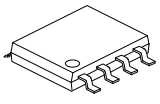
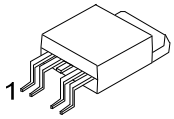
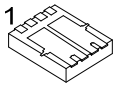
DUAL ENHANCEMENT MODE (N-CHANNEL / P-CHANNEL)



SOP-8



TO-252-4



PDFN5×6

■ DESCRIPTION

The UTC **UT25NP04** 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 **UT25NP04** is universally applied in low voltage applications.

■ FEATURES

*N-CHANNEL

$R_{DS(ON)}$ ≤ 15 mΩ @ V_{GS} = 10V, I_D = 6.0A

$R_{DS(ON)}$ ≤ 22 mΩ @ V_{GS} = 4.5V, I_D = 5.0A

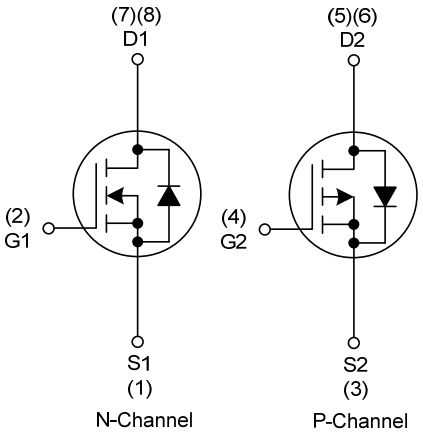
*P-CHANNEL

$R_{DS(ON)}$ ≤ 40 mΩ @ V_{GS} = -10V, I_D = -5.5A

$R_{DS(ON)}$ ≤ 55 mΩ @ V_{GS} = -4.5V, I_D = -3.5A

* High switching speed

■ SYMBOL



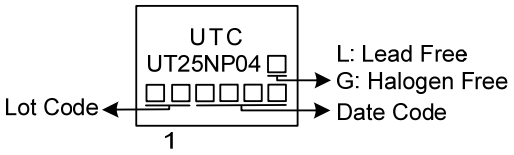
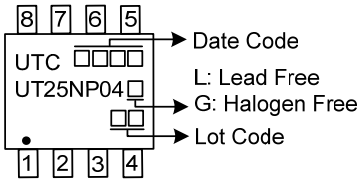
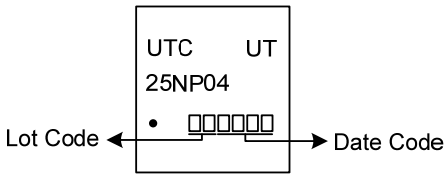
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UT25NP04L-TN4-R	UT25NP04G-TN4-R	TO-252-4	S1	G1	D	S2	G2	-	-	-	Tape Reel
UT25NP04L-S08-R	UT25NP04G-S08-R	SOP-8	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel
UT25NP04L-P5060-R	UT25NP04G-P5060-R	PDFN5×6	S1	G1	S2	G2	D2	D2	D1	D1	Tape Reel

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

UT25NP04G-TN4-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) TN4: TO-252-4, S08: SOP-8, P5060: PDFN5×6 (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING

PACKAGE	MARKING
TO-252-4	
SOP-8	
PDFN5×6	

■ ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS		UNIT
			N-CHANNEL	P-CHANNEL	
Drain-Source Voltage		V_{DSS}	40	-40	V
Gate-Source Voltage		V_{GSS}	±20	±20	V
Drain Current	Continuous	I_D	12	-12	A
	Pulsed (Note 1)	I_{DM}	36	-36	A
Avalanche Energy, Single Pulse (Note 3)		E_{AS}	3.5	40	mJ
Power Dissipation	TO-252-4	P_D	50		W
	SOP-8		1.9		W
	PDFN5×6		28		W
Junction Temperature		T_J	-55 ~ +150		°C
Storage Temperature Range		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} = 8.4A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
P-Channel: L = 0.1mH, I_{AS} = -28.3A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-252-4	θ_{JA}	110	°C/W
	SOP-8		125	°C/W
	PDFN5×6		65	°C/W
Junction to Case	TO-252-4	θ_{JC}	2.5	°C/W
	SOP-8		65.7	°C/W
	PDFN5×6		4.46	°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	40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, 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 (Note 2)		$R_{DS(ON)}$	V_{GS}=10V, I_D=6.0A			15	mΩ
			V_{GS}=4.5V, I_D=5.0A			22	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		972		pF
Output Capacitance		C_{OSS}			114		pF
Reverse Transfer Capacitance		C_{RSS}			98		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q_G	V_{GS}=10V, V_{DS}=32V, I_D=25A		37		nC
Gate to Source Charge		Q_{GS}			4		nC
Gate to Drain Charge		Q_{GD}			14		nC
Turn-ON Delay Time (Note 2)		$t_{D(ON)}$	V_{DS}=20V, V_{GS}=10V, I_D=25A, R_G=3Ω		8		ns
Rise Time		t_R			16		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			28		ns
Fall-Time		t_F			19		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage(Note 2)		V_{SD}	I_S=25A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=25A, V_{GS}=0V, dI_F/dt=100A/μs		11.2		nS
Body Diode Reverse Recovery Charge		Q_{rr}			2.8		nC

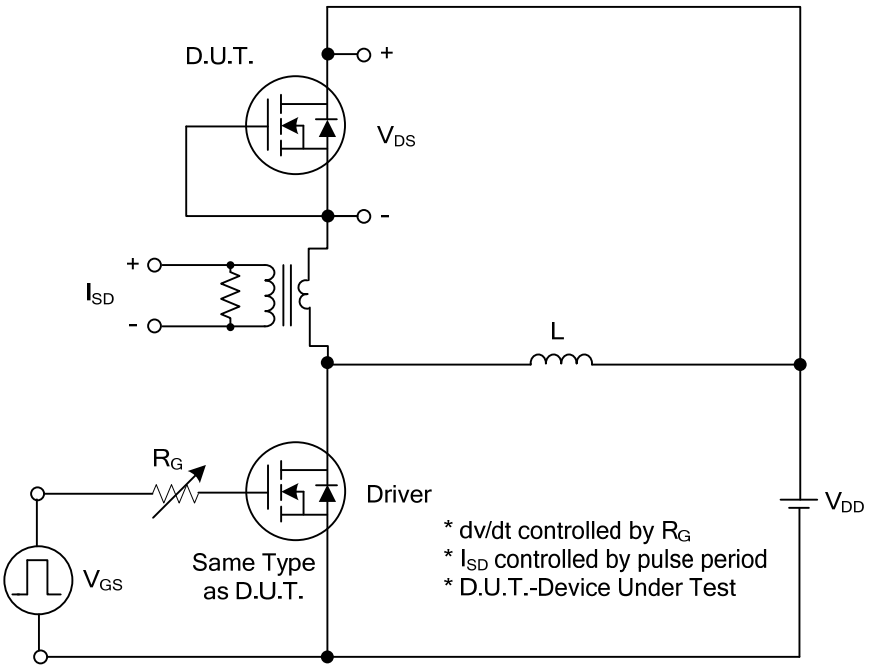
■ ELECTRICAL CHARACTERISTICS (Cont.)

P-Channel

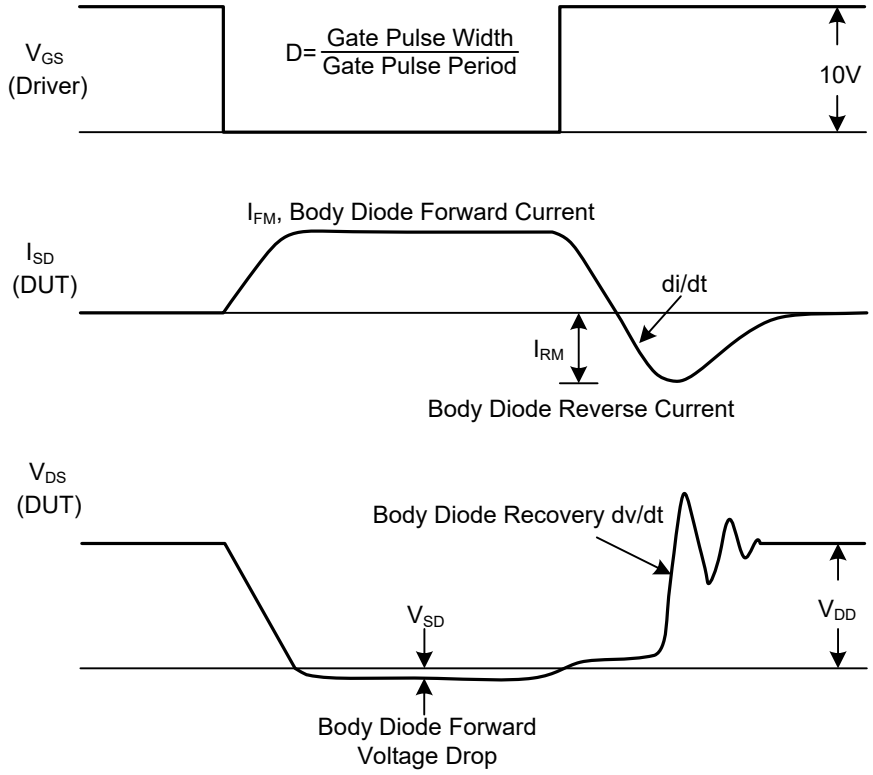
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=-250μA, V_{GS}=0V	-40			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-40V, V_{GS}=0V			-1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, 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 (Note 2)		$R_{DS(ON)}$	V_{GS}=-10V, I_D=-5.5A			40	mΩ
			V_{GS}=-4.5V, I_D=-3.5A			55	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=-25V, f=1.0MHz		1266		pF
Output Capacitance		C_{OSS}			134		pF
Reverse Transfer Capacitance		C_{RSS}			107		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 2)		Q_G	V_{GS}=-10V, V_{DS}=-32V, I_D=-25A		27		nC
Gate to Source Charge		Q_{GS}			9		nC
Gate to Drain Charge		Q_{GD}			9		nC
Turn-ON Delay Time (Note 2)		$t_{D(ON)}$	V_{DS}=-20V, V_{GS}=-10V, I_D=-25A, R_G=3Ω		7		ns
Rise Time		t_R			16		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			49		ns
Fall-Time		t_F			26		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage(Note 2)		V_{SD}	I_S=-25A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=-25A, V_{GS}=0V, dI_F/dt=100A/μs		53		nS
Body Diode Reverse Recovery Charge		Q_{rr}			44		nC

Notes: 1. Pulse width limited by maximum junction temperature
2. Pulse width ≤ 300μs, Duty cycle ≤ 2%

■ TEST CIRCUITS AND WAVEFORMS



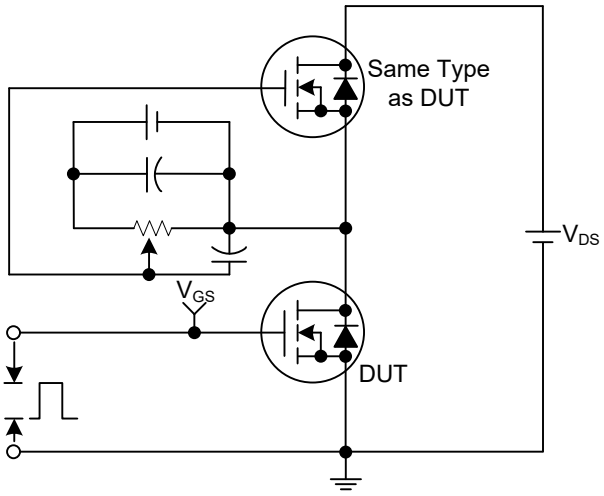
Peak Diode Recovery dv/dt Test Circuit



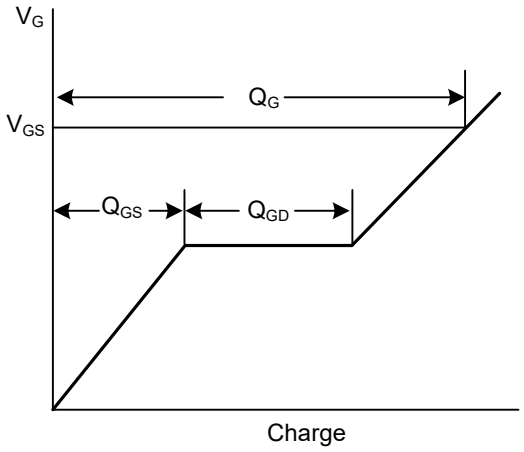
Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

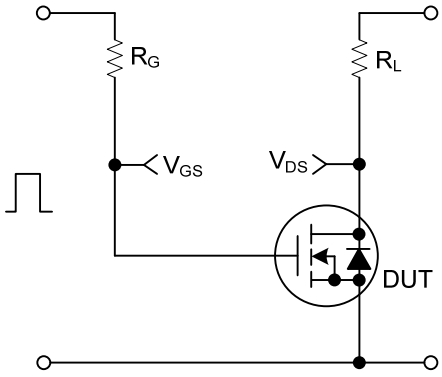
N-CHANNEL



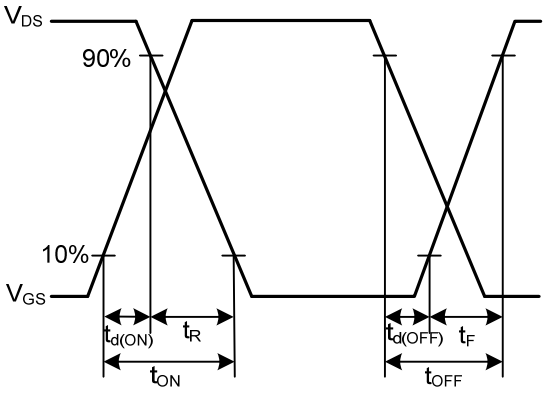
Gate Charge Test Circuit



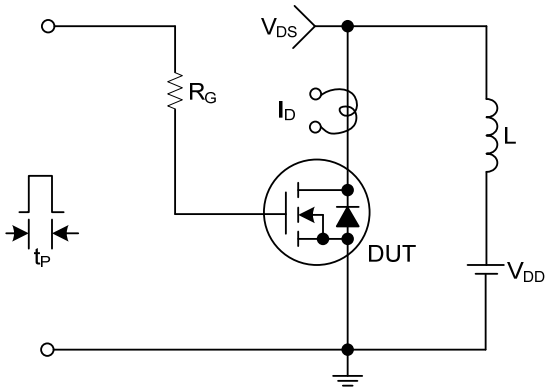
Gate Charge Waveforms



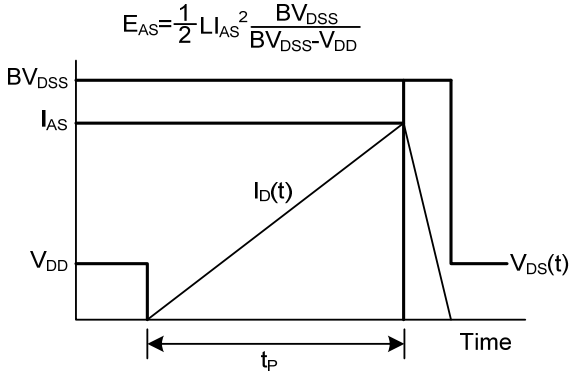
Resistive Switching Test Circuit



Resistive Switching Waveforms



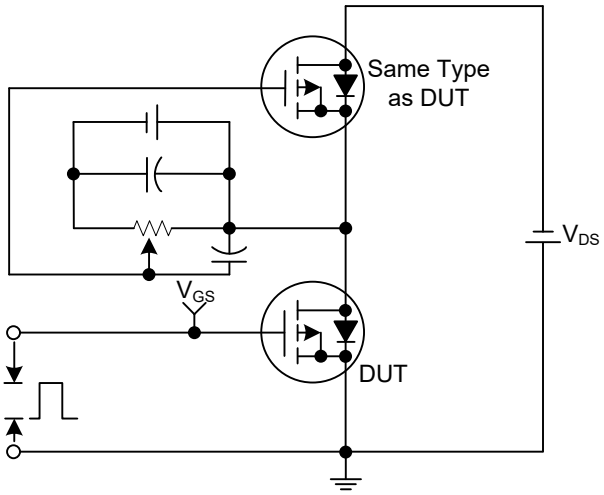
Unclamped Inductive Switching Test Circuit



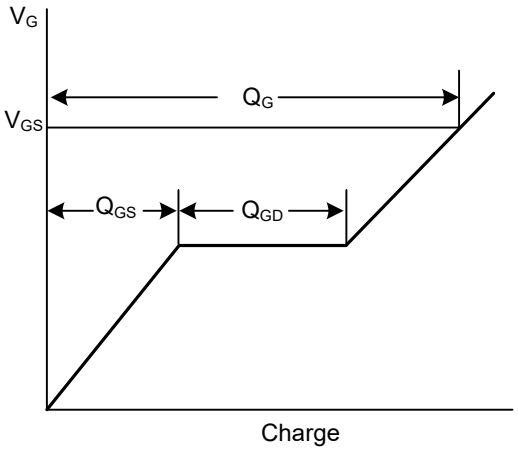
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS

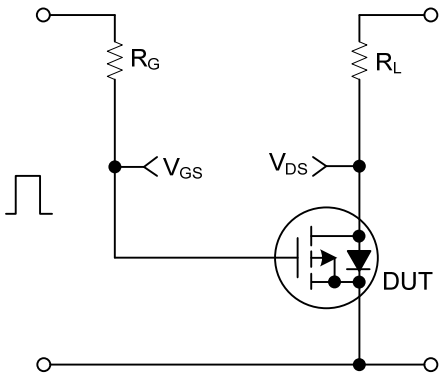
P-CHANNEL



Gate Charge Test Circuit



Gate Charge Waveforms



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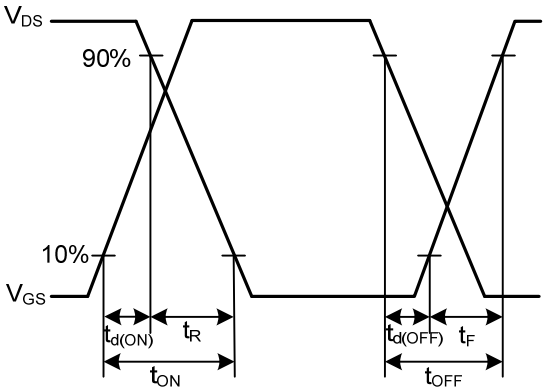
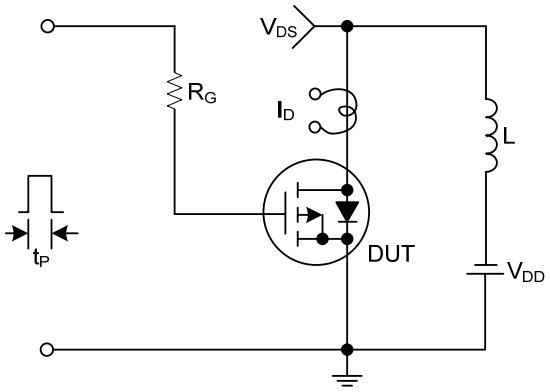
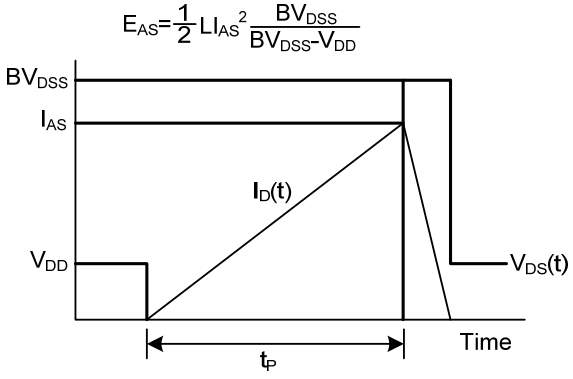


Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms