



UT32NP06

Preliminary

Power MOSFET

**DUAL ENHANCEMENT MODE
(N-CHANNEL / P-CHANNEL)**

■ DESCRIPTION

The UTC **UT32NP06** incorporates a N-channel MOSFET and a P-channel MOSFET, it uses UTC's advanced technology to provide customers a minimum on-state resistance, high switching speed, low gate charge and cost effectiveness.

The UTC **UT32NP06** is universally applied in low voltage applications.

■ FEATURES

* N-CHANNEL

$R_{DS(on)} \leq 18 \Omega @ V_{GS}=10V, I_D=8.0A$

$R_{DS(on)} \leq 20 \Omega @ V_{GS}=4.5V, I_D=8.0A$

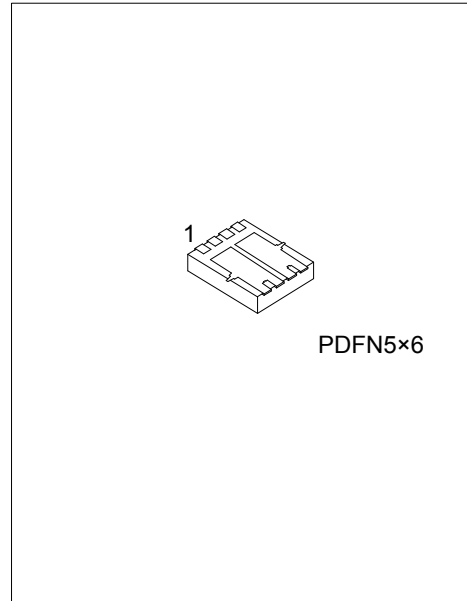
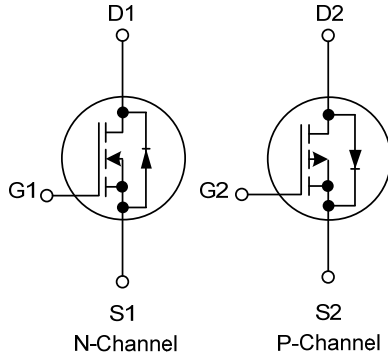
* P-CHANNEL

$R_{DS(on)} \leq 65 m\Omega @ V_{GS}=-10V, I_D=-8.0A$

$R_{DS(on)} \leq 112 m\Omega @ V_{GS}=-4.5V, I_D=-8.0A$

* High switching speed

■ SYMBOL



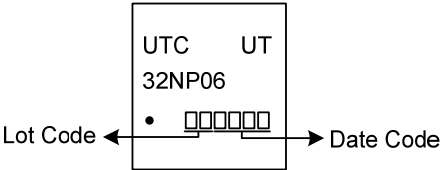
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT32NP06L-P5060-R	UT32NP06G-P5060-R	PDFN5x6	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

<p>UT32NP06G-P5060-R</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) R: Tape Reel (2) P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS		UNIT
			N-CH	P-CH	
Drain-Source Voltage		V_{DSS}	60	-60	V
Gate-Source Voltage		V_{GSS}	± 20	± 20	V
Drain Current	Continuous $T_C=25^\circ\text{C}$	I_D	16	-16	A
	Pulsed	I_{DM}	32	-32	A
Avalanche Energy, Single Pulse		E_{AS}	84	30	mJ
Power Dissipation		P_D	2.1		W
Junction Temperature		T_J	+150		$^\circ\text{C}$
Range of 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. N-Channel: $L=0.1\text{mH}$, $I_{AS}=41\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

P-Channel: $L=0.1\text{mH}$, $I_{AS}=-24.6\text{A}$, $V_{DD}=-50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	90	$^\circ\text{C/W}$
Junction to Case	θ_{JC}	59.5 (Note)	$^\circ\text{C/W}$

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)

N-Channel

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	60			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$, $T_J=25^\circ\text{C}$			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}			+100	nA
	Reverse					
		$V_{GS}=-20\text{V}$			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.0		3.0	V
Static Drain-Source On-State Resistance (Note)	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=8.0\text{A}$			18	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=8.0\text{A}$			20	$\text{m}\Omega$
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		2500		pF
Output Capacitance	C_{OSS}			205		pF
Reverse Transfer Capacitance	C_{RSS}			180		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q_G	$V_{DS}=48\text{V}$, $V_{GS}=10\text{V}$, $I_D=32\text{A}$, $I_G=1.0\text{mA}$		70		nC
Gate to Source Charge	Q_{GS}			10		nC
Gate to Drain Charge	Q_{GD}			20		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	$V_{DD}=30\text{V}$, $V_{GS}=10\text{V}$, $I_D=32\text{A}$, $R_G=3.0\Omega$		11		ns
Rise Time	t_R			17		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			48		ns
Fall-Time	t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				16	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				32	A
Drain-Source Diode Forward Voltage (Note)	V_{SD}	$I_S=32\text{A}$, $V_{GS}=0\text{V}$			1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S=30\text{A}$, $V_{GS}=0\text{V}$		66		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$di_F/dt=100\text{A}/\mu\text{s}$		155		nC

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

2. Essentially independent of operating ambient temperature.

■ ELECTRICAL CHARACTERISTICS (Cont.)

P-Channel

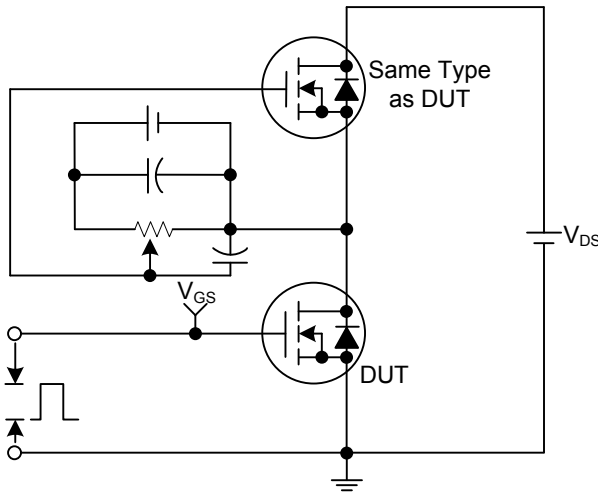
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -250\mu A, V_{GS} = 0V$	-60			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = -60V, V_{GS} = 0V, T_J = 25^\circ C$			-1	μA
Gate-Source Leakage Current	Forward	I_{GSS}			+100	nA
		Reverse			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Note)	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -8.0A$			65	m Ω
		$V_{GS} = -4.5V, I_D = -8.0A$			112	m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0V, V_{DS} = -25V, f = 1.0MHz$		1500		pF
Output Capacitance	C_{OSS}			106		pF
Reverse Transfer Capacitance	C_{RSS}			80		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note)	Q_G	$V_{DS} = -48V, V_{GS} = -10V, I_D = -36A, I_G = -1.0mA$		30		nC
Gate to Source Charge	Q_{GS}			7.8		nC
Gate to Drain Charge	Q_{GD}			7		nC
Turn-ON Delay Time (Note)	$t_{D(ON)}$	$V_{DD} = -30V, V_{GS} = -10V, I_D = -36A, R_G = 3.0\Omega$		8		ns
Rise Time	t_R			16		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			30		ns
Fall-Time	t_F			20		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				-16	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				-32	A
Drain-Source Diode Forward Voltage (Note)	V_{SD}	$I_S = -32A, V_{GS} = 0V$			-1.4	V
Body Diode Reverse Recovery Time	t_{rr}	$I_S = -30A, V_{GS} = 0V$ $di_F/dt = 100A/\mu s$		45		ns
Body Diode Reverse Recovery Charge	Q_{rr}			68		nC

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

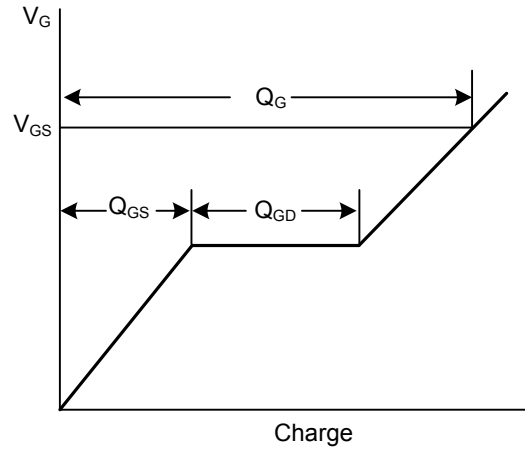
2. Essentially independent of operating ambient temperature.

TEST CIRCUITS AND WAVEFORMS

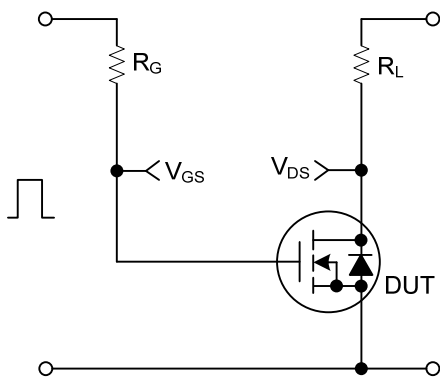
N-CHANNEL



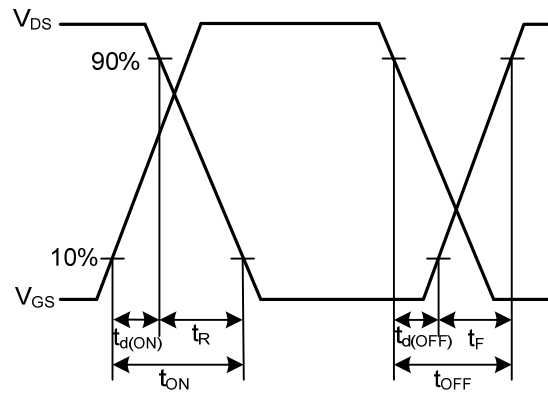
Gate Charge Test Circuit



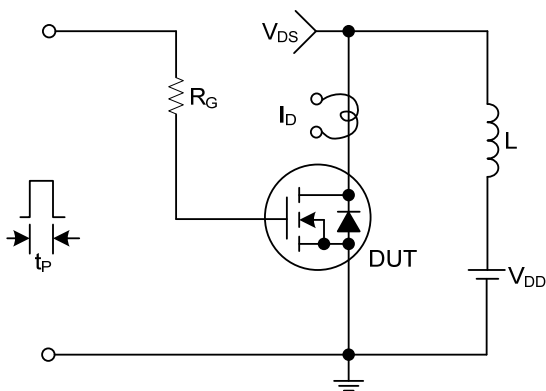
Gate Charge Waveforms



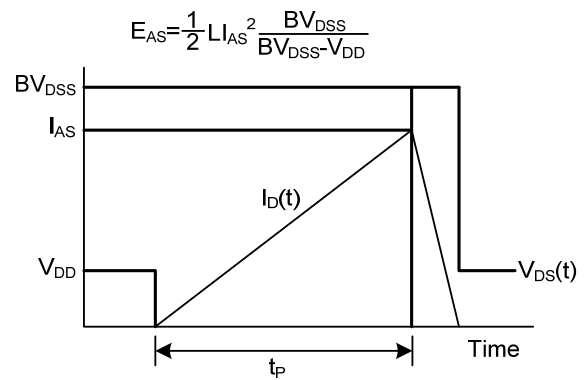
Resistive Switching Test Circuit



Resistive Switching Waveforms



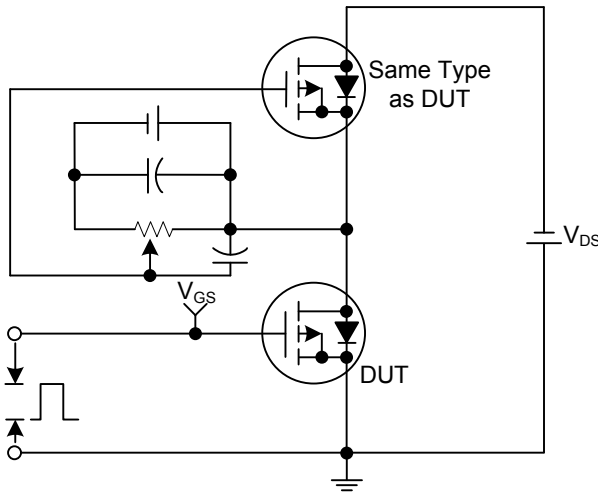
Unclamped Inductive Switching Test Circuit



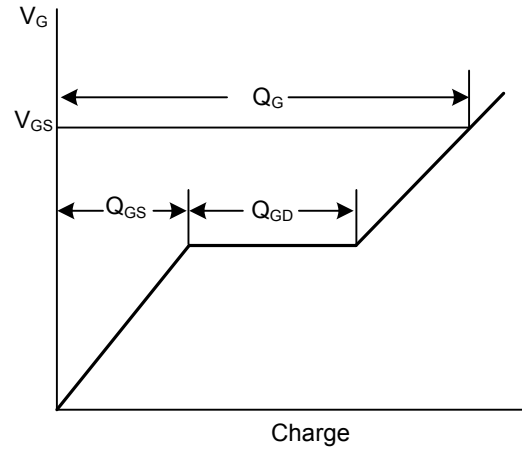
Unclamped Inductive Switching Waveforms

TEST CIRCUITS AND WAVEFORMS

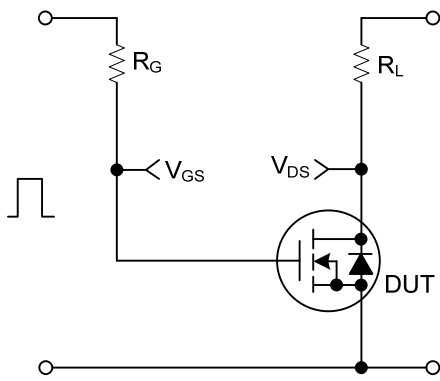
P-CHANNEL



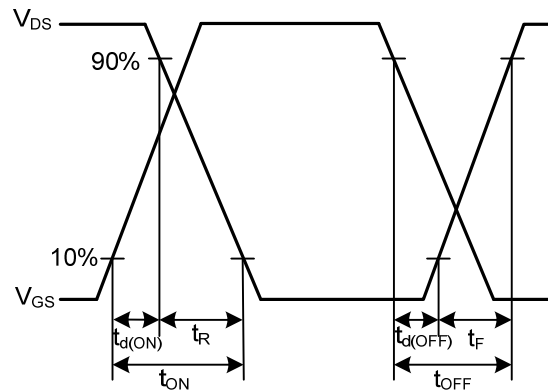
Gate Charge Test Circuit



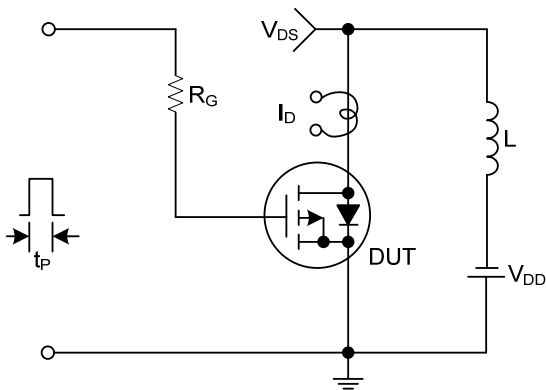
Gate Charge Waveforms



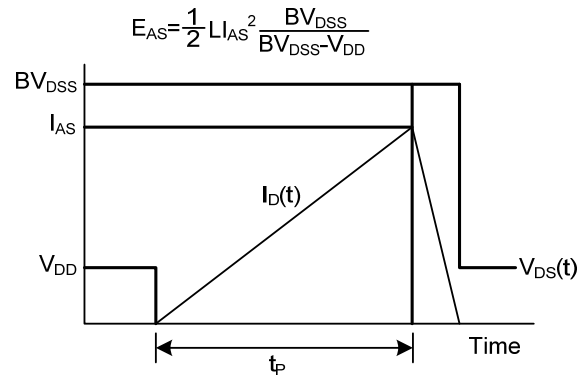
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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