



UTT9NP03

Advance

Power MOSFET

30V DUAL MIDDLE POWER MOSFET (N-CHANNEL/P-CHANNEL)

DESCRIPTION

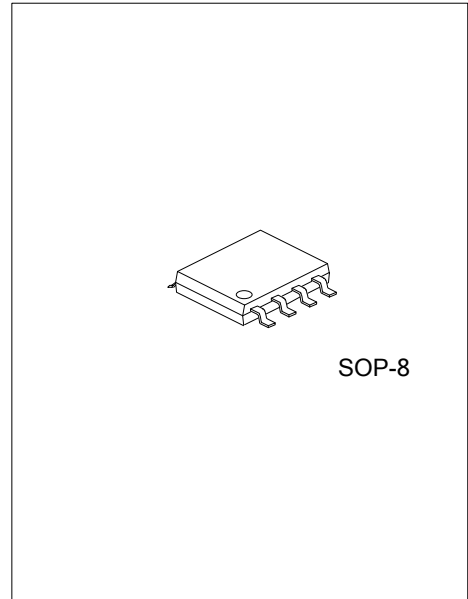
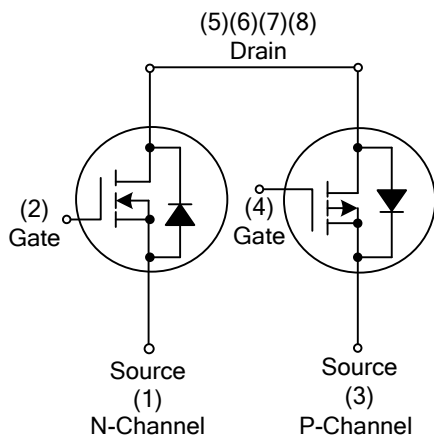
The UTC **UTT9NP03** is a 30V N-Channel & P-Channel middle Power MOSFET, it uses UTC's advanced technology to provide the customers with a minimum on state resistance, etc.

The UTC **UTT9NP03** is suitable for switching.

FEATURES

* Low on-resistance

SYMBOL



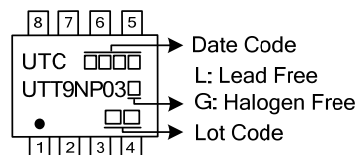
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT9NP03L-S08-R	UTT9NP03G-S08-R	SOP-8	S	G	S	G	D	D	D	D	Tape Reel

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

<p>UTT9NP03G-S08-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



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

PARAMETER		SYMBOL	RATINGS		UNIT
			TR1	TR2	
Drain-Source Voltage		V_{DSS}	30	-30	V
Gate-Source Voltage		V_{GSS}	± 20	± 20	V
Drain Current	Continuous (Note 4)	I_D	± 9.0	± 8.0	A
	Pulsed (Note 5)	I_{DP}	± 18	± 18	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	3.5	2.2	mJ
Avalanche Current (Note 3)		I_{AS}	7.0	-5.5	A
Power Dissipation	Total	P_D (Note 4)	2.6		W
		P_D (Note 6)	1.5		W
	Element	P_D (Note 6)	1.25		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 T_J .

3. N-CHANNEL : $L=0.1\text{mH}$, $V_{DD}=15\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

P-CHANNEL : $L=0.1\text{mH}$, $V_{DD}=-15\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^{\circ}\text{C}$

4. $P_W \leq 1\text{s}$, Limited only by maximum temperature allowed.

5. $P_W \leq 10\ \mu\text{s}$, Duty cycle $\leq 1\%$.

6. Mounted on a ceramic board.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient (Note 6)	θ_{JA}	83.3	$^{\circ}\text{C/W}$

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

N-CHANNEL

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=1\text{mA}$, $V_{GS}=0\text{V}$	30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=1\text{mA}$	1.0		2.5	V
Static Drain-Source On-State Resistance (Pulsed)	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=9\text{A}$		12.3	16.0	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=7\text{A}$		18.2	23.7	m Ω
Transconductance (Pulsed)	g_{FS}	$V_{GS}=5\text{V}$, $I_D=7\text{A}$	4.4			S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1.0\text{MHz}$		640		pF
Output Capacitance	C_{OSS}			110		pF
Reverse Transfer Capacitance	C_{RSS}			90		pF
SWITCHING PARAMETERS						
Total Gate Charge (Pulsed)	Q_G	$V_{GS}=4.5\text{V}$, $V_{DD}=15\text{V}$, $I_D=9\text{A}$ (Note 1, 2)		7.9		nC
Gate to Source Charge (Pulsed)	Q_{GS}			3.1		nC
Gate to Drain Charge (Pulsed)	Q_{GD}			2.8		nC
Turn-ON Delay Time (Pulsed)	$t_{D(ON)}$	$V_{DD}=15\text{V}$, $V_{GS}=10\text{V}$, $I_D=4.5\text{A}$, $R_G=10\Omega$, $R_L=3.3\Omega$ (Note 1, 2)		8		ns
Rise Time (Pulsed)	t_R			19		ns
Turn-OFF Delay Time (Pulsed)	$t_{D(OFF)}$			33		ns
Fall-Time (Pulsed)	t_F			7		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Body Diode Continuous Forward Current	I_S	$T_A=25^\circ\text{C}$			1.0	A
Body Diode Pulse Current (Note 3)	I_{SP}				18	A
Forward Voltage (Pulsed)	V_{SD}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$			1.2	V

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

2. Essentially independent of operating temperature.

3. $P_W \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$.

■ ELECTRICAL CHARACTERISTICS (Cont.)

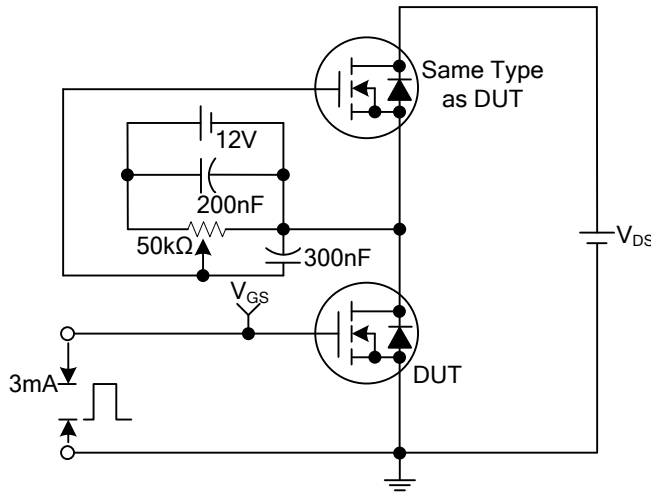
P-CHANNEL

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -1mA, V_{GS} = 0V$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V$			-1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -1mA$	-1.0		-2.5	V
Static Drain-Source On-State Resistance (Pulsed)	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -8A$		22.0	28.6	m Ω
		$V_{GS} = -4.5V, I_D = -5.5A$		31.0	40.3	m Ω
Transconductance (Pulsed)	g_{FS}	$V_{GS} = -5V, I_D = -5.5A$	5.5			S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0V, V_{DS} = -15V, f = 1.0MHz$		890		pF
Output Capacitance	C_{OSS}			160		pF
Reverse Transfer Capacitance	C_{RSS}			125		pF
SWITCHING PARAMETERS						
Total Gate Charge (Pulsed)	Q_G	$V_{GS} = -4.5V, V_{DD} = -15V, I_D = -8A$ (Note 1, 2)		9.8		nC
Gate to Source Charge (Pulsed)	Q_{GS}			3.0		nC
Gate to Drain Charge (Pulsed)	Q_{GD}			3.7		nC
Turn-ON Delay Time (Pulsed)	$t_{D(ON)}$	$V_{DD} = -15V, V_{GS} = -10V, I_D = -4A,$ $R_G = 10\Omega, R_L = 3.8\Omega$ (Note 1, 2)		10		ns
Rise Time (Pulsed)	t_R			16		ns
Turn-OFF Delay Time (Pulsed)	$t_{D(OFF)}$			55		ns
Fall-Time (Pulsed)	t_F			22		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Body Diode Continuous Forward Current	I_S	$T_A = 25^\circ C$			-1.0	A
Body Diode Pulse Current (Note 2)	I_{SP}				-18	A
Forward Voltage (Pulsed)	V_{SD}	$I_S = -1A, V_{GS} = 0V$			-1.2	V

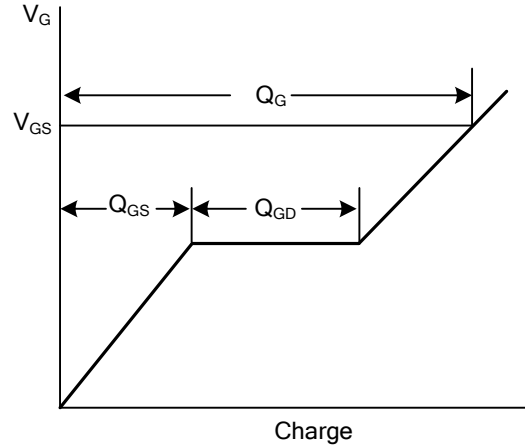
- Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
 2. Essentially independent of operating temperature.
 3. $P_W \leq 10\mu s$, Duty cycle $\leq 1\%$.

TEST CIRCUITS AND WAVEFORMS

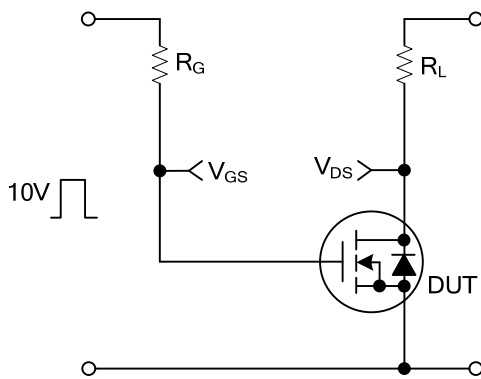
N-CHANNEL



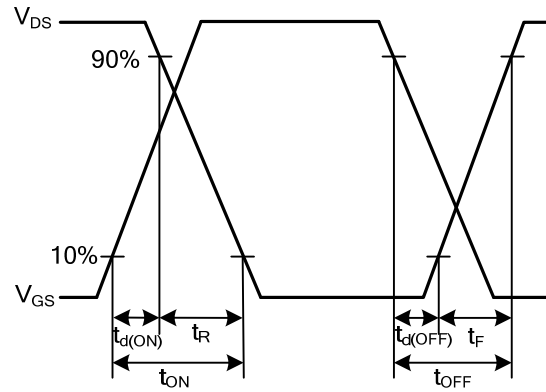
Gate Charge Test Circuit



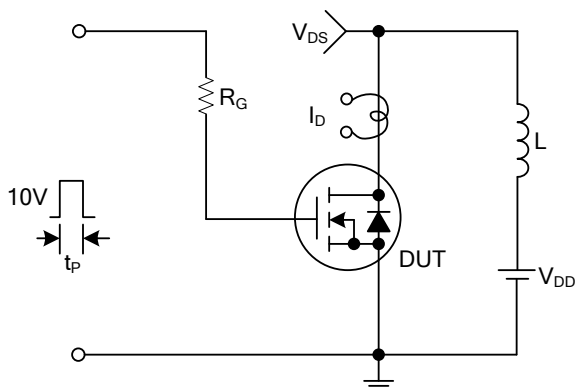
Gate Charge Waveforms



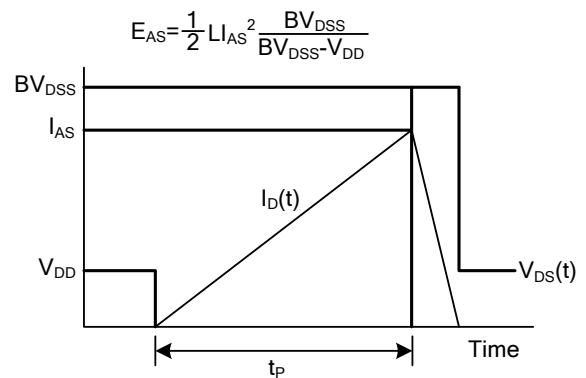
Resistive Switching Test Circuit



Resistive Switching Waveforms



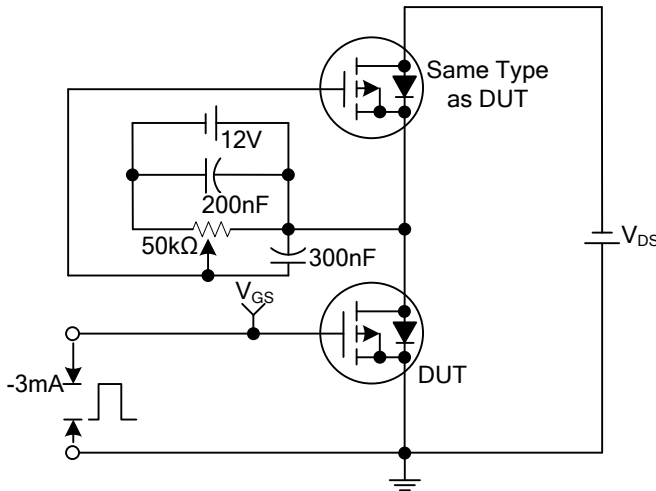
Unclamped Inductive Switching Test Circuit



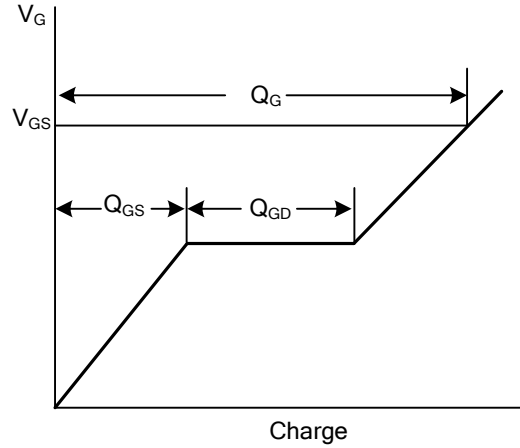
Unclamped Inductive Switching Waveforms

TEST CIRCUITS AND WAVEFORMS (Cont.)

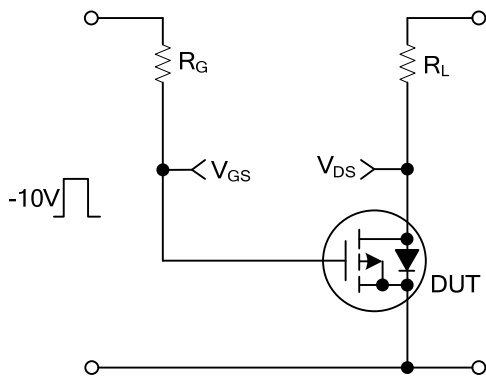
P-CHANNEL



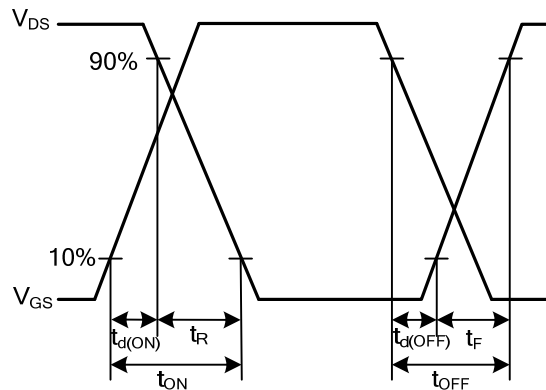
Gate Charge Test Circuit



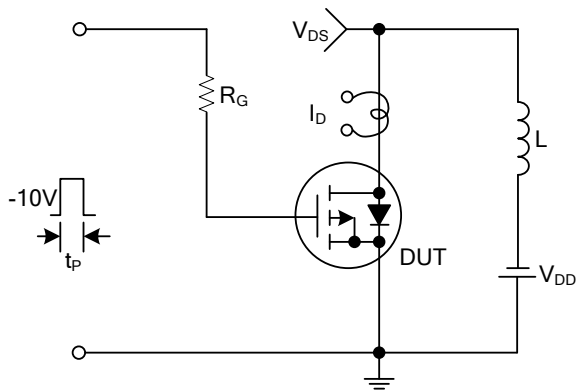
Gate Charge Waveforms



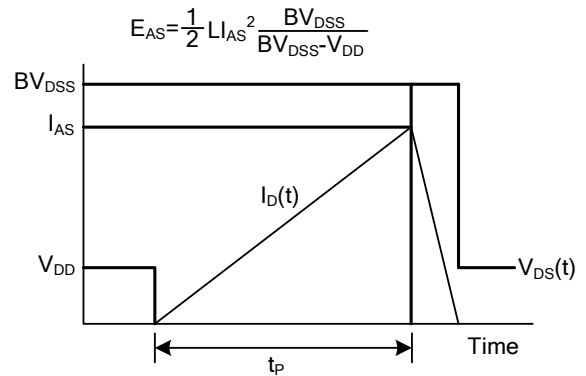
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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