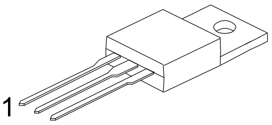
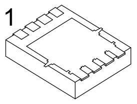
UTC **UNISONIC TECHNOLOGIES CO., LTD**

UT90N06 **Preliminary** ***POWER MOSFET***

90A, 60V N-CHANNEL POWER MOSFET



TO-220



PDFN5×6

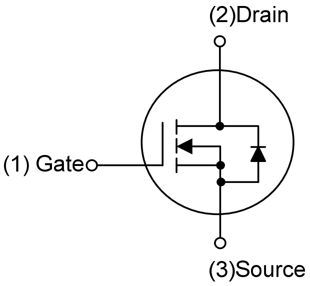
DESCRIPTION

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.

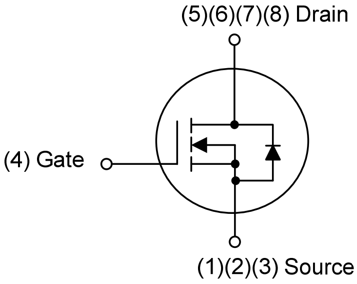
FEATURES

* $R_{DS(ON)}$ ≤ 6.5 mΩ @ V_{GS}=10V, I_D=45A
$R_{DS(ON)}$ ≤ 11 mΩ @ V_{GS}=4.5V, I_D=45A
* Fast switching
* 100% avalanche tested
* Improved dv/dt capability

SYMBOL



TO-220

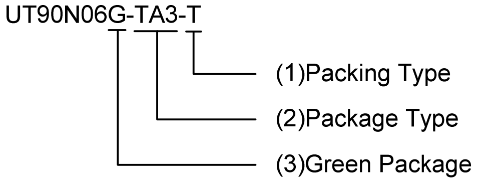


PDFN5×6

ORDERING INFORMATION

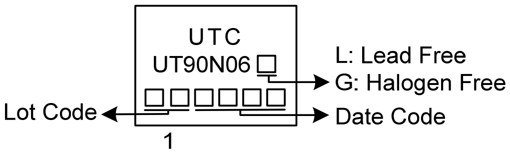
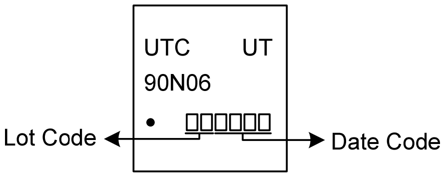
Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT90N06L-TA3-T	UT90N06G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UT90N06L-P5060-R	UT90N06G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

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



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

■ MARKING

TO-220	PDFN5×6
	

■ ABSOLUTE MAXIMUM RATING (T_C=25°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	°C
Storage Temperature Range		T_{STG}	-20 ~ +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} = 49.4A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
4. $I_{SD} \leq$ 30A, di/dt ≤ 200A/μs, $V_{DD} \leq BV_{DSS}$, Starting T_J = 25°C

■ THERMAL DATA

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

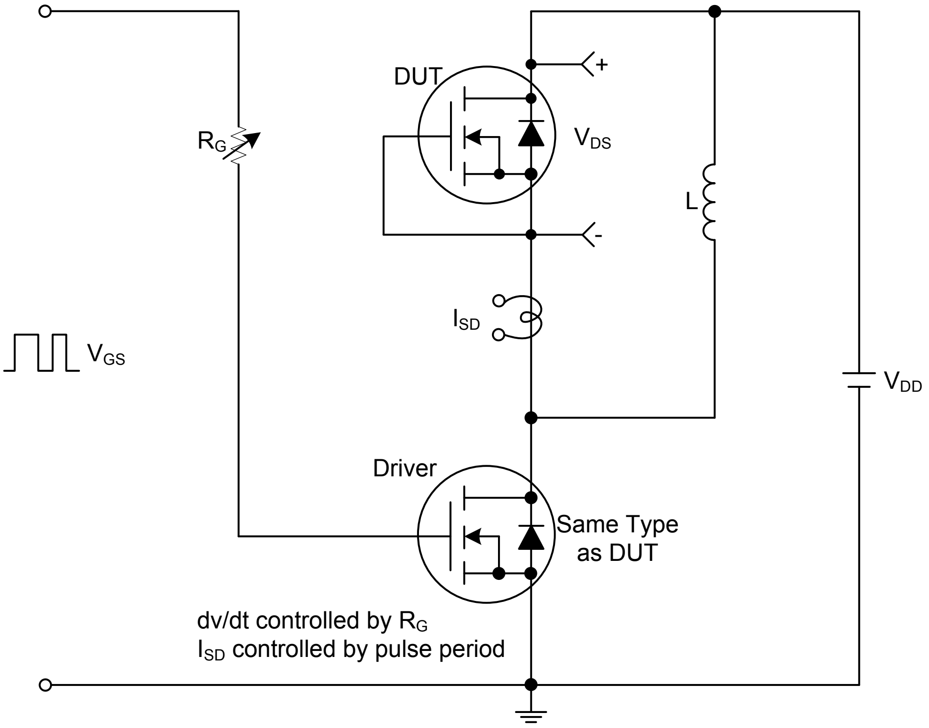
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

