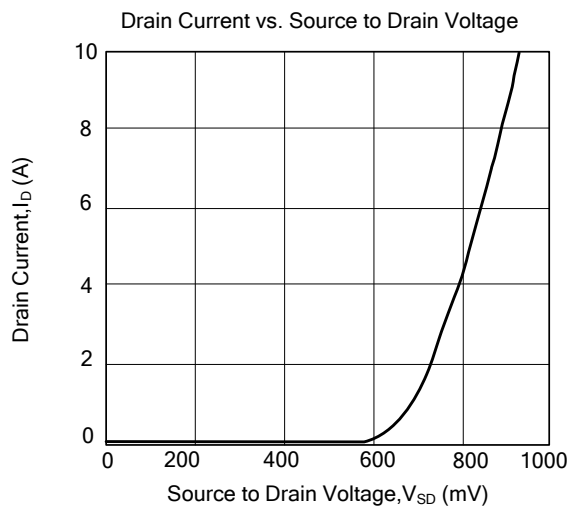
Middle Trace: I_{SD} (D.U.T.)

- Shows the drain-source current during the switching event.
- During the "ON" state of the MOSFET, the current is the forward current I_{FM} , labeled as "Body Diode Forward Current".
- During the "OFF" state, the current is the reverse current I_{RM} , labeled as "Body Diode Reverse Current".
- The reverse current shows a recovery phase with a slope labeled di/dt .

Bottom Trace: V_{DS} (D.U.T.)

- Shows the drain-source voltage during the switching event.
- During the "ON" state, the voltage is zero.
- During the "OFF" state, the voltage rises to the supply voltage V_{DD} .
- The recovery phase of the reverse current is associated with the "Body Diode Recovery dv/dt ".
- The "Body Diode Forward Voltage Drop" is indicated during the forward conduction phase.

■ TYPICAL CHARACTERISTICS



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