



UTT12NP03

Preliminary

Power MOSFET

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

DESCRIPTION

The UTC **UTT12NP03** 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 **UTT12NP03** is universally applied in high-speed switching, motor driver.

FEATURES

* N-Channel

$R_{DS(on)} < 30m\Omega @ V_{GS} = 10V, I_D = 5.8A$

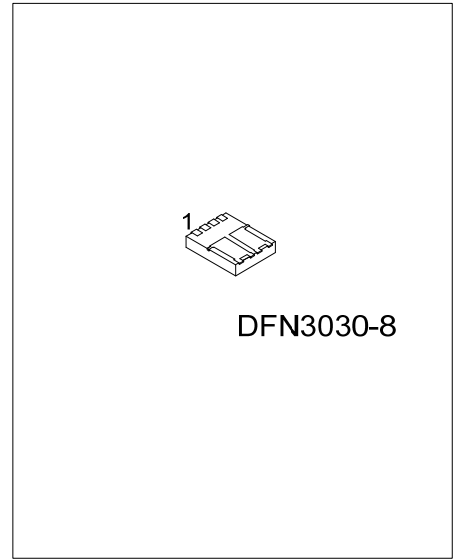
$R_{DS(on)} < 35m\Omega @ V_{GS} = 4.5V, I_D = 5.0A$

* P-Channel

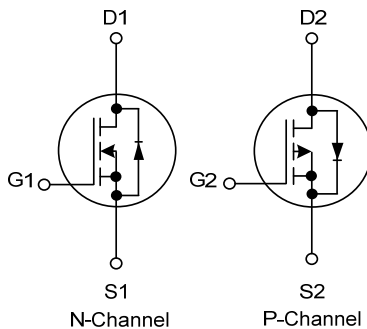
$R_{DS(on)} < 50m\Omega @ V_{GS} = -10V, I_D = -5.0A$

$R_{DS(on)} < 70m\Omega @ V_{GS} = -4.5V, I_D = -2.0A$

* High switching speed



SYMBOL



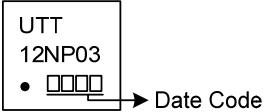
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT12NP03L-K08-3030-R	UTT12NP03G-K08-3030-R	DFN3030-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UTT12NP03G-K08-3030-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) K08-3030: DFN3030-8
	(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}	± 10	± 10	V	
Drain Current	Continuous	I_D	$T_C=25^\circ\text{C}$	12	-8	A
			$T_C=100^\circ\text{C}$	7.2	-4.8	A
	Pulsed	I_{DM}	36	-24	A	
Avalanche Current		I_{AS}	17.5	-17	A	
Avalanche Energy, Single Pulse		E_{AS}	15.3	14.5	mJ	
Power Dissipation		P_D	20		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: $L=0.1\text{mH}$, $V_{DD}=15\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

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

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C/W}$
Junction to Case	θ_{JC}	6.25	$^\circ\text{C/W}$

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

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

N-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} =±10V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250mA	0.5		2.0	V
Static Drain-Source On-State Resistance (Pulsed)	R _{Ds(ON)}	V _{GS} =10V, I _D =5.8A			30	mΩ
		V _{GS} =4.5V, I _D =5.0A			35	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =15V, f=1.0MHz		970		pF
Output Capacitance	C _{OSS}			100		pF
Reverse Transfer Capacitance	C _{RSS}			90		pF
SWITCHING PARAMETERS						
Total Gate Charge (Pulsed)	Q _G	V _{GS} =10V, V _{DD} =15V, I _D =10A (Note 1, 2)		27		nC
Gate to Source Charge (Pulsed)	Q _{GS}			4		nC
Gate to Drain Charge (Pulsed)	Q _{GD}			3		nC
Turn-ON Delay Time (Pulsed)	t _{D(ON)}	V _{DD} =15V, V _{GS} =10V, I _D =10A, R _G =10Ω (Note 1, 2)		13		ns
Rise Time (Pulsed)	t _R			17		ns
Turn-OFF Delay Time (Pulsed)	t _{D(OFF)}			52		ns
Fall-Time (Pulsed)	t _F			13		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Maximum Body-Diode Continuous Current	I _S				12	A
Maximum Body-Diode Pulsed Current	I _{SM}				24	A
Diode Forward Voltage	V _{SD}	I _S =1.0A, V _{GS} =0V			1	V

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

■ ELECTRICAL CHARACTERISTICS (Cont.)

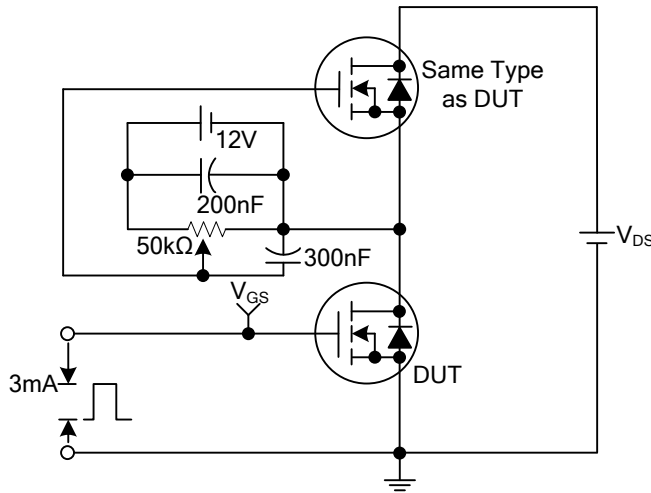
P-CHANNEL

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -1mA, V_{GS} = 0V$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V$			-1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 10V, V_{DS} = 0V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -250mA$	-0.5		-2.0	V
Static Drain-Source On-State Resistance (Pulsed)	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -5.0A$ $V_{GS} = -4.5V, I_D = -2.0A$			50 70	m Ω m Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{GS} = 0V, V_{DS} = -15V, f = 1.0MHz$		895		pF
Output Capacitance	C_{OSS}			125		pF
Reverse Transfer Capacitance	C_{RSS}			100		pF
SWITCHING PARAMETERS						
Total Gate Charge (Pulsed)	Q_G	$V_{GS} = -10V, V_{DD} = -15V, I_D = -2A$ (Note 1, 2)		125		nC
Gate to Source Charge (Pulsed)	Q_{GS}			17		nC
Gate to Drain Charge (Pulsed)	Q_{GD}			21		nC
Turn-ON Delay Time (Pulsed)	$t_{D(ON)}$	$V_{DD} = -15V, V_{GS} = -10V, I_D = -2A,$ $R_G = 10\Omega$ (Note 1, 2)		12		ns
Rise Time (Pulsed)	t_R			16		ns
Turn-OFF Delay Time (Pulsed)	$t_{D(OFF)}$			120		ns
Fall-Time (Pulsed)	t_F			60		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Maximum Body-Diode Continuous Current	I_S				-8	A
Maximum Body-Diode Pulsed Current	I_{SM}				-16	A
Diode Forward Voltage	V_{SD}	$I_S = -1.0A, V_{GS} = 0V$			-1	V

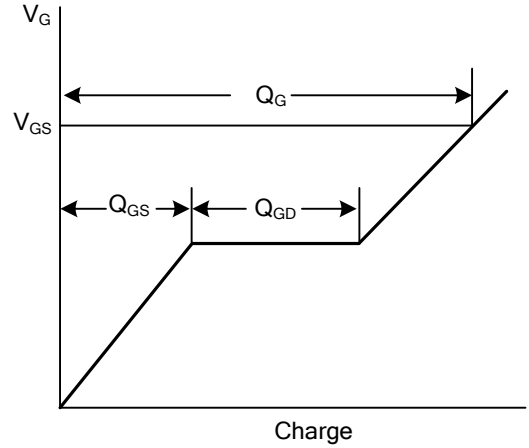
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

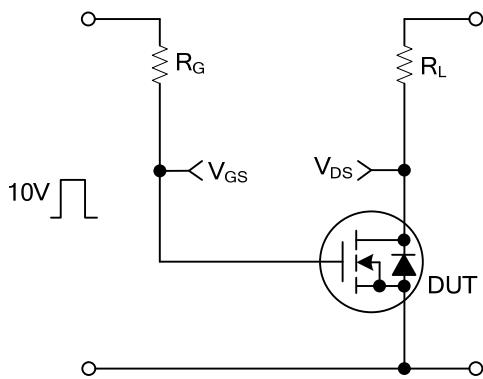
N-CHANNEL



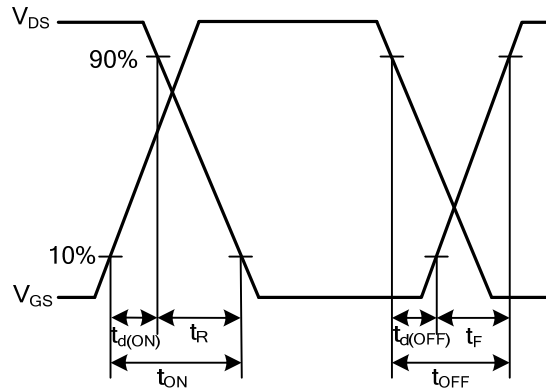
Gate Charge Test Circuit



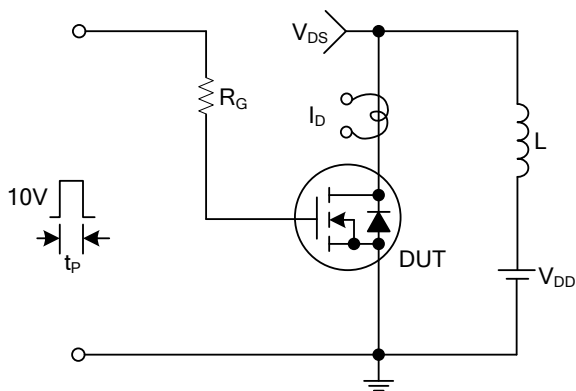
Gate Charge Waveforms



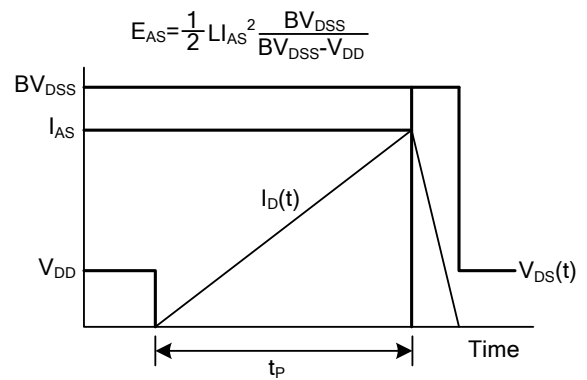
Resistive Switching Test Circuit



Resistive Switching Waveforms



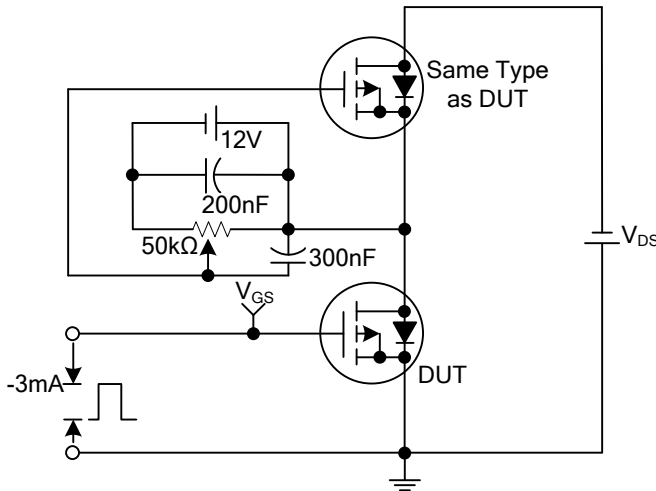
Unclamped Inductive Switching Test Circuit



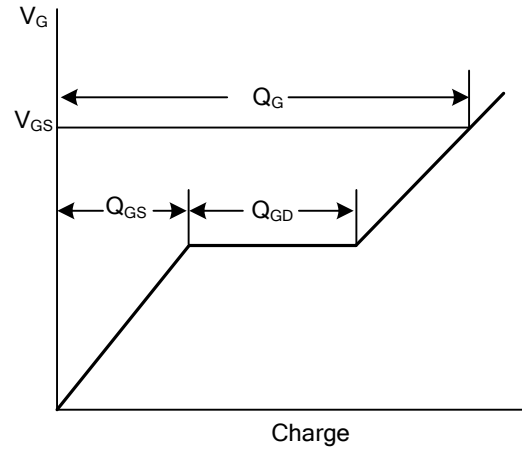
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

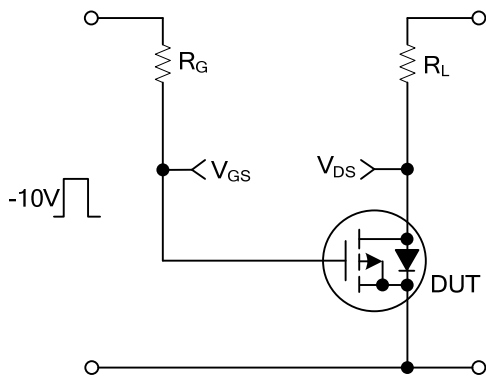
P-CHANNEL



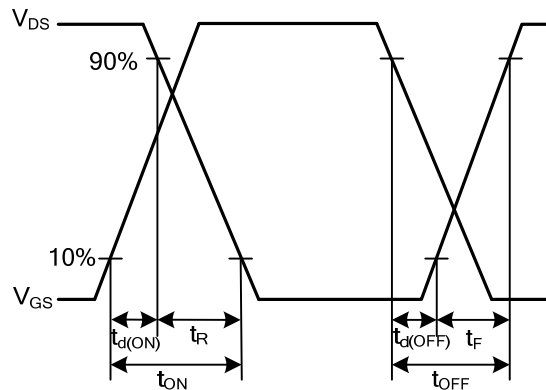
Gate Charge Test Circuit



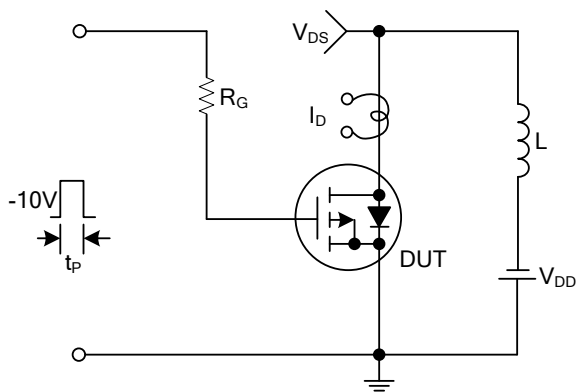
Gate Charge Waveforms



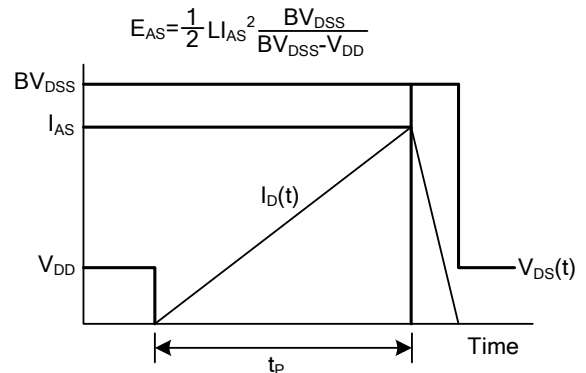
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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