



UT90N06

Preliminary

POWER MOSFET

90A, 60V N-CHANNEL POWER MOSFET

DESCRIPTION

The **UTC UT90N06** 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 DC to DC converters and bridge circuits.

FEATURES

* $R_{DS(ON)} \leq 6.5 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=45\text{A}$

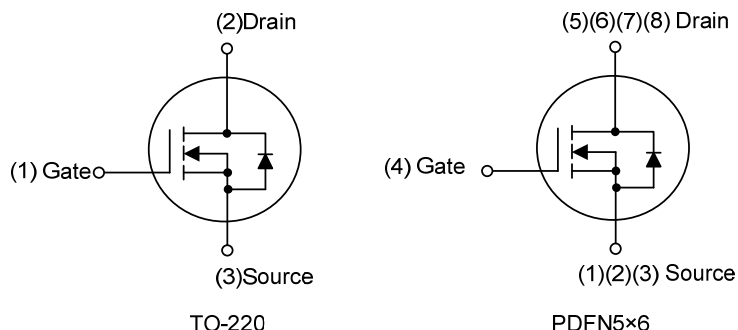
$R_{DS(ON)} \leq 11 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=45\text{A}$

* Fast switching

* 100% avalanche tested

* Improved dv/dt capability

SYMBOL



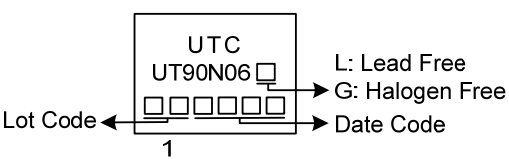
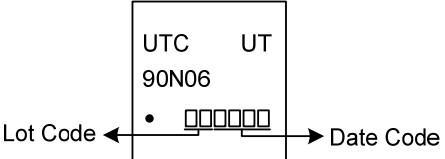
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT90N06L-TA3-T	UT90N06G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UT90N06L-P5060-R	UT90N06G-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

<p>UT90N06G-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>		<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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■ MARKING

TO-220	PDFN5×6
 <p>UTC UT90N06</p> <p>Lot Code ← [] [] [] [] [] → Date Code</p> <p>1</p> <p>L: Lead Free G: Halogen Free</p>	 <p>UTC UT 90N06</p> <p>Lot Code ← [] [] [] [] [] → Date Code</p>

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	± 20	V
Drain Current	Continuous	I_D	90	A
	Pulsed (Note 2)	I_{DM}	180	A
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	122	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	157	W
	PDFN5×6		70	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-20 ~ +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. $L = 0.1\text{mH}$, $I_{AS} = 49.4\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		65 (Note)	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	0.79	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		1.78 (Note)	$^{\circ}\text{C}/\text{W}$

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

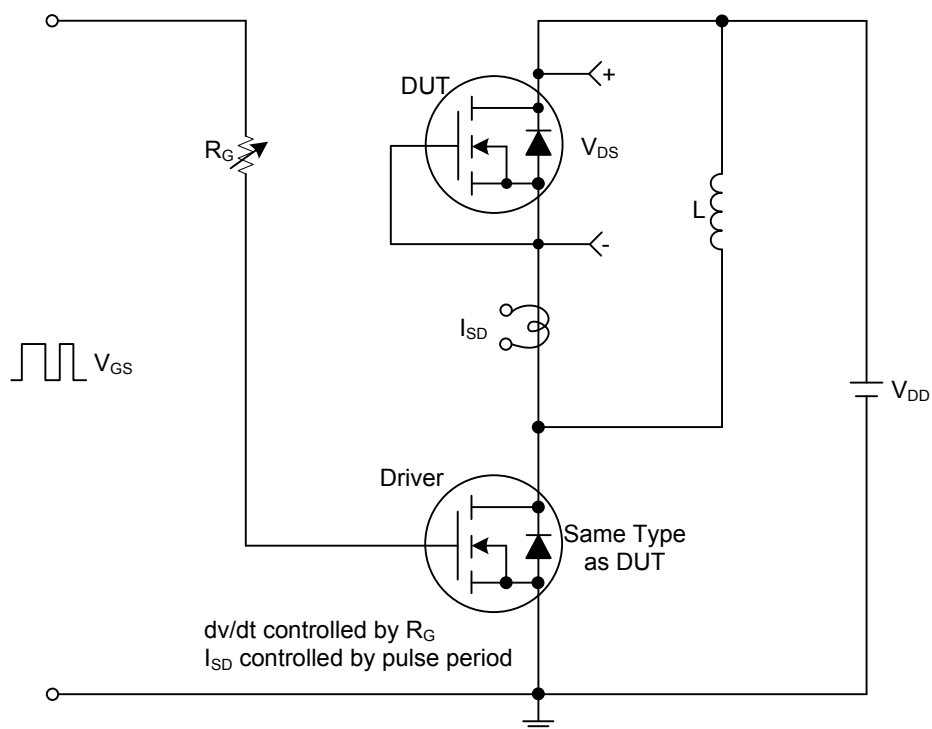
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	60			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	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 =45A			6.5	mΩ
			V _{GS} =4.5V, I _D =45A			11	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		3900		pF
Output Capacitance		C _{OSS}			350		pF
Reverse Transfer Capacitance		C _{RSS}			300		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =48V, V _{GS} =10V, I _D =90A, I _G =1mA (Note 1, 2)		90		nC
Gate to Source Charge		Q _{GS}			8		nC
Gate to Drain Charge		Q _{GD}			7		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DD} =30V, V _{GS} =10V, I _D =90A, R _G =3.3Ω (Note 1, 2)		15		ns
Rise Time		t _R			21		ns
Turn-off Delay Time		t _{D(OFF)}			66		ns
Fall-Time		t _F			25		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				90	A
Maximum Body-Diode Pulsed Current		I _{SM}				180	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =90A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =30A, V _{GS} =0V,		47		nS
Reverse Recovery Charge		Q _{rr}	dl _F /dt =100A/μs		145		nC

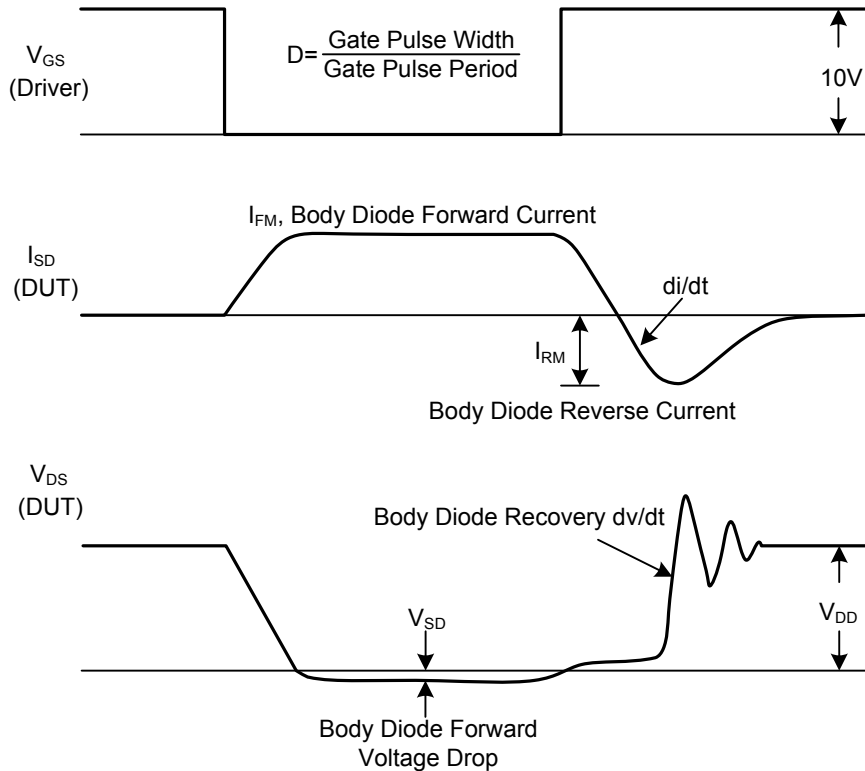
Notes: 1. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

■ TEST CIRCUITS AND WAVEFORMS



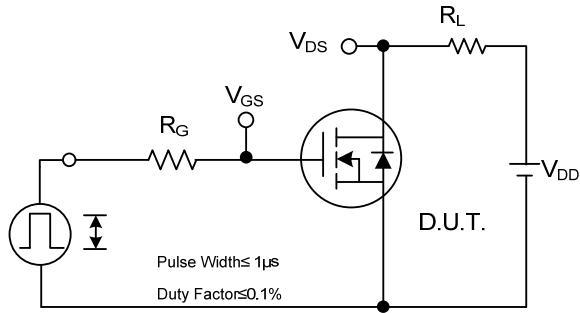
Peak Diode Recovery dv/dt Test Circuit



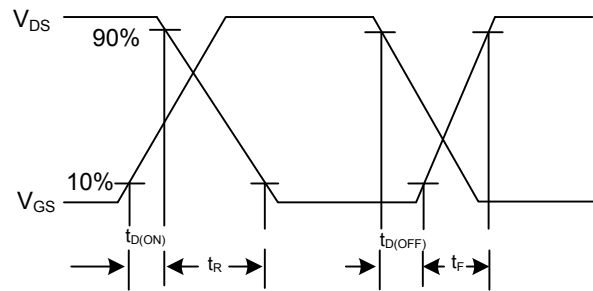
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

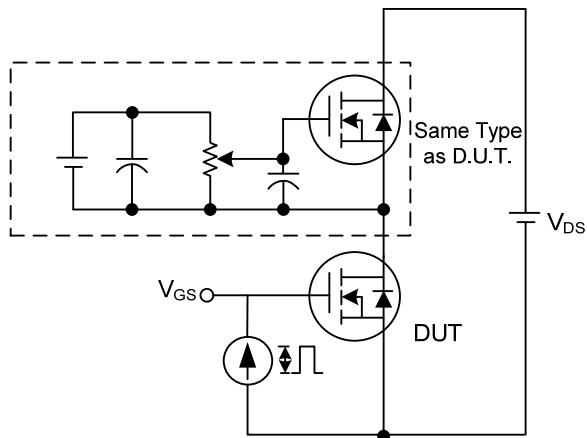
■ TEST CIRCUITS AND WAVEFORMS



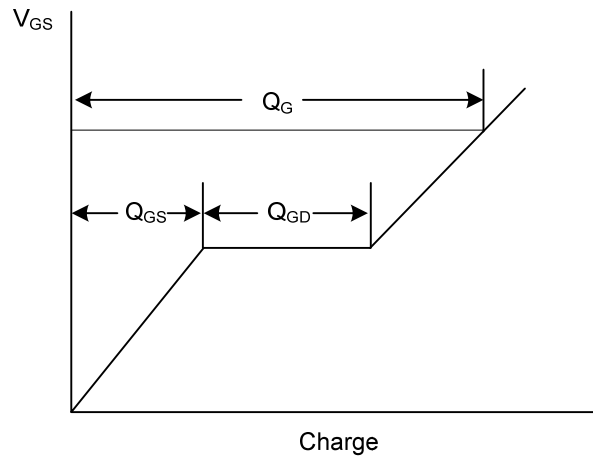
Switching Test Circuit



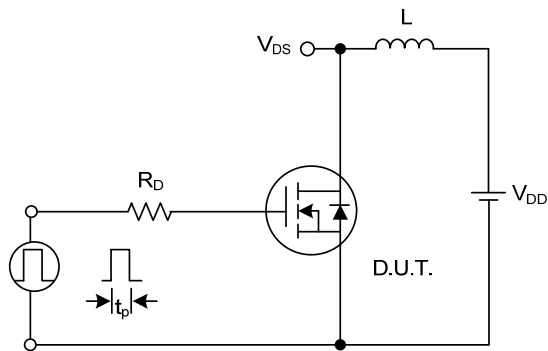
Switching Waveforms



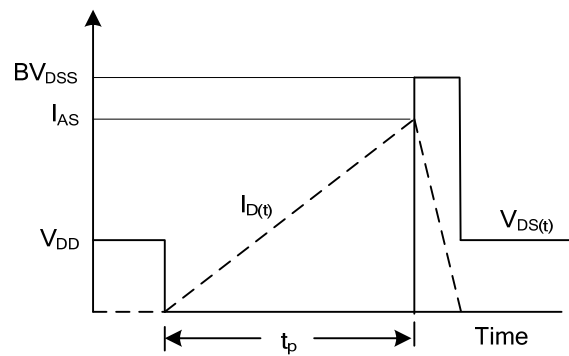
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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