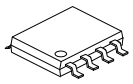
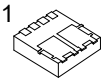
UTT12NP03

Power MOSFET

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



SOP-8



PDFN3×3

■ DESCRIPTION

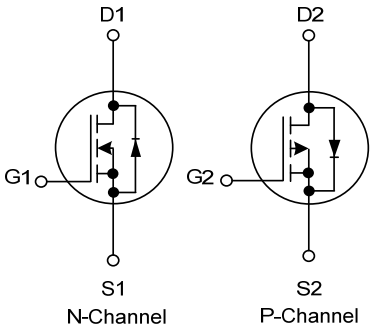
The UTC **UTT12NP03** incorporates an N-channel MOSFET and a P-channel MOSFET，it uses UTC's advanced technology to provide customers a minimum on-state resistance and high-speed switching, thereby enabling high-density mounting.

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

■ FEATURES

* N-Channel
  $R_{DS(on)}$ ≤ 26 mΩ @V_{GS} = 10V, I_D = 5.8A
  $R_{DS(on)}$ ≤ 31 mΩ @V_{GS} = 4.5V, I_D = 5.0A
* P-Channel
  $R_{DS(on)}$ ≤ 44 mΩ @V_{GS} = -10V, I_D = -5.0A
  $R_{DS(on)}$ ≤ 55 mΩ @V_{GS} = -4.5V, I_D = -2.0A
* High switching speed

■ SYMBOL



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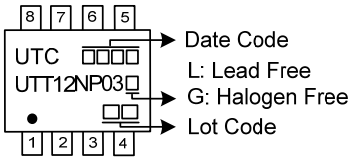
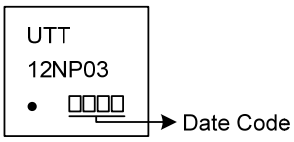
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT12NP03L-S08-R	UTT12NP03G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel
UTT12NP03L-P3030-R	UTT12NP03G-P3030-R	PDFN3×3	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UTT12NP03G-S08-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) S08: SOP-8, P3030: PDFN3×3 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

SOP-8	PDFN3×3
	

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°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	8	-8	A
	Pulsed	I_{DM}	24	-24	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	3	21	mJ
Power Dissipation	SOP-8	P_D	1.08		W
	PDFN3×3		15		W
Junction Temperature		T_J	+150		°C
Range of Storage Temperature		T_{STG}	-55 ~ +150		°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 = 0.1mH, I_{AS} = 7.7A, V_{DD} = 25V, R_G = 25Ω, Starting T_J = 25°C
P-Channel: L = 0.1mH, I_{AS} = -20.5A, V_{DD} = -25V, R_G = 25Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOP-8	θ_{JA}	125	°C/W
	PDFN3×3		75	°C/W
Junction to Case	SOP-8	θ_{JC}	115	°C/W
	PDFN3×3		8.3	°C/W

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

■ 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=250μA,, 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=250μA	0.5		2.0	V
Static Drain-Source On-State Resistance (Pulsed)	$R_{DS(ON)}$	V_{GS}=10V, I_D=5.8A			26	mΩ
		V_{GS}=4.5V, I_D=5.0A			31	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=15V, f=1.0MHz		489		pF
Output Capacitance	C_{OSS}			69		pF
Reverse Transfer Capacitance	C_{RSS}			59		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 2)	Q_G	V_{GS}=10V, V_{DD}=24V, I_D=12A (Note 1, 2)		23		nC
Gate to Source Charge	Q_{GS}			5		nC
Gate to Drain Charge	Q_{GD}			5		nC
Turn-ON Delay Time (Note 2)	$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 1, 2)		19		ns
Rise Time	t_R			24		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			290		ns
Fall-Time	t_F			121		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Diode Forward Voltage	V_{SD}	I_S=1.0A,V_{GS}=0V			1	V
Body Diode Reverse Recovery Time	t_{rr}	I_S=12A, V_{GS}=0V, dI_F/dt=100A/μs		73		nS
Body Diode Reverse Recovery Charge	Q_{rr}			35		nC

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

■ ELECTRICAL CHARACTERISTICS (Cont.)

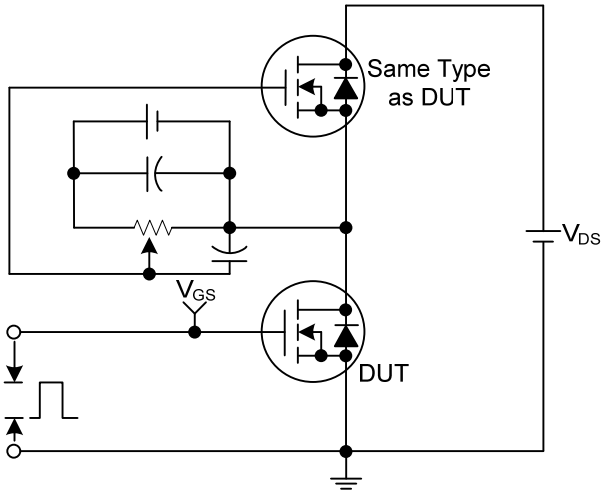
P-CHANNEL

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, VGS=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=-250μA	-1.0		-3.0	V
Static Drain-Source On-State Resistance (Pulsed)	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-5.0A			44	mΩ
		V_{GS}=-4.5V, I_D=-2.0A			55	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=-15V, f=1.0MHz		902		pF
Output Capacitance	C_{OSS}			118		pF
Reverse Transfer Capacitance	C_{RSS}			97		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 2)	Q_G	V_{GS}=-10V, V_{DD}=-24V, I_D=-12A (Note 1, 2)		125		nC
Gate to Source Charge	Q_{GS}			17		nC
Gate to Drain Charge	Q_{GD}			21		nC
Turn-ON Delay Time (Note 2)	$t_{D(ON)}$	V_{DD}=-30V, V_{GS}=-10V, I_D=-0.5A, R_G=25Ω (Note 1, 2)		20		ns
Rise Time	t_R			40		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			459		ns
Fall-Time	t_F			257		ns
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Diode Forward Voltage	V_{SD}	I_S=-1.0A,V_{GS}=0V			-1	V
Body Diode Reverse Recovery Time	t_{rr}	I_S=-12A, V_{GS}=0V, dI_F/dt=100A/μs		146		nS
Body Diode Reverse Recovery Charge	Q_{rr}			244		nC

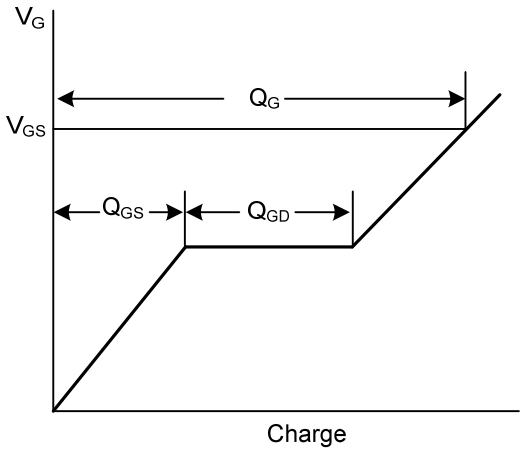
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

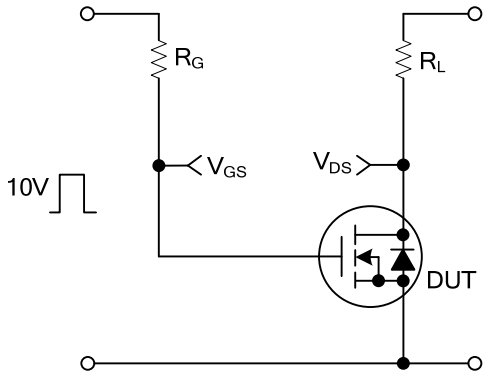
N-CHANNEL



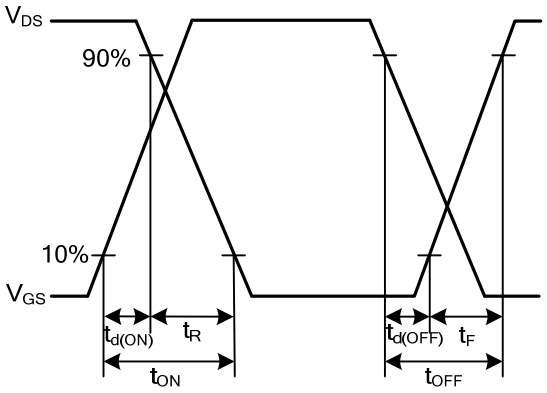
Gate Charge Test Circuit



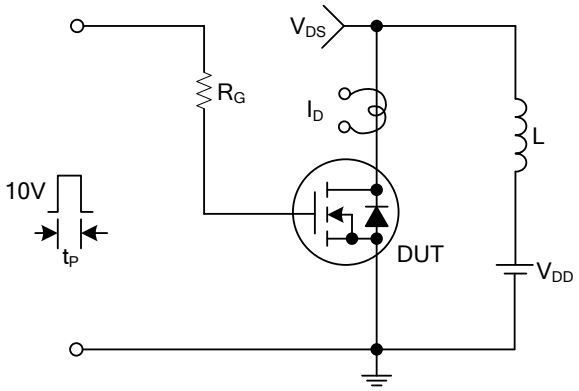
Gate Charge Waveforms



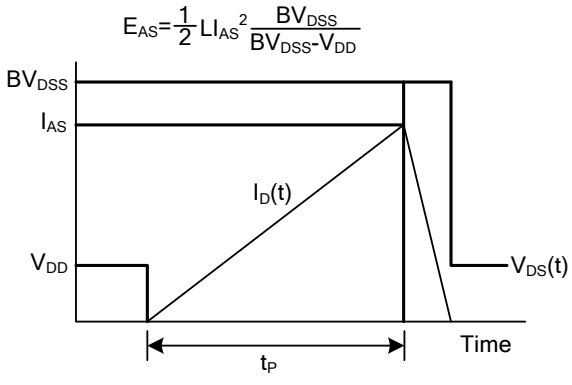
Resistive Switching Test Circuit



Resistive Switching Waveforms



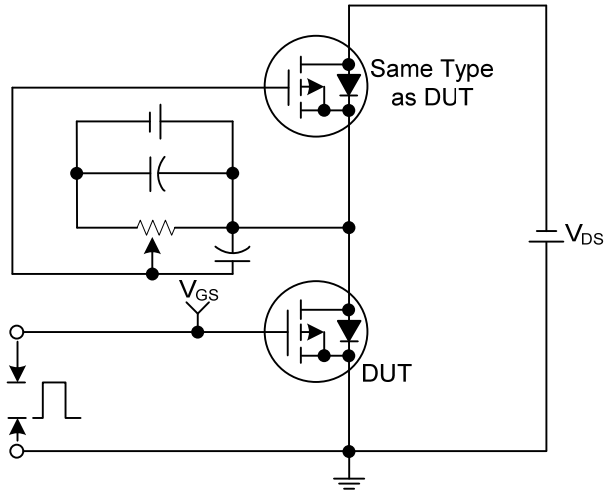
Unclamped Inductive Switching Test Circuit



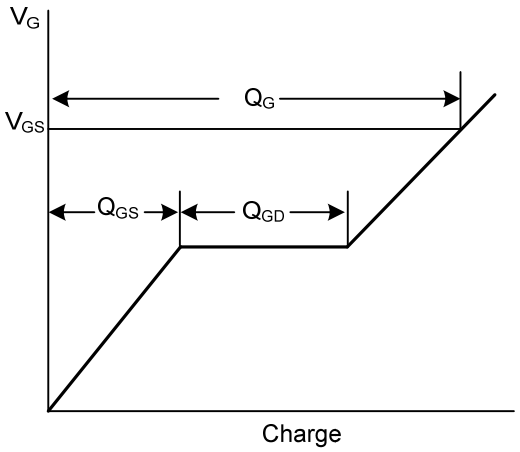
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS (Cont.)

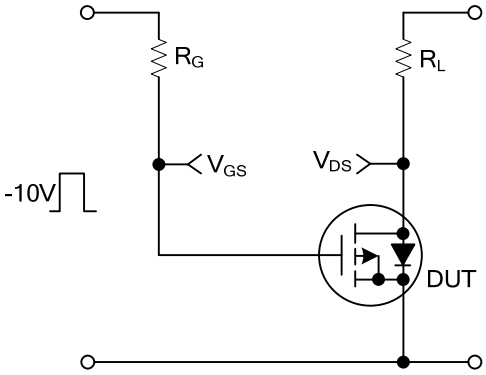
P-CHANNEL



Gate Charge Test Circuit



Gate Charge Waveforms



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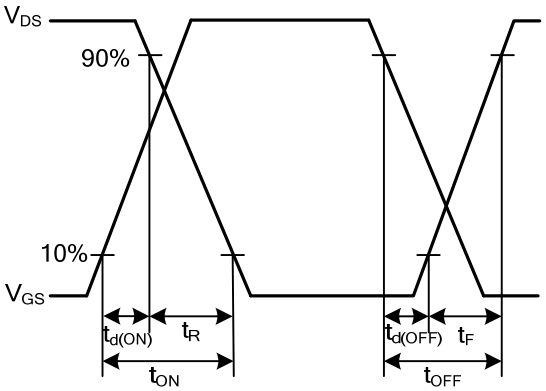
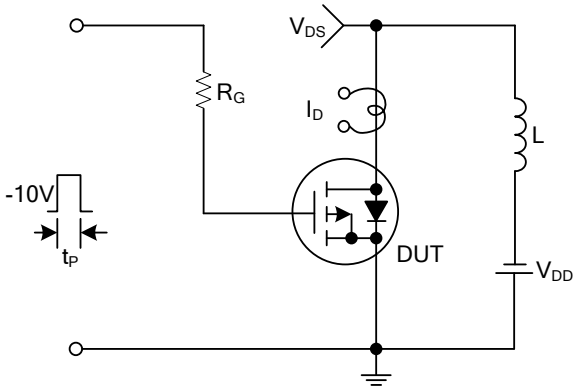
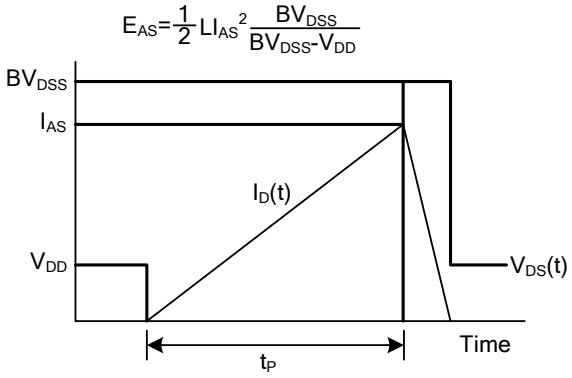


Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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