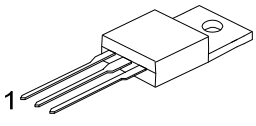
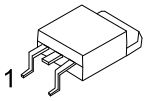
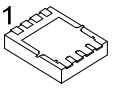
120A, 80V N-CHANNEL POWER MOSFET



TO-220



TO-252



PDFN5×6

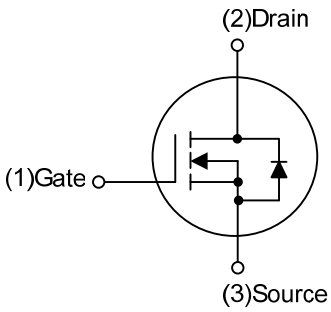
■ DESCRIPTION

The **UTC UT120N08** is a high voltage and high current power MOSFET, designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.

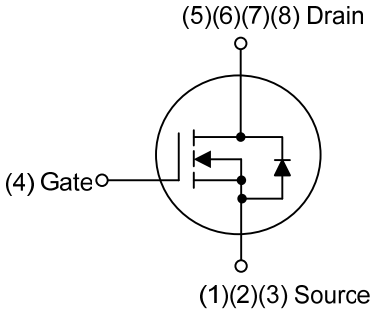
■ FEATURES

* $R_{DS(ON)}$ ≤ 9.0 mΩ @ V_{GS}=10V, I_D=20A
  $R_{DS(ON)}$ ≤ 11 mΩ @ V_{GS}=4.5V, I_D=20A
* Fast switching
* 100% avalanche tested
* Improved dv/dt capability

■ SYMBOL



TO-220/TO-252



PDFN5×6

■ ORDERING INFORMATION

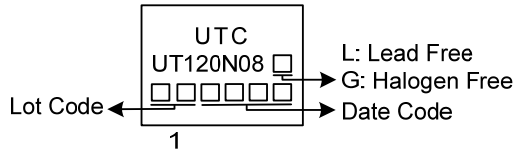
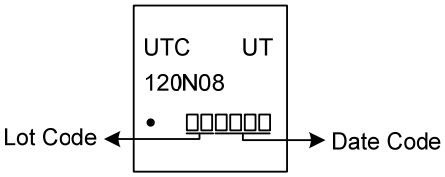
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT120N08L-TA3-T	UT120N08G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UT120N08L-TN3-R	UT120N08G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT120N08L-P5060-R	UT120N08G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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

UT120N08G-TA3-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TN3: TO-252, P5060: PDFN5×6
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

TO-220 / TO-252	PDFN5×6
	

■ ABSOLUTE MAXIMUM RATINGS (T_C =25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	80	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	120	A
	Pulsed	I_{DM}	240	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	107	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.6	V/ns
Power Dissipation	TO-220	P_D	156	W
	TO-252		64	W
	PDFN5×6		56	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		T_{STG}	-55 ~ +150	°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=0.1mH, I_{AS}=46.4A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	°C/W
	TO-252		110	
	PDFN5×6		65 (Note)	
Junction to Case	TO-220	θ_{JC}	0.8	°C/W
	TO-252		1.95 (Note)	
	PDFN5×6		2.23 (Note)	

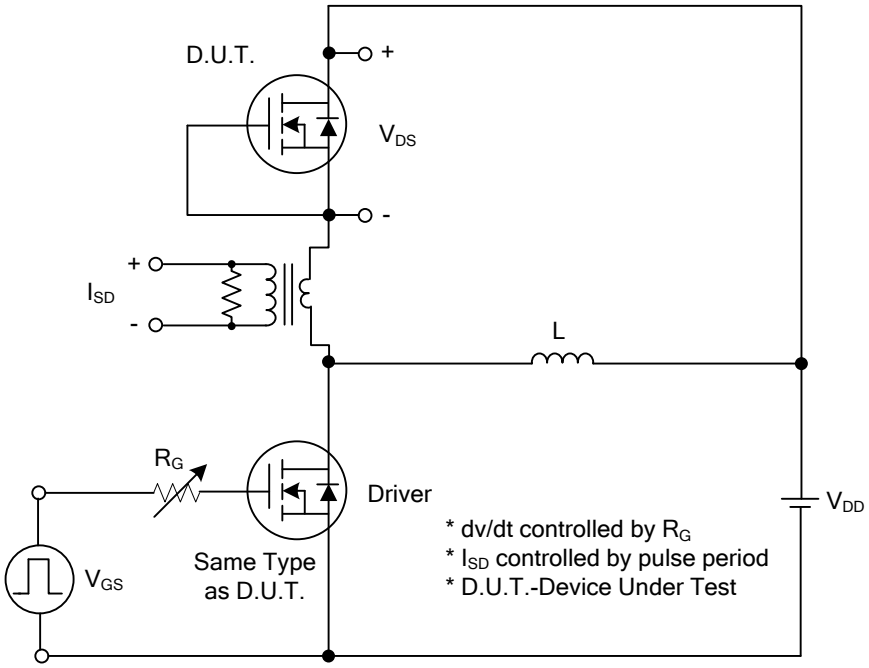
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

■ ELECTRICAL CHARACTERISTICS (T_C =25°C, unless otherwise specified)

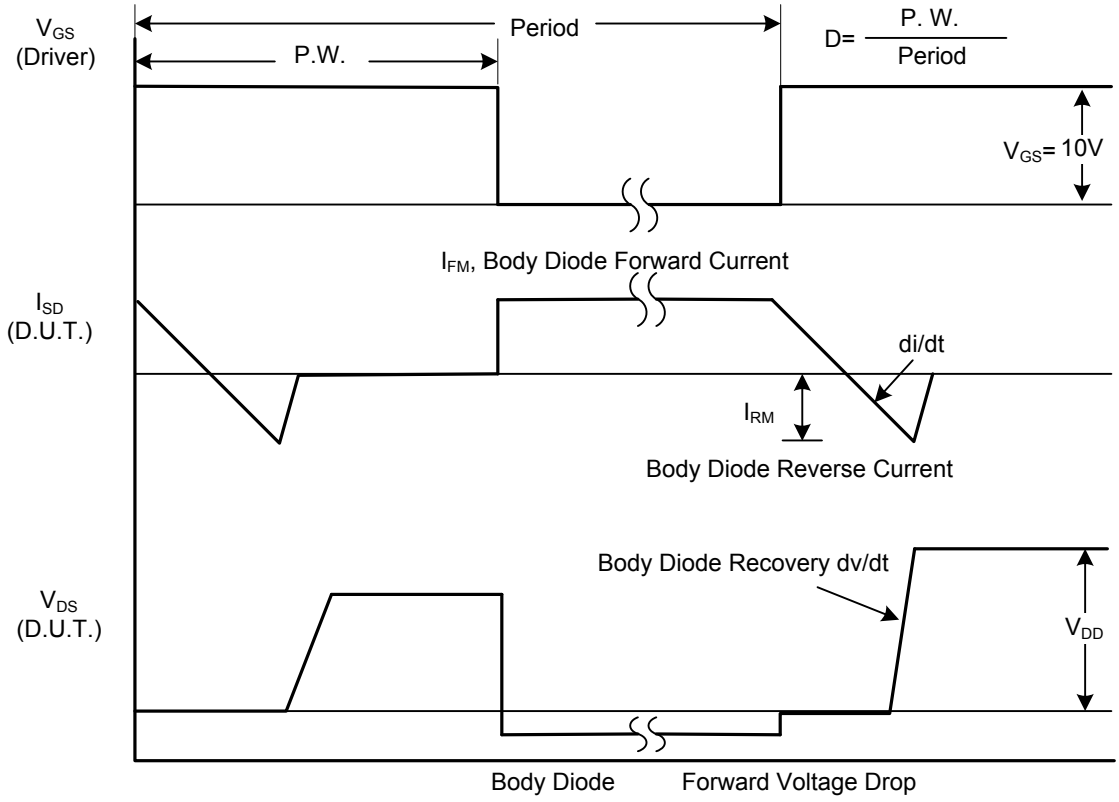
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	80			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=80V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=20A			9.0	mΩ
			V_{GS}=4.5V, I_D=20A			11	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		3720		pF
Output Capacitance		C_{OSS}			320		pF
Reverse Transfer Capacitance		C_{RSS}			280		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q_G	V_{DS}=64V, V_{GS}=4.5V, I_D=120A, I_G=1mA (Note 1, 2)		60		nC
Gate to Source Charge		Q_{GS}			13		nC
Gate to Drain Charge		Q_{GD}			32		nC
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	V_{DD}=40V, V_{GS}=10V, I_D=120A, R_G =3.3Ω (Note 1, 2)		14		ns
Rise Time		t_R			20		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			74		ns
Fall-Time		t_F			32		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				120	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				240	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	I_S=120A, V_{GS}=0V			1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	I_S=30A,V_{GS}=0V, dI/dt=100A/μs		50		ns
Reverse Recovery Charge		Q_{rr}			100		nC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle≤2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