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

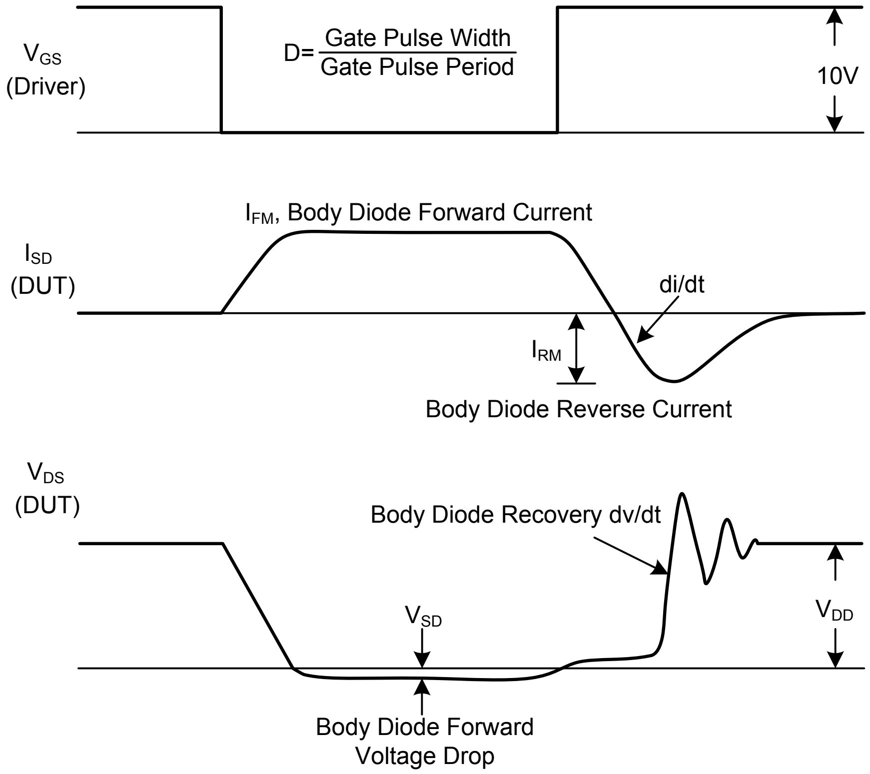
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	60			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=60V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		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, dI_F/dt =100A/μs		47		nS
Reverse Recovery Charge		Q_{rr}			145		nC

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

■ TEST CIRCUITS AND WAVEFORMS



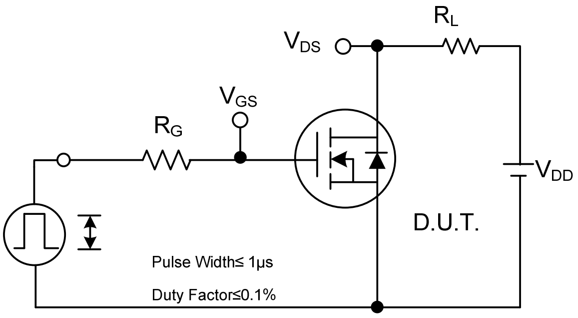
Peak Diode Recovery dv/dt Test Circuit



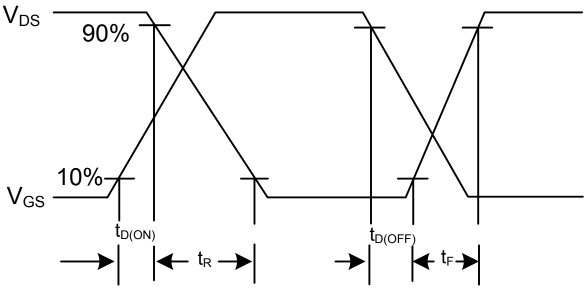
Peak Diode Recovery dv/dt Test Circuit and Waveforms

Peak Diode Recovery dv/dt Waveforms

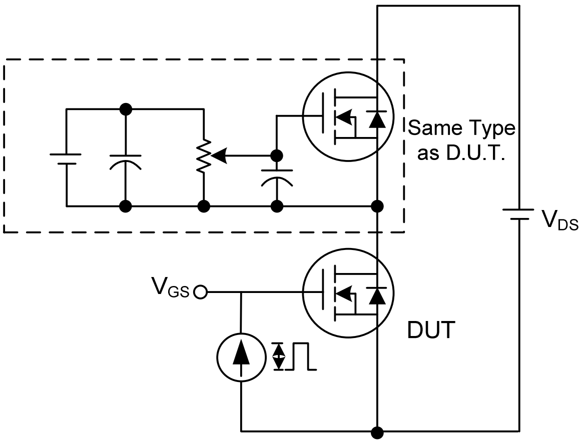
■ TEST CIRCUITS AND WAVEFORMS



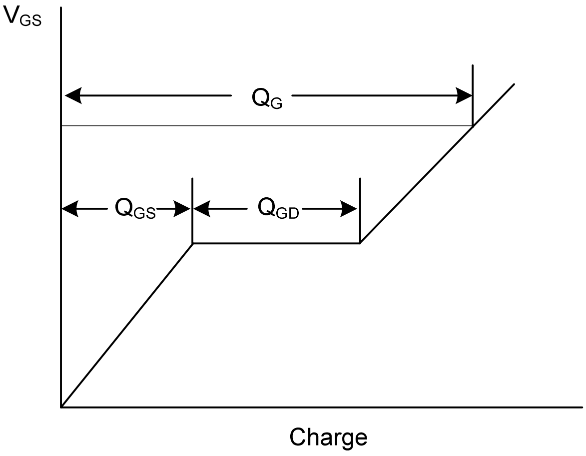
Switching Test Circuit



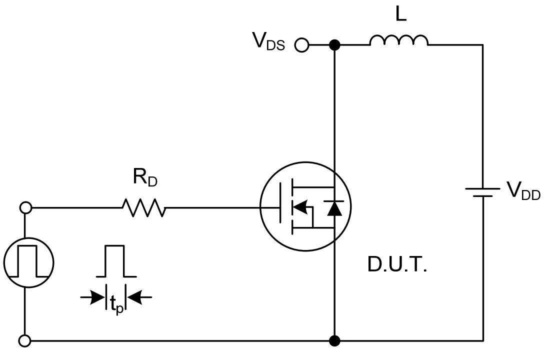
Switching Waveforms



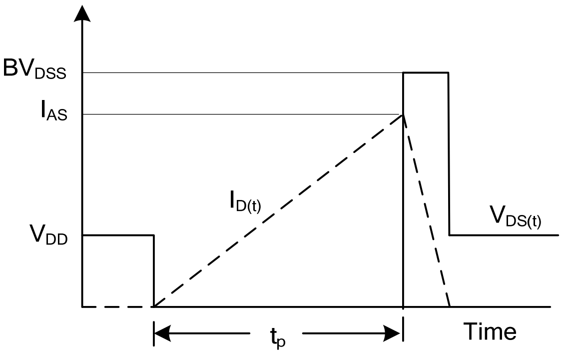
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms