

**UT4NP03V**

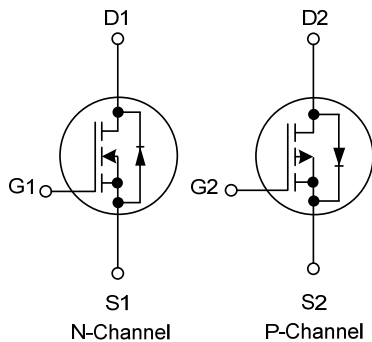
Advance

Power MOSFET

**DUAL MIDDLE POWER MOSFET
(N-CHANNEL/P-CHANNEL)****DESCRIPTION**

The UTC **UT4NP03V** incorporates an N-channel MOSFET and a P-channel MOSFET, it uses UTC's advanced technology to provide customers a minimum on-state resistance and high-speed switching, thereby enabling high-density mounting.

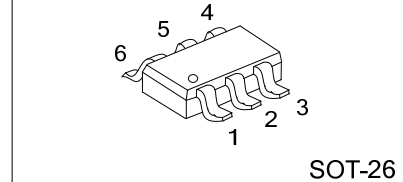
The UTC **UT4NP03V** is universally applied in high-speed switching, motor driver.

FEATURES*** N-Channel** $R_{DS(on)} \leq 60 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=3.8\text{A}$ $R_{DS(on)} \leq 70 \text{ m}\Omega @ V_{GS}=4.5\text{V}, I_D=3.5\text{A}$ $R_{DS(on)} \leq 90 \text{ m}\Omega @ V_{GS}=2.5\text{V}, I_D=1.0\text{A}$ *** P-Channel** $R_{DS(on)} \leq 80 \text{ m}\Omega @ V_{GS}=-10\text{V}, I_D=-3.0\text{A}$ $R_{DS(on)} \leq 90 \text{ m}\Omega @ V_{GS}=-4.5\text{V}, I_D=-1.5\text{A}$ $R_{DS(on)} \leq 130 \text{ m}\Omega @ V_{GS}=-2.5\text{V}, I_D=-1.0\text{A}$ *** Advanced Trench Process Technology***** Specially Designed for Switch Load, PWM Application, etc.****SYMBOL****ORDERING INFORMATION**

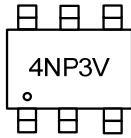
Ordering Number		Package	Pin Assignment						Packing
Lead Free	Halogen Free		1	2	3	4	5	6	
UT4NP03VL-AG6-R	UT4NP03VG-AG6-R	SOT-26	G1	S2	G2	D2	S1	D1	Tape Reel

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

UT4NP03VG-AG6-R		(1) Packing Type	(1) R: Tape Reel
		(2) Package Type	(2) AG6: SOT-26
		(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free



■ 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}	30	-30	V
Gate-Source Voltage			V_{GSS}	± 12	± 12	V
Drain Current	Continuous	$T_C=25^{\circ}\text{C}$	I_D	4	-3	A
	Pulsed		I_{DM}	20	-15	A
Avalanche Energy, Single Pulse			E_{AS}	1	9.8	mJ
Power Dissipation			P_D	1.56		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: $L=0.1\text{mH}$, $I_{AS}=4.0\text{A}$, $V_{DD}=25\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$.

P-Channel: $L=0.1\text{mH}$, $I_{AS}=-14\text{A}$, $V_{DD}=-25\text{V}$, $R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$.

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	150	$^{\circ}\text{C/W}$
Junction to Case	θ_{JC}	80	$^{\circ}\text{C/W}$

Note: The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

■ **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}	V _{GS} =0V, I _D =250μA	30			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±12V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	0.5		1.5	V
Drain-Source On-State Resistance (Note 2)	R _{DS(ON)}	V _{GS} =10V, I _D =3.8A			65	mΩ
		V _{GS} =4.5V, I _D =3.5A			70	mΩ
		V _{GS} =2.5V, I _D =1.0A			90	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =15V, V _{GS} =0V, f=1.0MHz		186		pF
Output Capacitance	C _{OSS}			31		pF
Reverse Transfer Capacitance	C _{RSS}			24		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge	Q _G	V _{DS} =24V, V _{GS} =10V, I _D =4.0A (Note 1,2)		16		nC
Gate-Source Charge	Q _{GS}			1.8		nC
Gate-Drain Charge	Q _{GD}			2		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =15V, V _{GS} =10V, I _D =4.0A, R _G =3Ω (Note 1,2)		2		ns
Turn-ON Rise Time	t _R			16		ns
Turn-OFF Delay Time	t _{D(OFF)}			10		ns
Turn-OFF Fall Time	t _F			15		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				4	A
Maximum Body-Diode Pulsed Current	I _{SM}				20	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =1.0A, V _{GS} =0V			1.2	V

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

2. Essentially independent of operating temperature.

ELECTRICAL CHARACTERISTICS (Cont.)

P-CHANNEL

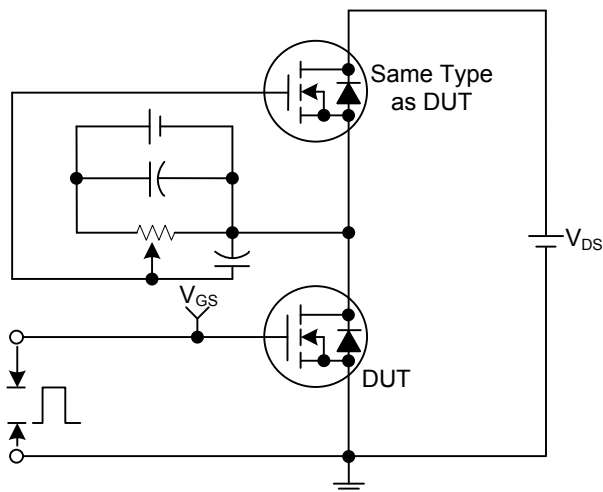
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-30			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V			-1	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250uA	-0.5		-1.5	V
Drain-Source On-State Resistance (Note 2)	R _{DS(ON)}	V _{GS} =-10V, I _D =-3.0A			80	mΩ
		V _{GS} =-4.5V, I _D =-1.5A			90	mΩ
		V _{GS} =-2.5V, I _D =-1.0A			130	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-15V, f=1.0MHz		550		pF
Output Capacitance	C _{OSS}			74		pF
Reverse Transfer Capacitance	C _{RSS}			56		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 2)	Q _G	V _{DS} =-24V, V _{GS} =-10V, I _D =-2.5A (Note 1, 2)		16		nC
Gate-Source Charge	Q _{GS}			1.6		nC
Gate-Drain Charge	Q _{GD}			2.5		nC
Turn-ON Delay Time (Note 2)	t _{D(ON)}	V _{DS} =-15V, V _{GS} =-10V, I _D =-2.5A, R _G =3Ω (Note 1, 2)		4		ns
Turn-ON Rise Time	t _R			16		ns
Turn-OFF Delay Time	t _{D(OFF)}			35		ns
Turn-OFF Fall Time	t _F			25		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				-3	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}				-15	A
Drain-Source Diode Forward Voltage (Note 1)	V _{SD}	I _S =-1.0A, V _{GS} =0V			-1.2	V

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

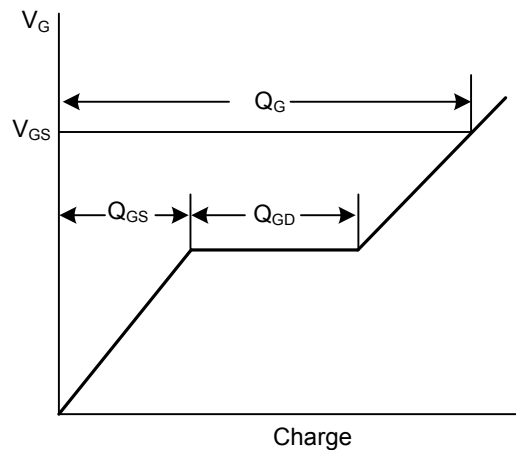
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

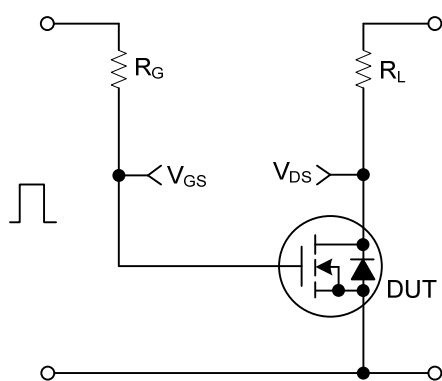
N-CHANNEL



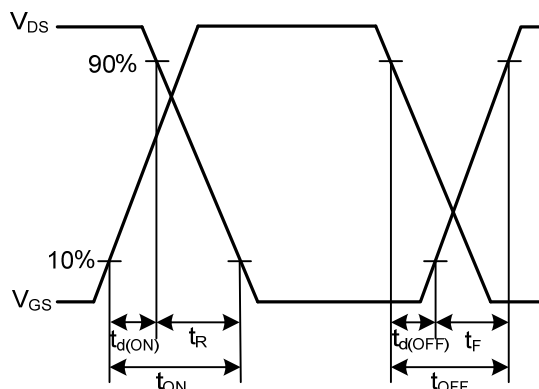
Gate Charge Test Circuit



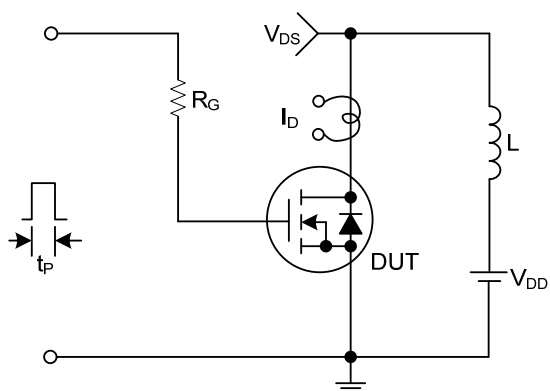
Gate Charge Waveforms



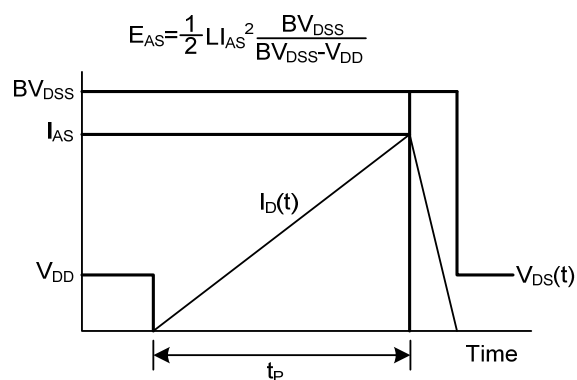
Resistive Switching Test Circuit



Resistive Switching Waveforms



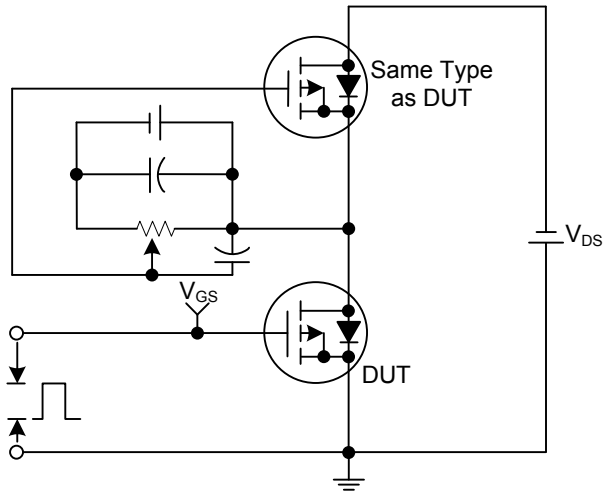
Unclamped Inductive Switching Test Circuit



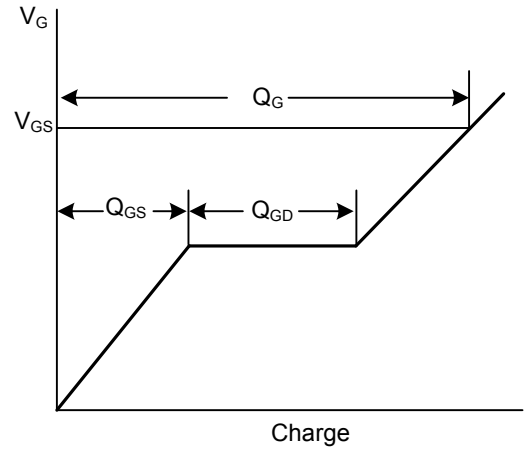
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS

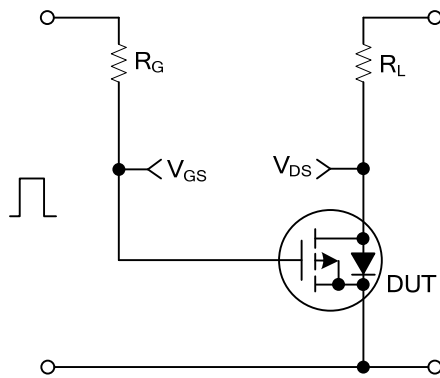
P-CHANNEL



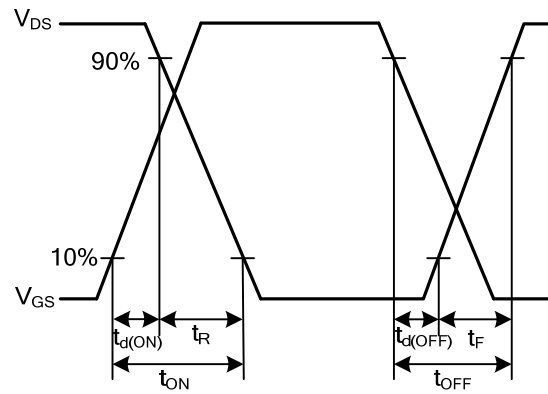
Gate Charge Test Circuit



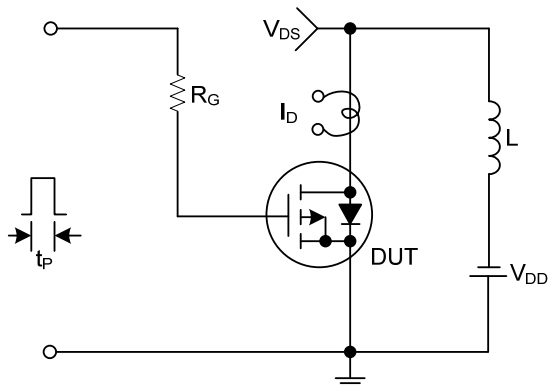
Gate Charge Waveforms



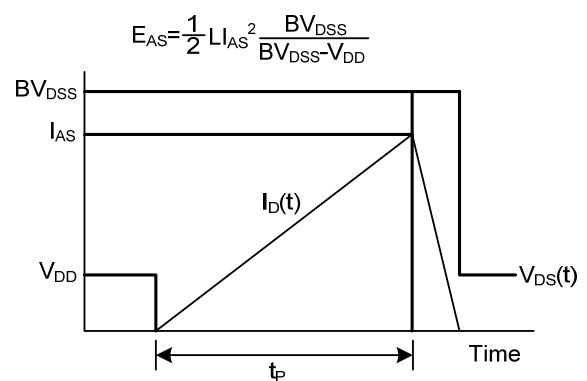
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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