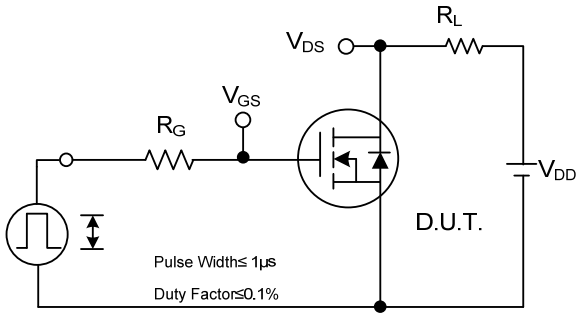


Peak Diode Recovery dv/dt Test Circuit

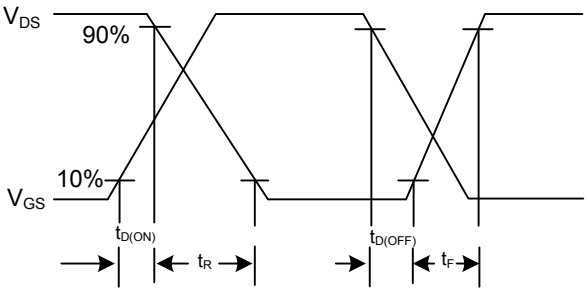


Peak Diode Recovery dv/dt Waveforms

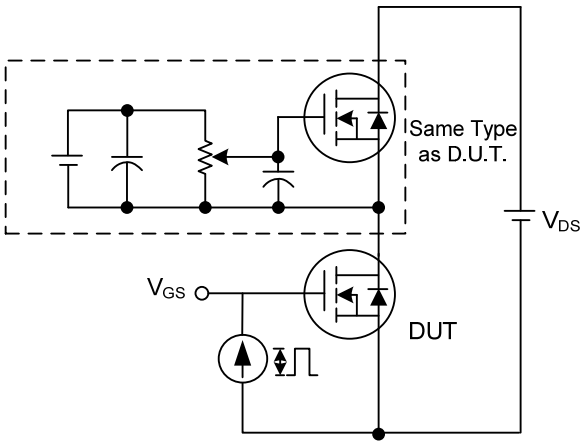
■ TEST CIRCUITS AND WAVEFORMS



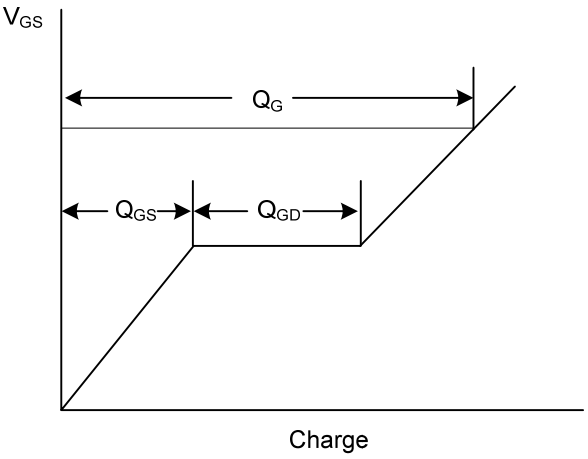
Switching Test Circuit



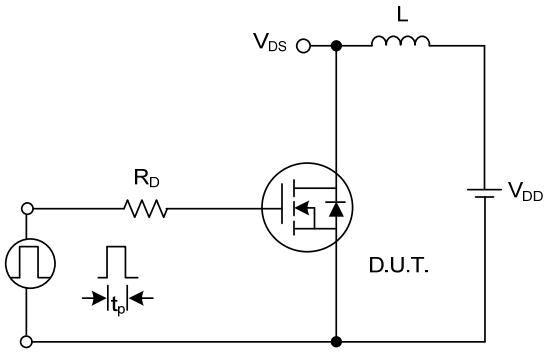
Switching Waveforms



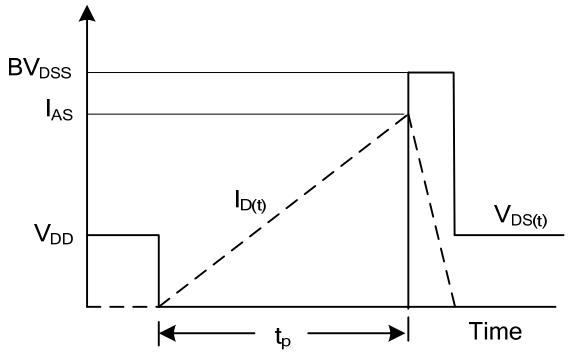
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms