



UT70N06

Preliminary

POWER MOSFET

70A, 60V N-CHANNEL POWER MOSFET

DESCRIPTION

The UTC **UT70N06** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, low gate charge and high switching speed.

The UTC **UT70N06** is suitable for high voltage synchronous rectifier and DC/DC converters, etc.

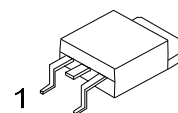
FEATURES

* $R_{DS(ON)} \leq 8.0 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=35\text{A}$

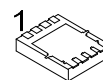
$R_{DS(ON)} \leq 14 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=20\text{A}$

* High Switching Speed

* High Cell Density Trench Technology

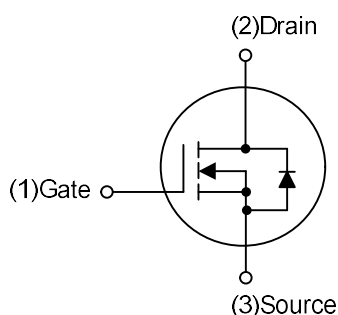


TO-252

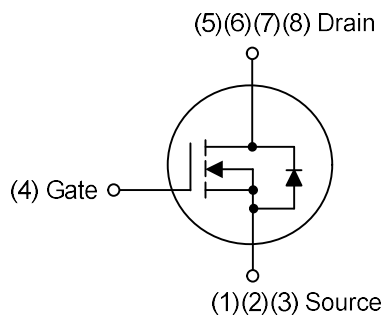


PDFN5x6

SYMBOL



TO-252



PDFN5x6

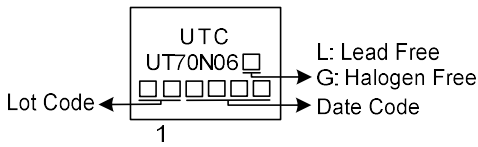
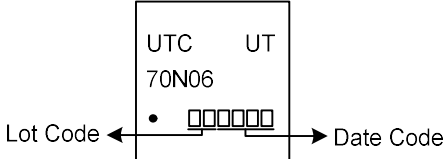
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT70N06L-TN3-R	UT70N06G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UT70N06L-P5060-R	UT70N06G-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	Tape Reel

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

UT70N06G-TN3-R (1) Packing Type (2) Package Type (3) Green Package		(1) R: Tape Reel (2) TN3: TO-252, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING

TO-252	PDFN5×6
 Diagram showing the marking layout for the TO-252 package. The marking area contains the text "UTC", "UT70N06", and a small square symbol. Below this, there are four small squares representing the Lot Code and four small squares representing the Date Code. To the left of the Lot Code squares is the label "Lot Code" with an arrow pointing to them. To the right of the Date Code squares is the label "Date Code" with an arrow pointing to them. Below the Lot Code squares is the number "1". To the right of the Date Code squares are the labels "L: Lead Free" and "G: Halogen Free" with arrows pointing to them.	 Diagram showing the marking layout for the PDFN5×6 package. The marking area contains the text "UTC", "UT", "70N06", and a small square symbol. Below this, there are four small squares representing the Lot Code and four small squares representing the Date Code. To the left of the Lot Code squares is the label "Lot Code" with an arrow pointing to them. To the right of the Date Code squares is the label "Date Code" with an arrow pointing to them.

■ **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	70	A
	Pulsed (Note 2)	I_{DM}	140	A
Avalanche Energy (Note 3)	Single Pulsed (Note 3)	E_{AS}	130	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.7	V/ns
Power Dissipation	TO-252	P_D	55	W
	PDFN5x6		50	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Storage Temperature Range		T_{STG}	-70 ~ +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. $L=0.1\text{mH}$, $I_{AS}=51\text{A}$, $V_{DD}=30\text{V}$, $R_G = 25\Omega$, 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-252	θ_{JA}	110	$^{\circ}\text{C}/\text{W}$
	PDFN5x6		65	$^{\circ}\text{C}/\text{W}$
Junction to Case (Note)	TO-252	θ_{JC}	2.2	$^{\circ}\text{C}/\text{W}$
	PDFN5x6		2.5	$^{\circ}\text{C}/\text{W}$

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

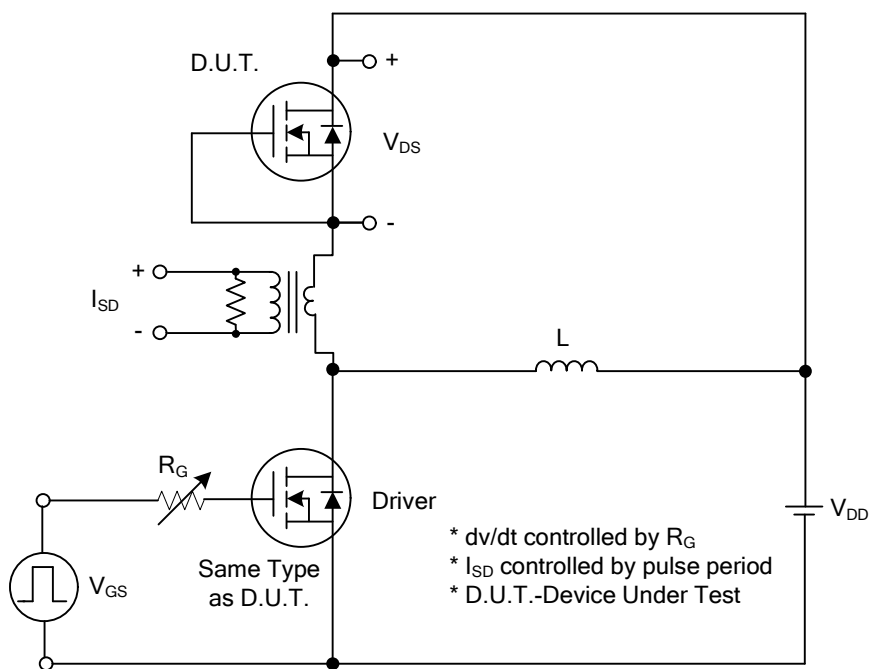
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

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 =1mA	1.0		3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =35A			8.0	mΩ
			V _{GS} =4.5V, I _D =20A			14	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		3150		pF
Output Capacitance		C _{OSS}			300		pF
Reverse Transfer Capacitance		C _{RSS}			265		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =48V, V _{GS} =10V, I _D =70A (Note 1, 2)		82		nC
Gate to Source Charge		Q _{GS}			13		nC
Gate to Drain Charge		Q _{GD}			28		nC
Turn-on Delay Time (Note 1)		t _{D(ON)}	V _{DS} =30V, V _{GS} =10V, I _D =70A, R _G =3Ω (Note 1, 2)		14		ns
Rise Time		t _R			20		ns
Turn-off Delay Time		t _{D(OFF)}			46		ns
Fall-Time		t _F			22		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				70	A
Maximum Body-Diode Pulsed Current		I _{SM}				140	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =70A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =30A, V _{GS} =0V,		30		ns
Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs (Note 1)		15		nC

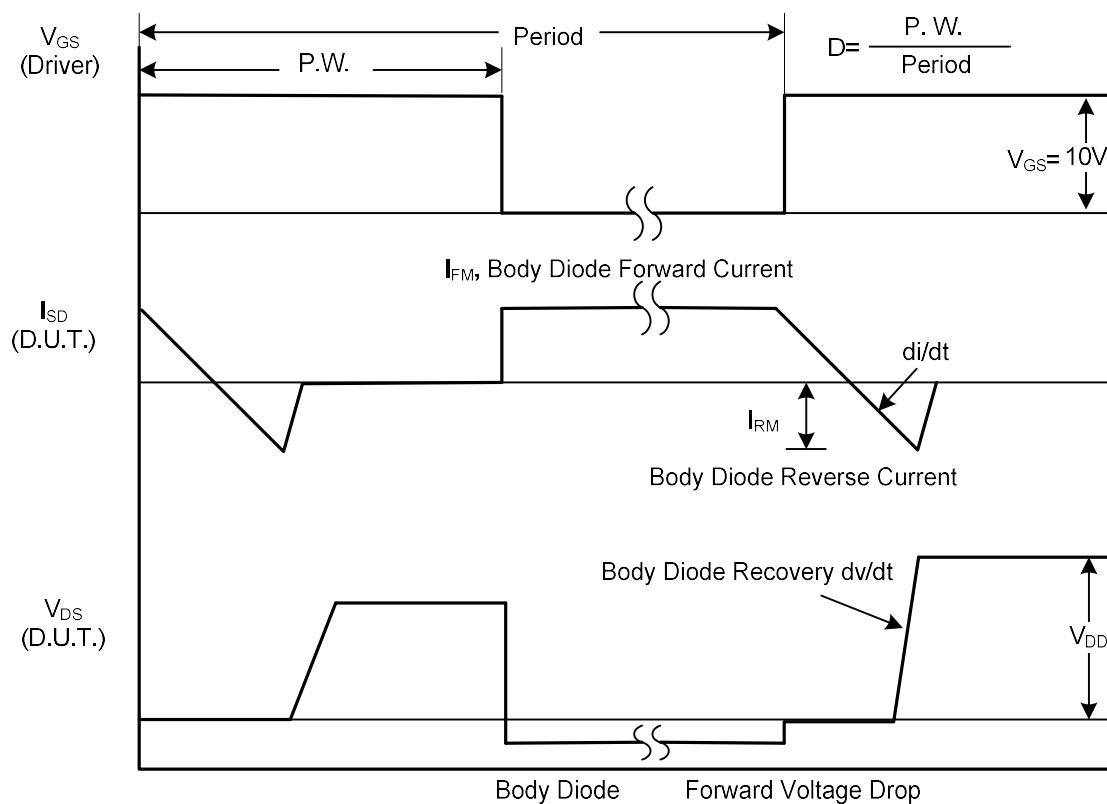
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

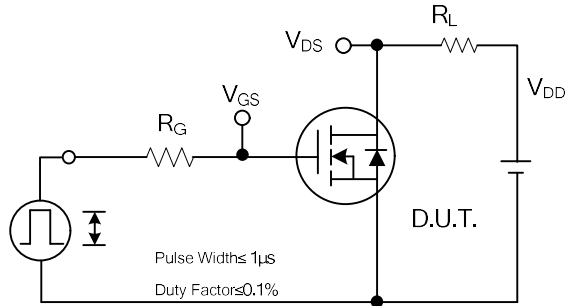


Peak Diode Recovery dv/dt Test Circuit

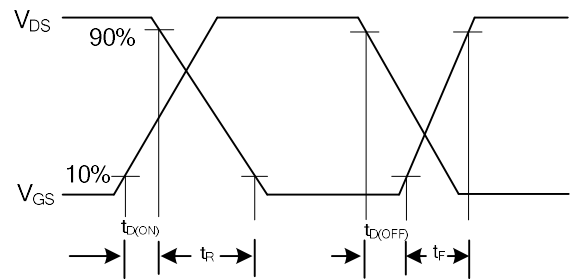


Peak Diode Recovery dv/dt Waveforms

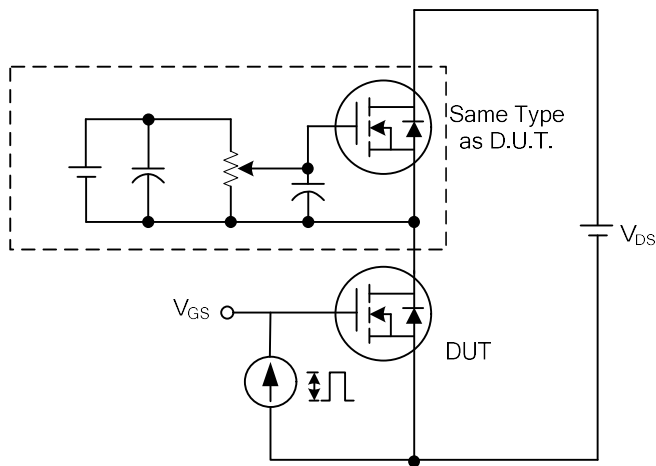
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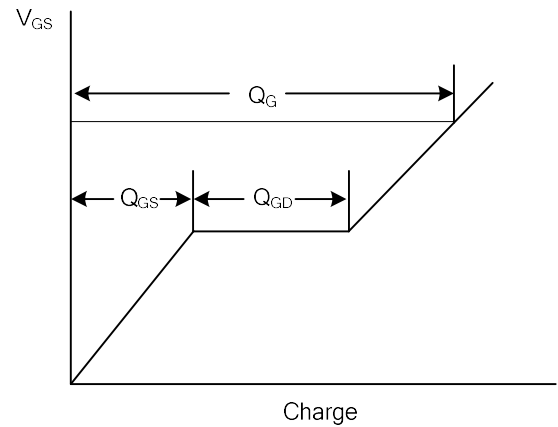
Switching Test Circuit



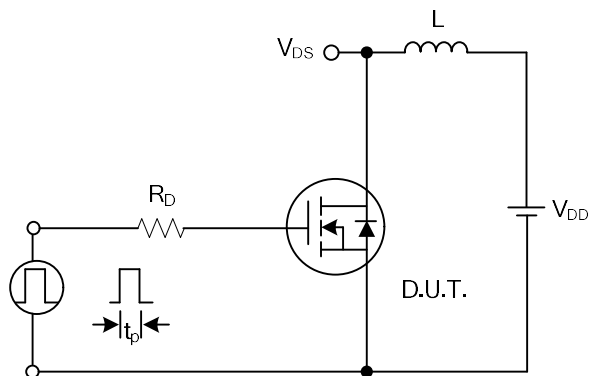
Switching Waveforms



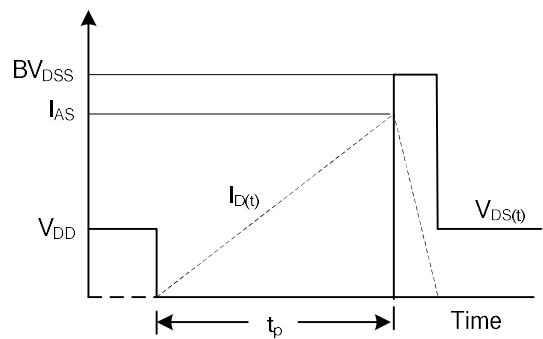
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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